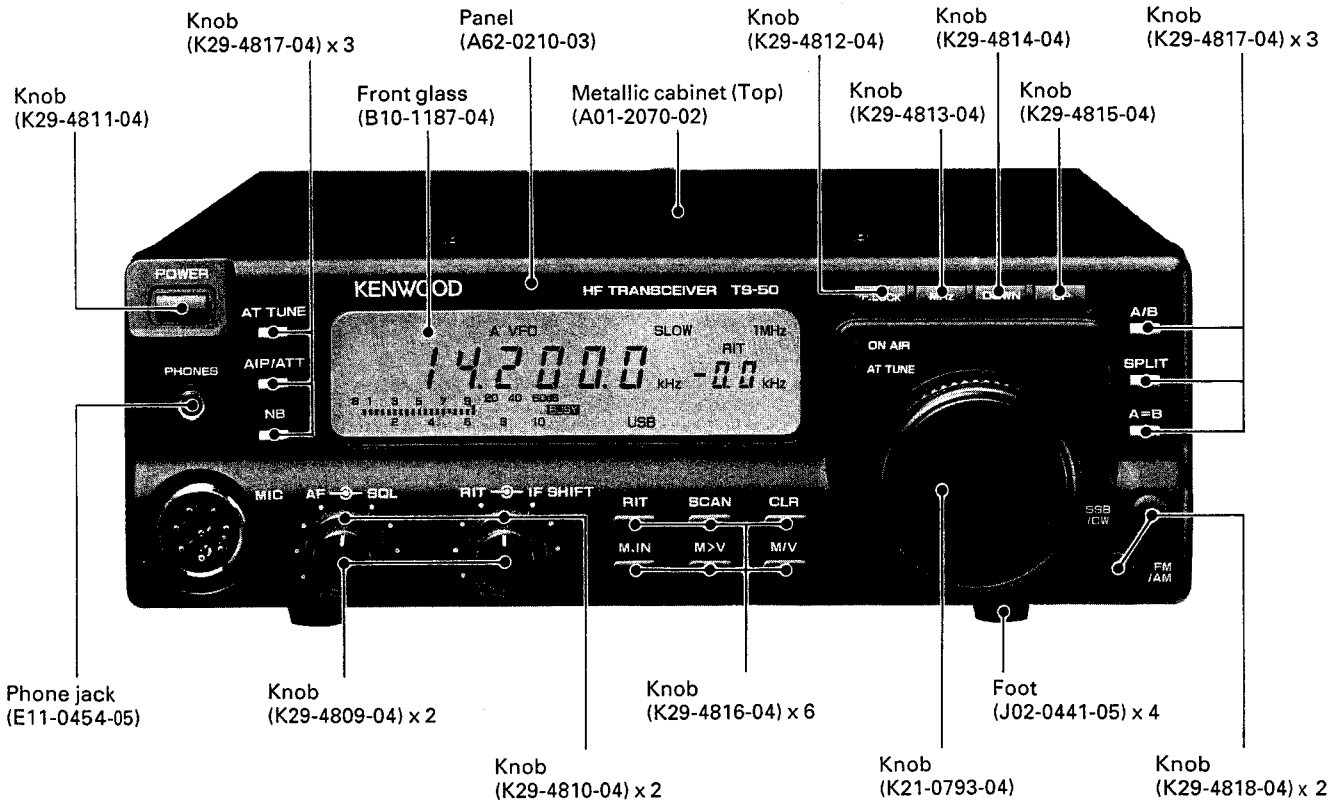
HF TRANSCEIVER

TS-50S

SERVICE MANUAL

KENWOOD

B51-8199-00(O)1676



CONTENTS

CIRCUIT DESCRIPTION

Frequency Configuration

The TS-50S uses double conversion in all transmission modes, double conversion in all reception modes except FM, and triple conversion in FM reception mode. (Fig. 1)

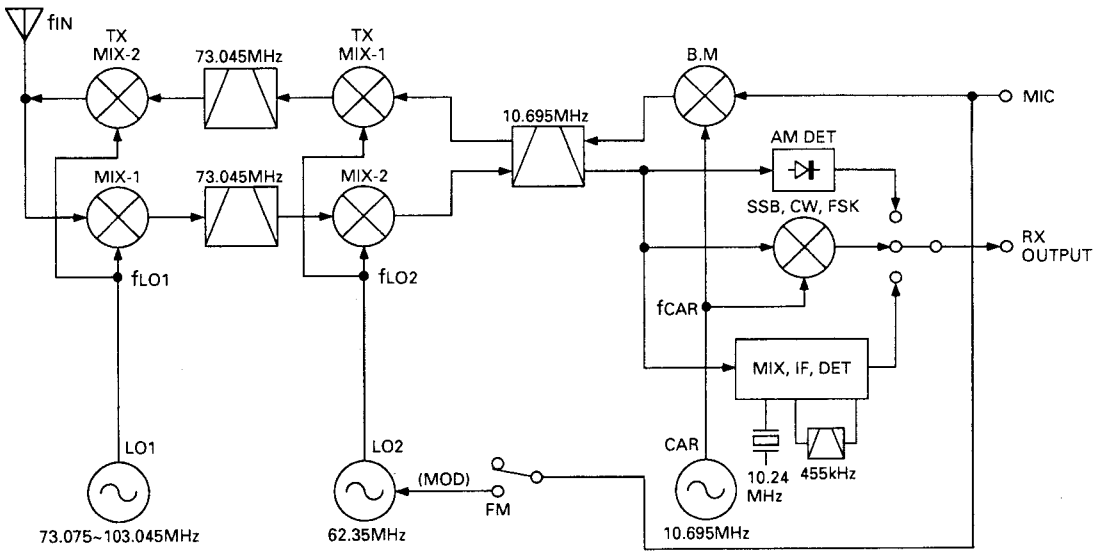


Fig. 1 Frequency configuration

The receiver frequency in SSB mode is given by the following equation when the receiver tone produced by the input frequency (fIN) from the antenna is zero beat (when an SSB signal with a carrier point of fin is zeroed in):

$$f_{IN} = f_{LO1} - f_{LO2} - f_{CAR}$$

Since all these frequencies are generated by the PLL circuit, as shown in Figure 2 (PLL frequency configuration), the receiver frequency is determined only by the reference frequency, fSTD, and the PLL divide ratio. This means, the accuracy of the reference frequency determines the accuracy of the operating frequency of the transceiver.

The accuracy of the reference crystal oscillator used in the TS-50S is 10 ppm (–10 to +50°C). The accuracy of the optional temperature-compensated crystal oscillator (TCXO, SO-2) is 0.5 ppm (–10 to +50°C).

In SSB transmission mode or in other modes, the frequency is determined by the reference frequency (fSTD) and the PLL divide ratio. Table 1 lists the display frequencies in the various modes.

The pitch of the incoming signal in CW mode can be varied in 50-Hz steps in the range 400 to 1000Hz without changing the center frequency of the IF filter (variable CW pitch system).

FM transmission is carried out by applying the audio signal from the microphone to the 62.35-MHz VCO and modulating fLO2.

Mode	Display frequency
USB, LSB	Carrier point frequency
CW	Transmit carrier frequency
AM, FM	IF filter center frequency

Table 1 Display frequency in each mode

PLL Circuit Configuration

The TS-50 PLL circuit uses a reference frequency of 20MHz, and covers 30kHz to 30MHz in 5- to 200-Hz steps, depending on how fast the encoder is turned. Figure 2 shows the frequency configuration of the PLL circuit. Figure 3 is a PLL block diagram.

1. Reference oscillator circuit

The reference frequency (fSTD) for frequency control is generated by the 20-MHz crystal oscillator, X1 and Q12 (2SC2714(Y)). The reference frequencies for other circuits are produced by dividing fSTD by two and by five by IC2 (μPD74HC390G). fSTD is divided by two to produce a 10-MHz PLL reference signal, which goes to IC11 (CXD1225M) and IC101 (CXD1225M). It is input to the CAR oscillator section to produce a 10.695-MHz signal. The 4-MHz signal produced by dividing fSTD by five goes to IC4 (SN16913P).

The crystal oscillator circuit can be replaced by an optional TCXO (SO-2). The TS-50S can be switched to the TCXO by removing a shorting jumper (W1/W2).

CIRCUIT DESCRIPTION

2. LO2 (PLL loop)

The VCO of IC10 (KCH14) generates a signal of 62.35MHz. The 10-MHz reference frequency is applied to pin 5 of IC101 (CXD1225M), and is divided by 200 (800 in FM mode) to produce a 50-kHz (12.5-kHz in FM mode) comparison frequency. The output from the VCO is applied to pin 11 of IC101, and is divided by 1247 (4988 in FM mode). It is then compared with the 50-kHz (12.5-kHz in FM mode) reference signal by the phase comparator to lock the VCO frequency. Divide ratio data is supplied by the digital unit.

The output is amplified by amplifier Q18 (2SC2954) and passes through a low-pass filter. The VCO is modulated in FM mode.

3. LO1 (PLL loop)

Q1 to Q3 (2SK508NV) in the X58-4010-00 are VCOs. Q1 generates a signal of 73.075 to 83.544MHz; Q2, a signal of 83.545 to 94.544MHz; and Q3, a signal of 94.545 to 103.045MHz. The 10-MHz reference signal is input to pin 5 of IC11 (CXD1225M) and is divided by 20 to produce a 500-kHz comparison frequency. The output signal from the VCO is mixed with a 55.045- to 55.545-MHz signal from the PLL (described later) to produce a 18.5- to 47.5-MHz signal. It is input to pin 11 of IC11, divided, and compared with the 500-kHz signal by the phase comparator, and the VCO frequency is locked. Divide ratio data is supplied by the digital unit.

The 20-MHz reference signal is input to DDS1 (X58-4020-00), and the output signal is mixed with a 4-MHz signal by IC4 to generate a signal of 4.455 to 4.955MHz (in 5- or 200-Hz steps). The signal is mixed with the 60-MHz signal (3 x 20-MHz reference frequency) by IC5 (SN16913P) to produce a 55.045 to 55.545MHz signal (in 5- or 200-Hz steps).

4. CAR

The 20-MHz reference signal is input to DDS2 (X58-4020-00), and the output signal is mixed by IC7 (SN 16913P) with the 10MHz signal divided by IC2 to produce a 10.695-MHz signal. This signal passes through the band-pass filter and amplifier and is output for local oscillation and detection.

5. DDS

The DDS is the same as that used in the TS-950.

	RX	TX
USB	+1.5kHz	+1.5kHz
LSB	−1.5kHz	−1.5kHz
CW W	+1.5kHz	−0.7kHz
CW N	+0.8kHz	0kHz
CW RW	−1.5kHz	−0.7kHz
CW RN	−0.8kHz	0kHz
AM	–	0kHz
FM	–	0kHz

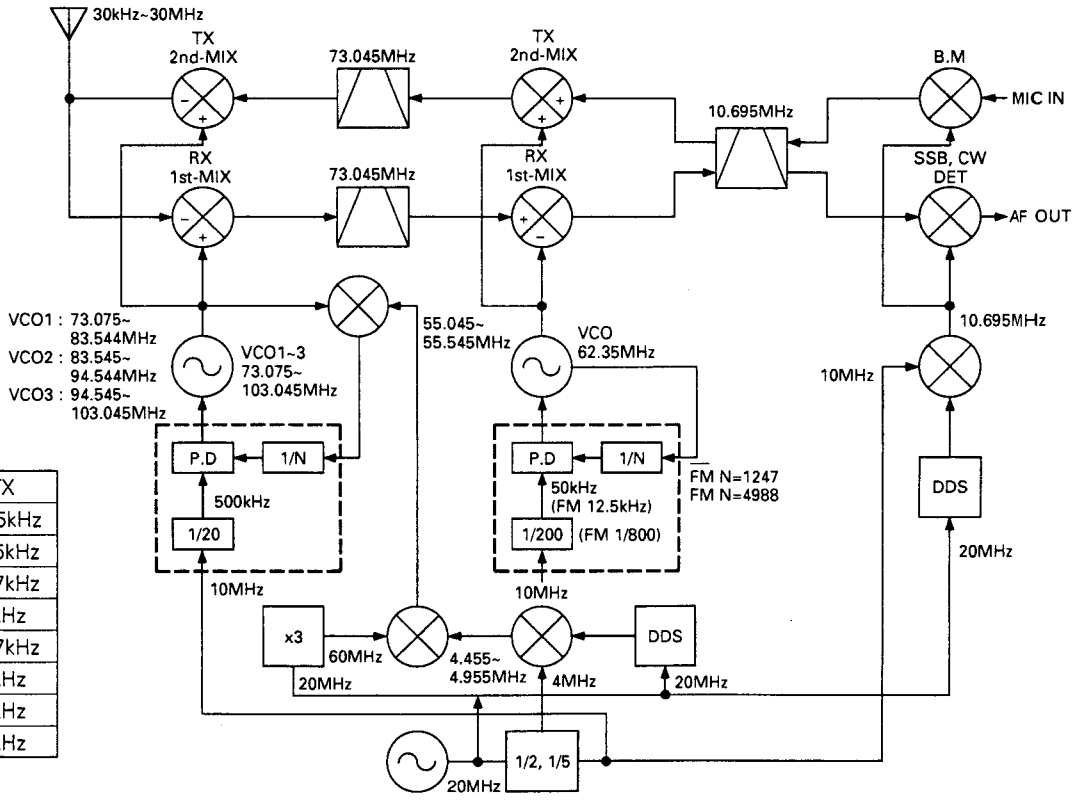


Fig. 2 PLL circuit frequency configuration

CIRCUIT DESCRIPTION

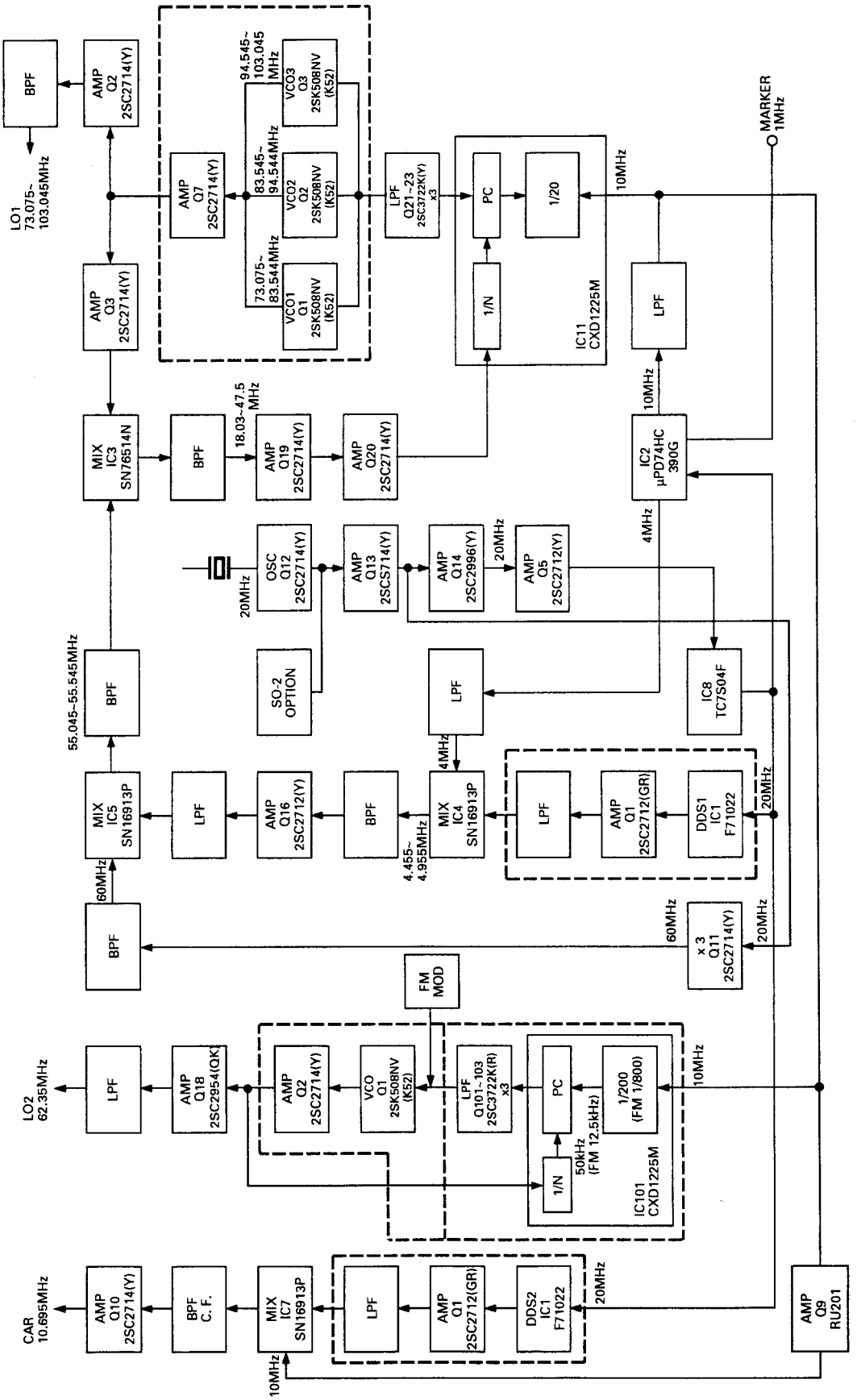


Fig. 3 PLL block diagram

CIRCUIT DESCRIPTION

Receiver Circuit Configuration

The configuration of the receiver circuit is double-conversion with a first IF of 73.045MHz and a second IF of 10.695 MHz, and triple-conversion in FM mode with a first IF of 73.045MHz, a second IF of 10.695MHz, and a third IF of 455kHz. (Fig. 5)

The incoming signal from the antenna passes through the antenna switch relay on the filter unit, then through the 30-MHz low-pass filter, and goes to the TX-RX unit. The signal passes through a 20dB attenuator and 30-MHz low-pass filter in the TX-RX unit, and goes through the eight band-pass filters. If AIP is off, the signal passing through each band-pass filter is amplified by the RF amplifier, Q9 and Q10 (2SK520 x 2), and is input to the first mixer, Q5 to Q8 (2SK520 x 4). If AIP is on, the signal bypasses Q9 and Q10 and goes directly to the first mixer. It is mixed with the LO1 signal by the first mixer to produce a first IF signal of 73.045MHz.

The first IF signal of 73.045MHz passes through the MCF (XF1), is amplified by Q17 (3SK131), and mixed with the 62.35-MHz LO2 signal by the second mixer, Q18 and Q19 (2SK520 x 2), to produce a second IF signal of 10.695MHz.

The second IF signal of 10.695MHz is split into two. One signal goes to the NB amplifier, and the other passes through the NB gate FET (3SK131). The signal then passes through the CF (XF2) and is detected by IC2 (KCD04) in FM mode. In other modes, the signal goes to the IF filter of the X48-3110-00 unit. There are three types of IF filter: 6-kHz, 2.7-kHz, and 500-Hz (500-Hz is optional). The signal passing through the IF filter goes to IC3 (KCD08), and is product-detected in SSB and CW modes, and envelope-detected in AM mode.

1. Receiver front-end

The signal input to the TX-RX unit passes through the switching circuit of the attenuator and the 30-MHz low-pass filter, and goes to seven band-pass filters. If AIP is off, D10 and D11 turn on and D8 and D9 turn off, and the signal passing through each filter is amplified by about 13 dB by Q9 and Q10 (2SK520 x 2) and output to the first mixer. If AIP is on, D10 and D11 turn off and D8 and D9 turn on, and the signal is output directly to the first mixer without passing through Q9 and Q10. The first mixer, is a quad balanced mixer, Q5 to Q8 (2SK520 x 4). (Fig. 4)

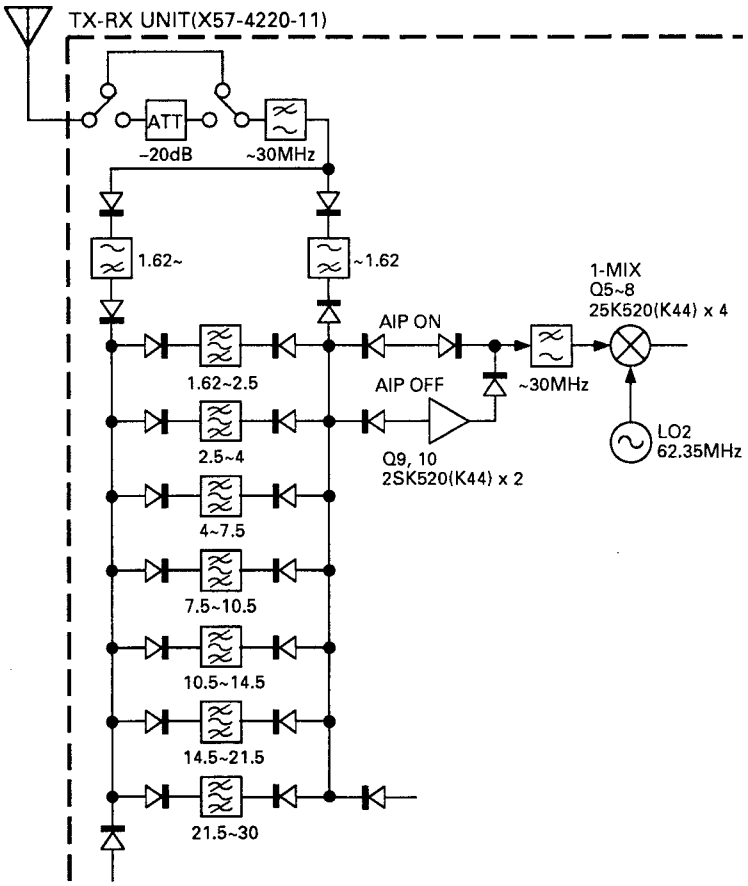


Fig. 4 Receiver front-end

CIRCUIT DESCRIPTION

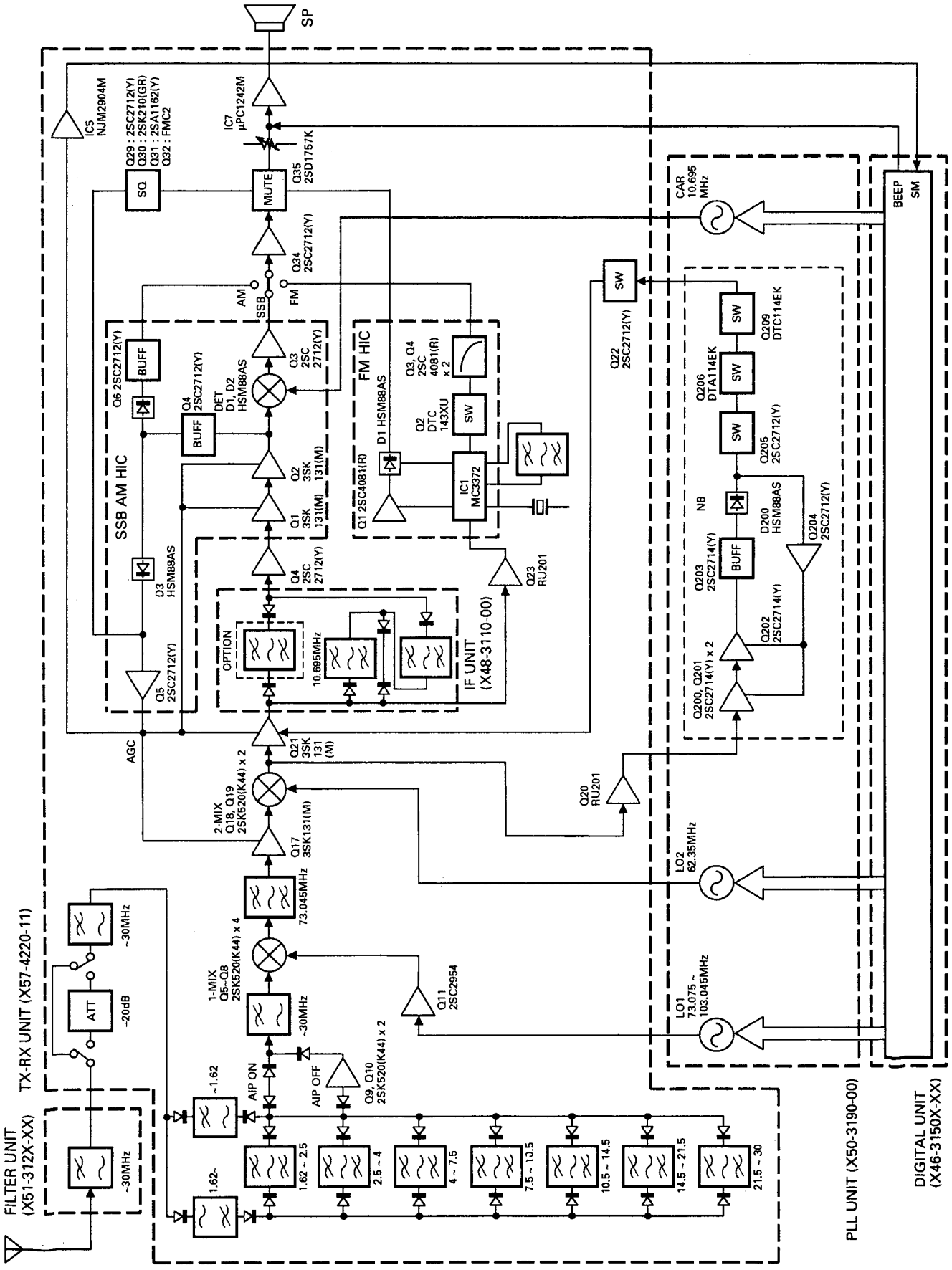


Fig. 5 Receiver section block diagram

CIRCUIT DESCRIPTION

2. Noise blanker circuits

The 10.695-MHz IF signal generated from the first IF of 73.045MHz by the second mixer is input to IF amplifier Q21 (3SK131), sent through Q20, amplified by noise amplifier Q200, Q201, and Q202 (2SC2714), sent through buffer Q203, and noise-detected by D200. This signal switches Q205, Q206, and Q209, and controls Q22 in the TX-RX unit. Q22 controls IF amplifier Q21 and blanks the noise.

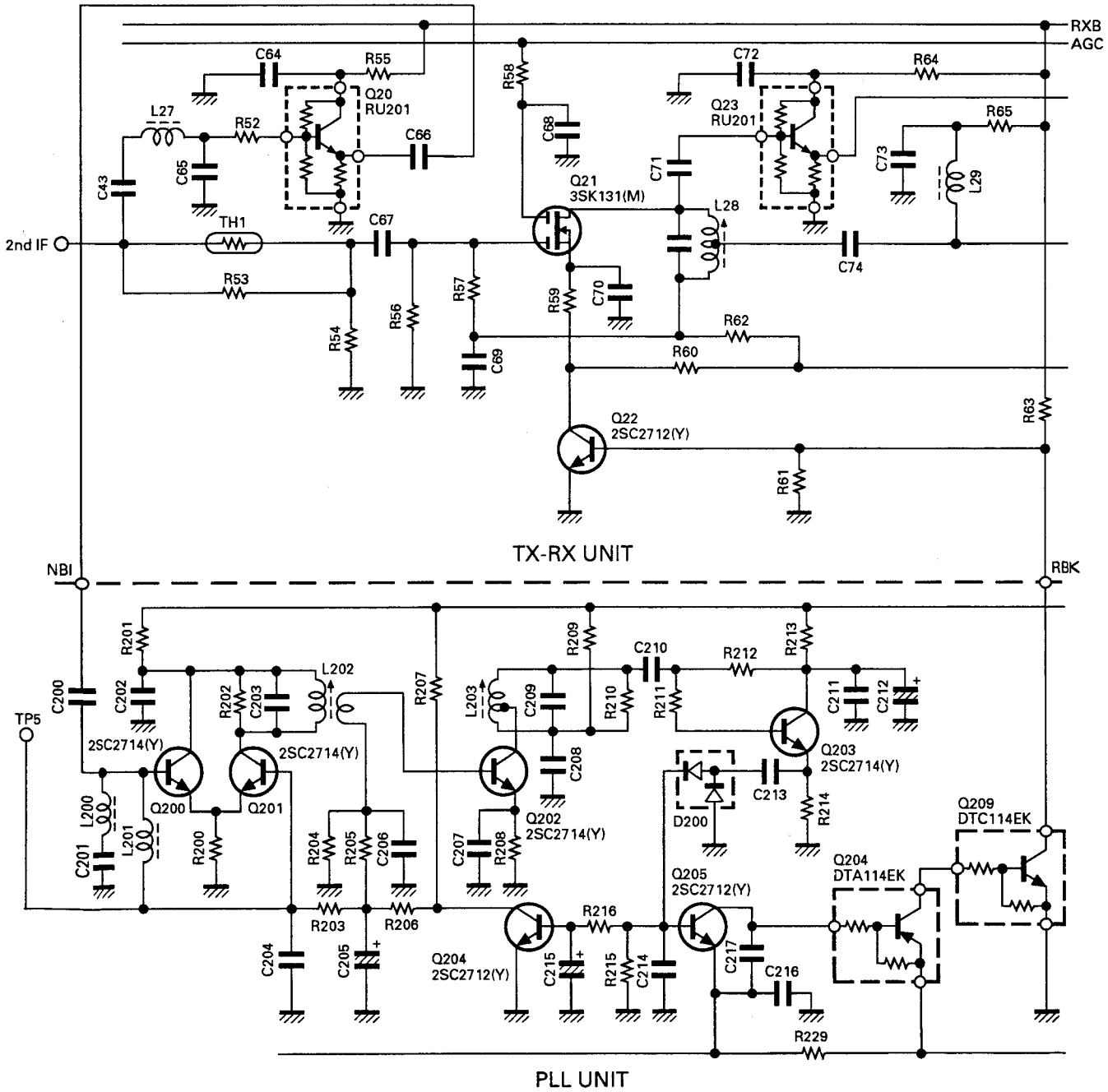


Fig. 6 Noise blanker circuits

CIRCUIT DESCRIPTION

3. SSB, AM, CW filter circuit

The second IF signal amplified by Q21 is input to the X48-3110-00 unit in all modes except FM.

If an optional CW filter (XF1) is installed and CW NARROW is elected in CW mode, the signal passes through XF1 according to the control signal from the microcomputer. If XF1 is not installed or CW NARROW is not selected, the signal passes through XF3 and XF2.

In SSB mode, the signal passes through XF3 and XF2.

In AM mode, the signal passes through XF3 and XF2 as in SSB mode if AM NARROW is selected. If AM NARROW is not selected, the signal passes through XF2 only.

In FM mode, the signal does not pass through the filter circuit in this unit.

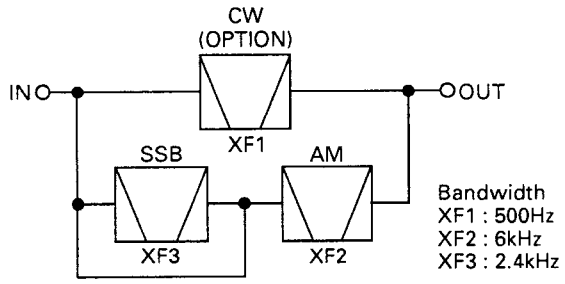


Fig. 7 Filter circuit

Item	Rating
Nominal center frequency	10,695kHz
Center frequency deviation	Within ±80Hz at 6dB
Pass bandwidth	500Hz or more at 6dB
Insertion loss	Within 5dB ± 2dB
Terminating impedance	1200Ω/6pF

Table 2 MCF (L71-0283-05) : IF unit XF1 (Option)

Item	Rating
Nominal center frequency	10.695MHz
Pass bandwidth	6kHz or more at 6dB
Attenuation bandwidth	40kHz or less at 60dB
Ripple	2dB or less
Insertion loss	3dB or less
Guaranteed attenuation	60dB or more within fo ± 1MHz
Terminating impedance	1.2kΩ ± 10% / 6pF ± 10%

Table 3 MCF (L71-0433-05) : IF unit XF2

Item	Rating
Nominal center frequency	10.695MHz
Center frequency deviation	Within ±200Hz at 6dB
Pass bandwidth and Attenuation bandwidth	2.2kHz or more at 6dB
	±1.5kHz or less at 20dB
	±2.4kHz or less at 60dB
Ripple	2dB or less
Insertion loss	5dB or less
Guaranteed attenuation	60dB or more within fo ± 40kHz
Terminating impedance	1.2kΩ ± 5% / 6pF ± 5%

Table 4 MCF (L71-0249-05) : IF unit XF3

4. SSB, AM, CW detection circuit

After unwanted signal components have been removed in the X48-3110-00 unit, the signal is input to IC3 (KCD08). The signal amplified by IC3 is mixed with the CAR signal input from CN11 in SSB and CW modes, and detected to output an audio signal. In AM mode, the signal is envelope-detected by the diode and capacitor to output an audio signal.

5. FM detection circuit

The impedance of the second IF signal amplified by Q21 is converted by Q23 (RU201) in FM mode, and unwanted signal components are removed by the CF (XF2). The resulting signal is input to the detection IC (IC2: KCD04). The signal is then mixed with the 10.24-MHz oscillator signal to generate the 455-kHz signal. The signal is passed through ceramic filter CF1, and detected by the quadrature detector with the signal phase-shifted by CD1.

6. Squelch circuit

In all modes except FM, the 10.695-MHz IF signal is detected by a diode in IC3, passed through Q29 and Q30, and a voltage proportional to the signal level appears at the base of Q31. When the SQ VR is turned clockwise, the emitter voltage of Q31 increases and Q32 is switched on.

In FM mode, as the IF signal increases, the noise level decreases, and the voltage at the SQ pin decreases, making the SC pin low. When the SQ VR is turned clockwise, the voltage at the SQ pin rises, and the SC pin goes high. Current flows through R77, and Q32 turns on.

Q35 turns on to mute the AF signal line. (Fig. 8)

CIRCUIT DESCRIPTION

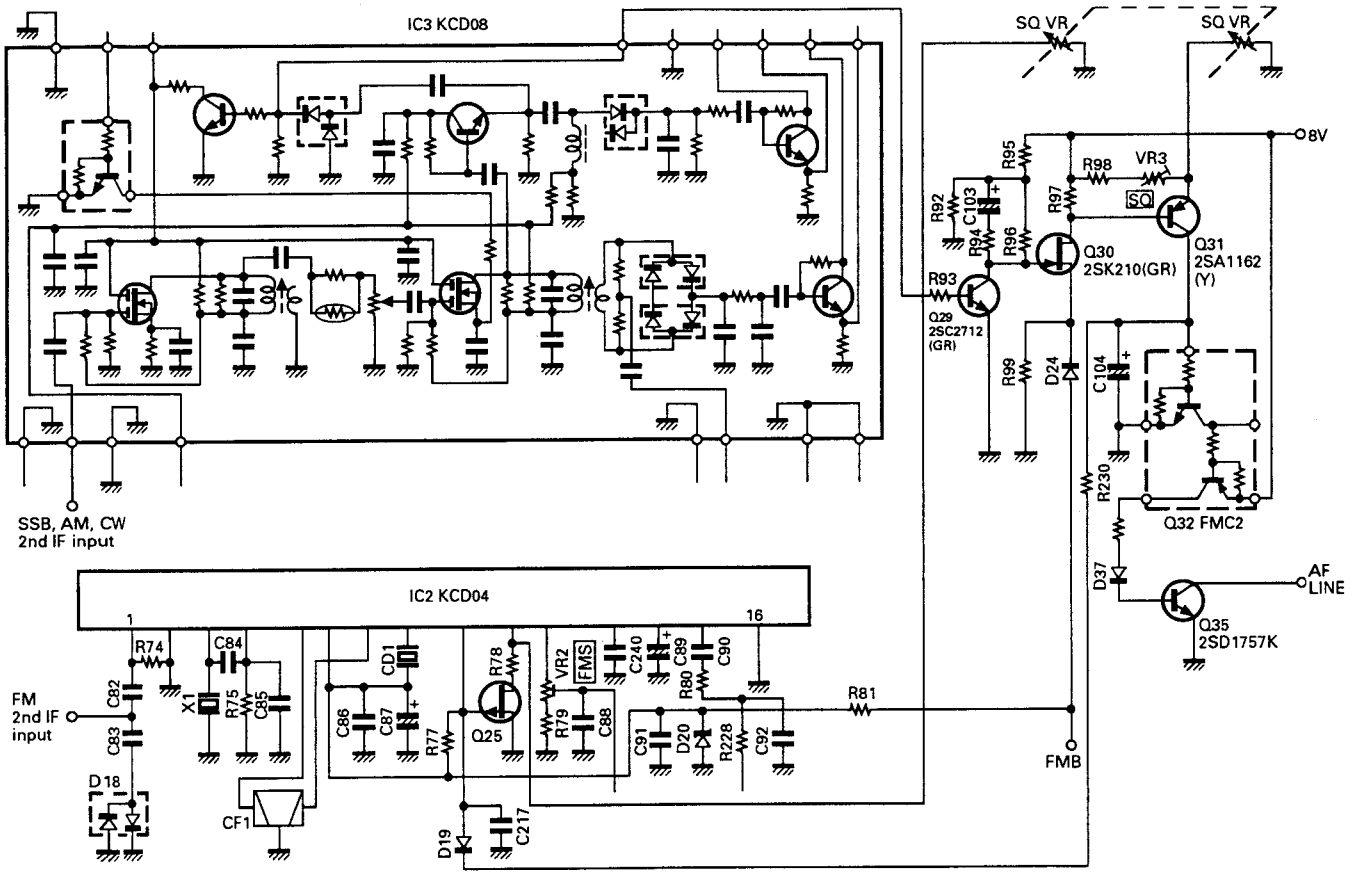


Fig. 8 Squelch circuit

7. Signalstrength meter circuit

In all modes except FM, the signalstrength meter circuit comprises operational amplifier IC5. The signal, level-detected by IC3, is input to IC5 (1/2) and amplified by about 8 dB by IC5 (2/2).

In FM mode, the level detection signal from IC2 is adjusted by VR2, selected by IC4 (BU4066BF) according to the mode, and output directly to the digital unit. (Fig. 9)

8. AGC circuit

The time constant for the signal envelope-detected by IC3 is changed in each mode by the analog switch. The effective value, not the peak value, is used in AM mode. When SLOW is selected in SSB and CW modes, the analog switch is turned on. (Fig. 9)

CIRCUIT DESCRIPTION

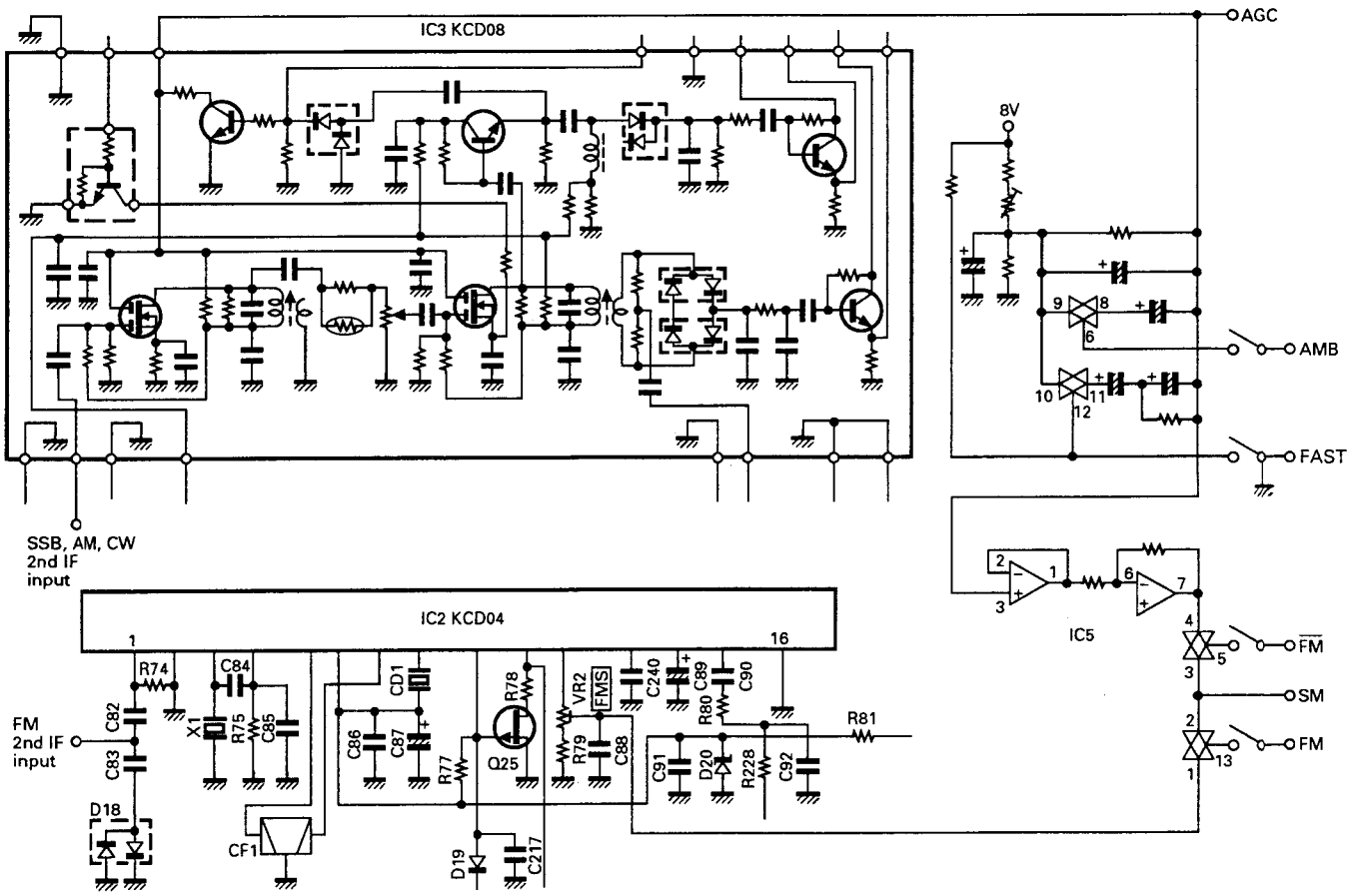


Fig. 9 S-meter and AGC circuits

Transmitter Circuit Configuration

The audio signal from the microphone enters CN15 of the TX-RX unit. The signal then goes to Q38 (2SC3722K) of the microphone amplifier, and is split and directed to the SSB and FM systems. In the SSB system, the signal, its gain properly adjusted by VR7, is amplified by Q40 (2SC2712(Y)), balance-modulated with the CAR signal (10.695MHz) input from CN11 by IC8 (μPC1037HA), passed through Q42 (2SC2712(Y)), and sent to the crystal filter in the X48-3110-00 unit. The SSB signal passing through the filter is amplified by Q43 (3SK131M).

The 62.35-MHz LO2 signal from the PLL unit is input from CN3 of the TX-RX unit, and mixed with the 10.695-MHz signal amplified by Q43, Q46, and Q47 (3SK131(M)) to produce a 73.045-MHz signal. The LO1 signal from the PLL unit is input from CN2 of the TX-RX unit, and mixed with the 73.045-MHz signal by Q48 and Q49 (3SK131(M)) to generate the desired signal. The signal passes through the band-pass filter and is amplified by Q50 (2SC2954) to produce the drive output, which goes to the final unit from CN19.

The signal is amplified to the appropriate power level for the type by the final unit. Harmonic components are attenuated by the filter unit, and the signal is output from the antenna connector.

In FM mode, the audio signal amplified by microphone amplifier Q38 and Q39 is input to CN1 of the PLL unit, and passes through the pre-emphasis and IDC circuit of IC201 to modulate LO2 (62.35MHz).

In AM mode, the signal is generated by unbalancing the carrier of SSB balance modulator IC8.

In CW mode, Q59 of the TX-RX unit is switched by the key, and the signal is input to IC1 of the digital unit. The sidetone monitor signal is generated by X59-4000-00 in the TX-RX unit, and output from the speaker. The CW control signal is output from IC1 of the digital unit, and input from CN17 of the TX-RX unit to switch Q46 and Q47 and generate the CW signal. (Fig. 10)

CIRCUIT DESCRIPTION

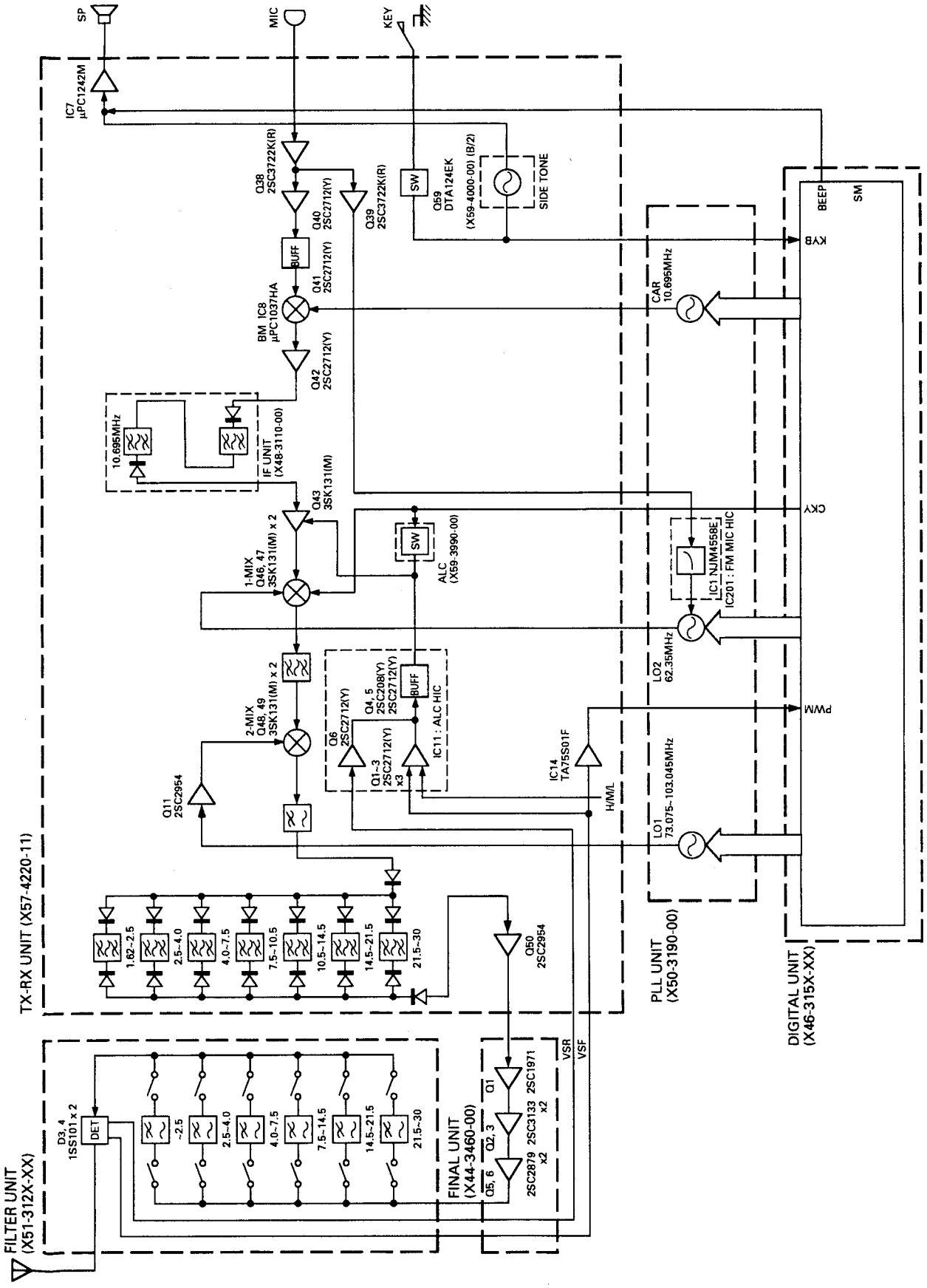


Fig. 10 Transmitter section block diagram

CIRCUIT DESCRIPTION

1. ALC circuit

The forward wave voltage detected in the filter unit passes through CN18 in the TX-RX unit, its level is adjusted by VR14, and it is applied to the differential amplifier comprising Q1 and Q2 (2SC2712(Y) x 2) in IC11. When VSF is applied to the base of Q1, the emitter voltage of Q1 and Q2 increases and the current flowing through the base of Q2 decreases; thus the collector voltage rises. When this voltage exceeds the emitter voltage of Q3 (2SC2712(Y)) (about 1.8V) plus VBE (about 0.6V), the current flows through the base of Q3 and the collector voltage drops. ALC time constants C and R are connected to this collector.

The collector voltage change is shifted by Q4 (2SK208) and D2 (3.6V), and matched with the voltage for keying by Q5 and D3 (RLS73) to generate the ALC voltage. This ALC voltage activates ALC by lowering the second gate voltage of Q43 (3SK131(M)) of the TX-RX unit. (Fig. 11)

2. Power control circuit

Power is controlled by lowering the base voltage of Q2 in IC11. As the base voltage of Q2 decreases, the emitter voltage of Q1 and Q2 decreases. This activates ALC and reduces the power even if the base voltage (VSF) of Q1 is low. The power is changed by IC12. In AM mode, Q63 turns on, and the power is reduced to about 1/4 of the power in other modes. (Fig. 11)

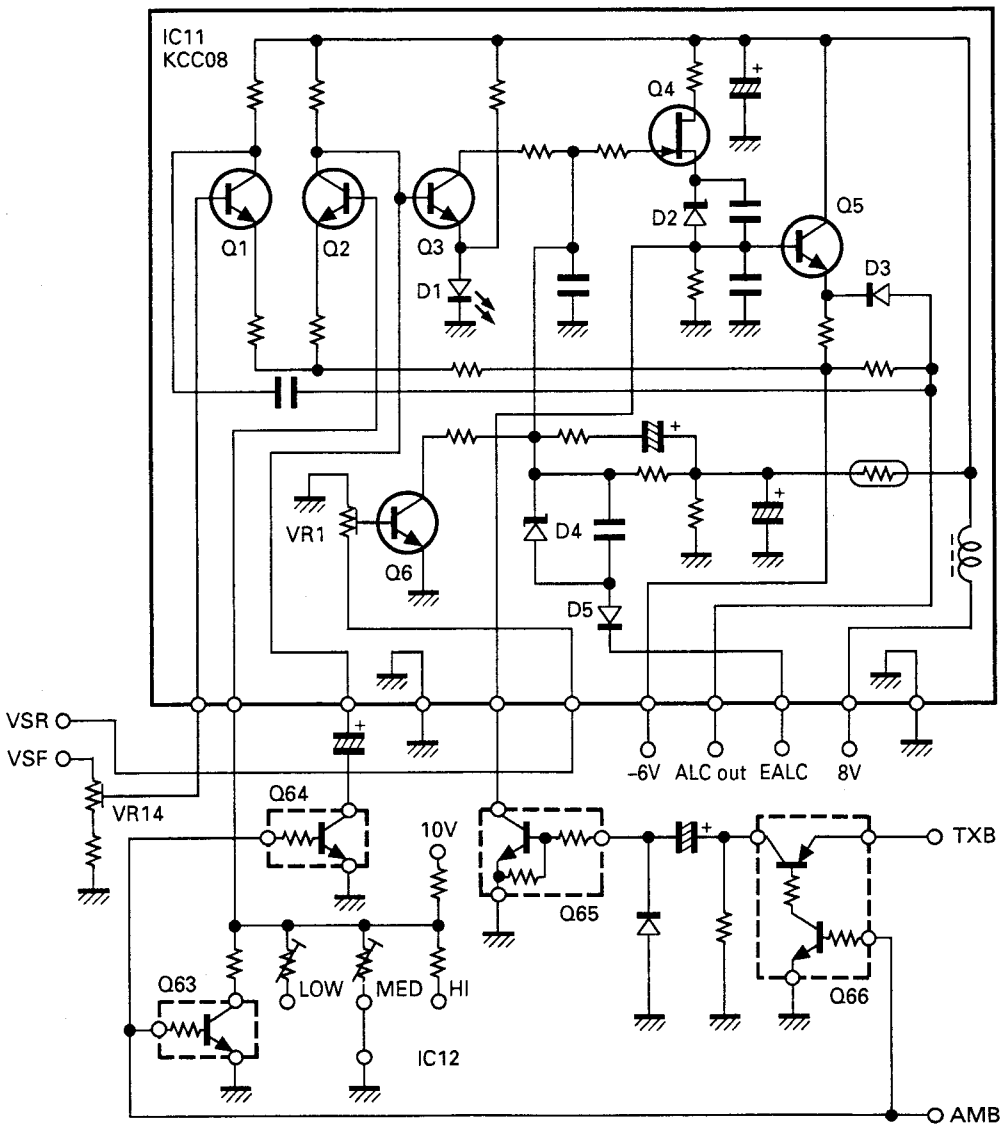


Fig. 11 ALC and power control circuits

CIRCUIT DESCRIPTION

3. Protection circuit

When the reflected wave voltage (VSR) detected by the filter unit rises, Q6 (2SC2714(Y)) in IC11 turns on to reduce the voltage of the ALC time constant line. The drive is decreased and the power is reduced to protect the final transistor.

4. Temperature protection

If the final heat sink temperature rises, Q8 in the final unit turns on and the fan starts running at low speed in both transmit and receive modes. If the final heat sink temperature rises further, Q9 turns on, and the fan rotates at medium speed in both transmit and receive modes. If the temperature rises further still, the fan rotates at high speed in transmit mode, and at medium speed in receive mode to reduce the fan noise.

If the temperature continues to rise, the temperature detection port of the microcomputer (IC1 in the digital unit) is made high to reduce the RF output forcibly. If the fan fails or does not rotate because something is stopping it, the RF output is forcibly reduced in the same way.

Digital Control Circuit

The TS-50S digital control circuit comprises a 16-bit microcomputer (M37702M4A-FP), a reset IC (M62003FP), an EEPROM (NM93C66EM8), a latch (TC74HC573AF), and a decoder (TC74HC238AF). The latch and decoder are used to expand the output ports. The decoder outputs an enable signal pulse.

Since there are many control signals for the TX-RX unit and filter unit, they are output to the shift register (serial-to-parallel converter) in series. (Fig. 13)

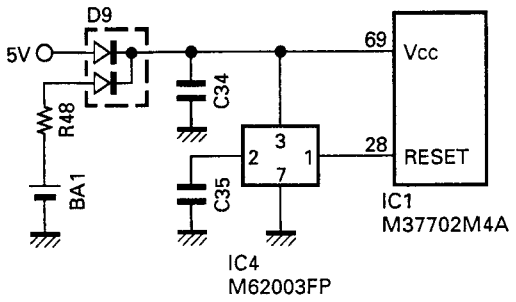
1. Power button

With this transceive, the power is turned on and off by the microcomputer. When the power button is pressed, the microcomputer detects it and energizes, the power relay to supply 14V to the transceiver. When the power button is pressed to turn the transceiver off, the microcomputer checks it a little longer than when turning the power on, and deenergizes the power relay.

2. Reset circuit

IC4 (M62003FP) monitors Vcc applied to the microcomputer. If the voltage falls below 2.15V, the IC outputs a reset signal (low) to the microcomputer, and the CPU initializes all internal data (including memory channel data). The reset signal is not output when the power is turned on or off or 14V is turned on or off. It is output when the battery voltage level goes low and 14V is turned on or off.

C35 generates the signal width (td) required to reset the microcomputer. (Fig. 12)



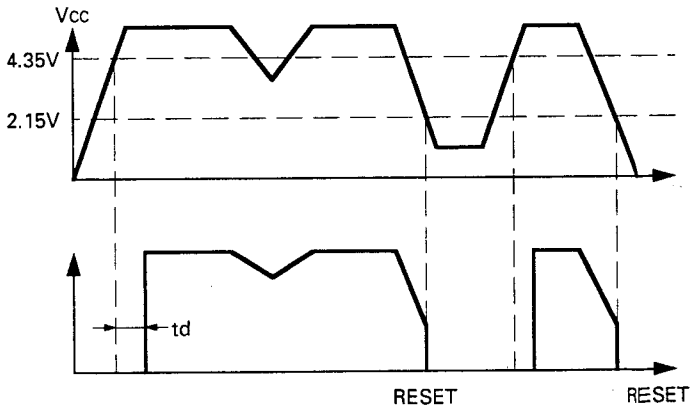


Fig. 12 Reset circuit

CIRCUIT DESCRIPTION

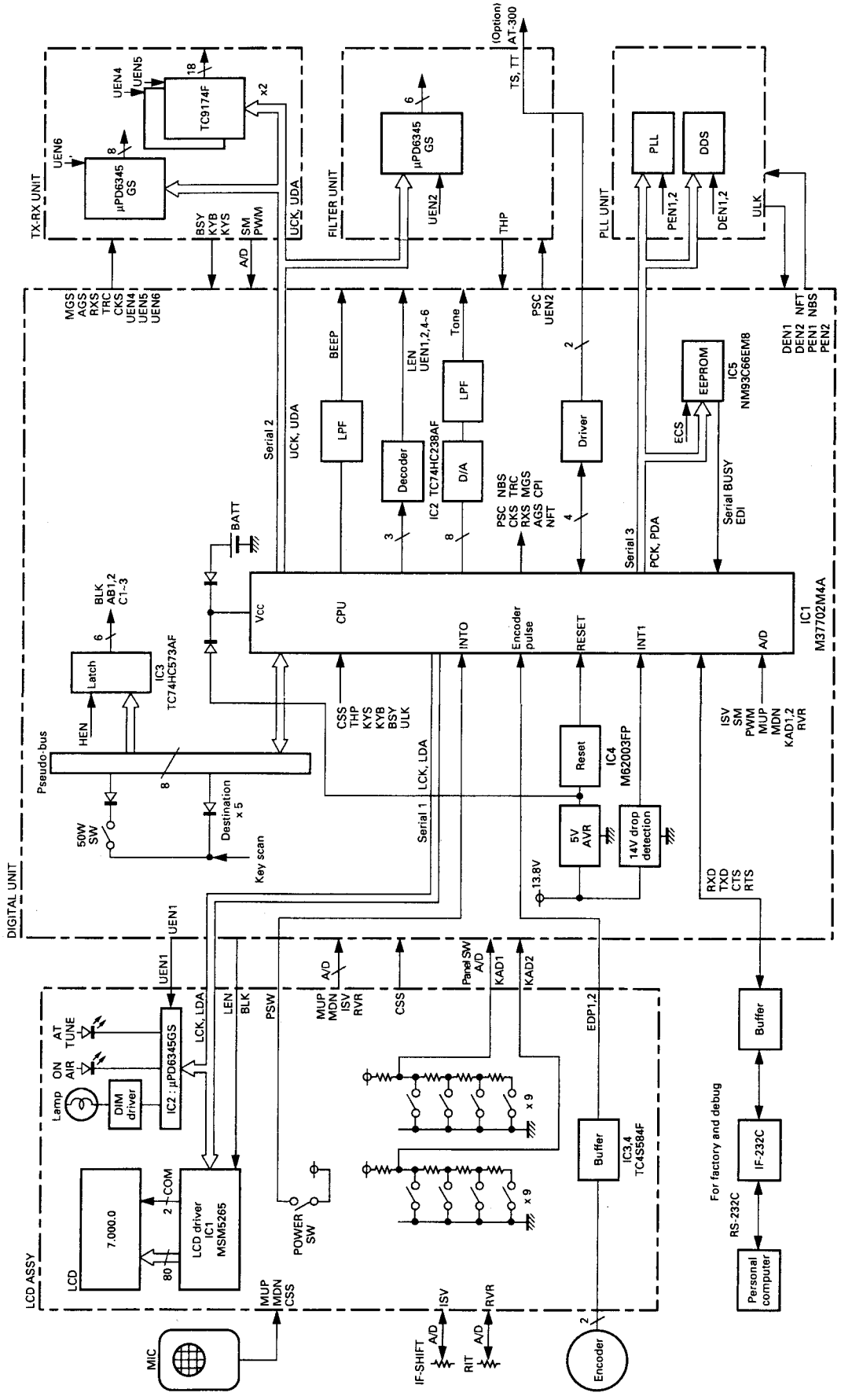


Fig. 13 Digital control block diagram

CIRCUIT DESCRIPTION

3. Backup circuit

This transceiver has two kinds of data stored in the microcomputer and EEPROM. User data, such as memory channel data, is stored in the microcomputer, and adjustment data, such as meter curves, is stored in the EEPROM. The EEPROM data is retained when the power supply voltage is off, but power is required to retain the microcomputer data. If 14V is not cut off, power is supplied from the 5V AVR in the digital unit. If 14 V is cut off, power is supplied from a lithium battery. To retain data with the lithium battery, the microcomputer must be in backup mode. So, the backup circuit shown in Figure.14 detects a voltage drop in the 14V line and outputs a backup request signal to the microcomputer.

4. PLL and DDS control circuit

The TS-50S has three PLLs and two DDSs. The main microcomputer outputs frequency data to the PLLs and DDSs serially according to the display frequency.

5. TX-RX unit control signal circuit

The microcomputer sends the mode signal, If filter select signal, power signal, and BPF select signal to the TX-RX unit. It receives meter signals and standby switch signals from the TX-RX unit, displays data on the meters, and performs the transmit operation. The output signal from the microcomputer goes to the serial-to-parallel converter (TC9174F, µPD6345). (Fig. 15)

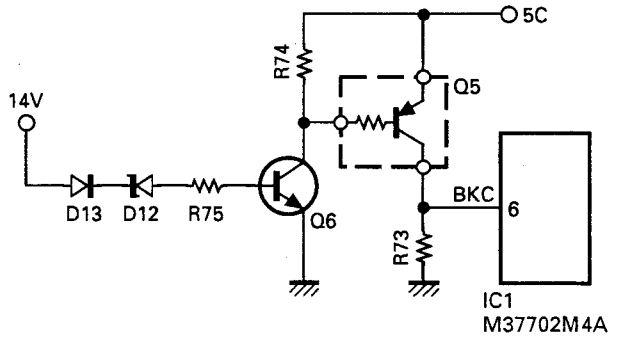


Fig. 14 Backup circuit

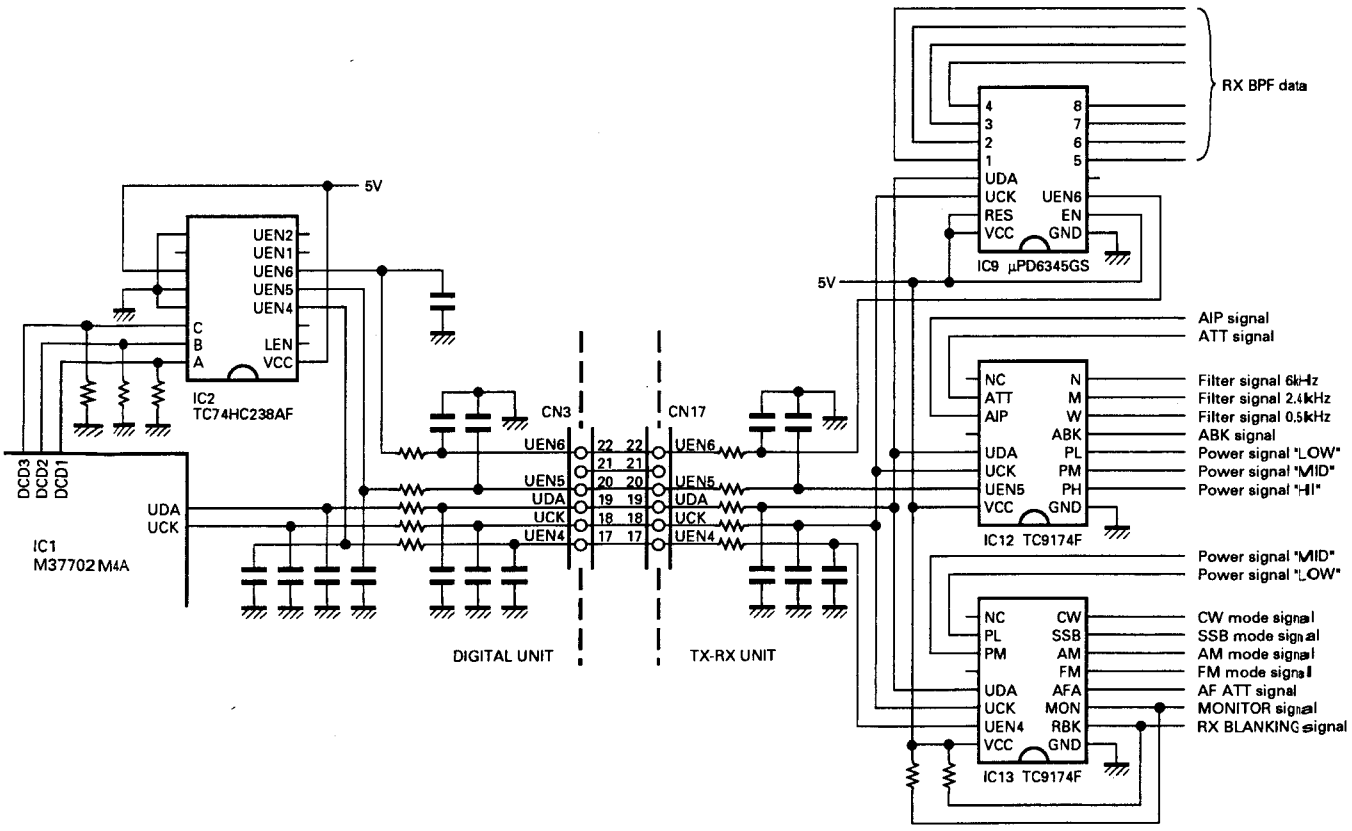


Fig. 15 TX-RX unit control signal circuit

CIRCUIT DESCRIPTION

6. Switch A/D input

The voltage divided by nine switches S16, S2 to S9, S10 to S15, and S17 to S19 is applied to the A/D input pin of the microcomputer when a button is pressed. (Fig. 16) When two or more buttons in the same group are pressed at the same time, only the button with the highest priority is detected (listed below).

KAD1		KAD2		Priority
S16	SPLIT	S11	F. LOCK	1
S3	AIP/AT	S12	DOWN	2
S4	NB	S13	UP	3
S5	RIT	S14	MHz	4
S6	M. IN	S15	A/B	5
S7	SCAN	S10	M/V	6
S8	M>V	S17	A=B	7
S9	CLR	S18	SSB/CW	8
S2	AT TUNE	S19	FM/AM	9

Table 5

7. EEPROM

Adjustment data is stored in the EEPROM, which consists of 256 16-bit registers. Data can be written to and read from the EEPROM. Each time the power is switched on, data is read from the EEPROM. If corrupt data is detected, the default adjustment data is used. Adjustment data can be written into the EEPROM in service adjustment mode. (Fig. 17)

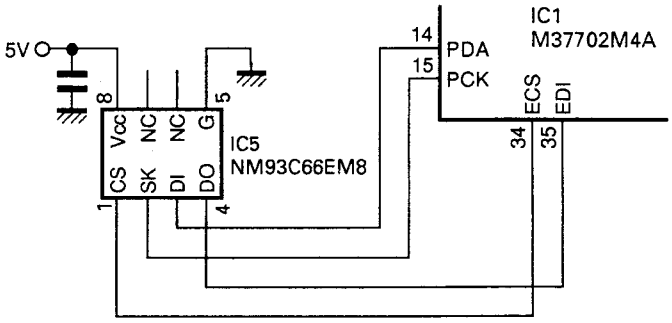


Fig. 17 EEPROM circuit

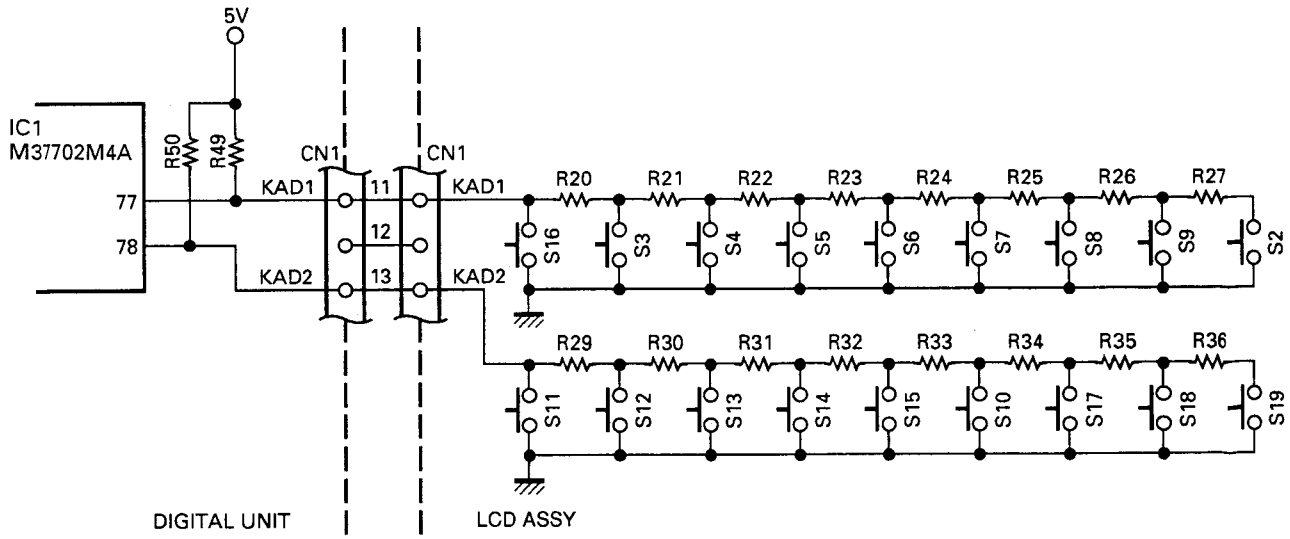


Fig. 16 Switch A/D input circuit

CIRCUIT DESCRIPTION

8. Encoder circuit

The encoder is a mechanical one. The waveforms of the encoder pulses are rectified by IC3 and IC4 (TC4S584F) in the LCD assembly, and the number of pulses is counted by the hardware counter in the microcomputer. The rotational speed of the encoder is detected. When the encoder is turned slowly, the frequency step is made fine; when it is turned quickly, the frequency step is made coarse to ensure smooth tuning and frequency change. The minimum frequency step is 5 Hz (50 Hz in FM mode); the maximum, 200 Hz (2kHz in FM mode). The frequency step is changed continuously according to the speed of rotation. (Fig. 18)

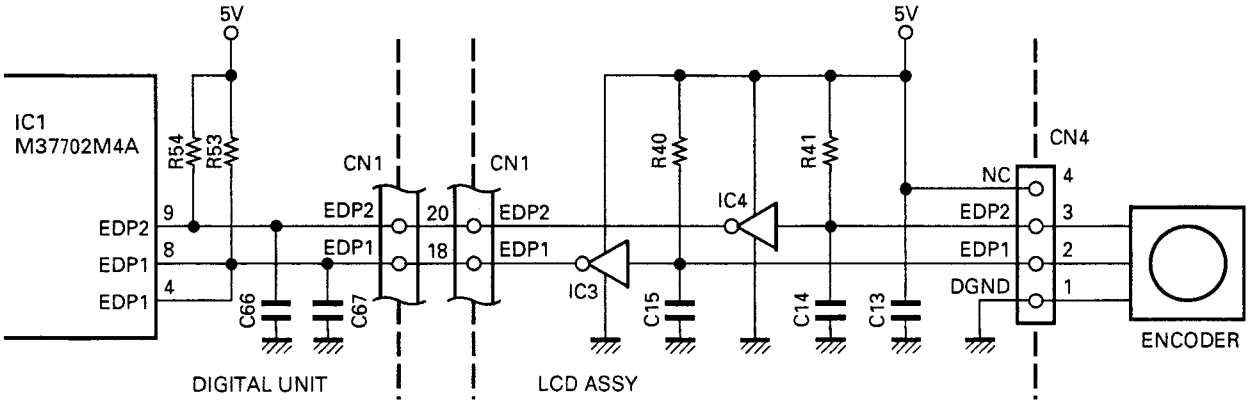


Fig. 18 Encoder circuit

9. Busy signal

The level of the port is monitored in receive mode, and busy indication and busy stop are performed during scanning.

10. Dimmer control

The dimmer is controlled in five steps (including OFF). The lamp is turned on or off by pin 7 of IC2 of the switch unit. The brightness of the dimmer lamp is determined by pins 5 and 6 of IC2. (Fig. 19)

11. Beep

The beep signal is generated using the timer in the microcomputer. The menu enable data (beep on/off, mode beep, warning Morse) is recognized, and the necessary code is output. A dot lasts about 40ms; a dash, about 120ms. The oscillation frequency is about 1.4kHz.

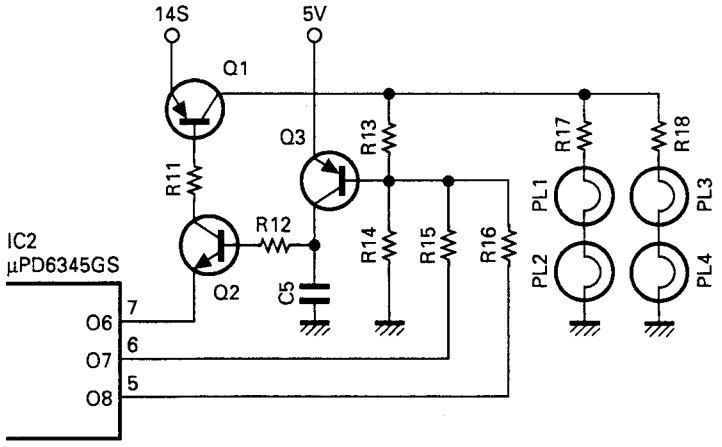


Fig. 19 Dimmer control circuit

CIRCUIT DESCRIPTION

12. Subtone

The subtone frequency is converted from digital to analog by a ladder resistor, and a pseudo-sine wave, including the 1750-Hz tone, is output. (Fig. 20)

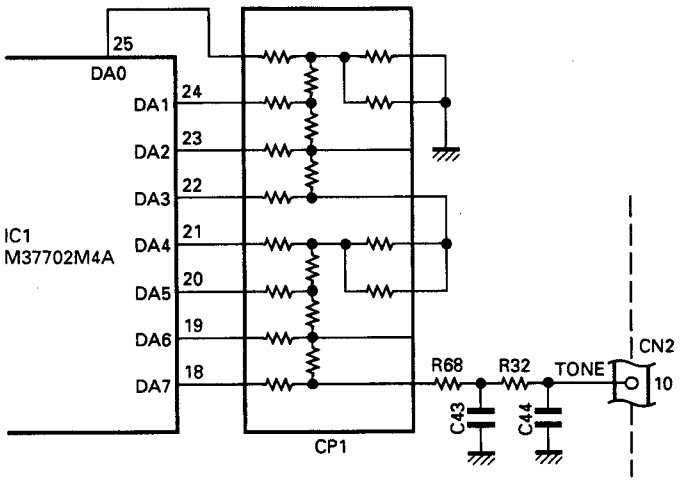


Fig. 20 Subtone circuit

13. AT control signal

The AT-300 (option) control signal is bidirectional, and tuning is done by handshaking with the AT-300. The AT-50 (option) is controlled and tuned by transferring serial data. (Fig. 21)

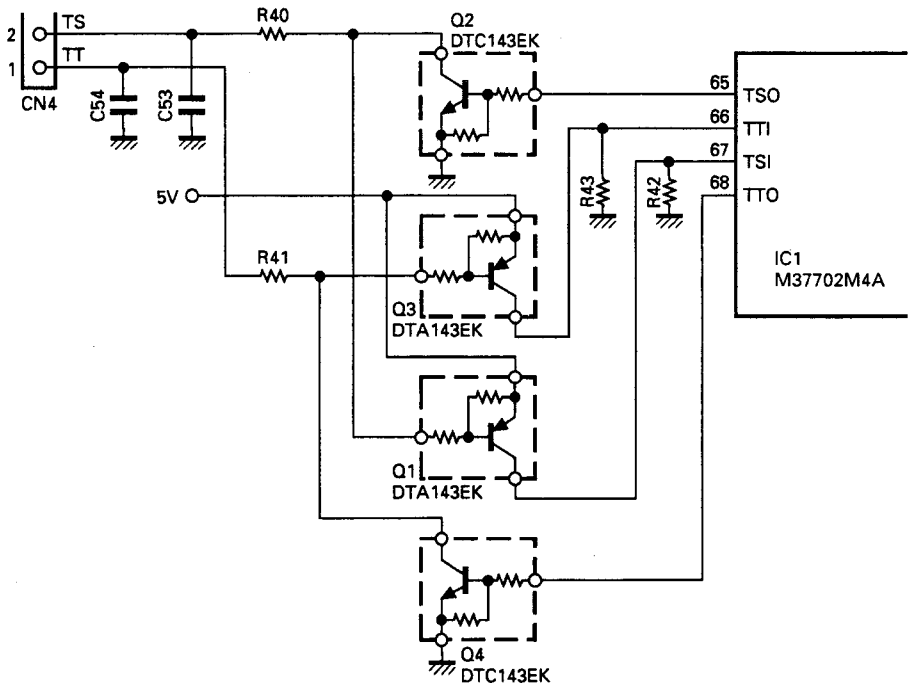


Fig. 21 AT control circuit

CIRCUIT DESCRIPTION

14. Settings

- **Contents of menu**

If you hold down the F. LOCK key for more than 1.5 seconds, a menu is displayed. You can change the menu number with the encoder, change between menus A and B with the A/B key, and change settings with the UP/DOWN key.

Menu No.	Contents of menu A	State (display)	Initial state
00	Power change	Depending on marketplace	Depending on marketplace
01	Dimmer quantity changeover	OFF/d1/d2/d3/d4	d2
02	AGC SLOW/FAST changeover (SSB, CW, AM)	S/F	Depending on data
03	IF filter switching (SSB, CW, AM)	0.5/2.4/6kHz	Depending on data
04	SSB/CW switch change	SSB/ULC	SSB
05	CW delay time switching	See instruction manual.	600
06	CW pitch change (50-Hz step)	400~1000	800
07	CW reverse on/off	ON/OFF	OFF
08	Encoder lock on/off	ON/OFF	OFF
09	Program scan busy stop on/off	ON/OFF	ON
10	Program scan time-operate/carrier-operate changeover	0/1	0
11	Memory scan busy stop on/off	ON/OFF	ON
12	Memory scan time-operate/carrier-operate changeover	0/1	0
13	All memory scan on/off	ON/OFF	OFF
14	Four times power meter indication at lower power	ON/OFF	OFF
15	Repeater subtone on/off	ON/OFF	ON
16	MIC U/D step frequency change in SSB/CW mode	See instruction manual.	10kHz
17	MIC U/D step frequency change in FM/AM mode	See instruction manual.	10kHz

Menu No.	Contents of menu B	State (display)	Initial state
50	Beep tone on/off	ON/OFF	ON
51	Mode Morse on/off	ON/OFF	ON
52	Warning Morse on/off	ON/OFF	ON
53	Repeater subtone frequency setting	67.0~1750.0	Contents in memory
54	Repeater subtone mode setting	b/c	c
55	Meter peak hold on/off	ON/OFF	ON
56	Memory channel automatic increment on/off	ON/OFF	OFF
57	Standard memory channel frequency temporary change	ON/OFF	OFF
58	Program scan hold function on/off	ON/OFF	OFF
59	Memory protect 1 (write/erase inhibit) on/off	ON/OFF	OFF
60	Memory protect 2 (overwrite/erase inhibit) on/off	ON/OFF	OFF
61	AM broadcast band 9-kHz step function on/off	9kHz/OFF	OFF
62	1-MHz/500-kHz changeover when 1-MHz step is on	1000/500kHz	1000
63	RIT frequency variable range 1.1-kHz/2.2-kHz changeover	1.1/2.2kHz	1.1kHz
64	Automatic power-off on/off	ON/OFF	OFF
65	Transmit inhibit function	ON/OFF	OFF
66	Microphone sensitivity change	H/L	L
67	PF1 key setting	00~99	83 (menu A)
68	PF2 key setting	00~99	00 (power change)
69	PF3 key setting	00~99	36 (TF-SET)
70	PF4 key setting	00~99	82 (monitor)
71	LSB transmit/receive carrier point setting	-100~200	0
72	USB transmit/receive carrier point setting	-100~200	0

CIRCUIT DESCRIPTION

- **PF key functions**

Three kinds of function (panel function, menu A/B function, and non-panel function) are assigned to the four PF keys on the microphone. To assign a function to a key, specify the number in the following table using the UP/DOWN key in the order of 67 to 70 (PF1 to PF4) in menu B mode. The PF keys are named PF1, PF2, PF3, and PF4 from the left, as viewed from the front of the microphone.

No.	Menu A function	No.	Panel key function	No.	Menu B function	No.	Special function
00	Menu 00	20	AT TUNE	50	Menu 50	80	AF MUTE
01	Menu 01	21	AIP	51	Menu 51	81	AF ATT
02	Menu 02	22	ATT	52	Menu 52	82	MONITOR
03	Menu 03	23	NB	53	Menu 53	83	Menu A
04	Menu 04	24	F. LOCK	54	Menu 54	84	Menu B
05	Menu 05	25	UP	55	Menu 55	85	1Hz display
06	Menu 06	26	DOWN	56	Menu 56	99	OFF
07	Menu 07	27	MHz	57	Menu 57		
08	Menu 08	28	RIT	58	Menu 58		
09	Menu 09	29	SCAN	59	Menu 59		
10	Menu 10	30	CLR	60	Menu 60		
11	Menu 11	31	M. IN	61	Menu 61		
12	Menu 12	32	M>V	62	Menu 62		
13	Menu 13	33	M/V	63	Menu 63		
14	Menu 14	34	A/B	64	Menu 64		
15	Menu 15	35	SPLIT	65	Menu 65		
16	Menu 16	36	TF-SET	66	Menu 66		
17	Menu 17	37	A=B				
		38	SSB/CW				
		39	FM/AM				

15.Band data

Frequency	RX BPF DATA								TX LPF DATA						VCO DATA		
(MHz)	BR7	BR6	BR5	BR4	BR3	BR2	BR1	BR0	LPF6	LPF5	LPF4	LPF3	LPF2	LPF1	VB3	VB2	VB1
0.030000~ 0.499999	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
0.500000~ 0.999999	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
1.000000~ 1.599999	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1
1.600000~ 1.999999	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1
2.000000~ 2.499999	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
2.500000~ 2.999999	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1
3.000000~ 3.499999	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1
3.500000~ 3.999999	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1
4.000000~ 4.499999	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
4.500000~ 4.999999	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1
5.000000~ 5.499999	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1
5.500000~ 5.999999	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1

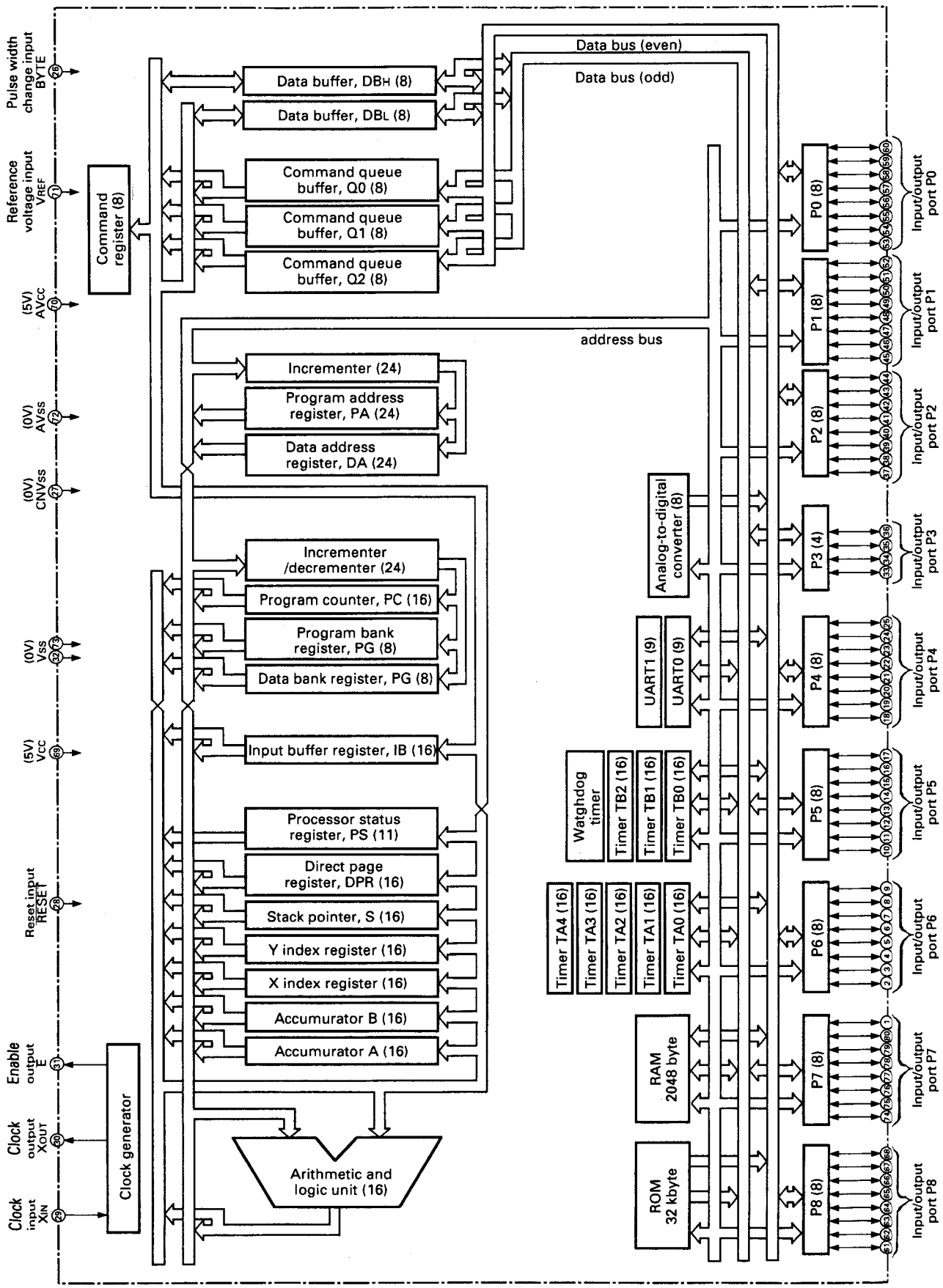
CIRCUIT DESCRIPTION

Frequency (MHz)	RX BPF DATA								TX LPF DATA						VCO DATA		
	BR7	BR6	BR5	BR4	BR3	BR2	BR1	BR0	LPF6	LPF5	LPF4	LPF3	LPF2	LPF1	VB3	VB2	VB1
6.000000~ 6.499999	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1
6.500000~ 6.999999	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1
7.000000~ 7.499999	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1
7.500000~ 7.999999	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
8.000000~ 8.499999	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
8.500000~ 8.999999	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
9.000000~ 9.499999	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
9.500000~ 9.999999	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
10.000000~10.499999	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
10.500000~10.999999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
11.000000~11.499999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
11.500000~11.999999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
12.000000~12.499999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
12.500000~12.999999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
13.000000~13.499999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
13.500000~13.999999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
14.000000~14.499999	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
14.500000~14.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
15.000000~15.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
15.500000~15.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
16.000000~16.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
16.500000~16.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
17.000000~17.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
17.500000~17.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
18.000000~18.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
18.500000~18.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
19.000000~19.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
19.500000~19.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
20.000000~20.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
20.500000~20.999999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
21.000000~21.499999	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
21.500000~21.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
22.000000~22.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
22.500000~22.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
23.000000~23.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
23.500000~23.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
24.000000~24.400000	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
24.500000~24.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
25.000000~25.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
25.500000~25.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
26.000000~26.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
26.500000~26.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
27.000000~27.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
27.500000~27.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
28.000000~28.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
28.500000~28.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
29.000000~29.499999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
29.500000~29.999999	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0

SEMICONDUCTOR DATA

CPU : M37702M4A-FP (Digital Unit IC1)

- **Block diagram**



SEMICONDUCTOR DATA

• Terminal function

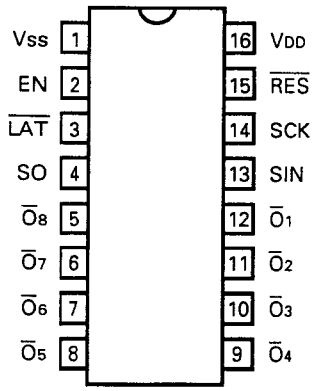
Pin	Pin name	Signal name	I/O	Function	Remarks
1	AN0/	MDN	I	Microphone down switch	/P70
2	P67/	CSS	I	PTT switch	/TB2IN
3	P66/	LDA	O	LCD data	Destination D input strobe/TB1IN
4	TB0IN/	EDP1	I	Encoder pulse	/P65
5	INT2/	LCK	O	LCD clock	/P64
6	INT1/	BKC	I	Backup Vcc detection	/P63
7	INT0/	PSW	I	Power switch	/P62
8	TA4IN	EDP1	I	Encoder pulse	/P61
9	TA4OUT	EDP2	I	Encoder pulse	/P60
10	P57/	DRL	O	Power relay control	/TA3IN
11	P56/	THP	I	Final temperature detection	/TA3OUT
12	P55/	NFT	O	Not FM TX	/TA2IN
13	P54/	PEN2	O	PLL enable	/TA2OUT
14	P53/	PDA	O	PLL/EEPROM/DDS data	/TA1IN
15	P52/	PCK	O	PLL/EEPROM/DDS clock	/TA1OUT
16	P51/	NB	O	NB on/off	/TA0IN
17	P50/	BEEP	O	Beeper pulse	/TA0OUT
18~22	P47~P43	DA7~DA3	O	D/A	
23	P42/	DA2	O	Digital-to-analog converter	/ø
24	P41/	DA1	O	Digital-to-analog converter	/RDY
25	P40/	DA0	O	Digital-to-analog converter	/HOLD
26	BYTE		I	(External bus width specification)	* = don't care
27	CNVss		I	CPU operation mode specification	
28	RESET	RES	I	CPU reset	
29	XIN		I	System clock	
30	XOUT		O	System clock	
31	E		O		
32	Vss				
33	P33/	DEN2	O	DDS2 enable	/HLDA
34	P32/	ECS	O	EEPROM chip select	/ALE
35	P31/	EDI	I/O	EEPROM data output/Busy input	/BHE
36	P30/	UCK	O	Shift register clock	/R/W
37	P27/	UDA	O	Shift register data	/A23/D7
38	P26/	KYS	I	Key jack input	/A22/D6
39	P25	KYB	I	Key input	/A21/D5
40	P24/	TXS	O	TX/RX control	/A20/D4
41	P23/	RXS	O	RX enable	/A19/D3
42	P22/	CKS	O	CKY control signal	/A18/D2
43	P21/	AGC	O	AGC slow/fast changeover	/A17/D1
44	P20/	HEN	O	Latch enable	/A16/D0
45~52	P17/~P10	D7~D0	I/O	Pseudo-bus	/A15/D15~/A8/D8
53	P07/	BSY	I	Signal busy	/A7
54	P06/	MGS	O	Microphone sensitivity selection	/A6
55	P05/	ULK	I	Unlock signal	/A5
56	P04/	PEN1	O	PLL enable	/A4
57	P03/	DEN1	O	DDS1 enable	/A3
58~60	P02/~P00/	DCD1~DCD3	O	Decoder output	/A2~/A0
61	P87/	TXD	O	ASCI (debug)	/TXD1
62	P86/	RXD	I	ASCI (debug)	/RXD1
63	P85/	RTS	O	ASCI (debug)	/CLK1
64	P84/	CTS	I	ASCI (degub)	/CTS1/RTS1
65	TXD0/	TSO	O	AT TS signal	Connection with TSI/P83
66	RXD0	TTI	I	AT TT signal	Connection with TTO/P82

SEMICONDUCTOR DATA

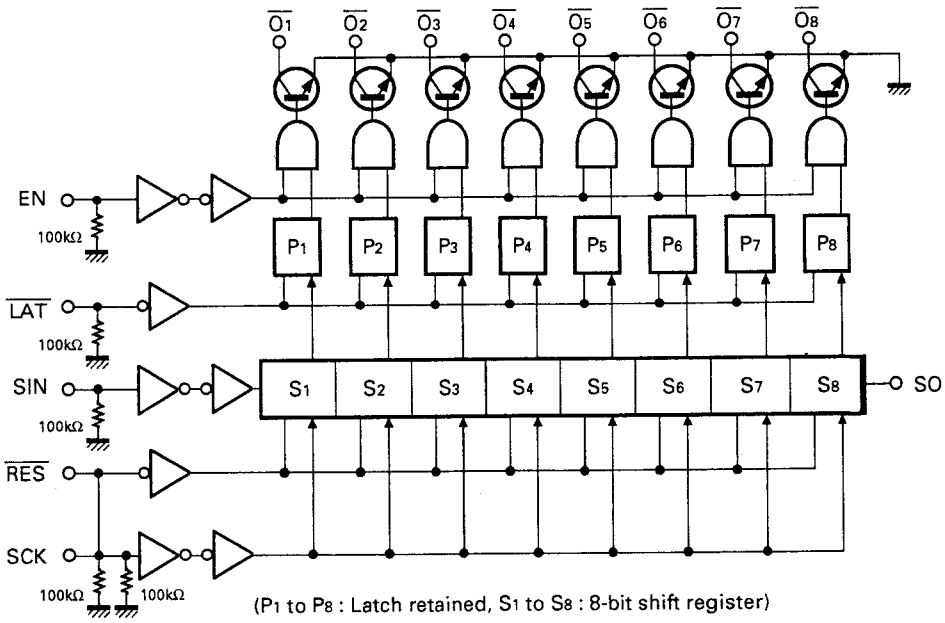
Pin	Pin name	Signal name	I/O	Function	Remarks
67	P81/	TSI	I	AT TS signal	Connection with TSO/CLK0
68	CTS0/	TTO	O	AT TT signal	Connection with TTI/P80/RTS0
69	Vcc		I	Power supply	
70	AVcc		I	Analog-to-digital converter power supply	
71	VREF		I	Analog-to-digital converter reference power supply	
72	AVss		I	Analog-to-digital converter ground	
73	Vss		I	Ground	
74	AN7/	SM	I	Signal strength meter	/P77/ADTRG
75	AN6/	PWM	I	Power meter	/P76
76	AN5/	RVR	I	RIT VR	/P75
77, 78	AN4/, AN3/	KAD1, KAD2	I	Panel key input	/P74, /P73
79	AN2/	ISV	I	IF SHIFT VR	/P72
80	AN1/	MUP	I	Microphone up switch	

Extended I/O : μPD6345GS (TX-RX Unit IC9)

- **Terminal connection diagram**



- **Block diagram**



(P1 to P8 : Latch retained, S1 to S8 : 8-bit shift register)

- **Terminal function**

Pin No.	Code	Pin name	I/O	Function
1	GND	Ground pin	–	Connected to system ground.
2	EN	Enable pin	I	High : Data is output; Low (or open) : All output buffers are turned off.
3	LAT	Latch pin	I	Low (or open) : Data is retained; High : Data is latched.
4	SO	Serial data output pin	O	Serial data is output on rising edge of SCK. If no μPD6345s are connected in series, this pin can be connected to SIN at the next stage.
5~12	O8~O1	Data output pin	O	Open collector NPN transistor high-voltage-resistant output. Correspond to outputs O1 to O8.
13	SIN	Serial data input pin	I	Data input pin : Input to shift register on rising edge of SCK.
14	SCK	Serial clock input pin	I	SIN data is read into the shift register on rising edge of SIN; data is output from SO on rising edge of SCK.
15	RES	Reset input pin	I	All shift register data is cleared. High : Normal operation; Low (or open) : Reset.
16	VDD	Power supply pin	–	4 to 6V.

SEMICONDUCTOR DATA

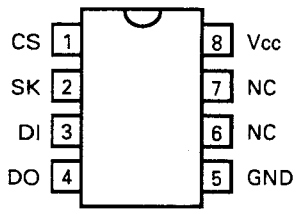
- **Truth table**

SCK	EN	$\overline{RES}$	$\overline{LAT}$	SIN	OUT		SO *1	Remarks
					$\overline{O_1}$	$\overline{O_8}$		
↗	H	H	H	L	High impedance	$\overline{O_{8-1}}$	S_7	SCK : Clock input E : Enable input
↗	H	H	H	H	L	$\overline{O_{8-1}}$	S_7	$\overline{RES}$: Reset input $\overline{LAT}$: Latch input
↗	H	H	L *2	*	No change	No change	S_7	SIN : Serial input
↗	L	H	*	*	High impedance	High impedance	S_7	OUT : Parallel output
↘	*	*	*	*	No change	No change	S_8	SO : Serial output * : H or L
*	*	L	H	*	High impedance	High impedance	L	H : High level L : Low level
*	H	⊓	L	*	No change	No change	L	

*1 : Data S_7 is shifted to data S_8, and data is output to SO output on rising edge of clock.
*2 : The shift register is executed.

EEPROM : NM93C66EM8 (Digital Unit IC5)

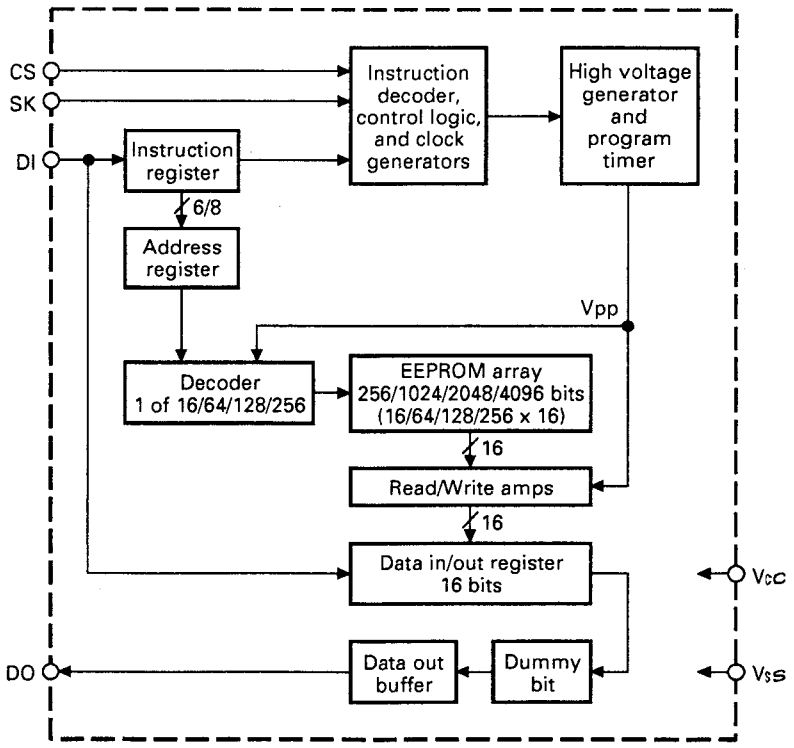
- **Terminal connection diagram**



- **Terminal names**

CS	Chip Select
SK	Serial Data Clock
DI	Serial Data Input
DO	Serial Data Output
GND	Ground
Vcc	Power Supply

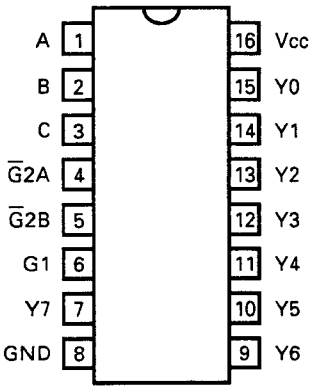
- **Block diagram**



SEMICONDUCTOR DATA

3 to 8 Line Decoder : TC74HC238AF (Digital Unit IC2)

- **Terminal connection diagram**



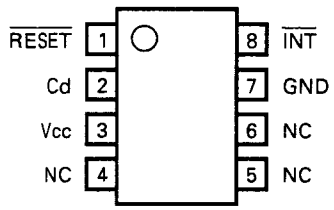
- **Truth table**

Inputs						Outputs								Selected output
Enable			Select											
G1	$\overline{G2A}$	$\overline{G2B}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	
L	X	X	X	X	X	L	L	L	L	L	L	L	L	None
X	H	X	X	X	X	L	L	L	L	L	L	L	L	None
X	X	H	X	X	X	L	L	L	L	L	L	L	L	None
H	L	L	L	L	L	H	L	L	L	L	L	L	L	Y0
H	L	L	L	L	H	L	H	L	L	L	L	L	L	Y1
H	L	L	L	H	L	L	L	H	L	L	L	L	L	Y2
H	L	L	L	H	H	L	L	L	H	L	L	L	L	Y3
H	L	L	H	L	L	L	L	L	L	H	L	L	L	Y4
H	L	L	H	L	H	L	L	L	L	L	H	L	L	Y5
H	L	L	H	H	L	L	L	L	L	L	L	H	L	Y6
H	L	L	H	H	H	L	L	L	L	L	L	L	H	Y7

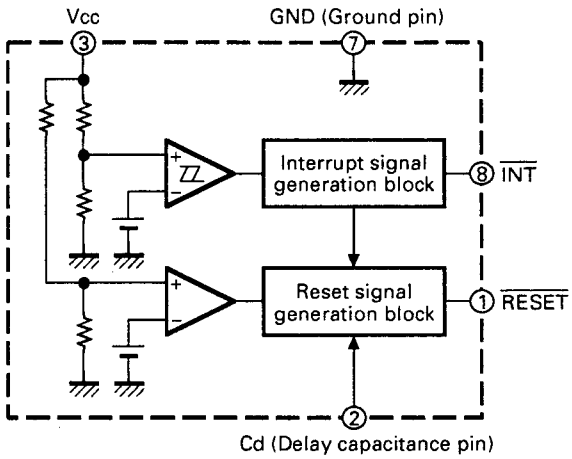
X : Don't care

System Reset : M62003FP (Digital Unit IC4)

- **Terminal connection diagram**



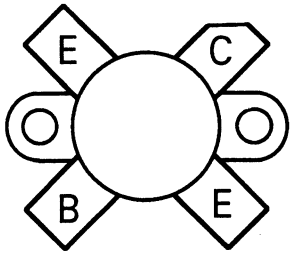
- **Block diagram**



SEMICONDUCTOR DATA

Final Transistor : 2SC2879 (Final Unit Q5, 6)

- **External View**

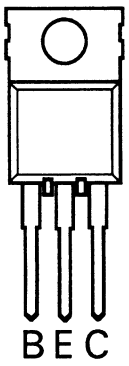


- **Maximum rating** (Ta = 25°C)

Item	Symbol	Rating	Unit
Collector-Base voltage	V_{CBO}	45	V
Collector-Emitter voltage	V_{CES}	45	V
Collector-Emitter voltage	V_{CEO}	18	V
Emitter-Base voltage	V_{EBO}	4	V
Collector current	I_C	25	A
Collector dissipation (Tc=25°C)	P_C	250	W
Operating temperature	Tj	175	°C
Storage temperature	Tstg	−65~+175	°C

Drive Transistor : 2SC3133 (Final Unit Q2, 3)

- **External View**



- **Maximum rating** (Ta = 25 ± 3°C)

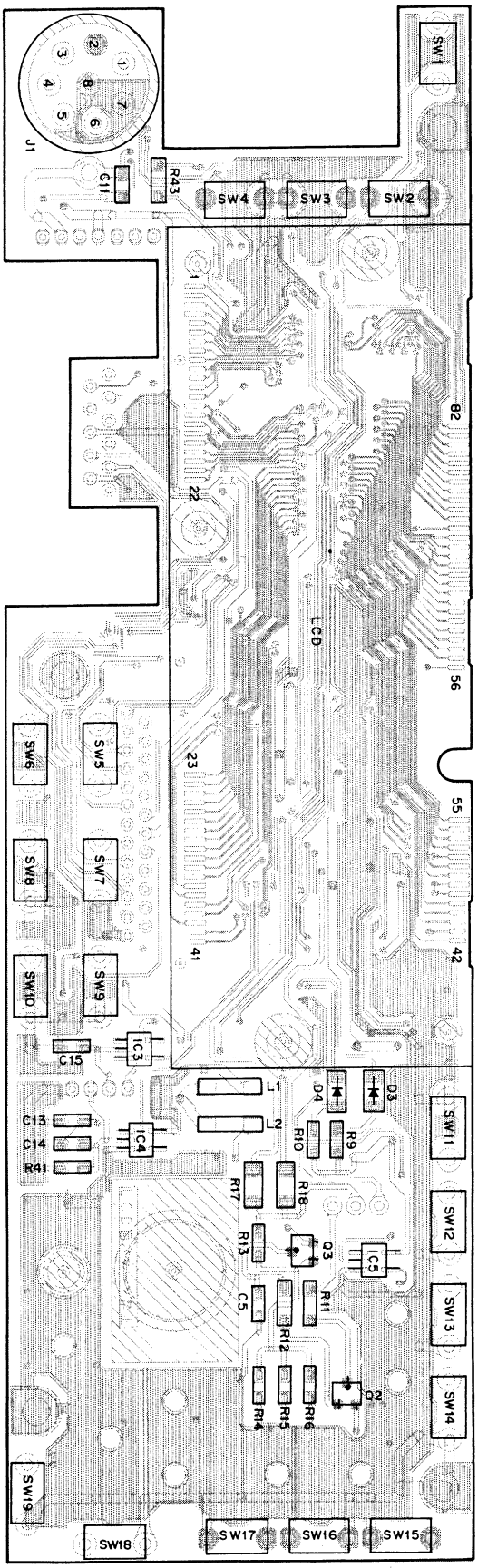
Symbol	Condition	Rating	Unit
V_{CBO}		60	V
V_{EBO}		5	V
V_{CEO}	R_{BE} = ∞	25	V
I_C		6	A
P_C	Tc = 25°C	20	W
Tj		150	°C
Tstg		−55~+150	°C

SEMICONDUCTOR DATA

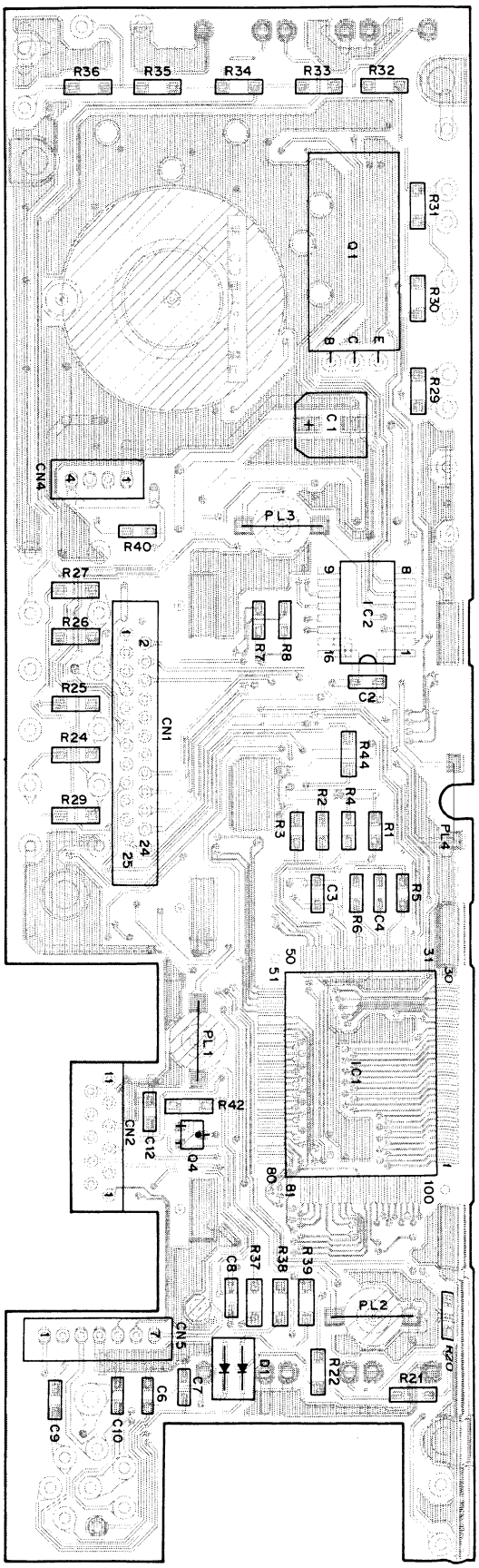
LCD Assy : B38-0377-05

- **PC board views (SW unit)**

Component side view

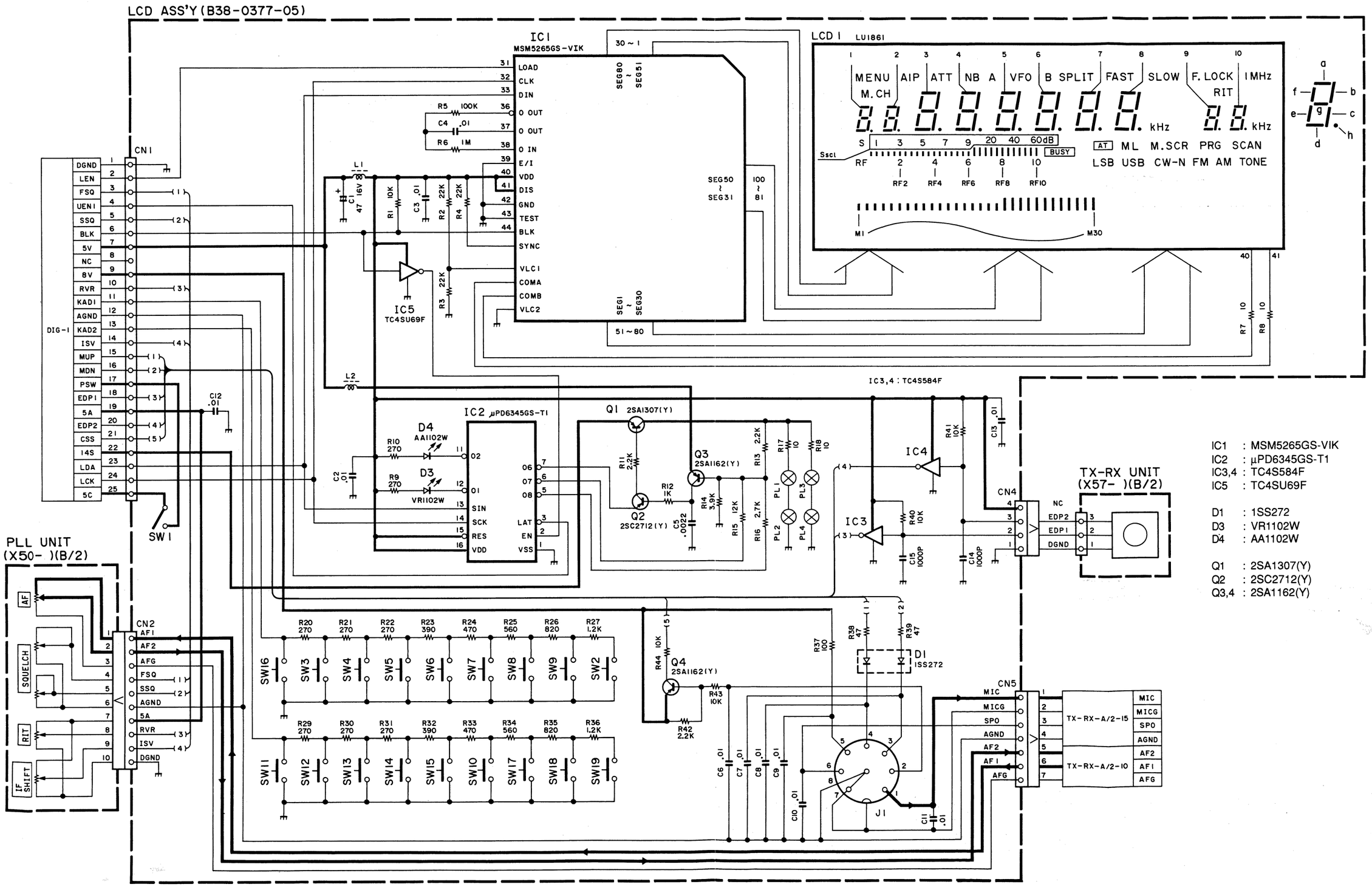


Foil side view



SEMICONDUCTOR DATA

- **Schematic diagram**



IC1 : MSM5265GS-VIK
IC2 : µPD6345GS-T1
IC3,4 : TC4S584F
IC5 : TC4SU69F

D1 : 1SS272
D3 : VR1102W
D4 : AA1102W

Q1 : 2SA1307(Y)
Q2 : 2SC2712(Y)
Q3,4 : 2SA1162(Y)

DESCRIPTION OF COMPONENTS

FINAL UNIT (X45-3460-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC1	Comparator	Fan control.
IC101	Regulator	14V → 5V
IC102	Regulator	14V → 8V
Q1	Pre-drive amplifier	HF band wide band-amplification.
Q2, 3	Drive amplifier	HF band push-pull wide-band amplification.
Q4	Final bias supply	Final temperature compensation.
Q5, 6	Final amplifier	HF band push-pull wide-band amplification.
Q7	Relay drive	Energizes or deenergizes the linear amplifier control relay.
Q8~10	Fan motor drive	Runs the fan during transmission or when the temperature rises.
Q11	Switching transistor	On when the fan runs.
Q101	Relay drive	The relay is energized when the power is turned on.
Q102	Switching transistor	On when overvoltage occurs.
D1	Temperature compensation	Pre-drive temperature detection.
D2	Temperature compensation	Drive temperature detection.
D3	Relay surge absorption	Linear amplifier relay.
D4, 5	Temperature compensation	Final temperature detection.
D6	Relay surge absorption	The relay is energized when the power switch is turned on.
D7	Protection diode	Reverse power connection protection.
D8	Switching	OR circuit.
D102	Protection diode	Relay counter-voltage bypass.
D103	Zener diode	Overvoltage detection.

DIGITAL UNIT (X46-315X-XX) 0-11 : K,P 0-22 : M2 0-71: M,X 2-71 : E 2-72 : E2 2-73 : E3

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC1	CPU	Microcomputer.
IC2	3 to 8 line decoder	Serial-to-parallel conversion.
IC3	Latch	Data retention.
IC4	Reset	
IC5	ROM	4k bits.
IC6	Regulator	14V → 5.6V
Q1, 2	Signal switch	On during AT tune.
Q3, 4	Signal switch	On during AT through.
Q5, 6	Signal switch	Off : Backup
D1~7	Switching	Destination selection.
D9	Switching (reverse-flow prevention)	OR circuit.
D11	Power supply	Voltage shift.
D12	Zener diode	Backup detection (voltage shift).
D13	Switching	Backup detection.

IF UNIT (X48-3110-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q1, 2	Switching	On when 0.5kHz filter is selected.
Q3	Switching	On when 2.4kHz filter is selected.
D1, 2	Switching	10.695MHz filter selection.
D3	Switching	On in FM receive mode.
D4~7	Switching	10.695MHz filter selection.

TS-50S

DESCRIPTION OF COMPONENTS

PLL UNIT (X50-3190-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC2	Divider	1/2, 2/5
IC3	Mixer	5 : 73.075~103.045MHz input 11 : 55.045~55.545MHz input 13 : 18.03~47.5MHz output
IC4	Mixer	1 : 4.455~4.955MHz output 2 : 4MHz input
IC5	Mixer	1 : 55.045~55.545MHz output 2 : 60MHz input 5 : 4.455~4.955MHz input
IC7	Mixer	1 : 10.695MHz output 2 : 10MHz input
IC8	Inverter	Reference oscillation (20MHz) phase reversal.
IC10	VCO	62MHz VCO (HIC)
IC11	PLL	2,3,4 : Divide ratio setting input 5 : 10MHz input 7 : Lock voltage output 8 : Unlock output (High during UL) 11 : 18.5~47.5MHz input
IC201	MIC amplifier	FM MIC amplifier (HIC)
Q1	Signal switch	ULK signal.
Q2	Amplifier	LO1 (73.075~103.045MHz) output.
Q3	Buffer	LO1 (73.075~103.045MHz) mixer (IC3) input.
Q5	Amplifier	20MHz, divider (IC2) input.
Q9	Amplifier	10MHz, mixer (IC7) input.
Q10	Amplifier	CAR (10.695MHz) output.
Q11	Triple circuit	20MHz x 3
Q12	Crystal oscillator	20MHz
Q13, 14	Buffer	20MHz
Q16	Buffer	4.455~4.955MHz mixer (IC5) input.
Q17	Signal switch	FM MIC mute
Q18	Amplifier	LO2 (62.35MHz) output.
Q19	Buffer	18.03~47.5MHz
Q20	Amplifier	18.03~47.5MHz PLL (IC11) input.
Q21~23	LPF	Active low-pass filter.
Q200~202	Amplifier	NB amplifier.
Q203	Buffer	NB amplifier.
Q204	Amplifier	NB AGC.
Q205, 206	Signal switch	NB amplifier.
Q207	Signal switch	NB ON/OFF.
Q209	Signal switch	NB amplifier.
Q210	Buffer	Tone signal.
Q211	Switch	On in FM mode.
D1	Switching	ULK OR circuit.
D2	LED	On : Unlock
D3	Clipper	
D200	Detection	Noise detection.

FILTER UNIT (X51-312X-XX) 0-00 : K,P,M,M2,X 2-71 : E,E2,E3

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC1	Switch	Serial-to-parallel conversion.
Q1	Signal switch	Transmit/receive changeover relay drive.
Q2~4	Signal switch	Bandpass filter changeover relay drive.
D1	Spike surge absorption	Surge absorber.
D2	Relay surge absorption	Transmit/receive changeover relay.
D3, 4	RF detection	SWR, PO detection.
D101~106	Relay surge absorption	Bandpass filter changeover relay.

DESCRIPTION OF COMPONENTS

TX-RX UNIT (X57-4220-11)

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC2	HIC	FM frequency conversion, detection, signal strength meter output.
IC3	HIC	SSB, AM, CW detection, signal strength meter output.
IC4	Switching	Analog switch.
IC5	DC amplifier	For signal strength meter (except FM).
IC6	Switching	Analog switch.
IC7	Amplifier	Audio amplifier.
IC8	Balanced modulation	SSB, AM modulation.
IC9	Extended I/O	Serial-to-parallel conversion.
IC10	Three-terminal regulator	Constant voltage, output 5V.
IC11	HIC	ALC, final protection.
IC12, 13	Extended I/O	Serial-to-parallel conversion.
IC14	Amplifier	Power meter.
Q1	Switching	Attenuator relay drive.
Q2	Switching	On in transmit mode, off in receive mode.
Q3,4	Switching	On in receive mode, off in transmit mode.
Q5~8	Mixer	IF : 73.045MHz RF : 30kHz~30MHz LO1 : 73.075~103.045MHz
Q9, 10	RF amplifier	
Q11	Amplifier	LO1 amplification.
Q12	Switching	On when AIP is on.
Q13	Power supply	Ripple filter.
Q14	Switching	On when AIP is on.
Q15, 16	Switching	On when AIP is off.
Q17	IF1 amplifier	73.045MHz amplification.
Q18, 19	Mixer	IF1 : 73.045MHz LO2 : 62.35MHz IF2 : 10.695MHz
Q20	Amplifier	Buffer amplifier for NB noise amplifier.
Q21	Amplifier	IF2 amplification.
Q22	Switching	For NB.
Q23	Amplifier	Buffer amplifier for FM XF.
Q24	Amplifier	Amplification in all modes except FM.
Q25	Switching	Squelch time constant switching.
Q26	Switching	On in FM mode.
Q27, 28	Switching	On in receive mode.
Q29, 30	Amplifier	DC amplifier for squelch.
Q31, 32	Switching	For squelch.
Q33	Switching	On in FM mode.
Q34	Amplifier	For audio.
Q35	Switching	Audio mute.
Q36	Switching	Off : High microphone sensitivity.
Q37	Switching	On in CW mode (microphone mute).
Q38	Amplifier	Microphone amplifier.
Q39	Amplifier	Microphone amplifier (For FM).
Q40	Amplifier	Microphone amplifier (For SSB and AM).
Q41	Amplifier	Buffer for input to balanced modulator.
Q42	Amplifier	Amplifier for balanced modulator output.
Q43	Amplifier	10.695MHz amplification.
Q44	Switching	On at medium power.
Q45	Switching	On at low power.
Q46, 47	Mixer	LO2 : 62.35MHz IN : 10.695MHz OUT : 73.045MHz
Q48, 49	Mixer	LO1 : 73.075~103.045MHz IN : 73.045MHz OUT : 30kHz~30MHz
Q50	Amplifier	Transmit drive amplifier.
Q51~53	Switching	DC/DC converter.
Q55	Switching	Medium/Narrow : On.
Q56	Switching	AF mute/wide : On.

DESCRIPTION OF COMPONENTS

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q57	Switching	SSB/CW : On.
Q58	Switching	FM/AM : On.
Q59	Switching	On for CW key down.
Q60	Switching	Off during monitoring.
Q61	Switching	Off during audio muting.
Q62~66	Switching	On in AM mode.
Q67	Switching	On : Squelch open.
D1	Relay surge absorption	For attenuator relay.
D2~5	Lightning surge absorption	
D6, 7	Switching	On in receive mode, off in transmit mode.
D8, 9	Switching	The diode is on when AIP is on.
D10, 11	Switching	The diode is on when AIP is off.
D12	Switching	Switch for sending LO1 to the transmit or receive mixer.
D13	Switching	AGC time constant.
D14	Switching	Switch for sending LO1 to the transmit or receive mixer.
D16, 17	Switching	On in transmit mode, off in receive mode.
D18	Clipper	On when input is large.
D19	Reverse-flow prevention	
D20	Zener diode	For constant voltage.
D21, 22	Switching	On in transmit mode.
D23	Switching	On in receive mode.
D24	Reverse-flow prevention	
D25	Zener diode	For constant voltage.
D26	Reverse-flow prevention	
D27, 28	Switching	On in FM and CW modes.
D29	Reverse-flow prevention	
D30	Voltage shift	
D31	LED	Stabilizing power supply using Vp.
D32, 33	Switching	On in transmit mode.
D34	Rectification	DC/DC converter.
D35, 36	Zener diode	For constant voltage.
D37~40	Reverse-flow prevention	
D41	Switching	On in receive mode, off in transmit mode.
D42, 43	Reverse-flow prevention	
D44	Switching	On in receive mode, off in transmit mode.
D46	Reverse-flow prevention	

VCO (X58-4010-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q1	VCO1-A	73.075~83.544MHz.
Q2	Switching	VCO1-A change.
Q3	VCO1-B	83.545~94.544MHz.
Q4	Switching	VCO1-B change.
Q5	VCO1-C	94.545~103.045MHz.
Q6	Switching	VCO1-C change.
Q7	Buffer	VCO1 output, 73.075~103.045MHz.
D1	Varicap	VCO1-A.
D2	Switching	VCO1-A output.
D3	Varicap	VCO1-B.
D4	Switching	VCO1-B output.
D5	Varicap	VCO1-C.
D6	Switching	VCO1-C output.

DESCRIPTION OF COMPONENTS

DDS (X58-4020-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC1	DDS	
Q1	Buffer	D/A buffer.

ALC (X59-3990-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q1	Switching	CKY control.
Q2	Waveform rectification	ALC keying.
D1, 2	Reverse-flow prevention	

DSST (X59-4000-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q1	Switching	TXB.
Q2	Switching	RXB.
Q3, 4	Switching	On in transmit mode.
Q5	Switching	On in receive mode.
Q11	Oscillator	Sidetone.
D11	Temperature compensation	
D12	Switching	
D13	Reverse-flow prevention	

LP BPF (X59-4010-00)

Ref. No.	Use/Function	Operation/Condition/Compatibility
D1, 2	Switching	LPF switch.
D11, 12	Switching	BPF switch.
D21, 22	Switching	BPF switch.
D31, 32	Switching	BPF switch.
D41, 42	Switching	BPF switch.
D51, 52	Switching	BPF switch.
D61, 62	Switching	BPF switch.
D71, 72	Switching	BPF switch.

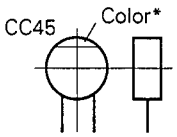
TS-50S

PARTS LIST

CAPACITORS

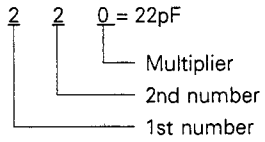
CC 45 TH 1H 220 J
1 2 3 4 5 6

1 = Type ... ceramic, electrolytic, etc.
2 = Shape ... round, square, ect.
3 = Temp. coefficient
4 = Voltage rating
5 = Value
6 = Tolerance



• Capacitor value

010 = 1pF
100 = 10pF
101 = 100pF
102 = 1000pF = 0.001µF
103 = 0.01µF



• Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	–80	–150	–220	–330	–470	–750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example : CC45TH = –470 ± 60ppm/°C

• Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40	+80	+100	More than 10µF – 10 ~ +50
							–20	–20	–0	Less than 4.7µF –10 ~ +75

Less than 10pF

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

• Voltage rating

1st word \ 2nd word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	–
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	–
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	–

• Chip capacitors (Refer to the table above except dimension)

(EX) CC 73 F SL 1H 000 J
1 2 3 4 5 6 7
(Chip) (CH, RH, UJ, SL)

(EX) CK 73 F F 1H 000 Z
1 2 3 4 5 6 7
(Chip) (B, F)

RESISTORS

• Chip resistor (Carbon)

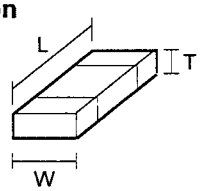
(EX) RD 73 E B 2B 000 J
1 2 3 4 5 6 7
(Chip) (B,F)

• Carbon resistor (Normal type)

(EX) RD 14 B B 2C 000 J
1 2 3 4 5 6 7

1 = Type ... ceramic, electrolytic, etc.
2 = Shape ... round, square, ect.
3 = Dimension
4 = Temp. coefficient
5 = Voltage rating
6 = Value
7 = Tolerance

Dimension



• Dimension (Chip capacitor)

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Lessthan 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Lessthan 1.25

• Dimension (Chip resistor)

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
2A	1/10W	2E	1/4W	3A	1W
2B	1/8W	2H	1/2W	3D	2W
2C	1/6W				

PARTS LIST

* New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

TS-50S

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
			TS-50S			
1	1A	*	A01-2070-02	METALLIC CABINET (TOP)		
2	3B	*	A01-2071-02	METALLIC CABINET (BOTTOM)		
3	1B	*	A10-1329-02	CHASSIS (MAIN)		
4	2A	*	A22-0784-03	SUB PANEL		
5	2A	*	A62-0210-03	PANEL		
6	2A	*	A62-0211-03	PANEL ASSY		
-		*	B10-1187-04	FRONT GLASS		
-		*	B11-1067-04	FILTER		
8	2B	*	B38-0377-05	LCD ASSY		
9	1A		B42-2455-04	LABEL (M4X8MAX)		
10	3B		B42-3343-04	LABEL (S/NO)		
11	3B		B42-3395-04	LABEL	K	
-			B44-2163-04	LABEL (UPC CARD)		
13	1G		B46-0410-30	WARRNTY CARD	K	
13	1G		B46-0419-00	WARRNTY CARD	EE2E3	
13	1G		B46-0422-00	WARRNTY CARD	P	
14	1G	*	B62-0291-00	INSTRUCTION MANUAL		
14	1G	*	B62-0292-00	INSTRUCTION MANUAL	E	
14	1G	*	B62-0293-00	INSTRUCTION MANUAL	MM2E2	
14	1G	*	B62-0293-00	INSTRUCTION MANUAL	E3P	
15	3B	*	B72-0480-04	MODEL NAME PLATE	KMM2XP	
15	3B	*	B72-0483-04	MODEL NAME PLATE	EE2E3	
17	1F		E04-0167-05	RF COAXIAL CABLE RECEPTACLE		
-			E06-0858-15	CYLINDRICAL RECEPTACLE(LCD ASSY)		
19	1F		E23-0616-14	GND TERMINAL (FILTER)		
-			E23-0623-04	GND TERMINAL (LCD ASSY)		
21	1H	*	E30-3157-05	DC CABLE		
22	2H		E31-2154-05	CONNECTING WIRE		
23	1E,3C		E31-3092-05	CONNECTING WIRE		
24	3D		E31-6118-05	CONNECTING WIRE		
-		*	E33-1967-05	FINISHED WIRE SET		
26	2B	*	E37-0348-05	FLAT CABLE (LCD-DIG)		
27	1B	*	E37-0349-05	FLAT CABLE (DIG-TXRX)		
28	1F,2D	*	E37-0350-05	FLAT CABLE (FILTER-DIG)		
29	2D	*	E37-0352-05	CONNECTING WIRE (PLL-TXRX)		
30	2A	*	E37-0355-05	CONNECTING WIRE (SP)		
31	2D	*	E37-0356-05	CONNECTING WIRE (PLL-TXRX)		
33	1H		F05-2531-05	FUSE (25A····DC CABLE)		
33	2H		F05-2531-05	FUSE (25A····ACSY)		
34	2H		F06-4029-05	FUSE (4A ····ACSY)		
35	2F	*	F10-2048-03	SHIELDING PLATE(FILTER UNIT)		
36	3B	*	F10-2049-03	SHIELDING PLATE(FILTER COVER)		
37	1C,2B	*	F10-2050-04	SHIELDING PLATE(DIGITAL UNIT)		
38	3B	*	F15-0681-04	SHADE (CASE BOTTOM)		
39	1F	*	F20-1119-04	INSULATING BOARD(FILTER UNIT)		
-			F20-1132-14	INSULATING BOARD(SUB PANEL)		
43	3A	*	G01-0874-04	COIL SPRING (PANEL)		
44	1B		G02-0576-14	FLAT SPRING (PLL UNIT)		
45	3A	*	G02-0733-04	FLAT SPRING (PANEL)		
46	1A,2B		G10-0700-04	NON-WOVEN FABRIC (60X10)		
47	3A	*	G10-0732-04	NON-WOVEN FABRIC (SPRING)		

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TS-50S

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TS-50S

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
-		*	G10-0733-04	NON-WOVEN FABRIC (CASE TOP)		
49	2A	*	G13-1380-04	CUSHION (KNOB)		
50	2A	*	G13-1381-04	CUSHION (KNOB)		
51	2A	*	G13-1382-04	CUSHION (KNOB)		
52	2G	*	G13-1402-04	CUSHION (BRACKET ACSY)		
54	2H	*	H10-2761-02	POLYSTYRENE FOAMED FIXTURE		
55	1H	*	H11-0877-04	POLYSTYRENE FOAMED BOARD	K	
55	1H	*	H13-0898-04	CARTON BOARD	MM2XP	
55	1H	*	H13-0898-04	CARTON BOARD	EE2E3	
56	1G	*	H13-0899-04	CARTON BOARD		
57	2H		H25-0029-04	BAG (ACSY····60X110)		
58	1H,2H		H25-0079-04	BAG (MIC,DC CABLE···200X200)		
59	1G		H25-0194-04	BAG (BODY····280X400)		
60	3G	*	H52-0341-04	ITEM CARTON BOX		
-		*	H62-0297-04	PACKING CASE		
61	3B		J02-0441-05	FOOT		
62	2A	*	J21-4406-04	MOUNTING HARDWARE (SP)		
63	2J	*	J29-0422-13	BRACKET (ACSY)		
64	3A	*	J30-0592-04	SPACER (PANEL)		
65	2A		J31-0141-04	COLLAR (MIC)		
-			J61-0307-05	BAND		
67	1H		K01-0416-05	HANDLE (ACSY)		
68	3A	*	K21-0793-04	KNOB (MAIN)		
69	3A	*	K29-4809-04	KNOB (AF,RIT)		
70	3A	*	K29-4810-04	KNOB (SQL,AF SHIFT)		
71	2A	*	K29-4811-04	KNOB (POWER)		
72	3A	*	K29-4812-04	KNOB (F LOCK)		
73	3A	*	K29-4813-04	KNOB (MHz)		
74	3A	*	K29-4814-04	KNOB (DOWN)		
75	3A	*	K29-4815-04	KNOB (UP)		
76	3A	*	K29-4816-04	KNOB (RIT etc)		
77	2A,3A	*	K29-4817-04	KNOB (A/B etc)		
78	3A	*	K29-4818-04	KNOB (SSB/CW etc)		
A	2B,1C	*	N09-2207-05	SCREW (DIGITAL UNIT)	X	
80	2B		N15-1040-46	FLAT WASHER (GND)		
B	1B,2B		N32-2606-46	FLAT HEAD MACHIN SCREW(CHASSIS)		
C	1A,3B		N33-2606-45	OVAL HEAD MACHIN SCREW(CASE)		
D	1B		N35-2604-46	BINDING HEAD MACHINE SCREW(IF)		
E	1C,2B		N35-2606-46	BINDING HEAD MACHINE SCREW(DIG)	KMM2P	
E	1C,2B		N35-2606-46	BINDING HEAD MACHINE SCREW(DIG)	EE2E3	
F	2B		N35-4010-46	BINDING HEAD MACHINE SCREW(GND)		
G	1B,2D		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
H	2F		N87-3008-46	BRAZIER HEAD TAPTITE SCREW(ANT)		
82	2H		N99-0321-05	SCREW SET (ACSY)		
84	1A	*	T07-0298-05	LOUDSPEAKER(FULLRANGE)		
85	2H	*	T91-0528-05	MICROPHONE		
87	2E,3F	*	X45-3460-00	FINAL UNIT		
89	1C,2B	*	X46-3150-11	DIGITAL UNIT	KP	
89	1C,2B	*	X46-3150-22	DIGITAL UNIT	M2	
89	1C,2B	*	X46-3150-71	DIGITAL UNIT	MX	
89	1C,2B	*	X46-3152-71	DIGITAL UNIT	E	
89	1C,2B	*	X46-3152-72	DIGITAL UNIT	E2	

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TS-50S
FINAL UNIT (X45-3460-00)

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89	1C,2B	*	X46-3152-73	DIGITAL UNIT	E3	
90	1B	*	X48-3110-00	IF UNIT		
91	2B,2C	*	X50-3190-00	PLL UNIT		
92	2B	*	X51-3120-00	FILTER UNIT	KMM2XP	
92	2B	*	X51-3122-71	FILTER UNIT	EE2E3	
93	1B,2B	*	X57-4220-11	TX-RX UNIT		
FINAL UNIT (X45-3460-00)						
C2			CK73FB1E104K	CHIP C 0.10UF K		
C3			CK73FB1E103K	CHIP C 0.01UF K		
C4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73FB1E104K	CHIP C 0.10UF K		
C6			CC73FSL1H821J	CHIP C 820PF J		
C7			CK73FB1H102K	CHIP C 1000PF K		
C8			CK73FB1E104K	CHIP C 0.10UF K		
C9 ,10			CK73FB1E103K	CHIP C 0.01UF K		
C11			CK73FB1E104K	CHIP C 0.10UF K		
C12		*	C90-2193-05	ELECTRO 39UF 25WV		
C13			CC45SL2H221J	CERAMIC 220PF J		
C14			CK73FB1E103K	CHIP C 0.01UF K		
C15			CK73FB1E104K	CHIP C 0.10UF K		
C17			CK73FB1E103K	CHIP C 0.01UF K		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			CK73FB1E104K	CHIP C 0.10UF K		
C20			CE04EW1C100M	ELECTRO 10UF 16WV		
C23			CK73FB1E103K	CHIP C 0.01UF K		
C24			CK45E2H222P	CERAMIC 2200PF P		
C25 ,26			C91-1004-05	CHIP C 0.0068UF J		
C27		*	C90-2194-05	ELECTRO 220UF 25WV		
C28 ,29			CK73FB1E104K	CHIP C 0.10UF K		
C30			CK73FB1H102K	CHIP C 1000PF K		
C31			CE04EW1C100M	ELECTRO 10UF 16WV		
C32			CK73FB1E104K	CHIP C 0.10UF K		
C33			CE04EW1E471M	ELECTRO 470UF 25WV		
C34 ,35			CK73FB1E103K	CHIP C 0.01UF K		
C36			CK73FB1E104K	CHIP C 0.10UF K		
C37			CK73FB1E103K	CHIP C 0.01UF K		
C38			CC45SL2H151J	CERAMIC 150PF J		
C39		*	CM73F2H102J	CHIP C 1000PF J		
C40			CM73F2H561J	CHIP C 560PF J		
C42 ,43			CK73FB1E103K	CHIP C 0.01UF K		
C44			CM73F2H122J	CHIP C 1200PF J		
C45			CK73FB1H472K	CHIP C 4700PF K		
C46			CK73FB1H102K	CHIP C 1000PF K		
C47			CK73FB1E104K	CHIP C 0.10UF K		
C101			CK73FB1E104K	CHIP C 0.10UF K		
C102-105			CK73FB1E103K	CHIP C 0.01UF K		
C106-111			CK73FB1E104K	CHIP C 0.10UF K		
C112,113			CK73FB1H102K	CHIP C 1000PF K		
C115,116			CK73FB1H102K	CHIP C 1000PF K		
C118-121			CE04NW1E100M	ELECTRO 10UF 25WV		
C122			CE04EW1E102M	ELECTRO 1000UF 25WV		
C123			CK73FB1E103K	CHIP C 0.01UF K		
C124			CE04EW1E102M	ELECTRO 1000UF 25WV		

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CN2			E04-0157-05	RF COAXIAL CABLE RECEPTACLE		
CN3 ,4			E40-3246-05	PIN CONNECTOR (2P)		
CN101		*	E40-5604-05	PIN CONNECTOR (11P)		
CN102			E40-3248-05	PIN CONNECTOR		
CN103,104			E40-3250-05	PIN CONNECTOR (6P)		
CN105			E40-3246-05	PIN CONNECTOR (2P)		
J1		*	E63-0401-05	PHONO JACK (RELAY)		
J2			E13-0166-05	PHONO JACK (EXT ALC)		
J101		*	E11-0451-05	PHONE JACK (EXT SP)		
J102		*	E11-0450-05	PHONE JACK (KEY)		
TP1 -4			E23-0512-05	TERMINAL		
W1	-	*	E37-0360-05	CONNECTING WIRE (6P to 2P4P)		
W2	-	*	E37-0361-05	CONNECTING WIRE (14V,14V)		
W3	2F	*	E37-0362-05	CONNECTING WIRE (DC CABLE)		
W4	2E	*	E37-0363-05	CONNECTING WIRE (EALC)		
W5	-	*	E37-0364-05	CONNECTING WIRE (PHONE,KEY)		
W6	2F	*	E37-0358-05	FLAT CABLE (to FILTER)		
W7	-	*	E37-0359-05	CONNECTING WIRE (DRV)		
W8	-		E31-3301-05	CONNECTING WIRE (PO)		
100	3E	*	F01-0994-02	HEAT SINK		
101	3E	*	F10-2052-04	SHIELDING PLATE (FAN)		
102	2E	*	F20-1120-04	INSULATING BOARD		
103	2E		F29-0014-05	INSULATOR (Q1)		
F101	-	*	F53-0093-05	FUSE		
M1	3E	*	F09-0438-05	FAN MOTOR		
104	2F		G02-0574-04	FLAT SPRING (IC101,102)		
L1			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L2			L40-3392-48	SMALL FIXED INDUCTOR (3.3UH)		
L3		*	L39-0481-05	TOROIDAL COIL (PRI DRV)		
L4		*	L19-0342-15	BALUN TRANSFORMER (DRV)		
L5			L33-0699-05	CHOKE COIL		
L6			L33-0617-05	CHOKE COIL		
L7 -10			L33-0699-05	CHOKE COIL		
L11			L33-0651-05	CHOKE COIL		
L12			L33-0617-05	CHOKE COIL		
L13		*	L39-1209-25	TOROIDAL COIL		
L14		*	L39-0480-15	TOROIDAL COIL		
L15			L40-3392-48	SMALL FIXED INDUCTOR (3.3UH)		
L16			L40-3982-48	SMALL FIXED INDUCTOR (0.39UH)		
L17			L40-4791-14	SMALL FIXED INDUCTOR		
L101			L15-0016-05	LOW-FREQENCY CHOKE COIL		
K	2E		N09-2187-05	SCREW (TRANSISTOR)		
L	3E		N35-3020-46	BINDING HEAD MACHINE SCREW		
M	2E,3F		N87-3006-46	BRAZIER HEAD TAPTITE SCREW		
R2			R92-0670-05	CHIP R 0 OHM		
R4			RK73FB2A101J	CHIP R 100 J 1/10W		
R5			RK73FB2A681J	CHIP R 680 J 1/10W		
R6 ,7			RK73FB2A331J	CHIP R 330 J 1/10W		
R8 ,9			RK73FB2A6R8J	CHIP R 6.8 J 1/10W		
R10		*	R92-1242-05	CHIP R 6.8 J 1/4W		
R11		*	R92-1243-05	CHIP R 8.2 J 1/2W		
R12 ,13		*	R92-0696-05	CHIP R 33 J 1/4W		
R14 ,15		*	R92-1318-05	FIXED RESISTOR 100 1W		

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R16		*	R92-1221-05	FIXED RESISTOR 82 1/4W		
R17 -20			RS14DB3A5R6J	FL-PROOF RS 5.6 J 1W		
R21 ,22			RS14DB3A150J	FL-PROOF RS 15 J 1W		
R23 ,24			RS14DB3A4R7J	FL-PROOF RS 4.7 J 1W		
R25			RK73FB2A561J	CHIP R 560 J 1/10W		
R26		*	R92-1317-05	FIXED RESISTOR 18 1W		
R30			RK73FB2A333J	CHIP R 33K J 1/10W		
R31			RK73FB2A103J	CHIP R 10K J 1/10W		
R32			RK73FB2A474J	CHIP R 470K J 1/10W		
R33 ,34			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R35			RK73FB2A681J	CHIP R 680 J 1/10W		
R36			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R37			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R38			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R39			RK73FB2A101J	CHIP R 100 J 1/10W		
R40			RK73FB2A104J	CHIP R 100K J 1/10W		
R41			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R42			RK73FB2A103J	CHIP R 10K J 1/10W		
R43			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R44			RK73FB2A103J	CHIP R 10K J 1/10W		
R45			RK73FB2A333J	CHIP R 33K J 1/10W		
R47			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R48			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R50		*	R92-1316-05	FIXED RESISTOR 39 1W		
R51		*	R92-1292-05	FIXED RESISTOR 68 1W		
R52		*	R92-1240-05	FIXED RESISTOR 10 1/4W		
R101			RK73FB2A472J	CHIP R 4.7K J 1/10W		
VR1			R12-0104-05	TRIM POT. 220		
VR2			R12-1085-05	TRIM POT. 2.2K		
K1			S51-1420-05	RELAY		
K101			S51-2423-05	RELAY		
D1			MA27T-B	DIODE		
D2			MA27-B	DIODE		
D3			LFB01	DIODE		
D4 ,5			MA27-B	DIODE		
D6			LFB01	DIODE		
D7			SG-5L(R)	DIODE		
D8			DAN202K	DIODE		
D102			LFB01	DIODE		
D103			RD18M(B1)	DIODE		
IC1			NJM2902M	IC(OP AMP X4)		
IC101			UPC7805H	IC(VOLTAGE REGULATOR/ +5V)		
IC102			UPC7808H	IC(VOLTAGE REGULATOR/ +8V)		
Q1	2E		2SC1971	TRANSISTOR		
Q2 ,3	2E		2SC3133	TRANSISTOR		
Q4	2E		2SC3421(Y)	TRANSISTOR		
Q5 ,6	2E		2SC2879(O,Y)	TRANSISTOR		
Q7			FMC1	TRANSISTOR		
Q8 -10			DTD114EK	DIGITAL TRANSISTOR		
Q11			DTC124TK	DIGITAL TRANSISTOR		
Q101			DTC143TK	DIGITAL TRANSISTOR		
Q102			DTC114EK	DIGITAL TRANSISTOR		
TH1			5TP41L	THERMISTOR		

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DIGITAL UNIT (X46-315X-XX)

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DIGITAL UNIT (X46-315X-XX) 0-11 : K, P 0-22 : M2 0-71 : M, X 2-71 : E 2-72 : E2 2-73 : E3						
C1 -4			CK73FB1H102K	CHIP C 1000PF K		
C5			CK73FB1E103K	CHIP C 0.01UF K		
C6 -8			CK73FB1H102K	CHIP C 1000PF K		
C9			CK73FB1E103K	CHIP C 0.01UF K		
C10 -24			CK73FB1H102K	CHIP C 1000PF K		
C25 ,26			CC73FCH1H101J	CHIP C 100PF J		
C27 -29			CK73FB1E103K	CHIP C 0.01UF K		
C30			CC73FCH1H101J	CHIP C 100PF J		
C31			CK73FB1H102K	CHIP C 1000PF K		
C32 ,33			CC73FCH1H330J	CHIP C 33PF J		
C34			CK73FF1C105Z	CHIP C 1.0UF Z		
C35			CK73FF1E104Z	CHIP C 0.1UF Z		
C36			CK73FB1H102K	CHIP C 1000PF K		
C37 -45			CC73FCH1H101J	CHIP C 100PF J		
C46			C92-0009-05	CHIP TAN 4.7UF 10WV		
C47 -54			CK73FB1H102K	CHIP C 1000PF K		
C55			CK73EF1H104Z	CHIP C 0.1UF Z		
C56 ,57			CK73FB1H102K	CHIP C 1000PF K		
C58			C92-0009-05	CHIP TAN 4.7UF 10WV		
C59			CK73FF1C105Z	CHIP C 1.0UF Z		
C60			CK73FB1E103K	CHIP C 0.01UF K		
C61 ,62			CC73FCH1H101J	CHIP C 100PF J		
C63			CK73EF1H104Z	CHIP C 0.1UF Z		
C64			CK73FB1H102K	CHIP C 1000PF K		
C65			C92-0009-05	CHIP TAN 4.7UF 10WV		
C66 -73			CK73FB1H102K	CHIP C 1000PF K		
C74			CK73EF1H104Z	CHIP C 0.1UF Z		
C75			C92-0009-05	CHIP TAN 4.7UF 10WV		
C76 -79			CK73FB1H102K	CHIP C 1000PF K		
C80 -84			CK73FB1E103K	CHIP C 0.01UF K		
CN1		*	E40-5314-05	PIN CONNECTOR (25P)		
CN2		*	E40-5610-05	PIN CONNECTOR (11P)		
CN3		*	E40-5314-05	PIN CONNECTOR (25P)		
CN4		*	E40-5301-05	PIN CONNECTOR (12P)		
CN5		*	E40-5610-05	PIN CONNECTOR (11P)		
CN6			E40-5183-05	PIN CONNECTOR (6P)		
-			F20-0521-04	INSULATING BOARD		
L1		*	L40-1801-18	SMALL FIXED INDUCTOR (18UH)		
X1		*	L77-1522-05	CRYSTAL RESONATOR (7.9MHz)		
CP1			R90-0711-05	MULTI-COMP		
R1			RK73FB2A223J	CHIP R 22K J 1/10W		
R2			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R3 -5			RK73FB2A471J	CHIP R 470 J 1/10W		
R6			RK73FB2A223J	CHIP R 22K J 1/10W		
R7 -11			RK73FB2A471J	CHIP R 470 J 1/10W		
R12 -19			RK73FB2A103J	CHIP R 10K J 1/10W		
R20 -25			RK73FB2A221J	CHIP R 220 J 1/10W		
R26			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R27 -31			RK73FB2A221J	CHIP R 220 J 1/10W		

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DIGITAL UNIT (X46-315X-XX)
IF UNIT (X48-3110-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R32			RK73FB2A471J	CHIP R 470 J 1/10W		
R33 ,34			RK73FB2A221J	CHIP R 220 J 1/10W		
R35			RK73FB2A471J	CHIP R 470 J 1/10W		
R36			RK73FB2A223J	CHIP R 22K J 1/10W		
R37 -39			RK73FB2A471J	CHIP R 470 J 1/10W		
R40 ,41			RK73FB2A101J	CHIP R 100 J 1/10W		
R42 ,43			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R44			RK73FB2A104J	CHIP R 100K J 1/10W		
R45			RK73FB2A154J	CHIP R 150K J 1/10W		
R46 ,47			RK73FB2A104J	CHIP R 100K J 1/10W		
R48			RK73FB2A471J	CHIP R 470 J 1/10W		
R49 ,50			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R51 ,52			RK73FB2A473J	CHIP R 47K J 1/10W		
R53 -56			RK73FB2A103J	CHIP R 10K J 1/10W		
R57 ,58			RK73FB2A221J	CHIP R 220 J 1/10W		
R60 -68			RK73FB2A471J	CHIP R 470 J 1/10W		
R69 ,70			RK73FB2A103J	CHIP R 10K J 1/10W		
R71			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R73 ,74			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R75			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R81 -99			RK73FB2A103J	CHIP R 10K J 1/10W		
D1			1SS133	DIODE	E2E3M3	
D2			1SS133	DIODE	E3	
D3			1SS133	DIODE	EE2E3	
D4			1SS133	DIODE	EE2E3	
D4			1SS133	DIODE	MXM2M3	
D5			1SS133	DIODE	EE2E3	
D5			1SS133	DIODE	KPM3	
D6			1SS355	DIODE	MX	
D9			1SS301	DIODE		
D11			1SS301	DIODE		
D12		*	RD8.2M(B2)	DIODE		
D13			1SS355	DIODE		
IC1		*	M37702M4A212FP	IC(CPU)		
IC2		*	TC74HC238AF	IC		
IC3			TC74HC573AF	IC(LATCH)		
IC4		*	M62003FP	IC		
IC5			NM93C66EM83	IC(CMOS EEPROM)		
IC6			NJM78L05UA	IC(VOLTAGE REGULATOR/ +5V)		
Q1			DTA143EK	DIGITAL TRANSISTOR		
Q2			DTC143EK	DIGITAL TRANSISTOR		
Q3			DTA143EK	DIGITAL TRANSISTOR		
Q4			DTC143EK	DIGITAL TRANSISTOR		
Q5			DTA143TK	DIGITAL TRANSISTOR		
Q6			2SC2712(Y)	TRANSISTOR		
BA1	1C,2B		W09-0515-05	LITHIUM BATTERY		
IF UNIT (X48-3110-00)						
C1 -13			CK73FB1E103K	CHIP C 0.01UF K		
C14			CC73FCH1H120J	CHIP C 12PF J		
C15 ,16			CK73FB1E103K	CHIP C 0.01UF K		
C17			CC73FCH1H010C	CHIP C 1PF C		
C18			CC73FCH1H200J	CHIP C 20PF J		
C19			CC73FCH1H010C	CHIP C 1PF C		

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TS-50S

PARTS LIST

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IF UNIT (X48-3110-00)
PLL UNIT (X50-3190-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C20 ,21			CC73FCH1H020C	CHIP C 2.0PF C		
CN1		*	E40-4465-05	PIN CONNECTOR (5P)		
CN2		*	E40-4464-05	PIN CONNECTOR (4P)		
CN3		*	E40-4465-05	PIN CONNECTOR (5P)		
CN4		*	E40-4463-05	PIN CONNECTOR (3P)		
XF2		*	L71-0433-05	CRYSTAL FILTER(10.695MHz･･･AM)		
XF3			L71-0249-05	CRYSTAL FILTER(10.695MHz･･SSB)		
R1			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R2			RK73FB2A101J	CHIP R 100 J 1/10W		
R3			RK73FB2A561J	CHIP R 560 J 1/10W		
R4			RK73FB2A473J	CHIP R 47K J 1/10W		
R5			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R6			RK73FB2A101J	CHIP R 100 J 1/10W		
R7 -9			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R10			RK73FB2A391J	CHIP R 390 J 1/10W		
R11			RK73FB2A473J	CHIP R 47K J 1/10W		
R12			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R13			RK73FB2A101J	CHIP R 100 J 1/10W		
R14			RK73FB2A473J	CHIP R 47K J 1/10W		
R15			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R16 ,17			RK73FB2A101J	CHIP R 100 J 1/10W		
R18			RK73FB2A473J	CHIP R 47K J 1/10W		
R19			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R20			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R21			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A221J	CHIP R 220 J 1/10W		
D1 ,2			DAN235K	DIODE		
D3			RLS135	DIODE		
D4			DAN202K	DIODE		
D5			DAN235K	DIODE		
D6			1SS226	DIODE		
D7			RLS135	DIODE		
Q1 -3			DTC143TK	DIGITAL TRANSISTOR		
PLL UNIT (X50-3190-00)						
C2 ,3			CK73FB1E103K	CHIP C 0.01UF K		
C8 ,9			CC73FCH1H221J	CHIP C 220PF J		
C10 ,11			CC73FCH1H470J	CHIP C 47PF J		
C12 ,13			CC73FCH1H221J	CHIP C 220PF J		
C14 -16			CC73FCH1H470J	CHIP C 47PF J		
C17			CE04EW1A221M	ELECTRO 220UF 10WV		
C18			CK73FB1E103K	CHIP C 0.01UF K		
C19 ,20			CK73FB1H102K	CHIP C 1000PF K		
C21			CK73FB1E103K	CHIP C 0.01UF K		
C22			CC73FCH1H470J	CHIP C 47PF J		
C23			CC73FSL1H391J	CHIP C 390PF J		
C24			CC73FCH1H470J	CHIP C 47PF J		
C25			CC73FCH1H330J	CHIP C 33PF J		
C26			CC73FCH1H060D	CHIP C 6PF D		
C27			CC73FCH1H470J	CHIP C 47PF J		
C28			CC73FCH1H180J	CHIP C 18PF J		
C29			CC73FCH1H270J	CHIP C 27PF J		
C30			CK73FB1E103K	CHIP C 0.01UF K		

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PLL UNIT (X50-3190-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C31 ,32			CK73FB1H102K	CHIP C 1000PF K		
C33 -37			CK73FB1E103K	CHIP C 0.01UF K		
C46 ,47			CK73FB1E103K	CHIP C 0.01UF K		
C48			C92-0037-05	ELECTR@ 10UF 16WV		
C55 -61			CK73FB1E103K	CHIP C 0.01UF K		
C62			CC73FCH1H560J	CHIP C 56PF J		
C63			CC73FSL1H391J	CHIP C 390PF J		
C64			CC73FCH1H390J	CHIP C 39PF J		
C65			CC73FCH1H680J	CHIP C 68PF J		
C66			CC73FCH1H390J	CHIP C 39PF J		
C67			CC73FCH1H101J	CHIP C 100PF J		
C68			CC73FCH1H680J	CHIP C 68PF J		
C69			CC73FCH1H390J	CHIP C 39PF J		
C70			CC73FCH1H070D	CHIP C 7PF D		
C71			CC73FCH1H680J	CHIP C 68PF J		
C72			CC73FCH1H220J	CHIP C 22PF J		
C73			CC73FCH1H330J	CHIP C 33PF J		
C74			CC73FSL1H121J	CHIP C 120PF J		
C75			CC73FSL1H181J	CHIP C 180PF J		
C76			CC73FSL1H121J	CHIP C 120PF J		
C77 -79			CK73FB1E103K	CHIP C 0.01UF K		
C80			C92-0040-05	ELECTR@ 47UF 16WV		
C81 -84			CK73FB1E103K	CHIP C 0.01UF K		
C85			CC73FSL1H181J	CHIP C 180PF J		
C86 -89			CK73FB1E103K	CHIP C 0.01UF K		
C90 ,91			CC73FCH1H0R5C	CHIP C 0.5PF C		
C93			CC73FCH1H330J	CHIP C 33PF J		
C94			CK73FB1H102K	CHIP C 1000PF K		
C104			CK73FB1E103K	CHIP C 0.01UF K		
C109			CC73FCH1H101J	CHIP C 100PF J		
C110-113			CK73FB1E103K	CHIP C 0.01UF K		
C114			CK73FB1H102K	CHIP C 1000PF K		
C115-117			CK73FB1E103K	CHIP C 0.01UF K		
C118			CC73FCH1H220J	CHIP C 22PF J		
C119			C92-0040-05	ELECTR@ 47UF 16WV		
C120			CK73FB1E223K	CHIP C 0.022UF K		
C121			CC73FCH1H101J	CHIP C 100PF J		
C122			CC73FSL1H221J	CHIP C 220PF J		
C123			CK73FB1E103K	CHIP C 0.01UF K		
C124			CC73FCH1H0R5C	CHIP C 0.5PF C		
C125,126			CC73FCH1H270J	CHIP C 27PF J		
C127			CC73FCH1H390J	CHIP C 39PF J		
C129			CC73FCH1H390J	CHIP C 39PF J		
C130			CC73FSL1H151J	CHIP C 150PF J		
C131			CK73FB1E103K	CHIP C 0.01UF K		
C132			CC73FCH1H050C	CHIP C 5PF C		
C134			CK73FB1E103K	CHIP C 0.01UF K		
C135			CC73FCH1H100D	CHIP C 10PF D		
C136			CK73FB1E103K	CHIP C 0.01UF K		
C138			CK73EB1E104K	CHIP C 0.10UF K		
C139,140			CK73FB1E103K	CHIP C 0.01UF K		
C141			CK73FB1H102K	CHIP C 1000PF K		
C142			CC73FCH1H221J	CHIP C 220PF J		
C143			CK73FB1E104K	CHIP C 0.10UF K		
C145			CK73FB1H102K	CHIP C 1000PF K		

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PLL UNIT (X50-3190-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C146,147			CC73FCH1H330J	CHIP C	33PF	J		
C148			C92-0037-05	ELECTRO	10UF	16WV		
C149,150			CK73FB1E103K	CHIP C	0.01UF	K		
C151			CE04EW1C101M	ELECTRO	100UF	16WV		
C152			CK73FB1H102K	CHIP C	1000PF	K		
C153			CK73FB1E103K	CHIP C	0.01UF	K		
C154,155			CK73FB1H102K	CHIP C	1000PF	K		
C156			CC73FCH1H070D	CHIP C	7PF	D		
C157			CC73FCH1H330J	CHIP C	33PF	J		
C158			CC73FCH1H680J	CHIP C	68PF	J		
C159			CK73FB1E103K	CHIP C	0.01UF	K		
C160			CK73FB1H102K	CHIP C	1000PF	K		
C163			CK73FB1H472K	CHIP C	4700PF	K		
C164			CK73FB1H102K	CHIP C	1000PF	K		
C165			CK73FB1E103K	CHIP C	0.01UF	K		
C166			CC73FCH1H330J	CHIP C	33PF	J		
C167			CC73FCH1H470J	CHIP C	47PF	J		
C168			CC73FCH1H060D	CHIP C	6PF	D		
C169			CC73FCH1H100D	CHIP C	10PF	D		
C170			CC73FCH1H080D	CHIP C	8PF	D		
C171			CC73FCH1H270J	CHIP C	27PF	J		
C172			CC73FCH1H010C	CHIP C	1PF	C		
C173			CK73FB1E103K	CHIP C	0.01UF	K		
C174			CC73FCH1H330J	CHIP C	33PF	J		
C175			CK73FB1E103K	CHIP C	0.01UF	K		
C176			CK73FB1H102K	CHIP C	1000PF	K		
C177			CC73FCH1H101J	CHIP C	100PF	J		
C178			CK73FB1E103K	CHIP C	0.01UF	K		
C179,180			CK73FB1H102K	CHIP C	1000PF	K		
C181			CE04EW1A221M	ELECTRO	220UF	10WV		
C182,183			CK73FB1E103K	CHIP C	0.01UF	K		
C184,185			C92-0004-05	ELECTRO	1.0UF	16WV		
C186			C92-0040-05	ELECTRO	47UF	16WV		
C187			CK73FB1E103K	CHIP C	0.01UF	K		
C188			CC73FCH1H101J	CHIP C	100PF	J		
C189			CK73FB1E103K	CHIP C	0.01UF	K		
C200			CK73FB1E103K	CHIP C	0.01UF	K		
C201			CC73FCH1H050C	CHIP C	5PF	C		
C202			CK73FB1E103K	CHIP C	0.01UF	K		
C203			CC73FCH1H470J	CHIP C	47PF	J		
C204			CK73FB1E103K	CHIP C	0.01UF	K		
C205			C92-0003-05	CHIP TAN	0.47UF	25WV		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C206-208			CK73FB1E103K	CHIP C 0.01UF K		
C209			CC73FCH1H470J	CHIP C 47PF J		
C210			CC73FCH1H100D	CHIP C 10PF D		
C211			CK73FB1E103K	CHIP C 0.01UF K		
C212			C92-0004-05	ELECTRO 1.0UF 16WV		
C213			CK73FB1E103K	CHIP C 0.01UF K		
C214			CK73FB1H102K	CHIP C 1000PF K		
C215			C92-0003-05	CHIP TAN 0.47UF 25WV		
C216,217			CK73FB1E103K	CHIP C 0.01UF K		
C226			CK73EF1C105Z	CHIP C 1.0UF Z		
C227			CK73FB1H472K	CHIP C 4700PF K		
C229,230			CK73FB1E103K	CHIP C 0.01UF K		
C231			C92-0009-05	CHIP TAN 4.7UF 10WV		
C232			CK73FF1C105Z	CHIP C 1.0UF Z		
C233			CK73FB1E103K	CHIP C 0.01UF K		
C234			CK73FB1H222K	CHIP C 2200PF K		
C235			CK73FF1C105Z	CHIP C 1.0UF Z		
C236			CK73FB1E103K	CHIP C 0.01UF K		
C237			C92-0009-05	CHIP TAN 4.7UF 10WV		
C238			CK73FB1E103K	CHIP C 0.01UF K		
C239			CE04EW1C101M	ELECTRO 100UF 16WV		
TC1			C05-0344-05	TRIMMER CAPACITOR		
CN1			E40-3248-05	PIN CONNECTOR (4P)		
CN2 -4			E04-0157-05	RF COAXIAL CABLE RECEPTACLE		
CN6 ,7		*	E40-5609-05	PIN CONNECTOR (11P)		
CN301		*	E40-5415-05	PIN CONNECTOR (11P)		
TP6			E23-0512-05	TERMINAL		
-		*	F10-2062-04	SHIELDING PLATE		
CF1		*	L72-0391-05	CERAMIC FILTER(10.7MHz)		
L1			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		
L2			L40-6882-48	SMALL FIXED INDUCTOR(0.68UH)		
L3			L40-1082-48	SMALL FIXED INDUCTOR(0.1UH)		
L4			L40-8272-48	SMALL FIXED INDUCTOR(82NH)		
L5			L40-5672-48	SMALL FIXED INDUCTOR(56NH)		
L9			L40-1001-48	SMALL FIXED INDUCTOR(10UH)		
L12 ,13			L40-2701-48	SMALL FIXED INDUCTOR(27UH)		
L14			L40-1801-48	SMALL FIXED INDUCTOR(18UH)		
L15 ,16			L40-2701-48	SMALL FIXED INDUCTOR(27UH)		
L17			L40-2201-48	SMALL FIXED INDUCTOR(22UH)		
L18			L40-1801-48	SMALL FIXED INDUCTOR(18UH)		
L19			L40-4792-48	SMALL FIXED INDUCTOR(4.7UH)		
L20			L40-1001-48	SMALL FIXED INDUCTOR(10UH)		
L21			L34-4222-05	COIL		
L22			L34-4029-05	COIL		
L23			L34-4222-05	COIL		
L27		*	L34-4334-05	COIL		
L28 ,29			L34-4222-05	COIL		
L32		*	L40-1501-48	SMALL FIXED INDUCTOR(15UH)		
L33			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		
L34			L40-4792-48	SMALL FIXED INDUCTOR(4.7UH)		
L36			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		

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PLL UNIT (X50-3190-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
L37			L40-2282-48	SMALL FIXED INDUCTOR(0.22UH)		
L38 ,39			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		
L40 ,41		*	L40-3991-48	SMALL FIXED INDUCTOR(3.9UH)		
L42		*	L40-1892-48	SMALL FIXED INDUCTOR(1.8UH)		
L43		*	L40-1592-48	SMALL FIXED INDUCTOR(1.5UH)		
L44			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		
L200			L40-1092-48	SMALL FIXED INDUCTOR(1UH)		
L201			L40-4701-48	SMALL FIXED INDUCTOR(47UH)		
L202,203		*	L34-0590-05	COIL		
L204			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		
L205			L33-0695-05	CHOKE COIL (1MH)		
X1		*	L77-1521-05	CRYSTAL RESONATOR (20MHz)		
R1			RK73FB2A331J	CHIP R 330 J 1/10W		
R2 -10			RK73FB2A101J	CHIP R 100 J 1/10W		
R11			RK73FB2A181J	CHIP R 180 J 1/10W		
R12			RK73FB2A330J	CHIP R 33 J 1/10W		
R13			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R14			RK73FB2A103J	CHIP R 10K J 1/10W		
R15			RK73FB2A100J	CHIP R 10 J 1/10W		
R16			RK73FB2A101J	CHIP R 100 J 1/10W		
R17			RK73FB2A221J	CHIP R 220 J 1/10W		
R18			RK73FB2A471J	CHIP R 470 J 1/10W		
R19			RK73FB2A100J	CHIP R 10 J 1/10W		
R20			RK73FB2A471J	CHIP R 470 J 1/10W		
R21			RK73FB2A330J	CHIP R 33 J 1/10W		
R22			RK73FB2A101J	CHIP R 100 J 1/10W		
R23			RK73FB2A223J	CHIP R 22K J 1/10W		
R24			RK73FB2A471J	CHIP R 470 J 1/10W		
R25			RK73FB2A103J	CHIP R 10K J 1/10W		
R27			RK73FB2A101J	CHIP R 100 J 1/10W		
R33			RK73FB2A470J	CHIP R 47 J 1/10W		
R34			RK73FB2A681J	CHIP R 680 J 1/10W		
R35			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R36			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R37			RK73FB2A184J	CHIP R 180K J 1/10W		
R38			RK73FB2A681J	CHIP R 680 J 1/10W		
R39			RK73FB2A103J	CHIP R 10K J 1/10W		
R40			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R42			RK73FB2A220J	CHIP R 22 J 1/10W		
R43			RK73FB2A331J	CHIP R 330 J 1/10W		
R44			RK73FB2A330J	CHIP R 33 J 1/10W		
R45			RK73FB2A101J	CHIP R 100 J 1/10W		
R46			RK73FB2A470J	CHIP R 47 J 1/10W		
R54			RK73FB2A101J	CHIP R 100 J 1/10W		
R55			RK73FB2A681J	CHIP R 680 J 1/10W		
R56			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R57 ,58			RK73FB2A101J	CHIP R 100 J 1/10W		
R59			RK73FB2A821J	CHIP R 820 J 1/10W		
R60			RK73FB2A334J	CHIP R 330K J 1/10W		
R61			RK73FB2A221J	CHIP R 220 J 1/10W		
R62 ,63			RK73FB2A101J	CHIP R 100 J 1/10W		
R64			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R65			RK73FB2A333J	CHIP R 33K J 1/10W		
R66			RK73FB2A221J	CHIP R 220 J 1/10W		

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PARTS LIST

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PLL UNIT (X50-3190-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R67			RK73FB2A101J	CHIP R 100 J 1/10W		
R71			RK73FB2A103J	CHIP R 10K J 1/10W		
R72			RK73FB2A223J	CHIP R 22K J 1/10W		
R73			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R74			RK73FB2A101J	CHIP R 100 J 1/10W		
R75 ,76			RK73FB2A473J	CHIP R 47K J 1/10W		
R77			RK73FB2A101J	CHIP R 100 J 1/10W		
R79			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R80			RK73FB2A101J	CHIP R 100 J 1/10W		
R81			RK73FB2A681J	CHIP R 680 J 1/10W		
R82			RK73FB2A471J	CHIP R 470 J 1/10W		
R84			RK73FB2A101J	CHIP R 100 J 1/10W		
R90			RK73FB2A101J	CHIP R 100 J 1/10W		
R91			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R92			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R93			RK73FB2A470J	CHIP R 47 J 1/10W		
R94			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R95			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R96			RK73FB2A331J	CHIP R 330 J 1/10W		
R97			RK73FB2A180J	CHIP R 18 J 1/10W		
R98			RK73FB2A101J	CHIP R 100 J 1/10W		
R99			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R101,102			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R103			RK73FB2A101J	CHIP R 100 J 1/10W		
R104			RK73FB2A471J	CHIP R 470 J 1/10W		
R105			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R106			RK73FB2A821J	CHIP R 820 J 1/10W		
R107			RK73FB2A822J	CHIP R 8.2K J 1/10W		
R108			RK73FB2A331J	CHIP R 330 J 1/10W		
R109			RK73FB2A101J	CHIP R 100 J 1/10W		
R110			RK73FB2A223J	CHIP R 22K J 1/10W		
R111			RK73FB2A183J	CHIP R 18K J 1/10W		
R112			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R113			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R114			RK73FB2A683J	CHIP R 68K J 1/10W		
R115			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R116			RK73FB2A151J	CHIP R 150 J 1/10W		
R117			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R118			RK73FB2A101J	CHIP R 100 J 1/10W		
R200			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R201			RK73FB2A221J	CHIP R 220 J 1/10W		
R202			RK73FB2A103J	CHIP R 10K J 1/10W		
R203			RK73FB2A223J	CHIP R 22K J 1/10W		
R204			RK73FB2A333J	CHIP R 33K J 1/10W		
R205			RK73FB2A683J	CHIP R 68K J 1/10W		
R206,207			RK73FB2A103J	CHIP R 10K J 1/10W		
R208			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R209			RK73FB2A221J	CHIP R 220 J 1/10W		
R210			RK73FB2A103J	CHIP R 10K J 1/10W		
R211			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R212			RK73FB2A563J	CHIP R 56K J 1/10W		
R213			RK73FB2A101J	CHIP R 100 J 1/10W		
R214			RK73FB2A681J	CHIP R 680 J 1/10W		
R215			RK73FB2A333J	CHIP R 33K J 1/10W		
R216,217			RK73FB2A152J	CHIP R 1.5K J 1/10W		

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PLL UNIT (X50-3190-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R218			RK73FB2A223J	CHIP R 22K J 1/10W		
R220			RK73FB2A101J	CHIP R 100 J 1/10W		
R221,222			RK73FB2A103J	CHIP R 10K J 1/10W		
R223,224			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R225			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R226			RK73FB2A101J	CHIP R 100 J 1/10W		
R227			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R228			RK73FB2A561J	CHIP R 560 J 1/10W		
R229			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R230			RK73FB2A103J	CHIP R 10K J 1/10W		
R231			RK73FB2A563J	CHIP R 56K J 1/10W		
R232			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R233			RK73FB2A681J	CHIP R 680 J 1/10W		
R234			RK73FB2A103J	CHIP R 10K J 1/10W		
VR1 ,2			R12-3132-05	TRIM POT. 47K		
VR3			R12-6717-05	TRIM POT 47K		
VR301		*	R24-3410-05	POTENTIOMETER 10Kx2,50KB(AF/SQ		
VR302		*	R23-3408-15	POTENTIOMETER 10KBx2(RIT/IF)		
W1 ,2			R92-1061-05	JUMPER REST 0 OHM		
D1			1SS184	DIODE		
D2		*	B30-2004-05	LED		
D3			1SS226	DIODE		
D200			HSM88AS	DIODE		
IC2			UPD74HC390G	IC(DUAL DECADE COUNTER)		
IC3			SN76514N	IC(MIXER)		
IC4 ,5			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC7			SN16913P	IC(DUBLE BALANCED MIXERS)		
IC8			TC7S04F	IC(2CH NAND GATE)		
IC10		*	KCH14	IC		
IC11			CXD1225M	IC		
IC201			KCA04	IC(MIC AMPLIFIER)		
Q1			DTC114TK	DIGITAL TRANSISTOR		
Q2 ,3			2SC2714(Y)	TRANSISTOR		
Q5			2SC2712(Y)	TRANSISTOR		
Q9		*	RU201	TRANSISTOR		
Q10 -13			2SC2714(Y)	TRANSISTOR		
Q14			2SC2996(Y)	TRANSISTOR		
Q16			2SC2712(Y)	TRANSISTOR		
Q17			2SD1757K	TRANSISTOR		
Q18			2SC2954	TRANSISTOR		
Q19			2SC2712(Y)	TRANSISTOR		
Q20			2SC2714(Y)	TRANSISTOR		
Q21 -23			2SC3722K(R)	TRANSISTOR		
Q200-203			2SC2714(Y)	TRANSISTOR		
Q204,205			2SC2712(Y)	TRANSISTOR		
Q206			DTA114EK	DIGITAL TRANSISTOR		
Q207			DTC114EK	DIGITAL TRANSISTOR		
Q209			DTC114EK	DIGITAL TRANSISTOR		
Q210			2SC2712(Y)	TRANSISTOR		
Q211			DTC114EK	DIGITAL TRANSISTOR		
Z1	-	*	X58-4010-00	SUB UNIT (L01)		
Z2 ,3	-	*	X58-4020-00	SUB UNIT (DDS)		

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FILTER UNIT (X51-312X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
FILTER UNIT (X51-312X-XX) 0-00 : K, M, M2, X, P 2-71 : E, E2, E3								
C1			CC73FCH1H680J	CHIP C	68PF	J		
C2			CC73FCH1H121J	CHIP C	120PF	J		
C3			CC73FCH1H560J	CHIP C	56PF	J		
C4			CC73FSL1H221J	CHIP C	220PF	J		
C5			CC45CH2H030C	CERAMIC	3PF	C		
C6			CC73FCH1H560J	CHIP C	56PF	J		
C7			CC73FCH1H101J	CHIP C	100PF	J		
C8			CC73FSL1H221J	CHIP C	220PF	J		
C9			CK73FB1E103K	CHIP C	0.01UF	K		
C10			CK73FB1H102K	CHIP C	1000PF	K		
C11			CK73FB1E104K	CHIP C	0.10UF	K		
C12			CK73FB1H102K	CHIP C	1000PF	K		
C14			CK73FB1E103K	CHIP C	0.01UF	K		
C15 -17			CK73FB1H102K	CHIP C	1000PF	K		
C101			CM93D2H222J	MICA	2200PF	J		
C102			CC45SL2H471J	CERAMIC	470PF	J		
C103			CM93D2H222J	MICA	2200PF	J		
C105			CC45SL2H301J	CERAMIC	300PF	J		
C106			CM93D2H152J	MICA	1500PF	J		
C201			CC45SL2H561J	CERAMIC	560PF	J		
C202			CC45SL2H301J	CERAMIC	300PF	J		
C203,204			CC45SL2H431J	CERAMIC	430PF	J		
C205			CC45SL2H121J	CERAMIC	120PF	J		
C206			CC45SL2H301J	CERAMIC	300PF	J		
C207			CC45SL2H121J	CERAMIC	120PF	J		
C301			CC45SL2H221J	CERAMIC	220PF	J		
C302			CC45SL2H151J	CERAMIC	150PF	J		
C303			CC45SL2H271J	CERAMIC	270PF	J		
C304			CC45SL2H331J	CERAMIC	330PF	J		EE2E3
C304			CC45SL2H331J	CERAMIC	330PF	J		KMM2XP
C305			CC45SL2H560J	CERAMIC	56PF	J		
C306			CC45SL2H331J	CERAMIC	330PF	J		EE2E3
C306			CC45SL2H331J	CERAMIC	330PF	J		KMM2XP
C401			CC45SL2H151J	CERAMIC	150PF	J		
C402			CC45SL2H270J	CERAMIC	27PF	J		
C403			CC45SL2H331J	CERAMIC	330PF	J		EE2E3
C403			CC45SL2H331J	CERAMIC	330PF	J		KMM2XP
C405			CC45SL2H121J	CERAMIC	120PF	J		
C406			CC45SL2H181J	CERAMIC	180PF	J		
C407			CC45SL2H220J	CERAMIC	22PF	J		
C408			CC45SL2H680J	CERAMIC	68PF	J		EE2E3
C409			CC45SL2H331J	CERAMIC	330PF	J		EE2E3
C501			CC45SL2H121J	CERAMIC	120PF	J		
C502			CC45SL2H150J	CERAMIC	15PF	J		
C503			CC45SL2H221J	CERAMIC	220PF	J		
C505			CC45SL2H470J	CERAMIC	47PF	J		
C506			CC45SL2H101J	CERAMIC	100PF	J		
C601			CC45SL2H470J	CERAMIC	47PF	J		
C602			CC45SL2H120J	CERAMIC	12PF	J		
C603			CC45SL2H121J	CERAMIC	120PF	J		
C604			CC45SL2H430J	CERAMIC	43PF	J		
C605			CC45SL2H180J	CERAMIC	18PF	J		
C606			CC45SL2H330J	CERAMIC	33PF	J		

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FILTER UNIT (X51-312X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C607			CC45SL2H100D	CERAMIC 10PF D		
C701-712			CK73FB1E103K	CHIP C 0.01UF K		
TC1			C05-0030-15	TRIM CAP 20PF		
CN1			E04-0159-05	RF COAXIAL CABLE RECEPTACLE		
CN2			E40-3248-05	PIN CONNECTOR (4P)		
CN3		*	E40-5604-05	PIN CONNECTOR (11P)		
CN4		*	E40-5605-05	PIN CONNECTOR (12P)		
CN5			E04-0159-05	RF COAXIAL CABLE RECEPTACLE		
CN6			E40-3247-05	PIN CONNECTOR (3P)		
J1		*	E11-0454-05	PHONE JACK		
TP1			E23-0512-05	TERMINAL		
W1	1F	*	E37-0368-05	CONNECTING WIRE		
W2 ,3	-		R92-1061-05	JUMPER REST 0 OHM		
W4	-		E31-1448-05	INSIDE CONNECTING WIRE	KMM2X	
F1	1F		F06-4029-05	FUSE		
A1 ,2	-		J13-0075-05	FUSE HOLDER		
L1 ,2		*	L34-1391-05	COIL (12.5T)		
L3 ,4		*	L40-2221-33	SMALL FIXED INDUCTOR(2.2MH)		
L5		*	L39-0480-15	TOROIDAL COIL		
L6 ,7			L40-1001-48	SMALL FIXED INDUCTOR(10UH)		
L101		*	L39-1226-05	TOROIDAL COIL		
L102		*	L39-1227-05	TOROIDAL COIL		
L201		*	L39-1224-05	TOROIDAL COIL		
L202		*	L39-1225-05	TOROIDAL COIL		
L301		*	L39-1222-05	TOROIDAL COIL		
L302		*	L39-1223-05	TOROIDAL COIL		
L401		*	L39-1221-05	TOROIDAL COIL		
L402		*	L39-1220-05	TOROIDAL COIL		
L403			L39-1208-05	TOROIDAL COIL	EE2E3	
L501			L34-1279-05	COIL (7.5T)		
L502			L34-1280-05	COIL (6.5T)		
L601			L34-1281-05	COIL (5.5T)		
L602			L34-1282-05	COIL (4.5T)		
T101-106			L92-0107-05	CORE		
T107,108			L92-0108-05	CORE		
T109			L92-0108-05	CORE	EE2E3	
R1		*	R92-1244-05	CHIP R 27 J 1/4W		
R2		*	R92-0696-05	CHIP R 33 J 1/4		
R3			RK73FB2A100J	CHIP R 10 J 1/10W		
R5 -8			RK73FB2A221J	CHIP R 220 J 1/10W		
VR1			R12-6730-05	TRIM POT. 220		
K1			S51-1429-05	RELAY		
K101-112			S51-1420-05	RELAY		
D1			DSA301LA	DIODE		
D2			LFB01	DIODE		
D3 ,4			1SS101	DIODE		
D101-106			LFB01	DIODE		
IC1		*	UPD6345GS	IC		
Q1			FMC2	TRANSISTOR		
Q2 -4			FMA1	TRANSISTOR		

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TX-RX UNIT (X57-4220-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
TX-RX UNIT (X57-4220-11)						
C1 ,2			CK73FB1E103K	CHIP C 0.01UF K		
C3			CC73GCH1H470J	CHIP C 47PF J		
C4			CC73GCH1H070D	CHIP C 7PF D		
C5			CC73GCH1H121J	CHIP C 120PF J		
C6			CC73GCH1H180J	CHIP C 18PF J		
C7			CC73GCH1H390J	CHIP C 39PF J		
C8			CK73FB1E104K	CHIP C 0.10UF K		
C9			CK73FF1C105Z	CHIP C 1.0UF Z		
C10			CK73EB1H104K	CHIP C 0.10UF K		
C11 ,12			CK73FB1E103K	CHIP C 0.01UF K		
C13			CK73FB1E104K	CHIP C 0.10UF K		
C14 ,15			CK73FB1H272K	CHIP C 2700PF K		
C16			CK73FB1H392K	CHIP C 3900PF K		
C17			CC73GCH1H151J	CHIP C 150PF J		
C18			CC73GCH1H180J	CHIP C 18PF J		
C19			CC73GCH1H680J	CHIP C 68PF J		
C20			CK73FB1E104K	CHIP C 0.10UF K		
C21			CK73GB1H102K	CHIP C 1000PF K		
C22 -24			CK73FB1E104K	CHIP C 0.10UF K		
C25			CK73GB1E103K	CHIP C 0.010UF K		
C26			CK73FB1E104K	CHIP C 0.10UF K		
C27			CC73FCH1H220J	CHIP C 22PF J		
C28			CC73FSL1H471J	CHIP C 47PF J		
C29			CK73FB1E104K	CHIP C 0.10UF K		
C30			CK73GB1E103K	CHIP C 0.010UF K		
C31			CK73FB1E104K	CHIP C 0.10UF K		
C32			CK73GB1E103K	CHIP C 0.010UF K		
C33 -35			CK73FB1E104K	CHIP C 0.10UF K		
C36			CK73GB1E103K	CHIP C 0.010UF K		
C37			CK73GB1H471K	CHIP C 470PF K		
C38 ,39			CK73FB1E103K	CHIP C 0.01UF K		
C40			CK73GB1E103K	CHIP C 0.010UF K		
C41			CK73GB1H471K	CHIP C 470PF K		
C42			CK73FB1E103K	CHIP C 0.01UF K		
C43			CC73GCH1H100D	CHIP C 10PF D		
C44			CK73FF1C105Z	CHIP C 1.0UF Z		
C45			CC73FCH1H020C	CHIP C 2.0PF C		
C46			CC73FCH1H030C	CHIP C 3PF C		
C47			CC73FCH1H010C	CHIP C 1PF C		
C48			CC73FCH1H101J	CHIP C 100PF J		
C49			CK73FB1E104K	CHIP C 0.10UF K		
C50 ,51			CK73FB1E103K	CHIP C 0.01UF K		
C53			CK73GB1H102K	CHIP C 1000PF K		
C54			CC73FCH1H060D	CHIP C 6PF D		
C55			CC73FCH1H010C	CHIP C 1PF C		
C56			CK73GB1E103K	CHIP C 0.010UF K		
C57			CC73FCH1H240J	CHIP C 24PF J		
C58 ,59			CK73GB1E103K	CHIP C 0.010UF K		
C60			CK73FB1E103K	CHIP C 0.01UF K		
C62			CK73GB1E103K	CHIP C 0.010UF K		
C63 ,64			CK73FB1E103K	CHIP C 0.01UF K		
C65			CC73GCH1H020C	CHIP C 2.0PF C		
C66 ,67			CK73FB1E103K	CHIP C 0.01UF K		

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TX-RX UNIT (X57-4220-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C68			CK73FB1E104K	CHIP C 0.10UF K		
C69 ,70			CK73FB1E103K	CHIP C 0.01UF K		
C71			CC73FCH1H220J	CHIP C 22PF J		
C72 -74			CK73FB1E103K	CHIP C 0.01UF K		
C75			CK73GB1E103K	CHIP C 0.010UF K		
C76 -81			CK73FB1E103K	CHIP C 0.01UF K		
C82			CK73FB1H102K	CHIP C 1000PF K		
C83			CK73FB1E103K	CHIP C 0.01UF K		
C84			CC73FCH1H470J	CHIP C 47PF J		
C85			CC73FCH1H270J	CHIP C 27PF J		
C86			CK73FB1E103K	CHIP C 0.01UF K		
C87			C92-0009-05	CHIP TAN 4.7UF 10WV		
C88			CK73FB1E104K	CHIP C 0.10UF K		
C89			C92-0003-05	CHIP TAN 0.47UF 25WV		
C90			CK73FB1E104K	CHIP C 0.10UF K		
C91			CK73GB1E103K	CHIP C 0.010UF K		
C92			CK73FB1E103K	CHIP C 0.01UF K		
C93			CK73FF1C105Z	CHIP C 1.0UF Z		
C94			CK73FB1E104K	CHIP C 0.10UF K		
C95			CK73FF1C105Z	CHIP C 1.0UF Z		
C96			CK73FB1H472K	CHIP C 4700PF K		
C97 -100			CK73GB1E103K	CHIP C 0.010UF K		
C101			CC73FCH1H470J	CHIP C 47PF J		
C102			CK73FB1E103K	CHIP C 0.01UF K		
C103,104			C92-0003-05	CHIP TAN 0.47UF 25WV		
C105			C92-0509-05	TANTAL 10UF 6.3WV		
C106			C92-0004-05	ELECTRO 1.0UF 16WV		
C107,108			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C109			C92-0002-05	CHIP TAN 0.22UF 35WV		
C110			CK73FB1E223K	CHIP C 0.022UF K		
C111			CK73FB1E473K	CHIP C 0.047UF K		
C112			CK73FB1E103K	CHIP C 0.01UF K		
C113			CK73FB1H392K	CHIP C 3900PF K		
C114			CK73FB1E104K	CHIP C 0.10UF K		
C115			C92-0038-05	ELECTRO 22UF 16WV		
C116			C92-0041-05	ELECTRO 10UF 10WV		
C117-118			CK73FB1E104K	CHIP C 0.10UF K		
C119			CC73FSL1H471J	CHIP C 47PF J		
C120			CK73FB1H102K	CHIP C 1000PF K		
C121,122			C92-0040-05	ELECTRO 47UF 16WV		
C123			C90-2153-05	ELECTRO 470UF 10WV		
C124			CK73FB1E104K	CHIP C 0.10UF K		
C125			C92-0040-05	ELECTRO 47UF 16WV		
C126			C92-0038-05	ELECTRO 22UF 16WV		
C127			CE04EW1C331M	ELECTRO 330UF 16WV		
C128			CK73GB1H102K	CHIP C 1000PF K		
C129,130			CC73FCH1H101J	CHIP C 100PF J		
C131			C92-0009-05	CHIP TAN 4.7UF 10WV		
C132			C92-0007-05	CHIP TAN 2.2UF 10WV		
C133			C92-0009-05	CHIP TAN 4.7UF 10WV		
C134,135			CK73FF1C105Z	CHIP C 1.0UF Z		
C136			C92-0007-05	CHIP TAN 2.2UF 10WV		
C137			CK73FF1C105Z	CHIP C 1.0UF Z		
C138			C92-0009-05	CHIP TAN 4.7UF 10WV		
C139			CK73FF1C105Z	CHIP C 1.0UF Z		

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TX-RX UNIT (X57-4220-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C140			C92-0509-05	TANTAL 10UF 6.3WV		
C141,142			CK73FF1C105Z	CHIP C 1.0UF Z		
C143			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C144			CC73FCH1H050C	CHIP C 5PF C		
C145-147			CK73FB1E103K	CHIP C 0.01UF K		
C148			C92-0038-05	ELECTRO 22UF 16WV		
C149			CK73GB1E103K	CHIP C 0.010UF K		
C150-152			CK73FB1E103K	CHIP C 0.01UF K		
C153,154			CK73GB1E103K	CHIP C 0.010UF K		
C155-157			CK73FB1E103K	CHIP C 0.01UF K		
C158			CK73GB1E103K	CHIP C 0.010UF K		
C159			CC73FCH1H050C	CHIP C 5PF C		
C160			CK73GB1E103K	CHIP C 0.010UF K		
C161			CC73FCH1H200J	CHIP C 20PF J		
C162,163			CK73GB1E103K	CHIP C 0.010UF K		
C164,165			CK73FB1E103K	CHIP C 0.01UF K		
C166			CC73FCH1H010C	CHIP C 1PF C		
C167			CC73FCH1H0R5C	CHIP C 0.5PF C		
C168			CC73FCH1H010C	CHIP C 1PF C		
C169,170			CK73GB1E103K	CHIP C 0.010UF K		
C171			CK73FB1E103K	CHIP C 0.01UF K		
C172-175			CK73GB1E103K	CHIP C 0.010UF K		
C176			CK73FB1E104K	CHIP C 0.10UF K		
C179			CK73FB1E104K	CHIP C 0.10UF K		
C181			CK73FB1E104K	CHIP C 0.10UF K		
C182			C92-0037-05	ELECTRO 10UF 16WV		
C183-186			CK73FB1E104K	CHIP C 0.10UF K		
C187			C92-0037-05	ELECTRO 10UF 16WV		
C188-190			CK73FB1E104K	CHIP C 0.10UF K		
C191			CK73GB1E103K	CHIP C 0.010UF K		
C192,193			CK73FB1H222K	CHIP C 2200PF K		
C194			C92-0040-05	ELECTRO 47UF 16WV		
C195			CK73FB1E103K	CHIP C 0.01UF K		
C196,197			C92-0040-05	ELECTRO 47UF 16WV		
C198			CK73FB1E103K	CHIP C 0.01UF K		
C199			C92-0047-05	ELECTRO 47UF 6.3WV		
C200			CK73FB1E103K	CHIP C 0.01UF K		
C201			CE04EW1C101M	ELECTRO 100UF 16WV		
C202			CK73FB1E104K	CHIP C 0.10UF K		
C203-205			CK73FB1E103K	CHIP C 0.01UF K		
C206-210			CC73GCH1H470J	CHIP C 47PF J		
C211,212			CK73FB1E103K	CHIP C 0.01UF K		
C213			CC73GCH1H060D	CHIP C 6PF D		
C214			CC73GCH1H680J	CHIP C 68PF J		
C215			CK73GB1H102K	CHIP C 1000PF K		
C216			CK73FB1E473K	CHIP C 0.047UF K		
C217			CK73FF1C105Z	CHIP C 1.0UF Z		
C218			CK73FB1E223K	CHIP C 0.022UF K		
C219			C92-0004-05	ELECTRO 1.0UF 16WV		
C220,221			CK73FB1E103K	CHIP C 0.01UF K		
C222-225			CC73FUJ1H080D	CHIP C 8PF D		
C226			CK73GB1H102K	CHIP C 1000PF K		
C227,228			CC73FCH1H020C	CHIP C 2.0PF C		
C229			C92-0040-05	ELECTRO 47UF 16WV		
C230			C92-0004-05	ELECTRO 1.0UF 16WV		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C231			CK73GB1H102K	CHIP C 1000PF K		
C232			CE04EW1E4R7M	ELECTRO 4.7UF 25WV		
C234-239			CK73FB1E102K	CHIP C 1000PF K		
C240			CK73FB1H122K	CHIP C 1200PF K		
C241			CC73FCH1H270J	CHIP C 27PF J		
A1	-	*	E23-0918-04	TERMINAL		
CN1 -3			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN4			E40-3247-05	PIN CONNECTOR (3P)		
CN5 ,6			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN7		*	E40-5608-05	PIN CONNECTOR (5P)		
CN8		*	E40-5607-05	PIN CONNECTOR (4P)		
CN9		*	E40-5608-05	PIN CONNECTOR (5P)		
CN10			E40-3248-05	PIN CONNECTOR (4P)		
CN11			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN12			E40-3237-05	PIN CONNECTOR (2P)		
CN13			E40-3247-05	PIN CONNECTOR (3P)		
CN14			E40-3246-05	PIN CONNECTOR (2P)		
CN15			E40-3249-05	PIN CONNECTOR (5P)		
CN16			E40-3254-05	PIN CONNECTOR (10P)		
CN17		*	E40-5233-05	PIN CONNECTOR (25P)		
CN18			E40-3250-05	PIN CONNECTOR (6P)		
CN19			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
CN20		*	E40-5606-05	PIN CONNECTOR (3P)		
TP1 ,2			E40-0211-05	PIN CONNECTOR (2P)		
TP3			E23-0512-05	TERMINAL		
W1	-		E37-0179-05	PIN CONNECTOR		
W2	-	*	E37-0373-05	CONNECTING WIRE		
F1	-	*	F53-0055-05	FUSE (2A)		
-			J30-0545-05	SPACER(XF1)		
CD1			L79-1013-05	DISCRI (455KHz)		
CF1			L72-0372-05	CERAMIC FILTER (455KHz)		
L1			L40-2211-48	SMALL FIXED INDUCTOR (220UH)		
L2 ,3			L40-2782-48	SMALL FIXED INDUCTOR (0.27UH)		
L4 -6			L33-0695-05	CHOKE COIL (1MH)		
L7		*	L40-5692-48	SMALL FIXED INDUCTOR (5.6UH)		
L8 ,9			L40-2782-48	SMALL FIXED INDUCTOR (0.27UH)		
L10			L33-0695-05	CHOKE COIL (1MH)		
L11			L19-0324-05	TRANSFORMER		
L12			L39-0454-05	TOROIDAL COIL		
L13			L40-4701-48	SMALL FIXED INDUCTOR (47UH)		
L14			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L15			L34-4222-05	COIL		
L16		*	L34-4332-05	COIL		
L17		*	L34-4331-05	COIL		
L18			L19-0324-05	TRANSFORMER		
L19			L40-3392-48	SMALL FIXED INDUCTOR (3.3UH)		
L20			L19-0324-05	TRANSFORMER		
L21			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L22			L39-0454-05	TOROIDAL COIL		
L23			L40-4701-48	SMALL FIXED INDUCTOR (47UH)		
L24			L34-4209-05	COIL		
L25		*	L34-4330-05	COIL		
L26		*	L34-4216-05	COIL		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
L27			L40-1082-48	SMALL FIXED INDUCTOR (0.1UH)		
L28		*	L34-4328-05	COIL		
L29 -32			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L33 ,34		*	L40-8295-48	SMALL FIXED INDUCTOR (8.2UH)		
L35 -37			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L38		*	L34-4327-05	COIL		
L39		*	L34-4326-05	COIL		
L40		*	L34-4329-05	COIL		
L41 -43			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L44 -46		*	L34-4333-05	COIL		
L47			L39-0454-05	COIL		
L48		*	L34-4333-05	COIL		
L49 ,50			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L51			L19-0324-05	TRANSFORMER		
L53			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L54			L40-1001-48	SMALL FIXED INDUCTOR (10UH)		
L55			L19-0324-05	TRANSFORMER		
L56			L40-1011-48	SMALL FIXED INDUCTOR (100UH)		
L57			L40-1021-13	SMALL FIXED INDUCTOR (1MH)		
L58			L33-0695-05	CHOKE COIL		
L64			L40-4701-48	SMALL FIXED INDUCTOR (47UH)		
X1			L77-0720-05	CRYSTAL RESONATOR (10.24MHZ)		
XF1		*	L71-0432-05	CRYSTAL FILTER (72.045MHZ)		
XF2			L71-0230-05	CRYSTAL FILTER (10.695MHZ)		
R1			RK73FB2A560J	CHIP R 56 J 1/10W		
R2			RK73EB2B471J	CHIP R 470 J 1/8W		
R3			RK73FB2A181J	CHIP R 180 J 1/10W		
R4			RK73FB2A101J	CHIP R 100 J 1/10W		
R5			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R6			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R7			RK73FB2A151J	CHIP R 150 J 1/10W		
R8			RK73FB2A471J	CHIP R 470 J 1/10W		
R9 ,10			RK73GB1J681J	CHIP R 680 J 1/16W		
R11 -14			RK73FB2A100J	CHIP R 10 J 1/10W		
R15			RK73FB2A271J	CHIP R 270 J 1/10W		
R16			RK73FB2A100J	CHIP R 10 J 1/10W		
R17			RK73FB2A221J	CHIP R 220 J 1/10W		
R18			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R19			RK73FB2A101J	CHIP R 100 J 1/10W		
R20			RK73FB2A220J	CHIP R 22 J 1/10W		
R21			RK73FB2A470J	CHIP R 47 J 1/10W		
R22			RK73FB2A391J	CHIP R 390 J 1/10W		
R23			RK73FB2A560J	CHIP R 56 J 1/10W		
R24			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R25			RK73FB2A471J	CHIP R 470 J 1/10W		
R26			RK73FB2A220J	CHIP R 22 J 1/10W		
R27			RK73FB2A150J	CHIP R 150 J 1/10W		
R28			RK73FB2A680J	CHIP R 68 J 1/10W		
R29			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R30			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R31			RK73GB1J474J	CHIP R 470K J 1/16W		
R32			RK73FB2A273J	CHIP R 27K J 1/10W		
R33			RK73FB2A471J	CHIP R 470 J 1/10W		
R34			RK73FB2A104J	CHIP R 100K J 1/10W		

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R35			RK73GB1J101J	CHIP R 100 J 1/16W		
R37			R92-0679-05	CHIP R 0 OHM		
R39			RK73GB1J103J	CHIP R 10K J 1/16W		
R40			RK73GB1J681J	CHIP R 680 J 1/16W		
R41 ,42			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R43			R92-0670-05	CHIP R 0 OHM		
R44			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R45			R92-0670-05	CHIP R 0 OHM		
R46 ,47			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R48			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R49			RK73FB2A101J	CHIP R 100 J 1/10W		
R50			RK73GB1J101J	CHIP R 100 J 1/16W		
R51			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R52			RK73GB1J101J	CHIP R 100 J 1/16W		
R53			RK73GB1J103J	CHIP R 10K J 1/16W		
R54			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R55			RK73GB1J101J	CHIP R 100 J 1/16W		
R56			RK73FB2A333J	CHIP R 33K J 1/10W		
R57			RK73FB2A104J	CHIP R 100K J 1/10W		
R58			RK73FB2A223J	CHIP R 22K J 1/10W		
R59			RK73FB2A471J	CHIP R 470 J 1/10W		
R60			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R61			RK73FB2A103J	CHIP R 10K J 1/10W		
R62			RK73GB1J101J	CHIP R 100 J 1/16W		
R63			RK73GB1J103J	CHIP R 10K J 1/16W		
R64 -66			RK73GB1J101J	CHIP R 100 J 1/16W		
R67			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R68 -70			RK73FB2A101J	CHIP R 100 J 1/10W		
R71			RK73FB2A104J	CHIP R 100K J 1/10W		
R72			RK73GB1J471J	CHIP R 470 J 1/16W		
R73			RK73FB2A221J	CHIP R 220 J 1/10W		
R74			RK73FB2A224J	CHIP R 220K J 1/10W		
R75			RK73FB2A103J	CHIP R 10K J 1/10W		
R76			RK73GB1J820J	CHIP R 82 J 1/16W		
R77			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R78			RK73FB2A104J	CHIP R 100K J 1/10W		
R79			RK73GB1J104J	CHIP R 100K J 1/16W		
R80			RK73FB2A103J	CHIP R 10K J 1/10W		
R81			RK73GB1J101J	CHIP R 100 J 1/16W		
R82 ,83			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R84			RK73FB2A273J	CHIP R 27K J 1/10W		
R85			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R86			RK73FB2A473J	CHIP R 47K J 1/10W		
R87			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R88			RK73FB2A103J	CHIP R 10K J 1/10W		
R89 ,90			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R91			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R92			RK73GB1J103J	CHIP R 10K J 1/16W		
R93			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R94			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R95			RK73GB1J153J	CHIP R 15K J 1/16W		
R96			RK73FB2A335J	CHIP R 3.3M J 1/10W		
R97			RK73FB2A123J	CHIP R 12K J 1/10W		
R98			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R99			RK73GB1J123J	CHIP R 12K J 1/16W		

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R100			RK73FB2A473J	CHIP R 47K J 1/10W		
R101			RK73GB1J473J	CHIP R 47K J 1/16W		
R102			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R103			RK73FB2A474J	CHIP R 470K J 1/10W		
R104			RK73GB1J103J	CHIP R 10K J 1/16W		
R105			RK73FB2A103J	CHIP R 10K J 1/10W		
R106			RK73GB1J331J	CHIP R 330 J 1/16W		
R107			RK73FB2A393J	CHIP R 39K J 1/10W		
R108			RK73FB2A104J	CHIP R 100K J 1/10W		
R109			RK73FB2A823J	CHIP R 82K J 1/10W		
R110			RK73FB2A273J	CHIP R 27K J 1/10W		
R111			RK73GB1J104J	CHIP R 100K J 1/16W		
R112			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R113			RK73GB1J473J	CHIP R 47K J 1/16W		
R114			RK73GB1J273J	CHIP R 27K J 1/16W		
R115			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R116			RK73GB1J271J	CHIP R 270 J 1/16W		
R117			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R118			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R119			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R120			RK73FB2A473J	CHIP R 47K J 1/10W		
R121			RK73GB1J101J	CHIP R 100 J 1/16W		
R122			RK73FB2A104J	CHIP R 100K J 1/10W		
R123			RK73GB1J331J	CHIP R 330 J 1/16W		
R124			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R125			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R126			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R127			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R128			RK73GB1J471J	CHIP R 470 J 1/16W		
R129			RK73GB1J104J	CHIP R 100K J 1/16W		
R130			RK73FB2A223J	CHIP R 22K J 1/10W		
R131			RK73GB1J101J	CHIP R 100 J 1/16W		
R132			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R133			RK73FB2A151J	CHIP R 150 J 1/10W		
R134			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R135			RK73GB1J101J	CHIP R 100 J 1/16W		
R136			RK73GB1J104J	CHIP R 100K J 1/16W		
R137			RK73FB2A473J	CHIP R 47K J 1/10W		
R138			RK73FB2A471J	CHIP R 470 J 1/10W		
R139			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R140			RK73FB2A151J	CHIP R 150 J 1/10W		
R141,142			RK73GB1J471J	CHIP R 470 J 1/16W		
R143			RK73GB1J101J	CHIP R 100 J 1/16W		
R144			RK73FB2A184J	CHIP R 180K J 1/10W		
R145			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R146			RK73FB2A224J	CHIP R 220K J 1/10W		
R147			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R148			RK73GB1J224J	CHIP R 220K J 1/16W		
R149			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R150			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R151			RK73GB1J331J	CHIP R 330 J 1/16W		
R152			RK73GB1J101J	CHIP R 100 J 1/16W		
R153			RK73FB2A221J	CHIP R 220 J 1/10W		
R154			RK73FB2A224J	CHIP R 220K J 1/10W		
R155			R92-0670-05	CHIP R 0 OHM		

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PARTS LIST

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TX-RX UNIT (X57-4220-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R156			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R157			RK73GB1J101J	CHIP R 100 J 1/16W		
R158			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R159			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R160			RK73GB1J561J	CHIP R 560 J 1/16W		
R161			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R162,163			RK73FB2A223J	CHIP R 22K J 1/10W		
R164			RK73FB2A331J	CHIP R 330 J 1/10W		
R165			RK73GB1J103J	CHIP R 10K J 1/16W		
R166			RK73FB2A101J	CHIP R 100 J 1/10W		
R167			RK73GB1J101J	CHIP R 100 J 1/16W		
R168			RK73FB2A333J	CHIP R 33K J 1/10W		
R169			RK73GB1J271J	CHIP R 270 J 1/16W		
R170			RK73GB1J470J	CHIP R 47 J 1/16W		
R171			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R172			RK73GB1J823J	CHIP R 82K J 1/16W		
R173			RK73GB1J103J	CHIP R 10K J 1/16W		
R174			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R175-178			RK73FB2A330J	CHIP R 33 J 1/10W		
R179,180			RK73GB1J471J	CHIP R 470 J 1/16W		
R181,182			RK73FB2A101J	CHIP R 100 J 1/10W		
R183			RK73FB2A390J	CHIP R 39 J 1/10W		
R184			RK73FB2A101J	CHIP R 100 J 1/10W		
R185			RK73GB1J473J	CHIP R 47K J 1/16W		
R186-189			RK73FB2A330J	CHIP R 33 J 1/10W		
R190			RK73GB1J273J	CHIP R 27K J 1/16W		
R191			RK73GB1J103J	CHIP R 10K J 1/16W		
R193			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R194			RK73FB2A151J	CHIP R 150 J 1/10W		
R195			RK73FB2A560J	CHIP R 56 J 1/10W		
R196			RK73FB2A820J	CHIP R 82 J 1/10W		
R197			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R198			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R199			RK73GB1J101J	CHIP R 100 J 1/16W		
R200			RK73FB2A561J	CHIP R 560 J 1/10W		
R201-203			RK73FB2A330J	CHIP R 33 J 1/10W		
R204			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R205			RK73FB2A101J	CHIP R 100 J 1/10W		
R206			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R207			RK73FB2A473J	CHIP R 47K J 1/10W		
R208,209			RK73FB2A223J	CHIP R 22K J 1/10W		
R210			RK73FB2A471J	CHIP R 470 J 1/10W		
R211			R92-0670-05	CHIP R 0 OHM		
R212			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R213			RK73FB2A473J	CHIP R 47K J 1/10W		
R214			RK73GB1J103J	CHIP R 10K J 1/16W		
R215			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R216,217			RK73FB2A103J	CHIP R 10K J 1/10W		
R218			RK73FB2A471J	CHIP R 470 J 1/10W		
R219			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R220			RK73FB2A471J	CHIP R 470 J 1/10W		
R221,222			RK73GB1J104J	CHIP R 100K J 1/16W		
R223			RK73GB1J564J	CHIP R 560K J 1/16W		
R224,225			R92-1252-05	CHIP R 0 OHM		
R226			RK73GB1J102J	CHIP R 1.0K J 1/16W		

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TX-RX UNIT (X57-4220-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R227			RK73GB1J223J	CHIP R 22K J 1/16W		
R228			RK73GB1J123J	CHIP R 12K J 1/16W		
R229			RK73FB2A470J	CHIP R 47 J 1/10W		
R230			RK73GB1J473J	CHIP R 47K J 1/16W		
R231			RK73GB1J104J	CHIP R 100K J 1/16W		
R232			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R233			RK73FB2A104J	CHIP R 100K J 1/10W		
R234			RK73FB2A101J	CHIP R 100 J 1/10W		
R235			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R236			RK73FB2A681J	CHIP R 680 J 1/10W		
R237-241			RK73FB2A101J	CHIP R 100 J 1/10W		
R242,243			RK73FB2A221J	CHIP R 220 J 1/10W		
R244,245			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R246			RK73FB2A561J	CHIP R 560 J 1/10W		
R247			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R248			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R249			R92-1252-05	CHIP R 0 ΩHM		
R251			RK73GB1J222J	CHIP R 2.2K J 1/16W		
VR1			R12-6711-05	TRIMMING PΩT.4.7K		
VR2			R12-6719-05	TRIMMING PΩT.100K		
VR3			R12-6711-05	TRIMMING PΩT.4.7K		
VR4			R12-6713-05	TRIMMING PΩT.10K		
VR5			R12-3126-05	TRIMMING PΩT.10K		
VR6			R12-3132-05	TRIMMING PΩT.47K		
VR7			R12-3126-05	TRIMMING PΩT.10K		
VR8 ,9			R12-6713-05	TRIMMING PΩT.10K		
VR10			R12-6719-05	TRIMMING PΩT.100K		
VR11			R12-6713-05	TRIMMING PΩT.10K		
VR12			R12-6717-05	TRIMMING PΩT.47K		
VR13			R12-6707-05	TRIMMING PΩT.1K		
VR14			R12-4414-05	TRIMMING PΩT.50K		
VR15,16			R12-6713-05	TRIMMING PΩT.10K		
K1			S51-1436-05	RELAY		
D1			LFB01	DIΩDE		
D2			V08(G)	DIΩDE		
D3 ,4			RLS245	DIΩDE		
D5			V08(G)	DIΩDE		
D6			MI204	DIΩDE		
D7			LFB01	DIΩDE		
D8 -11			RLS135	DIΩDE		
D12			DAN235K	DIΩDE		
D13			1SS355	DIΩDE		
D14			DAN235K	DIΩDE		
D16 ,17			RLS135	DIΩDE		
D18			1SS226	DIΩDE		
D19			1SS355	DIΩDE		
D20		*	RD6.2M(B2)	DIΩDE		
D21 -23			RLS135	DIΩDE		
D24			1SS355	DIΩDE		
D25		*	RD4.7M(B2)	DIΩDE		
D26			1SS355	DIΩDE		
D27 ,28			DAN202K	DIΩDE		
D29 ,30			1SS355	DIΩDE		

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TX-RX UNIT (X57-4220-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D31			B30-2001-05	LED		
D32			RLS135	DIODE		
D33			LFB01	DIODE		
D34			1SS226	DIODE		
D35		*	RD6.2M(B2)	DIODE		
D36			RD10M(B2)	DIODE		
D37			1SS355	DIODE		
D38 ,39			DAN202K	DIODE		
D40			1SS355	DIODE		
D41			RLS135	DIODE		
D42			HSM88AS	DIODE		
D43			1SS355	DIODE		
D44			RLS135	DIODE		
D46			1SS355	DIODE		
IC2			KCD04	IC(FM IF)		
IC3		*	KCD08	IC		
IC4			BU4066BF	IC(ANALOG SWITCH X4)		
IC4			XRU4066BF	IC(ANALOG SWITCH)		
IC5			NJM2904M	IC(OP AMP X2)		
IC6			BU4066BF	IC(ANALOG SWITCH X4)		
IC6			XRU4066BF	IC(ANALOG SWITCH)		
IC7			UPC1241H	IC		
IC8			UPC1037HA	IC(DUBBLE BALANCE MODULATOR)		
IC9		*	UPD6345GS	IC		
IC10			UPC78N05H	IC(VOLTAGE REGULATOR/+8V)		
IC11		*	KCC08	IC		
IC12,13			TC9174F	IC(CMOS I/O EXTENSION)		
IC14		*	TA75S01F	IC		
Q1			DTA124EK	DIGITAL TRANSISTOR		
Q2			DTC124EK	DIGITAL TRANSISTOR		
Q3			2SA1213(Y)	TRANSISTOR		
Q4			DTC143TK	DIGITAL TRANSISTOR		
Q5 -10			2SK520(K44)	FET		
Q11			2SC2954	TRANSISTOR		
Q12			DTA124EK	DIGITAL TRANSISTOR		
Q13		*	2SC4728(S)	TRANSISTOR		
Q14 ,15			DTC143TK	DIGITAL TRANSISTOR		
Q16			2SA1213(Y)	TRANSISTOR		
Q17			3SK131(M)	FET		
Q18 ,19			2SK520(K43)	FET		
Q20		*	RU201	TRANSISTOR		
Q21			3SK131(M)	FET		
Q22			2SC2712(Y)	TRANSISTOR		
Q23		*	RU201	TRANSISTOR		
Q24			2SC2712(Y)	TRANSISTOR		
Q25			2SJ106(GR)	FET		
Q26			FMC1	TRANSISTOR		
Q27 ,28			DTC124EK	DIGITAL TRANSISTOR		
Q29			2SC2712(GR)	TRANSISTOR		
Q30			2SK210(GR)	FET		
Q31			2SA1162(Y)	TRANSISTOR		
Q32			FMC2	TRANSISTOR		
Q33			DTC124EK	DIGITAL TRANSISTOR		
Q34			2SC2712(Y)	TRANSISTOR		
Q35			2SD1757K	TRANSISTOR		

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TX-RX UNIT (X57-4220-11)
VCO (X58-4010-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
Q36 ,37			DTC143EK	DIGITAL TRANSISTOR		
Q38 ,39			2SC3722K(R)	TRANSISTOR		
Q40 -42			2SC2712(Y)	TRANSISTOR		
Q43			3SK131(M)	FET		
Q44 ,45		*	IMD3	TRANSISTOR		
Q46 -49			3SK131(M)	FET		
Q50			2SC2954	TRANSISTOR		
Q51			2SA1162(Y)	TRANSISTOR		
Q52 ,53			2SC2712(Y)	TRANSISTOR		
Q55 -58		*	FMA3	TRANSISTOR		
Q59			DTA124EK	DIGITAL TRANSISTOR		
Q60 ,61			DTC124EK	DIGITAL TRANSISTOR		
Q62			2SD1757K	TRANSISTOR		
Q63 ,64			DTC143TK	DIGITAL TRANSISTOR		
Q65			DTC114EK	DIGITAL TRANSISTOR		
Q66			FMC1	TRANSISTOR		
Q67			DTC124EK	DIGITAL TRANSISTOR		
S1		*	W02-1764-05	ENCODER		
TH1			157-502-53002	THERMISTOR		
TH2			157-501-53009	THERMISTOR		
TH3 ,4		*	157-102-53003	THERMISTOR		
TH5			157-502-53002	THERMISTOR		
TH6 ,7			157-302-53008	THERMISTOR		
TH8		*	157-102-53003	THERMISTOR		
TH9			157-103-55001	THERMISTOR		
-		*	X59-3990-00	MODULE UNIT		
-		*	X59-4000-00	MODULE UNIT		
-		*	X59-4010-00	MODULE UNIT		
VCO (X58-4010-00)						
C1			CK73GB1H102K	CHIP C 1000PF K		
C2			CC73GCH1H390J	CHIP C 39PF J		
C3			CC73GCH1H150J	CHIP C 15PF J		
C5			CC73GCH1H110J	CHIP C 11PF J		
C6			CC73GCH1H180J	CHIP C 18PF J		
C7			CC73GCH1H100D	CHIP C 10PF D		
C8			CK73GB1H102K	CHIP C 1000PF K		
C9			CC73GCH1H050C	CHIP C 5PF C		
C10 ,11			CK73GB1H102K	CHIP C 1000PF K		
C12			CC73GCH1H330J	CHIP C 33PF J		
C13			CC73GCH1H100D	CHIP C 10PF D		
C15			CC73GCH1H090D	CHIP C 9PF D		
C16			CC73GCH1H160J	CHIP C 16PF J		
C17			CC73GCH1H090D	CHIP C 9PF D		
C18			CK73GB1H102K	CHIP C 1000PF K		
C19			CC73GCH1H050C	CHIP C 5PF C		
C20 ,21			CK73GB1H102K	CHIP C 1000PF K		
C22			CC73GCH1H180J	CHIP C 18PF J		
C23			CC73GCH1H100D	CHIP C 10PF D		
C25			CC73GCH1H070D	CHIP C 7PF D		
C26			CC73GCH1H120J	CHIP C 12PF J		
C27			CC73GCH1H080D	CHIP C 8PF D		
C28			CK73GB1H102K	CHIP C 1000PF K		
C29			CC73GCH1H050C	CHIP C 5PF C		
C30 -37			CK73GB1H102K	CHIP C 1000PF K		

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TS-50S

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VCO (X58-4010-00)
DDS (X58-4020-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
TC1 -3			C05-0375-05	TRIMMER CAPACITOR		
CN1			E40-5201-05	PIN CONNECTOR (7P)		
-		*	F10-2060-04	SHIELDING COVER		
-		*	F10-2061-04	SHIELDING CASE		
-		*	G13-1395-04	CUSHION		
L1			L40-6882-48	SMALL FIXED INDUCTOR (0.68UH)		
L2		*	L34-2360-05	COIL		
L3			L40-6882-48	SMALL FIXED INDUCTOR (0.68UH)		
L4		*	L34-2359-05	COIL		
L5			L40-6882-48	SMALL FIXED INDUCTOR (0.68UH)		
L6		*	L34-2359-05	COIL		
-			N30-2606-46	PAN HEAD MACHIN SCREW		
R1			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R2			RK73GB1J271J	CHIP R 270 J 1/16W		
R3			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R4			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R5			RK73GB1J271J	CHIP R 270 J 1/16W		
R6			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R7			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R8			RK73GB1J271J	CHIP R 270 J 1/16W		
R9 ,10			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R11			RK73GB1J560J	CHIP R 56 J 1/16W		
R12 ,13			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R14			RK73GB1J471J	CHIP R 470 J 1/16W		
R15 -17			RK73GB1J472J	CHIP R 4.7K J 1/16W		
D1			1SV166	DIODE		
D2			RLS135	DIODE		
D3			1SV166	DIODE		
D4			RLS135	DIODE		
D5			1SV166	DIODE		
D6			RLS135	DIODE		
Q1			2SK508NV(K52)	FET		
Q2			DTC114EU	DIGITAL TRANSISTOR		
Q3			2SK508NV(K52)	FET		
Q4			DTC114EU	DIGITAL TRANSISTOR		
Q5			2SK508NV(K52)	FET		
Q6			DTC114EU	DIGITAL TRANSISTOR		
Q7			2SC2714(Y)	TRANSISTOR		
DDS (X58-4020-00)						
C1			CK73FB1E223K	CHIP C 0.022UF K		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3 ,4			C92-0007-05	CHIP TAN 2.2UF 10WV		
C5			CK73FB1H102K	CHIP C 1000PF K		
C6			CC73FCH1H181J	CHIP C 180PF J		
C7			CC73FCH1H100D	CHIP C 10PF D		
C8			CC73FCH1H221J	CHIP C 220PF J		
C9			CC73FCH1H220J	CHIP C 22PF J		
C10			CC73FCH1H151J	CHIP C 150PF J		
C12 ,13			CC73FCH1H270J	CHIP C 27PF J		
C14 -17			CC73FCH1H101J	CHIP C 100PF J		

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DDS (X58-4020-00)
ALC (X59-3990-00)
DSST (X59-4000-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
CN1		*	E40-5612-05	PIN CONNECTOR (8P)		
CN2		*	E40-5611-05	PIN CONNECTOR (2P)		
L1 -3			L40-1011-48	SMALL FIXED INDUCTOR(100UH)		
L4 ,5			L40-2201-48	SMALL FIXED INDUCTOR(22UH)		
CP1 ,2			R90-0721-05	MULTIPLE COMPONENTS (R)		
R1			RK73FB2A103J	CHIP R 10K J 1/10W		
R2			RK73FB2A153J	CHIP R 15K J 1/10W		
R3			RK73FB2A221J	CHIP R 220 J 1/10W		
R4			RK73FB2A101J	CHIP R 100 J 1/10W		
R5			RK73FB2A471J	CHIP R 470 J 1/10W		
IC1			F71022	IC(DDS)		
Q1			2SC2712(GR)	TRANSISTOR		
ALC (X59-3990-00)						
C1			CK73GB1E103K	CHIP C 0.010UF K		
C2			CK73EF1E474Z	CHIP C 0.47UF Z		
C3			CK73FB1E104K	CHIP C 0.10UF K		
C4			CK73GB1E103K	CHIP C 0.010UF K		
C5			CK73FB1E473K	CHIP C 0.047UF K		
C6			CK73FB1E104K	CHIP C 0.10UF K		
R1			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R2			RK73GB1J473J	CHIP R 47K J 1/16W		
R3			RK73GB1J223J	CHIP R 22K J 1/16W		
R4 -6			RK73GB1J473J	CHIP R 47K J 1/16W		
R7			RK73GB1J330J	CHIP R 33 J 1/16W		
R8			RK73GB1J222J	CHIP R 2.2K J 1/16W		
D1			DAP202K	DIODE		
D2			1SS355	DIODE		
Q1			FMC2	DIODE		
Q2			2SC2712(Y)	TRANSISTOR		
DSST (X59-4000-00)						
C1 ,2			CK73GB1H102K	CHIP C 1000PF K		
C11			C92-0509-05	TANTAL 10UF 6.3WV		
C12			CK73FB1E223K	CHIP C 0.022UF K		
C13 -16			CK73FB1E123K	CHIP C 0.012UF K		
C17 -19			CK73FB1E223K	CHIP C 0.022UF K		
C20			C92-0009-05	CHIP TAN 4.7UF 10WV		
R1 ,2			RK73GB1J681J	CHIP R 680 J 1/16W		
R3			RK73GB1J103J	CHIP R 10K J 1/16W		
R4 ,5			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R11 ,12			RK73GB1J823J	CHIP R 82K J 1/16W		
R13			RK73GB1J223J	CHIP R 22K J 1/16W		
R14			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R15			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R16			RK73GB1J103J	CHIP R 10K J 1/16W		
R17 ,18			RK73GB1J333J	CHIP R 33K J 1/16W		
R19			RK73GB1J103J	CHIP R 10K J 1/16W		
R20			RK73GB1J333J	CHIP R 33K J 1/16W		
R21			RK73GB1J183J	CHIP R 18K J 1/16W		
R22			RK73GB1J101J	CHIP R 100 J 1/16W		
D11 -13			1SS355	DIODE		

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TS-50S

PARTS LIST

* New Parts
Parts without **Parts No.** are not supplied.
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Teile ohne **Parts No.** werden nicht geliefert.

DSST (X59-4000-00)
LP BPF (X59-4010-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
Q1 ,2			2SA1213(Y)	TRANSISTOR		
Q3 -5			DTC143TK	DIGITAL TRANSISTOR		
Q11			2SC2712(GR)	TRANSISTOR		
LP BPF (X59-4010-00)						
C1			CK73GB1H222K	CHIP C 2200PF K		
C2			CK73GB1H472K	CHIP C 4700PF K		
C3			CK73GB1H222K	CHIP C 2200PF K		
C4 ,5			CK73GB1E103K	CHIP C 0.010UF K		
C6			CK73EF1C105Z	CHIP C 1.0UF Z		
C6			CK73EF1C105Z	CHIP C 1.0UF Z		
C11			CK73GB1H392K	CHIP C 3900PF K		
C12			CK73GB1H102K	CHIP C 1000PF K		
C13			CK73GB1H392K	CHIP C 3900PF K		
C14			CK73EB1E104K	CHIP C 0.10UF K		
C15 ,16			CK73GB1H102K	CHIP C 1000PF K		
C17			CK73EB1E104K	CHIP C 0.10UF K		
C21			CK73GB1H222K	CHIP C 2200PF K		
C22		*	CC73GSL1H471J	CHIP C 470PF J		
C23			CK73GB1H222K	CHIP C 2200PF K		
C24			CK73EB1E104K	CHIP C 0.10UF K		
C25 ,26			CK73GB1H102K	CHIP C 1000PF K		
C27			CK73EB1E104K	CHIP C 0.10UF K		
C31			CK73GB1H102K	CHIP C 1000PF K		
C32		*	CC73GSL1H331J	CHIP C 330PF J		
C33			CK73GB1H102K	CHIP C 1000PF K		
C34			CK73EB1E104K	CHIP C 0.10UF K		
C35 ,36			CK73GB1H102K	CHIP C 1000PF K		
C37			CK73EB1E104K	CHIP C 0.10UF K		
C41			CK73GB1H821K	CHIP C 820PF K		
C42			CC73GCH1H121J	CHIP C 120PF J		
C43			CK73GB1H821K	CHIP C 820PF K		
C44			CK73EB1E104K	CHIP C 0.10UF K		
C45 ,46			CK73GB1H102K	CHIP C 1000PF K		
C47			CK73EB1E104K	CHIP C 0.10UF K		
C51			CK73GB1H681K	CHIP C 680PF K		
C52			CC73GCH1H820J	CHIP C 82PF J		
C53			CK73GB1H681K	CHIP C 680PF K		
C54			CK73EB1E104K	CHIP C 0.10UF K		
C55 ,56			CK73GB1H102K	CHIP C 1000PF K		
C57			CK73EB1E104K	CHIP C 0.10UF K		
C61		*	CC73GSL1H331J	CHIP C 330PF J		
C62			CC73GCH1H680J	CHIP C 68PF J		
C63		*	CC73GSL1H331J	CHIP C 330PF J		
C64			CK73EB1E104K	CHIP C 0.10UF K		
C65 ,66			CK73GB1H102K	CHIP C 1000PF K		
C67			CK73EB1E104K	CHIP C 0.10UF K		
C71			CC73GSL1H221J	CHIP C 220PF J		
C72			CC73GCH1H470J	CHIP C 47PF J		
C73			CC73GSL1H221J	CHIP C 220PF J		
C74			CK73EB1E104K	CHIP C 0.10UF K		
C75 ,76			CK73GB1H102K	CHIP C 1000PF K		
C77			CK73EB1E104K	CHIP C 0.10UF K		
L1 ,2		*	L40-6892-48	SMALL FIXED INDUCTOR(6.8UH)		
L3			L33-0695-05	CHOKE COIL		

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LP BPF (X59-4010-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
L11		*	L40-1892-48	SMALL FIXED INDUCTOR(1.8UH)		
L12		*	L40-6892-48	SMALL FIXED INDUCTOR(6.8UH)		
L13		*	L40-1892-48	SMALL FIXED INDUCTOR(1.8UH)		
L21		*	L40-1592-48	SMALL FIXED INDUCTOR(1.5UH)		
L22		*	L40-5692-48	SMALL FIXED INDUCTOR(5.6UH)		
L23		*	L40-1592-48	SMALL FIXED INDUCTOR(1.5UH)		
L31			L40-1092-48	SMALL FIXED INDUCTOR(1UH)		
L32		*	L40-2792-18	SMALL FIXED INDUCTOR(2.7UH)		
L33			L40-1092-48	SMALL FIXED INDUCTOR(1UH)		
L41			L40-4782-48	SMALL FIXED INDUCTOR(0.47UH)		
L42		*	L40-2792-18	SMALL FIXED INDUCTOR(2.7UH)		
L43		*	L40-4782-48	SMALL FIXED INDUCTOR(0.47UH)		
L51			L40-3382-48	SMALL FIXED INDUCTOR(0.33UH)		
L52		*	L40-1892-18	SMALL FIXED INDUCTOR(1.8UH)		
L53			L40-3382-48	SMALL FIXED INDUCTOR(0.33UH)		
L61			L40-2782-48	SMALL FIXED INDUCTOR(0.27UH)		
L62		*	L40-1292-18	SMALL FIXED INDUCTOR(1.2UH)		
L63			L40-2782-48	SMALL FIXED INDUCTOR(0.27UH)		
L71			L40-2782-48	SMALL FIXED INDUCTOR(0.27UH)		
L72			L40-8282-48	SMALL FIXED INDUCTOR(0.82UH)		
L73			L40-2782-48	SMALL FIXED INDUCTOR(0.27UH)		
R1			RK73GB1J471J	CHIP R 470 J 1/16W		
R2			RK73EB2B151J	CHIP R 150 J 1/8W		
R3			RK73GB1J103J	CHIP R 10K J 1/16W		
R4			R92-0670-05	CHIP R 0 OHM		
R11			RK73EB2B330J	CHIP R 33 J 1/8W		
R12			RK73EB2B121J	CHIP R 120 J 1/8W		
R13			RK73GB1J103J	CHIP R 10K J 1/16W		
R21			RK73EB2B330J	CHIP R 33 J 1/8W		
R22			RK73EB2B121J	CHIP R 120 J 1/8W		
R23			RK73GB1J103J	CHIP R 10K J 1/16W		
R31			RK73EB2B330J	CHIP R 33 J 1/8W		
R32			RK73EB2B121J	CHIP R 120 J 1/8W		
R33			RK73GB1J103J	CHIP R 10K J 1/16W		
R41			RK73EB2B330J	CHIP R 33 J 1/8W		
R42			RK73EB2B121J	CHIP R 120 J 1/8W		
R43			RK73GB1J103J	CHIP R 10K J 1/16W		
R51			RK73EB2B330J	CHIP R 33 J 1/8W		
R52			RK73EB2B121J	CHIP R 120 J 1/8W		
R53			RK73GB1J103J	CHIP R 10K J 1/16W		
R61			RK73EB2B330J	CHIP R 33 J 1/8W		
R62			RK73EB2B121J	CHIP R 120 J 1/8W		
R63			RK73GB1J103J	CHIP R 10K J 1/16W		
R71			RK73EB2B330J	CHIP R 33 J 1/8W		
R72			RK73EB2B121J	CHIP R 120 J 1/8W		
R73			RK73GB1J103J	CHIP R 10K J 1/16W		
D1 ,2			RLS135	DIODE		
D11 ,12			RLS135	DIODE		
D21 ,22			RLS135	DIODE		
D31 ,32			RLS135	DIODE		
D41 ,42			RLS135	DIODE		
D51 52			RLS135	DIODE		
D61 ,62			RLS135	DIODE		
D71 ,72			RLS135	DIODE		

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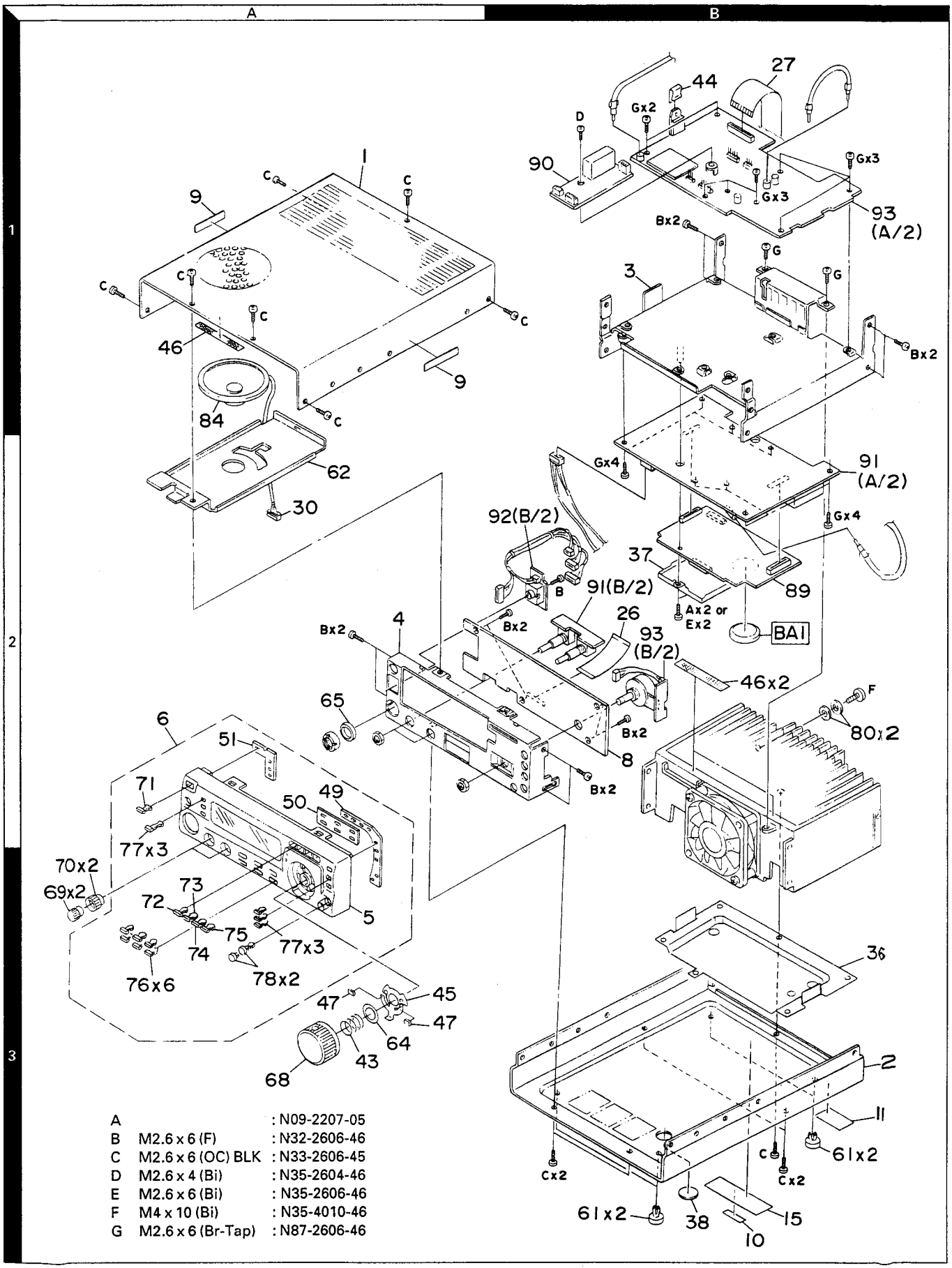
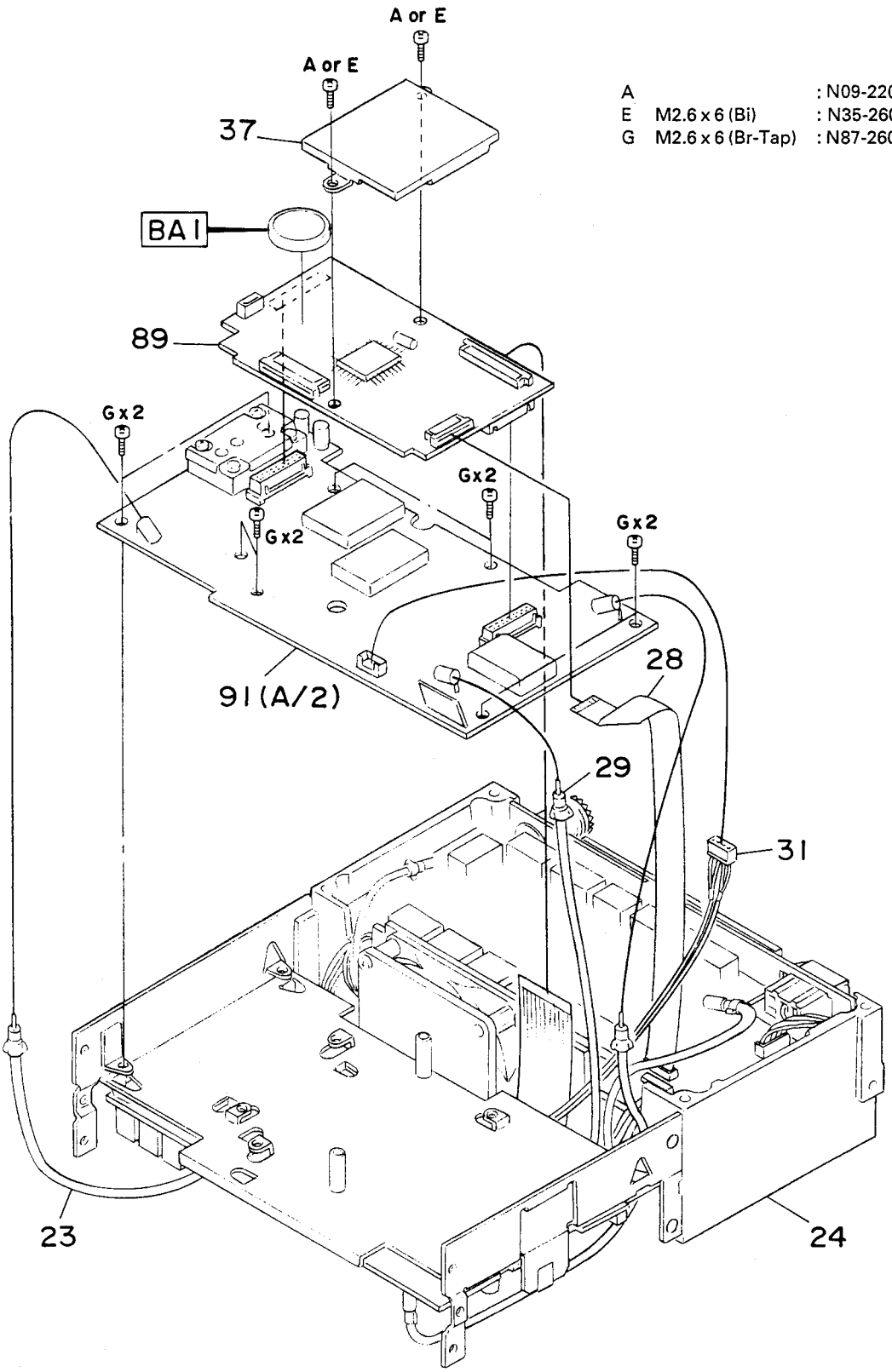
TS-50S

EXPLODED VIEW



A		: N09-2207-05
B	M2.6 x 6 (F)	: N32-2606-46
C	M2.6 x 6 (OC) BLK	: N33-2606-45
D	M2.6 x 4 (Bi)	: N35-2604-46
E	M2.6 x 6 (Bi)	: N35-2606-46
F	M4 x 10 (Bi)	: N35-4010-46
G	M2.6 x 6 (Br-Tap)	: N87-2606-46

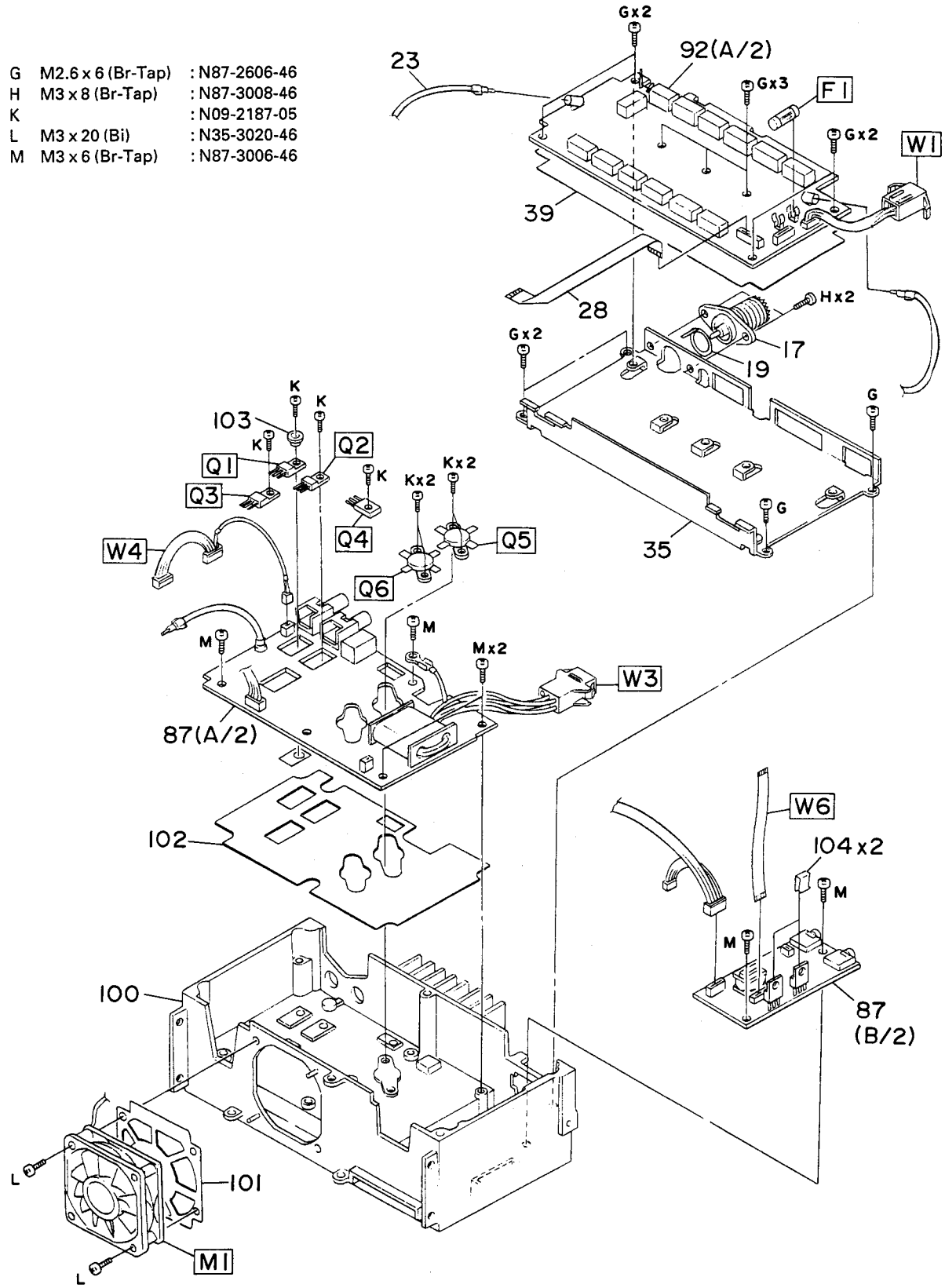
EXPLODED VIEW



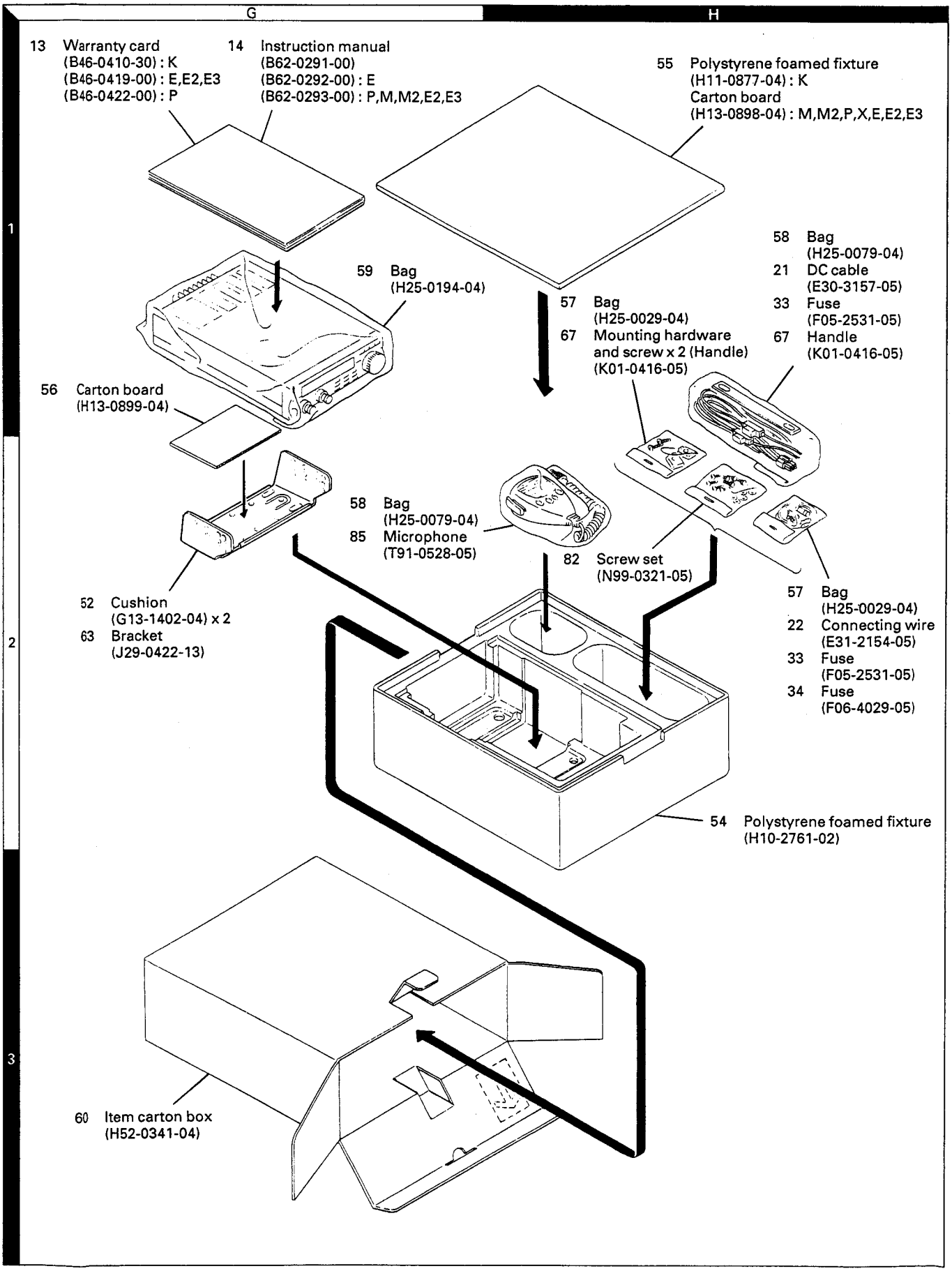
TS-50S

EXPLODED VIEW

G	M2.6 x 6 (Br-Tap)	: N87-2606-46
H	M3 x 8 (Br-Tap)	: N87-3008-46
K		: N09-2187-05
L	M3 x 20 (Bi)	: N35-3020-46
M	M3 x 6 (Br-Tap)	: N87-3006-46



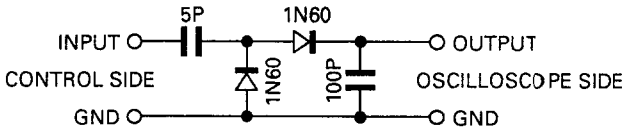
PACKING


G
H
1
2
3
13 Warranty card
(B46-0410-30) : K
(B46-0419-00) : E,E2,E3
(B46-0422-00) : P
14 Instruction manual
(B62-0291-00)
(B62-0292-00) : E
(B62-0293-00) : P,M,M2,E2,E3
55 Polystyrene foamed fixture
(H11-0877-04) : K
Carton board
(H13-0898-04) : M,M2,P,X,E,E2,E3
59 Bag
(H25-0194-04)
57 Bag
(H25-0029-04)
67 Mounting hardware
and screw x 2 (Handle)
(K01-0416-05)
58 Bag
(H25-0079-04)
21 DC cable
(E30-3157-05)
33 Fuse
(F05-2531-05)
67 Handle
(K01-0416-05)
56 Carton board
(H13-0899-04)
58 Bag
(H25-0079-04)
85 Microphone
(T91-0528-05)
82 Screw set
(N99-0321-05)
52 Cushion
(G13-1402-04) x 2
63 Bracket
(J29-0422-13)
57 Bag
(H25-0029-04)
22 Connecting wire
(E31-2154-05)
33 Fuse
(F05-2531-05)
34 Fuse
(F06-4029-05)
54 Polystyrene foamed fixture
(H10-2761-02)
60 Item carton box
(H52-0341-04)

ADJUSTMENT

Required Test Equipment

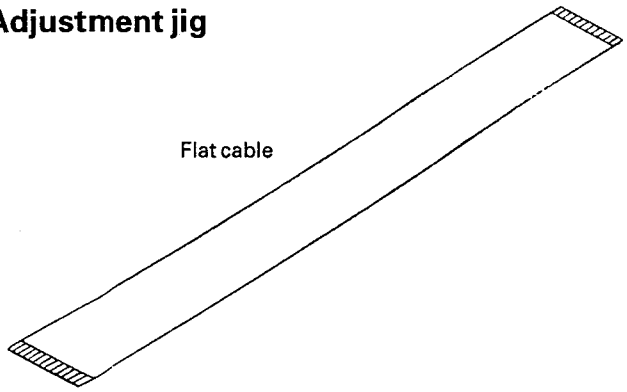
1. **DC Voltmeter (DC V.M)**
   1) Input resistance : More than 1MΩ
   2) Voltage range : 1.5 to 1000V AC/DC
   Note : A high-precision multimeter maybe used. However, accurate readings can not be obtained for high-impedance circuits.
2. **AC Ammeter**
   1) Current range : 1.5A, 3A, 20A, High-precision ammeter may be used.
3. **RF VTVM (RF V.M)**
   1) Input impedance : 1MΩ and less than 3pF, min.
   2) Voltage range : 10mV to 300V
   3) Frequency range : 10kHz to 100MHz or greate.
4. **AF Voltmeter (AF V.M)**
   1) Frequency range : 50Hz to 10kHz
   2) Input resistance : 1MΩ or greater
   3) Voltage range : 10mV to 30V
5. **AF Generator (AG)**
   1) Frequency range : 200Hz to 5kHz
   2) Output : 1mV or less to 1V, low distortion
6. **AF Dummy Load**
   1) Impedance : 8Ω
   2) Dissipation : 3W or greater
7. **Oscilloscope (SCOPE)**
   Vertical amplifier which has frequency characteristics higher than 100MHz.
   Requires high sensitivity, and external synchronization capabiliity.
8. **Tracking Generator**
   1) Center frequency : 50kHz to 90MHz
   2) Frequency deviation : Maximum ±35MHz
   3) Output voltage : 0.1V or greater
   4) Sweep rate : At least 0.5sec/cm
9. **Standard Signal Generator (SSG)**
   1) Frequency range : 50kHz to 500MHz
   2) Output : –20dB/0.1μV to 120dB/1V
   3) Output impedance : 50Ω
   4) AM and FM modulation can be possible
   Note : Generator must be frequency stable.
10. **Frequency Counter (f. counter)**
    1) Minimum input voltage : 50mV
    2) Frequency range : 500MHz or greater
    3) Output impedance : 50Ω
11. **Noise Generator**
    Must generate ignition noise containing harmonics beyond 30MHz.
12. **RF Dummy Load**
    1) Impedance : 150Ω
    2) Dissipation : 150W or greater
13. **Power Meter**
    1) Impedance : 50Ω
    2) Dissipation : 150W continuous or greater
    3) Frequency limits : 60MHz or greater
14. **Spectrum Analyzer**
    1) Frequency range : 100kHz to 500MHz or greater
    2) Bandwidth : 1kHz to 3MHz
15. **Detector**
    1) For adjustment of PLL/VCO BPF

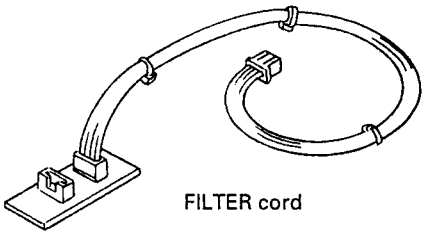


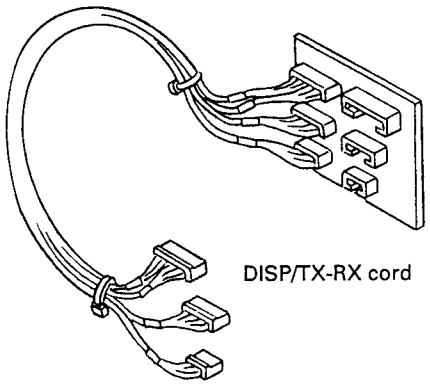
16. **Directional Coupler**
17. **Power Supply**
    PS-33, PS-53
18. **Microphone**
    MC-47
19. **Adjustment jig**

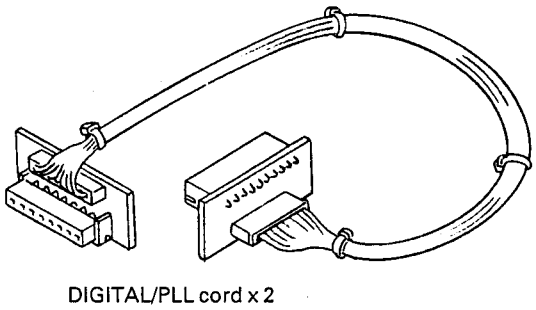
ADJUSTMENT

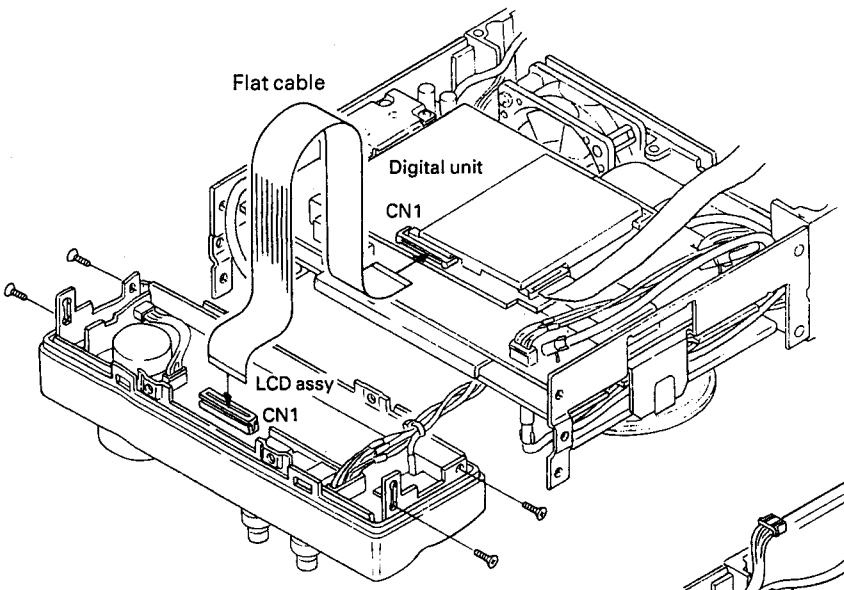
Adjustment jig

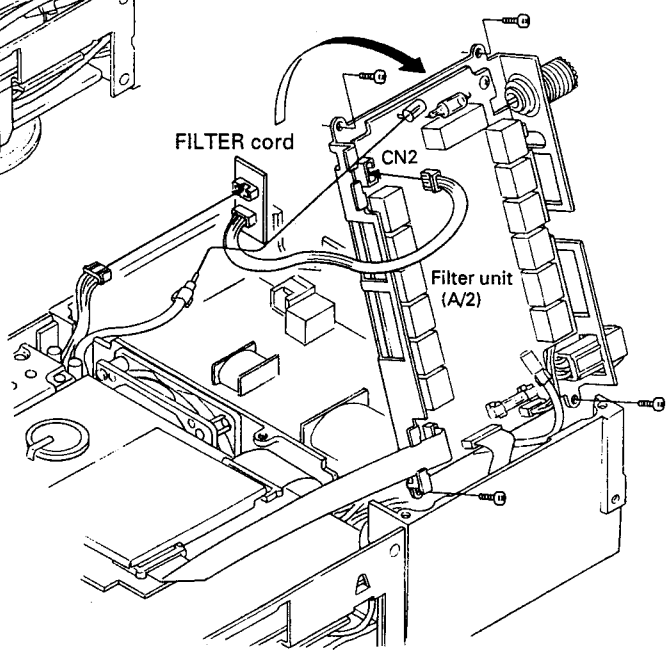




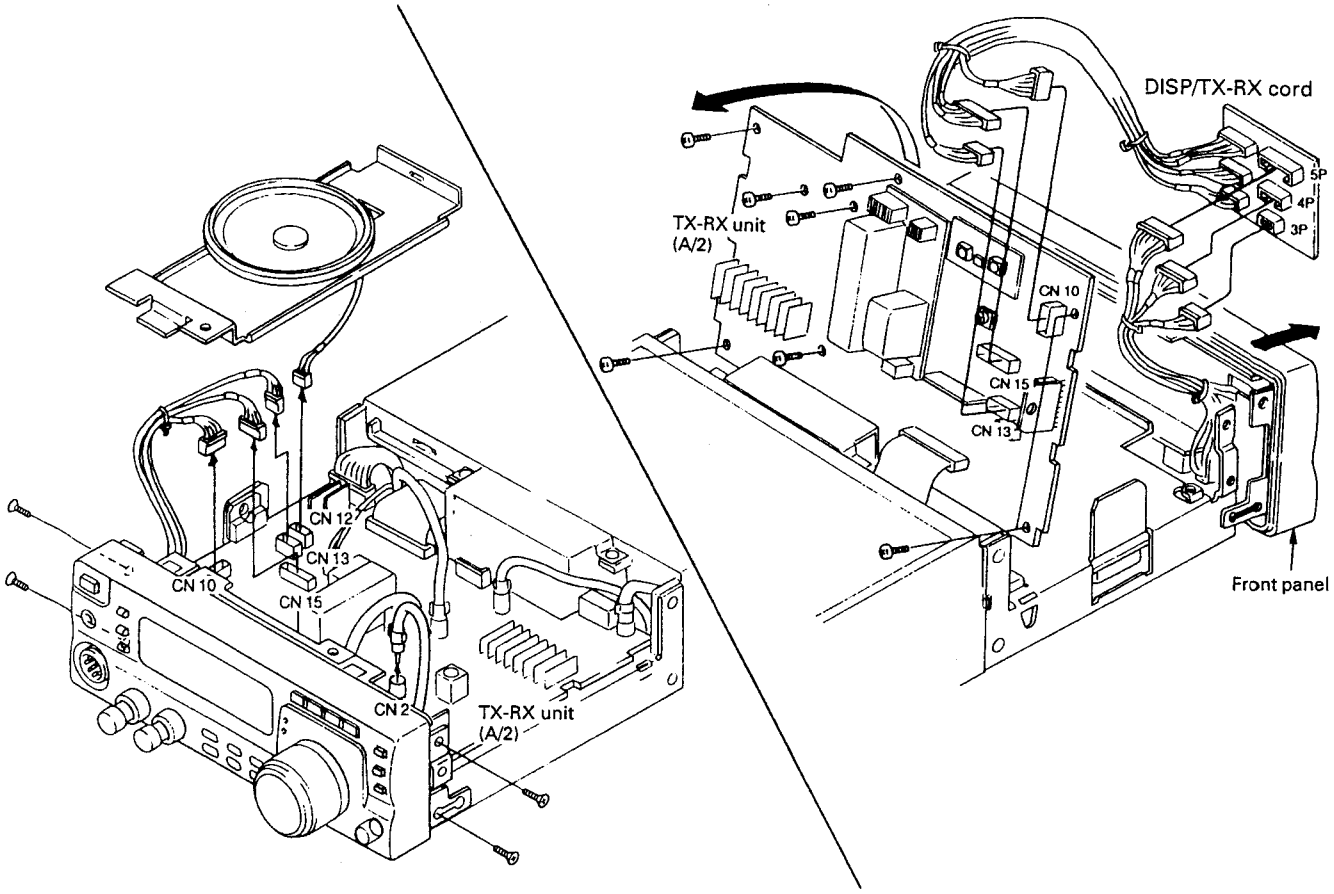


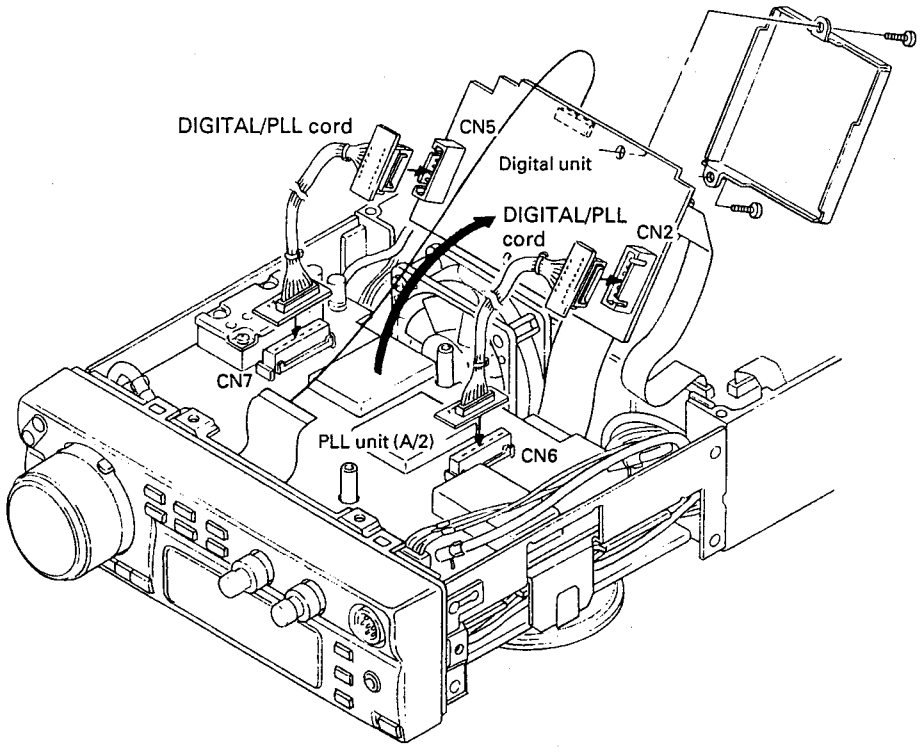






ADJUSTMENT


DISP/TX-RX cord
5P
4P
3P
TX-RX unit
(A/2)
CN 10
CN 15
CN 13
Front panel
CN 12
CN 13
CN 10
CN 15
CN 2
TX-RX unit
(A/2)


DIGITAL/PLL cord
CN5
Digital unit
DIGITAL/PLL
cord
CN2
CN7
PLL unit (A/2)
CN6

ADJUSTMENT

Service Adjustment Mode

- **Functions**

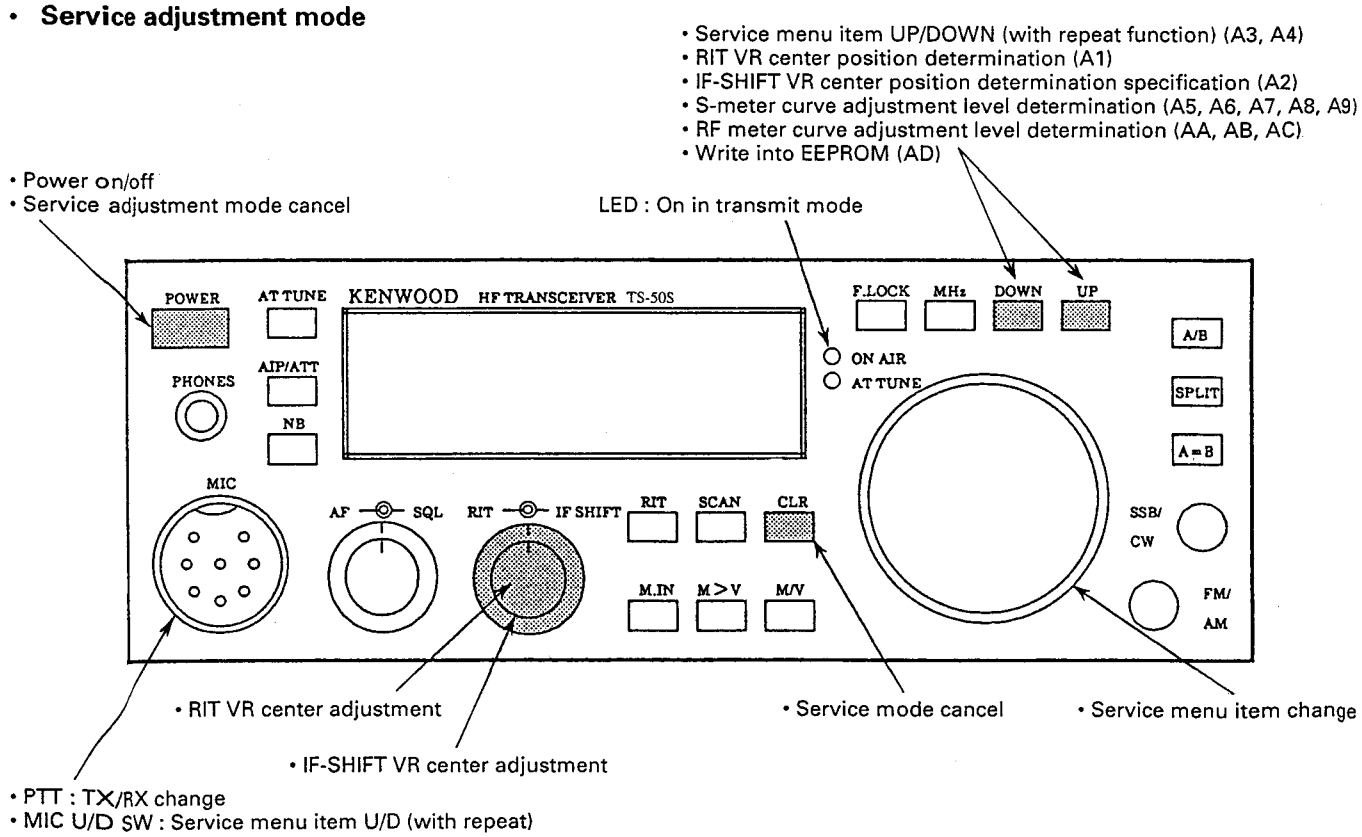
1) Only the adjustment items on the service adjustment mode menu are set in service adjustment mode.
2) Adjusted data items A1 to AC in service adjustment mode are stored in the EEPROM.
3) When you enter service adjustment mode, data is read from the EEPROM into the RAM of the microcomputer. You can then modify the settings.
4) The EEPROM is updated only when a write operation is performed with the UP/DOWN key when in menu AD.
5) Two sets of the same data are written into the EEPROM to check whether the data has been written correctly. Data may not be written correctly if the power is turned off during writing.
6) When the power is turned on, the two sets of data are compared. If they are not the same, "Error" is displayed, not HELLO, and the default values for the unmatched data are used.
7) Adjusted menu numbers are backed up.
8) The following items are changed as shown to perform adjustment correctly in service adjustment mode. (When service adjustment mode ends, the original state returns.)
   IF SHIFT → Center (0Hz)
   RIT → OFF
   AIP, ATT → OFF
   NB → OFF
   AGC → FAST
   Transmit/receive carrier point correction → Center (0Hz)
   Power → Hi
   Filter FM mode (RX) → OFF
   Other mode → 2.4k
9) A short tone is output when an item is changed with the UP/DOWN key. It is not output when repeating.

- **Setting**

1) Hold down the NB and MHz keys and switch the power on. (Turn the encoder to change the menu number.)
2) When the UP or DOWN key is pressed, the menu number is set.
3) Menu numbers A1 to A9 and AA to AC can be used in adjustment mode.
4) Press the CLR key to cancel adjustment mode. (It is also canceled when the power is turned off.)

Panel Operation

- **Service adjustment mode**



ADJUSTMENT

Service Adjustment Mode Menu

Menu No.	Menu contents	State (display)	Initial value
A0	Checksum display	-	-
A1	RIT VR machine center correction	00~FF	80
A2	IF-SHIFT VR machine center correction	00~FF	80
A3	LSB carrier point adjustment	-400~+400	0
A4	USB carrier point adjustment	-400~+400	0
A5	S-meter curve adjustment (non- FM) S1	00~FF	2E
A6	S-meter curve adjustment (non- FM) S9	00~FF	73
A7	S-meter curve adjustment (non- FM) Full scale	00~FF	C2
A8	S-meter curve adjustment (FM) Start	00~FF	91
A9	S-meter curve adjustment (FM) Full scale	00~FF	CC
AA	RF meter curve adjustment (low)	00~FF	3C
AB	RF meter curve adjustment (middle)	00~FF	80
AC	RF meter curve adjustment (high)	00~FF	B1
AD	Write into EEPROM	ready run good error	ready
AE	All LCD segments on	All segments on	All segments on

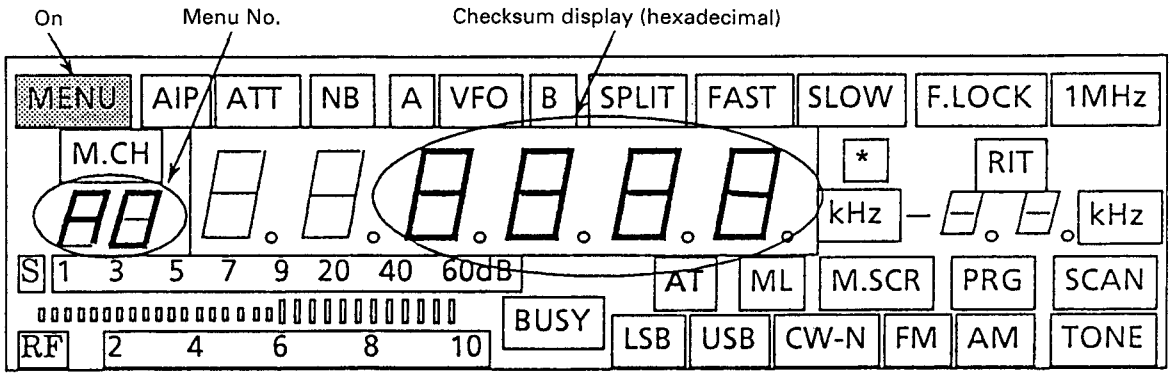
A0 : Checksum Display

- **Adjustment function**

  Displays the version of the installed program.

  Displays the two low-order bytes of the checksum obtained by adding all program codes.

- **Display**



All other indicators are off.

ADJUSTMENT

A1 : RIT VR Mechanical Center Correction

- **Adjustment function**

Input the RIT control center position to the microcomputer so that the RIT frequency is zero when the RIT control is at its center position.

- **Adjustment procedure**

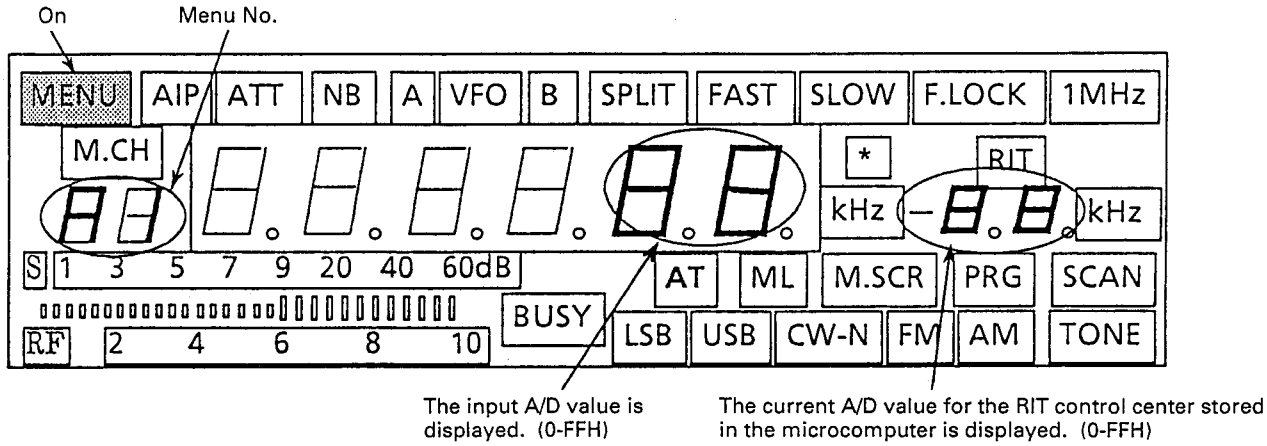
1. Set the RIT control to its center position.
2. Press the UP or DOWN key.

- **Remarks**

The center can be input unconditionally without pressing the UP/DOWN key. However, the UP/DOWN key must be pressed to prevent this menu item data from being modified accidentally when the RIT control is not at the center position.

When the UP/DOWN key is pressed, data is updated and the two displays match.

- **Display**



A2 : IF-SHIFT VR Mechanicale Center Correction

- **Adjustment function**

Input the IF-SHIFT control center position to the microcomputer so that the IF-SHIFT frequency is zero when the IF-SHIFT control is at its center position.

- **Adjustment procedure**

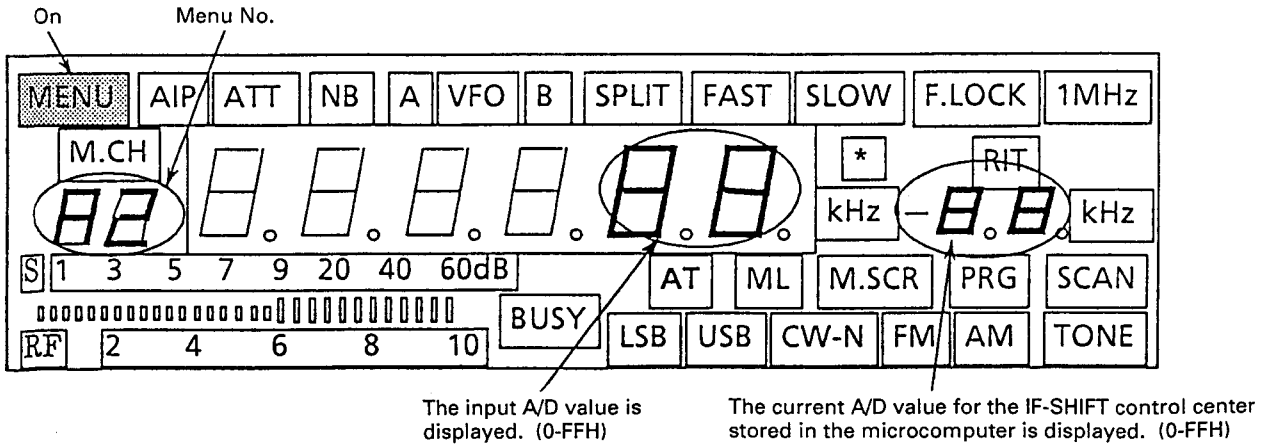
1. Set the IF-SHIFT control to its center position.
2. Press the UP or DOWN key.

- **Remarks**

The center can be input unconditionally without pressing the UP/DOWN key. However, the UP/DOWN key must be pressed to prevent this menu item data from being modified accidentally when the IF-SHIFT control is not at the center position.

When the UP/DOWN key is pressed, data is updated and the two displays match.

- **Display**



ADJUSTMENT

A3 : LSB Carrier Point Adjustment

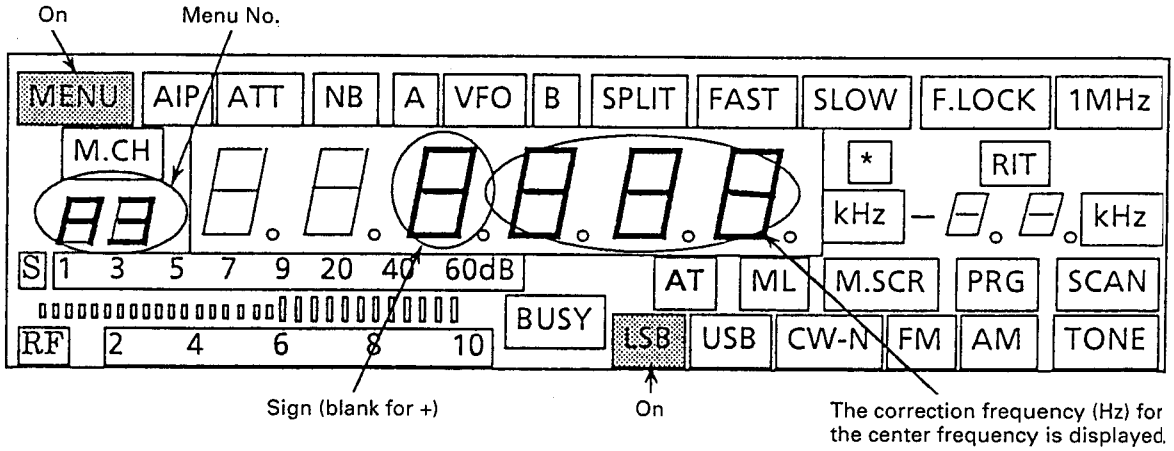
- **Adjustment function**

Adjust the carrier point in 10-Hz steps to correct variations in the center frequency of the IF filter in LSB mode.

- **Adjustment procedure**

1. Press the PTT button to enter transmit mode.
2. Change the correction frequency with the UP/DOWN key or MIC UP/DOWN key.

- **Display**



- **Remarks**

The plus sign (+) indicates the direction of moving away from the carrier. (Same as IF-SHIFT)

The frequency and mode are forcibly changed to 14.2MHz and LSB.

A4 : USB Carrier Point Adjustment

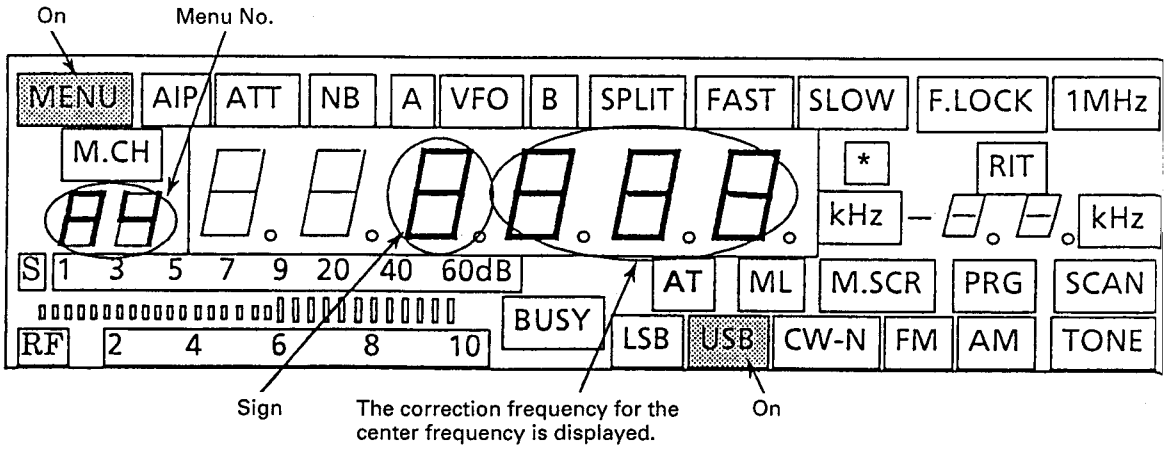
- **Adjustment function**

Adjust the carrier point in 10-Hz steps to correct variations in the center frequency of the IF filter in USB mode.

- **Adjustment procedure**

1. Press the PTT button to enter transmit mode.
2. Change the correction frequency with the UP/DOWN key or MIC UP/DOWN key.

- **Display**



- **Remarks**

The plus sign (+) indicates the direction of moving away from the carrier. (Same as IF-SHIFT)

The frequency and mode are forcibly changed to 14.2MHz and USB.

ADJUSTMENT

A5 : S-meter Curve Adjustment (S1) (non- FM)

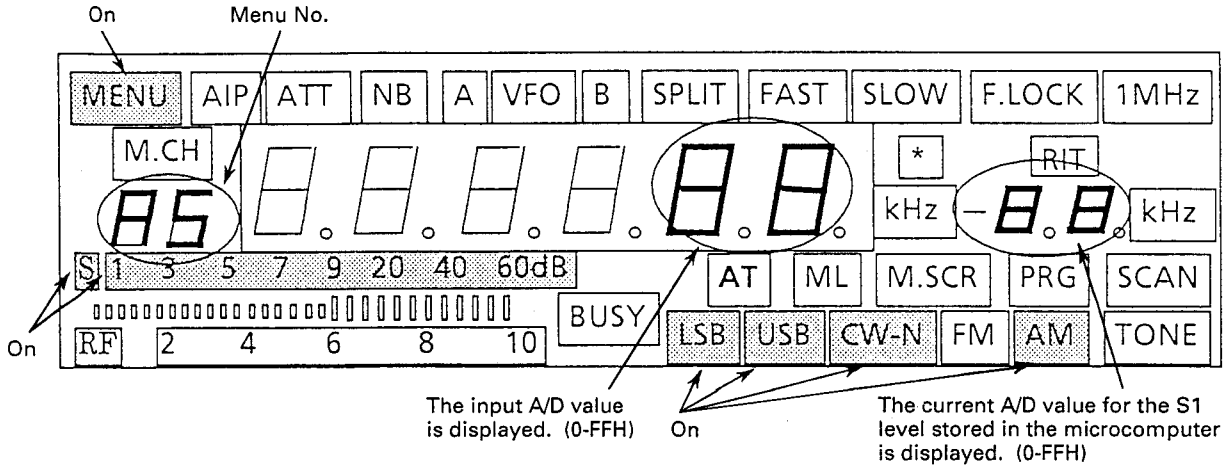
- **Adjustment function**

Input the S-meter voltage at which two bars of the S-meter light to the microcomputer to correct variations in the S1 level of the S-meter.

- **Adjustment procedure**

1. Input the specified level with the signal generator.
2. Press the UP or DOWN key.

- **Display**



- **Remarks**

The threshold is the input level minus the fixed value (6). When the input signal exceeds the threshold, one bar of the S-meter lights. The curve between S1 and S9 is obtained from the level for menus A5 and A6 by line approximation. Only the A/D values for the S1, S9, and full-scale levels are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are forcibly changed to 14.1MHz and USB.

A6 : S-meter Curve Adjustment (S9) (non- FM)

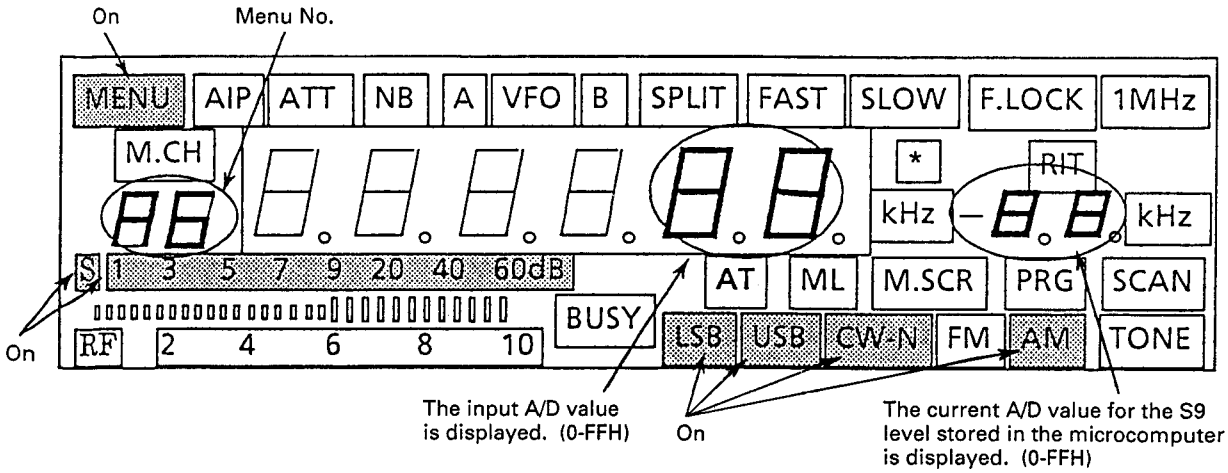
- **Adjustment function**

Input the S-meter voltage that indicates S9 (the first large segment) to correct variations in the S9 level of the S-meter.

- **Adjustment procedure**

1. Input the specified level with the signal generator.
2. Press the UP or DOWN key.

- **Display**



- **Remarks**

The curve between S1 and S9 is obtained from the level for menus A5 and A6 by line approximation. The curve between S9 and full scale is obtained from the level for menus A6 and A7 by line approximation. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are forcibly changed to 14.1MHz and USB.

ADJUSTMENT

A7 : S-meter Curve Adjustment (Full scale) (non- FM)

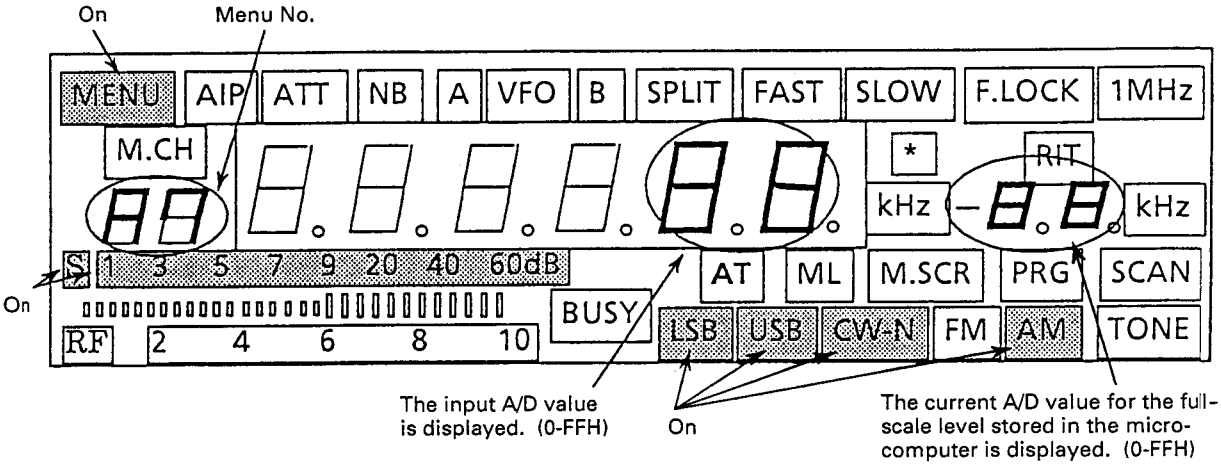
- **Adjustment function**

Input the S-meter voltage at which all the segments of the S- meter light to correct variations in the full-scale level of the S-meter.

- **Adjustment procedure**

1. Input the specified level with the signal generator.
2. Press the UP or DOWN key.

- **Display**



- **Remarks**

The curve between S9 and full scale is obtained from the level for menus A6 and A7 by line approximation. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are forcibly changed to 14.1MHz and USB.

A8 : S-meter Curve Adjustment (S1) (FM)

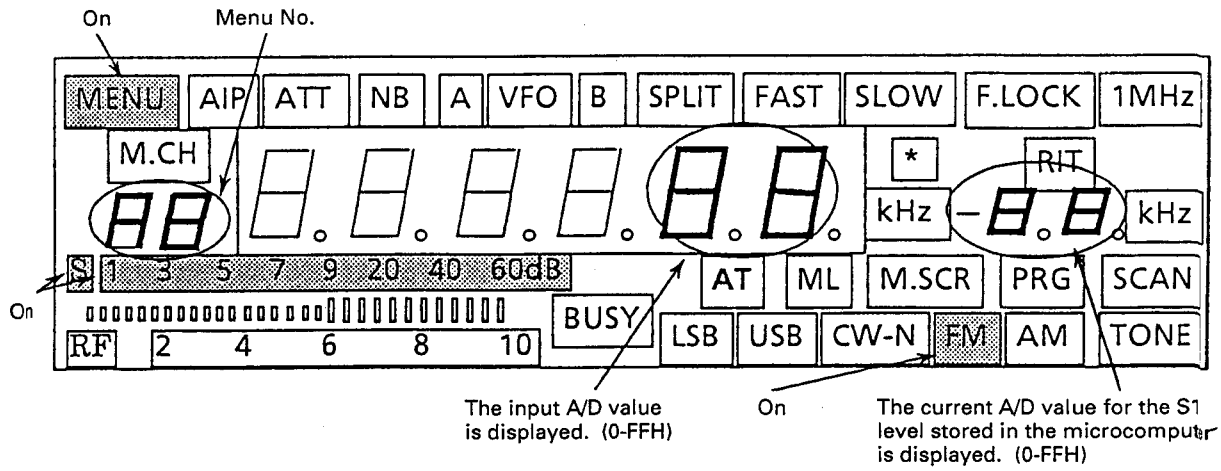
- **Adjustment function**

Input the S-meter voltage at which two bars of the S-meter light to the microcomputer to correct variations in the S1 level of the S-meter.

- **Adjustment procedure**

1. Input the specified level with the signal generator.
2. Press the UP or DOWN key.

- **Display**



- **Remarks**

The threshold is the input level minus the fixed value (12). When the input signal exceeds the threshold, one bar of the S-meter lights. The curve between S1 and full scale is obtained from the level for menus A8 and A9 by line approximation. Only the A/D values for the S1 and full-scale levels are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are forcibly changed to 28.8MHz and FM.

ADJUSTMENT

A9 : S-meter Curve Adjustment (Full scale) (FM)

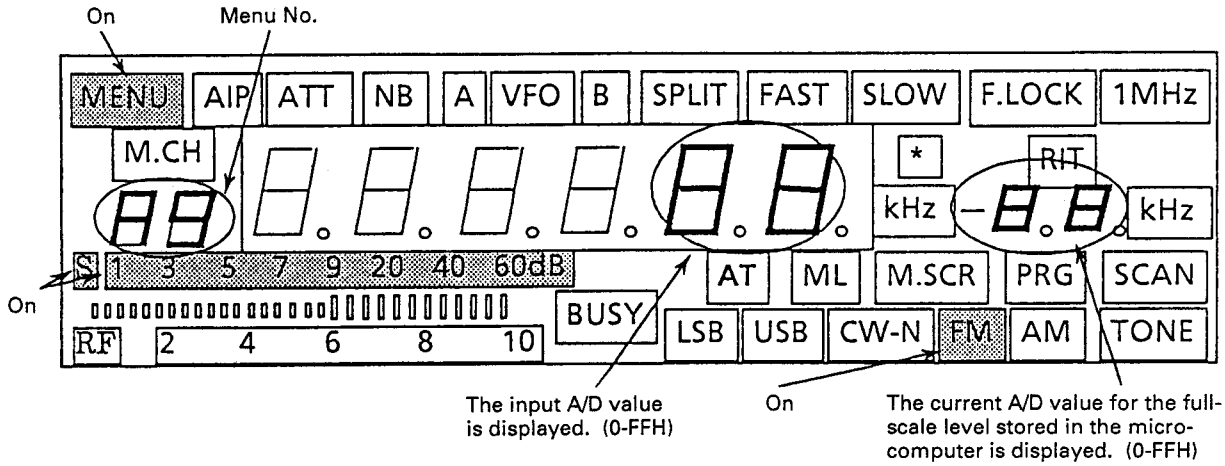
- **Adjustment function**

Input the S-meter voltage at which all the segments of the S- meter light to correct variations in the full-scale level of the S-meter.

- **Adjustment procedure**

1. Input the specified level with the signal generator.
2. Press the UP or DOWN key.

- **Display**



- **Remarks**

Only the A/D values for S1 and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are forcibly changed to 28.8MHz and FM.

AA : RF Meter Curve Adjustment (Low)

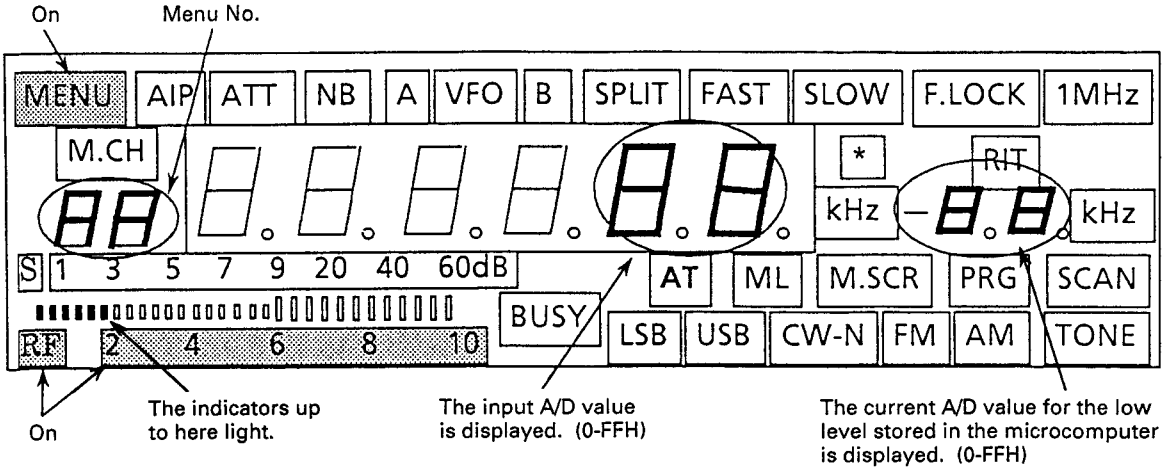
- **Adjustment function**

Input the RF meter voltage at which six segments of the RF meter light to the microcomputer to correct variations in the low level of the RF meter.

- **Adjustment procedure**

1. Input the specified level with the AG.
2. Press the UP or DOWN key.

- **Display**



- **Remarks**

The threshold for the RF meter registering a signal is the input level minus the fixed value (21H). The curve is obtained from the level for menu AA and the start level by line approximation. The curve between 2 and 6 is obtained from the level for menus AA and AB by line approximation. Only the A/D values for 2, 6, and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are changed to 14.2MHz and USB.

ADJUSTMENT

AB : RF Meter Curve Adjustment (Middle)

- **Adjustment function**

Input the RF meter voltage for segment 6 (the first large segment) to the microcomputer to correct variations in the middle level of the RF meter.

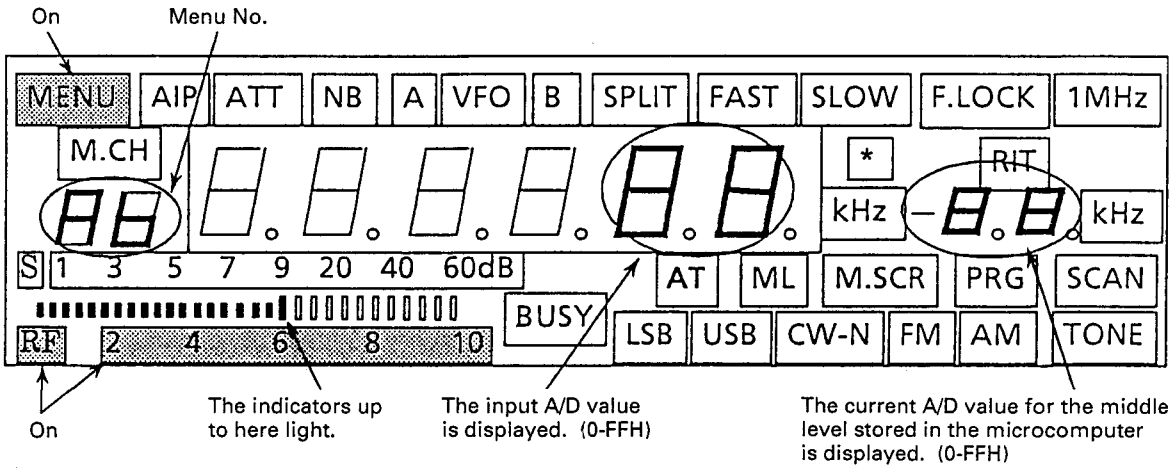
- **Adjustment procedure**

1. Input the specified level with the AG.
2. Press the UP or DOWN key.

- **Remarks**

The curve between 2 and 6 is obtained from the level for menus AA and AB by line approximation. The curve between 6 and full scale is obtained from the level for menus AB and AC by line approximation. Only the A/D values for 2, 6, and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are changed to 14.2MHz and USB.

- **Display**



AC : RF Meter Curve Adjustment (High)

- **Adjustment function**

Input the RF meter voltage at which all the segments of the RF meter light to the microcomputer to correct variations in the full-scale level of the RF meter.

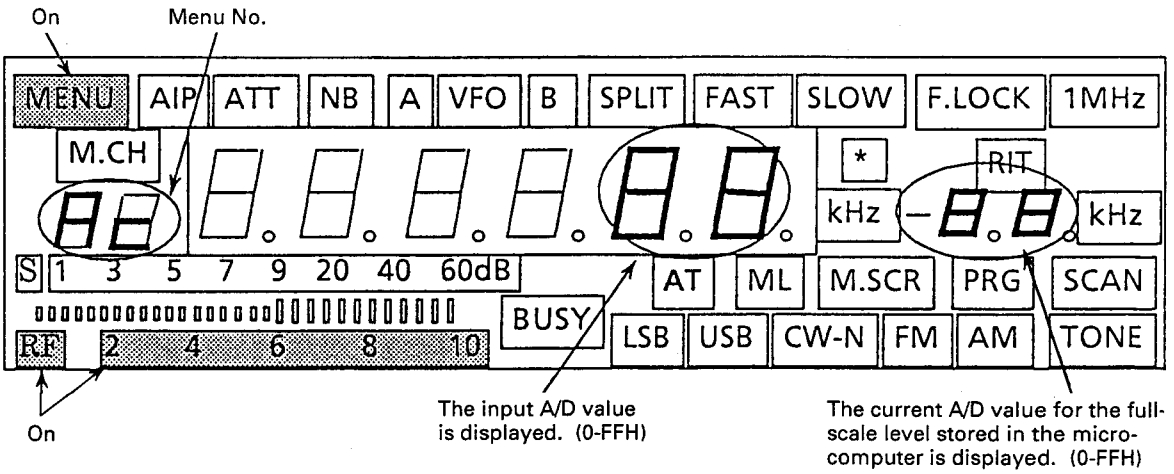
- **Adjustment procedure**

1. Input the specified level with the AG.
2. Press the UP or DOWN key.

- **Remarks**

The curve between 6 and full scale is obtained from the level for menus AB and AC by line approximation. Only the A/D values for 2, 6, and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The frequency and mode are changed to 14.2MHz and USB.

- **Display**



ADJUSTMENT

AD : Write into EEPROM

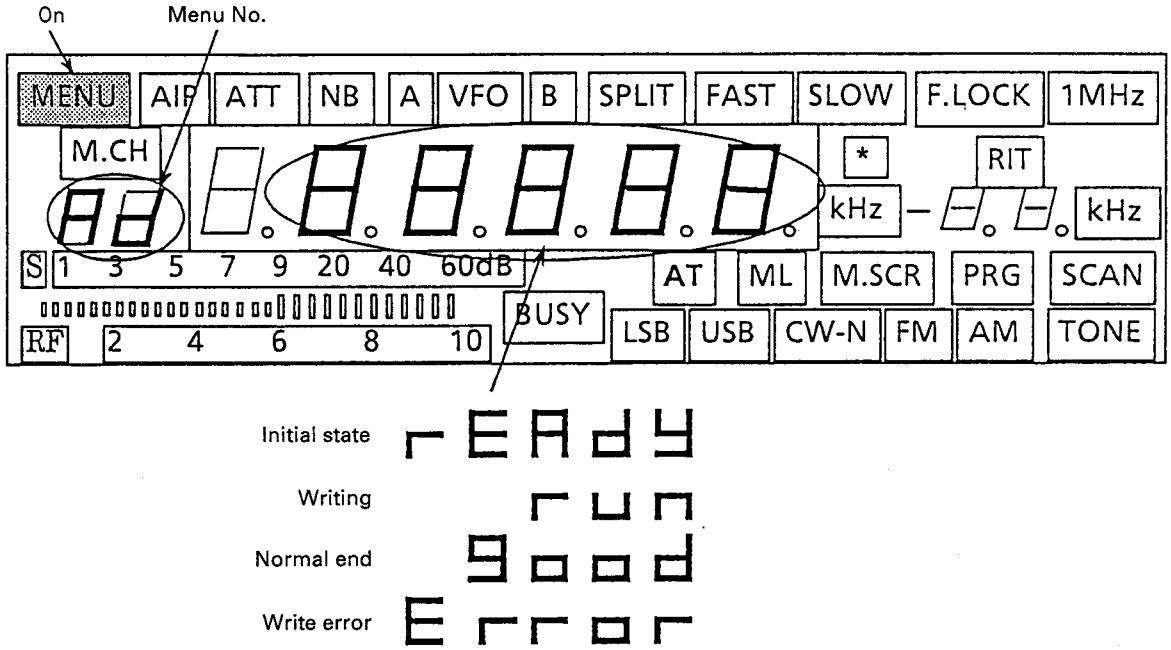
- **Adjustment function**
  Write data into the EEPROM.

- **Adjustment procedure**

1. Press the UP/DOWN key when "ready" is displayed.
2. While data is being written, "run" is displayed.
3. If the data is written correctly, "good" is displayed.
4. If a write error occurs, "error" is displayed.
   Press the UP/DOWN key again.
   If "error" is displayed repeatedly, check the EEPROM or other hardware for defects.

- **Remarks**
  Writing is performed unconditionally (even if nothing has been changed). Two sets of the same data are written into the EEPROM. "good" is displayed only when both sets of data have been written normally. The UP/DOWN key is effective only when "ready" or "error" is displayed, and does not have the repeat function.

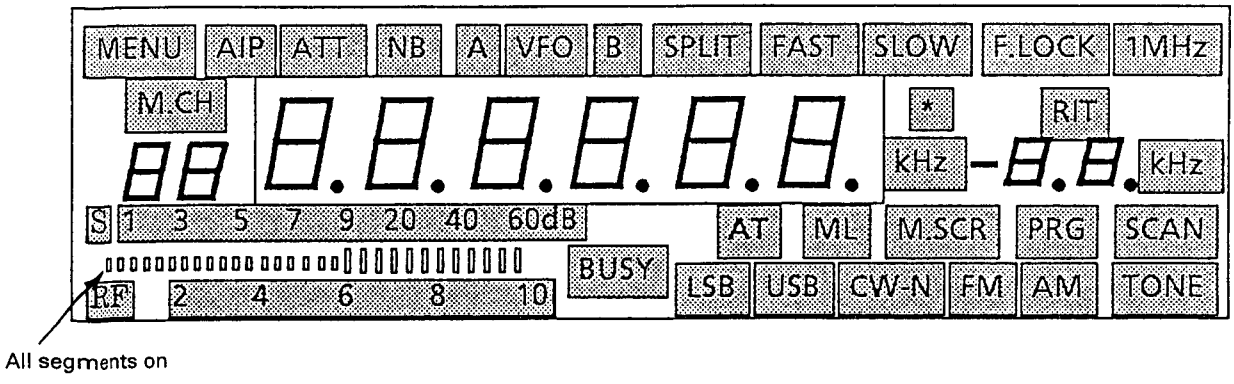
- **Display**



AE : All LCD Segments On

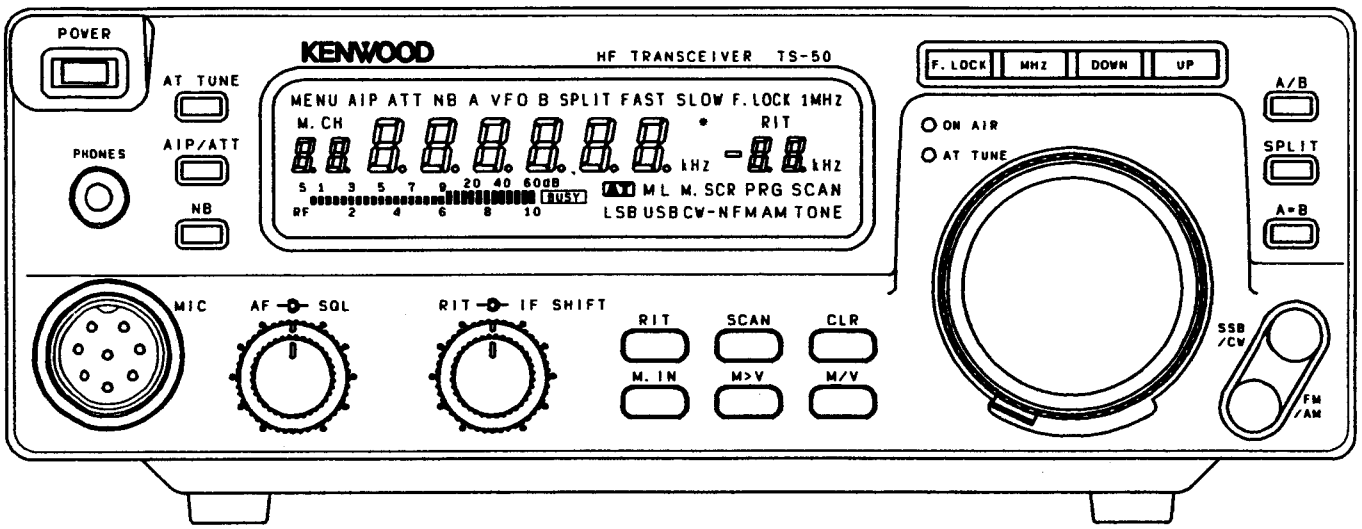
- **Adjustment function**
  Check LCD cells and rubber connector connection.

- **Display**

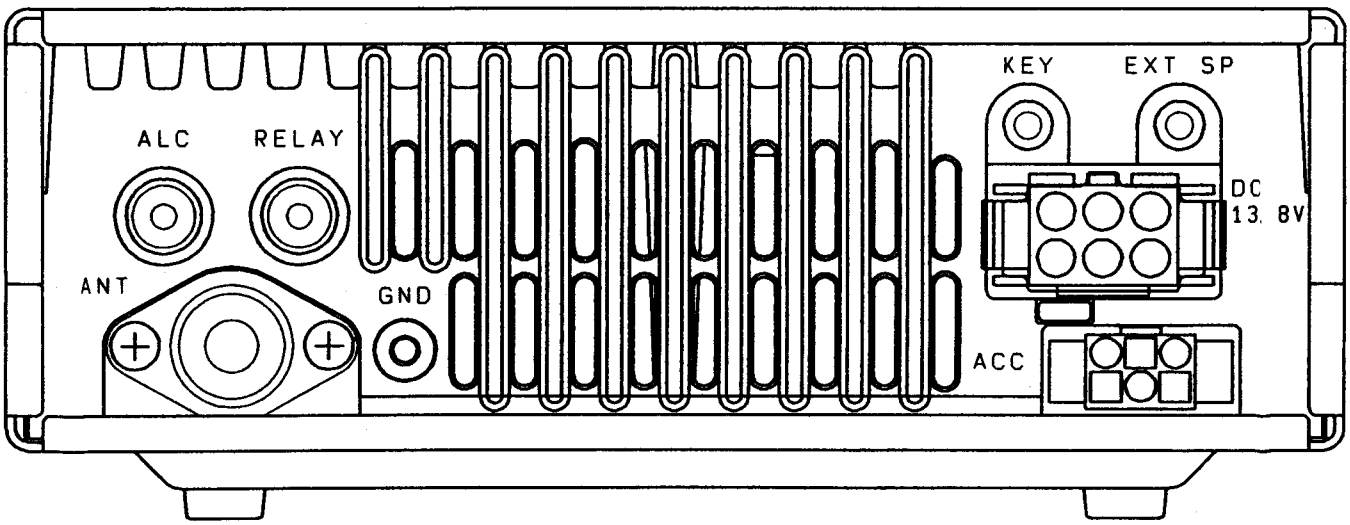


ADJUSTMENT

Front Panel



Rear Panel

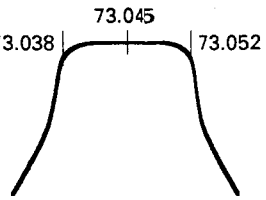


ADJUSTMENT

PLL and CAR Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) DC IN : 13.8V RIT VR : Center IF SHIFT VR : Center							
2. Reference OSC	1) MODE : FM	f. counter	PLL	TP1	PLL	TC1	20.000.00MHz	±20Hz
3. L28, 29 (60MHz)	1) MODE : FM	RF V.M		IC5-2 pin		L28 L29	Peak	Reference value : –4dBm
4. L21, 22, 23 (55.045~ 55.545MHz)	1) Frequency : 14.250MHz MODE : FM	RF V.M		TP3		L21~ L23	Peak Align the core by screwing it in.	Reference value : –5dBm
5. Lock voltage	1) Frequency : 500kHz MODE : FM	DC V.M		TP2	VCO	TC1	2V	±0.1V
	2) Frequency : 10.499MHz						Check	5.5~7.0V
	3) Frequency : 10.500MHz				VCO	TC2	2V	±0.1V
	4) Frequency : 21.499MHz						Check	5.5~7.0V
	5) Frequency : 21.500MHz				VCO	TC3	2V	±0.1V
	6) Frequency : 29.999MHz						Check	5.5~7.0V
6. 10.695MHz level	1) Frequency : 14.100MHz MODE : CW	RF V.M 50Ω dummy load		TP4	PLL	L27	–4dBm	±1.0dBm

Receiver Section Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RFG	1) Frequency : 14.100MHz MODE : FM	DC V.M	TX-RX	TP4	TX-RX	VR4	2.9V	±0.03V
2. MCF	1) Frequency : 14.100MHz MODE : FM Tracking generator output : –30dBm Spectrum analyzer setting Center frequency : 73.045MHz Frequency span : 70kHz ATT : 10dB V. REF : 2dB/DIV	Spectrum analyzer Tracking generator		TP2 TP1		L15~ L17	Repeat 2~3 times. Adjust it to make gain maximum, and make the band flat as shown in the right.	
3. IF AMP	1) Frequency : 14.100MHz MODE : USB SSG ATT : 0.25~0.5µV (–119~–113dBm)	SSG DM. SP Oscilloscope AF V.M	Rear panel	ANT EXT. SP	TX-RX	L24~ L26, L28 IFT in IC3 (2 pcs)	Repeat 2~3 times. AF output MAX.	
4. MIX BAL	1) Frequency : 30.0kHz MODE : CW SSG RF : OFF AIP : OFF					VR1	AF output MIN.	
5. SSB S-meter (S1)	1) Frequency : 14.100MHz MODE : USB SSG RF : OFF	SSG	Rear panel	ANT	TX-RX		Record voltage.	
	2) SSG ATT : 0.7µV (–110dBm)	DC V.M	TX-RX	TP5		VR in IC3	Record voltage + 0.1V.	
	3) Service adjustment mode menu No. (S MENU No.) : A5 SSG ATT : 1µV (–107dBm)						UP or DOWN key : 1 push	S1 check
(S9)	4) S MENU No. : A6 SSG ATT : 20µV (–81dBm)							S9 check
(FULL)	5) S MENU No. : A7 SSG ATT : 20mV (–21dBm)							Full scale check

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. FM S-meter (S1)	1) Frequency : 28.800MHz MODE : FM SSG ATT : 1.6mV (–43dBm)	SSG DC V.M	Rear panel TX-RX	ANT TP5	TX-RX	VR2	4.25V	
	2) S MENU No. : A8 SSG ATT : 0.5μV (–113dBm)	SSG	Rear panel	ANT			UP or DOWN key : 1 push	S1 check
(FULL)	3) S MENU No. : A9 SSG ATT : 5μV (–93dBm)							Full scale check
	4) SSG ATT : 4.5μV (–94dBm)						Check	Just before full scale.
7. Beep tone	1) AF VR : MIN SQL VR : Noise disappears SSB/CW key : Push	DM. SP Oscilloscope	Rear panel	EXT. SP	TX-RX	VR6	0.2Vp-p	±0.1Vp-p
8. NB	1) Frequency : 14.100MHz MODE : USB NB : ON	Noise G. DC V.M	PLL	TP5	PLL	L202 L203	Voltage MIN.	
							Adjust the noise generator output to S-meter 1 and 9 dots lights.	Noise disappears.
9. RF ATT	1) Frequency : 14.100MHz MODE : USB	SSG	Rear panel	ANT			S9	100~400μV (–67~–55dBm)
10. S/N (AIP : OFF)	1) Frequency and MODE : Indicated below However, USB : +1kHz LSB : –1kHz AF VR : 0.63V/8Ω	SSG DM. SP Oscilloscope AF V.M	Rear panel	ANT EXT. SP				
	Frequency / MODE / SSG ATT / SSG MOD / SSG DEV							
	550.0kHz / AM / 2.5μV (–99dBm) / 1kHz / 60%						S/N measurement	10dB or more
	1550.0kHz / AM / 3.5μV (–96dBm) / 1kHz / 60%							
	1800.0kHz / LSB / 0.25μV (–119dBm) / OFF						S/N measurement	10dB or more
	3550.0kHz / LSB / 0.25μV (–119dBm) / OFF						MAX sensitivity	0.7V/8Ω or more
	7100.0kHz / LSB / 0.25μV (–119dBm) / OFF							
	10.100MHz / LSB / 0.25μV (–119dBm) / OFF							
	14.100MHz / USB / 0.25μV (–119dBm) / OFF							
	21.100MHz / USB / 0.25μV (–119dBm) / OFF							
	24.800MHz / USB / 0.25μV (–119dBm) / OFF							
	28.800MHz / USB / 0.25μV (–119dBm) / OFF							
	29.800MHz / FM / 0.5μV (–113dBm) / 1kHz / ±3kHz						SINAD sensitivity measurement	12dB or more
11. Squelch (SSB)	1) Frequency : 14.100MHz MODE : USB SQL VR : 12 : 30 SSG RF : OFF	SSG DM. SP Oscilloscope	Rear panel	ANT EXT. SP	TX-RX	VR3	Set to the point squelch closes.	
	2) SSG ATT : 1.25μV (–105dBm)	AF V.M					Check	Squelch should open
	3) SQL VR : MAX							Squelch should close
	4) SSG ATT : 16μV (–83dBm) After checked, SQL VR : MIN							Squelch should open
(FM)	5) Frequency : 28.800MHz MODE : FM SSG ATT : OFF				Front panel	SQL VR	Adjust SQL VR is slowly increase noise just goes off.	Knob position 8 : 00~12 : 00
	6) SSG ATT : 0.2μV (–121dBm)						Check	Squelch should open
	7) SQL VR : MAX							Squelch should close
	8) SSG ATT : 0.9μV (–108dBm) After checked, SQL VR : MIN							Squelch should open
12. S-meter sensitivity	1) Frequency : 14.100MHz MODE : USB	SSG	Rear panel	ANT			S1 (two small dots lights)	Within 1μV (–107dBm) ± 6dB
							S9 (one large dot lights)	Within 20μV (–81dBm) ± 6dB
	2) Frequency : 29.800MHz MODE : FM						S-meter full scale (all dots lights)	Within 5μV (–93dBm) ± 6dB

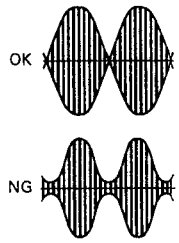
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
13. Noise	1) Frequency : 14.100MHz MODE : USB AF VR : MIN	SSG DM. SP Oscilloscope AF V.M	Rear panel	ANT EXT. SP			Check	2mV/8Ω or less
14. Reset	1) POWER SW : OFF While pushing the A=B key POWER SW : ON						Reset display f. : 14.000.0kHz VFO : A MODE : USB	

Transmitter Section Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. ALC voltage	1) Frequency : 29.600MHz MODE : CW Remove the cable from CN19 of the TX-RX unit. Transmit	DC V.M 50Ω dymmy load	TX-RX Rear panel	TP6 (ALC) ANT	TX-RX	IC11-VR2	2.7V	+0.05V, −0.0V
2. TX AMP	1) Frequency : 29.600MHz MODE : CW Transmit	Synchro scope or Spectrum analyzer 50Ω dummy load	TX-RX Rear panel	CN19 ANT	TX-RX	L38~ L40 L44~ L46 L48	Repeat 2~3 times for MAX.	
3. MIX BIAS	1) Frequency : 29.600MHz MODE : CW Transmit					VR12	MAX.	
(CW level)	2) Transmit					VR11	9dBm	
(AM level)	3) MODE : AM Transmit After adjusted, CN19 connect.					VR10	8.5dBm	
4. Final idling current	1) Frequency : 14.200MHz MODE : USB Final unit VR1, VR2 : MIN Transmit	Power meter DC V.M	Rear panel	ANT	Final		Record current at VR1 and VR2 are MIN.	This current is total current.
						VR1	Total current + 250mA.	
						VR2	(Total current + 250mA) + 250mA.	
5. NULL	1) Frequency : 3.500MHz MODE : CW Transmit	DC V.M	Filter	TP1	Filter	TC1	MIN	Reference value : 50mV or less
6. Power (HI)	1) Frequency : 14.200MHz MODE : CW Transmit	Power meter	Rear panel	ANT	TX-RX	VR14	100W	
(MID)	2) Frequency : 14.200MHz MODE : CW Transmit					VR16	50W	
(LOW)	3) Frequency : 14.200MHz MODE : CW Transmit					VR15	10W	
7. Power frequency response	1) Frequency : 29.600MHz MODE : CW Transmit				Filter	VR1	MAX.	95W or more.
8. RF meter (FULL)	1) Frequency : 14.200MHz MODE : USB S MENU No. : AC TX output : 90W Transmit	Power meter AG	Rear panel Front panel	ANT MIC			UP or DOWN key : 1 push	Full scale check.

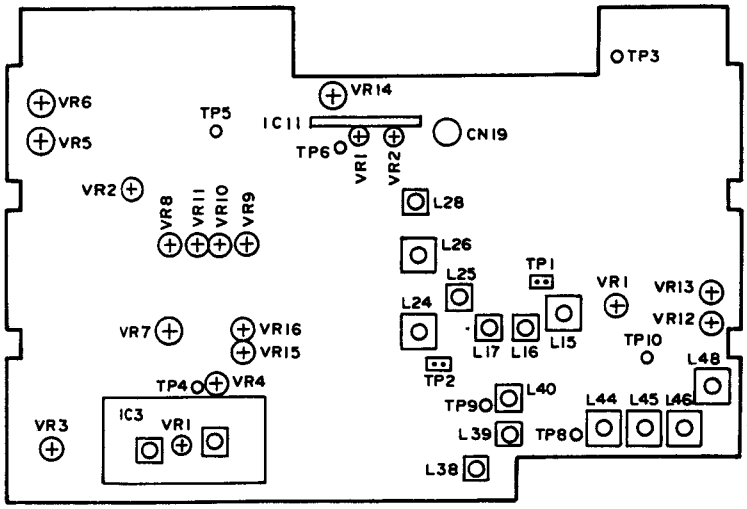
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
(2)	2) S MENU No. : AA TX output : 18W Transmit	Power meter	Rear panel	ANT			Up or DOWN key : 1 push	RF-meter "2" check.
(6)	3) S MENU No. : AB TX output : 55W Transmit	AG	Front panel	MIC				RF-meter "6" check.
9. CAR point	1) S MUNE No. : A3 or A4 (A3 : LSB, A4 : USB) AG1 : 300Hz AG2 : 2700Hz AG output : Level at which not activated. Transmit	Power meter Oscilloscope AG AF V.M	Rear panel Front panel	ANT MIC			Adjust so that wave-form cross by UP and DOWN key.	
10. Suppression	1) Frequency : 14.200MHz MODE : USB Transmit	Power meter Coupler Oscilloscope	Rear panel	ANT	TX-RX	VR8 VR9	MIN. Set it to the mini-mum value by adjusting in the USB and modes alter-nately near the center of the VR.	–40dB or less.
11. MIC sensitivity	1) Frequency : 14.200MHz MODE : USB AG : 1kHz/3mV Transmit	Power meter AG AF V.M	Rear panel Front panel	ANT MIC	TX-RX	VR7	60W	
12. Spurious	1) Frequency : 24.900MHz MODE : CW Transmit	Power meter Coupler Spectrum analyzer	Rear panel	ANT	TX-RX	VR13	MIN	–40dB or less.
13. SWR protection	1) Frequency : 14.200MHz MODE : CW Transmit	150Ω dummy load Through-type power meter	Rear panel	ANT	TX-RX	IC11-VR1	40W	
14. FM MAX DEV	1) Frequency : 28.700MHz MODE : FM AG : 1kHz/30mV **E,E2,E3,X** 1kHz/50mV **K,P,M,M2** Transmit	Power meter Coupler Linear detector	Rear panel	ANT	PLL	VR2	±4.6kHz	±0.1kHz
15. FM MIC sensitivity	1) Frequency : 28.700MHz MODE : FM AG : 1kHz/3mV **E,E2,E3,X** 1kHz/5mV **K,P,M,M2** Transmit	AG AF V.M	Front panel	MIC		VR1	±3.0kHz	±0.1kHz
16. Sub tone	1) Frequency : 28.700MHz MODE : FM M/V : 1 push SPLIT : 1 push A=B : 1 push Transmit					VR3	±0.75kHz	±0.1kHz
17. Side tone	1) Frequency : 14.200MHz MODE : CW AF VR : Center KEY : DOWN Transmit	Power meter Oscilloscope AF V.M	Rear panel	ANT EXT. SP	TX-RX	VR5	0.2V/8Ω	±0.02V
18. TX power		Power meter	Rear panel	ANT			Check	HI : 90~110W MID : 45~55W LOW : 8~12W

ADJUSTMENT

Adjustment Points

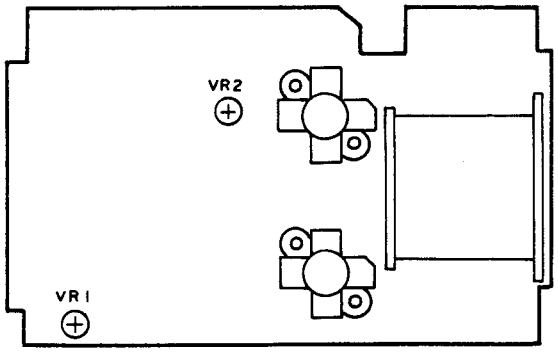
TX-RX UNIT (X57-4220-11)



TX-RX UNIT (X57-4220-11)

VR1 : MIX BAL
VR2 : FM meter
VR3 : SSB squelch
VR4 : RFG
VR5 : Side tone
VR6 : Beep tone
VR7 : MIC sensitivity
VR8, 9 : Suppression
VR10 : MIX BIAS (AM)
VR11 : MIX BIAS (CW)
VR12 : MIX BIAS
VR13 : Spurious
VR14 : Hi power
VR15 : Low power
VR16 : Mid power
L15~17 : MCF
L24~26, 28 : IF AMP
L38~40, 44~46, 48 : TX AMP
IFT in IC3 : IF AMP
VR1 in IC3 : SSB S-meter (S1)
VR1 in IC11 : SWR protection
VR2 in IC11 : ALC voltage

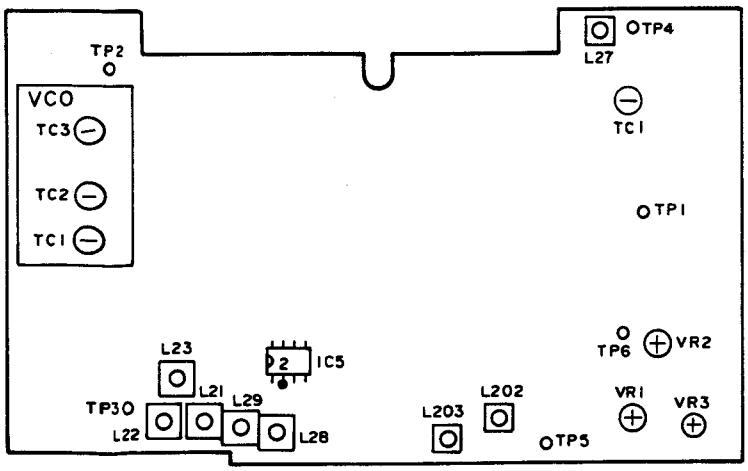
FINAL UNIT (X45-3460-00)



FINAL UNIT (X45-3460-00)

VR1, 2 : Final idling current

PLL UNIT (X50-3190-00)



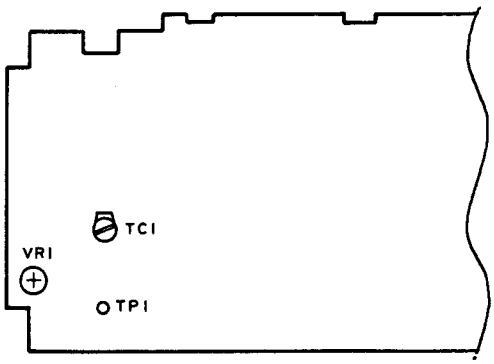
PLL UNIT (X50-3190-00)

VR1 : FM MIC sensitivity
VR2 : FM MAX DEV
VR3 : Sub tone
L21~23 : 55.045~55.545MHz
L27 : 10.695MHz
L28, 29 : 60MHz
L202, 203 : NB
TC1 : Reference OSC

VCO (X58-4010-00)

TC1~3 : Lock voltage

FILTER UNIT (X51-312X-XX)



FILTER UNIT (X51-312X-XX)

TC1 : NULL
VR1 : Power frequency response

TS-50S

TERMINAL FUNCTION

CN No.	Pin No.	Name	Function
LCD ASSY (B38-0377-05)			
CN1	1	DGND	Digital ground.
	2	LEN	LCD control enable.
	3	FSQ	FM squelch voltage.
	4	UEN1	Shift register enable.
	5	SSQ	SSB squelch voltage.
	6	BLK	All LCD segments off.
	7	5V	5V.
	8	NC	
	9	8V	8V.
	10	RVR	RIT VR voltage.
	11	KAD1	Key matrix voltage.
	12	AGND	Analog ground
	13	KAD2	Key matrix voltage.
	14	ISV	IF SHIFT VR voltage.
	15	MUP	Microphone UP switch.
	16	MDN	Microphone DOWN switch.
	17	PSW	POWER switch.
	18	EDP1	Encoder pulse.
	19	5A	Analog 5V.
	20	EDP2	Encoder pulse.
	21	CSS	PTT signal.
	22	14S	14V.
	23	LDA	LCD control data.
	24	LCK	LCD control clock.
	25	5C	5.6V for power switch.
CN2	1	AF1	AF VR-1.
	2	AF2	AF VR-2.
	3	AF3	AF VR-3 (ground).
	4	FSQ	FM squelch setting voltage.
	5	SSQ	SSB squelch setting voltage.
	6	AGND	Analog ground.
	7	5A	Analog 5V.
	8	RVR	RIT VR voltage.
	9	ISV	IF SHIFT VR voltage.
	10	DGND	Digital ground.
CN4	1	DGND	Digital ground.
	2	EDP1	Encoder pulse output.
	3	EDP2	Encoder pulse output.
	4	NC	
CN5	1	MIC	MIC.
	2	MICG	MIC ground.
	3	SPO	Speaker output.
	4	AGND	Analog ground.
	5	AF2	AF VR-2.
	6	AF1	AF VR-1.
	7	AFG	AF VR-3 (ground).
FINAL UNIT (X45-3460-00)			
CN2	Coaxial	PO	High-frequency output.
CN3	1	EALC	External ALC.
	2	EALG	External ALC ground.
CN4	1	MOT+	Fan power supply.
	2	MOT–	Fan power supply.
CN101	1	AGND	Analog ground.
	2	AGND	Analog ground.
	3	14	Always 14V.
	4	14S	14V when power is on.
	5	14S	14V when power is on.
	6	DGND	Digital ground.
	7	5V	5V when power is on.
	8	PSC	High when power switch is turned on.
	9	8V	8V when power is on.
	10	TXB	8V in transmit mode.
	11	THP	Final temperature detection.
CN102	1	14AG	Ground for 14AF.
	2	14AF	14V when power is on (with filter).
	3	8V	8V.
	4	14S	14V when power is on.
CN103	1	SEG	External speaker ground.
	2	ES2	External speaker.
	3	ES1	External speaker.
	4	AGND	Analog ground.
	5	STS	Sidetone switch.
	6	KEY	CW keying output.
CN104	1	14S	14V when power is on.
	2	14S	14V when power is on.
	3	8V	8V.
	4	TXB	8V in transmit mode.
	5	14S	14V when power is on.
	6	THP	Final temperature detection.
CN105	1	14	Always 14V.
	2	14	Always 14V.
W1 (1/2)	1	14S	14V when power is on.
	2	14S	14V when power is on.
	3	8V	8V when power is on.
	4	TXB	8V in transmit mode.
W1 (2/2)	1	14S	14V when power is on.
	2	THP	Final temperature detection.
W2	1	14	Always 14V.
	2	14	Always 14V.
W7	Coaxial	DRV	Drive input.
J1		RELAY	Linear relay control.
J2		EXT ALC	ALC input from linear.
J101		EXT SP	External speaker.
J102		KEY	CW key input.
DIGITAL UNIT (X46-315X-XX)			
CN1	1	DGND	Digital ground.
	2	LEN	LCD control enable.
	3	FSQ	FM squelch voltage.
	4	UEN1	Shift register enable 1.
	5	SSQ	SSB squelch voltage.
	6	BLK	All LCD segments off.
	7	5V	5V.
	8	NC	
	9	8V	8V.
	10	RVR	RIT VR voltage.
	11	KAD1	Key matrix voltage.
	12	AGND	Analog ground.
	13	KAD2	Key matrix voltage.
	14	ISV	IF SHIFT VR voltage.
	15	MUP	Microphone UP switch.
	16	MDN	Microphone DOWN switch.
	17	PSW	POWER switch.
	18	EDP1	Encoder pulse.
	19	5A	Analog 5V.
	20	EDP2	Encoder pulse.
	21	CSS	PTT signal.
	22	14S	14V.
	23	LDA	LCD control data.
	24	LCK	LCD control clock.
	25	5C	5.6V for power switch.
CN2	1	AB2	DDS2 (CAR) register selection.
	2	DE2	DDS2 (CAR) enable.

TERMINAL FUNCTION

CN No.	Pin No.	Name	Function
	3	NBS	NB ON/OFF control.
	4	RBK	RX RF blanking output.
	5	PCK	PLL clock.
	6	PDA	PLL data.
	7	GND	Ground.
	8	PE2	PLL2 (KCH14) enable.
	9	FMB	8V in FM mode, 0V in other modes.
	10	TONE	Subtone output.
	11	NFT	0V in FM transmit mode, 5V in other modes.
CN3	1	DGND	Digital ground.
	2	AGND	Analog ground.
	3	NC	
	4	KYS	Key jack input; when inserted.
	5	KYB	Key input.
	6	FMB	8V in FM mode, 0V in other modes.
	7	TRC	TX/RX control signal. High in transmit mode.
	8	RXS	RX enable.
	9	BEEP	Beep output.
	10	AGS	AGC slow/fast changeover.
	11	MGS	Microphone sensitivity selection.
	12	FSQ	FM squelch voltage.
	13	SSQ	SSB squelch voltage.
	14	BSY	Busy signal.
	15	RBK	RF blanking.
	16	SM	Signal meter voltage.
	17	UEN4	Shift register enable 4.
	18	UCK	Shift register clock.
	19	UDA	Shift register data.
	20	UEN5	Shift register enable 5.
	21	NC	
	22	UEN6	Shift register enable 6.
	23	CKS	CKS control signal.
	24	NC	
	25	PWM	Power meter voltage.
CN4	1	DGND	Digital ground.
	2	THP	Final temperature detection.
	3	8V	8V.
	4	PSC	Power relay control.
	5	5V	5V.
	6	14S	14V.
	7	14	14V.
	8	UDA	Shift register data.
	9	UCK	Shift register clock.
	10	UEN2	Shift register enable 2.
	11	TS	AT control.
	12	TT	AT control.
CN5	1	NC	
	2	ULK	Unlock detection input.
	3	PE1	PLL1 (LO1) enable.
	4	DE1	DDS1 (LO1) enable.
	5	AB1	DDS1 (LO1) register selection.
	6	8V	8V output.
	7	5V	5V output.
	8	GND	Ground.
	9	C3	0.03~10.4999MHz. VCO
	10	C2	10.5~21.4999MHz. selection line.
	11	C1	21.5~29.9999MHz. Active high
CN6	1	GND	Ground.
	2	5V	5V output.
	3	TXD	Personal computer interface.
	4	RXD	Personal computer interface.
	5	RTS	Personal computer interface.
	6	CTS	Personal computer interface.

CN No.	Pin No.	Name	Function
PLL UNIT (X50-3190-00)			
CN1	1	FMM	FM modulator input.
	2	FMG	Ground.
	3	NBI	NB amplifier signal input.
	4	NBG	Ground.
CN2	Coaxial	LO1	LO1 output. 73.075~103.045MHz.
CN3	Coaxial	CAR	CAR output. 10.695MHz.
CN4	Coaxial	LO2	LO2 output. 62.35MHz.
CN5	1	NC	
	2	ULK	Unlock detection output.
	3	PE1	PLL1 (LO1) enable.
	4	DE1	DDS1 (LO1) enable.
	5	AB1	DDS1 (LO1) register selection.
	6	8V	8V.
	7	5V	5V.
	8	GND	Ground.
	9	C3	0.03~10.4999MHz. VCO
	10	C2	10.5~21.4999MHz. selection line.
	11	C1	21.5~29.9999MHz. Active high.
CN6	1	AB2	DDS2 (CAR) register selection.
	2	DE2	DDS2 (CAR) enable.
	3	NBS	NB ON/OFF control.
	4	RBK	RX RF blanking input.
	5	PCK	PLL clock.
	6	PDA	PLL data.
	7	GND	Ground.
	8	PE2	PLL2 (KCH14) enable.
	9	FMB	8V in FM mode, 0V in other modes.
	10	TONE	Subtone input.
	11	NFT	0V in FM transmit mode, 5V in other modes.
FILTER UNIT (X51-312X-XX)			
CN1	Coaxial	RAT	Receive signal input.
CN2	1	AGND	Analog ground.
	2	VSF	Progressive wave voltage.
	3	VSR	Reflected wave voltage.
	4	TXB	Transmission power supply 8V.
CN3	1	THP	Temperature protection. High during operation.
	2	TXB	Transmission power supply 8V.
	3	8V	8V.
	4	PSC	14V power relay control. High when power is turned on.
	5	5V	5V.
	6	DGND	Digital ground.
	7	14S	14V.
	8	14S	14V.
	9	14	14V.
	10	AGND	Analog ground.
	11	AGND	Analog ground.
CN4	1	TT	Antenna tuner control.
	2	TS	Antenna tuner control.
	3	UEN2	Shift register enable.
	4	UCK	Shift register clock.
	5	UDA	Shift register data.
	6	14	14V.
	7	14S	14V.
	8	5V	5V.
	9	PSC	14V power relay control. High when power is turned on.
	10	8V	8V.
	11	THP	Temperature protection. High during operation.
	12	DGND	Digital ground.

TS-50S

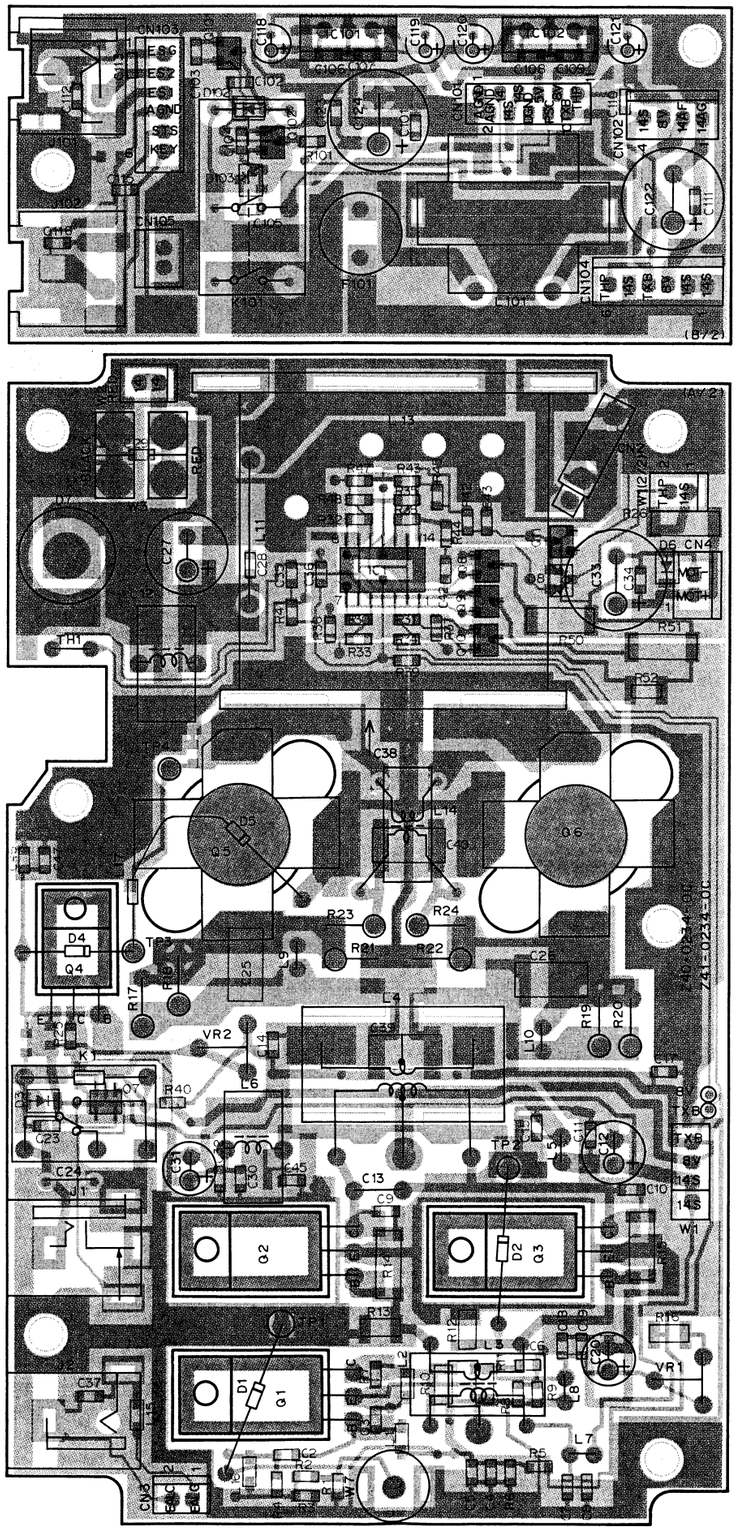
TERMINAL FUNCTION

CN No.	Pin No.	Name	Function
CN5	Coaxial	PO	Filter input.
CN6	1	PHG	Head phone ground.
	2	PH2	Head phone output.
	3	PH1	Head phone input.
W1	1	14S	14V.
	2	ATG	Ground.
	3	TT	Antenna tuner control.
	4	TS	Antenna tuner control.
	5	GND	Ground.
W2		ANT	Antenna.
W3		ANT GND	Antenna ground.
TX-RX UNIT (X57-4220-11)			
CN1	Coaxial	RAT	Receive signal input.
CN2	Coaxial	LO1	LO1 input. 73.075~103.045MHz.
CN3	Coaxial	LO2	LO2 input. 62.35MHz.
CN4	1	NBI	10.695MHz NB AMP output.
	2	NBG	NB ground.
	3	NC	
CN10	1	NC	
	2	AF2	AF VR-2.
	3	AF1	AF VR-1.
	4	AFG	AF VR-3 (ground).
CN11	Coaxial	CAR	CAR input. 10.695MHz.
CN12	1	SP	Speaker input.
	2	SPG	Speaker ground.
CN13	1	PHG	Head phone ground.
	2	PH2	Head phone through.
	3	PH1	Head phone output.
CN14	1	FMM	FM MIC output.
	2	FMG	FM MIC ground.
CN15	1	NC	
	2	MIC	MIC.
	3	MICG	MIC ground.
	4	SPO	Speaker output (MIC connector).
	5	AGND	Analog ground.
CN16	1	KEY	CW keying. High : Key down.
	2	STS	Sidetone switch.
	3	AGND	Analog ground.
	4	ES1	External speaker output.

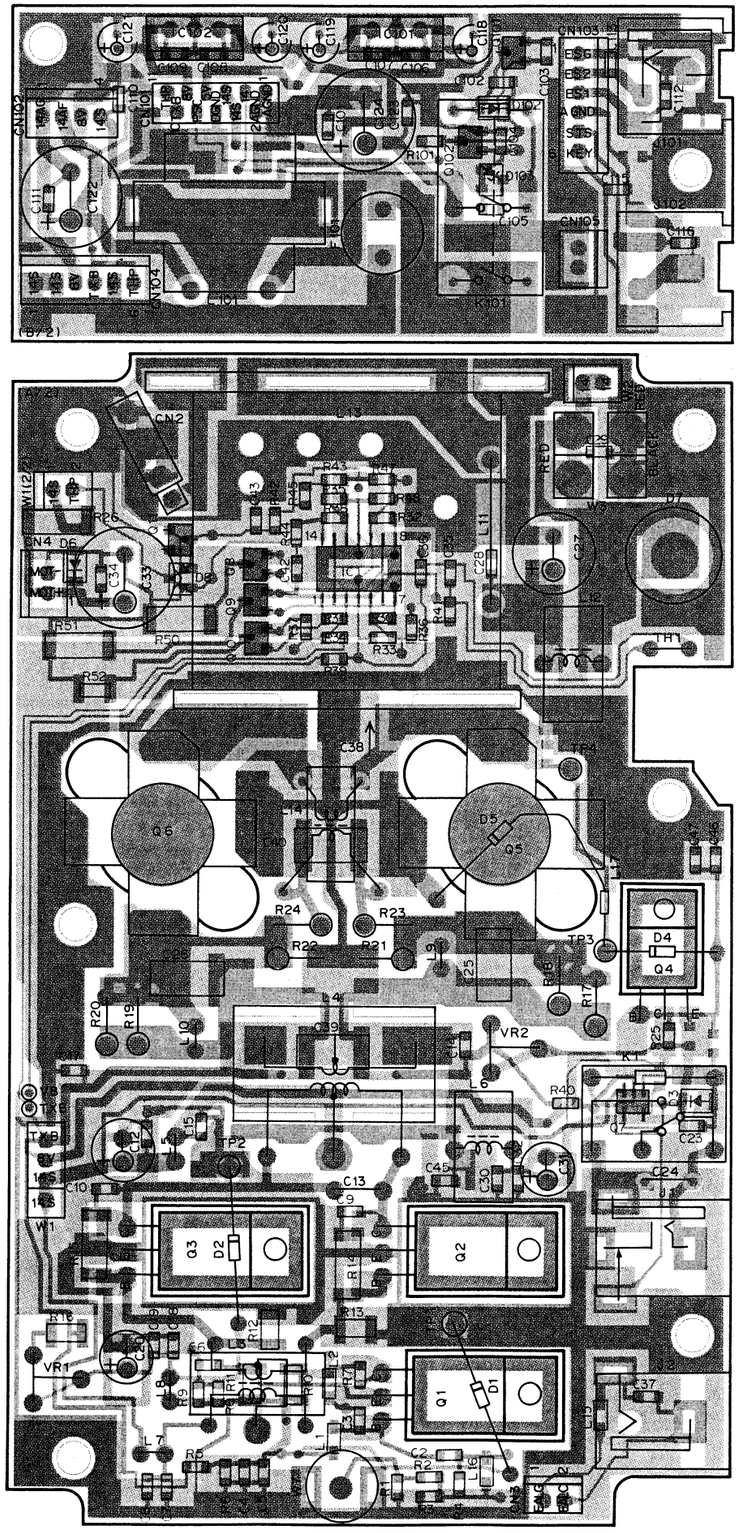
CN No.	Pin No.	Name	Function
	5	ES2	External speaker through.
	6	ESG	External speaker ground.
	7	14S	14V.
	8	8V	8V.
	9	14AF	14V (For audio IC).
	10	14AG	14V (For audio IC).
CN17	1	DGND	Digital ground.
	2	AGND	Analog ground
	3	NC	
	4	KYS	Key jack input.
	5	KYB	Key input. High : Key down.
	6	FMB	8V in FM mode.
	7	TRC	TX/RX control. High in transmit mode.
	8	RXS	RX switch. High in receive mode.
	9	BEEP	Beep.
	10	AGS	AGC switch. Low : Fast.
	11	MGS	Microphone sensitivity switch.
	12	FSQ	FM squelch setting voltage.
	13	SSQ	SSB squelch setting voltage.
	14	BSY	Busy signal.
	15	RBK	RF blanking.
	16	SM	Signal strength meter voltage.
	17	UEN4	Shift register enable.
	18	UCK	Shift register clock.
	19	UDA	Shift register data.
	20	UEN5	Shift register enable.
	21	NC	
	22	UEN6	Shift register enable.
	23	CKS	CKY (keying) control. Hight in transmit mode.
	24	NC	
	25	PWM	Power meter voltage.
CN18	1	EALC	External ALC.
	2	EALG	External ALC ground.
	3	TXB	8V in transmit mode.
	4	VSR	Reflected wave voltage.
	5	VSF	Progressive wave voltage.
	6	AGND	Analog ground.
CN19	Coaxial	DRV	Drive output.
W2	1	DGND	Digital ground.
	2	EDP1	Encoder pulse output.
	3	EDP2	Encoder pulse output.

TS-50S PC BOARD VIEWS

FINAL UNIT (X45-3460-00) Component side view

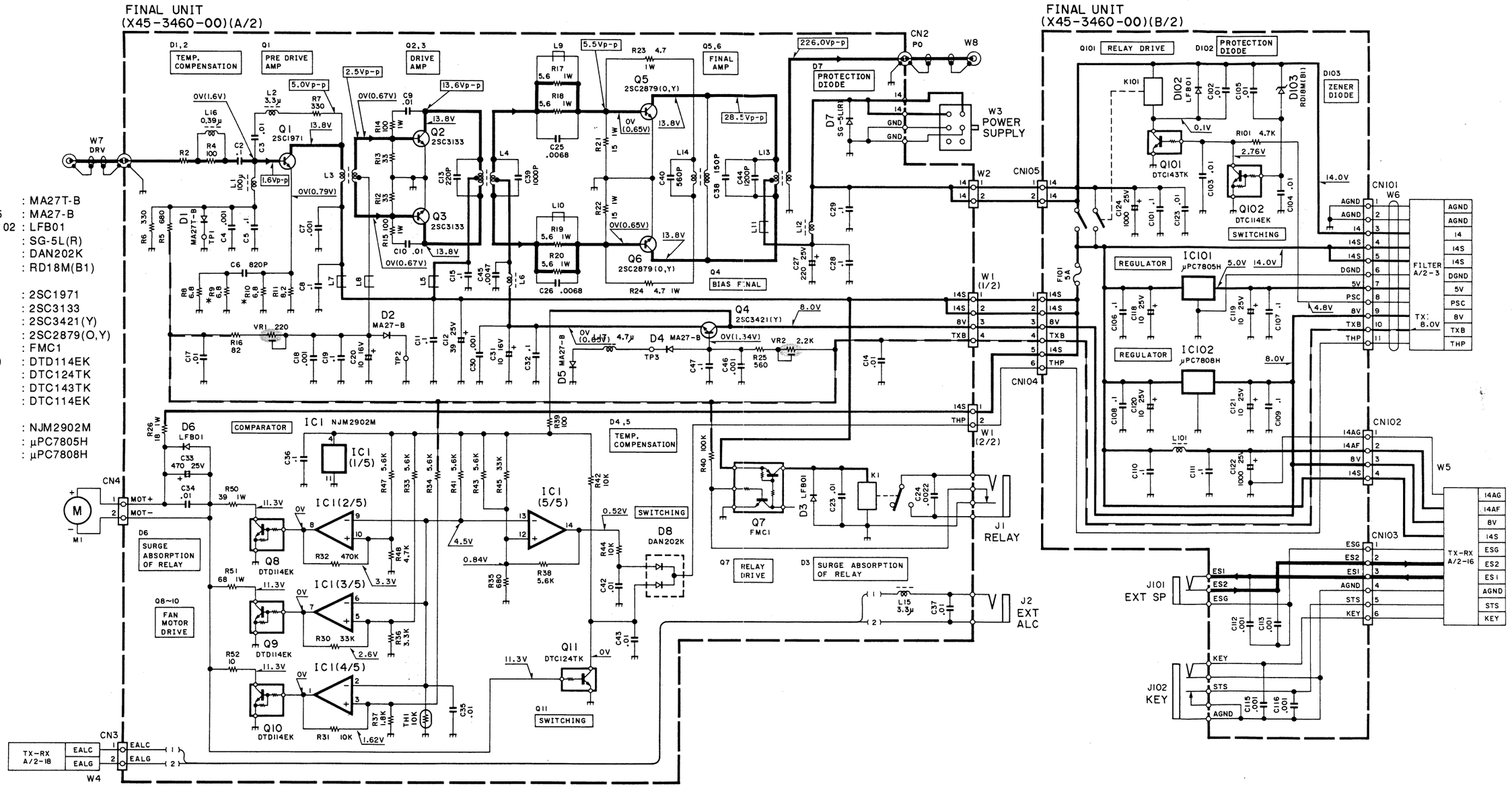


FINAL UNIT (X45-3460-00) Foil side view



: Component side
: Foil side

FINAL UNIT (X45-3460-00)



D1 : MA27T-B
D2,4,5 : MA27-B
D3,6,102 : LFB01
D7 : SG-5L(R)
D8 : DAN202K
D103 : RD18M(B1)

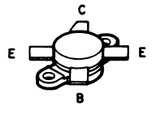
Q1 : 2SC1971
Q2,3 : 2SC3133
Q4 : 2SC3421(Y)
Q5,6 : 2SC2879(O,Y)
Q7 : FMC1
Q8~10 : DTD114EK
Q11 : DTC124TK
Q101 : DTC143TK
Q102 : DTC114EK

IC1 : NJM2902M
IC101 : µPC7805H
IC102 : µPC7808H

2SC1971
2SC3133

FMC1

2SC2879



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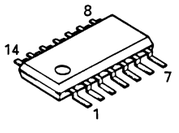
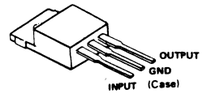
DTC124TK
DTC143TK
DTD114EK

2SC3421

NJM2902M



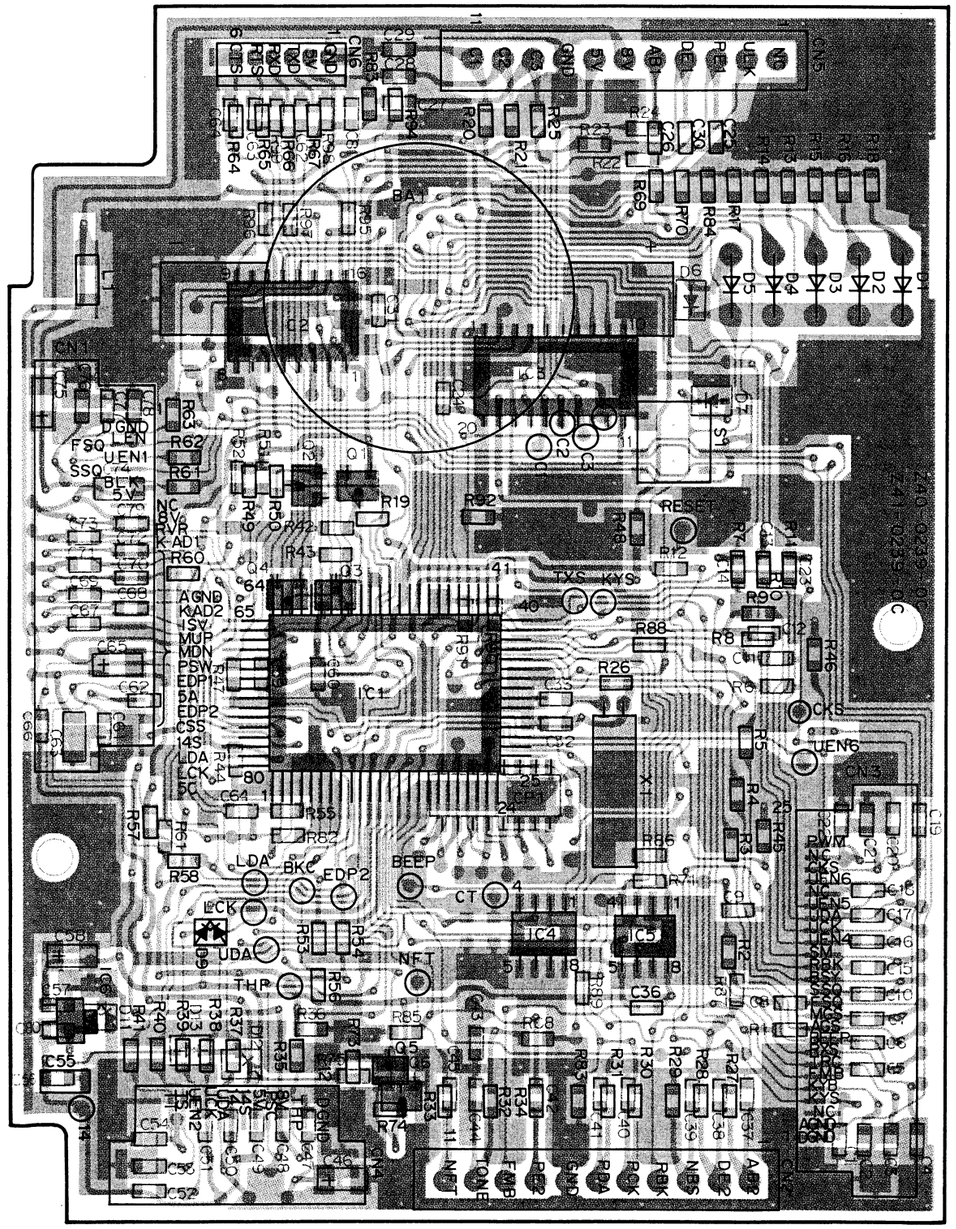
µPC7805H
µPC7808H



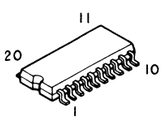
TS-50S PC BOARD VIEWS

DIGITAL UNIT (X46-315X-XX) Component side view

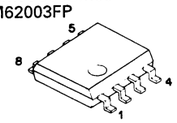
0-11 : K, P 0-22 : M2 0-71 : X, M 2-71 : E 2-72 : E2 2-73 : E3



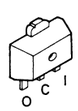
TC74HC573AF



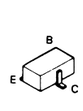
NM93C66EM83
M62003FP



NJM78L05UA

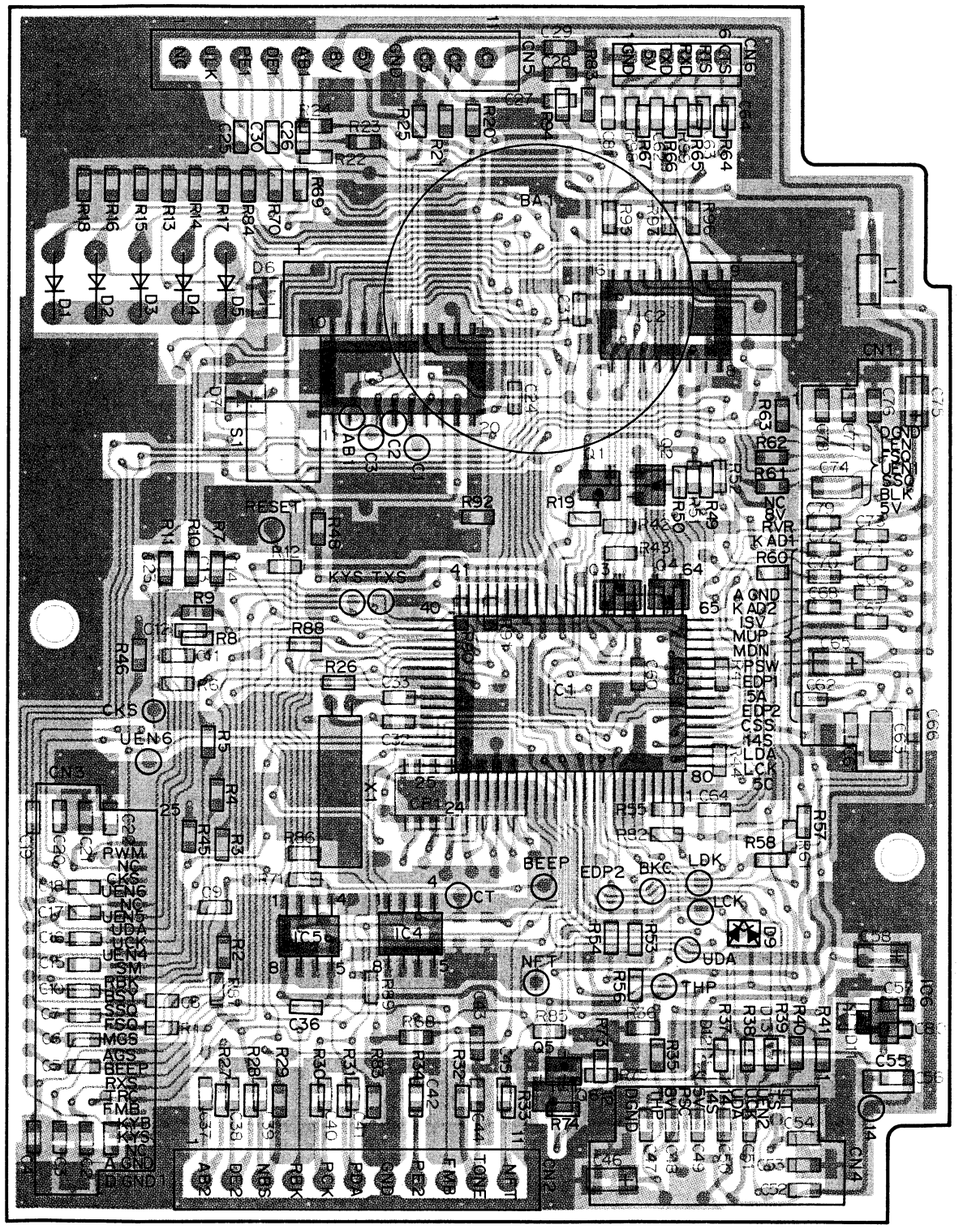


2SC2712
DTA143EK
DTA143TK
DTC143EK



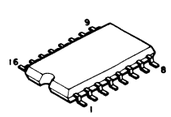
DIGITAL UNIT (X46-315X-XX) Foil side view

0-11 : K, P 0-22 : M2 0-71 : X, M 2-71 : E 2-72 : E2 2-73 : E3

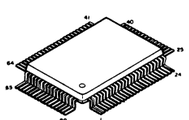


: Component side
: Foil side

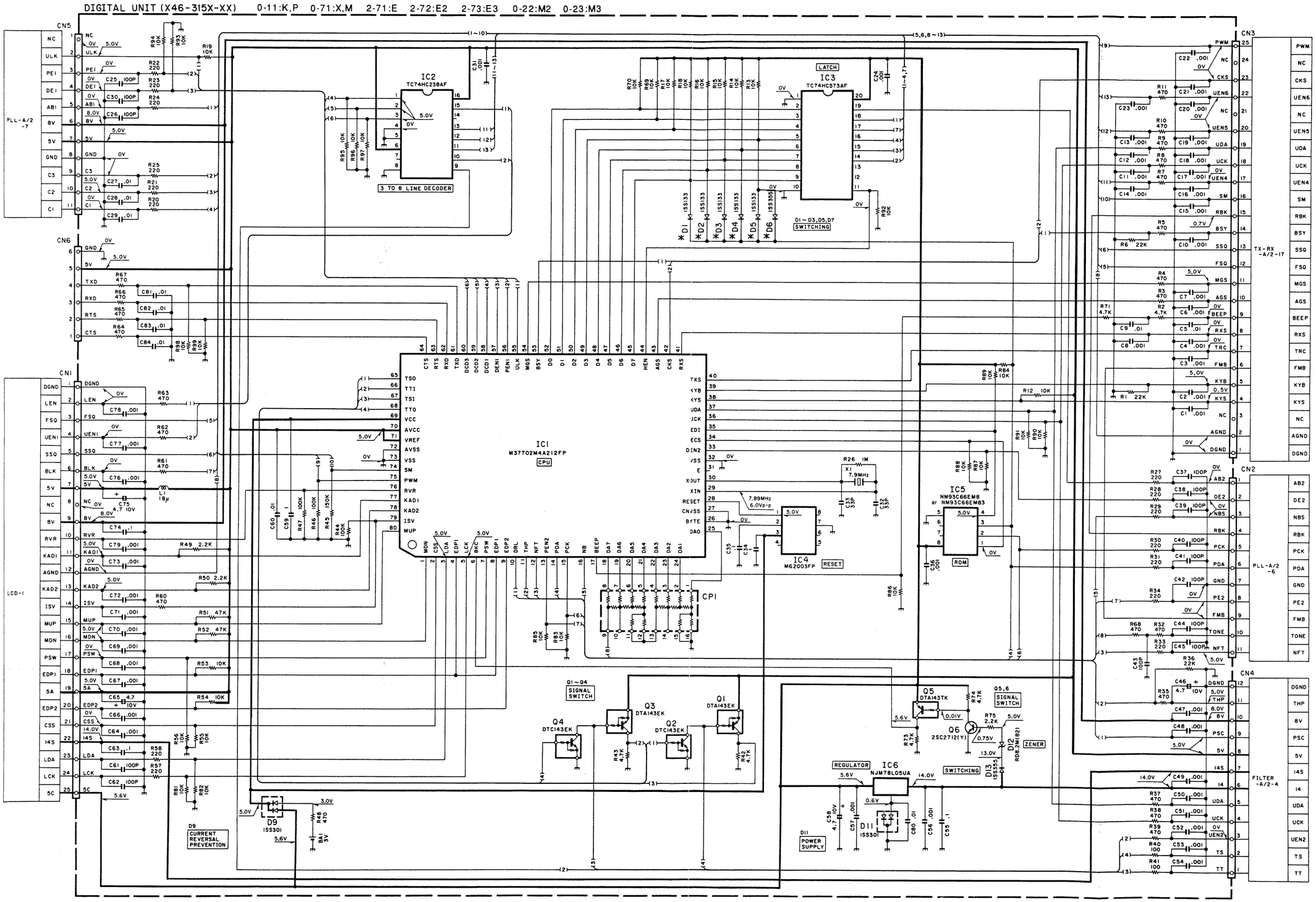
TC74HC238AF



M37702M4A212FP



DIGITAL UNIT (X46-315X-XX)



Q1,3 : DTA143EK
Q2,4 : DTC143EK
Q5 : DTA143TK
Q6 : 2SC2712(Y)

IC1 : M37702M4A212FP
IC2 : TC74HC238AF
IC3 : TC74HC573AF
IC4 : M62003FP

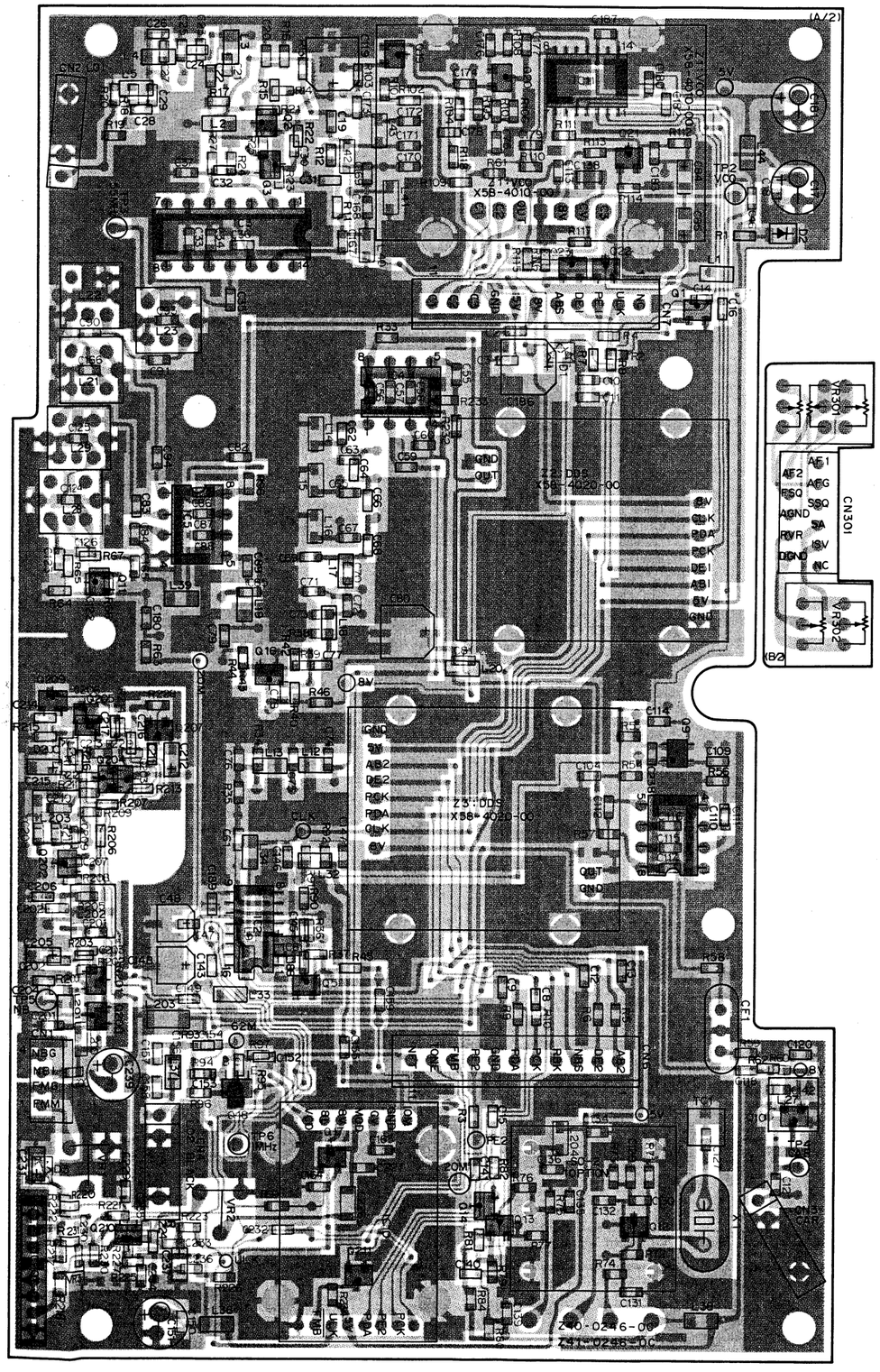
IC5 : NM93C66EM83 or NM93C66EM8
IC6 : NJM78L05UA

D1~5 : 1SS133
D6,13 : 1SS355
D9,11 : 1SS301
D12 : RD8.2M(B2)

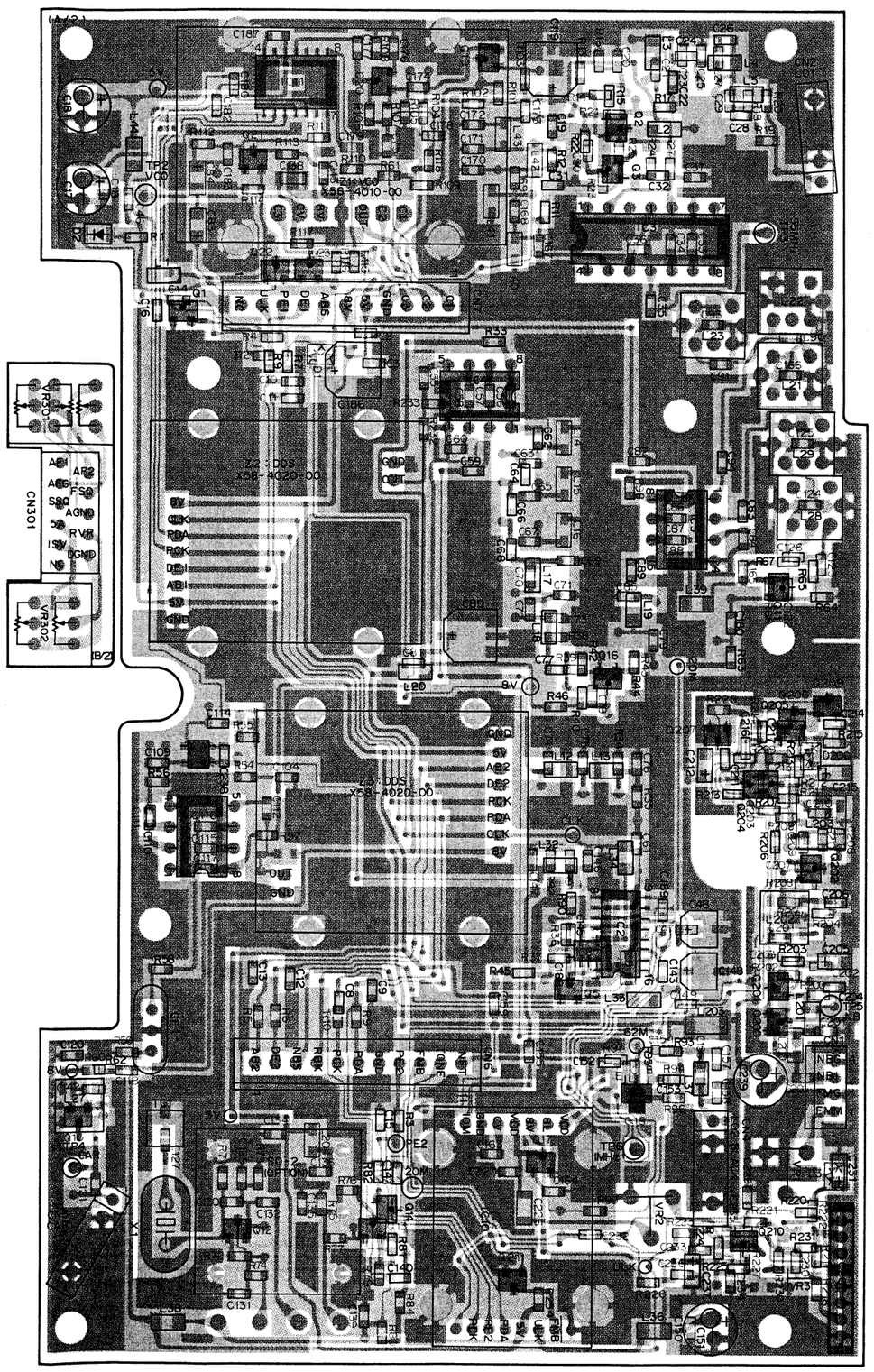
	D1	D2	D3	D4	D5	D6
0-11	NO	NO	NO	NO	YES	NO
0-71	NO	NO	NO	YES	NO	YES
2-71	NO	NO	YES	YES	YES	NO
2-72	YES	NO	YES	YES	YES	NO
2-73	YES	YES	YES	YES	YES	NO
0-22	NO	NO	NO	YES	NO	NO
0-23	YES	NO	NO	YES	YES	NO

TS-50S PC BOARD VIEWS

PLL UNIT (X50-3190-00) Component side view

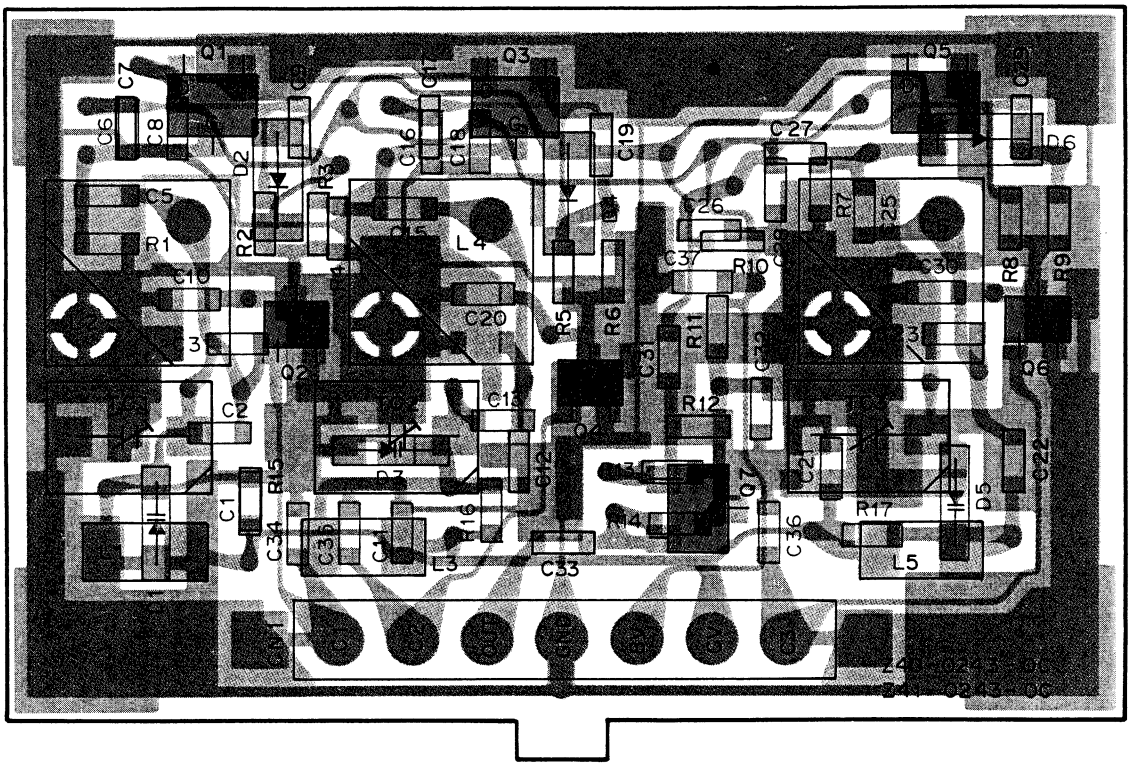


PLL UNIT (X50-3190-00) Foil side view

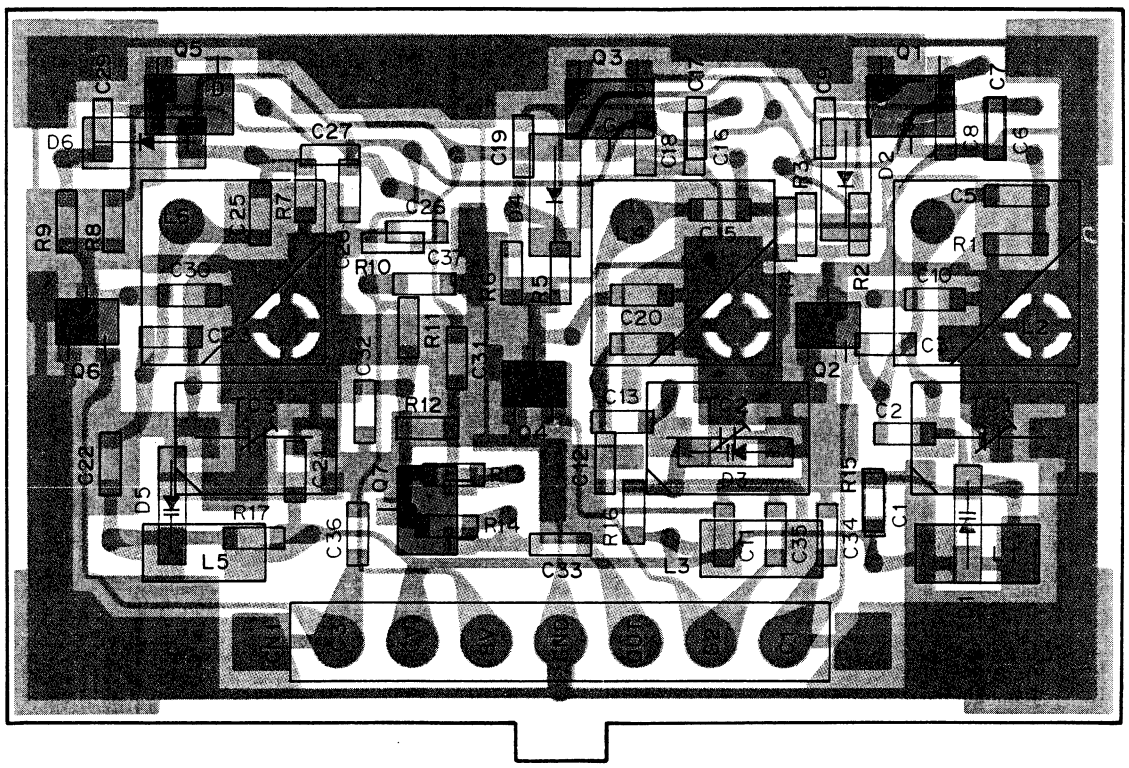


: Component side
: Foil side

VCO (X58-4010-00) Component side view



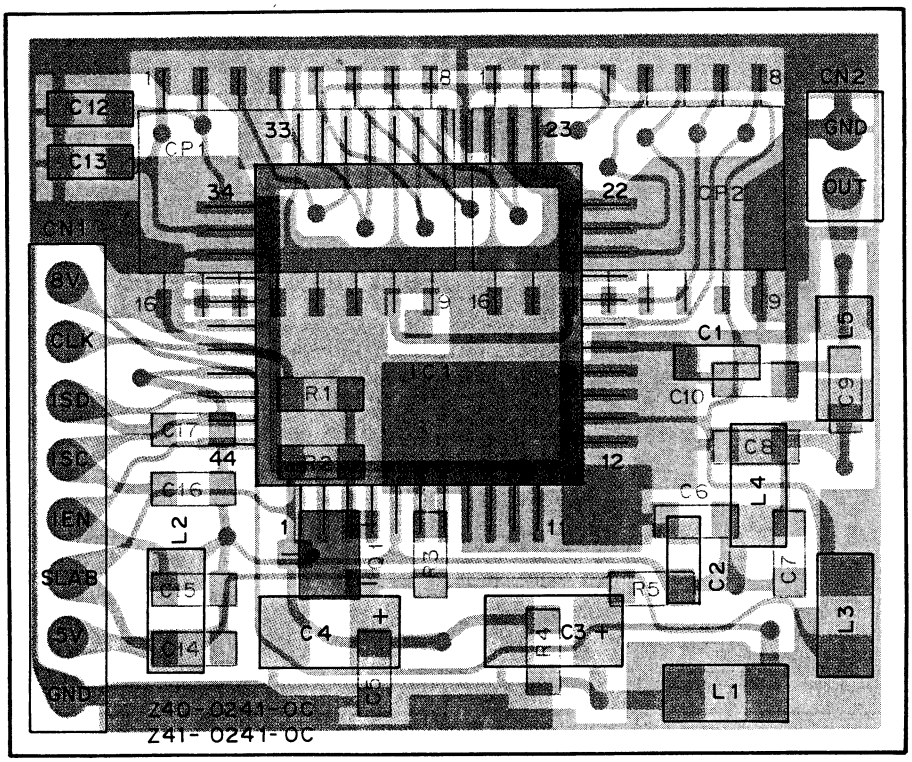
VCO (X58-4010-00) Foil side view



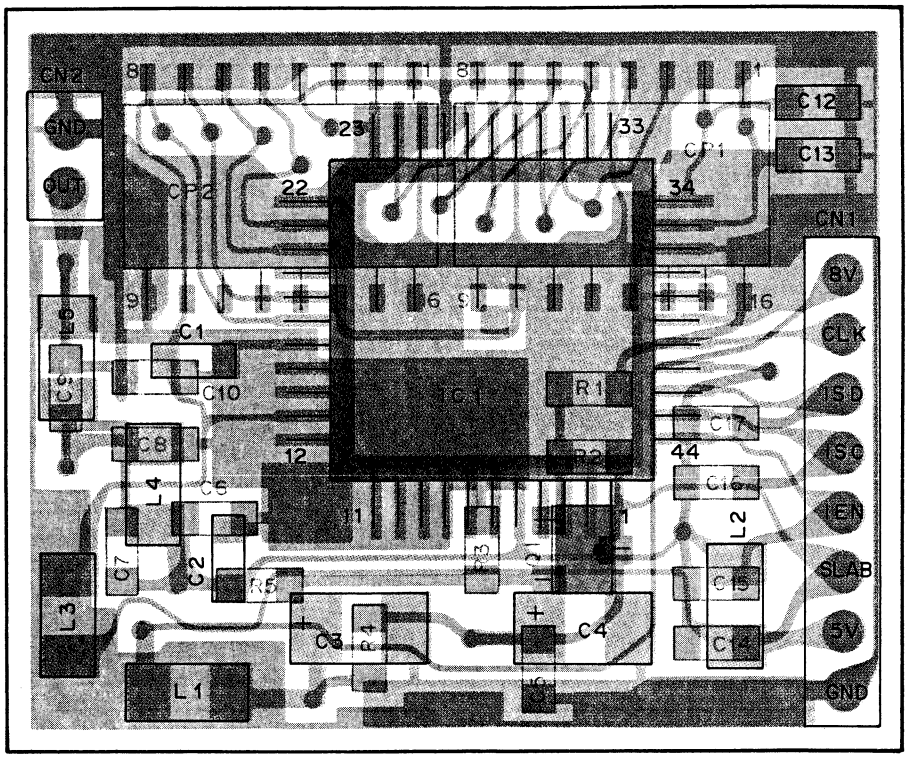
: Component side
: Foil side

TS-50S PC BOARD VIEWS

DDS (X58-4020-00) Component side view



DDS (X58-4020-00) Foil side view

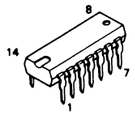


: Component side
: Foil side

PLL UNIT (X50-3190-00)

2SC2712
2SC2714
2SC2996
2SC3722K
2SD1757K
DTA114EK
DTC114EK
DTC114EU
DTC114TK

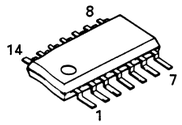
SN76514N



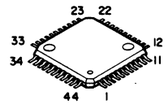
2SC2954

TC7S04F

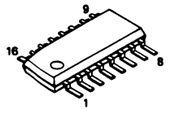
CXD1225M



F71022

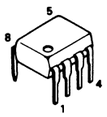


µPD74HC390G

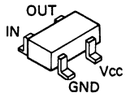


2SK508NV

SN16913P



RU201

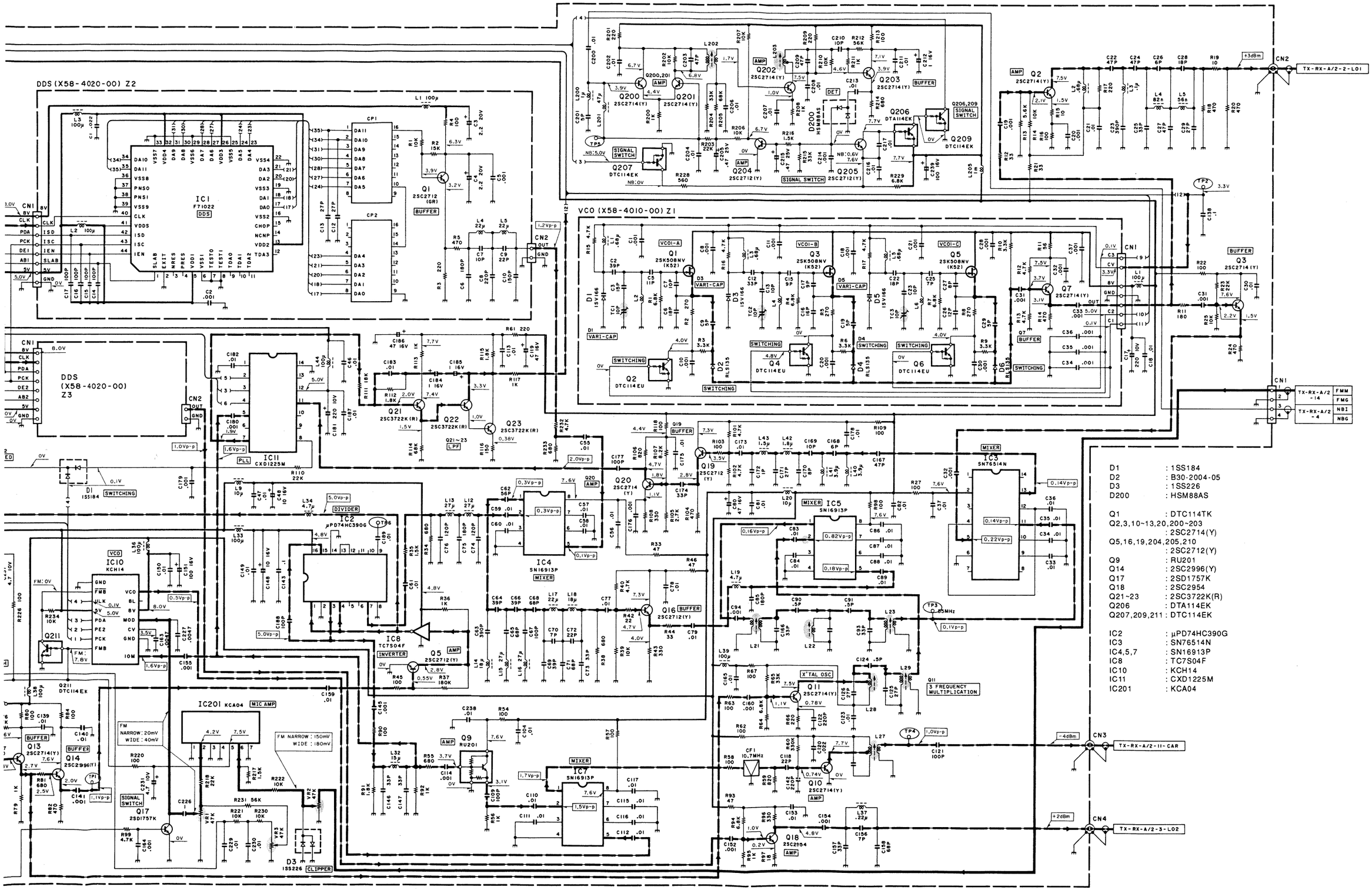


PLL UNIT (X50-3190-00) (A/2)

DDS (X58-4020-00) Z2

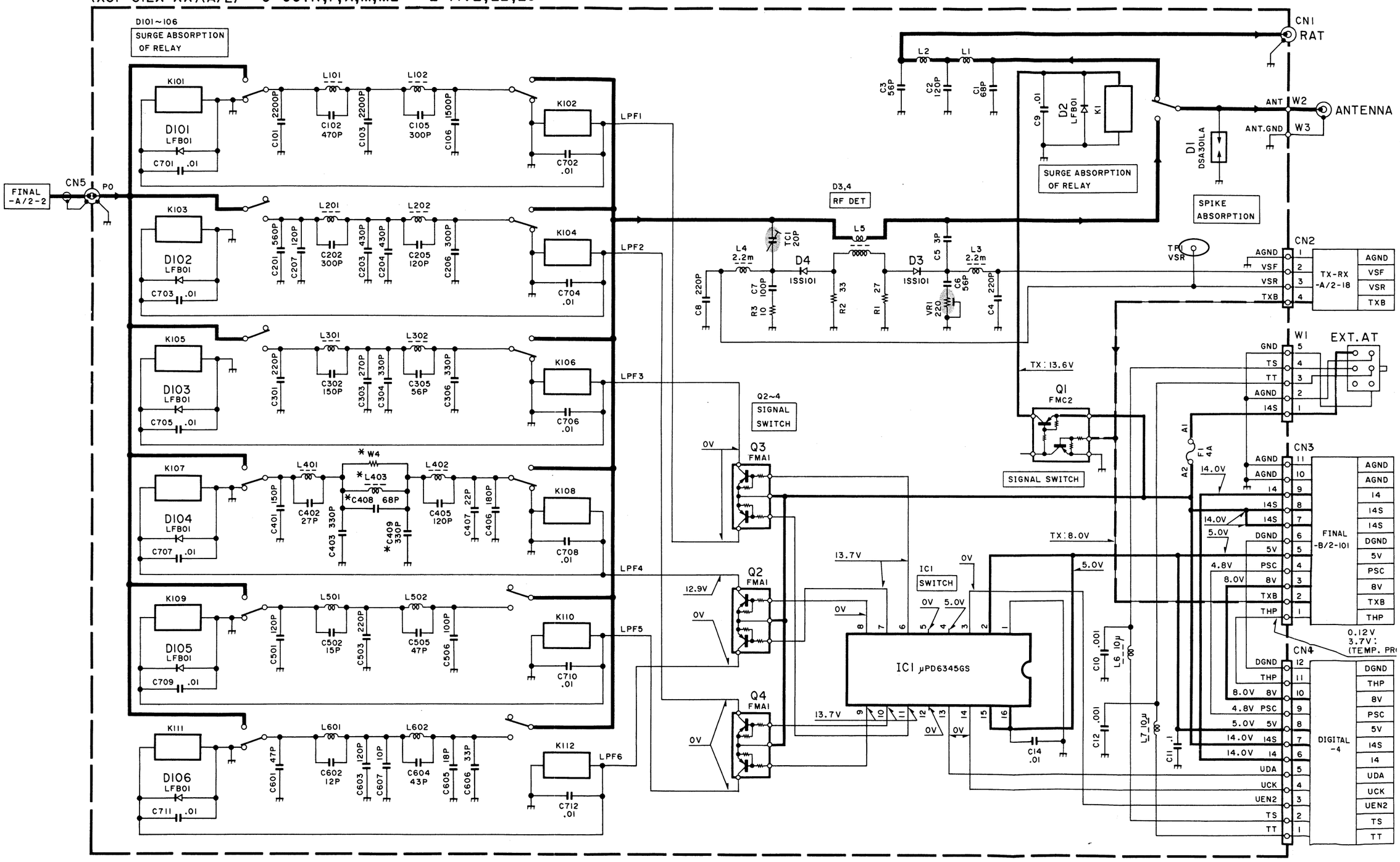
VCO (X58-4010-00) Z1

DDS (X58-4020-00) Z3


DDS (X58-4020-00) Z2
DDS (X58-4020-00) Z3
VCO (X58-4010-00) Z1
IC1 F71022 DDS
IC2 μPD74HC390G
IC3 SN76514N
IC4,5,7 SN16913P
IC8 TC7S04F
IC10 KCH14
IC11 CXD1225M
IC201 KCA04
Q1 2SK508NV (K52)
Q2,3,10~13,20,200~203 : 2SC2714(Y)
Q5,16,19,204,205,210 : 2SC2712(Y)
Q9 RU201
Q14 2SC2996(Y)
Q17 2SD1757K
Q18 2SC2954
Q21~23 2SC3722K(R)
Q206 DTA114EK
Q207,209,211 DTC114EK
D1 1SS184
D2 B30-2004-05
D3 1SS226
D200 HSM88AS
TX-RX-A/2-2-LO1
TX-RX-A/2-11-CAR
TX-RX-A/2-3-LO2
TX-RX-A/2-14 FMM FMG
TX-RX-A/2-4 NBI NBG

TS-50S CIRCUIT DIAGRAM

FILTER UNIT (X51-312X-XX)



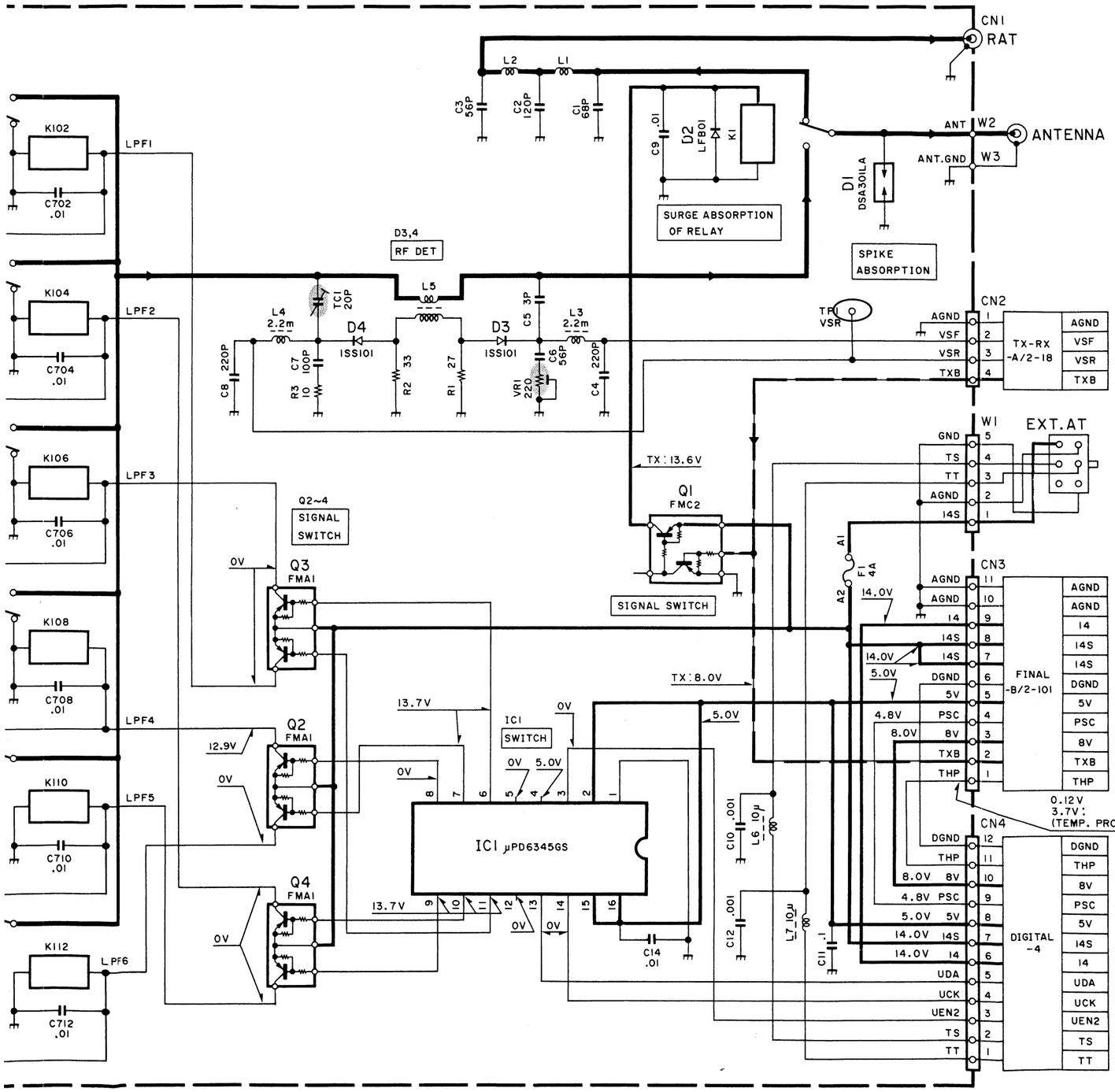
D1 : DSA301LA
D2,101~106 : LFB01
D3,4 : 1SS101

Q1 : FMC2
Q2~4 : FMA1

IC1 : μPD6345GS

	L403	W4	C408,409
0-00	NO	YES	NO
2-71	YES	NO	YES

3

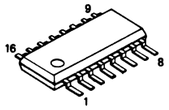


45GS

	L403	W4	C408,409
0-00	NO	YES	NO
2-71	YES	NO	YES

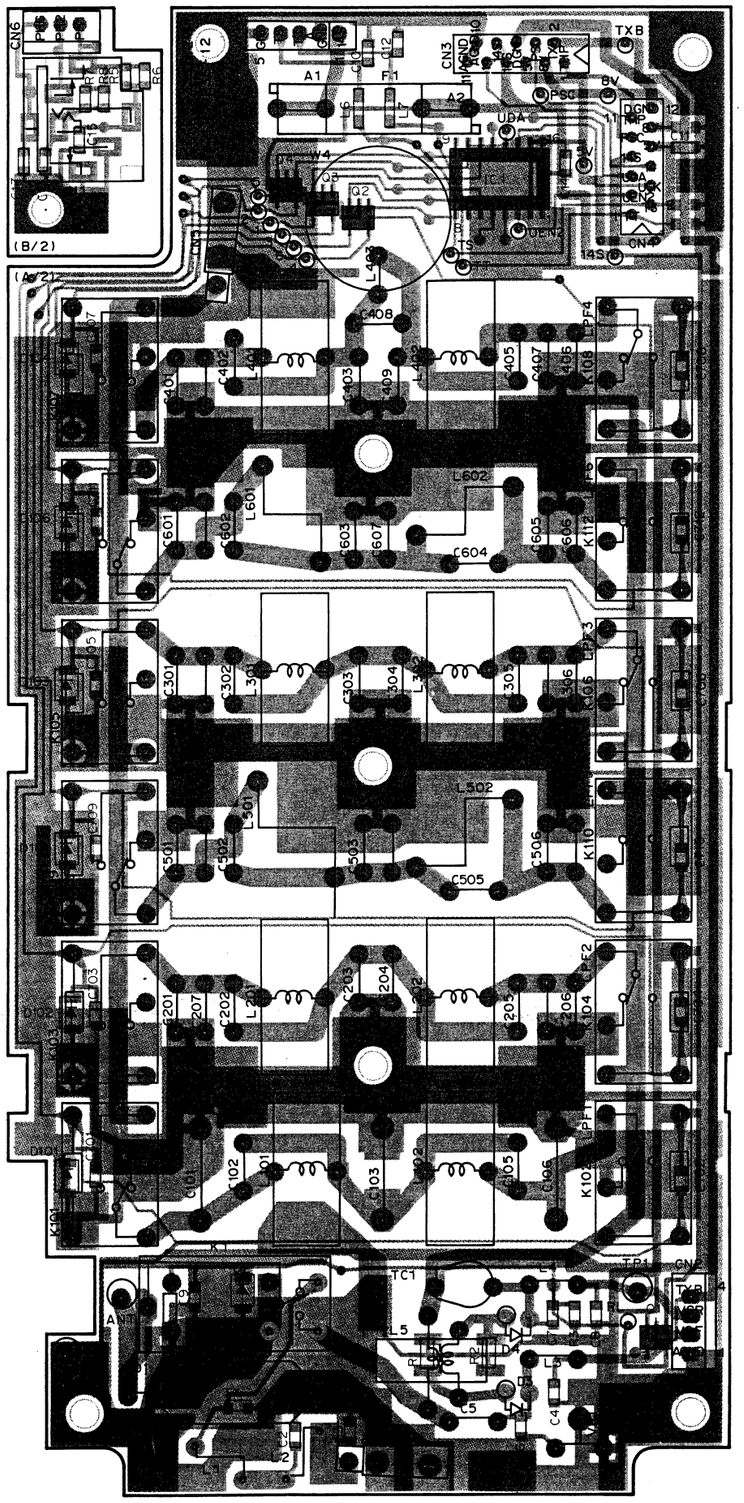
FMA1
FMC2

µPD6345GS



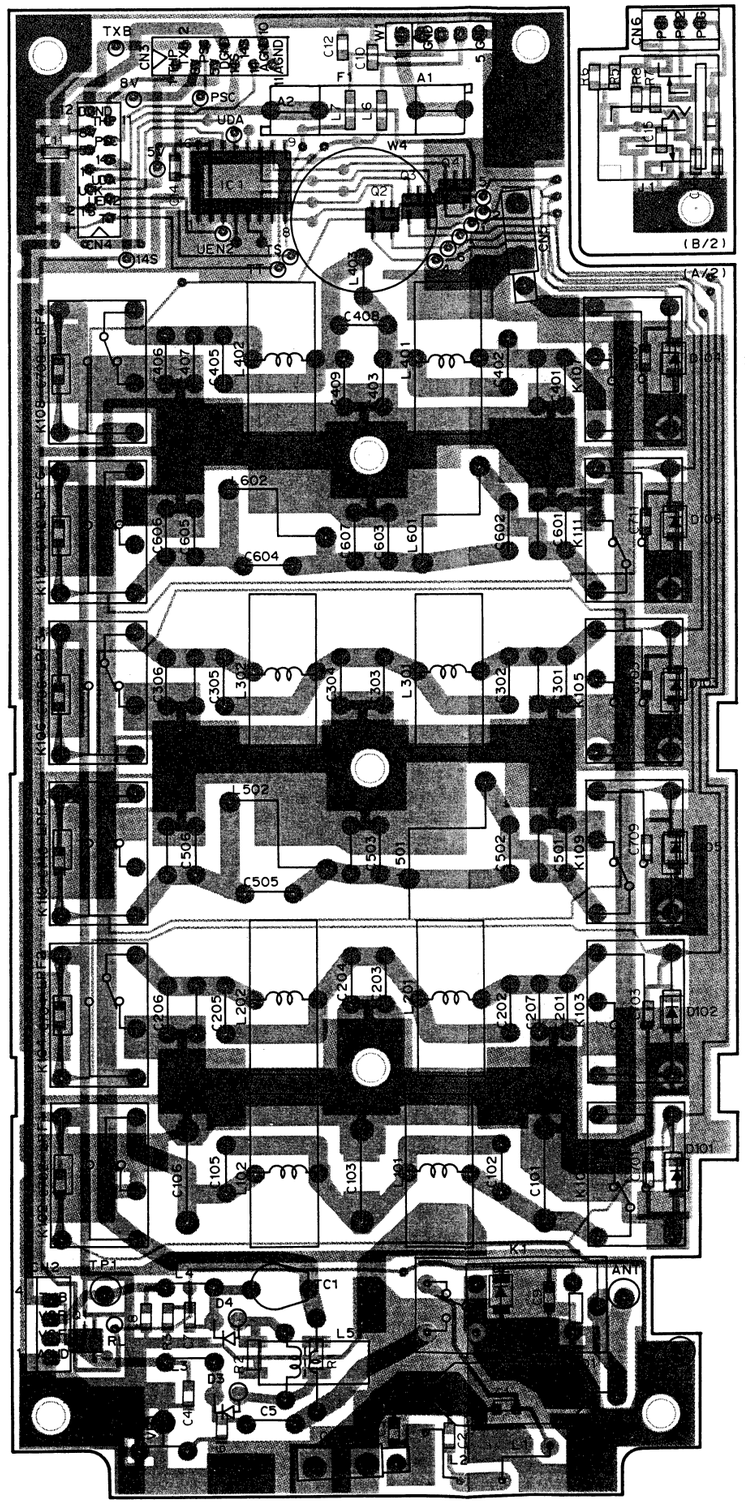
FILTER UNIT (X51-312X-XX) Component side view

0-00 : K, X, P, M, M2 2-71 : E, E2, E3



FILTER UNIT (X51-312X-XX) Foil side view

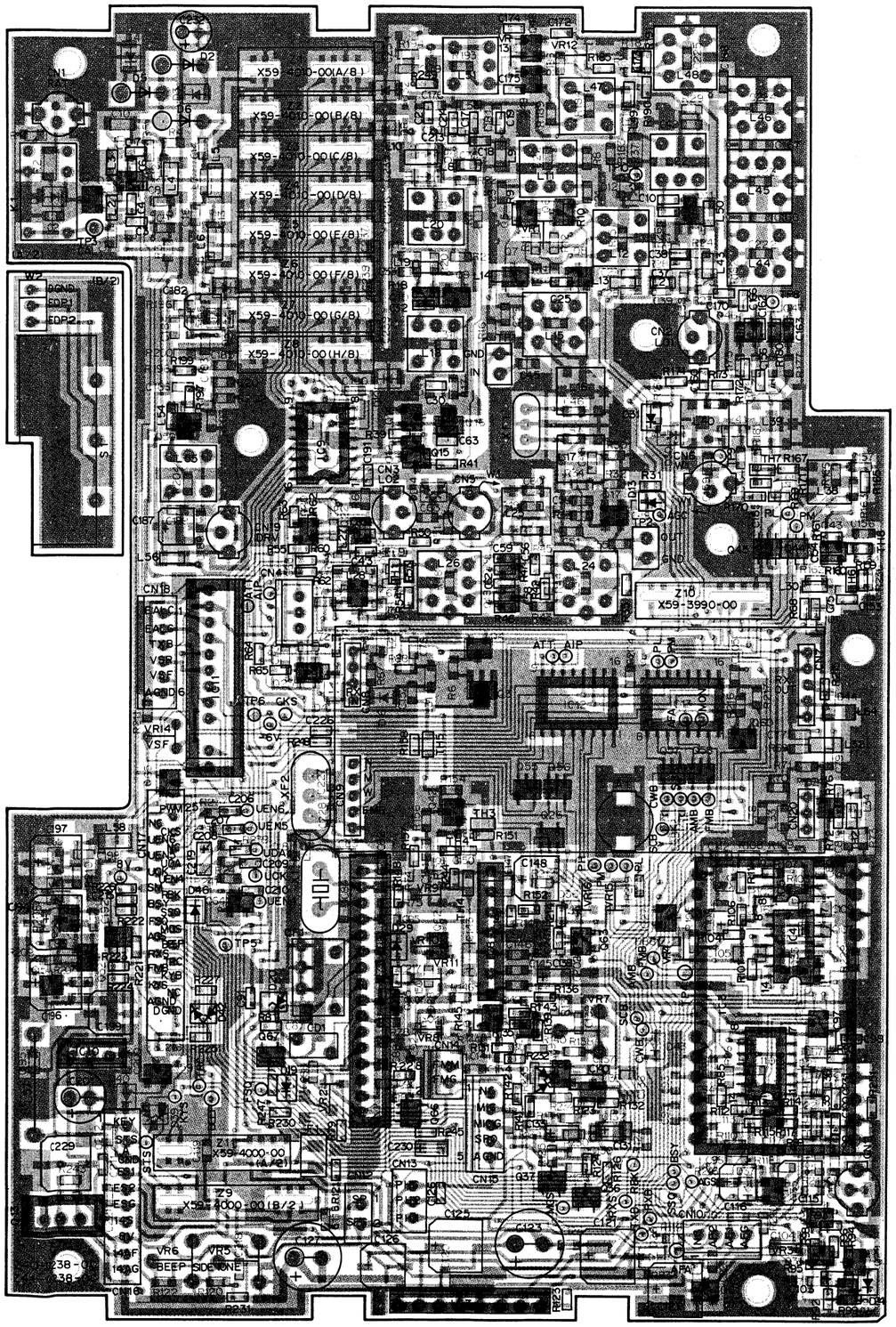
0-00 : K, X, P, M, M2 2-71 : E, E2, E3



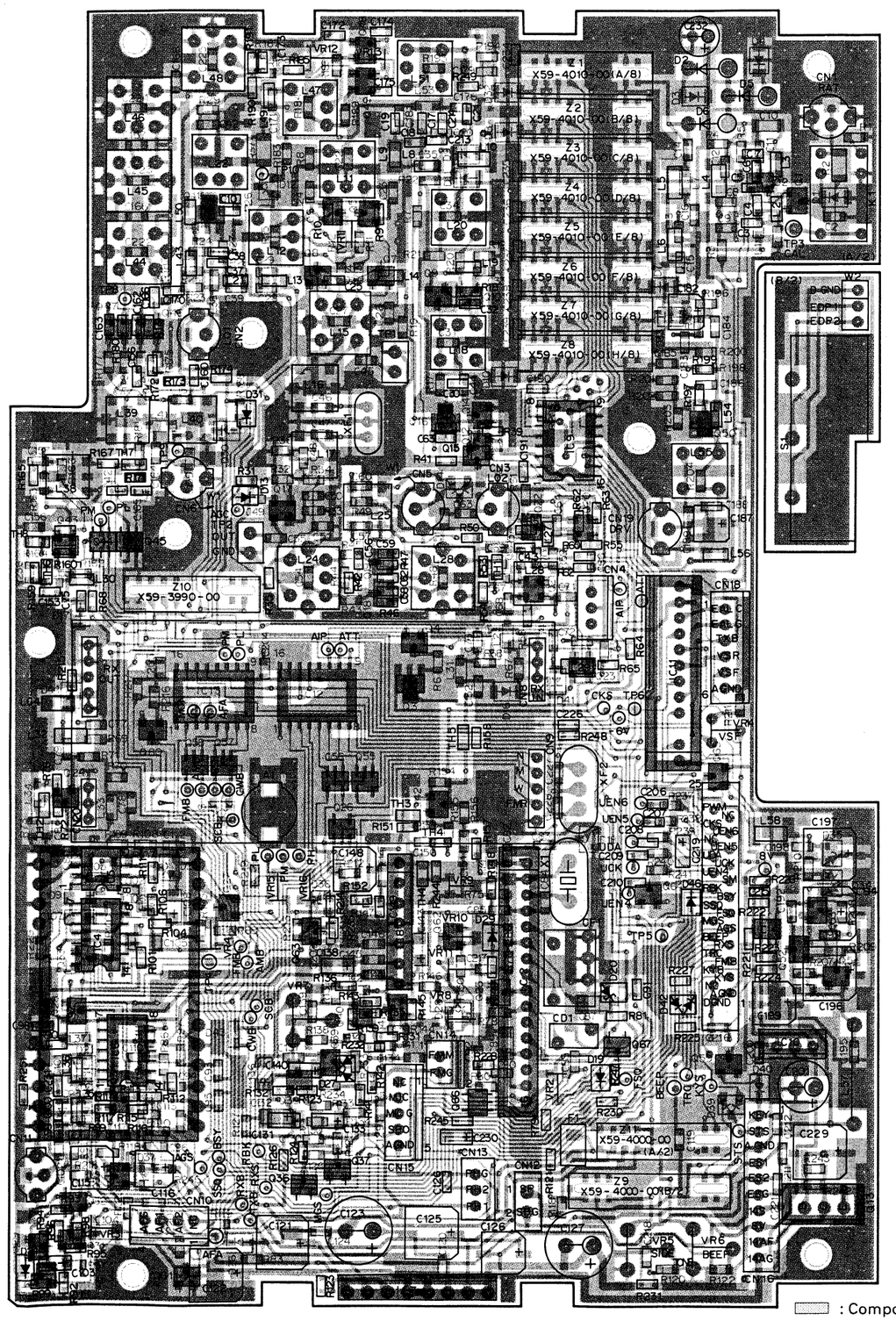
: Component side
: Foil side

TS-50S PC BOARD VIEWS

TX-RX UNIT (X57-4220-11) Component side view



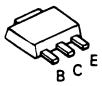
TX-RX UNIT (X57-4220-11) Foil side view



: Component side
: Foil side

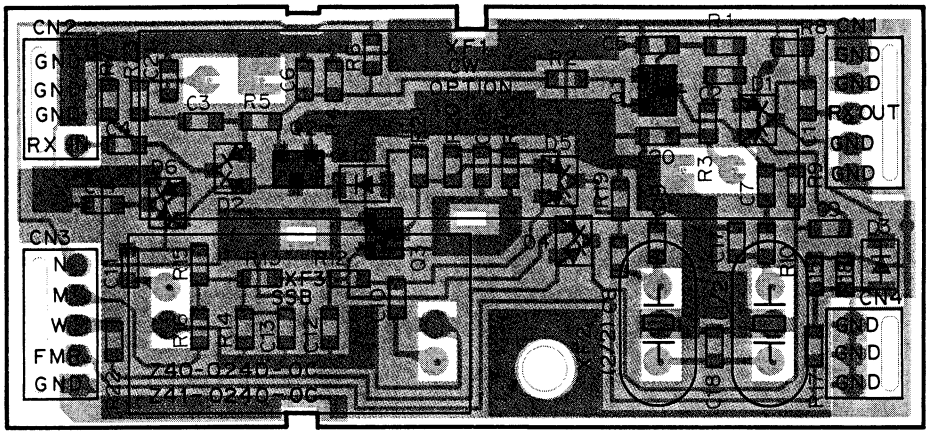
2SA1162
2SC2712
2SC3722K
2SD1757K
DTA124EK
DTC114EK
DTC124EK
DTC143EK
DTC143TK

2SA1213
2SC2954

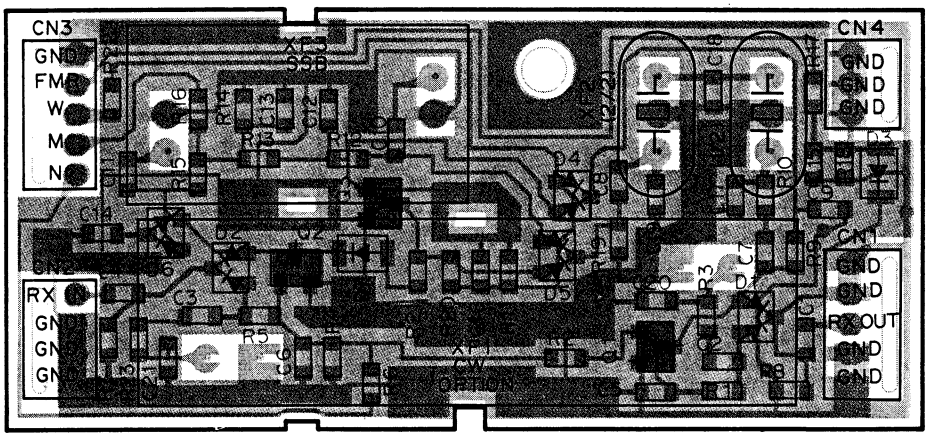


2SK210

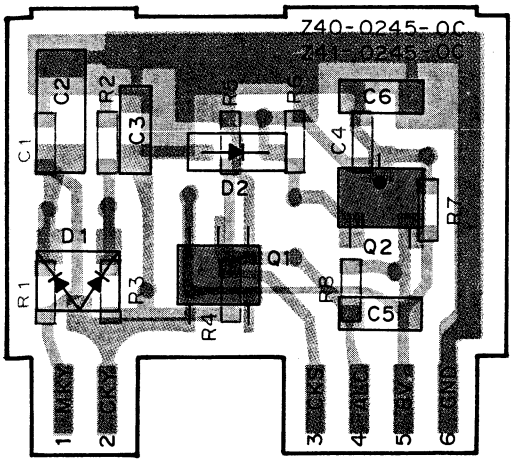
IF UNIT (X48-3110-00) Component side view



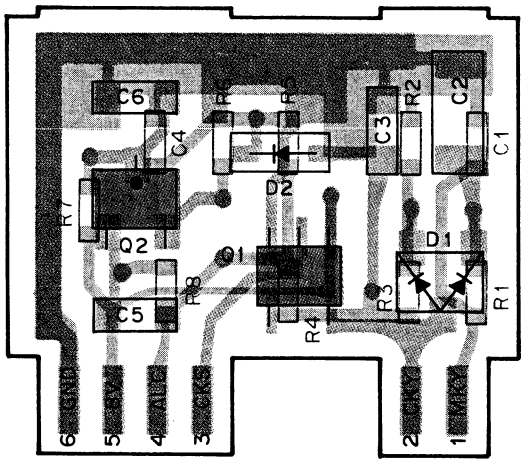
IF UNIT (X48-3110-00) Foil side view



ALC (X59-3990-00) Component side view



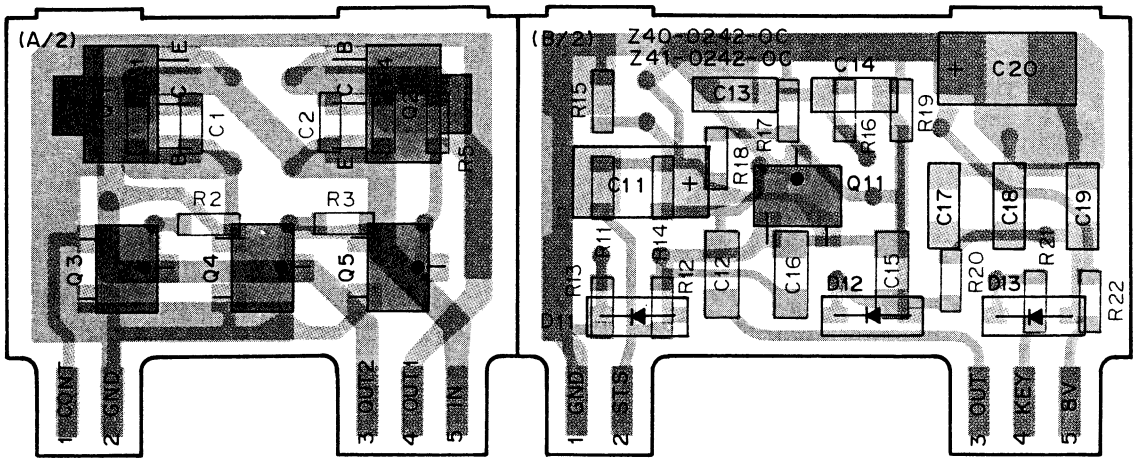
ALC (X59-3990-00) Foil side view



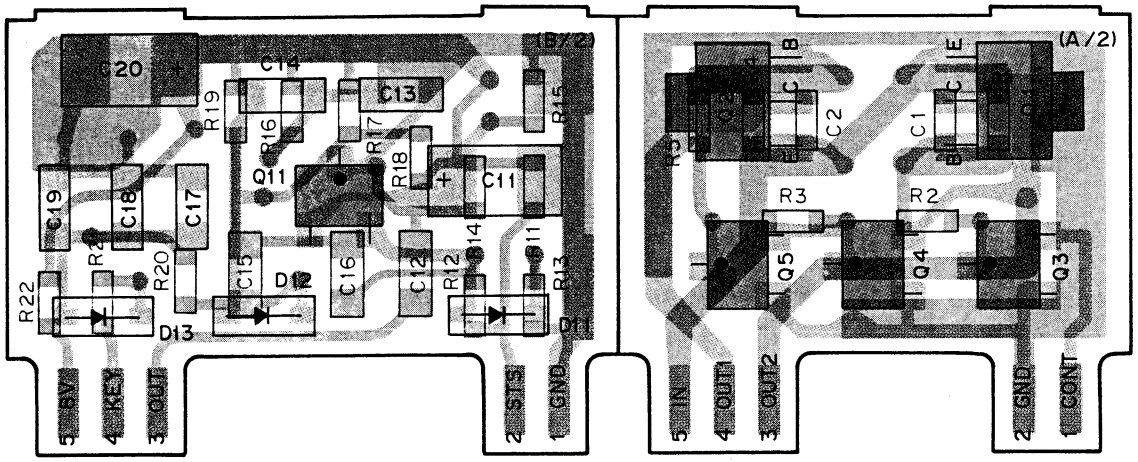
: Component side
: Foil side

TS-50S PC BOARD VIEWS

DSST (X59-4000-00) Component side view

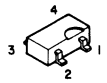


DSST (X59-4000-00) Foil side view

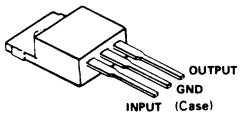


: Component side
: Foil side

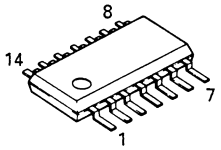
3SK131



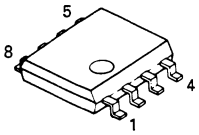
μPC78N05H



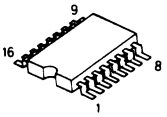
BU4066BF



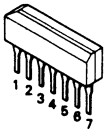
NJM2904M



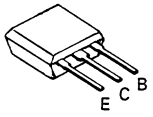
TC9174F



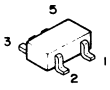
μPC1037HA



2SC4728



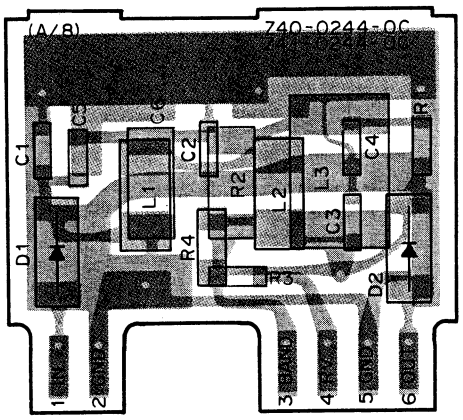
FMA3
FMC1
FMC2



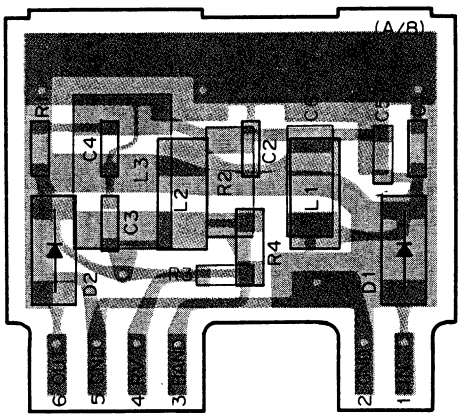
PC BOARD VIEWS TS-50S

LP BPF (X59-4010-00)

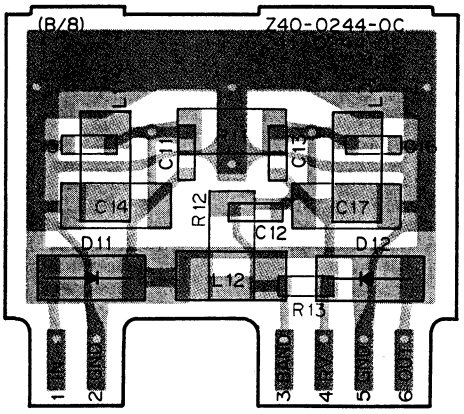
(A/8) Component side view



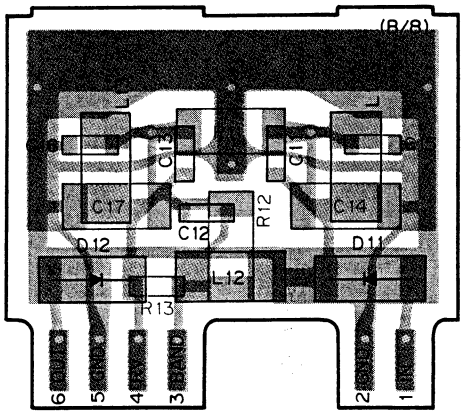
(A/8) Foil side view



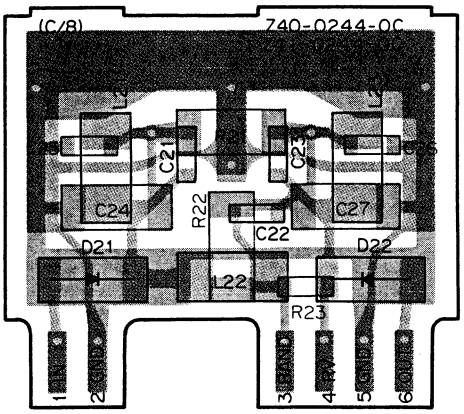
(B/8) Component side view



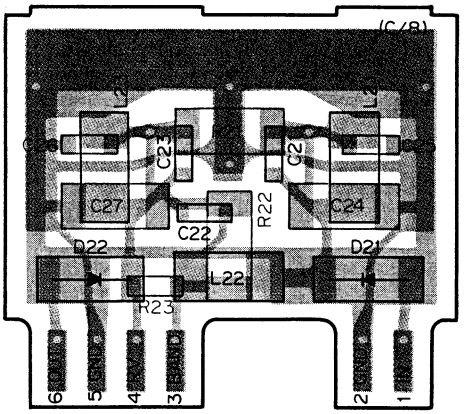
(B/8) Foil side view



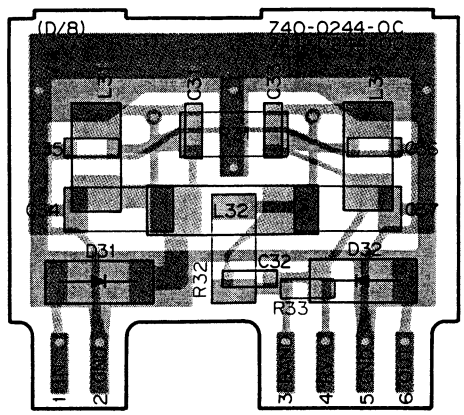
(C/8) Component side view



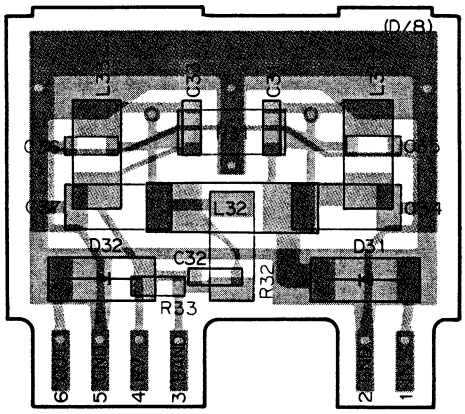
(C/8) Foil side view



(D/8) Component side view



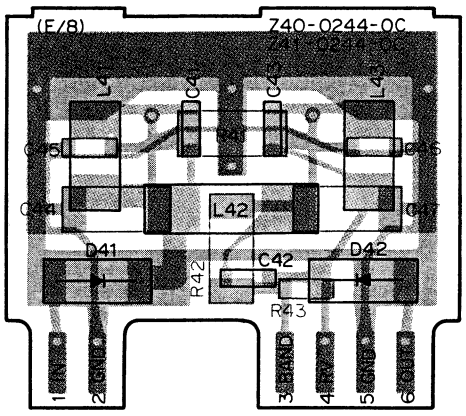
(D/8) Foil side view



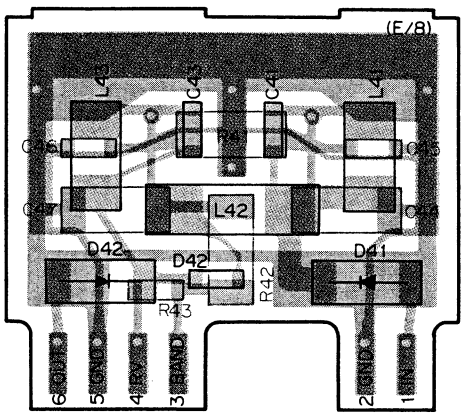
: Component side
: Foil side

TS-50S PC BOARD VIEWS

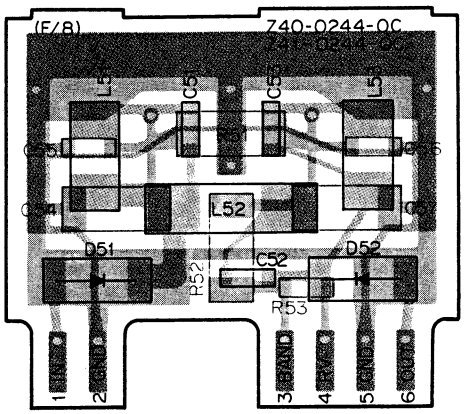
(E/8) Component side view



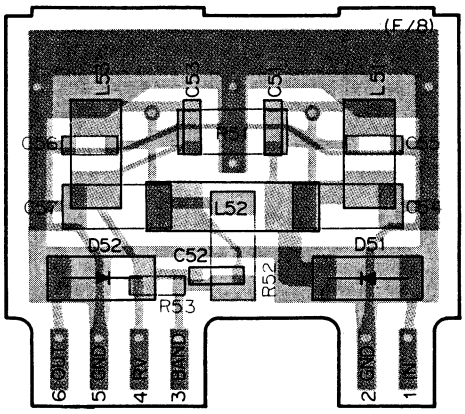
(E/8) Foil side view



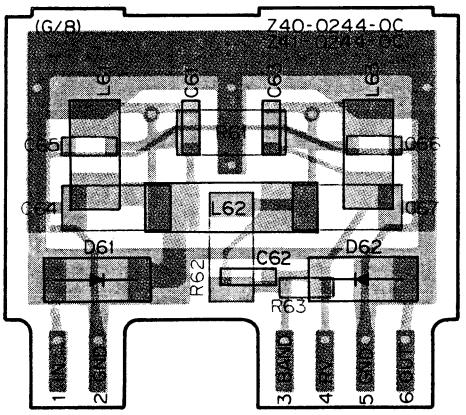
(F/8) Component side view



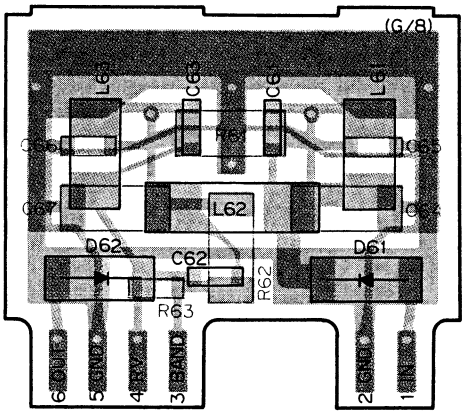
(F/8) Foil side view



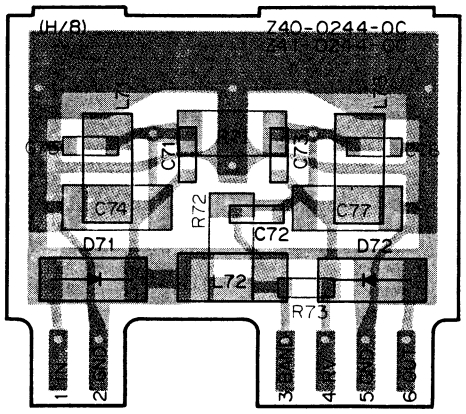
(G/8) Component side view



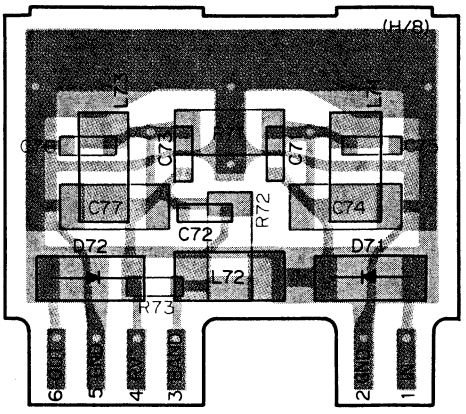
(G/8) Foil side view



(H/8) Component side view



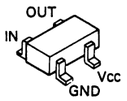
(H/8) Foil side view



: Component side
: Foil side

TX-RX UNIT (X57-4220-11)

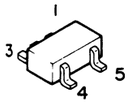
RU201



2SJ106
2SK520

IMD3

TA75S01F



(X59-4010-00)
D1,2,11,12,21,22,
31,32,41,42,51,
52,61,62,71,72
: RLS135

(X59-4000-00)
D11~13 : 1SS355

Q1,2 : 2SA1213(Y)
Q3~5 : DTC143TK
Q11 : 2SC2712(GR)

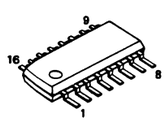
(X59-3990-00)
D1 : DAP202K
D2 : 1SS355

Q1 : FMC2
Q2 : 2SC2712(Y)

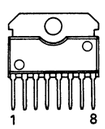
(X48-3110-00)
D1,2,5 : DAN235K
D3,7 : RLS135
D4 : DAN202K
D6 : 1SS226

Q1~3 : DTC143TK

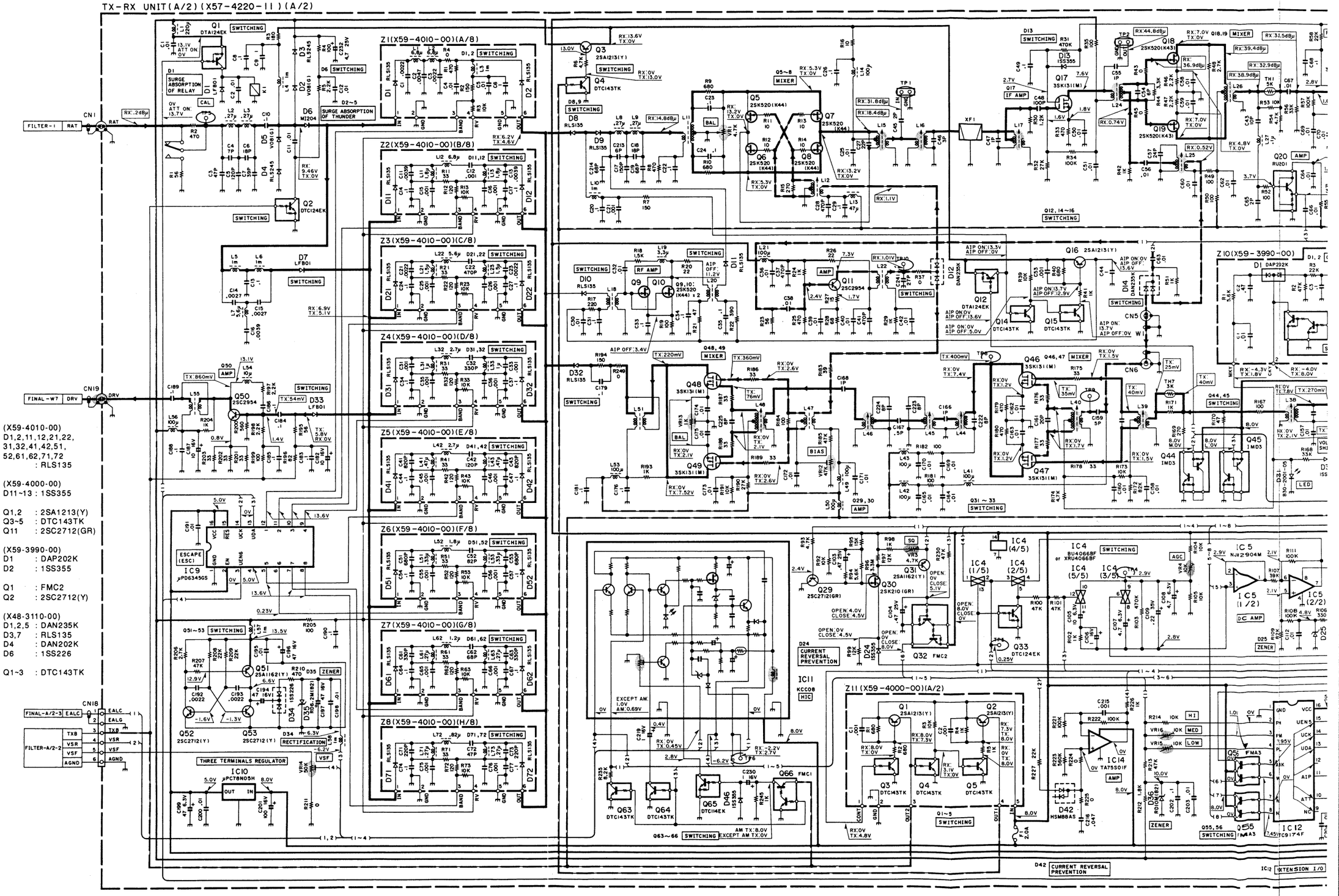
µPD6345GS



µPC1241H



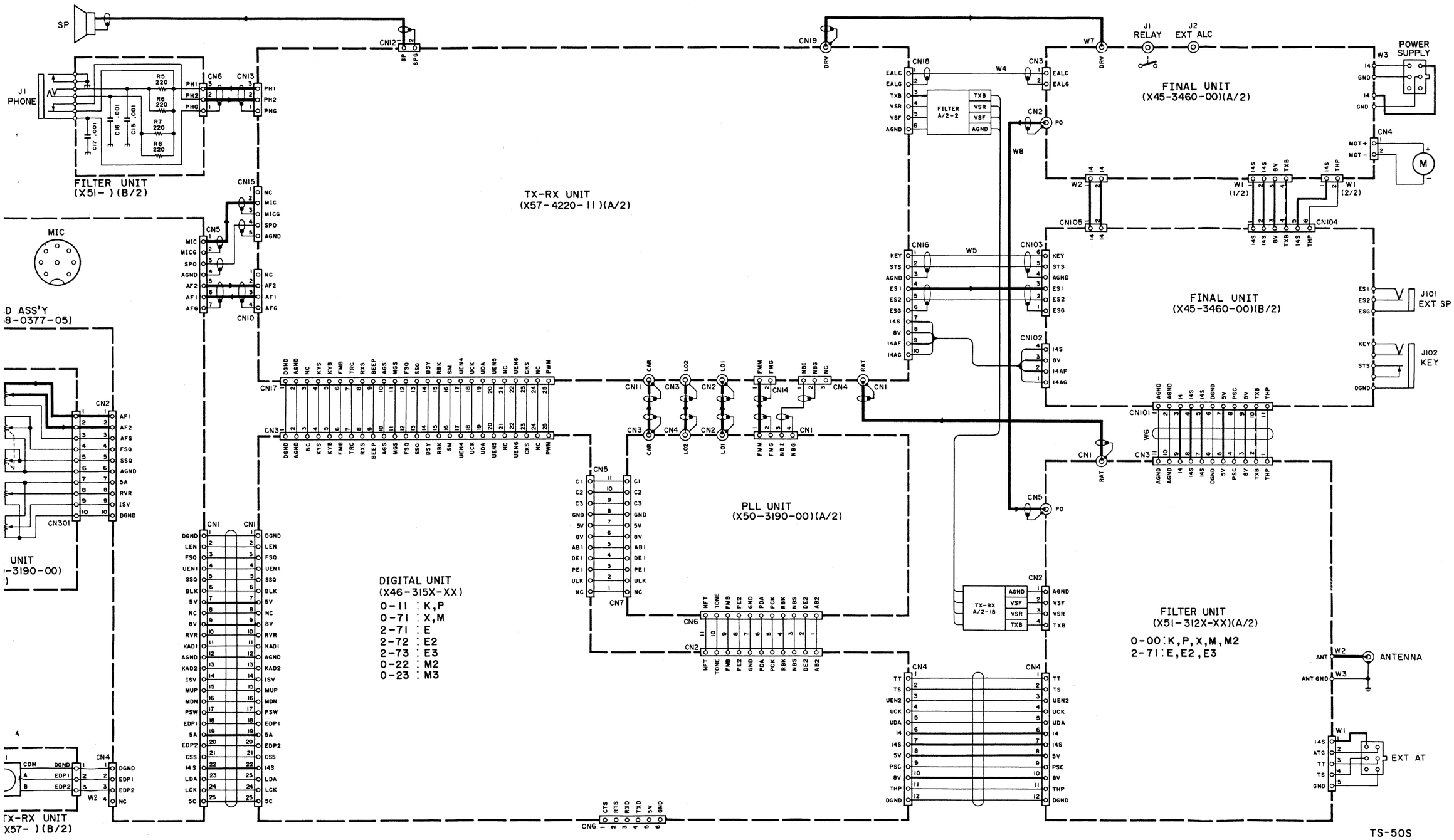
TX-RX UNIT(A/2)(X57-4220-11)(A/2)



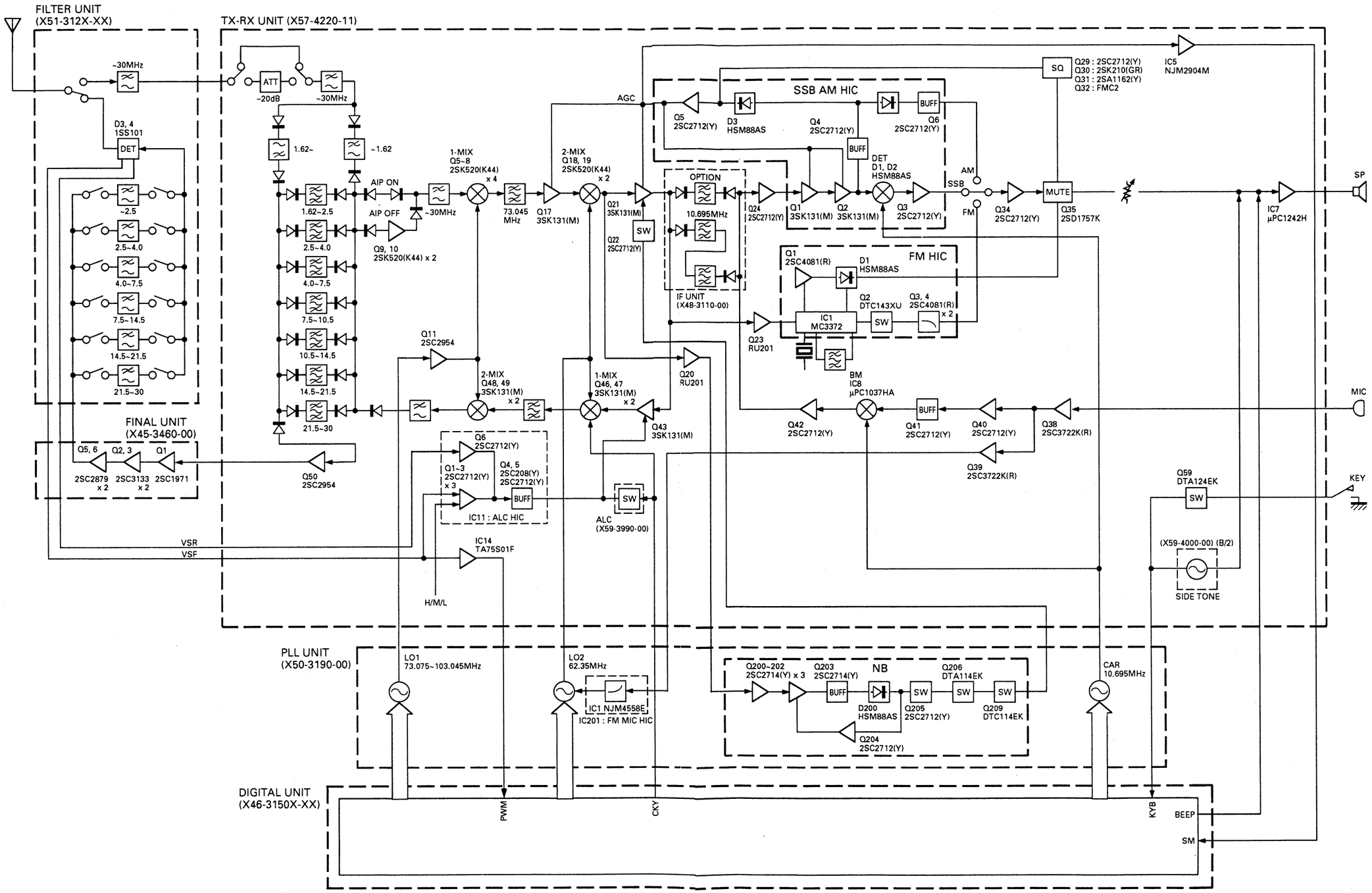
CIRCUIT DIAGRAM TS-50S

D1,7,33	: LFB01
D2,5	: V08(G)
D3,4	: RLS245
D6	: MI204
D8~11,16,17,21~23,32,41,44	: RLS135
D12,14	: DAN235K
D13,19,24,26,29,30,37,40,43,46	: 1SS355
D18,34	: 1SS226
D20,35	: RD6.2M(B2)
D25	: RD4.7M(B2)
D27,28,38,39	: DAN202K
D31	: B30-2001-05
D36	: RD10M(B2)
D42	: HSM88AS
Q1,12,59	: DTA124EK
Q2,27,28,33,60,61,67	: DTC124EK
Q3,16	: 2SA1213(Y)
Q4,14,15,63,64	: DTC143TK
Q5~10	: 2SK520(K44)
Q11,50	: 2SC2954
Q13	: 2SC4728(S)
Q17,21,43,46~49	: 3SK131(M)
Q18,19	: 2SK520(K43)
Q20,23	: RU201
Q22,24,34,40,41,42,52,53	: 2SC2712(Y)
Q25	: 2SJ106(GR)
Q26,66	: FMC1
Q29	: 2SC2712(GR)
Q30	: 2SK210(GR)
Q31,51	: 2SA1162(Y)
Q32	: FMC2
Q35,62	: 2SD1757K
Q36,37	: DTC143EK
Q38,39	: 2SC3722K(R)
Q44,45	: IMD3
Q55~58	: FMA3
Q65	: DTC114EK
IC2	: KCD04
IC3	: KCD08
IC4,6	: BU4066BF or XRU4066BF
IC5	: NJM2904M
IC7	: μPC1241H
IC8	: μPC1037HA
IC9	: μPD6345GS
IC10	: μPC78N05H
IC11	: KCC08
IC12,13	: TC9174F
IC14	: TA75S01F

TS-50S SCHEMATIC DIAGRAM

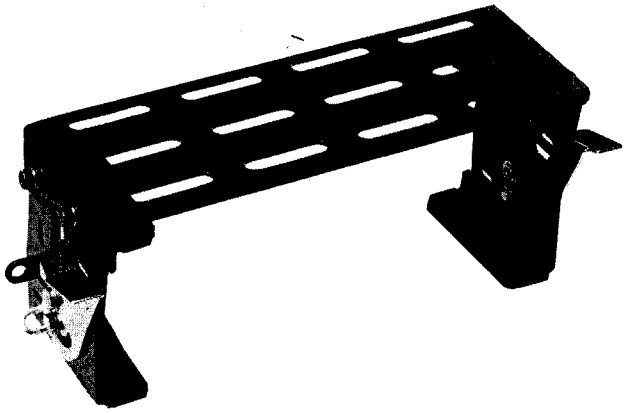


BLOCK DIAGRAM



MB-13 (MOUNTING BRACKET) / PG-2Y (DC CABLE)

MB-13 External View

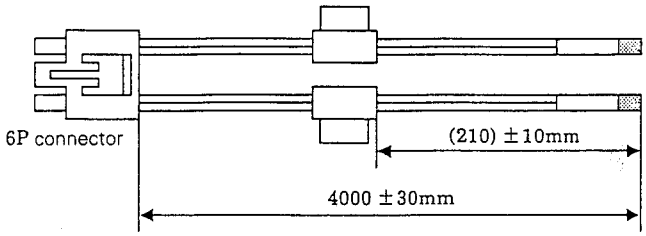


PG-2Y External View

MB-13 Specifications

Dimensions ..... 66 W x 196 D x 90 H (mm)
Weight 500g

PG-2Y Dime sions



MB-13 Parts List

Parts No.	New parts	Description
A13-0668-04		Angle
D10-0615-04		Lever (R)
D10-0616-04		Lever (L)
G01-0873-04		Spring coil
G13-0823-04		Cushion
J21-4433-04		Mounting hardware (R)
J21-4434-04		Mounting hardware (R)
J21-4435-04		Mounting hardware (L)
J21-4436-04		Mounting hardware (L)
J32-0922-04		Round boss
N09-0008-04		Hex. screw (Accessory)
N09-0632-05		Tapping screw (Accessory)
N14-0510-04		Flange nut (Accessory)
N15-1040-41		Flat washer
N15-1040-45		Flat washer (Accessory)
N15-1060-46		Flat washer (Accessory)
N16-0040-45		Spring wahser (Accessory)
N16-0060-46		Spring washer (Accessory)
N24-3030-41		E ring
N99-0304-04		Hex. bolt (Accessory)
W01-0401-05		Hex. wrench (Accessory)

PG-2Y Parts List

Parts No.	New parts	Description
E30-3159-05		DC cord
F05-2531-05		Fuse (25A/32V)

TS-50S

MC-47 (MULTI FUNCTION MICROPHONE)

MC-47 External View

MC-47 Specifications

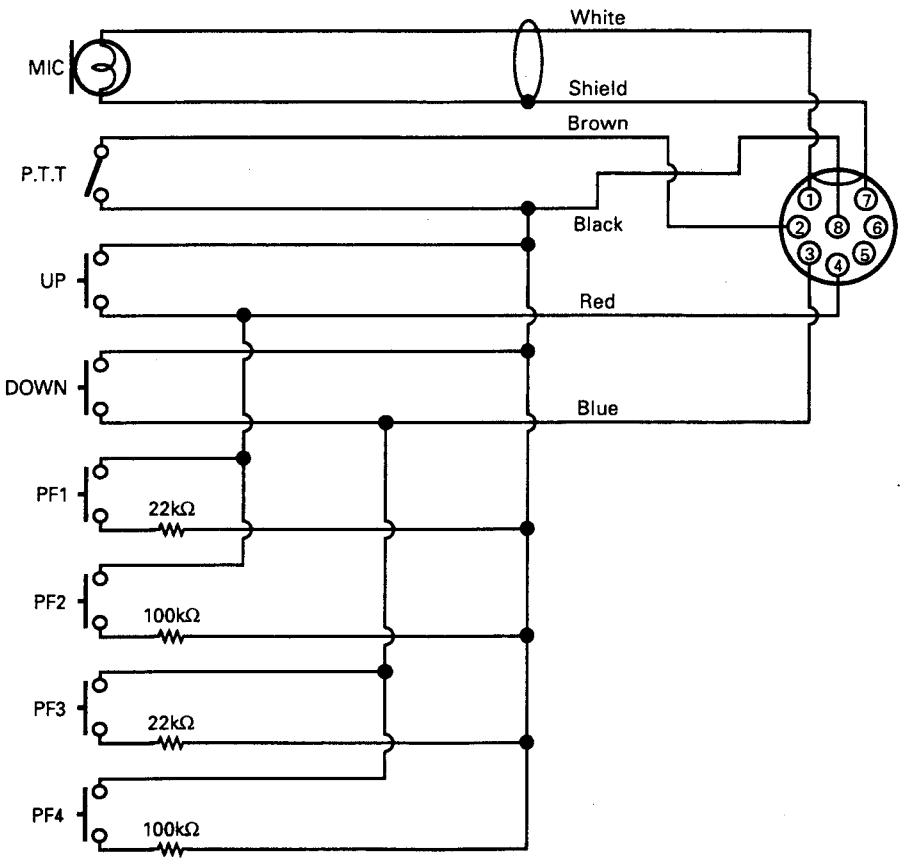
Electrical characteristics
- Impedance ..... 500Ω ± 30% (1kHz)
- Sensitivity ..... –78dB (0dB = 1V/μBAR, 1000Hz)
  –71dB ± 3dB (1kHz, 0dB = 1V/μBAR)

Dimensions ..... 53 W x 81 H x 36 D (mm)
Weight 200g

MC-47 Parts List

Parts No.	New parts	Description
E30-3171-08	*	Curl cord assy
K29-4857-08	*	PF knob
S50-1406-05	*	Tact switch (UP, DOWN)
S70-0427-08	*	Tact switch (RF1~4)
S74-0403-08	*	Micro switch (PTT)
T91-0528-05	*	Microphone assy
T91-0540-08	*	Microphone element

MC-47 Schematic diagram



SPECIFICATIONS

					Specifications
General	Mode				J3E (LSB, USB), A1A (CW), A3E (AM), F3E (FM)
	Number of memory channels				100
	Antenna impedance				50Ω
	Supply voltage				DC13.8V ±15%
	Grounding method				Negative ground
	Current	Transmit (maximum output)			20.5A
		Receive (standby)			1.45A
	Usable temperature range				–20°C to +60°C (–4°F to +140°F)
	Frequency stability (–10°C to +50°C)				Within ±10PPM
	Frequency accuracy (at room temperature)				Within ±10PPM
	Dimensions [W x H x D] ( ) : Projections included				179 x 60 x 233 mm (180 x 69 x 270 mm)
	Weight (main unit only)				2.9kg (6.4lbs)
Transmitter	Transmit frequency range	160m band			1.800 to 2.000MHz
		80m band			3.500 to 4.000MHz
		40m band			7.000 to 7.300MHz
		30m band			10.100 to 10.150MHz
		20m band			14.000 to 14.350MHz
		17m band			18.068 to 18.168MHz
		15m band			21.000 to 21.450MHz
		12m band			24.890 to 24.990MHz
		10m band			28.000 to 29.700MHz
	Power output	1.9 to 28MHz	SSB, CW, FM	Max.	100W
				Med.	50W
				Min.	10W
			AM	Max.	25W
				Med.	12.5W
				Min.	2.5W
	Modulation type		SSB		Balanced
			FM		Variable reactance
			AM		Low-level
	Spurious emissions				–50dB or less
	Carrier suppression (modulation frequency 1.5kHz)				40dB or more
	Unwanted sideband suppression (modulation frequency 1.5kHz)				40dB or more
	Maximum FM deviation				5kHz +10% –20%
	Transmit frequency characteristics (–10dB)				400 to 2600Hz
	Microphone impedance				600Ω

SPECIFICATIONS

				Specifications
Receiver	Circuit type			SSB, CW : Double conversion FM : Triple conversion
	Receive frequency range			500 to 30MHz
	Intermediate frequency	SSB, CW, AM		1st : 73.045MHz, 2nd : 10.695MHz
		FM		1st : 73.045MHz, 2nd : 10.695MHz, 3rd : 455kHz
	Sensitivity	SSB, CW (at 10dB (S+N)/N)	500kHz to 1.5MHz	Less than 0.25μV
			1.5MHz to 1.7MHz	Less than 0.35μV
			1.7MHz to 30MHz	Less than 0.25μV
		AM (at 10dB (S+N)/N)	500kHz to 1.5MHz	Less than 0.25μV
			1.5MHz to 1.7MHz	Less than 0.35μV
			1.7MHz to 30MHz	Less than 0.25μV
		FM (at 12dB SINAD)	28MHz to 30MHz	Less than 0.5μV
	Selectivity	SSB, CW		–6dB : More than 2.2kHz, –60dB : Less than 4.8kHz
		AM		–6dB : More than 5kHz, –60dB : Less than 40kHz
		FM		–6dB : More than 12kHz, –50dB : Less than 25kHz
	Image rejection			More than 70dB
	1st IF rejection			More than 80dB
	RIT shift frequency range	10Hz steps		More than ±1.1kHz
		20Hz steps		More than ±2.2kHz
	Squelch sensitivity	SSB, CW, AM	500kHz to 30MHz	Less than 2μV
		FM	28MHz to 30MHz	Less than 0.32μV
	Audio output (8Ω, 5% distortion)			2.0W
	Audio output impedance			8Ω

Note
1. Specifications are subject to change without notice or obligation due to ongoing technological developments.
2. Remember to keep the transmit output power within the power limitations of your license.

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Bolivia, 239-08020 Barcelona, Spain

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P.O. Box 504, 8 Figtree Drive, Australia Centre, Homebush, N.S.W. 2140, Australia

KENWOOD & LEE ELECTRONICS, LTD.
Unit 3712-3724, Level 37, Tower one Metroplaza, 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong

KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

HF TRANSCEIVER

TS-50S

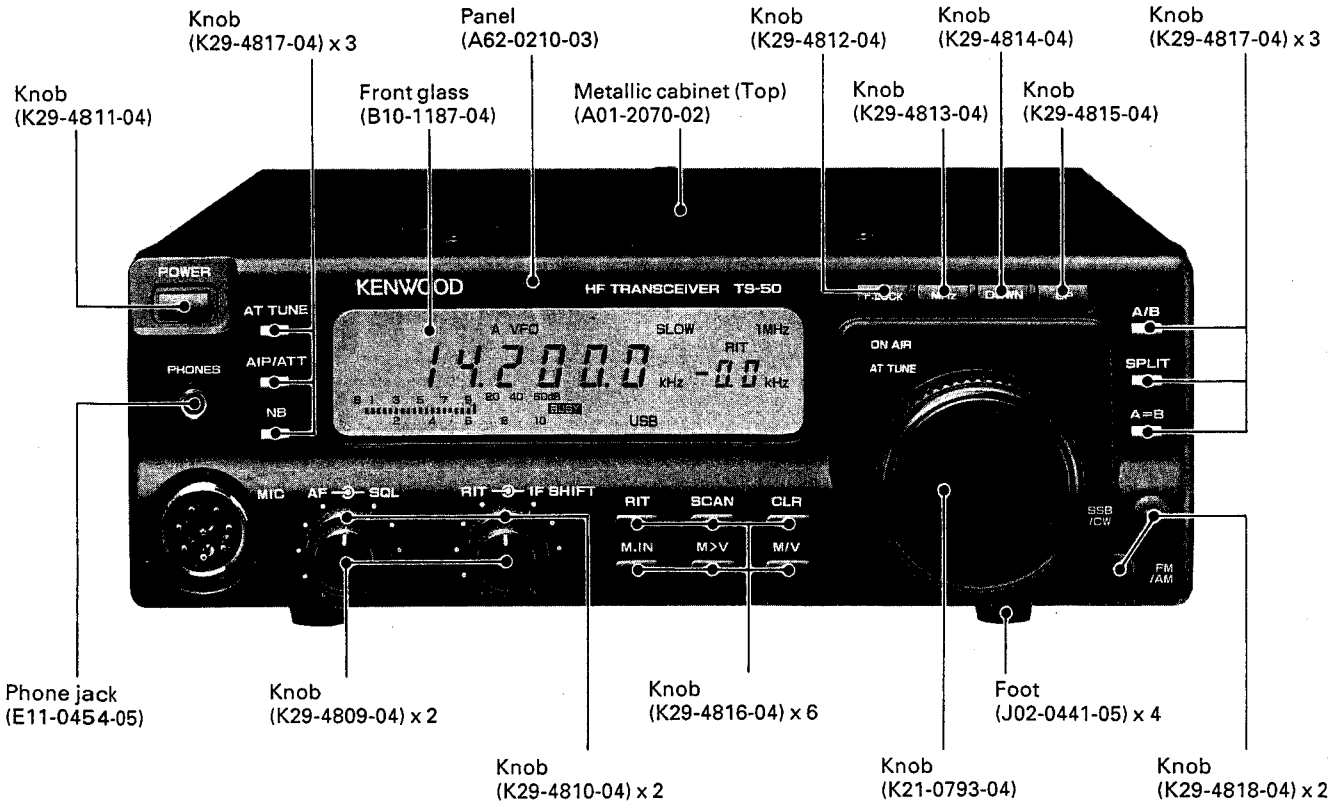
SERVICE MANUAL

SUPPLEMENT

KENWOOD

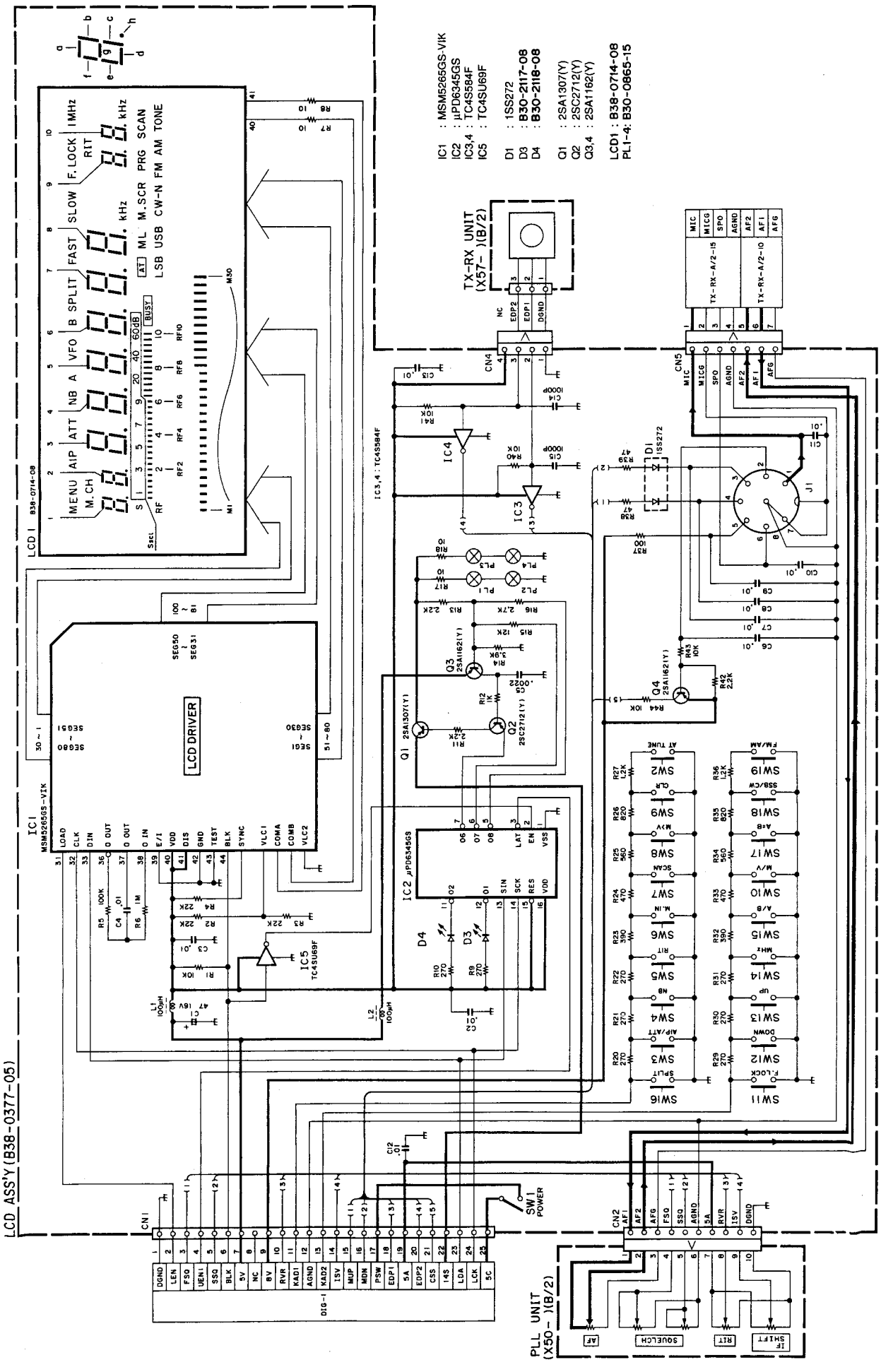
B51-8225-00(O)1676

LCD ASSY (B38-0377-05)

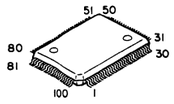


This manual is issued for a supplementary reference of the LCD Assembly. For further information, please refer to the service manual (B51-8199-00).

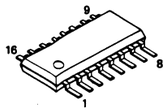
TS-50S SCHEMATIC DIAGRAM



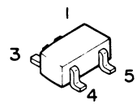
MSM5265GS-V1K



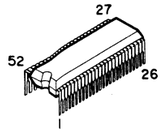
µPD6345GS



TC4S584F



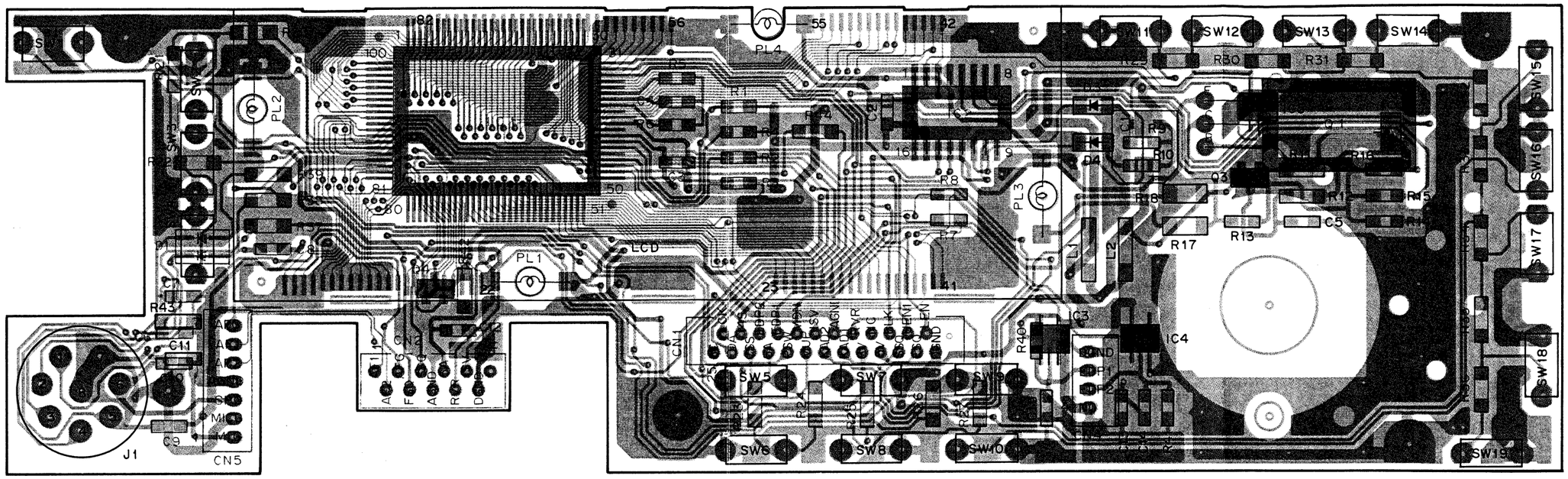
TC4SU69F



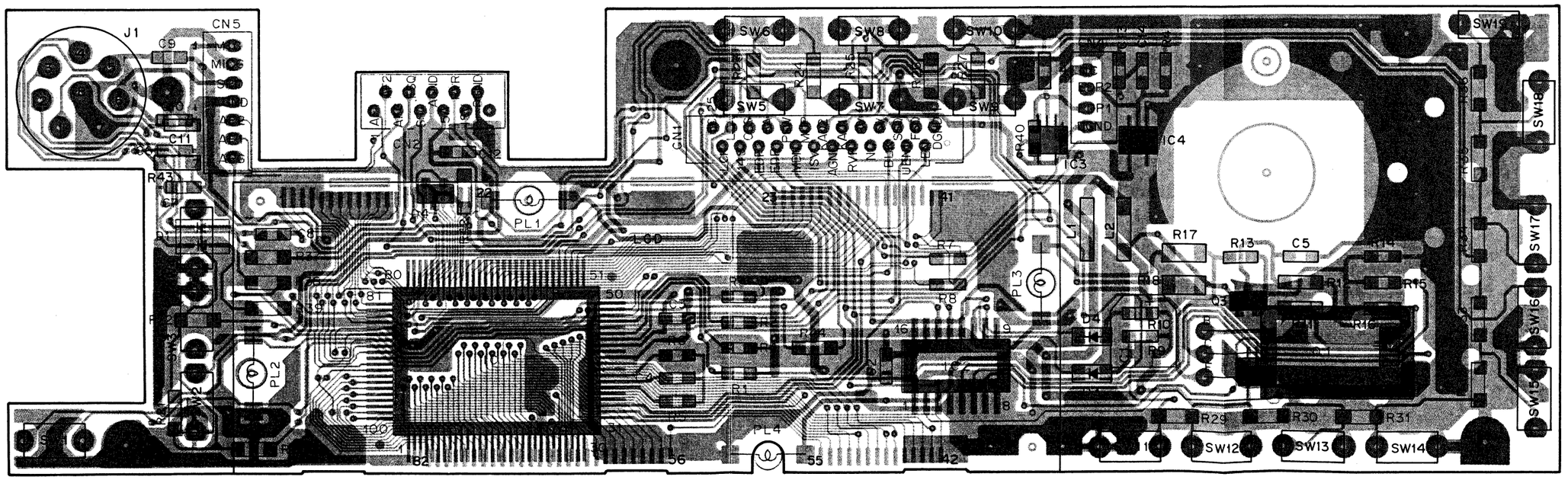
2SA1307

2SA1162
2SC2712

LCD ASSY (B38-0377-05) Component side view



LCD ASSY (B38-0377-05) Foil side view



: Component side
: Foil side

PARTS LIST

* New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

LCD ASSY (B38-0377-05)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
LCD ASSY (B38-0377-05)						
C1			C92-0040-05	ELECTRO 47UF 16WV		
C2 -4			CK73FB1H103K	CHIP C 0.010UF K		
C5			CK73FB1H223K	CHIP C 0.022UF K		
C6 -13			CK73EB1H103K	CHIP C 0.01UF K		
C14 ,15			CK73FB1H102K	CHIP C 1000PF K		
			E23-0623-04	EARTH TERMINAL		
CN1			E40-5233-05	CONNECTOR (25P)		
CN2		*	E40-5398-05	CONNECTOR (11P)		
CN4			E40-3248-05	CONNECTOR (4P)		
CN5			E40-3251-05	CONNECTOR (7P)		
J1			E06-0858-15	MIC CONNECTOR(8P)		
L1 ,2			L40-1011-18	CHOCK COIL (100UH)		
R1			RK73FB2A103J	CHIP R 10K J 1/10W		
R2 -4			RK73FB2A223J	CHIP R 22K J 1/10W		
R5			RK73FB2A104J	CHIP R 100K J 1/10W		
R6			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R7 ,8			RK73EB2B223J	CHIP R 22K J 1/8W		
R9 ,10			RK73FB2A271J	CHIP R 270 J 1/10W		
R11			RK73EB2B222J	CHIP R 2.2K J 1/8W		
R12			RK73EB2B102J	CHIP R 1.0K J 1/8W		
R13			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R14			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R15			RK73FB2A123J	CHIP R 12K J 1/10W		
R16			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R17 ,18		*	RK73EB2E100J	CHIP R 10 J 1/4W		
R20 -22			RK73EB2B271J	CHIP R 270 J 1/8W		
R23			RK73EB2B391J	CHIP R 390 J 1/8W		
R24			RK73EB2B471J	CHIP R 470 J 1/8W		
R25			RK73EB2B561J	CHIP R 560 J 1/8W		
R26			RK73EB2B821J	CHIP R 820 J 1/8W		
R27			RK73EB2B122J	CHIP R 1.2K J 1/8W		
R29 -31			RK73EB2B271J	CHIP R 270 J 1/8W		
R32			RK73EB2B391J	CHIP R 390 J 1/8W		
R33			RK73EB2B471J	CHIP R 470 J 1/8W		
R34			RK73EB2B561J	CHIP R 560 J 1/8W		
R35			RK73EB2B821J	CHIP R 820 J 1/8W		
R36			RK73EB2B122J	CHIP R 1.2K J 1/8W		
R37			RK73EB2B101J	CHIP R 100 J 1/8W		
R38 ,39			RK73EB2B470J	CHIP R 47 J 1/8W		
R40 ,41			RK73EB2A103J	CHIP R 10K J 1/10W		
R42			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R43 ,44			RK73FB2A103J	CHIP R 10K J 1/10W		
SW1 ,2			S40-1079-05	TACT SWITCH		
SW3 -14			S40-1086-05	TACT SWITCH		
SW15			S40-1079-05	TACT SWITCH		
SW16 -19			S40-1086-05	TACT SWITCH		
D1			1SS272	DIODE		
D3		*	B30-2117-08	LED (RED)		
D4		*	B30-2118-08	LED (ORG)		
IC1			MSM5265GS-V1K	IC(LCD DRIVER)		
IC2			UPD6345GS	IC		

L:Scandinavia **K:**USA **P:**Canada
Y:PX(Far East, Hawaii) **T:**England **E:**Europe
Y:AAFES(Europe) **X:**Australia **M:**Other Areas

⚠ indicates safety critical components.

TS-50S

PARTS LIST

* New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

LCD ASSY (B38-0377-05)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
IC3 ,4			TC4S584F	IC(SCHMITT TRIGGER)		
IC5			TC4SU69F	IC(INVERTER GATE)		
LCD1			B38-0714-08	LCD ELEMENT		
PL1 -4			B30-0865-15	LAMP (6.3V 75mA)		
Q1			2SA1307(Y)	TRANSISTOR		
Q2			2SC2712(Y)	TRANSISTOR		
Q3 ,4			2SA1162(Y)	TRANSISTOR		

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