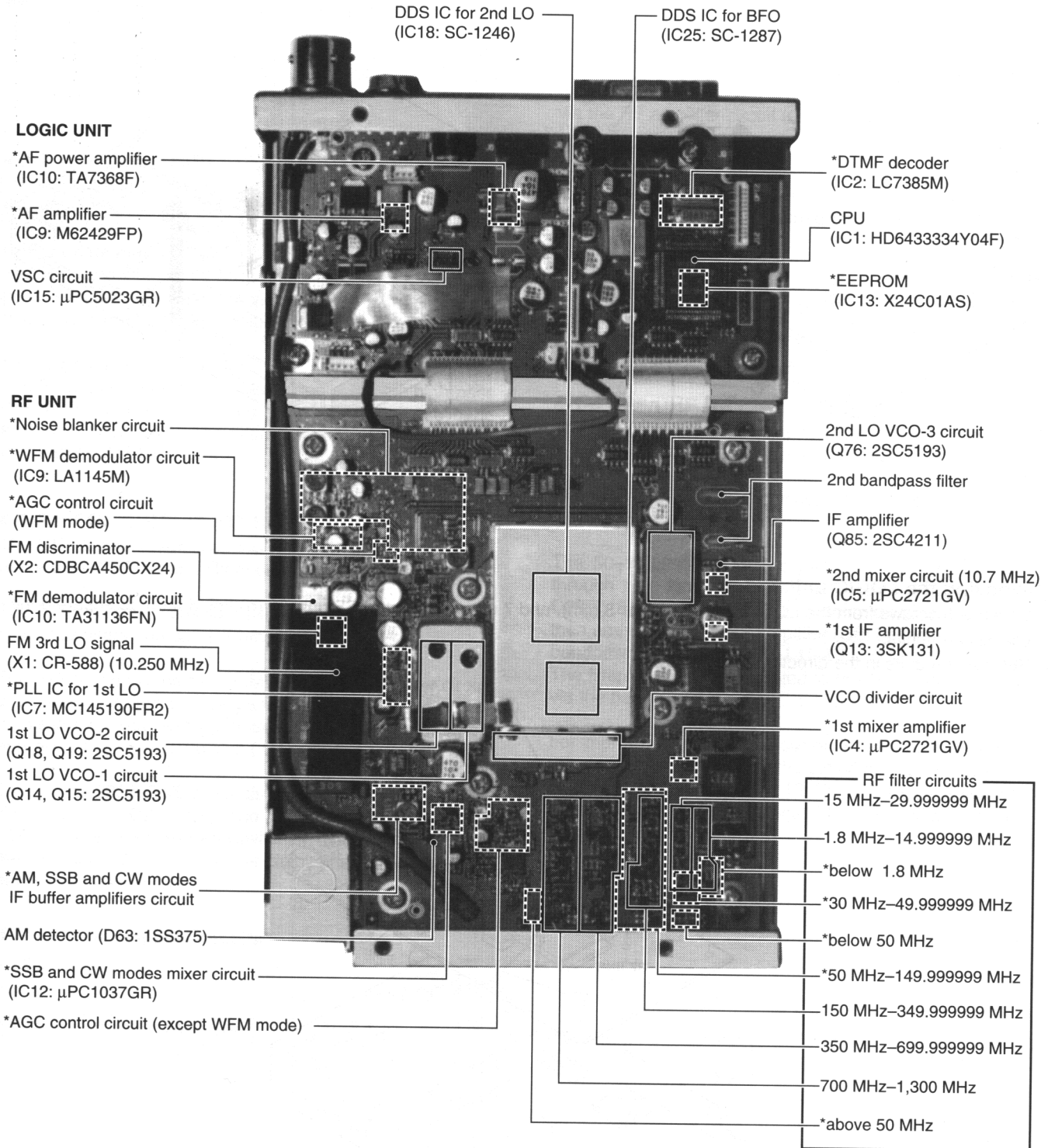


SECTION 2 INSIDE VIEW

• LOGIC UNIT and RF UNIT

* : Located underside of this point.



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).

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)

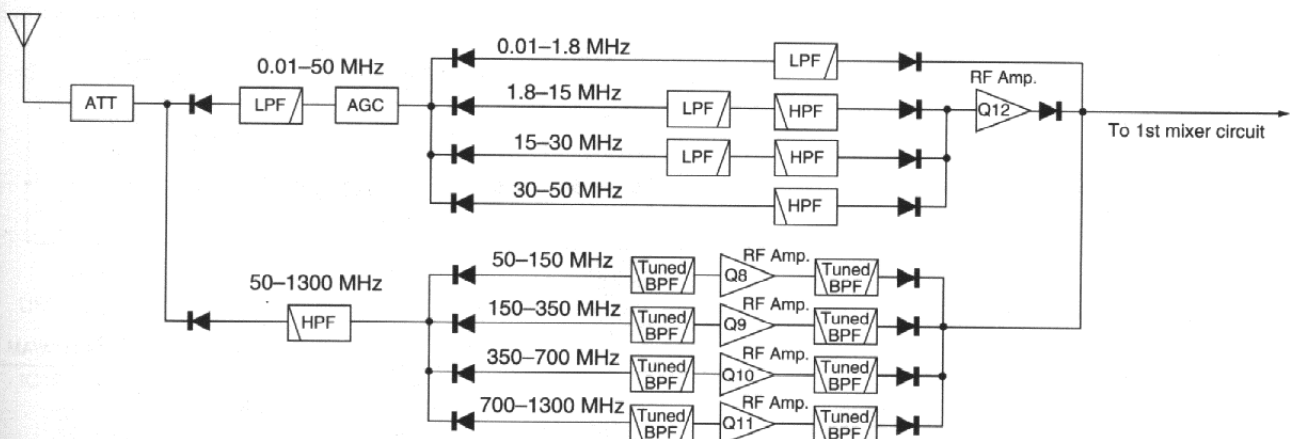
The VHF/UHF RF circuit amplifies the received signals within the range 50–1300 MHz and filters out-of-band signals.

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).

• RF filter and amplifier circuits



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).

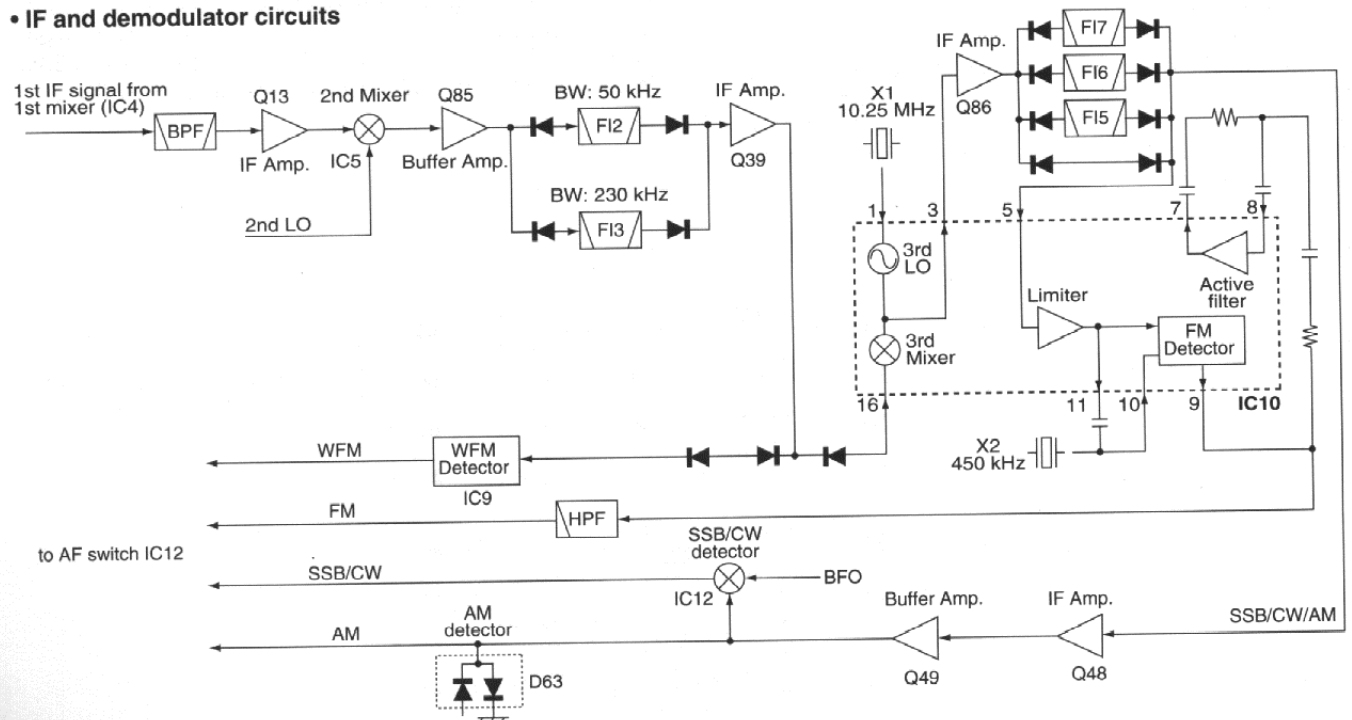
The 700–1300 MHz signals from the band switching diode (D26) pass through the high-pass filter (L141, C110, C606) and 2-stage tunable bandpass filters (D78, D79, L163, D29, D30, L51–L53). The filtered signals are then amplified at the RF amplifier (Q11) and pass through the tunable bandpass filters (D31, 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 |

• IF and demodulator circuits



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).

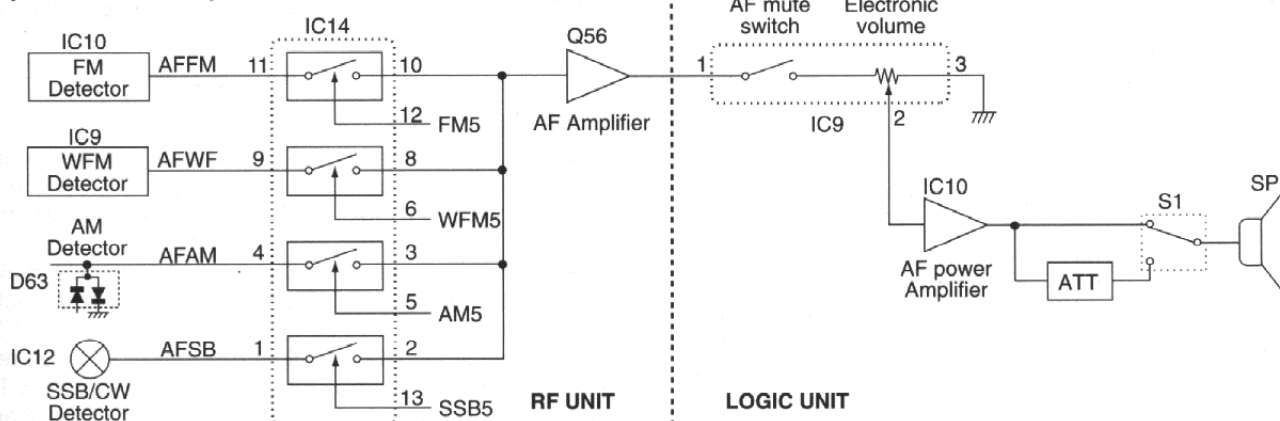
(2) FM mode

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.

• 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

its 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)

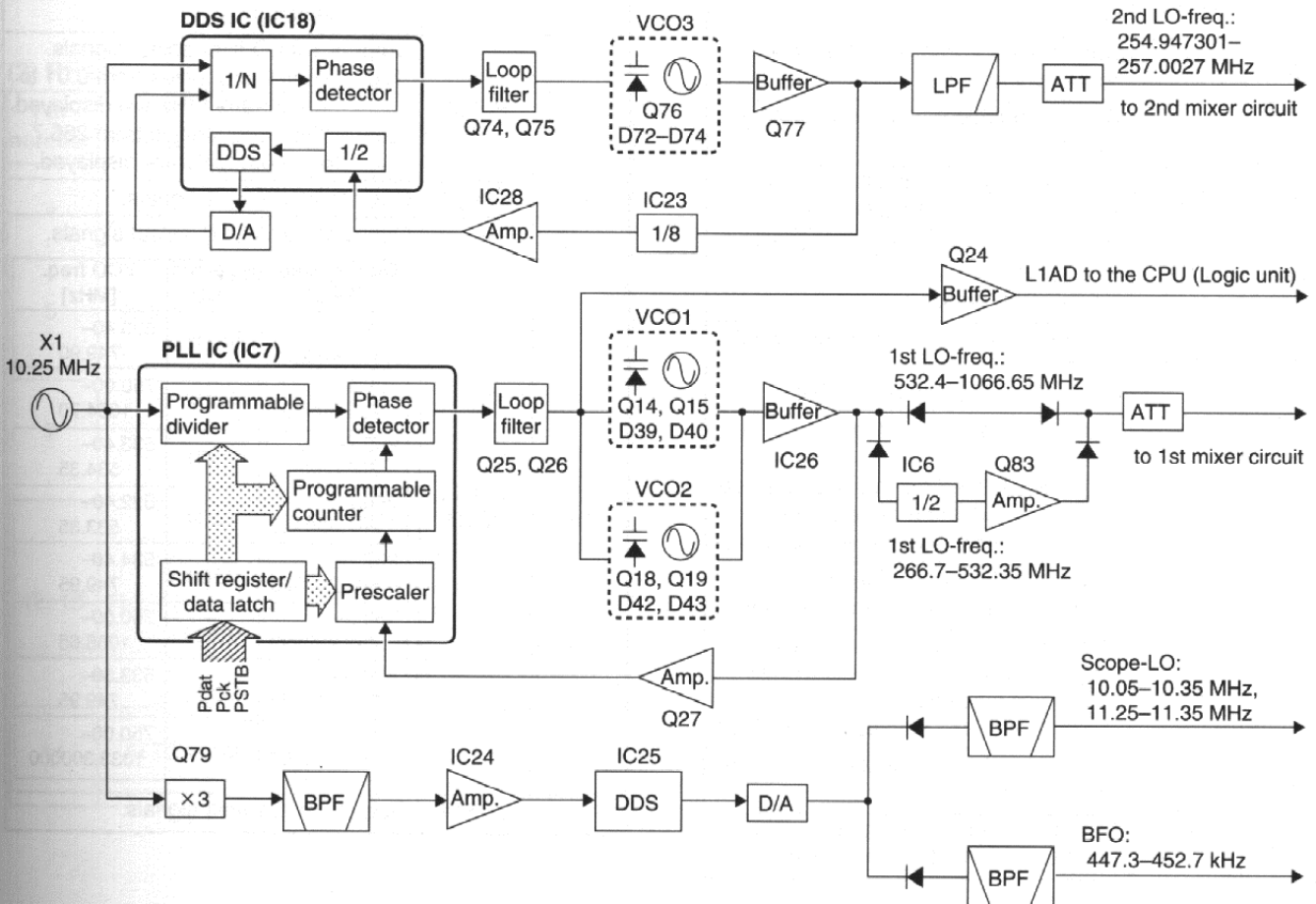
The BFO signals are generated by the DDS circuit (IC25) using the divided reference signal. 10-bit digital signals are converted into 447.3–452.7 kHz analog wave signals at the D/A converter (R423–R442). The converted analog wave signals are passed through the bandpass filter (L99–L101, C269–C274) via 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Display freq. [MHz]</th> <th>Selected VCO</th> <th>VCO freq. [MHz]</th> </tr> </thead> <tbody> <tr> <td>0.01–108.299999</td> <td>VCO1</td> <td>533.40–749.90</td> </tr> <tr> <td>108.3–265.699999</td> <td>VCO2</td> <td>750.00–1064.70</td> </tr> <tr> <td>265.7–266.699999</td> <td>VCO1</td> <td>533.40–534.35</td> </tr> <tr> <td>266.7–267.699999</td> <td>VCO1</td> <td>532.40–533.35</td> </tr> <tr> <td>267.7–483.299999</td> <td>VCO1</td> <td>534.40–749.95</td> </tr> <tr> <td>483.3–799.999999</td> <td>VCO2</td> <td>750.00–1066.65</td> </tr> <tr> <td>800.0–1016.699999</td> <td>VCO1</td> <td>533.30–749.95</td> </tr> <tr> <td>1016.7–1300.000000</td> <td>VCO2</td> <td>750.00–1033.300000</td> </tr> </tbody> </table> | 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 |
| | | 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. | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>SW signal</th> <th>Bandpass filter</th> <th>Passband width</th> </tr> </thead> <tbody> <tr> <td>FL0</td> <td>FI5</td> <td>2.8 kHz</td> </tr> <tr> <td>FL1</td> <td>FI6</td> <td>6 kHz</td> </tr> <tr> <td>FL2</td> <td>FI7</td> <td>15 kHz</td> </tr> <tr> <td>FL3</td> <td>By-pass</td> <td>—</td> </tr> </tbody> </table> | SW signal | Bandpass filter | Passband width | FL0 | FI5 | 2.8 kHz | FL1 | FI6 | 6 kHz | FL2 | FI7 | 15 kHz | FL3 | By-pass | — |
| | | 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.

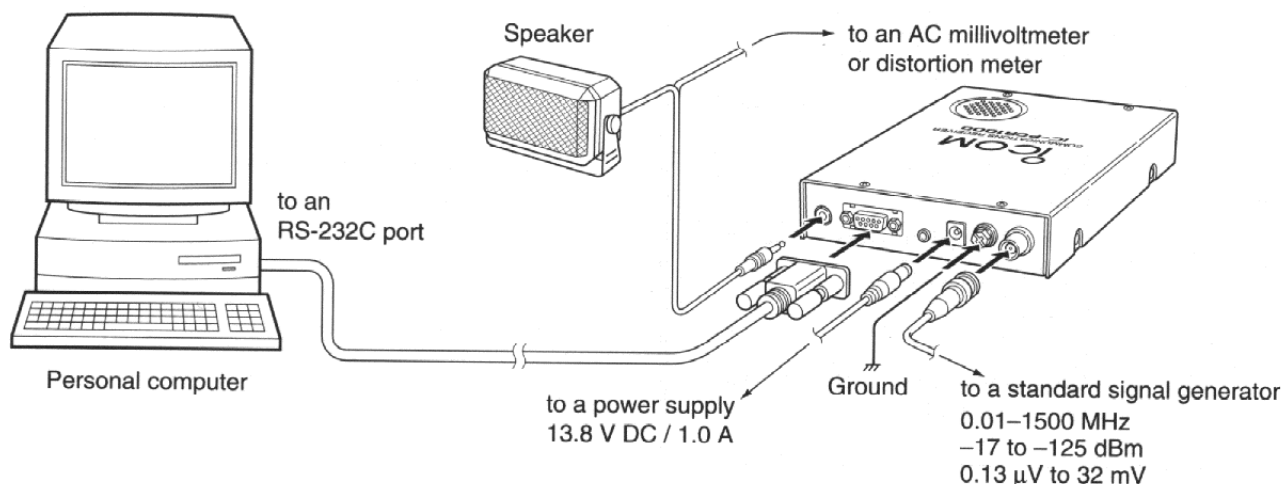
OPERATING INSTRUCTIONS

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.

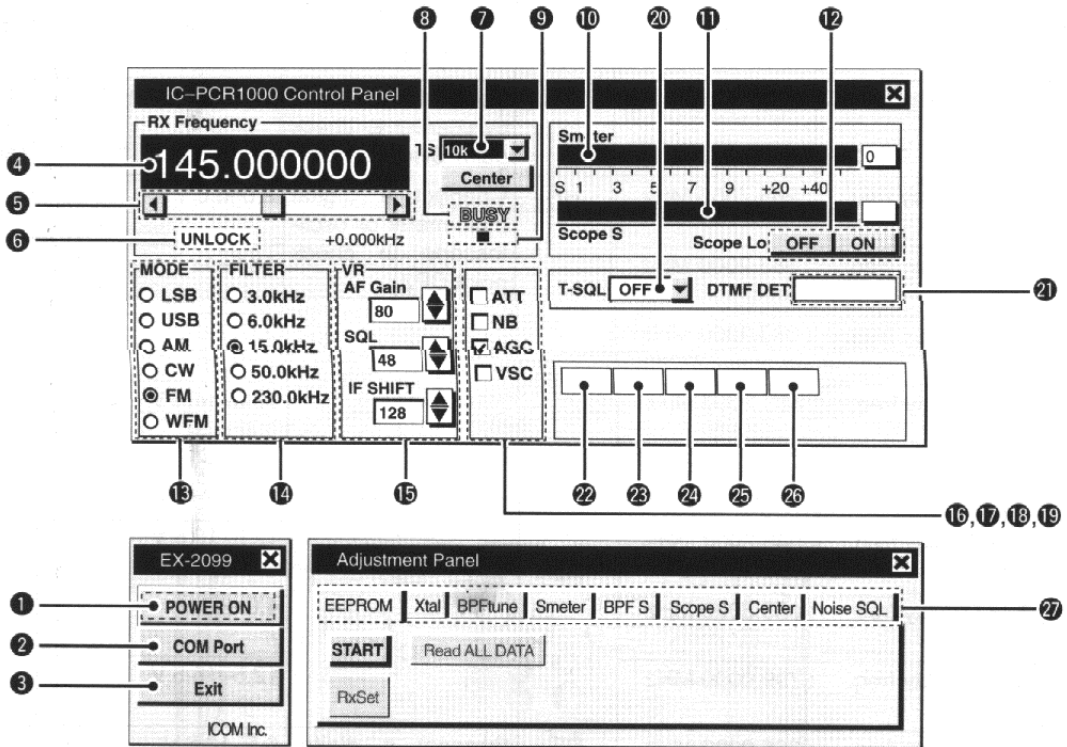
- ① Connect IC-PCR1000 and PC with an RS-232C serial cable.
- ② Boot up Windows.
- ③ Click the "EX-2099 for IC-PCR1000" in the program group 'IC-PCR1000' to start the program.
 - The Power Panel appears.
- ④ Click "POWER ON" on the Power panel.
 - Control Panel and Adjustment Panel appear.
- ⑤ Click "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.

IBM is a registered trademark of International Business Machines Corporation in the U.S.A and other countries. Microsoft and Windows are registered trademarks of Microsoft Corporation in the U.S.A and other countries. Screen shots produced with permission from Microsoft Corporation. All other products or brands are registered trademarks or trademarks of their respective holders.

BASIC CONNECTION



■ PANEL DESCRIPTIONS



◆ POWER PANEL

- ❶ **POWER button**
Turns IC-PCR1000 on and off.
- ❷ **COM port button**
Used to select a COM port.
- ❸ **EXIT button**
Quits the program.

◆ CONTROL PANEL

- ❹ **FREQUENCY indication**
Indicates or inputs the receive frequency.
- ❺ **FREQUENCY scroll bar**
Used to change the receive frequency. Moving the button to the right increases the frequency; to the left decreases the frequency.
- ❻ **UNLOCK indicator**
Appears when the PLL is unlocked.
- ❼ **Tuning step button**
Used to change the tuning step.
- ❽ **BUSY indicator**
Appears when receiving a signal or when signal noise opens the squelch.
- ❾ **FM center indicator**
Indicates the tuning level when selecting the 6 kHz or 15 kHz IF filter in FM mode.
- ❿ **S-meter indicator**
Indicates the receive signal strength.
- ⓫ **Scope S indicator**
- ⓬ **Scope Lo (ON/OFF) button**
- ⓭ **Receive mode buttons**
Select a receive mode.
- ⓮ **FILTER (IF filter) buttons**
Change the IF filter in use.
- ⓯ **Volume buttons**
Adjust the audio output, squelch level and set the signals passband position.

❿ **ATT (Attenuator) button**

Turns the attenuator on and off.

⓫ **NB (Noise Blanker) button**

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

⓬ **AGC (Automatic Gain Control) button**

Turns the AGC function on and off.

⓭ **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.

⓮ **T-SQL (Tone squelch) button**

Indicates or selects tone frequency for the tone squelch.

⓯ **DTMF decode indicator**

Indicates the decoded DTMF signals.

⓰ **AD1 (SMAD) indicator**

Indicates voltage level for the S-meter.

⓱ **AD2 (CMAD) indicator**

Indicates voltage level for the center meter.

⓲ **AD3 (L1AD) indicator**

Indicates the 1st LO PLL lock voltage level.

⓳ **AD4 (SCAD) indicator**

Indicates voltage level for the scope signal.

⓴ **AD5 (CTAD) indicator**

Indicates voltage level for the CTCSS decoded signal.

▶ **ADJUSTMENT PANEL**

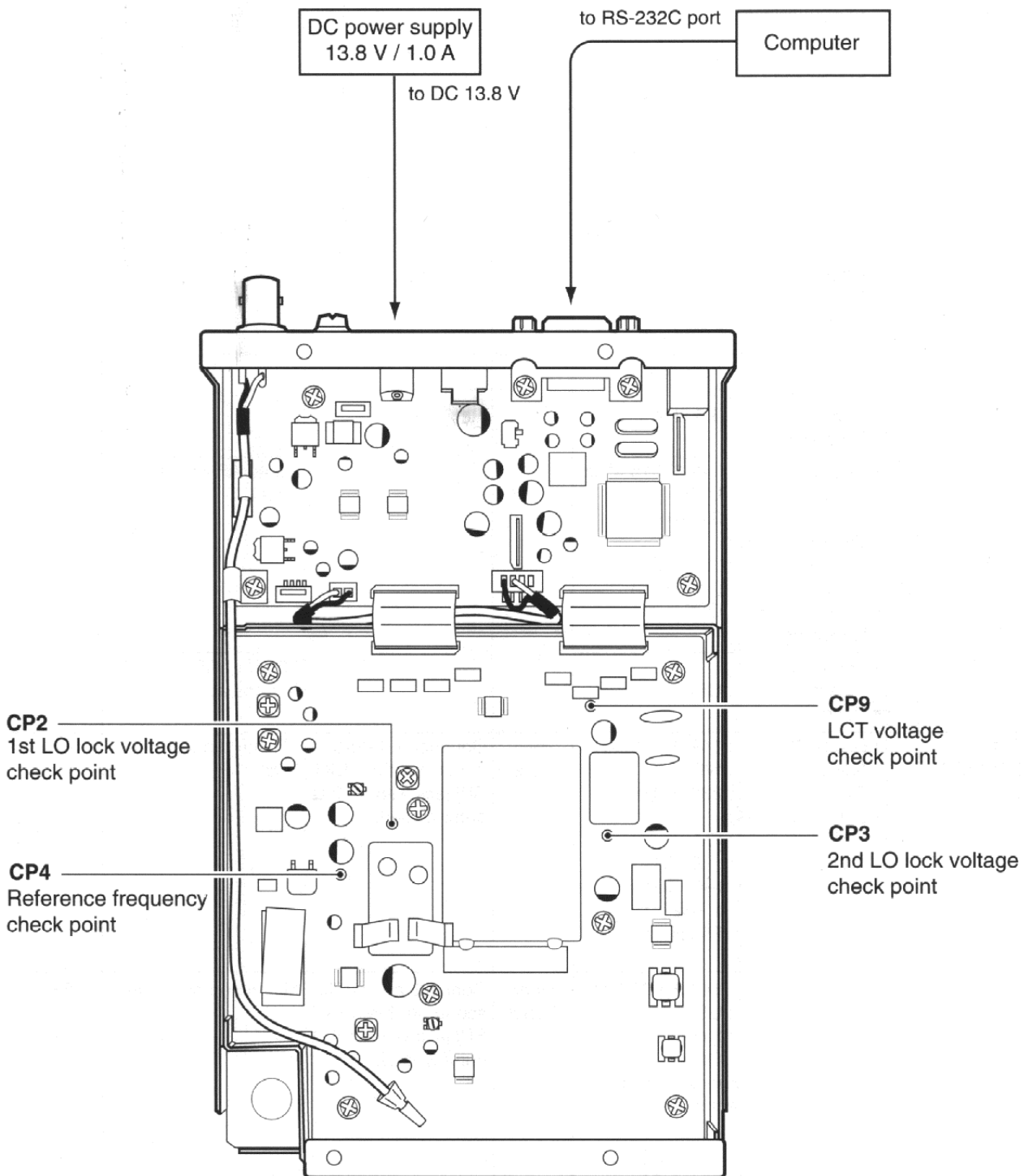
⓴ **Item select buttons**

Used to select the adjustment items.

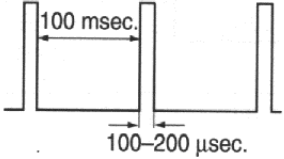
5-2 PLL ADJUSTMENT AND IF PEAK ADJUSTMENT

| 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 μ V* (-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 | | | | |

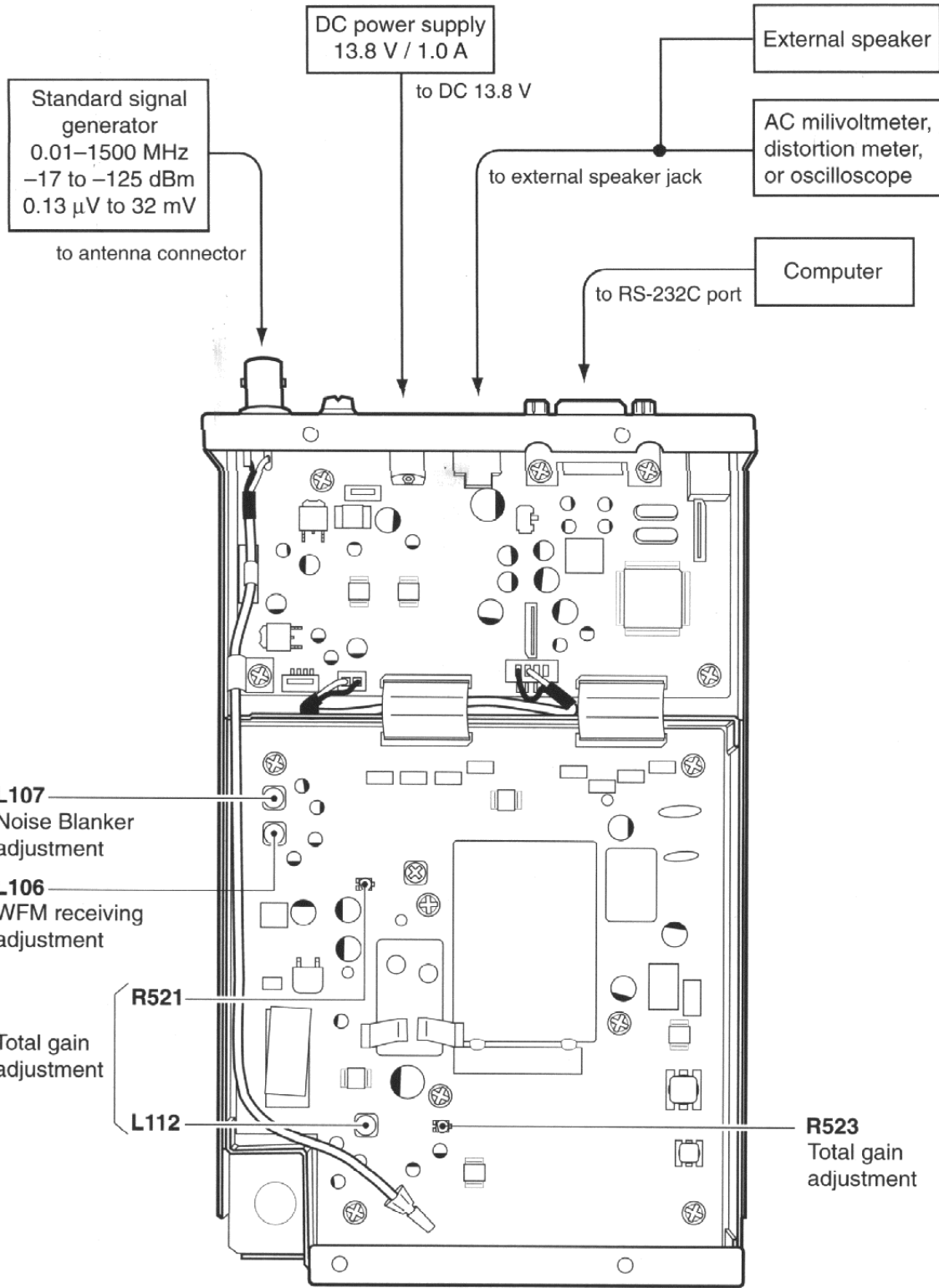
*This output level of a standard signal generator (SSG) is indicated as SSG's open circuit.



5-3 RECEIVE ADJUSTMENT

| ADJUSTMENT | ADJUSTMENT CONDITION | MEASUREMENT | | VALUE | ADJUSTMENT POINT | | | |
|---------------|----------------------|--|------------|--|--------------------------|--|------------------|---------|
| | | UNIT | LOCATION | | UNIT | ADJUST | | |
| TOTAL GAIN | 1 | <ul style="list-style-type: none"> • Display freq. : 149.97000 MHz • Mode : USB • Filter : 3.0 kHz • Set an SSG as : <ul style="list-style-type: none"> Frequency : 149.97015 MHz Level : 1.8 μV* (-102 dBm) Modulation : OFF • Receiving | Rear Panel | Connect an AC millivoltmeter to the [EXT SP] jack with an 8 Ω dummy load. | Maximum AF level | RF | L112 | |
| | 2 | <ul style="list-style-type: none"> • Display freq. : 149.97000 MHz • Mode : FM • Filter : 15.0 kHz • Set an SSG as : <ul style="list-style-type: none"> Mode : FM Level : 1.0 mV* (-47 dBm) Modulation : 1 kHz Deviation : 3.5 kHz • Receiving | | | | Any AF level | Computer display | AF Gain |
| | 3 | <ul style="list-style-type: none"> • Display freq. : 149.97015 MHz • Mode : USB • Filter : 3.0 kHz • Set an SSG as : <ul style="list-style-type: none"> Level : 1.0 mV* (-47 dBm) Modulation : OFF • Receiving | | | | Same AF level as step 2 | RF | R523 |
| | 4 | <ul style="list-style-type: none"> • Set an SSG as : <ul style="list-style-type: none"> Level : OFF • Receiving | | | | 20 dB of AF level difference as step 3 | | R521 |
| WFM RECEIVER | 1 | <ul style="list-style-type: none"> • Display freq. : 149.97000 MHz • Mode : WFM • Filter : 230.0 kHz • Set an SSG as : <ul style="list-style-type: none"> Mode : FM Level : 1.0 μV* (-47 dBm) Modulation : 1 kHz Deviation : 75 kHz • Receiving | 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 | <ul style="list-style-type: none"> • Display freq. : 149.97000 MHz • Mode : USB • Filter : 3.0 kHz • NB : ON • Apply the following noise signal to the [ANT] connector.  <p>The diagram shows a square wave pulse. The width of the pulse is labeled as 100 msec. The time between the start of one pulse and the start of the next pulse is labeled as 100-200 μsec.</p> <ul style="list-style-type: none"> • Receiving | 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 • Click adjustment item [Xtal] on the Adjustment Panel. • Connect a frequency counter to check point CP4 on the RF unit (see page 5-4). | • Click “▲” or “▼” to set reference frequency to 10.250000 MHz. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TUNED BPF | 1 • 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 : Frequency : 50.02 MHz Level : 50 μ V* (-73 dBm) Modulation : OFF • Receiving | • 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 • Same operation as step 1 for the listed frequencies. <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">BPF 4-2 – 58.28 MHz</td> <td style="width: 33%;">BPF 5-6 – 265.72 MHz</td> <td style="width: 33%;">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> • 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 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S-METER | 1 • Click adjustment item [Smeter] on the Adjustment Panel. • Select “FM S0” at the left side of Adjustment Panel. • Set an SSG as : Frequency : 149.97000 MHz Mode : FM Level : 0.5 μ V* (-113 dBm) Modulation : OFF • Receiving | • Click “Write” switch to store sampled data into memory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 • Same operation as step 1 for the listed levels. • Set an SSG as: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">FM S3 : 1.3 μV* (-105 dBm)</td> <td style="width: 50%;">WFM S0 : 0.79 μV* (-109 dBm)</td> </tr> <tr> <td>FM S5 : 3.2 μV* (-97 dBm)</td> <td>WFM S3 : 1.6 μV* (-103 dBm)</td> </tr> <tr> <td>FM S7 : 13 μV* (-85 dBm)</td> <td>WFM S5 : 3.2 μV* (-97 dBm)</td> </tr> <tr> <td>FM S9 : 50 μV* (-73 dBm)</td> <td>WFM S7 : 13 μV* (-85 dBm)</td> </tr> <tr> <td>FM S9+20 : 280 μV* (-58 dBm)</td> <td>WFM S9 : 50 μV* (-73 dBm)</td> </tr> <tr> <td>FM S9+40 : 1.6 mV* (-43 dBm)</td> <td>WFM S9+20 : 280 μV* (-58 dBm)</td> </tr> <tr> <td>FM S9+60 : 8.9 mV* (-28 dBm)</td> <td>WFM S9+40 : 1.6 mV* (-43 dBm)</td> </tr> <tr> <td></td> <td>WFM S9+60 : 8.9 mV* (-28 dBm)</td> </tr> </table> • Receiving | FM S3 : 1.3 μ V* (-105 dBm) | WFM S0 : 0.79 μ V* (-109 dBm) | FM S5 : 3.2 μ V* (-97 dBm) | WFM S3 : 1.6 μ V* (-103 dBm) | FM S7 : 13 μ V* (-85 dBm) | WFM S5 : 3.2 μ V* (-97 dBm) | FM S9 : 50 μ V* (-73 dBm) | WFM S7 : 13 μ V* (-85 dBm) | FM S9+20 : 280 μ V* (-58 dBm) | WFM S9 : 50 μ V* (-73 dBm) | FM S9+40 : 1.6 mV* (-43 dBm) | WFM S9+20 : 280 μ V* (-58 dBm) | FM S9+60 : 8.9 mV* (-28 dBm) | WFM S9+40 : 1.6 mV* (-43 dBm) | | WFM S9+60 : 8.9 mV* (-28 dBm) | | | | | | | | | | | | | | | | | | | |
| FM S3 : 1.3 μ V* (-105 dBm) | WFM S0 : 0.79 μ V* (-109 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FM S5 : 3.2 μ V* (-97 dBm) | WFM S3 : 1.6 μ V* (-103 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FM S7 : 13 μ V* (-85 dBm) | WFM S5 : 3.2 μ V* (-97 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FM S9 : 50 μ V* (-73 dBm) | WFM S7 : 13 μ V* (-85 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FM S9+20 : 280 μ V* (-58 dBm) | WFM S9 : 50 μ V* (-73 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FM S9+40 : 1.6 mV* (-43 dBm) | WFM S9+20 : 280 μ V* (-58 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FM S9+60 : 8.9 mV* (-28 dBm) | WFM S9+40 : 1.6 mV* (-43 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WFM S9+60 : 8.9 mV* (-28 dBm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S-METER FLAT | 1 • Click adjustment item [BPF S] on the Adjustment Panel. • Select “BPF0” at the left side of Adjustment Panel. • Set an SSG as : Frequency : 1.02 MHz Level : 50 μ V* (-73 dBm) Modulation : OFF • Receiving | • Click “Write” switch to store sampled data into memory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*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 • Same adjustment as step 1 for the listed BPFs frequencies. BPF 1 – 7.02 MHz BPF 2 – 21.02 MHz BPF 3 – 40.02 MHz BPF 4-1 – 50.02 MHz BPF 4-2 – 58.28 MHz BPF 4-3 – 58.32 MHz BPF 4-4 – 88.02 MHz BPF 4-5 – 108.28 MHz BPF 4-6 – 108.32 MHz BPF 4-7 – 130.02 MHz BPF 4-8 – 149.98 MHz BPF 5-1 – 150.02 MHz BPF 5-2 – 183.28 MHz BPF 5-3 – 183.32 MHz • Receiving | BPF 5-4 – 216.02 MHz BPF 5-5 – 265.68 MHz BPF 5-6 – 265.72 MHz BPF 5-7 – 300.02 MHz BPF 5-8 – 349.98 MHz BPF 6-1 – 350.02 MHz BPF 6-2 – 383.28 MHz BPF 6-3 – 383.32 MHz BPF 6-4 – 433.32 MHz BPF 6-5 – 483.28 MHz BPF 6-6 – 483.32 MHz BPF 6-7 – 558.32 MHz BPF 6-8 – 633.28 MHz BPF 6-9 – 633.32 MHz BPF 6-10 – 699.98 MHz BPF 7-1 – 700.02 MHz BPF 7-2 – 750.02 MHz BPF 7-3 – 799.98 MHz BPF 7-4 – 800.02 MHz BPF 7-5 – 916.68 MHz BPF 7-6 – 916.72 MHz BPF 7-7 – 1016.68 MHz BPF 7-8 – 1016.72 MHz BPF 7-9 – 1166.68 MHz BPF 7-10 – 1166.72 MHz BPF 7-11 – 1299.98 MHz |
| SCOPE S | 1 • 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 : Frequency : 149.97000 MHz Level : 0.32 μ V* (-117 dBm) Modulation : OFF • Receiving 2 • Same operation as step 1 for the listed levels. • Set an SSG as : S3 : 3.2 μ V* (-97 dBm) S5 : 10 μ V* (-87 dBm) S7 : 32 μ V* (-77 dBm) S9 : 100 μ V* (-67 dBm) • Receiving | • Click “Write” switch to store sampled data into memory. S9+20 : 320 μ V* (-57 dBm) S9+40 : 1.0 mV* (-47 dBm) S9+60 : 3.2 mV* (-37 dBm) |
| CENTER INDICATOR | 1 • Click adjustment item [Center] on the Adjustment Panel. • Select “CW low” at the left side of Adjustment Panel. • Set an SSG as : Frequency : 149.96700 MHz Level : 50 μ V* (-73 dBm) Modulation : OFF • Receiving 2 • Select “CW high” at the left side of Adjustment Panel. • Set an SSG as : Frequency : 149.97300 MHz • Receiving | • Click “Write” switch to store sampled data into memory. • Click “Write” switch to store sampled data into memory. |
| NOISE SQUELCH | 1 • Click adjustment item [Noise SQL] on the Adjustment Panel. 2 • Set an Adjustment panel as: Timing : T2 — 2 T3 — 100 Level : Thresh — 20 Tight — 20 3 • Set an Adjustment panel as: Timing : T2 — 2 T3 — 4 | • Click each “Write” switch for Timing and Level. • Click “▼” then “Write” switches at ‘Level’ to set Thresh/Tight data until noise disappears. NOTE: “Write” switch must be clicked at each level, otherwise the level is invalid. • Click “Write” switch for Timing. |

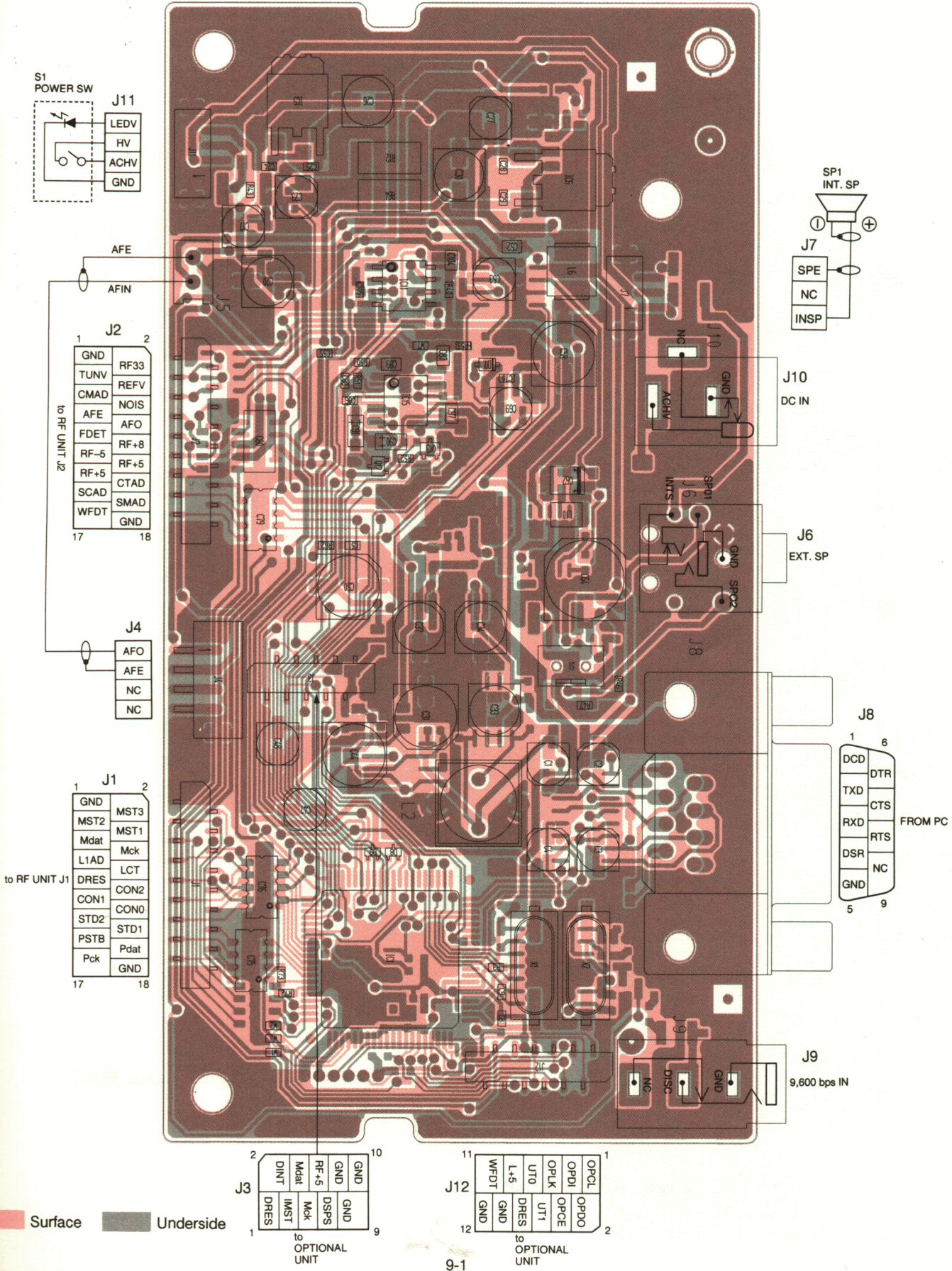
*This output level of a standard signal generator (SSG) is indicated as SSG's open circuit.

SECTION 9 BOARD LAYOUTS

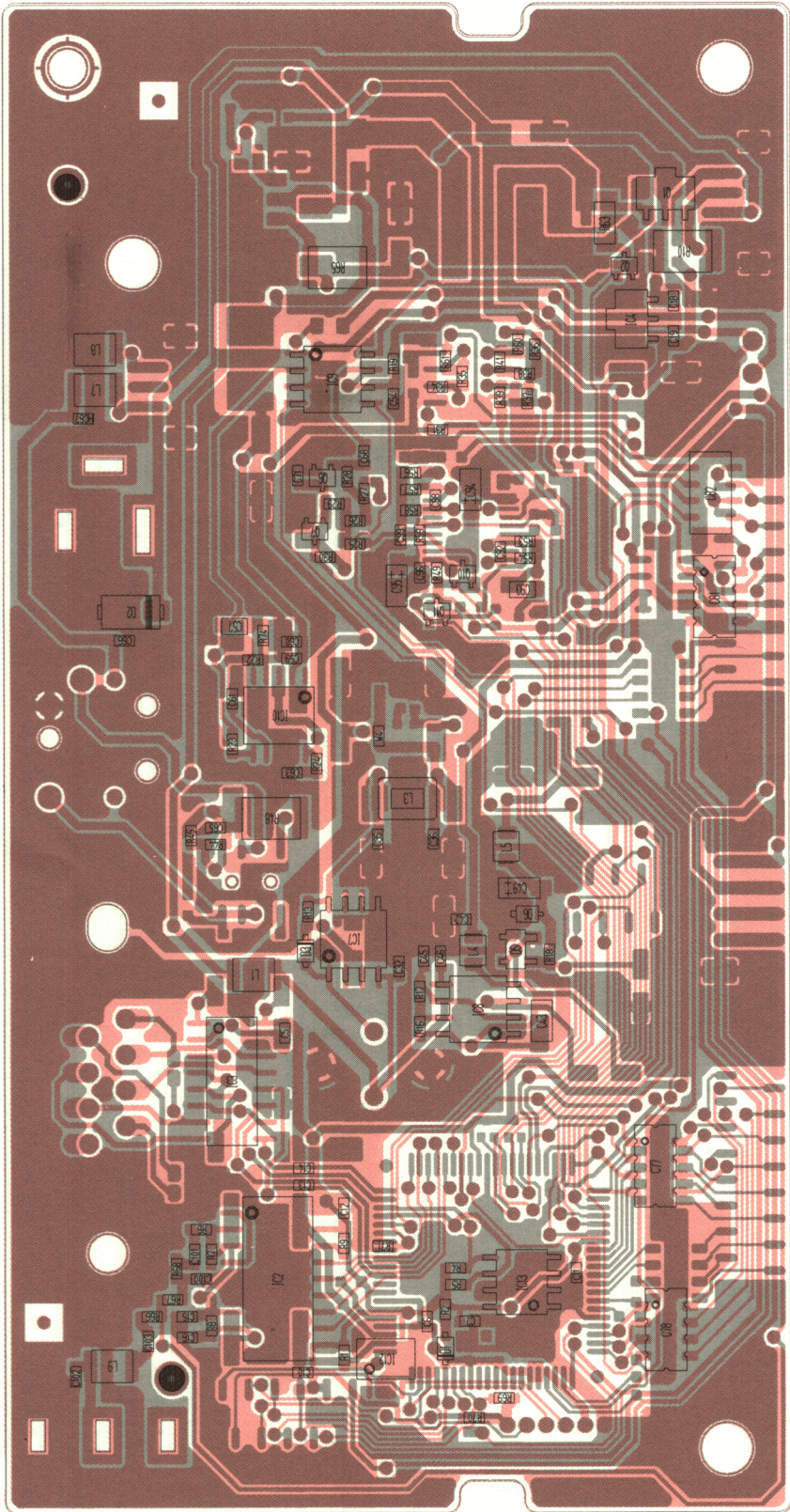
The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

9-1 LOGIC UNIT

• TOP VIEW



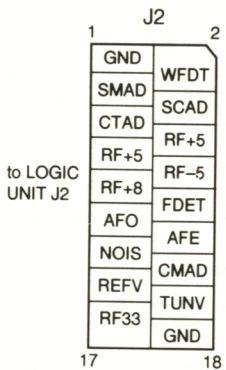
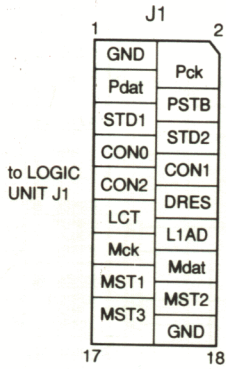
• BOTTOM VIEW



Surface Underside

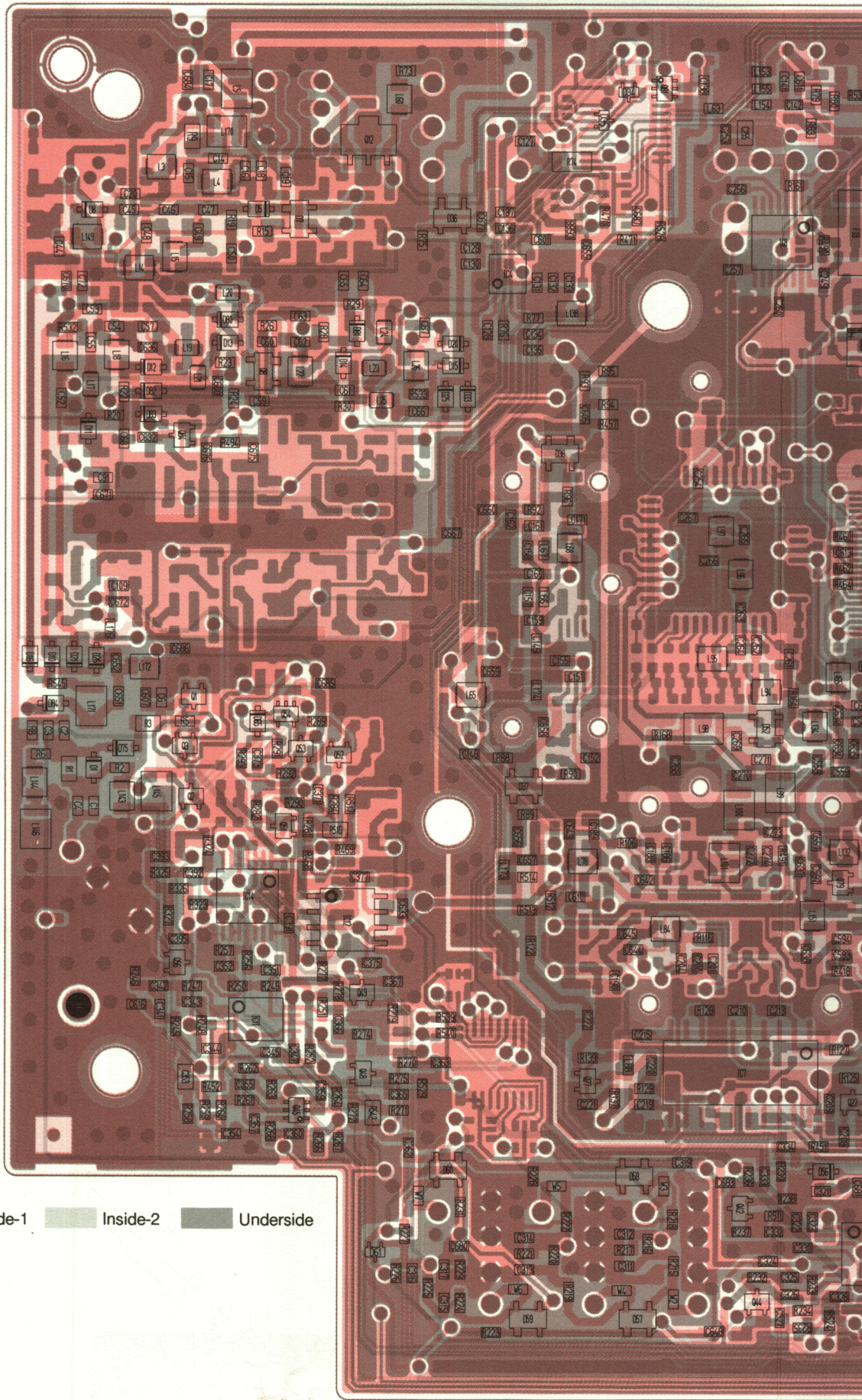
F UNIT

TOP VIEW

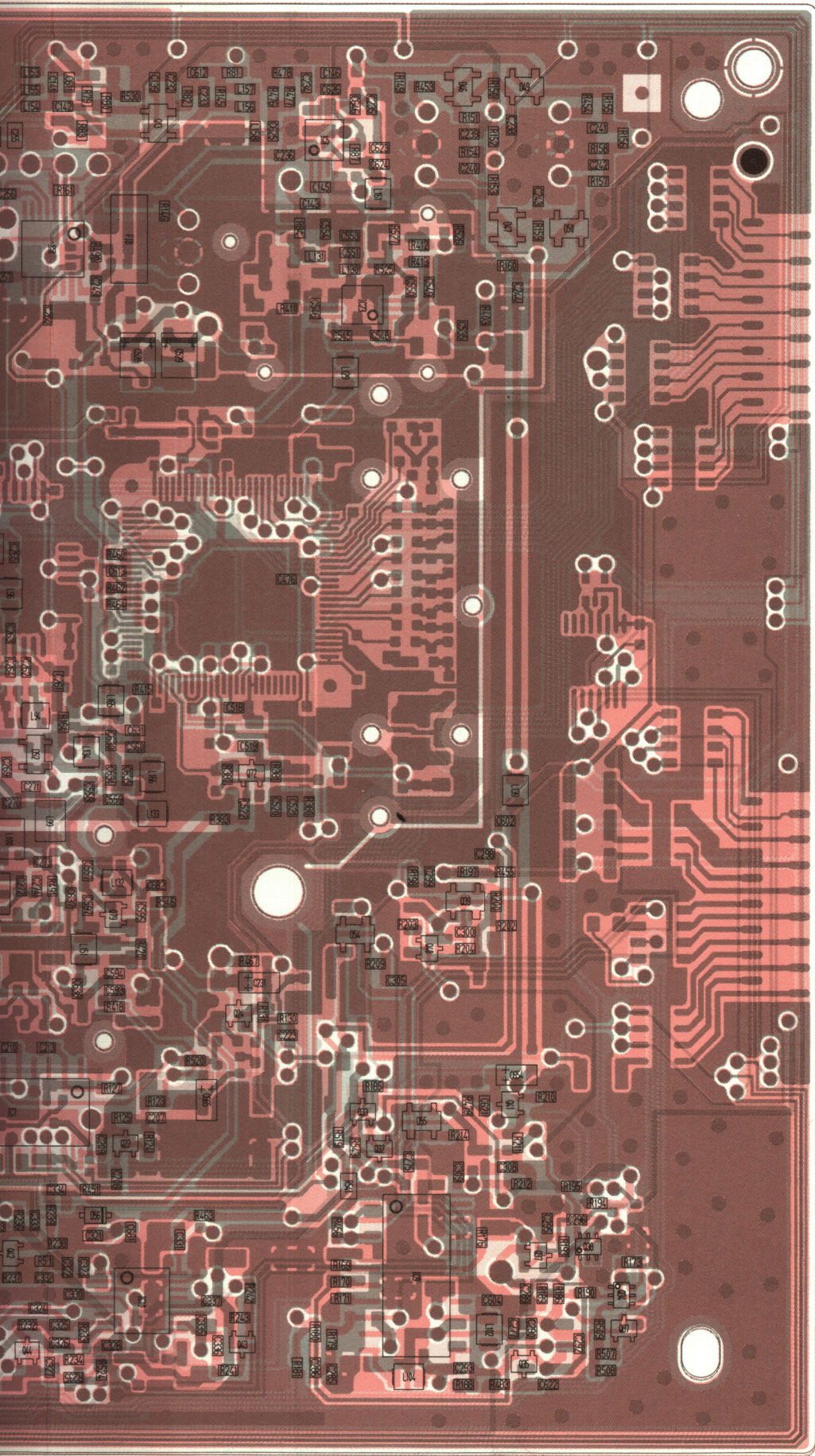


- Surface
- Inside-1
- Inside-2
- Underside

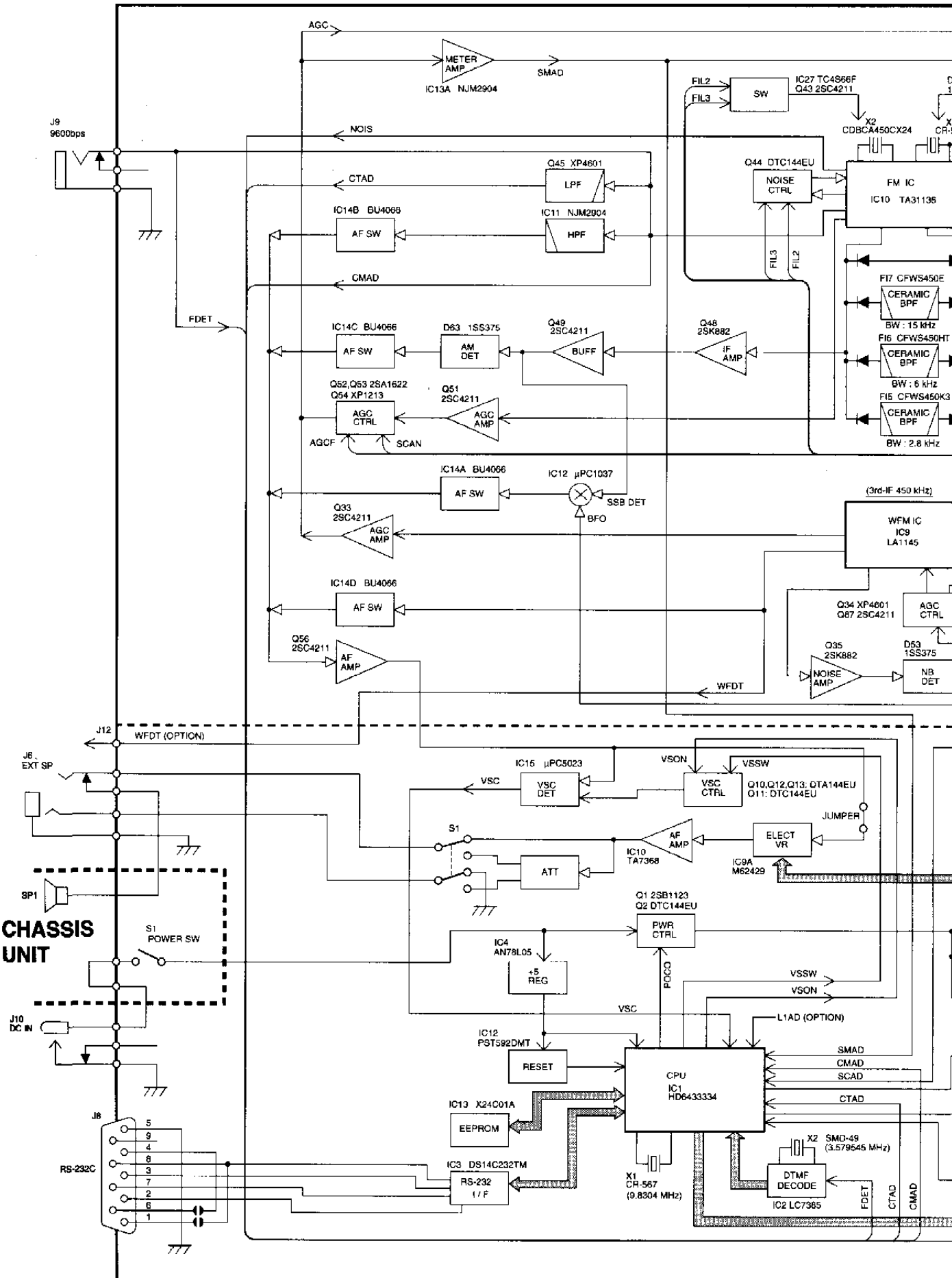
BOTTOM VIEW

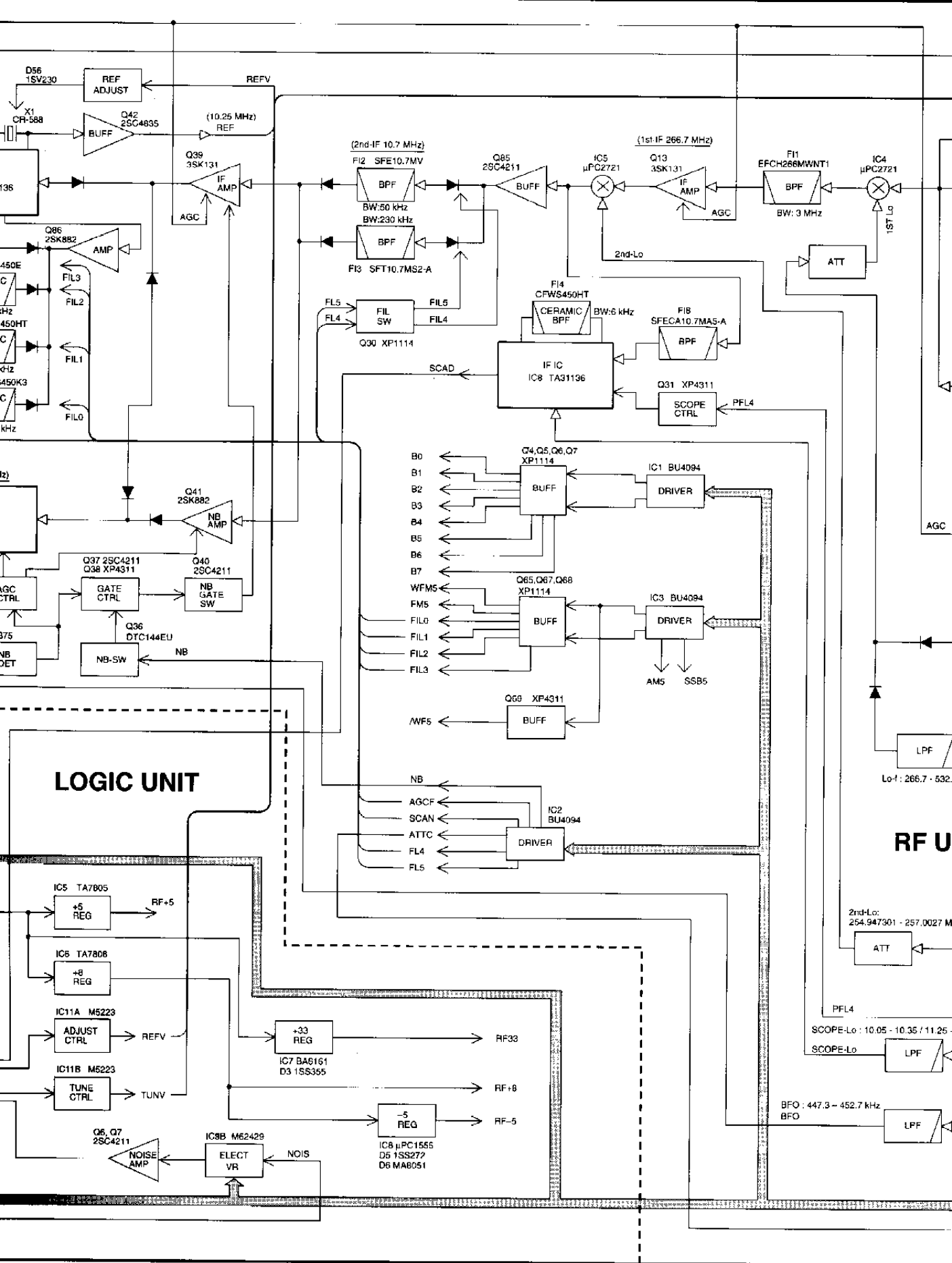


Surface Inside-1 Inside-2 Underside



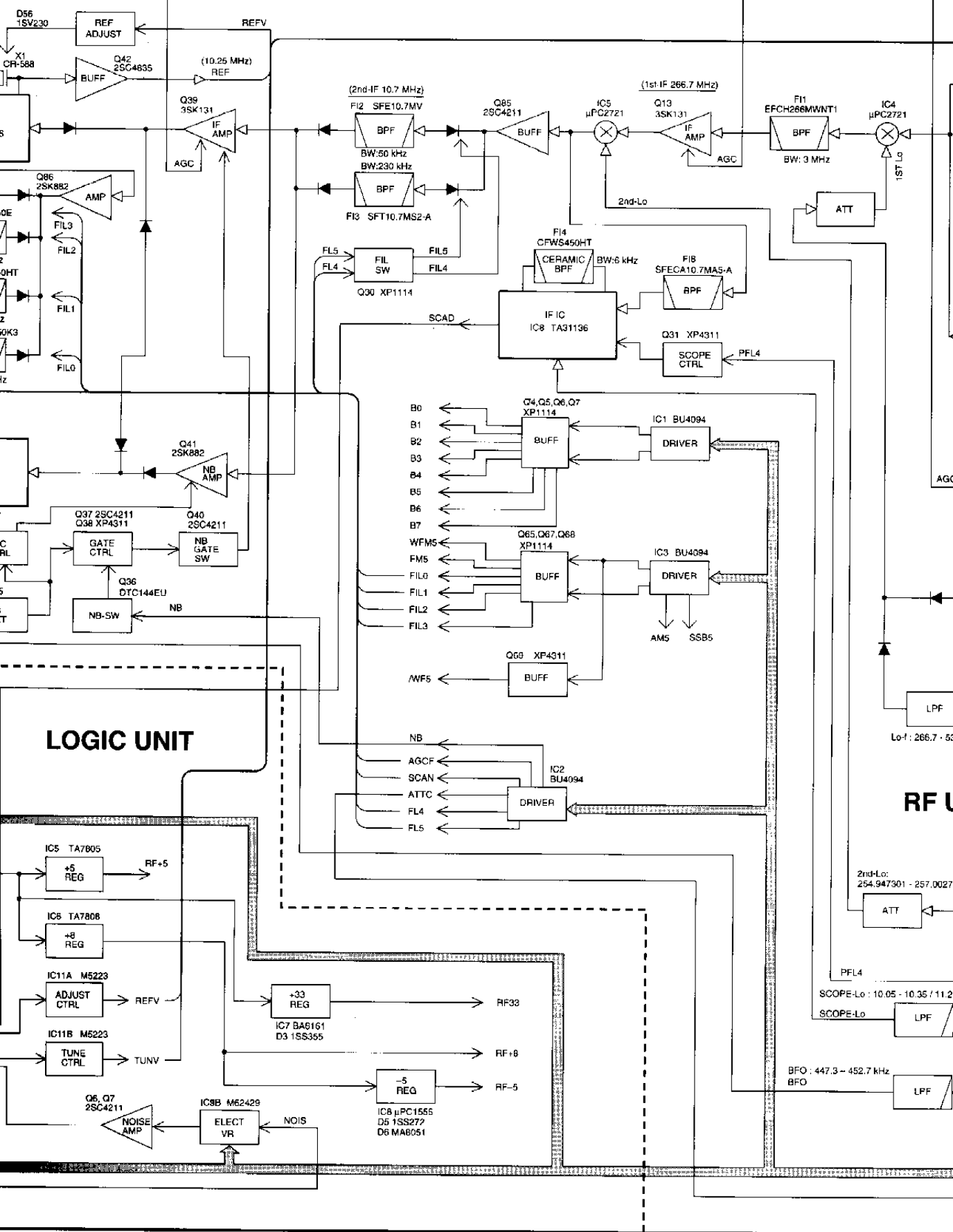
SECTION 10 BLOCK DIAGRAM



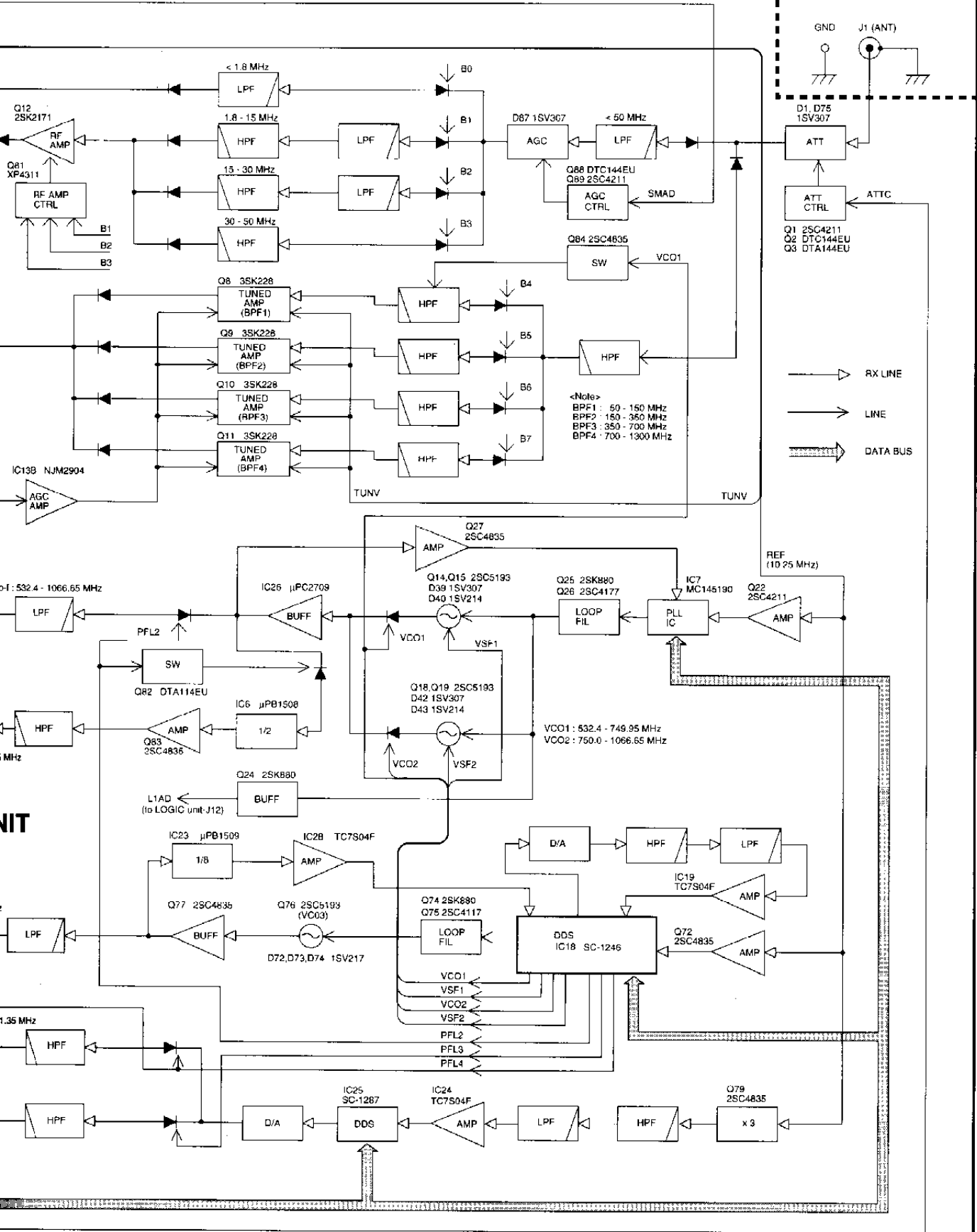


LOGIC UNIT

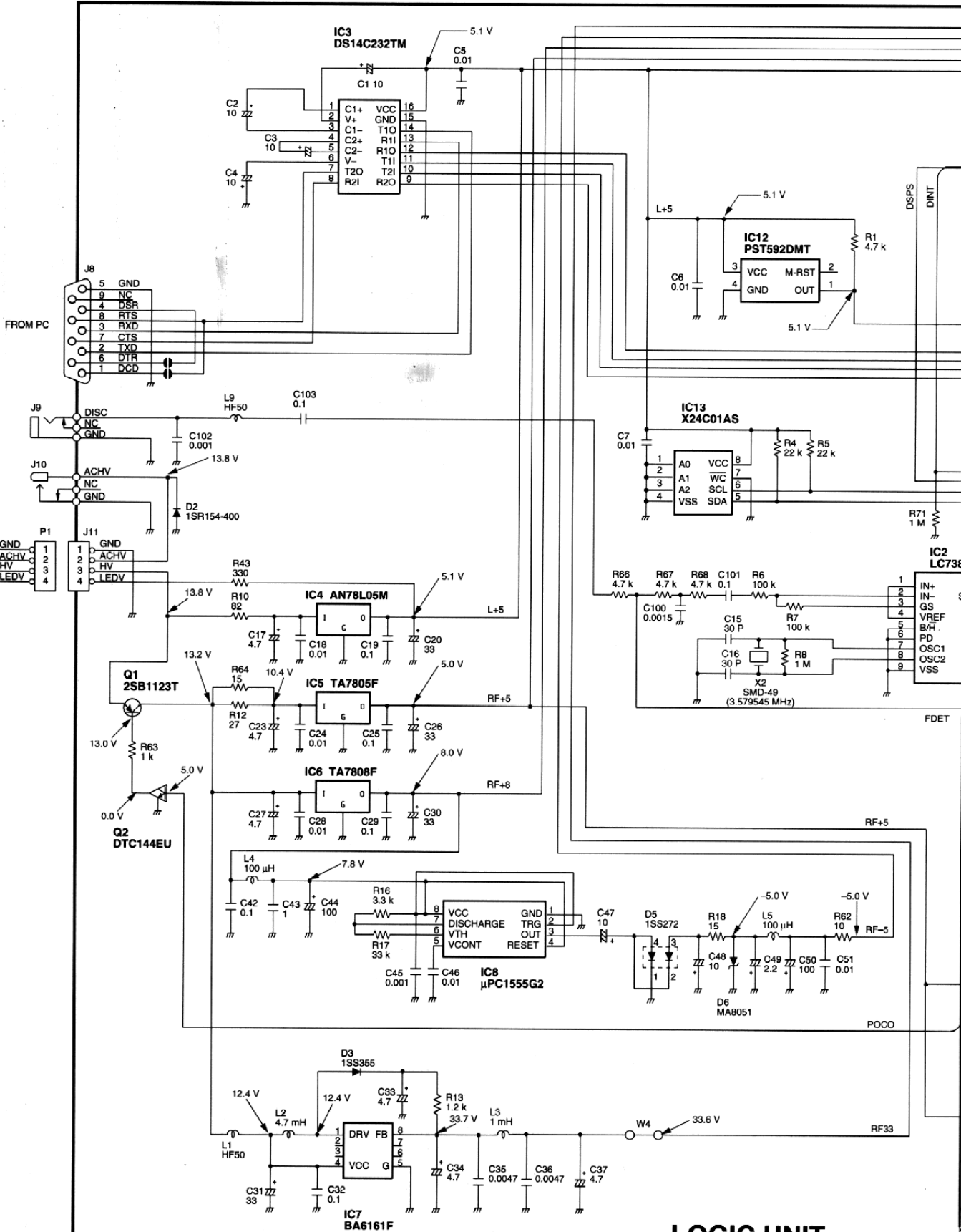
RF U



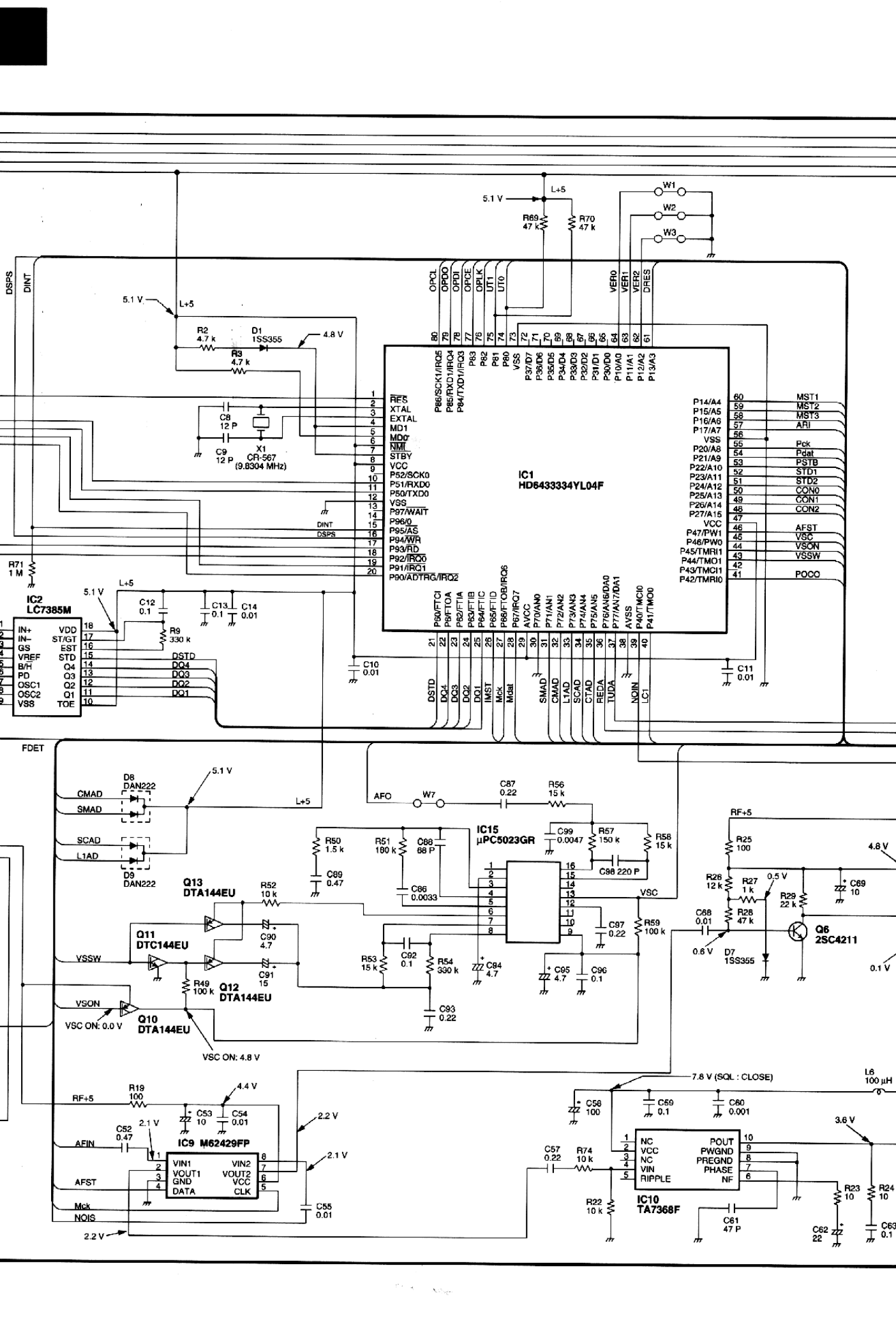
CHASSIS UNIT

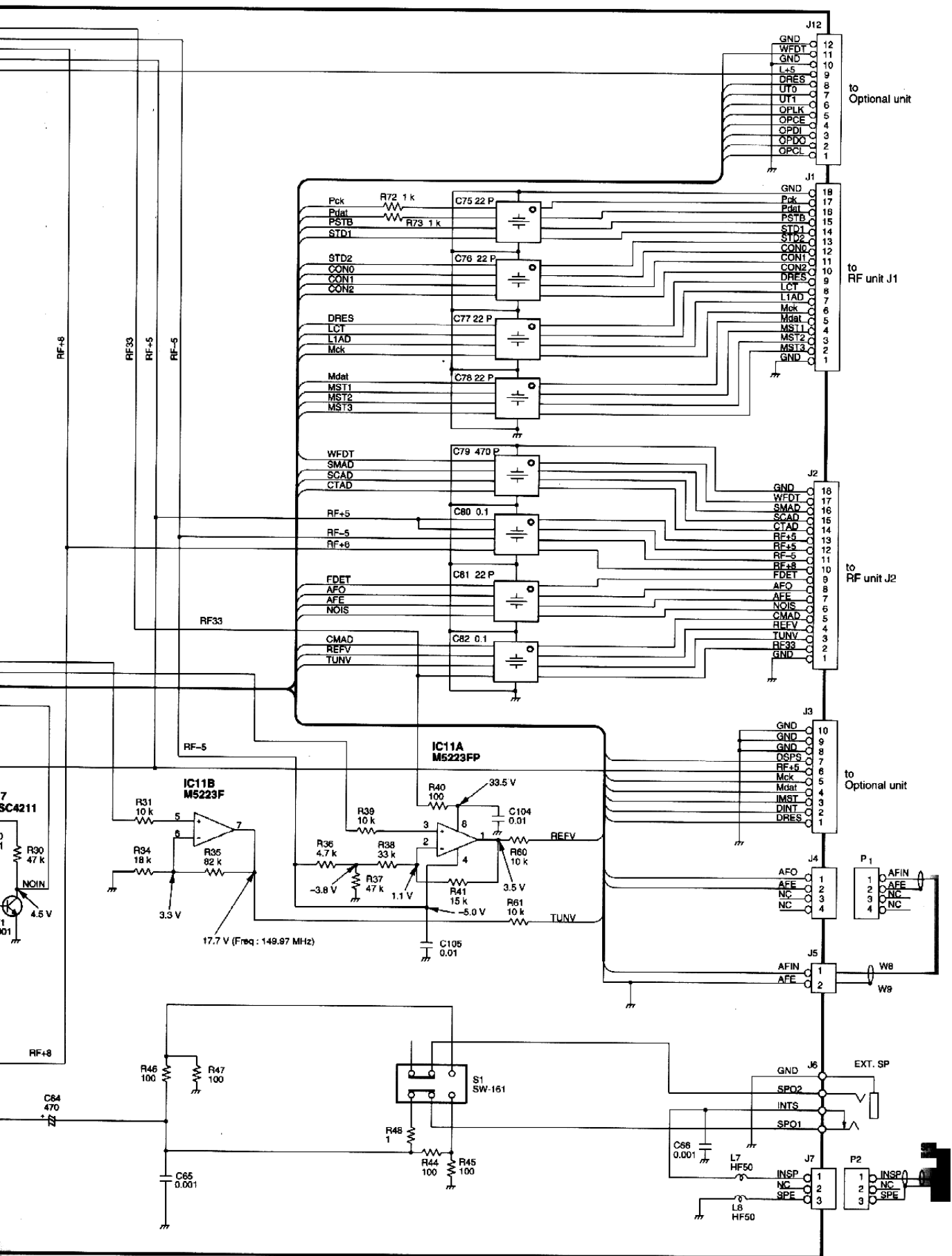


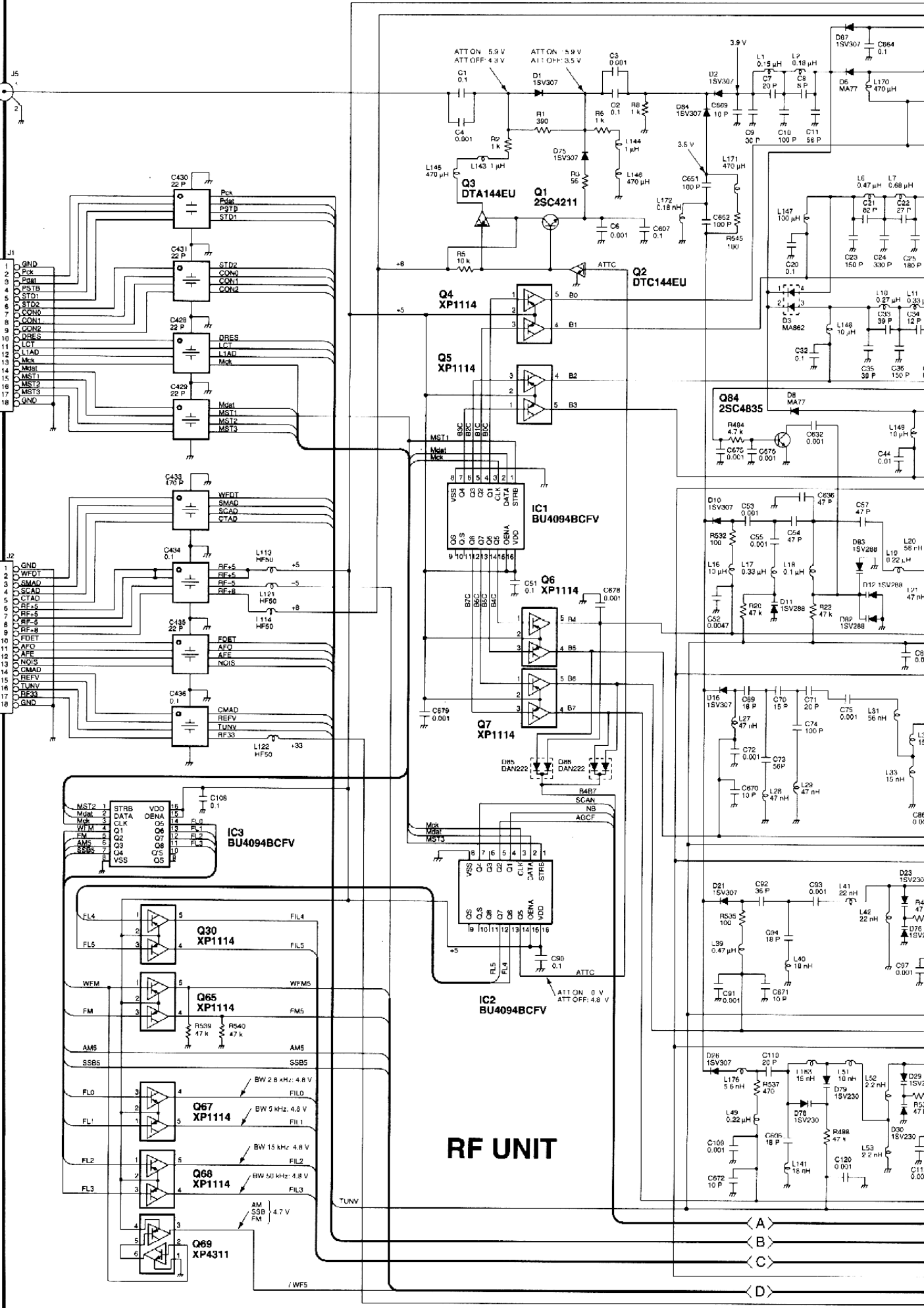
SECTION 11 VOLTAGE DIAGRAM

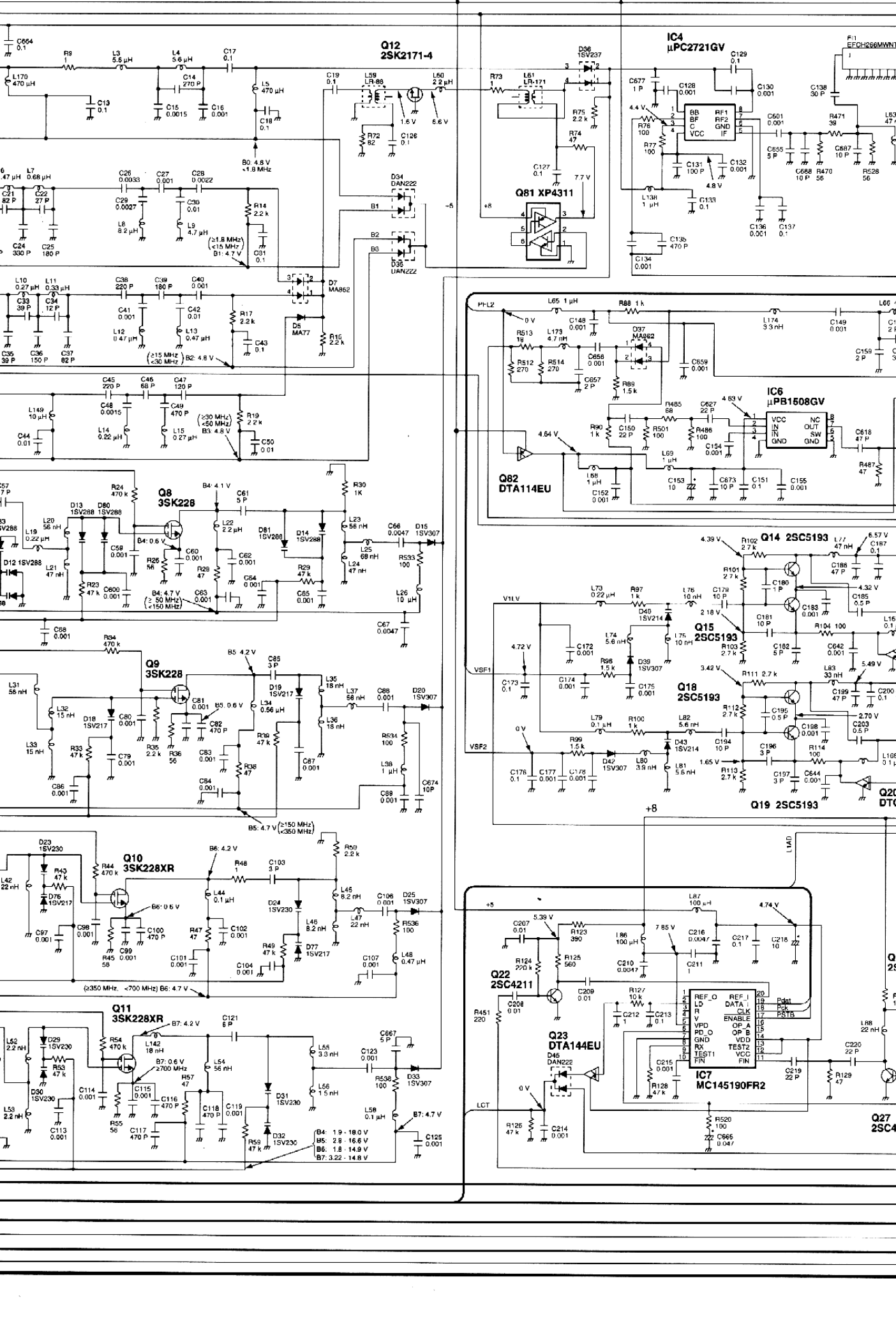


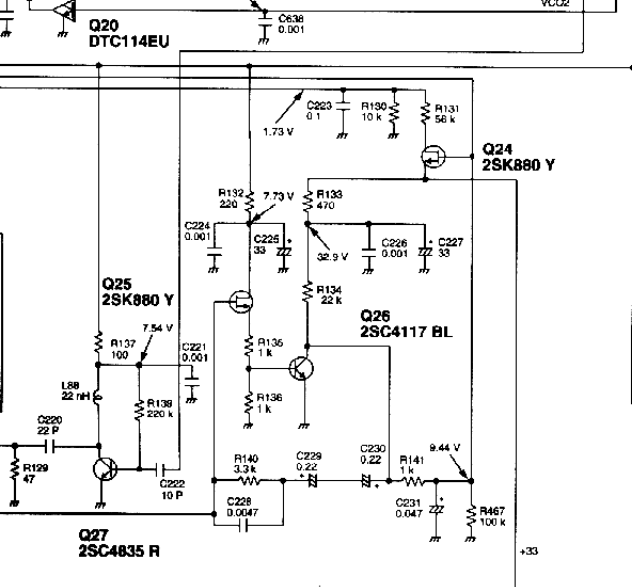
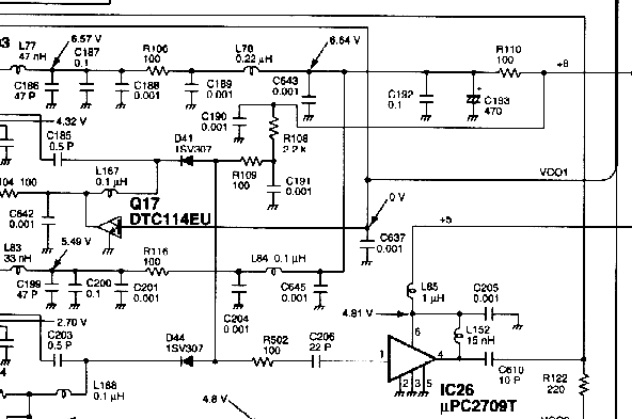
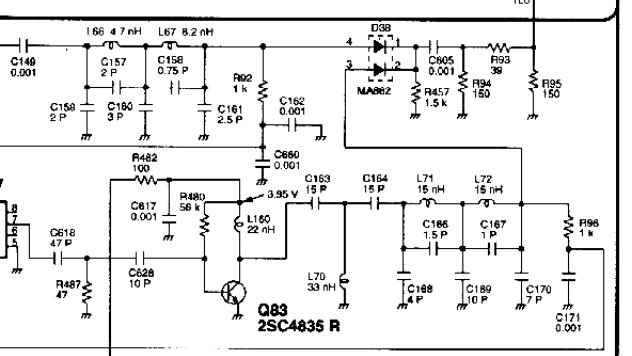
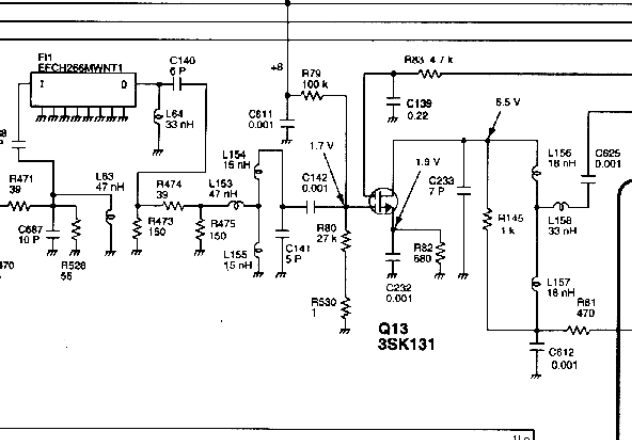
LOGIC UNIT

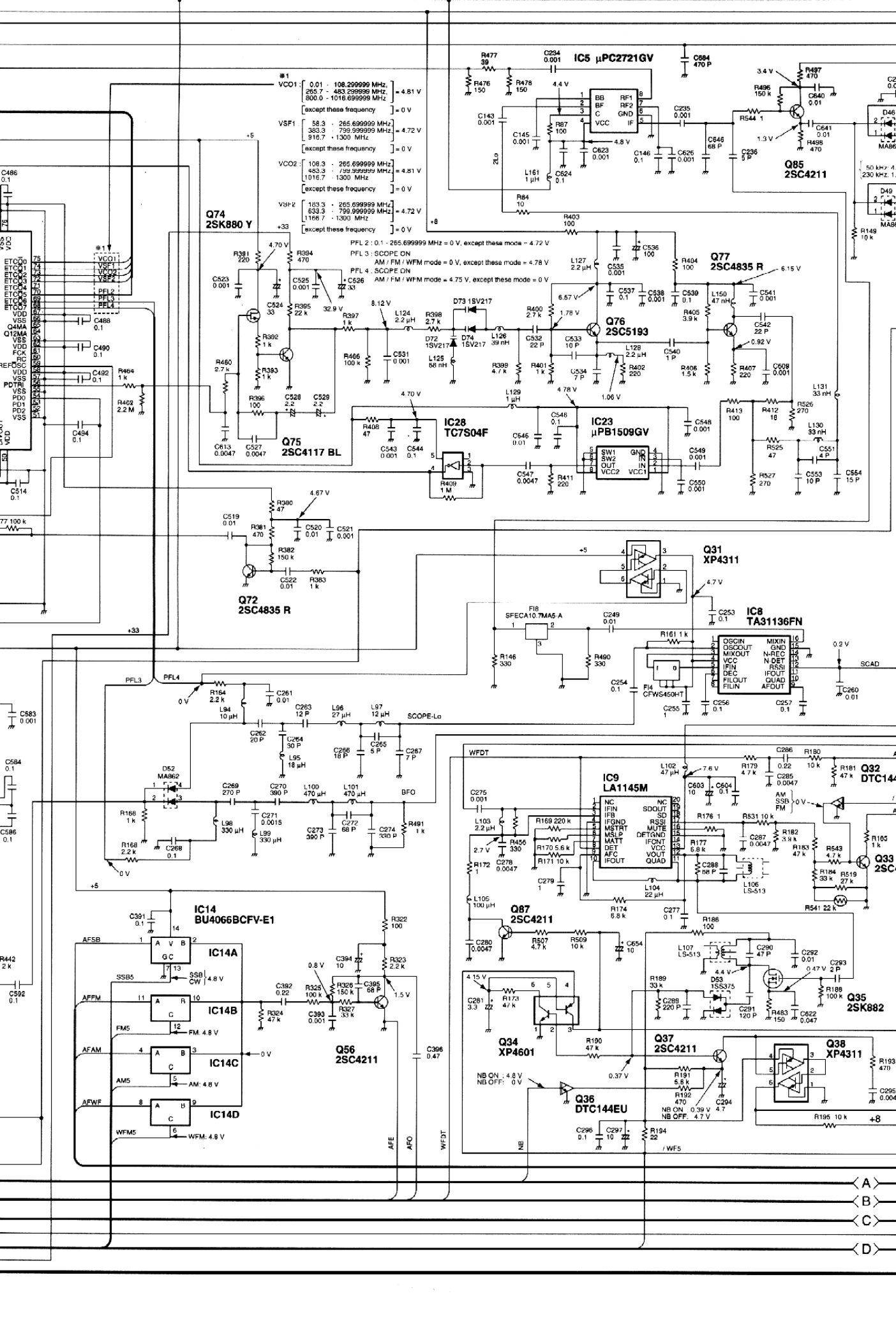












| | | |
|--------------------------|-------------------------|----------|
| VCO1 | 0.01 - 108.299999 MHz | = 4.81 V |
| | 265.7 - 483.299999 MHz | |
| | 800.0 - 1016.699999 MHz | |
| [except these frequency] | | = 0 V |
| VSF1 | 58.3 - 265.699999 MHz | = 4.72 V |
| | 383.3 - 720.099999 MHz | |
| | 916.7 - 1300 MHz | |
| [except these frequency] | | = 0 V |
| VCO2 | 108.3 - 265.699999 MHz | = 4.81 V |
| | 483.3 - 720.099999 MHz | |
| | 1016.7 - 1300 MHz | |
| [except these frequency] | | = 0 V |
| VSP-P | 183.3 - 265.699999 MHz | = 4.72 V |
| | 383.3 - 720.099999 MHz | |
| | 1166.7 - 1300 MHz | |
| [except these frequency] | | = 0 V |

PFL 2: 0.1 - 265.699999 MHz = 0 V, except these mode = 4.72 V
 PFL 3: SCOPE ON AM / FM / WFM mode = 0 V, except these mode = 4.78 V
 PFL 4: SCOPE ON AM / FM / WFM mode = 4.75 V, except these mode = 0 V

Q74 2SK880 Y
 Q75 2SC4117 BL
 Q76 2SC5193
 Q77 2SC4835 R
 Q85 2SC4211
 Q31 XP4311
 Q32 DTC144
 Q33 2SC4211
 Q34 XP4601
 Q35 2SK882
 Q36 DTC144EU
 Q37 2SC4211
 Q38 XP4311

IC5 µPC2721GV
 IC8 TA31136FN
 IC9 LA1145M
 IC14 BU4066BCFV-E1
 IC23 µPB1509GV
 IC28 TC7S04F

D52 MAR62
 D73 1S2V17
 D74 1S2V17
 D77 1S2V17
 D83 1S375

AF5B
 AFFM
 AFAM
 AMS
 AFWF
 WFM5

SCOPE-Lo
 BFO
 AFE
 AFO
 WFDI
 WFS

VC01
 VSF1
 VCO2
 VSP-P

OSCIN
 OSCOUT
 MIXIN
 N-REC
 N-DET
 RSSI
 IFIN
 IFOUT
 QUAD
 AFOUT

AF5B
 FM5
 AM5
 WFM5

SCOPE-Lo
 BFO
 AFE
 AFO
 WFDI
 WFS

VC01
 VSF1
 VCO2
 VSP-P

OSCIN
 OSCOUT
 MIXIN
 N-REC
 N-DET
 RSSI
 IFIN
 IFOUT
 QUAD
 AFOUT

AF5B
 FM5
 AM5
 WFM5

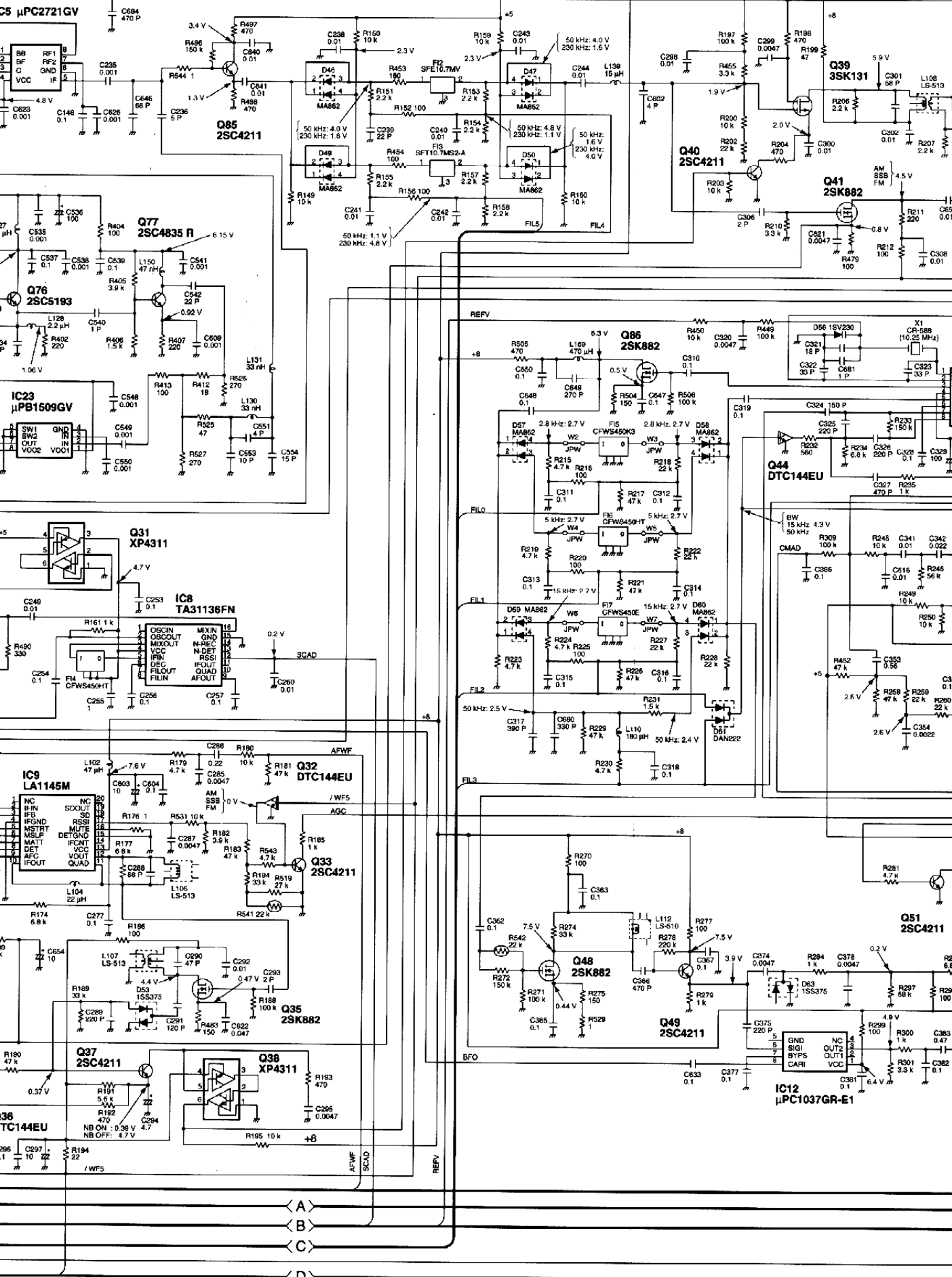
SCOPE-Lo
 BFO
 AFE
 AFO
 WFDI
 WFS

VC01
 VSF1
 VCO2
 VSP-P

OSCIN
 OSCOUT
 MIXIN
 N-REC
 N-DET
 RSSI
 IFIN
 IFOUT
 QUAD
 AFOUT

AF5B
 FM5
 AM5
 WFM5

A
 B
 C
 D



- (A)
- (B)
- (C)
- (D)

