

VHF FM TRANSCEIVER

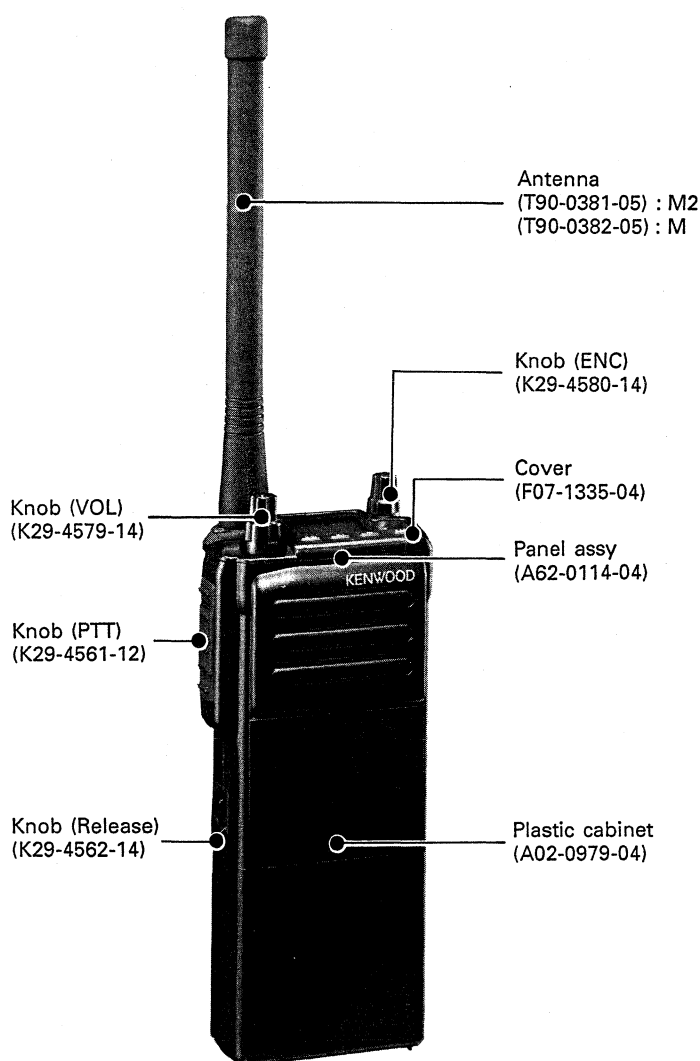
TK-240(F)

SERVICE MANUAL

KENWOOD

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B51-8096-00 (O) 507

5-TONE MODEL



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Since this service manual only describes the differences between the TK-240(F) and the TK-240 (B51-8055-00), see the TK-240 service manual as well.

For information on installing, setting, and adjusting the 5-TONE unit, and for circuit diagrams and PC board views, see the TK-240(F) service manual.

TK-240(F)

GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication data. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as required.

ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts : components, kits, or chassis. If the part number is not known, include the chassis or kit number of which it is a part, and a sufficient description of the required component for proper identification.

PERSONNEL SAFETY

The following precautions are recommended for personnel safety :

- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

SERVICE

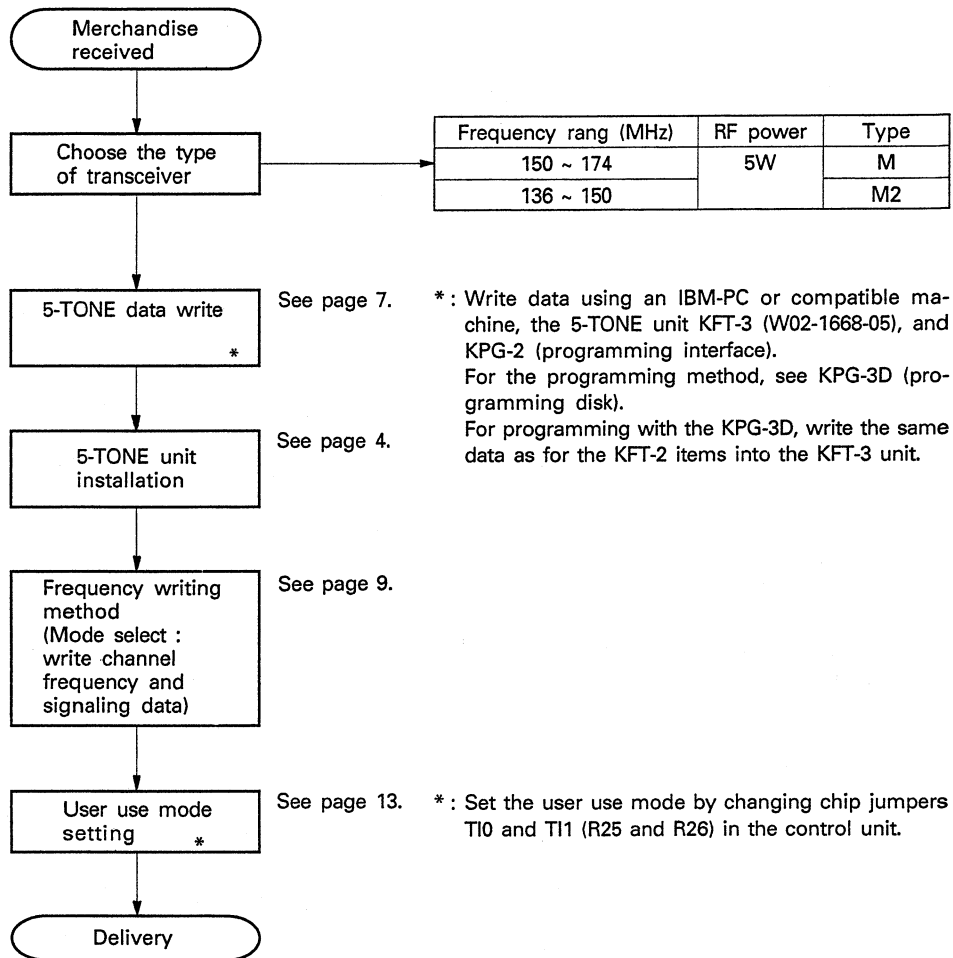
This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

NOTE

WE CANNOT guarantee oscillator stability when using channel element manufactured by other than KENWOOD or its authorized agents.

Version	Frequency range	Remark		QT/CTCSS (Encode only)	Battery	Charger
M	150 ~ 174MHz	IF1	34.400MHz	○	OP	OP
		LOC	34.855MHz			
M2	136 ~ 150MHz	IF1	30.825MHz	↑	↑	↑
		LOC	30.370MHz			

SYSTEM SET-UP



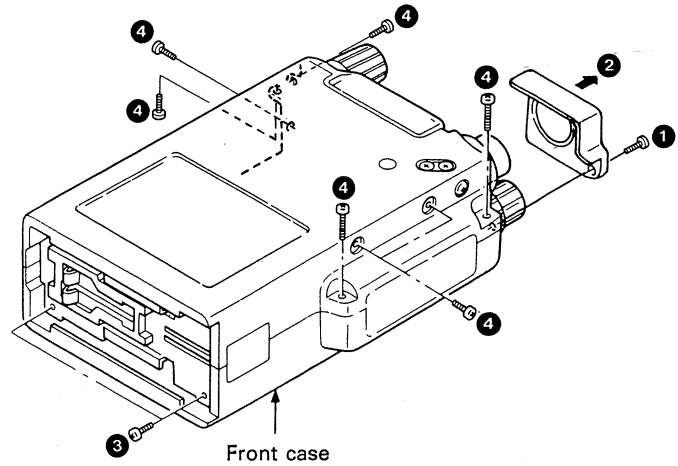
TK-240(F)

INSTALLATION

5-TONE Unit Installation Method (KFT-3)

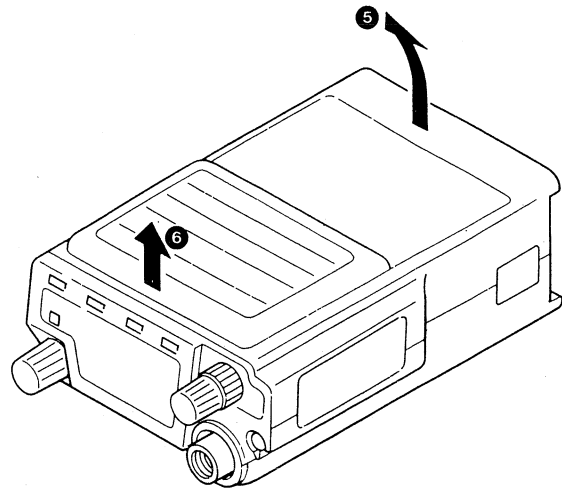
(5-TONE data must already have been written)

1. Remove the screw (1) holding the antenna connector rubber cap (2), and remove the rubber cap from the antenna connector.
2. Remove the two screws (3) at the front of the bottom plate, and remove the seven screws (4) on both sides of the cases.

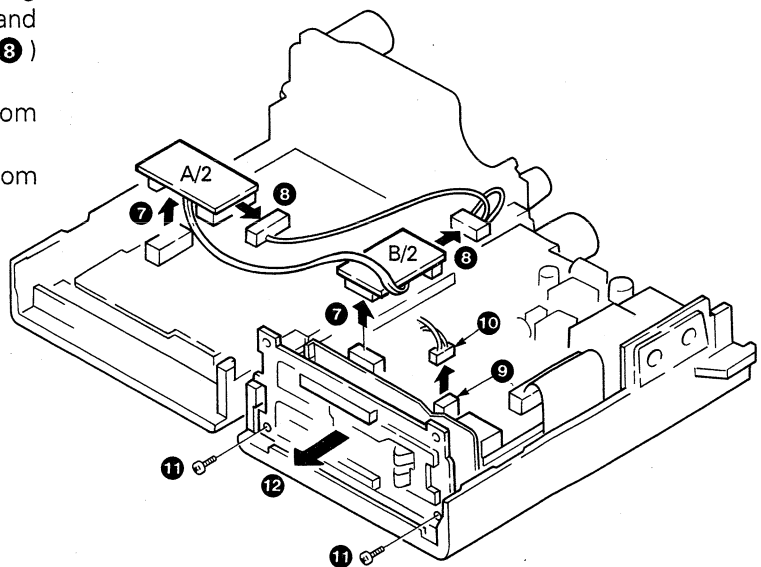


3. With the transceiver face up (6), lift the front half of the case at the bottom (5), and remove it.

Note : Use care when pulling (6) so the FPC cable in the front case is not cut.

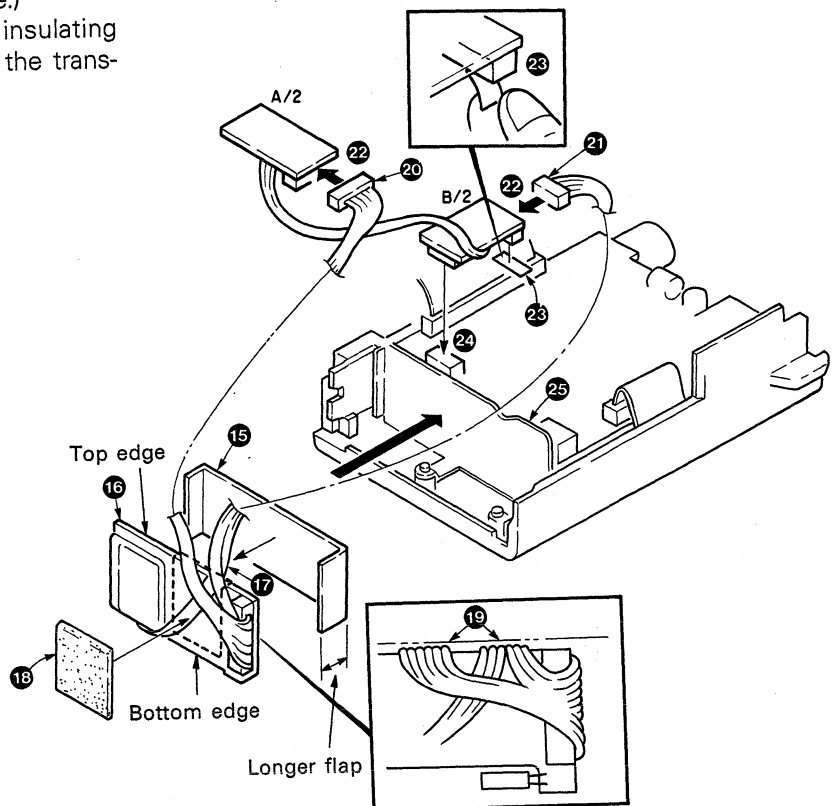
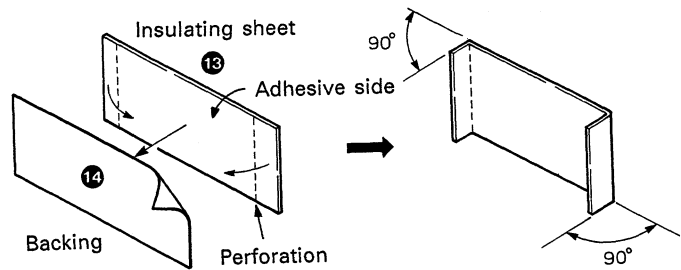


4. Open the transceiver up, and remove the signaling units (A/2 and B/2) from the control assembly and the TX-RX unit (7). Remove the dummy lead (8) with connectors between the signaling units.
5. Remove the connector (10) with its cable from CN204 (9) of the TX-RX unit.
6. Remove the two screws (11) holding the bottom plate, then remove the bottom plate (12).



INSTALLATION

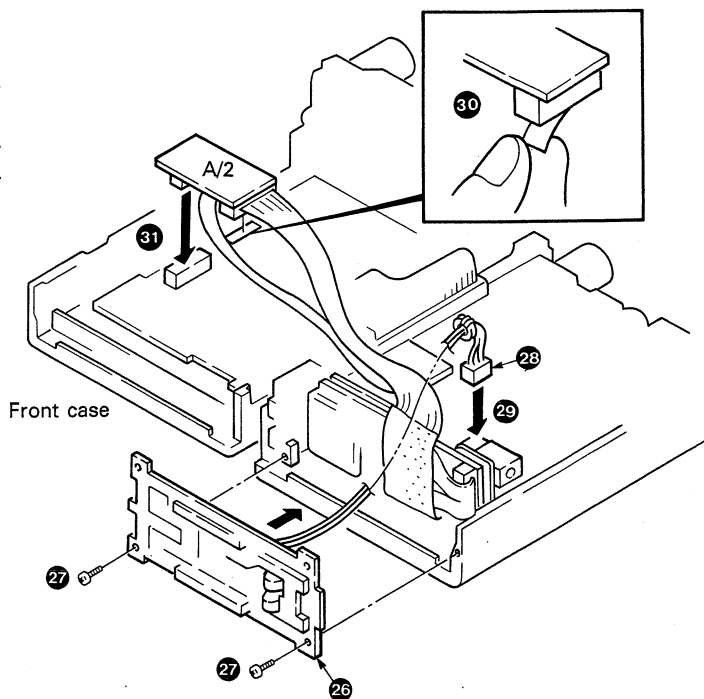
7. Remove the backing (14) from the insulating sheet (13), and fold both ends of the sheet at right angles along the perforations.
8. Attach the insulating sheet (13) so that it does not project from the top or bottom edges (pattern side) of the 5-TONE unit (16). (Position the insulating sheet (13) with the longer flap as shown in the figure.)
9. Attach the fiber sheet (18) by pulling the cables (17) from the 5-TONE unit from the center, and fix the cables. (Do not overlap the cables (19).)
10. Connect the cable with connectors (8 pins : 20, 7 pins : 21) from the 5-TONE unit to the signaling units (A/2 and B/2) (22).
11. Remove the protective sheet (23) on the connector of the signaling unit B/2, and insert the connector into connector CN203 (24) of the TX-RX unit A/2. Press the signaling unit B/2 from above. (Fix it to the TX-RX unit A/2 with adhesive tape.)
12. Insert the 5-TONE unit (16) with the insulating sheet along the shielding plate (25) of the transceiver.



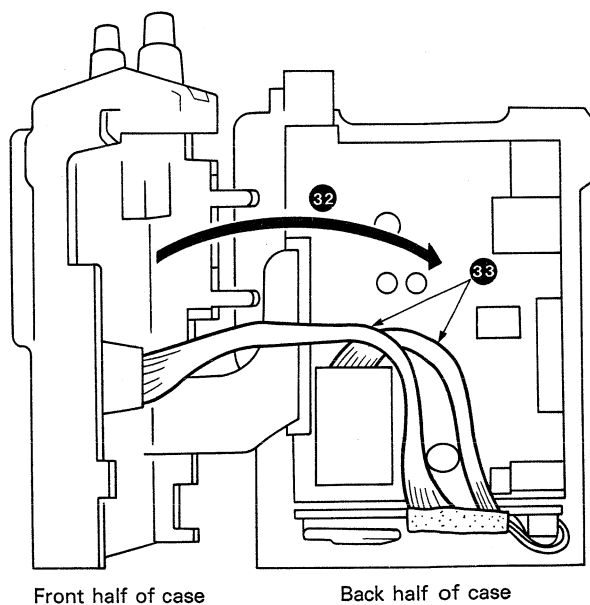
TK-240(F)

INSTALLATION

13. Reinstall the bottom plate (26) with the two screws (27).
14. Insert the connector (28) with cabling to CN204 (29).
15. Remove the protective sheet (30) on the connector of the signaling unit A/2, and insert the signaling unit A/2 into connector CN2 (31) of the control assembly. Press the signaling unit A/2 from above. (Fix it to the control unit with adhesive tape.)



16. Put the two halves of the case back together (32). Route the cable (33) as shown in the figure so that it is not caught between the two halves of the case.
17. Reinstall the screws removed in steps 1 and 2.

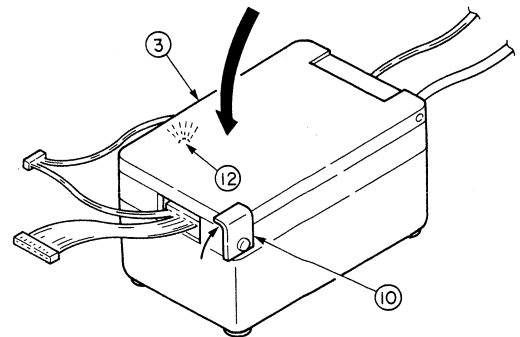
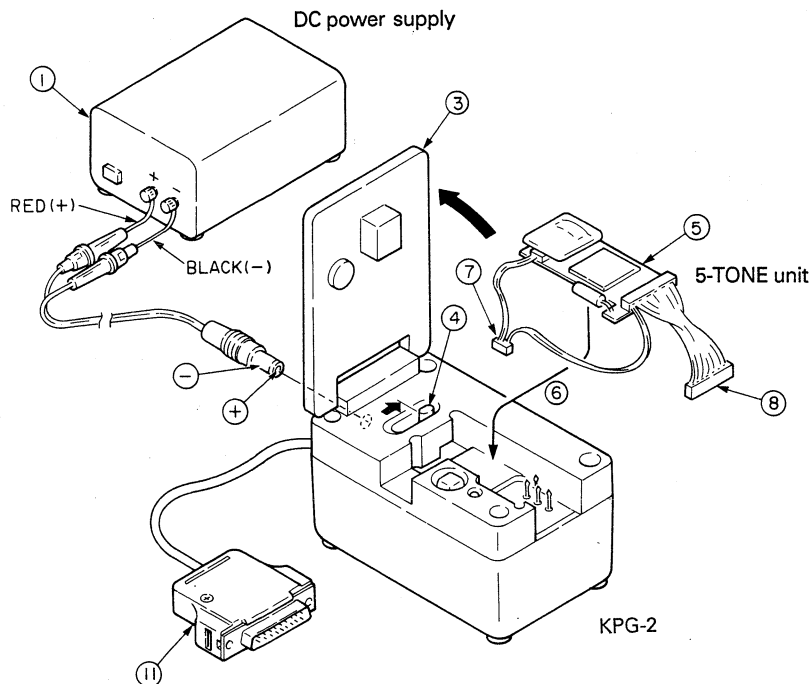


WRITING METHOD

5-TONE Data Write Method

1. Setting

1. Connect the DC power supply to the connector on the rear of the KPG-2 (①). (Do not switch anything on yet.)
Use the cable (②) with a DC plug supplied with the KPG-2.
Use a DC power supply providing 12V DC (8 to 15V), 0.5A.
2. Open the lid (③) of the KPG-2 and slide lever (④) in the direction of the arrow.
3. Insert 5-TONE unit (KFT-3) (⑤) into the KPG-2 (⑥) as shown in the figure. (Free connector ⑦ and ⑧.)
4. Close the lid (③) of the KPG-2 and secure the lock lever (⑩).
5. Connect the D sub-connector (⑪) to the printer output port of the personal computer (IBM-PC or compatible machine).
6. The connection diagram is shown in figure.
7. Switch the DC power supply on and make sure that the LED (⑫) of the KPG-2 goes on.
8. The following section describes how to start the program.



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WRITING METHOD

2. To install onto another flexible or hard disk

The user may install the KPG-3D programming software onto another disk as follows :

1. Insert the KPG-3D disk into an appropriate drive if installing from a flexible disk.
2. Type : 'source-drive:' <ENTER>
e.g. A: <ENTER>
3. Type : CD \KENWOOD\KPG3D <ENTER>
4. Type : KPG3DINS 'target-drive:' <ENTER>
e.g. KPG3DINS C: <ENTER>

The program and associated help files and hand-book will be loaded into a new sub-directory structure starting at :

\KENWOOD\KPG3D\

The software may also be installed from a hard disk onto a flexible disk by following the same procedure as above.

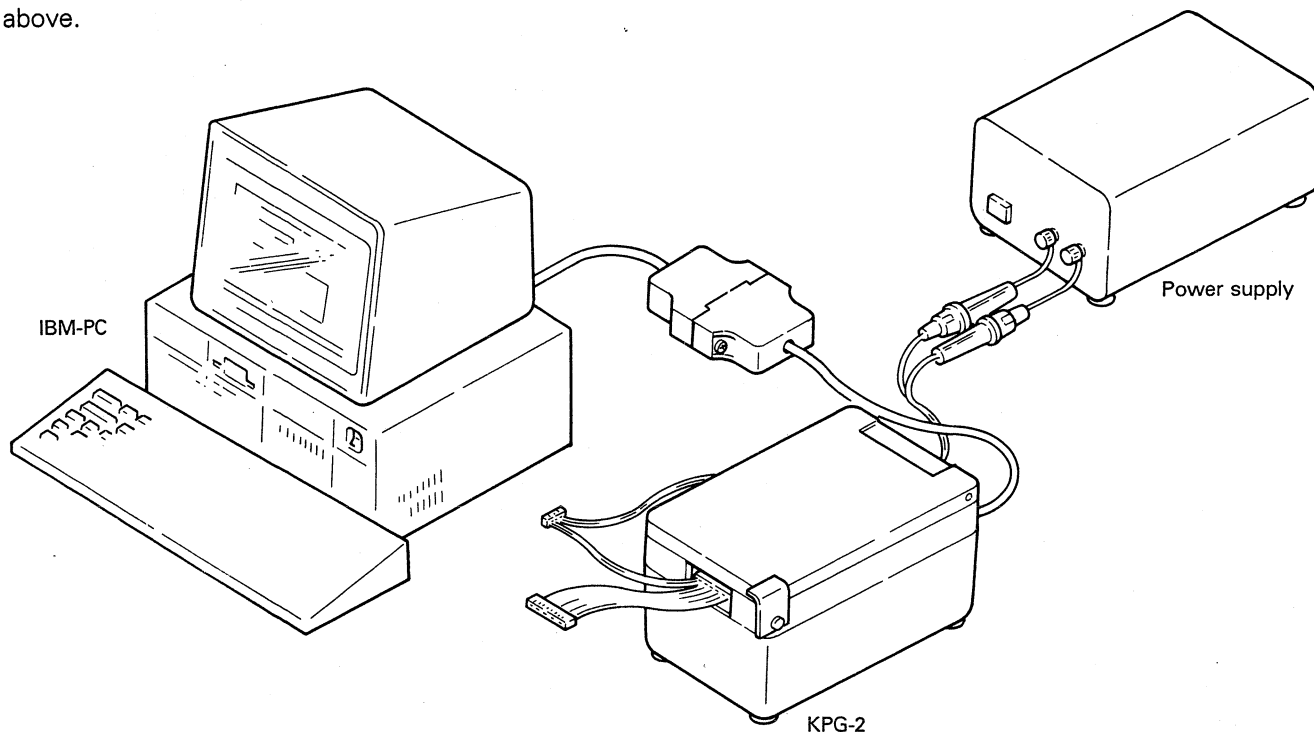
3. To start the product support software

If operating the software from a flexible disk, insert the disk into an appropriate drive.

1. Type : 'drive:' <ENTER>
e.g. A: <ENTER>
2. Type : CD \ <ENTER>
3. Type : KPG3D <ENTER> to start the software

Note : ☐ is space

Note : For programming with the KPG-3D, write the same data as for the KFT-2 items into the KFT-3 unit.

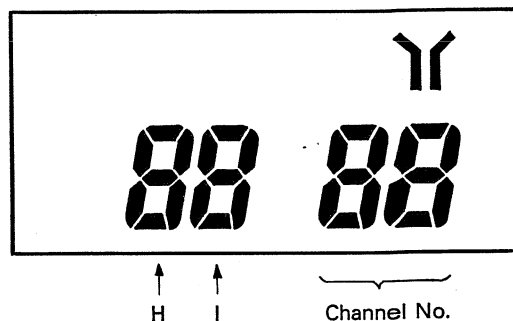


4. Precautions for 5-TONE data programming

When data is written into the 5-TONE unit using an IBM-PC, set the TX CALL code as follows :

	IBM-PC display	
The lowermost digit is variable	TX CALL	* * * * I
The lower two digits are variable	code	* * * H I

- * is a 5-TONE code from 0 to 9.
- H and I are related to the TK-240(F) panel indications as follows. The digits to which H and I are entered become variable.



H : Incremented with the x10. switch.
I : Incremented with the x1 switch.

FREQUENCY SETTING

1. Introduction

The frequency for the TK-240(F) is set by storing the transmit, receive, and QT/CTCSS frequencies in the EEPROM as follows.

1-1. Modes and their functions

The modes and their functions are summarized below.

	Mode name	Function
Setting mode	Dealer setting mode	The dealer determines specifications
	Frequency setting mode	Sets the frequency and tone for each channel
	EEPROM clear mode	After clearing the EEPROM, the frequency setting mode is entered
	Clone mode	Sets the frequency and tone for each channel with the clone function
Use mode	User mode	Used by the user for channel display
	Confirmation mode	The serviceman confirm EEPROM data

Table 1 Modes and their functions

1-2. Mode setting

The mode can be changed as follows by remove the two jumpers (T10 and T11) and switching the power on without pressing a key.

Jumpers		Mode name
T10	T11	
1	0	Dealer specification setting mode
0	1	Setting mode (frequency setting mode)
0	0	Use mode (User mode)

0 : No jumper 1 : Jumper

Table 2 Mode change with jumpers

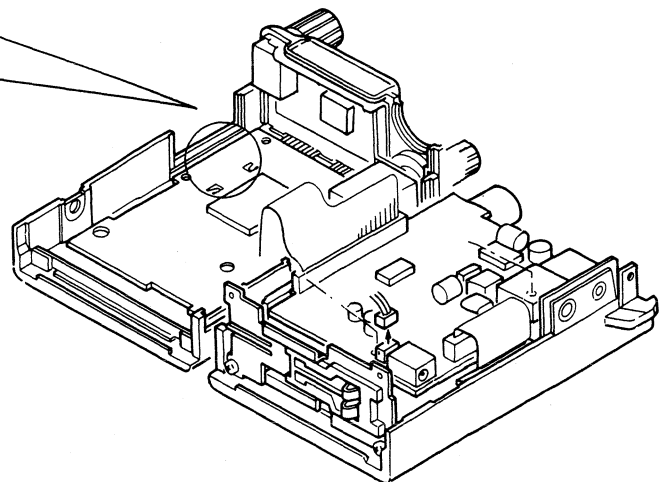
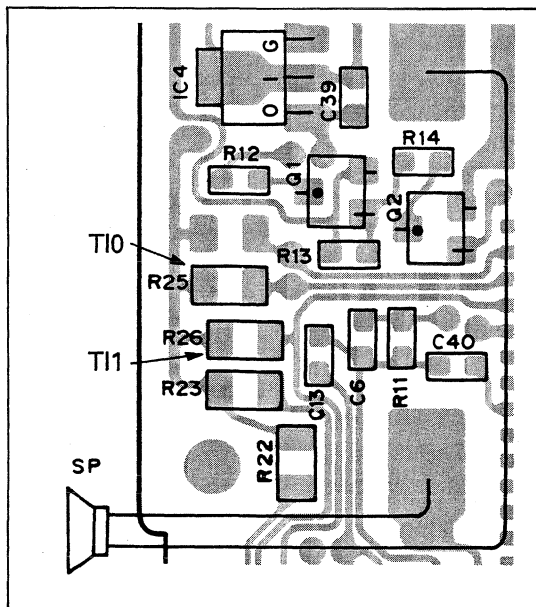


Fig. 1 Jumper locations

TK-240(F)

FREQUENCY SETTING

The default mode is the frequency setting mode (jumper T10 : 0, T11 : 1)

To enter a mode from the setting mode, perform the following operation and switch the POWER ON. Any of the modes can be set in any order.

Operation	Mode
Turn the POWER ON without pressing a key	Frequency setting mode
Hold down the [PTT] key and turn the POWER ON	Dealer setting mode
Hold down the [MONI] key and turn the POWER ON	EEPROM clear mode
Hold down the [SET1] key and turn the POWER ON	Clone mode

Table 3 Operations for entering each mode from the setting mode

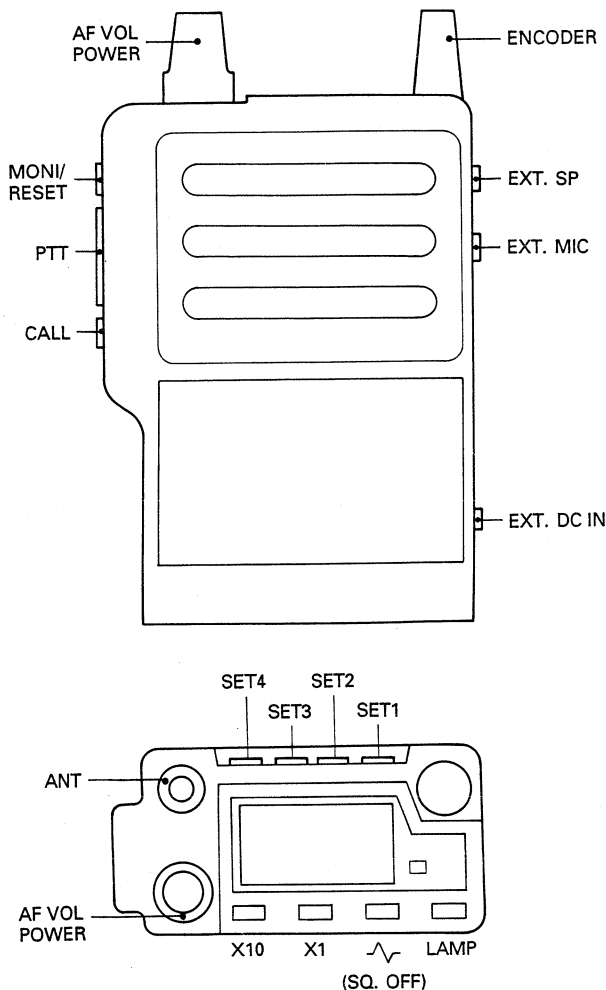


Fig. 2 Operation key locations

When all the work, such as frequency setting and performance checking, is finished, change the mode to the use mode by cutting the jumpers (T10 : 0, T11 : 0) before reassembling the TK-240(F).

Reference : Even if the use mode has been set by removing jumpers, each of the above modes can be entered by software to improve serviceability.

Operation	Mode
Turn the POWER ON without pressing a key	User mode
Hold down the [SET3] key and turn the POWER ON	Confirmation mode
Hold down the [SET3] and [CALL] keys and turn the POWER ON	Frequency setting mode
Hold down the [SET3] and [PTT] keys and turn the POWER ON	Dealer setting mode
Hold down the [SET3] and [MONI] keys and turn the POWER ON	EEPROM clear mode
Hold down the [SET4] key and turn the POWER ON	Clone mode

Table 4 Operations for entering each mode from the setting mode

2. Frequency Setting Mode

1. This mode is entered when microprocessor T10 is set to high, T11 to low, and the power is turned on without pressing a key.
2. The mode can also be entered from the use mode by holding down the SET3 and CALL keys and turning the POWER ON. The mode is used by the dealer to write the transmit/receive frequency and QT/CTCSS frequency into the EEPROM. The mode is entered when the POWER is turned ON in the SETTING MODE without pressing any key. When the POWER is turned ON, the 1-channel receive frequency setting mode (1-ch. R-F) is entered. Each time the PTT key is pressed, the mode changes as follows :

- 1) 1-channel receive frequency setting mode
 - 2) 1-channel transmit frequency setting mode
 - 3) 1-channel transmit QT/CTCSS frequency setting mode
 - 4) 2-channel receive frequency setting mode
- ↓
- 46) 16-channel receive frequency setting mode
 - 47) 16-channel transmit frequency setting mode
 - 48) 16-channel transmit QT/CTCSS frequency setting mode
 - 49) END display (Writing is complete)

FREQUENCY SETTING

2-1. Receive frequency setting mode

Initial display
 Channel display : Number of channels to be set
 Frequency display : When a frequency has already been written in to the EEPROM, that frequency
 When there is no data in the EEPROM, one channel; Initial frequency
 Other channel : Receive frequency of the previous channel

1. When the encoder is turned, the display frequency changes.
 When the encoder is turned while holding down the CALL key, the display frequency changes in 1MHz steps.
2. When the PTT switch is pressed, the displayed frequency is set as the receive frequency for the channel, and the mode changes to the next transmit frequency setting mode.

2-2. Transmit frequency setting mode

Initial display
 Channel display : Number of channels to be set
 Frequency display : When a frequency has already been written in to the EEPROM, that frequency
 When there is no data in the EEPROM, the receive frequency for the channel
 Others : The ON AIR LED lights to distinguish this mode from the receive frequency setting mode

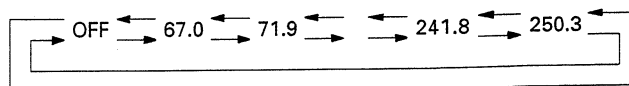
1. When the encoder is turned, the display frequency changes.
 When the encoder is turned while holding down the LAMP key, the display frequency changes in 1MHz steps.
2. When the PTT switch is pressed, the displayed frequency is set as the transmit frequency for the channel, and the mode changes to the next transmit QT/CTCSS frequency setting mode

2-3. Transmit QT/CTCSS frequency setting mode

Initial display
 Channel display : Number of channels to be set
 Frequency display : When a QT/CTCSS frequency has already been written into the EEPROM, that QT/CTCSS frequency
 When there is no data in the EEPROM, OFF is displayed.

Others : The ON AIR LED lights to distinguish this mode from the receive QT/CTCSS frequency setting mode

1. When the encoder is turned, the QT/CTCSS frequency (38 frequencies + OFF) changes.



2. When the PTT switch is pressed, the displayed QT/CTCSS frequency is set as the transmit QT/CTCSS frequency for the channel, and the mode changes to the next receive frequency setting mode.
 When the data for all 16 channels has been written, END is displayed, and no further writing is permitted.

2-4. Data confirmation with the MONI key

The written contents can be confirmed by pressing the MONI key in the frequency setting mode. The operation is as follows depending on the condition when the MONI key is pressed.

Condition	Operation
When no write operation is performed using the PTT key after clearing the EEPROM	No operation
When END is displayed	The 1-channel receive frequency setting mode is displayed
In the receive frequency setting mode	The receive frequency setting mode for the previous channel is displayed
In a mode other than above	The receive frequency setting mode for that channel is displayed
When the written contents are being confirmed by pressing the MONI key	Each time the MONI key is pressed, the modes are displayed in the following order : Receive frequency setting mode → Transmit frequency setting mode → Transmit QT/CTCSS frequency setting mode → Receive frequency setting mode for the next channel. The modes are displayed for the channels in which data has been written. If data is written in channel 1 and channel 6, the channels between them are displayed as blank channels.

The encoder, PTT, and CALL keys are effective and data can be rewritten even when data is being confirmed with the MONI key.

FREQUENCY SETTING

3. Clone Mode

In the clone mode, two transceivers are connected together and the contents of the EEPROM of one transceiver are copied to the EEPROM of the other.

The optional KCT-8 is used for cloning. For the connection method, see Figure 3.

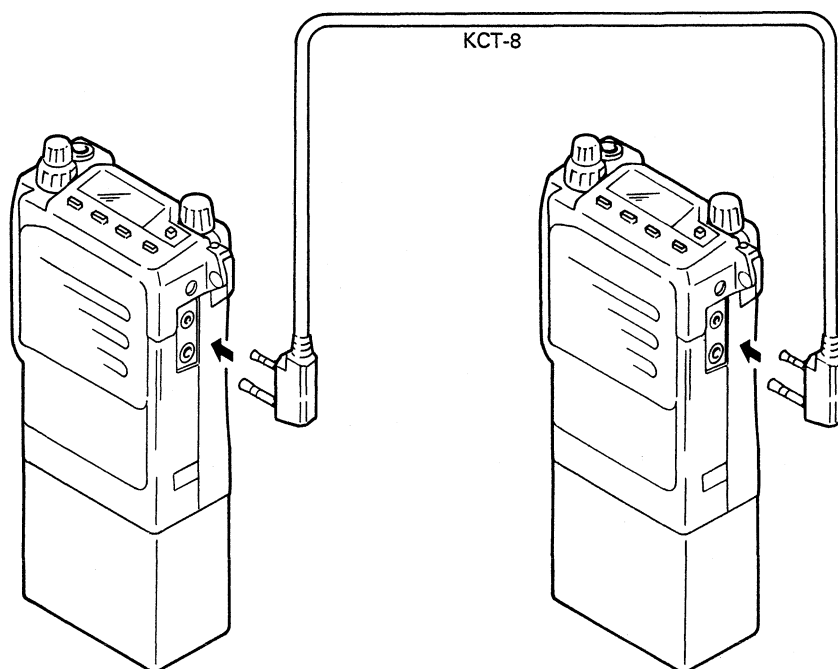
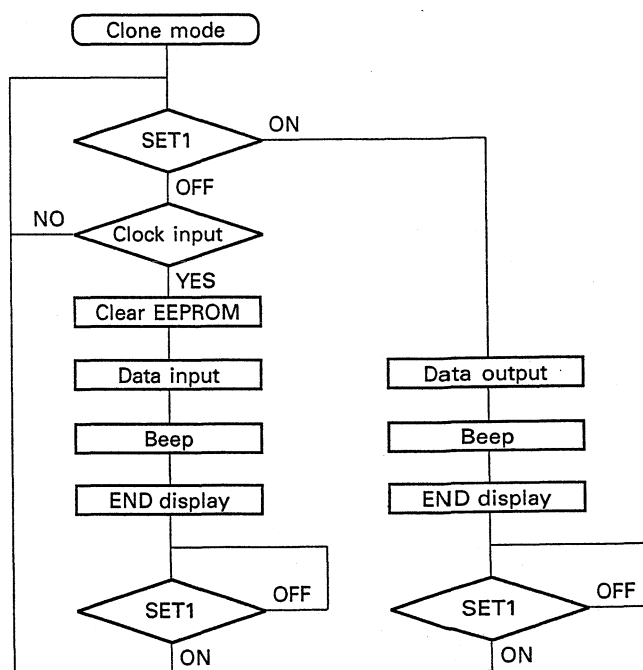


Fig. 3

3-1. Method of operation

1. When the SET1 key is held down and the power is turned on in the setting mode, and when the SET4 key is held down and the power is turned on in the use mode, the clone mode is entered and "-C-" is displayed on the LCD.
2. Connect the clone terminals (PTT line) of the two transceivers in the clone mode.
3. When the SET1 key on the transceiver that has the data to be copied from its EEPROM is pressed, the ON AIR LED lights, and the data is copied from that transceiver to the other. (The display on the receiving transceiver remains unchanged.) When data ends (after about 20 seconds), both transceivers beep and show END on their displays.
4. When the SET1 key is pressed with END displayed, the mode in 1. is entered again. In the clone mode, three types of data can be copied; receive PLL data, transmit PLL data, and transmit tone.



FREQUENCY SETTING

3-2. Condition for using the clone mode correctly

The IF and PLL comparison frequency of the transmitter must match those of the receiver.

If they do not, the clone mode can be used, but the data in the receiver is destroyed.

3-3. Clone with a land mobile

A handy transceiver and a land mobile can be connected together in the clone mode in the same way and under the same conditions as when connecting two handy transceivers.

Note : If the IF of the TK-240(F) is 30.825MHz, the IF of the other (TK-705) is 21.4MHz, and the PLL comparison frequencies are the same, the clone mode is effective.

4. User Mode

The user mode is for the user. This mode is entered when the power is turned on in the use mode (except when the SET1 key is held down and the power is turned on).

4-1. Initial state

CH : If the last channel number is maintained, the transceiver enters the receive state with that channel. If not, the transceiver enters the receive state with one channel.

MONI/RESET : OFF

SQ OFF : OFF

5-TONE No. : If the tone number has been backed up, the 5-TONE unit operates with that number. If it has not been backed up, 00 is used.

4-2. Functions

Encoder : Channel UP/DOWN

MONI/RESET : MONI ON/OFF, RESET

SQ OFF : SQ ON/OFF

PTT : Transmit/receive

LAMP : LAMP ON/OFF

5. Confirmation Mode

In this mode, the serviceman can confirm EEPROM data in the use mode.

5-1. Operation

When the SET3 key is held down and the power is turned on the use mode, the mode changes to the confirmation mode and the receive frequency of 1CH is displayed.

Subsequent operations are the same as those for data confirmation with the MONI key in the frequency setting mode. However, the encoder, PTT, SQ OFF, CALL, x1, and x10 keys are disabled.

6. Dealer Setting Mode

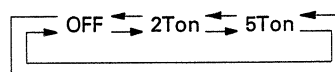
Dealer setting mode is set by making T10 of the microprocessor low, and T11, high. The mode is then entered by switching the power on without holding down any key. From use mode, dealer setting mode can be entered by holding down the SET3 and PTT keys and switching the power on.

Whenever the PTT key is pressed, the mode changes as follows (1 to 5). The options for each mode can be set with the control panel keys while observing the display.

1. Signaling setting (Note : Steps 2 to 5 are described when 5-TONE is set in step 1.)
2. 5-TONE code variable function
3. Group tone setting
4. Battery save setting
5. OFF display

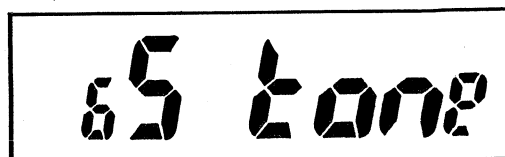
6-1. Signaling setting mode

When the encoder is turned, the display changes. Set it to 5-TONE.



OFF : Signaling is not set
2Ton : 2-TONE
5Ton : 5-TONE

LCD (When 5-TONE is set)



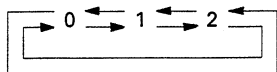
Press the PTT key

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FREQUENCY SETTING

6-2. 5-TONE code variable function

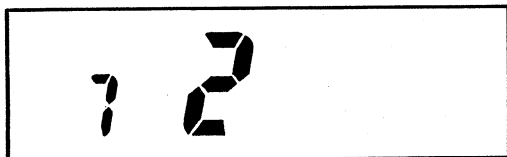
- When the 5-TONE unit is installed and the encoder is turned, the display changes.



0 : Fixed code
1 : One-digit variable
2 : Two-digit variable

Note : Set the 5-TONE unit to the same value (when the KPG-3D is used).

LCD (Example : The two-digit variable function is set)



- Press the PTT key

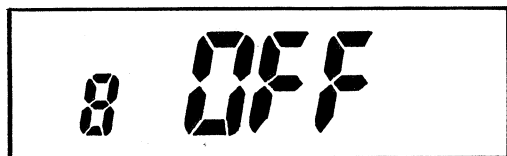
6-3. Group tone setting mode

- When the encoder is turned, the display changes.

ON $\longleftrightarrow$ OFF

ON : With group tone
OFF : Without group tone

LCD (Example : Group tone is set to OFF)



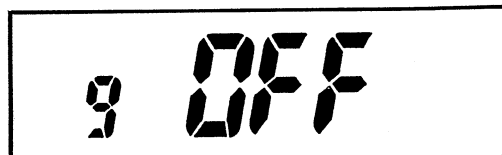
- Press the PTT key

6-4. Battery save setting mode

- When the encoder is turned, the display changes. Set it to OFF.

ON $\longleftrightarrow$ OFF

LCD (Set to OFF)

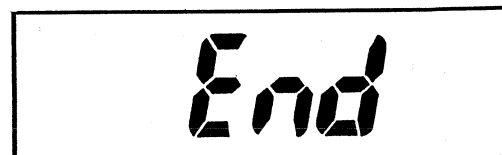


- Press the PTT key

6-5. END

- The LCD shows End, and the Dealer setting mode is terminated.

LCD



CIRCUIT DESCRIPTION

1. Digital Control Circuits

1-1. Switch and rotary encoder circuit

The signal is applied directly to the microprocessor as shown in Figure 1.

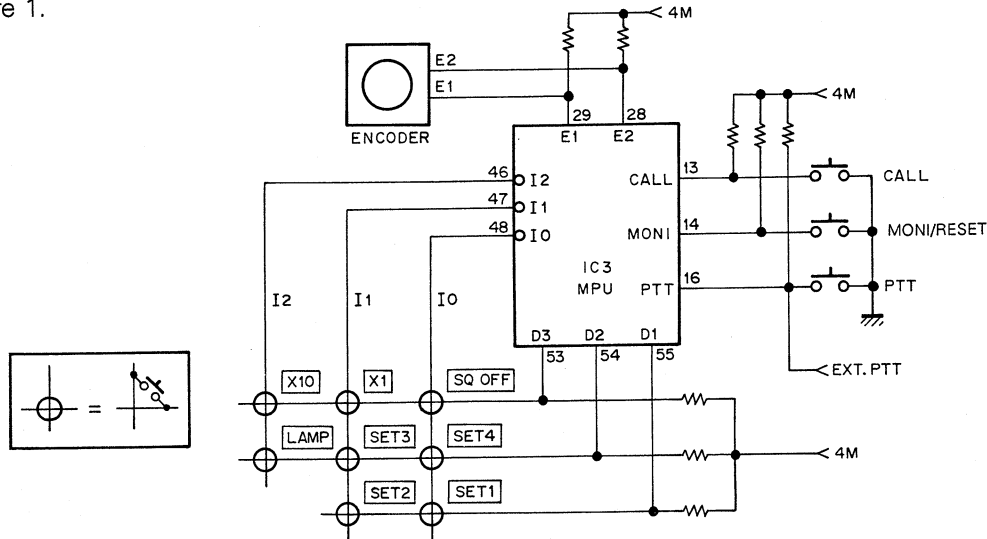


Fig. 1 Switch and rotary encoder input circuit

2. 5-TONE Circuit

2-1. 5TONE code transmission

When the CALL switch is pressed to call the other station, the CPU (IC3 : control) transfers data to the shift register (IC1 : signaling unit). The TX CALL pin of IC1 goes low, and when the signal is input to the 5-TONE unit, the following occurs:

1. TX ON goes low
2. MIC MUTE goes high

IC3 detects that TX ON is low and enables transmission. The CPU (IC3) detects that MUTE of IC3 is high, and effects muting so that modulation is not applied to MIC by the MM pin of IC1.

The 5-TONE code is then output from the TONE pin of the 5-TONE unit. The 5-TONE code level can be adjusted by the variable resistor (VR21) in the signaling unit, and the code enters the microphone amplifier (IC201) of the TX-RX unit (A/2), and modulates the VCO.

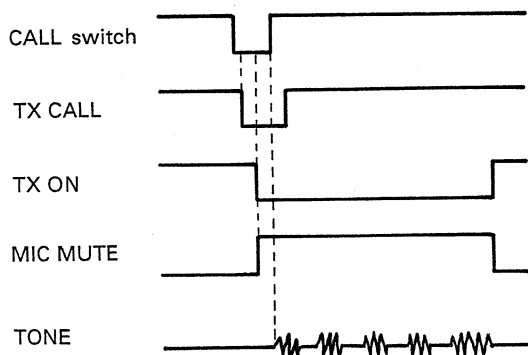


Fig. 2

2-2. Wait for the 5-TONE code

The received signal is demodulated by IC205 in the TX-RX unit (A/2), and the resulting signal passes through the buffer amplifier (Q213), and enters RD of the 5-TONE unit via the RD terminal of the signaling unit.

If the 5-TONE code matches in the 5-TONE unit, the LED terminal of the 5-TONE unit goes low, and the signal enters the LED pin of the CPU (IC3). The CPU displays the $\square$ symbol on the LCD. MUTE of the 5-TONE unit goes low, the signal enters MUTE of the CPU (IC3), and muting of the audio amplifier (IC204) is canceled.

The alert signal is output from the ALERT terminal of the 5-TONE unit, passes through the filter (C21, R21, R28) in the signaling unit, and enters the audio amplifier (IC204). The signal is amplified by the audio amplifier, and output to the speaker.

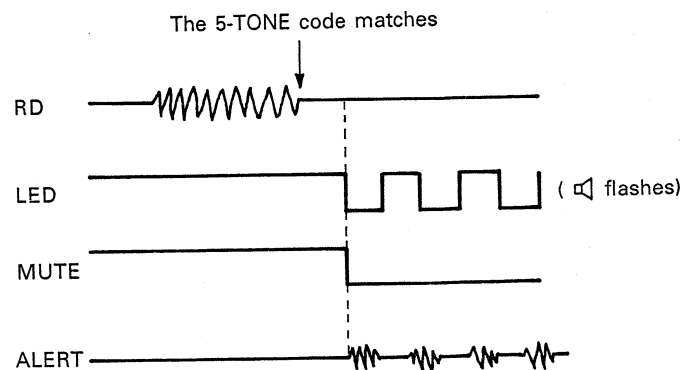


Fig. 3

TK-240(F)

CIRCUIT DESCRIPTION

2-3. Transmission when the 5-TONE code matches

When the PTT switch is pressed, data is transmitted from the CPU (IC3) to the shift register (IC1). When the PTT pin of IC1 goes low, TX ON of the 5-TONE unit goes low. The CPU (IC3) detects that TX ON has gone low, and enters the transmit mode.

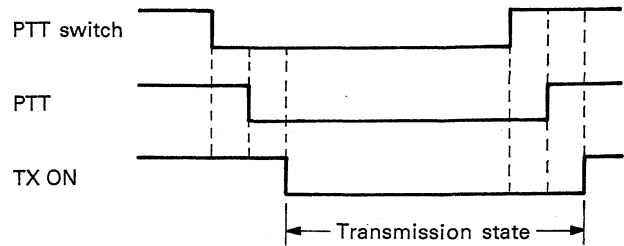


Fig. 4

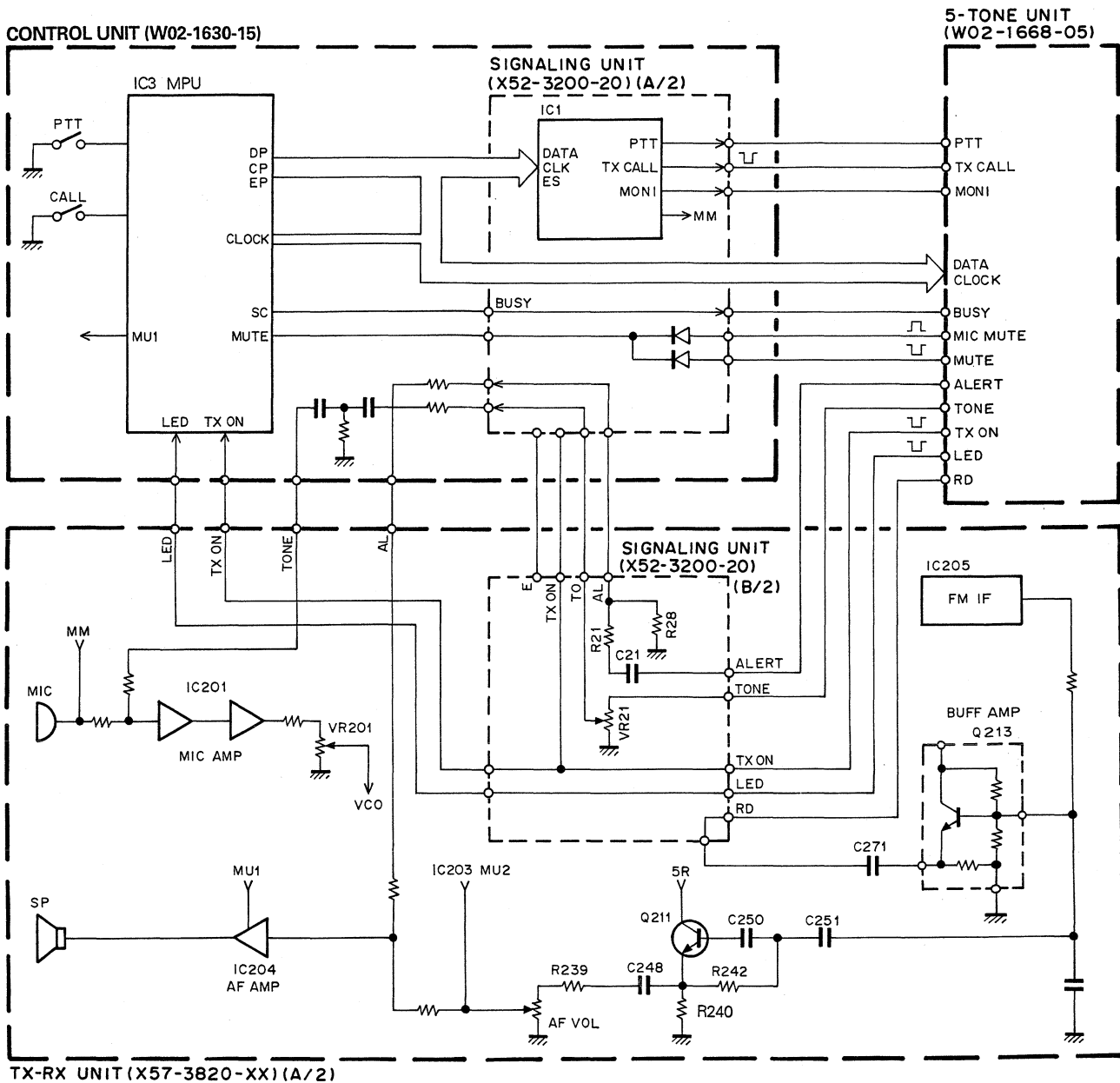
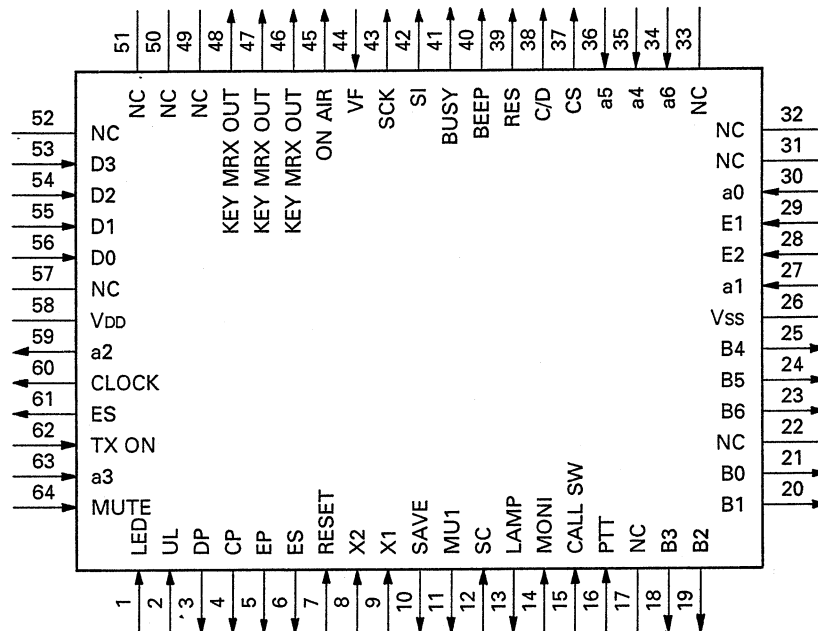


Fig. 5 5-TONE circuit

SEMICONDUCTOR DATA

1. MPU : (Control unit IC3)

• Terminal connection diagram



• Terminal function

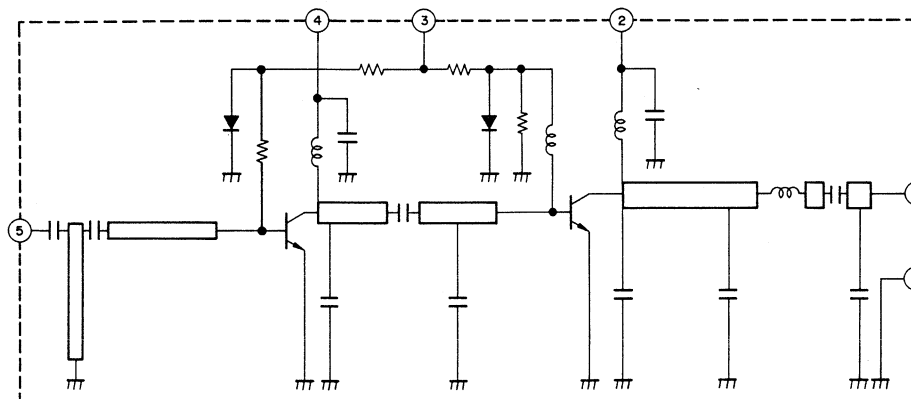
Pin No.	Port name	I/O	Function
1	LED	I	5-TONE LED "L" : Not match, "H" : Match
2	UL	I	PLL unlock data input "L" : Lock, "H" : Unlock
3	DP	O	PLL, 5-TONE and shift register EEPROM data output
4	CP	O	PLL, 5-TONE and shift register EEPROM clock output
5	EP	O	Enable output (PLL)
6	ES	O	Enable output (Shift register)
7	RESET	I	Reset voltage input
8	X2	I	Clock OSC.
9	X1	I	Clock OSC.
10	SAVE	O	Power save control data output
11	MU1	O	AF AMP control data output "L" : OFF, "H" : ON
12	SC	I	Busy data input "H" : Busy
13	LAMP	O	Lamp control data output
14	MONI	I	MONI switch data input "L" : ON, "H" : OFF
15	CALL SW	I	CALL switch data input "L" : ON, "H" : OFF
16	PTT	I	PTT switch data input "L" : OFF, "H" : ON
17	NC	I	Pull up
18	B3	O	Sub tone data output : bit 3
19	B2	O	Sub tone data output : bit 2
20	B1	O	Sub tone data output : bit 1
21	B0	O	Sub tone data output : bit 0
22	NC	O	Open
23	B6	O	Sub tone data output : bit 6
24	B5	O	Sub tone data output : bit 5
25	B4	O	Sub tone data output : bit 4
26	Vss	-	GND
27	a1	I	Destination
28	E2	I	Encoder data input
29	E1	I	Encoder clock
30	a0	I	Destination

SEMICONDUCTOR DATA

Pin No.	Port name	I/O	Function
31	NC	I	Pull up
32,33	NC	I	Pull down
34	a6	I	Destination
35	a4	I	Destination
36	a5	I	Destination
37	CS	O	Chip selector for LCD driver IC
38	C/D	O	Command/Data switching for LCD driver IC
39	RES	O	Reset of LCD driver IC
40	BEEP	O	Beep output
41	BUSY	O	Busy control "H" : Busy
42	SI	O	Data for LCD driver IC
43	SCK	O	Clock for LCD driver IC
44	VF	I	Buck-up detection
45	ON AIR	O	LED control "L" : TX
46~48	KEY MRX OUT	O	Key matrix data output
49~52	NC		
53~56	D3~D0	I	Key matrix data input
57	NC	-	Open
58	VDD	-	+4V
59	a2	O	EEPROM enable data output
60	CLOCK	O	5-TONE unit clock output
61	ES	O	Shift register enable output
62	TX ON	I	5-TONE TX ON data input
63	a3	I	EEPROM data input
64	MUTE	I	5-TONE unit mute data input

2. Power Module : M67748LR, M67748HR (IC1)

• Equivalent circuit



1. Output terminal
2. End power supply terminal
3. Base bias power supply terminal
4. First power supply terminal
5. Input terminal
6. Fin (GND)

• Electrical characteristics (Maximum rating)

Item	Symbol	Tc (°C)	Condition	Rating	Unit
Power supply voltage	Vcc	25	Zl = 50Ω	16	V
Bias voltage	Vbb	25		6	V
Total current	Icc	25		4	A
Input voltage	Pin	25	Vcc1 ≤ 12.5V	40	mW
Output power	Pout	25	Zg = Zl = 50Ω	10	W
Casa temperature during operation	Tc(op)			-30 ~ +110	°C
Storage temperature	Tstg			-40 ~ +110	°C

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TK-240(F)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
TK-240(F)						
1	3B		A01-2009-04	METALLIC CABINET		
2	1B		A02-0979-04	PLASTIC CABINET		
4	1B		A21-1538-04	DRESSING PANEL		
6	2B	*	A40-0626-24	BOTTOM PLATE		
7	2A	*	A62-0114-04	PANEL ASSY		
8	1A		B09-0319-04	CAP (DC IN)		
12	3B		B42-2437-04	LABEL (S/NO)		
15	2A, 2C		B42-3420-04	LABEL (ACSY)		
18	1C	*	B62-0116-00	INSTRUCTION MANUAL(ENGLISH)		
23	3B		B72-0023-14	MODEL NAME PLATE	M	
23	3B		B72-0024-14	MODEL NAME PLATE	M2	
-			B44-2163-04	UPC CORD LABEL		
C1 -3			CC45SL1H101J	CERAMIC 100PF J		
C5			CC45SL1H470J	CERAMIC 47PF J	M2	
31	3A		E04-0182-15	RF COAXIAL CABLE RECEPTACLE		
32	2B		E23-0494-14	TERMINAL (-)		
33	2B		E23-0605-14	TERMINAL (+)		
34	2B		E23-0650-14	TERMINAL (RECEPTACLE)		
40	3A		E31-6126-05	FPC		
-	-	*	E37-0144-05	CONNECTING WIRE		
-	-	*	E37-0168-15	CONNECTING WIRE (5-TONE)		
42	1A, 2C		F07-1206-03	COVER (SP/MIC)		
43	2A	*	F07-1335-04	COVER (KEY TOP)		
44	2A		F10-1423-14	SHIELDING CASE (MODULE)		
47	3B		F10-1456-03	SHIELDING CASE (PLL)		
48	3B		F10-2005-04	SHIELDING PLATE (5-TONE)		
49	1B		F19-0666-04	BLIND PLATE (MIC)		
51	3B	*	F20-1079-04	INSULATING SHEET(5-TONE)		
52	3A		F29-0435-05	INSULATOR (BELT HOOK)		
-			F10-1447-04	SHIELDING PLATE (5-TONE)		
-			F20-1065-04	INSULATING SHEET(PTT)		
54	2A		G02-0505-05	D SPRING		
55	2A, 2B		G10-0692-04	NON-WOVEN FABRIC(5-TONE, MIC)		
56	2B, 2D	*	G10-0706-04	FELT (5-TONE, ACSY)		
57	2B		G13-0852-04	CUSHION (TERMINAL)		
58	2A		G13-0976-04	CUSHION (FPC)		
60	2A		G53-0584-22	PACKING (PANEL)		
61	2B		G53-0585-12	PACKING (RELEASE)		
62	2A		G53-0586-22	PACKING (SP/MIC)		
63	3A		G53-0600-03	PACKING (RECEPTACLE)		
-			G10-0696-04	FELT		
-			G11-0645-04	SHEET		
64	1D		H11-0808-14	POLYSTURENE PLATE		
65	3C		H11-0840-04	POLYSTURENE PLATE		
66	2C		H13-0818-04	PROTECTION BOARD		
67	2D		H13-0841-04	PROTECTION BOARD		
68	3C		H52-0017-04	ITEM CARTON BOX		
69	3D		H10-2691-02	POLYSTYRENE FOAMED FIXTURE		
70	2C		H25-0029-04	PROTECTION BAG (COVER, LABEL)		
71	2D		H25-0085-04	PROTECTION BAG (100X200)		
72	2D		H25-0711-04	PROTECTION BAG (5-TONE)		

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TK-240(F)

SIGNALING UNIT (X52-3200-20)

Ref. No. 参照番号	Address 位置	New Parts	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
73	2B		J19-1426-03	HOLDER (TERMINAL)		
75	1B		J21-4289-03	MOUNTING HARDWARE(FPC)		
76	1A		J21-4291-14	MOUNTING HARDWARE(SP/MIC)		
77	1B		J21-4292-04	MOUNTING HARDWARE(BOTTOM PLATE)		
78	3B		J21-4307-04	MOUNTING HARDWARE(PTT)		
79	2C		J29-0424-04	BELT HOOK (ACSY)		
80	1B		J39-0440-14	MIC SPACER		
81	2A		J69-0321-05	Ø RING		
-			J19-1485-04	HOLDER (PTT)		
-	2B		J30-0581-04	SPACER (SIGNALING)		
-	1A		J30-0582-04	SPACER (SIGNALING)		
83	2B		K29-4561-12	KNØB (PTT)		
84	2B		K29-4562-14	KNØB (RELEASE)		
85	2A		K29-4579-14	KNØB (VOL)		
86	2A		K29-4580-14	KNØB (ENC)		
87	2A	*	K29-4713-04	KEY TOP (TOP)		
88	2A		K29-4662-04	KNØB (KEY TOP)		
L1	-		L39-0489-05	TOROIDAL COIL (POWER SOURCE)		
90	2A		N14-0545-04	NUT		
A	2B		N09-2025-05	SCREW (1.7X3)		
B	3A		N09-2028-05	SCREW (3X4)		
C	1A, 2B		N09-2064-05	SCREW (2X3.5)		
D	2A, 2B		N09-2086-05	SCREW (2X5)		
E	2B		N09-2087-15	SCREW (2X3.5)		
F	2A, 3B		N09-2107-05	SCREW (2X12)		
G	2A		N09-2122-05	SCREW (2.6X6)		
H	3A		N09-2124-05	SCREW		
J	2A, 2B		N30-2003-46	PAN HEAD MACHINE SCREW		
K	3A, 3B		N35-2003-45	BINDING HEAD MACHINE SCREW		
L	2A		N35-2005-45	BINDING HEAD MACHINE SCREW		
M	2C		N35-2006-45	BINDING HEAD MACHINE SCREW(ACS)		
N	2C		N35-2004-45	BINDING HEAD MACHINE SCREW(ACS)		
104	3D		T90-0381-05	ANTENNA (134-150MHZ)	M2	
104	3D		T90-0382-05	ANTENNA (150-162MHZ)	M	
IC1	3A		M67748HR	IC(POWER MODULE)	M	
IC1	3A		M67748LR	IC(POWER MODULE)	M2	
107	2B	*	W02-1630-15	CONTROL UNIT		
108	2B, 2D	*	W02-1668-05	5-TONE UNIT		
109	2D		W09-0508-05	BATTERY ASSY (KNB-5 ACSY)		
110	2A, 2B	*	X52-3200-20	SIGNALING UNIT		
111	3A, 2B	*	X57-3820-20	TX-RX UNIT	M	
111	3A, 2B	*	X57-3820-21	TX-RX UNIT	M2	
SIGNALING UNIT (X52-3200-20)						
C1			C92-0003-05	CHIP TAN 0.47UF 25WV		
C21			CK73FB1H223K	CHIP C 0.022UF K		
C22, 23			CK73FB1E104K	CHIP C 0.10UF K		
C24			C92-0003-05	CHIP TAN 0.47UF 25WV		
CN1			E40-5342-05	CONNECTOR(13P)		
CN2		*	E40-5173-05	CONNECTOR(8P)		
CN21			E40-5341-05	CONNECTOR(9P)		
CN22		*	E40-5172-05	CONNECTOR(7P)		

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SIGNALING UNIT (X52-3200-20)

TX-RX UNIT (X57-3820-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
W1		*	E37-0144-05	CONNECTING WIRE		
R1 ,2			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R3			RK73GB1J683J	CHIP R 68K J 1/16W		
R4 -6			RK73GB1J473J	CHIP R 47K J 1/16W		
R7			R92-1252-05	CHIP R 0 OHM		
R8			RK73GB1J224J	CHIP R 220K J 1/16W		
R21			RK73GB1J104J	CHIP R 100K J 1/16W		
R22			R92-1252-05	CHIP R 0 OHM		
R23			RK73GB1J124J	CHIP R 120K J 1/16W		
R24			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R25			RK73GB1J273J	CHIP R 27K J 1/16W		
R26			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R27			RK73GB1J121J	CHIP R 120 J 1/16W		
R28			RK73GB1J473J	CHIP R 47K J 1/16W		
VR21			R12-6526-05	TRIM POT. 47K		
D1 ,2			DAN202U	DIODE		
IC1			MB88307FP	IC(SHIFT RESISTER)		
Q1			DTC114EU	DIGITAL TRANSISTOR		
Q21			2SC4116(BL)	TRANSISTOR		
Q21			2SC4116(GR)	TRANSISTOR		
TX-RX UNIT (X57-3820-XX) -20 : M -21 : M2						
C1 ,2			CK73GB1H102K	CHIP C 1000PF K		
C3			CK73GB1H103K	CHIP C 0.01UF K		
C4			CC73GCH1H100D	CHIP C 10PF D	M	
C4 ,5			CC73GCH1H120J	CHIP C 12PF J	M2	
C5			CC73GCH1H090D	CHIP C 9PF D	M	
C6			CK73GB1H102K	CHIP C 1000PF K		
C7			CC73GCH1H0R5C	CHIP C 0.5PF C		
C8			CK73GB1H103K	CHIP C 0.01UF K		
C9			CC73GCH1H020C	CHIP C 2.0PF C		
C10			CK73GB1H103K	CHIP C 0.01UF K		
C11			CC73GCH1H070D	CHIP C 7PF D	M	
C11 ,12			CC73GCH1H100D	CHIP C 10PF D	M2	
C12			CC73GCH1H090D	CHIP C 9PF D	M	
C13			CK73GB1H102K	CHIP C 1000PF K		
C14			CC73GCH1H0R5C	CHIP C 0.5PF C		
C15			CK73GB1H103K	CHIP C 0.01UF K		
C16			CC73GCH1H020C	CHIP C 2.0PF C		
C17			CC73GCH1H101J	CHIP C 100PF J		
C18			CK73GB1H102K	CHIP C 1000PF K		
C19			CC73GCH1H100D	CHIP C 10PF D		
C20			CK73GB1H102K	CHIP C 1000PF K		
C21			CC73GCH1H080D	CHIP C 8PF D	M	
C21			CC73GCH1H220J	CHIP C 22PF J	M2	
C22 ,23			CK73GB1H102K	CHIP C 1000PF K		
C24			CC73GCH1H330J	CHIP C 33PF J		
C25			CC73GCH1H100D	CHIP C 10PF D		
C26 ,27			CK73GB1H102K	CHIP C 1000PF K		
C28			CC73GCH1H100D	CHIP C 10PF D		
C29 ,30			CK73GB1H102K	CHIP C 1000PF K		
C31			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C32			CK73GB1H102K	CHIP C 1000PF K		
C33			CC73GCH1H101J	CHIP C 100PF J		
C34			CK73FB1E473K	CHIP C 0.047UF K		

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TK-240(F)

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TX-RX UNIT (X57-3820-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C35			CK73FB1E104K	CHIP C 0.10UF K		
C36			CK73GB1H102K	CHIP C 1000PF K		
C37			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C38			CK73GB1H102K	CHIP C 1000PF K		
C39			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C40			CK73FB1E104K	CHIP C 0.10UF K		
C41			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C42			C92-0002-05	CHIP TAN 0.22UF 35WV		
C43			CK73GB1H102K	CHIP C 1000PF K		
C44			CC73GCH1H220J	CHIP C 22PF J		
C45			CC73GCH1H180J	CHIP C 18PF J		
C46 ,47			CK73GB1H103K	CHIP C 0.01UF K		
C48 -50			CK73GB1H102K	CHIP C 1000PF K		
C51			CC73GCH1H220J	CHIP C 22PF J		
C52 -54			CK73GB1H102K	CHIP C 1000PF K		
C55			CK73GB1H103K	CHIP C 0.01UF K		
C56			CC73GCH1H180J	CHIP C 18PF J	M	
C56			CC73GCH1H220J	CHIP C 22PF J	M2	
C57 -59			CK73GB1H102K	CHIP C 1000PF K		
C60			C92-0038-05	ELECTR0 22UF 16WV		
C61			CK73GB1H102K	CHIP C 1000PF K		
C62			C90-2049-05	ELECTR0 15UF 6.3WV		
C63			CK73GB1H102K	CHIP C 1000PF K		
C64			CK73FB1E104K	CHIP C 0.10UF K		
C65			C92-0040-05	ELECTR0 47UF 16WV		
C66			CK73GB1H102K	CHIP C 1000PF K		
C67			CC73GCH1H040C	CHIP C 4PF C	M2	
C67			CC73GCH1H060D	CHIP C 6PF D	M	
C69			CC73GCH1H560J	CHIP C 56PF J	M	
C69			CC73GCH1H820J	CHIP C 82PF J	M2	
C70			CC73GCH1H120J	CHIP C 12PF J		
C71			CC73GCH1H030C	CHIP C 3PF C		
C72			CC73GCH1H180J	CHIP C 18PF J	M	
C72			CC73GCH1H270J	CHIP C 27PF J	M2	
C73			CC73GCH1H030C	CHIP C 3PF C	M	
C73			CC73GCH1H040C	CHIP C 4PF C	M2	
C74			CC73GCH1H270J	CHIP C 27PF J	M	
C74			CC73GCH1H330J	CHIP C 33PF J	M2	
C75			CC73GCH1H040C	CHIP C 4PF C	M	
C75			CC73GCH1H050C	CHIP C 5PF C	M2	
C76			CC73GCH1H100D	CHIP C 10PF D	M	
C76			CC73GCH1H120J	CHIP C 12PF J	M2	
C77			CC73GCH1H560J	CHIP C 56PF J	M2	
C77			CK73GB1H102K	CHIP C 1000PF K	M	
C78			CC73GCH1H040C	CHIP C 4PF C	M2	
C79			CC73GTH1H100D	CHIP C 10PF D		
C80			CK73GB1H102K	CHIP C 1000PF K		
C81			CC73GCH1H030C	CHIP C 3PF C		
C82			CK73GB1H102K	CHIP C 1000PF K		
C83			CC73GTH1H070D	CHIP C 7PF D	M2	
C83			CC73GTH1H120J	CHIP C 12PF J	M	
C84			CC73GCH1HR75C	CHIP C 0.75PF C	M	
C84			CC73GCH1H0R5C	CHIP C 0.5PF C	M2	
C85			CC73GCH1H050C	CHIP C 5PF C		
C86			CC73GTH1H070D	CHIP C 7PF D	M2	

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TX-RX UNIT (X57-3820-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C86			CC73GTH1H120J	CHIP C 12PF J	M	
C87			CC73GCH1H0R5C	CHIP C 0.5PF C	M2	
C87			CC73GCH1H010C	CHIP C 1PF C	M	
C88			CC73GCH1H040C	CHIP C 4PF C		
C89			CC73GTH1H070D	CHIP C 7PF D	M2	
C89			CC73GTH1H100D	CHIP C 10PF D	M	
C90			CK73GB1H102K	CHIP C 1000PF K		
C91			CK73GB1H103K	CHIP C 0.01UF K		
C92			CK73GB1H102K	CHIP C 1000PF K		
C93			CC73GCH1H101J	CHIP C 100PF J		
C95			CK73FB1H223K	CHIP C 0.022UF K		
C96			CK73GB1H102K	CHIP C 1000PF K		
C97			CC73GCH1H060D	CHIP C 6PF D	M2	
C97			CC73GCH1H090D	CHIP C 9PF D	M	
C98			CK73FB1H223K	CHIP C 0.022UF K		
C99			CK73GB1H102K	CHIP C 1000PF K		
C100			CC73GCH1H101J	CHIP C 100PF J		
C101			CC73GCH1H050C	CHIP C 5PF C		
C102			CC73GCH1H180J	CHIP C 18PF J	M2	
C103-105			CK73GB1H102K	CHIP C 1000PF K		
C108			CC73GCH1H070D	CHIP C 7PF D	M	
C108			CC73GCH1H080D	CHIP C 8PF D	M2	
C109			CC73GCH1H070D	CHIP C 7PF D		
C110			CC73GCH1H100D	CHIP C 10PF D	M	
C111			CC73GCH1H180J	CHIP C 18PF J	M	
C112			CC73GCH1H270J	CHIP C 27PF J	M	
C112			CC73GCH1H330J	CHIP C 33PF J	M2	
C201-209			CK73GB1H102K	CHIP C 1000PF K		
C210			CK73FB1E103K	CHIP C 0.01UF K		
C211			CK73GB1H102K	CHIP C 1000PF K		
C212			CE04NW1C101M	ELECTRO 100UF 16WV		
C213			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C214			CK73GB1H102K	CHIP C 1000PF K		
C215			C92-0518-05	CHIP-TAN 0.22UF 8WV		
C216			CK73FB1E103K	CHIP C 0.01UF K		
C217			CK73GB1H102K	CHIP C 1000PF K		
C218			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C219			CK73GB1H103K	CHIP C 0.01UF K		
C220			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C221			CK73GB1H102K	CHIP C 1000PF K		
C222			CK73GB1H103K	CHIP C 0.01UF K		
C223			CK73GB1H471K	CHIP C 470PF K		
C224			CK73GB1H122K	CHIP C 1200PF K		
C225			CC73GCH1H101J	CHIP C 100PF J		
C226			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C227			CK73FB1E473K	CHIP C 0.047UF K		
C228			CK73EF1E334Z	CHIP C 0.33UF Z		
C229			CK73GB1H102K	CHIP C 1000PF K		
C231			C92-0003-05	CHIP TAN 0.47UF 25WV		
C237			CK73GB1H102K	CHIP C 1000PF K		
C238			C92-0004-05	ELECTRO 1.0UF 16WV		
C239			CK73GB1H103K	CHIP C 0.01UF K		
C240			CK73GB1H102K	CHIP C 1000PF K		
C241			C92-0040-05	ELECTRO 47UF 16WV		
C242			C90-2052-05	ELECTRO 68UF 10WV		

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TX-RX UNIT (X57-3820-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C243			C92-0047-05	ELECTRØ 47UF 6.3WV		
C244			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C245			CK73FB1E473K	CHIP C 0.047UF K		
C248			CK73FB1H273K	CHIP C 0.027UF K		
C249			C92-0045-05	ELECTRØ 22UF 6.3WV		
C250, 251			CK73FB1H393K	CHIP C 0.039UF K		
C252			C92-0004-05	ELECTRØ 1.0UF 16WV		
C253			C92-0005-05	ELECTRØ 2.2UF 6.3WV		
C254			CK73FB1H223K	CHIP C 0.022UF K		
C255			CK73GB1H102K	CHIP C 1000PF K		
C256			CK73FB1E104K	CHIP C 0.10UF K		
C257-260			CK73GB1H102K	CHIP C 1000PF K		
C261			C92-0001-05	CHIP TAN 0.1UF 35WV		
C262			C92-0005-05	ELECTRØ 2.2UF 6.3WV		
C263			CK73GB1H102K	CHIP C 1000PF K		
C264			CC73GCH1H390J	CHIP C 39PF J		
C265			CC73GCH1H470J	CHIP C 47PF J		
C266, 267			CK73FB1E104K	CHIP C 0.10UF K		
C268			CC73GCH1H820J	CHIP C 82PF J		
C269			CK73FB1E104K	CHIP C 0.10UF K		
C270			C90-2050-05	ELECTRØ 33UF 6.3WV		
C271, 272			CK73FB1E104K	CHIP C 0.10UF K		
C273			CK73GB1H102K	CHIP C 1000PF K		
C275			CC73GCH1H151J	CHIP C 150PF J		
C276			C92-0519-05	CHIP-TAN 1UF 25WV		
C279			CK73GB1H102K	CHIP C 1000PF K		
C280			CK73FB1H103K	CHIP C 0.010UF K		
C281			CK73FB1E102K	CHIP C 1000PF K		
C282			CK73GB1H103K	CHIP C 0.01UF K		
C283-286			CK73GB1H102K	CHIP C 1000PF K		
C287			C92-0047-05	ELECTRØ 47UF 6.3WV		
C288			CK73GB1H102K	CHIP C 1000PF K		
C289			C92-0045-05	ELECTRØ 22UF 6.3WV		
C290, 291			CK73GB1H102K	CHIP C 1000PF K		
C292			CK73FB1E183K	CHIP C 0.018UF K		
C295-298			CK73GB1H102K	CHIP C 1000PF K		
C300			CK73FB1E104K	CHIP C 0.10UF K		
C301			CK73GB1H332K	CHIP C 3300PF K		
C302			CC73GCH1H820J	CHIP C 82PF J		
TC1			C05-0369-05	TRIMMING CAP 6PF		
CN1			E40-5224-05	FLAT CABLE CONNECTOR(16P)		
CN2			E40-5179-05	PIN ASSY		
CN201			E40-5247-05	FLAT CABLE CONNECTOR(30P)		
CN202			E40-5224-05	FLAT CABLE CONNECTOR(16P)		
CN203			E40-5343-05	CONNECTOR		
CN204			E40-5179-05	PIN ASSY		
J201			E03-0170-05	DC JACK		
J202			E11-0429-05	PHONE JACK (3.5D)		
J203			E11-0439-05	PHONE JACK (2.5D)		
TP4			E23-0342-05	TERMINAL		
TP201			E23-0342-05	TERMINAL		
W201			E31-6119-15	CONNECTING WIRE		
W202-204			E33-1928-05	WIRING KIT		
W209		*	E37-0145-05	LEAD		

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TX-RX UNIT (X57-3820-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
-			J30-0545-05	SPACER		
CD201			L79-0817-05	CRISTAL DISC.		
CF201			L72-0373-05	CERAMIC FILTER		
L1			L92-0130-05	CHIP INDUCTOR		
L2			L40-1095-48	SMALL FIXED INDUCTOR(1UH)		
L3 , 4			L40-3395-48	SMALL FIXED INDUCTOR(3.3UH)		
L5			L34-2363-05	COIL	M	
L5			L34-2364-05	COIL	M2	
L6			L34-2371-05	COIL	M2	
L6			L34-2391-05	COIL	M	
L7 -9			L40-1095-48	SMALL FIXED INDUCTOR(1UH)		
L10			L40-1095-48	SMALL FIXED INDUCTOR(1UH)	M2	
L10			L40-1582-48	SMALL FIXED INDUCTOR(0.15UH)	M	
L11			L40-2782-48	SMALL FIXED INDUCTOR(0.27UH)		
L13			L92-0130-05	CHIP INDUCTOR		
L14			L40-1082-48	SMALL FIXED INDUCTOR(0.1UH)	M2	
L14			L40-8272-48	SMALL FIXED INDUCTOR(82NH)	M	
L15			L40-8272-48	SMALL FIXED INDUCTOR(82NH)		
L16 , 17			L92-0130-05	CHIP INDUCTOR		
L18			L40-2295-48	SMALL FIXED INDUCTOR(2.2UH)		
L19			L92-0130-05	CHIP INDUCTOR		
L20			L34-0893-05	COIL (4T)		
L21			L34-0894-05	COIL (5T)		
L22			L40-2292-19	SMALL FIXED INDUCTOR(2.2UH)		
L23			L34-0894-05	COIL (5T)		
L24			L34-1210-05	COIL (7T)	M2	
L24			L34-1258-05	COIL (6T)	M	
L25			L34-4234-05	COIL (3-1/4T)		
L26 -28			L34-4235-05	COIL (3-1/2T)	M2	
L26 -28			L34-4236-05	COIL (3T)	M	
L30			L34-4229-05	COIL		
L31			L40-4782-48	SMALL FIXED INDUCTOR(0.47UH)	M	
L31			L40-6882-48	SMALL FIXED INDUCTOR(0.68UH)	M2	
L32			L40-1582-48	SMALL FIXED INDUCTOR(0.15UH)		
L33 , 34			L40-5672-48	SMALL FIXED INDUCTOR(56UH)	M	
L201			L40-1095-48	SMALL FIXED INDUCTOR(1UH)		
L202			L92-0130-05	CHIP INDUCTOR		
X1			L77-1383-05	CRYSTAL RESONATOR(12.8MHZ)		
X201			L77-1356-05	CRYSTAL RESONATOR(30.37MHZ)	M2	
X201			L77-1415-05	CRYSTAL RESONATOR(34.855MHZ)	M	
XF1			L71-0263-05	MCF(30.825MHZ)	M2	
XF1			L71-0298-05	MCF(34.4MHZ)	M	
R1			RK73GB1J223J	CHIP R 22K J 1/16W		
R2			RK73GB1J334J	CHIP R 330K J 1/16W		
R3			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R4			RK73GB1J104J	CHIP R 100K J 1/16W		
R5 , 6			RK73GB1J101J	CHIP R 100 J 1/16W		
R7			RK73GB1J103J	CHIP R 10K J 1/16W		
R8			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R9 , 10			RK73GB1J101J	CHIP R 100 J 1/16W		
R11			RK73GB1J104J	CHIP R 100K J 1/16W		
R12			RK73GB1J471J	CHIP R 470 J 1/16W		
R13			RK73GB1J104J	CHIP R 100K J 1/16W		

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TK-240(F)

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R14			RK73GB1J101J	CHIP R 100 J 1/16W		
R15			RK73GB1J104J	CHIP R 100K J 1/16W		
R16			RK73GB1J101J	CHIP R 100 J 1/16W		
R17			RK73GB1J681J	CHIP R 681 J 1/16W		
R18			RK73GB1J104J	CHIP R 100K J 1/16W		
R19			RK73GB1J101J	CHIP R 100 J 1/16W		
R21			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R22			RK73FB2A220J	CHIP R 22 J 1/10W		
R23			RK73GB1J101J	CHIP R 100 J 1/16W		
R24			RK73GB1J104J	CHIP R 100K J 1/16W		
R25 -27			RK73GB1J103J	CHIP R 10K J 1/16W		
R28			RK73GB1J223J	CHIP R 22K J 1/16W		
R29			RK73GB1J103J	CHIP R 10K J 1/16W		
R30			RK73GB1J331J	CHIP R 330 J 1/16W		
R31			RK73GB1J223J	CHIP R 22K J 1/16W		
R32			RK73GB1J103J	CHIP R 10K J 1/16W		
R33			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R34			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R35			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R36			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R37			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R38			RK73GB1J104J	CHIP R 100K J 1/16W		
R39			RK73FB2A823F	CHIP R 82K F 1/10W		
R40			RK73FB2A473F	CHIP R 47K F 1/10W		
R41			RK73FB2A153F	CHIP R 15K F 1/10W		
R42			RK73GB1J180J	CHIP R 18 J 1/16W	M	
R42			R92-1252-05	CHIP R 0 OHM	M2	
R43 ,44			RK73GB1J271J	CHIP R 270 J 1/16W	M	
R45			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R46			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R47			RK73GB1J560J	CHIP R 56 J 1/16W		
R48			RK73GB1J220J	CHIP R 22 J 1/16W		
R49			RK73GB1J331J	CHIP R 330 J 1/16W		
R50			RK73GB1J5R6J	CHIP R 5.6 J 1/16W		
R51			RK73GB1J681J	CHIP R 681 J 1/16W		
R52			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R53			RK73GB1J270J	CHIP R 27 J 1/16W		
R54			RK73GB1J5R6J	CHIP R 5.6 J 1/16W		
R56 ,57			RK73GB1J271J	CHIP R 270 J 1/16W		
R58			RK73FB2A220J	CHIP R 22 J 1/10W		
R59 ,60			RK73GB1J271J	CHIP R 270 J 1/16W		
R61			RK73GB1J101J	CHIP R 100 J 1/16W		
R62			R92-0679-05	CHIP R 0 OHM	M2	
R63			RK73GB1J470J	CHIP R 47 J 1/16W		
R64			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R65 -69			RK73GB1J104J	CHIP R 100K J 1/16W		
R72			RK73GB1J331J	CHIP R 330 J 1/16W		
R74			RK73GB1J470J	CHIP R 47 J 1/16W		
R75			RK73GB1J102J	CHIP R 1.0K J 1/16W	M2	
R75			RK73GB1J331J	CHIP R 330 J 1/16W	M	
R76			RK73GB1J122J	CHIP R 1.2K J 1/16W	M2	
R76			RK73GB1J821J	CHIP R 820 J 1/16W	M	
R77			RK73GB1J334J	CHIP R 330K J 1/16W		
R78			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R79 ,80			RK73GB1J473J	CHIP R 47K J 1/16W		

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R81			RK73GB1J181J	CHIP R 180 J 1/16W		
R82			RK73GB1J103J	CHIP R 10K J 1/16W		
R83			R92-1252-05	CHIP R 0 0HM		
R84			R92-1276-05	CHIP R 820 J 1/16W		
R85			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R201, 202			RK73GB1J101J	CHIP R 100 J 1/16W		
R203			RK73GB1J104J	CHIP R 100K J 1/16W		
R205			RK73GB1J100J	CHIP R 10 J 1/16W		
R206			RK73GB1J471J	CHIP R 470 J 1/16W		
R207			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R208			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R209			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R210			RK73GB1J184J	CHIP R 180K J 1/16W		
R211			RK73GB1J103J	CHIP R 10K J 1/16W		
R212			RK73GB1J683J	CHIP R 68K J 1/16W		
R213			RK73GB1J273J	CHIP R 27K J 1/16W		
R214			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R215			RK73GB1J391J	CHIP R 390 J 1/16W		
R216			RK73GB1J124J	CHIP R 120K J 1/16W		
R217			RK73GB1J823J	CHIP R 82K J 1/16W		
R218			RK73GB1J104J	CHIP R 100K J 1/16W		
R219			RK73GB1J223J	CHIP R 22K J 1/16W		
R220			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R221			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R222			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R223			RK73GB1J563J	CHIP R 56K J 1/16W		
R224			RK73GB1J153J	CHIP R 15K J 1/16W		
R225			RK73GB1J223J	CHIP R 22K J 1/16W		
R226			R92-1252-05	CHIP R 0 0HM		
R227			RK73GB1J224J	CHIP R 220K J 1/16W		
R232			RK73GB1J153J	CHIP R 15K J 1/16W		
R234			RK73GB1J151J	CHIP R 150 J 1/16W		
R235			RK73GB1J103J	CHIP R 10K J 1/16W		
R236			RK73GB1J100J	CHIP R 10 J 1/16W		
R238			RK73GB1J103J	CHIP R 10K J 1/16W		
R239			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R240			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R241			RK73GB1J104J	CHIP R 100K J 1/16W		
R242			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R243			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R244			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R245			RK73GB1J101J	CHIP R 100 J 1/16W		
R246			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R247			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R248			RK73GB1J274J	CHIP R 270K J 1/16W		
R249			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R250			RK73GB1J681J	CHIP R 681 J 1/16W		
R251			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R252			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R253			RK73GB1J561J	CHIP R 560 J 1/16W		
R254			RK73GB1J473J	CHIP R 47K J 1/16W		
R255			RK73GB1J103J	CHIP R 10K J 1/16W		
R256			RK73GB1J271J	CHIP R 270 J 1/16W		
R256			RK73GB1J391J	CHIP R 390 J 1/16W		
R257			RK73GB1J122J	CHIP R 1.2K J 1/16W		

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R258			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R262			RK73GB1J393J	CHIP R 39K J 1/16W		
R263			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R265			RK73GB1J474J	CHIP R 470K J 1/16W		
R266			RK73GB1J471J	CHIP R 470 J 1/16W		
R268, 269			R92-1257-05	RESISTOR 0.47 1/2W		
R273			R92-1252-05	CHIP R 0 OHM		
R274			R92-0679-05	CHIP R 0 OHM		
R276			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R277			RK73GB1J221J	CHIP R 220 J 1/16W		
R278			RK73GB1J331J	CHIP R 330 J 1/16W		
R279			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R280			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R281			RK73GB1J121J	CHIP R 120 J 1/16W		
R282			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R284			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R285			RK73GB1J683J	CHIP R 68K J 1/16W		
R286			R92-0679-05	CHIP R 0 OHM		
R287			R92-1252-05	CHIP R 0 OHM		
R288			R92-0679-05	CHIP R 0 OHM		
R289-293			R92-1252-05	CHIP R 0 OHM		
R295			R92-0679-05	CHIP R 0 OHM		
R299			R92-1252-05	CHIP R 0 OHM		
R301, 302			R92-0679-05	CHIP R 0 OHM		
R303			RK73GB1J184J	CHIP R 180K J 1/16W		
R304			RK73GB1J224J	CHIP R 220K J 1/16W		
R305			RK73GB1J334J	CHIP R 330K J 1/16W		
R306			RK73EB2B471J	CHIP R 470 J 1/8W		
R307			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R308, 309			RK73GB1J104J	CHIP R 100K J 1/16W		
R312, 313			R92-1252-05	CHIP R 0 OHM		
R320, 321			RK73GB1J473J	CHIP R 47K J 1/16W		
R322			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R323			RK73GB1J473J	CHIP R 47K J 1/16W		
R326			RK73GB1J473J	CHIP R 47K J 1/16W		
VR201			R12-6532-05	TRIM POT. 470K		
VR204			R12-6495-05	TRIM POT. 4.7K		
VR205			R12-6491-05	TRIM POT. 1K		
D1			DAN202U	DIODE		
D2			MA363	DIODE		
D3 , 4			1T33C	DIODE		
D6 , 7			1T33C	DIODE		
D8			DAN202U	DIODE		
D9		*	MA110	DIODE		
D10			DA204U	DIODE		
D11			MA344B	DIODE		
D12			DA204U	DIODE		
D13			1SV172	DIODE		
D14 , 15			MI808	DIODE		
D16			HSM88AS	DIODE		
D17			MA334B	DIODE		
D18			MA344B	DIODE		
D201			EA61FC1F	DIODE		
D202			MA110	DIODE		

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PARTS LIST

* New Parts

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TX-RX UNIT (X57-3820-XX)

CONTROL UNIT (W02-1630-15)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
D205 D206 D207 D208 D209			DAN202U 02CZ8.2Y HSM88AS 02CZ3.9Y,Z DAN202U	DIODE DIODE DIODE DIODE DIODE		
D210 IC1 IC2 IC201 IC203		*	MA110 MB1504 TC4S11F NJM2060M MB88307FP	DIODE IC(PLL FREQ SYNTHESIZER) IC(2 INPUT NAND GATE) IC IC(SHIFT RESISTER)		
IC204 IC205 IC206 IC207 Q1 ,2			NJM386BD TK10485M LM301AD M5236(ML) 2SK238(K17)	IC(AF POWER AMP) IC(FM IF) IC(OP AMP) IC(AVR) FET		
Q3 Q4 ,5 Q6 Q7 Q8			2SC4215(Y) 2SC4083 2SC4215(Y) 2SC4117(BL) DTC114EU	TRANSISTOR TRANSISTOR TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR		
Q10 ,11 Q12 Q13 Q14 Q15			DTC114EU 2SA1312(B) 2SC3324(B) 2SC4215(Y) 2SC4093	DIGITAL TRANSISTOR TRANSISTOR TRANSISTOR TRANSISTOR TRANSISTOR		
Q16 Q17 Q18 Q19 Q201			2SK302(Y) DTC144WU 3SK184(S) 2SC4215(Y) 2SK879(GR,Y)	FET DIGITAL TRANSISTOR FET TRANSISTOR FET		
Q208 Q209 Q210 Q211,212 Q213			2SB798(DL,DK) 2SC4116(GR,BL) DTC144EU 2SC4116(GR,BL) FMU1	TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR TRANSISTOR		
Q215 Q216 Q217 Q218 Q219			DTC114EU 2SB798(DL,DK) DTA143ZU DTC114TU 2SB798(DL,DK)	DIGITAL TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR		
Q220 Q221 Q223 Q224 TH1			DTC124TU FMA5 2SJ144(GR) DTC144WU 157-252-45005	DIGITAL TRANSISTOR TRANSISTOR FET DIGITAL TRANSISTOR THERMISTOR		
TH201			157-252-43001	THERMISTOR		
CONTROL UNIT (W02-1630-15)						
			A33-0413-08	REFLECTOR		
C1 C2 ,3 C4 ,5 C6 ,7 C8 -10			CK73GB1H103K CK73GB1H471K CK73GB1H103K CC73GCH1H101J CK73GB1H471K	CHIP C 0.01UF K CHIP C 470PF K CHIP C 0.01UF K CHIP C 100PF J CHIP C 470PF K		

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TK-240(F)

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CONTROL UNIT (W02-1630-15)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C13 -16			CK73GB1H471K	CHIP C 470PF K		
C19			CC73GCH1H470J	CHIP C 47PF J		
C20			CK73GB1H471K	CHIP C 470PF K		
C23			CK73FB1H223K	CHIP C 0.022UF K		
C24			CC73GCH1H101J	CHIP C 100PF J		
C25 -27			CK73GB1H471K	CHIP C 470PF K		
C28			CK73GB1H103K	CHIP C 0.01UF K		
C29			CK73GB1H222K	CHIP C 2200PF K		
C30			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C31			CK73GB1H122K	CHIP C 1200PF K		
C32			CK73GB1H471K	CHIP C 470PF K		
C33			CK73GB1H103K	CHIP C 0.01UF K		
C34			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C35			CK73GB1H471K	CHIP C 470PF K		
C36			CC73GCH1H101J	CHIP C 100PF J		
C37			CC73GCH1H470J	CHIP C 47PF J		
C38			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
C39			CC73GCH1H101J	CHIP C 100PF J		
C40 -42			CC73GCH1H470J	CHIP C 47PF J		
C43			CC73GCH1H101J	CHIP C 100PF J		
CN2			E29-0484-08	CONNECTOR		
			E40-5344-05	CONNECTOR		
			G13-0966-08	DUMMY CONNECTOR		
			J21-4299-08	MOUNTING HARDWARE		
L1			L33-0737-05	COIL		
X1			L78-0066-05	CRYSTAL (3.58MHZ)		
R1			RK73GB1J184J	CHIP R 180K J 1/16W		
R2			R92-0670-05	CHIP R 0 OHM		
R3 -7			RK73GB1J473J	CHIP R 47K J 1/16W		
R8			RK73GB1J471J	CHIP R 470 J 1/16W		
R11			RK73GB1J183J	CHIP R 18K J 1/16W		
R12			RK73GB1J121J	CHIP R 120 J 1/16W		
R13			RK73GB1J103J	CHIP R 10K J 1/16W		
R14			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R15 -19			RK73GB1J473J	CHIP R 47K J 1/16W		
R22 ,23			R92-0670-05	CHIP R 0 OHM		
R26			R92-0670-05	CHIP R 0 OHM		
R27 ,28			RK73GB1J473J	CHIP R 47K J 1/16W		
R31 ,32			RK73GB1J473J	CHIP R 47K J 1/16W		
R33			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R34			RK73FB1J473J	CHIP R 47K J 1/16W		
R37			RK73GB1J473J	CHIP R 47K J 1/16W		
R39			RK73GB1J473J	CHIP R 47K J 1/16W		
R43 ,44			RK73GB1J473J	CHIP R 47K J 1/16W		
R45			RK73GB1J223J	CHIP R 22K J 1/16W		
R46			RK73GB1J564J	CHIP R 560K J 1/16W		
R48			RK73GB1J274J	CHIP R 270K J 1/16W		
R49 -53			RK73GB1J473J	CHIP R 47K J 1/16W		
R59			RK73GB1J224J	CHIP R 220K J 1/16W		
R60			RK73GB1J473J	CHIP R 47K J 1/16W		
R61			RK73GB1J223J	CHIP R 22K J 1/16W		
R62			RK73GB1J224J	CHIP R 220K J 1/16W		

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CONTROL UNIT (W02-1630-15)

5-TONE UNIT (KFT-3)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R64 R65 R68 R69 R70			RK73GB1J330J RK73GB1J224J R92-1252-05 RK73GB1J564J RK73GB1J101J	CHIP R 33 J 1/16W CHIP R 220K J 1/16W CHIP R 0 ΩHM CHIP R 560K J 1/16W CHIP R 100 J 1/16W		
R71 R72 -74 R75 R76 R78			RK73GB1J102J R92-1252-05 RK73GB1J471J RK73GB1J472J RK73GB1J392J	CHIP R 1.0K J 1/16W CHIP R 0 ΩHM CHIP R 470 J 1/16W CHIP R 4.7K J 1/16W CHIP R 3.9K J 1/16W		
R79 R80 -81 VR1	2A		R92-1252-05 RK73GB1J472J R23-9403-05	CHIP R 0 ΩHM CHIP R 4.7K J 1/16W POTENTIOM. 50K/10K		
S10 -12			S40-1420-05	SWITCH		
MIC1 SP1	2B 1A		T91-0502-05 T07-0257-05	MICROPHONE SPEAKER		
D1 D3 D4 -5 D8 IC1	2A		LN01301C(Q) B30-0842-05 1SS272 DAN202U B38-0346-08	LED LED DIODE DIODE LCD		
IC2 IC3 IC4 IC5 IC6			UPD7225GB-3B7 UNDECIDED S-8054ALB-LM-T1 R90-0711-05 AK93C47	IC(LCD DRIVER) IC(MPU) IC(VOLTAGE DETECTOR) RESISTOR BLOCK IC		
IC7 Q1 Q2 Q3			S-81250HG-RD-T1 2SA1586(Y) DTC114EU DTC123JU	IC(VOLTAGE REGULATOR) TRANSISTOR TRANSISTOR TRANSISTOR		
EN1	2A		W02-1601-05	ENCODER		
5-TONE UNIT (KFT-3)						
			When ordering the 5-TONE unit, quote part number W02-1668-05.			

E: Scandinavia & Europe K: USA P: Canada W: Europe

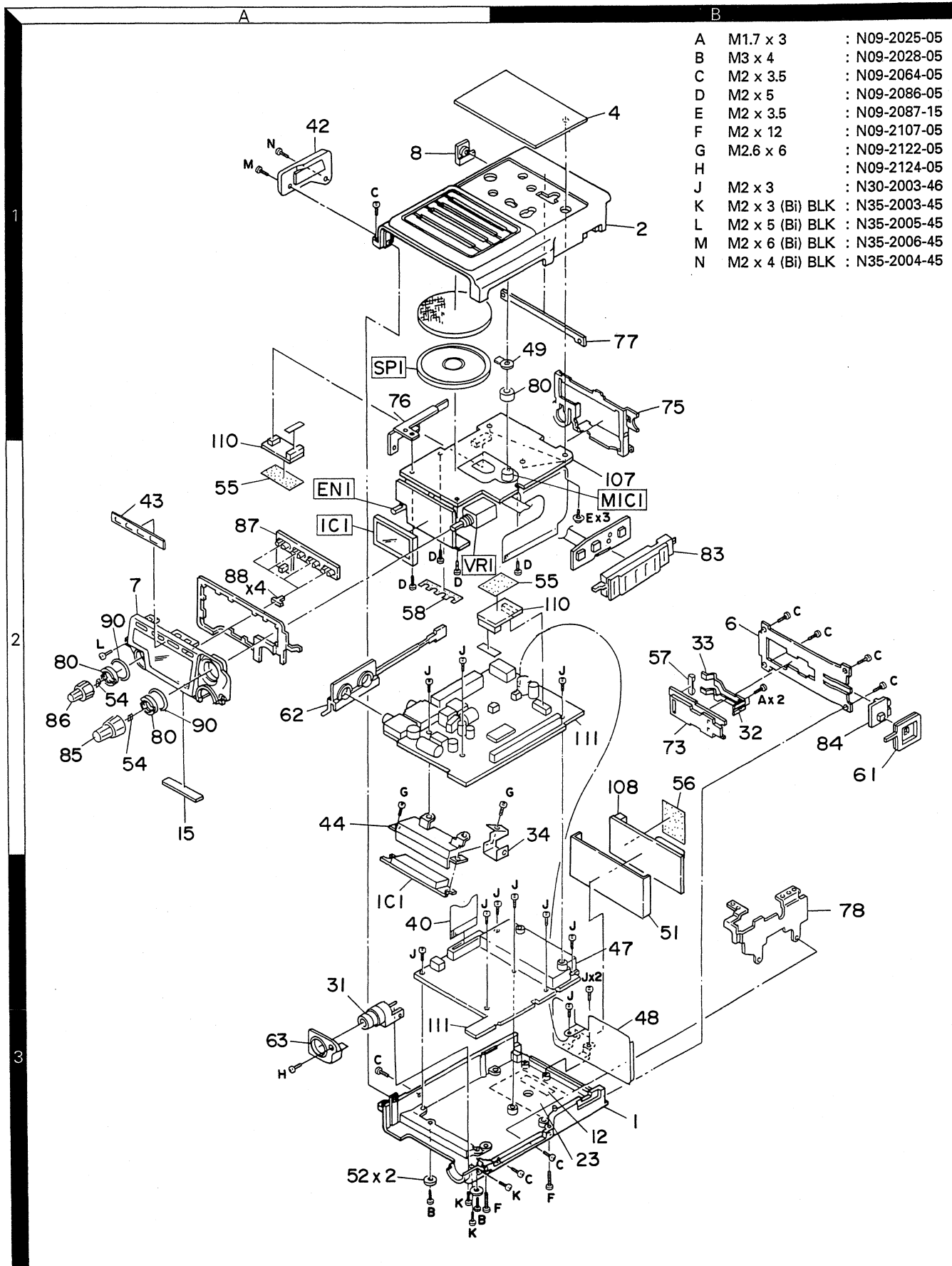
U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

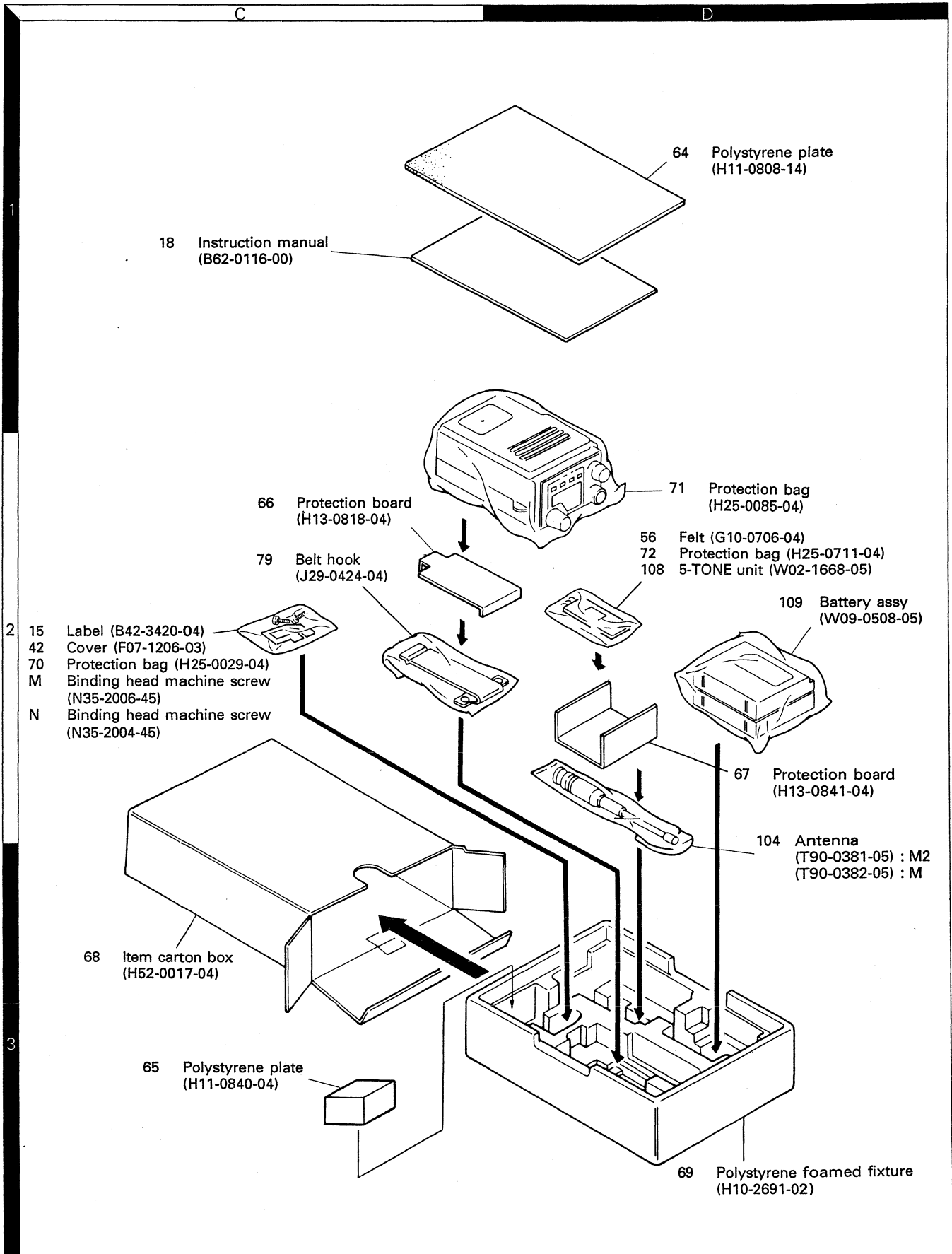
⚠ indicates safety critical components.

TK-240(F)

EXPLODED VIEW



PACKING



ADJUSTMENT

Required Test Equipment

1. Stabilized Power supply

1. The supply voltage can be changed between 5V and 18V, and the current is 3A or more.
2. The standard voltage is 12.0V.

2. DC Ammeter

1. Class 1 ammeter (17 ranges and other features).
2. The full scale can be set to either 300mA or 3A.
3. A cable of less internal loss must be used.

3. Frequency Counter (f. counter)

1. Frequencies of up to 1GHz or so can be measured.
2. The sensitivity can be changed to 250MHz or below, and measurements are highly stable and accurate (0.2ppm or so).

4. Power Meter

1. Measurable frequency : Up to 500MHz
2. Impedance : 50Ω, unbalanced
3. Measuring range : Full scale of 10W or so
4. A standard cable (5D2W 1m) must be used.

5. RF VTVM (RF V.M)

1. Measurable frequency : Up to 500MHz or so

6. Linear Detector

1. Measurable frequency : Up to 500MHz
2. Characteristics are flat, and CN is 60dB or more.

7. Digital Voltmeter

1. Voltage range : FS = 18V or so
2. Input resistance : 1MΩ or more

8. Oscilloscope

1. Measuring range : DC to 30MHz
2. Provides highly accurate measurements for 5 to 25MHz.

9. AF Voltmeter (AF VTVM)

1. Measurable frequency : 50Hz to 1MHz
2. Maximum sensitivity : 1mV or more

10. Spectrum Analyzer

1. Measuring range : DC to 1GHz or more

11. Standard Signal Generator (SSG)

1. Maximum frequency : 500MHz or more
2. Output : -20dB/0.1μV to 120dB/1V
3. Output impedance : 50Ω

12. Tracking Generator

1. Center frequency : 50kHz to 500MHz
2. Frequency deviation : ±35MHz
3. Output voltage : 100mV or more

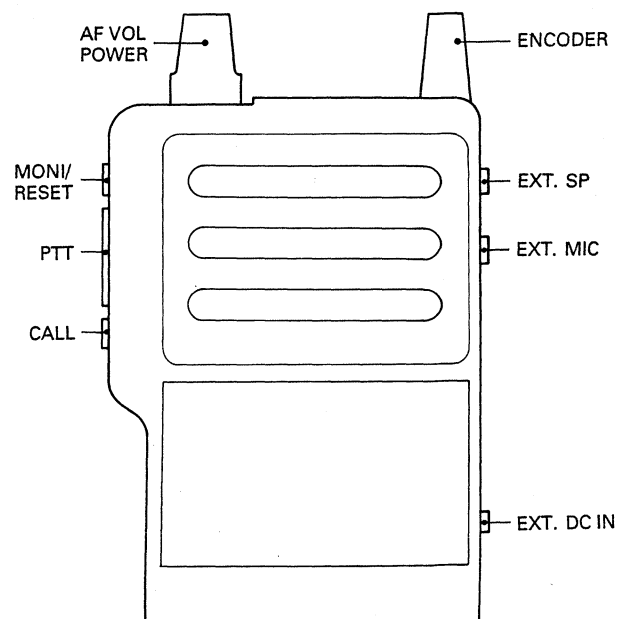
13. Dummy Load

1. 8Ω, 3W or more

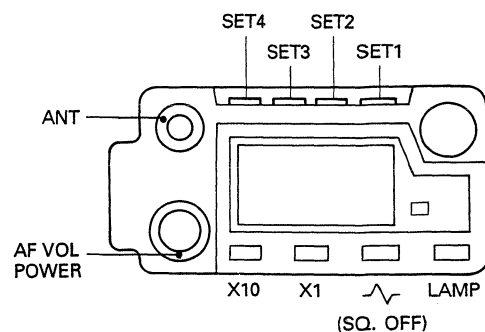
- Use a non-conductive rod such as a Bakelite rod for adjustment (especially of trimmers and coils).
- To protect the SSG, do not send out signals while adjusting the receiving unit.
- The indicated SSG output levels are for maximum output.

Version	Frequency range	Remark	
M	150~174MHz	IF1	34.400MHz
		LOC	34.855MHz
M2	136~150MHz	IF1	30.825MHz
		LOC	30.370MHz

Front side view



Panel side view



ADJUSTMENT

Adjustment Point

TX-RX unit (X57-3820-XX) (A/2)
Component side view

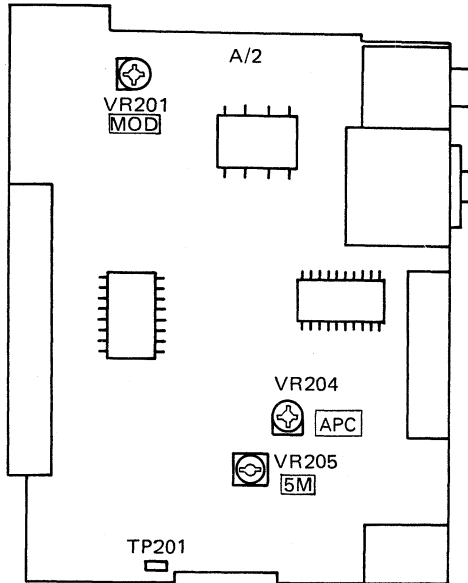


Fig. 1

TX-RX unit (X57-3820-XX) (B/2)
Component side view

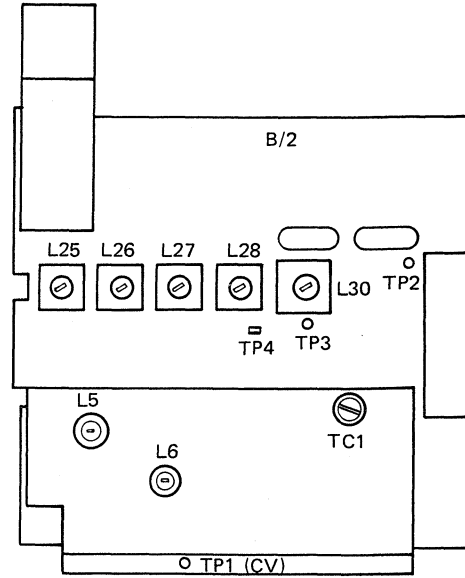


Fig. 2

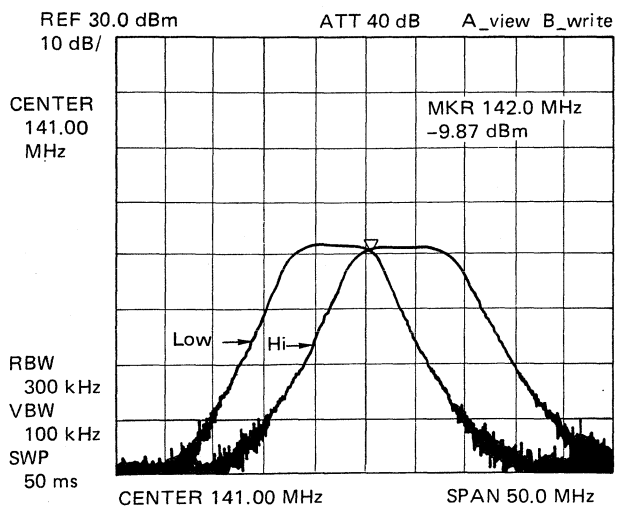


Fig. 3 Version M2

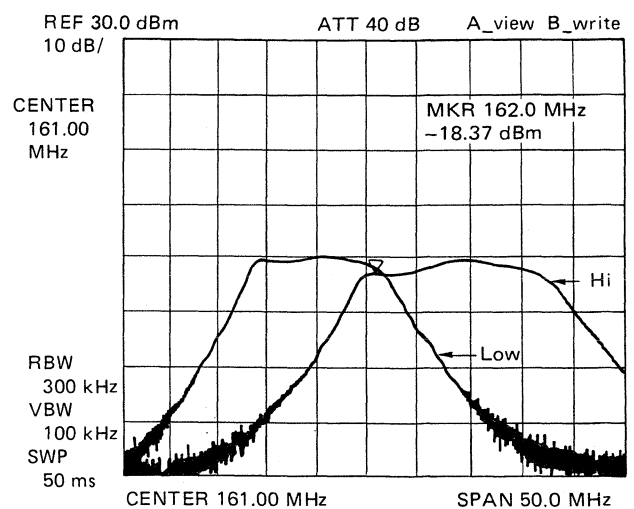


Fig. 4 Version M

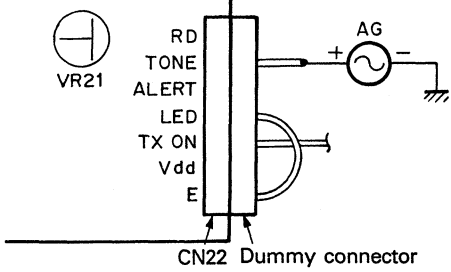
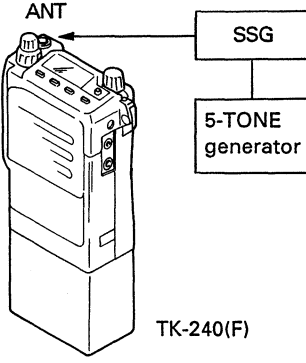
TK-240(F)

ADJUSTMENT

Alignment

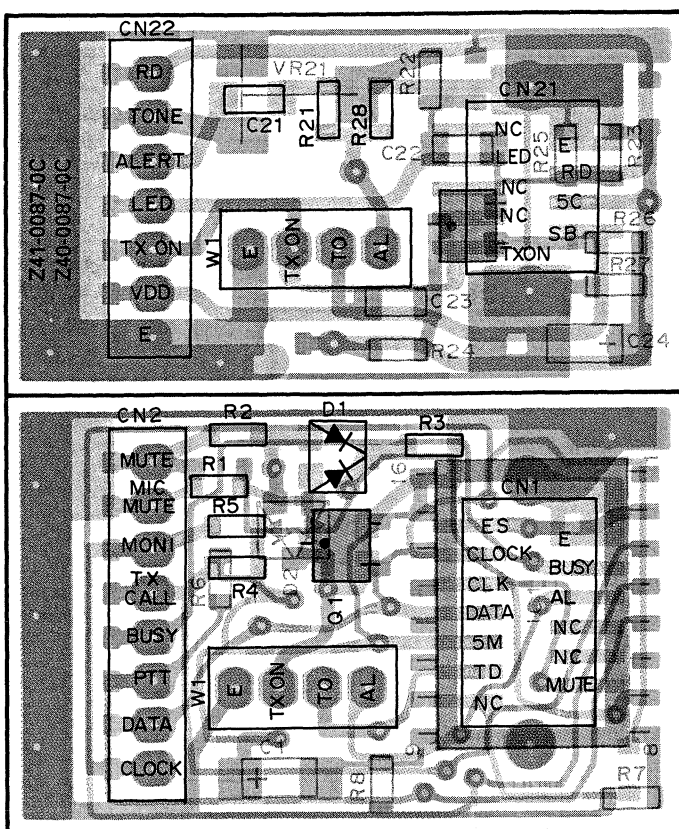
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) POWER SW : OFF 2) EXT. DC IN : 13.8V POWER SW : ON * If there is no SSG modulation specification, standard modulation is used (MOD : 1kHz, DEV : ± 3 kHz, AF output : 0.63V/8 Ω)							
2. 5M ADJ.		DVM	TX-RX (a/2)	TP201	TX-RX (A/2)	VR205	4.8V	4.76~4.84V
3. Write the requested frequencies in the TK-240(F).								
4. PLL lock voltage check	1) CH : Channel with highest TX freq' (fTH). PTT : ON	DVM	TX-RX (B/2)	TP1	TX-RX (B/2)	L5	3.8V M 3.6V M2	3.79~3.81V M 3.59~3.61V M2
	2) CH : Channel with highest RX freq' (fRH).					L6	3.9V M 3.6V M2	3.89~3.91V M 3.59~3.61V M2
	3) CH : Channel with lowest TX freq' (fTL). PTT : ON						Check	1.2~1.6V M 1.6~2.0V M2
	4) CH : Channel with lowest RX freq' (fRL).							1.1~1.5V M 1.5~1.9V M2
5. Transmit frequency adjustment	1) CH : Channel with center TX freq' (fTM) PTT : ON	f. counter		ANT	TX-RX (B/2)	TC1	Freq' adj. of TX	± 500 Hz
6. Power (APC) adjustment	1) CH : Channel with center TX freq' (fTM) PTT : ON * Must be performed in a short time.	Power meter		ANT	TX-RX (A/2)	VR204	MAX	5.5W or more ON AIR must light
	2) CH : Channel with lowest and highest TX freq' (fTL or fTH). (Adjust with lower power) PTT : ON	DC ammeter					5.0W Turn VR204 counterclockwise.	1.8A or less
	3) CH : TX freq' (fTM) TX freq' (fTL) and (fTH) (When adjustment is made with fTL, confirm with fTH). PTT : ON						Check	5.0~6.5W 1.8A or less
	4) DC IN : 8.5V CH : TX freq' (fTM) TX freq' (fTL) TX freq' (fTH) PTT : ON						Check	1.5W or more 1.4A or less
7. Maximum deviation adjustment	1) Connect the AG to the MIC terminal AG : 1kHz/150mV Deviation meter filter LPF : 20kHz HPF : OFF De-emphasis : OFF CH : Channel with center TX freq' (fTM). PTT : ON	Power meter AG Deviation meter AF V.M		ANT	TX-RX (A/2)	VR201	± 4.2 kHz	± 100 Hz

ADJUSTMENT

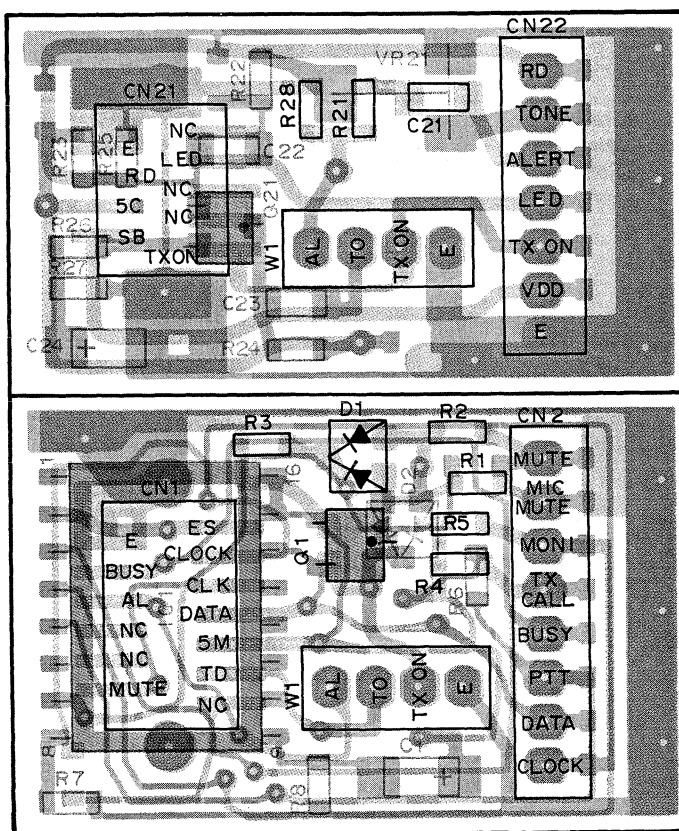
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
8. 5-TONE deviation adjustment	1) Before installing the 5-TONE unit, connect the AG (between the TONE terminal and ground) to the 7-pin connector (CN22) without removing the dummy connector (7-pin and 8-pin) between the signaling units. AG : 1KHz/750mV Deviation meter filter LPF : 3kHz HPF : 50Hz De-emphasis : 750μs PTT : ON After adjusting the deviation, disconnect the dummy connector and install the 5-TONE unit.	Power meter Deviation meter		ANT	Signaling	VR21	±2kHz adj.	±100Hz
		SIGNALING UNIT (X52-3200-20) (B/2) Remove the fiber sheet of signaling unit (B/2) for VR21. 						
9. 5-TONE decode operation check	1) SSG output : 0.5μV/-113dBm MOD: 1kHz DEV : ±3kHz Match to the receive code of the set.	SSG					Check	A whistling sound is produced when 5-TONE matches.
								
10. BPF (Hi)	1) Tracking generator output : -40dBμ Connect the spectrum analyzer to TP4.	Tracking generator Spectrum analyzer	TX-RX (B/2)	ANT	TX-RX (B/2)	L25~L28	Fig. 3 M2 Fig. 4 M	
11. BPF (Low)	1) Tracking generator output : -40dBμ Connect the spectrum analyzer to TP4.			TP4			Fig. 3 M2 Fig. 4 M	
12. Sensitivity	1) CH : Channel with center RX freq' (f _{RM}). Channel with highest RX freq' (f _{RH}). Channel with lowest RX freq' (f _{RL}). SSG freq' : CH (f _{RH} ~f _{RL}) output : 0.32μV/-117dBm	Oscilloscope AF V.M Distortion meter SSG		EXT. SP	TX-RX (B/2)		Check	12dB SINAD or more
	2) SSG output : 1mV/-47dBm					L30	Distortion MIN	
13. Major input S/N	1) CH : Channel with center RX freq' (f _{RM}). SSG output : 501μV/-53dBm AF output : 0.63V/8Ω	Oscilloscope AF VTVM SSG		EXT. SP ANT			Check	40dB or more
14. Squelch power consumption	1) CH : Channel with center RX freq' (f _{RM}). SSG output : OFF	Oscilloscope AF V.M DC ammeter SSG					Check	Power consumption 75mA or less
	2) SSG output : 0.2μV/-121dBm							Squelch must be opened
	3) SSG output : OFF							Squelch must be closed

TK-240(F) PC BOARD VIEWS

SIGNALING UNIT (X52-3200-20) Component side view



SIGNALING UNIT (X52-3200-20) Foil side view

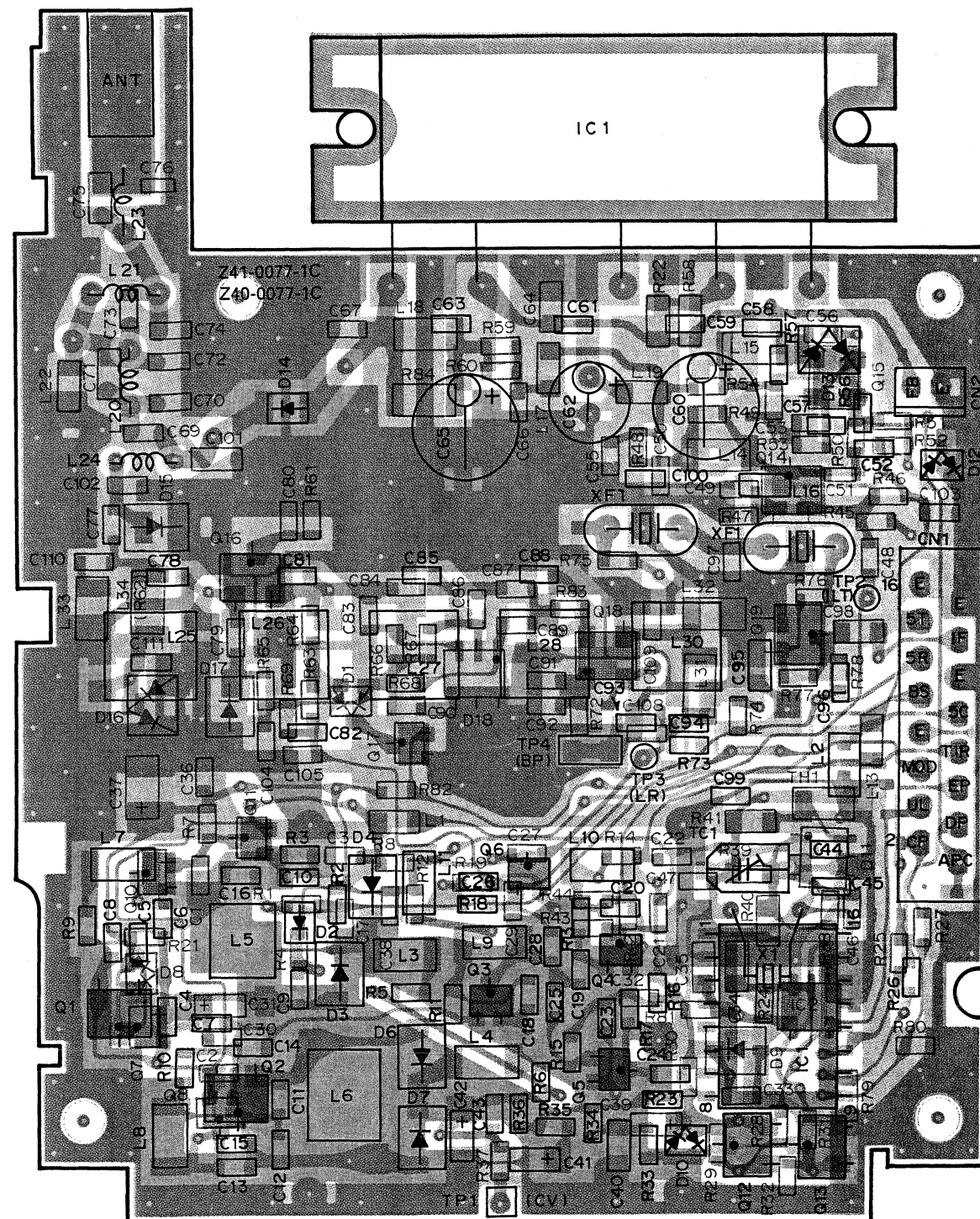


 : Component side
 : Foil side

TK-240(F) PC BOARD VIEWS

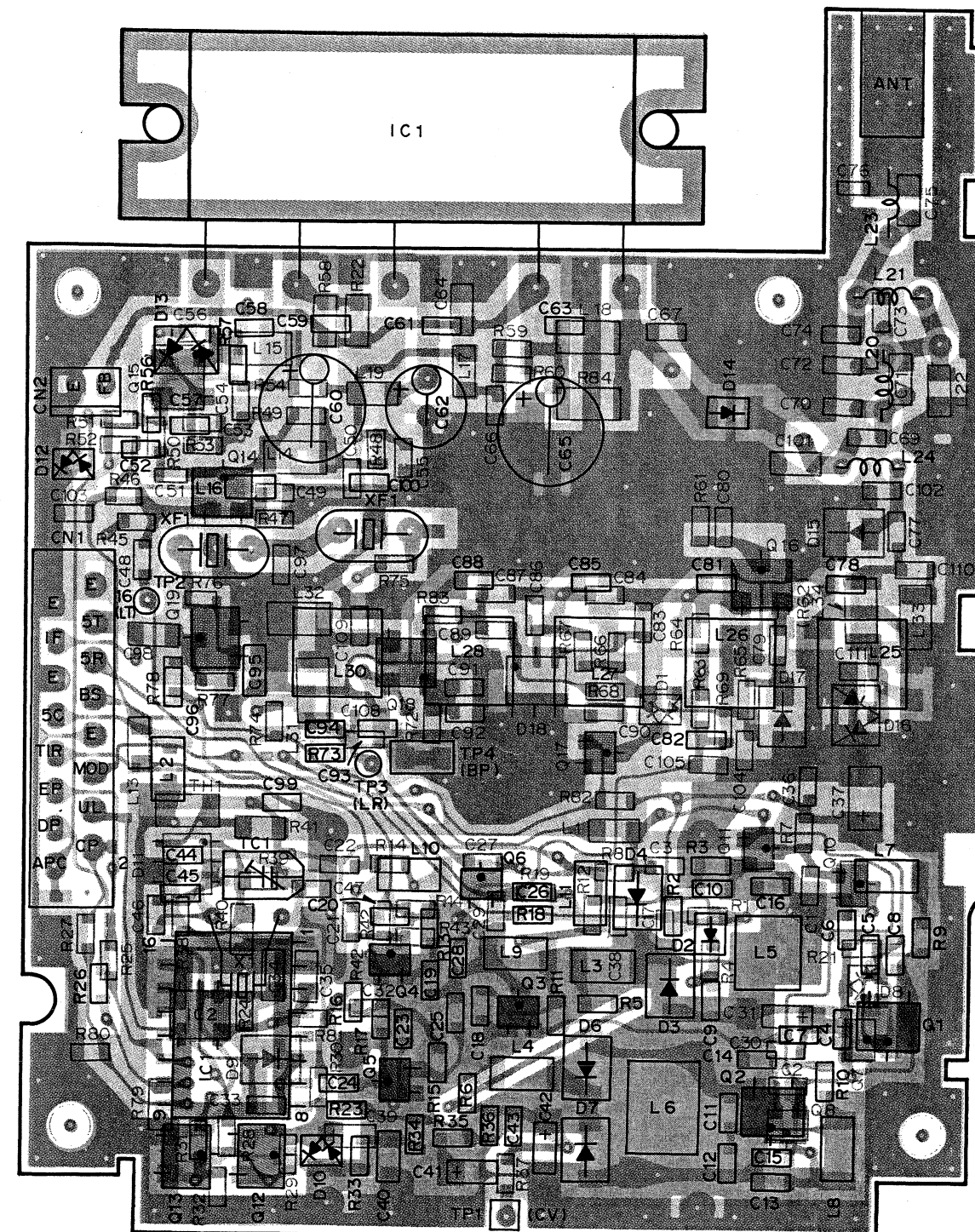
TX-RX UNIT (X57-3820-XX) (B/2) -20 : M -21 : M2

Component side view



TX-RX UNIT (X57-3820-XX) (B/2) -20 : M -21 : M2

Foil side view



□ : Component side
■ : Foil side

DTC114EU
DTC123JU
DTC144WU
2SA1312
2SA1586
2SC3324
2SC4083
2SC4117
2SC4215



2SK302



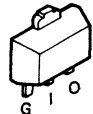
2SK238



S-8054ALB-LM-T1



S-81250HG-RD-T1



2SC4093
3SK184



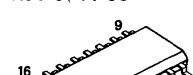
AK93C47
TC4S11F



M67748LR
M67748HR



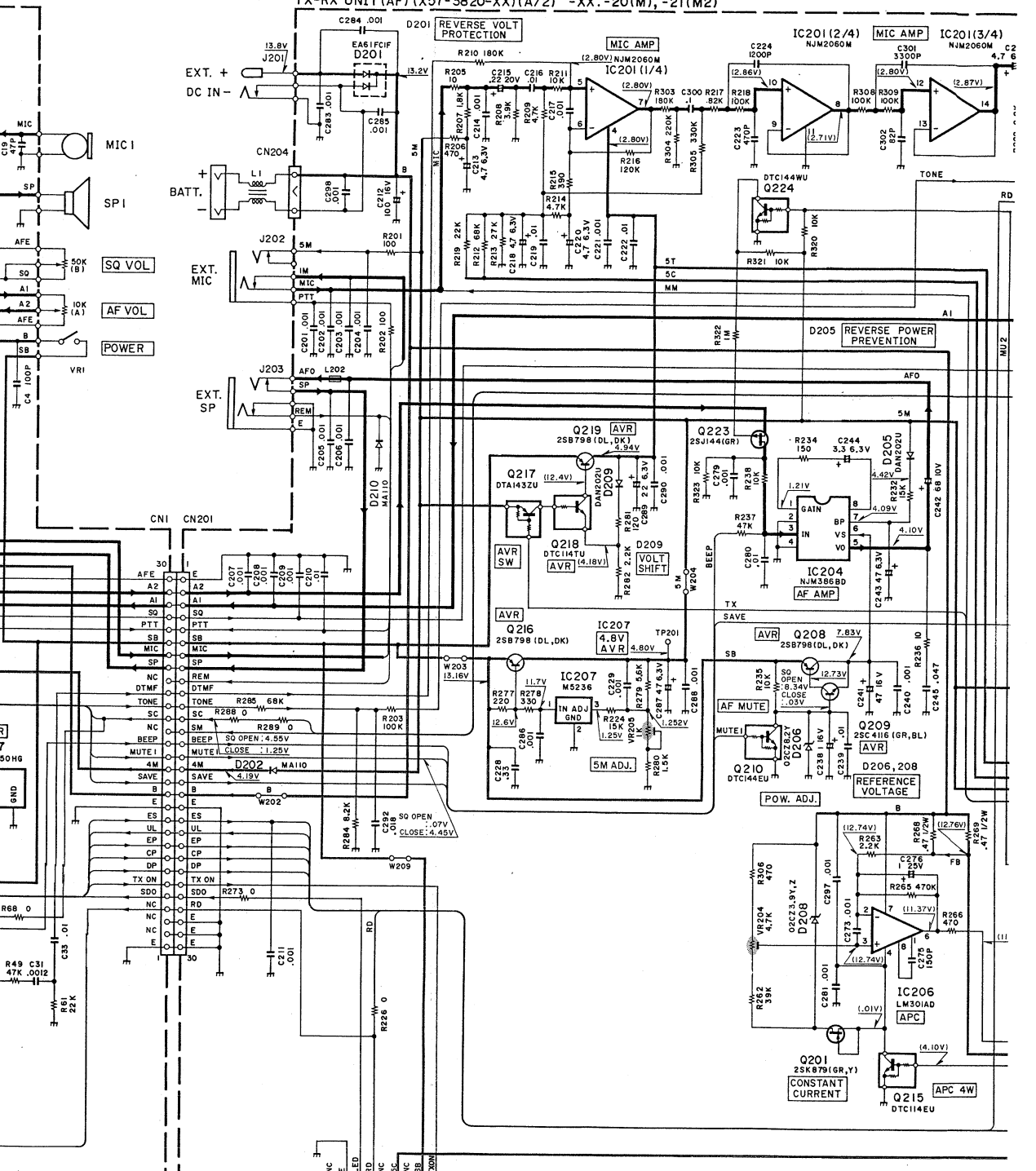
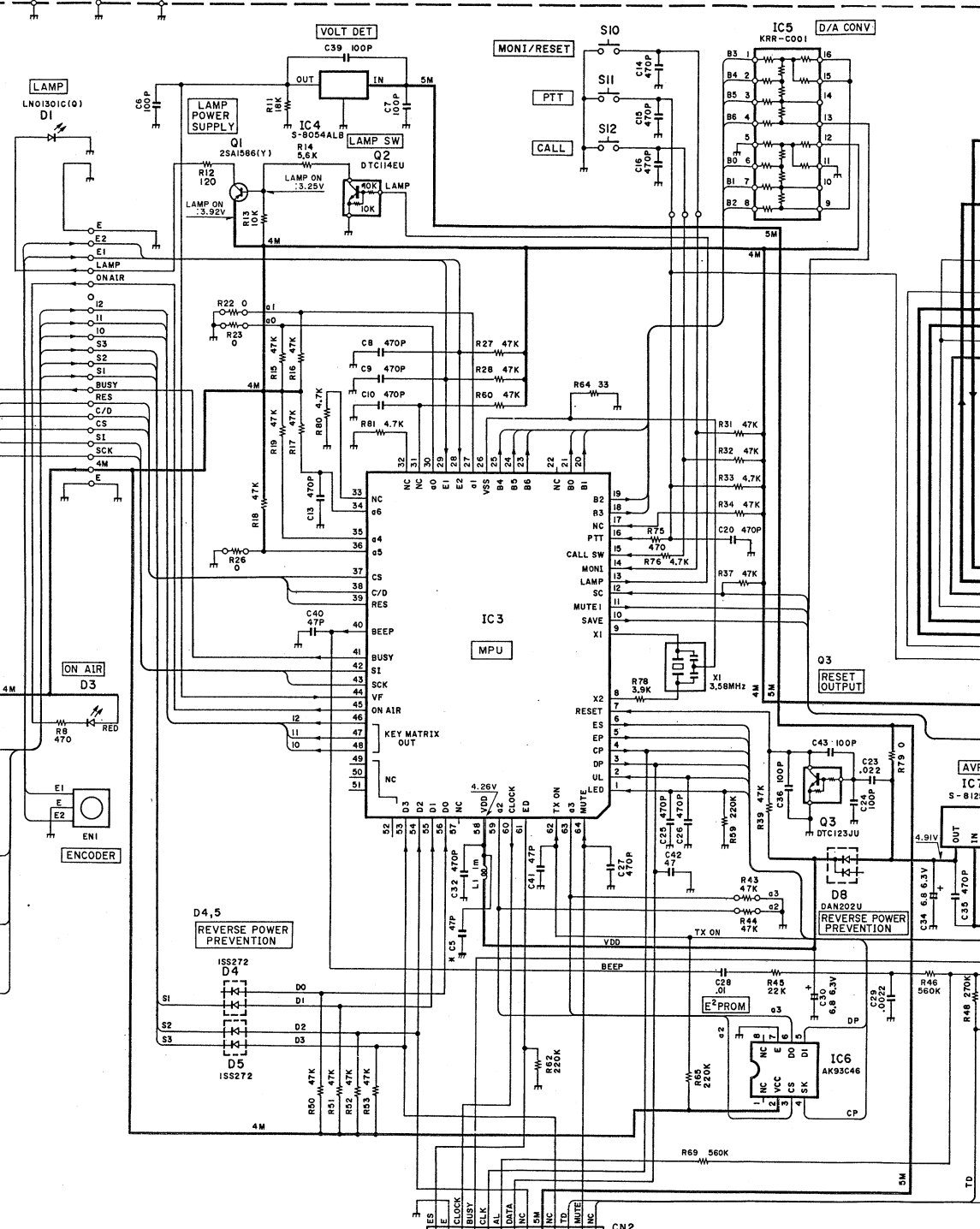
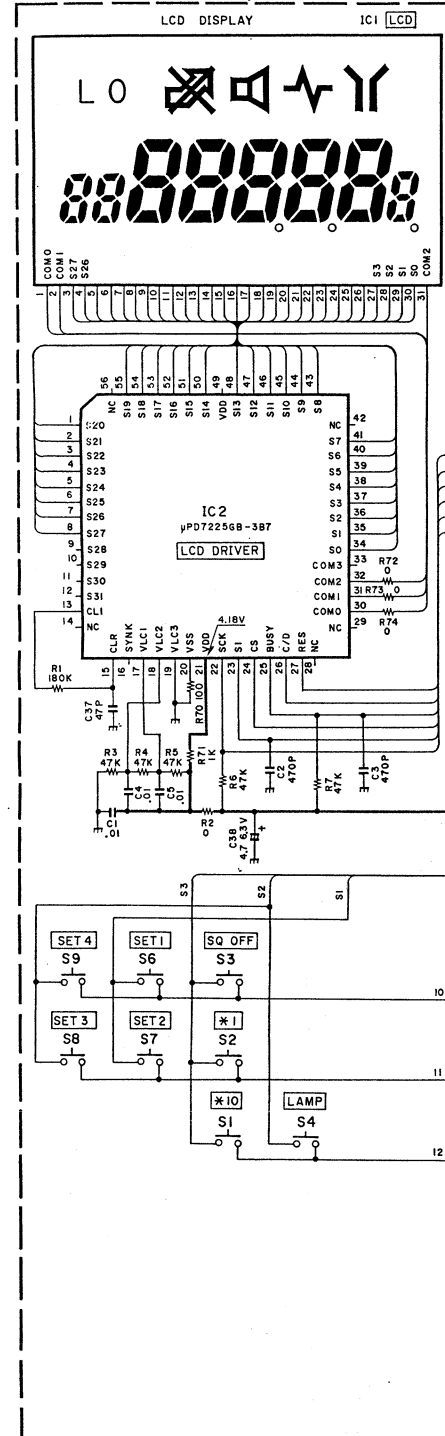
MB1504
R90-0711-05



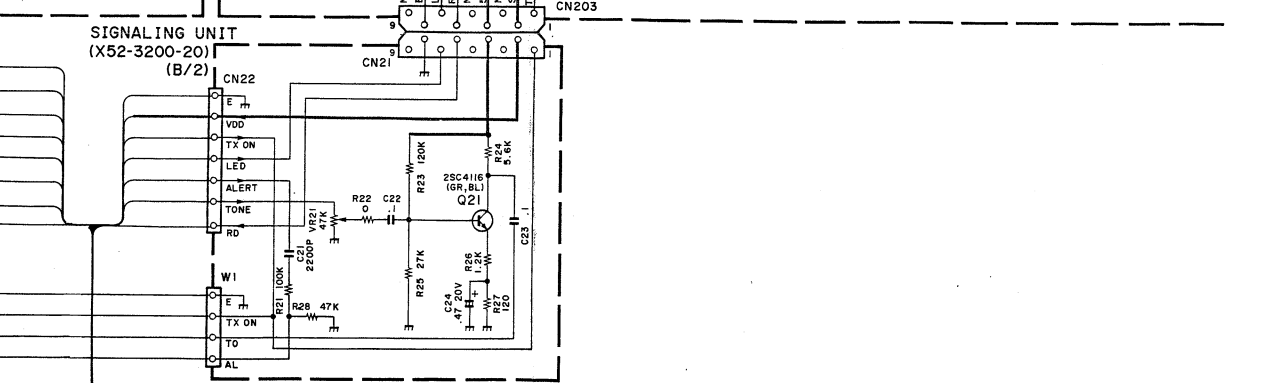
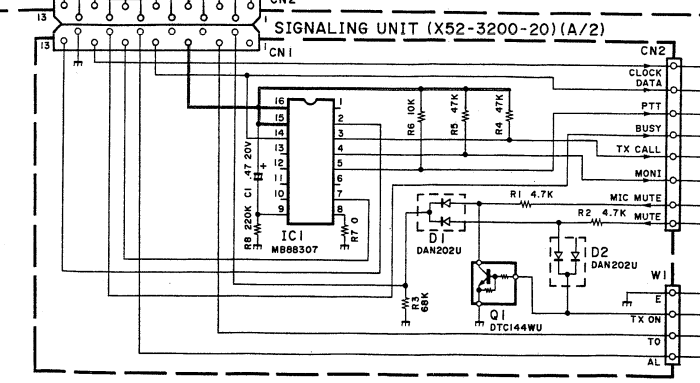
μPD7225GB-3B7



CONTROL UNIT (W02-1630-15)

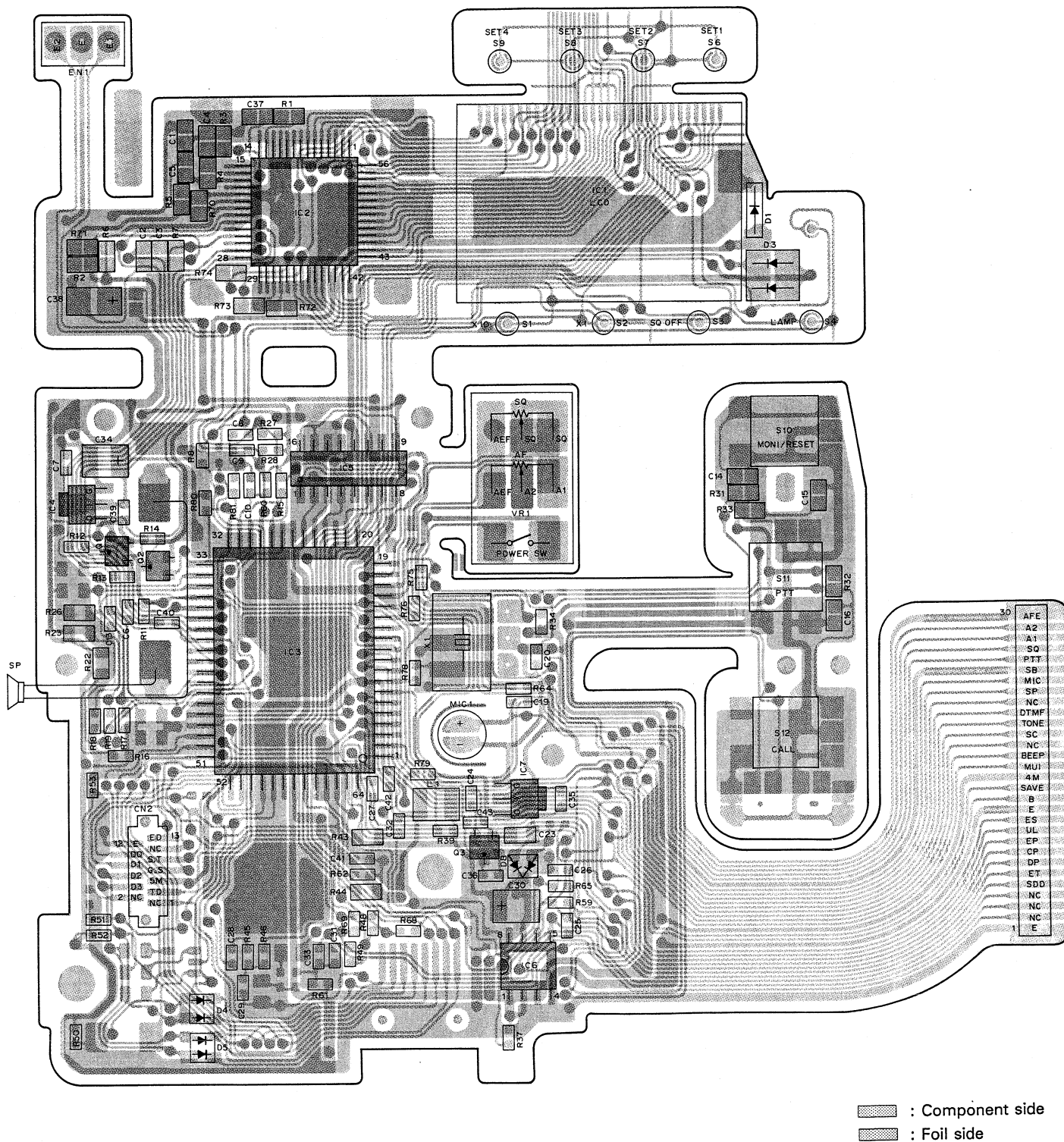


TK-240F(M)	0-XX	C5
TK-240F(M2)	0-20	NO
TK-240F(M2)	0-21	YES



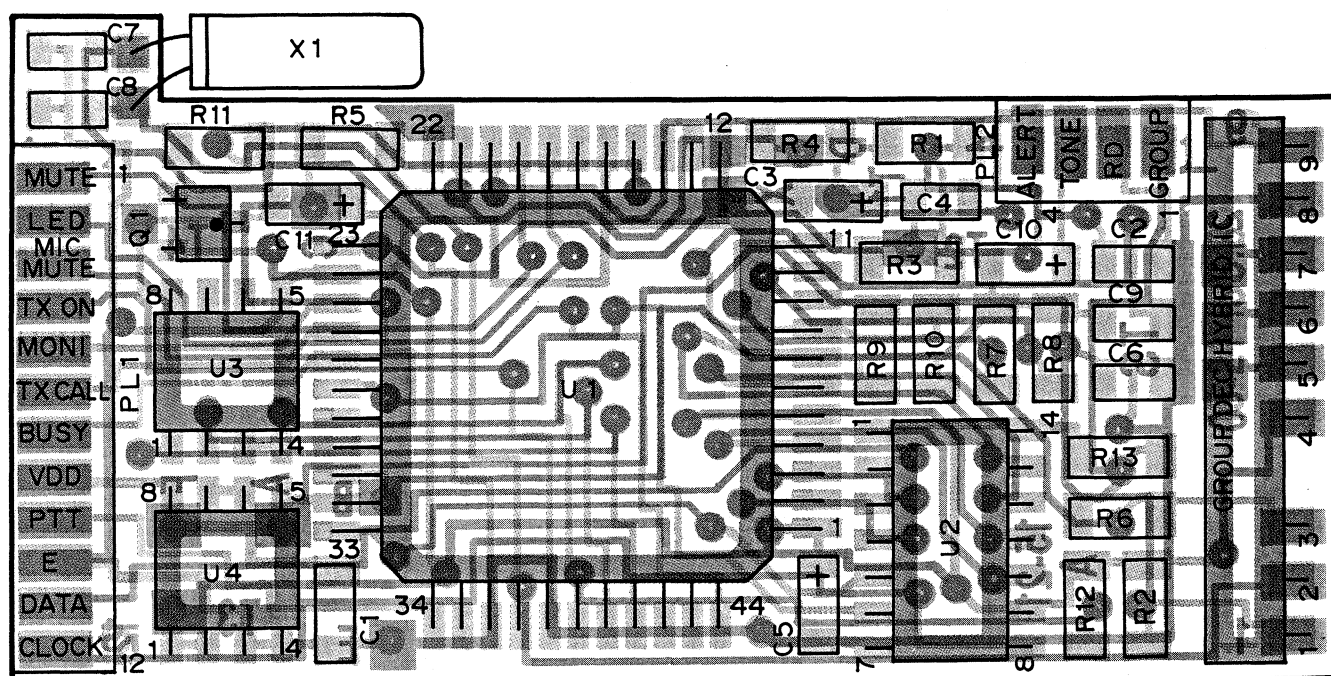
PC BOARD VIEW TK-240(F)

CONTROL UNIT (W02-1630-15) Component side view



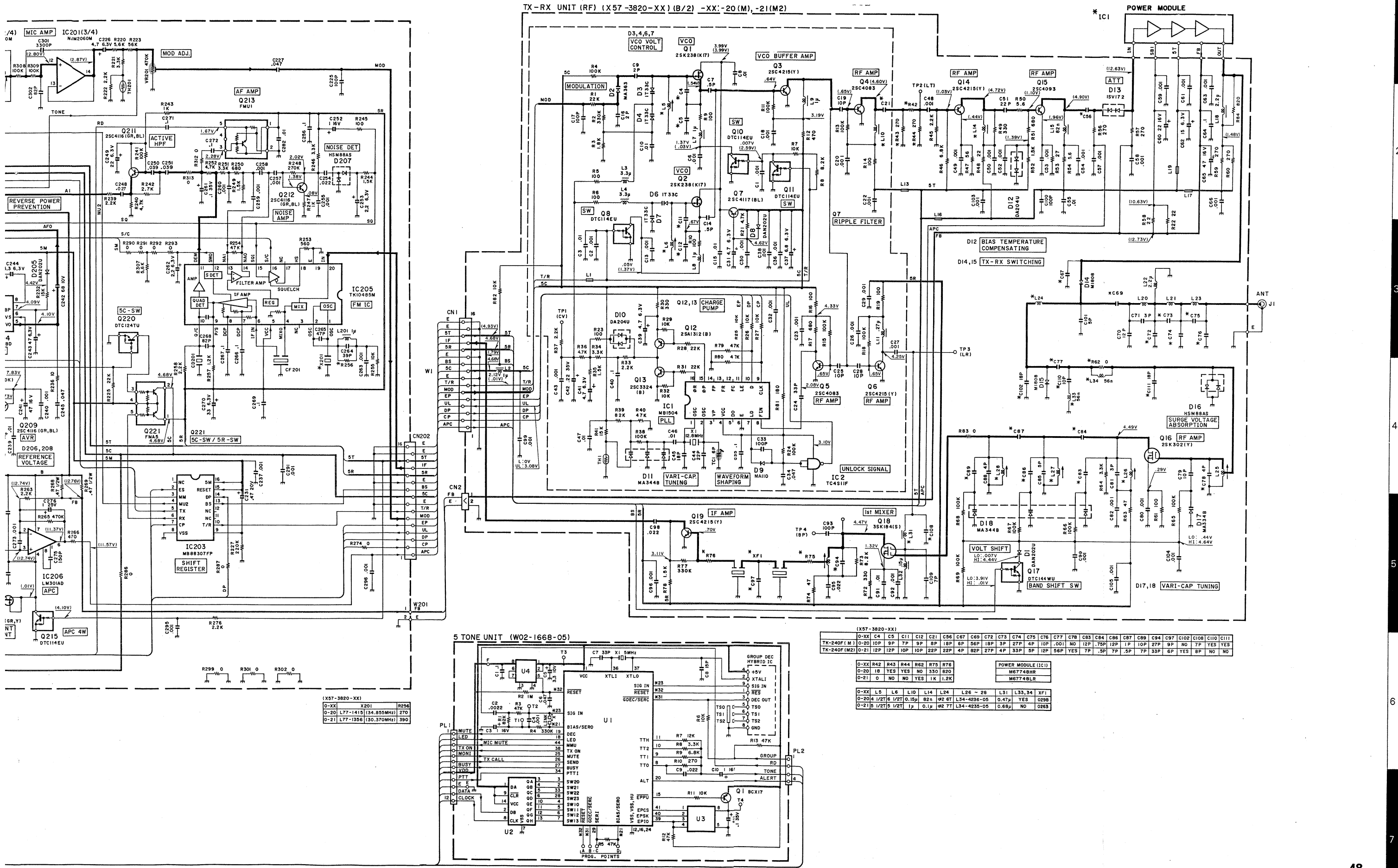
TK-240(F) PC BOARD VIEW

5-TONE UNIT (W02-1668-05) Component side view



 : Component side
 : Foil side

SCHEMATIC DIAGRAM TK-240(F)



BLOCK DIAGRAM



SPECIFICATIONS

GENERAL

Frequency Range	150 to 174MHz : M type 136 to 150MHz : M2 type
Number of Channels	16 semi-duplex channels
Channel Spacing	30kHz (PLL channel step 5kHz)
Selective Calling	5 tone encode, decode ZVEI (ZVEI-1, ZVEI-2, DZVEI, PZVEI), EEA, CCIR, NATEL, EIA
Battery Voltage	7.5V (with KNB-5 or KNB-6) 12.5V (with KNB-7A)
Temperature Range	-30°C to +60°C (-22°F to +140°F)
Battery Life	More than 8 hours with KNB-6 battery (5-5-90 duty cycle)
Dimensions and Weight	
With KNB-5 (7.5V, 600mA battery)	5.69" (144.5mm) H x 2.28" (58mm) W x 1.16" (29.5mm) D, 14.10ozs. (400g)
With KNB-6 (7.5V, 1100mA battery)	7.38" (187.5mm) H x 2.28" (58mm) W x 1.16" (29.5mm) D, 17.64ozs. (500g)
With KNB-7 (12.5V, 600mA battery)	7.38" (187.5mm) H x 2.28" (58mm) W x 1.16" (29.5mm) D, 17.64ozs. (500g)
Applicable MIL-STD	MIL 810D rain method 506.2, procedure 2

RECEIVER (Measurements made per EIA standard EIA-316-B)

Sensitivity	
EIA 12dB SINAD	0.25μV
20dB Quieting	0.35μV
Squelch Sensitivity	0.16μV threshold
Modulation Acceptance	±7kHz
Selectivity	-70dB
Intermodulation	-65dB
Spurious Rejection	-70dB
Image Rejection	-70dB
Audio Power Output	250mW at less than 5% distortion (300mW with KNB-7 battery)
Frequency Stability	±0.0005% from -30°C to +60°C
Channel Frequency Spread	24MHz

TRANSMITTER (Measurements made per EIA standard EIA-316-B)

RF Power Output	5W with KNB-7 battery 2W with KNB-5 or KNB-6 battery
Spurious and Harmonics	-70dB
Modulation	F3E, ±5kHz for 100% at 1000Hz
FM Noise	-45dB
Microphone Impedance	High impedance
Audio Distortion	1.0% at 1000Hz
Frequency Stability	±0.0005% from -30°C to +60°C
Channel Frequency Spread	24MHz

Radio specifications may vary in accordance with the type accepted local national regulations (including 12.5kHz narrow channel spacing).