

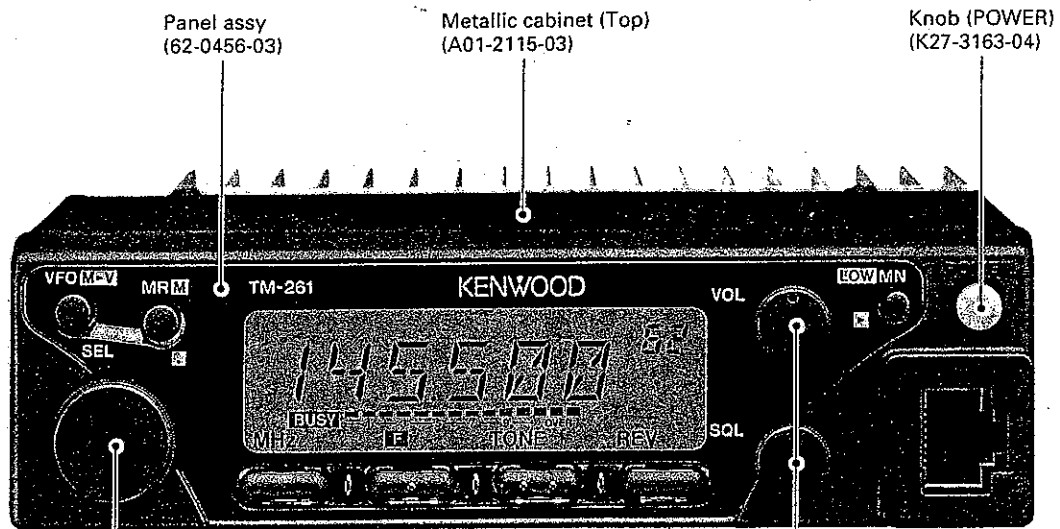
144MHz FM TRANSCEIVER

# TM-261A

## SERVICE MANUAL

# KENWOOD

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B51-8317-00 (N) 518



Knob (MAIN)  
(K29-5090-04)



Knob (VOL, SQL)  
(K29-5091-04) x 2

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CIRCUIT DESCRIPTION

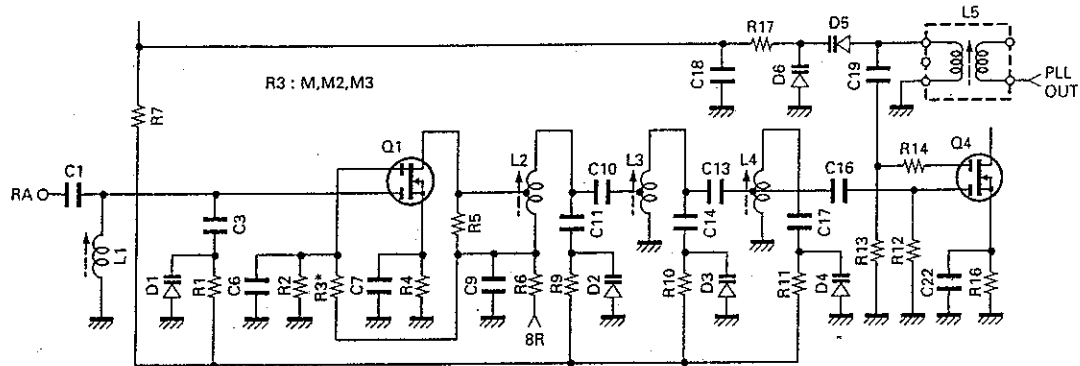


Fig. 2 Front-end section (Vari-cap tuning)

Item	Rating
Nominal center frequency (fo)	10.700MHz
Pass bandwidth	±7.5kHz or less at 3dB
Attenuation bandwidth	±25kHz or less at 40dB ±45kHz or less at 60dB
Ripple	1.0dB or less
Insertion loss	1.5dB or less
Guaranteed attenuation	70dB or more within ±1MHz Spurious : 40dB or more at fo~fo+500kHz 80dB or more at fo-(900~920kHz)
Terminating impedance	3kΩ/0pF

Table 1 MCF (L71-0228-15) : TX-RX unit XF1 (M,M2,M3)

Item	Rating
Nominal center frequency (fo)	30.825MHz
Pass bandwidth	±7.5kHz or less at 3dB
Attenuation bandwidth	±28kHz or less at 40dB
Ripple	1.5dB or less
Insertion loss	3.0dB or less
Guaranteed attenuation	60dB or more within ±1MHz Spurious 40dB or more
Terminating impedance	1.4kΩ/1pF

Table 2 MCF (L71-0270-05) : TX-RX unit XF1 (K)

Item	Rating
Nominal center frequency (fo)	455kHz±1kHz
6dB bandwidth	±7.5kHz or more (from 455kHz)
50dB bandwidth	±15kHz or less (from 455kHz)
Ripple	3dB or less (within ±5kHz of 455kHz)
Insertion loss	6dB or less
(on the maximum point of output)	
Guaranteed attenuation	35dB or more (within ±100kHz of 455kHz)
Terminating impedance	1.5kΩ

Table 3 Ceramic filter CFWM455E (L72-0366-05) : TX-RX unit CF1

TRANSMITTING SYSTEM

• Overview

The transmitter produces the target frequency through the use of direct FM-modulation via a vari-cap diode.

• Modulation circuit

Voice signals from the microphone are fed into the microphone amplifier circuit of the control unit for amplification by the 1st transistor amplifier, and then into two operational amplifiers. These operational amplifiers perform pre-emphasis, amplification, limiting, and includes a splatter filter, which is used to reduce undesirable high-frequency components from the signal. This signal is into the VCO of TX-RX unit.

The FM modulation circuit applies this signal directly to the VCO via a vari-cap diode.

• Younger-stage circuit

Signals from the VCO are applied to the drive HIC IC8 (KCB11). The amplifier always operates in a linear mode so that signals can be amplified without degradation. Additionally the amplifier is designed to cover a wide range of frequencies and can produce stable output without adjustment. The APC (Automatic Power Control) controls collector voltage from the last stage of the younger-stage circuit.

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## CIRCUIT DESCRIPTION

• **Power amplifier circuit**

The drive signal is amplified to the required level by the power module. The TM-261A uses a large heat sink to prevent failure of the final amplifier due to temperature. It is provide efficient radiation of the heat generated by the final amplifier.

• **APC circuit (Automatic Power Control)**

The automatic power control circuit (APC) uses a diode to detect a portion of the output from the final module, It amplifies this signal and uses it as a control voltage, this control voltage is inversely proportion to the output so that a constant output is produced.

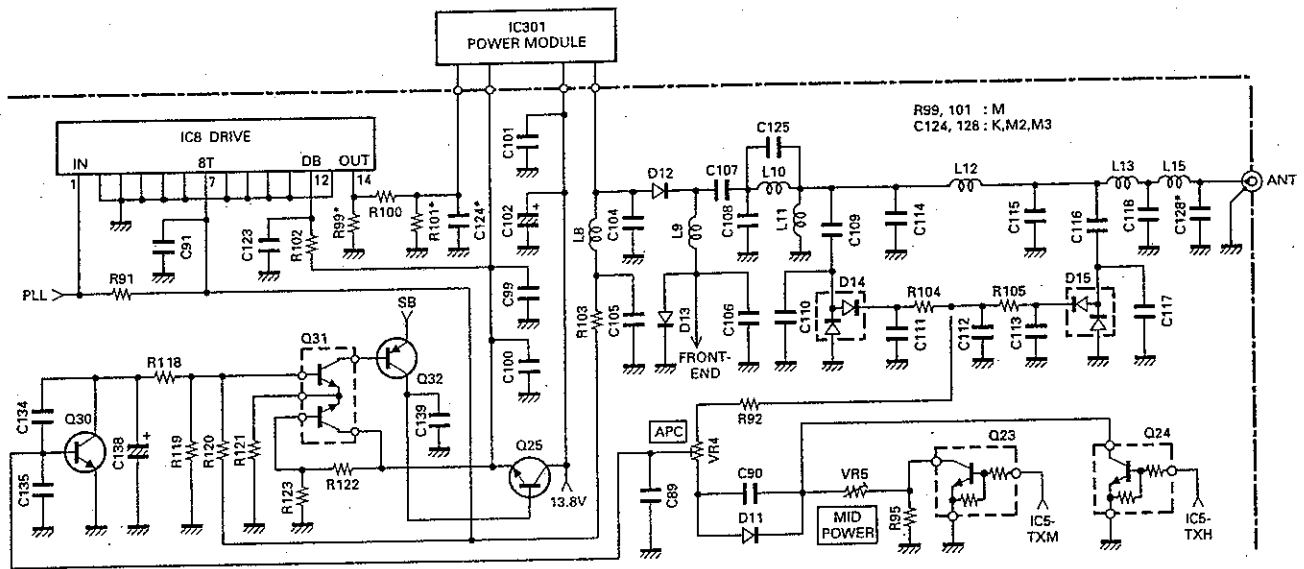


Fig. 3 Younger-stage, Power amplifier, APC circuits

(Tc=25°C)

Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		17	V
Current consumption	Icc		5	A
Input power	Pin	f : 144~148MHz, Vcc : 12.5V, ZG=ZL=50Ω	200	mW
Output power	Po	f : 144~148MHz, Vcc : 12.5V, ZG=ZL=50Ω	.15	W
Operating case temperature	Tc(op)		-30~+110	°C
Storage temperature	Tstg		-40~+110	°C

Table 4 Power module M57715 maximum ratings (TX-RX unit IC301) : M

(Tc=25°C)

Item	Symbol	Condition	Rating	Unit
Operating voltage	Vcc		16	V
Control voltage	VCON		16	V
Current consumption	It		14	A
Input power	Pi		600	mW
Output power	Po	12.5V<Vcc≤16V, VCON≤12.5V, Pi=0~500mW, ZG=ZL=50Ω	65	W
Operating case temperature	Tc(opr)		-30~+100	°C
Storage temperature	Tstg		-40~+110	°C

Table 5 Power module S-AV17 maximum ratings (TX-RX unit IC301) : K,M2,M3

# CIRCUIT DESCRIPTION

## PLL SYNTHESIZER UNIT

A block diagram of the PLL and VCO unit is provided in Figure 4 and 5. In the TM-261A, the PLL system is implemented as a sub-unit which is divided into the upper VCO and lower PLL blocks. The sub-unit is shielded to prevent external interference.

There are two reference frequencies, 6.25kHz and 5kHz, available to allow 5,10,12.5,15,20,25kHz-step operation. The 6.25kHz is obtained by dividing the reference oscillator frequency of 12.8MHz by 1/2048, and the 5kHz is obtained by dividing it by 1/2560. The VCO directly generates the dial frequency. This dial frequency is amplified once and then fed into a pulse swallow-type PLL IC for frequency division and phase comparison, in order to lock the frequency.

The PLL system is locked without switching between transmit mode and receive mode. By using a signal ("L" in transmit mode) from pin 11 of the PLL IC (M54959FP), the LPF is deactivated-activated by Q52 and Q53 only for the moment when the TM-261A enters transmit mode. This helps produce lock more rapidly than previous methods.

### • Calculate example (M,M2,M3).

In 144MHz mode,  $f_{vco}$  (RX) is calculated by the following formula;

$$f_{vco} = (144 - 10.700) = ((n \times 128) + A) \times f_{osc} \div R$$

where,

$f_{vco}$  : VCO output frequency

$n$  : Binary value of the 10-bit programmable counter

$A$  : Binary value of the 7-bit programmable counter

$f_{osc}$  : 12.8MHz reference frequency

$R$  : Binary value of the 14-bit programmable counter 2560

In this case,

$$n = 208 \text{ and } A = 36$$

Therefore,  $f_{vco}$  is calculated as follows;

$$\begin{aligned} f_{vco} &= \{(208 \times 128) + 36\} \times 12800 \div 2560 \\ &= (26624 + 36) \times 5 \\ &= 133300 = 133.300\text{MHz} \end{aligned}$$

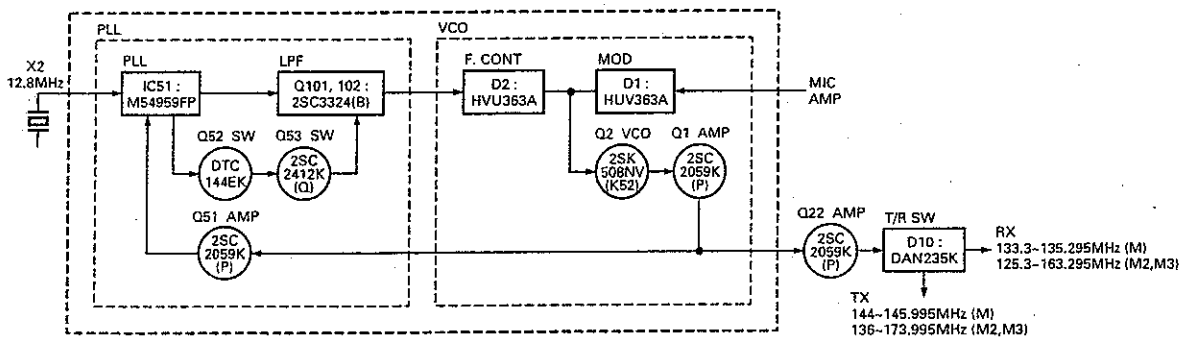


Fig. 4 PLL block daigram : M,M2,M3

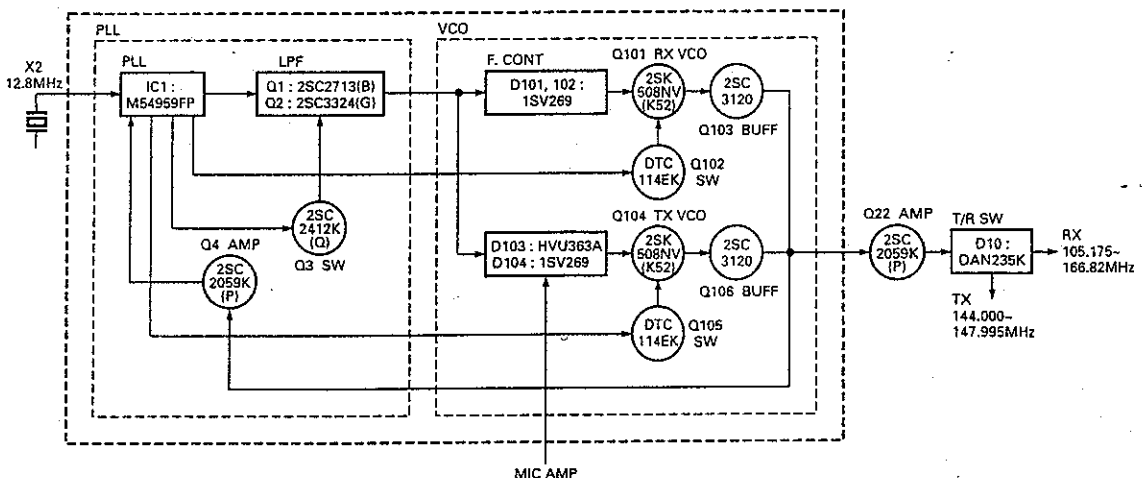


Fig. 5 PLL block diagram : K

# TM-261A

## CIRCUIT DESCRIPTION

- **8T (8V in transmit mode)/8R (8V in receive mode) switching and unlock circuits**

In receive mode, the base of Q15, Q17 has 0.7V. As a result, Q15, Q17 is on, and Q16 and Q14 are off, then the collector of Q13 (8R) provides voltage, and the collector of Q14 (8T) provides no voltage.

The CPU output serial data to shift register IC5 when the PTT switch is depressed. As a result, pin 8 of IC5 becomes "L", turning Q17 off, and Q16 and Q14 on. The 8T line is therefore supplied with 8V. D7 is using for quickly switching of 8T.

The unlock protect circuit operates only in transmit mode. Q18 is a PLL unlocking switching transistor. Usually, the base of Q18 is supplied with 0V ("L"), and the collector is supplied with 8V ("H").

When the PLL is unlocked, the base of Q18 is supplied with 0.7V, turning Q18 on. As a result, the collector of Q18 becomes "L" (0V), this turns Q16 off and the collector of Q14 becomes 8V, turning it off. Therefore, when the PLL is unlocked, Q14 is off removing bias voltage from the 8T line. Without the 8T voltage no transmit signal is generated.

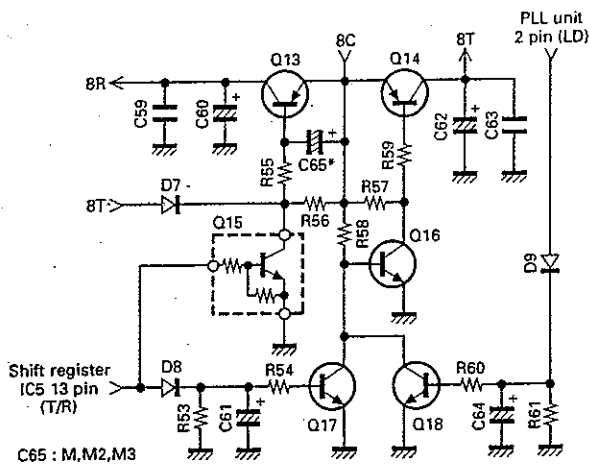


Fig. 6 8T/8R switching and unlock circuits

## DIGITAL CONTROL UNIT

- **Overview**

The digital control unit consists of a several keys, a rotary encoder input, a lamp switching circuit, a reset circuit, and a back-up circuit. These circuits are controlled by a single microprocessor (CPU).

The LCD drive and a tone output is carried by CPU.

- **Key and rotary encoder input circuits**

The keys (on the panel) input and output from the rotary encoder is fed directly into the CPU.

- **Microphone key input circuit**

The UP, DOWN, and other function keys of the microphone are directly connected to their corresponding analog input pins of the CPU. Each of the functions is activated by a voltage generated when the corresponding key is pressed.

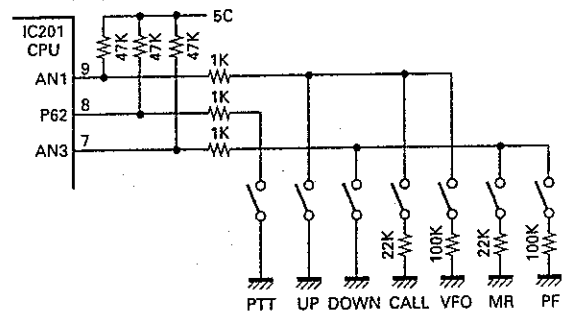


Fig. 7 Microphone key input circuit

- **Lamp switch circuit**

The lamp switch circuit is switched by the constant voltage of 8V from 8C with Q201 and Q202. The lamp switch circuit is turning ON and OFF to LCD back-lamp. R201 is always supply the idle-current to the lamps, it on account of prevent an over-current from flowing through the lamp.

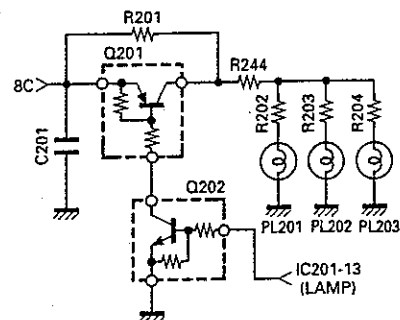


Fig. 8 Lamp switch circuit

### CIRCUIT DESCRIPTION

• **Reset and back-up circuits**

When the TM-261A power is turned on, the reset circuit sends a "L" level pulse to the RESET pin of the CPU. This initiates the power-on reset sequence.

When the TM-261A power is turned off, the back-up circuit detects a voltage drop in the SB line and sets the CPU INTO (BCHK) to a "H" level. This causes the CPU to enter a back-up state and then back-up data is transmitting to the EEPROM (IC210 : X25160SI-2.7).

• **Microprocessor and EEPROM**

The microprocessor (IC201) and the EEPROM (IC210 : X25160SI-2.7) is connected three line system of data input and output. The data forward with Serial-data type. The port P17 and P20 of the microprocessor are directly connected to SI and SO port of the EEPROM.

• **Shift register circuit**

The shift register circuit consists of IC5 (BU2090FS). The IC5 receives serial data from the microprocessor to perform the controls listed below.

Pin No.	Pin name	Function
1	Vss	GND
2	DATA	Serial data input
3	CLOCK	Clock input
4	AMR	Usually "H"
5	AM1	Usually "L"
6	AM2	Usually "L"
7	AM3	Usually "H"
8	-	Not used
9	-	Not used
10	TXM	TX power select. "H" in MID mode, "L" in HI or LOW mode
11	TXH	TX power select. "H" in HI mode, "L" in MID or LOW mode
12	-	Not used
13	T/R	Transmit/receive select. "H" in RX mode, "L" in TX mode
14	MUTE	AF mute. "H" when TX mode, CTCSS or squelch is on.
15	-	Not used
16	Vdd	5V

Table 5

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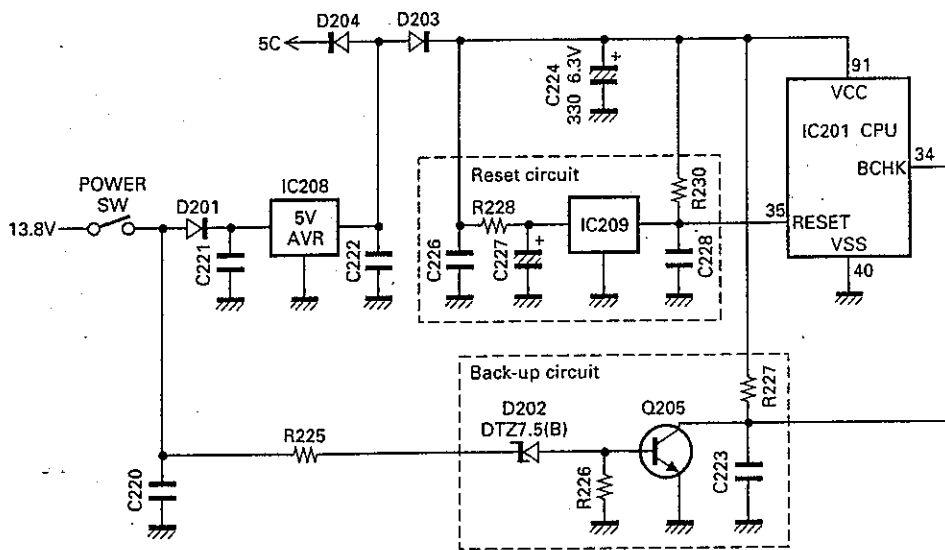


Fig. 9 Reset and back-up circuits

# TM-261A

• **PLL data output**

PLL data is available from P47 (CK), P46 (DT), and P50 (EP1) of the CPU. Figure 10 is a timing chart for PLL data transfer, and Figure 11 shows the format of PLL data.

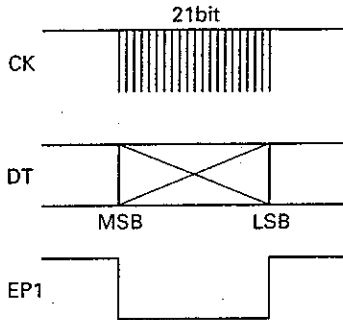
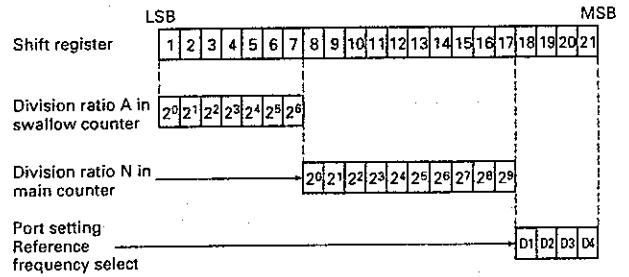


Fig. 10 Timing chart for PLL data transfer



The 21-bit data is made up of the following:

1. Division ratio data A and N (17bits)

F (Display - 10.7MHz (M,M2,M3) or 30.825MHz (K) in RX mode)

$$= \{(N \times 128) + A\} \times 12.8\text{MHz} \times \text{ref}$$

N : Division ratio set in 10-bit main counter (binary)

A : Division ratio set in 7-bit swallow counter (binary)

2. Reference frequency (ref) select (2bits)

Data		Phase reference frequency	
D1	D2		
L	L	5kHz	5,10,15,20,25kHz step mode
H	H	6.25kHz	12.5kHz step mode

3. Switch select (2 bit)

Data		Output port		
D3	D4	SW1	SW2	
L	H	L	H	RX mode
H	L	H	L	TX mode

Fig.11 PLL data format

• **Input and output of CTCSS unit (option)**

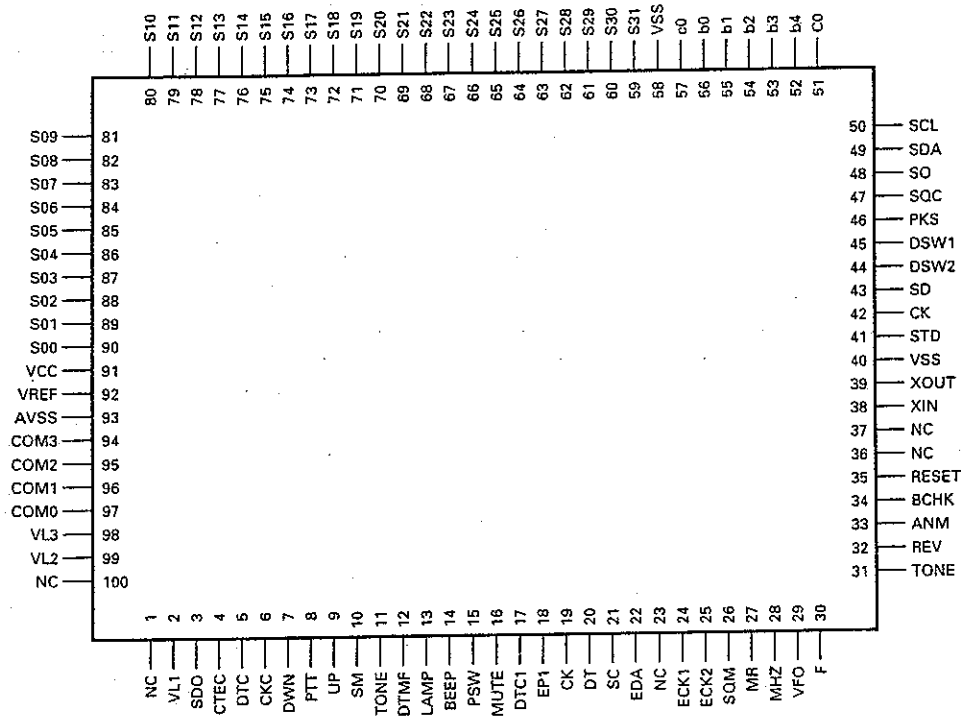
The optional CTCSS unit receives data from P64, P65, and P66 of the CPU.

When a tone from the CTCSS unit is detected, a "H" level signal is sent to P67 of the CPU, opening the squelch.

SEMICONDUCTOR DATA

CPU : M38267M8L10\*FP (TX-RX Unit IC201) 3 : M2,M3 4 : M 5 : K

• Terminal connection diagram



• Terminal function

○ : Pull up, ● : Pull up

Pin No.	Pin	I/O	P/U	Pin name	Function
1	C1	I			Not used (Vss).
2	VL1	I		VL1	Power supply for LCD.
3	P67	I/O	●	P_SDO	CTCSS signal detect.
4	P66	I/O	○	P_CTEC	CTCSS connected/CTCSS enable output.
5	P65	O		P_DTC	CTCSS data output.
6	P64	O		P_CKC	CTCSS clock output.
7	AN3	I	○	P_DWN	DOWN, MR, PF.
8	P62	I	○	P_PTT	Stand-by for PLL.
9	AN1	I	○	P_UP	UP, CALL, VFO.
10	P60	I		P_SM	S-meter input.
11	DA2	O		P_TONE	Sub-tone output.
12	DA1	O		P_DTMF	DTMF tone output.
13	P55	O		P_LAMP	Lamp control.
14	P54	O		P_BEEP	Beep tone output.

## TM-261A

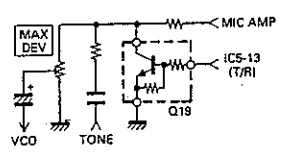
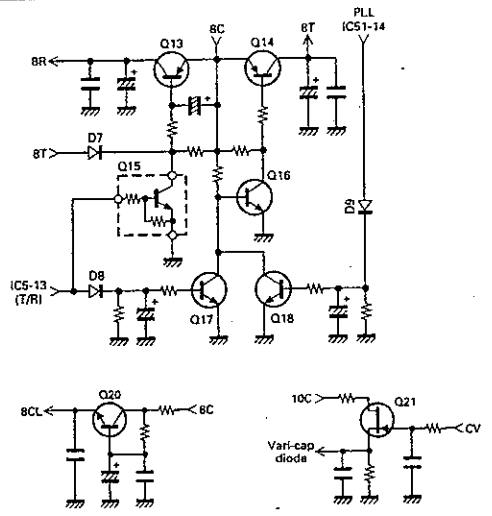
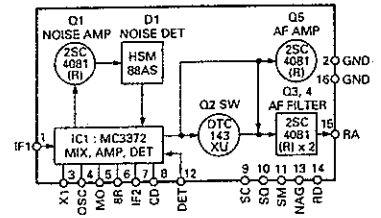
## SEMICONDUCTOR DATA

Pin No.	Pin	I/O	P/U	Pin name	Function
15	P53	O		P_PSW	Power switch.
16	P52	O		P_MUTE	MIC mute.
17	P51	O		P_ES1	Shift register data output.
18	P50	O		P_EP1	PLL IC enable output.
19	P47	O		P_CKS	PLL and shift register clock output.
20	P46	O		P_DTS	PLL data output.
21	P45	I	○	P_SC	BUSY signal input.
22	P40	O		P_SQM	Squelch monitor.
23	P43/TOUT	I/O			Not used.
24	INT3	I	○	P_ENCCK1	Encoder clock1.
25	INT2	I	○	P_ENCCK2	Encoder clock2.
26	R44	I	○	P_EDA	Encoder data.
27	P77	I	○	P_KEY6	VFO-key input.
28	P76	I	○	P_KEY5	MR-key input.
29	P75	I	○	P_KEY4	MHZ-key input.
30	P74	I	○	P_KEY3	F-key input.
31	P73	I	○	P_KEY2	TONE-key input.
32	P72	I	○	P_KEY1	REV-key input.
33	P71	I/O	○	P_KEU0	ID-key input.
34	INT0	I	○	BCHK	Power supply check.
35	REST	I		SET	System reset input.
36	XCIN	I			Not used (Vss).
37	XCOU	O			Not used (Open).
38	XIN	I		XIN	4.19MHz crystal oscillator.
39	XOUT	O		XCOU	4.19MHz crystal oscillator.
40	Vss	I		Vss	GND.
41	P27	I/O	●	P_STD	DTMF signal detect.
42	P26	O		P_CKD	DTMF decoder clock line.
43	P25	O		P_SD	DTMF decoder data line.
44	P24	O		P_DTSW2	DTMF input select switch 2.
45	P23	O		P_DTSW1	DTMF input select switch 1.
46	P22	I	●	P_PKS	Packet standby.
47	P21	O		P_SQC	Squelch control.
48	P20	I		P_EPSO	EEPROM SO.
49	P17	O		P_EPDT	EEPROM SI.
50	P16	O		P_EPCK	EEPROM clock line.
51	P15	I/O	○●	P_C0	Channel display bit.
52~56	P14~P10	I	○●	P_B4~P_B0	Destination bit 4~0.
57	P07	O		P_EPCS	EEPROM chip select.
58	P06	I/O			Not used (Vss).
59~90	SEG31~SEG00	O		P_SEG31~P_SEG0	LCD segment 31~0.
91	Vcc	I		Vcc	Power supply pin.
92	VREF	I		VREF	Standard power supply for A/D converter.
93	AVss	I		AVss	Standard GND for A/D converter.
94~97	COM3~COM0	O		P_COM3~P_COM0	LCD common 3~0.
98	VL3	I		VL3	power supply for LCD
99	VL2	I		VL2	power supply for LCD
100	C2	I			Not used (Vss).

DESCRIPTION OF COMPONENTS

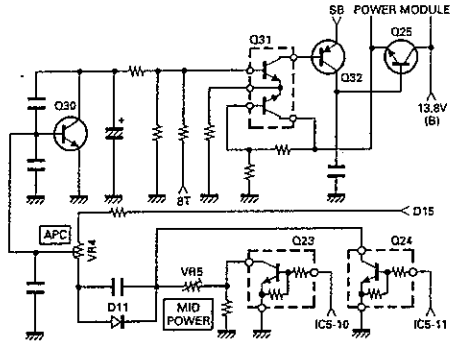
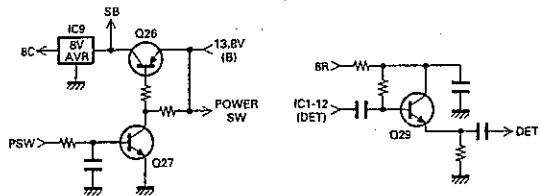
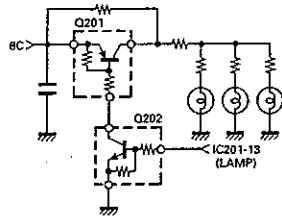
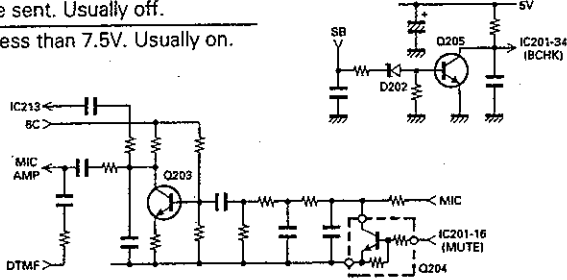
TX-RX Unit (X57-4970-XX) -11 : K -21 : M -22 : M2 -23 : M3

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC1	2nd local oscillator, Mixer, IF amplification, IDetection, Low-frequency amplification, Noise amplification, Noise detection, Squelch switching	1 : 1st IF signal input (10.7MHz (M,M2,M3), 30.825MHz (K)) 3,4 : 2nd local oscillator (10.245MHz (M,M2,M3), 30.370MHz (K)) 9 : Busy output 10 : Squelch control 11 : S-meter output 14 : RD output 15 : Low-frequency output
IC2	AM detector	K type only
IC3	AF amplification	1 : AF input 6 : AF output
IC5	Shift register	See circuit description.
IC6	5V AVR	
IC7	10V AVR	For PLL
IC8	Transmit drive	
IC9	8V AVR	
IC10	Analog switch	K type only.
IC201	Microprocessor	See circuit description.
IC205	Analog switch	
IC207	Low-frequency amplification	Mic amplifies.
IC208	5V AVR	
IC209	Reset	
IC210	EEPROM	
IC211	DTMF decoder	
IC212, 213	Analog switch	
IC213	Analog switch	
Q1	High-frequency amplification	Operates in receive mode.
Q2	AMR switch	K type only.
Q3	BPF switch	K type only.
Q4	1st mixer	Converts received 144MHz-range signals to 1st IF (10.7MHz (M,M2,M3), 30.825MHz (K)).
Q5	High-frequency amplification	Amplifies 1st IF signal.
Q6	Q5 gain control	K type only.
Q7	Detector output switch	K type only.
Q8	Low-frequency amplification	K type only.
Q12	AF line mute	Operates when transmit mode, CTCSS or squelch is on.
Q13	8R switching	On in receive mode.
Q14	8T switching	On in transmit mode.
Q15	8R switching control	On in receive mode.
Q16	8T switching control	On in transmit mode.
Q17	8T switching control	Off in transmit mode.
Q18	8T switching control	Off when PLL locked.
Q19	Modulation system mute	On in receive mode.
Q20	PLL 8V ripple filter	
Q21	CV line buffer	



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## DESCRIPTION OF COMPONENTS

Ref. No.	Use/Function	Operation/Condition/Compatibility
Q22	VCO output amplification	
Q23	TX power select	On in MID mode.
Q24	TX power select	On in HI mode.
Q25	TX drive stage +B control	
Q26	Power switch	
Q27	Power switch control	On when power switch is on.
Q28	Squelch hysteresis	On when the squelch is on.
Q29	RD buffer amplification	
Q30~32	APC control	See circuit description.
Q33	BPF switch	Usually off.
Q201	Lamp switch	
Q202	Lamp switch control	
Q203	Low-frequency amplification	
Q204	Mic mute	On when DTSS code are sent. Usually off.
Q205	buffer amplifier switch	On when SB voltage is less than 7.5V. Usually on.
		
D1~6	Vari-cap tuning	
D7~9	Reverse current prevention	
D10	VCO output switch	
D11	Temperature compensation	For APC.
D12, 13	Transmit/receive switching	
D14,15	Power detection	For APC.
D16	Reverse power protection	
D17	Tune switching	K type only.
D201	Reverse current prevention	
D202	Voltage drop detect	For power supply.
D203~207	Reverse current prevention	

## DESCRIPTION OF COMPONENTS

## PLL (X58-4390-00) : M, M2, M3

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC51	PLL	1 : VCO input. 133.300 to 135.295MHz (M), 125.300 to 163.295MHz (M2,M3) in receive mode, 144 to 145.995MHz (M), 136 to 173.995MHz (M2,M3) in transmit mode. 11 : "L" in transmit mode. 14 : "H" when PLL unlocked.
Q1	VCO output buffer	
Q2	VCO	133.300 to 135.295MHz (M), 125.300 to 163.295MHz (M2,M3) in receive mode, 144 to 145.995MHz (M), 136 to 173.995MHz (M2,M3) in transmit mode.
Q51	VCO output buffer	
Q52	Transmit switch	Off in transmit mode.
Q53	Transmit switch	On for moment when transmission stars.
Q101,102	LPF	
D1	For modulation in TX mode	
D2	VCO voltage control	

## PLL (X58-4400-00) : K

Ref. No.	Use/Function	Operation/Condition/Compatibility
IC1	PLL	1 : VCO input. 105.175 to 166.820MHz in receive mode, 144.000MHz to 147.995MHz in transmit mode. 11 : "L" in transmit mode. 14 : "H" when PLL unlocked.
Q1,2	LPF	
Q3	Transmit switch	On for an instant when transmission starts.
Q4	VCO output buffer	
Q101	Receive VCO	107.175 to 166.820MHz.
Q102	Receive VCO switch	On in receive mode.
Q103	Receive VCO output buffer	107.175 to 166.820MHz.
Q104	Transmit VCO	144.000 to 147.995MHz.
Q105	Transmit VCO switch	On in transmit mode.
Q106	Transmit VCO output buffer	144.000 to 147.995MHz.
D101,102	VCO voltage control	Receive.
D103,104	VCO voltage control	Transmission. Varactor diode for modulation in transmit mode.

# TM-261A

## PARTS LIST

\* New Parts.  $\Delta$  indicates safety critical components.  
 Parts without **Parts No.** are not supplied.  
 Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.  
 Teile ohne **Parts No.** werden nicht geliefert.

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

**TM-261A**  
**TX-RX UNIT (X57-4970-XX)**

Ref. No.	Address	New parts	Parts No.	Description	Destination
<b>TM-261A</b>					
1	1B	*	A01-2115-03	METALLIC CABINET TOP	
2	2B	*	A01-2116-03	METALLIC CABINET BOTTOM	
3	2A	*	A62-0456-03	PANEL ASSY	
5	1B,1C		B42-2455-04	STICKER (M4X8 MAX)	
9		*	B46-0469-00	WARRANTY CARD	K
12		*	B62-0605-00	INSTRUCTION MANUAL (ENGLISH)	
12		*	B62-0606-00	INSTRUCTION MANUAL (SPANISH)	K,M3
13	1C	*	B72-1041-04	MODEL NAME PLATE	K
13	1C	*	B72-1042-04	MODEL NAME PLATE	M2,M3
13	1C	*	B72-1043-04	MODEL NAME PLATE	M
15			E30-2111-15	DC CORD ACCESSORY	
16	1C		E30-2137-15	DC CORD	
17	1C		E30-2145-15	ANTENNA CORD	
18	1B		E31-3197-15	LEAD WIRE WITH CONNECTOR	
21	2A	*	F15-0695-04	SHADE PLATE	
22	2B	*	F15-0696-04	SHADE	
24	1C		F51-0013-05	FUSE 4A	M
24	1C		F51-0017-05	FUSE 15A	K,M2M3
25			F51-0018-05	FUSE 20A ACCESSORY	
29	2B	*	G02-0794-04	FLAT SPRING GND	
30	2C	*	G02-0795-04	FLAT SPRING GND	
31	1B	*	G02-0796-04	FLAT SPRING IC	
35	1B,2C	*	G10-0779-04	FIBROUS SHEET CHASSIS	
37	1C	*	G10-0786-04	FIBROUS SHEET SP HOLDER	
38	2B	*	G13-1539-04	CUSHION	
			G09-0405-05	KNOB SPRING	
40		*	H52-0763-02	ITEM CARTON CASE	K,M2M3
40		*	H52-0764-02	ITEM CARTON CASE	M
41		*	H10-6601-02	POLYSTYRENE FOAMED FIXTURE	
42		*	H11-0885-04	POLYSTYRENE FOAMED BOARD	
43		*	H13-0977-04	CARTON BOARD	
44			H25-0103-04	PROTECTION BAG 125X250 DC CORD	
45			H25-0337-04	PROTECTION BAG 200X350 MANUAL	
46			H25-0720-04	PROTECTION BAG 180X300 ITEM	
50	1C	*	J19-1580-04	HOLDER SPEAKER	
51		*	J29-0628-03	BRACKET ACCESSORY	
55	1A	*	K27-3163-04	KNOB POWER	
56	1A	*	K29-5090-04	KNOB MAIN	
57	1A	*	K29-5091-04	KNOB VOLUME	
A	1C,2C		N33-2606-45	OVAL HEAD MACHIN SCREW	
B	2A		N38-2640-46	PAN HEAD MACHINE SCREW	
C	2B		N67-3008-46	PAN HEAD SEMS SCREW	
D	2B,2C		N87-2608-46	BRAZIER HEAD TAPTITE SCREW	
F			N99-0331-05	SCREW SET	
61A			T91-0516-05	MICROPHONE	M,M2
61A			T91-0568-05	MICROPHONE	K,M3
61B			E30-3206-08	CURL CABLE MIC	M,M2
61B			E30-3240-08	CURL CABLE MIC	K,M3
SP	1B	*	T07-0331-05	LOUDSPEAKER (FULLRANGE)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
63		*	W01-0433-04	SPANNER ACCESSORIES	
A1	2B,2C	*	X58-4390-00	SUB UNITPLL	M,M2M3
A1	2B,2C	*	X58-4400-00	SUB UNITPLL	K
<b>TX-RX UNIT (X57-4970-XX) -11 : K -21 : M -22 : M2 -23 : M3</b>					
65	2B	*	B11-1154-02	REFLECTOR	
66	2B	*	B11-1156-04	FILTER	
LCD	2A	*	B38-0761-05	LCD	
PL201-203		*	B30-2158-05	LAMP	
C1			CC73FCH1H040C	CHIP C 4.0PF	C
C3			CC73FCH1H180J	CHIP C 18PF	J
C4-7			CK73FB1H102K	CHIP C 1000PF	K
C6,7			CK73FB1H102K	CHIP C 1000PF	K
C8			CK73FB1H103K	CHIP C 0.010UF	K
C9			CK73FB1H102K	CHIP C 1000PF	K
C10			CC73FCH1H0R5C	CHIP C 0.5PF	C
C11			CC73FCH1H270J	CHIP C 27PF	J
C12			CK73FB1H103K	CHIP C 0.010UF	K
C13			CC73FCH1H0R5C	CHIP C 0.5PF	C
C14			CC73FCH1H270J	CHIP C 27PF	J
C15			CK73FB1H102K	CHIP C 1000PF	K
C16			CC73FCH1H150J	CHIP C 15PF	J
C17			CC73FCH1H270J	CHIP C 27PF	J
C18			CK73FB1H103K	CHIP C 0.010UF	K
C19			CC73FCH1H030C	CHIP C 3.0PF	C
C20			CK73FB1H102K	CHIP C 1000PF	K
C21			CK73FB1H103K	CHIP C 0.010UF	K
C22			CK73FB1H102K	CHIP C 1000PF	K
C23			CC73FCH1H050C	CHIP C 5.0PF	C
C23			CC73FCH1H080D	CHIP C 8.0PF	D
C24			CK73FB1H102K	CHIP C 1000PF	K
C25			CK73FB1H103K	CHIP C 0.010UF	K
C26			CC73FCH1H100D	CHIP C 10PF	D
C26			CC73FCH1H220J	CHIP C 22PF	J
C26			CC73FCH1H470J	CHIP C 47PF	J
C27			CK73FB1H102K	CHIP C 1000PF	K
C28			CC73FCH1H100D	CHIP C 10PF	D
C28			CC73FCH1H330J	CHIP C 33PF	J
C29			CC73FCH1H151J	CHIP C 150PF	J
C29,30			CK73FB1H102K	CHIP C 1000PF	K
C31			CC73FSL1H101J	CHIP C 100PF	J
C32			CE04EW1C100M	ELECTRO 10UF 16WV	
C33			CK73FB1H223K	CHIP C 0.022UF	K
C34			CK73FB1H333K	CHIP C 0.033UF	K
C35			C92-0004-05	CHIP-TAN 1.0UF 16WV	K
C36,37			CK73FB1H103K	CHIP C 0.010UF	K
C38			C92-0002-05	CHIP-TAN 0.22UF 35WV	K
C38			C92-0003-05	CHIP-TAN 0.47UF 25WV	M
C38			C92-0504-05	CHIP-TAN 0.68UF 20WV	M2,M3
C39			CK73FF1C105Z	CHIP C 1.0UF	Z
C41			CK73FF1C105Z	CHIP C 1.0UF	Z
C43			CE04EW1A470M	ELECTRO 47UF 10WV	
C44			CK73FB1H103K	CHIP C 0.010UF	K
C47			CK73FB1E104K	CHIP C 0.10UF	K

PARTS LIST

TX-RX UNIT (X57-4970-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C48			CE04EW1A471M	ELECTRO 470UF 10WV		C116			CC73FCH1H0R5C	CHIP C 0.5PF C	K,M2M3
C49			CK73FB1H103K	CHIP C 0.010UF K		C116			CC73FCH1H010C	CHIP C 1.0PF C	M
C50			CE04EW1C470M	ELECTRO 47UF 16WV		C117			CC73FCH1H020C	CHIP C 2.0PF C	
C51.52			CE04EW1A470M	ELECTRO 47UF 10WV		C118			CM73F2H270J	CHIP C 27PF J	M
C53			CE04EW1C101M	ELECTRO 100UF 16WV		C118			CM73F2H470J	CHIP C 47PF J	K,M2M3
C54			CK73FB1H473K	CHIP C 0.047UF K		C119			CK73FB1H102K	CHIP C 1000PF K	
C55			CK73FB1H681K	CHIP C 680PF K		C120,121			CK73FF1C105Z	CHIP C 1.0UF Z	
C56			CE04EW1C470M	ELECTRO 47UF 16WV		C122			CK73FB1H102K	CHIP C 1000PF K	
C57			CK73FF1C105Z	CHIP C 1.0UF Z		C123			CK73FF1C105Z	CHIP C 1.0UF Z	
C58,59			CK73FB1H103K	CHIP C 0.010UF K		C124			CC73FCH1H120J	CHIP C 12PF J	M2,M3
C60			CE04EW1A470M	ELECTRO 47UF 10WV		C124			CC73FCH1H270J	CHIP C 27PF J	K
C61			C92-0504-05	CHIP-TAN 0.68UF 20WV		C125			CM73F2H050D	CHIP C 5.0PF D	K,M2M3
C62			CE04EW1A470M	ELECTRO 47UF 10WV		C125			CM73F2H060D	CHIP C 6.0PF D	M
C63			CK73FB1H103K	CHIP C 0.010UF K		C128			CM73F2H150J	CHIP C 15PF J	K,M2M3
C64			C92-0504-05	CHIP-TAN 0.68UF 20WV		C129			CC73FCH1H270J	CHIP C 27PF J	K
C65			CE04EW1C470M	ELECTRO 47UF 16WV	M,M2M3	C131			CK73FF1C105Z	CHIP C 1.0UF Z	
C67			CC73FUJ1H150J	CHIP C 15PF J		C132			CK73FB1H103K	CHIP C 0.010UF K	
C68			CC73FCH1H220J	CHIP C 22PF J		C133			CK73FF1C105Z	CHIP C 1.0UF Z	
C69			CK73FB1H103K	CHIP C 0.010UF K		C134			CK73FB1H472K	CHIP C 4700PF K	
C70			CC73FCH1H390J	CHIP C 39PF J	K	C135			CK73FB1H102K	CHIP C 1000PF K	
C72			CK73FB1H473K	CHIP C 0.047UF K		C138			CE04EW1E4R7M	ELECTRO 4.7UF 25WV	
C73			CK73FB1H102K	CHIP C 1000PF K		C139			CK73FB1H102K	CHIP C 1000PF K	
C74			C92-0606-05	CHIP-TAN 4.7UF 10WV		C140			CC73FCH1H040C	CHIP C 4.0PF C	K
C75			CC73FCH1H101J	CHIP C 100PF J		C141,142			CK73FB1H103K	CHIP C 0.010UF K	K
C76			CK73FB1H102K	CHIP C 1000PF K		C201			CK73FB1H102K	CHIP C 1000PF K	
C78			CK73FB1H102K	CHIP C 1000PF K		C202			CK73FF1C105Z	CHIP C 1.0UF Z	
C79			CC73FCH1H330J	CHIP C 33PF J		C203			CK73FB1H102K	CHIP C 1000PF K	
C80			CK73FB1H102K	CHIP C 1000PF K		C204			CC73FCH1H101J	CHIP C 100PF J	
C81			CC73FCH1H220J	CHIP C 22PF J		C205			CE04CW1C100M	ELECTRO 10UF 16WV	
C82			CK73FB1H103K	CHIP C 0.010UF K		C206			CC73FCH1H820J	CHIP C 82PF J	
C83			CE04EW1A470M	ELECTRO 47UF 10WV		C207			CK73FB1H332K	CHIP C 3300PF K	
C84			CK73FB1H103K	CHIP C 0.010UF K		C208			CK73FB1H681K	CHIP C 680PF K	
C86			CE04EW1C100M	ELECTRO 10UF 16WV		C209			CK73FB1H333K	CHIP C 0.033UF K	
C87,88			CK73FB1H103K	CHIP C 0.010UF K		C210			CC73FCH1H270J	CHIP C 27PF J	
C89-92			CK73FB1H102K	CHIP C 1000PF K		C211			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C93			CK73FB1H103K	CHIP C 0.010UF K		C212			CK73FB1H333K	CHIP C 0.033UF K	
C94			CE04EW1A470M	ELECTRO 47UF 10WV		C213			CK73FB1H102K	CHIP C 1000PF K	
C95,96			CK73FB1H103K	CHIP C 0.010UF K		C214			CK73FF1E104Z	CHIP C 0.10UF Z	
C97			CE04EW1C102M	ELECTRO 1000UF 16WV		C215			CK73FB1H223K	CHIP C 0.022UF K	
C99			CK73FB1H102K	CHIP C 1000PF K		C216,217			CC73FCH1H101J	CHIP C 100PF J	
C100			CK73FF1C105Z	CHIP C 1.0UF Z		C218			CK73FB1H102K	CHIP C 1000PF K	
C101			CK73FB1H102K	CHIP C 1000PF K		C219			CK73FB1H103K	CHIP C 0.010UF K	
C102			CE04EW1C100M	ELECTRO 10UF 16WV		C220,221			CK73FB1H102K	CHIP C 1000PF K	
C104			C91-3004-05	CHIP C 3.0PF J	M	C222,223			CK73FB1H103K	CHIP C 0.010UF K	
C104		*	C91-3019-05	CHIP C 22PF J	K,M2M3	C224			CE04CW0J331M	ELECTRO 330UF 6.3WV	
C105			CK73FB1H102K	CHIP C 1000PF K		C225			CE04CW1C100M	ELECTRO 10UF 16WV	
C106			CC73FCH1H220J	CHIP C 22PF J		C226			CK73FB1H471K	CHIP C 470PF K	
C107		*	C91-1182-05	CHIP C 1000PF J	K,M2M3	C227			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C107		*	C91-3035-05	CHIP C 100PH J	M	C228-230			CK73FB1H103K	CHIP C 0.010UF K	
C108			CM73F2H180J	CHIP C 18PF J	K,M2M3	C231			CK73FB1H102K	CHIP C 1000PF K	
C108			CM73F2H330J	CHIP C 33PF J	M	C232			CC73FCH1H330J	CHIP C 33PF J	
C109			CC73FCH1H0R5C	CHIP C 0.5PF C	K,M2M3	C233,234			CK73FB1H103K	CHIP C 0.010UF K	
C109			CC73FCH1H010C	CHIP C 1.0PF C	M	C236			CK73FB1H332K	CHIP C 3300PF K	
C110			CC73FCH1H020C	CHIP C 2.0PF C	M	C237			CK73FF1E104Z	CHIP C 0.10UF Z	
C110			CC73FCH1H030C	CHIP C 3.0PF C	K,M2M3	C238-241			CC73FCH1H101J	CHIP C 100PF J	
C111-113			CK73FB1H102K	CHIP C 1000PF K		C242			CK73FB1H103K	CHIP C 0.010UF K	
C114		*	C91-3025-05	CHIP C 39PF J	K,M2M3	C243			CC73FCH1H101J	CHIP C 100PF J	
C114		*	C91-3029-05	CHIP C 56PF J	M	C244			CK73FF1E104Z	CHIP C 0.10UF Z	
C115		*	C91-3027-05	CHIP C 47PF J		C245			CK73FB1H102K	CHIP C 1000PF K	

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## PARTS LIST

TX-RX UNIT (X57-4970-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C246,247			CC73FCH1H100D	CHIP C 10PF D		R19			R92-0670-05	CHIP R 0 OHM	M,M2M3
C248			CK73FB1H102K	CHIP C 1000PF K		R20			RK73FB2A101J	CHIP R 100 J 1/10W	
C249			CK73FB1H103K	CHIP C 0.010UF K		R21			RK73FB2A471J	CHIP R 470 J 1/10W	
C250			CK73FF1C105Z	CHIP C 1.0UF Z		R22			RK73FB2A152J	CHIP R 1.5K J 1/10W	M,M2M3
C251,252			CK73FB1H472K	CHIP C 4700PF K		R23			RK73FB2A102J	CHIP R 1.0K J 1/10W	K
TC1			C05-0349-05	TRIM CAP 10P		R23			RK73FB2A471J	CHIP R 470 J 1/10W	M,M2M3
CN1			E40-3237-05	PIN ASSY		R24			RK73FB2A101J	CHIP R 100 J 1/10W	
CN3,4		*	E40-5817-05	PIN ASSY		R25			RK73FB2A103J	CHIP R 10K J 1/10W	
CN201,202			E40-5203-05	PIN ASSY SOCKET		R26			RK73FB2A473J	CHIP R 47K J 1/10W	
CN203		*	E40-5830-05	FLAT CABLE CONNECTOR		R27			RK73FB2A272J	CHIP R 2.7K J 1/10W	K
J1			E11-0425-05	PHONE JACK		R28			RK73FB2A103J	CHIP R 10K J 1/10W	
J201			E08-0877-05	RECTANGULAR RECEPTACLE		R29			RK73FB2A681J	CHIP R 680 J 1/10W	K
W1,2			E33-1871-25	PROCESSED WIRE KIT	K	R30			RK73FB2A103J	CHIP R 10K J 1/10W	K
			J30-0564-05	SPACER		R30			RK73FB2A153J	CHIP R 15K J 1/10W	M,M2M3
CD1			L79-1013-05	TUNING COIL 455kHz		R31			RK73FB2A274J	CHIP R 270K J 1/10W	K
CF1			L72-0366-05	CERAMIC FILTER 455kHz		R32			RK73FB2A332J	CHIP R 3.3K J 1/10W	K
L1-4			L34-1239-05	COIL		R33			RK73FB2A102J	CHIP R 1.0K J 1/10W	K
L5			L34-4113-05	COIL		R35			RK73FB2A102J	CHIP R 1.0K J 1/10W	
L6			L30-0005-05	COIL	M,M2M3	R39			R92-0670-05	CHIP R 0 OHM	M,M2M3
L6			L34-2157-05	COIL	K	R42			RK73FB2A101J	CHIP R 100 J 1/10W	
L7			L40-1005-48	SMALL FIXED INDUCTOR 10UH		R43			RK73FB2A487J	CHIP R 4.7 J 1/10W	
L8			L34-1239-05	AIR-CORE COIL 10.5T		R44			RK73FB2A101J	CHIP R 100 J 1/10W	
L9			L34-0895-05	AIR-CORE COIL 6T		R45			R92-0670-05	CHIP R 0 OHM	
L10			L34-0742-05	AIR-CORE COIL 5T		R46			RK73FB2A102J	CHIP R 1.0K J 1/10W	
L11			L34-0908-05	AIR-CORE COIL 9.5T		R47			RK73FB2A473J	CHIP R 47K J 1/10W	
L12,13			L34-0499-05	AIR-CORE COIL 4T		R48			RK73FB2A333J	CHIP R 33K J 1/10W	
L14			L40-3395-48	SMALL FIXED INDUCTOR 3.3UH		R49			R92-0670-05	CHIP R 0 OHM	
L15			L34-0499-05	AIR-CORE COIL 4T		R53			RK73FB2A334J	CHIP R 330K J 1/10W	
L16			L40-1095-48	SMALL FIXED INDUCTOR 10UH	K	R54			RK73FB2A223J	CHIP R 22K J 1/10W	
L17			L40-1892-19	SMALL FIXED INDUCTOR 1.8UH	K	R55			RK73FB2A182J	CHIP R 1.8K J 1/10W	
L18			L40-4785-48	SMALL FIXED INDUCTOR 470nH		R56-58			RK73FB2A103J	CHIP R 10K J 1/10W	
L201			L40-1091-42	SMALL FIXED INDUCTOR 1.0UH		R59			RK73FB2A182J	CHIP R 1.8K J 1/10W	
X1			L77-1312-05	CRYSTAL RESONATOR 30.369MHz	K	R60			RK73FB2A223J	CHIP R 22K J 1/10W	
X1			L77-1473-05	CRYSTAL RESONATOR 10.2441MHz	M,M2M3	R61			RK73FB2A473J	CHIP R 47K J 1/10W	
X2			L77-1405-05	CRYSTAL RESONATOR 12.800MHz		R69			RK73FB2A224J	CHIP R 220K J 1/10W	
X201			L77-1476-05	CRYSTAL RESONATOR 4.194304MHz		R70			RK73FB2A104J	CHIP R 100K J 1/10W	
XF1			L71-0228-15	MCF 10.700MHz	M,M2M3	R72			RK73FB2A103J	CHIP R 10K J 1/10W	
XF1			L71-0270-05	MCF 30.825MHz	K	R73			RK73FB2A153J	CHIP R 15K J 1/10W	
CP1			R90-0714-05	MULTI-COMP 10K X 4		R75-78			RK73FB2A472J	CHIP R 4.7K J 1/10W	
CP2			R90-0720-05	MULTI-COMP 100K X 4		R79			RK73FB2A105J	CHIP R 1.0M J 1/10W	
CP3,4			R90-0714-05	MULTI-COMP 10K X 4		R80			RK73FB2A104J	CHIP R 100K J 1/10W	
R1			RK73FB2A104J	CHIP R 100K J 1/10W		R81			RK73FB2A471J	CHIP R 470 J 1/10W	
R2			RK73FB2A103J	CHIP R 10K J 1/10W	M,M2M3	R82			RK73FB2A220J	CHIP R 22 J 1/10W	
R2			R92-0670-05	CHIP R 0 OHM	K	R84			RK73FB2A122J	CHIP R 1.2K J 1/10W	
R3			RK73FB2A274J	CHIP R 270K J 1/10W	M,M2M3	R85			RK73FB2A220J	CHIP R 22 J 1/10W	
R4			RK73FB2A101J	CHIP R 100 J 1/10W		R86			RK73FB2A223J	CHIP R 22K J 1/10W	
R5			RK73FB2A103J	CHIP R 10K J 1/10W		R87			RK73FB2A103J	CHIP R 10K J 1/10W	
R6			RK73FB2A101J	CHIP R 100 J 1/10W		R88,89			RK73FB2A101J	CHIP R 100 J 1/10W	
R7			RK73FB2A104J	CHIP R 100K J 1/10W		R90			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R8			RK73FB2A273J	CHIP R 27K J 1/10W	K	R91			RK73FB2A470J	CHIP R 47 J 1/10W	
R9-11			RK73FB2A104J	CHIP R 100K J 1/10W		R92			RK73FB2A104J	CHIP R 100K J 1/10W	
R12,13			RK73FB2A473J	CHIP R 47K J 1/10W		R93			RK73FB2A102J	CHIP R 1.0K J 1/10W	K
R14			RK73FB2A470J	CHIP R 47 J 1/10W		R94			RK73FB2A220J	CHIP R 22 J 1/10W	
R15			RK73FB2A274J	CHIP R 270K J 1/10W	M,M2M3	R95			RK73FB2A104J	CHIP R 100K J 1/10W	M
R16			RK73FB2A470J	CHIP R 47 J 1/10W		R95			RK73FB2A392J	CHIP R 3.9K J 1/10W	K,M2M3
R17			RK73FB2A103J	CHIP R 10K J 1/10W		R96			RK73FB2A103J	CHIP R 10K J 1/10W	
R18			RK73FB2A102J	CHIP R 1.0K J 1/10W		R97			R92-1215-05	CHIP R 470 J 1/2W	
						R98			RK73FB2A103J	CHIP R 10K J 1/10W	
						R99			RK73FB2A271J	CHIP R 270 J 1/10W	M

PARTS LIST

TX-RX UNIT (X57-4970-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R100			RK73FB2A180J	CHIP R 18 J 1/10W	M	R237			RK73FB2A473J	CHIP R 47K J 1/10W	K,M2M3
R100			R92-0670-05	CHIP R 0 OHM	K,M2M3	R238			RK73FB2A392J	CHIP R 3.9K J 1/10W	M
R101			RK73FB2A271J	CHIP R 270 J 1/10W	M	R238			RK73FB2A563J	CHIP R 56K J 1/10W	M
R102			R92-0685-05	CHIP R 22 J 1/2W	K,M2M3	R239			RK73FB2A183J	CHIP R 18K J 1/10W	M
R102			R92-0686-05	CHIP R 33 J 1/2W	M	R240			RK73FB2A473J	CHIP R 47K J 1/10W	M
R103			R92-1213-05	CHIP R 100 J 1/2W	K,M2M3	R244			R92-0670-05	CHIP R 0 OHM	K
R103			R92-1214-05	CHIP R 120 J 1/2W	M	R245			R92-0670-05	CHIP R 0 OHM	K
R104,105			RK73FB2A223J	CHIP R 22K J 1/10W	M	R246-248			RK73FB2A473J	CHIP R 47K J 1/10W	M
R106			RK73FB2A274J	CHIP R 270K J 1/10W	M2,M3	R249			RK73FB2A822J	CHIP R 8.2K J 1/10W	M
R106			RK73FB2A394J	CHIP R 390K J 1/10W	M	R250-253			RK73FB2A102J	CHIP R 1.0K J 1/10W	M
R107			RK73FB2A104J	CHIP R 100K J 1/10W	M	R254			RK73FB2A330J	CHIP R 33 J 1/10W	M
R108			R92-0670-05	CHIP R 0 OHM	M	R255			RK73FB2A102J	CHIP R 1.0K J 1/10W	M
R109			RK73FB2A103J	CHIP R 10K J 1/10W	M	R256			RK73FB2A473J	CHIP R 47K J 1/10W	M
R110			R92-0670-05	CHIP R 0 OHM	M	R257			RK73FB2A474J	CHIP R 470K J 1/10W	M
R111			RK73FB2A101J	CHIP R 100 J 1/10W	M	R258			R92-0670-05	CHIP R 0 OHM	M
R112			RK73FB2A104J	CHIP R 100K J 1/10W	M	R259			RK73FB2A472J	CHIP R 4.7K J 1/10W	M
R113			RK73FB2A683J	CHIP R 68K J 1/10W	M	R260			RK73FB2A103J	CHIP R 10K J 1/10W	M
R114			RK73FB2A151J	CHIP R 150 J 1/10W	M	R261			R92-0670-05	CHIP R 0 OHM	M
R115			RK73FB2A154J	CHIP R 150K J 1/10W	M	R262-264			RK73FB2A473J	CHIP R 47K J 1/10W	M
R116			RK73FB2A332J	CHIP R 3.3K J 1/10W	M	R265			R92-0670-05	CHIP R 0 OHM	M
R117			RK73FB2A102J	CHIP R 1.0K J 1/10W	M	R266			RK73FB2A473J	CHIP R 47K J 1/10W	M
R118			RK73FB2A152J	CHIP R 1.5K J 1/10W	M	R267,268			RK73FB2A102J	CHIP R 1.0K J 1/10W	M
R119,120			RK73FB2A103J	CHIP R 10K J 1/10W	M	R269			RK73FB2A223J	CHIP R 22K J 1/10W	M
R121			RK73FB2A152J	CHIP R 1.5K J 1/10W	M	R270-272			RK73FB2A473J	CHIP R 47K J 1/10W	M
R122			RK73FB2A222J	CHIP R 2.2K J 1/10W	M	R273			R92-0670-05	CHIP R 0 OHM	M
R123			RK73FB2A102J	CHIP R 1.0K J 1/10W	K	R280			RD148B2C473J	RD 47K J 1/6W	K
R124			RK73FB2A473J	CHIP R 47K J 1/10W	K	VR1			R12-6746-05	TRIM POT 100K	K
R125,126			RK73FB2A472J	CHIP R 4.7K J 1/10W	K	VR3			R12-6744-05	TRIM POT 47K	K
R127			RK73FB2A222J	CHIP R 2.2K J 1/10W	K	VR4			R12-6740-05	TRIM POT 10K	K
R128			RK73FB2A102J	CHIP R 1.0K J 1/10W	K	VR5			R12-6740-05	TRIM POT 10K	K
R200			RK73FB2A333J	CHIP R 33K J 1/10W	M	VR5			R12-6744-05	TRIM POT 47K	M
R201			R92-0686-05	CHIP R 33 J 1/2W	M	VR201			R05-4420-05	VARIABLE RESISTOR 50K	M
R203-204			RK73FB2A106J	CHIP R 10 J 1/10W	M	VR202			R05-3441-05	VARIABLE RESISTOR 10K	M
R205			RK73FB2A332J	CHIP R 3.3K J 1/10W	M	S201	*		S68-0410-05	PUSH SWITCH	M
R206			RK73FB2A101J	CHIP R 100 J 1/10W	M	S202-208			S70-0439-05	TACT SWITCH	M
R207			RK73FB2A103J	CHIP R 10K J 1/10W	M	S209			W02-1707-05	ROTARY ENCODER	M
R208-210			RK73FB2A823J	CHIP R 82K J 1/10W	M	D1	*		1SV270	VARI-CAP DIODE	M
R211			RK73FB2A473J	CHIP R 47K J 1/10W	M	D2-4			1SV269	VARI-CAP DIODE	M
R212			RK73FB2A224J	CHIP R 220K J 1/10W	M	D5,6	*		HVU363A	DIODE	M,M2M3
R213			RK73FB2A333J	CHIP R 33K J 1/10W	M	D7			MA110	DIODE	M,M2M3
R214			RK73FB2A184J	CHIP R 180K J 1/10W	M	D8,9			DAN202K	DIODE	M,M2M3
R215			RK73FB2A394J	CHIP R 390K J 1/10W	M	D10			DAN235K	DIODE	M
R216			RK73FB2A224J	CHIP R 220K J 1/10W	M	D11			DAN202K	DIODE	M
R217			RK73FB2A561J	CHIP R 560 J 1/10W	M	D12,13			MI407	DIODE	K,M2M3
R218			RK73FB2A564J	CHIP R 560K J 1/10W	M	D13			MI308	DIODE	M
R219			RK73FB2A561J	CHIP R 560 J 1/10W	M	D13			MI308	DIODE	K,M2M3
R220			RK73FB2A470J	CHIP R 47 J 1/10W	M	D14,15			1SS226	DIODE	M
R221			RK73FB2A104J	CHIP R 100K J 1/10W	M	D16	*		OSA3A1-FK	SURGE ABSORBER	M
R222			RK73FB2A223J	CHIP R 22K J 1/10W	M	D17			MA77	DIODE	K
R223,224			RK73FB2A102J	CHIP R 1.0K J 1/10W	M	D19-21			1SV269	VARI-CAP DIODE	M2M3
R225			RK73FB2A472J	CHIP R 4.7K J 1/10W	M	D112			MA112	DIODE	M
R226,227			RK73FB2A103J	CHIP R 10K J 1/10W	M	D201			MA110	DIODE	M
R228			RK73FB2A223J	CHIP R 22K J 1/10W	M	D202			DTZ7.5(B)	ZENER DIODE	M
R229			RK73FB2A473J	CHIP R 47K J 1/10W	M	D203,204			MA729	DIODE	M
R230,231			RK73FB2A103J	CHIP R 10K J 1/10W	M	D205,206			MA110	DIODE	M
R234			R92-0670-05	CHIP R 0 OHM	M	D207			MA729	DIODE	M
R235			RK73FB2A103J	CHIP R 10K J 1/10W	K	IC1			KCD10	IC (FM IF)	M
R236			RK73FB2A222J	CHIP R 2.2K J 1/10W	K,M2M3	IC2			TA7787AF	IC (FM/AM IF/3V)	K
R236			RK73FB2A821J	CHIP R 820 J 1/10W	M	IC3			LA4446	IC (AF POWER AMP)	M

# TM-261A

## PARTS LIST

TX-RX UNIT (X57-4970-XX)  
 PLL (X58-4390-00)  
 PLL (X58-4400-00)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
IC5			BU2090FS	IC (SHIFT/STORE REGISTER)	K	C52			CK73FB1H102K	CHIP C 1000PF K	
IC6			NJM78L05UA	IC (VOLTAGE REGULATOR/ +5V)		C53			CC73FCH1H100D	CHIP C 10PF D	
IC7			LA5010M	IC (LOW SATURATION REGULATOR)		C54			CK73FB1H102K	CHIP C 1000PF K	
IC8			KCB11	IC (DRIVER)		C55			CK73FB1H223K	CHIP C 0.022UF K	
IC9			TA7808S	IC (VOLTAGE REGULATOR/ +8V)		C56			CK73FB1E393K	CHIP C 0.039UF K	
IC10			BU4S66	IC (ANALOG SWITCH)	K	C101			CK73FB1H223K	CHIP C 0.022UF K	
IC201		*	M38267M8L103FP	IC (MICROPROCESSOR)	M2,M3	C102,103			C92-0009-05	CHIP-TAN 4.7UF 10WV	
IC201		*	M38267M8L104FP	IC (MICROPROCESSOR)	M	C104			CK73FB1H102K	CHIP C 1000PF K	
IC201		*	M38267M8L105FP	IC (MICROPROCESSOR)	K	C105			C92-0003-05	CHIP-TAN 0.47UF 25WV	
IC205			BU4S66	IC (ANALOG SWITCH)		C106			CK73FB1H223K	CHIP C 0.022UF K	
IC207			NJM4558E	IC (OP AMP X2)		C109,110			CK73FB1H102K	CHIP C 1000PF K	
IC208			TA78L05F	IC (VOLTAGE REGULATOR/ +5V)		CN1			E40-0311-05	PIN ASSY	
IC209			PST9130NR	IC (SYSTEM RESET)		CN2			E40-0411-05	PIN ASSY	
IC210			X25160SI-2.7	IC (2KXBbit SERIAL EEPROM)		CN3			E40-5201-05	PIN ASSY	
IC211			LC73881M	IC (DTMF DECODER)		L1			L40-1581-80	SMALL FIXED INDUCTOR 150uH	
IC212,213			BU4S66	IC (ANALOG SWITCH)		L2			L40-3391-19	SMALL FIXED INDUCTOR 3.3uH	
IC301			M57715	IC (POWER MODULE)	M	L3,4			L40-4791-19	SMALL FIXED INDUCTOR 4.7uH	
IC301			S-AV17	IC (POWER MODULE FOR 144MHZ)	K,M2M3	L5		*	L34-4456-05	COIL 3T	
Q1			3SK184(S)	FET		L51			L40-3392-81	SMALL FIXED INDUCTOR 3.3uH	
Q2			DTA114YK	DIGITAL TRANSISTOR	K	R1			RK73FB2A472J	CHIP R 4.7K J 1/10W	
Q3			DTC123JK	DIGITAL TRANSISTOR	K	R2			RK73FB2A561J	CHIP R 560 J 1/10W	
Q4			3SK131(L)	FET		R3			RK73FB2A101J	CHIP R 100 J 1/10W	
Q5			2SC2059K(P)	FET		R4			RK73FB2A121J	CHIP R 120 J 1/10W	
Q6			2SK208(Y)	FET	K	R5			RK73FB2A47DJ	CHIP R 47 J 1/10W	
Q7			DTC143EK	DIGITAL TRANSISTOR	K	R6,7			R92-0670-05	CHIP R 0 OHM	
Q8			2SC2412K(Q)	TRANSISTOR	K	R8			RK73FB2A101J	CHIP R 100 J 1/10W	
Q12			DTC363EK	DIGITAL TRANSISTOR		R9			RK73FB2A470J	CHIP R 47 J 1/10W	
Q13,14			2SB1132(Q,R)	TRANSISTOR		R10			RK73FB2A103J	CHIP R 10K J 1/10W	
Q15			DTC144WK	DIGITAL TRANSISTOR		R51			RK73FB2A103J	CHIP R 10K J 1/10W	
Q16-18			2SC2412K(Q)	TRANSISTOR		R52			RK73FB2A223J	CHIP R 22K J 1/10W	
Q19			DTC363EK	DIGITAL TRANSISTOR		R53			RK73FB2A221J	CHIP R 220 J 1/10W	
Q20			2SC2412K(Q)	TRANSISTOR		R54			RK73FB2A472J	CHIP R 4.7K J 1/10W	
Q21			2SK208(Y)	TRANSISTOR		R55			RK73FB2A473J	CHIP R 47K J 1/10W	
Q22			2SC2059K(P)	TRANSISTOR		R101			RK73FB2A152J	CHIP R 1.5K J 1/10W	
Q23,24			DTC124EK	DIGITAL TRANSISTOR		R102			R92-0670-05	CHIP R 0 OHM	
Q25			2SD1406(Y)	TRANSISTOR		R103			RK73FB2A222J	CHIP R 2.2K J 1/10W	
Q26			2SB1302(S)	TRANSISTOR		R104			R92-0670-05	CHIP R 0 OHM	
Q27			2SC2412K(Q)	TRANSISTOR		R105			RK73FB2A222J	CHIP R 2.2K J 1/10W	
Q28			2SJ106(GR)	FET		R106			RK73FB2A392J	CHIP R 3.9K J 1/10W	
Q29,30			2SC2412K(Q)	TRANSISTOR		R107-111			RK73FB2A473J	CHIP R 47K J 1/10W	
Q31			FMW1	TRANSISTOR		R112			RK73FB2A223J	CHIP R 22K J 1/10W	
Q32			2SA1037K(Q)	TRANSISTOR		R113			RK73FB2A472J	CHIP R 4.7K J 1/10W	
Q33			DTC123JK	DIGITAL TRANSISTOR	K	R114			R92-0670-05	CHIP R 0 OHM	
Q201			2SA1519	DIGITAL TRANSISTOR		D1,2		*	HVU363A	DIODE	
Q202			DTC114EK	DIGITAL TRANSISTOR		IC51			M54959FP	IC (PLL FREQUENCY SYNTHESIZER)	
Q203			2SC4116(GR)	TRANSISTOR		Q1			2SC2059K(P)	TRANSISTOR	
Q204			DTC114EK	DIGITAL TRANSISTOR		Q2			2SK508NV(K52)	FET	
Q205			2SC4116(Y)	TRANSISTOR		Q51			2SC2059K(P)	TRANSISTOR	
<b>PLL (X58-4390-00) : M,M2,M3</b>						Q52			DTC144EK	DIGITAL TRANSISTOR	
C1			CC73FCH1H220J	CHIP C 22PF J		Q53			2SC2412K(Q)	TRANSISTOR	
C2			CK73FB1H102K	CHIP C 1000PF K		Q101,102			2SC3324(B)	TRANSISTOR	
C3			CC73FCH1H020C	CHIP C 2.0PF C		<b>PLL (X58-4400-00) : K</b>					
C4,5			CK73FB1H472K	CHIP C 4700PF K		C1			CK73FB1E223K	CHIP C 0.022UF K	
C6			CC73FCH1H010C	CHIP C 1.0PF C		C2,3			CK73FB1H102K	CHIP C 1000PF K	
C7-9			CK73FB1H102K	CHIP C 1000PF K		C4			CK73FB1E223K	CHIP C 0.022UF K	
C10			CK73FB1H472K	CHIP C 4700PF K		C5			CK73FB1H471K	CHIP C 470PF K	
C11			CK73FB1H102K	CHIP C 1000PF K		C6,7			C92-0507-05	CHIP-TAN 4.7UF 6.3WV	
C51			CC73FCH1H100D	CHIP C 10PF D							

## PARTS LIST

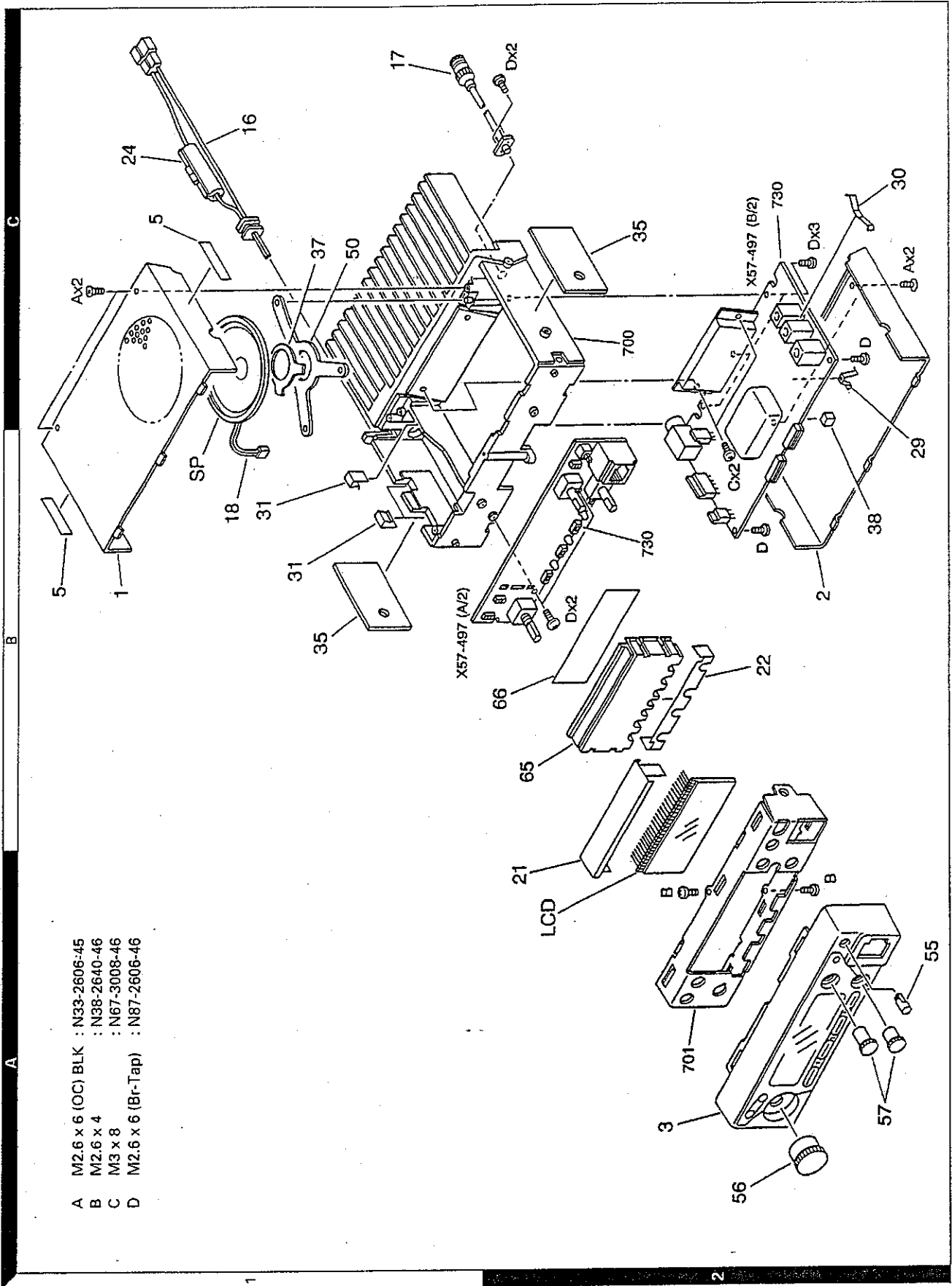
PLL (X58-4400-00)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C8			C92-0003-05	CHIP-TAN 0.47UF 25WV		Q1			2SC3324(B)	TRANSISTOR	
C9			CK73EB1E473K	CHIP C 0.047UF K		Q2			2SC3324(B)	TRANSISTOR	
C10			CC73FCH1H050C	CHIP C 5.0PF C		Q2			2SC3324(G)	TRANSISTOR	
C11,12			CK73FB1H102K	CHIP C 1000PF K		Q3			2SC2412K(Q)	TRANSISTOR	
C13,14			CK73FB1E223K	CHIP C 0.022UF K		Q4			2SC2059K(P)	TRANSISTOR	
C101			CK73GB1E103K	CHIP C 0.010UF K		Q101			2SK508NV(K52)	FET	
C102			CC73GCH1H030C	CHIP C 3.0PF C		Q102			DTC114EK	DIGITAL TRANSISTOR	
C103,104			CK73GB1E103K	CHIP C 0.010UF K		Q103			2SC3120	TRANSISTOR	
C105			CC73GCH1H010C	CHIP C 1.0PF C		Q104			2SK508NV(K52)	FET	
C106			CC73GCH1H220J	CHIP C 22PF J		Q105			DTC114EK	DIGITAL TRANSISTOR	
C107,108			CK73GB1H102K	CHIP C 1000PF K		Q106			2SC3120	TRANSISTOR	
C109,110			CK73GB1E103K	CHIP C 0.010UF K							
C111			CC73GCH1H030C	CHIP C 3.0PF C							
C112,113			CK73GB1E103K	CHIP C 0.010UF K							
C114			CC73GCH1H010C	CHIP C 1.0PF C							
C115			CC73GCH1H220J	CHIP C 22PF J							
C116			CK73GB1H102K	CHIP C 1000PF K							
CN1			E40-5201-05	PIN ASSY							
CN101			E40-0411-05	PIN ASSY							
CN102			E40-0311-05	PIN ASSY							
L1			L40-3391-19	SMALL FIXED INDUCTOR 3.3UH							
L101,102			L40-4791-19	SMALL FIXED INDUCTOR 4.7UH							
L103		*	L34-4470-05	COIL 2T							
L104-106		*	L40-4791-19	SMALL FIXED INDUCTOR 4.7UH							
L107		*	L34-4471-05	COIL 2T							
L108			L40-4791-19	SMALL FIXED INDUCTOR 4.7UH							
R1-5			RK73GB1J473J	CHIP R 47K J 1/16W							
R6			RK73GB1J152J	CHIP R 1.5K J 1/16W							
R7			RK73GB1J222J	CHIP R 2.2K J 1/16W							
R8			RK73GB1J392J	CHIP R 3.9K J 1/16W							
R9			RK73GB1J222J	CHIP R 2.2K J 1/16W							
R10,11			RK73GB1J103J	CHIP R 10K J 1/16W							
R13			RK73GB1J472J	CHIP R 4.7K J 1/16W							
R14			RK73GB1J473J	CHIP R 47K J 1/16W							
R15			RK73GB1J223J	CHIP R 22K J 1/16W							
R16			RK73GB1J103J	CHIP R 10K J 1/16W							
R17-			RK73GB1J221J	CHIP R 220 J 1/16W							
R18			R92-1252-05	CHIP R 0 OHM							
R101			RK73GB1J101J	CHIP R 100 J 1/16W							
R102			RK73GB1J470J	CHIP R 47 J 1/16W							
R103			RK73GB1J151J	CHIP R 150 J 1/16W							
R104			RK73GB1J222J	CHIP R 2.2K J 1/16W							
R105			RK73GB1J472J	CHIP R 4.7K J 1/16W							
R106			RK73GB1J471J	CHIP R 470 J 1/16W							
R107			RK73GB1J101J	CHIP R 100 J 1/16W							
R108			RK73GB1J470J	CHIP R 47 J 1/16W							
R109			RK73GB1J682J	CHIP R 6.8K J 1/16W							
R110			RK73GB1J470J	CHIP R 47 J 1/16W							
R111			RK73GB1J151J	CHIP R 150 J 1/16W							
R112			RK73GB1J222J	CHIP R 2.2K J 1/16W							
R113			RK73GB1J472J	CHIP R 4.7K J 1/16W							
R114			RK73GB1J471J	CHIP R 470 J 1/16W							
D101,102			1SV269	VARI-CAP DIODE							
D103		*	HVU383A	DIODE							
D104			1SV269	VARI-CAP DIODE							
IC1			M54959FP	IC (PLL FREQUENCY SYNTHESIZER)							
Q1			2SC2713(B)	TRANSISTOR							

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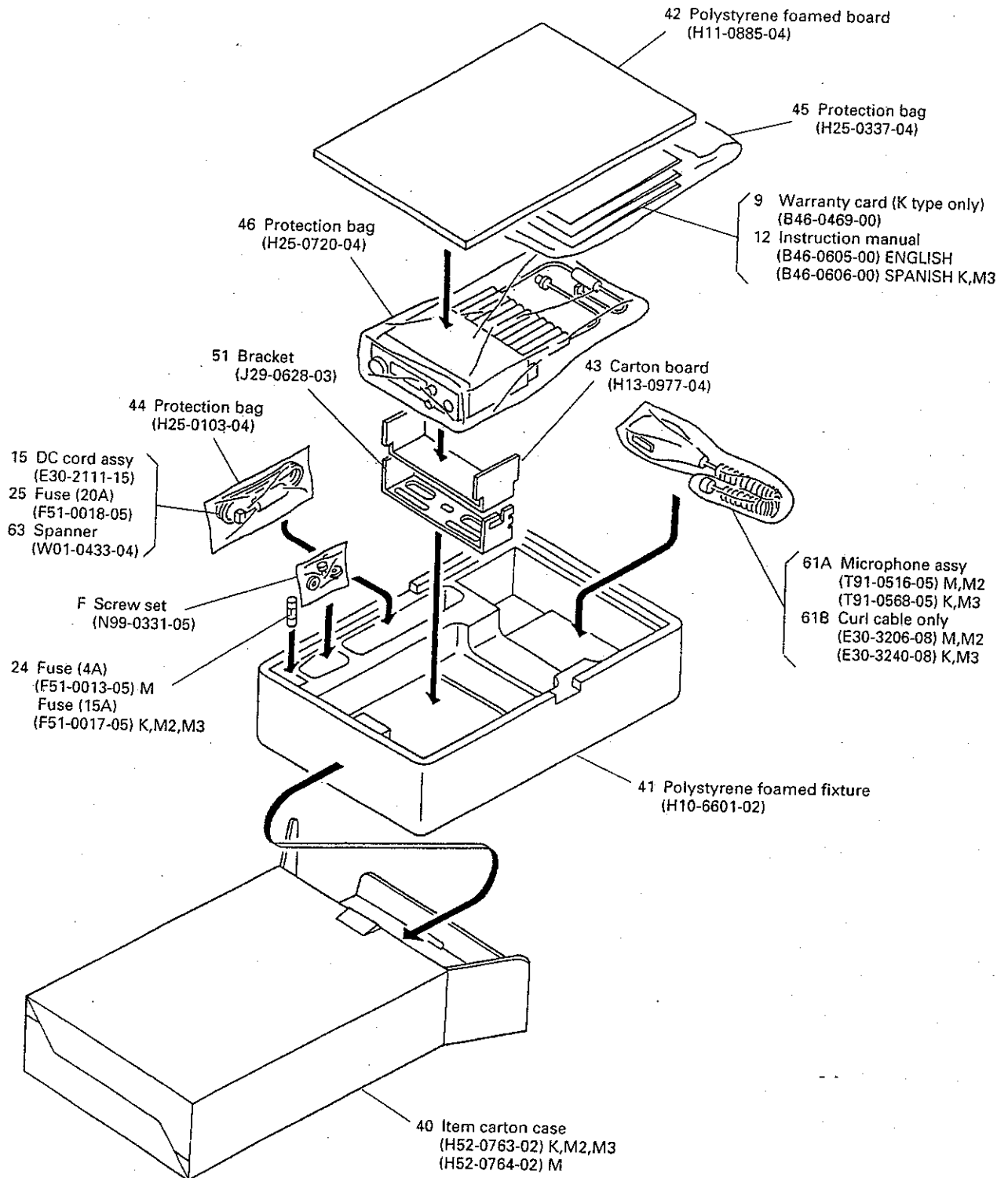
# TM-261A

## EXPLODED VIEW



- A M2.6 x 6 (OC) BLK : N33-2606-45
- B M2.6 x 4 : N38-2640-46
- C M3 x 8 : N67-3008-46
- D M2.6 x 6 (Br-Tap) : N87-2606-46

PACKING



## TM-261A

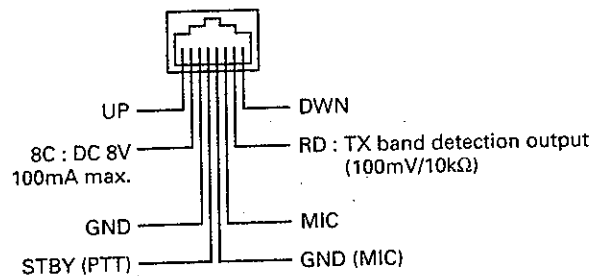
## ADJUSTMENT

## Measuring Equipment for Adjustment

1. Tester  
Input impedance: High
2. RF valve voltmeter (RF V.M.)  
Input impedance: 1M $\Omega$  or more, 2pF or less  
Voltage range: Full scale = 10mV to 300V  
Measurable frequency range: Up to 450MHz
3. Frequency counter (f. counter)  
Input sensitivity: About 50mV  
Measurable frequency: 450MHz or more
4. DC power supply  
Voltage: Variable in the range 10 to 17V  
Current: 13A or more
5. Power meter  
Measurement power: 60W, 3W, 1W  
Impedance: 50 $\Omega$   
Measurable frequency: 450MHz
6. AF valve voltmeter (AF V.M.)  
Input range: Full scale = 1mV to 30V  
Measurable frequency range: 50Hz to 10kHz
7. AF generator (AG)  
Output frequency: 100Hz to 10kHz  
Output voltage: 0.5mV to 1V
8. Line detector  
Measurable frequency: 450MHz
9. Spectrum analyzer  
Measurable frequency: 450MHz
10. Directional coupler
11. Oscilloscope  
High sensitivity with horizontal input terminal
12. Standard signal generator (SSG)  
The standard signal generator must be able to generate the 144 and 430MHz band frequencies and vary the amplitude and frequency.  
Output: -20 to 100dB $\mu$
13. Dummy load  
8 $\Omega$  about 5W
14. Noise generator  
The noise generator must be able to generate noise similar to ignition noise containing high-frequency components of 450MHz or more.
15. Sweep generator  
The sweep generator must be able to sweep the 144 and 430MHz bands.
16. Tracking generator

## Preparation

- Set the controls and switches to the positions listed below unless otherwise specified.  
VOL control ..... Fully counterclockwise  
SQL control ..... Fully counterclockwise  
POWER switch ..... OFF  
DC power supply POWER switch  
(For fixed stations) ..... OFF



**Microphone socket**  
(as viewed from the front of the set)

- Use an insulated rod, such as a plastic rod, for adjustment (especially for trimmers, coils, etc.).
- To protect the signal generator, never connect the microphone socket when the receiver section is adjusted.
- Before the power cord is connected, make sure the power switch is off.
- See the instruction manual for transmit and receive operations.

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## ADJUSTMENT

## Common Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Source voltage : DC 13.8V POWER : OFF VOL, SQL knob : Minimum							
2. Reset	1) MR key + POWER ON After the check, MR key : Press						Check	All indicator of LCD on.
3. PLL	1) Frequency : 146.000MHz Transmit/Receive	DC V.M Dummy load	TX-RX Rear panel	TP2 ANT			Check	RX : 1.2 to 9.0V TX : 1.2 to 9.0V
4. Transmission frequency	1) Frequency : 146.000MHz Transmit	f. counter Power meter	Rear panel	ANT	TX-RX	TC1	146.000MHz	±100Hz

## Receiver Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks		
		Test-equipment	Unit	Terminal	Unit	Parts	Method			
1. BPF	1) Frequency : 146.05MHz <b>K,M2,M3</b> 145.04MHz <b>M</b> SSG output : -93dBm MOD : 1.0kHz DEV : ±3.0kHz	Tester SSG Oscilloscope	TX-RX Rear panel	TP1 ANT EXT. SP	TX-RX	L1-L6	For max. voltage of TP1, align from L1 to L6.			
	2) SSG output : -113dBm								For max. voltage of TP1, repeat the alignment from L1 to L6, twist.	
2. Sensitivity	1) Frequency <b>K,M2,M3</b> : 146.05, 144.05, 147.95MHz <b>M</b> : 145.04, 144.04, 145.94MHz SSG output : -121dBm <b>K</b> -122dBm <b>M,M2,M3</b> AF : 0.63V/8Ω	SSG Distortion meter AF V.M Oscilloscope	Rear panel	ANT EXT. SP			Check	More than SINAD 12dB		
3. Distortion	1) Frequency : 146.05MHz <b>K,M2,M3</b> 145.04MHz <b>M</b> SSG output : -53dBm AF : 4.0V/8Ω								Check	Less than 3.0%
4. Hum and Noise ratio	1) Frequency : 146.05MHz <b>K,M2,M3</b> 145.04MHz <b>M</b> SSG output : -53dBm MOD : OFF AF : 2.83V/8Ω	SSG AF V.M Oscilloscope	Rear panel	ANT EXT. SP			Check	More than S/N 46dB		
5. S-meter	1) Frequency : 146.05MHz <b>K,M2,M3</b> 145.04MHz <b>M</b> SSG output : -95dBm	SSG LCD	Rear panel	ANT	TX-RX	VR1	Align so that all the S-meter go on, then the last segment goes off.			
	2) SSG output : -93dBm								Check	All S-meter segments on.
	3) SSG output : OFF								Check	S-meter segments off.

## TM-261A

## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. Squelch	1) Frequency : 146.05MHz . <b>K,M2,M3</b> 145.04MHz <b>M</b> SSG output : OFF Align so that noise is not audible by SQL knob.	SSG Ammeter	Rear panel	ANT			Check	Maker position of SQL knob 8 : 00~11 : 00 BUSY indication off. Less than 0.6A
	2) SSG output : -127dBm	Oscilloscope		EXT. SP			Check	Squelch opens. BUSY indication on.
	3) SSG output : -113dBm SQL knob : Maximum After the check, SQL knob : Minimum						Check	Squelch opens.

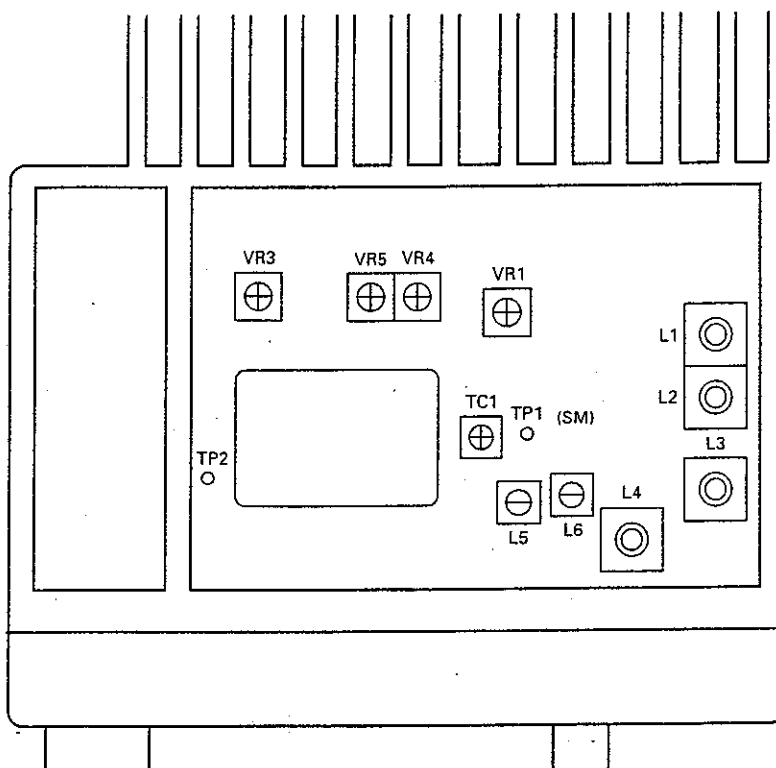
## Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Power	1) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> TX-RX unit VR4 : Maximum Transmit	Power meter Ammeter	Rear panel	ANT			Check	More than 55.0W <b>K,M2,M3</b> More than 13.0W <b>M</b> ON AIR indication on. All RF-meter segments on.
	2) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> Transmit				TX-RX	VR4	52.0W <b>K,M2,M3</b> 12.0W <b>M</b>	$\pm 1.0W$ , Less than 11.0A <b>K,M2,M3</b> $\pm 1.0W$ , Less than 3.5A <b>M</b>
	3) Frequency : <b>K,M2,M3</b> : 144.00, 147.975MHz <b>M</b> : 144.00, 145.98MHz Transmit						Check	44.0~60.0W, Less than 11.0A <b>K,M2,M3</b> 10.0~14.0W, Less than 3.5A <b>M</b>
	4) F key → LOW key (M on.) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> Transmit				TX-RX	VR5	12.0W <b>K,M2,M3</b> 1.0W <b>M</b>	$\pm 1.0W$ <b>K,M2,M3</b> $\pm 0.15W$ <b>M</b>
	5) F key → LOW key (L on.) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> Transmit						Check	3.0~8.0W <b>K,M2,M3</b> 0.3~0.8W <b>M</b>
2. DEV	1) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> AG : 1kHz/50mV <b>K,M2,M3</b> 1kHz/25mV <b>M</b> Transmit	Modulation analyzer Oscilloscope	Rear panel	ANT	TX-RX	VR3	$\pm 4.4kHz$ (Align absolute value of + or - value.)	$\pm 0.2kHz$ No abnormal oscilloscope wave.
	2) AG : 1kHz/5mV <b>K,M2,M3</b> 1kHz/2.5mV <b>M</b> Transmit	AG AF V.M	Front panel	MIC			Check	$\pm 2.2\sim 3.6kHz$ Nor abnormal oscilloscope wave.
3. Tone	1) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> TONE key : Press (T on.) Transmit After the check, TONE key : Press (T off.)	Modulation analyzer Oscilloscope	Rear panel	ANT			Check	$\pm 0.5\sim 1.5kHz$

# ADJUSTMENT

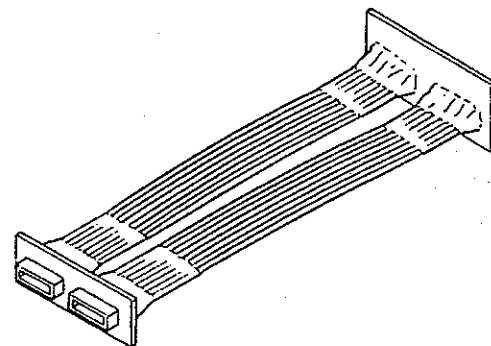
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
4. Single tone	1) POWER : OFF MHz key + REV key + POWER ON Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> Transmit	Modulation analyzer Oscilloscope	Rear panel	ANT			Check	±0.8~1.5kHz
5. DTMF	1) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> Press the DTMF key of transmission jig.						Check	More than ±2.2kHz
6. Protection	1) Frequency : 146.000MHz <b>K,M2,M3</b> 144.98MHz <b>M</b> POWER : HI (F key + LOW key) ANT : Open and short Transmit	Ammeter					Check	Less than 11.0A <b>K,M2,M3</b> Less than 4.0A <b>M</b>
7. CTCSS	1) Only TSU-8 is installed set. Frequency : 145.100MHz (CTCSS : 88.5Hz) TX-RX-communicate between testing set and monitor set.	Monitor 50Ω dummy load	Rear panel	ANT			Check	Their sets are able to TX-RX-communicate.
	2) Frequency : 145.100MHz (CTCSS : 103.5Hz)							Their sets are not able to TX-RX-communicate.

## Adjustment Points



## Jig (13 Pin Flat cable)

This is the same cable as TM-241's cable.



- TC1 : Transmission frequency
- L1~6 : BPF
- VR1 : S-meter
- VR3 : DEV
- VR4 : HI power
- VR5 : MID power

## TM-261A

## TERMINAL FUNCTION

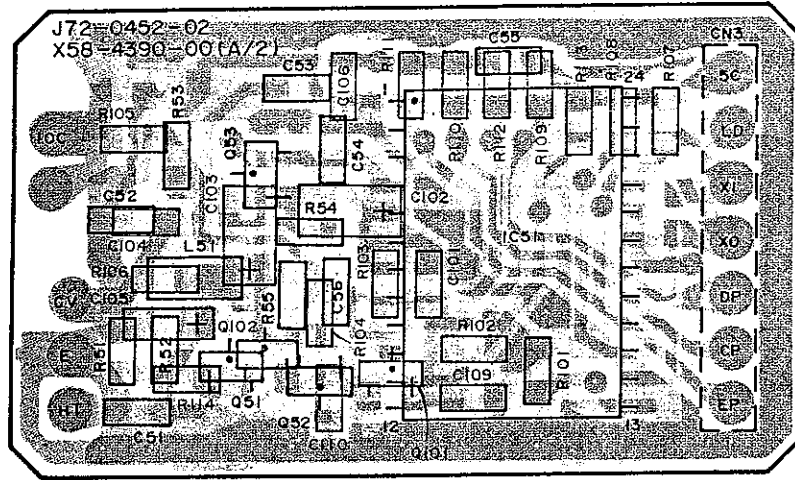
## TX-RX Unit (X57-4970-XX)

CN No.	Pin No.	Name	Function	CN No.	Pin No.	Name	Function	
CN1	1	E	GND		3	DT2	Shift register data output (From CPU IC201).	
	2	SP	Speaker input.		4	JK1	Destination data input.	
CN3	1	E	GND.		5	EP1	PLL enable (From CPU IC201).	
	2	JK2	Destination data output.		6	CK	PLL clock (From CPU IC201).	
	3	DT2	Shift register (IC5) enable.		7	DT1	PLL data (From CPU IC201).	
	4	JK1	Destination data output.		8	DET	CTCSS detector output.	
	5	EP1	PLL enable.		9	RD	Audio input.	
	6	CK	PLL clock.		10	SC	Squelch busy control input (To CPU IC201).	
	7	DT1	PLL data.		11	SQ	Squelch input (To CPU IC201).	
	8	DET	CTCSS detector output.		12	SM	S-meter input (To CPU IC201).	
	9	RD	Audio output.		13	E	GND.	
	10	SC	Squelch busy control output.		CN202	1	E	GND.
	11	SQ	Squelch output.			2	B	+13.8V.
12	SM	S-meter output.	3	PSW		Power switch control output (From CPU IC201).		
13	E	GND.	4	NC				
CN4	1	E	GND.	5		8C	Common +8V.	
	2	B	+13.8V.	6		BEEP	Beep output(From CPU IC201).	
	3	PSW	Power switch control input.	7		A2	Audio output (From AF volume).	
	4	NC		8		A1	Audio input (To AF volume).	
	5	8C	Common +8V.	9		AE	GND	
	6	BEEP	Beep input (To audio IC from CPU).	10		TONE	TONE output (From CPU IC201).	
	7	A2	Audio input (To AF power amplifier from AF volume).	11		ME	MIC GND.	
	8	A1	Audio output (To AF volume).	12		MO	Modulation output(From MIC amplifier).	
	9	AE	GND.	13		E	GND.	
	10	TONE	Tone input.	CN203	1	RD	CTCSS unit voice de-modulation input.	
	11	ME	MIC GND.		2	5C	+5V.	
	12	MO	Modulation input.		3	E	GND.	
	13	E	GND.		4	SDO	CTCSS unit tone matching input.	
CN201	1	E	GND.		5	TO	Not used.	
	2	JK2	Destination data input.		6	STC	CTCSS unit connect/enable output.	
					7	DTC	CTCSS unit data output.	
					8	CKC	CTCSS unit clock output.	

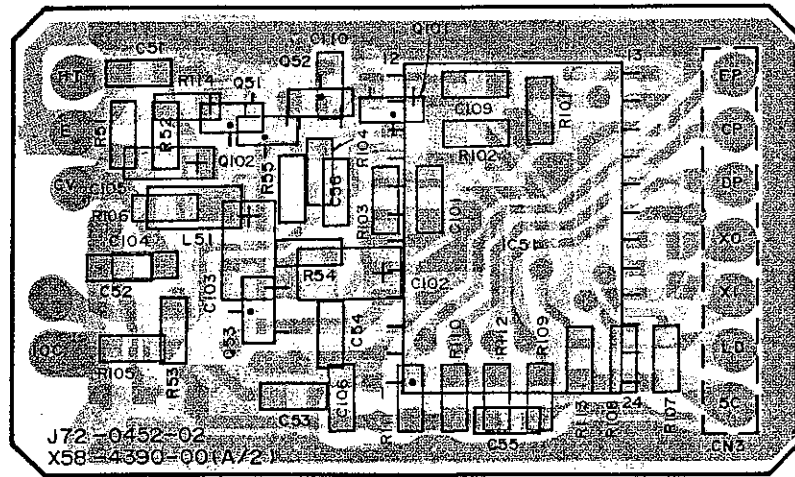
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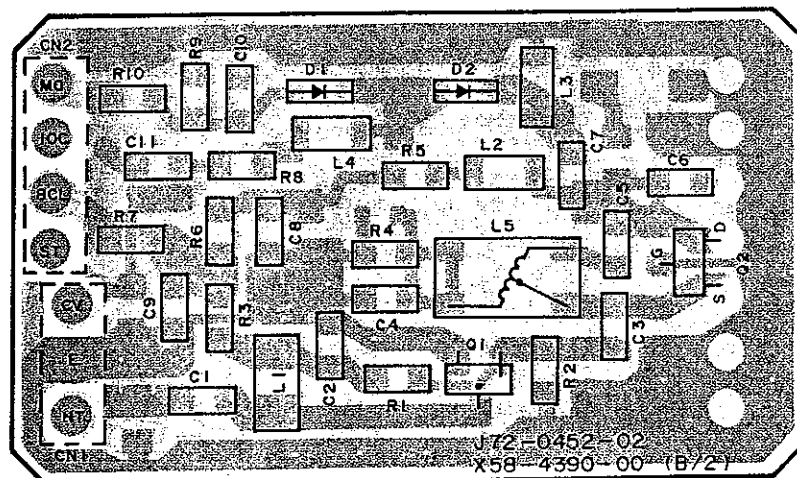
PLL (X58-4390-00) (A/2) Component side view M,M2,M3



PLL (X58-4390-00) (A/2) Foil side view M,M2,M3



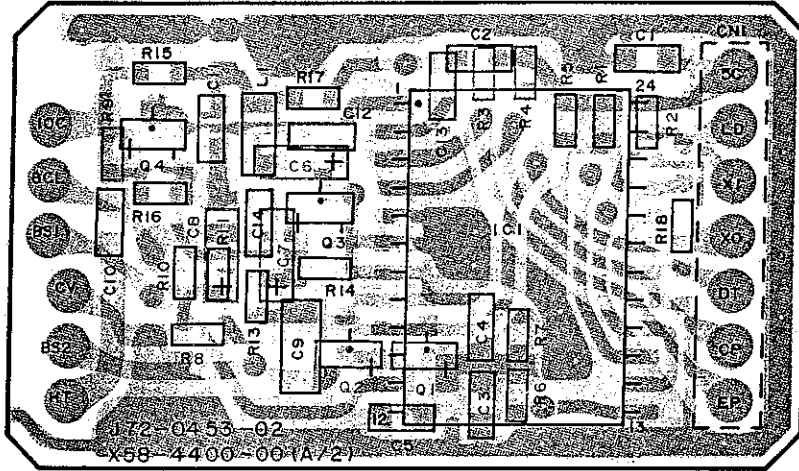
PLL (X58-4390-00) (B/2) Component side view M,M2,M3



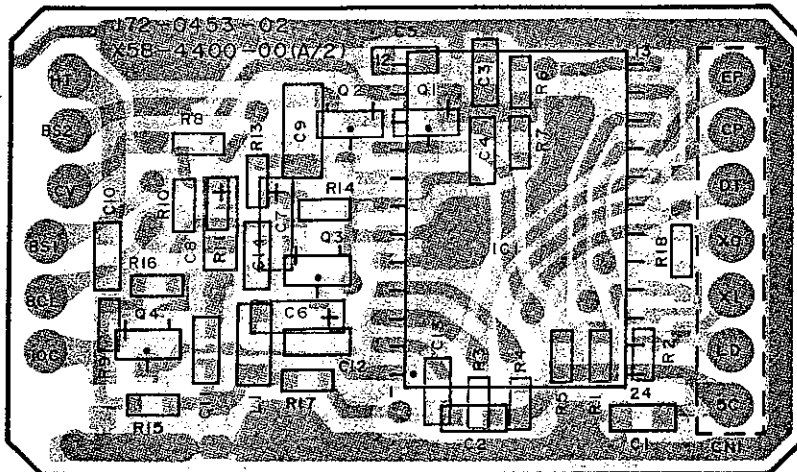
Component side  
Foil side

# PC BOARD VIEWS TM-261A

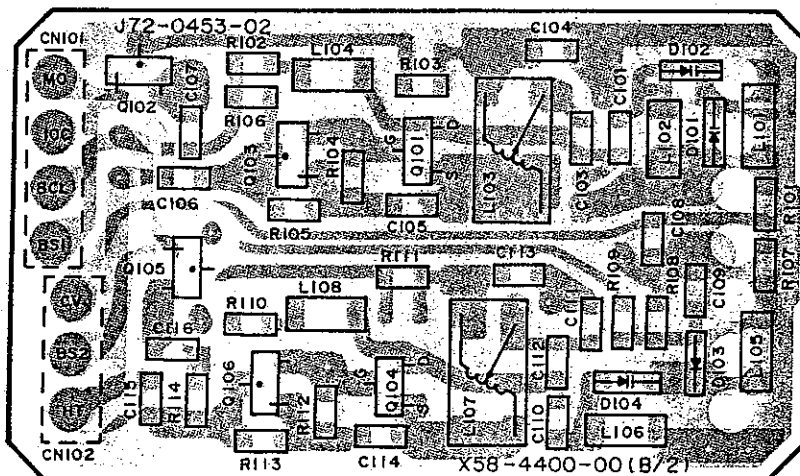
PLL (X58-4400-00) (A/2) Component side view K



PLL (X58-4400-00) (A/2) Foil side view K



PLL (X58-4400-00) (B/2) Component side view K

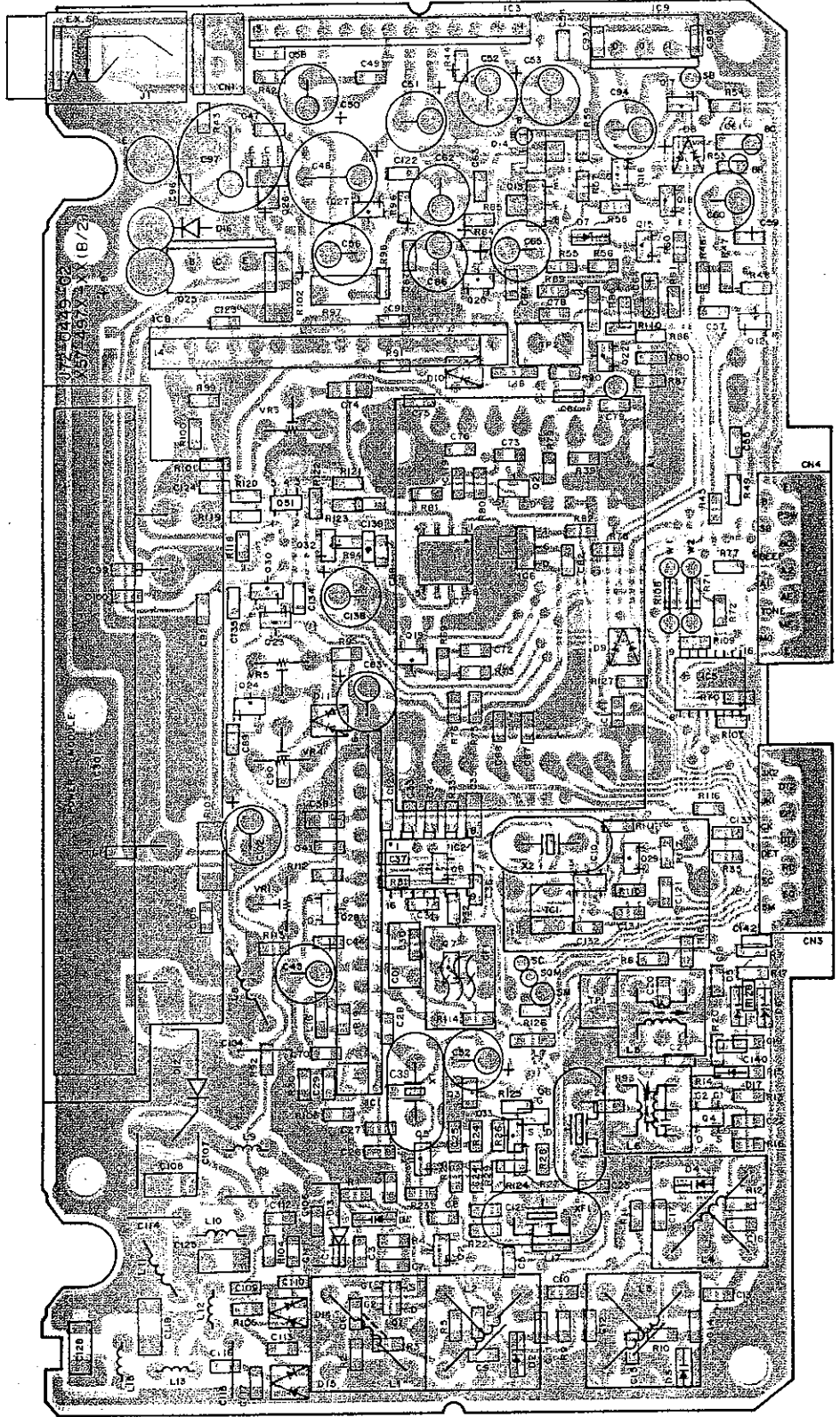
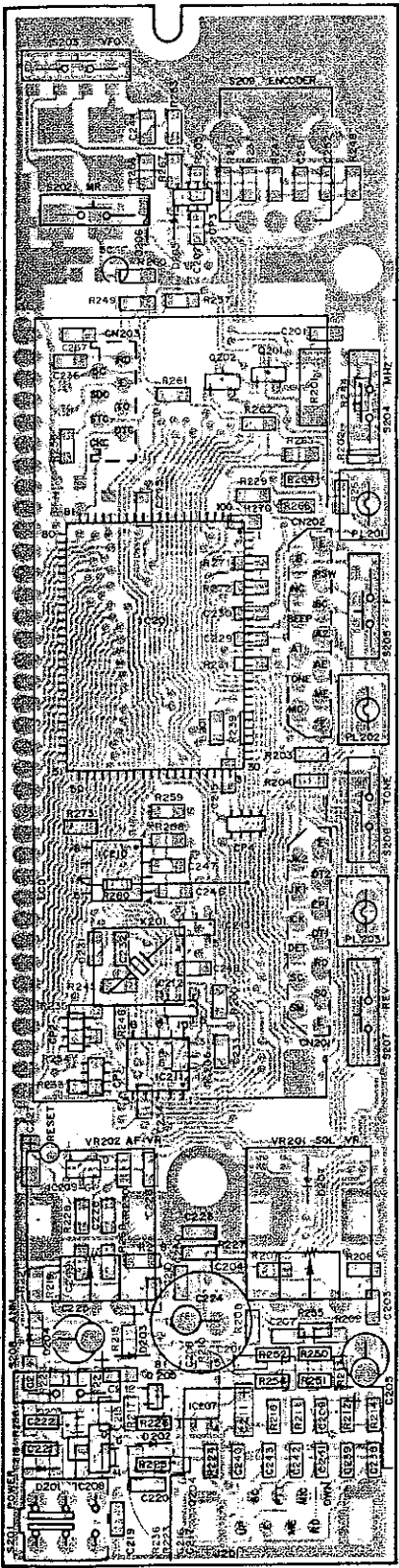


Component side  
 Foil side



F G H I J

TX-RX UNIT (X57-4970-XX) Foil side view -11 : K -21 : M -22 : M2 -23 : M3

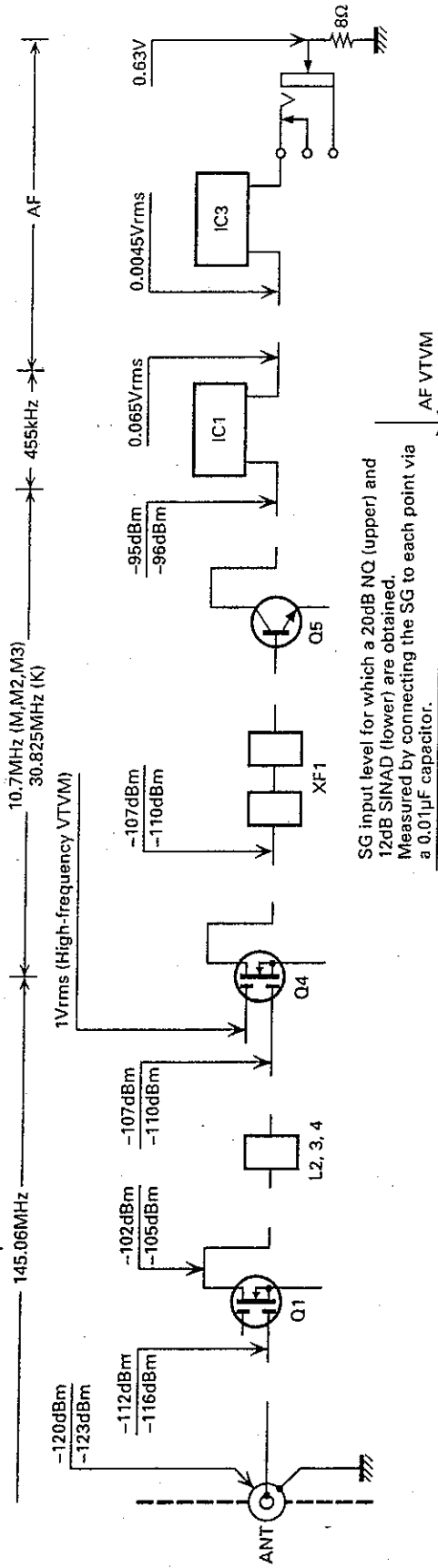


Component side  
 Foil side

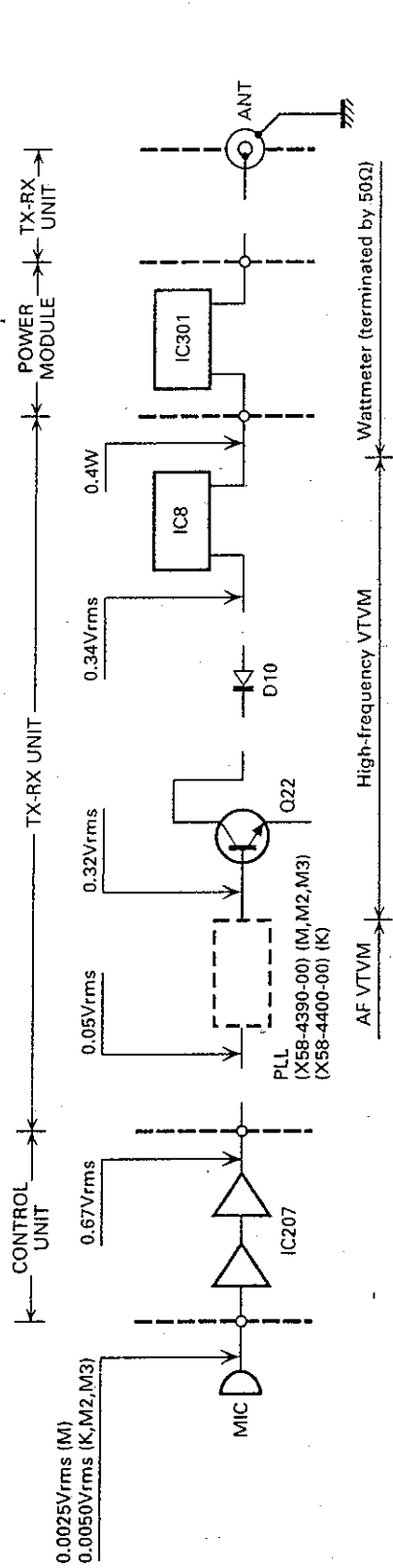
# TM-261A

## LEVEL DIAGRAM

### 37 RX Section



### TX Section



1. AG is set so that MIC input becomes 3kHz DEV at 1kHz MOD.
2. Transmitting frequency : 145.06MHz

TM-261A

## SPECIFICATIONS

**General**

Frequency range .....	144 to 148MHz
Mode .....	F3E (FM)
Antenna impedance .....	50Ω
Usable temperature range .....	-20°C to +60°C (-4°F to +140°F)
Power supply .....	13.8V DC ± 15% (11.7 to 16.0V)
Grounding method .....	Negative ground
Current	
Transmit (max.) .....	11.0A or less (K,M2,M3) 3.5A or less (M)
Receive (no signal) .....	0.6A or less
Frequency stability .....	Within ±10ppm
Dimensions (W x H x D projections not included) .....	140 x 40 x 160.5 mm / 5-1/2" x 1-9/16" x 6-5/16"
Weight .....	1.0kg / 2.2lb

**Transmitter**

Power output	
High .....	50W (K,M2,M3) 10W (M)
Medium .....	10W (K,M2,M3) 1W (M)
Low .....	Approx. 5W (K,M2,M3) 0.5W (M)
Modulation .....	Reactance
Spurious emissions .....	-60dB or less
Maximum frequency deviation .....	±5kHz
Audio distortion (at 60% modulation) .....	3% or less
Microphone impedance .....	600Ω

**Receiver**

Circuitry .....	Double conversion superheterodyne
Intermediate frequency (1st / 2nd)	
U.S.A./Canada .....	30.825MHz / 455kHz
General .....	10.7MHz / 455kHz
Sensitivity	
12dB SINAD .....	0.16μV or less
-6dB .....	12kHz or more
-60dB .....	28kHz or less
Squelch sensitivity .....	0.1μV or less
Audio output (8Ω, 5% distortion) .....	2W or higher
Audio output impedance .....	8Ω

Specifications are subject to change without notice due to developments in technology.

TM-261A

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