KENWOOD

SERVICE MANUAL

TR-7950/TR-7930 TU-79

2m FM TRANSCEIVER

Downloaded by RadioAmateur.EU

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TR-7950/TR-7930

SPECIFICATIONS

[General]

Semiconductors..... MPU 1
ICs 19
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FETs 5
Diodes 61 (K) (M), 60(T), 59(w)

Frequency range..... 144.000 to 147.995 MHz (K) (M)
144.000 to 145.995 MHz (W) (T)

Frequency synthesizer..... Digital control, phase locked VCO

Mode..... FM (F3)

Antenna impedance..... 50 ohms

Power requirement..... 13.8V DC ±15%

Grounding..... Negative

Operating temperature.... –20°C to +50°C

Current drain..... 0.5A in receive mode with no input signal
(TR-7950) (Max.) 9.5A in HI transmit mode
(TR-7930) (Max.) 6.5A in HI transmit mode
(TR-7950) (Approx.) 3.0A in LOW transmit mode
(TR-7930) (Approx.) 2.5A in LOW transmit mode

Dimensions..... 175 mm (6 – 7/8) wide
64 mm (2 – 1/2) high
220 mm (8 – 11/36") deep (TR-7950),
206 mm (8 – 1/16") deep (TR-7930)
(projections excluded)

Weight..... 1.9 kg (4.18 lb) (TR-7950)
1.8 kg (3.96 lb) (TR-7930)

[Transmitter Section]

RF output power (at 13.8V DC, 50Ω load).... HI 45 Watts min. (TR-7950)
25 Watts min. (TR-7930)
LOW 3 ~ 7W (TR-7950)
2 ~ 6W (TR-7930)

Modulation..... Phase shift

Frequency tolerance (–20°C ~ +50°C)..... Less than $\pm 15 \times 10^{-6}$

Spurious radiation..... HI Less than –70 dB
LOW Less than –60 dB

Maximum frequency deviation (FM)..... ±5 kHz

Microphone..... Dynamic microphone with PTT switch, 500Ω

[Receiver Section]

Circuitry..... Double superheterodyne

Intermediate frequency... 1st 1F 10.695 MHz
2nd 1F 455 kHz

Receiver sensitivity..... Better than 30 dB for 0.5 μV S+N/N
Better than 12 dB for 0.25 μV SINAD

Receiver selectivity..... More than 12 kHz (–6 dB)
Less than 24 kHz (–60 dB)

Spurious response..... Better than 70 dB

Squelch sensitivity..... Less than 0.16 μV (threshold)

Auto scan step level..... Less than 0.2 μV (threshold)

Audio output..... More than 2.0 watts across 8 ohms load (5% dist.)

Note: Circuit and ratings are subject to change without notice due to developments in technology.

SEMI CONDUCTOR

K_1, M_1, T_1, W_1 : TR-7950 (45W Type)
K_2, M_2, T_2, W_2 : TR-7930 (25W Type)
N : New Parts

Item	Name	Remarks
Diode	1N60	
	1S1555	
	1S1587	
	1S2208	
	1SV50	
	MI402 K_1, M_1, T_1, W_1	
	MI303 K_2, M_2, T_2, W_2	
	U15B	
	UM9401	
Zener Diode	WZ-120	
	XZ-043	
	XZ-055 K,M	
	XZ-060 T,W	
Thermistor	112-102-2	
LCD	FTS1212	N
LED	GL107S12	N
	GL9HY24	N
	PY5532K	
	SLP144B	
TR	2SA496 (Y)	
	2SA1015 (Y)	
	2SA1048 (Y)	
	2SC496 (Y)	
	2SC945 (Q)	
	2SC1675 (L)	
	2SC1775 (E)	
	2SC1815 (Y)	
	2SC1815 (BL)	
	2SC1959 (Y)	
	2SC2240 (GR)	
	2SC2347	
	2SC2458 (Y)	
	2SC2458 (BL)	
	2SC2538-22-A K_2, M_2, T_2, W_2	
	2SC2603 (D,E)	
	2SC2668 (Y)	
	2SC2787 (L)	
	2SC3019 K_1, M_1, T_1, W_1	N
	2SD880 (Y)	
FET	2SK125	
	3SK73 (GR)	
	3SK74 (L)	
IC	AFG05F1750A2 T,W	
	LR4087 K,M	N
	MB3712	
	MC14066BCP	
	MC145155P	
	MC145151P	N
	NJM78L06K	
	MK5087N K,M	
	MSM58292GS	N
	TA7302P	
	TA7612AP	
	TC4011BP	
	TC4049BP	
	TC4050BP	N
	UPC577H	
	UPC592H2	N
	UPC78M08H	
	UPC4558C	
Micro-processor	UPD7508C-017	N
Power Module	M57726 K_1, M_1, T_1, W_1	
	M57737 K_2, M_2, T_2, W_2	N

CIRCUIT DESCRIPTION

The TR-7950 and TR-7930 are 2 meter high power FM amateur radio mobile transceivers.
The operating frequency is controlled in 5 kHz steps by a microcomputer-controlled PLL (Phase Locked Loop). An LCD (Liquid Crystal Display) indicates various information. Both models have 21 memory channels for storing operating frequencies. Operation is controlled by either the keyboard or memory channel selector. The keyboard is illuminated for night time operation. The memory channel knob perimeter lights memory channel recall operations. Repeater functions include programmable offset, manual offset select, reverse and two paired-channelmemories. Types K and M can be equipped with an optional plug-in subtone circuit which allows 3 preset tone signals to be stored and controlled from memory; these types also have a built-in touch tone encoder. Types T and W include a 1750 Hz tone burst circuit. The microcomputer (backed up by a built-in lithium battery) supports all control functions such as scanning and Up/Down tuning. These transceivers are also equipped with a "beep" tone generator and other accessory circuits.

[RX]

The antenna signal is fed to the RX unit from the diode T/R switch in the Final unit. The RX unit front end consists of a dual gate FET RF amplifier Q1: 3SK74, first mixer Q2, a helical resonator and a 2-stage MCF (Monolithic Crystal Filter). This front end has high dynamic range and sensitivity.
The 10.695 MHz 1st IF signal from the MCF is mixed with the 10.24 MHz 2nd local signal by the 2nd mixer, Q3: 3SK73 and converted to a 455 kHz signal. This 455 kHz signal is applied through ceramic filter CF1 (CFW-455F) to the IF amplifiers Q6: TA7302P, Q7: 2SC2787, and Q8: μPC577H. The amplified and limited signal is detected by ceramic discriminator L11. The 10.24 MHz 2nd local oscillator signal is also sent to the PLL unit for use as the reference signal.
The receiver detector output consists of three components: voice intelligence, noise and direct current.
The voice component, after de-emphasis, is preamplified by Q16: 2SC2240, and is then power amplified by Q17: MB3712 to drive the speaker.
The noise component is applied to a band pass filter to obtain noise at about 30 kHz. This filtered noise component is applied to noise amplifier Q11: μPC592H2, which provides the squelch operating singal. After detection by diodes D7 & D8, the signal is DC amplified by Q12 and Q13 for control of the AF preamplifier, Q16.
The direct current component is applied to window comparator Q9: μPC4558 which checks whether the signal being received is in the center of the receiver's pass band. An on-channel signal will be detected at or near zero DC volts, while a signal greater than +/– 2 kHz from channel-center will contain a polar DC component sufficient for comparator rejection. Both the comparator and squelch output signals are applies to a logic AND operation (Q14), and the C-TUNE indicator is lit when the resultant is true. The AND output is also sent to the Control unit as the scan stop (SS) signal.

Item	Rating
Nominal center frequency (fo)	10.695 MHz
Pass bandwidth	±7.5 kHz or more at 3 dB
Attenuation bandwidth	±25 kHz or less at 40 dB ±45 kHz or less at 60 dB
Guaranteed attenuation	1. 70 dB or more within ±1 MHz 2. Spurious level = 40 dB or more at $fo \sim fo + 500$ kHz 3. Spurious level = 80 dB or more at fo – (910 kHz ±10 kHz)
Ripple Loss	1.0 dB or less 1.5 dB or less
Impedance	3 kΩ/0 pF

Table 1. MCF (L71 - 0216 - 05) RX unit XF 1

Item	Rating
Nominal center frequency	455 kHz
6 dB bandwidth	± 6 kHz or more
50 dB bandwidth	± 12.5 kHz or more
Ripple (within 455 ±5 kHz)	3 dB or less
Loss	6 dB or less
Guaranteed attenuation (within 455 ±100 kHz)	35 dB or more
Input and output impedance	2.0 kΩ

Table 2. Ceramic filter (L72 - 0315 - 05) RX unit CF 1

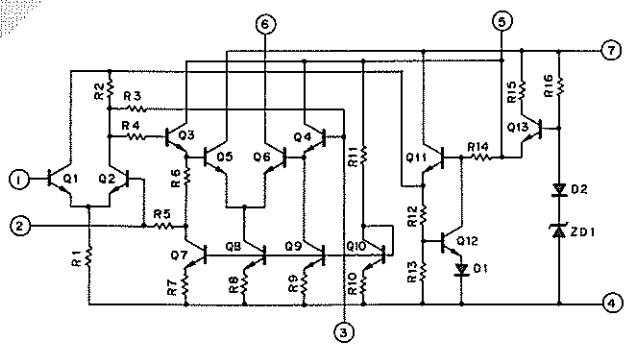


Fig 1. TA7302P Equivalent circuit RX unit Q6)

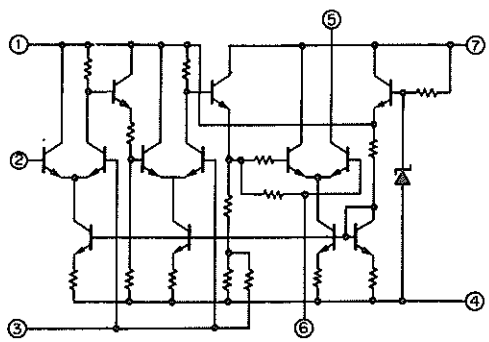


Fig 2. μPC577H Equivalent circuit (RX unit Q8)

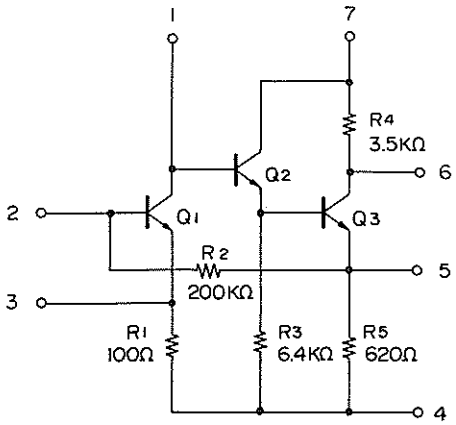


Fig 3. μPC592H2 Equivalent circuit (RX unit Q11)

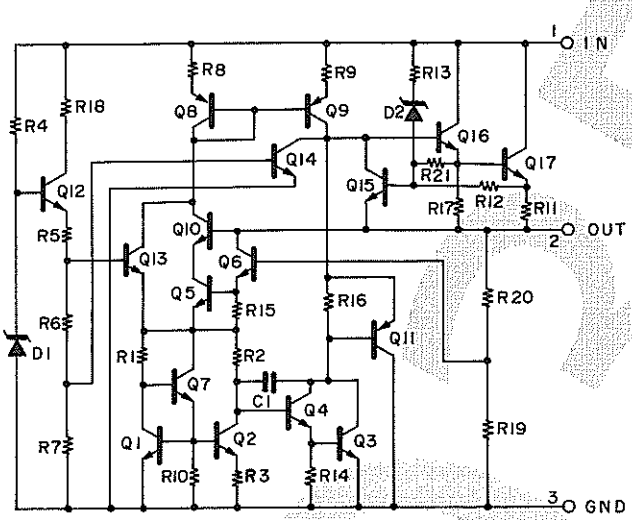


Fig 4. μPC78M08H Equivalent circuit (RX unit Q21)

[TX]

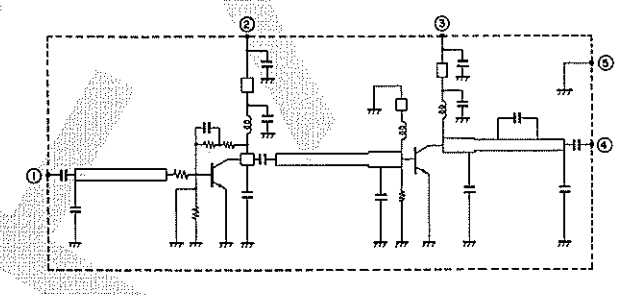
Audio from the microphone is amplified by Q18: μPC4558C (in the RX unit), buffered by Q19: 2SC2458(Y) and limited by diodes D13 ~ D16 (1S1555's). High frequencies which may be included in the limited signal are eliminated by active low pass filter Q20: μPC4558C. The filtered signal is applied to the TX PLL loop (in the PLL unit) via the MO line to phase modulate the RF singal. The resultant FM signal is amplified by Q22: 2SC2668(Y), Q23: 2SC2347 and Q24: (2SC3019 for the 45W type and 2SC2538 for the 25W type) to drive the Final unit.

The DO input to the Final unit is power amplified by power hybrid Q1: (M57726 for the 45W type and M57737 for the 25W type), then fed to the antenna through the T/R switch (D1 and D2) and low pass filter.

The APC (Automatic Power Control) circuit switches the output power between high and low to protect the final unit as follows. The output from the power hybrid is detected by diode D3, and the detected signal is amplified by Q7: 2SC2458(Y), which is controlled by the Hi/Low switch setting. Q7's output is applied to differential amplifier Q4 and Q5: 2SC2458(Y)'s. The reflected power from the antenna is detected by diode D4, amplified by Q6: 2SC2458(Y), and also applied to the differential amplifier. The differential amplifier's output is applied to regulators Q3: 2SA496(Y) and Q2: 2SD880(Y) and to the collector of Q24 in the PLL unit to control transmitter output by reducing the voltage applied to Q1 pin 2 (DB).

Item	Symbol	Tc (°C)	Condition	Rating
Operating	Vcc	25		17V
DC current	Icc	25		7A
Operating case temp.	Tc (op)		-30 ~ +110°C	
Storage temp.	Tstg		-40 ~ +110°C	
Power input	Pin	25	Zg=Zl=50Ω	0.4W
Power output	Po	25	Zg=Zl=50Ω	40W

Table 3. Max rating M57737 (TR-7930)



① INPUT ②VCC1 ③VCC2 ④OUT ⑤GND

Fig 5. M57737 Equivalent circuit (TR-7930)

MAX Raitig M57726

Item	Symbol	Tc (°C)	Rating
Operating voltage	Vcc	25	17V
DC current	Icc	25	14A
Operating case temp	Tc (op)		-30 ~ + 110°C
Storage temp	Tstg		-40 ~ + 110°C

Electrical characteristic M57726

Item	Symbol	Tc (°C)	Condition	Value	
				Min.	Typ
Power output	P_o	25	Vcc = 12.5V, F = 144 ~ 148 MHz, P_{IN} = 0.4W, ZL = ZG = 50Ω	43W	47W
Total efficiency	η_T	25	Vcc = 12.5V, F = 144 ~ 148 MHz, P_{IN} = 0.4W, ZL = ZG = 50Ω	50%	54%

Table 4. M57726 (TR-7950)

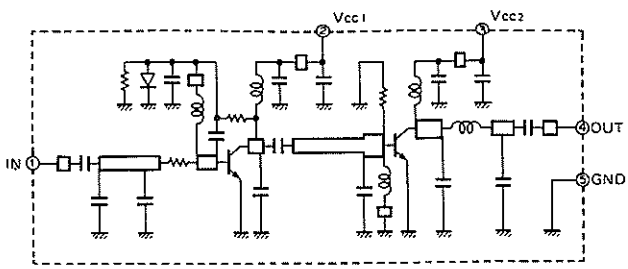


Fig 6. M57726 Equivalent circuit (TR-7950)

[PHASE LOCK LOOP UNIT]

The PLL unit contains two separate PLL circuits, an RX PLL and a TX PLL.

- RX PLL

The signal generated by RX VCO (Voltage Controlled Oscillator) Q9: 2SK125 is buffered by Q10: 2SC2668(Y) and mixed with the HET (Heterodyne) signal by Q3: 2SC2668(Y) to obtain an 11.015 – 18.010 MHz (K, M) or 13.015 – 15.010 MHz (W, T) PLL IF signal. This signal is amplified by Q4: 2SC2668(Y) and applied to PLL IC Q5: MC145155P, where it is divided according to frequency division data sent from the Control unit to obrain a 5 kHz comparison signal. This is compared with the 5 kHz reference signal obtained by division of the 10.240 MHz reference signal originating in the RX unit. The comparator's output is applied to active low pass filter Q7 and Q8: 2SC2240GR, and then to varicap diode D2 (1S2208) to lock the VCO to the desired frequency.
If the PLL should unlock, Q5 outputs an unlock signal. The signal turns off Q6 to interrupt operation of output amplifier Q11: 2SC2668(Y), and prevents receiver operation by removing the first mixer injection signal.
Q1: 2SC2787L generates a 40.0966 MHz signal which is tripled by Q2 to obtain the 120.29 MHz HET signal for application to mixer Q3.

- TX PLL

The signal generated by TX VCO Q21: 2SK125 is mixed with the RX PLL output by Q14: 2SC2668(Y) to obtain the 10.695 MHz TX IF signal. This is amplified by Q15: 2SC2668(Y) and applied to PLL IC Q12: MC145151P.
In this PLL IC, the 10.695 MHz signal is divided by 512 to obtain a 20.88 kHz signal, and this is compared with the 20.88 kHz reference signal obtained by division of the 10.695 MHz reference signal generated by Q13: 2SC2787L. This design reduces the TX PLL response time. Q12's comparator output is actively low pass filtered by Q16, Q17 and Q18: 2SC1775E and applied to varicap diode D5 (1S2208). This locks the TX VCO to a frequency which is 10.695 MHz higher than the RX PLL frequency.
If the TX PLL unlocks, the bias voltage supplied by Q19 & Q20 to Q22, Q23 and Q24 is turned off to disable transmission.

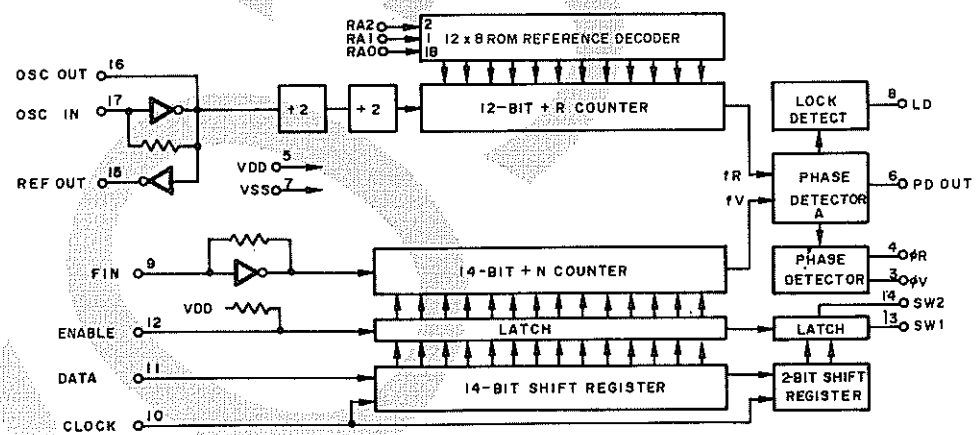


Fig 7. MC145155P (PLL unit Q5)

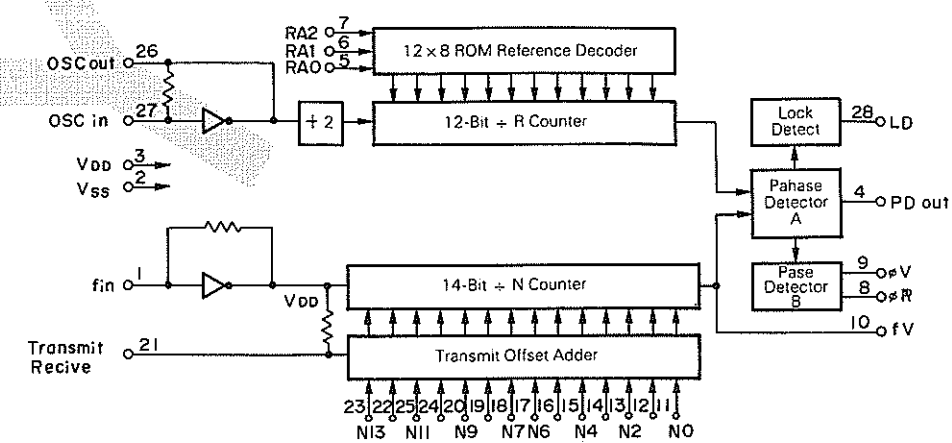


Fig 8. MC145151P (PLL unit Q12)

[Control Unit (X53-1180-10)]

An LCD (Liquid Crystal Display) indicates both the operating frequency in four digits and the memory channel in one of two digits. This LCD is statically driven.

(1) LCD data output

Q4, The microcomputer, sends serial data for the LCD to Q101: MSM58292GS in the LCD unit through three data lines.

(2) PLL data output

The microcomputer also sends division serial data for PLL operation to Q5 in the PLL unit through three data lines. Two of these data lines, SERIAL DATA and CLOCK, are also used as LCD data lines.

(3) Keyboard

The keyboard switches are scanned by the microcomputer; pulse signals are output from ports P30 ~ P33 and the return pulses are received at ports P10 ~ P13. During transmission, receive ports P10 ~ P13 are disconnected via bilateral switch Q6: MC14066BCP. This allows keyboard control of Q8: LR4087, the DTMF (Dual Tone Multi Frequency) generator during transmission without disturbing frequency setting. The return pulse signals are shaped by Q5: TC4050BP before being fed back to the microcomputer.

(4) Switches (Switch unit)

Switches are scanned by the microcomputer; scan pulse signals are output from ports P22 and P23 and the return pulses are received at ports P10 ~ P12.

(5) Rotary Encoder (M. CH)

The rotary encoder signals are applied via the E1 & E2 lines to Q3: TC4049BP, then Q5: TC4050BP. These ICs shape the signal waveform to reduce chattering, etc. These are input to microcomputer ports P72 and P73 for processing.

(6) Up/Down

The Up/Down signals from the microphone are inverted by Q3: TC4049BP, then applied to microcomputer ports P70 and P71.

(7) Scan

The squelch stop signal from the RX unit is applied to microcomputer port P61. This signal is also applied to R12 and C9, the delay circuit which determines the scan hold time. This is inverted by Q3: TC4049BP and applied to microcomputer port P62. One-half of Q7: TC4011BP is a monostable vibrator used to adjust (with VR1) scan resume timing. The trigger pulse for the vibrator is output from microcomputer port P53.

(8) "Beep" tone generator

The "beep" tone is generated by an astable vibrator, the other one half of Q7: TC4011BP. The switching signal for the vibrator is output from microcomputer port P20. Tone frequency is determined by R28 and C24.

(9) Backup circuit

The voltage output from Q1, the AVR (Automatic Voltage Regulator) is applied to microcomputer switching input port P00 through Q2: 2SA1048(Y). When the AVR output voltage drops to the lithium backup battery voltage, the level at P00 goes L to start backup and stop the clock signal.

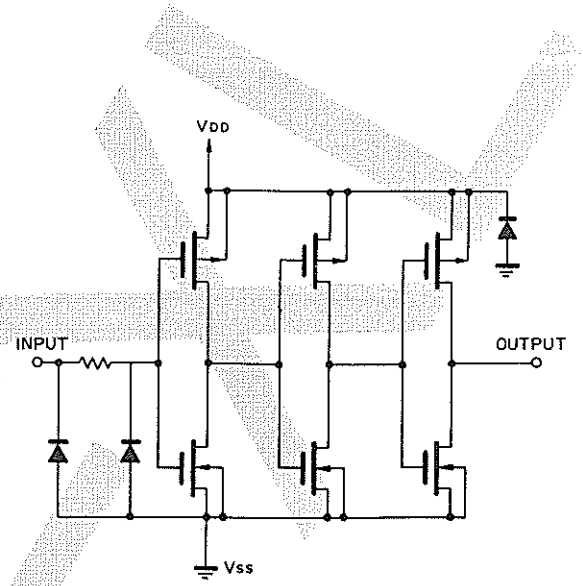


Fig. 9. TC4049BP Equivalent Circuit 1/6 (Control Unit Q3)

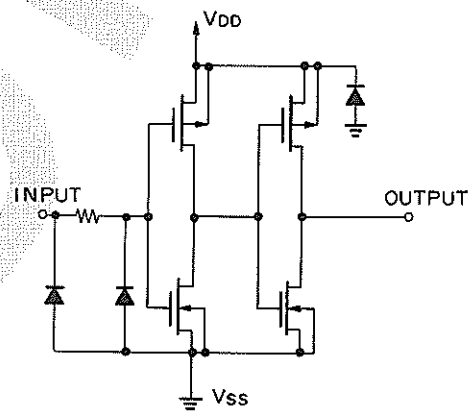


Fig. 10. TC4050BP Equivalent Circuit 1/6 (Control Unit Q5)

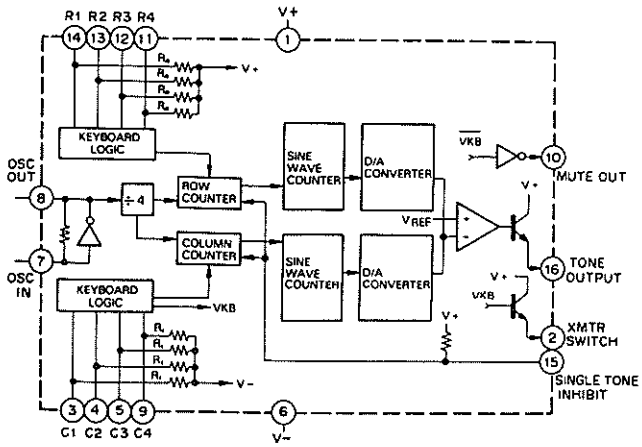


Fig 11. MK5087N, LR4087 (Control Unit Q8) K only

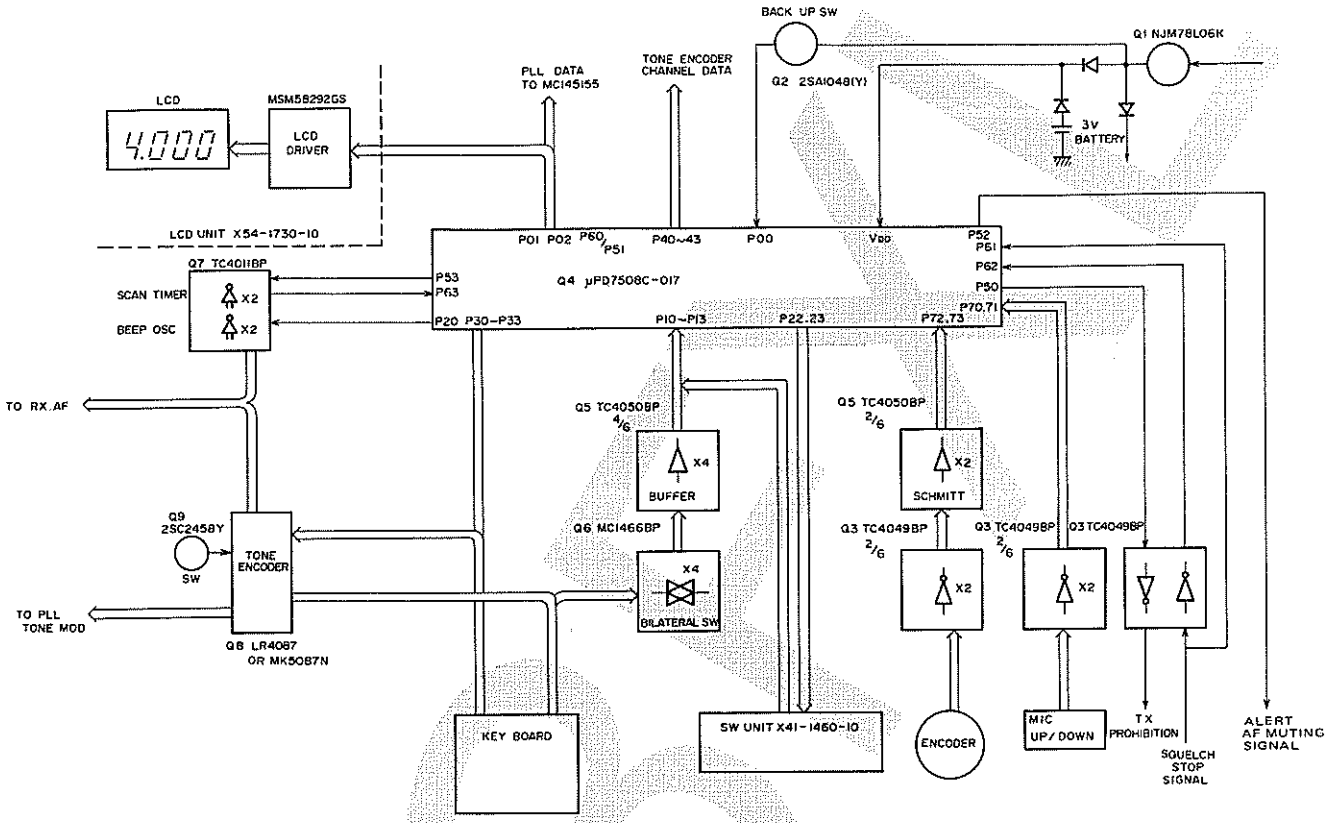


Fig 12. Control Unit Block Diagram

TERMINAL FUNCTION OF μPD 7508C-017

Terminal No.	Symbol	Function	Input	Output
1	X2	Open		
2	P20/PSTB	"Beeper" switching		O
3	P21/PTOUT	SCAN pulse		O
4	P22	SW SCAN pulse		O
5	P23	SW SCAN pulse		O
6	P10	KEY return and SW return (KA)	O	
7	P11	KEY return and SW return (KB)	O	
8	P12	KEY return and SW return (KC)	O	
9	P13	KEY return and SW return (KD)	O	
10	P30	KEY scan (K0)		O
11	P31	KEY scan (K1)		O
12	P32	KEY scan (K2)		O
13	P33	KEY scan (K3)		O
14	P70	MIC up SW input	O	
15	P71	MIC down SW input	O	
16	P72	Encoder E2	O	
17	P73	Encoder E1	O	
18	RESET	Reset input	O	
19	CL1	Clock		
20	VDD	Power supply		

Terminal No.	Symbol	Function	Input	Output
21	CL2	Clock		
22	INT 1	GND		
23	P00/INT 0	Back up information input	O	
24	P01/SCK	PLL Display serial data		O
25	P02/SO	PLL Display		O
26	P03/SI	TX/RX input RX: H, TX: L	O	
27	P60	LCD Driver Load of MSM58292GS		O
28	P61	SCAN stop signal	O	
29	P62	SCAN stop delay signal	O	
30	P63	SCAN timer input signal	O	
31	P50	TX inhibit signal		O
32	P51	PLL MC145155 Load signal		O
33	P52	ALERT audio mute signal		O
34	P53	SCAN Timer trigger pulse		O
35	P40	TONE ON/OFF data		O
36	P41	TONE channel data F1		O
37	P42	TONE channel data F2		O
38	P43	TONE channel data F3		O
39	VSS	GND		
40	X1	GND		

TR-7950/ TR-7930

PARTS LIST

CAPACITORS

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

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

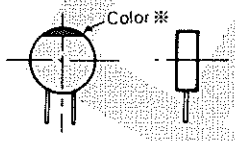
Temperature coefficient

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

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

Example CC45TH = −470 ± 60ppm/℃

CC45



Rating voltage

2nd word / 1st 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	—

Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF
2 2 0 = 22pF

1st number | Multiplier
2nd number

Tolerance

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

Less than 10 pF

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

Resistors not listed in this parts list are standard, fixed carbon composition, 1/4W or 1/8W.
The resistance values, in ohms, are indicated on the schematic diagram.

Abbreviation		Abbreviation	
Cap	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

N: New parts

TR-7950 : K_1, M_1, T_1, W_1
TR-7930 : K_2, M_2, T_2, W_2
K = K_1, K_2 M = M_1, M_2
T = T_1, T_2 W = W_1, W_2

Symbol	Destination
K	U.S.A.
W	Europe
T	Britain
M	General market

N: New Parts

Part No.	Re-marks	Description	
GENERAL			
A01-0932-03	N	Case (A)	
A01-0933-03	N	Case (B)	
A13-0612-02		Angle Assy (Right)	
A13-0613-02		Angle Assy (Left)	
A13-0614-04		Mounting hardware	
A20-2454-03	N	Panel (TR-7950)	K_1, M_1, T_1, W_1
A20-2455-03	N	Panel (TR-7930)	K_2, M_2, T_2, W_2
B05-0701-04		Speaker grill cloth	
B05-0713-04		Grill cloth	
B40-2620-04	N	Name plate	K_1, M_1
B40-2621-04	N	Name plate	T_1
B40-2622-04	N	Name plate	W_1

Part No.	Re-marks	Description	
B40-2623-04	N	Name plate	K_2, M_2
B40-2624-04	N	Name plate	T_2
B40-2625-04	N	Name plate	W_2
B43-0680-04	N	Badge	K, M, W
B43-0681-04	N	Badge	T
B46-0058-10		Warranty card	K
B50-3993-00	N	Instruction manual	K
B50-3994-00	N	Instruction manual	T
B50-3995-00	N	Instruction manual	W
B50-4004-00	N	Instruction manual	M
E06-0651-05		6P Metal socket (MIC)	
E07-0252-05		2P Connector	
E07-0651-05		6P Metal consent	
E12-0001-15		Phone plug	

PARTS LIST

Part No.	Re-marks	Description	
E30-1674-05		DC Cord assy (TR-7950)	K_2,M_2,T_2,W_2
E30-1685-05		DC Cord assy (TR-7930)	K_1,M_1,T_1,W_1
E31-0456-05		Connector with lead line (SP)	
F05-1031-05		Fuse, 10A × 2 (TR-7950)	K_1,M_1,T_1,W_1
F05-8021-05		Fuse, 8A × 2 (TR-7930)	K_2,M_2,T_2,W_2
G02-0505-05		Knob fixed spring, (VOL)	
G09-0411-05		Knob fixed spring, (SQL)	
G53-0511-04		Packing, (Case) × 8	
H01-4437-03	N	Packing carton	K_1,M_1,W_1
H01-4438-03	N	Packing carton	T_1
H01-4439-03	N	Packing carton	K_2,M_2,W_2
H01-4440-03	N	Packing carton	T_2
H10-2501-03		Packing fixture	
H25-0049-03		Accessory bag	
H25-0079-04		Protective bag, MIC	
H25-0103-04		Protective bag, Cord	
H25-0106-04		Protective bag, TR-7950/30	
J02-0069-05		Rubber foot × 2 (Accessory)	
J02-0070-05		Foot × 2 (Accessory)	
J21-2504-04		SP mounting hardware	
J61-0401-05		Nylon band × 3	
K21-0767-03	N	Main knob, M. CH	
K23-0735-04		Knob, SQL	
K23-0754-04	N	Knob, VOL	
K27-0435-04	N	Push knob × 6	
N09-0008-04		Ornamental screw × 4 (Accessory)	
N09-0256-05		Gnd screw, MIC	
N14-0510-04		Flang nut × 4 (Accessory)	
M15-1040-46		Washer × 4 (Accessory)	
N15-1060-46		Washer × 4 (Accessory)	
N16-0060-46		Spring washer × 4 (Accessory)	
N30-2006-46		Round head screw, ON AIR PC board	
N30-3006-41		Round head screw × 2 (Accessory foot)	
N30-3008-41		Round head screw × 2 (Accessory foot)	
N32-3006-46		Flat head screw × 8, Sub panel·Heat sink	
N33-3006-45		Round flat head screw × 18, Case·Side escutioen	
N35-3006-46		Bind screw × 4, Panel	
N87-2606-46		Self tapping screw × 4, SW unit	
N87-3006-46		Self tapping screw × 20, PC board	
N99-0304-04		Hex. head screw × 4	
S50-1406-05		Micro switch × 2	
T03-0027-15		Speaker	
T91-0311-05		Microphone (TRIO)	T
T91-0313-05		Microphone (KENWOOD)	K,M,W
W01-0401-14		Hexagonal wrench (Accessory)	
W02-0315-05		Rotary encoder	
W09-0323-05		Lithium battery (CR2032)	
X41-1460-10	N	Switch unit	K,M
X41-1460-51	N	Switch unit	T
X41-1460-61	N	Switch unit	W
X45-1270-10	N	FINAL unit (TR-7950)	K_1,M_1,T_1,W_1
X45-1270-11	N	FINAL unit (TR-7930)	K_2,M_2,T_2,W_2
X50-1900-10	N	PLL unit (TR-7950)	K_1,M_1,T_1,W_1
X50-1900-11	N	PLL unit (TR-7930)	K_2,M_2,T_2,W_2

Part No.	Re-marks	Description	
X53-1280-10	N	Control unit	K,M
X53-1280-61	N	Control unit	T,W
X55-1330-10	N	RX unit	K,M
X55-1330-51	N	RX unit	T
X55-1330-61	N	RX unit	W
X60-1230-10	N	Display assy unit	

Part No.	Re-marks	Description		Ref. No.	Q'ty
SWITCH Unit (X41-1460-10, 61, 51)		10 : K,M 51: T 61: W			
B30-0828-05	N	Lamp with cap			1
CK45B1H102K		C, 0.001		C1	1
E40-0673-05		Connector (6P)			1
R19-9408-05	N	Pot. with SW, 10K(K), 50K(B)		S8	1
R92-0150-05		Jumper wire	K,M,W		1
S36-2410-05	N	See saw switch		S7	1
S40-2438-05	N	Push switch	K,M,W	S1,3,4,5,6	5
S40-2438-05	N	Push switch	T	S1,2,3,4,5,6	6
S40-2439-05	N	Push switch	K,M,W	S2	1
FINAL Unit (X45-1270-10, 11)		10: TR-7950 11: TR-7930			
CC45CH1H020C		C, 2P ±0.25P		C19,22	2
CC45CH1H330J		C, 33P		C15	1
CC45SL2H040C		C, 4P ±0.25P	K_2,M_2,T_2,W_2	C13	1
CC45SL2H050C		C, 5P ±0.25P	K_1,M_1,T_1,W_1	C13	1
CC45SL2H100D		C, 10P ±0.5P	K_1,M_1,T_1,W_1	C21	1
CC45SL2H100D		C, 10P ±0.5P	K_2,M_2,T_2,W_2	C14,21	2
CC45SL2H101J		C, 100P		C17	1
CC45SL2H120J		C, 12P	K_2,M_2,T_2,W_2	C24	1
CC45SL2H120J		C, 12P	K_1,M_1,T_1,W_1	C14,24	2
CC45SL2H150J		C, 15P		C16,18	2
CC45SL2H220J		C, 22P		C23	1
CC45SL2H390J		C, 39P		C20	1
CE04W1C220M		E, 22 16V		C3,5	2
CK45B1H102K		C, 0.001		C2,4,6,7,8,9 11,12,25,26 27,29,31,33	14
C90-0820-05		E, 470 16V		C1	1
C91-0105-05		C, 0.0047		C10,30	2
E04-0152-05		UHF type receptacle			1
E06-0252-05		2P Metal socket (power supply)			1
E11-0403-05		Phone jack			1
E23-0046-04		Square terminal			6
E23-0047-04		Square terminal			1
E31-2065-05		Cable with terminal (B)			1
E40-0373-05		Mini connector, 3P			1
E40-0473-05		Mini connector, 4P			1
F20-0516-05		Insulating sheet			1
F29-0014-03		Shoulder washer			1
L34-0452-05		Coil (3ϕ, 6T)		L4	1
L34-0692-05		VHF coil (5ϕ, 4T)		L3	1
L34-0742-05		Coil (3ϕ, 5T)		L6	1
L34-0822-05		VHF Coil (5ϕ, 3T)		L9	1

TR-7950/TR-7930

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
L34-0908-05		Coil (3ϕ)	L2,5	2
L34-1020-05		Coil (3ϕ, 3.5T)	L1	1
L40-1091-03		Ferri-inductor (1μH)	L7,8	2
N09-0256-05		Gnd screw		1
N30-3006-46		Round Screw		1
N35-3008-46		Bind screw		2
N87-3006-46		Screw		5
R12-0408-05		Trim.pot. 100Ω	VR1	1
R12-3054-05		Trim.pot. 47kΩ	VR3	1
R12-3419-05		Trim.pot. 10kΩ	VR2	1
R92-0150-05		Jumper wire		4
RC05GF2H151J		Resister 150Ω ± 5% 1/2W K_1,M_1,T_1,W_1	R7	1
RC05GF2H181J		Resister 180Ω ±5% 1/2W K_2,M_2,T_2,W_2	R7	1

PLL Unit (X50-1900-10, 11) 10: TR-7950 11: TR-7930

C05-0030-15		Ceramic trimmer, 20P	TC1,3,5,6	4
C05-0062-05		Ceramic trimmer, 6P	TC2	1
C05-0308-05		Ceramic trimmer, 4P	TC4	1
CC45CH1H020C		C, 2P±0.25P	C46,69	2
CC45CH1H030C		C, 3P±0.25P	C1,33,35,69 68	5
CC45CH1H050C		C, 5P±0.25P	C11,12	2
CC45CH1H0R5C		C, 0.5P±0.25P	C10,62	2
CC45CH1H080D		C, 8P±0.5P	C30,63	2
CC45CH1H100D		C, 10P±0.5P	C65	1
CC45CH1H101J		C, 100P	C44	1
CC45CH1H120J		C, 12P	C27,	1
CC45CH1H150J		C, 15P	C34,61	2
CC45CH1H180J		C, 18P	C6,13	2
CC45CH1H220J		C, 22P	C14,47,79	3
CC45CH1H330J		C, 33P	C2,26,37,45 73	5
CC45SH1H560J		C, 56P	C4	1
CE04W1A470M		E, 47 10V	C17,28,67,72 81	5
CE04W1C100M		E, 10 16V	C55,82	2
CE04W1H010M		E, 1 50V	C20,22,57	3
CE04W1HR47M		E, 0.47 50V	C60	1
CK45B1H102K		C, 0.001	C3,5,8,25,29 32,36,38,39 42,59,66,70 71,74,76,77 80	18
CK45B1H471K		C, 470P	C15,40,43,48	4
CQ92M1H223K		ML, 0.022	C21,24	2
CQ92M1H683K		ML, 0.068	C52	1
CS15E1C2R2M		T, 2.2 16V	C23	1
CS15E1C4R7M		T, 4.7 16V	C31	1
CS15E1E010M		T, 1 25V	C54,58	2
CS15E1V0R1M		T, 0.1 35V	C56	1
C90-0804-05		Cap. 0.001	C75,78	2
C91-0105-05		C, 0.0047	C16,50,51	3
C91-0131-05		C, 0.01	C7, 9,19,41 49	5
C91-0457-05		C, 0.022	C18,53	2
E04-0154-05		Coax. connector DO		1
E40-0573-05		Mimi connector, 5P		1
E40-0973-05		Mini connector, 9P		1

Part No.	Re-marks	Description	Ref. No.	Q'ty
L32-0654-05	N	VCO coil (4$^1/_4$T)	L8	1
L32-0655-05	N	VCO coil (3/4T)	L14	1
L33-0002-05		Choke coil (1μH)	L2,3	2
L33-0605-05		Choke coil (0.47μH)	L9	1
L34-0452-05		Coil A (3ϕ 6T) K_2,M_2,T_2,W_2	L16	1
L34-0742-05		Coil A (3ϕ 5T) K_2,M_2,T_2,W_2	L17	1
L34-0742-05		Coil A (3ϕ 5T) K_1,M_1,T_1,W_1	L16,17	2
L34-0902-05		VHF coil	L15	1
L34-2035-05		Tuning coil	L4,5	2
L40-1021-03		Ferri-inductor (1μH)	L12	1
L40-3391-03		Ferri-inductor (3.3μH)	L6,11,13	3
L77-0975-05	N	Crystal (40, 0966MHz)	L1	1
L77-0976-05	N	Crystal (10.695MHz)	L10	1
RC05GF2H220J		Resister 22Ω ±5% K_1,M_1,T_1,W_1	R81	1
RC05GF2H330J		Resister 33Ω ±5% 1/2W K_2,M_2,T_2,W_2	R81	1
R92-0150-05		Jumper wire		8

CONTROL Unit (X53-1280-10, 61) 10: K,M 61: T,W

CC45CH1H330J		C, 33P	C6	1
CE04W1A101M		E, 100 10V	C4	1
CE04W1A470M	K,M	E, 47 10V	C27	1
CE04W1C330M		E, 33 16V	C9,15	2
CE04W1C470M		E, 47 16V	C2	1
CE04W1E100M		E, 10 25V	C14	1
CE04W1H010M	K,M	E, 1 50V	C26	1
CK45B1H102K	T,W	C, 0.001	C3,5,10,28 29,30	6
	K,M		C3,5,10 19~22,28,29,30	10
CK45B1H681K		C, 680P	C25	1
CQ92M1H102K		ML, 0.001	C24	1
CQ92M1H222K		ML, 0.0022	C23	1
CS15E1A100M		T, 10 10V	C7	1
C91-0131-05		C, 0.01	C1	1
C91-0456-05		C, 0.047	C31,32	2
C91-0457-05		C, 0.022	C8,11,12,13 16	5
E40-0373-05		Mini connector 3P	J7,10	2
E40-0473-05		Mini connector 4P	J6	1
E40-0573-05		Mini connector 5P	J3,9	2
E40-0773-05		Mini connector 7P	J5	1
E40-0973-05		Mini connector 9P	J4,8	2
L78-0003-05	K,M	Ceramic oscillator (3.58MHz)	X1	1
R12-2411-05	K,M	Trim pot (5kΩ)	VR2	1
R12-7406-05	N	Trim pot (500kΩ)	VR1	1
R90-0515-05		Resistor block (10kΩ×4)	R13	1
R90-0526-05		Resistor block (27kΩ×4)	R18	1
R90-0557-05	N	Resistor block (27kΩ×8)	R19	1
R90-0558-05	N	Resistor block (27kΩ×10)	R11	1
S59-0415-05	N	Key board switch (Reset SW)	S1	1

RX Unit (X55-1330-10, 61,51) 10: K, M 51: T 61: W

CC45CH1H020C		C, 2P ±0.25P	C14	1
CC45CH1H030C		C, 3P ±0.25P	C3	1
CC45CH1H050C		C, 5P ±0.25P	C17	1
CC45CH1H0R5C		C, 0.5P ±0.25P	C12	1
CC45CH1H150J		C, 15P	C11	1

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
CC45CH1H220J		C, 22P	C4	1
CC45CH1H330J		C, 33P	C1,13	2
CC45RH1H100D		C, 10P ±0.5P	C5	1
CC45RH1H120J		C, 12P	C2	1
CC45SL1H101J		C, 100P	C18,20,71	3
CC45SL1H121J		C, 120P	C51	1
CC45SL1H221J		C, 220P	C23,90	2
CC45SL1H331J		C, 330P	C86	1
CC45SL1H390J		C, 39P	C88	1
CC45SL1H561J		C, 560P	C85	1
CE04W1A101M		E, 100 10V	C70,75	2
CE04W1A470M		E, 47 10V	C41,65,74,91	5
			97	
CE04W1E220M		E, 22 25V K,M	C64	1
		T,W	C64,201,202	3
CE04W1H010M		E, 1 50V	C44,61,67,84	5
			89	
CE04W1H100M		E, 10 50V	C55,56	2
CE04W1HR47M		E, 0.47 50V K,M	C78,79,80,82,	5
			83	
		T,W	C78,79,80,82	6
			83,203	
CE04W1H4R7M		E, 4.7 50V	C36	1
CK45B1H102K		C, 0.001	C6,7,8,9,10	9
			15,26,77,100	
CK45B1H222K		C, 0.0022	C69	1
CK45B1H471K		C, 470P	C22,24,31,34	4
CK45B1H681K		C, 680P	C57	1
CK45F1H103Z		C, 0.01 K,M	C49,92,93,95	6
			98,99	
		T,W	C49,92,93,95	7
			98,99,205	
CQ92M1H102K		ML, 0.001	C42,45	2
CQ92M1H103K		ML, 0.01	C30	1
CQ92M1H122K		ML, 0.0012	C72	1
CQ92M1H152K		ML, 0.0015	C87	1
CQ92M1H222K		ML, 0.0022	C53	1
CQ92M1H223K		ML, 0.022	C62,63,66	3
CQ92M1H333K		ML, 0.033 K,M	C52,68	2
		T,W	C52,68,204	3
CQ92M1H472K		ML, 0.0047	C50,81	2
CQ92M1H473K		ML, 0.047	C46,47,52	2
CS15E1A100M		T, 10 10V K,M,W	C60	1
		T	C60,207	2
CS15E1A220M		T, 22 10V T	C206	1
CS15E1A3R3M		T, 3.3 10V	C48	1
CS15E1A4R7M		T, 4.7 10V	C54	1
CS15E1VR47M		T, 0.47 35V	C58,59	2
C90-0820-05		E, 470 16V	C76,94	2
C90-0834-05		C, 0.15	C73	1
C91-0131-05		C, 0.01	C25,35	2
C91-0456-05		C, 0.047	C27,28,29,32,	9
			33,37,38,39,	
			40	
C91-0457-05		C, 0.022	C16,19,21,43	5
			96	
E40-0273-05		Mini connector 2P K,M	J11,12,19	4
		T,W	J11,12,19,20	5
E40-0373-05		Mini connector 3P	J13,18	2
E40-0473-05		Mini connector 4P	J14	1
E40-0673-05		Mini connector 6P	J17	1
E40-0973-05		Mini connector 9P	J16	1
E40-1073-05		Mini connector 10P	J15	1

Part No.	Re-marks	Description	Ref. No.	Q'ty
G09-0407-14		Gnd spring		1
L15-0016-05		Choke coil (Low frequency)	L14	1
L30-0005-05		IFT 10.7MHz	L5,6	2
L30-0199-05		IFT 455kHz	L9	1
L30-0503-05		IFT 455kHz	L7,10	2
L31-0267-05		ANT coil	L1,2	2
L34-0683-05		Tuning coil	L4	1
L40-1021-03		Ferri-inductor, 1mH	L12	1
L40-1021-25		Ferri-inductor, 1mH	L13	1
L71-0216-05		MCF, 10.695MHz	XF1	1
L72-0315-05		Ceramic filter, CFW455F	CF1	1
L77-0858-05		Crystal, 10.24MHz	L8	1
L79-0446-05		Ceramic discri, CFY455S	L11	1
L79-0468-05		Helical block T,W	L3	1
L79-0483-05		Helical block K,M	L3	1
N30-3004-46		Round screw		2
R12-1426-05	N	Trim. pot. 2kΩ	VR2	1
R12-3436-05		Trim. pot. 10kΩ	VR1,4	2
R12-3439-05	N	Trim. pot. 20kΩ T,W	VR5	1
R12-4412-05		Trim. pot. 50kΩ	VR3	1
R92-0150-05		Jumper wire K,M		22
		T		27
		W		28

Display assy Unit (X60-1230-10)

B10-0652-04	N	Front glass		1
	N	LCD plate		1
	N	Connector with lead line		1
	N	Shadow mask		2
J21-2775-04	N	Mounting plate		1
N89-2005-46		Tap tight screw		7
S59-0412-05	N	Key board assy		1
X54-1700-10	N	Display unit		1
X54-1730-10	N	LCD unit		1

Display Unit (X54-1700-10)

B30-0827-05	N	Lamp		1
B30-0828-05		Lamp with cap		2
CK45B1H102K		C, 0.001	C1	1
CK45F1H103Z		C, 0.01		1
CS15E1VR47M		T, 0.47 35V	C2	1
C90-0560-05		Inline block 0.022 x 5	C5	1
C91-0457-05		C, 0.022	C3,4	2
				1
E40-0473-05		Mini connector 4P	J24	1
E40-0573-05		Mini connector 5P	J23	1
E40-0673-05		Mini connector 6P	J25	1
RC05GF2H100J		Resistor 10Ω, 1/2W	R13,14	2

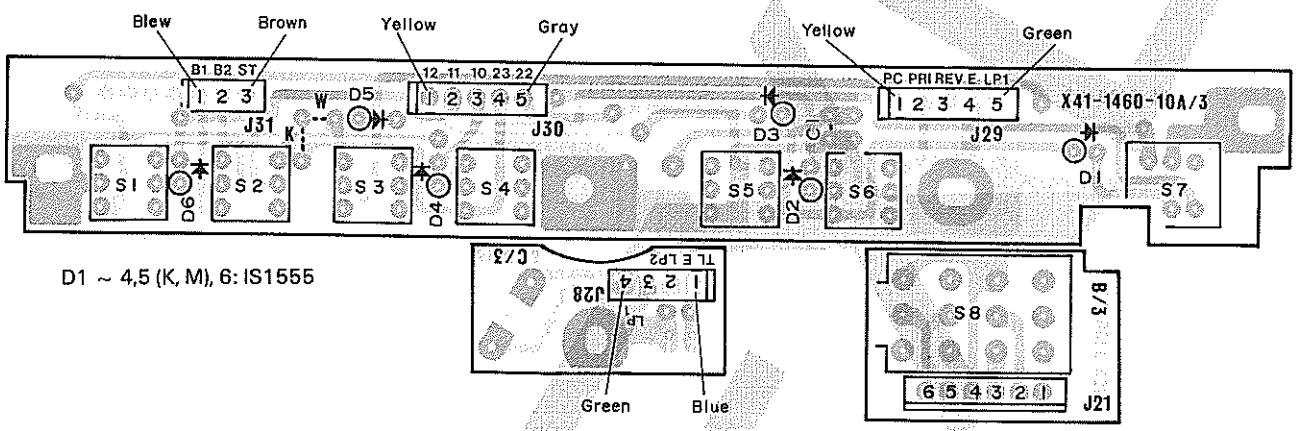
LCD Unit (X54-1730-10)

CS15E1V0R1M		T, 0.1 35V	C101	1
E40-0573-05		Mini connector, 5P	J22	1

PC BOARD VIEWS

SWITCH UNIT (X41 - 1460 - 10,61,51)

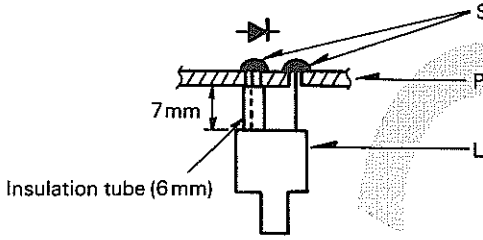
Component Side View



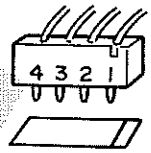
D1 ~ 4,5 (K, M), 6: IS1555

J31: W, T only

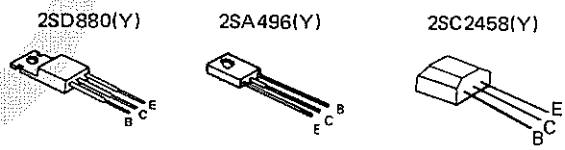
1. Installation of D7 (Use a jig.)



2. Installation of J28, J29 and J30

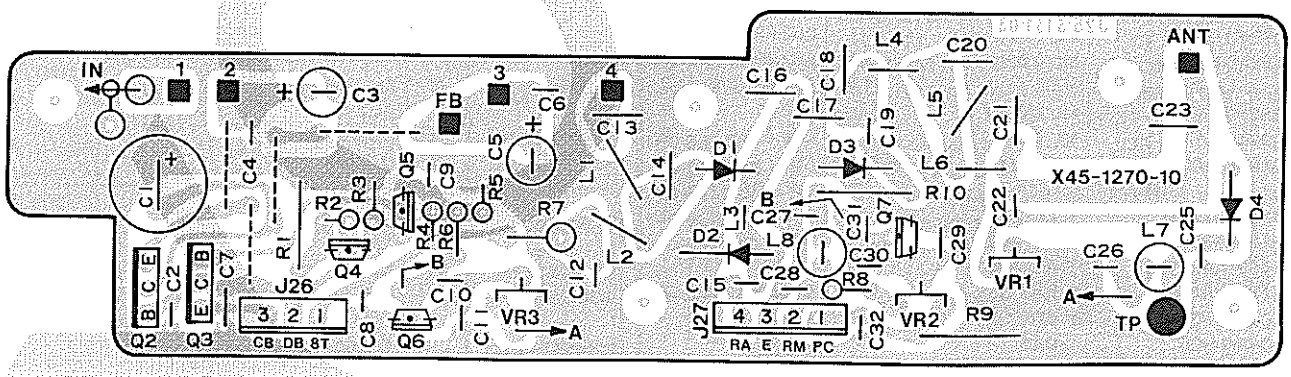


Insert onto the foil side.

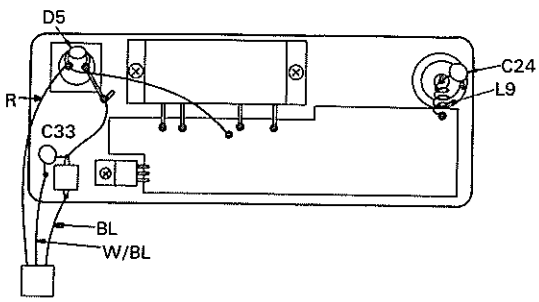


FINAL UNIT (X45 - 1270 - 10,11)

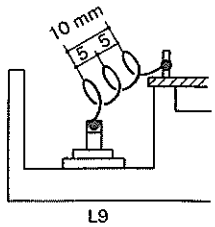
Component Side View

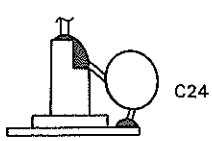


Q1: M57726(TR-7950), M57733(TR-7930)
Q2: 2SD880(Y), Q3: 2SA496(Y)
Q4~7: 2SC2458(Y)
D1: UM9401 D2: MI402(TR-7950), MI303(TR-7930) D3,4: 1S1587
D5: U15B

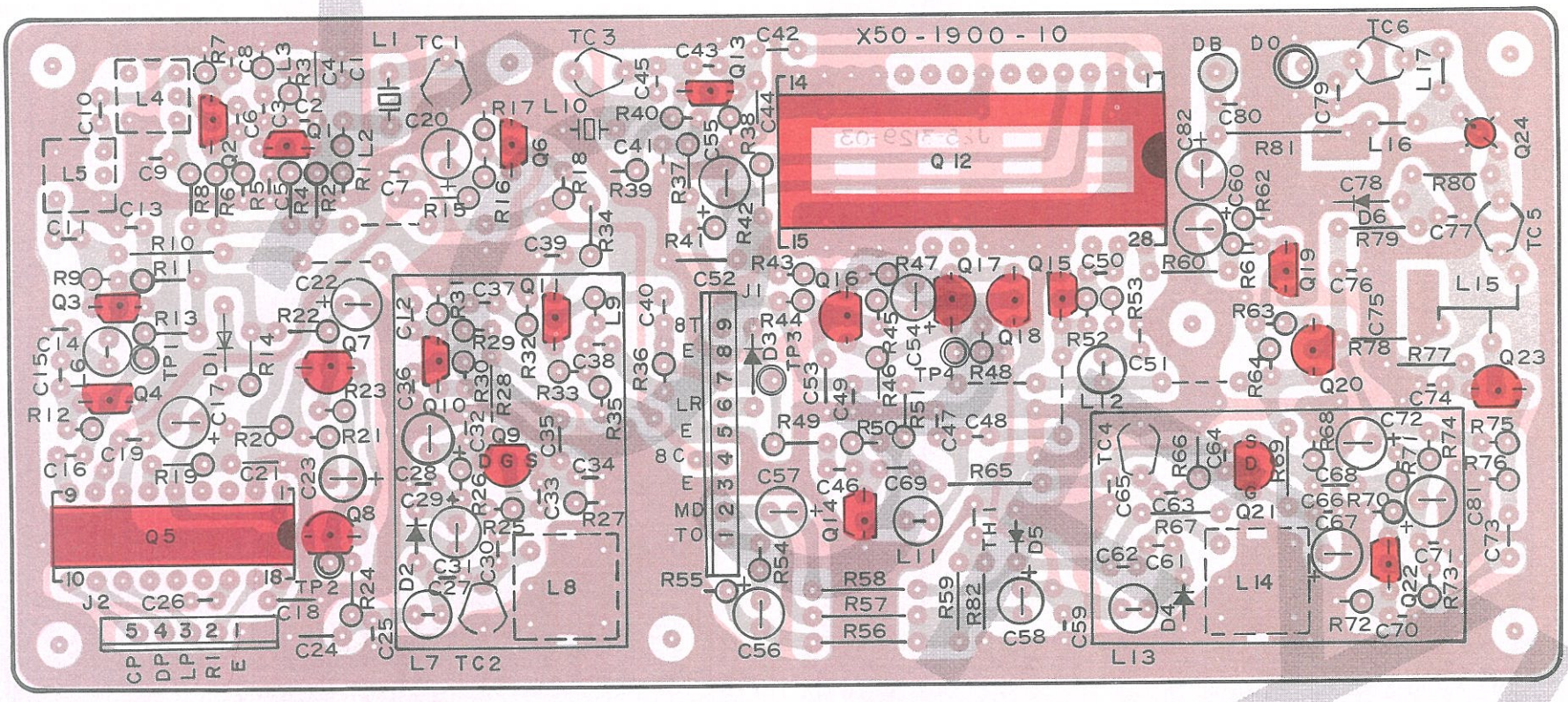


1. Apply heat sinker to the power module and heat sink.
2. Tighten screw Q2, then others, to fix PCB.
3. Connect L9 and C24 as short as possible.
4. Expand the distance between coils L9 to about 5mm.



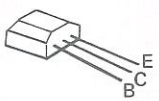


PLL UNIT (X50-1900-10, 11) Component Side View

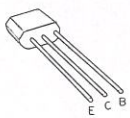


Q1,2,13: 2SC2787(L) Q3,4,10,11,14,15,22: 2SC2668(Y)
Q5: MC145155P Q6,19:2SC2603(D,E)
Q7,8: 2SC2240(GR) Q9:2SK125 Q12: MC145151P Q16～18: 2SC1775(E)
Q20: 2SA1015(Y) Q21:2SK125 Q22: 2SC2668(Y) Q23: 2SC2347
Q24: 2SC2538(TR-7930), 2SC3019(TR-7950)
D1: XZ-055 D2,5-1S2208 D3,6: 1S1555 D4: 1SV50

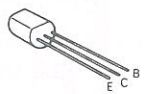
2SC2668



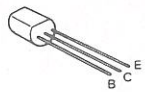
2SC2603
2SC2787



2SA1015
2SC1775
2SC2240
2SC2347

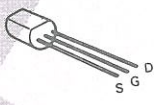


2SC2538-22-A

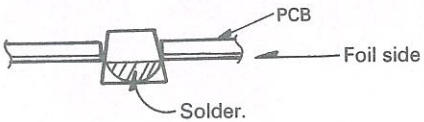


2SC3019

2SK125



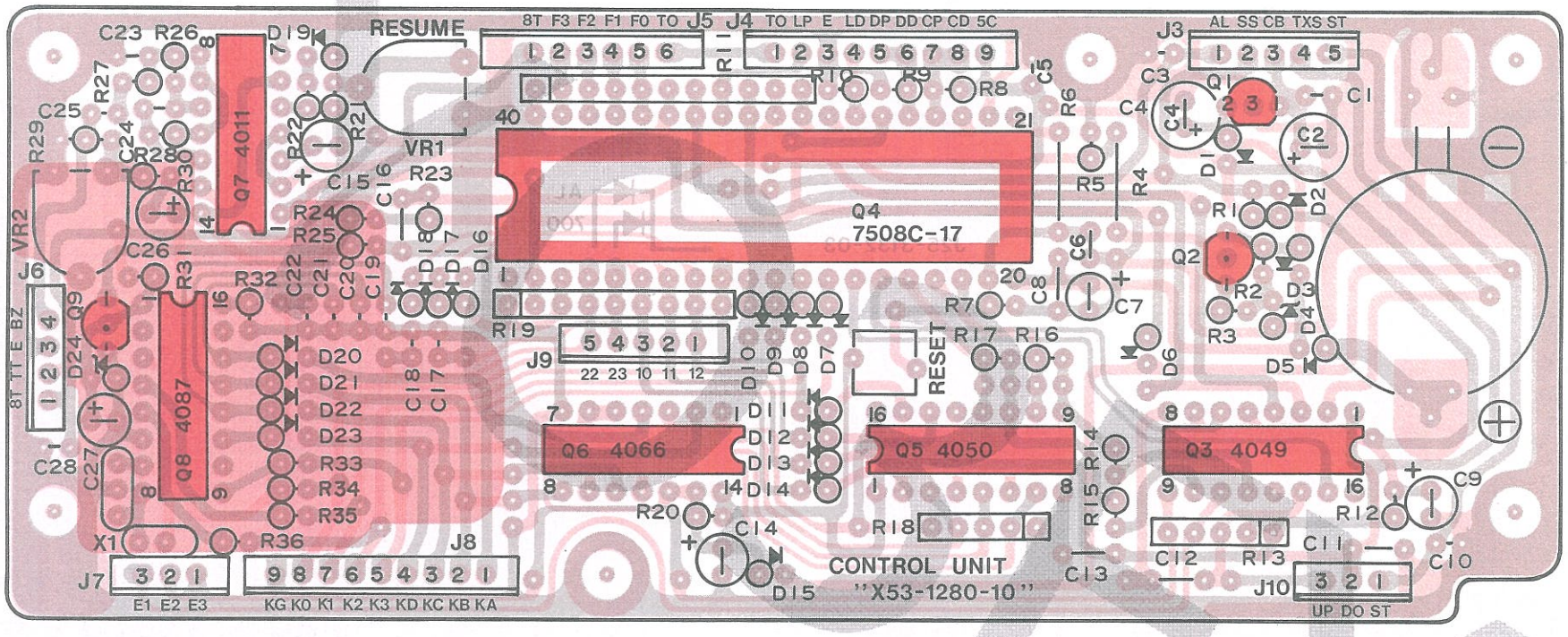
1. Installation of C75 and C78.



2. Incline C30 to L8,and L7 to shield case.

PC BOARD VIEW

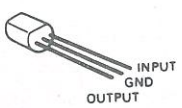
CONTROL UNIT (X53 - 1280 - 10,61) Component Side View



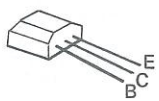
:K,M only

Q1: NJM78L06K Q2:2SA1048(Y) Q3: TC4049BP Q4: μPD7508C-017
Q5: TC4050BP Q6:MC1466BCP Q7: TC4011BP Q8(K,M): LR4087
Q9(K,M)- 2SC2458
D1 ~ 3, 5 ~ 15, 16(W, T), 17(W, T), 19, 20 ~ 23(K, M): IS1555

NJM78L06K



2SA1048
2SC2458



PC BOARD VIEW

PC BOARD VIEW

RX UNIT (X55 - 1330 - 10,61,51) Component Side View

RX UNIT
"X55-1330-10"

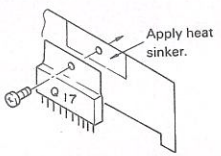
D21
C206,207
R208,209
} T only

:W,T only

Q1,2: 3SK74(L) Q3:3SK73(GR) Q4,5,7: 2SC2787(L)
Q6: TA7302P Q8:μPC577H Q9,18,20:μPC4558C
Q10, 15, 23, 26, 27(W, T): 2SC2458(Y) Q11: μPC592H2 Q12 ~ 14: 2SC2458(BL)

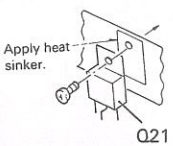
Q16- 2SC2240(GR) Q17: MB3712 Q21: μPC78M08H Q22,24: 2SC1959(Y)
Q25: 2SC496(Y) Q28(W,T): AFG05F1750A2
D1,2,5~17,20(W,T), 21(T): 1S1555 D3,4: IN60 D18:WZ-120 D19: XZ-060(W, T)

1. Installation of Q17 to shield plate.

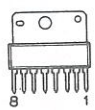


2. Install XF1s so that the top faces inward.

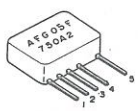
3. Installation of Q21 to shield plate



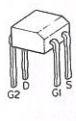
MB3712



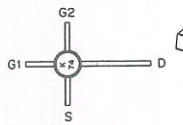
AFG05F1750A2



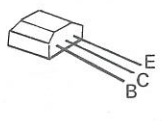
3SK74



3SK73

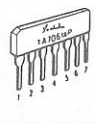


2SC2458

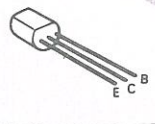


2SC2787

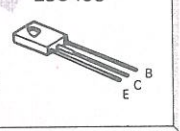
μPC577H
μPC592H2
TA7302P



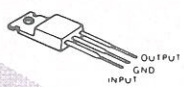
2SC1959
2SC2240



2SC496

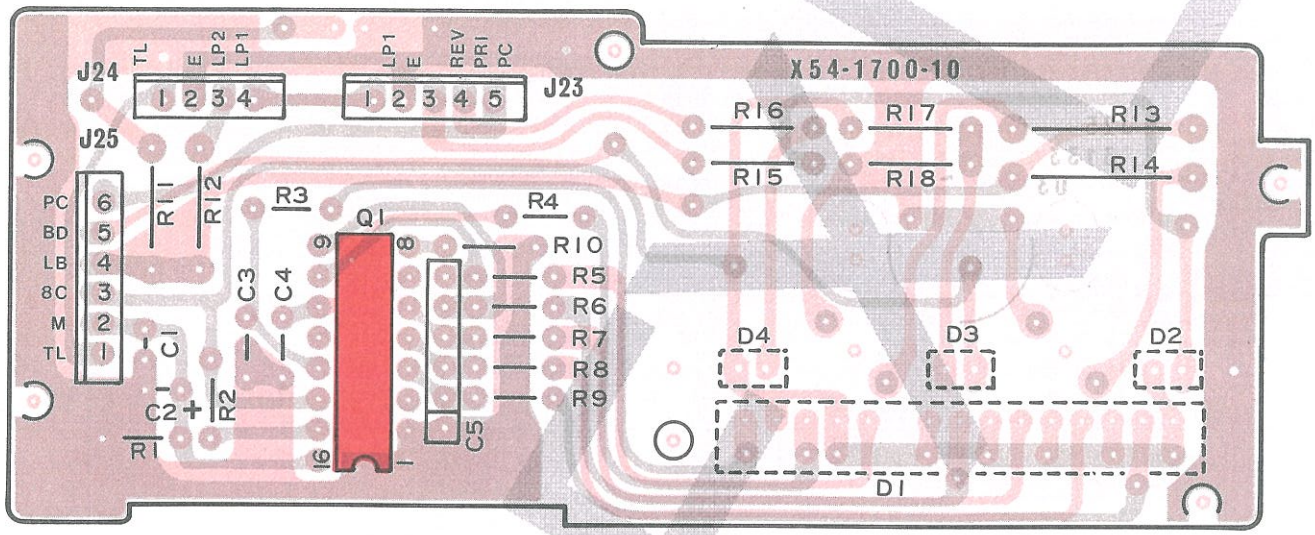


μPC78M08H



DISPLAY ASSY UNIT (X60-1230-10) PC BOARD VIEWS

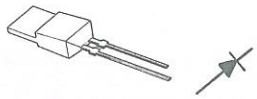
DISPLAY UNIT (X54 - 1700 - 10) Component Side View



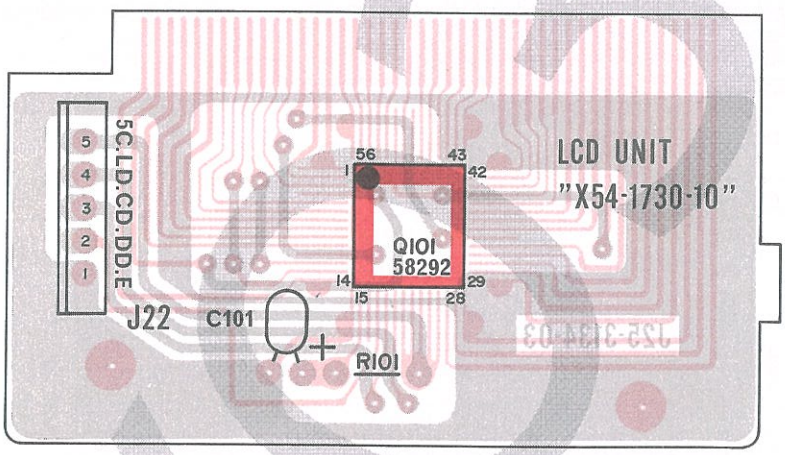
Q1: TA7612AP
D1: GL107S12 D2, 4: GL9HY24 D3: PY5532K

Attach D1, D2, D3 and D4 to the foil side and solder them using a jig.

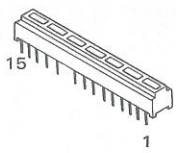
GL9HY24

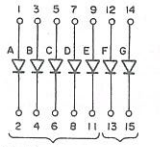


LCD UNIT (X54 - 1730 - 10) Component Side View



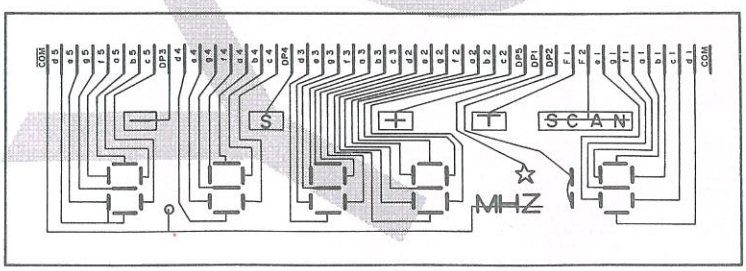
GL107S12

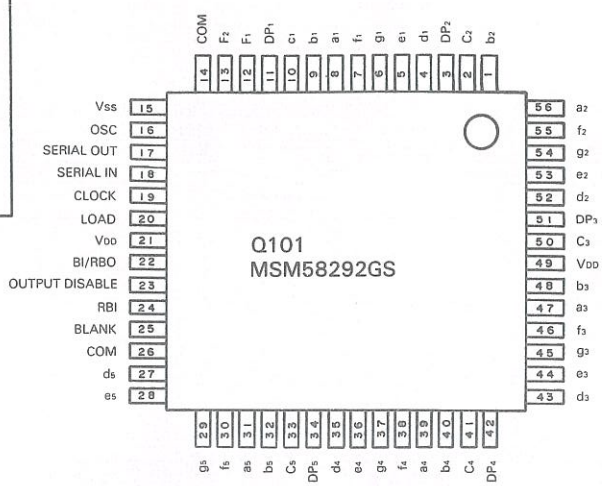




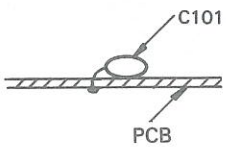
No.	FUNCTION
1	Dot A Anode
2	Dot A Cathode
3	Dot B Anode
4	Dot B Cathode
5	Dot C Anode
6	Dot C Cathode
7	Dot D Anode
8	Dot D Cathode
9	Dot E Anode
10	NO PIN
11	Dot E Cathode
12	Dot F Anode
13	Dot F Cathode
14	Dot G Anode
15	Dot G Cathode

Q101 : MSM58292GS





1. Install C101 as shown below.



2. Install Q101 with mark aligned.

DISASSEMBLY

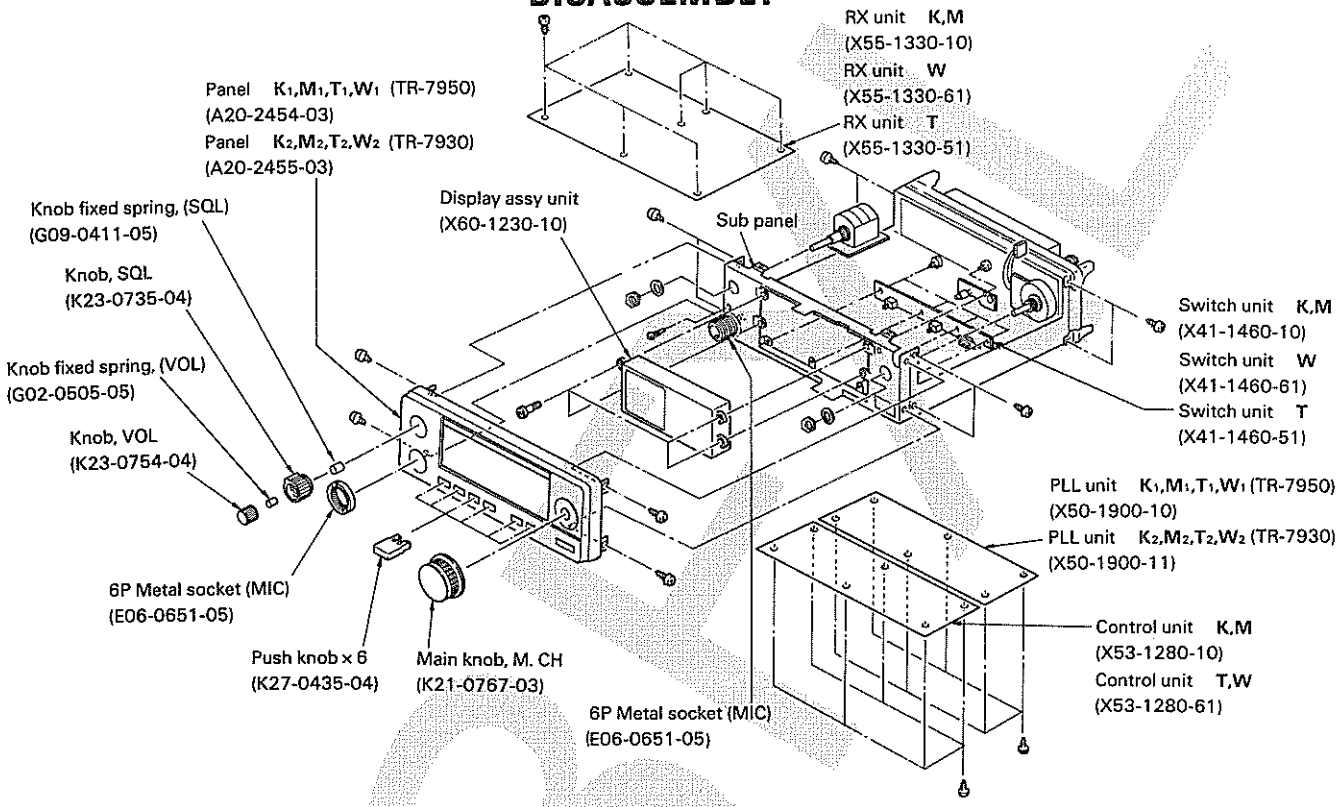


Fig 13. Front panel

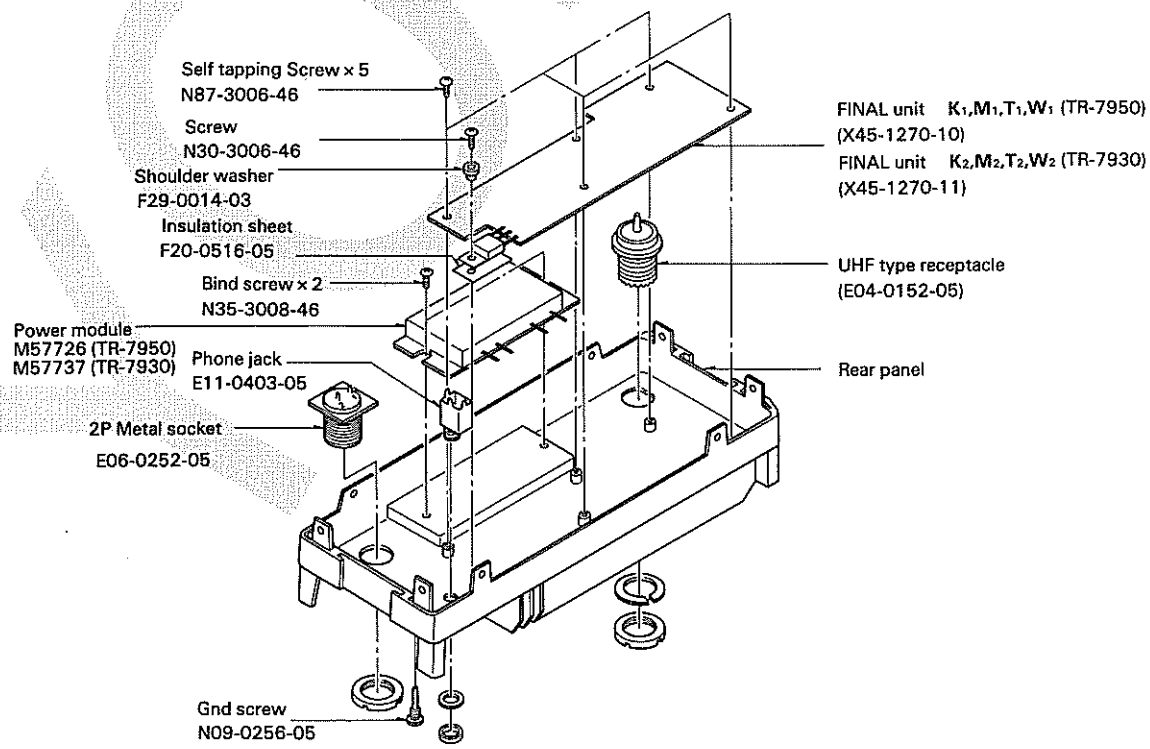


Fig 14. Rear panel

DISASSEMBLY

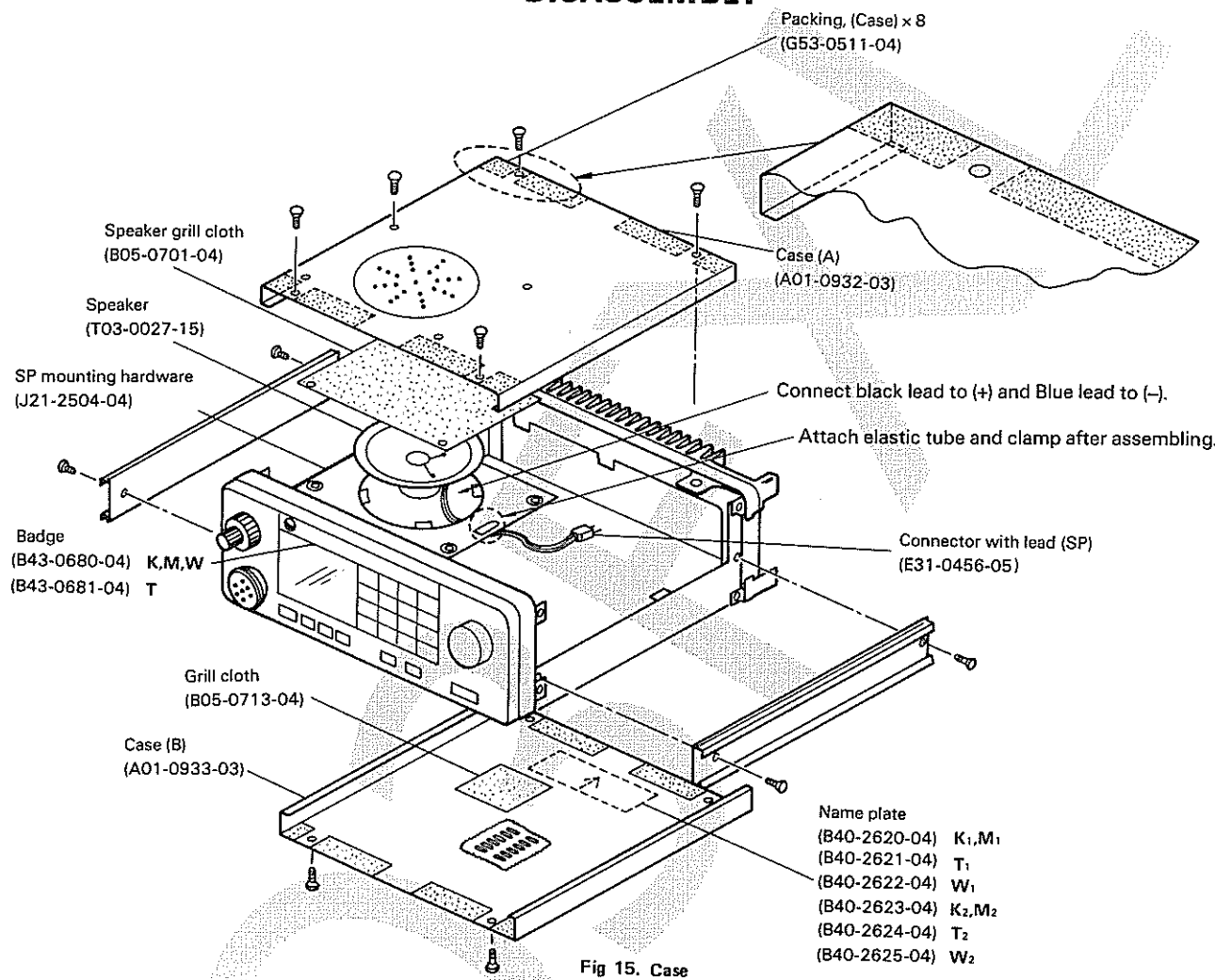


Fig 15. Case

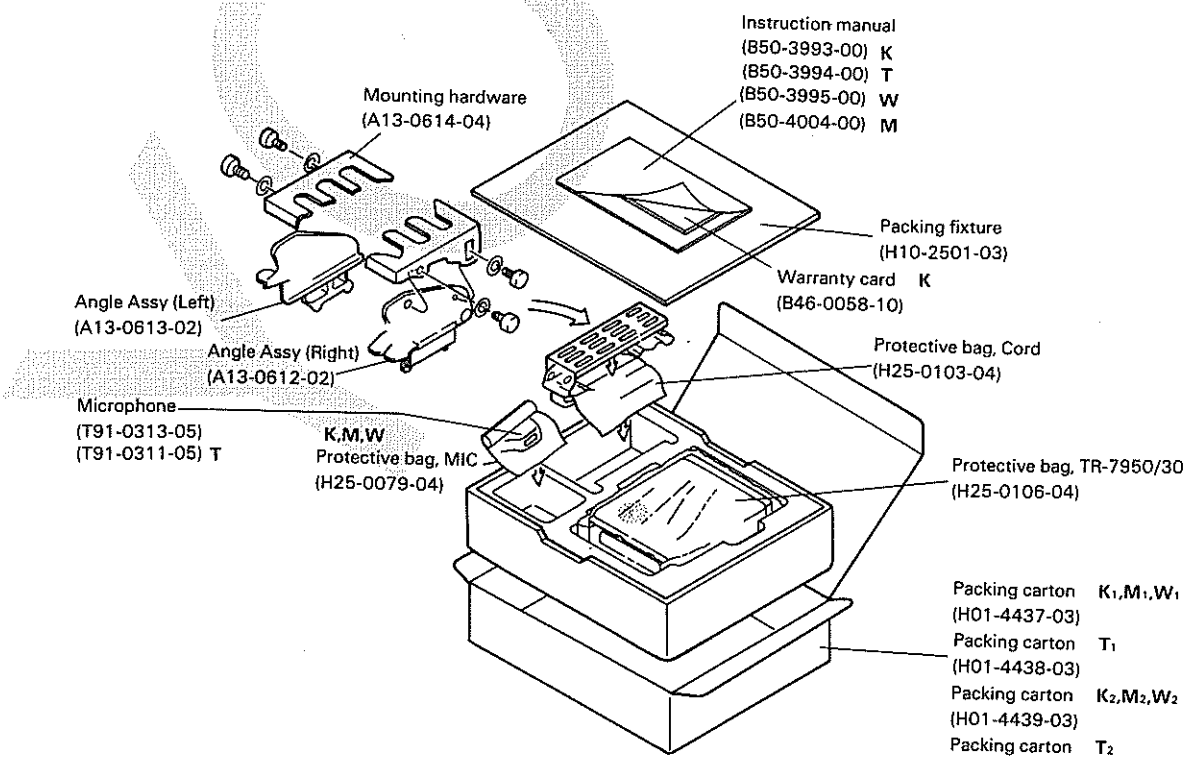
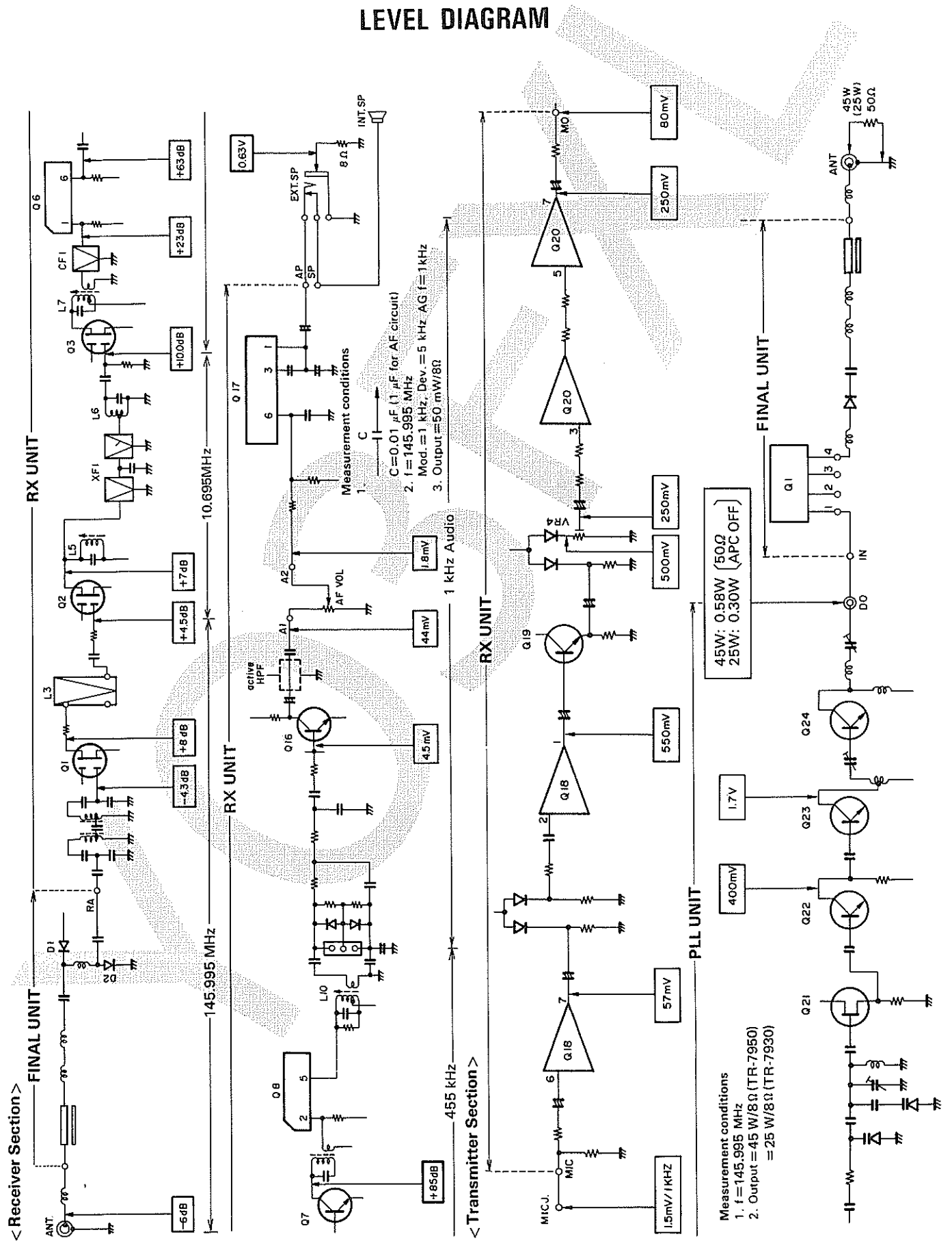


Fig 16. Packing

LEVEL DIAGRAM



ADJUSTMENTS

<Test Equipment>

1. Tester
   - Input Sufficient
2. RF VTVM (RF V.M.)
   - Input impedance 1 MΩ and less than 2 pF
   - Voltage range F S = 10 mV to 300V
   - Frequency range 150 MHz or greater
3. Frequency counter (F count)
   - Minimum input voltage 50 mV
   - Frequency range 150 MHz or greater
4. DC power supply
   - Voltage 10V to 17V variable
   - Current 8A min
5. RF Power Meter
   - Dissipation 50W
   - Impedance 50Ω
   - Frequency range 144 MHz
6. AF VTVM (AF V.M.)
   - Input impedance 1 MΩ or greater
   - Voltage range F S = 1 mV to 30V
   - Frequency range 50 Hz to 10 kHz
7. AF Generator (AG)
   - Frequency range 100 Hz to 10 kHz
   - Output 0 5 mV to 1V
8. Linear detector
   - Frequency range 144 MHz
9. Directional coupler
10. Oscilloscope
    - With horizontal input and high sensitivity
11. Standard signal generator (SSG)
    - Frequency range 144 ~ 149 MHz
    - Modulation amplitude and frequency modulation
    - Output −20 dB ~ 100 dB
12. AF Dummy load
    - 8Ω, 5W (approx.)
13. Sweep generator
    - Frequency range 144 ~ 149 MHz

13.8 V Power
Low power 7W 3.5 amp
High power 50W 9 amp
Receive (no-SND) .4 amp

<Preparation>

Unless otherwise specified, set the controls as follows

POWER/ VOL SW	ON
SEND/ REC (MIC)	REC
AF VOL	MIN
SQUELCH VOL	MIN
SELECT	KEY
SCAN	TO
HI/ LOW SW	HI
PRIORITY	
[ALERT	OFF
[OPER	OFF
TONE	OFF
REV	OFF

Notes:

- When adjusting the trimmers or coils, use a non-induced adjusting rod of bakelite, etc
- When adjusting the RX section never transmit to prevent SSG damage
- Connect MIC connector as shown in Fig. 17

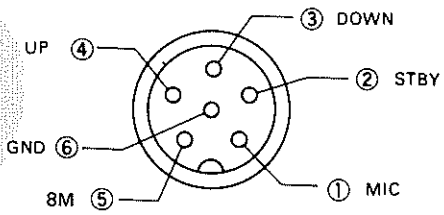
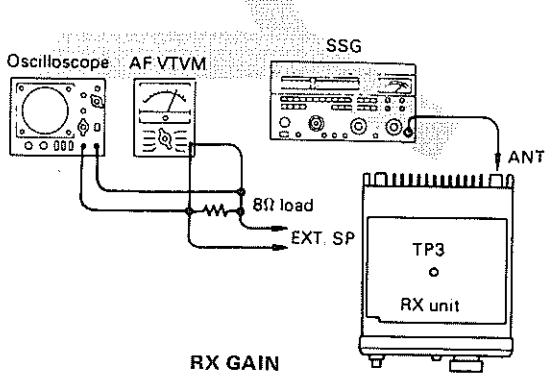


Fig 17. MIC terminals (view from font panel side)

- The output level of SSG is indicated as SSG's open circuit.



RX GAIN

Fig 18.

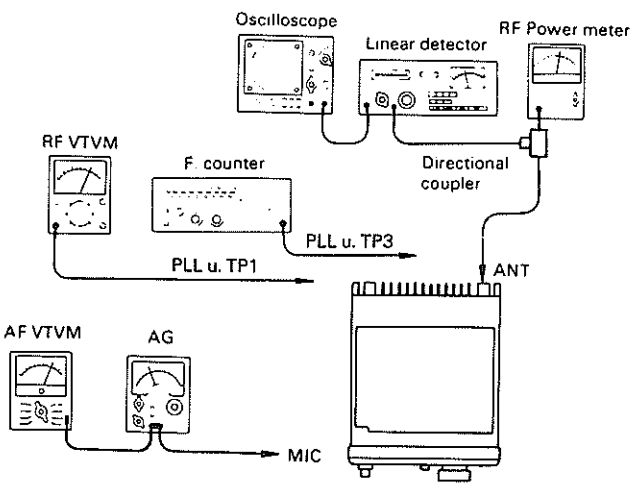
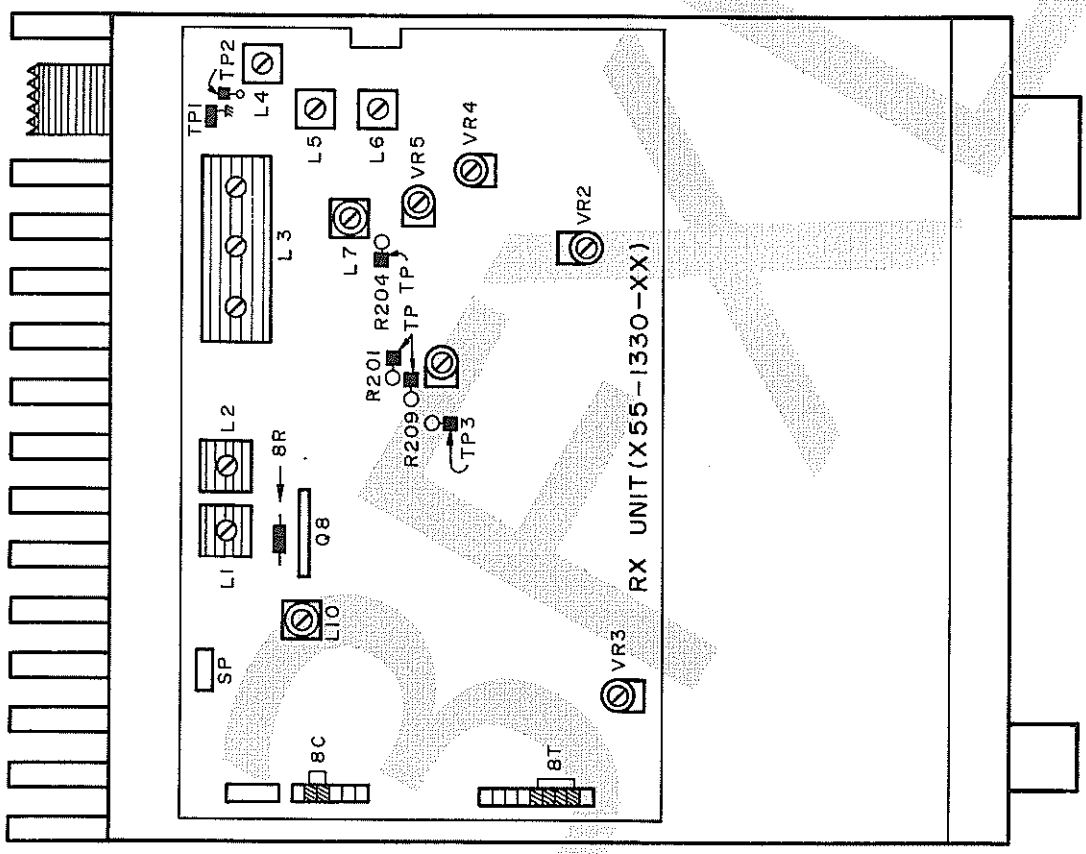


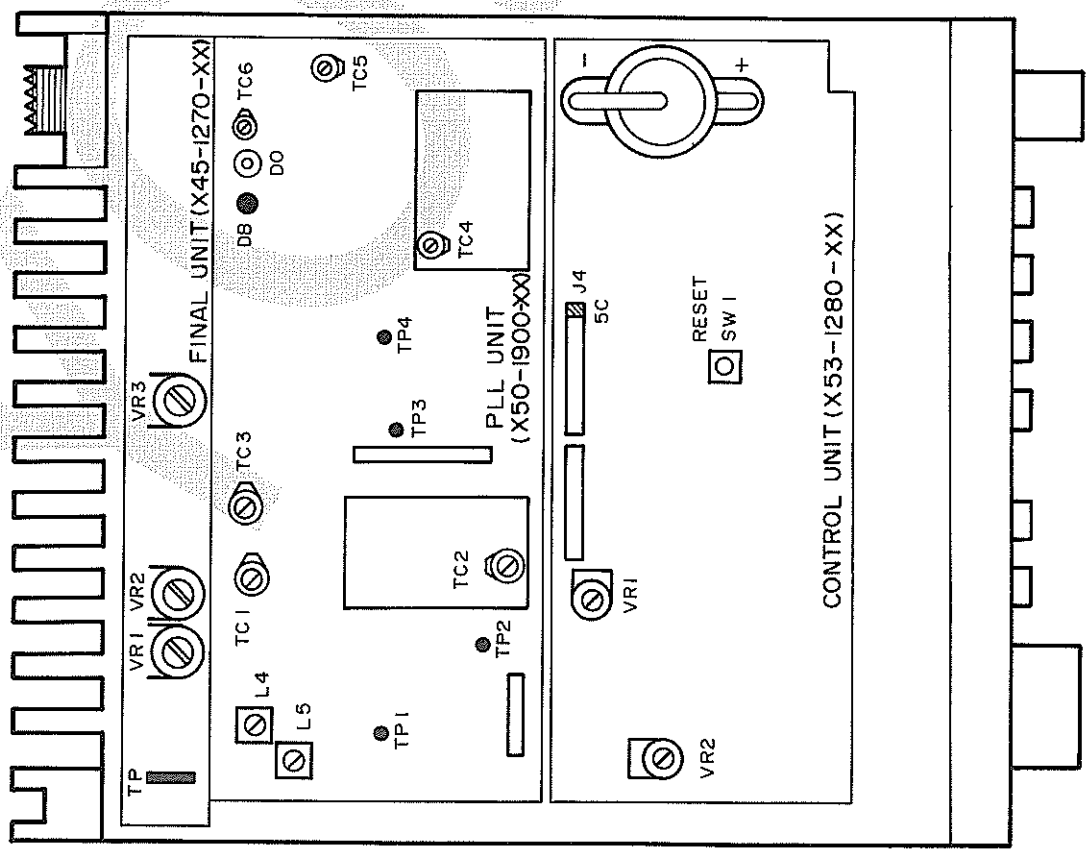
Fig 19. PLLU, DRIVE, Deviation

ADJUSTMENT POINT

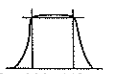
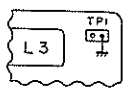
TOP VIEW



BOTTOM VIEW



ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Voltage check	1) DC power supply: 13.8V Power SW: ON SQL control: MIN. (fully CCW)	DVM (Digital volt meter)	RX	8R				7.6 ~ 8.2V
				8C				7.7 ~ 8.3V
				8T				0.3V or less
	2) Transmit			8T				7.6 ~ 8.2V
				8R				0.1V or less
			PLL	DB				7 ~ 13V
	3) Receive		CONTROL	5C				5.1 ~ 5.7V
2. Reset	1) Depress (CONTROL unit) SW1, RESET SW ON, 2 ~ 3 times.	Display						4,000
	2) SELECT: M. CH MEMORY: b	DVM	CONTROL	⊕				7,995 (K, M) 5,995 (W, T)
3. Lithium Backup Battery	1) Solder the Lithium Battery to the CONTROL unit when Power SW is ON.							Do not short the Lithium Battery. 3V
4. "Beeper"	1) VOL: 12 : 00 SQL: 12 : 00 MIC: Connect and press the MIC UP or DOWN continuously.	AF VTVM	Rear -Panel	SP	RX	VR3	0.5V	
5. PLL	1) Dial: 2.000 4.000 (W, T)	RF VTVM	PLL	TP1	PLL	L4, 5	MAX.	1.5V or more
		DC, VM		TP2		TC2	6.2V 5.2V (W, T)	± 0.1V
	2) Transmit			TP4		TC4	2.5V 3.5V (W, T)	± 0.1V
	3) Receive Dial: 5.000	f.counter		TP3		TC1	134.305 MHz	± 100 Hz
	4) Transmit			D0		TC3	145.000 MHz	
6. DRIVE	1) Dial: 6.600 5.995 (W, T) Transmit	Power -meter		D0		TC5, 6	MAX.	0.5W or more 0.2W or more (K2, W2, T2, M2)
7. HELICAL	1) ANT: Sweep Gen. Output 10dB	Detector Oscilloscope	RX	TP1	RX	L1, 2, 3	Adjust to obtain the waveform shown. 	
8. GAIN	1) Dial: 6.000 5.000 (W, T) ANT: SSG Output 10 dBμ Mod. 1 kHz, DEV/5 kHz f: 146 MHz 145 MHz (W, T)	DC VTVM	RX	TP3	RX	L4, 5 6, 7		0.8V or more
9. S-meter	1) Dial: 6.000 5.000 (W, T) ANT: SSG Output 15 dBμ Mod. 1 kHz, DEV/5 kHz	S-LED S-meter	Front-panel		RX	VR1	All LED's ON.	
		C.TUNING LED					LED should light.	
10. Discriminator	1) ANT: SSG Output 60 dBμ Mod. 1 kHz, DEV/5 kHz	AF VTVM Oscilloscope	Rear -Panel	SP	RX	L10	MAX.	
S/N	2) SSG Output: –6 dBμ						Check	S/N 20 dB or more
11. POWER	1) Final unit VR2, 3: MAX. (fully CW) 2) Dial: 6.600 5.000 (W, T) Connect coax. cable to D0 terminal in the PLL unit. Then transmit.	Ammeter in the DC supply			PLL	TC6	MAX.	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
12. PROTECTION null		DC Multi meter	FINAL	TP	FINAL	VR1	MIN.	0.5V or less
		Power -meter	Real -Panel	ANT				45W or more (TR-7950) 30W or more (TR-7930)
13. RF. LED						VR2	25W (TR-7950) 15W (TR-7930)	
		RF-LED	Front-Panel		RX	VR2	All RF-LED's should light.	
14. POWER SET-1 (TR-7950 only)	1) Final unit VR2: MAX. (CW) Increase the DC supply voltage untill output becomes 55W. Dial: 8.995 5.995 (W1, T1)	Power -meter	Rear -Panel	ANT	FINAL	VR2	52W	
	2) Reset voltage to 13.8V						Check	4.5W or more (144 ~ 148MHz)
15. POWER SET-2 (TR-7930 only)	1) Dial: 8.995 5.995 (W_2, T_2)				FINAL	VR2	28W	
16. LOW POWER	1) HI/LOW SW: LOW	Power -meter		ANT			Check	3 ~ 7W (TR-7950) 2 ~ 6W (TR-7930)
		RF-LED						2 ~ 4 LED's should light.
17. PROTCTION Current	1) ANT: Open	DC Power Supply Ammeter			FINAL	VR3	4A (TR-7950) 2.5A (TR-7930)	
18. DEV	1) MIC 30 mV/1 kHz 2) MIC 3 mV/1 kHz	Linear -Detector			RX	VR4	4.6 kHz	± 100 Hz
19. SCAN	1) SCAN SW: TO Confirm (CONTROL unit) VR1 at 12 o'clock. SQL CONTROL: MIN (CCW) KEY Board: Press "SC"						Check	Should be SCAN 3 ~ 7 seconds
	2) KEY Board: Press "C"							
20. TONE (W1, W2 only)	1) Same as item 18. TONE SW: ON	f counter			RX	VR5	1,750 Hz	± 10 Hz
		Linear Detector					Check	2.5 kHz or more
21. TONE Buarst (T1, T2 only)	1) Same as item 18. Connect a short jumper to R204, R201, R209 in the RX unit. Transmit	f counter			RX	VR5	1,750 Hz	± 10 Hz
		Linear -Detector					Check	2.5 kHz or more
	2) Disconnect short jumper Transmit TONE SW: ON	Monitor					Check	Should be monitored 0.5 ~ 1 second.
22. Touch TONE (K1, K2, M1, M2 only)	1) Transmit KEY Board: Press "S"	Linear -Detector			CONTROL	VR2	3 kHz	± 1 kHz

TR-7950/TR-7930

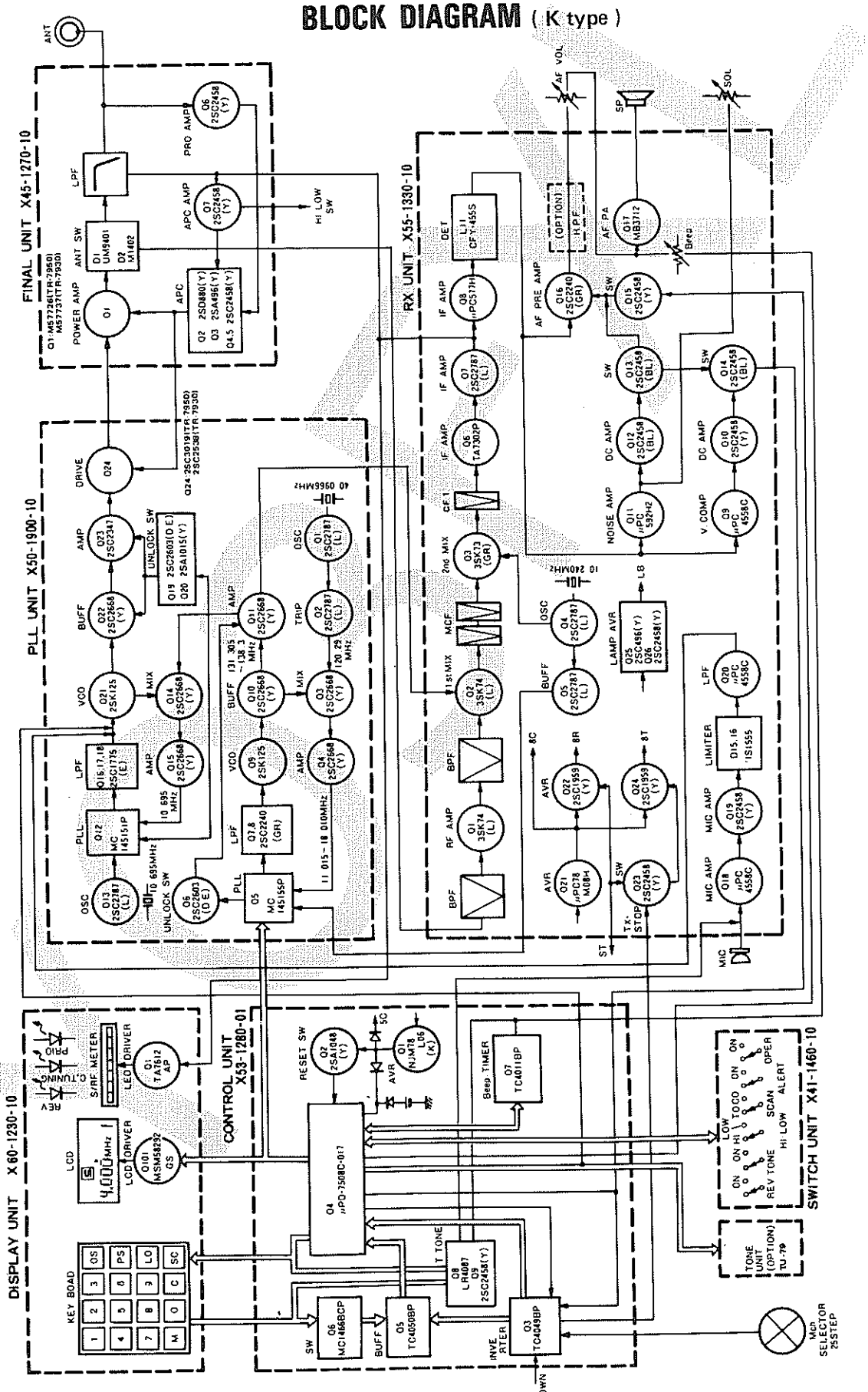
<Micro-processor operational check>

Item	Condition	Operation check
1. KEY BOARD	1) SELECT SW: KEY SQL control: MIN (CCW) POWER SW: ON RESET SW: ON	[S] 4.000 1
	2) KEY 1, 9, 0, PS, LO 1, 2, 3, 6, 7, 8, 9, 0, PS, LO (W, T)	[S] 4.000 1
	3) KEY 2, 2, 2, 2, 2, 2, 2, 2, (W, T)	[S] 2.220 1 Tone sounds 4 times. [S] 4.220 1 (W, T)
	4) KEY 3, 3, 3, 3, 4, 3, 3, 3, (W, T)	[S] 3.330 1 Tone sounds 4 times. [S] 4.330 1 (W, T)
	5) KEY 4, 4, 4, 4,	[S] 4.440 1 Tone sounds 4 times.
	6) KEY 5, 5, 5, 5,	[S] 5.555 1 Tone sounds 4 times.
	7) KEY 6, 6, 6, 6, 5, 6, 6, 6, (W, T)	[−] 6.665 1 Tone sounds 4 times. [−] 5.665 1 (W, T)
	8) KEY 7, 7, 7, 7, 5, 7, 7, 7, (W, T)	[−] 7.775 1 Tone sounds 4 times. [−] 5.775 1 (W, T)
	9) KEY 8, 8, 8, 8, 5, 8, 8, 8, (W, T)	[S] 8.885 1 Tone sounds 4 times. [S] 5.885 1 (W, T)
	10) KEY 8, 9, 9, 9, 5, 9, 9, 9, (W, T)	[S] 8.995 1 Tone sounds 4 times. [S] 5.995 1 (W, T)
	11) KEY 5, 0, 0, 0	[S] 5.000 1 Tone sounds 4 times.
	12) KEY OS	[+] 5.000 1 The tone sounds.
	13) MEMORY Turn the dial to the right 1 step.	[+] 5.000 2
	14) KEY M	[+] 5.000 2 The tone sounds.
	15) Turn MEMORY Dial to the right. 2, 3, 4 ... 19, A, b, 1, 2	LCD MEMORY CH number should indicate. The tone sounds. b → 1 (or 1 → b)
2. SELECT SW	1) SELECT SW: M. CH	[+] 5.000 2
	2) Turn MEMORY Dial left 1 step.	[S] 4.000 1 The tone sounds.
	3) KEY LO	[S] 4.000 ★ 1 The tone sounds.
3. REV & PRIO SW's	1) SELECT SW: KEY	[+] 5.000 1
	2) REV SW: ON.	5.600 1
	3) REV SW: OFF OPER SW: ON	[S] 4.000 ★ 1 REV-LED should extinguish. PRIO-LED should light.
4. ALERT	1) OPER SW: OFF SQL control: MIN (CCW) ALERT SW: ON VOL control: 9:00 ~ 10:00	PRIO-LED goes off. Noise should momentarily mute approx. 0.3 second, every 6 ~ 7 seconds.
5. PS KEY	1) Turn MEMORY Dial to CH b. KEY PS: ON	[+] 5.000 b The tone sounds.
	2) ALERT SW: OFF OPER SW: ON	[S] 7.995 b 5.995 b (W, T)
6. SCAN SW	1) OPER SW: OFF KEY "SC": ON	PRIO-LED goes off. 6 SCAN 4.000 b The tone sounds. The display should step up in 5 kHz steps approx every 6 seconds.
	2) KEY "C": ON	

<REFERENCE>

Japanese "SG"	American "SG"
− 6 dB	0.25 μV
0 dB	0.5 μV
6 dB	1 μV
12 dB	2 μV
24 dB	8 μV
30 dB	15.8 μV
40 dB	50 μV
50 dB	158 μV
60 dB	500 μV
70 dB	1.58 mV
80 dB	5 mV
90 dB	15.8 mV
100 dB	50 mV
120 dB	0.5V

BLOCK DIAGRAM (K type)



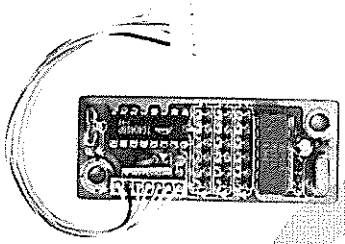
TU-79

TU-79 TONE UNIT (K. M only)

TU-79 SPECIFICATIONS

Oscillator frequency ..... 1 MHz ± 0.1%
Output frequency..... 37 band within 67.0 Hz ~ 250.3 Hz

NOTE: To Control Unit J5



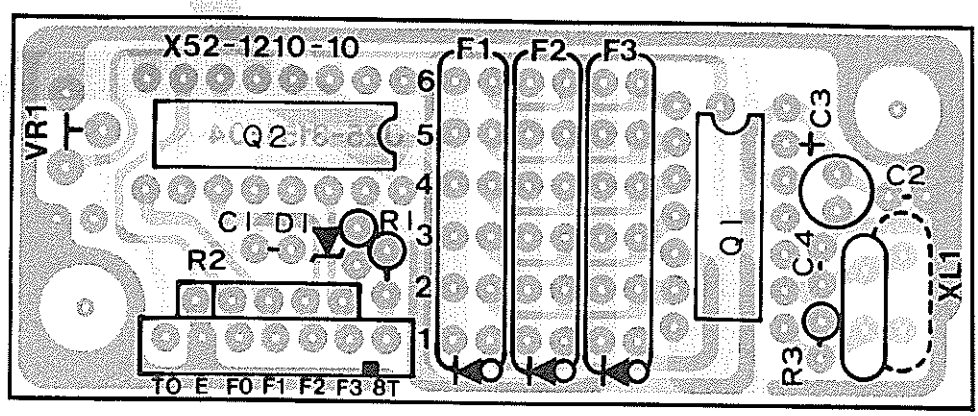
TU-79 PARTS LIST

N : New Parts

Part No.	Re-marks	Description	Ref. No.
GENERAL			
B50-4020-00	N	Instruction manual	
H01-4459-03	N	Packing carton	
H25-0029-04		Protective bag	
N87-3012-46		Self tapping screw x 2	
X52-1210-10	N	Tone unit	
TONE unit (X52-1210-10)			
CC45CH1H220J		C, 22P	C4
CE04W1A470M		E, 47	C3
C91-0131-05		C, 0.01	C1,2
E02-0110-05	N	IC socket 14P	
E31-2160-05	N	Connector with lead	
J31-0502-04		PC board collar	
J42-0404-05		PC board bush	
L77-0983-05		Crystal 1 MHz	XL1
MX315		IC	Q1
TC4049BP		IC	Q2
XZ-055		Zener Diode	D1
1S1555		Diode	D11 ~ 16 21 ~ 26 31 ~ 36
R12-1419-05		Trim. Pot. 3 kΩ	VR1
R90-0124-05		Resistor block 47 kΩ x 4	R2

TU-79 PC BOARD (X52 - 1210 - 10)

Component side view

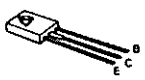


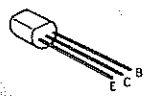
ABBREVIATION

AL	Alert	KB	Key Board "Row"	RM	RF Meter
AP	Audio Power Output	KC	Key Board "Row"	RO	Reference Oscillator Output
A1	Top of AF Control	KD	Key Board "Row"	SP	Speaker
A2	Arm of AF Control	KG	Key Board GND	SQ	Squelch Control
B	+13.8V	K1	Key Board "Column"	SS	SCAN Stop
BD	Busy Light	K2	Key Board "Column"	ST	Stand by Switch
BZ	Buzzer	K3	Key Board "Column"	SWB	Switched +B
B1	Tone Unit Switched +B W.T only	K4	Key Board "Column"	TL	TX Light
B2	Tone Unit +B W. T only	LB	Lamp +B	TO	Tone Output
CB	Common +B	LD	LCD IC Data	TT	Touch Tone Signal
CD	LCD IC Data	LP	PLL IC Data	TXS	TX Stop
CP	PLL IC Data	LP1	Rotary Lamp 1	UP	MIC Up Switch
DB	Drive +B	LP2	Rotary Lamp 2	5C	+5V Common
DD	LCD IC Data	LR	RX Local	8C	+8V Common
DO	MIC Down Switch	M	Meter	8T	+8V in TX
DP	PLL IC Data	MO	Modulator Out	10	μ-proc. port-1
E	GND	PC	Power Control	11	μ-proc. port-1
E1	Rotary Encoder	PR1	Priority Light	12	μ-proc. port-1
E2	Rotary Encoder	QS	Squelch Switch	22	μ-proc. port-2
E3	Rotary Encoder	RA	RX Antenna	23	μ-proc. port-2
F0 ~ F3	Tone Select Code	REV	Reverse Light		
KA	Key Board "Row"	RI	Reference Oscillator Input		

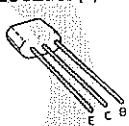
2SA1015(Y)
2SC945(Q)
2SC1675(L)
2SC1775(E)
2SC1815(Y, BL)
2SC1959(Y)
2SC2240(GR)

2SA496
2SC496





2SC2603(D, E)
2SC2787(L)



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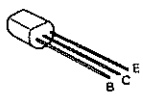
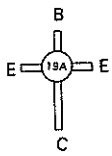
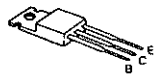


2SC3019



2SD880



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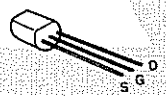
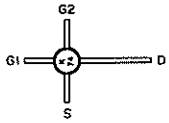


3SK73(GR)

3SK74(L)



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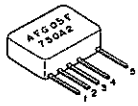

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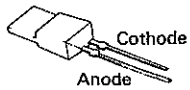

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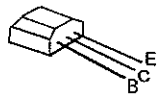
2SC2458(Y,BL)
2SC2668(Y)



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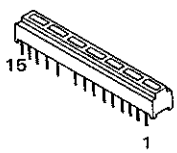

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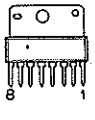

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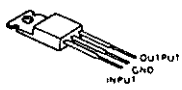

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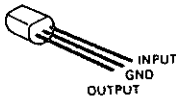

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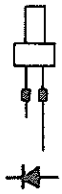

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