ICOM

SERVICE MANUAL

IC-U2

UHF FM TRANSCEIVER

ICOM INCORPORATED

INTRODUCTION

This service manual contains information relative to the theoretical, physical, mechanical and electrical characteristics of the **IC-U2** UHF FM TRANSCEIVER.

ASSISTANCE

Two separate versions of the **IC-U2** have been designed for use in the U.S.A. and U.K. This service manual covers both versions.
When using the manual each model can be referred to by the following assigned version numbers.

VERSION	FREQUENCY RANGE (MHz)	TUNING STEP (kHz)
#01	450 ~ 490	25
#02	420 ~ 470	12.5

If you require assistance or further information regarding the operation and capabilities of the **IC-U2**, please contact your nearest authorized ICOM Dealer or ICOM Service Center.

ORDERING PARTS

For the fastest service, supply all of the following information when ordering parts from your dealer or ICOM Service Center:

1. Equipment model and serial number
2. Schematic part identifier (e.g., IC301, Q318)
3. Printed circuit board name and number (e.g., MAIN UNIT/B-1038E)
4. Part number and name (e.g., 2SC2053 Transistor)
5. Quantity required (e.g., 3pcs.)

REPAIR NOTE

1. **DO NOT** open transceiver covers until the transceiver is disconnected from a power source.
2. **DO NOT** connect the transceiver to an external power source of more than 16V.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts.
5. An insulated tuning tool **MUST BE** used for all adjustments.
6. **DO NOT** keep power ON for a long time when the transceiver is defective.
7. **DO NOT** transmit power into a signal generator or sweep generator. Always connect a 20dB or 30dB 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 the equipment to the transceiver.

TABLE OF CONTENTS

The SCHEMATIC DIAGRAM is attached at the end of this manual.

SECTION 1 SPECIFICATIONS

■ GENERAL

Frequency range	:	450.00 ~ 490.00MHz (#01) 420.00 ~ 470.00MHz (#02)
Number of channels	:	2 channels programmed with cloning
Usable temperature range	:	−30°C ~ +60°C
Channel spacing	:	25kHz (#01) 12.5kHz (#02)
Frequency stability	:	±0.0005% (5ppm)
Antenna impedance	:	50Ω
Power supply requirement	:	7V ~ 16V DC (negative ground) EXTERNAL DC POWER JACK accepts 10 ~ 16V.
Current drain	:	Transmit 1.5A (13.2V) 1.15A (8.4V) Receive 160mA (AF max. power) 65mA (standby) 30mA (power save)
Dimensions (with IC-CM8)	:	65 (74) (W) × 196 (207) (H) × 38 (41) (D) mm Bracketed values include projections.
Weight (with IC-CM8)	:	595g

■ TRANSMITTER

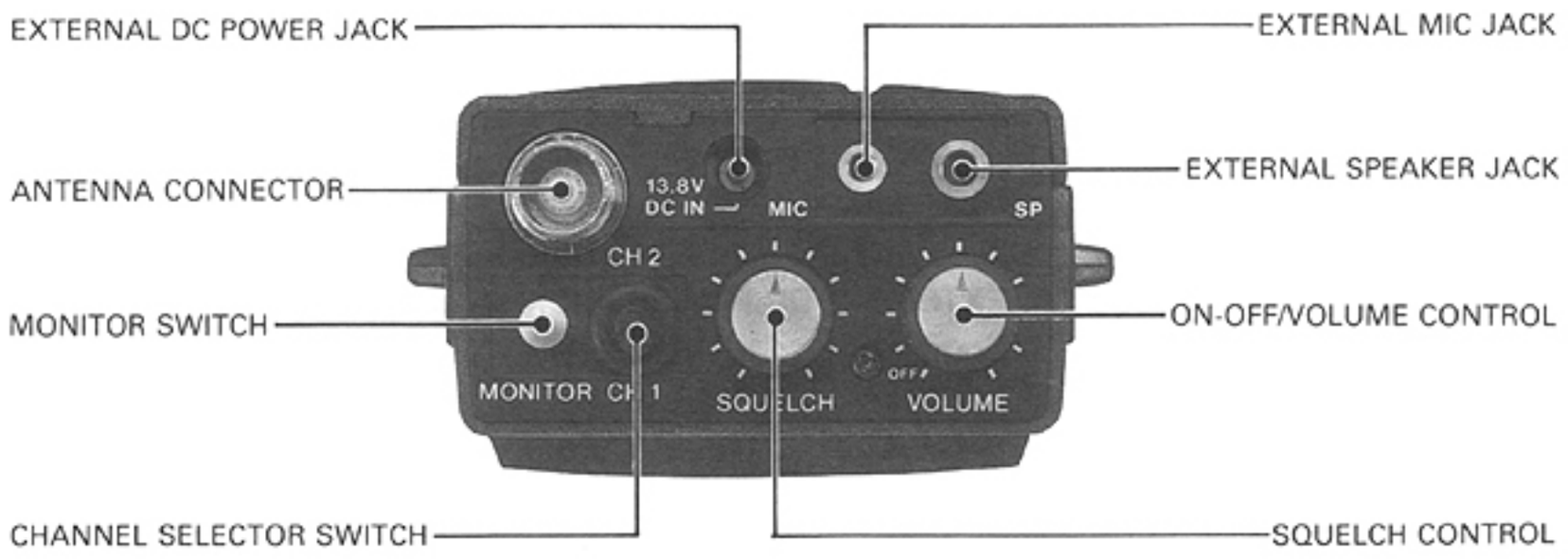
Output power	:	5.0W with IC-CM7 BATTERY PACK 2.5W with IC-CM8 BATTERY PACK
Emission mode	:	16K0F3E (#01) 8K50F3E (#02)
Modulation system	:	Variable reactance frequency modulation
Maximum frequency modulation	:	±5kHz (#01) ±2.5kHz (#02)
Spurious and harmonics emissions	:	More than 60dB

■ RECEIVER

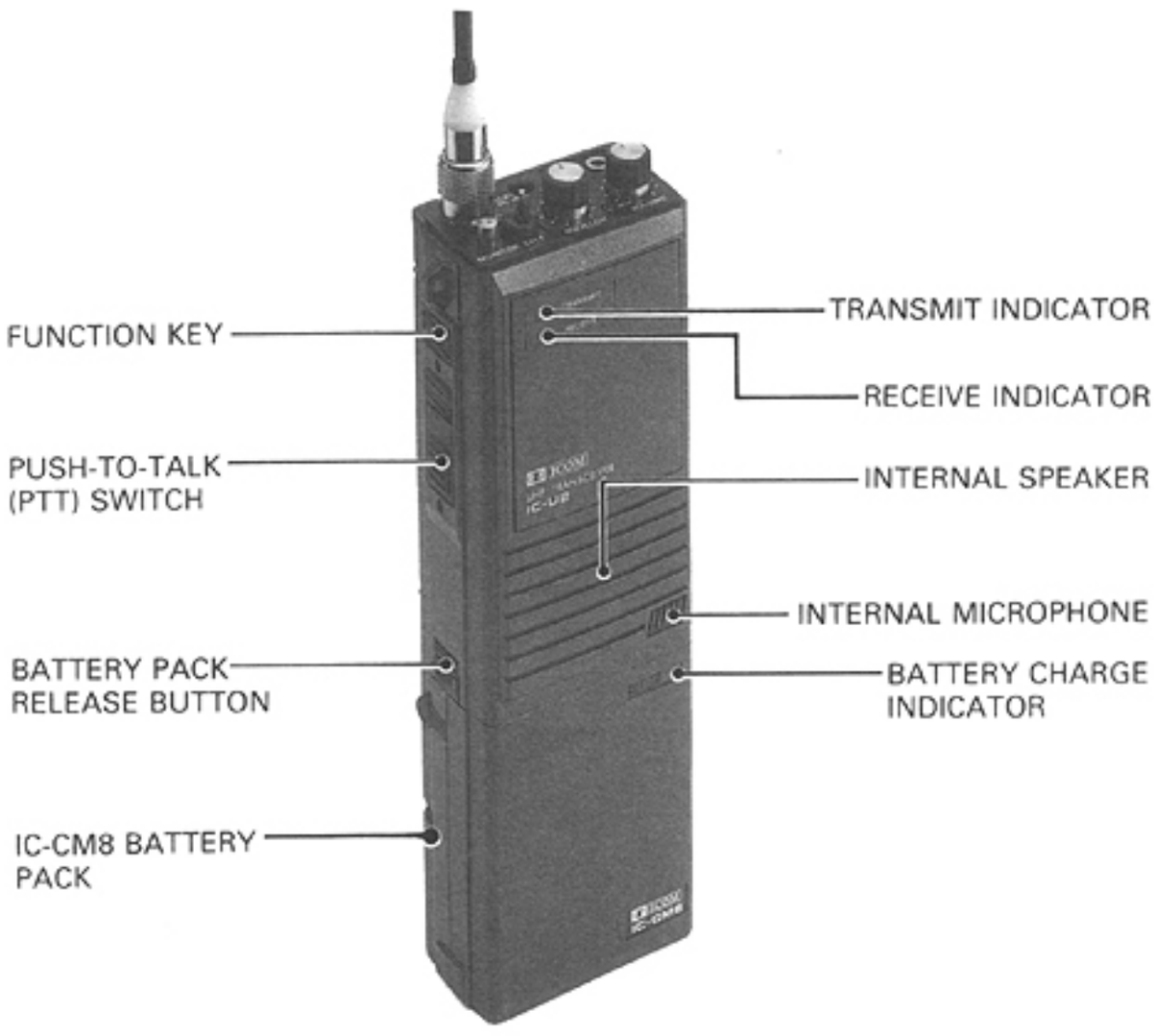
Receiving system	:	Double-conversion superheterodyne
Modulation acceptance	:	±7kHz (#01)
Intermediate frequency	:	1st 21.8MHz 2nd 455kHz
Sensitivity	:	Less than 0.4μV for 12dB SINAD
Squelch sensitivity (threshold)	:	Less than 0.4μV
Spurious and image rejection	:	70dB
Adjacent channel selectivity	:	More than 65dB
Intermodulation rejection	:	65dB
Audio power output	:	500mW at 10% distortion (#01) 350mW at 10% distortion (#02)

SECTION 2 OPERATING CONTROLS

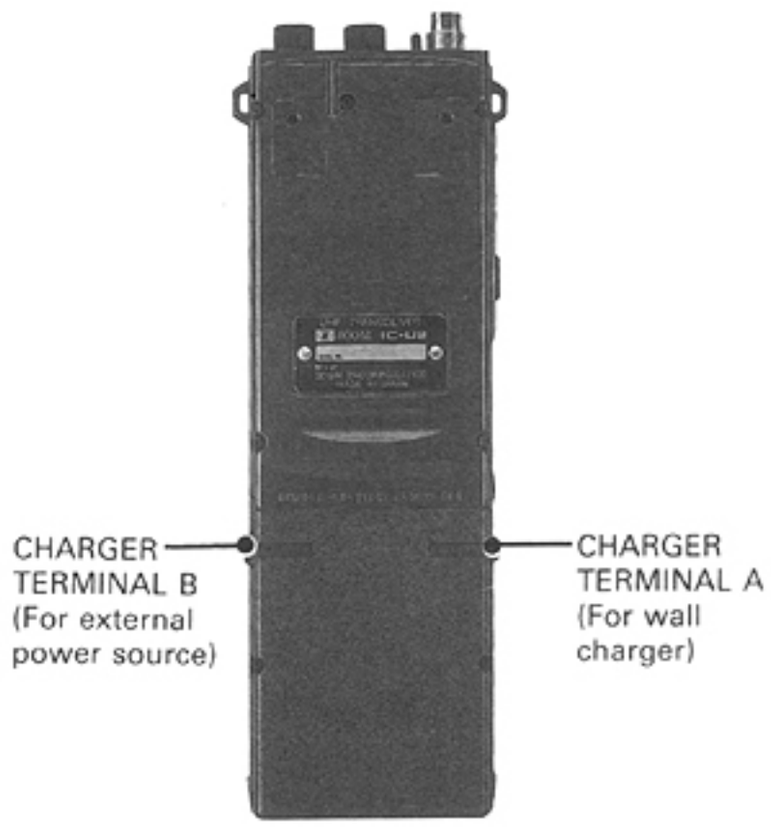
TOP PANEL



FRONT PANEL

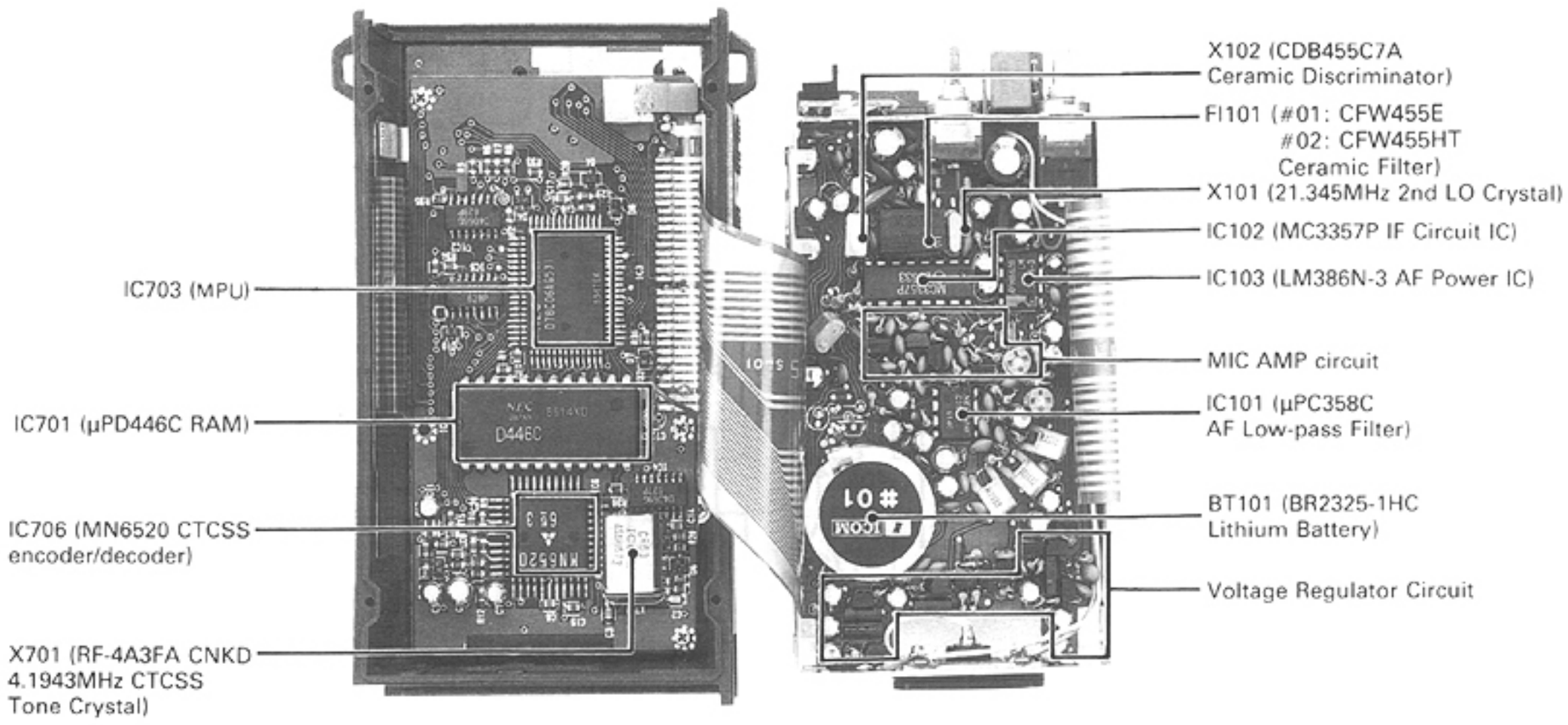


REAR PANEL



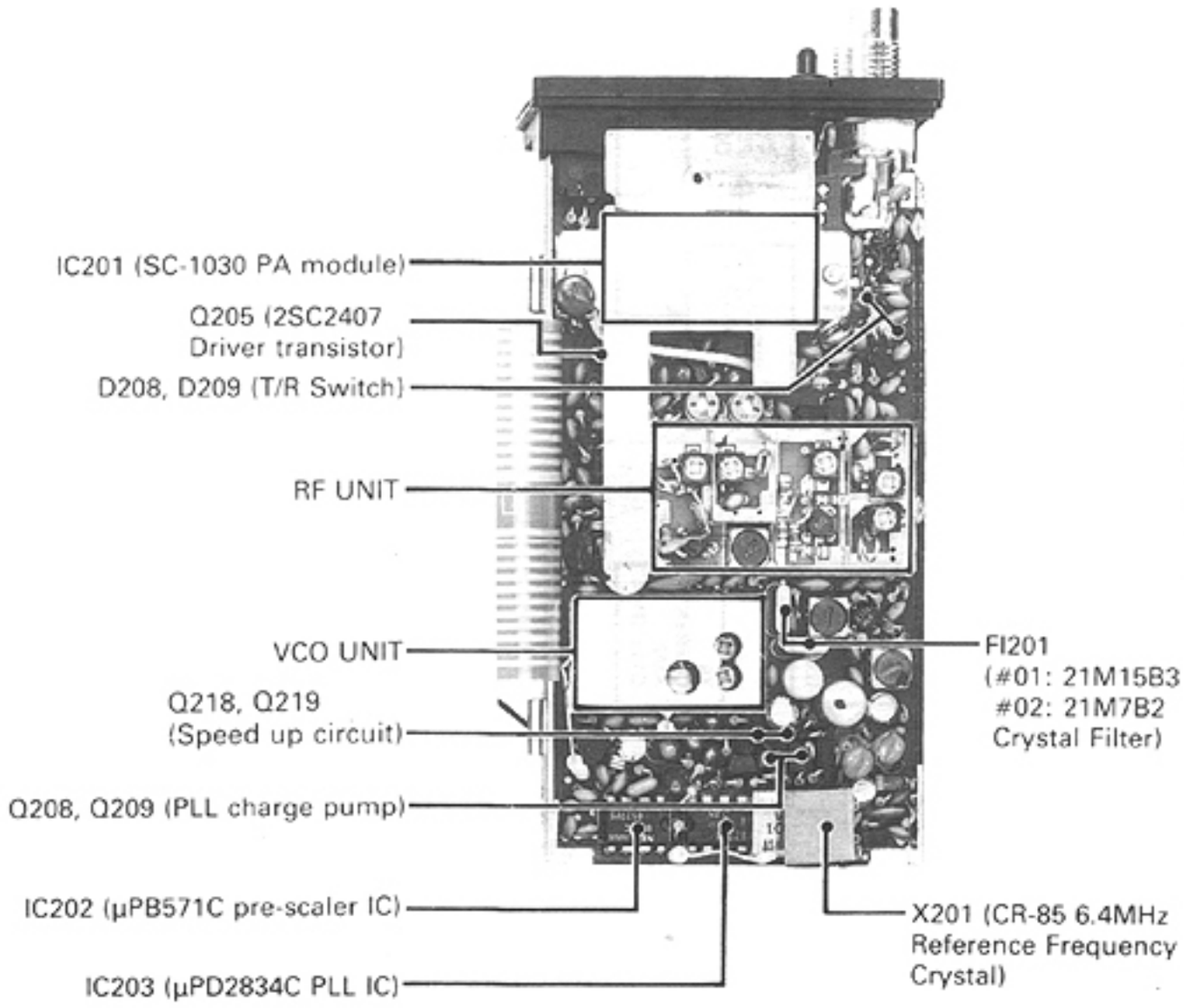
SECTION 3 INSIDE VIEWS

LOGIC, MAIN UNITS

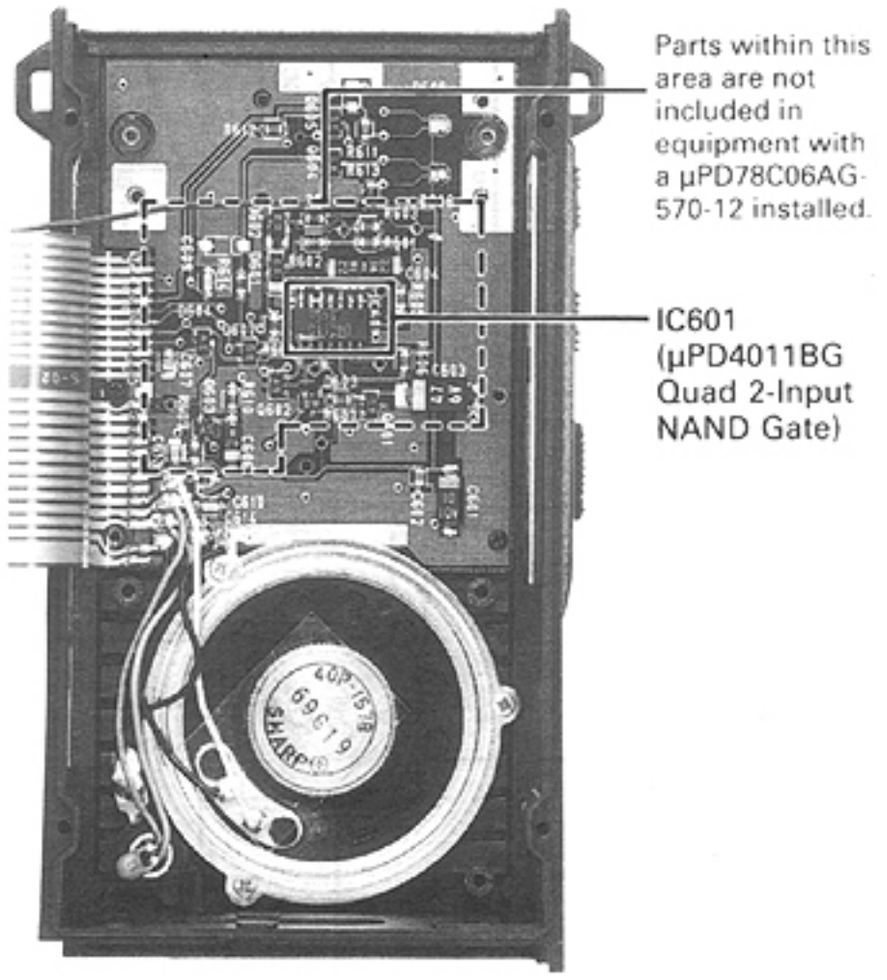


LOGIC UNIT **MAIN UNIT**

PLL, DISPLAY UNITS

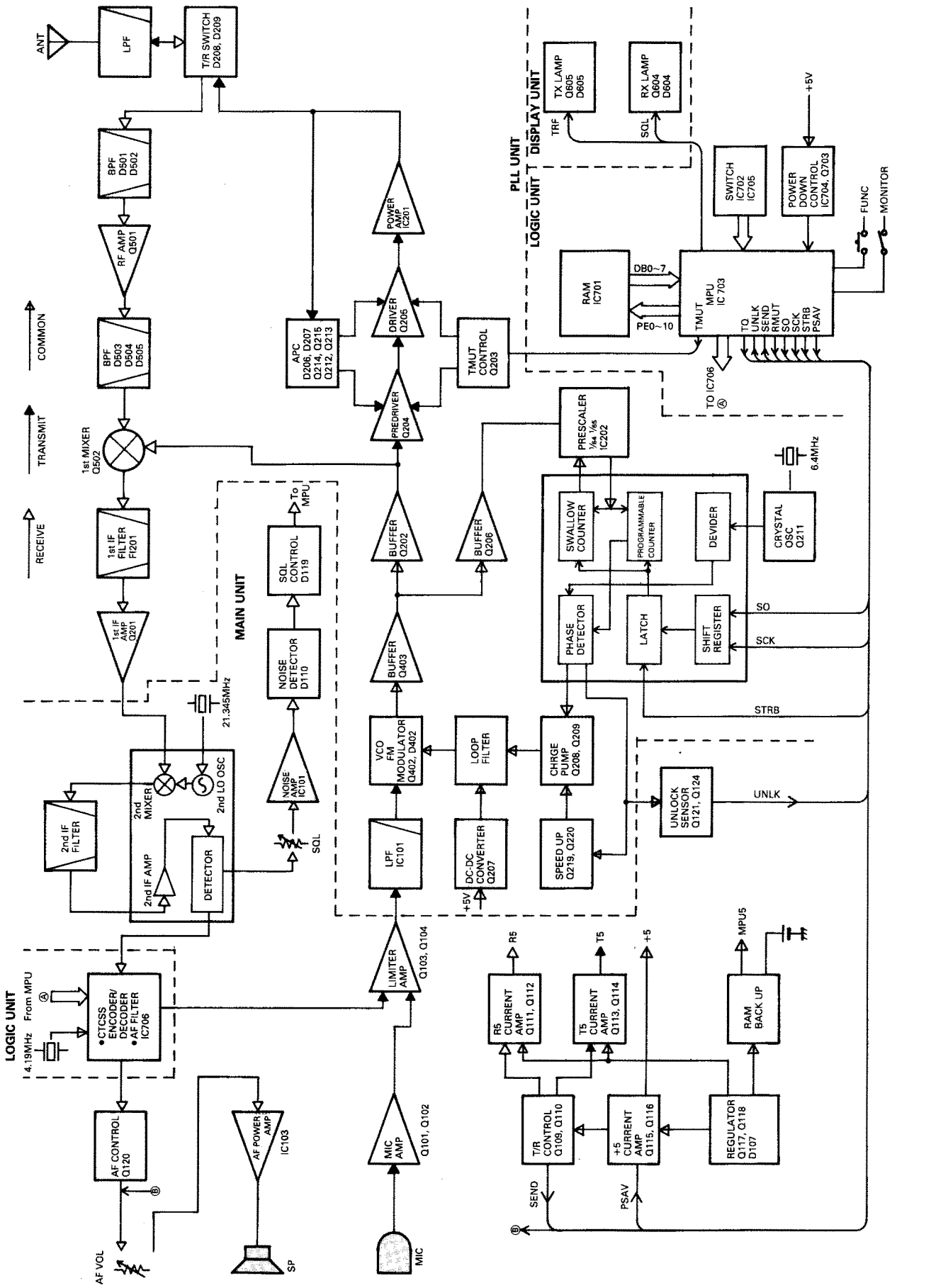


PLL UNIT



DISPLAY UNIT

SECTION 4 BLOCK DIAGRAM



SECTION 5 CIRCUIT DESCRIPTION

5 - 1 RECEIVER CIRCUITS

5 - 1 - 1 ANTENNA SWITCHING CIRCUIT

Input RF signals from the antenna connector are fed into the antenna switching circuit through Chebyshev low-pass filters consisting of C245, C244, C243, L212 and L211 in the PLL UNIT. The antenna switching circuit employs a quarter wave circuit consisting of D208, D209, L209 and C246.

5 - 1 - 2 RF CIRCUIT

RF signals from the switching circuit pass through bandpass filters consisting of L501, C501, D501, C504, D502 and L502 on the RF UNIT. These bandpass filters reduce interference from out-of-band signals. Signals passed through the bandpass filters are fed into gate 1 of Q501, the 1st RF amplifier, and are amplified.

Output signals from Q501 are again passed through bandpass filters which consist of L503, C509, D503, C512, D504, L505, C515, D505 and L506, and are then fed into gate 1 of Q502.

Diodes D501 ~ D505 are varactor diodes that track the bandpass filters and are controlled by the PLL lock voltage. These diodes tune the center frequency of the bandpass filters for wide bandwidth reception and a good image response rejection ratio.

RF signals from the bandpass filters are fed into gate 1 of Q502. Local oscillator signals from the PLL UNIT are fed into gate 2 of Q502 through C517. Q502 is a 1st mixer which converts RF signals into 21.8MHz 1st IF signals and outputs them at L201.

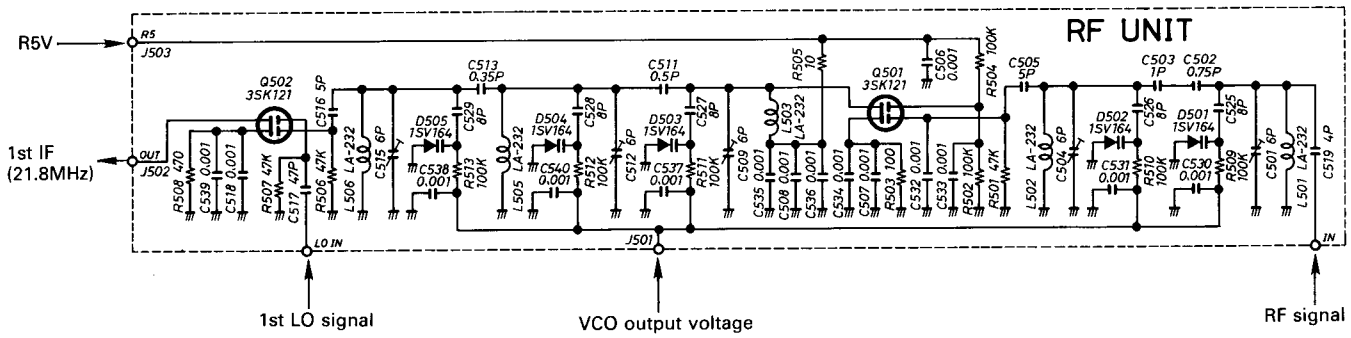


Fig. 5-1 Variable Bandpass Filters Controlled by VCO

5 - 1 - 3 IF CIRCUIT

1st IF signals from L201 are filtered further from out-of-band interference through a matched pair of monolithic crystal filters that are FI201 and are then amplified at Q201.

1st IF signals amplified at Q201 are fed into IC102 on the MAIN UNIT through the limiter circuit (D201, D202) and tuning circuit (L203), both on the PLL UNIT.

IC102 incorporates in one package a 2nd local oscillator, a 2nd mixer, a limiter amplifier, an active filter, and a quadrature detector.

1st IF signals enter IC102 (pin 16) and mix with a 2nd local oscillator frequency (21.345MHz) generated by X101. The 455kHz 2nd IF signals are then output from pin 3. These signals pass through a high-performance ceramic filter (FI101), and are amplified at a limiter amplifier.

Output 2nd IF signals from the limiter amplifier are separated. One of the signals enters a quadrature detector circuit, and the other exits from pin 7. The signals output from pin 7 enter pin 8 through ceramic resonator X102, and then both signals are detected at a quadrature detector circuit inside IC102. The resulting AF signals are output from pin 9 and are then applied to IC706 (pin 29) on the LOGIC UNIT.

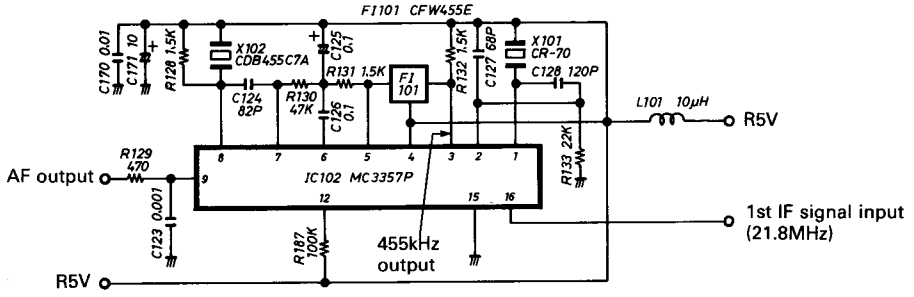


Fig. 5-2 IF Circuit IC Chip

5 - 1 - 4 AF CIRCUIT

IC706 incorporates a CTCSS encoder/decoder, an AF amplifier, and a dual AF filter circuit.

AF signals applied to IC706 are amplified, exit from pin 18, pass through a low-pass filter, and then are amplified at Q702. The low-pass filter consists of R715 and C711 and has −6dB/oct.de-emphasis characteristics.

Output signals from Q702 re-enter the MAIN UNIT and are fed into AF SWITCH (Q120). This transistor cuts the AF signal when RX MUTE is operating or the squelch is closed.

The signals that enter Q120 are then fed into an AF power amplifier circuit (IC103 pin 3) through AF volume control R161. The gain of IC103 is fixed by R162 and C155 which are connected across pins 1 and 8. The speaker is driven at more than 500mW of AF output by IC103 with an 8Ω load and 8.4V Vcc.

The power source for IC103 consists of Q123 and D113 which protect it from excess voltage, maintaining the voltage at less than 12V.

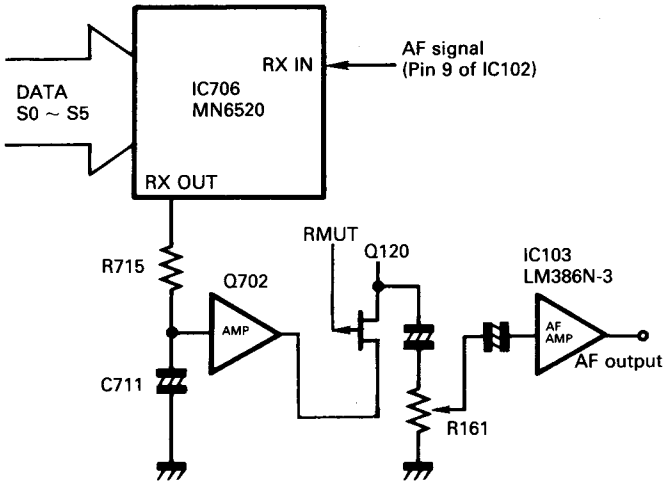


Fig. 5-3 AF Circuit Block Diagram

5 - 1 - 5 SQUELCH CIRCUIT

A portion of signals output from IC102 (pin 9) passes through R148, squelch control and is then input to active filter IC101B (pin 2) where noise signals are selected at approximately 20kHz then output from pin 1.

The noise signals are rectified by D110 and are then converted to DC voltage and used as squelch control signals. This voltage is input to IC703 (pin 15) on the LOGIC UNIT through inverter circuit Q119, and is then output from pin 30 as R.MUTE voltage.

R.MUTE voltage is applied to the gate of Q120 and switches AF output. Q120 also eliminates the noise from channel changing during operation. Q126 receives a strobe pulse from IC703 and applies a mute signal to Q120.

5 - 1 - 6 1st LOCAL OSCILLATOR CIRCUIT

Local oscillator signals (420 ~ 490MHz) generated at the VCO are amplified at Q202 on the PLL UNIT and are then input to gate 2 of Q502 on the RF UNIT through D203.

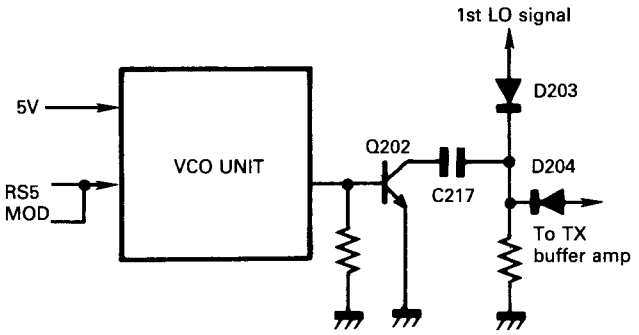


Fig. 5-4 1st LO Circuit

5 - 2 TRANSMITTER CIRCUITS

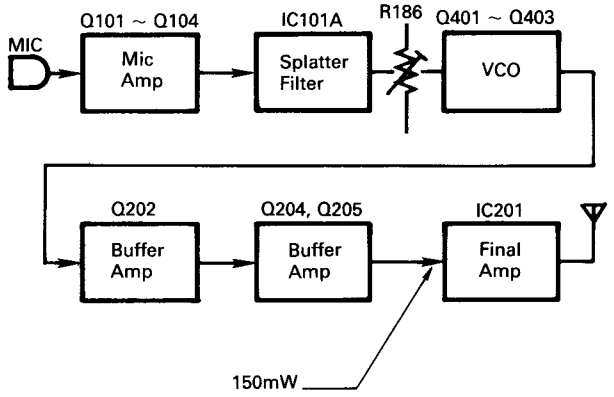


Fig. 5-5 Transmitter Circuit Block Diagram

5 - 2 - 1 MIC AMPLIFIER CIRCUIT

The audio signal from MIC 1 or MIC 2 is amplified by a limiter amplifier circuit consisting of Q101 to Q104. This limiter amplifier circuit employs of a negative feedback circuit that has pre-emphasis characteristics between 300Hz and 3kHz with 6dB/oct.

The 1st mic amplifier circuit consists of a differential amplifier circuit that makes a limiter output signal in a symmetrical waveform.

The output signal from the limiter amplifier is like a square wave and includes many RF signals which are fed back from the transmitter's final stage. The output signal, therefore, is fed to splatter filter circuit IC101A which reduces signals with more than 3kHz, and then applies them to the VCO for modulation.

5 - 2 - 2 BUFFER AMPLIFIER CIRCUIT

The 400MHz band is generated by the VCO and is buffered and amplified at Q202. Output from Q202 is amplified at pre-drive stage Q204 through D204 and is then amplified at drive stage Q205, thus obtaining a wideband of 150mW.

5 - 2 - 3 POWER AMPLIFIER CIRCUIT

IC201 is a small-sized power module giving a stable output power of more than 5W between 450 and 490MHz with a driving power of 150mW from Q205.

The driving signals from Q205 are fed into IC201 (pin 1), amplified up to approximately 5W at 13.2V, and are output from pin 5.

While transmitting, Q216, D208 and D209 are activated, then L209 and C246 become parallel resonance circuits. The output power from IC201 is applied to the antenna terminal through a low-pass filter consisting of C243, L211, C244, L212 and C245 that filters and reduces harmonic spurious radiation.

Q203 controls the bias voltage of Q204, Q205 and IC201 to prevent unwanted emissions when switching from receive mode to transmit mode, or when the PLL is being unlocked to prevent a possible failure.

5 - 2 - 4 APC CIRCUIT

The antenna mismatching detection circuit consists of L207, C234 ~ C239, D206, and D207. Output voltage of the detector is a minimum value when the antenna impedance is matched at 50Ω. However, when the antenna impedance is in a mismatched condition, the detector voltage becomes higher than it would be if the antenna were matched.

Q214 and Q215 make up the differential amplifier circuit. At the base of Q215, the bias voltage determined by R262, R263, and R266 is applied.

The voltage detected at D206 and D207 is combined by R226 and R227, and is fed into the base of Q214. If a mismatched condition occurs, the voltage at the base of Q214 will be higher than at the base of Q215. This condition will reduce the Q214 collector current and the Q213 base current, decreasing the current of Q204 and Q205.

The output power of Q205 also decreases, reducing the output power of IC201 until the base voltage of Q214 becomes equal to the base voltage of Q215.

5 - 3 PLL CIRCUITS

The PLL is designed in a way that allows the desired frequency to be generated directly by the VCO, adopting a dual modulus pre-scaler system. The PLL consists of a pre-scaler (IC202) and PLL IC (IC203). It is fed "divided by N-data" from the MPU which determines the operating frequency.

N-data is determined by dividing the desired frequency by the reference frequency. Desired frequency is the transmit frequency in the transmit mode and the 1st local oscillator frequency in the receive mode.

$$N = \frac{\text{Desired frequency}}{\text{Reference frequency}}$$

A reference frequency of 12.5kHz is obtained by oscillator Q211, X201 and the internal IC203 divider.

Signals from the VCO that are buffer amplified at Q206 are divided N times at IC202 and fed into pin 4 of IC203. Signals inside IC203 are phase detected and are lock voltages that are output from pins 12 and 13. Output voltages are applied to varactor diode D401 in the VCO UNIT through a loop filter that controls the VCO frequency. Due to a no-multiplying mixing circuitry, the circuit constitution is simple and reduces spuriousness.

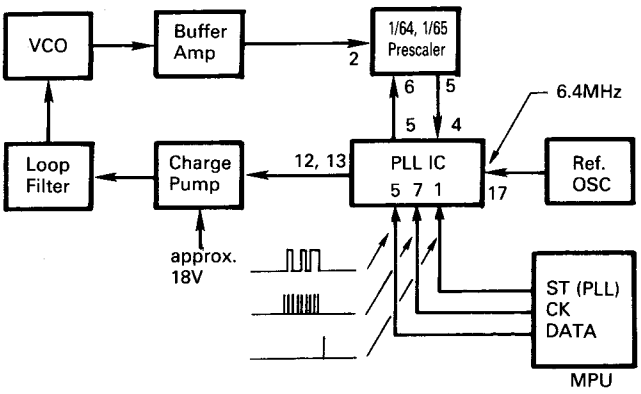


Fig. 5-6 PLL Circuit Block Diagram

5 - 3 - 1 UNLOCK CIRCUIT

When the PLL is unlocked, pin 10 of IC203 is "LOW". This voltage is fed into unlock detection circuits Q121 and Q124 on the MAIN UNIT and is then sent to the MPU on the LOGIC UNIT.

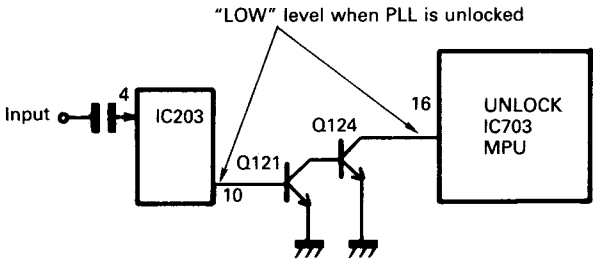


Fig. 5-7 PLL Unlock Circuit

5 - 3 - 2 LOOP FILTER CIRCUIT

Output from pins 12 and 13 on IC203 is fed into charge pumps Q208 and Q209 and is then applied to a lag lead-type loop filter that consists of R241, R282, R284, C267, C305 and C306. This circuit determines the characteristics of the PLL.

Output voltage from the loop filter controls varactor diode D401 on the VCO UNIT through the integral circuit, R233 and C258. Q219 and Q220 form a speed-up circuit that determines the time constant of the loop filter. This circuit shortens the time for lock up when changing from receive to transmit mode and vice versa.

5 - 3 - 3 VCO UNIT

The VCO, Q402 employs a Colpitts oscillator circuit. The VCO free-run frequency is shifted by induction reactance which is changed by Q401 and D402, and is then controlled by a varactor diode. Thus a stable oscillation is achieved over a wide frequency range.

While receiving, the RS5 line is 5V, Q401 is activated, and the VCO free-run frequency is shifted and controlled by a varactor diode. While transmitting, the RS5 line is 0V and Q401 turns OFF. D402 therefore obtains reverse bias and has capacitance. D402 is connected in series with C405 and C406, resulting in a VCO free-run frequency that is shifted higher than the receive frequency.

While transmitting, modulation signals are applied to the anode of D402, and then its capacitance is changed, performing frequency modulation. This deviation is adjusted by R186.

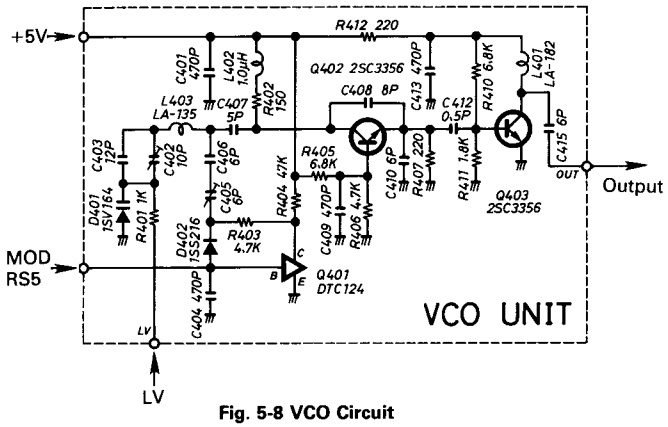


Fig. 5-8 VCO Circuit

5 - 4 POWER SUPPLY CIRCUITS

5 - 4 - 1 INTERNAL/EXTERNAL POWER

When using a battery pack, RL101 is OFF. When a power source having 10 ~ 16V is connected to the external power terminal (EXT), RL101 is activated. The power switch is then connected to an external power source.

If an incorrect connection to the external power terminal (such as reversing polarities) is made, D109 is affected, reversing its bias and preventing RL101 from being activated.

5 - 4 - 2 +5V REGULATOR CIRCUIT

The +5V voltage regulator circuit consists of Q117, Q118 and D107 where output voltage is kept at 5V constantly, even with input voltage from 5.1 ~ 16V. These transistors are connected in a complementary circuit in order to acquire a higher current amplification factor. As the temperature coefficient of the junction voltage of D108 is nearly equal to the voltage of Q117 V_{BE}, the output voltage is kept constant against temperature changes.

5 - 4 - 3 5V REGULATOR, POWER SAVE CIRCUIT

This voltage regulator circuit uses reference voltage from pin 29 of IC703 on the LOGIC UNIT. This circuit consists of Q115 and Q116 which are also connected in a complementary circuit in order to stabilize operations.

When the power save function is activated, power save signals from pin 29 of IC703 on the LOGIC UNIT are applied to Q115 at intervals, thus Q115 turns ON and OFF alternately. The result is that the power save signals control +5V and construct the power save circuit.

5 - 4 - 4 T/R SWITCHING CIRCUIT

While transmitting, Q106 is activated and transfers transmit signals to the MPU. At the same time, Q107, Q108, and Q109 are also activated, and Q110 turns OFF. Q113 and Q114 are T5 voltage regulator circuits that are switched by Q109. When Q109 is activated, the T5 line operates at 5V and the R5 line at 0V. While receiving, Q106 is OFF. Q109 is then OFF and Q110 is ON, resulting in the T5 line being 0V and the R5 line 5V.

When the squelch is changed from the closed to open condition some noise will be emitted from the speaker. This phenomenon is called the squelch burst. To remove this noise from the speaker, the squelch can be controlled by a CTCSS tone.

The transmitter contains a delay circuit for the transmit carrier. The delay period for the transmit carrier is longer than that of the PTT.

In this transceiver the delay circuit consists of time constants C131 and R137 which remove the squelch burst.

5 - 4 - 5 VOX POWER SOURCE CIRCUIT

This is a current limiter that supplies a voltage to the external VOX unit, HS-10SA. Current drain of up to 5mA is acceptable. In the case of a normal load current the voltage drop through R273 is small, approximately 5V, and is fed into the VOX unit. The increase in load current leads to the increase of the voltage drop at R273. When the voltage, obtained by adding the voltage between the emitter and base of Q217 to it, is equal to the voltage between R272 and the D216 cathode, the load current is limited.

5 - 4 - 6 CLONING DATA RECEPTION

Cloning data exits from the mic terminal and passes through R102, R104, and control Q106 on the MAIN UNIT. It then enters pin 14 (SEND) of IC703 for data reception. SEND also combines a data input port.

5 - 5 LOGIC CIRCUITS

The LOGIC circuits consist of an 8 bit C-MOS MPU, a 2k C-MOS RAM and a CTCSS tone encoder/decoder. They control frequency, tone, etc.

5 - 5 - 1 MPU

The MPU, µPD78C06AG, includes a 4k byte ROM and a 128 byte RAM. The following table explains the function of each port.

PORT	OPERATION
DB 0 ~ DB 3	Matrix input and 8 bit data bus with DB 4 ~ DB 7.
DB 4 ~ DB 7	8 bit data bus with DB 0 ~ DB 3.
PE 0 ~ PE 15	16 bit selectable output and address port.
PA 0 (STRB)	Outputs PLL latch signals.
PA 3 (RMUT)	Becomes "HIGH" when receiving mute condition.
PA 4 (TMUT)	Becomes "HIGH" for 80msec. when changing from receive to transmit modes, and when unlocked in transmit mode.
PB 0 ~ PB 5 (S0 ~ S5)	Outputs subaudible tone data.
PB 6 ($\overline{T}$/R)	Becomes "LOW" in transmit mode and "HIGH" in receive mode when subaudible tone data is programmed.
PB 7 (MONI)	Inputs the MONITOR SWITCH signal.
PC 0 (UNLK)	Inputs "LOW" when unlocked.
PC 1 (SQL)	Inputs "HIGH" when squelch opens.
PC 2 (SEND)	Inputs "HIGH" when transmitting. Inputs cloning data when in cloning mode.
PC 3 (FUNC)	Inputs the [FUNC] SWITCH condition.
PC 4 (TRF)	Inputs "HIGH" to light up the transmit indicator.
SO	Outputs the shift register of the MPU.
$\overline{SCK}$	Outputs the timing signal for the SO port.
INT 1	Inputs "HIGH" when the transceiver turns OFF to initialize each port.
TO	Outputs BEEP signals.
$\overline{RD}$	Outputs a timing signal to receive the data (reading) from the RAM IC.
$\overline{WR}$	Outputs a timing signal to transfer the data (writing) to the RAM IC.

Table 5-1 MPU Port Allocations

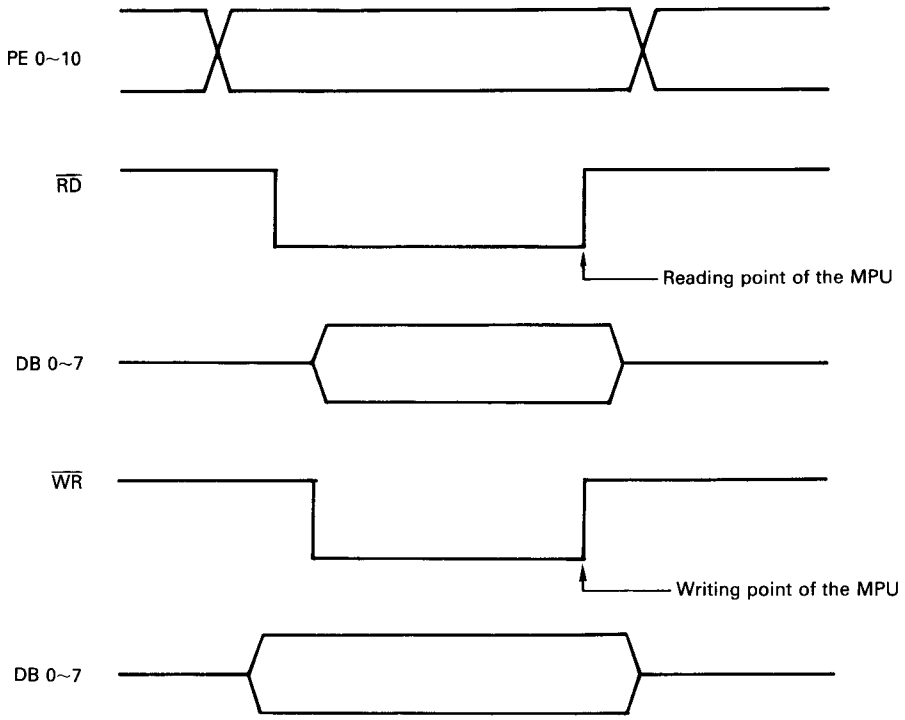


Fig. 5-9 Timing Chart of Memory Reading/Writing

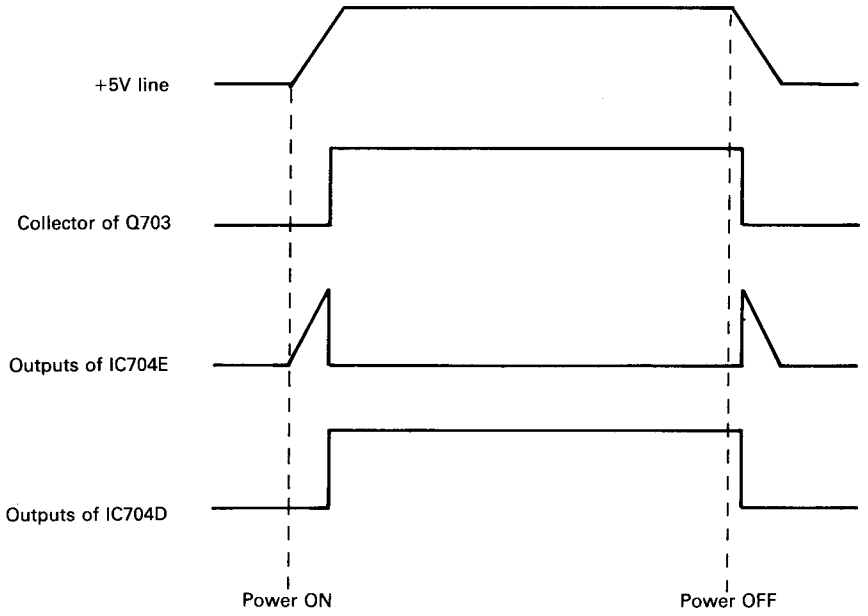
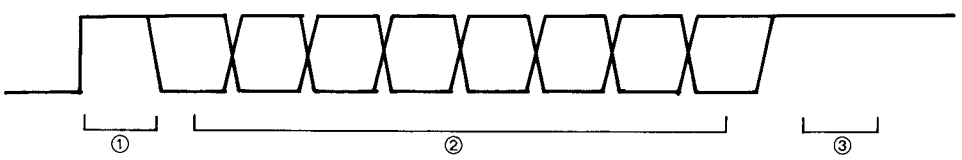


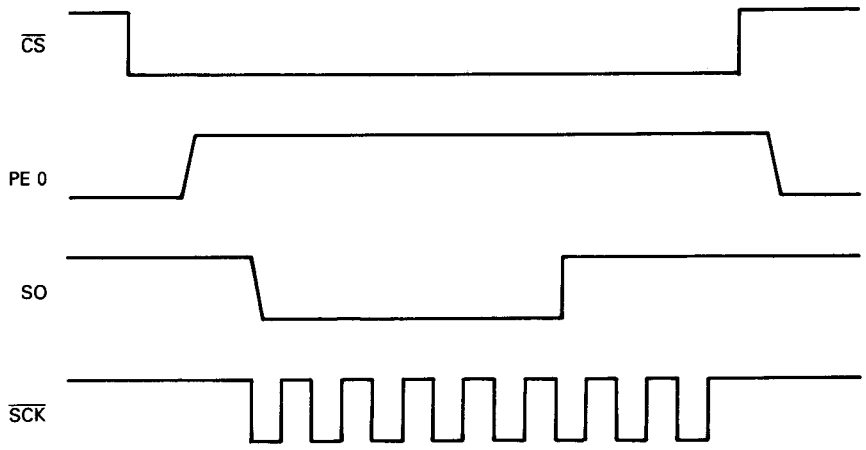
Fig. 5-10 Reset Timing Chart



① START BIT
② DATA BITS
③ STOP BIT

Fig. 5-11 Cloning Data Construction

AT COMMAND TRANSMITTING (CODE 0E, 0H)



AT DATA TRANSMITTING (DATA 0A, 5H)

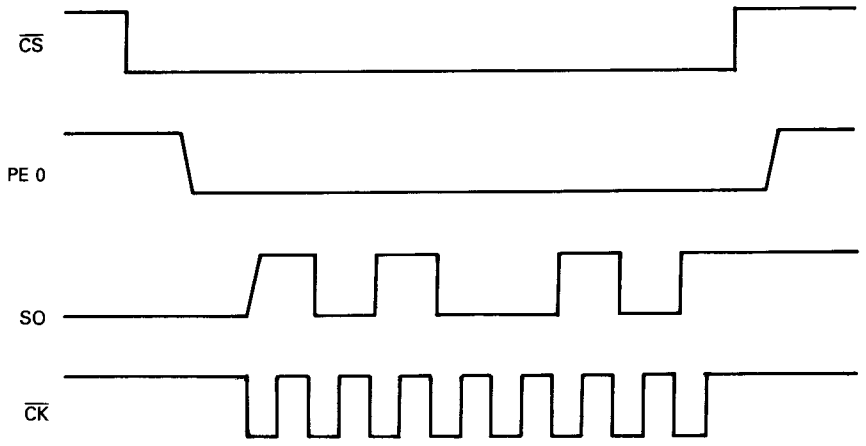


Fig. 5-12 Timing Chart of COMMAND and DATA

5 - 5 - 2 RAM

μPD446C is a 2048 word 8 bit C-MOS RAM IC chip. This RAM memorizes operating channels, PLL T/R N-data, TONE numbers, shift frequencies, TONE-data tables, etc. The data are written or read to addresses which are selected by PE 0 to PE 10 of the MPU. Writing and reading timing depend on ports $\overline{RD}$ and $\overline{WR}$.

5 - 5 - 3 RESET CIRCUIT

After the circuit is switched ON, the +5V line becomes 5V and Q703 is activated. The collector of Q703 thus is "HIGH". Pin 12 of IC704E is "LOW" and pin 10 of IC704D is changed from "LOW" to "HIGH". The result is that the MPU is reset.

At the time the power switch is turned OFF, Q703 also is OFF. Pin 12 of IC704E then is "HIGH" and is applied to INT 1 of the MPU. The MPU is then in stand-by operation.

5 - 5 - 4 CTCSS CIRCUIT

IC706 generates 37 tones of programmable CTCSS encoder/decoders. When a tone number is set, data is sent to IC706 from the MPU (S0 ~ S5). The $\overline{T}$/R port is a switching port for transmitting and receiving for IC706. When this port is in the LOW position, IC706 is in the transmit mode, and when the port is in the HIGH position IC706 is in the receive mode. However, while transmitting with tone number 0, the $\overline{T}$/R port of IC703 is in the HIGH position, and thus no tone signal is output from IC706.

SECTION 6 MECHANICAL PARTS AND DISASSEMBLY

6 - 1 CASE DISASSEMBLY

1. Turn the ON-OFF/VOLUME CONTROL OFF and remove the BATTERY PACK.
2. Remove screw Ⓐ and four screws Ⓑ on the REAR PANEL, and four screws Ⓒ on the bottom as shown in Fig. 6-1-1.
3. Remove the REAR PANEL as shown in Fig. 6-1-2.

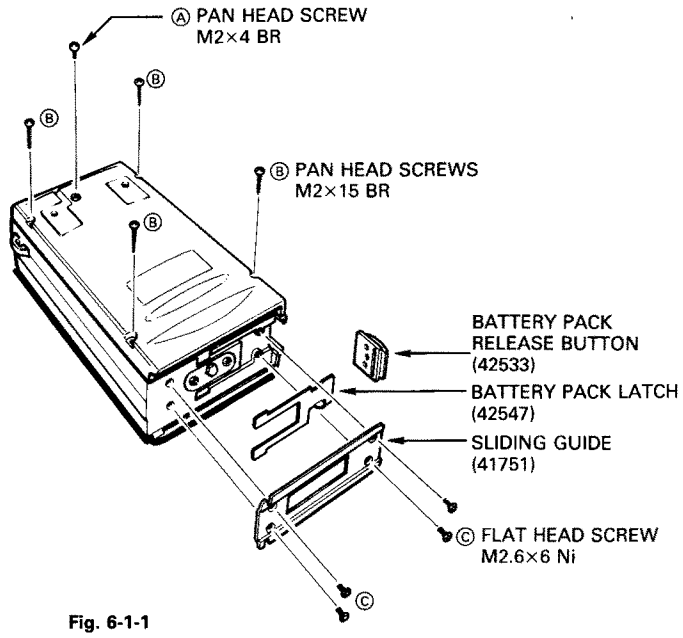


Fig. 6-1-1

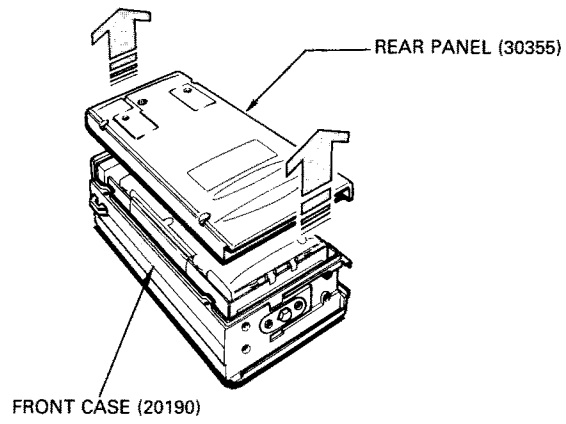


Fig. 6-1-2

4. Unsolder the point shown in Fig. 6-1-3 and then remove the REAR SHIELD PLATE.
5. Slide the inner frame upward slightly as shown in Fig. 6-1-3, and lift the frame away from the FRONT CASE. Be sure not to damage the flexible boards while removing the FRONT CASE.

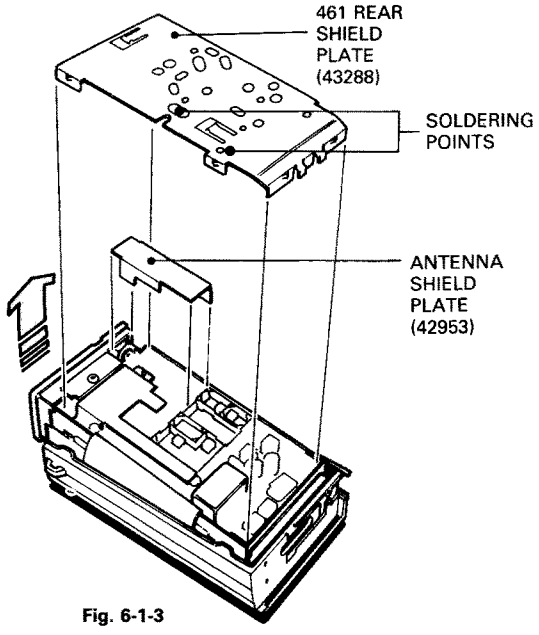


Fig. 6-1-3

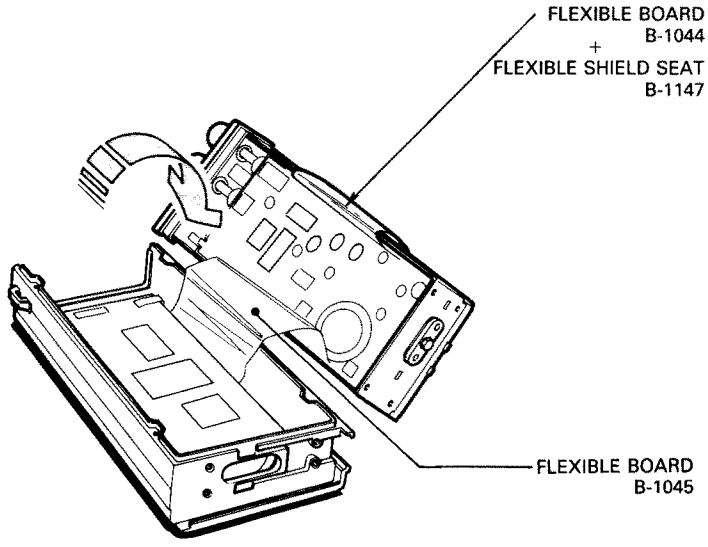


Fig. 6-1-4

6. To see the printed sides of the MAIN and PLL UNITS, remove the SQUELCH CONTROL and ON-OFF/VOLUME CONTROL knobs. Remove the four screws on the sides of the inner frame.

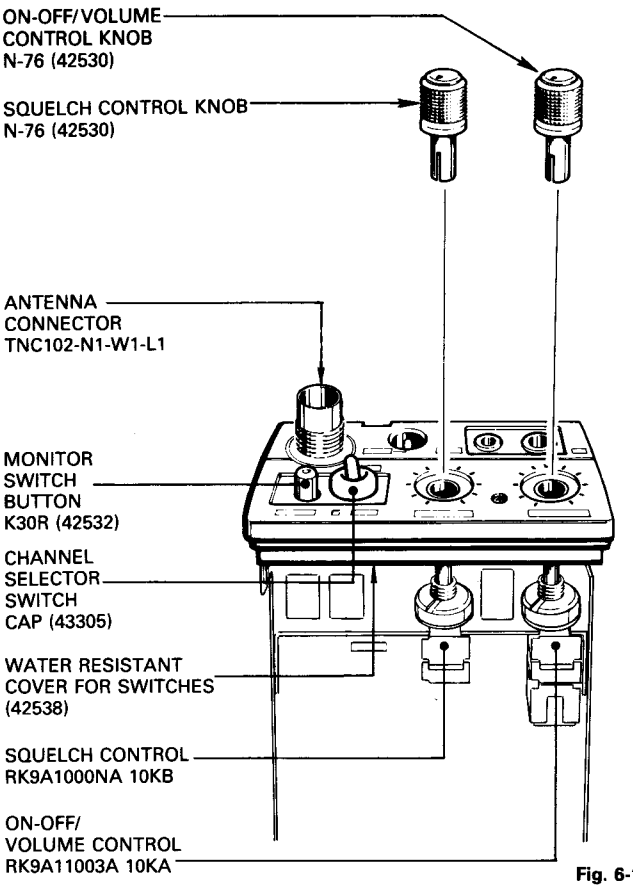


Fig. 6-1-5

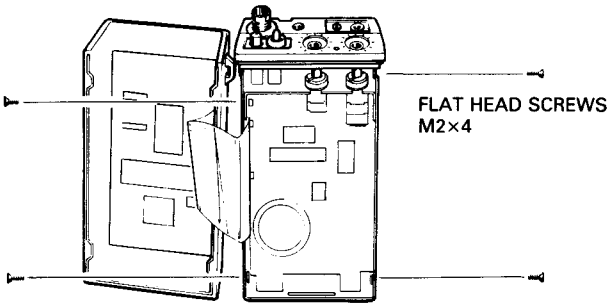


Fig. 6-1-6

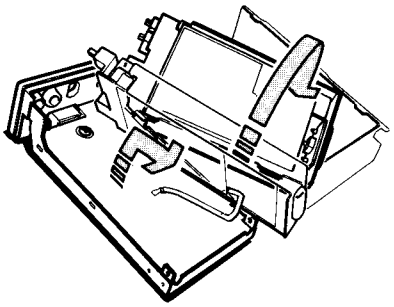


Fig. 6-1-7

6 - 2 TOP PANEL DISASSEMBLY

1. Remove screw Ⓐ.
2. Remove the TNC-NUT and the TNC-WASHER. See Fig. 6-2-2.
3. Remove the ANTENNA CONNECTOR by desoldering point Ⓑ on the components side and point Ⓒ on the foil side of the PLL UNIT.
4. Remove the TOP PANEL by slightly prying outward on both sides points Ⓓ of the TOP PANEL. See Fig. 6-2-3. **DO NOT** break the tabs.

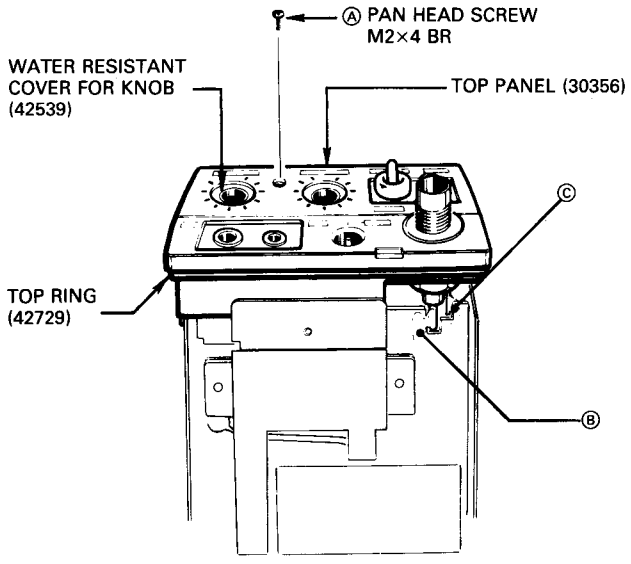


Fig. 6-2-1

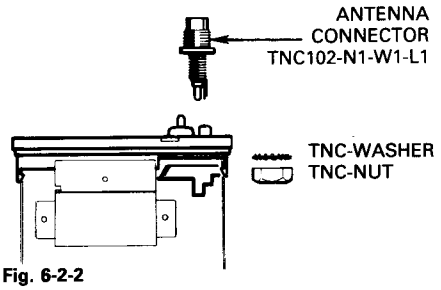


Fig. 6-2-2

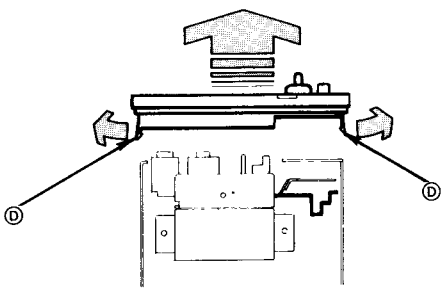


Fig. 6-2-3

6 - 3 PA/EXTERNAL JACK DISASSEMBLY
(HOW TO REPLACE THE POWER MODULE)

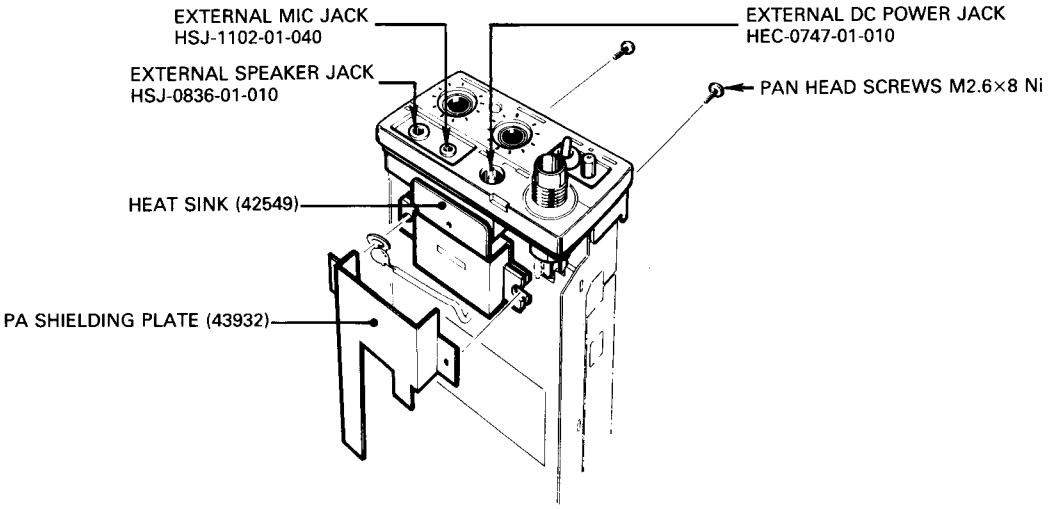


Fig. 6-3-1

6 - 4 SPEAKER/MICROPHONE DISASSEMBLY
(HOW TO REPLACE THE SPEAKER/MICROPHONE)

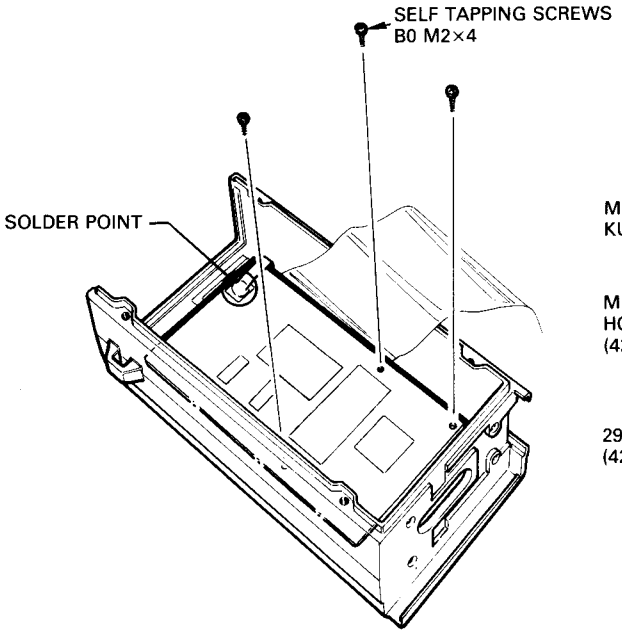


Fig. 6-4-1

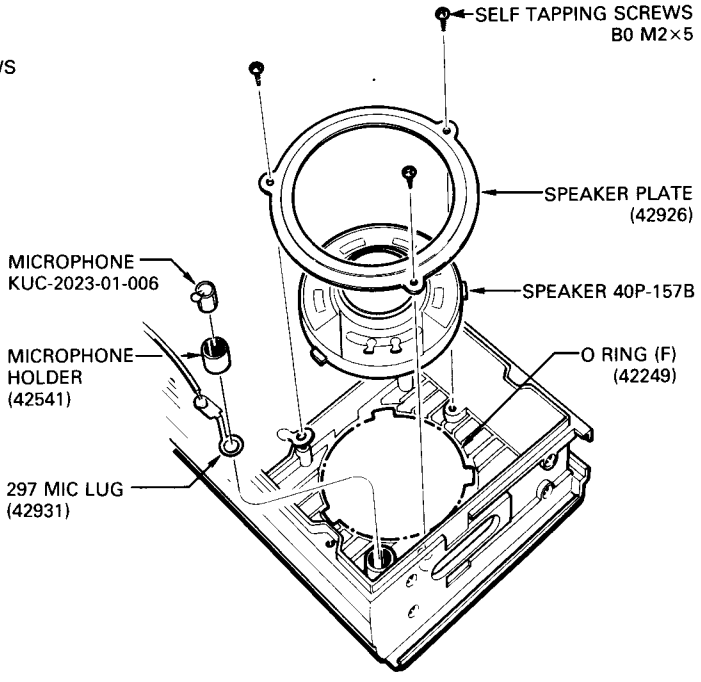


Fig. 6-4-2

6 - 5 DISPLAY UNIT DISASSEMBLY

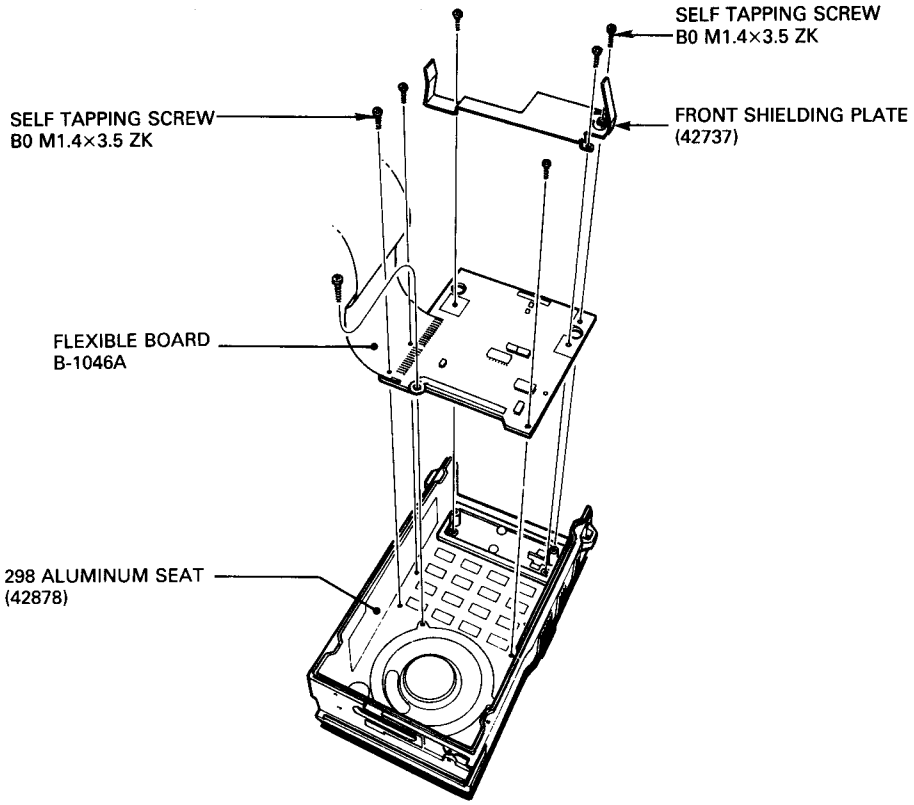


Fig. 6-5-1

6 - 6 PTT SPRING AND UNIT BOTTOM DISASSEMBLY

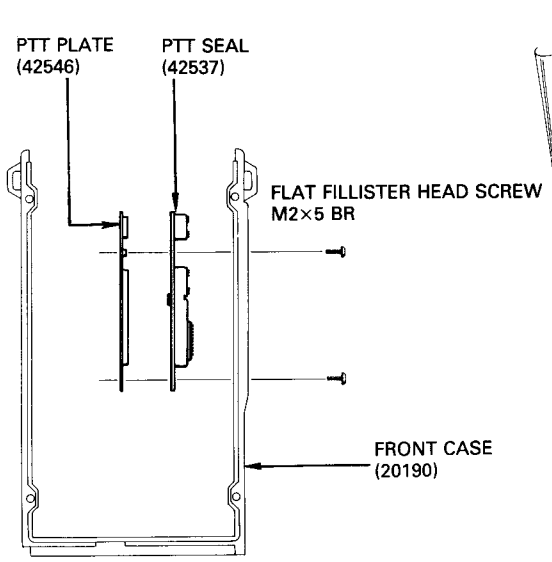


Fig. 6-6-1

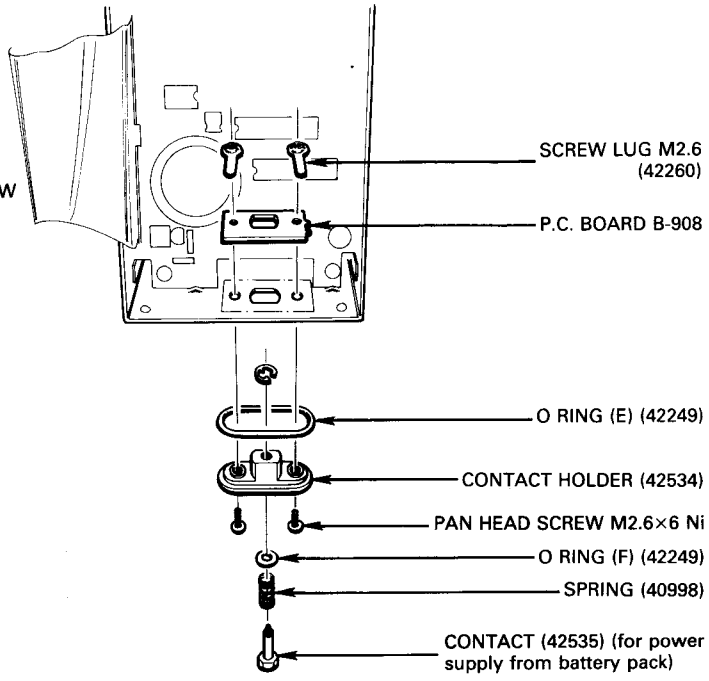
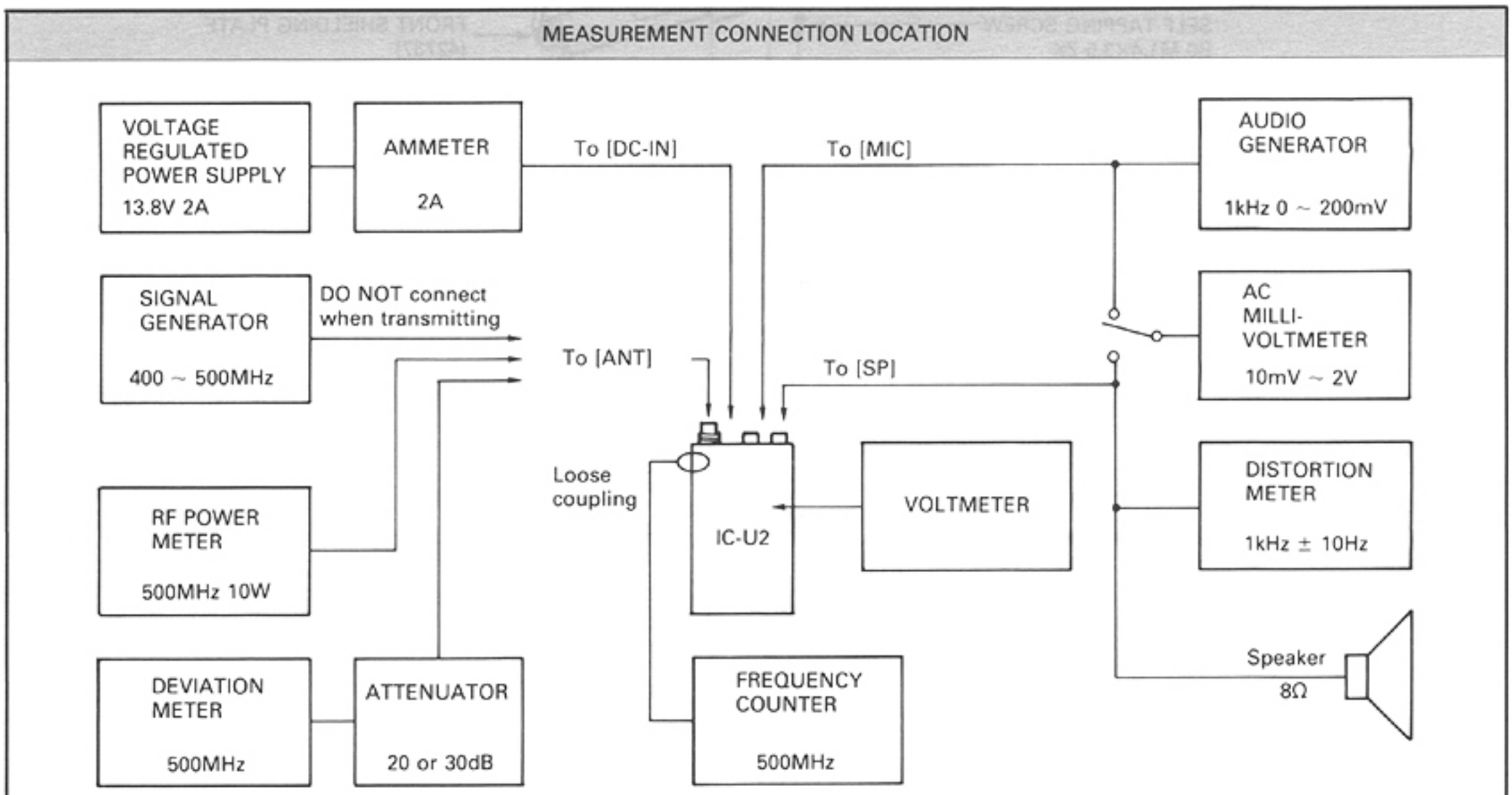


Fig. 6-6-2

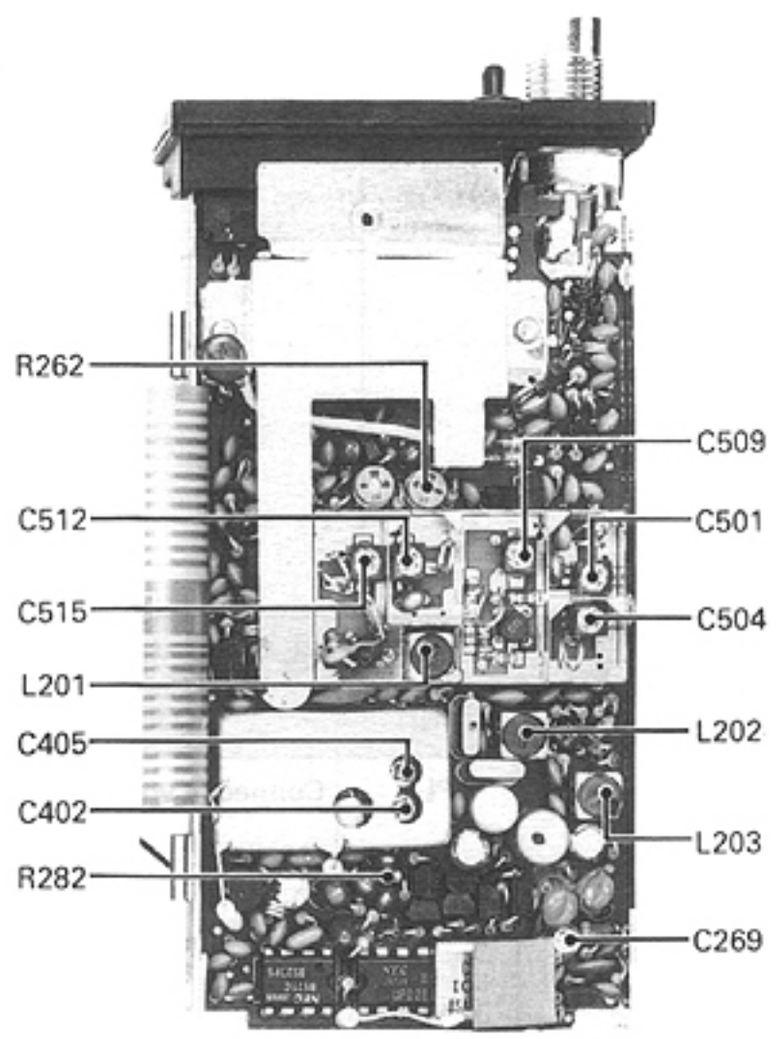
SECTION 7 ADJUSTMENT PROCEDURES

7 - 1 GENERAL ADJUSTMENT

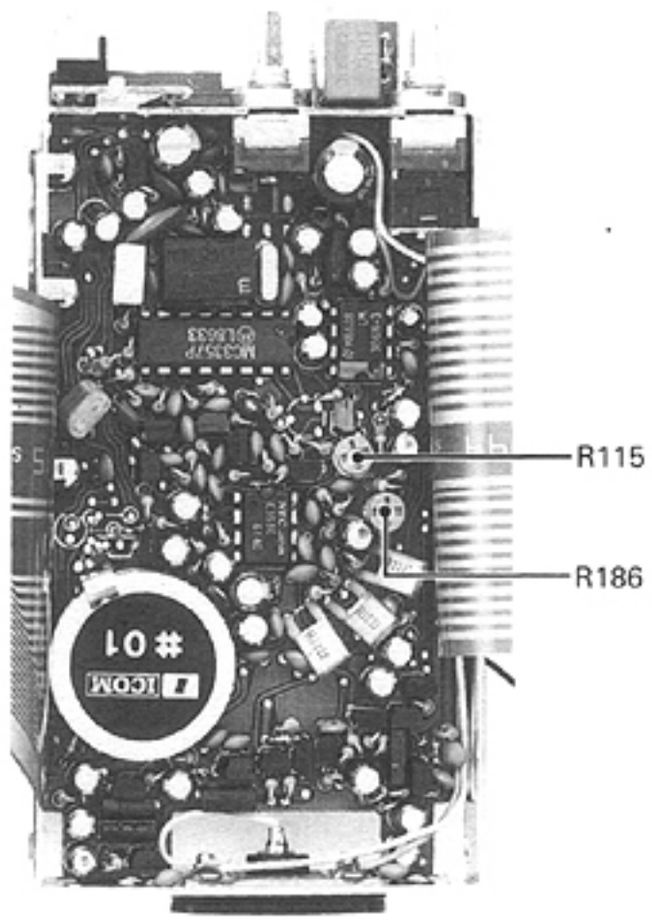


ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
PLL LOCK VOLTAGE	1	• Connect an RF power meter as shown above. • Operating channel: Both 1 and 2 • Transmit mode	PLL	Connect a voltmeter to R282.	3.0 ~ 11.0V (#01) 1.5 ~ 11.5V (#02)	VCO	Verify If not in specified range, adjust C402
	2	• Receive mode			3.0 ~ 10V (#01) 1.5 ~ 11V (#02)	VCO	Verify If not in specified range, adjust C405
FREQUENCY	1	• Connect an RF power meter as shown above. • Operating channel: Either 1 or 2 • Transmit mode	Top panel	Make a loose coupling between a frequency counter and the antenna connector.	Same as the operating frequency	PLL	C269
TRANSMIT OUTPUT POWER	1	• Connect an RF power meter as shown above. • Operating channel: Both 1 and 2 • Transmit mode	Top panel	The RF power meter connected to the [ANT] CONNECTOR.	5W	PLL	R262
DEVIATION	1	• Apply an AF signal of 1kHz/170mV to the [MIC] CONNECTOR • Operating channel: Either 1 or 2 • Transmit mode	Top panel	Connect a deviation meter to the [ANT] CONNECTOR via an attenuator.	±4.5kHz (#01) ±2.1kHz (#02)	MAIN	R186
SUBAUDIBLE TONE DEVIATION (If pre-programmed)	1	• Apply no AF signal to the [MIC] CONNECTOR • Transmit mode	Top panel	Connect a deviation meter to the [ANT] CONNECTOR via an attenuator.	±0.75kHz (#01) ±0.35kHz (#02)	MAIN	R115
RECEIVE SENSITIVITY		**NOTE:** If the bandwidth of 2 programmed channels is more than 5MHz, receiver adjustment must be performed as in SECTION 7 - 4 RECEIVER ADJUSTMENT					
	1	• [MONITOR] SWITCH : ON • [SQUELCH] CONTROL : Open • Apply an RF signal to the [ANT] CONNECTOR Level : 0.4µV Dev. : ±3.5kHz (#01) ±1.75kHz (#02) Mod. : 1kHz	Top panel	Connect a distortion meter to the [SP] JACK.	Minimum distortion level	RF PLL	C501 C504 C509 C512 C515 L201 L202 L203

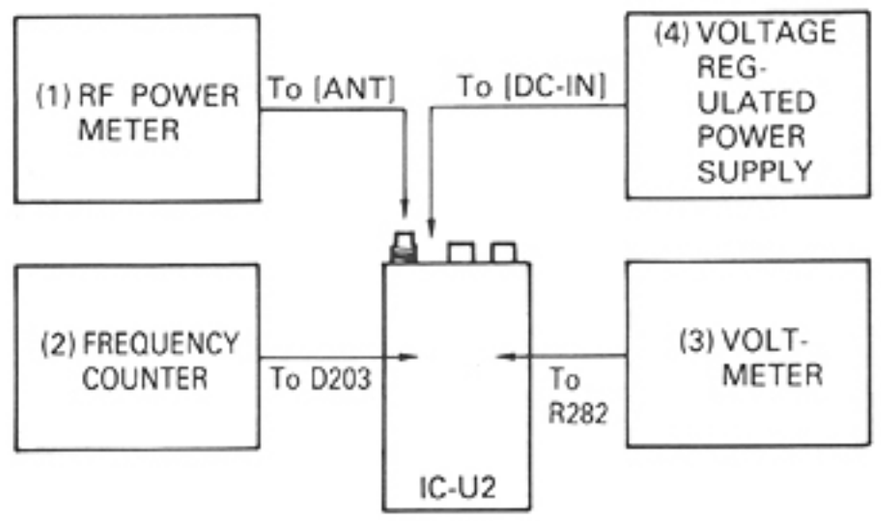
PLL, RF UNITS



MAIN UNIT

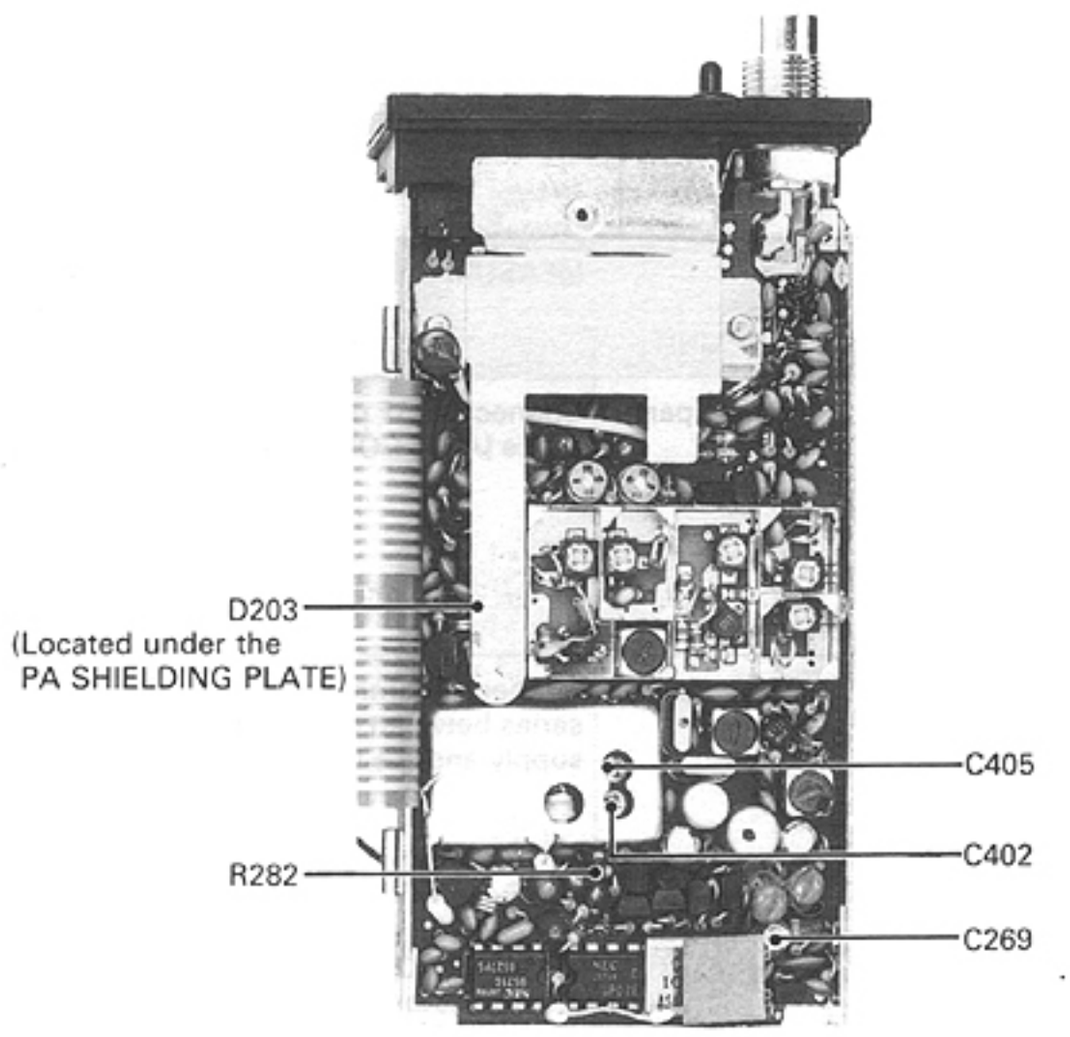


7 - 2 PLL ADJUSTMENT

TEST INSTRUMENTS REQUIRED	MEASUREMENT CONNECTION LOCATION
(1) RF POWER METER (TERMINATED TYPE) • Measuring range : 0 ~ 10W • Frequency range : At least 490MHz • Impedance : 50Ω • SWR : Less than 1:1.2 (2) FREQUENCY COUNTER • Frequency range : At least 490MHz • Accuracy : Better than ±1ppm • Sensitivity : 100mV or better (3) VOLTMETER • Input impedance : 50kΩ DC or better (4) VOLTAGE REGULATED POWER SUPPLY • Output voltage : 13.2V DC • Current capacity : 2A	

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1	• Operating frequency: 450.00MHz (#01) 420.00MHz (#02) • Transmit mode	PLL	Connect a voltmeter to R282.	3.0V (#01) 1.5V (#02)	VCO	C402
	2	• Receive mode			2.8V (#01) 1.5V (#02)	VCO	C405
		NOTE: Repeat steps 1 and 2 several times.					
	3	• Operating frequency: 490.00MHz (#01) 470.00MHz (#02) • Receive mode	PLL	Connect a voltmeter to R282.	9 ~ 10V (#01) 10 ~ 11V (#02)		Verify
	4	• Transmit mode			Below 11V (#01) Below 11.5V (#02)		Verify
REFERENCE FREQUENCY	1	• Operating frequency: 470.00MHz (#01, #02) • Receive mode	PLL	Connect a frequency counter to the cathode of D203.	448.20MHz	PLL	C269
	2	• Transmit mode			470.00MHz		Verify

PLL, VCO UNITS



7 - 3 TRANSMITTER ADJUSTMENT

TEST INSTRUMENTS REQUIRED

(1) RF POWER METER (TERMINATED TYPE)
- Measuring range : 0 ~ 5W
- Frequency range : At least 490MHz
- Impedance : 50Ω
- SWR : Less than 1:1.2

(2) FM DEVIATION METER
- Frequency range : At least 490MHz
- Measuring range : 0 ~ ±10kHz

(3) AUDIO GENERATOR
- Output frequency : 50 ~ 3000Hz
- Output level : 0 ~ 200mV
- Distortion : Less than 0.1%

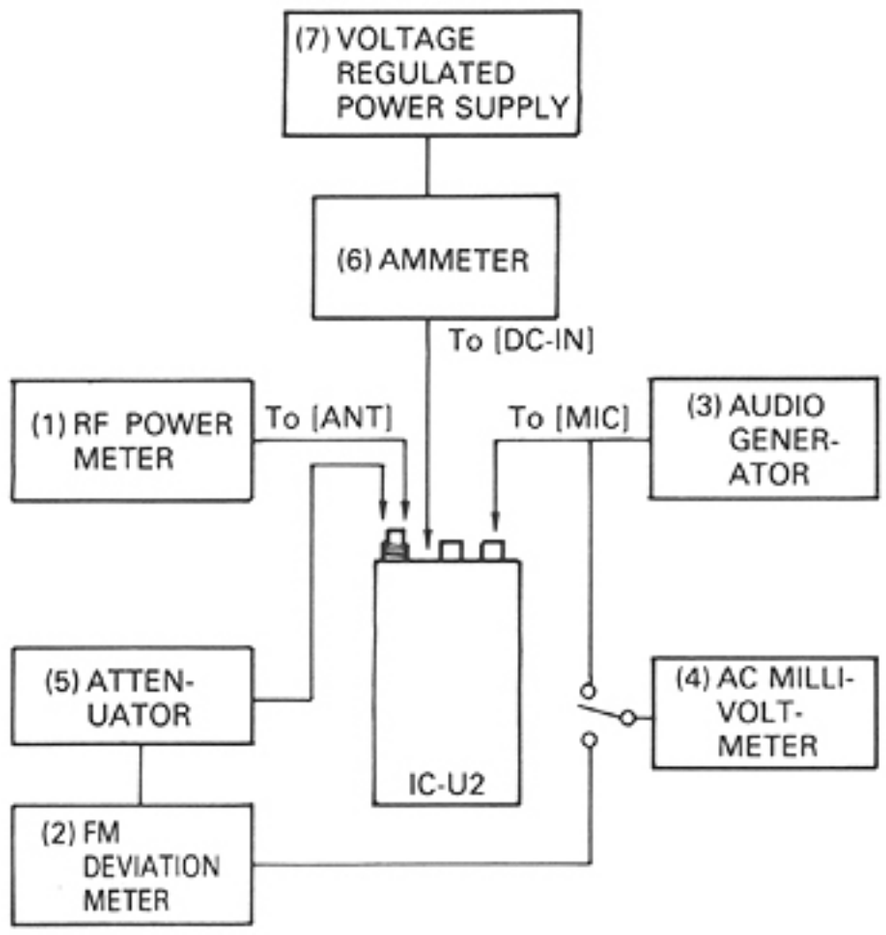
(4) AC MILLI-VOLTMETER
- Measuring range : 10mV ~ 2V

(5) ATTENUATOR
- Input power : At least 5W
- Attenuation : 20dB or 30dB

(6) AMMETER
- Measuring range : 0 ~ 2A

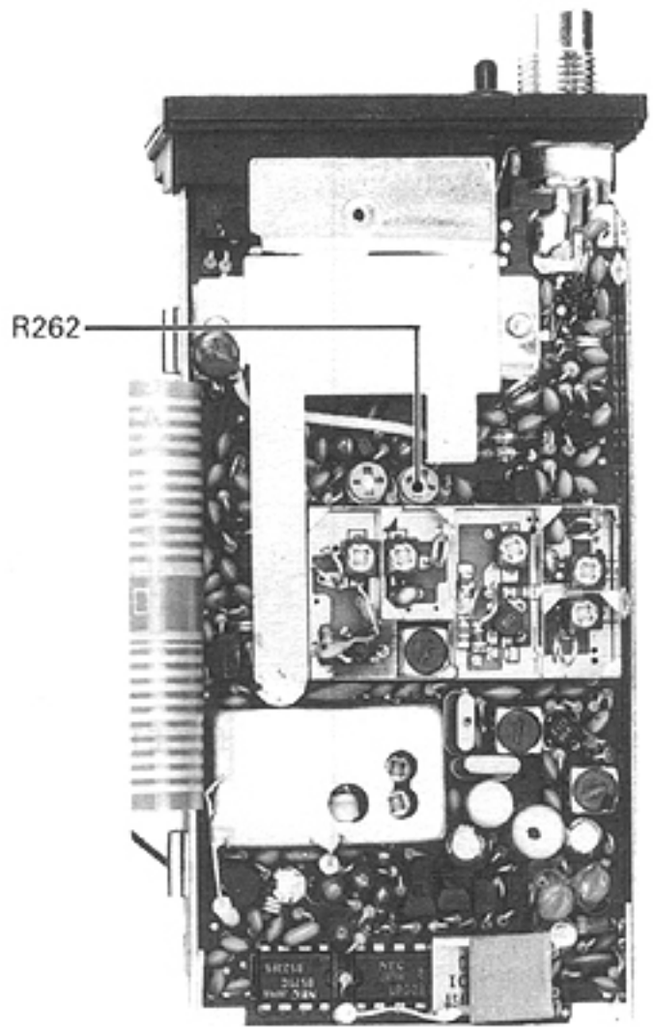
(7) VOLTAGE REGULATED POWER SUPPLY
- Output voltage : 13.2V DC
- Current capacity : 2A

MEASUREMENT CONNECTION LOCATION

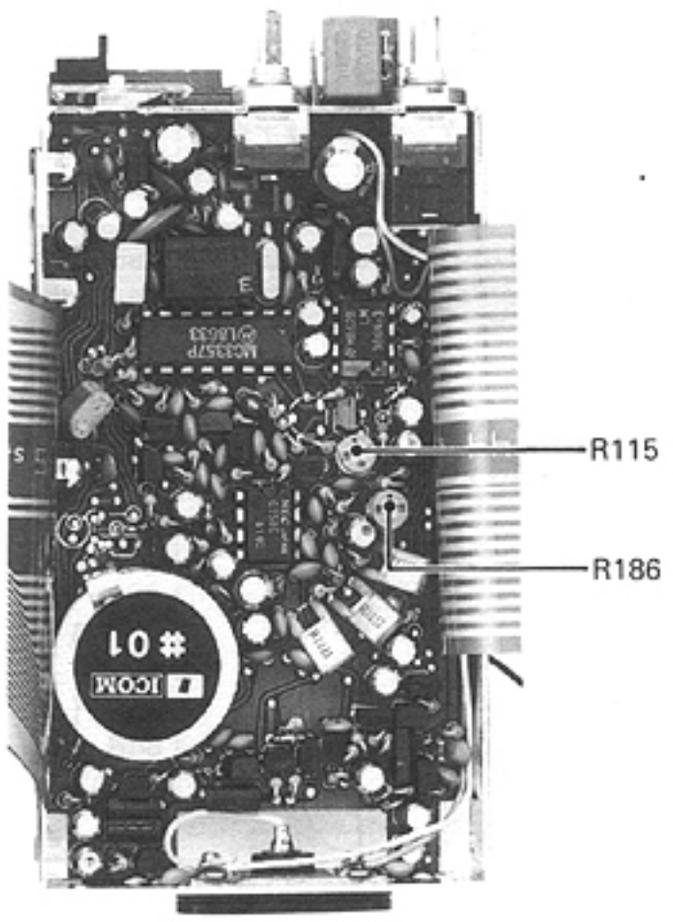


ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER SETTING	1	• Operating frequency: 470.00MHz • Transmit mode	Top panel	Connect an RF power meter to the [ANT] CONNECTOR.	5W (at 13.2V)	PLL	R262
	2	• Operating frequency: 450.00 and 490.00MHz (#01) 420.00 and 470.00MHz (#02) • Transmit mode			4.5 ~ 5.5W		Verify
CURRENT DRAIN	1	• Operating frequency: 450.00 and 490.00MHz (#01) 420.00 and 470.00MHz (#02) • Power supply : 13.2V	Top panel	Connect an ammeter in series between the power supply and the transceiver.	Less than 1.65A		Verify
	2	• Power supply : 8.4V			Less than 1.25A		Verify
DEVIATION	1	• Operating frequency: 450.00MHz (#01) 420.00MHz (#02) • Apply AF signal 1kHz/170mV to the [MIC] CONNECTOR. • Transmit mode	Top panel	Connect a deviation meter to the [ANT] CONNECTOR via an attenuator.	±4.5kHz (#01) ±2.1kHz (#02)	MAIN	R186
	2	• Apply an AF signal of 1kHz/17mV (20dB down) to the [MIC] CONNECTOR. • Transmit mode			±3.1 ~ ±3.9kHz (#01) ±1.9 ~ ±2.3kHz (#02)		Verify
	3	• Operating frequency: 450.00 and 490.00MHz (#01) 420.00 and 470.00 MHz (#02) • Apply an AF signal of 1kHz/170mV to the [MIC] CONNECTOR. • Transmit mode			Less than ±4.6kHz (#01) Less than ±2.2kHz (#02)		Verify
SUBAUDIBLE TONE DEVIATION	1	• Operating frequency: 450.00MHz (#01) 420.00MHz (#02) • Program 01 as the tone encoder number. • Apply no AF signal to the [MIC] CONNECTOR. • Transmit mode	Top panel	Connect a deviation meter to the [ANT] CONNECTOR via an attenuator.	±0.75kHz (#01) ±0.35kHz (#02)	MAIN	R115
TRANSMITTER S/N	1	• Operating frequency: 450.00MHz (#01) 420.00MHz (#02) • Apply AF signal 1kHz/17mV to the [MIC] CONNECTOR.	Top panel	Connect a milli-voltmeter to the deviation meter.	The ratio between AF signals applied and not applied is as follows: More than 40dB (#01) More than 35dB (#02)		Verify
	2	• Apply no AF signal to the [MIC] CONNECTOR. • Subaudible tone encoder must be programmed to OFF					

PLL, UNIT



MAIN UNIT



7 - 4 RECEIVER ADJUSTMENT

TEST INSTRUMENTS REQUIRED	MEASUREMENT CONNECTION LOCATION

(1) SIGNAL GENERATOR
- Frequency range : 400 ~ 500MHz
- Output level : 0.1μV ~ 32mV

(2) DISTORTION METER
- Frequency range : 1kHz ± 10Hz
- Measuring range : 1% ~ 100%

(3) OSCILLOSCOPE
- Frequency range : DC ~ 20MHz
- Measuring range : 0.01 ~ 10V

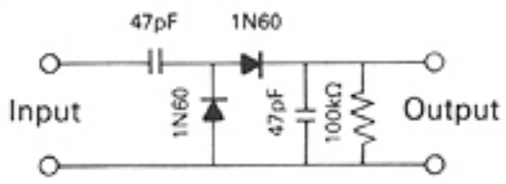
(4) RF SWEEP GENERATOR
- Frequency range : 350 ~ 550MHz
- Sweep bandwidth : 30MHz
- Output impedance : 50Ω

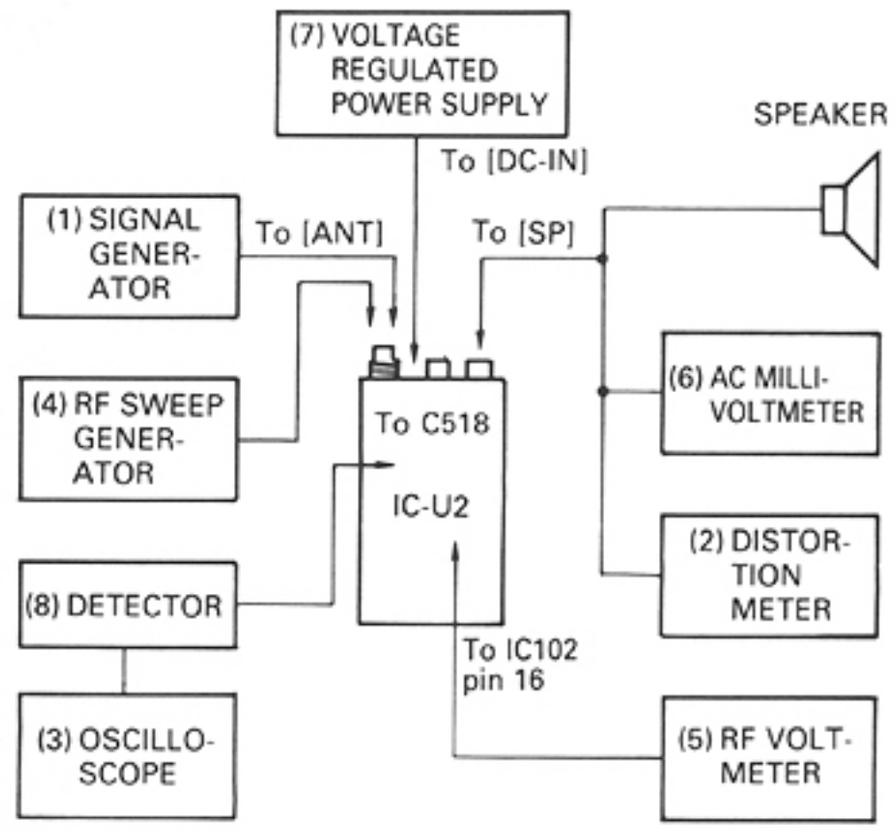
(5) RF VOLTMETER
- Frequency range : At least 170MHz
- Measuring range : 0.01 ~ 10V

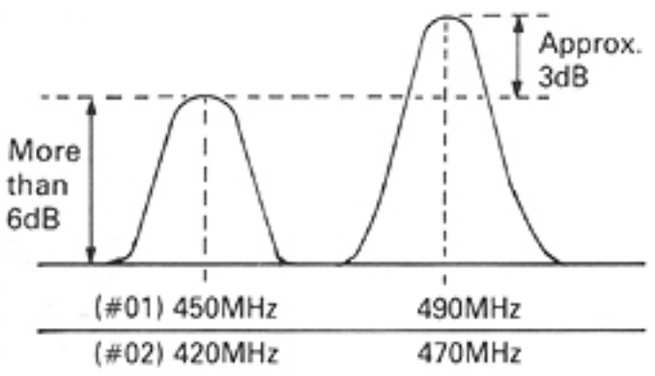
(6) AC MILLI-VOLTMETER
- Measuring range : 10mV ~ 10V

(7) VOLTAGE REGULATED POWER SUPPLY
- Output voltage : 13.2V DC
- Current capacity : 2A

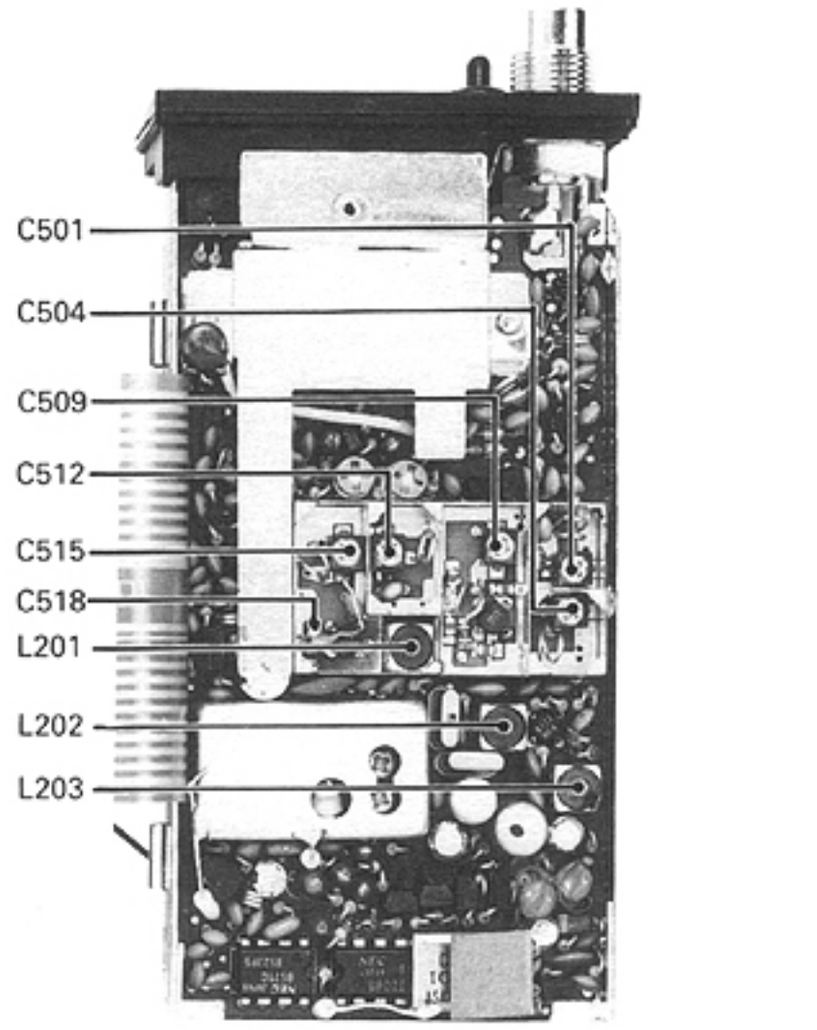
(8) DETECTOR



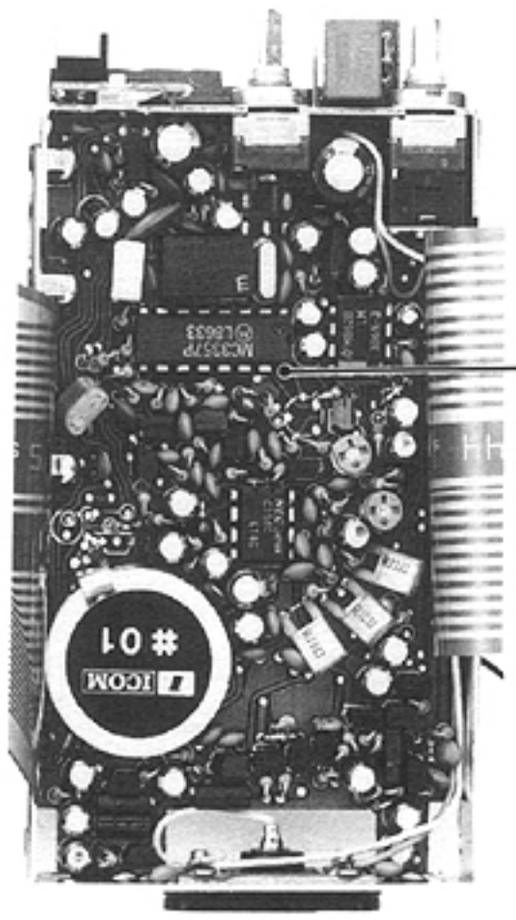


ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
IF STAGE	1	• Operating frequency: 470.00MHz (#01) 445.00 MHz (#02) • [MONITOR] SWITCH : ON • [SQUELCH] CONTROL : Open • Apply an RF signal to the [ANT] CONNECTOR. Level : 2.0μV Mod. : 1kHz Dev. : ±3.5kHz (#01) ±1.75kHz (#02)	MAIN	Connect an RF voltmeter to pin 16 of IC102	Maximum voltage	PLL	L201 L202 L203
RF STAGE		**NOTE:** The RF UNIT in the RF stage has been thoroughly adjusted prior to leaving the factory. The following should be regarded as reference material.					
	1	• Operating frequency: 450.00MHz (#01) 420.00MHz (#02) • Apply an RF sweep signal to the [ANT] CONNECTOR. Frequency: 430 ~ 520MHz (#01) 400 ~ 500MHz (#02)	RF	Connect an oscilloscope to C518 through a detector circuit as described at "TEST INSTRUMENTS REQUIRED".  	RF	C501 C504 C509 C512 C515

PLL, RF UNITS

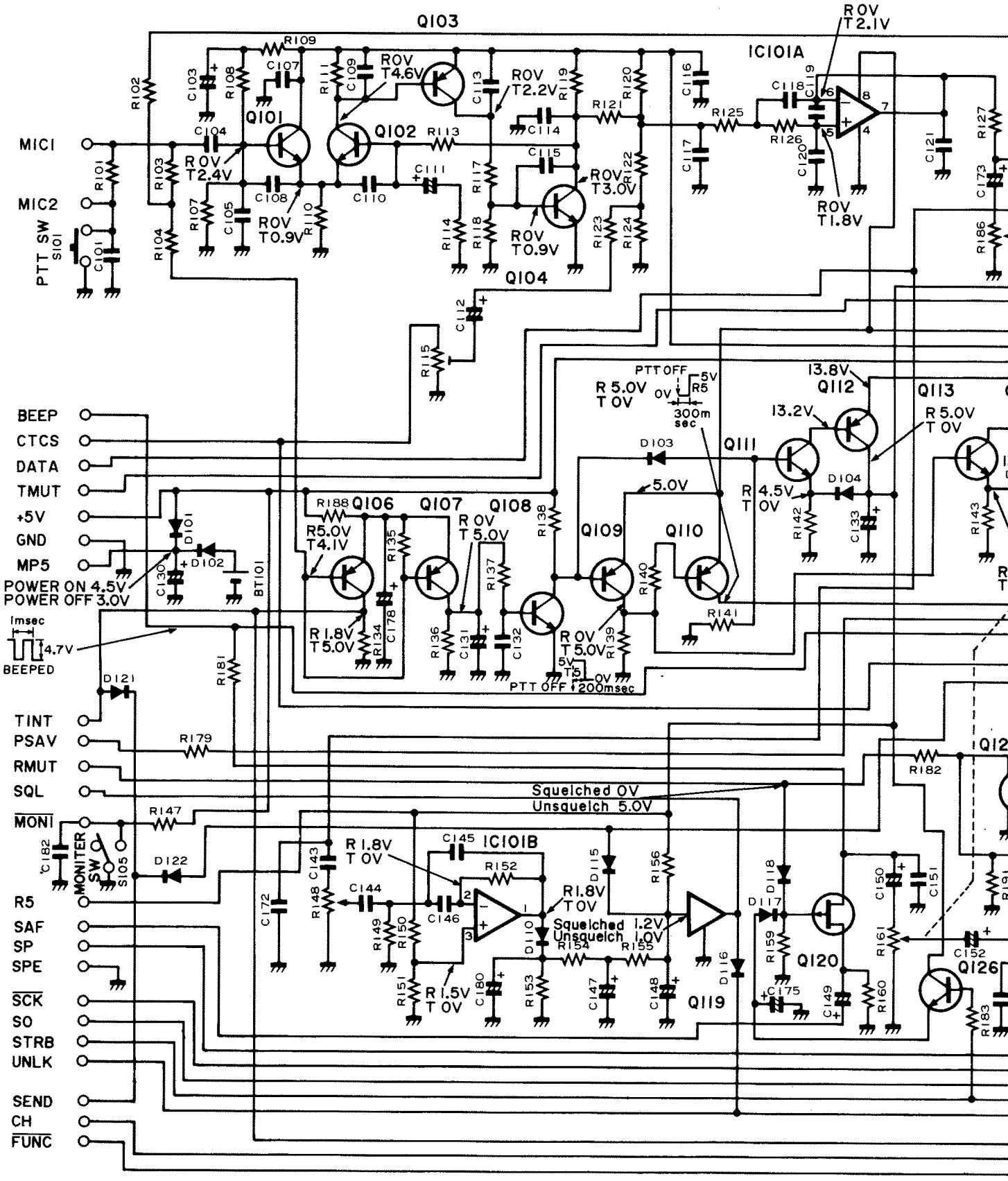


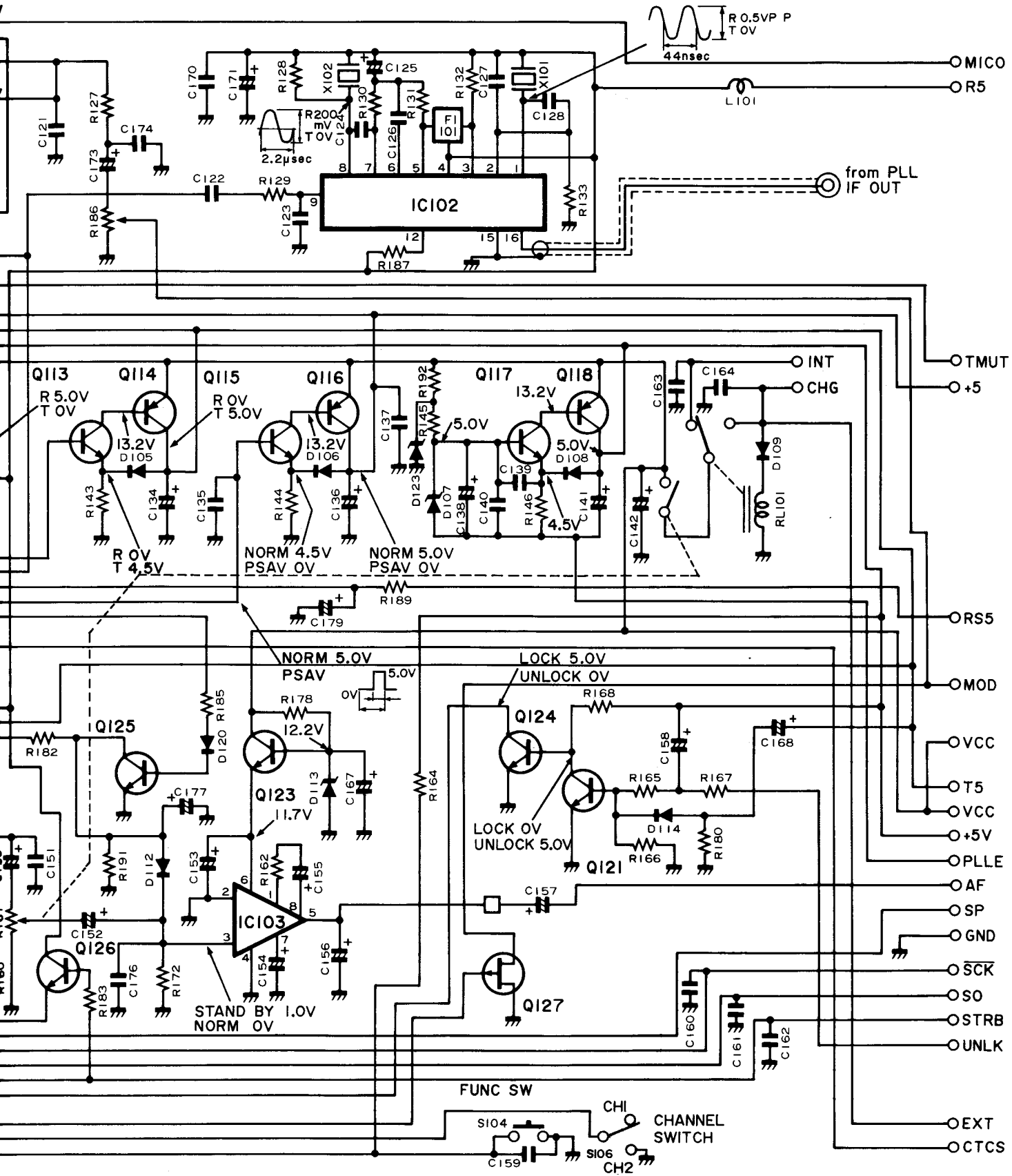
MAIN UNIT



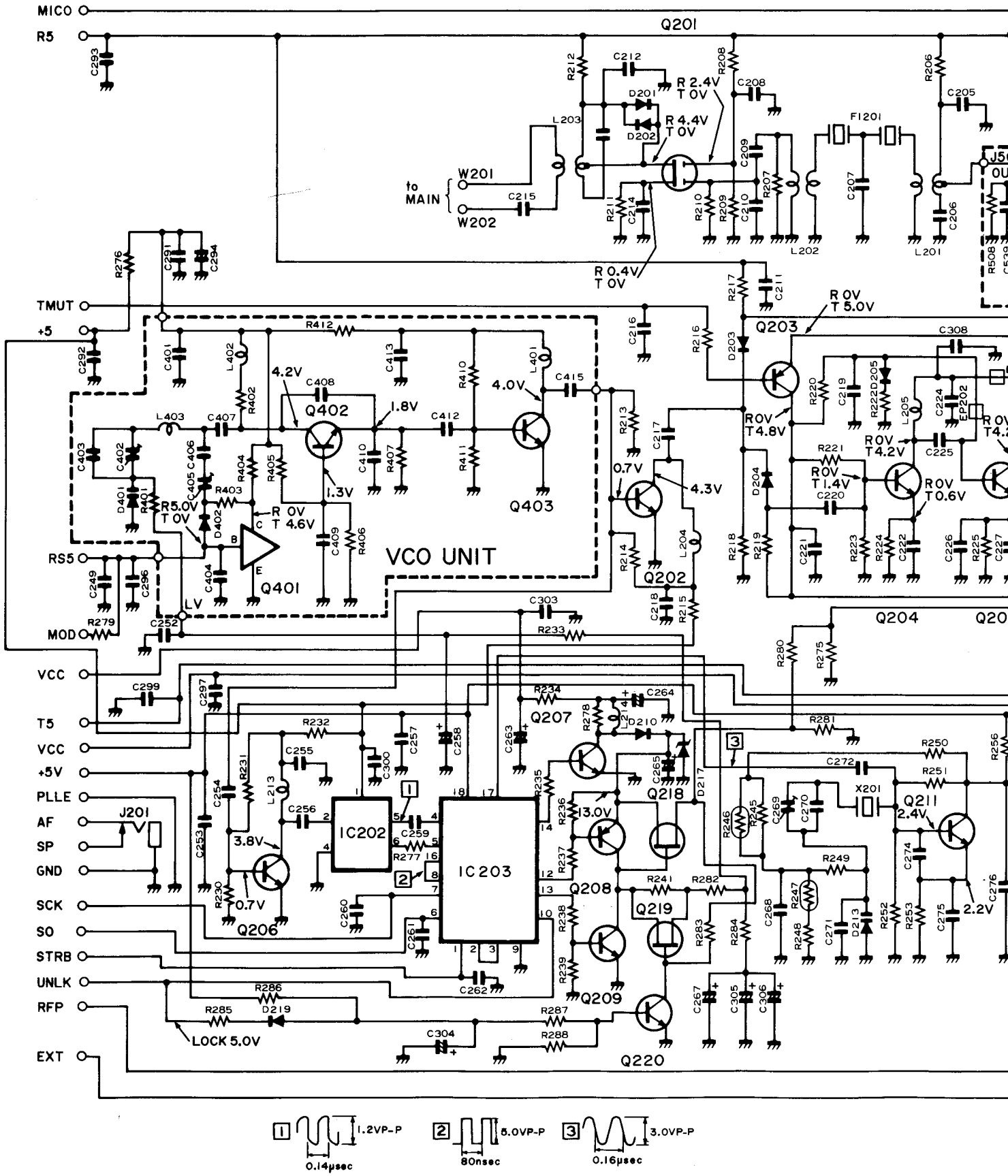
SECTION 8 VOLTAGE DIAGRAMS

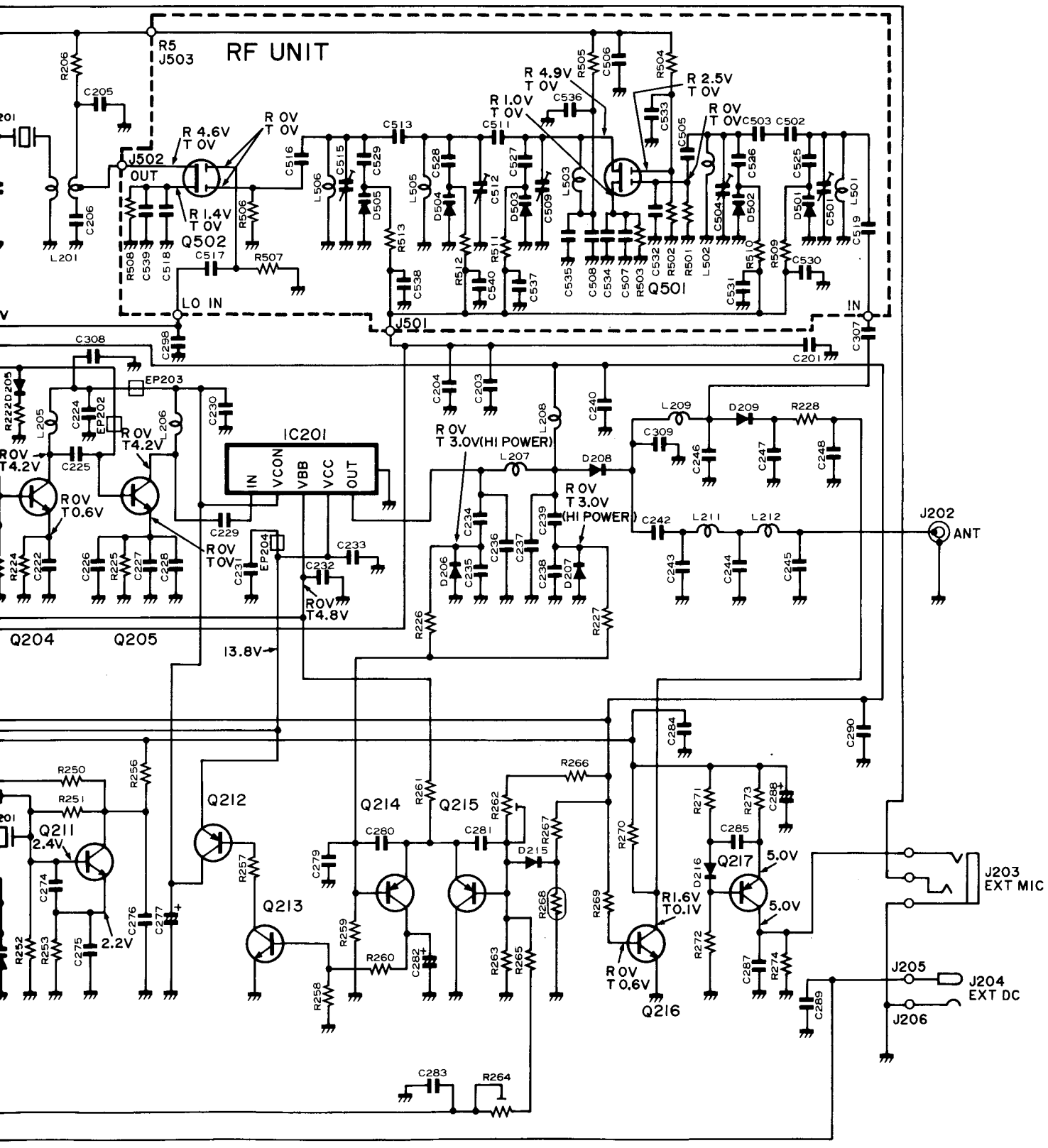
8 - 1 MAIN UNIT

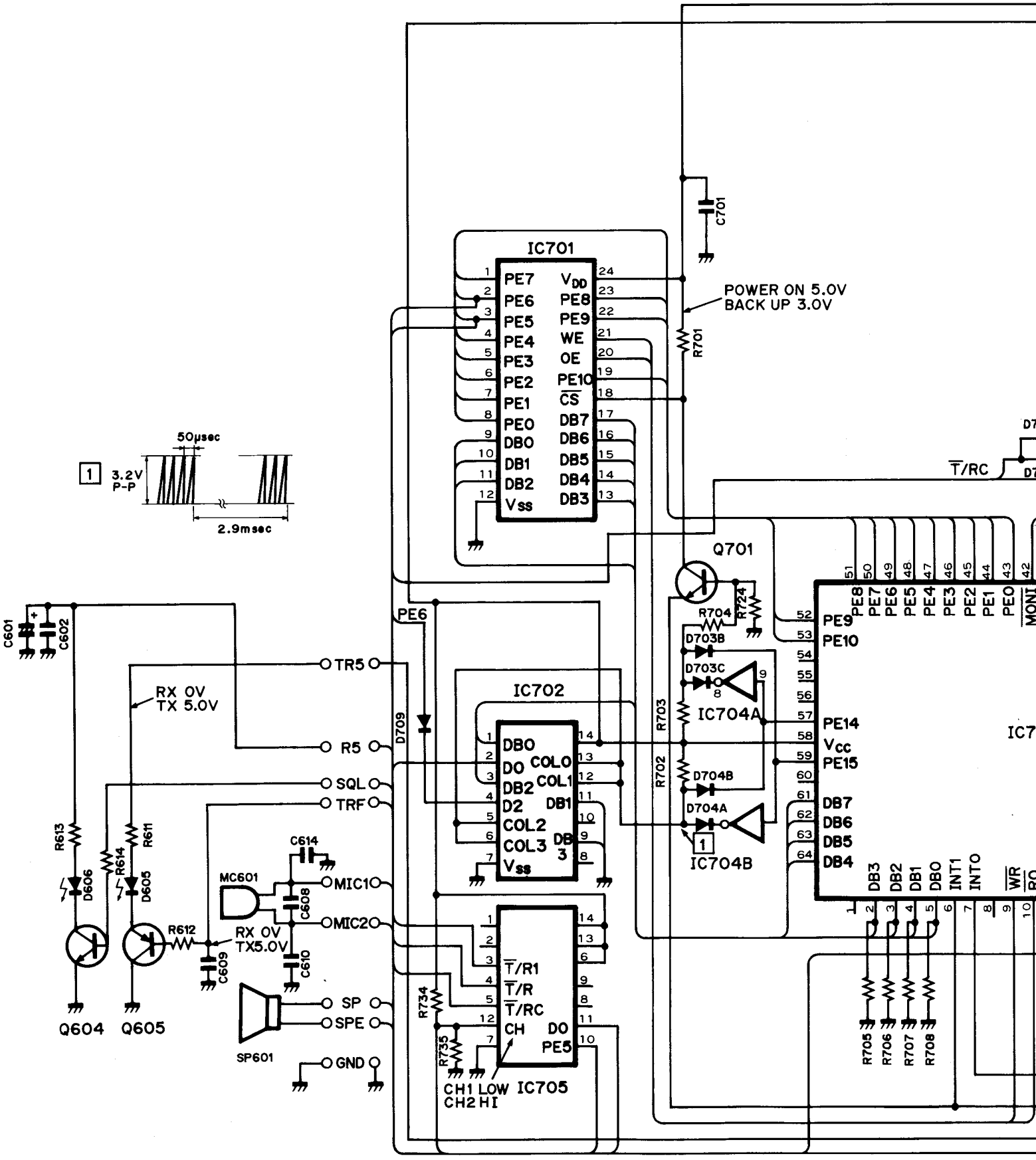


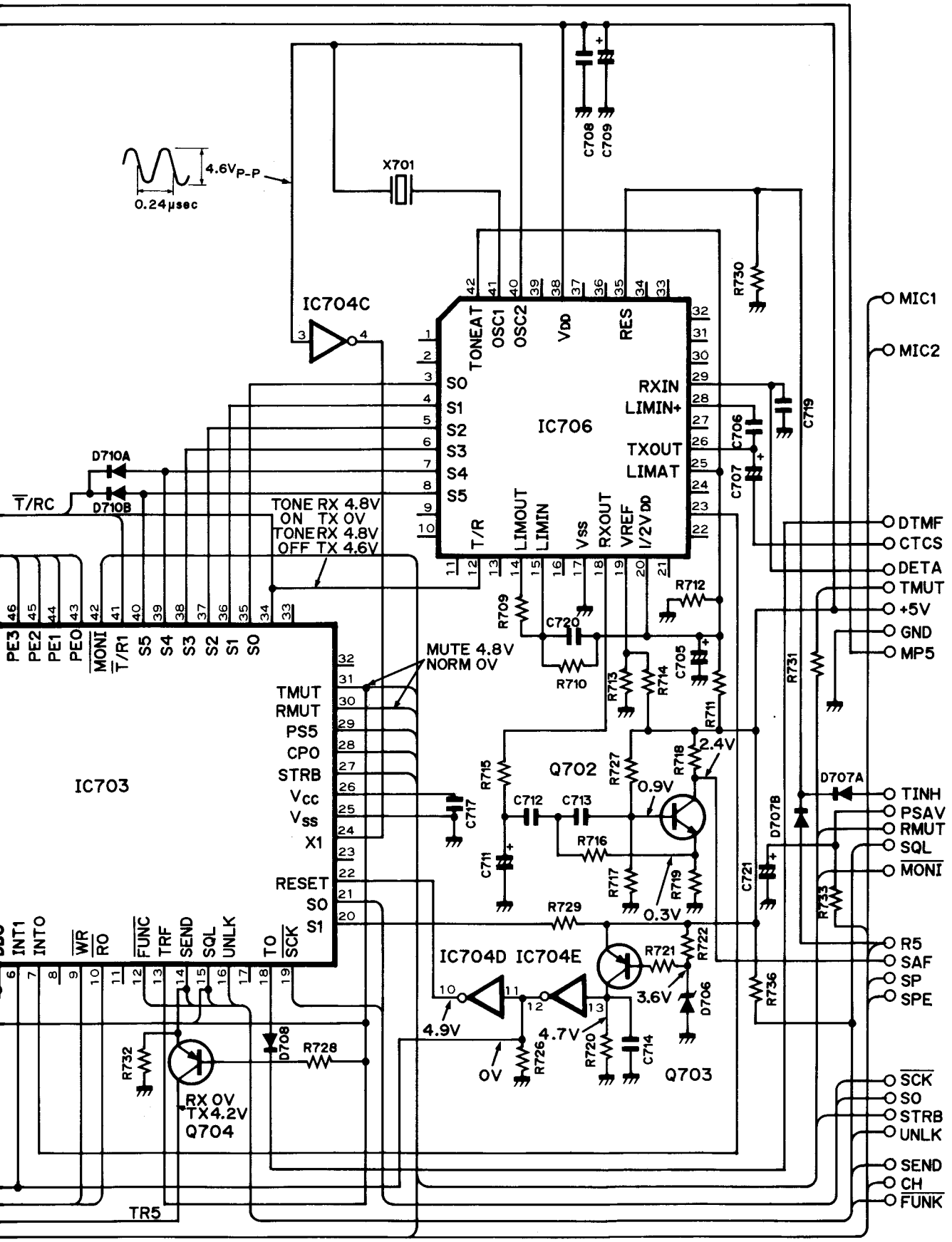

R 0.5VP P
T 0V
44nsec
MICO
R5
L101
X102
X101
C125
C124
C126
C127
C128
R128
R130
R131
R132
R127
C121
C174
C173
C170
C171
R200mV
T 0V
2.2μsec
FI 101
C122
R129
C123
R186
IC102
R133
from PLL
IF OUT
R187
Q113
R 5.0V
T 0V
Q114
13.2V
D105
Q115
R 0V
T 5.0V
Q116
13.2V
D106
Q117
5.0V
Q118
13.2V
5.0V
D108
D107
D123
R192
R145
C137
C138
C139
C140
R146
4.5V
C141
C142
C163
C164
INT
CHG
D109
RL101
TMUT
+5
R143
C134
C135
R144
C136
R 0V
T 4.5V
NORM 4.5V
PSAV 0V
NORM 5.0V
PSAV 0V
R189
C179
RS5
NORM 5.0V
PSAV
5.0V
0V
LOCK 5.0V
UNLOCK 0V
MOD
R178
12.2V
Q123
11.7V
D113
C167
R164
R168
Q124
C158
C168
VCC
R165
R167
T5
VCC
+5V
PLLE
AF
SP
GND
SCK
SO
STRB
UNLK
D114
R166
R180
LOCK 0V
UNLOCK 5.0V
Q121
C157
Q125
R182
D120
R185
C177
C151
R191
D112
C153
R162
C155
IC103
C152
Q126
C176
R183
R172
C154
C156
STAND BY 1.0V
NORM 0V
Q127
C160
C161
C162
FUNC SW
S104
CHI
CHANNEL
SWITCH
S106
CH2
C159
EXT
CTCS

8 - 2 PLL, VCO, RF UNITS




RF UNIT
R5
J503
J502
OUT
J501
LO IN
IN
Q502
Q501
R 4.6V
T 0V
R 0V
T 0V
R 1.4V
T 0V
R 4.9V
T 0V
R 1.0V
T 0V
R 2.5V
T 0V
R 0V
T 0V
IC201
IN
VCON
VBB
VCC
OUT
R 0V
T 4.2V
R 0V
T 0.6V
R 0V
T 0V
R 0V
T 4.8V
R 0V
T 3.0V(HI POWER)
R 0V
T 3.0V
(HI POWER)
Q204
Q205
13.8V
J202
ANT
Q211
2.4V
2.2V
Q212
Q213
Q214
Q215
Q216
Q217
5.0V
5.0V
R1.6V
T0.1V
R 0V
T 0.6V
J203
EXT MIC
J205
J204
EXT DC
J206


IC701
PE7
PE6
PE5
PE4
PE3
PE2
PE1
PE0
DB0
DB1
DB2
Vss
VDD
PE8
PE9
WE
OE
PE10
CS
DB7
DB6
DB5
DB4
DB3
C701
R701
POWER ON 5.0V
BACK UP 3.0V
50µsec
1
3.2V
P-P
2.9msec
T/RC
Q701
R704
R724
D703B
D703C
IC704A
D704B
D704A
IC704B
R703
R702
PE6
D709
IC702
DBO
DO
DB2
D2
COL2
COL3
Vss
COLO
COL1
DB1
DB
3
C601
C602
TR5
RX 0V
TX 5.0V
R5
SQL
TRF
R613
R614
R611
D606
D605
C614
MC601
MIC1
C608
MIC2
R612
RX 0V
TX5.0V
C609
C610
SP
SPE
SP601
GND
Q604
Q605
T/R1
T/R
T/RC
CH
DO
PE5
R734
R735
CH1 LOW
CH2 HI
IC705
PE14
Vcc
PE15
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DBO
INT1
INTO
R705
R706
R707
R708


4.6VP-P
0.24µsec
X701
C708
C709
IC704C
IC706
TONEAT
OSC1
OSC2
VDD
RES
S0
S1
S2
S3
S4
S5
RXIN
LIMIN+
TXOUT
LIMAT
T/R
LIMOUT
LIMIN
VSS
RXOUT
VREF
I/2VDD
R730
C719
C706
C707
MIC1
MIC2
D710A
D710B
T/RC
TONE RX 4.8V
ON TX 0V
TONE RX 4.8V
OFF TX 4.6V
DTMF
CTCS
DETA
TMUT
+5V
GND
MP5
R709
C720
R710
R712
R713
R714
C705
R711
R731
MUTE 4.8V
NORM 0V
IC703
PE3
PE2
PE1
PE0
MONI
T/R1
S5
S4
S3
S2
S1
S0
TMUT
RMUT
PS5
CPO
STRB
VCC
VSS
X1
RESET
SO
S1
Q702
2.4V
0.9V
R715
R727
R718
C712
C713
C717
R716
C711
R717
R719
0.3V
R729
C721
D707A
D707B
TINH
PSAV
RMUT
SQL
MONI
R733
R722
R721
3.6V
D706
R736
IC704D IC704E
4.9V
4.7V
0V
R726
R720
C714
Q703
R5
SAF
SP
SPE
INT1
INT0
WR
RO
FUNC
TRF
SEND
SQL
UNLK
TO
SCK
R732
D708
R728
RX 0V
TX4.2V
Q704
SCK
SO
STRB
UNLK
SEND
CH
FUNK
TR5

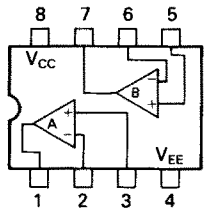
SECTION 9 BOARD LAYOUTS

9-1 MAIN UNIT

• ICs

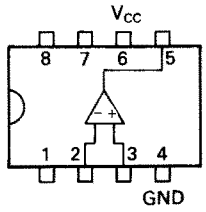
µPC358C (Dual Driver)

IC101



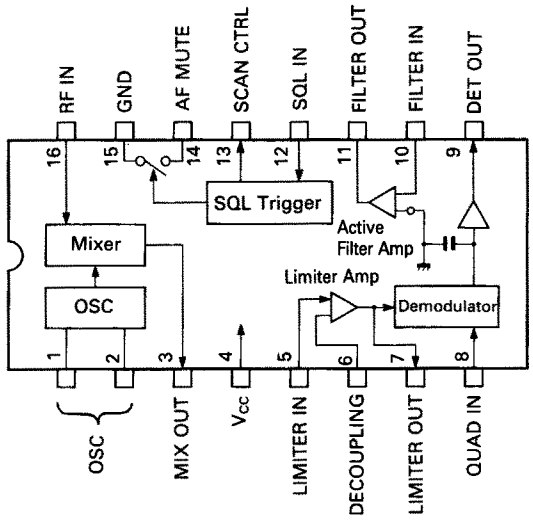
LM386N-3 (Low Voltage Audio Power Amplifier)

IC103



MC3357P (Low Power FM IF)

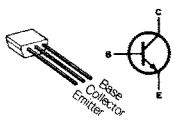
IC102



• Transistors

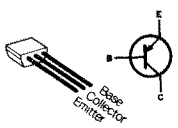
2SC2458 GR

Q101, Q102, Q104, Q108
Q111, Q113, Q115, Q117
Q121, Q124, Q125, Q126



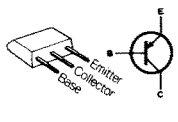
2SA1048 GR

Q103, Q106, Q107, Q109
Q110



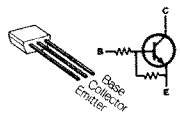
2SB909M R

Q112, Q114, Q116, Q118



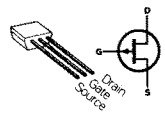
2SC3399 K

Q119



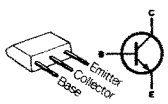
2SJ105 Y

Q120, Q127

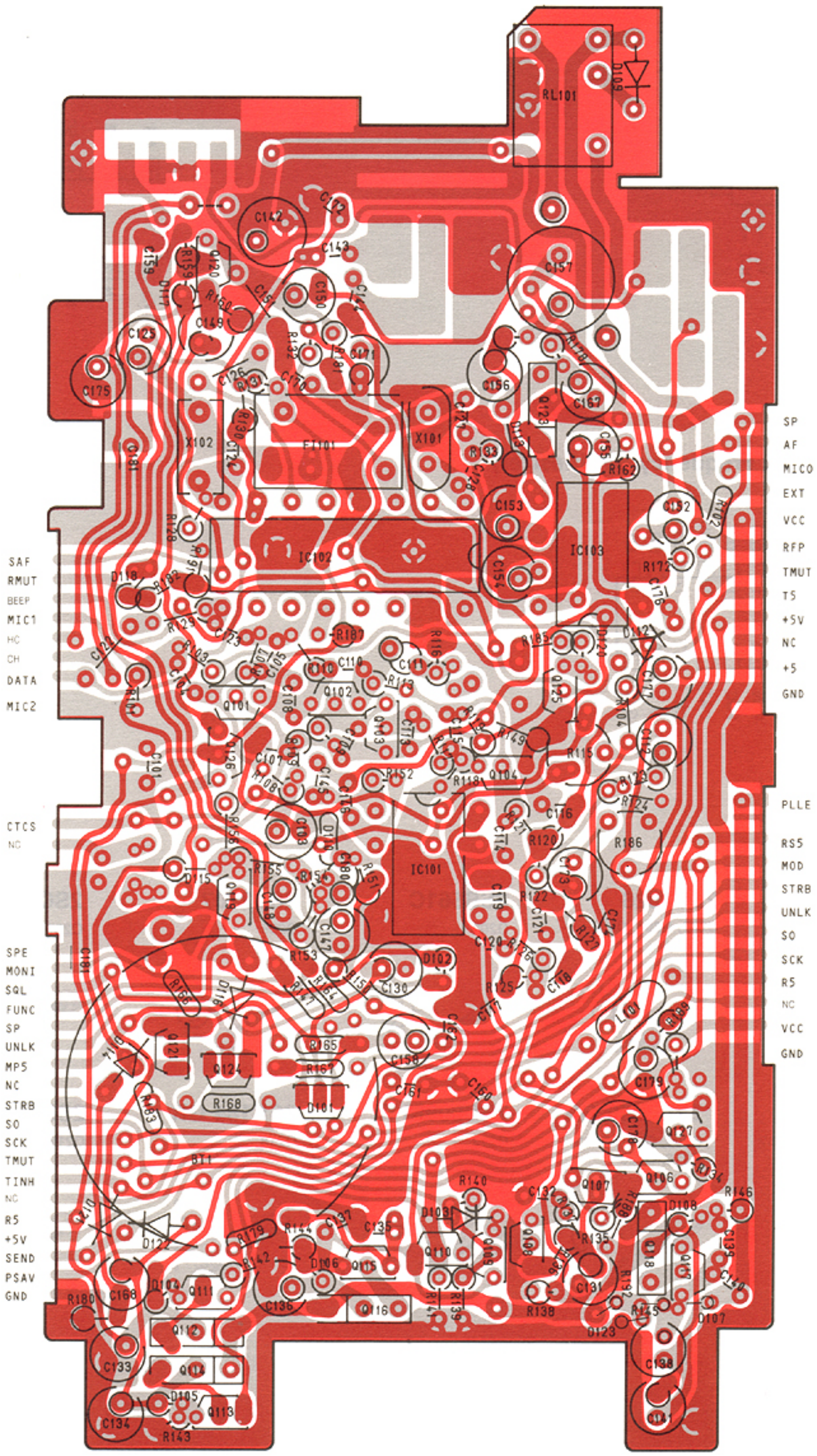


2SD1225M

Q123



MAIN UNIT

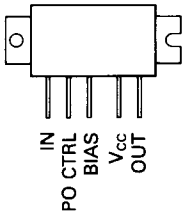

SAF
RMUT
BEEP
MIC1
HC
CH
DATA
MIC2
CTCS
NC
SPE
MONI
SQL
FUNC
SP
UNLK
MPS
NC
STRB
SO
SCK
TMUT
TINH
NC
R5
+5V
SEND
PSAV
GND
To LOGIC unit
SP
AF
MICO
EXT
VCC
RFP
TMUT
TS
+5V
NC
+5
GND
PLLE
RS5
MOD
STRB
UNLK
SO
SCK
R5
NC
VCC
GND
To PLL unit
RL101
D109
IC101
IC102
IC103
X101
X102
F1101
Q101
Q102
Q103
Q104
Q105
Q106
Q107
Q108
Q109
Q110
Q111
Q112
Q113
Q114
Q115
Q116
Q117
Q118
Q119
Q120
Q121
Q122
Q123
Q124
Q125
Q126
Q127
D101
D102
D103
D104
D105
D106
D107
D108
D110
D111
D112
D113
D114
D115
D116
D117
D118
D119
D120
D121
D122
D123
BT1
L101

9-2 PLL, VCO, RF UNITS

• ICs

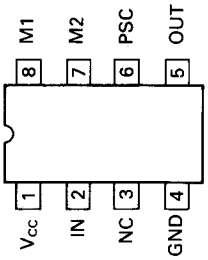
SC-1030 (UHF Power Module)

IC201



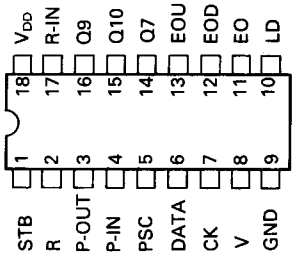
µPB571C (Low Power Prescaler)

IC202



µPD2834C (PLL Frequency Synthesizer)

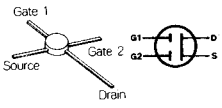
IC203



• Transistors

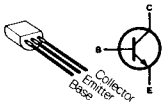
3SK122 K

Q201



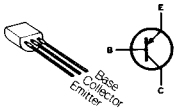
2SC2026

Q202, Q204, Q206



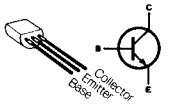
2SB561C

Q203



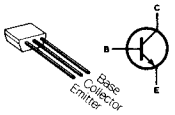
2SC2407

Q205



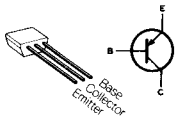
2SC3327B

Q207



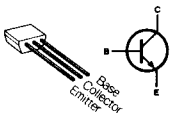
2SA1048 GR

Q208, Q214, Q215, Q217



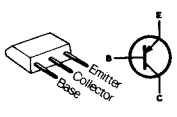
2SC2458 GR

Q209, Q211, Q213, Q216, Q220



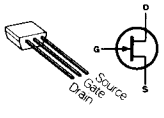
2SB909M R

Q212



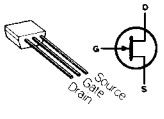
2SK184 GR

Q218

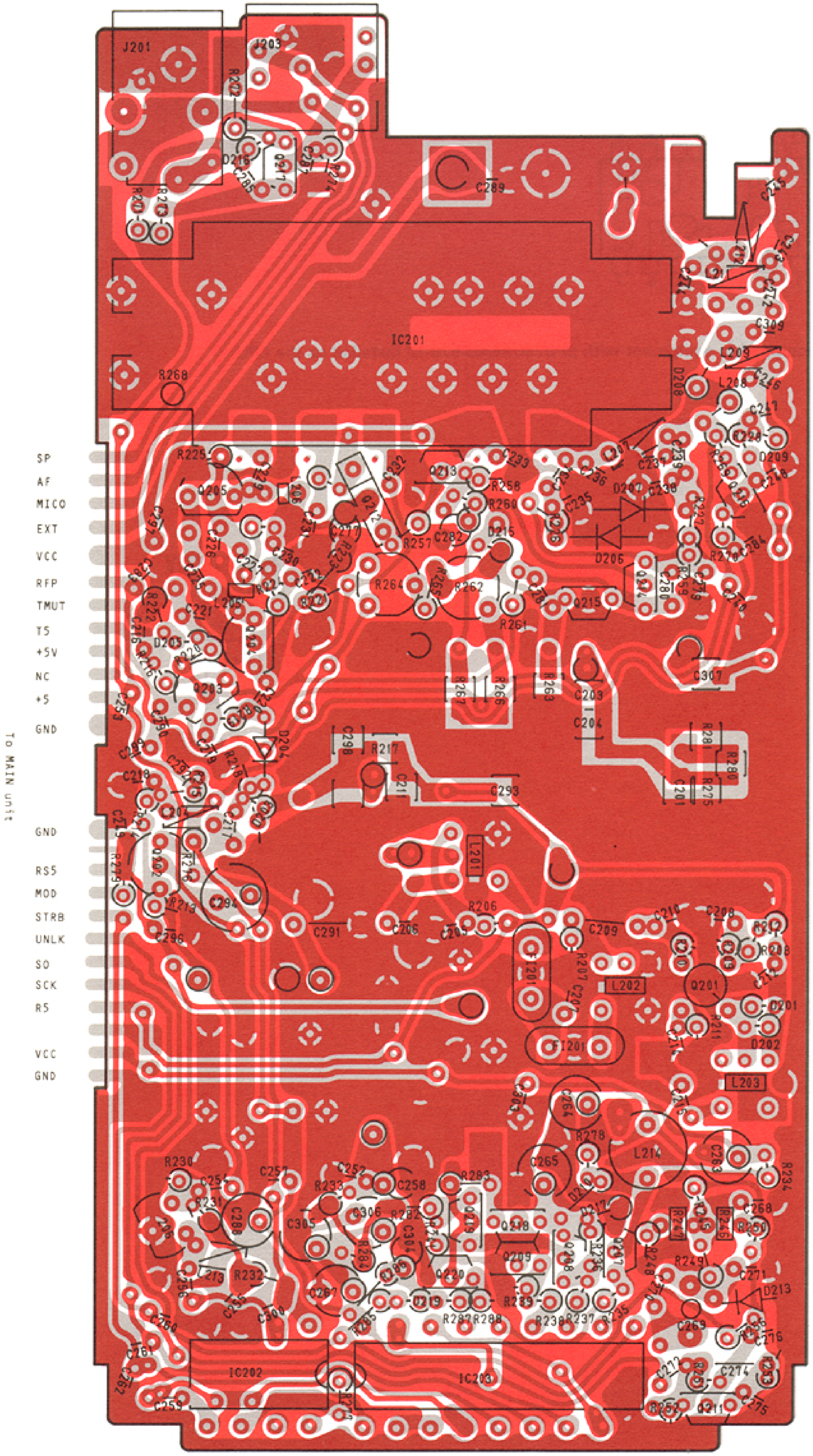


2SK184 Y

Q219



PLL UNIT

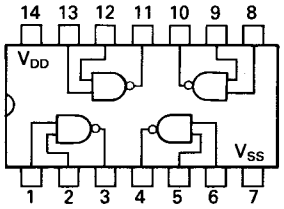

J201
J203
IC201
IC202
IC203
SP
AF
MICO
EXT
VCC
RFP
TMUT
T5
+5V
NC
+5
GND
GND
RS5
MOD
STRB
UNLK
SO
SCK
R5
VCC
GND
To MAIN unit

9-3 DISPLAY UNIT

• IC

μPD4011BG (Quad 2-Input NAND Gate)

IC601

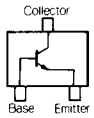


IC601 is not equipped in equipment with μPD78C06AG-570-12 installed as the CPU.

• Transistors

2SC2712 Y

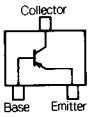
Q604



Symbol: LY

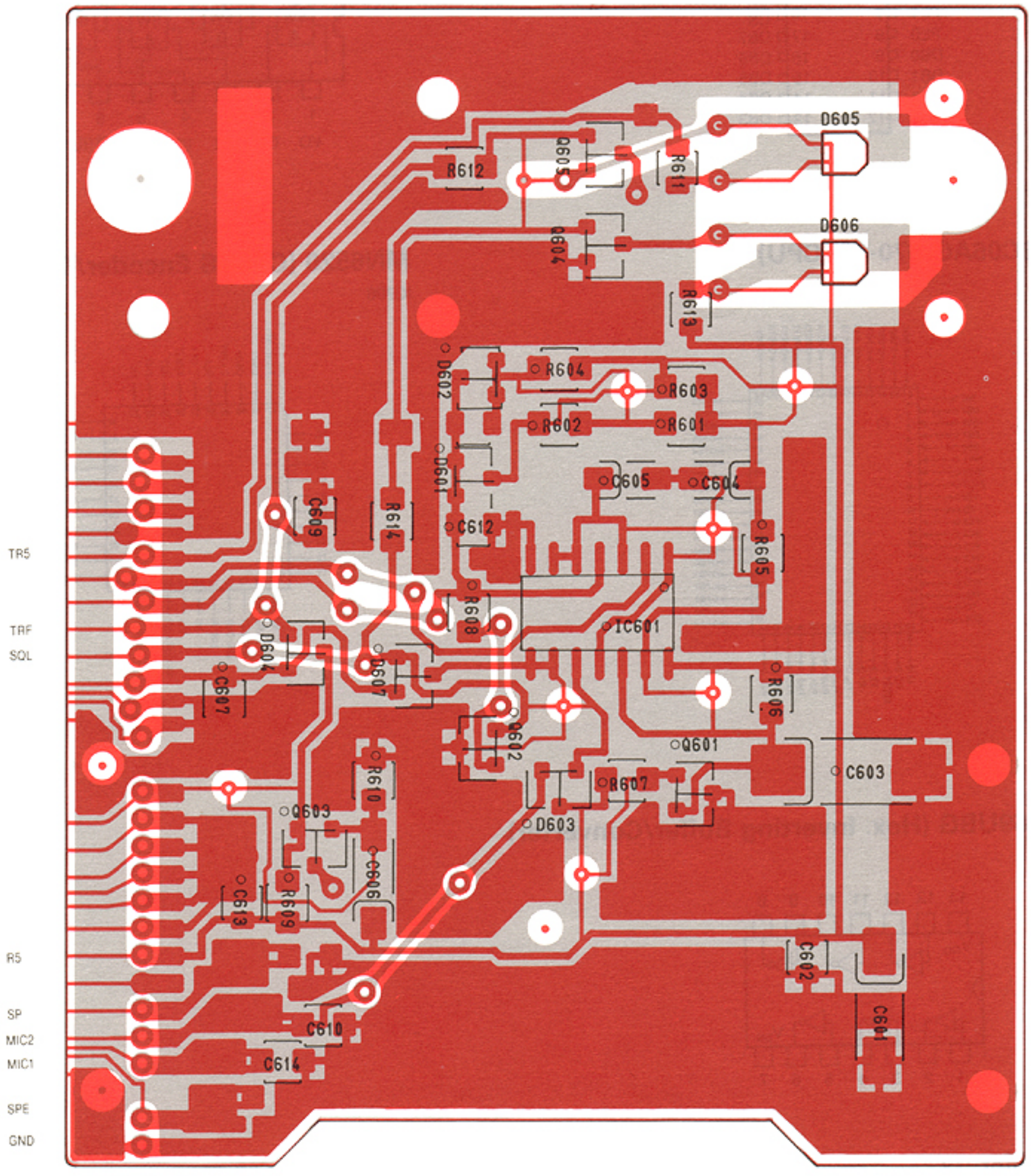
2SA1162 Y

Q605



Symbol: SY

DISPLAY UNIT



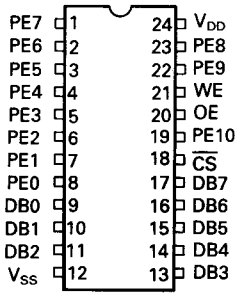
* Parts with a "○" mark preceding the part number (i.e., ○IC-601, ○R601, etc.) are not included in equipment with μPD78C06 AG-570-12 installed as the MPU.

9-4 LOGIC UNIT

• ICs

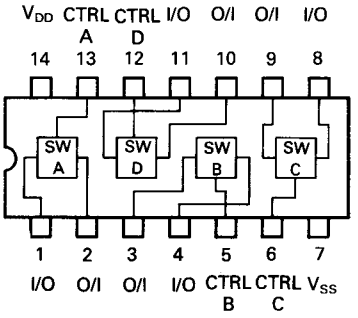
μPD446C (16384-bit Static C-MOS RAM)

IC701



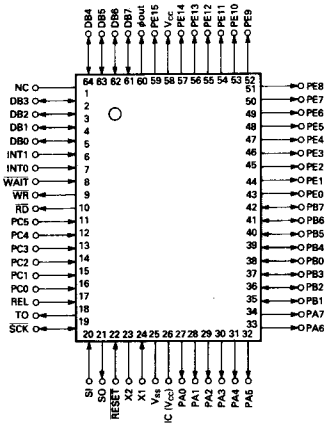
μPD4066BG (Quad Bilateral Switch)

IC702, IC705



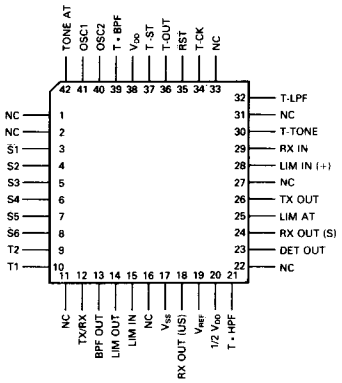
μPD78C06AG-570-12 (CPU)

IC703



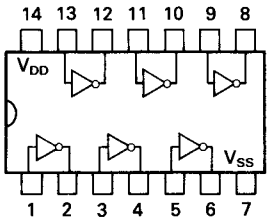
MN6520 (CTCSS Encoder/Decoder)

IC706



μPD4069UBG (Hex. Inverting Buffer/Converter)

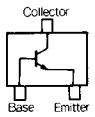
IC704



• Transistors

2SC2712 Y

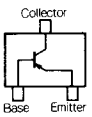
Q701, Q702



Symbol: LY

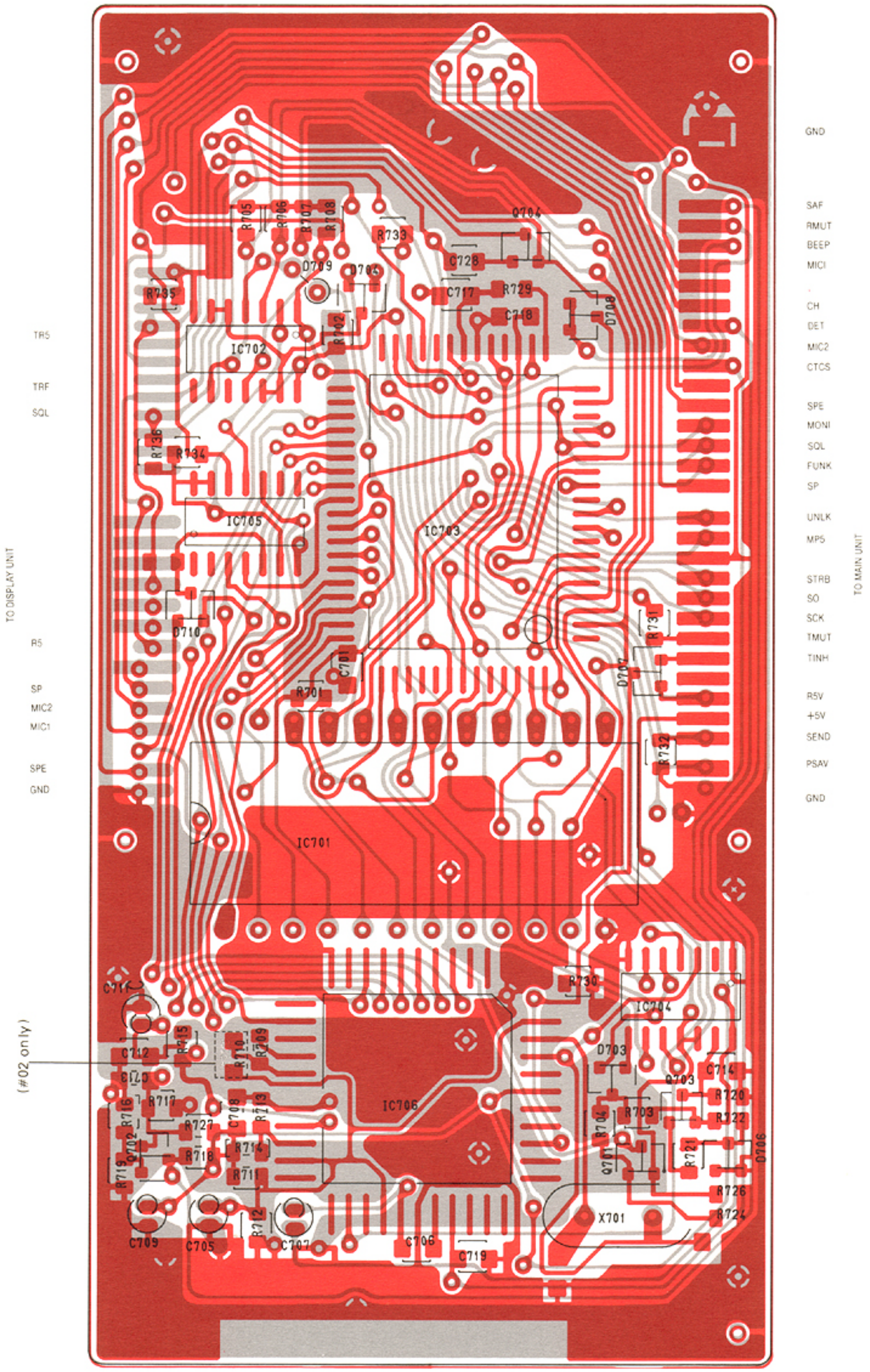
2SA1162 Y

Q703, Q704



Symbol: SY

LOGIC UNIT

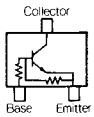

TO DISPLAY UNIT
TR5
TRF
SQL
R5
SP
MIC2
MIC1
SPE
GND
(#02 only)
GND
SAF
RMUT
BEEP
MIC1
CH
DET
MIC2
CTCS
SPE
MONI
SQL
FUNK
SP
UNLK
MP5
STRB
SO
SCK
TMUT
TINH
R5V
+5V
SEND
PSAV
GND
TO MAIN UNIT
IC701
IC702
IC703
IC704
IC705
IC706
X701
Q701
Q702
Q703
Q704
D701
D702
D703
D704
D705
D706
D707
D708
D709
D710
C701
C702
C703
C704
C705
C706
C707
C708
C709
C710
C711
C712
C713
C714
C715
C716
C717
C718
C719
R701
R702
R703
R704
R705
R706
R707
R708
R709
R710
R711
R712
R713
R714
R715
R716
R717
R718
R719
R720
R721
R722
R723
R724
R725
R726
R727
R728
R729
R730
R731
R732
R733
R734
R735
R736

9-5 RF AND VCO UNITS

• Transistors

DTC124 EK

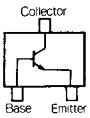
Q401



Symbol: 25

2SC3356

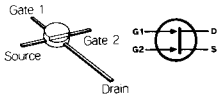
Q402, Q403



Symbol: R22

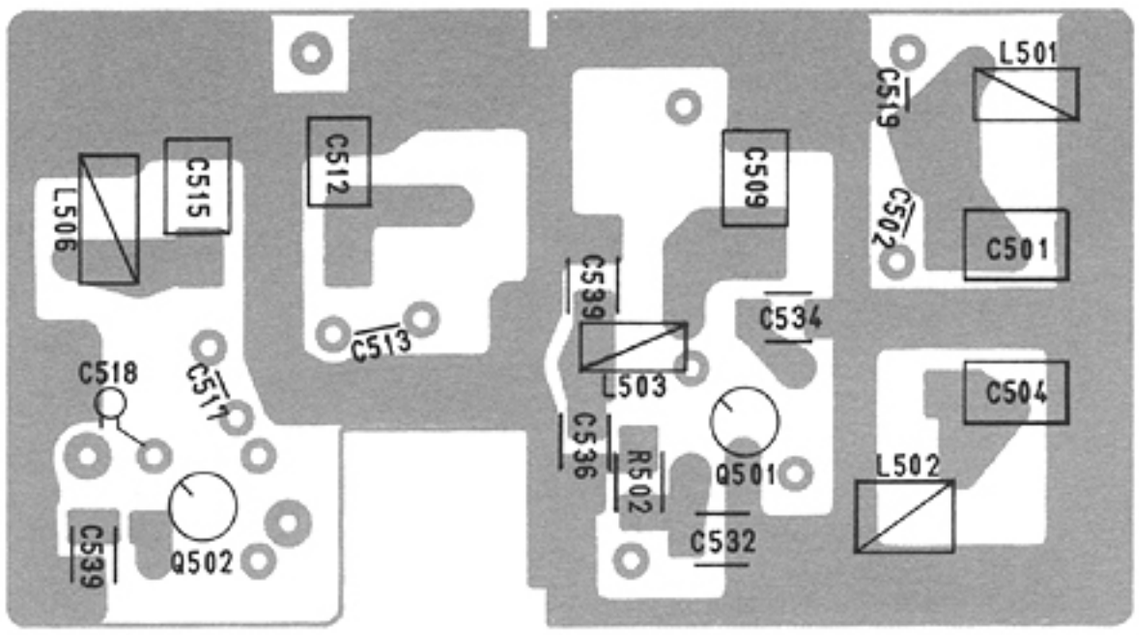
3SK121 Y

Q501, Q502

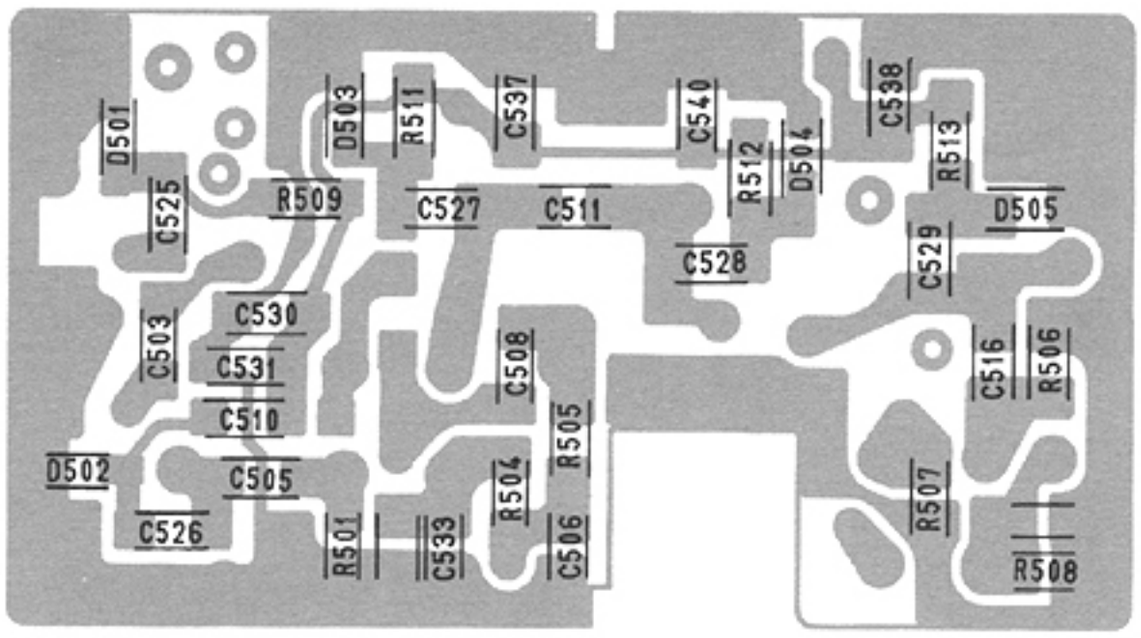


RF UNIT

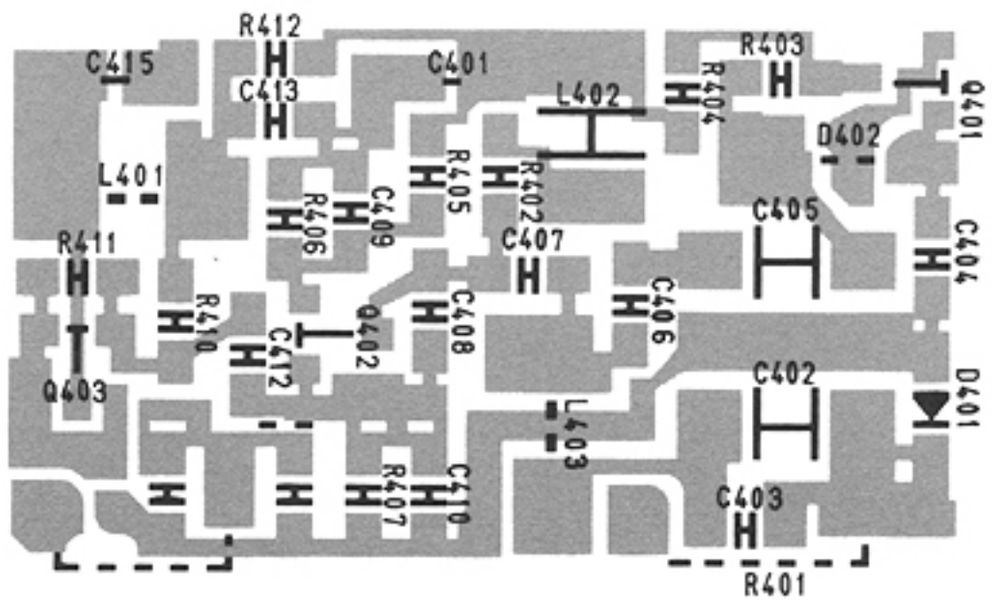
COMPONENTS SIDE



FOIL SIDE



VCO UNIT



SECTION 10 PARTS LIST

MAIN UNIT

REF. NO.	DESCRIPTION	PART NO.
IC101	IC	μPC358C
IC102	IC	MC3357P
IC103	IC	LM386N-3
Q101	Transistor	2SC2458 GR
Q102	Transistor	2SC2458 GR
Q103	Transistor	2SA1048 GR
Q104	Transistor	2SC2458 GR
Q106	Transistor	2SA1048 GR
Q107	Transistor	2SA1048 GR
Q108	Transistor	2SC2458 GR
Q109	Transistor	2SA1048 GR
Q110	Transistor	2SA1048 GR
Q111	Transistor	2SC2458 GR
Q112	Transistor	2SB909M R
Q113	Transistor	2SC2458 GR
Q114	Transistor	2SB909M R
Q115	Transistor	2SC2458 GR
Q116	Transistor	2SB909M R
Q117	Transistor	2SC2458 GR
Q118	Transistor	2SB909M R
Q119	Transistor	2SC3399 K
Q120	FET	2SJ105 Y
Q121	Transistor	2SC2458 GR
Q123	Transistor	2SD1225M R
Q124	Transistor	2SC2458 GR
Q125	Transistor	2SC2458 GR
Q126	Transistor	2SC2458 GR
Q127	FET	2SJ105 Y
D101	Diode	1SS233
D102	Diode	1SS211
D103	Diode	1SS211
D104	Diode	1SS211
D105	Diode	1SS211
D106	Diode	1SS211
D107	Zener	RD5.1JS B2
D108	Diode	1SS211
D109	Diode	1SS211
D110	Diode	1SS211
D112	Diode	1SS211
D113	Zener	RD12JS B2
D114	Diode	1SS211
D115	Diode	1SS211
D116	Diode	1SS211
D117	Diode	1SS211
D118	Diode	1SS211
D120	Diode	1SS211
D121	Diode	1SS211
D122	Diode	1SS211
D123	Zener	RD6.8E B2
FI101	Ceramic Filter	CFW455 E (#01) CFW455 HT (#02)
X101	Crystal	CR-70
X102	Discriminator	CDB455 C7A
L101	Choke	LAL03NA 100K
R101	Resistor	33kΩ ELR10
R102	Resistor	1kΩ R10
R103	Resistor	1kΩ ELR10
R104	Resistor	1.2kΩ ELR10
R107	Resistor	120kΩ ELR10
R108	Resistor	120kΩ ELR10
R109	Resistor	470Ω ELR10
R110	Resistor	12kΩ ELR10
R111	Resistor	5.6kΩ ELR10
R113	Resistor	330kΩ ELR10
R115	Trimmer	100kΩ RHM0A1505A
R116	Resistor	270Ω ELR10
R117	Resistor	2.2kΩ ELR10
R118	Resistor	1kΩ ELR10
R119	Resistor	3.3kΩ ELR10
R120	Resistor	150kΩ ELR10
R121	Resistor	220kΩ ELR10
R122	Resistor	39kΩ ELR10
R123	Resistor	10kΩ ELR10
R124	Resistor	33kΩ ELR10
R125	Resistor	27kΩ ELR10
R126	Resistor	39kΩ ELR10
R127	Resistor	12kΩ ELR10
R128	Resistor	1.5kΩ ELR10 (#01) 4.7kΩ ELR10 (#02)
R129	Resistor	470Ω ELR10
R130	Resistor	47kΩ ELR10
R131	Resistor	1.5kΩ ELR10 (#01) 2.2kΩ ELR10 (#02)
R132	Resistor	1.5kΩ ELR10 (#01) 2.2kΩ ELR10 (#02)
R133	Resistor	22kΩ ELR10
R134	Resistor	47kΩ ELR10
R135	Resistor	10kΩ ELR10
R136	Resistor	100kΩ ELR10
R137	Resistor	220kΩ ELR10
R138	Resistor	33kΩ ELR10
R139	Resistor	10kΩ ELR10
R140	Resistor	180kΩ ELR10
R141	Resistor	10kΩ ELR10
R142	Resistor	10kΩ ELR10
R143	Resistor	10kΩ ELR10
R144	Resistor	10kΩ ELR10
R145	Resistor	3.3kΩ ELR10
R146	Resistor	10kΩ ELR10
R147	Resistor	100kΩ R10
R148	Variable	10kΩB RK9A1000NA
R149	Resistor	5.6kΩ ELR10
R150	Resistor	330kΩ ELR10
R151	Resistor	180kΩ ELR10
R152	Resistor	1MΩ ELR10
R153	Resistor	100kΩ ELR10
R154	Resistor	1kΩ ELR10
R155	Resistor	150kΩ ELR10
R156	Resistor	820kΩ ELR10

R159	Resistor	470kΩ	ELR10	
R160	Resistor	1MΩ	ELR10	
R161	Variable	10kΩA	RK9A11003A	
R162	Resistor	1.8kΩ	ELR10	(#01)
		5.6kΩ	ELR10	(#02)
R164	Resistor	100kΩ	R10	
R165	Resistor	33kΩ	R10	
R166	Resistor	56kΩ	R10	
R167	Resistor	150kΩ	R10	
R168	Resistor	470kΩ	R10	
R172	Resistor	150kΩ	ELR10	
R178	Resistor	220Ω	ELR10	
R179	Resistor	1kΩ	R10	
R180	Resistor	220kΩ	ELR10	
R181	Resistor	27kΩ	ELR10	
R182	Resistor	220kΩ	ELR10	
R183	Resistor	47kΩ	R10	
R185	Resistor	33kΩ	ELR10	
R186	Trimmer	100kΩ	RHM0A1505A	
R187	Resistor	100kΩ	ELR10	
R188	Resistor	470Ω	ELR10	
R189	Resistor	6.8kΩ	ELR10	
R191	Resistor	150kΩ	ELR10	
R192	Resistor	2.7kΩ	ELR10	
C101	Ceramic	0.001μF	50V	
C103	Electrolytic	10μF	16V	RC3
C104	Barrier Layer	0.01μF	25V	
C105	Ceramic	470pF	50V	
C107	Ceramic	47pF	50V	
C108	Ceramic	470pF	50V	
C109	Ceramic	47pF	50V	
C110	Ceramic	470pF	50V	
C111	Tantalum	CS15E1V0R1		
C112	Electrolytic	0.22μF	50V	RC3
C113	Ceramic	47pF	50V	
C114	Ceramic	47pF	50V	
C115	Ceramic	0.001μF	50V	
C116	Ceramic	47pF	50V	
C117	Mylar	0.0022μF	50V	
C118	Mylar	0.01μF	50V	
C119	Ceramic	47pF	50V	
C120	Ceramic	120pF	50V	
C121	Ceramic	47pF	50V	
C122	Mylar	0.056μF	50V	
C123	Ceramic	0.001μF	50V	
C124	Ceramic	82pF	50V	
C125	Electrolytic	0.1μF	50V	RC3
C126	Barrier Layer	0.1μF	16V	
C127	Ceramic	68pF	50V	
C128	Ceramic	120pF	50V	
C130	Electrolytic	47μF	6.3V	RC3
C131	Electrolytic	2.2μF	50V	RC3
C132	Ceramic	0.001μF	50V	
C133	Electrolytic	22μF	6.3V	RC3
C134	Electrolytic	22μF	6.3V	RC3
C135	Ceramic	47pF	50V	
C136	Electrolytic	22μF	6.3V	RC3
C137	Ceramic	47pF	50V	
C138	Electrol	22μF	6.3V	RC3
C139	Ceramic	470pF	50V	
C140	Ceramic	0.001μF	50V	
C141	Electrolytic	22μF	6.3V	RC3
C142	Electrolytic	47μF	25V	MS7
C143	Ceramic	0.001μF	50V	(#01)
	Barrier Layer	0.01μF	25V	(#02)
C144	Ceramic	0.001μF	50V	
C145	Ceramic	10pF	50V	
C146	Ceramic	0.001μF	50V	
C147	Electrolytic	0.22μF	50V	RC3
C148	Electrolytic	0.22μF	50V	RC3
C149	Electrolytic	1μF	50V	RC3
C150	Electrolytic	1μF	50V	RC3
C151	Barrier Layer	0.018μF	25V	
C152	Electrolytic	0.1μF	50V	MS5
C153	Electrolytic	10μF	16V	MS5
C154	Electrolytic	10μF	16V	MS5
C155	Electrolytic	10μF	16V	RC3
C156	Electrolytic	2.2μF	50V	RC3
C157	Electrolytic	220μF	10V	
C158	Electrolytic	4.7μF	25V	RC3
C159	Ceramic	470pF	50V	
C160	Ceramic	47pF	50V	
C161	Ceramic	47pF	50V	
C162	Ceramic	47pF	50V	
C163	Ceramic	47pF	50V	
C164	Ceramic	47pF	50V	
C167	Electrolytic	4.7μF	25V	RC3
C168	Electrolytic	10μF	16V	RC3
C170	Barrier Layer	0.01μF	25V	
C171	Electrolytic	10μF	16V	RC3
C172	Ceramic	47pF	50V	
C173	Electrolytic	0.47μF	50V	RC3
C174	Mylar	0.0022μF	50V	
C175	Electrolytic	0.1μF	50V	RC3
C176	Ceramic	47pF	50V	
C177	Electrolytic	2.2μF	50V	RC3
C178	Electrolytic	10μF	16V	RC3
C179	Electrolytic	10μF	16V	RC3
C180	Tantalum	DN1V	0R47	
C181	Ceramic	47pF	50V	
C182	Ceramic	47pF	50V	
RL101	Relay	OUC-SS-114D		
S101	Switch	SKHHAB062A		
S103	Switch	SKHHAB062A		
S104	Switch	SKHHAB062A		
S105	Switch	SPPH22014A		
S106	Switch	AS-243		
BT101	Lithium Battery	BR2325-1HC		
EP101	P.C. Board	B-1038E		
EP102	P.C. Board	B-908		
EP103	F.P.C. Board	B-1045		
EP104	Bead Core	DL2-OP2.6-3-1.2H		
EP105	Irrax Tube	d=0.7 l=3mm		
EP106	Crystal Seat	41590		
W101	Wire	23/03/135/D21/W01		
W102	Wire	23/02/115/D21/W01		
W103	Wire	23/04/040/W02/W02		
W104	Wire	72/99/050/X98/X98		
W106	Wire	23/04/110/W01/W01		
W107	Wire	23/00/045/W01/W01		

PLL UNIT

REF. NO.	DESCRIPTION	PART NO.	
IC201	IC	SC-1030	
IC202	IC	μPB571C	
IC203	IC	μPD2834C	
Q201	FET	3SK122 K	
Q202	Transistor	2SC2026	
Q203	Transistor	2SB561 C	
Q204	Transistor	2SC2026	
Q205	Transistor	2SC2407	
Q206	Transistor	2SC2026	
Q207	Transistor	2SC3327 B	
Q208	Transistor	2SA1048 GR	
Q209	Transistor	2SC2458 GR	
Q211	Transistor	2SC2458 GR	
Q212	Transistor	2SB909M R	
Q213	Transistor	2SC2458 GR	
Q214	Transistor	2SA1048 GR	
Q215	Transistor	2SA1048 GR	
Q216	Transistor	2SC2458 GR	
Q217	Transistor	2SA1048 GR	
Q218	FET	2SK184 GR	
Q219	FET	2SK184 Y	
Q220	Transistor	2SC2458 GR	
D201	Diode	1SS99	
D202	Diode	1SS99	
D203	Diode	1SS216	
D204	Diode	1SS216	
D205	Diode	1SS211	
D206	Diode	1SS97	
D207	Diode	1SS97	
D208	Diode	1SS216	
D209	Diode	1SS216	
D210	Diode	1SS130	
D213	Varicap	1SV50E	
D215	Diode	1SS211	
D216	Diode	1SS211	
D217	Zener	RD13 EB2	
D219	Diode	1SS211	
FI201	MC	21M15B3	(#01)
		21M7B2	(#02)
X201	Crystal	CR-85	
L201	Coil	LS-264	
L202	Coil	LS-264	
L203	Coil	LS-263	
L204	Coil	LA-232	
L205	Coil	LA-126	
L206	Coil	LA-126	
L207	Coil	LA-242	
L208	Choke	LAL02TB R56M	
L209	Coil	LA-232	
L211	Coil	LA-147	
L212	Coil	LA-232	
L213	Coil	LA-233	
L214	Coil	LW-30	
R206	Resistor	100Ω	ELR10
R207	Resistor	10kΩ	ELR10
R208	Resistor	100kΩ	ELR10
R209	Resistor	100kΩ	ELR10
R210	Resistor	470kΩ	ELR10
R211	Resistor	100Ω	ELR10
R212	Resistor	100Ω	ELR10
R213	Resistor	4.7kΩ	ELR10
R214	Resistor	15kΩ	ELR10
R215	Resistor	100Ω	ELR10
R216	Resistor	6.8kΩ	ELR10
R217	Chip	10kΩ	MCR10
R218	Resistor	22kΩ	ELR10
R219	Resistor	10kΩ	ELR10
R220	Resistor	1kΩ	ELR10
R221	Resistor	1.2kΩ	ELR10
R222	Resistor	220Ω	ELR10
R223	Resistor	560Ω	ELR10
R224	Resistor	47Ω	ELR10
R225	Resistor	10Ω	ELR10
R226	Resistor	4.7kΩ	ELR10
R227	Resistor	4.7kΩ	ELR10
R228	Resistor	330Ω	ELR10
R230	Resistor	1.8kΩ	ELR10
R231	Resistor	6.8kΩ	ELR10
R232	Resistor	470Ω	ELR10
R233	Resistor	6.8kΩ	ELR10
R234	Resistor	470Ω	ELR10
R235	Resistor	10kΩ	ELR10
R236	Resistor	100kΩ	ELR10
R237	Resistor	47kΩ	ELR10
R238	Resistor	18kΩ	ELR10
R239	Resistor	100kΩ	ELR10
R241	Resistor	4.7kΩ	ELR10
R245	Resistor	10kΩ	ELR10
R246	Thermistor	33D28	
R247	Thermistor	33D28	
R248	Resistor	15kΩ	ELR10
R249	Resistor	10kΩ	ELR10
R250	Resistor	6.8kΩ	ELR10
R251	Resistor	100kΩ	ELR10
R252	Resistor	100kΩ	ELR10
R253	Resistor	2.2kΩ	ELR10
R256	Resistor	100Ω	ELR10
R257	Resistor	1.8kΩ	ELR10
R258	Resistor	560kΩ	ELR10
R259	Resistor	22kΩ	ELR10
R260	Resistor	150kΩ	ELR10
R261	Resistor	82kΩ	ELR10
R262	Trimmer	22kΩ	RHM0AJ406A
R263	Chip	22kΩ	MCR10
R264	Trimmer	2.2kΩ	RHM0AJ305A
R265	Resistor	2.2kΩ	ELR10
R266	Chip	8.2kΩ	MCR10
R267	Chip	10kΩ	MCR10
R268	Thermistor	112503-2	
R269	Resistor	47kΩ	ELR10
R270	Resistor	1MΩ	ELR10
R271	Resistor	5.6kΩ	ELR10
R272	Resistor	47kΩ	ELR10
R273	Resistor	27Ω	ELR10
R274	Resistor	47kΩ	ELR10
R275	Chip	1MΩ	MCR10
R276	Resistor	47Ω	ELR10
R277	Resistor	10kΩ	ELR10
R278	Resistor	10kΩ	ELR10

R279	Resistor	22kΩ	ELR10	
R280	Chip	10kΩ	MCR10	
R281	Chip	120kΩ	MCR10	
R282	Resistor	220Ω	R10	
R283	Resistor	2.2MΩ	ELR10	
R284	Resistor	150Ω	ELR10	
R285	Resistor	4.7kΩ	ELR10	
R286	Resistor	220kΩ	ELR10	
R287	Resistor	270kΩ	ELR10	
R288	Resistor	100kΩ	ELR10	
C201	Monolithic	0.1μF	GRM40	
C203	Monolithic	47pF	GRM40	
C204	Monolithic	47pF	GRM40	
C205	Ceramic	0.001μF	50V	
C206	Ceramic	47pF	50V	
C207	Ceramic	7pF	50V	(#01)
		15pF	50V	(#02)
C208	Ceramic	0.001μF	50V	
C209	Ceramic	180pF	50V	
C210	Ceramic	62pF	50V	
C211	Monolithic	0.001μF	GRM40	
C212	Ceramic	0.001μF	50V	
C214	Ceramic	0.001μF	50V	
C215	Ceramic	0.001μF	50V	
C216	Ceramic	470pF	50V	
C217	Ceramic	8pF	50V	
C218	Ceramic	0.001μF	50V	
C219	Ceramic	0.001μF	50V	
C220	Ceramic	6pF	50V	
C221	Ceramic	470pF	50V	
C222	Ceramic	47pF	50V	
C224	Ceramic	0.001μF	50V	
C225	Ceramic	4pF	50V	
C226	Ceramic	47pF	50V	
C227	Ceramic	0.001μF	50V	
C228	Ceramic	47pF	50V	
C229	Ceramic	12pF	50V	
C230	Ceramic	0.001μF	50V	
C231	Ceramic	47pF	50V	
C232	Ceramic	47pF	50V	
C233	Ceramic	0.001μF	50V	
C234	Ceramic	1pF	50V	
C235	Ceramic	5pF	50V	
C236	Ceramic	5pF	50V	
C237	Ceramic	9pF	50V	
C238	Ceramic	5pF	50V	
C239	Ceramic	1pF	50V	
C240	Ceramic	0.001μF	50V	
C242	Ceramic	18pF	50V	
C243	Ceramic	8pF	50V	
C244	Ceramic	10pF	50V	
C245	Ceramic	6pF	50V	
C246	Ceramic	6pF	50V	
C247	Ceramic	24pF	50V	
C248	Ceramic	47pF	50V	
C249	Ceramic	47pF	50V	
C252	Ceramic	47pF	50V	
C253	Ceramic	470pF	50V	
C254	Ceramic	4pF	50V	
C255	Ceramic	0.001μF	50V	
C256	Ceramic	10pF	50V	
C257	Ceramic	RPE121C 104M50		
C258	Tantalum	CS15E1V0R1M		
C259	Ceramic	0.001μF	50V	
C260	Ceramic	47pF	50V	
C261	Ceramic	47pF	50V	
C262	Ceramic	47pF	50V	
C263	Electrolytic	22μF	16V	RC3
C264	Electrolytic	22μF	16V	RC3
C265	Electrolytic	22μF	16V	RC3
C267	Tantalum	DN1C	100	
C268	Ceramic	0.001μF	50V	
C269	Trimmer	10pF	ECRGA010E30	
C270	Ceramic	39pF	50V	CH
C271	Ceramic	4pF	50V	CH
C272	Ceramic	0.001μF	50V	
C274	Ceramic	220pF	50V	
C275	Ceramic	100pF	50V	
C276	Barrier Layer	0.01μF	25V	
C277	Tantalum	DN1C	4R7M	
C278	Ceramic	47pF	50V	
C279	Ceramic	47pF	50V	
C280	Ceramic	47pF	50V	
C281	Ceramic	47pF	50V	
C282	Tantalum	DN1C	4R7M	
C283	Ceramic	47pF	50V	
C284	Ceramic	470pF	50V	
C285	Ceramic	47pF	50V	
C287	Ceramic	47pF	50V	
C288	Electrolytic	22μF	6.3V	RC2
C289	Ceramic	470pF	50V	
C290	Ceramic	470pF	50V	
C291	Barrier Layer	0.1μF	16V	
C292	Ceramic	470pF	50V	
C293	Monolithic	0.001μF	GRM40	
C294	Electrolytic	100μF	6.3V	RC2
C296	Ceramic	47pF	50V	
C297	Ceramic	47pF	50V	
C298	Monolithic	8pF	GRM40	
C299	Ceramic	47pF	50V	
C300	Ceramic	RPE121C 104M50		
C303	Ceramic	47pF	50V	
C304	Tantalum	DN1V	010	
C305	Tantalum	DN1C	100	
C306	Tantalum	DN1C	100	
C307	Monolithic	2pF	GRM40	
C308	Ceramic	0.001μF	50V	
C309	Ceramic	2pF	50V	
J201	Connector	HSJ-0836-01-010		[EXT SP]
J202	Connector	TNC102-N1-W1-L1		[ANT]
J203	Connector	HSJ-1102-01-040		[EXT MIC]
J204	Connector	HEC-0747-01-010		[EXT DC]
J205	Connector	171255-1		
J206	Connector	171255-1		
EP201	P.C. Board	B-1039E		
EP202	Bead Core	DL2-OP2.6-3-1.2H		
EP203	Bead Core	DL2-OP2.6-3-1.2H		
EP204	Bead Core	DL2-OP2.6-3-1.2H		
EP205	Irrax Tube	d=0.7 l=30mm		
EP206	Irrax Tube	d=0.7 l=5mm		
EP207	Crystal Seat	41590		
EP208	Irrax Tube	d=0.7 l=8mm		
EP215	F.P.C. Board	B-1044		
W201	Shield cable	66/99/115/W99/W99		
W202		08		
W203	Wire	23/03/080/W02/W02		

W204	Wire	72/98/050/X98/X98
W205	Jumper	JPW-02A
W206	Wire	72/98/015/X98/X98
W207	Wire	23/04/065/W01/W01
W209	Jumper	JPW-02A
W210	Jumper	JPW-02A
W211	Wire	72/98/010/X98/X98
W212	Wire	23/06/070/W01/W01

VCO UNIT

REF. NO.	DESCRIPTION	PART NO.	
Q401	Transistor	DTC124 K	
Q402	Transistor	2SC3356	
Q403	Transistor	2SC3356	
D401	Varicap	1SV164 T2B	
D402	Diode	1SS216	
L401	Coil	LA-182	
L402	Choke	LAN5N1ROM	
L403	Coil	LA-135	
R401	Resistor	1kΩ	R10
R402	Chip	150Ω	MCR10
R403	Chip	4.7kΩ	MCR10
R404	Chip	47kΩ	MCR10
R405	Chip	6.8kΩ	MCR10
R406	Chip	4.7kΩ	MCR10
R407	Chip	220Ω	MCR10
R410	Chip	6.8kΩ	MCR10
R411	Chip	1.8kΩ	MCR10
R412	Chip	220Ω	MCR10
C401	Ceramic	470pF	50V
C402	Trimmer	TZB04N100BA	
C403	Monolithic	12pF	GRM40
C404	Monolithic	470pF	GRM40
C405	Trimmer	TZB04Z060BA	
C406	Monolithic	6pF	GRM40
C407	Monolithic	5pF	GRM40
C408	Monolithic	8pF	GRM40
C409	Monolithic	470pF	GRM40
C410	Monolithic	6pF	GRM40
C412	Monolithic	0.75pF	GRM40
C413	Monolithic	470pF	GRM40
C415	Ceramic	6pF	50V
EP401	P.C. Board	B-930B	

RF UNIT

REF. NO.	DESCRIPTION	PART NO.
Q501	FET	3SK121 Y
Q502	FET	2SK121 Y
D501	Varicap	1SV164 T2B
D502	Varicap	1SV164 T2B
D503	Varicap	1SV164 T2B
D504	Varicap	1SV164 T2B
D505	Varicap	1SV164 T2B

L501	Coil	LA-232	
L502	Coil	LA-232	
L503	Coil	LA-232	
L505	Coil	LA-232	
L506	Coil	LA-232	
R501	Chip	47kΩ	MCR10
R502	Chip	100kΩ	MCR10
R503	Chip	100Ω	MCR10
R504	Chip	100kΩ	MCR10
R505	Chip	10Ω	MCR10
R506	Chip	47kΩ	MCR10
R507	Chip	47kΩ	MCR10
R508	Chip	470Ω	MCR10
R509	Chip	100kΩ	MCR10
R510	Chip	100kΩ	MCR10
R511	Chip	100kΩ	MCR10
R512	Chip	100kΩ	MCR10
R513	Chip	100kΩ	MCR10
C501	Trimmer	6pF	TZB04N100BA
C502	Barrier Layer	0.75µF	50V
C503	Monolithic	1pF	GRM40
C504	Trimmer	6pF	TZB04N100BA
C505	Monolithic	5pF	GRM40
C506	Monolithic	0.001µF	GRM40
C507	Monolithic	0.001µF	GRM40
C508	Monolithic	0.001µF	GRM40
C509	Trimmer	6pF	TZB04N100BA
C511	Monolithic	0.5pF	GRM40
C512	Trimmer	6pF	TZB04N100BA
C513	Barrier Layer	0.35pF	50V
C515	Trimmer	6pF	TZB04N100BA
C516	Monolithic	5pF	GRM40
C517	Ceramic	47pF	50V
C518	Ceramic	0.001µF	50V
C519	Ceramic	4pF	50V
C525	Monolithic	8pF	GRM40
C526	Monolithic	8pF	GRM40
C527	Monolithic	8pF	GRM40
C528	Monolithic	8pF	GRM40
C529	Monolithic	8pF	GRM40
C530	Monolithic	0.001µF	GRM40
C531	Monolithic	0.001µF	GRM40
C532	Monolithic	0.001µF	GRM40
C533	Monolithic	0.001µF	GRM40
C534	Monolithic	0.001µF	GRM40
C535	Monolithic	0.001µF	GRM40
C536	Monolithic	0.001µF	GRM40
C537	Monolithic	0.001µF	GRM40
C538	Monolithic	0.001µF	GRM40
C539	Monolithic	0.001µF	GRM40
C540	Monolithic	0.001µF	GRM40
EP501	P.C. Board	B-1057G	

DISPLAY UNIT

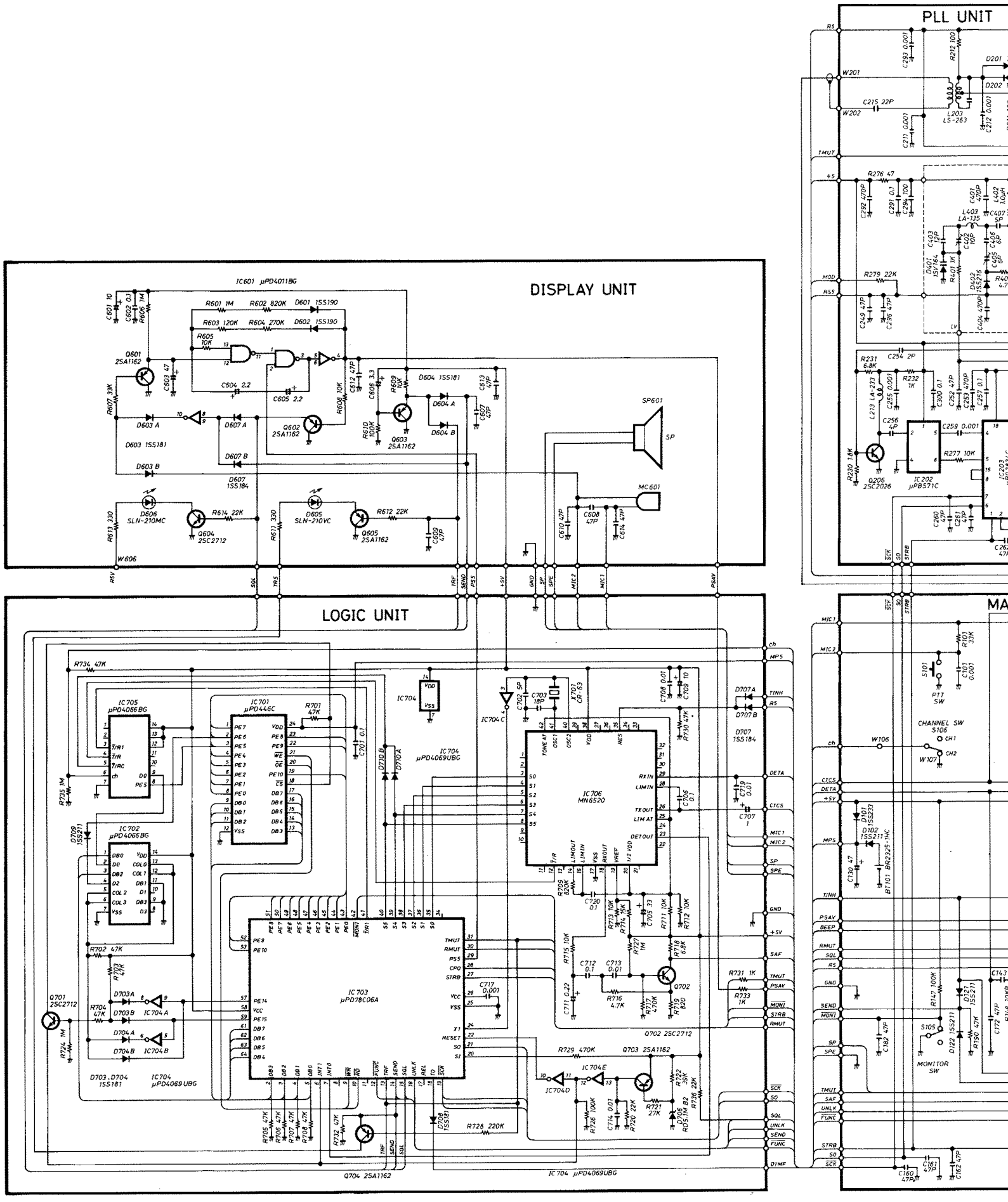
REF. NO.	DESCRIPTION	PART NO.
Q604	Transistor	2SC2712 Y
Q605	Transistor	2SC1162 Y

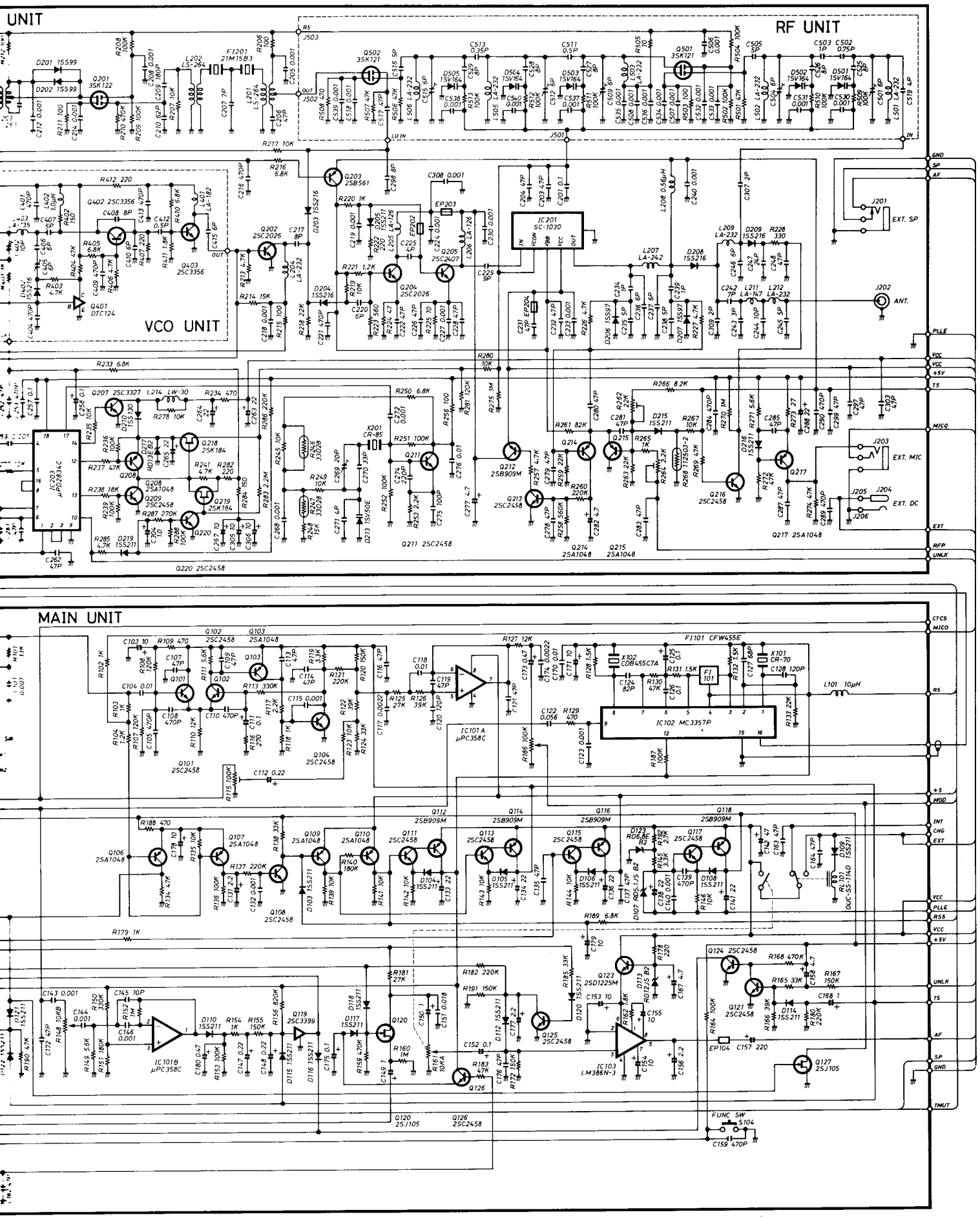
D605	Diode	SLN-210VC	
D606	Diode	SLN-210MC	
R611	Chip	330Ω	MCR10
R612	Chip	22kΩ	MCR10
R613	Chip	330Ω	MCR10
R614	Chip	22kΩ	MCR10
C601	Tantalum	TESVC1A 106M12	
C602	Monolithic	0.1μF	GRM40 F
C608	Ceramic	47pF	50V
C609	Monolithic	47pF	GRM40
C610	Monolithic	47pF	GRM40
C614	Monolithic	47pF	GRM40
MC601	Microphone	KUC-2023-01-06	
SP601	Speaker	40P-157B	
EP603	P.C. Board	B-1237B	
EP604	F.P.C. Board	B-1046A	
W601	Wire	23/04/050/W01/W01	
W602	Wire	23/00/040/W01/W01	
W603	Wire	23/02/050/W01/W01	
W604	Wire	23/07/050/W01/W01	
W605	Wire	23/00/040/W01/W01	

LOGIC UNIT

REF. NO.	DESCRIPTION	PART NO.	
IC701	IC	μPD446C	
IC702	IC	μPD4066BG	
IC703	IC	μPD78C06AG-570-12	
IC704	IC	μPD4069UBG	
IC705	IC	μPD4066BG	
IC706	IC	MN6520	
Q701	Transistor	2SC2712 Y	
Q702	Transistor	2SC2712 Y	
Q703	Transistor	2SA1162 Y	
Q704	Transistor	2SA1162 Y	
D703	Diode	1SS181	
D704	Diode	1SS181	
D706	Zener	RD5.1M B2	
D707	Diode	1SS184	
D708	Diode	1SS181	
D709	Diode	1SS211	
D710	Diode	1SS184	
X701	Crystal	RF-4A3FACNKD	
R701	Chip	47kΩ	MCR10
R702	Chip	47kΩ	MCR10
R703	Chip	47kΩ	MCR10
R704	Chip	47kΩ	MCR10
R705	Chip	47kΩ	MCR10
R706	Chip	47kΩ	MCR10
R707	Chip	47kΩ	MCR10
R708	Chip	47kΩ	MCR10
R709	Chip	820kΩ	MCR10 (#01)
		150kΩ	MCR10 (#02)
R710	Chip	2.2kΩ	MCR10 (#02 only)
R711	Chip	10kΩ	MCR10
R712	Chip	10kΩ	MCR10
R713	Chip	10kΩ	MCR10
R714	Chip	15kΩ	MCR10
R715	Chip	10kΩ	MCR10
R716	Chip	4.7kΩ	MCR10
R717	Chip	470kΩ	MCR10
R718	Chip	6.8kΩ	MCR10
R719	Chip	820Ω	MCR10
R720	Chip	22kΩ	MCR10
R721	Chip	27kΩ	MCR10
R722	Chip	39kΩ	MCR10
R724	Chip	1MΩ	MCR10
R726	Chip	100kΩ	MCR10
R727	Chip	1MΩ	MCR10
R728	Chip	220kΩ	MCR10
R729	Chip	470kΩ	MCR10
R730	Chip	47kΩ	MCR10
R731	Chip	1kΩ	MCR10
R732	Chip	47kΩ	MCR10
R733	Chip	1kΩ	MCR10
R734	Chip	47kΩ	MCR10
R735	Chip	1MΩ	MCR10
R736	Chip	22kΩ	MCR10
C701	Monolithic	0.1μF	GRM40 F
C705	Electrolytic	33μF	10V RC3
C706	Monolithic	0.1μF	GRM40 F
C707	Electrolytic	1μF	50V RC3
C708	Monolithic	0.01μF	GRM40 F
C709	Electrolytic	10μF	16V RC3
C711	Electrolytic	0.22μF	50V RC3
C712	Monolithic	0.1μF	GRM40 F
C713	Monolithic	0.01μF	GRM40 F
C714	Monolithic	0.01μF	GRM40 F
C717	Monolithic	0.01μF	GRM40 F
C718	Monolithic	0.001μF	GRM40
C719	Monolithic	0.01μF	GRM40 F
EP702	P.C. Board	B-1236C	

IC-U2 SCHEMATIC DIAGRAM





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