



# SERVICE MANUAL

UHF PRIVATE MOBILE RADIO

**IC-F2010**

UHF LAND MOBILE RADIO

**IC-F2020**

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## INTRODUCTION

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This service manual describes the latest service information for the **IC-F2010** UHF PRIVATE MOBILE RADIO and **IC-F2020** UHF LAND MOBILE RADIO at the time of publication.

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

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## DANGER

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

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

**DO NOT** reverse the polarities of the power supply when connecting the transceiver.

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



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## ORDERING PARTS

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

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

<**SAMPLE ORDER**>

1110003571 S.IC MC3372SVM IC-F2010 MAIN UNIT 5 pieces  
8810008660 Screw BT M3 x 8 NI-ZU IC-F2010 Bottom cover 10 pieces

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

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## REPAIR NOTES

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1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 50 dB to 60 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

## EXPLICIT DEFINITIONS

### • IC-F2010 [PMR]

Frequency Coverage	Channel Spacing	Power
P400, 400 – 430 MHz	12.5 kHz	25 W
P400, 400 – 430 MHz	25 kHz	25 W
P440, 440 – 490 MHz	12.5 kHz	25 W
P440, 440 – 490 MHz	25 kHz	25 W
P490, 490 – 520 MHz	12.5 kHz	25 W
P490, 490 – 520 MHz	25 kHz	25 W
P440, 440 – 490 MHz	12.5 kHz	10 W
P440, 440 – 490 MHz	25 kHz	10 W
P425, 425 – 432 MHz (Tx) 440 – 450 MHz (Rx)	12.5 kHz	25 W
P400, 400 – 430 MHz	25/12.5 kHz	25 W
P440, 440 – 490 MHz	25/12.5 kHz	25 W
P490, 490 – 520 MHz	25/12.5 kHz	25 W
P440, 440 – 490 MHz	25/12.5 kHz	10 W

### • IC-F2020 [LMR]

Frequency Coverage	Channel Spacing	Power
L400, 400 – 430 MHz	25 kHz	35 W
L450, 450 – 470 MHz	25 kHz	35 W
L470, 470 – 490 MHz	25 kHz	35 W
L490, 490 – 512 MHz	25 kHz	35 W
L400, 400 – 430 MHz	12.5 kHz	35 W
L450, 450 – 470 MHz	12.5 kHz	35 W
L470, 470 – 490 MHz	12.5 kHz	35 W
L490, 490 – 512 MHz	12.5 kHz	35 W
L400, 400 – 430 MHz	25/12.5 kHz	35 W
L450, 450 – 470 MHz	25/12.5 kHz	35 W
L470, 470 – 490 MHz	25/12.5 kHz	35 W
L490, 490 – 512 MHz	25/12.5 kHz	10 W

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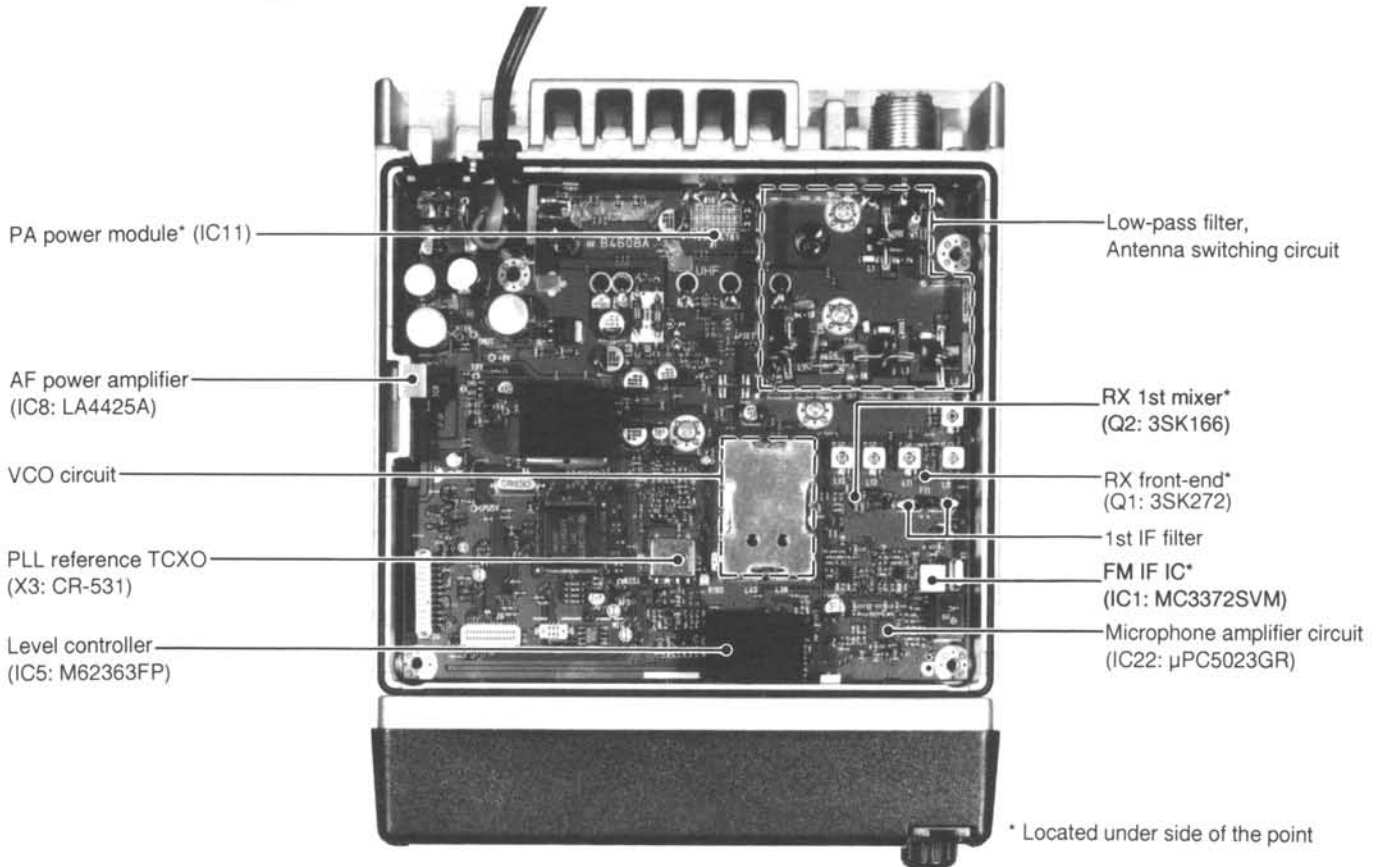
# SECTION 1 SPECIFICATIONS

		IC-F2010 (PMR)	IC-F2020 (LMR)	
GENERAL	Frequency coverage	400–430 MHz (P400) Tx:425–432 MHz, Rx: 440–450 MHz (P425) 440–490 MHz (P440) 490–520 MHz (P490)	400–430 MHz (L400) 450–470 MHz (L450) 470–490 MHz (L470) 490–512 MHz (L490)	
	Mode	16K0F3E (Wide), 14K0F3E (Middle; PMR only), 8K50F3E (Narrow)		
	Number of channels	32 (standard), 160 (with optional EX-1761)		
	Antenna connector	SO-239 (50 Ω)		
	Usable temperature range	–25°C to +55°C (–13°F to +131°F)	–30°C to +60°C (–22°F to +140°F)	
	Channel spacing	25 kHz (Wide), 20 kHz (Middle), 12.5 kHz (Narrow) (PLL step: 5 kHz and 6.25 kHz)		
	Power supply requirement	13.2 V DC (nominal; negative ground)	13.6 V DC (nominal; negative ground)	
	Current drain	Rx	Stand-by 700 mA	700 mA
			Max. audio 1.2 A	1.2 A
		Tx	High power 8.0 A (25 W), 6.5 A (10 W)	11 A (at 35 W)
Dimensions (proj. not incl.)	150(W) × 50(H) × 180(D) mm; 5 <sup>29</sup> / <sub>32</sub> × 1 <sup>31</sup> / <sub>32</sub> (H) × 7 <sup>3</sup> / <sub>32</sub> (D) in			
Weight	1.5 kg; 3 lb 5 oz			
RECEIVER	Measurement method	ETS 300 086 or CEPT T/R24	EIA/TIA-204D	
	Receive system	Double conversion superheterodyne		
	Intermediate frequencies	1st: 30.875 MHz, 2nd: 455 kHz		
	Sensitivity	–4 dBμV (emf) for 20 dB SINAD	0.25 μV (pd) typical for 12 dB SINAD	
	Squelch sensitivity (threshold)	–12 dBμV (emf)	0.25 μV (pd)	
	Adjacent channel selectivity	75 dB typical (Wide, Middle), 65 dB typical (Narrow)		
	Spurious response	70 dB min.	80 dB typical	
	Intermodulation rejection	65 dB min.	70 dB typical	
	Audio frequency response	–3 dB to +1 dB in a 6 dB/octave range from 300 Hz to 3000 (Wide, Middle)/2550 (Narrow) Hz		
	Hum and noise	40 dB min.	45 dB	
	Max. audio output power	4 W at 10 % distortion with a 4 Ω load		
	External speaker connector	2-conductor 3.5 (d) mm (1/8")/4 Ω		
TRANSMITTER	Measurement method	ETS 300 086 or CEPT T/R24	EIA/TIA-152C	
	RF output power	25 W or 10 W (according to version) and 2 programmable low powers	35 W and 2 programmable low powers	
	Modulation system	Variable reactance frequency modulation		
	Max. frequency deviation	±5 kHz (Wide), ±4 kHz (Middle), ±2.5 kHz (Narrow)		
	Spurious emission	0.25 μW max.	70 dB min.	
	Frequency tolerance	±1.5 kHz	±0.0005 %	
	Audio frequency response	–3 dB to +1 dB in a 6 dB/octave range from 300 Hz to 3000 (Wide, Middle)/2550 (Narrow) Hz		
	Adjacent channel power	70 dB min. (Wide, Middle) 60 dB min. (Narrow)	70 dB min. (Wide) 60 dB min. (Narrow)	
	Hum and noise	40 dB	45 dB	
	Audio harmonic distortion	5 %		
	Limiting of modulator	70 % to 100 % deviation		
Microphone connector	8-pin modular (600 Ω)			

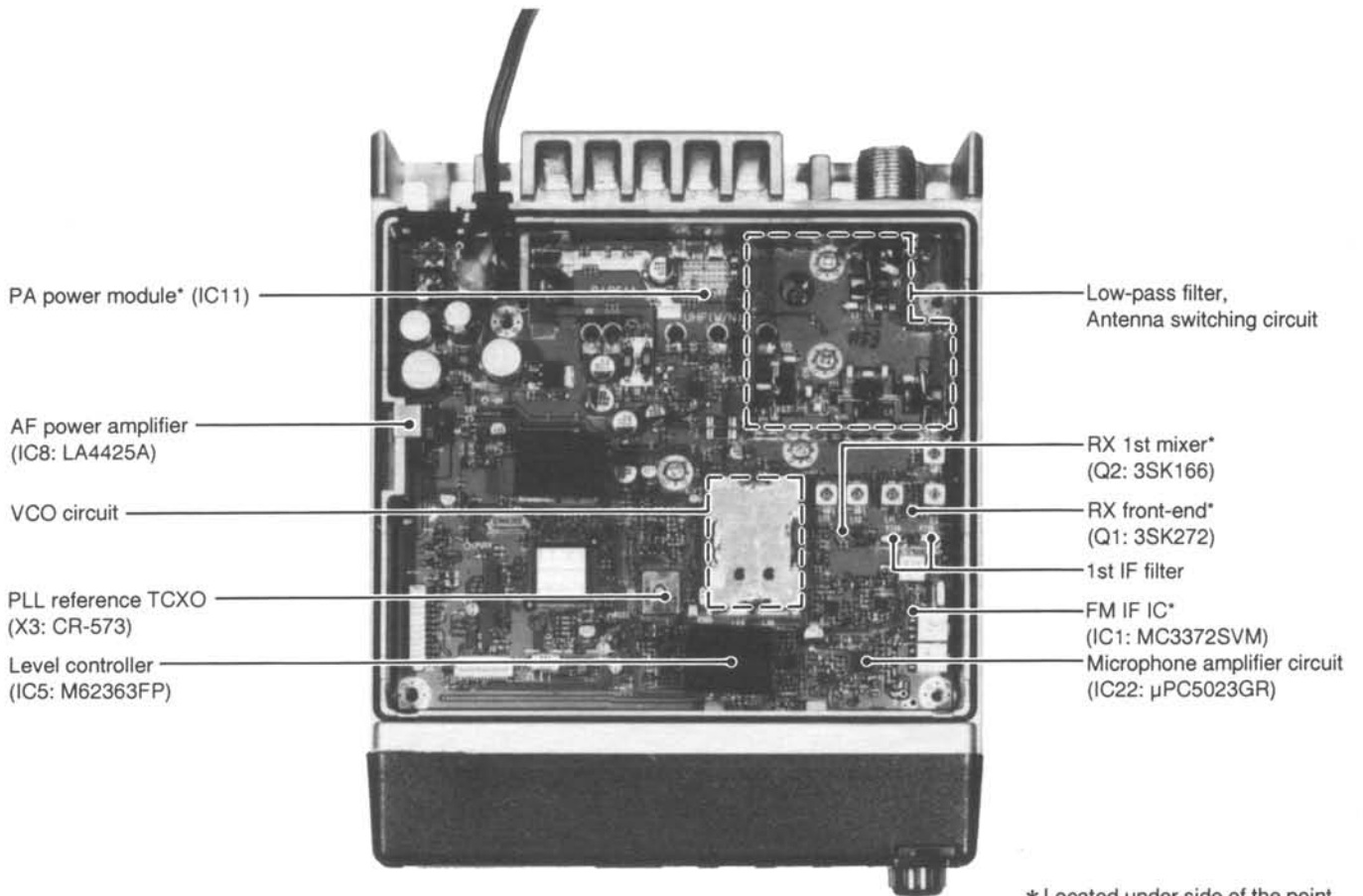
All stated specifications are subject to change without notice or obligation.

## SECTION 2 INSIDE VIEWS

### • Wide and Narrow types



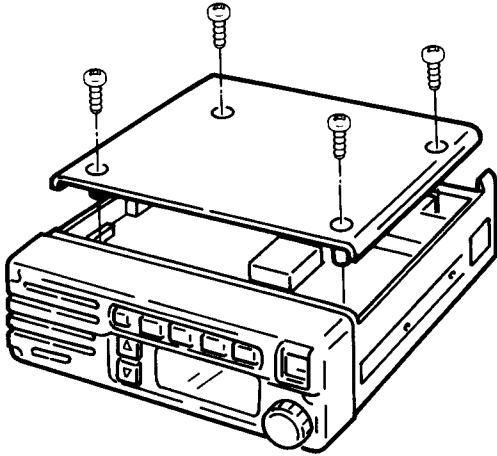
### • Wide / Narrow types



## SECTION 3 OPTION INSTALLATIONS

### • Opening covers

Remove 4 screws from bottom covers.



### • Installation location

Install option units.

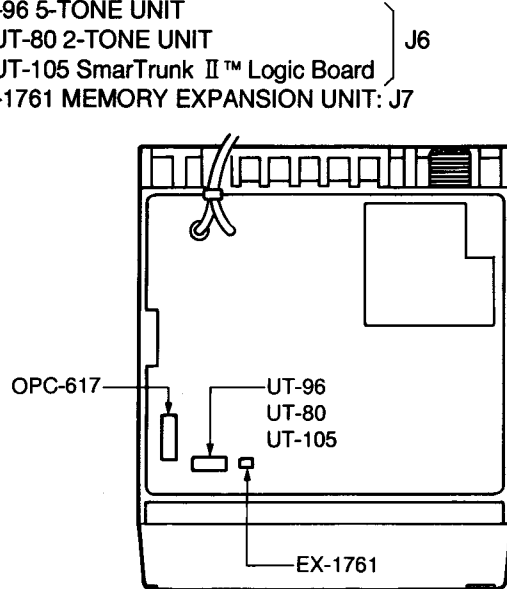
OPC-617 ACC CABLE: J4

UT-96 5-TONE UNIT

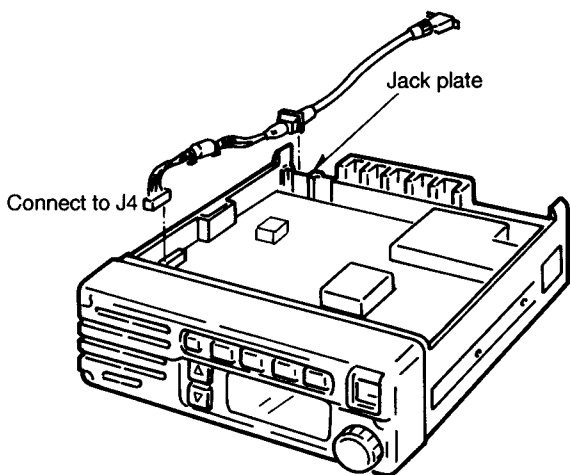
or UT-80 2-TONE UNIT

or UT-105 SmarTrunk II™ Logic Board

EX-1761 MEMORY EXPANSION UNIT: J7

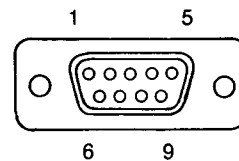


### • OPC-617 connection



Break the jack plate using cutting pliers to connect the OPC-617.

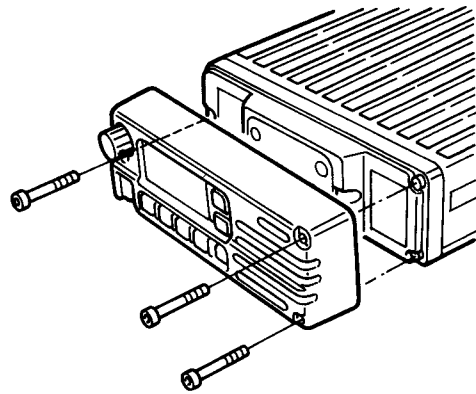
### PIN ASSIGNMENT



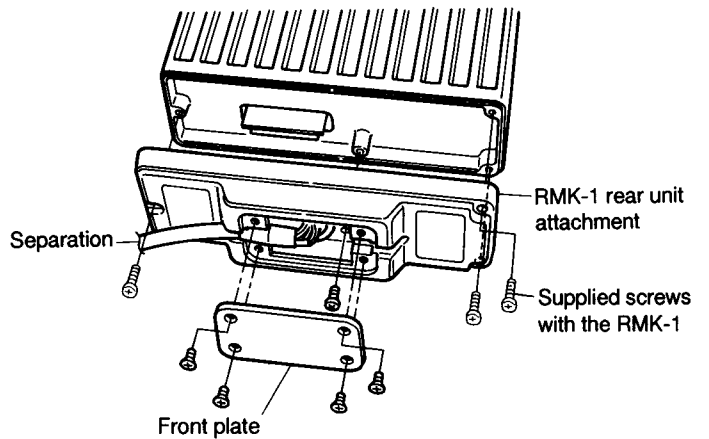
Pin No.	Terminal name	Description	Specification
1	DIM	Backlight control input	+5 to +30 V for dark
2	PAAF	AF output for public address and Ext SP functions	0 to 330 mV rms/ 47 kΩ
3	DISC	AF output for a terminal unit	330 mV rms/100 kΩ
4	IN	AF input for a terminal unit	330 mV rms/1200 bps
5	PTT	PTT control input	0 V for transmit
6	HORN	Grounded when receiving the specified call	Less than 50 mA when grounded
7	PAAF ⊖	Ground for PAAF	—
8	DISC ⊖	Ground for terminal output	—
9	IN ⊖	Ground for terminal input	—

● **RMK-1 connection**

- ① Remove 3 allen-socket bolts from the front plate using an allen-wrench (1/32 in).
- ② Separate the front unit from the transceiver main unit.

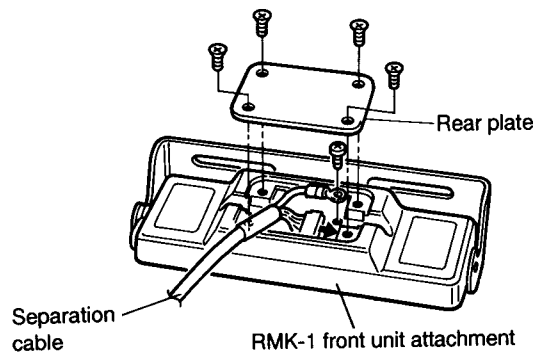


- ③ Attach the 'RMK-1 rear unit attachment' to the transceiver main unit using the supplied screws.
- ④ Remove 4 screws from the attachment to open the rear plate.
- ⑤ Connect one of three following optional separation cables to the inside of the rear plate and tighten the cable lug using the screw.
  - OPC-607 (3 m) } Not permitted for European
  - OPC-608 (8 m) } countries
  - OPC-609 (1.9 m)

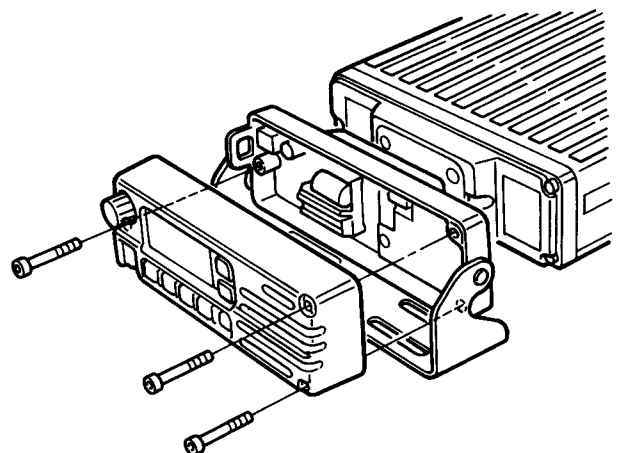


- ⑥ Re-attach the rear plate.

- ⑦ Remove 4 screws from the 'RMK-1 front unit attachment' to open the rear plate.
- ⑧ Connect the other end of the optional separation cable to the attachment and tighten the cable lug using the screw.
- ⑨ Re-attach the rear plate.



- ⑩ Attach the front unit and attachment with the 3 removed allen-socket bolts.



## SECTION 4 CIRCUIT DESCRIPTION

### 4-1 RECEIVER CIRCUITS

#### 4-1-1 ANTENNA SWITCHING CIRCUIT

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

Received signals enter the antenna connector (J1) and pass through the low-pass filters (L1–L3, C2, C3, C8–C10). The filtered signals are passed through the  $\lambda/4$  type antenna switching circuit (D5, D6, L5) and then applied to the RF circuit.

#### 4-1-2 RF CIRCUIT

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

The signals from the antenna switching circuit pass through the two-stage bandpass filters (D7, D8, L8, L9). The filtered signals are amplified at the RF amplifier (Q1) and then enter the three-stage bandpass filters (D9–D11, L12, L13) to suppress unwanted signals.

D7–D11 employ varactor diodes, that are controlled by the PLL lock voltage, to track the bandpass filter. These varactor diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

#### 4-1-3 1ST MIXER AND 1ST IF CIRCUITS

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

The RF signals from the bandpass filter are mixed with the 1st LO signals coming from the VCO circuit via the buffer amplifier (Q3) at the 1st mixer circuit (Q2) to produce a 30.875 MHz 1st IF signal. The 1st IF signal is passed through a pair of crystal filters (F11) in order to obtain wide selection capability and to pass only the desired signals. The filtered signal is applied to the 2nd IF circuit after being amplified at the 1st IF amplifier (Q4).

#### 4-1-4 2ND IF AND DEMODULATOR CIRCUITS

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

The 1st IF signal from the IF amplifier (Q4) is applied to the 2nd mixer section of the FM IF IC (IC1, pin 16) and is then mixed with the 2nd LO signal for conversion to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, local oscillator, limiter amplifier, quadrature detector, active filter and audio amplifier circuit. The local oscillator section and X1 generate 30.420 MHz for the 2nd LO signal.

##### • Wide and narrow types (MAIN unit)

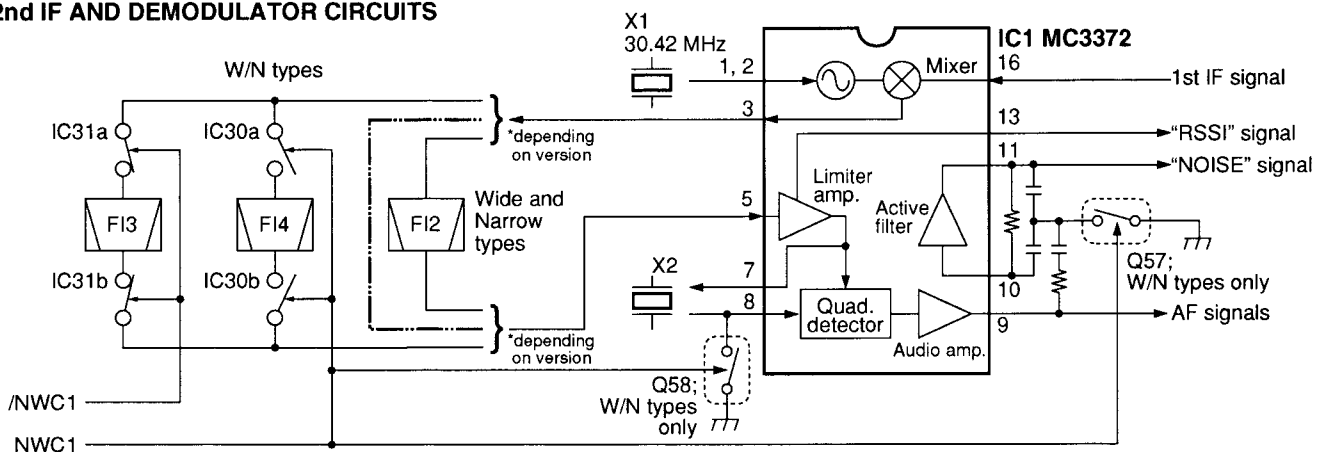
The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through the ceramic filter (F12) to suppress unwanted heterodyne frequencies. The filtered signal is amplified at the limiter amplifier section (pin 5) and applied to the quadrature detector section in the FM IF IC to demodulate the 2nd IF signal into AF signals using the ceramic discriminator (X2). The demodulated AF signals are output from pin 9 of the IC and applied to the AF circuit via the receiver mute circuit.

##### • Wide/Narrow types (MAIN-A unit)

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through either one of 2 ceramic filters (F13: Narrow, F14: Wide) to suppress unwanted heterodyne frequencies via either one of 2 N/W switches (IC30:Wide, IC31: Narrow). The filtered signal is applied to the quadrature detector section in the FM IF IC to demodulate the 2nd IF signal into AF signals using the ceramic discriminator (X2) after being amplified at the limiter amplifier section (pin 5). The demodulated AF signals are output from pin 9 of the IC and applied to the AF circuit via the receiver mute circuit.

The N/W switches (IC30, IC31) select a ceramic filter (F13 or F14), and the other N/W switches (Q57, Q58) adjusts the input level to the FM IF IC (IC1, pins 9, 10) to switch the bandwidth depending whether the /NWC and NWC signals from the CPU (IC23, pins 24, 25) have wide or narrow settings.

#### • 2nd IF AND DEMODULATOR CIRCUITS





#### 4-1-5 AF CIRCUIT

The AF signals from the FM IF IC (IC1, pin 9) are amplified at the AF amplifier (IC2) and are then applied to the high-pass filter circuit (IC3a/b). The high-pass filter characteristics are controlled by the HFSW signal from the CPU (IC20, pin 58). When the HFSW signal level is high, the cut-off frequency is shifted higher to remove CTCSS or DTCS signals.

The filtered AF signals from the high-pass filter (IC3, pin 1) are passed through the de-emphasis circuit (R68, C74) with frequency characteristics of  $-6$  dB/octave, and are then applied to the electronic volume controller (IC7) via the AF mute switch (Q6).

The output AF signals from the electronic volume controller (IC7, pin 9) are applied to the AF power amplifier (IC8) to drive the speaker.

#### 4-1-6 RECEIVE MUTE CIRCUITS

##### • NOISE SQUELCH

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

Some noise components in the AF signals from the FM IF IC (IC1, pin 9) are passed through the active filter section in the IC (pins 10, 11). The N/W switch (Q57) adjusts the input noise level to the IC between wide and narrow bandwidths. (Wide/Narrow types only)

The noise signals from the FM IF IC (IC1, pin 11) are passed through the level controller (IC5, pins 21, 22), and are then converted into pulse-type signals (NOIS) at the noise detector circuit (Q9, Q10).

The NOIS signal from the noise detector (Q10) is applied to the CPU (IC20, pin 19). The CPU then analyses the noise condition and controls the AMUT and SP ports to toggle the AF mute switches (Q6, Q7).

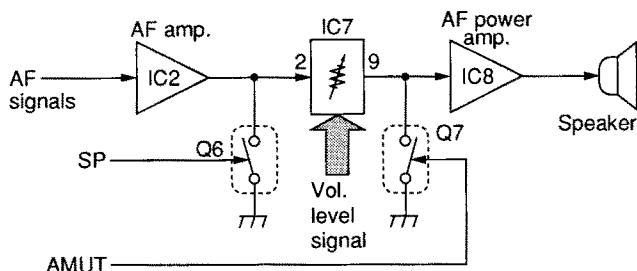
##### • CTCSS AND DTCS

A portion of the AF signals from the AF amplifier (IC2) pass through the low-pass filters (IC4a/b) and are then amplified at the tone amplifier (IC28a). The signals are applied to the CTCSS decoder in the CPU (IC20, pin 98) to control the AMUT and SP ports.

When the DTCS system is in use, the amplified signals are converted into digital signals at IC28b, then applied to the DTCS decoder in the CPU (IC20, pin 23).

The LFSW port (IC20, pin 62) controls the low-pass filter (IC4a) characteristics to shift the cut-off frequency for CTCSS and DTCS separately.

##### • AF AND RECEIVE MUTE CIRCUITS



## 4-2 TRANSMITTER CIRCUITS

### 4-2-1 MICROPHONE AMPLIFIER CIRCUIT

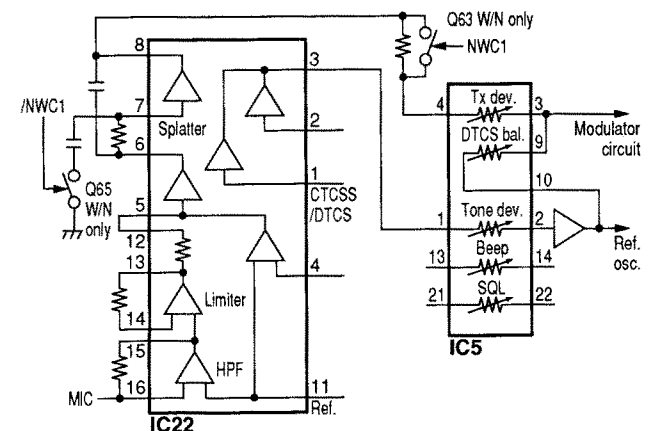
The microphone amplifier circuit amplifies audio signals from the microphone, within  $+6$  dB/octave pre-emphasis characteristics, to a level needed for the modulation circuit.

The AF signals (MIC) from the FRONT unit via J5 (pin 10) are passed through the audio switch (IC10, pins 5, 6). While transmitting, the MCON signal from the CPU (IC20, pin 79) becomes high, and the AF signals pass to the microphone amplifier circuit. The applied signals are amplified at the microphone amplifier (IC22) via the preamplifier (IC21b). The amplified signals are applied to the limiter amplifier in IC22.

The entered signals are pre-emphasized with  $+6$  dB/octave at a limiter amplifier, then passed through a splatter filter section in IC22. The output signals from pin 8 pass through the level controller (IC5, pins 4, 3) and are then applied to the modulation circuit (D23).

In addition to the Wide/Narrow types, the N/W switch is connected to the input (N/W switch; Q65) and output (N/W switch; Q63) lines of the splatter filter circuit for each. Q63 is controlled by the "NWC1" and Q65 is controlled by the "/NWC1" signal coming from the CPU (IC23, pins 24, 25) to adjust filter cut-off frequency (by Q65) and maximum frequency deviation (by Q63).

##### • MICROPHONE AMPLIFIER CIRCUIT



### 4-2-2 MODULATION CIRCUIT

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

The AF signals from the level controller (IC5) change the reactance of a varactor diode (D23) to modulate the oscillated signal at the Tx VCO circuit (Q23). The modulated VCO signal, RF signal, is amplified at the buffer amplifiers (Q19, Q20) and is then applied to the drive amplifier circuit via the T/R switch (D17).

CTCSS/DTCS signals from the level controller (IC5, pin 2) are amplified at IC21a, and are applied to the reference oscillator circuit (X3) to modulate the oscillated signal.

### 4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS

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

The signal from the buffer amplifier (Q20) passes through the T/R switch (D17), and is amplified by the drivers (Q15–Q17) and the power module (IC11) to obtain 25 W (IC-F2010) or 35 W (IC-F2020) of RF power.

The amplified signal is passed through the antenna switching circuit (D4), low-pass filter and APC detector, and is then applied to the antenna connector.

The collector voltages for the driver (Q16) come from the MT8V regulator (Q38, D28). The transmit mute switch (Q39) controls the regulator when transmit mute is necessary.

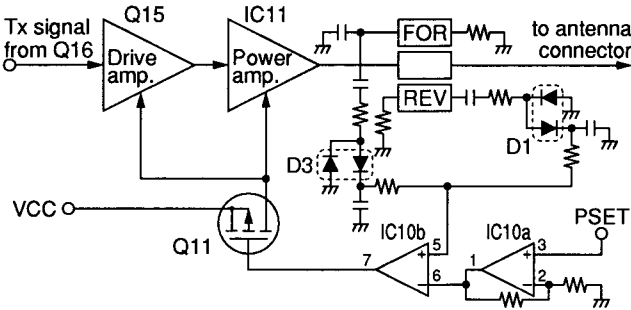
#### 4-2-4 APC CIRCUIT

The APC circuit protects the power module (IC11) from a mismatched output load and stabilizes the output power.

The APC detector circuit detects forward signals and reflected signals at D3 and D1 respectively. The combined voltage is at a minimum level when the antenna impedance is matched to 50 Ω and is increased when it is mismatched.

The detected voltage is applied to the inverse amplifier (IC10b, pin 5), and the power setting voltage (PSET) is applied to the other input (IC10b, pin 6) via the amplifier (IC10a). When antenna impedance is mismatched, the detected voltage exceeds the power setting voltage. Then the output voltage of the inverse amplifier (IC10b, pin 7) controls the input current of the driver (Q15) and the power module (IC11) to reduce the output power via the APC driver (Q11).

#### • APC CIRCUIT



### 4-3 PLL CIRCUITS

#### 4-3-1 PLL CIRCUIT

A PLL circuit provides stable oscillation of the transmit frequency and the receive 1st LO frequency. The PLL circuit consists of the PLL IC, charge pump and loop filter and employs a pulse swallow counter.

Oscillated signals from the VCO pass through buffer amplifiers (Q19, Q18) are prescaled in the PLL IC (IC12, pin 11) based on the divided ratio (N-data). The PLL IC (IC12) detects the out-of-step phase using the reference frequency and outputs it from pin 6. The output signal is passed through the charge pump (Q30–Q33) and loop filter (R154/C181, R153/C179), and is then applied to the VCO circuit as the lock voltage.

The accelerator switch (IC13a/b) selects the effective loop filter to accelerate the PLL lock up speed.

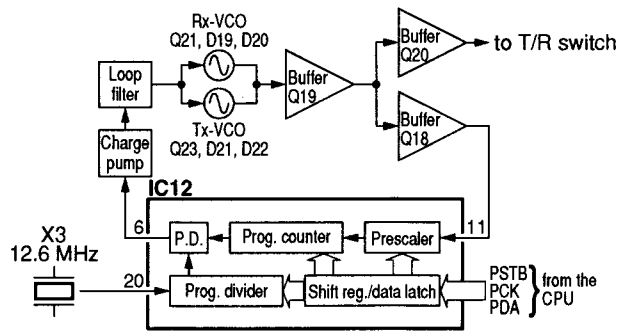
The lock voltage is also used for the receiver tuneable band-pass filters to match the filter's center frequency to the desired receive frequency. The lock voltage is amplified at the buffer amplifier (Q29) and is then applied to the bandpass filters (D8–D11).

#### 4-3-2 VCO CIRCUIT

The VCO circuit contains separate Rx (Q21, D19, D20) and Tx (Q23, D21, D22) VCOs. The oscillated signal is amplified at the buffer amplifier (Q19, Q20) and is then applied to the T/R switch (D17, D18). Then the receive 1st LO signal is applied to the 1st mixer circuit (Q2) via the buffer amplifier (Q3) and the transmit signal to the driver (Q17).

A portion of the signal from the buffer amplifier (Q19) is fed back to the PLL IC (IC12, pin 11) via the buffer amplifier (Q18) as the comparison signal.

#### • PLL CIRCUIT



### 4-4 POWER SUPPLY CIRCUITS

#### VOLTAGE LINES

LINE	DESCRIPTION
HV	The voltage from the external power connector.
VCC	Same voltage as the HV line passed through the power control circuit (Q12) controlled by PWON signal from the CPU (IC20, pin 67).
CPU5V	Common 5 V converted from the HV line at the 5V regulator circuit (IC25). This voltage is supplied to the CPU regardless of the power switch.
+5V	Common 5 V converted from the VCC line at the +5V regulator circuit (Q42, Q43, D30) using the CPU5V line voltage as the reference.
+8V	Common 8 V converted from the VCC line at the +8V regulator circuit (IC16).
R8V	Receive 8 V converted from the VCC line at the R8V regulator circuit (Q36, D27) using the +8V line voltage as the reference and controlled by VRX signal from the CPU (IC20, pin 66).
T8V	Transmit 8 V converted from the VCC line at the T8V regulator circuit (Q40, D29) using the +8V line voltage as the reference and controlled by VTX signal from the the CPU (IC20, pin 65).
MT8V	Transmit 8 V converted from the VCC line at the MT8V regulator circuit (Q38, D28) using the +8V line voltage as the reference and controlled by TMUT signal from the the CPU (IC20, pin 60).

## 4-5 PORT ALLOCATIONS

### CPU (IC20)

Pin number	Port name	Description
1	AFV	Input port for the volume control.
11	SIFT	Outputs CPU clock shift signal.
19	NOIS	Input port for noise signals (pulse-type) for noise squelch operation.
21	POSW	Input port for the power switch. Low : While power switch is pushed
23	DDEC	Input port for DTCS decoding.
24	/NWC	Outputs N/W switch control signals. Low : While narrow is selected (Wide/Narrow types only)
25	NWC	Outputs N/W switch control signals. High : While narrow is selected (Wide/Narrow types only)
32-35	CTN3-CTN0	Output ports for CTCSS/DTCS signals.
36	PTTO	Outputs the PTT control signal. Low : While transmitting
39	PTTI	Input port for the PTT control signal from PTTO port.
42	ECK	Outputs clock signal for EEPROMs.
43	ESI	Input port for serial signal from EEPROMs.
44	ESO	Outputs serial signal for EEPROMs.
45, 46	ECS1, ECS2	Output ports for EEPROM select signals. ECS1: For internal EEPROM (IC27) ECS2: For optional EEPROM
47	PDA	Outputs data signal for the PLL IC (IC12).
48	PCK	Outputs clock signal for the PLL IC (IC12).
49	UNLK	Input port for the PLL unlock signal. High : During unlock
50	PSTB	Outputs strobe signals for the PLL IC (IC12).
51	PLLT	Outputs PLL accelerator control signal. High : While scanning, etc.
52	PLLR	Outputs PLL accelerator control signal. High : While transmitting
53	DDA	Outputs data signal for the level controller (IC5).
54	DCK	Outputs clock signal for the level controller (IC5).
55	DSTB	Outputs strobe signals for the level controller. (IC5)
56	PASP	Outputs "Public-address" mute signal. High : While PA and Ext. SP functions are not used

Pin number	Port name	Description
57	SP	Outputs the mute switch (Q7) control signal (incl. beep). High : While squelched, etc.
59	HFSW	Outputs high-pass filter's characteristics select signal. High : During CTCSS operation
59	PA	Outputs mic. audio select signal to the audio switch (IC25). High : While "Public-address" function is ON
60	TMUT	Outputs MT8V regulator circuit (Q38, D27) control signal. High : While transmit is muted
61	HORN	Outputs high level control signal for the pre-set time to the connected external unit when matched 2- or 5-tone code is received.
64	DIM	Input port for an external LCD backlight brightness control signal. Low : LCD backlight is dimmed
65	VTX	Outputs the T8V regulator circuit (Q38, D28) control signal. Low : While transmitting
66	VRX	Outputs the R8V regulator circuit (Q36, D27) control signal. Low : While receiving
67	PWON	Outputs the power control circuit (Q12) control signal. High : During power ON
79	MCON	Outputs mic. audio mute control signal to the audio switch (IC25). High : While DTMF signals are being transmitted, etc.
80	AMUT	Outputs the AF mute switch (Q5) control signal. High : While squelched, etc.
81	MMUT	Input port for microphone audio mute control signal from an optional unit.
82	RMUT	Input port for receive audio mute control signal from an optional unit.
84	BUSY	Outputs busy signal for an optional unit.
85	AFON	Input port for the AF amplifier ON signal from an optional unit.
90	BEEP	Outputs beep audio signals.
91	DTMF	Outputs DTMF audio signals.
98	CDEC	Input port for CTCSS decoding.
99	RSSI	Input port for receiving signal strength level detection.

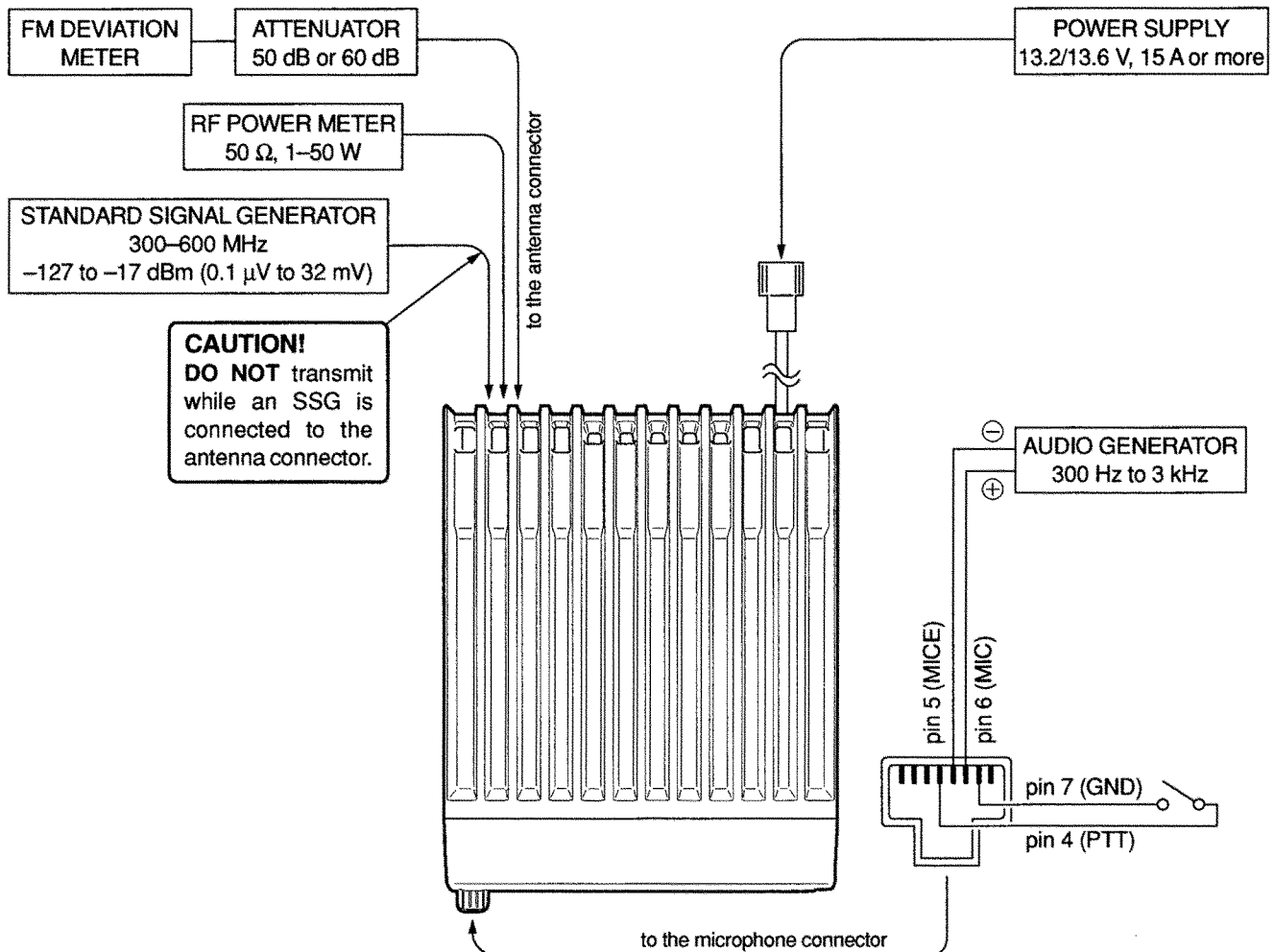
# SECTION 5 ADJUSTMENT PROCEDURES

## 5-1 PREPARATION

### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output Voltage : 13.2 V DC (IC-F2010)	Standard signal generator (SSG)	Frequency range : 0.1–600 MHz
	13.6 V DC (IC-F2020)		Output level : 0.1 $\mu$ V –32 mV (–127 to –17 dBm)
RF power meter (terminated type)	Measuring range : 1–50 W	Oscilloscope	Frequency range : DC–20 MHz
	Frequency range : 300–600 MHz	DC voltmeter	Measuring range : 0.01–20 V
Frequency counter	Impedance : 50 $\Omega$	Digital multimeter	Input impedance : 50 k $\Omega$ /V DC or better
	SWR : Less than 1.2 : 1		Measuring range : 10 mV –10 V
RF voltmeter	Frequency range : 0.1–600 MHz	AC millivoltmeter	Input impedance : 10 M $\Omega$ /V DC or better
	Measuring range : 0.01–10 V	External speaker	Input impedance : 4 $\Omega$
FM deviation meter	Frequency range : DC–600 MHz		Capacity : 5 W or more
	Measuring range : 0 to $\pm$ 10 kHz	Power attenuation : 50 dB or 60 dB	Capacity : 50 W or more
Audio generator	Frequency range : 300–3000 Hz	Terminator	Impedance : 50 $\Omega$
	Measuring range : 1–500 mV		Capacity : 50 W or more

### ■ CONNECTION



## 5-2 INITIAL SET MODE

The following items can be adjusted via *Initial Set Mode* without opening the transceiver's case.

### ■ ENTERING INITIAL SET MODE

- ① Turn the transceiver power OFF.
- ② While pushing  $\triangle$  and  $\nabla$ , turn power ON.
  - Bank number appears regardless of the channel separation type, 'bank' or 'free'.
- ③ Push  $P_0$  to cycle through the initial set mode items.

**NOTE:** Initial Set Mode access can be inhibited through PC programming. In such case,  $P_0$  cannot be used and only 'DISPLAY' setting is available. Ask your Dealer or Icom Service Center for PC programming.

### ■ SELECTABLE ITEMS

No.	ITEM	SELECTABLE CONDITIONS		
		$P_1$	$P_2$	$P_3$
1	DISPLAY	Backlight	—	Contrast
2	AF/SQUELCH	—	Squelch level	Minimum AF level
3	BEEP TONES	Link ON/OFF	Beep tones ON/OFF	Beep level
4	DEVIATION	DTCS balance	Tone deviation	Max. voice deviation
5	S-METER	Indicate the received signal level regardless of $P_1$ to $P_3$ keys.		
6	TX POWER	Low 1	Low 2	High

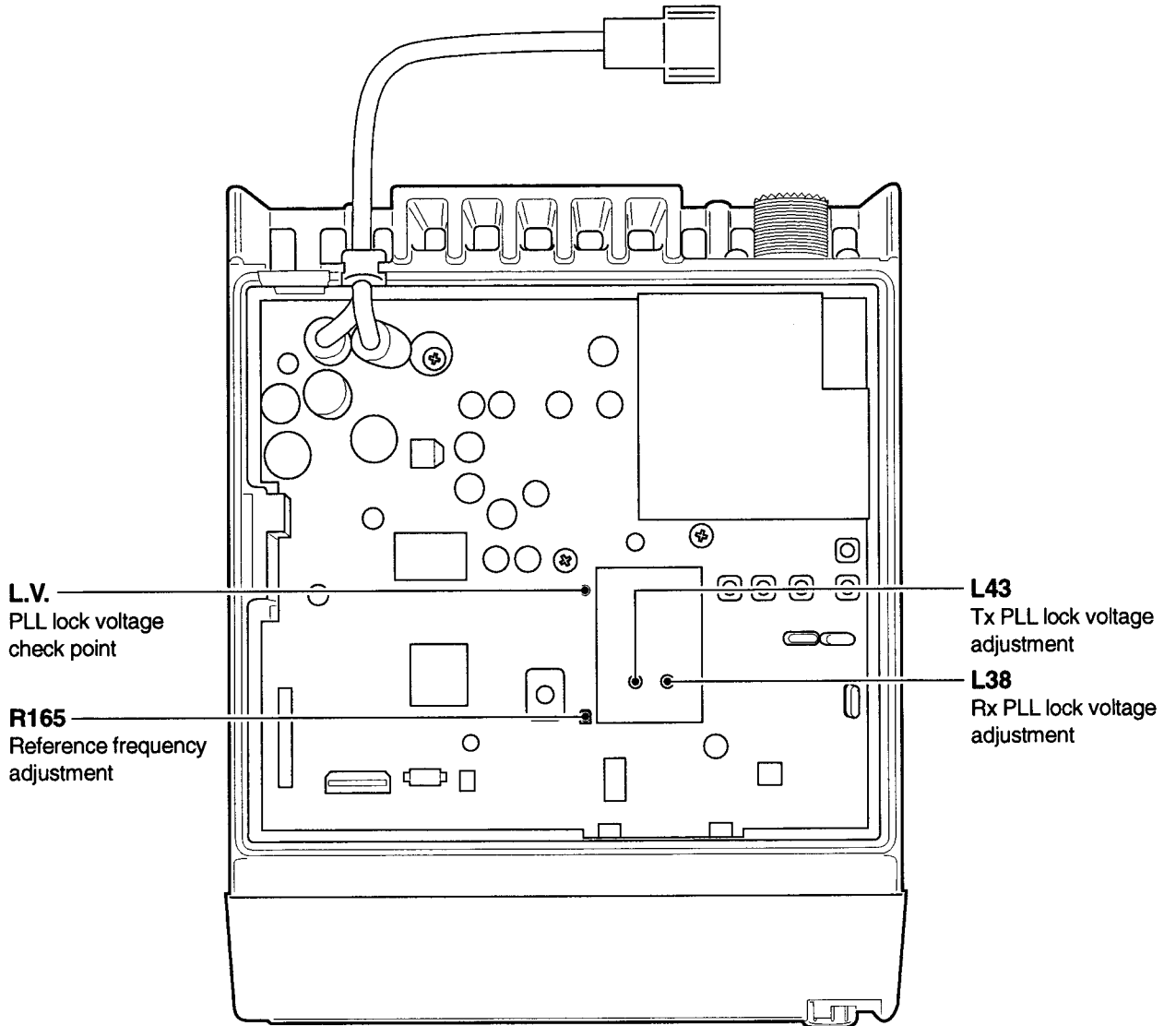
### ■ SELECTION METHOD

MODE No.	ITEM	METHOD	NOTE
1	Display backlight	Push $P_1$ to select 'dark' or 'bright'.	
	Display contrast	Rotate the volume control while pushing $P_3$ .	
2	Squelch level	Rotate the volume control while pushing $P_2$ .	
	Minimum AF level	Rotate the volume control while pushing $P_3$ .	
3	Link/unlink beep tones with the volume control	Push $P_1$ to select 'link' or 'unlink'.	2 beeps: link    1 beep: unlink
	Beep ON/OFF	Push $P_2$ to turn beeps ON and OFF.	2 beeps: ON    1 beep: OFF Effective after exiting Initial Set Mode
	Maximum beep level	Rotate the volume control while pushing $P_3$ .	
4	DTCS balance	Rotate the volume control while pushing $P_1$ .	Automatic transmission while pushing the key.
	CTCSS/DTCS Tone deviation	Rotate the volume control while pushing $P_2$ .	Automatic transmission while pushing the key. Separate setting for CTCSS and DTCS depending on the programmed tone system.
	Maximum voice deviation	Rotate the volume control while pushing $P_3$ .	Automatic transmission while pushing the key.
5	S-meter level	—	Received signal level is shown in the display.
6	Transmit low power (L1)	Rotate the volume control while pushing $P_1$ .	Automatic transmission while pushing the key.
	Transmit low power (L2)	Rotate the volume control while pushing $P_2$ .	Same as above.
	Transmit high power (H)	Rotate the volume control while pushing $P_3$ .	Same as above.




### 5-3 PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT		
		UNIT	LOCATION		UNIT	ADJUST	
PLL LOCK VOLTAGE	1 • Operating frequency [L400], [P400] : 390.000 MHz [P425], [P440], [L450], [L470] : 440.000 MHz [L490], [P490] : 480.000 MHz • Receiving	MAIN or MAIN-A	Connect a digital multi-meter or an oscilloscope to the check point, "LV".	2.0 V	MAIN or MAIN-A	L38	
	2 • Operating frequency [L400], [P400] : 430.000 MHz [P425], [P440], [L450], [L470] : 490.000 MHz [L490], [P490] : 520.000 MHz • Receiving					7.0–13.0 V	Verify
	3 • Operating frequency [L400], [P400], [P425] : 390.000 MHz [P440], [L450], [L470] : 440.000 MHz [L490], [P490] : 480.000 MHz • Transmitting					2.0 V	L43
	4 • Operating frequency [L400], [P400], [P425] : 430.000 MHz [P440], [L450], [L470] : 490.000 MHz [L490], [P490] : 520.000 MHz • Transmitting					7.0–13.0 V	Verify
PLL REFERENCE FREQUENCY	1 • Operating frequency [L400], [P400] : 430.000 MHz [P425] : 432.000 MHz [L450] : 470.000 MHz [P440], [L470] : 490.000 MHz [L490] : 512.000 MHz [P490] : 520.000 MHz • Transmitting	Rear panel	Loosely couple a frequency counter to the antenna connector.	430.00000 MHz [L400], [P400] 432.00000 MHz [P425] 470.00000 MHz [L450] 490.00000 MHz [P440], [L470] 512.00000 MHz [L490] 520.00000 MHz [P490]	MAIN or MAIN-A	R165	

• MAIN/MAIN-A UNIT



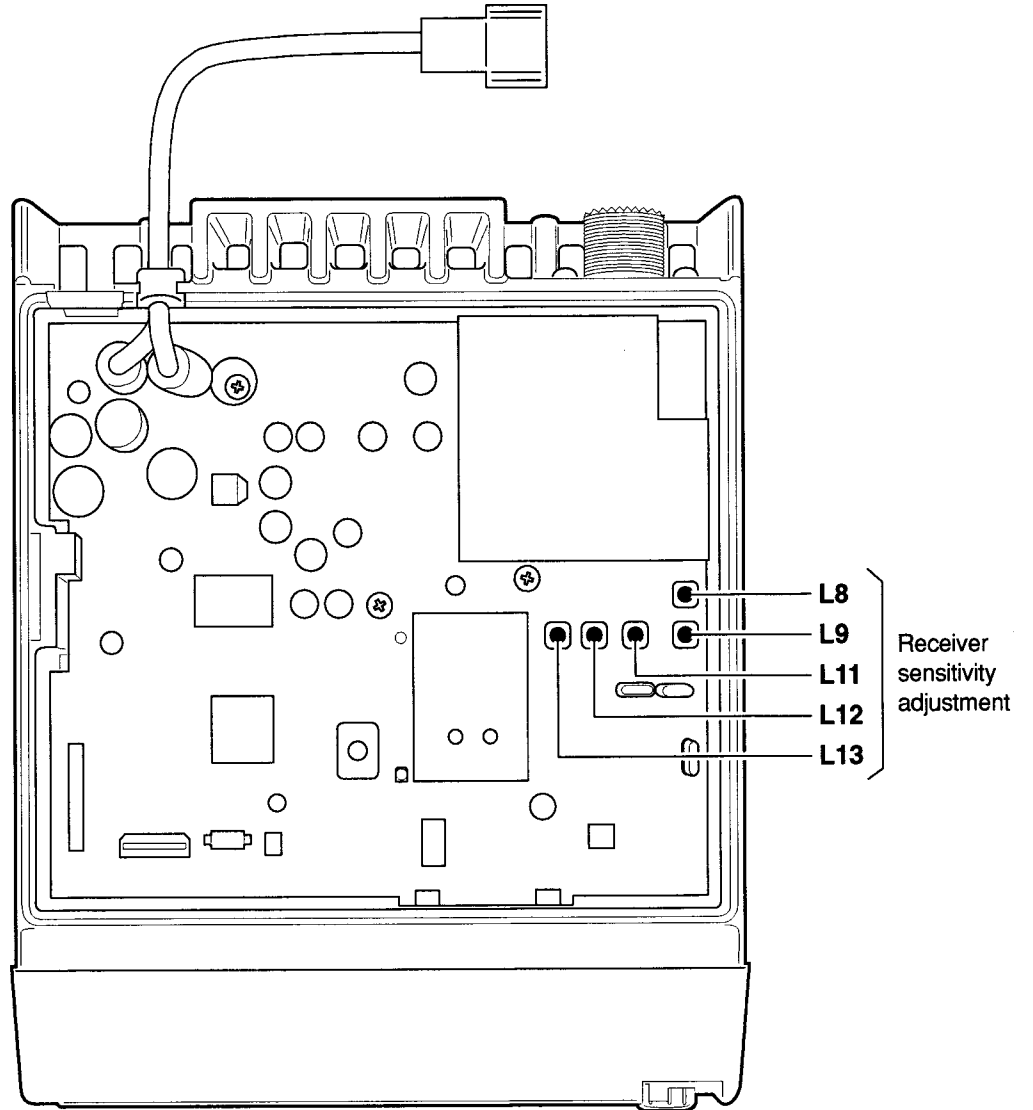
## 5-4 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT METHOD	ADJUSTMENT	
			VALUE	ADJUST
RECEIVER SENSITIVITY	<p>1</p> <ul style="list-style-type: none"> <li>Operating frequency               <ul style="list-style-type: none"> <li>[L400], [P400] : 400.000 MHz</li> <li>[P425], [P440] : 440.000 MHz</li> <li>[L450] : 450.000 MHz</li> <li>[L470] : 470.000 MHz</li> <li>[P490] : 490.000 MHz</li> <li>[L490] : 520.000 MHz</li> </ul> </li> <li>Connect an SSG to the antenna connector and set as:               <ul style="list-style-type: none"> <li>Level : 5.6 <math>\mu</math>V* (-92 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>Connect a 4 <math>\Omega</math> load to the external speaker jack.</li> <li>Enter <b>Initial Set Mode</b> No. 5. Refer to page 5-2 for details.</li> <li>Receiving</li> </ul>	Number digits in the LCD 	Maximum indication	Adjust in sequence L8, L9, L11, L12, L13 on the MAIN/MAIN-A unit
NOISE SQUELCH THRESHOLD POINT	<p>1</p> <ul style="list-style-type: none"> <li>Make sure no signal is being applied to the antenna connector.</li> <li>Enter <b>Initial Set Mode</b> No. 2. Refer to page 5-2 for details.</li> <li>Operating frequency : Any</li> <li>Receiving</li> </ul>	Speaker output	At the point where the noise audio just disappears.	Rotate volume control while pushing  .
	<p>2</p> <ul style="list-style-type: none"> <li>Connect an SSG to the antenna connector and set as:               <ul style="list-style-type: none"> <li>Level : 0.25 <math>\mu</math>V* (-119 dBm)</li> <li>Deviation : <math>\pm</math>3.5 kHz [Wide] and <math>\pm</math>2.8 kHz [Middle] and <math>\pm</math>1.75 kHz [Narrow]</li> <li>Modulation : 1 kHz</li> </ul> </li> <li>Receiving</li> </ul>		Squelch opens	Verify
BEEP LEVEL	<p>1</p> <ul style="list-style-type: none"> <li>Enter <b>Initial Set Mode</b> No. 3. Refer to page 5-2 for details.</li> <li>Operating frequency : Any</li> <li>Receiving</li> </ul>	Speaker output	Desired level	Rotate volume control while pushing  .

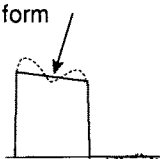
\*This output level of the standard signal generator (SSG) is indicated as SSG's open circuit.



• MAIN/MAIN-A UNIT



## 5-5 TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT METHOD	ADJUSTMENT	
			VALUE	ADJUST
OUTPUT POWER	<ul style="list-style-type: none"> <li>Operating frequency :  [L400], [P400], [P425] : 400.000 MHz  [P440] : 440.000 MHz  [L450] : 450.000 MHz  [L470] : 470.000 MHz  [L490], [P490] : 490.000 MHz</li> <li>Enter <b>Initial Set Mode</b> No. 6.  Refer to page 5-2 for details.</li> </ul>	Connect an RF power meter to the antenna connector.	25 W or 10 W (IC-F2010 according to versions) 35 W (IC-F2020)	Rotate volume control while pushing <b>[P3]</b> .
			10 W or 5 W (IC-F2010 according to versions) 10 W (IC-F2020)	Rotate volume control while pushing <b>[P2]</b> .
			2.5 W (IC-F2010) 3.5 W (IC-F2020)	Rotate volume control while pushing <b>[P1]</b> .
<p><b>NOTE:</b> When the RF output power cannot be set with this procedure, cloning may be necessary to cancel the output power setting.</p>				
FM DEVIATION	<ul style="list-style-type: none"> <li>Operating frequency :  [L400], [P400], [P425] : 400.000 MHz  [L450] : 450.000 MHz  [L470] : 470.000 MHz  [P440], [L490], [P490] : 490.000 MHz</li> <li>Enter <b>Initial Set Mode</b> No. 4.  Refer to page 5-2 for details.</li> <li>Connect an audio generator to the microphone connector and set as:  1 kHz/35 mV (IC-F2010)  1 kHz/50 mV (IC-F2020)</li> <li>Set an FM deviation meter as:  HPF : OFF    LPF : 20 kHz  De-emphasis : OFF  Detector : (P-P)/2</li> <li>Wide/Narrow setting : Wide  [Wide/Narrow] types only</li> </ul>	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.1 kHz [Wide/Narrow] and [Wide]	Rotate volume control while pushing <b>[P3]</b> .
			±3.4 kHz [Middle]	
	<ul style="list-style-type: none"> <li>Wide/Narrow setting : Narrow  [Wide/Narrow] types only</li> </ul>		±1.75–±2.2 kHz	Verify
DTCS WAVE FORM AND DEVIATION	<ul style="list-style-type: none"> <li>Operating frequency :  [L400], [P400], [P425] : 415.000 MHz  [P440] : 465.000 MHz  [L450] : 460.000 MHz  [L470] : 480.000 MHz  [L490] : 500.000 MHz  [P490] : 505.000 MHz</li> <li>Enter <b>Initial Set Mode</b> No. 4.  Refer to page 5-2 for details.</li> <li>No AF signals are applied to the microphone connector.</li> <li>Set an FM deviation meter as:  HPF : OFF    LPF : 20 kHz  De-emphasis : OFF  Detector : (P-P)/2</li> <li>Wide/Narrow setting : Wide  [Wide/Narrow] types only</li> <li>DTCS code : 007</li> </ul>	Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.	Maximum wave form	Rotate volume control while pushing <b>[P2]</b> .
			Set to flat wave form 	Rotate volume control while pushing <b>[P1]</b> .
			±0.7 kHz [Wide/Narrow] and [Wide] ±0.55 kHz [Middle]	Rotate volume control while pushing <b>[P2]</b> .
			±0.35 kHz [Middle]	
	<ul style="list-style-type: none"> <li>Wide/Narrow setting : Narrow  [Wide/Narrow] types only</li> </ul>		±0.25–±0.5 kHz	Verify

### 5-5 TRANSMITTER ADJUSTMENT— continued

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT METHOD	ADJUSTMENT	
			VALUE	ADJUST
CTCSS TONE DEVIATION	1 <ul style="list-style-type: none"> <li>• Operating frequency                [L400], [P400], [P425] : 415.000 MHz                [P440] : 465.000 MHz                [L450] : 460.000 MHz                [L470] : 480.000 MHz                [L490] : 500.000 MHz                [P490] : 505.000 MHz</li> <li>• Enter <b>Initial Set Mode</b> No. 4.                Refer to page 5-2 for details.</li> <li>• No AF signals are applied to the microphone connector.</li> <li>• Set an FM deviation meter as:                HPF : OFF    LPF : 20 kHz                De-emphasis : OFF                Detector : (P-P)/2</li> <li>• Wide/Narrow setting : Wide                [Wide/Narrow] types only</li> <li>• CTCSS tone frequency: 67.0 Hz</li> </ul>	Connect an FM deviation meter to the antenna connector through an attenuator.	±0.7 kHz [Wide/Narrow] and [Wide] ±0.55 kHz [Middle] ±0.35 kHz [Narrow]	Rotate volume control while pushing <input type="button" value="P2"/> .
	2 <ul style="list-style-type: none"> <li>• Wide/Narrow setting : Narrow                [Wide/Narrow] types only</li> </ul>		±0.25–±0.5 kHz	Verify

# SECTION 6 PARTS LIST

## FRONT UNIT

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1140006300	S.IC	HD404812E65H
IC3	1110001550	S.IC	S-8054ALB-LM-T1
IC4	1110003390	S.IC	AN8005M-(E1)
Q1	1590001330	S.TRANSISTOR	DTA114EU T107
Q2	1590000680	S.TRANSISTOR	DTC114EU T107
Q3	1590000680	S.TRANSISTOR	DTC114EU T107
Q4	1590000680	S.TRANSISTOR	DTC114EU T107
Q5	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q6	1590001330	S.TRANSISTOR	DTA114EU T107
D1	1750000390	S.DIODE	1SS353 TE-17
D2	1750000390	S.DIODE	1SS353 TE-17
D3	1750000130	S.DIODE	DA204U T107
D4	1750000130	S.DIODE	DA204U T107
D5	1750000390	S.DIODE	1SS353 TE-17
X1	6060000600	S.CERAMIC	PBRC 3.68 AR
L1	6200003960	S.COIL	MLF1608A 1R0K-T
L3	6200003540	S.COIL	MLF1608D R22K-T
R1	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R3	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R4	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R5	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R6	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R7	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R10	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R11	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R13	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R14	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R15	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R16	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R17	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R18	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R20	7210002830	VARIABLE	EVU-F2JFK4 B14
R21	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R22	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R26	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R27	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R28	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R29	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R30	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R31	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R32	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R40	7030000310	S.RESISTOR	MCR10EZHZJ 270 Ω (271)
R41	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R42	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R43	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R44	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R45	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R46	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R47	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R48	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R49	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R50	7510000200	S.THERMISTOR	TN20-3U473LT
R51	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R52	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R53	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C3	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C4	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C5	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C6	4030008560	S.CERAMIC	C1608 CH 1H 300J-T-A
C7	4030008560	S.CERAMIC	C1608 CH 1H 300J-T-A
C8	4550002890	S.TANTALUM	TESVA 1A 225M1-8L
C9	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C10	4510004440	S.ELECTROLYTIC	ECEV1HA010SR
C11	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A

## FRONT UNIT

REF NO.	ORDER NO.	DESCRIPTION	
C12	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C13	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C15	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C16	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C18	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A
C19	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C20	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C21	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C22	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C23	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C24	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C25	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C26	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C27	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C28	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C30	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C31	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C32	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C33	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C34	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C35	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
DS1	5030001300	LCD	LD-BU4404E
DS2	5040002030	S.LED	CL-170Y-CD-T
DS3	5040002030	S.LED	CL-170Y-CD-T
DS4	5040002030	S.LED	CL-170Y-CD-T
DS5	5040002030	S.LED	CL-170Y-CD-T
DS6	5040002030	S.LED	CL-170Y-CD-T
DS7	5040002030	S.LED	CL-170Y-CD-T
J1	6510018030	S.CONNECTOR	53248-1217
J2	6450001470	CONNECTOR	95003-2881
W1	7120000380	JUMPER	JPW 01 R-01
W2	7120000380	JUMPER	JPW 01 R-01
W3	7030003860	S.JUMPER	ERJ3GE JPW V
SP1	2510000880	SPEAKER	SME-45W
EP1	0910045653	PCB	B 4565C
EP2	8930037960	LCD CONTACT	SRCN-1705 ZSS

S.=Surface mount

[MAIN UNIT] for Wide and Narrow types

Table with columns: REF NO., ORDER NO., DESCRIPTION. Contains detailed component list for the left section, including transistors (IC1-IC28, Q1-Q59), diodes (D1-D47), and other electronic components.

[MAIN UNIT] for Wide and Narrow types

Table with columns: REF NO., ORDER NO., DESCRIPTION. Contains detailed component list for the right section, including transistors (Q60-Q62), diodes (D1-D47, FI1-FI2), crystals (X1-X4), coils (L1-L23), and filters.

L: LMR, 1: [L400], 2: [L450], 3: [L470], 4: [L490], W: Wide
P: PMR, 1: [P400], 2: [P440], 3: [P425], 4: [P490], 5: [P425], 6: Narrow

S.=Surface mount















[MAIN UNIT] for Wide and Narrow types

REF NO.	ORDER NO.	DESCRIPTION	
W39	7030000010	S.JUMPER	MCR10EZHZ JPW (000)
W41	7030003860	S.JUMPER	ERJ3GE JPW V
W42	7030003860	S.JUMPER	ERJ3GE JPW V
W43	7030003860	S.JUMPER	ERJ3GE JPW V
W44	7030003860	S.JUMPER	ERJ3GE JPW V
W46	7120000010	JUMPER	JPW 02A
W47	7120000010	JUMPER	JPW 02A
W48	7120000010	JUMPER	JPW 02A
EP1	0910045914	PCB	B 4608D
EP2	6910010220	BEAD	HF70BB3.5x5x1.3
EP3	6910010280	BEAD	HF70BB9.5x10.4x4.9

[MAIN-A UNIT] for Wide/Narrow types

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1110003571	S.IC	MC3372SVMEL
IC2	1130007370	S.IC	TA75S558F(TE85L)
IC3	1130007090	S.IC	TA75W558FU(TE12L)
IC4	1130007090	S.IC	TA75W558FU(TE12L)
IC5	1190000350	S.IC	M62363FP-650C
IC7	1110003300	S.IC	M5282FP 70CD
IC8	1110003090	IC	LA4425A
IC9	1130006920	S.IC	TA75W01FU (TE12L)
IC10	1110003800	S.IC	NJM2904V-TE1
IC11	1150001250	IC	SC-1236 ①
	1150001260	IC	SC-1237 ②
	1150001670	IC	SC-1322 ①
	1150001680	IC	SC-1323 ②
	1150001690	IC	SC-1324 ③
	1150001700	IC	SC-1325 ③
	1150001710	IC	SC-1326 ④
IC12	1130007970	S.IC	MC145190FR2
IC13	1130007300	S.IC	TC4W66FU(TE12L)
IC16	1180001250	S.IC	TA7808F(TE16L)
IC17	1180000970	S.IC	AN78L05M-(E1)
IC18	1130007110	S.IC	TC7W04FU(TE12L)
IC19	1110001550	S.IC	S-8054ALB-LM-T1
IC20	1140006740	S.IC	HD6433875NA51H
IC21	1130006920	S.IC	TA75W01FU (TE12L)
IC22	1110003410	S.IC	μPC5023GR-043-GJG-T2
IC25	1130007300	S.IC	TC4W66FU(TE12L)
IC26	1130007110	S.IC	TC7W04FU(TE12L)
IC27	1190000340	S.IC	X25160SI-T6
IC28	1110004050	S.IC	NJM3404AV-TE1
IC30	1130007300	S.IC	TC4W66FU(TE12L)
IC31	1130007300	S.IC	TC4W66FU(TE12L)
Q1	1580000660	S.FET	3SK272-(TX)
Q2	1580000590	S.FET	3SK166-0-T7
Q3	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q4	1530003170	S.TRANSISTOR	2SC4863-4-TR
Q5	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q6	1590000680	S.TRANSISTOR	DTC114EU T107
Q7	1590000990	S.TRANSISTOR	DTC363EK T147
Q8	1590000680	S.TRANSISTOR	DTC114EU T107
Q9	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q10	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q11	1550000020	S.FET	2SJ377 (TE16R)
Q12	1550000020	S.FET	2SJ377 (TE16R)
Q14	1590000680	S.TRANSISTOR	DTC114EU T107
Q15	1530003291	S.TRANSISTOR	2SC4703-T1 SE
Q16	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q17	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q18	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q19	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q20	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q21	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q22	1590000680	S.TRANSISTOR	DTC114EU T107
Q23	1530003420	S.TRANSISTOR	2SC5110-O (TE85R)
Q24	1590000680	S.TRANSISTOR	DTC114EU T107
Q25	1590000680	S.TRANSISTOR	DTC114EU T107
Q26	1590001330	S.TRANSISTOR	DTA114EU T107
Q27	1590001330	S.TRANSISTOR	DTA114EU T107
Q28	1590001330	S.TRANSISTOR	DTA114EU T107
Q29	1560000530	S.FET	2SK880-GR (TE85R)
Q30	1590002290	S.TRANSISTOR	FMS2A T148
Q31	1590002300	S.TRANSISTOR	FMW2 T148
Q32	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q33	1510000510	S.TRANSISTOR	2SA1576 T107 R
Q35	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q36	1540000550	S.TRANSISTOR	2SD1664 T100Q
Q37	1590000680	S.TRANSISTOR	DTC114EU T107
Q38	1540000550	S.TRANSISTOR	2SD1664 T100Q
Q39	1590000680	S.TRANSISTOR	DTC114EU T107
Q40	1540000550	S.TRANSISTOR	2SD1664 T100Q
Q41	1590000680	S.TRANSISTOR	DTC114EU T107
Q42	1520000560	S.TRANSISTOR	2SB1123T-TD
Q43	1530003280	S.TRANSISTOR	2SC4211-6-TL
Q44	1560000810	S.FET	2SK1069-4-TL
Q48	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)
Q49	1590000680	S.TRANSISTOR	DTC114EU T107
Q50	1590001330	S.TRANSISTOR	DTA114EU T107
Q51	1590000680	S.TRANSISTOR	DTC114EU T107
Q54	1590000680	S.TRANSISTOR	DTC114EU T107
Q55	1590001330	S.TRANSISTOR	DTA114EU T107
Q57	1590001330	S.TRANSISTOR	DTA114EU T107

①: LMR, ②: [L400], ③: [L450], ④: [L470], ⑤: [L490], ⑥: Wide  
 ⑦: PMR, ⑧: [P400], ⑨: [P440], ⑩: [P490], ⑪: [P425], ⑫: Narrow

S.=Surface mount

[MAIN-A UNIT] for Wide/Narrow types

REF NO.	ORDER NO.	DESCRIPTION	
Q58	1590000680	S.TRANSISTOR DTC114EU T107	
Q59	1590000680	S.TRANSISTOR DTC114EU T107	
Q60	1590000680	S.TRANSISTOR DTC114EU T107	
Q61	1530002060	S.TRANSISTOR 2SC4081 T107 R	
Q62	1590001390	S.FET 2SJ144-Y (TE85R)	
Q63	1560000810	S.FET 2SK1069-4-TL	
Q64	1590000430	S.TRANSISTOR DTC144EU T107	
Q65	1560000840	S.FET 2SK1829(TE85R)	
Q66	1590000430	S.TRANSISTOR DTC144EU T107	
Q67	1590000430	S.TRANSISTOR DTC144EU T107	
Q68	1530002060	S.TRANSISTOR 2SC4081 T107 R	
Q69	1590000430	S.TRANSISTOR DTC144EU T107	
D1	1790000980	S.DIODE MA742(TX)	
D3	1790000980	S.DIODE MA742(TX)	
D4	1710000310	DIODE MI407	L
	1750000510	S.DIODE UM9401F	P
D5	1710000730	S.DIODE MI809-T11	
D6	1710000730	S.DIODE MI809-T11	
D7	1720000370	S.VARICAP HVU350TRF	
D8	1720000370	S.VARICAP HVU350TRF	
D9	1720000370	S.VARICAP HVU350TRF	
D10	1720000370	S.VARICAP HVU350TRF	
D11	1720000370	S.VARICAP HVU350TRF	
D12	1750000300	S.DIODE 1SS302 (TE85R)	
D15	1790000700	DIODE DSA3A1	
D16	1750000370	S.DIODE DA221 TL	
D17	1790000620	S.DIODE MA77(TW)	
D18	1790000620	S.DIODE MA77(TW)	
D19	1720000270	S.VARICAP 1SV217 (TPH2)	
D20	1720000270	S.VARICAP 1SV217 (TPH2)	
D21	1720000270	S.VARICAP 1SV217 (TPH2)	
D22	1720000270	S.VARICAP 1SV217 (TPH2)	
D23	1720000520	S.VARICAP 1T365-01-T8A	
D27	1750000300	S.DIODE 1SS302 (TE85R)	
D28	1750000300	S.DIODE 1SS302 (TE85R)	
D29	1750000300	S.DIODE 1SS302 (TE85R)	
D30	1750000390	S.DIODE 1SS353 TE-17	
D31	1720000360	S.DIODE HSU88TRF	
D32	1790000980	S.DIODE MA742(TX)	
D33	1730002420	S.ZENER MA8160(TX)	
D35	1750000390	S.DIODE 1SS353 TE-17	
D36	1750000390	S.DIODE 1SS353 TE-17	
D37	1750000390	S.DIODE 1SS353 TE-17	
D38	1750000390	S.DIODE 1SS353 TE-17	
D40	1790001280	S.DIODE MA111(TX)	
D41	1790001280	S.DIODE MA111(TX)	
D44	1160000060	S.DIODE DAN202U T107	
D45	1750000390	S.DIODE 1SS353 TE-17	
D46	1750000390	S.DIODE 1SS353 TE-17	
D52	1750000260	S.DIODE 1SS352 (TPH3)	
F11	2010002070	CRYSTAL FL-266 (30.875 MHz)	
F13	2020001180	S.CERAMIC SFPC455H-TC01	
F14	2020001050	S.CERAMIC SFPC455E-TC01	
X1	6050008810	CRYSTAL CR-473 (30.41909 MHz)	
X2	6070000170	S.DISCRIMINATOR CDBC455CX16-TC	
X3	6050009960	S.CRYSTAL CR-573 (12.6 MHz)	
X4	6050008840	S.CRYSTAL CR-463 (6.8 MHz)	
L1	6110003140	COIL LA-502	others
	6110003150	COIL LA-505	[1], [3]
L2	6110003140	COIL LA-502	others
	6110003150	COIL LA-505	[1], [3]
L3	6110003150	COIL LA-505	
L4	6200002540	S.COIL 33CS-655LY-03K=P3	
L5	6200002540	S.COIL 33CS-655LY-03K=P3	
L6	6170000230	COIL LW-25	
L7	6110003140	COIL LA-502	
L8	6200003690	S.COIL MC152-E558ANA-100051=P3	
L9	6200003690	S.COIL MC152-E558ANA-100051=P3	[1], [1]
	6200004110	S.COIL MC152-E558ANA-100050	others
L10	6200004440	S.COIL ELJFC 4R7M-F	
L11	6200003690	S.COIL MC152-E558ANA-100051=P3	
L12	6200003690	S.COIL MC152-E558ANA-100051=P3	

[MAIN-A UNIT] for Wide/Narrow types

REF NO.	ORDER NO.	DESCRIPTION	
L13	6200003690	S.COIL MC152-E558ANA-100051=P3	
L14	6200003300	S.COIL ELJNC R22K-F	
L15	6200001630	S.COIL ELJNC R10K-F	
L16	6200003440	S.COIL ELJNC 39NK-F	
L17	6200003440	S.COIL ELJNC 39NK-F	
L18	6200004230	S.COIL ELJNC R56K-F	
L19	6200002710	S.COIL ELJFC 1R8K-F	
L23	6200001650	S.COIL ELJNC 18NK-F	
L24	6200001650	S.COIL ELJNC 18NK-F	
L25	6200001750	S.COIL ELJNC 15NK-F	[4], [3]
	6200001760	S.COIL ELJNC 22NK-F	others
L26	6200004230	S.COIL ELJNC R56K-F	
L27	6200001650	S.COIL ELJNC 18NK-F	[2], [2], [3]
	6200001750	S.COIL ELJNC 15NK-F	[4], [3]
	6200001650	S.COIL ELJNC 22NK-F	[1], [1]
L28	6200001650	S.COIL ELJNC 18NK-F	[2], [2], [3]
	6200001750	S.COIL ELJNC 15NK-F	[4], [3]
	6200001760	S.COIL ELJNC 22NK-F	[1], [1]
L29	6200004230	S.COIL ELJNC R56K-F	
L30	6200004230	S.COIL ELJNC R56K-F	
L31	6200001650	S.COIL ELJNC 18NK-F	
L32	6200001760	S.COIL ELJNC 22NK-F	
L33	6200001760	S.COIL ELJNC 22NK-F	
L35	6200001620	S.COIL ELJFC 1R0K-F	
L37	6200001620	S.COIL ELJFC 1R0K-F	
L38	6200003690	S.COIL MC152-E558ANA-100051=P3	
L39	6200001620	S.COIL ELJFC 1R0K-F	
L40	6200004230	S.COIL ELJNC R56K-F	
L41	6200001620	S.COIL ELJFC 1R0K-F	
L42	6200004230	S.COIL ELJNC R56K-F	
L43	6200003690	S.COIL MC152-E558ANA-100051=P3	
L44	6200004230	S.COIL ELJNC R56K-F	
L45	6200002860	S.COIL NL 252018T-4R7J	
L46	6200004230	S.COIL ELJNC R56K-F	
L47	6200004230	S.COIL ELJNC R56K-F	
L48	6200004230	S.COIL ELJNC R56K-F	
L50	6200004230	S.COIL ELJNC R56K-F	
L51	6200001750	S.COIL ELJNC 15NK-F	
L52	6200004230	S.COIL ELJNC R56K-F	
L53	6200003960	S.COIL MLF1608A 1R0K-T	
L54	6200003960	S.COIL MLF1608A 1R0K-T	
L55	6200003960	S.COIL MLF1608A 1R0K-T	
L56	6200003960	S.COIL MLF1608A 1R0K-T	
L57	6200003960	S.COIL MLF1608A 1R0K-T	
L58	6200003960	S.COIL MLF1608A 1R0K-T	
L59	6200005130	S.COIL NLC453232T-101K	
L61	6170000320	COIL LW-29	
L62	6170000320	COIL LW-29	
L63	6200003960	S.COIL MLF1608A 1R0K-T	
L64	6200003960	S.COIL MLF1608A 1R0K-T	
L65	6200004210	S.COIL MLR1608M 15NJ-T	
R1	7030000220	S.RESISTOR MCR10EZHZ 47 Ω (470)	
R2	7030004050	S.RESISTOR ERJ3GEYJ 1R0 V (1 Ω)	
R4	7030000220	S.RESISTOR MCR10EZHZ 47 Ω (470)	
R5	7030004050	S.RESISTOR ERJ3GEYJ 1R0 V (1 Ω)	
R7	7030001170	S.RESISTOR MCR50JZHZ 220 Ω (221)	
R8	7030001170	S.RESISTOR MCR50JZHZ 220 Ω (221)	
R10	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)	
R11	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)	
R12	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)	
R13	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)	others
	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)	[1], [1]
R14	7030003640	S.RESISTOR ERJ3GEYJ 473 V (47 kΩ)	
R15	7030003300	S.RESISTOR ERJ3GEYJ 680 V (68 Ω)	others
	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)	[1], [1]
R16	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)	
R17	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)	
R18	7030003700	S.RESISTOR ERJ3GEYJ 154 V (150 kΩ)	
R19	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)	
R20	7030003680	S.RESISTOR ERJ3GEYJ 104 V (100 kΩ)	
R21	7030003360	S.RESISTOR ERJ3GEYJ 221 V (220 Ω)	
R22	7030003230	S.RESISTOR ERJ3GEYJ 180 V (18 Ω)	
R23	7030003370	S.RESISTOR ERJ3GEYJ 271 V (270 Ω)	
R24	7030003370	S.RESISTOR ERJ3GEYJ 271 V (270 Ω)	
R25	7030003380	S.RESISTOR ERJ3GEYJ 331 V (330 Ω)	
R26	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)	
R27	7030003500	S.RESISTOR ERJ3GEYJ 332 V (3.3 kΩ)	
R28	7030003480	S.RESISTOR ERJ3GEYJ 222 V (2.2 kΩ)	
R29	7030003430	S.RESISTOR ERJ3GEYJ 821 V (820 Ω)	
R30	7030003320	S.RESISTOR ERJ3GEYJ 101 V (100 Ω)	

[L]: LMR, [P]: PMR, [1]: [P400], [2]: [P440], [3]: [P490], [4]: [L400], [5]: [L450]  
[6]: [L470], [7]: [L490]

S.=Surface mount











[MAIN-A UNIT] for Wide/Narrow types

REF NO.	ORDER NO.	DESCRIPTION
C299	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C300	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C301	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C302	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C303	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C304	4030006870	S.CERAMIC C1608 JB 1H 222K-T-A
C305	4030009570	S.CERAMIC C1608 CH 1H 0R3B-T-A
C306	4030009500	S.CERAMIC C1608 CH 1H 0R5B-T-A ②, ②, ③
	4030009570	S.CERAMIC C1608 CH 1H 0R3B-T-A ①, ④, other ⑤
C307	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C308	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C309	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C310	4550006250	S.TANTALUM TEMSVA 1A 106M-8L
C311	4510005900	S.ELECTROLYTIC ECEVOGA101SR
C312	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C313	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C314	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C315	4030006900	S.CERAMIC C1608 JB 1E 103K-T-A
C316	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C317	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C318	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C319	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C320	4030011050	S.CERAMIC GRM42-6 CJ 030C 500PT ③, ④, other ⑤
	4030011060	S.CERAMIC GRM42-6 CH 040C 500PT ②
	4030011070	S.CERAMIC GRM42-6 CH 050C 500PT ①, ①
C321	4030009510	S.CERAMIC C1608 CH 1H 010B-T-A except ④, ⑤
C323	4030006940	S.CERAMIC C1608 CH 1H 030C-T-A ③, ④, other ⑤
	4030006950	S.CERAMIC C1608 CH 1H 040C-T-A ②
	4030006960	S.CERAMIC C1608 CH 1H 050C-T-A ①, ①
C324	4030008920	S.CERAMIC C1608 JB 1C 473K-T-A
C325	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C326	4550000460	S.TANTALUM TESVA 1C 105M1-8L
C327	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C329	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C331	4030006960	S.CERAMIC C1608 CH 1H 050C-T-A
	4030006990	S.CERAMIC C1608 CH 1H 080D-T-A
C332	4030006960	S.CERAMIC C1608 CH 1H 050C-T-A
	4030006990	S.CERAMIC C1608 CH 1H 080D-T-A ①, ①
C335	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C336	4030006870	S.CERAMIC C1608 JB 1H 222K-T-A
C338	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C339	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C340	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C341	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C342	4550002890	S.TANTALUM TESVA 1A 225M1-8L
C343	4550002890	S.TANTALUM TESVA 1A 225M1-8L
C344	4550002890	S.TANTALUM TESVA 1A 225M1-8L
C346	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C347	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C349	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C350	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C351	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C352	4550006480	S.TANTALUM TEMSVA 1C 475M-8L
C353	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C354	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C355	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C356	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C357	4550002890	S.TANTALUM TESVA 1A 225M1-8L
C358	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C359	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C361	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C362	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C363	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C364	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C365	4030010070	S.CERAMIC C1608 X7S 1C 104K-T-A
C366	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C367	4030010210	S.CERAMIC C3216 JB 1C 105M-T-A
C368	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C371	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C373	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C374	4550006480	S.TANTALUM TEMSVA 1C 475M-8L
C375	4510006090	S.ELECTROLYTIC ECEVOGA470SR
C376	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C377	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C378	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C379	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C380	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C381	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A

[MAIN-A UNIT] for Wide/Narrow types

REF NO.	ORDER NO.	DESCRIPTION
C382	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C383	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C384	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C385	4510005750	S.ELECTROLYTIC ECEV1EA220SP
C386	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C387	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C388	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C389	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C390	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C392	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C393	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C394	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C395	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C396	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C397	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C398	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C399	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C400	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C401	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C402	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C403	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C404	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C405	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C406	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C407	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C408	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C409	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C411	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C412	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C413	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C414	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C415	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C416	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C417	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C418	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C419	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C420	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C421	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C422	4030006930	S.CERAMIC C1608 CH 1H 020C-T-A ②, ②, ③
	4030009540	S.CERAMIC C1608 CH 1H 1R5B-T-A ①, ③
C424	4030006970	S.CERAMIC C1608 CH 1H 060D-T-A ④, ③
	4030006980	S.CERAMIC C1608 CH 1H 070D-T-A others ①, ④, other ⑤
C425	4030006970	S.CERAMIC C1608 CH 1H 060D-T-A ②, ②, ③
	4030006980	S.CERAMIC C1608 CH 1H 070D-T-A
C427	4510006650	S.ELECTROLYTIC ECEV1EA 100SR
C428	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C429	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C430	4030007140	S.CERAMIC C1608 CH 1H 121J-T-A
C431	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C432	4030006880	S.CERAMIC C1608 JB 1H 472K-T-A
C433	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C434	4030006850	S.CERAMIC C1608 JB 1H 471K-T-A
C438	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C439	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C442	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C443	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C444	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C445	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C446	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C447	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C448	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C449	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C450	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C451	4030006860	S.CERAMIC C1608 JB 1H 102K-T-A
C452	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C453	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C454	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C455	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C456	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C457	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C458	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C459	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C460	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C461	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C462	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C463	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C464	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C465	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C467	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C469	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A
C470	4030007090	S.CERAMIC C1608 CH 1H 470J-T-A

①: LMR, ②: PMR, ③: [P400], ④: [P440], ⑤: [P490], ⑥: [L400], ⑦: [L450]  
⑧: [L470], ⑨: [L490]

S.=Surface mount

[MAIN-A UNIT] for Wide/Narrow types

REF NO.	ORDER NO.	DESCRIPTION	
C471	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C472	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C473	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C474	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C475	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C476	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C477	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C478	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C479	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C480	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C481	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C482	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C483	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C484	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C485	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C486	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C487	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C488	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L
C489	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A □ only
C490	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C491	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C492	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C493	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C494	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C495	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
J1	6510004880	CONNECTOR	MR-DS-E 01
J2	6450000140	CONNECTOR	HSJ0807-01-010
J4	6510019250	S.CONNECTOR	B11B-ZR-SM3-TF
J5	6510018040	CONNECTOR	52330-1217
J6	6510018430	S.CONNECTOR	AXN330C038P
J7	6510019270	S.CONNECTOR	52365-0691
J8	6910001040	CONNECTOR	IPS-1136
J9	6910001040	CONNECTOR	IPS-1136
J10	6910001040	CONNECTOR	IPS-1136
W1	8900004540	CABLE	OPC-453
W2	7030003860	S.JUMPER	ERJ3GE JPW V ⊕ only
W3	7030003860	S.JUMPER	ERJ3GE JPW V
W7	7120000010	JUMPER	JPW 02A
W8	7030003860	S.JUMPER	ERJ3GE JPW V
W9	7030000010	S.JUMPER	MCR10EZHZ JPW (000)
W10	7030003860	S.JUMPER	ERJ3GE JPW V
W11	7030003860	S.JUMPER	ERJ3GE JPW V
W12	7030003860	S.JUMPER	ERJ3GE JPW V
W14	7030003860	S.JUMPER	ERJ3GE JPW V
W19	7030003860	S.JUMPER	ERJ3GE JPW V
W24	7030003860	S.JUMPER	ERJ3GE JPW V ① ①
W25	7030003860	S.JUMPER	ERJ3GE JPW V ② ②
W26	7030003860	S.JUMPER	ERJ3GE JPW V ③ ③
W27	7030003860	S.JUMPER	ERJ3GE JPW V ④ ②-10 W
W35	7030003860	S.JUMPER	ERJ3GE JPW V
W36	7030000010	S.JUMPER	MCR10EZHZ JPW (000)
W37	7030000010	S.JUMPER	MCR10EZHZ JPW (000)
W39	7030000010	S.JUMPER	MCR10EZHZ JPW (000)
W41	7030003860	S.JUMPER	ERJ3GE JPW V
W42	7030003860	S.JUMPER	ERJ3GE JPW V
W43	7030003860	S.JUMPER	ERJ3GE JPW V
W44	7030003860	S.JUMPER	ERJ3GE JPW V
W45	7030003860	S.JUMPER	ERJ3GE JPW V
W46	7120000010	JUMPER	JPW 02A
W47	7120000010	JUMPER	JPW 02A
W48	7120000010	JUMPER	JPW 02A
EP1	0910048161	PCB	B 4961A
EP2	6910010220	BEAD	HF70BB3.5x5x1.3
EP3	6910010280	BEAD	HF70BB9.5x10.4x4.9

□: LMR, ⊕: PMR, ①: [P400], ②: [P440], ③: [P490], ①: [L400], ②: [L450]  
 ③: [L470], ④: [L490]

S.=Surface mount

# SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

## [CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8010016320	1705 chassis	1
MP2	8810008660	Screw PH BT M3 x 8 NI-ZU	4
MP3	8810008660	Screw PH BT M3 x 8 NI-ZU	2
MP4	8810008660	Screw PH BT M3 x 8 NI-ZU	2
MP5	8810009130	Screw PH BT M3 x 12 NI-ZU	4
MP6	8930027480	1126 TR-A clip	1
MP7	8820000870	1705 cap screw	3
MP8	8110005570	1705 cover	1
MP11	8930039610	Thermal sheet (C)	1
MP15	8930039630	1706 jack sheet	1
MP16	8930036771	1705 main seal-1	1

## [UNPACKING]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
F1	5210000120	Fuse FGB 15A [PMR]	2
	5210000080	Fuse FGB 20A [LMR]	2
W1	Optional product	DC power cable OPC-345 [PMR]	1
	Optional product	DC power cable OPC-346 [LMR]	1
W2	8900000730	Microphone (HANG) cable OPC-049	1
MC1	Optional product	Microphone EM-99	1
MP1	8010016730	150 mounting bracket (SI)	1
MP2	8930041170	Felt (A) (SI)	2
MP3	8820000530	Flange bolt M4 x 8 NI	4
MP4	8810000470	Screw PH M5 x 12 (+/-)	4
MP5	8810005840	Screw PH A M5 x 20	4
MP6	8850000150	Flat washer M5 NI BS	4
MP7	8850000390	Spring washer M5	4
MP8	8830000120	Nut M5	4
MP9	6910004210	731 microphone hanger set	1
MP10	8310037280	Key assign sticker	1

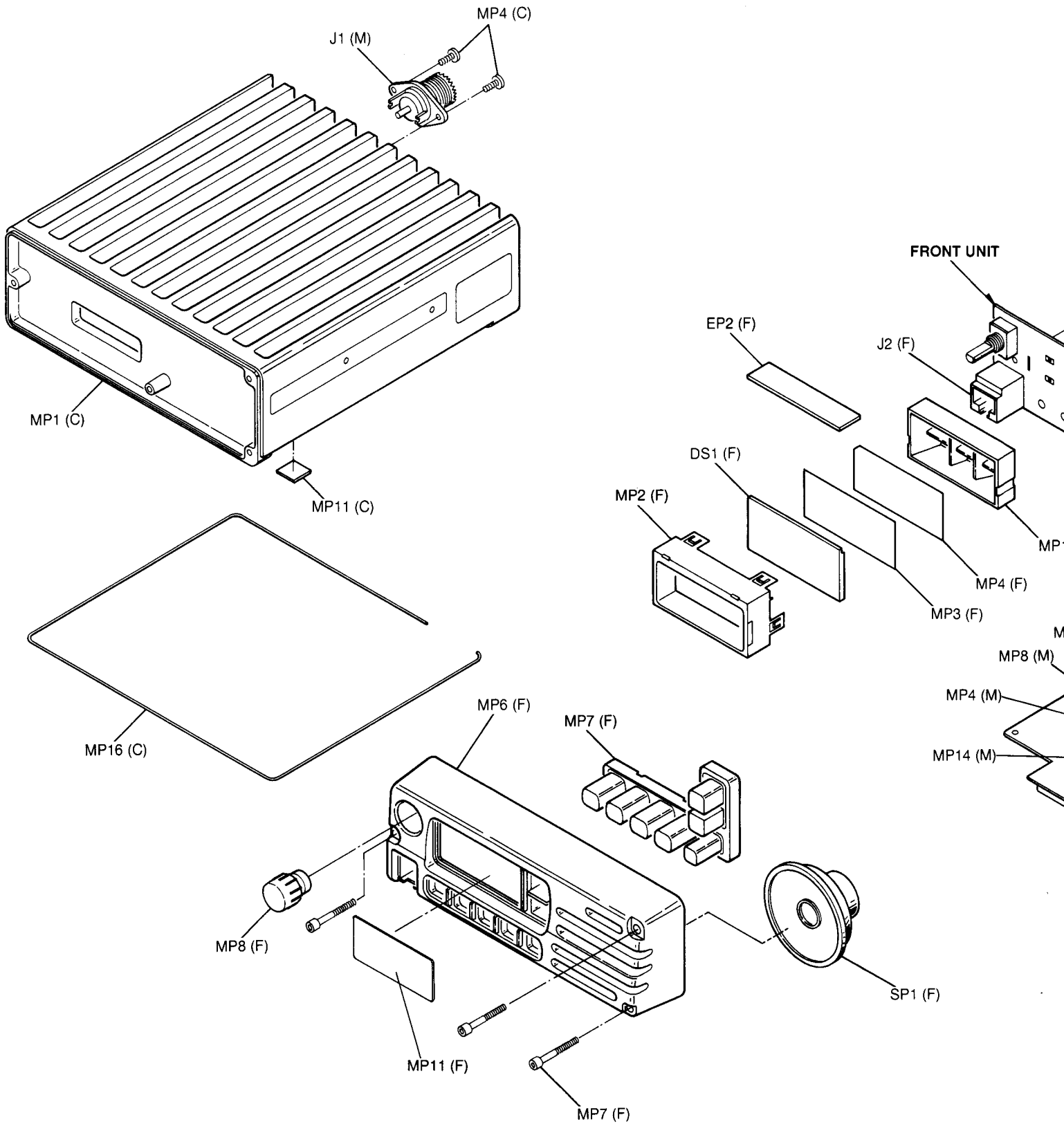
## [FRONT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J2	6450001470	Connector 95003-2881	1
DS1	5030001300	LCD LD-BU4404E	1
EP2	8930037960	LCD contact SRCN-1705 ZSS	1
MP1	8210012610	1705 reflector	1
MP2	8930036830	1705 LCD holder	1
MP3	8930036820	1705 LCD filter	1
MP4	8930037660	1705 LCD sheet	1
MP6*	8210012600	1705 front panel	1
MP7	8930036810	1705 front key	1
MP8	8610009840	Knob N-234	1
MP10	8810009130	Screw PH BT M3 x 12 NI-ZU	3
MP11*	8310036290	1705 window plate	1
MP14	8930038780	1706 front spring	1
MP15	8930038900	O ring (P)	1
SP1	2510000880	Speaker SME-45W	1
*	8210013310	1705 front panel assembly (incl. MP6, MP11)	1

**Screw abbreviations**    BT: Self-tapping    PH: Pan head  
    NI: Nickel    NI-ZU: Nickel-Zinc  
    BS: Brass

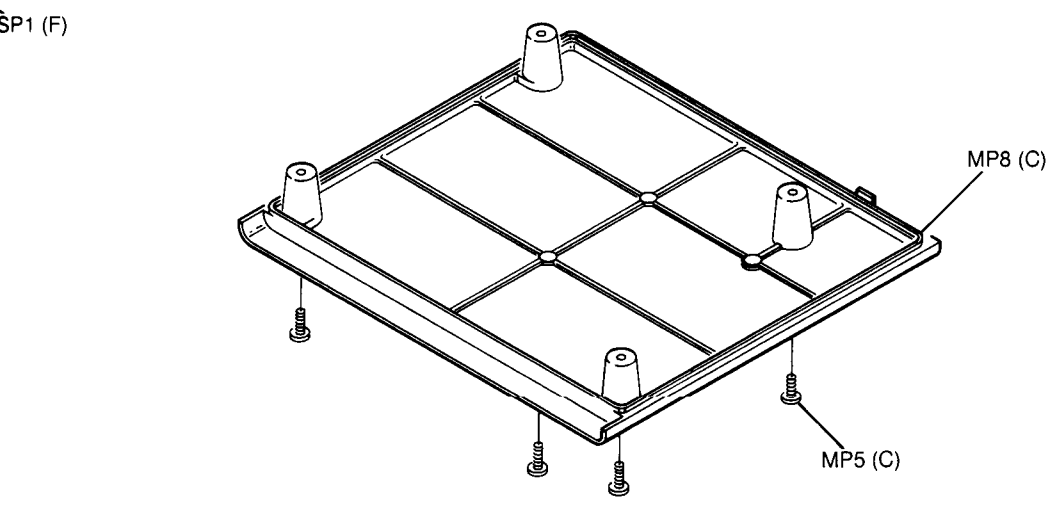
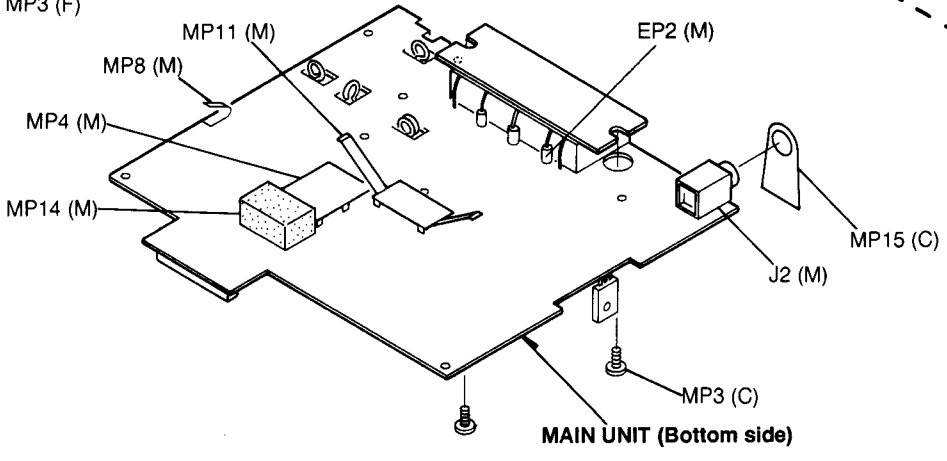
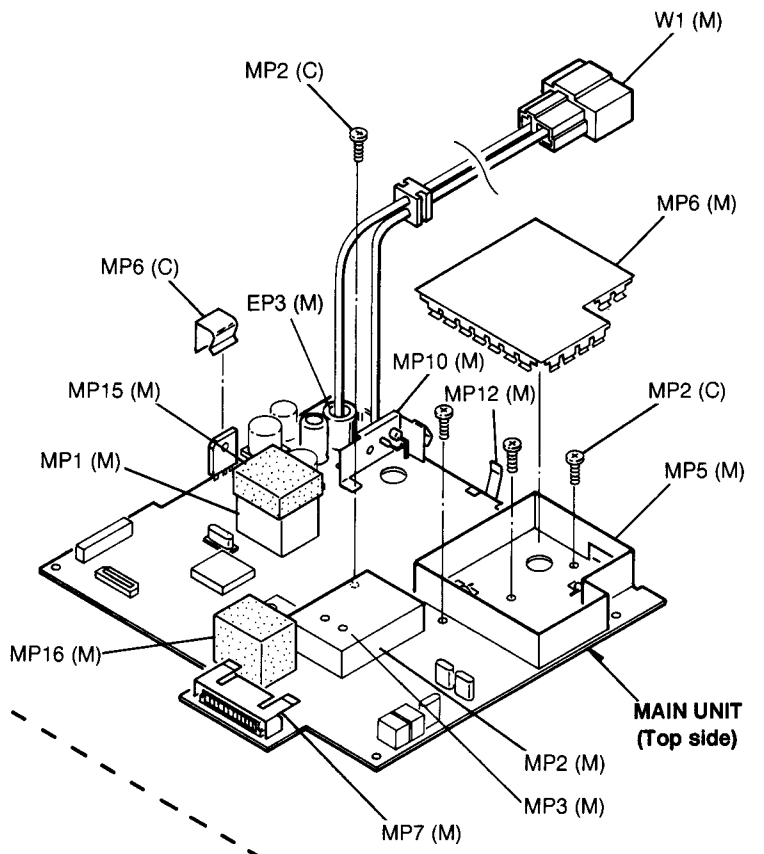
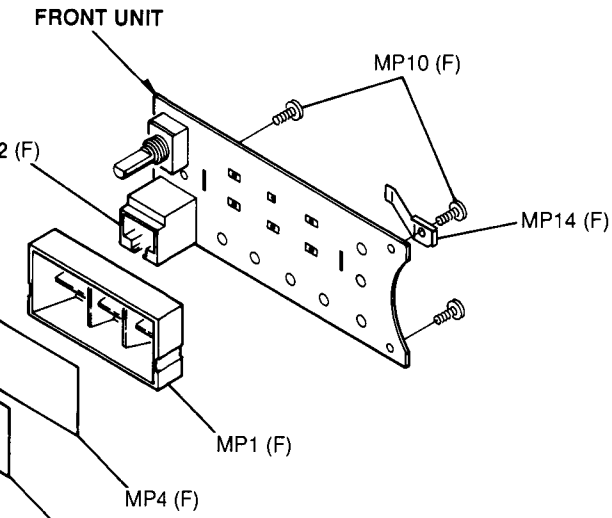
## [MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510004880	Connector MR-DS-E 01	1
J2	6450000140	Connector HSJ0807-01-010	1
W1	8900004540	Cable OPC-453	1
EP2	6910010220	Bead HF70BB 3.5 x 5 x 1.3	3
EP3	6910010280	Bead HF70BB 9.5 x 10.4 x 4.9	1
MP1	8510006810	DC-DC case	1
MP2	8510009980	1705 VCO case	1
MP3	8510010080	1705 VCO cover	1
MP4	8510005070	599 shield plate	1
MP5	8510010230	1705 LPF case	1
MP6	8510010240	1705 LPF cover	1
MP7	8930037840	1705 connector spring	1
MP8	8930029511	1327 ANT plate -1	1
MP10	8930038960	Feed through AS-315	1
MP11	8510010250	1705 shield plate	1
MP12	8930038790	1706 spring	1
MP14	8930001880	Sponge (C)	1
MP15	8930001810	Sponge (A)	1
MP16	8930039870	Sponge (E)	1



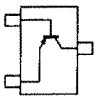
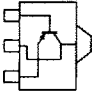
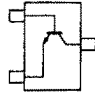
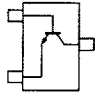
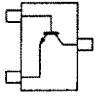
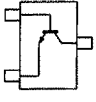
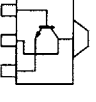
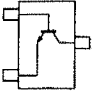
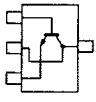
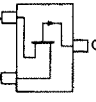
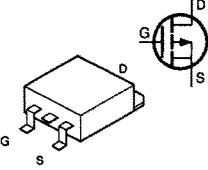
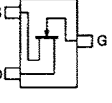
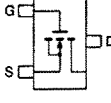
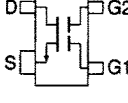
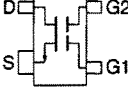
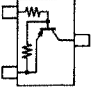
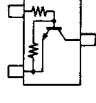
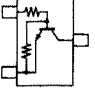
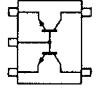
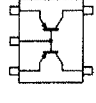
**Unit abbreviations** (F): FRONT UNIT (M): MAIN UNIT (C): CHASSIS PARTS

**OPPOSITE DIRECTION TO THE MAIN UNIT**

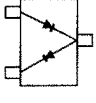
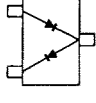
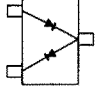
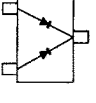
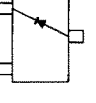




# SECTION 8 SEMI-CONDUCTOR INFORMATION

## • TRANSISTORS AND FET'S

<b>2SA1576 R</b> (Symbol: FR) 	<b>2SB1123T</b> (Symbol: BF) 	<b>2SC1863 4</b> (Symbol: FN4) 	<b>2SC4081 R/2SC4116 GR</b> (Symbol: BR/LG) 	<b>2SC4211 6</b> (Symbol: L6) 
<b>2SC4226 R25</b> (Symbol: R25) 	<b>2SC4703 SE</b> (Symbol: SE) 	<b>2SC5110 O</b> (Symbol: MGO) 	<b>2SD1664</b> (Symbol: DA) 	<b>2SJ144 Y</b> (Symbol: VY) 
<b>2SJ377</b> (Symbol: 4L) 	<b>2SK880 GR/2SK1069 4</b> (Symbol: XG/FJ) 	<b>2SK1829</b> (Symbol: KI) 	<b>3SK166</b> (Symbol: K) 	<b>3SK272</b> (Symbol: DU) 
<b>DTA114EU</b> (Symbol: 14) 	<b>DTC114EU</b> (Symbol: 24) 	<b>DTC363EK</b> (Symbol: H27) 	<b>FMS2A</b> (Symbol: S2) 	<b>FMW2</b> (Symbol: W2) 

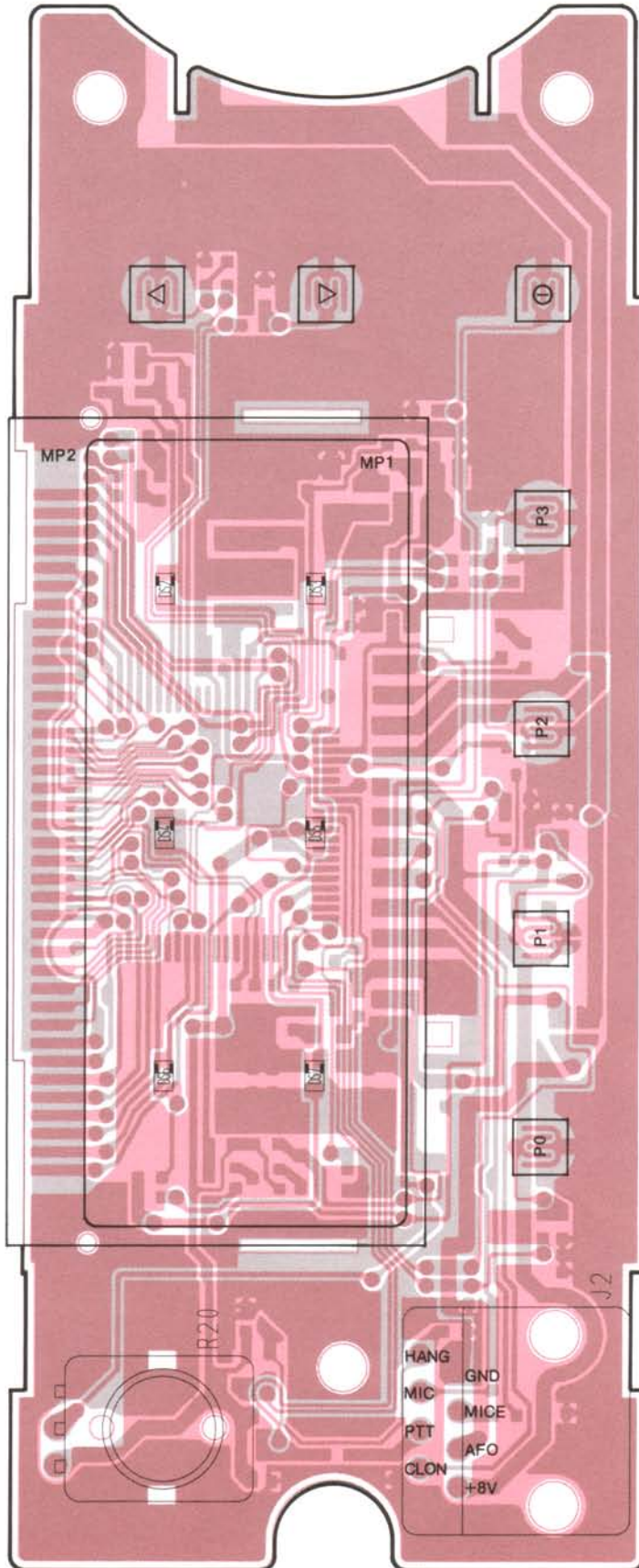
## • DIODES

<b>1SS302</b> (Symbol: C3) 	<b>DA204U</b> (Symbol: K) 	<b>DA221</b> (Symbol: K) 	<b>DAN202U</b> (Symbol: N) 	<b>HSU88TRF</b> (Symbol: 9) 
<b>HVU350TRF</b> (Symbol: 4) 	<b>MA742</b> (Symbol: M1U) 			

# SECTION 9 BOARD LAYOUTS

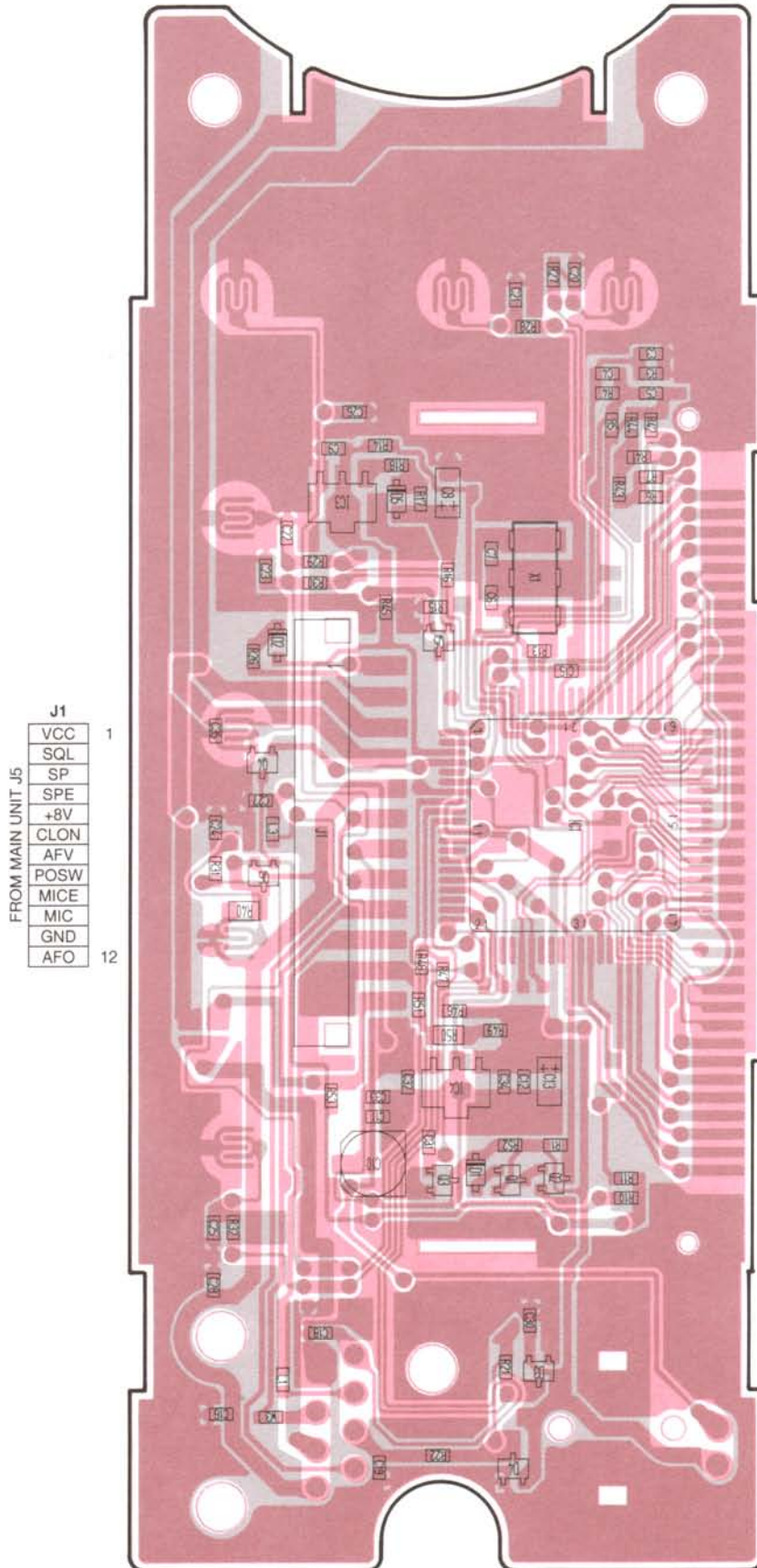
## 9-1 FRONT UNIT

• TOP VIEW



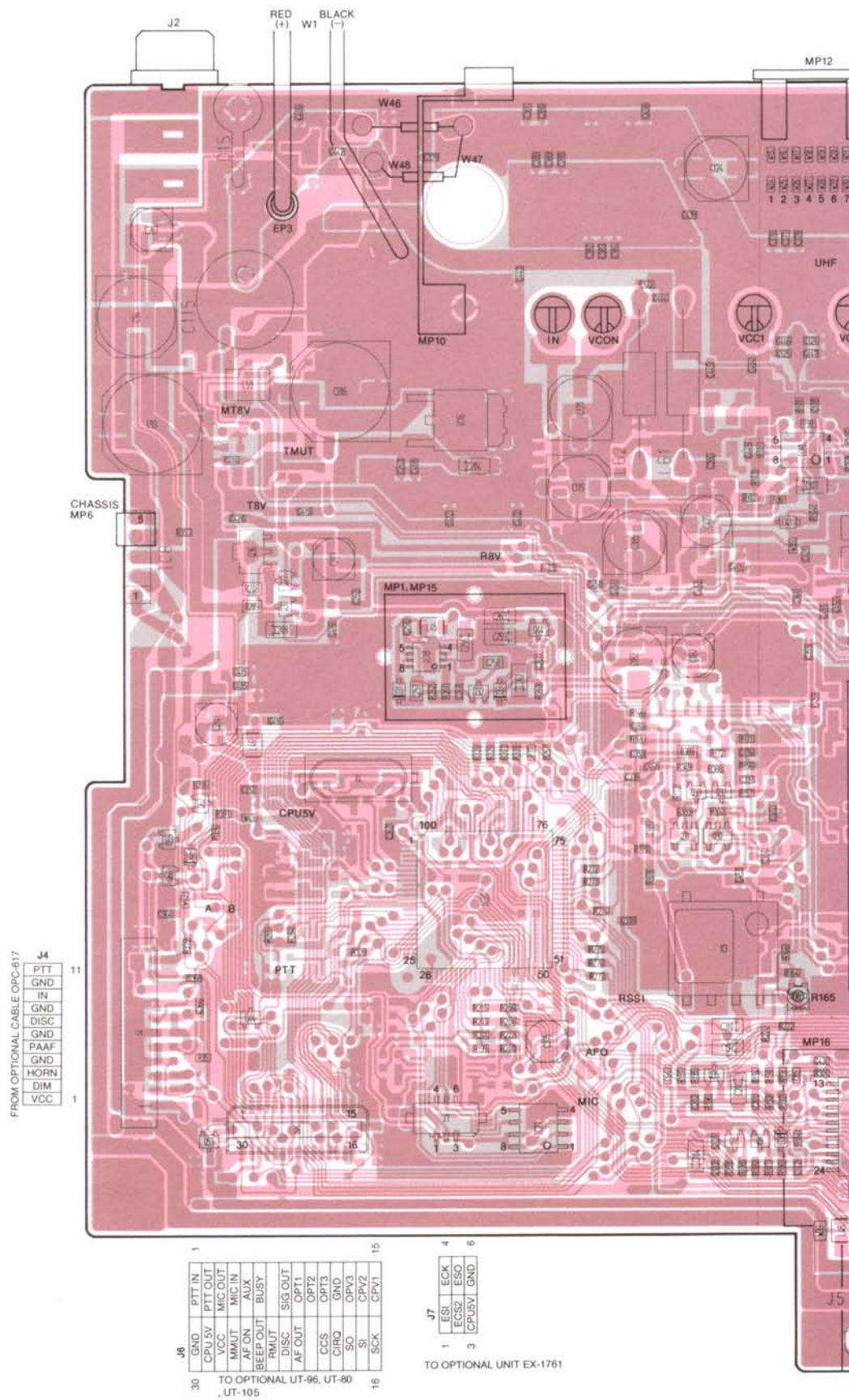


● BOTTOM VIEW



# 9-2 MAIN UNIT (for Wide and Narrow types)

## • TOP VIEW



FROM OPTIONAL CABLE OPC-617

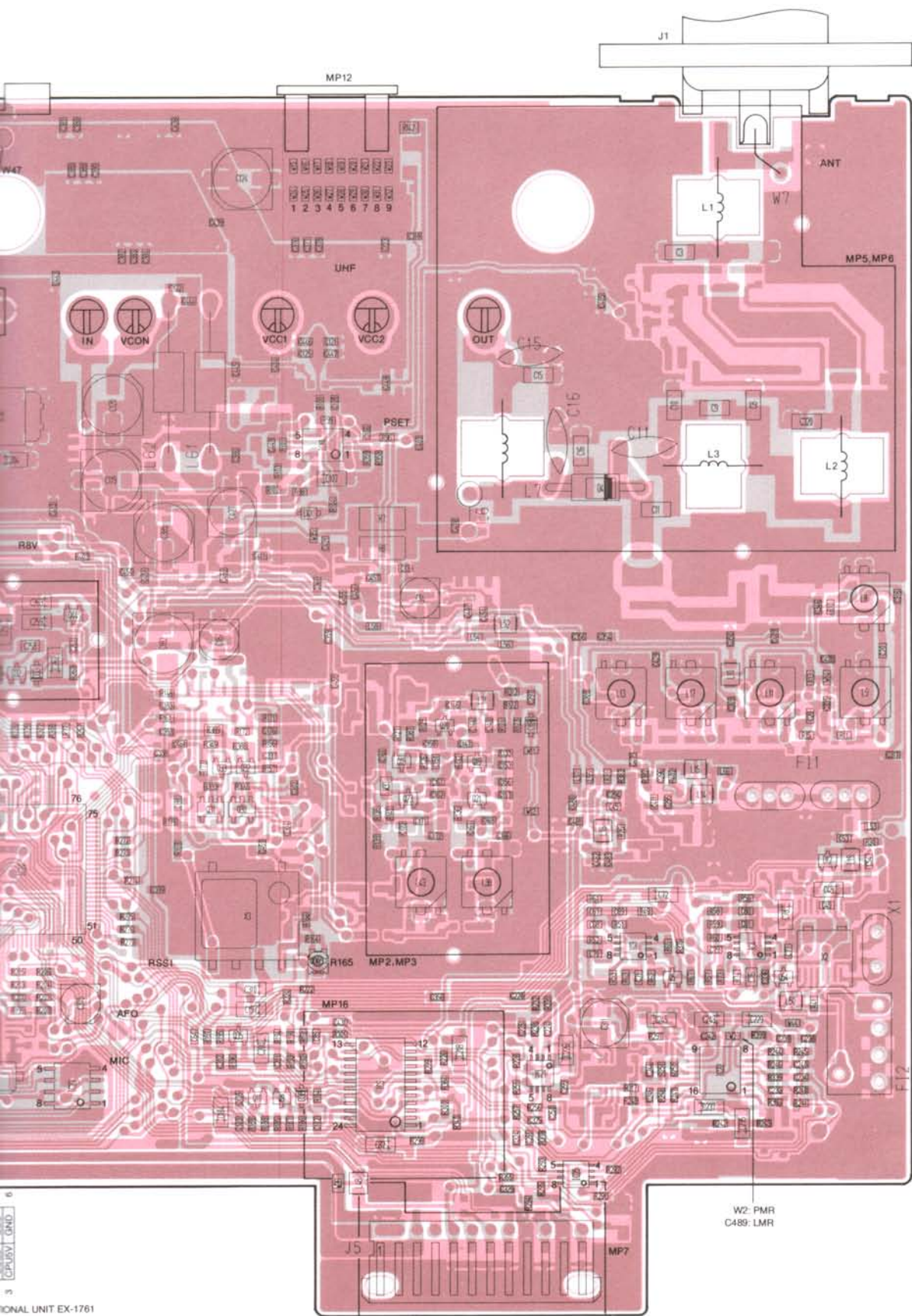
J4
PTT
GND
IN
GND
DISC
GND
PAAF
GND
HORN
DIM
VCC

J6
1
PTT IN
PTT OUT
CPU 5V
VCC
MIC OUT
MMUT
MIC IN
AF ON
AUX
BEEP OUT
BUSY
RMUT
SIG OUT
DISC
AF OUT
OPT1
OPT2
CCS
OPT3
CIRQ
GND
SO
OPV3
SI
CPV2
CPV1
SCK
15
16
18
30

TO OPTIONAL UT-96, UT-80, UT-105

J7
1
ES1
ECK
4
ES2
ES0
3
CPU5V
GND
6

TO OPTIONAL UNIT EX-1761



3 CHIRP GND 6

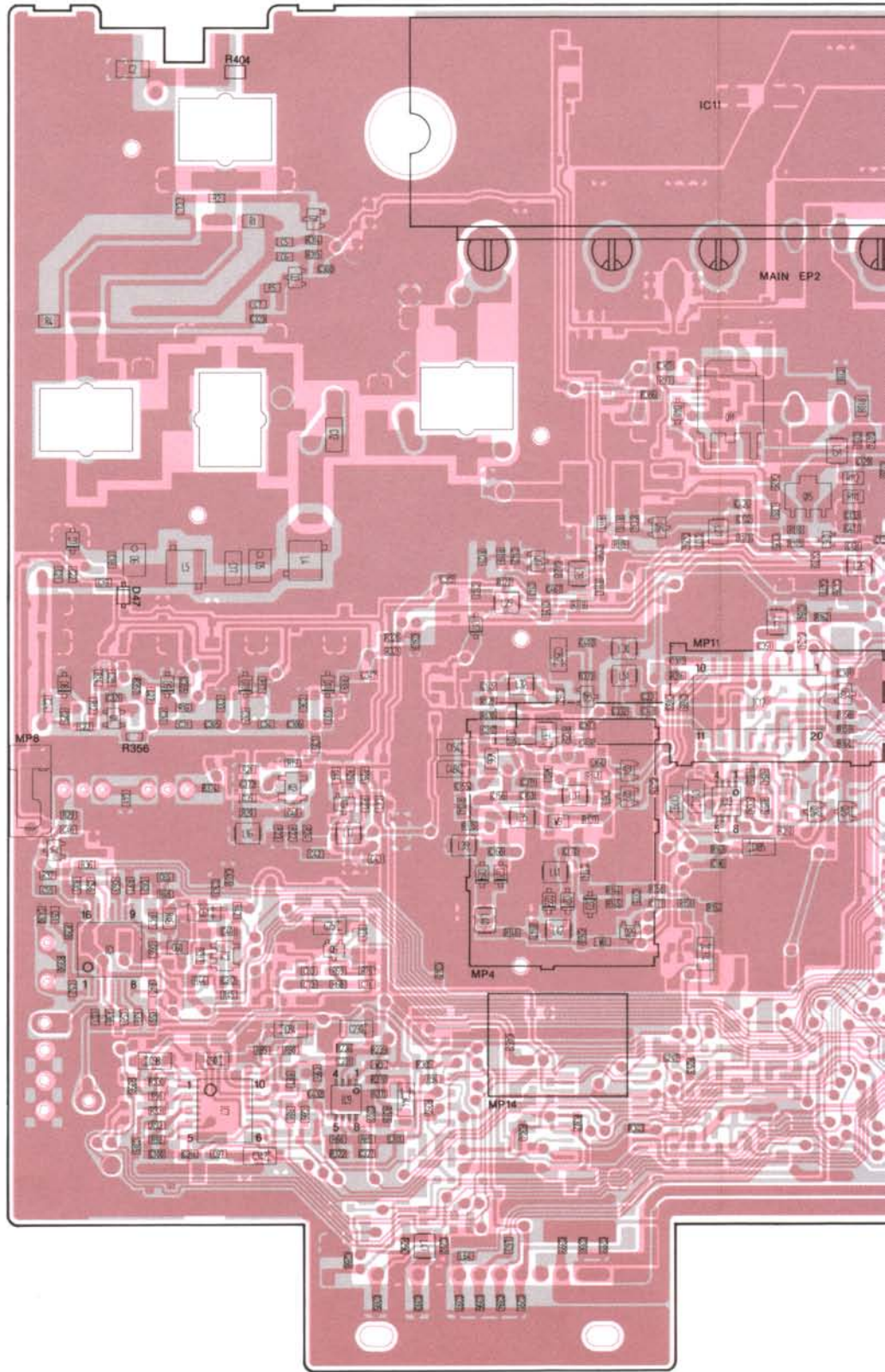
IONAL UNIT EX-1761

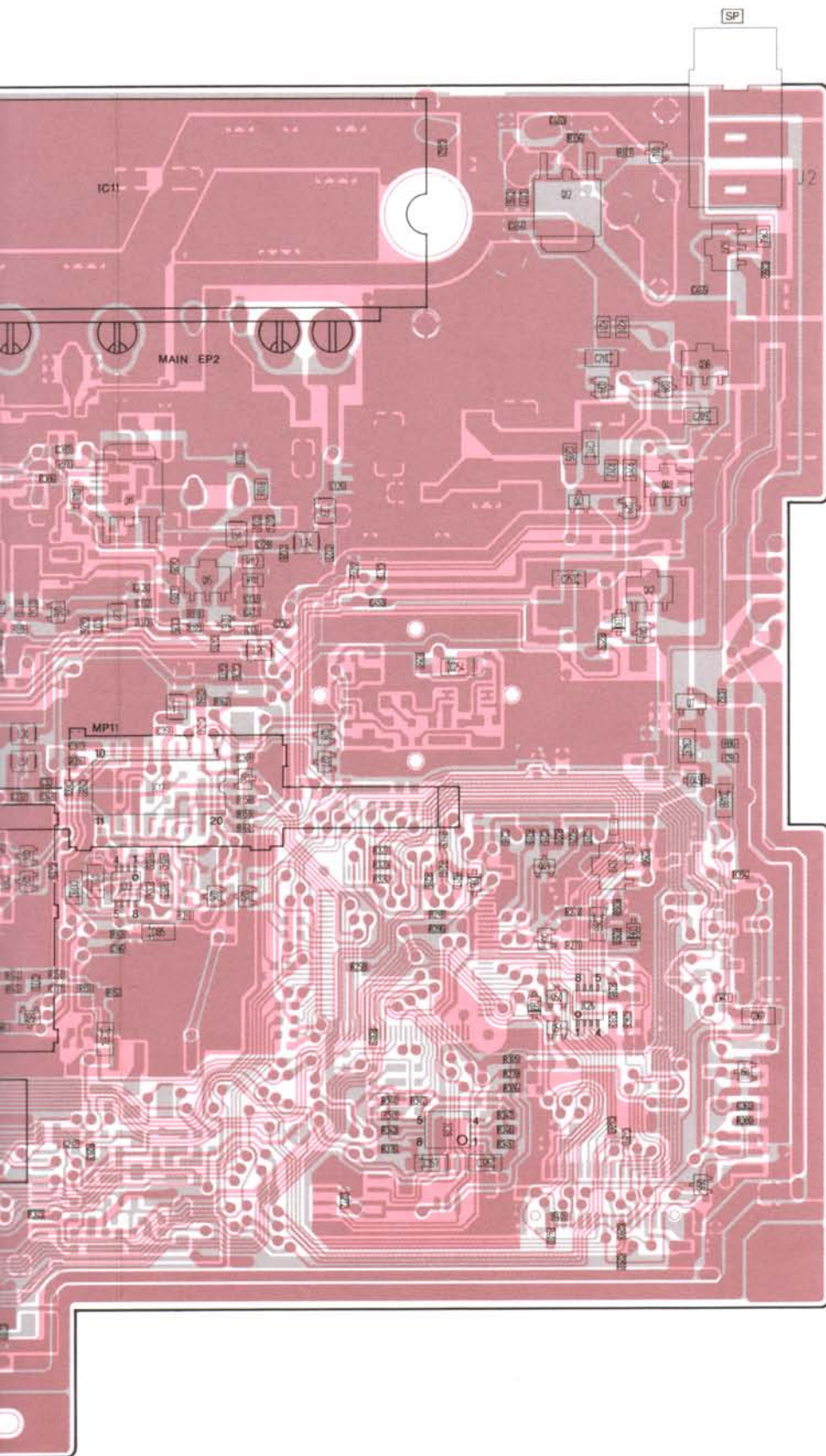
18	VCC
17	VCC
16	SP
15	SP
14	+8V
13	CLON
12	AFV
11	POSW
10	MIC
9	MIC
8	GND
7	AF0

TO FRONT UNIT J1

W2: PMR  
C489: LMR

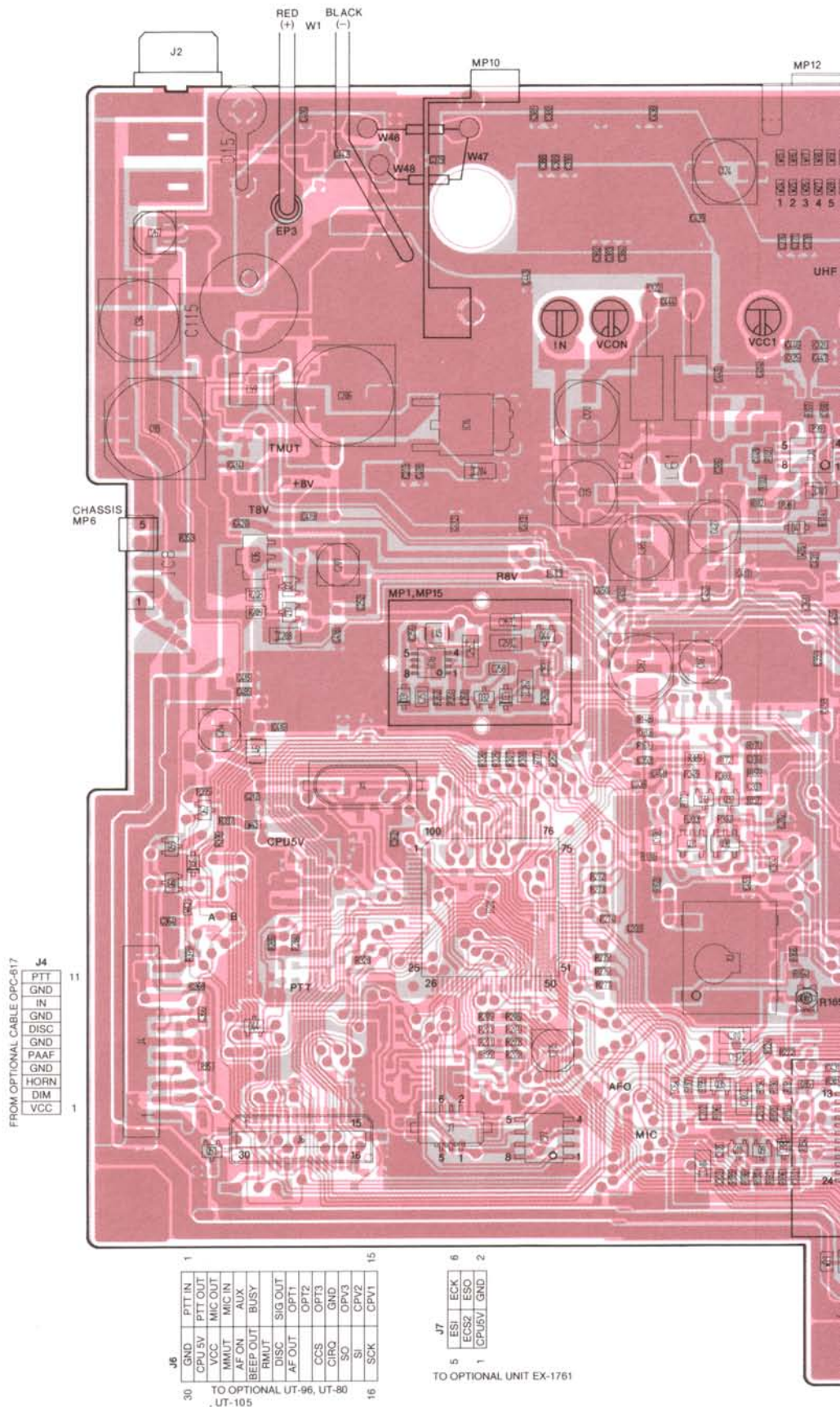
● BOTTOM VIEW





# 9-3 MAIN-A UNIT (for Wide/Narrow types)

## • TOP VIEW



FROM OPTIONAL CABLE OPC-817

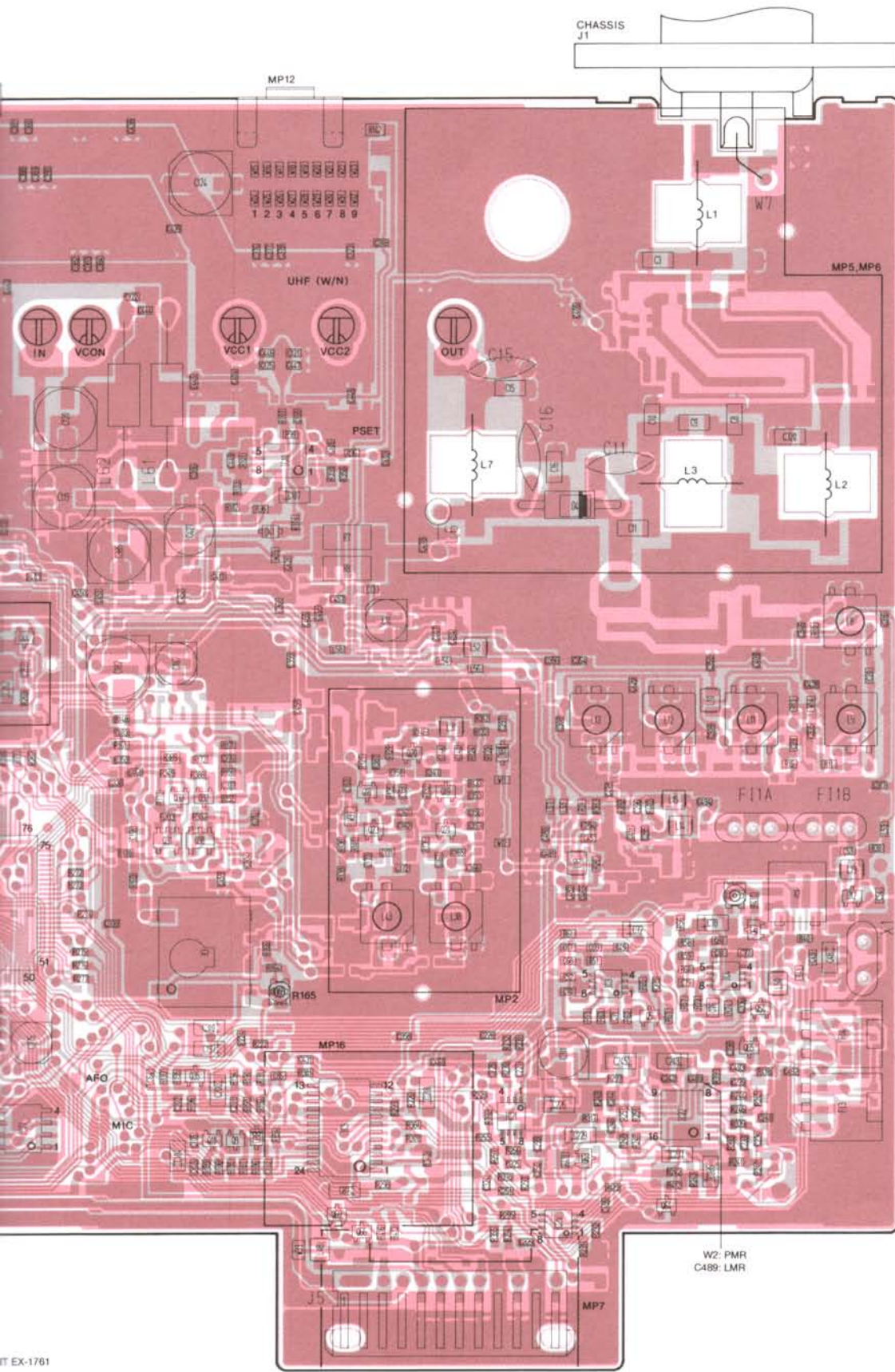
J4
PTT
GND
IN
GND
DISC
GND
PAAF
GND
HORN
DIM
VCC

J6
GND
PTT IN
CPU5V
VCC
MMUT
AF ON
BEEP OUT
RMUT
DISC
AF OUT
CCS
CIRQ
SO
SI
SCK

TO OPTIONAL UT-96, UT-80, UT-105

J7
ESI
ECSZ
ESO
CPU5V
GND

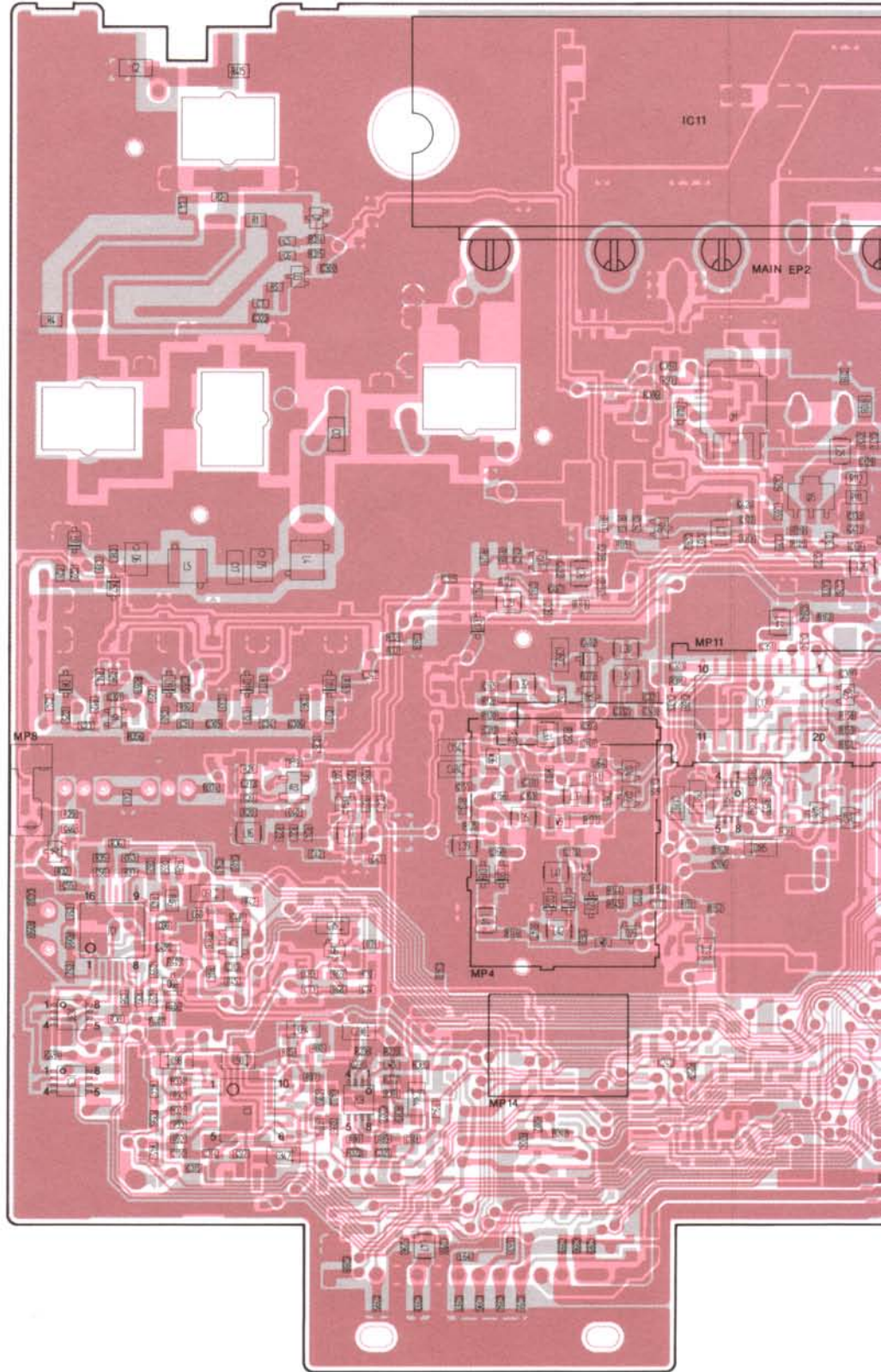
TO OPTIONAL UNIT EX-1761



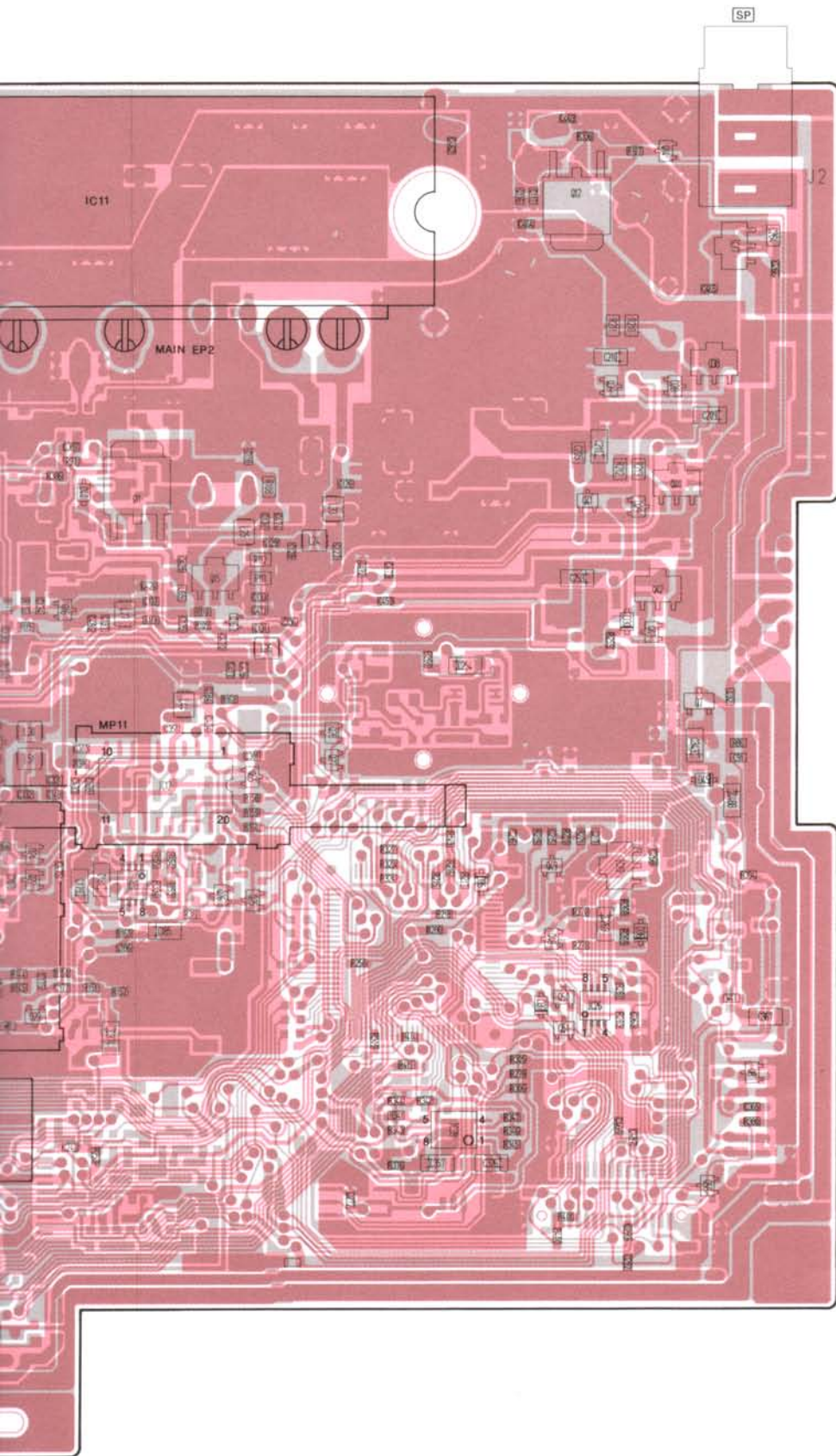
J5	13
VCC	VCC
SP	SP
+8V	+8V
CLON	CLON
AFV	AFV
POSW	POSW
MICE	MICE
MIC	MIC
GND	GND
AFO	AFO

TO FRONT UNIT J1

● BOTTOM VIEW

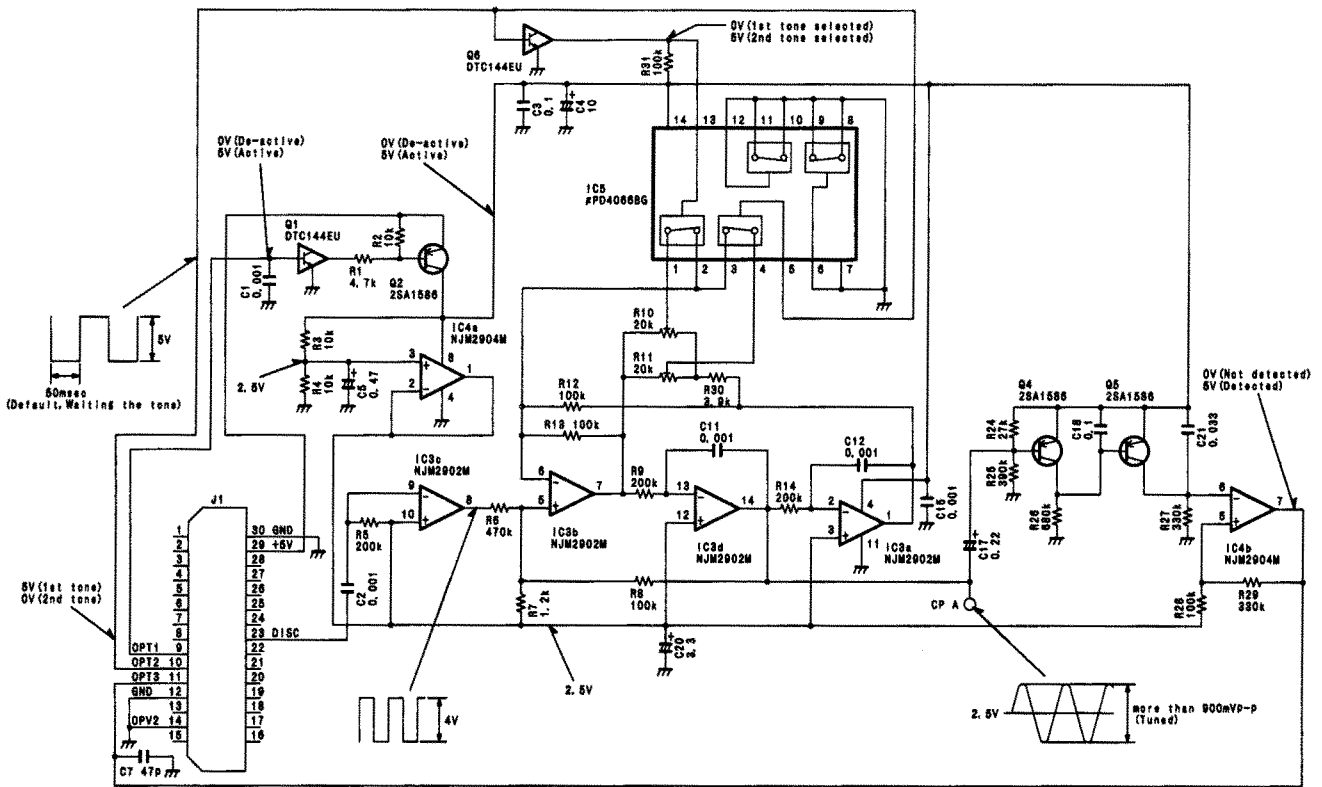




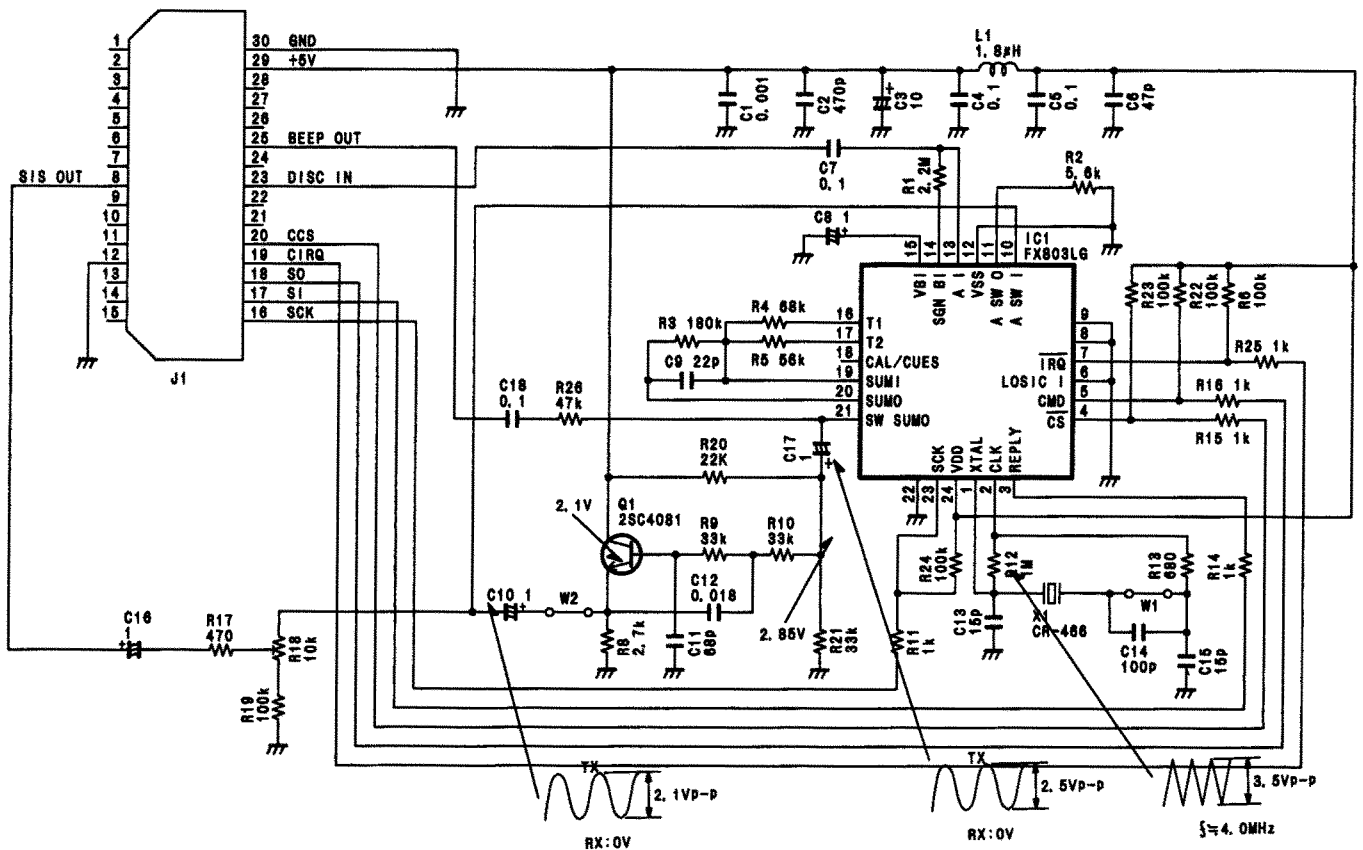


# SECTION 10 OPTIONAL UNITS

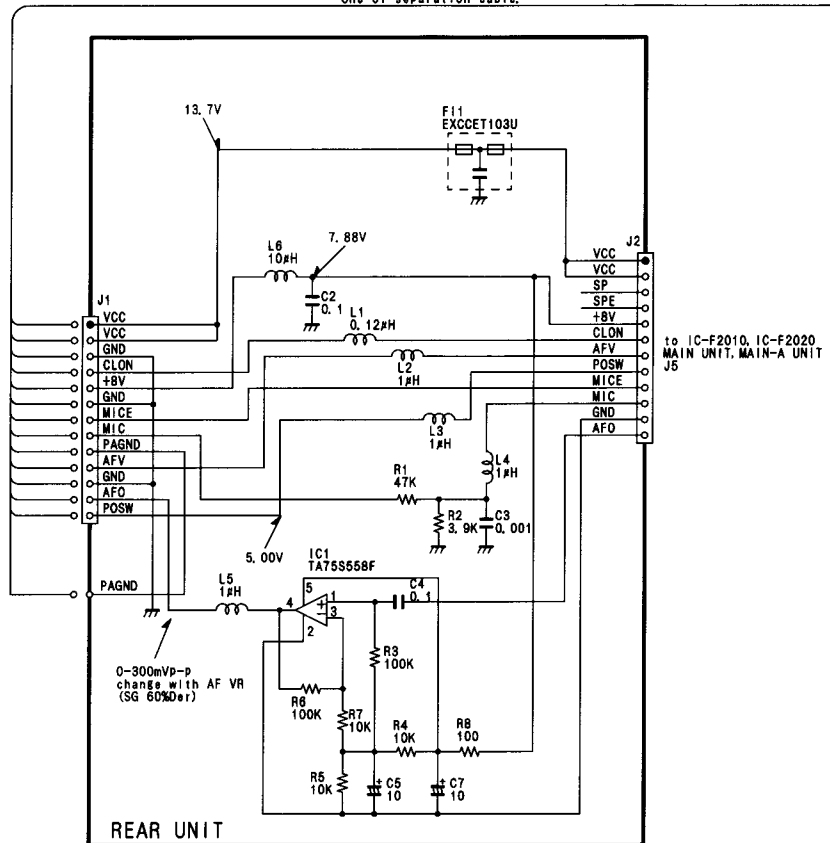
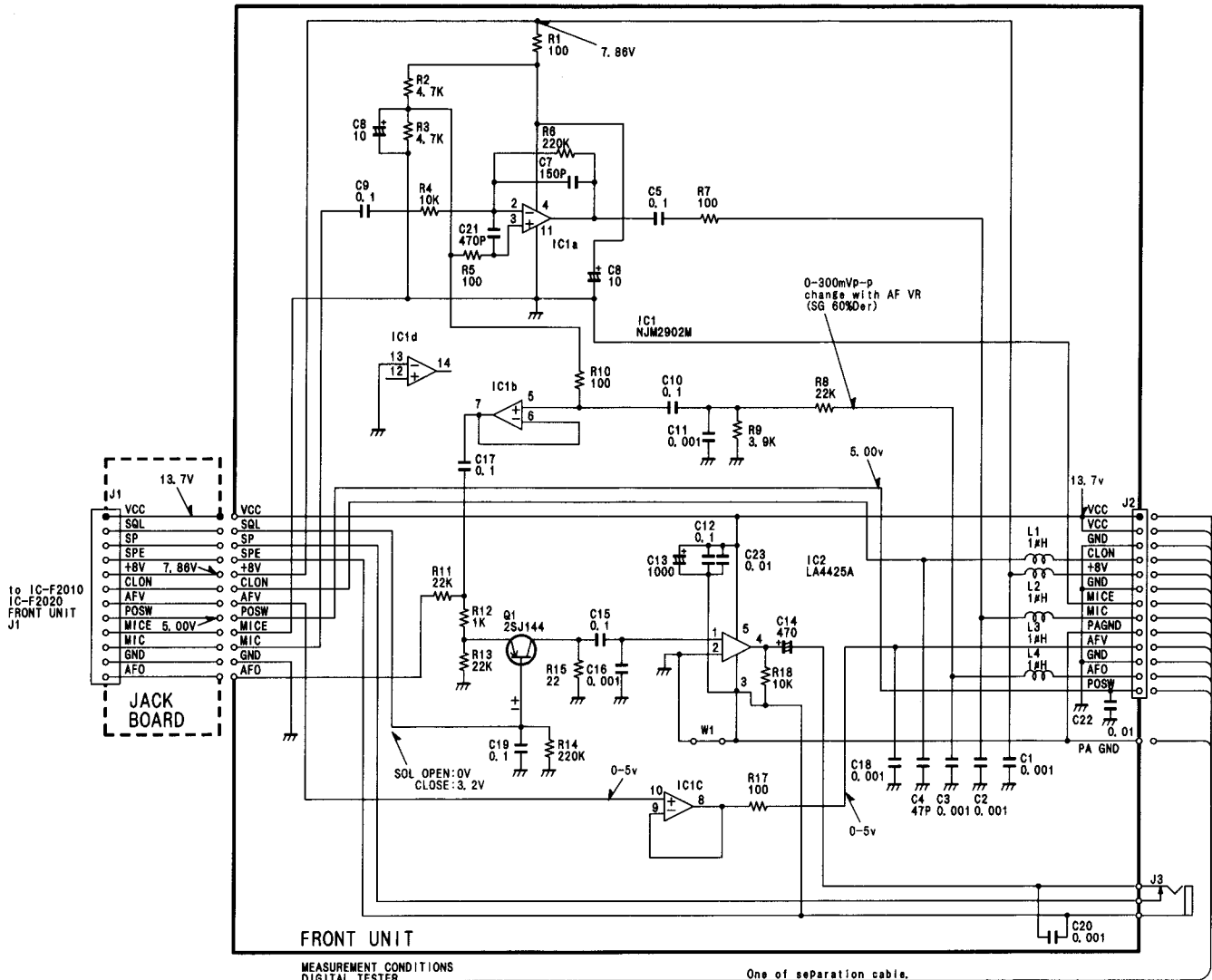
## 10-1 UT-80 2-TONE UNIT



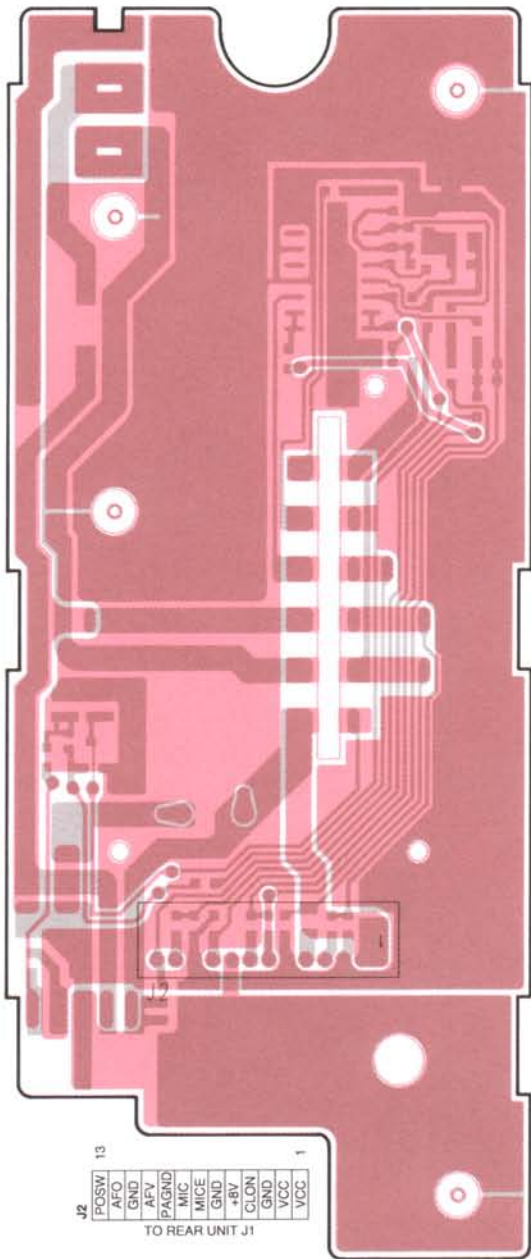
## 10-2 UT-96 5-TONE UNIT



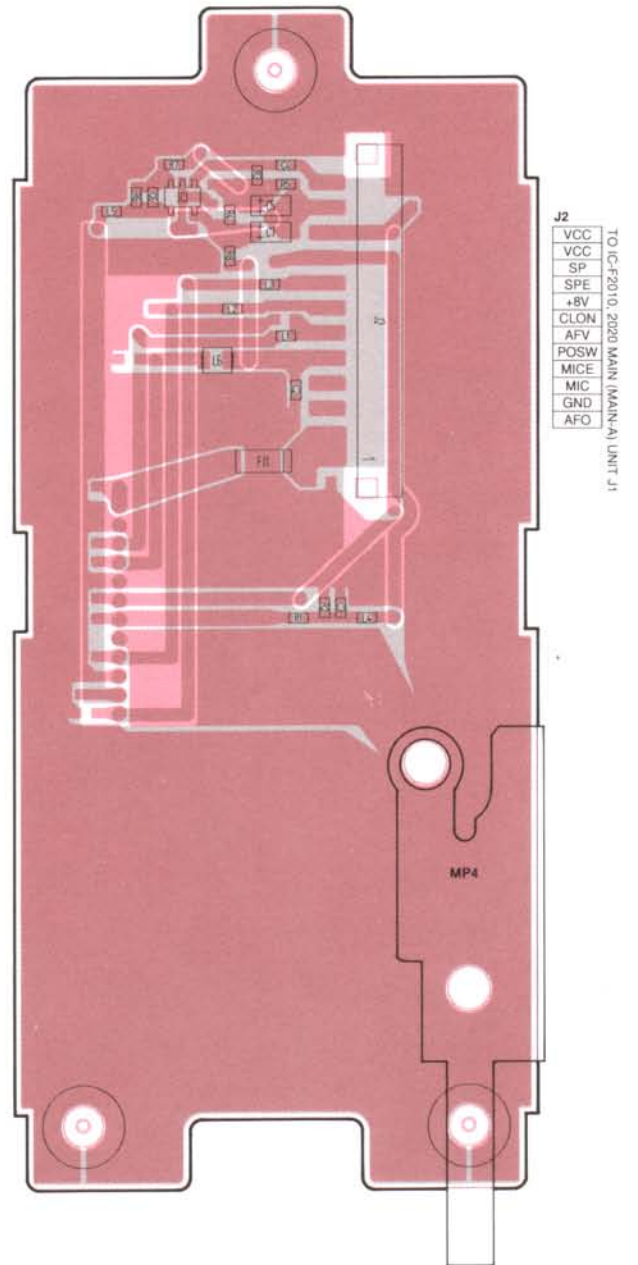
# 10-3 RMK-1 SEPARATION KIT



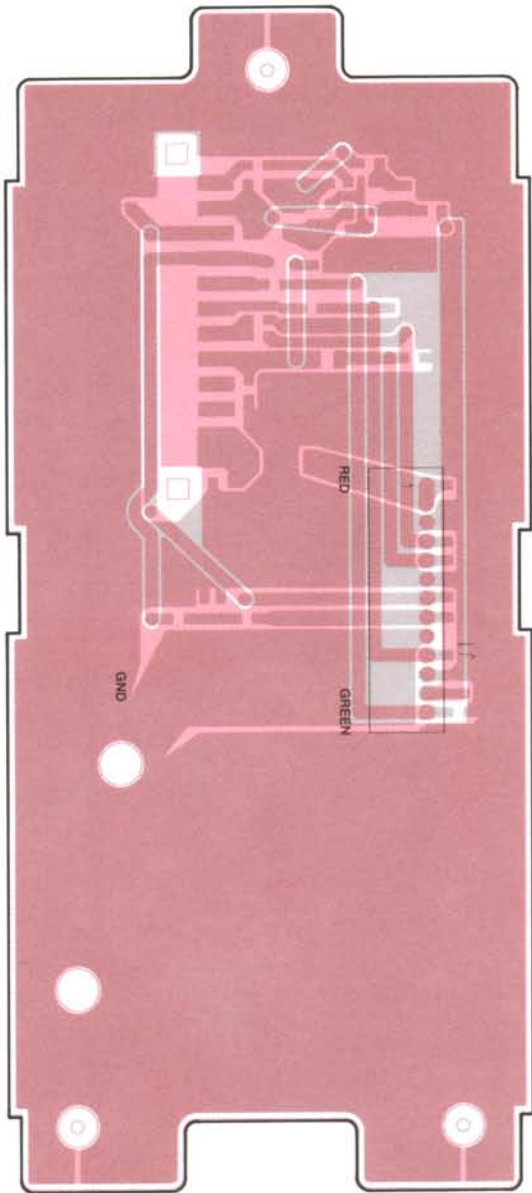
● FRONT UNIT



● REAR UNIT



● REAR UNIT



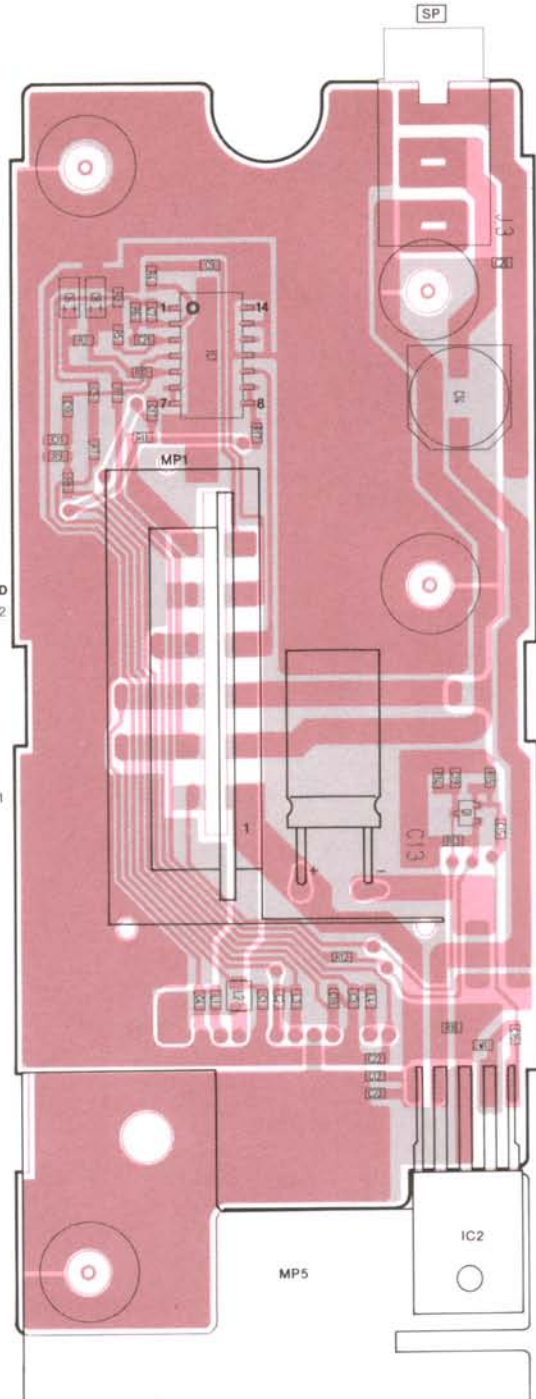
J1	
VCC	1
VCC	
GND	
CLON	
+8V	
GND	
MICE	
MIC	
PAGND	
AFV	
GND	
AFO	
POSW	13

JACK BOARD

TO FRONT UNIT J1	
AFO	12
GND	
MIC	
MICE	
POSW	
AFV	
CLON	
+8V	
SPE	
SP	
SQL	
VCC	1

TO IC-F2010, 2000 FRONT UNIT J1

● FRONT UNIT



**[FRONT UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
IC1	1110002680	S.IC	NJM2902M-T1	1
IC2	1110003090	IC	LA4425A	1
Q1	1590001450	S.FET	2SJ144-GR (TE85R)	1
L1	6200003960	S.COIL	MLF1608A 1R0K-T	1
L2	6200001980	S.COIL	NL 252018T-1R0J	1
L3	6200003960	S.COIL	MLF1608A 1R0K-T	1
L4	6200003960	S.COIL	MLF1608A 1R0K-T	1
R1	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	1
R2	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	1
R3	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)	1
R4	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	1
R5	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	1
R6	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	1
R7	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	1
R8	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	1
R9	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)	1
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	1
R11	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	1
R12	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	1
R13	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	1
R14	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)	1
R15	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)	1
R17	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	1
R18	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	1
C1	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C2	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C3	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C4	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A	1
C5	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C6	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	1
C7	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A	1
C8	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	1
C9	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C10	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C12	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A	1
C13	4510005040	ELECTROLYTIC	25 MV 1000 HC	1
C14	4510006260	S.ELECTROL	ECEV1AA471UP	1
C15	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C16	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C17	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C18	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C19	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C20	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C21	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A	1
C22	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	1
C23	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A	1
J2	6510019090	CONNECTOR	S13B-ZR	1
J3	6450000140	CONNECTOR	HSJ0807-01-010	1
W1	7030003860	S.JUMPER	ERJ3GE JPW V	1
EP1	0910045692	PCB	B 4588B (FRONT)	1

**[FRONT UNIT]**

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
MP1	8930038200	1765 jack plate		1
MP2	8210013160	1765 front panel		1
MP5	8930038180	1765 IC plate		1
MP6	8930038210	1765 jack seal		1
MP7	8930038190	1765 jack bush		1
MP8	8810009130	Screw PH BT M3 x 12 NI-ZU		2
MP10	8810009130	Screw PH BT M3 x 12 NI-ZU		1

**[JACK BOARD]**

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
J1	6510018040	CONNECTOR	52330-1217	1
EP1	0910045711	PCB	B 4590A (JACK)	1

**[REAR UNIT]**

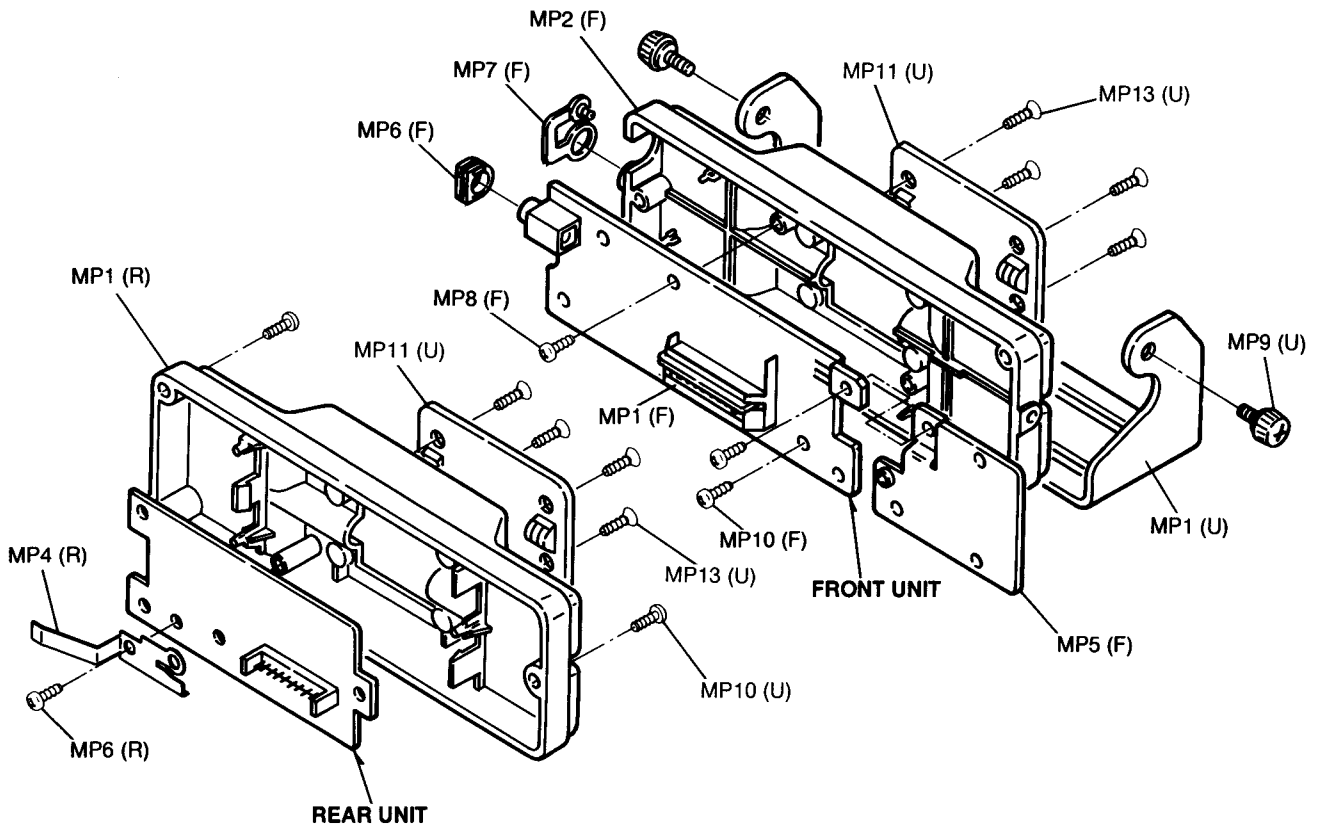
REF. NO.	ORDER NO.	DESCRIPTION		QTY.
IC1	1130007370	S.IC	TA75S558F (TE85L)	1
FI1	2040000790	S.LC	EXCCET103U	1
L1	6200004470	S.COIL	MLF1608D R12K-T	1
L2	6200003960	S.COIL	MLF1608A 1R0K-T	1
L3	6200003960	S.COIL	MLF1608A 1R0K-T	1
L4	6200003960	S.COIL	MLF1608A 1R0K-T	1
L5	6200003960	S.COIL	MLF1608A 1R0K-T	1
L6	6200001980	S.COIL	NL 252018T-1R0J	1
R1	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)	1
R2	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)	1
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	1
R4	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	1
R5	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	1
R6	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)	1
R7	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)	1
R8	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)	1
C2	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A	1
C3	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A	1
C4	4030010740	S.CERAMIC	C1608 JB 1A 104K-T-A	1
C5	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	1
C7	4550006250	S.TANTALUM	TEMSVA 1A 106M-8L	1
J1	6510019090	CONNECTOR	S13B-ZR	1
J2	6510018030	S.CONNECTOR	53248-1217	1
EP1	0910045701	PCB	B 4589A (REAR)	1
MP1	8210013150	1765 rear panel		1
MP4	8930038240	1765 spring		1
MP6	8810009130	Screw PH BT M3 x 12 NI-ZU		1

S.=Surface mount

**[UNPACKING]**

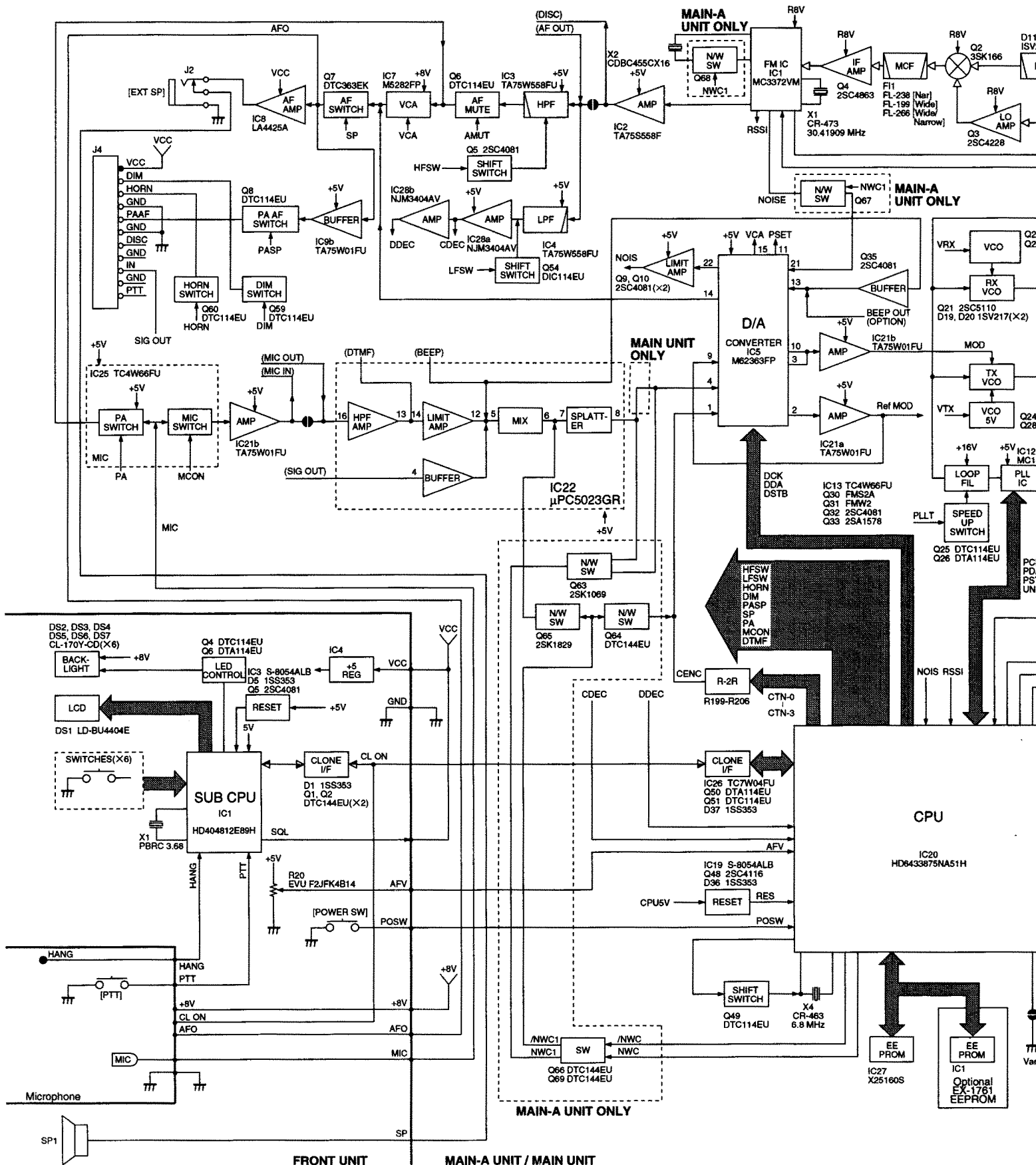
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8010016470	1765 mounting bracket	1
MP3	8810000470	Screw PH M5 x 12 (+/-)	4
MP4	8810000950	Screw PH A M5 x 16	4
MP5	8850000150	Flat washer M5 NI BS	4
MP6	8850000390	Spring washer M5	4
MP7	8830000120	Nut M5	4
MP8	8810004430	Screw PH M3 x 6 ZK	2
MP9	8820000910	1765 screw	2
MP10	8810004300	Screw PH M3 x 10 ZK	3
MP11	8930038230	1765 rear seal	2
MP12	8930038220	1765 rear plate	2
MP13	8810009060	Screw FH M3 x 6 ZK	8

**Screw abbreviations** BT: Self-tapping PH: Pan head  
 FH: Flat head NI-ZU: Nickel-zinc  
 NI: Nickel BS: Brass ZK: Black

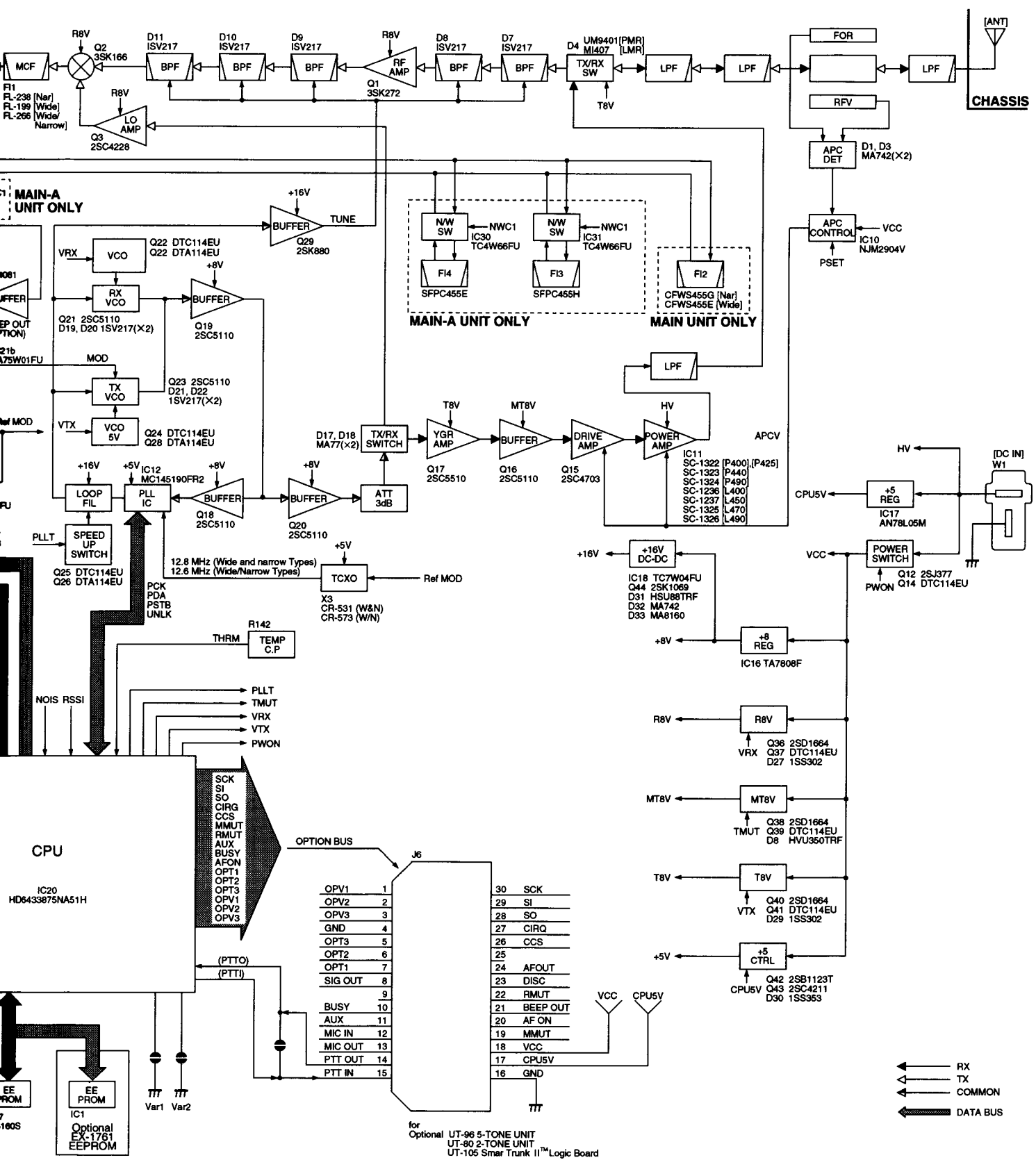


**Unit abbreviations** (F): FRONT UNIT (R): REAR UNIT (U): UNPACKING

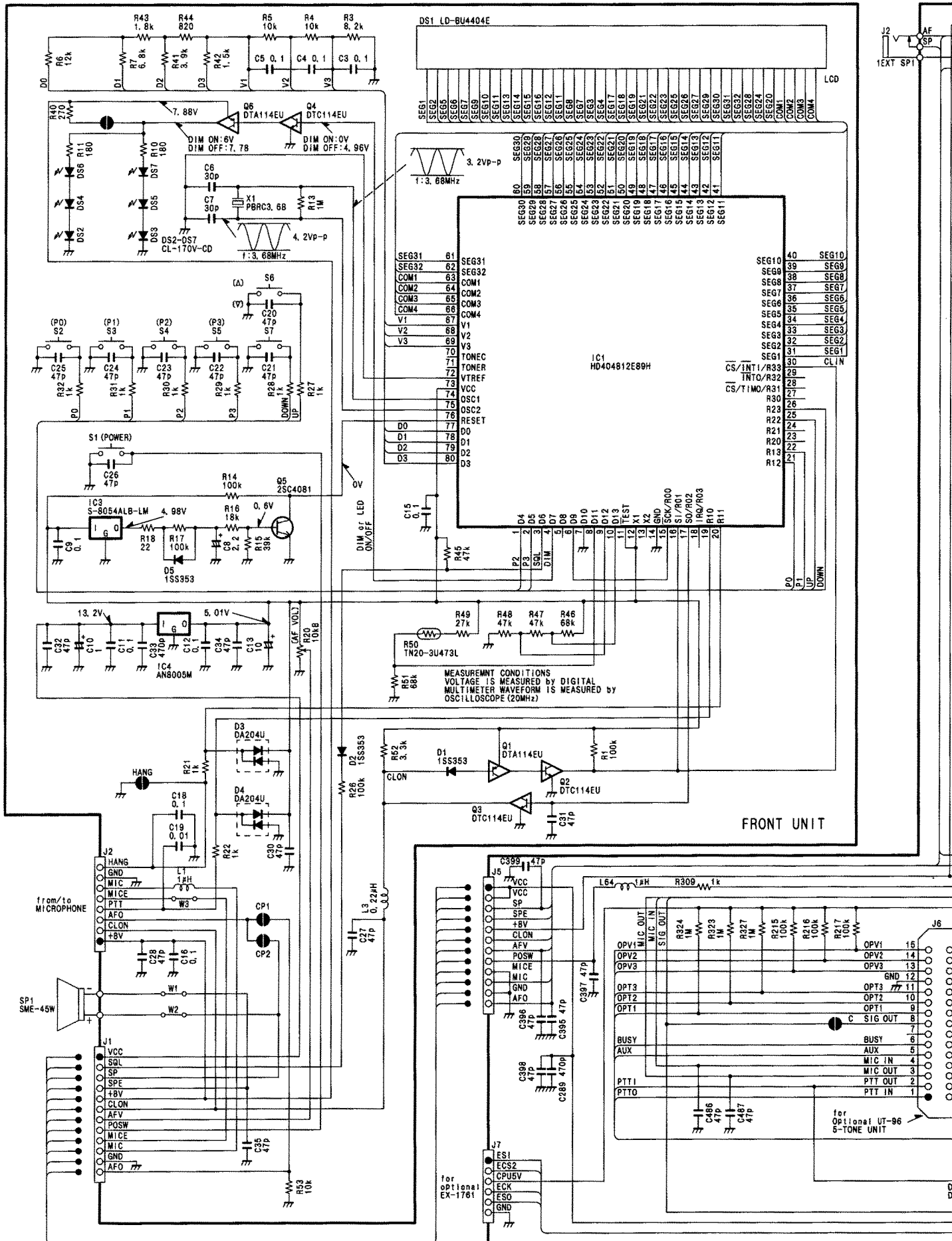
# SECTION 11 BLOCK DIAGRAM

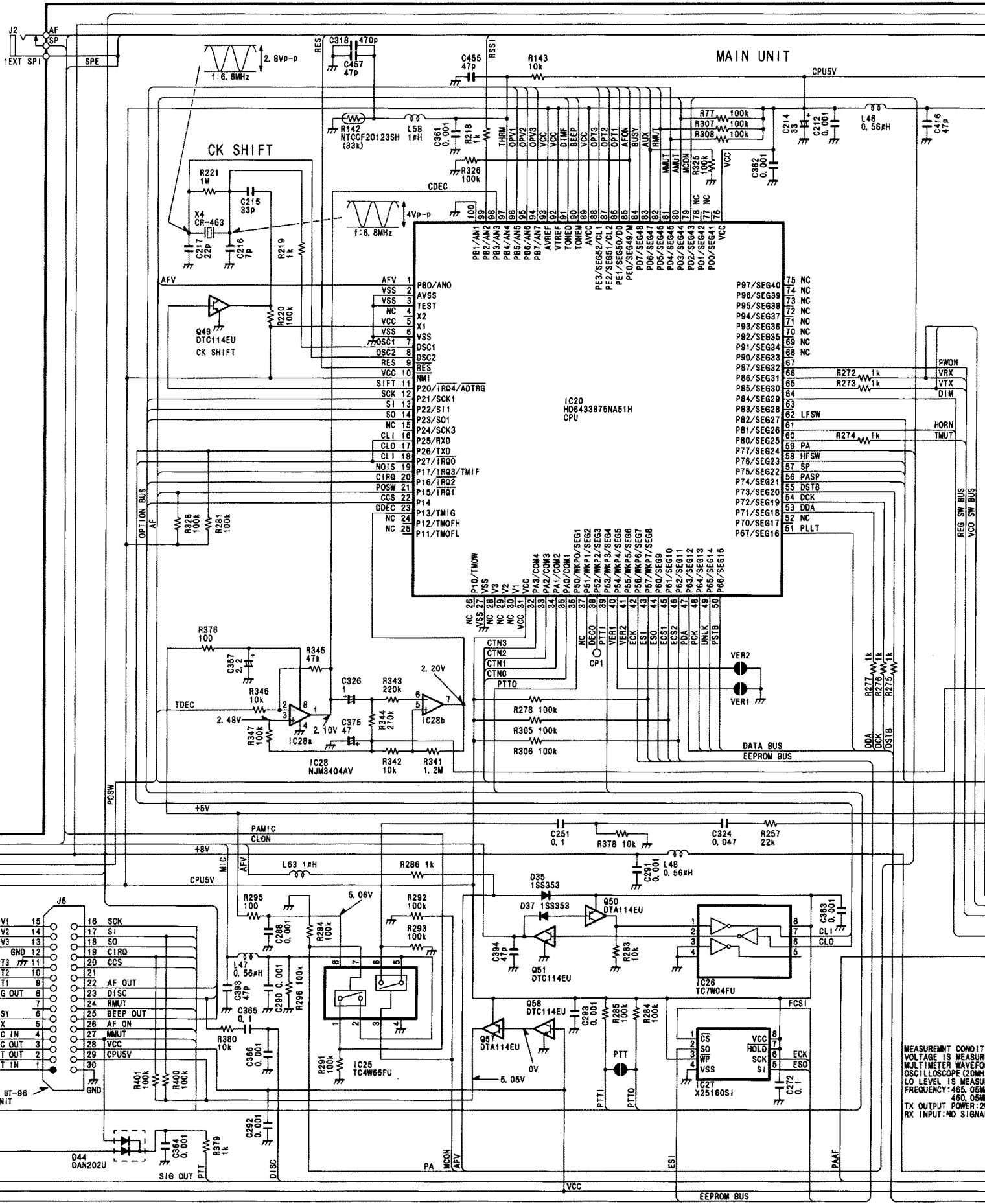






# SECTION 12 VOLTAGE DIAGRAM

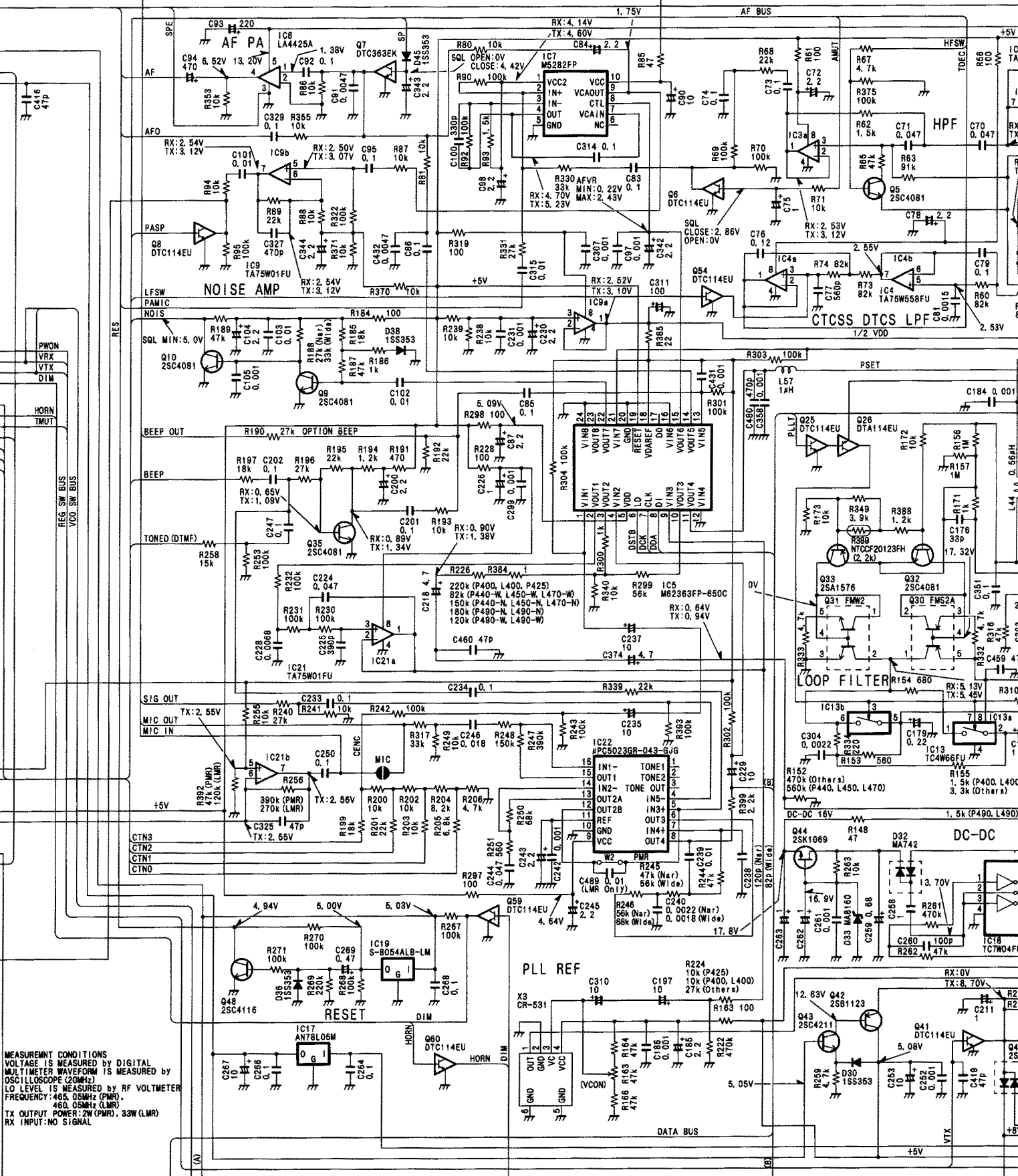




MEASUREMENT CONDITION  
 VOLTAGE IS MEASURED  
 MULTIMETER WAVEFORM  
 OSCILLOSCOPE (20MHz)  
 LO LEVEL IS MEASURED  
 FREQUENCY: 465.05MHz  
 460.05MHz  
 TX OUTPUT POWER: 2W  
 RX INPUT: NO SIGNAL

OPTION CONNECTION BUS

+8V

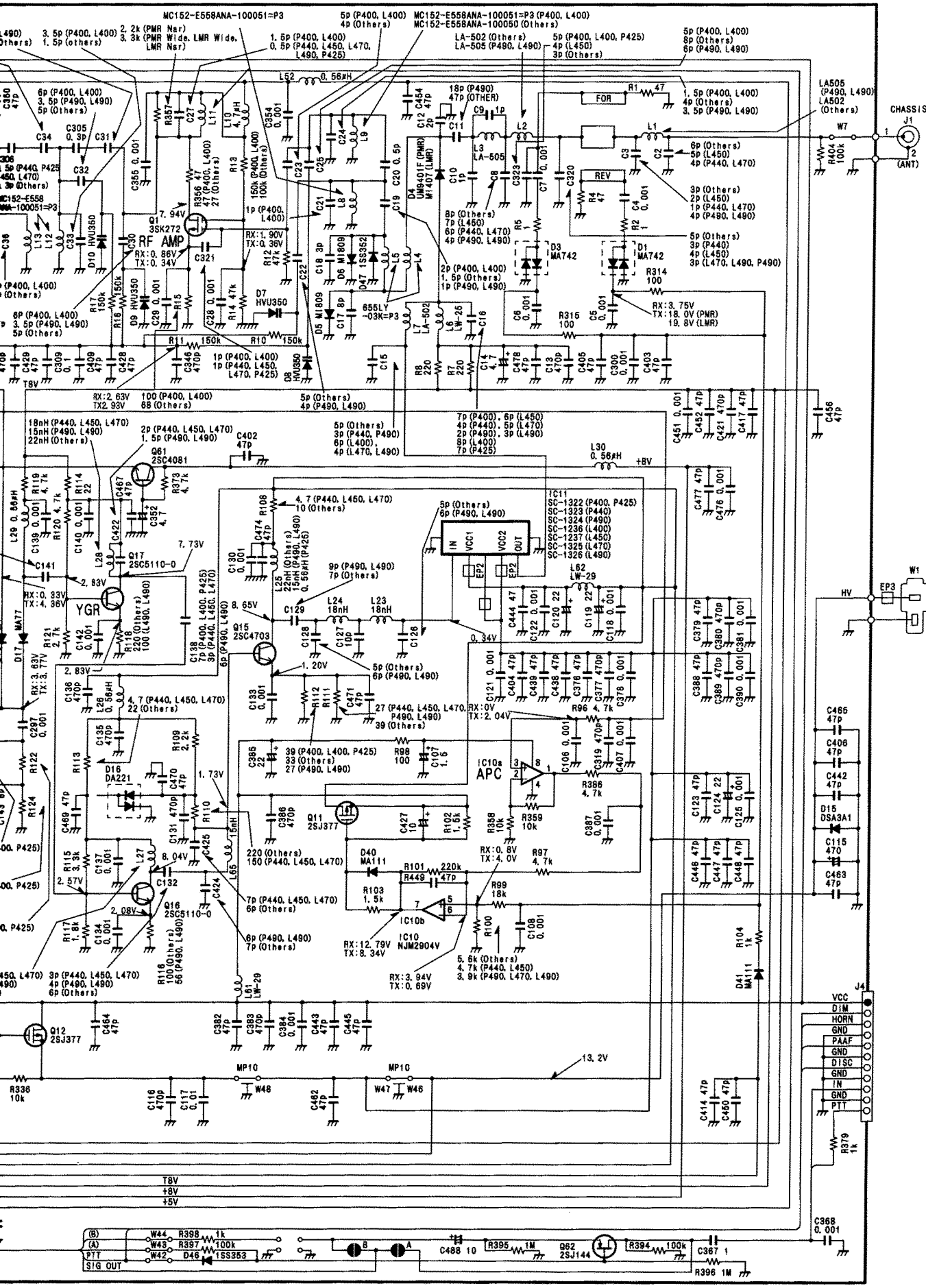


MEASUREMENT CONDITIONS  
 VOLTAGE IS MEASURED BY DIGITAL  
 MULTIMETER WAVEFORM IS MEASURED BY  
 OSCILLOSCOPE (20MHz)  
 LO LEVEL IS MEASURED BY RF VOLTMETER  
 FREQUENCY: 465.05MHz (PMR),  
 460.05MHz (LMR)  
 TX OUTPUT POWER: 2W (PMR), 33W (LMR)  
 RX INPUT-NO SIGNAL

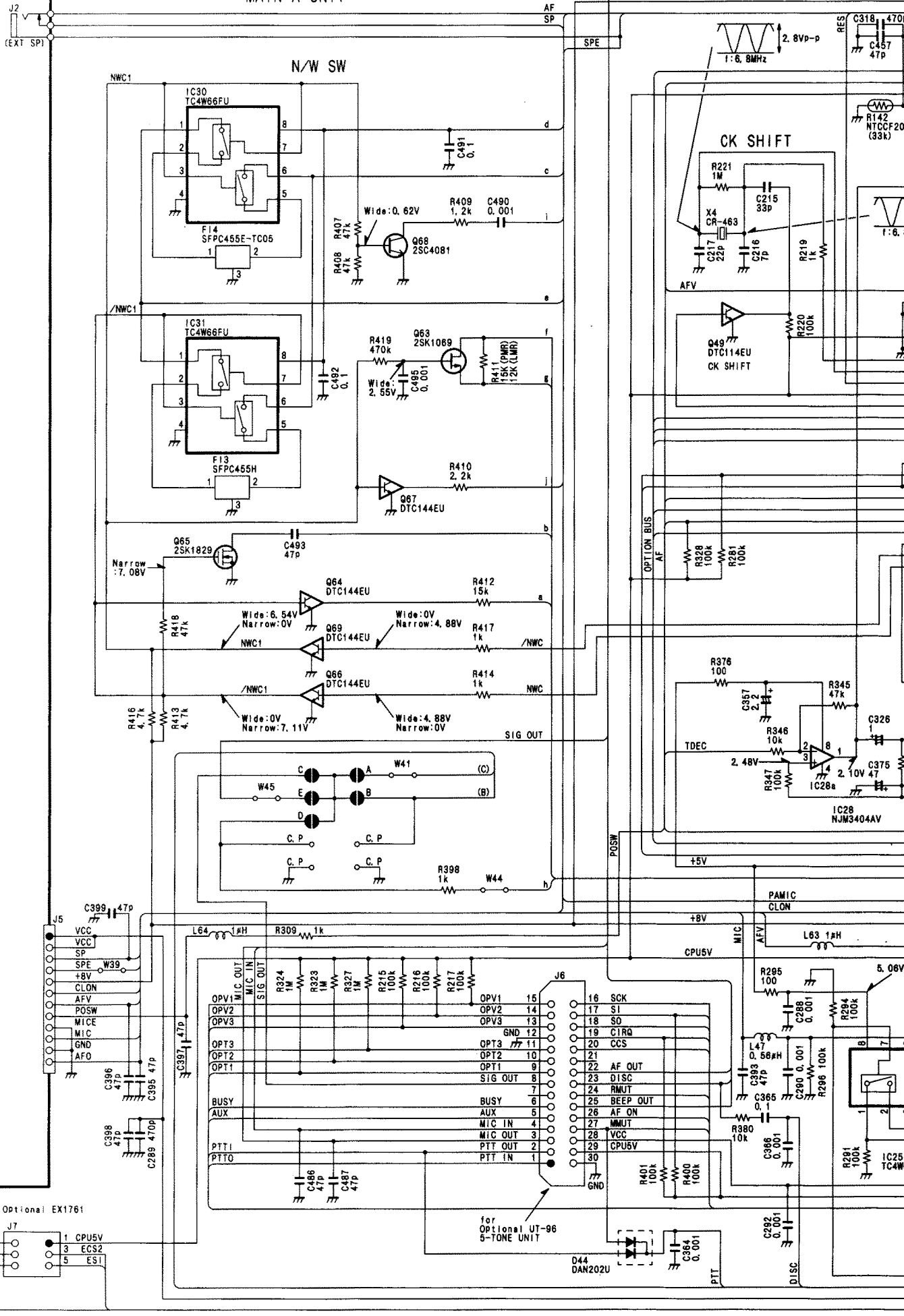
(A)

(B)

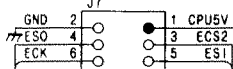




# MAIN-A UNIT

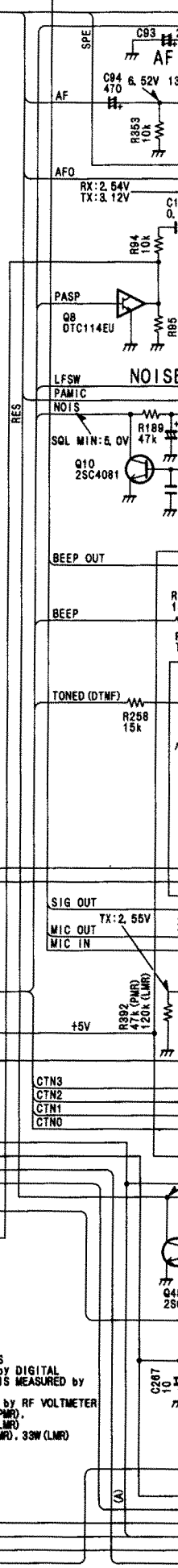
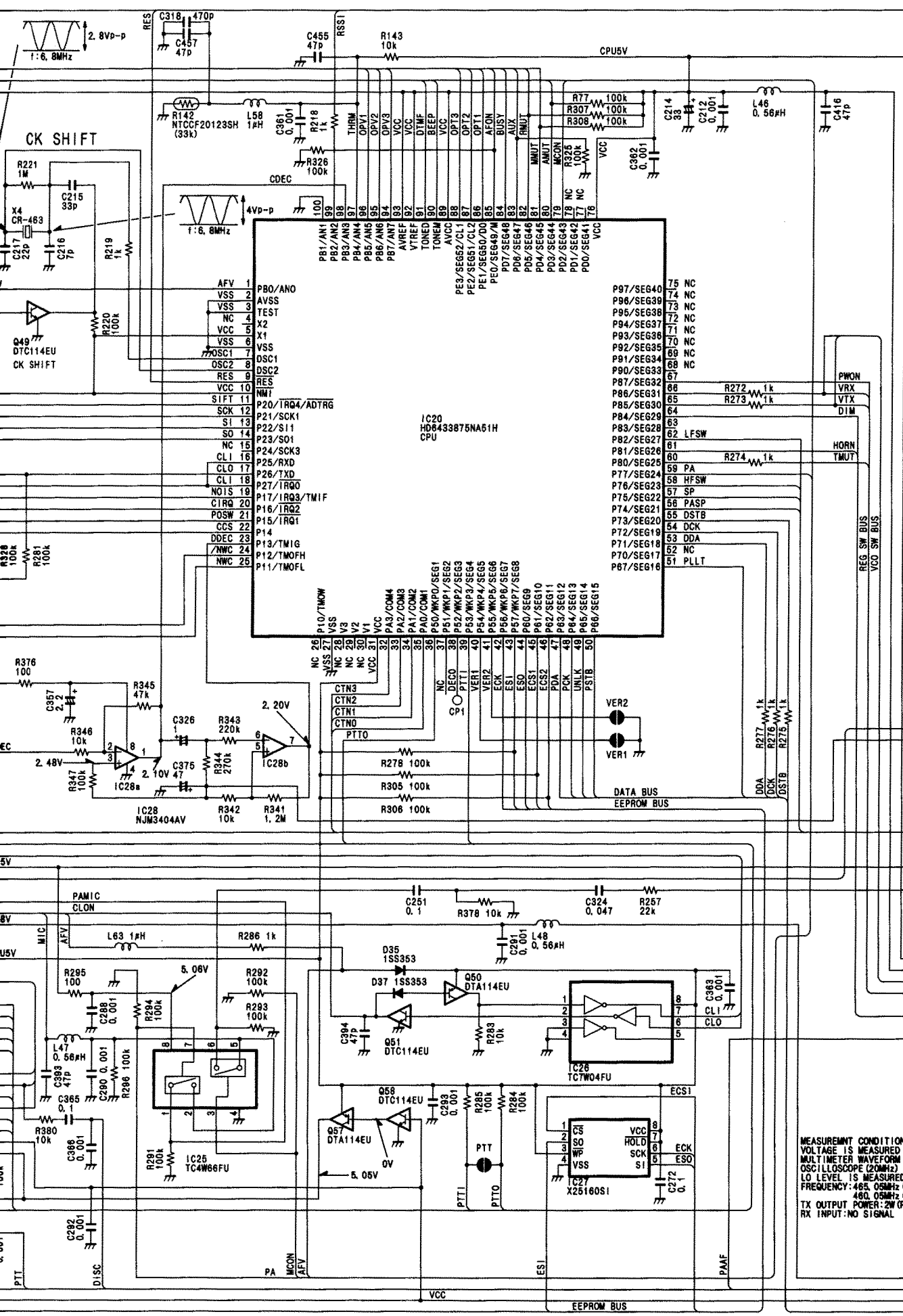


for Optional EX1761



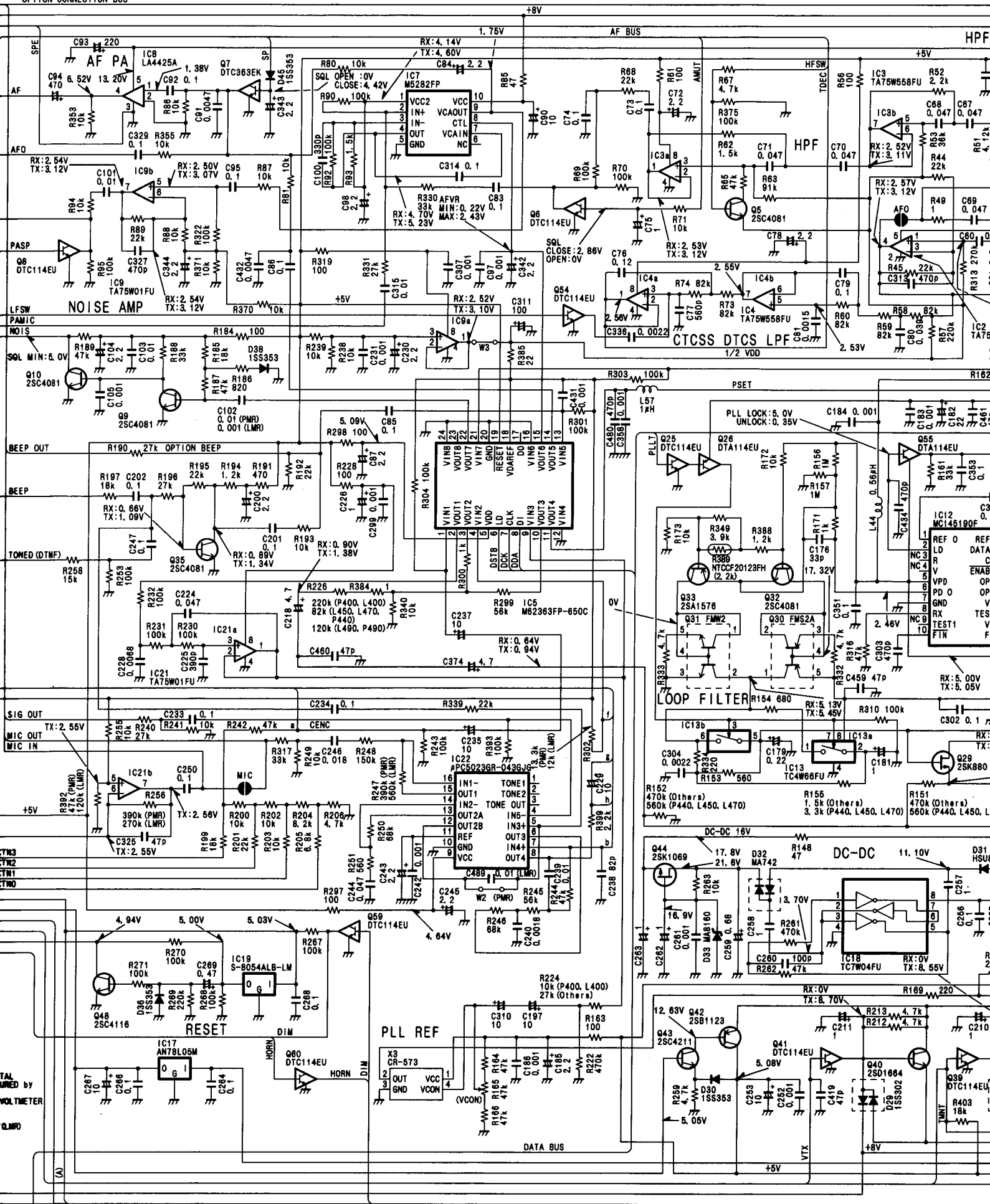
for Optional UT-96 5-TONE UNIT





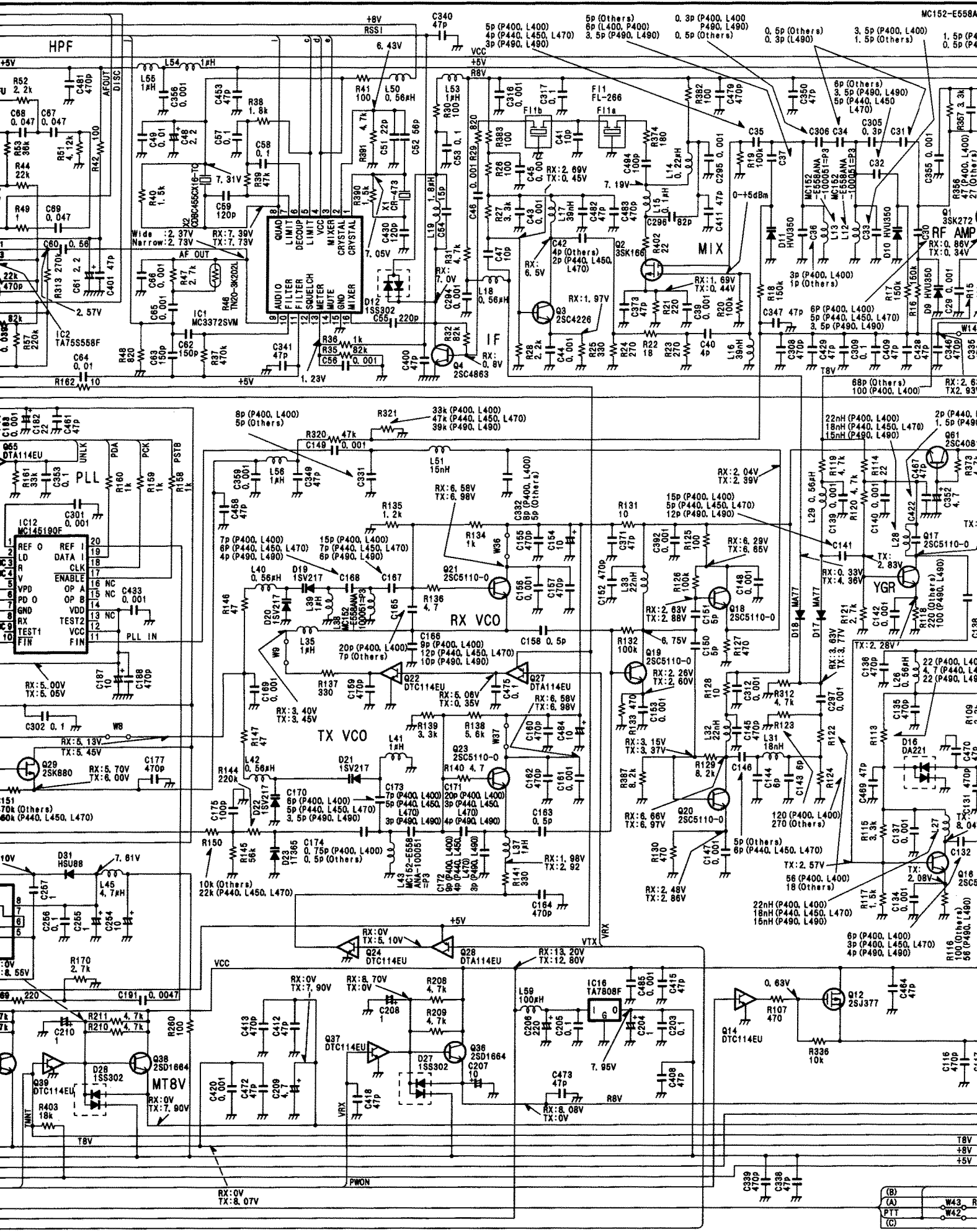
MEASUREMENT CONDITIONS  
 VOLTAGE IS MEASURED BY DIGITAL  
 MULTIMETER WAVEFORM IS MEASURED BY  
 OSCILLOSCOPE (20MHz)  
 LO LEVEL IS MEASURED BY RF VOLT METER  
 FREQUENCY: 485.05MHz (PWR),  
 480.05MHz (LWR)  
 TX OUTPUT POWER: 2W (PWR), 33W (LWR)  
 RX INPUT: NO SIGNAL



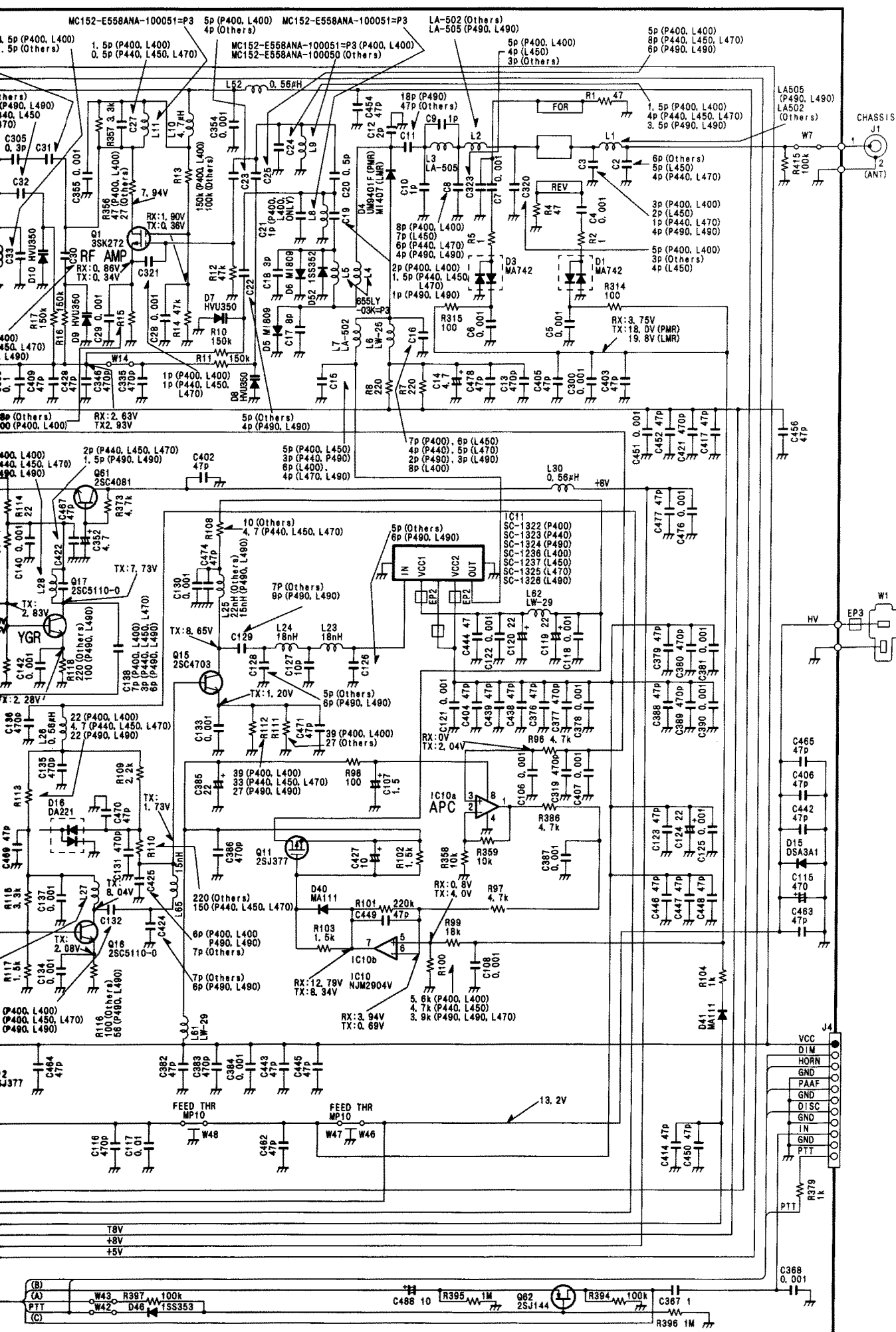


TAL  
METER  
CLMP

REF O  
DATA  
C  
ENAB  
OP  
PD O  
GND  
RX  
TEST1  
FTN  
F



(B) W43 R  
(A) PTT W42  
(C)



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