COMPACT SYNTHESIZED
UHF FM TWO-WAY RADIO

TK-710

SERVICE MANUAL

KENWOOD

B51-3317-00(O)2341

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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 date. 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 if someone is within two feet (0.6 meter) of the antenna.
- 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.
- All equipment should be properly grounded before power-up for safe operation.
- This equipment should be serviced by a qualified technician only.

FCC COMPLIANCE AND TYPE NUMBERS

Type acceptance number	Frequency range	Compliance
ALH9TKTK-710-1	150~162MHz	Part 15, 22, 74 and 90
ALH9TKTK-710-2	162~174MHz	

1. POWER-UP

To turn on the radio, rotate the OFF-VOLUME control clockwise until a click is heard. The channel indicator will illuminate to indicate power is ON.

2. TO RECEIVE

Operation	Procedure
1. Disable QT (if so equipped)	Remove microphone from its hanger.
2. Unsquelch radio	Turn SQUELCH control counterclockwise until noise is heard.
3. Set VOLUME control	Adjust VOLUME control for a normal listening level.
4. Set SQUELCH control	Advance SQUELCH control clockwise until noise just stops.
5. Select operating frequency. (Multichannel models only)	Rotate CH selector switch to desired channel.
The radio will now receive all traffic on the selected channel.	
6. Enable QT (if so equipped)	Insert microphone back into its hanger to activate KQT-7 or KMS-4.
You will now hear messages for your system only.	

3. TO TRANSMIT

Operation	Procedure
1. Disable QT (if so equipped)	Depress MONITOR button ON. – or – Remove microphone from hanger.
2. Select operating frequency. (Multichannel models only)	
3. LISTEN	DO NOT TRANSMIT if channel is in use.
4. Key transmitter	Press and hold the microphone PTT switch. The Red LED on the front panel will glow indicating the transmitter is ON.
5. Transmit message	Hold microphone at about 2 inches distance and speak at a normal voice level. Keep transmissions brief.
6. Receive reply	Release the microphone PTT switch.
7. Enable QT at end of the conversation. (if QT equipped)	Depress MONITOR to the out position. and Replace the microphone into its hanger.

GENERAL

PRE-INSTALLATION CONSIDERATIONS

1. UNPACKING

Unpack the radio from its shipping container and check for accessory items. If any item is missing, please contact KENWOOD immediately.

2. LICENSING REQUIREMENTS

Federal regulations require a station license for each radio installation (mobile or base) be obtained by the equipment owner. The licensee is responsible for ensuring transmitter power, frequency, and deviation are within the limits permitted by the station license.

Transmitter adjustments may be performed only by a licensed technician holding an FCC first, second or general class commercial radiotelephone operator's license. There is no license required to install or operate the radio.

3. PRE-INSTALLATION CHECKOUT

3-1. Introduction

Each radio is adjusted and tested before shipment. However, it is recommended that receiver and transmitter operation be checked for proper operation before installation.

3-2. Testing

The radio should be tested complete with all cabling and accessories as they will be connected in the final installation. Transmitter frequency, deviation, and power output should be checked, as should receiver sensitivity, squelch operation, and audio output. QT equipment operation should be verified.

4. PLANNING THE INSTALLATION

4-1. General

Inspect the vehicle and determine how and where the radio antenna and accessories will be mounted.

Plan cable runs for protection against pinching or crushing wiring, and radio installation to prevent overheating.

4-2. Antenna

The favored location for an antenna is in the center of a large, flat conductive area, usually at the roof center. The trunk lid may also provide a good antenna location. If the trunk lid is prefered, bond the trunk lid and vehicle chassis using ground straps to ensure the lid is at chassis ground.

4-3. Radio

The universal mount bracket allows the radio to be mounted in a variety of ways. Be sure the mounting surface is adequate to support the radio's weight. Allow sufficient space around the radio for air cooling. Position the radio close enough to the vehicle operator to permit easy access to the controls when driving.

4-4. DC Power and wiring

1. This radio may be installed in negative ground electrical systems only. Reverse polarity will cause the cable fuse to blow. Check the vehicle ground polarity before installation to prevent wasted time and effort.
2. Connect the positive power lead directly to the vehicle battery positive terminal. Connecting the Positive lead to any other positive voltage source in the vehicle is not recommended.

CAUTION:

If DC power is to be controlled by the vehicle ignition switch, a switching relay should be used to switch the positive power lead. The vehicle ignition switch then controls DC to the relay coil.

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3. Connect the ground lead directly to the battery negative terminal.
4. The cable provided with the radio is sufficient to handle the maximum radio current demand. If the cable must be extended, be sure the additional wire is sufficient for the current to be carried and length of the added lead.

5. INSTALLATION PLANNING – CONTROL STATIONS

5-1. Antenna system

Control station. The antenna system selection depends on many factors and is beyond the scope of this manual. Your KENWOOD dealer can help you select an antenna system that will best serve your particular needs.

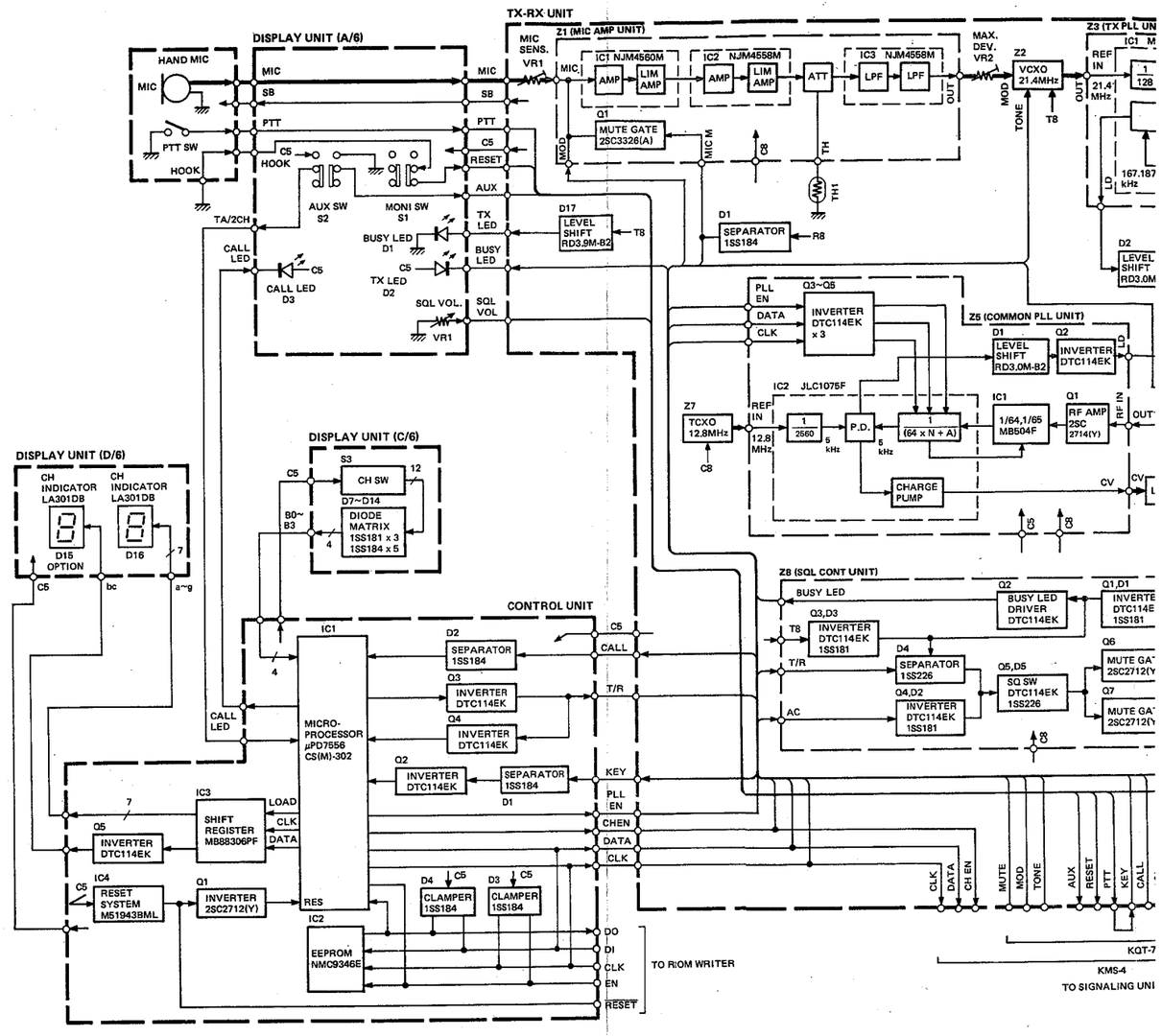
5-2. Radio location

Select a convenient location for your control station radio which is as close as practical to the antenna cable entry point. Secondly, use your system's power supply (which supplies the voltage and current required for your system). Make sure sufficient air can flow around the radio and power supply to allow adequate cooling.

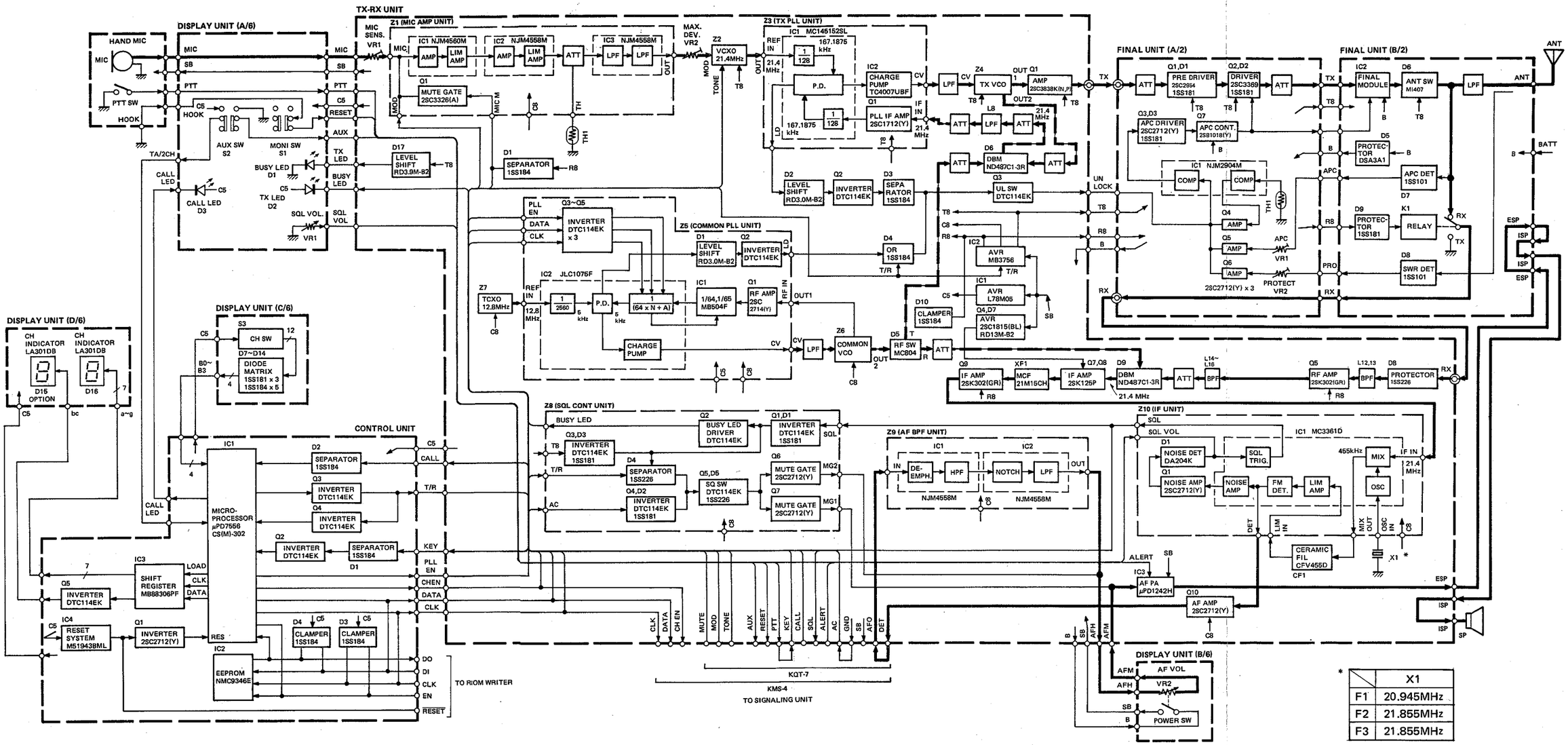
SERVICE

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

BLOCK DI



BLOCK DIAGRAM

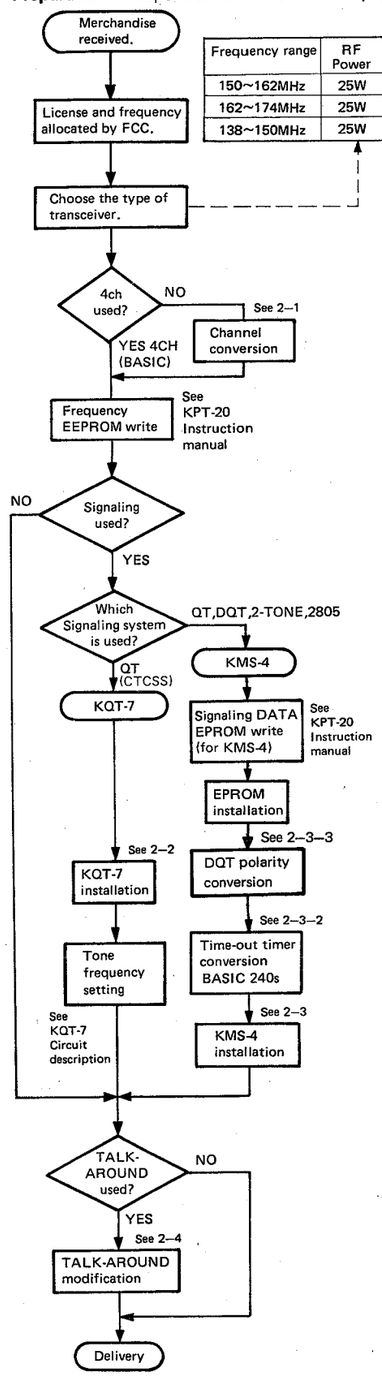


*	X1
F1	20.945MHz
F2	21.855MHz
F3	21.855MHz

SYSTEM SET-UP/INSTALLATION AND CONVERSION

1. SYSTEM SET-UP

Preparation : Prepare an EEPROM writer, KPT-20.



Frequency range	RF Power	Type
150~162MHz	25W	TK-710 K,M
162~174MHz	25W	TK-710 K2, M2
138~150MHz	25W	TK-710 M3

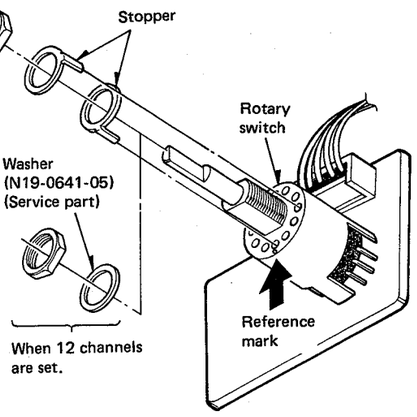
Fig. 1

2. INSTALLATION AND CONVERSION

2–1. Change of the number of channels used

1) Change of the stopper position of the rotary switch

1. Insert a stopper into the hole indicated by the reference mark.
2. Turn the shaft fully counterclockwise.
3. Insert the second stopper into the hole following the number of holes equal to the number of channels to be set. (In the **Fig. 2–1**, 8 channels are set.)
4. To set 12 channels, remove the two stoppers, insert a washer (service part) (N19-0641-05), and tighten the nut.



Front view of rotary switch (example of 8 channels are set)

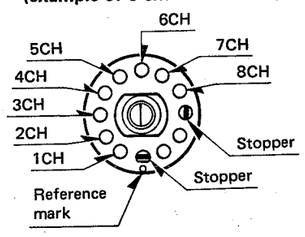


Fig. 2–1

INSTALLATION AND CONVERSION

2) Addition of channel LED (D15)

When the number of channels used is 10 to 12, the system is modified as follows to display the high-order digit of the channel LED.

1. Remove the front panel, and release the lugs retaining the Display unit (X54-3030-10) (D/6) (PC board with a 7 segment LED), then remove the Display unit from the front panel.
2. Solder the optional LED (LA301DB : D15) to the (D/6) PC board. At this time, align the decimal point mark of the LED with the silk mark.
3. Fasten the (D/6) PC board on the front panel, and mount the front panel on the chassis.

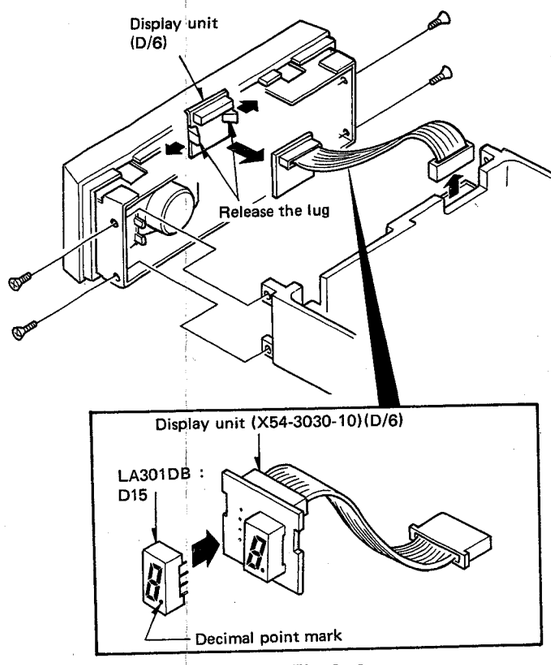


Fig. 2–2

2–2. Installation of KQT-7

1. Remove the six screws holding the shield case, and remove the shield case (❶).
2. Disconnect the 12-pin jumper plug of the TX-RX unit from the connector (CN10) (❷).
3. Pass the leads (CN1 and CN2) with their connectors through the supplied bushing.
4. Insert the bushing into the shield case (❸).
5. Mount the KQT-7 on the shield case with four binding screws (❹).
6. Insert the leads with their connectors as follows: (❺)

KQT-7		TX-RX unit
CN1 (12P)	→	CN10
CN2 (4P)	→	CN2

7. Install the shield case on the front with the six screws (❻).

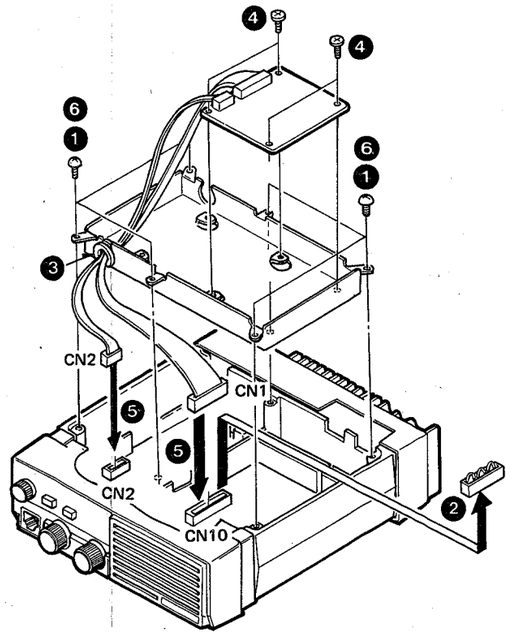


Fig. 2–3

2–3. Installa

1. Installatio

1) Remove t
move the
2) Disconnec
from the
3) Pass the l
the suppli
4) Insert the
5) Mount th
screws (
6) Insert the

7) Install th
(❻).
Note : The 2
this c

2. Time-out t

A differen
and R66) or
the time-out.

Time(s)	R63
∞	X
30	X
60	X
90	X
120	X
150	O

O : Used X : (

3. DQT polar

Polarity switc

	MO
TK-710 (K, M	
TK-710 (K2,	

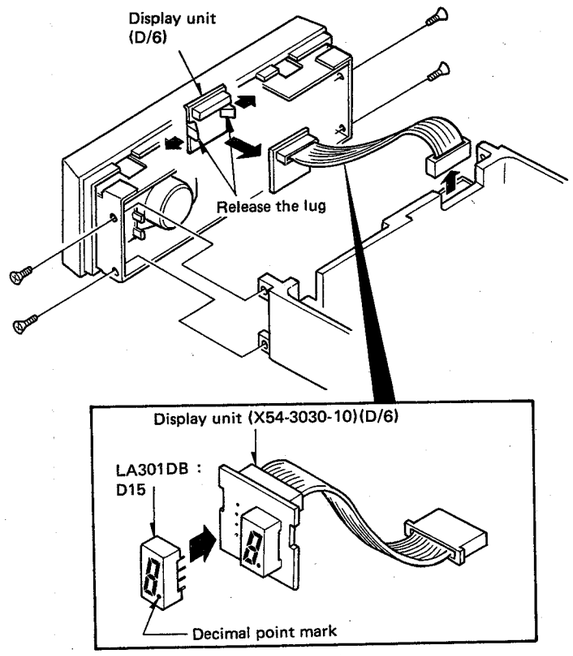
O : Connect
X : Delete

INSTALLATION AND CONVERSION

2) Addition of channel LED (D15)

When the number of channels used is 10 to 12, the system is modified as follows to display the high-order digit of the channel LED.

1. Remove the front panel, and release the lugs retaining the Display unit (X54-3030-10) (D/6) (PC board with a 7 segment LED), then remove the Display unit from the front panel.
2. Solder the optional LED (LA301DB : D15) to the (D/6) PC board. At this time, align the decimal point mark of the LED with the silk mark.
3. Fasten the (D/6) PC board on the front panel, and mount the front panel on the chassis.



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2. Disconnect the 12-pin jumper plug of the TX-RX unit from the connector (CN10) (❷).
3. Pass the leads (CN1 and CN2) with their connectors through the supplied bushing.
4. Insert the bushing into the shield case (❸).
5. Mount the KQT-7 on the shield case with four binding screws (❹).
6. Insert the leads with their connectors as follows: (❺)

KQT-7		TX-RX unit
CN1 (12P)	→	CN10
CN2 (4P)	→	CN2

7. Install the shield case on the front with the six screws (❻).

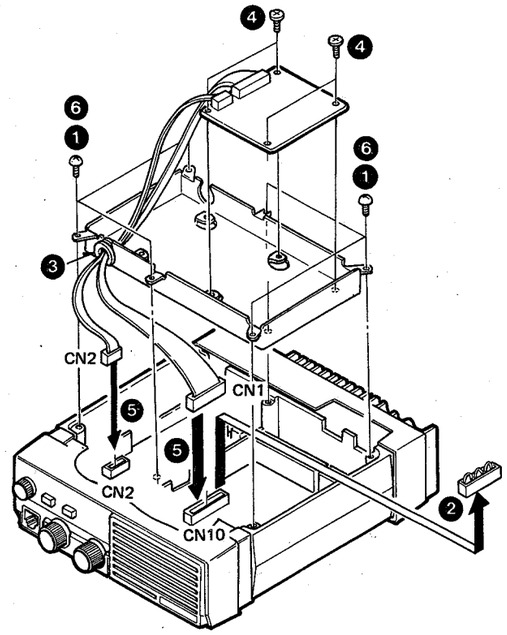


Fig. 2–3

INSTALLATION AND CONVERSION

2–3. Installation of KMS-4

1. Installation

1) Remove the six screws holding the shield case, and remove the shield case (❶).
2) Disconnect the 12-pin jumper plug of the TX-RX unit from the connector (CN10) (❷).
3) Pass the leads (J1 to J3) with their connectors through the supplied bushing.
4) Insert the bushing into the shield case (❸).
5) Mount the KMS-4 on the shield case with six binding screws (❹).
6) Insert the leads with their connectors as follows: (❺)

KMS-4		TX-RX unit
J1 (12P)	→	CN10
J2 (2P)	→	CN2
J3 (3P)	→	CN3

7) Install the shield case on the frame with the six screws (❻).

Note : The 2-pin connector (J4) is not used. Discard or free this connector (❼).

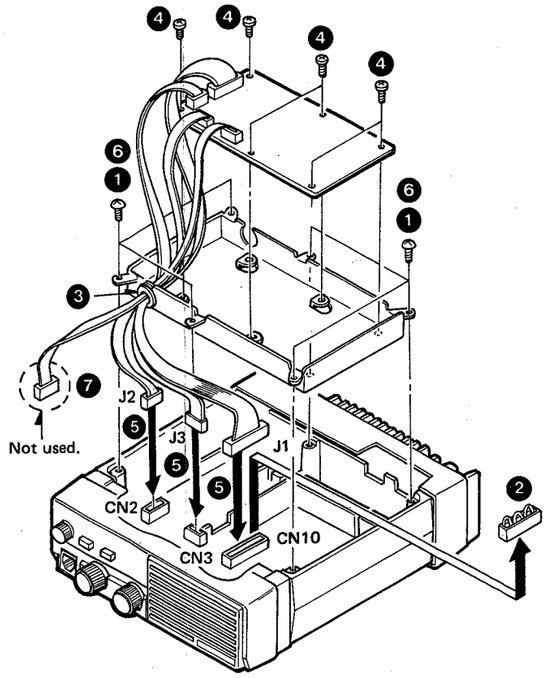


Fig. 2–4

2. Time-out timer conversion

A different combination of resistors (R63, R64, R65 and R66) or a chage of resistance value allows you to set the time-out.

Time(s)	R63	R64	R65	R66	Time(s)	R63	R64	R65	R66
∞	X	X	X	X	180	O	X	O	O
30	X	X	X	O	210	O	O	X	O
60	X	X	O	O	240	O	O	O	O
90	X	O	X	O	270	*390Ω	*1.8kΩ	O	O
120	X	O	O	O	300	*390Ω	*390Ω	O	O
150	O	X	X	O	330	*Jumper wire	O	O	O

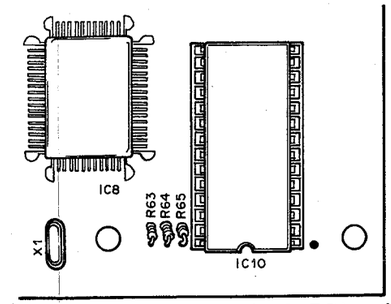
O : Used X : Cut * : Replace the resistor with one of the specified value.

3. DQT polarity conversion

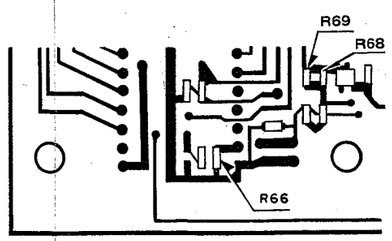
Polarity switching is set by the combination of R68 and R69.

MODEL	R68	R69
TK-710 (K, M)	O	X
TK-710 (K2, K3, M2, M3)	X	X

O : Connect
X : Delete



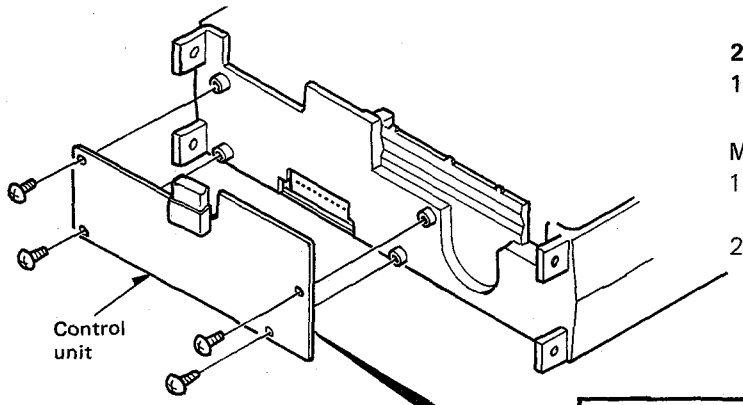
KMS-4 Component side view (R63~R65 part)



KMS-4 Foil side view (R66 or R68, R69 part)

Fig. 2–5

INSTALLATION AND CONVERSION



2–4. Examples of AUX SW use

1) Talk-Around modification (AUX SW set ON for Talk-Around)

Main body side modification:

1. Remove the front panel and then the Control unit (X53-3050-10) from the chassis.
2. Solder the optional chip jumper (R92-0687-05), a plating wire, or lead to R36 of the Control unit.

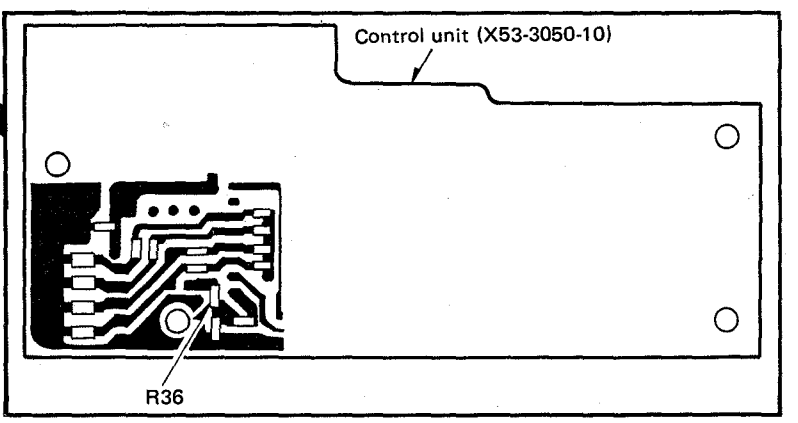


Fig. 2–6

3. Remove the Display unit (X54-3030-10) (A/6) from the front panel, then solder the optional chip jumper (R92-0687-05), a plating wire, or lead to R7 of the Display unit.
4. Install the Display unit in the front panel and Control unit in the chassis and mount the front panel on the chassis.
5. Pressing AUX SW operates the Talk-Around function (to harmonize the sending frequency with the receiving frequency.) Check that this operates properly after readjustment.

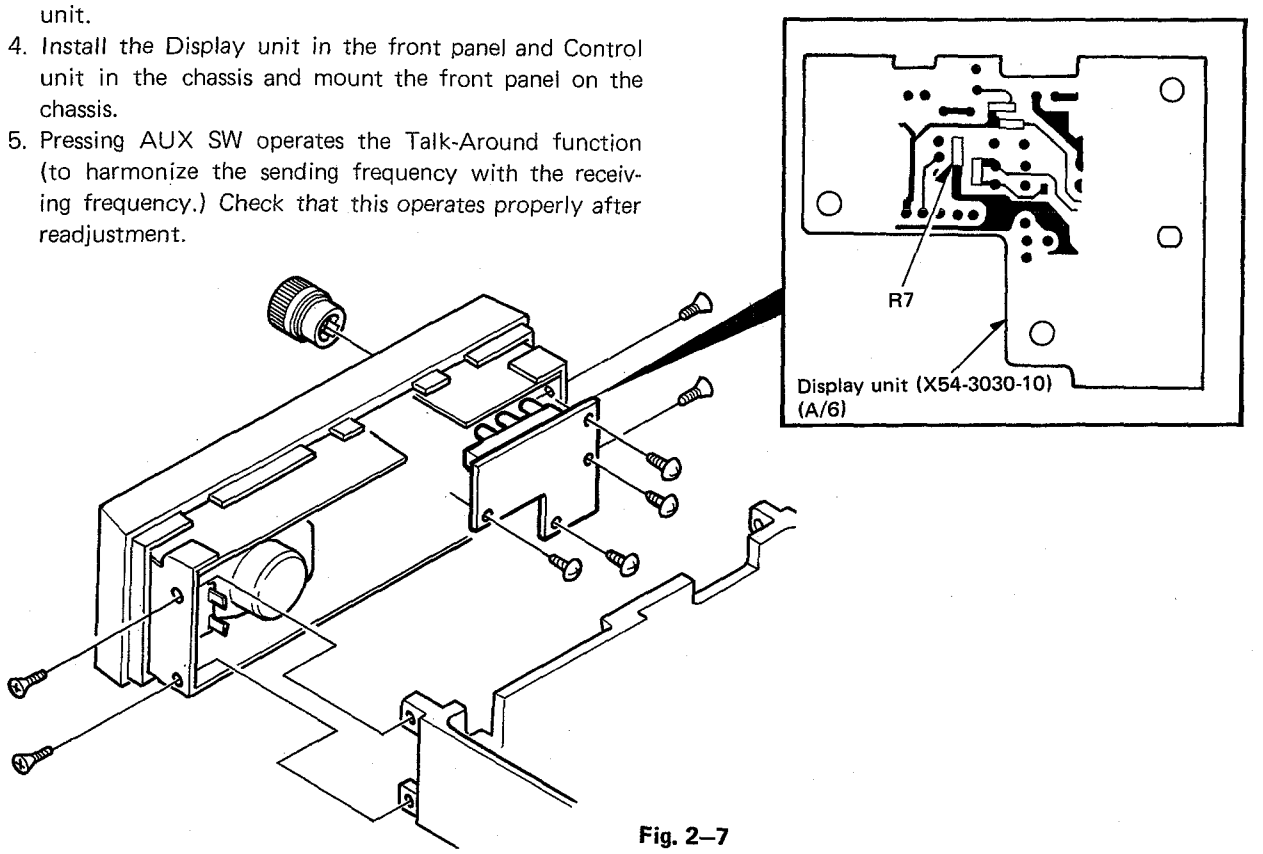


Fig. 2–7

INSTALLATION AND CONVERSION

KMS-4 side modification:

1. Remove R75 of KMS-4. Note that R72, R73, and R74 must still be connected.

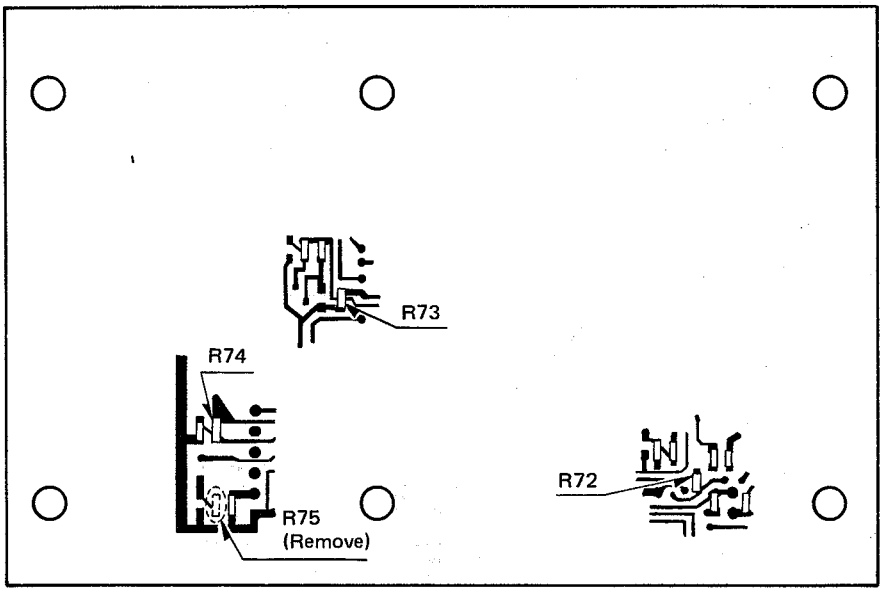


Fig. 2–8 KMS-4 Foil side view

2) HOME/ROAM switching (AUX SW set ON for ROAM)

Main body side modification: See Fig. 2–7.

1. Remove the front panel and then the Display unit (X54-3030-10 (A/6) on which AUX SW is mounted.
2. Solder the optional chip jumper (R92-0687-05), a plating wire, or lead to R7 of the Display unit (A/6).
3. Install the Display unit (A/6) on the front panel and mount it on the chassis.

KMS-4 side modification:

1. Remove R72, R73, R74, and R75 of KMS-4.
2. Connect pin 34 of microprocessor IC8 to pin 6 of connector J1 (AUX) with a lead.

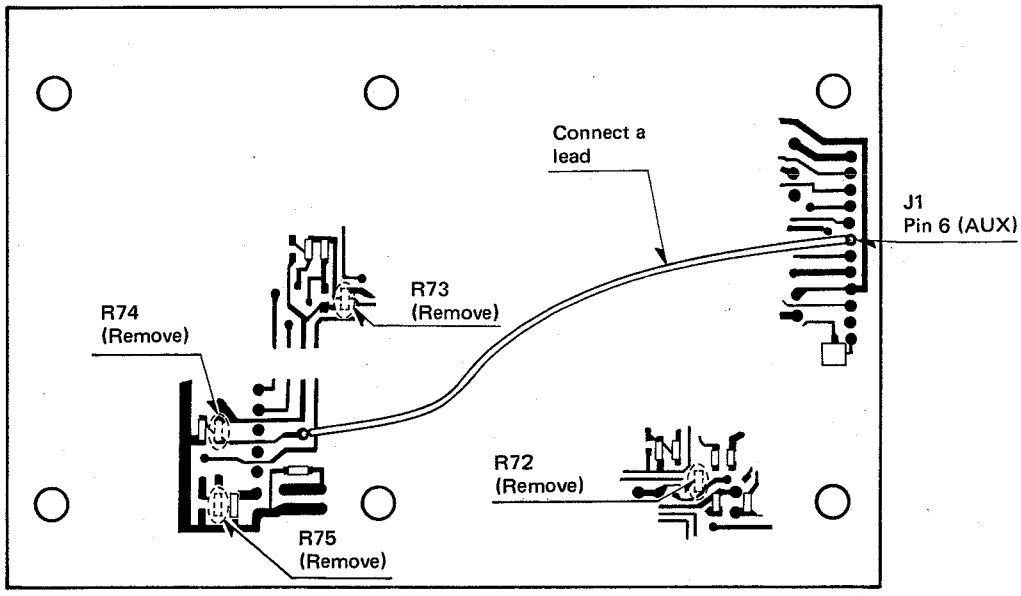


Fig. 2–9 KMS-4 Foil side view

DISASSEMBLY FOR REPAIR

DISASSEMBLY FOR REPAIR

REMOVING THE CASE AND SHIELDING COVER

(See Fig. 1.)

1. Remove the two screws retaining both the top and bottom case, then remove the top and bottom cases (❶).
2. Remove the six screws holding both the top and bottom shielding cover to the frame. Then remove the upper and lower shielding covers (❷).
3. Pull out the VOL. CHANNEL SW and SQL knobs (❸) from the front panel, and remove the four screws from the sides of the sub panels (❹).

Note : When removing the knobs, use rubber for pulling them out easily.

REMOVING THE EACH UNIT (See Fig. 2.)

1. Remove the four screws (❺) from the side of the Final unit heat sink, and move the Final unit backward and out (❻).
2. Remove the eight connectors from the TX-RX unit, and remove the two connectors and the two coaxial plugs from the Final unit **(See Fig. 3)**.
3. Move the front panel toward the front and out (❼).
4. Remove the four screws (❽) retaining the Control unit, and disconnect the Control unit from the TX-RX connector (❾).
5. Remove the leaf spring holding the three ICs to the frame, using a screwdriver (❿).
6. Remove the seven screws from the bottom of the frame Then remove the frame from the TX-RX unit (⓫).

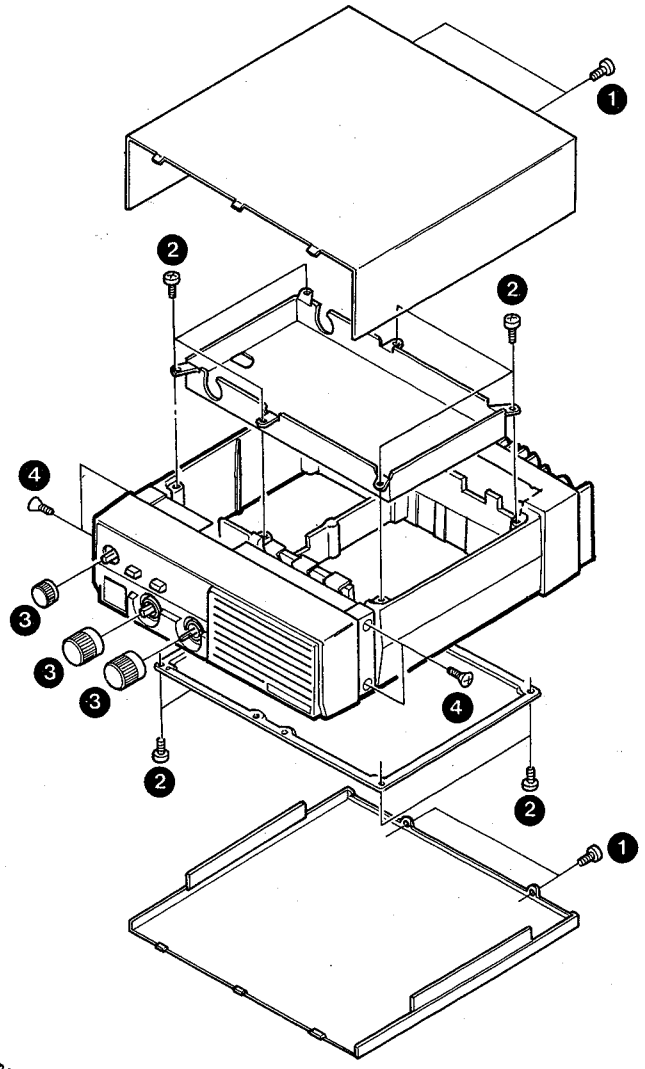


Fig. 1

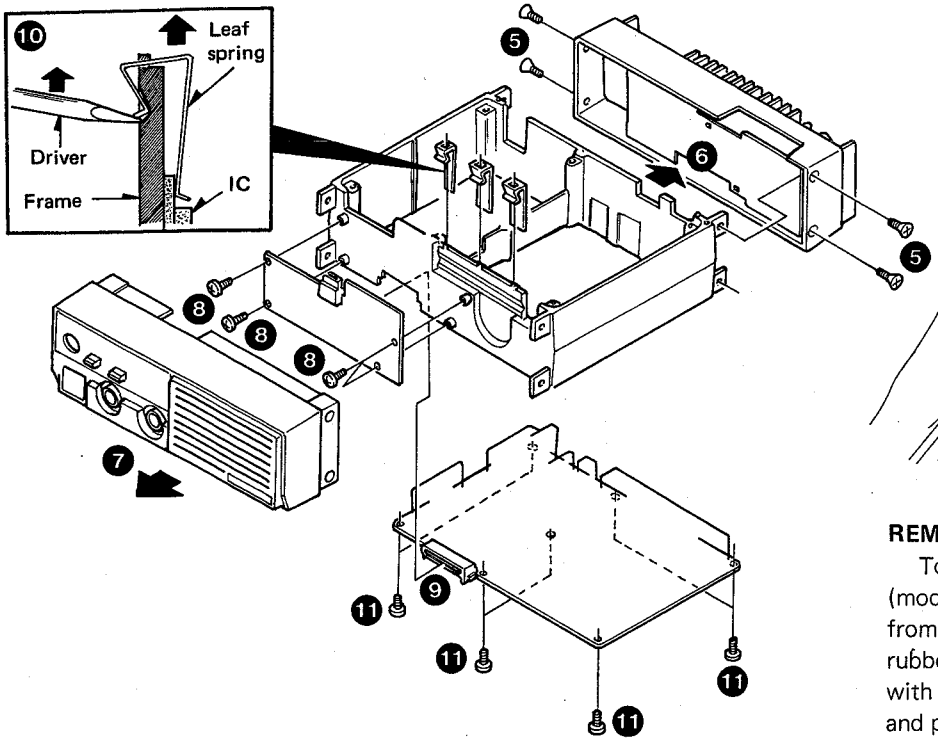
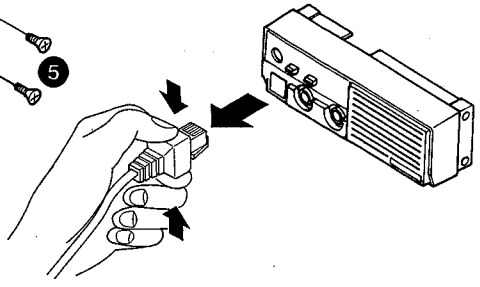


Fig. 2



REMOVING MICROPHONE PLUG

To remove the microphone plug (module) from the Main unit or from the microphone, grasp the rubber cap from up and down with your fingers (to unlock it) and pull it out.

DISASSEMBLY FOR REPAIR

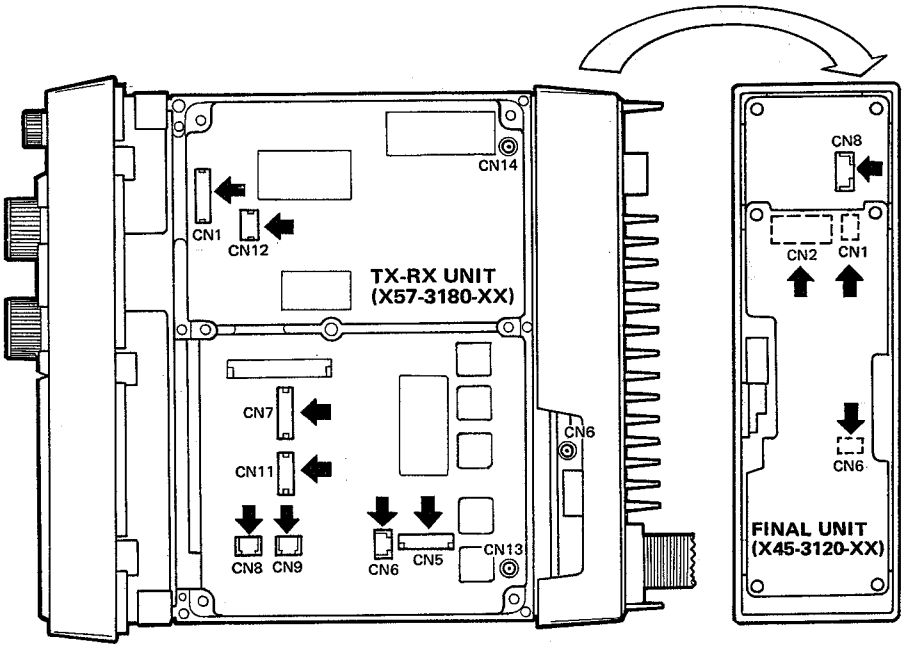


Fig. 3

DISASSEMBLING THE FRONT PANEL (See Fig. 4.)

1. Remove the four screws holding the speaker to the panel, then remove the speaker (⑫).

Note : When replacing the speaker, unsolder the lead wires and electrolytic (chemical) capacitor.

2. Remove the four screws holding the Display unit (A/6), then remove it (⑬).

Note : When replacing the Display unit (A/6) LEDs, make sure that the color of the LEDs are arranged correctly (⑭).

3. Remove the nuts on the front panel holding the Display units (B/6) and (C/6) to the front panel. Then remove the Display unit (⑮).
4. Release the lugs retaining the PC board, then remove the Display unit (D/6) (⑯).
5. Remove the screw holding the sub panel to the front panel. Then remove the sub panel (⑰).

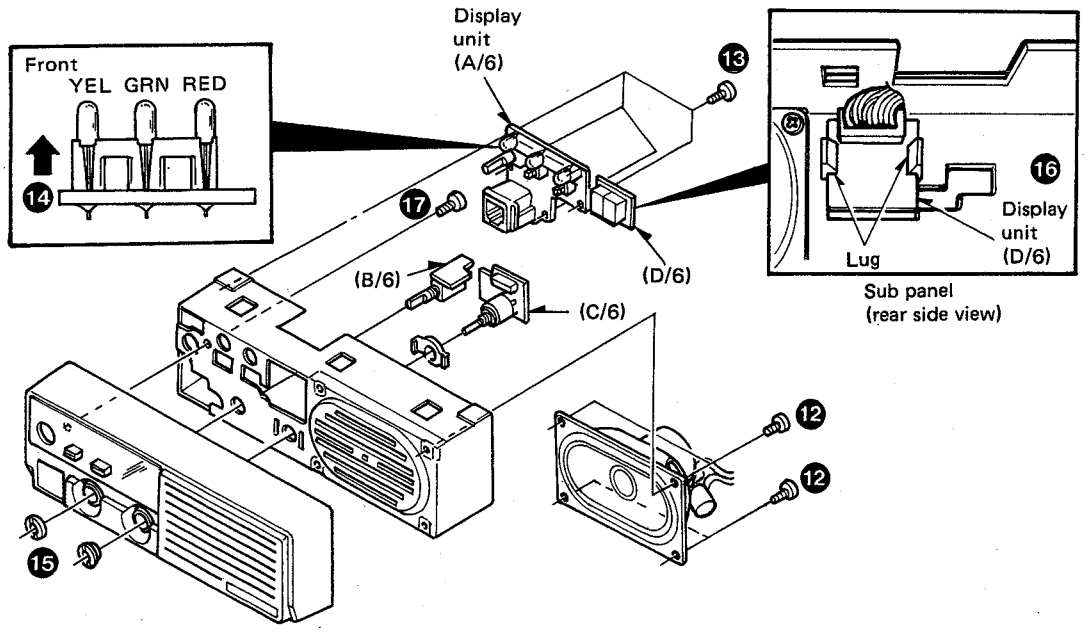


Fig. 4

DISASSEMBLY FOR REPAIR

DISASSEMBLING THE FINAL UNIT (See Fig. 5.)

1. Remove the solder from the ground metal fittings, etc. (18).
2. Remove the transistor mounting screw (19) and the four other screws (20), then disconnect the Final unit (A/2) from the two connectors of the Final unit (B/2).

Note : When removing the Final unit, pull it out straight forward and upward.

3. Remove the two screws (21) retaining the module. When replacing the module only, first remove the pin soldering (22).
4. Remove the solder from each part (23).
5. Remove the screws (24) holding the ground metal fitting, then remove it.
6. Remove the seven screws retaining the PC board (25).
7. Remove the Final unit (B/2).
8. Remove the two screws holding the UHF connector, then remove it (26).

Note : At this time, the ground terminal is also removed. Make sure that the ground terminal is in the correct direction when reassembling.

9. Remove the cover while pressing on the inside lugs (27).

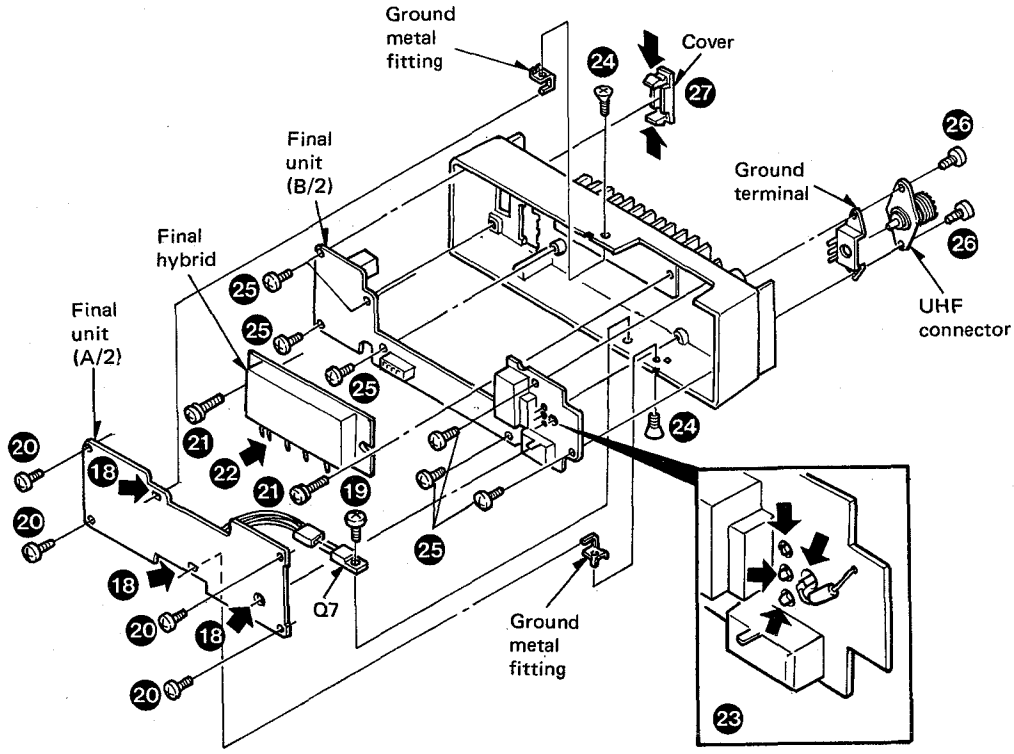


Fig. 5

CIRCUIT DESCRIPTION

1. TX (Transmitter)

The TX signal from the TX-RX unit is amplified by an amplifier chain consisting of a pre-driver : Q1 (2SC2954), driver : Q2 (2SC3369), an final hybrid IC : IC2 (M57741-L : F1, M57741-H : F2, M57741-UL : F3). The power hybrid output passes through an ANT switch : D6 (MI407), and is then applied to the antenna terminal via the LPF and the SWR protection detector circuit.

1) APC (Automatic Power Control) Circuit

Part of the TX power passing through the ANT switch : D6 is samples as a DC voltage, proportional to the TX power at the APC DET : D7 (1SS101). This DC voltage is attenuated by the APC Potentiometer VR1, and is then amplified by APC Potentiometer VR1, and is then amplified by Amplifier : Q5 (2SC2712(Y)). The output from Amplifier : Q5 is further amplified by a circuit including negative feedback consisting of a comparator : IC1 (1/2) (NJM2904M) and APC Driver : Q3 (2SC2712(Y)). The output from the APC Driver : Q3 is applied to the APC Control amplifier : Q7 (2SB1018(Y)). The output from Q7 controls the collector voltage to the first internal stage of the final hybrid : IC2, and the transistors control the output power. Output power is adjusted by APC Potentiometer VR1.

2) SWR Protection Circuit

Reflected power is detected by the SWR protection detection circuit, as a DC voltage by the SWR Detector : D8 (1SS101). This output is attenuated by the Protection Potentiometer : VR2, and is then sent to Amplifier : Q6 (2SC2712(Y)). The output of Q6 is applied to the APC circuit. If the antenna circuit is less than optimal, and the VSWR level is too high, Q6 controls the APC circuit to lower the radio's output power.

3) Thermal Protection Circuit

The temperature of the final hybrid : IC2 is monitored by thermistor: TH1 (112-503-2) and is input to comparator : IC1 (2/2). If the temperature of IC2 exceeds approximately 120°C (248°F), comparator : IC1 (1/2) outputs a logic high signal. If the comparators output goes high, Amplifier : Q4 (2SC2712(Y)) controls the APC circuit, to reduce the radio's RF output power by one-half.

4) Antenna Selection Circuit

Antenna Switch : D6 is turned ON by T8 (8V DC during TX) to connect the Final hybrid output : IC2 to the antenna line. Simultaneously, relay : K1 in the receive antenna line is grounded to prevent the transmitter's output from entering the receivers input circuit.

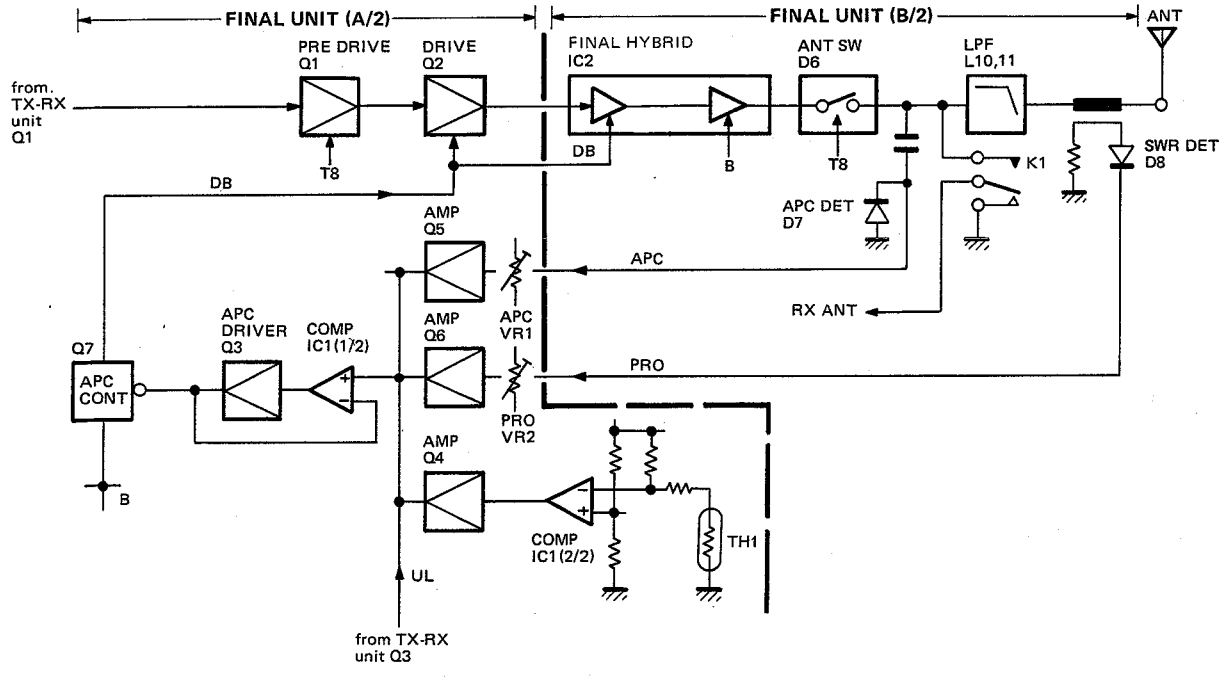


Fig. 1 Transmitter block diagram

CIRCUIT DESCRIPTION

2. RX (Receiver)

The received signal from the antenna terminal is output to the Final unit (A/2) via the Final unit LPF (B/2) and relay : K1. Relay : K1 is connected to the antenna line only in received mode, and ANT SW : D6 is OFF in receive mode. The received signal input to the Final unit (A/2) is output to the TX-RX unit. This is amplified, and the bandwidth is limited by a tuned amplifier consisting of BPF : L12 and L13, RF amplifier Q5 : (2SK302(GR)), and BPF : L14 to L16. The output BPF : L16 is input to DBM : D9 (ND487C1-3R), together with the first local signal (f–21.4MHz) for mixing. The DBM : D9 output range is limited by IF Transformer : L20 and becomes the first IF signal (21.4MHz). L20 output is amplified by the first IF amplifiers : Q7, Q8 (2SK125), and the range is further limited by the (Monolithic X'tal Filter) MCF : XF1. The output from MCF : XF1 is amplified by IF amplifier : Q9 (2SK302(GR)), and then input to module unit (IF) : Z10. Module unit (IF) : Z10 is a miniature PC board, incorporating the second mixer, second IF, FM detector, and part of the noise squelch circuit.

The first IF signal input to Z10 is mixed with the second local signal (20.945MHz : F1, 21.855MHz : F2, F3) in the FM system IC : IC1 (MC3361D) internal to Z10. The range of the mixed output is limited by externally-connected ceramic filter : CF1 to become the second IF signal (455 kHz). CF1 output is again input to Z10 IC1, and amplified by a limiting amp, then demodulated to an audio signal by the FM detector.

The FM detector signal is output from Z10, and amplified by an AF amplifier : Q10 (2SC2712(Y)). The signal from Q10 is output to the DET pin of the signaling unit. When no signaling unit is connected, the DET pin signal is output to the AFO terminal. The AFO signal is input to module unit (AF BPF) : Z9, and 6dB/oct de-emphasis is applied to the audio signal is the De-emphasis IC1 (1/2) (NJM4558M). The signal is then passed through HPF IC1 (2/2), notch filter : IC2 (1/2) (NJM4558M), and LPF IC2 (2/2), and then the audio range is limited to between 300Hz and 3kHz. The output from Z7 is applied to the AF Volume Control : VR2 on the Display unit (B/6). After the level is adjusted by VR2, it is fed back to the TX-RX unit, and input to the AF PA : IC3 (μPC1242H). The audio signal, which is pmlified to a specified level to drive the speaker, is applied to the E.SP pin. The audio signal input to the Final unit (B/2) is output to the connector E.SP pin, to enable connection of an external speaker. If an external speaker is not used, use the shorting plug to send the E.SP pin signal to the I.SP pin. The I.SP signal, which is input to CN9 of the TX-RX unit via the I.SP pin, is supplied to the speaker via CN8.

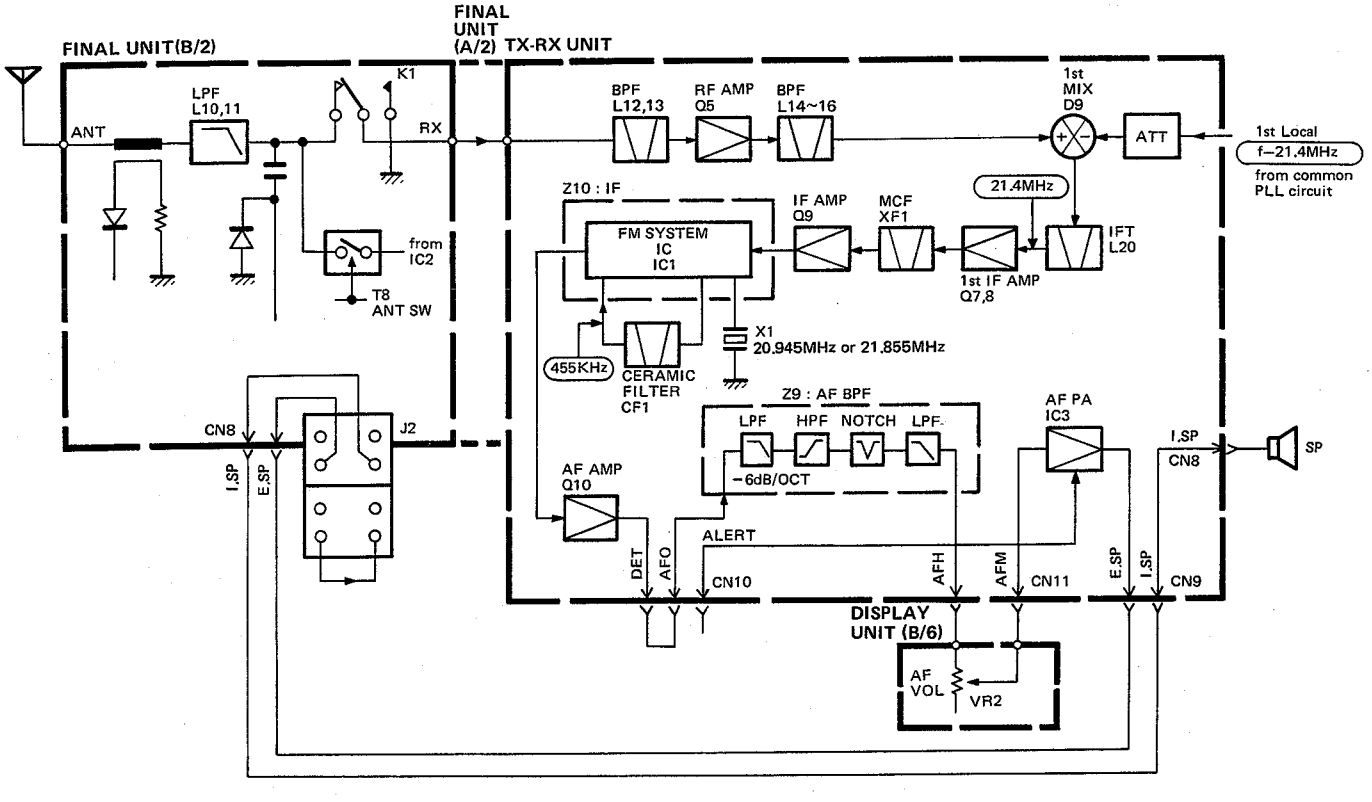


Fig. 2 Receiver block diagram

CIRCUIT DESCRIPTION

3. Squelch Circuit

The module unit Z10 (IF) in the TX-RX unit removes the component from the FM decoder output only, using a noise filter consisting of capacitors and resistors. The noise component is amplified by noise amplifier IC1 : FM system IC, and further amplified by noise amplifier : Q1 (2SC2712(Y)). The output of Q1 is converted to a DC voltage by Noise Detector : D1 (DA204K), and input to the squelch trigger circuit. SQL Control : VR1 on the Display unit (A/6) varies the level of the noise detected output which is input to the squelch trigger circuit. When a low signal is not received in receive mode, the output from the squelch trigger circuit (SQL signal) goes high. The SQL signal is input to module unit (SQL): Z8 as part of the conditions for the squelch operation.

Operation of SQL : Z8 are described below.

SQL : Z8 consists of a muting circuit, a logic circuit to control muting, and a BUSY LED control circuit. When the SQL signal is low (while receiving a signal), Inverter : Q1 (DTC114EK) is turned OFF. Inverter : Q4 (DTC114EK) is turned OFF. When the AC signal (which shows the signaling squelch status) is low (when the signaling tone is correct). However, when the signaling unit is not used, AC is always set to a low level, so Q4 maintains the OFF status. Inverter : Q3 (DTC114EK) is turned OFF when T8 (which goes to 8V during TX) is low (when receiving). T/R is the transmission/reception select signal (RX : high, TX : low), and controls Squelch switch : Q5 (DTC114EK) and LED driver : Q2, via Gate : D4 (1SS226).

Q4 in **Fig. 3**, the Squelch Circuit Diagram, is only concerned with the squelch muting operation, while D4 and Q1 to Q3 are concerned with squelch muting and BUSY LED control. Refer to **Fig. 3** and **Table 1**.

Squelch open conditions are as follows:

(1) SQL signal is low.
(2) T8 line is low.
(3) T/R signal is high.
(4) AC signal is high.

If one of the above conditions is not satisfied, Squelch switch : Q5 is turned OFF and MUTE GATE : Q6, Q7 (2SC2712(Y)) is turned ON. When Q6 and Q7 are turned ON, the audio signal, consisting of the output from AF BPF: Z9 and the input of AF PA : IC3, is sent to the GND line by C86 and C87, so that muting is ON. To light the BUSY LED the output of Z9 : AF BPF and the input of IC3 : AF PA must satisfy items 1 through 3 of the four squelch open conditions. When conditions 1 through 3 are satisfied, LED driver : Q2 (DTC114EK) is turned ON so that BUSY LED : D1 (SLH-56MC3F) on the Display unit (A/6) lights up.

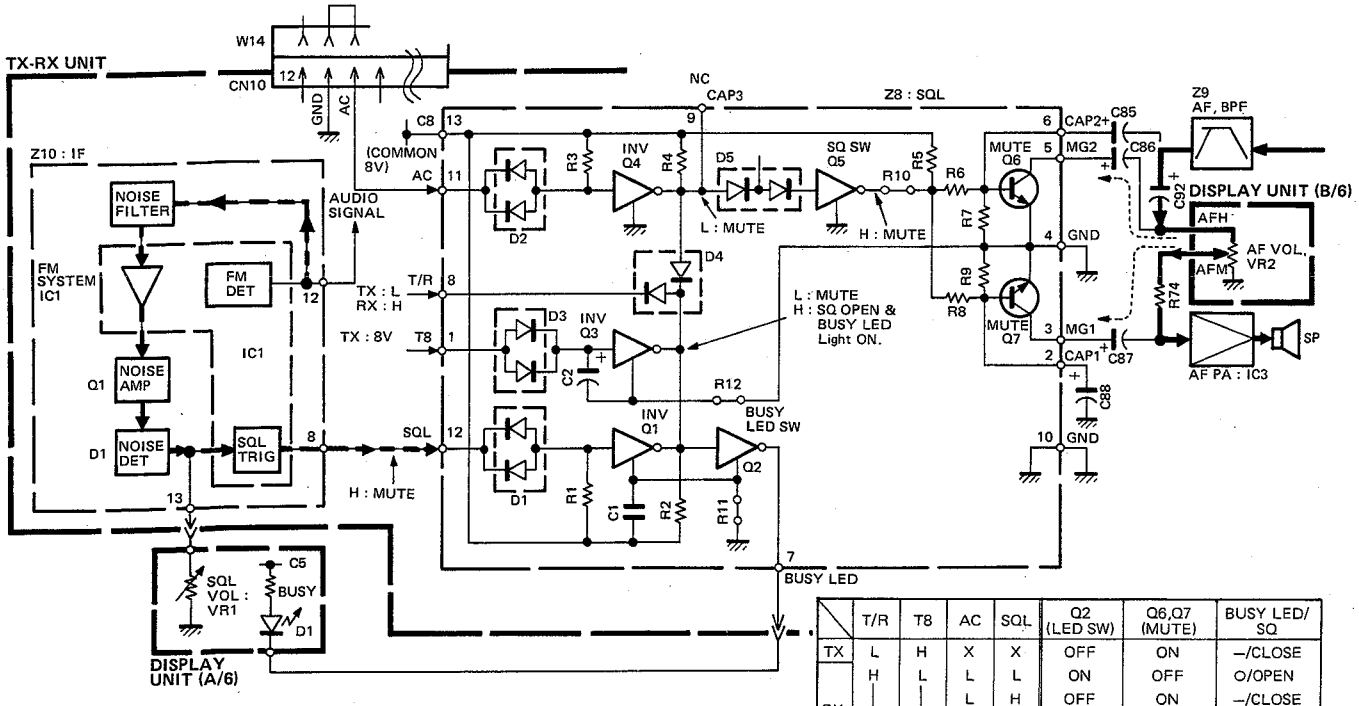


Fig. 3 Squelch control block diagram

	T/R	T8	AC	SQL	Q2 (LED SW)	Q6,Q7 (MUTE)	BUSY LED/ SQ
TX	L	H	X	X	OFF	ON	–/CLOSE
RX	H	L	L	L	ON	OFF	O/OPEN
	↓	↓	L	H	OFF	ON	–/CLOSE
			H	L	ON	ON	O/CLOSE
	H	L	H	H	OFF	ON	–/CLOSE

X : Regardless of H or L level

– : Light OFF
O : Light ON

Table 1 Squelch open condition

CIRCUIT DESCRIPTION

4. Common PLL

Common VCO : Z6 in the TX-RX unit oscillates at frequency which is 21.4MHz less than the operation frequency f (f–21.4MHz). OUT1 of the Common VCO is used for the output pin of the Common PLL loop, and OUT2 supplies the first mixer : D9 (ND487C1-3R) in the receiving unit and mixer : D6 in the TX PLL loop, as an output from the Common PLL.

The output signal from OUT1 of the Common VCO (f–21.4MHz) is input to Module Unit (Common PLL) : Z5. The signal input to Z5 is amplified by amplifier : Q1 (2SC2714(Y)), and then divided by 64 ot 65 in the prescaler IC : IC1 (MB504F). Prescaler IC : IC1, which consists of a Dual Modulus counter, together with PLL System IC : IC2, (JLC1057F) divides the output signal from the Common VCO (F–21.4MHz) by 5kHz. The dividing ratio of the Dual Modulus counter is determined by the dividing data of the N counter and the A counter internal to IC2, as follows.

N0 = 64 N + A

N and A are transmitted from the Control unit with the CLK, DATA, and PEN (PLL Enable) signals as serial data. Output from the Dual Modulus counter is compared to the comparison signal (5kHz) in a phase comparator internal to IC2. The comparison signal is made by dividing 2560 by the output of TCXO Z7 (12.8MHz) in IC2 on Z5. The output signal from the phase comparator passes through a LPF consisting of capacitors and resistors, and is applied to a varicap diode in the Common VCO, to control the oscillating frequency of the Common VCO.

5. TX PLL Circuit

TX VCO : Z4 in the TX-RX unit oscillated directly at the transmission frequency : fT. The signal from OUT1 of TX VCO : Z4 is amplified by Amplifier Q1 (2SC3838K(N,P)) and supplied to the Final unit as the transmission carrier signal. OUT2 supplies the signal to DBM : D6 (ND487C1-3R) as the signal from the TX PLL loop, and is mixed with the output from the Common PLL (f–21.4MHz). The output of DBM : D6 is filtered by LPF : L8, and the bandwidth-limited signal is used as a 21.4MHz TX signal. The 21.4 MHz TX signal is input to module unit (TX PLL) : Z3. The TX signal (21.4MHz) input to Z3 is amplified by amplifier : Q1, and is then input to the PLL system IC : IC1 (MC14512SL) via a LPF consisting of inductors and capacitors.

The 21.4MHz TX signal input to IC1 is divided by 128 in a divider internal to IC1, and results in a 167.1875 kHz signal. This signal is input to a phase comparator and then compared to the comparison signal (167.1875kHz). The comparison signal is derived by dividing 128 by the output signal from VCXO : Z2 (21.4MHz) in IC1 on Z3.

The output from the phase comparator internal to the IC is passed through Charge Pump : IC2, and output from Z3. The output from Charge Pump : IC2 is passed through a LPF consisting of capacitors and resistors, and is then applied to a varicap diode internal to the TX VCO, to control the oscillating frequency of the TX VCO.

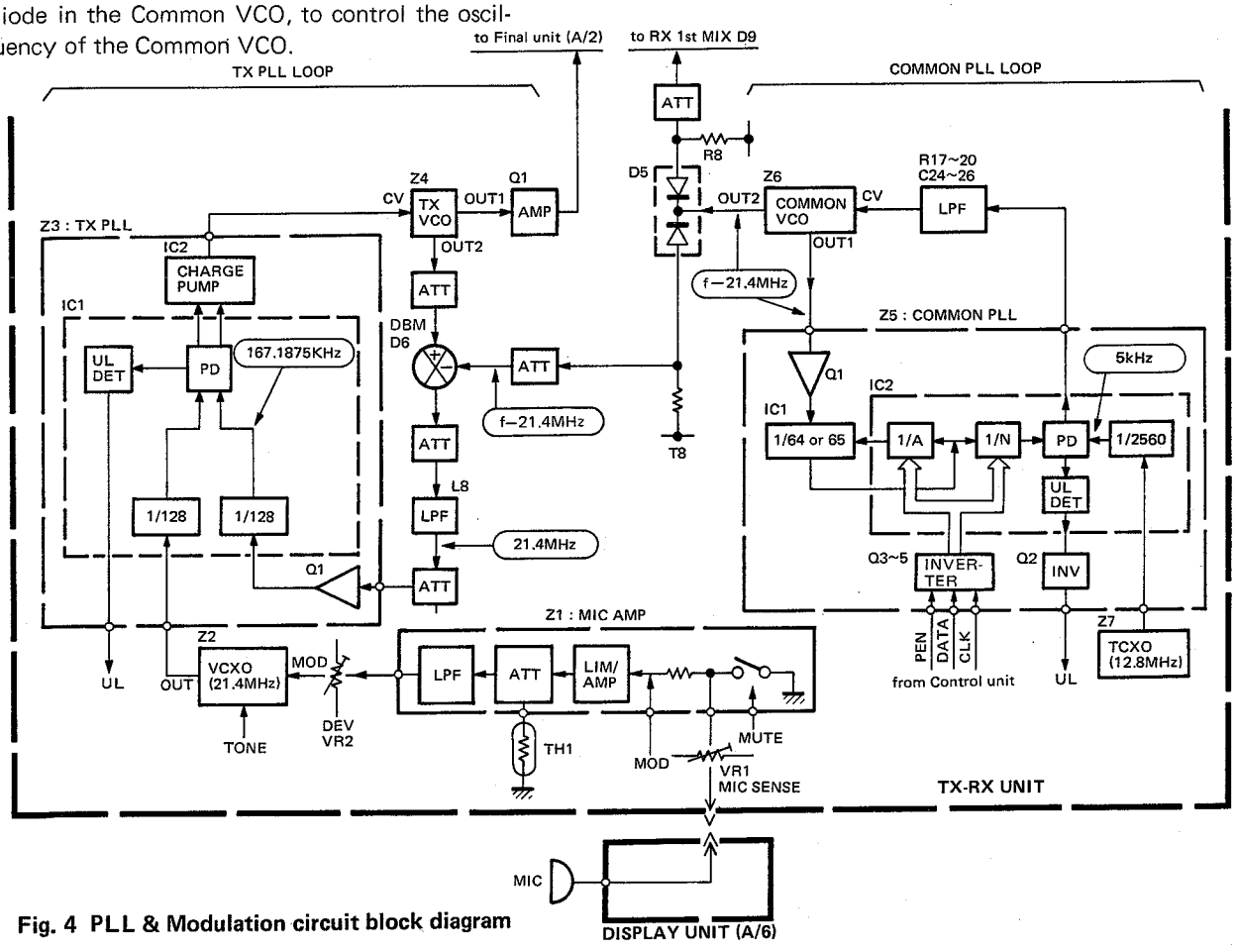


Fig. 4 PLL & Modulation circuit block diagram

CIRCUIT DESCRIPTION

6. Modulation Circuit

This applies modulation directly to VCXO : Z2 (Offset 21.4MHz) which is the reference oscillator for the TX PLL. The signal picked up from the microphone passes through the Display unit (A/6) and is input to the TX-RX unit. The microphone signal input to the TX-RX unit is attenuated by the Mic Sensitivity Control : VR1 and then input to the module unit (Mic Amp) : Z1. The Mic signal input to Z1 passes through Mute Gate : Q1 (2SC3326(A)) and is amplified by Limiter Amplifier : IC1 (NJM4560M) and is limited by IC2 (NJM4558M). A 6dB/oct pre-emphasis is applied to the signal within range of from 300Hz to 3kHz.

The output of IC2 is input to the ATT circuit, which is used to compensate the gain variation caused by the temperature of Mic Amp : Z1 by means of externally connected thermistor : TH1 (112-503-2).

The output from the ATT circuit is passed through a splatter filter (24dB/oct) consisting of LPF : IC3 (NJM4558M). The signal from IC3 is output from Mic Amplifier : Z1, passes through Max Deviation Control : VR2, and then modulates varicap diode internal to VCXO : Z2.

When signaling data used, Mute Gate : Q1 "kills" the microphone signal when the Mic signal is required to be switched off. Two lines are available for tone signaling input operation. The tone signal for a QT : (Quiet Talk) (CTCSS) or a DQT : (Digital Quiet Talk) signal from the QT (Quiet Talk) and the DQT (Digital Quiet Talk) reference is input to the Tone pin of VCXO: Z2. Signals, such as DTMF/ANI, having a frequency of 300Hz or more, are input to Mic amp : Z1 and input to the MOD pin, and then passed through the same path as that of the microphone signal as modulation.

7. Unlock Circuit

If phase-lock in the Common PLL or TX PLL is lost, this circuit takes control of the drive and final circuits operation, so that RF power is not output at an abnormal frequency. If phase-lock in the Common PLL is lost, the lock detector output of IC2 in the module unit (Common PLL) : Z5 goes low. The lock detector output pin outputs the unlock signal (at a high level) to pin 5 of Z5 via Inverter : Q2 (DTC114EK). The unlock signal passes through OR Gate : D4 (1SS184) and is output to the UL (Unlock Switch) SW : Q3 (DTC114EK). Since the T/R (TX-RX CONTROL) line is connected to D4, the high level signal is applied to Q3 in RX mode. If phase-lock is lost in the TX PLL, the lock detector output of IC1 in the module unit (TX PLL) : Z3 goes low, and outputs the signal from Z3 pin 4. The lock detector output signal passes through Level Shift : D2 (RD3.0M-B2) and is inverted to a high level by inverter : Q2 (DTC114EK). The high level unlock signal is then passed through Diode : D3 (1SS184) and is output to Q3. When the unlock signal is applied to Q3, it is turned ON and controls the APC circuit in the Final unit (A/2) to interrupt the power supply to the drive and the Final unit so that RF is not output.

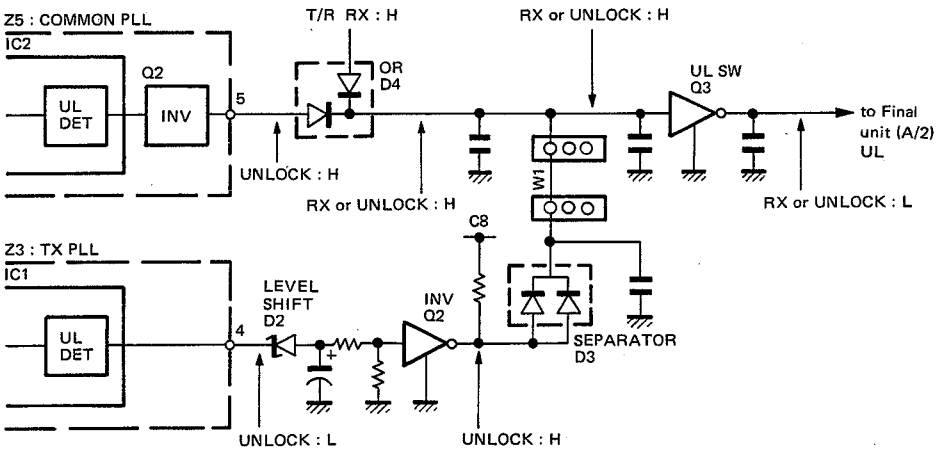


Fig. 5 PLL unlock detection circuit (TX-RX unit)

CIRCUIT DESCRIPTION

8. Power Supply Circuit

Main power : B from the battery, which is input to the Final unit (B/2), is supplied to Final hybrid IC2. Power B is also supplied to the Display unit Power Switch (B/6) via the Final unit (A/2) and the TX-RX unit. Output from the Power Switch is returned to the TX-RX unit as a switched B (SB) signal. SB is supplied to connector : CN10, regulator : IC2 (MB3756), 5V AVR (Automatic Voltage Regulator) : IC1 (L78M05), and AF PA : IC3 for signal connections. Regulator : IC2 creates a fixed 8V (C8), and the T8 and R8 signals which are switched in transmit and receive modes.

9. Control Circuit

Switching between transmit and receive, channel display, and PLL control are controlled by microprocessor : IC1 (μPD7556CS(M)-302) in the Control unit. Microprocessor operations are described as follows:

1) Reset Circuit

When power is turned ON, the voltage rise of C5 (Common PLL) is detected by System Reset IC : IC4 (M51943BML) in the Control unit.

When the C5 line voltage exceeds 4.25V, IC4 outputs a high level signal. When the output of IC4 is applied, Inverter : Q1 (2SC2712(Y)) is turned ON and inverts the Reset pin of IC1 from a high to a low level, so that IC1 is system reset.

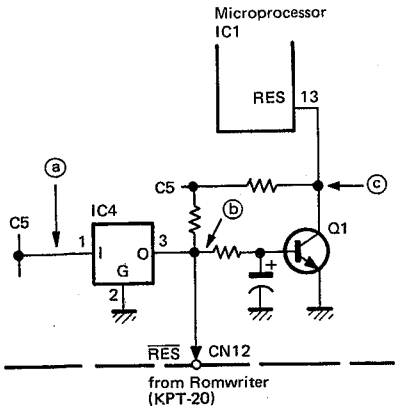
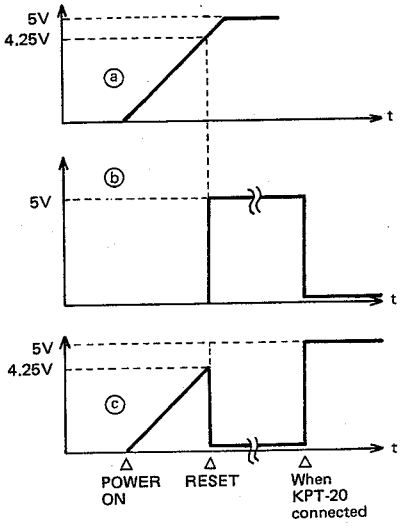


Fig. 6 Reset circuit block diagram



2) PLL Data, Signaling Data, LED Data

When power is turned ON, or when a channel is changed, microprocessor : IC1 reads channel data off of the Display unit (C/6). Then, IC1 transmits EN (Enable), CLK (Clock) and DI (Data Input) signals to EEPROM : IC2 (NMC9346E) in serial data form, using the channel data as an address, while reading the output data (DO) synchronous to the CLK signal. Frequency data is read at this time.

- **PLL Data**
  Using the frequency data which is read from EEPROM : IC2, the microprocessor transmits the PLL data, depending on the transmit or receive mode. The PLL data is transmitted from the PEN (PLL Enable), DATA, and CLK pins to IC2 as serial data.
- **Signaling Data**
  The channel data which is read when power is turned ON, or when a channel is changed, is transmitted to CN3 in the TX-RX unit as channel data for the signaling unit. The channel data is output from the CH EN (Channel Enable) DATA, and CLK pins as serial data.
- **LED Data**
  The channel data which is read by IC1 is changed to lighting data for the 7-segment LEDs and transmitted to Shift Register : IC3 (MB88306PF). The LED data is transmitted from IC1 to IC3 via the $\overline{\text{LOAD}}$, SI (Serial Input), and the SC (Serial Clock) pins as serial data. IC3 incorporates a driver, and the LEDs are directly driven by the driver output.

3) Transmission Control Circuit

The PTT signal from the microphone is connected to CN10 of the TX-RX unit via the Display Unit (A/6). When a signaling unit is not used, the PTT signal input to CN10 is returned to the KEY pin of CN10 by shorting plug : W14. When a signaling unit is connected to CN10, the PTT signal is returned to the KEY pin of CN10 after the signaling unit has executed the required time limiting (Time-out timer, etc.) and timing processing.

The KEY signal from CN10 passes through Separator : D1 (1SS184) and Inverter : Q2 (DTC114EK) and is input to the KEY pin of IC1. The signal input to $\overline{\text{KEY}}$ is output to the $\overline{\text{T/R}}$ pin after timing processing. The $\overline{\text{T/R}}$ output is applied to Inverter : Q3 (DTC114EK) and inverted to the $\overline{\text{T/R}}$ signal, and then sent to the TX-RX unit, where it is used for switching between transmit and receive modes. The Control unit $\overline{\text{T/R}}$ signal passes through Inverter : Q4 (DTC114EK) and is input to the T/R-M (T/R Monitor) pin of IC1.

According to the status of the T/R-M, $\overline{\text{T/R}}$ and $\overline{\text{KEY}}$ input/output pins, IC1 performs the processing which returns the radio to the receive operation mode if the channel is changed in transmit mode, or delays the T/R signal or performs timing processing when the operation is changed from the receive to transmit.

CIRCUIT DESCRIPTION

4) Call LED Control Circuit

When the CALL pin of CN10 in the TX-RX unit goes low, the signal is applied to the microprocessor : IC1 $\overline{CAI}$ (Call Data Input) via Diode : D2 (1SS184), so that the $\overline{CAI}$ pin goes low. When the $\overline{CAI}$ goes low, the $\overline{CAO}$ (Call Data Out) pin also goes low to light the CALL LED : D3 (SLH-56YC3F) on the Display Unit (A/6). Actually, this circuit is used only when an optional KMS-4 signaling unit is connected to CN10 of the TX-RX unit. When the signaling function for independent calling is activated with the KMS-4, and the matching tone is decoded, the CN10 CALL pin goes low.

5) Talk-Around Control Circuit

By adding R36 to the Control unit, the AUX switch is converted to a Talk-Around switch. It is possible to use a chip jumper (R92-0687-05) or a wire lead instead of R36. When the AUX switch : S2 on the Display unit (A/6) is activated, a high level signal is input to microprocessor : IC1 of the Control unit. IC1 matches the transmission frequency to the receiving frequency.

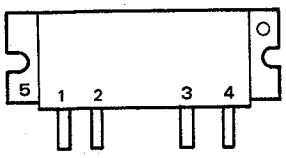
6) Data Write into the EEPROM

Connect the KPT-20 ROM WRITER to CN2 of the Control unit and turn the TK-710 power switch ON. When the KPT-20 is connected, a low level Reset signal is input to $\overline{RES}$ of CN2 from the KPT-20. Inverter : Q1 is turned OFF by this Reset signal and the microprocessor : IC1 Reset pin goes high. When the Reset pin goes high, the impedance of IC1 I/O port goes high, so that data communication between the EEPROM : IC2 and the ROM writer is enabled. Data writing to IC2 is performed by serial data ; EN1 (Enable), DI (Data Input), and CLK, which are input from the CN2 pin. Write data is confirmed by EN1, DI, CLK, and DO (Data Output).

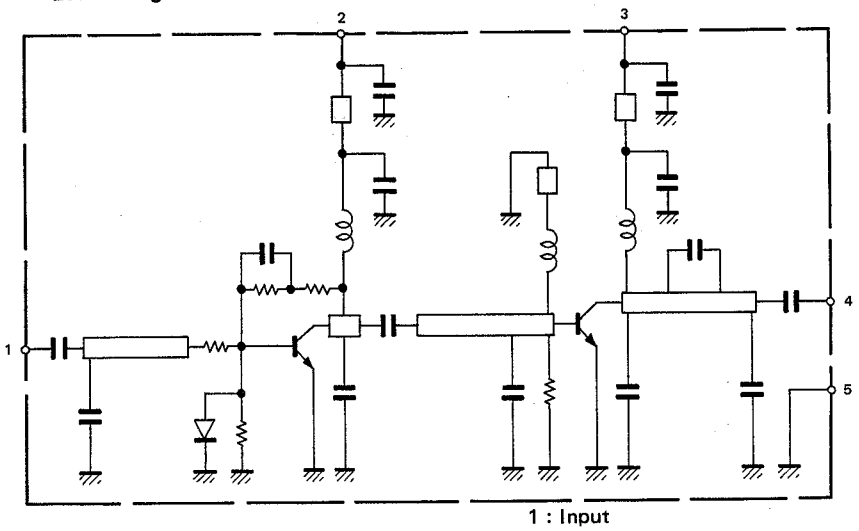
SEMICONDUCTOR DATA

M57741 : Final hybrid IC (Final unit IC2 : 25W HI POWER)

- **Terminal connection diagram**



- **Block diagram**



1 : Input
2 : DC Power supply (First stage)
3 : DC Power supply (Final stage)
4 : Output
5 : GND

- **Electrical characteristics**

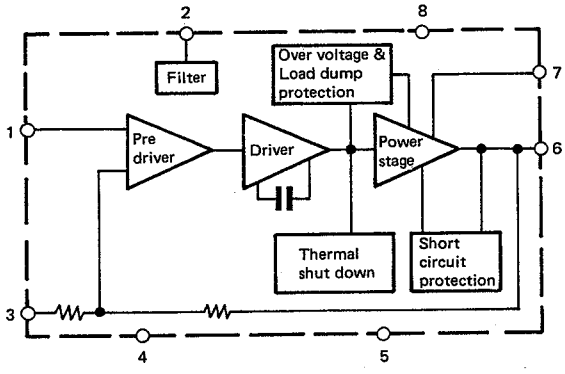
Symbol	Item	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
PO	Output power	f= 148~160MHz, Vcc= 12.5V, Pin = 0.2W, Z_G = Z_L = 50Ω	28			W
ηT	Total efficiency		40			%
	2nd harmonic				–25	dB
	3rd harmonic				–30	dB
ρ in	Input VSWR				3.3	–
ρ out	Output VSWR			2.0		–
	Load VSWR tolerance	Vcc= 15.2V, P_O= 30W	More then 20:1 (All phase)			

(Tc= 25°C)

SEMICONDUCTOR DATA

μPC1242H : (TX-RX unit IC3)

- **Block diagram**



1 : Input
2 : Ripple filter
3 : N.F.B.
4 : GND
5 : GND
6 : Output
7 : Bootstrap
8 : Vcc

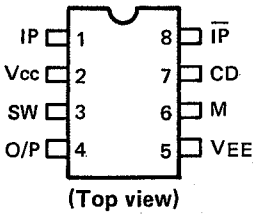
- **Electrical characteristics**

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
DC current	Icc	νin = 0	25	45	80	mA
Output power	PO	T.H.D. = 10%	5.0	5.8		W
		R_L = 2Ω, T.H.D. = 10%		9.2		W
Distortion	T.H.D.	PO = 0.5W		0.1	1.0	%
		R_L = 2Ω, PO = 1W		0.4		%
Max. output power	POM			9.5		W
Voltage gain	A_ν	PO = 0.5W	49	51.5	54	dB
Noise output voltage	νn	R_G = 10kΩ		1.4	4	mVrms

(Ta = 25°C, Vcc = 13.2V, f = 1kHz, R_L = 4Ω)

MB504F : Prescaler (COMMON PLL unit IC1)

- **Terminal connection diagram**



(Top view)

- **Explanation of terminal functions**

Symbol	Function
IP/$\overline{IP}$	Input and compensated input.
O/P	Output.
Vcc	Power supply (+ 5V).
VEE	Power supply (GND).
SW	Dividing ratio select pin.
M	Module set pin.
CD	Data set pin for checking. (OPEN or VEE voltage used.)

- **Function table**

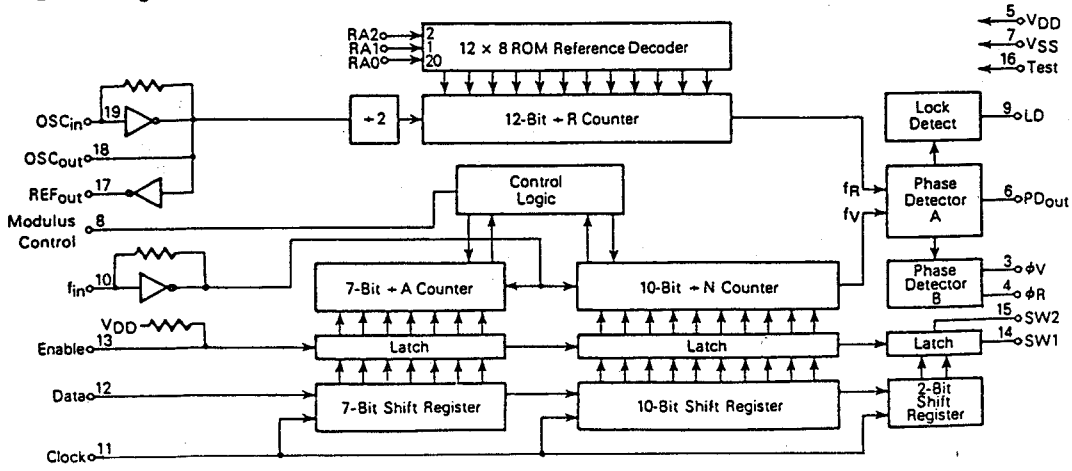
SW	M	Divide value
H	H	32
H	L	33
L	H	64
L	L	65

Note : SW terminal
H : Vcc, L : Open
M terminal
H : 2.0V~Vcc, L : VEE~0.8V

SEMICONDUCTOR DATA

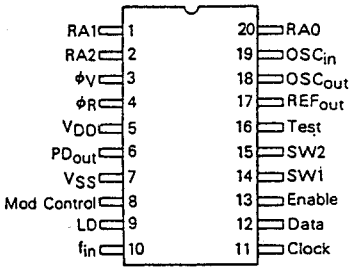
JLC1075F : PLL Frequency Synthesizer (COMMON PLL unit IC2)

- **Block diagram**



Reference Address Code			Total Divide Value
RA2	RA1	RA0	
0	0	0	8
0	0	1	64
0	1	0	128
0	1	1	256
1	0	0	1160
1	0	1	2560
1	1	0	1024
1	1	1	2048

- **Terminal connection diagram**

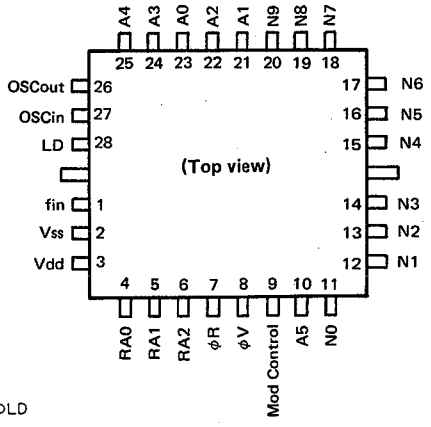


(Top view)

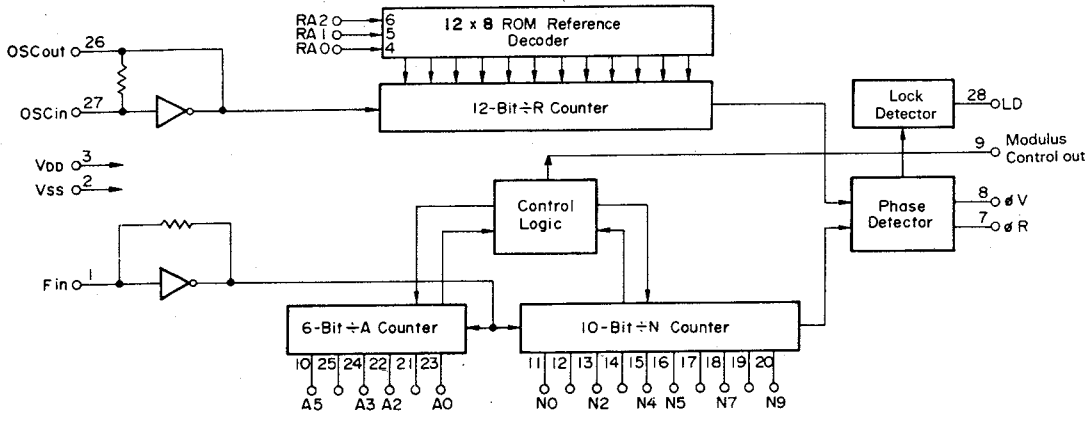
MC145152SL : PLL Frequency Synthesizer (TX PLL unit IC1)

Reference Address Code			Total Divide Value
RA2	RA1	RA0	
0	0	0	8
0	0	1	64
0	1	0	128
0	1	1	256
1	0	0	512
1	0	1	1024
1	1	0	1160
1	1	1	2048

- **Terminal connection diagram**



- **Block diagram**



Note : N0 through N9, A0 through A5 and RA0 through RA2 have pullup resistors not shown.

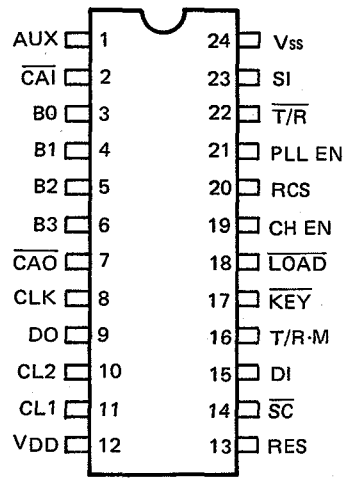
SEMICONDUCTOR DATA

μPD7556CS(M)-302 : Microprocessor (Control unit IC1)

• Explanation of terminal functions

Terminal No.	Terminal name	I/O	Function
1	AUX	I	AUX SW Input.
2	$\overline{CAI}$	I	CALL LED Control Signal. ("L" : Blinking, "H" : Goes off)
3	B0	I	CH DATA (bit 0) ("H" : Active).
4	B1	I	CH DATA (bit 1) ("H" : Active).
5	B2	I	CH DATA (bit 2) ("H" : Active).
6	B3	I	CH DATA (bit 3) ("H" : Active).
7	$\overline{CAO}$	O	CALL LED Drive ("L" : Light on, "H" : Goes off).
8	CLK	O	Clock.
9	DO	O	Data Output.
10	CL2	O	System Clock Output.
11	CL1	I	System Clock Input.
12	VDD	–	+ 5V.
13	RES	I	System Reset ("H" : Reset, "L" : Active).
14	$\overline{SC}$	O	7-Seg LED Drive Serial Clock (⎍⎍).
15	DI	I	EEPROM Data Read ("H" : Active).
16	T/R·M	I	Indicates a status of the transciver ("H" : RX, Stand-by, "L" : TX).
17	$\overline{KEY}$	I	PTT Signal from the microphone.
18	$\overline{LOAD}$	O	7-Seg LED Drive Latch Pulse Output (⎍⎍).
19	CH EN	O	CH Data Enable ("H" : Active).
20	RCS	O	EEPROM CS ("H" : Active).
21	PLL EN	O	PLL Enable ("L" : Active).
22	$\overline{T/R}$	O	Key Line (TX Request) Signal ("L : Active).
23	SI	O	7-Seg LED Drive Serial Data.
24	Vss	–	GND.

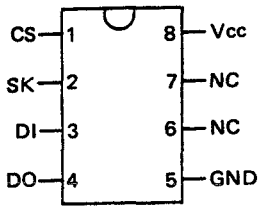
• Terminal connection diagram



(Top View)

NMC9346E : 1K EEPROM (Control unit IC2)

• Terminal connection diagram



(Top View)

CS	Chip Select
SK	Serial Data Clock
DI	Serial Data Input
DO	Serial Data Output
Vcc	Power Supply
GND	Ground
NC	Not Connected

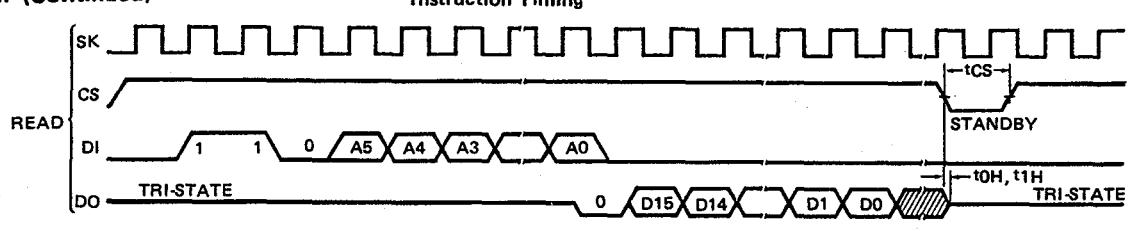
• Instruction set for NMC9346E

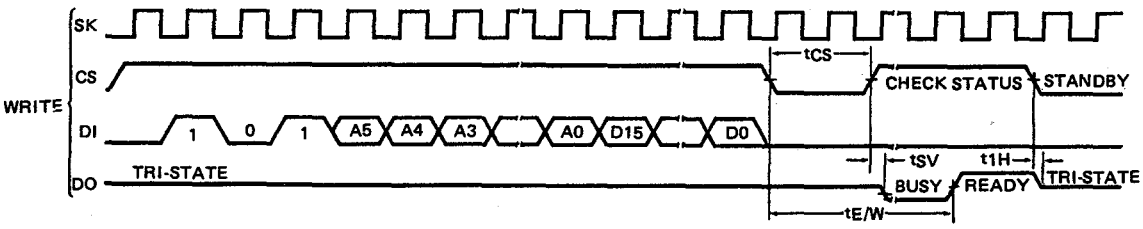
Instruction	SB	Op code	Address	Data	Comments
READ	1	10	A5A4A3A2A1A0		Read Register A5A4A3A2A1A0
WRITE	1	01	A5A4A3A2A1A0	D15–D0	Write Register A5A4A3A2A1A0
ERASE	1	11	A5A4A3A2A1A0		Erase Register A5A4A3A2A1A0
EWEN	1	00	11XXXX		Erase/Write Enable
EWDS	1	00	00XXXX		Erase/Write Disable
ERAL	1	00	10XXXX		Erase All Registers

NMC9346E has 6 instructions as shown. Note that the MSB of any given instruction is a "1" and is viewed as a start bit in the interface sequence. The next 8 bits carry the op code and the 6-bit address for 1 of 64, 16-bit registers.

• Timing diagram (Continued)

Instruction Timing

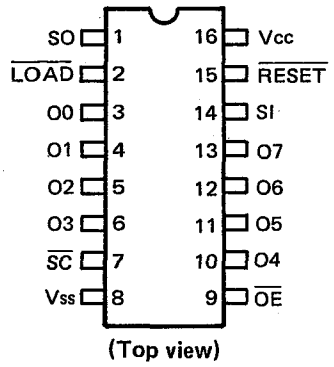




SEMICONDUCTOR DATA

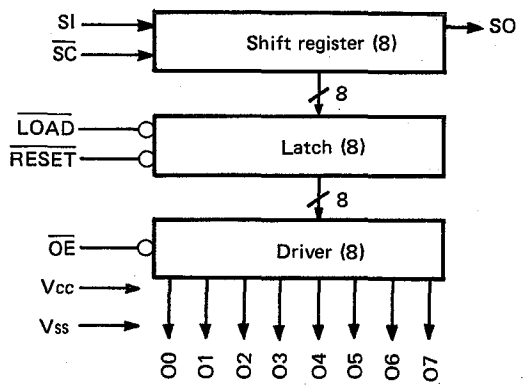
MBM88306PF : Output Expander (Control unit IC3)

- Terminal connection diagram



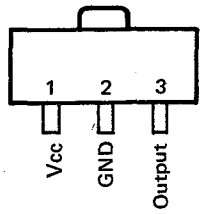
(Top view)

- Block diagram

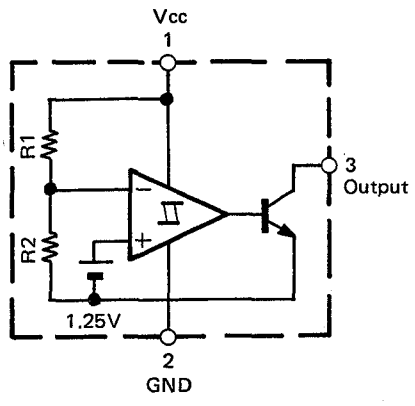


M51943BML : System Reset IC (Control unit IC4)

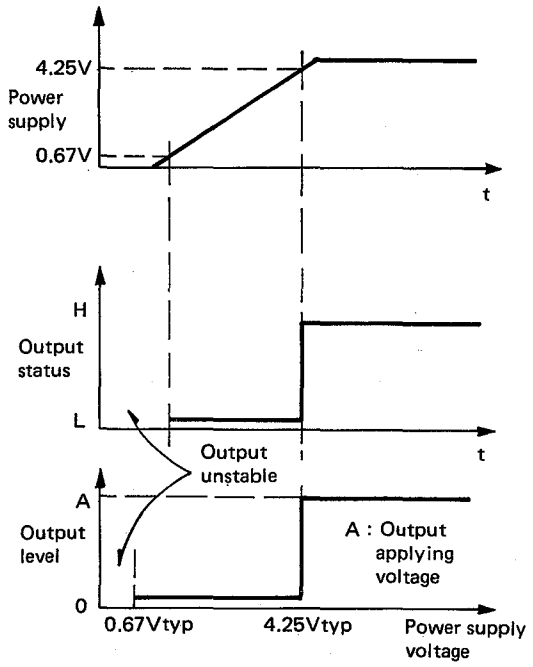
- Terminal connection diagram



- Block diagram

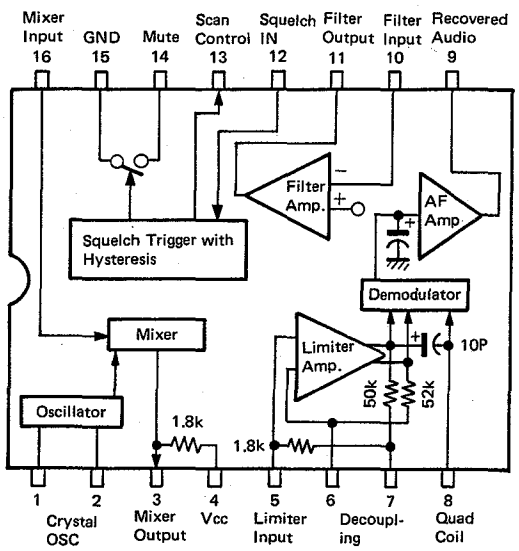


- Timing chart



MC3361D : IF System IC (IF unit : IC1)

- Block diagram



DESCRIPTION OF COMPONENTS

Description of components

TX-RX UNIT (X57-3180-XX)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	L78MO5	AVR	+ 5V.
IC2	MB3756	AVR	+ 8V (C8, R8, T8).
IC3	μPC1242H	AF power amplifier	
Q1	2SC3838K(N,P)	RF amplifier	For TX.
Q2,Q3	DTC114EK	Inverter	
Q4	2SB1815(BL)	AVR	Combined with + 12V, D7.
Q5	2SK302(GR)	RF amplifier	For RX.
Q7, Q8	2SK125	IF amplifier	
Q9	2SK302(GR)	IF amplifier	
Q10	2SC2712(Y)	AF amplifier	
D1	1SS184	Separator	
D2	RD3.0M-B2	Level shifter	
D3,D4	1SS184	Separator	
D5	MC804	RF switch	
D6	ND487C1-3R	DBM	For TX.
D7	RD13M-B2	AVR	Combined with Q4.
D8	1SS226	Protector	For Q5.
D9	ND487C1-3R	DBM	For RX.
D10	1SS184	Clamper	
D11	RD3.9M-B2	Level shifter	

CONTROL UNIT (X53-3050-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	μPD7556CS(M)-302	Microprocessor	Control of frequency, display, transmission,reception, CALL LED, etc.
IC2	NMC9346E	EEPROM	Frequency data memory.
IC3	MB88306PF	Shift register	Serial-parallel conversion of display data.
IC4	M51943BML	Reset system	Resetting of the microprocessor at power on.
Q1	2SC2712(Y)	Inverter	
Q2~Q5	DTC114EK	Inverter	
D1,D2	1SS184	Separator	
D3,D4	1SS184	Clamper	

FINAL UNIT(X45-3120-XX)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	NJM2904M	Comparator	Temperature protection, APC comparator.

IC2	M57741-L : F1
	M57741-H : F2
	M57741-UL : F3
		Power amplifier	For (X45-3120-10)
			For (X45-3120-11)
			For (X45-3120-21)
			} Final transmission

Q1	2SC2954	Pre-driver	
Q2	2SC3369	Driver	
Q3	2SC2712(Y)	APC driver	
Q4	2SC2712(Y)	Amplifier	For temperature protection.
Q5	2SC2712(Y)	Amplifier	For APC.
Q6	2SC2712(Y)	Amplifier	For protection against abnormal load.
Q7	2SB1018(Y)	APC amplifier	
D1	1SS181	Temperature compensation	For Q1.
D2	1SS181	Temperature compensation	For Q2.
D3	1SS181	Protector	Q3 protection.
D4	1SS181	Temperature compensation	
D5	DSA3A1	Protector	Protection against reverse connection of power supply.
D6	MI407	Antenna switch	
D7	1SS101	APC detection	
D8	1SS101	Reflected wave detection	
D9	1SS181	Protector	Relay (K1) protection.

DESCRIPTION OF COMPONENTS

DISPLAY UNIT (X54-3030-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
D1	SLH-56MC3F	BUSY LED	Green.
D2	SLH-56VC3F	TX LED	Red.
D3	SLH-56YC3F	CALL LED	Yellow.
D7	1SS184	Diode matrix	Channel data. Duodecimal-binary conversion.
D8,D9	1SS181	Diode matrix	Channel data. Duodecimal-binary conversion.
D10,D11	1SS184	Diode matrix	Channel data. Duodecimal-binary conversion.
D12	1SS181	Diode matrix	Channel data. Duodecimal-binary conversion.
D13,D14	1SS184	Diode matrix	Channel data. Duodecimal-binary conversion.
D15	(LA301DB)	(Channel indicator)	Optional; 7-segment LED.
D16	LA301DB	Channel indicator	7-segment LED.

TX PLL UNIT : Z3 (X58-3130-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	MC145152SL	PLL system	Reference divider, programmable divider, phase comparator.
IC2	TC4007UBF	Charge pump	
Q1	2SC2712(Y)	PLL IF amplifier	

COMMON PLL UNIT : Z5 (X58-3140-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	MB504F	Pre-scaler	Dual modulus pre-scaler (1/64 or 1/65).
IC2	JLC1075F	PLL system	Reference divider, programmable divider, phase comparator, and charge pump.
Q1	2SC2714(Y)	RF amplifier	
Q2~Q5	DTC114EK	Inverter	
D1	RD3.0M-B2	Level shifter	

SQL CONT UNIT : Z8 (X59-3260-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
Q1	DTC114EK	Inverter	
Q2	DTC114EK	BUSY LED driver	
Q3~Q5	DTC114EK	Inverter	
Q6,Q7	2SC2712(Y)	Mute gate	Squelch mute.
D1~D3	1SS181	Separator	
D4,D5	1SS226	Separator	

MIC AMP UNIT : Z1 (X59-3210-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	NJM4560M	Mic amplifier	Forming of transmission frequency characteristics and limiting characteristics.
IC2	NJM4558M	Mic amplifier	Forming of transmission frequency characteristics and limiting characteristics.
IC3	NJM4558M	Active filter	Splatter filter, −24dB/oct.
Q1	2SC3326(A)	Mute gate	Mic mute.

AF BPF UNIT : Z9 (X59-3250-10)

Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1,IC2	NJM4558M	Active filter	Forming of reception frequency characteristics.

IF UNIT : Z10 (X59-3220-10)

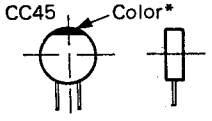
Component	Part No.	Use/Function	Operation/Condition/Compatibility
IC1	MC3361D	IF system	Second mixer, second local oscillator, limiting amplifier, FM detection, noise amplifier, squelch switch.
Q1	2SC2712(Y)	Noise amplifier	
D1	DA204K	Noise detection	

PARTS LIST

CAPACITORS

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

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



• Temperature Coefficient

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

• Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF

1 0 3 = 0.01μF

2 2 0 = 22pF
1st number | Multiplier
2nd number

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

Example CC45TH = −470±60 ppm/°C

• Tolerance

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

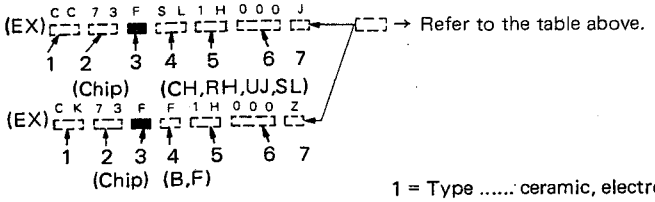
Less than 10 pF

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

• Rating voltage

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

• Chip capacitors



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

Dimension

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

Dimension

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

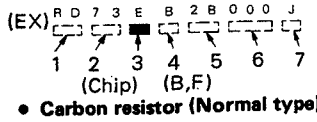
Rating wattage

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

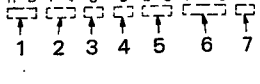
Dimension

RESISTORS

• Chip resistor (Carbon)



• Carbon resistor (Normal type)



PARTS LIST

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

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Destination 仕向	Remarks 備考
			TK-710			
1	1A		A01-1010-02	CASE (UPPER)		
2	3B		A01-1023-03	CASE (LOWER)		
3	2B		A13-0676-12	FRAME		
4	2A		A20-2610-02	PANEL		
5	3A		A22-0752-03	SUB PANEL		
6	1B		A23-1499-04	REAR PANEL		
10	2A		B01-0658-04	PANEL ESCUTCHEON		
11	2A		B03-0543-03	DRESSING PLATE		
12	2A		B11-0444-04	FILTER		
13	1B	*	B40-3754-04	MODEL NAME PLATE	KM	
13	1B	*	B40-3778-04	MODEL NAME PLATE	K2M2	
13	1B	*	B40-3779-04	MODEL NAME PLATE	M3	
14	1D		B46-0409-20	WARRANTY CARD	KK2	
15	1D		B50-8129-20	INSTRUCTION MANUAL		
C1	2A		CE04BW1C470M	NP-ELEC 47UF 16WV		
17	1C		E30-2036-05	GROUND LEAD		
18	1C		E30-2070-05	DC CORD		
19	1C		E30-2089-08	CURL CORD (FOR MIC)		
21	1D		E31-3257-05	SHORT PLUG		
-			E31-3214-05	CONNECTING WIRE(SPEAKERS)		
-			E31-3270-05	CONNECTING WIRE		
23	1C		F05-1031-05	FUSE (10A)		
25	1B		F07-0873-04	COVER		
26	3B		F11-1052-03	SHIELDING COVER(LOWER)		
27	1A		F11-1053-03	SHIELDING COVER(UPPER)		
28	2A		G02-0563-04	LEAF SPRING		
29	2A		G02-0567-04	LEAF SPRING		
30	2A		G09-0418-05	SPRING (VOL,SQ)		
31	2A		G09-0419-05	SPRING (CH SW)		
32	2A		G10-0649-04	FELT		
33	3A,3B		G10-0661-04	FELT (75X12)		
34	2B		G13-0847-04	CUSHION		
39	3D	*	H01-8126-04	ITEM CARTON BOX		
40	2D		H10-2628-02	POLYSTYRENE FOAMED FIXTURE		
42	1D		H12-1345-04	PACKING FIXTURE		
43	2D		H12-1402-04	PACKING FIXTURE		
44	1C		H25-0103-04	PROTECTION BAG (DC CORD)		
45	2D		H25-0162-04	PROTECTION BAG		
47	1D		J19-1376-15	MIC HANGER		
48	2C		J29-0418-03	BRACKET		
49	2A		J69-0310-05	RING (SQ VR)		
-			J19-1327-05	LEAD HOLDER		
-			J61-0307-05	WIRE BAND		
53	2A		K27-0497-04	KNOB (PUSH)		
54	2A		K29-3071-04	KNOB (VOL)		
55	2A		K29-3072-04	KNOB (SQ)		
56	2A		K29-3073-04	KNOB (CH)		
62	2A		N14-0532-04	NUT (1/4")		
63	2A		N14-0533-04	NUT (M7)		

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

K, M : F1
K2, M2 : F2
M3 : F3

⚠ indicates safety critical components.

PARTS LIST

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Teile ohne **Parts No.** werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
64	2A		N19-0640-04	FLAT WASHER		
65	1D		N99-0321-05	SCREW SET		
A	1B		N09-0650-05	SCREW (REAR PANEL)		
B	2A,3A		N09-0675-05	SCREW (FRONT PANEL)		
C	3A,1B		N09-2030-05	FLAT HEAD MACHINE SCREW		
D	1B,3B		N35-3006-45	BINDING HEAD MACHINE SCREW		
E	2A,3A		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
-			S40-1419-08	TACT SWITCH		
69	3A		T07-0245-05	LOUDSPEAKER (8 OHM)		
70	2C		T91-0374-08	MICROPHONE (WITHOUT CORD)		
-			T91-0375-08	MIC ELEMENT		
74	2B	*	X45-3120-10	PA PC BOARD ASSY(FINAL)	KM	
74	2B	*	X45-3120-11	PA PC BOARD ASSY(FINAL)	K2M2	
74	2B	*	X45-3120-21	PA PC BOARD ASSY(FINAL)	M3	
75	2A		X53-3050-10	CONTROL PC BOARD ASSY		
76	3B		X54-3030-10	DISPLAY UNIT		
77	3B	*	X57-3180-10	TX.RX UNIT	KM	
77	3B	*	X57-3180-11	TX.RX UNIT	K2M2	
77	3B	*	X57-3180-21	TX.RX UNIT	M3	
FINAL UNIT (X45-3120-XX) -10 (F1), -11 (F2), -21 (F3)						
C1			CC73FCH1H680J	CHIP C 68PF J		
C2 ,3			CK73FB1H102K	CHIP C 1000PF K		
C4			CC73FCH1H220J	CHIP C 22PF J		
C7			CK73FB1H102K	CHIP C 1000PF K		
C8			CC73FCH1H080D	CHIP C 8.0PF D		
C9 ,10			CK73FB1H102K	CHIP C 1000PF K		
C11			CC73FCH1H220J	CHIP C 22PF J		
C13 -16			CK73FB1H102K	CHIP C 1000PF K		
C17			C90-2055-05	ELECTRO 3.3UF 16WV		
C18 -23			CK73FB1H102K	CHIP C 1000PF K		
C24			C92-0004-05	CHIP TAN 1UF 16WV		
C25			CK73FB1H102K	CHIP C 1000PF K		
C26			CK73FB1H472K	CHIP C 4700PF K		
C27			CK73FB1H102K	CHIP C 1000PF K		
C28			CK73FB1H472K	CHIP C 4700PF K		
C29			CK73FB1H102K	CHIP C 1000PF K		
C30			CK73FB1H472K	CHIP C 4700PF K		
C31			CK73FB1H102K	CHIP C 1000PF K		
C32			CS15E1E010M	TANTAL 1.0UF 25WV		
C33 -36			CK73FB1H102K	CHIP C 1000PF K		
C37			CE04CW1E100M	ELECTRO 10UF 25WV		
C39			CK73FB1H102K	CHIP C 1000PF K		
C40			CE04CW1E330M	ELECTRO 33UF 25WV		
C41			C90-2021-05	ELECTRO 10UF 25WV		
C43			CM73F2H090D	CHIP C 9.0PF D	M3	
C43			CM73F2H120J	CHIP C 12PF J	KM	
C43			CM73F2H160J	CHIP C 16PF J	K2M2	
C44 ,45			CK73FB1H102K	CHIP C 1000PF K		
C46			CM73F2H391J	CHIP C 390PF J		
C47			CC73FCH1H0R5C	CHIP C 0.5PF C		
C48			CK73FB1H102K	CHIP C 1000PF K		
C49			CM73F2H130J	CHIP C 13PF J	K2M2	
C50			CM73F2H270J	CHIP C 27PF J	K2M2	

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C50			CM73F2H300J	CHIP C 30PF J	KMM3	
C51			CM73F2H200J	CHIP C 20PF J	K2M2	
C51			CM73F2H220J	CHIP C 22PF J	KMM3	
C52			CM73F2H180J	CHIP C 18PF J		
C53			CM73F2H050C	CHIP C 5.0PF C	KMM3	
C53			CM73F2H060D	CHIP C 6.0PF D	K2M2	
C54			CM73F2H140J	CHIP C 14PF J		
C55 -57			CK73FB1H102K	CHIP C 1000PF K		
C59			CK73EB1H104K	CHIP C 0.10UF K		
-			E31-3267-15	CONNECTING WIRE		
-			E31-3268-05	CONNECTING WIRE		
-			E31-3269-05	CONNECTING WIRE		
A1	2B		E23-0487-04	TERMINAL (ANT,GND)		
A2	2B		E29-0477-04	EARTH TERMINAL		
CN1			E04-0159-05	RF COAXIAL CABLE RECEPTACLE		
CN2			E40-0574-05	PIN CONNECTOR (5P)		
CN4 ,5			E40-5105-05	PIN CONNECTOR (5P)		
CN6			E04-0159-05	RF COAXIAL CABLE RECEPTACLE		
CN8			E40-0273-05	PIN CONNECTOR (2P)		
CN12,13			E40-5106-05	PIN SOCKET (5P)		
J1			E08-0274-05	RECTANGULAR RECEPTACLE (2P)		
J2			E08-0475-05	RECTANGULAR RECEPTACLE (4P)		
J4	1B		E04-0167-05	VHF RECEPTACLE		
W3			E31-3253-05	CONNECTING WIRE		
A3	1B		F01-0953-12	HEAT SINK		
A5	2B		G53-0538-04	PACKING		
L1			L40-6872-80	SMALL FIXED INDUCTOR		
L3			L34-1203-05	COIL (8.5T)		
L4			L34-1197-05	COIL (6.5T)		
L5 ,6			L33-0697-05	CHOKE COIL		
L8 ,9			L34-0904-05	COIL (9.5T)		
L10 ,11			L34-1202-05	COIL (4T)		
L12			L34-0904-05	COIL (9.5T)		
L13			L34-0742-05	COIL (5T)		
E	2B		N87-2606-46	BRAZIER HEAD TAPTITE SCREW(TR)		
F	2B		N09-0626-04	SCREW (POWER MODULE)		
G	1B,2B		N32-2606-41	FLAT HEAD MACHINE SCREW(AV)		
H	1B		N87-3008-41	BRAZIER HEAD TAPTITE SCREW		
-			R92-1061-05	JUMPER REST 0 OHM		
L7			R92-0150-05	JUMPER REST 0 OHM		
R1			RD41FB2B271J	CHIP R 270 J 1/8W		
R2			RD41FB2B180J	CHIP R 18 J 1/8W		
R3			RD41FB2B271J	CHIP R 270 J 1/8W		
R4			RD41FB2B470J	CHIP R 47 J 1/8W		
R5			RD41FB2B152J	CHIP R 1.5K J 1/8W		
R6 ,7			RD41FB2B470J	CHIP R 47 J 1/8W		
R9			RD41FB2B470J	CHIP R 47 J 1/8W		
R10			RD41FB2B332J	CHIP R 3.3K J 1/8W		
R11			RD41FB2B331J	CHIP R 330 J 1/8W		
R12			RD14BB2C101J	RD 100 J 1/6W		
R13			RS14DB3A180J	FL-PROOF RS 18 J 1W		
R14			RD14BB2E331J	RD 330 J 1/4W		
R15			RD14BB2E150J	RD 15 J 1/4W		

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R16			RD14BB2E331J	RD 330 J 1/4W		
R17 -19			RD41FB2B333J	CHIP R 33K J 1/8W		
R20			RD41FB2B303J	CHIP R 30K J 1/8W		
R21			RD41FB2B471J	CHIP R 470 J 1/8W		
R22			RD41FB2B103J	CHIP R 10K J 1/8W		
R23			RD41FB2B333J	CHIP R 33K J 1/8W		
R24			RD41FB2B101J	CHIP R 100 J 1/8W		
R25			RD41FB2B333J	CHIP R 33K J 1/8W		
R26			RD41FB2B103J	CHIP R 10K J 1/8W		
R27			RD41FB2B394J	CHIP R 390K J 1/8W		
R28			RD41FB2B101J	CHIP R 100 J 1/8W		
R29			RD41FB2B471J	CHIP R 470 J 1/8W		
R30			RD41FB2B562J	CHIP R 5.6K J 1/8W		
R31			RD41FB2B222J	CHIP R 2.2K J 1/8W		
R32			RD41FB2B122J	CHIP R 1.2K J 1/8W		
R33			RS14DB2H151J	FL-PROOF RS 150 J 1/2W		
R34			RD41FB2B223J	CHIP R 22K J 1/8W		
R35			RD41FB2B101J	CHIP R 100 J 1/8W		
R36 ,37			RD41FB2B222J	CHIP R 2.2K J 1/8W		
R39			R92-0670-05	CHIP R 0 OHM		
VR1 ,2			R12-3459-05	TRIMMING POT. (47K)		
K1			S51-1434-05	RELAY (G5Y-154P)		
D1 -4			1SS181	DIODE		
D5			DSA3A1	DIODE		
D6			MI407	DIODE		
D7 ,8			1SS101	DIODE		
D9			1SS181	DIODE		
IC1			NJM2904M	IC(OP AMP X2)		
IC2			M57741-L	IC	KM	
IC2		*	M57741-H	IC	K2M2	
IC2		*	M57741-UL	IC	M3	
Q1			2SC2954	TRANSISTOR		
Q2			2SC3369	TRANSISTOR		
Q3 -6			2SC2712(Y)	TRANSISTOR		
Q7			2SB1018(Y)	TRANSISTOR		
TH1			112-503-2	THERMISTER (50K)		
CONTROL UNIT (X53-3050-10)						
C1			CE04CW1A101M	ELECTRO 100UF 10WV		
C2			CS15E1A100M	TANTAL 10UF 10WV		
C3 ,4			CK73FB1H103K	CHIP C 0.010UF K		
C5 -8			C92-0004-05	CHIP TAN 1UF 16WV		
C9			CK73FB1H103K	CHIP C 0.010UF K		
CN1			E40-3109-05	PIN CONNECTOR (9P)		
CN2		*	E08-0874-05	RECTANGULAR RECEPTACLE(8P)		
CN3			E40-5108-05	PIN CONNECTOR (9P)		
CN4			E40-3105-05	PIN CONNECTOR (5P)		
CN5			E40-3103-05	PIN CONNECTOR (3P)		
R1 -3			RD41FB2B103J	CHIP R 10K J 1/8W		
R4 -11			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R12			RD41FB2B333J	CHIP R 33K J 1/8W		
R13			RD41FB2B103J	CHIP R 10K J 1/8W		
R14			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R15			RD41FB2B103J	CHIP R 10K J 1/8W		

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R16			RD41FB2B563J	CHIP R 56K J 1/8W		
R17 -20			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R21 -24			RD41FB2B473J	CHIP R 47K J 1/8W		
R25 -31			RD41FB2B271J	CHIP R 270 J 1/8W		
R32			RD41FB2B121J	CHIP R 120 J 1/8W		
R33			RD41FB2B151J	CHIP R 150 J 1/8W		
R34			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R35			RD41FB2B473J	CHIP R 47K J 1/8W		
D1 -4			1SS184	DIODE		
IC1			7556CS(M)-302	IC(MICROPROCESSOR)		
IC2			93C46PI	IC		
IC3		*	MB88306	IC(OUTPUT EXPANDER)		
IC4		*	M51943BML	IC(SYSTEM RESET)		
Q1			2SC2712(Y)	TRANSISTOR		
Q2 -5			DTC114EK	DIGITAL TRANSISTOR		
DISPLAY UNIT (X54-3030-10)						
D1			B30-0856-05	LED (BUSY)		
D2			B30-0855-05	LED (TX)		
D3			B30-0857-05	LED (CALL)		
C1 -6			CK73FB1H102K	CHIP C 1000PF K		
C7			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
J1		*	E08-0673-05	RECTANGULAR RECEPTACLE(6P MODU		
W1		*	E31-3258-05	CONNECTING WIRE(2P SQL)		
W2		*	E31-3259-05	CONNECTING WIRE(2P SB)		
W3		*	E31-3260-05	CONNECTING WIRE(3P CALL)		
W4		*	E31-3261-05	CONNECTING WIRE(4P AF VOL)		
W5		*	E31-3262-05	CONNECTING WIRE(5P MIC)		
W6		*	E31-3263-05	CONNECTING WIRE(6P TX.RX)		
W7		*	E31-3264-05	CONNECTING WIRE(9P CH LED)		
W8		*	E31-3265-05	CONNECTING WIRE		
A1			J39-0426-04	SPACER (3)		
R1			RD41FB2B151J	CHIP R 150 J 1/8W		
R8			R92-0341-05	FIXED RESISTOR (4.7 OHM)		
VR1			R05-4420-05	POTENTIOMETER (50K)		
VR2		*	R05-3442-05	POTENTIOMETER (10K) WITH SW		
S1 ,2			S40-2458-05	PUSH SWITCH (MONI,AUX)		
S3		*	S29-1437-05	ROTARY SWITCH		
D7			1SS184	DIODE		
D8 ,9			1SS181	DIODE		
D10 -14			1SS184	DIODE		
D12			1SS181	DIODE		
D16			LA301DB	LED		
TX-RX UNIT (X57-3180-XX) -10 (F1), -11 (F2), -21 (F3)						
C1 ,2			CK73FB1H102K	CHIP C 1000PF K		
C3			CE04EW1A470M	ELECTRO 47UF 10WV		
C4			C90-2044-05	ELECTRO 1UF 25WV		
C5			CK73FB1H103K	CHIP C 0.010UF K		
C6			CE04EW1A470M	ELECTRO 47UF 10WV		
C7			CK73FB1H103K	CHIP C 0.010UF K		
C8			C90-2041-05	ELECTRO 10UF 10WV		
C9			CK73FB1H103K	CHIP C 0.010UF K		
C10			CK73FB1H123K	CHIP C 0.012UF K		

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C11			CS15E1VR68M	TANTAL	0.68UF	35WV		
C12			CK73FB1H182K	CHIP C	1800PF	K		
C13			CK73FB1H471K	CHIP C	470PF	K		
C14			CK73FB1H103K	CHIP C	0.010UF	K		
C15			C90-2041-05	ELECTRO	10UF	10WV		
C16 ,17			CK73FB1H102K	CHIP C	1000PF	K		
C18			CC73FCH1H090D	CHIP C	9.0PF	D	K2M2	
C18			CC73FCH1H110J	CHIP C	11PF	J	KM	
C18			CC73FCH1H130J	CHIP C	13PF	J	M3	
C19			CE04EW1H2R2M	ELECTRO	2.2UF	50WV		
C21 ,22			CK73FB1H103K	CHIP C	0.010UF	K		
C23			C90-2032-05	ELECTRO	47UF	10WV		
C24			CQ92M1H473K	MYLAR	0.047UF	K		
C25			CS15E1E010M	TANTAL	1.0UF	25WV		
C26			CS15E1V0R1M	TANTAL	0.1UF	35WV		
C27			CK73FB1H103K	CHIP C	0.010UF	K		
C28			CE04EW1A471M	ELECTRO	470UF	10WV		
C29 ,30			CK73FB1H103K	CHIP C	0.010UF	K		
C31 -36			CK73FB1H102K	CHIP C	1000PF	K		
C37 ,38			CK73FB1H103K	CHIP C	0.010UF	K		
C39			CE04EW1A470M	ELECTRO	47UF	10WV		
C40			C90-2045-05	ELECTRO	2.2UF	25WV		
C41 ,42			CK73FB1H102K	CHIP C	1000PF	K		
C43			CE04EW1C330M	ELECTRO	33UF	16WV		
C44			CE04EW1C330M	ELECTRO	33UF	16WV		
C45			CC73FCH1H300J	CHIP C	30PF	J	K2M2	
C45			CC73FCH1H330J	CHIP C	33PF	J	KM	
C45			CC73FCH1H390J	CHIP C	39PF	J	M3	
C46			CE04EW1A470M	ELECTRO	47UF	10WV		
C47			CC73FCH1H120J	CHIP C	12PF	J	K2M2	
C47			CC73FCH1H150J	CHIP C	15PF	J	KM	
C47			CC73FCH1H180J	CHIP C	18PF	J	M3	
C48			CK73FB1H102K	CHIP C	1000PF	K		
C49			CC73FCH1H050C	CHIP C	5.0PF	C	K2M2	
C49			CC73FCH1H070D	CHIP C	7.0PF	D	KM	
C49			CC73FCH1H100D	CHIP C	10PF	D	M3	
C50			CK73FB1H102K	CHIP C	1000PF	K		
C51			CC73FCH1H080D	CHIP C	8.0PF	D	K2M2	
C51			CC73FCH1H100D	CHIP C	10PF	D	KM	
C51			CC73FCH1H120J	CHIP C	12PF	J	M3	
C52			CC73FCH1H090D	CHIP C	9.0PF	D	K2M2	
C52			CC73FCH1H110J	CHIP C	11PF	J	KM	
C52			CC73FCH1H130J	CHIP C	13PF	J	M3	
C53			CC73FCH1H120J	CHIP C	12PF	J	K2M2	
C53			CC73FCH1H150J	CHIP C	15PF	J	KM	
C53			CC73FCH1H180J	CHIP C	18PF	J	M3	
C54			CC73FCH1H560J	CHIP C	56PF	J	K2M2	
C54			CC73FCH1H620J	CHIP C	62PF	J	KM	
C54			CC73FCH1H680J	CHIP C	68PF	J	M3	
C55		*	C91-1100-05	G	1.00PF	K		
C56 ,57		*	C91-1099-05	G	0.62PF	K		
C58			CK73FB1H102K	CHIP C	1000PF	K		
C60 ,61			CC73FSL1H101J	CHIP C	100PF	J		
C62 -65			CK73FB1H103K	CHIP C	0.010UF	K		
C66 ,67			CE04EW1A470M	ELECTRO	47UF	10WV		

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C68			CE04EW1A221M	ELECTRO 220UF 10WV		
C68			CE04EW1A221M	ELECTRO 220UF 10WV		
C69			CK73FB1H103K	CHIP C 0.010UF K		
C70			CE04EW1C330M	ELECTRO 33UF 16WV		
C71			CK73FB1H103K	CHIP C 0.010UF K		
C72 ,73			CE04EW1A101M	ELECTRO 100UF 10WV		
C74			CK73FB1H102K	CHIP C 1000PF K		
C75			CE04EW1A470M	ELECTRO 47UF 10WV		
C76			CE04EW1H100M	ELECTRO 10UF 50WV		
C77			CQ92M1H273K	MYLAR 0.027UF K		
C78			CE04EW1A101M	ELECTRO 100UF 10WV		
C79			C90-2076-05	ELECTRO 560UF 10WV		
C80			CE04EW1A470M	ELECTRO 47UF 10WV		
C81			CQ92M1H104K	MYLAR 0.10UF K		
C82			CK73FB1H102K	CHIP C 1000PF K		
C83			CE04EW1E471M	ELECTRO 470UF 25WV		
C84			CK73FB1H103K	CHIP C 0.010UF K		
C85			CE04EW1H100M	ELECTRO 10UF 50WV		
C86 ,87			CE04EW1A101M	ELECTRO 100UF 10WV		
C88			CE04EW1H100M	ELECTRO 10UF 50WV		
C89			CK73FB1H103K	CHIP C 0.010UF K		
C90			C90-2044-05	ELECTRO 1UF 25WV		
C91			CE04EW1A470M	ELECTRO 47UF 10WV		
C92			C90-2044-05	ELECTRO 1UF 25WV		
C93			CE04EW1A470M	ELECTRO 47UF 10WV		
C94			C90-2041-05	ELECTRO 10UF 10WV		
C95			CE04EW1A470M	ELECTRO 47UF 10WV		
C96			C90-2041-05	ELECTRO 10UF 10WV		
C97			CE04EW1E471M	ELECTRO 470UF 25WV		
C98 -104			CK73FB1H102K	CHIP C 1000PF K		
C105			CK73FB1H103K	CHIP C 0.010UF K		
C106			CK73FB1H102K	CHIP C 1000PF K		
C107			CC73FSL1H101J	CHIP C 100PF J		
C108,109			CK73FB1H102K	CHIP C 1000PF K		
C114			CC73FCH1H220J	CHIP C 22PF J		
CC20			C90-2032-05	ELECTRO 47UF 10WV		
CN1			E40-3093-05	PIN CONNECTOR (5P)		
CN2			E40-3092-05	PIN CONNECTOR (4P)		
CN3			E40-3091-05	PIN CONNECTOR (3P)		
CN4			E40-5099-05	PIN CONNECTOR (9P SOCKET)		
CN5			E40-5055-05	PIN CONNECTOR (5P)		
CN6			E40-0273-05	PIN CONNECTOR (2P)		
CN7			E40-3094-05	PIN CONNECTOR (6P)		
CN8			E40-0273-05	PIN CONNECTOR (2P)		
CN9			E40-5052-05	PIN CONNECTOR (2P)		
CN10			E40-5069-05	PIN CONNECTOR (12P)		
CN11			E40-3092-05	PIN CONNECTOR (4P)		
CN12			E40-3090-05	PIN CONNECTOR (2P)		
CN13,14			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
TP1 ,2			E23-0464-05	TERMINAL		
W1			E31-3271-05	CONNECTING WIRE		
A1		*	F10-1368-03	SHIELDING PLATE		
CF1			L72-0339-05	CERAMIC FILTER (CFV455D)		

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PARTS LIST

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
L1			L40-4701-14	SMALL FIXED INDUCTOR(47MH)		
L2 ,3			L40-1021-13	SMALL FIXED INDUCTOR(1MH)		
L4			L40-1281-80	SMALL FIXED INDUCTOR(120MH)		
L5 -7			L40-1021-13	SMALL FIXED INDUCTOR(1MH)		
L8			L79-0812-05	FILTER		
L9 ,10			L39-0430-05	COIL		
L11			L40-4701-14	SMALL FIXED INDUCTOR(47MH)		
L12 -16		*	L34-4045-05	COIL (RF)		
L17 ,18			L39-0430-05	COIL		
L19			L40-5682-14	SMALL FIXED INDUCTOR(0.56MH)		
L20			L30-0532-05	IFT (21.4MHZ)		
L21			L30-0533-05	IFT (21.4MHZ)		
L22			L34-2160-05	COIL (21.4MHZ)		
L24			L30-0503-05	IFT (455KHZ)		
L25			L40-1021-14	SMALL FIXED INDUCTOR(1MH)		
L33			L15-0016-05	LOW-FREQUENCY CHOKE COIL		
X1			L77-1337-05	CRYSTAL RESONATOR(20.945MHZ)	KM	
X1			L77-1349-05	CRYSTAL RESONATOR(21.855MHZ)	K2M2M3	
XF1			L71-0272-05	MCF (21M15CH)		
Z2			L77-1339-05	VCXO		
Z4		*	L78-0032-05	RESONATOR	KK2MM2	
Z4		*	L78-0034-05	RESONATOR	M3	
Z6		*	L78-0031-05	RESONATOR	KK2MM2	
Z6		*	L78-0033-05	RESONATOR	M3	
Z7			L77-1338-05	TCXO (12.8MHZ)		
A4			R92-0150-05	JUMPER REST 0 OHM		
R1			RD41FB2B101J	CHIP R 100 J 1/8W		
R2			RD41FB2B561J	CHIP R 560 J 1/8W		
R3			RD41FB2B470J	CHIP R 47 J 1/8W		
R4			RD41FB2B272J	CHIP R 2.7K J 1/8W		
R5			RD41FB2B103J	CHIP R 10K J 1/8W		
R6			RD41FB2B122J	CHIP R 1.2K J 1/8W		
R7			RD41FB2B121J	CHIP R 120 J 1/8W		
R8			RD41FB2B561J	CHIP R 560 J 1/8W		
R9			RD41FB2B222J	CHIP R 2.2K J 1/8W		
R10			RD41FB2B123J	CHIP R 12K J 1/8W		
R11			RD41FB2B270J	CHIP R 27 J 1/8W		
R12			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R13			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R14			RD41FB2B270J	CHIP R 27 J 1/8W		
R15			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R16			RD41FB2B122J	CHIP R 1.2K J 1/8W		
R17 ,18			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R19 ,20			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R21			RD41FB2B221J	CHIP R 220 J 1/8W		
R22 ,23			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R24			RD41FB2B221J	CHIP R 220 J 1/8W		
R25			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R26			RD41FB2B271J	CHIP R 270 J 1/8W		
R27			RD41FB2B180J	CHIP R 18 J 1/8W		
R28 ,29			RD41FB2B271J	CHIP R 270 J 1/8W		
R30			RD41FB2B180J	CHIP R 18 J 1/8W		
R31			RD41FB2B271J	CHIP R 270 J 1/8W		
R32			RD41FB2B471J	CHIP R 470 J 1/8W		
R33			RD41FB2B103J	CHIP R 10K J 1/8W		

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R34			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R35			RD41FB2B271J	CHIP R 270 J 1/8W		
R36			RD41FB2B180J	CHIP R 18 J 1/8W		
R37 ,38			RD41FB2B271J	CHIP R 270 J 1/8W		
R39			RD41FB2B180J	CHIP R 18 J 1/8W		
R40 ,41			RD41FB2B271J	CHIP R 270 J 1/8W		
R42			RD41FB2B180J	CHIP R 18 J 1/8W		
R43			RD41FB2B271J	CHIP R 270 J 1/8W		
R44			RD41FB2B680J	CHIP R 68 J 1/8W		
R45			RD41FB2B561J	CHIP R 560 J 1/8W		
R47			RD41FB2B222J	CHIP R 2.2K J 1/8W		
R48			RD41FB2B270J	CHIP R 27 J 1/8W		
R49			RD41FB2B223J	CHIP R 22K J 1/8W		
R50			RD41FB2B474J	CHIP R 470K J 1/8W		
R51			RD41FB2B470J	CHIP R 47 J 1/8W		
R52			RD41FB2B561J	CHIP R 560 J 1/8W		
R58			RD41FB2B271J	CHIP R 270 J 1/8W		
R59			RD41FB2B180J	CHIP R 18 J 1/8W		
R60			RD41FB2B271J	CHIP R 270 J 1/8W		
R61			RD41FB2B470J	CHIP R 47 J 1/8W		
R62			RD41FB2B681J	CHIP R 680 J 1/8W		
R63			RD41FB2B162J	CHIP R 1.6K J 1/8W		
R64 ,65			RD41FB2B470J	CHIP R 47 J 1/8W		
R66			RD41FB2B681J	CHIP R 680 J 1/8W		
R67			RS14KB3D220J	FL-PROOF RS 22 J 2W		
R68			RD41FB2B222J	CHIP R 2.2K J 1/8W		
R69			RD41FB2B101J	CHIP R 100 J 1/8W		
R70			RD41FB2B221J	CHIP R 220 J 1/8W		
R71			RD41DB2B2R2J	CHIP R 2.2 J 1/8W		
R72			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R73			RD41FB2B123J	CHIP R 12K J 1/8W		
R74			RD41FB2B272J	CHIP R 2.7K J 1/8W		
R75			RD41FB2B470J	CHIP R 47 J 1/8W		
R76			RD41FB2B682J	CHIP R 6.8K J 1/8W		
R77			RD41FB2B471J	CHIP R 470 J 1/8W		
R78			RD41FB2B332J	CHIP R 3.3K J 1/8W		
R79			RD41FB2B394J	CHIP R 390K J 1/8W		
R80			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R81			RD41FB2B683J	CHIP R 68K J 1/8W		
VR1			R12-0420-05	TRIMMING POT. (500)		
VR2			R12-3430-05	TRIMMING POT. (10K)		
D1			1SS184	DIODE		
D2			RD3.0M-B2	CHIP ZENER DIODE(3.0V)		
D3 ,4			1SS184	DIODE		
D5			MC804	DUIDE		
D6			ND487C1-3R	DIODE		
D7			RD13M-B2	CHIP ZENER DIODE(13V)		
D8			1SS226	DIODE		
D9			ND487C1-3R	DIODE		
D10			1SS184	DIODE		
D11			RD3.9M-B2	CHIP ZENER DIODE(3.9V)		
IC1			L78M05	IC(VOLTAGE REGULATOR/ +5V)		
IC2			MB3756	IC(REGULATOR/OUTPUT.SEL)		
IC3			UPC1242H	IC		

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Q1			2SC3838K(N,P)	TRANSISTOR		
Q2 ,3			DTC114EK	DIGITAL TRANSISTOR		
Q4			2SC1815(BL)	TRANSISTOR		
Q5			2SK302(GR)	FET		
Q7 ,8			2SK125P	FET		
Q9			2SK302(GR)	FET		
Q10			2SC2712(Y)	TRANSISTOR		
TH1			112-103-2	THERMISTER (10K)		
Z1			X59-3210-10	MODULE UNIT (MIC AMP)		
Z3			X58-3130-10	MODULE UNIT (TX. PLL)		
Z5		*	X58-3140-10	MODULE UNIT (RX. PLL)		
Z8			X59-3260-10	MODULE UNIT (SQL)		
Z9			X59-3250-10	MODULE UNIT (AF BPF)		
10			X59-3220-10	MODULE UNIT (IF)		
TX PLL : Z3 (X58-3130-10)						
C1 -3			CK73FB1H103K	CHIP C 0.010UF K		
C4			CC41FCH1H100D	CYLND CHIP C 10PF D		
C5			CC41FCH1H220J	CYLND CHIP C 22PF J		
C6			CC41FCH1H100D	CYLND CHIP C 10PF D		
C7			CK73FB1H103K	CHIP C 0.010UF K		
C8			CK73FB1H102K	CHIP C 1000PF K		
C9 ,10			CK73FB1H103K	CHIP C 0.010UF K		
-			E23-0471-05	TERMINAL		
A1			F10-1351-04	SHIELDING PLATE		
L1 ,2			L40-1092-81	SMALL FIXED INDUCTOR(1.0UH)		
R1			RD41FB2B103J	CHIP R 10K J 1/8W		
R2			RD41FB2B273J	CHIP R 27K J 1/8W		
R3			RD41FB2B221J	CHIP R 220 J 1/8W		
R4			RD41FB2B101J	CHIP R 100 J 1/8W		
R5			RD41FB2B471J	CHIP R 470 J 1/8W		
R6			RD41FB2B103J	CHIP R 10K J 1/8W		
R7 ,8			R92-0687-05	CHIP R 0 OHM		
IC1			MC145152SL	IC(PLL)		
IC2			TC4007UBF	IC(COMPLEMENTARY PAIR PLUS INV		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
COMMON PLL : Z5 (X58-3140-10)						
C1 -7			CK73FB1H102K	CHIP C 1000PF K		
C8			CC41FCH1H080D	CYLND CHIP C 8.0PF D		
C9			CK73FB1H102K	CHIP C 1000PF K		
C10			C92-0009-05	CHIP TAN 4.7UF 10WV		
C11 ,12			CC41FCH1H070D	CYLND CHIP C 7.0PF D		
C13 ,14			CK73FB1H102K	CHIP C 1000PF K		
-			E23-0471-05	TERMINAL		
A1			F11-1092-04	SHIELDING COVER		
L1			L40-2281-80	SMALL FIXED INDUCTOR(220NH)		
R1			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R2			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R3 ,4			RD41FB2B270J	CHIP R 27 J 1/8W		

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R5			RD41FB2B182J	CHIP R 1.8K J 1/8W		
R6 -9			RD41FB2B103J	CHIP R 10K J 1/8W		
R10			R92-0687-05	CHIP R 0 OHM		
R11			RD41FB2B103J	CHIP R 10K J 1/8W		
R12			RD41FB2B471J	CHIP R 470 J 1/8W		
R13			R92-0687-05	CHIP R 0 OHM		
R14			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R15			RD41FB2B562J	CHIP R 5.6K J 1/8W		
D1			RD3.0M-B2	CHIP ZENER DIODE(3.0V)		
IC1			MB504F	IC(MODULUS PRE SCALER)		
IC2			JLC1075F	IC(PLL FREQ SYNTHESIZER)		
Q1			2SC2714(Y)	CHIP TRANSISTOR		
Q2 -5			DTC114EK	DIGITAL TRANSISTOR		
MIC AMP : Z1 (X59-3210-10)						
C1			CC73FCH1H101J	CHIP C 100PF J		
C2			C92-0004-05	CHIP TAN 1UF 16WV		
C3 ,4			CK73FB1E223K	CHIP C 0.022UF K		
C5			CC73FCH1H330J	CHIP C 33PF J		
C6			C92-0009-05	CHIP TAN 4.7UF 10WV		
C7			C92-0004-05	CHIP TAN 1UF 16WV		
C8			CC73FCH1H101J	CHIP C 100PF J		
C9			C92-0004-05	CHIP TAN 1UF 16WV		
C10			CK73FB1H123K	CHIP C 0.012UF K		
C11			CK73FB1H222K	CHIP C 2200PF K		
C12			CC73FCH1H330J	CHIP C 33PF J		
C13			C92-0004-05	CHIP TAN 1UF 16WV		
C14			CK73FB1H222K	CHIP C 2200PF K		
C15			CK73FB1H392K	CHIP C 3900PF K		
C16			CC73FCH1H221J	CHIP C 220PF J		
C17			CK73FB1H472K	CHIP C 4700PF K		
C18			C92-0004-05	CHIP TAN 1UF 16WV		
-			E23-0471-05	TERMINAL		
R1			RD41FB2B473J	CHIP R 47K J 1/8W		
R2			RD41FB2B223J	CHIP R 22K J 1/8W		
R3			RD41FB2B561J	CHIP R 560 J 1/8W		
R4			RD41FB2B681J	CHIP R 680 J 1/8W		
R5			RD41FB2B561J	CHIP R 560 J 1/8W		
R6			RD41FB2B104J	CHIP R 100K J 1/8W		
R7			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R8			RD41FB2B333J	CHIP R 33K J 1/8W		
R9			RD41FB2B393J	CHIP R 39K J 1/8W		
R10			RD41FB2B104J	CHIP R 100K J 1/8W		
R11			RD41FB2B683J	CHIP R 68K J 1/8W		
R12			RD41FB2B224J	CHIP R 220K J 1/8W		
R13			RD41FB2B474J	CHIP R 470K J 1/8W		
R14			RD41FB2B123J	CHIP R 12K J 1/8W		
R15			RD41FB2B154J	CHIP R 150K J 1/8W		
R16			RD41FB2B272J	CHIP R 2.7K J 1/8W		
R17			RD41FB2B822J	CHIP R 8.2K J 1/8W		
R19 ,20			RD41FB2B104J	CHIP R 100K J 1/8W		
R21			RD41FB2B103J	CHIP R 10K J 1/8W		
R22			RD41FB2B272J	CHIP R 2.7K J 1/8W		
R23			RD41FB2B393J	CHIP R 39K J 1/8W		

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R25			RD41FB2B333J	CHIP R 33K J 1/8W		
R26 ,27			RD41FB2B472J	CHIP R 4.7K J 1/8W		
R28			RD41FB2B683J	CHIP R 68K J 1/8W		
RR24			RD41FB2B123J	CHIP R 12K J 1/8W		
IC1			NJM4560M	IC(OP AMP X2)		
IC2 ,3			NJM4558M	IC(OP AMP X2)		
Q1			2SC3326(A)	CHIP TRANSISTOR		
IF : Z10 (X59-3220-10)						
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FCH1H220J	CHIP C 22PF J		
C3			CC73FCH1H470J	CHIP C 47PF J		
C4 -7			CK73EB1E104K	CHIP C 0.10UF K		
C8			C92-0003-05	CHIP TAN 0.47UF 25WV		
C9 ,10			CC73FCH1H680J	CHIP C 68PF J		
C11 ,12			CK73FB1H102K	CHIP C 1000PF K		
C14			C92-0003-05	CHIP TAN 0.47UF 25WV		
C17			CK73FB1E223K	CHIP C 0.022UF K		
C19			CK73FB1H102K	CHIP C 1000PF K		
C20			CC73FCH1H470J	CHIP C 47PF J		
-			E23-0471-05	TERMINAL		
R1			RD41FB2B183J	CHIP R 18K J 1/8W		
R3			RD41FB2B272J	CHIP R 2.7K J 1/8W		
R4			RD41FB2B334J	CHIP R 330K J 1/8W		
R5 ,6			RD41FB2B153J	CHIP R 15K J 1/8W		
R7			RD41FB2B821J	CHIP R 820 J 1/8W		
R10			RD41FB2B224J	CHIP R 220K J 1/8W		
R13			RD41FB2B392J	CHIP R 3.9K J 1/8W		
R14			RD41FB2B223J	CHIP R 22K J 1/8W		
R15			RD41FB2B821J	CHIP R 820 J 1/8W		
R16			RD41FB2B223J	CHIP R 22K J 1/8W		
D1			DA204K	CHIP DIODE		
IC1			MC3361D	IC(FM IF SYSTEM)		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
AF BPF : Z9 (X59-3250-10)						
C1 -4			C93-0502-05	CERAMIC 1800PF G		
C5 -9			C93-0501-05	CERAMIC 680PF G		
C10 ,11			C93-0502-05	CERAMIC 1800PF G		
C12			CC73FCH1H101J	CHIP C 100PF J		
-			E23-0471-05	TERMINAL		
R1			RD41FB2B184J	CHIP R 180K J 1/8W		
R2 ,3			RD41FB2B563J	CHIP R 56K J 1/8W		
R4			RD41FB2B394J	CHIP R 390K J 1/8W		
R5			RK73FB2A134G	CHIP R 130K G 1/10W		
R6 ,7			RK73FB2A225J	CHIP R 2.2M J 1/10W		
R8			RK73FB2A683G	CHIP R 68K G 1/10W		
R9 ,10			RK73FB2A105G	CHIP R 1.0M G 1/10W		
R11 ,12			RD41FB2B105J	CHIP R 1.0M J 1/8W		
R13 ,14			RD41FB2B473J	CHIP R 47K J 1/8W		
R15			RK73FB2A303G	CHIP R 30K G 1/10W		
R16			RK73FB2A514G	CHIP R 510K G 1/10W		
R17			RD41FB2B124J	CHIP R 120K J 1/8W		
R18 ,19			RD41FB2B433J	CHIP R 43K J 1/8W		

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R20 ,21			RD41FB2B513J	CHIP R 51K J 1/8W		
R22			RK73FB2A164G	CHIP R 160K G 1/10W		
IC1 ,2			NJM4558M	IC(OP AMP X2)		
SQL : Z8 (X59-3260-10)						
C1			CK73FB1H103K	CHIP C 0.010UF K		
C2			C92-0009-05	CHIP TAN 4.7UF 10WV		
-			E23-0471-05	TERMINAL		
R1 -4			RD41FB2B103J	CHIP R 10K J 1/8W		
R5			RD41FB2B222J	CHIP R 2.2K J 1/8W		
R6			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R7			RD41FB2B103J	CHIP R 10K J 1/8W		
R8			RD41FB2B102J	CHIP R 1.0K J 1/8W		
R9			RD41FB2B103J	CHIP R 10K J 1/8W		
R10			R92-0338-05	CLYND CHIP R 0 OHM		
R11 ,12			R92-0687-05	CHIP R 0 OHM		
D1 -3			1SS181	CHIP DIODE		
D4 ,5			1SS226	CHIP DIODE		
Q1 -5			DTC114EK	DIGITAL TRANSISTOR		
Q6 ,7			2SC2712(Y)	CHIP TRANSISTOR		

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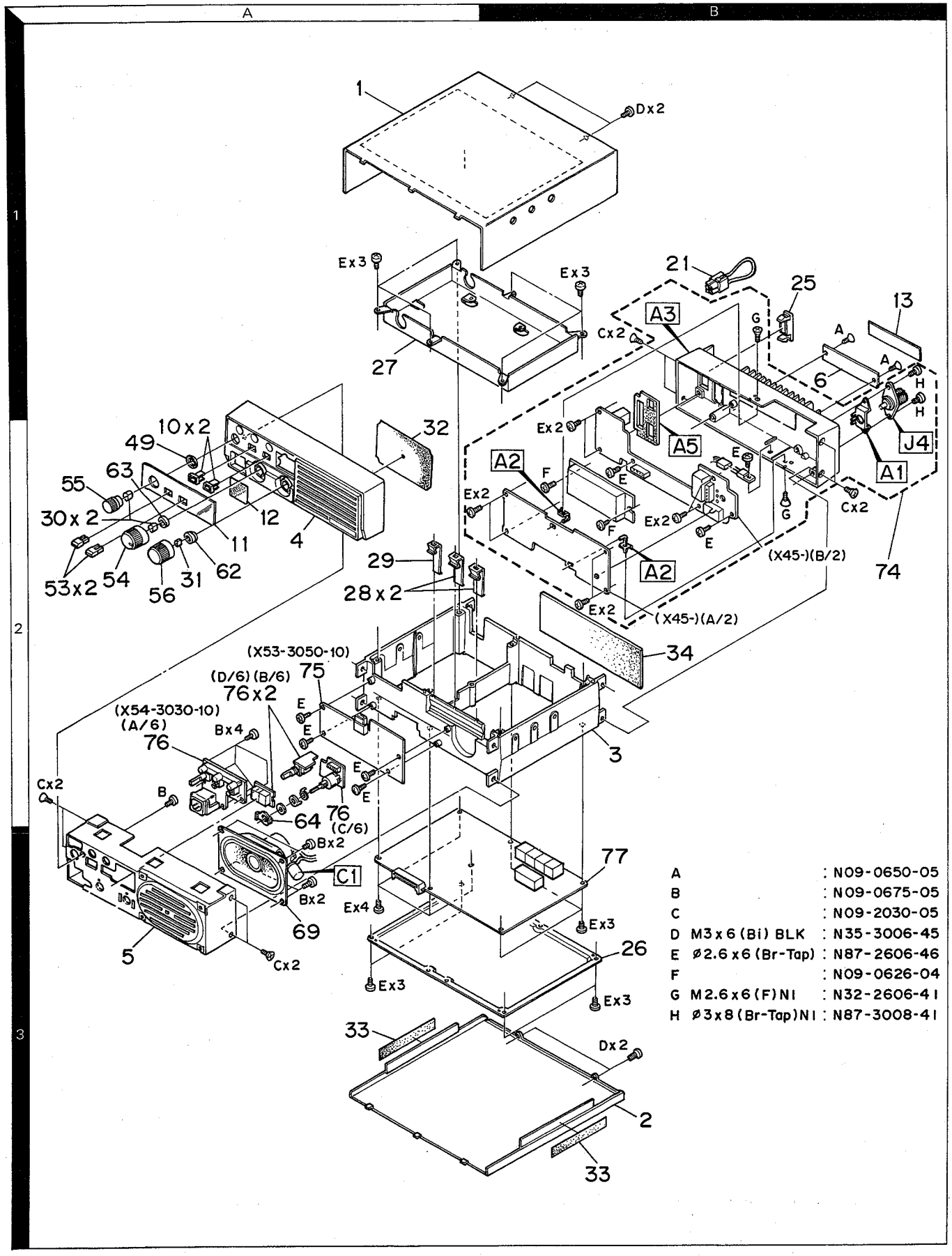
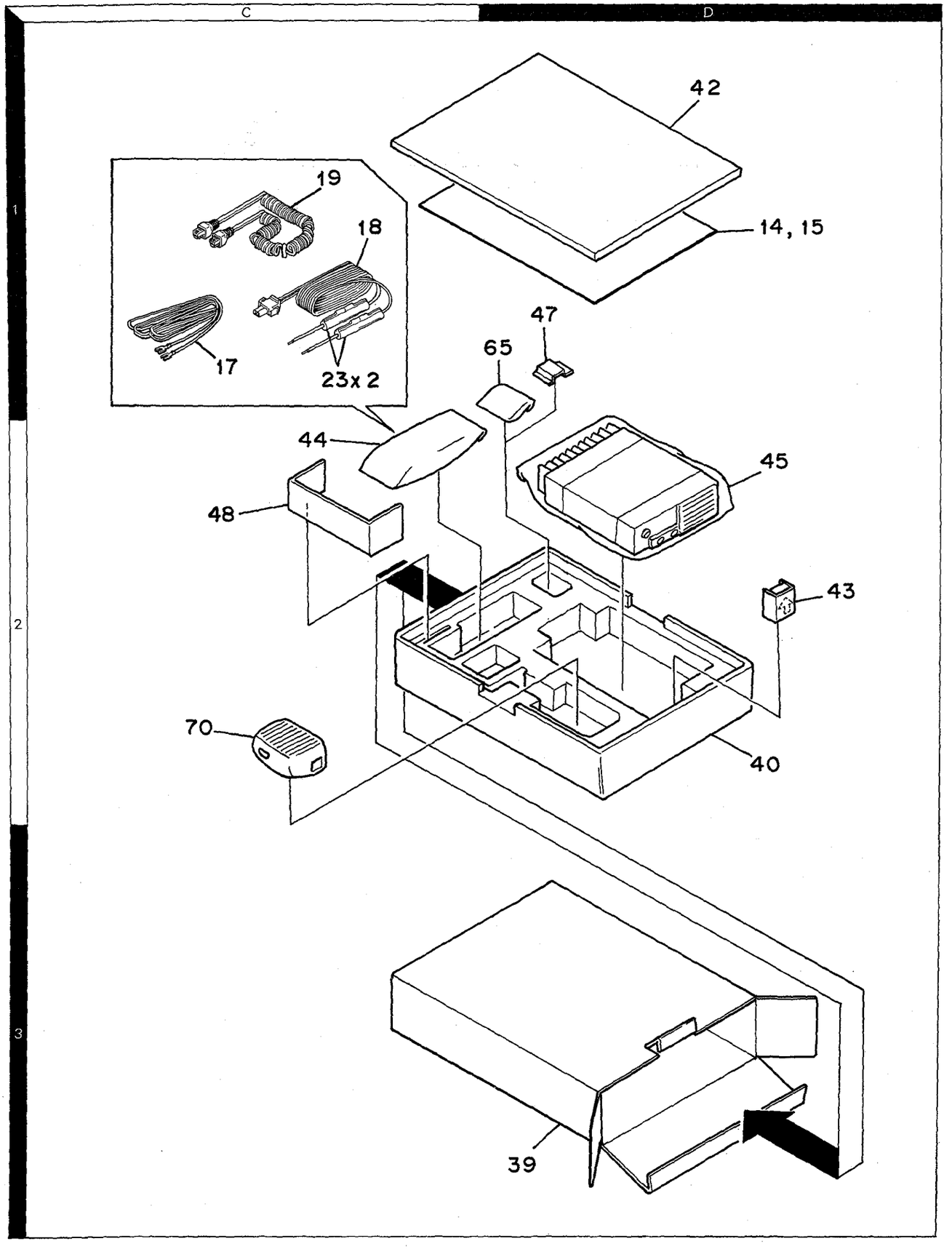
DISASSEMBLY



A		: N09-0650-05
B		: N09-0675-05
C		: N09-2030-05
D	M3x6(Bi) BLK	: N35-3006-45
E	ø2.6x6(Br-Tap)	: N87-2606-46
F		: N09-0626-04
G	M2.6x6(F)NI	: N32-2606-41
H	ø3x8(Br-Tap)NI	: N87-3008-41

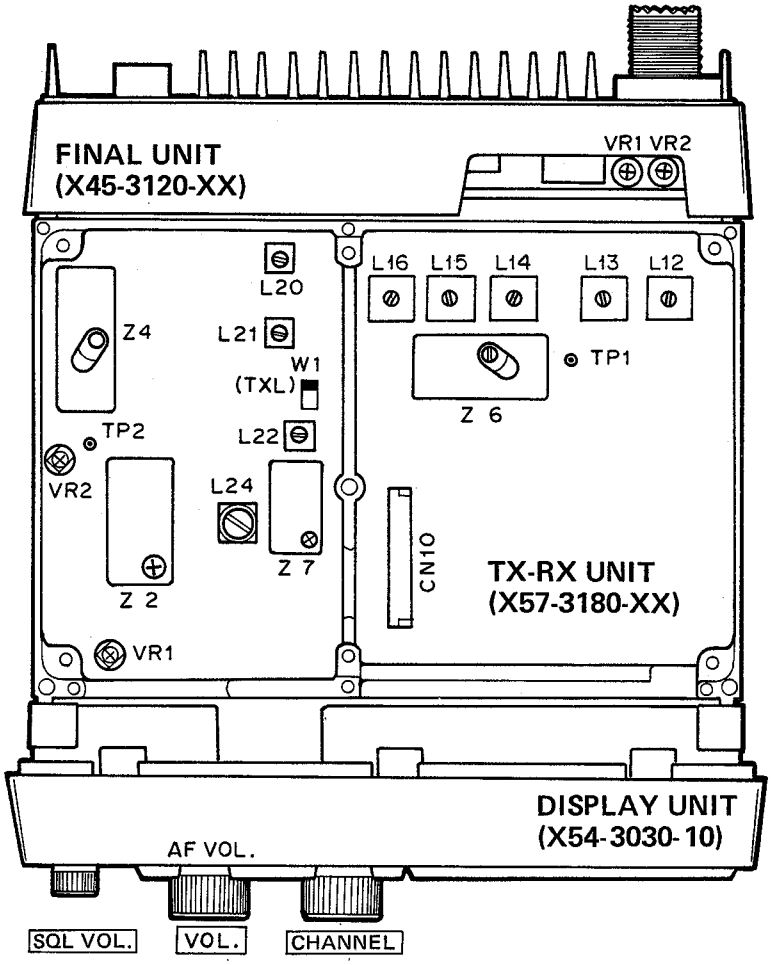
PACKING

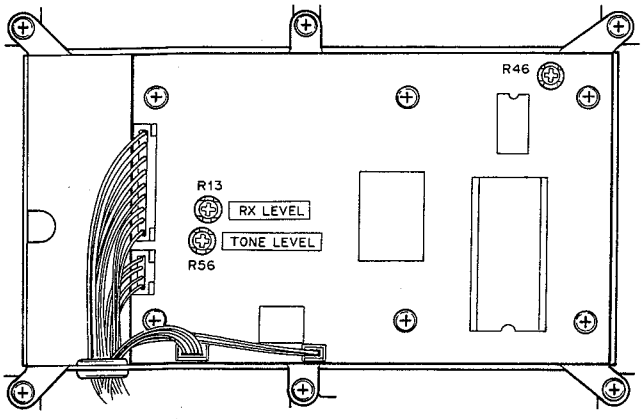


ADJUSTMENT

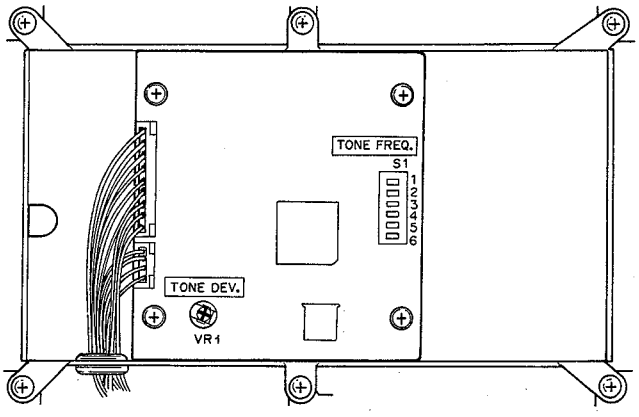
ADJUSTMENT

4–1. Adjustment location





KMS-4 Install



KQT-7 Install

ADJUSTMENT

4–2. Test equipment required for alignment

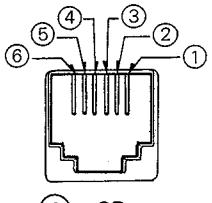
Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency range Modulation Output	150~174MHz Frequency modulation and external modulation. 0.1μV to greater than 1mV
2. Power meter	Input impedance Operation frequency Measurement capability	50 ohms 150 to 174MHz or more. Vicinity of 25W and 10W.
3. Deviation meter	Frequency range	150~174MHz
4. Digital Volt Meter	Measuring range Accuracy	1~10V DC. High input impedance for minimum circuit loading.
5. Oscilloscope		DC through 30MHz.
6. High sensitivity frequency counter	Frequency range Frequency stability	10Hz to 200MHz. 0.2 ppm or less.
7. Ammeter		15A.
8. AF Volt Meter (AFVTVM)	Frequency range Voltage range	50Hz to 10kHz. 3mV to 3V.
9. Audio Generator (AG)	Frequency range Output	50Hz to 5kHz or more. 0 and 1V.
10. Distortion meter	Capability Input level	3% or less at 1kHz. 50mV to 10Vrms.
11. Voltmeter	Measuring range Input impedance	1.5~10V DC or less. 50 kohms/V or greater.
12. 4 ohm dummy load		Approx. 4 ohm, 3W.
13. Regulated power supply		13.8V, approx. 15A (adjustable from 9~17V) Useful if ammeter equipped.

The set has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

	RX freq' fR ( ) MHz			TX freq' fT ( ) MHz		
	L	M	H	L	M	H
K ,M	158.1	160.1	161.9	150.0	156.0	162.0
K2,M2	170.1	172.1	173.9	162.0	168.0	174.0
M3	147.1	148.5	149.9	140.0	145.0	150.0

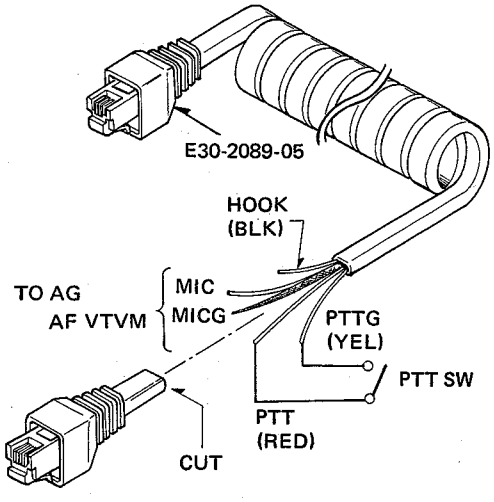
L : Low freq' M : Mid freq' H : Hi freq'

MIC connector front view

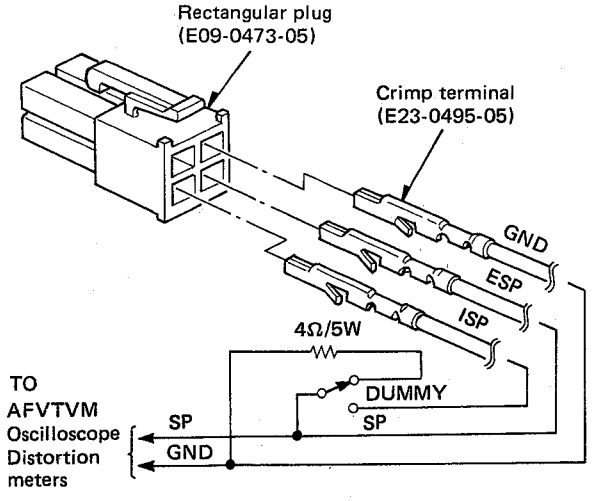


① SB
② PTTG
③ PTT
④ MICG
⑤ MIC
⑥ HOOK

- The following test cables are recommended.



Test cable for Microphone input



Test cable for Speaker output

ADJUSTMENT

4–3. Alignment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Write in freq' designed with EEPROM writer. 2) Connect the power cable to the rear panel. 3) Final unit VR1 : MAX CCW. 4) Power SW : ON							
2. Common PLL Lock Voltage	1) CH : Channel with highest TX FREQ' (f_{TH}). 2) PTT : ON	Power meter DVM	TX-RX	TP1	TX-RX	Z6	6.0V ADJ.	±0.1V
3. TX PLL Lock Voltage			TX-RX	TP2	TX-RX	Z4	6.0V ADJ.	±0.1V
4. TCXO FREQ' ADJ.	1) CH : Channel with TX center FREQ' (f_{TM}) 2) PTT : ON	Power meter FREQ' counter	TX-RX	W1 (TXL)	TX-RX	Z7	f–21.4MHz ADJ.	±100Hz
5. Power ADJ. (APC)	1) CH : Channel with TX center FREQ' (f_{TM}) PTT : ON	Power meter Ammeter	Rear panel	ANT	Final	VR1	MAX CW	30W or more
							26W ADJ.	±1W, 6A or less
	2) CH : Channel with lowest TX FREQ' (f_{TL}) and channel with highest TX FREQ' (f_{TH}). PTT : ON						Check	22~28W 6A or less
6. Protection	1) CH : Channel with lowest TX FREQ' (f_{TL}). PRO VR (Final unit : VR2) : MAX CCW ANT : OPEN, PTT : ON **(K,K2,M,M2)**	Ammeter	Rear panel	Power connector	Final	VR2	3.5A ADJ. **(K,K2,M,M2)**	±0.2A
	ANT : SHORT, PTT : ON **(M3)**						3.5A ADJ. **(M3)**	
7. Transmit FREQ' ADJ.	1) CH : Channel with TX center FREQ' (f_{TM}) ANT : Power meter PTT : ON	Power meter FREQ' counter	Rear panel	ANT	TX-RX	Z2	FREQ' ADJ of TX	±100Hz
	2) CH : Check other channel. PTT : ON						Check	

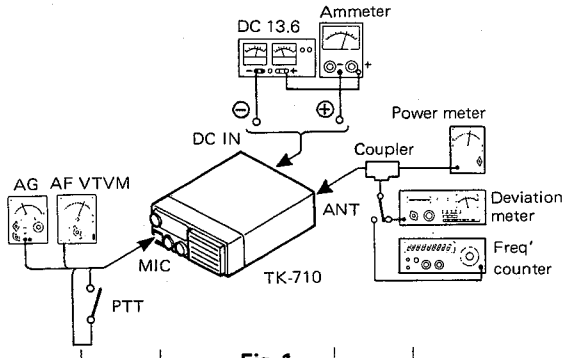


Fig. 1

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
8. Tone deviation ADJ. KQT-7 or KMS-4 (OPTION)	1) CH : Set the channel selector to the channel with which QT (CTCSS) is used. Deviation meter filter LPF : 3kHz, HPF : OFF, De-emphasis : OFF, PTT : ON	Power meter Deviation meter	Rear panel	ANT	KQT-7 (KMS-4)	VR1 (R56)	±0.75kHz ADJ.	±100Hz
9. Maximum deviation ADJ.	1) Connect AG to the MIC terminal. AG : 1kHz/50mV Deviation meter filter : LPF : 20kHz De-emphasis : 750μsec. TX-RX unit VR1 : MAX (CW) CH : Channel with highest TX-FREQ' (f_{TH}). PTT : ON	Power meter Deviation meter	Rear panel	ANT	TX-RX	VR2	±4.4kHz ADJ. (±5kHz ADJ. when signaling unit installed.) Adjust one more than the other by switching between −P and +P.	±200Hz
10. MIC sensitivity ADJ.	1) AG : 1kHz/5mV				TX-RX	VR1	±3.0kHz ADJ. (±3.75kHz ADJ., when signaling unit installed.)	±200Hz
11. Sensitivity ADJ.	1) CH : Channel with RX center FREQ' (f_{RM}). L20 : With the core top flush, rotate once. 	AF VTVM 4Ω dummy load	Rear panel	EXT.SP	Front panel	AF VOL.	0.78V/4Ω (Noise)	
	2) SSG FREQ' : f_{RM} Output : 2000μV/ −41dBm MOD : OFF	SSG AF VTVM Distortion meter 4Ω dummy load	Rear panel	EXT.SP	TX-RX	L12~ L16	Reduce noise level using L12~16. Decrease the SSG output so that noise level is always 20 to 30dB lower than 0.78V. Repeat 3 to 4 times.	
	3) SSG MOD : 1kHz/±5kHz DEV.					L24	Adjust for maximum AF output.	
	4) SSG Output : 0.25μV/ −119dBm					L21, L22	Adjust for maximum SINAD.	
	5) SSG MOD : 1kHz/±3kHz DEV.				Front panel	AF VOL.	0.78V/4Ω ADJ.	
							Check	SINAD 12dB or more.
	6) CH : Channel with lowest RX FREQ' (f_{RL}) and channel with highest RX FREQ' (f_{RH}). SSG FREQ' : f_{RL} or f_{RH} Output : 0.35μV/ −116dBm				Front panel	AF VOL.	0.78V/4Ω ADJ.	
							Check	SINAD 12dB or more.
	7) CH : Channel with RX center FREQ' (f_{RM}). SSG FREQ' : f_{RM} Output : 2000μV/ −41dBm				Front panel	AF VOL.	3.5V/4Ω ADJ.	
							Check	S/N 45dB or more. Distortion : 5% or less.

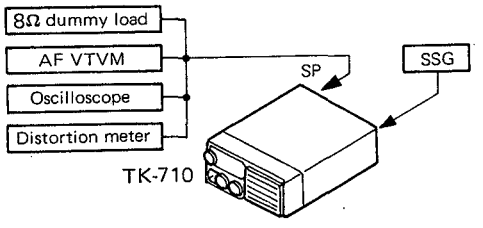


Fig. 2

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
12. Adjusting decoder sensitivity for signaling squelch KMS-4 (OPTION)	1) CH : Set the channel selector to the channel with which QT (CTCSS) is used. SSG FREQ' : Set it to the FREQ' of the channel mentioned above. SSG output : Tune the SSG output so that the SINAD sensitivity becomes 10dB.							
	2) SSG MOD SW : EXT MOD AG1 FREQ' : 1kHz AG2 FREQ' : QT tone FREQ'							
	3) AG1 : Power switch OFF AG2 Output : Adjust the output level of AG2 so that SSG deviation becomes 0.75kHz.							
	4) AG1 : Power switch ON. AG1 Output : Adjust the output level of AG1 so that the the SSG deviation becomes 3.75kHz. (i.e., QT tone frequency/ 0.75kHz deviation, + 1kHz/3kHz deviation) MIC HOOK : ON HOOK MONI SW : OFF		Rear panel	EXT.SP	KMS-4	R13	Adjust R13 so that the squelch will start to open.	

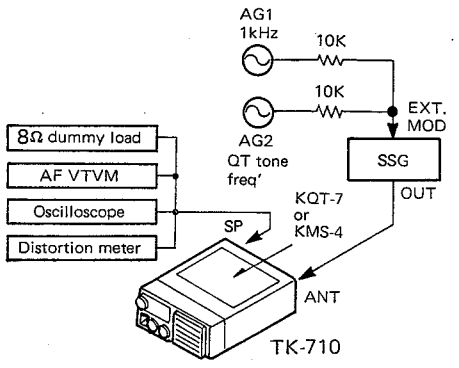
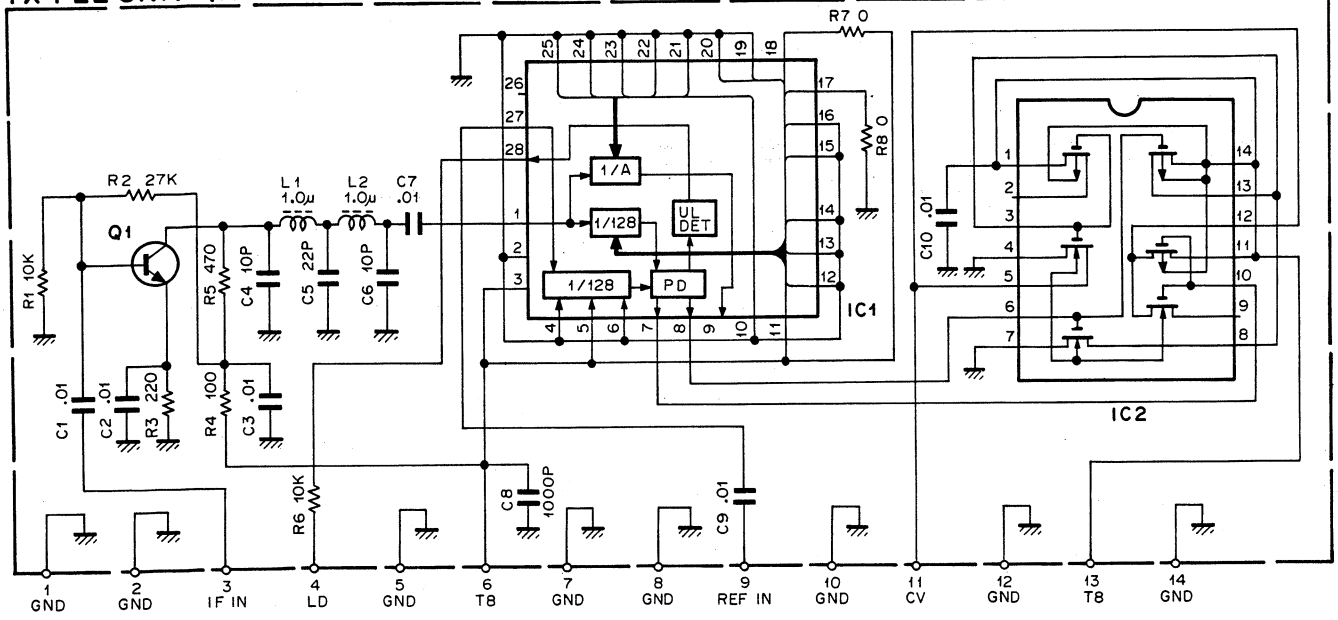


Fig. 3

CIRCUIT DIAGRAM/PC BOARD VIEWS TK-710

TX PLL UNIT : Z3 (X58-3130-10) CIRCUIT DIAGRAM

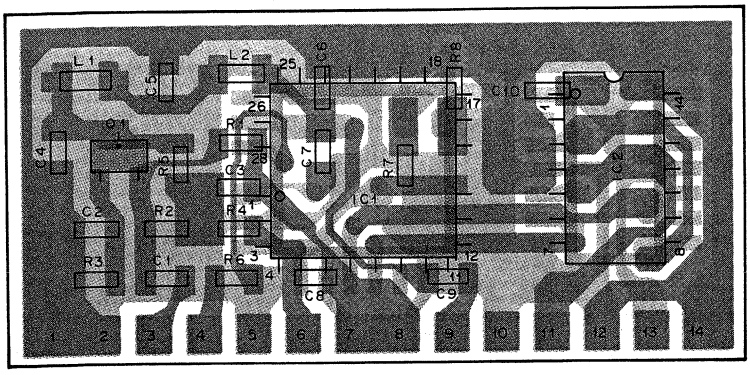
TX PLL UNIT (X58-3130-10)



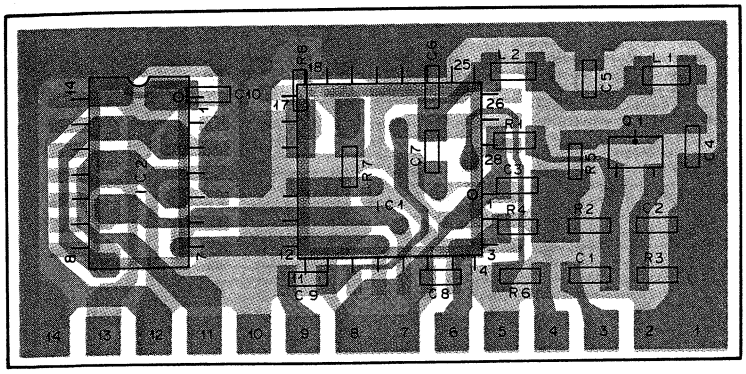
Q1 : 2SC2712(Y) IC1 : MC145152SL
IC2 : TC4007UBF

TX PLL UNIT : Z3 (X58-3130-10) PC BOARD VIEWS

Component side view

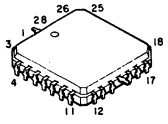


Foil side view

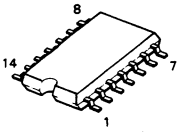


2SC2712(Y)

TC4007UBF



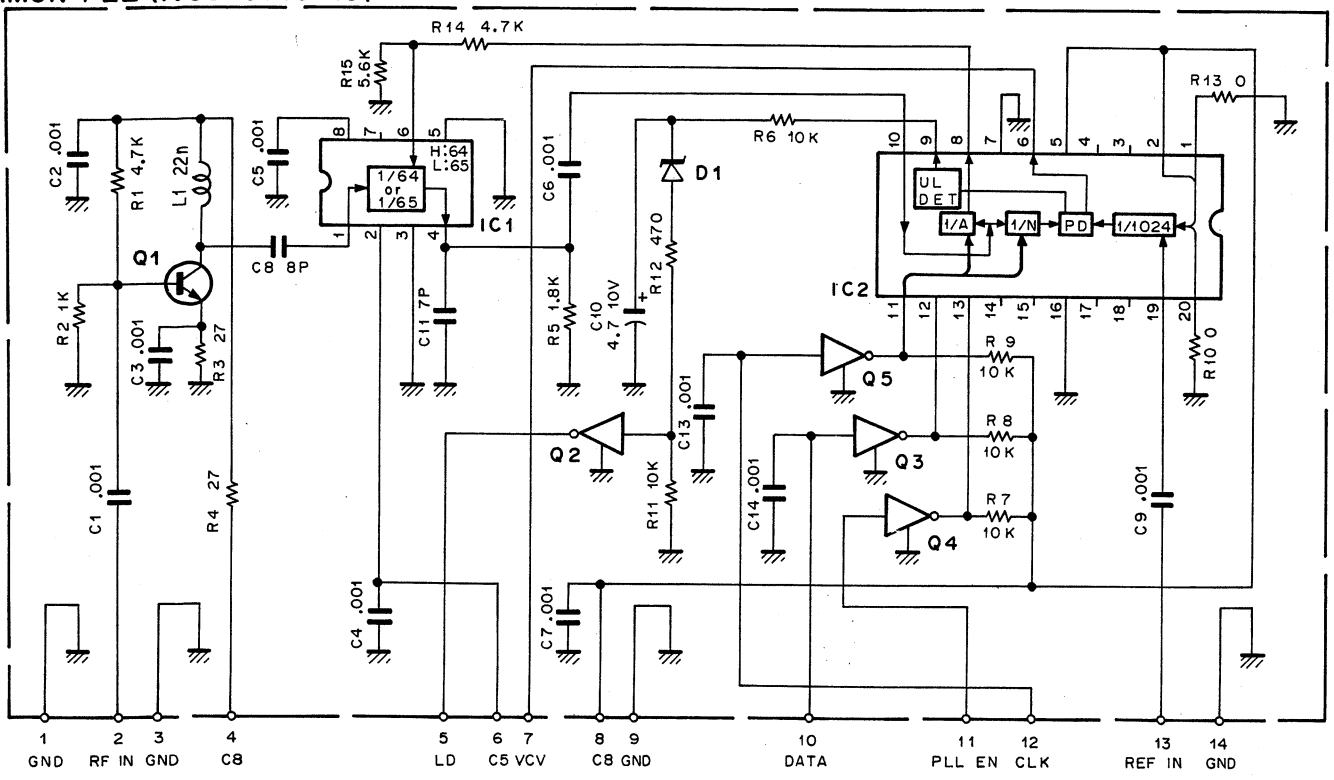
MC145152SL



TK-710 CIRCUIT DIAGRAM/PC BOARD VIEWS

COMMON PLL UNIT : Z5 (X58-3140-10) CIRCUIT DIAGRAM

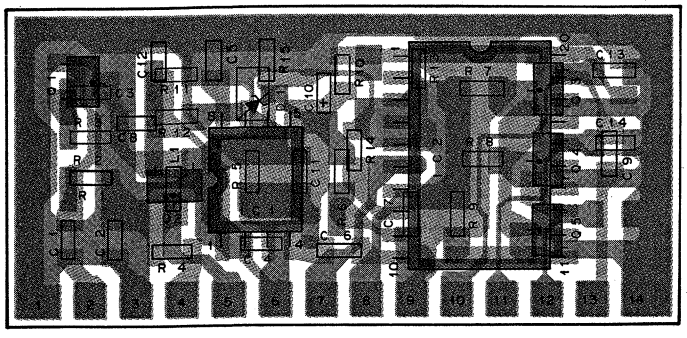
COMMON PLL (X58-3140-10)



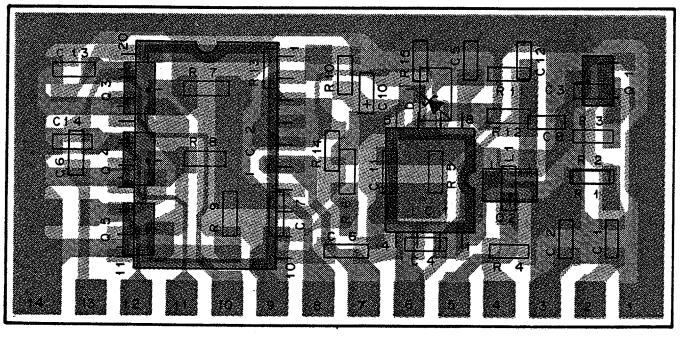
Q1 : 2SC2714(Y)
Q2,3,4,5 : DTC114EK
IC1 : MB504F
IC2 : JLC1075F
D1 : RD3.0M-B2

COMMON PLL UNIT : Z5 (X58-3140-10) PC BOARD VIEWS

Component side view

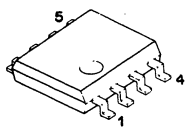


Foil side view



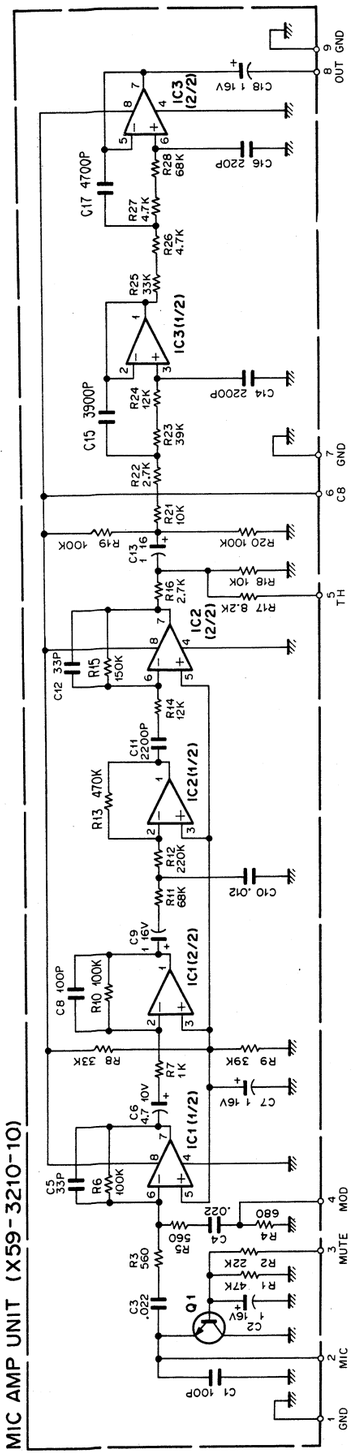
2SC2714(Y)
DTC114EK

MB504F



MIC AMP UNIT : Z1 (X59-3210-10) CIRCUIT DIAGRAM

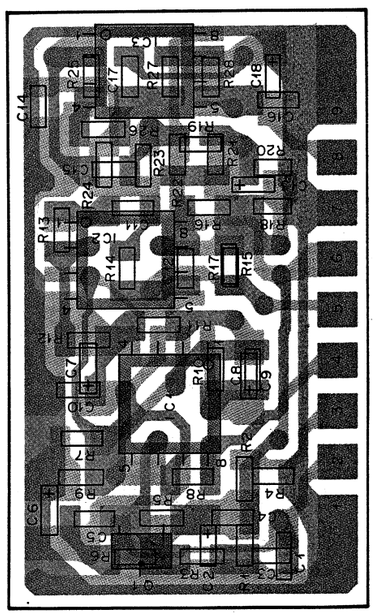
MIC AMP UNIT (X59-3210-10)



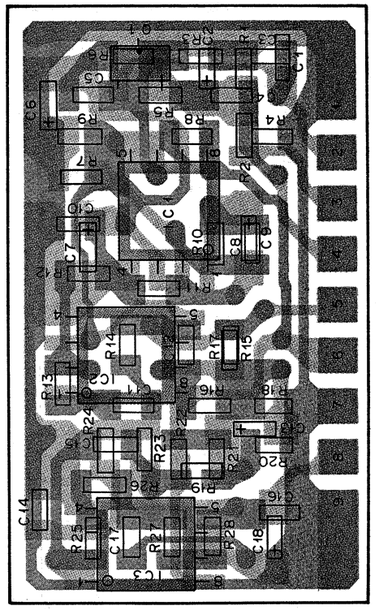
Q1 : 2SC3326(A) IC1 : NJM4560M IC2,3 : NJM4558M

MIC AMP UNIT : Z1 (X59-3210-10) PC BOARD VIEWS

Component side view

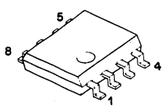


Foil side view



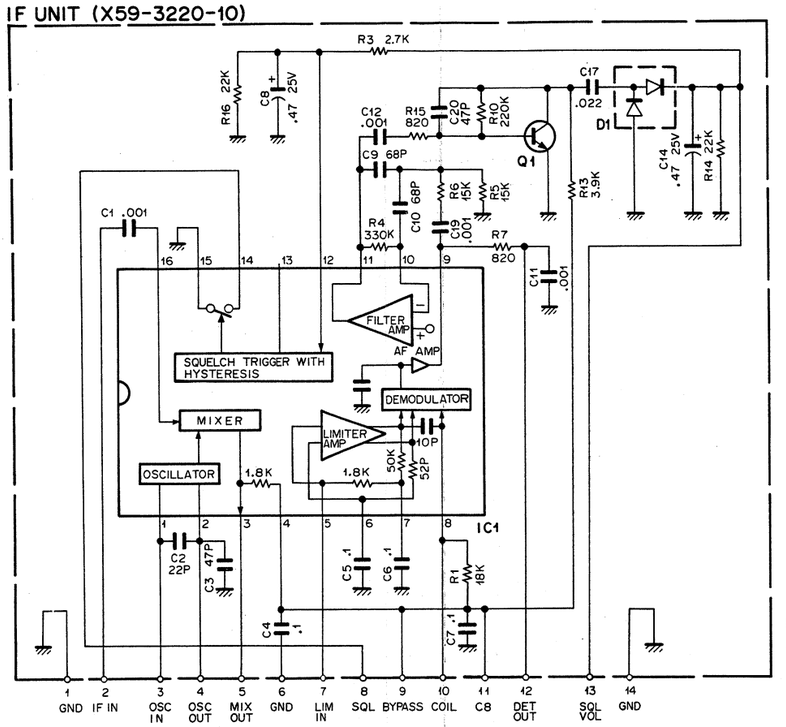
2SC3326(A)

NJM4560M
NJM4558M



IF UNIT : Z10 (X59-3220-10) CIRCUIT DIAGRAM

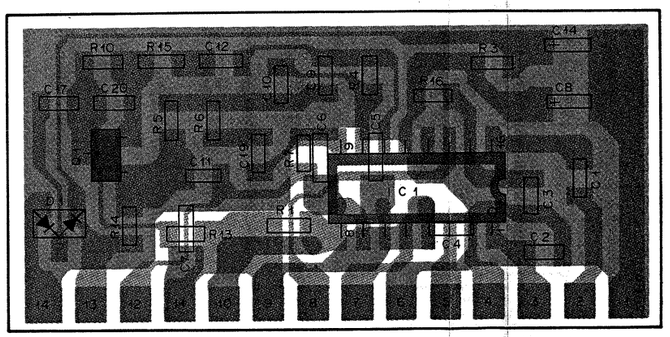
IF UNIT (X59-3220-10)



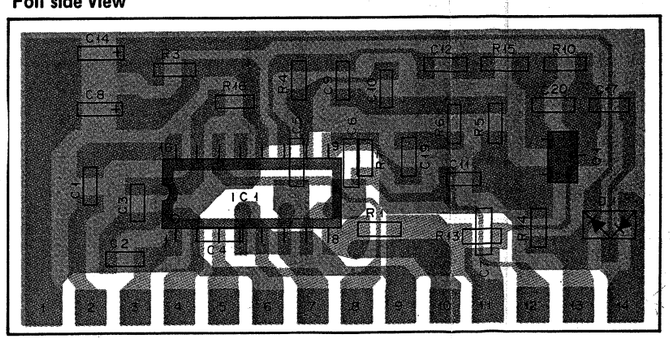
IC1 : MC3361D
Q1 : 2SC2712(Y)
D1 : DA204K

IF UNIT : Z10 (X59-3220-10) PC BOARD VIEWS

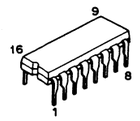
Component side view



Foil side view



MC3361D

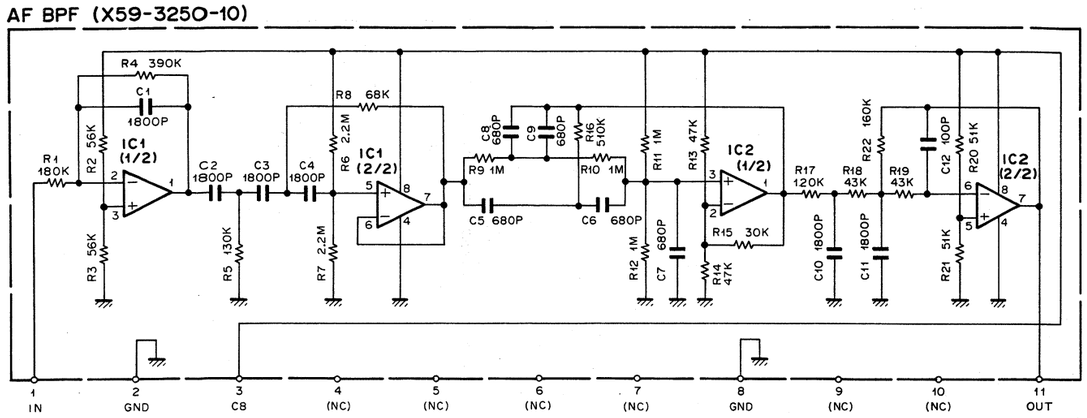


2SC2712(Y)

TK-710 CIRCUIT DIAGRAM/PC BOARD VIEWS

AF BPF UNIT : Z9 (X59-3250-10) CIRCUIT DIAGRAM

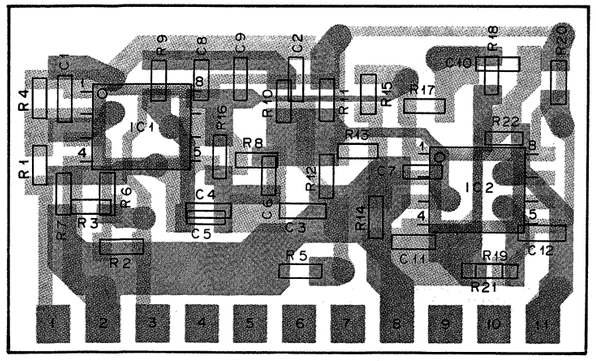
AF BPF (X59-3250-10)



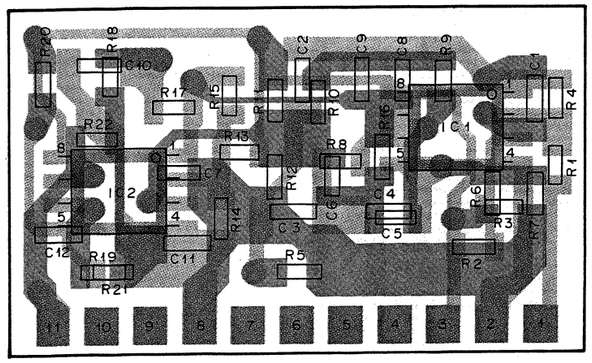
IC1,2 : NJM4558M

AF BPF UNIT : Z9 (X59-3250-10) PC BOARD VIEWS

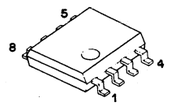
Component side view



Foil side view

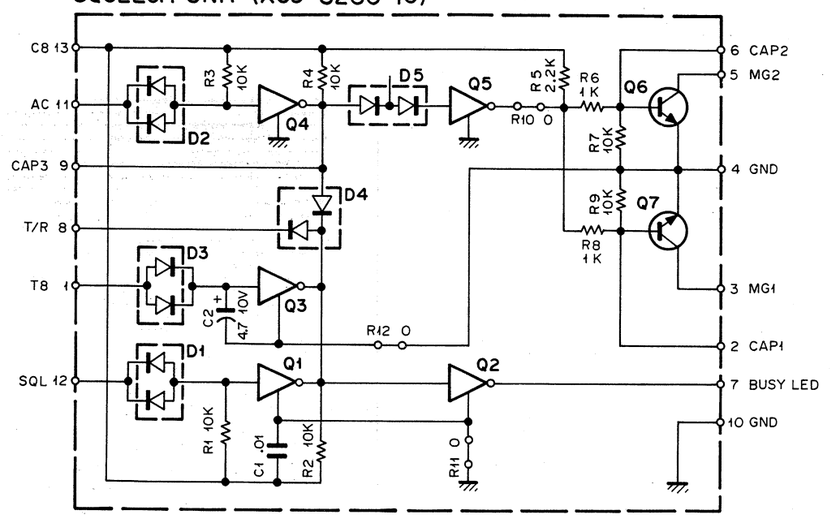


NJM4558M



SQL UNIT : Z8 (X59-3260-10) CIRCUIT DIAGRAM

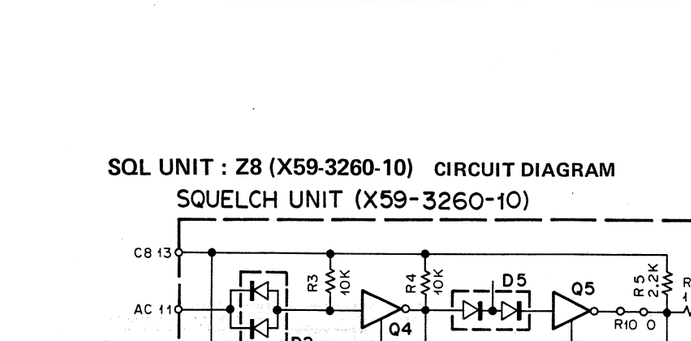
SQUELCH UNIT (X59-3260-10)



Q1~5 : DTC114EK D1~3 : 1SS181
Q6,7 : 2SC2712(Y) D4,5 : 1SS226

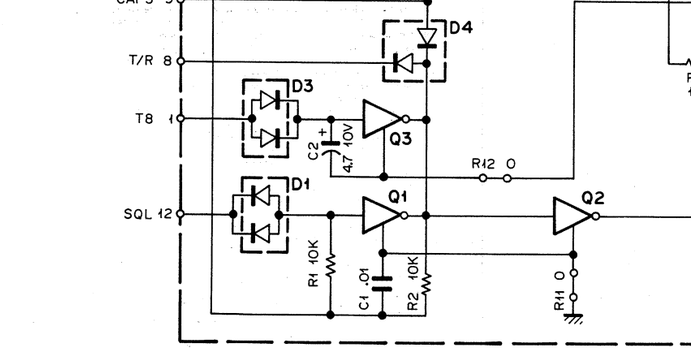
SQL UNIT : Z8 (X59-3260-10) PC BOARD VIEWS

Component side view



DTC114EK
2SC2712(Y)

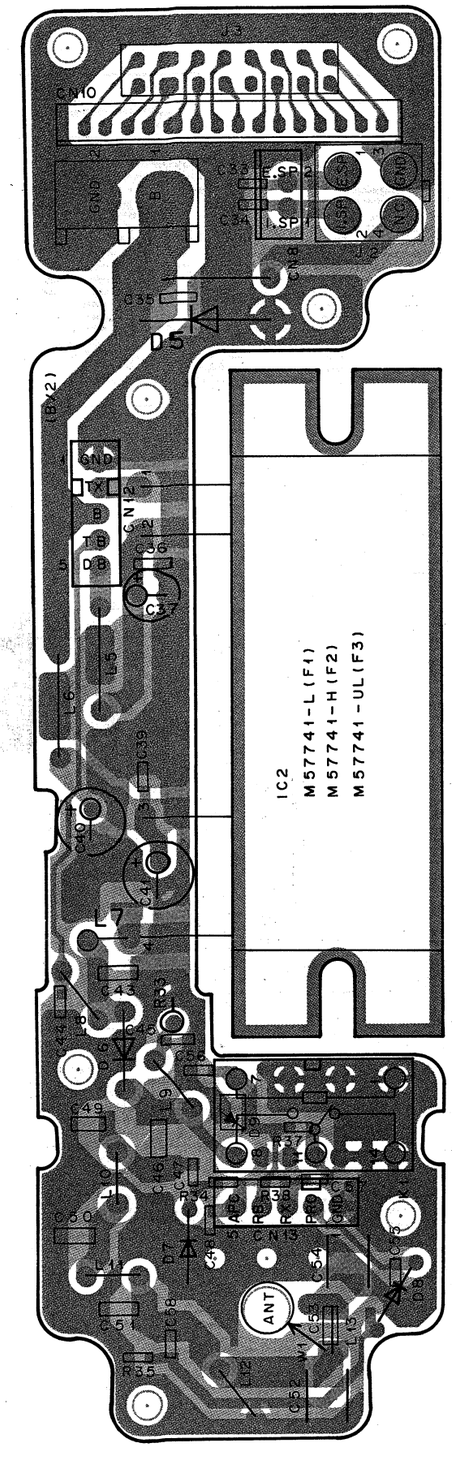
Foil side view

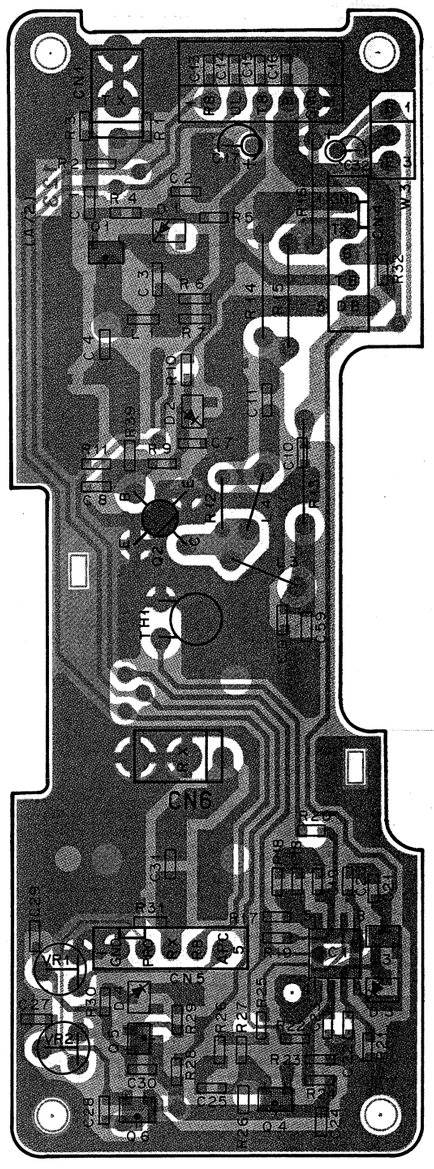


PC BOARD VIEWS TK-710

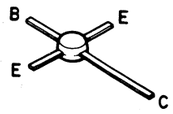
FINAL UNIT (X45-3120-XX)

Component side view



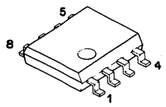


2SC3369



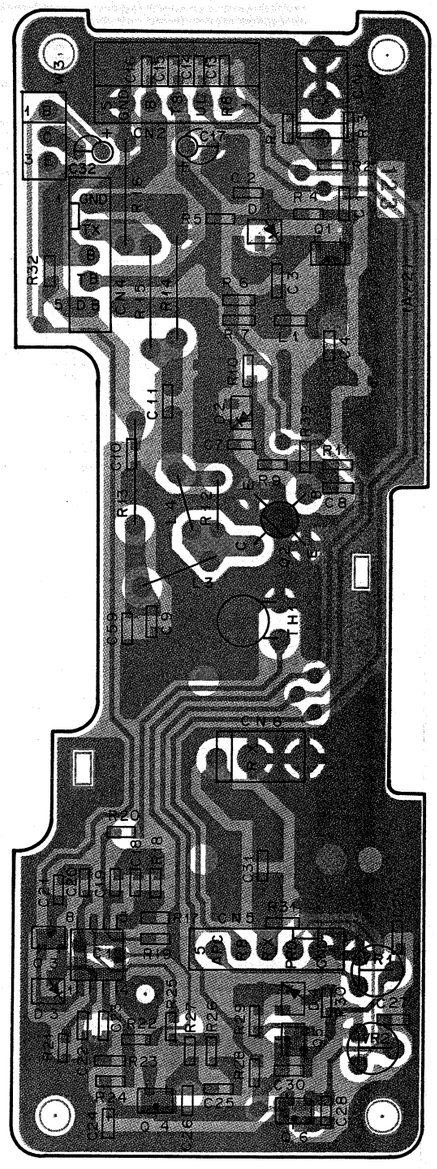
2SC2712
2SC2954

NJM2904M



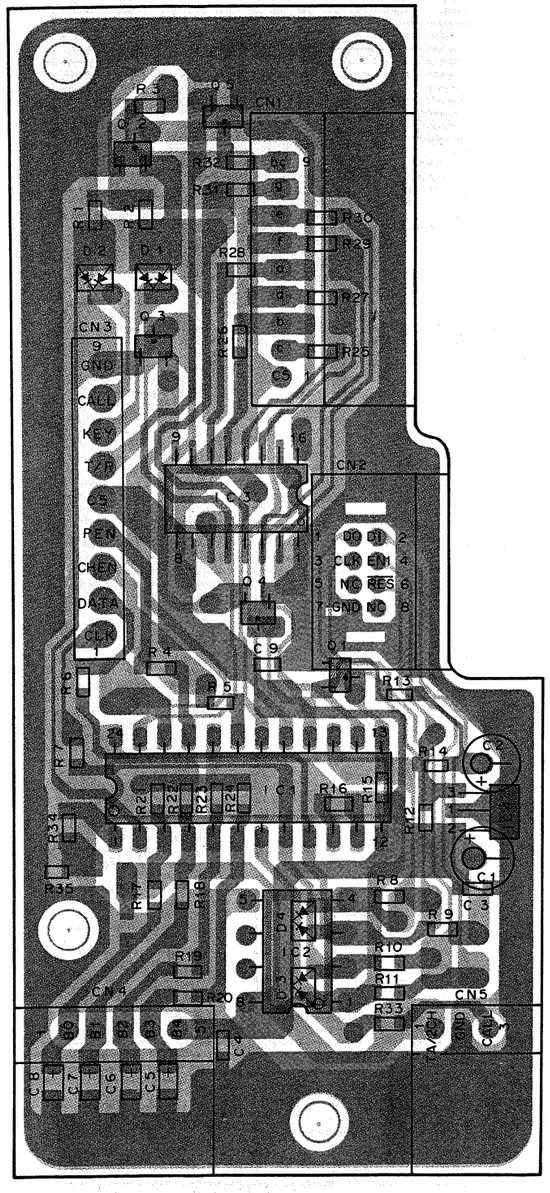
2SB1018(O)

Foil side view

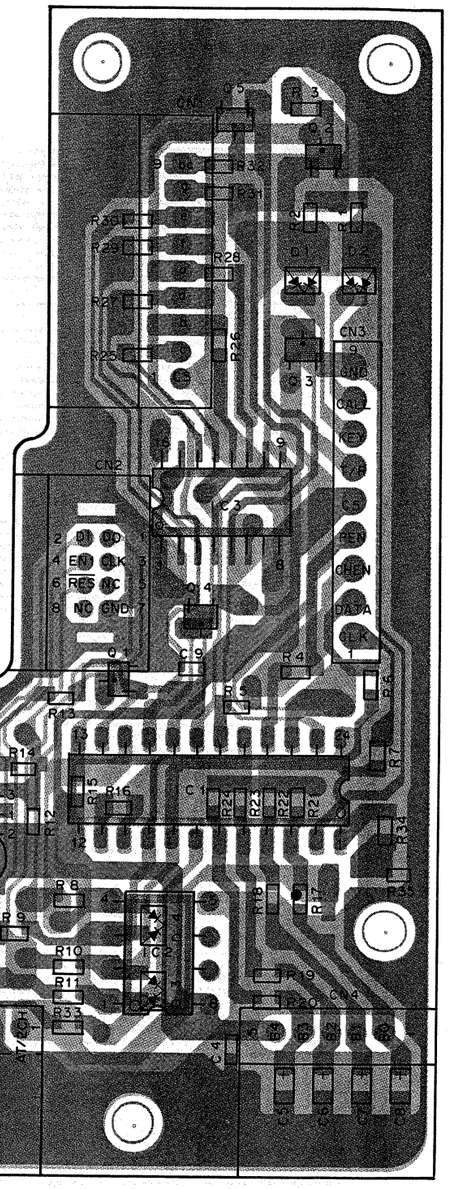


TK-710 PC BOARD VIEWS

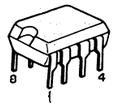
CONTROL UNIT (X53-3050-10) Component side view



Foil side view

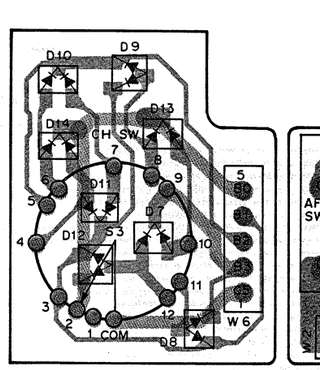


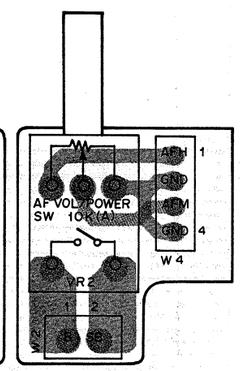
93C46PI

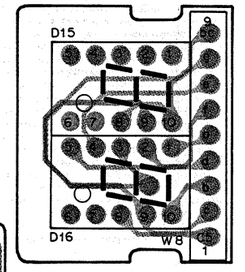


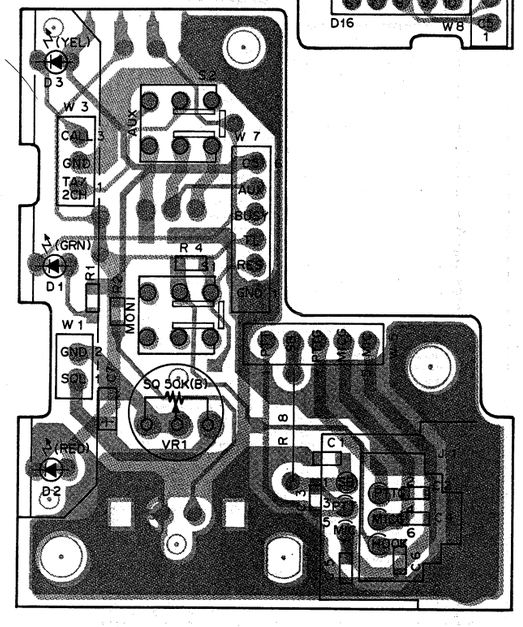
2SC2712(Y)
DTC114EK

DISPLAY UNIT (X54-3030-10) Component side view

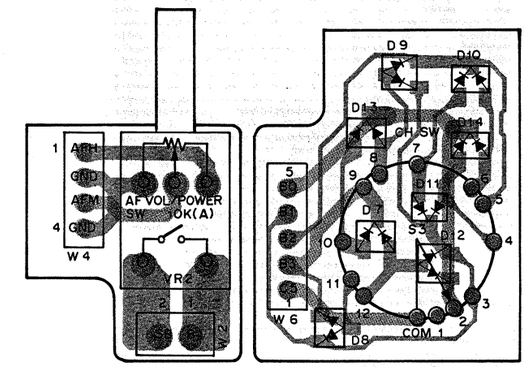


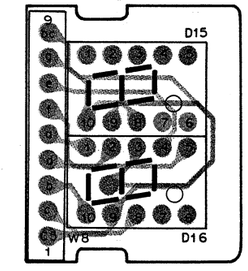


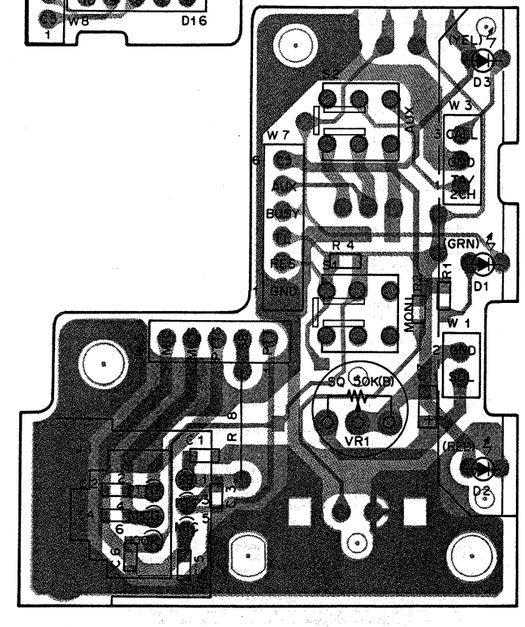




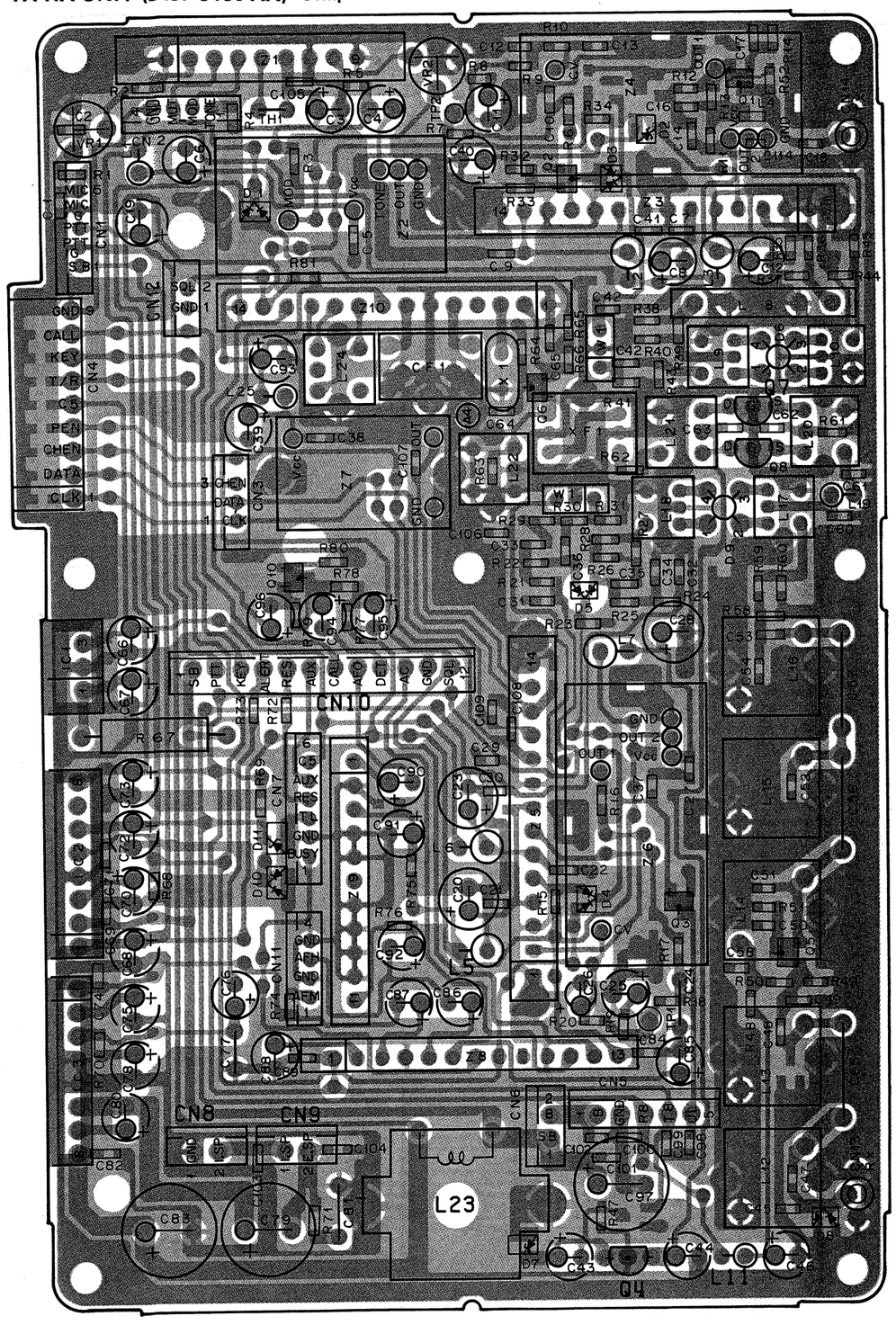
Foil side view



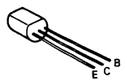




TX-RX UNIT (X57-3180-XX) Component side view

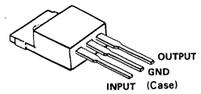


2SC1815

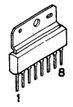


2SC2712(Y)
2SC3838K(N,P)
DTC114EK

LM78M05

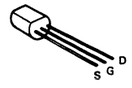


MB3756



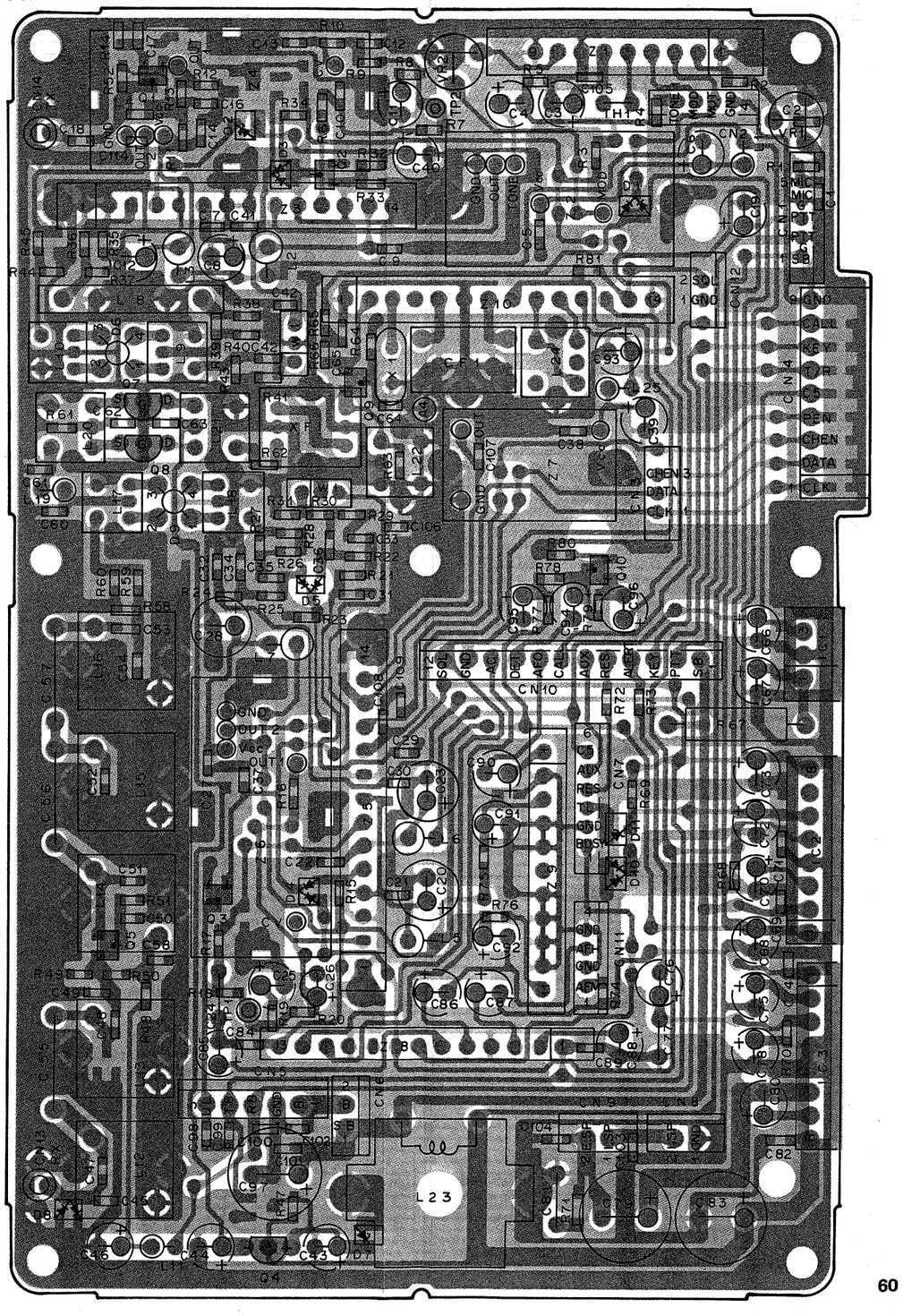
2SK302

2SK125



μPC1242H

Foil side view



TERMINAL FUNCTIONS

Terminal functions

FINAL UNIT (X45-3120-XX)

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN1	—	TX	Transmission drive input, coaxial connector.
CN2	1	R8	8V input during reception.
	2	UL	PLL unlock signal input.
	3	T8	8V input during transmission.
	4	B	Power supply output.
	5	GND	GND.
CN3	1	B	Q7 (APC AMP) base.
	2	C	Q7 (APC AMP) collector.
	3	E	Q7 (APC AMP) emitter.
CN4 (A/2) CN12 (B/2)	1	GND	GND.
	2	TX	Transmission power amplifier drive output (CN4) and input (CN12).
	3	B	Power supply input (CN4) and output (CN12).
	4	T8	8V output (CN4) and input (CN12) during transmission.
	5	DB	Drive voltage output (CN4) and input (CN12).
CN5 (A/2) CN13 (B/2)	1	GND	GND.
	2	PRO	Reflected wave detection voltage input (CN5) and output (CN13).
	3	RX	Receive signal input (CN5) and output (CN13).
	4	R8	8V output (CN5) and input (CN13) during reception.
	5	APC	APC detection voltage input (CN5) and output (CN13).
CN6	—	RX	Receive signal output, coaxial connector.
CN8	1	I.SP	Internal speaker output.
	2	E.SP	External speaker input.
J1	1	B	Power supply input.
	2	GND	GND.
J2	1	E.SP	External speaker output.
	2	I.SP	Internal speaker input.
	3	GND	GND.
	4	NC	No connection.
J4	—	ANT	For antenna connection, UHF coaxial connector.

CONTROL UNIT (X53-3050-00)

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN1	1	C5	Always outputs 5V.
	2	c	Channel LED low-order digit display on signal output.
	3	b	
	4	d	
	5	a	
	6	f	
	7	e	
	8	g	
	9	bc	Channel LED high-order digit display on signal output.
CN2	1	DO	EEPROM data output.
	2	DI	EEPROM data input.
	3	CLK	CLOCK signal input.
	4	EN1	EEPROM ENABLE signal input.
	5	NC	No connection.
	6	$\overline{RES}$	Microprocessor reset signal input.
	7	GND	GND.
	8	NC	No connection.
CN3	1	CLK	CLOCK signal output.
	2	DATA	DATA signal output.
	3	CH EN	CH DATA ENABLE signal output.
	4	PEN	PLL DATA ENABLE signal output.
	5	C5	Always inputs 5V.
	6	T/R	T/R signal output.
	7	KEY	KEY signal input.
	8	CALL	CALL LED control signal input.
	9	GND	GND.
CN4	1	B0	(LSB) CH SW DATA (binary) signal input.
	2	B1	
	3	B2	
	4	B3	(MSB)
	5	C5	Always outputs 5V.
CN5	1	TA/2CH	TALK-AROUND signal (AUX SW) input.
	2	GND	GND.
	3	CALL	CALL LED flash signal output.

DISPLAY UNIT (X54-3030-10)

Connector No.	Terminal No.	Terminal Name	Terminal Function
J1	1	SB	Power supply output via the power switch.
	2	PTT G	PTT GND.
	3	PTT	PTT signal input.
	4	MIC G	MIC GND.
	5	MIC	MIC signal input.
	6	HOOK	HOOK signal (mic hook) input.
W1	1	SQL	Noise detection signal input to SQL VOL.
	2	GND	GND.
W2	1	B	Power supply input.
	2	SB	Power supply output via the power switch.
W3	1	TA/2CH	TALK-AROUND signal (AUX SW) output.
	2	GND	GND.
	3	CALL	CALL LED flash signal input.
W4	1	AFH	AF signal input to AF VOL.
	2	GND	GND.
	3	AFM	AF signal output via the AF VOL.
	4	GND	GND.
W5	1	PTT	PTT signal output.
	2	SB	Power supply input via the power switch.
	3	PTT G	PTT GND.
	4	MIC G	MIC GND.
	5	MIC	MIC signal output.
W6	1	C5	Always 5V inputs.
	2	B3	(MSB) CH SW DATA (binary) signal output.
	3	B2	
	4	B1	
	5	B0	(LSB)
W7	1	GND	GND.
	2	RES	Mic hook, MONI SW signal output.
	3	TL	TX LED on signal input.
	4	BUSY	BUSY LED on signal output.
	5	AUX	AUX SW signal output.
	6	C5	Always 5V inputs.

TK-710 TK-710

TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
W8	1	C5	Always 5V inputs.
	2	c	CH LED low-order digit display signal input.
	3	b	
	4	d	
	5	a	
	6	f	
	7	e	
	8	g	
	9	bc	CH LED high-order digit display on signal input.
W9	1	SQL VOL.	Noise detection signal input to SQL VOL.
	2	GND	GND.

TX-RX UNIT (X57-3180-XX)

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN1	1	SB	Power supply output via the power switch.
	2	PTT G	PTT GND.
	3	PTT	PTT signal input.
	4	MIC G	MIC GND.
	5	MIC	MIC signal input.
CN2	1	TONE	TONE signal (300Hz or less) input.
	2	MOD	MOD signal (300Hz~3kHz) input.
	3	MUT	MIC MUTE signal input.
	4	GND	GND.
CN3	1	CLK	CLOCK signal output.
	2	DATA	DATA signal output.
	3	CH EN	CH DATA ENABLE signal output.
CN4	1	CLK	CLOCK signal input.
	2	DATA	DATA signal input.
	3	CH EN	CH DATA ENABLE signal input.
	4	PEN	PLL DATA ENABLE signal input.
	5	C5	Always 5V outputs.
	6	T/R	T/R signal input.
	7	KEY	KEY signal output.
	8	CALL	CALL LED control signal output.
	9	GND	GND.
CN5	1	B	Power supply input.
	2	GND	GND.
	3	R8	8V output during reception.
	4	T8	8V output during transmission.
	5	UL	PLL unlock signal output.
CN6	1	SB	Power supply input via the power switch.
	2	B	Power supply output.
CN7	1	BUSY	BUSY LED on signal output.
	2	GND	GND.
	3	TL	TX LED on signal output.
	4	RES	Mic hook, MONI SW signal input.
	5	AUX	AUX SW signal input.
	6	C5	Always outputs 5V.
CN8	1	GND	GND.
	2	I.SP	Internal speaker output.
CN9	1	I.SP	Internal speaker input.
	2	E.SP	External speaker output.
CN10	1	SB	Power supply output via the power switch.
	2	PTT	PTT signal output.
	3	KEY	KEY signal input.
	4	ALERT	Alert signal input.
	5	RES	Mic hook, MONI SW signal output.
	6	AUX	AUX SW signal output.
	7	CALL	CALL LED control signal input.
	8	AFO	Detection signal input via the signaling unit.
	9	DET	Detection signal output to the signaling unit.
	10	AC	Audio mute control signal input by the signaling unit.
	11	GND	GND.
	12	SQL	Noise squelch signal output.
CN11	1	AFM	AF signal input via the AF VOL.
	2	GND	GND.
	3	AFH	AF signal output to the AF VOL.
	4	GND	GND.
CN12	1	GND	GND.
	2	SQL	Noise detection signal output to SQL VOL.
CN13	—	RX	Receive signal input, coaxial connector.
CN14	—	TX	Transmission drive output, coaxial connector.

SCHEMATIC DIAGRAM

Signal line — Control line — Common DC line — Adjusting points

MICROPHONE (T91-0362-05)

DISPLAY UNIT(X54-3030-10)(A/6)

DISPLAY UNIT(X54-3030-10)(C/6)

TX-RX UNIT (X57-3180-XX)

FINAL ASS'Y(X45-3120-XX)

FINAL UNIT(A/2)

CONTROL UNIT (X53-3050-10)

(X54-3030-10)
D1 : SLH-56MC3F
D2 : SLH-56VC3F
D3 : SLH-56YC3F
D7,10,11,13,14 : 1SS184
D8,9,12 : 1SS181
D16 : LA301DB

(X53-3050-10)
IC1 : 7556CS(M)-302
IC2 : 93C46P1
IC3 : MB88306PF
IC4 : M51943BML

Q1 : 2SC2712(Y)
Q2~5 : DTC114EK

D1~4 : 1SS184

FROM ROM WRITER (KPT-20)

DISPLAY UNIT (X54-3030-10)(D/6)

MIC AMP Z1 : X59-3210-10

TX PLL Z3 : X58-3130-10

Z2 VCXO (21.4MHz)

*Z4 TX VCO

Z7 TCXO (12.8MHz)

*Z6 COMMON VCO

COMMON PLL Z5 : X58-3140-10

IF Z10 : X59-3220-10

SQL Z8 : X59-3260-10

TO SIGNALING UNIT

KQT-7

KMS-4

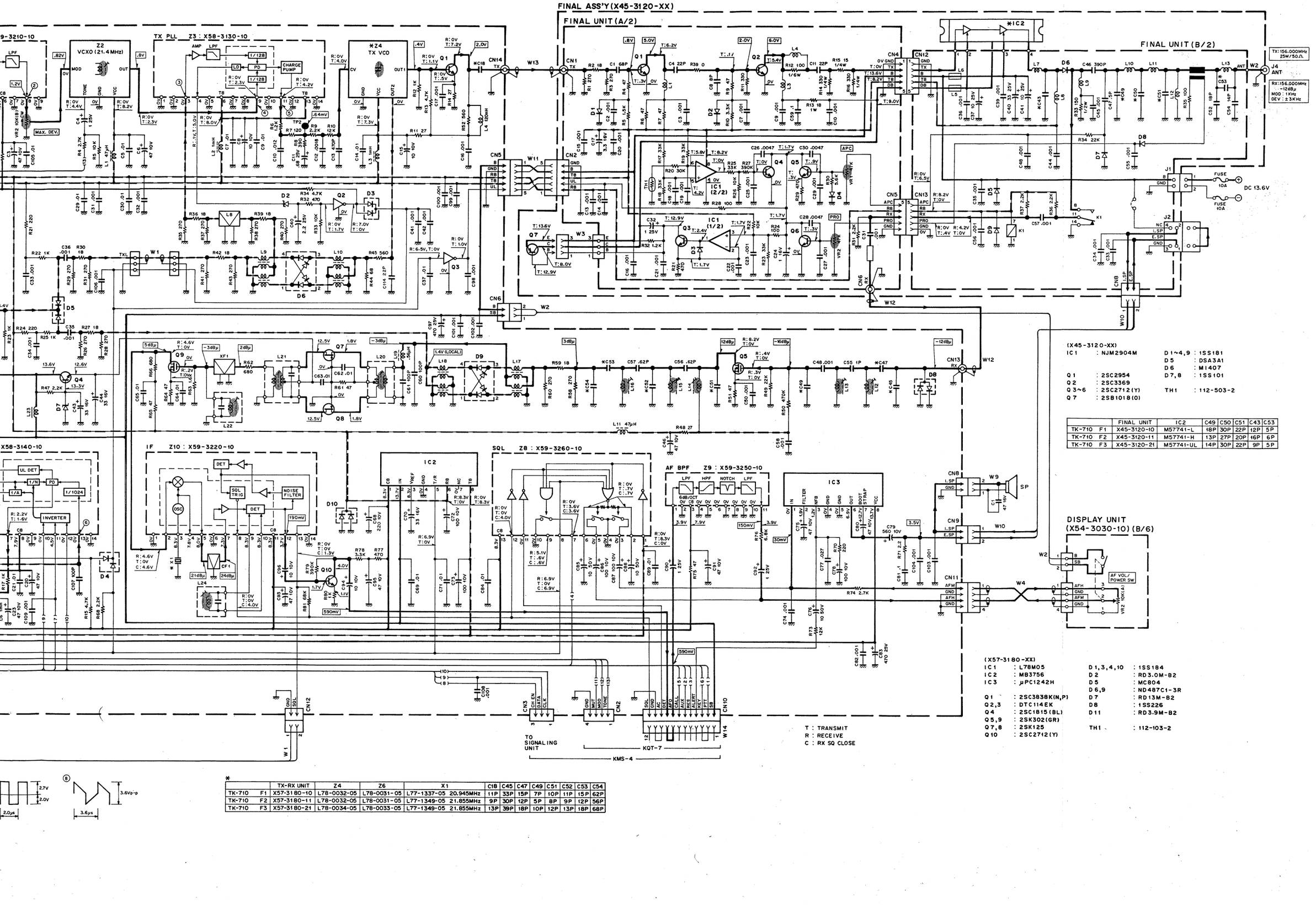
INPUT LEVEL: 50mV

① 7.3mVp-p 1.0ms
② 3.3Vp-p 1.0ms
③ 4.2Vp-p 1.0ms
④ 40mVp-p 0.047μs
⑤ 2.2Vp-p 0.047μs
⑥ 5.6Vp-p 6.0μs
⑦ 3.8Vp-p 0.078μs
⑧ 2.7V / 2.0V 2.0μs
⑨ 3.6Vp-p 3.6μs

*

		TX-RX UNIT	Z4	Z6	X1	C18	C45	C47	C49	C51	C52	C53	C54
TK-710	F1	X57-3180-10	L78-0032-05	L78-0031-05	L77-1337-05 20.945MHz	11P	33P	15P	7P	10P	11P	15P	62P
TK-710	F2	X57-3180-11	L78-0032-05	L78-0031-05	L77-1349-05 21.855MHz	9P	30P	12P	5P	8P	9P	12P	56P
TK-710	F3	X57-3180-21	L78-0034-05	L78-0033-05	L77-1349-05 21.855MHz	13P	39P	18P	10P	12P	13P	18P	68P

SCHEMATIC DIAGRAM



(X45-3120-XX)

IC1	: NJM2904M	D1~4,9	: 1SS181
		D5	: DSA3A1
		D6	: M1407
Q1	: 2SC2954	D7,8	: 1SS101
Q2	: 2SC3369		
Q3~6	: 2SC2712(Y)	TH1	: 112-503-2
Q7	: 2SB1018(O)		

	FINAL UNIT	IC2	C49	C50	C51	C43	C53
TK-710 F1	X45-3120-10	M57741-L	18P	30P	22P	12P	5P
TK-710 F2	X45-3120-11	M57741-H	13P	27P	20P	16P	6P
TK-710 F3	X45-3120-21	M57741-UL	14P	30P	22P	9P	5P

(X57-3180-XX)

IC1	: L78M05	D1,3,4,10	: 1SS184
IC2	: MB3756	D2	: RD3.0M-B2
IC3	: μPC1242H	D5	: MC804
		D6,9	: ND487C1-3R
Q1	: 2SC3838K(N,P)	D7	: RD13M-B2
Q2,3	: DTC114EK	D8	: 1SS226
Q4	: 2SC1815(BL)	D11	: RD3.9M-B2
Q5,9	: 2SK302(GR)		
Q7,8	: 2SK125	TH1	: 112-103-2
Q10	: 2SC2712(Y)		

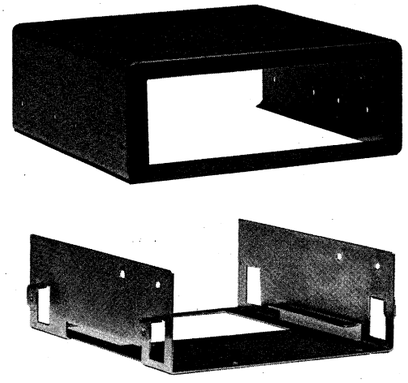
T : TRANSMIT
R : RECEIVE
C : RX SQ CLOSE

*

	TX-RX UNIT	Z4	Z6	X1	C18	C45	C47	C49	C51	C52	C53	C54
TK-710 F1	X57-3180-10	L78-0032-05	L78-0031-05	L77-1337-05 20.945MHz	11P	33P	15P	7P	10P	11P	15P	62P
TK-710 F2	X57-3180-11	L78-0032-05	L78-0031-05	L77-1349-05 21.855MHz	9P	30P	12P	5P	8P	9P	12P	56P
TK-710 F3	X57-3180-21	L78-0034-05	L78-0033-05	L77-1349-05 21.855MHz	13P	39P	18P	10P	12P	13P	18P	68P

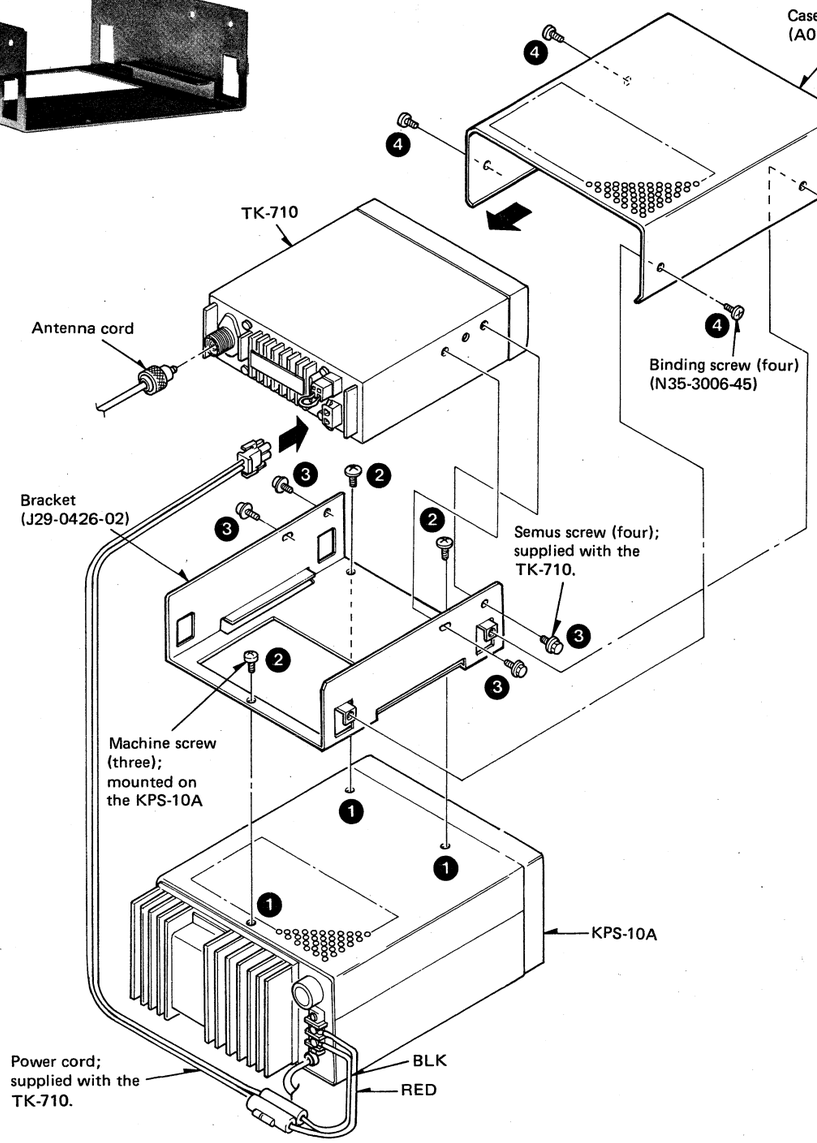
KMB-2 (MOUNTING CASE)

EXTERNAL VIEW



MOUNTING THE KMB-2 (mounting bracket)

1. Remove the three machine screws from the top of the KPS-10A (❶).
2. Mount the bracket using these screws (❷).
3. Mount the TK-710 in the bracket; the machine screws used are supplied with the TK-710 (❸).
4. Mount the case from the front taking care not to damage the panel of the TK-710. Secure it with the four binding head machine screws (N35-3006-45) (❹).



KMC-9 (BASE MICROPHONE)

EXTERNAL VIEW

CHASSIS REMOVAL

1. Remove the four rubber feet (❶).
2. Remove the four screws (❷).
3. Remove the chassis (❸).
4. Disconnect the 3-pin connector from the microphone amplification unit (❹).

DISASSEMBLY FOR REPAIR

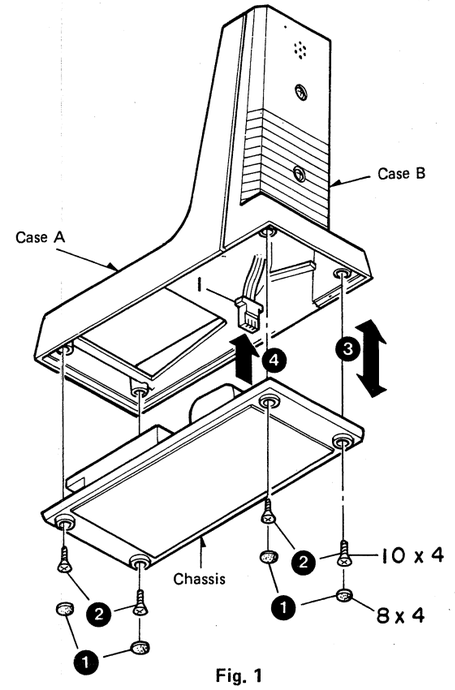


Fig. 1

REMOVAL OF MICROPHONE ELEMENT AND MICROPHONE AMPLIFICATION UNIT

5. Remove the two screws holding cases A and B (❺).
6. Remove case B (❻).
7. Remove the microphone element and microphone amplification unit (❼).

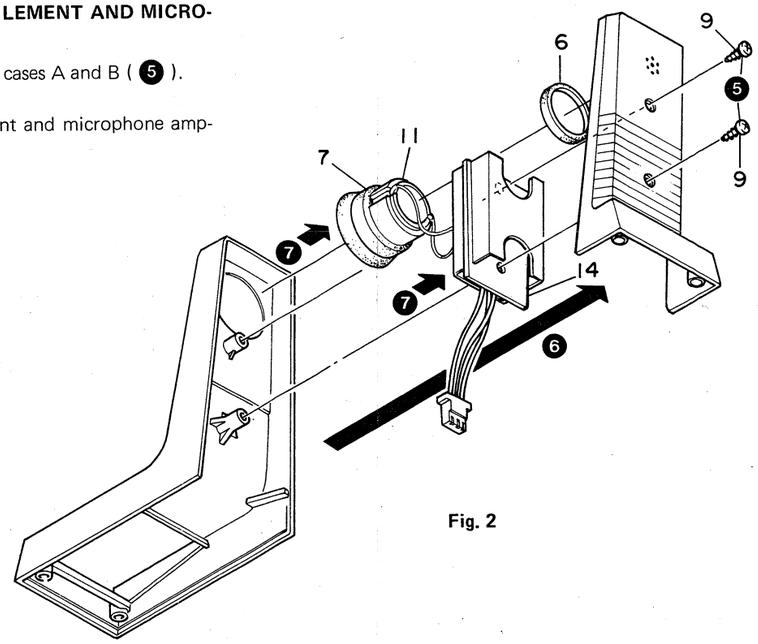


Fig. 2

SWITCH I

8. Discon
9. Remov
10. Pull c
11. Remc
12. Remc holdi (⓬

REMOVII

To rer
Main unit
from up
pull it out

PARTS

*New par

Ref. No.
1
2
3
4
5
6
7
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9
10
11
12
13
14

KMC-9 (BASE MICROPHONE)

RNAL VIEW

IS REMOVAL

ıove the four rubber feet (1).
ıove the four screws (2).
ıove the chassis (3).
onnect the 3-pin connector from the microphone lification unit (4).

DISASSEMBLY FOR REPAIR

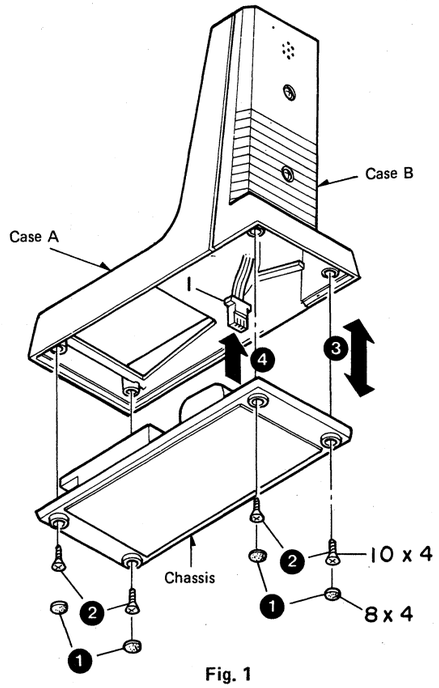


Fig. 1

/AL OF MICROPHONE ELEMENT AND MICRO- : AMPLIFICATION UNIT

ıove the two screws holding cases A and B (5).
ıove case B (6).
ıove the microphone element and microphone amp- ıtion unit (7).

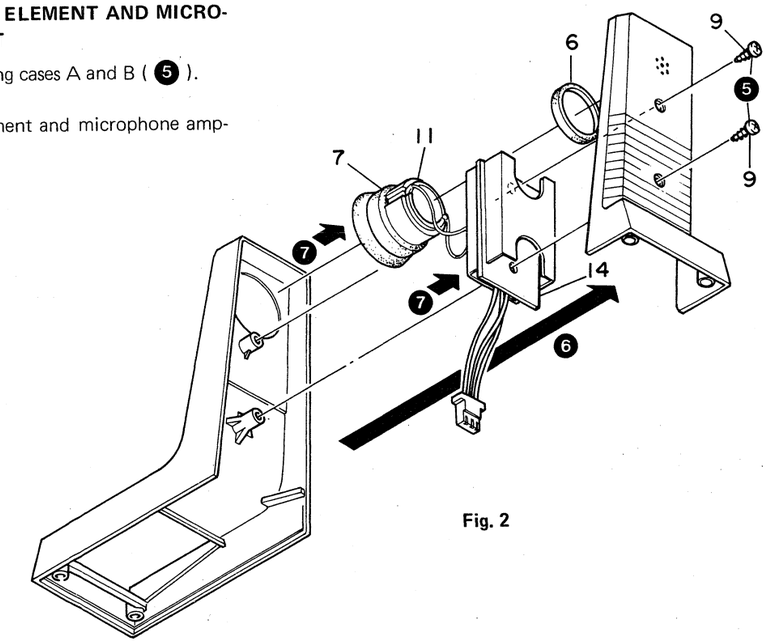


Fig. 2

KMC-9 (BASE MICROPHONE)

SWITCH UNIT REMOVAL

8. Disconnect the 6-pin connector (8).
9. Remove the springs (L and R) (9).
10. Pull out the shaft (10).
11. Remove spring A and slider (11).
12. Remove the switch unit while pressing the two claws holding the switch unit in the direction of the arrow (12).

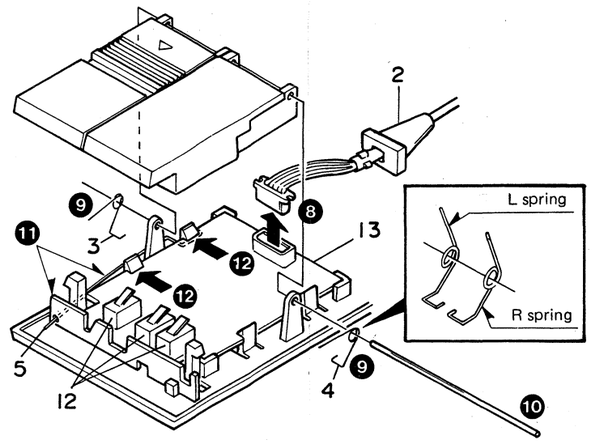


Fig. 3

REMOVING MICROPHONE PLUG

To remove the microphone plug (module) from the Main unit or from the microphone, grasp the rubber cap from up and down with your fingers (to unlock it) and pull it out.

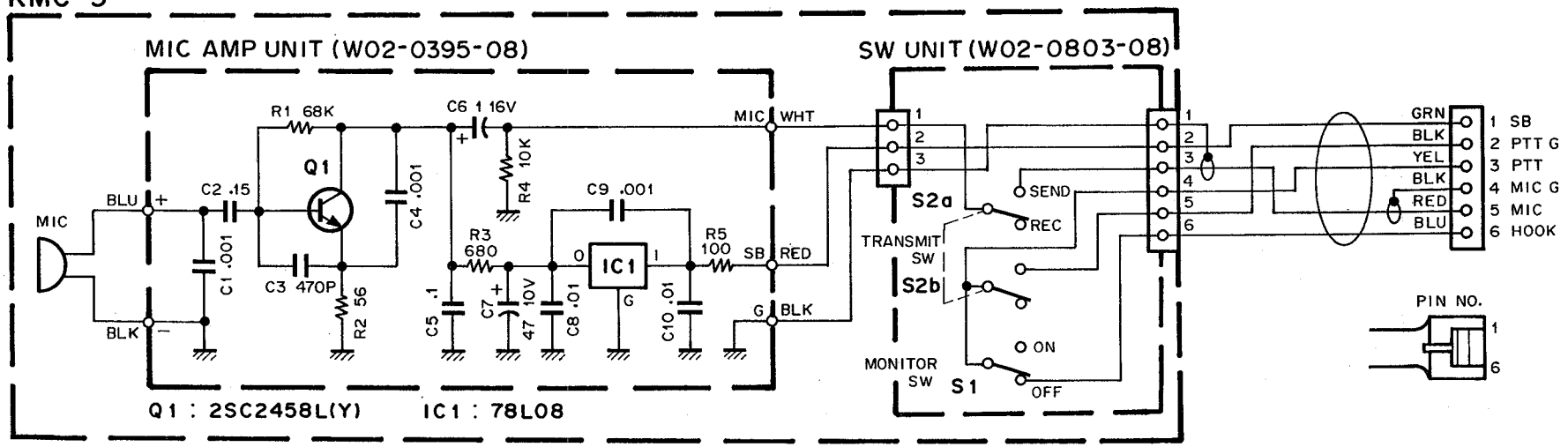
PARTS LIST

*New parts

Ref. No.	New parts	Parts No.	Description
1	*	E23-0612-08	CRIMP TERMINAL
2		E30-2080-08	CURL CORD
3	*	G09-0423-08	L SPRING
4	*	G09-0424-08	R SPRING
5	*	G09-0425-08	SPRING A
6	*	G13-0877-08	CUSHION
7	*	G13-0878-08	CUSHION D
8	*	J02-0448-08	RUBBER FOOT
9		N44-3018-45	TAPPING SCREW
10		N47-3010-46	TAPPING SCREW
11		T91-0368-08	MIC UNIT
12	*	S50-1430-08	MICRO SWITCH
13		W02-0803-08	SW UNIT
14		W02-0395-08	MIC AMP UNIT

CIRCUIT DIAGRAM

KMC-9



SPECIFICATIONS

MODEL / SPECIFICATIONS	KMC-9
Type	Uni-directional Dynamic Microphone (Preamplifier built-in)
Output impedance	600Ω±30% (at 1kHz)
Sensitivity	−50dB±3dB (at 1kHz, 0dB=1V/μ bar)
Frequency Characteristic	300~3000Hz (±6dB)
Power Requirements	13.8V DC (supplied from the radio)
Dimensions (W x H x D)	70 x 162 x 150mm (2-3/4 x 6-3/8 x 5-29/32 inch)
Weight	550g (1.2 lbs)

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

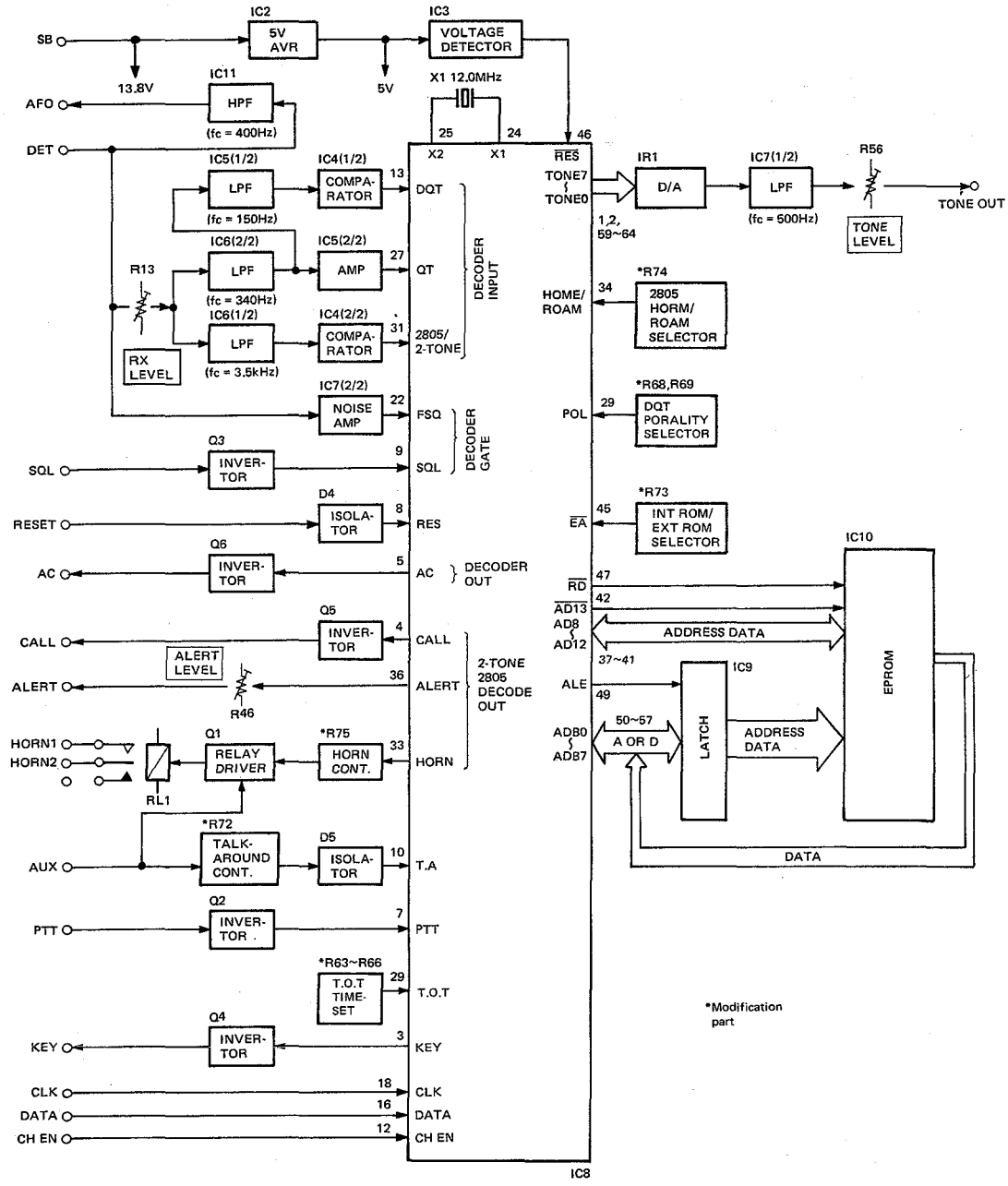


Fig. 1 KMS-4 Block Diagram

CIRCUIT DESCRIPTION

The KMS-4 is a signaling unit with quiet talk (QT) (CTCSS), digital quiet talk (DQT), 2805, and 2-tone sequential functions. All signaling data must be written into the KMS-4 ROM by the KPT-20 ROM WRITER before use.

Encode and decode for each signaling format can be mixed. However, only decode is available for the 2805 and 2-tone sequential functions.

Sequential fuction	Decode	Encode
QT	O	O
DQT	O	O
2805	O	X
2-tone	O	X

Table 1 KMS-4 Encode/Decode List

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

1. Reset Circuit

When the transceiver power switch is turned on, the microprocessor (IC8 : μPD78310G-301-1B) is reset by monitoring the output KMS-4 5V AVR (automatic voltage regulator : IC2 : μPC78L05A) line by voltage detector (IC3 : S-8054HN).

When IC2 output is 4V or less, IC3 output goes low and the microprocessor is reset. When IC2 output exceeds 4V, IC3 output goes high, the microprocessor leaves the reset state and starts operating.

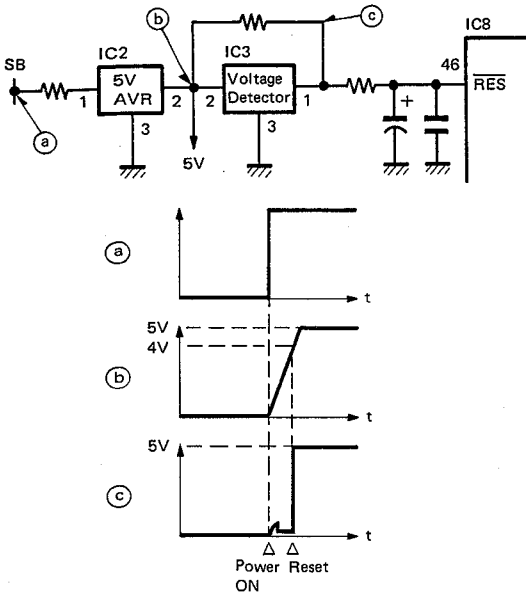
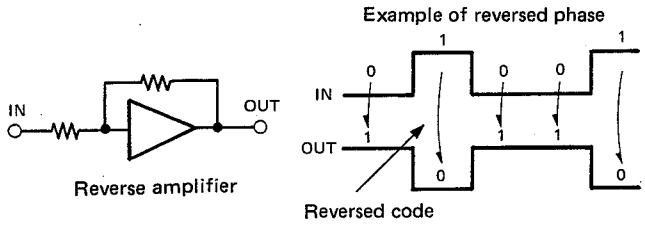


Fig. 2

2. DQT Polarity Switching

The KMS-4 corrects the phase shift in the microprocessor by switching the DQT polarity. Polarity switching is set by the combination of R68 and R69.



The combination of R68 and R69 varies depending on each model. DQT operation is not available with other combination than specified.

	Polarity		Setting	
Model	Decode	Encode	R68	R69
* Undefined	+	−	O	O
TK-810 TK-710F1	+	+	O	X
Undefined	−	−	X	O
TK-710F2,F3	−	+	X	X

* : BASIC O : Installed X : Removed
*Undefined : Reserved for future use.

Table 2 DQT Polarity Select

3. Signaling Data Read

When the transceiver power switch is turned on, and when the channel is changed, channel data is sent from the transceiver to the KMS-4 as serial data via the CHEN (channel enable), DATA, and CLK (CLOCK) lines.

The microprocessor (IC8) reads the channel data from the transceiver, and the KMS-4 calculates and outputs the ROM address data (IC10 : MBM27C64-25JAL1) in which signaling data is written.

The address data is output to IC8 ADB0 to ADB7 and AD8 to AD12.

ADB0 to ADB7 are connected to LATCH (IC9 : TC74HC573F), and address data is read into IC9 at the leading edge of ALE. IC9 output and AD8 to AD12 become address data for the ROM (IC10).

The ROM (IC10) data is output and read into IC8 when IC8 ALE, $\overline{RD}$ and $\overline{ADB}$ are low.

4. Decoder Operation

The transceiver receive audio signal is input to connector J1. Part of this audio signal passes through the active low-pass filter (IC11 : AFH24F400B1), through which any frequency of 400Hz or less is remoued, and returns to the transceiver. Another part of the signal is input to the LPF (low-pass filter) corresponding to each signaling tone data.

The QT tone signal passes through the 340Hz LPF, then the amplifier, and is input to IC8 as an analog signal.

The DQT tone signal passes through the 340Hz LPF and the 150Hz LPF, and is input to IC8 as a 5Vp-p digital signal by the comparator.

A 2-tone or 2805 tone signal passes through the 3.5kHz LPF, and is input to IC8 as a 5Vp-p digital signal by the comparator.

When the tone signal input to IC8 matches the signaling data, IC8 AC terminal goes high. When IC8 AC terminal goes high, a low is output to the J1 connector AC terminal as signaling squelch open data through inverter Q6 : DTC144EK.

The KMS-4 protects the decoder against noise when no signal is present by the following operation:

The high frequency noise component (40kHz or above) derived from the receive audio signal, taken from the transceiver is amplified by noise amplifier IC7 (2/2), and is input to microprocessor IC8. This IC counts the noise level, and if it exceeds a preset value, IC8 judges it as noise, and disables the decoder.

The SQL signal (high when no data is received) from the transceiver is input to IC8 through inverter Q3 : DTC144EK. When IC8 SQL terminal is low, decoder operation is inhibited.

Thus, the decoder operates only when the noise squelch is open and no noise exists (when data is received). Therefore, the decoder does not malfunction due to noise even when the monitor switch is on and the squelch volume is at minimum.

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

- **Operation when 2-tone or 2805 is decoded**

When 2-tone or 2805 is decoded, a high level is output to the IC8 CALL terminal, and a pulse is output to the ALERT terminal. The IC8 CALL terminal signal passes through inverter Q5 : DTC144EK, and a low level is output to connector J1 CALL terminal as CALL LED on-data.

The IC8 ALERT terminal pulse passes through the alert level adjustment volume control (R46), and is output to the ALERT terminal. That is, when 2-tone or 2805 is decoded, the CALL LED is turned on, and an alert tone is output.

When the automatic monitor function is written into the ROM (IC10), the squelch is held open for 30 seconds after 2-tone or 2805 is decoded, and a message can be received even when the microphone is on hook.

- **Monitor Circuit**

The J1 connector RESET terminal is connected to the transceiver MONITOR switch and microphone HOOK.

When the MONITOR switch is on or the microphone is off hook, J1 RESET terminal goes high, and the microprocessor (IC8) pin 9 (RES) goes high through isolator diode D4 : 1SS187. When the RES terminal goes high, pin 5 (AC) goes high and the signaling squelch opens regardless of the decode operation. The transceiver operates only in the noise squelch mode.

5. Encoder Operation

When the transceiver PTT switch is pressed, the low-level PTT signal is input to the J1 connector PTT terminal. The PTT signal passes through inverter Q2 : DTC144EK, and is input to IC8, PTT terminal as a high-level PTT signal. When IC8 PTT terminal goes high, IC8 starts an encode operation. When this occurs, tone data is output to IC8 TONE 0 to TONE 7. Tone data is converted from digital to analog by a ladder resistor (IR1), and input to the 500Hz LPF (IC7 (1/2)). The LPF output passes through the tone level volume control (R56), and is output to the J2 connector TONE terminal as a tone encode signal.

6. Time-out Timer Operation

Time-out timer duration is set by the IC8 T.O.T terminal DC voltage. The actual time is set by combining R63 to R66 and changing the resistance.

When the microprocessor (IC8) PTT terminal goes high, IC8 starts time-out timer operation. During the time set on the time-out timer, IC8 outputs a high level to the KEY terminal. The IC8 KEY terminal output controls the low-level transmit control signal to the J1 connector KEY terminal through the inverter (Q4).

When the timer runs out, the IC8 KEY terminal goes low. When this occurs, the J1 KEY terminal goes high, and the transceiver enters the receive mode.

The timer can be set by combining resistors (R63, R64, R65, and R66) and changing the resistance.

Time(s)	R63	R64	R65	R66	Time(s)	R63	R64	R65	R66
∞	X	X	X	X	180	O	X	O	O
30	X	X	X	O	210	O	O	X	O
60	X	X	O	O	240	O	O	O	O
90	X	O	X	O	270	*390Ω	*1.8kΩ	O	O
120	X	O	O	O	300	*390Ω	*390Ω	O	O
150	O	X	X	O	330	*Jumper wire	O	O	O

O : Used

X : Cut

* Replace with a resistor of similar specified resistance.

Table 3 Time-out timer setting List

7. AUX FUNCTION

The following control functions are individually available through the transceiver AUX switch. However, only one function can be implemented at one time.

The transceiver must be modified so that connector J1 pin 6 goes low when the transceiver AUX switch is turned on. For the TK-710, Display unit (A/6) R7 is connected.

1) **TALK-AROUND:** Make the send tone equal to the receive tone during TALK-AROUND operation.
2) **HOME/ROAM:** Switches the number of digits between 4 or 7 in the 2805 decode mode.
   When AUX is ON, HOME (4 digits) is selected, and when AUX is OFF, ROAM (7 digits) is selected. If the transceiver is not modified, ROAM is available, and when the low-order 4 bits of 7 bits match, decoding is available. Therefore, both 7 digits and 4 digits are decoded.
3) **HORN CONTROL (AUTO):** Connector (J4) HORN1 and HORN2 are connected by relay RL2 only when 2-tone or 2805 is decoded. *1
4) **HORN CONTROL (MANUAL):** Controls RL1 directly by the AUX switch, and connect HORN1 and HORN2. *1

Note : HORN1 and HORN2 are available for optional use.

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

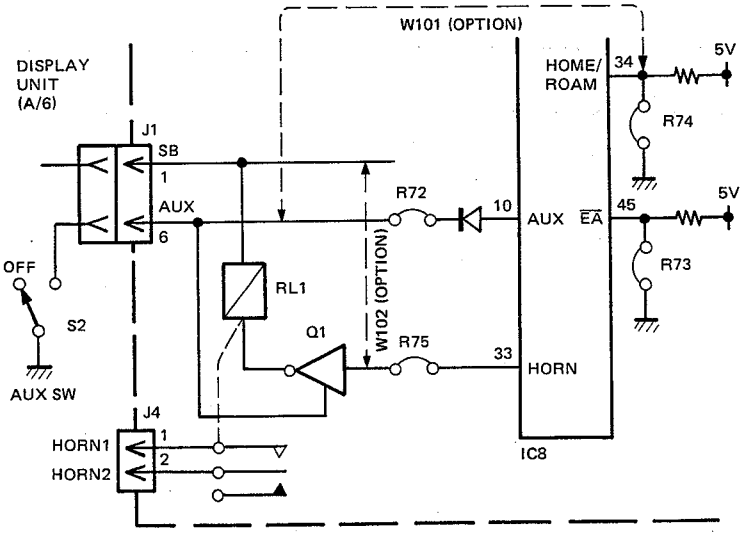


Fig. 3 AUX Function Block Diagram

	R72	R73	R74	R75	W101	W102
TALK-AROUND	O	O	O	X	X	X
HOME/ROAM	X	X	X	X	ADD	X
HORN CONT (AUTO)	X	X	O	O	X	X
HORN CONT (MANUAL)	X	X	O	X	X	ADD
*	X	X	O	X	X	X

Note :
* Using AUX SW for other switching functions.

O : Connect X : Cut/Not used — : Undefined ADD : Addition

Table 4 Aux Function Setting List

RESISTOR & JUMPER FUNCTION LIST

No.	Normal		Function	Time (s)											
	OPEN	SHORT		∞	30	60	90	120	150	180	210	240	270	300	330
R63		O	Time-out timer	X	X	X	X	X	O	O	O	O	*390Ω	*390Ω	*Jumper wire
R64		O		X	X	X	O	O	X	X	O	O	*1.8kΩ	*390Ω	O
R65		O	Time setting	X	X	O	X	O	X	O	X	O	O	O	O
R66		O		X	O	O	O	O	O	O	O	O	O	O	O

O : Used X : Cut * Replace with a resistor of similar specified resistance.

				Polarity		Setting	
			Model	Decode	Encode	R68	R69
R68 R69		O	* Undefined	+	—	O	O
			TK-810,TK-710F1	+	+	O	X
			Undefined	—	—	X	O
			TK-710F2,F3	—	+	X	X

* : BASIC
O : Installed
X : Removed
* Undefined : Reserved for future use.

			AUX SW FUNCTION	OPEN	SHORT	TALK-AROUND	HORM/ ROAM	HORN CONT (AUTO)	HORN CONT (MANUAL)	*
R72		O	TALK-AROUND FUNCTION	Other use	TALK-AROUND FUNCTION	O	X	X	X	X
R73		O	INT.ROM/EXT.ROM SELECT	INT.ROM (IC8)	EXT.ROM (IC10)	O	X	X	X	X
R74		O	HOME/ROAM SELECT	HOME (4-digit)	ROAM (7-digit)	O	X	O	O	O
R75		O	HORN CONT (AUTO)	Other use	HORN CONT (AUTO)	X	X	O	X	X
W101	OPTION		HOME/ROAM SELECT	Other use	HOME/ROAM SELECT	X	ADD	X	X	X
W102	OPTION		HORN CONT (MANUAL)	Other use	HORN CONT (MANUAL)	X	X	X	ADD	X

* Using AUX SW for other switching functions, O : Connect, X : Cut/not used, — : Undefined, ADD : Addition

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

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

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
KMS-4						
120		*	B58-0685-00	CAUTION CARD		
135		*	B42-3317-04	LABEL		
128			E31-3254-05	CONNECTING WIRE(12P) W1		
129			E31-3255-05	CONNECTING WIRE(4P) W2		
130		*	E31-3281-05	CONNECTING WIRE(3P) W3		
131		*	E31-3282-05	CONNECTING WIRE(2P) W4		
133			G13-0829-04	CUSHION (ROM 40X70)		
121		*	H01-8120-03	ITEM CARTON BOX		
122			H21-0709-04	PROTECTION SHEET		
123			H25-0076-03	PROTECTION BAG (60X50)		
124			H25-0710-04	PROTECTION BAG (100X150)		
132			H25-0029-04	PROTECTION BAG (ROM 60X110)		
127			J42-0452-05	POWER CORD BUSHING		
125			N35-2606-41	BINDING HEAD MACHINE SCREW		
134		*	MBM27C64-25JAL1	IC(EPROM)		
126			X52-3110-20	SIGNALLING UNIT		
SIGNALING UNIT (X52-3110-20)						
C1			C90-2064-05	ELECTRO 22UF 25WV		
C2			C90-2060-05	ELECTRO 22UF 16WV		
C3			CK73FB1H103K	CHIP C 0.01UF K		
C4			C90-2060-05	ELECTRO 22UF 16WV		
C5 ,6			CK73FB1H103K	CHIP C 0.01UF K		
C7			C90-0508-05	ELECTRO 2.2UF 50WV		
C8			CK73FB1H103K	CHIP C 0.01UF K		
C9 ,10			CK73FB1H153K	CHIP C 0.015UF K		
C11 ,12			CS15E1C010M	TANTAL 1.0UF 16WV		
C13			CK73FB1H102K	CHIP C 1000PF K		
C14			CK73FB1H153K	CHIP C 0.015UF K		
C15			CK73FB1H822K	CHIP C 8200PF K		
C16 ,17			CC73FCH1H100D	CHIP C 10PF D		
C18			CK73FB1H102K	CHIP C 1000PF K		
C19			C90-0478-05	ELECTRO 10UF 16WV		
C20			CK73FB1H103K	CHIP C 0.01UF K		
C21 ,22			CK73FB1H332K	CHIP C 3300PF K		
C23			CK73FB1H103K	CHIP C 0.01UF K		
C24 -26			CC73FSL1H471J	CHIP C 470PF J		
C27 ,28			CK73FB1H102K	CHIP C 1000PF K		
C29			CC73FSL1H221J	CHIP C 220PF J		
C30			CS15E1C010M	TANTAL 1.0UF 16WV		
C31 -34			CC73FSL1H471J	CHIP C 470PF J		
C35			CS15E1C100M	TANTAL 10UF 16WV		
C36			CK73FB1H103K	CHIP C 0.01UF K		
C37			CK73FB1H103K	CHIP C 0.01UF K		
C38			CS15E1C100M	TANTAL 10UF 16WV		
C39			CK73FB1H102K	CHIP C 1000PF K		
C40			CS15E1C010M	TANTAL 1.0UF 16WV		
			E02-2001-05	IC SOCKET (28PIN)		
J1			E40-5077-05	PIN CONNECTOR (12PIN)		
J2			E40-5075-05	PIN CONNECTOR (4PIN)		

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⚠ indicates safety critical components.

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
J3			E40-5074-05	PIN CONNECTOR (3PIN)		
J4			E40-5073-05	PIN CONNECTOR (2PIN)		
X1		*	L77-1355-05	CRYSTAL RESONATOR(12000MHZ)		
IR1			R90-0598-05	MULTI-COMP		
R1			RD14BB2E680J	RD 68 J 1/4W		
R2 ,3			RK73FB2A103J	CHIP R 10K J 1/10W		
R4			RK73FB2A473J	CHIP R 47K J 1/10W		
R5 ,6			RK73FB2A124J	CHIP R 120K J 1/10W		
R7 ,8			RK73FB2A823J	CHIP R 82K J 1/10W		
R9 ,10			RK73FB2A103J	CHIP R 10K J 1/10W		
R11			RK73FB2A684J	CHIP R 680K J 1/10W		
R12			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R13			R12-3445-05	TRIMMING POT. (47K)		
R14 ,15			RK73FB2A473J	CHIP R 47K J 1/10W		
R16			RK73FB2A333J	CHIP R 33K J 1/10W		
R17			RK73FB2A563J	CHIP R 56K J 1/10W		
R18 ,19			RK73FB2A103J	CHIP R 10K J 1/10W		
R20			RK73FB2A273J	CHIP R 27K J 1/10W		
R21			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R22			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R23			RK73FB2A103J	CHIP R 10K J 1/10W		
R24			RK73FB2A223J	CHIP R 22K J 1/10W		
R25 ,26			RK73FB2A153J	CHIP R 15K J 1/10W		
R27 ,28			RK73FB2A473J	CHIP R 47K J 1/10W		
R29 ,30			RK73FB2A103J	CHIP R 10K J 1/10W		
R31			RK73FB2A684J	CHIP R 680K J 1/10W		
R32			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R33			RK73FB2A153J	CHIP R 15K J 1/10W		
R34 -40			RK73FB2A473J	CHIP R 47K J 1/10W		
R41			RK73FB2A104J	CHIP R 100K J 1/10W		
R42 ,43			RK73FB2A273J	CHIP R 27K J 1/10W		
R44			RK73FB2A124J	CHIP R 680K J 1/10W		
R45			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R46			R12-3445-05	TRIMMING POT. (47K)		
R47			RK73FB2A473J	CHIP R 47K J 1/10W		
R48 ,49			RK73FB2A153J	CHIP R 15K J 1/10W		
R50			RK73FB2A103J	CHIP R 10K J 1/10W		
R51 ,52			RK73FB2A563J	CHIP R 56K J 1/10W		
R53			RK73FB2A104J	CHIP R 100K J 1/10W		
R54			RK73FB2A333J	CHIP R 33K J 1/10W		
R55			RK73FB2A273J	CHIP R 27K J 1/10W		
R56			R12-3445-05	TRIMMING POT. (47K)		
R57			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R58 -62			RK73FB2A473J	CHIP R 47K J 1/10W		
R63			RD14CB2C222J	RD 2.2K J 1/6W		
R64			RD14CB2C562J	RD 5.6K J 1/6W		
R65			RD14CB2C123J	RD 12K J 1/6W		
R66			RK73FB2A123J	CHIP R 12K J 1/10W		
R67			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R68			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R69			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R70 ,71			RK73FB2A473J	CHIP R 47K J 1/10W		
R72,74,75			R92-0687-05	CHIP R 0 OHM		
R73			RK73FB2A102J	CHIP R 1.0K J 1/10W		

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KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
RL1			S51-1421-05	RELAY		
D1		*	1SS193	CHIP DIODE		
D2 ,3			1SS184	CHIP DIODE		
D4		*	1SS187	CHIP DIODE		
D5			1SS181	CHIP DIODE		
D6			1S1555	DIODE		
D7			1SS184	CHIP DIODE		
IC1			NJM78L08A	IC(AVR 8V)		
IC2			UPC78L05A	IC(AVR 5V)		
IC3			S-8054HN-CB	IC(VOLTAGE DETECTOR)		
IC4 -6			NJM2904M	IC(OP AMP X2)		
IC7			NJM4558M	IC(OP AMP X2)		
IC8		*	78312G-301-1B	IC(MICROPROCESSOR)		
IC9		*	TC74HC573F	IC(8-BIT LATCH)		
IC11			AFH24F400B1	IC(HPF FC=400HZ)		
Q1 -6			DTC144EK	DIGITAL TRANSISTOR		

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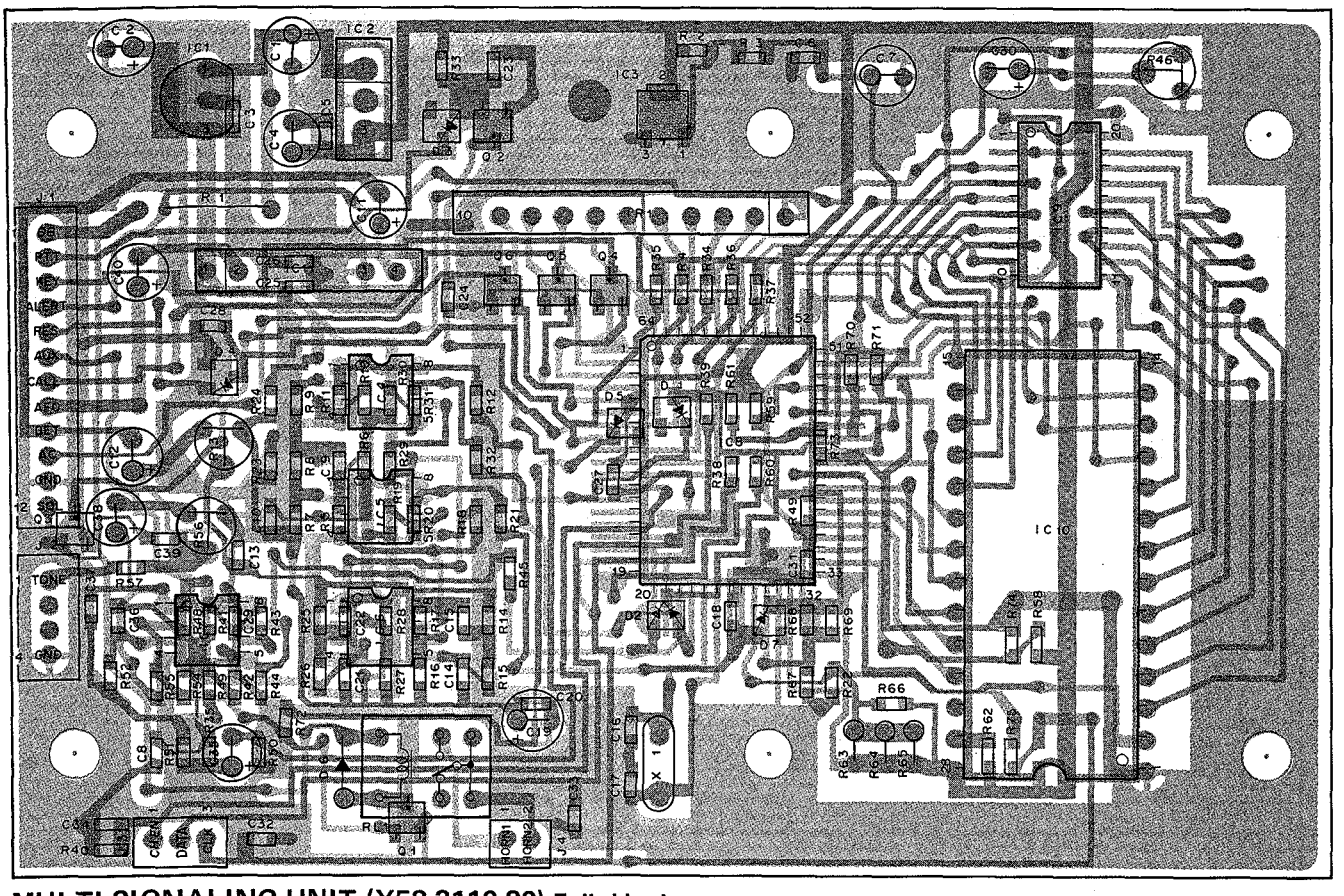
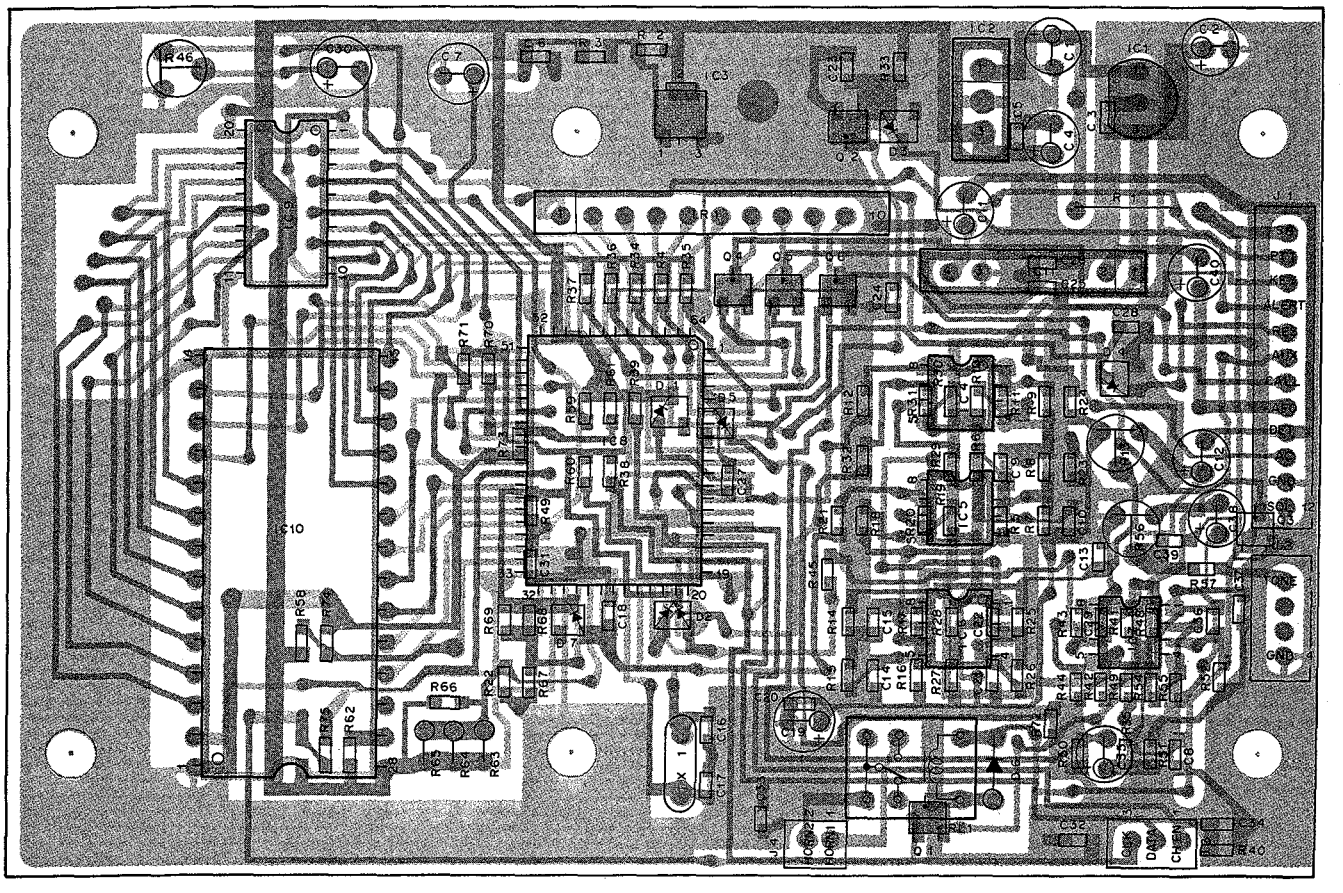
KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

PC BOARD VIEWS

MULTI SIGNALING UNIT (X52-3110-20) *Component side view*

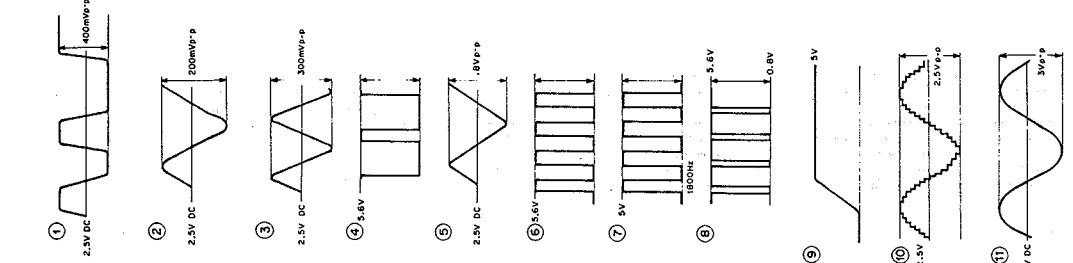


MULTI SIGNALING UNIT (X52-3110-20) *Foil side view*



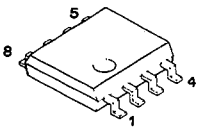
KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

CIRCUIT DIAGRAM

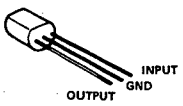


DTC144EK

NJM2904M
NJM4558M



S-8054HN

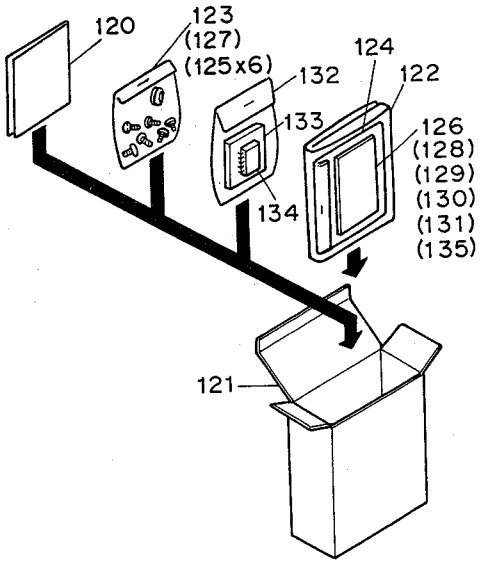


MULTI SIGNALING UNIT (X52-3110-20)

IC1 : NJM78L09A
IC2 : μPC78L05A
IC3 : S-8054HN-C8
IC4~6 : NJM2904M
IC7 : NJM4558M
IC8 : μPD78310G-301-18
IC9 : TC74HC573F
IC10 : M5M27C64-25JAL1
IC11 : AFH24F40081
Q1~6 : DTC144EK
D1 : 1SS193
D2,3,7 : 1SS184
D4 : 1SS187
D5 : 1SS181
D6 : 1S1555

KMS-4 (MULTIPLE SIGNALING DQT/QT/2-TONE/2805)

PACKING



RATINGS

QT Decoder/Encoder	
Decoder/Encoder tone frequency	67.0 to 288.5Hz (in 0.1Hz steps)
Decoder response time: (T1)	T1 = 100/QT tone frequency x 250ms or less
Encoder response time: (T2)	T2 = 100/QT tone frequency x 75ms or less
Reverse burst time: (Tr)	Tr = 180ms or less
Encoder frequency error	±0.5% or less
Squelch sensitivity	SINAD 10dB or less
DQT Decoder/Encoder	
DQT code	23 bits total: a 3-digit octal number (0~7, 12 bits) with error correction (11 bits)
Decoder response time: (T3)	T3 = 270ms or less
Encoder response time: (T4)	T4 = 0
Turn-off code transmission time: (Toff)	Toff = 180ms
Encoder pulse width error	±0.7% or less
Squelch sensitivity	SINAD 10dB or less
2-Tone Decoder	
Decoder tone frequency	242.1 to 3000.0Hz (in 0.1Hz steps)
2-tone format Tone A | Gap | Tone B | Voice message Ta Tg Tb	Slow format Ta = 1s Tb = 1s Tg = 0~0.775s (in 25ms steps) First format Ta = 700ms Tb = 700ms Tg = 0
Group call format Tone A | Voice message Ta	Slow format Ta = 15s First format Ta = 5s
Other functions	• Beep tone output during calling, call confirmation by call signal output, and horn control function. • Call confirmation by the 30-second automatic monitor function (settable).
2805 Decoder	
2805 Code	4- or 7-digit code, including 1 digit which represents a signal obtained by turning 2805Hz tone on and off by dial pulses (see the number of pulses listed below).

Dial No.	1	2	3	4	5	6	7	8	9	0
Number of pulses	1	2	3	4	5	6	7	8	9	10

Pulse time

	ON (mark) [ms]	OFF (Break) [ms]	Time between digits (s)
10 pulse/sec.	60	40	1
20 pulse/sec.	30	20	0.5

Other functions	• Beep tone output during calling, call confirmation by call signal output, and horn control function. • Call confirmation by the 30-second automatic monitor function (settable).
Time-out Timer	
Time	OFF, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330s (pre-settable).

KQT-7 (QUIET TALK (CTCSS))

CIRCUIT DESCRIPTION

This unit is the QT : (Quiet Talk) (CTCSS) unit incorporating a QT encoder and decoder.

Decoder Operation

The receiving decoder output (DET signal), which is transmitted from the transceiver, is inputs to the DET pin of this unit. Since the DET signal level is shifted by the ATT unit, the DET signal is input to the RX IN pin of Tone Squelch LSI : IC1 (NJM6520). The DET signal input to IC1 is amplified, passed through LPF1, LIM, BPF, and DET, and then output to DET OUT. The output from the amplifier is also supplied to LPF2 and output to RX OUT via a HPF. The output of RX OUT passes through amplifier : Q2 (2SC2712(GR)) and the AFO pin and is returned to the transceiver.

The DET OUT pin outputs a high level signal when the tone signal input to RX IN matches the tone selected by DIP switch : S1. The low level DET OUT signal passes through diode OR : D2 (1SS184) and Inverter : Q3 (DTC114EK) and is applied to the AC pin to open transceiver squelch. The Reset signal from the transceiver MIC HOOK is applied to diode OR : D2 as well as the DET OUT Signal. Since the reset signal goes high when the transceiver microphone is off hook, the AC pin goes low and monitoring is possible even when no DET OUT signal is present.

The LPF1, BPF, and HPF in IC1 consist of switched capacitor filters and they are controlled by the clock signal. The clock signal is created by dividing the reference signal, from the externally connected crystal oscillator : X1 (4.19430MHz) and the oscillator circuit internal to IC1. The dividing ratio is determined by the tone frequency setting switch : S1, and the selection of the receiving tone frequency is set with switch S1 by varying the center frequency of the BPF (band-pass filter).

Encoder Operation

When a low level PTT signal is input from the transceiver, the signal is applied to Diode : D1 (1SS184) to place IC1 in the transmit mode. The output from D1 is used as a control, so that the operation of TONE MUTE : Q4 (DTC114EK) is interrupted and a TONE signal is output. When IC1 is set to transmit mode, the transmission tone signal is output from the Divider, passed through the LPF1, and applied to the TX OUT pin. The transmission tone signal passes through amplifier : Q1 (2SC2712(GR)), the level of the signal is adjusted by TONE DEV Control : VR1, and is then applied to the transceiver modulator circuit via the TONE pin.

The transmission and reception tone frequency can be selected by Tone Frequency setting switch : S1. The same frequency is used for both transmission and the reception.

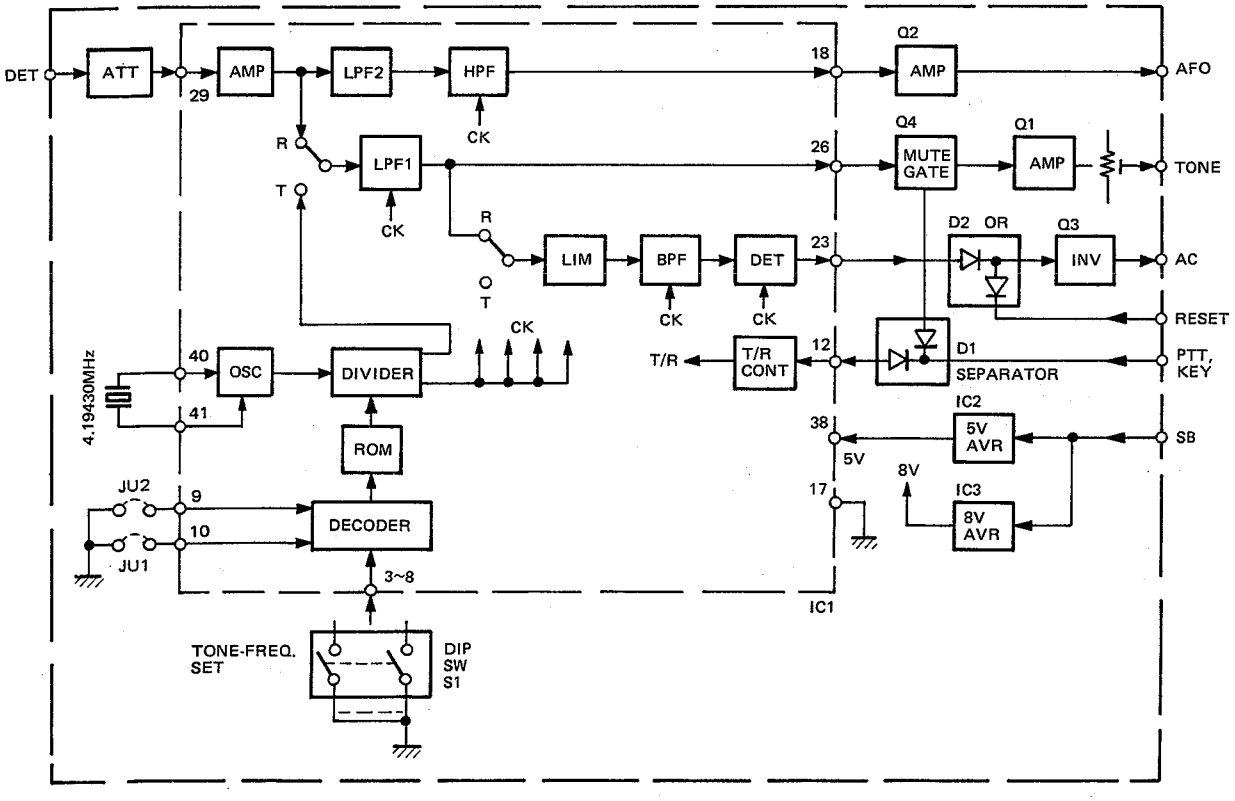


Fig. 1 KQT-7 Block Diagram

KQT-7 (QUIET TALK (CTCSS))

Tone frequency setting

The tone frequency for this unit is set by the dip switch. No. 1 through No. 6 on the dip switch, corresponds to S1 through S6 in the tone frequency table; therefore set the tone frequency according to the **Table 1.**

No.	EIA Specification Group	Hz	Program lines (ON : L, OFF : H) S1 (Dip switch) 1	2	3	4	5	6	No.	EIA Specification Group	Hz	Program lines (ON : L, OFF : H) S1 (Dip switch) 1	2	3	4	5	6
1	A	67.0	OFF	ON	OFF	OFF	OFF	ON	20	B	136.5	OFF	OFF	OFF	OFF	ON	OFF
2	B	71.9	ON	ON	OFF	OFF	OFF	ON	21	A	141.3	ON	OFF	OFF	OFF	ON	OFF
3	C	74.4	OFF	OFF	ON	OFF	OFF	ON	22	B	146.2	OFF	ON	OFF	OFF	ON	OFF
4	A	77.0	ON	OFF	ON	OFF	OFF	ON	23	A	151.4	ON	ON	OFF	OFF	ON	OFF
5	C	79.7	OFF	ON	ON	OFF	OFF	ON	24	B	156.7	OFF	OFF	ON	OFF	ON	OFF
6	B	82.5	ON	ON	ON	OFF	OFF	ON	25	A	162.2	ON	OFF	ON	OFF	ON	OFF
7	C	85.4	OFF	OFF	OFF	ON	OFF	ON	26	B	167.9	OFF	ON	ON	OFF	ON	OFF
8	A	88.5	ON	OFF	OFF	ON	OFF	ON	27	A	173.8	ON	ON	ON	OFF	ON	OFF
9	C	91.5	OFF	ON	OFF	ON	OFF	ON	28	B	179.9	OFF	OFF	OFF	ON	ON	OFF
10	B	94.8	OFF	ON	ON	OFF	OFF	OFF	29	A	186.2	ON	OFF	OFF	ON	ON	OFF
11	A	100.0	ON	ON	ON	OFF	OFF	OFF	30	B	192.8	OFF	ON	OFF	ON	ON	OFF
12	B	103.5	OFF	OFF	OFF	ON	OFF	OFF	31	A	203.5	ON	ON	OFF	ON	ON	OFF
13	A	107.2	ON	OFF	OFF	ON	OFF	OFF	32	B	210.7	OFF	OFF	ON	ON	ON	OFF
14	B	110.9	OFF	ON	OFF	ON	OFF	OFF	33	A	218.1	ON	OFF	ON	ON	ON	OFF
15	A	114.8	ON	ON	OFF	ON	OFF	OFF	34	B	225.7	OFF	ON	ON	ON	ON	OFF
16	B	118.8	OFF	OFF	ON	ON	OFF	OFF	35	A	233.6	ON	ON	ON	ON	ON	OFF
17	A	123.0	ON	OFF	ON	ON	OFF	OFF	36	B	241.8	OFF	OFF	OFF	OFF	OFF	ON
18	B	127.3	OFF	ON	ON	ON	OFF	OFF	37	A	250.3	ON	OFF	OFF	OFF	OFF	ON
19	A	131.8	ON	ON	ON	ON	OFF	OFF									

Table 1 Tone Frequency Table

Fine tuning of the receiving frequency (fine frequency tuning of BPF)

Fine tuning of the receiving frequency depends on whether the jumpers (JU1 and JU2) are grounded or not.

	JU1	JU2
0%	X	X
+ 0.5%	O	X
+ 1%	X	O
+ 1.5%	O	O

O : Connect, X : Open

KQT-7 (QUIET TALK (CTCSS))

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

PARTS LIST

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
KQT-7						
120		*	B58-0684-00	CAUTION CARD		
128		*	E31-3254-05	CONNECTING WIRE(12P)		
129		*	E31-3255-05	CONNECTING WIRE(4P)		
121		*	H01-8117-03	CARTON (INSIDE)		
122			H21-0709-04	PROTECTION SHEET		
123			H25-0076-03	PROTECTION BAG (60X50)		
124			H25-0710-04	CONDUCTIVE BAG (100X150)		
125			N35-2606-41	BINDING HEAD MACHINE SCREW		
126		*	X52-3080-20	CTCSS UNIT		
127		*	J42-0452-05	POWER CORD BUSHING		
QT UNIT (X52-3080-20)						
C1 ,2			CC73FCH1H150J	CHIP C 15PF J		
C3			C90-2050-05	ELECTRO 33UF 6.3WV		
C4 ,5		*	C90-2077-05	ELECTRO 0.1UF 25WV		
C6 ,7			C90-2044-05	ELECTRO 1UF 25WV		
C8			C90-2021-05	ELECTRO 10UF 25WV		
C9 ,10			C90-2044-05	ELECTRO 1UF 25WV		
C11			C90-2021-05	ELECTRO 10UF 25WV		
C12			C90-0482-05	ELECTRO 4.7UF 25WV		
C13			CK73FB1H103K	CHIP C 0.010UF K		
C14 -17			C90-0501-05	ELECTRO 33UF 25WV		
CN1			E40-5077-05	PIN CONNECTOR (12P)		
CN2			E40-5075-05	PIN CONNECTOR (4P)		
X1			L77-0999-15	CRYSTAL RESONATOR(4.19430MHZ)		
R1 ,2			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R3			RD41FB2B824J	CYLND CHIP R 820K J 1/8W		
R4			RD41FB2B181J	CYLND CHIP R 180 J 1/8W		
R5			RD41FB2B332J	CYLND CHIP R 3.3K J 1/8W		
R6			RD41FB2B391J	CYLND CHIP R 390 J 1/8W		
R7			RD41FB2B393J	CYLND CHIP R 39K J 1/8W		
R8			RD41FB2B154J	CYLND CHIP R 150K J 1/8W		
R9			RD41FB2B561J	CYLND CHIP R 560 J 1/8W		
R10			RD41FB2B391J	CYLND CHIP R 390 J 1/8W		
R11			RD41FB2B154J	CYLND CHIP R 150K J 1/8W		
R12			RD41FB2B222J	CYLND CHIP R 2.2K J 1/8W		
R13			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R14			RD41FB2B123J	CYLND CHIP R 12K J 1/8W		
R15			RD41FB2B222J	CYLND CHIP R 2.2K J 1/8W		
R16 ,17			RD41FB2B472J	CYLND CHIP R 4.7K J 1/8W		
R18			RD41FB2B121J	CYLND CHIP R 120 J 1/8W		
R19 ,20			RD41FB2B333J	CYLND CHIP R 33K J 1/8W		
VR1			R12-4408-05	TRIMMING POT. (50K)		
S1			S31-6403-05	DIP SWITCH		
D1 ,2			1SS184	CHIP DIODE		
IC1			MN6520	IC(CTCSS SYSTEM)		
IC2			NJM78L05A	AVR IC(5V)		
IC3			NJM78L08A	AVR IC(8V)		
Q1 ,2			2SC2712(GR)	TRANSISTOR		
Q3 ,4			DTC114EK	DIGITAL TRANSISTOR		

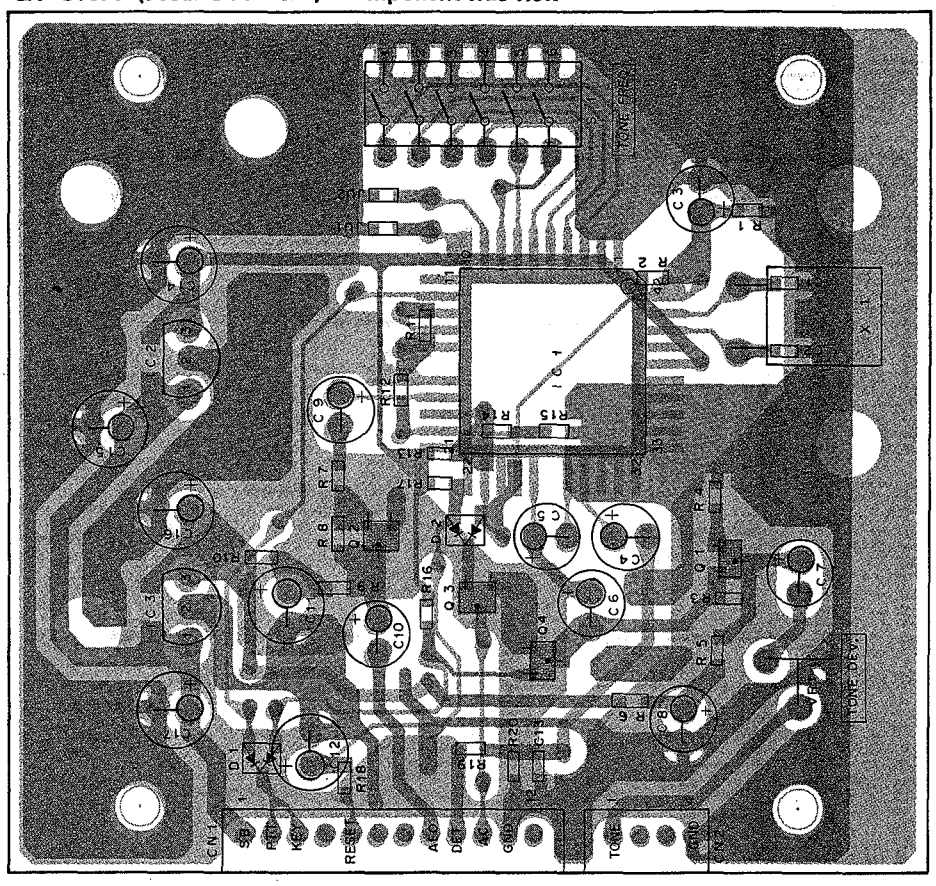
E: Scandinavia & Europe K: USA P: Canada
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

⚠ indicates safety critical components.

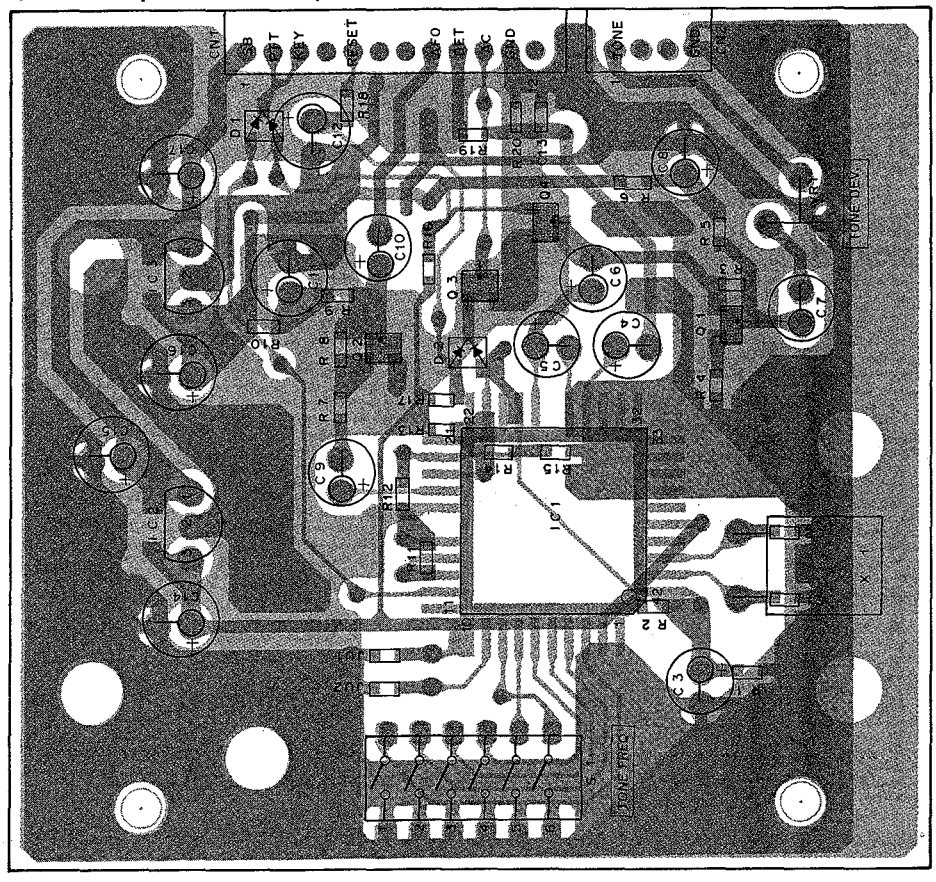
KQT-7 (QUIET TALK (CTCSS))

PC BOARD VIEWS

QT UNIT (X52-3080-20) Component side view

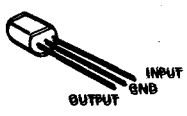


QT UNIT (X52-3080-20) Foil side view

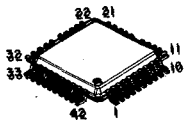


DTC114EK
2SC2712

NJM78L05A

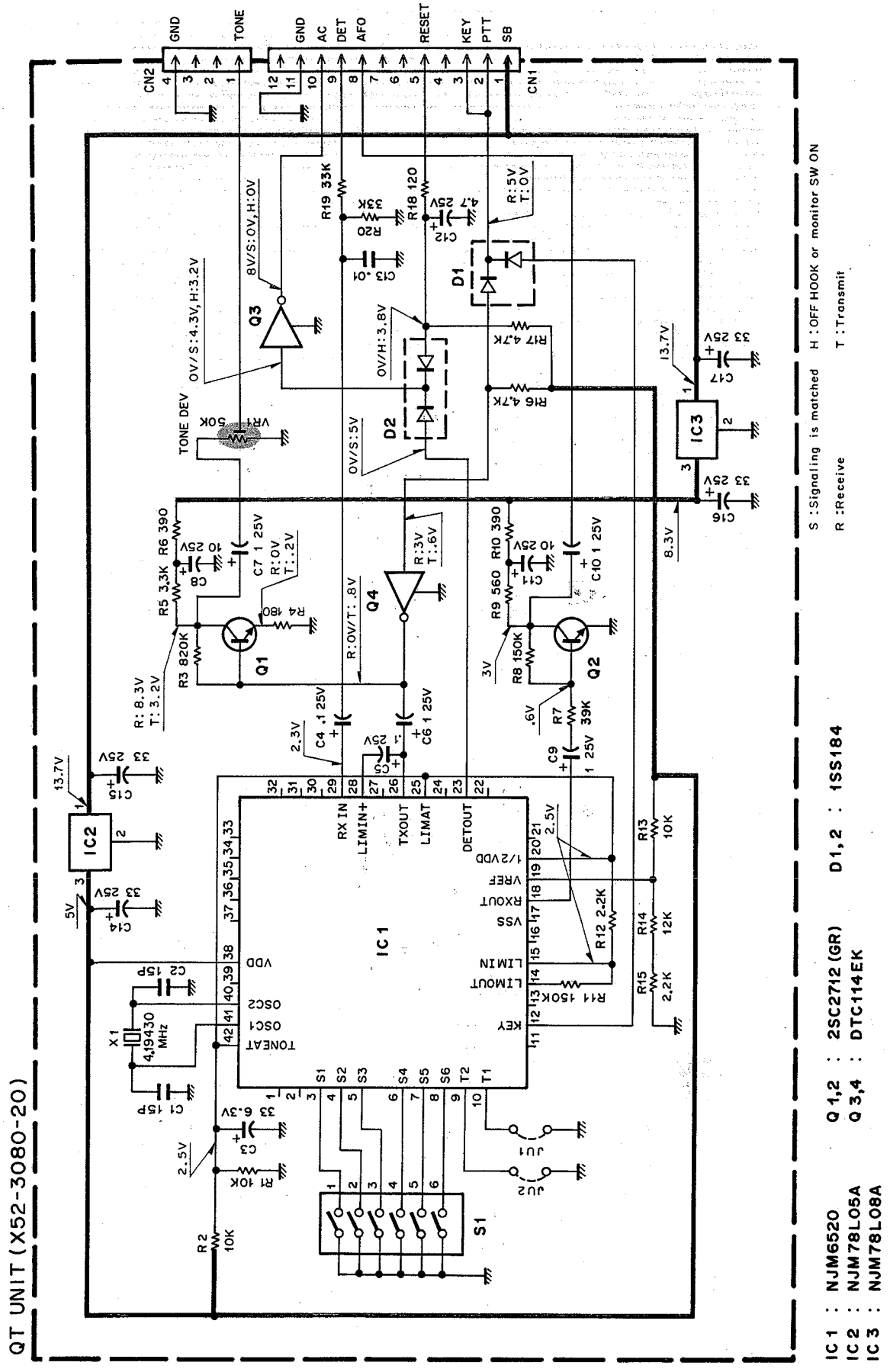


MN6520



KQT-7 (QUIET TALK (CTCSS))

CIRCUIT DIAGRAM

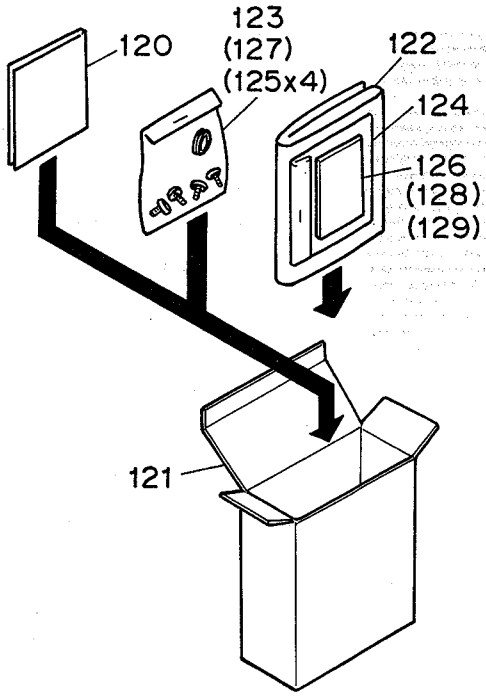


S : Signaling is matched H : OFF HOOK or monitor SW ON
R : Receive T : Transmit

IC1 : NJM6520 Q1,2 : 2SC2712 (GR) D1,2 : 1SS184
IC2 : NJM78L05A Q3,4 : DTC114EK
IC3 : NJM78L08A

KQT-7 (QUIET TALK (CTCSS))

PACKING



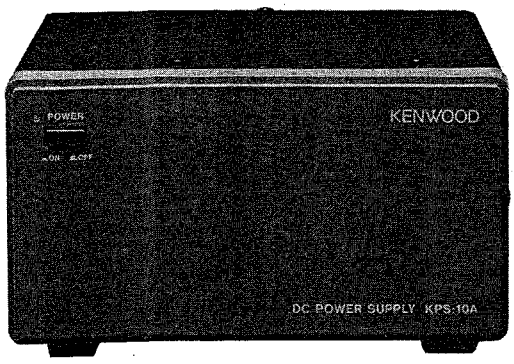
RATINGS

QT	
Encoder/Decoder tone frequency	67.0 to 250.3Hz EIA STD (RS-220A) tone frequencies
Decoder response time: (T1)	T1 = 100/QT tone frequency x 250ms or less
Encoder response time: (T2)	T2 = 100/QT tone frequency x 75ms or less
Encoder frequency error	±0.5% or less
Squelch sensitivity	SINAD 10dB or less

TK-710

KPS-10A (DC POWER SUPPLY)

EXTERNAL VIEW



CIRCUIT DESCRIPTION

This power supply uses a tapped secondary transformer to maintain low voltage between the pass transistor collectors and emitters (Q101 & Q102) for excellent efficiency. Control and operating voltages are rectified and supplied independently for good ripple characteristics.

Temperature compensation for the regulator Zener diode D6 and error amplifier transistor Q1 is provided by silicon diodes D4 & D5.

At initial POWER-ON Q3 is ON to turn-down Q1 base voltage. This prevents a surge voltage from being output when no load is connected. As C5 charges, Q4 turns ON to shut Q3 OFF. Q1 is thereafter fully ON.

If the load is shorted, comparator Q2 is turned OFF and curent proportional only to that in the initial turn-on circuit is output. When the output is shorted, the output current drops to 1A. This circuit protects the pass transistors, transformer and full wave bridge rectifies from thermal damage.

OPERATION

Depressing the POWER switch lights the POWER indicator and 13.8V DC is present at the output terminal. This unit outputs 13.8V DC, 7A.

If the output terminals, (+) and (–) are shorted, the protection circuit protects the pass transistors from damage. When the short circuit is removed, protection releases and normal output is automatically resumed.

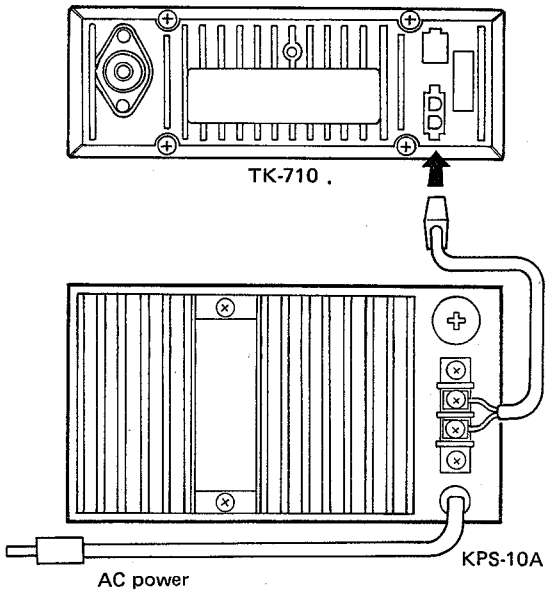


Fig. 1

SPECIFICATIONS

Input voltage	120/220/240V AC ±10%, 50/60Hz
Output voltage	13.8V DC (standard voltage)
Continuous load current	7A max.
Output voltage fluctuation	Within ±0.7V at AC 120V, 220V, 240V ±10% (Load current; 7A) Within 0.7V between 2~7A load. (No-load output voltage; Less than 16V at 120/220/240V AC)
Ripple voltage	Less than 30mV (rms) at 13.8V, output current 7A.
Power consumption	Approx. 200W (at load current DC, 7A)
Dimensions (W x H x D)	174 (6-27/32") x 107 (4-7/32") x 240 mm (9-15/32")
Weight	Approx. 6kg (13.2 lbs.)

* Circuit design and ratings are subject to change for improvement without notice.

KPS-10A (DC POWER SUPPLY)

BLOCK DIAGRAM

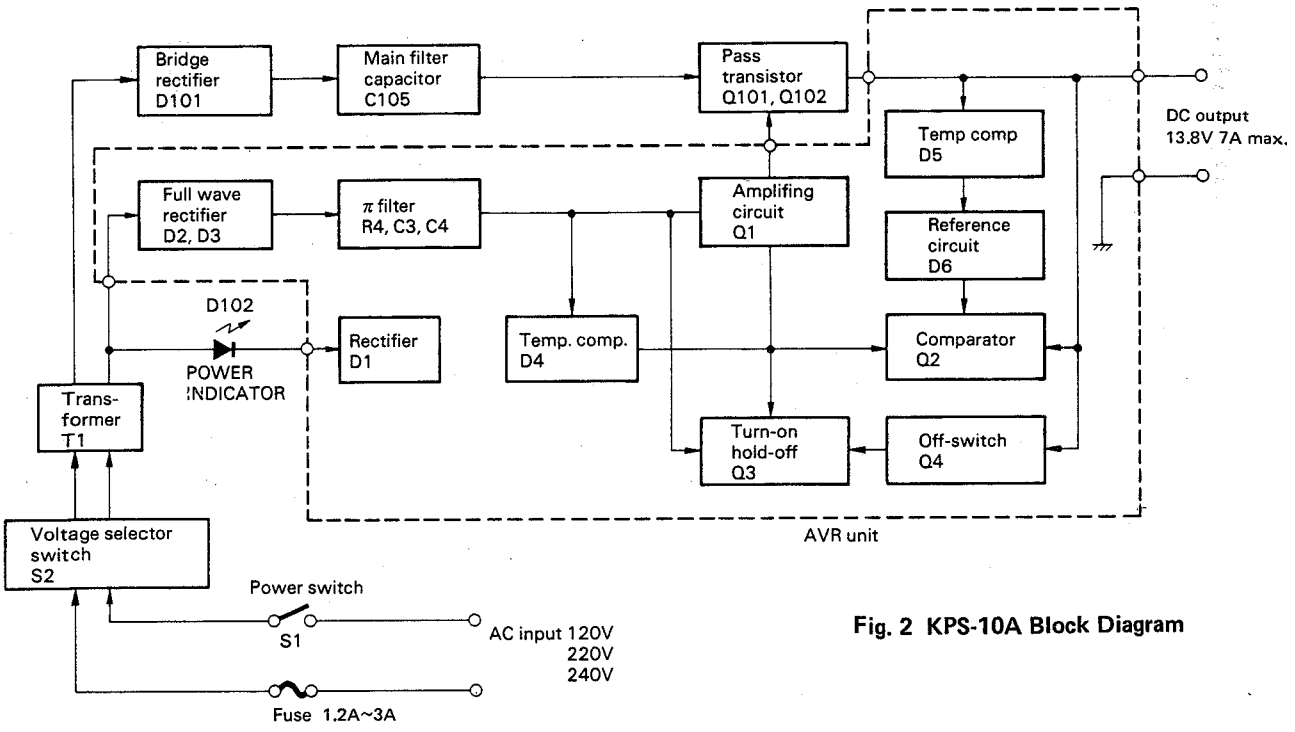
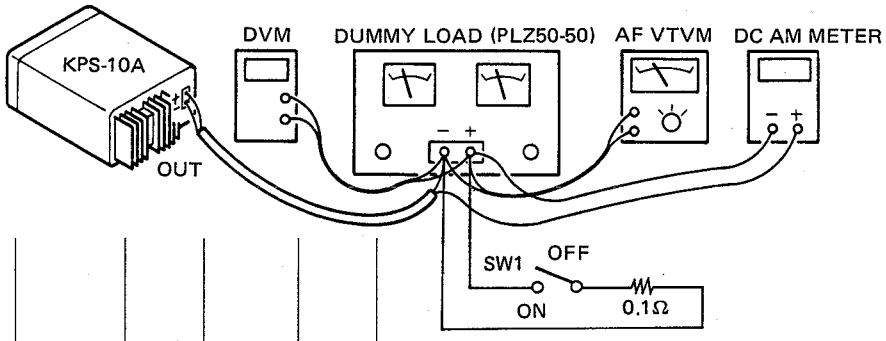


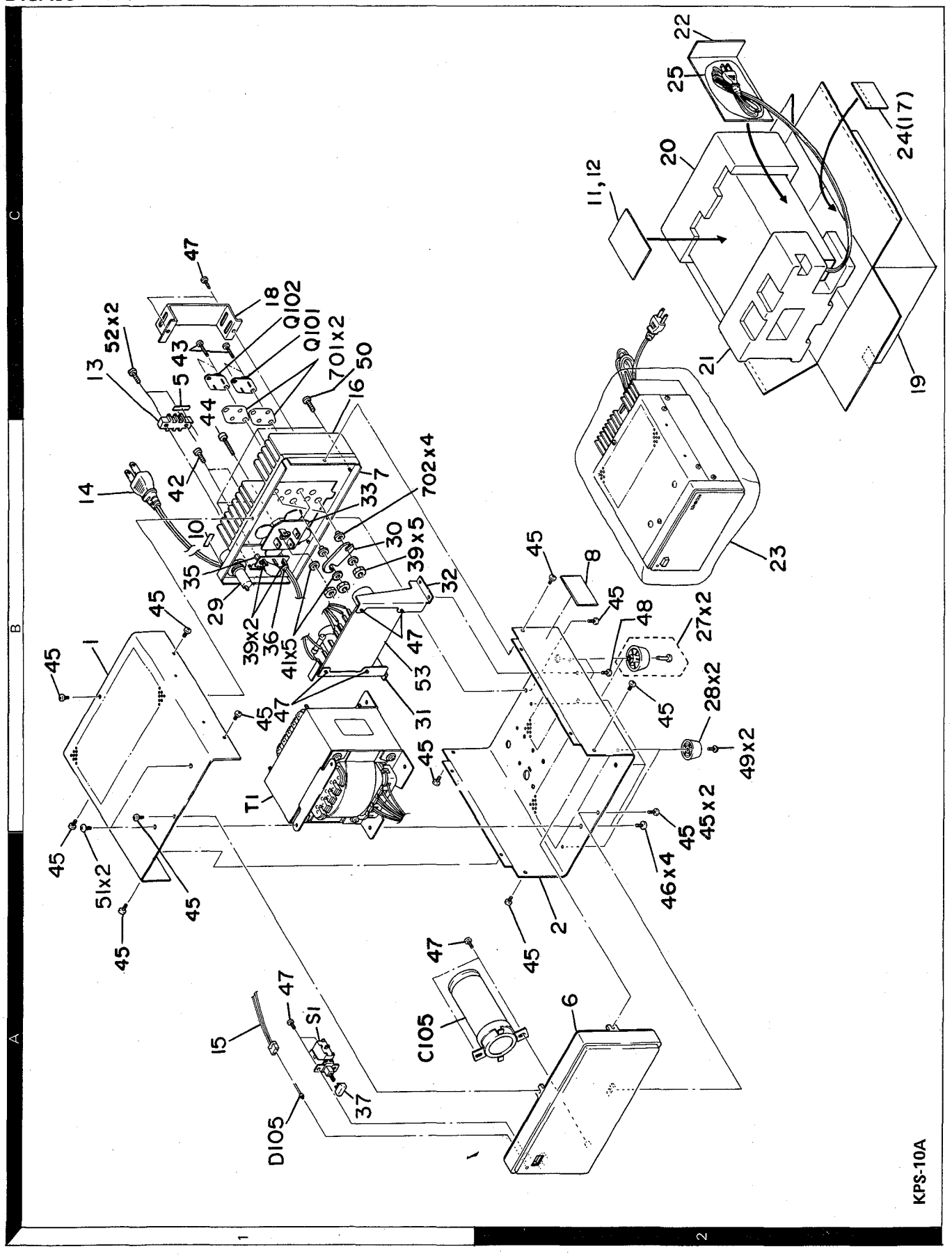
Fig. 2 KPS-10A Block Diagram

ALIGNMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Setting	AC voltage for destination (K) : 120V (W) : 220V (T,X) : 240V (M) : 120,220,240V Set the voltage selector switch for the local line voltage.							
2. Test equip-ment set-up	Function → 0.1Ω resistor Meter → 60A, 60V DC → ON Power → ON SW1 → OFF							
3. Voltage setting	Power switch : ON	DVM		Output	AVR	VR1	Adjust the load for 7A.	13.6V±0.4V (Verify Power indicator lights.)
	Vary the load for 2A—7A draw. (Set to 7A after check.)	DVM AF VTVM						13.6V±0.7V DC Less than 30mV AC
	Power SW : OFF							
4. Protection	1) SW1 : ON, VR2 : MAX CW 2) Power SW : ON	DVM		Output	AVR	VR2	0.2V	0.2V±0.1V
	3) SW1 : OFF						Check	13.6V±0.4V

DISASSEMBLY

KPS-10A (DC POWER SUPPLY)



KPS-10A (DC POWER SUPPLY)

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

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
			KPS-10A			
1		*	A01-1039-02	METALLIC CABINET(UPPER)		
2		*	A01-1040-02	METALLIC CABINET(LOWER)		
6		*	A20-2632-03	PANEL ASSY		
7		*	A23-1502-03	REAR PANEL		
3			B41-0659-14	CAUTION LABEL	K	
4			B41-0660-04	CAUTION LABEL (FUSE)	K	
5		*	B42-3311-04	LABEL (+,-)		
8		*	B40-3758-04	MODEL NAME PLATE	K	
8		*	B40-3760-04	MODEL NAME PLATE	M	
8		*	B40-3765-04	MODEL NAME PLATE	TXW	
10		*	B42-3309-04	LABEL (3A)	K	
10		*	B42-3310-04	LABEL (1.5A)	MTXW	
11			B46-0418-10	WARRANTY CARD	K	
12		*	B50-8193-00	INSTRUCTION MANUAL		
C101-104			CK45E2H103P	CERAMIC 0.010UF P		
C105			C90-0865-05	ELECTRO 47000UF 25WV		
C106			C91-1098-05	FIXED CAPACITOR(4700PF,AC400WV		
C107,108			C91-0496-05	CERAMIC 470PF K		
13			E20-0282-05	TERMINAL BOARD (2P)		
14			E30-0185-05	AC POWER CORD	X	
14			E30-0585-05	AC POWER CORD	W	
14			E30-0602-05	AC POWER CORD	T	
14			E30-0780-05	AC POWER CORD	KM	
15			E31-2188-05	CONNECTING WIRE(LED)		
-			E23-0022-04	TERMINAL		
16			F01-0795-13	HEAT SINK		
17			F05-1222-05	FUSE (1.25A)	TXW	
17			F05-1224-05	FUSE (1.2A)	M	
17			F05-3021-05	FUSE (3A)	KM	
18			F07-0849-04	COVER		
F1			F05-1222-05	FUSE (1.25A)	TXW	
F1			F05-1224-05	FUSE (1.2A)	M	
F1			F05-3021-05	FUSE (3A)	K	
19		*	H01-8132-04	ITEM CARTON BOX		
20			H10-2567-02	POLYSTYRENE FOAMED FIXTURE(F)		
21			H10-2576-02	POLYSTYRENE FOAMED FIXTURE(R)		
22			H12-1337-04	PACKING FIXTURE		
23			H20-1420-03	PROTECTION COVER		
24			H25-0029-04	PROTECTION BAG (FUSE)		
25			H25-0105-04	PROTECTION BAG (AC POWER CORD)		
27			J02-0323-05	FOOT (REAR SIDE)		
28			J02-0429-05	FOOT (FRONT SIDE)		
29		*	J13-0031-05	FUSE HOLDER (5X20)	TXW	
29			J13-0033-05	FUSE HOLDER (6X30)	KM	
30			J19-1325-04	RETAINER		
31			J21-4102-04	PCB BRACKET (A)		
32			J21-4103-04	PCB BRACKET (B)		
35			J32-0220-04	HEX BOSS		
36			J41-0024-15	CORD BUSHING	TXW	
36			J41-0033-05	CORD BUSHING	KM	
37			K29-0758-14	PUSH KNOB		

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

⚠ indicates safety critical components.

KPS-10A (DC POWER SUPPLY)

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

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
T1		*	L01-8101-05	POWER TRANSFORMER	K	
T1		*	L01-8132-05	POWER TRANSFORMER	TX	
T1		*	L01-8142-05	POWER TRANSFORMER	W	
T1		*	L01-8326-05	POWER TRANSFORMER	M	
39			N10-2030-46	HEXAGON NUT		
41			N15-1030-46	FLAT WASHER		
42			N30-3004-46	PAN HEAD MACHINE SCREW		
43			N30-3016-46	PAN HEAD MACHINE SCREW		
44			N30-3025-46	PAN HEAD MACHINE SCREW		
45			N35-3006-45	BINDING HEAD MACHINE SCREW		
46			N35-4008-45	BINDING HEAD MACHINE SCREW		
47			N87-3006-46	BRAZIER TAPTITE SCREW		
48			N89-3008-45	BINDING TAPTITE SCREW(PCB)		
49			N87-3010-46	BRAZIER TAPTITE SCREW(FOOT)		
50			N30-3010-46	PAN HEAD MACHINE SCREW		
51			N34-4008-45	TRUSS HEAD MACHINE SCREW(T1)		
52			N87-3012-46	BRAZIER TAPTITE SCREW(TERMINAL		
S1		*	S40-1416-05	PUSH SWITCH (POWER)		
S2			S29-2406-05	VOLTAGE SELECT SWITCH	M	
D101			S25VB10	DIODE		
D102			SLP144B	LED (RED)		
Q101,102			2N5885	TRANSISTOR		
53			X63-1030-10	AVR UNIT		
AVR UNIT (X63-1030-10)						
C1 ,2			CK45F1H103Z	CERAMIC 0.010UF Z		
C3 ,4			C90-0814-05	ELECTRO 4700UF 25WV		
C5			CE04W1A470M	ELECTRO 47UF 10WV		
C6 ,7			CK45F1H103Z	CERAMIC 0.010UF Z		
C8			C90-0814-05	ELECTRO 4700UF 25WV		
C9 -11			CK73FB1H102K	CHIP C 1000PF K		
C12			CK45B1H102K	CERAMIC 1000PF K		
-			E23-0022-04	TERMINAL		
R1 ,2			R92-0619-05	FIXED RESISTOR (0.05,5W)		
R3			RD14CB2E391J	RD 390 J 1/4W		
R4			RS14AB3A4R7J	FL-PROOF RS 4.7 J 1W		
R5			RD14CB2E822J	RD 8.2K J 1/4W		
R6			RD14CB2E273J	RD 27K J 1/4W		
R7			RD14BB2E273J	RD 27K J 1/4W		
R8			RD14CB2E273J	RD 27K J 1/4W		
R9			RD14CB2E683J	RD 68K J 1/4W		
R10			RD14CB2E121J	RD 120 J 1/4W		
R11			RD14CB2E821J	RD 820 J 1/4W		
R12			RD14BB2E122J	RD 1.2K J 1/4W		
VR1			R12-0427-05	TRIMMING POT. (500)		
VR2			R12-8405-05	TRIMMING POT. (1M)		
D1			1S1555	DIODE		
D2 ,3			DSA3A1	DIODE		
D4 ,5			1S1555	DIODE		
D6			RD7.5EB2	ZENER DIODE (7.5V)		
Q1			2SB512(P)	TRANSISTOR		
Q2 -4			2SC1815(Y)	TRANSISTOR		

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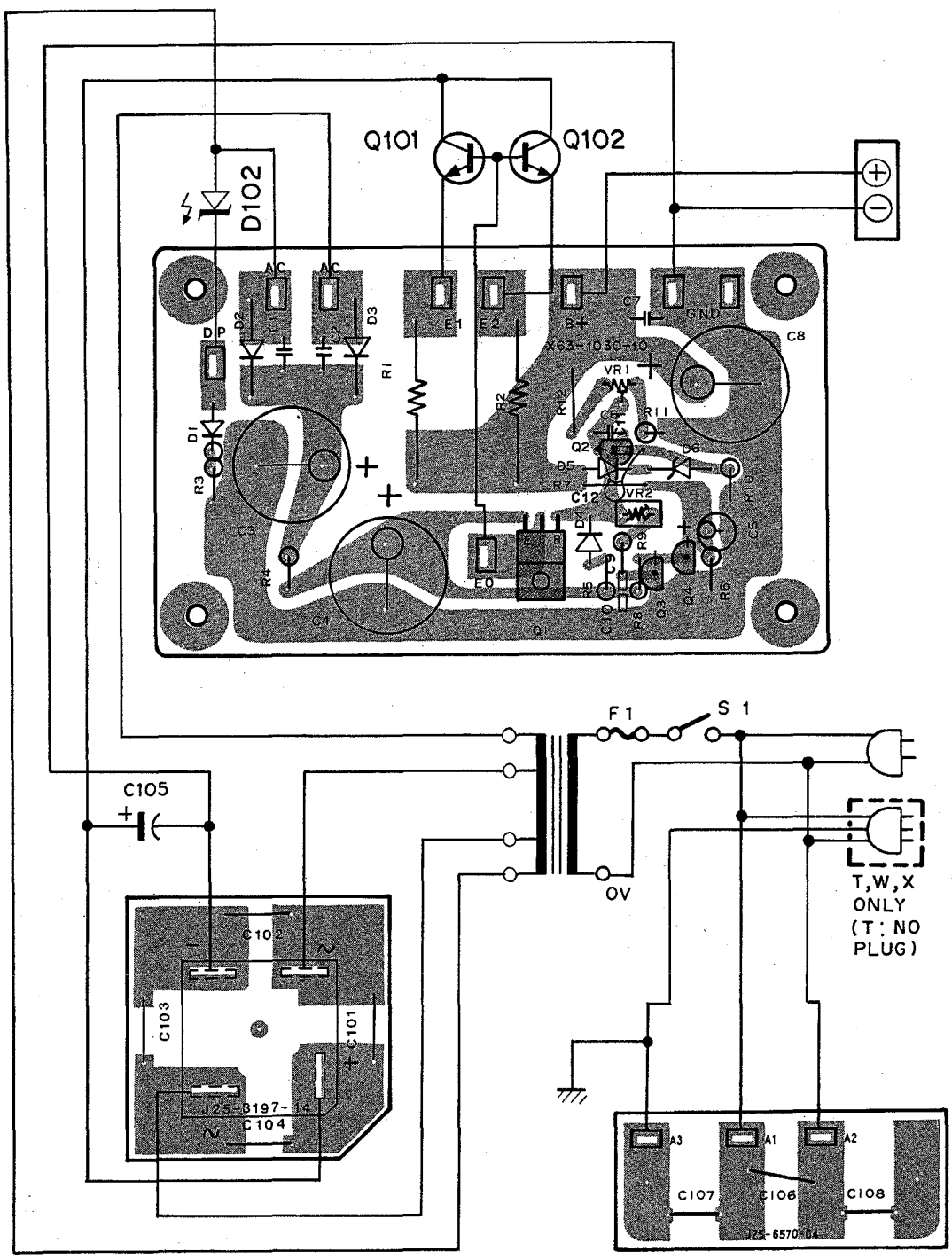
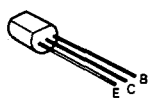
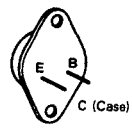
KPS-10A (DC POWER SUPPLY)



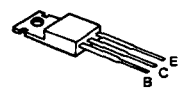
2SC1815



2N5885



2SB512



TK-710

KSP-1A (EXTERNAL SPEAKER)

CONNECTION FOR THE KSP-1A WITH THE TK-710

The following tools are required for changing the connector.

Extracting tool

The following extracting tool is recommended:

Molex Inc. Order No.: 11-03-0038

Hand crimping tool, or soldering iron and solder.

The following hand crimping tool is recommended:

Molex Inc. Order No.: 11-01-0122

1. Remove the connector with jumper from the External Speaker connector on the rear panel of the radio. **(Fig. 2)**

Note:
Save the jumper, which is required when the radio is used without the External Speaker.

2. Remove the terminals with the jumper from the connector housing holes number 1 and 2 using the extracting tool.

REMOVING THE JUMPER LEAD (Fig. 3)

1) Insert the extracting tool (11-03-0038) into the connector while pushing the jumper lead in the direction of (a).
2) Push the extracting tool into collapse the barbs of the crimp terminal.
3) Pull out the lead while continuing to push the extracting tool in the direction (b).

3. Cut the terminals from the leads **(Fig. 4 (A))**.
4. Strip the leads for 3mm (1/8") **(Fig. 4 (B))**.
5. Crimp the two crimp terminals provided with the KSP-1A using the hand crimping tool. If a hand crimping tool is not available, soldering is acceptable **(Fig. 4 (C))**.
6. Reinsert the terminal with the black and white stripe lead into hole number 1, and the terminal with the black lead into hole number 3 **(Fig. 5)**.
7. Attach the connector to the External Speaker connector on the radio.

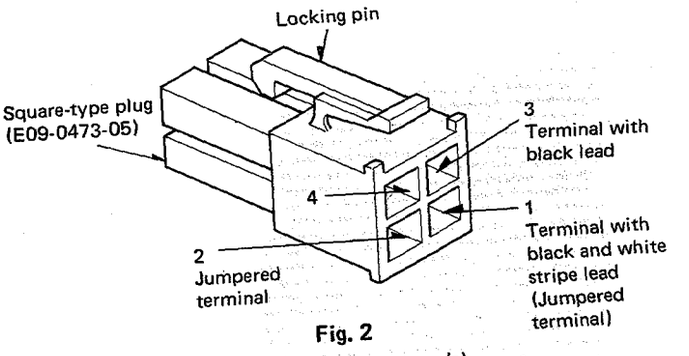


Fig. 2

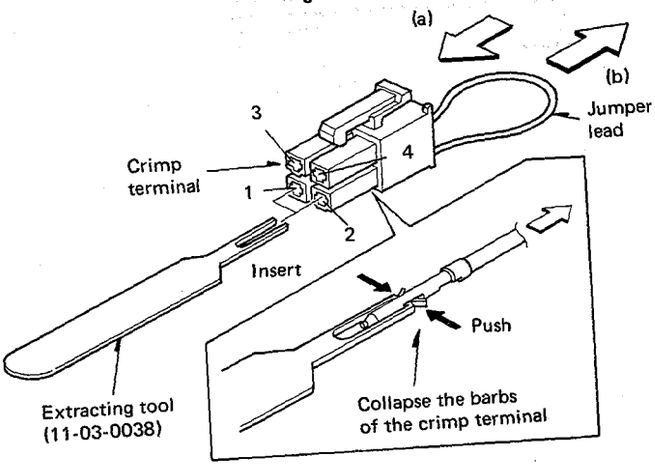


Fig. 3

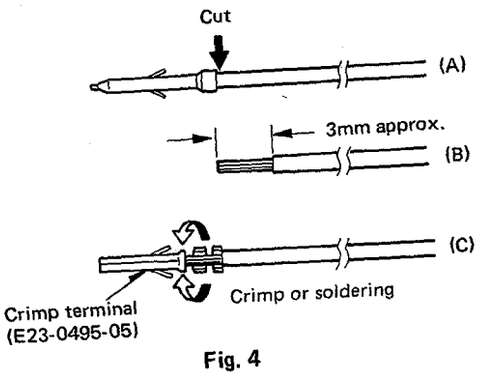


Fig. 4

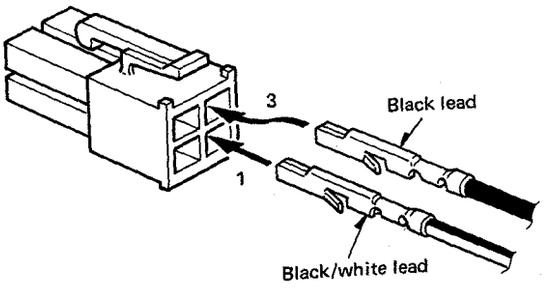


Fig. 5

KSP-1A (EXTERNAL SPEAKER)

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PARTS LIST

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
			KSP-1A			
1	1B	*	A01-1034-02	PLASTIC CABINET(FRONT)		
2	1A	*	A01-1035-02	PLASTIC CABINET(REAR)		
3	2A	*	A13-0678-03	ANGLE		
4	1B	*	B40-3739-04	MODEL NAME PLATE		
5	2A	*	B50-8165-00	INSTRUCTION MANUAL		
6	1A	*	E30-2083-05	CABLE ASSY WITH TERMINAL		
60	2B	*	E23-0495-05	CRIMP TERMINAL		
7	3A	*	H01-8106-03	ITEM CARTON CASE		
9	3A	*	H12-1335-03	PACKING FIXTURE		
10	2A		H25-0029-04	PROTECTION BAG (60X110)		
11	2A		H25-0106-04	PROTECTION BAG (250X350)		
61	2A	*	H12-1341-04	PACKING FIXTURE		
62	2A	*	J42-0443-05	CORD BUSHING		
12	2B		N09-0008-04	HEX BOLT 4 USED		
13	2B		N09-0655-05	TAPPING SCREW (4 USED)		
14	1A		N09-0656-05	SCREW WITH WASHERS,(ANGLE)		
15	2B		N09-0662-05	WING BOLT 2 USED		
16	2B		N14-0510-04	FLANGE NUT 4 USED		
17	1A		N15-1040-46	FLAT WASHER (SPEAKER,CABINET)		
18	1A,1B		N15-1060-46	FLAT WASHER (6 USED)		
19	2A		N16-0040-46	SPRING WASHER(SPEAKER,CABINET)		
20	2B		N16-0060-46	SPRING WASHER(6 USED)		
21	1A		N87-4010-46	BRAZIER TAPTITE SCREW(SPEAKER)		
22	2A		N87-4020-46	BRAZIER TAPTITE SCREW(CABINET)		
23	1B	*	T07-0228-05	LOUDSPEAKER		

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KSP-1A (EXTERNAL SPEAKER)

DISASSEMBLY