

DX-701

Service Manual

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ALINCO ELECTRONICS INC.

SPECIFICATIONS

1) General

Frequency coverage	Receiver Transmit	0.5 - 29.9999MHz continuously 1.6000 - 29.9999MHz
Mode		J3E(USB,LSB), A3E(AM)
Usable temperature		- 10 °C ~ +60 °C
Frequency stability		± 0.5ppm
Antenna impedance		50 ohms unbalanced
Power supply		13.8V DC ± 15%
Number of memory		100 channels simplex or two-frequency simplex (TX RX split frequency memory)
Current drain (13.8V DC)	Transmit 20A Receive 1.2A	
Dimensions		W178 × H58 × D228 mm (Projections not included) (W170 × H23 × D9.0 inches) W179 × H71 × D268 mm (W7.1 × H2.8 × D10.6 inches) Approx. 2.7 kg(6.0 lb)
Weight		

2) Transmitter

Output power	J3E(USB,LSB) A3E(AM)	1.6 - 29.9999MHz 100W 1.6 - 29.9999MHz 40W
Spurious emissions		Less than - 40db
Carrier suppression		More than 40db
Unwanted sideband		More than 50 db (1kHz)
Modulation system	SSB Balanced	
Microphone impedance	AM Low power modulation	2K ohms

3) Receiver

Sensitivity	J3E	(1.8 ~ 30MHz) 0db μ EMF (1 μ V) SINAD 12db (0.5 ~ 1.8MHz) +10db μ EMF (3 μ V) SINAD 12db
	A3E	(1.8 ~ 30MHz) +12db μ EMF (4.0 μ V) SINAD 12db (0.5 ~ 1.8MHz) +20db μ EMF (10 μ V) SINAD 12db
Selectivity	J3E	2.4kHz/ - 6db 4.5kHz/ - 60db
	A3E	6kHz/ - 6db 18kHz/ - 60db
Intermediate frequency	1st	71.75MHz
	2nd	455kHz
Spurious and image rejection ratio		More than 70db
Audio output power		More than 2.0W (8ohms,10%) 4W (4ohms,10%)
RTT variable range		± 1.4kHz or ± 0.2kHz

CIRCUIT DESCRIPTION

1. Receiver System

1) Filter Unit

a. HF Antenna Input

SA501 and R527 are installed in the input part of HF antenna terminal as the countermeasure against the thunder. The electric charge of HF antenna is discharged at R527, and when the voltage becomes over about 300V, the gap of SA501 is discharged so that the receiving input circuit is protected.

The input signal from HF antenna is passed through the transmission/reception selecting relay RL513. The followings are prevented in LPF consisting of L525, L526, C580, C581 and C582: 2m band image receiving, passing through the First IF (71.75MHz) and leaking of the first local oscillating frequency (72-102MHz) to the antenna terminal. The receiving signal, then after passing through the attenuator circuit (ON/OFF) of about 20dB consisting of RL515, R528 and R531 the signal is led to the Main unit.

2) Main Unit

a. Front End

The receiving signal output from Filter Unit is fed to Main unit through CN2. HPF, consisting of L19, L20, C47, C48, C49, C50, C51 and C52, eliminates the strong radio signal of MW band of 1.6MHz or below. In case of receiving the signal of 1.6MHz or below, the sensitivity is controlled by the attenuator in R37 and BPF1, also the signal is separated into 1.6MHz, over or below.

4 BPF units consists of 8 filters. Each filter covers the following frequency range. The frequency of 2.5MHz or more consists of Chebyshev BPF, and under 2.5MHz frequency band is LPF. Two BPF's are installed on the same unit. Not to be influenced so much, the distant frequency band BPF's are combined.

- 1.6MHz	BPF1
1.6 - 2.5MHz	BPF2
2.5 - 4.5MHz	BPF3
4.5 - 7.5MHz	BPF4
7.5 - 10.5MHz	BPF1
10.5 - 14.5MHz	BPF2
14.5 - 21.5MHz	BPF3
21.5 - 30MHz	BPF4
	1.8MHz
	3.5MHz
	7MHz
	10MHz
	14MHz
	18, 21MHz
	24, 28MHz

Passing through BPF, the signal turns ON/OFF in the switching diode, D29 and D30. This preamplifier is the parallel grounded gate operation of Q9 and Q10 (2SK2171), so the unit can obtain a good performance at a high level input signal with low NF.

The wide range frequency from about 1MHz to 30MHz is amplified about 10dB. This 10dB preamplifier and 20dB attenuator in the Filter unit are combined, then by pressing RF gain switch on the front panel, one of four steps, -20, -10, 0, or +10dB is selected.

The LPF, consisting of L52, L53, L54, C103, C104, C105, and C106, prevents the following first receiving mixer from the local oscillation leaking, and also prevents the first IF and image of the spurious receiving.

The first receiving mixer consisting of Q10 and Q11 is the balanced mixer, in which the local oscillating signal is fed to the gate of 2SK2171.

The 3rd intercept point is about 20dBm, and local oscillator of about 2V P-P is fed to the gate. The receiving signal is converted into the first IF of 71.75MHz.

As the ratio of the spurious interference is decreased in 50MHz band mode, the trap of 71.75MHz consisting of L72 and C107 keeps the ratio of spurious interference 70dB or more in all band.

b. The First IF Amplifier Circuit

FL1, A and FL1, B are the crystal filters of 71.75MHz. By the combination of two filters, the unit has the characteristics of the band width of 15kHz or more/3dB and the value of guaranteed attenuation of 70dB or more. Here the image ratio is determined 70dB or more (approx. 80dB). The first IF amplifier circuit of Q12 is located between the crystal filters to prevent the loss in the front-end and mutual interference.

The first IF amplifier circuit Q12 decides the sensitivity after passing the mixer. AGC voltage is applied to the second gate.

c. The Second Mixer Circuit, The Second Amplifier Circuit

DBM (Double Balanced Mixer) consists of L14, D7 and L16. The signal is passed in the opposite direction while receiving or transmitting in this DBM. Approximately 0dBm is fed as the second local oscillating level, and the third IP is approximately 10dBm.

The receiving signal (71.75MHz) and the second local oscillating frequency (71.295MHz) is mixed, and unwanted signal is eliminated in LPF consisting of L17, L73 and C36, then the signal of 455kHz is generated. After passing through the switching diode D8, the signal is amplified in Q22. The source of Q22 is controlled by the output of the noise blanker circuit.

d. IF Filter

After passing through the transmission/reception switching diode D9, the signal is led to one of three ceramic filters of 455kHz. The selectivity is decided here except CW narrow.

SSB	FL3(CFJ455K14)	2.4kHz/ - 6dB	4.5kHz/ - 60dB
AM	FL4(CFW455HT)	6kHz/ - 6dB	18kHz/ - 60dB

Each filter has 4 switching diodes (D3-D48) in front and rear to isolate the filter.

The isolation is required the value of guaranteed attenuation of each filter (approx. 70dB) or more. The diode connected in parallel in front and rear of no used filter is short and the diode connected in series is open. The combination of open and short is used to get the high isolation.

The modes, transmission/reception of this filter are selected by Q37, Q38, D82, D113.

e. The Second IF Amplifier Circuit

After passing through the filter, the signal is led to the transmission/reception switching diode D49, and amplified in Q23 and Q24, then buffered in Q25.

The AGC voltage is applied to the second gate of Q22, Q23 and Q24.

The output level of Q25 is fixed because the AGC voltage is added to the receiving signal.

This output signal is used for the demodulation in SSB and AM modes and AGC detection.

f. Demodulation Circuit

In SSB modes, the following local oscillating frequency is supplied from PLL unit to IC3 balanced mixer, then the signal is demodulated.

The receiving signal is fed to Pin1, and local oscillation Pin3, then picked up the demodulation output of approximately 100mV from Pin7.

USB	456.5kHz
LSB	453.5kHz

The output is led to the switching circuit of each mode.

In AM mode, the signal is detected in D51, then led to IC5.

g. AF, AGC Time Constant Selection

IC5 is the analogue multiplexer which has 2 circuits with 4 contact points, and switches the demodulation output in every mode and AGC time constant. The voltage combined in D55 and D56 is input to Pin9 and Pin10, then the output of IC3(SSB), the modulation output of AM audio filter output are selected. The voltage of 8V is applied to Pin6 (INHIBIT) when transmitting, and the modulation output is turned OFF unconditionally.

h. AF Amplifier

The voltage that can pass through the analogue switch of IC5 is very low. The voltage is amplified approximately 20dB in IC12: B to get higher AF input voltage to following IC13 (voltage controlled electronic volume). Also a part of this output is picked up and output to Pin6 of microphone as non-squelched audio output. This output is used as the terminal of packet, RTTY, FAX, etc.

i. Electronic Volume, AF Amplifier

IC13 is the dual electronic volume controlled by the voltage.

The volume is controlled by the AF GAIN VR on the front panel. Pin5 is the control terminal. The value of the attenuation is the minimum when the control voltage is about 3.4V, and the value is 90dB or more at maximum when the control voltage is about 3.1V.

One of the circuits is for volume control of the demodulation sound, and the other for the volume control of the beep. The beep can be heard even if the volume is set to the minimum point and sound tone is related with AF GAIN VR.

AF GAIN VR.

The squelch circuit (IC14:A, Q14) controls Pin5. The output of IC14: A activates to close the squelch when transmitting, so Q14 is turned OFF in D85 to control the volume of the sidetone.

The receiving sound is fed to pin6 and applied from Pin7. As for the beep, Pin2 is for input and Pin1 for output. This output is combined with the input of LPF amplifier IC12:A. The high tone noise that is generated in IF amplifier is decreased by LPF amplifier.

The output of IC12: A is attenuated in R309 and R310 to get the same level with IC20, and also to decrease the noise. IC20 is the AF power amplifier which can get the output of 2W or more (THD 10%) at 8Ω load. The ripple filter consists of Q51 and C260.

j. AGC

The AGC voltage is supplied one stage to first IF amplifier and three stages to second IF amplifier. These IF amplifiers consist of 3SK131. AGC voltage is applied to the Gate2. The IF amplifiers are designed that the gain is changed linearly corresponding to the AGC voltage. D53 and D54 are the rectifier, and Q26 is DC amplifier. D50, the anode is set to about 2V in R176, D110, D111 and R177. Usually AGC voltage is applied 2.4V. The strong signal rectifies D53 and D54 resulting in DC voltage. Q26 decreases the AGC voltage.

The attack time of AGC is determined R167 and C204 then the release time is determined R175 and C287. The characteristics are "fast attack" and "slow release". In case of AM, C206 is connected in parallel, then the attack time is delayed, which is the average type. D110, D114 and D115 is the thermal compensation of D50.

In receiving AM, AGC is the average type not to follow the modulation.

k. S Meter, Squelch

The output of Pin1 and RF meter output are combined in the diode, then it is sent to the front CPU to display the meter. The output signal of Pin1 is fed to Pin6 of IC14:A. The voltage of Pin5 is determined by the squelch level. Comparing with this voltage, the squelch is opened or closed.

While the check operation the CPU output decreases the voltage of squelch VR in front side to open the squelch forcibly. The squelch output controls IC13, at the same time it is provided to the front unit to light RX LED and led to CPU unit.

l. Noise Blanker Circuit

This circuit eliminates the pulse noise of a car, etc. Because the noise emitting time is short, in this duration the operation of receiver is stopped to prevent the unit from emitting a noise. The pulse noise is delayed when it is passed through the narrow band filter, and the emitting time becomes longer. It makes difficult to eliminate the noise, so it is necessary to eliminate the noise in the earlier stage. A part of the second mixer output, whose band width is limited, is amplified in Q20, Q19, Q18, and Q16. The signal is detected in D33 and D34, and the AGC voltage is applied to Q19, Q18 and Q16.

The charge time constant of this AGC is determined by R82 and C128, and also the discharge constant is determined by R81+R82, C128. The voltage of AGC does not rise suddenly because of the charge constant, so that this voltage is not applied to almost all the short signals such as pulse noise, but is applied to the continuous signals such as receiving signal and amplifier gain is decreased.

While emitting the pulse noise, the AGC voltage does not follow the pulse noise, so the detected voltage is high, then Q15 is turned ON in that time.

On the contrary, as for the continuous signal, the detected voltage of D33 and D34 is fixed by AGC, so Q15 is turned OFF because of the emitter bias of R85 and R84.

Namely Q15 is turned ON only the time of the pulse noise, then Q21 is turned OFF. The source of IF amplifier of Q22 is biased through R98 and R102 so that the gain is decreased and the signal is blanked. When the emitter of Q15 is biased to high, the Noise Blanker is turned OFF.

2. Transmitter System

1) Main Unit

a. Microphone Amplifier

The input signal from microphone is amplified by the low noise amplifier Q56 through the mic gain VR1. It is possible to bias (8V) the microphone terminal with R388 for the microphone which needs the power supply. (solder bridge)

The gain of IC21 (approx. 15dB) is determined by R329 and R328.

C345 and R384 are connected to the feedback circuit by Q63 when the speech compressor is turned ON. The gain is increased about 15dB. IC21:B is operated as the limiter.

When the speech compressor is ON, the low frequency is cut by C345.

The output of Pin1 of IC21: B is attenuated in R326 and R325. The subaudible

b. Balanced Mixer

IC2 is the balanced mixer, and the carrier is suppressed in SSB mode. To get more ratio of carrier suppression, the balance adjustment of VR3 and VR4 are applied.

The carrier is necessary in AM mode, so the input of Pin1 is made unbalanced by applying the DC voltage to obtain the carrier.

By applying the DC in AM, the balance is broken to obtain the carrier wave. VR11 is used for the adjustment of carrier level.

In the AM mode, the DC and modulation is added simultaneously. In SSB mode, the modulation is added by R317. In AM mode, D93 is DC-biased and turned ON. Then the attenuator consisting of R317 and R383 limits the modulation.

c. IF Filter

After the output of IC2 increases the impedance in C177 and L77, it is passed through D49 and led into band limit IF filter. D52 is isolated highly by connecting to the output in parallel at receiving. In SSB mode, the output is DSB signal. (Double Side Band)

The filter is switched by the selection of above-mentioned diode switch. The signal is passed through the following filter in each mode.

SSB	FL3(CFJ455K14)	2.4kHz/ - 6dB	4.5kHz/ - 60dB
FM,AM	FL4(CFW455HT)	6kHz/ - 6dB	18kHz/ - 60dB

SSB is obtained by eliminating one of side bands of DSB through the filter.

d. IF Amplifier, The Second Mixer

After passing through the filter, the signal is led to D37, Q7, and D6, and passed through the second mixer in the opposite direction of the receiving, then the signal of 71.75MHz is obtained.

The voltage of ALC is added to the second gate of Q7.

The local oscillating signal of 71.295MHz and unwanted signal are eliminated in FL1: A and FL5. The signal is amplified in Q5, passed through FL5, then led to the balanced mixer of Q3 and Q4.

e. The First Transmitting Mixer

This mixer is the balanced type, and the unwanted signals (IF and local oscillating signal) are decreased. The best operation is selected by biasing the second gate. To decrease the spurious, the signal is balanced in VR1.

f. Power Amplifier

Passing through the mixer, the transmitting signal which has the desired transmitting frequency is passed after switching the LPF. The unwanted signal and especially the leak of local oscillating signal is decreased as less as possible. The signal is amplified up to 0-3dBm in Q1. Then the signal is supplied to PA unit.

2) PA Unit

a. Power Amplifier

The signal input to PA unit is amplified up to approximately 100mW. The idling current of Q601 flows about 100mA during transmitting as A-class amplifier. The frequency characteristics are compensated by feedback, besides connecting the capacitor to emitter resistor in parallel.

The signal is amplified up to 10W in Q602 and Q603.

PA amplifier is the wide band range from 1.8MHz to 30MHz

The idling current flows 100mA (adjusted in VR601), and the amplifier is the push-pull type.

D601 is connected to Q602 and Q603 thermally, and the idling current is compensated for temperature.

b. Final Stage Power Amplifier

In the final stage amplifier circuit consisting of Q604 and Q605 (2SC2904), the idling current of about 300mA is flowing. The base bias is made by Q606. D604 and D605 are connected to Q604, Q605 and Q606 thermally, and the idling current is compensated for temperature.

The feedback circuit, consisting of R621, R622, R623, C633, R627, R628 and C637, makes the gain flat in the wide range of 1.8MHz-30MHz.

The 100W output is led to filter unit.

The collector current of Q606 and Q607 is detected by using FB606 and L611. Then led to the main unit.

c. Fan Control

The heat of Q606 and Q607 is detected by the thermistor TH601, and the fan is controlled. While transmitting, the resistance value is decreased by the rising of the temperature, then the voltage of inverting input terminal of IC601A/B is decreased. Non-inverting input is applied with the voltage corresponding to the temperature. When the temperature goes up to about 50°C or more and the compared voltage becomes lower than the inverting input voltage, Q607 is turned ON by the output voltage of comparator, IC601: A. Then the fan starts turning at a low speed by the value of series resistor (R639). When the temperature rises more and the voltage becomes much lower than the compared voltage IC601: B, Q608 is turned ON. Then R639 is turned OFF and the fan turns at a high speed according to the value of series resistor of R640 to decrease the compared voltage of IC601: A.

When the temperature goes up to about 100°C and the voltage is decreased further lower, IC601: A supplies again, then R639 and R640 are connected in parallel to turn the fan at a higher speed. Although ordinary PDWN is pulled up to 14V by R637, the power output is set to LOW because both cathode terminals of D608 become LOW when the fan turns at a high speed. Then the signal is sent to the main unit as the control signal for power down at high temperature.

As the compared voltage of IC601: B is decreased in D611 while receiving, IC601: B does not work if the temperature does not go up higher than it while transmitting. The temperature, at which the fan turns at a middle speed or more, is higher than it while transmitting. At high temperature, fan's turning speed comes down while receiving.

d. Protection Circuit

For the protection of the final power amplifier, the followings are equipped:

- SWR detection
- Protection against over current
- Power down circuit for the temperature detection

e. Power Control, ALC Circuit

The forward wave voltage in proportion to the transmitting power obtained in filter unit is inverting-input to IC8-A, and inverting-amplified. Non-inverting input is applied the voltage, and the output voltage is shifted by the non-inverting input voltage.

ALC line is applied the voltage of about 2.7V beforehand, and the ALC voltage is supplied to the second gate of the amplifier.

When the forward wave voltage is detected, the output voltage of IC8: A is decreased. If it is about 3V or below, the ALC line voltage is decreased by D63. VR7 is used for the adjustment of 100W. When the unit is switched to 50W by S1, Q27 is turned ON and VR5 is connected in parallel to decrease the voltage, then the unit is adjusted to 50W.

In AM mode, R195 is connected in parallel to decrease the voltage up to about 40W.

In the low power mode, R191 is connected in parallel by setting to LOW, and the voltage is decreased.

Q29 and VR8 are used for the adjustment to get the required power of about 10W in the matching operation of external automatic tuner. (The required power depends on the tuner.)

When the value of SWR is high, the reflected wave voltage turns Q28 ON to decrease the power. The unit is operated when the SWR is about 3 or more.

Compared with the forward wave detection power in HF band of 100 W, the forward wave voltage in 50MHz band of 10W is set to higher a little.

In SSB mode, "fast attack" is obtained by D63, and the release time of "slow attack" is obtained by C222 and R130. In AM mode C221 is connected in parallel by Q30, and the unit is operated in near the average value.

f. Over Current Protection Circuit

The final stage collector current which is detected in PA unit is differential-amplified in IC8: B. The output voltage is decreased according to the increase of the current. Then ALC line is fallen by D63 and the output power is decreased. The operational point is decided in VR6.

g. RF Meter Circuit, ALC Indication

The forward wave is amplified in IC9: A to obtain the meter output voltage. The peak is held in D70, R223 and C223, and the meter swings smoothly. Meter output voltage and S meter output voltage are switched in D71 and D86 automatically.

ALC voltage is inverting voltage amplified in IC9: B. This output is applied to the base of Q31, then sent to front unit for the detection of transmission/reception and lighting the transmitting LED. The LED brightness is changed according to the ALC voltage.

h. Tune Circuit

When using the external automatic antenna tuner, this circuit controls the matching start signal and the operation of the unit during tuner matching.

When the tune operation is started, the Tune voltage is supplied to operate the one-shot multivibrator in IC18: C, D. The voltage of about 8 V is applied to outside for a fixed time through Q52 as the start signal. In the other hand, Q53 supplies the tune voltage of sink output, it becomes LOW while tuning. (For the transceiver made by ICOM, KENWOOD).

As soon as the tuner receives the tune start signal, the tuner provides it as the tuning signal. (TKEY terminal)

CPU observes the TKEY terminal, and keeps the unit in TUNE mode indicating that the tuner is operating while it is in the LOW level. CPU releases the TUNE mode when TKEY terminal is in LOW for 20 seconds or more. In the Tune mode the unit transmits a signal in AM mode, the microphone output is muted, then the carrier is kept on outputting about 10W (adjustable).

i. Regulated Power Supply Circuit

IC11 is the 8V Regulated Power Supply Circuit. T8V that is necessary for transmitting is made in Q33, and R8V that is necessary for receiving is made in Q35. IC10, Q32 and Q34 control the transmission/reception. When PTT line is connected to the ground through the microphone terminal or CW keying output (Q46), H level is supplied from IC10: A and it is led to CPU of front unit to detect the transmission/reception switching.

IC10: C delays the rise of receiving in R227, C224 and D62 and controls in Q32 and Q33.

While receiving, the current is flowing from 13.8V through R230 and D75, then the base voltage Q33 is approximately 8.7V, and the emitter output is just 8V.

While transmitting, the base voltage of Q33 is 0V because Q32 is turned ON, and R8V is not provided.

While transmitting R8V is short by D77, and it makes the charge voltage such as electrolytic capacitor discharge momentarily not to remain R8V.

As for Q35, as same as R8V the current is flowing from 13.8V through R230 and D75, then the base voltage of Q35 is approximately 8.7V and the emitter output is just 8V while receiving. While transmitting, the base voltage is 0V because Q34 is turned ON, and T8V is not provided.

While transmitting T8V is short by D77, and it makes the charge voltage such as electrolytic capacitor discharge momentarily not to remain T8V.

After delayed the transmitting rise time in IC10:B, the signal is inverted in IC16:D, then T8V is controlled in Q34.

When Pin8 IC10:A is supplied the voltage, the unit enters PTT lock mode without changing the output of Pin10 even if the PTT line is connected to the ground.

j. Mode Voltage, Function Control (BPF/LPF Selector)

The enable terminals of IC15 and IC16 select the signal ENX or ENY by using IC24 and Q62.

The data from CPU (DAT2) consists of 16-bit serial data, two 8-bit shift resistors are connected in series.

IC22 and IC23 control the band selection, ON/OFF of preamplifier, ATT, power, TX mute function, etc. They are operated in Low level.

IC15 controls the Mode voltage, and IC16 controls filter, AGC, Break-in, PTT lock, and Noise blanker. The voltage of every mode (USB, LSB, AM, CW, CWU, CWL, FM, TUNE) turns ON Q41, Q42, Q43 and Q44 to supply 8V.

k. LPF

HF supplied from PA final stage eliminates harmonics through LPF of filter unit. Input/Output of this filter is switched by the relay, and Input/Output of unused filter is short at the relay contact.

LPF control is used the BPF control voltage of the main unit.

Every LPF consists of Chebyshev filter, and double or more harmonics are attenuated about 40dB or more.

L0	~ 2.5MHz	BB0, BB1	1.8MHz band
L1	2.5MHz~4.0MHz	BB2	3.5MHz band
L2	4.0MHz~7.5MHz	BB3	7MHz band
L3	7.5MHz~14.5MHz	BB4, BB5	10, 14MHz band

L4	14.5MHz~21.5MHz	BB6	18, 21MHz band
L5	21.5MHz~30.0MHz	BB7	24, 28MHz band

The transmitting signal, whose spurious is eliminated by passing through LPF, is led to power detection circuit and supplied to antenna terminal passing through the selection relay.

l. Power Detection Circuit

L534 is 10-turn bifilar of toroidal core (twisted pairs of AWG). Therefore the both sides are 20 turns with center tap.

Piercing the center hole of the core means the same with 1 turn. So the transformer is 1:20.

Therefore R508 is applied the voltage (forward wave voltage) according to the output voltage, and R509 is applied the voltage (reflected wave) according to the reflected power. The output power and reflection detect the power to control the power in the main unit.

3) Front Unit

a. Power Switch

When SW1001 is push ON, Q1001 is turned ON, then the contact of RL602 in PA unit is turned ON to supply the voltage of 13.8V to the front unit.

b. Power Supply

IC1007 is the regulated power supply of 5V which has the output for CPU reset. IC1008 is the regulated power supply of 8V which generates the required voltage for volume control.

When the power supply is cut OFF, the output of regulated power supply of 8V is decreased first, and it is detected in IC1001:B, then sent to CPU. In CPU the data is stored in the EEPROM of IC1005 before the output of regulated power supply of 5V is decreased and the unit is reset. D1019 and C1002 are used to hold the output voltage of 5V by keeping the input voltage of 5V regulated power supply as long as possible.

c. Dimmer Circuit

The regulated power supply of about 10.5V consists of Q1003, Q1004 and Q1005. Q1003 supplies about 10.5V when the DIMM output from CPU is 5V. In CPU unit, DIMM is the pulse output, and it switches ON/OFF of the output of about 10.5V.

At full lighting the output from CPU is fixed to 5V. In this way the brightness is changed by the duty in Q1003.

Q1003 is supplied the current by turning ON/OFF. At the maximum the brightness is the lightest, and the duty is decreased according to the dimmer, then the power dissipation is decreased. The dimmer can be operated by the small transistor.

The maximum brightness is 10.5V, and it is set to under the regulation voltage (6.3V x 2) to prolong the life of the lamp. The rush current when the lamp is turned ON is in pulse mode to decrease the load on the lamp.

d. LCD

The indication such as frequency that is required the speed is performed by the CPU itself, and the other indications are performed by the LCD driver of IC1009. The LCD indication employs the frame frequency of about 128Hz, 1/2 DUTY and 1/2 bias.

e. Others

X1001 is the ceramic resonator of 8MHz selected not to enter the amateur band in the harmonics relations.

When the power is ON, the voltage is supplied from Y2 and Y3, to detect whether it is connected to the outputs DB0-DB4 or not, then the destination is determined. The currents in Y0 and Y1, and between DB-DB4 are scanned to detect which switch on the front panel is pressed.

The both sides of RIT VR are applied 5V, and the location of VR is detected by the voltage of A/D input terminal.

In the Receiving frequency monitor Q1019 is turned ON by the MONI output from CPU, the squelch setting voltage programmed by switch on the front panel is decreased forcibly. Then the squelch is open forcibly without any relation with squelch position.

The output from the main unit (RTXC) lights the LED according to the change of the ALC voltage. The output cannot be supplied as it is, so it is changed to ON/OFF signal in Q1009.

Q1011 is the squelch output from the main unit, and it lights RX LED.

4) PLL Unit

Summary

The followings are performed in PLL unit:

- The generation of carrier signal
- The generation of the first and second local oscillating signal
- Making the power supply of 5V

Details

(1) There are 3 kinds of power supply as follows:

- The voltage of 13V passed through the switch
- The voltage of 8V made in the MAIN unit
- The voltage of 5V made in the PLL unit

Power supply depending on the MODE comes from the main unit.

- (2) First the reference signal of 30MHz is generated in X701 and Q701 according to the constant of TC701 and L702.
- (3) Secondly the signal of 9.420MHz +/- 1.5kHz is generated by the voltage of D706 in X702, Q721 and Q722.
- (4) Thirdly the signal of 9.875MHz +/- 1.5kHz is generated according to the constant of TC702-TC704, C807, C809, C810, C811 and C812 in Q725 and Q724.
- (5) The frequency of 9.875MHz is changed according to the MODE, transmission/reception.

[Transmission/Reception of LSB]

CN701 Pin21 (LSB) is applied the voltage of 8V and the signal is passed through D714, then results in the frequency of 9.8735MHz according to the constant of TC702 and C812. Also (LSB), 8V is passed through D718, and the voltage is applied to Q723 to emit the carrier signal.

[Transmission/Reception of USB]

CN701 Pin26 (USB) is applied the voltage of 8V and the signal is passed through D711, then results in the frequency of 9.8765MHz according to the constant of TC704 and C807. Also(USB) 8V is passed through D717, and the voltage is

applied to Q723 to emit the carrier signal.

[Reception of AM]

CN701 Pin22 (AT) is added the voltage of 8V, then results in the frequency of 9.875MHz according to the constant of TC703 and C811. Q723 has no voltage, and carrier signal is never emitted.

[Transmission of AM/TUNE]

CN701 Pin22(AT) is applied 8V and results in the frequency of 9.875MHz according to the constant of TC703, C811.

The voltage of 8V from CN701 Pin23 (TBV) is passed through D718 to add the voltage to Q723, then the carrier signal is emitted.

(7) The Emission of 455kHz Carrier Signal

The above-mentioned 9.875MHz signal is input to Mixer IC712 Pin6, and 9.42MHz signal is input to IC712 Pin8. The difference frequency of 455kHz is output from IC712 Pin3 and sent to the MAIN unit from J701 after amplified in Q723. The Output level is approximately -5dB.

(Frequency Relations depending on the Mode)

- USB(TX RX) 9.8765MHz - 9.42MHz = 456.5kHz (**)
- LSB(TX RX) 9.8735MHz - 9.42MHz = 453.5kHz (**)
- AM (TX) 9.8750MHz - 9.42MHz = 455.0kHz (*)
- AM (RX) does not output

(8) The Second Local Oscillating Signal

In VCO2 unit, after the frequency of 71.295MHz is oscillated in Q941 and amplified in Q949, Q944 and Q945, the signal of approximately 3dB is supplied to MAIN unit through J702 as the second local oscillating signal.

The signal for PLL loop is supplied from Q942 to PLL unit.

The signal of 71.295MHz is fed to Mixer IC711 Pin7 and the signal of 9.42MHz is fed to Pin3, so that the difference frequency of 61.875MHz output from Pin6 only is picked up by Q711, L712 and L711, and fed to PLL IC707, then locked at 61.875MHz.

Therefore, by rotating the IF shift volume, 9.42MHz, and also 71.295MHz are changed.

The frequency of 30MHz is fed to IC707 through Pin1, and it is divided to get the following frequency as the reference frequency, and also the frequency of 61.875MHz is divided to get the reference frequency, then these two frequencies are compared.

(9) The First Local Oscillating Signal

The frequency oscillated in VCO3 is amplified in Q710 and Q714, and passed through the switching diode D725 and D726, then band-pass filter and RL701. The signal of approximately 3dB is fed to the MAIN unit from J703.

3 VCO's are built in VCO3, and it is oscillated under following frequency conditions:

150kHz~under 10.5MHz:

The VCO is oscillated within 71.90~82.25MHz by D961, TC961 and C961.

10.5kHz~under 21.5MHz:

The VCO is oscillated within 82.25~93.25MHz by D963, TC962 and Q963.
21.5kHz~under 30.0MHz:

The VCO is oscillated within 93.25~101.75MHz by D965, TC963 and Q965.

These 3 VCO's are selected by the serial data of DAT2, CK2 and ENB from CPU. 8 signals from IC716 are reduced up to 3 signals, then VCO is selected by the switches of VCO3, Q962, Q964 and Q966.

When the frequency is 50MHz, in VCO3 the oscillated frequency within 76.75~80.75MHz by D961, TC961 and Q961 are synthesized with the frequency of 45MHz by the DBM (Double Balanced Mixer) in L729, L730 and D730, then the frequency within 121.75~125.75MHz is generated. It is passed through RL701 by the band-pass filters of L732, L733, L734 and L735 and Amplifier of Q731 and Q716, then the signal of approximately 3dB is output to J703.

The frequency of 45MHz is generated as follows: The reference signal of 30MHz is amplified in Q719 and fed to IC701 Pin3, then one half of the signal is supplied from Pin5. 3 times frequency of the signal only is passed through the filter L720, L721 and L722, and fed to the center tap of L729, then led to DEM.

The frequency loop of VCO3 is locked as follows: VCO3 oscillating frequency is passed through Q712 and input to the mixer IC709 Pin6, also the signal of 70.65~70.75MHz (25Hz step) is fed to IC709 Pin8. Then the signal of 1.1~31.1MHz is passed through the amplifier Q713 and led to PLL IC702 Pin8 as the difference signal.

This frequency is locked by the following procedure.

1.1MHz is added to the digit number of 100kHz or more of the operation frequency, and divided to obtain 100kHz. Then the frequency is locked after comparing with the reference frequency 100kHz. See the examples as shown below.

Operation Frequency: 1MHz

→ PLL The frequency fed to IC702 Pin8: 2.1MHz

Operation Frequency: 29MHz

→ PLL The frequency fed to IC702 Pin8: 30.1MHz

Therefore, as the reference frequency of IC702, the reference frequency of 30MHz is divided up to 100kHz inside the unit.

In IC702, the operation frequency of 100kHz or more only is controlled.

In 50MHz band, CN701 Pin1 (50M) is sink, Q732 collector is supplied the voltage of 8V. The power supply of Q731, Q716 is turned ON, Q709 and D730 are turned ON, Q709, RL701, D724 and D724 are turned ON, then D730 is ON and Q724 is OFF.

The deviation while transmitting is 5kHz/DEV, and 2.5kHz/DEV while HF/FM transmitting.

In the HF mode, Q717 is ON, and D725 and D726 are turned ON, then D735 is ON. IC710 Pin4 is supplied about 0.7V so that the operation of IC710 is stopped.

When the unlock signal is emitted from every Pin7 in PLL IC IC702, IC703 and IC707, the voltage of 8V is supplied from the collector in Q728, and Q718 is turned ON so that Q714 is turned OFF, then the level of J703 is decreased about 30dB or more.

(10) 25Hz Step 70.65~70.75MHz

In VCO1 Unit, to generate 25Hz step of the first local oscillating, Q931 is used to oscillate the frequency of 155MHz~175MHz, the signal is passed through Q932 and divided by 20 in IC704, and supplied through Q933. Then the signal is divided by 10 in IC705, and the frequency of 775~875kHz (25Hz step) is fed to the mixer IC701. Therefore, the operation frequency of 100kHz digit or below can be operated in 25Hz step.

Also the frequency is input to PLL unit IC703 Pin8 through Q931 for the PLL loop. PLL IC divides the frequency of 155.000~174.995MHz to get 5kHz, and it is compared with the reference frequency of 5kHz to make the loop.

Indication of the operation frequency of 100kHz digit or below	Oscillating frequency
.0000(00)	155.000MHz
.5000(00)	165.000MHz
.9999(75)	174.995MHz

*The number in () is the frequency of no indication.

The reference frequency of 30MHz is divided to get 5kHz (25Hz x 200), and used as the reference frequency in IC703. Because the signal of 9.875MHz is input to IC701 Pin8, the sum of the frequencies, 10.65~10.75MHz is supplied from IC703 Pin2, and passed through the ceramic filter of 10.7MHz, then fed to IC706 Pin6.

As the double harmonics of reference frequency of 30MHz are generated in Q708, L710 and L709, and they are fed to IC706 Pin8. The sum of the frequency of 70.65~70.75MHz is supplied from IC703 Pin3, passed through the band-pass filter of L706, L707 and L708, and fed to IC709 Pin8. Then the signal is included in a part of the loop of the first local oscillating signal.

5) Terminal function of CPU

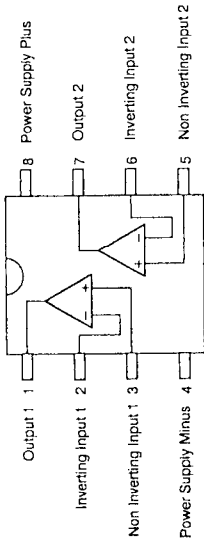
No.	User 1	User 2	User 3	Pin Name	Remarks	I/O	Description	L	H
2		AVss		GND		.			
3				GND		.			
4		X2		XTAL_LOSC		.			
5		X1		XTAL		.			
6		Vss		GND		.			
7				OSC1_XTAL		.			
8				OSC2_XTAL		.			
9		/RES		/RST		1			
10		MDO		S17		1			
11	P20	IRQA		ADTRG_SIC2	SOL CONT	0	Switch Control D/A		
12	P21			UD	SOL CONT	0	Switch Control D/A		
13	P22			SC4	SOL CONT	0	Switch Control D/A		
14	P23			TREY	TUNE KEY	1	Detection of working external antenna tuner	At work	Waiting
15	P24			UNLK	PULL UNLOCK	1	PULL unlock detection	Unlock	Lock
16	P25			MCK	EEPROM CK	0	Check for data transmission/reception to EEPROM		
17	P26			MDAT	EEPROM DATA	I/O	Data Transmission/Reception to EEPROM		
18	P27			EXTIN	EXT IN	1	External EEPROM transmission acceptance	EEPROM	Acceptance
19	P30			SOCK1	CK1	0	HPL, LPL, data transmission clock		
20	P31			SH	DAT1	0	HPL, LPL, data transmission		
21	P32			SO1	ENH	0	HPL data transmission enable		Enable
22	P33			SO2	ENL	0	LPL data transmission enable		Enable
23	P34			SIF	CR2	0	MODE, BPF, etc. transmission clock		
24	P35			SO2	DAT2	0	MODE, BPF, etc. data transmission		
25	P36			STRB	ENA	0	MODE, BPF, etc. data analysis selection		Enable 1
26	P37			CS	ENB	0	MODE, BPF, etc. data enable selection		Enable 2
27				Vss	GND	.			
28				V1		.			
29				V2		.			
30				V1		.			
31				Vcc	5V	.			
32	PA3	COM4		COM4		0	LCD COMMON		
33	PA2	COM3		COM4		0	LCD COMMON		
34	PA1	COM2		COM3		0	LCD COMMON		
35	PA0	COM1		COM3		0	LCD COMMON		
36	P50	SEG1		WKP0_DB0		1	SW_initial setting detection		Detection
37	P51	SEG2		WKP1_DB1		1	SW_initial setting detection		Detection
38	P52	SEG3		WKP2_DB2		1	SW_initial setting detection		Detection
39	P53	SEG4		WKP3_DB3		1	SW_initial setting detection		Detection
40	P54	SEG5		WKP4_DB4		1	SW_initial setting detection		Detection
41	P55	SEG6		WKP5_DB5		0			
42	P56	SEG7		WKP6_DB6		0			
43	P57	SEG8		WKP7_DB7		0			
44	P60	SEG9		Y0		0	Panel SW for ON detection		At detecting
45	P61	SEG10		Y1		0	Panel SW for ON detection		At detecting
46	P62	SEG11		Y2		0	Output for initial condition setting detection		
47	P63	SEG12		Y3		0	Output for initial condition setting detection		
48	P64	SEG13		GND		0			
49	P65	SEG14		LCDEN		0	LCD driver enable		
50	P66	SEG15		LCKCK		0	LCD driver clock		
51	P67	SEG16		LCDATA		0	LCD driver data		

No.	User 1	User 2	User 3	Pin Name	Remarks	I/O	Description	L	H
52	P70	SEG17		SEG17		0	Output to LCD Segment		
53	P71	SEG18		SEG18		0	Output to LCD Segment		
54	P72	SEG19		SEG19		0	Output to LCD Segment		
55	P73	SEG20		SEG20		0	Output to LCD Segment		
56	P74	SEG21		SEG21		0	Output to LCD Segment		
57	P75	SEG22		SEG22		0	Output to LCD Segment		
58	P76	SEG23		SEG23		0	Output to LCD Segment		
59	P77	SEG24		SEG24		0	Output to LCD Segment		
60	P80	SEG25		SEG25		0	Output to LCD Segment		
61	P81	SEG26		SEG26		0	Output to LCD Segment		
62	P82	SEG27		SEG27		0	Output to LCD Segment		
63	P83	SEG28		SEG28		0	Output to LCD Segment		
64	P84	SEG29		SEG29		0	Output to LCD Segment		
65	P85	SEG30		SEG30		0	Output to LCD Segment		
66	P86	SEG31		SEG31		0	Output to LCD Segment		
67	P87	SEG32		SEG32		0	Output to LCD Segment		
68	P90	SEG33		SEG33		0	Output to LCD Segment		
69	P91	SEG34		SEG34		0	Output to LCD Segment		
70	P92	SEG35		SEG35		0	Output to LCD Segment		
71	P93	SEG36		SEG36		0	Output to LCD Segment		
72	P94	SEG37		SEG37		0	Output to LCD Segment		
73	P95	SEG38		SEG38		0	Output to LCD Segment		
74	P96	SEG39		SEG39		0	Output to LCD Segment		
75	P97	SEG40		SEG40		0	Output to LCD Segment		
76		Vcc		5V					
77	P10	TM0W		MONI		0	Open the squelch locally (monitor)		Squelch open locally
78	P11	TM0FL		LIT		0	The command to put out the light locally and flashing to LCD driver	Put out the light locally	Burning lighting
79	P12	TM0FH		BEEP		0	Beep sound output	Pulse output	
80	P13	TM0S		SQS		1	Squelch open/close condition detection	Squelch close	Squelch open
81	P14	PWM		DIMM	DIMMER	0	LCD dimmer control	Duty control of pulse output	
82	P15	TRQ1		TXS		1	Transmission condition detection	Transmission	Reception
83	P15	TRQ2		SUBA		1	MF dial rotation detection		
84	P17	TRQ3		SUBB		1	MF dial rotation detection		
85	P40	SOCK3		SC1		0	Switch Control D/A		
86	P41	RXD		RXD		1	Come Data input		
87	P42	TXD		TXD		1	Come Data output		
88	P43	IRCO		POWERD	POWER DOWN	1	Power OFF detection	Power OFF	Power OK
89		AVcc		5V		.			
90	P80	AN0		DO1		1	Dial clock 1/2		
91	P81	AN1		DO2		1	Dial clock 1/4		
92	P82	AN2		DO3		1	Dial clock 1/8		
93	P83	AN3		DO4		1	Dial clock 1/16		
94	P84	AN4		DO5		1	Dial clock 1/32		
95	P85	AN5		DO6		1	Dial clock 1/64		
96	P86	AN6		DO		1	Dial up rotation		Up
97	P87	AN7		DO		1	Dial down rotation		Down
98	P88	AN8		DO		1	Dial speed detection	The voltage according to the speed of rotation.	
99	P89	AN9		DO		1	Dial speed detection	0-5V	
100	P90	AN10		DO		1	McUP/DOWN selection	2-3V down	D-2V up
101	P91	AN11		DO		1	S & RF Meter voltage input	0-5V	

SEMICONDUCTOR DATA

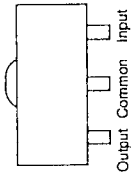
1) M5218FP (XA0068)

Dual Low Noise Operational Amplifiers



2) NJM78L08UA (XA0075)

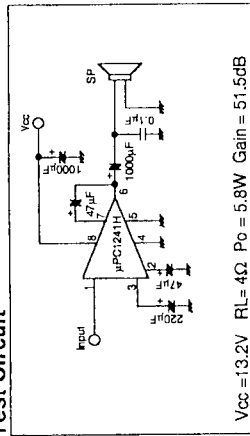
8V Voltage Regulator



3) μ PC1241H (XA0079)

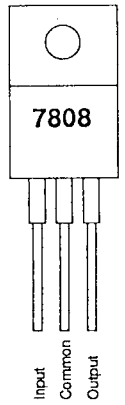
Audio Power Amplifier

Test Circuit



4) MC7808CT (XA0082)

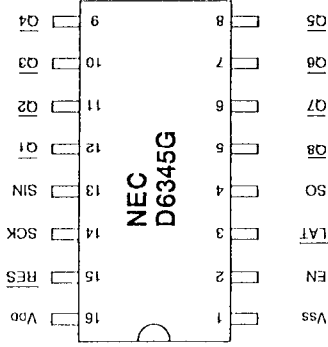
8V Voltage Regulator



5) μ PD6345GS (XA0114)

8bit Serial in Parallel Out Driver

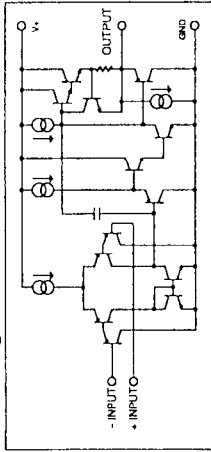
No.	Pin Name	Description
1	GND	GND terminal
2	EN	Enable terminal
3	LAT	Latch terminal
4	SO	Serial data output terminal
5-12	D0-D7	Data output terminal
13	SIN	Serial data input terminal
14	SCK	Serial clock input terminal
15	RES	Reset input terminal
16	Vcc	Power supply terminal



6) NJM2904M (XA0224)

Dual Operational Amplifiers

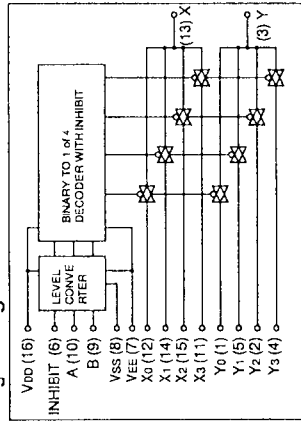
Block Diagram



7) BU4052BF (XA0236)

Analog Multiplexer/Demultiplexer

Logic Diagram



Truth Table

INHIBIT	A	B	ON SWITCH
L	L	L	X0 Y0
L	L	H	X1 Y1
L	L	H	X2 Y2
L	H	H	X3 Y3
H	X	X	NONE

X: Don't Care

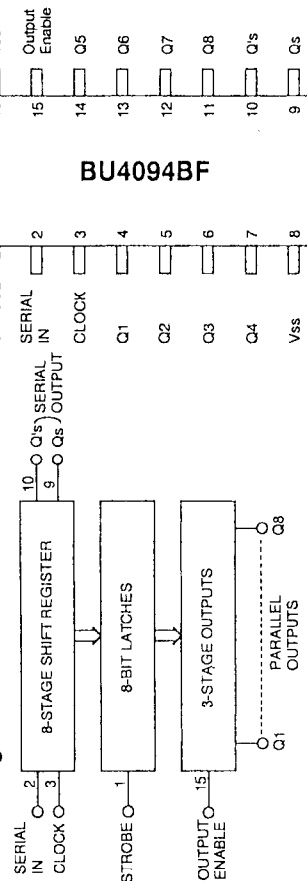
8) BU4094BF (XA0246)
8-Stage Shift Register

Truth Table

Clock	Output enable	Strobe	Parallel outputs		Serial outputs	
			Q1	Qn	Qs	Q's
↑	L	X	Z	Z	Q7	No Chg.
↓	L	X	Z	Z	No Chg.	Qs
↑	H	L	X	No Chg.	Q7	No Chg.
↓	H	H	L	Qn-1	Q7	No Chg.
↑	H	H	H	Qn-1	Q7	No Chg.
↓	H	X	X	No Chg.	No Chg.	Qs

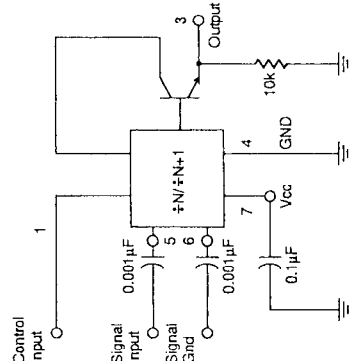
Z=High Impedance
X=Don't Care

Block Diagram



9) MC12019D (XA0292)
Two-Modulus Prescaler

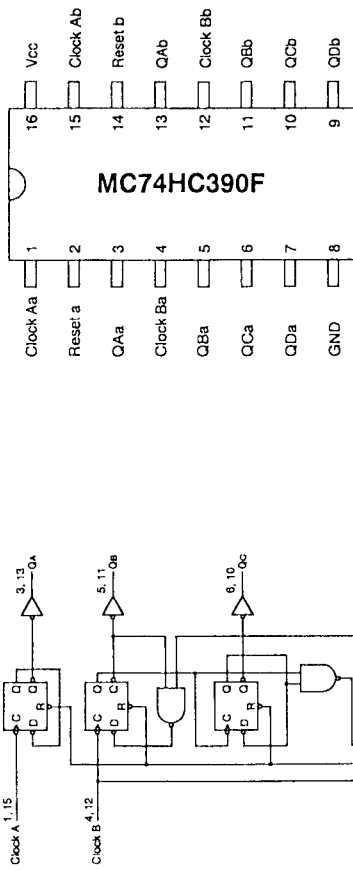
Block Diagram



Characteristics	Symbol	Min.	Typ	Max	Unit
Toggle frequency (Sine wave input)	fmax fmin	225	-	20	MHz
Supply current	Icc	-	-	7.5	mA
Control input High (1/20)	V _{IH}	2.0	-	-	V
Control input Low (1/21)	V _{IL}	-	-	0.8	V
Output voltage swing	V _{out}	600	-	1200	mVpp
Input voltage sensitivity	V _{in}	200	-	800	mVpp
PLL response time	t _{PLL}	-	-	t _{out}	ns

10) MC74HC390F (XA0294)
Dual 4-Stage Binary Ripple Counter 1/2 and 1/5 Sections

Truth Table

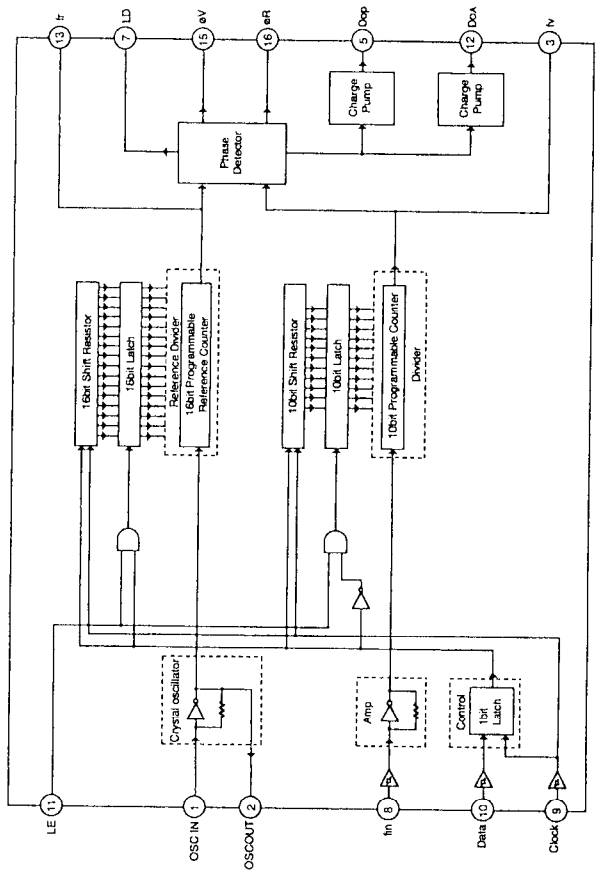
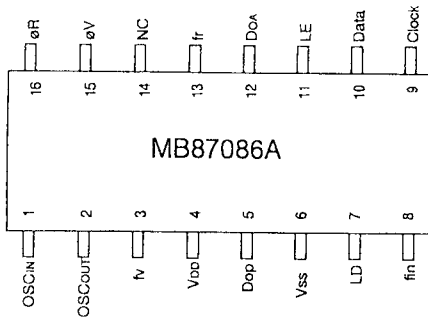


Truth Table

Clock	Reset		Action
	A	B	
X	X	H	Reset 1/2 and 1/5
↑	X	L	Increment 1/2
X	↑	L	Increment 1/5

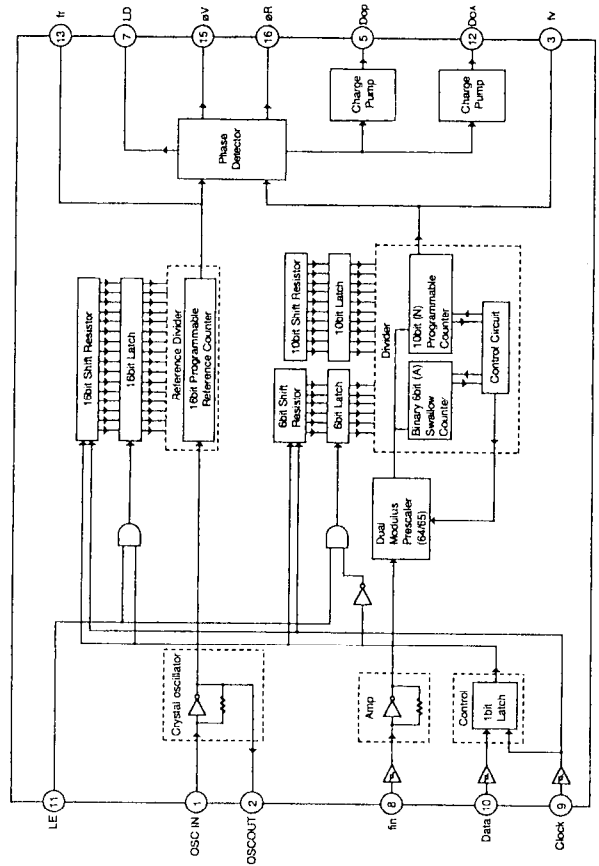
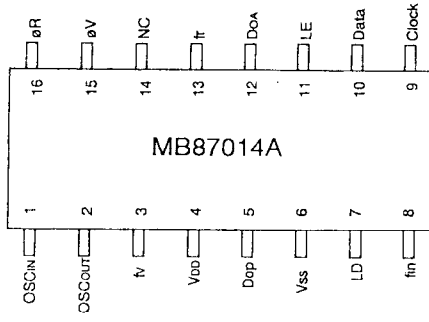
11) MB87086A (XA0297)
PLL Frequency Synthesizer

No.	Pin Name	I/O	Description
1	OSCIN	I	Crystal connection terminal
2	OSCOU	O	Crystal connection terminal
3	Iv	O	Phase comparator input monitor terminal Comparator divider output terminal
4	VDD	-	Power supply
5	Dop	O	Passive LPF connection terminal Iv-iv: Drive mode, Dop="H" Iv-iv: High impedance Iv-iv: Sink mode, Dop="L"
6	VSS	-	GND terminal
7	LD	O	Phase detector output terminal
8	fin	I	Lock="H": Unlocks/negative pulse Comparator divider input terminal
9	Clock	I	Serial clock input terminal
10	Data	I	Serial data input terminal
11	LE	I	Load enable input terminal
12	DOA	O	Active LPF connection terminal Iv-iv: Drive mode, DOA="L" Iv-iv: High impedance Iv-iv: Sink mode, DOA="H"
13	fr	O	Phase comparator input monitor terminal Reference divider output terminal
14	NC	-	No connection
15	eV	O	Differential LPF connection terminal Iv-iv: eV="H": eB="L" Iv-iv: eV="L": eB="H"
16	eR	O	Differential LPF connection terminal Iv-iv: eV="H": eB="L" Iv-iv: eV="L": eB="H"

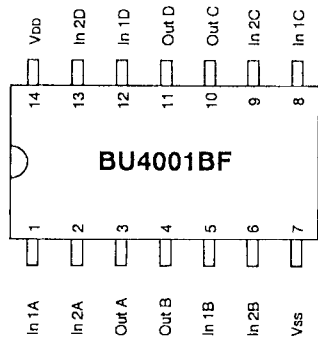
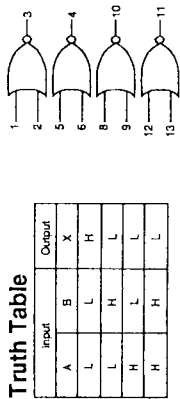


12) MB87014A (XA0298)
PLL Frequency Synthesizer

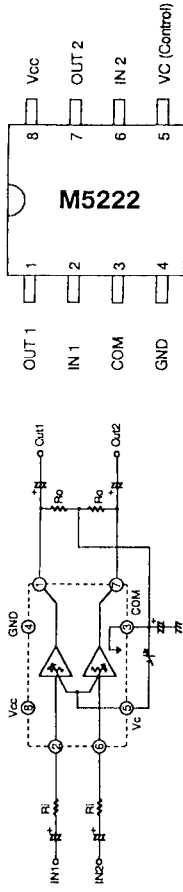
No.	Pin Name	I/O	Description
1	OSCIN	I	Crystal connection terminal
2	OSCOU	O	Crystal connection terminal
3	Iv	O	Phase comparator input monitor terminal Comparator divider output terminal
4	VDD	-	Power supply
5	Dop	O	Passive LPF connection terminal Iv-iv: Drive mode, Dop="H" Iv-iv: High impedance Iv-iv: Sink mode, Dop="L"
6	VSS	-	GND terminal
7	LD	O	Phase detector output terminal
8	fr	I	Lock="H": Unlocks/negative pulse Prescaler input terminal
9	Clock	I	Serial clock input terminal
10	Data	I	Serial data input terminal
11	LE	I	Load enable input terminal
12	DOA	O	Active LPF connection terminal Iv-iv: Sink mode, DOA="L" Iv-iv: High impedance Iv-iv: Drive mode, DOA="H"
13	fr	O	Phase comparator input monitor terminal Reference divider output terminal
14	NC	-	No connection
15	eV	O	Differential LPF connection terminal Iv-iv: eV="H": eB="L" Iv-iv: eV="L": eB="H"
16	eR	O	Differential LPF connection terminal Iv-iv: eV="L": eB="H"



13) MC4001BF (XA0299)
Quad 2-Input NOR Gate



15) M5222FP (XA0385)
Low Voltage Dual VCA

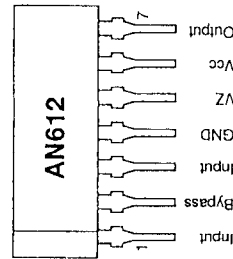
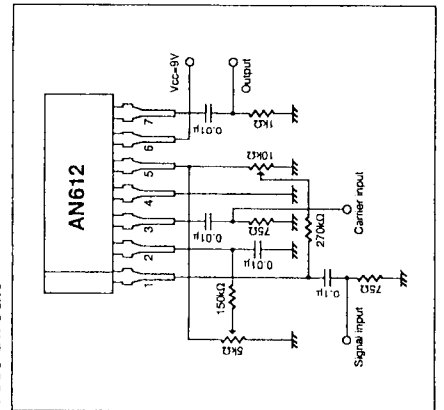


Parameter	Symbol	Condition	Vcc	Min	Typ	Max	Unit
Supply current	Icc	V _i =0, V _c =0	3V	2.5	3.6	5.5	mA
Max. input voltage	VIM1	f=1kHz, V _c =0, THD=1%, R _i =10kΩ, R _o =20kΩ	3V	0.7	1.0	-	Vrms
	VIM2	f=1kHz, V _c =0, THD=1%, R _i =50kΩ, R _o =100kΩ	9V	2.3	3.4	-	Vrms
Max. attenuation level	ATTM	V _c =0 (ATT=1.4dB)	3V	80	90	-	dB
Noise output voltage	VNO1	V _c =0 (ATT=1.4dB)	3V	-	30	60	μVrms
	VNO2	R _i =10kΩ, R _o =20kΩ, BW=20Hz-20kHz	3V	-	-	5	μVrms
Noise output voltage		V _c =-40dB	3V	-	-	-	-
		R _i =10kΩ, R _o =20kΩ, BW=20Hz-20kHz	3V	-	-	-	-

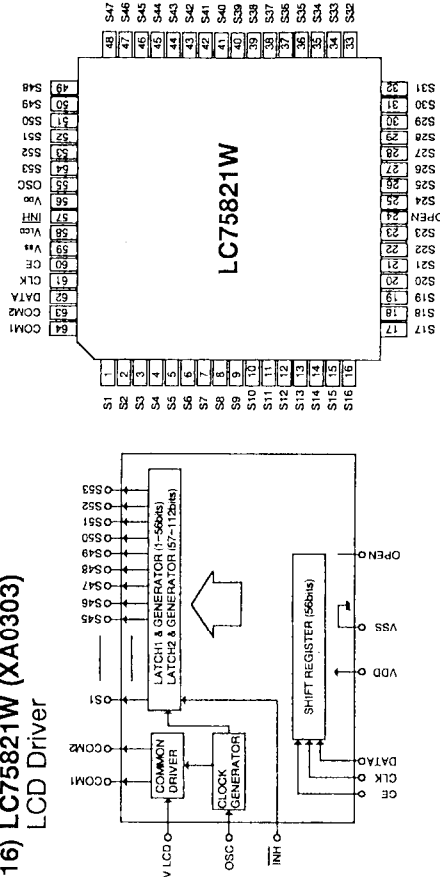
14) AN612 (XA0300)
Balanced Modulator Circuit

Parameter	Symbol	Condition	Unit
Max. supply voltage	Vcc		14.4 V
Supply current	Icc		15 mA
Power dissipation	PD		220 mW
Total current	Ibt		9.5 mA
Zener voltage	VZ-4		6.15 V
Signal input terminal voltage	V1-4	V ₆ =12.0V	3.1 V
Carrier input terminal voltage	V3-4		3.4 V
Output terminal voltage	V7-4		8.6 V
Output voltage (BM AC)	Vo(BM)	V ₆ =9.0V	-3 dBm
Carrier suppression	SC		50 dB

Test Circuit

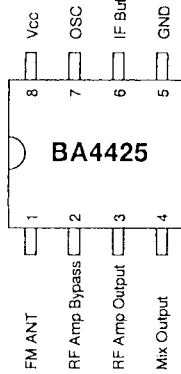


16) LC75821W (XA0303)
LCD Driver



Pin Name	Description
S1-S53	Segment output terminal
COM1,2	Common output terminal
V LCD	LCD Bias voltage setting terminal
OSC	Oscillator terminal
CE, CLK, DATA	Serial data transmission terminal
VSS, VDD	Power supply terminal
INH	Display turn off input terminal
	INH=L: Vss, turn on (S1-S53, COM1,2=L)
	INH=PP: vdd, turn on
OPEN	No connection

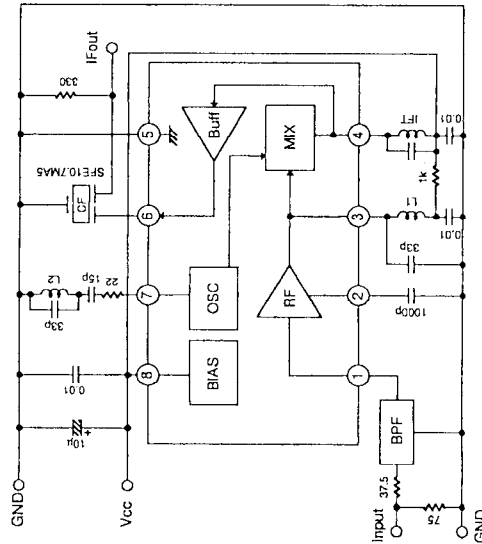
17) BA4425F (XA0304)
FM Front End IC



Vcc=4V

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Current	Iq	No signal	2.6	4.5	7.2	mA
Saturated output voltage	Vo	Id=98MHz, 80dBμV	30	50	72	mV rms
Local oscillator voltage	Vosc	fosc=1.08MHz	200	400	630	mV rms
Conversion gain	Gvc	Id=98MHz, 55dBμV	31	36	42	dB
Local oscillator stop voltage	OSC STOP		-	-	1.2	V

Test Circuit

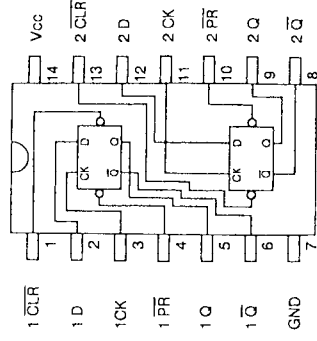


18) TC74AC74F (XA0305)
Dual D-Type Flip Flop

Truth Table

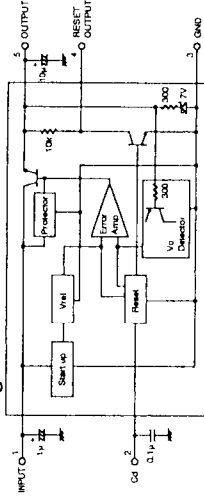
INPUTS		OUTPUTS		FUNCTION
CLR	PR	D	Q	
L	H	X	L	CLEAR
H	L	X	H	PRESET
L	L	X	H	-
H	H	L	L	-
H	H	H	H	-
H	H	X	Qn	NO CHARGE

X=Don't Care

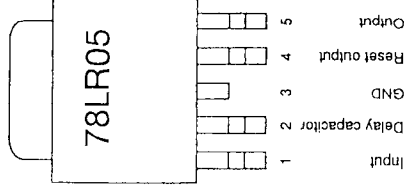


19) L78LR05B (XA0338)
Voltage Regulator

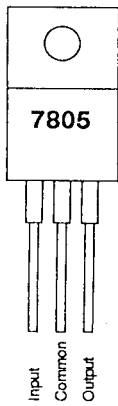
Block Diagram



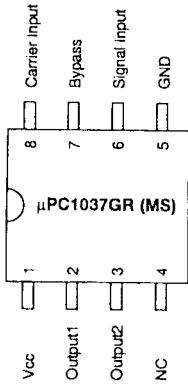
Parameter	Symbol	Ratings	Unit
Input voltage	Vin	7.5-20	V
Output current	Iout	1-150	mA
Output voltage	Vout	5.0	V



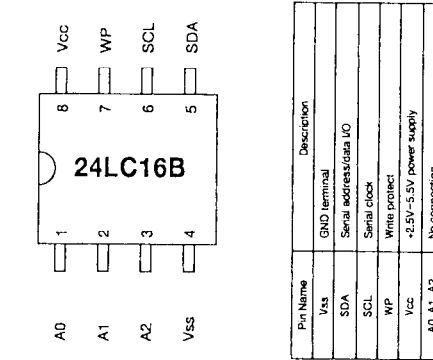
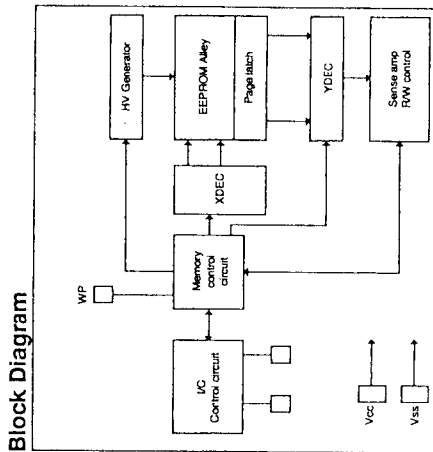
20) MCT7805 (XA0346)
5V Voltage Regulator



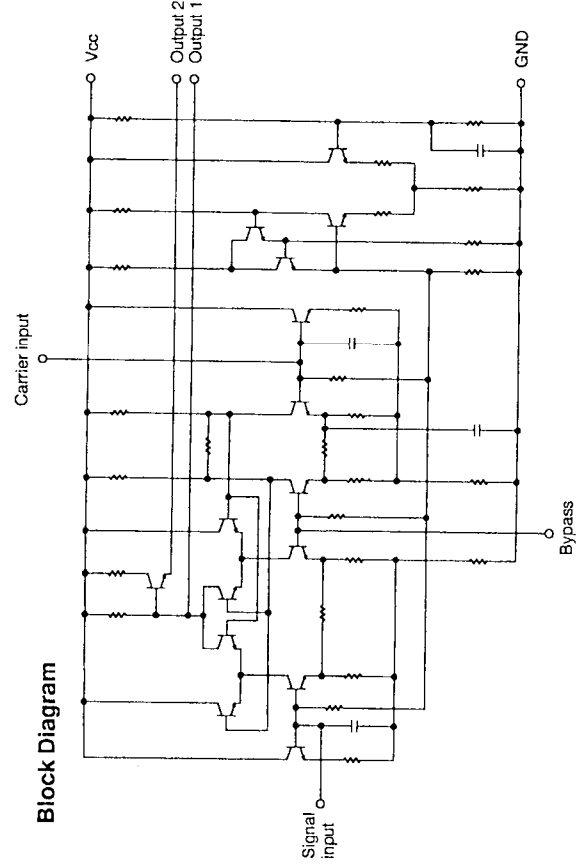
22) μ PC1037GR (XA0379)
Double Balanced Modulator



21) 24LC16B (XA0351)
16K bits CMOS Serial EEPROM

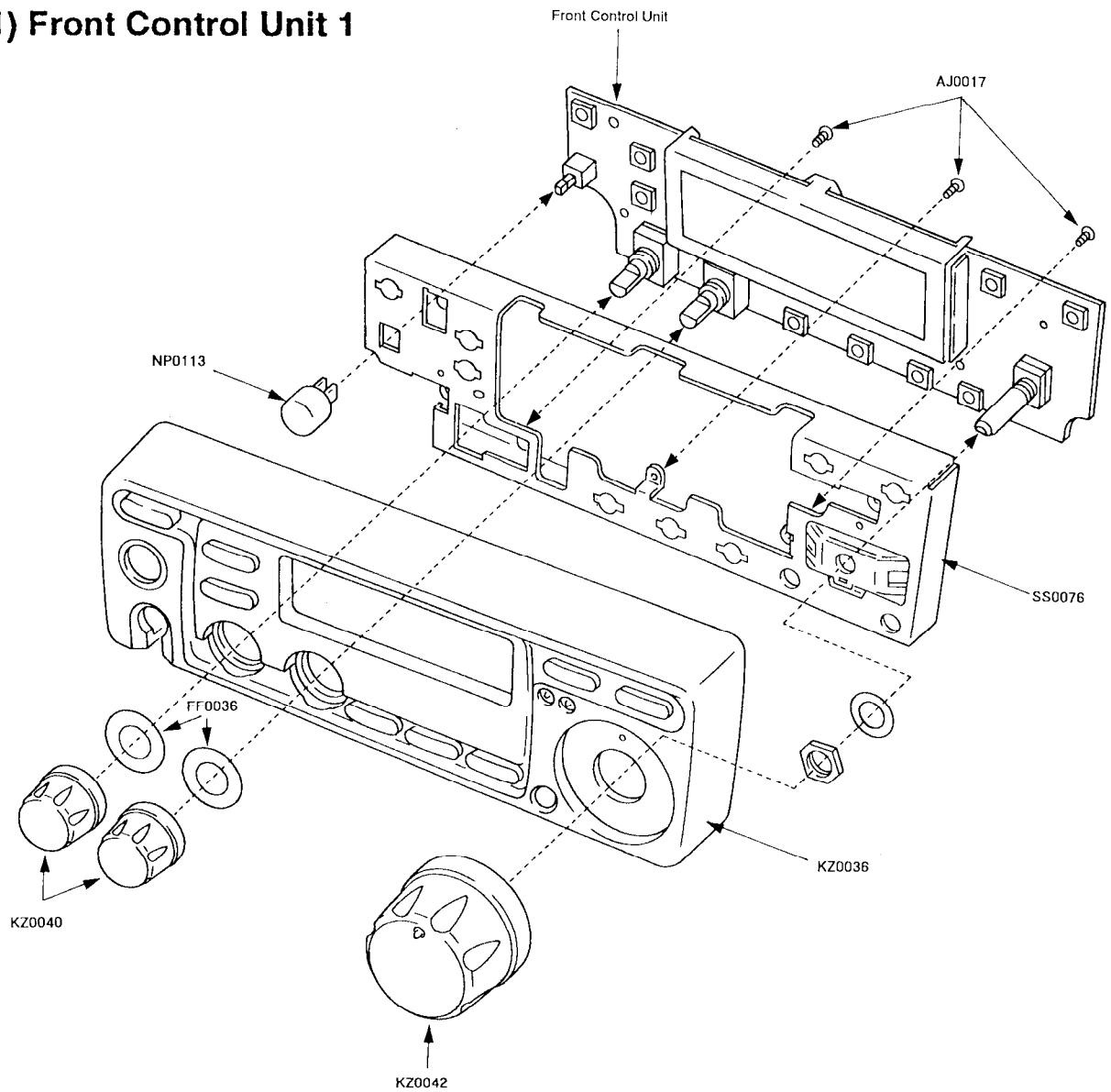


Characteristics	Symbol	Condition	Min.	Typ.	Max.	Unit
Circuit current	I _{cc}	No signal	-	12	16	mA
Conversion gain	G _c	Signal: 70mV r.m.s. 1.75MHz	-2	0	+2	dB
Signal leakage	L _s	Carrier: 100mV r.m.s. 28.25MHz	-	-40	-20	dB
Carrier leakage	L _c	Output: 30MHz	-	-32	-20	dB
Inter modulated distortion	IMD	Signal 1: 42.5mV r.m.s. 1.75MHz	-	-45	-35	dB
		Signal 2: 42.5mV r.m.s. 2.00MHz				
		Carrier: 100mV r.m.s. 28.25MHz				
		Output: 29.75MHz				
Signal input impedance	Z _{si}		-	500/9	-	Ω/pF
Carrier input impedance	Z _{ci}		-	1.0/9	-	kΩ/pF
Output impedance	Z _{ol}	Output 1	-	350/7	-	Ω/pF

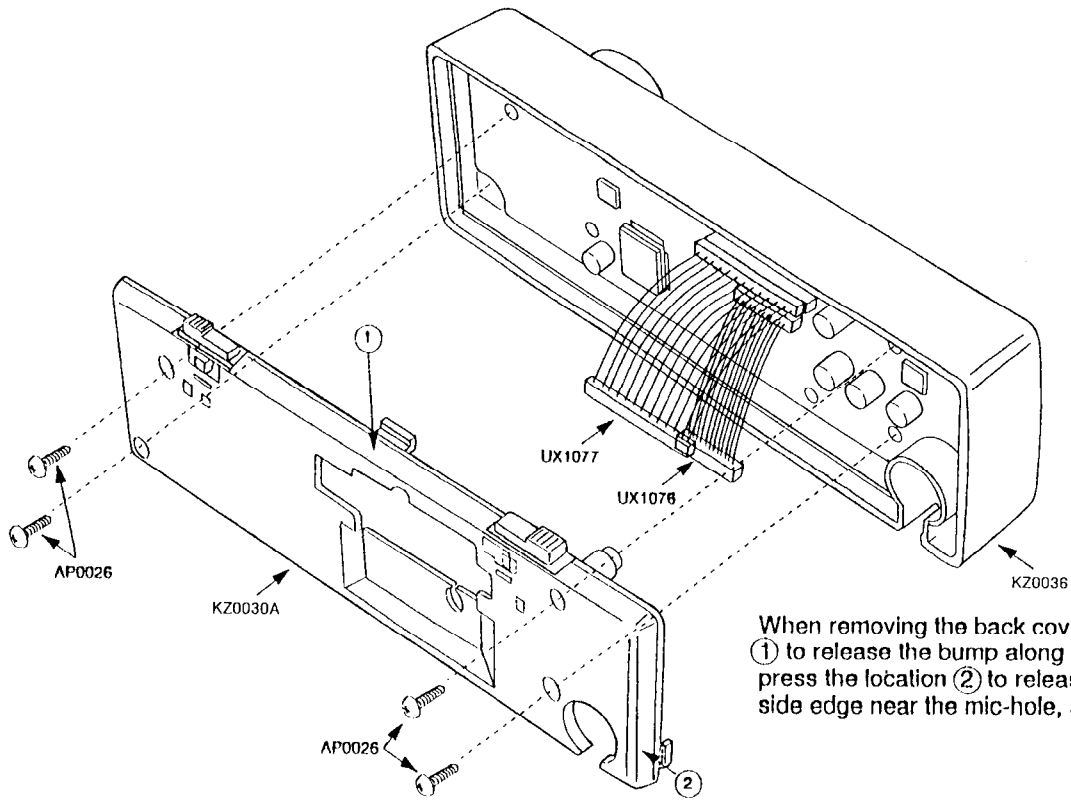


EXPLODED VIEW

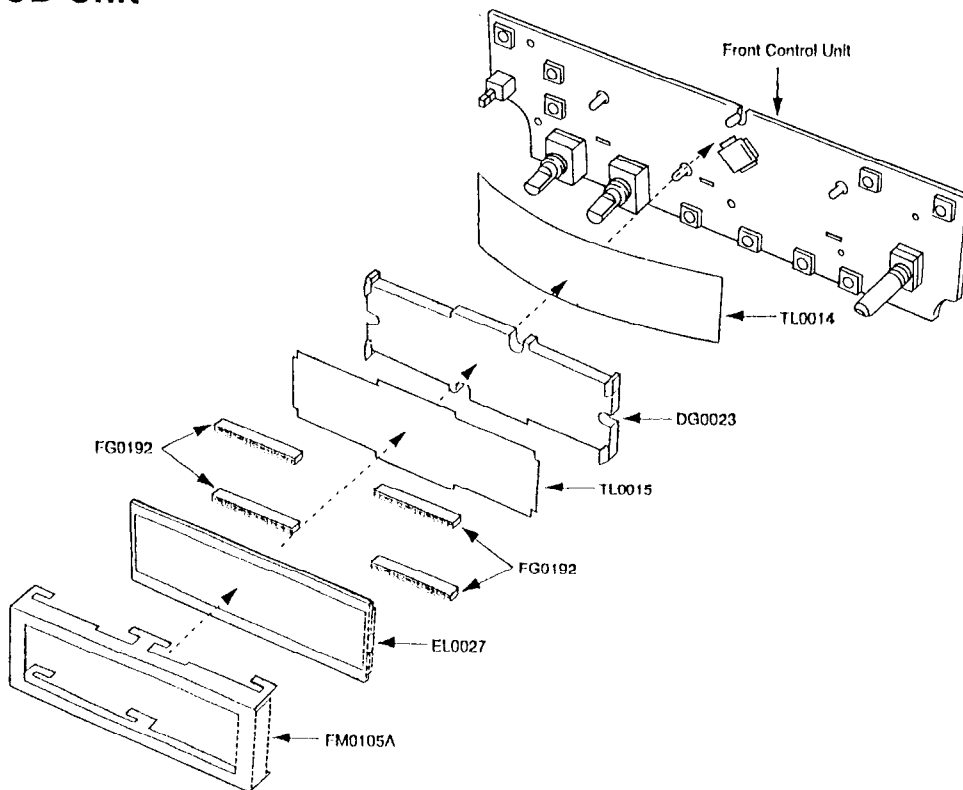
1) Front Control Unit 1



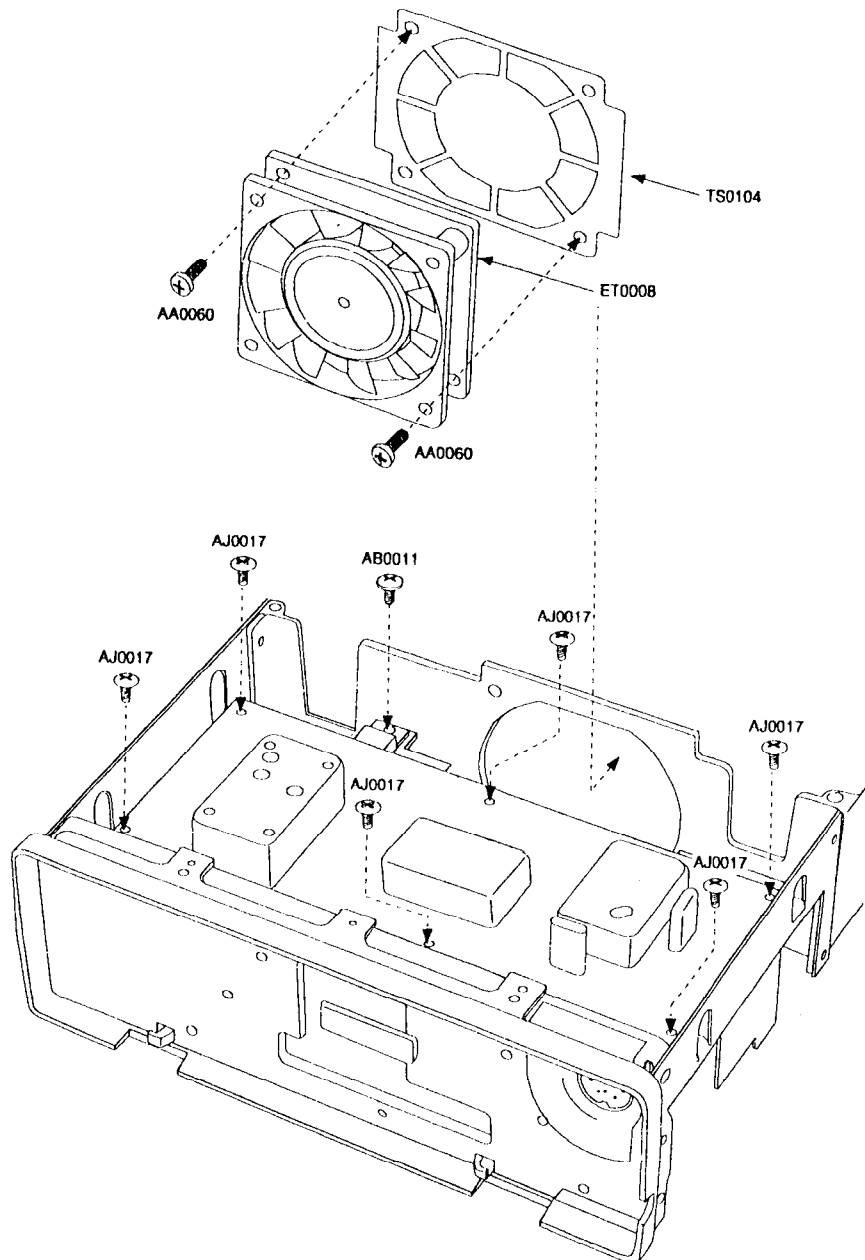
2) Front Control Unit 2



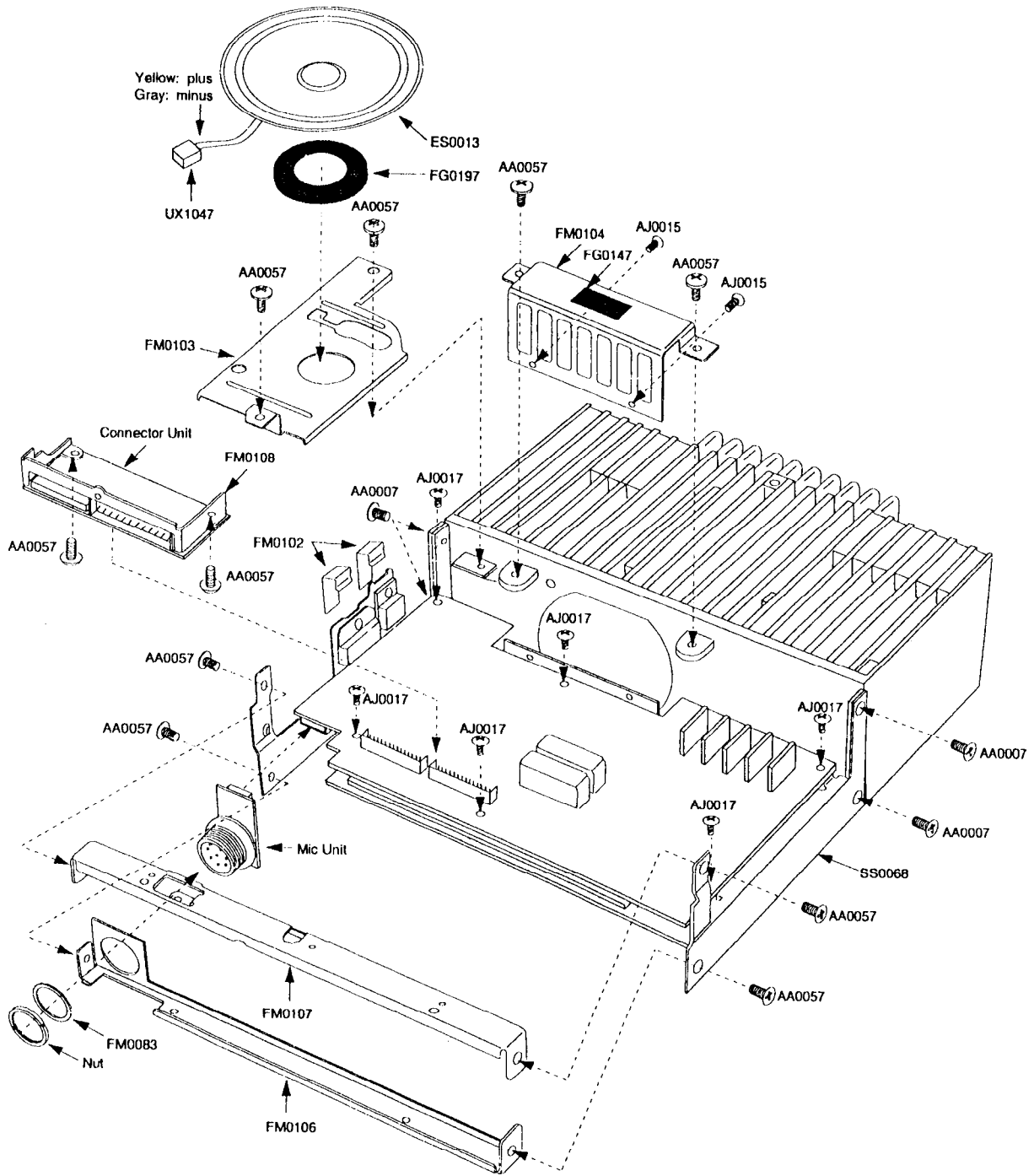
3) LCD Unit



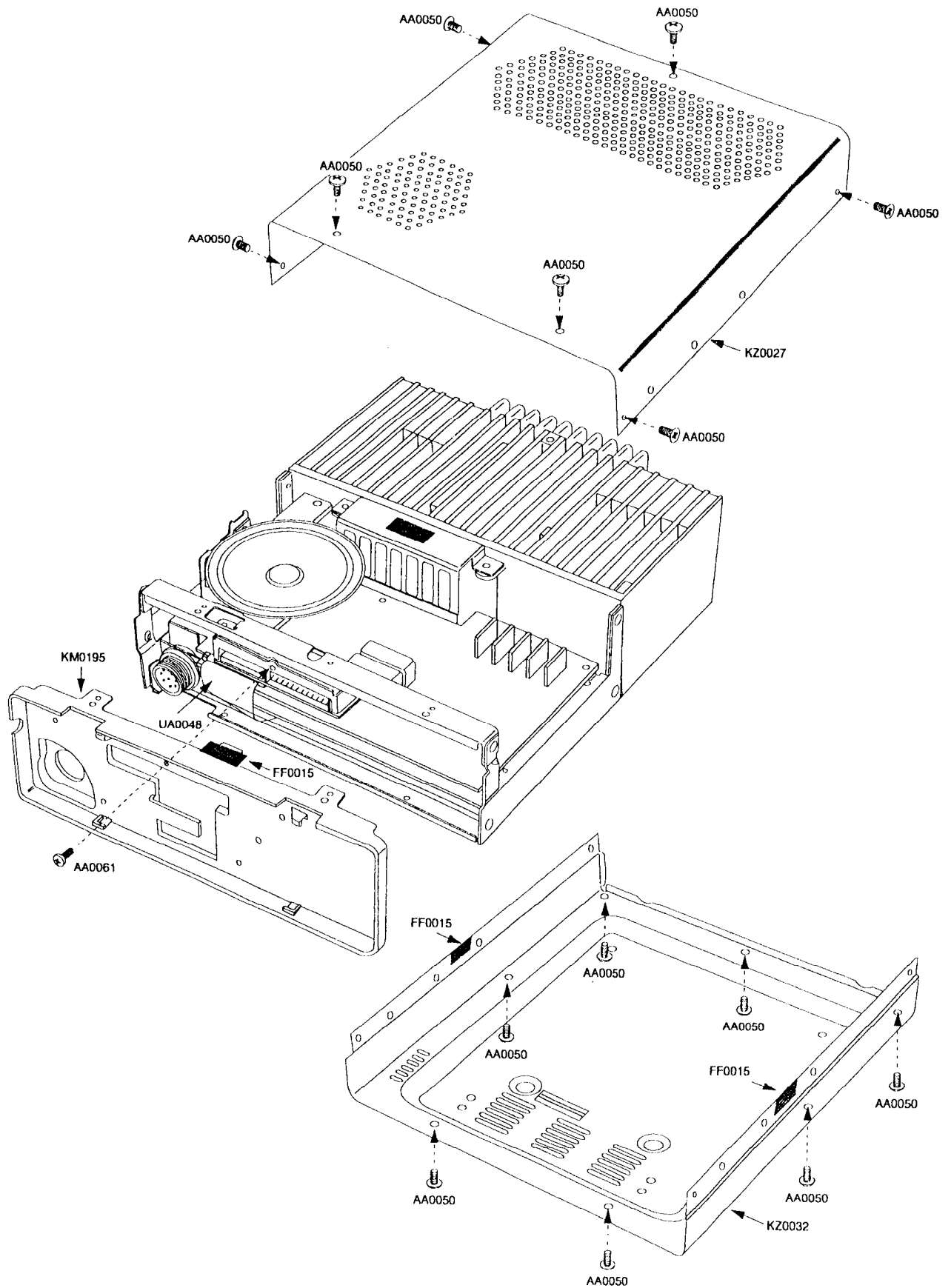
4) PLL Unit and Fan



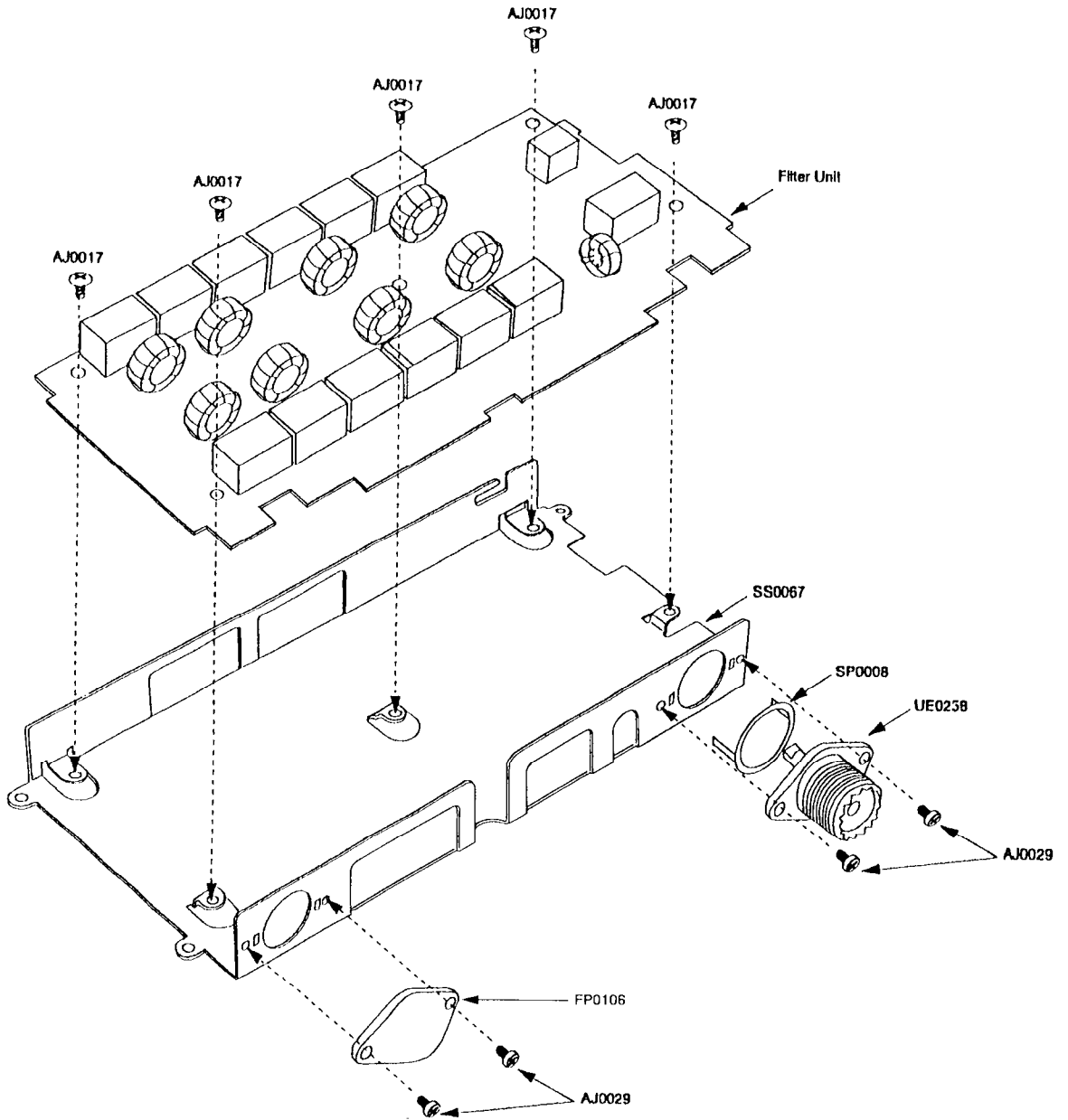
5) Top View 1



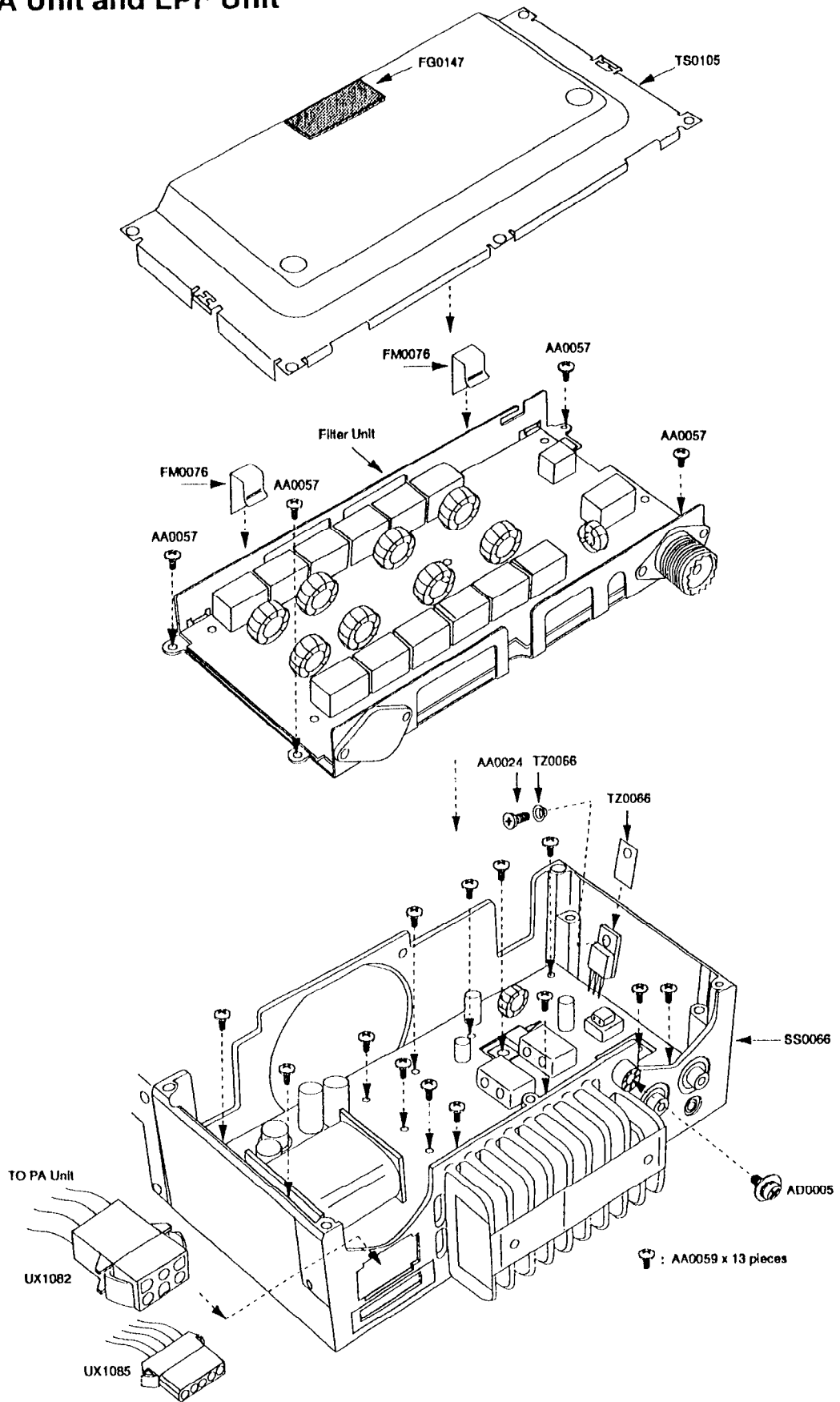
6) Top View 2



7) LPF Unit



8) PA Unit and LPF Unit



PARTS LIST

CPU Unit

Ref. No.	Parts No.	Description	Parts Name
C3	CU3056	Chip C.	C1608JF1E4732T-A
C5	CU3035	Chip C.	C1608JH102KT-A
C7	CU3056	Chip C.	C1608JF1E4732T-A
C9	CU3059	Chip C.	C1608JF1E1042T-A
C12	CU3024	Chip C.	C1608CH1H21JT-A
C14	CU3018	Chip C.	C1608CH1H30JT-A
C15	CU3027	Chip C.	C1608CH1H22JT-A
C17	CU3013	Chip C.	C1608CH1H50JT-A
C19	CU3025	Chip C.	C1608CH1H15JT-A
C20	CU3056	Chip C.	C1608JF1E4732T-A
C21	CU3056	Chip C.	C1608JF1E4732T-A
C22	CU3056	Chip C.	C1608JF1E4732T-A
C23	CU3007	Chip C.	C1608CH1H060CT-A
C24	CU3047	Chip C.	C1608JH103KT-A
C25	CU3012	Chip C.	C1608JH103KT-A
C26	CU3047	Chip C.	C1608JH103KT-A
C27	CU3012	Chip C.	C1608JH103KT-A
C28	CU3043	Chip C.	C1608JH1H472T-A
C29	CU3009	Chip C.	C1608CH1H080CT-A
C30	CU3047	Chip C.	C1608JH1H03KT-A
C31	CU3047	Chip C.	C1608JH1H03KT-A
C32	CU3012	Chip C.	C1608CH1H20JT-A
C33	CU3012	Chip C.	C1608CH1H20JT-A
C34	CU3003	Chip C.	C1608CH1H020CT-A
C35	CU3035	Chip C.	C1608JH1H02KT-A
C36	CU3045	Chip C.	C1608JH1H582KT-A
C37	CU3006	Chip C.	C1608CH1H050CT-A
C38	CU3043	Chip C.	C1608JH1H472T-A
C40	CU3056	Chip C.	C1608JF1E4732T-A
C41	CU3031	Chip C.	C1608JH1H471KT-A
C42	CU3056	Chip C.	C1608JF1E4732T-A
C43	CU3056	Chip C.	C1608JH1H03KT-A
C44	CU3047	Chip C.	C1608JH1H03KT-A
C45	CU3047	Chip C.	C1608JH1H03KT-A
C46	CU3056	Chip C.	C1608JF1E4732T-A
C47	CU3038	Chip C.	C1608JH1H82KT-A
C48	CU3037	Chip C.	C1608JH1H582KT-A
C49	CU3038	Chip C.	C1608JH1H82KT-A
C50	CU3041	Chip C.	C1608JH1H323KT-A
C51	CU3041	Chip C.	C2012JH1C104KT-A
C52	CU3051	Chip C.	C1608JF1E4732T-A
C53	CU3056	Chip C.	C1608JF1E4732T-A
C98	CU3059	Chip C.	C1608JF1E1042T-A
C99	CU3059	Chip C.	C1608JF1E1042T-A
C100	CU3059	Chip C.	C1608JF1E1042T-A
C101	CU3018	Chip C.	C1608CH1H30JT-A
C102	CU3059	Chip C.	C1608JF1E1042T-A
C103	CU3013	Chip C.	C1608CH1H50JT-A
C104	CU3021	Chip C.	C1608CH1H60JT-A
C105	CU3017	Chip C.	C1608CH1H30JT-A

CPU Unit

Ref. No.	Parts No.	Description	Parts Name
C160	CU3056	Chip C.	C1608JF1E4732T-A
C161	CU3056	Chip C.	C1608JF1E4732T-A
C162	CU3039	Chip C.	C1608JH1H222KT-A
C163	CU3056	Chip C.	C1608JF1E4732T-A
C164	CU3056	Chip C.	C1608JF1E4732T-A
C165	CU3056	Chip C.	C1608JF1E4732T-A
C166	CU3031	Chip C.	C1608JH1H471KT-A
C167	CU3056	Chip C.	C1608JF1E4732T-A
C168	CU3031	Chip C.	C1608JH1H471KT-A
C169	CU3056	Chip C.	C1608JF1E4732T-A
C170	CU3027	Chip C.	C1608CH1H221T-A
C171	CU3056	Chip C.	C1608JF1E4732T-A
C172	CU3056	Chip C.	C1608JF1E4732T-A
C173	CU3035	Chip C.	C1608JH1H02KT-A
C174	CU3051	Chip C.	C1608JH1E223KT-A
C175	CU3056	Chip C.	C1608JF1E4732T-A
C176	CU3056	Chip C.	C1608JF1E4732T-A
C177	CU3037	Chip C.	C1608JH1H52KT-A
C178	CU3047	Chip C.	C1608JH1H03KT-A
C179	CU3056	Chip C.	C1608JF1E4732T-A
C180	CS0372	Chip Tantalum	TKCMB1C106MTR
C181	CU3056	Chip C.	C1608JF1E4732T-A
C182	CU3051	Chip C.	C1608JH1E223KT-A
C183	CU3056	Chip C.	C1608JF1E4732T-A
C184	CU3056	Chip C.	C1608JF1E4732T-A
C185	CU3056	Chip C.	C1608JF1E4732T-A
C186	CU3056	Chip C.	C1608JF1E4732T-A
C187	CU3056	Chip C.	C1608JF1E4732T-A
C188	CU3056	Chip C.	C1608JF1E4732T-A
C189	CS0372	Chip Tantalum	TKCMB1C106MTR
C190	CU3102	Chip C.	C1608JH1C338KT-A
C191	CU3042	Chip C.	C2012JH1C104KT-A
C201	CU3018	Chip C.	C1608CH1H30JT-A
C202	CU3029	Chip C.	C1608CH1H30JT-A
C203	CU3056	Chip C.	C1608JF1E4732T-A
C204	CS0051	Chip Tantalum	TKCSA1Y224MTR
C205	CS0230	Chip Tantalum	TKCMA1E105MTR
C206	CU3101	Chip C.	C1608JH1C473KT-A
C207	CU3059	Chip C.	C1608JF1E4732T-A
C218	CU3047	Chip C.	C1608JH1H03KT-A
C219	CU3059	Chip C.	C1608JH1H03KT-A
C220	CU3059	Chip C.	C1608JF1E1042T-A
C221	CS0372	Chip Tantalum	TKCMB1C106MTR
C222	CS0230	Chip Tantalum	TKCMA1E105MTR
C223	CS0372	Chip Tantalum	TKCMB1C106MTR
C224	CU3047	Chip C.	C1608JH1H03KT-A
C225	CU3047	Chip C.	C1608JH1H03KT-A
C226	CS0230	Chip Tantalum	TKCMA1E105MTR
C227	CS0225	Chip Tantalum	TKCMA1D155MTR
C228	CU3047	Chip C.	C1608JF1E4732T-A
C229	CE0312	Electrolytic C.	ECEV1CA100R

CPU Unit

Ref. No.	Parts No.	Description	Parts Name
C230	CU3047	Chip C.	C1608JH1H03KT-A
C231	CE0315	Electrolytic C.	ECEV1CA470P
C232	CU3026	Chip C.	C1608CH1H181JT-A
C233	CU3043	Chip C.	C1608JH1H472KT-A
C234	CU3038	Chip C.	C1608JH1H182KT-A
C237	CU3059	Chip C.	C1608JF1E1042T-A
C238	CS0367	Chip Tantalum	TKCMA01106MTR
C239	CU3059	Chip C.	C1608JF1E1042T-A
C240	CU3042	Chip C.	C2012JH1C104KT-A
C241	CS0372	Chip Tantalum	TKCMB1C106MTR
C242	CU3047	Chip C.	C1608JH1H03KT-A
C243	CU3101	Chip C.	C1608JH1H03KT-A
C246	CS0230	Chip Tantalum	TKCMA1E105MTR
C250	CS0223	Chip Tantalum	TKCMA1C225MTR
C260	CE0315	Electrolytic C.	ECEV1CA470P
C261	CE0352	Electrolytic C.	16WV330HC
C262	CU3042	Chip C.	C2012JH1C104KT-A
C263	CE0379	Electrolytic C.	EEJFA1C471L
C264	CE0315	Electrolytic C.	ECEV1CA470P
C265	CE0315	Electrolytic C.	ECEV1CA470P
C266	CE0315	Electrolytic C.	ECEV1CA470P
C267	CE0356	Chip C.	C1608JF1E4732T-A
C268	CU3042	Chip C.	C2012JH1C104KT-A
C269	CS0230	Chip Tantalum	TKCMA1E105MTR
C270	CU3059	Chip C.	C1608JF1E1042T-A
C271	CU3059	Chip C.	C1608JF1E1042T-A
C272	CU3026	Chip C.	C1608CH1H181JT-A
C273	CU3043	Chip C.	C1608JH1H472KT-A
C274	CU3039	Chip C.	C1608JH1H222KT-A
C275	CU3047	Chip C.	C1608JH1H03KT-A
C276	CS0372	Chip Tantalum	TKCMB1C106MTR
C277	CU3051	Chip C.	C1608JH1E223KT-A
C278	CU3042	Chip C.	C2012JH1C104KT-A
C279	CU3047	Chip C.	C1608JH1H03KT-A
C280	CS0230	Chip Tantalum	TKCMA1E105MTR
C281	CE0315	Electrolytic C.	ECEV1CA470P
C282	CS0232	Chip Tantalum	TKCMA1V47MTR
C283	CU3047	Chip C.	C1608JH1H03KT-A
C284	CU3027	Chip C.	C1608CH1H221JT-A
C285	CU3027	Chip C.	C1608CH1H221JT-A
C286	CU3027	Chip C.	C1608CH1H221JT-A
C287	CS0210	Chip Tantalum	TKCMB07156MTR
C288	CU3056	Chip C.	C1608JF1E4732T-A
C291	CU3047	Chip C.	C1608JH1H03KT-A
C292	CU3047	Chip C.	C1608JH1H03KT-A
C293	CU3047	Chip C.	C1608JH1H03KT-A
C294	CU3059	Chip C.	C1608JF1E1042T-A
C297	CU3056	Chip C.	C1608JF1E1042T-A
C298	CU3042	Chip C.	C2012JH1C104KT-A
C299	CU3047	Chip C.	C1608JH1H03KT-A
C300	CU3035	Chip C.	C1608JH1H02KT-A

CPU Unit

Ref. No.	Parts No.	Description	Parts Name
C301	CU3047	Chip C.	C1608JBH103KT-A
C302	CU3047	Chip C.	C1608JBH103KT-A
C303	CU3047	Chip C.	C1608JBH103KT-A
C304	CU3047	Chip C.	C1608JBH103KT-A
C305	CU3047	Chip C.	C1608JBH103KT-A
C306	CU3047	Chip C.	C1608JBH103KT-A
C307	CU3047	Chip C.	C1608JBH103KT-A
C308	CU3047	Chip C.	C1608JBH103KT-A
C309	CU3047	Chip C.	C1608JBH103KT-A
C310	CU3047	Chip C.	C1608JBH103KT-A
C311	CU3047	Chip C.	C1608JBH103KT-A
C312	CU3056	Chip C.	C1608JFE473ZT-A
C313	CU3047	Chip C.	C1608JBH103KT-A
C314	CU3047	Chip C.	C1608JBH103KT-A
C315	CU3027	Chip C.	C1608CHH221JT-A
C316	CU3027	Chip C.	C1608CHH221JT-A
C317	CU3027	Chip C.	C1608CHH221JT-A
C318	CU3027	Chip C.	C1608CHH221JT-A
C319	CU3027	Chip C.	C1608CHH221JT-A
C320	CU3027	Chip C.	C1608CHH221JT-A
C321	CU3027	Chip C.	C1608CHH221JT-A
C322	CU3047	Chip C.	C1608JBH103KT-A
C323	CU3047	Chip C.	C1608JBH103KT-A
C324	CU3059	Chip C.	C1608JFE104ZT-A
C326	CU3047	Chip C.	C1608JBH103KT-A
C327	CU3047	Chip C.	C1608JBH103KT-A
C328	CU3047	Chip C.	C1608JBH103KT-A
C329	CU3047	Chip C.	C1608JBH103KT-A
C330	CU3047	Chip C.	C1608JBH103KT-A
C331	CU3039	Chip C.	C1608JBH22KT-A
C332	CU3047	Chip C.	C1608JBH103KT-A
C333	CU3047	Chip C.	C1608JBH103KT-A
C334	CU3047	Chip C.	C1608JBH103KT-A
C335	CU3047	Chip C.	C1608JBH103KT-A
C341	CU3047	Chip C.	C1608JBH103KT-A
C342	CU3047	Chip C.	C1608JBH103KT-A
C344	CU3047	Chip C.	C1608JBH103KT-A
C345	CU3044	Chip C.	C1608JBH562XT-A
C346	CU3047	Chip C.	C1608JBH103KT-A
C347	CU3027	Chip C.	C1608CHH221JT-A
C349	CU3055	Chip C.	C1608JFE473ZT-A
C350	CU3055	Chip C.	C1608JFE473ZT-A
C351	CU3035	Chip C.	C1608JBH102KT-A
C353	CU3047	Chip C.	C1608JBH103KT-A
C355	CS3372	Chip tantalum	TMCMB1C106MTR
CN1	UE0255	Connector	00-6208-000-112-001
CN2	UE0043	Connector	P122A02M
CN3	UE0070	Connector	P122A04M
CN4	UE0071	Connector	P122A05M
CN5	UE0044	Connector	P122A09M
CN6	UE0259	Connector	CP05026-0201
CN9	UE0250	Connector	CP05-JE

Ref. No.	Parts No.	Description	Parts Name
CN11	UE0043	Connector	P122A02M
CN12	UE0252	Connector	IWSA-9120B-13
CN13	UE0252	Connector	IWSA-9120B-13
D1	XD0272	Diode	ISS356 TW1
D4	XD0256	Diode	DAP202U T106
D6	XD0246	Diode	DAN235UT106
D7	XD0289	Diode	SS3275(TE12L)
D8	XD0246	Diode	DAN235UT106
D9	XD0246	Diode	DAN235UT106
D10	XD0231	Diode	DAP202U T106
D11	XD0231	Diode	DAP202U T106
D29	XD0246	Diode	DAN235UT106
D30	XD0246	Diode	DAN235UT106
D33	XD0234	Diode	MA728 TX
D34	XD0234	Diode	MA728 TX
D39	XD0272	Diode	ISS356 TW1
D40	XD0272	Diode	ISS356 TW1
D41	XD0272	Diode	ISS356 TW1
D42	XD0272	Diode	ISS356 TW1
D45	XD0272	Diode	ISS356 TW1
D46	XD0272	Diode	ISS356 TW1
D47	XD0272	Diode	ISS356 TW1
D48	XD0272	Diode	ISS356 TW1
D49	XD0246	Diode	DAN235UT106
D50	XD0254	Diode	ISS355 TE-17
D51	XD0234	Diode	MA728 TX
D52	XD0272	Diode	ISS356 TW1
D53	XD0234	Diode	MA728 TX
D54	XD0234	Diode	MA728 TX
D55	XD0230	Diode	DAN202U T106
D59	XD0231	Diode	DAP202U T106
D60	XD0254	Diode	ISS355 TE-17
D62	XD0254	Diode	ISS355 TE-17
D63	XD0231	Diode	DAP202U T106
D64	XD0054	Diode	D1Z5.6C T111
D65	XD0054	Diode	ISS355 TE-17
D66	XD0054	Diode	ISS355 TE-17
D67	XD0231	Diode	DAP202U T106
D68	XD0230	Diode	DAN202U T106
D69	XD0254	Diode	ISS355 TE-17
D70	XD0254	Diode	ISS355 TE-17
D71	XD0231	Diode	DAP202U T106
D72	XD0254	Diode	ISS355 TE-17
D73	XD0254	Diode	ISS355 TE-17
D74	XD0254	Diode	ISS355 TE-17
D75	XD0254	Diode	ISS355 TE-17
D76	XD0254	Diode	ISS355 TE-17
D77	XD0254	Diode	ISS355 TE-17
D78	XD0254	Diode	ISS355 TE-17
D82	XD0230	Diode	DAN202U T106
D85	XD0254	Diode	ISS355 TE-17

Ref. No.	Parts No.	Description	Parts Name
D86	XD0231	Diode	DAP202U T106
D88	XD0254	Diode	ISS355 TE-17
D90	XD0230	Diode	DAN202U T106
D93	XD0231	Diode	DAP202U T106
D94	XD0230	Diode	DAN202U T106
D101	XD0230	Diode	DAN202U T106
D102	XD0230	Diode	DAN202U T106
D104	XD0254	Diode	ISS355 TE-17
D106	XD0230	Diode	DAN202U T106
D108	XD0230	Diode	DAN202U T106
D109	XD0230	Diode	DAN202U T106
D110	XD0254	Diode	ISS355 TE-17
D113	XD0231	Diode	ISS355 TE-17
D114	XD0254	Diode	ISS355 TE-17
D115	XD0254	Diode	ISS355 TE-17
F81	QB0037	Ferrite Beads	ZF25SD-00
FL1	XF0017	Crystal Filter	71M15B4 UM1
FL3	XC0020	Ceramic Filter	CF1455K14
FL4	XC0019	Ceramic Filter	CF1455H1
FL5	XF0021	Crystal Filter	71M15A2
IC2	XA0300	IC	AN512
IC3	XA0300	IC	AN512
IC5	XA0236	IC	BU4052BFC-T1
IC8	XA0224	IC	NJM2904M-T1
IC9	XA0224	IC	NJM2904M-T1
IC10	XA0239	IC	BU4001BF
IC11	XA0082	IC	MC7808CT
IC12	XA0368	IC	M5218FP-T01-1
IC13	XA0385	IC	ME222FP
IC14	XA0224	IC	NJM2904M-T1
IC15	XA0246	IC	BU4094BF-T1
IC16	XA0114	IC	UPD6346GS-T1
IC18	XA0299	IC	UPD6346GS-T1
IC20	XA0079	IC	MFC1241H
IC21	XA0168	IC	M5218FP-T01-1
IC22	XA0114	IC	UPD6346GS-T1
IC23	XA0114	IC	UPD6346GS-T1
IC24	XA0299	IC	BU4001BF
J1	UE0041	Connector	TMP-J01X-V6
J3	UE0041	Connector	TMP-J01X-V6
J4	UE0041	Connector	TMP-J01X-V6
J5	UE0041	Connector	TMP-J01X-V6
L2	QR0017	Coil	QR0017
L4	QC0126	Chip L.	NL32252ZT-R22J-3
L6	QC0127	Chip L.	NL32252ZT-R27J-3
L8	QR0017	Coil	QR0017
L9	QA0108	Coil	QA0108
L10	QA0107	Coil	QA0107
L11	QA0107	Coil	QA0107
L12	QA0107	Coil	QA0107
L13	QA0107	Coil	QA0107

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Ref. No.	Parts No.	Description	Parts Name
L14	QR0017	Coil	QR0017
L15	QC0039	Chip L.	NL32252ZT-1R0J
L16	QR0017	Coil	QR0017
L17	QC0078	Chip L.	NL32252ZT-220J
L18	QA0119	Coil	QA0119
L19	QC0074	Chip L.	NL32252ZT-8R2J
L20	QC0072	Chip L.	NL32252ZT-5R6J
L21	QC0483	Chip L.	LQ4N471J04
L48	QC0483	Chip L.	LQ4N471J04
L49	QC0483	Chip L.	LQ4N471J04
L50	QC0483	Chip L.	LQ4N471J04
L51	QR0017	Coil	QR0017
L52	QC0124	Chip L.	NL32252ZT-R15J-3
L53	QC0124	Chip L.	NL32252ZT-R15J-3
L54	QC0124	Chip L.	NL32252ZT-R15J-3
L55	QR0017	Coil	QR0017
L56	QA0108	Coil	QA0108
L57	QA0107	Coil	QA0107
L58	QA0107	Coil	QA0107
L59	QA0107	Coil	QA0107
L60	QC0047	Chip L.	NL32252ZT-4R7J
L61	QC0082	Chip L.	NL32252ZT-039J
L62	QC0123	Chip L.	NL32252ZT-R12J-3
L63	QA0119	Coil	QA0119
L64	QA0119	Coil	QA0119
L65	QA0119	Coil	QA0119
L66	QA0119	Coil	QA0119
L67	QC0483	Chip L.	LQ4N471J04
L68	QA0119	Coil	QA0119
L69	QA0119	Coil	QA0119
L70	QC0048	Chip L.	NL32252ZT-100J
L71	QC0048	Chip L.	NL32252ZT-100J
L72	QC0039	Chip L.	NL32252ZT-1R0J
L73	QC0078	Chip L.	NL32252ZT-220J
L75	QC0040	Chip L.	NL32252ZT-1R2J
L76	QC0048	Chip L.	NL32252ZT-100J
L77	QC0086	Chip L.	NL32252ZT-101J
L80	QR0017	Coil	QR0017
Q1	XT0084	Transistor	2SC2954-T1
Q3	XE0028	FET	3SK131V1ZT1
Q4	XE0028	FET	3SK131V1ZT1
Q5	XE0028	FET	3SK131V1ZT1
Q7	XE0028	FET	3SK131V1ZT1
Q8	XE0026	FET	2SK171-4
Q9	XE0026	FET	2SK171-4
Q10	XE0025	FET	2SK171-4
Q11	XE0025	FET	2SK171-4
Q12	XE0028	FET	3SK131V1ZT1
Q13	XT0084	Transistor	2SA1576T106R
Q14	XT0084	Transistor	2SA1576T106R
Q15	XT0085	Transistor	2SC4081T106R

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Ref. No.	Parts No.	Description	Parts Name
Q15	XT0085	Transistor	2SC4081T106R
Q18	XT0085	Transistor	2SC4081T106R
Q19	XT0085	Transistor	2SC4081T106R
Q20	XE0028	FEI	35K131V1271
Q21	XU0078	Transistor	UMZ211-TX
Q22	XE0028	FEI	35K131V1271
Q23	XE0028	FEI	35K131V1271
Q24	XE0028	FEI	35K131V1271
Q25	XT0085	Transistor	2SC4081T106R
Q27	XT0085	Transistor	2SC4081T106R
Q28	XU0148	Transistor	DTCL44EUT106
Q29	XU0148	Transistor	2SC4081T106R
Q30	XT0085	Transistor	2SC4081T106R
Q31	XT0085	Transistor	2SC4081T106R
Q32	XU0061	Transistor	UMZ211-TX
Q33	XT0136	Transistor	2SD1664
Q34	XU0061	Transistor	UMZ211-TX
Q35	XT0136	Transistor	2SD1664
Q37	XT0085	Transistor	2SC4081T106R
Q38	XU0075	Transistor	UMZ211-TX
Q41	XU0049	Transistor	UMZ211-TX
Q43	XU0049	Transistor	UMZ211-TX
Q44	XU0049	Transistor	UMZ211-TX
Q51	XT0127	Transistor	2SC3419-Y
Q52	XU0061	Transistor	UMZ211-TX
Q53	XU0061	Transistor	UMZ211-TX
Q54	XT0095	Transistor	2SC4081T106R
Q56	XT0111	Transistor	2SC4081T106S
Q57	XU0116	Transistor	DTA123EUT106
Q59	XU0112	Transistor	DTA114VUT106
Q60	XT0095	Transistor	2SC4081T106R
Q61	XU0047	Transistor	UMC3TR
Q62	XU0051	Transistor	UMZ211-TX
Q63	XU0148	Transistor	DTCL44EUT106
Q64	XU0029	Transistor	DTCL14YUT106
Q65	XU0061	Transistor	UMZ211-TX
R1	RK3026	Chip R.	ERJ3GSY101V
R2	RK3013	Chip R.	ERJ3GSY1822V
R3	RK3038	Chip R.	ERJ3GSY102V
R4	RK3042	Chip R.	ERJ3GSY1222V
R5	RK3032	Chip R.	ERJ3GSY1331V
R7	RK3038	Chip R.	ERJ3GSY102V
R12	RK3042	Chip R.	ERJ3GSY1222V
R13	RK3018	Chip R.	ERJ3GSY1220V
R14	RK3030	Chip R.	ERJ3GSY1221V
R15	RK3049	Chip R.	ERJ3GSY1822V
R16	RK3043	Chip R.	ERJ3GSY1272V
R17	RK3038	Chip R.	ERJ3GSY102V
R18	RK3040	Chip R.	ERJ3GSY102V
R19	RK3050	Chip R.	ERJ3GSY103V

Ref. No.	Parts No.	Description	Parts Name
R20	RK3026	Chip R.	ERJ3GSY101V
R21	RK3034	Chip R.	ERJ3GSY1471V
R22	RK3030	Chip R.	ERJ3GSY1221V
R23	RK3026	Chip R.	ERJ3GSY101V
R25	RK3042	Chip R.	ERJ3GSY1222V
R26	RK3046	Chip R.	ERJ3GSY1472V
R28	RK3038	Chip R.	ERJ3GSY102V
R29	RK3038	Chip R.	ERJ3GSY101V
R30	RK3026	Chip R.	ERJ3GSY101V
R31	RK3034	Chip R.	ERJ3GSY1471V
R32	RK3066	Chip R.	ERJ3GSY1224V
R33	RK3026	Chip R.	ERJ3GSY101V
R34	RK3058	Chip R.	ERJ3GSY1473V
R35	RK3050	Chip R.	ERJ3GSY103V
R36	RK3030	Chip R.	ERJ3GSY1221V
R37	RK3023	Chip R.	ERJ3GSY1560V
R38	RK1025	Chip R.	ERJ8GFY1331V
R57	RK3031	Chip R.	ERJ3GSY1271V
R58	RK3018	Chip R.	ERJ3GSY1220V
R59	RK3024	Chip R.	ERJ3GSY1080V
R60	RK4068	Chip R.	ERJ14V1151H
R61	RK3050	Chip R.	ERJ14V1561H
R62	RK3035	Chip R.	ERJ3GSY1561V
R63	RK4088	Chip R.	ERJ3GSY1471V
R64	RK3034	Chip R.	ERJ3GSY1470V
R65	RK3022	Chip R.	ERJ3GSY1223V
R66	RK3054	Chip R.	ERJ3GSY105V
R67	RK3074	Chip R.	ERJ3GSY101V
R68	RK3026	Chip R.	ERJ3GSY101V
R69	RK3034	Chip R.	ERJ3GSY1272V
R70	RK3025	Chip R.	ERJ3GSY101V
R71	RK3025	Chip R.	ERJ3GSY101V
R72	RK3044	Chip R.	ERJ3GSY1332V
R73	RK3032	Chip R.	ERJ3GSY102V
R74	RK3044	Chip R.	ERJ3GSY1332V
R75	RK3013	Chip R.	ERJ3GSY1822V
R76	RK3020	Chip R.	ERJ3GSY102V
R77	RK3040	Chip R.	ERJ3GSY1562V
R78	RK3042	Chip R.	ERJ3GSY1470V
R79	RK3030	Chip R.	ERJ3GSY1221V
R80	RK3030	Chip R.	ERJ3GSY1331V
R81	RK3058	Chip R.	ERJ3GSY1473V
R82	RK3052	Chip R.	ERJ3GSY1563V
R83	RK3038	Chip R.	ERJ3GSY102V
R84	RK3032	Chip R.	ERJ3GSY1331V
R85	RK3050	Chip R.	ERJ3GSY108V
R86	RK3025	Chip R.	ERJ3GSY1222V
R87	RK3042	Chip R.	ERJ3GSY1272V
R88	RK3050	Chip R.	ERJ3GSY102V
R90	RK3042	Chip R.	ERJ3GSY1222V
R89	RK3062	Chip R.	ERJ3GSY104V

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Ref. No.	Parts No.	Description	Parts Name
R91	RK3054	Chip R.	ERJ3GSY1223V
R92	RK3026	Chip R.	ERJ3GSY101V
R93	RK3022	Chip R.	ERJ3GSY1470V
R94	RK3034	Chip R.	ERJ3GSY1471V
R95	RK3078	Chip R.	ERJ3GSY1225V
R96	RK3043	Chip R.	ERJ3GSY1272V
R97	RK3058	Chip R.	ERJ3GSY1473V
R98	RK3038	Chip R.	ERJ3GSY102V
R99	RK3042	Chip R.	ERJ3GSY1222V
R100	RK3070	Chip R.	ERJ3GSY1474V
R101	RK3026	Chip R.	ERJ3GSY101V
R102	RK3034	Chip R.	ERJ3GSY1471V
R103	RK3050	Chip R.	ERJ3GSY108V
R104	RK3026	Chip R.	ERJ3GSY101V
R105	RK3050	Chip R.	ERJ3GSY108V
R106	RK3051	Chip R.	ERJ3GSY123V
R107	RK3034	Chip R.	ERJ3GSY1471V
R109	RK3046	Chip R.	ERJ3GSY1472V
R110	RK3050	Chip R.	ERJ3GSY1392V
R111	RK3030	Chip R.	ERJ3GSY103V
R113	RK3030	Chip R.	ERJ3GSY1221V
R114	RK3030	Chip R.	ERJ3GSY1221V
R115	RK3046	Chip R.	ERJ3GSY1472V
R118	RK3046	Chip R.	ERJ3GSY1472V
R120	RK3030	Chip R.	ERJ3GSY1221V
R121	RK3051	Chip R.	ERJ3GSY123V
R123	RK3050	Chip R.	ERJ3GSY108V
R124	RK3060	Chip R.	ERJ3GSY103V
R125	RK3058	Chip R.	ERJ3GSY1473V
R126	RK3026	Chip R.	ERJ3GSY101V
R127	RK3034	Chip R.	ERJ3GSY101V
R128	RK3034	Chip R.	ERJ3GSY101V
R130	RK3050	Chip R.	ERJ3GSY103V
R131	RK3026	Chip R.	ERJ3GSY101V
R132	RK3054	Chip R.	ERJ3GSY1223V
R133	RK3026	Chip R.	ERJ3GSY101V
R134	RK3058	Chip R.	ERJ3GSY1473V
R135	RK3059	Chip R.	ERJ3GSY1563V
R136	RK3042	Chip R.	ERJ3GSY1222V
R137	RK3042	Chip R.	ERJ3GSY1222V
R138	RK3032	Chip R.	ERJ3GSY1331V
R139	RK3070	Chip R.	ERJ3GSY1474V
R140	RK3042	Chip R.	ERJ3GSY104V
R141	RK3062	Chip R.	ERJ3GSY102V
R142	RK3038	Chip R.	ERJ3GSY102V
R143	RK3042	Chip R.	ERJ3GSY1222V
R144	RK3025	Chip R.	ERJ3GSY101V
R145	RK3058	Chip R.	ERJ3GSY1473V
R146	RK3074	Chip R.	ERJ3GSY108V
R147	RK3038	Chip R.	ERJ3GSY102V

CPU Unit

Ref. No.	Parts No.	Description	Parts Name
R148	RK3038	Chip R.	ERJ3GSY102V
R149	RK3045	Chip R.	ERJ3GSY1392V
R150	RK3026	Chip R.	ERJ3GSY101V
R151	RK3050	Chip R.	ERJ3GSY103V
R152	RK3048	Chip R.	ERJ3GSY1562V
R164	RK3062	Chip R.	ERJ3GSY104V
R165	RK3046	Chip R.	ERJ3GSY1472V
R166	RK3050	Chip R.	ERJ3GSY103V
R167	RK3034	Chip R.	ERJ3GSY1471V
R168	RK3076	Chip R.	ERJ3GSY155V
R169	RK3062	Chip R.	ERJ3GSY104V
R170	RK3058	Chip R.	ERJ3GSY1473V
R171	RK3038	Chip R.	ERJ3GSY102V
R172	RK3050	Chip R.	ERJ3GSY103V
R173	RK3058	Chip R.	ERJ3GSY1473V
R174	RK3001	Chip R.	ERJ3GSY0800V
R175	RK3044	Chip R.	ERJ3GSY1392V
R176	RK3047	Chip R.	ERJ3GSY1562V
R177	RK3044	Chip R.	ERJ3GSY1392V
R186	RK3058	Chip R.	ERJ3GSY1473V
R187	RK3050	Chip R.	ERJ3GSY103V
R189	RK3062	Chip R.	ERJ3GSY104V
R190	RK3062	Chip R.	ERJ3GSY104V
R191	RK3059	Chip R.	ERJ3GSY1563V
R192	RK3058	Chip R.	ERJ3GSY1473V
R193	RK3058	Chip R.	ERJ3GSY1473V
R194	RK3056	Chip R.	ERJ3GSY1333V
R195	RK3064	Chip R.	ERJ3GSY154V
R196	RK3054	Chip R.	ERJ3GSY1223V
R197	RK3066	Chip R.	ERJ3GSY1393V
R198	RK3074	Chip R.	ERJ3GSY105V
R199	RK3058	Chip R.	ERJ3GSY1473V
R200	RK3068	Chip R.	ERJ3GSY1334V
R201	RK3068	Chip R.	ERJ3GSY1274V
R202	RK3042	Chip R.	ERJ3GSY1222V
R203	RK3042	Chip R.	ERJ3GSY1222V
R204	RK3074	Chip R.	ERJ3GSY105V
R205	RK3034	Chip R.	ERJ3GSY1471V
R206	RK3051	Chip R.	ERJ3GSY1123V
R207	RK3054	Chip R.	ERJ3GSY1223V
R208	RK3049	Chip R.	ERJ3GSY1822V
R209	RK3032	Chip R.	ERJ3GSY1331V
R212	RK3045	Chip R.	ERJ3GSY1392V
R213	RK3046	Chip R.	ERJ3GSY1472V
R214	RK3049	Chip R.	ERJ3GSY1822V
R215	RK3074	Chip R.	ERJ3GSY105V
R216	RK3074	Chip R.	ERJ3GSY105V
R217	RK3062	Chip R.	ERJ3GSY104V
R218	RK3075	Chip R.	ERJ3GSY1125V
R219	RK3074	Chip R.	ERJ3GSY105V
R220	RK3074	Chip R.	ERJ3GSY105V

CPU Unit

Ref. No.	Parts No.	Description	Parts Name
R221	RK3070	Chip R.	ERJ3GSYJ474V
R222	RK3047	Chip R.	ERJ3GSYJ562V
R223	RK3034	Chip R.	ERJ3GSYJ471V
R224	RK3050	Chip R.	ERJ3GSYJ103V
R225	RK3030	Chip R.	ERJ3GSYJ221V
R226	RK3049	Chip R.	ERJ3GSYJ822V
R227	RK3070	Chip R.	ERJ3GSYJ474V
R228	RK3070	Chip R.	ERJ3GSYJ474V
R229	RK4082	Chip R.	ERJ14VX4R7H
R230	RK1035	Chip R.	ERJ3GSYJ102V
R231	RK4082	Chip R.	ERJ14VX4R7H
R232	RK1035	Chip R.	ERJ3GSYJ102V
R233	RK3046	Chip R.	ERJ3GSYJ472V
R237	RK3057	Chip R.	ERJ3GSYJ393V
R238	RK3057	Chip R.	ERJ3GSYJ393V
R239	RK3062	Chip R.	ERJ3GSYJ104V
R240	RK3042	Chip R.	ERJ3GSYJ222V
R241	RK3053	Chip R.	ERJ3GSYJ183V
R242	RK3060	Chip R.	ERJ3GSYJ683V
R244	RK3062	Chip R.	ERJ3GSYJ104V
R246	RK3056	Chip R.	ERJ3GSYJ333V
R247	RK3056	Chip R.	ERJ3GSYJ333V
R248	RK3054	Chip R.	ERJ3GSYJ223V
R249	RK3062	Chip R.	ERJ3GSYJ104V
R250	RK3050	Chip R.	ERJ3GSYJ103V
R251	RK3046	Chip R.	ERJ3GSYJ472V
R252	RK3062	Chip R.	ERJ3GSYJ104V
R253	RK3052	Chip R.	ERJ3GSYJ103V
R254	RK3026	Chip R.	ERJ3GSYJ101V
R255	RK3069	Chip R.	ERJ3GSYJ394V
R256	RK3071	Chip R.	ERJ3GSYJ101V
R257	RK3041	Chip R.	ERJ3GSYJ564V
R258	RK3052	Chip R.	ERJ3GSYJ153V
R259	RK3034	Chip R.	ERJ3GSYJ105V
R260	RK3050	Chip R.	ERJ3GSYJ103V
R261	RK3051	Chip R.	ERJ3GSYJ123V
R262	RK3038	Chip R.	ERJ3GSYJ102V
R263	RK3034	Chip R.	ERJ3GSYJ471V
R264	RK3034	Chip R.	ERJ3GSYJ471V
R265	RK3058	Chip R.	ERJ3GSYJ473V
R266	RK3034	Chip R.	ERJ3GSYJ471V
R267	RK3053	Chip R.	ERJ3GSYJ183V
R268	RK3034	Chip R.	ERJ3GSYJ471V
R273	RK3054	Chip R.	ERJ3GSYJ223V
R285	RK3042	Chip R.	ERJ3GSYJ222V
R287	RK3035	Chip R.	ERJ3GSYJ561V
R294	RK3045	Chip R.	ERJ3GSYJ392V
R302	RK3045	Chip R.	ERJ3GSYJ392V
R304	RK0022	Chip R.	ERJ16GEVJ221V
R305	RK0022	Chip R.	ERJ16GEVJ221V
R306	RK0114	Chip R.	ERJ16GEVJ010V

Ref. No.	Parts No.	Description	Parts Name
R307	RK3026	Chip R.	ERJ3GSYJ101V
R308	RK3001	Chip R.	ERJ3GSYR000V
R309	RK3048	Chip R.	ERJ3GSYJ682V
R310	RK3032	Chip R.	ERJ3GSYJ331V
R311	RK3074	Chip R.	ERJ3GSYJ105V
R312	RK3050	Chip R.	ERJ3GSYJ822V
R313	RK3050	Chip R.	ERJ3GSYJ103V
R314	RK3058	Chip R.	ERJ3GSYJ473V
R315	RK3058	Chip R.	ERJ3GSYJ473V
R316	RK3058	Chip R.	ERJ3GSYJ472V
R317	RK3038	Chip R.	ERJ3GSYJ102V
R318	RK3046	Chip R.	ERJ3GSYJ472V
R319	RK3054	Chip R.	ERJ3GSYJ223V
R320	RK3038	Chip R.	ERJ3GSYJ102V
R321	RK3057	Chip R.	ERJ3GSYJ393V
R322	RK3057	Chip R.	ERJ3GSYJ393V
R323	RK3056	Chip R.	ERJ3GSYJ333V
R324	RK3038	Chip R.	ERJ3GSYJ102V
R325	RK3050	Chip R.	ERJ3GSYJ103V
R326	RK3050	Chip R.	ERJ3GSYJ103V
R327	RK3064	Chip R.	ERJ3GSYJ154V
R328	RK3072	Chip R.	ERJ3GSYJ684V
R329	RK3062	Chip R.	ERJ3GSYJ104V
R331	RK3062	Chip R.	ERJ3GSYJ104V
R332	RK3054	Chip R.	ERJ3GSYJ223V
R333	RK3055	Chip R.	ERJ3GSYJ273V
R334	RK3038	Chip R.	ERJ3GSYJ102V
R335	RK3026	Chip R.	ERJ3GSYJ101V
R336	RK3066	Chip R.	ERJ3GSYJ224V
R337	RK3038	Chip R.	ERJ3GSYJ102V
R338	RK3026	Chip R.	ERJ3GSYJ101V
R339	RK3042	Chip R.	ERJ3GSYJ222V
R341	RK3034	Chip R.	ERJ3GSYJ471V
R342	RK3034	Chip R.	ERJ3GSYJ471V
R343	RK3001	Chip R.	ERJ3GSYR000V
R344	RK1035	Chip R.	ERJ3GSYJ102V
R345	RK3034	Chip R.	ERJ3GSYJ471V
R346	RK3034	Chip R.	ERJ3GSYJ471V
R348	RK3050	Chip R.	ERJ3GSYJ103V
R349	RK3046	Chip R.	ERJ3GSYJ472V
R350	RK3050	Chip R.	ERJ3GSYJ472V
R351	RK3033	Chip R.	ERJ3GSYJ103V
R352	RK3015	Chip R.	ERJ3GSYJ120V
R353	RK3024	Chip R.	ERJ3GSYJ680V
R354	RK3033	Chip R.	ERJ3GSYJ391V
R355	RK3064	Chip R.	ERJ3GSYJ154V
R356	RK3046	Chip R.	ERJ3GSYJ472V
R357	RK3030	Chip R.	ERJ3GSYJ221V
R358	RK3045	Chip R.	ERJ3GSYJ392V
R359	RK3030	Chip R.	ERJ3GSYJ221V

Ref. No.	Parts No.	Description	Parts Name
R361	RK0020	Chip R.	ERJ16GEVJ151V
R362	RK3018	Chip R.	ERJ3GSYJ220V
R363	RK3018	Chip R.	ERJ3GSYJ220V
R364	RK3048	Chip R.	ERJ3GSYJ682V
R365	RK3042	Chip R.	ERJ3GSYJ222V
R366	RK3042	Chip R.	ERJ3GSYJ222V
R368	RK3001	Chip R.	ERJ3GSYR000V
R369	RK3050	Chip R.	ERJ3GSYJ103V
R370	RK3050	Chip R.	ERJ3GSYJ103V
R371	RK3050	Chip R.	ERJ3GSYJ103V
R372	RK3050	Chip R.	ERJ3GSYJ103V
R373	RK3050	Chip R.	ERJ3GSYJ103V
R374	RK3050	Chip R.	ERJ3GSYJ103V
R375	RK3050	Chip R.	ERJ3GSYJ103V
R376	RK3050	Chip R.	ERJ3GSYJ103V
R377	RK3064	Chip R.	ERJ3GSYJ154V
R378	RK3050	Chip R.	ERJ3GSYJ103V
R379	RK3058	Chip R.	ERJ3GSYJ103V
R380	RK3050	Chip R.	ERJ3GSYJ103V
R381	RK3058	Chip R.	ERJ3GSYJ473V
R382	RK3050	Chip R.	ERJ3GSYJ103V
R383	RK3063	Chip R.	ERJ3GSYJ183V
R384	RK3054	Chip R.	ERJ3GSYJ223V
R385	RK3047	Chip R.	ERJ3GSYJ562V
R386	RK3026	Chip R.	ERJ3GSYJ101V
R388	RK3034	Chip R.	ERJ3GSYJ471V
R389	RK3034	Chip R.	ERJ3GSYJ471V
R390	RK3053	Chip R.	ERJ3GSYJ183V
R391	RK3064	Chip R.	ERJ3GSYJ154V
R392	RK305C	Chip R.	ERJ3GSYJ103V
R393	RK3042	Chip R.	ERJ3GSYJ473V
R394	RK3058	Chip R.	ERJ3GSYJ224V
R395	RK3066	Chip R.	ERJ3GSYJ224V
R396	RK3042	Chip R.	ERJ3GSYJ222V
R397	RK1023	Chip R.	ERJ3GSYJ271V
R398	RK3054	Chip R.	ERJ3GSYJ223V
R399	RK3054	Chip R.	ERJ3GSYJ223V
R400	RK3082	Chip R.	ERJ3GSYJ104V
R405	RK3049	Chip R.	ERJ3GSYJ822V
R406	RK3049	Chip R.	ERJ3GSYJ822V
R407	RK3046	Chip R.	ERJ3GSYJ472V
R408	RK3054	Chip R.	ERJ3GSYJ223V
R409	RK3018	Chip R.	ERJ3GSYJ220V
R411	RK3027	Chip R.	ERJ3GSYJ121V
R413	RK3001	Chip R.	ERJ3GSYR000V
R414	RK3001	Chip R.	ERJ3GSYR000V
S1	US0012	Switch	SSSS212A NS-L-2
TH1	XS0019	Thermistor	TEPSR472K440H5Q
TH2	XS0017	Thermistor	TEPSR1222K410H5Q
VR1	RH0115	Trim Pot	EWY1YSX50B12
VR2	RH0101	Trim Pot	EWY1YSX50B03

CPU/BPF 1/BPF 2 Unit

Ref. No.	Parts No.	Description	Parts Name
VR3	RH0103	Trim Pot	EWY1YSX50B14
VR4	RH0103	Trim Pot	EWY1YSX50B14
VR5	RH0111	Trim Pot	EWY1YSX50B05
VR6	RH0103	Trim Pot	EWY1YSX50B14
VR7	RH0108	Trim Pot	EWY1YSX50B15
VR8	RH0111	Trim Pot	EWY1YSX50B05
VR9	RH0108	Trim Pot	EWY1YSX50B15
VR10	RH0099	Trim Pot	EWY1YSX50B03
VR11	RH0099	Trim Pot	EWY1YSX50B03
VR13	RH0103	Trim Pot	EWY1YSX50B14
VR14	RH0103	Trim Pot	EWY1YSX50B14
VR15	RH0113	Trim Pot	EWY1YSX50B16
TZ0049	UM-1	UM-1	
TZ0049	UM-1	UM-1	
UP9288C	P. C. B	MAIN Circuit Board C	

BPF 1			
C54	CU3059	Chip C.	C1608JF1E042T-A
C55	CU3023	Chip C.	C1608CH1H01JT-A
C56	CU3035	Chip C.	C1608JBIH102KT-A
C57	CU3035	Chip C.	C1608JBIH102KT-A
C58	CU3059	Chip C.	C1608JF1E042T-A
C73	CU3025	Chip C.	C1608CH1H15JT-A
C74	CU3034	Chip C.	C1608JBIH821KT-A
C75	CU3034	Chip C.	C1608JBIH821KT-A
C76	CU3056	Chip C.	C1608JF1E4732T-A
C77	XD0266	Diode	DAP2360 T106
D13	XD0272	Diode	1SS356 T101
L22	QC0079	Chip L.	NL322522T-270J
L23	QC0078	Chip L.	NL322522T-220J
L33	QC0043	Chip L.	NL322522T-2R2J
L34	QC0129	Chip L.	NL322522T-R3J-3
L35	QC0129	Chip L.	NL322522T-R3J-3
R39	RK4070	Chip R.	ERJ14YJ271H
R40	RK3015	Chip R.	ERJ3GSYJ120V
R41	RK3031	Chip R.	ERJ3GSYJ271V
R47	RK3028	Chip R.	ERJ3GSYJ151V
R48	RK4068	Chip R.	ERJ14YJ151H

BPF 2			
C59	CU3040	Chip C.	C1608JBIH272T-A
C60	CU3042	Chip C.	C1608JBIH392T-A
C61	CU3040	Chip C.	C1608JBIH272T-A
C62	CU3066	Chip C.	C1608JF1E4732T-A
C78	CU3024	Chip C.	C1608CH1H121JT-A
C79	CU3033	Chip C.	C1608JBIH681KT-A
C80	CU3033	Chip C.	C1608JBIH681KT-A
C81	CU3056	Chip C.	C1608JF1E4732T-A
C82	CU3066	Chip C.	C1608JF1E4732T-A

Ref. No.	Parts No.	Description	Parts Name
R887	RK3050	Chip R.	ERJ3GSY1103V
R888	RK3050	Chip R.	ERJ3GSY1104V
R892	RK3030	Chip R.	ERJ3GSY1221V
R893	RK3030	Chip R.	ERJ3GSY1103V
R894	RK3052	Chip R.	ERJ3GSY1153V
R895	RK3001	Chip R.	ERJ3GSY0R00V
R896	RK3001	Chip R.	ERJ3GSY0R00V
R897	RK3001	Chip R.	ERJ3GSY0R00V
R899	RK3046	Chip R.	ERJ3GSY1472V
R900	RK3046	Chip R.	ERJ3GSY1472V
TC702	CT0034	Trimmer	CT23S-30CW1-P
TC703	CT0034	Trimmer	CT23S-30CW1-P
TC704	CT0034	Trimmer	CT23S-30CW1-P
VR703	RH0103	Trim. Pot	EW1YXS08H4
VR701	RH0104	Trim. Pot	EW1YXS08E4
VR702	RH0104	Trim. Pot	EW1YXS08E4
X702	XQ0066	Crystal	49U-9.420MHz
X703	XQ0067	Crystal	49U-9.875MHz
X704	XQ0082	Crystal	NT0-7970.30.000MHz
TZ0065		49U	
UA0048		49U	
UF0283B		P. C. B	SMD26X50-28X6-P1.0 PLL Circuit Board B

VCO 1

Ref. No.	Parts No.	Description	Parts Name
C924	CS0372	Chip Tantalum	TMCMB1C106MTR
C925	CU3035	Chip C.	C1608JB1H102KT-A
C926	CU3035	Chip C.	C1608JB1H102KT-A
C927	CU3035	Chip C.	C1608JB1H102KT-A
C928	CU3035	Chip C.	C1608JB1H102KT-A
C929	CU3035	Chip C.	C1608JB1H102KT-A
C930	CU3035	Chip C.	C1608JB1H102KT-A
C931	CU3035	Chip C.	C1608JB1H102KT-A
C932	CU3035	Chip C.	C1608JB1E223KT-A
C933	CU3022	Chip C.	C1608CH1H20JT-A
C934	CU3024	Chip C.	C1608CH1H21JT-A
C935	CU3012	Chip C.	C1608CH1H20JT-A
C936	CU3011	Chip C.	C1608CH1H100CT-A
C937	CU3006	Chip C.	C1608CH1H050CT-A
C938	CU3035	Chip C.	C1608JB1H102KT-A
C939	CS0382	Chip Tantalum	TMCMB14225MTR
C940	UE0185	Connector	BSP-BC-2
D931	XD0233	Diode	1S1217TPH4
IC704	XA0292	IC	MC12019DR2
L931	QA0109	Coil	QA0109
L932	QC0043	Chip L.	NL3225Z2T-2R2J
Q931	FE0006	FET	2SK210GR-TE85L
Q932	XT0059	Transistor	2SC3082X1146Q
Q933	XT0059	Transistor	2SC4081H106R
R925	RK3050	Chip R.	ERJ3GSY1103V
R927	RK3030	Chip R.	ERJ3GSY1221V

Ref. No.	Parts No.	Description	Parts Name
R951	RK3038	Chip R.	ERJ3GSY1102V
R952	RK3030	Chip R.	ERJ3GSY1221V
R953	RK3030	Chip R.	ERJ3GSY1221V
R954	RK3040	Chip R.	ERJ3GSY1152V
R955	RK3032	Chip R.	ERJ3GSY1331V
R956	RK3035	Chip R.	ERJ3GSY1561V
R957	RK3036	Chip R.	ERJ3GSY1681V
R958	RK3050	Chip R.	ERJ3GSY1103V
R959	RK3047	Chip R.	ERJ3GSY1562V
T90106		VCO Case (A)	
C961	CU3026	Chip C.	C1608CH1H183JT-A
C962	CU3011	Chip C.	C1608CH1H100CT-A
C963	CU3020	Chip C.	C1608CH1H560JT-A
C964	CU3013	Chip C.	C1608CH1H50JT-A
C965	CU3012	Chip C.	C1608CH1H20JT-A
C966	CU3006	Chip C.	C1608CH1H050CT-A
C967	CU3035	Chip C.	C1608JB1H102KT-A
C968	CS0382	Chip Tantalum	TMCMB14228MTR
C969	CU3035	Chip C.	C1608JB1H102KT-A
C970	CU3035	Chip C.	C1608JB1H102KT-A
C971	CU3022	Chip C.	C1608CH1H20JT-A
C972	CU3009	Chip C.	C1608CH1H080CT-A
C973	CU3018	Chip C.	C1608CH1H390JT-A
C974	CU3012	Chip C.	C1608CH1H20JT-A
C975	CU3010	Chip C.	C1608CH1H090CT-A
C976	CU3035	Chip C.	C1608JB1H102KT-A
C977	CU3035	Chip C.	C1608JB1H102KT-A
C978	CS0382	Chip Tantalum	TMCMB14228MTR
C979	CU3035	Chip C.	C1608JB1H102KT-A
C980	CU3035	Chip C.	C1608JB1H102KT-A
C981	CU3018	Chip C.	C1608CH1H390JT-A
C982	CU3005	Chip C.	C1608CH1H400CT-A
C983	CU3017	Chip C.	C1608CH1H30JT-A
C984	CU3011	Chip C.	C1608CH1H100CT-A
C985	CU3006	Chip C.	C1608CH1H050CT-A
C986	CU3035	Chip C.	C1608JB1H102KT-A
C987	CU3035	Chip C.	C1608JB1H102KT-A
C988	CS0382	Chip Tantalum	TMCMB14228MTR
C989	CU3035	Chip C.	C1608JB1H102KT-A
C990	CU3035	Chip C.	C1608JB1H102KT-A
C991	CU3101	Chip C.	C1608JB1H102KT-A
C992	CU3101	Chip C.	C1608JB1C473KT-A
C993	UE0183	Connector	B4P-BC-2
C994	UE0182	Connector	B5P-BC-2
D961	XD0233	Diode	1S1217TPH4
D962	XD0266	Diode	DAP268U T106
D963	XD0233	Diode	1S1217TPH4
D965	XD0233	Diode	1S1217TPH4
D966	XD0272	Diode	1SS356 TW1.1
L962	QA0110	Coil	QA0110
L963	QC0047	Chip L.	NL3225Z2T-4R7J

PA

Ref. No.	Parts No.	Description	Parts Name
C502	CU8047	Chip C.	C1608JB1H103KT-A
C503	CS0395	Ceramic C.	RCC125L47J1-L46AU
C504	CS0393	Ceramic C.	RCC125L39J1-L46AU
C505	CM0008	Mica C.	DM19 2221 500V

PA Unit

Ref. No.	Parts No.	Description	Parts Name
C506	CC5083	Ceramic C.	RC008SL151J-L46AU
C507	CC5085	Ceramic C.	RCC12SL471J-L46AU
C508	CU3047	Chip C.	C1608JB1H103KT-A
C509	CU3047	Chip C.	C1608JB1H103KT-A
C510	CC5081	Ceramic C.	RCC11SL331J-L46AU
C511	CC5089	Ceramic C.	RCC10SL271J-L46AU
C512	CC5085	Ceramic C.	RCC12SL471J-L46AU
C513	CC5077	Ceramic C.	RC007SL820J-L46AU
C514	CC5089	Ceramic C.	HM153J-SL681J
C515	CU3047	Chip C.	C1608JB1H103KT-A
C516	CU3047	Chip C.	C1608JB1H103KT-A
C517	CC5085	Ceramic C.	RCC12SL471J-L46AU
C518	CC5089	Ceramic C.	RCC06SL470J-L46AU
C519	CC5089	Ceramic C.	HM153J-SL681J
C520	CC5081	Ceramic C.	RCC07SL121J-L46AU
C521	CC5079	Ceramic C.	RCC07SL101J-L46AU
C522	CU3047	Chip C.	C1608JB1H103KT-A
C523	CU3047	Chip C.	C1608JB1H103KT-A
C524	CC5083	Ceramic C.	RCC06SL151J-L46AU
C525	CC5088	Ceramic C.	RCC06SL390J-L46AU
C526	CC5081	Ceramic C.	RCC11SL331J-L46AU
C527	CC5077	Ceramic C.	RCC07SL820J-L46AU
C528	CC5085	Ceramic C.	RCC09SL181J-L46AU
C529	CU3047	Chip C.	C1608JB1H103KT-A
C530	CU3047	Chip C.	C1608JB1H103KT-A
C531	CC5081	Ceramic C.	RCC07SL121J-L46AU
C532	CC5080	Ceramic C.	RCC06SL150J-L46AE
C533	CC5085	Ceramic C.	RCC09SL181J-L46AU
C534	CC5089	Ceramic C.	RCC06SL470J-L46AU
C535	CC5077	Ceramic C.	RCC07SL820J-L46AU
C536	CU3047	Chip C.	C1608JB1H103KT-A
C537	CU3047	Chip C.	C1608JB1H103KT-A
C538	CC5084	Ceramic C.	RCC06SL220J-L46AE
C539	CC5085	Ceramic C.	RCC05SL270J-L46AE
C540	CC5081	Ceramic C.	RCC07SL121J-L46AU
C542	CC5084	Ceramic C.	RCC05SL220J-L46AU
C543	CC5073	Ceramic C.	RCC06SL560J-L46AU
C544	CU3047	Chip C.	C1608JB1H103KT-A
C545	CU3027	Chip C.	C1608CH121J-A
C546	CU3029	Chip C.	C1608CH121J-A
C547	CU3031	Chip C.	C1608JB1H471KT-A
C548	CU3031	Chip C.	C1608JB1H471KT-A
C549	CU3047	Chip C.	C1608JB1H103KT-A
C550	CU3047	Chip C.	C1608JB1H103KT-A
C551	CU3047	Chip C.	C1608JB1H103KT-A
C552	CU3047	Chip C.	C1608JB1H103KT-A
C553	CU3047	Chip C.	C1608JB1H103KT-A
C554	CU3047	Chip C.	C1608JB1H103KT-A
C555	CU3047	Chip C.	C1608JB1H103KT-A
C580	CU3024	Chip C.	C1608JB1H103KT-A
C581	CU3026	Chip C.	C1608CH121J-A

Ref. No.	Parts No.	Description	Parts Name
Q609	XU0175	Transistor	UM5111-TX
R501	RK4029	Chip R.	ERJ-12YJ181H
R502	RK4024	Chip R.	ERJ-12YJ680H
R503	RK0107	Chip R.	ERJ6GEV1000V
R504	RK3050	Chip R.	ERJ3GSVJ103V
R505	RK3050	Chip R.	ERJ3GSVJ103V
R506	RK3052	Chip R.	ERJ3GSVJ153V
R507	RK3052	Chip R.	ERJ3GSVJ153V
R508	RK3062	Chip R.	ERJ3GSVJ104V
R509	RK3062	Chip R.	ERJ3GSVJ104V
R510	RK3038	Chip R.	ERJ3GSVJ102V
R511	RK3038	Chip R.	ERJ3GSVJ102V
R512	RK3038	Chip R.	ERJ3GSVJ102V
R513	RK3038	Chip R.	ERJ3GSVJ102V
R514	RK3038	Chip R.	ERJ3GSVJ102V
R515	RK3038	Chip R.	ERJ3GSVJ102V
R527	RK0065	Chip R.	ERJ6GEVJ683Y
R528	RK3034	Chip R.	ERJ3GSVJ471V
R529	RK3038	Chip R.	ERJ3GSVJ102V
R531	RK3023	Chip R.	ERJ3GSVJ560V
R532	RK0008	Chip R.	ERJ6GEVJ933Y
R533	RK3001	Chip R.	ERJ3GSVOR00V
R534	RK3001	Chip R.	ERJ3GSVOR00V
R535	RK3001	Chip R.	ERJ3GSVOR00V
R536	UL0006	Relay	AG201344
RL501	UL0006	Relay	AG201344
RL502	UL0006	Relay	AG201344
RL503	UL0006	Relay	AG201344
RL504	UL0006	Relay	AG201344
RL505	UL0006	Relay	AG201344
RL506	UL0006	Relay	AG201344
RL507	UL0006	Relay	AG201344
RL508	UL0006	Relay	AG201344
RL509	UL0006	Relay	AG201344
RL510	UL0006	Relay	AG201344
RL512	UL0006	Relay	AG201344
RL513	UL0010	Relay	FBR22D12
RL515	UL0010	Relay	FBR22D12
SA501	FU0001	Surge absorber	DSA-3011LA
TC501	TC501	Trimmer	ECV12W0453T
W506	UX1079	Wire	FILTER-MAIN 2
W507	UA0050	Power cord	FFC SWCD-12395-BD
W508	UX1080	Wire	FILTER-MAIN 3
C602	CU3042	Chip C.	C2012JB1C104KT-A
C603	CU3006	Chip C.	C2012JB1C104KT-A
C604	CU3012	Chip C.	C1608CH1H050CT-A
C605	CU3029	Chip C.	C1608JB1R331KT-A
C606	CU3029	Chip C.	C1608JB1R331KT-A
C607	CU3023	Chip C.	C1608CH1H101J-A
C608	CU3042	Chip C.	C2012JB1C104KT-A
C609	CU3035	Chip C.	C1608JB1H103KT-A

PA Unit

Ref. No.	Parts No.	Description	Parts Name
C610	CE0350	Electrolytic C.	16WV100HC
C611	CU3042	Chip C.	C2012JB1C104KT-A
C612	CU3035	Chip C.	C1608JB1H103KT-A
C613	CU3002	Chip C.	C2012JB1H103KT-A
C614	CU0089	Chip C.	C2012CHH831J
C615	CU0002	Chip C.	C2012JB1H103KT-A
C616	CU0023	Chip C.	C3216CH1H121J-A
C617	CE0350	Electrolytic C.	16WV100HC
C618	CU3042	Chip C.	C2012JB1C104KT-A
C619	CU3065	Chip C.	C1608JB1H103KT-A
C620	CU7065	Chip C.	C2C312AC6330J
C622	CU7038	Chip C.	C2C312AC6680J
C623	CU8032	Chip C.	C2012JB1E223KT-A
C624	CU8032	Chip C.	C2012JB1E223KT-A
C625	CU8032	Chip C.	C2012JB1E223KT-A
C626	CU0006	Mica C.	DM19 152J 500V
C628	CU8032	Chip C.	C2012JB1E223KT-A
C629	CU8032	Chip C.	C2012JB1E223KT-A
C630	CE0364	Electrolytic C.	16WV475WB-TS
C631	CU8042	Chip C.	C2012JB1C104KT-A
C632	CU8042	Chip C.	C1608JB1H103KT-A
C634	CU0004	Mica C.	DM19 102J 500V
C635	CC5085	Ceramic	C. RCC12SL471J-L46AU
C636	CC5067	Ceramic	C. FCC05SL300J-L46AE
C638	CU3035	Chip C.	C1608JB1H103KT-A
C639	CU8042	Chip C.	C2012JB1C104KT-A
C641	CE0353	Electrolytic C.	16WV470HC
C642	CU8042	Chip C.	C2012JB1C104KT-A
C643	CU3047	Chip C.	C1608JB1H103KT-A
C644	CU3035	Chip C.	C1608JB1H103KT-A
C645	CU3035	Chip C.	C1608JB1H103KT-A
C646	CU3035	Chip C.	C1608JB1H103KT-A
C647	CE0343	Electrolytic C.	16WV 1000HC-T
C648	CU3047	Chip C.	C1608JB1H103KT-A
C649	CU9009	Chip C.	C3216JB1H103KT-A
C650	CU3047	Chip C.	C1608JB1H103KT-A
C651	CU3047	Chip C.	C1608JB1H103KT-A
C652	CU3047	Chip C.	C1608JB1H103KT-A
C653	CU3035	Chip C.	C1608JB1H103KT-A
C654	CE0201	Electrolytic C.	16WV100SZ
C655	CE0355	Electrolytic C.	16WV470HC
C656	CU3047	Chip C.	C1608JB1H103KT-A
C657	CU3047	Chip C.	C1608JB1H103KT-A
C658	CU3047	Chip C.	C1608JB1H103KT-A
C659	CU3047	Chip C.	C1608JB1H103KT-A
C661	CU3047	Chip C.	C1608CH1H103KT-A
C662	CU3047	Chip C.	C1608JB1R331KT-A
C663	CU8042	Chip C.	C2012JB1C104KT-A
C664	CU8042	Chip C.	C2012JB1C104KT-A
C665	CU3047	Chip C.	C1608JB1H103KT-A

PA/PA MAIN1/PA MAIN2/PA FILTER1/JACK MAIN1 Unit

Ref. No.	Parts No.	Description	Parts Name
C1019	CE0315	Electrolytic C.	EEFYCA470P
C1029	CS0035	Chip C.	C1608JB1H103KT-A
C1021	CS0061	Chip C.	TWCSA1V224MFR
C1022	CE0315	Electrolytic C.	EEFYCA470P
C1023	CS0035	Chip C.	C1608JB1H103KT-A
C1024	CE0315	Electrolytic C.	EEFYCA470P
C1025	CS0035	Chip C.	TWCSA1C106KFR
C1026	CS0047	Chip C.	C1608JB1H103KT-A
C1027	CS0061	Chip C.	C1608JB1E1042T-A
C1028	CE0315	Electrolytic C.	EEFYCA470P
C1029	CS0035	Chip C.	C1608JB1H103KT-A
C1030	CS0035	Chip C.	C1608JB1E1042T-A
C1031	CS0047	Chip C.	C1608JB1H103KT-A
C1032	CS0047	Chip C.	C1608JB1H103KT-A
C1033	CS0047	Chip C.	C1608JB1H103KT-A
C1034	CS0047	Chip C.	C1608JB1H103KT-A
C1035	CS0047	Chip C.	C1608JB1H103KT-A
C1036	CS0065	Chip C.	C1608JB1H103KT-A
C1037	CS0047	Chip C.	C1608JB1H103KT-A
C1038	CS0047	Chip C.	C1608JB1H103KT-A
C1039	CS0047	Chip C.	C1608JB1H103KT-A
C1040	CS0035	Chip C.	C1608JB1H103KT-A
C1041	CS0035	Chip C.	C1608JB1H103KT-A
C1042	CS0027	Chip C.	C1608CH1H221JT-A
C1043	CS0027	Chip C.	C1608CH1H221JT-A
C1044	CS0035	Chip C.	C1608JB1H103KT-A
C1045	CS0032	Chip C.	C1608JB1H565KT-A
CN1002	NE0265	Connector	B12B-EH
CN1003	NE0174	Connector	R13B-ZR
CN1004	NE0279	Connector	32365-0691
D1001	XL00254	Diode	1SS355 TE-17
D1002	XL0043	LED	CL-170C-CO-T
D1003	XL0042	LED	CL-170C-CO-T
D1004	XD00254	Diode	1SS355 TE-17
D1005	XD00254	Diode	1SS355 TE-17
D1007	XD00230	Diode	DAN202U T106
D1009	XD00230	Diode	DAN202U T106
D1010	XD00230	Diode	DAN202U T106
D1011	XD00230	Diode	DAN202U T106
D1019	XD0273	Diode	RLS-93 TE-11
D1020	XD0230	Diode	DAN202U T106
D1021	XD0230	Diode	DAN202U T106
D1022	XD0254	Diode	1SS355 TE-17
D1023	XD0254	Diode	1SS355 TE-17
D1027	XD0230	Diode	DAN202U T106
D1028	XD0230	Diode	DAN202U T106
D1029	XD0230	Diode	DAN202U T106
D1030	XD0230	Diode	DAN202U T106
IC1001	XA0224	IC	NJM2904M-T1
IC1005	XA0351	IC	24LC16B
IC1006	XA0407	IC	CFU DX-701

PA Unit

Ref. No.	Parts No.	Description	Parts Name
L610	QR0016	Coil	Transformer QR0016
L611	QR0012	Coil	Troidal Core QR0012
Q607	XU0176	Transistor	2N2222-7X
Q608	XU0176	Transistor	2N2222-7X
Q609	XU0078	Transistor	2N2222-7X
Q601	RK3001	Chip R.	ERJ3GSY0R00V
Q602	RK3028	Chip R.	ERJ3GSY151V
Q603	RK0028	Chip R.	ERJ6GEV1471V
Q604	RK0020	Chip R.	ERJ6GEV151V
Q606	RK4083	Chip R.	ERJ14V5R6H
Q607	RK4023	Chip R.	ERJ12V560H
Q608	RK0028	Chip R.	ERJ6GEV1471V
Q609	RK4030	Chip R.	ERJ12V221H
Q610	RK4030	Chip R.	ERJ12V221H
Q611	RK4055	Chip R.	ERJ-14V1470H
Q612	RK4055	Chip R.	ERJ-14V1470H
Q613	RK4030	Chip R.	ERJ12V221H
Q615	RK4014	Chip R.	ERJ12V100V
Q616	RK4014	Chip R.	ERJ12V100V
Q617	R03007	Resistor	ERM1SJ3R3
Q618	R03007	Resistor	ERM1SJ3R3
Q619	R03007	Resistor	ERM1SJ3R3
Q620	R03007	Resistor	ERM1SJ3R3
Q624	RK4014	Chip R.	ERJ12V100V
Q625	RK4014	Chip R.	ERJ12V100V
Q626	RE0017	Cement R.	ERK3SJ4R7
Q630	RK0039	Chip R.	ERJ6GEV1222V
Q631	RK0039	Chip R.	ERJ6GEV1222V
Q632	RK0005	Chip R.	ERJ6GEV1220V
Q633	RK3026	Chip R.	ERJ3GSY101V
Q634	RK3026	Chip R.	ERJ3GSY101V
Q635	RK3026	Chip R.	ERJ3GSY101V
Q636	RK0028	Chip R.	ERJ6GEV1471V
Q637	RK3058	Chip R.	ERJ3GSY1473V
Q638	RK3026	Chip R.	ERJ3GSY101V
Q639	RK6024	Chip R.	ERJ1WJ1680H
Q640	RK5020	Chip R.	ERJ1WJ330H
Q641	RK3070	Chip R.	ERJ3GSY1474V
Q642	RK3050	Chip R.	ERJ3GSY103V
Q643	RK3054	Chip R.	ERJ3GSY1223V
Q644	RK3053	Chip R.	ERJ3GSY183V
Q645	RK3056	Chip R.	ERJ3GSY333V
Q646	RK3056	Chip R.	ERJ3GSY1682V
Q647	RK3048	Chip R.	ERJ3GSY153V
Q648	RK3052	Chip R.	ERJ3GSY1932V
Q649	RK3044	Chip R.	ERJ3GSY102V
Q650	RK3038	Chip R.	ERJ3GSY102V
Q651	RK3001	Chip R.	ERJ3GSY0R00V
Q653	RK3001	Chip R.	ERJ3GSY0R00V
Q654	RK3026	Chip R.	ERJ3GSY101V
Q655	RK0008	Chip R.	ERJ6GEV1530V

Ref. No.	Parts No.	Description	Parts Name
C655	CU0042	Chip C.	C2012B1C104KT-A
C657	CU0042	Chip C.	C2012B1C104KT-A
C658	CU0047	Chip C.	C1608JB1H103KT-A
C659	CU0047	Chip C.	C1608JB1H103KT-A
C670	CU0047	Chip C.	C1608CH1H101JT-A
C671	CU0023	Chip C.	C1608CH1H101JT-A
C672	CU0039	Chip C.	C1608FJ1E1042T-A
C673	CU0039	Chip C.	C1608FJ1E1042T-A
CN608	UE0071	Connector	P122A05M
CN609	UE0226	Connector	B2B-PH-X-S
CF601	UE0047	Round Pin	RX10
CF602	UE0047	Round Pin	RX10
CF603	UE0047	Round Pin	RX10
CF604	UE0047	Round Pin	RX10
CF605	UE0047	Round Pin	RX10
CF606	UE0047	Round Pin	RX10
CF607	UE0047	Round Pin	RX10
CF608	UE0047	Round Pin	RX10
CF609	UE0047	Round Pin	RX10
CF610	UE0047	Round Pin	RX10
CF611	UE0047	Round Pin	RX10
D606	XD0039	Diode	M4Z1-B
D607	XD0265	Diode	RLS4152 TE-11
D608	XD0265	Diode	S65LR
D609	XD0231	Diode	DAP202U T106
D610	XD0039	Diode	RLS4152 TE-11
D611	XD0039	Diode	RLS4152 TE-11
D612	XD0039	Diode	RLS4152 TE-11
F601	EF0011	Fuse	F6MB125V-5A
F602	QB0037	Ferrite Beads	ZBF253D-00
F603	QB0037	Ferrite Beads	ZBF253D-00
F604	QB0037	Ferrite Beads	ZBF253D-00
F605	QB0037	Ferrite Beads	ZBF253D-00
F606	QB0038	Ferrite Beads	EXCELSA93
F607	QB0008	Ferrite Beads	HF30ACB201209-T
F608	UH0014	Fuse holder	PFCS000-0301
F609	UH0014	Fuse holder	PFCS000-0301
IC601	XA0224	IC	NJM2904M-T1
J602	IJ0030	Jack	JPJ2545-01-510
L601	QC0044	Coil L.	NL32252T-2R7J
L602	QC0014A	Coil L.	NL32252T-1R0J
L603	QC0039	Coil L.	NL32252T-1R0J
L604	QC0039	Coil L.	NL32252T-1R0J
L605	QC0048	Coil L.	NL32252T-100J
L606	QC0012	Coil	Troidal Core QR0012
L607	QR0015	Coil	Transformer QR0015
L608	QR0015	Coil	Transformer QR0015
L609	QR0012	Coil	Troidal Core QR0012

JACK MAIN 1 Unit

Ref. No.	Parts No.	Description	Parts Name
R1007	XA0338	IC	L78L05B-TL/TR
R1008	XA0075	IC	NJM78L08UA-TE1
R1009	XA0303	IC	LC75821W
L1001	QC0489	Chip L.	LQ44N221104
LC0101	EL0027	LCD	LCD DKT0
PL1001	EP0009	Lamp	B0031-20805A
PL1002	EP0009	Lamp	B0031-20805A
PL1003	EP0009	Lamp	B0031-20805A
PL1004	EP0009	Lamp	B0031-20805A
Q1001	XT0099	Transistor	2SA1766TE12R
Q1002	XU0061	Transistor	UM5211-TX
Q1003	XT0081	Transistor	2SB1132T100Q
Q1004	XT0095	Transistor	2SC4081T106R
Q1005	XT0095	Transistor	2SC4081T106R
Q1006	XU0061	Transistor	UM5211-TX
Q1009	XU0061	Transistor	UM5211-TX
Q1010	XU0061	Transistor	UM5211-TX
Q1011	XU0061	Transistor	UM5211-TX
Q1012	XU0061	Transistor	UM5211-TX
Q1013	XU0061	Transistor	UM5211-TX
Q1014	XU0061	Transistor	UM5211-TX
Q1015	XU0061	Transistor	UM5211-TX
Q1016	XU0061	Transistor	UM5211-TX
R1001	RK3057	Chip R.	ERJ3GSY1333V
R1002	RK3046	Chip R.	ERJ3GSY1472V
R1003	RK3053	Chip R.	ERJ3GSY163V
R1004	RK3048	Chip R.	ERJ3GSY1682V
R1005	RK3034	Chip R.	ERJ3GSY1471V
R1006	RK3034	Chip R.	ERJ3GSY1471V
R1007	RK3034	Chip R.	ERJ3GSY1471V
R1008	RK3058	Chip R.	ERJ3GSY1473V
R1009	RK3058	Chip R.	ERJ3GSY1473V
R1010	RK3038	Chip R.	ERJ3GSY1102V
R1011	RK3028	Chip R.	ERJ3GSY1101V
R1012	RK3038	Chip R.	ERJ3GSY1102V
R1013	RK3049	Chip R.	ERJ3GSY1822V
R1014	RK3045	Chip R.	ERJ3GSY1392V
R1015	RK3042	Chip R.	ERJ3GSY2222V
R1016	RK3038	Chip R.	ERJ3GSY1102V
R1017	RK3050	Chip R.	ERJ3GSY1103V
R1018	RK3038	Chip R.	ERJ3GSY1103V
R1019	RK3038	Chip R.	ERJ3GSY1103V
R1020	RK3038	Chip R.	ERJ3GSY1102V
R1021	RK3038	Chip R.	ERJ3GSY1102V
R1022	RK3038	Chip R.	ERJ3GSY1102V
R1023	RK3038	Chip R.	ERJ3GSY1102V
R1024	RK3050	Chip R.	ERJ3GSY1103V
R1025	RK3050	Chip R.	ERJ3GSY1103V
R1027	RK3050	Chip R.	ERJ3GSY1103V
R1028	RK3050	Chip R.	ERJ3GSY1103V
R1029	RK3034	Chip R.	ERJ3GSY1471V
R1030	RK3034	Chip R.	ERJ3GSY1471V
R1031	RK0130	Chip R.	ERJ3GSY1471V

JACK MAIN 1/SPERKER/OTHER/PARTS/PACKING

Ref. No.	Parts No.	Description	Parts Name
R1097	RK3062	Chip R.	ERJ3GSY1104V
R1098	RK3050	Chip R.	ERJ3GSY1103V
S1001	U00011	Switch	ESP-64801
S1002	US0012	Switch	SSSS212A NS L=2
S1003	UR0014	Switch	RH90N74E20
S1006	U00022	Switch	SKPAD
S1007	U00022	Switch	SKPAD
S1008	U00022	Switch	SKPAD
S1009	U00022	Switch	SKPAD
S1010	U00022	Switch	SKPAD
S1011	U00022	Switch	SKPAD
S1012	U00022	Switch	SKPAD
S1013	U00022	Switch	SKPAD
S1014	U00022	Switch	SKPAD
X1001	X80019	Crystal	CSACS8.000MT
YR1001	RY0030	Trim Pot	EYU-F2JFK314
YR1002	RY0031	Trim Pot	EWU-F3JFK3B14
FG0192	FG0192	LCD Light	LCD Light
FG0193	FG0192	LCD Rubber Connector	LCD Rubber Connector
FG0194	FG0192	LCD Rubber Connector	LCD Rubber Connector
FG0195	FG0192	LCD Rubber Connector	LCD Rubber Connector
FG0196	FG0192	LCD Holder	LCD Holder
FG0197	FG0192	LCD Filter	LCD Filter
FG0198	FG0192	Tube 1.0 13	Tube 1.0 13
FP0100	FP0100	Tube 1.0 13	Tube 1.0 13
FP0101	FP0101	Tube 1.0 13	Tube 1.0 13
KM0195	KM0195	FRONT Circuit Board A	FRONT Circuit Board A
KZ0027	KZ0027	YS-66-Y0811-2.0W	YS-66-Y0811-2.0W
KZ0031	KZ0031	Harness DR130	Harness DR130
KZ0036	KZ0036	FRONT MAIN 1	FRONT-MAIN 1
KZ0040	KZ0040	FBA 05T12HP	FBA 05T12HP
KZ0042	KZ0042	Attachment	Attachment
NP0113	NP0113	Connector	Connector
SP0008	SP0008	ACC Connector	ACC Connector
SD0034	SD0034	Transistor	2SC1971-01 Attachment
SS0056	SS0056	Connector	FW-L D. R. (4)
SS0058	SS0058	Connector	ACC Connector
SS0076	SS0076	Transistor	2SC1972
SS0076	SS0076	Transistor	2SC1971
SS0076	SS0076	Transistor	2SC3419-Y
TS0042A	TS0042A	Transistor	2SC2904
TS0104	TS0104	Transistor	Silicon Grease
TS0105	TS0105	Transistor	Silicon Grease
TS0119	TS0119	Transistor	Silicon Grease

PACKING

*G0598A	MIC Hanger Unit
DS0352A	Specifications Card

PARTS

AA0007	Screw M2.6-6FeCr
AA0024	Screw M3-6FeCr

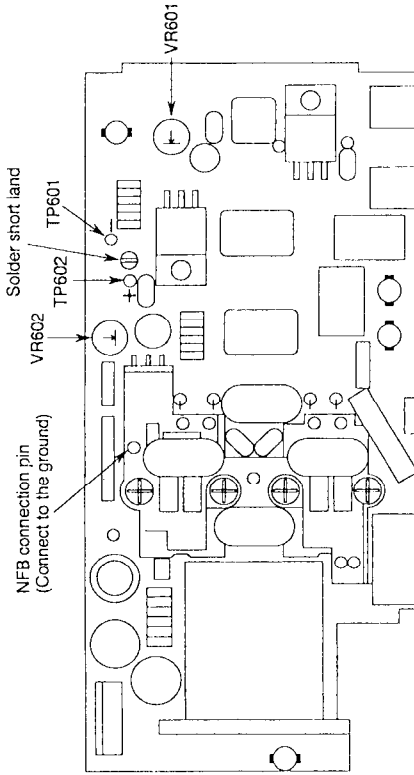
ADJUSTMENT

1) PA unit Adjustment

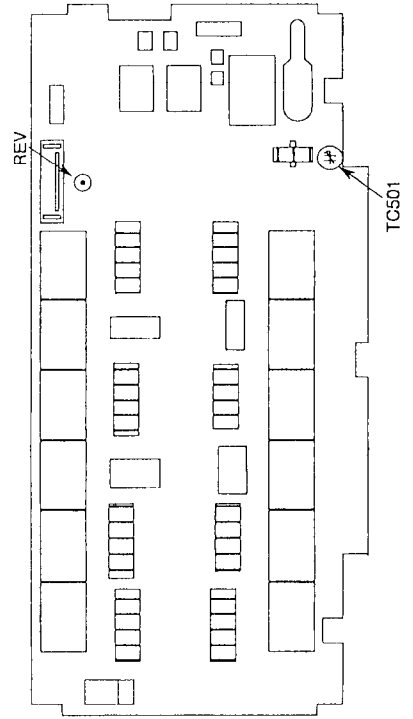
Required Test Equipment

1. Digital voltage meter
300~500mA
2. DC current meter
3A
3. DC regulated power supply
13.80V 25A or more
(should be equipped with 20~25A current limit and current meter)
4. Power meter
100W (1.9~30MHz)
5. Linear detector
1.9~60MHz, -10~+10dBm
6. SG or RF generator

PA Unit Adjustment Points



Filter Unit Adjustment Points

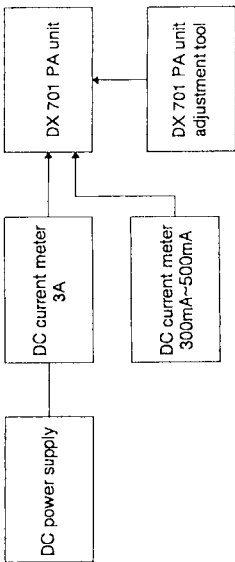


PACKING

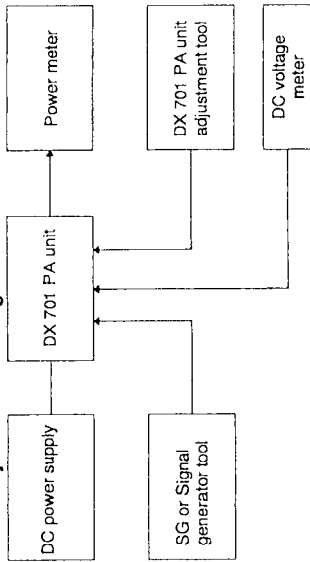
Ref. No.	Parts No.	Description	Parts Name

Ref. No.	Parts No.	Description	Parts Name
ERM42			MIC
HK0404			Item Carton
HMC148			Item Carton I
HP0002			Protection Bag(Instr. Card)
HP0039			Protection Bag(Radio)
HU0080			Fixture(A)
HU0082			Fixture(C)
HU0084			Fixture I
HU0088			Fixture(D)
HU0101			Fixture(E)
PX0061			Schematic Diagram
PR0288			Seal
PS0233			Instruction Card 701
PT0004A			Lot Number Seal
UA0052			Power Cord

Idle Current Adjustment Setting



SWR Adjustment Setting



PA Adjustment

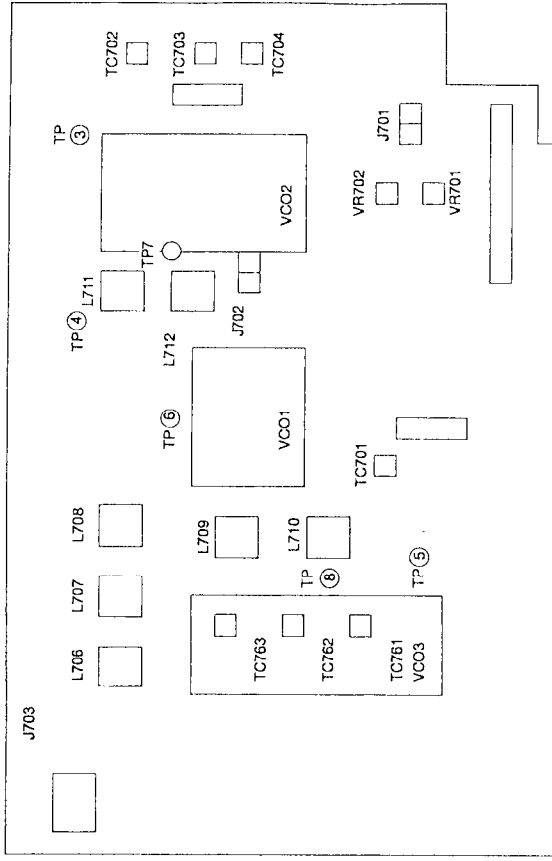
Item	Condition	Measurement		Adjustment	
		Equipment	Terminal	Parts	Method
Idling current 2SC1972 x 2	SSG: OFF Mode: USB VR601, 602: min.	Current Meter 300-500mA	TP601 ⊖ TP602 ⊕	VR601	Desolder the short-land Connect the current meter between TP601 and TP602, then adjust VR601 to 100mA. Desolder the short-land
		Current Meter 3A	CN605 unit total current	VR602	Connect terminal pin of NFB unit to the ground, check the total current in transmission mode. Then remove terminal pin from ground, adjust VR602 to increase 300mA.
Connect TP1 and TP2 by soldering after adjusting.					
SWR detection	f=1.9MHz SG -> PA unit	Voltage Meter	REV	TC501	Adjust the output power to 50W, then adjust the TC501 so that REV voltage is min.
		When you adjust the finished goods, set the mode to SSB, adjust the input level of microphone, and set the output power to about 50W. (To protect from accidental damage). Then proceed to "B) Transmission Adjustment".			

2) PLL Adjustment

Required Test Equipment

1. Digital voltage meter
2. DC regulated power supply 13.80V 5A or more
3. Frequency counter 500MHz or more
4. Spectrum Analyzer 1GHz or more
5. Oscilloscope 100MHz or more

PLL Unit Adjustment Points



Item	Condition	Measurement			Adjustment		
		Equipment	Unit	Terminal	Unit	Parts	Method
VCO1 Frequency	PD1=1.2V	Freq. Counter	VCO1	CN90 1-3		175MHz or above	
	PD1=4.3V					155MHz or below	
	PD1=1.5-4V	Freq. Counter	VCO2	CN90 2-4		VCO2 freq.: 71MHz	
Attach the VCO to PLL, then adjust the unit after installing the PLL to the unit.							
VCO2 Lock range	f=7.100MHz	Digital tester	PLL	TP7	Check	1.5V-4V	
VCO1 Lock range	f=7.0999MHz			TP6		1V-3V	
	f=7.1000MHz					3V-4.3V	
VCO3 Lock range	f=0.1500MHz			TP8	VCO3	2.5V	
	f=10.4999MHz					When the voltage is 6.45V or below, adjust the unit to 6.5V again, (6.45V-7.0V)	
	f=10.5000MHz					2.5V	
	f=21.4999MHz					When the voltage is 6.45V or below, adjust the unit to 6.5V again, (6.45V-7.0V)	
	f=21.5000MHz					2.5V	
	f=29.9999MHz					6.5V or below	
2nd LO Level	f=7.100MHz	Oscilloscope		TP4	PLL	Turn the coils to the max. repeatedly.	
1st LO Level	f=7.100MHz			TP5		Turn the coils to the max. repeatedly.	
	f=7.100MHz			L706		Turn the coils to the max. repeatedly.	
	f=7.100MHz			L707 L708		Turn the coils to the max. repeatedly.	

Item	Condition	Measurement			Adjustment		
		Equipment	Unit	Terminal	Unit	Parts	Method
Frequency (Mode)	RX LSB	Freq. Counter	PLL	TP3	PLL	TC702	9873.60kHz +/- 0.02kHz
	RX USB					TC704	9876.40kHz +/- 0.02kHz
	RX AM and FM					TC703	9875.00kHz +/- 0.02kHz
Frequency	RX LSB			J701		VR702	453.60kHz +/- 0.1kHz
(IF Shift)	TX LSB					VR701	453.60kHz +/- 0.01kHz
Frequency	f=7.1000MHz, FM			J703		TC701 L702	78850.00kHz Adjust TC701 at first, then L702 when TC701 can not be adjusted.
Level	f=7.100MHz, USB	Spectrum Analyzer		J701		Check	-6-0dBm f=456.4kHz
Level	f=7.100MHz, USB			J702			1-6dBm f=71.295MHz
Level	f=150kHz f=10.4999MHz f=10.5000MHz f=21.4999MHz f=21.5000MHz f=29.9999MHz					Check	Level: 2-6dBm +/-2dB

Required Test Equipment

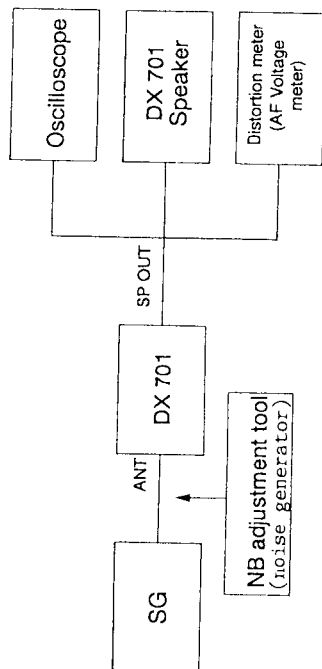
1. Digital voltage meter
2. DC regulated power supply
3. SG
4. Distortion meter, AF voltage meter
5. 8Ω speaker
6. Oscilloscope
7. (NB adjustment tool)

3) Sensitivity Adjustment

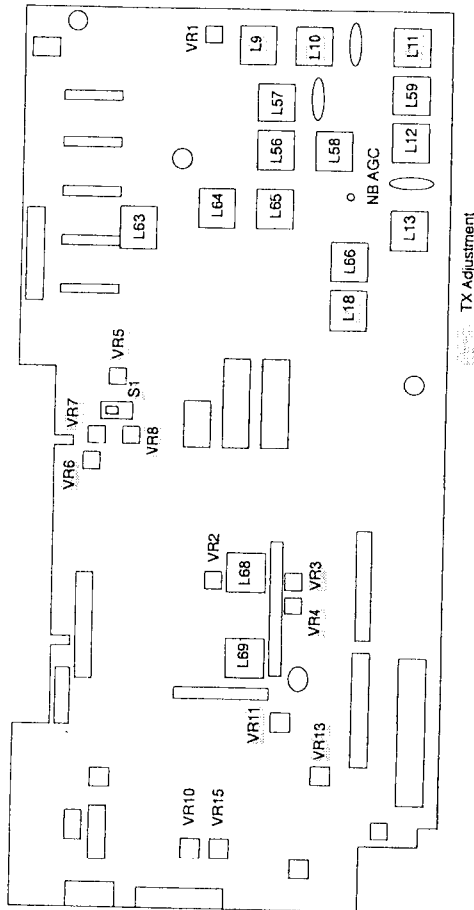
SG Output Frequency: 14.1000MHz
 Frequency: 14.0993MHz
 RF Gain: +10dB

Connect to Antenna Terminal
 RIT: OFF
 AGC: FAST
 Mode: USB
 NB: OFF
 Squelch VR: Turn the knob counterclockwise fully.

Main Unit Adjustment Setting



Main Unit Adjustment Points



Item	Condition	Measurement			Adjustment	
		Equipment	Terminal	Unit	Parts	Method
Tuning	SG output: -6dBμ Mod: OFF AF output: 300mV	Audio Voltmeter	SP	Main	L56 L57 L58 L59 L12 L13 L66 L68 L69	Adjust every following group repeatedly to obtain the maximum receiving signal; L56, 57, 58 L59, 12, 13 L66 L68, L69
	SG output: -6dBμ Mod: OFF Mode: USB f=14.0993MHz AF output: 300mV	Audio Voltmeter			Check	Make sure that S/N is 10.5dB or more by turning ON/OFF SG output.
	SG output: 10dBμ Mod: 1kHz, 30% Mode: AM f=14.1000MHz	Audio Voltmeter			Check	Make sure S/N is 10dB or more by turning ON/OFF SG modulation.

4) Noise Blanker Adjustment

SG Output Frequency: 14.1000MHz
 Frequency: 14.0993MHz
 RF Gain: +10dB

Connect to Antenna Terminal.
 RIT: OFF
 AGC: FAST
 Mode: USB
 Squelch VR: Turn the knob counterclockwise fully.

Item	Condition	Measurement			Adjustment	
		Equipment	Terminal	Unit	Parts	Method
Tuning	SG output: 0dB μ Mod: OFF Mode: USB f=14.0993MHz NB: ON RF Gain: +10dB	Oscilloscope	NB AGC (MAIN)	Main	L63 L64 L65	Adjust the coils, and set DC voltage of the terminal to the minimum with the oscilloscope.

5) S Meter Adjustment

Item	Condition	Measurement			Adjustment	
		Equipment	Terminal	Unit	Parts	Method
RX Total Gain	SG output: 40dB μ Mod: OFF Mode: USB f=14.0993MHz RF Gain: 0dB	AF Voltmeter	SP	Main	VR2	Adjust SP output by setting the AF gain to about 1V. The output level should be 0dB. Adjust only the noise output to -28dB by turning OFF SG output.
S Meter	SG output: 20dB μ Mod: OFF SG output: 40dB μ	S Meter	S Meter		VR10 VR15	The indicator between first and second digits is turned ON. The 9th digit starts flashing. Adjust VR10 and VR15 repeatedly.
	SG: OFF				Check	S Meter is not turned ON.
Squelch	SG: OFF		BUSY RX LED (Green) AF output		Check	Turn the Squelch VR to make sure that the squelch closes at about 10 o'clock.

6) Receiving Function Adjustment

SG Output Frequency: 14.1000MHz
 Frequency: 14.0993MHz
 RF Gain: +10dB

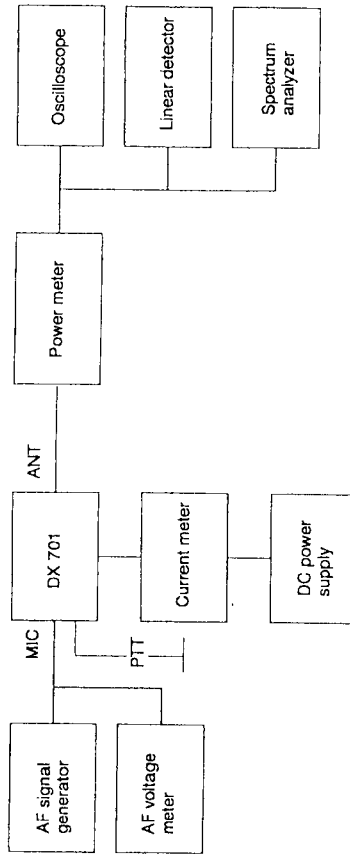
Connect to Antenna Terminal.
 RIT: OFF
 AGC: FAST
 Mode: USB
 Squelch VR: Turn the knob counterclockwise fully.

Item	Condition	Measurement		Adjustment		
		Equipment	Terminal	Unit	Method	
AGC	SG output: 40dB μ Output: ON/OFF Mod: OFF		S Meter		Check	Switch AGC. When SG is turned OFF, the meter moves slowly in SLOW, and fast in FAST.
RF GAIN	SG output: 40dB μ		S Meter		Check	Switch the RF GAIN from +10dB orderly, the meter swings shorter and shorter.
Band Sensitivity	SG output: -6dB μ f=1.9000MHz f=3.6000MHz f=7.0000MHz f=10.1000MHz f=28.1000MHz Mode: USB or LSB	Audio Voltmeter	SP		Check	In USB mode, SG frequency is -700Hz. In LSB mode, SG frequency is +700Hz. Make sure that S/N is 10dB or more.

Required Test Equipment

1. Digital voltage meter 20~30A
2. DC current meter 13.80V 25A or more
3. DC regulated power supply (should be equipped with 20~25A current limit)
100W (1.9~30MHz)
4. Power meter 10W (1.9~60MHz or more)
5. Linear detector
6. AF generator (600Ω)
7. AF voltage meter
8. Oscilloscope
9. Electronic keyer (CW telegraphy key)
10. TUNE operation tool

TX Adjustment Setting



7) Transmission Adjustment

Connect the power meter to antenna terminal.
 Frequency: 7.1000MHz Mode: USB Power: High

Item	Condition	Measurement		Adjustment				
		Equipment	Terminal	Parts	Method			
Tuning	Slide S1 to rear panel side.	Power Meter	Antenna Terminal	Main	L18 L11 L10 L9	Adjust to the maximum power. (Adjust the AG input level so that the power becomes the maximum at about 50W.		
	AG output: -50dBm							
Current Limit	AG output: OFF	Current Meter	Power Supply Terminal	VR6		Turn VR6 counterclockwise so that the total current becomes 20A. Be careful not to run much current for short time.		
	Mode: FM Set VR7 to 9 o'clock. Set VR6 to 3 o'clock.							
Power	Mode: LSB/USB	Power Meter	Antenna Terminal	VR7		Turn VR7 clockwise to decrease the power, then adjust to 100W.		
	Slide S1 to front panel side.						VR5	Turn VR5 to obtain the power of 50W.
	Slide S1 to rear panel side. Operate TUNE with tool.						VR8	Turn VR8 to obtain the power of 10W.

8) Spurious Adjustment

Connect the power meter to antenna terminal.
Frequency: 7.1000MHz Mode: LSB

Power: High

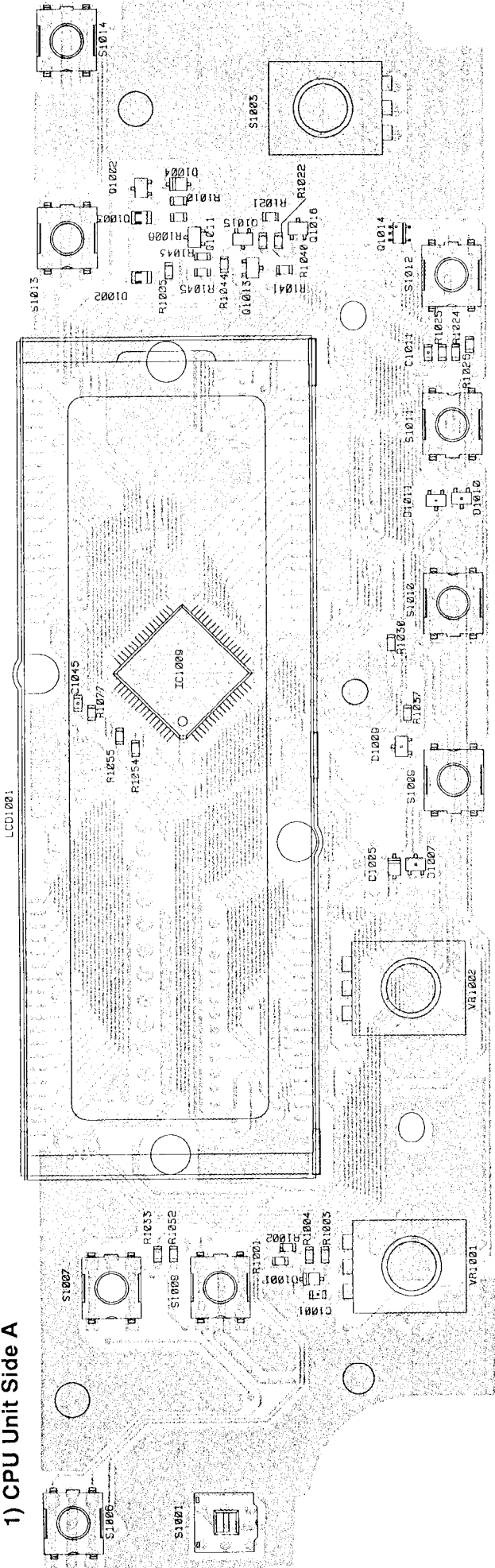
Connect the power meter to antenna terminal.
Frequency: 7.1000MHz Mode: LSB Power: High

Item	Condition	Measurement		Adjustment		
		Equipment	Terminal	Unit	Parts	Method
Carrier Balance	AG output: OFF f: 7.1000MHz Mode: LSB f: 10.1000MHz Mode: USB	Oscilloscope	Antenna Terminal	Main	VR3 VR4	Adjust VR3 and VR4 so that the carrier suppression is 50dB (1/300) or below at 100W. The carrier suppression should be decreased in both USB and LSB.
Low Power	Mode: LSB/USB Power: Low	Power Meter			Check	Within 10-20W
AM Power	AG output: OFF Mode: AM Power: High				Check	35-50W
Band Power	Mode: LSB/USB Band (MHz): 1.9, 3.5, 10, 14, 18, 21, 24, 28				Check	Make sure that the power is 90-105W.

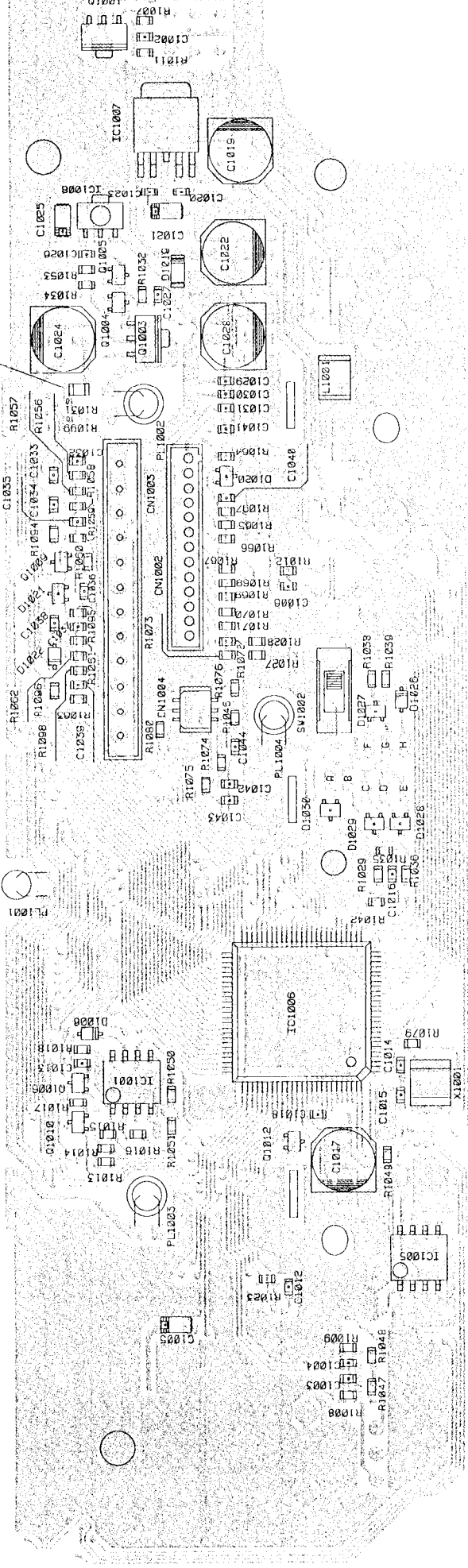
Item	Condition	Measurement		Adjustment		
		Equipment	Terminal	Unit	Parts	Method
Spurious Balance	AG output: OFF Mode: LSB/USB f: 28.1000MHz	ATT + spectrum Analyzer	Antenna Terminal	Main	VR1	Balance the spurious to obtain the minimum value. -60dB or below
Spurious	AG output: OFF Mode: FM Band (MHz): 1.9, 3.5, 10, 14, 18, 21, 24, 28		Antenna Terminal		Check	-50dB or below (-47dB or below in 10MHz band only)
Carrier Balance	AG output: OFF Mode: LSB/USB				L9	Adjust so that the value is within the regulation. (Adjust L9 when the spurious is not -52dB or below in 24/28MHz band.)
Modulation	Mode: AM, USB/LSB Connect the microphone.	Monitor Transceiver			Check (VR3 VR4)	-50dB or below (Adjust VR3 and VR4 when the carrier suppression is not -50dB or below.)
					Check	Make sure the modulation sound in every mode.

PC BOARD VIEW

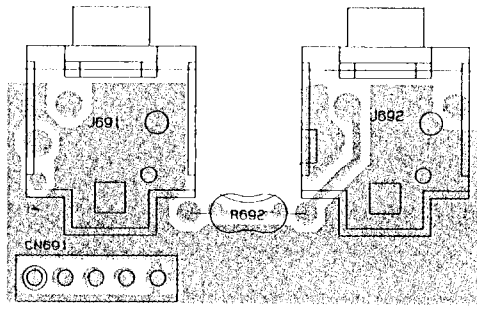
1) CPU Unit Side A



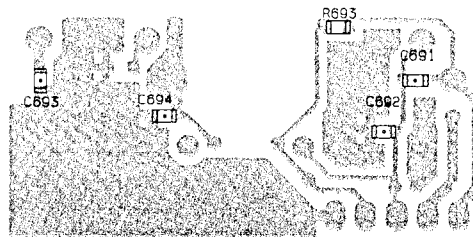
2) CPU Unit Side B



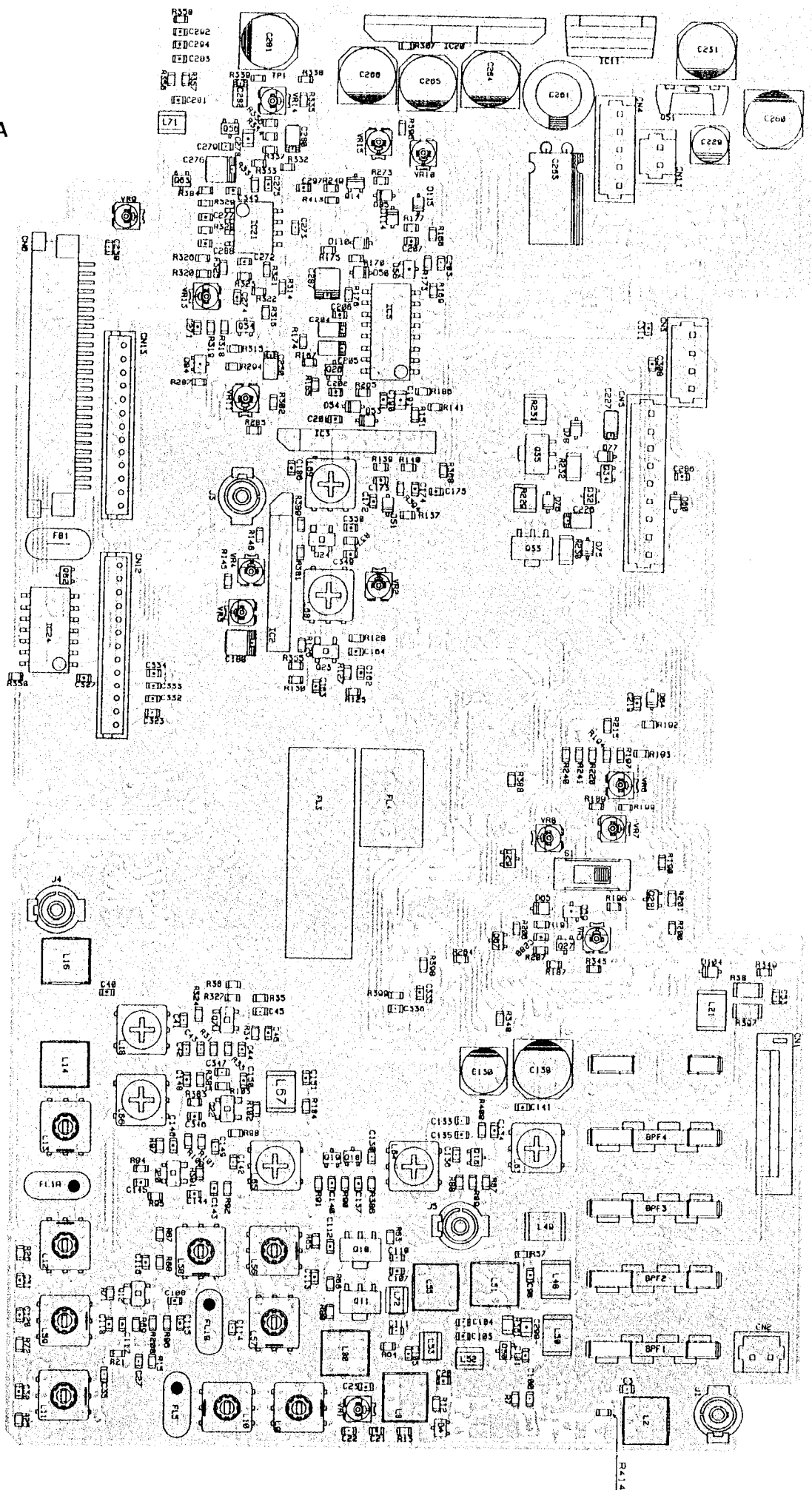
3) Jack Unit Side A



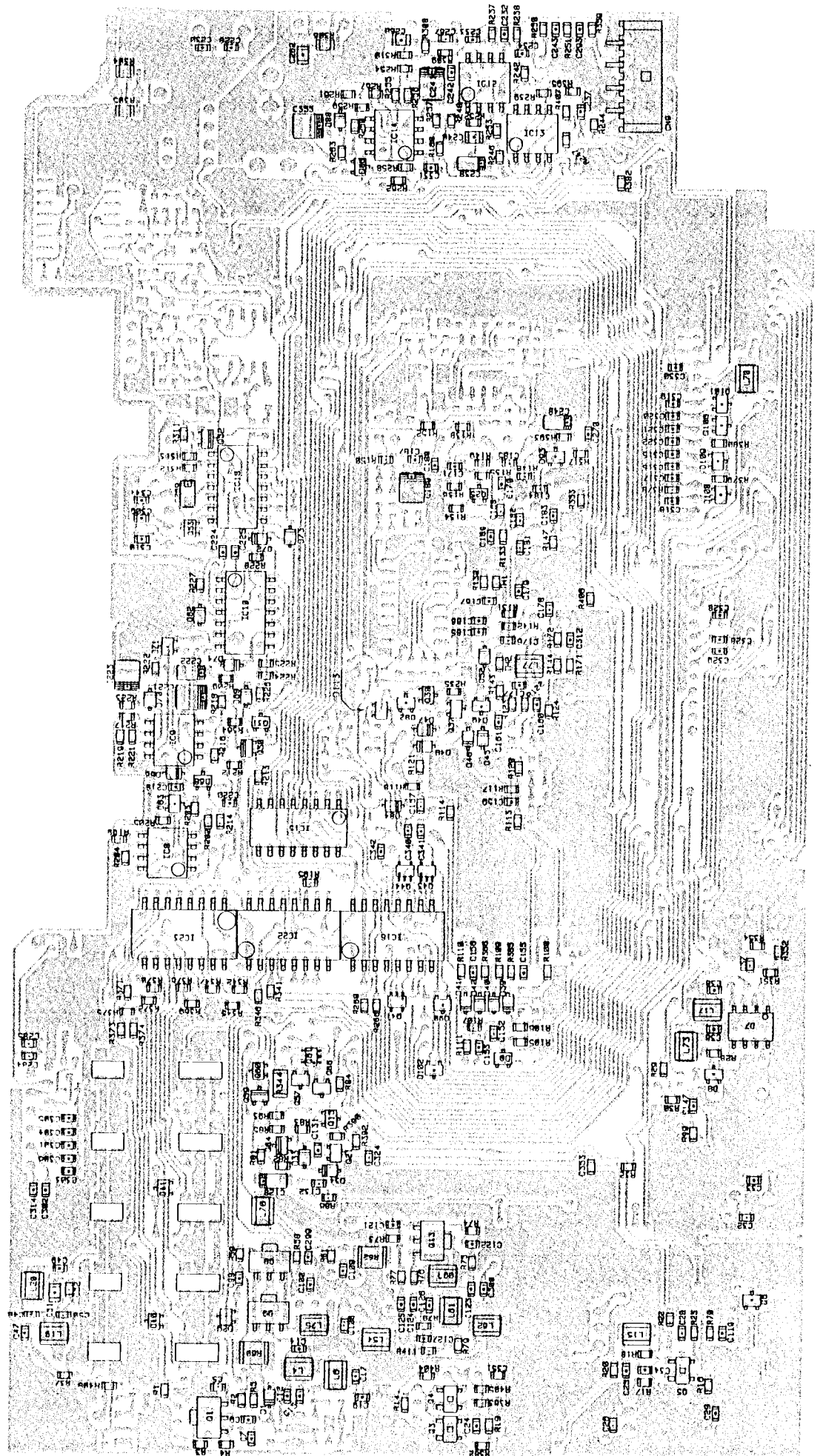
4) Jack Unit Side B



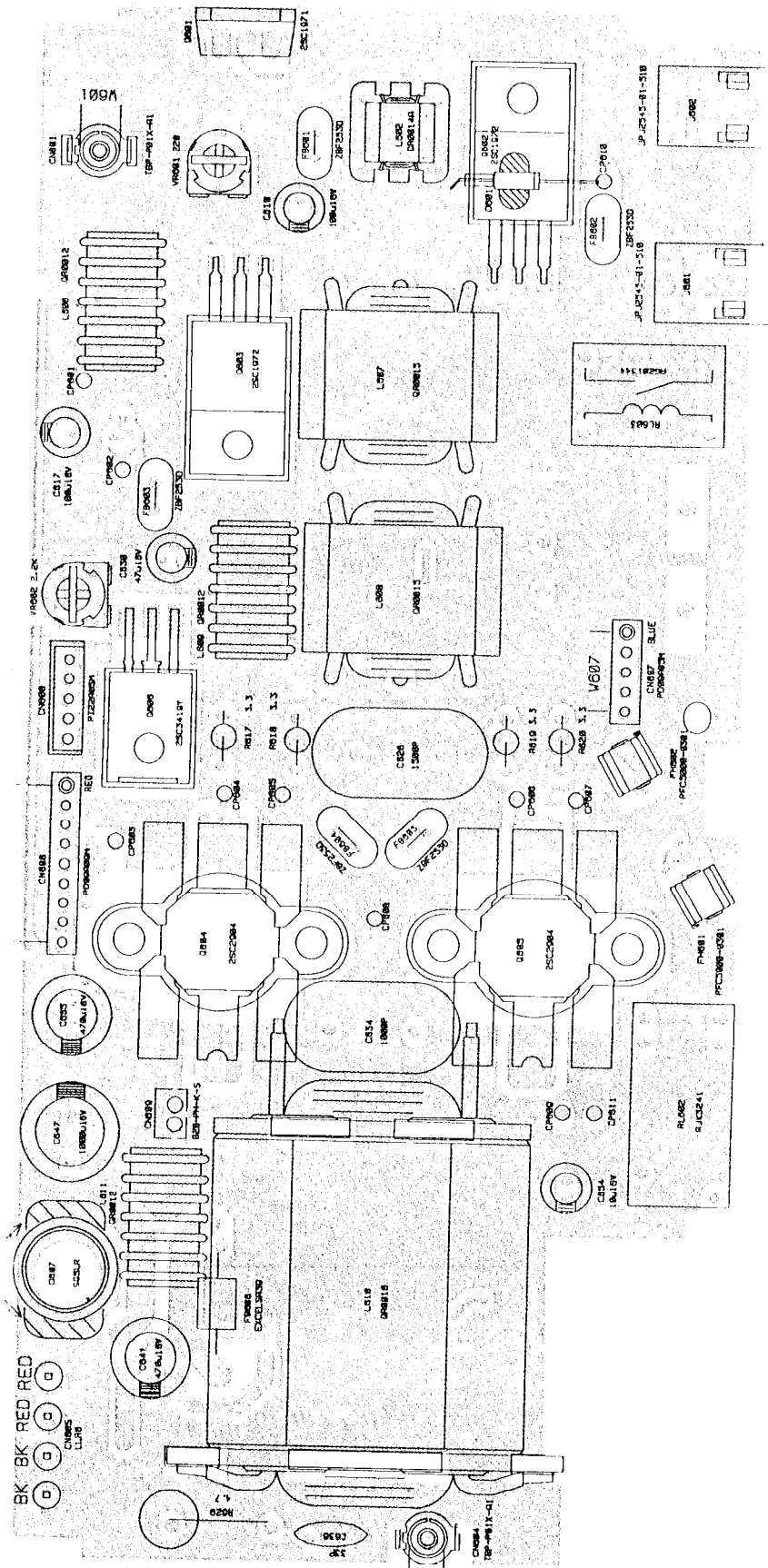
5) Main Unit Side A



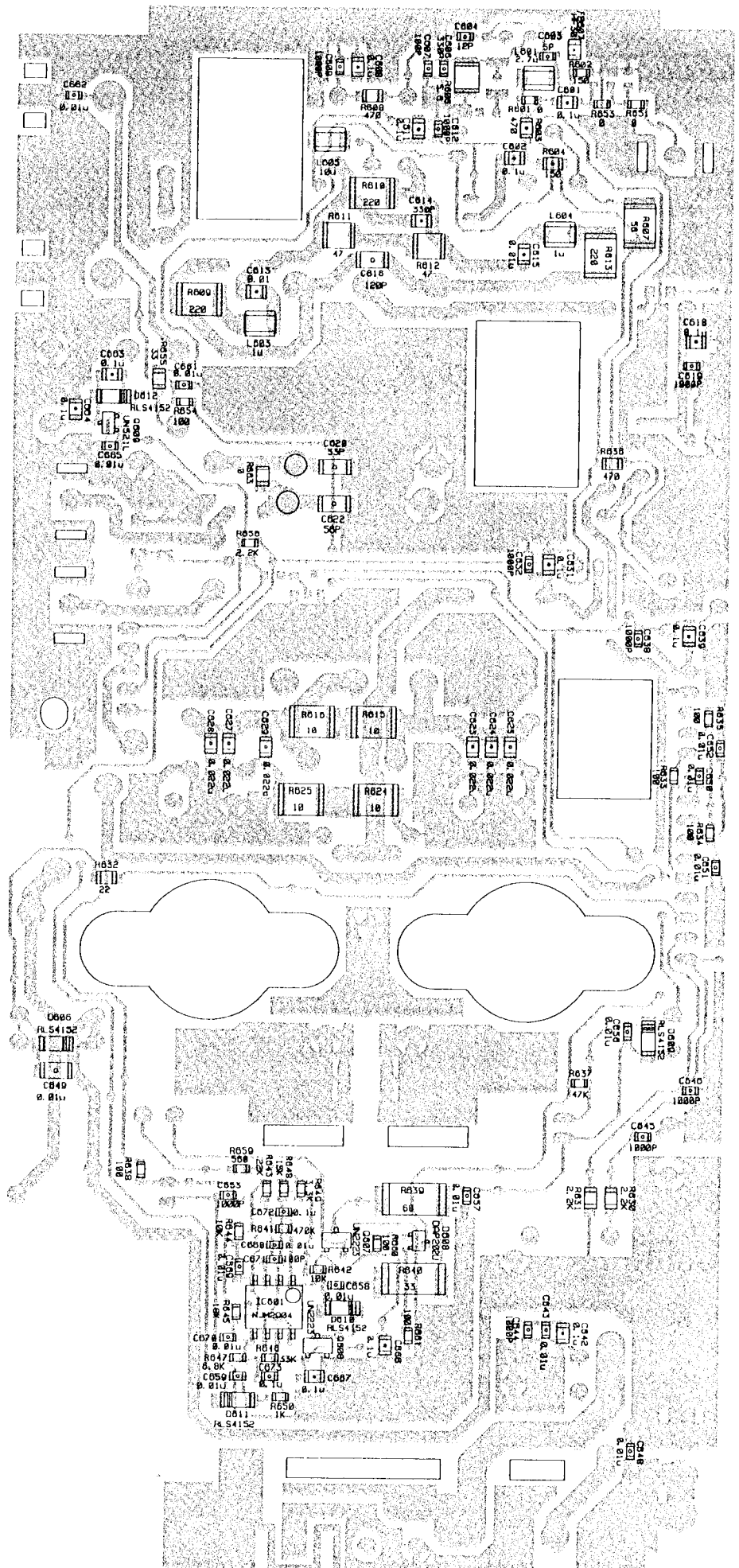
6) Main Unit Side B



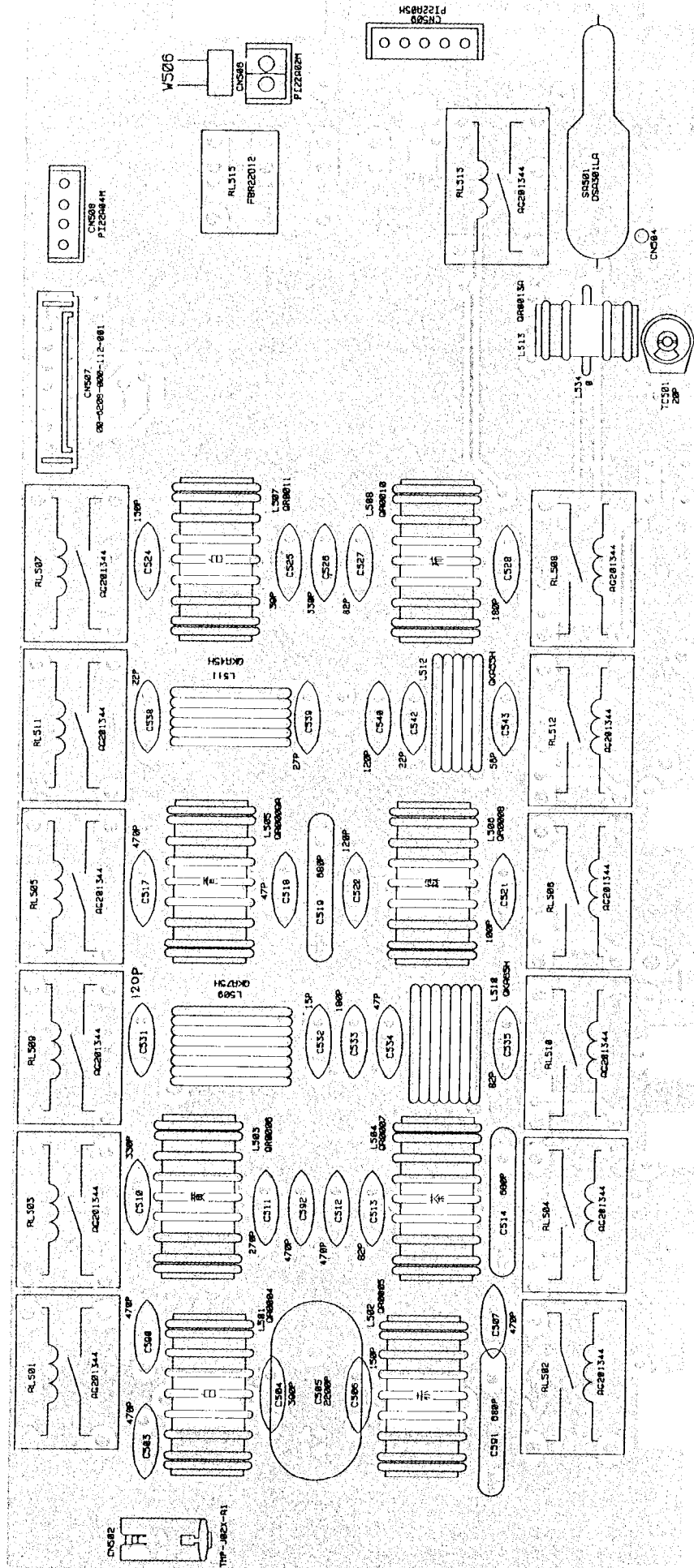
7) PA Unit Side A



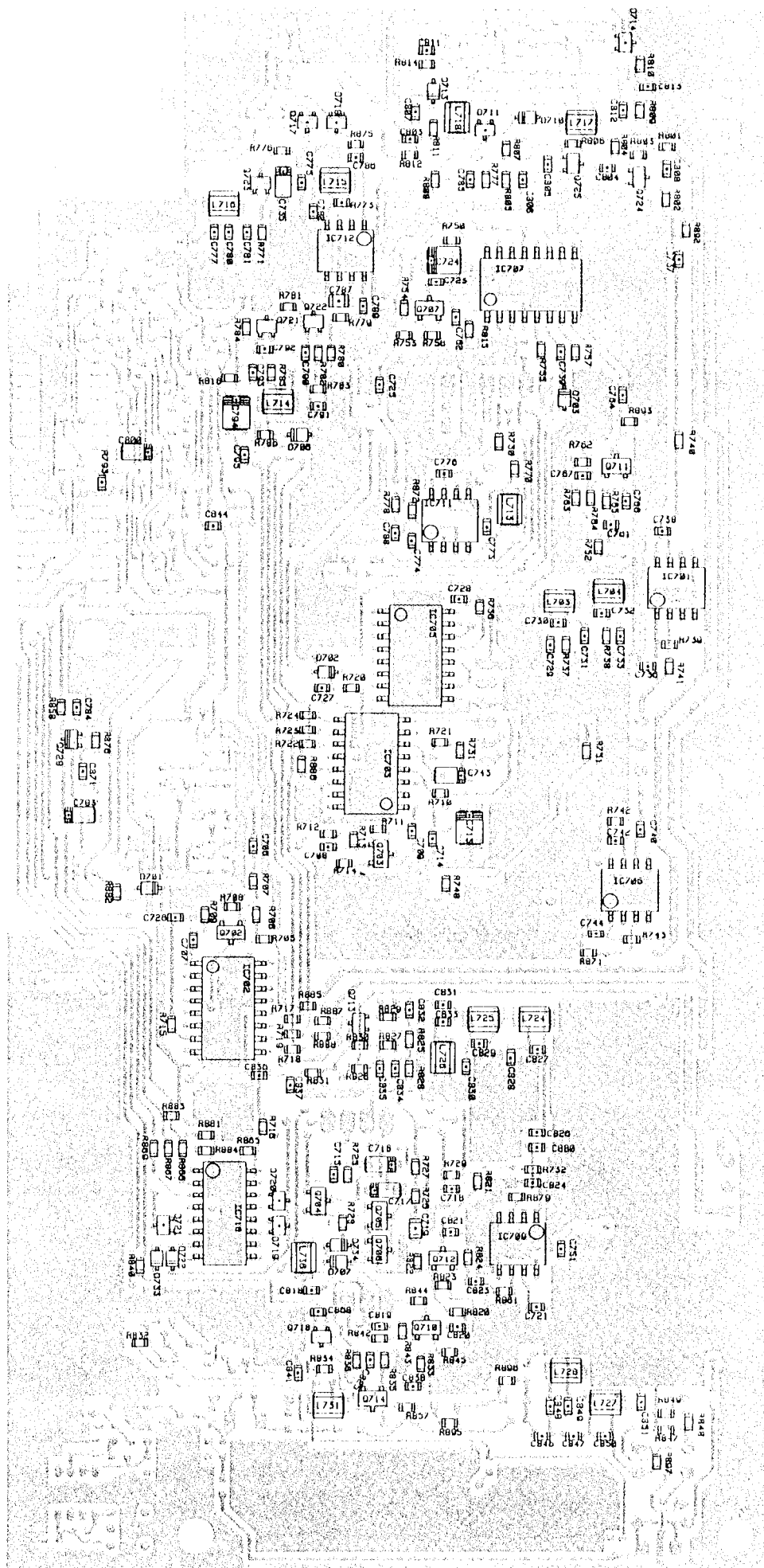
8) PA Unit Side B



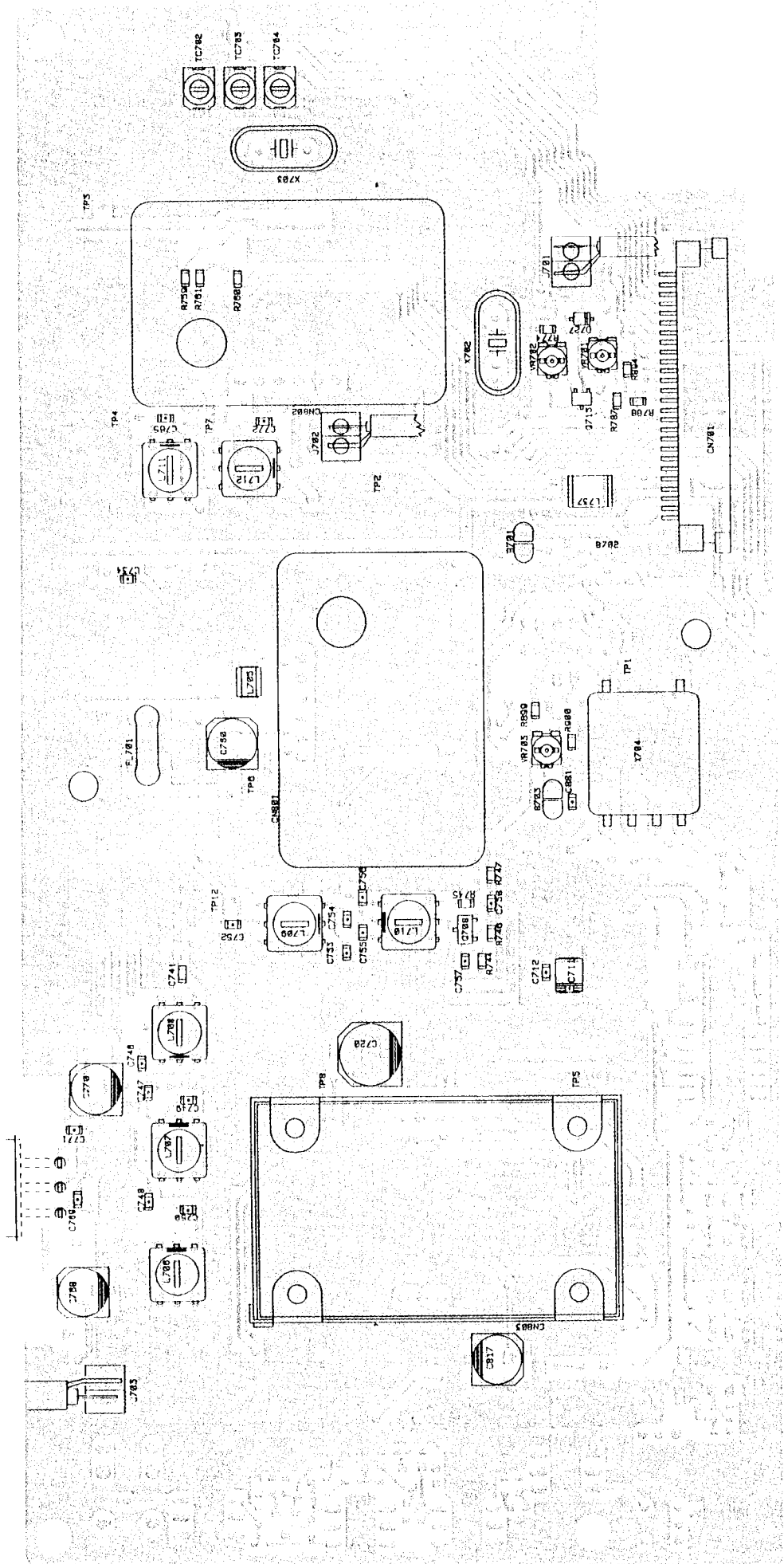
9) Filter Unit Side A



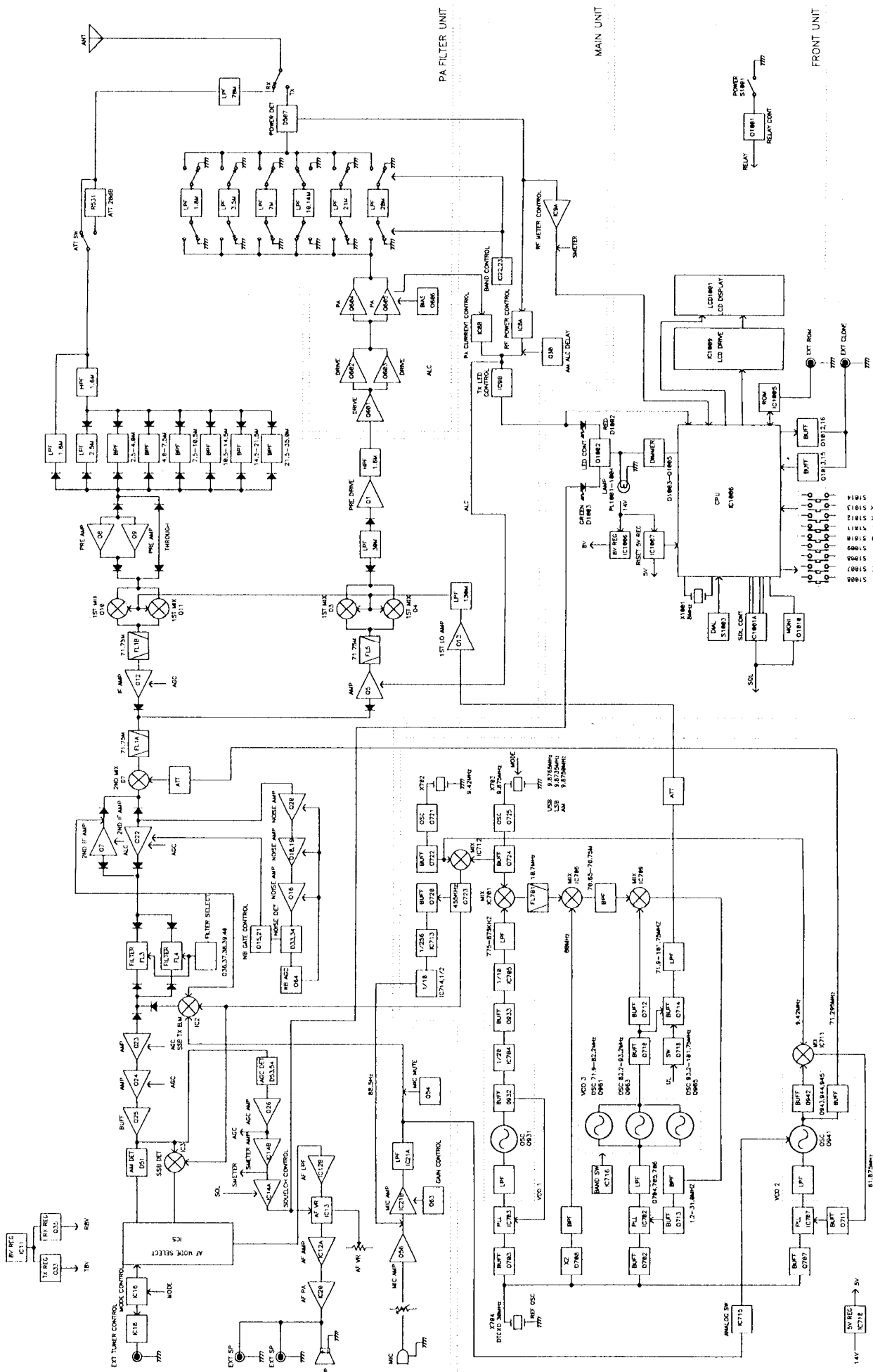
11) PLL Unit Side A



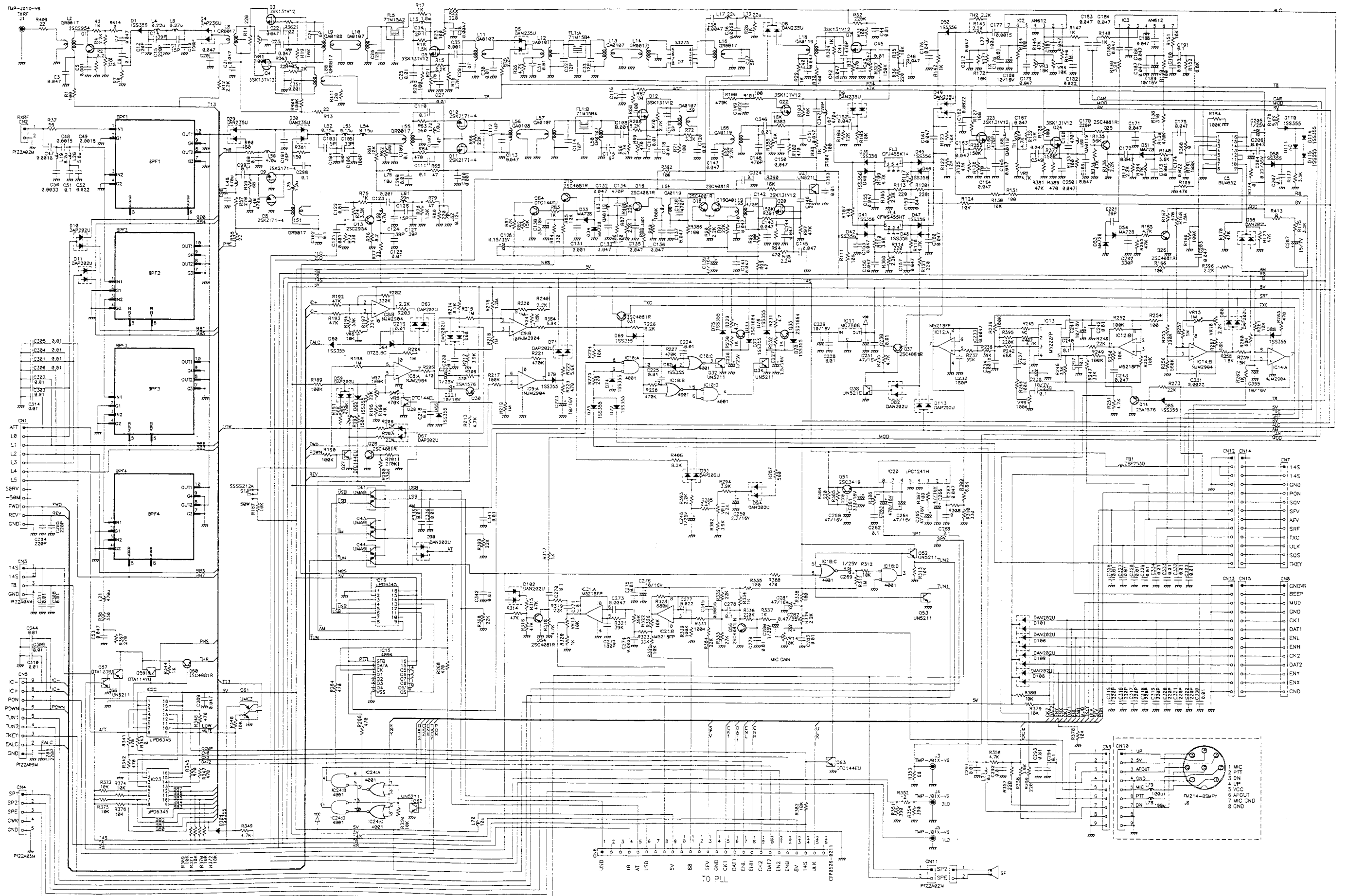
12) PLL Unit Side B



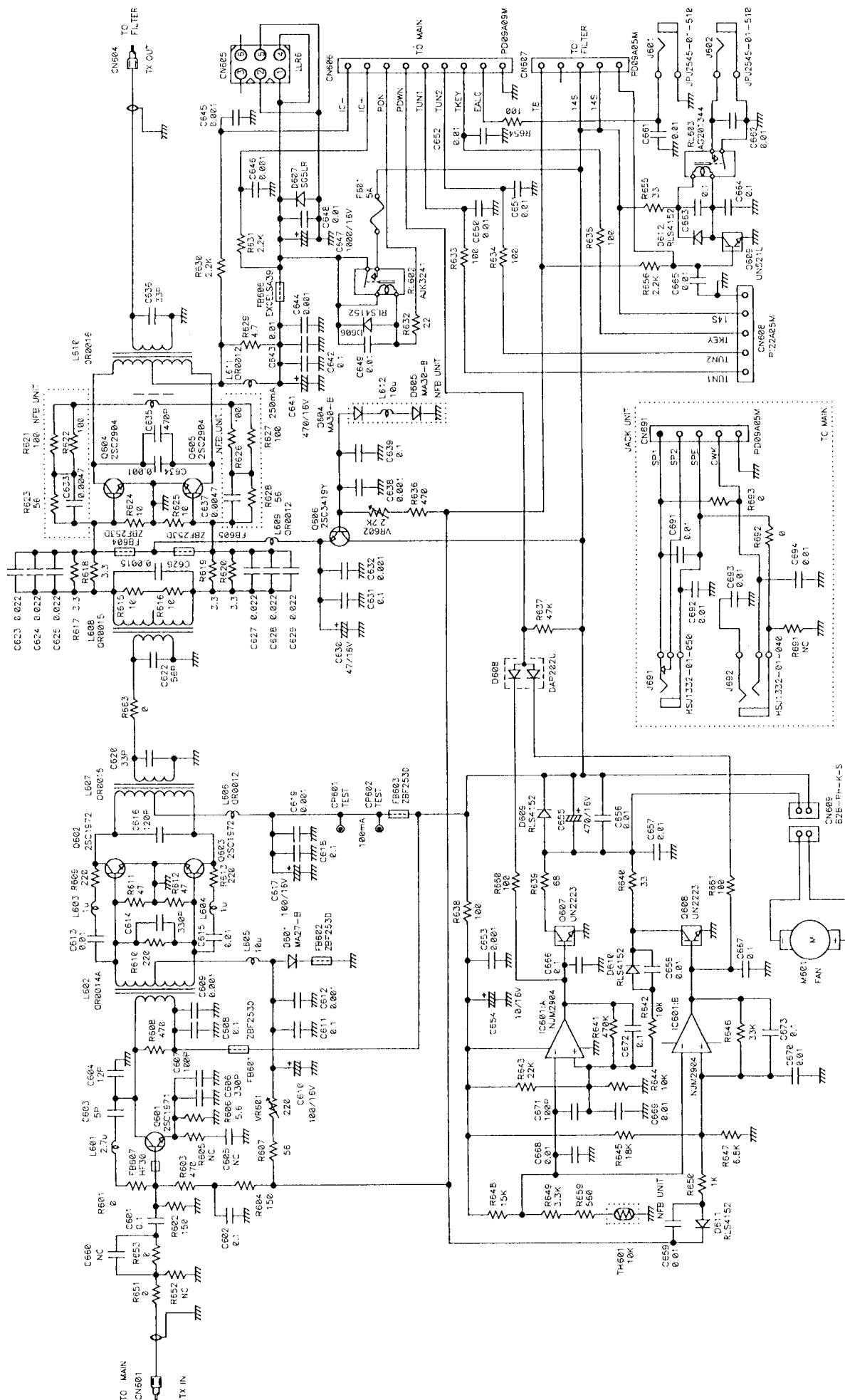
BLOCK DIAGRAM



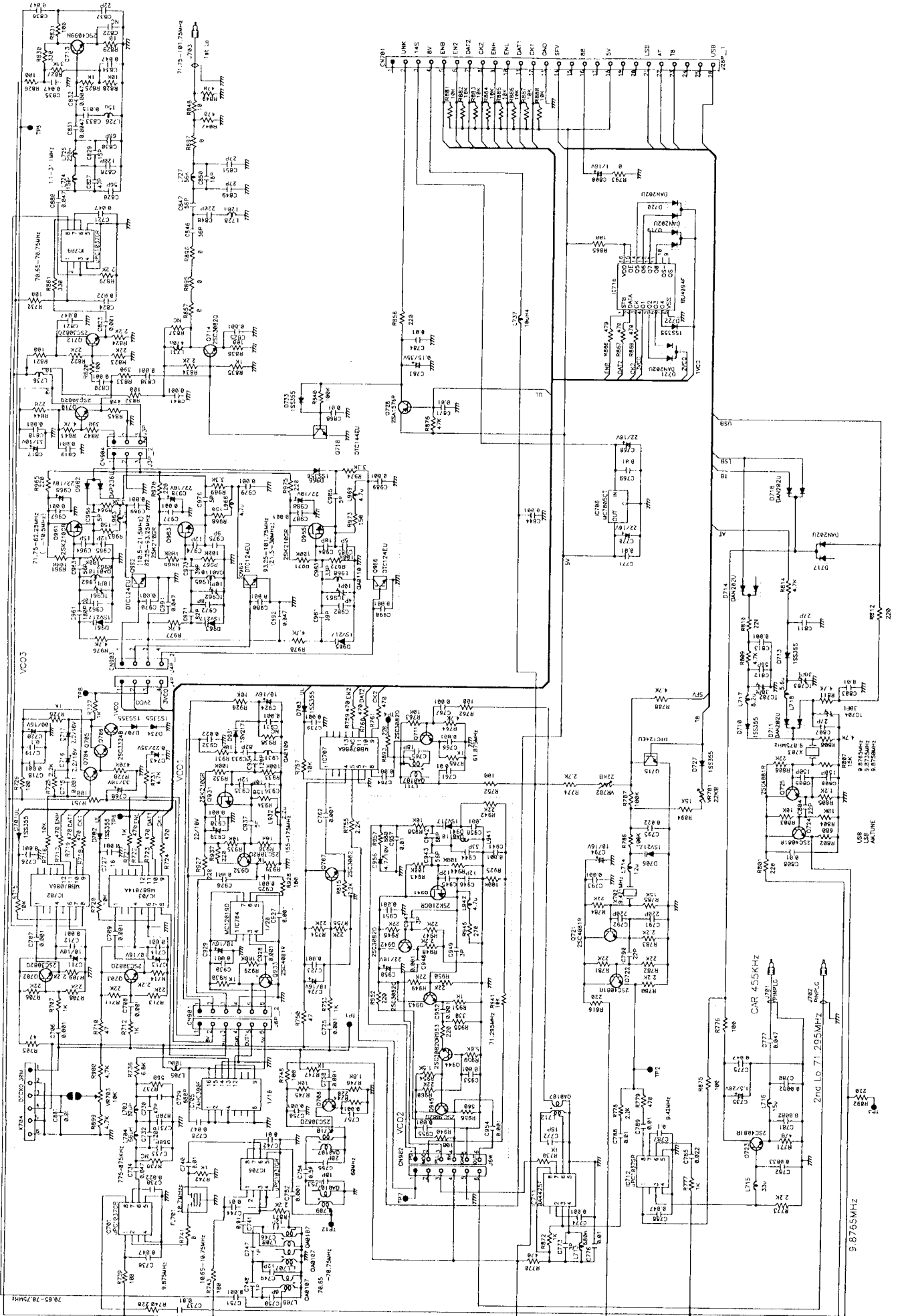
CIRCUIT DIAGRAM MAIN UNIT



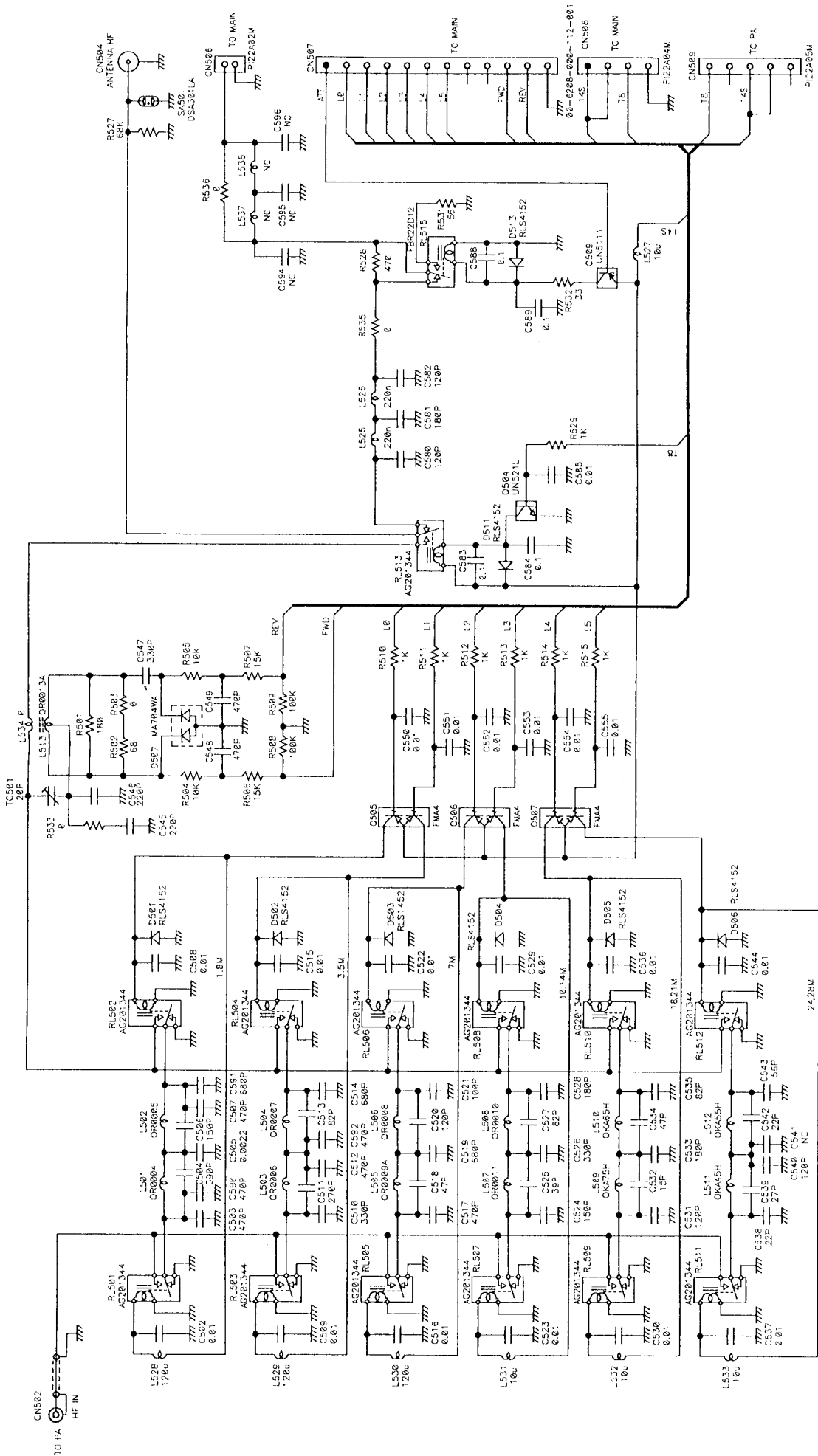
PA UNIT



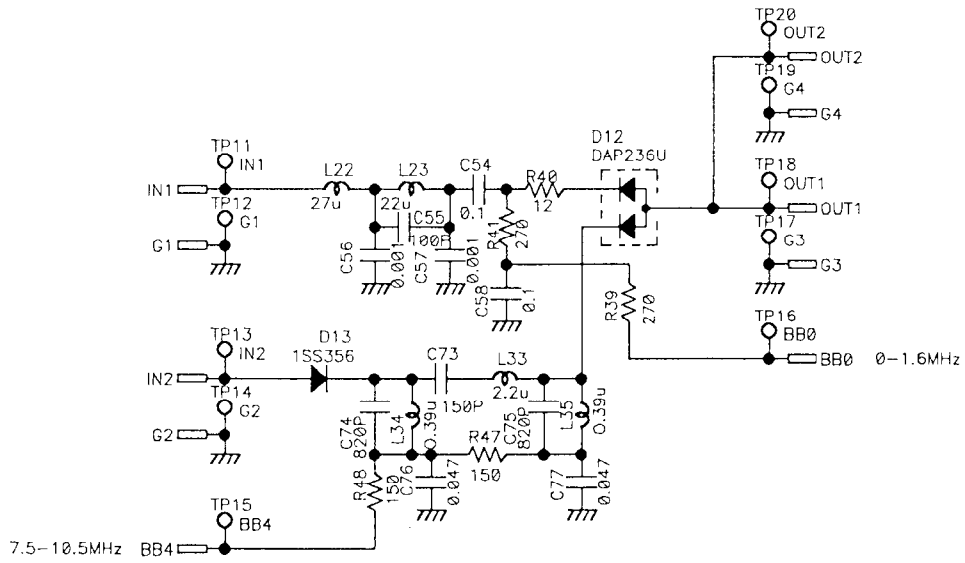
PLL UNIT



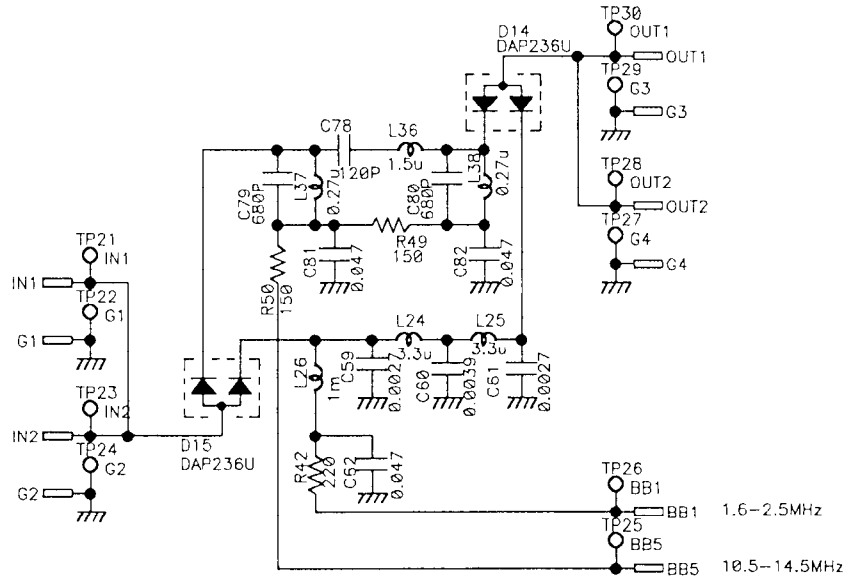
FILTER UNIT



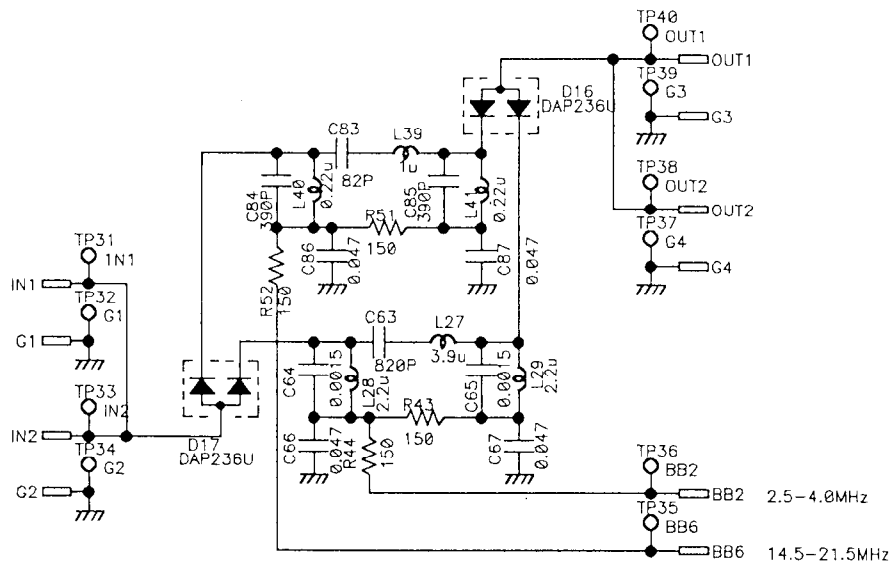
BPF 1



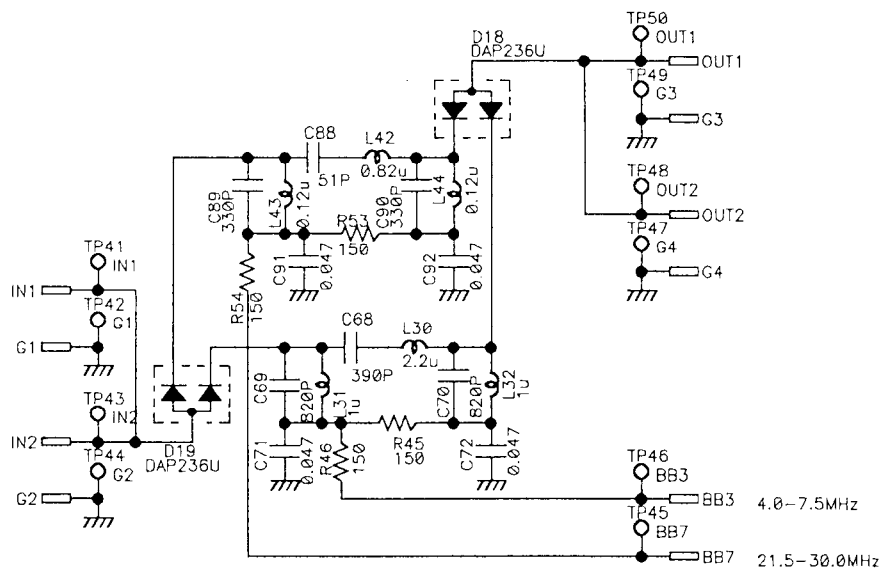
BPF 2



BPF 3



BPF 4





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