

UHF DESK-TOP REPEATER

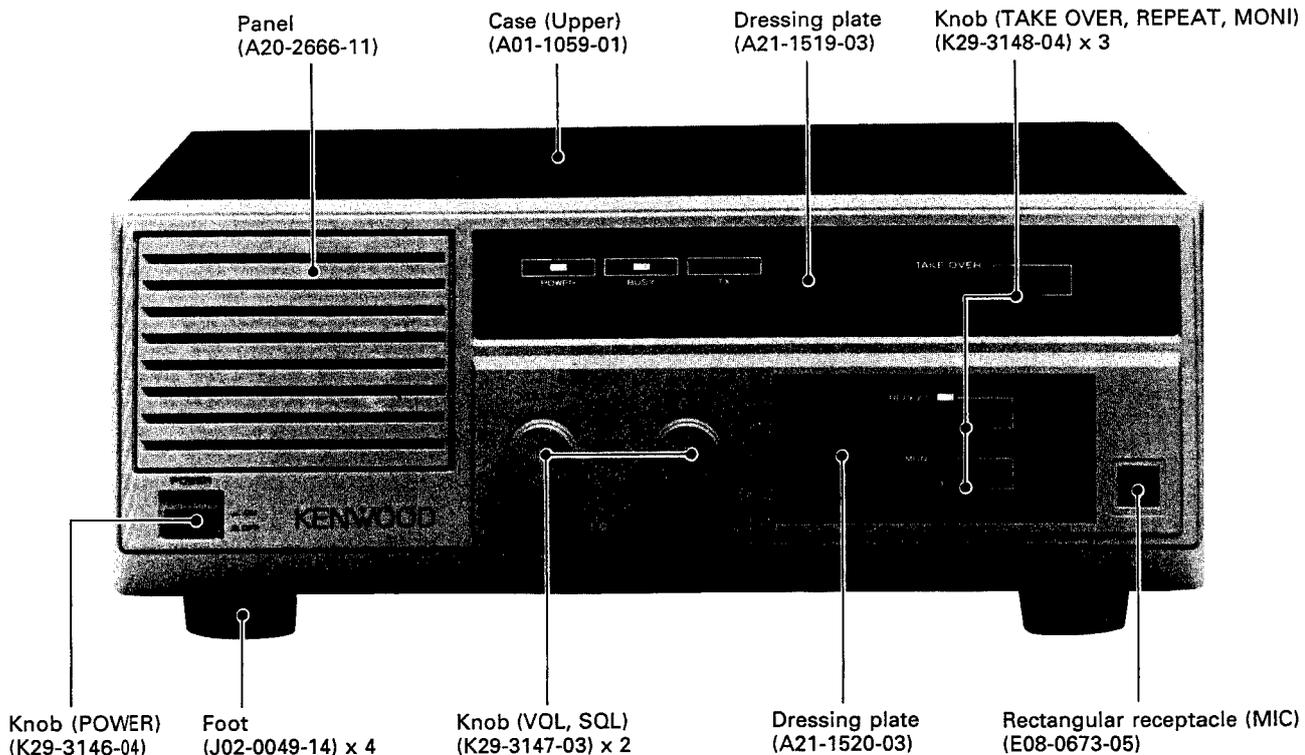
# TKR-820

## SERVICE MANUAL

# KENWOOD

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### REVISED



## CONTENTS

<b>GENERAL</b> .....	2	RX VCO : Z2 (X58-3150-XX) .....	63
<b>SYSTEM SET-UP</b> .....	4	TX VCO : Z5 (X58-3460-XX) .....	64
<b>INSTALLATION</b> .....	5	MIC AMP : Z7 (X59-3210-10) .....	65
<b>CONVERSION</b> .....	9	IF : Z8 (X59-3220-10) .....	66
<b>DISASSEMBLY FOR REPAIR</b> .....	11	BPF / VCA : Z9 (X59-3230-10) .....	67
<b>BLOCK DIAGRAM</b> .....	17	AVR UNIT (X43-3040-10) .....	68
<b>CIRCUIT DESCRIPTION</b> .....	19	FINAL UNIT (X45-3250-XX) .....	70
<b>SEMICONDUCTOR DATA</b> .....	26	SIGNALING UNIT (X52-3140-10) .....	72
<b>DESCRIPTION OF COMPONENTS</b> .....	31	DISPLAY UNIT (X54-3070-11) .....	74
<b>PARTS LIST</b> .....	33	TX-RX UNIT (X57-3270-XX) .....	78
<b>DISASSEMBLY</b> .....	53	<b>SIGNALING CIRCUIT DIAGRAM</b> .....	83
<b>PACKING</b> .....	55	<b>SCHEMATIC DIAGRAM</b> .....	87
<b>ADJUSTMENT</b> .....	56	<b>TERMINAL FUNCTIONS</b> .....	95
<b>PC BOARD VIEWS / CIRCUIT DIAGRAMS</b>		<b>KMC-9 (BASE MICROPHONE)</b> .....	97
RX PLL : Z1, TX PLL : Z4 (X58-3120-10) .....	62	<b>SPECIFICATIONS</b> .....	BACK COVER

# TKR-820

## GENERAL

### INTRODUCTION

#### SCOPE OF THIS MANUAL

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

#### ORDERING REPLACEMENT PARTS

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

### PERSONNEL SAFETY

The following precautions are recommended for personnel safety:

- DO NOT transmit if someone is within two feet (0.6 meter) of the antenna.
- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- All equipment should be properly grounded before power-up for safe operation.
- This equipment should be serviced by a qualified technician only.
- 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.

### FCC COMPLIANCE AND TYPE NUMBERS

Type acceptance number	Frequency range	Compliance
ALH9TKTKR-820-1	450 to 470MHz	Part 22, 74, 90 and 95A
ALHTKR-820-2	470 to 490MHz	Part 22, 74 and 90
ALHTKR-820-3	490 to 512MHz	Part 22, 74 and 90
ALHTKR-820-4	406 to 430MHz	Part 90

### 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. Unsquench 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.

## GENERAL

### 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.

### 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.

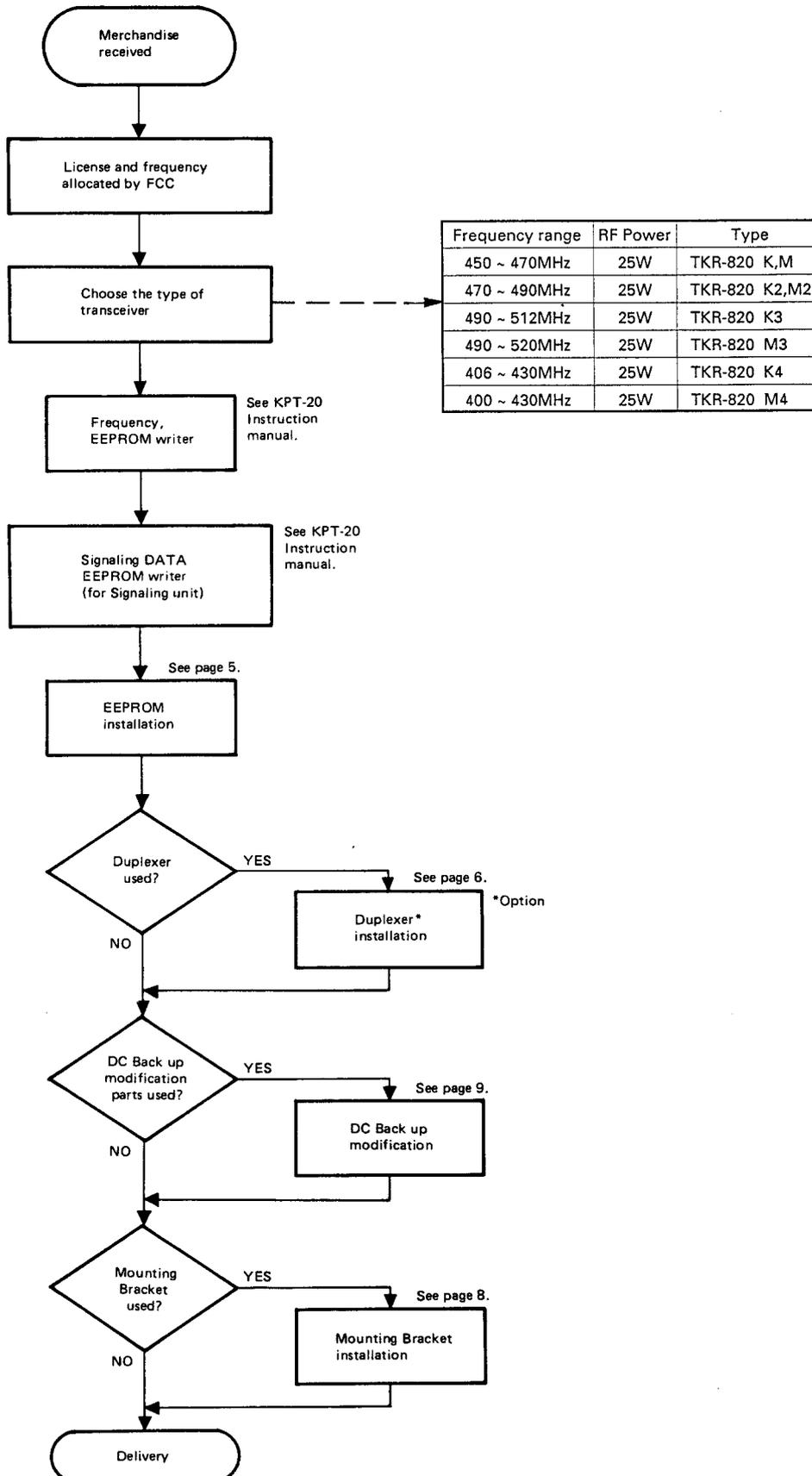
### SERVICE

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

# TKR-820

## SYSTEM SET-UP

**Preparation :** Prepare an EEPROM writer, KPT-20.

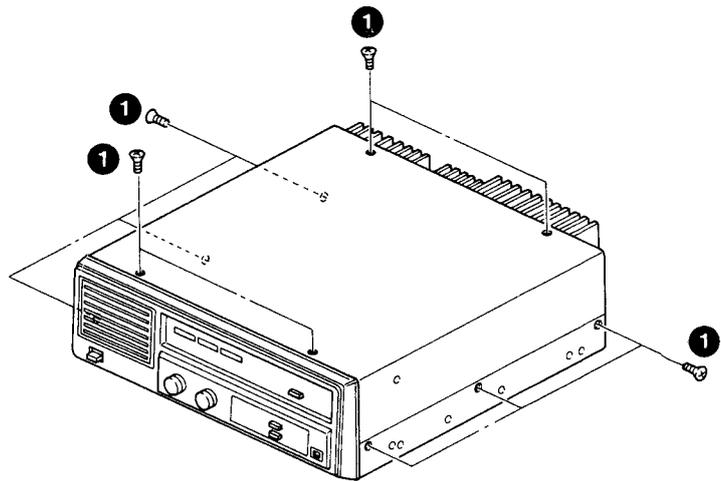


## INSTALLATION

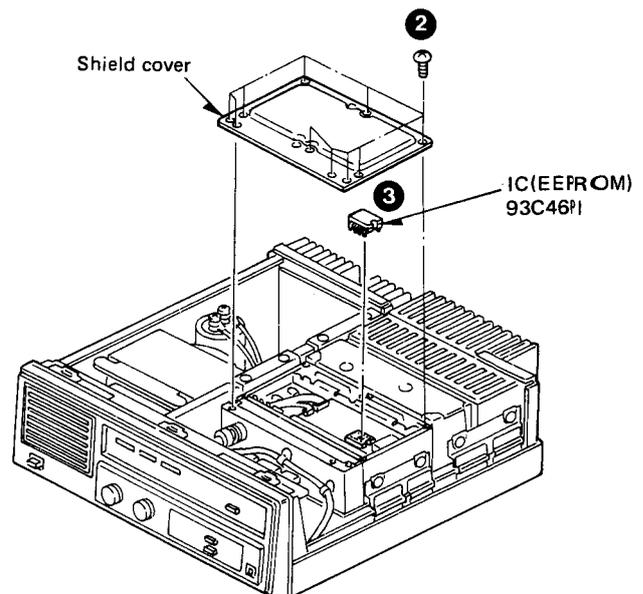
## Installing the EEPROM of Signaling Unit

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

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



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



# TKR-820

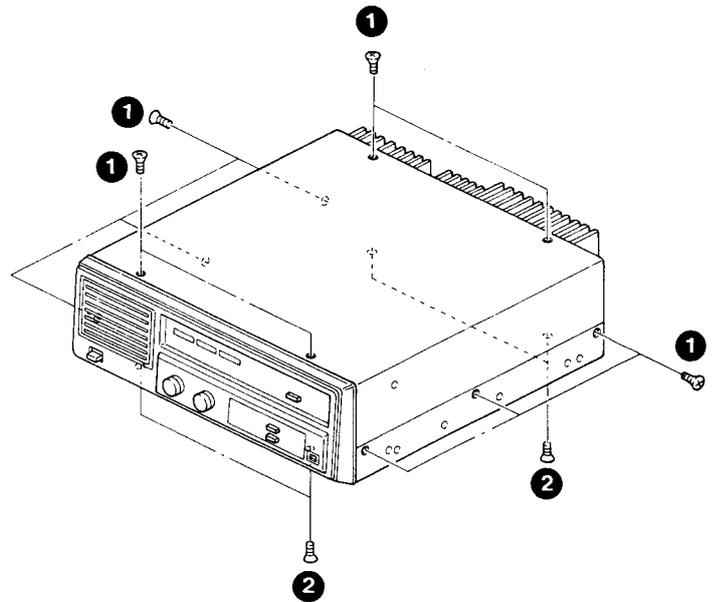
## INSTALLATION

### Installing the Duplexer

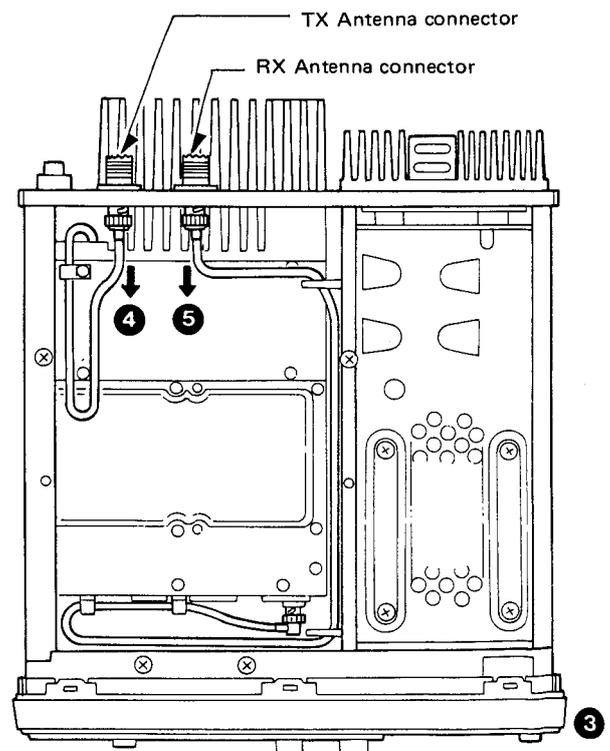
**Note** :When installing the duplexer in the TKR-820, use the either of the following products ;

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 ( **1** ) holding the upper case to remove the upper case.
2. Remove the 4 screws ( **2** ) 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 ( **3** ).
4. Remove the coaxial cables ( **4** , **5** ) connected to the TX and RX antenna connectors.

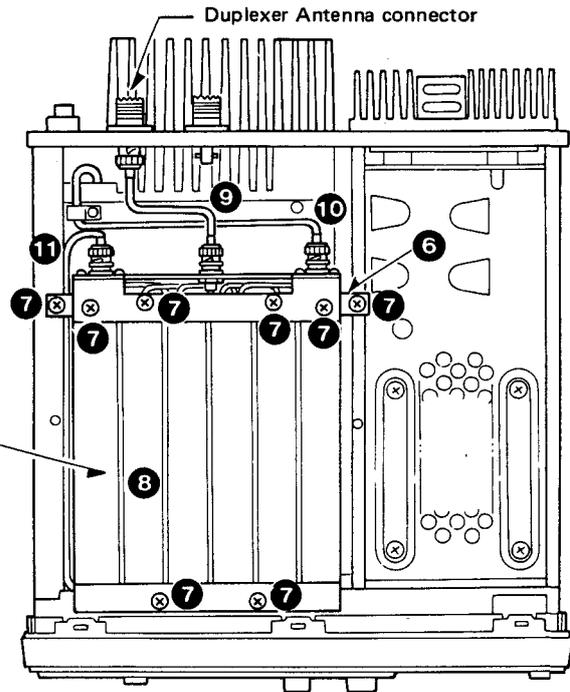


## INSTALLATION

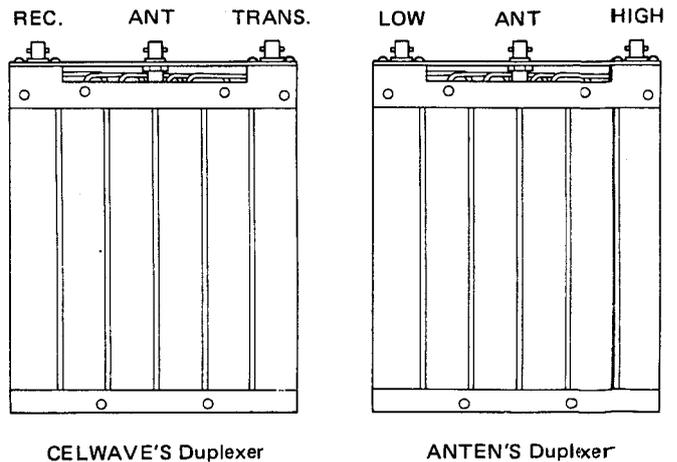
5. Mount the duplexer (8) using the mounting hardware (6) and the 8 screws (7) provided with the set.
6. Connect the one end of the connector cable (9) provided with the set to the duplexer antenna connector and the other end to the ANT (center) of the duplexer.
7. Connect the connector cable (10) wired from the TX section and the connector cable (11) wired from the RX section to the duplexer.

ex.

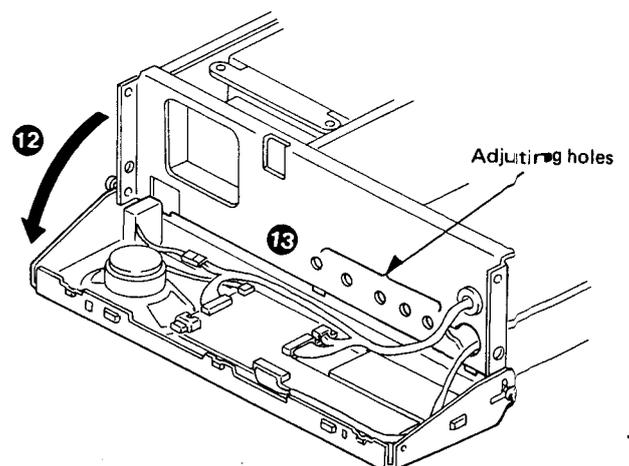
CELWAVE'S Duplexer



**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 (12), then perform adjustments from the adjusting holes (13).



# TKR-820

## INSTALLATION

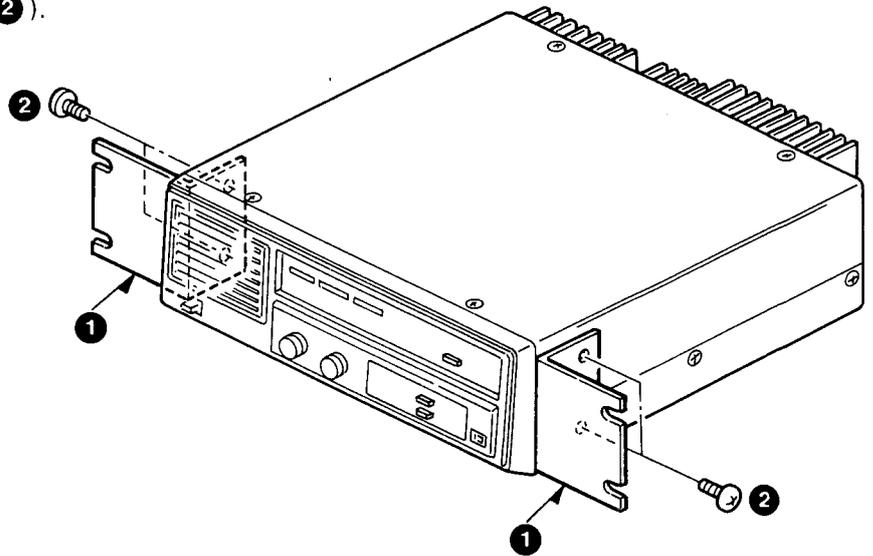
### Attaching the Rack-mount Brackets (for EIA racks)

The brackets and screws are optional.

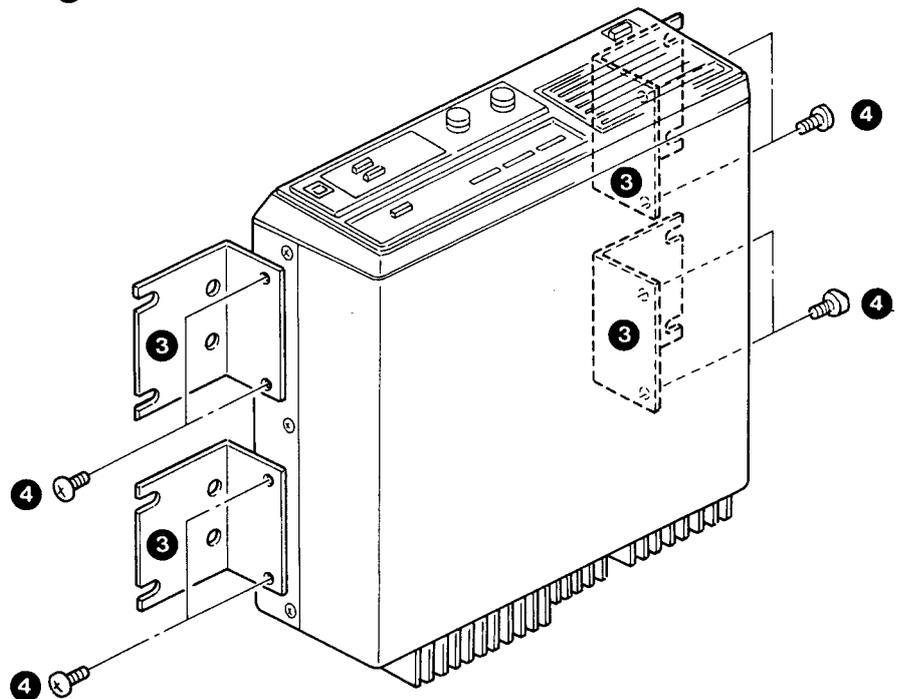
Brackets : J21-4250-04 (Common for left and right)

Screws : N09-0704-05 (Use 2 screws per bracket)

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



2. When the TKR-820 is to be mounted vertically :  
Attach 4 brackets (3), using 8 screws (4), to the sides of the bottom panel.



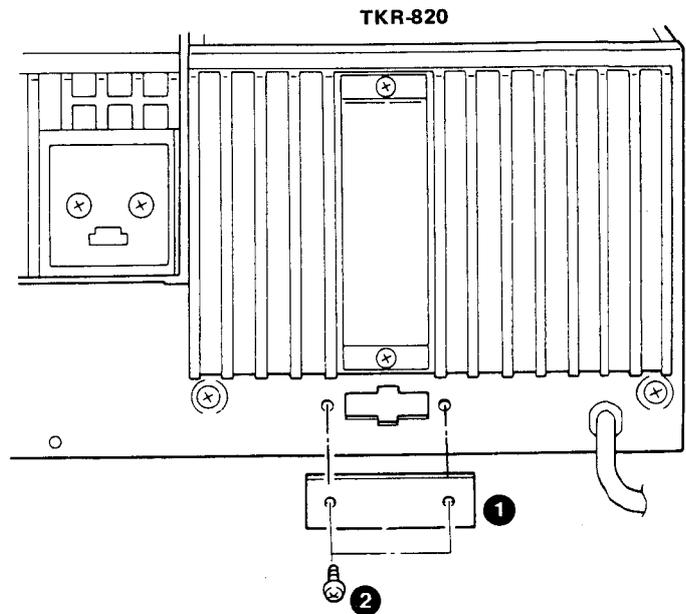
## CONVERSION

### Modification of the DC Switching Circuit (For Backup during a Power Failure)

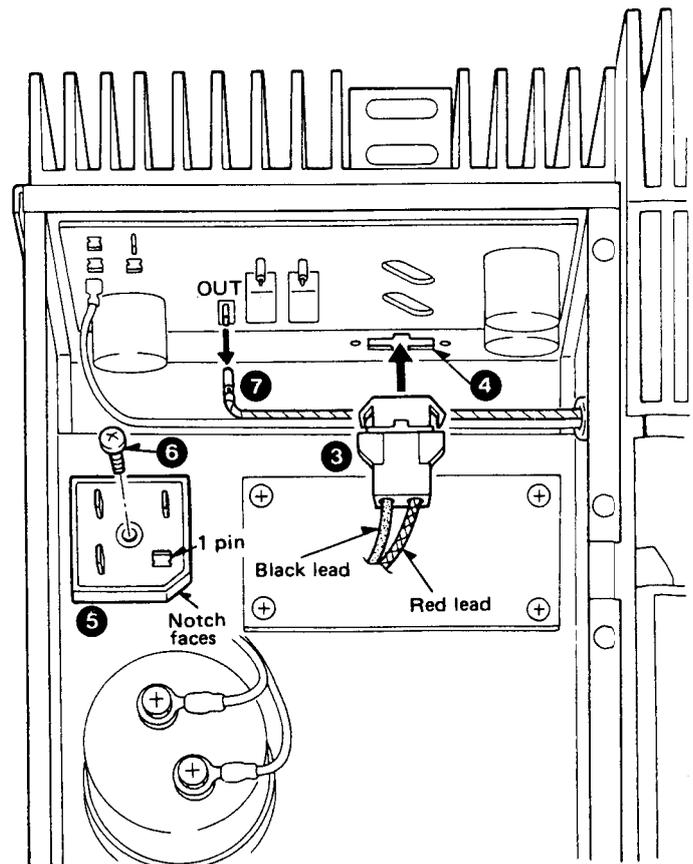
The following parts (optional) are required for the circuit modification.

Diode (S25VB10) . . . . .	1 pc.
DC cable (E30-2076-10) . . . . .	1 pc.
Connector with lead wires (E31-3389-05) . . . . .	1 pc.
Connector with lead wires (E31-3455-05) . . . . .	1 pc.
Screw (N87-4014-46) . . . . .	1 pc.

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



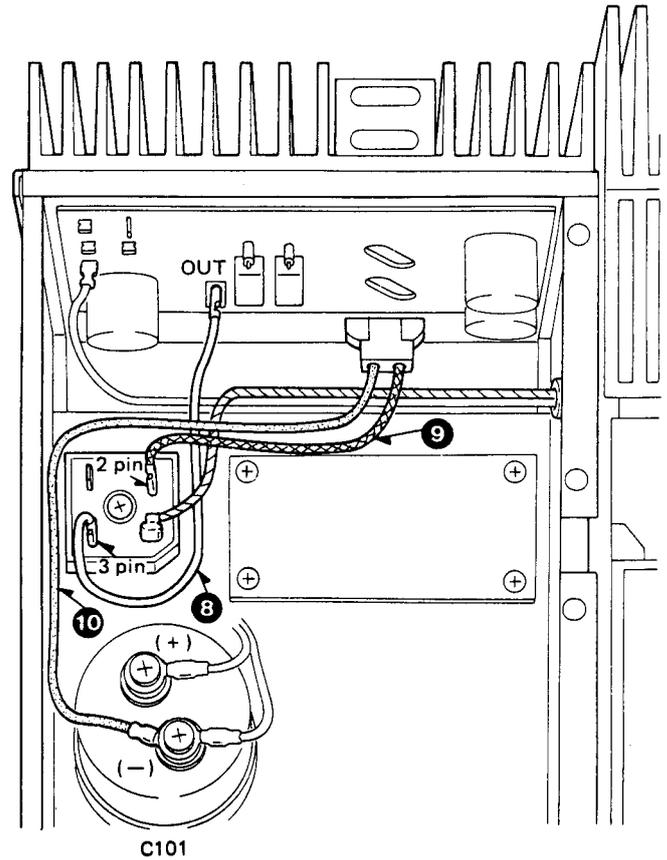
2. Insert the connector with lead wires (3) into the hole on the rear panel (4) (so that the red lead is on the right).
3. Place the diode (5) so that its notch faces the direction shown in the illustration, and attach it using a screw (6).
4. Disconnect the connector (7) from the OUT terminal of the AVR unit, and connect its lead wire to pin 1 of the diode (5).



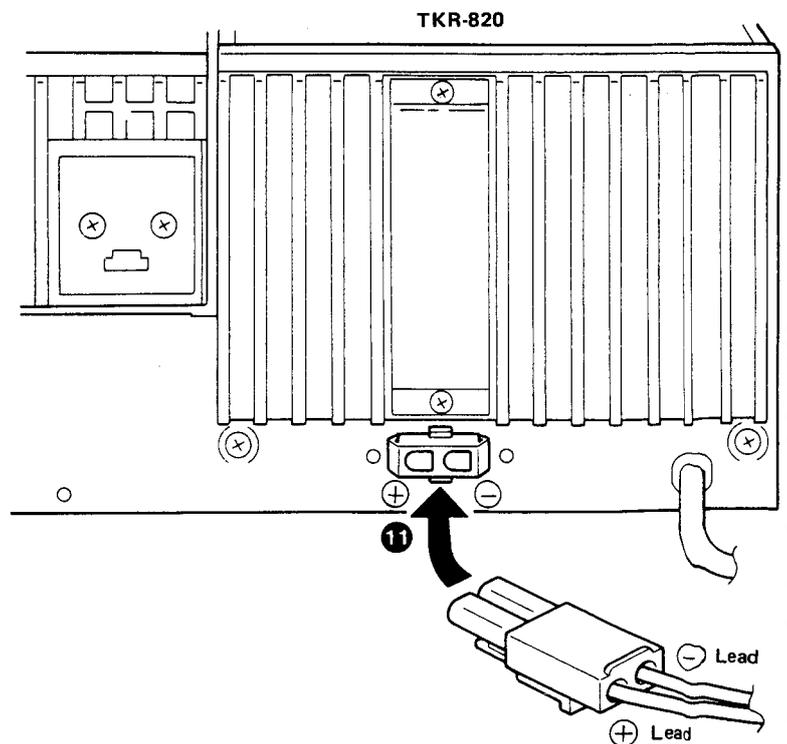
# TKR-820

## CONVERSION

5. Connect the optional connector with lead wires ( **8** ) to the OUT terminal of the AVR unit and to pin 3 of the diode.
6. Connect the red lead ( **9** ) of the optional connector with lead wires to pin 2 of the diode, and its black lead ( **10** ) 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.



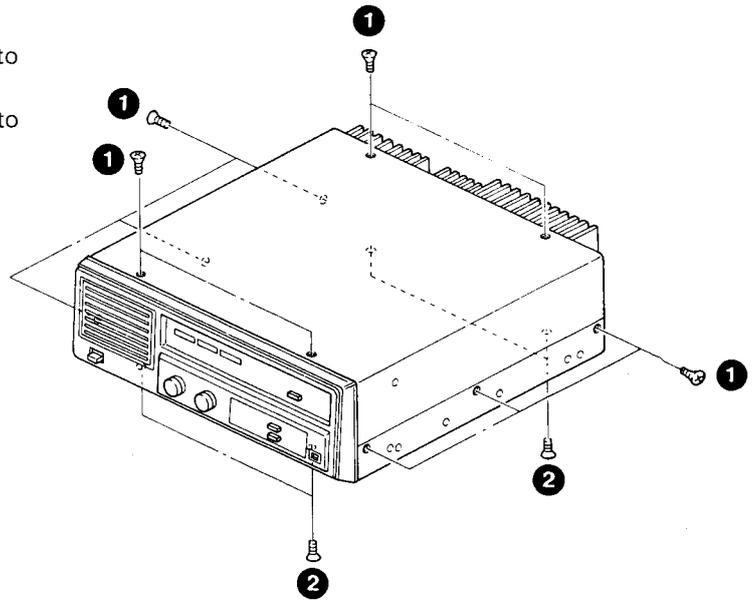
7. Connect the optional DC cable to the connector on the rear panel ( **11** ).



## DISASSEMBLY FOR REPAIR

### How to Remove the Case

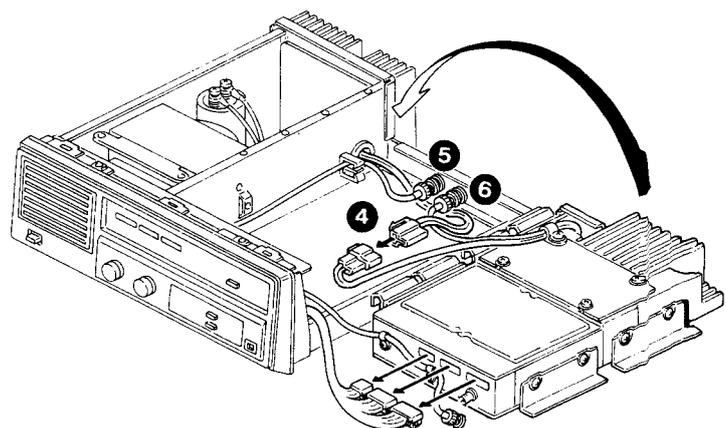
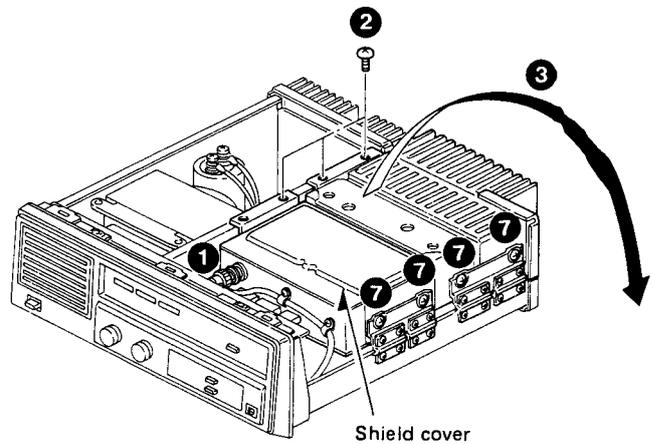
1. Remove the 10 screws (1) holding the upper case to remove the upper case.
2. Remove the 4 screws (2) holding the lower case to remove the lower case.



### 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) (1).
2. Remove the 3 screws (2) holding the transmitter/receiver section.
3. While lifting up on the transmitter/receiver section (3), remove the power supply connector (4) and the connector cables (5, 6) connected to the frame, and restore the transmitter/receiver section in place.
4. Remove the 4 screws (7) holding the transmitter/receiver section to the frame to remove the transmitter/receiver section.

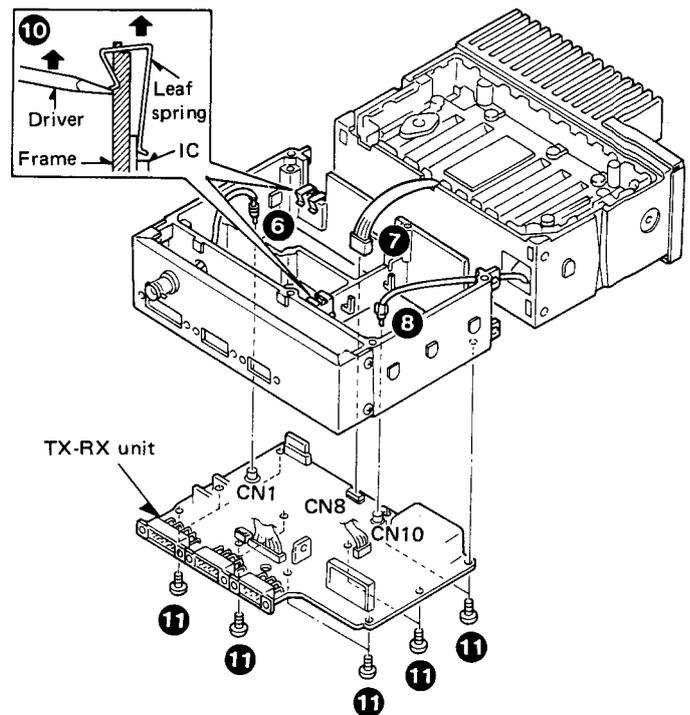
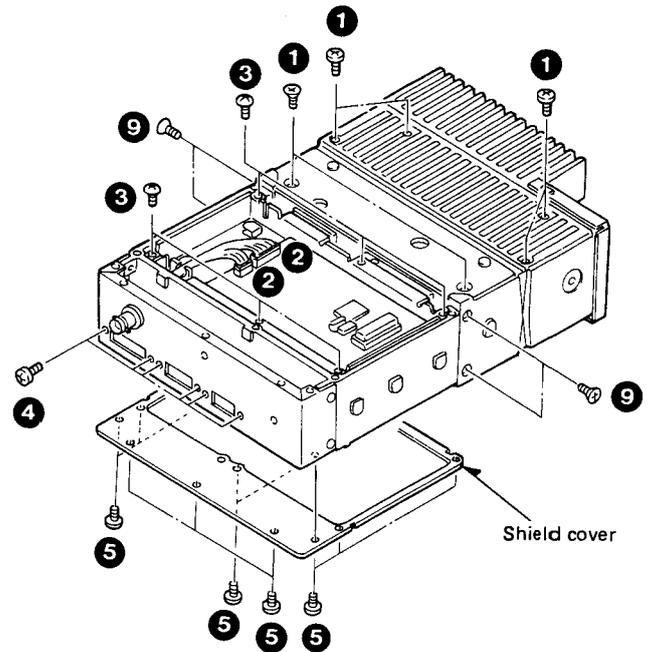


# TKR-820

## DISASSEMBLY FOR REPAIR

### 2. How to remove the TX-RX unit

1. Remove the 6 screws (1) retaining the shield cover to remove the shield cover.
2. Remove the 2 connectors (2) of the Signaling unit and the 6 screws (3) retaining the shield cover to remove the shield cover.
3. Remove the 6 screws (4) retaining the connectors CN2 to CN4.
4. Remove the 11 screws (5) attached on the bottom of the TX-RX unit to remove the shield cover.
5. Remove the 3 connectors CN1 (6), CN8 (7) and CN10 (8) connected to the TX-RX unit.
6. Remove the 4 screws (9) 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. (10).
8. Remove the 11 screws (11) mounting the TX-RX unit to remove the TX-RX unit.

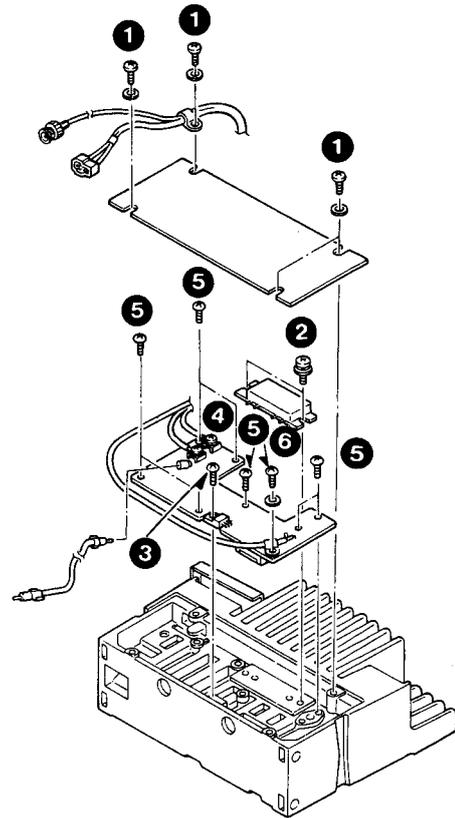


## DISASSEMBLY FOR REPAIR

### 3. Disassembling the Final ass'y unit

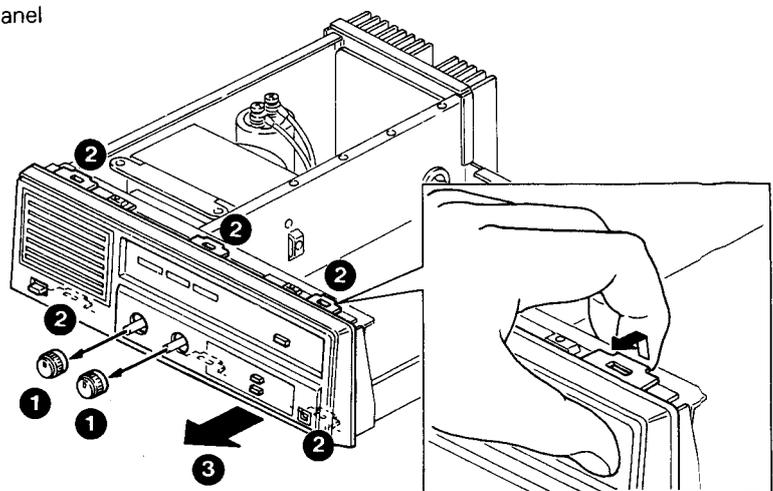
1. Remove the 4 screws (1) retaining the shield cover to remove the shield cover.
2. Remove the 2 screws (2) retaining the power module IC to the heat sink.
3. Remove the screw (3) retaining the transistor to the heat sink.
4. Remove the 2 screws (4) retaining the power supply cables.
5. Remove the 8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

**Note :** When replacing only the power module IC, remove the screws (2) and then remove the 5 soldered parts of the power module IC's terminals (6) to remove the power module IC.



### How to Remove the Panel

1. Pull off the VOLUME and SQUELCH knobs (1).
2. Release the 6 hooks (2) located on the upper and lower section, and holding the sub-panel by pushing them up with your finger. Then remove the sub-panel (3) by pulling it out toward the front.

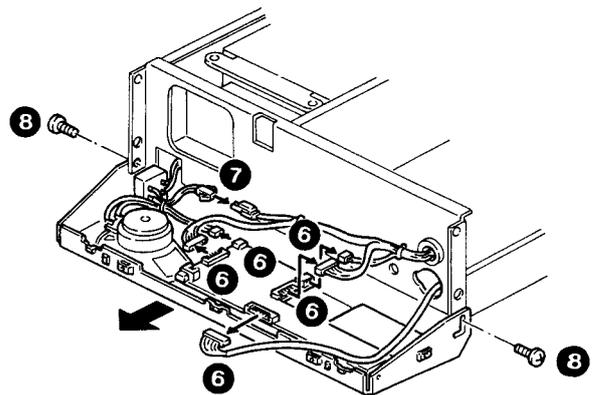
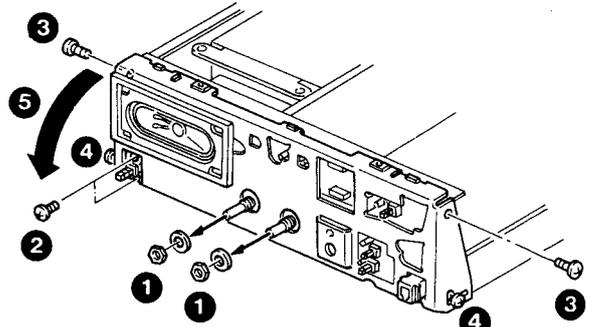


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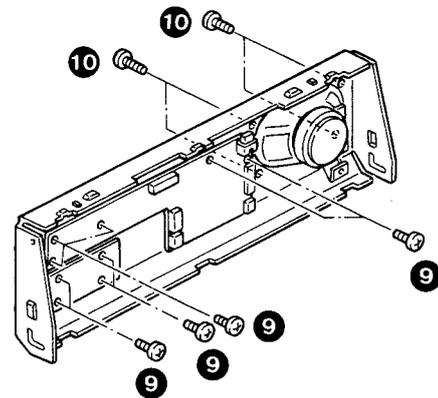
## DISASSEMBLY FOR REPAIR

### Disassembling the Sub-panel

1. Remove the 2 nuts and 2 washers holding the VOLUME and SQUELCH VRs (1), and remove the 2 screws (2) holding the POWER switch.
2. Remove 2 of the screws (3) holding the sub-panel, and loosen the other 2 screws (4), then tilt the sub-panel toward the front (5).
3. Remove the 5 connectors (6) connected to the Display unit, and remove the connector (7) connected to the POWER switch.
4. Remove the 2 remaining screws (8) holding the sub-panel to remove the sub-panel.



5. Remove the 9 screws (9) 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 (10) holding the speaker to the sub-panel to remove the speaker.

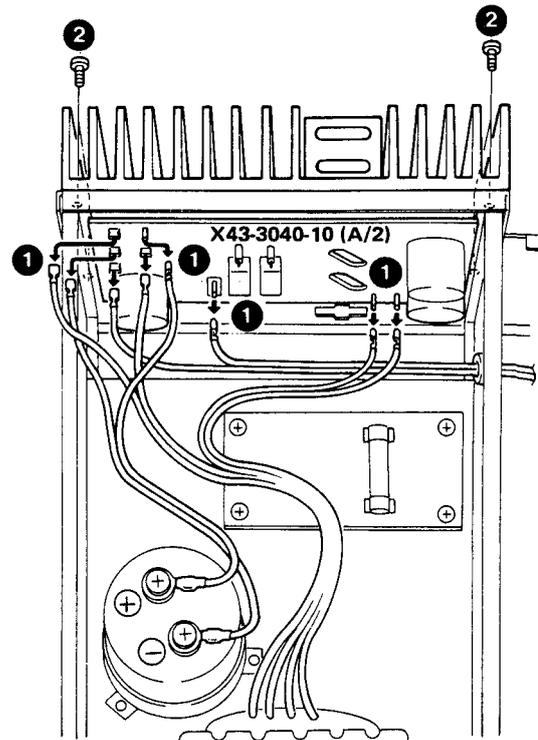


## DISASSEMBLY FOR REPAIR

### Disassembling the AVR unit

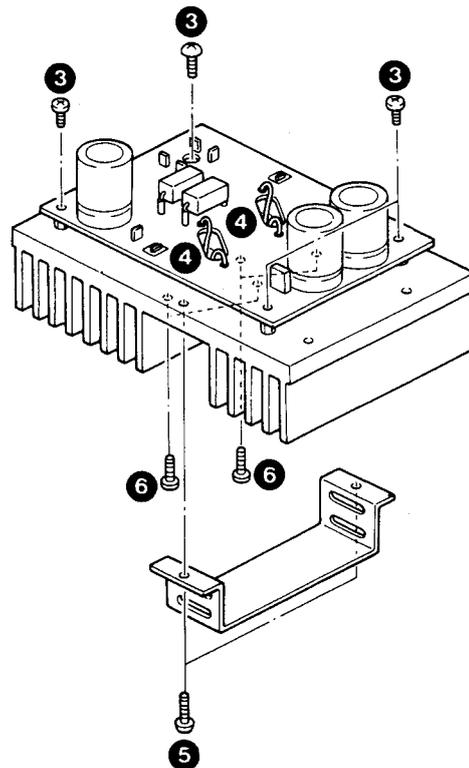
#### 1. How to remove the AVR unit (X43-3040-10) (A/2)

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



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

1. Remove the 4 screws (3) holding the AVR unit.
2. Desolder the 4 wires (4) connected to the bases and emitters of transistor Q5 and Q6.
3. Remove the 2 screws (5) on the radiation cover attached to the heat sink to remove the radiation cover.
4. Remove the 4 screws (6) of the transistors (Q5 and Q6) attached to the heat sink, and remove the AVR unit (A/2).

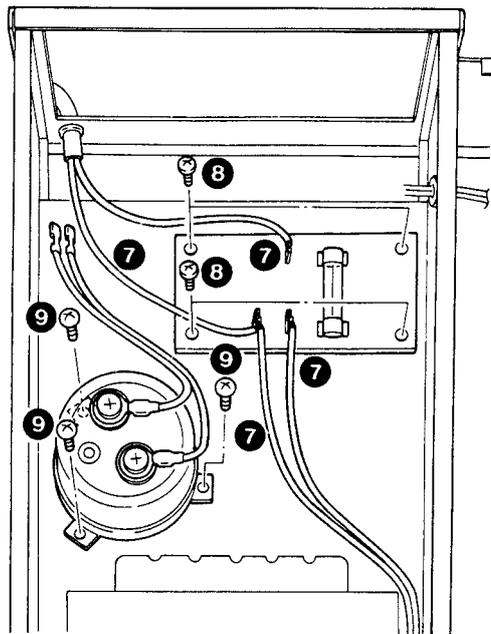


# TKR-820

## DISASSEMBLY FOR REPAIR

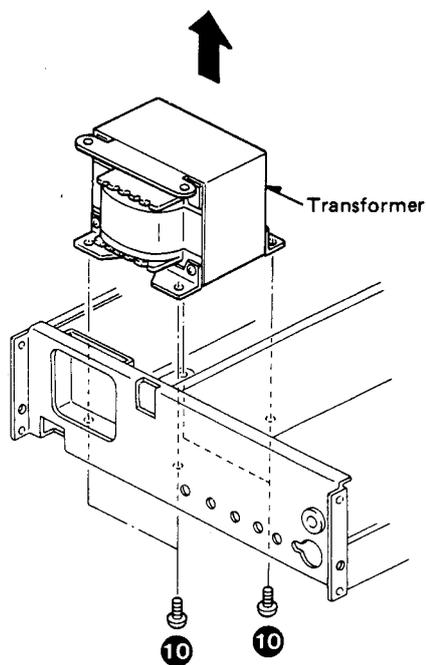
### 3. How to remove the AVR unit (X43-3040-10) (B/2) and the electrolytic capacitor (C101)

1. Remove the 4 wires (7) holding to the AVR unit.
2. Remove the 4 screws (8) holding the AVR unit to remove the AVR unit.
3. Remove the 3 screws (9) holding the electrolytic capacitor (C101).

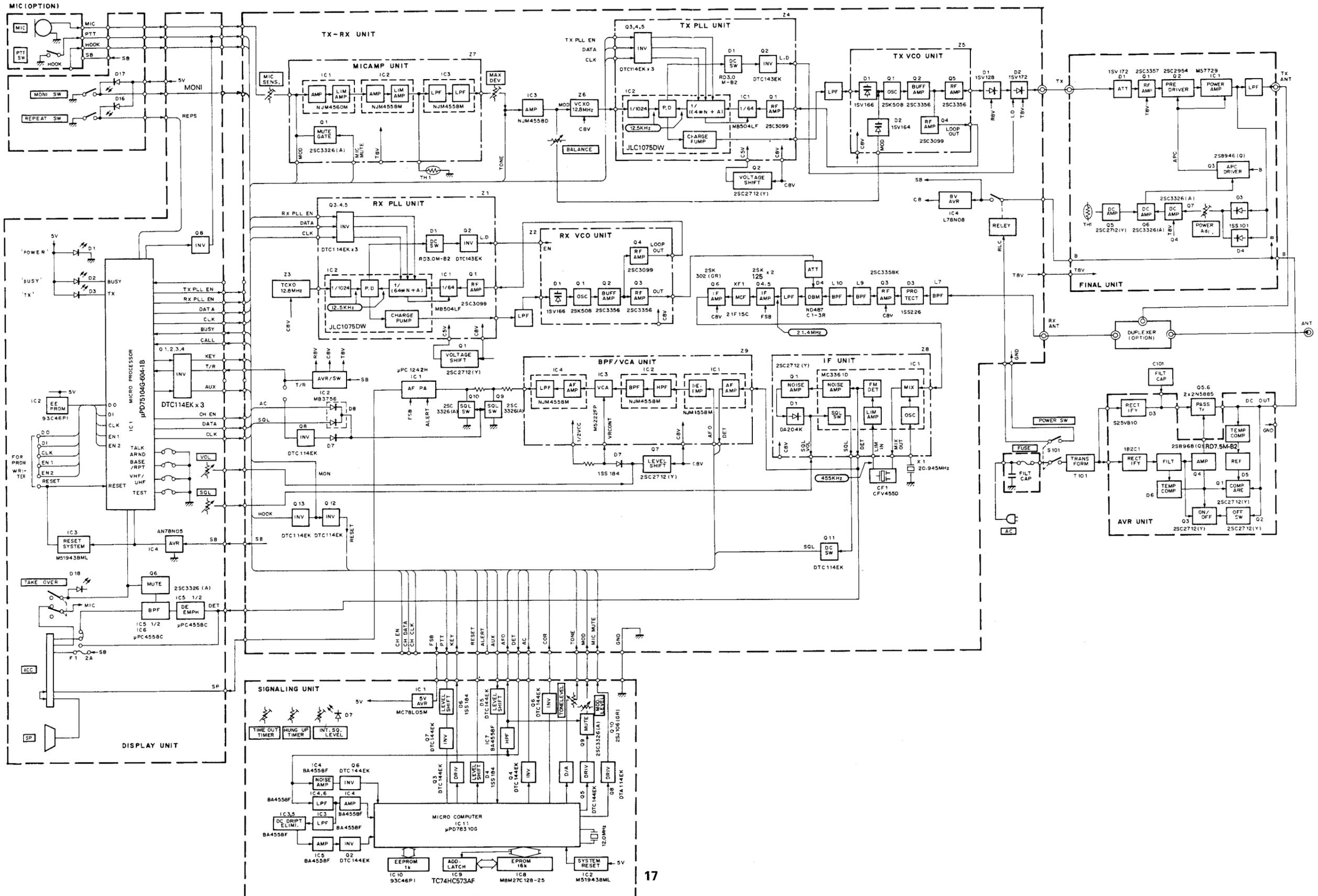


### 4. How to remove the power transformer

1. Remove the 4 screws (10) holding the power transformer to the bottom plate, and remove the power transformer.



# TKR-820 TKR-820 BLOCK DIAGRAM



## CIRCUIT DESCRIPTION

### Transmitter Circuit

The signal generated at the transmitter frequency synthesizer is amplified by RF amplifier transistors Q1 (2SC3357) and Q2 (2SC2954) and amplifier module IC1 (M57729) to a level of 25 watts 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 (1SS101) 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 (2SC3326A). The base current of Q3 (2SB946Q) is varied according to the difference from the comparison voltage at Q5, 6 (2SC3326A) so that the collector voltages of Q2 (2SC2954) 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 thermister (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.

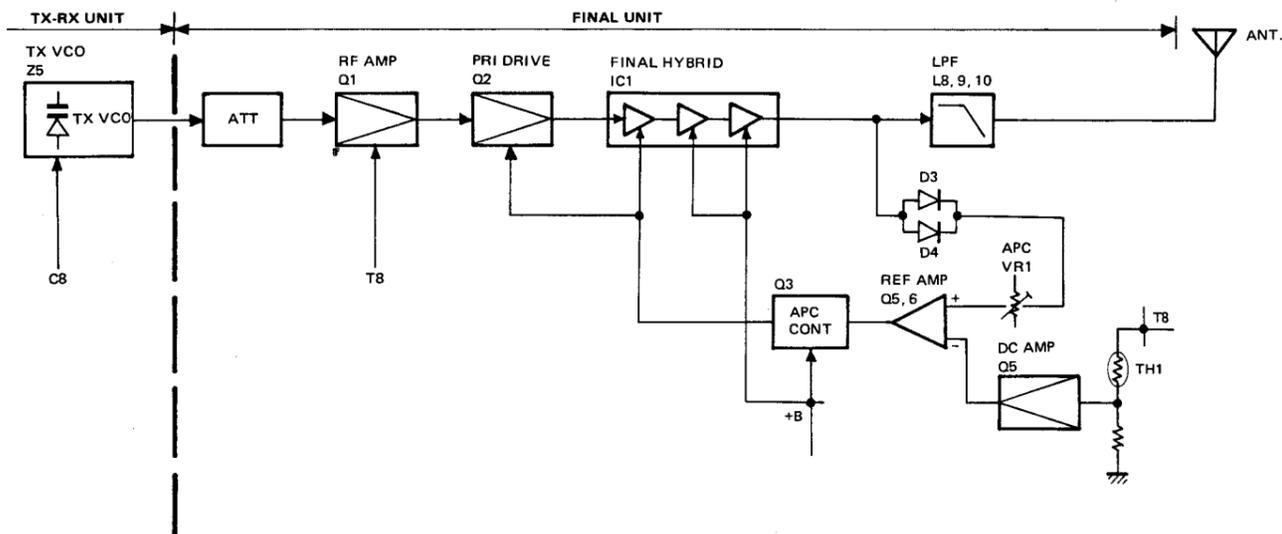


Fig. 1 Transmitter block diagram

## CIRCUIT DESCRIPTION

### Receiver Circuit

An incoming RF signal from the antenna is fed into a bandpass filter (L7). Then eliminated RF signal pass a protector D3 (1SS226).

The signal is then amplified by an RF amplifier (Q3, 2SC3358K) and filtered again by bandpass filters (L9 and L10). After amplification and filtering, the signal is applied to a double balanced modulator (DMB, D4, ND487C1-3R) 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 (first IF), which is applied to a 6-pole monolithic crystal filter (MCF, XF1) after being amplified by a buffer amplifier (Q4, 2SK125 and Q5, 2SK125 connected in parallel). The signal out of the MCF is further amplified by a first IF amplifier (Q6, 2SK302GR) 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 second IF signal. The signal obtained at the second 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 (NJM4558M) 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, M522FP), 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,  $\mu$ PC1242H) after going through squelch switches (Q9 and Q10, 2SC3326A).

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.

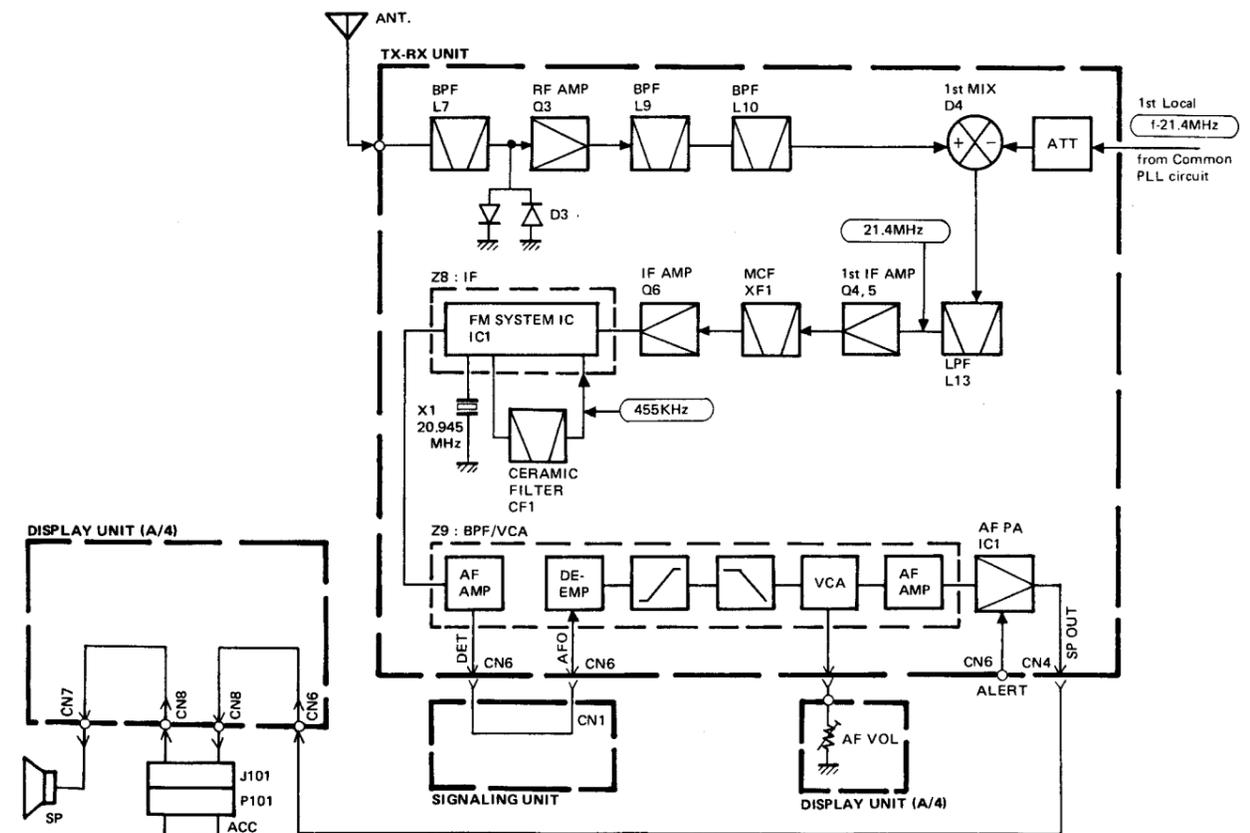


Fig. 2 Receiver block diagram

## CIRCUIT DESCRIPTION

### Squelch Circuit

The high frequency component of the recovered audio signal is fed to a noise amplifier within IC1 (MC3361D) of Z8 and it is further amplified by an external noise amplifier (Q1, 2SC2712Y). The signal is then detected by a noise detector (D1, DA204K) and applied to the squelch switch in IC1. This detected noise is also routed to the squelch control (VR3) through the display unit (C/4) for adjusting the noise squelch sensitivity.

The busy information is sent from the above IC1 ( $\mu$ PD 75104G) 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 (1SS184) and applied to squelch switch transistors

Q9 (2SC3326A) and Q10 (2SC3326A) 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

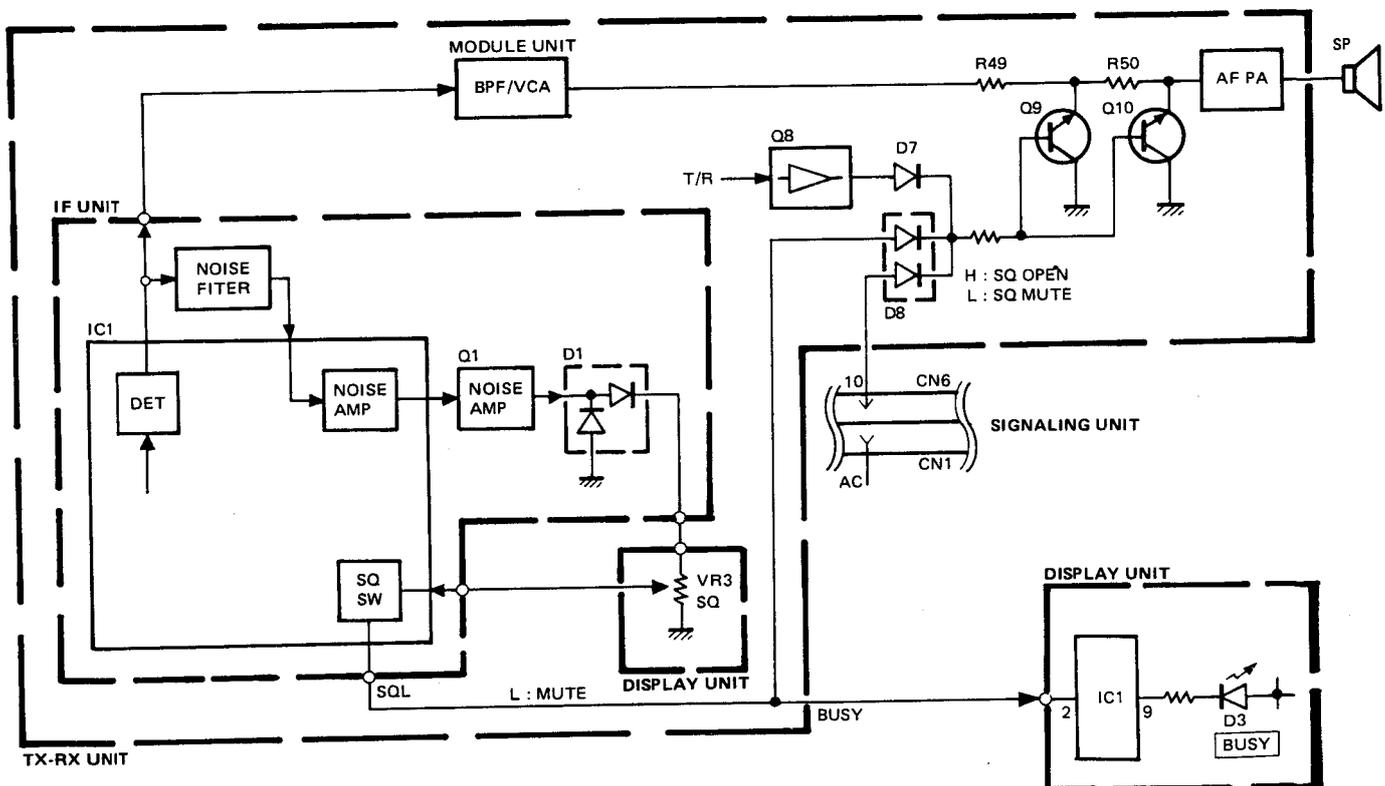


Fig. 3 Squelch circuit

## CIRCUIT DESCRIPTION

### 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  $\pm 2.5$ ppm from  $-30$  to  $+60$  degrees Celsius. This output signal is fed to the frequency synthesizer IC (IC2, JLC1075DW) 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 (MB504F) 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  $\pm 2.5$ ppm from  $-30$  to  $+60$  degrees Celsius. This output signal is fed to the frequency synthesizer IC (IC2, JLC1075DW) 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.

### 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.

## CIRCUIT DESCRIPTION

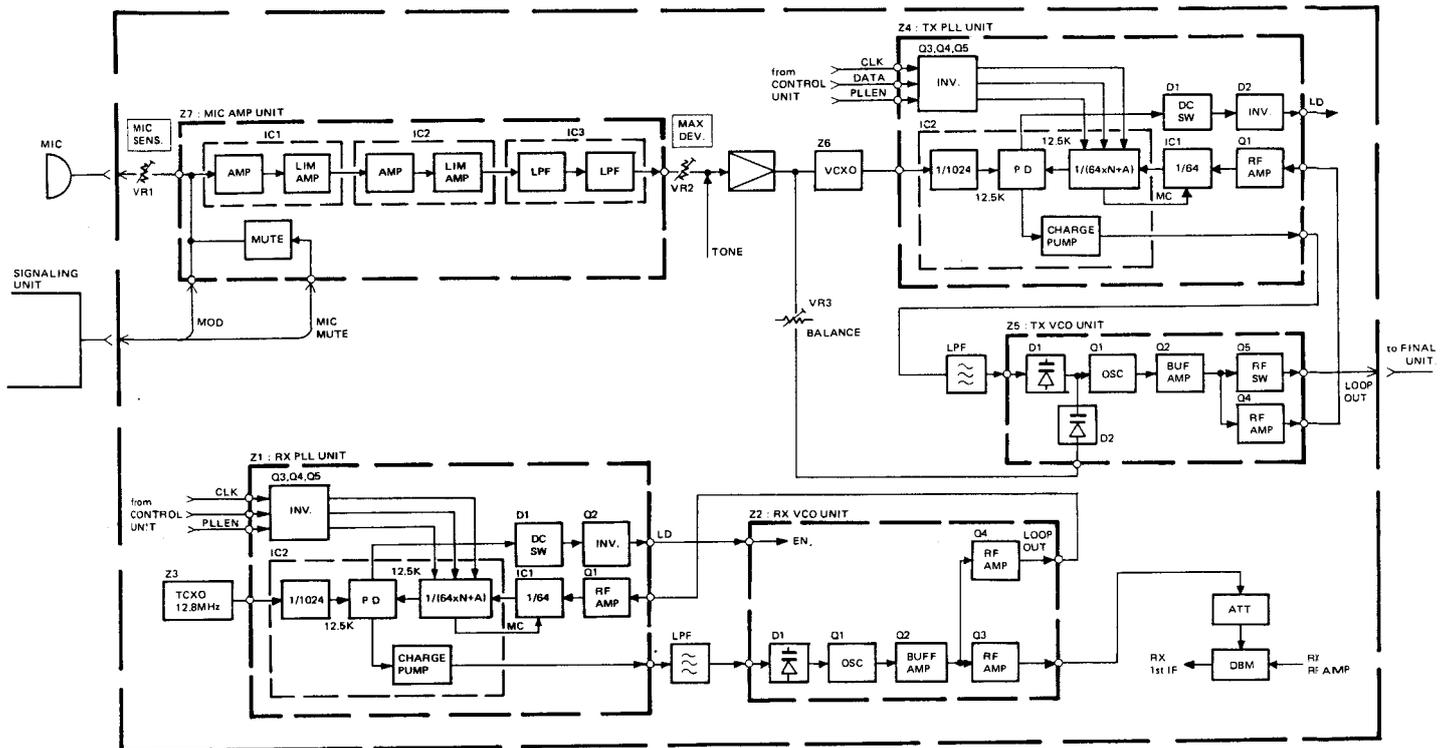


Fig. 4 PLL & Modulation circuit block diagram

### 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.

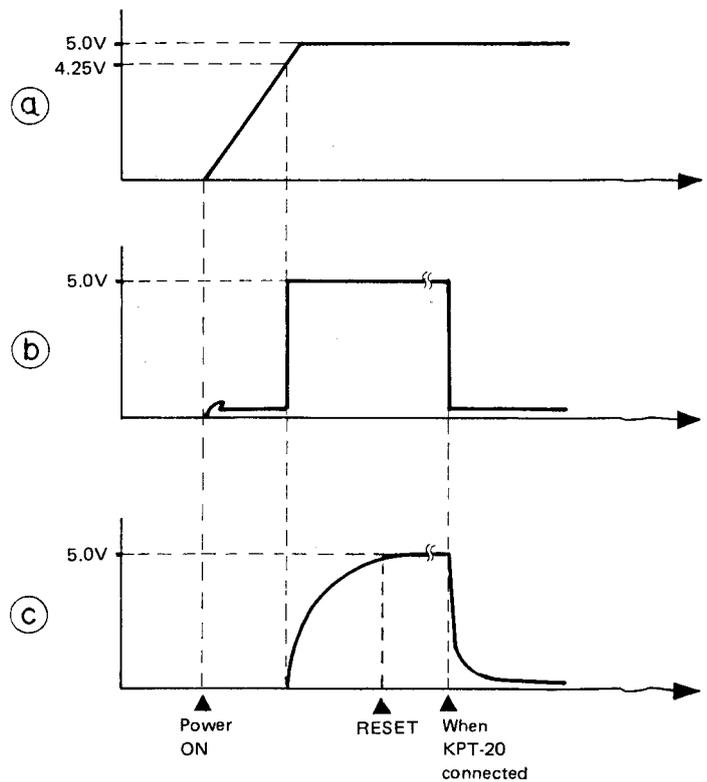
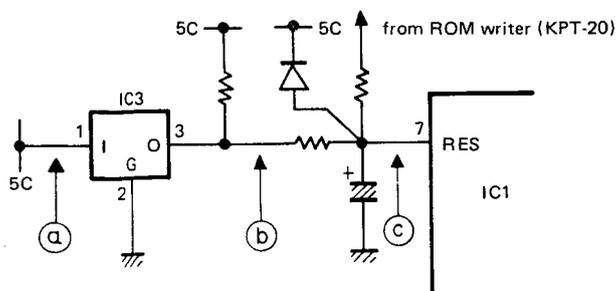


Fig. 5 Reset circuit block diagram

## CIRCUIT DESCRIPTION

### EEPROM Programming

Programming of data into the EEPROM (IC2) in the display unit is done by connecting the KPT-20 programmer to the transceiver by cable provided with the KPT-20. 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 become 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 controls 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 TAKE OVER 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 : $\pm 750\text{Hz}$ DEV at approx. $600\Omega$ input impedance, $0.2\text{Vp-p}$ . Degree of modulation is to be adjusted externally.	
4	DO	Direct detection output / Direct output of detected (unfiltered) signal : Output impedance $10\text{k}\Omega$ . Output level : $-10\text{dBs}$ at $\pm 3\text{kHz}$ DEV, $1\text{kHz}$ .	
5	LI	Line input / Input terminal for external modulation. Standard modulation is provided at $600\Omega$ , $0.24\text{dBm}$ . Same as MIKE 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	LO	Line output / Used for output of received signal, for standard modulation at $600\Omega$ , $-10\text{dBm}$ . $-6\text{dB/oct}$ , $300\text{Hz}$ to $3\text{kHz}$ . 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 $10\text{mA}$ 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.

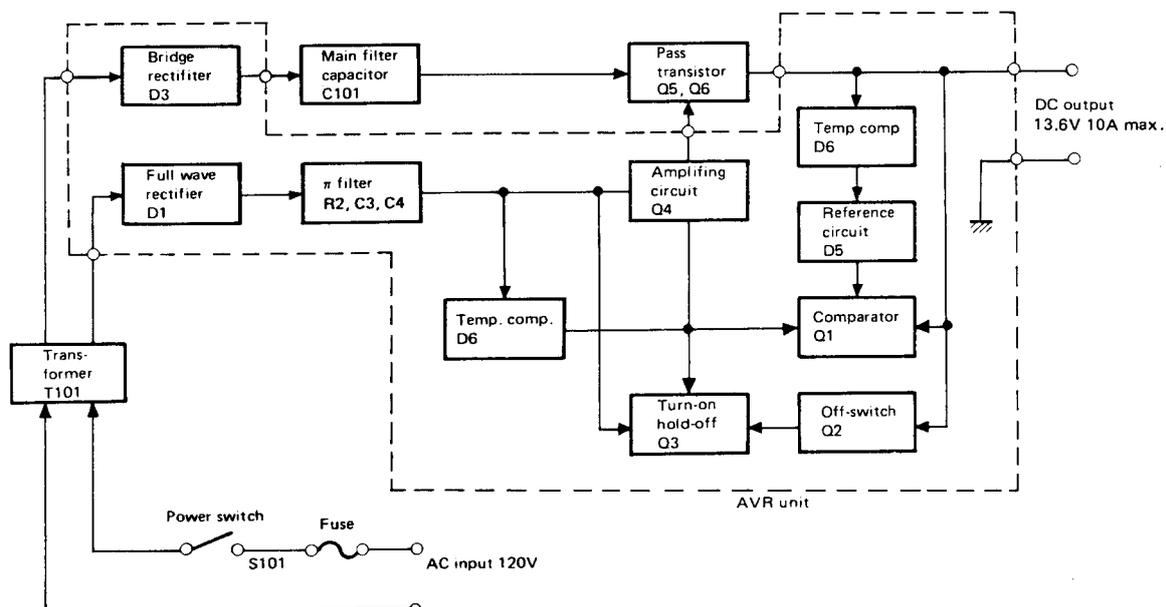


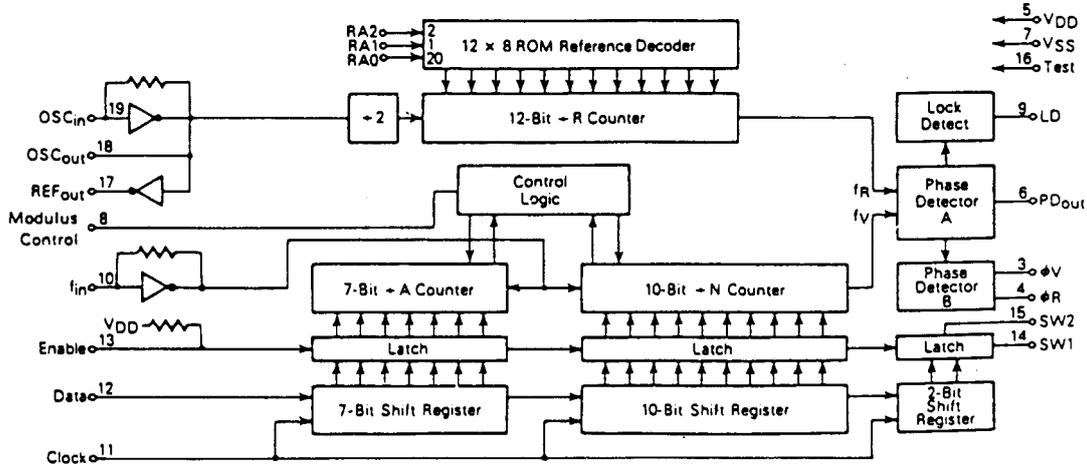
Fig. 6 AVR circuit block diagram

# TKR-820

## SEMICONDUCTOR DATA

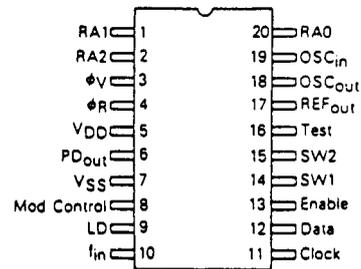
### JLC1075DW : PL system (TXPLL, RX PLL IC2)

• Block diagram



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

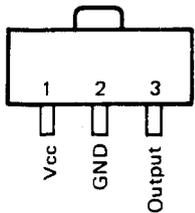
• Terminal connection diagram



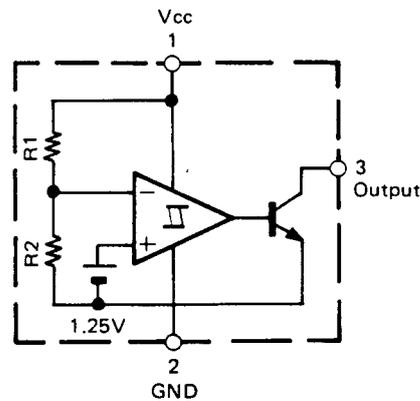
(Top view)

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

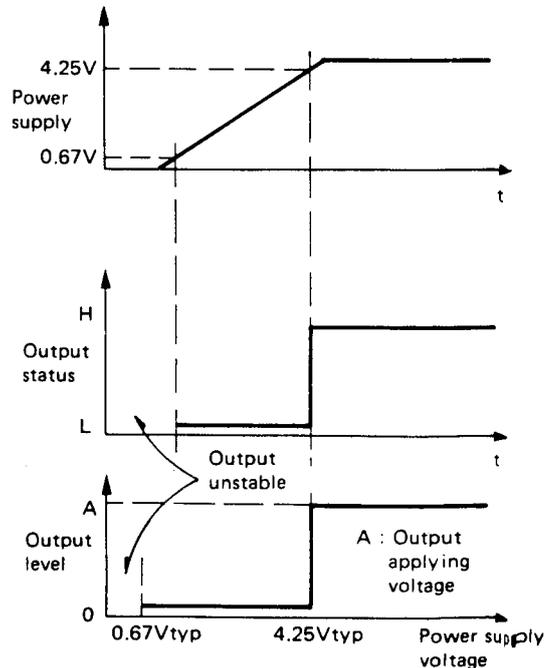
• Terminal connection diagram



• Block diagram



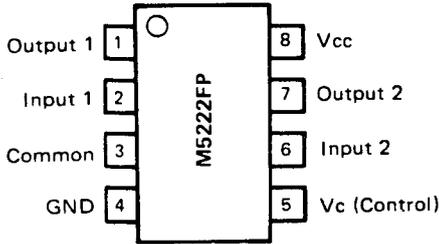
• Timing chart



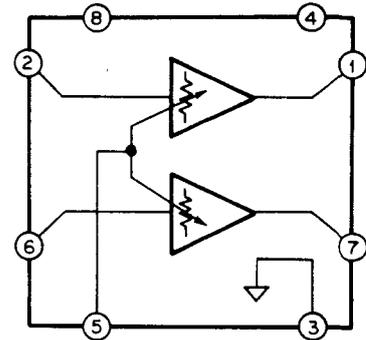
## SEMICONDUCTOR DATA

### M5222FP : Electronic attenuator (BPF/VCA IC3)

#### Terminal connection diagram

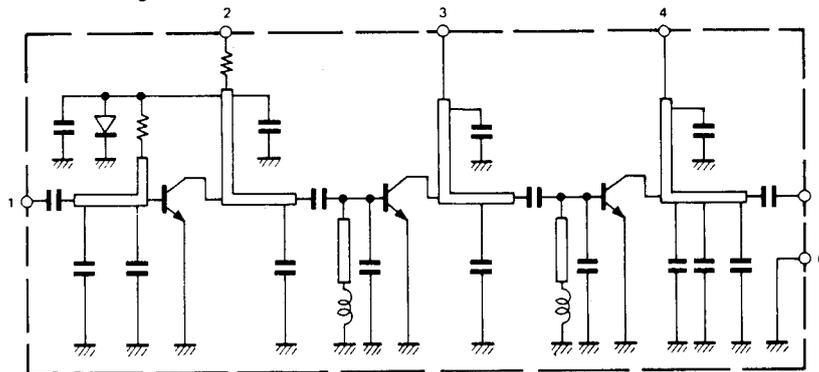
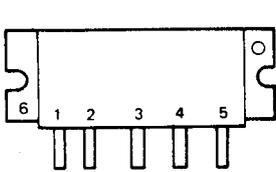


#### Equivalent circuit



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

#### Terminal connection diagram      Block diagram



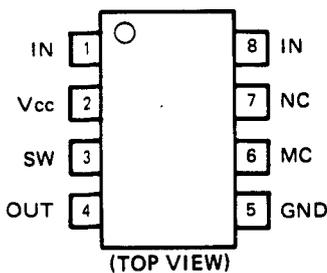
- 1 : Input
- 2 : Pre-drive + B
- 3 : Bias + B
- 4 : Final + B
- 5 : Output
- 6 : GND

#### Electrical characteristics

Symbol	Item	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
P <sub>O</sub>	Output power	f = H-01-P : 430~450MHz = UH-P : 470~490MHz = SH-22 : 490~520MHz = L-22 : 400~430MHz	30	33		W
η <sub>T</sub>	Total efficiency		40	45		%
	2nd spurious				-30	dB
	Spurious after 3rd.				-30	dB
ρ <sub>in</sub>	Input SWR	V <sub>cc</sub> = 12.5V			2.8	-
ρ <sub>out</sub>	Output SWR	P <sub>in</sub> = 0.3W, Z <sub>G</sub> = Z <sub>L</sub> = 50Ω		2		-

### MB504F : Prescaler (TX PLL, RX PLL IC1)

#### Terminal connection diagram



#### Function table

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

**Note :** SW terminal  
H : V<sub>cc</sub>, L : Open  
MC terminal  
H : 2.0V~V<sub>cc</sub>, L : GND~0.8V

#### Explanation of terminal functions

Pin No.	Symbol	Function
1	IN	Input.
2	V <sub>cc</sub>	Power supply.
3	SW	Dividing ratio select pin.
4	OUT	Output.
5	GND	Ground.
6	MC	Module set pin.
7	NC	Non connector.
8	IN	Compensated input.

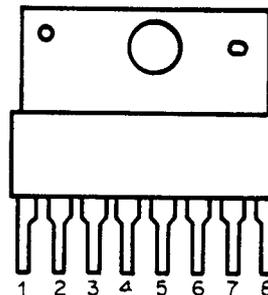
### MB3756 : Voltage regulator (TX-RX UNIT IC2)

#### • Electrical characteristics

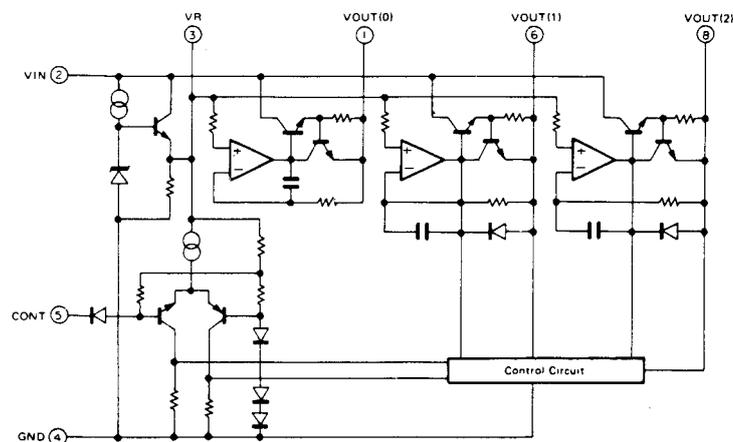
Item	Symbol	Condition	Rating			Unit
			Min.	Typ.	Max.	
Input voltage range	V <sub>IN</sub>		10.6	—	18	V
Output voltage	V <sub>O</sub>		7.8	8.2	8.6	V
Input stability		11V ≤ V <sub>IN</sub> ≤ 18V	—	20	100	mV
		(V <sub>O1</sub> , V <sub>O2</sub> ) 1mA ≤ I <sub>L</sub> ≤ 100mA	—	15	80	mV
Load stability		(V <sub>O2</sub> ) 1mA ≤ I <sub>L</sub> ≤ 200mA	—	20	100	mV
			—	10	50	mV
Voltage difference between outputs	ΔV <sub>O</sub>		—	10	50	mV
Peak output load	I <sub>sc</sub>	(V <sub>O1</sub> , V <sub>O2</sub> )	—	200	—	mA
		(V <sub>O2</sub> )	—	350	—	mA
Output voltage short-circuit current (Active "L")	V <sub>O1</sub> (L)	V <sub>IC</sub> = 0.8V	0	—	0.2	V
	V <sub>O2</sub> (L)	V <sub>IC</sub> = 0.8V	7.8	8.2	8.6	V
Output voltage short-circuit current (Active "H")	V <sub>O1</sub> (H)	V <sub>IC</sub> = 2.0V	7.8	8.2	8.6	V
	V <sub>O2</sub> (H)	V <sub>IC</sub> = 2.0V	0	—	0.2	V

(T<sub>J</sub> = 25°C, V<sub>IN</sub> = 14, R<sub>L0</sub> = R<sub>L1</sub> = 200Ω, R<sub>L2</sub> = 100Ω)

#### • Terminal connection diagram

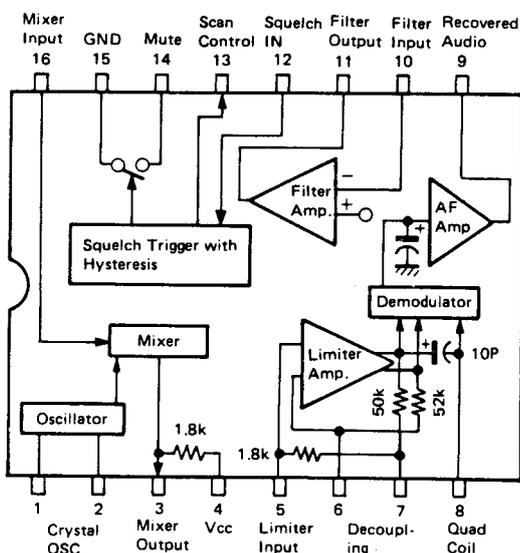


#### • Equivalent circuit



### MC3361D : IF system (IF IC1)

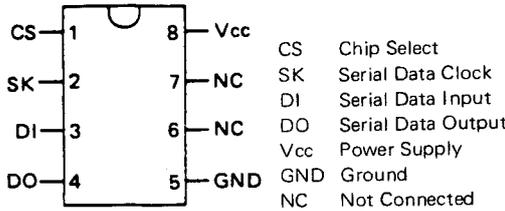
#### • Block diagram



## SEMICONDUCTOR DATA

### 93C46PI : EEPROM (Signaling unit IC10, Display unit IC2)

#### • Terminal connection diagram



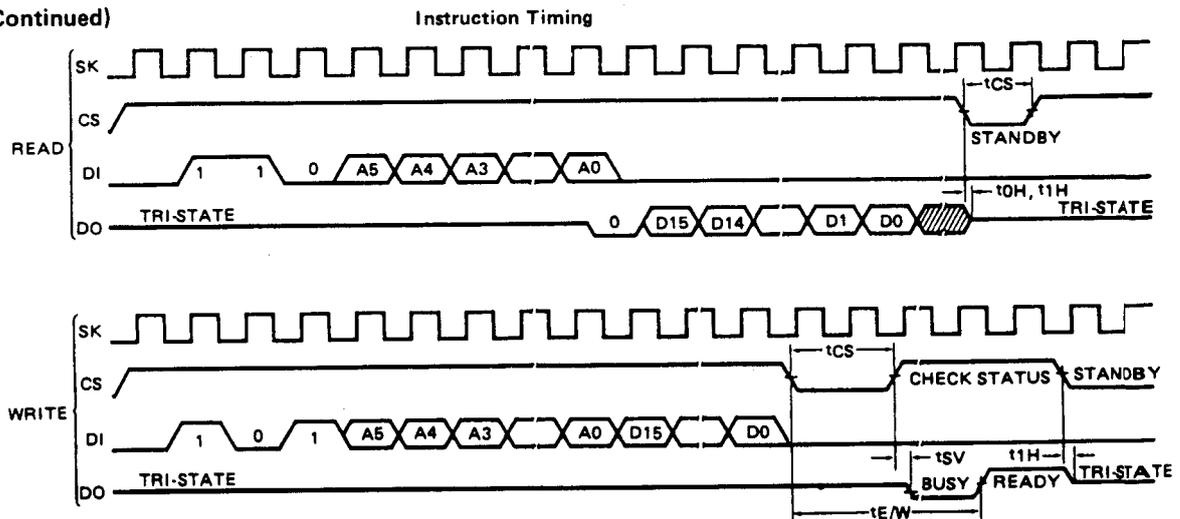
(Top View)

#### • Instruction set for 93C46PI

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

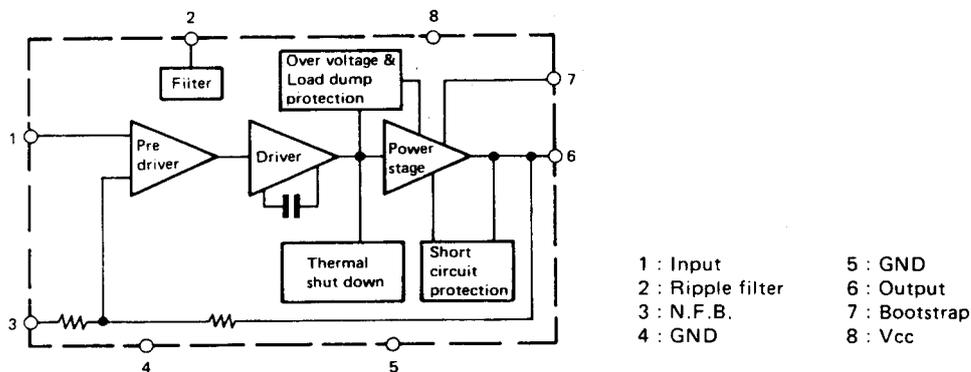
NMC9346E has 6 instructions as shown. Note that the MSB of any given instruction is a "1" and is viewed as a start bit in the interface sequence. The next 8 bits carry the op code and the 6-bit address for 1 of 64, 16-bit registers.

#### • Timing chart (Continued)



### μPC1242H : AF power amplifier (TX-RX UNIT IC1)

#### • Block diagram



#### • Electrical characteristics

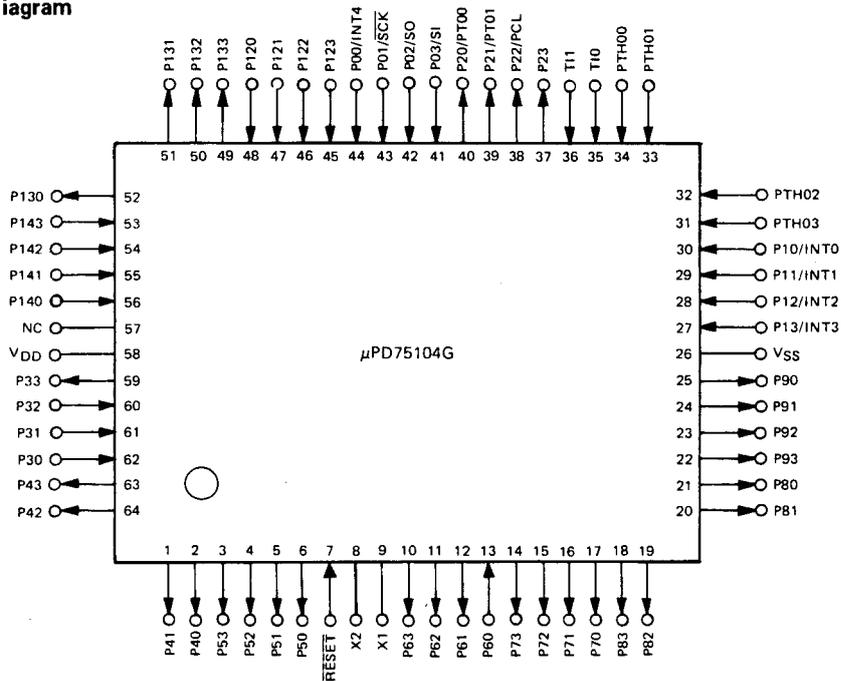
Item	Symbol	Condition	Rating			Unit
			MIN.	TYP.	MAX.	
DC current	I <sub>cc</sub>	v <sub>in</sub> = 0	25	45	80	mA
Output power	P <sub>O</sub>	T.H.D. = 10%	5.0	5.8		W
		R <sub>L</sub> = 2Ω, T.H.D. = 10%		9.2		W
Distortion	T.H.D.	P <sub>O</sub> = 0.5W		0.1	1.0	%
		R <sub>L</sub> = 2Ω, P <sub>O</sub> = 1W		0.4		%
Max. output power	P <sub>OM</sub>			9.5		W
Voltage gain	A <sub>v</sub>	P <sub>O</sub> = 0.5W	49	51.5	54	dB
Noise output voltage	v <sub>n</sub>	R <sub>G</sub> = 10kΩ		1.4	4	mV <sub>rms</sub>

(T<sub>a</sub> = 25°C, V<sub>cc</sub> = 13.2V, f = 1kHz, R<sub>L</sub> = 4Ω)

## SEMICONDUCTOR DATA

### μPD75104G-604-1B : Microprocessor (Display unit IC1)

● Terminal connection diagram



● Explanation of terminal functions

No.	Port	I/O	Signal name	No.	Port	I/O	Signal name
1	P41	O	LED (option) b seg. (Active "H").	33	PTH01	I	F1.
2	P40	O	LED (option) a seg. (Active "H").	34	PTH00	I	F0.
3	P53	O	GND (Active "L").	35	T10	I	GND.
4	P52	O	LED (option) g seg. (Active "H").	36	T11	I	GND.
5	P51	O	LED (option) f seg. (Active "H").	37	P23	O	TX LED (Active "H").
6	P50	O	LED (option) e seg. (Active "H").	38	P22/PCL	O	BUSY LED (Active "H").
7	RESET	I	System reset input.	39	P21/PT1	O	CHECK OUT (Active "L").
8	X2	-	X'tal.	40	P20/PT0	O	DEL/ADD LED (Active "L").
9	X1	-	X'tal.	41	P03/SI	I	PTT (Remote).
10	P63	O	CS (EEPROM) (Active "L").	42	P02/SO	I	MON (Remote).
11	P62	O	CLK (EEPROM) (Active "L").	43	P01/SCK	I	GND.
12	P61	O	DI (EEPROM) (Active "L").	44	P00/INT4	I	TAKEOVER SW
13	P60	I	DO (EEPROM).	45	P123	I	MON SW.
14	P73	O	CLK (Active "L").	46	P122	I	AUX SW.
15	P72	O	DATA (Active "L").	47	P121	I	KEY.
16	P71	O	PLL EN (Active "H").	48	P120	I	BUSY.
17	P70	O	CH EN (Active "L").	49	P133	O	TX PLL EN (Active "H").
18	P83	O	LED d seg. (Active "H").	50	P132	O	T/R (Active "L").
19	P82	O	LED c seg. (Active "H").	51	P131	O	PTT (Active "L").
20	P81	O	LED b seg. (Active "H").	52	P130	O	MON (Active "L").
21	P80	O	LED a seg. (Active "H").	53	P143	I	T.A/Not use.
22	P93	O	GND (Active "L").	54	P142	I	BASE/REP.
23	P92	O	LED g seg. (Active "H").	55	P141	I	VHF/UHF.
24	P91	O	LED f seg. (Active "H").	56	P140	I	Not use/Test.
25	P90	O	LED e seg. (Active "H").	57	NC (Vpp)	-	No connection.
26	VSS	-	GND.	58	VDD	-	+5V.
27	P13/INT3	I	GND.	59	P33	O	AUX (Active "L").
28	P12/INT2	I	GND.	60	P32	I	CALL.
29	P11/INT1	I	ENC-B.	61	P31	I	SER-OUT.
30	P10/INT0	I	ENC-A.	62	P30	I	SER-IN.
31	PTH03	I	F3.	63	P43	O	LED (option) d seg. (Active "H").
32	PTH02	I	F2.	64	P42	O	LED (option) c seg. (Active "H").

## DESCRIPTION OF COMPONENTS

## AVR UNIT (X43-3040-10)

Ref. No.	Parts No.	Descriptions
Q1 ~ 3	2SC2712(Y)	DC amplifier
Q4	2SB968(Q)	DC amplifier
Q5, 6	2N5885	DC amplifier
D1	1B2C1	Rectifier
D3	S25VB10	Rectifier
D4	1SS181	Temperature compensate
D5	RD7.5M-B2	Voltage reference
D6	1SS181	Temperature compensate

## DISPLAY UNIT (X54-3070-11)

Ref. No.	Parts No.	Descriptions
IC1	$\mu$ PD75104G	Microprocessor
IC2	93C46PI	EEPROM
IC3	M51943BML	Precision reference
IC4	AN78N05	Voltage regulator 5V
IC5	$\mu$ PC4558C	Audio amplifier
IC6	$\mu$ PC4558C	Active filter
Q1, 2	DTC114EK	DC switch
Q3	2SA1162(Y)	Digital switch
Q6	2SC3326(A)	AF switch
Q7, 8	DTC114EK	DC switch
D1	B30-0855-05	LED (Red)
D2	B30-0856-05	LED (Green)
D3	B30-0855-05	LED (Red)
D4 ~ 6	1SS184	Voltage clamp
D7, 8	1SS181	Current steering
D10, 11	1SS181	Current steering
D13	1SS181	Current steering
D16	B30-0857-05	LED (Yellow)
D17	B30-0856-05	LED (Green)
D18	B30-0857-05	LED (Yellow)
D19, 21	1SS272	Current steering
D24	ISS133	Current setting

## FINAL UNIT (X45-3250-XX)

Ref. No.	Parts No.	Descriptions
IC1	M57729	TX power amplifier
Q1	2SC3357	RF amplifier
Q2	2SC2954	RF amplifier
Q3	2SB946(Q)	DC amplifier
Q4	2SC2712(Y)	DC amplifier
Q5, 6	2SC3326(A)	DC amplifier
D1	1SV172	RF switch
D2	1SS226	Voltage reference
D3, 4	1SS101	RF detect
D5	DSA3A1	Reverse polarity protection

## SIGNALING UNIT (X52-3140-10)

Ref. No.	Parts No.	Description
IC1	MC78L05M	Voltage regulator 5V
IC2	M51943BML	Reset system
IC3	BA4558F	Data recovery, active filter
IC4	BA4558F	Active filter
IC5	BA4558F	Data recovery
IC6, 7	BA4558F	Active filter
IC8	27C128-25	EPROM
IC9	TC74HC573AF	Data latch
IC10	93C46PI	EEPROM
IC11	$\mu$ PD78310G	Microprocessor
Q1	DTC144EK	Level translator
Q2	DTC144EK	Inverter
Q3 ~ 7	DTC144EK	DC switch
Q8	DTA114EK	DC switch
Q9	2SC3326(A)	Audio amplifier
Q10	2SJ106(GR)	Audio amplifier
D1, 2	1SS184	Current steering
D3	HSM88AS	Voltage clamp
D4 ~ 6	1SS184	Current steering
D7	B30-0838-05	LED (Red)
D8	MTZ8.2JB	Voltage reference

## TX-RX UNIT (X57-3270-XX)

Ref. No.	Parts No.	Descriptions
IC1	$\mu$ PC1242H	AF power amplifier
IC2	MB3756	Voltage regulator
IC3	NJM4558D	AF amplifier
IC4	L78N08	Voltage regulator
Q1, 2	2SC2712(Y)	Voltage shift
Q3	2SC3358K	RF amplifier
Q4, 5	2SK125	IF amplifier
Q6	2SK302(GR)	IF amplifier
Q7	2SC2712(Y)	Level translator
Q8	DTC114EK	Inverter
Q9, 10	2SC3326(A)	Audio mute switch
Q11	DTC114EK	DC switch
Q12, 13	DTC114EK	Inverter
D1	1SV128	TX VCO output mute
D2	1SV172	TX VCO output mute
D3	1SS226	Voltage clamp
D4	ND487C1-3R	Double balanced modulator
D5~11	1SS184	Current steering

# TKR-820

## DESCRIPTION OF COMPONENTS

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

Ref. No.	Parts No.	Descriptions
IC1	MB504F	Prescaler
IC2	JLC1075DW	PLL system
Q1	2SC3829TS	RF amplifier
Q2 ~ 5	DTC114EK	Inverter
D1	RD3.0M-B2	Level shifter

### MIC AMP : Z7 (X59-3210-10)

Ref. no.	Parts no.	Descriptions
IC1	NJM4560M	Mic amplifier/Limiter
IC2	NJM4558M	Limiter
IC3	NJM4558M	Active filter
Q1	2SC3326(A)	Muting switch

### RX VCO : Z2 (X58-3150-XX)

Ref. No.	Parts No.	Descriptions
Q1	2SK508(K52)	Oscillator
Q2, 3	2SC3356	Buffer amplifier
Q4	2SC3099	Buffer amplifier
D1	1SV166	Tuning

### IF : Z8 (X59-3220-10)

Ref. No.	Parts No.	Descriptions
IC1	MC3361D	IF system
Q1	2SC2712(Y)	Noise amplifier
D1	DA204K	Noise detector

### TX VCO : Z5 (X58-3460-XX)

Ref. No.	Parts No.	Descriptions
Q1	2SK508NV (K52)	Oscillator
Q2	2SC3356	Buffer amplifier
Q3, 4	2SC3356	RF amplifier
D1	1SV166	Tuning
D2	1SV164	Modulator

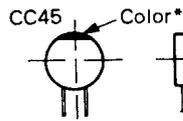
### BPF/VCA : Z9 (X59-3230-10)

Ref. No.	Parts No.	Descriptions
IC1	NJM4558M	Audio amplifier
IC2	NJM4558M	Active filter
IC3	M5222FP	Electronic attenuator
IC4	NJM4558M	Active filter

## PARTS LIST

### CAPACITORS

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



#### Capacitor value

1 0 3 = 0.01μF

0 1 0 = 1pF

1 0 0 = 10pF

1 0 1 = 100pF

1 0 2 = 1000pF = 0.001μF

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

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

#### Temperature Coefficient

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

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

Example CC45TH = -470 ± 60 ppm/°C

#### Tolerance

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

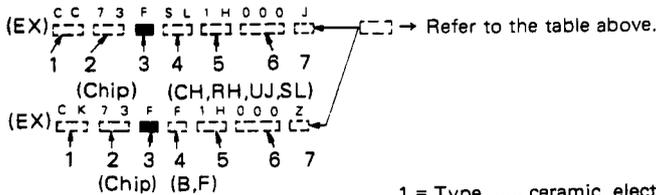
Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Less than 10 pF

#### Rating voltage

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

#### Chip capacitors



#### Dimension

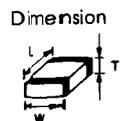
Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

#### Dimension

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

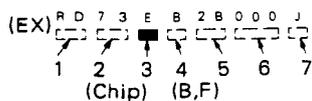
#### Rating wattage

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



### RESISTORS

#### Chip resistor (Carbon)



#### Carbon resistor (Normal type)



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

# TKR-820

## PARTS LIST

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TKR-820

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
<b>TKR-820</b>						
1	1A		A01-1059-01	CASE (UPPER)		
2	3A		A01-1060-01	CASE (LOWER)		
3	2C		A13-0684-01	FRAME		
4	3A		A20-2666-11	PANEL		
5	3A		A21-1519-03	DRESSING PLATE		
6	3A		A21-1520-03	DRESSING PLATE(REPEAT, MONI)		
7	2A		A22-0758-01	SUB PANEL		
8	2B		A22-0759-02	SUB PANEL		
9	2B		A23-1508-02	REAR PANEL		
10	2A		A40-0623-02	BOTTOM PLATE (AVR)		
11	2A		A50-0409-03	SIDE PLATE		
12	2B	*	A50-0410-13	SIDE PLATE		
			B42-3348-04	LABEL(TX)		
			B42-3349-04	LABEL(RX)		
		*	B42-3404-04	LABEL(COCCOM 406-430MHZ)		K4
		*	B42-3405-04	LABEL(COCCOM 450-470MHZ)		KM
		*	B42-3406-04	LABEL(COCCOM 470-490MHZ)		K2M2
		*	B42-3407-04	LABEL(COCCOM 490-512MHZ)		K3
		*	B42-3414-04	LABEL(COCCOM 400-430MHZ)		M4
		*	B42-3415-04	LABEL(COCCOM 490-520MHZ)		M3
		*	B42-3362-04	DOC LABEL		
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		MM2
16	2B	*	B40-7664-04	MODEL NAME PLATE		M3M4
17	1A		B41-0659-14	CAUTION LABEL		
18	1F	*	B46-0409-30	WARRANTY CARD		
19	1F	*	B50-8263-00	INSTRUCTION MANUAL		
C101	1A		C90-2084-05	ELECTRO CAPA(AL) 68000UF 25WV		
			E31-3435-05	CONNECTING WIRE		
			E31-3437-05	CONNECTING WIRE (SP)		
			E31-3438-05	CONNECTING WIRE (RED)		
			E31-3439-05	CONNECTING WIRE (BLACK)		
			E31-3446-05	CONNECTING WIRE (2P) POWER SW		
			E40-5197-05	PIN CONNECTOR (7P)		
			E40-5198-05	PIN CONNECTOR (9P)		
			E40-5199-05	PIN CONNECTOR (11P)		
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		KK2
24	1B		E30-2125-05	AC POWER CORD		K3K4
24	1B	*	E30-2153-05	AC POWER CORD		MM2
24	1B	*	E30-2153-05	AC POWER CORD		M3M4
P101	2B		E31-3228-05	SHORT PLUG(ACCESSORY)		
W101	2B		E31-3390-05	CONNECTING WIRE		
W102		*	E31-3474-15	CONNECTING WIRE (9P, 7P)		
W103		*	E31-3473-15	CONNECTING WIRE (11P)		

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

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

△ indicates safety critical components.

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TKR-820

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W106	2B	*	E31-3468-15	CONNECTING CABLE(BNC-BNC)		
25	1B, 2E	*	F05-1222-05	FUSE (1.25A)	MM2	
25	1B, 2E	*	F05-1222-05	FUSE (1.25A)	M3M4	
25	1B, 2E		F06-3024-05	FUSE (3A)	KK2	
25	1B, 2E		F06-3024-05	FUSE (3A)	K3K4	
26	1B		F07-0878-04	COVER (REAR PANEL)		
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)		
32	2C		G02-0570-04	LEAF SPRING		
33	3A		G09-0405-05	SPRING (VOL, SQL)		
34	2A		G13-0895-04	CUSHION(SP)		
35	3A		G13-0912-04	CUSHION(PANEL)		
36	3E		H13-0820-04	PACKING FIXTUEER		
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	2E		H25-0117-04	PROTECTION BAG (80X250)		
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 (DUPLXER)		
52	2D		J21-4253-04	MOUNTING HARDWARE (HEAT SINK)		
53	1B		J41-0024-15	BUSHING (AC CORD)		
54	2C		J42-0452-05	BUSHING		
55	2B		J42-0455-05	BUSHING		
56	2D, 3D		J50-0401-05	HINGE		
57	2A, 2B		J61-0023-05	WIRE BAND		
			J61-0307-05	WIRE BAND		
61	2A		K29-3146-04	KNOB (POWER)		
62	3A		K29-3147-03	KNOB (VOL, SQL)		
63	2B, 3B		K29-3148-04	KNOB (TAKE, REPEAT, MONI)		
T101	1A		L01-8341-05	POWER TRANSFORMER	KK2	
T101	1A		L01-8341-05	POWER TRANSFORMER	K3K4	
T101	1A	*	L01-8347-05	POWER TRANSFORMER	MM2	
T101	1A	*	L01-8347-05	POWER TRANSFORMER	M3M4	
65	2B		N19-0631-05	FLAT WASHER(LEAD HOLDER)		
A	2A, 2E		N09-0704-05	SCREW(DUPLXER)		
B	2C, 2D		N09-2030-05	SCREW		
C	2B, 2D		N32-3005-46	FLAT HEAD MACHINE SCREW(HING)		
D	1A, 3B		N33-3006-45	OVAL HEAD MACHINE SCREW(CASE)		
E	2A, 2C		N35-3006-46	BINDING HEAD MACHINE SCREW		
F	1B		N35-3008-46	BINDING HEAD MACHINE (AVR HEAT)		
G	1C		N35-2606-41	BINDING HEAD MACHINE (SIGNAL)		
H	1C, 2B		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
I	1B, 2D	*	N87-3008-46	BRAZIER HEAD TAPTITE SCREW		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

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# TKR-820

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TKR-820

DC BACK UP

MOUNTING BRACKET

AVR UNIT (X43-3040-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
J	1A		N87-4006-46	BRAZIER HEAD TAPTITE SCR(C101)		
K	3A	*	N87-4010-46	BRAZIER HEAD TAPTITE SCR(F00T)		
S101	2A		S40-2450-05	PUSH SWITCH(POWER)		
SP101	3A		T07-0227-15	LOUDSPEAKER		
70	1B, 2B		X43-3040-10	AVR UNIT		
71	1C		X52-3140-10	SIGNALING UNIT		
72	2B, 3B		X54-3070-11	DISPLAY UNIT		
73	2C		X57-3270-10	TX.RX UNIT	KM	
73	2C	*	X57-3270-11	TX.RX UNIT	K2M2	
73	2C	*	X57-3270-12	TX.RX UNIT	K3M3	
73	2C	*	X57-3270-13	TX.RX UNIT	K4M4	
74	1D		X60-3180-10	FINAL ASSY UNIT	KM	
74	1D	*	X60-3180-11	FINAL ASSY UNIT	K2M2	
74	1D	*	X60-3180-12	FINAL ASSY UNIT	K3M3	
74	1D	*	X60-3180-13	FINAL ASSY UNIT	K4M4	
<b>DC BACK UP</b>						
			E30-2076-05	DC DORD (DC BACK UP)		
			E31-3389-05	CONNECTING WIRE(DC BACK UP)		
			E31-3455-05	CONNECTING WIRE(DC BACK UP)		
			N87-4014-46	BRAZIER HEAD TAPTITE SCREW		
D101			S25VB10	DIODE (DC BACK UP)		
<b>MOUNTING BRACKET</b>						
			J21-4250-04	MOUNTING BRACKET		
			N09-0704-05	SCREW		
<b>AVR UNIT (X43-3040-10)</b>						
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			C91-1103-05	CERAMIC 470PF		
C103			C91-1098-05	CERAMIC 4700PF AC400V		
CN1 ,2			E23-0462-05	TERMINAL		
CN3 ,4			E23-0611-05	TERMINAL		
CN5 -7			E23-0159-05	TERMINAL		
A3	1B		F01-0965-03	HEAT SINK		
A5	1B		F07-0849-04	COVER		
A9 -12	1B		F29-0432-05	INSULATOR		
A1 ,2			J13-0055-05	FUSE HOLDER		
A4	1B		J21-4247-04	MOUNTING HARDWARE		
A6 -8	1B		J32-0906-14	BOSS		
E	1B		N35-3006-46	BINDING HEAD MACHINE SCREW		
I	1B	*	N87-3008-46	BRAZIER HEAD TAPTITE SCREW		
L	1B		N35-3012-46	BINDING HEAD MACHINE SCREW		

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K : TKR-820 K,M

K3 : TKR-820 K3,M3

K2 : TKR-820 K2,M3

K4 : TKR-820 K4,M4

△ indicates safety critical components.

## PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

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

Teile ohne Parts No. werden nicht geliefert.

AVR UNIT (X43-3040-10)

FINAL UNIT (X45-3250-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
M	1B		N87-4016-46	BRAZIER HEAD TAPTITE SCREW		
R2			RS14AB3A4R7J	FL-PROOF RS 4.7 J 1W		
R3 -5			RD41FB2B273J	CYLND CHIP R 27K J 1/8W		
R6 ,7			R92-0619-05	FIXED RESISTOR 0.05 5W		
R8			RD41FB2B152J	CYLND CHIP R 1.5K J 1/8W		
R9			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R10 -12			RD41FB2B391J	CYLND CHIP R 390 J 1/8W		
R13			RD41FB2B683J	CYLND CHIP R 68K J 1/8W		
R14			RD41FB2B822J	CYLND CHIP R 8.2K J 1/8W		
VR1			R12-0440-05	TRIMMING POT.680		
VR2			R12-8406-05	TRIMMING POT.1M		
D1			1B2C1	DIODE		
D3	1B		S25VB10	DIODE		
D4			1SS181	CHIP DIODE		
D5		*	RD7.5M-B2	CHIP ZENER DIODE		
D6			1SS181	CHIP DIODE		
Q1 -3			2SC2712(Y)	CHIP TRANSISTOR		
Q4			2SB968(Q)	CHIP TRANSISTOR		
Q5 ,6	1B		2N5885	TRANSISTOR		
<b>FINAL UNIT (X45-3250-XX) -10 : K,M -11 : K2,M2 -12 : K3,M3 -13 : K4,M4</b>						
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		
C8 ,9			CC73FCH1H060D	CHIP C 6.0PF D		
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			CC73FCH1H120J	CHIP C 12PF J		
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		
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		KK2
C27			CM73F2H130J	CHIP C 13PF J		K4
C28			CM73F2H120J	CHIP C 12PF J		K
C28			CM73F2H100D	CHIP C 10PF D		K2K3
C28			CM73F2H150J	CHIP C 15PF J		K4
C29			CM73F2H150J	CHIP C 15PF J		K
C29			CM73F2H100D	CHIP C 10PF D		K2K3
C29			CM73F2H180J	CHIP C 18PF J		K4
C30			CM73F2H110J	CHIP C 11PF J		K
C30			CM73F2H070D	CHIP C 7PF D		K2K3
C31 -37			CK73FB1H471K	CHIP C 470PF K		
C38			C90-2044-05	ELECTRO 1UF 25WV		
C39			CK73FB1H103K	CHIP C 0.010UF K		
C40 -44			CK73FB1H471K	CHIP C 470PF K		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

△ indicates safety critical components.

# TKR-820

## PARTS LIST

\* New Parts

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Teile ohne Parts No. werden nicht geliefert.

FINAL UNIT (X45-3250-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C46 ,47 C48 -50 C51 C52 C101			C90-0871-05 CK73FB1H471K C90-2044-05 CM73F2H090D CK45B1H471K	ELECTRO 220UF 16WV CHIP C 470PF K ELECTRO 1UF 25WV CHIP C 9PF D CERAMIC 470PF K	K3 K2K3K4	
CN1 CN2 ,3 W1			E04-0159-05 E23-0491-05 E31-3273-05	RF COAXIAL CABLE RECEPTACLE TERMINAL CONNECTING WIRE(5P)		
		*	F10-1439-04	SHILDING PLATE	K2K3K4	
L1 L2 L3 L4 -6 L7 -10			L40-2272-80 L40-1872-80 L40-2272-80 L33-0666-05 L34-1198-05	SMALL FIXED INDUCTOR(22NH) SMALL FIXED INDUCTOR(18NH) SMALL FIXED INDUCTOR(22NH) CHOKE COIL COIL (LPF)		
L11			L34-0908-05	COIL (9.5T)		
R1 ,2 R3 R4 R5 R6			RD41FB2B271J RK73EB2B562J RD41FB2B101J RK73EB2B471J RD41FB2B561J	CYLND CHIP R 270 J 1/8W CHIP R 5.6K J 1/8W CYLND CHIP R 100 J 1/8W CHIP R 470 J 1/8W CYLND CHIP R 560 J 1/8W		
R7 R8 R9 R10 R11			RD41FB2B220J RK73EB2B6R8J R92-0679-05 RD41FB2B271J RD41FB2B221J	CYLND CHIP R 22 J 1/8W CHIP R 6.8 J 1/8W CHIP R 0 OHM CYLND CHIP R 270 J 1/8W CYLND CHIP R 220 J 1/8W		
R12 R13 R14 R15 ,16 R17			R92-0679-05 RK73EB2B150J RD41FB2B222J RD41FB2B221J RD41FB2B222J	CHIP R 0 OHM CHIP R 15 J 1/8W CYLND CHIP R 2.2K J 1/8W CYLND CHIP R 220 J 1/8W CYLND CHIP R 2.2K J 1/8W		
R18 R19 R20 R21 R22			RD41FB2B472J RD41FB2B123J RD41FB2B221J RD41FB2B392J RD41FB2B102J	CYLND CHIP R 4.7K J 1/8W CYLND CHIP R 12K J 1/8W CYLND CHIP R 220 J 1/8W CYLND CHIP R 3.9K J 1/8W CYLND CHIP R 1.0K J 1/8W		
R23 R24 R25 R26 R27			RD41FB2B122J RD41FB2B103J RD41FB2B470J RD41FB2B100J RD41FB2B102J	CYLND CHIP R 1.2K J 1/8W CYLND CHIP R 10K J 1/8W CYLND CHIP R 47 J 1/8W CYLND CHIP R 10 J 1/8W CYLND CHIP R 1.0K J 1/8W		
VR1		*	R12-4420-05	TRIMMING POT.(50K)		
D1 D2 D3 ,4 D5 Q1			1SV172 1SS226 1SS101 DSA3A1 2SC3357	CHIP DIODE CHIP DIODE DIODE DIODE CHIP TRANSISTOR		
Q2 Q3 Q4 Q5 ,6 TH1			2SC2954 2SB946(Q) 2SC2712(Y) 2SC3326(A) SDT1000	CHIP TRANSISTOR TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR THERMISTER 10K		

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## SIGNALLING UNIT (X52-3140-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
<b>SIGNALLING UNIT (X52-3140-10)</b>						
D7			B30-0838-05	LED		
C1			CE04NW1E220M	ELECTRØ 22UF 25WV		
C2 ,3			CK73FB1H103K	CHIP C 0.010UF K		
C4			CE04NW1C470M	ELECTRØ 47UF 16WV		
C5			C92-0004-05	CHIP TAN 1UF 16WV		
C6			CK73FB1H103K	CHIP C 0.010UF K		
C7			CC73FCH1H470J	CHIP C 47PF J		
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 1UF 16WV		
C26 -28			CC73FCH1H101J	CHIP C 100PF J		
C29			CK73FB1H103K	CHIP C 0.010UF K		
C30			C92-0011-05	CHIP TAN 10UF 4WV		
C31			CK73FB1H103K	CHIP C 0.010UF K		
C32			C92-0004-05	CHIP TAN 1UF 16WV		
C33			CK73EB1H104K	CHIP C 0.10UF K		
C34			C92-0004-05	CHIP TAN 1UF 16WV		
C35 -38			CK73FB1H153K	CHIP C 0.015UF K		
C39			C92-0502-05	ELECTRØ 0.33UF 35WV		
C40 ,41			C92-0004-05	CHIP TAN 1UF 16WV		
C42			CK73FB1H103K	CHIP C 0.010UF K		
C43 -46			CK73FF1E104Z	CHIP C 0.1UF Z		
		*	E02-2015-05	IC SOCKET (28P)		
		*	E02-2010-05	IC SOCKET (8P)		
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		
W104			E31-3254-05	CONNECTING WIRE		
W105			E31-3255-05	CONNECTING WIRE		
X1			L77-1374-05	CRYSTAL RESONATOR (12MHZ)		
CP1			R90-0598-05	MULTI-COMP 10K		
R1			RD41FB2B100J	CYLND CHIP R 10 J 1/8W		
R2			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R3			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R4 ,5			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R6 ,7			RD41FB2B273J	CYLND CHIP R 27K J 1/8W		
R8			RD41FB2B684J	CYLND CHIP R 680K J 1/8W		
R9			R92-0687-05	CHIP R 0 ØHM		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

△ indicates safety critical components

# TKR-820

## PARTS LIST

× New Parts

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**SIGNALING UNIT (X52-3140-10)**

**DISPLAY UNIT (X54-3070-11)**

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R10			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R11 -13			RD41FB2B683J	CYLND CHIP R 68K J 1/8W		
R14			RD41FB2B753J	CYLND CHIP R 75K J 1/8W		
R15			RD41FB2B563J	CYLND CHIP R 56K J 1/8W		
R16 -19			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R20			RD41FB2B123J	CYLND CHIP R 12K J 1/8W		
R21			RD41FB2B153J	CYLND CHIP R 15K J 1/8W		
R22 ,23			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R24 ,25			RD41FB2B394J	CYLND CHIP R 390K J 1/8W		
R26			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R27 -29			RD41FB2B124J	CYLND CHIP R 120K J 1/8W		
R30			RD41FB2B183J	CYLND CHIP R 18K J 1/8W		
R31			RD41FB2B221J	CYLND CHIP R 220 J 1/8W		
R32 ,33			RD41FB2B393J	CYLND CHIP R 39K J 1/8W		
R34			RK73FB2A225J	CHIP R 2.2M J 1/10W		
R35 -37			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R38			R92-0687-05	CHIP R 0 OHM		
R39 -41			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R42 -45			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R46 -50			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R51			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R52			RD41FB2B331J	CYLND CHIP R 330 J 1/8W		
R53			RD41FB2B394J	CYLND CHIP R 390K J 1/8W		
R54			RD41FB2B474J	CYLND CHIP R 470K J 1/8W		
R55			RD41FB2B622J	CYLND CHIP R 6.2K J 1/8W		
R56			RD41FB2B563J	CYLND CHIP R 56K J 1/8W		
R57			RD41FB2B683J	CYLND CHIP R 68K J 1/8W		
R58			RD41FB2B153J	CYLND CHIP R 15K J 1/8W		
R59 ,60			RD41FB2B222J	CYLND CHIP R 2.2K J 1/8W		
R61			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R62 ,63			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R64			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R65			RD41FB2B471J	CYLND CHIP R 470 J 1/8W		
R66			RD14BB2C473J	RD 47K J 1/6W		
VR1 -5			R12-3099-05	TRIMMING POT.47K		
D1 -6			1SS184	CHIP DIODE		
D8		*	MTZ8.2JB	ZENER DIODE		
D3			HSM88AS	CHIP DIODE		
IC1			MC78L05M	IC(VOLTAGE REGULATOR/ +5V)		
IC2			M51943BML	IC(SYSTEM RESET)		
IC3 -7			BA4558F	IC(OP AMP X2)		
IC8		*	27C128-25JAQ4	EPROM		
IC9		*	TC74HC573AF	IC(8-BIT LATCH))		
IC10			93C46PI	EEPROM		
IC11			UPD78310G	IC(MICROPROCESSOR)		
Q1 -7			DTC144EK	DIGITAL TRANSISTOR		
Q8			DTA114EK	DIGITAL TRANSISTOR		
Q9			2SC3326(A)	CHIP TRANSISTOR		
Q10			2SJ106(GR)	CHIP FET		
<b>DISPLAY UNIT (X54-3070-11)</b>						
D2			B30-0856-05	LED(GREEN)		
D1, D3			B30-0855-05	LED(RED)		
D16			B30-0857-05	LED(YELLOW)		
D17			B30-0856-05	LED(GREEN)		
D18			B30-0857-05	LED(YELLOW)		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

⚠ indicates safety critical components.

## PARTS LIST

× New Parts

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

Teile ohne Parts No. werden nicht geliefert.

DISPLAY UNIT (X54-3070-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C1			CK73FB1H102K	CHIP C 1000PF K		
C2	, 3		CC73FCH1H330J	CHIP C 33PF J		
C4			CS15E1C010M	TANTAL 1UF 16WV		
C5			CK73FB1H103K	CHIP C 0.010UF K		
C6			CE04NW1E470M	ELECTRØ 47UF 25WV		
C7	, 8		CK73FB1H103K	CHIP C 0.010UF K		
C9			CE04CW1E220M	ELECTRØ 22UF 25WV		
C10			CE04CW1A101M	ELECTRØ 100UF 10WV		
C11			CK73FB1H102K	CHIP C 1000PF K		
C12			CS15E1C010M	TANTAL 1.0UF 16WV		
C13			CK73FB1H103K	CHIP C 0.010UF K		
C14			CE04CW1E220M	ELECTRØ 22UF 25WV		
C15	-20		CK73FB1H102K	CHIP C 1000PF K		
C21			CS15E1C100M	TANTAL 10UF 16WV		
C22			C92-0004-05	CHIP TAN 1UF 16WV		
C23			CK73FB1H102K	CHIP C 1000PF K		
C24			C92-0004-05	CHIP TAN 1UF 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 1UF 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 0.047UF K		
C43	-46		CK73FB1H102K	CHIP C 1000PF K		
CN1			E40-0218-05	SPACER (LED)		
CN2			E08-0874-05	RECTANGULAR RECEPTACLE (ROM)		
CN3			E40-3273-05	PIN CONNECTOR (15P)		
CN4			E40-3271-05	PIN CONNECTOR (13P)		
CN5			E08-0673-05	RECTANGULAR RECEPTACLE (MIC)		
CN6			E40-3270-05	PIN CONNECTOR (12P)		
CN7			E40-3260-05	PIN CONNECTOR (2P)		
CN8			E40-0274-05	PIN CONNECTOR (2P)		
W1			E40-3273-05	PIN CONNECTOR (15P)		
F1			E31-3440-05	CONNECTING WIRE		
X1			F06-2029-05	FUSE 2A		
J2			L77-1333-05	CRYSTAL RESONATOR (4.195MHZ)		
J4			R92-0687-05	CHIP R 0 ØHM		
J7			R92-0687-05	CHIP R 0 ØHM		
J9			R92-0687-05	CHIP R 0 ØHM		
J11	, 12		R92-0687-05	CHIP R 0 ØHM		
J14			R92-0687-05	CHIP R 0 ØHM		
JP1			R92-0150-05	JUMPER REST 0 ØHM		
R1			RD41FB2B331J	CYLND CHIP R 330 J 1/8W		
R3	, 4		RD41FB2B331J	CYLND CHIP R 330 J 1/8W		
R5	-8		RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R9			RD41FB2B153J	CYLND CHIP R 15K J 1/8W		
R10			RD41FB2B102J	CYLND CHIP R 1K J 1/8W		
R11			RD41FB2B220J	CYLND CHIP R 22 J 1/8W		
R12	-15		RD41FB2B223J	CYLND CHIP R 22K J 1/8W		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

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# TKR-820

## PARTS LIST

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DISPLAY UNIT (X54-3070-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R16			RS14DB3A470J	FL-PROOF RS 47 J 1W		
R17 -19			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R20			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R22			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R24 -28			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R30 ,31			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R32			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R33			RD41FB2B562J	CYLND CHIP R 5.6K J 1/8W		
R34			RD41FB2B681J	CYLND CHIP R 680 J 1/8W		
R35			R92-0341-05	FIXED RESISTOR 4.7 J 1/4W		
R38 ,39			RD41FB2B331J	CYLND CHIP R 330 J 1/8W		
R40 ,41			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R42			RD41FB2B681J	CYLND CHIP R 680 J 1/8W		
R43 ,44			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R45			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R46			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R47			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R48 ,49			RD41FB2B224J	CYLND CHIP R 220K J 1/8W		
R50			RD41FB2B394J	CYLND CHIP R 390K J 1/8W		
R51			RD41FB2B153J	CYLND CHIP R 15K J 1/8W		
R52			RD41FB2B303J	CYLND CHIP R 30K J 1/8W		
R53			RD41FB2B224J	CYLND CHIP R 220K J 1/8W		
R54			RD41FB2B622J	CYLND CHIP R 6.2K J 1/8W		
R55 ,56			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R57			RD41FB2B183J	CYLND CHIP R 18K J 1/8W		
R58			RD41FB2B681J	CYLND CHIP R 680 J 1/8W		
R59			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R61			RS14DB3A1R0J	FL-PROOF RS 1.0 J 1W		
R62 ,63			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R64			RD41FB2B331J	CYLND CHIP R 330 J 1/8W		
R65			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R66			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R67			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R68			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R69			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R70			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R71			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R72			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R73 ,74			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R75 ,76			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R92 -94			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R95			RD41FB2B271J	CYLND CHIP R 270 J 1/8W		
R96 ,97			R92-0687-05	CHIP R 0 OHM		
R100		*	R92-0687-05	CHIP R 0 OHM		
VR1		*	R01-4418-05	POTENTIOMETER(50K)SQL		
VR2			R01-3434-05	POTENTIOMETER(10K)VOL		
S2 -4			S40-2455-05	PUSH SWITCH		
D4 -6			1SS184	CHIP DIODE		
D7 ,8			1SS181	CHIP DIODE		
D10 ,11			1SS181	CHIP DIODE		
D13			1SS181	CHIP DIODE		
D19 ,21			1SS272	CHIP DIODE		
D24			1SS133	DIODE		

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# TKR-820

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TX-RX UNIT (X57-3270-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C66			CE04EW1C220M	ELECTRØ 22UF 16WV		
C67			C92-0007-05	CHIP TAN 2.2UF 20WV		
C68 ,69			CS15E0J100M	TANTAL 10UF 6.3WV		
C70			CS15E1C100M	TANTAL 10UF 16WV		
C71			CE04EW1A101M	ELECTRØ 100UF 10WV		
C72			CE04EW1A221M	ELECTRØ 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	ELECTRØ 47UF 10WV		
C80			CE04EW1C100M	ELECTRØ 10UF 16WV		
C81			CK73FB1H103K	CHIP C 0.010UF K		
C82			CE04EW1A470M	ELECTRØ 47UF 10WV		
C83			CE04EW1E471M	ELECTRØ 470UF 25WV		
C84			C90-2030-05	ELECTRØ 1000UF 10WV		
C85			CK73EB1H104K	CHIP C 0.10UF K		
C86			C92-0004-05	CHIP TAN 1UF 16WV		
C87			CE04EW1A470M	ELECTRØ 47UF 10WV		
C88			CK73FB1H103K	CHIP C 0.010UF K		
C89			CE04EW1A470M	ELECTRØ 47UF 10WV		
C90			CK73FB1H103K	CHIP C 0.010UF K		
C91			CE04EW1C100M	ELECTRØ 10UF 16WV		
C92			CE04EW1A470M	ELECTRØ 47UF 10WV		
C93 -95			CK73FB1H103K	CHIP C 0.010UF K		
C96 -101			CK73FB1H471K	CHIP C 470PF K		
CN1		*	E04-0171-05	RF COAXIAL CABLE RECEPTACLE		
CN5			E40-3091-05	PIN CONNECTOR (3P)		
CN6			E40-5069-05	PIN CONNECTOR (12P)		
CN7			E40-3092-05	PIN CONNECTOR (4P)		
CN8			E40-0573-05	PIN CONNECTOR (5P)		
CN9 ,10			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
TP1 -3			E23-0464-05	TERMINAL		
A1			F10-1366-04	SHIELDING PLATE		
CF1			L72-0339-05	CERAMIC FILTER (CFV455D)		
		*	G02-0598-04	PLATE SPRING		K3
L1			L40-2211-81	CHIP INDUCTOR (220UH)		
L2			L40-1021-13	SMALL FIXED INDUCTOR(1MH)		
L3 ,4			L40-2211-81	CHIP INDUCTOR (220UH)		
L5			L40-1021-13	SMALL FIXED INDUCTOR(1MH)		
L6			L40-2211-81	CHIP INDUCTOR (220UH)		
L7			L79-0674-05	HELICAL BLOCK		KK2
L7		*	L79-0893-05	HELICAL BLOCK		K3
L7		*	L79-0892-05	HELICAL BLOCK		K4
L8			L34-1079-05	COIL (/3-1.5T)		
L9 ,10		*	L79-0674-05	HELICAL BLOCK		KK2
L9 ,10		*	L79-0893-05	HELICAL BLOCK		K3
L9 ,10		*	L79-0892-05	HELICAL BLOCK		K4
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)		

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TX-RX UNIT (X57-3270-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
L15 L16 ,17 L18 L19 L20		*	L40-2201-14 L34-2160-05 L30-0503-05 L15-0016-05 L40-2272-80	SMALL FIXED INDUCTOR(22UH) IFT (21.4MHZ) IFT (455KHZ) LOW-FREQUENCY CHOKE COIL(22UH) SMALL FIXED INDUCTOR(22NH)	K2	
X1 XF1 Z3 Z6		*	L77-1348-05 L71-0274-05 L77-1338-05 L77-1388-05	CRYSTAL RESONATOR 20.945MHZ M.C.F (21F15C) TCXO 12.8MHZ VCXO 12.8MHZ		
R1 R2 R3 ,4 R5 ,6 R7			RD41FB2B332J RD41FB2B122J RD41FB2B102J RD41FB2B472J RD41FB2B221J	CYLND CHIP R 3.3K J 1/8W CYLND CHIP R 1.2K J 1/8W CYLND CHIP R 1.0K J 1/8W CYLND CHIP R 4.7K J 1/8W CYLND CHIP R 220 J 1/8W		
R8 R9 R10 R11 R12			RD41FB2B271J RD41FB2B180J RD41FB2B271J RD41FB2B332J RD41FB2B122J	CYLND CHIP R 270 J 1/8W CYLND CHIP R 18 J 1/8W CYLND CHIP R 270 J 1/8W CYLND CHIP R 3.3K J 1/8W CYLND CHIP R 1.2K J 1/8W		
R13 ,14 R15 ,16 R17 R18 R19 ,20			RD41FB2B102J RD41FB2B472J RD41FB2B221J RD41FB2B681J RD41FB2B821J	CYLND CHIP R 1.0K J 1/8W CYLND CHIP R 4.7K J 1/8W CYLND CHIP R 220 J 1/8W CYLND CHIP R 680 J 1/8W CYLND CHIP R 820 J 1/8W		
R21 R22 R23 R24 R24			RD41FB2B101J RD41FB2B103J RD41FB2B123J RD41FB2B182J RD41FB2B152J	CYLND CHIP R 100 J 1/8W CYLND CHIP R 10K J 1/8W CYLND CHIP R 12K J 1/8W CYLND CHIP R 1.8K J 1/8W CYLND CHIP R 1.5K J 1/8W	KK2K3 K4	
R25 ,26 R27 R28 R29 R30			RD41FB2B473J RD14BB2C103J RD41FB2B102J RD41FB2B332J RD41FB2B470J	CYLND CHIP R 47K J 1/8W RD 10K J 1/6W CYLND CHIP R 1.0K J 1/8W CYLND CHIP R 3.3K J 1/8W CYLND CHIP R 47 J 1/8W		
R31 R32 R33 R34 R35			RD41FB2B100J R92-0687-05 RD41FB2B102J RD41FB2B330J RD41FB2B182J	CYLND CHIP R 10 J 1/8W CHIP R 0 OHM CYLND CHIP R 1.0K J 1/8W CYLND CHIP R 33 J 1/8W CYLND CHIP R 1.8K J 1/8W		
R36 R37 R38 R39 R40			RD41FB2B100J RD41FB2B152J RD41FB2B681J RD41FB2B560J RD41FB2B154J	CYLND CHIP R 10 J 1/8W CYLND CHIP R 1.5K J 1/8W CYLND CHIP R 680 J 1/8W CYLND CHIP R 56 J 1/8W CYLND CHIP R 150K J 1/8W		
R41 R42 R43 R44 R45			RD41FB2B333J RD41FB2B682J RD41FB2B683J RD41FB2B222J RD41FB2B221J	CYLND CHIP R 33K J 1/8W CYLND CHIP R 6.8K J 1/8W CYLND CHIP R 68K J 1/8W CYLND CHIP R 2.2K J 1/8W CYLND CHIP R 220 J 1/8W		
R46 R47 R48 R49 R50			RD41FB2B392J RD41FB2B222J RD41FB2B103J RD41FB2B182J RD41FB2B222J	CYLND CHIP R 3.9K J 1/8W CYLND CHIP R 2.2K J 1/8W CYLND CHIP R 10K J 1/8W CYLND CHIP R 1.8K J 1/8W CYLND CHIP R 2.2K J 1/8W		

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TX-RX UNIT (X57-3270-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R51 -54			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R55			RD41FB2B221J	CYLND CHIP R 220 J 1/8W		
R56			RD41FB2B123J	CYLND CHIP R 12K J 1/8W		
R57			RD41FB2B2R2J	CYLND CHIP R 2.2 J 1/8W		
R58 ,59			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R60			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R61			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R62			RD41FB2B222J	CYLND CHIP R 2.2K J 1/8W		
R63			R92-0687-05	CHIP R 0 ΩHM		
R64 ,65			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R66 ,67			RD41FB2B471J	CYLND CHIP R 470 J 1/8W		
R68 ,69			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R70 ,71			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R72			RD41FB2B681J	CYLND CHIP R 680 J 1/8W		
R73			RD41FB2B821J	CYLND CHIP R 820 J 1/8W		
R74			RD41FB2B562J	CYLND CHIP R 5.6K J 1/8W		
R75			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R76			RD41FB2B332J	CYLND CHIP R 3.3K J 1/6W		
R77			RD41FB2B560J	CYLND CHIP R 56 J 1/6W		
VR1			R12-0420-05	TRIMMING POT.500		K2
VR2 ,3			R12-4408-05	TRIMMING POT.50K		
K1			S51-1435-05	RELAY (DC12V)		
D1			1SV128	CHIP DIODE		
D2			1SV172	CHIP DIODE		
D3			1SS226	CHIP DIODE		
D4			ND487C1-3R	D.B.M		
D5 -11			1SS184	CHIP DIODE		
IC1			UPC1242H	IC(AF POWER AMP)		
IC2			MB3756	IC(REGULATOR/OUTPUT.SEL)		
IC3			NJM4558D	IC(OP AMP X2)		
IC4			L78N08	REGULATOR IC(8V)		
Q1 ,2			2SC2712(Y)	CHIP TRANSISTOR		
Q3			2SC3358K	TRANSISTOR		
Q4 ,5		*	2SK125	FET		
Q6			2SK302(GR)	CHIP FET		
Q7			2SC2712(Y)	CHIP TRANSISTOR		
Q8			DTC114EK	DIGITAL TRANSISTOR		
Q9 ,10			2SC3326(A)	CHIP TRANSISTOR		
Q11 -13			DTC114EK	DIGITAL TRANSISTOR		
TH1			112-203-2	THERMISTOR 20K		
TH2			112-101-2	THERMISTOR 100		
Z1			X58-3120-10	SUB UNIT (RX PLL)		
Z2			X58-3150-10	SUB UNIT (RX VCO)		K
Z2		*	X58-3150-11	SUB UNIT (RX VCO)		K2
Z2		*	X58-3150-13	SUB UNIT (RX VCO)		K3
Z2		*	X58-3150-14	SUB UNIT (RX VCO)		K4
Z4		*	X58-3120-10	SUB UNIT (TX PLL)		
Z5			X58-3460-10	SUB UNIT (TX VCO)		K
Z5		*	X58-3460-11	SUB UNIT (TX VCO)		K2
Z5		*	X58-3460-12	SUB UNIT (TX VCO)		K3
Z5		*	X58-3460-13	SUB UNIT (TX VCO)		K4
Z7			X59-3210-10	SUB UNIT (MIC AMP)		
Z8			X59-3220-10	SUB UNIT (IF)		

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TX-RX UNIT (X57-3270-XX)

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

RX VCO : Z2 (X58-3150-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
Z9			X59-3230-10	SUB UNIT (BPF/VCA)		
<b>RX PLL : Z1, TX PLL : Z4 (X58-3120-10)</b>						
C1 -9 C10 C11			CK73FB1H102K C92-0009-05 CC41FCH1H070D	CHIP C 1000PF K CHIP TAN 4.7UF 10WV CYLND CHIP C 7.0PF D		
-			E23-0471-05	TERMINAL		
A1		*	F11-1092-04	SHIELDING PLATE		
L1			L40-2272-80	CHIP INDUCTOR (22NH)		
R1			RD41FB2B472J	CYLND CHIP R 4.7K J 1/8W		
R2			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R3 ,4			RD41FB2B270J	CYLND CHIP R 27 J 1/8W		
R5			RD41FB2B182J	CYLND CHIP R 1.8K J 1/8W		
R6 -9			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R10			R92-0687-05	CHIP R 0 OHM		
R11			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R12			RD41FB2B471J	CYLND CHIP R 470 J 1/8W		
R13			R92-0687-05	CHIP R 0 OHM		
R14			RD41FB2B472J	CYLND CHIP R 4.7K J 1/8W		
R15			RD41FB2B562J	CYLND CHIP R 5.6K J 1/8W		
D1			RD3.0M-B2	CHIP ZENER DIODE(3.0V)		
IC1			MB504F	IC(MODULUS PRE SCALER)		
IC2		*	JLC1075DW	IC(PLL FREQ SYNTHESIZER)		
Q1			2SC3829TS	CHIP TRANSISTOR		
Q2 -5			DTC114EK	DIGITAL TRANSISTOR		
<b>RX VCO : Z2 (X58-3150-XX) -10 : K,M -11 : K2,M2 -13 : K3,M3 -14 : K4,M4</b>						
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FCH1H110J	CHIP C 11PF J		K
C2			CC73FCH1H110J	CHIP C 11PF J		K2K4
C2			CC73FCH1H180J	CHIP C 18PF J		K5
C3			CC73FCH1H060D	CHIP C 6.0PF D		KK5
C3			CC73FCH1H050D	CHIP C 5.0PF D		K2K4
C4			CC73FCH1H150J	CHIP C 15PF J		K
C4			CC73FCH1H120J	CHIP C 12PF J		K2
C4			CC73FCH1H090J	CHIP C 9PF J		K4
C4			CC73FCH1H330J	CHIP C 33PF J		K5
C5			CC73FCH1H040C	CHIP C 4.0PF C		K
C5			CC73FCH1H030C	CHIP C 3.0PF C		K2
C5			CC73FCH1H010C	CHIP C 1.0PF C		K4K5
C6			CK73FB1H102K	CHIP C 1000PF K		
C7			CC73FCH1H090D	CHIP C 9PF D		K5
C7 ,8			CC73FCH1H080D	CHIP C 8PF D		K2
C7 ,8			CC73FCH1H070D	CHIP C 7PF D		K4
C7 ,8			CC73FCH1H100D	CHIP C 10PF D		K5
C8			CC73FCH1H150J	CHIP C 15PF J		K5
C9			CC73FCH1H010C	CHIP C 1.0PF C		
C10 ,11			CK73FB1H102K	CHIP C 1000PF K		
C12			CC73FCH1H030C	CHIP C 3.0PF C		
C13			CC73FCH1H090D	CHIP C 9.0PF D		
C14 ,15			CK73FB1H102K	CHIP C 1000PF K		
C16			CC73FCH1H030C	CHIP C 3.0PF C		
C16			CC73FCH1H050C	CHIP C 5.0PF C		K5

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# TKR-820

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RX VCO : Z2 (X58-3150-XX)

TX VCO : Z5 (X58-3460-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C17 ,18 C19 C20 C21 -23 TC1			CC73FCH1H100D CC73FCH1H040C CE04EW1A101M CK73FB1H102K C05-0353-05	CHIP C 10PF D CHIP C 4.0PF C ELECTRO 100UF 10WV CHIP C 1000PF K TRIMMING CAP (10P)		
			E23-0603-05	TERMINAL		
L1 L2 L2 L3 ,4 L3 ,4		*	L40-1092-81 L34-2304-05 L34-2375-05 L40-1081-80 L40-1881-80	CHIP INDUCTOR (1UH) COIL COIL CHIP INDUCTOR (100NH) CHIP INDUCTOR (180NH)		KK2K4 K5 KK2K4 K5
L5 L6 L7			L40-2272-80 L40-1872-80 L40-1072-80	CHIP INDUCTOR (22NH) CHIP INDUCTOR (18NH) CHIP INDUCTOR (10NH)		
R1 ,2 R3 R4 R5 R6 ,7			RD41FB2B221J RD41FB2B101J RD41FB2B183J RD41FB2B682J RD41FB2B101J	CYLND CHIP R 220 J 1/8W CYLND CHIP R 100 J 1/8W CYLND CHIP R 18K J 1/8W CYLND CHIP R 6.8K J 1/8W CYLND CHIP R 100 J 1/8W		
R8 R9 R10 R11 R12 ,13			RD41FB2B100J RD41FB2B183J RD41FB2B682J RD41FB2B470J RD41FB2B101J	CYLND CHIP R 10 J 1/8W CYLND CHIP R 18K J 1/8W CYLND CHIP R 6.8K J 1/8W CYLND CHIP R 47 J 1/8W CYLND CHIP R 100 J 1/8W		
R14 R15 R16			RD41FB2B103J RD41FB2B222J RD41FB2B560J	CYLND CHIP R 10K J 1/8W CYLND CHIP R 2.2K J 1/8W CYLND CHIP R 56 J 1/8W		
D1 Q1 Q2 ,3 Q4			1SV166 2SK508(K52) 2SC3356 2SC3099	VARI-CAP DIODE CHIP FET CHIP TRANSISTOR CHIP TRANSISTOR		
<b>TX VCO : Z5 (X58-3460-XX) -10 : K,M -11 : K2,M2 -12 : K3,M3 -13 : K4,M4</b>						
C1 C2 C2			CK73FB1H102K CC73FCH1H100D CC73FCH1H080D	CHIP C 1000PF K CHIP C 10PF D CHIP C 8PF D		KK2 K3
C3 C3 C3 C4 C4 C4			CC73FCH1H050C CC73FCH1H040C CC73FCH1H030C CC73FCH1H470J CC73FCH1H220J CC73FCH1H330J	CHIP C 5.0PF C CHIP C 4.0PF C CHIP C 3.0PF C CHIP C 47PF J CHIP C 22PF J CHIP C 33PF J		KK4 K2 K3 K K3 K4
C5 C5 C6 C6 C7			CC73FCH1H010C CC73FCH1H0R5C CC73FCH1H0R5C CC73FCH1HR75C CK73FB1H102K	CHIP C 1.0PF C CHIP C 0.5PF C CHIP C 0.5PF C CHIP C 0.75PF C CHIP C 1000PF K		KK4 K2 KK2K3 K4
C8 C9 C10 ,11 C10 ,11 C10 ,11			CK73FB1H103K CE04EW1A101M CC73FCH1H080D CC73FCH1H070D CC73FCH1H100D	CHIP C 0.010UF K ELECTRO 100UF 10WV CHIP C 8.0PF D CHIP C 7.0PF D CHIP C 10PF D		KK2 K3 K4
C12			CC73FCH1H0R5C	CHIP C 0.5PF C		KK3

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

△ indicates safety critical components.

## PARTS LIST

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**TX VCO : Z5 (X58-3460-XX)**

**MIC AMP : Z7 (X59-3210-10)**

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C12			CC73FCH1H1R5C	CHIP C 1.5PF C	K4	
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	KK2K3	
C21			CC73FCH1H040C	CHIP C 4.0PF C	K4	
C22	,23		CK73FB1H102K	CHIP C 1000PF K		
TC1			C05-0353-05	TRIMMING 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	KK2K3	
L2		*	L34-2375-05	COIL	K4	
L3	,4		L40-1081-80	SMALL FIXED INDUCTOR (100NH)	KK2K3	
L3	,4	*	L40-1881-80	SMALL FIXED INDUCTOR (180NH)	K4	
L5			L40-2272-80	SMALL FIXED INDUCTOR (22NH)		
L6			L40-1872-80	SMALL FIXED INDUCTOR (18NH)		
L7			L40-1092-81	SMALL FIXED INDUCTOR (1UH)		
R1			RD41FB2B221J	CYLND CHIP R 220 J 1/8W		
R2			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R3			RD41FB2B180J	CYLND CHIP R 18 J 1/8W		
R4			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R5	,6		RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R7			RD41FB2B183J	CYLND CHIP R 18K J 1/8W	KK2K4	
R7			RD41FB2B470J	CYLND CHIP R 47 J 1/8W	K3	
R8			RD41FB2B101J	CYLND CHIP R 100 J 1/8W	KK2K4	
R8			RD41FB2B470J	CYLND CHIP R 47 J 1/8W	K3	
R9			RD41FB2B682J	CYLND CHIP R 6.8K J 1/8W		
R10			RD41FB2B101J	CYLND CHIP R 100 J 1/8W	KK2K4	
R10			RD41FB2B470J	CYLND CHIP R 47 J 1/8W	K3	
R11			RD41FB2B183J	CYLND CHIP R 18K J 1/8W		
R12			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R13			RD41FB2B682J	CYLND CHIP R 6.8K J 1/8W		
R14			RD41FB2B470J	CYLND CHIP R 47 J 1/8W		
R15			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R16			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R17			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R18			RD41FB2B222J	CYLND CHIP R 2.2K J 1/8W		
R19			RD41FB2B560J	CYLND CHIP R 56 J 1/8W		
R20	,21		RD41FB2B271J	CYLND CHIP R 270 J 1/8W		
D1			1SV166	CHIP DIODE		
D2			1SV164	CHIP DIODE		
Q1			2SK508NV(K52)	CHIP FET		
Q2	-4		2SC3356	CHIP TRANSISTOR		
<b>MIC AMP : Z7 (X59-3210-10)</b>						
C1			CC73FCH1H101J	CHIP C 100PF J		
C2			C92-0004-05	CHIP TAN 1UF 16WV		
C3	,4		CK73FB1E223K	CHIP C 0.022UF K		
C5			CC73FCH1H330J	CHIP C 33PF J		
C6			C92-0009-05	CHIP TAN 4.7UF 10WV		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M

△ indicates safety critical components

# TKR-820

## PARTS LIST

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MIC AMP : Z7 (X59-3210-10)

IF : Z8 (X59-3220-10)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C7			C92-0004-05	CHIP TAN 1UF 16WV		
C8			CC73FCH1H101J	CHIP C 100PF J		
C9			C92-0004-05	CHIP TAN 1UF 16WV		
C10			CK73FB1H123K	CHIP C 0.012UF K		
C11			CK73FB1H222K	CHIP C 2200PF K		
C12			CC73FCH1H330J	CHIP C 33PF J		
C13			C92-0004-05	CHIP TAN 1UF 16WV		
C14			CK73FB1H222K	CHIP C 2200PF K		
C15			CK73FB1H392K	CHIP C 3900PF K		
C16			CC73FCH1H221J	CHIP C 220PF J		
C17			CK73FB1H472K	CHIP C 4700PF K		
C18			C92-0004-05	CHIP TAN 1UF 16WV		
-			E23-0471-05	TERMINAL		
R1			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R2			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R3			RD41FB2B561J	CYLND CHIP R 560 J 1/8W		
R4			RD41FB2B681J	CYLND CHIP R 680 J 1/8W		
R5			RD41FB2B561J	CYLND CHIP R 560 J 1/8W		
R6			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R7			RD41FB2B102J	CYLND CHIP R 1.0K J 1/8W		
R8			RD41FB2B333J	CYLND CHIP R 33K J 1/8W		
R9			RD41FB2B393J	CYLND CHIP R 39K J 1/8W		
R10			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R11			RD41FB2B683J	CYLND CHIP R 68K J 1/8W		
R12			RD41FB2B224J	CYLND CHIP R 220K J 1/8W		
R13			RD41FB2B474J	CYLND CHIP R 470K J 1/8W		
R14			RD41FB2B123J	CYLND CHIP R 12K J 1/8W		
R15			RD41FB2B154J	CYLND CHIP R 150K J 1/8W		
R16			RD41FB2B272J	CYLND CHIP R 2.7K J 1/8W		
R17			RD41FB2B822J	CYLND CHIP R 8.2K J 1/8W		
R18			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R19 ,20			RD41FB2B104J	CYLND CHIP R 100K J 1/8W		
R21			RD41FB2B103J	CYLND CHIP R 10K J 1/8W		
R22			RD41FB2B272J	CYLND CHIP R 2.7K J 1/8W		
R23			RD41FB2B393J	CYLND CHIP R 39K J 1/8W		
R24			RD41FB2B123J	CYLND CHIP R 12K J 1/8W		
R25			RD41FB2B333J	CYLND CHIP R 33K J 1/8W		
R26 ,27			RD41FB2B472J	CYLND CHIP R 4.7K J 1/8W		
R28			RD41FB2B683J	CYLND CHIP R 68K J 1/8W		
IC1			NJM4560M	IC(OP AMP X2)		
IC2 ,3			NJM4558M	IC(OP AMP X2)		
Q1			2SC3326(A)	CHIP TRANSISTOR		
<b>IF : Z8 (X59-3220-10)</b>						
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FCH1H220J	CHIP C 22PF J		
C3			CC73FCH1H470J	CHIP C 47PF J		
C4 -7			CK73EB1E104K	CHIP C 0.10UF K		
C8			C92-0003-05	CHIP TAN 0.47UF 25WV		
C9 ,10			CC73FCH1H680J	CHIP C 68PF J		
C11 ,12			CK73FB1H102K	CHIP C 1000PF K		
C14			C92-0003-05	CHIP TAN 0.47UF 25WV		
C17			CK73FB1E223K	CHIP C 0.022UF K		
C19			CK73FB1H102K	CHIP C 1000PF K		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

△ indicates safety critical components.

## PARTS LIST

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IF : Z8 (X59-3220-10)

BPF/VCA : Z9 (X59-3230-10)

FINAL ASS'Y UNIT (X60-3180-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
C20			CC73FCH1H470J	CHIP C 47PF J		
-			E23-0471-05	TERMINAL		
R1			RD41FB2B203J	CYLND CHIP R 20K J 1/8W		
R3			RD41FB2B272J	CYLND CHIP R 2.7K J 1/8W		
R4			RD41FB2B334J	CYLND CHIP R 330K J 1/8W		
R5 ,6			RD41FB2B153J	CYLND CHIP R 15K J 1/8W		
R7			RD41FB2B821J	CYLND CHIP R 820 J 1/8W		
R10			RD41FB2B224J	CYLND CHIP R 220K J 1/8W		
R13			RD41FB2B392J	CYLND CHIP R 3.9K J 1/8W		
R14			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R15			RD41FB2B821J	CYLND CHIP R 820 J 1/8W		
R16			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
D1			DA204K	CHIP DIODE		
IC1			MC3361D	IC(FM IF SYSTEM)		
Q1			2SC2712(Y)	CHIP TRANSISTOR		
<b>BPF/VCA : Z9 (X59-3230-10)</b>						
C1 -4			C93-0502-05	CHIP C 1800PF G		
C5 -9			C93-0501-05	CHIP C 680PF G		
C10			CK73FB1H222K	CHIP C 2200PF K		
C11			C92-0004-05	CHIP TAN 1UF 16WV		
C12			CK73FB1H472K	CHIP C 4700PF K		
C13			CK73FB1H102K	CHIP C 1000PF K		
C14			C92-0004-05	CHIP TAN 1UF 16WV		
-			E23-0471-05	TERMINAL		
R1			RD41FB2B273J	CYLND CHIP R 27K J 1/8W		
R2			RD41FB2B822J	CYLND CHIP R 8.2K J 1/8W		
R3			RD41FB2B184J	CYLND CHIP R 180K J 1/8W		
R4			RD41FB2B224J	CYLND CHIP R 220K J 1/8W		
R5			RD41FB2B394J	CYLND CHIP R 390K J 1/8W		
R6			RK73FB2A134G	CHIP R 130K G 1/10W		
R7			RK73FB2A105G	CHIP R 1.0M G 1/10W		
R8			RK73FB2A683G	CHIP R 68K G 1/10W		
R9			R92-0695-05	CLYND CHIP R 1M G 1/8W		
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			RD41FB2B473J	CYLND CHIP R 47K J 1/8W		
R16			RD41FB2B472J	CYLND CHIP R 4.7K J 1/8W		
R17			RD41FB2B101J	CYLND CHIP R 100 J 1/8W		
R18			RD41FB2B183J	CYLND CHIP R 18K J 1/8W		
R19			RD41FB2B124J	CYLND CHIP R 120K J 1/8W		
R20 ,21			RD41FB2B223J	CYLND CHIP R 22K J 1/8W		
R22			RD41FB2B183J	CYLND CHIP R 18K J 1/8W		
R23			R92-0687-05	CHIP R 0 OHM		
IC1 ,2			NJM4558M	IC(OP AMP X2)		
IC3			M5222FP	IC(OP AMP X2)		
IC4			NJM4558M	IC(OP AMP X2)		
<b>FINAL ASS'Y UNIT (X60-3180-XX) -10 : K,M -11 : K2,M2 -12 : K3,M3 -13 : K4,M4</b>						
W2	2B		E31-3470-05	CONNECTING WIRE WITH BNC		
W3			E31-3472-05	CONNECTING WIRE DC CORD		

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K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

⚠ indicates safety critical components

## PARTS LIST

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FINAL ASS'Y UNIT (X60-3180-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
W4			E31-3123-05	CONNECTING WIRE		
101	2D		F01-0966-01	HEAT SINK		
102	1D		F11-1115-02	SHIELDING COVER		
103	2D		F11-1119-04	SHIELDING COVER		
			J19-1431-05	LEAD HOLDER		
			J19-1433-05	LEAD HOLDER		
108	2D		N16-0040-41	SPRING WASHER		
109	3D		N19-0631-05	FLAT WASHER		
I	2D	*	N87-3008-46	BRAZIER HEAD TAPTITE SCREW		
N	2D		N09-0626-04	SCREW (FINAL MODULE)		
Ø	1D		N32-3008-41	FLAT HEAD MACHINE SCREW		
P	1D, 3D		N35-3008-41	BINDING HEAD MACHINE SCREW		
IC1			M57729H-01-P	IC(POWER MODULE/ 450-470MHZ)	K	
IC1			M57729UH-P	IC(POWER MODULE/ 470-490MHZ)	K2	
IC1			M57729SH-22	IC(POWER MODULE/ 490-520MHZ)	K3	
IC1			M57729L-22	IC(POWER MODULE/ 400-430MHZ)	K4	
110	2D		X45-3250-10	FINAL UNIT	K	
110	2D	*	X45-3250-11	FINAL UNIT	K2	
110	2D	*	X45-3250-12	FINAL UNIT	K3	
110	2D	*	X45-3250-13	FINAL UNIT	K4	

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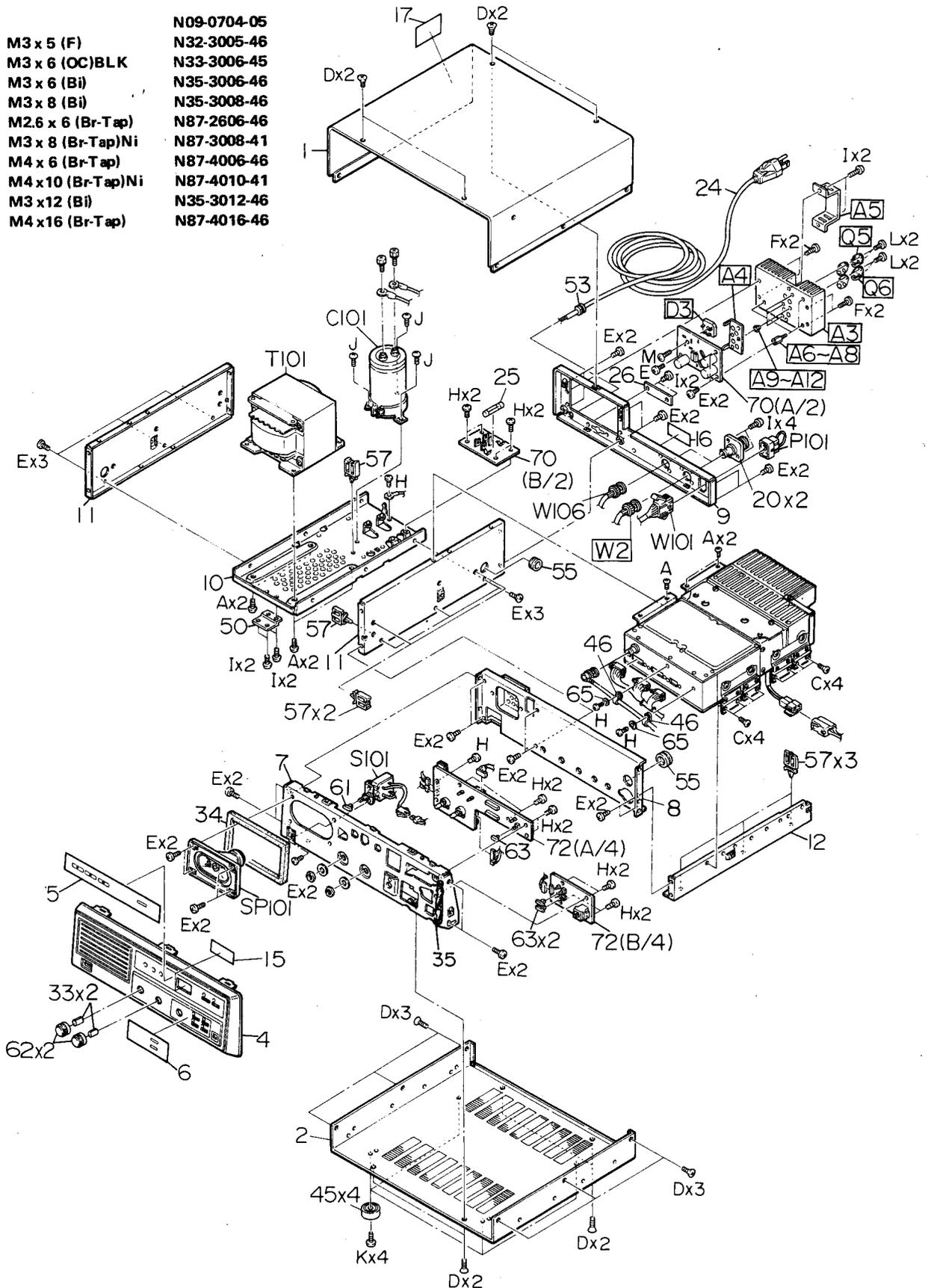
K : TKR-820 K,M K3 : TKR-820 K3,M3

K2 : TKR-820 K2,M3 K4 : TKR-820 K4,M4

⚠ indicates safety critical components.

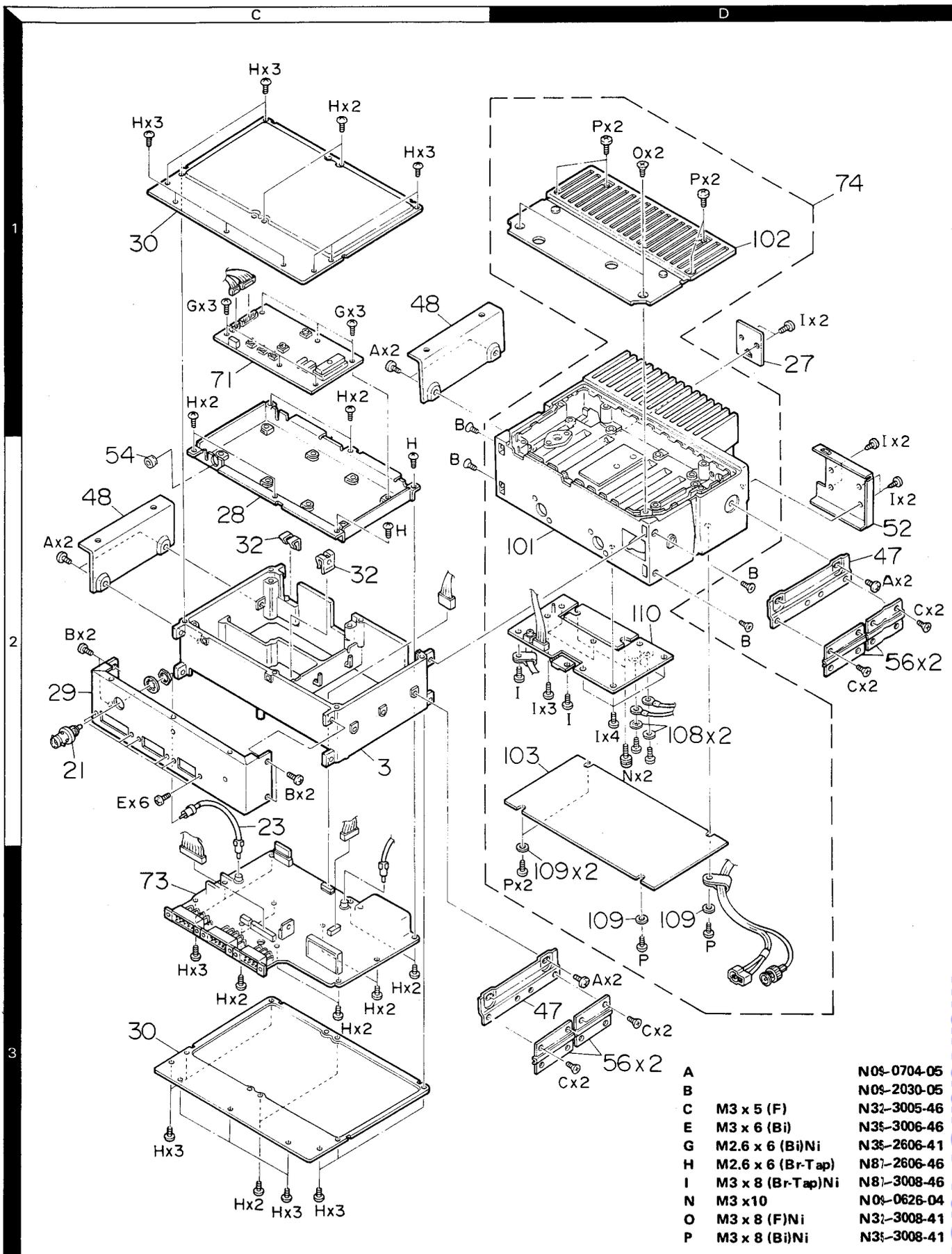
## DISASSEMBLY

A		N09-0704-05
C	M3 x 5 (F)	N32-3005-46
D	M3 x 6 (OC)BLK	N33-3006-45
E	M3 x 6 (Bi)	N35-3006-46
F	M3 x 8 (Bi)	N35-3008-46
H	M2.6 x 6 (Br-Tap)	N87-2606-46
I	M3 x 8 (Br-Tap)Ni	N87-3008-41
J	M4 x 6 (Br-Tap)	N87-4006-46
K	M4 x 10 (Br-Tap)Ni	N87-4010-41
L	M3 x 12 (Bi)	N35-3012-46
M	M4 x 16 (Br-Tap)	N87-4016-46

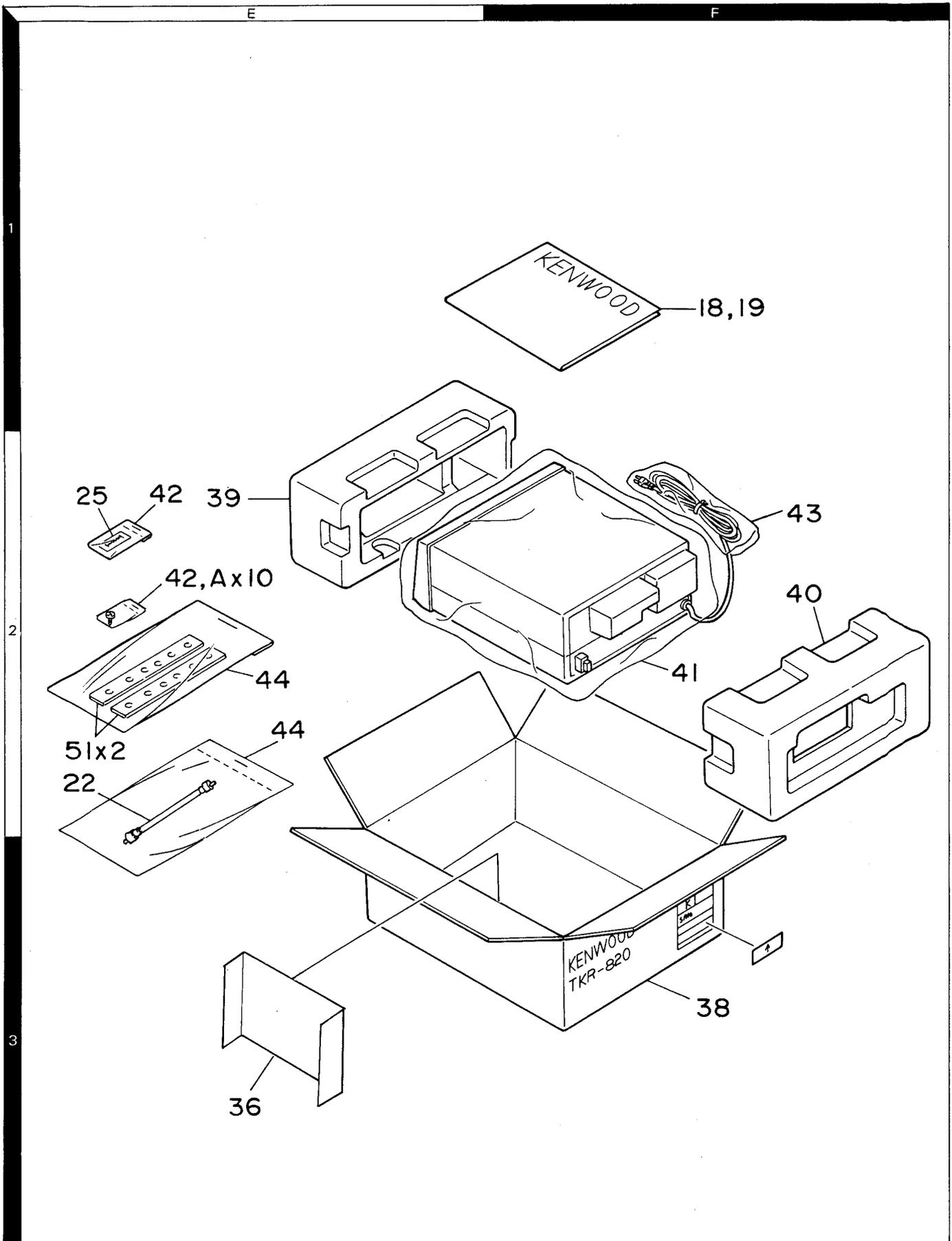


# TKR-820

## DISASSEMBLY



## PACKING



# TKR-820

## ADJUSTMENT

### Test equipment required for alignment

Test Equipment		Major Specifications	
1.	Standard Signal Generator (SSG)	Frequency range Modulation Output	400~520MHz Frequency modulation and external modulation. 0.1 $\mu$ V to greater than 1mV
2.	Power meter	Input impedance Operation frequency Measurement capability	50 ohms 400 to 520MHZ or more. Vicinity of 50W.
3.	Deviation meter	Frequency range	400~520MHz
4.	Digital Volt Meter	Measuring range Accuracy	1~10V DC. High input impedance for minimum circuit loading.
5.	Oscilloscope		DC through 30MHz.
6.	High sensitivity frequency counter	Frequency range Frequency stability	10Hz to 600MHz. 0.2 ppm or less.
7.	Ammeter		15A.
8.	AF Volt Meter (AFVTVM)	Frequency range Voltage range	50Hz to 10kHz. 3mV to 3V.
9.	Audio Generator (AG)	Frequency range Output	50Hz to 5kHz or more. 0 and 1V.
10.	Distortion meter	Capability Input level	3% or less at 1kHz. 50mV to 10Vrms.
11.	Voltmeter	Measuring range Input impedance	10~1.5V DC or less. 50 kohms/V or greater.
12.	4 ohm dummy load		Approx. 4 ohm, 3W.

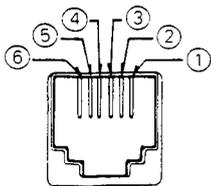
The set has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

		RX freq' (MHz)	TX freq' (MHz)
TKR-820	K, M	469.900	464.900
TKR-820	K2, M2	489.900	484.900
TKR-820	K3, M3	511.900	506.900
TKR-820	K4, M4	429.900	424.900

### SIGNALING

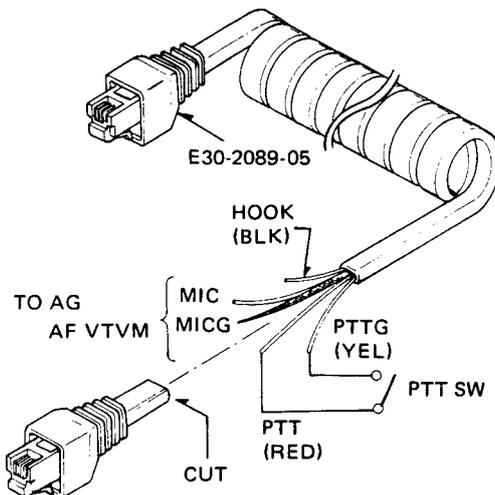
CH	RX		TX	
	QT (Hz)	DQT	QT(Hz)	DQT
1				754
2	67		77	
3	192.8		179.9	
4	77			754
5	88.5		167.9	
6	100			351

### MIC connector front view

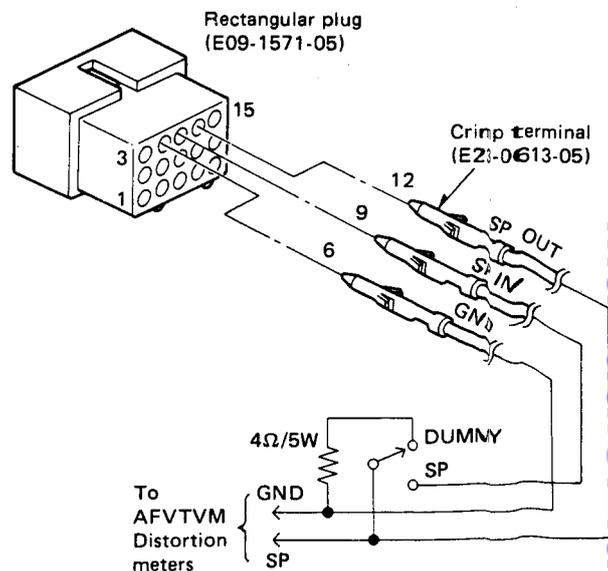


- ① SB
- ② PTTG
- ③ PTT
- ④ MICG
- ⑤ MIC
- ⑥ HOOK

- The following test cables are recommended.



Test cable for Microphone input

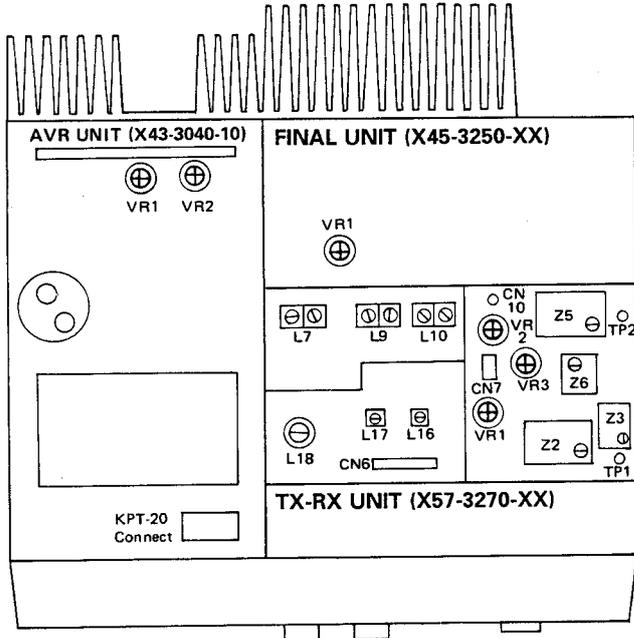


Test cable for Speaker output

## ADJUSTMENT

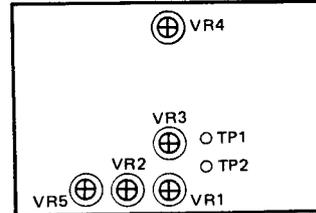
### Adjustment location

Top view

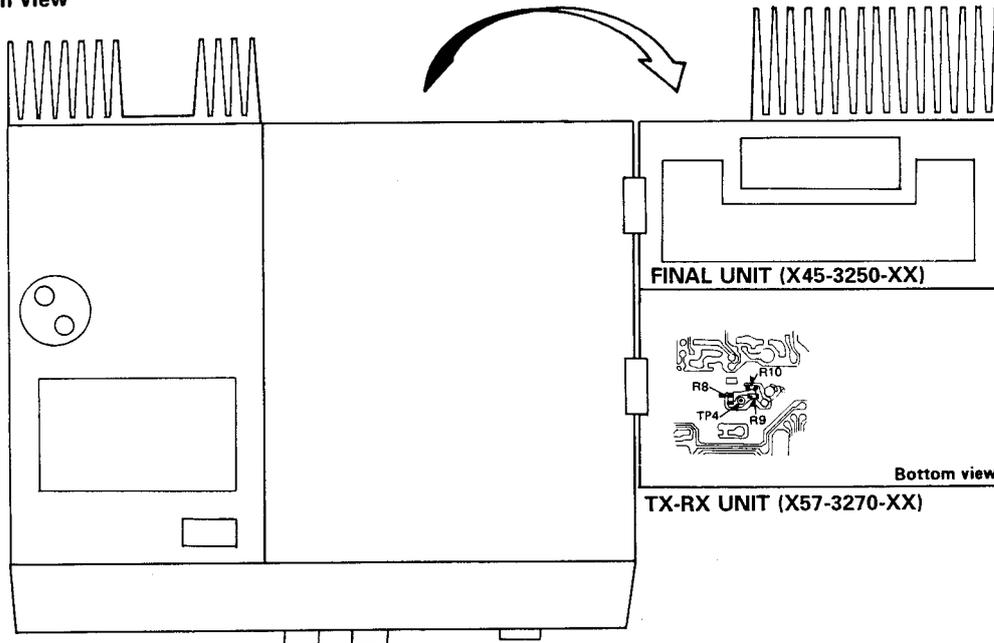


### Adjustment points

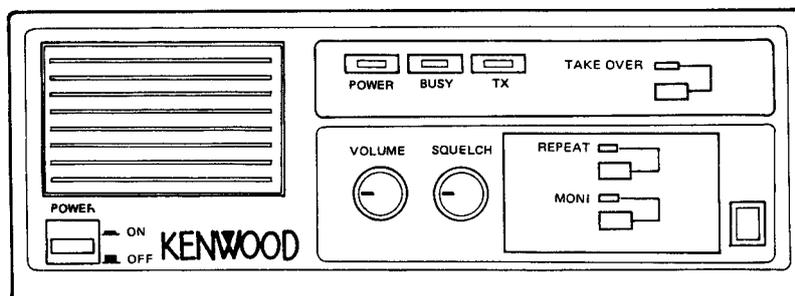
SIGNALING UNIT (X52-3140-10)



### Bottom view



### Front panel view



# TKR-820

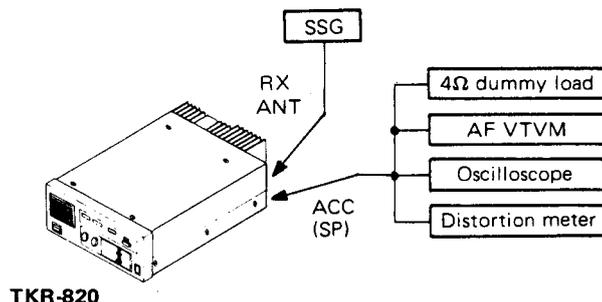
## ADJUSTMENT

### Alignment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Part	Method	
1. Setting	1) AC voltage for destination : 120V <b>K,K2,K3,K4</b> : 220V <b>M,M2,M3,M4</b> 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		Output	AVR	VR1	Adjust the load for 10A.	13.6V ± 0.4V (Verify power indicator lights.)
	2) Vary the load for 2A – 10A draw. (Set to 10A after check.)	DVM AF VTVM						13.6V ± 0.7V DC Less than 30mV AC.
	3) Power switch : OFF							
4. Protection	1) SW1 : ON VR2 : MAX CW. Power switch : ON	DVM		Output	AVR	VR2	0.25V	±0.05V
	2) SW1 : OFF						Check	13.6V ± 0.4V
5. Setting	1) Write in freq' designed with EEP ROM writer. (For freq' 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 : MAX CCW. VR3 : MAX CCW. 5) Power SW : ON							
6. RX PLL Lock Voltage		DVM	TX-RX	TP1	TX-RX	Z2	4.5V ADJ.	±0.5V
7. TX PLL Lock Voltage			TX-RX	TP2	TX-RX	Z5	4.5V ADJ.	±0.5V

## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
8. TCXO Freq' ADJ.	1) PTT : OFF (RX) <b>Note</b> : TCXO is adjusted precisely at 25°C. If it is readjusted, the frequency stability is changed. Do not touch it normally.	Power meter FREQ' counter	TX-RX	TP4 (Foil side)	TX-RX	Z3	f - 21.4MHz ADJ.	± 100Hz
9. Power ADJ. (APC)	1) PTT : ON	Power meter Ammeter	Rear panel	TX ANT	Final	VR1	MAX CW. MIN 26W ADJ.	28W or more. 2W or less. ± 1W
10. Transmit Freq' ADJ.	1) PTT : ON	Power meter FREQ' counter	Rear panel	TX ANT	TX-RX	Z6	FREQ' ADJ. of TX.	± 100Hz
11. Tone deviation ADJ.	1) QT tone freq' being written. Deviation meter filter : LPF : 3kHz, HPF : OFF, De-emphasis : OFF PTT : ON	Power meter Deviation meter	Rear panel	TX ANT	Signal-ing	VR4	± 0.75kHz	± 100Hz
12. Maximum deviation ADJ.	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. PTT : ON	Power meter Deviation meter	Rear panel	TX ANT	TX-RX	VR2	± 4.4kHz ADJ. (± 4.9kHz ADJ. In use of signaling.) Adjust one more than the other by switching between -P and +P.	± 100Hz
13. MIC sensitivity ADJ.	1) AG : 1kHz/5mV PTT : ON	Power meter Deviation meter	Rear panel	TX ANT	TX-RX	VR1	± 3.0kHz ADJ. (± 3.75kHz ADJ. In use of signaling.)	± 100Hz
14. DQT waveform correction	1) Connect AG to the TX-RX (TP3) and enter a square wave of 100Hz, 2Vp-p. Deviation meter filter : OFF PTT : ON	Power meter Deviation meter Oscilloscope			TX-RX	VR3	Make the demodulation waveform neat.	
15. RX sensitivity ADJ.		AF VTVM 4Ω dummy load	Rear panel	EXT.SP	Front panel	AF VOL.	0.78V/4Ω (Noise)	



TKR-820

## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
	1) SSG output : 500 $\mu$ V/-53dBm MOD : OFF	SSG AF VTVM Distortion meter 4 $\Omega$ 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 : 500 $\mu$ V/-53dBm MOD : 1kHz/3kHz DEV.					L18	Adjust for maximum AF output.		
	3) SSG output : 0.32 $\mu$ V/-117dBm					L16 L17	Adjust for maximum SINAD.		
	4) SSG output : 500 $\mu$ V/-53dBm					Front panel	AF VOL.		0.45V/4 $\Omega$ ADJ.
									Check
16. Squelch	1) SSG output : OFF Rotate SQL VR to a point at which noise disappears.	SSG AF VTVM 4 $\Omega$ dummy load Oscillo- scope	Rear panel	EXT.SP				SQL index angle 8:00 ~ 10:00	
	2) SSG output : 0.2 $\mu$ V/-121dBm								
17. Preset squelch ADJ.	1) Signaling unit VR1 to VR5 : MAX CCW. SSG output : OFF	SSG			Signal- ing	VR1		D7 : LED should light.	
	2) SSG output : 0.19 $\mu$ V/-121.5dBm								
18. Hangup timer ADJ.	1) SSG output : 1.58 $\mu$ V/-103dBm The set time can be continuously varied by VR2. 0 ~ 5V $\rightarrow$ 0 ~ 5sec.	DVM	Signal- ing	TP2	Signal- ing	VR2	1.0V	$\pm$ 0.1V	
	2) SSG output : 501 $\mu$ V/-53dBm REPEAT SW : ON	Power meter SSG	Rear panel	TX ANT RX ANT			Check	TX LED should light. REPEAT LED should light.	
	3) SSG output : OFF								
19. T.O.T	1) The set time can be continuously varied by VR3. 0 ~ 0.3V : OFF ~ 0.5V : 30sec. ~ 5V : ~ 5min.	DVM	Signal- ing	TP1	Signal- ing	VR3	Set it to the target time.		
20. Repeater TX deviation	1) SSG output : 501 $\mu$ V/-53dBm	Power meter SSG Deviation meter	Rear panel	EXT.SP	Signal- ing	VR5	$\pm$ 3.0kHz	$\pm$ 100Hz	

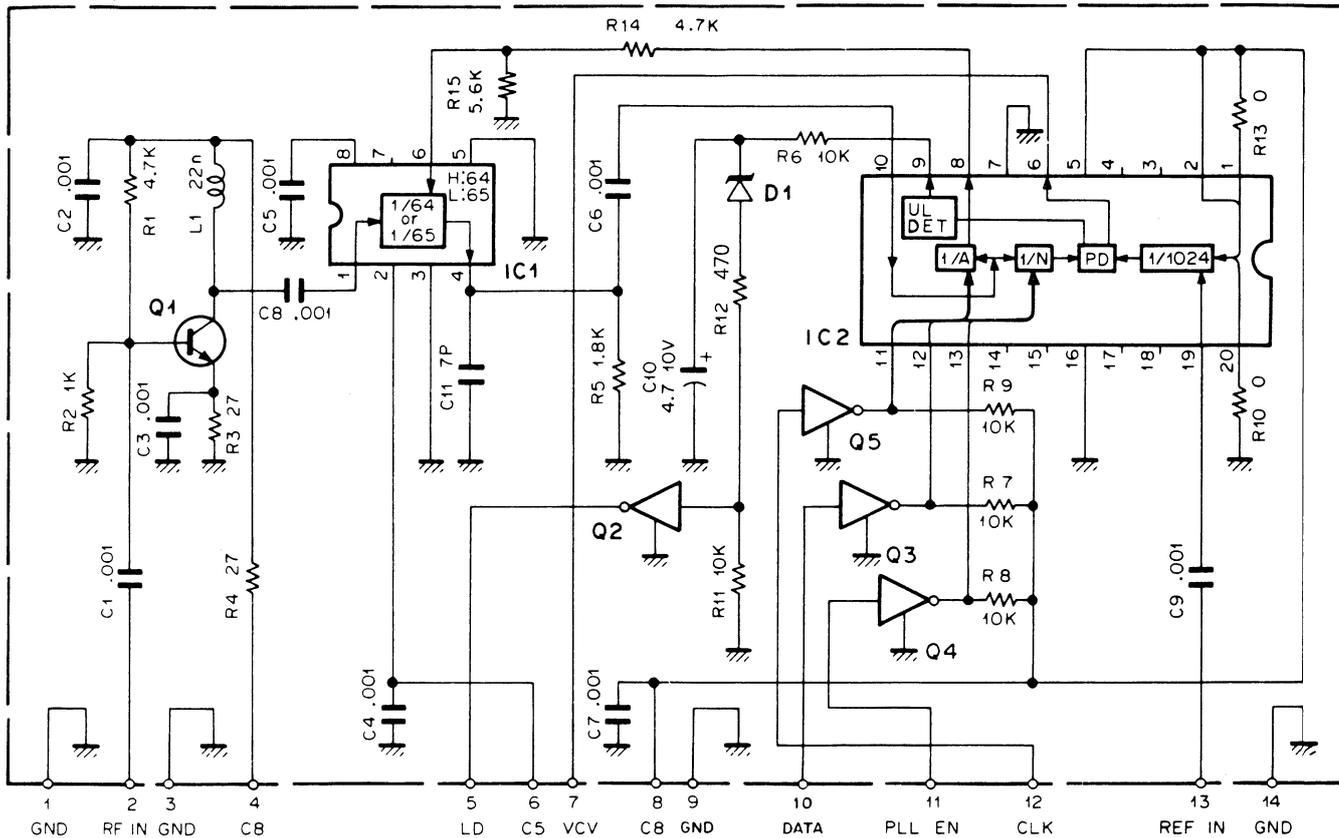
## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
21. Signaling squelch	1) SSG output : Turn the SSG output so that the SINAD sensitivity becomes 10dB.	<p style="text-align: center;"><b>TKR-820</b></p>						
	2) SSG MOD SW : EXT. MOD AG1 FREQ' : 1kHz AG2 FREQ' : QT tone freq'.							
	3) AG1 : Power switch OFF. AG2 output : Adjust the output level of AG2 so that SSG deviation becomes 0.75kHz.							
	4) AG1 : Power switch ON. AG1 output : Adjust the output level of AG1 so that the SSG deviation becomes 3.75kHz. (i.e., QT tone frequency/ 0.75kHz deviation, + 1kHz/3kHz deviation) MONITOR SW : OFF							
			Rear panel	EXT.SP	Signal-ing		Check	Open.
22. TAKE-OVER					Front panel	TAKE-OVER switch	Check	The TAKEOVER LED must light on.

# TKR-820 PC BOARD VIEWS/CIRCUIT DIAGRAM

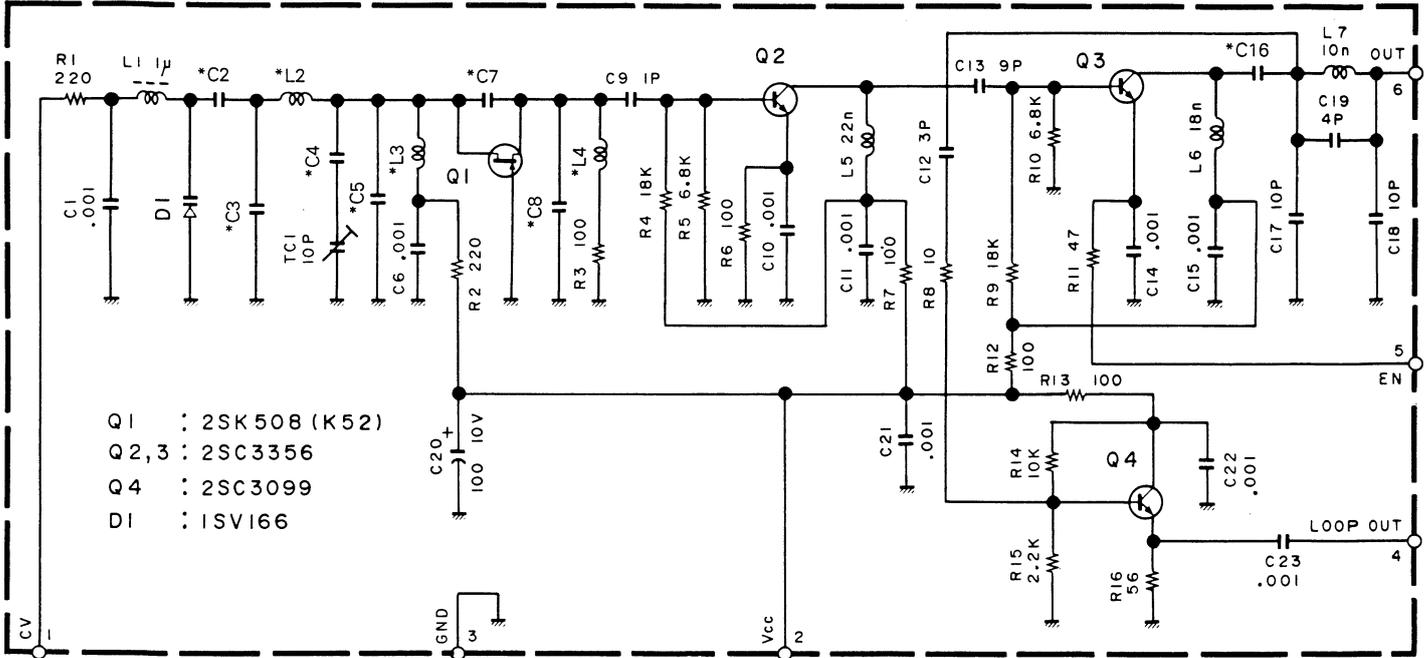
RX PLL : Z1, TX PLL : Z4 (X58-3120-10)

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



# PC BOARD VIEWS/CIRCUIT DIAGRAM TKR-820

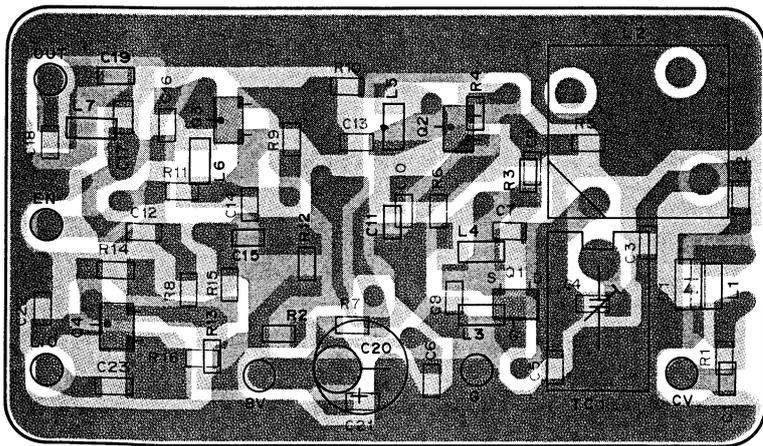
RX VCO : Z2 (X58-3150-XX) -10 : K,M -11 : K2,M2 -13 : K3,M3 -14 : K4,M4  
 RX VCO (X58-3150-XX)



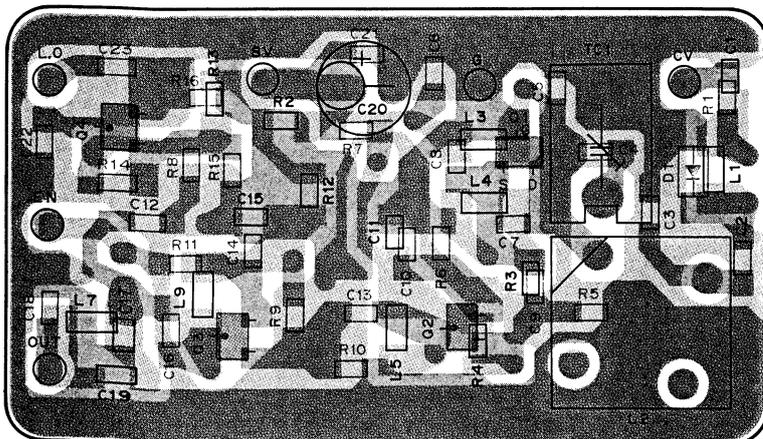
- Q1 : 2SK508 (K52)
- Q2,3 : 2SC3356
- Q4 : 2SC3099
- DI : ISVI66

Unit	C2	C3	C4	C5	C7	C8	C16	L2	L3	L4
X58-3150-10	11P	6P	15P	-	10P	10P	3P	L34-2304-05	100n	100n
X58-3150-11	10P	5P	12P	-	8P	8P	3P	L34-2304-05	100n	100n
X58-3150-13	10P	5P	9P	1P	7P	7P	3P	L34-2304-05	100n	100n
X58-3150-14	18P	6P	33P	1P	9P	15P	5P	L34-2375-05	180n	180n

Component side view



Foil side view



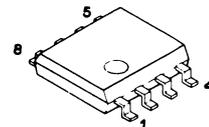
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 2SC3356  
 2SC3829TS  
 DTC114EK



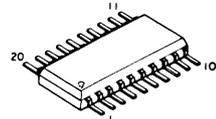
2SK508



MB504F



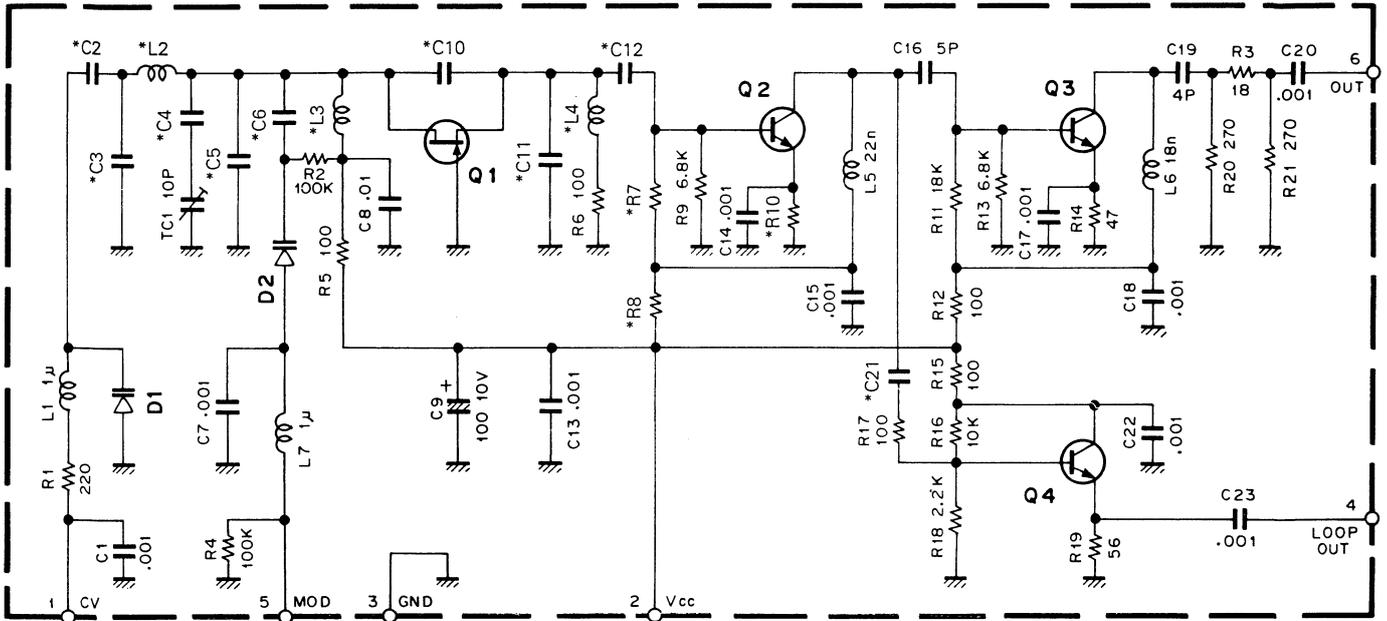
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□ : Component side  
 □ : Foil side

# TKR-820 PC BOARD VIEWS/CIRCUIT DIAGRAM

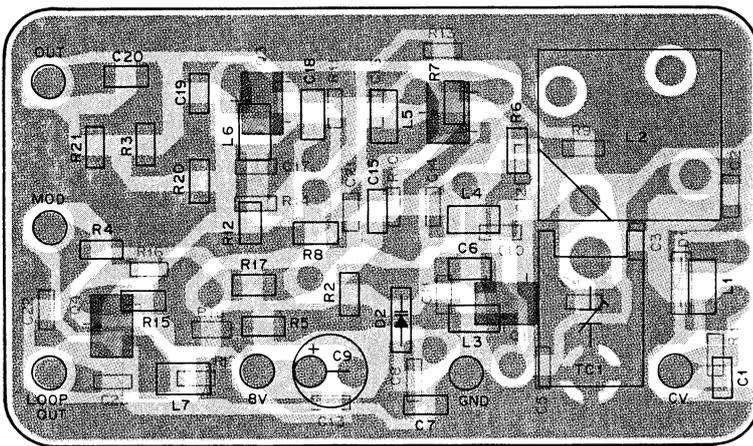
TX VCO : Z5 (X58-3460-XX) -10 : K,M -11 : K2,M2 -12 : K3,M3 -13 : K4,M4  
 TX VCO (X58-3460-XX)



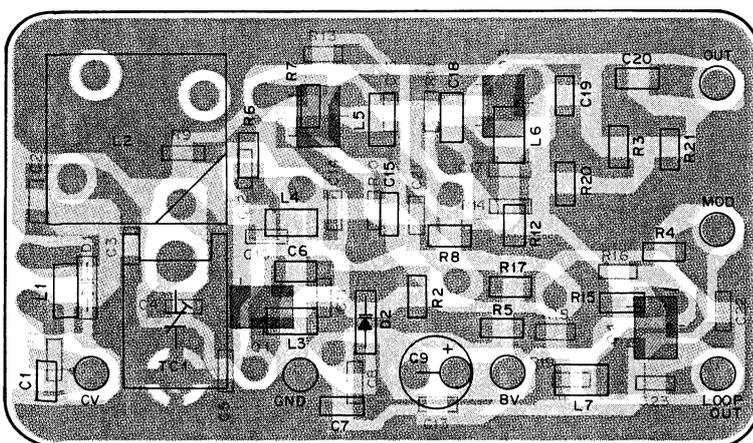
- Q 1 : 2SK508NV (K52)  
 Q 2~4 : 2SC3356  
 D 1 : 1SV166  
 D 2 : 1SV164

Unit	C2	C3	C4	C5	C6	C10	C11	C12	C21	R7	R8	R10	L2	L3	L4
X58-3460-10	10P	5P	47P	1P	0.5P	8P	8P	0.5P	1P	18k	100	100	L34-2304-05	100n	100n
X58-3460-11	10P	4P	33P	0.5P	0.5P	8P	8P	-	1P	18k	100	100	L34-2304-05	100n	100n
X58-3460-12	8P	3P	22P	-	0.5P	7P	7P	0.5P	1P	3.9k	47	47	L34-2304-05	100n	100n
X58-3460-13	-	5P	33P	1P	0.75P	10P	10P	1.5P	4P	18k	100	100	L34-2375-05	180n	180n

Component side view



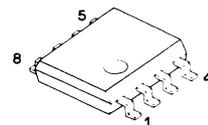
Foil side view



2SC3326  
 2SC3356



NJM4558M  
 NJM4560M



2SK508NV

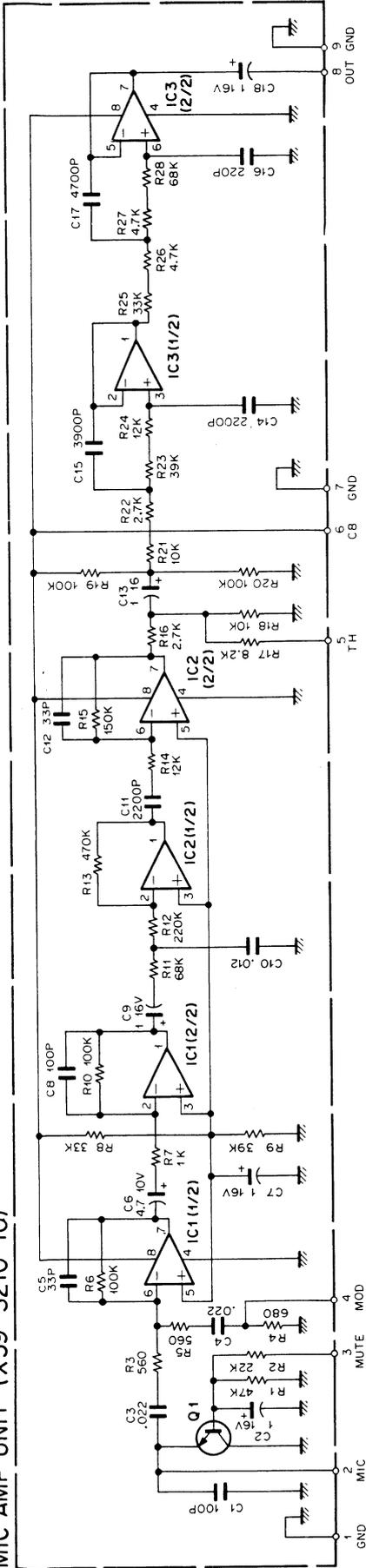


□ : Component side  
 □ : Foil side

# PC BOARD VIEWS/CIRCUIT DIAGRAM TKR-820

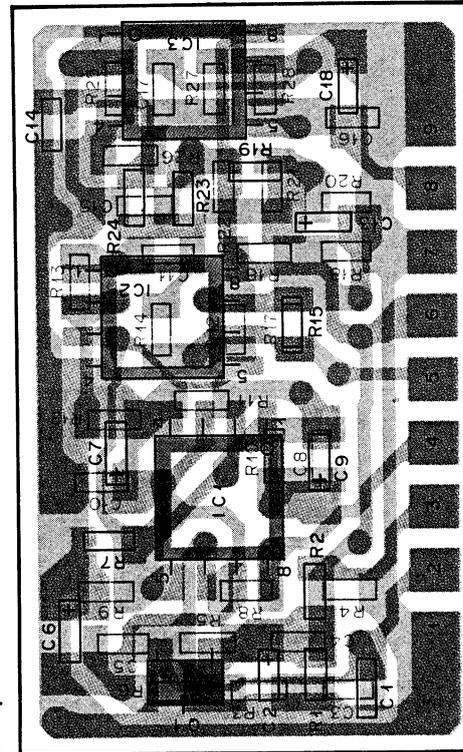
MIC AMP : Z7 (X59-3210-10)

MIC AMP UNIT (X59-3210-10)

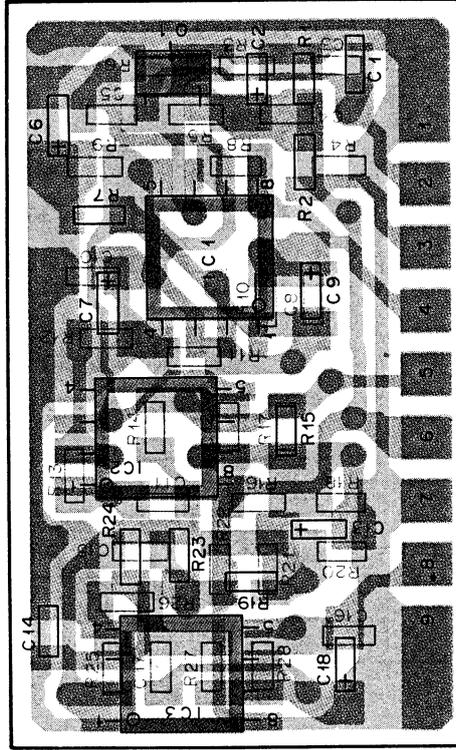


Q1 : 25C3326(A) IC1 : NJM4560M IC2,3 : NJM4558M

Component side view



Foil side view



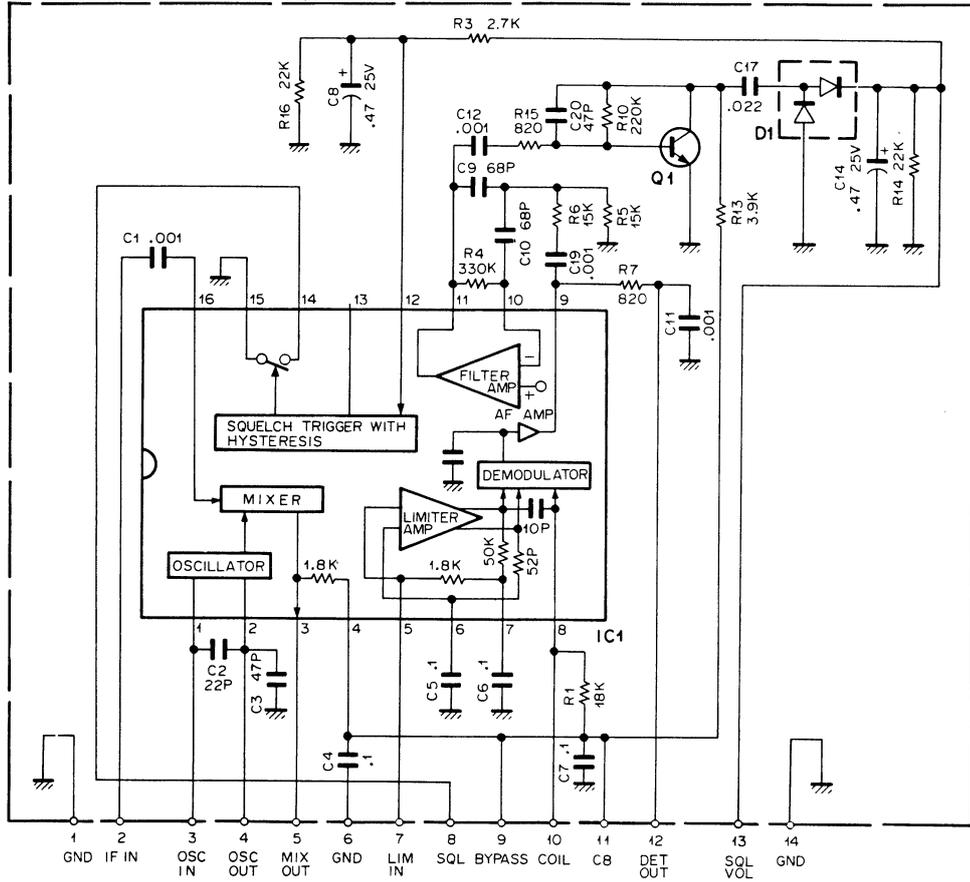
□ : Component side  
□ : Foil side

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# TKR-820 PC BOARD VIEWS/CIRCUIT DIAGRAM

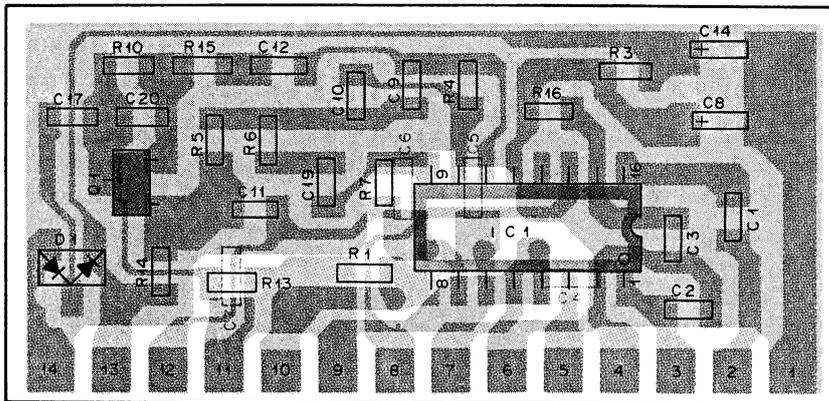
IF : Z8 (X59-3220-10)

IF UNIT (X59-3220-10)

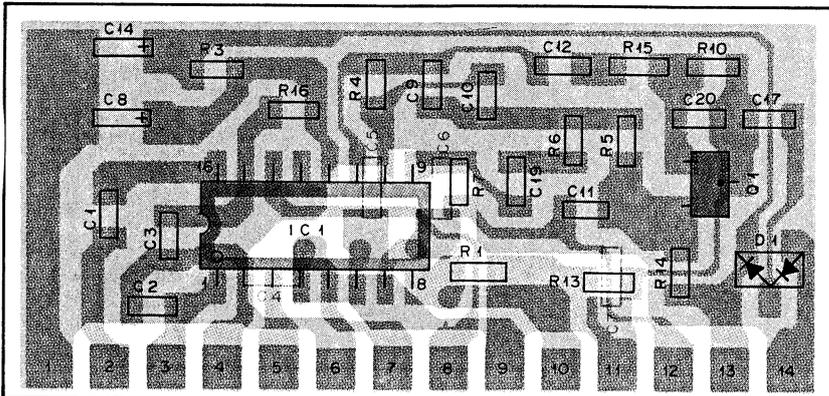


IC1 : MC3361D  
Q1 : 2SC2712(Y)  
D1 : DA204K

Component side view



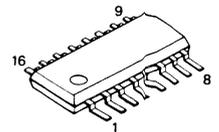
Foil side view



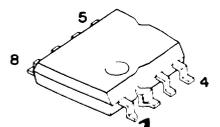
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MC3361D



M5222FP  
NJM4558M

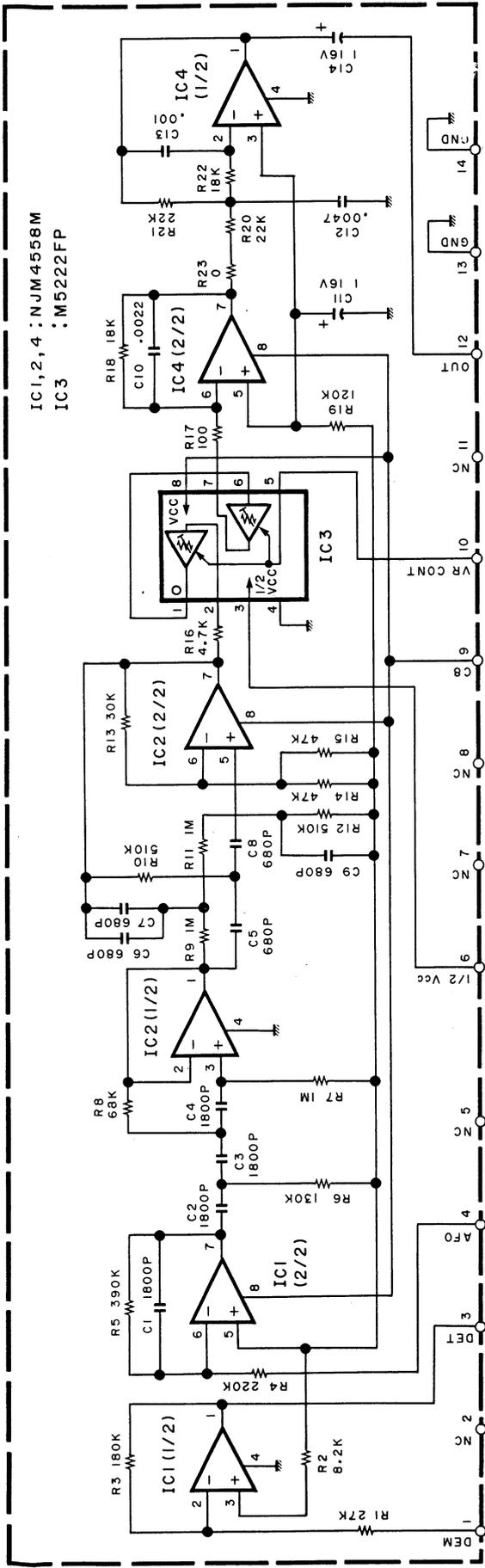


□ : Component side  
▨ : Foil side

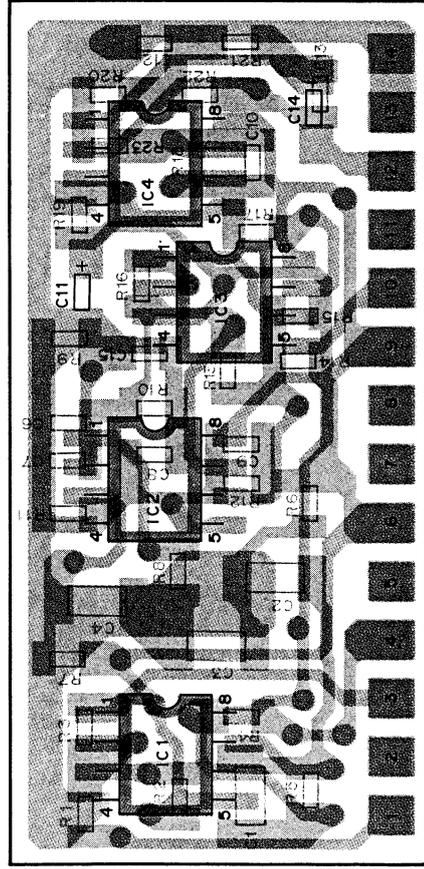
# PC BOARD VIEWS/CIRCUIT DIAGRAM TKR-820

**BPF/VCA : Z9 (X59-3230-10)**

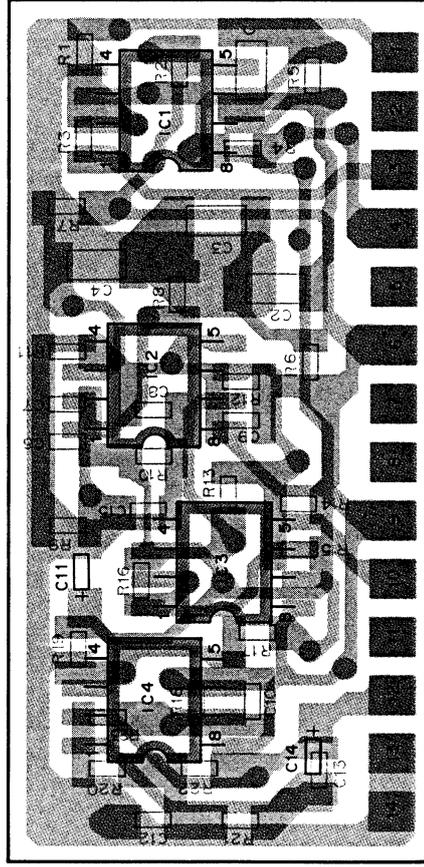
**BPF/VCA ( TX-RX UNIT : Z9 ) ( X59 -3230 -10 )**



Component side view



Foil side view

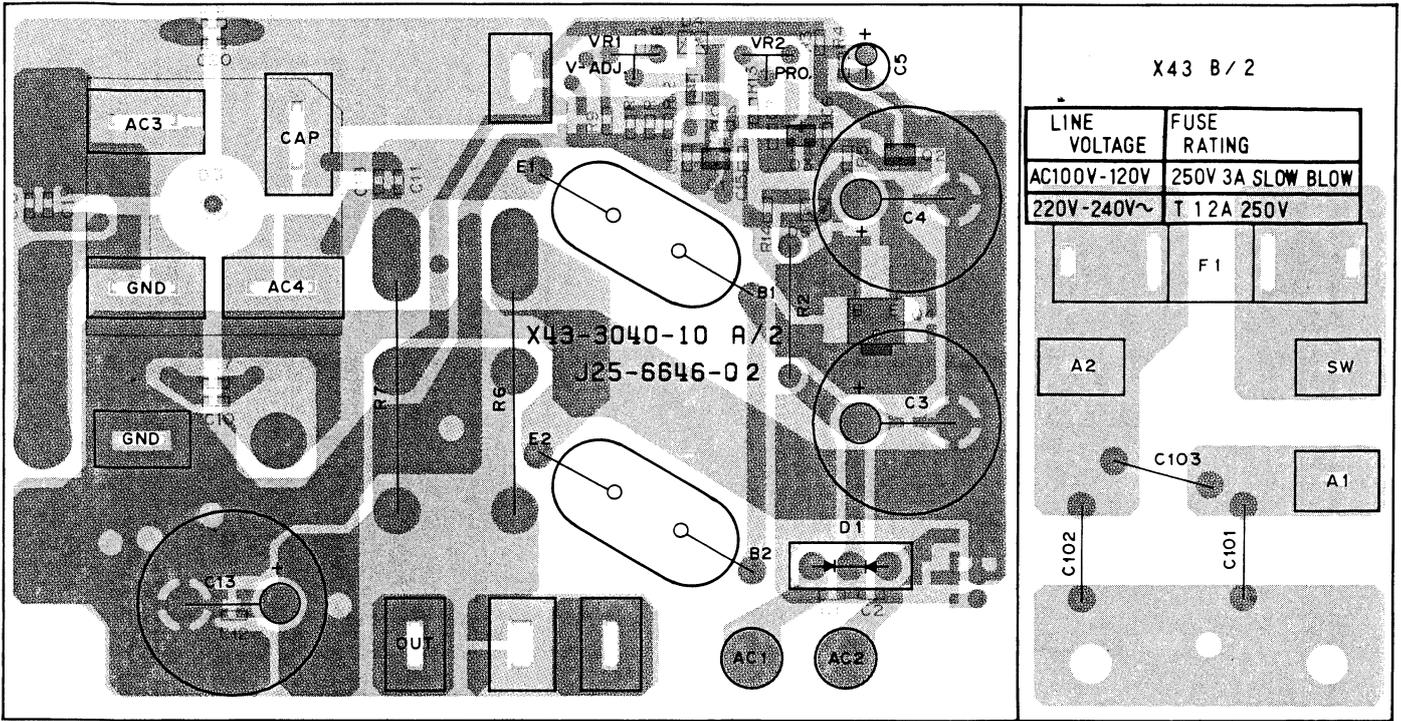


: Component side  
 : Foil side

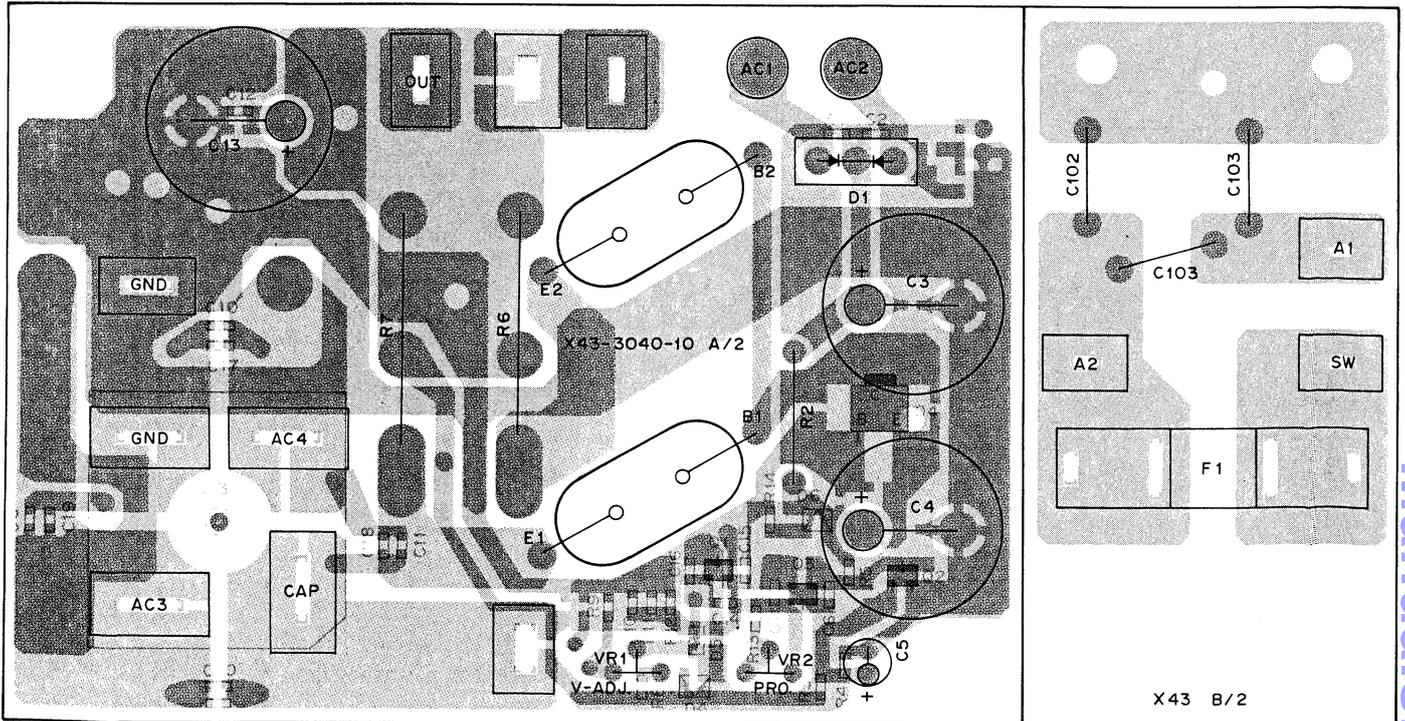
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# TKR-820 PC BOARD VIEWS

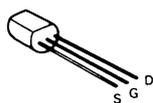
AVR UNIT (X43-3040-10) Component side view



Foil side view



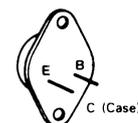
2SB968



2SC2712



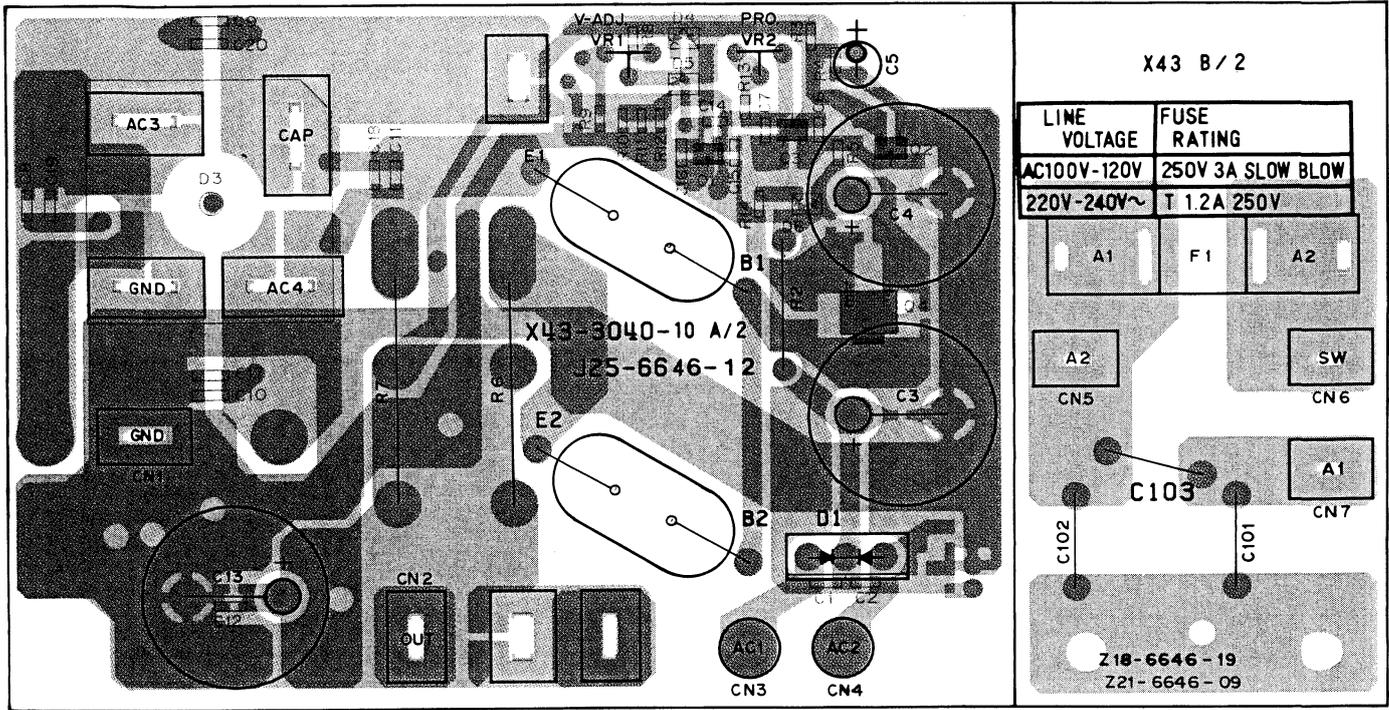
2N5885



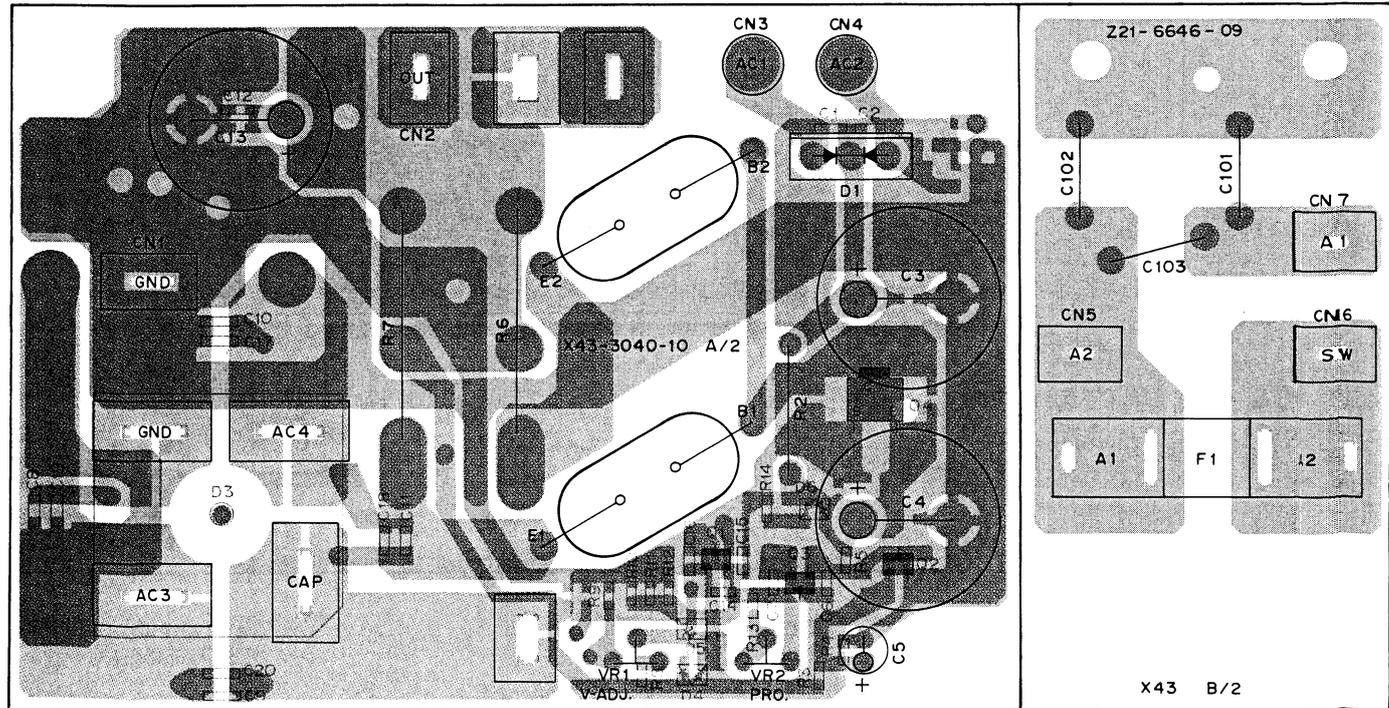
▨ : Component side  
▩ : Foil side

# PC BOARD VIEWS TKR-820

## AVR UNIT (X43-3040-10) Component side view (S/No. 104XXXX~)



## Foil side view



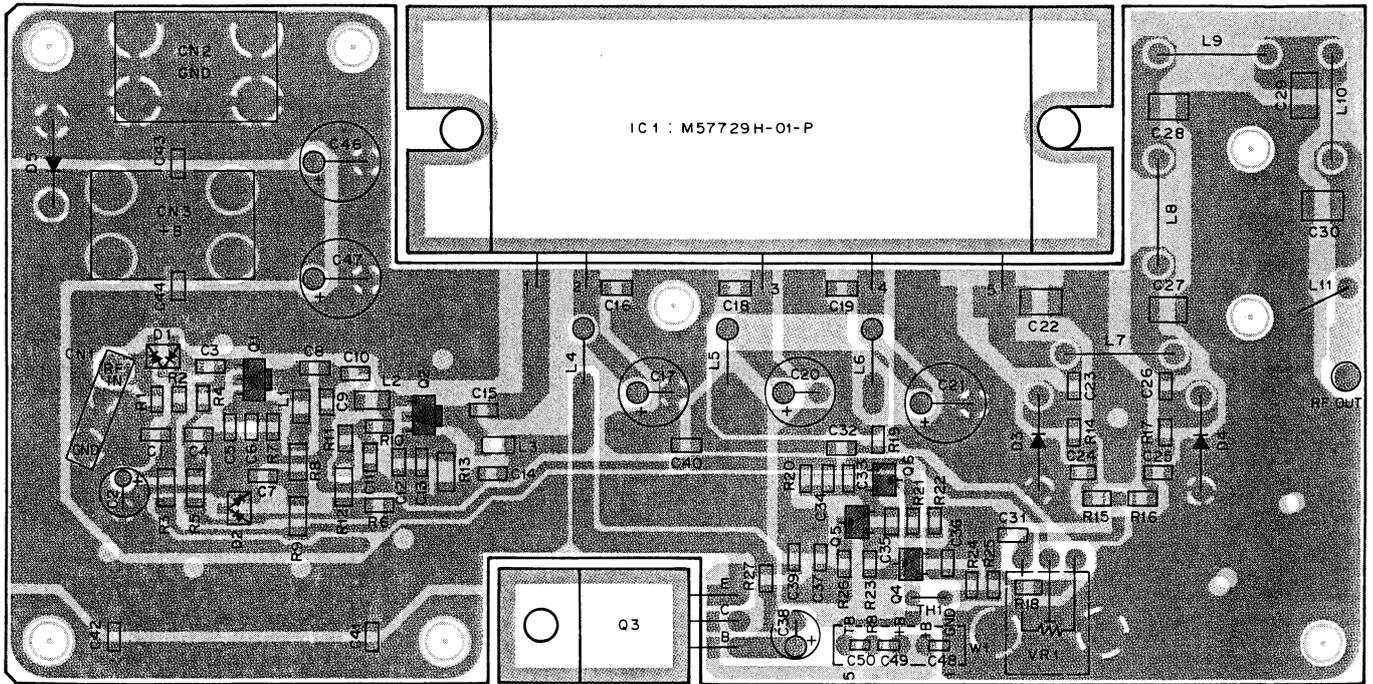
: Component side  
 : Foil side

A B C D E F

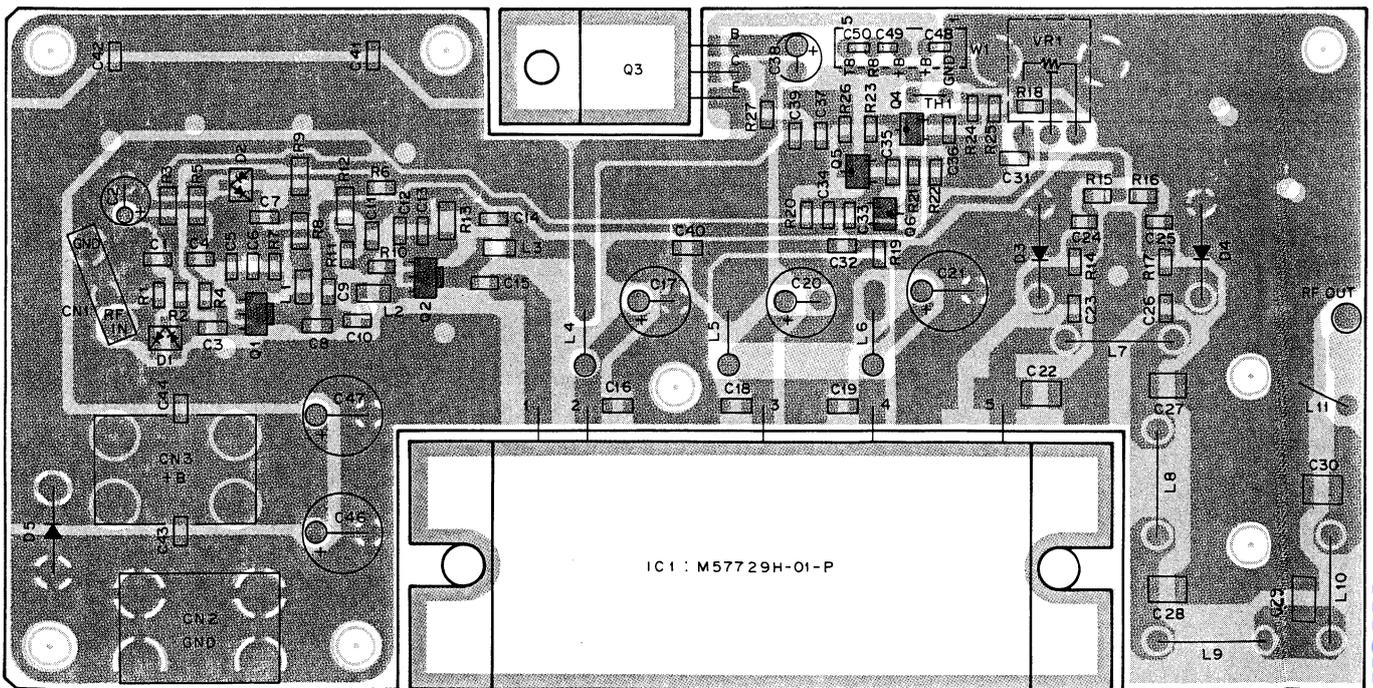
# TKR-820 PC BOARD VIEWS

FINAL UNIT (X45-3250-10)

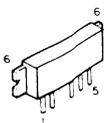
Component side view



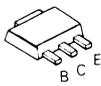
Foil side view



M57729



2SC3357



2SB946



2SC2712  
2SC3326



2SC2954

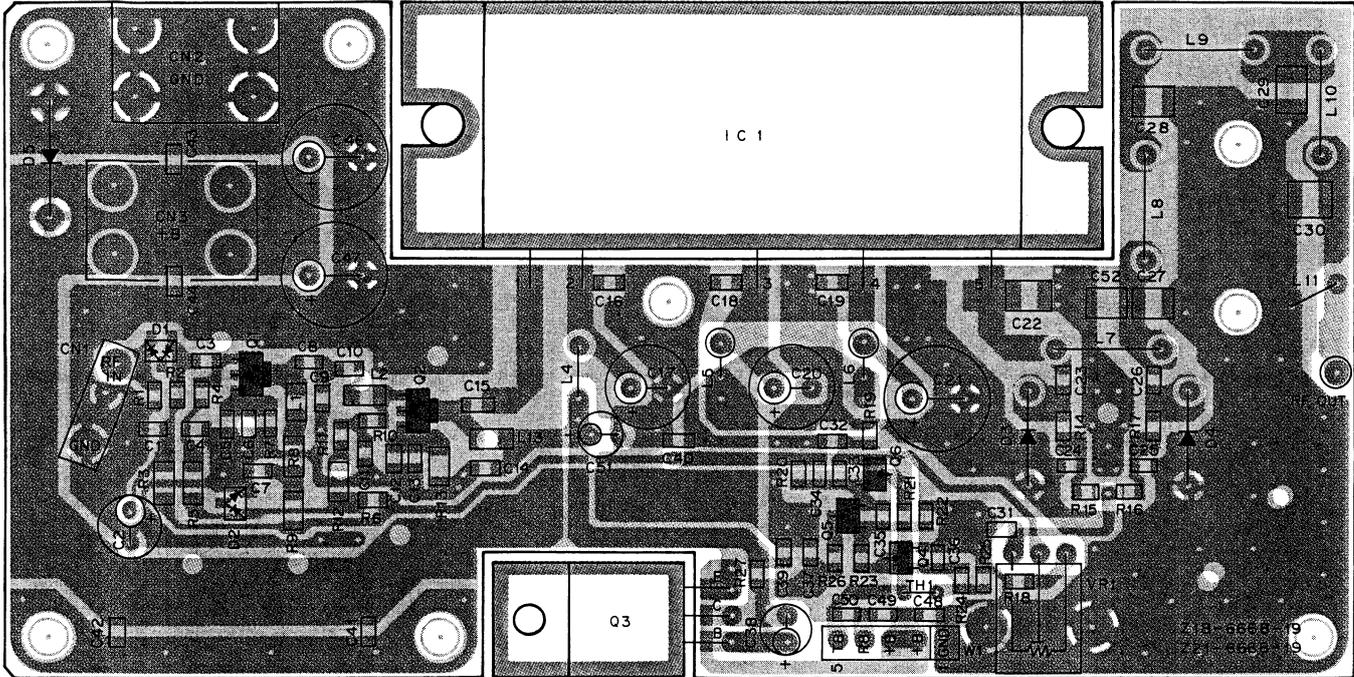


□ : Component side  
■ : Foil side

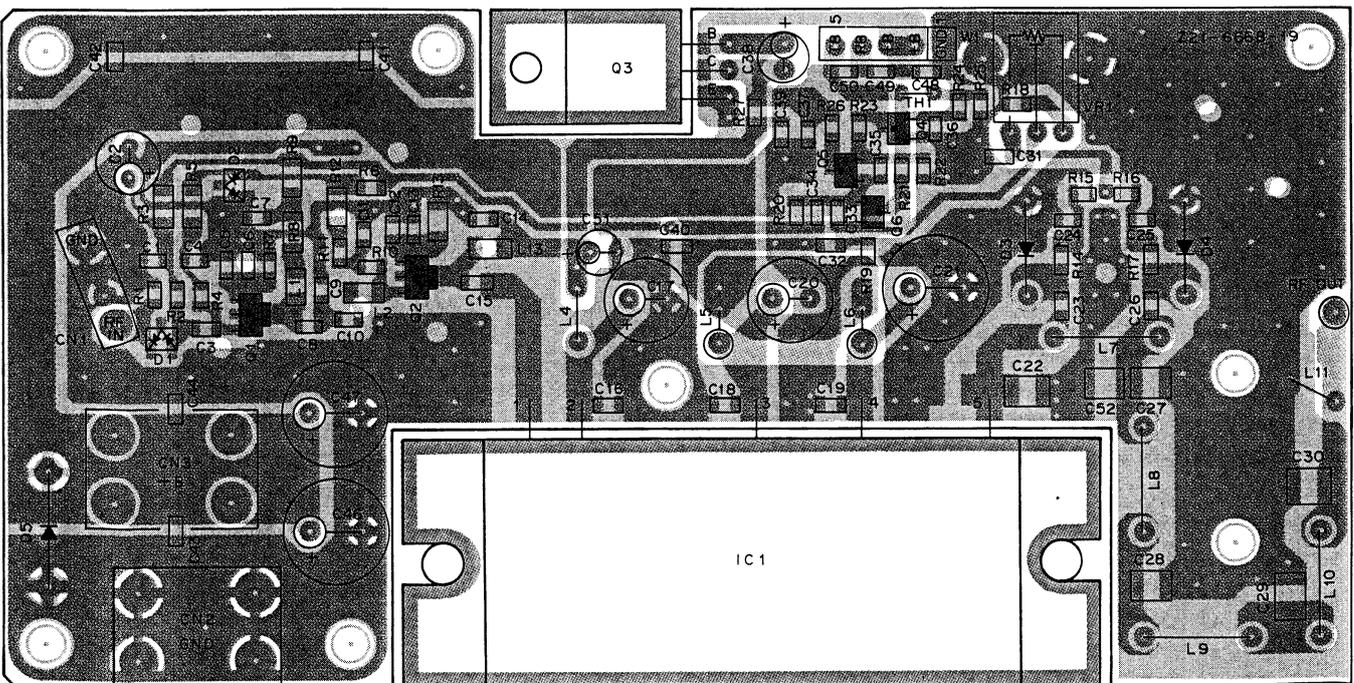
# PC BOARD VIEWS TKR-820

FINAL UNIT (X45-3250-XX) -10 : K,M -11 : K2,M2 -12 : K3,M3 -13 : K4,M4

Component side view (S/No. 104XXXX~)



Foil side view

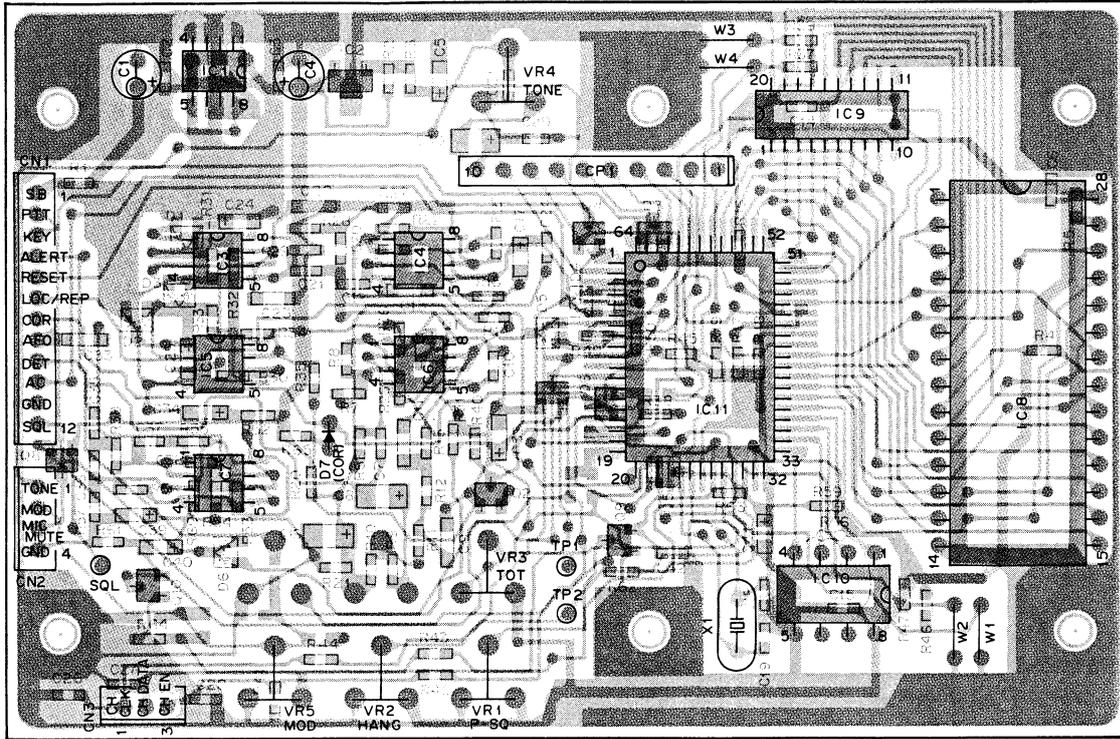


 : Component side  
 : Foil side

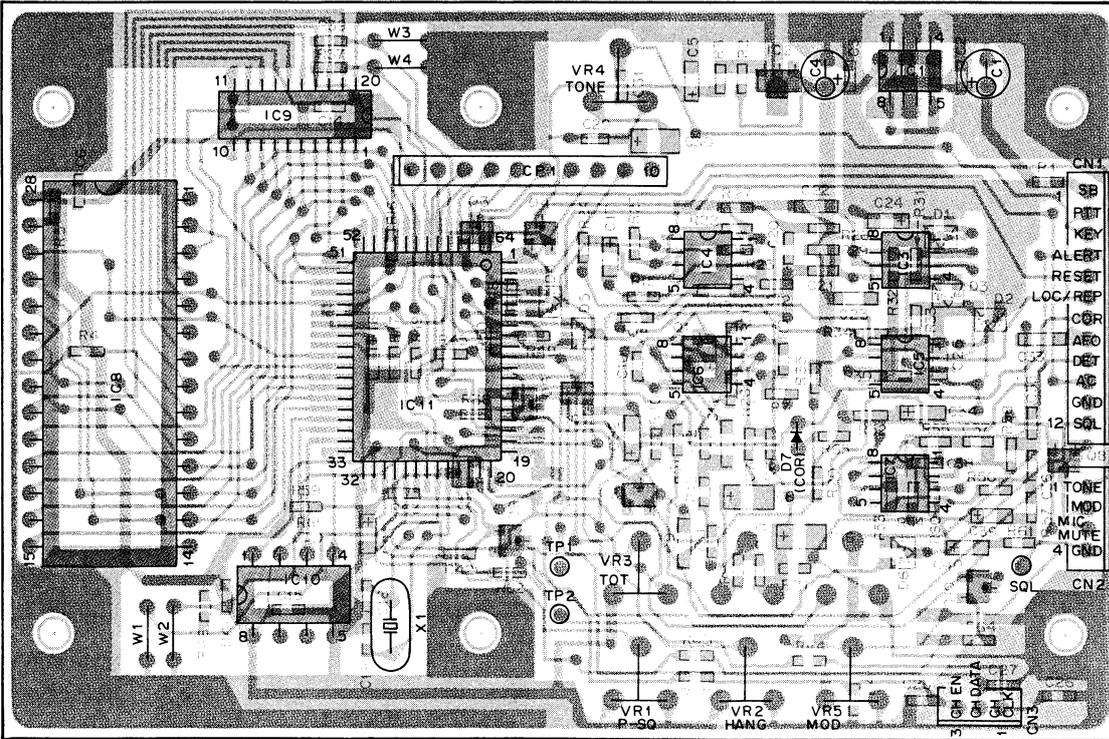
# TKR-820 PC BOARD VIEWS

## SIGNALING UNIT (X52-3140-10)

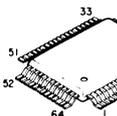
### Component side view



### Foil side view



μPD78310G



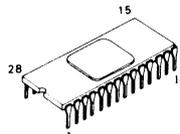
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DTC144EK



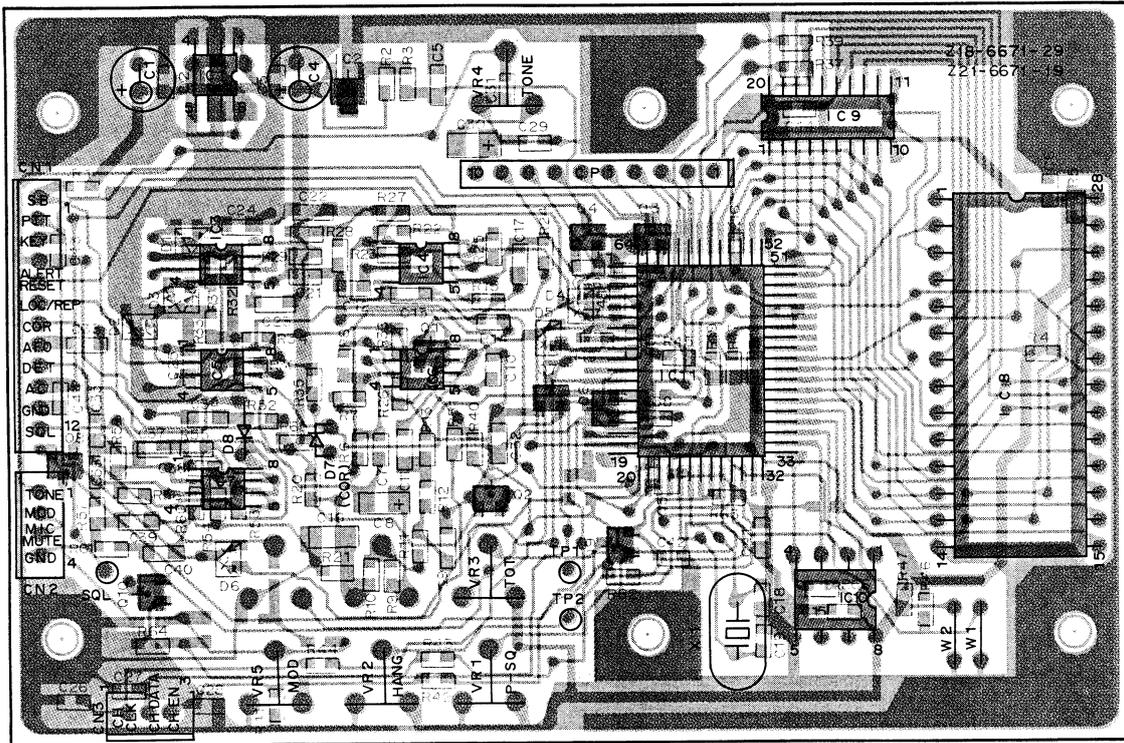
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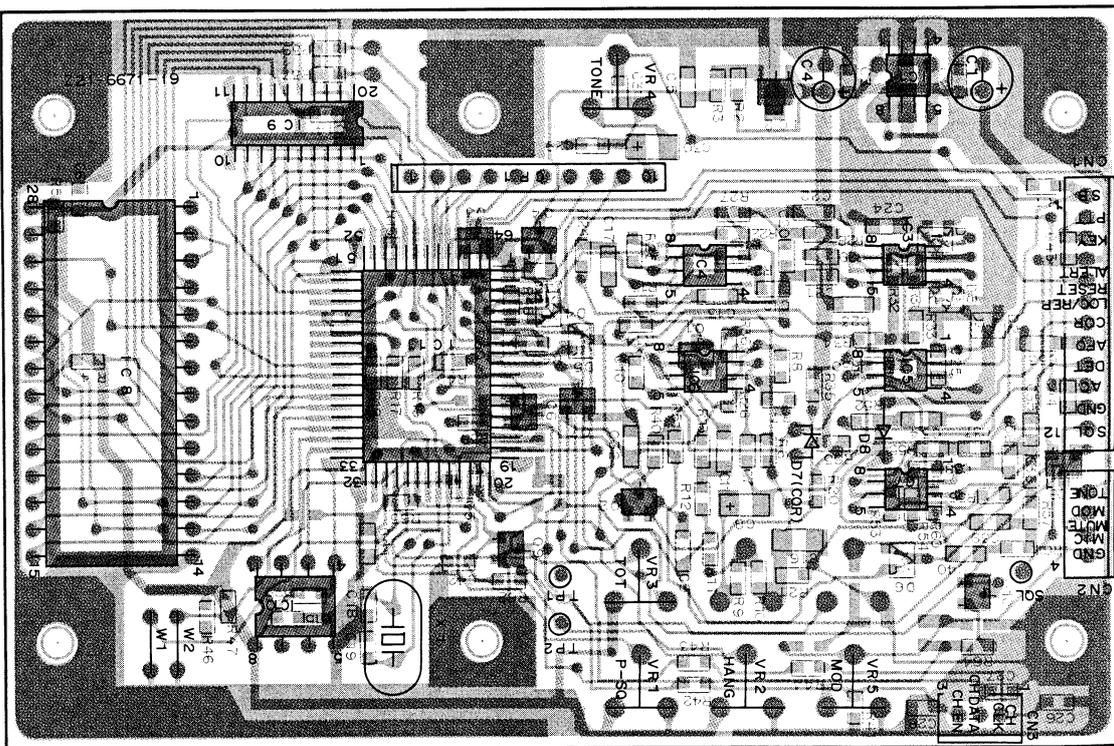
□ : Component side  
□ : Foil side

# PC BOARD VIEWS TKR-820

## SIGNALING UNIT (X52-3140-10) Component side view (S/No. 104XXXX~)



## Foil side view



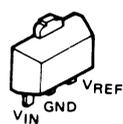
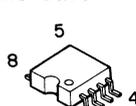
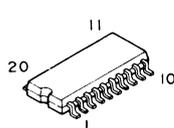
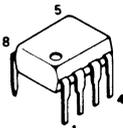
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BA4558F  
MC78L05M

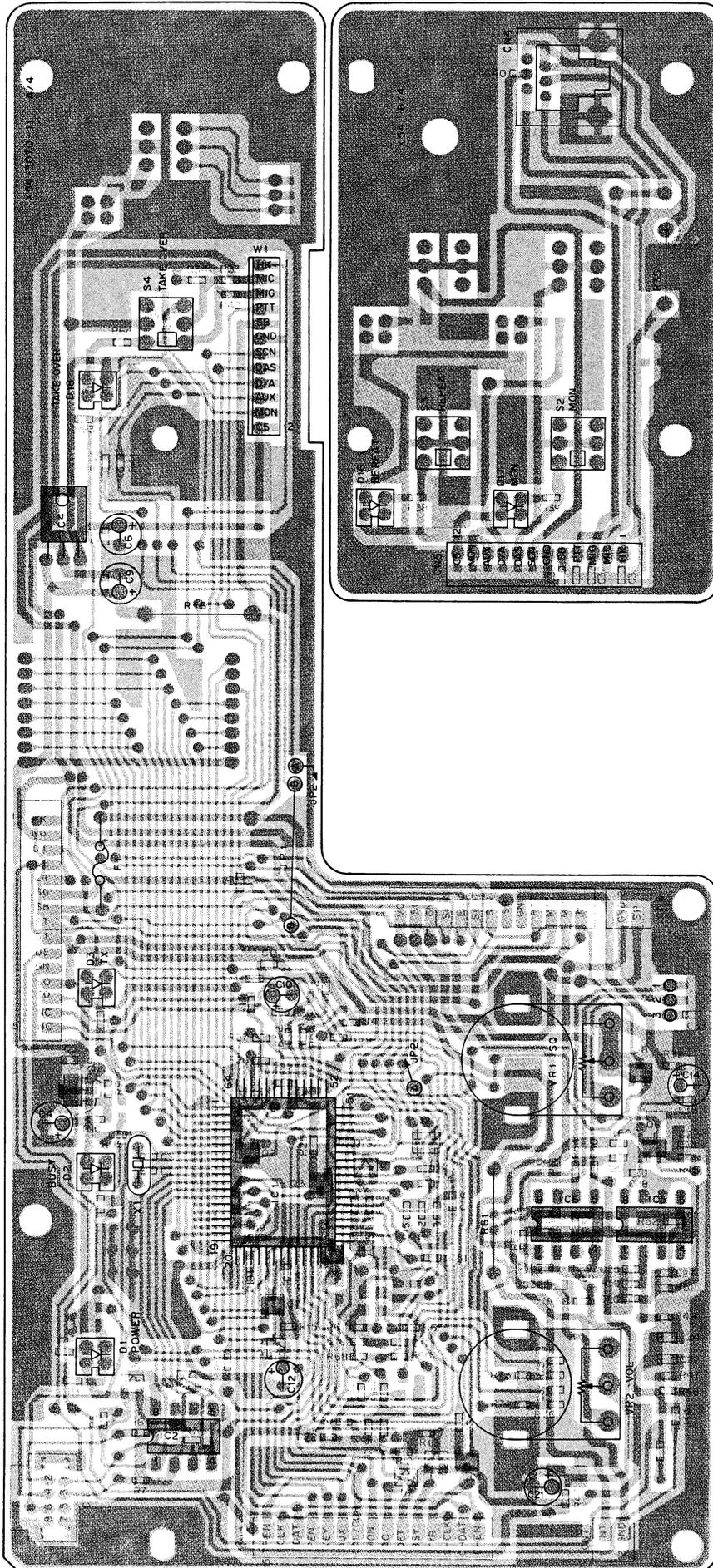
M51943BML

 : Component side  
 : Foil side



# TKR-820 PC BOARD VIEW

DISPLAY UNIT (X54-3070-11) Component side view

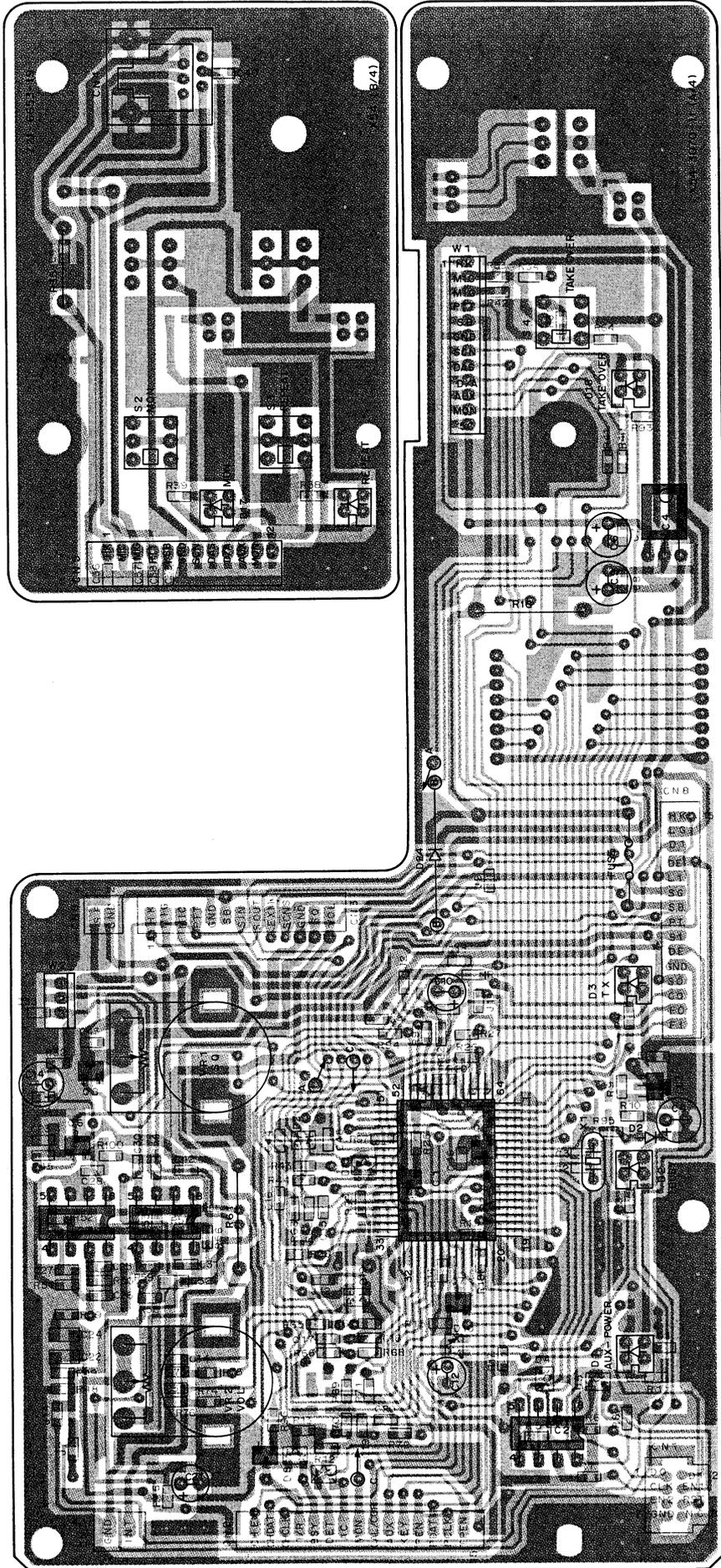






# PC BOARD VIEW TKR-820

Foil side view



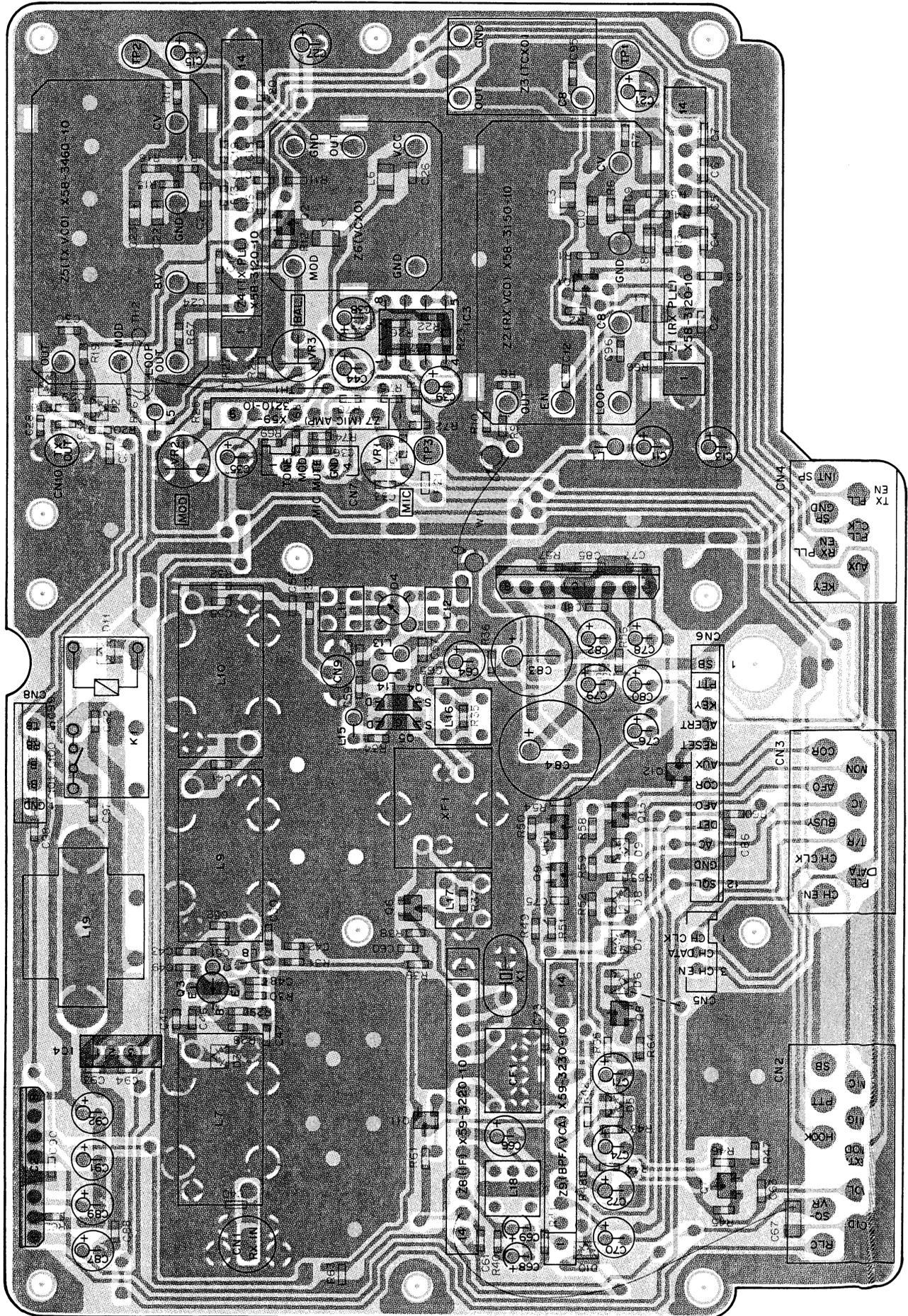
1  
2  
3  
4  
5  
6  
7

# TKR-820 PC BOARD VIEW

TX-RX UNIT (X57-3270-10)

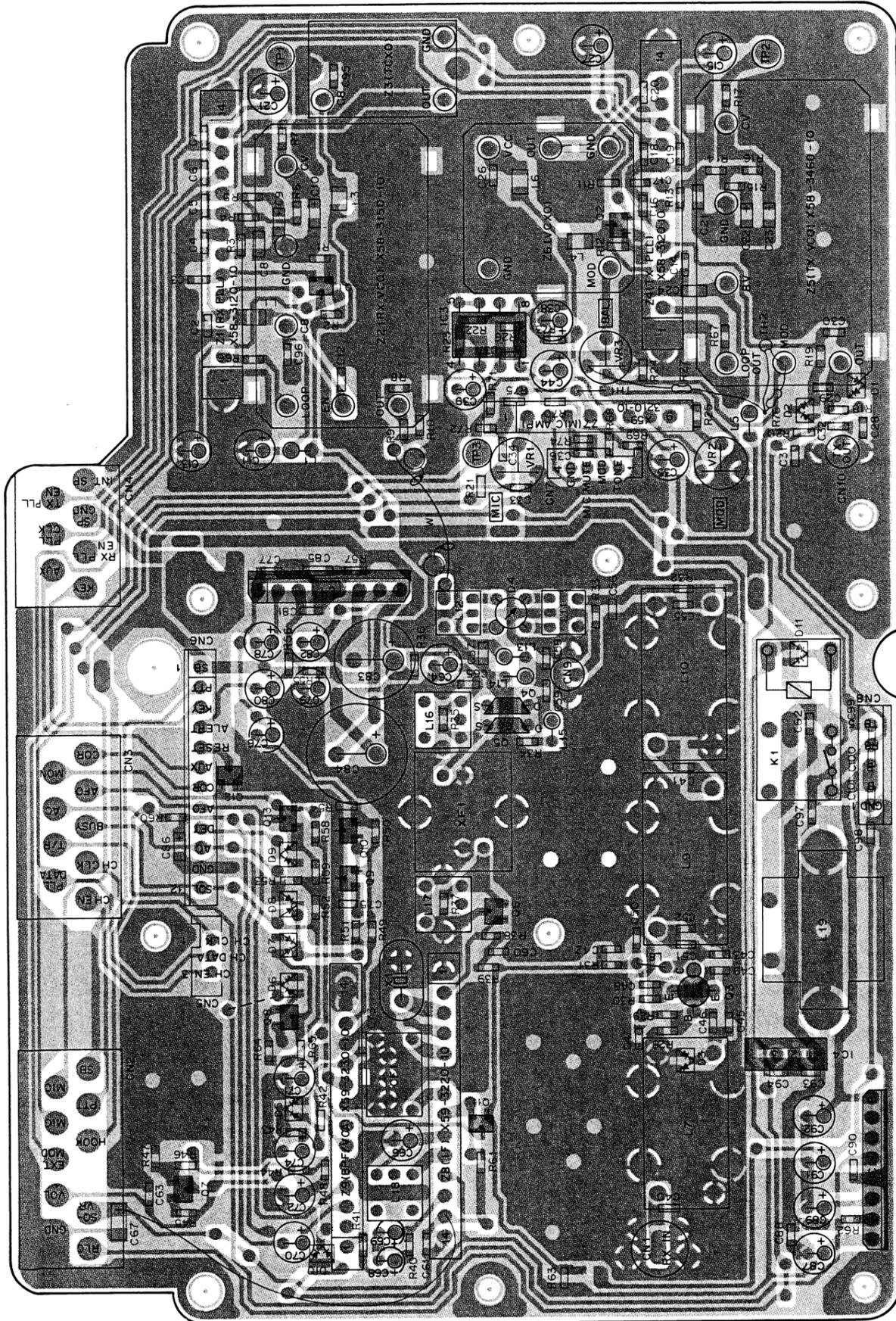
Component side view

 : Component side  
 : Foil side

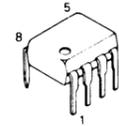


# PC BOARD VIEW TKR-820

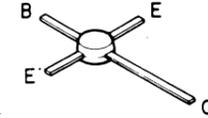
Foil side view



NJM4558D



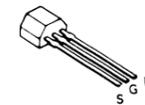
2SC3358K



MB3756  
μPC1242H



2SK125



2SC2712  
2SC3326  
DTC114EK

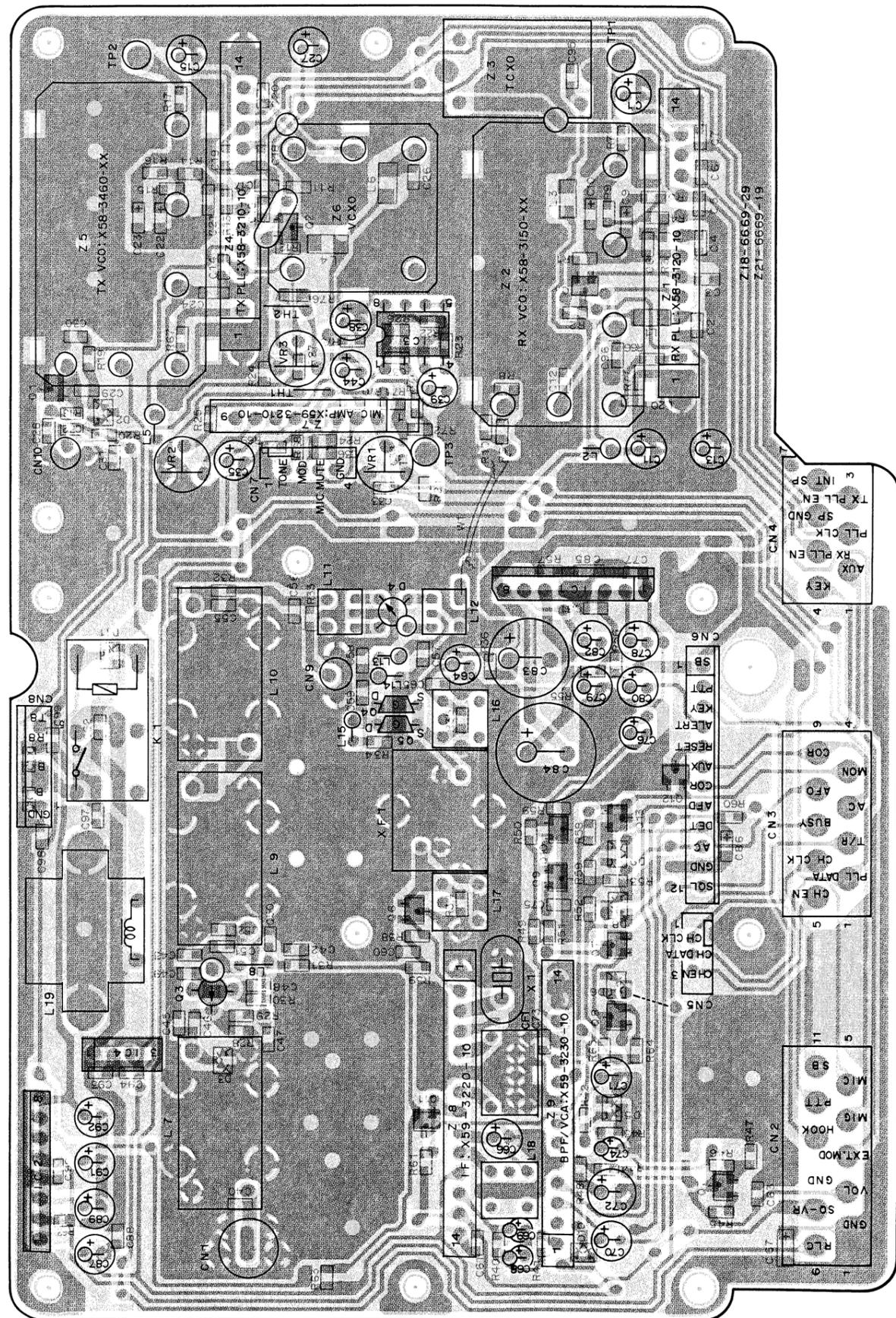


2SK302



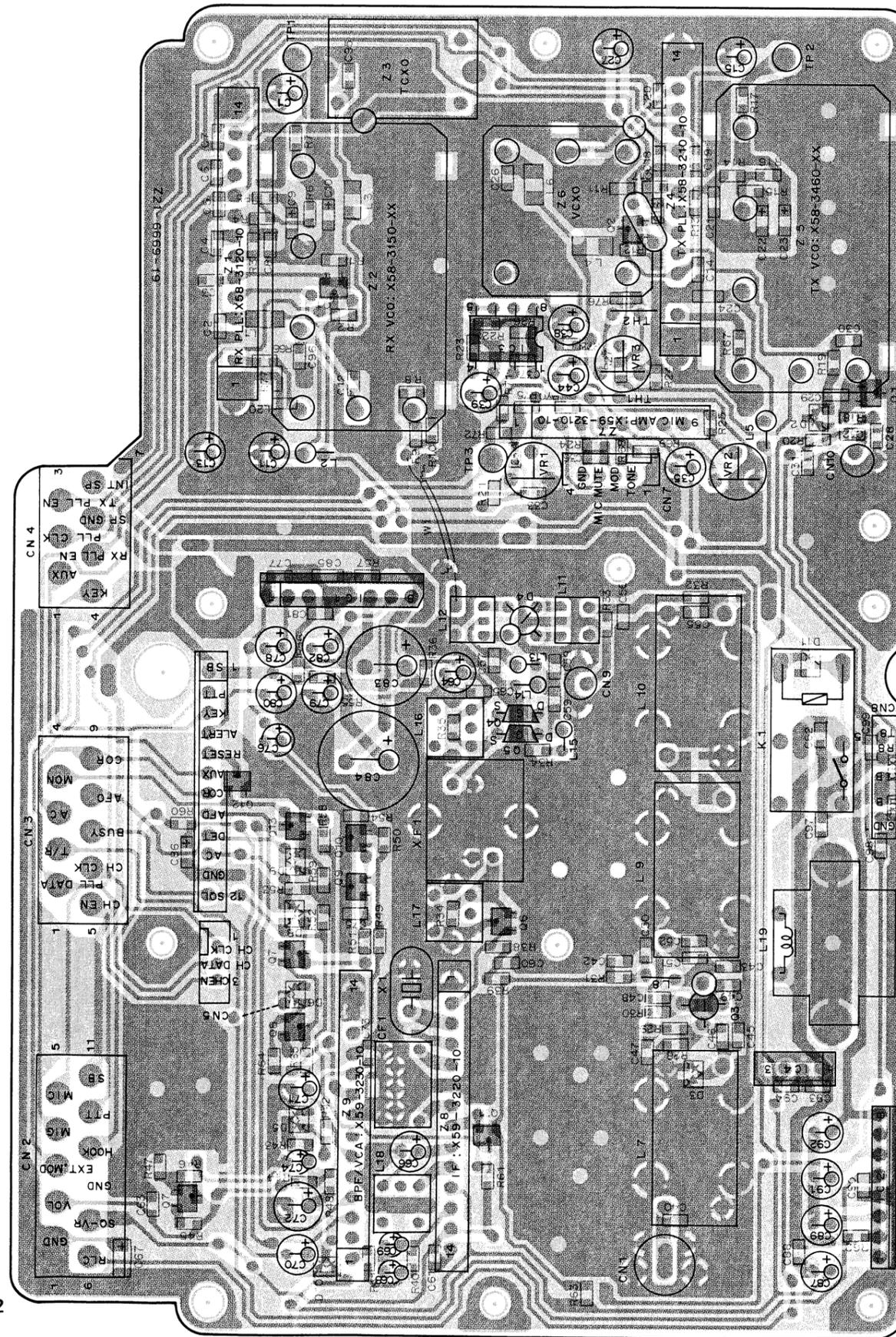
# TKR-820 PC BOARD VIEWS

TX-RX UNIT (X57-3270-XX) -10 : K,M -11 : K2,M2 -12 : K3,M3 -13 : K4,M4  
 Component side view (S/No. 104XXXX~)



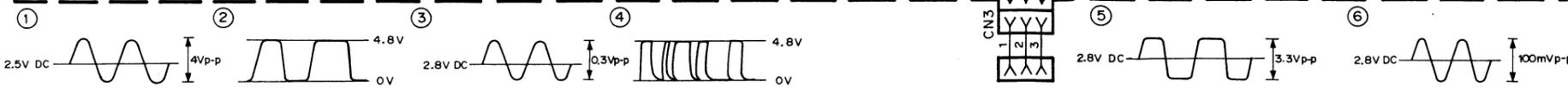
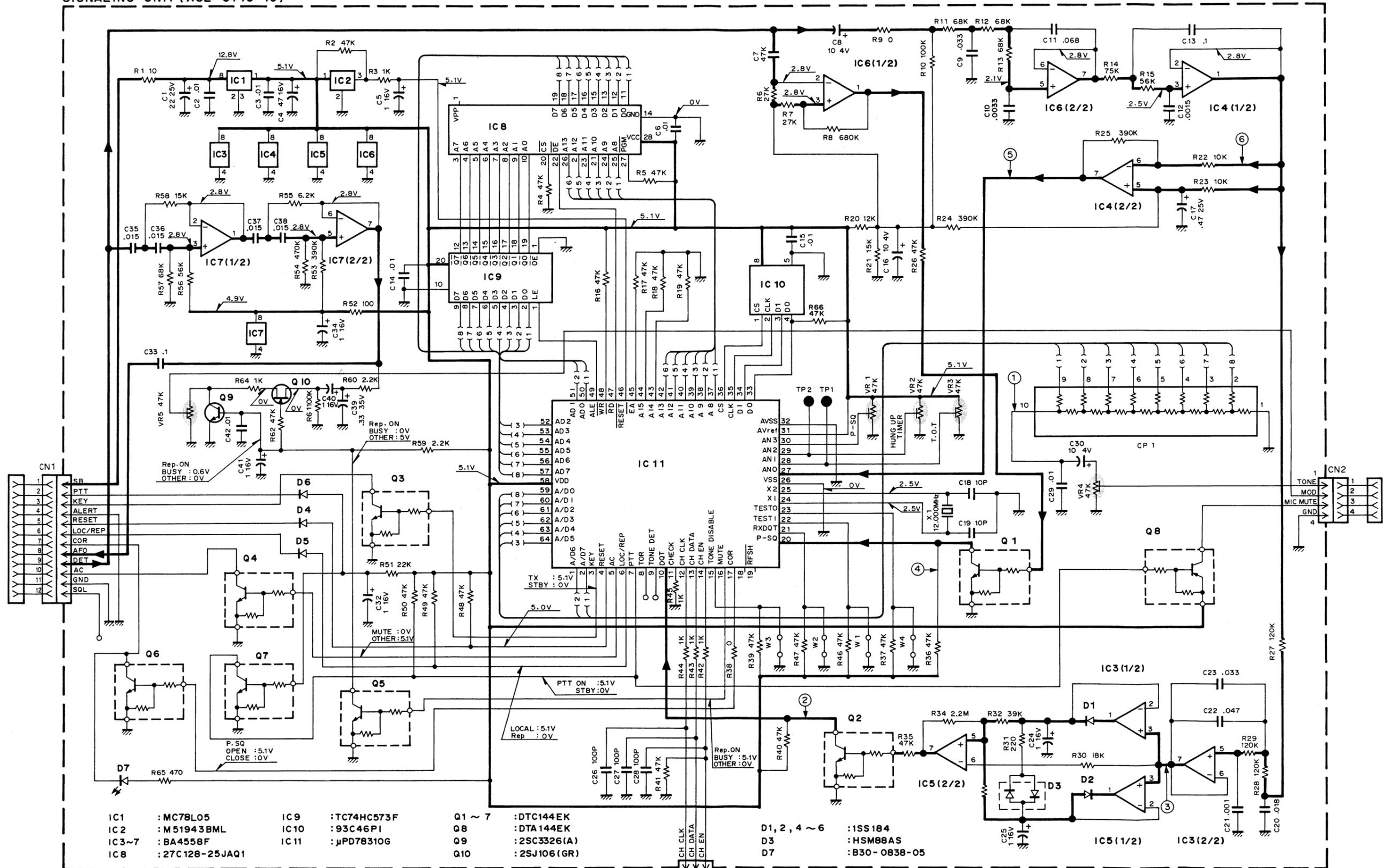
Foil side view

□ : Component side  
 □ : Foil side



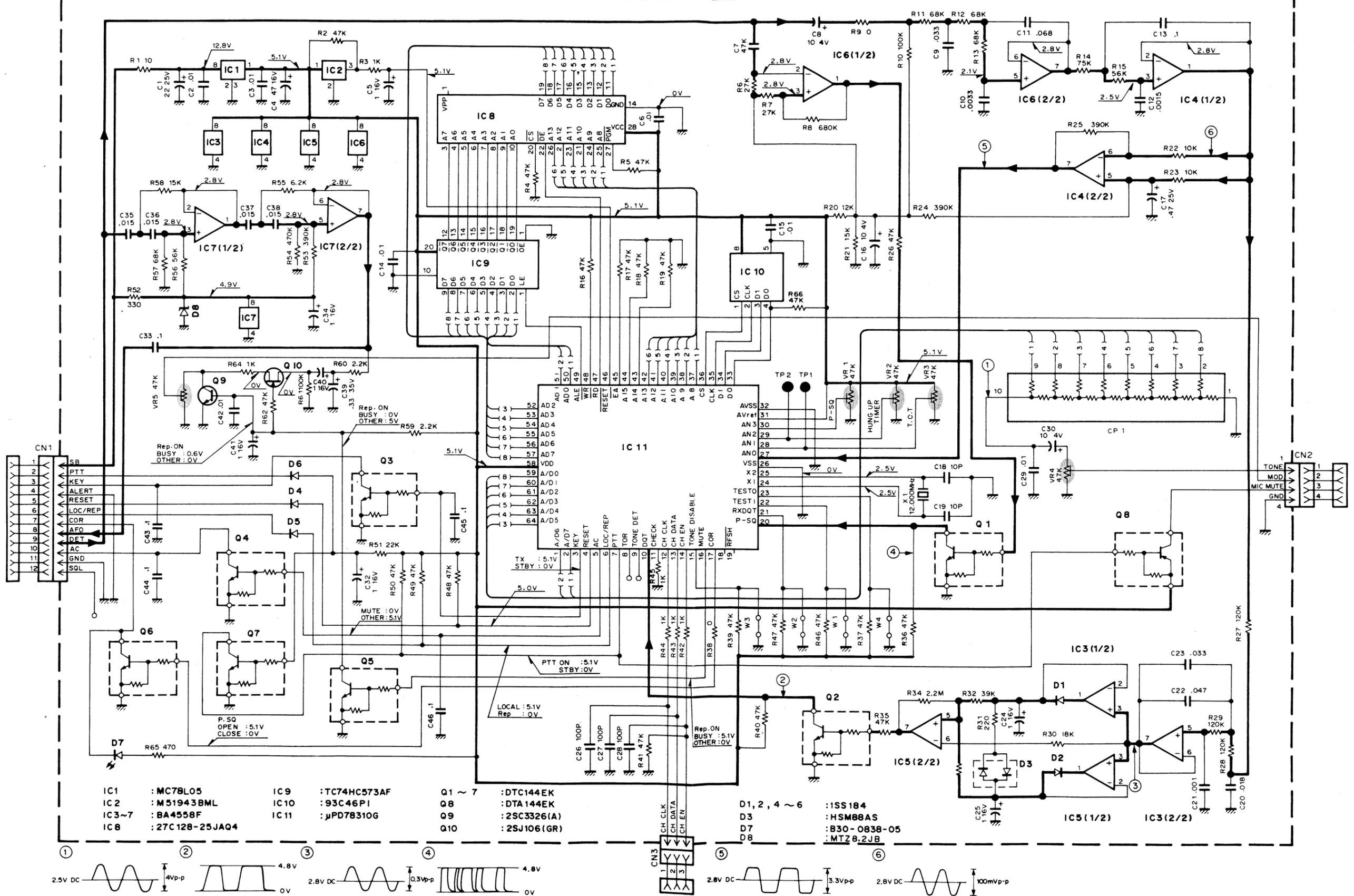
# SIGNALING CIRCUIT DIAGRAM TKR-820

SIGNALING UNIT (X52-3140-10)



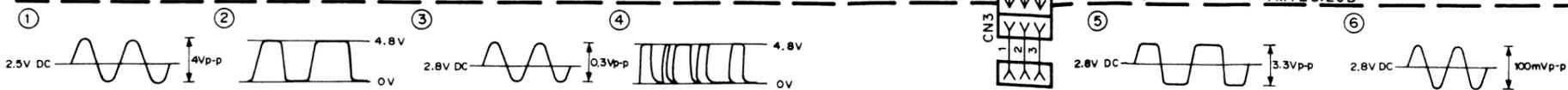
# TKR-820 SIGNALING CIRCUIT DIAGRAM (S/No. 104XXXX~)

SIGNALING UNIT (X52-3140-10)



- |                     |                   |                   |
|---------------------|-------------------|-------------------|
| IC1 : MC78L05       | IC9 : TC74HC573AF | Q1 ~ 7 : DTC144EK |
| IC2 : M51943BML     | IC10 : 93C46P1    | Q8 : DTA144EK     |
| IC3~7 : BA4558F     | IC11 : µPD78310G  | Q9 : 2SC3326(A)   |
| IC8 : 27C128-25JAQ4 |                   | Q10 : 2SJ106(GR)  |

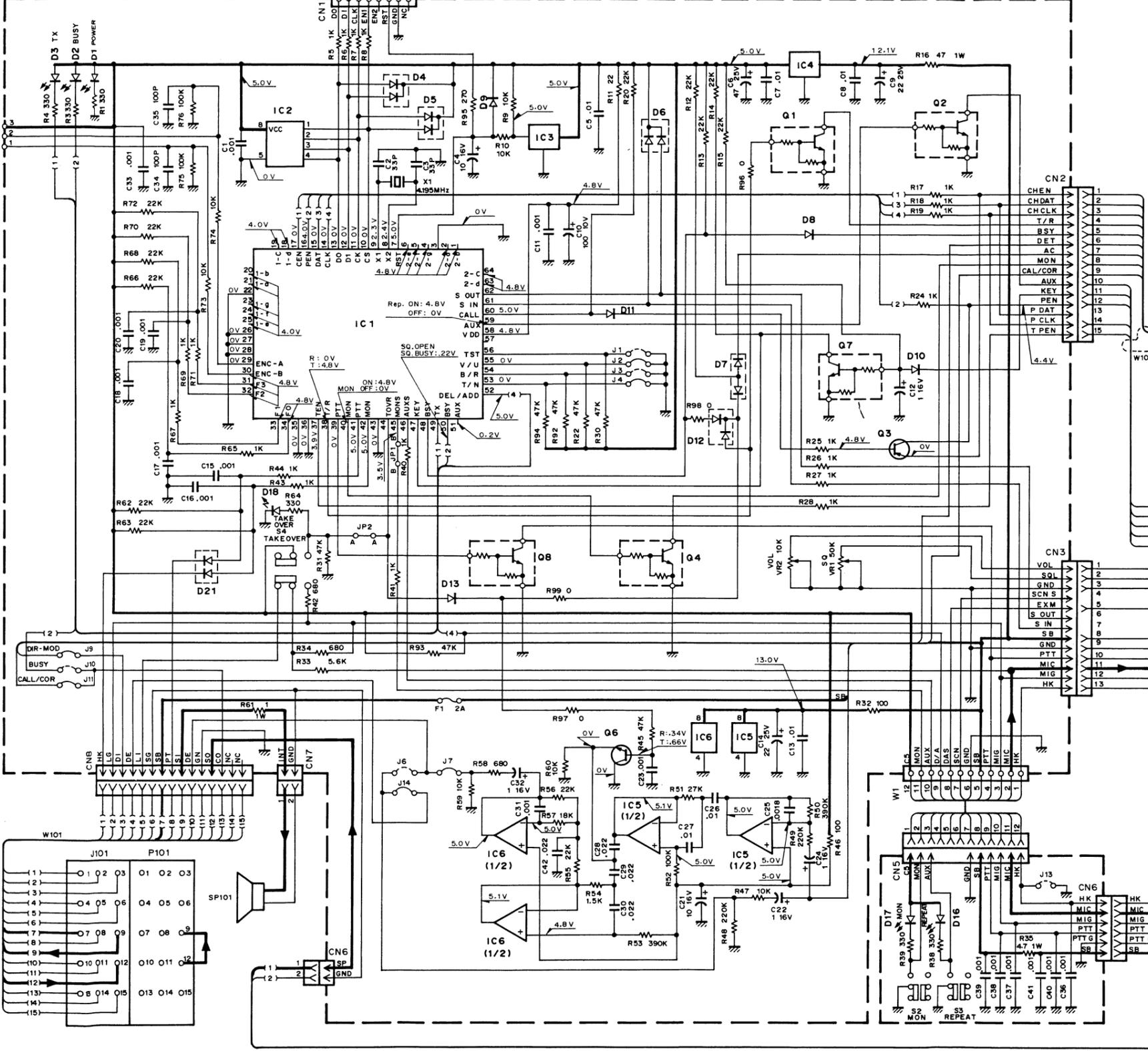
- |                       |
|-----------------------|
| D1, 2, 4 ~ 6 : 1SS184 |
| D3 : HSM88AS          |
| D7 : B30-0838-05      |
| D8 : MTZ8.2JB         |



# SCHEMATIC DIAGRAM

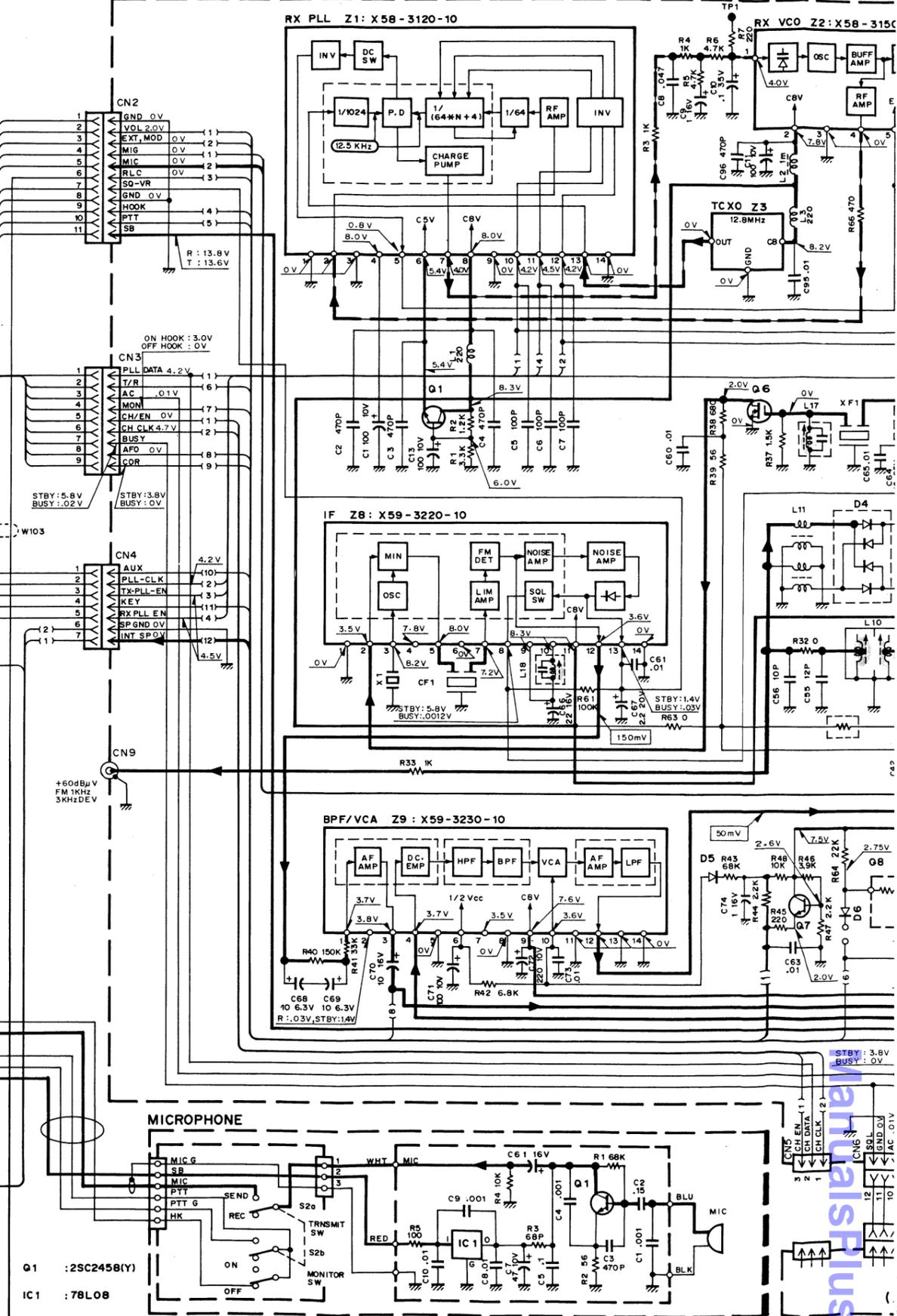
— Signal line — Control line — Common DC line

## DISPLAY UNIT (X54-3070-11)



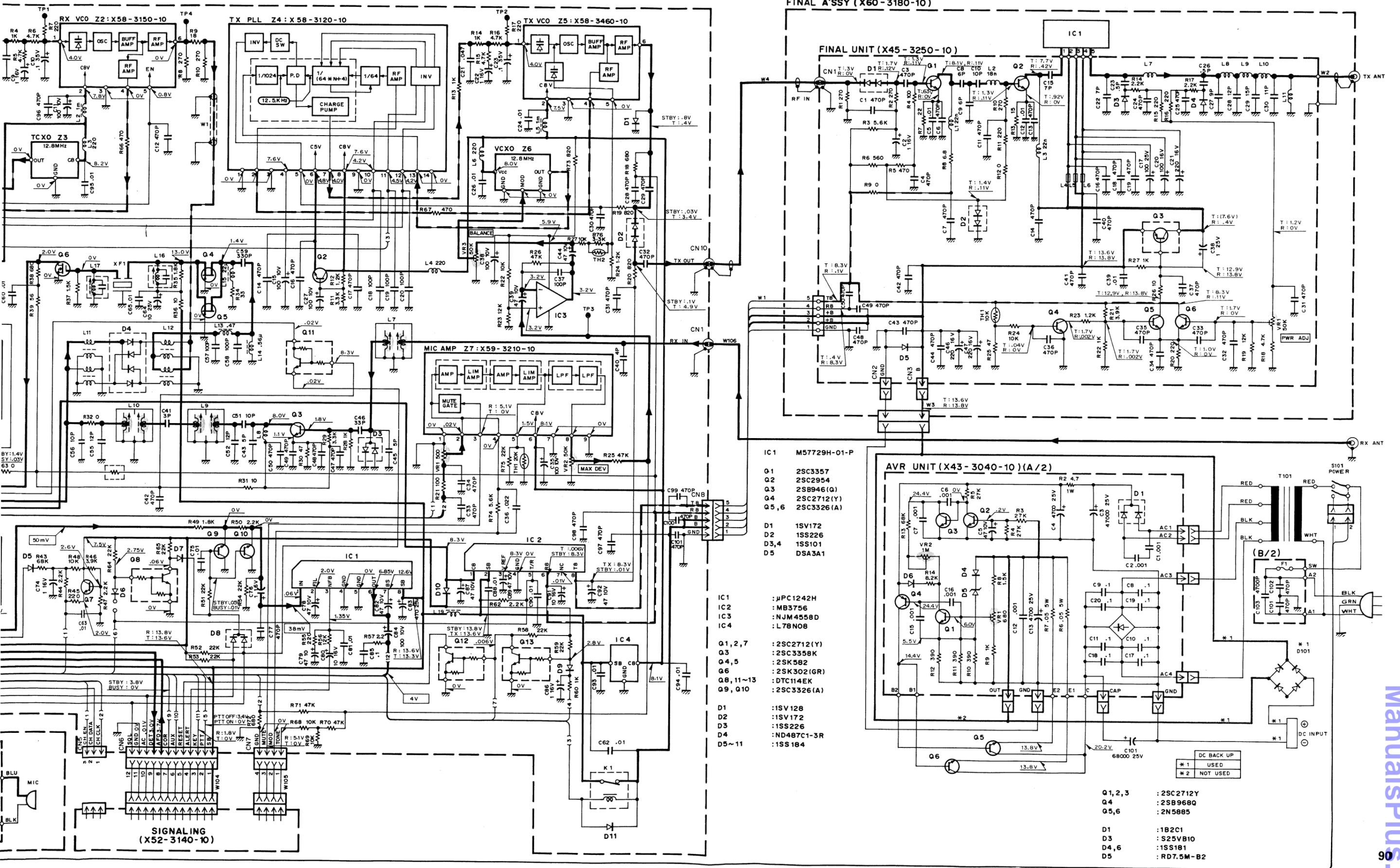
- |        |             |                |              |                   |               |
|--------|-------------|----------------|--------------|-------------------|---------------|
| IC1    | : μPD75104G | Q1, 2, 4, 7, 8 | : DTC114EK   | D1, 3             | : B30-0855-05 |
| IC2    | : 93C46P1   | Q3             | : 2SA1162(Y) | D16, 18           | : B30-0857-05 |
| IC3    | : M51943BML | Q6             | : 2SC3326(A) | D2, 17            | : B30-0856-05 |
| IC4    | : AN78N05   |                |              | D4, 5, 6          | : 1SS184      |
| IC5, 6 | : μPC4558C  |                |              | D7, 8, 10, 11, 13 | : 1SS181      |
|        |             |                |              | D21               | : 1SS272      |
|        |             |                |              | D9                | : 1SS1555     |

## TX-RX UNIT (X57-3270-10)



- |     |              |
|-----|--------------|
| Q1  | : 2SC2458(Y) |
| IC1 | : 78L08      |

# HEMATIC DIAGRAM



- IC1 M57729H-01-P
- Q1 2SC3357
- Q2 2SC2954
- Q3 2SB946(Q)
- Q4 2SC2712(Y)
- Q5, 6 2SC3326(A)
- D1 1SV172
- D2 1SS226
- D3, 4 1SS101
- D5 DSA3A1

- IC1 :µPC1242H
- IC2 :MB3756
- IC3 :NJM4558D
- IC4 :L78N08
- Q1, 2, 7 :2SC2712(Y)
- Q3 :2SC3358K
- Q4, 5 :2SK582
- Q6 :2SK302(GR)
- Q8, 11~13 :DTC114EK
- Q9, Q10 :2SC3326(A)
- D1 :1SV128
- D2 :1SV172
- D3 :1SS226
- D4 :ND487C1-3R
- D5~11 :1SS184

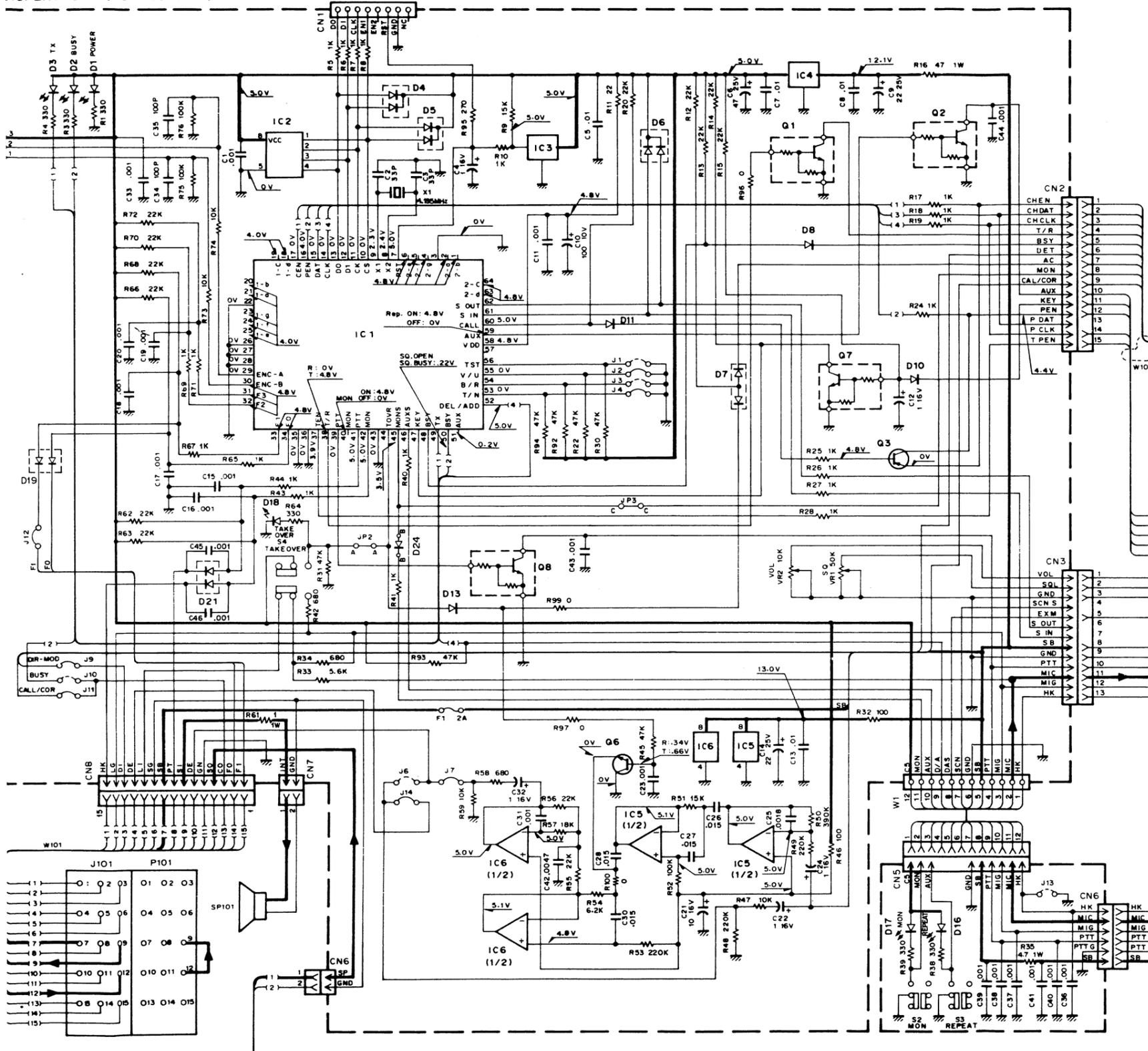
- Q1, 2, 3 :2SC2712Y
- Q4 :2SB968Q
- Q5, 6 :2N5885
- D1 :1B2C1
- D3 :S25V810
- D4, 6 :1SS181
- D5 :RD7.5M-B2

DC BACK UP	
*1	USED
*2	NOT USED

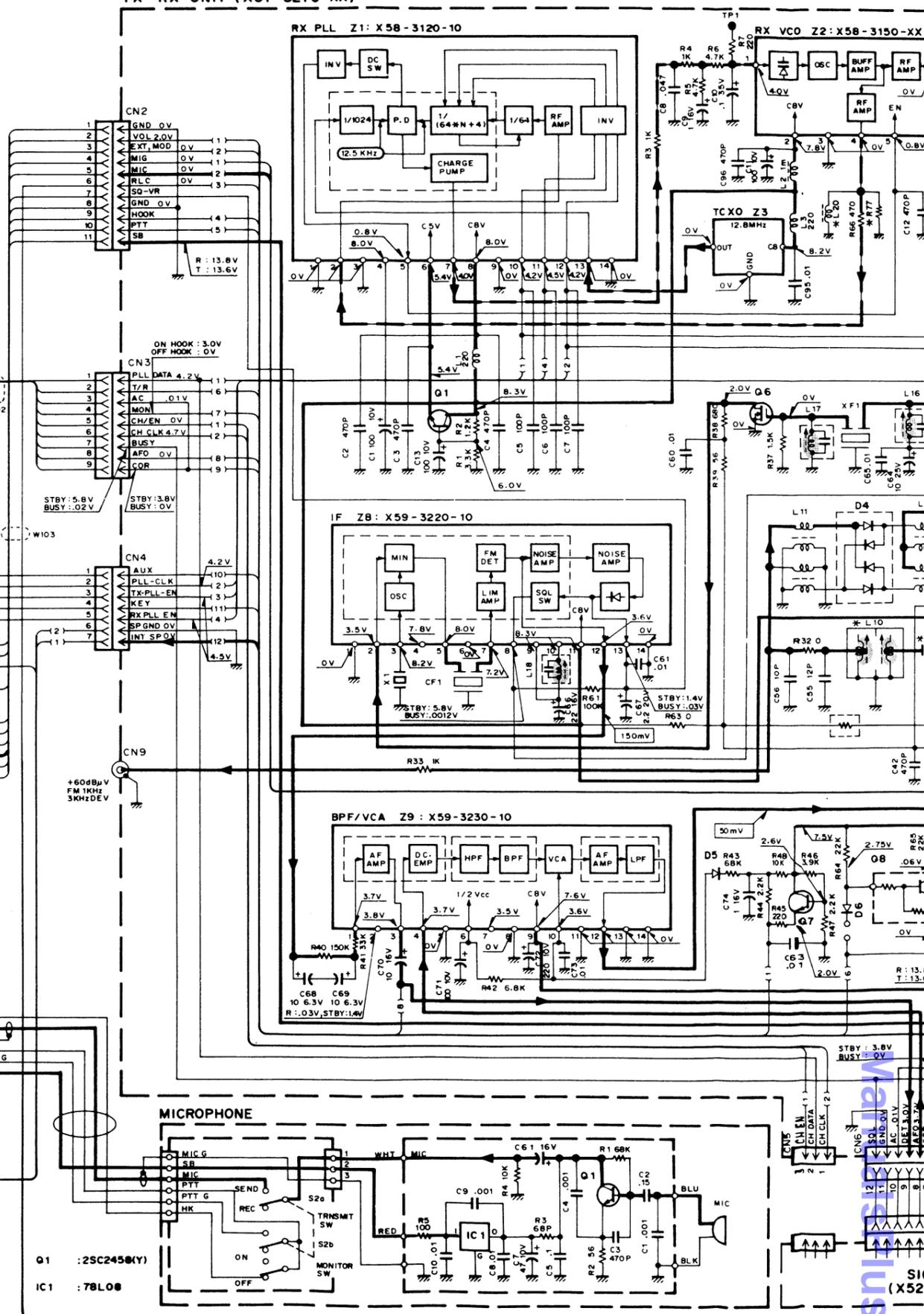
# SCHEMATIC DIAGRAM (S/No. 104X)

DISPLAY UNIT (X54-3070-11)

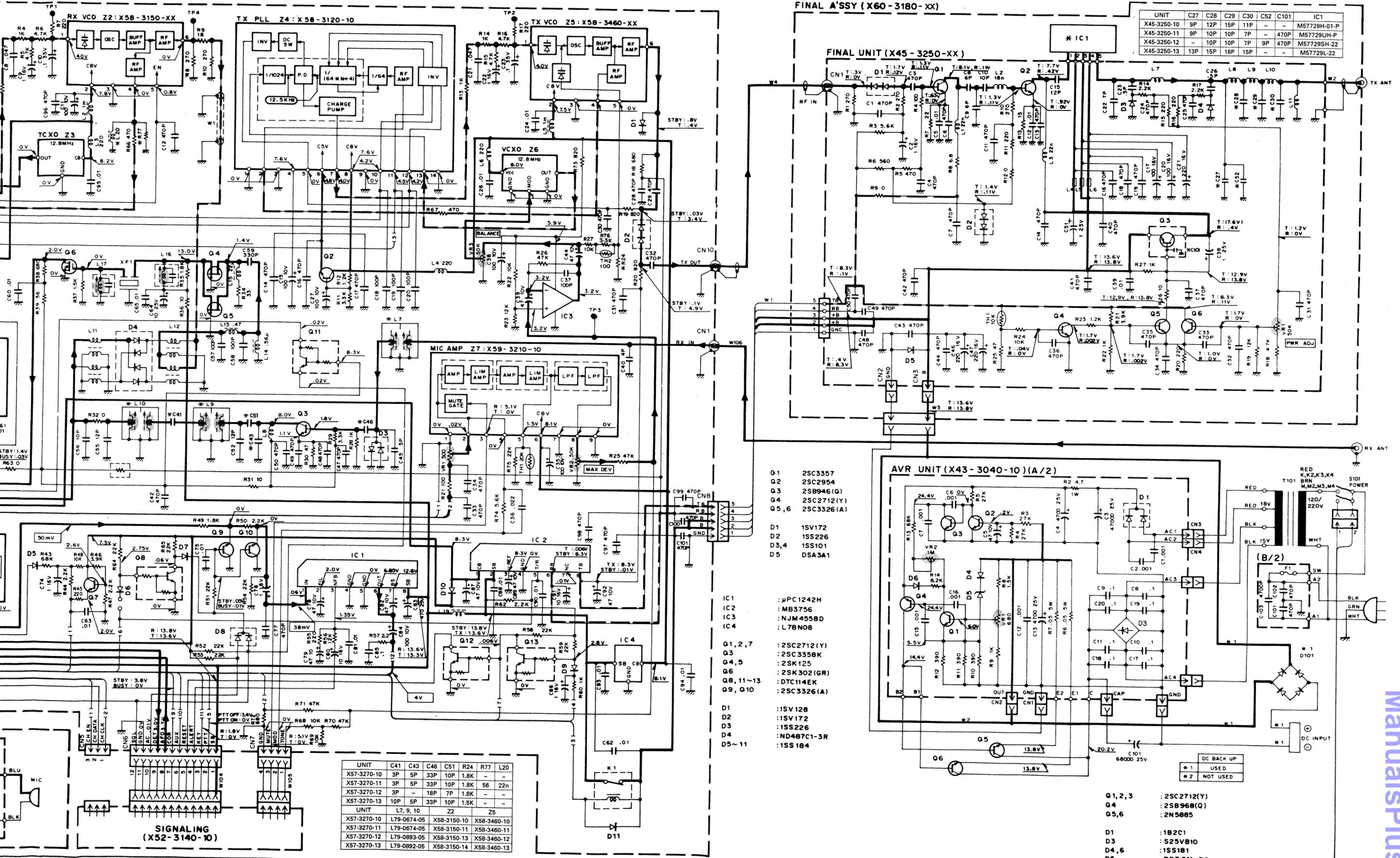
TX-RX UNIT (X57-3270-XX)



- |        |             |             |              |                   |               |
|--------|-------------|-------------|--------------|-------------------|---------------|
| IC1    | : µPD75104G | Q1, 2, 7, 8 | : DTC114EK   | D1, 3             | : B30-0855-05 |
| IC2    | : 93C46P1   | Q3          | : 2SA1162(Y) | D16, 18           | : B30-0857-05 |
| IC3    | : M51943BML | Q6          | : 2SC3326(A) | D2, 17            | : B30-0856-05 |
| IC4    | : AN78N05   |             |              | D4, 5, 6          | : 1SS184      |
| IC5, 6 | : PC4558C   |             |              | D7, 8, 10, 11, 13 | : 1SS181      |
|        |             |             |              | D21, 19           | : 1SS272      |
|        |             |             |              | D24               | : 1SS133      |



- |     |             |
|-----|-------------|
| Q1  | : 2SC245(Y) |
| IC1 | : 78L08     |



UNIT	C41	C43	C46	C51	R24	R77	L20
X57-3270-10	3P	5P	33P	10P	1.8K	-	-
X57-3270-11	3P	5P	33P	10P	1.8K	56	22n
X57-3270-12	3P	-	18P	7P	1.8K	-	-
X57-3270-13	10P	5P	33P	10P	1.5K	-	-

UNIT	L7, 9, 10	Z2	Z5
X57-3270-10	L79-0674-05	X58-3150-10	X58-3460-10
X57-3270-11	L79-0674-05	X58-3150-11	X58-3460-11
X57-3270-12	L79-0893-05	X58-3150-13	X58-3460-12
X57-3270-13	L79-0892-05	X58-3150-14	X58-3460-13

- Q1 : 2SC3357
- Q2 : 2SC2954
- Q3 : 2SB946(Q)
- Q4 : 2SC2712(Y)
- Q5, 6 : 2SC3326(A)
- D1 : 1SV172
- D2 : 1SS226
- D3, 4 : 1SS101
- D5 : DSA3A1
- IC1 : μPC1242H
- IC2 : MB3756
- IC3 : NJM4558D
- IC4 : L78N08
- Q1, 2, 7 : 2SC2712(Y)
- Q3 : 2SC3358K
- Q4, 5 : 2SK125
- Q6 : 2SK302(GR)
- Q8, 11~13 : DTC114EK
- Q9, Q10 : 2SC3326(A)
- D1 : 1SV128
- D2 : 1SV172
- D3 : 1SS226
- D4 : ND487C1-3R
- D5~11 : 1SS184

- Q1, 2, 3 : 2SC2712(Y)
- Q4 : 2SB966(Q)
- Q5, 6 : 2N5885
- D1 : 1B2C1
- D3 : S25V810
- D4, 6 : 1SS181
- D5 : RD7.5M-B2

DC BACK UP	
*1	USED
*2	NOT USED

## TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function
<b>AVR UNIT (X43-3040-10)</b>			
(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.
<b>SIGNALING UNIT (X52-3140-10)</b>			
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) out.
	2	MOD	MOD signal (300Hz to 3kHz) out.
	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.
<b>DISPLAY UNIT (X54-3070-11)</b>			
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.

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN2	1	CH EN	Channel 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.
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	PTT	PTT.
	3	MIG	MIC GND.
	4	MIC	MIC.
	5	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.

## TERMINAL FUNCTIONS

Connector No.	Terminal No.	Terminal Name	Terminal Function	
CN8 For ACC connector	1	NC	No connection.	
	2	NC	No connection.	
	3	CO	CALL/COR or BUSY signal out.	
	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.	
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.	
	10	AUX	AUX signal input.	
	11	MON	MONITOR signal input.	
	12	C5	Common 5V output.	
<b>TX-RX UNIT (X57-3270-XX)</b>				
CN1	—	RX IN	Receive 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 vol.	
	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.	
<b>FINAL UNIT ASS'Y (X60-3180-XX)</b>				
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 unit.	
	3	+B		
	4	R8		RX 8V input.
	5	T8		TX 8V input.
W2	—	RF OUT		Transmission signal output, coaxial connector.
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.	
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) in.	
	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		
	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.	

## KMC-9 (BASE MICROPHONE)

### EXTERNAL VIEW



### DISASSEMBLY FOR REPAIR

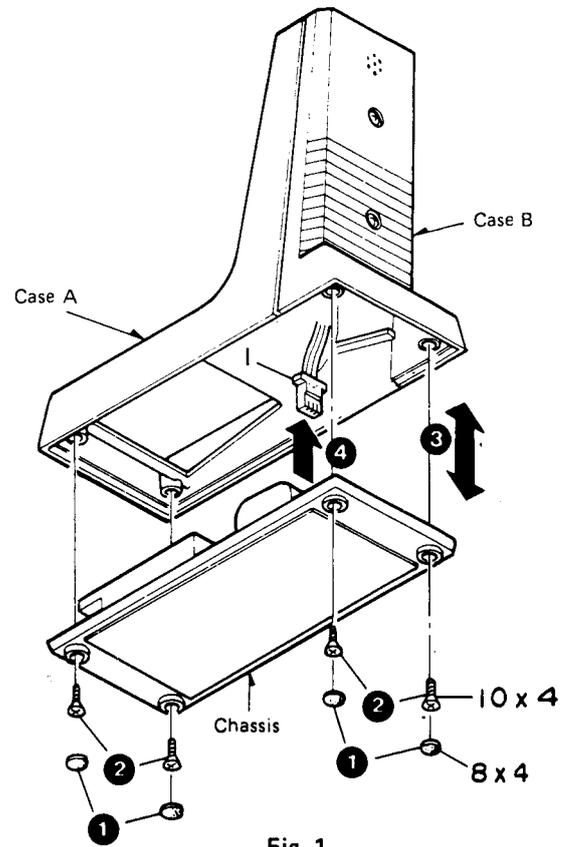


Fig. 1

### CHASSIS REMOVAL

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

### REMOVAL OF MICROPHONE ELEMENT AND MICROPHONE AMPLIFICATION UNIT

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

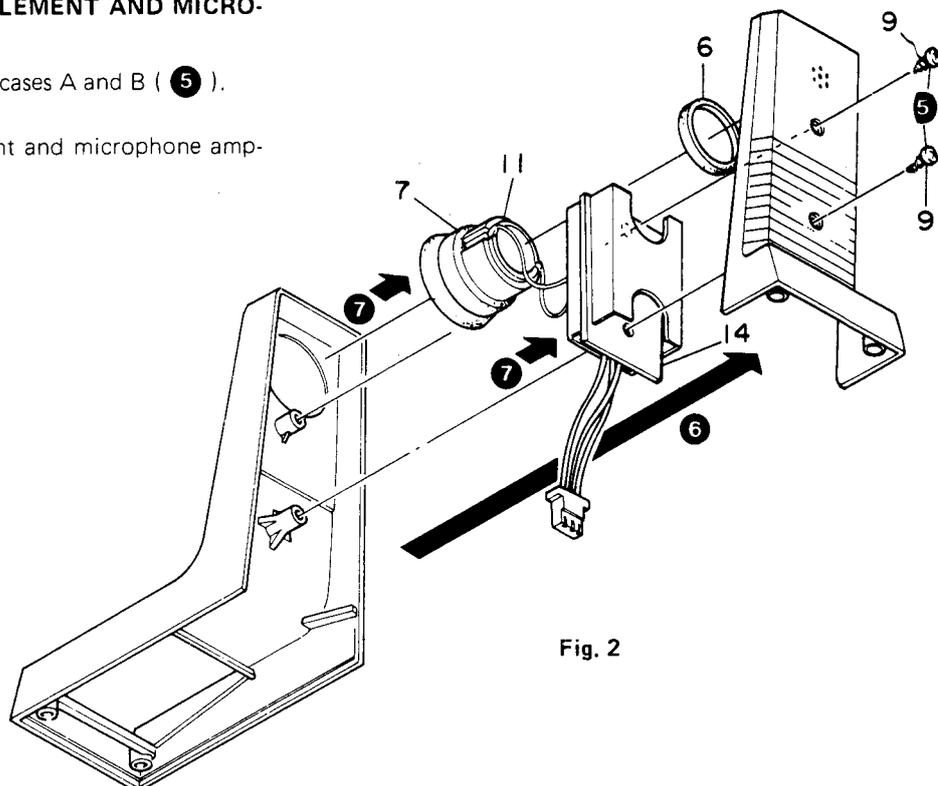


Fig. 2

# TKR-820

## KMC-9 (BASE MICROPHONE)

### SWITCH UNIT REMOVAL

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

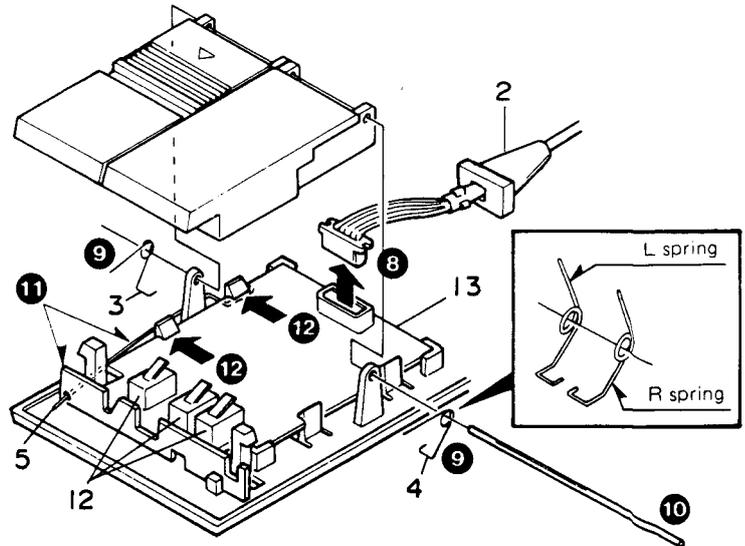


Fig. 3

### REMOVING MICROPHONE PLUG

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

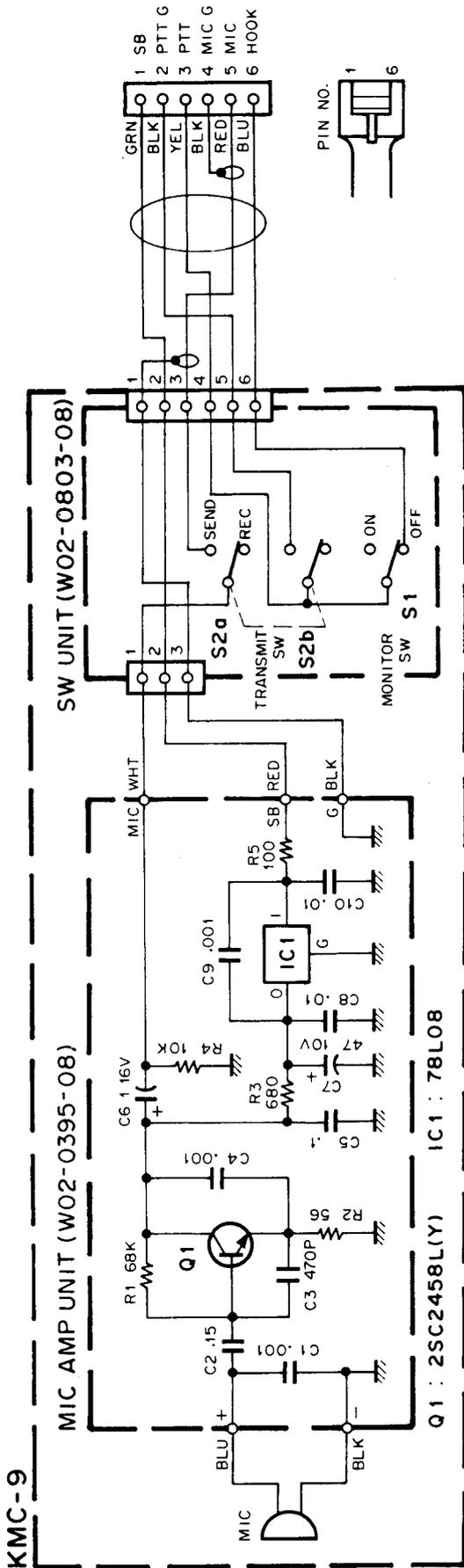
### PARTS LIST

\*New parts

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

## KMC-9 (BASE MICROPHONE)

### CIRCUIT DIAGRAM



### SPECIFICATIONS

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

# TKR-820

## SPECIFICATIONS

### GENERAL

Frequency Range .....	450 to 470MHz (K,M type) 470 to 490MHz (K2,M2 type) 490 to 512MHz (K3 type) 490 to 520MHz (M3 type) 406 to 430MHz (K4 type) 400 to 430MHz (M4 type)
Number of Channels .....	1
Channel Spacing .....	25kHz (PLL channel step 12.5kHz)
Input Voltage .....	120V/220V 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 +140°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-204-C)

RF Input Impedance .....	50Ω
Sensitivity	
EIA 12dB SINAD .....	0.35μV
20dB Quieting .....	0.45μV
Squelch Sensitivity .....	0.2μV threshold
Modulation Acceptance .....	±7kHz
Selectivity .....	-80dB
Intermodulation .....	-75dB
Spurious and Image Rejection ....	-85dB
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-B)

RF Power Output .....	20W adjustable to 2W (Duplexer output)
RF Output Impedance .....	50Ω
Spurious and Harmonics .....	-70dB
Modulation	
Direct FM Modulation .....	F3E, ±5kHz for 100% at 1000Hz
FM Noise .....	-50dB
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 .....	±0.05% 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

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