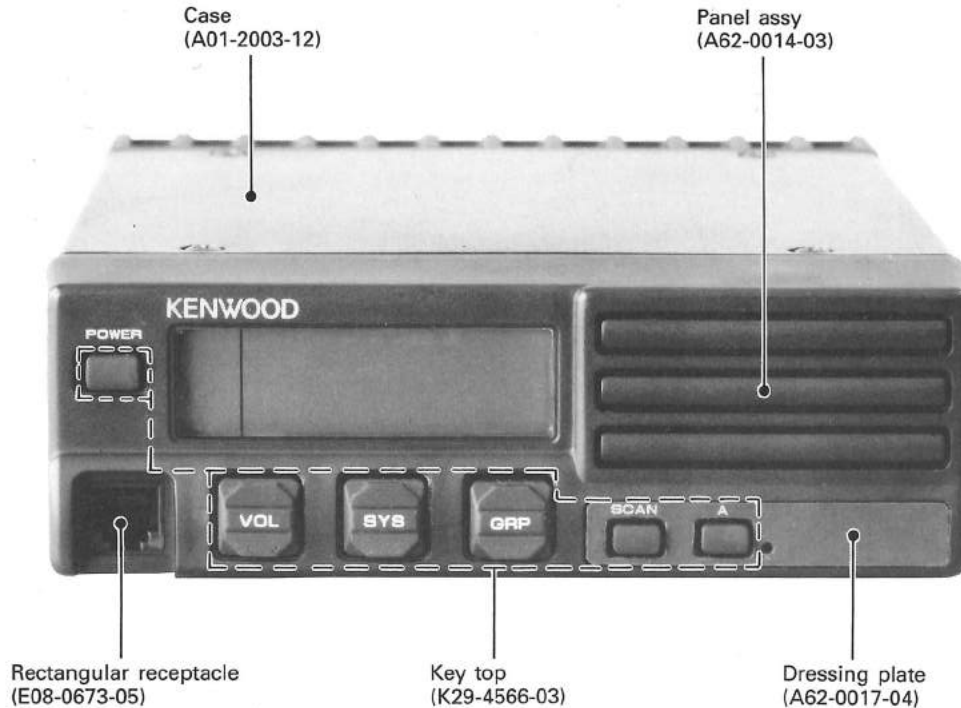


TK-931/931(HD)

SERVICE MANUAL

KENWOOD

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TK-931/931(HD)

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
ALHTK-931-1	896 ~ 941MHz	Parts 90
ALHTK-931H-1	896 ~ 941MHz	Parts 90

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 preferred, 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.

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.

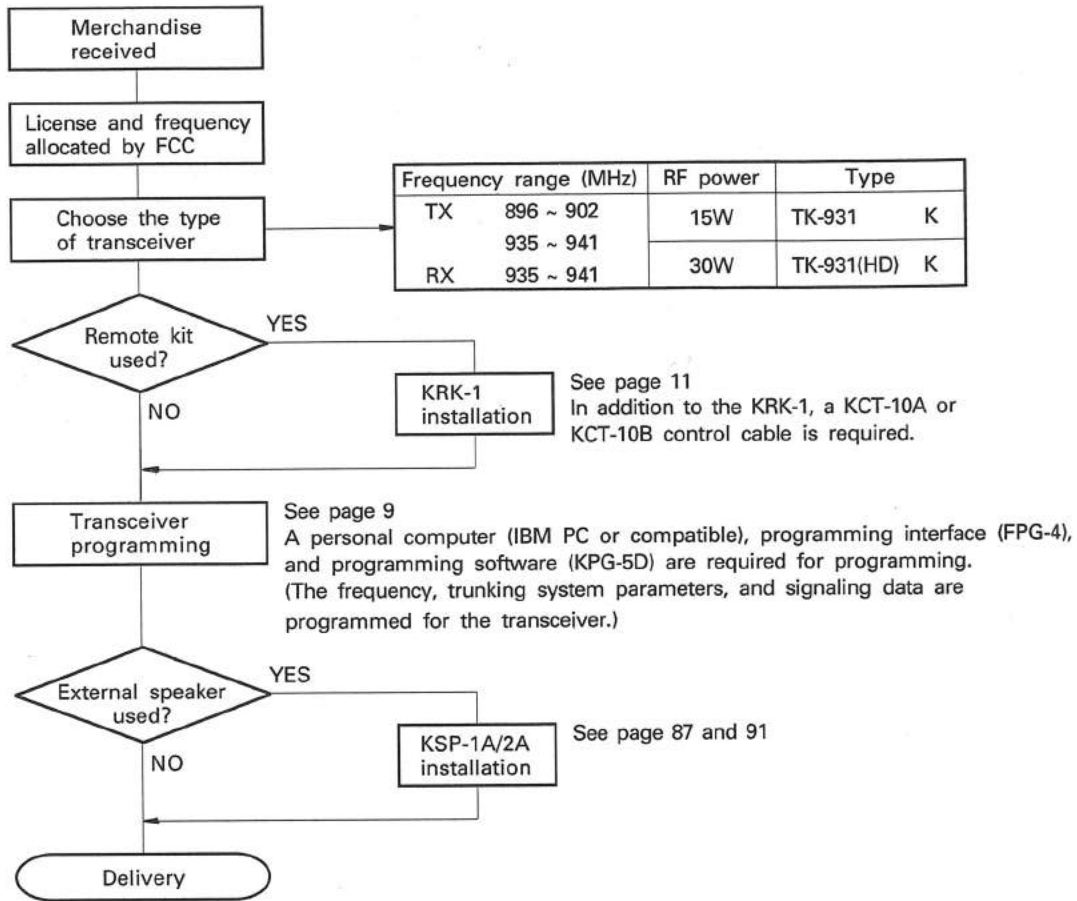
5-2. Radio location

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.

SYSTEM SET-UP



OPERATING FEATURES

1. Operating Features

1-1. Transceiver features

The TK-931 and TK-931(HD) EFJ LTR™-compatible trunked radios, are designed to operate on both trunked and conventional channels. The operating features common to both transceivers are summarized below. The features not within parentheses are common to both the TK-931 and the TK-931(HD).

- Any combination of ten (six for the TK-931) trunked and/or conventional systems programmable.
- Up to ten (four for the TK-931) groups are programmable in each system.
- Eight-digit alphanumeric characters are programmable for each group (TK-931(HD) only).
- System scan can be selected with the SCAN switch on the front panel.
- The SCAN switch can be disabled by programming.
- Either system scan lockout, horn alert, or the AUX switch can be programmed with the "A" switch on the front panel.
- Either LAST CALL REVERT or LAST USE REVERT can be selected for the off-hook revert during scanning by programming.
- Interval scan can be selected.
- Programmable call indicator, programmable horn alert, and programmable time-out timer are provided.
- A convenient switchable test mode for TX/RX bench testing.

1-2. Trunked system features

The following features are available with systems programmed for trunked transceiver operation.

- ID codes programmable for each system
- Two fixed priority decode codes
- Ten (four for the TK-931) decode and encode codes selectable with the GROUP button (codes can be different)
- Block of up to 250 decode codes
- Programmable group scan in each system
- Programmable transmit inhibit
- Programmable revert system scan time in each system
- Free system ringback programmable with interconnect calls
- Automatic system search programmable
- Transpond programmable for each group

1-3. Conventional system features

The following features are available with systems programmed for conventional transceiver operation.

- Up to ten (four for the TK-931) channels are programmable in each system. (Channels are selected using the GROUP button.)
- QT or DQT is programmable for each transmit and receive channel.
- Transmit mode of each channel is programmable as normal, talk-around, or disable (receive-only).
- Programmable busy channel lockout provided.

2. Front Panel Controls and Indicators

2-1. Front panel controls

All the switches on the front panel are momentary-type push buttons. The functions of these switches are explained below.

- **POWER switch**

Transceiver POWER switch. When the power is switched off, all the parameters, such as the volume level, system, and group, are stored in the memory. When the power is switched on again, the system returns to the previous conditions.

- **VOLUME switch**

When the upper part of the VOLUME switch is pressed, the volume increases one level at a time. When the lower part of the VOLUME switch is pressed, the volume decreases one level at a time. When the switch is held down, the volume level changes continuously. When the volume reaches the maximum or minimum level, it does not change, even if the switch is pressed. When the switch is pressed while awaiting reception, a volume set tone automatically sounds. This tone stops about 0.5 second after the switch is released.

- **SYSTEM switch**

When the upper part of the system switch is pressed, the system number is incremented. When the lower part is pressed, the number is decremented. Pressing the switch once changes the number by one. Holding it down rolls through the numbers cyclically, non-programmed systems being skipped.

- **GROUP switch**

This switch is operated in the same way as the SYSTEM switch. When the system number is changed, the GROUP indicator shows the original group number (the last selected group number in each system). The group to be set may differ by system.

OPERATING FEATURES

- **SCAN switch**

Each time this switch is pressed, the system scan function is toggled on and off.

- **A (Auxiliary) switch**

Each time this switch is pressed, the auxiliary functions, such as horn alert scan lockout, or manual relay are toggled on and off.

2-2. Front panel displays and indicators

All the indicators on the front panel are shown in the LCD.

- **System display**

Shows the selected system number (0-9) (1-6 for the TK-931)-0 indicates system 10. Only the programmed systems are displayed. The system display is positioned above the SYSTEM switch.

- **Group display**

Shows the selected group number (0-9) (1-4 for the TK-931)-0 indicates group 10. Only the programmed groups are displayed. The group display is positioned above the GROUP switch.

- **SCAN indicator**

The (S) mark on the left of the system display goes on in the system scan mode.

- **Delete (▶) indicator**

When a system deleted from system scan is selected, the mark (▶) on the left of the system display goes on.

- **TX indicator**

The TX indicator goes on during transmission.

- **BUSY indicator**

The BUSY indicator goes on if the PTT switch is pressed when the trunked system is busy or while a TX inhibit ID is being received.

- **CALL Indicator**

The CALL indicator can be programmed so that it goes on when a specified call is received. This indicator goes off when any front panel key or the microphone PTT switch is pressed.

- **A (Auxiliary) indicator**

The A (Auxiliary) indicator goes on when the A switch is programmed for horn alert or manual relay and either function is selected by pressing the A switch.

- **Alphanumeric display [TK-931(HD) only]**

Up to 100 8-digit alphanumeric displays can be programmed (10 systems of 10 groups maximum).

3. Details of Features

3-1. System scan

System scan can be selected with the front panel SCAN button by programming the scan feature. Scanning occurs only if the microphone is on-hook (Except for interval scan). Scanning starts from the system following the currently displayed system. When scanning, a dash (-) is indicated on both the SYSTEM and GROUP displays. When a call is received, scanning stops, and the system and group are displayed. (TK-931(HD) : Alphanumerics are also displayed.)

There is a three-second delay (scan resume time) before scanning resumes after a call is received. The revert system or group can be changed while scanning simply by pressing the GROUP or SYSTEM button. Scanning resumes one second after the button is released.

If the scan feature is not programmed, the SCAN button on the front panel is ineffective.

3-2. System lockout

The system lockout feature is used to lock systems out of the scan sequence, system lockout can be selected by programming in the following two ways :

- **Fixed lockout**

The fixed lockout feature is selected by programming, and the system to be locked out is selected by programming. When a locked system is selected, Delete (▶) appears on the left of the SYSTEM display.

- **User selectable lockout**

If the A (Auxiliary) button is programmed for the scan lockout feature, systems can be locked out of the scan sequence. To lock a system out of the scan sequence, press the A button when the system is displayed. Delete (▶) is displayed on the left of the SYSTEM display. To unlock a system, select the system and press the A button. Delete (▶) disappears to indicate that the system has been returned to the scan sequence. It is possible to lock all programmed systems out with the A button. If you attempt to lock out all programmed systems, a warning tone sounds.

If the A button is programmed for horn alert or an auxiliary function, the user-selectable system scan lockout feature is not available. Fixed lockout can, however, still be programmed.

OPERATING FEATURES

3-3. Off-hook revert (System/Group Revert)

Either LAST CALL REVERT or LAST USE REVERT can be programmed for the system/group off-hook revert condition during system scan. With LAST CALL REVERT, the system/group changes to the revert system/group when a call is received. With LAST USE REVERT, the system/group reverts to the system/group selected with the SYSTEM/GROUP buttons.

3-4. Interval scan

This function resumes scanning automatically after a preprogrammed time elapses when the microphone is off-hook. The time from off-hook to scan restart can be set to 4, 8, or 16 seconds.

3-5. Call indicator

The call indicator can be programmed for each group. In trunked systems, it can be set to respond to each of the selectable decode ID's and/or one or both of the fixed ID's, except block IDs. When a call is received with a selectable decode ID, the call indicator flashes. When a call is received with a fixed ID, the call indicator lights continuously. The call indicator is reset by pressing any front-panel button, PTT, or the microphone is placed ON-HOOK.

In a conventional system, the call indicator can be programmed to light for each QT or DQT code. It keeps flashing while a call is being received, and goes off when the call is terminated.

3-6. Horn alert

As with the call indicator, the same group ID codes can be programmed to enable the horn alert feature.

The same type of decode or fixed IDs or channels that can be programmed to light the call indicator can also be programmed to enable the horn alert. When the correct ID code or channel is received, the horn alert output pulses on for half a second and off for half a second for three cycles. When the fixed ID of the trunked system is set and that ID code is received, the horn alert output pulses on for one second and off for half a second for two cycles.

The A button can be programmed to enable and disable the horn alert function.

In a conventional system, a QT or DQT code can also be programmed to enable the horn alert. When the correct ID code is received, the horn alert output pulses on for half a second and off for half a second for three cycles.

3-7. Time-out timer

The time-out timer can be programmed in half minute increments from half a minute to five minutes for dispatch operation, and in one-minute increments from one to ten minutes for interconnected telephone op-

eration. If the transmitter is keyed continuously for longer than the programmed time, it is disabled and a warning tone sounds for as long as the PTT button is held down.

3-8. Priority ID codes

The priority of the programmable decode ID codes is as follows :

1. Fixed ID code 1
2. Fixed ID code 2
3. Selected ID code
4. Other selectable ID codes
5. Block decode codes

3-9. Group scan operation

Group scan can be programmed for each system. If the system is not programmed for group scan, only the selected ID codes, fixed ID codes, and block ID codes are decoded, regardless of whether the microphone is on- or off-hook; the other selectable ID codes are not decoded. The GROUP display indicates only the selected group. It does not change even if the fixed ID code is decoded.

If the system is programmed for group scan and the microphone is on-hook, all the selectable ID codes are decoded regardless of which group is selected. If the microphone is off-hook, only the selected group ID is decoded. The selected, fixed and block IDs are always decoded, regardless of whether the microphone is on- or off-hook.

Group scan programming	ID codes decoded			
	Fixed	Selected	Selectable	Block
NO	○	○	X	○
YES	○	○	○	○
YES	○	○	X	○
Group scan programming	MIC-hook condition	Group display		
NO	ON/OFF	Selected only		
YES	ON	Selectable decoded		
YES	OFF	Selected		

○ : Decoded
X : Not decoded

If, during group scanning, a call is received with one of the selectable group IDs, the display automatically changes to the group ID that the call came in with. That group then becomes the new selected group. If a call is received with one of the fixed ID codes during group scanning, the selected group changes to Group 1 if the first fixed ID is the same as the ID of the selected group 1, and to Group 2 if the second fixed ID is the same as the ID of the selected group 2. If it is different, the revert group is displayed. If a block ID is decoded with the microphone off-hook, the display continues to indicate the selected group.

OPERATING FEATURES

3-10. Transmit inhibit

The transceiver can be programmed with a transmit inhibit block of ID codes. If an ID code within this block is decoded up to five seconds before the PTT button is pressed, transmission is inhibited. The BUSY indicator lights and a busy tone sounds until the PTT button is released.

3-11. Revert system scan time

If there is no carrier on the home repeater of a programmed trunked system, the system is scanned for approximately 50 milliseconds. If there is a carrier, three data messages are monitored, this taking approximately 500 milliseconds. To increase the scanning time on a revert system, it can be increased in multiples of three data messages per line up to eight lines. If the repeater data message indicates that no mobiles on the revert system are being trunked out to other repeaters, data monitoring is terminated and the home repeater of the next system is scanned.

3-12. Free system ringback

This feature is available only when a telephone interconnect ID code is selected. If a busy tone sounds when the PTT button is pressed, the transceiver enters this mode automatically. When the PTT button is released, a beep sounds to indicate that the mode has been entered. When any repeater becomes available, a ringing tone sounds. System scan is automatically terminated when the mode is entered. The mode is terminated when the system, group, scan, A (AUX) button or PTT button is pressed.

3-13. System search

This feature can be programmed to automatically access other programmed systems when the selected system cannot be accessed. If an intercept tone sounds when the PTT button is pressed after setting the mode, the transceiver has entered the mode. System scan is automatically terminated at this point. If the group ID is a telephone interconnect ID, the transceiver then attempts to access, in succession, other systems that have a telephone interconnect ID in the revert group location. If the group ID is a dispatch ID, the transceiver attempts to access other systems that have a dispatch ID programmed in the revert group location. If there is no system to be accessed, an intercept tone sounds, the mode is terminated, and the transceiver returns to the first system. If the access is successful, the mode is terminated, and the searched system becomes the new selected system.

3-14. Transpond

Selectable IDs can be programmed for transpond. If an ID code programmed for transpond is decoded, the transceiver waits until the data message ends. It then automatically transmits two data messages (the second message containing the turn-off code). If fixed codes are decoded, the transceiver checks whether the first fixed ID matches the ID of the selected group 1 and the second fixed ID, the ID of the selected group 2. If the IDs are the same and are programmed for transpond, the transceiver transponds.

3-15. Conventional channel

A system set as a conventional system can be programmed with up to ten (four for the TK-931) channels, which are selected with the GROUP button. This permits up to 100 (24 for the TK-931) channels to be programmed with this transceiver. Each receive and transmit channel can be programmed with QT (Quiet-Talk), DQT (Digital Quiet-Talk) or carrier squelch. There is also a squelch tail eliminator (reverse burst or turn-off code) for transmission when signalling is set. It is monitored with the transceiver off-hook during receive. Each channel can be programmed as normal (TX/RX), talk-around, or inhibit (receive-only).

3-16. Scanning conventional system

When scanning conventional systems, only their revert channels are scanned. If QT or DQT is set for a channel, it is decoded during the system scan.

3-17. Busy channel lockout

When the system is set as a conventional system, the busy channel lockout can be programmed for each system. When a system is locked out by pressing the PTT button, a warning tone sounds and transmission cannot take place until the PTT button is released.

3-18. Automatic volume setting

The volume can be adjusted in 32 steps using the volume up/down button. If the button is pressed when there is no signal, a busy tone is produced automatically. The minimum volume level when the power is buttoned on can be programmed. If the volume is reduced below this setting and the power switched off, the volume level is returned to the programmed setting when the power is switched on again. It is recommended that the volume level be set in the range six to nine. If the volume is increased above the programmed setting, the new setting becomes the programmed setting.

OPERATING FEATURES

3-19. Alphanumeric display [TK-931(HD) Only]

Up to 100 eight-character alphanumeric strings can be programmed for each system or group (Fig. 1). These can be used to display the system or group name.

Display →	A	B	C	D	E	F	G	H	I
Key in →	A	B	C	D	E	F	G	H	I
	J	K	L	M	N	O	P	Q	R
	J	K	L	M	N	O	P	Q	R
	S	T	U	V	W	X	Y	Z	.
	S	T	U	V	W	X	Y	Z	.
	1	2	3	4	5	6	7	8	9
	1	2	3	4	5	6	7	8	9
	0	-	+	/	=	#	*	.	;
	0	-	+	/	=	#	*	.	;
	<	□	⊞	⊞	⊞	← All on			
	(@	\$	%					

Fig. 1

3-20. Test mode

The TK-931 and TK-931(HD) transceivers have a test mode. To enter the test mode, set button SW100 on the TX-RX unit to the TEST position. When the power is buttoned on with the button set to this position, the test mode is entered. To exit the test mode, reset the button to the NORMAL position, and turn the power off and then back on again. The mode will not be changed merely by resetting the switch. The following functions are available in the test mode.

• SYSTEM button

The SYSTEM button is used to select up to eight preprogrammed test frequencies.

• GROUP button

The following modulation signals can be selected :

Group	Modulation
1	No modulation
2	QT (100Hz) tone
3	DQT (065N) code
4	Trunked format data
5	100Hz square wave

• Squelch

In the test mode, the receiver operates with carrier squelch only.

• A button

When the A button is pressed in the test mode, the transmitter enters the talk-around mode to transmit with the receive frequency, and the Auxiliary indicator lights.

• SCAN button

If the SCAN button is pressed in the test mode, the carrier squelch is defeated. If there is no signal, noise is output by the speaker and the BUSY indicator lights.

• Transmitter

The transmitter is keyed using the microphone PTT button. The modulation signal selected with the GROUP button is transmitted.

4. Transceiver Programming

4-1. Preface

The TK-931 and TK-931(HD) transceiver is programmed by using a personal computer, programming interface (KPG-4), and programming software (KPG-5D).

The programming software can be used with an IBM PC or compatible. Figure 2 shows the setup of an IBM PC for programming.

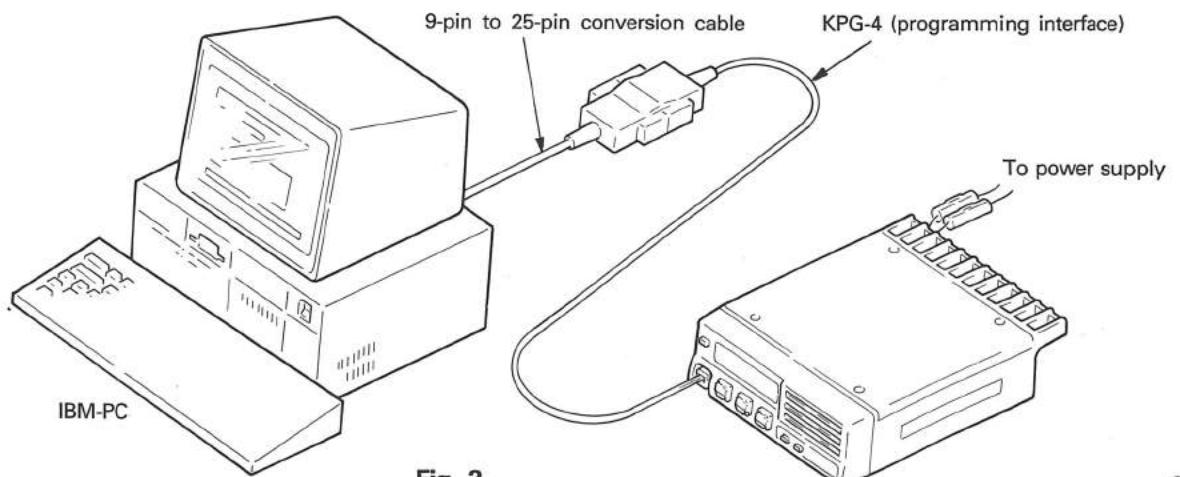


Fig. 2

TK-931/931(HD)

OPERATING FEATURES

4-2. KPG-4 description

(P.C. programming interface cable : Option)

The KPG-4 is required to interface the TK-931 and TK-931(HD) to the computer. It has a circuit in its D-subconnector (25-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-4 connects the front panel modular microphone connector of the TK-931 and TK-931(HD) to the computers RS-232C serial port.

4-3. Programming software description

The KPG-5D is the programming software for the TK-931 and TK-931(HD) supplied on a 5.25" and 3.5" floppy disk.

This software runs under MS-DOS (version 3.1 or later) on an IBM-PC/XT, AT, or PS2, or compatible. Data can be input to or read from the TK-931 and TK-931(HD) and edited on the screen, and programmed data can be printed.

4-4. Program mode

Data can be programmed into the EEPROM in RS-232C format via the microphone connector. To set the transceiver in this mode, hold down the A (Auxiliary) switch, switch the power on, wait for at least 1 second, then release the A switch.

The system and group display show a dash (-). The TK-931(HD) indicates "PROGRAM" on the alphanumeric display. In this mode, the microphone PTT and HOOK lines operate as TXD and RXD data lines respectively.

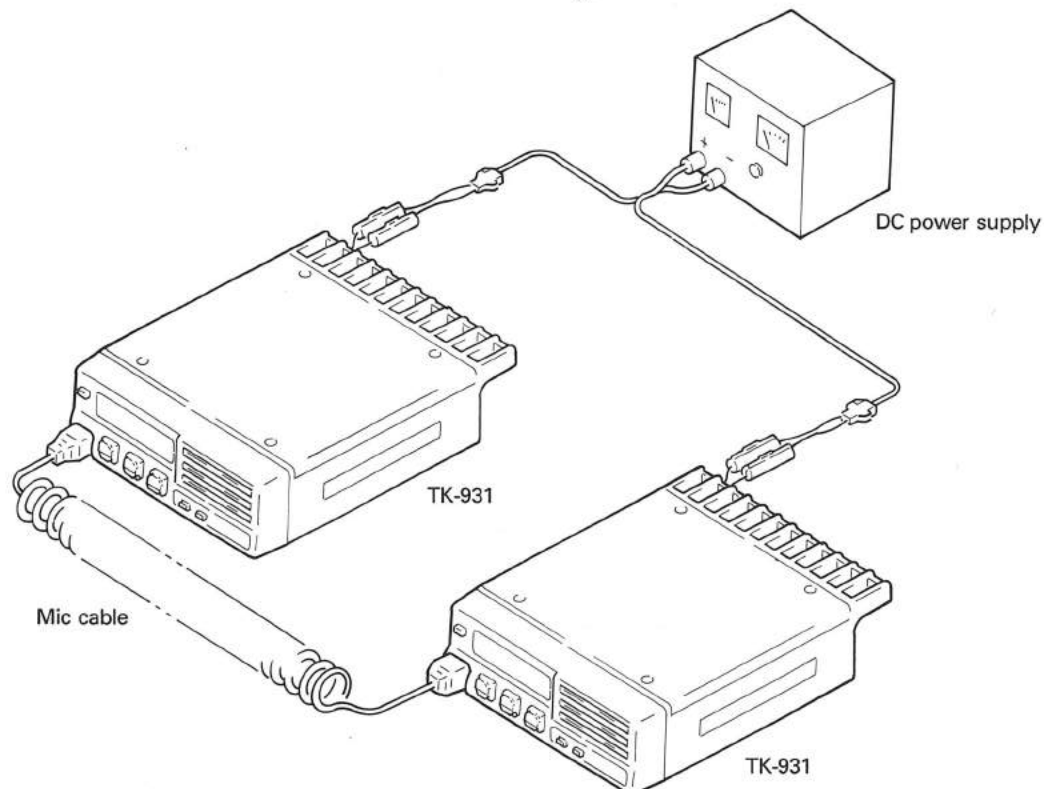
4-5. Clone mode

Programming data can be transferred from one radio to another by connecting them at their microphone connectors. (The two radios must be of the same model to use this function.) The operation is as follows (the transmit radio is the master and the receive radio is a slave) :

1. Power both radio sets.
2. Connect the microphone cable to the microphone connectors of the master and slave sets.
3. Set the master set in the programming mode, then press the GROUP UP switch. The A (Auxiliary) indicator goes on to indicate that the master set is in the clone mode. For the TK-931(HD), "CLONE" is displayed on the alphanumeric display.
4. Set the slave set in the programming mode.
5. Press the SCAN switch on the master set. Data is transmitted to the slave set and the (S) mark goes on. When data is completely cloned, the (S) mark disappears.

Note : When errors occur, the (▶) mark flashes.

6. Switch the slave set power off, disconnect the microphone cable, then switch the power on again. The slave set now operates with the same programming as the master set.
7. Any number of sets can be cloned by connecting the slave side of the microphone cable to the microphone connector of another set, setting it in the programming mode, then performing Steps 5 through 6.



INSTALLATION

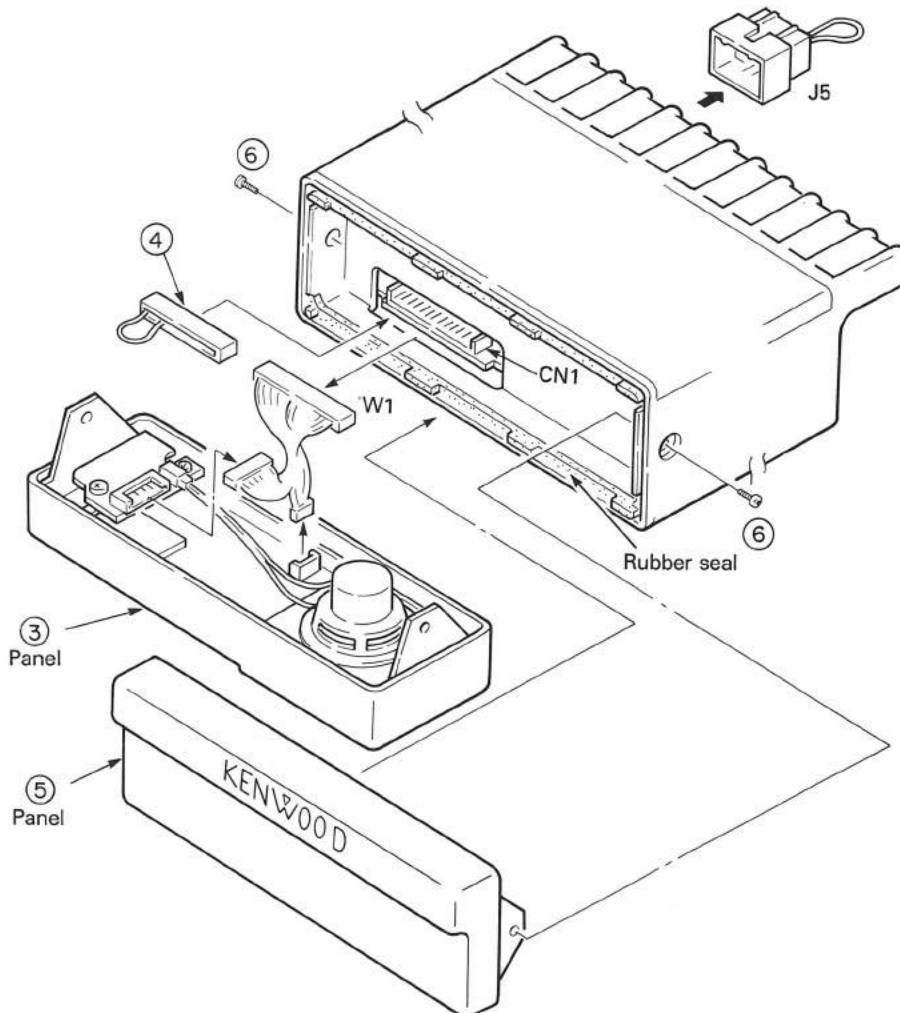
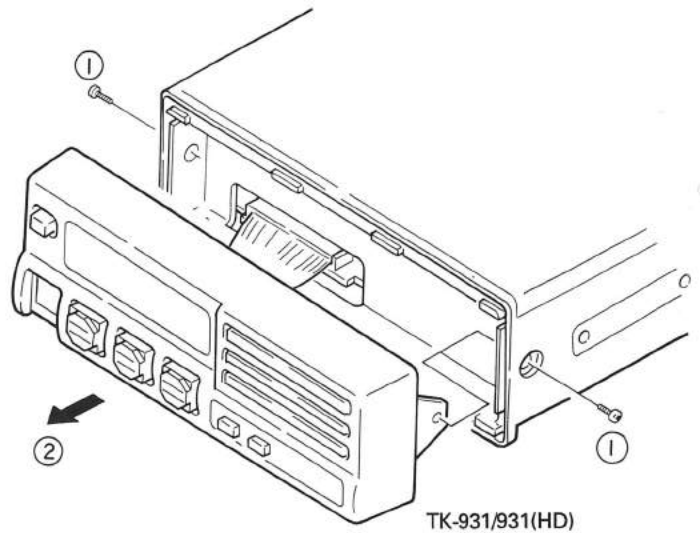
1. Installing the Remote Kit (KRK-1)

The KRK-1 is a kit for remote operation of the TK-931/931(HD). The kit contains a control head, a control head bracket, and mounting screws. The panel unit can be separated from the main unit. The kit requires optional control cable (remote cable, external speaker cable) KCT-10A (length : 6m) or KCT-10B (length : 4m).

Both the TK-931/931(HD) main unit and the control head (KRK-1) are required.

1-1. TK-931/931(HD) main unit

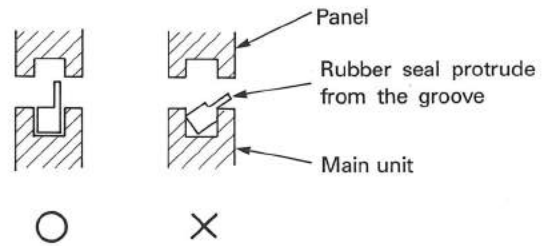
1. Remove the two screws (1) securing the panel.
2. Pull the panel (2) toward you.
3. Disconnect the the lead (W1) with connectors from the panel (3) and the main unit.
4. Disconnect the accessory connector (J5) from the rear panel.
5. Insert the jumper connector (4) supplied with the KCT-10A/10B into CN1 of the TX-RX unit.
6. Install the panel (5) removed from the KRK-1 on the main unit, and secure it with the two removed screws (6).



INSTALLATION

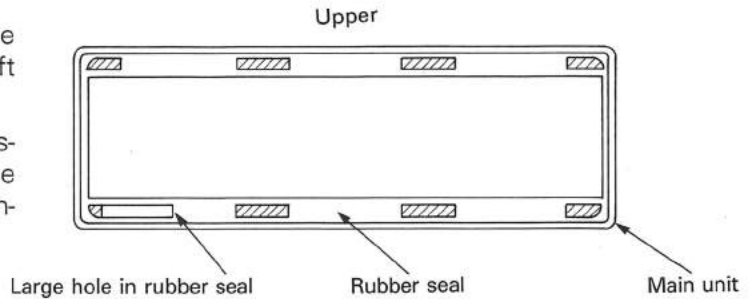
Notes :

a. When installing the panel (5) on the main unit, fit the rubber seal into the groove so that it does not protrude from the groove.



b. When fitting the rubber seal into the groove, the large hole in the seal must be at the lower left corner of the main unit.

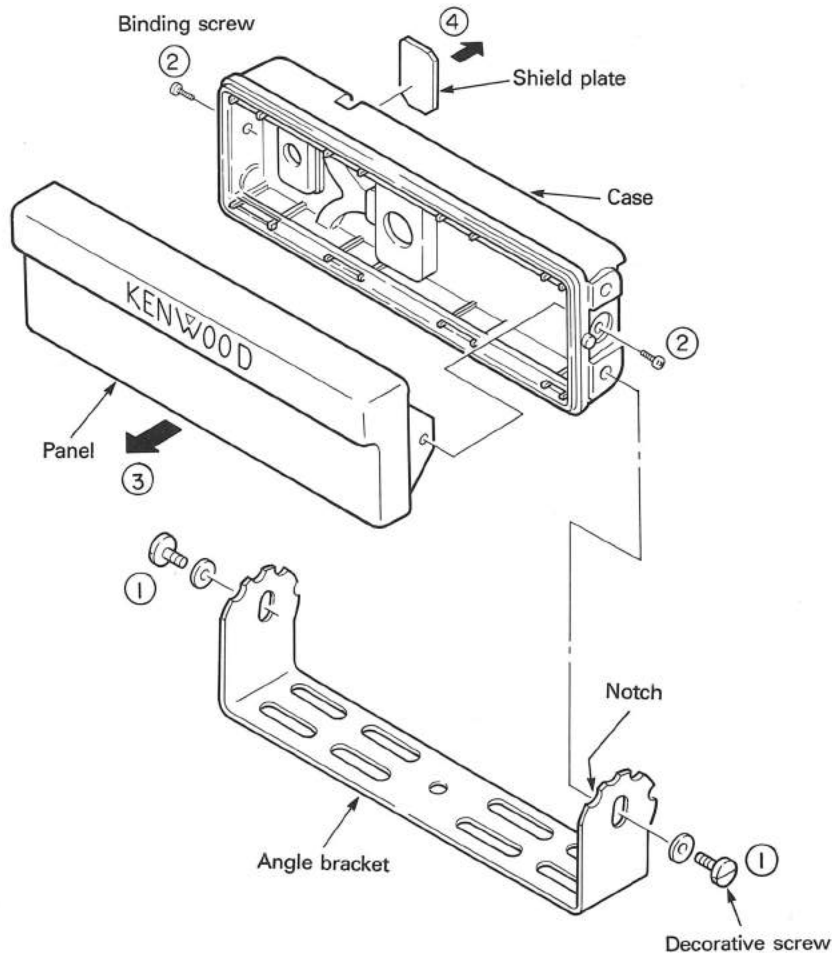
c. Keep the removed connector lead (W1) and accessory connector (J5). (They will be reused if the remote kit is removed to change back to the standard unit.)



1-2. KRK-1

1. Remove the two decorative screws (1) holding the angle bracket, then remove the bracket.
2. Remove the two screws (2) holding the control head panel, then remove the panel (3).

3. When the external speaker and the cable for the microphone hook ground are used, remove the shielding plate fixed with double-sided adhesive tape by pushing it with a bar from the back of the case (4).



INSTALLATION

4. Insert the remote cable (1) and external speaker cable (2) bushes (3) and (4) into the holes in the rear of the case, and secure them with the supplied screws and washers (5).

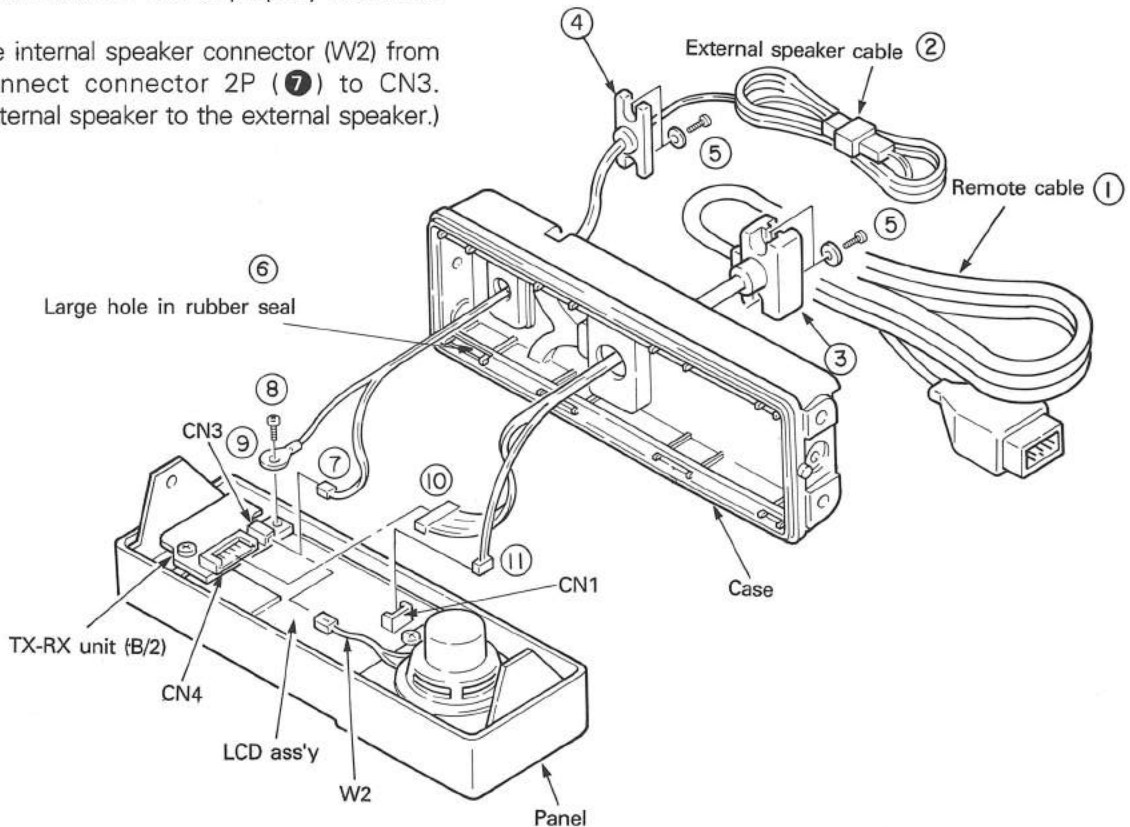
(Example : When the external speaker cable is installed)

5. Fit the rubber seal (6) around the rim of the case with the large hole at the lower left corner of the case. Make sure that the seal is properly fitted into the groove.

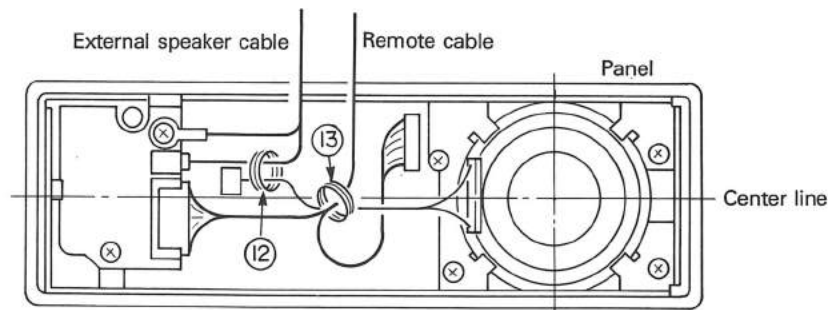
6. Disconnect the internal speaker connector (W2) from CN3, and connect connector 2P (7) to CN3. (Change the internal speaker to the external speaker.)

7. Remove the one screw (8) holding TX-RX unit B/2, pass the screw through the round terminal (9: microphone hook ground cable), and retighten the screw.

8. Insert remote cable connector 8P (10) into CN4 of TX-RX unit B/2, and insert remote cable connector 7P (11) into CN1 of the display unit.



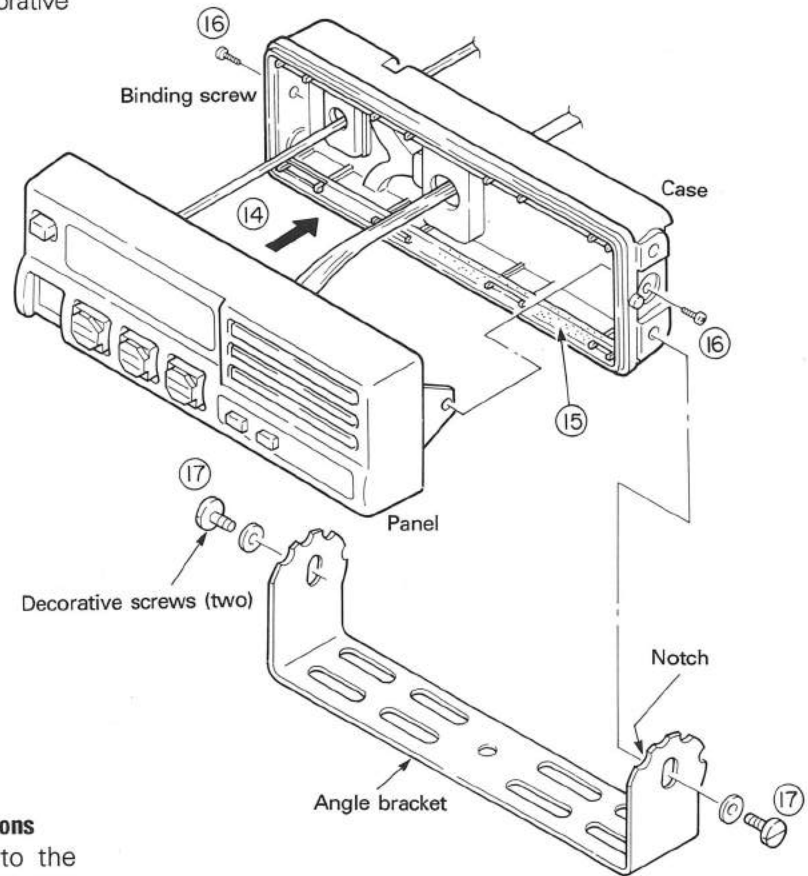
9. After inserting the connectors into the panel, secure the harness with the two supplied nylon bands (12) and (13) over the center line of the panel.



TK-931/931(HD)

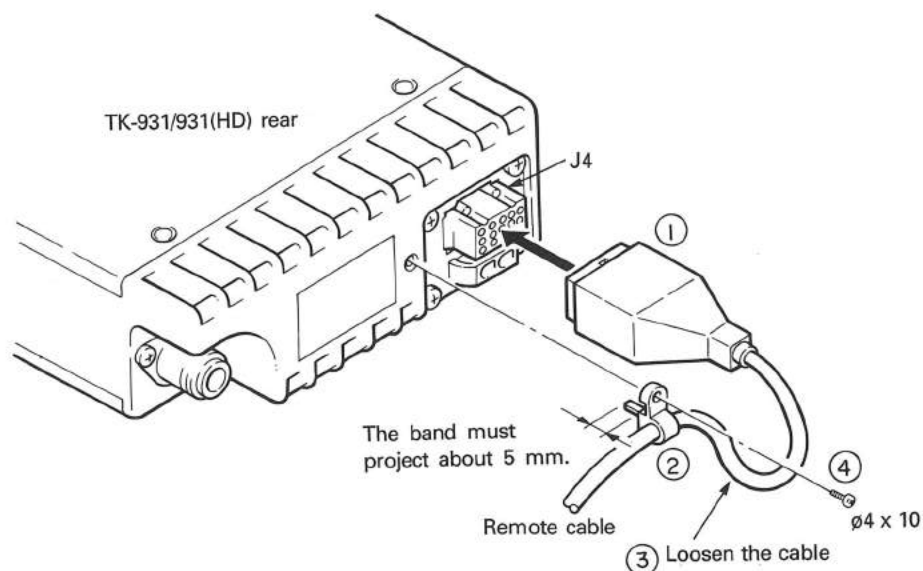
INSTALLATION

10. Mount the panel on the case (14) and secure it with two screws (16). (Be careful not to dislocate the seal (15) when mounting the panel.)
11. Secure the angle bracket with the two decorative screws (17).



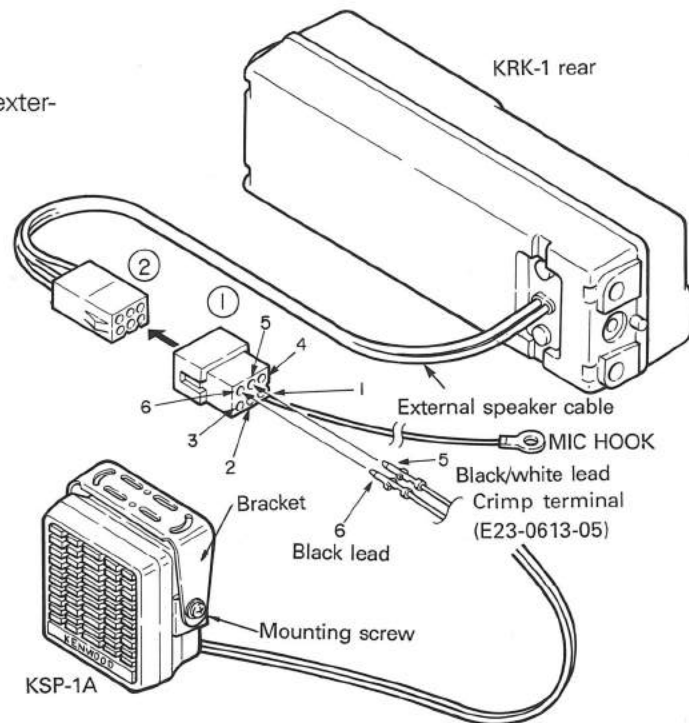
1-3. Connecting the TK-931/931(HD), KRK-1, and options

1. Insert the remote cable connector (1) into the connector (J4) on the rear panel of the TK-931/931(HD).
2. Pass the nylon band (2) around the cable. Tighten the band leaving enough room for the cable (3), and secure it with the screw (4 dia. x 10mm) (4).
- (Cut off the end of the band leaving a tail of about 5mm.)

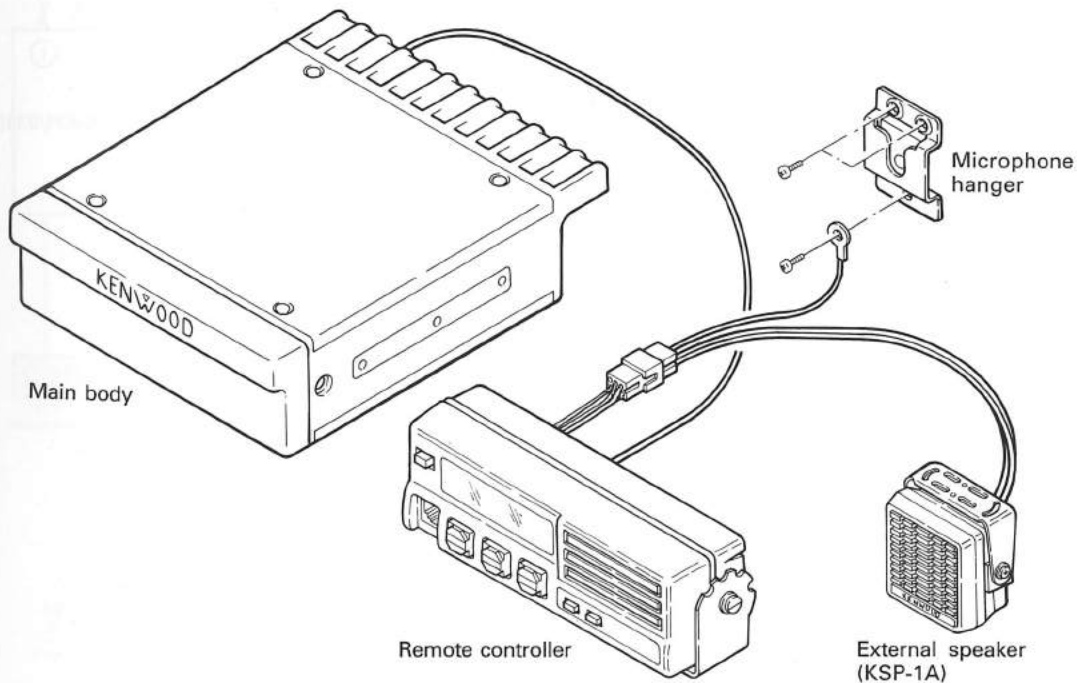


INSTALLATION

3. Connecting the external speaker (KSP-1A : option)
 Insert the KSP-1A leads into holes 6 and 5 of the external speaker plug (1).
 Hole 6 : Black lead
 Hole 5 : Black/white lead
 Insert the external speaker plug (1) into the external speaker socket (2).



4. Connection of TK-931/931(HD) remote unit

**Note :**

For details of the cabling to the power connector, see the TK-931/931(HD) Instruction Manual.

TK-931/931(HD)

DISASSEMBLY FOR REPAIR

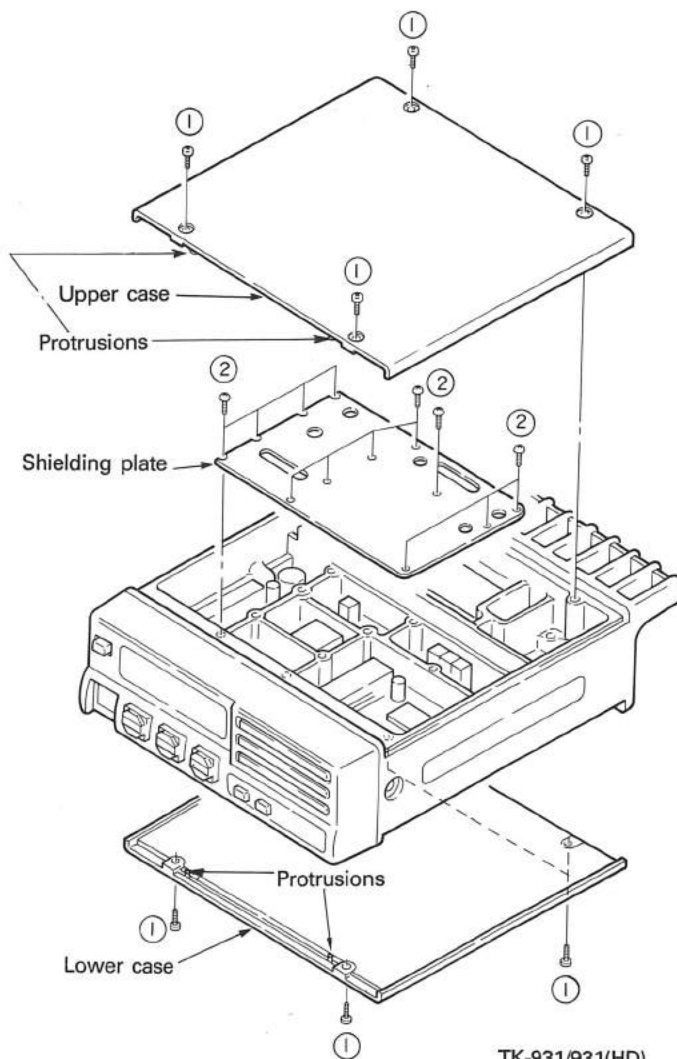
1. Removing the Case and Shield Plate

1. Remove the eight screws holding the upper and lower cases, then remove the cases (1).

Caution on TK-931/931(HD) assembly

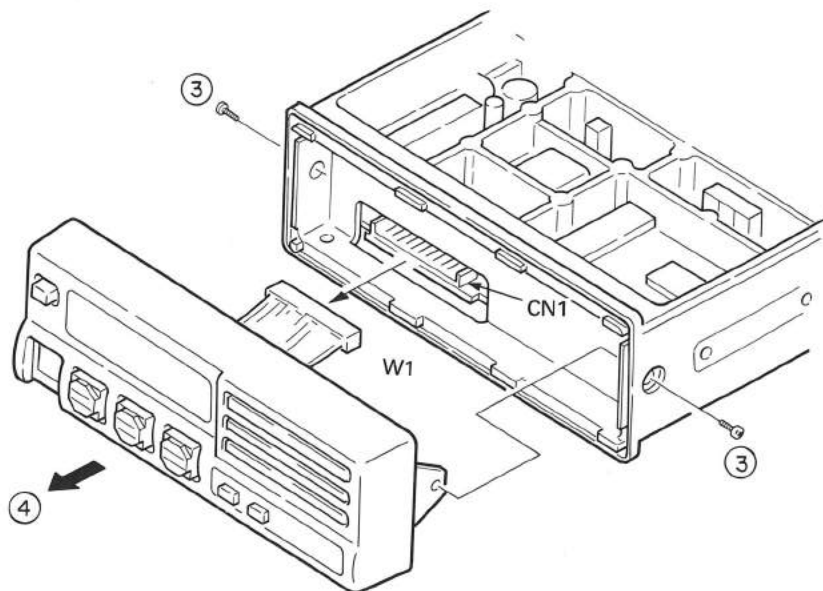
There are protrusions on the side of both the upper and lower halves of the case. Assemble with the protrusions on the front panel side.

2. Remove the 12 screws holding the shield plate to the frame, then remove the shield plate (2).



2. Removing the Front Panel

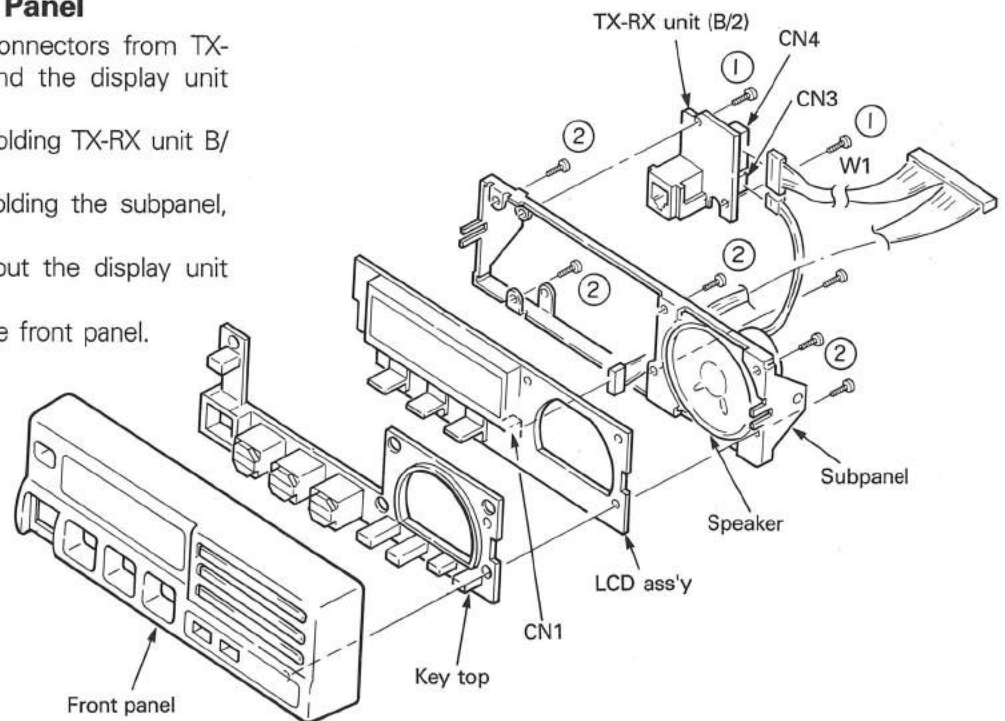
1. Remove the two screws (3) holding the front panel to the sides of the frame, and pull the front panel (4) forward slightly. Remove the connector cable (W1) from the TX-RX unit, then remove the front panel (4).



DISASSEMBLY FOR REPAIR

3. Disassembling the Front Panel

1. Remove the cable (W1) with connectors from TX-RX unit B/2 (CN3 and CN4) and the display unit (CN1).
2. Remove the two screws (1) holding TX-RX unit B/2, then remove the TX-RX unit.
3. Remove the six screws (2) holding the subpanel, then remove the subpanel.
4. Remove the speaker and pull out the display unit from the front panel.
5. Pull out the bottom tops from the front panel.



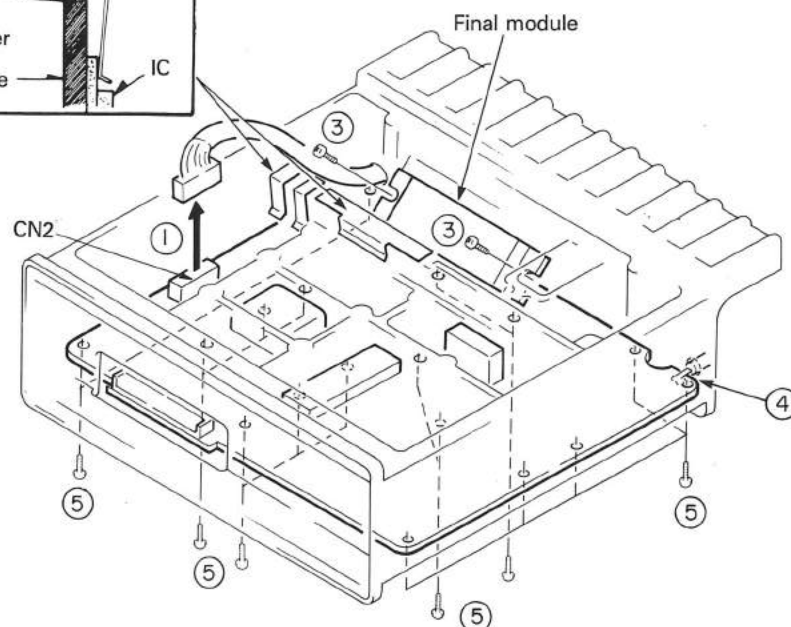
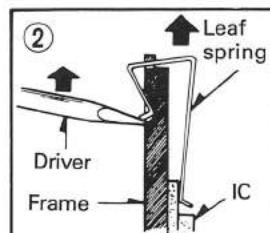
4. Removing the TX-RX Unit

1. Remove the cable connector (1) from CN2.
2. Remove the two leaf springs (2) holding the IC by pushing them up with a screwdriver.
3. Remove the two screws (3) holding the final module.

Note : To replace the final module, remove the lead soldered to the TX-RX unit.

4. Remove the metal plate (4) to which the N type socket (J2) and TX-RX unit have been soldered.
5. Remove the 16 screws (5) holding the TX-RX unit, then remove the TX-RX unit.

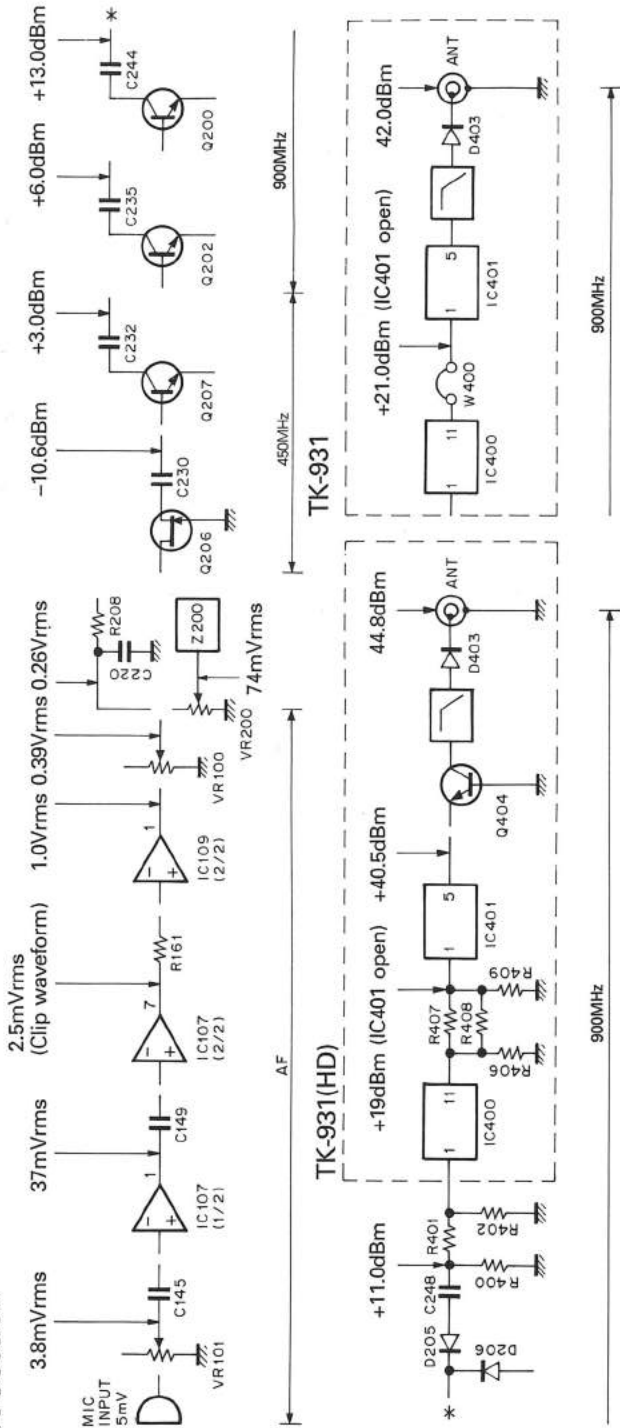
Notes : For the high power model, remove the two screws holding the final transistor. To remove the TX-RX unit completely, desolder the two leads from the power connector.



TK-931/931(HD)

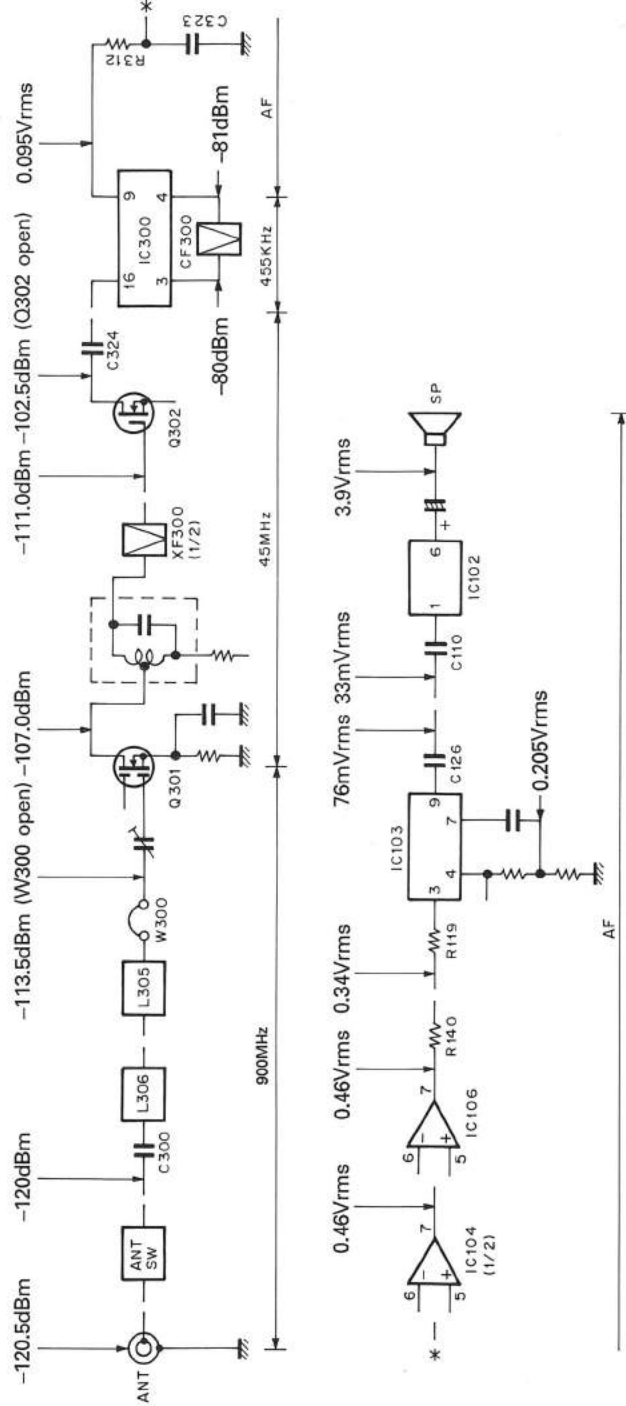
LEVEL DIAGRAM

TX Section



To make measurements in the AF section, connect the oscilloscope probes directly. In the RF section, use a 1000pF coupling capacitor.

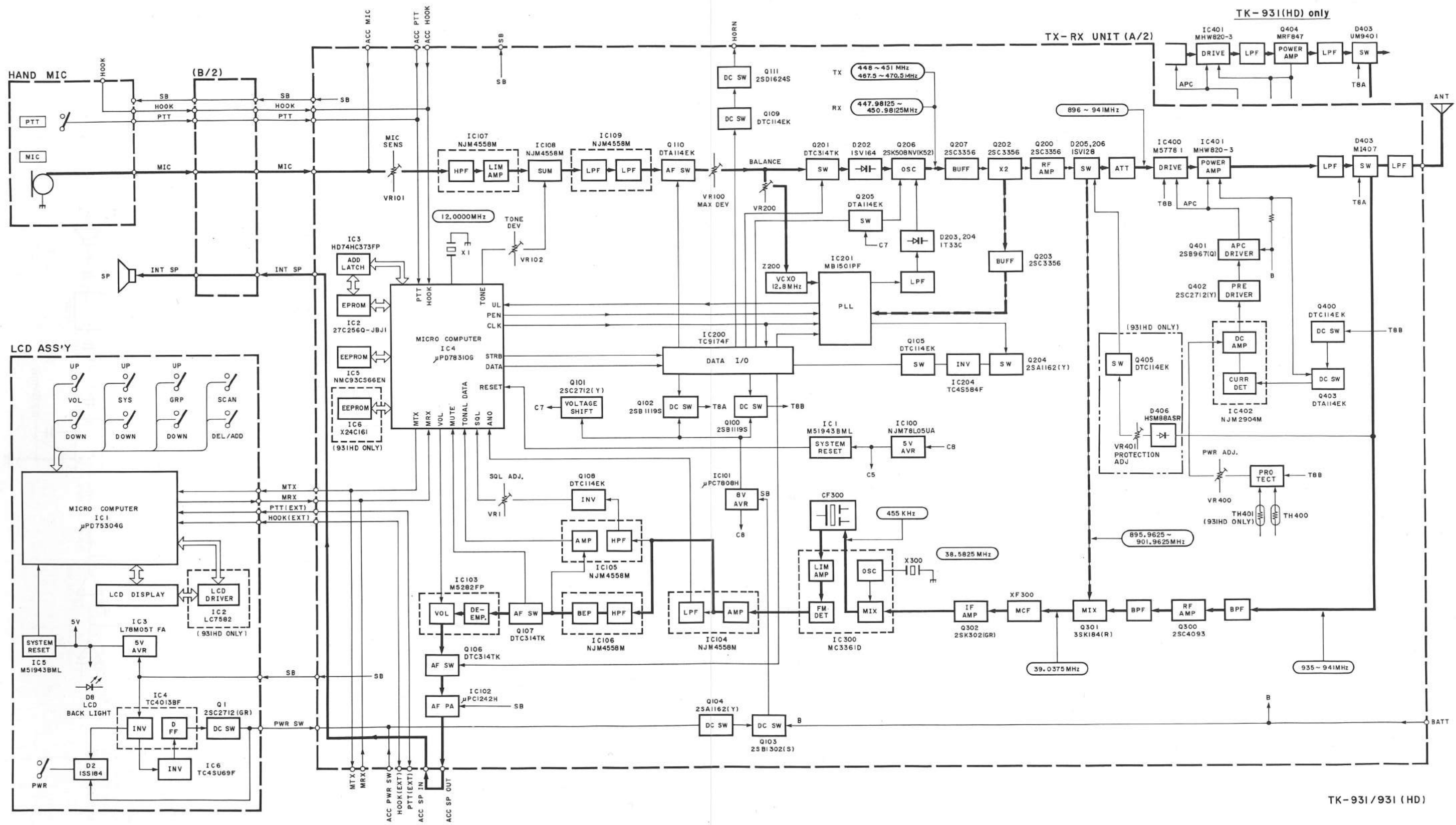
RX Section



To make measurements in the AF section, connect the oscilloscope probes directly. (ANT input: -47dBm, 1kHz FM, 1.5kHz dev.) In the RF section, use a 1000pF coupling capacitor. (The display shows the SSG input value required to obtain 12dB SINAD.)

TK-931/931(HD) TK-931/931(HD)

BLOCK DIAGRAM



1. Overview

This transceiver is compatible with FM and can be programmed in a conventional manner.

2. Circuit Components

The TK-931/931(HD) is a 100W channel step transmitter.

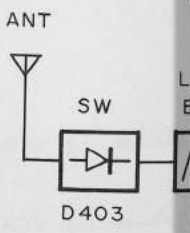
3. Receiving

3-1. RF unit

An incoming signal is applied to the antenna and passes through a protection diode. The resulting signal is mixed with the frequency (39.0375MHz).

3-2. IF unit

The first IF signal is produced by a monolithic crystal. The signal is amplified and goes to the second IF system IC.



CIRCUIT DESCRIPTION

1. Overview

This transceiver is an 900-MHz band EFJ LTR™ - compatible FM transceiver for commercial use that can be programmed to operate on both trunked and conventional channels.

2. Circuit Configuration by Frequency

The TK-931/TK-931(HD) incorporates a PLL synthesizer that works with a digital VFO and allows a 12.5kHz channel step to be selected.

The receiver is a double-conversion superheterodyne one with a first intermediate frequency (IF) of 39.0375MHz and a second IF of 455kHz. Incoming signals from the antenna are mixed with the PLL output to produce the first IF, and this is mixed with the 38.5825MHz second local oscillator output to produce the second IF.

A transmit signal of 1/2 the desired frequency is generated by the PLL VCO, amplified, frequency doubled, and fed to the antenna.

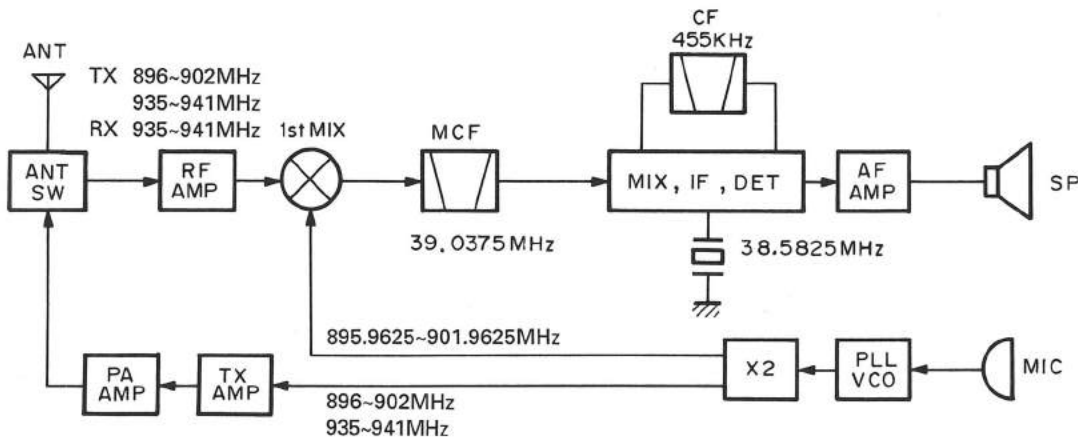


Fig. 1 Frequency configuration

3. Receiving System

3-1. RF unit

An incoming RF signal from the antenna terminal is applied to bandpass filter (L306). Pin diode D403 is turned off. The signal is amplified by RF amplifier (Q301), and passes through the bandpass filter (L305) again. The resulting signal goes to the first mixer, Q301, where it is mixed with the first local oscillator output from the frequency synthesizer to produce the first IF (39.0375MHz).

3-2. IF unit

The first IF signal then passes through a four-pole monolithic crystal filter (XF300) to limit its bandwidth. The signal is amplified by first IF amplifier Q302 and goes to the second IF unit. The second IF unit consists of IF system IC (IC300) and the second mixer, second

local oscillator, IF filter, and FM detector. IC300 mixes the signal input to it with the second local oscillator output of 39.0375MHz to produce the second IF of 455kHz. The 455kHz signal then goes through the 455kHz ceramic filter CF300, and is then amplified by the limiting amplifier, demodulated by the quadrature FM detector, and output to the receive audio amplifier.

3-3. Audio amplifier unit

The demodulated signal is amplified by IC104 (1/2), and goes through a high-pass filter consisting of IC106 (1/2), which has a 300Hz cut-off frequency. The signal then goes through the deemphasis and electronic volume control circuits in IC103, and on to power amplifier IC102, where it is amplified and output to the speaker.

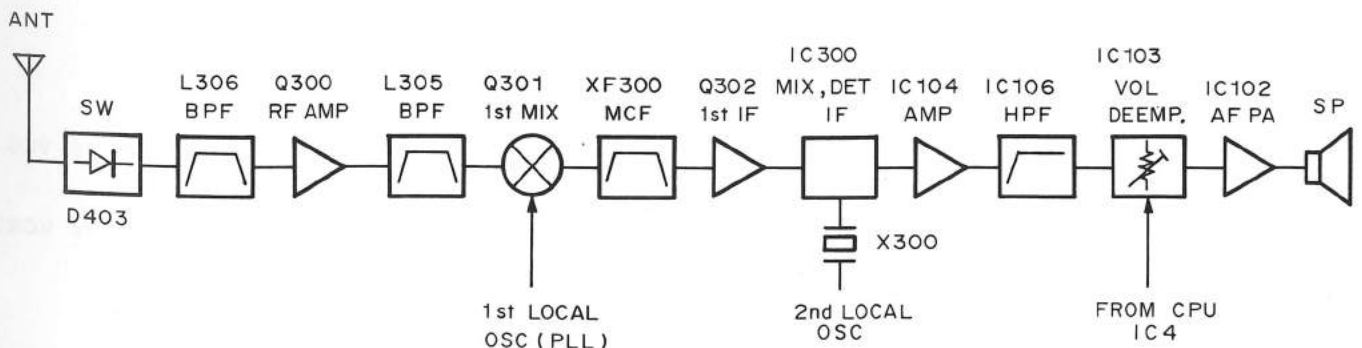


Fig. 2 Receiving system

CIRCUIT DESCRIPTION

3-4. Squelch Circuit

The receive detector output is amplified by IC104 (1/2), passes through C139, and goes to IC105 (2/2). IC105 (2/2) removes the noise component from the signal, and Q108 converts the level of the noise pulses and applies them to microprocessor (IC4) pin 20 (noise pulse pin). The microprocessor counts the pulses, performs digital integration, reads the voltage across the preset squelch semi-fixed resistor (VR1) via the analog input port (AN2), compares the voltage with the integration value, and turns the squelch on and off accordingly.

3-5. AF volume control circuit

The audio level is controlled by the DC voltage applied to pin 8 of the electronic volume IC (IC103). The voltage settings are stored in the memory of microprocessor IC4, and pulses of frequency about 23.8kHz with a duty ratio corresponding to one of the settings (32 steps) are output from the VRC pin and converted to a DC voltage by the low-pass filter consisting of R180, C161, R181, and C162.

The DC voltage is used to change the balance of the differential amplifier circuit in IC301 and change gm to attenuate.

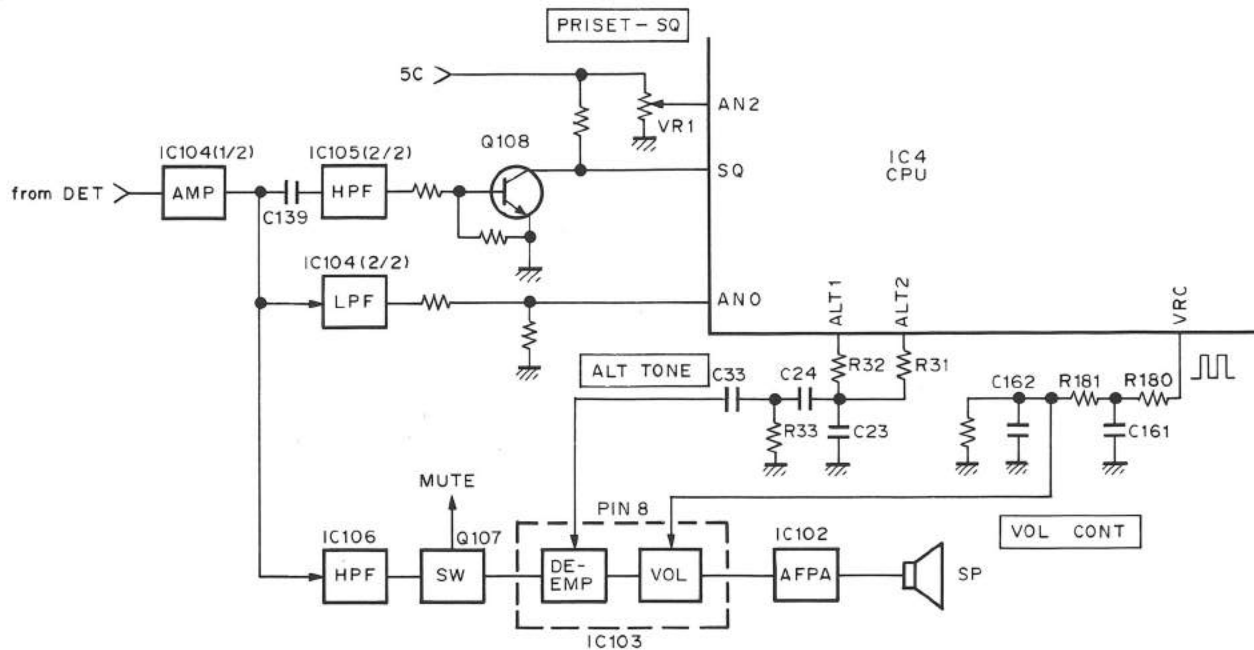


Fig. 3 Squelch and AF volume control

4. Transmitter System

4-1. Microphone amplifier

The signal from the microphone goes through the microphone gain potentiometer (VR101), and on to the high-pass filter in IC107 (1/2) and the preemphasis/limiting amplifier in IC107 (2/2). The output is mixed with the signaling encode output by IC108 (1/2), and unwanted harmonics are removed by low-pass filter IC109. The signal is switched by the AF switch (Q110), and goes to the modulation input of the PLL modulator (D202) and VCXO (Z200) in transmit mode only.

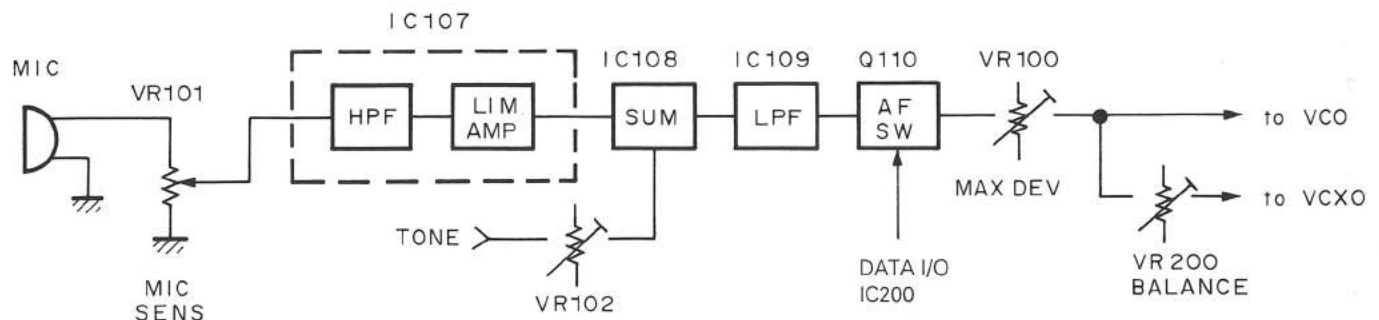


Fig. 4 Microphone amplification

CIRCUIT DESCRIPTION

4-2. Final amplifier

• TK-931

The signal from the PLL is amplified by the final module (IC400 and IC401) to an output level of 15W, and goes through the harmonic filter and antenna switch D403, and on to the antenna terminal.

• TK-931(HD)

The signal from the PLL is amplified to an output level of 30W by the final module (IC400 and IC401) and the harmonic power amplification transistor (Q404), and goes through the harmonic filter and antenna switch D403, and on to the antenna terminal.

4-3. APC circuit

• TK-931

The direct current that flows through the final module (IC401) produces a voltage across resistors R429, R430, and R431. This voltage is applied to pin 2 of IC402 (2/2), and is input as the reference voltage difference of pin 3 and amplified.

IC402 (1/2) compares the DC input of pin 6 with the reference voltage input of pin 5, amplifies it, and controls the DC amplifier (Q402 and Q401) to keep the transmit final current constant, thus keeping the transmit output constant.

• TK-931(HD)

The direct current that flows through the harmonic power transistor (Q404) and final module (IC401) produces a voltage across resistor R423. This voltage is applied to pin 2 of IC402 (2/2), and is input as the reference voltage difference of pin 3 and amplified.

IC402 (1/2) compares the DC input of pin 6 with the reference voltage input of pin 5, amplifies it, and controls the DC amplifier (Q402 and Q401) to keep the transmit final current constant, thus keeping the transmit output constant.

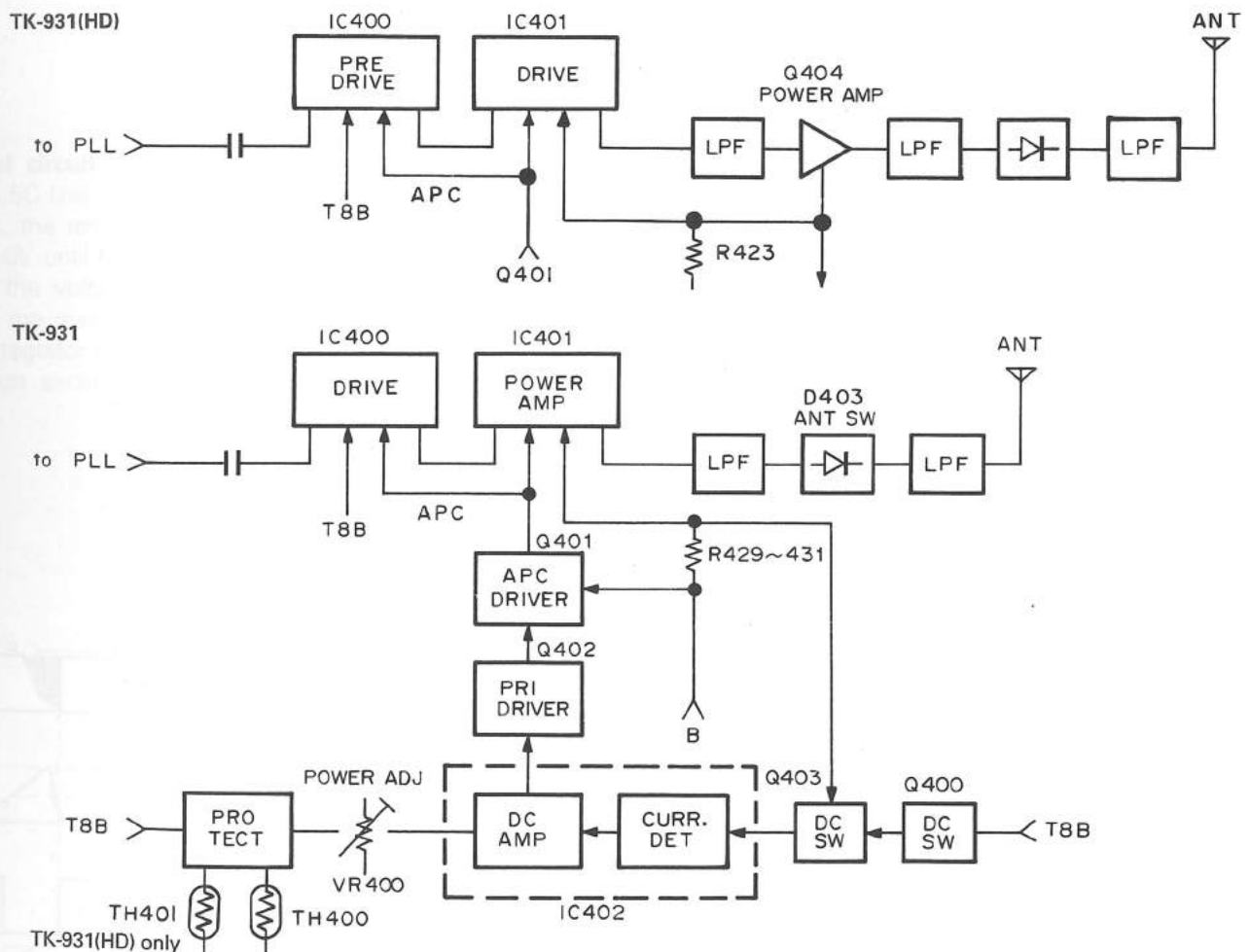


Fig. 5 Transmit power unit, APC circuit

CIRCUIT DESCRIPTION

5. Frequency Synthesizer Unit

5-1. PLL

The frequency synthesizer consists of VCXO (Z200), and a VCO circuit, PLL circuit, and peripheral circuits.

The VCXO generates 12.8MHz. The frequency stability is within $\pm 1.5\text{ppm}$ within the temperature range of -30°C to $+60^\circ\text{C}$. This output enters the PLL IC (IC201), and is divided by 1024 to produce a 12.5kHz reference signal.

The VCO output from the buffer amplifier (Q207) is doubled by Q202, amplified by buffer amplifier Q203, and sent to the PLL IC (IC201). The phase of this signal is compared with the 12.5kHz reference signal in IC201.

The output from the phase comparator goes through the charge pump and low-pass filter in IC201, and on to the varactor diodes (D203 and D204) in the VCO unit, keeping the VCO frequency constant. The other output from Q202 is amplified by the RF amplifier (Q200), and output to the transmit or receive unit via the RF switch (D205 and D206).

The VCO frequency shift circuit, comprising IC200, Q205, D200, and their peripheral circuits, operates during transmission only, when the talk-around mode has been selected. The VCO frequency is doubled to 39MHz and then the transmission frequency is increased by this amount.

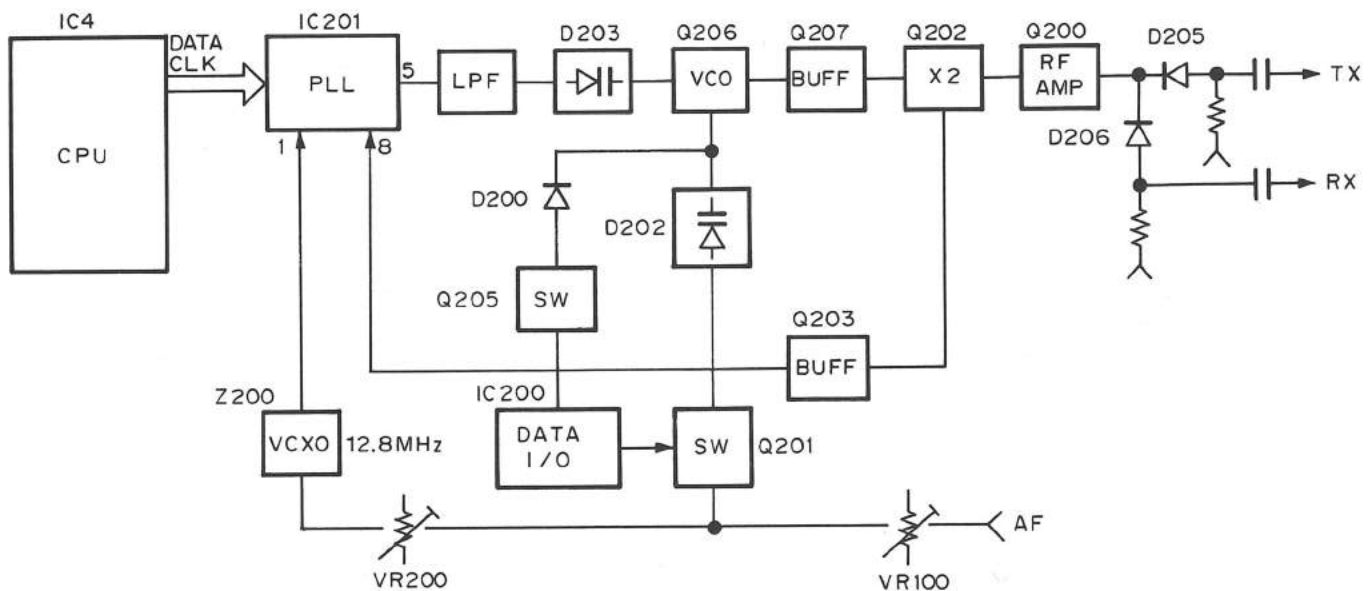


Fig. 6 PLL unit block diagram

5-2. PLL unlock

When the PLL is unlocked, the lock detect signal (LD) of IC201 is converted to a DC signal by Q204 and IC204. This signal cuts off the power line (T8B) of the transmit stage with the DC switch (Q105, Q100), stopping transmission.

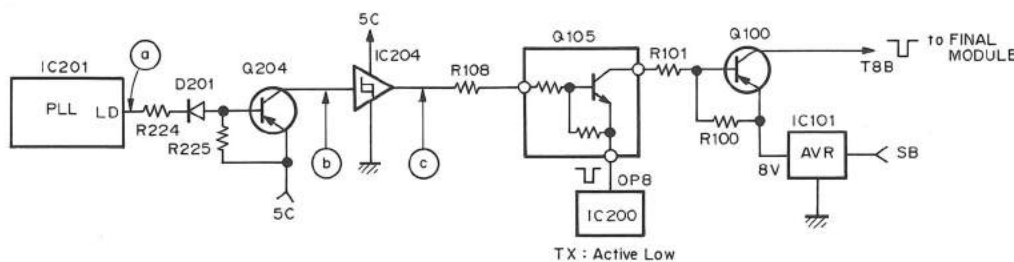
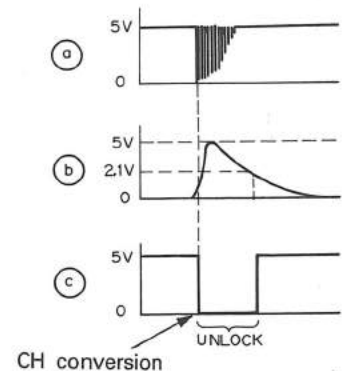


Fig. 7 PLL Unlock circuit



CIRCUIT DESCRIPTION

6. Control Unit

The control unit consists of microprocessor IC4 and its peripheral circuits. It controls the TX and RX units and transfers data to and from the display assembly.

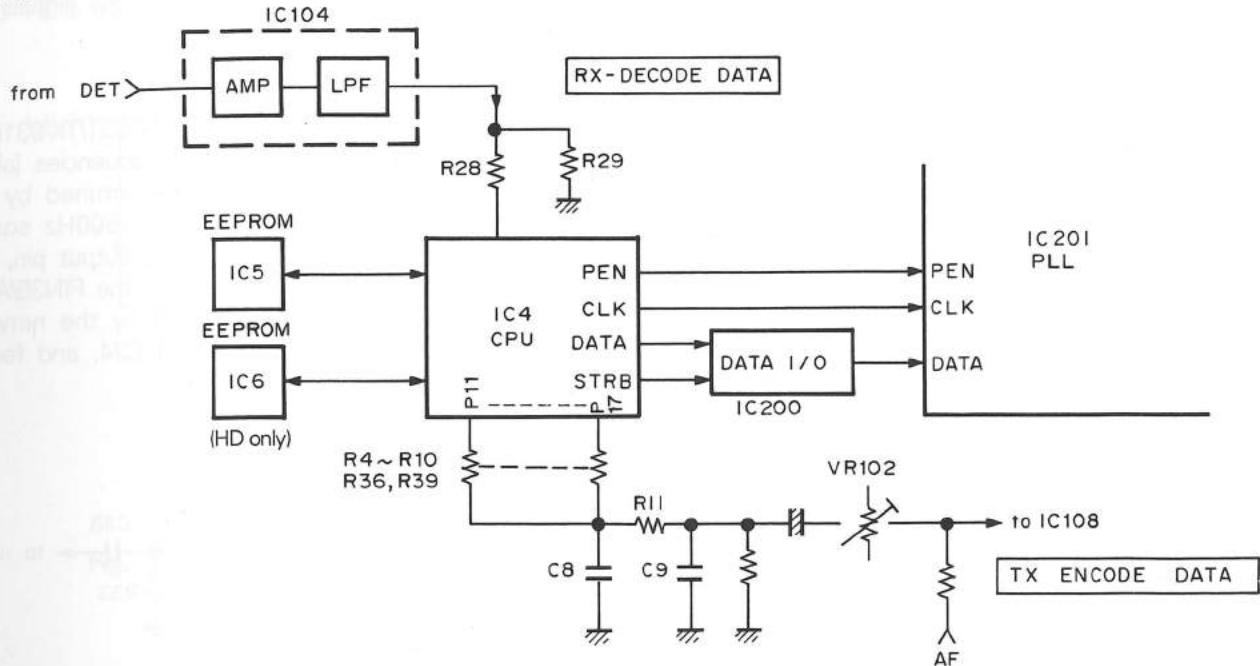


Fig. 8 Control unit block diagram

6-1. Reset circuit

As the 5C line voltage (5V) rises when the power is turned on, the reset system IC (IC1) keeps the output (pin 3) at 0V until the input voltage exceeds 4.2V.

When the voltage exceeds 4.2V, the output goes high, and the reset voltage is applied to the CPU (IC4) via the integrator consisting of R1, R2, and C1. When this voltage exceeds 3.8V, the CPU is initialized and starts up.

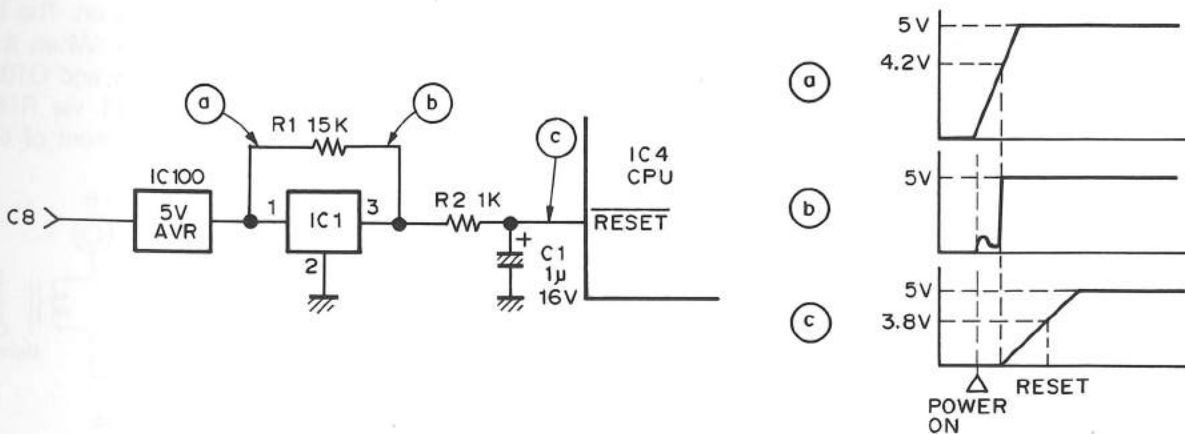


Fig. 9 Reset circuit

TK-931/931(HD)

CIRCUIT DESCRIPTION

6-2. Memory circuit

IC2 is an EPROM with a capacity of 32K x 8 bits, in which the transceiver control program is stored as part of the CPU (IC4). Data such as transceiver channels and operating features are programmed in the EEPROM consisting of IC5 and IC6 (TK-931(HD) only).

6-3. TX encode data

The CPU (IC4) transmits QT, DQT, and trunking format encode data selected by the program to the output pins (P11 to P17) in binary during transmission. This output is D/A-converted by the resistor network consisting of R4 to R10, R36, and R39, and the resulting signal then passes through the low-pass filter consisting of C8, C9, and R11 to remove unwanted components. It is then mixed with the audio signal and output to the modulation circuit by IC108 (1/2). The modulation level of the encode data can be adjusted to an appropriate value by VR102.

6-4. RX decode data

The receive detection signal is amplified by IC104 (1/2), and goes through low-pass filter IC106 (1/2), which has a 200Hz cut-off frequency, where audio components are removed. The signal is then divided by R28 and R29, and fed to the analog input port (AN0) of the CPU (IC4).

The CPU converts this signal from analog to digital, performs processing corresponding to QT, DQT, or trunking format using the low-pass filter and DC restoration circuit, and decodes the signal.

6-5. I/O expander

IC200 is an interface IC for I/O port expansion. It is used to expand the output ports of the microprocessor (IC4). Data for each port is transferred serially from the DATA (P04), CLOCK (P05), and STB (P06) pins to IC200.

6-6. PLL data output

PLL data is output from the DATA (P04), CLOCK (P05), and PLL ENABLE (P07) pins of the CPU (IC4) when the channel is changed or when transmission is changed to reception or vice versa. These signals are input to the PLL IC (IC201).

6-7. Tone generator

The beeps and tones used by the TK-931/TK-931(HD) are generated and mixed, and their frequencies (about 700Hz, 900Hz, and 1500Hz) are determined by the microprocessor (IC4). The 700Hz or 1500Hz square wave is output from the PIN33/ALT2 output pin, and the 900Hz square wave is output from the PIN33/ALT1 output pin. The signals are rectified by the network consisting of R31 to R33, C23, and C24, and fed to IC103 via C33.

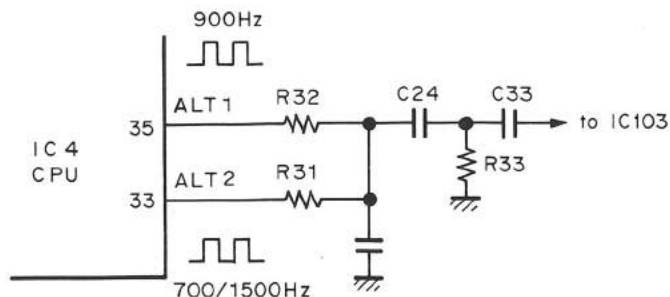


Fig. 10 Tone generator circuit

6-8. Horn control (Q109, Q111)

The horn switch, consisting of Q109 and Q111, controls the horn relay supplied by the dealer to provide the external horn alert function. Normally, the OP5 pin of IC200 is high and Q109 is on. The base of Q111 is at about 0V and Q111 is off. When the horn alert is enabled, the OP5 pin goes low and Q109 turns off. The base current flows to Q111 via R168 and Q111 turns on. The maximum sink current of Q111 is 800mA.

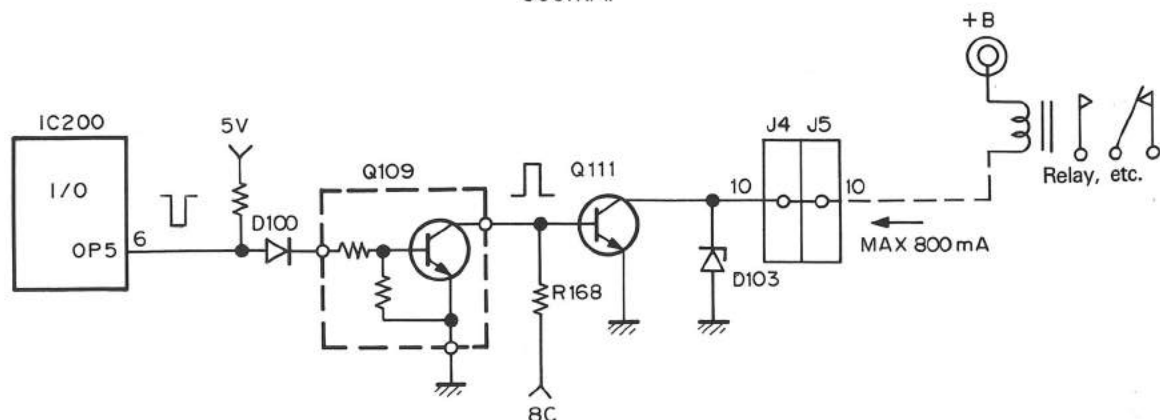


Fig. 11 Horn control circuit

CIRCUIT DESCRIPTION

6-9. Power switch circuit (semiconductor switch)

The power switch consists of Q103, Q104, and its peripheral circuits. When pin 1 of CN1 connected to the LCD assembly goes low, Q104 and Q103 turn on and +B is supplied.

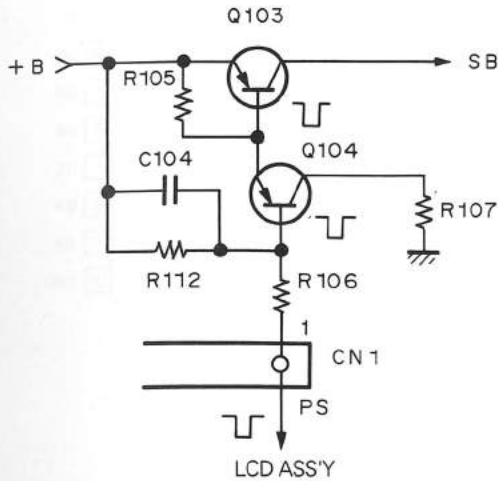


Fig. 12 Powe switch circuit

6-10. Audio muting

Audio muting is controlled by turning Q106 and Q107 on by making the PIN36/AC pin of the CPU (IC4) and the PIN8/OP7 pin of the interface IC (IC200) high.

To output a beep or alert tone, Q107 is turned on and Q106, off.

7. LCD assembly

The display assembly consists of the CPU, LCD, power switch circuit, and peripheral circuits.

7-1. CPU

The CPU (IC1) mainly does the following:

AF volume: Transmits on/off serial data from the AF volume UP/DOWN switch, system UP/DOWN switch, group UP/DOWN switch, SCAN switch, and A (AUX) switch to the TX/RX unit.

Receives serial data from the TX/RX unit and displays the data directly on the LCD. The LCD contains the system (7-segment), group (7-segment), transmission, BUSY, CALL, SCAN, and AUX indicators.

7-2. LCD drive (TK-931(HD) only)

The LCD drive IC (IC2) drives the alphanumeric display, performing dynamic operation with a 1/2 duty ratio. Display data is received on PIN62/DATA, PIN61/CLK, and PIN60/CE of IC2.

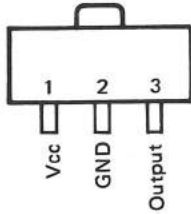
7-3. Power switch circuit

The power switch circuit consists of a D-type flipflop (IC4), inverter (IC6), transistor (Q1), diode (D2), and peripheral circuits. It is toggled on and off by the momentary-touch power switch (SW1).

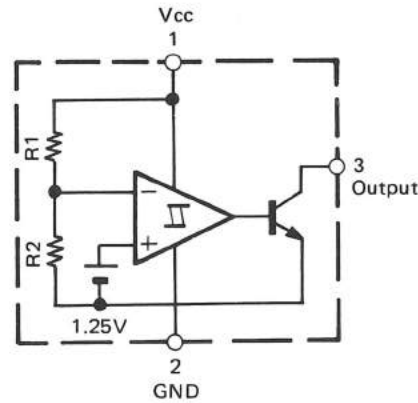
SEMICONDUCTOR DATA

Precision References : M51943BML (TX-RX unit IC1)

• Terminal connection diagram

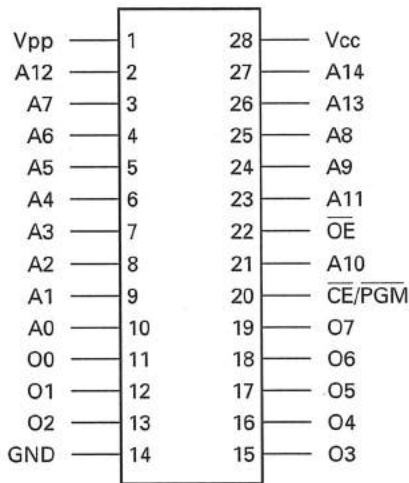


• Block diagram



EPROM : 27C256QB-JBJ1 (TX-RX unit IC2)

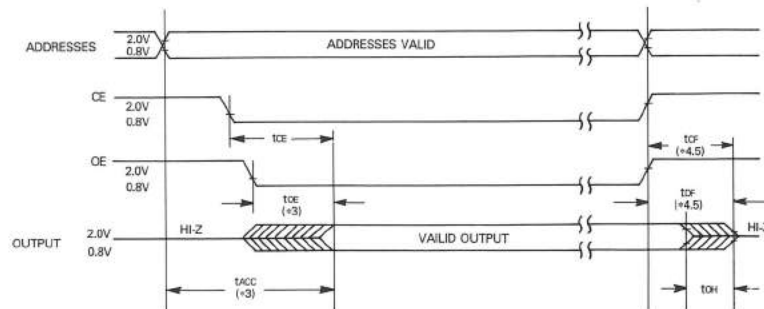
• Terminal connection diagram



• Terminal names

Name	Description
A0 ~ A14	Addresses
CE	Chip Enable
OE	Output Enable
O0 ~ O7	Outputs
PGM	Program
NC	No Connect

• AC waveforms (*6, 7 & 9)



*3 : \overline{OE} may be delayed up to $t_{ACC} - t_{OE}$ after the falling edge of \overline{CE} without impacting t_{ACC} .

*4 : The t_{DF} and t_{CF} compare level is determined as follows :
 High to TRI-STATE, the measured V_{OH1} (DC) - 0.10V
 Low to TRI-STATE, the measured V_{OL1} (DC) + 0.10V

*5 : TRI-STATE may be attained using \overline{OE} or \overline{CE} .

*6 : The power switching characteristics of EPROMs require careful device decoupling.
 It is recommended that at least a 0.1 μ F ceramic capacitor be used on every device between V_{CC} and GND.

*7 : The outputs must be restricted to $V_{CC} + 1.0V$ to avoid latch-up and device damage.

*8 : 1 TTL gate : $I_{OL} = 1.6mA$, $I_{OH} = -400\mu A$. C_L : 100pF includes fixture capacitance.

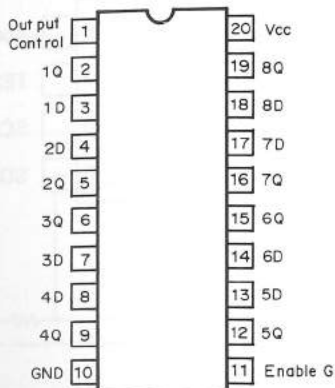
*9 : V_{pp} may be connected to V_{CC} except during programming.

*10 : Inputs and outputs can undershoot to -2.0V for 20ns Max.

SEMICONDUCTOR DATA

Octal Transparent Latch : HD74HC373FP (TX-RXunit IC3)

• Terminal connection diagram



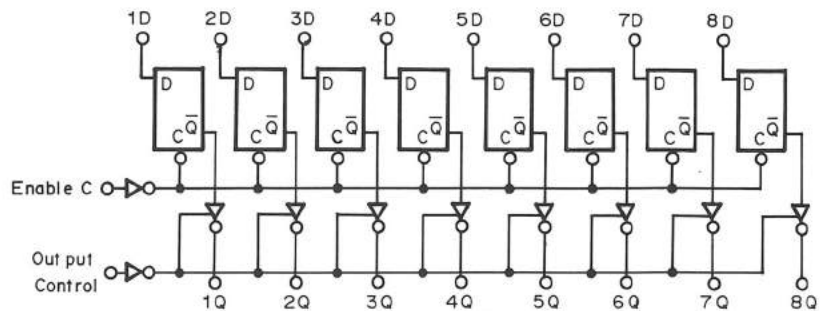
• Function table

Output Control	Enable G	D	Q
L	H	H	H
L	H	L	L
L	L	X	No change
H	X	X	Z

X : Don't care

Z : High impedance

• Logic diagram



TX Power Amplifier : MRF847 (TX-RX unit Q404) : TK-931(HD)

• Maximum ratings

Item	Symbol	Rating	Unit
Collector-Emitter voltage	V_{CE0}	16.5	Vdc
Collector-Base voltage	V_{CB0}	38	Vdc
Emitter-Base voltage	V_{EB0}	4	Vdc
Collector-current - Continuous	I_c	12	Adc
Total device dissipation @ $T_a = 25^\circ\text{C}$	P_D	150	Watts
Derate above 25°C		0.85	W/ $^\circ\text{C}$
Storage temperature range	T_{stg}	-65 to +150	$^\circ\text{C}$
Junction temperature	T_J	200	$^\circ\text{C}$
Thermal resistance, junction to case	$R_{\theta JC}$	1.17	$^\circ\text{C}/\text{W}$

• Electrical characteristics $T_c = 25^\circ\text{C}$ unless otherwise noted

Item	Symbol	Condition	Min	Typ	Max	Unit
OFF characteristics						
Emitter-Base breakdown voltage	$V_{(BR)EBO}$	$I_E = 5\text{mA dc}, I_C = 0$	4	-	-	Vdc
Collector-Emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 50\text{mA dc}, I_B = 0$	16.5	-	-	Vdc
Collector-Emitter breakdown voltage	$V_{(BR)CES}$	$I_C = 50\text{mA dc}, V_{BE} = 0$	38	-	-	Vdc
Collector cutoff current	I_{CES}	$V_{CE} \approx 15\text{Vdc}, V_{BE} = 0$	-	-	10	mA dc
ON characteristics						
DC current gain	h_{FE}	$I_C = 2\text{A dc}, V_{CE} = 5\text{Vdc}$	40	65	120	-
Dynamic characteristics						
Output capacitance	C_{ob}	$V_{CB} = 12.5\text{Vdc}, I_E = 0, f = 1\text{MHz}$	-	75	90	pF
Functional tests						
Common-base amplifier power gain	GPB	$V_{CC} = 12.5\text{Vdc}, P_{out} = 45\text{W}$	4.5	5.5	-	dB
Collector efficiency	η_C	$f = 870\text{MHz}$	60	68	-	%
Load mismatch	Ψ	$V_{CC} = 15.5\text{Vdc}, P_{in} = 16\text{W}, f = 870\text{MHz}$ $V_{SWR} = 10 : 1$ all phase angles	No degradation in output power			

TK-931/931(HD)

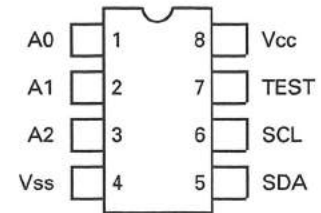
SEMICONDUCTOR DATA

EEPROM : X24C16I (TX-RX unit IC6) : TX-931(HD)

• Terminal description

No.	Name	Description
1	A0	Address inputs
2	A1	The A0, A1 and A2 inputs are unused by the X24C16I, however, they must be tied to Vss to insure proper device operation.
3	A2	
4	Vss	Vss
5	SDA	Serial data SDA is a bidirectional pin used to transfer data into and out of the device. It is an open drain output and may be wire-ORed with any number of open drain or open collector outputs.
6	SCL	Serial clock The SCL input is used to clock all data into and out of the device.
7	TEST	Test input → to Vss
8	Vcc	Vcc

• Terminal connection diagram



• Operating characteristics $T_a = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{cc} = +5\text{V} \pm 10\%$, unless otherwise specified.

Item	Symbol	Condition	Rating			Unit
			Min	Typ *1	Max	
Power supply current	I_{CC}	$f_{SCL} = 100\text{kHz}$	-	2.0	3.0	mA
Standby current *2	I_{SB}	$V_{IN} = \text{GND or } V_{CC}$	-	60	100	μA
Input Leakage current	I_{LI}	$V_{IN} = \text{GND to } V_{CC}$	-	0.1	10	μA
Output leakage current	I_{LO}	$V_{OUT} = \text{GND to } V_{CC}$	-	0.1	10	μA
Input low voltage	V_{IL}		-1.0	-	$V_{CC} \times 0.3$	V
Input high voltage	V_{IH}		$V_{CC} \times 0.7$	-	$V_{CC} + 0.5$	V
Output low voltage	V_{OL}	$I_{OL} = 3\text{mA}$	-	-	0.4	V

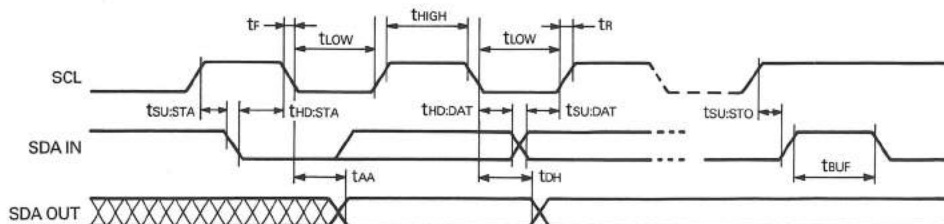
*1 : Typical values are for $T_a = 25^{\circ}\text{C}$ and nominal supply voltage.

*2 : SDA and SCL require pull up resistor.

• Read & write cycle limits $T_a = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{cc} = +5\text{V} \pm 10\%$, unless otherwise specified.

Item	Symbol	Min	Max	Unit
SCL clock frequency	f_{SCL}	0	100	kHz
Noise suppression time constant at SCL, SDA inputs	T_I	-	100	ns
SCL low to SDA data out valid	t_{AA}	0.3	3.5	μs
Time the bus must be free before a new transmission can start	t_{BUF}	4.7	-	μs
Start condition hold time	$t_{HD:STA}$	4.0	-	μs
Clock low period	t_{LOW}	4.7	-	μs
Clock high period	t_{HIGH}	4.0	-	μs
Start condition setup time (for a repeated start condition)	$t_{SU:STA}$	4.7	-	μs
Data in hold time	$t_{HD:DAT}$	0	-	μs
Data in setup time	$t_{SU:DAT}$	250	-	ns
SDA and SCL rise time	t_R	-	1	μs
SDA and SCL fall time	t_F	-	300	ns
Stop condition setup time	$t_{SU:STO}$	4.7	-	μs
Data out hold time	t_{DH}	300	-	ns

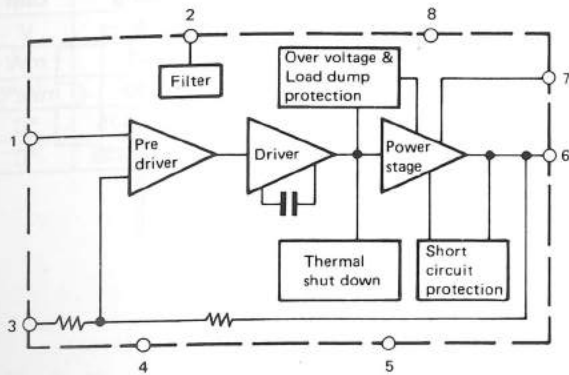
• Bus timing



SEMICONDUCTOR DATA

AF Power Amplifier : μ PC1242H (TX-RX unit IC102)

• Block diagram



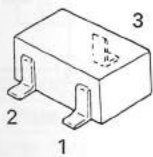
- 1 : Input
- 2 : Ripple filter
- 3 : N.F.B.
- 4 : GND
- 5 : GND
- 6 : Output
- 7 : Bootstrap
- 8 : Vcc

• Electrical characteristics $T_a = 25^\circ\text{C}$, $V_{cc} = 13.2\text{V}$, $f = 1\text{kHz}$, $R_L = 4\Omega$

Item	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
DC current	I_{cc}	$v_{in} = 0$	25	45	80	mA
Output power	P_o	T.H.D. = 10%	5.0	5.8	-	W
		$R_L = 2\Omega$, T.H.D. = 10%	-	9.2	-	W
Distortion	T.H.D.	$P_o = 0.5\text{W}$	-	0.1	1.0	%
		$R_L = 2\Omega$, $P_o = 1\text{W}$	-	0.4	-	%
Max. output power	P_{OM}		-	9.5	-	W
Voltage gain	A_v	$P_o = 0.5\text{W}$	49	51.5	54	dB
Noise output voltage	v_n	$R_G = 10\text{k}\Omega$	-	1.4	4.0	mVrms

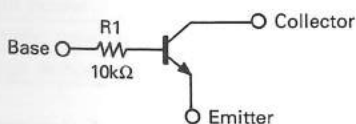
Switching : DTC314TK (TX-RX unit Q106, 107, 201)

• Terminal connection diagram



- 1 : Emitter
- 2 : Base
- 3 : Collector

• Circuit diagram



• Maximum ratings $T_a = 25^\circ\text{C}$

Item	Symbol	Rating	Unit
Collector-base voltage	V_{CB0}	30	V
Collector-emitter voltage	V_{CE0}	15	V
Emitter-base voltage	V_{EB0}	5	V
Collector current	I_c	600	mA
Collector power dissipation	P_c	200	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 ~ +125	$^\circ\text{C}$

DC Amplifier : 2SB967(Q) (TX-RX unit Q401)

• Terminal connection diagram



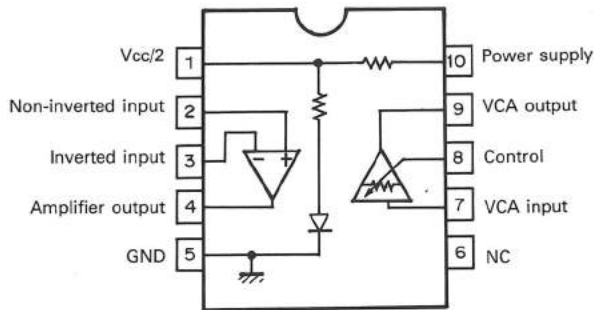
- 1 : Base
- 2 : Collector
- 3 : Emitter

• Maximum ratings $T_a = 25^\circ\text{C}$

Item	Symbol	Rating	Unit
Collector-base voltage	V_{CB0}	-27	V
Collector-emitter voltage	V_{CE0}	-18	V
Emitter-base voltage	V_{EB0}	-7	V
Applied collector current	I_{CP}	-8	A
Collector current	I_c	-5	A
Collector power dissipation ($T_c = 25^\circ\text{C}$)	P_c	20	W
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 ~ +150	$^\circ\text{C}$

Electronic Attenuator : M5282FP (TX-RX unit IC103)

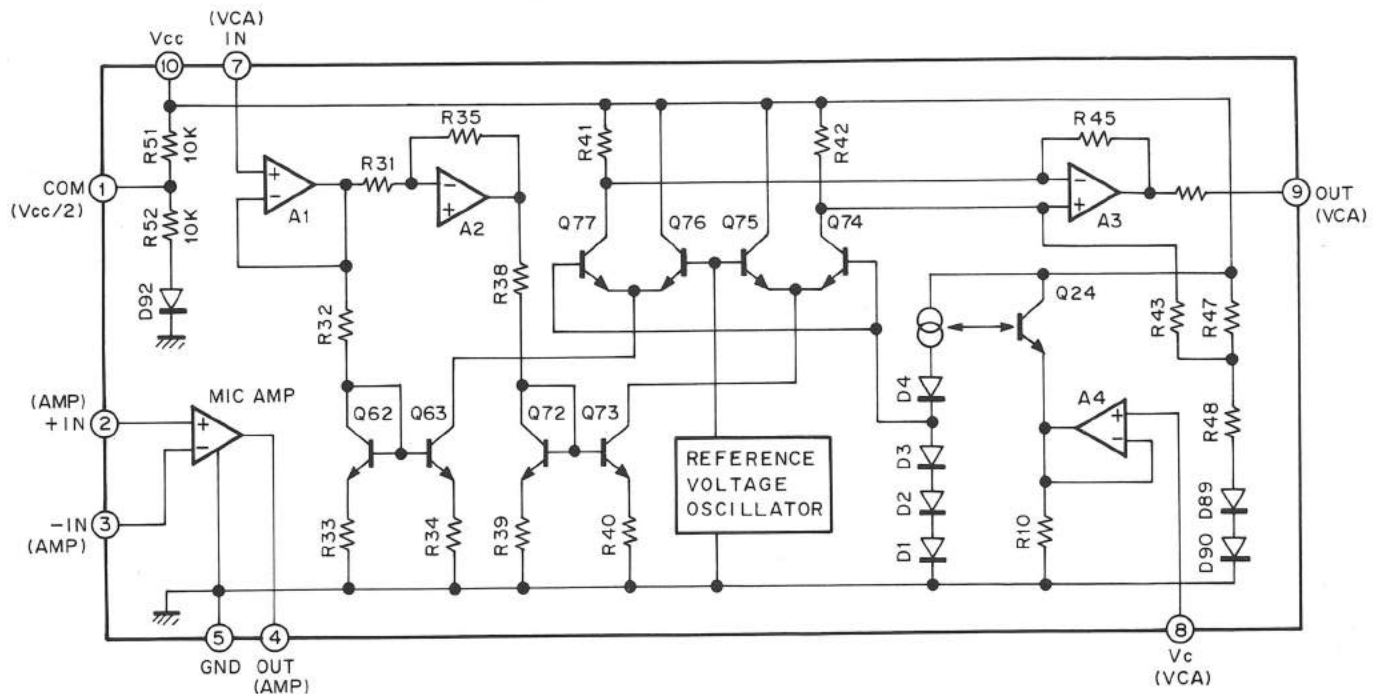
• Terminal connection diagram



• Maximum ratings

Item	Symbol	Condition	Rating	Unit
Power supply voltage	Vcc		15	V
	Pd		440	mW
	K θ	Ta \geq 25°C	4.40	mW/°C
Operating temperature range	Topr		-20 ~ +75	°C
Storage temperature range	Tstg		-40 ~ +125	°C

• Block diagram



• Electric volume (VCA) characteristics Vcc = 4.8V, Ta = 25°C

Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
Attenuation error	ATT	VC = 4.8V, VI = -10dBm, f = 1kHz	-2.0	-0.3	+2.0	dB
Maximum attenuation	ATTM	VC = 0V, VI = -10dBm, f = 1kHz	-77	-82	-	dB
Maximum input voltage	VIM	VC = 4.8V, f = 1kHz, THD = 0.2%	0.6	0.7	-	Vrms
Total harmonic distortion	THD	VC = 4.8V, VO = 0.5Vrms, f = 1kHz	-	0.06	0.20	%
Output noise voltage	VNO	VC = 4.8V, Rg = 0	-	19	50	μ Vrms

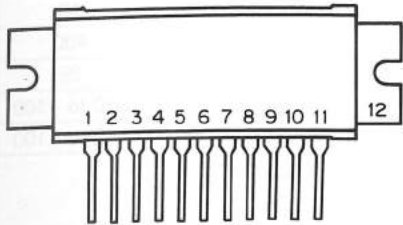
• Microphone amplifier characteristics Vcc = 4.8V, VC = 4.8V, Ta = 25°C, 40dB amp

Item	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
Maximum output voltage	VOM	THD = 0.2%	0.6	0.7	-	Vrms
Total harmonic distortion	THD	VO = 0.5Vrms, f = 1kHz	-	0.01	0.20	%
Input noise voltage	VIN	Rg = 1k Ω	-	0.5	1.0	μ Vrms

SEMICONDUCTOR DATA

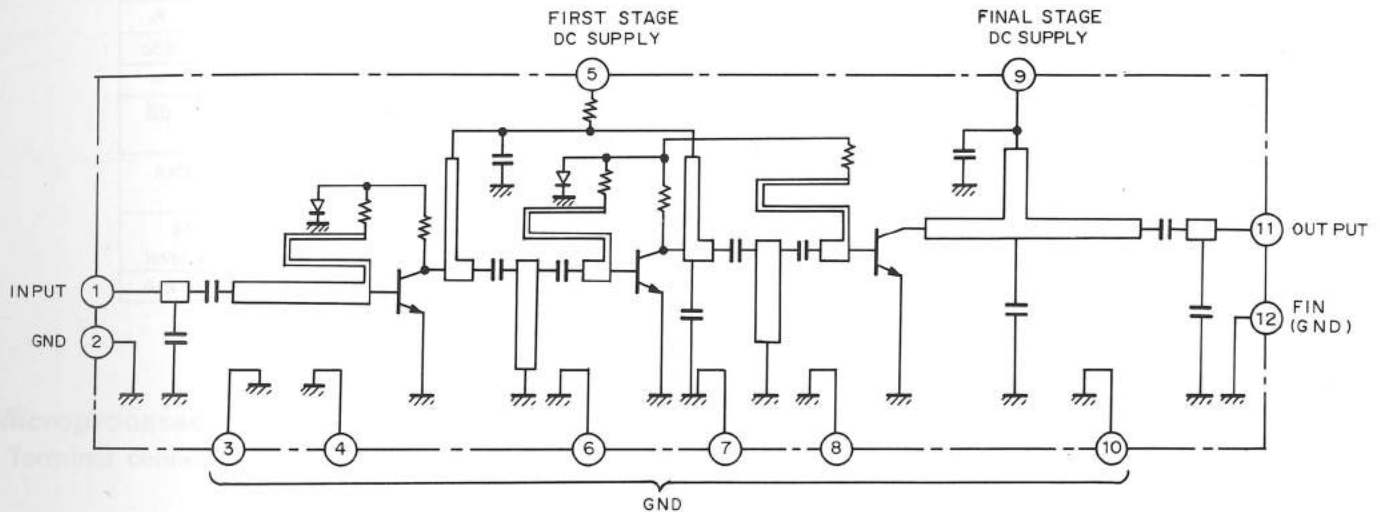
TX Driver : M57781 (TX-RX unit IC400)

• Terminal connection diagram



- 1 : Input
- 2~4 : GND
- 5 : First DC supply voltage
- 6~8 : GND
- 9 : Final DC supply voltage
- 10 : GND
- 11 : Output
- 12 : Fin (GND)

• Equivalent circuit



• Maximum ratings $T_c = 25^\circ\text{C}$

Item	Symbol	Condition	Rating	Unit
Supply voltage (First stage)	V_{cc1}		11	V
Supply voltage (Final stage)	V_{cc2}		15	V
Circuit current	I_{cc}		0.6	A
Power input	$P_{in}(\text{max})$	$Z_G = Z_L = 50\Omega$	10	mW
Output power	$P_o(\text{max})$		0.8	W
Operating case temperature	$T_c(\text{op})$		-30 ~ +110	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 ~ +110	$^\circ\text{C}$

• Electrical characteristics $T_c = 25^\circ\text{C}$

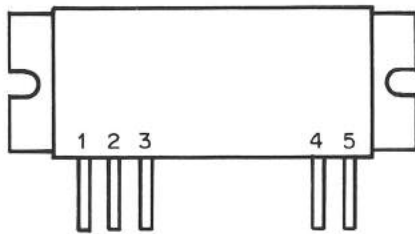
Item	Symbol	Condition	Rating			Unit
			Min	Typ	Max	
Output power	P_o	$V_{cc1} = V_{cc2} = 8\text{V}$, $f = 896\sim 941\text{MHz}$, $P_{in} = 3\text{mW}$, $Z_G = Z_L = 50\Omega$	300	500	-	mW
2nd harmonic			-	-	-30	dB
Input VSWR	p_{in}		-	-	3.0	-
Output VSWR	p_{out}		-	2.0	-	-
Total current	I_T	$V_{cc1} = V_{cc2} = 8\text{V}$, $f = 896\sim 941\text{MHz}$, $P_o = 0.3\text{W}$, $Z_G = Z_L = 50\Omega$	-	250	190	mA
Load VSWR		$V_{cc1} = 8\text{V}$, $V_{cc2} = 15\text{V}$, $f = 896\sim 941\text{MHz}$, $P_o = 0.3\text{W}$, $\rho_L \geq 20$ (All phase), $Z_G = 50\Omega$	20 : 1	-	-	-

TK-931/931(HD)

SEMICONDUCTOR DATA

TX Power Amplifier : MHW820-3 (TX-RX unit IC401)

• Terminal connection diagram



- 1 : RF input
- 2 : +DC (Control)
- 3 : +DC (Supply)
- 4 : +DC
- 5 : RF output

• Maximum ratings Flange temperature = 25°C

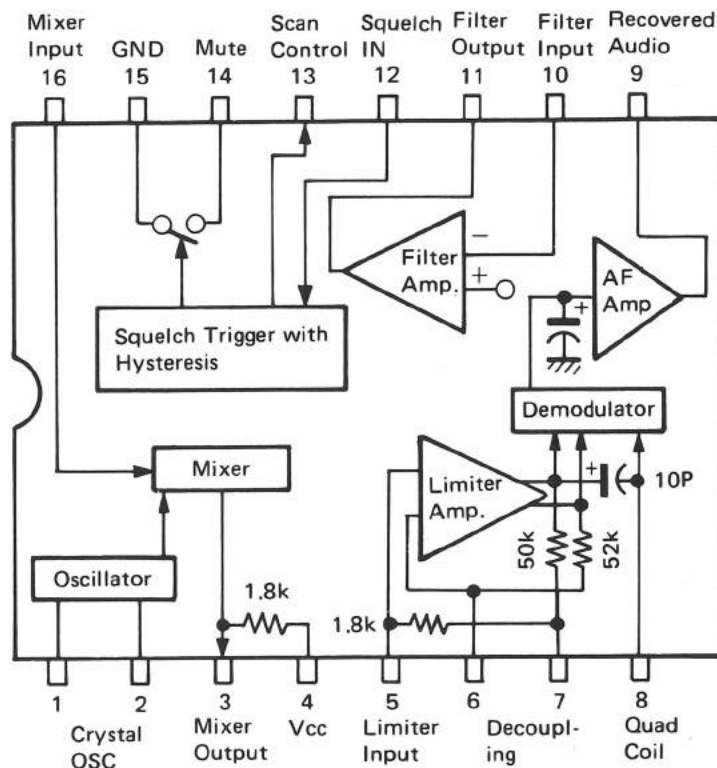
Item	Symbol	Rating	Unit
DC supply voltage	Vs1, Vs2, Vs3	16	Vdc
RF input power (Pout ≤ 25W)	Pin	400	mW
RF output power (Pin ≤ 400mW)	Pout	25	W
Storage temperature range	Tstg	-30 to +100	°C
Operating case temperature range	Tc	-40 to +100	°C

• Electrical characteristics Flange temperature = 25°C, 50Ω system, and Vs1 = Vs2 = 12.5V unless otherwise noted

Item	Symbol	Min	Typ	Max	Unit
Frequency range	BW	870	-	950	MHz
Input power (Pout = 18W)	Pin	-	300	350	mW
Power gain (Pout = 18W)	Gp	17.1	17.8	-	dB
Efficiency (Pout = 18W)	η	26	30	-	%
Harmonic output (Pout reference = Rated Pout)	-	-	-	-58	dBc
Input VSWR (Pout = Rated Pout, 50Ω reference)	-	-	-	2 : 1	-
Power degradation (-30 to +80°C) (Reference Pout = Rated Pout @ Tc = 25°C)	-	-	1.2	1.7	dB
Load mismatch stress (Vs1 = Vs2 = Vs3 = 16Vdc, Pout = 25W, VSWR = 30 : 1, all phase angles)	-	No degradation in power output			
Stability (Pin = 0 to 250mW (MHW820-1) or 350mW (MHW820-3) consistent with max, Pout = 25W, Vs1 = Vs2 = Vs3 = 10 to 15Vdc, Load VSWR = 4 : 11)	All non-harmonic related spurious outputs ≥ 70dB below the desired output signal level				
Quiescent current (Is1 with no RF drive applied)	Is1(q)	-	-	125	mA

IF System : MC3361D (TX-RX unit IC300)

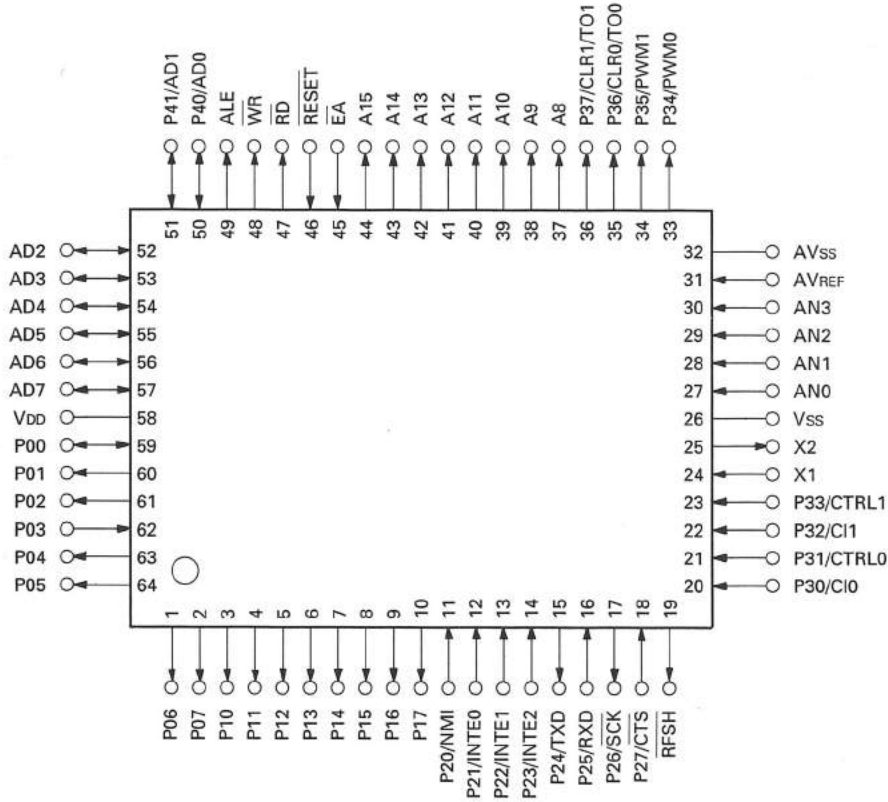
• Block diagram



SEMICONDUCTOR DATA

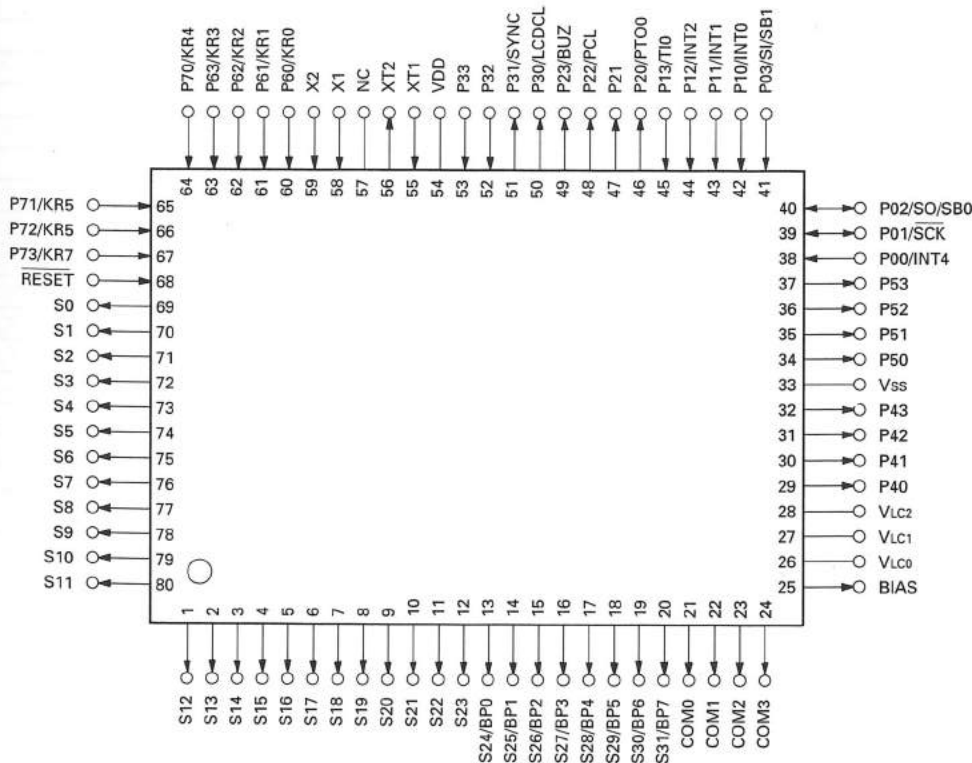
Microprocessor : μ PD78310G (TX-RX unit IC4)

• Terminal connection diagram



Microprocessor : μ PD75304GF-104 (LCD ass'y IC1)

• Terminal connection diagram



SEMICONDUCTOR DATA

• Terminal function (μ PD78310G)

Terminal No.	Terminal Name	I/O	Function
1	P06	O	TC9174F STROBE output (Active "H").
2	P07	O	PLL ENABLE output (Active "H").
3	P10	O	Open (not use).
4 ~ 10	P11 ~ P17	O	Signaling encode data output (bit 0 ~ bit 6).
11	P20/NMI	I	GND (not use).
12	P21/INTE0	I	Serial data input (display).
13	P22/INTE1	I	PTT SW input (Active "L").
14	P23/INTE2	I	HOOK SW input (Active "L").
15	P24/TxD	O	Serial data output (PC).
16	P25/RxD	I	Serial data input (PC).
17	P26/SCK	O	Open (not use).
18	P27/CTS	I	GND (clear to send).
19	RFSH	O	Open (not use).
20	P30/CI0	I	NOISE PULSE input.
21	P31/CRTL0	I	HIGH SPEED DATA input.
22	P32/CI1	I	Unlock signal input (Active "L").
23	P33/CTRL1	I	TEST MODE SELECT input (Active "L").
24	X1	I	System clock input.
25	X2	O	System clock output.
26	Vss	-	GND.
27	AN0	I	LOW SPEED DATA (signaling) input.
28	AN1	I	Open (not use).
29	AN2	I	NOISE SQ REFERENCE input.
30	AN3	I	Open (not use).
31	AVref	I	+5V.
32	AVss	-	GND.
33	P34/PWM0	O	Volume control output.
34	P35/PWM1	O	700/1500Hz BEEP output.
35	P36/CTR0/TO0	O	900Hz BEEP output.
36	P37/CTR1/TO1	O	AUDIO MUTE output (Active "H").
37 ~ 44	A8 ~ A15	O	Address output (bit 8 ~ bit 15).
45	\overline{EA}	I	EPROM access signal input (Active "L").
46	\overline{RESET}	I	System reset input.
47	\overline{RD}	O	EPROM read strobe output (Active "L").
48	\overline{WR}	O	Open (not use).
49	ALE	O	EPROM address latch enable output (Active "H").
50 ~ 57	AD0 ~ AD7	I/O	Address output (bit 0 ~ bit 7), data input (bit 0 ~ bit 7).
58	VDD	-	+5V.
59	P00	I/O	EEPROM (X24C16I) SERIAL DATA input/output.
60	P01	O	Serial data output (display).
61	P02	O	EEPROM (NMC93C66EN) CHIP SELECT output (Active "H").
62	P03	I	EEPROM (NMC93C66EN) DATA input.
63	P04	O	DATA output (PLL, NMC93C66EN, TC9174F).
64	P05	O	CLOCK output (PLL, EEPROM, TC9174F).

SEMICONDUCTOR DATA

• Terminal function (μ PD75304GF-104)

Terminal No.	Terminal Name	I/O	Function
1 ~ 20	S12 ~ S31	O	Open (not use).
21	COM0	O	LCD COM2 output.
22	COM1	O	LCD COM1 output.
23	COM2	O	Open (not use).
24	COM3	O	Open (not use).
25	BIAS	O	LCD power supply voltage.
26	Vlc0	-	LCD voltage level generator.
27	Vlc1	-	LCD voltage level generator.
28	Vlc2	-	LCD voltage level generator.
29 ~ 32	P40 ~ P43	O	Open (not use).
33	Vss	-	GND.
34 ~ 36	P50 ~ P52	O	Open (not use).
37	P53	O	Serial data output (μ PD78310GF).
38	P00/INT4	I	GND.
39	P01/ $\overline{\text{SCK}}$	I/O	Open (not use).
40	P02/SO/SB0	I/O	Open (not use).
41	P03/SI/SB1	I	GND.
42	P10/INT0	I	Open (not use).
43	P11/INT1	I	Serial data input (μ PD78310GF).
44	P12/INT2	I	PTT SW input (Active "L").
45	P13/TI0	I	HOOK SW input (Active "L").
46	P20/PTO0	O	Open (not use).
47	P21	O	Open (not use).
48	P22/PCL	O	LDC driver (LC7582) INHIBIT output (Active "L").
49	P23/BUZ	O	LCD driver (LC7582) CHIP ENABLE output (Active "H").
50	P30/LCDCL	O	LCD driver (LC7582) CLOCK output.
51	P31/SYNC	O	LCD driver (LC7582) DATA output.
52	P32	I	B SW input (Active "L").
53	P33	I	SCAN SW input (Active "L").
54	VDD	-	+5V.
55	XT1	I	GND (not use).
56	XT2	O	Open (not use).
57	NC	-	Open.
58	X1	I	System clock input (Active "L").
59	X2	I	System clock input (Active "L").
60	P60/KR0	I	GROUP DOWN SW input (Active "L").
61	P61/KR1	I	SYSTEM DOWN SW input (Active "L").
62	P62/KR2	I	GROUP UP SW input (Active "L").
63	P63/KR3	I	A SW input (Active "L").
64	P70/KR4	I	C SW input (Active "L").
65	P71/KR5	I	VOLUME UP SW input (Active "L").
66	P72/KR6	I	SYSTEM UP SW input (Active "L").
67	P73/KR7	I	VOLUME DOWN SW input (Active "L").
68	RESET	I	System reset input.
69 ~ 79	S0 ~ S10	O	LCD output (S1 ~ S11).
80	S11	O	Open (not use).

TK-931/931(HD)

DESCRIPTION OF COMPONENTS

TX-RX UNIT (X57-3570-11) : TK-931

Ref No.	Parts No.	Use/Function	Operation/Condition/Compatibility
IC1	M51943BML	Precision references	
IC2	27C256QB-JBJ1	EPROM	
IC3	HD74HC373FP	Octal transparent latch	
IC4	μPD78310G	Microprocessor	
IC5	NMC93C566EN	EEPROM	
IC100	NJM78L05UA	Voltage regulator	5V
IC101	μPC7808H	Voltage regulator	8V
IC102	μPC1242H	AF power amplifier	
IC103	M5282FP	Electronic attenuator	
IC104	NJM4558M	Active filter	
IC105	NJM4558M	Audio amplifier	
IC106	NJM4558M	Active filter	
IC107	NJM4558M	Mic amplifier / Limiter	
IC108	NJM4558M	Summing amplifier	
IC109	NJM4558M	Active filter	
IC200	TC9174F	I/O expander	
IC201	MB1501PF	PLL system	
IC203	TC4566F	Analog switch	
IC204	TC45584F	Schmitt inverter	
IC300	MC3361D	IF system	
IC400	M57781	TX driver	
IC401	MHW820-3	TX power amplifier	
IC402	NJM2904M	DC amplifier	APC
Q100	2SB1119S	DC switch	T8B
Q101	2SC2712(Y)	Ripple filter	SC7
Q102	2SB1119S	DC switch	T8A
Q103	2SB1302S	DC switch	SB
Q104	2SA1162(Y)	DC switch	
Q105	DTC114EK	DC switch	
Q106,107	DTC314TK	Muting switch	
Q108	DTC114EK	Noise amplifier	
Q109	DTC114EK	DC switch	
Q110	DTA114EK	Muting switch	
Q111	2SD1624S	DC switch	
Q200	2SC3356	RF amplifier	
Q201	DTC314TK	AF switch	
Q202	2SC3356	Doubler	
Q203	2SC3356	RF amplifier	
Q204	2SA1162(Y)	DC amplifier	
Q205	DTA114EK	DC switch	
Q206	2SK508NV(K52)	Oscillator	
Q207	2SC3356	Buffer amplifier	
Q300	2SC4093	RF amplifier	
Q301	3SK184(R)	Mixer	
Q302	2SK302(GR)	IF amplifier	
Q400	DTC114EK	DC switch	
Q401	2SB967(Q)	DC amplifier	APC
Q402	2SC2712(Y)	DC amplifier	
Q403	DTA114EK	DC switch	

DESCRIPTION OF COMPONENTS

Ref No.	Parts No.	Use/Function	Operation/Condition/Compatibility
D1	1SS226	Voltage clamp	HOOK/RXD
D2	1SS226	Voltage clamp	PTT/TXD
D3	1SS226	Voltage clamp	MTX
D4	1SS226	Voltage clamp	MRX
D5	1SS226	Voltage clamp	
D100,101	1SS184	Current steering	
D103	RD20M-B1	Voltage clamp	
D200	HSK277	RF switch	
D201	1SS184	DC isolation	
D202	1SV164	Varactor	Modulator
D203,204	1T33C	Varactor	Tuning
D205	1SV128	RF switch	For TX
D206	1SV128	RF switch	For RX
D300	1SS184	Current steering	
D301	HSM88ASR	Protection	
D400	ERZ-M10DK220	Surge absorber	
D401	DSA3A1	Protection	Reverse polarity protection
D402	1SS184	Current steering	
D403	MI407	RF switch	
D404	MI308	RF switch	
D405	MI808	RF switch	

LCD ASS'Y (B38-0333-05) : TK-931

Ref No.	Parts No.	Use/Function	Operation/Condition/Compatibility
IC1	μPD75304GF-104	Microprocessor	
IC3	L78M05T	Voltage regulator	+5V
IC4	TC4013BF	D-type flip flop	
IC5	M51943BML	Precision references	
IC6	TC4SU69F	Inverter	
Q1	2SC2712(GR)	DC switch	
D1,2	1SS184	Current steering	
D3	1SS226	Voltage clamp	MRX
D4	1SS226	Voltage clamp	PTT (EXT)
D5	1SS226	Voltage clamp	MTX
D6	1SS226	Voltage clamp	HOOK (EXT)
D7	RD18M-B2	Voltage clamp	
D8	B38-0336-08	LED	Orange
LCD1	B38-0335-08	LCD	Indicator

TK-931/931(HD)

DESCRIPTION OF COMPONENTS

TX-RX UNIT (X57-3560-11) : TK-931(HD)

Ref No.	Parts No.	Use/Function	Operation/Condition/Compatibility
IC1	M51943BML	Precision references	
IC2	27C256QB-JBJ1	EPROM	
IC3	HD74HC373FP	Octal transparent latch	
IC4	μPD78310G	Microprocessor	
IC5	NMC93C566EN	EEPROM	
IC6	X24C16I	EEPROM	
IC100	NJM78L05UA	Voltage regulator	5V
IC101	μPC7808H	Voltage regulator	8V
IC102	μPC1242H	AF power amplifier	
IC103	M5282FP	Electronic attenuator	
IC104	NJM4558M	Active filter	
IC105	NJM4558M	Audio amplifier	
IC106	NJM4558M	Active filter	
IC107	NJM4558M	Mic amplifier / Limiter	
IC108	NJM4558M	Summing amplifier	
IC109	NJM4558M	Active filter	
IC200	TC9174F	I/O expander	
IC201	MB1501PF	PLL system	
IC203	TC4566F	Analog switch	
IC204	TC45584F	Schmitt inverter	
IC300	MC3361D	IF system	
IC400	M57781	TX driver	
IC401	MHW820-3	TX power amplifier	
IC402	NJM2904M	DC amplifier	APC
Q100	2SB1119S	DC switch	T8B
Q101	2SC2712(Y)	Ripple filter	SC7
Q102	2SB1119S	DC switch	T8A
Q103	2SB1302S	DC switch	SB
Q104	2SA1162(Y)	DC switch	
Q105	DTC114EK	DC switch	
Q106,107	DTC314TK	Muting switch	
Q108	DTC114EK	Noise amplifier	
Q109	DTC114EK	DC switch	
Q110	DTA114EK	Muting switch	
Q111	2SD1624S	DC switch	
Q200	2SC3356	RF amplifier	
Q201	DTC314TK	AF switch	
Q202	2SC3356	Doubler	
Q203	2SC3356	RF amplifier	
Q204	2SA1162(Y)	DC amplifier	
Q205	DTA114EK	DC switch	
Q206	2SK508NV(K52)	Oscillator	
Q207	2SC3356	Buffer amplifier	
Q300	2SC4093	RF amplifier	
Q301	3SK184(R)	Mixer	
Q302	2SK302(GR)	IF amplifier	
Q400	DTC114EK	DC switch	
Q401	2SB967(Q)	DC amplifier	APC
Q402	2SC2712(Y)	DC amplifier	
Q403	DTA114EK	DC switch	
Q404	MRF847	TX power amplifier	
Q405	DTC114EK	DC switch	

DESCRIPTION OF COMPONENTS

Ref No.	Parts No.	Use/Function	Operation/Condition/Compatibility
D1	1SS226	Voltage clamp	HOOK/RXD
D2	1SS226	Voltage clamp	PTT/TXD
D3	1SS226	Voltage clamp	MTX
D4	1SS226	Voltage clamp	MRX
D5	1SS226	Voltage clamp	
D100,101	1SS184	Current steering	
D103	RD20M-B1	Voltage clamp	
D200	HSK277	RF switch	
D201	1SS184	DC isolation	
D202	1SV164	Varactor	Modulator
D203,204	1T33C	Varactor	Tuning
D205	1SV128	RF switch	For TX
D206	1SV128	RF switch	For RX
D300	1SS184	Current steering	
D301	HSM88ASR	Protection	
D400	ERZ-M10DK220	Surge absorber	
D401	DSA3A1	Protection	Reverse polarity protection
D402	1SS184	Current steering	
D403	UA9401	RF switch	
D404	MI308	RF switch	
D405	MI808	RF switch	
D406	HSM88ASR	Detector	
D407	1SS184	Current steering	

LCD ASS'Y (B38-0332-05) : TK-931(HD)

Ref No.	Parts No.	Use/Function	Operation/Condition/Compatibility
IC1	μPD75304GF-104	Microprocessor	
IC2	LC7582	LCD driver	
IC3	L78M05T	Voltage regulator	+5V
IC4	TC4013BF	D-type flip flop	
IC5	M51943BML	Precision references	
IC6	TC4SU69F	Inverter	
Q1	2SC2712(GR)	DC switch	
D1,2	1SS184	Current steering	
D3	1SS226	Voltage clamp	MRX
D4	1SS226	Voltage clamp	PTT (EXT)
D5	1SS226	Voltage clamp	MTX
D6	1SS226	Voltage clamp	HOOK (EXT)
D7	RD18M-B2	Voltage clamp	
D8	B38-0336-08	LED	Orange
LCD1	B38-0334-08	LCD	Indicator

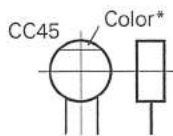
TK-931/931(HD)

PARTS LIST

CAPACITORS

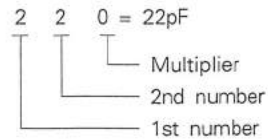
CC 45 TH 1H 220 J
1 2 3 4 5 6

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



Capacitor value

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



Temperature coefficient

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

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

Example : CC45TH = -470 ± 60ppm/°C

Tolerance

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

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

Less than 10pF

Voltage rating

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

(EX) C C 7 3 F S L 1 H 0 0 0 J
1 2 3 4 5 6 7
(Chip) (CH, RH, UJ, SL)

(EX) C K 7 3 F F 1 H 0 0 0 Z
1 2 3 4 5 6 7
(Chip) (B, F)

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

RESISTORS

Chip resistor (Carbon)

(EX) R D 7 3 E B 2 B 0 0 0 J
1 2 3 4 5 6 7
(Chip) (B,F)

Carbon resistor (Normal type)

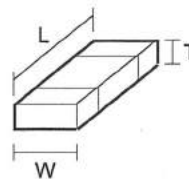
(EX) R D 1 4 B B 2 C 0 0 0 J
1 2 3 4 5 6 7

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

Rating wattage

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

Dimension



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TK-931/931(HD)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
TK-931/931(HD)						
1	1B, 3B	*	A01-2003-12	CASE(UPPER, LOWER)		
2	1A	*	A10-1313-01	FRAME	HK	
2	2B	*	A10-1314-01	FRAME	K	
3	2A	*	A22-0771-02	SUB PANEL		
4	3A	*	A62-0014-03	PANEL ASSY		
5	3A	*	A62-0017-04	DRESSING PLATE		
9	2B		B42-2455-04	LABEL(M4x8 MAX)		
10	-	*	B62-0005-00	INSTRUCTION MANUAL		
-	-	*	B72-0008-14	MODEL NAME PLATE	K	
-	-	*	B72-0009-14	MODEL NAME PLATE	HK	
12	-		B46-0409-30	WARRANTY CARD	K, HK	
13			E30-2036-05	GROUND LEADWIRE		
14			E30-2076-05	DC CORD		
15			E30-2089-08	CURL CORD(FOR MIC)		
16	2A	*	E37-0001-05	CONNECTING WIRE(DC CABLE:2P)		
17	2A	*	E37-0002-05	CONNECTING WIRE(ACCESSORY)		
		*	E37-0003-05	CONNECTING WIRE(TX·RX-DISPLAY)		
		*	E37-0004-05	CONNECTING WIRE(SPEAKER:2P)		
J2	2B		E04-0170-05	RF COAXIAL CABLE RECEPTACLE		
J5	1B		E31-3228-05	SHORT PLUG(ACCESSORY)		
20			F05-1031-05	FUSE(10A)	K	
20			F05-1531-05	FUSE(15A)	HK	
21	3B	*	F10-1440-03	SHIELDING COVER(LOWER)		
22	1B	*	F10-1441-04	SHIELDING COVER(UPPER)		
23	3B	*	F10-1476-04	SHIELDING PLATE(FINAL)		
25	2B		G02-0570-04	LEAF SPRING		
26	2B	*	G02-0597-04	LEAF SPRING(MODULE)		
27	1B, 3B	*	G53-0594-14	FELT(CASE)		
28	2B	*	G53-0595-03	RUBBER SEAL(FRAME-FRONT PANEL)		
29	2B	*	G53-0598-04	RUBBER SEAL(ACCESSORY)		
31		*	H11-0838-04	PACKING FIXTURE		
32		*	H11-0839-04	BUFFER	K	
33		*	H52-0007-04	ITEM CARTON BOX		
34		*	H10-2694-02	POLYSTYRENE FOAMED FIXTURE		
35		*	H25-0103-04	PROTECTION BAG		
36			H25-0747-04	PROTECTION BAG(RADIO)		
40			J19-1376-15	MIC HANGER		
42	2A	*	J21-4305-04	MOUNTING HARDWARE(ACCESSORY)		
43			J29-0418-03	BRACKET		
44	2B	*	J69-0324-05	Ø RING(ANT)		
45	3A	*	J90-0406-04	KEY TOP GUIDE		
47	3A	*	K29-4566-03	KEY TOP		
A	1B		N09-0626-04	SCREW(M3x10, FINAL MODULE)	K	
A	1B		N09-0626-04	SCREW(M3x10, FINAL TRANSISTOR)	HK	
B	2A, 2B	*	N09-2121-05	SCREW(M2.6x10, SUB PANEL)		
C	2A		N35-2606-46	BINDING HEAD MACHINE SCREW		
D	1B, 3B		N35-3008-45	BINDING HEAD MACHINE SCREW		
E	2B		N35-4008-45	BINDING HEAD MACHINE SCREW		
F	1B		N87-3005-46	BRAZIER HEAD TAPTITE SCREW		
G	3B		N87-3010-46	BRAZIER HEAD TAPTITE SCREW		
H	1A, 2B		N89-3008-45	BINDING HEAD TAPTITE SCREW		


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 indicates safety critical components.

TK-931/931(HD)

PARTS LIST

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TK-931/931(HD)

TX-RX UNIT (X57-3560-11) : TK-931(HD)


Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
J 50	3B		N87-3008-46 N99-0321-05	BRAZIER HEAD TAPTITE SCREW3X8 SCREW SET		
52 53	3A	*	T07-0265-05 T91-0362-15	SPEAKER MICROPHONE(WITH CORD)		
8 8	3A 3A	* *	B38-0332-05 B38-0333-05	LCD ASSY(FULL FUNCTION) LCD ASSY(BASIC)	HK K	
55 55	2A, 3B 2A, 3B	* *	X57-3560-11 X57-3570-11	TX·RX UNIT TX·RX UNIT	HK K	
TX-RX UNIT (X57-3560-11) : TK-931(HD)						
C1 C3 -9 C10 C11 -15 C18			C92-0004-05 CK73FB1H103K CE04EW1C470M CC73FCH1H101J CC73FCH1H101J	CHIP-TAN CHIP C ELECTRO CHIP C CHIP C	1.0UF 16WV 0.010UF K 47UF 16WV 100PF J 100PF J	
C19 ,20 C21 C23 ,24 C25 -32 C33			CC73FCH1H100D CE04EW1C470M CK73FB1H223K CC73FCH1H101J CK73FB1H103K	CHIP C ELECTRO CHIP C CHIP C CHIP C	10PF D 47UF 16WV 0.022UF K 100PF J 0.010UF K	
C34 ,35 C100 C101-103 C104 C105,106			CC73FCH1H101J CE04EW1C470M CK73FB1H103K CE04EW1C470M CK73FB1H103K	CHIP C ELECTRO CHIP C ELECTRO CHIP C	100PF J 47UF 16WV 0.010UF K 47UF 16WV 0.010UF K	
C107,108 C109 C110 C111 C112			CE04EW1C470M CK73EB1H104K CK73EF1C105Z CK73FB1H103K CE04EW1C470M	ELECTRO CHIP C CHIP C CHIP C ELECTRO	47UF 16WV 0.10UF K 1.0UF Z 0.010UF K 47UF 16WV	
C113 C114 C115 C116 C117			CC73FCH1H101J CE04EW1C470M CK73FB1H103K CE04EW1C470M C90-2076-05	CHIP C ELECTRO CHIP C ELECTRO ELECTRO	100PF J 47UF 16WV 0.010UF K 47UF 16WV 560UF 10WV	
C118 C119 C121 C122 C123			CE04EW1C470M CQ92M1H104K CK73EB1H104K CK73FB1H103K CK73EB1H104K	ELECTRO MYLAR CHIP C CHIP C CHIP C	47UF 16WV 0.10UF K 0.10UF K 0.010UF K 0.10UF K	
C124 C125,126 C127 C128-130 C131		*	CK73FB1H223K CK73EF1C105Z CE04EW1C470M CK73FB1E303K CE04EW1C470M	CHIP C CHIP C ELECTRO CHIP C ELECTRO	0.022UF K 1.0UF Z 47UF 16WV 0.030UF K 47UF 16WV	
C132,133 C134 C135-137 C139 C140-143			CK73EB1H104K CK73FB1H103K CK73EB1H104K CC73FCH1H101J CK73FB1H102K	CHIP C CHIP C CHIP C CHIP C CHIP C	0.10UF K 0.010UF K 0.10UF K 100PF J 1000PF K	
C145 C146 C147 C148			CK73FB1H223K CK73FB1H222K CK73FB1H223K CE04EW1C470M	CHIP C CHIP C CHIP C ELECTRO	0.022UF K 2200PF K 0.022UF K 47UF 16WV	

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PARTS LIST

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TX-RX UNIT (X57-3560-11) : TK-931(HD)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C149			CK73FB1H223K	CHIP C 0.022UF K		
C150			CC73FCH1H100D	CHIP C 10PF D		
C151, 152			CC73FCH1H101J	CHIP C 100PF J		
C155			CC73FCH1H101J	CHIP C 100PF J		
C156			CK73FB1H122K	CHIP C 1200PF K		
C157		*	CC73FCH1H751J	CHIP C 750PF J		
C158			CK73FB1H332K	CHIP C 3300PF K		
C159			CC73FCH1H181J	CHIP C 180PF J		
C160			CE04EW1C470M	ELECTRØ 47UF 16WV		
C161, 162			CK73FB1E104K	CHIP C 0.10UF K		
C163-165			CC73FCH1H101J	CHIP C 100PF J		
C166			CK73EF1C105Z	CHIP C 1.0UF Z		
C168			CC73FCH1H101J	CHIP C 100PF J		
C170			CK73FB1H102K	CHIP C 1000PF K		
C171			CK73FB1H103K	CHIP C 0.010UF K		
C172-175			CC73FCH1H101J	CHIP C 100PF J		
C200, 201			CK73FB1H103K	CHIP C 0.010UF K		
C202, 203			CC73FCH1H471J	CHIP C 470PF J		
C204			CK73EB1H473K	CHIP C 0.047UF K		
C205			CC73FCH1H0R5C	CHIP C 0.5PF C		
C206			C92-0004-05	CHIP-TAN 1.0UF 16WV		
C207			CK73EB1H473K	CHIP C 0.047UF K		
C208, 209			CC73FCH1H471J	CHIP C 470PF J		
C210-212			CC73FCH1H101J	CHIP C 100PF J		
C213			CE04EW1C470M	ELECTRØ 47UF 16WV		
C214			CK73FB1H103K	CHIP C 0.010UF K		
C215			CK73FB1H102K	CHIP C 1000PF K		
C216			C92-0004-05	CHIP-TAN 1.0UF 16WV		
C217			CK73FB1H102K	CHIP C 1000PF K		
C218, 219			CC73FCH1H471J	CHIP C 470PF J		
C220			CC73FCH1H020C	CHIP C 2.0PF C		
C221, 222			CC73FCH1H0R5C	CHIP C 0.5PF C		
C223			CK73FB1H102K	CHIP C 1000PF K		
C224			CC73FCH1H050C	CHIP C 5PF C		
C225			CC73FCH1H040C	CHIP C 4PF C		
C226			CC73FCH1H080D	CHIP C 8PF D		
C227			CK73FB1H102K	CHIP C 1000PF K		
C228			CC73FCH1H070D	CHIP C 7PF D		
C229			CC73FCH1H070D	CHIP C 7PF D		
C230			CC73FCH1H010C	CHIP C 1PF C		
C231			CK73FB1H102K	CHIP C 1000PF K		
C232			CC73FCH1H030C	CHIP C 3PF C		
C234			CC73FCH1H470J	CHIP C 47PF J		
C235			CC73FCH1H030C	CHIP C 3PF C		
C237			CC73FCH1H470J	CHIP C 47PF J		
C238, 239			CC73FCH1H010C	CHIP C 1PF C		
C240			CC73FCH1H470J	CHIP C 47PF J		
C241			CC73FCH1H020C	CHIP C 2.0PF C		
C242, 243			CC73FCH1H470J	CHIP C 47PF J		
C244			CC73FCH1H030C	CHIP C 3PF C		
C245			CC73FCH1H101J	CHIP C 100PF J		
C246-248			CC73FCH1H470J	CHIP C 47PF J		
C249, 250			CC73FCH1H471J	CHIP C 470PF J		
C251			CK73FB1H102K	CHIP C 1000PF K		
C252			C90-2041-05	ERECTRØ 10UF 10WV		

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⚠ indicates safety critical components.

TK-931/931(HD)

PARTS LIST

× New Parts

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Telle ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-3560-11) : TK-931(HD)


Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
C253, 254			CC73FCH1H101J	CHIP C 100PF J		
C300			CC73FCH1H470J	CHIP C 47PF J		
C301			CC73FCH1H020C	CHIP C 2.0PF C		
C302-305			CC73FCH1H471J	CHIP C 470PF J		
C306			CC73FCH1H040C	CHIP C 4PF C		
C307			CC73FCH1H020C	CHIP C 2.0PF C		
C308			CC73FCH1H030C	CHIP C 3.0PF C		
C309, 310			CC73FCH1H020C	CHIP C 2.0PF C		
C311			CC73FCH1H040C	CHIP C 4PF C		
C312, 313			CK73FB1H102K	CHIP C 1000PF K		
C314, 315			CK73FB1H103K	CHIP C 0.010UF K		
C316			CC73FCH1H100D	CHIP C 10PF D		
C317			CC73FCH1H120J	CHIP C 12PF J		
C318			CK73FB1H102K	CHIP C 1000PF K		
C319, 320			CK73EB1H104K	CHIP C 0.10UF K		
C321			C90-2041-05	ELECTRO 10UF 10WV		
C322			CK73EB1H104K	CHIP C 0.10UF K		
C323, 324			CK73FB1H102K	CHIP C 1000PF K		
C325			CC73FCH1H220J	CHIP C 22PF J		
C326			CC73FCH1H020C	CHIP C 2.0PF C		
C327			CC73FCH1H101J	CHIP C 100PF J		
C400			CK73FB1H102K	CHIP C 1000PF K		
C401, 402			CC73FCH1H470J	CHIP C 47PF J		
C403			CK73FB1H102K	CHIP C 1000PF K		
C404			CC73FCH1H471J	CHIP C 470PF J		
C405			CE04EW1C470M	ELECTRO 47UF 16WV		
C406			CC73FCH1H470J	CHIP C 47PF J		
C407, 408			CK73FB1H102K	CHIP C 1000PF K		
C409			CE04EW1C470M	ELECTRO 47UF 16WV		
C410			CC73FCH1H470J	CHIP C 47PF J		
C411			CK73FB1H102K	CHIP C 1000PF K		
C412			CC73FCH1H470J	CHIP C 47PF J		
C413			CE04EW1C470M	ELECTRO 47UF 16WV		
C414			CC73FCH1H470J	CHIP C 47PF J		
C415, 416			CK73FB1H102K	CHIP C 1000PF K		
C417, 418			CC73FCH1H471J	CHIP C 470PF J		
C419			CK73FB1H102K	CHIP C 1000PF K		
C420			CK73FB1H473K	CHIP C 0.047UF K		
C421			CK73EB1H104K	CHIP C 0.10UF K		
C422			CK73EB1H104K	CHIP C 0.10UF K		
C423			CC73FCH1H0R5C	CHIP C 0.5PF C		
C425			CC73FCH1H471J	CHIP C 470PF J		
C427			CK73FB1H102K	CHIP C 1000PF K		
C428			CK73FB1H103K	CHIP C 0.010UF K		
C429			CK73FB1H102K	CHIP C 1000PF K		
C430			CC73FCH1H470J	CHIP C 47PF J		
C431			CM73F2H030D	CHIP C 3.00F D		
C433			CM73F2H120J	CHIP C 12PF J		
C434			CM73F2H060D	CHIP C 6.0PF D		
C435			CM73F2H030D	CHIP C 3.00F D		
C436			CM73F2H470J	CHIP C 47PF J		
C437			CM73F2H020C	CHIP C 2.0PF C		
C438			CM73F2H040D	CHIP C 4.0PF D		
C439			CM73F2H020C	CHIP C 2.0PF C		
C440			CC73ECH1H470J	CHIP C 47PF J		

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 indicates safety critical components.

PARTS LIST

× New Parts

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Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-3560-11) : TK-931(HD)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C441			CM73F2H470J	CHIP C 47PF J		
C442			CC73FCH1H470J	CHIP C 47PF J		
C443			CK73FB1H102K	CHIP C 1000PF K		
C444			CC73ECH1H470J	CHIP C 47PF J		
C445			CK73EB1H102K	CHIP C 1000PF K		
C446			CM73F2H020C	CHIP C 2.0PF C		
C447			CC73FCH1H040C	CHIP C 4PF C		
C448			CC73ECH1H020C	CHIP C 2PF C		
C449			CK73FB1H103K	CHIP C 0.010UF K		
C450			CE04EW1C102M	ELECTRO 1000UF 16WV		
C451			CM73F2H120J	CHIP C 12PF J		
C452, 453			CM73F2H180J	CHIP C 18PF J		
C454			C90-2041-05	ERECTRO 10UF 10WV		
C455			CC73FCH1H470J	CHIP C 47PF J		
C456			CK73FB1H102K	CHIP C 1000PF K		
C457			CK73FB1H103K	CHIP C 0.010UF K		
C458			CM73F2H470J	CHIP C 47PF J		
C459			CK73EB1H102K	CHIP C 1000PF K		
C460			CK73FB1H103K	CHIP C 0.010UF K		
C461			CM73F2H030D	CHIP C 3.00F D		
C462			CK73FB1H102K	CHIP C 1000PF K		
C463			CC73FCH1H101J	CHIP C 100PF J		
C464			CC73FCH1H010C	CHIP C 1PF C		
C465			CC73FCH1H470J	CHIP C 47PF J		
C466			CC73FCH1H470J	CHIP C 47PF J		
C467			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C468			CC73FCH1H470J	CHIP C 47PF J		
C469			CC73FCH1H101J	CHIP C 100PF J		
C470, 471			CC73FCH1H470J	CHIP C 47PF J		
TC300			C05-0369-05	TRIMMING CAP(6P)		
A1			E29-0468-14	TERMINAL(ANT-TX-RX)		
CN1		*	E40-3312-05	PIN CONNECTOR(15P)		
CN2		*	E40-5428-05	PIN CONNECTOR(16P)		
CN3			E40-3260-05	PIN CONNECTOR(2P)		
CN4			E40-3266-05	PIN CONNECTOR(8P)		
CN5			E02-2010-05	IC SOCKET(8P)		
CN6			E02-2015-05	IC SOCKET(28P)		
CN7			E02-2010-05	IC SOCKET(8P)		
J1			E08-0673-05	RECTANGULAR RECEPTACLE(MIC 6P)		
TP200			E23-0464-05	TERMINAL		
CF300			L72-0360-05	CERAMIC FILTER(455KHZ)		
L200, 201			L40-1092-48	SMALL FIXED INDUCTOR(1UH)		
L202		*	L34-4240-05	COIL		
L203, 204			L40-1292-48	SMALL FIXED INDUCTOR(1.2UH)		
L205			L40-1092-48	SMALL FIXED INDUCTOR(1UH)		
L206			L40-3372-48	SMALL FIXED INDUCTOR(33NH)		
L207			L40-1572-48	SMALL FIXED INDUCTOR(15NH)		
L208, 209			L40-1072-48	SMALL FIXED INDUCTOR(10NH)		
L300		*	L34-4237-05	COIL		
L301		*	L34-4238-05	COIL		
L302		*	L34-4239-05	COIL		
L303			L40-8282-48	SMALL FIXED INDUCTOR(820NH)		
L304			L30-0503-05	IFT		
L305		*	L79-0898-05	FILTER		
L306		*	L79-0897-05	FILTER		

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TK-931/931(HD)

PARTS LIST

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TX-RX UNIT (X57-3560-11) : TK-931(HD)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
L307		*	L40-1572-48	SMALL FIXED INDUCTOR(15NH)		
L400-402			L33-0697-05	CHOKER COIL		
L403,404		*	L34-1308-05	COIL(2T)		
L405		*	L34-1309-05	COIL(2.5T)		
L406		*	L34-1306-05	COIL(4.5T)		
L407,408		*	L34-1313-05	COIL(2T)		
L409		*	L34-1318-05	COIL(5T)		
L410		*	L34-1329-05	COIL(3T)		
L411			L33-0679-05	CHOKER COIL		
L412		*	L34-1306-05	COIL(4.5T)		
L413			L40-3372-48	SMALL FIXED INDUCTOR(33NH)		
X1			L77-1355-05	CRYSTAL RESONATOR(12.0MHZ)		
X300		*	L77-1434-05	CRYSTAL RESONATOR(38.5825MHZ)		
XF300		*	L71-0408-05	MCF(39.0375MHZ)		
Z200		*	L77-1433-05	VCXO(12.8MHZ)		
R1			RK73FB2A153J	CHIP R 15K J 1/10W		
R2			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R3			RK73FB2A473J	CHIP R 47K J 1/10W		
R4			RK73FB2A684J	CHIP R 680K J 1/10W		
R5			RK73FB2A334J	CHIP R 330K J 1/10W		
R6			RK73FB2A164J	CHIP R 160K J 1/10W		
R7 ,8			RK73FB2A823J	CHIP R 82K J 1/10W		
R9 -12			RK73FB2A103J	CHIP R 10K J 1/10W		
R13 ,14			RK73FB2A473J	CHIP R 47K J 1/10W		
R15 -22			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R23 -26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R28			RK73FB2A123J	CHIP R 12K J 1/10W		
R29			RK73FB2A153J	CHIP R 15K J 1/10W		
R30			RK73FB2A473J	CHIP R 47K J 1/10W		
R31 ,32			RK73FB2A223J	CHIP R 22K J 1/10W		
R33			RK73FB2A103J	CHIP R 10K J 1/10W		
R34			RK73FB2A473J	CHIP R 47K J 1/10W		
R35			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R36			RK73FB2A823J	CHIP R 82K J 1/10W		
R37 ,38			RK73FB2A473J	CHIP R 47K J 1/10W		
R39			RK73FB2A103J	CHIP R 10K J 1/10W		
R40			R92-0341-05	FIXED RESISTOR(4.7 0.25W)		
R41			RS14DB3D2R2J	FL-PROOF RS 2.2 J 2W		
R100			RK73FB2A473J	CHIP R 47K J 1/10W		
R101			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R102			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R103			RK73FB2A473J	CHIP R 47K J 1/10W		
R104			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R105,106			RK73FB2A473J	CHIP R 47K J 1/10W		
H107			R92-1215-05	CHIP R 470 J 1/2W		
H108			RK73FB2A472J	CHIP R 4.7K J 1/10W		
H109			RK73FB2A102J	CHIP R 1.0K J 1/10W		
H110,111			RK73FB2A103J	CHIP R 10K J 1/10W		
H112			RK73FB2A104J	CHIP R 100K J 1/10W		
H113			RK73FB2A221J	CHIP R 220 J 1/10W		
H115		*	RK73EB2B1R0K	CHIP R 1.0 K 1/8W		
H116			RK73FB2A103J	CHIP R 10K J 1/10W		
H117			RK73FB2A473J	CHIP R 47K J 1/10W		
H118			RK73FB2A103J	CHIP R 10K J 1/10W		

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TX-RX UNIT (X57-3560-11) : TK-931(HD)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R119			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R120			RK73FB2A103J	CHIP R 10K J 1/10W		
R121			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R122			RK73FB2A103J	CHIP R 10K J 1/10W		
R123			RK73FB2A334J	CHIP R 330K J 1/10W		
R124			RK73FB2A103J	CHIP R 10K J 1/10W		
R126			RK73FB2A103J	CHIP R 10K J 1/10W		
R127			RK73FB2A153J	CHIP R 15K J 1/10W		
R130, 131			RK73FB2A224J	CHIP R 220K J 1/10W		
R132			RK73FB2A103J	CHIP R 10K J 1/10W		
R133			RK73FB2A563J	CHIP R 56K J 1/10W		
R134			RK73FB2A473J	CHIP R 47K J 1/10W		
R135			RK73FB2A333J	CHIP R 33K J 1/10W		
R136			RK73FB2A164J	CHIP R 160K J 1/10W		
R137			RK73FB2A103J	CHIP R 10K J 1/10W		
R140			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R141			RK73FB2A681J	CHIP R 680 J 1/10W		
R142, 143			RK73FB2A104J	CHIP R 100K J 1/10W		
R144			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R145			RK73FB2A223J	CHIP R 22K J 1/10W		
R146			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R147			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R148			RK73FB2A223J	CHIP R 22K J 1/10W		
R150			RK73FB2A684J	CHIP R 680K J 1/10W		
R151, 152			RK73FB2A223J	CHIP R 22K J 1/10W		
R153			RK73FB2A473J	CHIP R 47K J 1/10W		
R154			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R155			RK73FB2A243J	CHIP R 24K J 1/10W		
R156			RK73FB2A273J	CHIP R 27K J 1/10W		
R157			RK73FB2A223J	CHIP R 22K J 1/10W		
R158			RK73FB2A474J	CHIP R 470K J 1/10W		
R159			RK73FB2A561J	CHIP R 560 J 1/10W		
R160			RK73FB2A474J	CHIP R 470K J 1/10W		
R161			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R162			RK73FB2A153J	CHIP R 15K J 1/10W		
R163			RK73FB2A103J	CHIP R 10K J 1/10W		
R164			RK73FB2A223J	CHIP R 22K J 1/10W		
R165, 166			RK73FB2A123J	CHIP R 12K J 1/10W		
R168			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R173			RK73FB2A223J	CHIP R 22K J 1/10W		
R174, 175			RK73FB2A823J	CHIP R 82K J 1/10W		
R176, 177			RK73FB2A683J	CHIP R 68K J 1/10W		
R180, 181			RK73FB2A103J	CHIP R 10K J 1/10W		
R182			RK73FB2A823J	CHIP R 82K J 1/10W		
R185			RK73FB2A103J	CHIP R 10K J 1/10W		
R186			RK73FB2A243J	CHIP R 24K J 1/10W		
R187			RK73FB2A273J	CHIP R 27K J 1/10W		
R200			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R201			RK73FB2A103J	CHIP R 10K J 1/10W		
R202			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R204, 205			RK73FB2A223J	CHIP R 22K J 1/10W		
R206			RK73FB2A334J	CHIP R 330K J 1/10W		
R208			RK73FB2A473J	CHIP R 47K J 1/10W		
R209			RK73FB2A223J	CHIP R 22K J 1/10W		
R210			RK73FB2A102J	CHIP R 1.0K J 1/10W		

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TK-931/931(HD)

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TX-RX UNIT (X57-3560-11) : TK-931(HD)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R211, 212			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R213, 214			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R221, 222			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R223			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R224			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R225			RK73FB2A333J	CHIP R 33K J 1/10W		
R226			RK73FB2A101J	CHIP R 100 J 1/10W		
R227			RK73FB2A123J	CHIP R 12K J 1/10W		
R228			RK73FB2A104J	CHIP R 100K J 1/10W		
R229			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R230			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R231			RK73FB2A220J	CHIP R 22 J 1/10W		
R232			RK73FB2A181J	CHIP R 180 J 1/10W		
R233			RK73FB2A103J	CHIP R 10K J 1/10W		
R234			RK73FB2A223J	CHIP R 22K J 1/10W		
R235, 236			RK73FB2A101J	CHIP R 100 J 1/10W		
R237			RK73FB2A473J	CHIP R 47K J 1/10W		
R238			RK73FB2A101J	CHIP R 100 J 1/10W		
R239			RK73FB2A223J	CHIP R 22K J 1/10W		
R240			RK73FB2A103J	CHIP R 10K J 1/10W		
R241			RK73FB2A470J	CHIP R 47 J 1/10W		
R242, 243			RK73FB2A101J	CHIP R 100 J 1/10W		
R244			RK73FB2A183J	CHIP R 18K J 1/10W		
R245			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R246			RK73FB2A470J	CHIP R 47 J 1/10W		
R247			RK73FB2A101J	CHIP R 100 J 1/10W		
R248			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R249			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R250, 251			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R252			RK73FB2A151J	CHIP R 150 J 1/10W		
R253			RK73FB2A390J	CHIP R 39 J 1/10W		
R254			RK73FB2A151J	CHIP R 150 J 1/10W		
R256			RK73FB2A471J	CHIP R 470 J 1/10W		
R258			RK73FB2A104J	CHIP R 100K J 1/10W		
R300			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R301			RK73FB2A473J	CHIP R 47K J 1/10W		
R302		*	R92-1261-05	FIXED RESISTOR(150 0.5W)		
R305, 306			RK73FB2A101J	CHIP R 100 J 1/10W		
R307			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R308			RK73FB2A681J	CHIP R 680 J 1/10W		
R309			RK73FB2A220J	CHIP R 22 J 1/10W		
R310			RK73FB2A223J	CHIP R 22K J 1/10W		
R311			RK73FB2A220J	CHIP R 22 J 1/10W		
R312			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R313			RK73FB2A103J	CHIP R 10K J 1/10W		
R400			RK73FB2A121J	CHIP R 120 J 1/10W		
R401			RK73FB2A470J	CHIP R 47 J 1/10W		
R402			RK73FB2A121J	CHIP R 120 J 1/10W		
R403, 404			R92-0699-05	SOLID 10 1/2W		
R406			RK73EB2B271J	CHIP R 270 J 1/8W		
R407, 408		*	RK73EB2B390J	CHIP R 39 J 1/8W		
R409			RK73EB2B271J	CHIP R 270 J 1/8W		
R410			RK73EB2B151J	CHIP R 150 J 1/8W		
R411			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R412, 413			RK73FB2A470J	CHIP R 47 J 1/10W		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R414			RK73FB2A164J	CHIP R 160K J 1/10W		
R415			RK73EB2B181J	CHIP R 180 J 1/8W		
R416			RK73FB2A223J	CHIP R 22K J 1/10W		
R417, 418			R92-1268-05	CHIP R 4.7K J 1/8W		
R419			RK73FB2A513J	CHIP R 51K J 1/10W		
R420			RK73EB2B272J	CHIP R 2.7K J 1/8W		
R421			R92-1268-05	CHIP R 4.7K J 1/8W		
R422			R92-1267-05	CHIP C 3.3K J 1/8W		
R423		*	R92-1260-05	FIXED RESISTOR(0.033 3W)		
R424			RK73FB2A473J	CHIP R 47K J 1/10W		
R425			RK73FB2A103J	CHIP R 10K J 1/10W		
R426			RK73FB2A103J	CHIP R 10K J 1/10W		
R427			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R428		*	R92-1261-05	FIXED RESISTOR(150 0.5W)		
R432			R92-1269-05	CHIP R 2.2K J 1/8W		
R433			R92-0679-05	CHIP R 0 OHM		
R434			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R435, 436			RK73FB2A471J	CHIP R 470 J 1/10W		
R437			RK73FB2A272J	CHIP R 2.7K J 1/10W		
VR1		*	R12-4414-05	TRIMMING POT(50K)		
VR100		*	R12-6585-05	TRIMMING POT(47K)		
VR101		*	R12-6575-05	TRIMMING POT(1K)		
VR102		*	R12-6585-05	TRIMMING POT(47K)		
VR200		*	R12-6585-05	TRIMMING POT(47K)		
VR400, 401		*	R12-6583-05	TRIMMING POT(22K)		
W1			R92-0670-05	CHIP R 0 OHM		
W300			R92-0670-05	CHIP R 0 OHM		
W301			R92-0670-05	CHIP R 0 OHM		
W401			R92-0670-05	CHIP R 0 OHM		
SW100			S31-1411-05	SLIDE SWITCH		
D1 -5			1SS226	DIODE		
D100, 101			1SS184	DIODE		
D103		*	RD20M-B1	ZENER DIODE		
D200			HSK277	CHIP DIODE		
D201			1SS184	DIODE		
D202			1SV164	DIODE		
D203, 204			1T33C	VARACTOR DIODE		
D205, 206			1SV128	DIODE		
D300			1SS184	DIODE		
D301			HSM88ASR	DIODE		
D400		*	ERZ-M10DK220	SERGE ABSORBER		
D401			DSA3A1	DIODE		
D402			1SS184	DIODE		
D403			UM9401	DIODE		
D404			MI308	DIODE		
D405			MI808	DIODE		
D406			HSM88ASR	DIODE		
D407			1SS184	DIODE		
IC1			M51943BML	IC(SYSTEM RESET)		
IC2		*	27C256QB-JBJ1	IC(EPROM)		
IC3		*	HD74HC373FP	IC(D TYPE LATCHES)		
IC4		*	UPD78310G	IC(MICROPROCESSOR)		
IC5			NMC93CS66EN	IC(IC(4K EPROM))		
IC6		*	X24C16I	IC(EPROM)		

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▲ indicates safety critical components.

TK-931/931(HD)

PARTS LIST

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Telle ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-3560-11) : TK-931(HD)

TX-RX UNIT (X57-3570-11) : TK-931


Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
IC100			NJM78L05UA	IC(VOLTAGE REGULATOR/ +5V)		
IC101			UPC7808H	IC(VOLTAGE REGULATOR/ +8V)		
IC102			UPC1242H	IC(AF POWER AMP)LIFIER)		
IC103		*	M5282FP	IC(ELECTRONIC ATTENUATOR)		
IC104-109			NJM4558M	IC(OP AMP X2)		
IC200			TC9174F	IC(CMOS 1/0)EXPANDER)		
IC201			MB1501PF	IC(PLL)		
IC203			TC4S66F	IC(BILATERAL SWITCH)		
IC204			TC4S584F	IC(SCHMITT TRIGGER)		
IC300			MC3361D	IC(FM IF SYSTEM)		
IC400		*	M57781	IC(POWER MODULE:PRI-DRIVE)		
IC401		*	MHW820-3	IC(POWER MODULE:DRIVE)		
IC402			NJM2904M	IC(OP AMP X2)		
Q100			2SB1119S	TRANSISTOR		
Q101			2SC2712(Y)	TRANSISTOR		
Q102			2SB1119S	TRANSISTOR		
Q103			2SB1302S	TRANSISTOR		
Q104			2SA1162(Y)	TRANSISTOR		
Q105			DTC114EK	DIGITAL TRANSISTOR		
Q106,107		*	DTC314TK	DIGITAL TRANSISTOR		
Q108,109			DTC114EK	DIGITAL TRANSISTOR		
Q110			DTA114EK	DIGITAL TRANSISTOR		
Q111			2SD1624(S,T)	TRANSISTOR		
Q200			2SC3356	TRANSISTOR		
Q201		*	DTC314TK	DIGITAL TRANSISTOR		
Q202,203			2SC3356	TRANSISTOR		
Q204			2SA1162(Y)	TRANSISTOR		
Q205			DTA114EK	DIGITAL TRANSISTOR		
Q206			2SK508NV(K52)	FET		
Q207			2SC3356	TRANSISTOR		
Q300			2SC4093	TRANSISTOR		
Q301			3SK184(R)	FET		
Q302			2SK302(GR)	FET		
Q400,405			DTC114EK	DIGITAL TRANSISTOR		
Q401		*	2SB967(Q)	TRANSISTOR		
Q402			2SC2712(Y)	TRANSISTOR		
Q403			DTA114EK	DIGITAL TRANSISTOR		
Q404		*	MRF847	TRANSISTOR(RF POWER)		
TH100		*	157-302-53008	THERMISTOR(3K)		
TH400,401		*	157-203-55009	THERMISTOR(20K)		
TX-RX UNIT (X57-3570-11) : TK-931						
C1			C92-0004-05	CHIP-TAN	1.0UF	16WV
C3 -5			CK73FB1H103K	CHIP C	0.010UF	K
C7 -9			CK73FB1H103K	CHIP C	0.010UF	K
C10			CE04EW1C470M	ELECTRO	47UF	16WV
C11 -15			CC73FCH1H101J	CHIP C	100PF	J
C18			CC73FCH1H101J	CHIP C	100PF	J
C21			CE04EW1C470M	ELECTRO	47UF	16WV
C23 ,24			CK73FB1H223K	CHIP C	0.022UF	K
C25 -32			CC73FCH1H101J	CHIP C	100PF	J
C33			CK73FB1H103K	CHIP C	0.010UF	K
C34 ,35			CC73FCH1H101J	CHIP C	100PF	J
C100			CE04EW1C470M	ELECTRO	47UF	16WV
C101-103			CK73FB1H103K	CHIP C	0.010UF	K
C104			CE04EW1C470M	ELECTRO	47UF	16WV

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TX-RX UNIT (X57-3570-11) : TK-931

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C105, 106			CK73FB1H103K	CHIP C 0.010UF K		
C107, 108			CE04EW1C470M	ELECTRØ 47UF 16WV		
C109			CK73EB1H104K	CHIP C 0.10UF K		
C110			CK73EF1C105Z	CHIP C 1.0UF Z		
C111			CK73FB1H103K	CHIP C 0.010UF K		
C112			CE04EW1C470M	ELECTRØ 47UF 16WV		
C113			CC73FCH1H101J	CHIP C 100PF J		
C114			CE04EW1C470M	ELECTRØ 47UF 16WV		
C115			CK73FB1H103K	CHIP C 0.010UF K		
C116			CE04EW1C470M	ELECTRØ 47UF 16WV		
C117			C90-2076-05	ELECTRØ 560UF 10WV		
C118			CE04EW1C470M	ELECTRØ 47UF 16WV		
C119			CQ92M1H104K	MYLAR 0.10UF K		
C121			CK73EB1H104K	CHIP C 0.10UF K		
C122			CK73FB1H103K	CHIP C 0.010UF K		
C123			CK73EB1H104K	CHIP C 0.10UF K		
C124			CK73FB1H223K	CHIP C 0.022UF K		
C125, 126			CK73EF1C105Z	CHIP C 1.0UF Z		
C127			CE04EW1C470M	ELECTRØ 47UF 16WV		
C128-130		*	CK73FB1E303K	CHIP C 0.030UF K		
C131			CE04EW1C470M	ELECTRØ 47UF 16WV		
C132, 133			CK73EB1H104K	CHIP C 0.10UF K		
C134			CK73FB1H103K	CHIP C 0.010UF K		
C135-137			CK73EB1H104K	CHIP C 0.10UF K		
C139			CC73FCH1H101J	CHIP C 100PF J		
C140-143			CK73FB1H102K	CHIP C 1000PF K		
C145			CK73FB1H223K	CHIP C 0.022UF K		
C146			CK73FB1H222K	CHIP C 2200PF K		
C147			CK73FB1H223K	CHIP C 0.022UF K		
C148			CE04EW1C470M	ELECTRØ 47UF 16WV		
C149			CK73FB1H223K	CHIP C 0.022UF K		
C151, 152			CC73FCH1H101J	CHIP C 100PF J		
C155			CC73FCH1H101J	CHIP C 100PF J		
C156			CK73FB1H122K	CHIP C 1200PF K		
C157		*	CC73FCH1H751J	CHIP C 750PF J		
C158			CK73FB1H332K	CHIP C 3300PF K		
C159			CC73FCH1H181J	CHIP C 180PF J		
C160			CE04EW1C470M	ELECTRØ 47UF 16WV		
C161, 162			CK73FB1E104K	CHIP C 0.10UF K		
C163-165			CC73FCH1H101J	CHIP C 100PF J		
C166			CK73EF1C105Z	CHIP C 1.0UF Z		
C168			CC73FCH1H101J	CHIP C 100PF J		
C170			CK73FB1H102K	CHIP C 1000PF K		
C171			CK73FB1H103K	CHIP C 0.010UF K		
C172-175			CC73FCH1H101J	CHIP C 100PF J		
C180			CC73FCH1H100D	CHIP C 10PF D		
C200, 201			CK73FB1H103K	CHIP C 0.010UF K		
C202, 203			CC73FCH1H471J	CHIP C 470PF J		
C204			CK73EB1H473K	CHIP C 0.047UF K		
C205			CC73FCH1H0R5C	CHIP C 0.5PF C		
C206			C92-0004-05	CHIP-TAN 1.0UF 16WV		
C207			CK73EB1H473K	CHIP C 0.047UF K		
C210-212			CC73FCH1H101J	CHIP C 100PF J		
C213			CE04EW1C470M	ELECTRØ 47UF 16WV		
C214			CK73FB1H103K	CHIP C 0.010UF K		

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PARTS LIST

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TX-RX UNIT (X57-3570-11) : TK-931

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C215			CK73FB1H102K	CHIP C 1000PF K		
C216			C92-0004-05	CHIP-TAN 1.0UF 16WV		
C217			CK73FB1H102K	CHIP C 1000PF K		
C218, 219			CC73FCH1H471J	CHIP C 470PF J		
C220			CC73FCH1H020C	CHIP C 2.0PF C		
C221, 222			CC73FCH1H0R5C	CHIP C 0.5PF C		
C223			CK73FB1H102K	CHIP C 1000PF K		
C224			CC73FCH1H050C	CHIP C 5PF C		
C225			CC73FCH1H060D	CHIP C 6PF D		
C226			CC73FCH1H100D	CHIP C 10PF D		
C227			CK73FB1H102K	CHIP C 1000PF K		
C228			CC73FCH1H070D	CHIP C 7PF D		
C229			CC73FCH1H070D	CHIP C 7PF D		
C230			CC73FCH1H010C	CHIP C 1PF C		
C231			CK73FB1H102K	CHIP C 1000PF K		
C232			CC73FCH1H030C	CHIP C 3PF C		
C234			CC73FCH1H470J	CHIP C 47PF J		
C235			CC73FCH1H030C	CHIP C 3PF C		
C237			CC73FCH1H470J	CHIP C 47PF J		
C238, 239			CC73FCH1H010C	CHIP C 1PF C		
C240			CC73FCH1H470J	CHIP C 47PF J		
C241			CC73FCH1H020C	CHIP C 2.0PF C		
C242			CC73FCH1H220J	CHIP C 22PF J		
C243			CC73FCH1H470J	CHIP C 47PF J		
C244			CC73FCH1H030C	CHIP C 3PF C		
C245			CC73FCH1H101J	CHIP C 100PF J		
C246-248			CC73FCH1H470J	CHIP C 47PF J		
C249, 250			CC73FCH1H471J	CHIP C 470PF J		
C251			CK73FB1H102K	CHIP C 1000PF K		
C252			C90-2041-05	RECTRO 10UF 10WV		
C253			CC73FCH1H101J	CHIP C 100PF J		
C254			CC73FCH1H101J	CHIP C 100PF J		
C300			CC73FCH1H470J	CHIP C 47PF J		
C301			CC73FCH1H020C	CHIP C 2.0PF C		
C302-305			CC73FCH1H471J	CHIP C 470PF J		
C306			CC73FCH1H040C	CHIP C 4PF C		
C308			CC73FCH1H020C	CHIP C 2.0PF C		
C310			CC73FCH1H020C	CHIP C 2.0PF C		
C312, 313			CK73FB1H102K	CHIP C 1000PF K		
C314, 315			CK73FB1H103K	CHIP C 0.010UF K		
C316			CC73FCH1H100D	CHIP C 10PF D		
C317			CC73FCH1H120J	CHIP C 12PF J		
C318			CK73FB1H102K	CHIP C 1000PF K		
C319, 320			CK73EB1H104K	CHIP C 0.10UF K		
C321			C90-2041-05	RECTRO 10UF 10WV		
C322			CK73EB1H104K	CHIP C 0.10UF K		
C323, 324			CK73FB1H102K	CHIP C 1000PF K		
C325			CC73FCH1H220J	CHIP C 22PF J		
C326			CC73FCH1H020C	CHIP C 2.0PF C		
C400			CK73FB1H102K	CHIP C 1000PF K		
C401, 402			CC73FCH1H470J	CHIP C 47PF J		
C403			CK73FB1H102K	CHIP C 1000PF K		
C404			CC73FCH1H471J	CHIP C 470PF J		
C405			CE04EW1C470M	ELECTRO 47UF 16WV		
C406			CC73FCH1H470J	CHIP C 47PF J		

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TX-RX UNIT (X57-3570-11) : TK-931

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C407, 408			CK73FB1H102K	CHIP C 1000PF K		
C409			CE04EW1C470M	ELECTRØ 47UF 16WV		
C410			CC73FCH1H470J	CHIP C 47PF J		
C411			CK73FB1H102K	CHIP C 1000PF K		
C412			CC73FCH1H470J	CHIP C 47PF J		
C413			CE04EW1C470M	ELECTRØ 47UF 16WV		
C414			CC73FCH1H470J	CHIP C 47PF J		
C415, 416			CK73FB1H102K	CHIP C 1000PF K		
C417, 418			CC73FCH1H471J	CHIP C 470PF J		
C419			CK73FB1H102K	CHIP C 1000PF K		
C420			CK73FB1H473K	CHIP C 0.047UF K		
C422			CM73F2H040D	CHIP C 4.0PF D		
C423			CM73F2H060D	CHIP C 6.0PF D		
C425			CC73FCH1H471J	CHIP C 470PF J		
C427			CK73FB1H102K	CHIP C 1000PF K		
C428			CK73FB1H103K	CHIP C 0.010UF K		
C429			CK73FB1H102K	CHIP C 1000PF K		
C430			CC73FCH1H470J	CHIP C 47PF J		
C435			CM73F2H040C	CHIP C 4.0PF C		
C436			CM73F2H470J	CHIP C 47PF J		
C440			CC73FCH1H470J	CHIP C 47PF J		
C441			CM73F2H470J	CHIP C 47PF J		
C442			CC73FCH1H470J	CHIP C 47PF J		
C443			CK73FB1H102K	CHIP C 1000PF K		
C444			CC73FCH1H470J	CHIP C 47PF J		
C445			CK73FB1H102K	CHIP C 1000PF K		
C446			CM73F2H020C	CHIP C 2.0PF C		
C447			CC73FCH1H020C	CHIP C 2.0PF C		
C449			CK73FB1H103K	CHIP C 0.010UF K		
C450			CE04EW1C102M	ELECTRØ 1000UF 16WV		
C454			C90-2041-05	ERECTRØ 10UF 10WV		
C455			CC73FCH1H470J	CHIP C 47PF J		
C456			CK73FB1H102K	CHIP C 1000PF K		
C457			CK73FB1H103K	CHIP C 0.010UF K		
C460			CK73FB1H103K	CHIP C 0.010UF K		
C462			CK73FB1H102K	CHIP C 1000PF K		
C463			CC73FCH1H101J	CHIP C 100PF J		
TC300			C05-0369-05	TRIMMING CAP(6PF)		
A1			E29-0468-14	TERMINAL(ANT-TX-RX)		
CN1		*	E40-3312-05	PIN CONNECTØR(15P)		
CN2		*	E40-5428-05	PIN CONNECTØR(16P)		
CN3			E40-3260-05	PIN CONNECTØR(2P)		
CN4			E40-3266-05	PIN CONNECTØR(8P)		
CN5			E02-2010-05	IC SOCKET(8P)		
CN6			E02-2015-05	IC SOCKET(28P)		
J1			E08-0673-05	RECTANGULAR RECEPTACLE(MIC:6P)		
TP200			E23-0464-05	TERMINAL		
CF300			L72-0360-05	CERAMIC FILTER(455KHZ)		
L200, 201			L40-1092-48	SMALL FIXED INDUCTØR(1UH)		
L202		*	L34-4240-05	CØIL		
L203, 204			L40-1292-48	SMALL FIXED INDUCTØR(1.2UH)		
L205			L40-1092-48	SMALL FIXED INDUCTØR(1UH)		
L206			L40-3372-48	SMALL FIXED INDUCTØR(33NH)		
L207			L40-1572-48	SMALL FIXED INDUCTØR(15NH)		

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TK-931/931(HD)

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TX-RX UNIT (X57-3570-11) : TK-931


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L208, 209			L40-1072-48	SMALL FIXED INDUCTOR(10NH)		
L300		*	L34-4237-05	COIL		
L301		*	L34-4238-05	COIL		
L302		*	L34-4239-05	COIL		
L303			L40-8282-48	SMALL FIXED INDUCTOR(820NH)		
L304			L30-0503-05	IFT		
L305		*	L79-0898-05	FILTER		
L306		*	L79-0897-05	FILTER		
L400-402			L33-0697-05	CHOKER COIL		
L405		*	L34-1312-05	COIL(2.5T)		
L406		*	L34-1306-05	COIL(5.5T)		
L407, 408		*	L34-1313-05	COIL(2T)		
L412		*	L34-1306-05	COIL(5.5T)		
X1			L77-1355-05	CRYSTAL RESONATOR(12.0MHZ)		
X300		*	L77-1434-05	CRYSTAL RESONATOR(38.5825MHZ)		
XF300			L71-0408-05	MCF(39.0375MHZ)		
Z200		*	L77-1433-05	VCXO(12.8MHZ)		
R1			RK73FB2A153J	CHIP R 15K J 1/10W		
R2			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R3			RK73FB2A473J	CHIP R 47K J 1/10W		
R4			RK73FB2A684J	CHIP R 680K J 1/10W		
R5			RK73FB2A334J	CHIP R 330K J 1/10W		
R6			RK73FB2A164J	CHIP R 160K J 1/10W		
R7 ,8			RK73FB2A823J	CHIP R 82K J 1/10W		
R9 -12			RK73FB2A103J	CHIP R 10K J 1/10W		
R13 ,14			RK73FB2A473J	CHIP R 47K J 1/10W		
R15 -22			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R23			RK73FB2A473J	CHIP R 47K J 1/10W		
R25 ,26			RK73FB2A473J	CHIP R 47K J 1/10W		
R27			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R28			RK73FB2A123J	CHIP R 12K J 1/10W		
R29			RK73FB2A153J	CHIP R 15K J 1/10W		
R30			RK73FB2A473J	CHIP R 47K J 1/10W		
R31 ,32			RK73FB2A223J	CHIP R 22K J 1/10W		
R33			RK73FB2A103J	CHIP R 10K J 1/10W		
R34			RK73FB2A473J	CHIP R 47K J 1/10W		
R35			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R36			RK73FB2A823J	CHIP R 82K J 1/10W		
R37 ,38			RK73FB2A473J	CHIP R 47K J 1/10W		
R39			RK73FB2A103J	CHIP R 10K J 1/10W		
R40			R92-0341-05	FIXED RESISTOR(4.7 0.25W)		
R41			RS14DB3D2R2J	FL-PROOF RS 2.2 J 2W		
R100			RK73FB2A473J	CHIP R 47K J 1/10W		
R101			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R102			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R103			RK73FB2A473J	CHIP R 47K J 1/10W		
R104			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R105, 106			RK73FB2A473J	CHIP R 47K J 1/10W		
R107			R92-1215-05	CHIP R 470 J 1/2W		
R108			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R109			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R110, 111			RK73FB2A103J	CHIP R 10K J 1/10W		
R112			RK73FB2A104J	CHIP R 100K J 1/10W		
R113			RK73FB2A221J	CHIP R 220 J 1/10W		

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

UE: AAFES(Europe) X: Australia

K :TK-931 K
HK :TK-931(HD) K

 indicates safety critical components.

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-3570-11) : TK-931

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R115		*	RK73FB2B1R0K	CHIP R 1.0 K 1/8W		
R116			RK73FB2A103J	CHIP R 10K J 1/10W		
R117			RK73FB2A473J	CHIP R 47K J 1/10W		
R118			RK73FB2A103J	CHIP R 10K J 1/10W		
R119			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R120			RK73FB2A103J	CHIP R 10K J 1/10W		
R121			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R122			RK73FB2A103J	CHIP R 10K J 1/10W		
R123			RK73FB2A334J	CHIP R 330K J 1/10W		
R124			RK73FB2A103J	CHIP R 10K J 1/10W		
R126			RK73FB2A103J	CHIP R 10K J 1/10W		
R127			RK73FB2A153J	CHIP R 15K J 1/10W		
R130, 131			RK73FB2A224J	CHIP R 220K J 1/10W		
R132			RK73FB2A103J	CHIP R 10K J 1/10W		
R133			RK73FB2A563J	CHIP R 56K J 1/10W		
R134			RK73FB2A473J	CHIP R 47K J 1/10W		
R135			RK73FB2A333J	CHIP R 33K J 1/10W		
R136			RK73FB2A164J	CHIP R 160K J 1/10W		
R137			RK73FB2A103J	CHIP R 10K J 1/10W		
R140			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R141			RK73FB2A681J	CHIP R 680 J 1/10W		
R142, 143			RK73FB2A104J	CHIP R 100K J 1/10W		
R144			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R145			RK73FB2A223J	CHIP R 22K J 1/10W		
R146			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R147			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R148			RK73FB2A223J	CHIP R 22K J 1/10W		
R149			RK73FB2A473J	CHIP R 47K J 1/10W		
R150			RK73FB2A684J	CHIP R 680K J 1/10W		
R151, 152			RK73FB2A223J	CHIP R 22K J 1/10W		
R153			RK73FB2A473J	CHIP R 47K J 1/10W		
R154			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R155			RK73FB2A243J	CHIP R 24K J 1/10W		
R156			RK73FB2A273J	CHIP R 27K J 1/10W		
R157			RK73FB2A223J	CHIP R 22K J 1/10W		
R158			RK73FB2A474J	CHIP R 470K J 1/10W		
R159			RK73FB2A561J	CHIP R 560 J 1/10W		
R160			RK73FB2A474J	CHIP R 470K J 1/10W		
R161			RK73FB2A272J	CHIP R 2.7K J 1/10W		
R162			RK73FB2A153J	CHIP R 15K J 1/10W		
R163			RK73FB2A103J	CHIP R 10K J 1/10W		
R164			RK73FB2A153J	CHIP R 15K J 1/10W		
R165, 166			RK73FB2A123J	CHIP R 12K J 1/10W		
R168			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R173			RK73FB2A223J	CHIP R 22K J 1/10W		
R174, 175			RK73FB2A823J	CHIP R 82K J 1/10W		
R176, 177			RK73FB2A683J	CHIP R 68K J 1/10W		
R180, 181			RK73FB2A103J	CHIP R 10K J 1/10W		
R182			RK73FB2A823J	CHIP R 82K J 1/10W		
R185			RK73FB2A103J	CHIP R 10K J 1/10W		
R186			RK73FB2A243J	CHIP R 24K J 1/10W		
R187			RK73FB2A273J	CHIP R 27K J 1/10W		
R200			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R201			RK73FB2A103J	CHIP R 10K J 1/10W		
R202			RK73FB2A472J	CHIP R 4.7K J 1/10W		

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⚠ indicates safety critical components.

TK-931/931(HD)

PARTS LIST

× New Parts

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TX-RX UNIT (X57-3570-11) : TK-931

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R204, 205			RK73FB2A223J	CHIP R 22K J 1/10W		
R206			RK73FB2A104J	CHIP R 100K J 1/10W		
R208			RK73FB2A473J	CHIP R 47K J 1/10W		
R209			RK73FB2A223J	CHIP R 22K J 1/10W		
R210			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R211, 212			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R213, 214			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R221, 222			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R223			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R224			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R225			RK73FB2A333J	CHIP R 33K J 1/10W		
R226			RK73FB2A101J	CHIP R 100 J 1/10W		
R227			RK73FB2A123J	CHIP R 12K J 1/10W		
R228			RK73FB2A104J	CHIP R 100K J 1/10W		
R229			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R230			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R231			RK73FB2A220J	CHIP R 22 J 1/10W		
R232			RK73FB2A181J	CHIP R 180 J 1/10W		
R233			RK73FB2A103J	CHIP R 10K J 1/10W		
R234			RK73FB2A223J	CHIP R 22K J 1/10W		
R235, 236			RK73FB2A101J	CHIP R 100 J 1/10W		
R237			RK73FB2A473J	CHIP R 47K J 1/10W		
R238			RK73FB2A101J	CHIP R 100 J 1/10W		
R239			RK73FB2A223J	CHIP R 22K J 1/10W		
R240			RK73FB2A103J	CHIP R 10K J 1/10W		
R241			RK73FB2A470J	CHIP R 47 J 1/10W		
R242, 243			RK73FB2A101J	CHIP R 100 J 1/10W		
R244			RK73FB2A183J	CHIP R 18K J 1/10W		
R245			RK73FB2A682J	CHIP R 6.8K J 1/10W		
R246			RK73FB2A470J	CHIP R 47 J 1/10W		
R247			RK73FB2A101J	CHIP R 100 J 1/10W		
R248			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R249			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R250, 251			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R252			RK73FB2A151J	CHIP R 150 J 1/10W		
R253			RK73FB2A390J	CHIP R 39 J 1/10W		
R254			RK73FB2A151J	CHIP R 150 J 1/10W		
R256			RK73FB2A471J	CHIP R 470 J 1/10W		
R258			RK73FB2A104J	CHIP R 100K J 1/10W		
R300			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R301			RK73FB2A473J	CHIP R 47K J 1/10W		
R302		*	R92-1261-05	FIXED RESISTOR(150 0.5W)		
R305, 306			RK73FB2A101J	CHIP R 100 J 1/10W		
R307			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R308			RK73FB2A681J	CHIP R 680 J 1/10W		
R309			RK73FB2A220J	CHIP R 22 J 1/10W		
R310			RK73FB2A223J	CHIP R 22K J 1/10W		
R311			RK73FB2A220J	CHIP R 22 J 1/10W		
R312			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R313			RK73FB2A103J	CHIP R 10K J 1/10W		
R314			RK73FB2A223J	CHIP R 22K J 1/10W		
R400			RK73FB2A151J	CHIP R 150 J 1/10W		
R401			RK73FB2A390J	CHIP R 39 J 1/10W		
R402			RK73FB2A151J	CHIP R 150 J 1/10W		
R403, 404			R92-0699-05	SOLID 10 1/2W		

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△ indicates safety critical components.

PARTS LIST

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TX-RX UNIT (X57-3570-11) : TK-931

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R406			RK73EB2A221J	CHIP R 220 J 1/10W		
R409			RK73EB2A221J	CHIP R 220 J 1/10W		
R410			RK73EB2B151J	CHIP R 150 J 1/8W		
R411			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R412, 413			RK73FB2A470J	CHIP R 47 J 1/10W		
R414			RK73FB2A164J	CHIP R 160K J 1/10W		
R415			RK73EB2B181J	CHIP R 180 J 1/8W		
R416			RK73FB2A223J	CHIP R 22K J 1/10W		
R417, 418			R92-1266-05	CHIP R 4.7K J 1/8W		
R419			RK73FB2A473J	CHIP R 47K J 1/10W		
R420			RK73EB2B272J	CHIP R 2.7K J 1/8W		
R421			RK73EB2B472J	CHIP R 4.7K J 1/8W		
R422			R92-1267-05	CHIP R 3.3K J 1/8W		
R424			RK73FB2A473J	CHIP R 47K J 1/10W		
R425			RK73FB2A103J	CHIP R 10K J 1/10W		
R426			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R427			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R428		*	R92-1261-05	FIXED RESISTOR(150 0.5W)		
R429-431			R92-1203-05	CHIP R 0.22 J 1/2W		
R432			RK73EB2B272J	CHIP R 2.7K J 1/8W		
R433			R92-1265-05	CHIP R 390 J 1/8W		
VR1		*	R12-4414-05	TRIMMING POT(50K)		
VR100		*	R12-6585-05	TRIMMING POT(47K)		
VR101		*	R12-6575-05	TRIMMING POT(1K)		
VR102		*	R12-6585-05	TRIMMING POT(47K)		
VR200		*	R12-6585-05	TRIMMING POT(47K)		
VR400		*	R12-6583-05	TRIMMING POT(22K)		
W1			R92-0670-05	CHIP R 0 OHM		
W300			R92-0670-05	CHIP R 0 OHM		
W301			R92-0670-05	CHIP R 0 OHM		
W401			R92-0670-05	CHIP R 0 OHM		
SW100			S31-1411-05	SLIDE SWITCH		
D1 -5			1SS226	DIODE		
D100, 101			1SS184	DIODE		
D103		*	RD20M-B1	ZENER DIODE		
D200			HSK277	CHIP DIODE		
D201			1SS184	DIODE		
D202			1SV164	DIODE		
D203, 204			1T33C	VARACTOR DIODE		
D205, 206			1SV128	DIODE		
D300			1SS184	DIODE		
D400		*	ERZ-M10DK220	SERGE ABSORBER		
D401			DSA3A1	DIODE		
D402			1SS184	DIODE		
D403			MI407	DIODE		
D404			MI308	DIODE		
D405			MI808	DIODE		
IC1			M51943BML	IC(SYSTEM RESET)		
IC2		*	27C256QB-JBJ1	IC(EPR0M)		
IC3		*	HD74HC373FP	IC(D TYPE LATCHES)		
IC4		*	UPD78310G	IC(MICROPROCESSOR)		
IC5			NMC93CS66EN	IC(IC(4K EEPROM))		
IC100		*	NJM78L05UA	IC(VOLTAGE REGULATOR/+5V)	KP	

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TX-RX UNIT (X57-3570-11) : TK-931

LCD ASS'Y (B38-033X-05)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
IC101 IC102 IC103 IC104-109 IC200		*	UPC7808H UPC1242H M5282FP NJM4558M TC9174F	IC(VOLTAGE REGULATOR/ +8V) IC(AF POWER AMPRIFIER) IC(ELECTRONIC ATTENUATOR) IC(OP AMP X2) IC(CMOS I/O EXPANDER)		
IC201 IC203 IC204 IC300 IC400		*	MB1501PF TC4S66F TC4S584F MC3361D M57781	IC(PLL) IC(BILATERAL SWITCH) IC(SCHMITT TRIGGER) IC(FM IF SYSTEM) IC(POWER MODULE:DRIVE)		
IC401 IC402 Q100 Q101 Q102		*	MHW820-3 NJM2904M 2SB1119S 2SC2712(Y) 2SB1119S	IC(POWER MODULE:FINAL) IC(OP AMP X2) TRANSISTOR TRANSISTOR TRANSISTOR		
Q103 Q104 Q105 Q106, 107 Q108, 109		*	2SB1302S 2SA1162(Y) DTC114EK DTC314TK DTC114EK	TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR		
Q110 Q111 Q200 Q201 Q202, 203		*	DTA114EK 2SD1624S 2SC3356 DTC314TK 2SC3356	DIGITAL TRANSISTOR TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR		
Q204 Q205 Q206 Q207 Q300			2SA1162(Y) DTA114EK 2SK508NV(K52) 2SC3356 2SC4093	TRANSISTOR DIGITAL TRANSISTOR FET TRANSISTOR TRANSISTOR		
Q301 Q302 Q400 Q401 Q402		*	3SK184(R) 2SK302(GR) DTC114EK 2SB967(Q) 2SC2712(Y)	FET FET DIGITAL TRANSISTOR TRANSISTOR TRANSISTOR		
Q403 TH100 TH400		*	DTA114EK 157-302-53008 157-203-55009	DIGITAL TRANSISTOR THERMISTOR(3K) THERMISTOR(20K)		
LCD ASS'Y (B38-033X-05) -0332 : TK-931(HD) -0333 : TK-931						
C1 C2 -3 C4 C5 C6		*	C92-0038-05 CK73FB1H103K C92-0037-05 C92-0036-05 CK73FB1H103K	ELECTRO 22UF 16WV CHIP C 0.010UF K ELECTRO 10UF 16WV ELECTRO 4.7UF 16WV CHIP C 0.010UF K		
C7 -8 C9 -10 C11 C12			CK73EB1H473K CK73FB1H103K C92-0004-05 CC73FCH1H681J	CHIP C 0.047UF K CHIP C 0.010UF K CHIP-TAN 1.0UF 16WV CHIP C 680PF J	HK	
CN1			E40-5184-05	PIN CONNECTOR(7P)		
XL1			L78-0043-05	CRYSTAL RESONATOR (4.194MHZ)		
R1 -2 R3 R4 -17			RK73FB2A104J R92-0670-05 RK73FB2A473J	CHIP R 100K J 1/10W CHIP R 0 OHM CHIP R 47K J 1/10W		


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LCD ASS'Y (B38-033X-05)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R18			RK73FB2A224J	CHIP R 220K J 1/10W		
R19	-20		RK73FB2A473J	CHIP R 47K J 1/10W		
R21			RK73FB2A473J	CHIP R 47K J 1/10W	HK	
R22	-26		RK73FB2A102J	CHIP R 1.0K J 1/10W		
R27			RK73FB2A223J	CHIP R 22K J 1/10W		
R28			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R29			RK73FB2A153J	CHIP R 15K J 1/10W		
R30			RK73FB2A393J	CHIP R 39K J 1/10W	HK	
R31	-34		RK73FB2A470J	CHIP R 47 J 1/10W		
R35			RK73FB2A471J	CHIP R 470 J 1/10W		
D1			1SS184	DIODE		
D2			1SS184	DIODE		
D3	-6		1SS226	DIODE		
D7		*	RD18M-B2	ZENER DIODE		
IC1		*	UPD75304GF-104	IC(MICROPROCESSOR)		
IC2			LC7582	IC(LCD DRIVER)	HK	
IC3		*	L78M05T-FA	IC(VOLTAGE REGULATOR/+5V)		
IC4			TC4013BF	IC(D FLIP-FLOP X2)		
IC5			M51943BML	IC(SYSTEM RESET)		
IC6			TC4SU69F	IC(INVERTER GATE)		
TR1			2SC2712(GR)	TRANSISTER		

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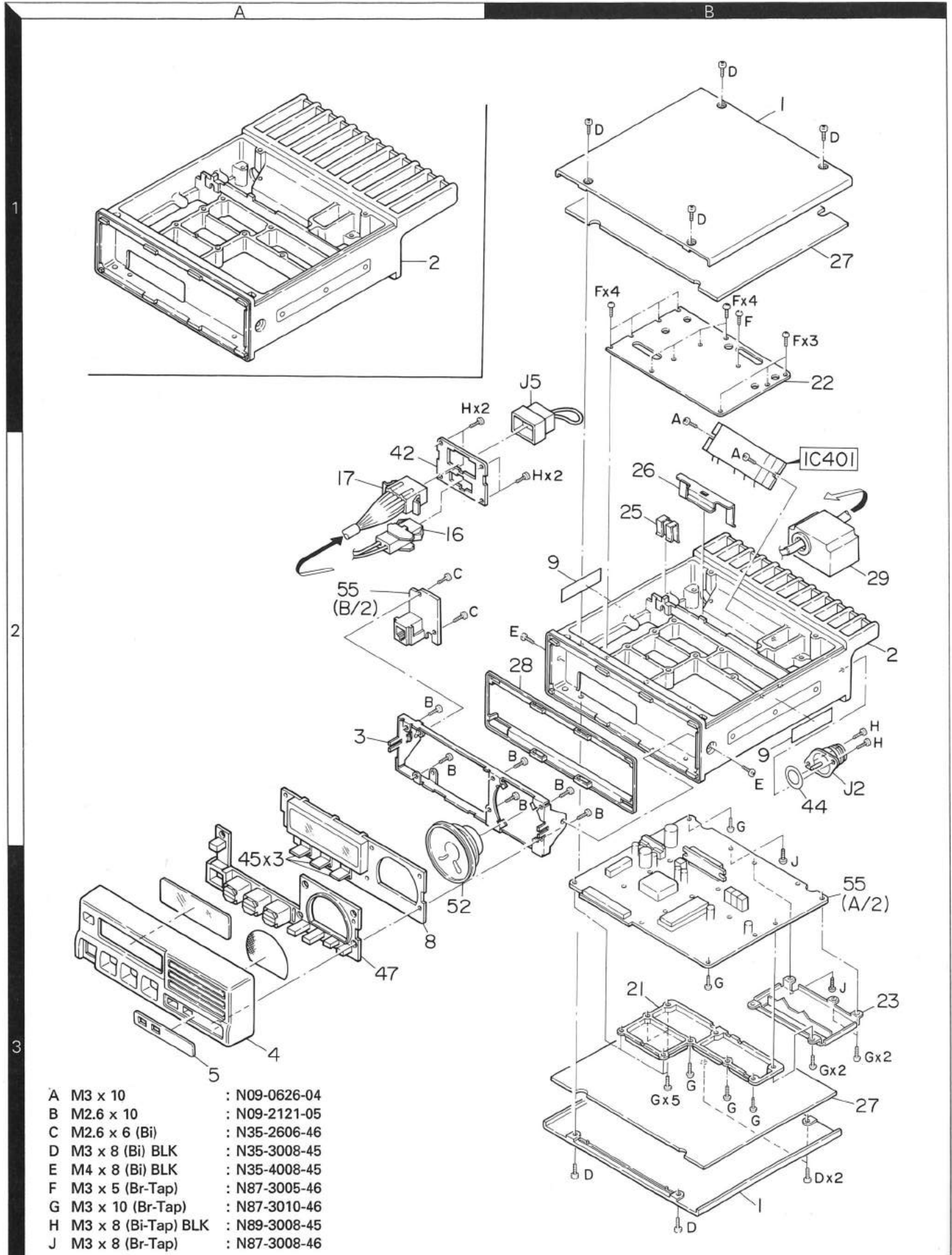
UE: AAFES(Europe) X: Australia

K :TK-931 K
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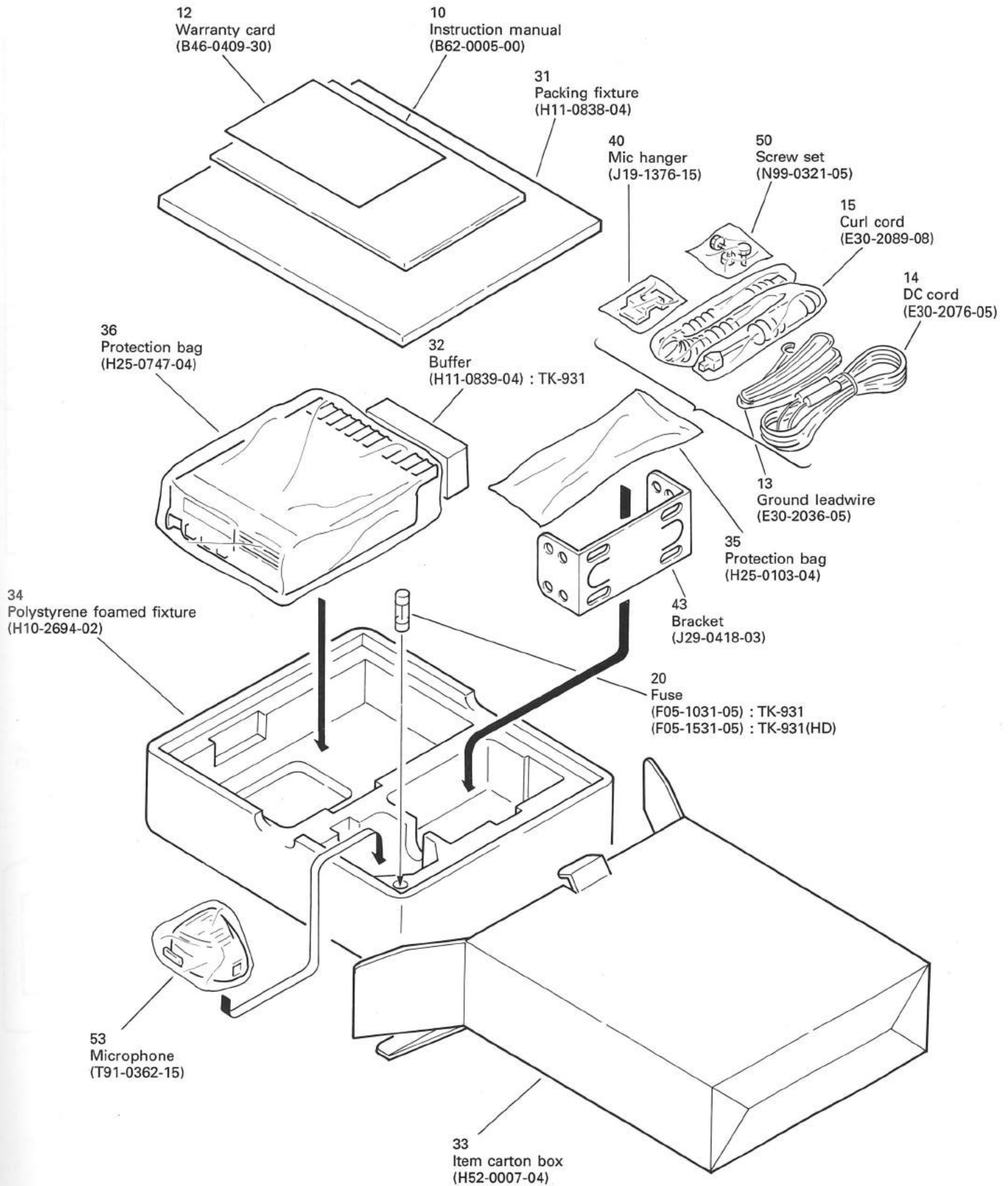
⚠ indicates safety critical components.

TK-931/931 (HD)

EXPLODED VIEW



PACKING

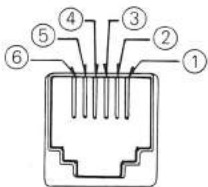


ADJUSTMENT

Test Equipment Required for Alignment

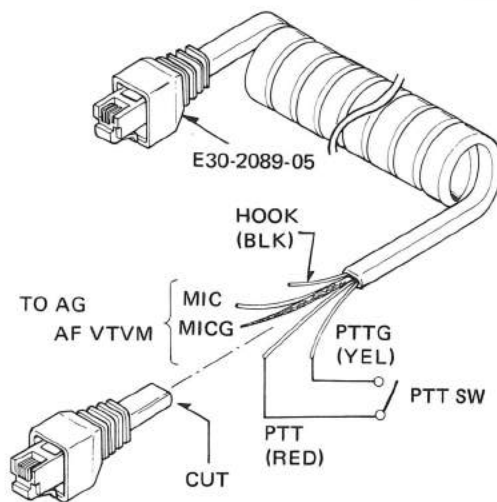
No.	Test Equipment	Major Specifications
1	Standard Signal Generator (SSG)	Frequency Range: 850 to 941MHz. Modulation: Frequency modulation and external modulation. Output: 0.1 μ V to greater than 1mV.
2	Power Meter	Input Impedance: 50 Ω . Operation Frequency: 800 to 950MHz or more. Measurement Capability: Vicinity of 100W.
3	Deviation Meter	Frequency Range: 800 to 950MHz.
4	Digital Volt Meter (DVM)	Measuring Range: 1 to 10V DC. Accuracy: High input impedance for minimum circuit loading.
5	Oscilloscope	DC through 30MHz.
6	High Sensitivity Frequency Counter	Frequency Range: 10Hz to 1000MHz. Frequency Stability: 0.2ppm or less.
7	Ammeter	30A.
8	AF Volt Meter (AFVTVM)	Frequency Range: 50Hz to 10kHz. Voltage Range: 3mV to 3V.
9	Audio Generator (AG)	Frequency Range: 50Hz to 5kHz or more. Output: 0 to 1V.
10	Distortion Meter	Capability: 3% or less at 1kHz. Input Level: 50mV to 10Vrms.
11	Voltmeter	Measuring Range: 10 to 1.5V DC or less. Input Impedance: 50k Ω /V or greater.
12	4 Ω Dummy Load	Approx. 4 Ω , 3W.
13	Regulated Power Supply	13.6V, approx. 30A (adjustable from 9 to 17 V). Useful if ammeter equipped.

MIC connector front view

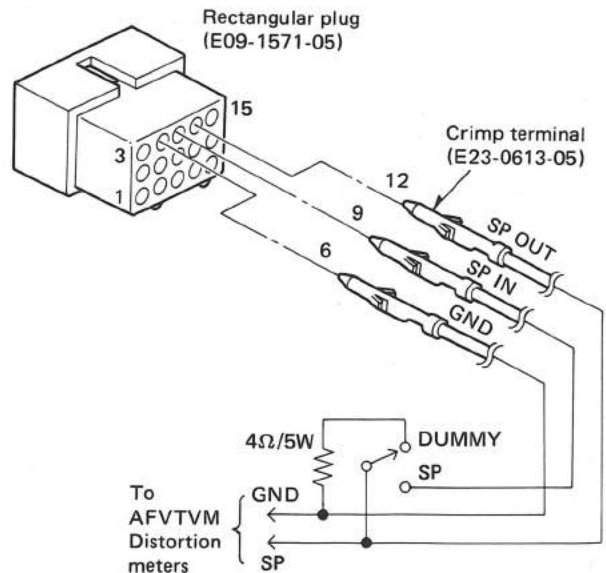


- ① SB
- ② PTTG
- ③ PTT
- ④ MICG
- ⑤ MIC
- ⑥ HOOK

- The following test cables are recommended.



Test cable for Microphone input



Test cable for Speaker output

ADJUSTMENT

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.

SW100 normal mode

		GRP 1	GRP 2	GRP 3	GRP 4
SYS 1	TX (MHz)	896.0250	899.0000	900.9875	901.4000
	RX (MHz)	935.0250	938.0000	939.9875	940.4000
	TONE	-	-	-	-
SYS 2	TX (MHz)	896.0000	899.0250	901.9000	
	RX (MHz)	935.0000	938.0250	940.9000	
	TONE	-	-	-	
SYS 3	TX (MHz)	938.0250	938.0250	938.0250	938.0250
	RX (MHz)	938.0250	938.0250	938.0250	938.0250
	TONE	QT 67.0	QT 88.5	QT 103.5	QT 151.4
SYS 4	TX (MHz)	938.0250	938.0250	938.0250	938.0250
	RX (MHz)	938.0250	938.0250	938.0250	938.0250
	TONE	DQT 023N	DQT 455N	DQT 754N	QT 210.7
SYS 5	TX (MHz)	897.2500	900.3000	936.7500	900.8000
	RX (MHz)	936.2500	939.3000	936.7500	900.8000
	TONE	-	-	-	-
SYS 6	LTR	CH12ID247	CH12ID247	CH12ID247	CH12ID247
	HOMECH12	CH16ID167	CH16ID167	CH16ID167	CH16ID167
	ID	45	47	49	46

SW100 test mode

		GRP 1	GRP 2	GRP 3	GRP 4	GRP 5
SYS 1	TX(MHz)	896.0000	896.0000	896.0000	896.0000	896.0000
	RX (MHz)	935.0000	935.0000	935.0000	935.0000	935.0000
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave
SYS 2	TX (MHz)	896.0250	896.0250	896.0250	896.0250	896.0250
	RX (MHz)	935.0250	935.0250	935.0250	935.0250	935.0250
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave
SYS 3	TX (MHz)	899.0000	899.0000	899.0000	899.0000	899.0000
	RX (MHz)	938.0000	938.0000	938.0000	938.0000	938.0000
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave
SYS 4	TX (MHz)	899.0250	899.0250	899.0250	899.0250	899.0250
	RX (MHz)	938.0250	938.0250	938.0250	938.0250	938.0250
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave
SYS 5	TX (MHz)	900.9875	900.9875	900.9875	900.9875	900.9875
	RX (MHz)	939.9875	939.9875	939.9875	939.9875	939.9875
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave
SYS 6	TX (MHz)	901.4000	901.4000	901.4000	901.4000	901.4000
	RX (MHz)	940.4000	940.4000	940.4000	940.4000	940.4000
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave
SYS 7	TX (MHz)	901.9000	901.9000	901.9000	901.9000	901.9000
	RX (MHz)	940.9000	940.9000	940.9000	940.9000	940.9000
	TONE	-	QT 100.0	DQT 065N	LTR	100Hz square wave

ADJUSTMENT

Test mode

The TK-931 and TK-931(HD) transceivers have a test mode. To enter the test mode, set button SW100 on the TX-RX unit to the TEST position. When the power is buttoned on with the button set to this position, the test mode is entered. To exit the test mode, reset the button to the NORMAL position, and turn the power off and then back on again. The mode will not be changed merely by resetting the switch. The following functions are available in the test mode.

- **SYSTEM button**

The SYSTEM button is used to select up to eight preprogrammed test frequencies.

- **GROUP button**

The following modulation signals can be selected :

Group	Modulation
1	No modulation
2	QT (100Hz) tone
3	DQT (065N) code
4	Trunked format data
5	100Hz square wave

In the test mode, only encoding is possible, not decoding.

- **Squelch**

In the test mode, the receiver operates with carrier squelch only.

- **A button**

When the A button is pressed in the test mode, the transmitter enters the talk-around mode to transmit with the receive frequency, and the Auxiliary indicator lights.

- **SCAN button**

If the SCAN button is pressed in the test mode, the carrier squelch is defeated. If there is no signal, noise is output by the speaker and the BUSY indicator lights.

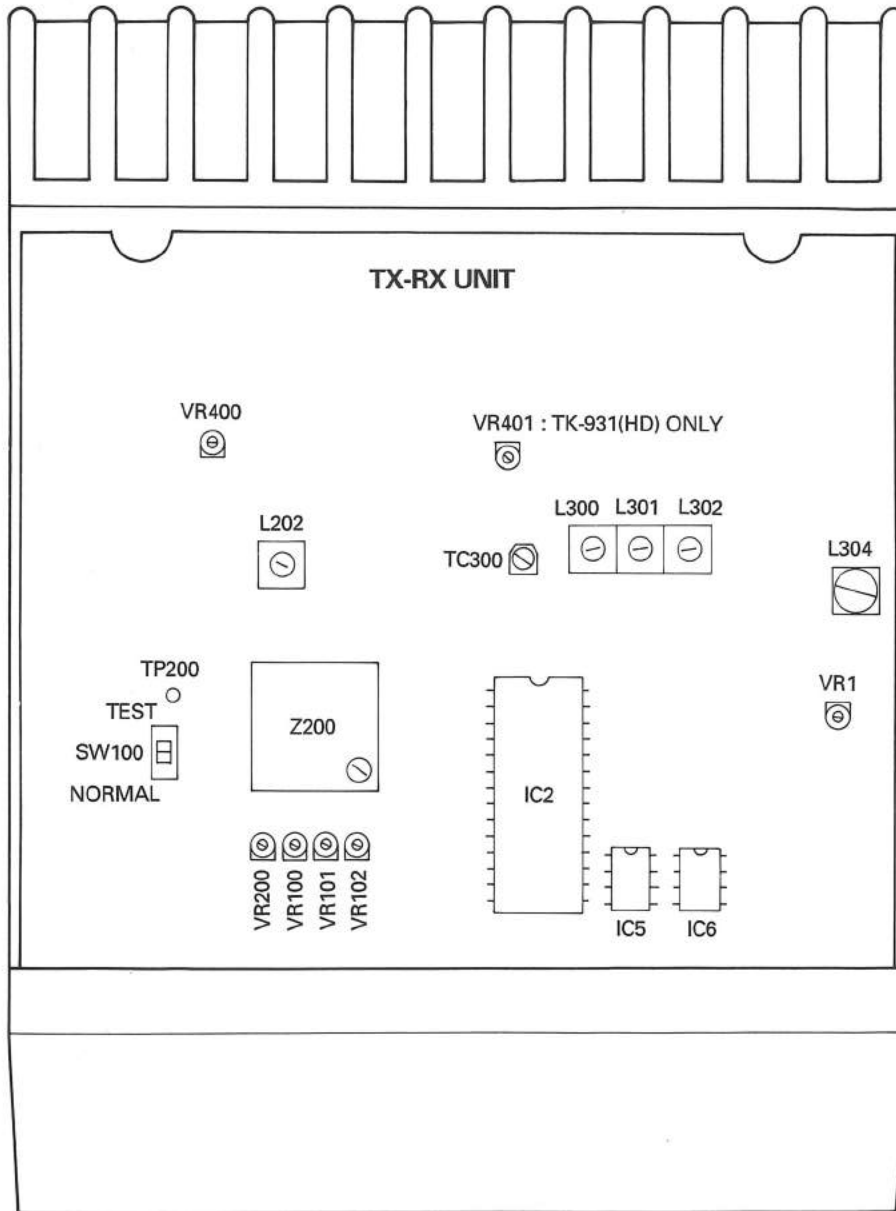
- **Transmitter**

The transmitter is keyed using the microphone PTT button. The modulation signal selected with the GROUP button is transmitted.

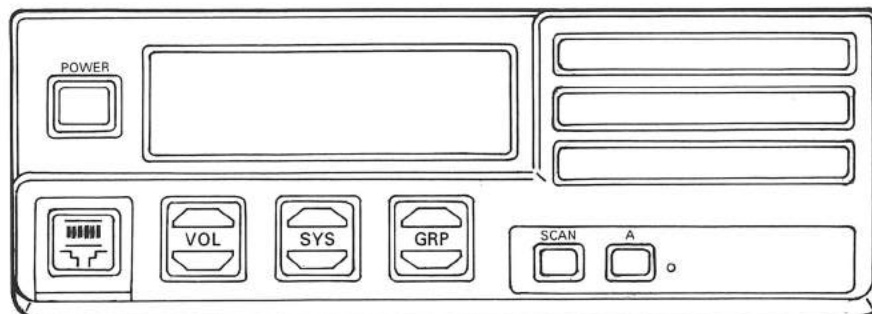
ADJUSTMENT

Adjustment Location

Top view



Front panel view


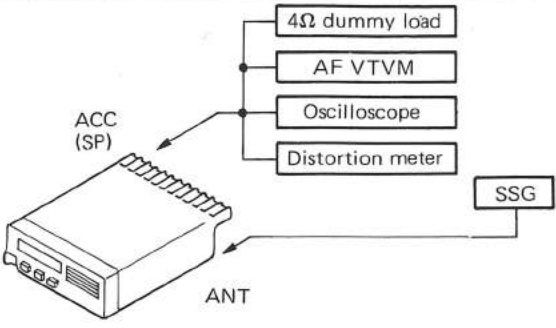


ADJUSTMENT

Alignment

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
1. Setting	1) Connect the power cable to the rear panel. TX-RX unit SW100 : TEST MODE Power SW : ON								
2. PLL lock voltage	1) CH : SYS 3 (938MHz) GRP 1	DVM Power meter	TX-RX	TP200	TX-RX	L202	4V	±0.1V	
	2) CH : SYS 1 (935MHz) GRP 1						Check	1.0V or more.	
	3) CH : SYS 7 (940.9MHz) GRP 1							7.0V or less.	
	4) CH : SYS 1, GRP 1 A SW : ON PTT : ON							1.0V or more.	
	5) CH : SYS 7, GRP 1 PTT : ON							7.0V or less.	
	6) A SW : OFF								
3. Frequency adjustment	1) CH : Channel with TX freq'. PTT : ON	Power meter f. counter	Rear panel	ANT	TX-RX	Z200	Freq' adj. of TX.	±50Hz	
	2) CH : Check other channel PTT : ON						Check		
4. Power adjustment	1) CH : SYS 4, GRP 1 (Channel with TX center freq') PTT : ON	Power meter Ammeter	Rear panel	ANT	TX-RX	VR400	MAX CW.	16.5W or more : TK-931 33W or more : TK-931(HD)	
							MAX CCW.	4W or less : TK-931 12W or less : TK-931(HD)	
							16W : TK-931 31W : TK-931(HD)	±1W 6.5A or less : TK-931 12A or less : TK-931(HD)	
	2) PTT : ON ANT : Short						VR401	5.5A : TK-931(HD) only	
	3) CH : SYS 1, 7 GRP 1 (Channel with lowest TX freq', and channel with highest TX freq') PTT : ON							Check	12~18W less than : TK-931 24~36W less than : TK-931(HD) 6.5A or less : TK-931 12A or less : TK-931(HD)
						4) A SW : ON			
	5) CH : SYS 1, 4, 7 GRP 1 PTT : ON								10~18W less than : TK-931 20~36W less than : TK-931(HD)
6) A SW : OFF									

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks			
		Test-equipment	Unit	Terminal	Unit	Parts	Method				
5. Maximum deviation adjustment	1) Connect AG to the MIC terminal. AG : 1kHz/100mV Deviation meter filter LPF : 20kHz HPF : 50Hz De-emphasis : OFF CH : SYS 4, GRP 1 PTT : ON	Power meter Deviation meter AF VTVM AG Oscilloscope	Rear panel	ANT	TX-RX	VR100	±1.7kHz Adjust one more than the other by switching between -P and +P.	±100Hz			
6. MIC sensitivity adjustment	1) AG : 1kHz/2.5mV Deviation meter filter LPF : 3kHz HPF : 50Hz De-emphasis : 750µs (P-P)/2 PTT : ON					VR101	±0.75kHz	±100Hz			
7. DQT waveform correction	1) MIC input : OFF Deviation meter filter LPF : 3kHz HPF : OFF De-emphasis : OFF CH : SYS 4, GRP 5 PTT : ON					VR200	Make the de-modulation waveform neat.				
8. LTR maximum deviation	1) MIC input : OFF Deviation meter filter LPF : 3kHz HPF : OFF De-emphasis : 750µs (P-P)/2 CH : SYS 4, GRP 4 PTT : ON					VR102	±0.75kHz	±100Hz			
9. Tone deviation (QT/CTCSS)	1) MIC input : OFF CH : SYS 4, GRP 2 PTT : ON	Power meter Deviation meter	Rear panel	ANT		Check	0.4~0.65kHz				
10. Sensitivity adjustment	1) CH : SYS 4, GRP 1 (Channel with RX center freq' (f _{RM})) SCAN SW : ON (BUSY)	SSG AF VTVM Distortion meter Oscilloscope	Rear panel	ACC (EXT.SP)							
	2) SSG freq' : f _{RM} Output : -10dBµ/0.32µV/-117dBm MOD : 1kHz DEV : ±2.5kHz							TX-RX	L304 L302	Adjust for maximum AF output.	
	3) SSG output : -6dBµ/0.5µV/-113dBm MOD : 1kHz DEV : ±2.5kHz								L300 L301	Adjust for minimum distortion.	
	4) SSG output : -10dBµ/0.32µV/-117dBm MOD : OFF								TC300	Adjust for minimum noise.	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
	5) SSG output : -10dB μ /0.32 μ V/-117dBm MOD : 1kHz DEV : \pm 1.5kHz	SSG AF VTVM Distortion meter	Rear panel	ACC (EXT.SP)			Check	SINAD 12dB or more.
	6) CH : SYS 2, 6 GRP 1 (Channel with lowset RX freq' (f _{RL}), and channel with highest RX freq' (f _{RH})) SSG freq' : f _{RL} and f _{RH} Output : -10dB μ /0.32 μ V/-117dBm MOD : 1kHz DEV : \pm 1.5kHz	Oscilloscope					Check	SINAD 12dB or more.
11. Squelch adjustment	1) CH : SYS 4, GRP 1 SSG freq' : f _{RM} Output : Value when 3dB is subtracted from the sensitivity value of 12dB SIAND. MOD : 1kHz DEV : \pm 1.5kHz SCAN SW : OFF	SSG AF VTVM Oscilloscope	Rear panel	EXT.SP	TX-RX	VR1	Set to threshold point.	
	2) SSG output : -11dB μ /0.28 μ V/-118dBm						Check	Squelch open.
12. Signaling squelch (QT/CTCSS)	1) Power SW : OFF SW100 : NORMAL mode							
	2) Power SW : ON							
	3) 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. Output : -10dB μ /0.32 μ V/-117dBm							
	4) SSG MOD SW : EXT MOD AG1 freq' : 1kHz AG2 freq' : QT tone freq'							
	5) AG1 : Power switch OFF AG2 output : Adjust the output level of AG2 so that SSG deviation becomes 0.35kHz.							
	6) AG1 : Power switch ON AG1 output : Adjust the output level of AG1 so that SSG deviation becomes 1.85kHz. (i.e., QT tone frequency/ 0.35kHz deviation, +1kHz/1.5kHz deviation) MIC hook : ON hook							
		Rear panel	EXT.SP			Check	Open.	

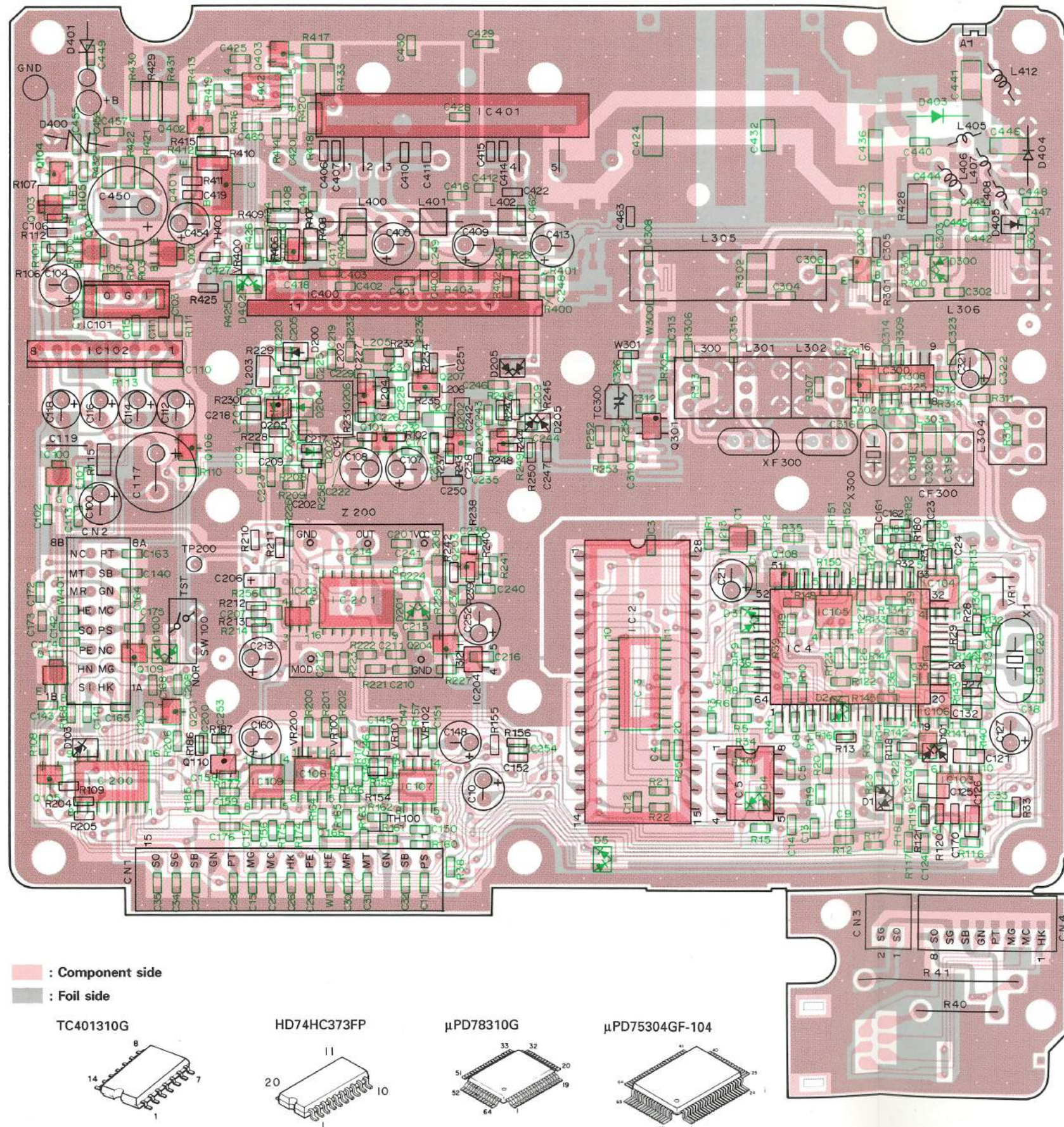
TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
TX-RX UNIT (X57-3560-11/X57-3570-11)			
CN1	1	PS	Power switch control signal IN.
	2	SB	Power OUT after power switch.
	3	GN	GND.
	4	MT	Serial control signal OUT to display ass'y.
	5	MR	Serial control signal IN from display ass'y.
	6	HE	(EXT) Hook signal OUT. (normally shorted)
	7	PE	(EXT) PTT signal OUT. (normally open)
	8	HK	HOOK (microphone hook) signal IN.
	9	MC	MIC signal IN.
	10	MG	MIC GND.
	11	PT	PTT signal IN.
	12	GN	GND.
	13	SB	Power OUT after power switch.
	14	SG	GND for speaker.
	15	SO	OUT for speaker.
CN2	1A	HK	HOOK (microphone hook) signal IN.
	2A	MG	MIC GND.
	3A	NC	Reserved IN/OUT terminal.
	4A	PS	Power switch control signal IN for remote control.
	5A	MC	MIC signal IN.
	6A	GN	GND.
	7A	SB	Power OUT after power switch.
	8A	PT	PTT signal IN.
	1B	SI	IN for internal speaker.
	2B	HN	Signal OUT for horn relay drive.
	3B	PE	(EXT) PTT signal OUT for remote control. (normally open)
	4B	SO	OUT for external speaker.
	5B	HE	(EXT) HOOK signal OUT for remote control. (normally shorted)
	6B	MR	Serial control signal IN for remote control.
7B	MT	Serial control signal OUT for remote control.	
8B	NC	Not connected.	
CN3	1	SPO	OUT for internal speaker.
	2	SPG	GND for internal speaker.
CN4	1	HK	HOOK (microphone hook) signal OUT.
	2	MC	MIC signal OUT.
	3	MG	MIC GND.
	4	PT	PTT signal OUT.
	5	GN	GND.
	6	SB	Power IN after power switch.
	7	SG	GND for speaker.
	8	SO	IN for internal speaker.
J1	1	SB	Power OUT after power switch.
	2	PTT-GND	PTT GND.
	3	PTT	PTT signal IN.
	4	MIC-GND	MIC GND.
	5	MIC	MIC signal IN.
	6	HOOK	HOOK (microphone hook) signal IN.

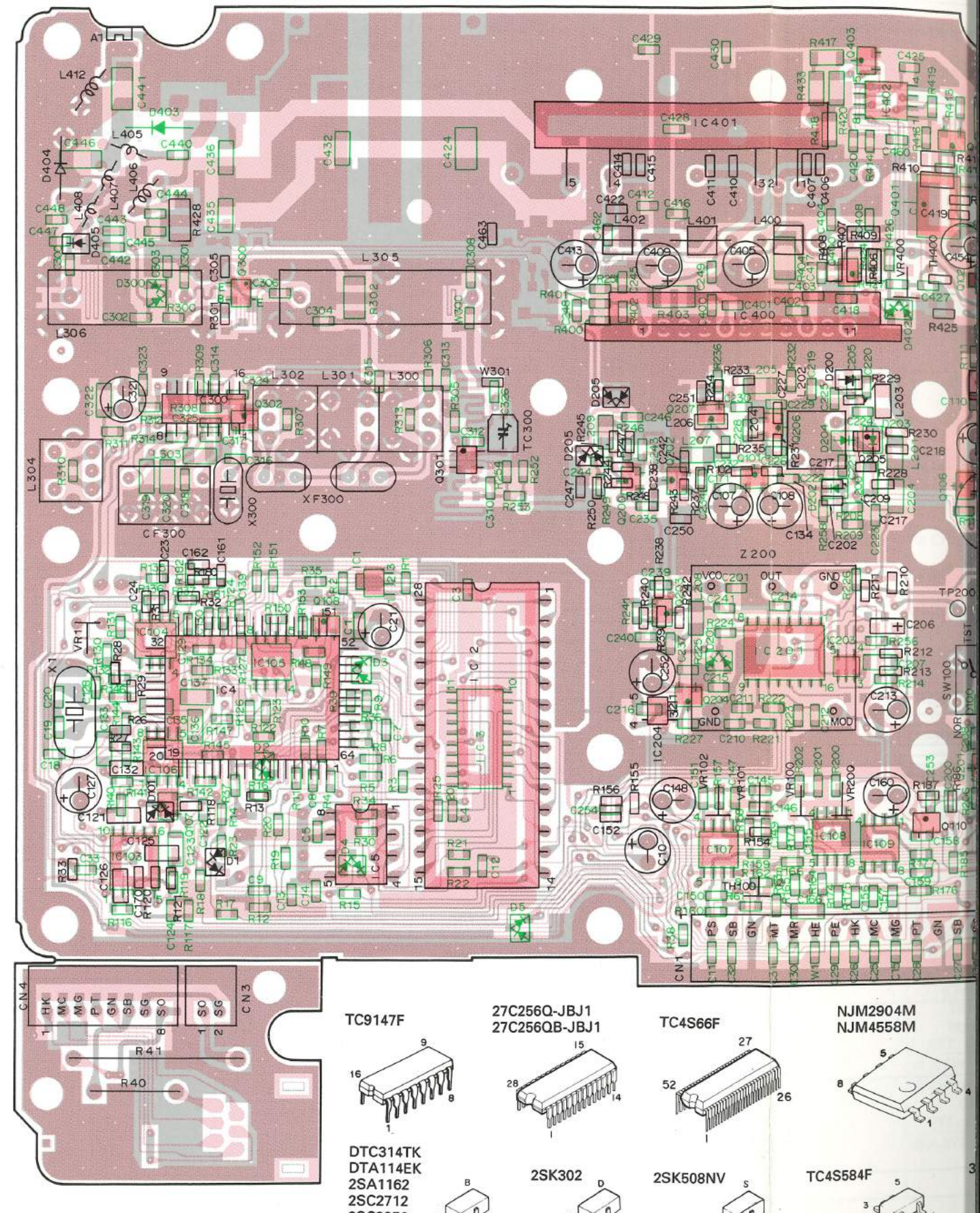
Connector No.	Terminal No.	Terminal Name	Terminal Function
LCD ASS'Y (B38-0332-05/B32-0333-05)			
CN1	1	POWER SW	Power switch control signal OUT.
	2	SB	Power IN after power switch.
	3	GND	GND.
	4	MTX	Serial control signal IN from TX-RX unit.
	5	MRX	Serial control signal OUT to TX-RX unit.
	6	HOOK (EXT)	(EXT) HOOK signal IN.
	7	PTT (EXT)	(EXT) PTT signal IN.
EXTERNAL CONNECTION			
J2		ANT	N-type coaxial connector for ANT connection.
J3	1	+B	13.6V power IN.
	2	GND	GND.
J4 (Accessory connector)	1	HOOK	HOOK (microphone hook) signal IN. GND → ON HOOK, OPEN → OFF HOOK
	2	MIC-GND	MIC GND.
	3	SPARE	Reserved IN/OUT terminal (Not used).
	4	POWER SW	Power switch control signal IN for remote control. GND → Power ON, OPEN → Power OFF
	5	MIC	MIC signal IN. Standard modulation at 600Ω, 5mV.
	6	GND	GND (for DC and SP OUT).
	7	SB	Power OUT after power switch (+13.6V, 1A max.).
	8	PTT	PTT signal IN. GND → TX, OPEN → RX
	9	SP-IN	IN for internal speaker. Normally connected to No. 12 (SP-OUT) at J5.
	10	HORN	Signal OUT for horn relay drive (open collector). Low level during horn drive; max. sink current 800mA.
	11	PTT (EXT)	(EXT) PTT signal OUT for remote control. (normally open)
	12	SP-OUT	OUT for external speaker.
	13	HOOK (EXT)	(EXT) HOOK signal OUT for remote control. (normally closed)
	14	MRX	Serial control signal IN for remote control.
	15	MTX	Serial control signal OUT for remote control.

TK-931 PC BOARD VIEWS

TX-RX UNIT (X57-3570-11) Component side view

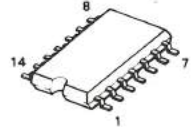


TX-RX UNIT (X57-3570-11) Foil side view

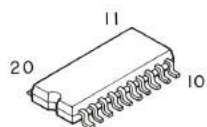


: Component side
 : Foil side

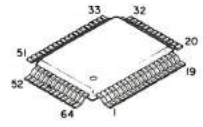
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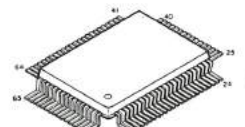
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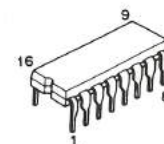
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μPD75304GF-104



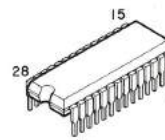
TC9147F



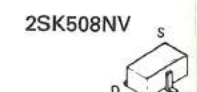
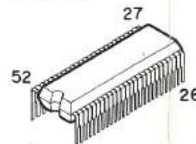
DTC314TK
DTA114EK
2SA1162
2SC2712
2SC3356



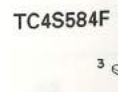
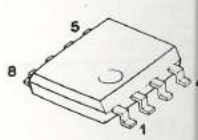
27C256Q-JBJ1
27C256QB-JBJ1



TC4S66F



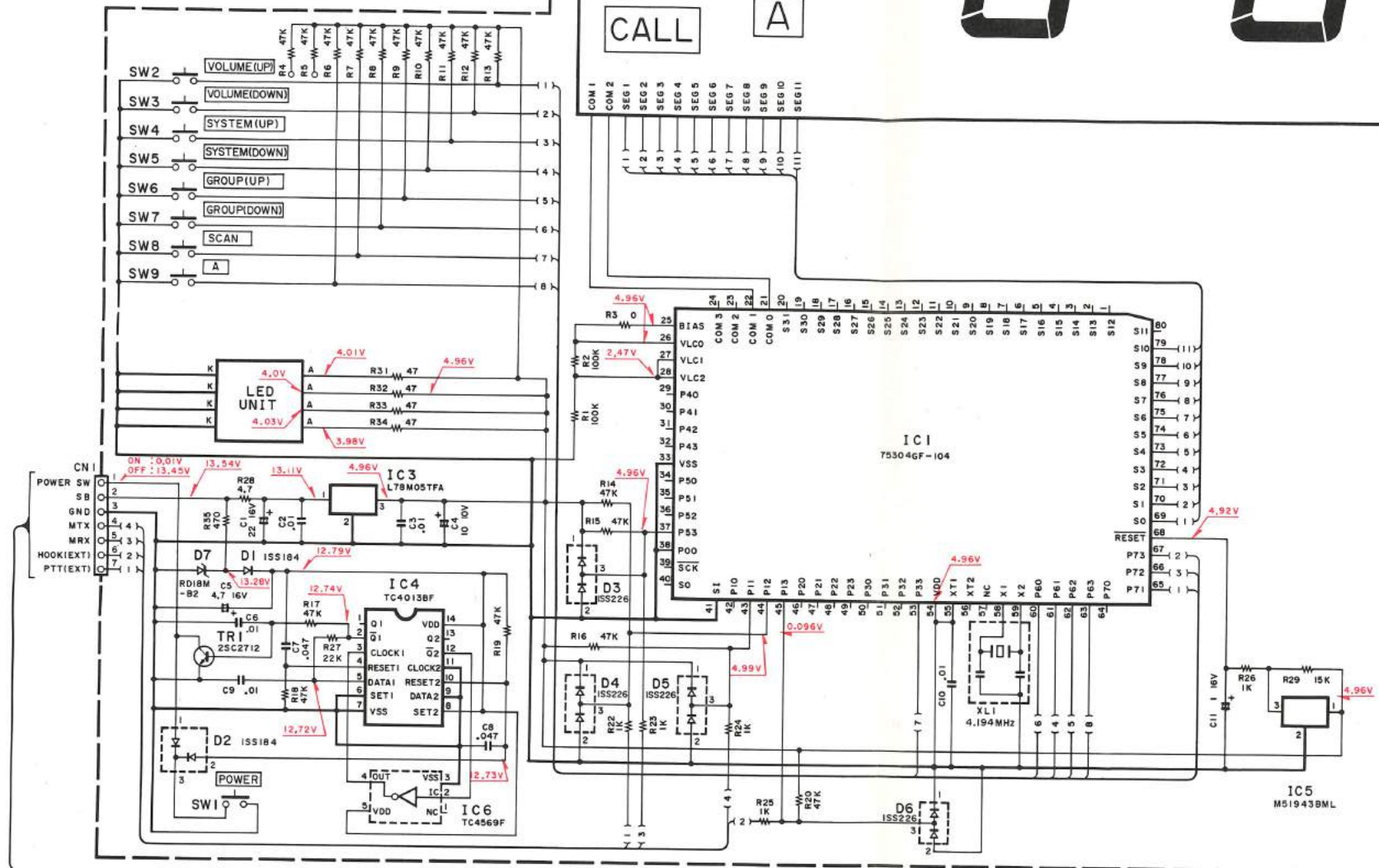
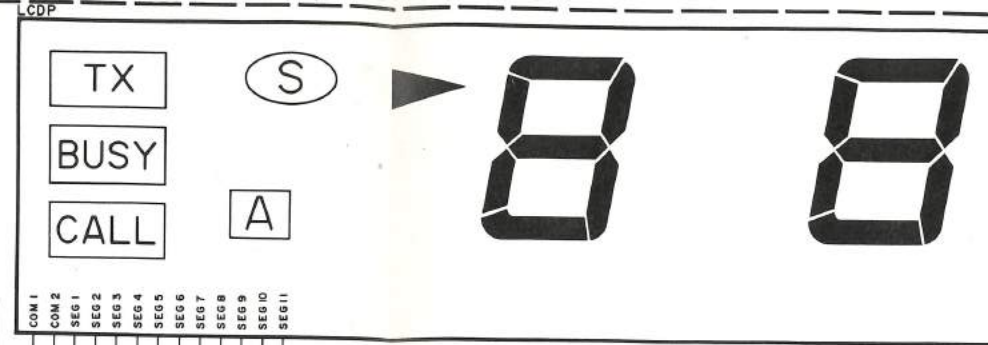
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NJM4558M



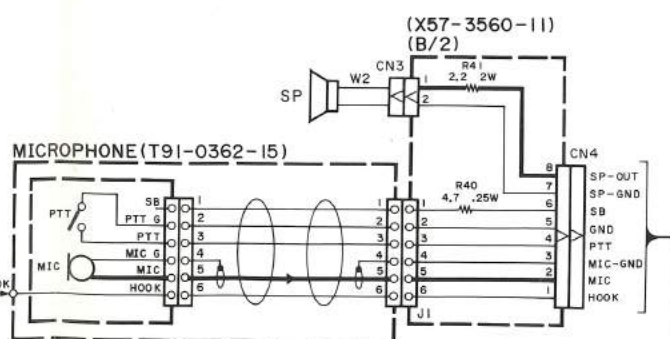
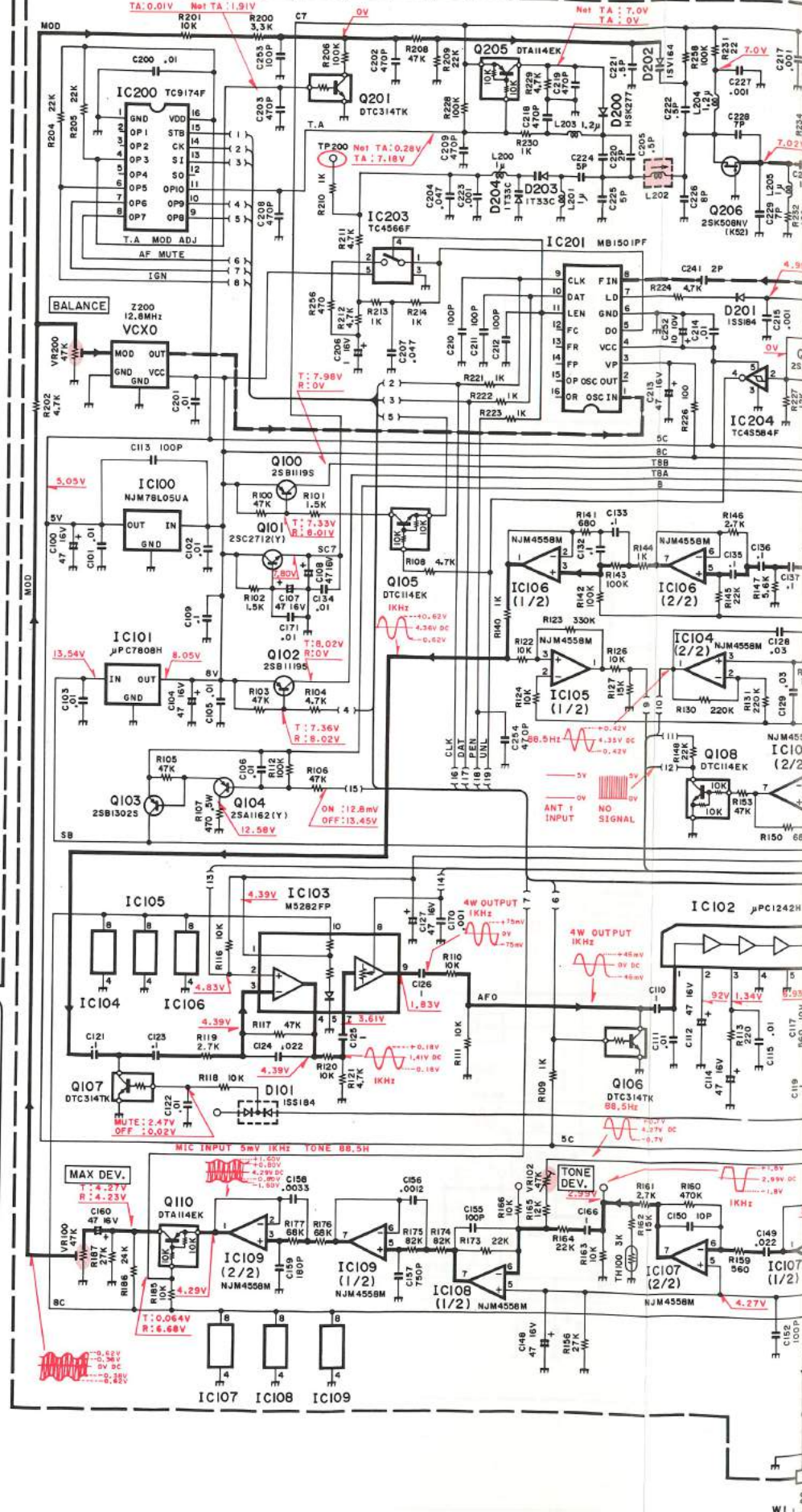
— Signal line — Control line — Common DC line

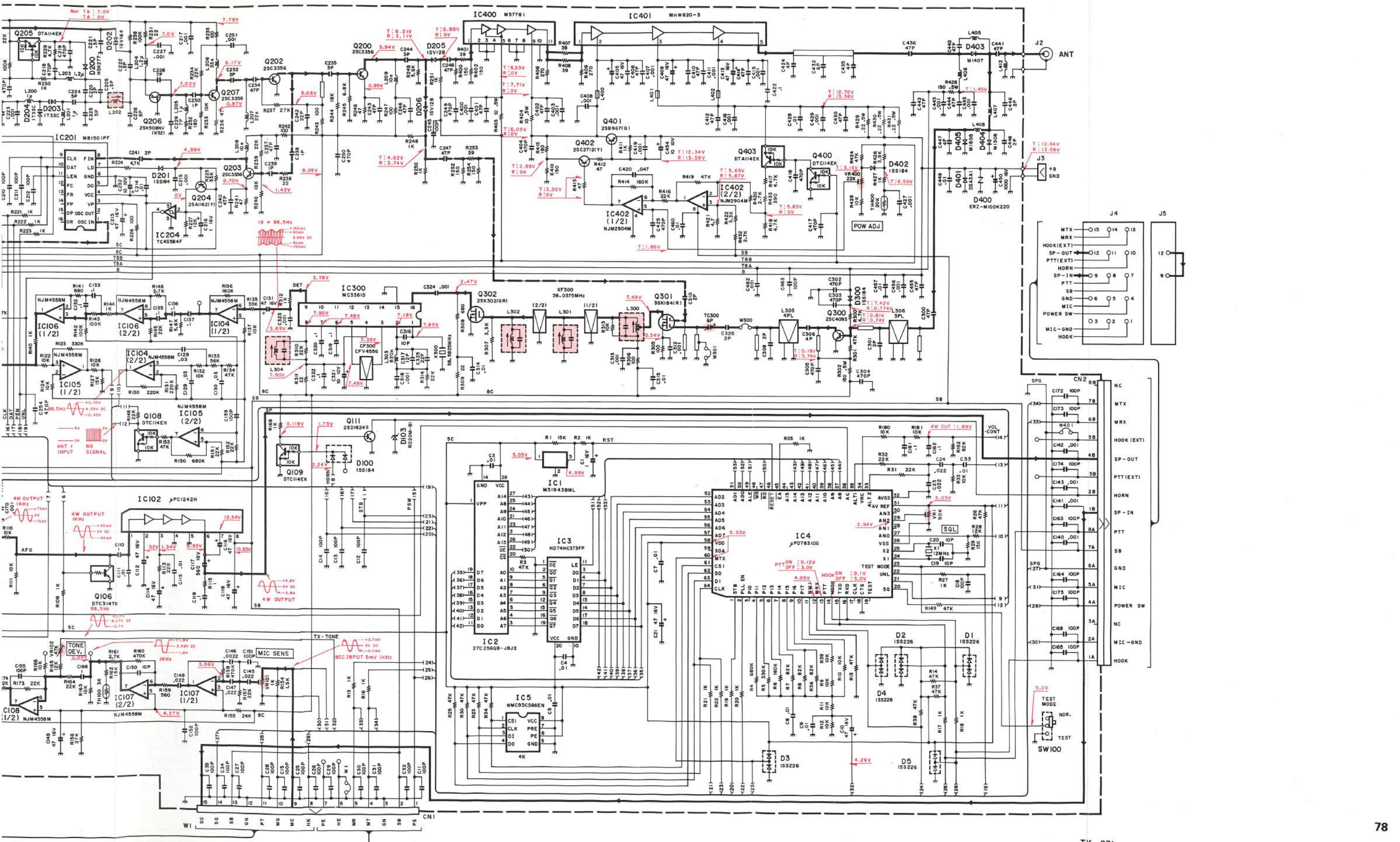
- IC1 : 75304GF-104
- IC3 : L7805TFA
- IC4 : TC4013BF
- IC5 : M51943BML
- IC6 : TC4569F
- TR1 : 2SC2712
- D1,2 : ISS184
- D3,6 : ISS226
- D7 : RD18M-B2

LCD ASS'Y (B38-0333-05)



TX-RX UNIT (X57-3570-11)(A/2)

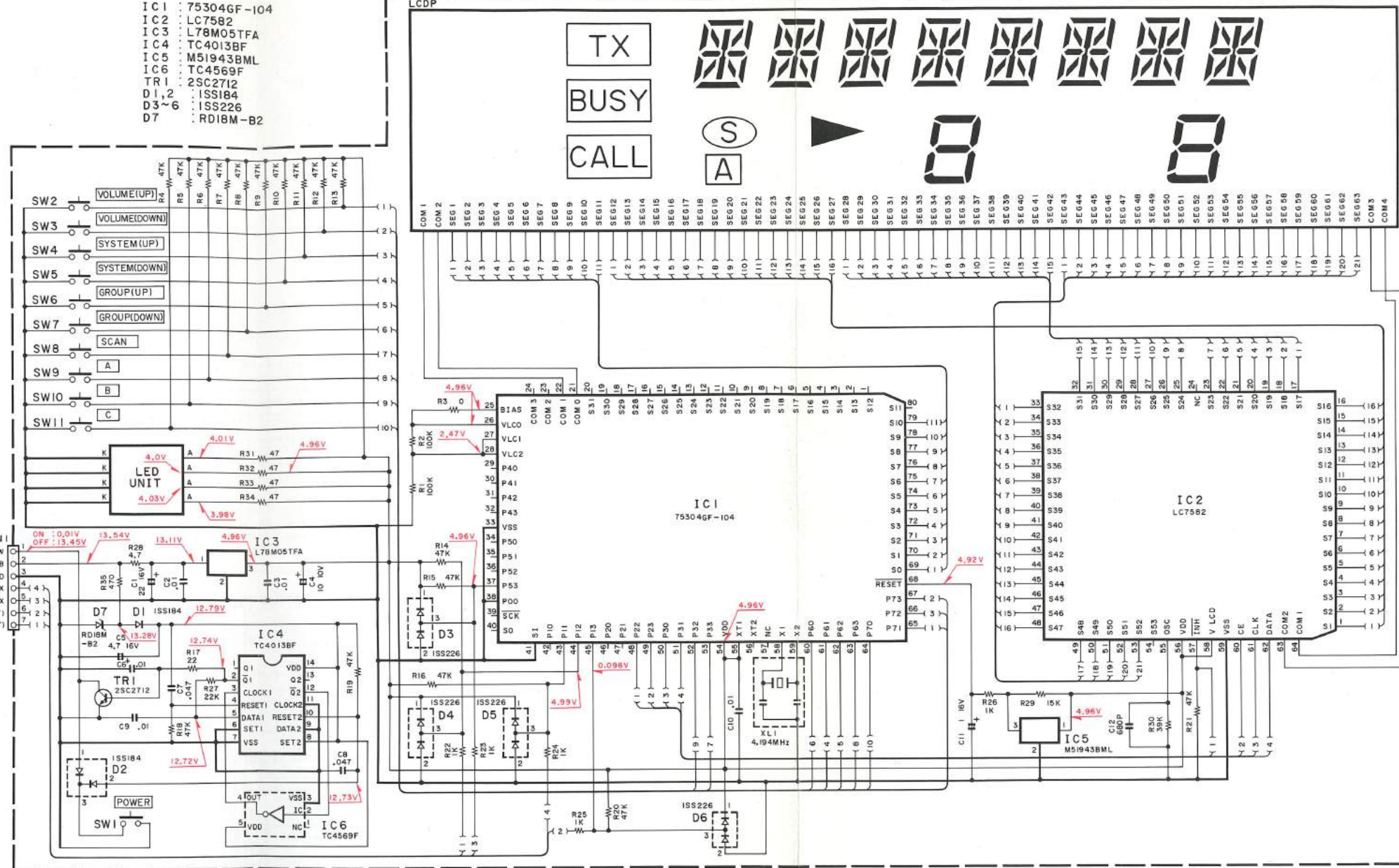




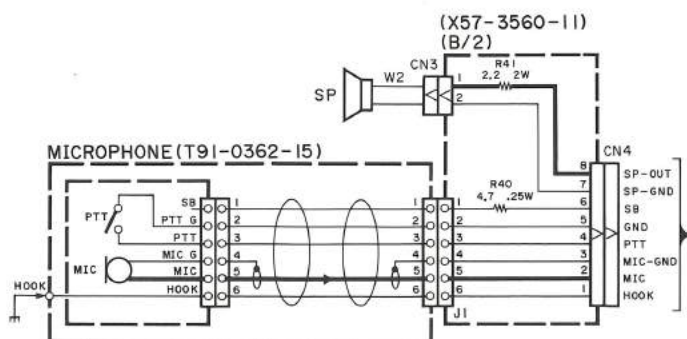
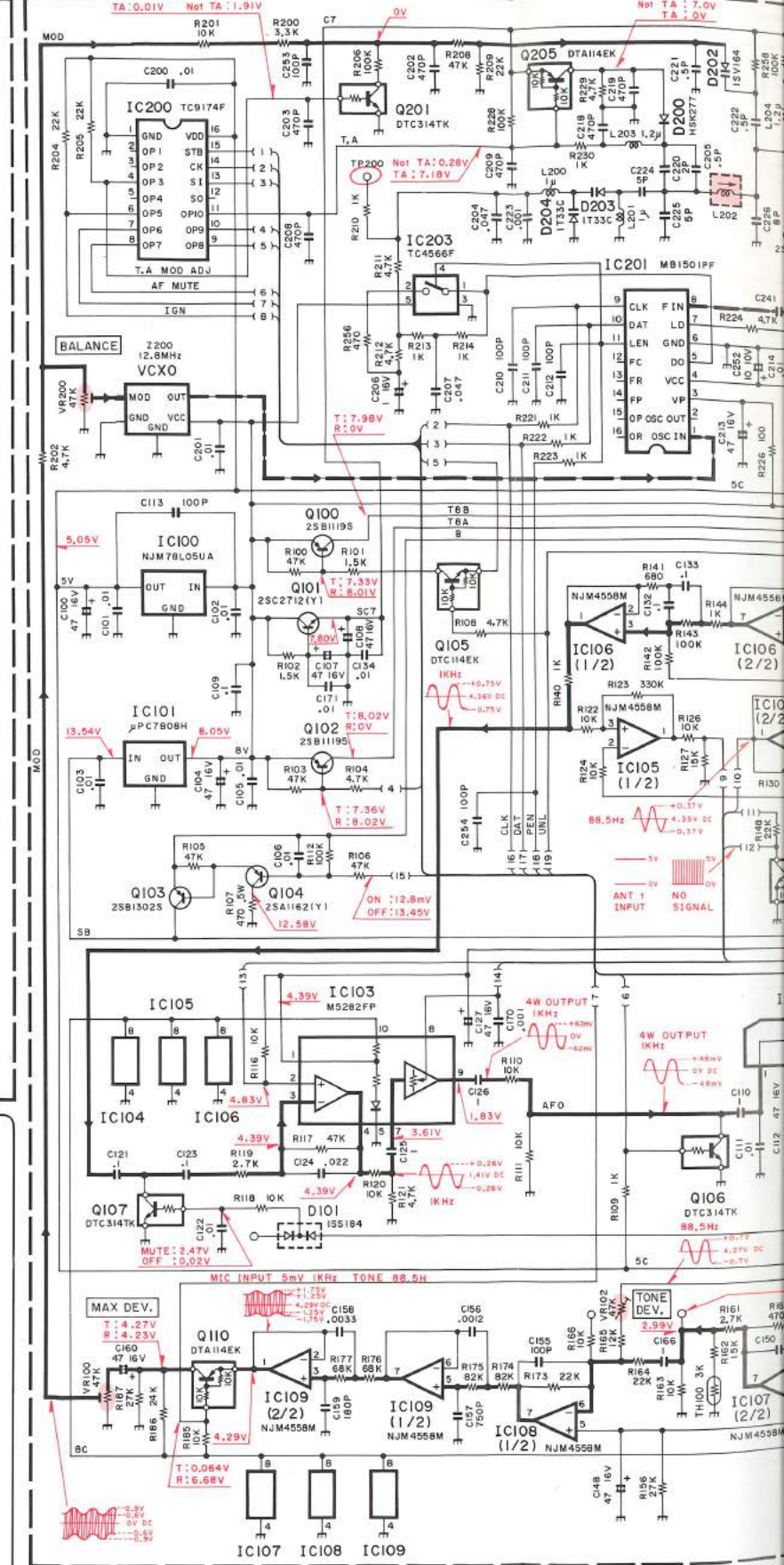
TK-931(HD) SCHEMATIC DIAGRAM

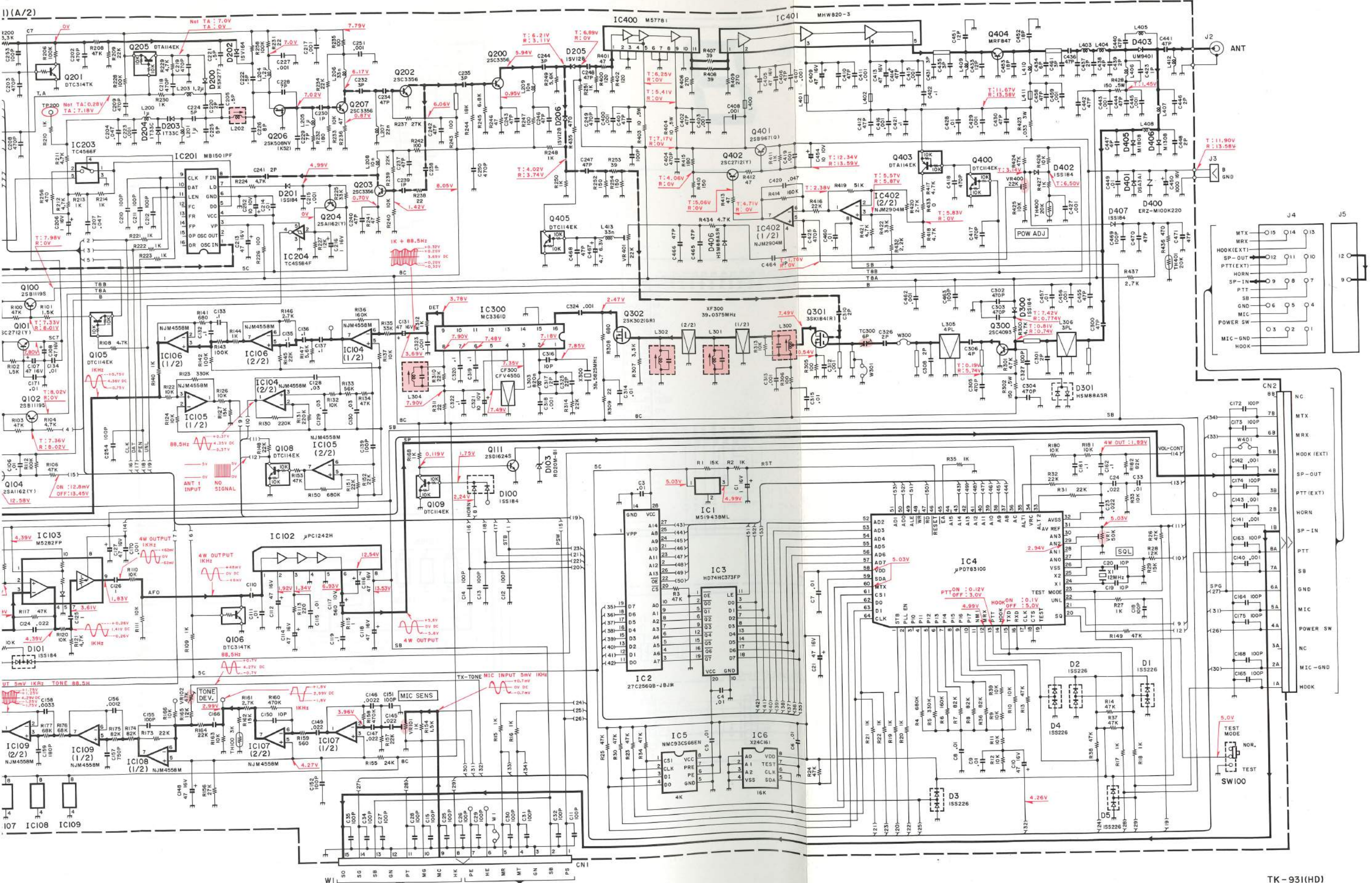
- IC1 : 75304GF-104
- IC2 : LC7582
- IC3 : L78M05TFA
- IC4 : TC4013BF
- IC5 : M51943BML
- IC6 : TC4569F
- TR1 : 2SC2712
- D1,2 : ISS184
- D3,6 : ISS226
- D7 : RD18M-B2

LCD ASS'Y (B38-0332-05)



TX-RX UNIT (X57-3560-11)(A/2)

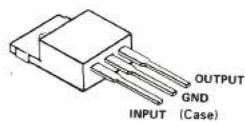




2SC4093



μPC7808H



2SB967
L78M05T-FA



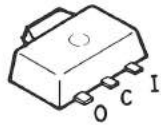
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2SB1302S



M51943BML
NJM78L05UA



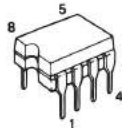
NJM78ML05VA



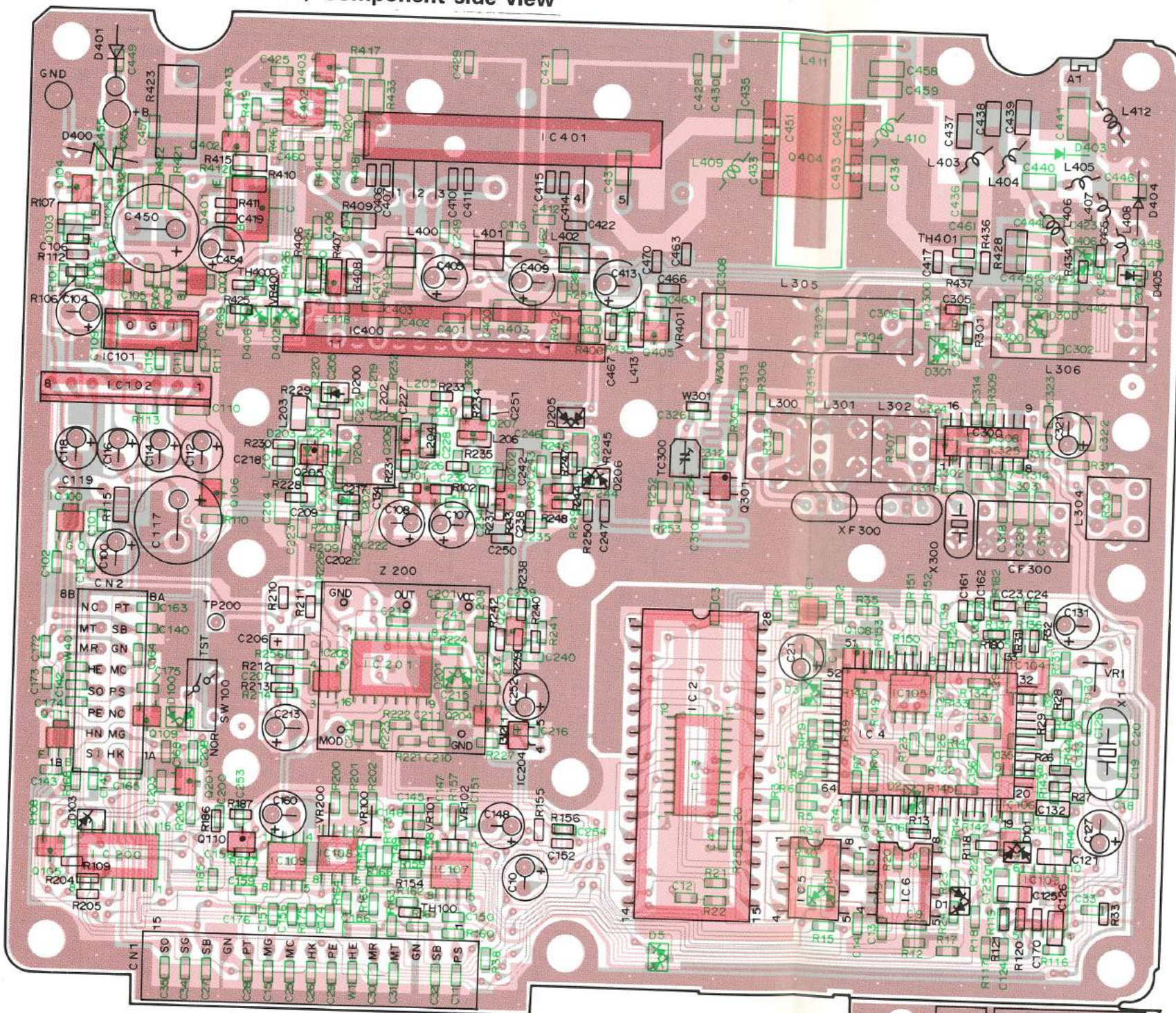
μPC1242H



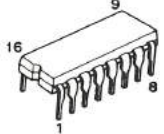
NMC93CS66EN



TX-RX UNIT (X57-3560-11) Component side view



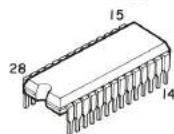
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DTC314TK
DTA114EK
2SA1162
2SC2712
2SC3356



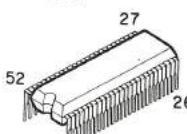
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27C256QB-JB1



2SK302



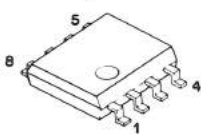
TC4S66F



2SK508NV



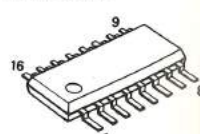
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NJM4558M



TC4S584F



MC3361D
MB1501PF



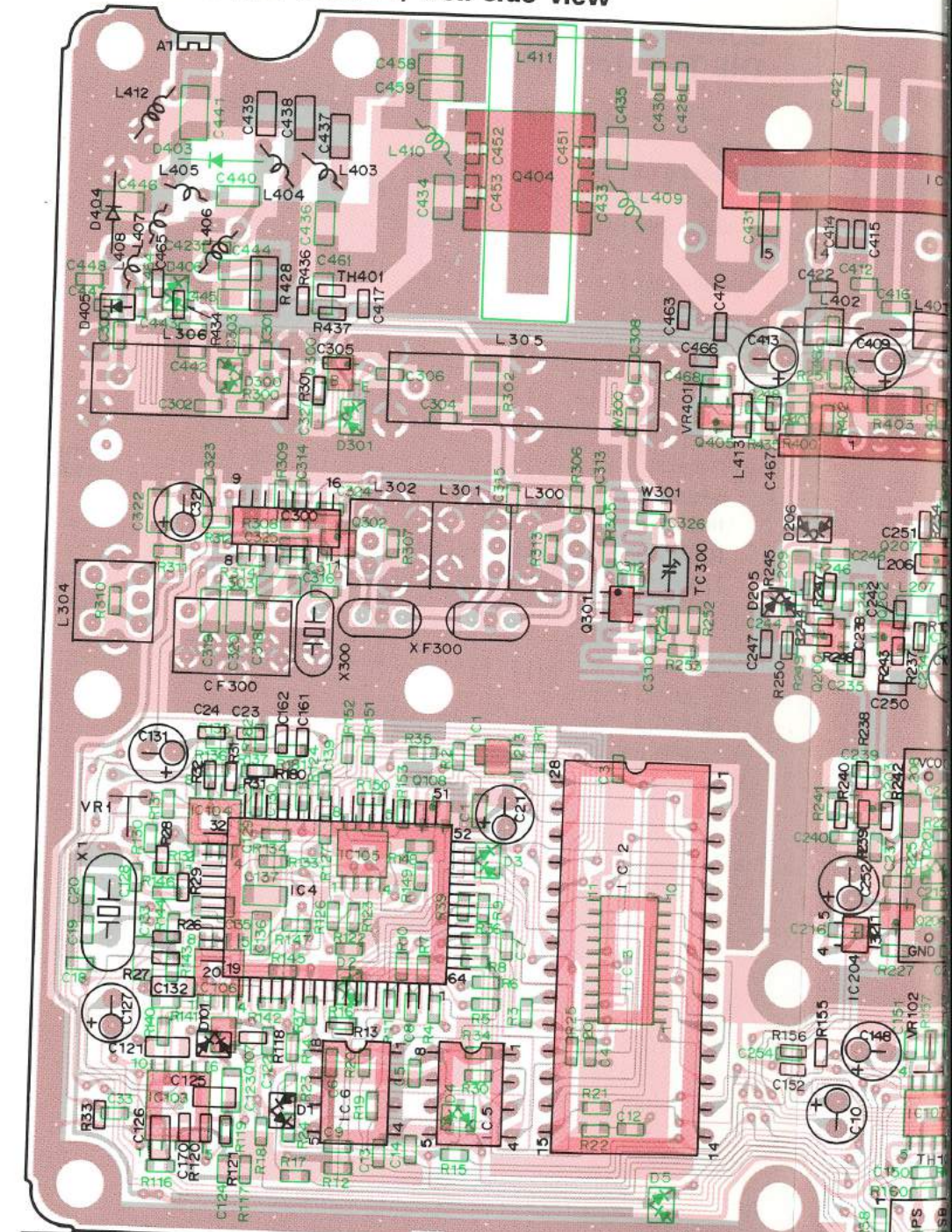
3SK184



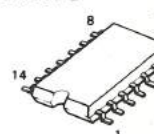
M5282FP



TX-RX UNIT (X57-3560-11) Foil side view



TC401310G



MRF847



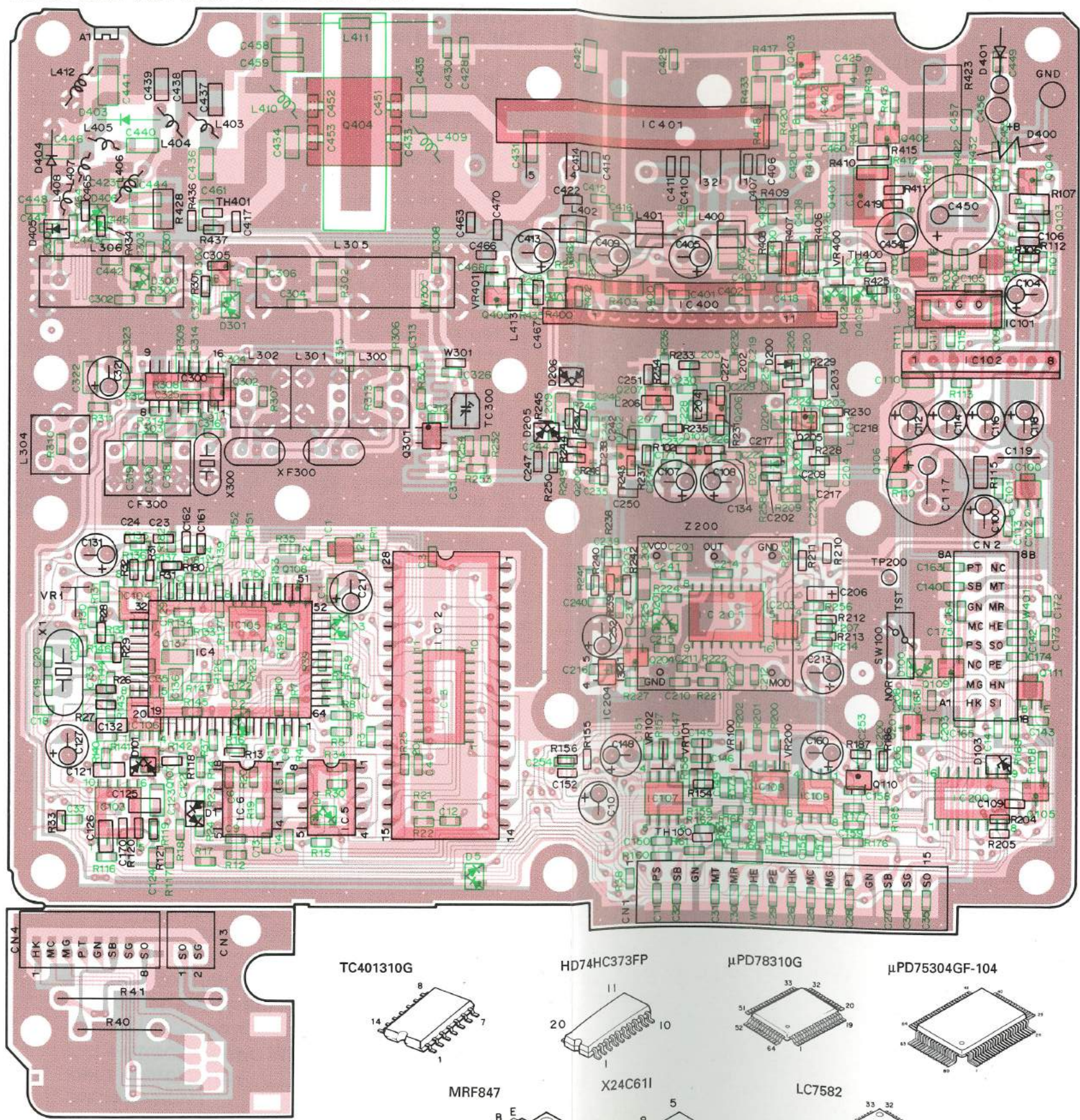
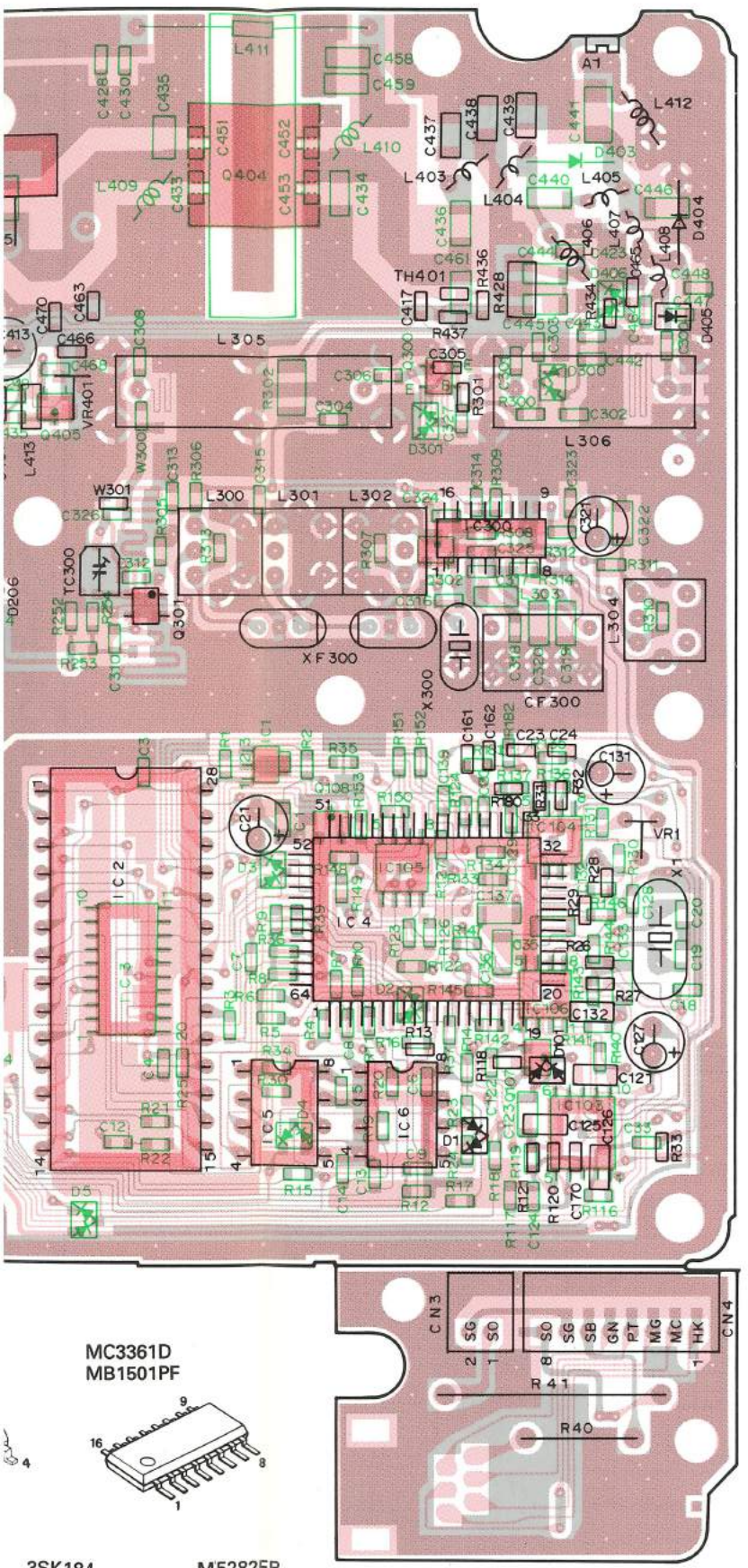
HD74HC373FP



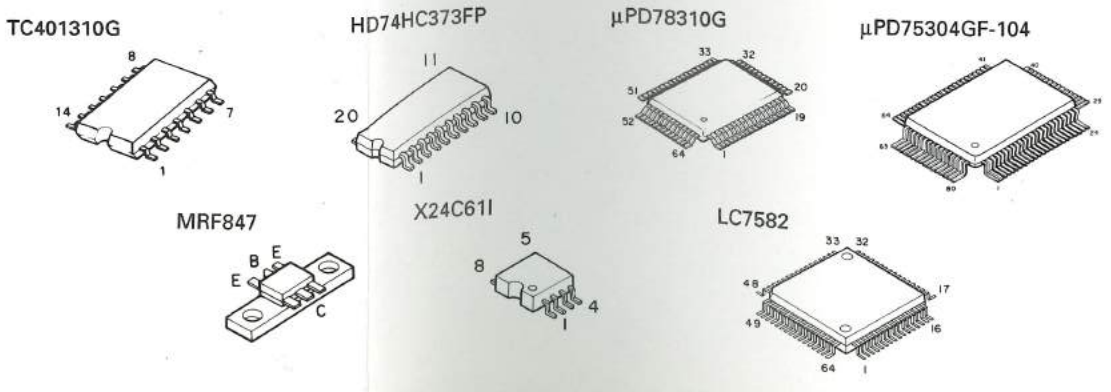
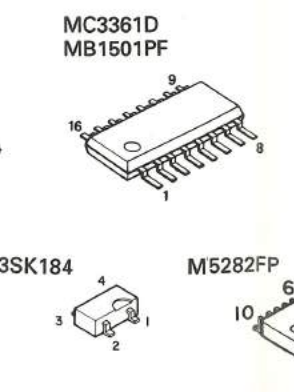
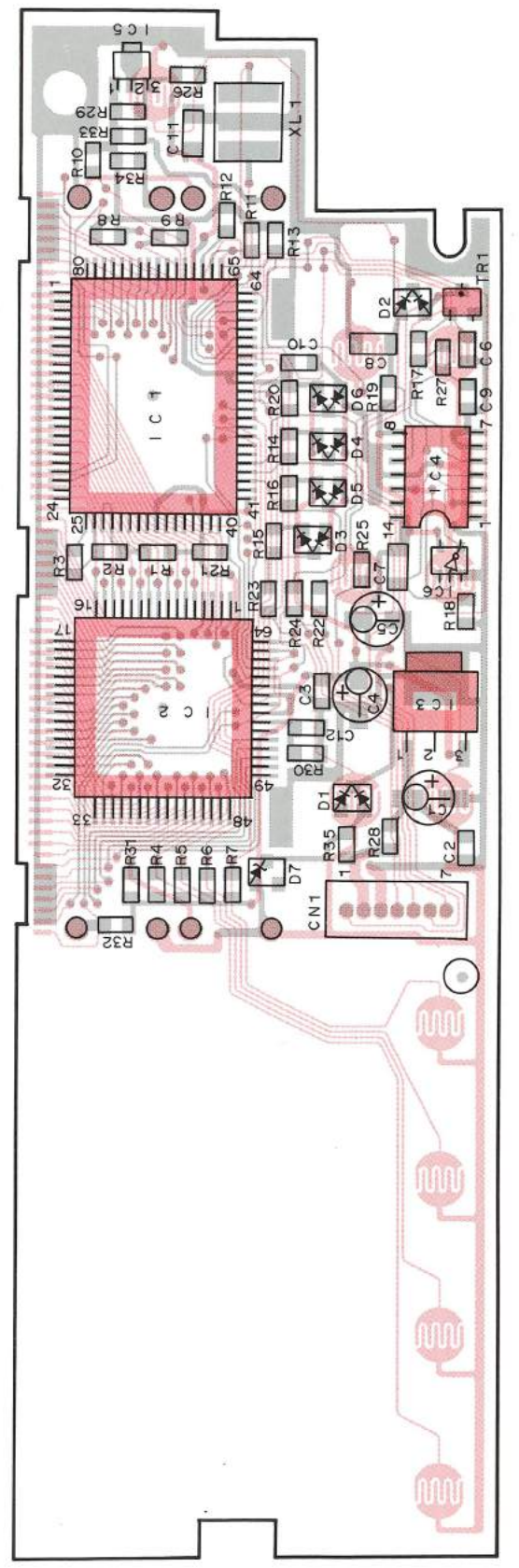
X24C611



TX-RX UNIT (X57-3560-11) Foil side view



LCD ASS'Y (B38-0332-05) Foil side view



Component side
Foil side

TK-931/931 (HD)

KSP-1A (EXTERNAL SPEAKER)

EXTERNAL VIEW



The Model KSP-1A is a compact, light-weight speaker specifically designed for mobile installation.

* Before installing your KSP-1A, check that the following mounting parts are supplied:

1. Self tapping screws (N09-0655-05) 4 pcs.
2. Wing bolts (N09-0662-05) 2 pcs.
3. Hex-head bolts (N09-0008-04) 4 pcs.
4. Flange nuts (N14-0510-04) 4 pcs.
5. Flat washers (N15-1060-46) 6 pcs.
6. Spring washers (N16-0060-46) 6 pcs.
7. Crimp terminal (E23-0495-05) 2 pcs.

SPECIFICATIONS

Speaker size	120mm
Maximum input	10W
Impedance	4 ohms
Frequency response	165Hz~8kHz
Dimensions	127 W x 127 H x 65 D mm
Weight	750g

INSTALLATION

The following tools are required for installing the External Speaker.

- 1/4" drill for Hex. Socket Screws.
- 1/6" drill for Self-tapping Screws.
- Screw Driver, Phillips No. 2.

1. Select a location in which to install the External Speaker.
2. Loosen the two Mounting Screws and remove the Bracket from the External Speaker (**Fig. 1**).
3. Use the Bracket as a template to locate the holes and mark four points to be drilled.
4. Drill four holes as marked using a 1/6" drill for Self-tapping Screws, or a 1/4" drill for Hex. Socket Screws.
5. Secure the Bracket with four each Hex. Socket Screws, Flat Washers, Spring Washers, Flange Nuts and Self-tapping Screws.
6. Attach the External Speaker temporarily to the Bracket using either two Mounting Screws or two Wing Screws.
7. The angle of the Bracket may be adjusted to any of seven possible angles. Select the desired angle.

Note: _____

The angle of the External Speaker can be adjusted 30-degree in seven steps.

8. Hold the External Speaker in place and tighten the two screws.

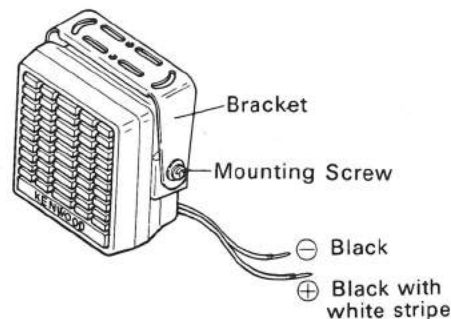


Fig. 1

KSP-1A (EXTERNAL SPEAKER)

CONNECTION FOR THE KSP-1A WITH THE TK-931/931(HD)

The following tools are required for changing the connector.

Extracting tool

The following extracting tool is recommended:
Molex Inc. Order No.: 11-03-0002

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 9 and 12 using the extracting tool.

REMOVING THE JUMPER LEAD (Fig. 3)

- 1) Insert the extracting tool (11-03-0002) 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. Reinsert the terminal with the black and white stripe lead into hole number 12, and the terminal with the black lead into hole number 6 (Fig. 4).
 4. Attach the connector to the External Speaker connector on the radio.

Square-type plug (E31-3228-05)

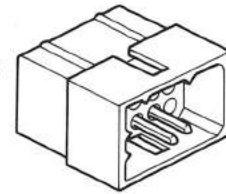


Fig. 2

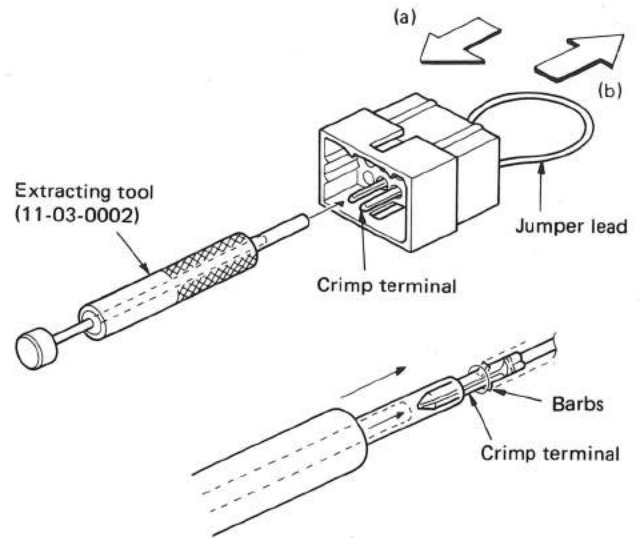


Fig. 3

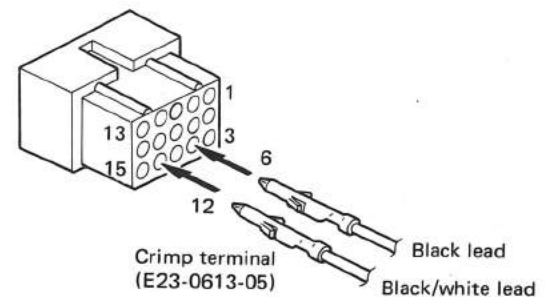


Fig. 4

KSP-1A (EXTERNAL SPEAKER)

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés 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	Desti- nation 仕向	Re- marks 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		

E: Scandinavia & Europe K: USA P: Canada

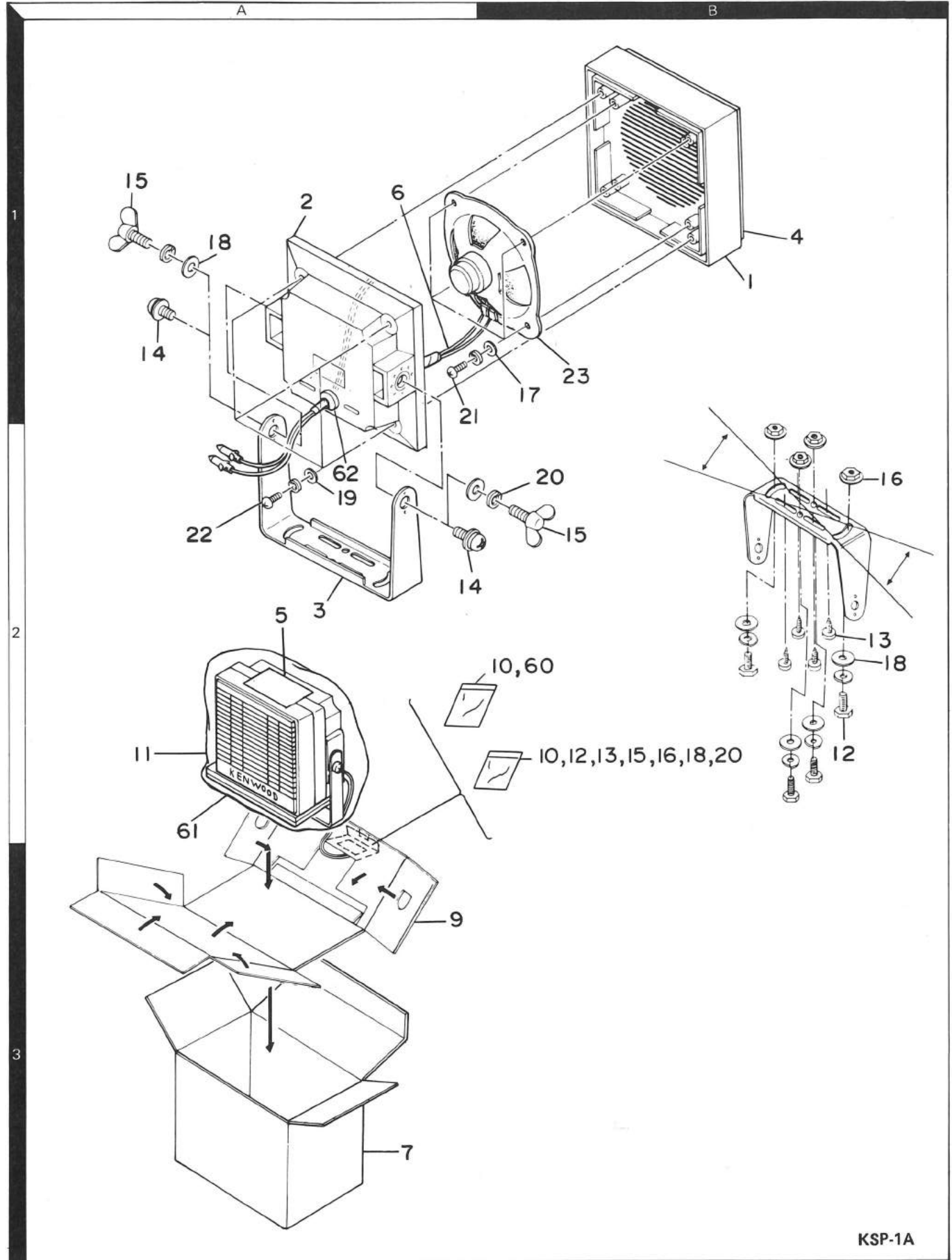
U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

 indicates safety critical components.

KSP-1A (EXTERNAL SPEAKER)

DISASSEMBLY



TK-931/931(HD)

KSP-2A (AMPLIFIED EXTERNAL SPEAKER)

EXTERNAL VIEW



The Model KSP-2A is a compact, Built-in amp speaker specifically designed for mobile installation.

* Before installation using your KSP-2A check that the following mounting parts are supplied :

1. Self tapping screws (N09-0655-05) 4 pcs.
2. Wing bolts (N09-0662-05) 2 pcs.
3. Hex-head bolts (N09-0008-04) 4 pcs.
4. Flange nuts (N14-0510-04) 4 pcs.
5. Flat washers (N15-1060-46) 6 pcs.
6. Spring washers (N16-0060-46) 6 pcs.
7. Fuse (F05-3022-05) 1 pcs.

FEATURES

1. This speaker is equipped with a large 10W output amplifier.
2. Specifically designed for mobile use to provide high sound quality.
3. Easy installation. The speaker can be mounted in almost any position by changing its angle in the bracket.
4. Perfectly matches the design of the transceiver.

SPECIFICATIONS

Speaker Size	120 mm
Maximum Output	10W
Impedance	8 ohms
Frequency Response	165Hz-8kHz
Dimensions	127W x 127H x 65D mm
Weight	approx. 1kg
Max. Input	3.4Vrms at 1kHz
Source Voltage	13.8V ±15% DC

INSTALLATION

1. Choose a location in which to install the speaker.
2. Remove the bracket from the speaker. (Two mounting screws)
3. Locate the bracket over the mounting space and mark 4 points to be drilled.
4. Drill 4 holes as marked. Use a 1/6" drill for self-tapping screws, or a 1/4" drill for machine screws.
5. Secure the bracket with the appropriate hardware.
A : Securing with hex. bolts and nuts.
B : Securing with 4 self tapping screws.
6. Reinstall the speaker to the bracket. Use either two mounting screws or two wing screws.

CIRCUIT DESCRIPTION

The KSP-2A consists of the following circuits.

a) Attenuator

The high level signal of the speaker output is decreased by resistance dividing.

b) Amplifier IC μ PC1280V (U1)

Amplifier 1 does not reverse the phase whereas amplifier 2 does reverse the phase of the input signal. The outputs of amplifiers 1 and 2 have opposite phase and doubles output can be obtained (BTL connection).

c) Oscillation prevention

To prevent oscillation, R4-R5 and C8-C9 are used in the output stage.

KSP-2A (AMPLIFIED EXTERNAL SPEAKER)

CONNECTION FOR THE KSP-2A WITH THE TK-931/931(HD)

The following tools are required for changing the connector.

Extracting tool

The following extracting tool is recommended:
Molex Inc. Order No.: 11-03-0002

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 9 and 12 using the extracting tool.

REMOVING THE JUMPER LEAD (Fig. 2)

- 1) Insert the extracting tool (11-03-0002) 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. Insert the terminal with the black lead into hole number 6, and the terminal with the black and white stripe lead into hole number 12, and the terminal with the red lead connected to the fuse holder into hole number 7.
 4. Attach the connector to the External Speaker connector on the radio.

Square-type plug
(E31-3228-05)

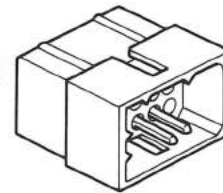


Fig. 1

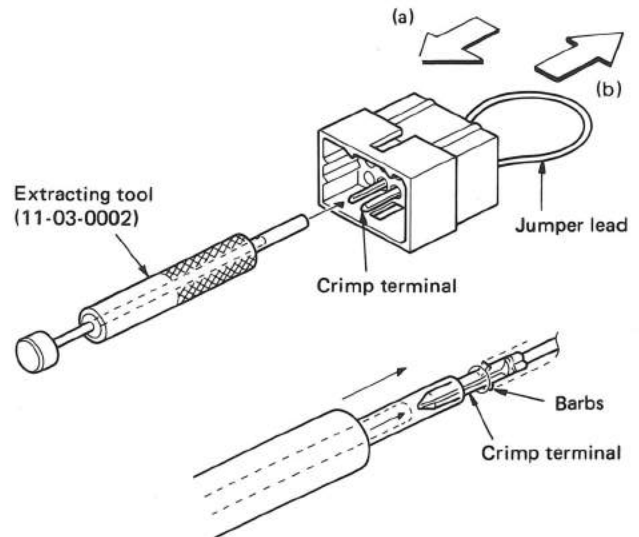


Fig. 2

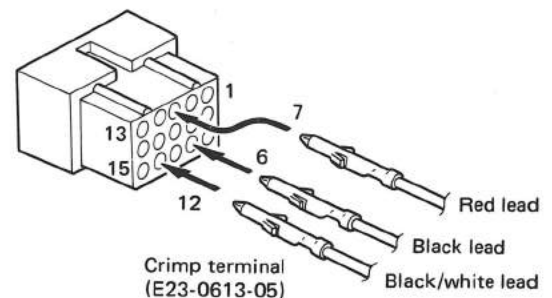


Fig. 3

TK-931/931(HD)

KSP-2A (AMPLIFIED EXTERNAL SPEAKER)

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés 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	Desti- nation 仕向	Re- marks 備考
KSP-2A						
1	1B		A01-1034-02	PLASTIC CABINET(FRONT)		
2	1A		A01-1035-02	PLASTIC CABINET(REAR)		
3	2A		A13-0678-03	ANGLE		
7	1B		B40-3740-04	MODEL NAME PLATE		
8	2A		B50-8165-00	INSTRUCTION MANUAL		
12	2A		E30-2083-05	CABLE ASSY WITH TERMINAL		
13	2A		E30-2084-05	DC POWER CORD		
17	1A		F01-0920-02	HEAT SINK		
18	3B		F05-3022-05	FUSE		
22	3A		H01-8107-03	ITEM CARTON BOX		
23	3A		H12-1335-03	PACKING FIXTURE		
24	3A		H12-1341-04	PACKING FIXTURE		
25	3B		H25-0029-04	PROTECTION BAG (60X110)		
26	3B		H25-0076-03	PROTECTION BAG (6X50)		
27	2A		H25-0106-04	PROTECTION BAG (250X350)		
31	2A		J41-0026-05	CORD BUSHING		
35	3B		N09-0008-04	HEX BOLT (4 USED)		
36	2B, 3B		N09-0655-05	TAPLING SCREW (4 USED)		
37	1A, 2A		N09-0656-05	SCREW WITH WASHERS(ANGLE)		
38	1A, 2A		N09-0662-05	WING BOLT (2 USED)		
39	1B		N10-2030-46	HEXAGON NUT (10)		
40	2B, 3B		N14-0510-04	FLANGE NUT (4 USED)		
41	2A, 1B		N15-1040-46	FLAT WASHER (SPEAKER, CABINET)		
42	1A, 2B		N15-1060-46	FLAT WASHER (6 USED)		
43	2A, 1B		N16-0040-46	SPRING WASHER(SPEAKER, CABINET)		
44	1A, 2B		N16-0060-46	SPRING WASHER (6 USED)		
45	1A		N35-3006-46	PAN HEAD MACHINE SCREW		
46	2B		N87-3006-46	BRAZIER HEAD TAPTITE SCREW(PCB)		
47	1A		N87-3010-46	BRAZIER HEAD TAPTITE SCREW		
48	1B		N87-4010-46	BRAZIER HEAD TAPTITE SCREW		
49	2A		N87-4020-46	BRAZIER HEAD TAPTITE SCREW		
50	1B		T07-0250-05	LOUDSPEAKER (8 OHM)		
52	2B		X63-1090-10	AMP UNIT		
AMP UNIT (X63-1090-10)						
C1			CQ92M1H102K	MYLAR 1000PF	K	
C2			CE04W1C470M	ELECTRO 47UF	16WV	
C3	.4		CE04W0J101M	ELECTRO 100UF	6.3WV	
C5			CQ92M1H104K	MYLAR 0.10UF	K	
C6			C90-2005-05	ELECTRO 1000UF	25WV	
C7			CE04W1A101M	ELECTRO 100UF	10WV	
C8	.9		CQ92M1H104K	MYLAR 0.10UF	K	
C10			CE04W1A101M	ELECTRO 100UF	10WV	
-			E31-3090-05	CONNECTOR WITH LEAD		
L1			L15-0307-05	HASH CHOKE (0.5MH)		
R1			RD14BB2E102J	RD 1.0K	J 1/4W	
R2			RD14BB2E3R9J	RD 3.9	J 1/4W	
R3			RD14BB2E102J	RD 1.0K	J 1/4W	

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.

KSP-2A (AMPLIFIED EXTERNAL SPEAKER)

× New Parts


Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

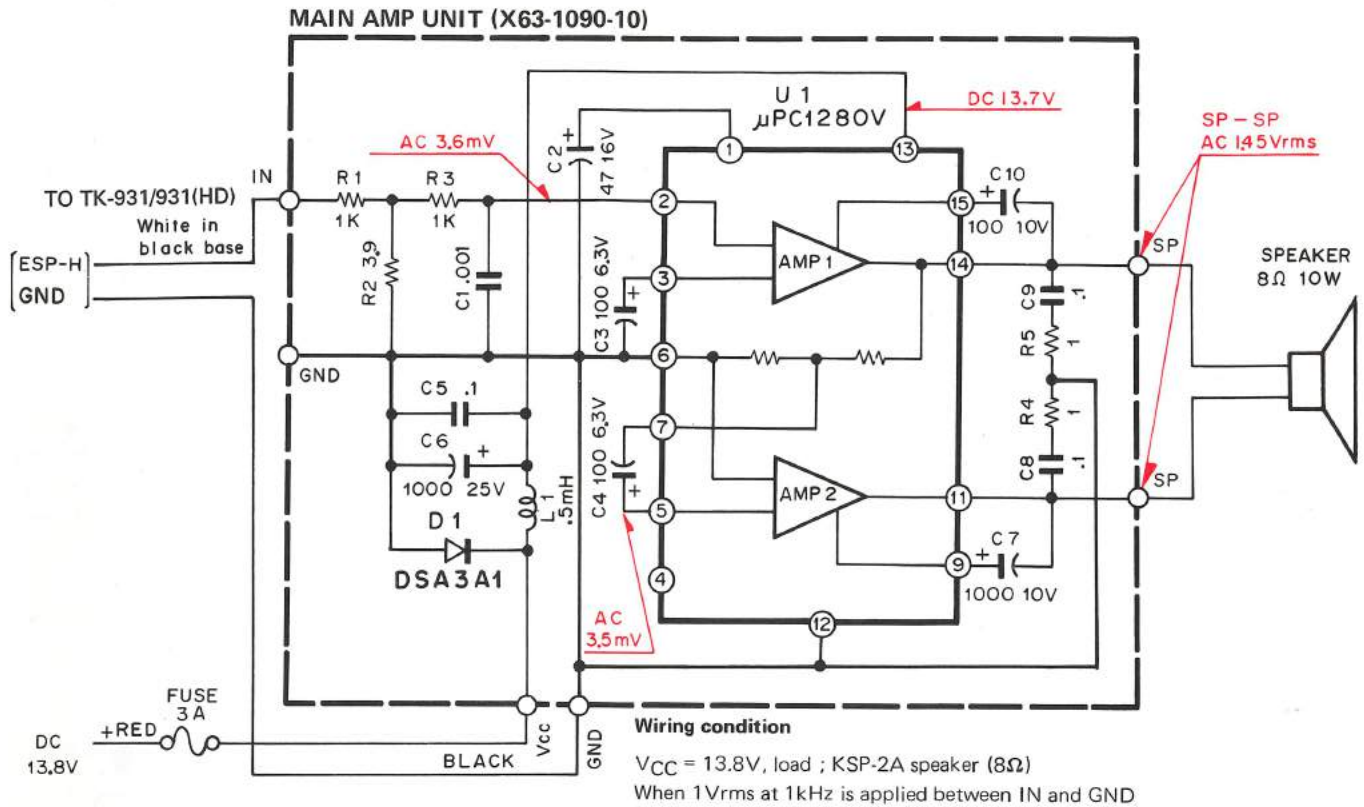
Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
R4 ,5 D1 U1			RD14BB2E010J DSA3A1 UPC1280V	RD 1.0 J 1/4W DIODE IC(AF POWER AMP/ 20W X2)		

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.

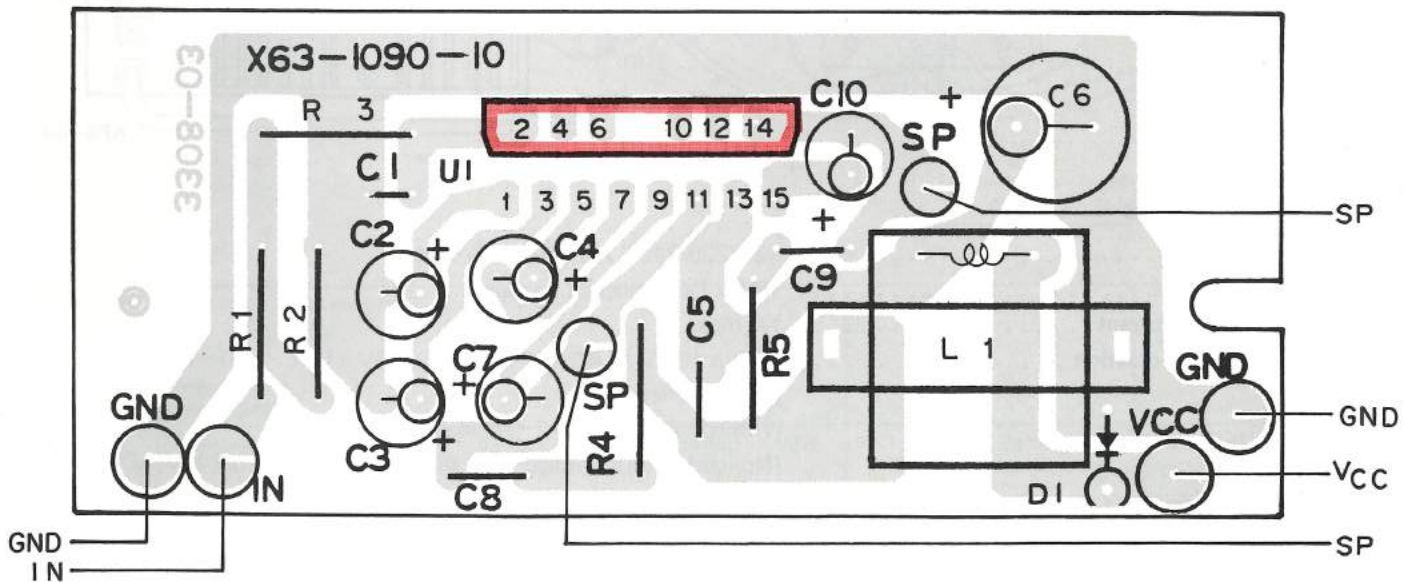
KSP-2A (AMPLIFIED EXTERNAL SPEAKER)

SCHEMATIC DIAGRAM



PC BOARD

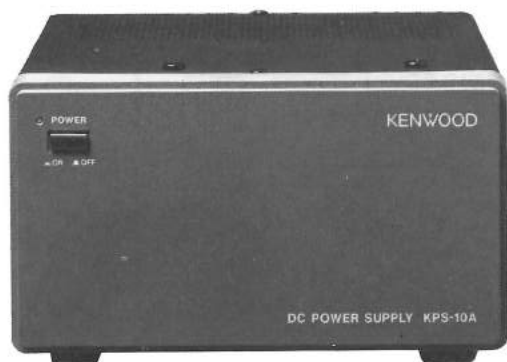
MAIN AMP UNIT (X63-1090-10) Component side view



TK-931/931(HD)

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 current 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.

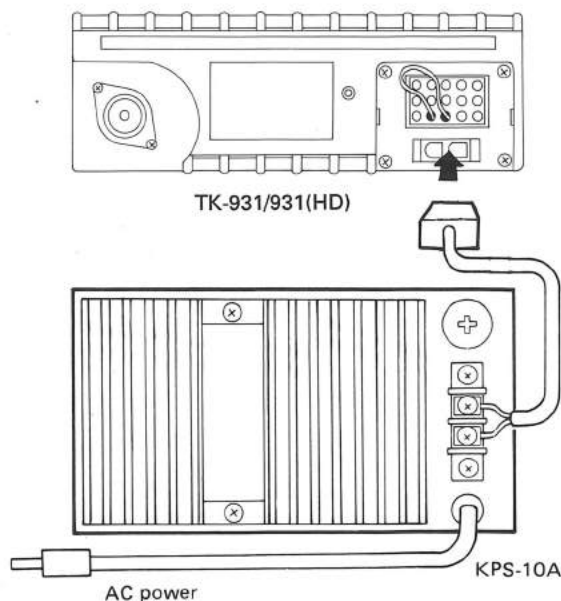


Fig. 1

SPECIFICATIONS

Input voltage	120/220/240V AC $\pm 10\%$, 50/60Hz
Output voltage	13.8V DC (standard voltage)
Continuous load current	7A max.
Output voltage fluctuation	Within $\pm 0.7V$ at AC 120V, 220V, 240V $\pm 10\%$ (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

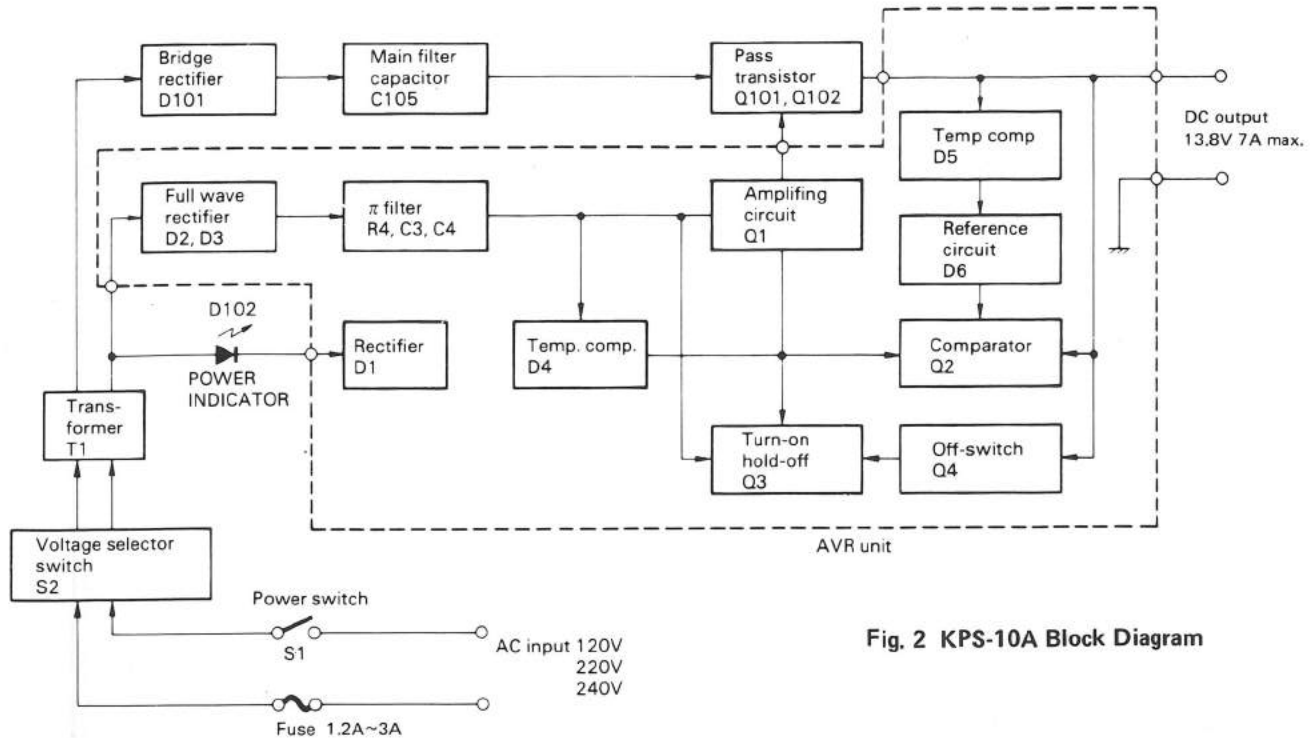


Fig. 2 KPS-10A Block Diagram

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 equipment 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.) Power SW : OFF	DVM AF VTVM						13.6V±0.7V DC Less than 30mV AC
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

KPS-10A (DC POWER SUPPLY)

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
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	ELECTRØ 47000UF 25WV		
C106			C91-1098-05	FIXED CAPACITØR(4700PF,AC400WV		
C107,108			C91-0496-05	CERAMIC 470PF K		
13			E20-0282-05	TERMINAL BOARD (2P)		
14			E30-0185-05	AC POWER CØRD	X	
14			E30-0585-05	AC POWER CØRD	W	
14			E30-0602-05	AC POWER CØRD	T	
14			E30-0780-05	AC POWER CØRD	KM	
15			E31-2188-05	CØNNECTING 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	CØVER		
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 CARTØN BØX		
20			H10-2567-02	PØLYSTYRENE FØAMED FIXTURE(F)		
21			H10-2576-02	PØLYSTYRENE FØAMED FIXTURE(R)		
22			H12-1337-04	PACKING FIXTURE		
23			H20-1420-03	PRØTECTION CØVER		
24			H25-0029-04	PRØTECTION BAG (FUSE)		
25			H25-0105-04	PRØTECTION BAG (AC POWER CØRD)		
27			J02-0323-05	FØØT (REAR SIDE)		
28			J02-0429-05	FØØT (FRØNT SIDE)		
29			J13-0031-05	FUSE HØLDER (5X20)	TXW	
29			J13-0033-05	FUSE HØLDER (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 BØSS		
36			J41-0024-15	CØRD BUSHING	TXW	
36			J41-0033-05	CØRD BUSHING	KM	
37			K29-0758-14	PUSH KNØB		

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 mentionnés 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	Desti- nation 仕 向	Re- marks 備考
T1			L01-8101-05	POWER TRANSFORMER	K TX W M	
T1			L01-8132-05	POWER TRANSFORMER		
T1			L01-8142-05	POWER TRANSFORMER		
T1			L01-8326-05	POWER TRANSFORMER		
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(FRONT)		
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)	M	
S2			S29-2406-05	VOLTAGE SELECT SWITCH		
D101			S25VR10	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 PNT. (500)		
VR2			R12-8405-05	TRIMMING PNT. (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		

E: Scandinavia & Europe K: USA P: Canada

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

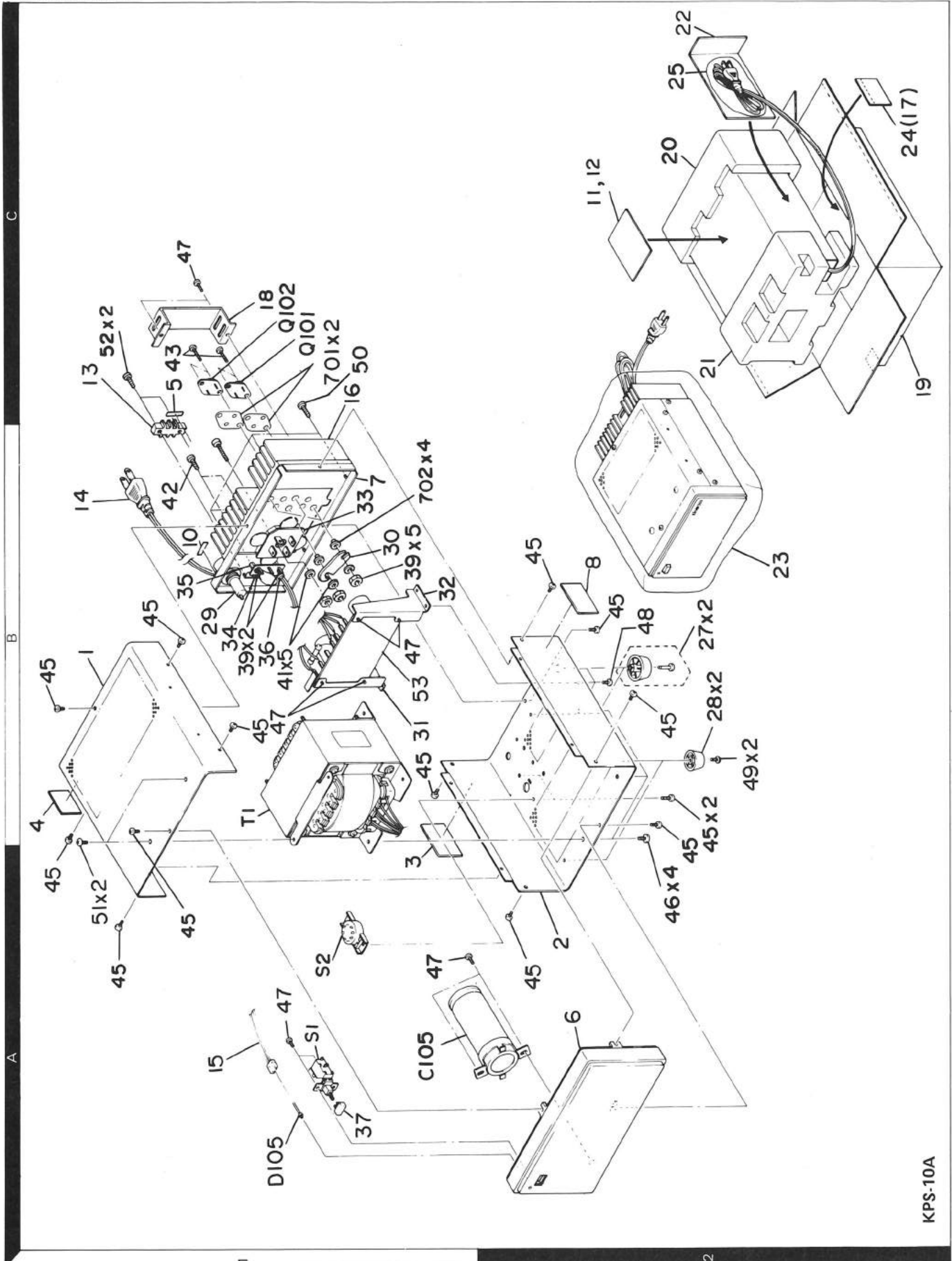
UE: AAFES(Europe) X: Australia

△ indicates safety critical components.

TK-931/931(HD)

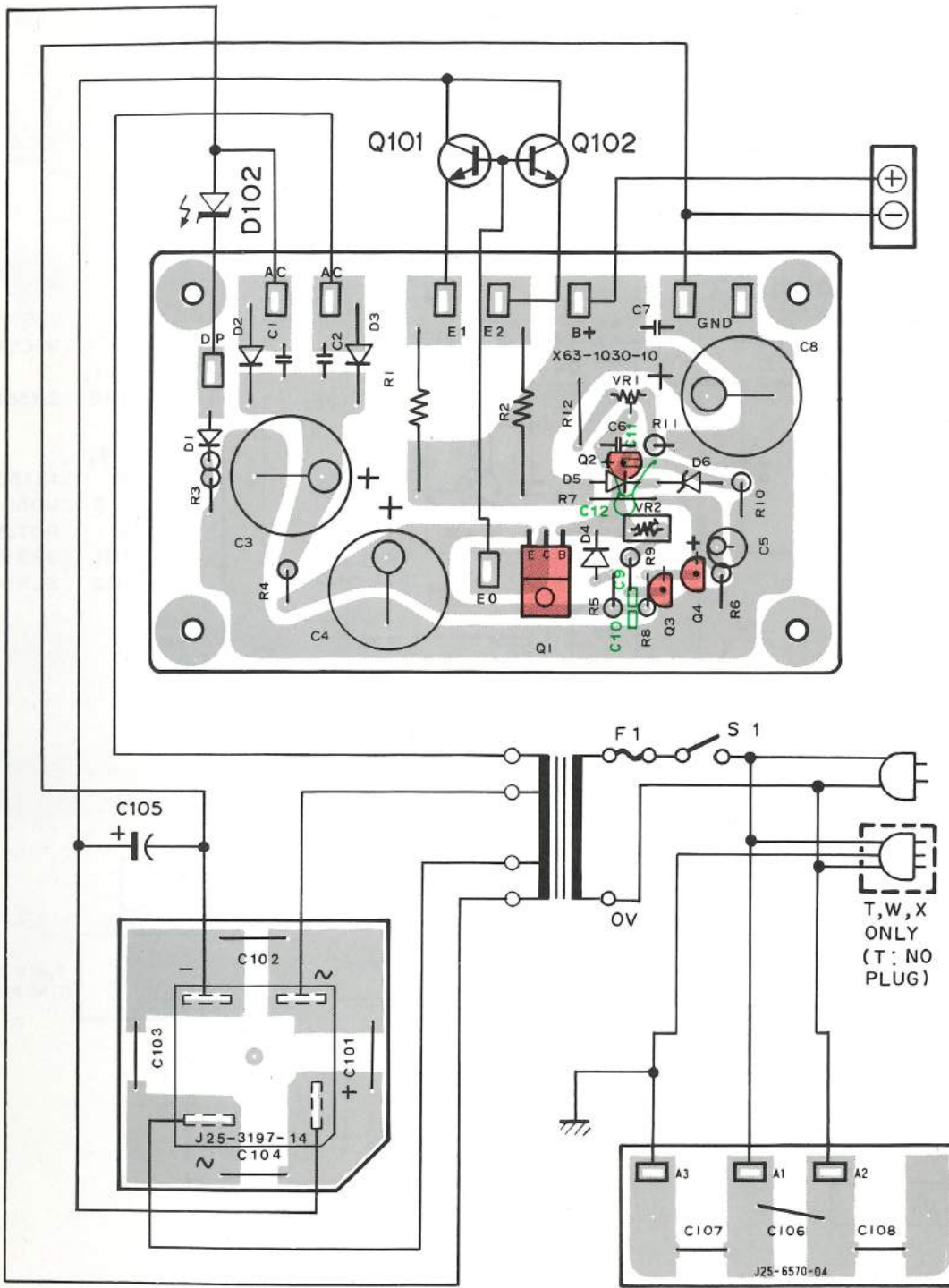
KPS-10A (DC POWER SUPPLY)

DISASSEMBLY

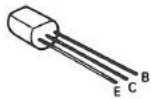


KPS-10A

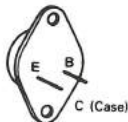
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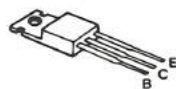
2SC1815



2N5885



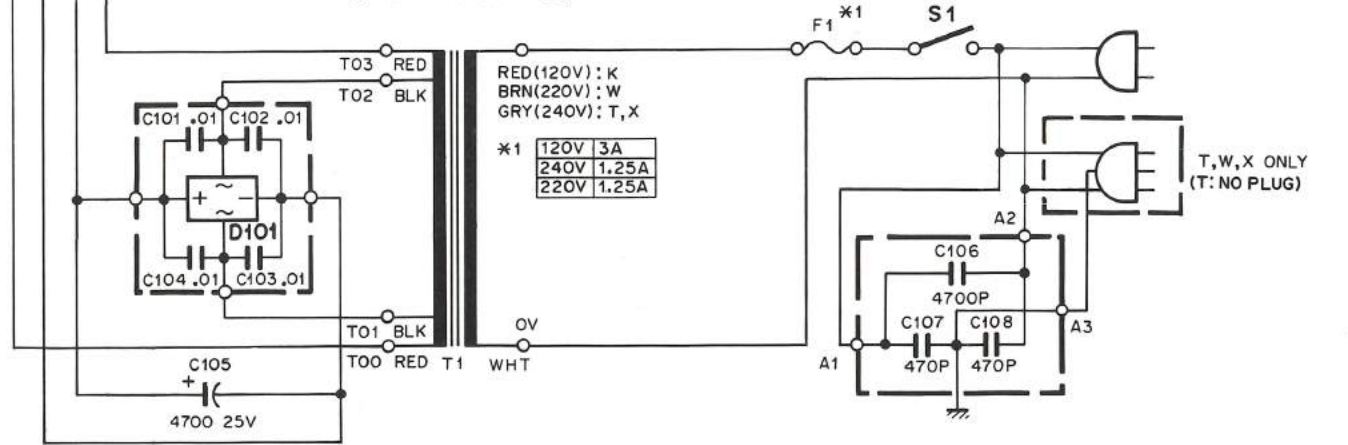
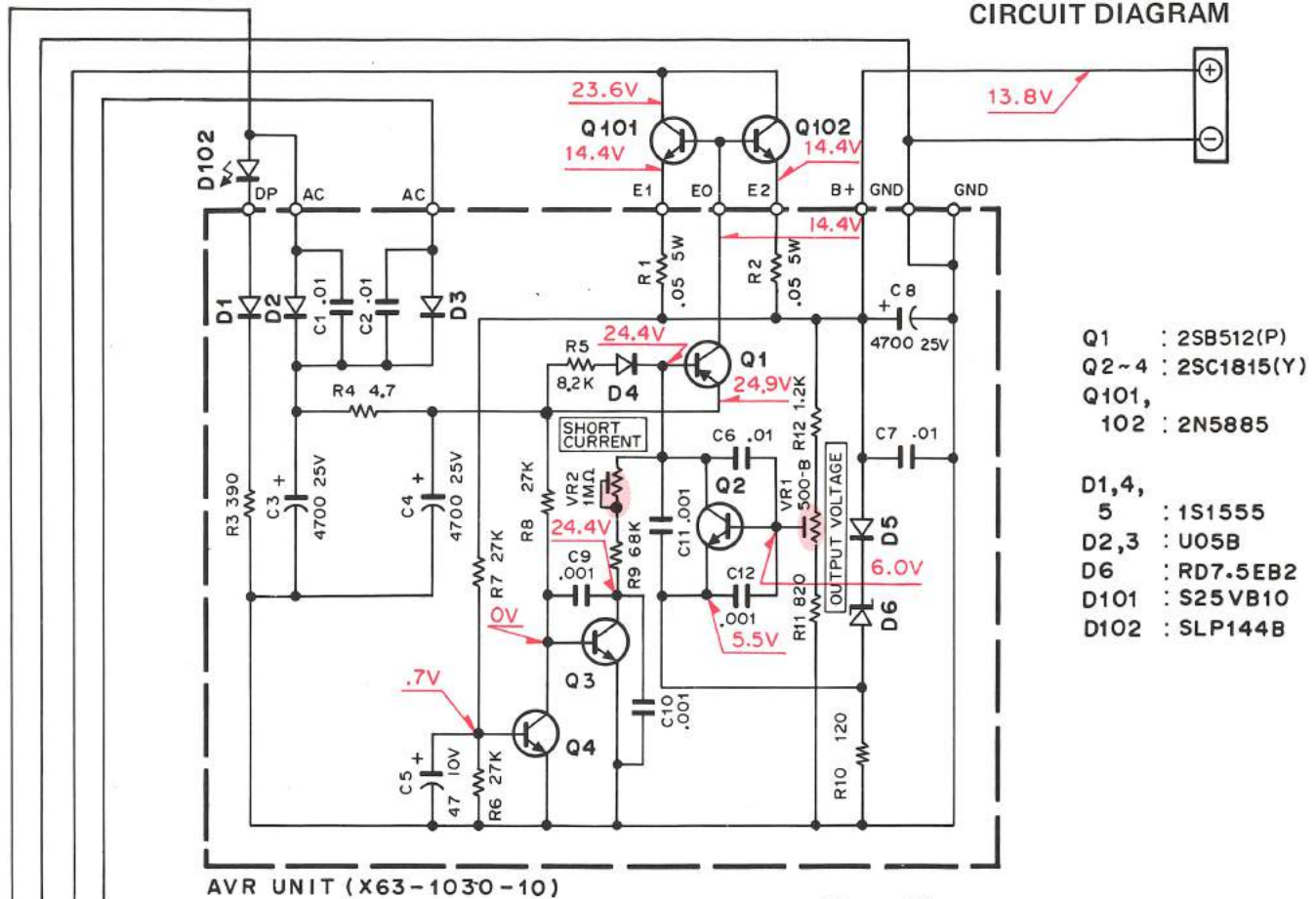
2SB512



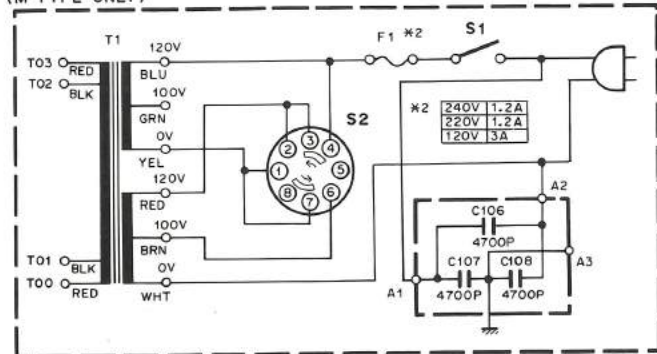
TK-931/931(HD)

KPS-10A (DC POWER SUPPLY)

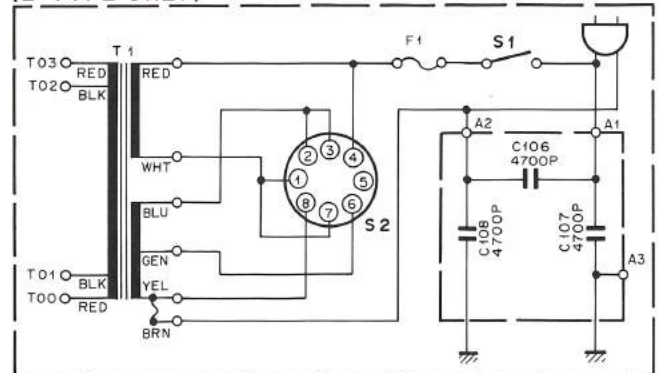
CIRCUIT DIAGRAM



(M TYPE ONLY)



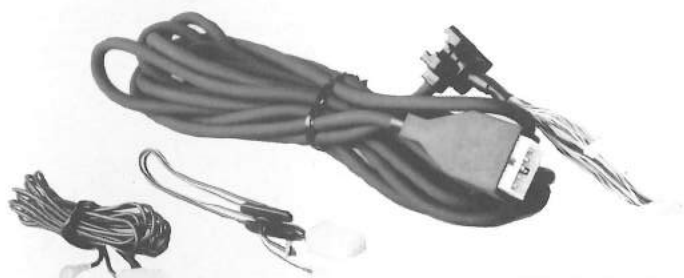
(E TYPE ONLY)



KCT-10A/10B (CONTROL CABLE)/ KPG-4 (PROGRAMMING INTERFACE)/KRK-1 (REMOTE KIT)

TK-931/931 (HD)

KCT-10A/10B External View



**KCT-10A : 6m
KCT-10B : 4m**

KPG-4 External View



KRK-1 External View



KRK-1 Parts List

Ref. No.	New	Parts No.	Description
	*	A01-2012-03	Case
	*	A62-0032-02	Front panel
	*	B62-0029-00	Instruction manual
	*	G53-0595-03	Rubber seal
	*	J29-0455-03	Angle bracket
		N08-0514-14	Decorative screw
	*	N19-0648-05	Flat washer
		N35-4008-45	Binding head machine screw (M4 x 8)
		N87-3008-46	Second brazier tap tight screw (M3 x 8)
	*	N99-0348-05	Screw set

TK-931/931(HD)

SPECIFICATIONS

GENERAL

Frequency Range	RX : 935~941MHz TX : 896~902MHz, 935~941MHz
Systems/Channels	6 systems/120 channels : TK-931, 10 systems/200 channels : TK-931(HD)
Groups	4 groups per system : TK-931, 10 groups per system : TK-931(HD)
Conventional Channels	4 channels per system : TK-931, 10 channels per system : TK-931(HD)
Channel Spacing	12.5kHz
Input Voltage	13.6V DC negative ground
Current Drain	0.4A on standby 1.0A on receive
Duty Cycle	5.0A on transmit : TK-931, 9.0A on transmit : TK-931(HD) Receiver 100%, Transmitter 20%
Temperature Range	-30°C to +60°C (-22°F to +140°F)
Dimensions and Weight	5.91" (150mm) W x 1.97" (50mm) H x 7.48" (190mm) D, 3.09 lbs (1.4kg) : TK-930 5.91" (150mm) W x 1.97" (50mm) H x 8.66" (220mm) D, 3.53 lbs (1.6kg) : TK-930(HD)

RECEIVER (Measurements made per EIA standard EIA-204-C)

RF Input Impedance	50Ω
Sensitivity (EIA 12dB SINAD)	0.35μV
Modulation Acceptance	±3.5kHz
Selectivity	-70dB
Intermodulation	-65dB
Spurious and Image Rejection	-75dB
Frequency Stability	±0.00015% from -30°C to +60°C
Channel Frequency Spread	6MHz
Audio Power Output	4W at less than 5% distortion

TRANSMITTER (Measurements made per EIA standard EIA-152-B)

RF Power Output	15W adjustable to 5W : TK-931 30W adjustable to 15W (More than 20W for talk around) : TK-931(HD)
RF Output Impedance	50Ω
Spurious and Harmonics	-65dB
Modulation	F3E, F1D, F2D
FM Noise	-40dB
Microphone Impedance	Low impedance
Audio Distortion	Less than 3% at 1000Hz
Frequency Stability	±0.00015% from -30°C to +60°C
Channel Frequency Spread	45MHz

APPLICABLE MIL STANDARD

MIL 810C Methods/Procedures	Rain : 506.1/2	Shock : 516.2/1,2,3,5	Vibration : 514.2/8
MIL 810D Methods/Procedures	Rain : 506.2/2	Shock : 516.3/1,4,5,6	Vibration : 514.3/1

APPLICABLE ENVIRONMENTAL EIA STANDARDS

EIA 152C, 204C Shock, Vibration, Humidity

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TK-930/930(HD) service manual part no. B51-8085-00

TK-931/931(HD) service manual part no. B51-8086-00

Service Manual Addendum

Due to the operational software improvements made in these radios after the printing of the above service manuals, the following features have been added or altered with respect to the original manual text. Features listed under "Additional Information " are expanded on here for clarification purposes.

Added Feature

ACCESS TONE When enabled, this feature sounds a short beep tone at the time system access is made on a trunking dispatch call. If the system is busy, no busy tone will sound, but if PTT is held continuously, the intercept tone will eventually sound. Access Tone provides an audible indication to the user that repeater access (handshake) is complete, and speaking can begin. It is also an alternative to the annoyance of getting repeated Busy Tones on a heavily congested system. (Note: On a mobile-initiated interconnect call, the Access Tone will sound only on the first successful handshake with an interconnect repeater. However, if all interconnect repeaters are busy, the busy tone will sound.)

To enable the Access Tone:

1. PLACE THE RADIO IN PROGRAM MODE: Turn on the power while at the same time depressing the Auxillary button. Keep the Aux.button held for 3 seconds.; then release.
2. PUSH THE SYSTEM BUTTON "UP" ONCE; WAIT 1 SECOND FOR THE DISPLAY TO CHANGE.: The revert system/group will appear .
3. TURN OFF THE POWER: Access Tone is now enabled.

To disable the Access Tone:

Repeat the above steps except, in step 2, push the system button "down" once.

This 3-step process reduces the chance that an end-user will enable or disable the Access Tone accidentally.

Additional Information

OFF-HOOK REVERT (pg.7, 3-3) This is a System Scan function which allows the mobile to be programmed to "revert" to the "Last Used" or "Last Call" system/group when the mic is taken off-hook during system scan.

Definitions: *Last Call: refers to the last system/group a call was "received on" before scan resumed.

*Last Used: refers to the last system/group a call was "transmitted on" or "selected" before scan was resumed.

- *Additional Notes:
- i) Manually selecting a system/group at anytime will set the revert system/group in both cases.
 - ii) Going off-hook while scan is "stopped", during receive or the scan resume time period, will hold the radio on the currently displayed system/group. (Unless Interval Scan is enabled and activates.)

INTERVAL SCAN (pg. 7, 3-4) [Enabled through dealer programming] During System Scan and while the mic is off-hook, this feature will "automatically" resume system scan within a programmed time period following each transmission and/or reception. The main purpose of this is to automatically resume scan after inordinate long "intervals" between transmit and receive during a two-way conversation. This reduces the chance of missing call on another system. One practical example would be in the case that a calling mobile has been "forced" to manually switch to another system during a two-way conversation because of out-of-range or busy conditions. The called mobile (not knowing the calling mobile has switched systems) will automatically resume scan to "find" the new system it is being called on. This relieves the called mobile from having to physically go back on-hook to scan for the calling mobile, and then off-hook again to respond. Now, if both mobiles have Interval Scan enabled, they will in essence "search for each other" among multiple systems, thus making the most efficient use of the systems available to them. Another advantage to Interval Scan is if the mic is left off hook inadvertently, it will resume scan automatically. For Interval Scan there are three programmable time extensions for the scan resume time period. These prevent the mobile from resuming scan "too soon", as user requirements will vary.

Program Settings: "OFF"- disables Interval Scan and the mic MUST be on-hook for system scan to operate, i.e., regular system scan .

"4,8,or16 SECONDS"- enables Interval Scan .The off-hook scan resume times are:

After receiving a call : 3 secs. + interval

After transmitting :1.5 secs.+ interval

Operational Notes:

- i.) Interval scan is disabled while the mic is on hook . Regular scan the takes place.
- ii.) After receiving a call, if the PTT is pressed before scan resumes, then the currently displayed (calling) system/group will be the one the radio responds on. If the PTT is pressed after scanning resumes, then the "revert" system/group will be the response sys./grp. (see Off-hook Revert: Last Call or Last Use). This is the same as regular scan operation.
- iii.) Group Scan is also enabled during Interval Scan (just as with on-hook regular scan) since the mic hook condition is electronically on-hook.

CALL INDICATOR (pg.7, 3-5 Trunked operation)

As stated in the manual, selectable Group IDs and Fixed IDs can be programmed for call indicator operation upon decode (Y/N- in CAL column). The call indicator "flashes" upon decoding selectable ID's and it lights "continuously" upon decoding Fixed ID's .This visual difference indicates the type of ID decoded. Each time an ID is decoded (and the call ind. is enabled for that ID) the indicator will change to a flashing or continuous state according to it's type. Decoding ID's that have the call indicator disabled will not extinguish an already lit call indication.

Additional Notes:

- i) The call indicator lights according to the above decode situations. However, the LCD system/group no.s shown during receive will not always indicate the actual calling party since it is a function of Group Scan programming and mic-hook condition.(see Group Scan, pg.7,3-9)
- ii) The call indicator resets when: the mic is taken off-hook or placed on-hook; or if PTT or any front panel button is pressed.

PRIORITY ID CODES (pg. 7, 3-8 ;Errata: PRIORITY OF ID CODES)

- 1. Fixed ID 1
- 2. Fixed ID 2
- 3. Selected Group ID
- 4. Other Selectable Group IDs*
- 5. Block Decode IDs: RIC **, Transmit Inhibit***, Receive

All IDs are given a hierchal order of priority as in the list above.

All the programmed Fixed, Selected & Block IDs within each system are ALWAYS decodable regardless of System Scan, Group Scan, or on/off-hook conditions. While the mobile is receiving it's "home channel" of a particular system, it will trunk to the higher priority ID call even if it is currently "listening" to a lower priority ID call.

FIXED IDs 1 & -2: (optional)- Are, for example, programmed in groups of fleet mobiles so that a base station or supervisory mobile can interrupt ongoing fleet calls for priority communications. (However, fleetmobiles that are trunked out from their home channel will not receive the Fixed ID until they "return" to the systems home channel)

GROUP IDs: (A minimum of one GroupID must be programmed for the System to be valid.)

- i) **SELECTED GROUP ID:**The last selected ID via the front panel Group buttons, or, via the Off-hook Revert programming; Last Call or LastUsed. (Often referred to as the "Revert Group")
- ii) ***OTHER SELECTABLE GROUP IDs:** All Group IDs other than the currently Selected ID. These are decodable only when:
 - a.Group Scan enabled & the Mic is On-hook.
 - b.Group Scan enabled & System Scan is in progress
(whether by regular Scan or Interval Scan)

BLOCK IDs:

****RIC BLOCK IDs:** (optional)-Any Group ID used for interconnect must be included in this block range. Generally, there is only one RIC ID programmed per mobile) Any encode Group ID selected or Group ID decoded within this block will cause the mobile to function in the telephone interconnect mode.

RECEIVE BLOCK IDs: (optional)- Any ID code within this range will be decoded. This feature is not generally used unless a group of ID's are to be monitored. It is NOT necessary to program the mobiles Group IDs here.

*****TX INHIBIT BLOCK IDs:** (optional) Decoding an ID within this block inhibits the mobiles transmitter during decoding and for a 5 second period after. The post-5 second inhibit period does not start to decrement until the mobile stops decoding the Tx Inhibit ID. If PTT is pressed during inhibit, the Busy indicator lights and Busy Tone^{*Note} will sound continuously unless PTT is released, or, the post-5 second inhibit period expires. Tx Inhibit IDs are programmed in mobiles to prevent them from "accessing the system" when these IDs are using the system. When Tx Inhibit IDs are decoded, the mobiles microprocessor only inhibits transmission. Decoding a Tx Inhibit ID does not effect the decoding of other IDs (receiving calls), nor do they cause the mobile to open squelch, light call indicator, trunk out, or stop system scan. Therefore, none of a mobiles Selectable Group IDs should be included in the Tx Inhibit Block as this would be impractical since the inhibiting action would make a two-way conversation difficult. If educated of the fact, the mobile user can recognize that they are being "locked-out" by a Tx Inhibit ID, because only Busy Tone sounds during inhibit as opposed to "Busy Tone and Intercept Tone" during "busy" or "out-of-range" conditions.

**Note :* If Access Tone is enabled, then Busy tone is disable; the LCD Busy Indicator is the only inhibit indication in this case.

Altered Feature

SYSTEM SEARCH (pg. 8, 3-13) This feature is "dealer-enabled" in programming, and "user-activated" via the the Scan button. When the Intercept Tone sounds, because of "busy" or "out-of-range" conditions, this feature can be activated by keeping the PTT depressed while momentarily pressing the Scan button, and then releasing PTT. This feature can be activated in or out of System Scan. If activated during System Scan, System Scan is terminated at the time of activation. If the selected or revert group ID at search initiation was a dispatch ID the mobile attempts to access successive systems that have that group number also programmed as a dispatch ID. This same action is followed for RIC IDs. At each access attempt, the LCD changes to show the current System/Group (and Alphanumerics ,if applicable) and an short beep is heard in the speaker audio.