UHF REPEATER

TKR-820/N/A

SERVICE MANUAL

REVISED Ⅳ

KENWOOD

B51-8050-30 (N) 1027

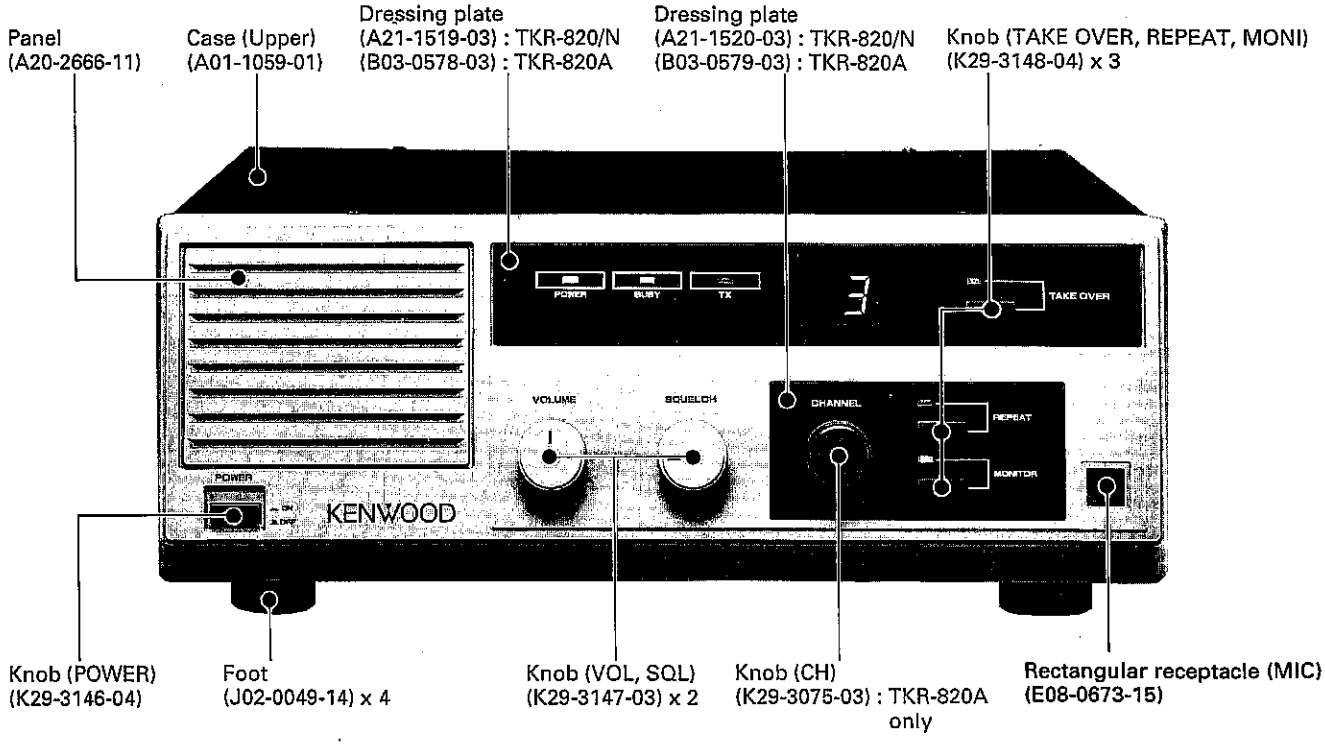


Photo is TKR-820A type.

CONTENTS

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 informations for the equipment and is current as of the publication date. Changes which may occur after publication are covered by either Service Bulletins of 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.
- Be careful against electric hazard, for the commercial power supply is being applied to the internal circuitry of the radio even when the Power switch is OFF.

1. POWER-UP

To push on the radio. The POWER indicator will illuminate to indicate power is ON.

2. TO RECEIVE

Operation	Procedure
1. Disable QT If so programmed.	Push on MONITOR switch.
2. Unsquelch radio	Turn SQUELCH control counter-clockwise until noise is heard.
3. Set VOLUME control	Adjust VOLUME control for a normal listening level.
4. Set SQUELCH control	Advance SQUELCH control clockwise until noise just stops.
The radio will now receive all traffic on the selected channel.	
5. Enable QT If so programmed.	Press the MONITOR switch to OFF.
You will now hear messages for your system only.	

3. TO TRANSMIT (In case a microphone is connected)

Operation	Procedure
1. Disable QT	Depress MONITOR switch on front panel or microphone.
2. LISTEN	DO NOT TRANSMIT if channel is in use.
3. Key transmitter	Press and hold the microphone PTT switch. The Red LED on the front panel will glow indicating the transmitter is ON.
4. Transmit message	Hold microphone at about 2 inches distance and speak at a normal voice level. Keep transmissions brief.
5. Receive reply	Release the microphone PTT switch.
6. Enable QT at end of the conversation If so programmed.	Depress MONITOR to the out position.

4. DURING OPERATION OF REPEATER

Operation	Procedure
1. Enable repeat	Press the REPEAT switch to ON.
2. Start of repeat	When a signal including the object tone signal (provided that it has been programmed) is input and if its level is higher than the preset squelch level, a signal modulated by the set tone signal (provided that it has been programmed) and received audio signal is transmitted.
3. End of repeat	When the received signal disappears, the transmission is stopped after the set period of time. There indicator lights while the signal is transmitted.
4. Disable repeat	Press the REPEAT switch again to OFF.

GENERAL / SYSTEM SET-UP

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

When an outdoor antenna is to be installed, select an unobstructed position with good visibility.

The VSWR of the antenna should be no more than 2.

Select a coaxial cable with as small loss as possible, and its length should be as short as possible.

4-3. Radio

Install the radio on a rack using rack-mount brackets, or on a flat surface that can withstand its weight. Do not install the radio in a place subject to direct sunlight or near heating equipment. Avoid wet place, and install it in a well-ventilated place.

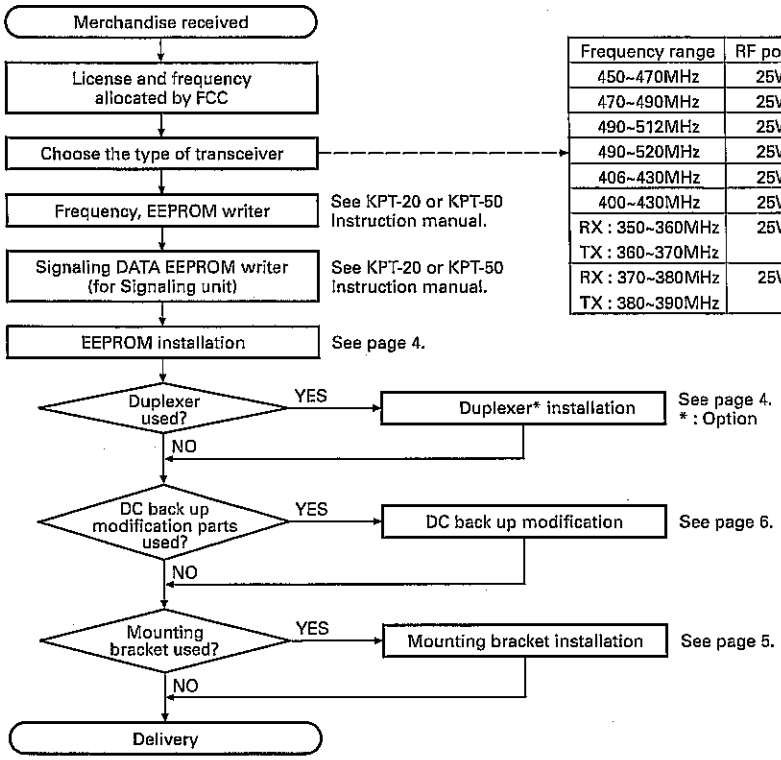
4-4. AC power supply

This unit has been designed for use exclusively with commercial AC power supply. As the rated current for transmission output attains about 2A, connect the unit to a wall outlet that can handle this current with margin.

SERVICE

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

Preparation : Prepare an EEPROM writer, KPT-20 or KPT-50.



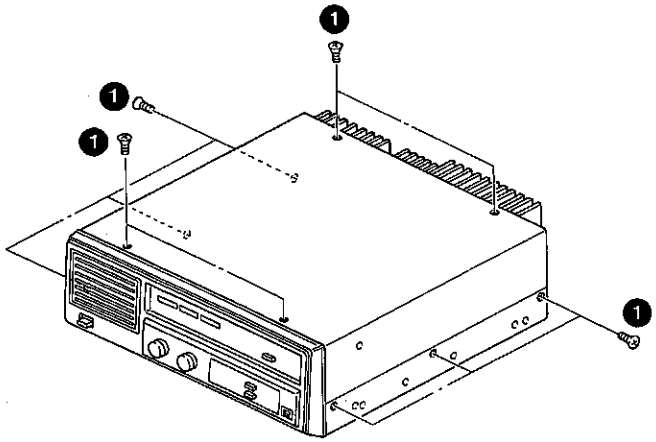
Frequency range	RF power	Type
450~470MHz	25W	TKR-820 K,M,NK,NM,AM
470~490MHz	25W	TKR-820 K2,M2,NK2
490~512MHz	25W	TKR-820 K3,NK3
490~520MHz	25W	TKR-820 M3
406~430MHz	25W	TKR-820 K4,NK4
400~430MHz	25W	TKR-820 M4,NM4,AM4
RX : 350~360MHz TX : 360~370MHz	25W	TKR-820 M5,AM5
RX : 370~380MHz TX : 380~390MHz	25W	TKR-820 M6,AM6

INSTALLATION

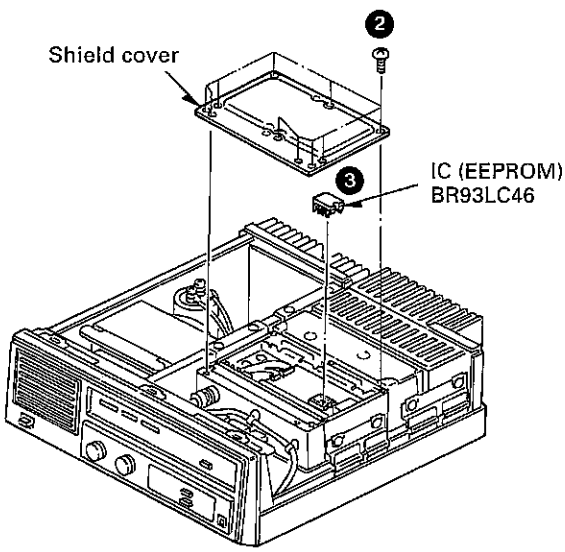
Installing the EEPROM of Signaling Unit

Note : EEPROM is inserted into the Signaling unit of the TKR-820. Install it after writing the data using the ROM writer (KPT-20 or KPT-50).

1. Remove the 10 screws (❶) holding the upper case to remove the upper case.



2. Remove the 11 screws (❷) holding the shield cover to remove the shield cover.
3. Insert the EEPROM (❸) on which the data has been written into the IC socket (IC10) on the Signaling unit.

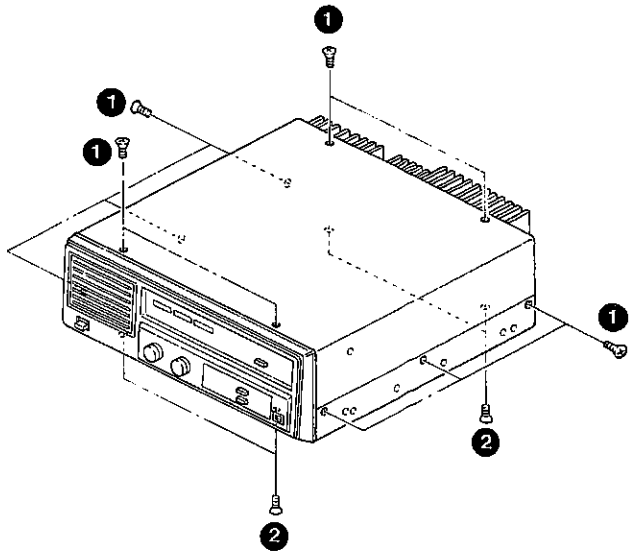


Installing the Duplexer

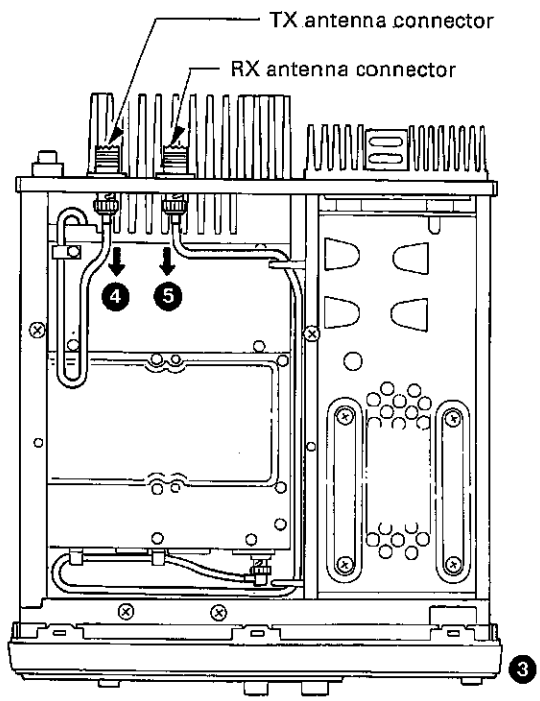
Note : When installing the duplexer in the TKR-820, use the either of the following products ;

1. CELWAVE (USA), 435 to 470MHz (PD633-6A)
2. ANTEN CORPORATION (JAPAN),
   450 to 470MHz (L79-0691-05)
   400 to 430MHz (L79-0896-05)

1. Remove the 10 screws (❶) holding the upper case to remove the upper case.
2. Remove the 4 screws (❷) holding the lower case to remove the lower case.

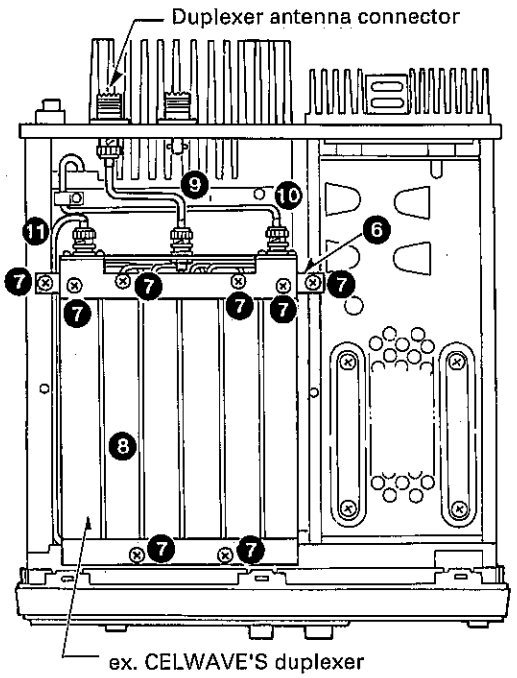


3. After removing the upper and lower cases, turn the set upside down, as shown in the figure (❸).
4. Remove the coaxial cables (❹ , ❺) connected to the TX and RX antenna connectors.

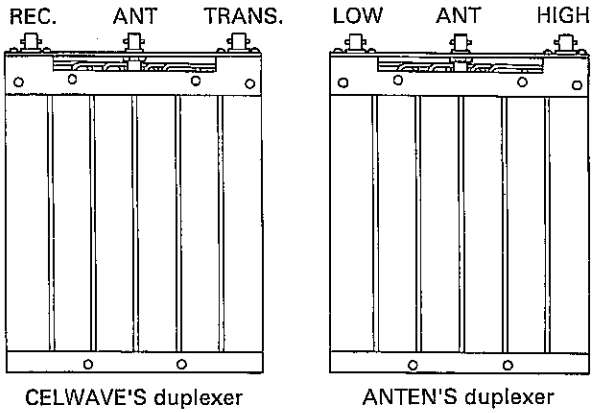


INSTALLATION

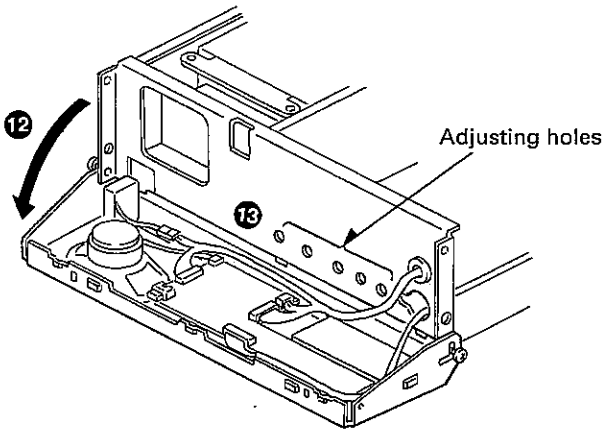
5. Mount the duplexer (❽) using the mounting hardware (❻) and the 8 screws (❼) provided with the set.
6. Connect the one end of the connector cable (❾) provided with the set to the duplexer antenna connector and the other end to the ANT (center) of the duplexer.
7. Connect the connector cable (❿) wired from the TX section and the connector cable (⓫) wired from the RX section to the duplexer.



Note : The input/output connectors of the duplexer manufacture by CELWAVE or ANTEN are located as shown in the figure. Pay attention when connecting the connectors (as input/output location is reversed).



Note : When making adjustments after installing the duplexer, remove the front panel and hold down the sub-panel (⓬), then perform adjustments from the adjusting holes (⓭).

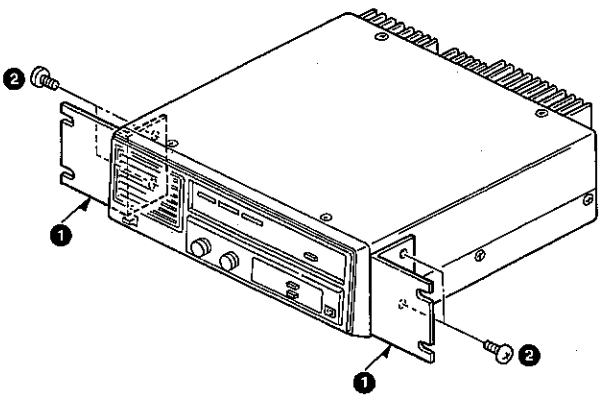


Attaching the Rack-mount Brackets (for EIA racks)

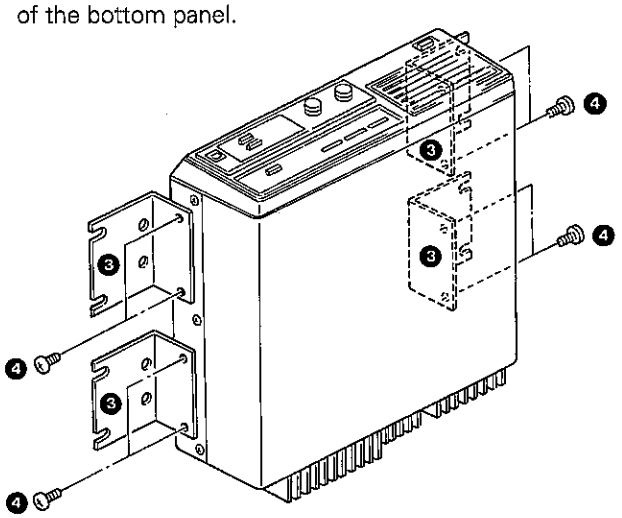
The brackets and screws are optional.

Brackets : J21-4250-04 (Common for left and right)
Screw : N09-0704-05 (Use 2 screws per bracket)

1. Attach the 2 brackets (❶) using 4 screws (❷).



2. When the TKR-820 is to be mounted vertically; Attach 4 brackets (❸), using 8 screws (❹), to the sides of the bottom panel.



CONVERSION

Signaling Wait Mode Setting Method

- **What is the signaling wait mode?**

The KPT-20 or KPT-50 can write signaling codes into channels 1 to 16. The codes written in up to eight channels can be used at a time, and the codes written in channels 1 to 8 are effective. One or more signaling codes to be waited for in the repeater mode can be selected. They can be changed by W4 of the Signaling unit (X52-3140-XX).

- **Wait mode setting method**

Ref. No.	Function	Mode	Setting
W4	Decode change in repeater mode	Short	Two or more codes
		Open	One code

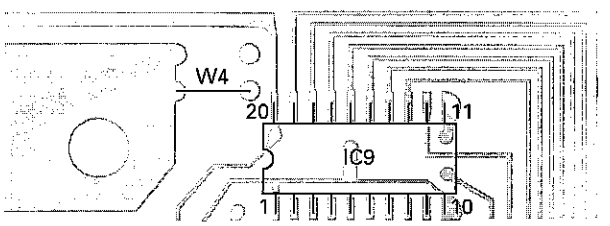
Factory setting : Short

W4 part No. : E31-1448-05

If the signaling wait is one code (W4 : open), the TKR-820/N uses the code written in channel 1, and the TKR-820A uses the signaling code in the displayed channel. If several codes are waited for (W4 : short), the multiple signaling codes written in channels 1 to 8 can be waited for.

Note : This function is available in serial No. 504XXXXX or later.

SIGNALING UNIT (X52-3140-XX)

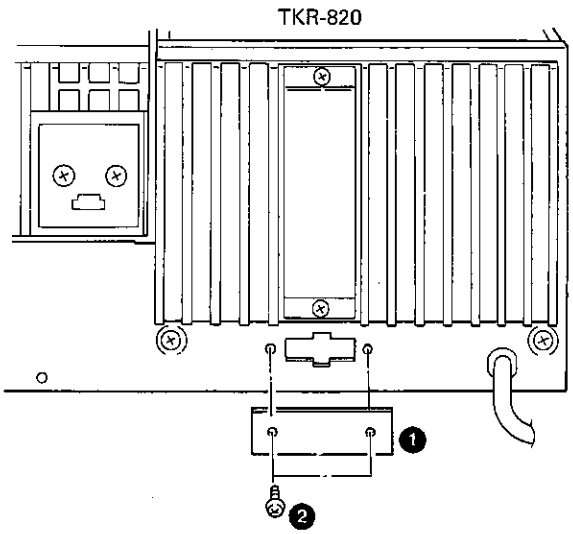


Modification of the DC Switching Circuit (For Backup during a Power Failure) : Excluding TKR-820A

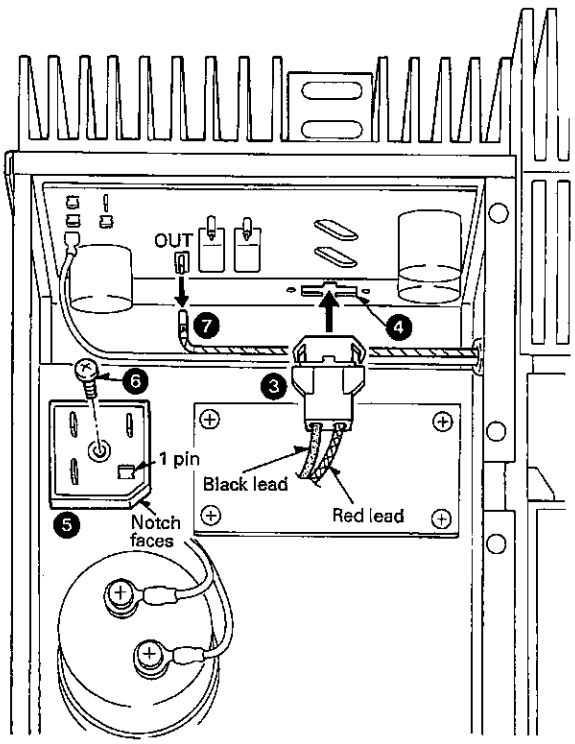
The following parts (optional) are required for the circuit modification.

Diode (S25VB20)	1 pc.
DC cable (E30-2076-15)	1 pc.
Connector with lead wires (E31-3389-15)	1 pc.
Connector with lead wires (E31-3455-15)	1 pc.
Screw (N87-4014-46)	1 pc.

1. From the cover (❶) attached to the rear panel, remove the 2 screws (❷) and take off the cover.

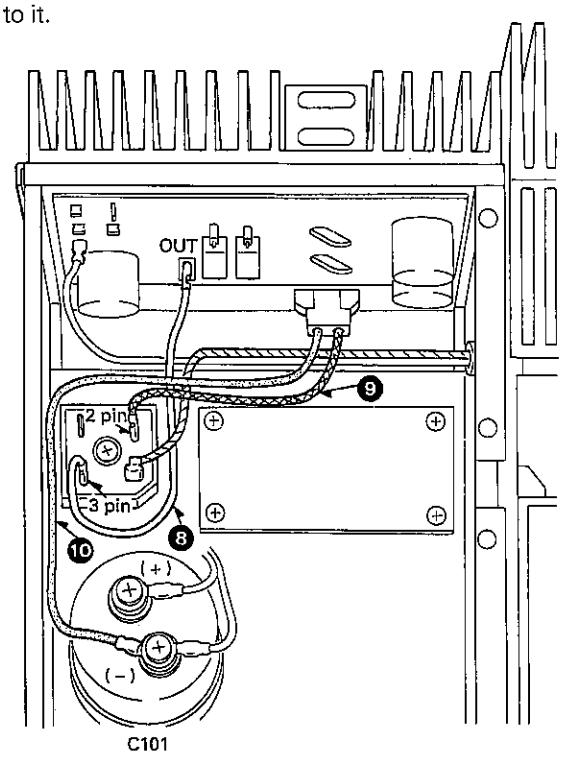


2. Insert the connector with lead wires (❸) into the hole on the rear panel (❹) (so that the red lead is on the right).
3. Place the diode (❺) so that its notch faces the direction shown in the illustration, and attach it using a screw (❻).
4. Disconnect the connector (❼) from the OUT terminal of the AVR unit, and connect its lead wire to pin 1 of the diode (❺).

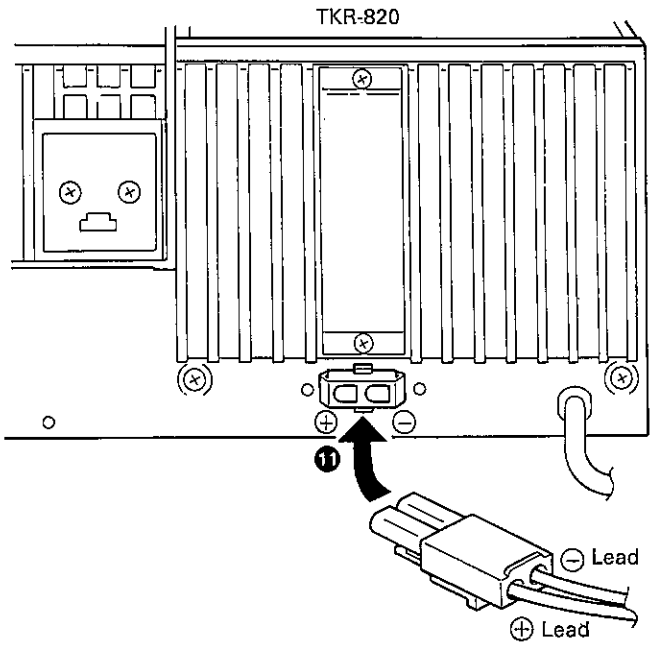


CONVERSION / DISASSEMBLY FOR REPAIR

5. Connect the optional connector with lead wires (❽) to the OUT terminal of the AVR unit and to pin 3 of the diode.
6. Connect the red lead (❾) of the optional connector with lead wires to pin 2 of the diode, and its black lead (❿) to the negative (–) terminal of chemical capacitor C101. Do not disconnect the lead wire which has been connected to the C101 negative terminal, but connect the black lead to it.

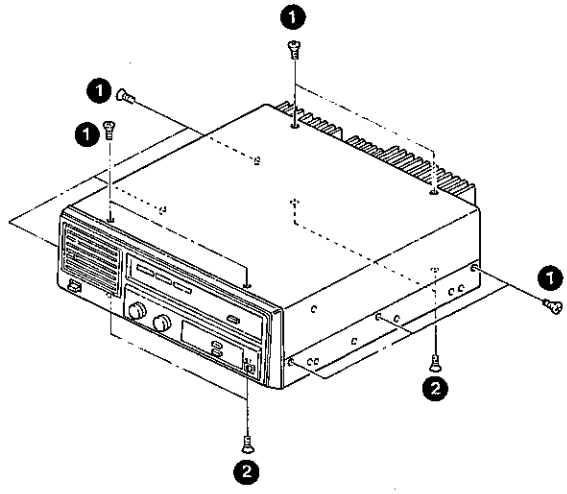


7. Connect the optional DC cable to the connector on the rear panel (⓫).



How to Remove the Case

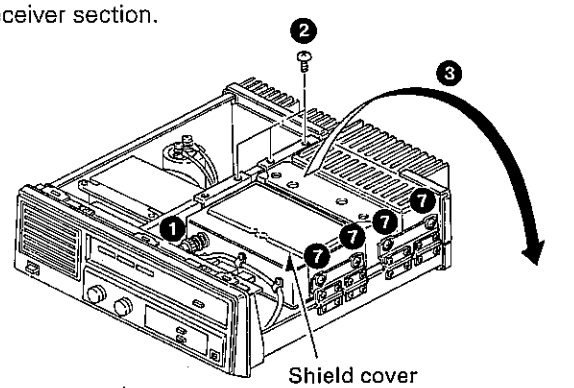
1. Remove the 10 screws (❶) holding the upper case to remove the upper case.
2. Remove the 4 screws (❷) holding the lower case to remove the lower case.

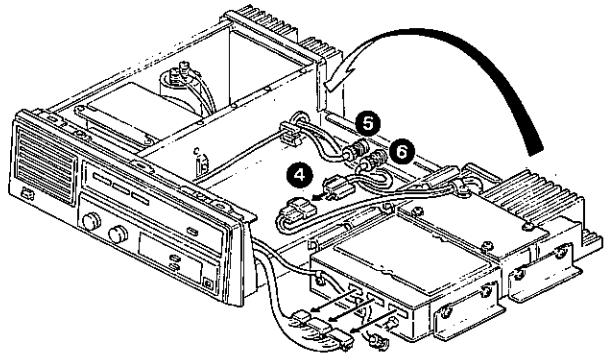


Disassembling the Transmitter/Receiver Section

1. How to remove the transmitter/receiver section

1. Remove the 4 connectors (CN1 to CN4) connected to the panel (Display unit) (❶).
2. Remove the 3 screws (❷) holding the transmitter/receiver section.
3. While lifting up on the transmitter/receiver section (❸), remove the power supply connector (❹) and the connector cables (❺ , ❻) connected to the frame, and restore the transmitter/receiver section in place.
4. Remove the 4 screws (❼) holding the transmitter/receiver section to the frame to remove the transmitter/receiver section.

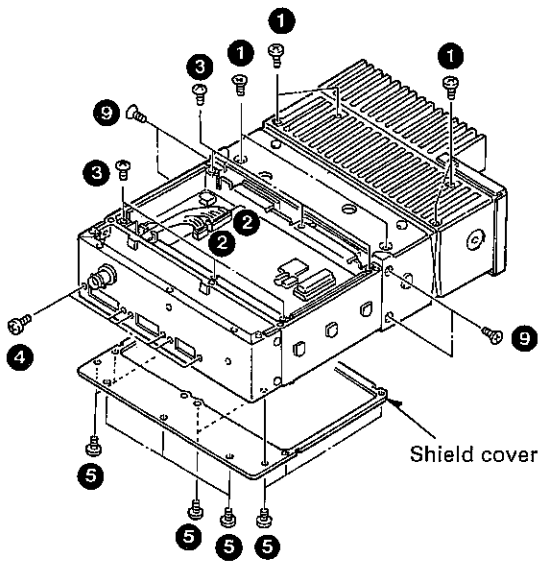


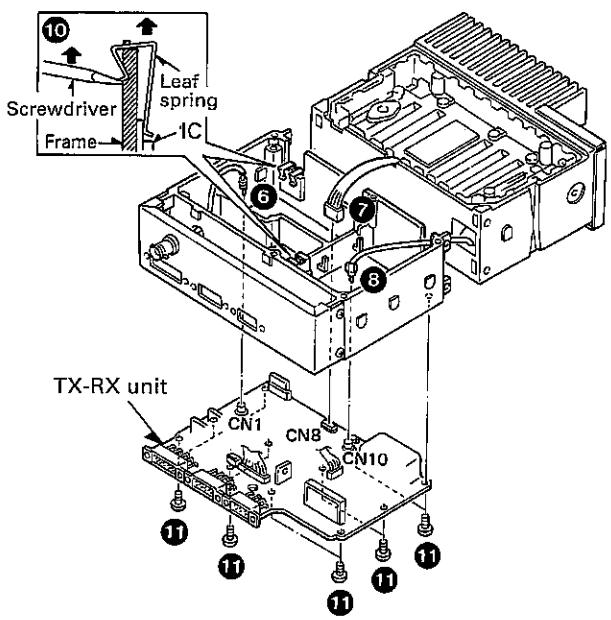


DISASSEMBLY FOR REPAIR

2. How to remove the TX-RX unit

1. Remove the 6 screws (❶) holding the shield cover to remove the shield cover.
2. Remove the 2 connectors (❷) of the Signaling unit and the 6 screws (❸) holding the shield cover to remove the shield cover.
3. Remove the 6 screws (❹) holding the connectors CN2 to CN4.
4. Remove the 11 screws (❺) attached on the bottom of the TX-RX unit to remove the shield cover.
5. Remove the 3 connectors CN1 (❻), CN8 (❼) and CN10 (❽) connected to the TX-RX unit.
6. Remove the 4 screws (❾) connected between the TX-RX unit and Final unit.
7. Remove the leaf spring fixing the two IC's to the frame with a screwdriver, etc. (❿).
8. Remove the 11 screws (⓫) mounting the TX-RX unit to remove the TX-RX unit.

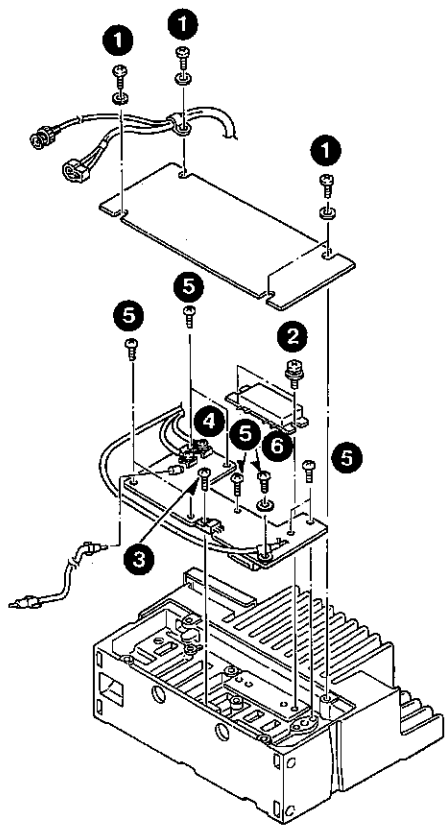




3. Disassembling the Final ass'y unit

1. Remove the 4 screws (❶) holding the shield cover to remove the shield cover.
2. Remove the 2 screws (❷) holding the power module IC to the heat sink.
3. Remove the screw (❸) holding the transistor to the heat sink.
4. Remove the 2 screws (❹) holding the power supply cables.
5. Remove the 8 screws (❺) holding the Final PC board to remove the Final PC board.

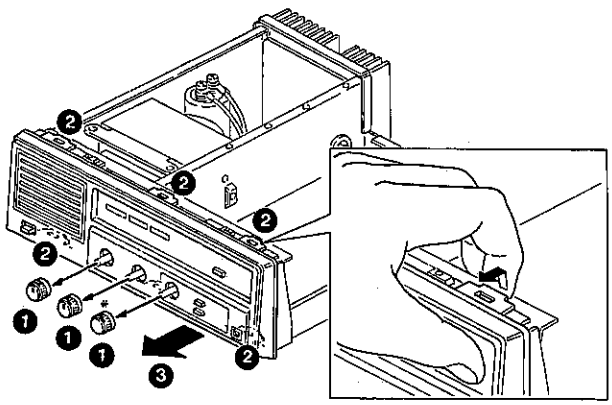
Note : When replacing only the power module IC, remove the screws (❷) and then remove the 5 soldered parts of the power module IC's terminals (❻) to remove the power module IC.



How to Remove the Panel

1. Pull off the VOLUME, SQUELCH and CHANNEL knobs (❶). CHANNEL knob is TKR-820A only.
2. Release the 6 hooks (❷) located on the upper and lower section, and holding the sub-panel by pushing them up with your finger. Then remove the sub-panel (❸) by pulling it out toward the front.

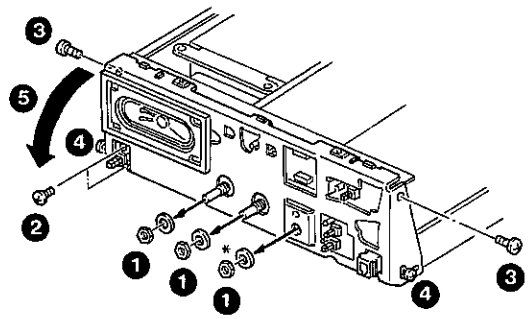
DISASSEMBLY FOR REPAIR



* : TKR-820A only

Disassembling the Sub-panel

1. TKR-820/N
   Remove the 2 nuts and 2 washers holding the VOLUME and SQUELCH VRs (❶).
   TKR-820A
   Remove the 3 nuts and 3 washers holding the VOLUME, SQUELCH and CHANNEL VRs (❶).
   Then remove the 2 screws (❷) holding the POWER switch.
2. Remove 2 of the screws (❸) holding the sub-panel, and loosen the other 2 screws (❹), then tilt the sub-panel toward the front (❺).
3. Remove the 5 connectors (❻) connected to the Display unit, and remove the connector (❼) connected to the POWER switch.
4. Remove the 2 remaining screws (❽) holding the sub-panel to remove the sub-panel.



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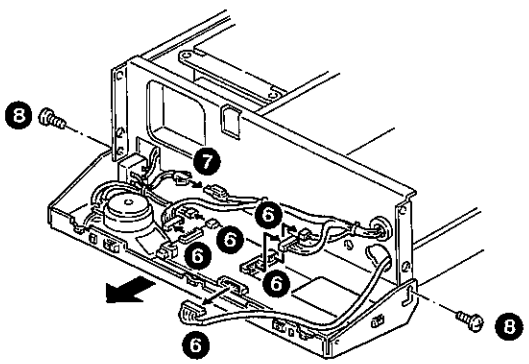
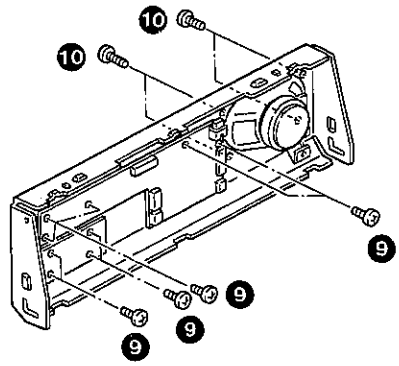


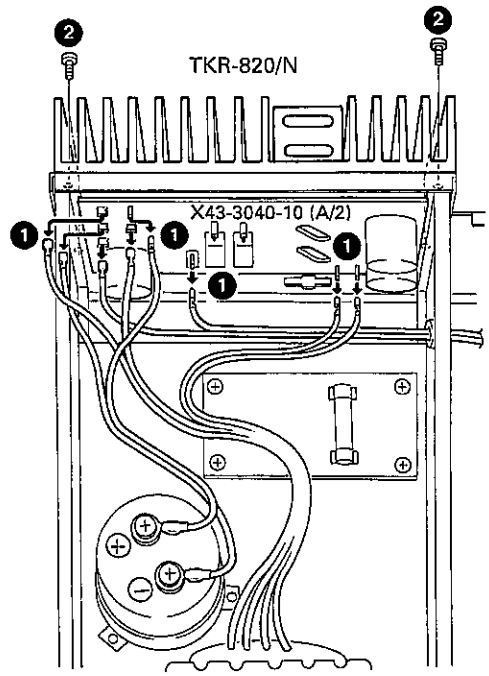
5. Remove the 9 screws (❾) holding Display unit (A/4) and (B/4) to the sub-panel, and remove the Display unit (A/4) and (B/4).
6. Remove the 4 screws (❿) holding the speaker to the sub-panel to remove the speaker.



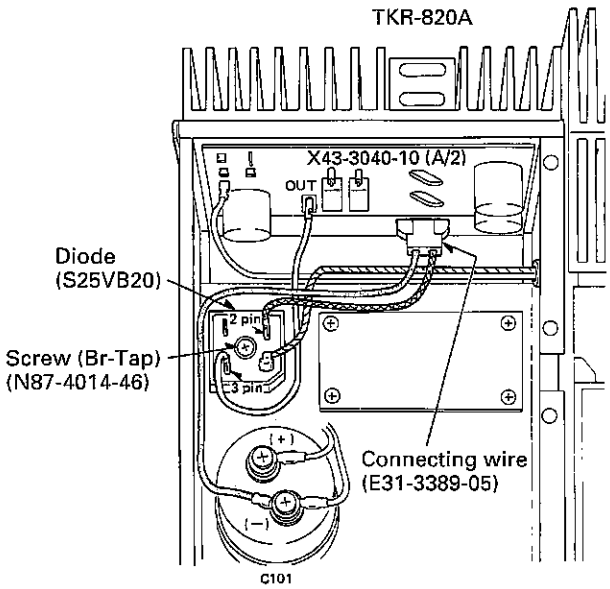
Disassembling the AVR Unit

1. How to remove the AVR unit (X43-3040-10) (A/2)

1. Remove the 8 connectors (❶) connected to the AVR unit.
2. Remove the 4 screws (❷) holding the AVR unit to the rear panel, and remove the AVR unit from the rear panel.

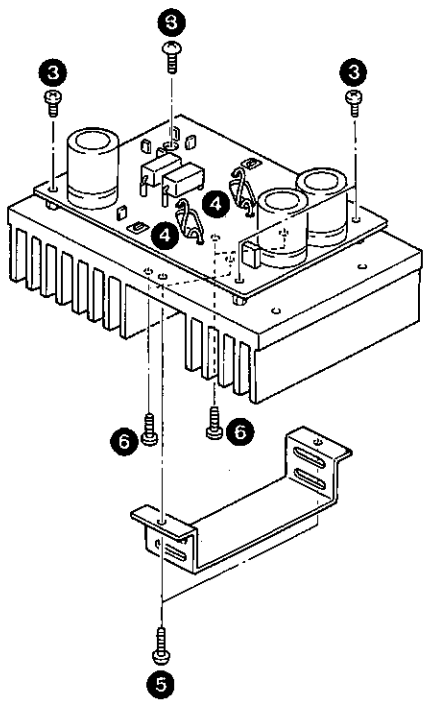


DISASSEMBLY FOR REPAIR



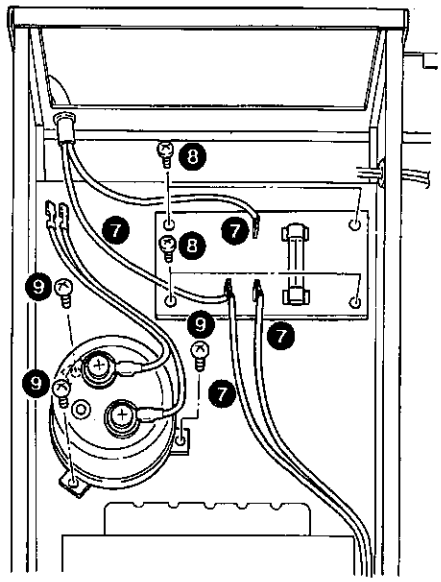
2. Disassembling the AVR unit (X43-3040-10) (A/2)

1. Remove the 4 screws (❸) holding the AVR unit.
2. Desolder the 4 wires (❹) connected to the bases and emitters of transistors Q5 and Q6.
3. Remove the 2 screws (❺) on the radiation cover attached to the heat sink to remove the radiation cover.
4. Remove the 4 screws (❻) of the transistors (Q5 and Q6) attached to the heat sink, and remove the AVR unit (A/2).



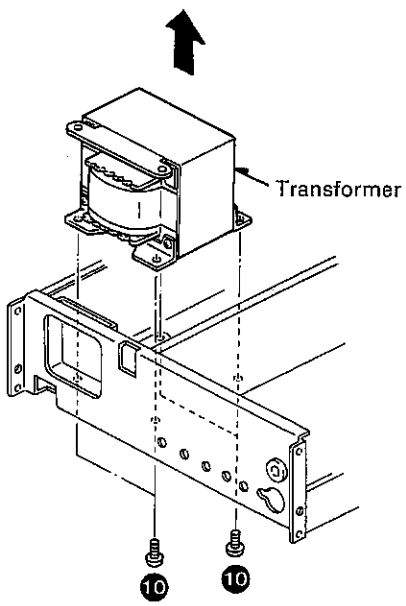
3. How to remove the AVR unit (X43-3040-10) (B/2) and the electrolytic capacitor (C101)

1. Remove the 4 wires (❼) holding to the AVR unit.
2. Remove the 4 screws (❽) holding the AVR unit to remove the AVR unit.
3. Remove the 3 screws (❾) holding the electrolytic capacitor (C101).



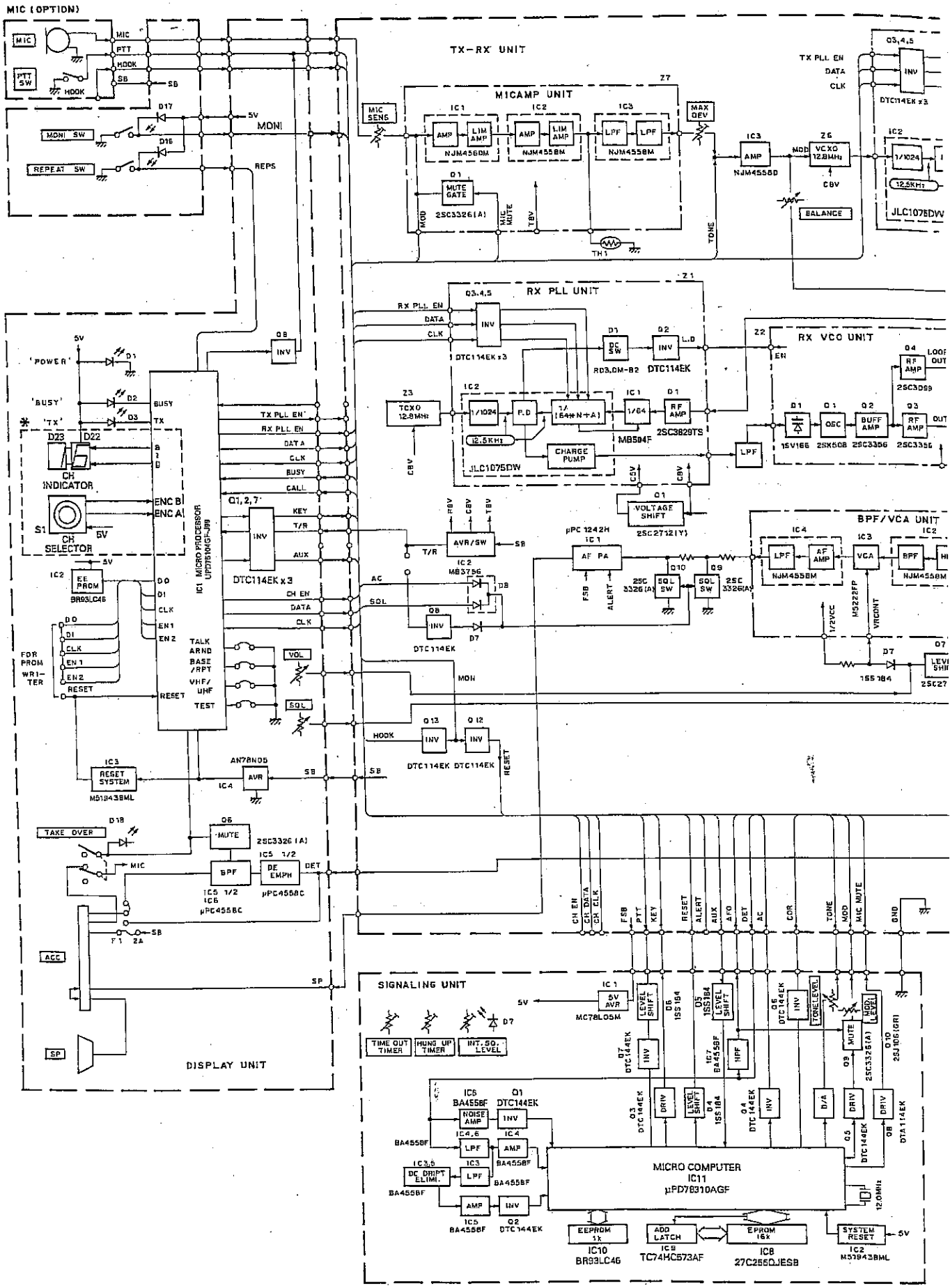
4. How to remove the power transformer

1. Remove the 4 screws (❿) holding the power transformer to the bottom plate, and remove the power transformer.



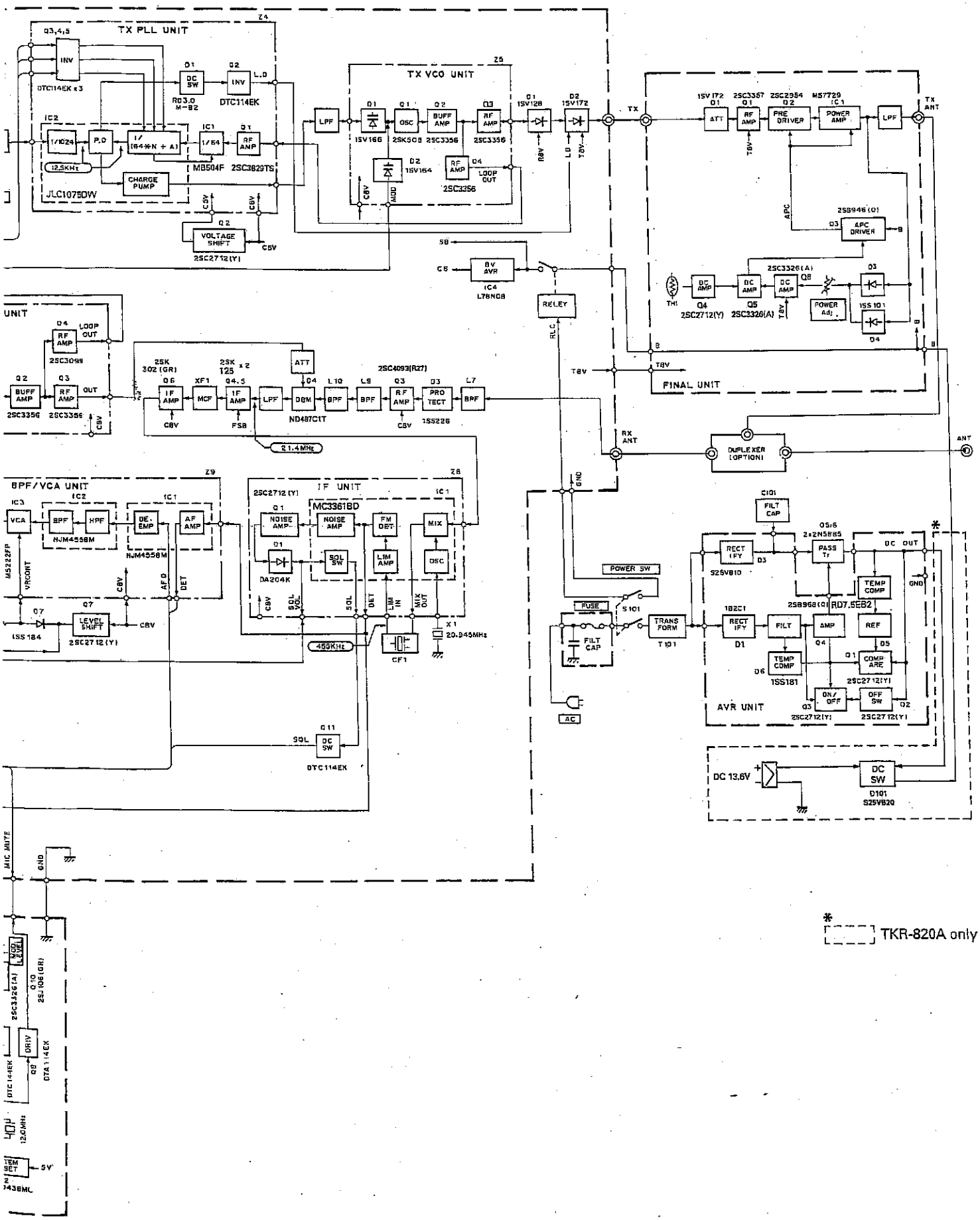
TKR-820/N/A

BLOCK DI



A TKR-820/N/A

OCK DIAGRAM



CIRCUIT DESCRIPTION

Transmitter Circuit

The signal generated at the transmitter frequency synthesizer is amplified by RF amplifier transistors (Q1 and Q2) and amplifier module (IC1) to a level of 25W in the power amplifier unit. The signal is then routed to the antenna connector after going through a harmonics filter.

The transmitter output is detected by D3, 4 and is converted to a DC form. The DC signal thus detected is level adjusted by APC control (VR1) and is applied to the base of Q6. The base current of Q3 is varied according to the difference from the comparison voltage at Q5, 6 so that the collector voltages of Q2 and the IC1 first stage are controlled to maintain the transmitter output level constant.

In the event an abnormal temperature rise occurs, the temperature is sensed by a thermistor (TH1) and reduces the output power to a safe level.

The harmonics filter is of a fifth order Butterworth type lowpass filter having a minimum attenuation of more than 55dB at the second harmonics frequency with a passband insertion loss of less than 0.5dB. With a characteristics of the transmitter final power amplifier module, which has more than 30dB of attenuation for the frequency at the second harmonics or higher, total attenuation of harmonics is more than 70dB.

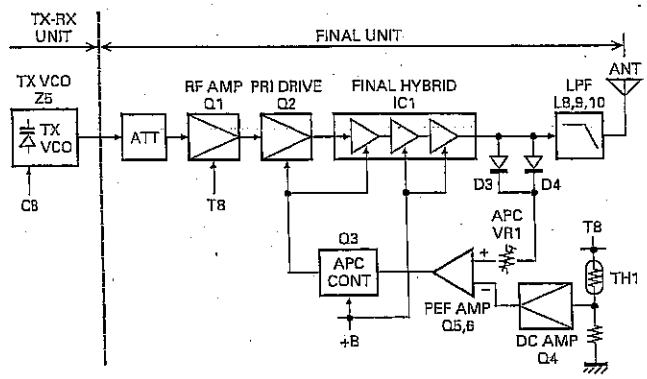


Fig. 1 Transmitter block diagram

Receiver Circuit

An incoming RF signal from the antenna is fed into a bandpass filter (L7). Then eliminated RF signal pass a protector (D3).

The signal is then amplified by an RF amplifier (Q3) and filtered again by bandpass filters (L9 and L10). After amplification and filtering, the signal is applied to a double balanced modulator (DBM, D4) for mixing with the first local signal generated at the common frequency synthesizer.

The heterodyning action of the first mixer produces a 21.4MHz first intermediate frequency (1st IF), which is applied to a 6-pole monolithic crystal filter (MCF, XF1) after being amplified by a buffer amplifier (Q4 and Q5 connected in parallel). The signal out of the MCF is further amplified by a 1st IF amplifier (Q6) and sent to the IF unit (Z8).

The signal applied to Z8 is mixed with a 20.945MHz signal at IC1 in Z8, which produces a 455kHz 2nd IF signal. The signal obtained at the 2nd mixer is filtered by a 455kHz ceramic filter (CF1) and amplified by limiting amplifier stages in IC1. The recovered audio signal from the incoming signal is also obtained at IC1 by a quadrature type FM detector. This recovered audio signal is then sent to the audio amplifier circuit and to the noise actuated squelch circuit.

In the receiver audio amplifier section, the recovered audio signal from Z8 is first applied to a bandpass filter/voltage controlled amplifier (BPF/VCA, Z9) unit. At this BPF/VCA unit, the signal is amplified and sent to pin 9 of CN6 as the DET signal. The signal is returned to Z9 by way of the Signaling unit. IC1 forms a lowpass filter and a highpass filter, and IC2 forms a bandpass filter and lowpass filter in Z9. The frequency components below 300Hz and above 3000Hz are attenuated in the above filter circuits.

The filtered audio signal is then applied to an electronic volume control (IC3), where the audio signal level is controlled by a DC voltage sent from the front panel volume control. The signal is then de-emphasized and sent to the audio power amplifier circuit (IC1) after going through squelch switches (Q9 and Q10).

The alert signal is also applied to IC1, when a specific signaling board, which requires an audible alert through the speaker, is installed. The signal, which is amplified by IC1, drives either the internal speaker or the optional external speaker and this selection is done through the accessory connector located on the Final unit.

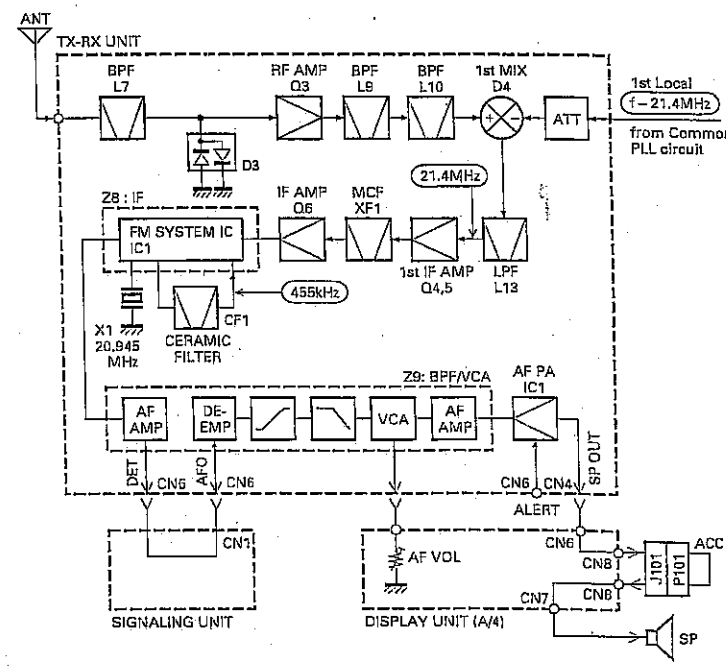


Fig. 2 Receiver block diagram

CIRCUIT DESCRIPTION

Squelch Circuit

The high frequency component of the recovered audio signal is fed to a noise amplifier within IC1 of Z8 and it is further amplified by an external noise amplifier (Q1). The signal is then detected by a noise detector (D1) and applied to the squelch switch in IC1. This detected noise is also routed to the squelch control (VR1) through the Display unit (C/4) for adjusting the noise squelch sensitivity.

The busy information is sent from the above IC1 in the Display unit in serial format to turn on or off the busy LED. The squelch switch output and the audio control (AC) signal from the signaling board are combined at D8 and applied to squelch switch transistors Q9 and Q10 along with the inverted signal of transmit/receive control signal. The squelch switch controls the input signal to the audio amplifier to mute or unmute the receive audio.

While the busy LED is being controlled only by the noise squelch circuit, the actual audio signal is controlled by the following signals and in order to unmute the audio, each signal must be in the condition as specified.

SQL signal = Low
R8 line = High
T/R signal = High
AC signal = Low

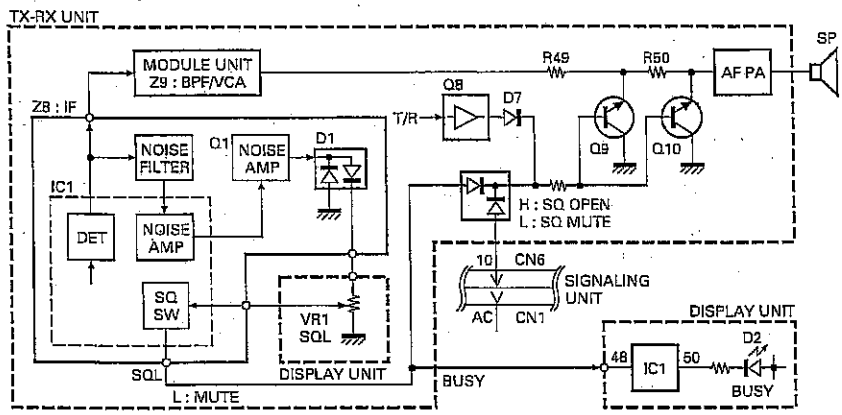


Fig. 3 Squelch circuit

RX Frequency Synthesizer

The RX frequency synthesizer consists of three major circuits. They are the temperature compensated crystal oscillator (TCXO, Z3), RX voltage controlled oscillator (RX VCO, Z2) and RX phase locked loop unit (RX PLL, Z1).

The TCXO is operating at 12.8MHz and its frequency stability is maintained within ±2.5ppm from –30°C to +60°C. This output signal is fed to the frequency synthesizer IC (IC2) in Z1. At IC2, this signal is divided by 1024 to become a 12.5kHz reference signal.

The output from the RX VCO operates at the frequency of the receiver first local signal and a portion of the signal is fed to a dual modulus counter formed by IC1 and IC2 in Z1. IC1 divides the incoming signal by 1/64 or 1/65 depending on the control line status sent from IC2. The output of the dual modulus counter is also a 12.5kHz and this signal is compared against the 12.5kHz reference signal in a phase comparator at IC2. The output signal from the phase comparator is then fed back to the RX VCO after going through a charge pump and a lowpass filter to maintain the RX VCO frequency.

If this RX frequency synthesizer phase locked loop becomes UNLOCK, the unlock condition is detected by IC2 and it prevents the transmitter frequency synthesizer from sending a transmitter signal to following amplifier stages in order to prevent an unauthorized transmission.

TX Frequency Synthesizer

The TX frequency synthesizer consists of three major circuits. They are the modulator/voltage controlled crystal oscillator (VCXO, Z6), TX voltage controlled oscillator (TX VCO, Z5) and TX phase locked loop unit (TX PLL, Z4).

The audio signal from the microphone amplifier and the Signaling unit is applied to the TX VCO (Z5) and the VCXO (Z6) operating at 12.8MHz to obtain an FM modulated signal. And its frequency stability is maintained within ±2.5ppm from –30°C to +60°C. This output signal is fed to the frequency synthesizer IC (IC2) in Z4. At IC2, this signal is divided by 1024 to become a 12.5kHz reference signal.

The output from the TX VCO operates at the frequency of the transmit signal and a portion of the signal is fed to a dual modulus counter formed by IC1 and IC2 in Z4. IC1 divides the incoming signal by 1/64 and 1/65 depending on the control line status sent from IC2. The output of the dual modulus counter is also a 12.5kHz and this signal is compared against the 12.5kHz reference signal in a phase comparator at IC2. The output signal from the phase comparator is then fed back to the TX VCO after going through a charge pump and a lowpass filter to maintain the TX VCO frequency.

If this TX frequency synthesizer phase locked loop becomes UNLOCK, the unlock condition is detected by IC2 and it prevents the transmitter frequency synthesizer from sending a transmitter.

CIRCUIT DESCRIPTION

Microphone Amplifier

The audio signal originating at the microphone is applied to a microphone amplifier unit (Z7) after going through a microphone sensitivity control (VR1).

The signal is amplified and voltage limited by IC1 and IC2 in Z7, then applied to an active lowpass filter/pre-emphasis network (IC3).

The processed audio signal is sent to the modulator/voltage controlled crystal oscillator (VCXO, Z6) and voltage controlled oscillator (TX VCO, Z5) in the transmitter frequency synthesizer via IC3.

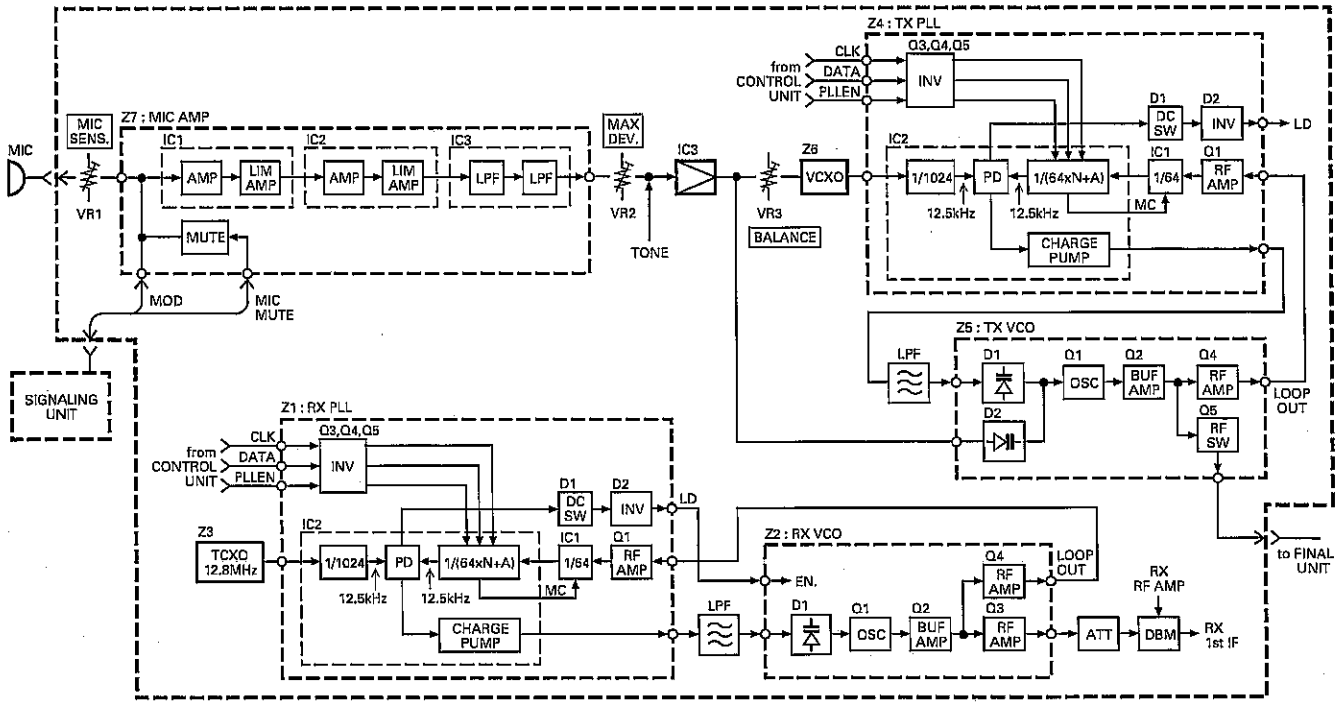
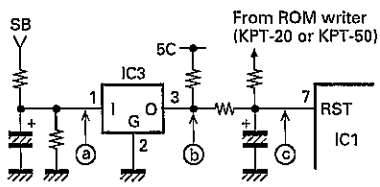


Fig. 4 PLL & Modulation circuit block diagram

Reset Circuit

Upon initial power up, the line voltage gradually increases and this causes the reset system (IC3) to generate a reset pulse. This reset pulse is applied to the microprocessor (IC1) to insure the initialization of the circuit.



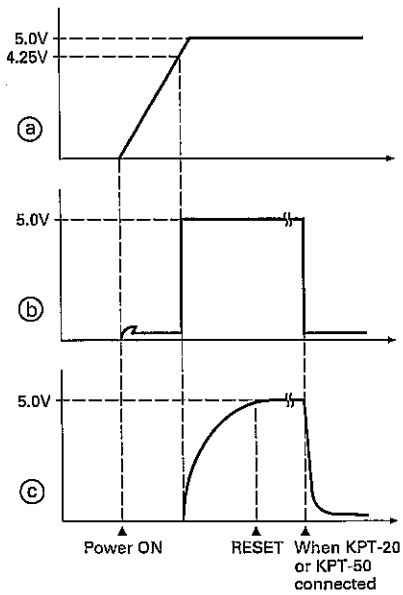


Fig. 5 Reset circuit block diagram

CIRCUIT DESCRIPTION

EEPROM Programming

Programming of data into the EEPROM (IC2) in the Display unit is done by connecting the KPT-20 or KPT-50 programmer to the transceiver by cable provided with the KPT-20 or KPT-50. When the programmer is connected to CN1 in the Display unit, this causes microprocessor IC1 to go into reset condition. In the reset condition, the output ports of IC1 becomes high impedance and are isolated from the data transfer lines. This permits data transfers between the programmer and the EEPROM.

Signaling Unit

- **Decoder operation**

The receive audio signal from the receiver section is fed to the Signaling unit. A part of this signal is returned to the receive audio amplifier circuit and fed to mute circuit after going through an active high-pass filter, in which any frequencies below 300Hz are removed. The mute circuit control a transfer audio signal by microprocessor. The other part of the audio signal is fed through a fifth-order active low-pass filter, of which the cut-off frequency is set at 220Hz, to discriminate the QT and DQT signals from other audio signals.

The QT tone obtained from the above filtered audio signal is applied to the microprocessor (IC11) as an analog signal for tone detection after being amplified by IC4 (2/2).

The DQT code is passed through a low-pass filter IC3 (2/2), of which the cut-off frequency is 140Hz, and the circuit consists of IC3 (1/2) and IC5 (1/2), where the DC drift component (low frequency) is removed from the signal. The signal is then amplified by IC5 (2/2). The amplified signal is applied to IC1 after waveform shaping by Q2.

IC11 sends an audio control signal (AC) to the AC terminal of CN1 through an inverter (Q4) according to the status of the incoming signal. If the incoming QT tone or DQT code matches the data stored, the AC terminal of CN1 is forced to become "LOW" to unmute the receive audio circuit.

- **Monitor circuit**

The RESET terminal of CN1 is connected to the MONITOR and MIC MONITOR circuits in the repeater.

The RESET terminal signal level goes to "HiGH" state, if either the MONITOR switch is on or the microphones MONITOR switch is on, causing pin 4 (RESET) of IC11 to become "HIGH". In this condition, the AC terminal of CN1 is held "LOW", enabling only the noise actuated squelch operation.

- **Encoder operation**

In the transmit mode, the PTT terminal of CN1 becomes "LOW" and this information is inverted to "HIGH" by Q7 before being applied to IC11. Upon receipt of this PTT signal or when the programmed tone has been decoded at the time of the REPEAT operation, IC11 starts the encode function. The encode signal is sent out from output ports, A/D 0 through A/D 7, of IC11 in a binary format and is fed to a ladder network resistor (CP1) for Digital-to-Analog signal conversion. The output signal from CP1, which is either the QT tone or the DQT code, is routed to the TONE terminal of CN1 after going through a level control for modulating the transmit signal.

- **Local/Repeater operation**

When the REPEAT switch on the front panel of the main body is set to ON, the repeater operation is engaged, while when this switch is set to OFF, the full-duplex transceiver operation is engaged.

- **Preset squelch operation**

The squelch circuit for the repeater operation which is independent from the main body consists of noise conditioner IC6 (1/2), waveform shaper Q1, microprocessor IC11 and squelch sensitivity adjuster VR1.

The preset squelch level, the hangup timer time and the time-out timer time are compared in IC11 respectively with the voltages at pins 30, 29 and 28 set by VR1, VR2 and VR3 with the reference of the voltage at pin 31 of IC11 and are thus subject to software control.

TAKEOVER Switch

The TAKEOVER switch is used to isolate the remote control. (The remote control is isolated when the TAKEOVER switch is pressed.)

The following table shows the functions and specifications of the accessory connector terminals, together with the control terminals that are subject to the TAKEOVER control.

CIRCUIT DESCRIPTION

- **Accessory connector**

No.	Name	Functions & Specifications	Terminal subject to TAKEOVER control
1	HK	External hook terminal / Set this terminal to GND level before using external PTT. Unlike MIC HOOK, no monitor function is provided.	○
2	LG	Line input GND / Used for No. 5 (LI).	
3	DI	Direct modulation input terminal / External input terminal for QT and DQT : ±750Hz DEV (wide) at approx. 600Ω input impedance, 0.2Vp-p. Degree of modulation is to be adjusted externally.	
4	DE	Direct detection output / Direct output of detected (unfiltered) signal : Output impedance 10kΩ. Output level : −10dBs at ±3kHz DEV (wide), 1kHz.	
5	LI	Line input / Input terminal for external modulation. Standard modulation is provided at 600Ω, 0.24dBm. Same as MIC level except for input level.	○
6	SG	Speaker output GND / GND for output to external speaker. Used for No. 12 (SO).	
7	SB	+13.6V external power output / Power supply for external equipment. Up to 1A.	
8	PT	External PTT input / Transmission is started at GND level if No. 1 (HK) is at GND level.	○
9	SI	Internal speaker input / Usually connected to No. 12 (SO) via jumper wire.	
10	DE	Line output / Used for output of received signal, for standard modulation at 600Ω, −10dBm. −6dB/oct, 300Hz to 3kHz. Interlocked with No.13 (CO).	○
11	GN	DC GND / GND for DC power supply.	
12	SO	Speaker output / Output terminal for external speaker.	
13	CO	Internal preset squelch output / Provides an output interlocked with internal preset squelch, or a tone squelch output when writing tone. When receiving signal, this output is at low level (open collector) with 10mA sink current.	
14	NC	Unused.	
15	NC	Unused.	

AVR Circuit

This power supply uses a tapped secondary transformer to maintain low voltage between the pass transistor collectors and emitters (Q5 and Q6) for excellent efficiency. Control and operating voltages are rectified and supplied independently for good ripple characteristics.

Temperature compensation for the regulator Zener diode D5 and error amplifier transistor Q4 is provided by silicon diodes D4 and D6.

At initial POWER-ON Q3 is ON to turn-down Q4 base voltage. This prevents a surge voltage from being output when no load is connected. As C5 charges, Q2 turns ON to shut Q3 OFF. Q4 is thereafter fully ON.

If the load is shorted, comparator Q1 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.

Changing between AC and DC is done with the DC switch (D101) for the TKR-820A only. The output from the AVR unit and the DC input from the external power input terminals are changed automatically.

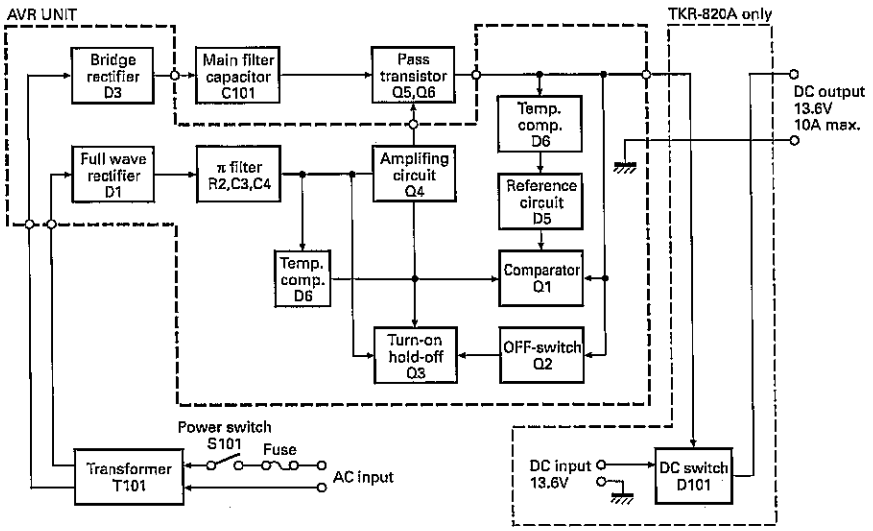


Fig. 6 AVR circuit block diagram

SEMICONDUCTOR DATA

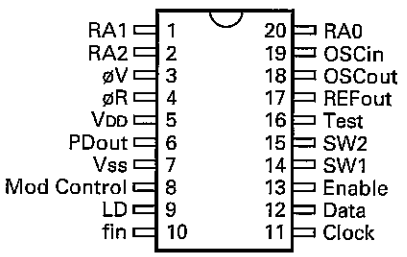
UPD75104GF-J99 : Microprocessor (Display unit IC1)

- **Explanation of terminal functions**

No.	Port	I/O	Signal name	No.	Port	I/O	Signal name
1,2	P41,P40	O	LED (option) b,a seg. (Active "H")	39	P21/PT01	O	CHECK OUT (Active "H")
3	P53	O	GND (Active "L")	40	P20/PT00	O	DEL/ADD LED (Active "L")
4~6	P52~P50	O	LED (option) g~e seg. (Active "H")	41	P03/SI	I	PTT (Remote)
7	$\overline{\text{RESET}}$	I	System reset input	42	P02/SO	I	MON (Remote)
8,9	X2,X1	–	X'tal	43	P01/SCK	I	GND
10	P63	O	CS (EEPROM) (Active "L")	44	P00/INT4	I	TAKEOVER SW
11	P62	O	CLK (EEPROM) (Active "L")	45	P123	I	MONI SW
12	P61	O	DI (EEPROM) (Active "L")	46	P122	I	AUX SW
13	P60	I	DO (EEPROM)	47	P121	I	KEY
14	P73	O	CLK (Active "L")	48	P120	I	BUSY
15	P72	O	DATA (Active "L")	49	P133	O	TX PLL EN (Active "H")
16	P71	O	PLL EN (Active "H")	50	P132	O	T/R (Active "L")
17	P70	O	CH EN (Active "L")	51	P131	O	PTT (Active "L")
18~21	P83~P80	O	LED d~a seg. (Active "H")	52	P130	O	MON (Active "L")
22	P93	O	GND (Active "L")	53	P143	I	T.A/Not use
23~25	P92~P90	O	LED g~e seg. (Active "H")	54	P142	I	BASE/REP
26	Vss	–	GND	55	P141	I	VHF/UHF
27	P13/INT3	I	GND	56	P140	I	Not use/Test
28	P12/INT2	I	GND	57	NC (Vpp)	–	No connection
29	P11/INT1	I	ENC-B	58	VDD	–	+5V
30	P10/INT0	I	ENC-A	59	P33	O	AUX (Active "L")
31~34	PTH03~PTH00	I	F3~F0	60	P32	I	CALL
35,36	TI0,TI1	I	GND	61	P31	I	SER-OUT
37	P23	O	TX LED (Active "H")	62	P30	I	SER-IN
38	P22/PCL	O	BUSY LED (Active "H")	63,64	P43,P42	O	LED (option) d,c seg. (Active "H")

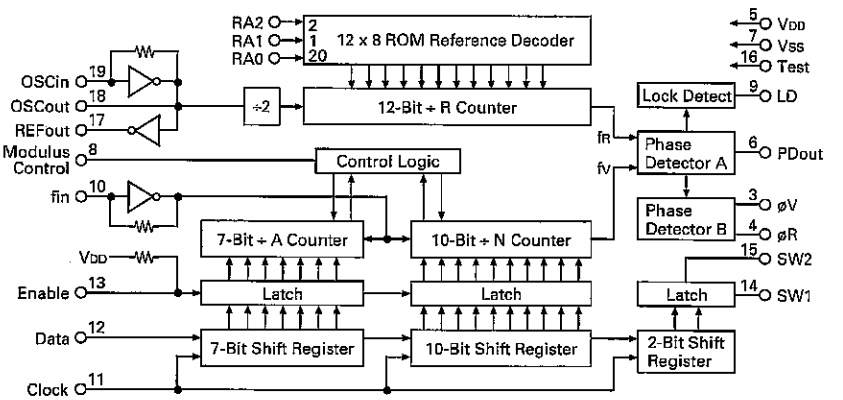
JLC1075DW or JLC1075F : PLL system (TX PLL, RX PLL IC2)

- **Terminal connection diagram**



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

- **Block diagram**



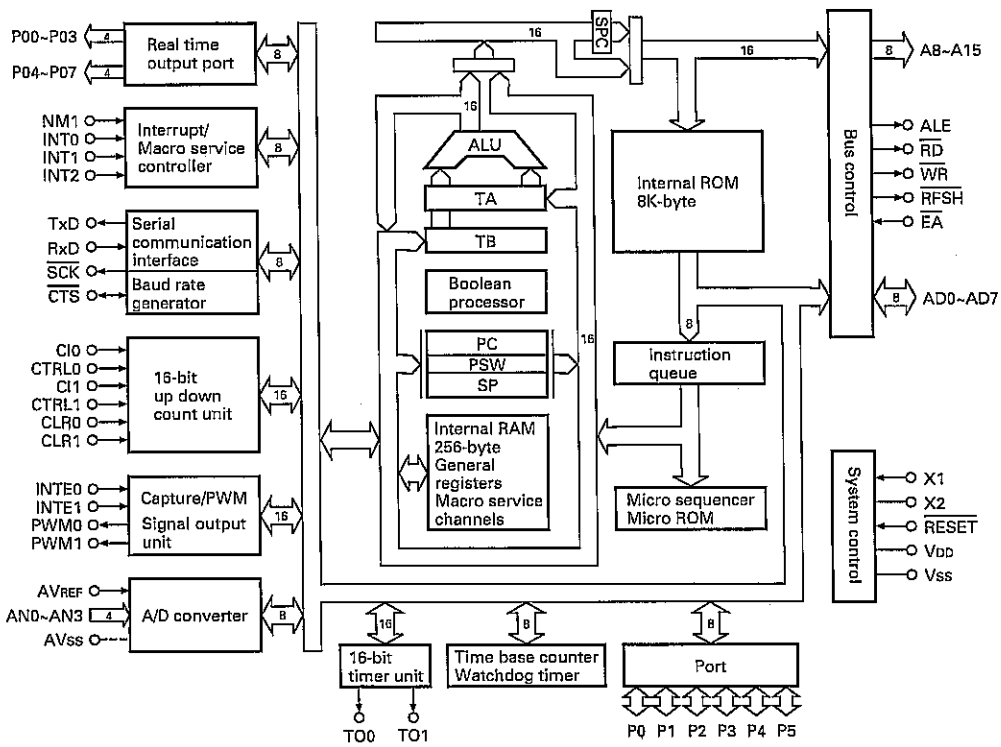
SEMICONDUCTOR DATA

μPD78310AGF : Microprocessor (Signaling unit IC11)

- **Explanation of terminal functions**

No.	Port	I/O	Signal name	No.	Port	I/O	Signal name
1,2	P06,P07	O	A/D6, A/D7 (R-2R)	24,25	X1,X2	–	X'tal
3	P10	O	Key	26	Vss	–	GND
4	P11	I	Reset	27	AN0	I	CTCSS IN
5	P12	O	AC	28	AN1	I	TOT VR
6	P13	I	LOC/REP	29	AN2	I	HUNG VR
7	P14	I	PTT	30	AN3	I	P-SQ VR
8	P15	O	COR	31	AVREF	–	+5V
9	P16	O	TONE DET	32	AVss	–	GND
10	P17	I	DQT	33	P34/PWM0	I	DO (EEPROM)
11	P20/NMI	I	Check	34	P35/PWM1	O	DI (EEPROM)
12	P21/INTE0	I	CH CLK	35	P36/CLR0/TO0	O	CLK (EEPROM)
13	P22/INTE1	I	CH DATA	36	P37/CLR1/TO1	O	CS (EEPROM)
14	P23/INTE2	I	CH EN	37~44	P50/A8~P57/A15	CONT.	A8~A15 (EEPROM)
15	P24/TxD	O	W3	45	$\overline{EA}$	CONT.	External access
16	P25/RxD	O	Mute	46	$\overline{RESET}$	CONT.	Power on reset
17	P26/$\overline{SCK}$	O	TOR	47	$\overline{RD}$	CONT.	READ (EEPROM)
18	P27/$\overline{CTS}$	O	Test	48	$\overline{WR}$	CONT.	WRITE (EEPROM)
19	$\overline{RFSH}$	CONT.	Reflesh	49	ALE	CONT.	Address latch enable
20	P30/CI0	I	P-SQ	50~57	P40/AD0~P47/AD7	CONT.	AD0~AD7 (EEPROM)
21	P31/CTRL0	I	W2	58	VDD	–	+5V
22	P32/CI1	I	W1	59~64	P00~P05	O	A/D0~A/D5 (R-2R)
23	P33/CTRL1	I	W4				

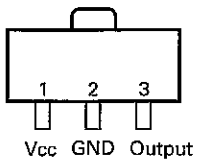
- **Block diagram**



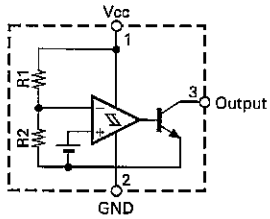
SEMICONDUCTOR DATA

M51943BML :
Reset system (Signaling unit IC2), Precision reference (Display unit IC3)

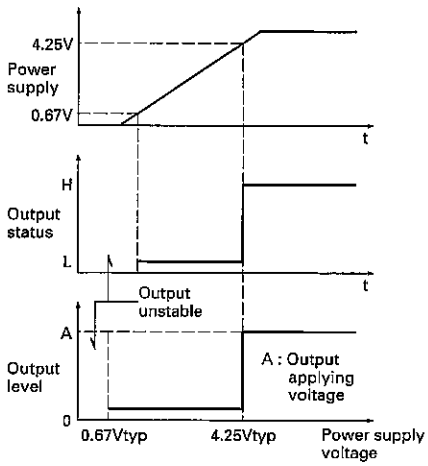
- **Terminal connection diagram**



- **Block diagram**

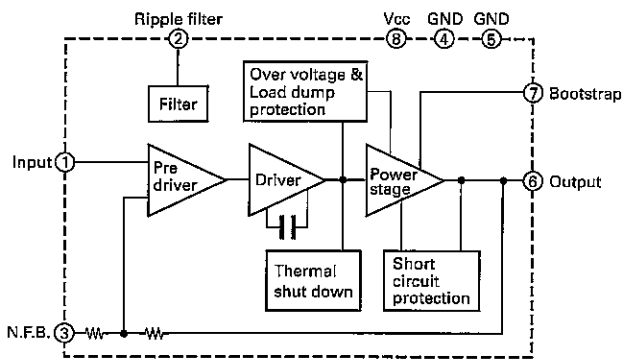


- **Timing chart**



µPC1242H : AF power amplifier (TX-RX unit IC1)

- **Block diagram**



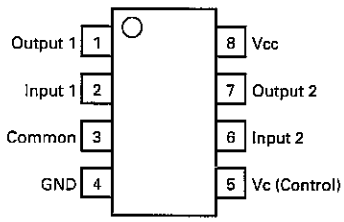
- **Electrical characteristics**

Item	Symbol	Condition	Rating			Unit
			Min.	Typ.	Max	
DC current	Icc	υin=0	25	45	80	mA
Output power	Po	T.H.D=10%	5.0	5.8		W
Distortion	T.H.D.	Po=0.5W		0.1	1.0	%
		RL=2Ω, Po=1W		0.4		%
Max. output power	POM			9.5		W
Voltage gain	Aυ	Po=0.5W	49	51.5	54	dB
Noise output voltage	υn	RG=10kΩ		1.4	4	mVrms

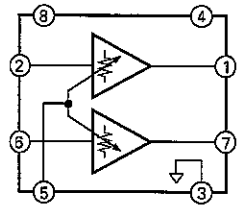
(Ta=25°C, Vcc=13.2V, f=1kHz, RL=4Ω)

M5222FP :
Electronic attenuator (BPF/VCA IC3)

- **Terminal connection diagram**

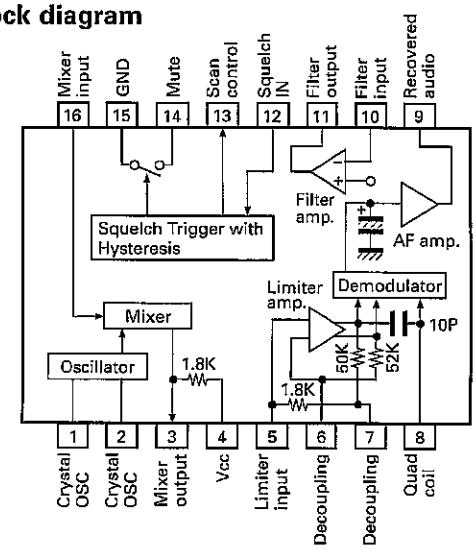


- **Equivalent circuit**



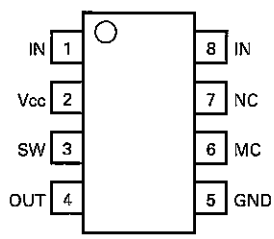
MC3361BD : IF system (IF IC1)

- **Block diagram**



MB504F : Prescaler (TX PLL, RX PLL IC1)

- **Terminal connection diagram**



- **Function table**

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

Note
SW terminal
H : Vcc, L : Open
MC terminal
H : 2.0V~Vcc, L : GND~0.8V

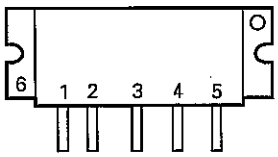
- **Explanation of terminals**

Pin No.	Symbol	Function
1	IN	Input
2	Vcc	Power supply
3	SW	Dividing ratio select pin
4	OUT	Output
5	GND	Ground
6	MC	Module set pin
7	NC	Non connection
8	IN	Compensated input

SEMICONDUCTOR DATA

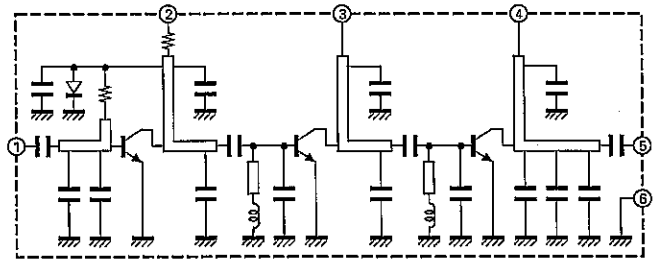
M57729UH, M57729SH-22, M57729L-22, M57729H-01, M57729SL, M57729UL : TX power amplifier (Final unit IC1)

- **Terminal connection diagram**



1 : Input
2 : Pre-drive +B
3 : Bias +B
4 : Final +B
5 : Output
6 : GND

- **Equivalent circuit**

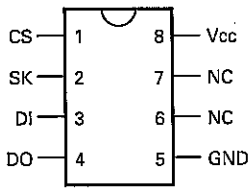


- **Electrical characteristics**

Symbol	Item	Condition	Rating			Unit
			Min.	Typ.	Max.	
PO	Output power	f = H-01 : 430~450MHz	30	33		W
ηT	Total efficiency	= UH : 470~490MHz	40	45		%
	2nd spurious	= SH-22 : 490~520MHz			-30	dB
	Spurious after 3rd	= L-22 : 400~430MHz			-30	dB
ρin	Input SWR	= SL : 360~380MHz			2.8	–
ρout	Output SWR	= UL : 380~400MHz Vcc = 12.5V Pin = 0.3W, ZG=ZL=50Ω		2		–

BR93LC46 : EEPROM (Signaling unit IC10, Display unit IC2)

- **Terminal connection diagram**



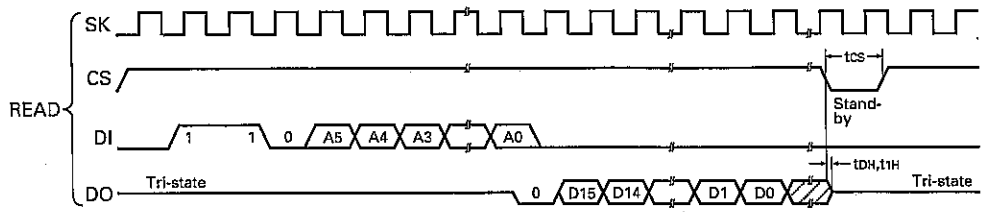
CS : Chip Select
SK : Serial Data Clock
DI : Serial Data Input
DO : Serial Data Output
Vcc : Power Supply
GND : Ground
NC : Not Connected

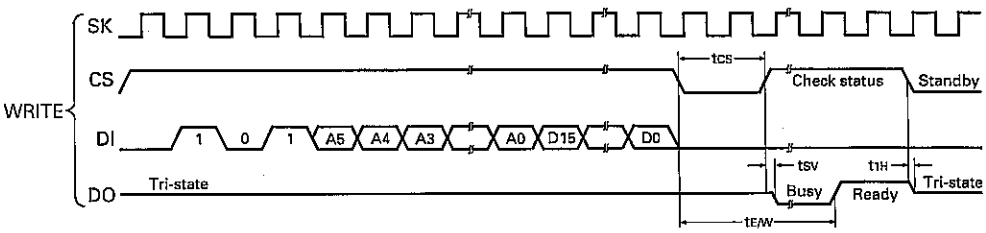
- **Instruction set for BR93LC46**

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

BR93LC46 has 6 instructions as shown. Note that the MSB of any given instruction is a "1" and is viewed as a start bit in the interface sequence. The next 8 bits carry the op code and the 6-bit address for 1 of 64, 16-bit registers.

- **Timing chart (Continued)**

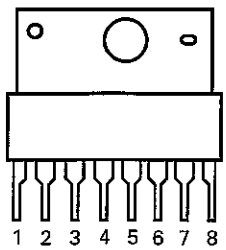




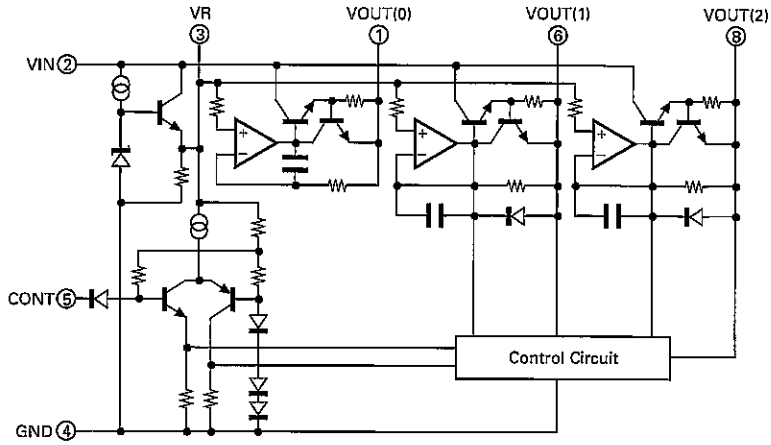
SEMICONDUCTOR DATA / DESCRIPTION OF COMPONENTS

MB3756 : Voltage regulator (TX-RX unit IC2)

- **Terminal connection diagram**



- **Equivalent circuit**



- **Electrical characteristics**

Item	Symbol	Condition	Rating			Unit
			Min.	Typ.	Max.	
Input voltage range	V_{IN}		10.6	–	18	V
Output voltage	V_O		7.8	8.2	8.6	V
Input stability		11V≤V_{IN}≤18V	–	20	100	mV
Load stability		(V_{O0}, V_{O1}) 1mA≤I_L≤100mA	–	15	80	mV
		(V_{O2}) 1mA≤I_L≤200mA	–	20	100	mV
Voltage difference between outputs	ΔV_O		–	10	50	mV
Peak output load	Isc	(V_{O0}, V_{O1})	–	200	–	mA
		(V_{O2})	–	350	–	mA
Output voltage short-circuit current (Active "L")	V_{O1} (L)	V_{IC}=0.8V	0	–	0.2	V
	V_{O2} (L)	V_{IC}=0.8V	7.8	8.2	8.6	V
Output voltage short-circuit current (Active "H")	V_{O1} (H)	V_{IC}=2.0V	7.8	8.2	8.6	V
	V_{O2} (H)	V_{IC}=2.0V	0	–	0.2	V

(T_J=25°C, V_{IN}=14, R_{L0}=R_{L1}=200Ω, R_{L2}=100Ω)

AVR UNIT (X43-3040-10)

Ref No.	Description
Q1~Q6	DC amplifier
D1	Rectifier
D3	Rectifier
D4	Temperature compensate
D5	Voltage reference
D6	Temperature compensate

FINAL UNIT (X45-3250-XX)

Ref No.	Description
IC1	TX power amplifier
Q1,Q2	RF amplifier
Q3~Q6	DC amplifier
D1	RF switch
D2	Voltage reference
D3,D4	RF detect
D5	Reverse polarity protection

SIGNALING UNIT (X52-3140-XX)

Ref No.	Description
IC1	Voltage regulator 5V
IC2	Reset system
IC3	Data recovery, active filter
IC4	Active filter
IC5	Data recovery
IC6,IC7	Active filter
IC8	EPROM
IC9	Data latch
IC10	EEPROM
IC11	Microprocessor
Q1	Level translator
Q2	Inverter
Q3~Q8	DC switch
Q9,Q10	Audio amplifier
D1,D2	Current steering
D3	Voltage clamp

DESCRIPTION OF COMPONENTS

Ref No.	Description
D4~D6	Current steering
D7	LED (Red)
D8	Voltage reference

DISPLAY UNIT (X54-3070-XX)

Ref No.	Description
IC1	Microprocessor
IC2	EEPROM
IC3	Precision reference
IC4	Voltage regulator 5V
IC5	Audio amplifier
IC6	Active filter
Q1,Q2	DC switch
Q3	Digital switch
Q6	AF switch
Q7,Q8	DC switch
D1	LED (Red)
D2	LED (Green)
D3	LED (Red)
D4~D6	Voltage clamp
D7,D8	Current steering
D10,D11	Current steering
D13	Current steering
D16	LED (Yellow)
D17	LED (Green)
D18	LED (Yellow)
D19,D21	Current steering
D22,D23	LED display assy
D24	Current setting

TX-RX UNIT (X57-3270-XX)

Ref No.	Description
IC1	AF power amplifier
IC2	Voltage regulator
IC3	AF amplifier
IC4	Voltage regulator
Q1,Q2	Voltage shift
Q3	RF amplifier
Q4~Q6	IF amplifier
Q7	Level translator
Q8	Inverter
Q9,Q10	Audio mute switch
Q11	DC switch
Q12,Q13	Inverter
D1,D2	TX VCO output mute
D3	Voltage clamp
D4	Double balanced modulator
D5~D11	Current steering

RX PLL : Z1, TX PLL : Z4 (X58-3120-10)

Ref No.	Description
IC1	Prescaler
IC2	PLL system
Q1	RF amplifier
Q2~Q5	Inverter
D1	Level shifter

RX VCO : Z2 (X58-3150-XX)

Ref No.	Description
Q1	Oscillator
Q2~Q4	Buffer amplifier
D1	Tuning

TX VCO : Z5 (X58-3460-XX)

Ref No.	Description
Q1	Oscillator
Q2	Buffer amplifier
Q3, Q4	RF amplifier
D1	Tuning
D2	Modulator

MIC AMP : Z7 (X59-3210-XX)

Ref No.	Description
IC1	MIC amplifier/Limiter
IC2	Limiter
IC3	Active filter
Q1	Muting switch

IF : Z8 (X59-3220-10)

Ref No.	Description
IC1	IF system
Q1	Noise amplifier
D1	Noise detector

BPF/VCA : Z9 (X59-3230-XX)

Ref No.	Description
IC1	Audio amplifier
IC2	Active filter
IC3	Electronic attenuator
IC4	Active filter

TKR-820/N/A

PARTS LIST

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

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

TKR-820/N/A

Ref. No.	Address	New parts	Parts No.	Description	Destination
			TKR-820/N/A		
1	1A		A01-1059-01	CASE (UPPER)	
2	3A		A01-1060-01	CASE (LOWER)	
3	2C		A13-0684-11	FRAME	
4	3A		A20-2666-11	PANEL	
5	3A		A21-1519-03	DRESSING PLATE	K–K4
5	3A		A21-1519-03	DRESSING PLATE	M–M6
5	3A		A21-1519-03	DRESSING PLATE	NK–NK4
5	3A		A21-1519-03	DRESSING PLATE	NM,NM4
6	3A		A21-1520-03	DRESSING PLATE (REPEAT,MONI)	K–K4
6	3A		A21-1520-03	DRESSING PLATE (REPEAT,MONI)	M–M6
6	3A		A21-1520-03	DRESSING PLATE (REPEAT,MONI)	NK–NK4
6	3A		A21-1520-03	DRESSING PLATE (REPEAT,MONI)	NM,NM4
7	2A		A22-0758-01	SUB PANEL	
8	2B		A22-0759-02	SUB PANEL	
9	2B		A23-1508-12	REAR PANEL	
10	2A		A40-0623-02	BOTTOM PLATE (AVR)	
11	2A		A50-0409-03	SIDE PLATE	
12	2B		A50-0410-13	SIDE PLATE	
5	3A		B03-0578-03	DRESSING PLATE	AM,AM4
5	3A		B03-0578-03	DRESSING PLATE	AM5,AM6
6	3A		B03-0579-03	DRESSING PLATE (REPEAT,MONI)	AM,AM4
6	3A		B03-0579-03	DRESSING PLATE (REPEAT,MONI)	AM5,AM6
15	3A		B11-0461-04	FILTER	
16	2B		B40-3835-04	MODEL NAME PLATE	K
16	2B		B40-7661-04	MODEL NAME PLATE	K2
16	2B		B40-7662-04	MODEL NAME PLATE	K3
16	2B		B40-7663-04	MODEL NAME PLATE	K4
16	2B		B40-7664-04	MODEL NAME PLATE	M–M4
16	2B		B40-7664-04	MODEL NAME PLATE	NM,NM4
16	2B		B40-7664-04	MODEL NAME PLATE	AM,AM4
16	2B		B40-7664-04	MODEL NAME PLATE	AM5
16	2B		B72-1474-04	MODEL NAME PLATE	M5
16	2B		B72-1513-04	MODEL NAME PLATE	M6,AM6
16	2B		B72-1532-04	MODEL NAME PLATE	NK
16	2B		B72-1533-04	MODEL NAME PLATE	NK2
16	2B		B72-1534-04	MODEL NAME PLATE	NK3
16	2B		B72-1535-04	MODEL NAME PLATE	NK4
17	1A		B41-0659-14	CAUTION LABEL	
17	3F		B44-2163-04	LABEL (UPC)	
18	1F		B46-0470-00	WARRANTY CARD	K–K4
18	1F		B46-0470-00	WARRANTY CARD	NK–NK4
19	1F		B62-0066-10	INSTRUCTION MANUAL	
C101	1A		C90-2084-05	ELECTRO 68000UF 25WV	
20	2B		E04-0169-15	RF COAXIAL RECEPT (M-BNC)	
21	2C		E04-0172-05	RF COAXIAL RECEPT (BNC)	
22	2E		E31-3391-05	CONNECTING CABLE (BNC-BNC)	
23	2C		E31-3469-05	CONNECTING WIRE (1P-1P)	
24	1B		E30-2125-05	AC POWER CORD (125V)	K–K4
24	1B		E30-2125-05	AC POWER CORD (125V)	NK–NK4
24	1B		E30-2153-15	AC POWER CORD (250V)	M–M6
24	1B		E30-2153-15	AC POWER CORD (250V)	NM,NM4
24	1B		E30-2153-15	AC POWER CORD (250V)	AM,AM4
24	1B		E30-2153-15	AC POWER CORD (250V)	AM5,AM6
P101	2B		E31-3228-05	SHORT PLUG ACCESSORY	
W101	2B		E31-3390-05	CONNECTING WIRE	
W102			E31-3474-15	CONNECTING WIRE (9P,9P)	
W103			E31-3473-15	CONNECTING WIRE (11P)	
W106	2B		E31-3468-15	CONNECTING CABLE (BNC-BNC)	
W107	2C		E31-3341-05	CONNECTING WIRE (CH)	AM,AM4
W107	2C		E31-3341-05	CONNECTING WIRE (CH)	AM5,AM6
-			E37-0793-05	LEAD WIRE WITH CONNECTOR	
25	1B,2E		F05-1623-05	FUSE (1.6A)	M–M6
25	1B,2E		F05-1623-05	FUSE (1.6A)	NM,NM4
25	1B,2E		F05-1623-05	FUSE (1.6A)	AM,AM4
25	1B,2E		F05-1623-05	FUSE (1.6A)	AM5,AM6
25	1B,2E		F06-3024-05	FUSE (3A)	K–K4
25	1B,2E		F06-3024-05	FUSE (3A)	NK–NK4
25	2E		F51-0016-05	FUSE (10A)	AM,AM4
25	2E		F51-0016-05	FUSE (10A)	AM5,AM6
26	1B		F07-0878-04	COVER (REAR PANEL)	K–K4
26	1B		F07-0878-04	COVER (REAR PANEL)	M–M6
26	1B		F07-0878-04	COVER (REAR PANEL)	NK–NK4
26	1B		F07-0878-04	COVER (REAR PANEL)	NM,NM4
27	1D		F07-0881-04	COVER (HEAT SINK)	
28	2C		F11-1068-03	SHIELDING COVER (UPPER)	
29	2C		F11-1108-03	SHIELDING COVER (TX.RX FRONT)	
30	1C,3C		F11-1109-03	SHIELDING COVER (TX.RX UPP/LOW)	
-	-		G02-0598-04	GND SPRING	K2,K3
-	-		G02-0598-04	GND SPRING	M2–M6
-	-		G02-0598-04	GND SPRING	NK–NK3
-	-		G02-0598-04	GND SPRING	NM,AM5
-	-		G02-0598-04	GND SPRING	AM6
31	2B		G13-1598-04	CUSHION (SHIELDING COVER)	
32	2C		G02-0570-04	LEAF SPRING	
33	3A		G09-0405-05	SPRING (VOL,SQL,CH)	
34	2A		G13-0895-04	CUSHION (SPEAKER)	
35	3A		G13-0912-14	CUSHION (PANEL)	
36	3E		H13-0820-04	PACKING FIXTUER	
37	2E		H25-0117-04	PROTECTION BAG (80X250)	
38	3F		H01-8193-04	ITEM CARTON BOX	
39	2E		H10-2649-02	POLYSTYRENE FOAMED FIX (FRONT)	
40	2F		H10-2650-02	POLYSTYRENE FOAMED FIX (REAR)	
41	2F		H20-1414-03	PROTECTION COVER	
42	2E		H25-0029-04	PROTECTION BAG (60X110)	
43	2F		H25-0105-04	PROTECTION BAG (AC CORD)	
44	3E		H25-0103-04	PROTECTION BAG (DC CORD)	AM,AM4
44	3E		H25-0103-04	PROTECTION BAG (DC CORD)	AM5,AM6
45	3A		J02-0049-14	FOOT	
46	2B		J19-1433-05	LEAD HOLDER	
47	2D,3D		J21-4243-04	MOUNTING HARDWARE (TX.RX)	
48	1C,2C		J21-4244-04	MOUNTING HARDWARE (TX.RX)	
50	2A		J21-4246-04	MOUNTING HARDWARE	
51	2E		J21-4248-04	MOUNTING HARDWARE (DUPLEXER)	
52	2D		J21-4253-04	MOUNTING HARDWARE (HEAT SINK)	
53	1B		J42-0489-05	BUSHING (AC CORD)	
54	2C		J42-0452-05	BUSHING	
55	2B		J42-0455-05	BUSHING	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

TKR-820/N/A
DC BACK UP
MOUNTING BRACKET
AVR UNIT (X43-3040-10)
FINAL UNIT (X45-3250-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
56	2D,3D		J50-0401-05	HINGE	
57	2A,2B		J61-0023-05	WIRE BAND	
61	2A		K29-3146-04	KNOB POWER	
62	3A		K29-3147-03	KNOB VOLNME,SQELCH	
63	2B,3B		K29-3148-04	KNOB TAKE,REPEAT,MONI	
64	3A		K29-3075-03	KNOB CHANNEL SELECTOR	AM,AM4
64	3A		K29-3075-03	KNOB CHANNEL SELECTOR	AM5,AM6
T101	1A		L01-8341-05	POWER TRANSFORMER	K–K4
T101	1A		L01-8341-05	POWER TRANSFORMER	NK–NK4
T101	1A		L01-8347-05	POWER TRANSFORMER	M–M6
T101	1A		L01-8347-05	POWER TRANSFORMER	NM,NM4
T101	1A		L01-8347-05	POWER TRANSFORMER	AM,AM4
T101	1A		L01-8347-05	POWER TRANSFORMER	AM5,AM6
A	2A,2E		N09-0704-05	SCREW (DUPLEXER)	
B	2C,2D		N09-2030-05	SCREW	
C	2B		N19-0631-05	FLAT WASHER (LEAD HOLDER)	
D	2B,2D		N32-3005-46	FLAT HEAD MACHINE SCREW (HING)	
E	1A,3B		N33-3006-45	OVAL HEAD MACHINE SCREW (CASE)	
F	1C		N35-2606-41	BINDING HEAD MACHINE (SIGNAL)	
G	2A,2C		N35-3006-46	BINDING HEAD MACHINE SCREW	
H	1B		N35-3008-46	BINDING HEAD MACHINE (AVR HEAT)	
J	1C,2B		N87-2606-46	BRAZIER HEAD TAPTITE SCREW	
K	3C		N87-2608-46	BRAZIER HEAD TAPTITE SCREW	
L	1B,2D		N87-3008-46	BRAZIER HEAD TAPTITE SCREW	
M	1A		N87-4006-46	BRAZIER HEAD TAPTITE SCR (C101)	
N	3A		N87-4010-46	BRAZIER HEAD TAPTITE SCR (FOOT)	
S101	2A		S40-2450-05	PUSH SWITCH (POWER)	
SP101	3A		T07-0227-25	LOUDSPEAKER	

DC BACK UP

75	1B		E31-3389-15	CONNECTING WIRE (DC BACK UP)	AM,AM4
75	1B		E31-3389-15	CONNECTING WIRE (DC BACK UP)	AM5,AM6
75	1B		E31-3455-15	CONNECTING WIRE (DC BACK UP)	AM,AM4
75	1B		E31-3455-15	CONNECTING WIRE (DC BACK UP)	AM5,AM6
76	3E		E30-2076-15	DC CORD (DC BACK UP)	AM,AM4
76	3E		E30-2076-15	DC CORD (DC BACK UP)	AM5,AM6
Y	1B		N87-4014-46	BRAZIER HEAD TAPTITESCR (DIODE)	AM,AM4
Y	1B		N87-4014-46	BRAZIER HEAD TAPTITESCR (DIODE)	AM5,AM6
D101	1B		S25VB20	DIODE (DC BACK UP)	AM,AM4
D101	1B		S25VB20	DIODE (DC BACK UP)	AM5,AM6

MOUNTING BRACKET

-			J21-4250-04	MOUNTING BRACKET	
-			N09-0704-05	SCREW	

Ref. No.	Address	New parts	Parts No.	Description	Destination
AVR UNIT (X43-3040-10)					
C1,2			CK73FB1H102K	CHIP C 1000PF K	
C3,4			C90-0814-05	ELECTRO 4700UF 25WV	
C5			CE04EW1A470M	ELECTRO 47UF 10WV	
C6,7			CK73FB1H102K	CHIP C 1000PF K	
C8-11			CK73EB1H104K	CHIP C 0.10UF K	
C12			CK73FB1H102K	CHIP C 1000PF K	
C13			C90-0814-05	ELECTRO 4700UF 25WV	
C14-16			CK73FB1H102K	CHIP C 1000PF K	
C17-20			CK73EB1H104K	CHIP C 0.10UF K	
C101,102			C91-1075-05	CERAMIC 470PF K	
C103			C91-1098-05	CERAMIC 4700PF M	
CN1,2			E23-0462-05	TERMINAL	
CN3,4			E23-0611-05	TERMINAL	
CN5-7			E23-0159-05	TERMINAL	
-			F20-1106-05	INSULATING SHEET	
A3	1B		F01-0955-03	HEAT SINK	
A5	1B		F07-0849-04	COVER	
A9-12	1B		F29-0432-05	INSULATOR	
A1,2			J13-0055-15	FUSE HOLDER	
A4	1B		J21-4247-04	MOUNTING HARDWARE	
A6-8	1B		J32-0906-14	BOSS	
G	1B		N35-3006-46	BINDING HEAD MACHINE SCREW	
O	1B		N35-3012-46	BINDING HEAD MACHINE SCREW	
L	1B		N87-3008-46	BRAZIER HEAD TAPTITE SCREW	
P	1B		N87-4016-46	BRAZIER HEAD TAPTITE SCREW	
R2			RS14AB3A4R7J	FL-PROOF RS 4.7 J 1W	
R3-5			RD41FB2B273J	CHIP R 27K J 1/8W	
R6,7			R92-0619-05	CHIP R 0.05 5W	
R8			RD41FB2B152J	CHIP R 1.5K J 1/8W	
R9			RD41FB2B102J	CHIP R 1.0K J 1/8W	
R10-12			RD41FB2B391J	CHIP R 390 J 1/8W	
R13			RD41FB2B683J	CHIP R 68K J 1/8W	
R14			RD41FB2B822J	CHIP R 8.2K J 1/8W	
VR1			R12-0440-05	TRIM POT. 68Ω	
VR2			R12-8406-05	TRIM POT. 1M	
D1			1B2C1	DIODE	
D3	1B		S25VB20	DIODE	
D4			1SS181	DIODE	
D5			RD7.5E(B2)	ZENER DIODE	
D6			1SS181	DIODE	
Q1-3			2SC2712(Y)	TRANSISTOR	
Q4			2SB968(Q,R)*J	TRANSISTOR	
Q5,6	1B		2N5885	TRANSISTOR	

FINAL UNIT (X45-3250-XX)

-10 : K,M,NK,NM,AM -11 : K2,M2,NK2
-12 : K3,M3,NK3 -13 : K4,M4,NK4,NM4,AM4
-14 : M5,AM5 -15 : M6,AM6

C1			CK73FB1H471K	CHIP C 470PF K	
C2			CS15E1C010M	TANTAL 1.0UF 16WV	
C3,4			CK73FB1H471K	CHIP C 470PF K	
C5			CK73FB1H103K	CHIP C 0.010UF K	
C6,7			CK73FB1H471K	CHIP C 470PF K	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

FINAL UNIT (X45-3250-XX)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C8			CC73FCH1H070D	CHIP C	7.0PF	D	M5,M6
C8			CC73FCH1H070D	CHIP C	7.0PF	D	AM5,AM6
C8,9			CC73FCH1H060D	CHIP C	6.0PF	D	K–K4
C8,9			CC73FCH1H060D	CHIP C	6.0PF	D	M–M4
C8,9			CC73FCH1H060D	CHIP C	6.0PF	D	NK–NK4
C8,9			CC73FCH1H060D	CHIP C	6.0PF	D	NM,NM4
C8,9			CC73FCH1H060D	CHIP C	6.0PF	D	AM,AM4
C9			CC73FCH1H100D	CHIP C	10PF	D	M5,M6
C9			CC73FCH1H100D	CHIP C	10PF	D	AM5,AM6
C10			CC73FCH1H100D	CHIP C	10PF	D	
C11			CK73FB1H471K	CHIP C	470PF	K	
C12			CK73FB1H103K	CHIP C	0.010UF	K	
C13,14			CK73FB1H471K	CHIP C	470PF	K	
C15			CC73FCH1H040C	CHIP C	4.0PF	C	M5,AM5
C15			CC73FCH1H120J	CHIP C	12PF	J	K–K4
C15			CC73FCH1H120J	CHIP C	12PF	J	M–M4,M6
C15			CC73FCH1H120J	CHIP C	12PF	J	NK–NK4
C15			CC73FCH1H120J	CHIP C	12PF	J	NM,NM4
C15			CC73FCH1H120J	CHIP C	12PF	J	AM,AM4
C15			CC73FCH1H120J	CHIP C	12PF	J	AM6
C16			CK73FB1H471K	CHIP C	470PF	K	
C17			C90-0875-05	ELECTRO	100UF	16WV	
C18,19			CK73FB1H471K	CHIP C	470PF	K	
C20			C90-0875-05	ELECTRO	100UF	16WV	
C21			C90-0871-05	ELECTRO	220UF	16WV	
C22			CM73F2H070D	CHIP C	7.0PF	D	K–K4
C22			CM73F2H070D	CHIP C	7.0PF	D	M–M4,M6
C22			CM73F2H070D	CHIP C	7.0PF	D	NK–NK4
C22			CM73F2H070D	CHIP C	7.0PF	D	NM,NM4
C22			CM73F2H070D	CHIP C	7.0PF	D	AM,AM4
C22			CM73F2H070D	CHIP C	7.0PF	D	AM6
C22			CM73F2H130J	CHIP C	13PF	J	M5,AM5
C23			CC73FCH1H0R5C	CHIP C	0.5PF	C	
C24,25			CK73FB1H471K	CHIP C	470PF	K	
C26			CC73FCH1H0R5C	CHIP C	0.5PF	C	
C27			CM73F2H090D	CHIP C	9.0PF	D	K,K2,M,M2
C27			CM73F2H090D	CHIP C	9.0PF	D	NK,NK2
C27			CM73F2H090D	CHIP C	9.0PF	D	NM,AM
C27			CM73F2H130J	CHIP C	13PF	J	K4,M4,NK4
C27			CM73F2H130J	CHIP C	13PF	J	NM4,AM4
C27			CM73F2H180J	CHIP C	18PF	J	M5,M6
C27			CM73F2H180J	CHIP C	18PF	J	AM5,AM6
C28			CM73F2H100D	CHIP C	10PF	D	K2,K3,M2
C28			CM73F2H100D	CHIP C	10PF	D	M3,NK2
C28			CM73F2H100D	CHIP C	10PF	D	NK3
C28			CM73F2H120J	CHIP C	12PF	J	K,M,NK
C28			CM73F2H120J	CHIP C	12PF	J	NM,AM
C28			CM73F2H150J	CHIP C	15PF	J	K4,M4,NK4
C28			CM73F2H150J	CHIP C	15PF	J	NM4,AM4
C28			CM73F2H180J	CHIP C	18PF	J	M5,M6
C28			CM73F2H180J	CHIP C	18PF	J	AM5,AM6
C29			CM73F2H100D	CHIP C	10PF	D	K2,K3,M2
C29			CM73F2H100D	CHIP C	10PF	D	M3,NK2
C29			CM73F2H100D	CHIP C	10PF	D	NK3
C29			CM73F2H150J	CHIP C	15PF	J	K,M,NK
C29			CM73F2H150J	CHIP C	15PF	J	NM,AM
C29			CM73F2H180J	CHIP C	18PF	J	K4,M4,NK4
C29			CM73F2H180J	CHIP C	18PF	J	NM4,AM4
C29			CM73F2H200J	CHIP C	20PF	J	M5,M6
C29			CM73F2H200J	CHIP C	20PF	J	AM5,AM6

Ref. No.	Address	New parts	Parts No.	Description				Destination
C30			CM73F2H070D	CHIP C	7.0PF	D		K2,K3,M2
C30			CM73F2H070D	CHIP C	7.0PF	D		M3,NK2
C30			CM73F2H070D	CHIP C	7.0PF	D		NK3
C30			CM73F2H110J	CHIP C	11PF	J		K,M,NK
C30			CM73F2H110J	CHIP C	11PF	J		NM,AM
C30			CM73F2H150J	CHIP C	15PF	J		K4,M4,M5
C30			CM73F2H150J	CHIP C	15PF	J		M6,NK4
C30			CM73F2H150J	CHIP C	15PF	J		NM4,AM4
C30			CM73F2H150J	CHIP C	15PF	J		AM5,AM6
C31-37			CK73FB1H471K	CHIP C	470PF	K		
C38			C90-2044-05	ELECTRO	1.0UF	25WV		
C39			CK73FB1H103K	CHIP C	0.010UF	K		
C40-44			CK73FB1H471K	CHIP C	470PF	K		
C46,47			C90-0871-05	ELECTRO	220UF	16WV		
C48-50			CK73FB1H471K	CHIP C	470PF	K		
C51			C90-2044-05	ELECTRO	1.0UF	25WV		
C52			CM73F2H090D	CHIP C	9.0PF	D		K3,M3,NK3
CN1			E04-0159-05	RF COAXIAL CABLE RECEPTACLE				
CN2,3			E23-1116-05	TERMINAL				
W1			E31-0792-05	CONNECTING WIRE (5P)				
L1			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				
L2			L40-1872-80	SMALL FIXED INDUCTOR (18nH)				K–K4
L2			L40-1872-80	SMALL FIXED INDUCTOR (18nH)				M–M4
L2			L40-1872-80	SMALL FIXED INDUCTOR (18nH)				NK–NK4
L2			L40-1872-80	SMALL FIXED INDUCTOR (18nH)				NM,NM4
L2			L40-1872-80	SMALL FIXED INDUCTOR (18nH)				AM,AM4
L2			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				M5,M6
L2			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				AM5,AM6
L3			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				K–K4
L3			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				M–M4,M6
L3			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				NK–NK4
L3			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				NM,NM4
L3			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				AM,AM4
L3			L40-2272-80	SMALL FIXED INDUCTOR (22nH)				AM6
L3			L40-3372-80	SMALL FIXED INDUCTOR (33nH)				M5,AM5
L4-6			L33-0666-05	CHOKE COIL				
L7-10			L34-1198-05	COIL (LPF)				
L11			L34-0908-05	COIL (9.5T)				
R1,2			RK73FB2A271J	CHIP R	270	J	1/10W	
R3			RK73EB2B562J	CHIP R	5.6K	J	1/8W	
R4			RK73FB2A101J	CHIP R	100	J	1/10W	
R5			RK73EB2B471J	CHIP R	470	J	1/8W	
R6			RK73FB2A561J	CHIP R	560	J	1/8W	
R7			RK73FB2A220J	CHIP R	22	J	1/8W	
R8			RK73EB2B6R8J	CHIP R	6.8	J	1/8W	
R9			R92-0679-05	CHIP R	0 OHM			
R10			RK73FB2A271J	CHIP R	270	J	1/10W	
R11			RK73FB2A221J	CHIP R	220	J	1/10W	
R12			R92-0679-05	CHIP R	0 OHM			
R13			RK73EB2B150J	CHIP R	15	J	1/8W	
R14			RK73FB2A222J	CHIP R	2.2K	J	1/10W	
R15,16			RK73FB2A221J	CHIP R	220	J	1/10W	
R17			RK73FB2A222J	CHIP R	2.2K	J	1/10W	
R18			RK73FB2A472J	CHIP R	4.7K	J	1/10W	
R19			RK73FB2A123J	CHIP R	12K	J	1/10W	
R20			RK73FB2A221J	CHIP R	220	J	1/10W	
R21			RK73FB2A392J	CHIP R	3.9K	J	1/10W	
R22			RK73FB2A102J	CHIP R	1.0K	J	1/10W	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

FINAL UNIT (X45-3250-XX)
SIGNALIN GUNIT (X52-3140-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R23			RK73FB2A122J	CHIP R 1.2K J 1/10W	
R24			RK73FB2A103J	CHIP R 10K J 1/10W	
R25			RK73FB2A270J	CHIP R 27 J 1/10W	M5,M6
R25			RK73FB2A270J	CHIP R 27 J 1/10W	AM5,AM6
R25			RK73FB2A470J	CHIP R 47 J 1/10W	K–K4
R25			RK73FB2A470J	CHIP R 47 J 1/10W	M–M4
R25			RK73FB2A470J	CHIP R 47 J 1/10W	NK–NK4
R25			RK73FB2A470J	CHIP R 47 J 1/10W	NM,NM4
R25			RK73FB2A470J	CHIP R 47 J 1/10W	AM,AM4
R26			RK73FB2A100J	CHIP R 10 J 1/10W	
R27			RK73FB2A102J	CHIP R 1.0K J 1/10W	
VR1			R12-4420-05	TRIM POT. (50K)	
D1			1SV172	DIODE	
D2			1SS226	DIODE	
D3,4			1SS101	DIODE	
D5			DSA3A1	SURGE ABSORBER	
Q1			2SC3357	TRANSISTOR	
Q2			2SC2954	TRANSISTOR	
Q3			2SB946(Q)	TRANSISTOR	
Q4			2SC2712(Y)	TRANSISTOR	
Q5,6			2SC3326(A)	TRANSISTOR	
TH1			SDT1000	THERMISTOR 10K	
TH1			112-103-2	THERMISTOR 10K	

SIGNALING UNIT (X52-3140-XX)

-10 : K,K3,K4,M,M3,M4,NK,NK3,NK4,NM,NM4,AM,AM4
-11 : K2,M2,NK2 -12 : M5,AM5 -13 : M6,AM6

Ref. No.	Address	New parts	Parts No.	Description	Destination
C1			CE04NW1E220M	ELECTRO 22UF 25WV	
C2,3			CK73FB1H103K	CHIP C 0.010UF K	
C4			CE04NW1C470M	ELECTRO 47UF 16WV	
C5			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C6			CK73FB1H103K	CHIP C 0.010UF K	
C7			CC73FCH1H101J	CHIP C 100PF J	K–K4
C7			CC73FCH1H101J	CHIP C 100PF J	M–M5
C7			CC73FCH1H101J	CHIP C 100PF J	NK–NK4
C7			CC73FCH1H101J	CHIP C 100PF J	NM,NM4
C7			CC73FCH1H101J	CHIP C 100PF J	AM,AM4
C7			CC73FCH1H101J	CHIP C 100PF J	AM5
C7			CK73FB1H102K	CHIP C 1000PF K	M6,AM6
C8			C92-0011-05	CHIP-TAN 10UF 4WV	
C9			CK73EB1E333K	CHIP C 0.033UF K	
C10			CK73FB1H332K	CHIP C 3300PF K	
C11			CK73EB1H683K	CHIP C 0.068UF K	
C12			CK73FB1H152K	CHIP C 1500PF K	
C13			CK73EB1H104K	CHIP C 0.10UF K	
C14,15			CK73FB1H103K	CHIP C 0.010UF K	
C16			C92-0011-05	CHIP-TAN 10UF 4WV	
C17			C92-0003-05	CHIP-TAN 0.47UF 25WV	
C18,19			CC73FCH1H100D	CHIP C 10PF D	
C20			CK73FB1H183K	CHIP C 0.018UF K	
C21			CK73FB1H102K	CHIP C 1000PF K	
C22			CK73EB1E473K	CHIP C 0.047UF K	
C23			CK73EB1E333K	CHIP C 0.033UF K	
C24,25			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C26-28			CC73FCH1H101J	CHIP C 100PF J	
C29			CK73FB1H103K	CHIP C 0.010UF K	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C30			C92-0011-05	CHIP-TAN 10UF 4WV	
C31			CK73FB1H103K	CHIP C 0.010UF K	
C32			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C33			CK73EB1H104K	CHIP C 0.10UF K	
C34			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C35-38			CK73FB1H153K	CHIP C 0.015UF K	K–K4
C35-38			CK73FB1H153K	CHIP C 0.015UF K	M–M4
C35-38			CK73FB1H153K	CHIP C 0.015UF K	NK–NK4
C35-38			CK73FB1H153K	CHIP C 0.015UF K	NM,NM4
C35-38			CK73FB1H153K	CHIP C 0.015UF K	AM,AM4
C35,36			CK73FB1E333K	CHIP C 0.033UF K	M5,M6
C35,36			CK73FB1E333K	CHIP C 0.033UF K	AM5,AM6
C37,38			CK73FB1E183K	CHIP C 0.018UF K	M5,M6
C37,38			CK73FB1E183K	CHIP C 0.018UF K	AM5,AM6
C39			C92-0502-05	CHIP-TAN 0.33UF 35WV	
C40,41			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C42			CK73FB1H103K	CHIP C 0.010UF K	
C43-46			CK73FF1E104Z	CHIP C 0.10UF Z	
-			E02-2010-05	IC SOCKET (8P)	
-			E02-2015-05	IC SOCKET (28P)	
CN1			E40-3256-05	PIN CONNECTOR (12P)	
CN2			E40-3248-05	PIN CONNECTOR (4P)	
CN3			E40-3247-05	PIN CONNECTOR (3P)	
TP1,2			E23-0467-05	TERMINAL	
W1,2			E31-1448-05	JUMPER WIRE	
W4			E31-1448-05	JUMPER WIRE	
W104			E31-3254-05	CONNECTING WIRE (12P)	
W105			E37-0785-05	CONNECTING WIRE (4P)	
X1			L77-1374-05	CRYSTAL RESONATOR (12MHz)	
CP1			R90-0598-05	MULTI-COMP 10K/20K	
R1			RK73FB2A100J	CHIP R 10 J 1/10W	
R2			RK73FB2A473J	CHIP R 47K J 1/10W	
R3			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R4,5			RK73FB2A473J	CHIP R 47K J 1/10W	
R6,7			RK73FB2A273J	CHIP R 27K J 1/10W	
R8			RK73FB2A684J	CHIP R 680K J 1/10W	
R9			R92-0670-05	CHIP R 0 OHM	
R10			RK73FB2A104J	CHIP R 100K J 1/10W	
R11-13			RK73FB2A683J	CHIP R 68K J 1/10W	
R14			RK73FB2A753J	CHIP R 75K J 1/10W	
R15			RK73FB2A563J	CHIP R 56K J 1/10W	
R16-19			RK73FB2A473J	CHIP R 47K J 1/10W	
R20			RK73FB2A123J	CHIP R 12K J 1/10W	
R21			RK73FB2A153J	CHIP R 15K J 1/10W	
R22,23			RK73FB2A103J	CHIP R 10K J 1/10W	
R24,25			RK73FB2A394J	CHIP R 390K J 1/10W	
R26			RK73FB2A473J	CHIP R 47K J 1/10W	
R27-29			RK73FB2A124J	CHIP R 120K J 1/10W	
R30			RK73FB2A183J	CHIP R 18K J 1/10W	
R31			RK73FB2A221J	CHIP R 220 J 1/10W	
R32,33			RK73FB2A393J	CHIP R 39K J 1/10W	
R34			RK73FB2A225J	CHIP R 2.2M J 1/10W	
R35-37			RK73FB2A473J	CHIP R 47K J 1/10W	
R38			R92-0670-05	CHIP R 0 OHM	
R39-41			RK73FB2A473J	CHIP R 47K J 1/10W	
R42-45			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R46-50			RK73FB2A473J	CHIP R 47K J 1/10W	
R51			RK73FB2A223J	CHIP R 22K J 1/10W	
R52			RK73FB2A331J	CHIP R 330 J 1/10W	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

SIGNALIN GUNIT (X52-3140-XX)
DISPLAY UNIT (X54-3070-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R53			RK73FB2A394J	CHIP R 390K J 1/10W	
R54			RK73FB2A474J	CHIP R 470K J 1/10W	
R55			RK73FB2A622J	CHIP R 6.2K J 1/10W	
R56			RK73FB2A563J	CHIP R 56K J 1/10W	
R57			RK73FB2A683J	CHIP R 68K J 1/10W	
R58			RK73FB2A153J	CHIP R 15K J 1/10W	K–K4
R58			RK73FB2A153J	CHIP R 15K J 1/10W	M–M4
R58			RK73FB2A153J	CHIP R 15K J 1/10W	NK–NK4
R58			RK73FB2A153J	CHIP R 15K J 1/10W	NM,NM4
R58			RK73FB2A153J	CHIP R 15K J 1/10W	AM,AM4
R58			RK73FB2A273J	CHIP R 27K J 1/10W	M5,M6
R58			RK73FB2A273J	CHIP R 27K J 1/10W	AM5,AM6
R59,60			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R61			RK73FB2A104J	CHIP R 100K J 1/10W	
R62,63			RK73FB2A473J	CHIP R 47K J 1/10W	
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	K,K3,K4
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	M,M3–M6
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	NK,NK3
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	NK4
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	NM,NM4
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	AM,AM4
R64			RK73FB2A102J	CHIP R 1.0K J 1/10W	AM5,AM6
R64			RK73FB2A103J	CHIP R 10K J 1/10W	K2,M2,NK2
R65			RK73FB2A471J	CHIP R 470 J 1/10W	
R66			RK73FB2A473J	CHIP R 47K J 1/10W	
R67			RD14BB2C103J	RD 10K J 1/6W	K2,M2,NK2
VR1-5			R12-3099-05	TRIM POT. 47K	
D1,2			1SS184	DIODE	
D3			HSM88AS	DIODE	
D4-6			1SS184	DIODE	
D7			B30-0839-05	LED	
D8			MTZ8.2JB	ZENER DIODE	
IC1			MC78L05M	IC (VOLTAGE REGULATOR/ +5V)	
IC2			M51943BML	IC (SYSTEM RESET)	
IC3-7			BA4558F	IC (OP AMP X2)	
IC3-7			XRA4558F	IC (OP AMP X2)	
IC8			27C256QJESB	IC	
IC9			TC74HC573AF	IC (8bit LATCH)	
IC10			BR93LC46	IC	
IC11			UPD78310AGF	IC	
Q1-7			DTC144EK	DIGITAL TRANSISTOR	
Q8			DTA114EK	DIGITAL TRANSISTOR	
Q9			2SC3326(A)	TRANSISTOR	
Q10			2SJ106(GR)	FET	
TH1			112-103-2	THERMISTOR	K2,M2,NK2

DISPLAY UNIT (X54-3070-XX)
-11 : K,K2,K3,K4,M,M2,M3,M4,M5,M6,NK,NK2, NK3,NK4,NM,NM4 -13 : AM,AM4,AM5,AM6

C1			CK73FB1H102K	CHIP C 1000PF K	
C2,3			CC73FCH1H330J	CHIP C 33PF J	
C4			CS15E1C010M	TANTAL 1.0UF 16WV	
C5			CK73FB1H103K	CHIP C 0.010UF K	
C6			CE04NW1E470M	ELECTRO 47UF 25WV	
C7,8			CK73FB1H103K	CHIP C 0.010UF K	
C9			CE04CW1E220M	ELECTRO 22UF 25WV	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C10			CE04CW1A101M	ELECTRO 100UF 10WV	
C11			CK73FB1H102K	CHIP C 1000PF K	
C12			CS15E1C010M	TANTAL 1.0UF 16WV	
C13			CK73FB1H103K	CHIP C 0.010UF K	
C14			CE04CW1E220M	ELECTRO 22UF 25WV	
C15-20			CK73FB1H102K	CHIP C 1000PF K	
C21			CS15E1C100M	TANTAL 10UF 16WV	
C22			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C23			CK73FB1H102K	CHIP C 1000PF K	
C24			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C25			CK73FB1H182K	CHIP C 1800PF K	
C26-28			CK73FB1H153K	CHIP C 0.015UF K	
C30			CK73FB1H153K	CHIP C 0.015UF K	
C31			CK73FB1H102K	CHIP C 1000PF K	
C32			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C33			CK73FB1H102K	CHIP C 1000PF K	
C34,35			CC73FCH1H101J	CHIP C 100PF J	
C36-41			CK73FB1H102K	CHIP C 1000PF K	
C42			CK73FB1H472K	CHIP C 4700PF K	
C43,44			CK73FB1H102K	CHIP C 1000PF K	
C45,46			CK73FB1H102K	CHIP C 1000PF K	K–K4
C45,46			CK73FB1H102K	CHIP C 1000PF K	M–M6
C45,46			CK73FB1H102K	CHIP C 1000PF K	NK–NK4
C45,46			CK73FB1H102K	CHIP C 1000PF K	NM,NM4
C47,48			CK73FB1H471K	CHIP C 470PF K	
C49			C92-0585-05	CHIP-TAN 4.7UF 16WV	
-			E40-0218-05	SPACER (LED)	
CN1			E08-0874-05	RECTANGULAR RECEPTACLE (ROM)	
CN2			E40-3273-05	PIN CONNECTOR (15P)	
CN3			E40-3271-05	PIN CONNECTOR (13P)	
CN4			E08-0673-15	RECTANGULAR RECEPTACLE (MIC)	
CN5			E40-3270-05	PIN CONNECTOR (12P)	
CN6			E40-3260-05	PIN CONNECTOR (2P)	
CN7			E40-3299-05	PIN CONNECTOR (2P)	
CN8			E40-3273-05	PIN CONNECTOR (15P)	
CN9			E40-3247-05	PIN CONNECTOR (3P)	AM,AM4
CN9			E40-3247-05	PIN CONNECTOR (3P)	AM5,AM6
CN10			E40-5191-05	PIN CONNECTOR (8P)	AM,AM4
CN10			E40-5191-05	PIN CONNECTOR (8P)	AM5,AM6
CN11,12			E40-5079-05	PIN CONNECTOR (8P)	AM,AM4
CN11,12			E40-5079-05	PIN CONNECTOR (8P)	AM5,AM6
CN13			E40-5191-05	PIN CONNECTOR (8P)	AM,AM4
CN13			E40-5191-05	PIN CONNECTOR (8P)	AM5,AM6
JP2			E33-1854-00	WIRE	
JP3			E33-1917-05	WIRE	
JP4			E37-0310-05	WIRE	AM,AM4
JP4			E37-0310-05	WIRE	AM5,AM6
W1			E31-3440-05	CONNECTING WIRE	
W2			E37-0812-05	CONNECTING WIRE	AM,AM4
W2			E37-0812-05	CONNECTING WIRE	AM5,AM6
F1			F06-2029-05	FUSE (2A)	
X1			L77-1333-05	CRYSTAL RESONATOR (4.195MHz)	
J2			R92-0670-05	CHIP R 0 OHM	
J4			R92-0670-05	CHIP R 0 OHM	
J7			R92-0670-05	CHIP R 0 OHM	
J9			R92-0670-05	CHIP R 0 OHM	
J11,12			R92-0670-05	CHIP R 0 OHM	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

DISPLAY UNIT (X54-3070-XX)
TX-RX UNIT (X57-3270-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
J14			R92-0670-05	CHIP R 0 OHM	
R1			RK73FB2A331J	CHIP R 330 J 1/10W	
R3,4			RK73FB2A331J	CHIP R 330 J 1/10W	
R5-8			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R9			RK73FB2A153J	CHIP R 15K J 1/10W	
R10			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R11			RK73FB2A220J	CHIP R 22 J 1/10W	
R12-15			RK73FB2A223J	CHIP R 22K J 1/10W	
R16			RS14DB3A470J	FL-PROOF RS 47 J 1W	
R17-19			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R20			RK73FB2A223J	CHIP R 22K J 1/10W	
R22			RK73FB2A473J	CHIP R 47K J 1/10W	
R23			R92-0670-05	CHIP R 0 OHM	
R24-28			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R29			R92-0670-05	CHIP R 0 OHM	
R30,31			RK73FB2A473J	CHIP R 47K J 1/10W	
R32			RK73FB2A101J	CHIP R 100 J 1/10W	
R33			RK73FB2A562J	CHIP R 5.6K J 1/10W	
R34			RK73FB2A681J	CHIP R 680 J 1/10W	
R35			R92-0341-05	FUSE RESIST 4.7 J 1/4W	
R38,39			RK73FB2A331J	CHIP R 330 J 1/10W	
R40,41			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R42			RK73FB2A681J	CHIP R 680 J 1/10W	
R43,44			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R45			RK73FB2A473J	CHIP R 47K J 1/10W	
R46			RK73FB2A101J	CHIP R 100 J 1/10W	
R47			RK73FB2A103J	CHIP R 10K J 1/10W	
R48,49			RK73FB2A224J	CHIP R 220K J 1/10W	
R50			RK73FB2A394J	CHIP R 390K J 1/10W	
R51			RK73FB2A153J	CHIP R 15K J 1/10W	
R52			RK73FB2A303J	CHIP R 30K J 1/10W	
R53			RK73FB2A224J	CHIP R 220K J 1/10W	
R54			RK73FB2A622J	CHIP R 6.2K J 1/10W	
R55,56			RK73FB2A223J	CHIP R 22K J 1/10W	
R57			RK73FB2A183J	CHIP R 18K J 1/10W	
R58			RK73FB2A681J	CHIP R 680 J 1/10W	
R59			RK73FB2A103J	CHIP R 10K J 1/10W	
R61			RS14DB3A1R0J	FL-PROOF RS 1.0 J 1W	
R62,63			RK73FB2A223J	CHIP R 22K J 1/10W	
R64			RK73FB2A331J	CHIP R 330 J 1/10W	
R65			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R66			RK73FB2A223J	CHIP R 22K J 1/10W	
R67			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R68			RK73FB2A223J	CHIP R 22K J 1/10W	
R69			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R70			RK73FB2A223J	CHIP R 22K J 1/10W	
R71			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R72			RK73FB2A223J	CHIP R 22K J 1/10W	
R73,74			RK73FB2A103J	CHIP R 10K J 1/10W	
R75,76			RK73FB2A104J	CHIP R 100K J 1/10W	
R77-90			RK73FB2A331J	CHIP R 330 J 1/10W	AM,AM4
R77-90			RK73FB2A331J	CHIP R 330 J 1/10W	AM5,AM6
R92-94			RK73FB2A473J	CHIP R 47K J 1/10W	
R95			RK73FB2A271J	CHIP R 270 J 1/10W	
R96,97			R92-0670-05	CHIP R 0 OHM	
R99,100			R92-0670-05	CHIP R 0 OHM	
R101			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R102			RK73FB2A392J	CHIP R 3.9K J 1/10W	
VR1			R01-4418-05	POTENTIOMETER (50K) SQL	
VR2			R01-3434-05	POTENTIOMETER (10K) VOL	

Ref. No.	Address	New parts	Parts No.	Description	Destination
S1			W02-0393-05	ENCODER	AM,AM4
S1			W02-0393-05	ENCODER	AM5,AM6
S2-4			S40-2455-05	PUSH SWITCH	
D1			B30-0855-05	LED (RED)	
D2			B30-0856-05	LED (GREEN)	
D3			B30-0855-05	LED (RED)	
D4-6			1SS184	DIODE	
D7,8			1SS181	DIODE	
D10,11			1SS181	DIODE	
D13			1SS181	DIODE	
D16			B30-0857-05	LED (YELLOW)	
D17			B30-0856-05	LED (GREEN)	
D18			B30-0857-05	LED (YELLOW)	
D19			1SS272	DIODE	
D21			1SS272	DIODE	K–K4
D21			1SS272	DIODE	M–M6
D21			1SS272	DIODE	NK–NK4
D21			1SS272	DIODE	NM,NM4
D22,23			B38-0308-05	LED (DISPLAY ASSY)	AM,AM4
D22,23			B38-0308-05	LED (DISPLAY ASSY)	AM5,AM6
D24			1SS133	DIODE	
IC1			UPD75104GF-J99	IC	
IC2			BR93LC46	IC	
IC3			M51943BML	IC (SYSTEM RESET)	
IC4			AN78N05	IC (VOLTAGE REGULATOR/ +5V)	
IC5,6			UPC4558C	IC (OP AMP X2)	
Q1,2			DTC114EK	DIGITAL TRANSISTOR	
Q3			2SA1162(Y)	TRANSISTOR	
Q6			2SC3326(A)	TRANSISTOR	
Q7,8			DTC114EK	DIGITAL TRANSISTOR	

TX-RX UNIT (X57-3270-XX) -10 : K,M,AM
-11 : K2,M2 -12 : K3,M3 -13 : K4,M4,AM4
-14 : NK,NM -15 : NK4,NM4 -16 : M5,AM5
-17 : M6,AM6 -18 : NK2 -19 : NK3

C1			CE04EW1A101M	ELECTRO	100UF	10WV
C2-4			CK73FB1H471K	CHIP C	470PF	K
C5-7			CC73FCH1H101J	CHIP C	100PF	J
C8			CK73EB1H473K	CHIP C	0.047UF	K
C9			C92-0004-05	CHIP-TAN	1.0UF	16WV
C10			C92-0001-05	CHIP-TAN	0.10UF	35WV
C11			CE04EW1A101M	ELECTRO	100UF	10WV
C12			CK73FB1H471K	CHIP C	470PF	K
C13			CE04EW1A101M	ELECTRO	100UF	10WV
C14			CK73FB1H471K	CHIP C	470PF	K
C15			CE04EW1A101M	ELECTRO	100UF	10WV
C16,17			CK73FB1H471K	CHIP C	470PF	K
C18-20			CC73FCH1H101J	CHIP C	100PF	J
C21			CK73EB1H473K	CHIP C	0.047UF	K
C22			C92-0004-05	CHIP-TAN	1.0UF	16WV
C23			C92-0001-05	CHIP-TAN	0.10UF	35WV
C24			CK73FB1H103K	CHIP C	0.010UF	K
C26			CK73FB1H103K	CHIP C	0.010UF	K
C27			CE04EW1A101M	ELECTRO	100UF	10WV
C28-34			CK73FB1H471K	CHIP C	470PF	K

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

TX-RX UNIT (X57-3270-XX)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C35			CE04EW1A101M	ELECTRO	100UF	10WV	
C36			CK73FB1H223K	CHIP C	0.022UF	K	
C37			CC73FCH1H101J	CHIP C	100PF	J	
C38			CE04EW1A101M	ELECTRO	100UF	10WV	
C39			CE04EW1A470M	ELECTRO	47UF	10WV	
C40			CC73FCH1H040C	CHIP C	4.0PF	C	
C41			CC73FCH1H030C	CHIP C	3.0PF	C	K–K3
C41			CC73FCH1H030C	CHIP C	3.0PF	C	M–M3
C41			CC73FCH1H030C	CHIP C	3.0PF	C	NK–NK3
C41			CC73FCH1H030C	CHIP C	3.0PF	C	NM,AM
C41			CC73FCH1H070D	CHIP C	7.0PF	D	M5,M6
C41			CC73FCH1H070D	CHIP C	7.0PF	D	AM5,AM6
C41			CC73FCH1H100D	CHIP C	10PF	D	K4,M4,NK4
C41			CC73FCH1H100D	CHIP C	10PF	D	NM4,AM4
C42			CK73FB1H471K	CHIP C	470PF	K	
C43			CC73FCH1H050C	CHIP C	5.0PF	C	K4,M4,M5
C43			CC73FCH1H050C	CHIP C	5.0PF	C	M6,NK4
C43			CC73FCH1H050C	CHIP C	5.0PF	C	NM4,AM4
C43			CC73FCH1H050C	CHIP C	5.0PF	C	AM5,AM6
C44			CE04EW1A470M	ELECTRO	47UF	10WV	
C45			CC73FCH1H050C	CHIP C	5.0PF	C	
C46			CC73FCH1H180J	CHIP C	18PF	J	K3,M3,NK3
C46			CC73FCH1H330J	CHIP C	33PF	J	K,K2,K4
C46			CC73FCH1H330J	CHIP C	33PF	J	M,M2,M4
C46			CC73FCH1H330J	CHIP C	33PF	J	M5,M6,NK
C46			CC73FCH1H330J	CHIP C	33PF	J	NK2,NK4
C46			CC73FCH1H330J	CHIP C	33PF	J	NM,NM4
C46			CC73FCH1H330J	CHIP C	33PF	J	AM,AM4
C46			CC73FCH1H330J	CHIP C	33PF	J	AM5,AM6
C47			CK73FB1H471K	CHIP C	470PF	K	
C48			CK73FB1H471K	CHIP C	470PF	K	K3,K4
C48			CK73FB1H471K	CHIP C	470PF	K	M3–M6
C48			CK73FB1H471K	CHIP C	470PF	K	NK3,NK4
C48			CK73FB1H471K	CHIP C	470PF	K	NM4,AM4
C48			CK73FB1H471K	CHIP C	470PF	K	AM5,AM6
C49			CC73FCH1H101J	CHIP C	100PF	J	K,K2,M,M2
C49			CC73FCH1H101J	CHIP C	100PF	J	NK,NK2
C49			CC73FCH1H101J	CHIP C	100PF	J	NM,AM
C49			CK73FB1H471K	CHIP C	470PF	K	K3,K4
C49			CK73FB1H471K	CHIP C	470PF	K	M3–M6
C49			CK73FB1H471K	CHIP C	470PF	K	NK3,NK4
C49			CK73FB1H471K	CHIP C	470PF	K	NM4,AM4
C49			CK73FB1H471K	CHIP C	470PF	K	AM5,AM6
C50			CK73FB1H471K	CHIP C	470PF	K	
C51			CC73FCH1H070D	CHIP C	7.0PF	D	K3,M3,NK3
C51			CC73FCH1H100D	CHIP C	10PF	D	K,K2,K4
C51			CC73FCH1H100D	CHIP C	10PF	D	M,M2,M4
C51			CC73FCH1H100D	CHIP C	10PF	D	M5,M6,NK
C51			CC73FCH1H100D	CHIP C	10PF	D	NK2,NK4
C51			CC73FCH1H100D	CHIP C	10PF	D	NM,NM4
C51			CC73FCH1H100D	CHIP C	10PF	D	AM,AM4
C51			CC73FCH1H100D	CHIP C	10PF	D	AM5,AM6
C52			CC73FCH1H120J	CHIP C	12PF	J	
C55			CC73FCH1H100D	CHIP C	10PF	D	M5,M6
C55			CC73FCH1H100D	CHIP C	10PF	D	AM5,AM6
C55			CC73FCH1H120J	CHIP C	12PF	J	K–K4
C55			CC73FCH1H120J	CHIP C	12PF	J	M–M4
C55			CC73FCH1H120J	CHIP C	12PF	J	NK–NK4
C55			CC73FCH1H120J	CHIP C	12PF	J	NM,NM4
C55			CC73FCH1H120J	CHIP C	12PF	J	AM,AM4

Ref. No.	Address	New parts	Parts No.	Description			Destination
C56			CC73FCH1H060D	CHIP C	6.0PF	D	M5,M6
C56			CC73FCH1H060D	CHIP C	6.0PF	D	AM5,AM6
C56			CC73FCH1H100D	CHIP C	10PF	D	K–K4
C56			CC73FCH1H100D	CHIP C	10PF	D	M–M4
C56			CC73FCH1H100D	CHIP C	10PF	D	NK–NK4
C56			CC73FCH1H100D	CHIP C	10PF	D	NM,NM4
C56			CC73FCH1H100D	CHIP C	10PF	D	AM,AM4
C57,58			CC73FCH1H101J	CHIP C	100PF	J	
C59			CC73FCH1H331J	CHIP C	330PF	J	
C60-63			CK73FB1H103K	CHIP C	0.010UF	K	
C64			CE04EW1E100M	ELECTRO	10UF	25WV	
C65			CK73FB1H103K	CHIP C	0.010UF	K	
C66			C90-2041-05	ELECTRO	10UF	10WV	
C67			C92-0007-05	CHIP-TAN	2.2UF	20WV	
C68,69			CS15E0J100M	TANTAL	10UF	6.3WV	
C70			CS15E1C100M	TANTAL	10UF	16WV	
C71			CE04EW1A101M	ELECTRO	100UF	10WV	
C72			CE04EW1A221M	ELECTRO	220UF	10WV	
C73			CK73FB1H103K	CHIP C	0.010UF	K	
C74			CS15E1C010M	TANTAL	1.0UF	16WV	
C75			CK73FB1H103K	CHIP C	0.010UF	K	
C76			CS15E1C010M	TANTAL	1.0UF	16WV	
C77			CK73FB1H471K	CHIP C	470PF	K	
C78,79			CE04EW1A470M	ELECTRO	47UF	10WV	
C80			CE04EW1C100M	ELECTRO	10UF	16WV	
C81			CK73FB1H103K	CHIP C	0.010UF	K	
C82			CE04EW1A470M	ELECTRO	47UF	10WV	
C83			CE04EW1E471M	ELECTRO	470UF	25WV	
C84			C90-2030-05	ELECTRO	1000UF	10WV	
C85			CK73EB1H104K	CHIP C	0.10UF	K	
C86			C92-0004-05	CHIP-TAN	1.0UF	16WV	
C87			CE04EW1A470M	ELECTRO	47UF	10WV	
C88			CK73FB1H103K	CHIP C	0.010UF	K	
C89			CE04EW1A470M	ELECTRO	47UF	10WV	
C90			CK73FB1H103K	CHIP C	0.010UF	K	
C91			CE04EW1C100M	ELECTRO	10UF	16WV	
C92			CE04EW1A470M	ELECTRO	47UF	10WV	
C93-95			CK73FB1H103K	CHIP C	0.010UF	K	
C96-101			CK73FB1H471K	CHIP C	470PF	K	
C102			CK45B1H102K	CERAMIC	1000PF	K	
CN1			E04-0171-05	RF COAXIAL CABLE RECEPTACLE			
CN5			E40-3091-05	PIN CONNECTOR (3P)			
CN6			E40-5069-05	PIN CONNECTOR (12P)			
CN7			E40-3248-05	PIN CONNECTOR (4P)			
CN8			E40-3240-05	PIN CONNECTOR (5P)			
CN9,10			E04-0154-05	RF COAXIAL CABLE RECEPTACLE			
TP1-3			E23-0464-05	TERMINAL			
W1			E33-1859-00	PROCESSED LEAD WIRE			
A1			F10-1366-04	SHIELDING PLATE			
CF1			L72-0339-05	CERAMIC FILTER (CFV455D)			K–K4
CF1			L72-0339-05	CERAMIC FILTER (CFV455D)			M–M5
CF1			L72-0339-05	CERAMIC FILTER (CFV455D)			AM,AM4
CF1			L72-0339-05	CERAMIC FILTER (CFV455D)			AM5
CF1			L72-0360-05	CERAMIC FILTER (CFV455G)			M6
CF1			L72-0360-05	CERAMIC FILTER (CFV455G)			NK–NK4
CF1			L72-0360-05	CERAMIC FILTER (CFV455G)			NM,NM4
CF1			L72-0360-05	CERAMIC FILTER (CFV455G)			AM6
L1			L40-2211-81	SMALL FIXED INDUCTOR (220UH)			
L2			L40-1021-13	SMALL FIXED INDUCTOR (1.0MH)			

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

TX-RX UNIT (X57-3270-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
L3,4			L40-2211-81	SMALL FIXED INDUCTOR (220UH)	
L5			L40-1021-13	SMALL FIXED INDUCTOR (1.0MH)	
L6			L40-2211-81	SMALL FIXED INDUCTOR (220UH)	
L7			L79-0674-05	HELICAL BLOCK	K,K2,M,M2
L7			L79-0674-05	HELICAL BLOCK	NK,NK2
L7			L79-0674-05	HELICAL BLOCK	NM,AM
L7			L79-0892-05	HELICAL BLOCK	K4,M4,NK4
L7			L79-0892-05	HELICAL BLOCK	NM4,AM4
L7			L79-0893-05	HELICAL BLOCK	K3,M3,NK3
L7			L79-1094-05	HELICAL BLOCK	M5,AM5
L7			L79-1095-05	HELICAL BLOCK	M6,AM6
L8			L34-1079-05	COIL (3D/1.5T)	
L9,10			L79-0674-05	HELICAL BLOCK	K,K2,M,M2
L9,10			L79-0674-05	HELICAL BLOCK	NK,NK2
L9,10			L79-0674-05	HELICAL BLOCK	NM,AM
L9,10			L79-0892-05	HELICAL BLOCK	K4,M4,NK4
L9,10			L79-0892-05	HELICAL BLOCK	NM4,AM4
L9,10			L79-0893-05	HELICAL BLOCK	K3,M3,NK3
L9,10			L79-1094-05	HELICAL BLOCK	M5,AM5
L9,10			L79-1095-05	HELICAL BLOCK	M6,AM6
L11,12			L39-0451-05	TROIDAL COIL	
L13			L40-4782-14	SMALL FIXED INDUCTOR (0.47UH)	
L14			L40-5682-14	SMALL FIXED INDUCTOR (0.56UH)	
L15			L40-2201-14	SMALL FIXED INDUCTOR (22UH)	
L16,17			L34-2160-05	IFT (21.4MHz)	
L18			L30-0503-05	IFT (455kHz)	
L19			L15-0016-05	LOW-FREQUENCY CHOKE COIL (22UH)	
L20			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	K2,M2,NK2
X1			L77-1348-05	CRYSTAL RESONATOR 20.945MHz	
XF1			L71-0274-05	M.C.F (21F15C)	K–K4
XF1			L71-0274-05	M.C.F (21F15C)	M–M5
XF1			L71-0274-05	M.C.F (21F15C)	AM,AM4
XF1			L71-0274-05	M.C.F (21F15C)	AM5
XF1			L71-0417-05	M.C.F (21F7.5C)	M6
XF1			L71-0417-05	M.C.F (21F7.5C)	NK–NK4
XF1			L71-0417-05	M.C.F (21F7.5C)	NM,NM4
XF1			L71-0417-05	M.C.F (21F7.5C)	AM6
Z3			L77-1338-15	TCXO 12.8MHz	
Z6			L77-1498-15	VCXO 12.8MHz	
Z6			L77-1688-05	VCXO 12.8MHz	
R1			RK73FB2A332J	CHIP R 3.3K J 1/10W	
R2			RK73FB2A122J	CHIP R 1.2K J 1/10W	
R3,4			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R5,6			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R7			RK73FB2A221J	CHIP R 220 J 1/10W	
R8			RK73FB2A271J	CHIP R 270 J 1/10W	
R9			RK73FB2A180J	CHIP R 18 J 1/10W	
R10			RK73FB2A271J	CHIP R 270 J 1/10W	
R11			RK73FB2A332J	CHIP R 3.3K J 1/10W	
R12			RK73FB2A122J	CHIP R 1.2K J 1/10W	
R13,14			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R15,16			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R17			RK73FB2A221J	CHIP R 220 J 1/10W	
R18			RK73FB2A681J	CHIP R 680 J 1/10W	
R19,20			RK73FB2A821J	CHIP R 820 J 1/10W	
R21			RK73FB2A101J	CHIP R 100 J 1/10W	
R22			RK73FB2A103J	CHIP R 10K J 1/10W	
R23			RK73FB2A123J	CHIP R 12K J 1/10W	
R24			RK73FB2A122J	CHIP R 1.2K J 1/10W	K–K3
R24			RK73FB2A122J	CHIP R 1.2K J 1/10W	M–M3,M5

Ref. No.	Address	New parts	Parts No.	Description	Destination
R24			RK73FB2A122J	CHIP R 1.2K J 1/10W	NK3
R24			RK73FB2A122J	CHIP R 1.2K J 1/10W	AM,AM5
R24			RK73FB2A182J	CHIP R 1.8K J 1/10W	NK,NM
R24			RK73FB2A471J	CHIP R 470 J 1/10W	K4,M4,NK4
R24			RK73FB2A471J	CHIP R 470 J 1/10W	NM4,AM4
R24			RK73FB2A681J	CHIP R 680 J 1/10W	M6,NK2
R24			RK73FB2A681J	CHIP R 680 J 1/10W	AM6
R25			RK73FB2A473J	CHIP R 47K J 1/10W	
R26			RK73FB2A473J	CHIP R 47K J 1/10W	K–K3
R26			RK73FB2A473J	CHIP R 47K J 1/10W	M–M3
R26			RK73FB2A473J	CHIP R 47K J 1/10W	M5,M6
R26			RK73FB2A473J	CHIP R 47K J 1/10W	NK–NK3
R26			RK73FB2A473J	CHIP R 47K J 1/10W	NM,AM
R26			RK73FB2A473J	CHIP R 47K J 1/10W	AM5,AM6
R26			RK73FB2A683J	CHIP R 68K J 1/10W	K4,M4,NK4
R26			RK73FB2A683J	CHIP R 68K J 1/10W	NM4,AM4
R27			RK73FB2A103J	CHIP R 10K J 1/10W	
R28			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R29			RK73FB2A332J	CHIP R 3.3K J 1/10W	
R30			RK73FB2A470J	CHIP R 47 J 1/10W	
R31			RK73FB2A100J	CHIP R 10 J 1/10W	
R32			R92-0670-05	CHIP R 0 OHM	
R33			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R34			RK73FB2A330J	CHIP R 33 J 1/10W	
R35			RK73FB2A122J	CHIP R 1.2K J 1/10W	M6
R35			RK73FB2A122J	CHIP R 1.2K J 1/10W	NK–NK4
R35			RK73FB2A122J	CHIP R 1.2K J 1/10W	NM,NM4
R35			RK73FB2A122J	CHIP R 1.2K J 1/10W	AM6
R35			RK73FB2A182J	CHIP R 1.8K J 1/10W	K–K4
R35			RK73FB2A182J	CHIP R 1.8K J 1/10W	M–M5,AM
R35			RK73FB2A182J	CHIP R 1.8K J 1/10W	AM4,AM5
R36			RK73FB2A100J	CHIP R 10 J 1/10W	
R37			RK73FB2A152J	CHIP R 1.5K J 1/10W	
R38			RK73FB2A561J	CHIP R 560 J 1/10W	NK2,NK3
R38			RK73FB2A681J	CHIP R 680 J 1/10W	K–K4
R38			RK73FB2A681J	CHIP R 680 J 1/10W	M–M6
R38			RK73FB2A681J	CHIP R 680 J 1/10W	NK,NK4
R38			RK73FB2A681J	CHIP R 680 J 1/10W	NM,NM4
R38			RK73FB2A681J	CHIP R 680 J 1/10W	AM,AM4
R38			RK73FB2A681J	CHIP R 680 J 1/10W	AM5,AM6
R39			RK73FB2A560J	CHIP R 56 J 1/10W	
R41			RK73FB2A333J	CHIP R 33K J 1/10W	K–K4
R41			RK73FB2A333J	CHIP R 33K J 1/10W	M–M5,AM
R41			RK73FB2A333J	CHIP R 33K J 1/10W	AM4,AM5
R41			R92-0670-05	CHIP R 0 OHM	M6
R41			R92-0670-05	CHIP R 0 OHM	NK–NK4
R41			R92-0670-05	CHIP R 0 OHM	NM,NM4
R41			R92-0670-05	CHIP R 0 OHM	AM6
R42			RK73FB2A682J	CHIP R 6.8K J 1/10W	
R43			RK73FB2A683J	CHIP R 68K J 1/10W	
R44			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R45			RK73FB2A221J	CHIP R 220 J 1/10W	
R46			RK73FB2A392J	CHIP R 3.9K J 1/10W	
R47			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R48			RK73FB2A103J	CHIP R 10K J 1/10W	
R49			RK73FB2A182J	CHIP R 1.8K J 1/10W	
R50			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R51-54			RK73FB2A223J	CHIP R 22K J 1/10W	
R55			RK73FB2A221J	CHIP R 220 J 1/10W	
R56			RK73FB2A123J	CHIP R 12K J 1/10W	

K : USA
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K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

TX-RX UNIT (X57-3270-XX)
RX PLL : Z1, TX PLL : Z4 (X58-3120-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R57			RK73FB2A2R2J	CHIP R 2.2 J 1/10W	
R58,59			RK73FB2A223J	CHIP R 22K J 1/10W	
R60			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R61			RK73FB2A104J	CHIP R 100K J 1/10W	
R62			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R63			R92-0670-05	CHIP R 0 OHM	
R64,65			RK73FB2A223J	CHIP R 22K J 1/10W	
R66,67			RK73FB2A471J	CHIP R 470 J 1/10W	
R68,69			RK73FB2A103J	CHIP R 10K J 1/10W	
R70,71			RK73FB2A473J	CHIP R 47K J 1/10W	
R72			RK73FB2A681J	CHIP R 680 J 1/10W	
R73			RK73FB2A271J	CHIP R 270 J 1/10W	K4,M4,NK4
R73			RK73FB2A271J	CHIP R 270 J 1/10W	NM4,AM4
R73			RK73FB2A821J	CHIP R 820 J 1/10W	K–K3
R73			RK73FB2A821J	CHIP R 820 J 1/10W	M–M3
R73			RK73FB2A821J	CHIP R 820 J 1/10W	M5,M6
R73			RK73FB2A821J	CHIP R 820 J 1/10W	NK–NK3
R73			RK73FB2A821J	CHIP R 820 J 1/10W	NM,AM
R73			RK73FB2A821J	CHIP R 820 J 1/10W	AM5,AM6
R74			RK73FB2A562J	CHIP R 5.6K J 1/10W	
R75			RK73FB2A223J	CHIP R 22K J 1/10W	
R76			RK73FB2A332J	CHIP R 3.3K J 1/10W	
R77			RK73FB2A560J	CHIP R 56 J 1/10W	K2,M2,NK2
VR1			R12-0420-05	TRIM POT. 500	
VR2,3			R12-4408-05	TRIM POT. 50K	
K1			S51-1435-05	RELAY (DC12V)	
D1			1SV128	DIODE	
D2			1SV172	DIODE	
D3			1SS226	DIODE	
D4			ND487C1T	D.B.M	
D5-11			1SS184	DIODE	
IC1			UPC1242H	IC (AF POWER AMP)	
IC2			MB3756	IC (REGULATOR/OUTPUT.SEL)	
IC3			NJM4558D	IC (OP AMP X2)	
IC4			AN78N08	IC	
Q1,2			2SC2712(Y)	TRANSISTOR	
Q3			2SC4093(R27)	TRANSISTOR	
Q4,5			2SK125	FET	
Q6			2SK302(GR)	FET	
Q7			2SC2712(Y)	TRANSISTOR	
Q8			DTC114EK	DIGITAL TRANSISTOR	
Q9,10			2SC3326(A)	TRANSISTOR	
Q11-13			DTC114EK	DIGITAL TRANSISTOR	
TH1			112-203-2	TRERMISTOR 20K	
TH2			112-101-2	TRERMISTOR 100	
Z1			X58-3120-10	SUB UNIT (RX PLL)	
Z2			X58-3150-13	SUB UNIT (RX VCO)	K3,M3,NK3
Z2			X58-3150-14	SUB UNIT (RX VCO)	K4,M4,NK4
Z2			X58-3150-14	SUB UNIT (RX VCO)	NM4,AM4
Z2			X58-3150-15	SUB UNIT (RX VCO)	K,M,AM
Z2			X58-3150-16	SUB UNIT (RX VCO)	K2,M2,NK2
Z2			X58-3150-17	SUB UNIT (RX VCO)	M5,AM5
Z2			X58-3150-18	SUB UNIT (RX VCO)	M6,AM6
Z2			X58-3150-19	SUB UNIT (RX VCO)	NK,NM
Z4			X58-3120-10	SUB UNIT (TX PLL)	
Z5			X58-3460-10	SUB UNIT (TX VCO)	K,M,NK
Z5			X58-3460-10	SUB UNIT (TX VCO)	NM,AM
Z5			X58-3460-11	SUB UNIT (TX VCO)	K2,M2,NK2
Z5			X58-3460-12	SUB UNIT (TX VCO)	K3,M3,NK3
Z5			X58-3460-13	SUB UNIT (TX VCO)	K4,M4,NK4
Z5			X58-3460-13	SUB UNIT (TX VCO)	NM4,AM4
Z5			X58-3460-14	SUB UNIT (TX VCO)	M5,AM5
Z5			X58-3460-15	SUB UNIT (TX VCO)	M6,AM6
Z7			X59-3210-10	SUB UNIT (MIC AMP)	K–K4
Z7			X59-3210-10	SUB UNIT (MIC AMP)	M–M4
Z7			X59-3210-10	SUB UNIT (MIC AMP)	NK–NK4
Z7			X59-3210-10	SUB UNIT (MIC AMP)	NM,NM4
Z7			X59-3210-10	SUB UNIT (MIC AMP)	AM,AM4
Z7			X59-3210-11	SUB UNIT (MIC AMP)	M5,M6
Z7			X59-3210-11	SUB UNIT (MIC AMP)	AM5,AM6
Z8			X59-3220-10	SUB UNIT (IF)	
Z9			X59-3230-10	SUB UNIT (BPF/VCA)	K–K4
Z9			X59-3230-10	SUB UNIT (BPF/VCA)	M–M4
Z9			X59-3230-10	SUB UNIT (BPF/VCA)	NK–NK4
Z9			X59-3230-10	SUB UNIT (BPF/VCA)	NM,NM4
Z9			X59-3230-10	SUB UNIT (BPF/VCA)	AM,AM4
Z9			X59-3230-11	SUB UNIT (BPF/VCA)	M5,M6
Z9			X59-3230-11	SUB UNIT (BPF/VCA)	AM5,AM6

RX PLL : Z1, TX PLL :Z4 (X58-3120-10)

C1-9			CK73FB1H102K	CHIP C 1000PF K	
C10			C92-0009-05	CHIP-TAN 4.7UF 10WV	
C11			CC73FCH1H070D	CHIP C 7.0PF D	
-			E23-0471-05	TERMINAL	
A1			F11-1092-04	SHIELDING PLATE	
L1			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	
R1			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R2			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R3,4			RK73FB2A270J	CHIP R 27 J 1/10W	
R5			RK73FB2A182J	CHIP R 1.8K J 1/10W	
R6-9			RK73FB2A103J	CHIP R 10K J 1/10W	
R10			R92-0670-05	CHIP R 0 OHM	
R11			RK73FB2A103J	CHIP R 10K J 1/10W	
R12			RK73FB2A471J	CHIP R 470 J 1/10W	
R13			R92-0670-05	CHIP R 0 OHM	
R14			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R15			RK73FB2A562J	CHIP R 5.6K J 1/10W	
D1			02CZ3.0(Z)	ZENER DIODE /3V	
IC1			MB504F	IC (MODULUS PRE SCALER)	
IC2			JLC1075DW	IC	
IC2			JLC1075F	IC	
Q1			2SC3829TS	TRANSISTOR	
Q2-5			DTC114EK	DIGITAL TRANSISTOR	

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K : TKR-820 K
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M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

RX VCO : Z2 (X58-3150-XX)

RX VCO : Z2 (X58-3150-XX)
-13 : K3,M3,NK3 -14 : K4,M4,NK4,NM4,AM4
-15 : K,M,AM -16 : K2,M2,NK2 -17 : M5,AM5
-18 : M6,AM6 -19 : NK,NM

Ref. No.	Address	New parts	Parts No.	Description			Destination
C1			CK73FB1H102K	CHIP C	1000PF	K	
C2			CC73FCH1H090D	CHIP C	9.0PF	D	K3,M3,NK
C2			CC73FCH1H090D	CHIP C	9.0PF	D	NK3,NM
C2			CC73FCH1H100D	CHIP C	10PF	D	K2,K4,M2
C2			CC73FCH1H100D	CHIP C	10PF	D	M4,M5,M6
C2			CC73FCH1H100D	CHIP C	10PF	D	NK2,NK4
C2			CC73FCH1H100D	CHIP C	10PF	D	NM4,AM4
C2			CC73FCH1H100D	CHIP C	10PF	D	AM5,AM6
C2			CC73FCH1H110J	CHIP C	11PF	J	K,M,AM
C3			CC73FCH1H030C	CHIP C	3.0PF	C	M6,AM6
C3			CC73FCH1H050C	CHIP C	5.0PF	C	K2,K3,M2
C3			CC73FCH1H050C	CHIP C	5.0PF	C	M3,M5,NK2
C3			CC73FCH1H050C	CHIP C	5.0PF	C	NK3,AM5
C3			CC73FCH1H060D	CHIP C	6.0PF	D	K,M,NK
C3			CC73FCH1H060D	CHIP C	6.0PF	D	NM,AM
C3			CC73FCH1H080D	CHIP C	8.0PF	D	K4,M4,NK4
C3			CC73FCH1H080D	CHIP C	8.0PF	D	NM4,AM4
C4			CC73FCH1H120J	CHIP C	12PF	J	K3,M3,NK3
C4			CC73FCH1H220J	CHIP C	22PF	J	K2,M2,NK2
C4			CC73FCH1H270J	CHIP C	27PF	J	K,M,NK
C4			CC73FCH1H270J	CHIP C	27PF	J	NM,AM
C4			CC73FCH1H330J	CHIP C	33PF	J	M5,M6
C4			CC73FCH1H330J	CHIP C	33PF	J	AM5,AM6
C4			CC73FCH1H470J	CHIP C	47PF	J	K4,M4,NK4
C4			CC73FCH1H470J	CHIP C	47PF	J	NM4,AM4
C5			CC73FCH1H010C	CHIP C	1.0PF	C	M5,M6
C5			CC73FCH1H010C	CHIP C	1.0PF	C	AM5,AM6
C5			CC73FCH1H020C	CHIP C	2.0PF	C	K–K3
C5			CC73FCH1H020C	CHIP C	2.0PF	C	M–M3,NK2
C5			CC73FCH1H020C	CHIP C	2.0PF	C	NK3,AM
C5			CC73FCH1H040C	CHIP C	4.0PF	C	NK,NM
C5			CC73FCH1H1R5C	CHIP C	1.5PF	C	K4,M4,NK4
C5			CC73FCH1H1R5C	CHIP C	1.5PF	C	NM4,AM4
C6			CK73FB1H102K	CHIP C	1000PF	K	K,K4,M,M4
C6			CK73FB1H102K	CHIP C	1000PF	K	M5,M6,NK
C6			CK73FB1H102K	CHIP C	1000PF	K	NK4,NM
C6			CK73FB1H102K	CHIP C	1000PF	K	NM4,AM
C6			CK73FB1H102K	CHIP C	1000PF	K	AM4,AM5
C6			CK73FB1H102K	CHIP C	1000PF	K	AM6
C6			CK73FB1H471K	CHIP C	470PF	K	K2,K3,M2
C6			CK73FB1H471K	CHIP C	470PF	K	M3,NK2
C6			CK73FB1H471K	CHIP C	470PF	K	NK3
C7			CC73FCH1H060D	CHIP C	6.0PF	D	K3,M3,NK3
C7			CC73FCH1H080D	CHIP C	8.0PF	D	K4,M4,M5
C7			CC73FCH1H080D	CHIP C	8.0PF	D	NK,NK4
C7			CC73FCH1H080D	CHIP C	8.0PF	D	NM,NM4
C7			CC73FCH1H080D	CHIP C	8.0PF	D	AM4,AM5
C7,8			CC73FCH1H070D	CHIP C	7.0PF	D	K2,M2,M6
C7,8			CC73FCH1H070D	CHIP C	7.0PF	D	NK2,AM6
C7,8			CC73FCH1H100D	CHIP C	10PF	D	K,M,AM
C8			CC73FCH1H080D	CHIP C	8.0PF	D	M5,AM5
C8			CC73FCH1H090D	CHIP C	9.0PF	D	K3,M3,NK3
C8			CC73FCH1H180J	CHIP C	18PF	J	K4,M4,NK
C8			CC73FCH1H180J	CHIP C	18PF	J	NK4,NM
C8			CC73FCH1H180J	CHIP C	18PF	J	NM4,AM4

Ref. No.	Address	New parts	Parts No.	Description			Destination
C9			CC73FCH1H010C	CHIP C	1.0PF	C	
C10,11			CK73FB1H102K	CHIP C	1000PF	K	
C12			CC73FCH1H030C	CHIP C	3.0PF	C	K–K3
C12			CC73FCH1H030C	CHIP C	3.0PF	C	M–M3
C12			CC73FCH1H030C	CHIP C	3.0PF	C	NK–NK3
C12			CC73FCH1H030C	CHIP C	3.0PF	C	NM,AM
C12			CC73FCH1H100D	CHIP C	10PF	D	K4,M4,M5
C12			CC73FCH1H100D	CHIP C	10PF	D	M6,NK4
C12			CC73FCH1H100D	CHIP C	10PF	D	NM4,AM4
C12			CC73FCH1H100D	CHIP C	10PF	D	AM5,AM6
C13			CC73FCH1H090D	CHIP C	9.0PF	D	
C14,15			CK73FB1H102K	CHIP C	1000PF	K	
C16			CC73FCH1H030C	CHIP C	3.0PF	C	K–K3
C16			CC73FCH1H030C	CHIP C	3.0PF	C	M–M3
C16			CC73FCH1H030C	CHIP C	3.0PF	C	NK–NK3
C16			CC73FCH1H030C	CHIP C	3.0PF	C	NM,AM
C16			CC73FCH1H050C	CHIP C	5.0PF	C	K4,M4,NK4
C16			CC73FCH1H050C	CHIP C	5.0PF	C	NM4,AM4
C16			CC73FCH1H080D	CHIP C	8.0PF	D	M6,AM6
C16			CC73FCH1H100D	CHIP C	10PF	D	M5,AM5
C17,18			CC73FCH1H100D	CHIP C	10PF	D	K–K4
C17,18			CC73FCH1H100D	CHIP C	10PF	D	M–M4
C17,18			CC73FCH1H100D	CHIP C	10PF	D	NK–NK4
C17,18			CC73FCH1H100D	CHIP C	10PF	D	NM,NM4
C17,18			CC73FCH1H100D	CHIP C	10PF	D	AM,AM4
C17,18			CC73FCH1H150J	CHIP C	15PF	J	M5,M6
C17,18			CC73FCH1H150J	CHIP C	15PF	J	AM5,AM6
C19			CC73FCH1H040C	CHIP C	4.0PF	C	K–K4
C19			CC73FCH1H040C	CHIP C	4.0PF	C	M–M4
C19			CC73FCH1H040C	CHIP C	4.0PF	C	NK–NK4
C19			CC73FCH1H040C	CHIP C	4.0PF	C	NM,NM4
C19			CC73FCH1H040C	CHIP C	4.0PF	C	AM,AM4
C19			CC73FCH1H050C	CHIP C	5.0PF	C	M5,M6
C19			CC73FCH1H050C	CHIP C	5.0PF	C	AM5,AM6
C20			CE04EW1A101M	ELECTRO	100UF	10WV	
C21-23			CK73FB1H102K	CHIP C	1000PF	K	
TC1			C05-0353-05	TRIM CAP.	10P		
-			E23-0603-05	TERMINAL			
-			F20-0584-04	INSULATING SHEET			
L1			L40-1092-81	SMALL FIXED INDUCTOR (1UH)			
L2			L34-2304-05	COIL			K–K3
L2			L34-2304-05	COIL			M–M3
L2			L34-2304-05	COIL			NK–NK3
L2			L34-2304-05	COIL			NM,AM
L2			L34-2375-05	COIL			K4,M4,M5
L2			L34-2375-05	COIL			M6,NK4
L2			L34-2375-05	COIL			NM4,AM4
L2			L34-2375-05	COIL			AM5,AM6
L3			L40-1081-80	SMALL FIXED INDUCTOR (100nH)			K–K3
L3			L40-1081-80	SMALL FIXED INDUCTOR (100nH)			M–M3
L3			L40-1081-80	SMALL FIXED INDUCTOR (100nH)			NK–NK3
L3			L40-1081-80	SMALL FIXED INDUCTOR (100nH)			NM,AM
L3			L40-1881-80	SMALL FIXED INDUCTOR (180nH)			K4,M4,M5
L3			L40-1881-80	SMALL FIXED INDUCTOR (180nH)			M6,NK4
L3			L40-1881-80	SMALL FIXED INDUCTOR (180nH)			NM4,AM4
L3			L40-1881-80	SMALL FIXED INDUCTOR (180nH)			AM5,AM6
L4			L40-1081-80	SMALL FIXED INDUCTOR (100nH)			K,M,NK
L4			L40-1081-80	SMALL FIXED INDUCTOR (100nH)			NM,AM

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

RX VCO : Z2 (X58-3150-XX)
TX VCO : Z5 (X58-3460-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
L4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	K4,M4,M5
L4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	M5,NK4
L4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	NM4,AM4
L4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	AM5,AM6
L4			L40-3372-80	SMALL FIXED INDUCTOR (33nH)	K3,M3,NK3
L4			L40-4772-80	SMALL FIXED INDUCTOR (47nH)	K2,M2,NK2
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	K–K4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	M–M4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	NK–NK4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	NM,NM4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	AM,AM4
L5			L40-3372-80	SMALL FIXED INDUCTOR (33nH)	M6,AM6
L5			L40-3972-80	SMALL FIXED INDUCTOR (39nH)	M5,AM5
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	K–K4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	M–M5
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	NK–NK4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	NM,NM4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	AM,AM4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	AM5
L6			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	M6,AM6
L7			L40-1072-80	SMALL FIXED INDUCTOR (10nH)	
R1			RK73FB2A221J	CHIP R 220 J 1/10W	
R2			RK73FB2A151J	CHIP R 150 J 1/10W	K4,M4,NK4
R2			RK73FB2A151J	CHIP R 150 J 1/10W	NM4,AM4
R2			RK73FB2A221J	CHIP R 220 J 1/10W	K–K3
R2			RK73FB2A221J	CHIP R 220 J 1/10W	M–M3
R2			RK73FB2A221J	CHIP R 220 J 1/10W	NK–NK3
R2			RK73FB2A221J	CHIP R 220 J 1/10W	NM,AM
R2			RK73FB2A270J	CHIP R 27 J 1/10W	M6,AM6
R2			RK73FB2A470J	CHIP R 47 J 1/10W	M5,AM5
R3			RK73FB2A101J	CHIP R 100 J 1/10W	K,M,NK
R3			RK73FB2A101J	CHIP R 100 J 1/10W	NM,AM
R3			RK73FB2A151J	CHIP R 150 J 1/10W	K4,M4,NK4
R3			RK73FB2A151J	CHIP R 150 J 1/10W	NM4,AM4
R3			RK73FB2A221J	CHIP R 220 J 1/10W	K2,K3,M2
R3			RK73FB2A221J	CHIP R 220 J 1/10W	M3,NK2
R3			RK73FB2A221J	CHIP R 220 J 1/10W	NK3
R3			RK73FB2A470J	CHIP R 47 J 1/10W	M5,M6
R3			RK73FB2A470J	CHIP R 47 J 1/10W	AM5,AM6
R4			RK73FB2A183J	CHIP R 18K J 1/10W	K,K2,K4,M
R4			RK73FB2A183J	CHIP R 18K J 1/10W	M2,M4,M5
R4			RK73FB2A183J	CHIP R 18K J 1/10W	M6,NK,NK2
R4			RK73FB2A183J	CHIP R 18K J 1/10W	NK4,NM
R4			RK73FB2A183J	CHIP R 18K J 1/10W	NM4,AM
R4			RK73FB2A183J	CHIP R 18K J 1/10W	AM4,AM5
R4			RK73FB2A183J	CHIP R 18K J 1/10W	AM6
R4			RK73FB2A473J	CHIP R 47K J 1/10W	K3,M3,NK3
R5			RK73FB2A682J	CHIP R 6.8K J 1/10W	
R6			RK73FB2A101J	CHIP R 100 J 1/10W	K–K4
R6			RK73FB2A101J	CHIP R 100 J 1/10W	M–M4,M6
R6			RK73FB2A101J	CHIP R 100 J 1/10W	NK–NK4
R6			RK73FB2A101J	CHIP R 100 J 1/10W	NM,NM4
R6			RK73FB2A101J	CHIP R 100 J 1/10W	AM,AM4
R6			RK73FB2A101J	CHIP R 100 J 1/10W	AM6
R6			RK73FB2A470J	CHIP R 47 J 1/10W	M5,AM5
R7			RK73FB2A101J	CHIP R 100 J 1/10W	
R8			RK73FB2A100J	CHIP R 10 J 1/10W	
R9			RK73FB2A183J	CHIP R 18K J 1/10W	K,K3,K4,M
R9			RK73FB2A183J	CHIP R 18K J 1/10W	M3,M4,M5
R9			RK73FB2A183J	CHIP R 18K J 1/10W	M6,NK,NK3
R9			RK73FB2A183J	CHIP R 18K J 1/10W	NK4,NM
R9			RK73FB2A183J	CHIP R 18K J 1/10W	NM4,AM
R9			RK73FB2A183J	CHIP R 18K J 1/10W	AM4,AM5
R9			RK73FB2A183J	CHIP R 18K J 1/10W	AM6
R9			RK73FB2A473J	CHIP R 47K J 1/10W	K2,M2,NK2
R10			RK73FB2A682J	CHIP R 6.8K J 1/10W	
R11			RK73FB2A470J	CHIP R 47 J 1/10W	
R12,13			RK73FB2A101J	CHIP R 100 J 1/10W	
R14			RK73FB2A103J	CHIP R 10K J 1/10W	
R15			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R16			RK73FB2A560J	CHIP R 56 J 1/10W	
D1			1SV166	VARI-CAP DIODE	
Q1			2SK508NV(K52)	FET	
Q2,3			2SC3356	TRANSISTOR	
Q4			2SC3099	TRANSISTOR	

TX VCO : Z5 (X58-3460-XX)

-10 : K,M,NK,NM,AM -11 : K2,M2,NK2
-12 : K3,M3,NK3 -13 : K4,M4,NK4,NM4,AM4
-14 : M5,AM5 -15 : M6,AM6

Ref. No.	Address	New parts	Parts No.	Description	Destination
C1			CK73FB1H102K	CHIP C 1000PF K	
C2			CC73FCH1H070D	CHIP C 7.0PF D	M6,AM6
C2			CC73FCH1H080D	CHIP C 8.0PF D	K3,M3,NK3
C2			CC73FCH1H100D	CHIP C 10PF D	K,K2,M,M2
C2			CC73FCH1H100D	CHIP C 10PF D	M5,NK,NK2
C2			CC73FCH1H100D	CHIP C 10PF D	NM,AM
C2			CC73FCH1H100D	CHIP C 10PF D	AM5
C2			CC73FCH1H110J	CHIP C 11PF J	K4,M4,NK4
C2			CC73FCH1H110J	CHIP C 11PF J	NM4,AM4
C3			CC73FCH1H040C	CHIP C 4.0PF C	K2,K3,M2
C3			CC73FCH1H040C	CHIP C 4.0PF C	M3,NK2
C3			CC73FCH1H040C	CHIP C 4.0PF C	NK3
C3			CC73FCH1H050C	CHIP C 5.0PF C	K,K4,M,M4
C3			CC73FCH1H050C	CHIP C 5.0PF C	NK,NK4
C3			CC73FCH1H050C	CHIP C 5.0PF C	NM,NM4
C3			CC73FCH1H050C	CHIP C 5.0PF C	AM,AM4
C3			CC73FCH1H1R5C	CHIP C 1.5PF C	M5,M6
C3			CC73FCH1H1R5C	CHIP C 1.5PF C	AM5,AM6
C4			CC73FCH1H220J	CHIP C 22PF J	K2,K3,M2
C4			CC73FCH1H220J	CHIP C 22PF J	M3,M5,M6
C4			CC73FCH1H220J	CHIP C 22PF J	NK2,NK3
C4			CC73FCH1H220J	CHIP C 22PF J	AM5,AM6
C4			CC73FCH1H470J	CHIP C 47PF J	K,K4,M,M4
C4			CC73FCH1H470J	CHIP C 47PF J	NK,NK4
C4			CC73FCH1H470J	CHIP C 47PF J	NM,NM4
C4			CC73FCH1H470J	CHIP C 47PF J	AM,AM4
C5			CC73FCH1H0R5C	CHIP C 0.5PF C	K2,M2,NK2
C5			CC73FCH1H010C	CHIP C 1.0PF C	K,K4,M,M4
C5			CC73FCH1H010C	CHIP C 1.0PF C	NK,NK4
C5			CC73FCH1H010C	CHIP C 1.0PF C	NM,NM4
C5			CC73FCH1H010C	CHIP C 1.0PF C	AM,AM4
C6			CC73FCH1HR75B	CHIP C 0.75PF B	K,M,M5,M6
C6			CC73FCH1HR75B	CHIP C 0.75PF B	NK,NM,AM
C6			CC73FCH1HR75B	CHIP C 0.75PF B	AM5,AM6

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

TX VCO : Z5 (X58-3460-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C6			CC73FCH1HR75C	CHIP C 0.75PF C	K2,M2,NK2
C6			CC73FCH1H0R5B	CHIP C 0.5PF B	K3,M3,NK3
C6			CC73FCH1H1R5C	CHIP C 1.5PF C	K4,M4,NK4
C6			CC73FCH1H1R5C	CHIP C 1.5PF C	NM4,AM4
C7			CK73FB1H102K	CHIP C 1000PF K	
C8			CK73FB1H103K	CHIP C 0.010UF K	
C9			CE04EW1A101M	ELECTRO 100UF 10WV	
C10			CC73FCH1H060D	CHIP C 6.0PF D	M5,M6
C10			CC73FCH1H060D	CHIP C 6.0PF D	AM5,AM6
C10,11			CC73FCH1H070D	CHIP C 7.0PF D	K3,M3,NK3
C10,11			CC73FCH1H080D	CHIP C 8.0PF D	K,K2,M,M2
C10,11			CC73FCH1H080D	CHIP C 8.0PF D	NK,NK2
C10,11			CC73FCH1H080D	CHIP C 8.0PF D	NM,AM
C10,11			CC73FCH1H100D	CHIP C 10PF D	K4,M4,NK4
C10,11			CC73FCH1H100D	CHIP C 10PF D	NM4,AM4
C11			CC73FCH1H050C	CHIP C 5.0PF C	M5,M6
C11			CC73FCH1H050C	CHIP C 5.0PF C	AM5,AM6
C12			CC73FCH1H0R5C	CHIP C 0.5PF C	K–K3
C12			CC73FCH1H0R5C	CHIP C 0.5PF C	M–M3
C12			CC73FCH1H0R5C	CHIP C 0.5PF C	NK–NK3
C12			CC73FCH1H0R5C	CHIP C 0.5PF C	NM,AM
C12			CC73FCH1H1R5C	CHIP C 1.5PF C	K4,M4,M5
C12			CC73FCH1H1R5C	CHIP C 1.5PF C	M6,NK4
C12			CC73FCH1H1R5C	CHIP C 1.5PF C	NM4,AM4
C12			CC73FCH1H1R5C	CHIP C 1.5PF C	AM5,AM6
C13-15			CK73FB1H102K	CHIP C 1000PF K	
C16			CC73FCH1H050C	CHIP C 5.0PF C	
C17,18			CK73FB1H102K	CHIP C 1000PF K	
C19			CC73FCH1H040C	CHIP C 4.0PF C	
C20			CK73FB1H102K	CHIP C 1000PF K	
C21			CC73FCH1H010C	CHIP C 1.0PF C	K–K3
C21			CC73FCH1H010C	CHIP C 1.0PF C	M–M3
C21			CC73FCH1H010C	CHIP C 1.0PF C	NK–NK3
C21			CC73FCH1H010C	CHIP C 1.0PF C	NM,AM
C21			CC73FCH1H040C	CHIP C 4.0PF C	K4,M4,M5
C21			CC73FCH1H040C	CHIP C 4.0PF C	M6,NK4
C21			CC73FCH1H040C	CHIP C 4.0PF C	NM4,AM4
C21			CC73FCH1H040C	CHIP C 4.0PF C	AM5,AM6
C22,23			CK73FB1H102K	CHIP C 1000PF K	
TC1			C05-0353-05	TRIM CAP. 10PF	
-			E23-0603-05	TERMINAL	
A1			F11-1060-04	SHIELDING COVER	
L1			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	
L2			L34-2304-05	COIL	K–K3
L2			L34-2304-05	COIL	M–M3
L2			L34-2304-05	COIL	NK–NK3
L2			L34-2304-05	COIL	NM,AM
L2			L34-2375-05	COIL	K4,M4,M5
L2			L34-2375-05	COIL	M6,NK4
L2			L34-2375-05	COIL	NM4,AM4
L2			L34-2375-05	COIL	AM5,AM6
L3,4			L40-1081-80	SMALL FIXED INDUCTOR (100nH)	K–K3
L3,4			L40-1081-80	SMALL FIXED INDUCTOR (100nH)	M–M3
L3,4			L40-1081-80	SMALL FIXED INDUCTOR (100nH)	NK–NK3
L3,4			L40-1081-80	SMALL FIXED INDUCTOR (100nH)	NM,AM
L3,4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	K4,M4,M5
L3,4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	M6,NK4
L3,4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	NM4,AM4
L3,4			L40-1881-80	SMALL FIXED INDUCTOR (180nH)	AM5,AM6
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	K–K4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	M–M4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	NK–NK4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	NM,NM4
L5			L40-2272-80	SMALL FIXED INDUCTOR (22nH)	AM,AM4
L5			L40-3372-80	SMALL FIXED INDUCTOR (33nH)	M5,M6
L5			L40-3372-80	SMALL FIXED INDUCTOR (33nH)	AM5,AM6
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	K–K4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	M–M4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	NK–NK4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	NM,NM4
L6			L40-1872-80	SMALL FIXED INDUCTOR (18nH)	AM,AM4
L6			L40-3972-80	SMALL FIXED INDUCTOR (39nH)	M5,M6
L6			L40-3972-80	SMALL FIXED INDUCTOR (39nH)	AM5,AM6
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	K,K2,K4,M
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	M2,M4,M5
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	M6,NK,NK2
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	NK4,NM
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	NM4,AM
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)	AM4–AM6
L7			L40-1292-81	SMALL FIXED INDUCTOR (1.2UH)	K3,M3,NK3
R1			RK73FB2A221J	CHIP R 220 J 1/10W	
R2			RK73FB2A104J	CHIP R 100K J 1/10W	
R3			RK73FB2A180J	CHIP R 18 J 1/10W	
R4			RK73FB2A104J	CHIP R 100K J 1/10W	
R5,6			RK73FB2A101J	CHIP R 100 J 1/10W	
R7			RK73FB2A183J	CHIP R 18K J 1/10W	K,K2,K4,M
R7			RK73FB2A183J	CHIP R 18K J 1/10W	M2,M4,M5
R7			RK73FB2A183J	CHIP R 18K J 1/10W	M6,NK,NK2
R7			RK73FB2A183J	CHIP R 18K J 1/10W	NK4,NM
R7			RK73FB2A183J	CHIP R 18K J 1/10W	NM4,AM
R7			RK73FB2A183J	CHIP R 18K J 1/10W	AM4–AM6
R7			RK73FB2A392J	CHIP R 3.9K J 1/10W	K3,M3,NK3
R8			RK73FB2A101J	CHIP R 100 J 1/10W	K,K2,K4,M
R8			RK73FB2A101J	CHIP R 100 J 1/10W	M2,M4,M5
R8			RK73FB2A101J	CHIP R 100 J 1/10W	M6,NK,NK2
R8			RK73FB2A101J	CHIP R 100 J 1/10W	NK4,NM
R8			RK73FB2A101J	CHIP R 100 J 1/10W	NM4,AM
R8			RK73FB2A101J	CHIP R 100 J 1/10W	AM4–AM6
R8			RK73FB2A470J	CHIP R 47 J 1/10W	K3,M3,NK3
R9			RK73FB2A682J	CHIP R 6.8K J 1/10W	
R10			RK73FB2A101J	CHIP R 100 J 1/10W	K,K2,K4,M
R10			RK73FB2A101J	CHIP R 100 J 1/10W	M2,M4,M5
R10			RK73FB2A101J	CHIP R 100 J 1/10W	M6,NK,NK2
R10			RK73FB2A101J	CHIP R 100 J 1/10W	NK4,NM
R10			RK73FB2A101J	CHIP R 100 J 1/10W	NM4,AM
R10			RK73FB2A101J	CHIP R 100 J 1/10W	AM4–AM6
R10			RK73FB2A470J	CHIP R 47 J 1/10W	K3,M3,NK3
R11			RK73FB2A183J	CHIP R 18K J 1/10W	
R12			RK73FB2A101J	CHIP R 100 J 1/10W	
R13			RK73FB2A682J	CHIP R 6.8K J 1/10W	
R14			RK73FB2A470J	CHIP R 47 J 1/10W	
R15			RK73FB2A101J	CHIP R 100 J 1/10W	
R16			RK73FB2A103J	CHIP R 10K J 1/10W	
R17			RK73FB2A101J	CHIP R 100 J 1/10W	
R18			RK73FB2A222J	CHIP R 2.2K J 1/10W	
R19			RK73FB2A560J	CHIP R 56 J 1/10W	
R20,21			RK73FB2A271J	CHIP R 270 J 1/10W	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

TX VCO : Z5 (X58-3460-XX)
MIC.AMP : Z7 (X59-3210-XX)
IF : Z8 (X59-3220-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination
D1			1SV166	VARI-CAP DIODE	
D2			1SV164	VARI-CAP DIODE	
Q1			2SK508NV(K52)	FET	
Q2-4			2SC3356	TRANSISTOR	

MIC AMP : Z7 (X59-3210-XX)
-10 : K,K2,K3,K4,M,M2,M3,M4,NK,NK2,NK3,NK4, NM,NM4,AM,AM4 -11 : M5,M6,AM5,AM6

Ref. No.	Address	New parts	Parts No.	Description	Destination
C1			CC73FCH1H101J	CHIP C 100PF J	
C2			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C3,4			CK73FB1E223K	CHIP C 0.022UF K	
C5			CC73FCH1H330J	CHIP C 33PF J	
C6			C92-0009-05	CHIP-TAN 4.7UF 10WV	
C7			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C8			CC73FCH1H101J	CHIP C 100PF J	
C9			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C10			CK73FB1H123K	CHIP C 0.012UF K	K–K4
C10			CK73FB1H123K	CHIP C 0.012UF K	M–M4
C10			CK73FB1H123K	CHIP C 0.012UF K	NK–NK4
C10			CK73FB1H123K	CHIP C 0.012UF K	NM,NM4
C10			CK73FB1H123K	CHIP C 0.012UF K	AM,AM4
C10			CK73FB1H153K	CHIP C 0.015UF K	M5,M6
C10			CK73FB1H153K	CHIP C 0.015UF K	AM5,AM6
C11			CK73FB1H222K	CHIP C 2200PF K	
C12			CC73FCH1H330J	CHIP C 33PF J	
C13			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C14			CK73FB1H182K	CHIP C 1800PF K	M5,M6
C14			CK73FB1H182K	CHIP C 1800PF K	AM5,AM6
C14			CK73FB1H222K	CHIP C 2200PF K	K–K4
C14			CK73FB1H222K	CHIP C 2200PF K	M–M4
C14			CK73FB1H222K	CHIP C 2200PF K	NK–NK4
C14			CK73FB1H222K	CHIP C 2200PF K	NM,NM4
C14			CK73FB1H222K	CHIP C 2200PF K	AM,AM4
C15			CK73FB1H182K	CHIP C 1800PF K	M5,M6
C15			CK73FB1H182K	CHIP C 1800PF K	AM5,AM6
C15			CK73FB1H392K	CHIP C 3900PF K	K–K4
C15			CK73FB1H392K	CHIP C 3900PF K	M–M4
C15			CK73FB1H392K	CHIP C 3900PF K	NK–NK4
C15			CK73FB1H392K	CHIP C 3900PF K	NM,NM4
C15			CK73FB1H392K	CHIP C 3900PF K	AM,AM4
C16			CC73FCH1H181J	CHIP C 180PF J	M5,M6
C16			CC73FCH1H181J	CHIP C 180PF J	AM5,AM6
C16			CC73FCH1H221J	CHIP C 220PF J	K–K4
C16			CC73FCH1H221J	CHIP C 220PF J	M–M4
C16			CC73FCH1H221J	CHIP C 220PF J	NK–NK4
C16			CC73FCH1H221J	CHIP C 220PF J	NM,NM4
C16			CC73FCH1H221J	CHIP C 220PF J	AM,AM4
C17			CK73FB1H472K	CHIP C 4700PF K	
C18			C92-0004-05	CHIP-TAN 1.0UF 16WV	
-			E23-0471-05	TERMINAL	
R1			RK73FB2A473J	CHIP R 47K J 1/10W	
R2			RK73FB2A223J	CHIP R 22K J 1/10W	
R3			RK73FB2A561J	CHIP R 560 J 1/10W	
R4			RK73FB2A681J	CHIP R 680 J 1/10W	
R5			RK73FB2A561J	CHIP R 560 J 1/10W	
R6			RK73FB2A104J	CHIP R 100K J 1/10W	
R7			RK73FB2A102J	CHIP R 1.0K J 1/10W	
R8			RK73FB2A333J	CHIP R 33K J 1/10W	
R9			RK73FB2A393J	CHIP R 39K J 1/10W	
R10			RK73FB2A104J	CHIP R 100K J 1/10W	
R11			RK73FB2A683J	CHIP R 68K J 1/10W	
R12			RK73FB2A224J	CHIP R 220K J 1/10W	
R13			RK73FB2A474J	CHIP R 470K J 1/10W	
R14			RK73FB2A123J	CHIP R 12K J 1/10W	
R15			RK73FB2A154J	CHIP R 150K J 1/10W	
R16			RK73FB2A272J	CHIP R 2.7K J 1/10W	
R17			RK73FB2A822J	CHIP R 8.2K J 1/10W	
R18			RK73FB2A103J	CHIP R 10K J 1/10W	
R19,20			RK73FB2A104J	CHIP R 100K J 1/10W	
R21			RK73FB2A103J	CHIP R 10K J 1/10W	
R22			RK73FB2A272J	CHIP R 2.7K J 1/10W	
R23			RK73FB2A393J	CHIP R 39K J 1/10W	
R24			RK73FB2A123J	CHIP R 12K J 1/10W	K–K4
R24			RK73FB2A123J	CHIP R 12K J 1/10W	M–M4
R24			RK73FB2A123J	CHIP R 12K J 1/10W	NK–NK4
R24			RK73FB2A123J	CHIP R 12K J 1/10W	NM,NM4
R24			RK73FB2A123J	CHIP R 12K J 1/10W	AM,AM4
R24			RK73FB2A182J	CHIP R 1.8K J 1/10W	M5,M6
R24			RK73FB2A182J	CHIP R 1.8K J 1/10W	AM5,AM6
R25			RK73FB2A333J	CHIP R 33K J 1/10W	
R26,27			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R28			RK73FB2A683J	CHIP R 68K J 1/10W	
IC1			NJM4560M	IC (OP AMP X2)	
IC2,3			NJM4558M	IC (OP AMP X2)	
Q1			2SC3326(A)	TRANSISTOR	

IF : Z8 (X59-3220-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C1			CK73FB1H102K	CHIP C 1000PF K	
C2			CC73FCH1H220J	CHIP C 22PF J	
C3			CC73FCH1H470J	CHIP C 47PF J	
C4-7			CK73EB1E104K	CHIP C 0.10UF K	
C8			C92-0003-05	CHIP-TAN 0.47UF 25WV	
C9,10			CC73FCH1H680J	CHIP C 68PF J	
C11			CK73FB1H332K	CHIP C 3300PF K	
C12			CK73FB1H102K	CHIP C 1000PF K	
C14			C92-0003-05	CHIP-TAN 0.47UF 25WV	
C17			CK73FB1E223K	CHIP C 0.022UF K	
C19			CK73FB1H102K	CHIP C 1000PF K	
C20			CC73FCH1H470J	CHIP C 47PF J	
-			E23-0471-05	TERMINAL	
R1			RK73FB2A203J	CHIP R 20K J 1/10W	
R3			RK73FB2A272J	CHIP R 2.7K J 1/10W	
R4			RK73FB2A334J	CHIP R 330K J 1/10W	
R5,6			RK73FB2A153J	CHIP R 15K J 1/10W	
R7			RK73FB2A821J	CHIP R 820 J 1/10W	
R10			RK73FB2A224J	CHIP R 220K J 1/10W	
R13			RK73FB2A392J	CHIP R 3.9K J 1/10W	
R14			RK73FB2A223J	CHIP R 22K J 1/10W	
R15			RK73FB2A821J	CHIP R 820 J 1/10W	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4
M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4
AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

IF : Z8 (X59-3220-10)
BPF/VCA : Z9 (X59-3230-XX)
FINAL ASSY UNIT (X60-3180-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R16			RK73FB2A223J	CHIP R 22K J 1/10W	
D1			DA204K	DIODE	
IC1			MC3361BD	IC	
Q1			2SC2712(Y)	TRANSISTOR	

BPF/VCA : Z9 (X59-3230-XX)
-10 : K,K2,K3,K4,M,M2,M3,M4,NK,NK2,NK3,NK4, NM,NM4,AM,AM4 -11 : M5,M6,AM5,AM6

C1-4			C93-0502-05	CHIP C 1800PF G	
C5-9			C93-0501-05	CHIP C 680PF G	
C10			CC73FCH1H561J	CHIP C 560PF J	M5,M6
C10			CC73FCH1H561J	CHIP C 560PF J	AM5,AM6
C10			CK73FB1H222K	CHIP C 2200PF K	K–K4
C10			CK73FB1H222K	CHIP C 2200PF K	M–M4
C10			CK73FB1H222K	CHIP C 2200PF K	NK–NK4
C10			CK73FB1H222K	CHIP C 2200PF K	NM,NM4
C10			CK73FB1H222K	CHIP C 2200PF K	AM,AM4
C11			C92-0004-05	CHIP-TAN 1.0UF 16WV	
C12			CK73FB1H472K	CHIP C 4700PF K	K–K4
C12			CK73FB1H472K	CHIP C 4700PF K	M–M4
C12			CK73FB1H472K	CHIP C 4700PF K	NK–NK4
C12			CK73FB1H472K	CHIP C 4700PF K	NM,NM4
C12			CK73FB1H472K	CHIP C 4700PF K	AM,AM4
C12			CK73FB1H562K	CHIP C 5600PF K	M5,M6
C12			CK73FB1H562K	CHIP C 5600PF K	AM5,AM6
C13			CC73FCH1H561J	CHIP C 560PF J	M5,M6
C13			CC73FCH1H561J	CHIP C 560PF J	AM5,AM6
C13			CK73FB1H102K	CHIP C 1000PF K	K–K4
C13			CK73FB1H102K	CHIP C 1000PF K	M–M4
C13			CK73FB1H102K	CHIP C 1000PF K	NK–NK4
C13			CK73FB1H102K	CHIP C 1000PF K	NM,NM4
C13			CK73FB1H102K	CHIP C 1000PF K	AM,AM4
C14			C92-0004-05	CHIP-TAN 1.0UF 16WV	
-			E23-0471-05	TERMINAL	
R1			RK73FB2A273J	CHIP R 27K J 1/10W	
R2			RK73FB2A822J	CHIP R 8.2K J 1/10W	
R3			RK73FB2A184J	CHIP R 180K J 1/10W	
R4			RK73FB2A224J	CHIP R 220K J 1/10W	
R5			RK73FB2A394J	CHIP R 390K J 1/10W	
R6			RK73FB2A134G	CHIP R 130K G 1/10W	
R7			RK73FB2A105G	CHIP R 1.0M G 1/10W	
R8			RK73FB2A563J	CHIP R 56K J 1/10W	M5,M6
R8			RK73FB2A563J	CHIP R 56K J 1/10W	AM5,AM6
R8			RK73FB2A683G	CHIP R 68K G 1/10W	K–K4
R8			RK73FB2A683G	CHIP R 68K G 1/10W	M–M4
R8			RK73FB2A683G	CHIP R 68K G 1/10W	NK–NK4
R8			RK73FB2A683G	CHIP R 68K G 1/10W	NM,NM4
R8			RK73FB2A683G	CHIP R 68K G 1/10W	AM,AM4
R9			RK73FB2A105G	CHIP R 1.0M G 1/10W	
R10			RK73FB2A514G	CHIP R 510K G 1/10W	
R11			RK73FB2A105G	CHIP R 1.0M G 1/10W	
R12			RK73FB2A514G	CHIP R 510K G 1/10W	
R13			RK73FB2A303G	CHIP R 30K G 1/10W	
R14,15			RK73FB2A473J	CHIP R 47K J 1/10W	

Ref. No.	Address	New parts	Parts No.	Description	Destination
R16			RK73FB2A472J	CHIP R 4.7K J 1/10W	
R17			RK73FB2A101J	CHIP R 100 J 1/10W	
R18			RK73FB2A183J	CHIP R 18K J 1/10W	
R19			RK73FB2A124J	CHIP R 120K J 1/10W	
R20,21			RK73FB2A223J	CHIP R 22K J 1/10W	
R22			RK73FB2A183J	CHIP R 18K J 1/10W	
R23			R92-0670-05	CHIP R 0 OHM	
IC1,2			NJM4558M	IC (OP AMP X2)	
IC3			M5222FP	IC (ELECTRCAL VOLUME)	
IC4			NJM4558M	IC (OP AMP X2)	

FINAL ASSY UNIT (X60-3180-XX) -10 : K,M,AM
-11 : K2,M2 -12 : K3,M3 -13 : K4,M4,AM4
-14 : NK,NM -15 : NK4,NM4 -16 : M5,AM5
-17 : M6,AM6 -18 : NK2 -19 : NK3

C101			CK45B1H471K	CERAMIC 470PF K	K2,K3,M2
C101			CK45B1H471K	CERAMIC 470PF K	M3,M5,M6
C101			CK45B1H471K	CERAMIC 470PF K	NK2,NK3
C101			CK45B1H471K	CERAMIC 470PF K	AM5,AM6
-			E23-0015-04	EARTH LUG	
-			E31-6028-05	LEAD WIRE WITH TERMINAL	
W2	2B		E31-3470-25	CONNECTING WIRE WITH BNC	
W3			E31-3472-05	CONNECTING WIRE DC CORD	
W4			E31-3123-05	CONNECTING WIRE	
-			F10-1439-04	SHIELDING PLATE	K2–K4
-			F10-1439-04	SHIELDING PLATE	M2–M6
-			F10-1439-04	SHIELDING PLATE	NK2–NK4
-			F10-1439-04	SHIELDING PLATE	NM4,AM4
-			F10-1439-04	SHIELDING PLATE	AM5,AM6
102	1D		F11-1115-02	SHIELDING COVER	
103	2D		F11-1119-04	SHIELDING COVER	
-			G10-0668-04	FIBROUS SHEET (80/40/0.45MM)	
-			J19-0306-05	HOLDER	K2–K4
-			J19-0306-05	HOLDER	M2–M6
-			J19-0306-05	HOLDER	NK2–NK4
-			J19-0306-05	HOLDER	NM4,AM4
-			J19-0306-05	HOLDER	AM5,AM6
-			J19-1431-05	LEAD HOLDER	
-			J19-1433-05	LEAD HOLDER	K,M,NK
-			J19-1433-05	LEAD HOLDER	NM,AM
-			J21-4135-04	HARDWARE FIXTURE	K2–K4
-			J21-4135-04	HARDWARE FIXTURE	M2–M6
-			J21-4135-04	HARDWARE FIXTURE	NK2–NK4
-			J21-4135-04	HARDWARE FIXTURE	NM4,AM4
-			J21-4135-04	HARDWARE FIXTURE	AM5,AM6
Q	2D		N16-0040-41	SPRING WASHER	
X	3D		N19-0631-05	FLAT WASHER	K,M,NK
X	3D		N19-0631-05	FLAT WASHER	NM,AM
R	1D		N32-3008-41	FLAT HEAD MACHINE SCREW	
S	1D,3D		N35-3008-41	BINDING HEAD MACHINE SCREW	
T	2D		N35-4006-46	BINDING HEAD MACHINE SCREW	
U	2D		N67-3010-41	PAN HEAD SEMS SCREW W	
L	2D		N67-3008-46	BRAZIER HEAD TAPTITE SCREW	

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

PARTS LIST

FINAL ASSY UNIT (X60-3180-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
V	1D,2D		N89-3010-45	BINDING HEAD TAPTITE SCREW	
W	3D		N90-3008-46	TP HEAD MACHINE SCREW	
IC1			M57729H-01	IC (POWER MODULE)	K,M,NK
IC1			M57729H-01	IC (POWER MODULE)NM,AM	
IC1			M57729L-22	IC (POWER MODULE/400-430MHz30W)	K4,M4,NK4
IC1			M57729L-22	IC (POWER MODULE/400-430MHz30W)	NM4,AM4
IC1			M57729SH-22	IC (POWER MODULE/ 490-512MHz)	K3,M3,NK3
IC1			M57729SL	IC	M5,AM5
IC1			M57729UH	IC (POWER MODULE/ 470-490MHz)	K2,M2,NK2
IC1			M57729UL	IC	M6,AM6
110	2D		X45-3250-10	FINAL UNIT	K,M,NK
110	2D		X45-3250-10	FINAL UNIT	NM,AM
110	2D		X45-3250-11	FINAL UNIT	K2,M2,NK2
110	2D		X45-3250-12	FINAL UNIT	K3,M3,NK3
110	2D		X45-3250-13	FINAL UNIT	K4,M4,NK4
110	2D		X45-3250-13	FINAL UNIT	NM4,AM4
110	2D		X45-3250-14	FINAL UNIT	M5,AM5
110	2D		X45-3250-15	FINAL UNIT	M6,AM6

Ref. No.	Address	New parts	Parts No.	Description	Destination

K : USA
M : Other Areas

K : TKR-820 K
K2 : TKR-820 K2
K3 : TKR-820 K3
K4 : TKR-820 K4

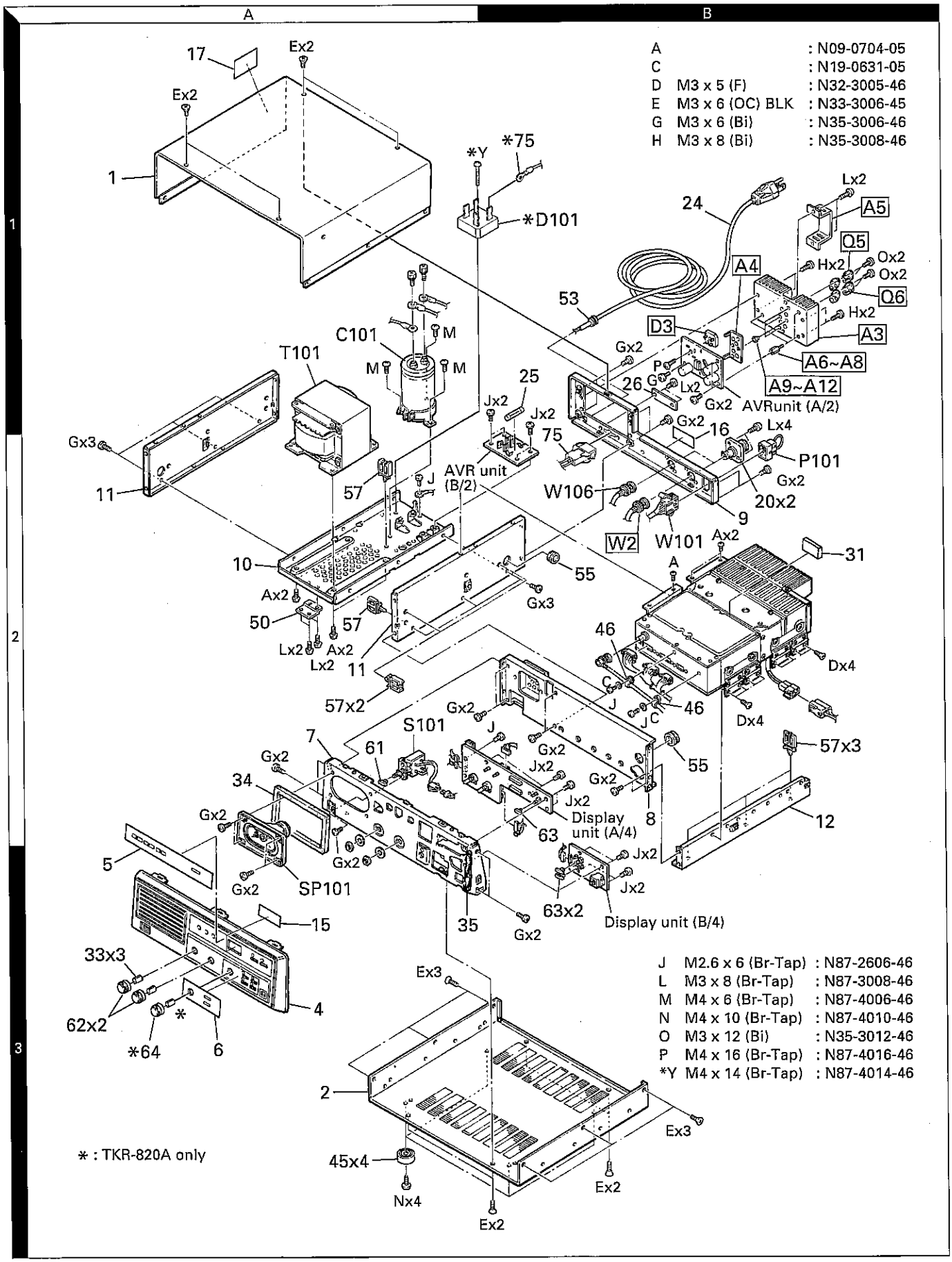
M : TKR-820 M
M2 : TKR-820 M2
M3 : TKR-820 M3
M4 : TKR-820 M4

M5 : TKR-820 M5
M6 : TKR-820 M6
NK : TKR-820N K
NK2 : TKR-820N K2

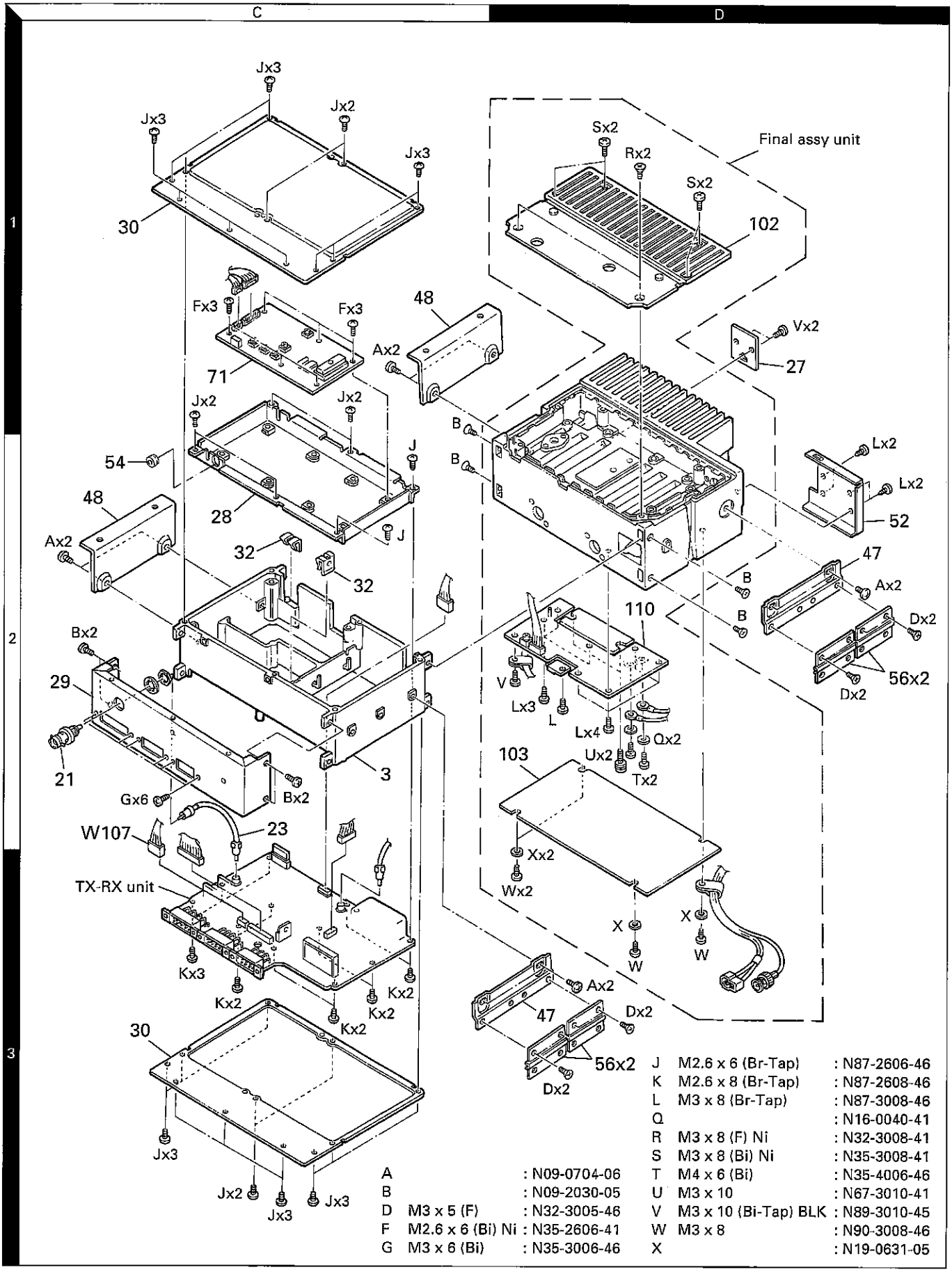
NK3 : TKR-820N K3
NK4 : TKR-820N K4
NM : TKR-820N M
NM4 : TKR-820N M4

AM : TKR-820A M
AM4 : TKR-820A M4
AM5 : TKR-820A M5
AM6 : TKR-820A M6

EXPLODED VIEW



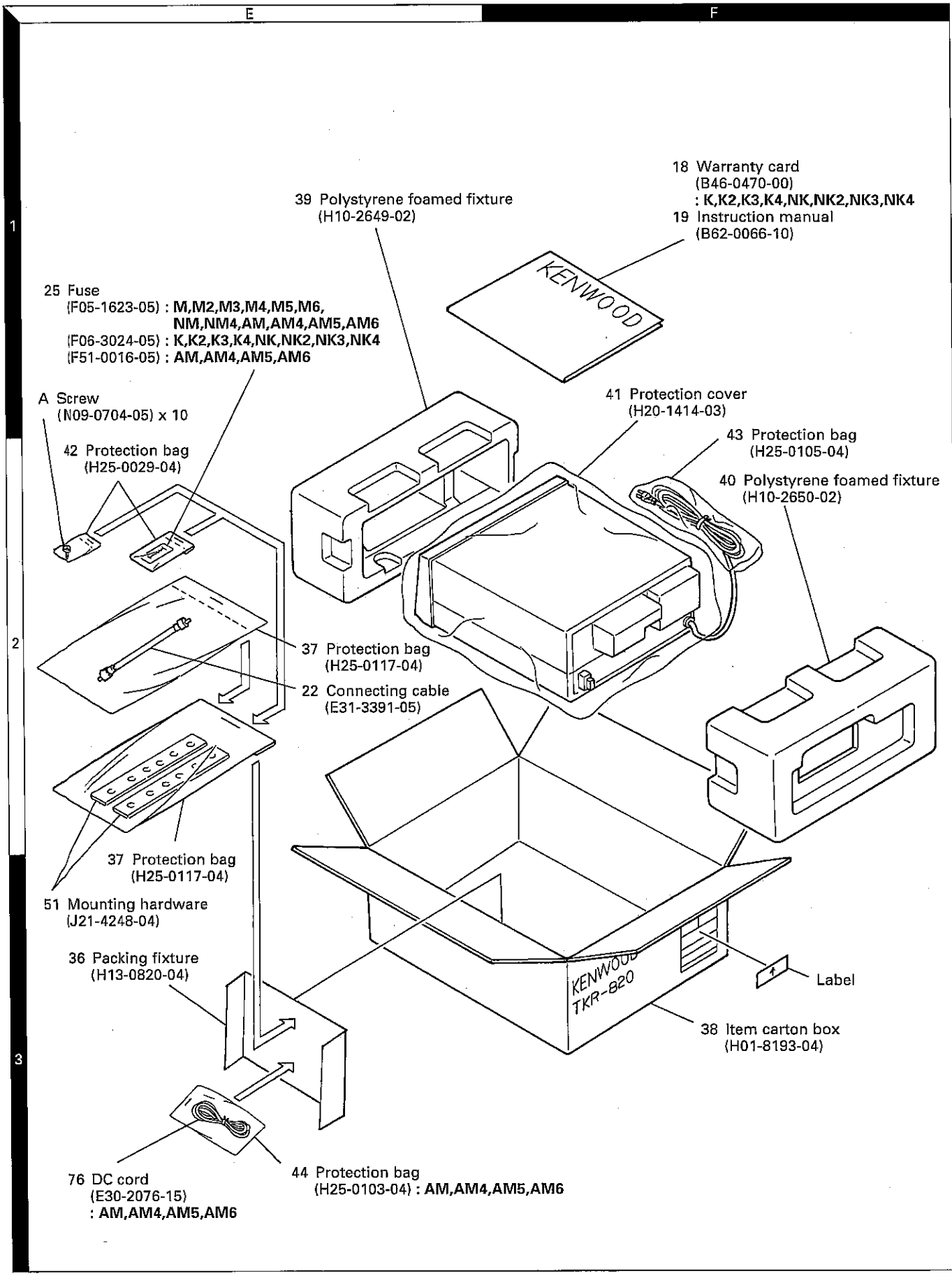
EXPLODED VIEW



A		: N09-0704-06
B		: N09-2030-05
D	M3 x 5 (F)	: N32-3005-46
F	M2.6 x 6 (Bi) Ni	: N35-2606-41
G	M3 x 6 (Bi)	: N35-3006-46

J	M2.6 x 6 (Br-Tap)	: N87-2606-46
K	M2.6 x 8 (Br-Tap)	: N87-2608-46
L	M3 x 8 (Br-Tap)	: N87-3008-46
Q		: N16-0040-41
R	M3 x 8 (F) Ni	: N32-3008-41
S	M3 x 8 (Bi) Ni	: N35-3008-41
T	M4 x 6 (Bi)	: N35-4006-46
U	M3 x 10	: N67-3010-41
V	M3 x 10 (Bi-Tap) BLK	: N89-3010-45
W	M3 x 8	: N90-3008-46
X		: N19-0631-05

PACKING


E
F
1
2
3
18 Warranty card
(B46-0470-00)
: K,K2,K3,K4,NK,NK2,NK3,NK4
19 Instruction manual
(B62-0066-10)
39 Polystyrene foamed fixture
(H10-2649-02)
KENWOOD
25 Fuse
(F05-1623-05) : M,M2,M3,M4,M5,M6,
NM,NM4,AM,AM4,AM5,AM6
(F06-3024-05) : K,K2,K3,K4,NK,NK2,NK3,NK4
(F51-0016-05) : AM,AM4,AM5,AM6
A Screw
(N09-0704-05) x 10
41 Protection cover
(H20-1414-03)
43 Protection bag
(H25-0105-04)
42 Protection bag
(H25-0029-04)
40 Polystyrene foamed fixture
(H10-2650-02)
37 Protection bag
(H25-0117-04)
22 Connecting cable
(E31-3391-05)
37 Protection bag
(H25-0117-04)
51 Mounting hardware
(J21-4248-04)
36 Packing fixture
(H13-0820-04)
KENWOOD
TKR-820
Label
38 Item carton box
(H01-8193-04)
76 DC cord
(E30-2076-15)
: AM,AM4,AM5,AM6
44 Protection bag
(H25-0103-04) : AM,AM4,AM5,AM6

ADJUSTMENT

Test Equipment Required for Alignment

No.	Test Equipment	Major Specifications	
1.	Standard Signal Generator (SSG)	Frequency Range Modulation Output	340 to 520MHz. Frequency modulation and external modulation. 0.1μV to greater than 1mV.
2.	Power Meter	Input Impedance Operation Frequency Measurement Capability	50Ω. 340 to 520MHz or more. Vicinity of 50W.
3.	Deviation Meter	Frequency Range	340 to 520MHz.
4.	Digital Volt Meter	Measuring Range Accuracy	1 to 10V DC. High input impedance for minimum circuit loading.
5.	Oscilloscope		DC through 30MHz.
6.	High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 600MHz. 0.2ppm or less.
7.	Ammeter		15A.
8.	AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz. 3mV to 3V.
9.	Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more. 0 to 1V.
10.	Distortion Meter	Capability Input Level	3% or less at 1kHz. 50mV to 10Vrms.
11.	Voltmeter	Measuring Range Input Impedance	10 to 1.5V DC or less. 50kΩ/V or greater.
12.	4Ω Dummy Load		Approx. 4Ω, 3W.

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.

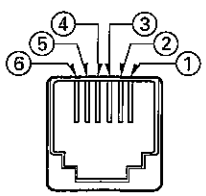
Type	CH	RX freq' (MHz)	TX freq' (MHz)
K,M,NK,NM,AM		469.900	464.900
K2,M2,NK2		489.900	484.900
K3,M3,NK3		511.900	506.900
K4,M4,NK4,NM4,AM4		429.900	424.900
M5,AM5	1	359.900	369.900
M6,AM6	1	379.900	389.900
AM5	8	358.900	367.400
AM6	8	378.900	387.400

TKR-820 : K,K2,K3,K4,M,M2,M3,M4,M5,M6
TKR-820N : K,K2,K3,K4,M,M4
TKR-820A : M,M4,M5,M6

Signaling

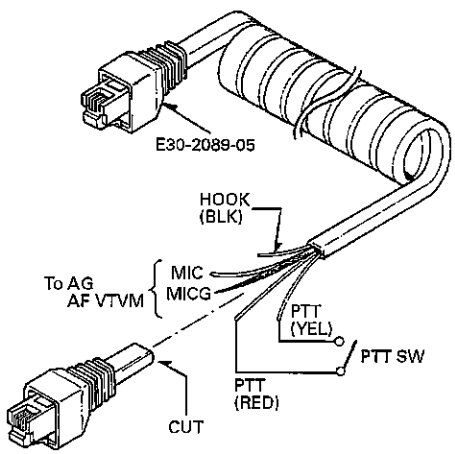
CH	RX		TX	
	QT (Hz)	DQT	QT (Hz)	DQT
1	210.7			023
2	67		77	
3	192.8		179.9	
4	77			754
5	88.5		167.9	
6	100			351

The following test cables are recommecded

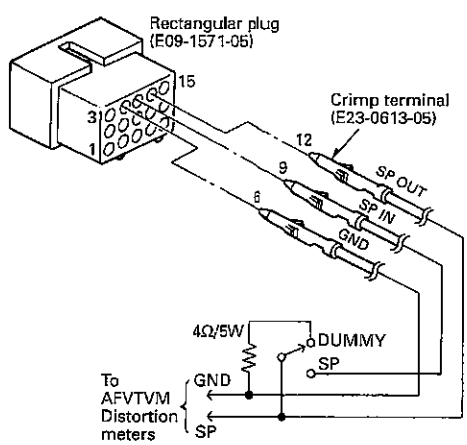


① SB
② PTTG
③ PTT
④ MICG
⑤ MIC
⑥ HOOK

MIC connector front view



Test cable for Microphone input

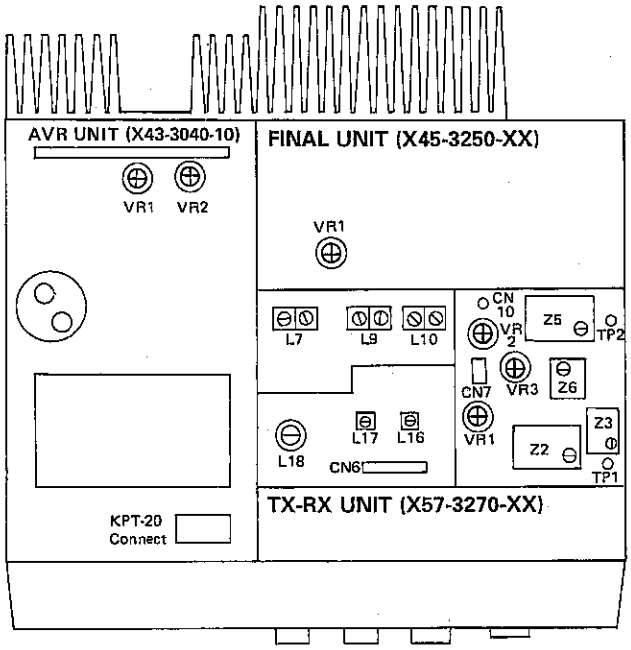


Test cable for Speaker output

ADJUSTMENT

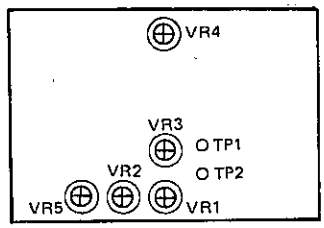
Adjustment location

Top view

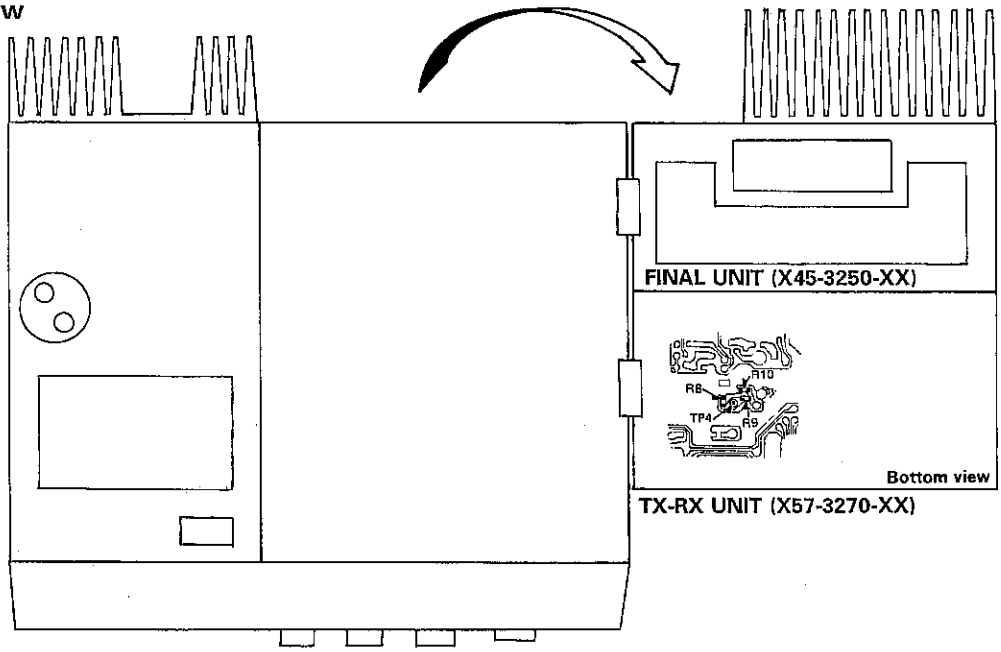


Adjustment points

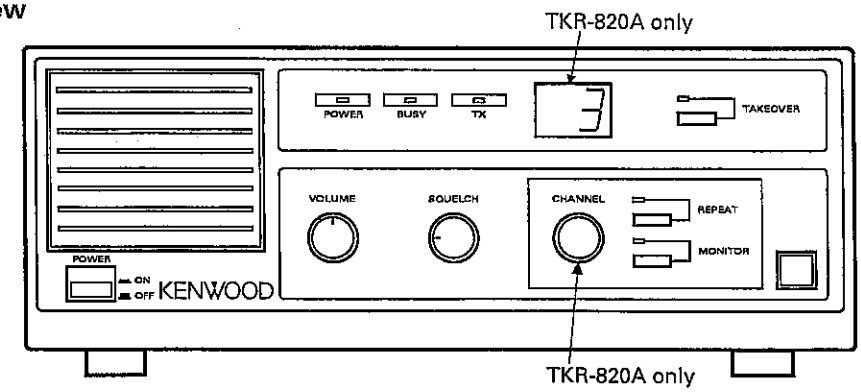
SIGNALING UNIT (X52-3140-XX)



Bottim view

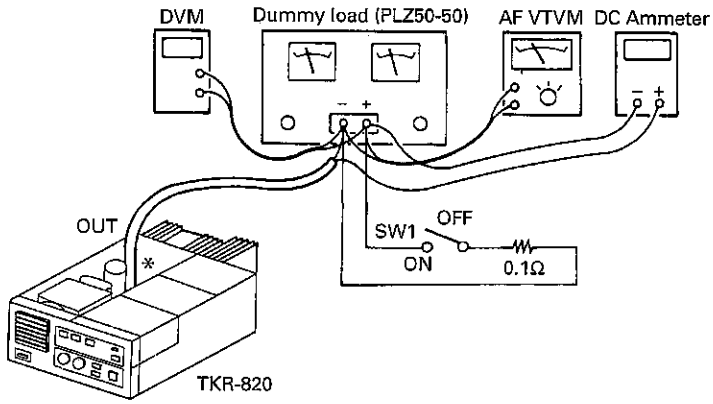
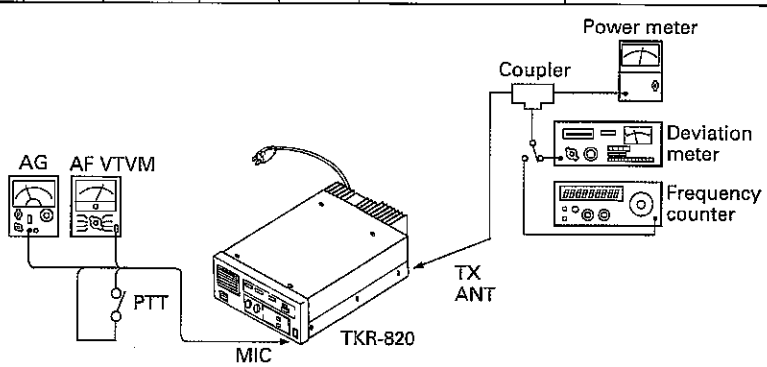


Front panel view

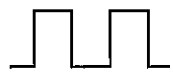


ADJUSTMENT

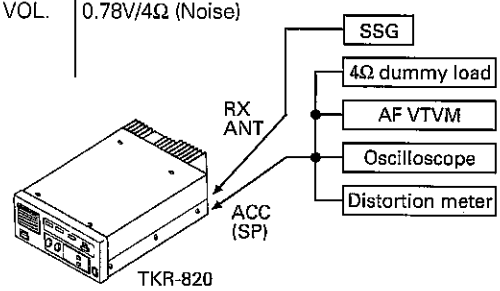
Alignment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) AC voltage for destination : 120V **K-K4,NK-NK4** : 220V **M-M6,NM,NM4 AM,AM4,AM5, AM6** 2) Connect to the DC output (OUT terminal) and GND of the AVR unit (*).							
2. Test equipment set-up	1) Function : 0.1Ω resistor Meter : 60A. 60V DC : ON Power : ON SW1 : OFF							
3. Voltage setting	1) Power switch : ON	DVM	AVR	OUT	AVR	VR1	Adjust the load for 10A.	13.6V±0.4V (Verify power indicator lights.)
	2) Vary the load for 2A to 10A draw. (Set to 10A after check)	DVM AF VTVF					Check	13.6V±0.7V DC **K-K4,M-M6, NK-NK4,NM,NM4** 13.6V±1.3V DC **AM,AM4,AM5,AM6**
	3) Power switch : OFF							
4. Protection	1) SW1 : ON VR2 : MAX CW. Power switch : ON	DVM	AVR	OUT	AVR	VR2	0.25V **K-K4,M-M6, NK-NK4,NM,NM4** MAX CW. **AM,AM4 AM5,AM6**	±0.05V **K-K4,M-M6,NK-NK4, NM,NM4**
	2) SW1 : OFF						Check	13.6V±0.4V
5. Setting	1) Write in frequency designed with EEPROM writer. (For frequency writing, set the power of TKR-820 to ON.) 2) Connect the power cable to the rear panel. 3) Final unit VR1 : MAX CCW. 4) TX-RX unit VR1, VR3 : MAX CCW. 5) Power switch : ON							
6. RX PLL lock voltage	1) CH : CH8 **AM5,AM6** PTT : ON	DVM	TX-RX	TP1	TX-RX	Z2	6.2V **K-K4,M-M4, NK2-NK4,NM, NM4,AM,AM4** 4.5V **NK,M5,M6, AM5,AM6**	±0.1V **K-K4,M-M4,NK-NK4, NM,NM4,AM,AM4** ±0.5V **M5,M6,AM5,AM6**
7. TX PLL lock voltage	2) CH : CH8 **AM5,AM6** PTT : ON			TP2		Z5	4.5V	±0.5V

ADJUSTMENT

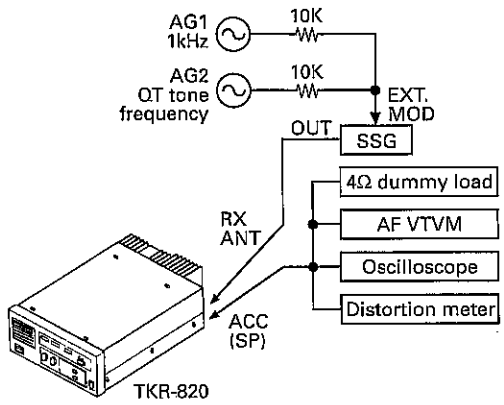
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
8. TCXO frequency	1) PTT : OFF (RX) **Note** : TCXO is adjusted precisely at 25°C. If it is readjusted, the frequency stability is changed. Do not touch it normally.	Power meter f. counter	TX-RX	TP4 (Foil side)	TX-RX	Z3	f – 21.4MHz Check	±100Hz
9. Power adjustment (APC)	1) CH : CH8 **AM5,AM6** PTT : ON	Power meter Ammeter	Rear panel	TX ANT	Final	VR1	MAX CW.	26W or more **K–K4,M–M4, NK–NK4,NM,NM4,AM,AM4** 28W or more **M5,M6,AM5,AM6**
							MIN	2W or less
							26W	±1W
10. Transmit frequency	1) CH : CH8 **AM5,AM6** PTT : ON	Power meter f. counter	Rear panel	TX ANT	TX-RX	Z6	Check	±800Hz **K–K4,M–M4, NK–NK4,NM,NM4,AM,AM4** ±370Hz **M5,AM5** ±390Hz **M6,AM6**
11. DQT waveform correction (For DQT use only)	1) Connect AG to the TX-RX (TP3) and enter a square wave of 100Hz, 2Vp-p. Deviation meter filter : OFF CH : CH8 **AM5,AM6** PTT : ON	Power meter Deviation meter Oscilloscope			TX-RX	VR3	Make the demodulation waveform neat.	
12. Tone deviation adjustment	1) QT and DQT tone frequency being written. Deviation meter filter LPF : 3kHz HPF : OFF De-emphasis : OFF CH : CH8 **AM5,AM6** PTT : ON	Power meter Deviation meter	Rear panel	TX ANT	Signaling	VR4	±0.75kHz (QT) ±0.9kHz (DQT) **K–K4,M–M5,AM, AM4,AM5** ±0.35kHz (QT) ±0.45kHz (DQT) **M6,NK–NK4, NM,NM4,AM6**	±100Hz
13. Maximum deviation adjustment	1) Connect AG to the MIC terminal. AG : 1kHz/50mV Deviation meter filter LPF : 20kHz HPF : 50Hz De-emphasis : 750µsec. TX-RX unit VR1 : MAX CW. VR3 : MAX CCW. CH : CH8 **AM5,AM6** PTT : ON				TX-RX	VR2	±4.4kHz (±4.9kHz in use of signaling.) **K–K4,M–M5,AM, AM4,AM5** ±2.2kHz **M6,NK–NK4, NM,NM4,AM6** Adjust one more than the other by switching between –P and +P.	±200Hz
14. MIC sensitivity adjustment	1) AG : 1kHz/5mV PTT : ON					VR1	±3.0kHz (±3.75kHz in use of signaling.) **K–K4,M–M5,AM, AM4,AM5** ±1.5kHz **M6,NK–NK4, NM,NM4,AM6**	±200Hz

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
15. RX sensitivity adjustment		AF VTVM 4Ω dummy load	Rear panel	EXT.SP	Front panel	VOL.	0.78V/4Ω (Noise) 	
	1) SSG output : 500μV/–53dBm MOD : OFF	SSG AF VTVM Distortion meter 4Ω dummy load	Rear panel	EXT.SP	TX-RX	L7 L9 L10	Reduce noise level using L7, L9 and L10. Decrease the SSG output so that noise level is always 20 to 30dB lower than 0.45V. Repeat 3 to 4 times.	
	2) SSG output : 500μV/–53dBm MOD : 1kHz DEV : 3kHz **K–K4, M–M5,AM,AM4,AM5** 1.5kHz **M6, NK–NK4,NM,NM4, AM6** CH : CH8 **AM5,AM6**					L18	Adjust for maximum AF output.	
						L16 L17	Adjust for maximum SINAD.	
	3) SSG output : 0.32μV/–117dBm **K–K4,M–M4,NK–NK4,NM, NM4,AM,AM4** 0.35μV/–116dBm **M5,M6,AM5,AM6**				Front panel	VOL.	0.45V/4Ω	
							Check	SINAD 12dB or more
	4) SSG output : 500μV/–53dBm				Front panel	VOL.	4.0V/4Ω	
							Check	S/N 45dB or more **K–K4, M–M5,AM,AM4,AM5** S/N 39dB or more **M6, NK–NK4,NM,NM4,AM6** Distortion : 5% or less
16. Squelch	1) SSG output : OFF Rotate SQL VR to a point at which noise disappears. CH : CH8 **AM5,AM6**	SSG AF VTVM 4Ω dummy load Oscilloscope	Rear panel	EXT.SP			Check	SQL index angle 8:00~12:00
	2) SSG output : 0.2μV/–121dBm							Squelch should open.
17. Preset squelch adjustment	1) Signaling unit VR1 to VR5 : MAX CCW. SSG output : OFF CH : CH8 **AM5,AM6**	SSG	Rear panel	RX ANT			Check	D7 : LED should light.
					Signaling	VR1	MAX CW.	D7 : LED should go out.
	2) SSG output : 0.14μV/–124dBm **K–K4,M–M4,AM,AM4** SSG output : 0.18μV/–122dBm **NK–NK4,NM,NM4** SSG output : 12dB SINAD sensitivity –3dB. **M5,M6,AM5,AM6**						Rotate VR1 CCW. to a point at which D7 lights.	

ADJUSTMENT

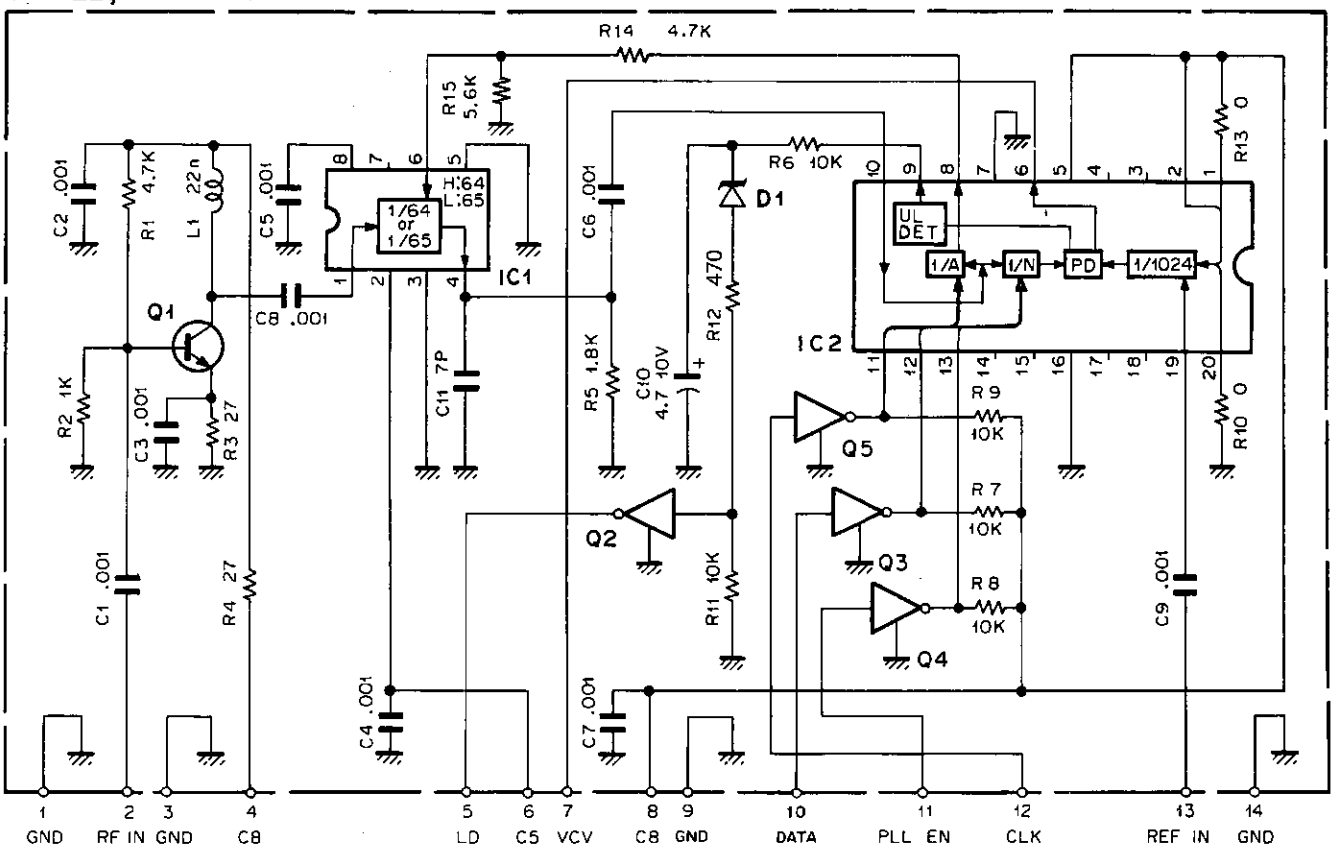
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
18. Hangup timer adjustment	1) SSG output : 1.58μV/–103dBm The set time can be continuously varied by VR2. 0~5V → 0~5 sec. CH : CH8 **AM5,AM6**	DVM	Signaling	TP2	Signaling	VR2	1.0V	±0.1V
	2) SSG output : 500μV/–53dBm REPEAT switch : ON	Power meter SSG	Rear panel	TX ANT RX ANT			Check	TX LED should light. REPEAT LED should light.
	3) SSG output : OFF							TX LED should go out about 1 sec. later after turning SSG OFF.
19. T.O.T	1) The set time can be continuously varied by VR3. 0~0.3V : OFF ~0.5V : 30 sec. ~5V : ~5 min. CH : CH8 **AM5,AM6**	DVM	Signaling	TP1	Signaling	VR3	Set it to the target time.	
20. Repeater TX deviation	1) SSG output : 500μV/–53dBm CH : CH8 **AM5,AM6** REPEAT switch : ON	Power meter SSG Deviation meter	Rear panel	EXT.SP	Signaling	VR5	±3.0kHz **K–K4, M–M5,AM,AM4, AM5** ±1.5kHz **M6, NK–NK4,NM,NM4 AM6**	±100Hz
21. Signaling squelch	1) SSG output : Turn the SSG output so that the SINAD sensitivity becomes 10dB.							
	2) SSG MOD SW : EXT.MOD AG1 : 1kHz AG2 : QT tone frequency							
	3) AG1 : Power switch OFF AG2 output : Adjust the output level of AG2 so that the SSG deviation becomes 0.75kHz.							
	4) AG1 : Power switch ON AG1 output : Adjust the output level of AG1 so that the SSG deviation becomes 3.75kHz **K–K4, M–M5,AM,AM4,AM5**, 1.85kHz **M6,NK–NK4,NM, NM4,AM6**.(i.e., QT tone frequency/0.75kHz **K–K4, M–M5,AM,AM4,AM5**, 0.35kHz **M6,NK–NK4,NM, NM4,AM6** deviation, +1kHz/3kHz **K–K4,M–M5,AM,AM4, AM5**, 1.5kHz **M6,NK–NK4, NM,NM4,AM6** deviation) MONITOR switch : OFF		Rear panel	EXT.SP			Check	Open.
22. TAKE OVER	1) TAKE OVER switch : ON						Check	The TAKE OVER LED should light.



TKR-820/N/A PC BOARD VIEWS / CIRCUIT DIAGRAM

RX PLL : Z1, TX PLL : Z4 (X58-3120-10)

TX PLL, RX PLL (X58-3120-10)

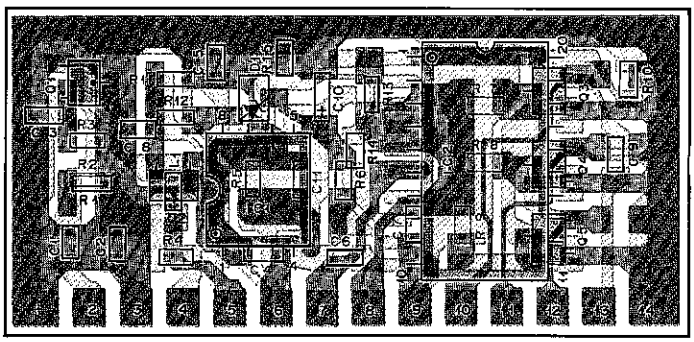


Q1 : 2SC3829TS
Q2~5 : DTC114EK

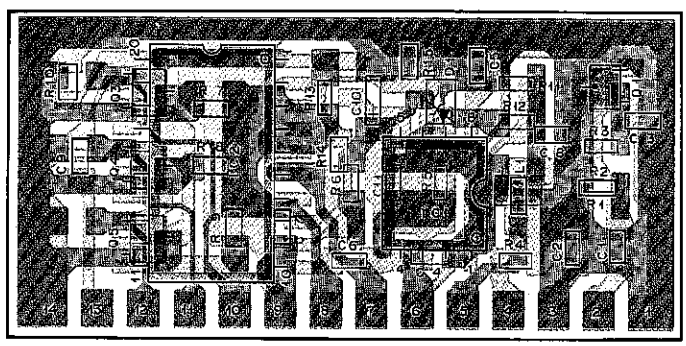
IC1 : MB504F
IC2 : JLC1075F or JLC1075DW

D1 : 02CZ3.0(Z)

Component side view



Foil side view

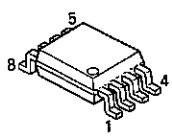


: Component side
: Foil side

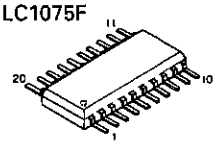
2SC3099
2SC3356
2SC3829TS
DTC114EK

2SK508NV

MB504F



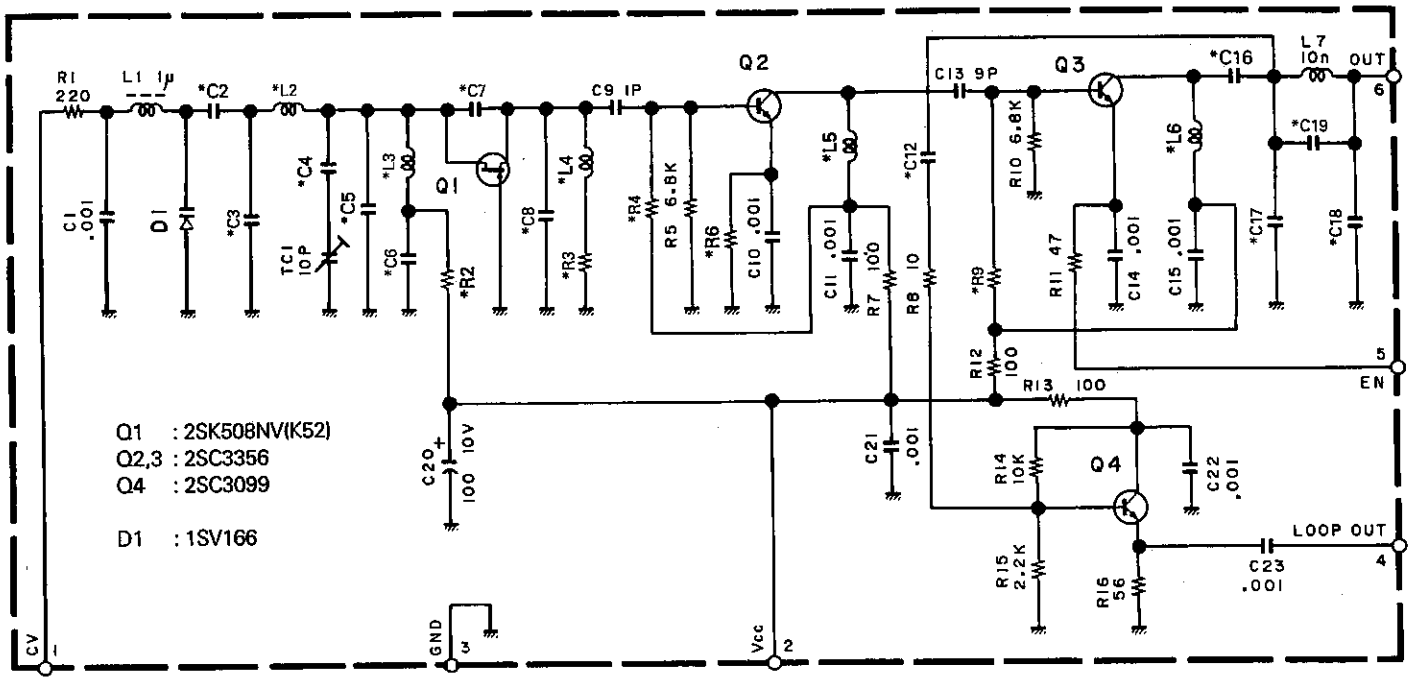
JLC1075DW
JLC1075F



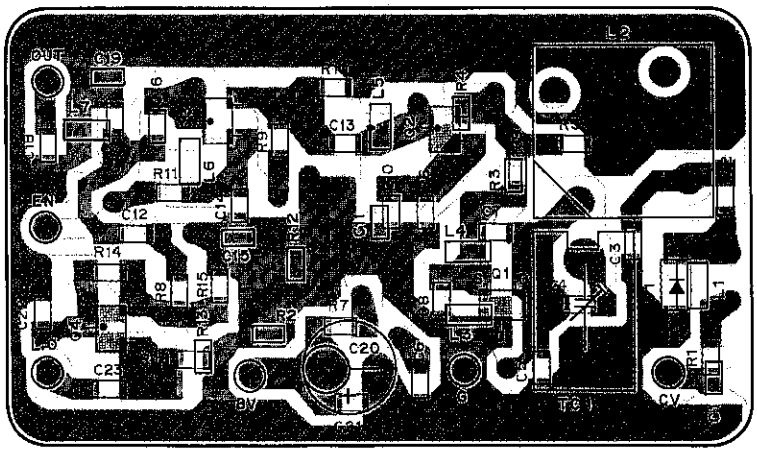
PC BOARD VIEWS / CIRCUIT DIAGRAM TKR-820/N/A

RX VCO : Z2 (X58-3150-XX) -13 : K3,M3,NK3 -14 : K4,M4,NK4,NM4,AM4 -15 : K,M,AM -16 : K2,M2,NK2 -17 : M5,AM5 -18 : M6,AM6 -19 : NK,NM

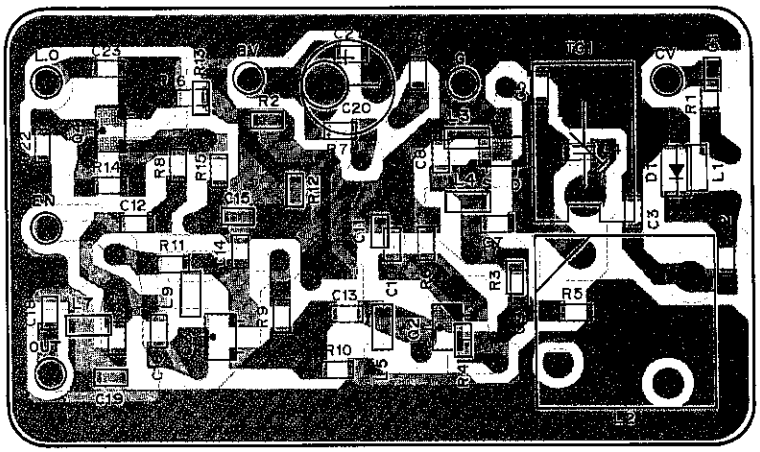
RX VCO (X58-3150-XX)



Component side view



Foil side view



	R2	R3	R4	R6	R9	C2	C3	C4
-13	220	220	47K	100	18K	9P	5P	12P
-14	150	150	18K	100	18K	10P	8P	47P
-15	220	100	18K	100	18K	11P	6P	27P
-16	220	220	18K	100	47K	10P	5P	22P
-17	47	47	18K	47	18K	10P	5P	33P
-18	27	47	18K	100	18K	10P	3P	33P
-19	220	100	18K	100	18K	9P	6P	27P

	C5	C6	C7	C8	C12	C16	C17	C18
-13	2P	470P	6P	9P	3P	3P	10P	10P
-14	1.5P	1000P	8P	18P	10P	5P	10P	10P
-15	2P	1000P	10P	10P	3P	3P	10P	10P
-16	2P	470P	7P	7P	3P	3P	10P	10P
-17	1P	1000P	8P	8P	10P	10P	15P	15P
-18	1P	1000P	7P	7P	10P	8P	15P	15P
-19	4P	1000P	8P	18P	3P	3P	10P	10P

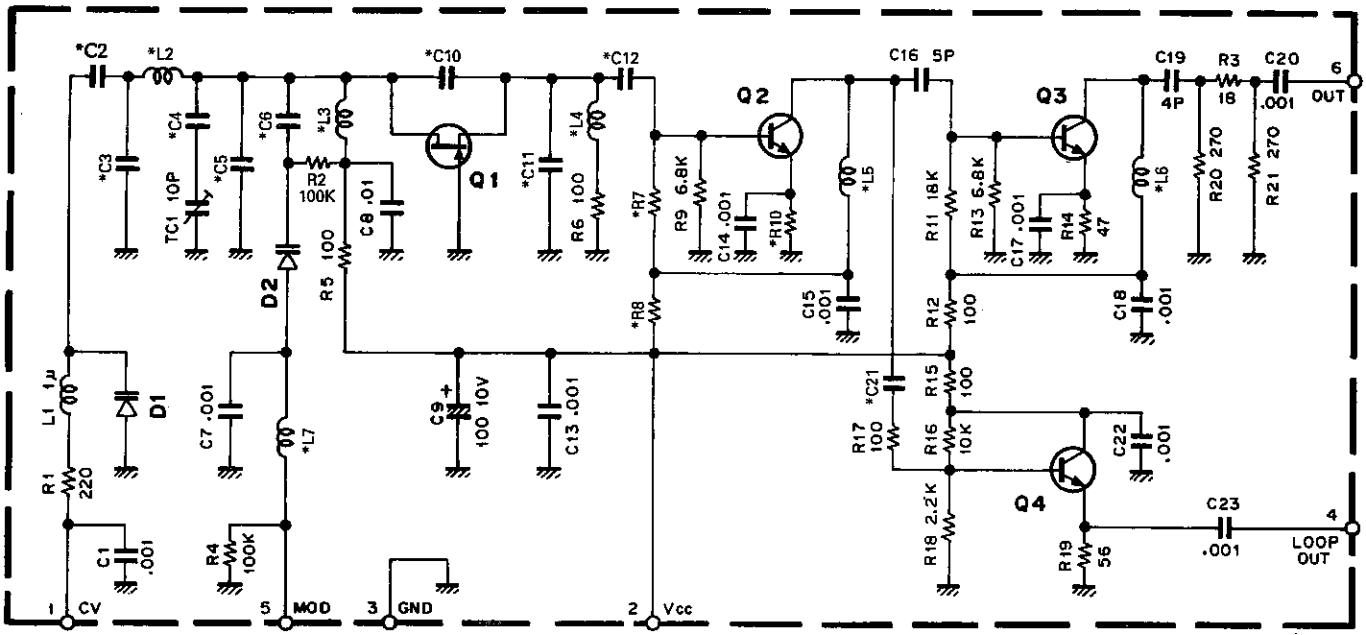
	C19	L2	L3	L4	L5	L6
-13	4P	L34-2304-05	33n	100n	22n	18n
-14	4P	L34-2375-05	180n	180n	22n	18n
-15	4P	L34-2304-05	100n	100n	22n	18n
-16	4P	L34-2304-05	47n	100n	22n	18n
-17	5P	L34-2375-05	180n	180n	39n	18n
-18	5P	L34-2375-05	180n	180n	33n	22n
-19	4P	L34-2304-05	100n	100n	22n	22n

: Component side
: Foil side

TKR-820/N/A PC BOARD VIEWS / CIRCUIT DIAGRAM

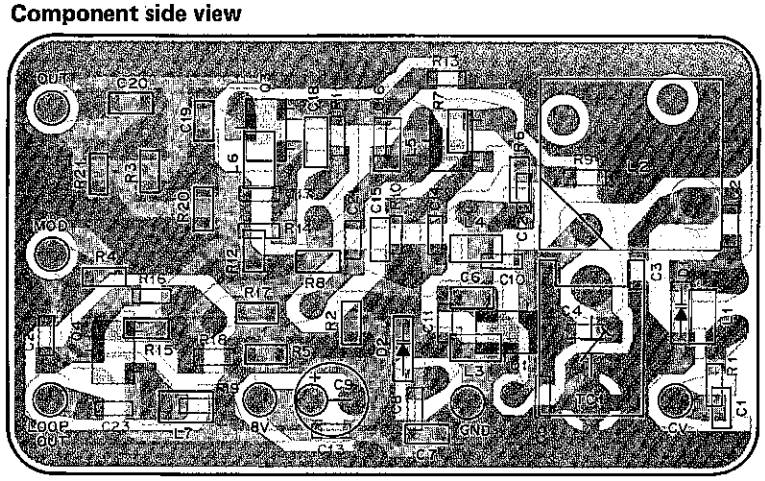
TX VCO : Z5 (X58-3460-XX) -10 : K,M,NK,NM,AM -11 : K2,M2,NK2
-12 : K3,M3,NK3 -13 : K4,M4,NK4,NM4,AM4 -14 : M5,AM5 -15 : M6,AM6

TX VCO (X58-3460-XX)

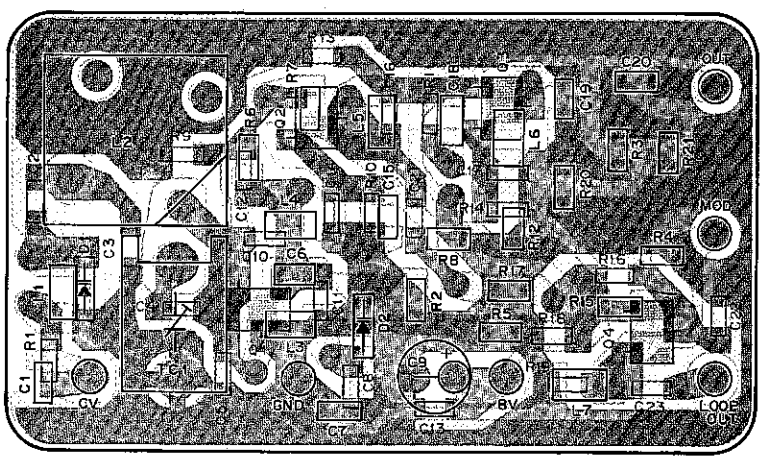


Q1 : 2SK508NV(K52) D1 : 1SV166
Q2~4 : 2SC3356 D2 : 1SV164

Component side view



Foil side view



	C2	C3	C4	C5	C6	C10	C11	C12
-10	10P	5P	47P	1P	0.75P	8P	8P	0.5P
-11	10P	4P	22P	0.5P	0.75P	8P	8P	0.5P
-12	8P	4P	22P	–	0.5P	7P	7P	0.5P
-13	11P	5P	47P	1P	1.5P	10P	10P	1.5P
-14	10P	1.5P	22P	–	0.75P	6P	5P	1.5P
-15	7P	1.5P	22P	–	0.75P	6P	5P	1.5P

	C21	R7	R8	R10	L2	L3
-10	1P	18K	100	100	L34-2304-05	100n
-11	1P	18K	100	100	L34-2304-05	100n
-12	1P	3.9K	47	47	L34-2304-05	100n
-13	4P	18K	100	100	L34-2375-05	180n
-14	4P	18K	100	100	L34-2375-05	180n
-15	4P	18K	100	100	L34-2375-05	180n

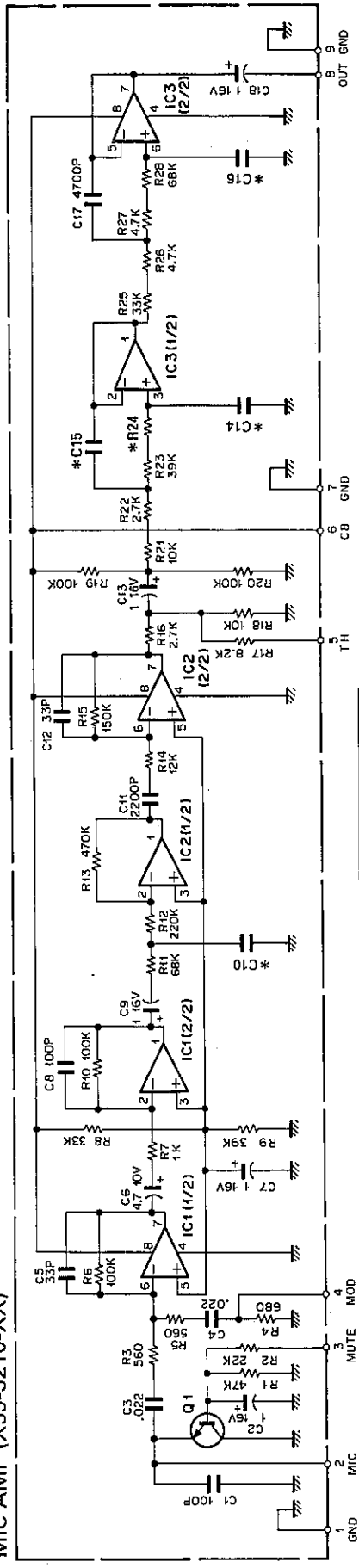
	L4	L5	L6	L7
-10	100n	22n	18n	1µ
-11	100n	22n	18n	1µ
-12	100n	22n	18n	1.2µ
-13	180n	22n	18n	1µ
-14	180n	33n	39n	1µ
-15	180n	33n	39n	1µ

: Component side
: Foil side

PC BOARD VIEWS / CIRCUIT DIAGRAM TKR-820/N/A

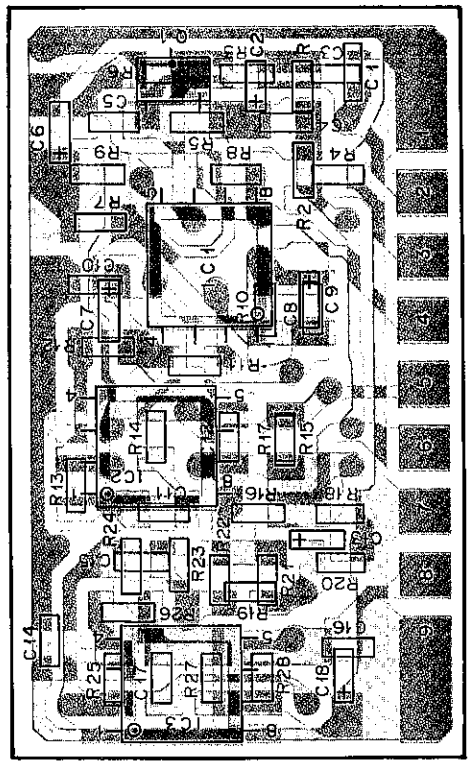
MIC AMP : Z7 (X59-3210-XX) **-10 : K,K2,K3,K4,M,M2,M3,M4,NK,NK2,NK3,NK4,NM,NM4,AM,AM4 -11 : M5,M6,AM5,AM6**

MIC AMP (X59-3210-XX)

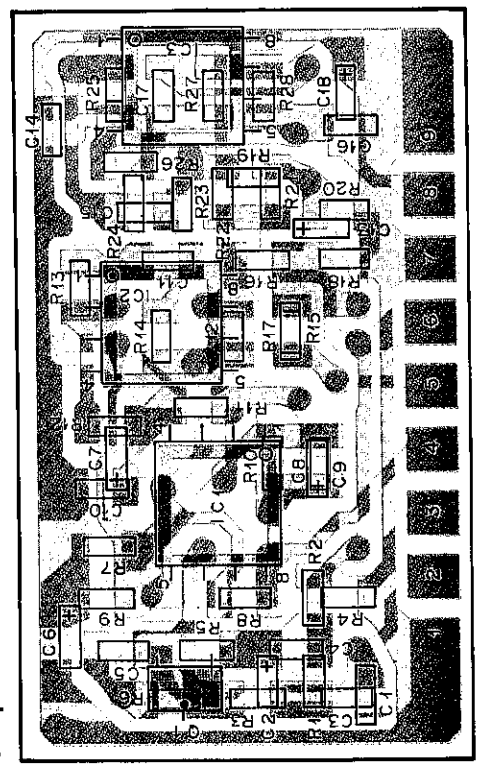


	C10	C14	C15	C16	R24
-10	0.012	2200P	3900P	220P	12K
-11	0.015	1800P	1800P	180P	1.8K

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



Foil side view



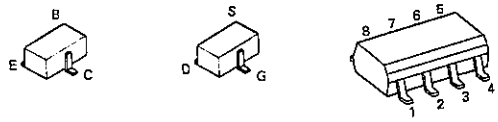
Component side view

: Component side
: Foil side

2SC3326
2SC3356

2SK508NV

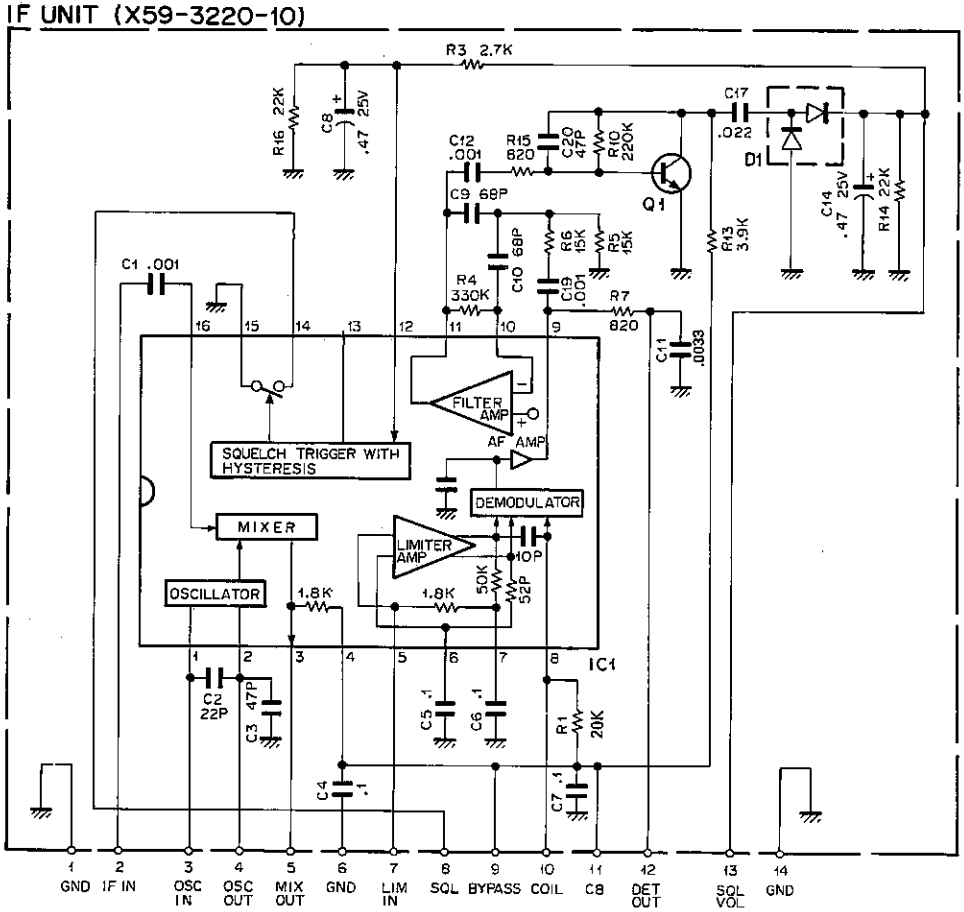
NJM4558M
NJM4560M



TKR-820/N/A PC BOARD VIEWS / CIRCUIT DIAGRAM

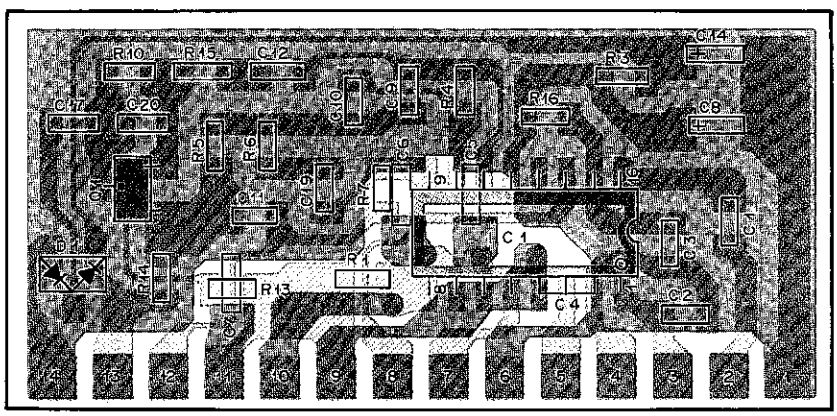
IF : Z8 (X59-3220-10)

IF UNIT (X59-3220-10)

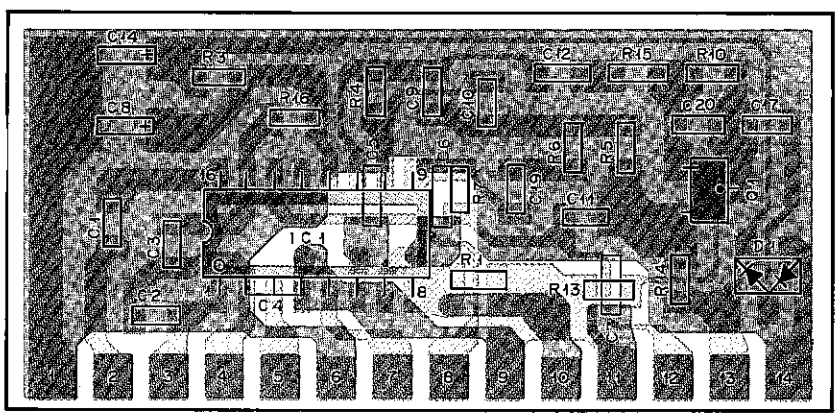


IC1 : MC3361BD
Q1 : 2SC2712(Y)
D1 : DA204K

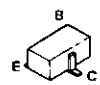
Component side view



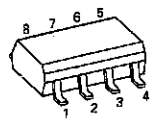
Foil side view



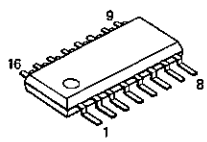
2SC2712



M5222FP
NJM4558M



MC3361BD

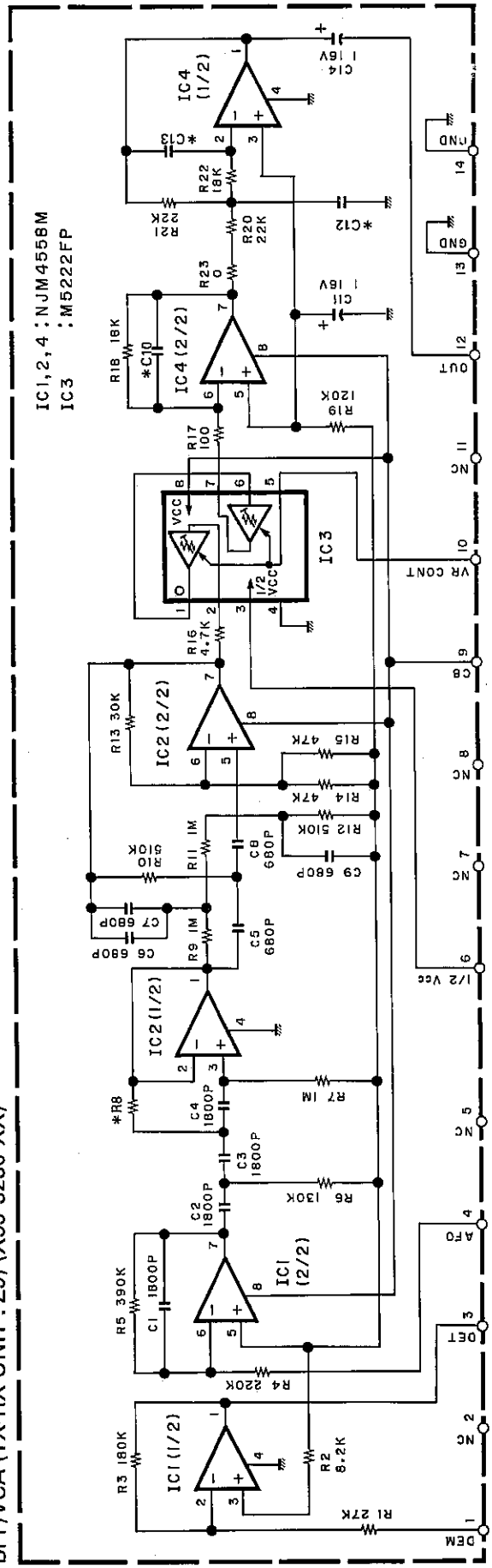


: Component side
: Foil side

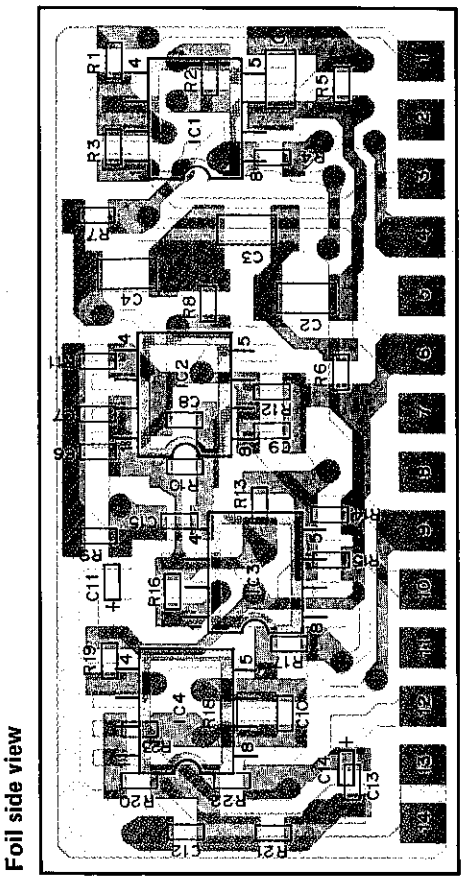
PC BOARD VIEWS / CIRCUIT DIAGRAM TKR-820/N/A

BPF/VCA : Z9 (X59-3230-XX) -10 : K,K2,K3,K4,M,M2,M3,M4,NK,NK2,NK3,NK4,NM,NM4,AM,AM4 -11 : M5,M6,AM5,AM6

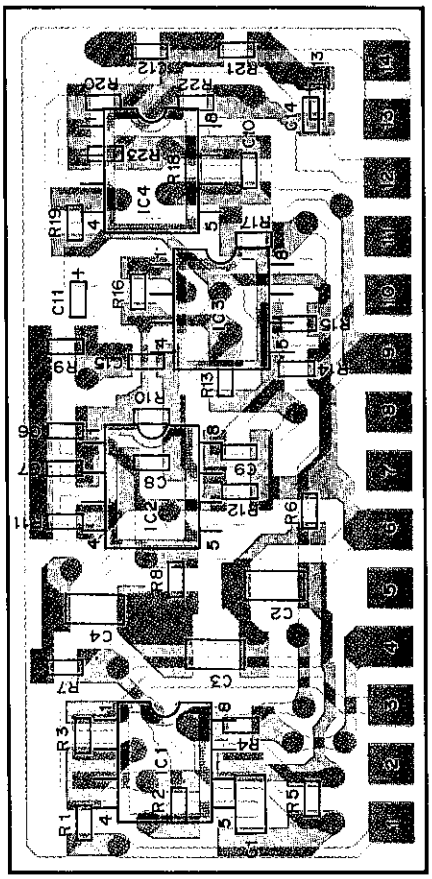
BPF/VCA (TX-RX UNIT : Z9) (X59-3230-XX)



	C10	C12	C13	R8
-10	2200P	4700P	1000P	68K
-11	560P	5600P	560P	56K



Foil side view



Component side view

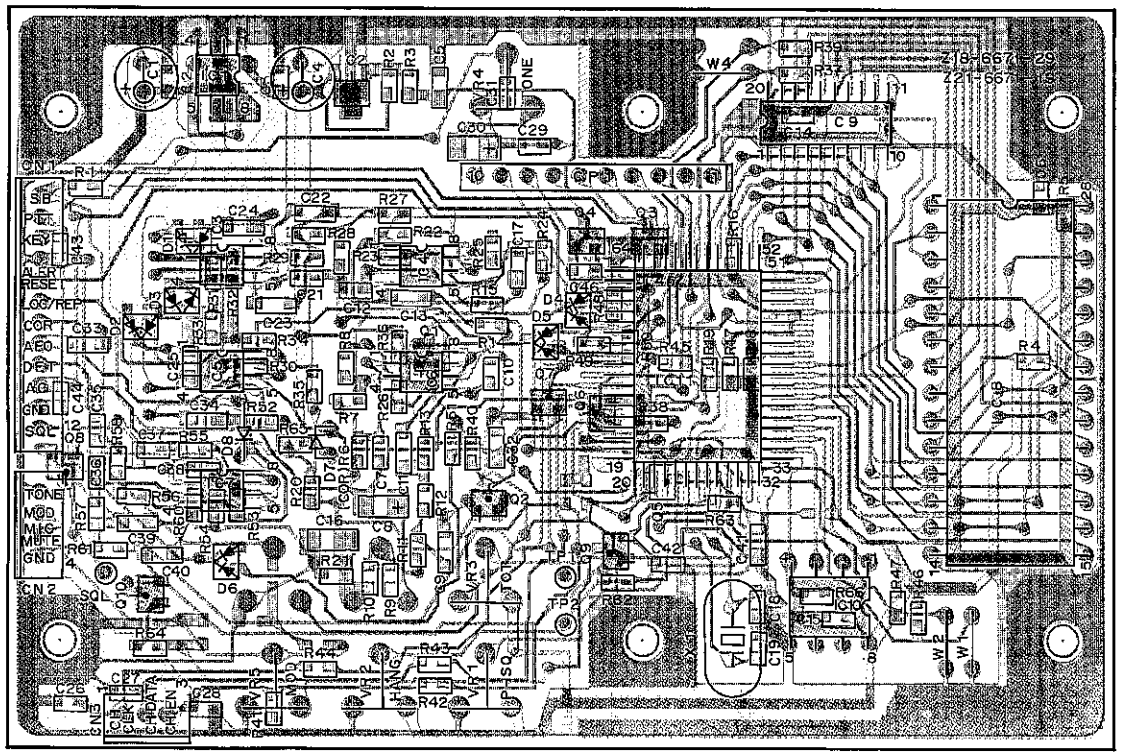
: Component side

: Foil side

TKR-820/N/A PC BOARD VIEWS

SIGNALING UNIT (X52-3140-XX) Component side view

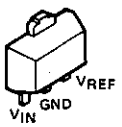
-10 : K,K3,K4,M,M3,M4,NK,NK3,NK4,NM,NM4,AM,AM4 -11 : K2,M2,NK2 -12 : M5,AM5 -13 : M6,AM6



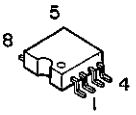
2SC3326
DTA114EK
DTC144EK

2SJ106

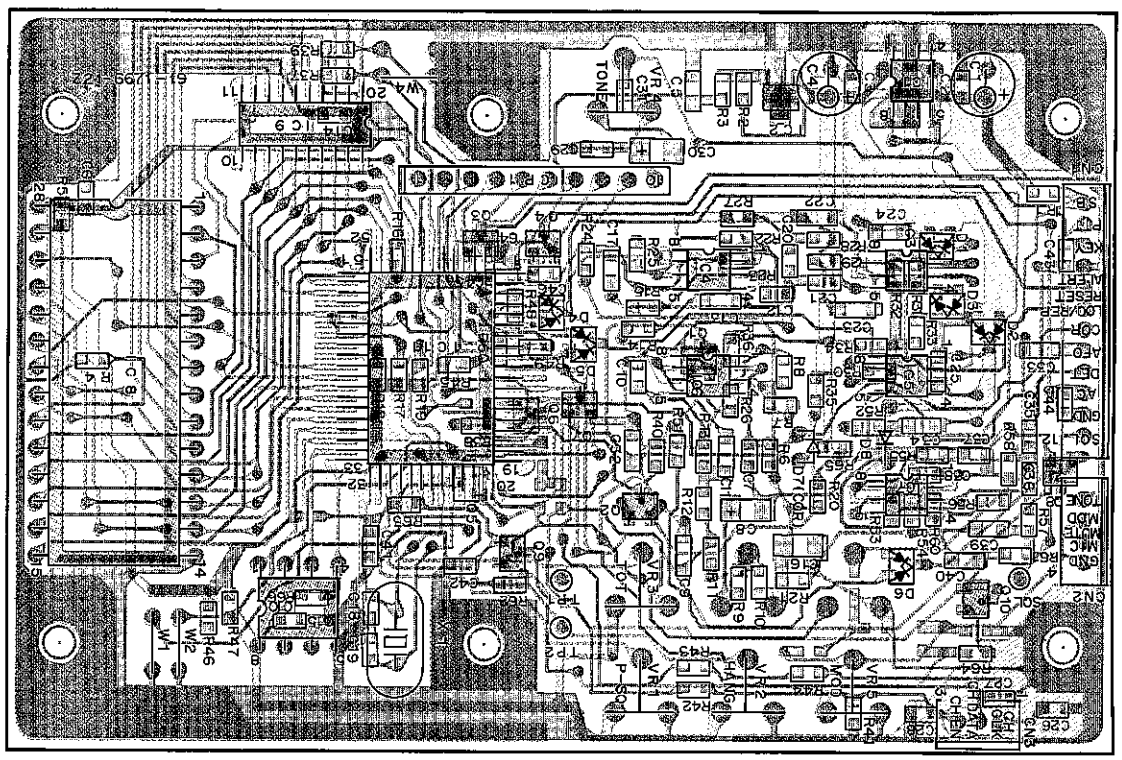
M51943BML



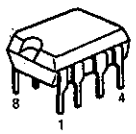
BA4558F
MC78L05M



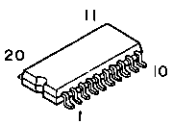
Foil side view



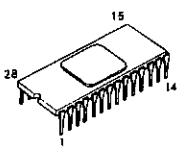
BR93LC46



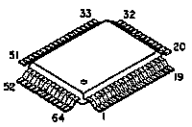
TC74HC573AF



27C256QJESB



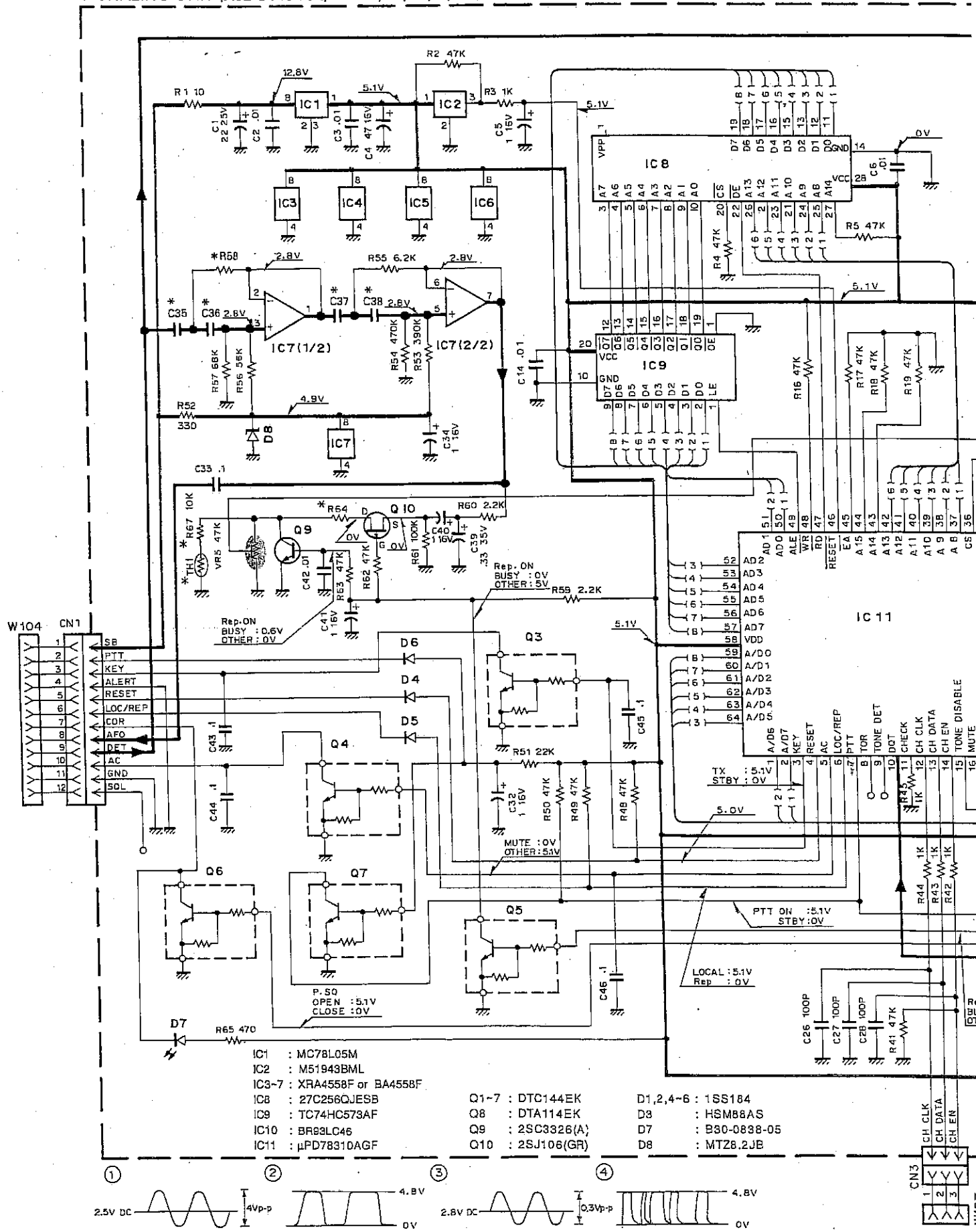
μPD78310AGF



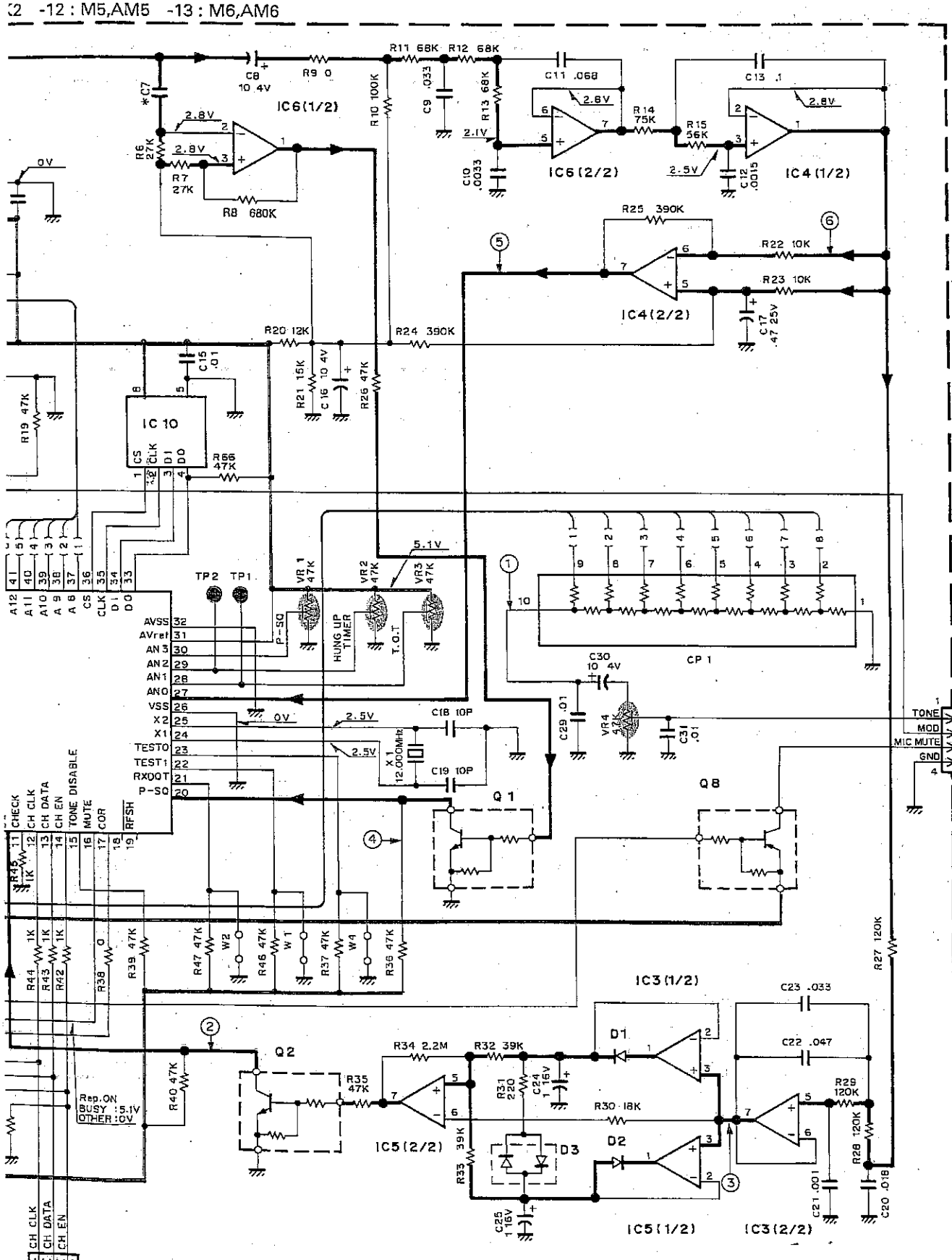
: Component side
: Foil side

SIGNALING UNIT (X52-3140-XX)

SIGNALING UNIT (X52-3140-XX)-10 : K,K3,K4,M,M3,M4,NK,NK3,NK4,NM,NM4,AM,AM4 -11 : K2,M2,NK2 -12 : M



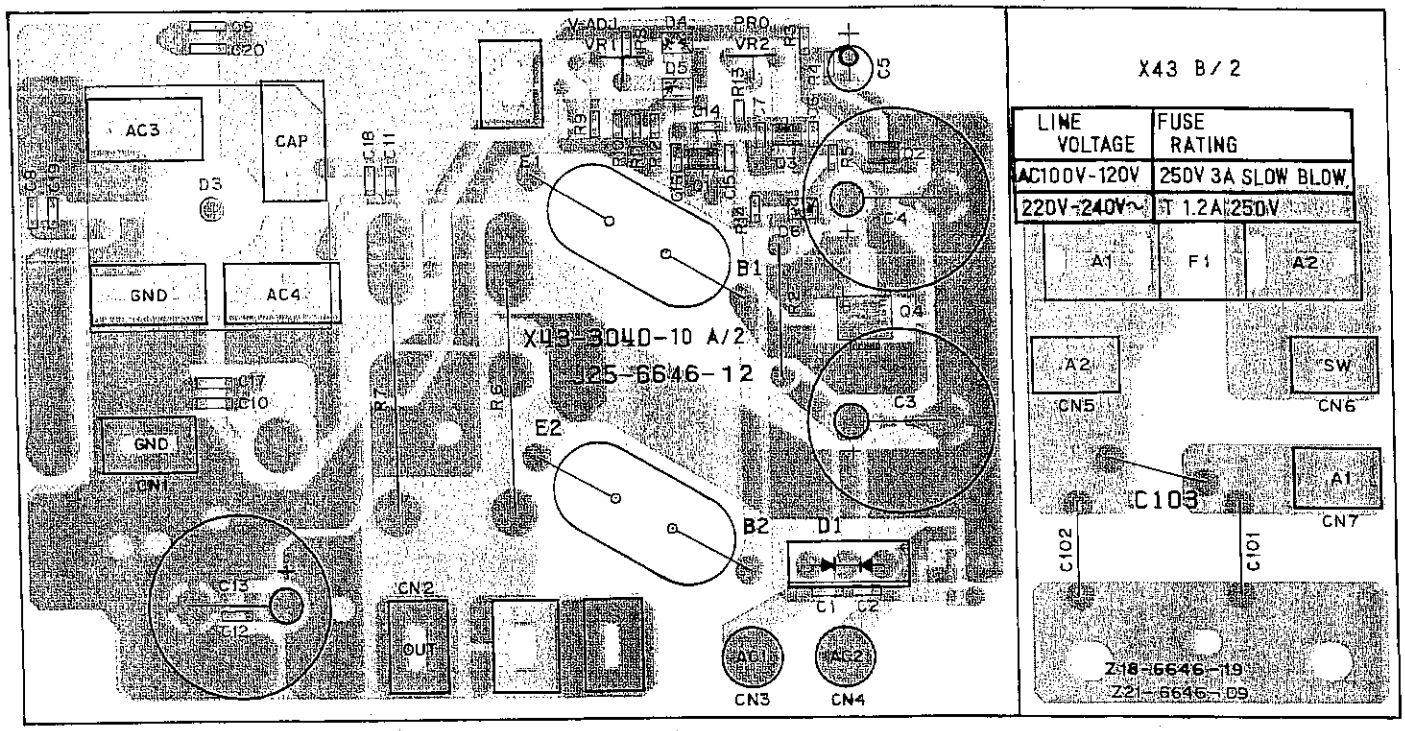
-2 -12 : M5,AM5 -13 : M6,AM6



	C7	C35	C36	C37	C38	R58	R64	R67	TH1
-10	100P	0.015	0.015	0.015	0.015	15K	1K	–	–
-11	100P	0.015	0.015	0.015	0.015	15K	10K	10K	112-103-2
-12	100P	0.033	0.033	0.018	0.018	27K	1K	–	–
-13	1000P	0.033	0.033	0.018	0.018	27K	10K	10K	112-103-2

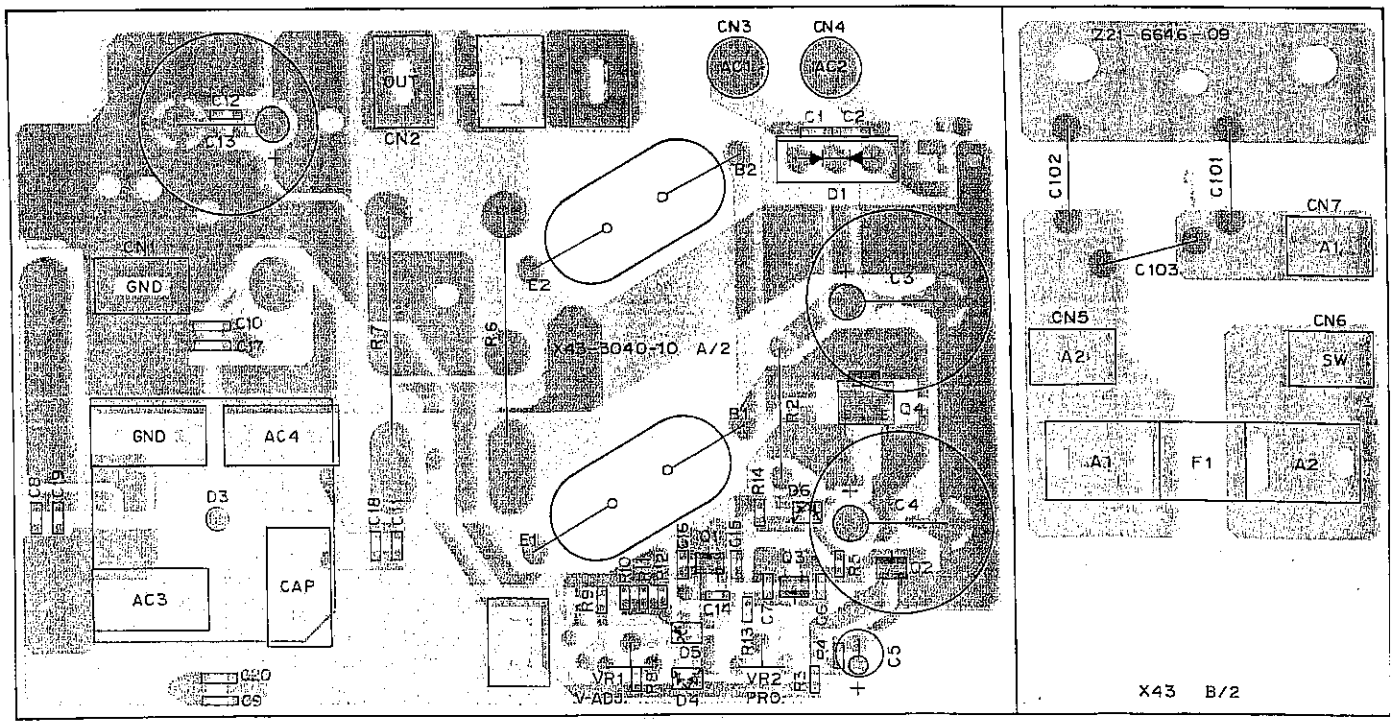
TKR-820/N/A PC BOARD VIEWS

AVR UNIT (X43-3040-10) Component side view



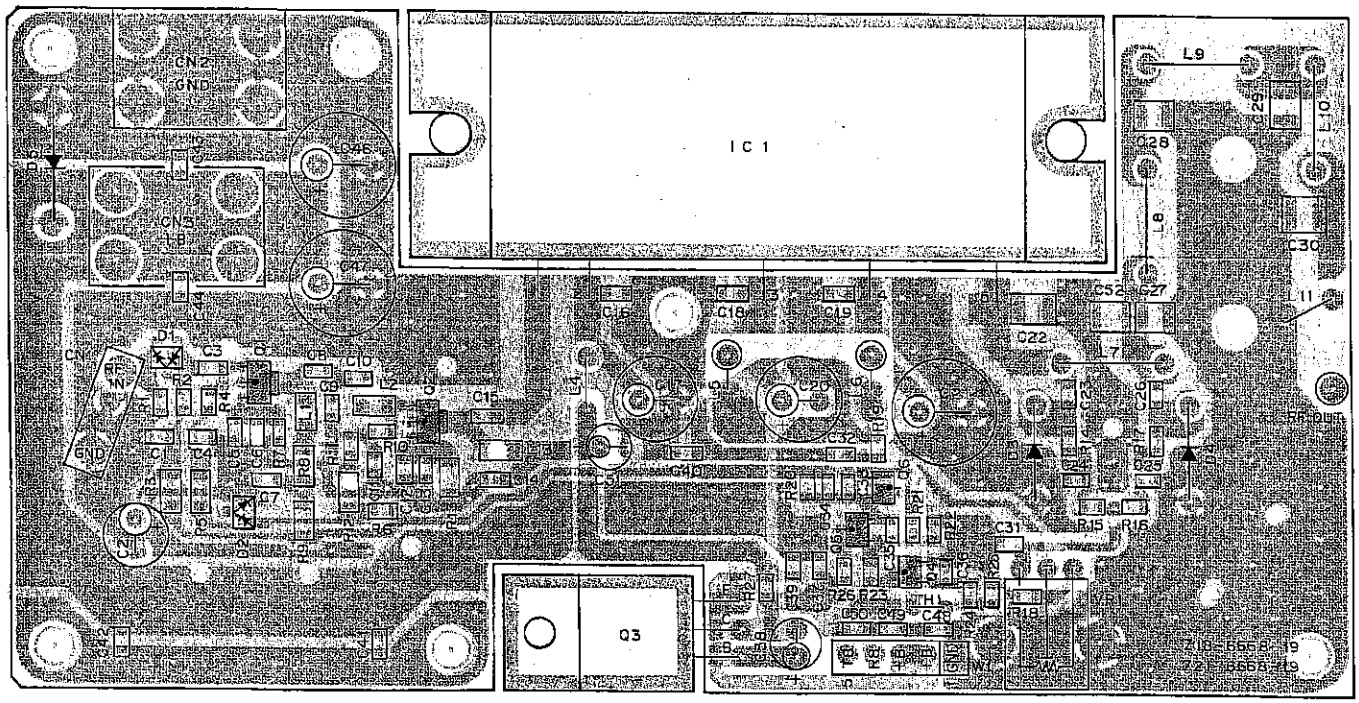
LINE VOLTAGE	FUSE RATING
AC100V-120V	250V 3A SLOW BLOW
220V-240V~	T 1.2A 250V

Foil side view

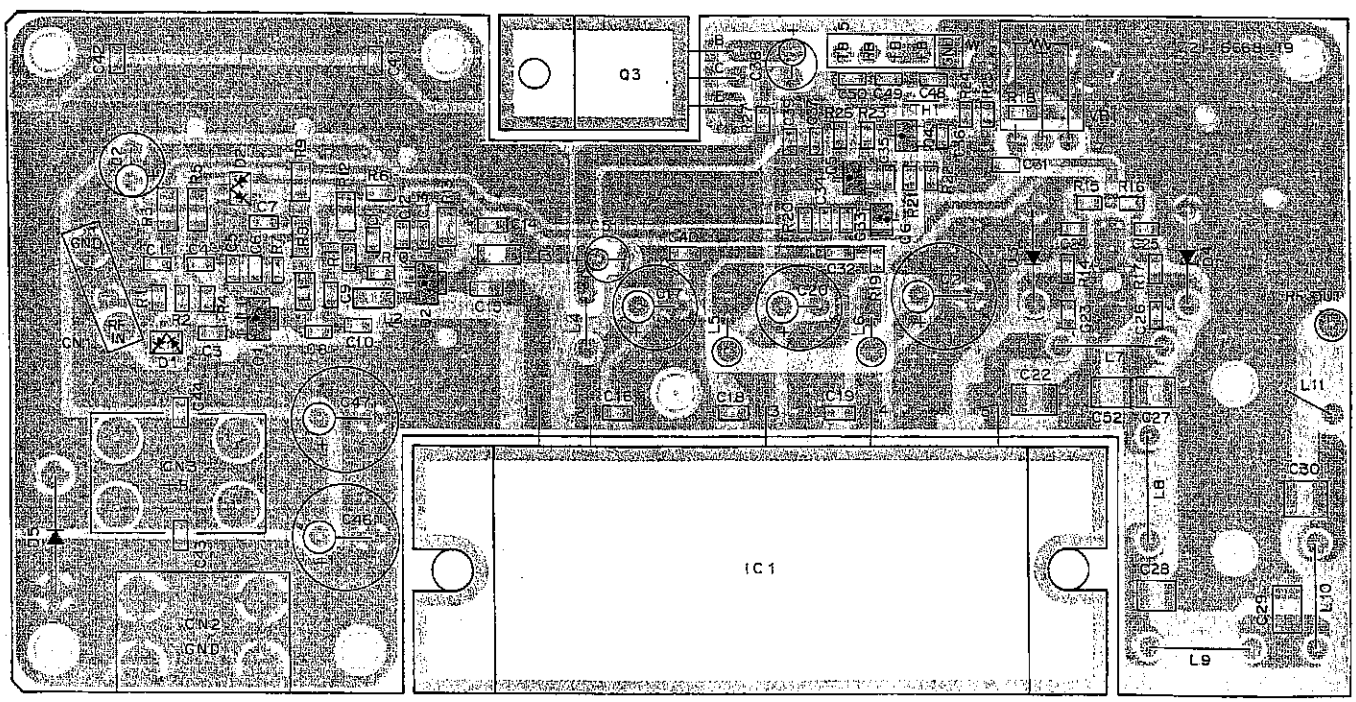


FINAL UNIT (X45-3250-XX) Component side view -10 : K,M,NK,NM,AM

-11 : K2,M2,NK2 -12 : K3,M3,NK3 -13 : K4,M4,NK4,NM4,AM4 -14 : M5,AM5 -15 : M6,AM6



Foil side view

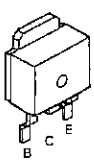


: Component side

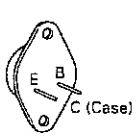
: Foil side

2SC2712
2SC3326

2SB968

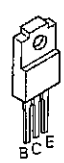


2N5885

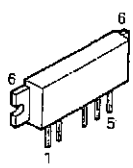


2SC3357
2SC2954

2SB946

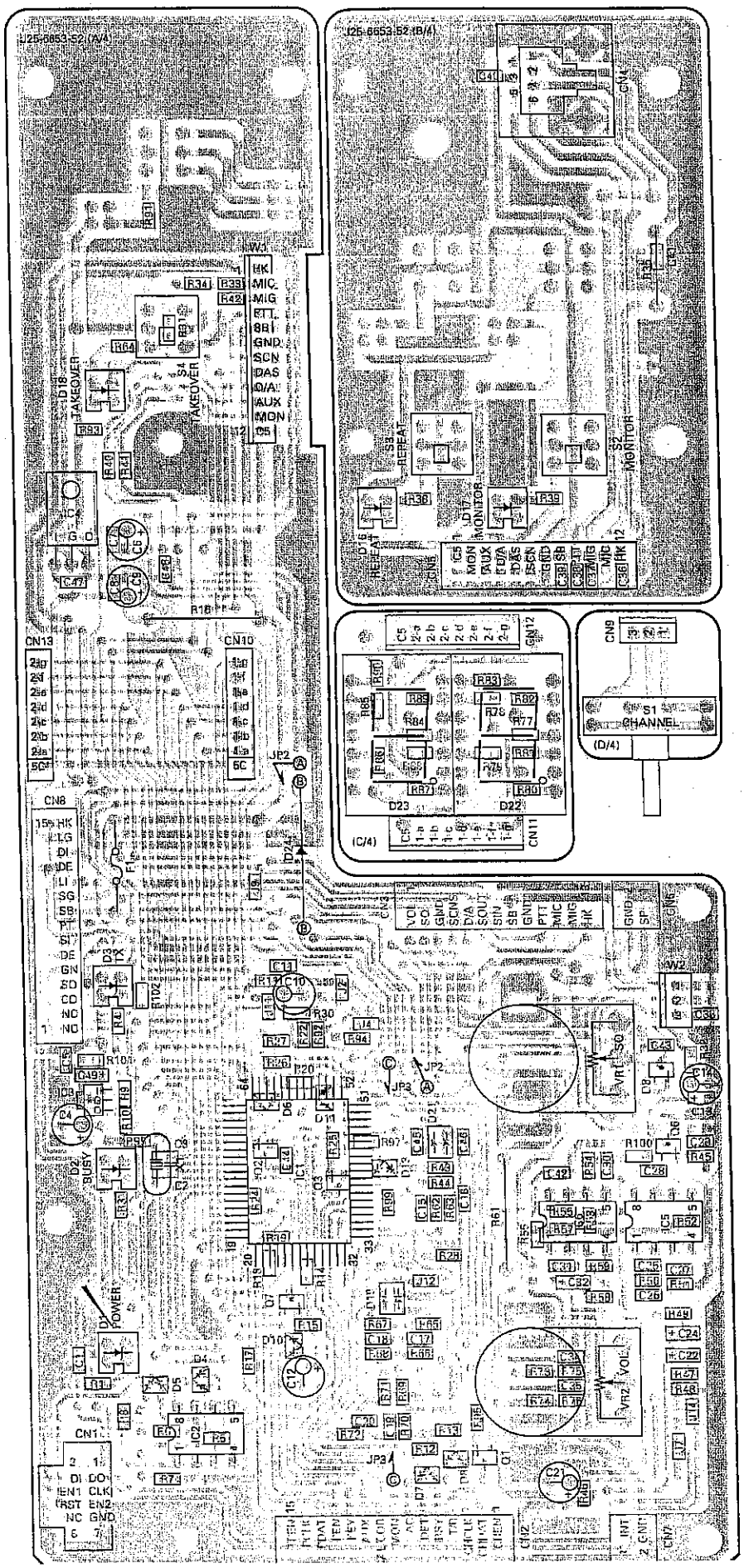


M57729



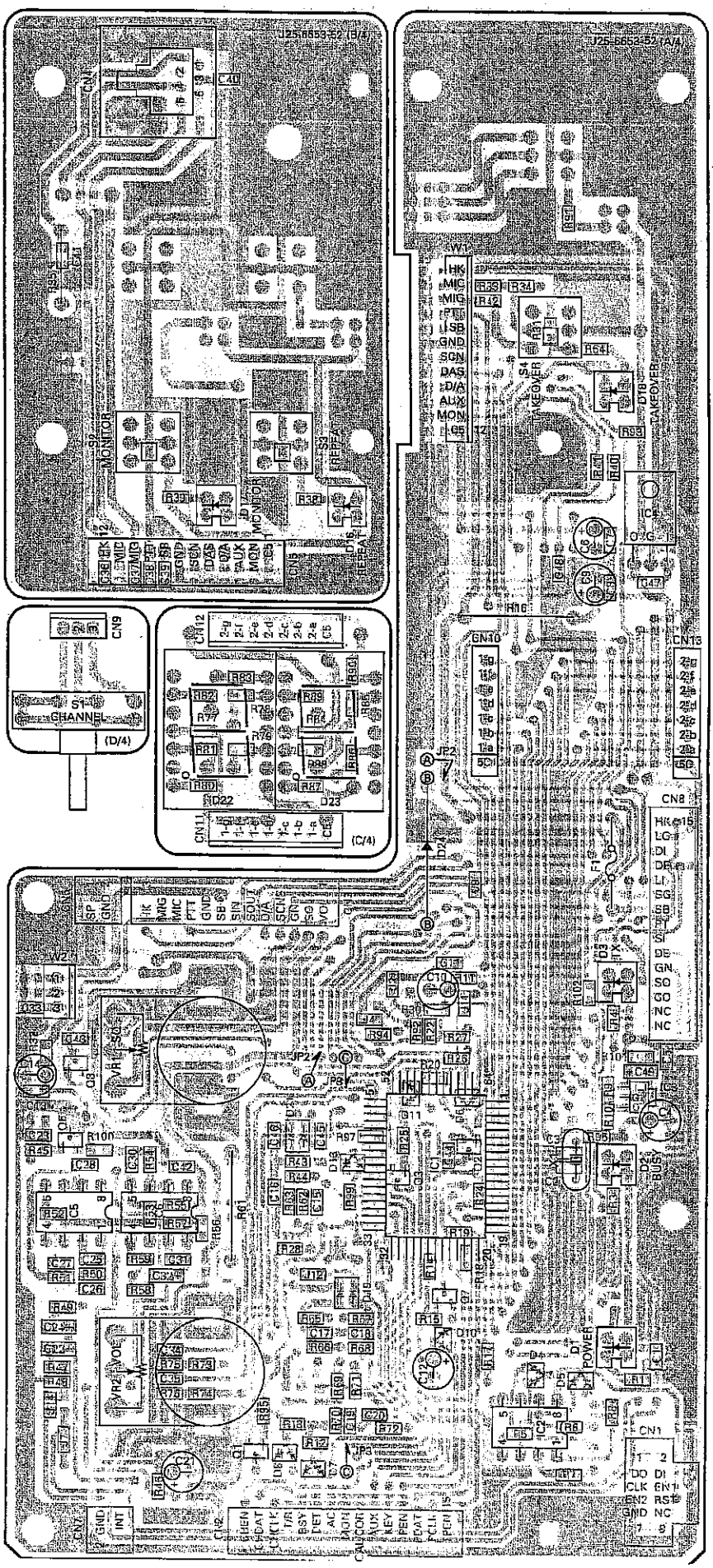
DISPLAY UNIT (X54-3070-XX) Component side view

-11 : K,K2,K3,K4,M,M2,M3,M4,M5,M6,NK,NK2,NK3,NK4,NM,NM4 -13 : AM,AM4,AM5,AM



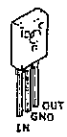
PC BOARD VIEWS TKR-820/N/A

Foil side view

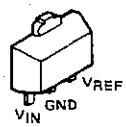


2SA1162
2SC3326
DTC114EK

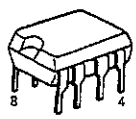
AN78N05



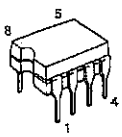
M51943BML



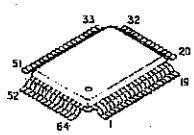
BR93LC46



µPC4558C

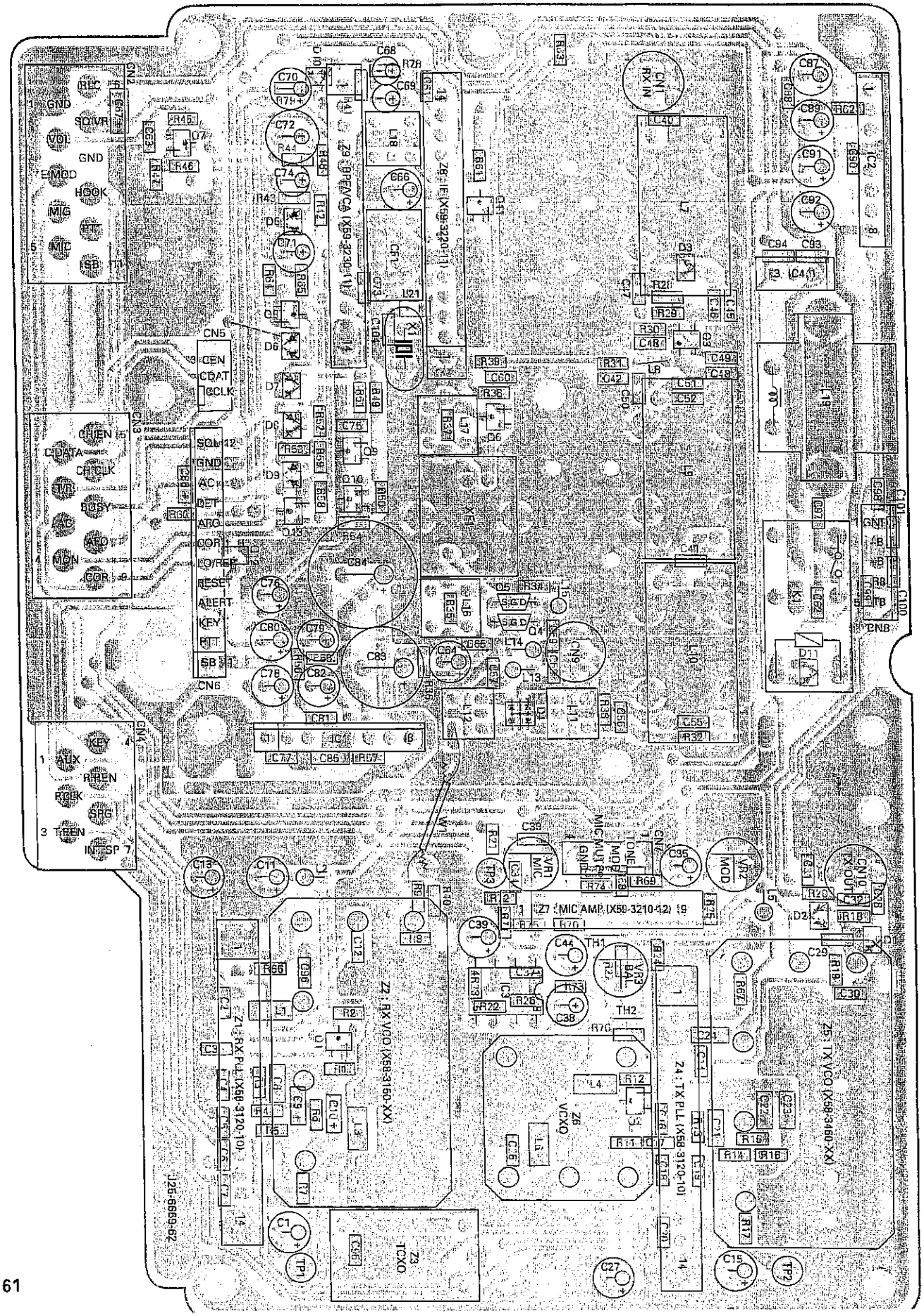


UPD75104GF-J99



TKR-820/N/A PC BOARD VIEWS

TX-RX UNIT (X57-3270-XX) Component side view -10 : K,M,AM -11 : K2,M2 -12 : K3,M3
-13 : K4,M4,AM4 -14 : NK,NM -15 : NK4,NM4 -16 : M5,AM5 -17 : M6,AM6 -18 : NK2 -19 : NK3

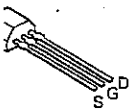


Foil side view

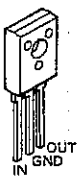
C2712
C3326
C114EK

K302

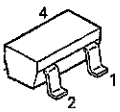
K125



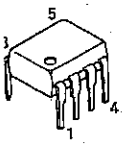
78N08



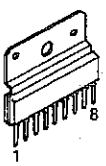
C4093

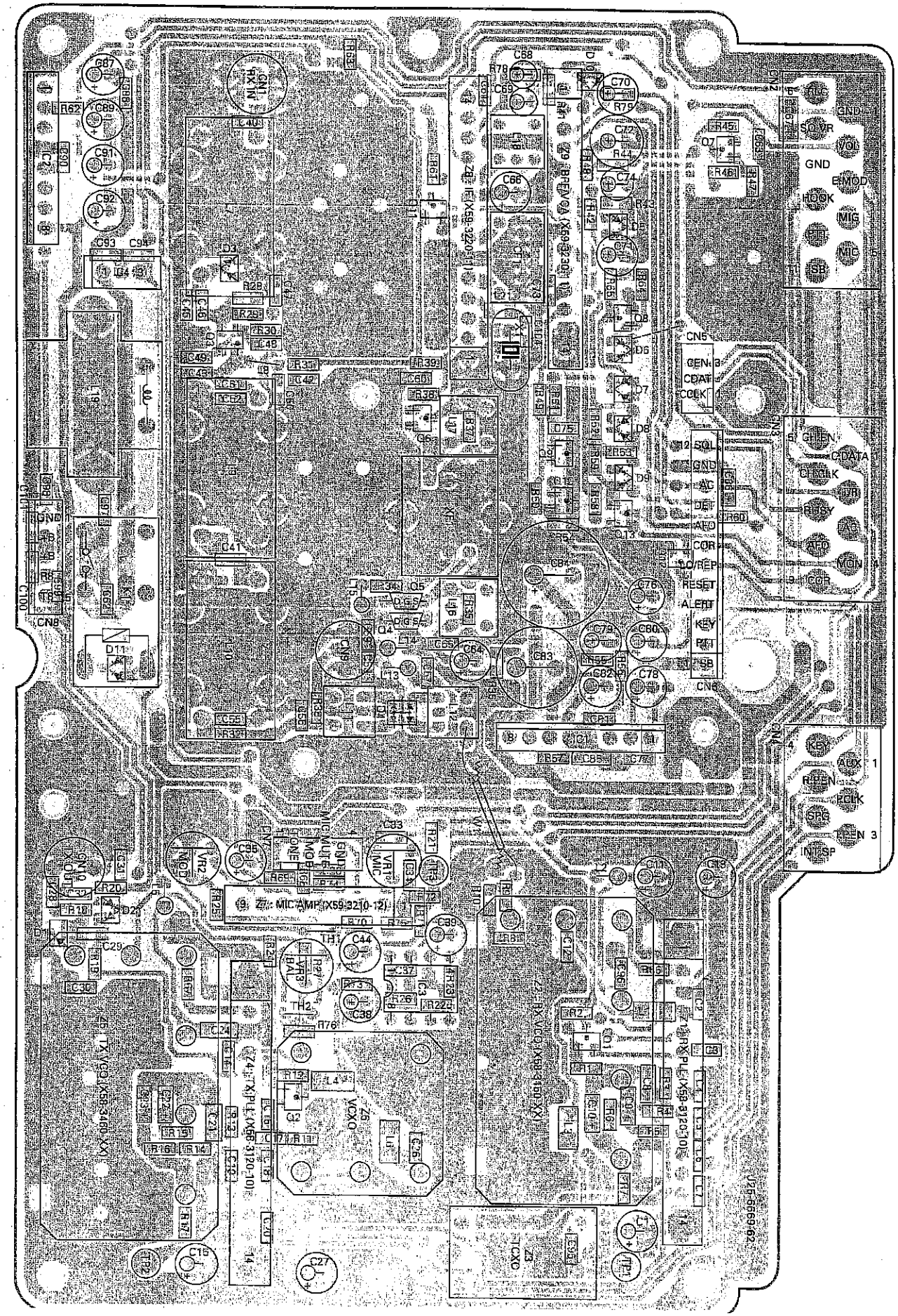


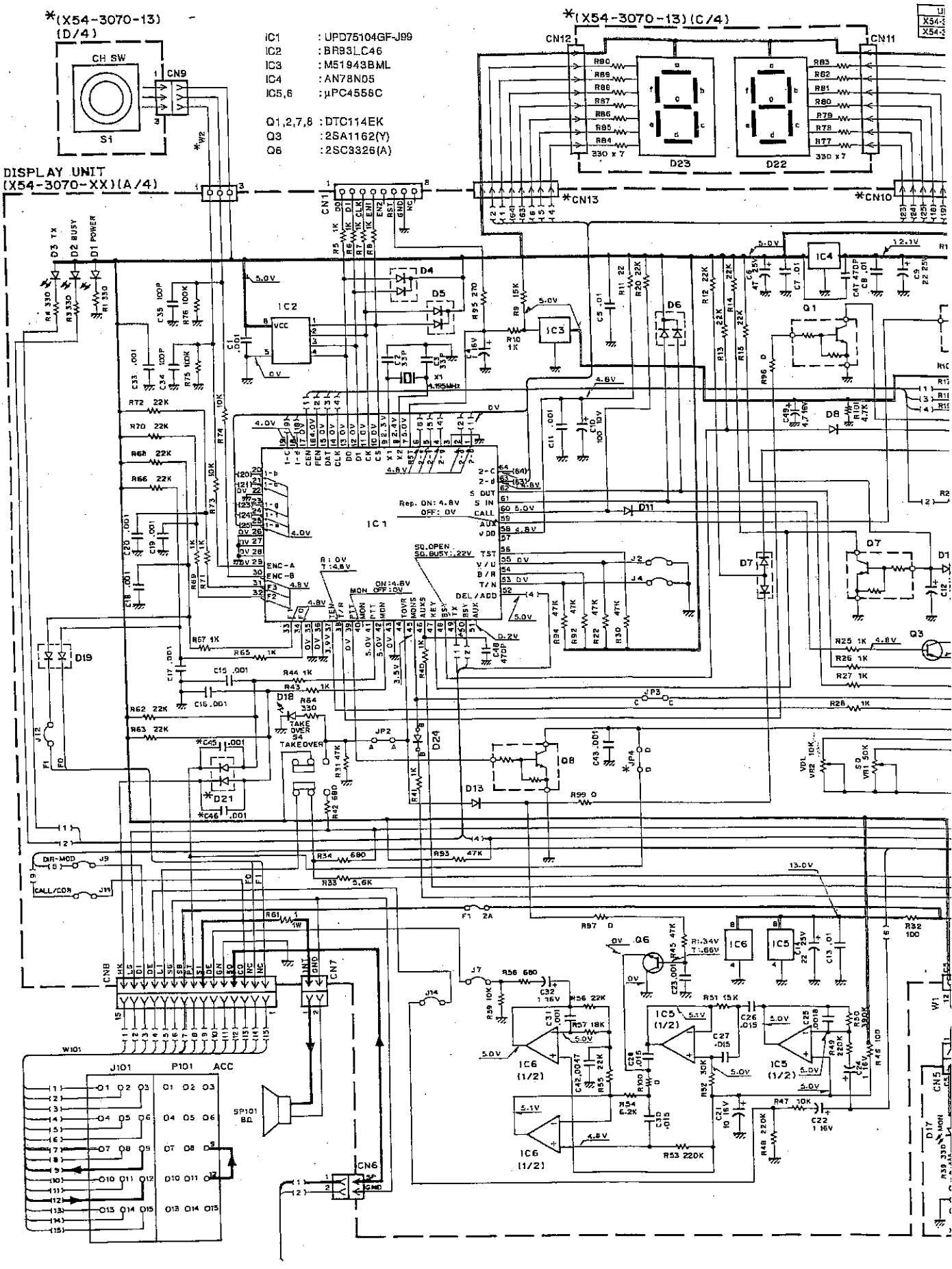
M4558D

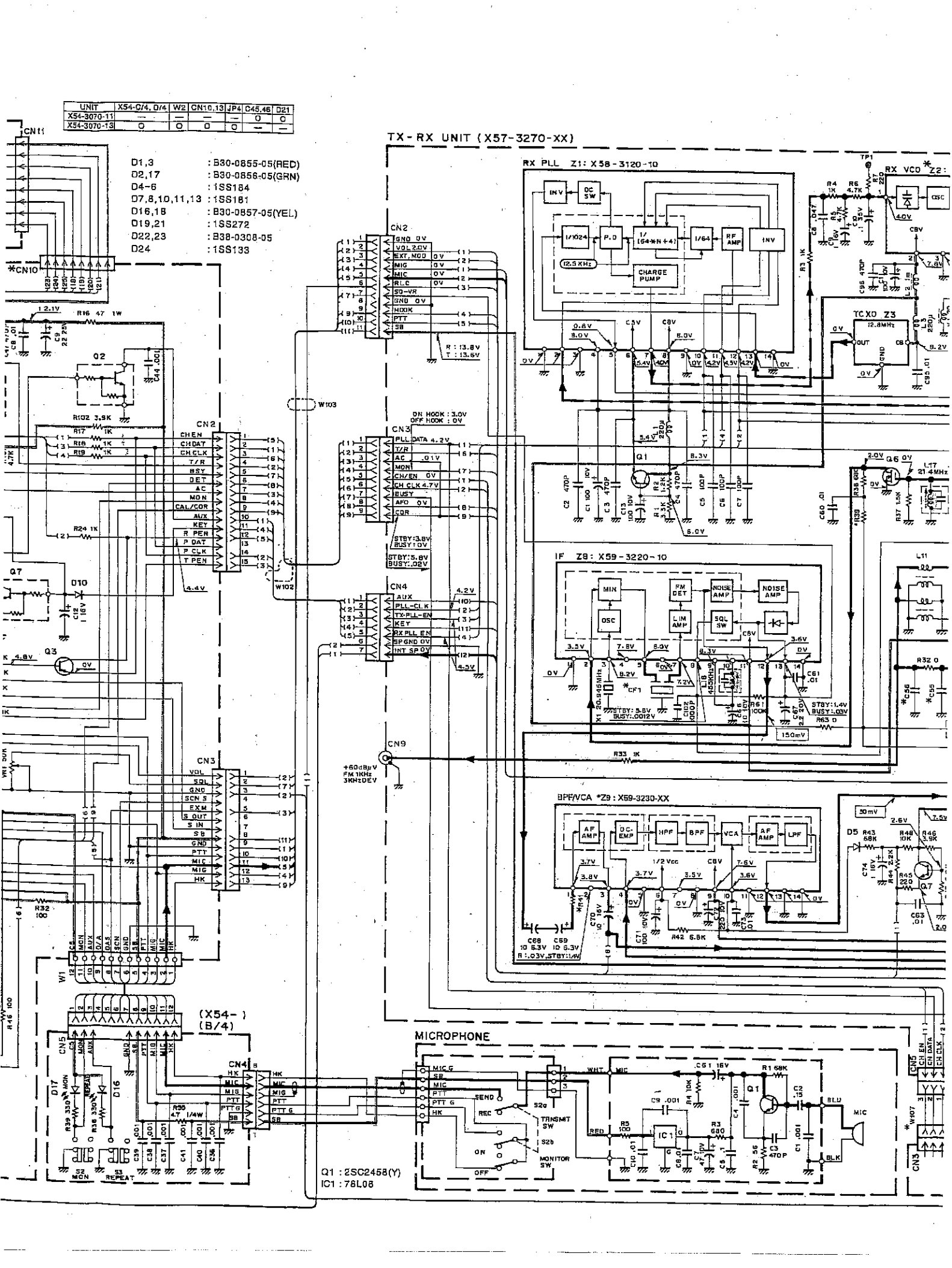


B3756
C1242H

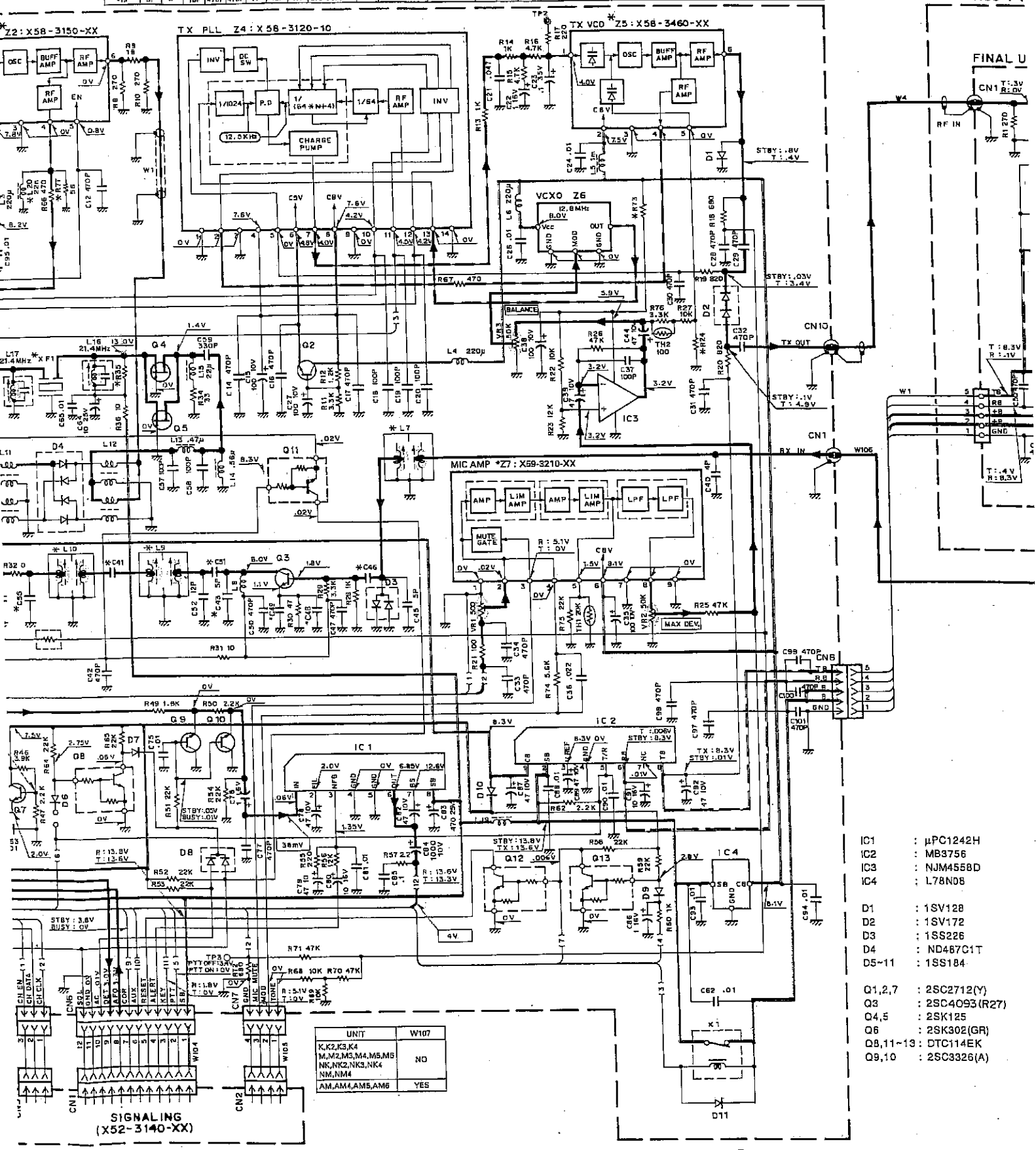





*(X54-3070-13)
(D/4)
CH SW
S1
CN9
*W2
IC1 : UPD75104GF-J99
IC2 : BR93LC46
IC3 : M51943BML
IC4 : AN78N05
IC5,6 : μPC4558C
Q1,2,7,8 : DTC114EK
Q3 : 2SA1162(Y)
Q6 : 2SC3326(A)
*(X54-3070-13)(C/4)
CN12
CN11
D23
D22
330 x 7
DISPLAY UNIT
(X54-3070-XX)(A/4)
CN1
*CN13
*CN10
D3 TX
D2 BUSY
D1 POWER
IC1
IC2
IC3
IC4
IC5 (1/2)
IC6 (1/2)
Q1
Q3
Q6
Q7
Q8
D4
D5
D6
D7
D8
D11
D13
D18
D19
D21
D24
TAKE OVER
DATA-MOD
CALL/COR
CN8
CN7
CN6
W101
J101
P101
ACC
5P101
8Ω


UNIT | X54-C/4, D/4 | W2 | CN10,13 | JP4 | C45,46 | D21
X54-3070-11 | — | — | — | — | O | O
X54-3070-13 | O | O | O | O | — | —
D1,3 : B30-0855-05(RED)
D2,17 : B30-0856-05(GRN)
D4-6 : 1SS184
D7,8,10,11,13 : 1SS181
D16,18 : B30-0857-05(YEL)
D19,21 : 1SS272
D22,23 : B38-0308-05
D24 : 1SS133
TX-RX UNIT (X57-3270-XX)
RX PLL Z1: X58-3120-10
RX VCO *Z2:
TCXO Z3
IF Z8: X59-3220-10
BPF/VCA *Z9: X59-3230-XX
MICROPHONE
CN2
CN3
CN4
CN5
CN9
W1
W102
W103
(X54-) (B/4)
Q1 : 2SC2458(Y)
IC1 : 78L08

X57-3270	C41	C43	C46	C48	C49	C51	C55	C56	L7,9,10	L20	CF1	XF1	R24	R26	R35	R36	R41	R73	R77	Z2	Z5	Z7	Z8
-10	3P	-	33P	-	100P	10P	12P	10P	L79-0674-05	-	L72-0339-05	L71-0274-05	1.2K	47K	1.8K	680	33K	820	-	X58-3150-15	X58-3460-10	X59-3210-10	X59-3230-10
-11	3P	-	33P	-	100P	10P	12P	10P	L79-0674-05	22n	L72-0338-05	L71-0274-05	1.2K	47K	1.8K	680	33K	820	56	X58-3150-16	X58-3460-11	X59-3210-10	X59-3230-10
-12	3P	-	18P	470P	470P	7P	12P	10P	L79-0693-05	-	L72-0339-05	L71-0274-05	1.2K	47K	1.8K	680	33K	820	-	X58-3150-13	X58-3460-12	X59-3210-10	X59-3230-10
-13	10P	5P	33P	470P	470P	10P	12P	10P	L78-0882-05	-	L72-0339-05	L71-0274-05	470	68K	1.8K	680	33K	270		X58-3150-14	X58-3460-13	X59-3210-10	X59-3230-10
-14	3P	-	33P	-	100P	10P	12P	10P	L79-0674-05	-	L72-0360-05	L71-0417-05	1.8K	47K	1.2K	680	0	820	-	X58-3150-15	X58-3460-10	X59-3210-10	X59-3230-10
-15	10P	5P	33P	470P	470P	10P	12P	10P	L79-0692-05	-	L72-0360-05	L71-0417-05	470	68K	1.2K	680	0	270	-	X58-3150-14	X58-3460-13	X59-3210-10	X59-3230-10
-16	7P	5P	33P	470P	470P	10P	10P	5P	L79-1094-05	-	L72-0339-05	L71-0274-05	1.2K	47K	1.8K	680	33K	820	-	X58-3150-17	X58-3460-14	X59-3210-11	X58-3230-11
-17	7P	5P	33P	470P	470P	10P	10P	5P	L79-1095-05	-	L72-0360-05	L71-0417-05	680	47K	1.2K	680	0	820	-	X58-3150-18	X58-3460-15	X59-3210-11	X59-3230-11
-18	3P	-	33P	-	100P	10P	12P	10P	L79-0674-05	22n	L72-0360-05	L71-0417-05	680	47K	1.2K	560	0	820	56	X58-3150-16	X58-3460-11	X59-3210-10	X59-3230-10
-19	3P	-	18P	470P	470P	7P	12P	10P	L79-0693-05	-	L72-0360-05	L71-0417-05	1.2K	47K	1.2K	560	0	820	-	X58-3150-13	X58-3460-12	X59-3210-10	X59-3230-10



X45-3250	C8	C9	C15	C22	C27	C28	C29	C30	C52	C101	L2	L3	R25	IC1
-10	8P	8P	12P	7P	9P	12P	15P	11P	–	–	18n	22n	47	MS7729H-01
-11	8P	8P	12P	7P	9P	10P	10P	7P	–	470P	18n	22n	47	MS7729UH
-12	6P	6P	12P	7P	–	10P	10P	7P	9P	470P	18n	22n	47	MS7729SH-22
-13	6P	6P	12P	7P	13P	15P	18P	15P	–	–	18n	22n	47	MS7729L-22
-14	7P	10P	4P	13P	18P	18P	20P	15P	–	470P	22n	33n	27	MS7729SL
-15	7P	10P	12P	7P	18P	18P	20P	15P	–	470P	22n	22n	27	MS7729UL

FINAL ASS'Y (X60 - 3180 - XX)

FINAL UNIT (X45 - 3250 - XX)

D1 : 1SV172
D2 : 1SS226
D3,4 : 1SS101
D5 : DSA3A1

Q1 : 2SC3357
Q2 : 2SC2954
Q3 : 2SB946(Q)
Q4 : 2SC2712(Y)
Q5,6 : 2SC3326(A)

AVR UNIT (X43 - 3040 - 10) (A/2)

USE FOR	T101	COLOR
K,K2,K3,K4 NK,NK2,NK3,NK4	L01-8341-05	RED
M,M2,M3,M4 M5,M6,NM,NM4 AM,AM4,AM5,AM6	L01-8347-05	BRN

(X43-)(B/2)

UNIT		DC BACK UP or A TYPE ONLY
X54-3070-11	*2	NOT USED
X54-3070-13	*1	USED

D1 :1B2C1
D3 :S25VB20
D4,6 :1SS181
D5 :RD7.5EB2
D101 :S25VB20

Q1~3 :2SC2712(Y)
Q4 :2SB968(Q)
Q5,6 :2N5885

TERMINAL FUNCTION

Connector No.	Pin No.	Pin Name	Function
AVR UNIT (X43-3040-10)			
(A/2)		AC1	AC input for reference voltage.
		AC2	AC input for reference voltage.
		AC3	AC input for power supply.
		AC4	AC input for power supply.
		GND	GND.
		CAP	For capacitor (+).
		C	Q5,Q6 collector.
		E1	For emitter Q6.
		E2	For emitter Q5.
		GND	GND for output.
		OUT	DC 13.6V output.
		B1	For base Q6.
		B2	For base Q5.
(B/2)		A1	AC power input.
		A2	AC power input.
		SW	Fused AC output.
SIGNALING UNIT (X52-3140-XX)			
CN1	1	SB	Power supply input via the power switch.
	2	PTT	PTT signal input.
	3	KEY	KEY signal input.
	4	ALERT	ALERT signal output.
	5	RESET	RESET signal input.
	6	LOC/REP	REPEAT signal input.
	7	COR	Busy signal output by the internal squelch.
	8	AFO	Detection signal output.
	9	DET	Detection signal output.
	10	AC	Audio mute control signal output.
	11	GND	GND.
	12	SQL	Noise squelch signal input.
CN2	1	TONE	TONE signal (300Hz or less) output.
	2	MOD	MOD signal (300Hz to 3kHz) output.
	3	MIC MUTE	MIC MUTE signal output.
	4	GND	GND.
CN3	1	CH CLK	CH CLOCK signal input.
	2	CH DATA	CH DATA signal input.
	3	CH EN	CH ENABLE signal input.
DISPLAY UNIT (X54-3070-XX)			
CN1 For EEPROM writer	1	DO	EEPROM data output.
	2	DI	EEPROM data input.
	3	CLK	Clock signal input.
	4	EN1	EEPROM enable signal input 1.
	5	EN2	EEPROM enable signal input 2.
	6	RST	Microprocessor reset input.
	7	GND	GND.
	8	NC	No connection.
CN2	1	CH EN	Chaannel enable.
	2	CH DAT	Channel data.
	3	CH CLK	Channel clock.
	4	T/R	Transmit/receive.
	5	BSY	Busy.
	6	DET	Detected signal input.
	7	AC	Audio mute control signal.
	8	MON	Monitor.
	9	CAL/COR	CALL/COR.
	10	AUX	REP/LOCAL.
	11	KEY	KEY line.
	12	P EN	RX PLL enable:
	13	P DAT	PLL data.
	14	P CLK	PLL clock.
	15	TP EN	TX PLL enable.

Connector No.	Pin No.	Pin Name	Function
CN3	1	VOL	Volume control input.
	2	SQ	Squelch control input.
	3	GND	GND.
	4	SCNS	Scan signal input.
	5	EXM	
	6	SOUT	Serial output.
	7	SIN	Serial input.
	8	SB	Switched B input.
	9	GND	GND.
	10	PTT	PTT signal output.
	11	MIC	MIC signal output.
	12	MIG	MIC GND.
	13	HK	HOOK signal output.
CN4 (B/4) For MIC	1	SB	Switched B output.
	2	GND	GND.
	3	PTT	PTT.
	4	MIG	MIC GND.
	5	MIC	MIC.
	6	HOOK	HOOK.
CN5 (B/4)	1	C5	Common 5V.
	2	MON	MONITOR signal output.
	3	AUX	AUX signal output.
	4	D/A	DEL/ADD LED signal input.
	5	DAS	DEL/ADD signal output.
	6	SCN	Scan signal output.
	7	GND	GND.
	8	SB	Switched B input.
	9	PTT	PTT signal output.
	10	MIG	MIC GND.
	11	MIC	MIC signal output.
	12	HK	HOOK signal output.
CN6	1	SP	Speaker input.
	2	GND	GND.
CN7	1	INT	Internal speaker output.
	2	GND	GND.
CN8 For ACC connecto	1	NC	No connection.
	2	NC	No connection.
	3	CO	CALL/COR or BUSY signal output.
	4	SO	Speaker signal output.
	5	GN	GND.
	6	DE	Detected signal output.
	7	SI	Speaker signal input.
	8	PT	PTT signal input.
	9	SB	Switched B output.
	10	SG	Speaker GND.
	11	LI	Line input.
	12	DE	Detected signal output.
	13	DI	Direct modulation input.
	14	LG	Line input GND.
	15	HK	HOOK signal input.
CN9 (D/4)	1	+B	Power supply input.
	2	ENC1	Encoder signal output.
	3	ENC2	Encoder signal output.
W1	1	HK	HOOK signal input.
	2	MIC	MIC signal input.
	3	MIG	MIC GND.
	4	PTT	PTT signal input.
	5	SB	Switched B output.
	6	GND	GND.
	7	SCN	Scan signal input.
	8	DAS	DEL/ADD signal input.
	9	D/A	DEL/ADD LED signal output.

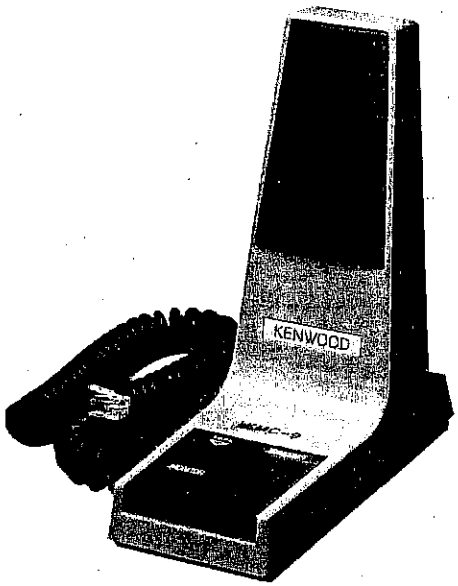
TERMINAL FUNCTION

Connector No.	Pin No.	Pin Name	Function
	10	AUX	AUX signal input.
	11	MON	MONITOR signal input.
	12	C5	Common 5V output.
W2	1	ENC2	Encoder signal input.
	2	ENC1	Encoder signal input.
	3	+B	Power supply output.
TX-RX UNIT (X57-3270-XX)			
CN1		RX IN	Receiver signal input, coaxial connector.
CN2	1	GND	GND.
	2	VOL	Electronic volume control signal output.
	3	EXT MOD	External modulation input.
	4	MIG	MIC GND.
	5	MIC	MIC signal input.
	6	RLC	Power supply relay control signal output to the power switch.
	7	SQ VR	Detection signal output to SQL volume.
	8	GND	GND.
	9	HOOK	HOOK signal (MIC hook) input.
	10	PTT	PTT signal input.
	11	SB	Power supply output via the power switch.
CN3	1	PLL DATA	PLL DATA signal input.
	2	T/R	T/R signal input.
	3	AC	Audio mute control signal input by the signaling unit.
	4	MON	MONITOR signal input.
	5	CH EN	CH ENABLE for signaling.
	6	CH CLK	CH CLOCK for signaling.
	7	BUSY	BUSY signal output.
	8	AFO	Detection signal input via the signaling unit.
	9	COR	BUSY signal output by the signaling unit.
CN4	1	AUX	REPEAT signal input.
	2	PLL CLK	PLL CLOCK signal input.
	3	TX PLL EN	TX PLL ENABLE signal input.
	4	KEY	KEY signal input.
	5	RX PLL EN	RX PLL ENABLE signal input.
	6	SP GND	Internal speaker GND.
	7	INT SP	Internal speaker output.
CN5	1	CH CLK	CH CLOCK signal output for signaling.
	2	CH DATA	CH DATA signal output for signaling.
	3	CH EN	CH ENABLE signal output for signaling.

Connector No.	Pin No.	Pin Name	Function
CN6	1	SB	Power supply output via the power switch.
	2	PTT	PTT signal output for signaling.
	3	KEY	KEY signal output for signaling.
	4	ALERT	ALERT signal input for signaling.
	5	RESET	RESET signal output for signaling.
	6	AUX	REPEAT signal output for signaling.
	7	COR	BUSY signal input by the signaling unit.
	8	AFO	Detection signal input to the signaling unit.
	9	DET	Detection signal output by the signaling unit.
	10	AC	Audio mute control signal input by the signaling unit.
	11	GND	GND.
	12	SQL	Noise squelch signal output.
CN7	1	TONE	TONE signal (300Hz or less) input.
	2	MOD	MOD signal (300Hz to 3kHz) input.
	3	MIC MUTE	MIC MUTE signal input.
	4	GND	GND.
CN8	1	GND	GND.
	2	B	Power supply input (from Final to TX-RX).
	3	B	Power supply input (from Final to TX-RX).
	4	R8	RX 8V output.
	5	T8	TX 8V output.
CN9			Filtered RX signal output, coaxial connector (for assemble line).
CN10		TX OUT	Transmission drive output, coaxial connector.
FINAL UNIT ASSY (X60-3180-XX)			
CN1		RF IN	Transmission drive output, coaxial connector.
CN2		GND	GND.
CN3		B	Power supply input.
W1	1	GND	GND.
	2	+B	Power supply output to TX-RX uinit.
	3	+B	Power supply output to TX-RX unit.
	4	R8	RX 8V input.
	5	T8	TX 8V input.
W2		RF OUT	Transmission signal output, coaxial connector.

KMC-9 (BASE MICROPHONE)

KMC-9 External View

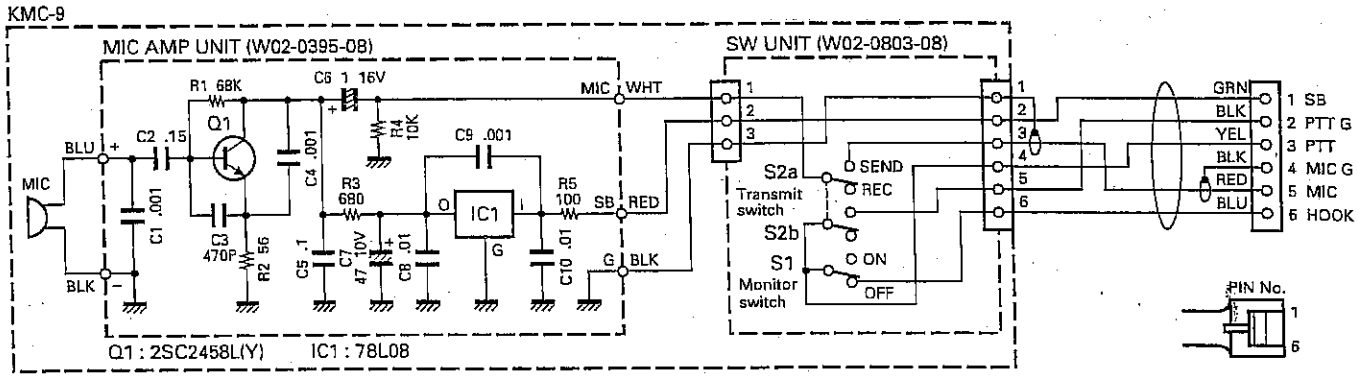


KMC-9 Parts List

* : New parts

Ref. No.	New parts	Parts No.	Description
1		E23-0612-08	Crimp terminal
2		E30-2080-08	Curl cord
3		G09-0423-08	L spring
4		G09-0424-08	R spring
5		G09-0425-08	Spring A
6		G13-0877-08	Cushion
7		G13-0878-08	Cushion D
8		J02-0448-08	Rubber foot
9		N44-3018-45	Tapping screw
10		N47-3010-46	Tapping screw
11		T91-0368-08	MIC unit
12		S50-1430-08	Micro switch
13		W02-0803-08	SW unit
14		W02-0395-08	MIC AMP unit

KMC-9 Circuit Diagram



KMC-9 Specifications

Type	Uni-directional dynamic microphone (Preamplifier built-in)
Output impedance	600Ω ± 30% (at 1kHz)
Sensitivity	–50dB ± 3dB (at 1kHz, 0dB = 1V/μ bar)
Frequency characteristic	300 to 3000Hz (±6dB)
Power requirements	13.8V DC (Supplied from the radio)
Dimensions (W x H x D)	70 x 162 x 150 mm (2-3/4 x 6-3/8 x 5-29/32 inch)
Weight	550g (1.2 lbs)

KMC-9 (BASE MICROPHONE)

KMC-9 Disassembly for Repair

- **Chassis removal**

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

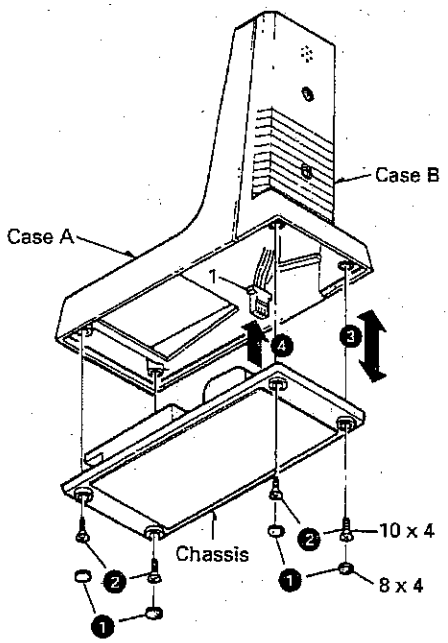


Fig. 1

- **Removal of microphone element and microphone amplification unit**

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

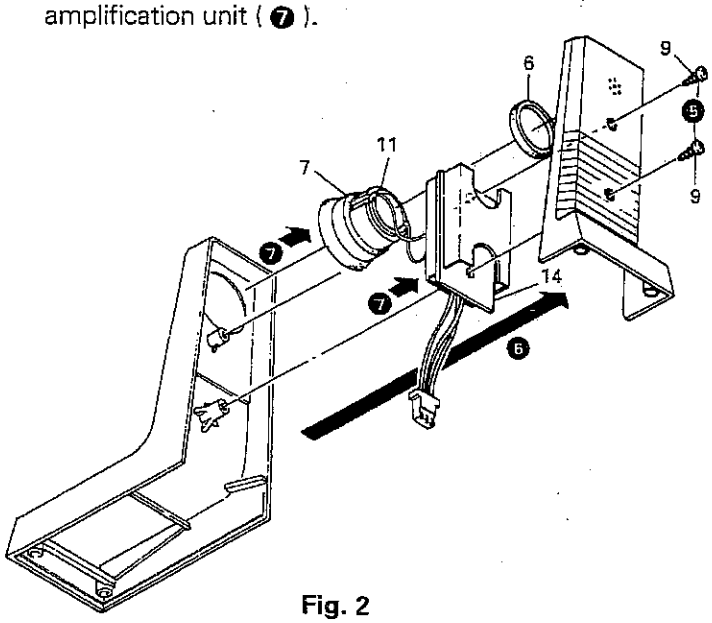


Fig. 2

- **Switch unit removal**

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

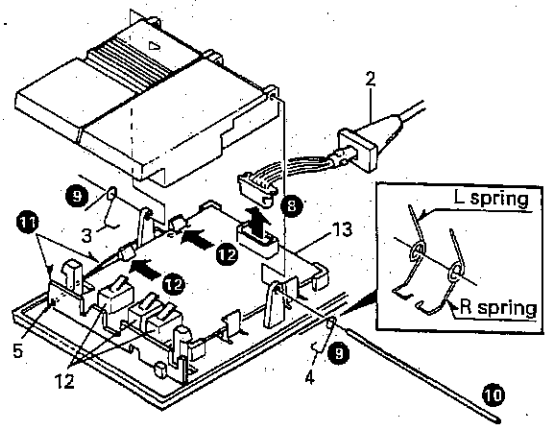


Fig. 3

- **Removing micophone plug**

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

SPECIFICATIONS

GENERAL

Frequency Range ..... 450 to 470MHz (K,M,NK,NM,AM types)
470 to 490MHz (K2,M2,NK2 types)
490 to 512MHz (K3,NK3 type)
490 to 520MHz (M3 type)
406 to 430MHz (K4,NK4 type)
400 to 430MHz (M4,NM4,AM4 types)
RX : 350 to 360MHz TX : 360 to 370MHz (M5,AM5 type)
RX : 370 to 380MHz TX : 380 to 390MHz (M6,AM6 type)
Number of Channels ..... 1 (16 : A type only)
Channel Spacing ..... 25kHz (PLL channel step 12.5kHz) / 12.5kHz (N,M6 types)
Input Voltage ..... 120V (K~K4, NK~NK4 types)/220V (Other types) AC 50/60Hz (Modifiable to DC backup)
Power Consumption ..... 200W max.
Duty Cycle ..... 50% at 20W output (100% at 5W output)
Temperature Range ..... –30°C to +60°C (–22°F to +40°F)
Dimensions ..... H : 4.72" (120mm) W : 12.99" (330mm) D : 15.08" (383mm)
Weight 28.66lbs (13kg)

RECEIVER (Measurements made per EIA standard EIA/TIA-204-D)

RF Input Impedance 50Ω
Sensitivity
EIA 12dB SINAD 0.35µV
20dB Quieting 0.45µV
Squelch Sensitivity ..... 0.2µV threshold
Modulation Acceptance ..... ±7kHz / ±3.5kHz (N,M6 types)
Selectivity ..... More than 70dB (±25kHz) / More than 65dB (±12.5kHz) : N,M6 types
Intermodulation ..... More than 65dB (±25/±50kHz) / More than 60dB (±12.5/±25kHz) : N,M6 types
Spurious and Image Rejection ..... More than 85dB / More than 75dB (IF/2 or 2 x Lo – IF)
Audio Power Output ..... 4W at 4Ω less than 5% distortion
Frequency Stability ..... ±0.00025% from –30°C to +60°C

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

RF Power Output ..... 20W adjustable to 2W (Duplexer output)
RF Output Impedance 50Ω
Spurious and Harmonics 70dB
Modulation
Direct FM Modulation ..... 16K0F3E, ±5kHz for 100% at 1000Hz / 8K50F3E, ±2.5kHz for 100% at 1000Hz (N,M6 types)
FM Hum and Noise ..... More than 37dB (750µs, 300Hz~3kHz) / More than 34dB (750µs, 300Hz~3kHz) : N,M6 types
Microphone Impedance ..... Low impedance
Audio Distortion ..... Less than 3% at 1000Hz
Frequency Stability ..... ±0.00025% from –30°C to +60°C

SIGNALING

Maximum Number of Tone Combination .....

QT	8	7	6	5	4	3	2	1	0
DQT	0	1	2	3	4	5	6	7	8

(In case of cross code operation, the maximum number of decode tone combinations is same as above. Up to eight encode tone may be programmed with any QT, DQT combinations.)

QT Decoder/Encoder
Decoder/Encoder tone frequency ..... 67.0 to 210.7Hz (in 0.1Hz steps)
Decoder response time ..... 200msec. or less
Squelch tail elimination time ..... 100msec.
Encoder frequency error ..... ±0.5% or less
Sensitivity ..... SINAD 8dB or less
DQT Decoder/Encoder
DQT code ..... 23 bits total; a 3-digit octal number (0 to 7 and 12 bits) with error correction (11 bits)
Decoder response time ..... 250msec. or less
Turn-off code transmission time ..... 156msec.
Squelch sensitivity ..... SINAD 8dB or less
Time-out-timer ..... Adjustable OFF 30sec. to 5min.
Hangup Timer ..... Adjustable 0 to 5sec.
Preset Squelch Sensitivity ..... 0.2µV threshold, 12dB SINAD + 10dB or less tight

TKR-820/N/A

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