

 ICOM

SERVICE MANUAL

COMMUNICATION
RECEIVER FOR COMPUTER

IC-PCR1000

INTRODUCTION

This service manual describe the latest service information for the IC-PCR1000 COMMUNICATION RECEIVER FOR COMPUTER at the time of publication.

MODEL	VERSION	SYMBOL
IC-PCR1000	U.S.A	USA
	Europe	EUR
	Other	OTH

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

DANGER

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

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

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

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

1130003830 S.I.C TC7S04F IC-PCR1000 RF UNIT 1 piece
8810008960 Screw FH M2.6 × 5 ZK IC-PCR1000 CHASSIS 8 pieces

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

REPAIR NOTES

1. Make sure a problem is internal before disassembling the receiver.
2. **DO NOT** open the receiver until the receiver 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 receiver is defective.
6. **READ** the instructions of test equipment thoroughly before connecting equipment to the receiver.

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SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency range

Version	Frequency Range (MHz)
U.S.A.	0.010000 – 823.999999*
	849.000001 – 868.999999
	894.000001 – 1300.000000
Europe and others	0.010000 – 1300.000000*

*Specifications guaranteed 0.5–1300 MHz only

- Mode : USB, LSB, CW, AM, FM, WFM
- Frequency stability : ±3 ppm (at 1300 MHz; ±0°C to +50°C; +32°F to +122°F)
- Frequency resolution : 1 Hz (minimum)
- Power supply requirement : 13.8 V DC ±15 % for receiver unit; or, supplied AC adaptor (negative ground)
- Current drain (at 13.8 V DC)
 - : Power ON (PC power OFF) 0.1 A
 - : Max. audio 0.7 A
 - : Standby (squelched) 0.6 A
- Usable temperature range : ±0°C to +50°C; +32°F to +122°F
- Antenna connector : BNC (50 Ω)
- RS-232C connector : D-sub 9-pin (female)
- Dimensions : 127.5(W)×30(H)×199(D) mm;
(projections not included) 5(W)×13/16(H)×727/32(D) inch
- Weight : approx. 1 kg; 2 lb 3 oz

■ RECEIVER

- Receive system : Triple-conversion superheterodyne
- Intermediate frequency : 1st 266.7 MHz
2nd 10.7 MHz
3rd 450 kHz (except WFM)
- Sensitivity (typical)*

Frequency [MHz]	FM	WFM	AM	SSB/CW
0.5 – 1.799999	—	—	2.5 μV	0.56 μV
1.8 – 27.999999			1.4 μV	0.28 μV
28.0 – 29.999999	0.5 μV	—	1.8 μV	0.35 μV
30.0 – 49.999999			1.0 μV	0.2 μV
50.0 – 699.999999	0.32 μV	0.79 μV	0.25 μV	0.25 μV
700.0 – 1300.000000	0.4 μV	1.0 μV	1.3 μV	0.25 μV

*FM and WFM are measured at 12 dB SINAD; AM, SSB and CW are measured at 10 dB S/N.; 230 kHz (for WFM), 15 kHz (for FM), 6 kHz (for AM) and 2.8 kHz (for SSB/CW) passband widths are selected.

Frequency [MHz]	FM	WFM	AM	SSB/CW
0.5 – 1.799999	—	—	1.8 μV	14 μV
1.8 – 27.999999			0.89 μV	7.1 μV
28.0 – 29.999999	0.63 μV	—	5.6 μV	5.6 μV
30.0 – 49.999999			7.1 μV	7.1 μV
50.0 – 699.999999	0.5 μV	—	0.71 μV	—
700.0 – 1300.000000	0.63 μV	—	0.89 μV	—

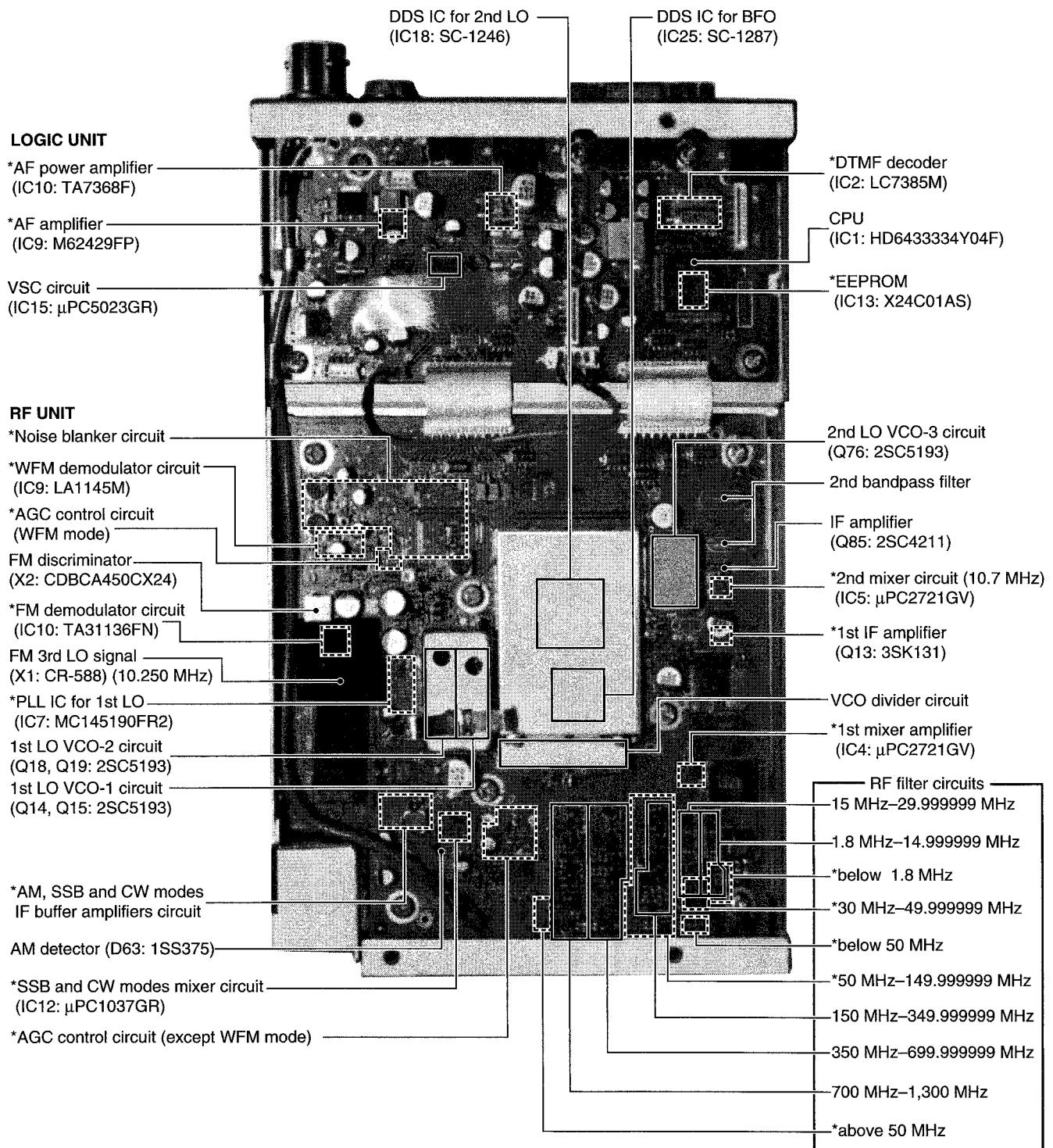
- Selectivity : WFM 230 kHz/-6 dB
WFM/FM/AM 50 kHz/-6 dB
FM/AM 15 kHz/-6dB
FM/AM/SSB/CW 6 kHz/-6 dB
AM/SSB/CW 2.8 kHz*/-6 dB (*Software indicates 3 kHz)
- IF shift range : More than ±1.2 kHz
- Max audio output : 200 mW at 10% distortion with an 8Ω load
- External speaker connector : 3-conductor 3.5(d) mm (1/8")/4–8 Ω

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

SECTION 2 INSIDE VIEW

• LOGIC UNIT and RF UNIT

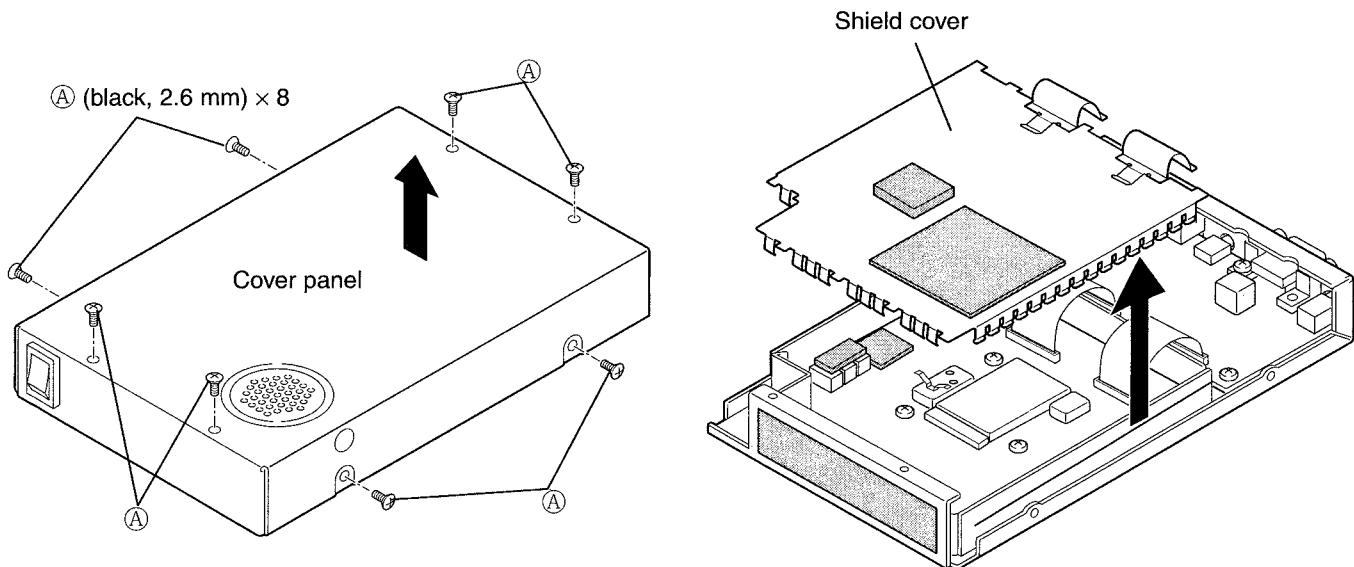
* : Located underside of this point.



SECTION 3 DISASSEMBLY INSTRUCTIONS

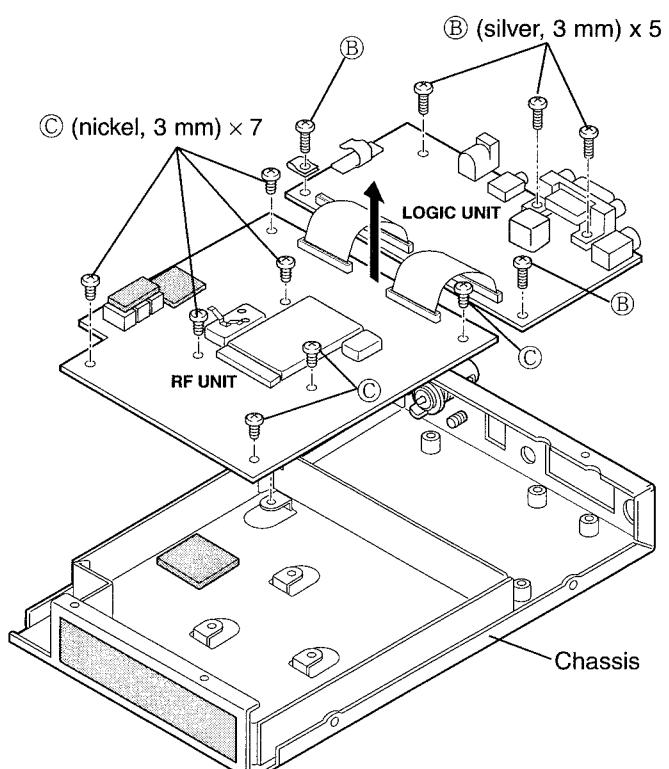
- Removing the cover panel

- ① Unscrew 8 screws, Ⓐ.
- ② Remove the cover panel in the direction of the arrow.
- ③ Remove the shield cover in the direction of the arrow.



- Removing the LOGIC unit and RF unit

- ① Unscrew 5 screws from the LOGIC unit, Ⓑ (silver, 3 mm), and 7 screws from the RF unit, Ⓒ (nickel, 3 mm), to separate the chassis and units.
- ② Remove the units in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 RF ATTENUATOR CIRCUIT (RF UNIT)

The attenuator circuit attenuates the signal strength to approx. 20 dB to protect the RF amplifier from distortion when excessively strong signals are received.

The RF signals from the antenna connector are passed through or bypass the "L" type attenuator (R1, R3). The signals are then applied to the RF filter circuit.

4-1-2 RF FILTER CIRCUIT (RF UNIT)

The applied signals pass through either the low-pass filter or the high-pass filter circuits via the band switching diodes.

- **RF signals below 50 MHz**

The RF signals below 50 MHz are passed through the low-pass filter (L1, L2, C7–C11) via the band switching diode (D2). The filtered signals are applied to the HF RF circuit.

- **RF signals above 50 MHz**

The RF signals above 50 MHz are applied to the high-pass filter (L172, C651, C652) after passing through the band switching diode (D84). The filtered signals are then applied to the VHF/UHF RF circuit.

4-1-3 HF RF CIRCUIT (RF UNIT)

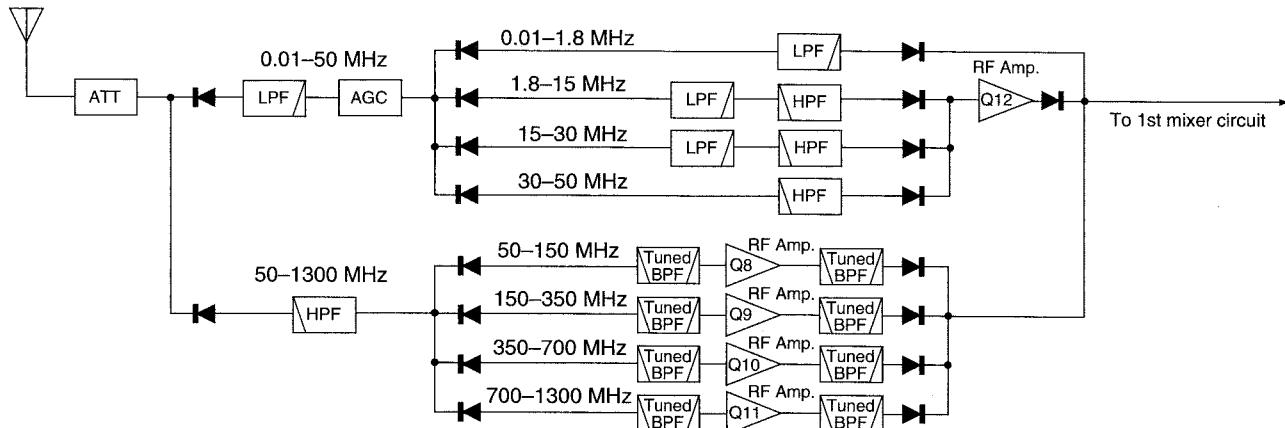
The HF RF circuit amplifies the received signals within the range 0.01–50 MHz and filters out-of-band signals.

The HF RF circuit consists of three low-pass filters, three high-pass filters and one RF amplifier.

The filtered signals below 1.8 MHz from the RF filter circuit are passed through the low-pass filter (L3, L4, C14– C16) between the band switching diodes (D6, D36), and are then applied to the 1st mixer circuit (IC4).

The 1.8–14.999999 MHz signals pass through the low-pass filter (L6, L7, C21–C25) and high-pass filter (L8, L9, C26–C30) between the band switching diodes (D3, D7), and are then applied to the 1st mixer circuit after being amplified at the RF amplifier (Q12).

- **RF filter and amplifier circuits**



The 15–29.999999 MHz signals pass through the low-pass filter (L10, L11, C33–C37) and high-pass filter (L11, L12, C38–C42) between the band switching diodes (D3, D7), and are then applied to the 1st mixer circuit via the RF amplifier circuit (Q12).

The 30–49.999999 MHz signals pass through the high-pass filter (L14, L15, C45–C49) between the band switching diodes (D8, D5), and are then applied to the 1st mixer circuit via the RF amplifier circuit (Q12).

- **Filters**

Receive freq. (MHz)	SW diode	Filter select signal	Components
0.01–1.799999	D6, D36	B0	L3–L5, C14–C17
1.8–14.999999	D3, D7	B1	L6–L9, C21–C30
15.0–29.999999	D3, D7	B2	L10–L13, C33–C42
30.0–49.999999	D8, D5	B3	L14, L15, C45–C49

4-1-4 VHF/UHF RF CIRCUIT (RF UNIT)

The VHF/UHF RF circuit amplifies the received signals within the range 50–1300 MHz and filters out-of-band signals.

The VHF/UHF RF circuit consists of 4 bands of filter circuits with an RF amplifier for each.

The 50–149.999999 MHz signals from the RF filter pass through high-pass filter (D11, L17, C53–C55, D12, D82, D83, L18, C57) via the band switching diode (D10), and are then amplified at the RF amplifier (Q8) between the tunable bandpass filters (D13, D80, L19–L21, D14, D81, L23–L25). The filtered signals are applied to the 1st mixer circuit (IC4) via the band switching diode (D15).

For improving the characteristic of the bandpass filter circuit, the shift switch (Q84) shifts the cut off frequency of the high-pass filter (D12, D82, D83, L18, C57). The shift switch (Q84) is controlled by the VCO 1 signal from the DDS IC (IC18).

The 150–349.999999 MHz signals from the band switching diode (D16) pass through the high-pass filter (L27–L29, C69–C74) and tunable bandpass filter (D18, L31–L33), and are then amplified at the RF amplifier (Q9) and pass through another tunable bandpass filter (D19, L35–L37). The filtered signals are applied to the 1st mixer circuit (IC4) via the band switching diode (D20).

The 350–699.999999 MHz signals from the band switching diode (D21) pass through the high-pass filter (L40, C92–C94, C619) and tunable bandpass filter (D23, D76, L41, L42). The filtered signals are then amplified at the RF amplifier (Q10) and pass through the tunable bandpass filters (D24, D77, L45–L47). The filtered signals are applied to the 1st mixer circuit (IC4) via the band switching diode (D25).

The 700–1300 MHz signals from the band switching diode (D26) pass through the high-pass filter (L141, C110, C606) and 2-stage tunable bandpass filters (D78, D79, L163, D29, D30, L51–L53). The filtered signals are then amplified at the RF amplifier (Q11) and pass through the tunable bandpass filters (D31, D32, L55, L56). The filtered signals are applied to the 1st mixer circuit (IC4) via the band switching diode (D33).

The tunable bandpass filters employ varactor diodes to tune the center frequency of the RF passband for wide bandwidth receiving and good image response rejection. These diodes are controlled by TUNV signal from the CPU (LOGIC unit; IC1, pin 37) via the tune controller (LOGIC unit; IC11b).

• Tunable bandpass filters

Receive freq. (MHz)	BPF select signal	Varactor diodes	RF amp.
50.0–149.999999	B0	D11–D14, D80–D83	Q8
150.0–349.999999	B1	D18, D19	Q9
350.0–699.999999	B2	D23, D24, D76, D77	Q10
700.0–1300.0	B3	D29–D32, D78, D79	Q11

4-1-5 1ST MIXER CIRCUIT (RF UNIT)

The 1st mixer circuit converts the received RF signals to a fixed frequency of the 1st IF signal with a PLL output frequency. By changing the PLL frequency, only the desired frequency will pass through the bandpass filters at the next stage of the 1st mixer.

The filtered RF signals are mixed with 1st LO signals at the 1st mixer circuit (IC4) to produce a 266.7 MHz 1st IF signal. The 1st IF signal is output from pin 5, and passed through the bandpass filter (F11) to suppress unwanted harmonic components. The filtered 1st IF signal is applied to the IF circuit.

The 1st LO signals are generated at the VCO-1 (Q14, Q15) or VCO-2 (Q18, Q19) circuit (according to the receiving frequency band) and are amplified at the buffer amplifier (IC26). The amplified signals are then applied to the 1st mixer (IC4, pin 2) directly or passed through the divider circuit (IC6).

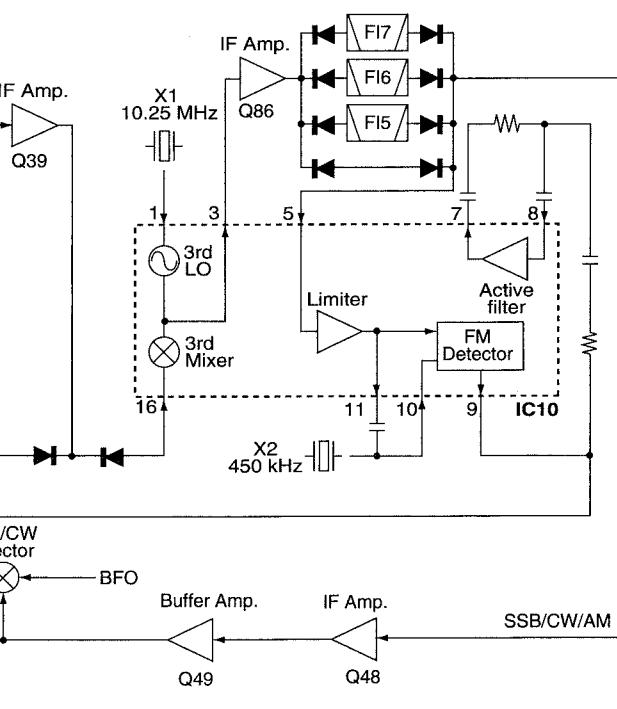
4-1-6 1ST IF AND 2ND MIXER CIRCUITS (RF UNIT)

The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal.

The filtered 266.7 MHz 1st IF signal from the bandpass filter (F11) is amplified at the 1st IF amplifier (Q13) then mixed with the 2nd LO signal at the 2nd mixer circuit (IC5) to produce a 10.7 MHz 2nd IF signal. The 2nd IF signal is passed through one of 2 bandpass filters (F12 or F13; depending on the selected mode and bandwidth) after being amplified at the IF amplifier (Q85). The filtered 2nd IF signal is amplified at the buffer amplifier (Q39), then applied to the WFM demodulator or 3rd IF circuit.

4-1-7 3RD MIXER CIRCUIT (RF UNIT)

The 3rd mixer circuit mixes the 2nd IF signal and 3rd LO signal to produce a 450 kHz 3rd IF signal (except WFM mode).



The 10.7 MHz 2nd IF signal from the buffer amplifier (Q39) is applied to the 3rd mixer section in the FM IF IC (IC10, pin 16). The applied signal is mixed with a 3rd LO signal generated by X1 (10.25 MHz) to produce a 450 kHz 3rd IF signal.

The 3rd IF signal is output from pin 3, and passed through one of 3 bandpass filters (FI5, FI6 or FI7) or bypassed, according to the selected mode and bandwidth after being amplified at the IF amplifier (Q86). The filtered or bypassed signal is applied to the each demodulator circuit (except WFM mode).

• Bandpass filter selection

Modes	Bandpass filter	Passband width
AM, SSB, CW	FI5	2.8 kHz
FM, AM, SSB, CW	FI6	6 kHz
FM, AM	FI7	15 kHz

4-1-8 DEMODULATOR CIRCUITS (RF UNIT)

The demodulator circuit converts the 2nd IF signal into AF signals. 4 separate demodulator circuits are employed for each mode.

(1) WFM mode

The 10.7 MHz 2nd IF signal from the buffer amplifier (Q39) is applied to the WFM demodulator circuit (IC9, pin 2).

The applied IF signal is amplified at the IF amplifier section in the IC9 and then output from pin 10. The output signal is applied to the quadrature detector section (pin 11) to demodulate AF signals. The demodulated AF signals are applied to the AF switch circuit via the de-emphasis circuit (R179, C285).

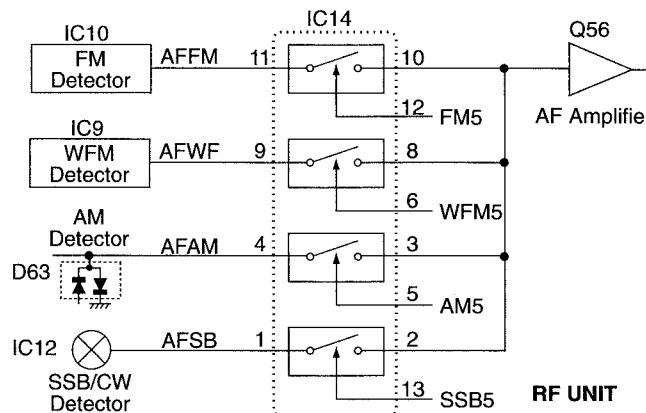
(2) FM mode

The filtered or bypassed 3rd IF signal is applied to the quadrature detector section in the FM IF IC (IC10, pin 10) then mixed with the signal generated by the discriminator (X2) to demodulate AF signals. The AF signals are output from pin 9 and applied to the AF switch circuit via the high-pass filter circuit (IC11).

(3) AM mode

The filtered 3rd IF signal from the one of 3 bandpass filters (FI5, FI6 or FI7) is amplified at the IF and buffer amplifiers (Q48, Q49). The amplified IF signal is applied to the AM detector circuit (D63) to be converted into AF signals, and the AF signals are applied to the AF switch circuit.

• Squelch and AF amplifier circuits



(4) SSB and CW modes

The amplified 3rd IF signal from the buffer amplifier (Q49) is applied to the mixer circuit (IC12, pin 6) and mixed with the BFO signal generated by the BFO circuit for demodulation. The demodulated AF signals are applied to the AF switch circuit.

4-1-9 AF SWITCH CIRCUIT (RF UNIT)

The demodulated AF signals from the demodulator circuits are applied to the AF switch (IC14). This consists of 4 analog switches which are selected with a mode signal from the CPU (LOGIC unit; IC1) via the I/O expander (IC3). The switched AF signals are applied to the AF circuit.

4-1-10 AF CIRCUIT (RF AND LOGIC UNITS)

The switched AF signals from the AF switch circuit are amplified at the AF amplifier circuit (RF unit; Q56) and then applied to the LOGIC unit.

The AF signals from the RF unit are applied to the electronic volume control circuit (LOGIC unit; IC9a, pin 1). The level controlled AF signals are output from pin 2 and applied to the AF power amplifier (LOGIC unit; IC10, pin 4). The power amplified AF signals are passed through the AF level control switch (LOGIC unit; S1) then applied to the internal speaker via the [EXT SP] jack.

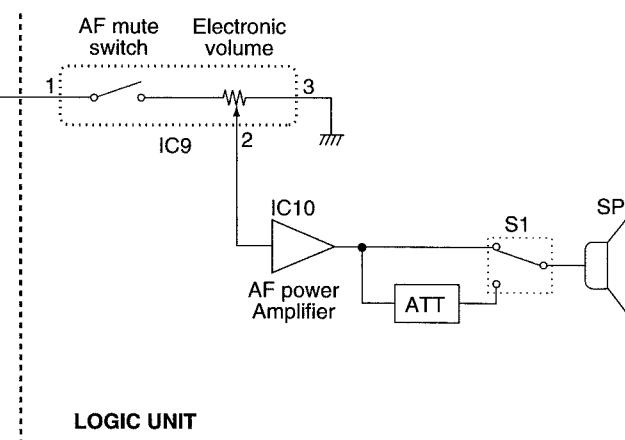
The electronic volume control circuit controls AF gain, therefore, the AF output level varies according to the [VOL] setting and also the squelch conditions.

4-1-11 SQUELCH CIRCUIT (RF AND LOGIC UNITS)

A squelch circuit cuts out AF signals when no RF signal is received or when the S-meter signal is lower than the [SQUELCH] control setting level. By detecting noise components in the AF signals, the CPU controls the electronic volume control circuit.

• NOISE SQUELCH

Some noise components in the AF signals from pin 9 of the FM IF IC (IC10) are applied to the noise amplifier section in the IC (IC10, pin 8). The amplified signals are output from pin 7, and applied to the electronic volume control circuit (LOGIC unit; IC9b, pin 8) and level controlled noise components are output from pin 7. The output signals are applied to the noise amplifiers (LOGIC unit; Q6, Q7) to be converted into pulse-type signals, then applied to the CPU (LOGIC unit; IC1, pin 39) as an NOIN signal.



LOGIC UNIT

• S-METER SQUELCH

The S-meter signal is applied to the CPU from the meter amplifier circuit (RF unit; IC13a) via the SMAD line, and also the S-meter squelch setting level is applied to the CPU. The CPU compares these signals, then outputs a control signal to the electronic volume control circuit (RF unit; IC9a) to cut out AF signals.

4-1-12 NOISE BLANKER CIRCUIT (RF UNIT)

The noise blanker circuit detects pulse-type noise, and stops IF amplifier operation during detection. The noise blanker function activates only when SSB, CW or AM mode is selected.

A portion of the filtered 2nd IF signal from one of 2 bandpass filters (FI2 or FI3) is amplified at the NB amplifier (Q41) then applied to the WFM IF IC (IC9, pin 2). The applied signal is amplified at the IF amplifier section in the IC, then output from pin 10. The output signal is rectified at the NB detector circuit (D53) to be converted into DC voltage after being amplified at the noise amplifier (Q35). The DC voltage is applied to the NB gate control circuit (Q37, Q38) to control the NB gate (Q40).

Some DC voltage is fed back to the IF amplifier section in the WFM IF IC (IC9, pin 3). The IF amplifier functions as an AGC circuit to reduce average noise. Therefore, the noise blanker function shuts off pulse-type noise only.

4-1-13 AGC CIRCUIT (RF UNIT)

The AGC (Auto Gain Control) circuit reduces IF amplifier gain to keep the audio output at a constant level.

An RSSI signal is used for AGC function from the WFM IF IC (IC9, pin 17) while in WFM mode, or used from the FM IF IC (IC10, pin 12) while in FM, AM, SSB or CW (except WFM) mode.

The RSSI output signal is applied to the IF amplifiers (Q13, Q39) after being amplified at the AGC amplifier (Q33) during WFM operation. In other modes, the RSSI signal is amplified at the AGC amplifier (Q51), passes through the time constant circuit (Q52, Q53, R284, R290, R291, C371-C373) and is then applied to the IF amplifiers (Q13, Q39). The AGC control signal is applied to the VHF/UHF tunable bandpass filters after being amplified at the VHF/UHF AGC amplifier (IC13b).

AGC speed is controlled by changing the time constant at the AGC control line with resistors (R284, R290, R291) and capacitors (C371-C373). R290 and C372 are used for AGC slow, and R284 and C371 are used for AGC fast mode's time constant. However, R291 and C373 are connected to the AGC control line while scanning to obtain the fastest AGC response.

4-1-14 VSC CIRCUIT (LOGIC UNIT)

The VSC (Voice Scan Control) detects AF signals and mutes undesired signals such as unmodulated, beat and noise component signals. When the VSC function is ON and an unmodulated signal is received, squelch functions the same as closed (no signal condition) even when it's open, or the scan function resumes for a short period on any scan setting during scanning.

A portion of the AF signals from the AF amplifier (RF unit; Q56) is applied to the VSC control circuit (IC15, pin 16) to detect demodulated signals while the VSC function is ON. When audio (voice) component signals are included in the AF signals, the VSC IC (IC15) outputs a low level signal from pin 13 to the CPU (IC1, pin 45) to release the mute switch (IC9).

4-1-15 S-METER CIRCUIT (RF UNIT)

The S-meter circuit indicates the relative received signal strength while receiving and changes depending on the received signal strength.

A portion of the AGC signal is applied to the meter amplifier circuit (IC13a). The amplified signal is then applied to the CPU (LOGIC unit; IC1, pins 31) as an SMAD signal to drive the S-meter.

The SMAD signal is also used for noise and S-meter squelch operation by comparison with the [SQUELCH] control setting level and received signal strength at the CPU.

4-2 PLL CIRCUITS

4-2-1 1ST LO PLL CIRCUIT (RF UNIT)

The 1st LO circuit generates the 1st LO frequencies, and the signals are applied to the 1st mixer circuit. The 1st LO circuit consists of a VCO-1/2 circuit and PLL IC, etc.

The generated signal from VCO-1 (Q14, Q15) or VCO-2 (Q18, Q19) is applied to the prescaler section in the PLL IC (IC7, pin 11) after being amplified at the buffer amplifiers (IC26, Q27). The applied signal is prescaled in the PLL IC based on the divided ratio (N-data) to produce approx. 50 kHz signals which are applied to the phase detector section.

The generated reference signal from the reference oscillator (X1; 10.25 MHz) is amplified at the buffer amplifiers (Q22, Q42) and is applied to the programmable divider section in the PLL IC (IC7, pin 20). The applied signal is prescaled in the PLL IC based on the divided ratio (1/205) to produce approx. 50 kHz phase signals. The reference phase signals are applied to the phase detector section.

The phase detector section compares 2 of the applied phase signals. The phase detected signals are passed through the charge pump section and then output from pin 6 of the PLL IC. The output signals are applied to the loop filter circuit (Q25, Q26) to be converted into DC voltage as a PLL lock voltage. The lock voltage is applied to the CPU (LOGIC unit; IC1, pin 33) as an L1AD signal to control the VHF/UHF tunable bandpass filter.

4-2-2 2ND LO PLL CIRCUIT (RF UNIT)

The 2nd LO circuit generates the 2nd LO frequencies, and the signals are applied to the 2nd mixer circuit. The 2nd LO circuit consists of a DDS, VCO-3 and loop filter circuit, etc.

The generated signal from VCO-3 (Q76) is divided by 8 at the divider circuit (IC23) after being amplified at the buffer amplifier (Q77). The divided signal is then amplified at IC28, and applied to the DDS circuit (IC18). The DDS circuit generates digital signals using the applied signal as a clock frequency. The phase detector section in the DDS IC compares

it's phase with the divided reference frequency (3.41 MHz) which is generated at the reference oscillator (X1).

The D/A converter (R351–R374), bandpass filter (L117, L118, L175, C496–C503) and buffer amplifier (IC19) circuits are connected to the DDS output to convert the digital oscillated signals into smooth analog signals.

4-2-3 BFO CIRCUIT (RF UNIT)

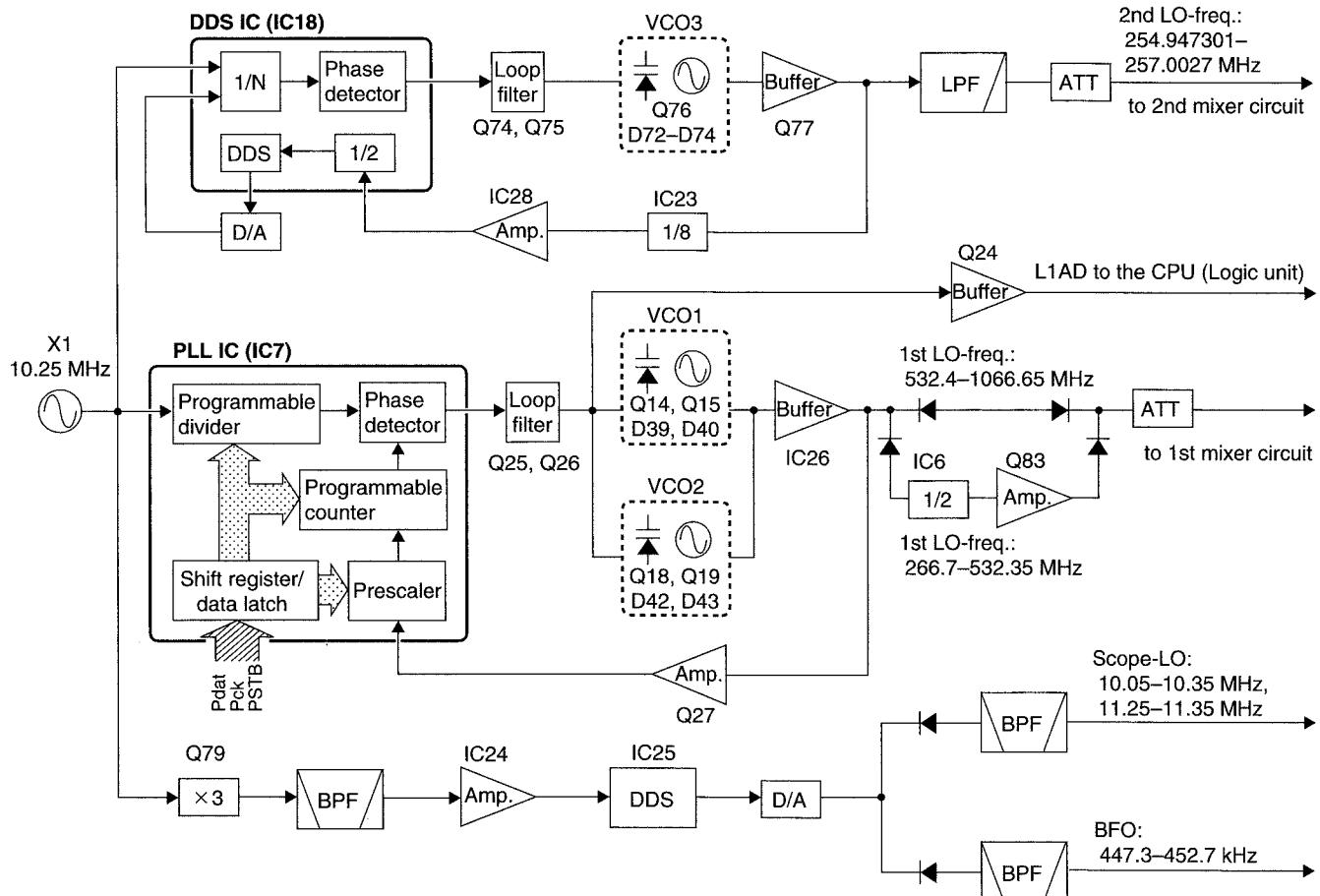
The BFO signals are generated by the DDS circuit (IC25) using the divided reference signal. 10-bit digital signals are converted into 447.3–452.7 kHz analog wave signals at the D/A converter (R423–R442). The converted analog wave signals are passed through the bandpass filter (L99–L101, C269–C274) via the switching diode (D52), then applied to the mixer circuit (IC12).

4-3 SCOPE CIRCUIT

4-3-1 SCOPE RECEIVER CIRCUIT (RF UNIT)

A portion of the 10.7 MHz 2nd IF signal from the 2nd mixer circuit (IC5) passes through the bandpass filter (F18) to suppress out-of-band signals, and is then mixed with a scope LO signal at the mixer section in the FM IF IC (IC8, pin 15), which includes the RSSI terminal, to produce a 450 kHz scope IF signal. The mixed IF signal is filtered at the ceramic bandpass filter (F14) then applied to the limiter amplifier section in the FM IF IC (IC8, pin 5). The applied IF signal is converted into DC voltages according to the applied IF signal strength at the RSSI section in the IC.

- PLL circuits



The converted voltages are applied to the CPU (LOGIC unit; IC1, pin 34) as an SCAD signal.

The sweeping scope LO signals generated by IC25 (10.05–10.35 MHz/11.25–11.35 MHz) are applied to the mixer section in the FM IF IC, when the scope function is activated.

4-4 POWER SUPPLY CIRCUITS

4-4-1 VOLTAGE LINES (LOGIC UNIT)

Line	Description
ACHV	The voltage from a DC power supply.
HV	The same voltage as the ACHV line which is controlled by the [POWER] switch.
RF+5	Common 5 V line converted from the HV line by the RF+5 regulator circuit (IC5).
RF+8	Common 8 V line converted from the HV line by the RF+8 regulator circuit (IC6).
RF33	Common 33 V line converted from the HV line by the 33 V DC-DC convertor circuit (IC7). The output voltage is applied to the PLL circuit (RF unit).
RF-5	Common -5 V line converted from the RF+8 line by the -5 V DC-DC convertor circuit (IC8).
L+5	Common 5 V line converted from the HV line by the L+5 regulator circuit (IC4).

4-5 PORT ALLOCATIONS

4-5-1 CPU (LOGIC unit; IC1)

Pin number	Port name	Description
1	RES	Input port for the reset signal.
2, 3	ETAL, EXTAL	Input ports for the CPU system clock oscillator (X1; 9.8304 MHz).
10	RXD	Input port for data signal from the connected PC via the RS-232C interface IC (IC3).
11	TXD	Outputs data signal to the connected PC via the RS-232C interface IC (IC3).
17	ECK	Outputs clock signal to the EEPROM IC (IC13).
18	EDAT	Outputs data signal to the EEPROM IC (IC13).
21	DSTD	Input port for the DTMF latch data.
22–25	DQ4– DQ1	Input ports for the DTMF decode signals.
27	Mck	Outputs serial clock signal for the electronic volume IC (IC9) and output expander ICs (RF unit; IC1– IC3).
28	Mdat	Outputs serial data signal for the electronic volume IC (IC9) and output expander ICs (RF unit; IC1– IC3).
31	SMAD	Input port for S-meter signal.
32	CMAD	Input port for center indicator signal.
33	L1AD	Input port for 1st LO PLL lock voltage.
34	SCAD	Input port for the scope signal.
35	CTAD	Input port for the CTCSS decoded signal.
36	REDA	Output port for reference frequency control voltage.
37	TUDA	Outputs tunable bandpass filter control voltage.
39	NOIN	Input port signal strength detection signal (NOIN; pulse-type).
40	LCT	Input port for unlock signal from the PLL IC (RF unit; IC7). High : PLL unlock
41	POCO	Outputs power switching circuit control signal. High: While turning power ON.
43	VSSW	Output VSC-time constant control signal. High: Modulated signals are received. Low : Unmodulated or beat signals are received or while scanning.
44	VSON	Outputs VSC control signals. Low : When the VSC function is ON.
45	VSC	Input port for VSC detected signals. High: Unmodulated or beat signals are received. Low : Modulated signals are received.
46	AFST	Outputs strobe signals for the volume control IC (IC9).
48–50	CON2– CON0	Output mode control signals for the 2nd LO DDS IC (RF unit; IC18).

CPU (IC1) — continued

Pin number	Port name	Description
51	STD2	Outputs strobe signals for the BFO/scope DDS IC (RF unit; IC25).
52	STD1	Outputs strobe signals for the 2nd LO DDS IC (RF unit; IC18).
53	PSTB	Outputs strobe signals for the PLL IC (RF unit; IC7).
54	Pdat	Outputs serial data signals for the PLL IC (RF unit; IC7) and DDS ICs (RF unit; IC18, IC25).
55	Pck	Outputs serial clock signal for the PLL IC (RF unit; IC7) and DDS ICs (RF unit; IC18, IC25).
58–60	MST3– MST1	Outputs strobe signals for the output expander ICs (RF unit; IC1–IC3).
61	DRES	Outputs reset signal for the DDS ICs (RF unit; IC18, IC25).

4-5-2 DDS (RF unit; IC18)

Pin number	Port name	Description		
68	PFIL4	Outputs scope LO select signals. High: When Scope function is ON.		
69	PFIL3	Outputs BFO select signals. High: When SSB or CW mode is selected.		
70	PFIL2	Outputs 1st LO filter select signals. High: When frequencies from 0.01 to 265.699999 MHz are displayed. Low : When frequencies from 265.7 to 1300.0 MHz are displayed.		
72	VSFT2	Outputs VCO2 shift signals.		
73, 75	VCO2, VCO1	Output VCO2/VCO1 select signals.		
		Display freq. [MHz]	Selected VCO	VCO freq. [MHz]
		0.01– 108.299999	VCO1	533.40– 749.90
		108.3– 265.699999	VCO2	750.00– 1064.70
		265.7– 266.699999	VCO1	533.40– 534.35
		266.7– 267.699999	VCO1	532.40– 533.35
		267.7– 483.299999	VCO1	534.40– 749.95
		483.3– 799.999999	VCO2	750.00– 1066.65
		800.0– 1016.699999	VCO1	533.30– 749.95
		1016.7– 1300.000000	VCO2	750.00– 1033.300000
74	VSFT1	Outputs VCO1 shift signals.		

4-5-3 OUTPUT EXPANDER IC

(1) RF unit; IC1

Pin number	Port name	Description
4	B0C	Outputs low-pass filter select signal. High: When frequencies below 1.8 MHz are displayed.
5	B1C	Outputs bandpass filter select signal. High: When frequencies from 1.8 to 14.999999 MHz are displayed.
6	B2C	Outputs bandpass filter select signal. High: When frequencies from 15.0 to 29.999999 MHz are displayed.
7	B3C	Outputs bandpass filter select signal. High: When frequencies from 30.0 to 49.999999 MHz are displayed.
11	B7C	Outputs bandpass filter select signal. High: When frequencies from 700.0 to 1300.0 MHz are displayed.
12	B6C	Outputs bandpass filter select signal. High: When frequencies from 350.0 to 699.999999 MHz are displayed.
13	B5C	Outputs bandpass filter select signal. High: When frequencies from 150.0 to 349.999999 MHz are displayed.
14	B4C	Outputs bandpass filter select signal. High: When frequencies from 50.0 to 149.999999 MHz are displayed.

(3) RF unit; IC3

Pin number	Port name	Description		
4	WFM	Outputs WFM mode select signals. High: When WFM mode is selected.		
5	FM	Outputs FM mode select signals. High: When FM mode is selected.		
6	AM	Outputs AM mode select signals. High: When AM mode is selected.		
7	SSB	Outputs SSB mode select signals. High: When SSB mode is selected.		
11-14	FL3-FL0	Output 450 kHz IF filter select signals.		
		SW signal	Bandpass filter	Passband width
		FL0	FI5	2.8 kHz
		FL1	FI6	6 kHz
		FL2	FI7	15 kHz
		FL3	By-pass	—

(2) RF unit; IC2

Pin number	Port name	Description									
4	NB	Outputs NB control signals. High: While NB function is ON. (SSB/CW mode only)									
5	AGCF	Outputs AGC time constant control signals. High: When WFM or FM mode is selected (AGC-fast).									
7	SCAN	Outputs AGC time constant control signals. High: While scanning (fastest AGC speed).									
12, 13	FL5, FL4	Output 10.7 MHz IF filter select signals.									
		<table border="1"> <thead> <tr> <th>SW signal</th> <th>Bandpass filter</th> <th>Passband width</th> </tr> </thead> <tbody> <tr> <td>FL4</td> <td>FI2</td> <td>50 kHz</td> </tr> <tr> <td>FL5</td> <td>FI3</td> <td>230 kHz</td> </tr> </tbody> </table>	SW signal	Bandpass filter	Passband width	FL4	FI2	50 kHz	FL5	FI3	230 kHz
SW signal	Bandpass filter	Passband width									
FL4	FI2	50 kHz									
FL5	FI3	230 kHz									
14	ATTC	Outputs attenuator control signals. High: When attenuator function is ON.									

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION BEFORE SERVICING

The receiver (IC-PCR1000) can be adjusted by sending adjustment data to the RS-232C port via a PC. Most of the adjustments in this section must use **EX-2099**, an adjustment program for IC-PCR1000. The software that comes with the IC-PCR1000 is not necessary for adjustments in this section.

■ SYSTEM REQUIREMENTS

- IBM PC compatible computer
- An RS-232C serial port (38400 bps or faster)
- Microsoft Windows 95
- Intel i486DX4 processor or faster (pentium 100 MHz or faster recommended)
- At least 16 MB RAM
- At least 10 MB of hard disk space
- 640 × 480 pixel display (800 × 600 pixel display recommended)

■ SOFTWARE INSTALLATION

NOTE: Before using the program, make a backup copy of the original disk. After making a backup copy, keep the original disk in a safe place.

- ① Boot up Windows.
 - Quit all applications when Windows is running.
- ② Insert the backup disk 1 into the appropriate floppy drive.
- ③ Select 'Run' from the [Start] menu.
- ④ Type the setup program name using the full path name, then push the [Enter] key. (A:\ setup [Enter])
- ⑤ Follow the prompts.
- ⑥ Program group 'IC-PCR1000' appears in the 'Programs' folder of the [Start] menu.

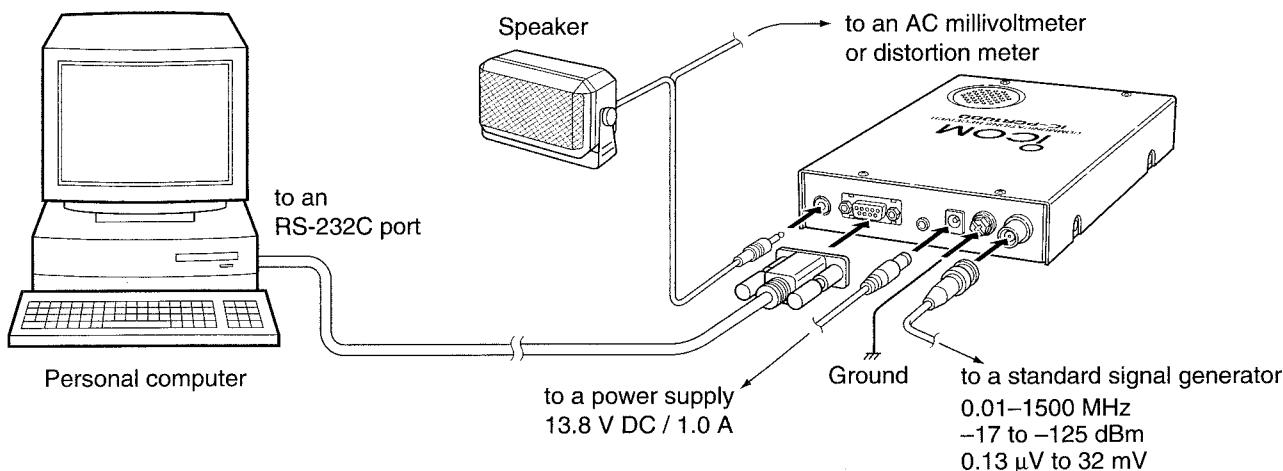
■ OPERATING INSTRUCTIONS

The adjustment program window contains 3 panels; the Power Panel, Control Panel and Adjustment Panel. The Power Panel will appear at start up the program.

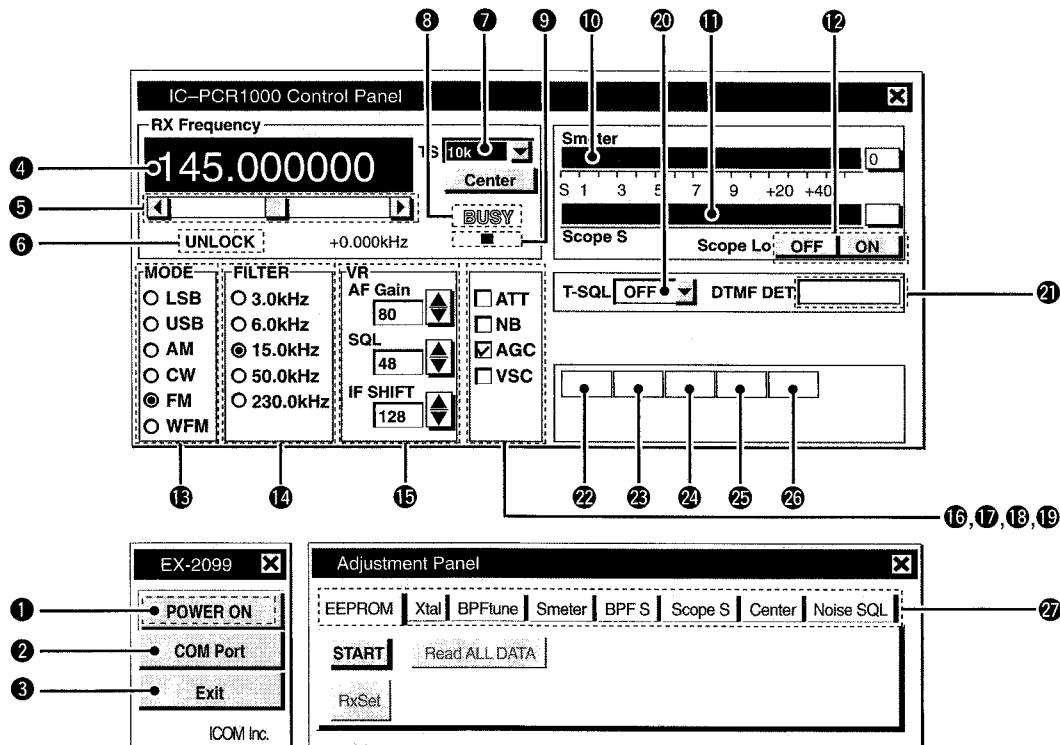
- ① Connect IC-PCR1000 and PC with an RS-232C serial cable.
- ② Boot up Windows.
- ③ Click the "EX-2099 for IC-PCR1000" in the program group 'IC-PCR1000' to start the program.
 - The Power Panel appears.
- ④ Click "POWER ON" on the Power panel.
 - Control Panel and Adjustment Panel appear.
- ⑤ Click "START" on the Adjustment Panel when starting the SOFTWARE adjustment.
 - Data panel appears at the bottom side of the Adjustment panel.
- ⑥ Click "Read ALL DATA" on the Adjustment Panel.
 - Application reads adjustment data of the connected receiver.
- ⑦ Set or modify adjustment data as desired. See the following SOFTWARE adjustments.

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■ BASIC CONNECTION



■ PANEL DESCRIPTIONS



◆ POWER PANEL

- ① **POWER button**
Turns IC-PCR1000 on and off.
- ② **COM port button**
Used to select a COM port.
- ③ **EXIT button**
Quits the program.

◆ CONTROL PANEL

- ④ **FREQUENCY indication**
Indicates or inputs the receive frequency.
- ⑤ **FREQUENCY scroll bar**
Used to change the receive frequency. Moving the button to the right increases the frequency; to the left decreases the frequency.
- ⑥ **UNLOCK indicator**
Appears when the PLL is unlocked.
- ⑦ **Tuning step button**
Used to change the tuning step.
- ⑧ **BUSY indicator**
Appears when receiving a signal or when signal noise opens the squelch.
- ⑨ **FM center indicator**
Indicates the tuning level when selecting the 6 kHz or 15 kHz IF filter in FM mode.
- ⑩ **S-meter indicator**
Indicates the receive signal strength.
- ⑪ **Scope S indicator**
- ⑫ **Scope Lo (ON/OFF) button**
- ⑬ **Receive mode buttons**
Select a receive mode.
- ⑭ **FILTER (IF filter) buttons**
Change the IF filter in use.
- ⑮ **Volume buttons**
Adjust the audio output, squelch level and set the signals passband position.

⑯ ATT (Attenuator) button

Turns the attenuator on and off.

⑰ NB (Noise Blanker) button

Turns the noise blanker function on and off. The noise blanker is used to reduce pulse type noise.

⑱ AGC (Automatic Gain Control) button

Turns the AGC function on and off.

⑲ VSC (Voice Scan Control) button

Turns the voice scan control function on and off. This function detects whether signals are modulated (contain voice or music components, etc.) or not.

⑳ T-SQL (Tone squelch) button

Indicates or selects tone frequency for the tone squelch.

㉑ DTMF decode indicator

Indicates the decoded DTMF signals.

㉒ AD1 (SMAD) indicator

Indicates voltage level for the S-meter.

㉓ AD2 (CMAD) indicator

Indicates voltage level for the center meter.

㉔ AD3 (L1AD) indicator

Indicates the 1st LO PLL lock voltage level.

㉕ AD4 (SCAD) indicator

Indicates voltage level for the scope signal.

㉖ AD5 (CTAD) indicator

Indicates voltage level for the CTCSS decoded signal.

◆ ADJUSTMENT PANEL

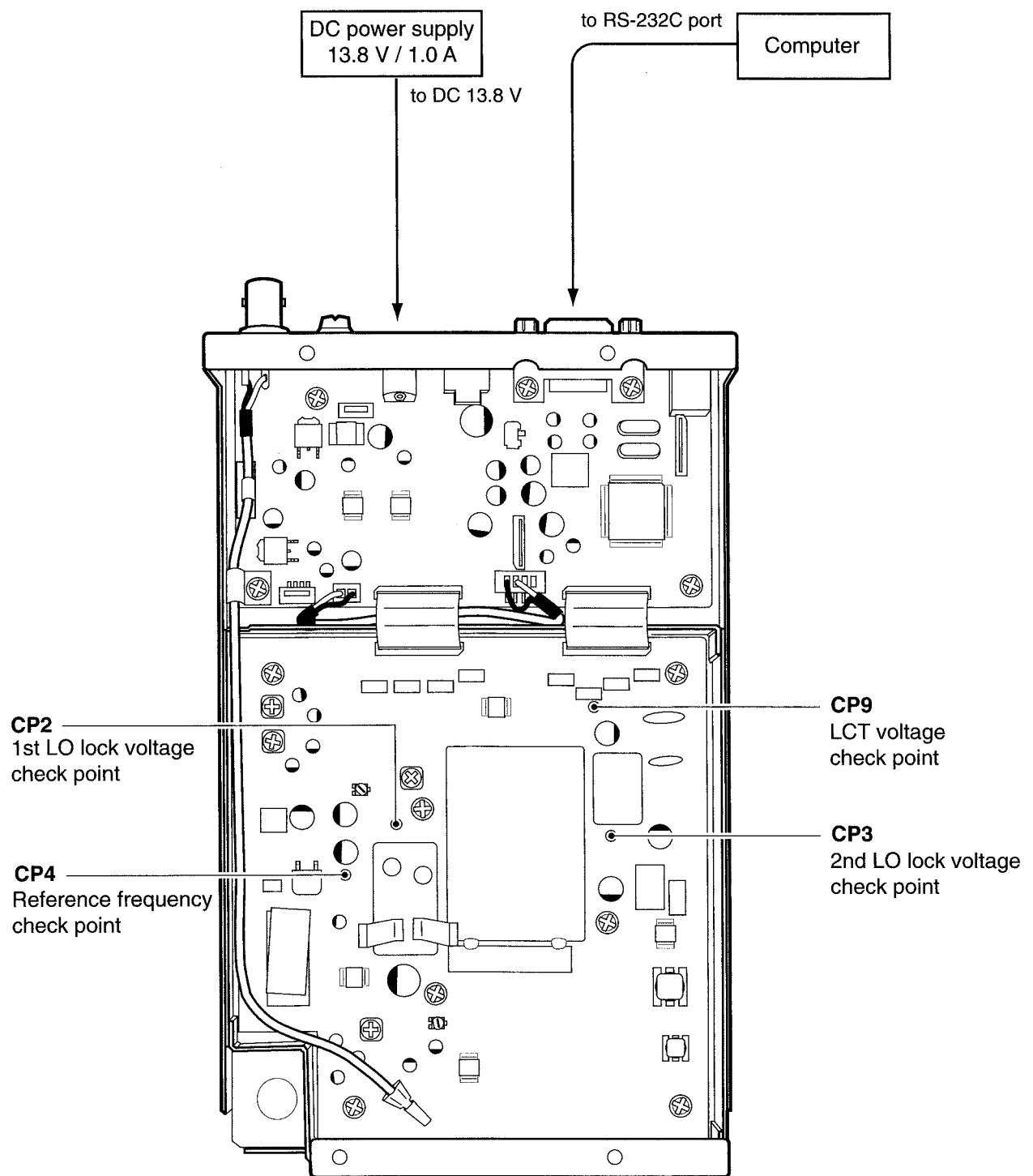
㉗ Item select buttons

Used to select the adjustment items.

5-2 PLL ADJUSTMENT AND IF PEAK ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT
		UNIT	LOCATION		
REFERENCE FREQUENCY	1 • Display freq. : Any	RF	Connect a frequency counter to check point CP4.	10.250000 MHz	Use the adjustment software. (see page 5-6)
1ST LO PLL LOCK VOLTAGE	1 • Display freq. : 265.7000 MHz	RF	Connect a digital multi-meter or oscilloscope to check point CP2.	2.0–6.0 V	Verify
	2 • Display freq. : 383.2000 MHz			13.5–17.7 V	
	3 • Display freq. : 383.3000 MHz			3.0–7.0 V	
	4 • Display freq. : 483.2000 MHz			10.0–14.0 V	
	5 • Display freq. : 483.3000 MHz			1.5–5.5 V	
	6 • Display freq. : 633.2000 MHz			12.5–16.5 V	
	7 • Display freq. : 633.3000 MHz			4.0–8.0 V	
	8 • Display freq. : 799.9000 MHz			12.5–16.5 V	
2ND LO PLL LOCK VOLTAGE	1 • Display freq. : 265.0000 MHz	RF	Connect a digital multi-meter or oscilloscope to check point CP3.	6.5–10.5 V	Verify
	2 • Display freq. : 266.0000 MHz			6.6–10.6 V	
	3 • Display freq. : 267.0000 MHz			6.4–10.4 V	
LCT TERMINAL	1 • Display freq. : Any frequency of the 1st LO and 2nd LO are locked.	RF	Connect a digital multi-meter or oscilloscope to check point CP9.	Less than 1.5 V	Verify
IF PEAK	1 • Display freq. : 130.0200 MHz • Mode : FM • AGC : ON • Filter : 15 kHz • R521 (RF unit) : Center • R523 (RF unit) : Center • Connect a standard signal generator to [ANT] and set as: Frequency : 130.0200 MHz Level : 50 µV* (-73 dBm) Modulation : OFF • Receiving			Maximum S-meter level	Use the adjustment software. (see page 5-6, Tuned BPF)
	2 • Display freq. : 149.9800 MHz • Set an SSG as: Frequency : 149.9800 MHz • Receiving				

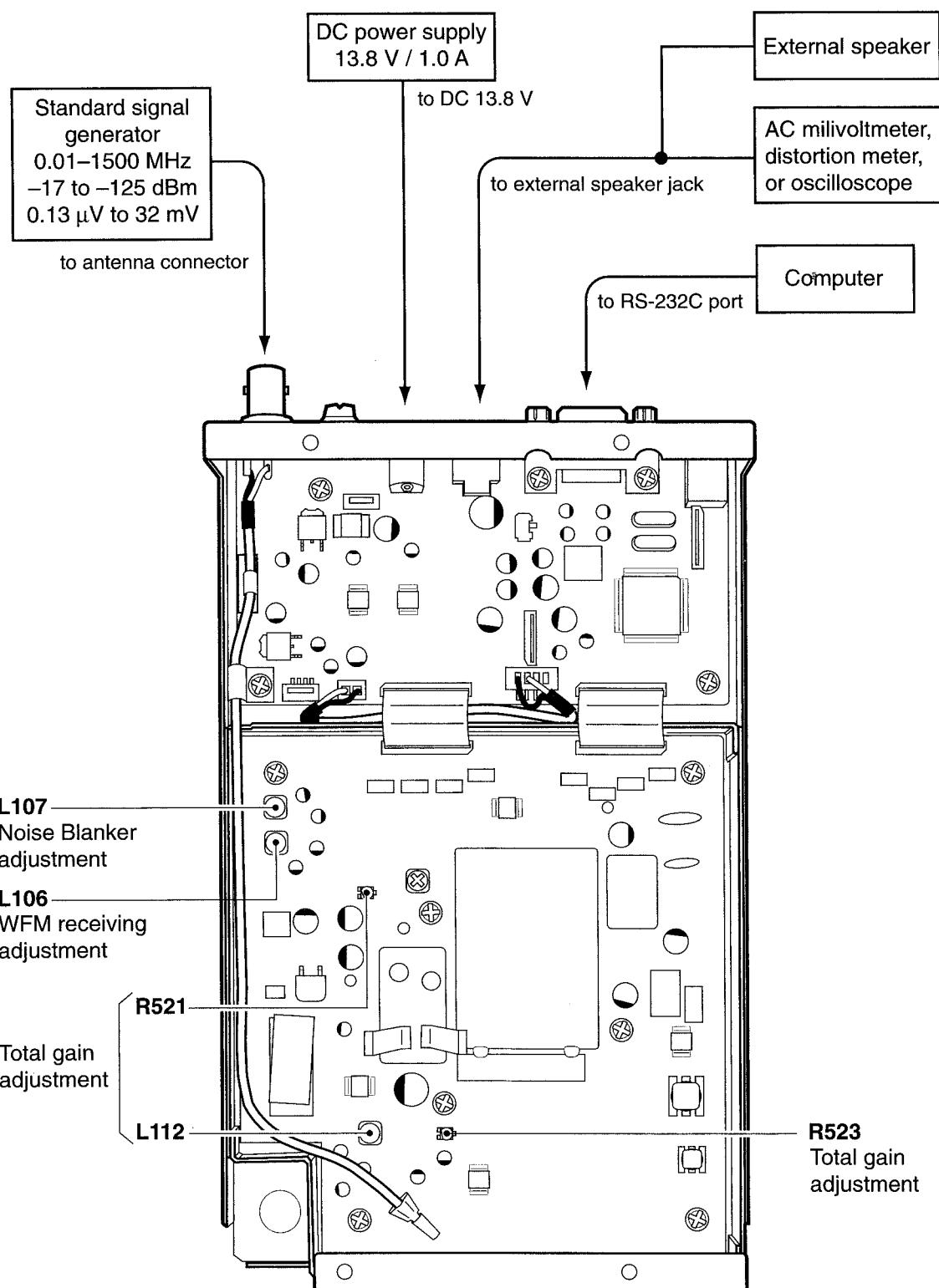
*This output level of a standard signal generator (SSG) is indicated as SSG's open circuit.



5-3 RECEIVE ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
TOTAL GAIN	1	Rear Panel	Connect an AC millivoltmeter to the [EXT SP] jack with an 8 Ω dummy load.	Maximum AF level	RF	L112
	2			Any AF level	Computer display	AF Gain
	3			Same AF level as step 2	RF	R523
	4			20 dB of AF level difference as step 3		R521
WFM RECEIVER	1	Rear Panel	Connect a distortion meter to the [EXT SP] jack with an 8 Ω dummy load.	Minimum distortion level	RF	L106
NOISE BLANKER	1	Rear Panel	Connect an oscilloscope to the [EXT SP] jack with an 8 Ω dummy load.	Minimum noise level	RF	L107

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



5-4 SOFTWARE ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION																																				
REFERENCE FREQUENCY	1	<ul style="list-style-type: none"> Click adjustment item [Xtal] on the Adjustment Panel. Connect a frequency counter to check point CP4 on the RF unit (see page 5-4). 	<ul style="list-style-type: none"> Click “▲” or “▼” to set reference frequency to 10.250000 MHz. 																																				
TUNED BPF	1	<ul style="list-style-type: none"> Click adjustment item [BPFtune] on the Adjustment Panel. Select “BPF 4-1” at the left side of Adjustment Panel. Manual/Auto Tune: Manual Set an SSG as : <table> <tr> <td>Frequency</td> <td>: 50.02 MHz</td> </tr> <tr> <td>Level</td> <td>: 50 µV* (-73 dBm)</td> </tr> <tr> <td>Modulation</td> <td>: OFF</td> </tr> </table> Receiving 	Frequency	: 50.02 MHz	Level	: 50 µV* (-73 dBm)	Modulation	: OFF	<ul style="list-style-type: none"> Move the scroll bar at the bottom side of Adjustment Panel, and set maximum S-meter level on the Control Panel. Then, click “Write” switch to store into memory. 																														
Frequency	: 50.02 MHz																																						
Level	: 50 µV* (-73 dBm)																																						
Modulation	: OFF																																						
	2	<ul style="list-style-type: none"> Same operation as step 1 for the listed frequencies. <table> <tr> <td>BPF 4-2 – 58.28 MHz</td> <td>BPF 5-6 – 265.72 MHz</td> <td>BPF 6-10 – 699.98 MHz</td> </tr> <tr> <td>BPF 4-3 – 58.32 MHz</td> <td>BPF 5-7 – 300.02 MHz</td> <td>BPF 7-1 – 700.02 MHz</td> </tr> <tr> <td>BPF 4-4 – 88.02 MHz</td> <td>BPF 5-8 – 349.98 MHz</td> <td>BPF 7-2 – 750.02 MHz</td> </tr> <tr> <td>BPF 4-5 – 108.28 MHz</td> <td>BPF 6-1 – 350.02 MHz</td> <td>BPF 7-3 – 799.98 MHz</td> </tr> <tr> <td>BPF 4-6 – 108.32 MHz</td> <td>BPF 6-2 – 383.28 MHz</td> <td>BPF 7-4 – 800.02 MHz</td> </tr> <tr> <td>BPF 4-7 – 130.02 MHz</td> <td>BPF 6-3 – 383.32 MHz</td> <td>BPF 7-5 – 916.68 MHz</td> </tr> <tr> <td>BPF 4-8 – 149.98 MHz</td> <td>BPF 6-4 – 433.32 MHz</td> <td>BPF 7-6 – 916.72 MHz</td> </tr> <tr> <td>BPF 5-1 – 150.02 MHz</td> <td>BPF 6-5 – 483.28 MHz</td> <td>BPF 7-7 – 1016.68 MHz</td> </tr> <tr> <td>BPF 5-2 – 183.28 MHz</td> <td>BPF 6-6 – 483.32 MHz</td> <td>BPF 7-8 – 1016.72 MHz</td> </tr> <tr> <td>BPF 5-3 – 183.32 MHz</td> <td>BPF 6-7 – 558.32 MHz</td> <td>BPF 7-9 – 1166.68 MHz</td> </tr> <tr> <td>BPF 5-4 – 216.02 MHz</td> <td>BPF 6-8 – 633.28 MHz</td> <td>BPF 7-10 – 1166.72 MHz</td> </tr> <tr> <td>BPF 5-5 – 265.68 MHz</td> <td>BPF 6-9 – 633.32 MHz</td> <td>BPF 7-11 – 1299.98 MHz</td> </tr> </table> <ul style="list-style-type: none"> Receiving 	BPF 4-2 – 58.28 MHz	BPF 5-6 – 265.72 MHz	BPF 6-10 – 699.98 MHz	BPF 4-3 – 58.32 MHz	BPF 5-7 – 300.02 MHz	BPF 7-1 – 700.02 MHz	BPF 4-4 – 88.02 MHz	BPF 5-8 – 349.98 MHz	BPF 7-2 – 750.02 MHz	BPF 4-5 – 108.28 MHz	BPF 6-1 – 350.02 MHz	BPF 7-3 – 799.98 MHz	BPF 4-6 – 108.32 MHz	BPF 6-2 – 383.28 MHz	BPF 7-4 – 800.02 MHz	BPF 4-7 – 130.02 MHz	BPF 6-3 – 383.32 MHz	BPF 7-5 – 916.68 MHz	BPF 4-8 – 149.98 MHz	BPF 6-4 – 433.32 MHz	BPF 7-6 – 916.72 MHz	BPF 5-1 – 150.02 MHz	BPF 6-5 – 483.28 MHz	BPF 7-7 – 1016.68 MHz	BPF 5-2 – 183.28 MHz	BPF 6-6 – 483.32 MHz	BPF 7-8 – 1016.72 MHz	BPF 5-3 – 183.32 MHz	BPF 6-7 – 558.32 MHz	BPF 7-9 – 1166.68 MHz	BPF 5-4 – 216.02 MHz	BPF 6-8 – 633.28 MHz	BPF 7-10 – 1166.72 MHz	BPF 5-5 – 265.68 MHz	BPF 6-9 – 633.32 MHz	BPF 7-11 – 1299.98 MHz	
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BPF 5-5 – 265.68 MHz	BPF 6-9 – 633.32 MHz	BPF 7-11 – 1299.98 MHz																																					
S-METER	1	<ul style="list-style-type: none"> Click adjustment item [Smeter] on the Adjustment Panel. Select “FM S0” at the left side of Adjustment Panel. Set an SSG as : <table> <tr> <td>Frequency</td> <td>: 149.97000 MHz</td> </tr> <tr> <td>Mode</td> <td>: FM</td> </tr> <tr> <td>Level</td> <td>: 0.5 µV* (-113 dBm)</td> </tr> <tr> <td>Modulation</td> <td>: OFF</td> </tr> </table> Receiving 	Frequency	: 149.97000 MHz	Mode	: FM	Level	: 0.5 µV* (-113 dBm)	Modulation	: OFF	<ul style="list-style-type: none"> Click “Write” switch to store sampled data into memory. 																												
Frequency	: 149.97000 MHz																																						
Mode	: FM																																						
Level	: 0.5 µV* (-113 dBm)																																						
Modulation	: OFF																																						
	2	<ul style="list-style-type: none"> Same operation as step 1 for the listed levels. Set an SSG as: <table> <tr> <td>FM S3</td> <td>: 1.3 µV* (-105 dBm)</td> <td>WFM S0</td> <td>: 0.79 µV* (-109 dBm)</td> </tr> <tr> <td>FM S5</td> <td>: 3.2 µV* (-97 dBm)</td> <td>WFM S3</td> <td>: 1.6 µV* (-103 dBm)</td> </tr> <tr> <td>FM S7</td> <td>: 13 µV* (-85 dBm)</td> <td>WFM S5</td> <td>: 3.2 µV* (-97 dBm)</td> </tr> <tr> <td>FM S9</td> <td>: 50 µV* (-73 dBm)</td> <td>WFM S7</td> <td>: 13 µV* (-85 dBm)</td> </tr> <tr> <td>FM S9+20</td> <td>: 280 µV* (-58 dBm)</td> <td>WFM S9</td> <td>: 50 µV* (-73 dBm)</td> </tr> <tr> <td>FM S9+40</td> <td>: 1.6 mV* (-43 dBm)</td> <td>WFM S9+20</td> <td>: 280 µV* (-58 dBm)</td> </tr> <tr> <td>FM S9+60</td> <td>: 8.9 mV* (-28 dBm)</td> <td>WFM S9+40</td> <td>: 1.6 mV* (-43 dBm)</td> </tr> </table> Receiving 	FM S3	: 1.3 µV* (-105 dBm)	WFM S0	: 0.79 µV* (-109 dBm)	FM S5	: 3.2 µV* (-97 dBm)	WFM S3	: 1.6 µV* (-103 dBm)	FM S7	: 13 µV* (-85 dBm)	WFM S5	: 3.2 µV* (-97 dBm)	FM S9	: 50 µV* (-73 dBm)	WFM S7	: 13 µV* (-85 dBm)	FM S9+20	: 280 µV* (-58 dBm)	WFM S9	: 50 µV* (-73 dBm)	FM S9+40	: 1.6 mV* (-43 dBm)	WFM S9+20	: 280 µV* (-58 dBm)	FM S9+60	: 8.9 mV* (-28 dBm)	WFM S9+40	: 1.6 mV* (-43 dBm)									
FM S3	: 1.3 µV* (-105 dBm)	WFM S0	: 0.79 µV* (-109 dBm)																																				
FM S5	: 3.2 µV* (-97 dBm)	WFM S3	: 1.6 µV* (-103 dBm)																																				
FM S7	: 13 µV* (-85 dBm)	WFM S5	: 3.2 µV* (-97 dBm)																																				
FM S9	: 50 µV* (-73 dBm)	WFM S7	: 13 µV* (-85 dBm)																																				
FM S9+20	: 280 µV* (-58 dBm)	WFM S9	: 50 µV* (-73 dBm)																																				
FM S9+40	: 1.6 mV* (-43 dBm)	WFM S9+20	: 280 µV* (-58 dBm)																																				
FM S9+60	: 8.9 mV* (-28 dBm)	WFM S9+40	: 1.6 mV* (-43 dBm)																																				
S-METER FLAT	1	<ul style="list-style-type: none"> Click adjustment item [BPF S] on the Adjustment Panel. Select “BPF0” at the left side of Adjustment Panel. Set an SSG as : <table> <tr> <td>Frequency</td> <td>: 1.02 MHz</td> </tr> <tr> <td>Level</td> <td>: 50 µV* (-73 dBm)</td> </tr> <tr> <td>Modulation</td> <td>: OFF</td> </tr> </table> Receiving 	Frequency	: 1.02 MHz	Level	: 50 µV* (-73 dBm)	Modulation	: OFF	<ul style="list-style-type: none"> Click “Write” switch to store sampled data into memory. 																														
Frequency	: 1.02 MHz																																						
Level	: 50 µV* (-73 dBm)																																						
Modulation	: OFF																																						

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

SOFTWARE ADJUSTMENT (continued)

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION																																										
S-METER FLAT	2	<ul style="list-style-type: none"> • Same adjustment as step 1 for the listed BPFs frequencies. <table> <tbody> <tr><td>BPF 1 – 7.02 MHz</td><td>BPF 5-4 – 216.02 MHz</td><td>BPF 6-10 – 699.98 MHz</td></tr> <tr><td>BPF 2 – 21.02 MHz</td><td>BPF 5-5 – 265.68 MHz</td><td>BPF 7-1 – 700.02 MHz</td></tr> <tr><td>BPF 3 – 40.02 MHz</td><td>BPF 5-6 – 265.72 MHz</td><td>BPF 7-2 – 750.02 MHz</td></tr> <tr><td>BPF 4-1 – 50.02 MHz</td><td>BPF 5-7 – 300.02 MHz</td><td>BPF 7-3 – 799.98 MHz</td></tr> <tr><td>BPF 4-2 – 58.28 MHz</td><td>BPF 5-8 – 349.98 MHz</td><td>BPF 7-4 – 800.02 MHz</td></tr> <tr><td>BPF 4-3 – 58.32 MHz</td><td>BPF 6-1 – 350.02 MHz</td><td>BPF 7-5 – 916.68 MHz</td></tr> <tr><td>BPF 4-4 – 88.02 MHz</td><td>BPF 6-2 – 383.28 MHz</td><td>BPF 7-6 – 916.72 MHz</td></tr> <tr><td>BPF 4-5 – 108.28 MHz</td><td>BPF 6-3 – 383.32 MHz</td><td>BPF 7-7 – 1016.68 MHz</td></tr> <tr><td>BPF 4-6 – 108.32 MHz</td><td>BPF 6-4 – 433.32 MHz</td><td>BPF 7-8 – 1016.72 MHz</td></tr> <tr><td>BPF 4-7 – 130.02 MHz</td><td>BPF 6-5 – 483.28 MHz</td><td>BPF 7-9 – 1166.68 MHz</td></tr> <tr><td>BPF 4-8 – 149.98 MHz</td><td>BPF 6-6 – 483.32 MHz</td><td>BPF 7-10 – 1166.72 MHz</td></tr> <tr><td>BPF 5-1 – 150.02 MHz</td><td>BPF 6-7 – 558.32 MHz</td><td>BPF 7-11 – 1299.98 MHz</td></tr> <tr><td>BPF 5-2 – 183.28 MHz</td><td>BPF 6-8 – 633.28 MHz</td><td></td></tr> <tr><td>BPF 5-3 – 183.32 MHz</td><td>BPF 6-9 – 633.32 MHz</td><td></td></tr> </tbody> </table> <ul style="list-style-type: none"> • Receiving 	BPF 1 – 7.02 MHz	BPF 5-4 – 216.02 MHz	BPF 6-10 – 699.98 MHz	BPF 2 – 21.02 MHz	BPF 5-5 – 265.68 MHz	BPF 7-1 – 700.02 MHz	BPF 3 – 40.02 MHz	BPF 5-6 – 265.72 MHz	BPF 7-2 – 750.02 MHz	BPF 4-1 – 50.02 MHz	BPF 5-7 – 300.02 MHz	BPF 7-3 – 799.98 MHz	BPF 4-2 – 58.28 MHz	BPF 5-8 – 349.98 MHz	BPF 7-4 – 800.02 MHz	BPF 4-3 – 58.32 MHz	BPF 6-1 – 350.02 MHz	BPF 7-5 – 916.68 MHz	BPF 4-4 – 88.02 MHz	BPF 6-2 – 383.28 MHz	BPF 7-6 – 916.72 MHz	BPF 4-5 – 108.28 MHz	BPF 6-3 – 383.32 MHz	BPF 7-7 – 1016.68 MHz	BPF 4-6 – 108.32 MHz	BPF 6-4 – 433.32 MHz	BPF 7-8 – 1016.72 MHz	BPF 4-7 – 130.02 MHz	BPF 6-5 – 483.28 MHz	BPF 7-9 – 1166.68 MHz	BPF 4-8 – 149.98 MHz	BPF 6-6 – 483.32 MHz	BPF 7-10 – 1166.72 MHz	BPF 5-1 – 150.02 MHz	BPF 6-7 – 558.32 MHz	BPF 7-11 – 1299.98 MHz	BPF 5-2 – 183.28 MHz	BPF 6-8 – 633.28 MHz		BPF 5-3 – 183.32 MHz	BPF 6-9 – 633.32 MHz		
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SCOPE S	1	<ul style="list-style-type: none"> • Click adjustment item [Scope S] on the Adjustment Panel. • Select "S0" at the left side of Adjustment Panel. • Mode : FM • Filter : 15.0 kHz • Set an SSG as : <table> <tbody> <tr><td>Frequency</td><td>: 149.97000 MHz</td></tr> <tr><td>Level</td><td>: 0.32 µV* (-117 dBm)</td></tr> <tr><td>Modulation</td><td>: OFF</td></tr> </tbody> </table> • Receiving 	Frequency	: 149.97000 MHz	Level	: 0.32 µV* (-117 dBm)	Modulation	: OFF	<ul style="list-style-type: none"> • Click "Write" switch to store sampled data into memory. 																																				
Frequency	: 149.97000 MHz																																												
Level	: 0.32 µV* (-117 dBm)																																												
Modulation	: OFF																																												
	2	<ul style="list-style-type: none"> • Same operation as step 1 for the listed levels. • Set an SSG as : <table> <tbody> <tr><td>S3</td><td>: 3.2 µV* (-97 dBm)</td><td>S9+20</td><td>: 320 µV* (-57 dBm)</td></tr> <tr><td>S5</td><td>: 10 µV* (-87 dBm)</td><td>S9+40</td><td>: 1.0 mV* (-47 dBm)</td></tr> <tr><td>S7</td><td>: 32 µV* (-77 dBm)</td><td>S9+60</td><td>: 3.2 mV* (-37 dBm)</td></tr> <tr><td>S9</td><td>: 100 µV* (-67 dBm)</td><td></td><td></td></tr> </tbody> </table> • Receiving 	S3	: 3.2 µV* (-97 dBm)	S9+20	: 320 µV* (-57 dBm)	S5	: 10 µV* (-87 dBm)	S9+40	: 1.0 mV* (-47 dBm)	S7	: 32 µV* (-77 dBm)	S9+60	: 3.2 mV* (-37 dBm)	S9	: 100 µV* (-67 dBm)																													
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S9	: 100 µV* (-67 dBm)																																												
CENTER INDICATOR	1	<ul style="list-style-type: none"> • Click adjustment item [Center] on the Adjustment Panel. • Select "CW low" at the left side of Adjustment Panel. • Set an SSG as : <table> <tbody> <tr><td>Frequency</td><td>: 149.96700 MHz</td></tr> <tr><td>Level</td><td>: 50 µV* (-73 dBm)</td></tr> <tr><td>Modulation</td><td>: OFF</td></tr> </tbody> </table> • Receiving 	Frequency	: 149.96700 MHz	Level	: 50 µV* (-73 dBm)	Modulation	: OFF	<ul style="list-style-type: none"> • Click "Write" switch to store sampled data into memory. 																																				
Frequency	: 149.96700 MHz																																												
Level	: 50 µV* (-73 dBm)																																												
Modulation	: OFF																																												
	2	<ul style="list-style-type: none"> • Select "CW high" at the left side of Adjustment Panel. • Set an SSG as : <table> <tbody> <tr><td>Frequency</td><td>: 149.97300 MHz</td></tr> </tbody> </table> • Receiving 	Frequency	: 149.97300 MHz	<ul style="list-style-type: none"> • Click "Write" switch to store sampled data into memory. 																																								
Frequency	: 149.97300 MHz																																												
NOISE SQUELCH	1	<ul style="list-style-type: none"> • Click adjustment item [Noise SQL] on the Adjustment Panel. 	<ul style="list-style-type: none"> • Click each "Write" switch for Timing and Level. 																																										
	2	<ul style="list-style-type: none"> • Set an Adjustment panel as: <table> <tbody> <tr><td>Timing</td><td>: T2 — 2</td></tr> <tr><td></td><td>T3 — 100</td></tr> <tr><td>Level</td><td>: Thresh — 20</td></tr> <tr><td></td><td>Tight — 20</td></tr> </tbody> </table> 	Timing	: T2 — 2		T3 — 100	Level	: Thresh — 20		Tight — 20	<ul style="list-style-type: none"> • Click "▼" then "Write" switches at 'Level' to set Thresh/Tight data until noise disappears. <p>NOTE: "Write" switch must be clicked at each level, otherwise the level is invalid.</p>																																		
Timing	: T2 — 2																																												
	T3 — 100																																												
Level	: Thresh — 20																																												
	Tight — 20																																												
	3	<ul style="list-style-type: none"> • Set an Adjustment panel as: <table> <tbody> <tr><td>Timing</td><td>: T2 — 2</td></tr> <tr><td></td><td>T3 — 4</td></tr> </tbody> </table> 	Timing	: T2 — 2		T3 — 4	<ul style="list-style-type: none"> • Click "Write" switch for Timing. 																																						
Timing	: T2 — 2																																												
	T3 — 4																																												

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

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C627	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C628	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C630	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C631	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C632	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C633	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C634	4030007160	S.CERAMIC	C1608 CH 1H 181J-T-A
C635	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C636	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C637	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C638	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C640	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C641	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C642	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C643	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C644	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C645	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C646	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C647	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C648	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C649	4030011280	S.CERAMIC	C1608 CH 1H 271J-T-A
C650	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C651	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C652	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C653	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C654	4550006700	S.TANTALUM	ECST1AY106R
C655	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C656	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C657	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C659	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C660	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C661	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C663	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C664	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C665	4550006810	S.TANTALUM	ECST1VY473R
C667	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C669	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C670	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C671	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C672	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C673	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C674	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C675	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C676	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C677	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C678	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C679	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C680	4030010760	S.CERAMIC	C1608 CH 1H 331J-T-A
C681	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C682	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C683	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C684	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C685	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C686	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C687	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C688	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
J1	6510020530	S.CONNECTOR	52808-1890
J2	6510020530	S.CONNECTOR	52808-1890
J5	6510006360	CONNECTOR	TMP-J02X-A1
W2	7030003860	S.JUMPER	ERJ3GE JPW V
W3	7030003860	S.JUMPER	ERJ3GE JPW V
W4	7030003860	S.JUMPER	ERJ3GE JPW V
W5	7030003860	S.JUMPER	ERJ3GE JPW V
W6	7030003860	S.JUMPER	ERJ3GE JPW V
W7	7030003860	S.JUMPER	ERJ3GE JPW V
EP1	0910049015	PCB	B 5015E

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[LOGIC UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP 1	8930044920	2032 Coil cover	1
MP 2	8930014140	Grounding spring (D)	1
MP 3	8950004610	S-5 (Wiresticker)	1

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION	QTY.
MP 1	8510007950	1312 VCO case	1
MP 2	8510010850	1897 D/A case	2
MP 3	8510004280	VCO case (A)	1
MP 4	8510011160	1897 PLL shield case	1
MP 5	8930043100	Sponge (EU)	2
MP 6	8930014140	Grounding spring (D)	1
MP 7	8510010460	1691 Main shield plate	3
MP 8	8930024170	Grounding spring (G)	1
MP 9	8930027730	Sponge (DC)	1

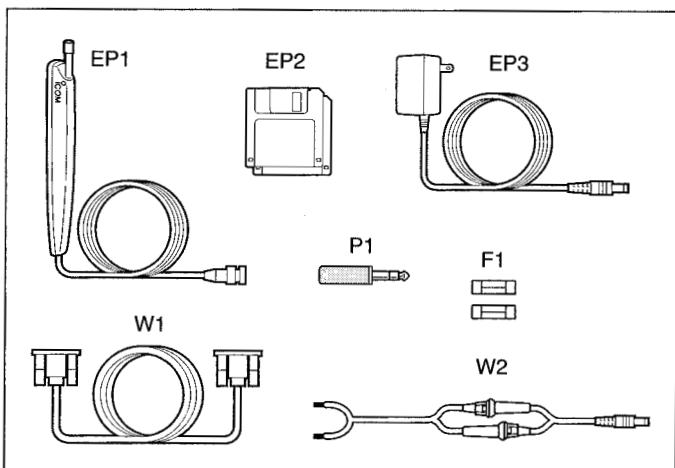
[CHASSIS]

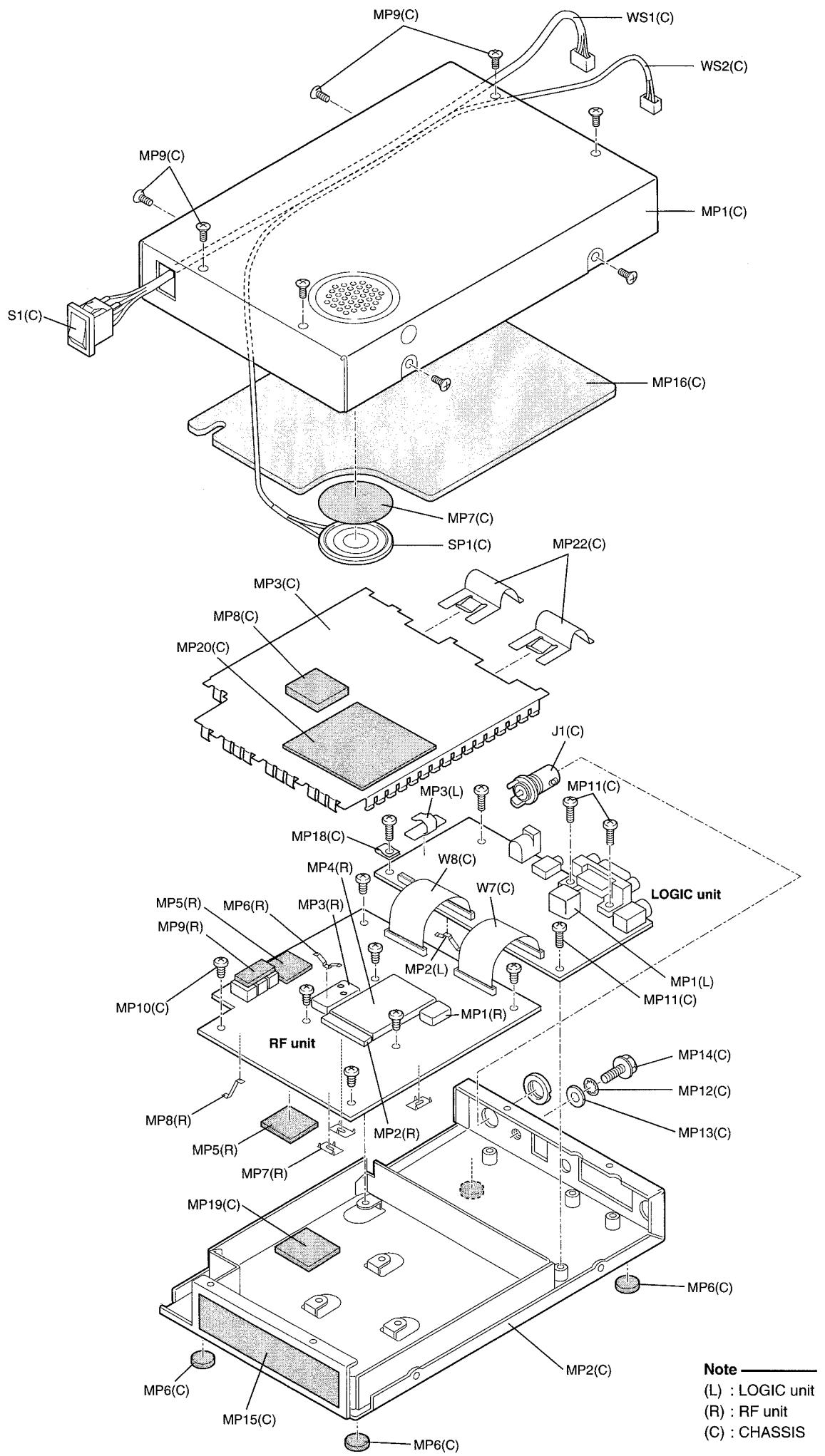
REF NO.	ORDER NO.	DESCRIPTION	QTY.
J 1	6510015550	Connector BNC-R117 (incl. nut)	1
S 1	2260002400	Switch DS850K-S-LG	1
W 7	8900007640	OPC-740 cable	1
W 8	8900007640	OPC-740 cable	1
MP 1	8110006250	2032 Cover	1
MP 2	8510011390	2032 Case	1
MP 3	8510011370	2032 Shield cover	1
MP 6	8930039620	Leg cushion (A)	4
MP 7	8930009630	SP net	1
MP 8	8930044120	Sponge (FI)	1
MP 9	8810008960	Screw FH M2.6x5 ZK	8
MP10	8810008630	Screw FH BT M3x6 NI-ZU	7
MP11	8810008680	Screw PH M3x8 NI 5	
MP12	8850001560	Star washer M4	1
MP13	8850000140	Flat washer M4 NI BS	1
MP14	8820000530	Hexagon bolt M4 x 8 NI	1
MP15	8930044790	Sheet BR	1
MP16	8930044780	2032 Sponge	1
MP18	8930015640	Code holder	1
MP19	8930043100	Sponge (EU)	1
MP20	8930018570	Cushion sheet (D)	1
MP22	8930045500	2032 SHIELD PLATE	2
SP 1	2510001020	Speaker SV-36W0843	1
WS 1	8600036000	Code P01CH	1
WS 2	8600036010	Code P02CH	1

Screw abbreviations: PH: Pan head FH: Flat head
NI: Nickel ZK: Black

7-2 ACCESSORIES

REF NO.	ORDER NO.	DESCRIPTION	QTY.
F1	5210000040	Fuse FGB 2A [EUR]	2
P1	5610000020	Connector AP313 3.5φ CS plug	1
W1	8900007650	RS-232C cable OPC-743	1
W2	8900001410	DC cable OPC-131 [EUR]	1
EP1	3310001920	2032 Antenna	1
EP2		3.5" FD 40MF2HDGEDV	1set
EP3	Optional product	AC adaptor BC-123A/BM-104A [USA] AC adaptor BC-123E/BM-104E [OTH]	1

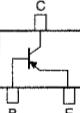
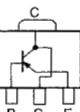
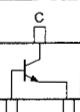
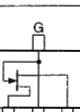
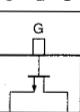
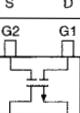


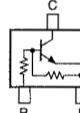
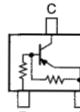
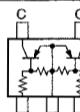
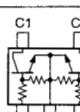
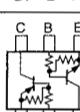
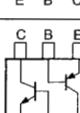


Note
 (L) : LOGIC unit
 (R) : RF unit
 (C) : CHASSIS

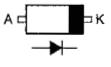
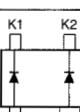
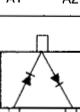
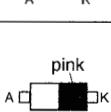
SECTION 8 SEMI-CONDUCTOR INFORMATION

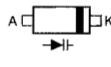
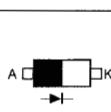
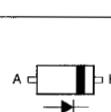
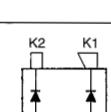
8-1 TRANSISTORS AND FET'S

NAME	SYMBOL	INSIDE VIEW
2SA1622-6-TL	M6	
2SB1123T-TD	BF	
2SC4117-BL 2SC4211-6 2SC4835-R 2SC5193-T1	CL L6 3M T88	
2SK2171-4-TD	KM	
2SK880-Y 2SK882-GR	XY TG	
3SK131-T2 3SK228XR	V12 XR	

NAME	SYMBOL	INSIDE VIEW
DTA114EU	26	
DTA144EU	16	
XP1114	7Q	
XP1213	9L	
XP4311	7X	
XP4601	5C	

8-2 DIODES

NAME	SYMBOL	INSIDE VIEW
1SR154-400 1SS355 1SV307 DAN222TL	14 A TX N-4	
1SS272 1SV237	A1 BB	
1SS375-TL	FH	
1SV214 1SV230 1SV288	T1 T7 TJ	

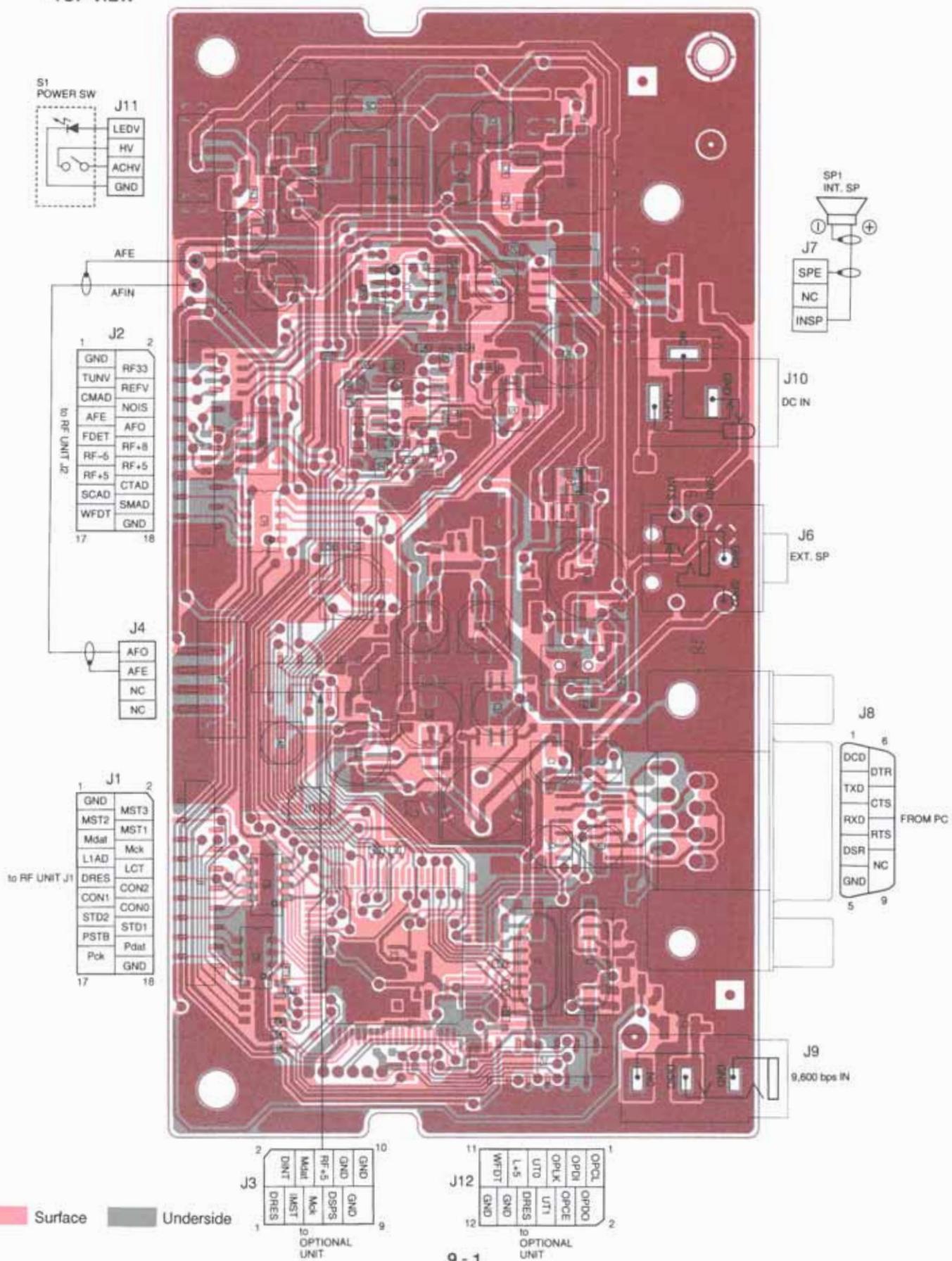
NAME	SYMBOL	INSIDE VIEW
1SV217	T6	
MA77	4B	
MA8051-M	5-1	
MA862	M1L	

SECTION 9 BOARD LAYOUTS

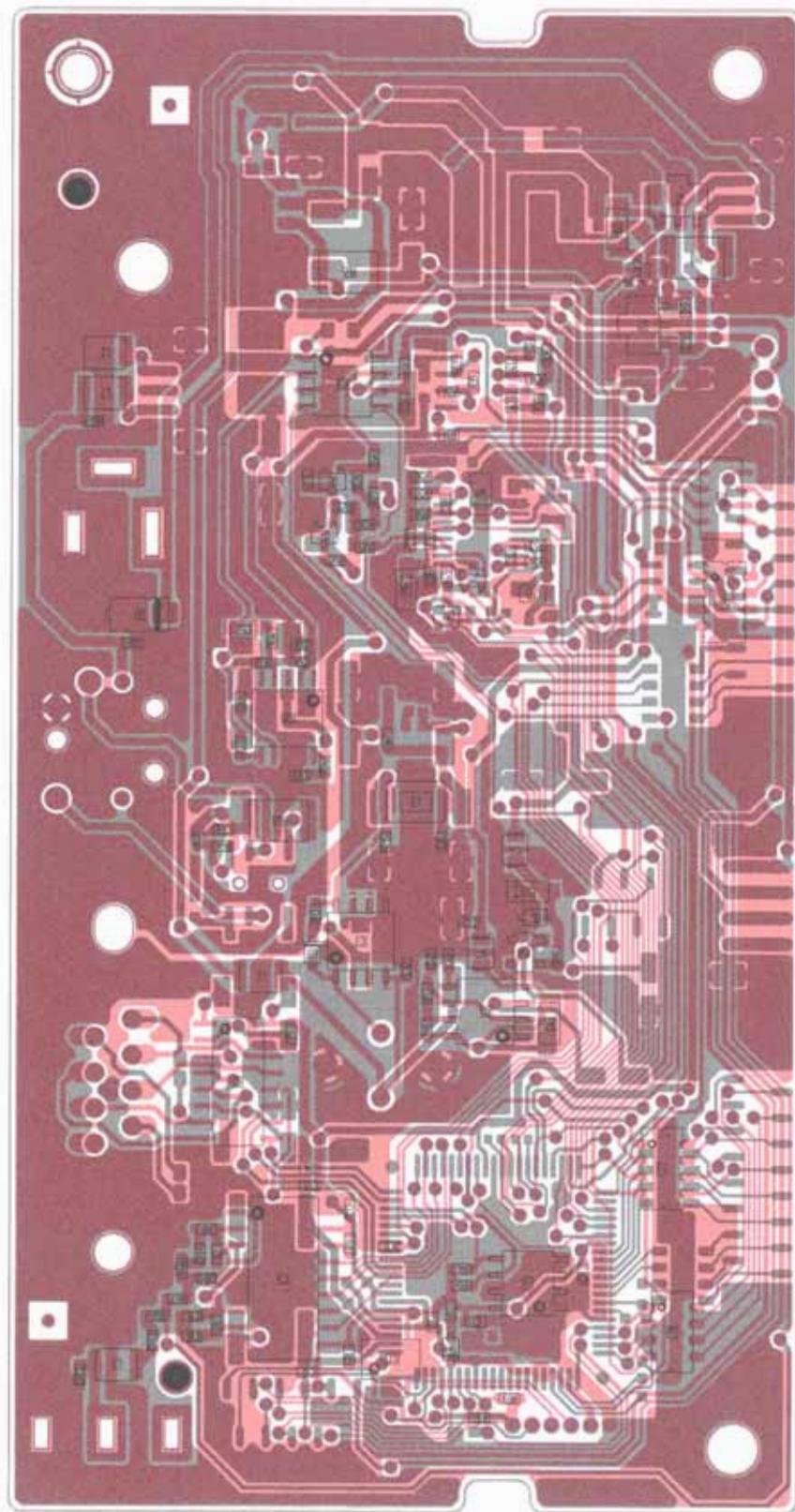
9-1 LOGIC UNIT

• TOP VIEW

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



• BOTTOM VIEW

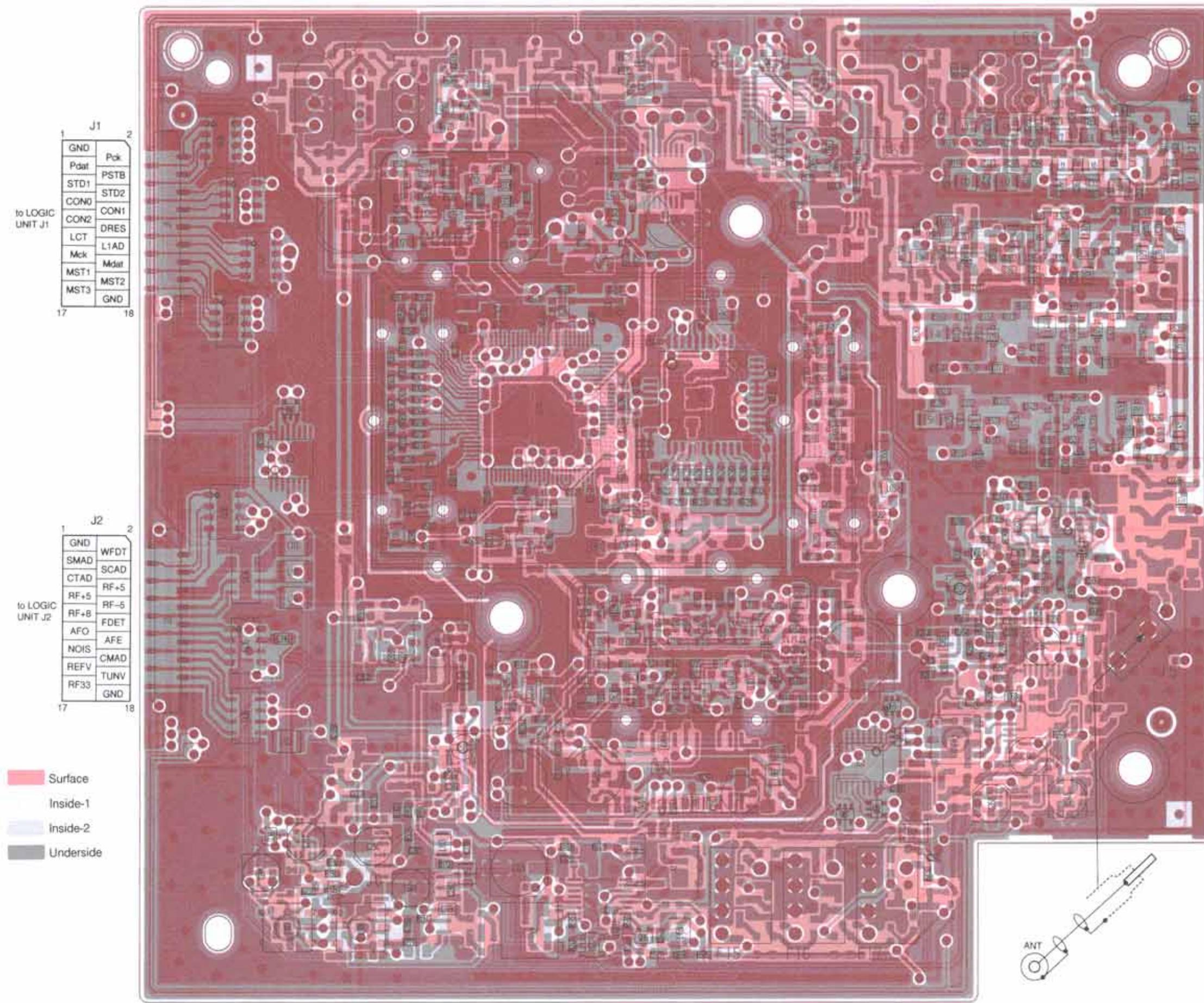


■ Surface ■ Underside

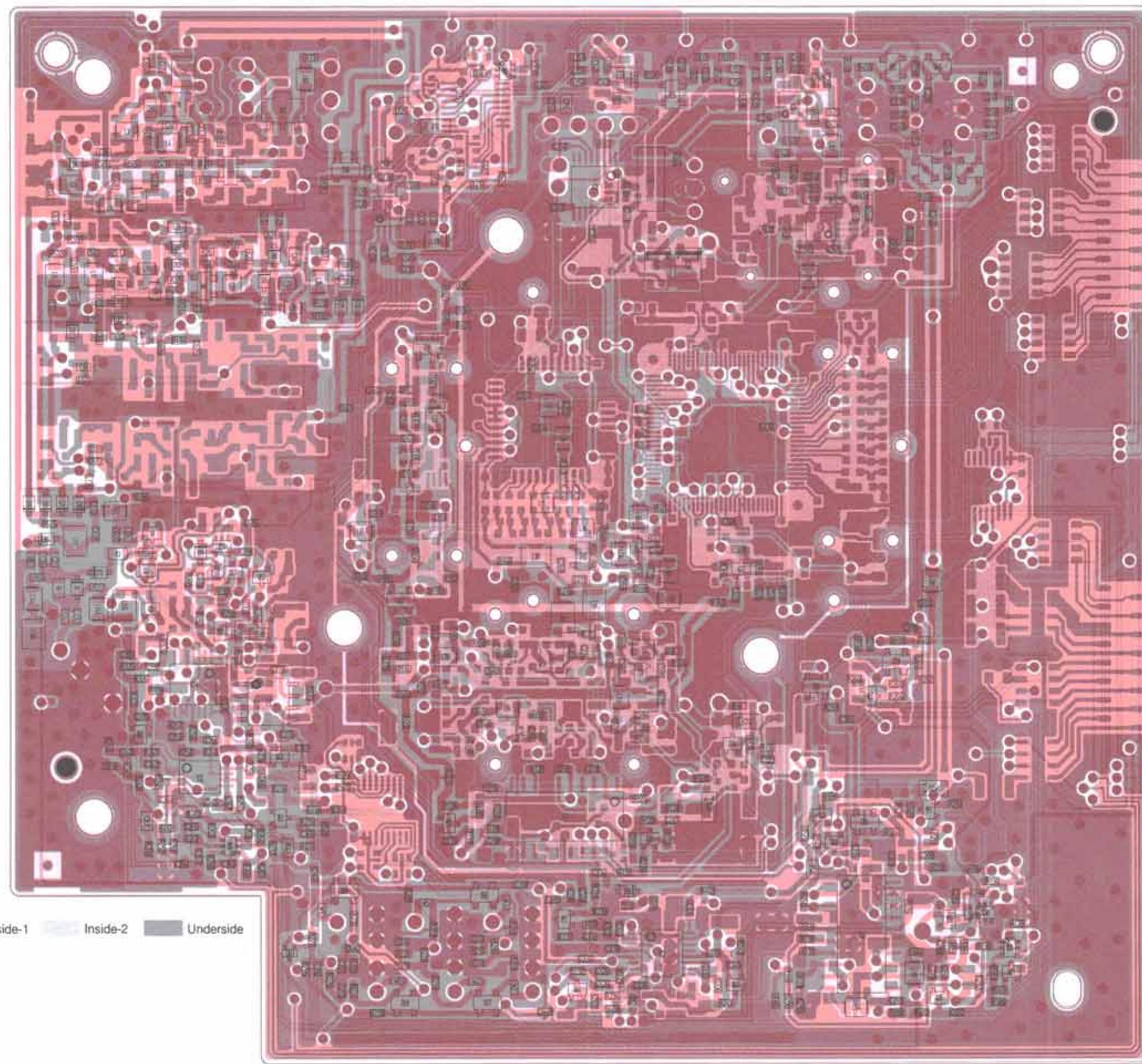
9-2 RF UNIT

• TOP VIEW

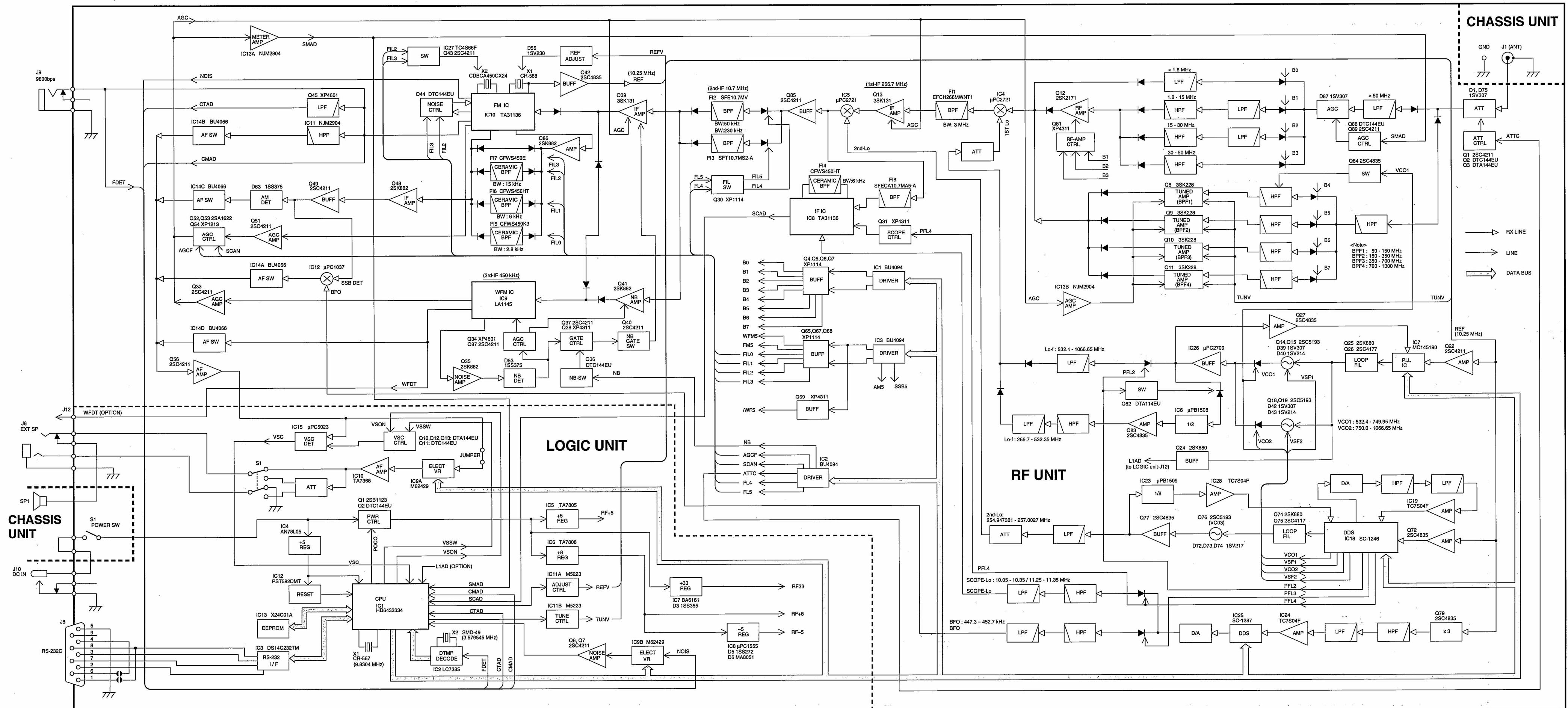
The combination of this page and the next page shows
the unit layout in the same configuration as the actual
P.C. Board.



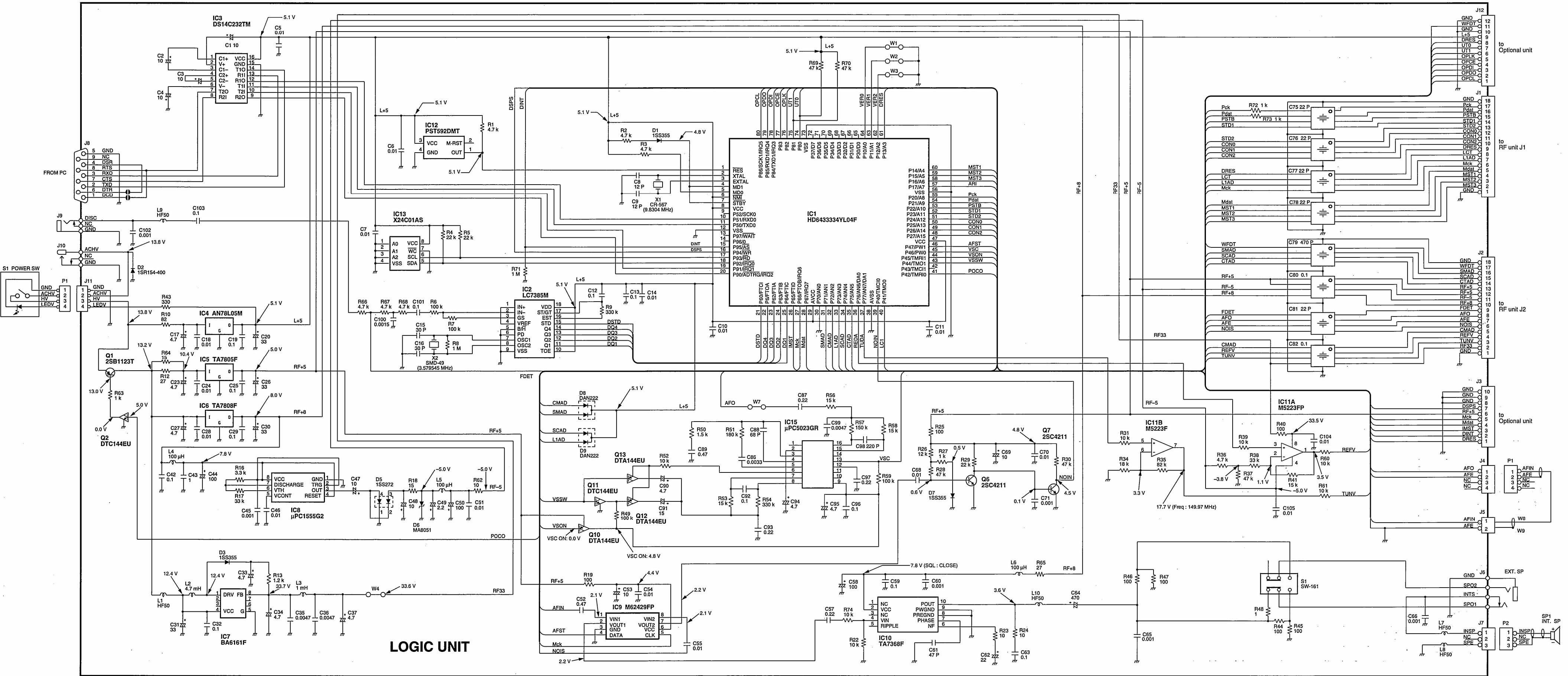
• BOTTOM VIEW

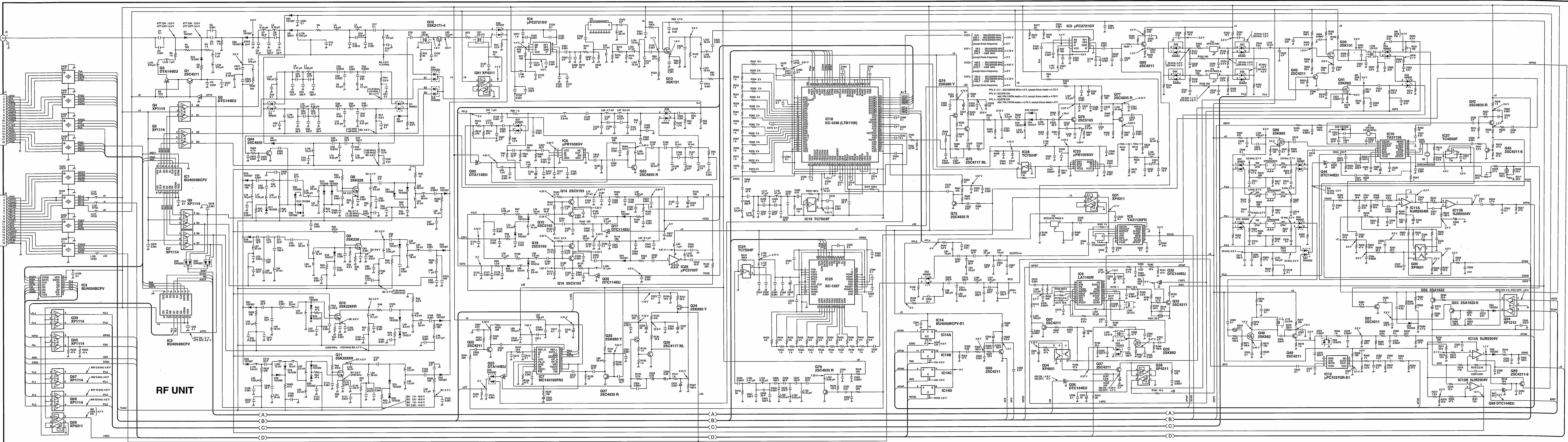


SECTION 10 BLOCK DIAGRAM



SECTION 11 VOLTAGE DIAGRAM





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