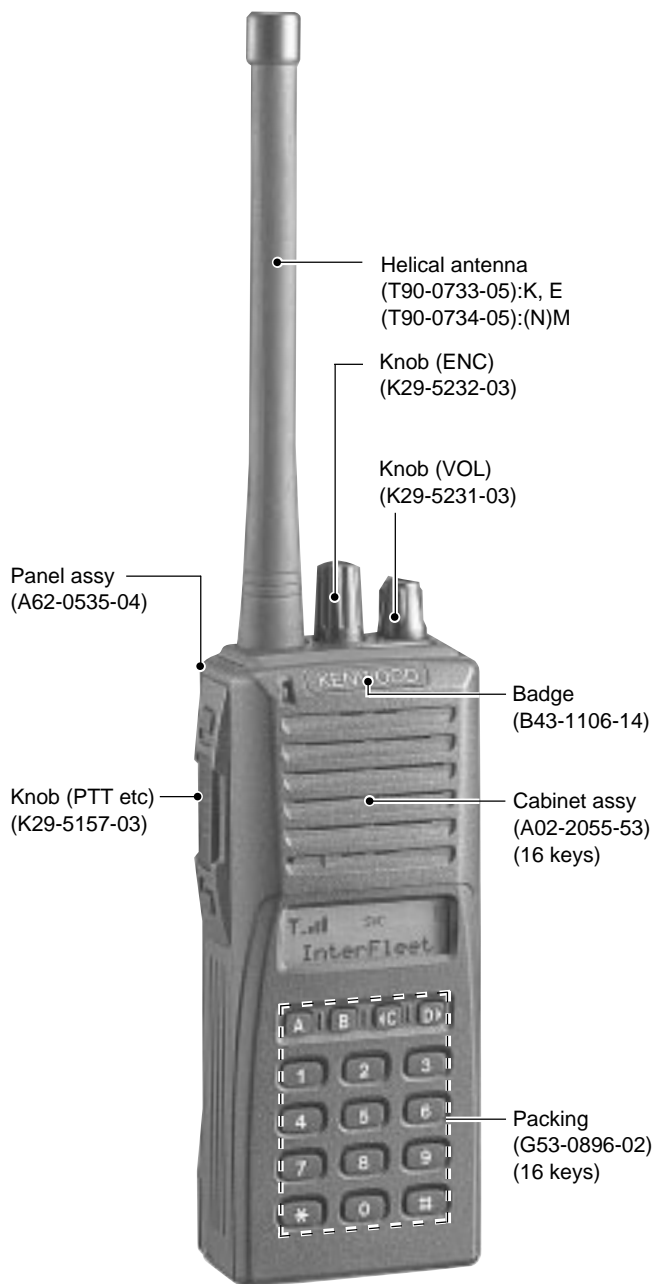


# TK-285/(N)

## SERVICE MANUAL



**Photo is K type**

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**CAUTION**

When using an external power connector, please use with maximum final module protection of 9V.

# TK-285/(N)

## GENERAL / SYSTEM SET-UP

### INTRODUCTION

#### SCOPE OF THIS MANUAL

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

#### ORDERING REPLACEMENT PARTS

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

### PERSONNEL SAFETY

The following precautions are recommended for personnel safety:

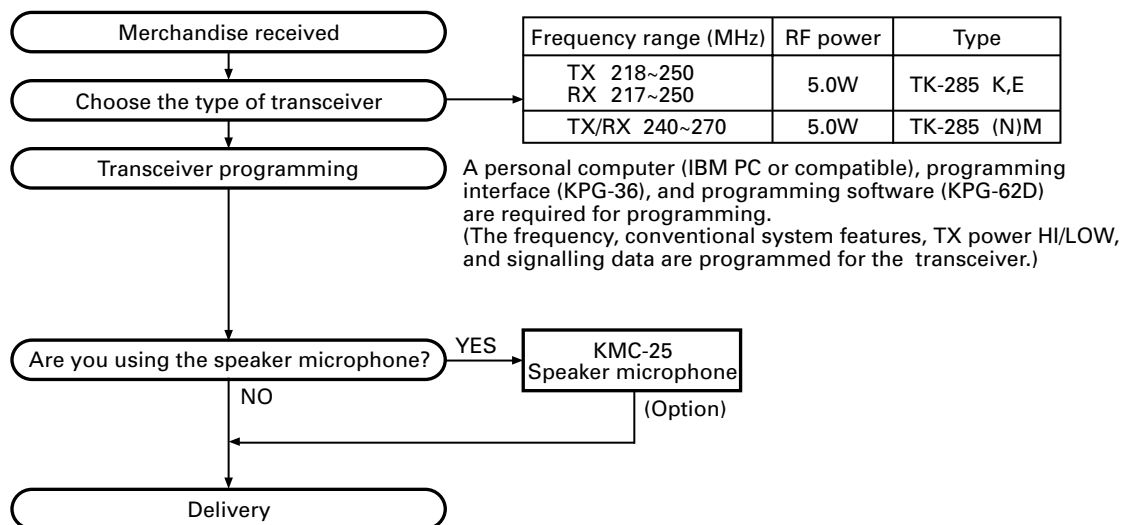
- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

### SERVICE

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

Model & destination		Unit		Frequency range	Remarks	Charger	Battery
		TX-RX unit	Display unit				
TK-285	K	X57-6190-11	X54-3210-13	RX : 217~250MHz	IF1 : 44.85MHz LOC : 44.395MHz	OP	OP
	E			TX : 218~250MHz			✓
	(N)M	X57-6190-21	240~270MHz	OP			

### SYSTEM SET-UP



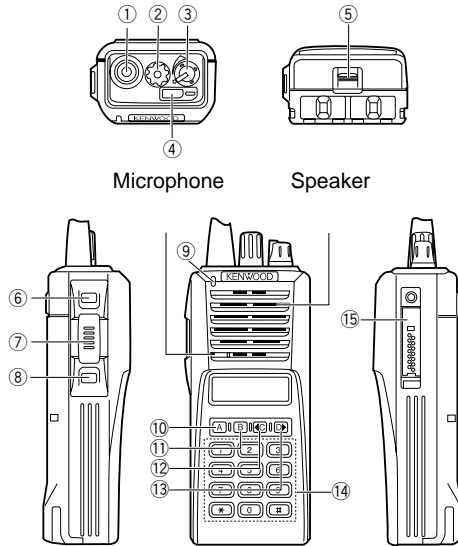
# OPERATING FEATURES

## 1. Operation Features

The TK-285 is a VHF FM Radio designed in both Trunking Mode and Conventional Mode.

## 2. Transceiver Controls and Indicators

### 2-1. Physical Layout



### 2-2. Panel controls

The key on the top and front panel is momentary-type push buttons. The functions of these keys and knob are explained below.

- ① **Antenna connector**  
Connect the antenna here.
- ② **Rotary encoder**
- ③ **POWER switch/ VOLUME control**  
Turn clockwise to switch ON the transceiver. Rotate to adjust the volume. Turn counterclockwise fully to switch OFF the transceiver.
- ④ **Auxiliary (orange) key**
- ⑤ **Battery pack release latch**  
Pull back on this latch to release the battery pack.
- ⑥ **Call key**
- ⑦ **PTT (Push-To-Talk) switch**
- ⑧ **Clear key**
- ⑨ **Transmit/ Receive indicator**
- ⑩ **A key**
- ⑪ **B key**
- ⑫ **◀ C key**
- ⑬ **D ▶ key**
- ⑭ **DTMF keypad**
- ⑮ **Universal connector**  
Connect the (optional KMC-25) speaker/ microphone here. Otherwise, keep the supplied cover in place.

### 2-3. Key functions

#### Trunking mode

- ② **Rotary encoder**  
Rotate this encoder to select your desired call address (voice calls) or status (status calls).
- ④ **Auxiliary (orange) key** (default setting: **None**)  
Press to activate its auxiliary function.
- ⑥ **Call key**  
Press to call the displayed call address.
- ⑦ **PTT (Push-To-Talk) switch**  
Press to transmit. Also press to initiate a call if "PTT to Initiate Call" has been programmed.
- ⑧ **Clear key**  
Press to end the current call.
- ⑨ **Transmit indicator**  
Lights red while transmitting.
- ⑩ **A key** (default setting: **Status/ Stack**)  
Press to activate its auxiliary function.
- ⑪ **B key** (default setting: **Redial**)  
Press to activate its auxiliary function.
- ⑫ **◀ C key** (default setting: **None**)  
Press to activate its auxiliary function. Also press to scroll left while viewing stack entries.
- ⑬ **D ▶ key** (default setting: **None**)  
Press to activate its auxiliary function. Also press to scroll right while viewing stack entries.
- ⑭ **DTMF keypad**  
Press to input a call address or dialing function.

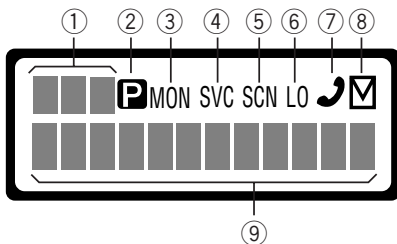
#### Conventional mode

- ② **Rotary encoder**  
Rotate this encoder to select your desired channel.
- ⑥ **Call key**  
Press to turn the monitor function ON in order to monitor your selected channel.
- ⑦ **PTT (Push-To-Talk) switch**  
Press this switch, then speak into the microphone to call a station.
- ⑧ **Clear key**  
Press to return to Trunking mode.
- ⑨ **Transmit/ Receive indicator**  
Lights green while receiving a signal. Lights red while transmitting.
- ⑩ **A key**  
Press to turn Scan ON (or OFF).
- ⑪ **B key**  
Press to add/delete channel(s) to/from Scan list.
- ⑬ **D ▶ key**  
Press to turn the display and keypad backlight ON. The backlight remains ON for 5 seconds.

# TK-285/(N)

## OPERATING FEATURES / REALIGNMENT

### 2-4. Display



- ① **Subdisplay**  
■■■ displays the strength of received signals.
- ② **Programming indicator**  
P appears while in AUX A or Scrambler is being activated.
- ③ **MON (Monitor) indicator**  
MON appears while you are monitoring a channel by pressing the Call key. (Conventional Mode only)
- ④ **SVC (Service) indicator**  
SVC appears when a control channel is found. It flashes while the transceiver is searching for a control channel.
- ⑤ **SCN (Scan) indicator**  
SCN appears while you are scanning. (Conventional Mode only)
- ⑥ **LO indicator**  
This icon blinks while in battery warning, if "Always" or "Always W/beep" is selected in the battery warning settings.
- ⑦ **Handset indicator**  
☎ flashes when you activate call diversion.
- ⑧ **MAIL indicator**  
✉ appears while there is data in the stack. It flashes when there is new data in the stack.
- ⑨ **Alphanumeric display**  
■■■■■■■■■■ displays call addresses, the call duration timer, data messages, and the current operating status of the transceiver.

Mode	Function
User mode	For normal use.
Panel test mode	Used by the dealer to check the fundamental characteristics.
Panel tuning mode	Used by the dealer to tune the radio.
PC mode	Used for communication between the radio and PC (IBM compatible).
Data program- ming mode	Used to read and write frequency data and other features to and from the radio.
PC test mode	Used to check the radio using the PC. This feature is included in the FPU. See panel tuning.
Firmware program- ming mode	Used when changing the main program of the flash memory.

### 2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
Panel test mode	[B]+Power ON
PC mode	Received commands from PC
Panel tuning mode	[Panel test mode]+[A]
Firmware programming mode	[A]+Power ON

### 3. Panel Test Mode

Setting method refer to ADJUSTMENT.

### 4. Panel Tuning Mode

Setting method refer to ADJUSTMENT.

### 5. PC Mode

#### 5-1. Preface

The TK-285 transceiver is programmed by using a personal computer, programming interface (KPG-36) and programming software (KPG-62D).

The programming software can be used with an IBM PC or compatible. Figure 1 shows the setup of an IBM PC for programming.

#### 5-2. Connection procedure

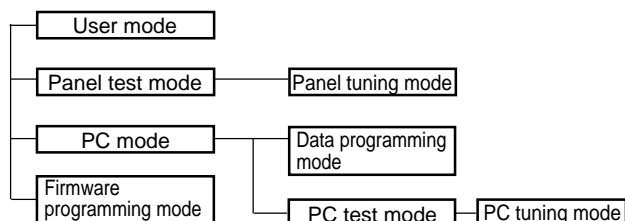
1. Connect the TK-285 to the personal computer with the interface cable.
2. When the POWER switch on, user mode can be entered immediately. When PC sends command the radio enter PC mode, and "PROGRAM" is displayed on the LCD. When data transmitting from transceiver, the red LED is blinking. When data receiving to transceiver, the green LED is blinking.

#### Notes:

- The data stored in the personal computer must match model type, when it is written into the flash memory.
- Change the TK-285 to PC mode, then attach the interface cable.

## REALIGNMENT

### 1. Modes



## REALIGNMENT

### 5-3. KPG-36 description

#### (PC programming interface cable: Option)

The KPG-36 is required to interface the TK-285 to the computer. It has a circuit in its D-subconnector (25-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-36 connects the universal connector of the TK-285 to the computers RS-232C serial port.

### 5-4. Programming software KPG-62D Description

The KPG-62D is the programming software for the transceiver supplied on three 3.5" floppy disks. This software runs under MS-Windows 95/98 on an IBM-PC or compatible machine.

The data can be input to or read from the transceiver and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

We recommend that install the KPG-62D for example to hard disk first then use it.

### 5-5. Programming with IBM PC

If data is transferred to the transceiver from an IBM PC with the KPG-62D, the destination data (basic radio information) for each set can be modified. Normally, it is not necessary to modify the destination data because their values are determined automatically when the frequency range (frequency type) is set.

The values should be modified only if necessary. Data can be programmed into the flash memory in RS-232C format via the universal connector.

KPG-62D instruction manual parts No. : B62-1354-XX

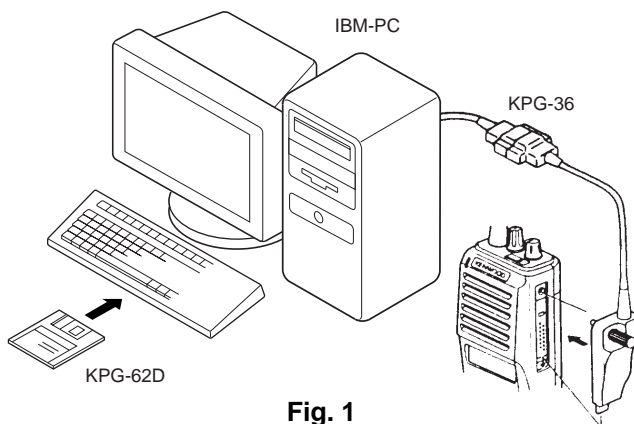


Fig. 1

## 6. Firmware Programming Mode

### 6-1. Preface

Flash memory is mounted on the TK-285. This allows the TK-285 to be upgraded when new features are released in the future. (For details on how to obtain the firmware, contact Customer Service.)

### 6-2. Connection procedure

Connect the TK-285 to the personal computer (IBM PC or compatible) with the interface cable (KPG-36). (Connection is the same as in the PC Mode.)

### 6-3. Programming

1. Start up the firmware programming software (Fpro.exe).
2. Set the communications speed (normally, 57600 bps) and communications port in the configuration item.
3. Set the firmware to be updated by File name item.
4. Turn the TK-285 power ON with the [A] switch held down. Hold the switch down until the display changes to "PROG 57600". When "PROG 57600" appears, release your finger from the switch.
5. Check the connection between the TK-285 and the personal computer, and make sure that the TK-285 is in the Program mode.
6. Press write button in the window. A window opens on the display to indicate progress of writing. When the TK-285 starts to receive data, the [P] icon is blinking.
7. If writing ends successfully, the LED on the TK-285 lights and the checksum is displayed.
8. If you want to continue programming other TK-285 s, repeat steps 4 to 7.

#### Notes:

- This mode cannot be entered if the Firmware Programming mode is set to Disable in the Programming software (KPG-62D).
- When programming the firmware, it is recommend to copy the data from the floppy disk to your hard disk before update the radio firmware.  
Directly copying from the floppy disk to the radio may not work because the access speed is too slow.

### 6-4. Function

1. If you press the [Call] switch (top of left side) while "PROG 57600" is displayed, the version is displayed. If you press the [Call] switch again while the version is displayed, "PROG 57600" is redisplayed.
2. If you press the [Clear] switch (bottom of left side) while "PROG 57600" is displayed, the display changes to "PROG 19200" to indicate that the write speed is low speed (19200 bps). If you press the [Clear] switch again while "PROG 19200" is displayed, the display changes to "PROG 38400", and the write speed becomes the middle-speed mode (38400 bps). If you press the [Clear] switch again while "PROG 38400" is displayed, the display returns to "PROG 57600".
3. If you press the [Clear] switch while the version is displayed, the checksum is displayed. If you press the [Clear] switch again while the checksum is displayed, the version is redisplayed.

#### Note:

Normally, write in the high-speed mode.

## CIRCUIT DESCRIPTION

### 1. Overview

This transceiver is VHF/FM portable transceiver designed to operate in the frequency range of 217 to 250MHz (K, E), 240 to 270MHz ((N)M).

### 2. Circuit Configuration by Frequency

The receiver is a double-conversion superheterodyne with a first intermediate frequency (IF) of 44.85MHz and a second IF of 455kHz. Incoming signals from the antenna are mixed with the local signal from the PLL to produce the first IF of 44.85MHz.

This is then mixed with the 44.395MHz second local oscillator output to produce the 455kHz second IF. This is detected to give the demodulated signal.

The transmit signal frequency is generated by the PLL VCO, and modulated by the signal from the microphone. It is then amplified and sent to the antenna.

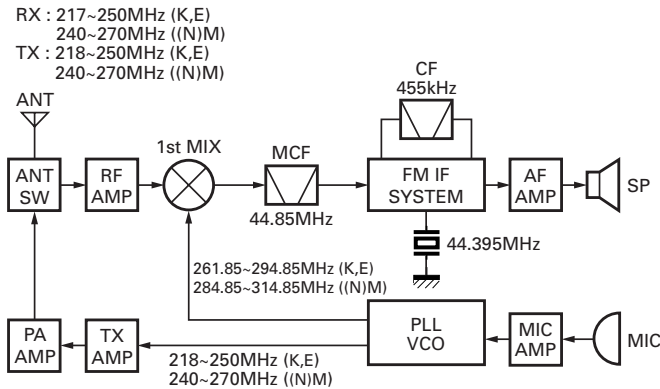


Fig. 1 Frequency configuration

### 3. Receiver System

#### 3-1. RF unit

An incoming RF signal from the antenna terminal is passed through the antenna switch (D12, D14, D22 and D401 are off) and then the bandpass filter (L403,404,405,406). The bandpass filter is adjusted by a variable capacitor. The input voltage to the variable capacitor is regulated by the voltage output from the D/A converter (IC8). The signal is amplified by RF amplifier (Q24), and passed through the bandpass filter (L31,33) and band-eliminate filter (L27,29) to remove the spurious signal again. The resulting signal is applied to the first mixer (IC18), where it is mixed with the first local oscillator signal output from the frequency synthesizer to produce the first IF (44.85MHz). The 1st mixer uses the GaAs IC.

#### 3-2. IF unit

The first IF signal is passed through a crystal filter (XF1) to remove a adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q12) and then applied to the IF system IC (IC12). The IF system IC provides a second mixer, second local oscillator, limiting amplifier, quadrature detector and RSSI (Received Signal Strength Indicator). The second mixer mixes the first IF signal with the 44.395MHz of second local oscillator output (crystal unit X2) and produces the second IF signal of 455kHz.

The second IF signal is passed through the ceramic filter (CF2) to more remove the adjacent channel signal. The filtered second IF signal is amplified by the limiting amplifier and demodulated by the quadrature detector with ceramic discriminator (CD1). The demodulated signal is routed to the audio circuit.

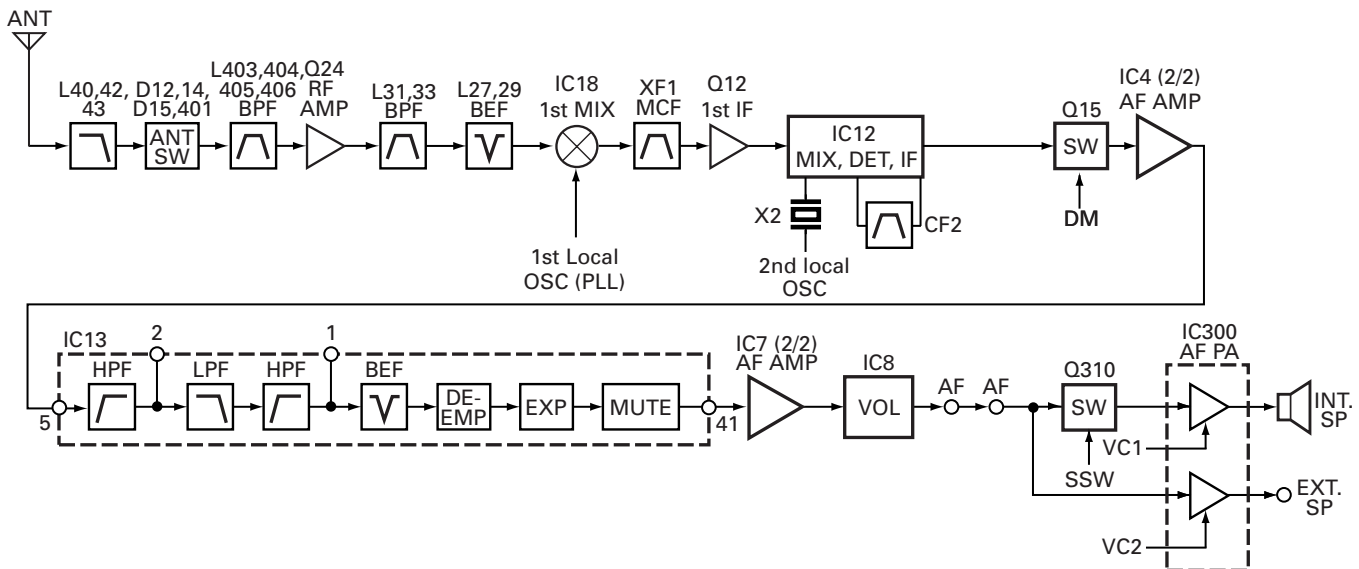


Fig. 2 Receiver section

## CIRCUIT DESCRIPTION

### 3-3. Audio amplifier circuit

The demodulated signal from IC12 goes through the mute switch (Q15) and is amplified by IC4 (2/2), high-pass filtered, low-pass filtered, high-pass filtered, band-eliminate filtered, and de-emphasized by IC13.

The signal then goes through an AF amplifier IC7 (2/2), an electronic volume control (IC8), and an AF switch (Q310 is on), and is routed to audio power amplifier (IC300), where it is amplified and output to the internal speaker.

The audio mute signal (AM) from the shift register becomes Low in the standby and Q304, Q305 which are power supply circuit for IC300 turn off. Also, IC13 is set to the power down mode according to data from microprocessor, and the AF signal is muted. When the audio is output, AM becomes High to turn Q304, Q305 ON, and voltage is supplied to power terminal VP of IC300. Also, IC13 is canceled out of the power down mode.

The speaker is switched by the logic of speaker switching terminal SSW on the universal connector. When SP-MIC is not attached, the logic of SSW becomes High and SW (Q310) is turned ON, and the AF signal is input to both amplifiers of IC300.

When SP-MIC is attached, SSW is connected to GND at inside of SP-MIC. For this reason, Q310 is turned OFF, and the AF signal is input only to amplifier for EXT SP of IC300.

Change of INT/EXT SP refer to Fig. 3.

AM	SSW	VC1	VC2	SP
H	H	H	L	INT
H	L	L	H	EXT
L	H	L	L	MUTE
L	L	L	L	MUTE

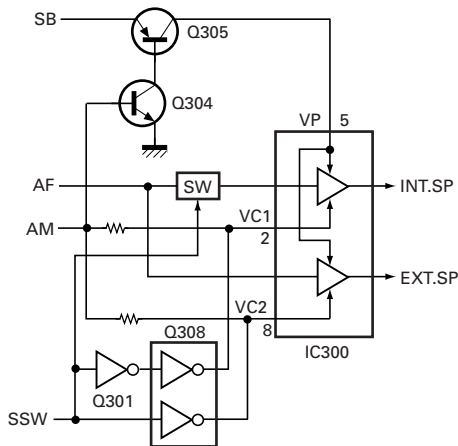


Fig. 3 Audio amplifier circuit

### 3-4. Squelch circuit

The output from IC12 enters FM IC again, then passed through a band-pass filter. The noise component output from IC12 is amplified by Q4 and rectified by D4 to produce a DC voltage corresponding to the noise level. The DC voltage is sent to the analog port of the CPU (IC19). And IC12 outputs a DC voltage (RSSI) corresponding to the input of the IF amplifier. The CPU reads the RSSI signal via pin 93.

IC19 determines whether to output sounds from the speaker by comparing the input voltage of pin 91 and pin 93 with the preset value.

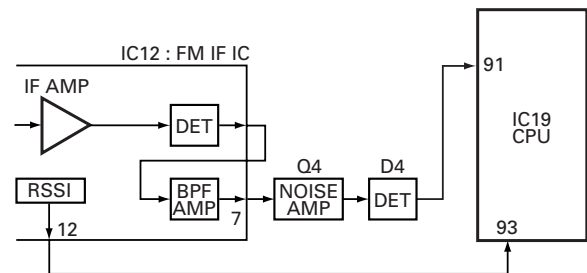


Fig. 4 Squelch circuit

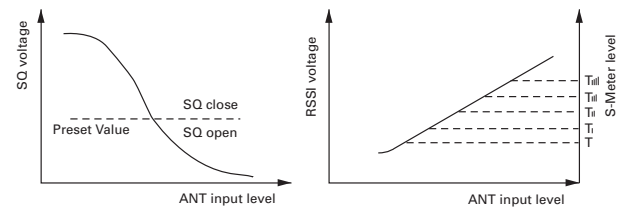


Fig. 5 Squelch and RSSI voltage vs ANT input level

## 4. Transmitter System

### 4-1. Microphone amplifier

The signal from the internal microphone goes through the mute switch (Q300).

When the SP-MIC is not attached, the microphone switching terminal (MSW) on the universal connector becomes High, and mute switch (Q300) is turned ON. When the SP-MIC is attached, MSW is connected to GND at inside of SP-MIC. For this reason, Q300 is turned OFF, the internal microphone is muted, and only the input of the external microphone is supplied to the microphone amplifier of the TX-RX unit.

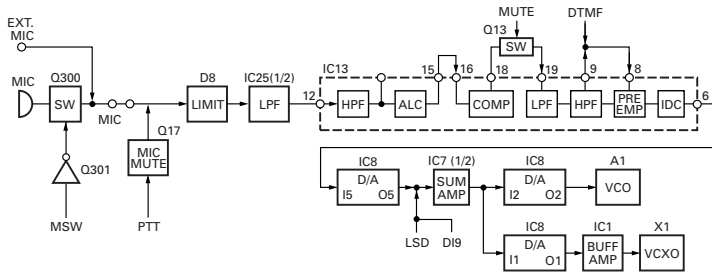
The signal from microphone passes through the limiter circuit in D8, and Mic mute switch (Q17 is off in TX) and through the low-pass filter (IC25:1/2), the high-pass filter, the ALC circuit, the low-pass filter, the high-pass filter, and pre-emphasis/IDC circuit in IC13. When encoding DTMF, mute switch (Q13) is turned OFF for muting the microphone input signal.

The signal passes through the D/A converter (IC8) for the maximum deviation adjustment, and enters the summing amplifier consisting of IC7 (1/2), and is mixed with the low speed data from the CPU (IC19) and 9600bps DATA from Optional Board Terminal.

## CIRCUIT DESCRIPTION

The output signal from the summing amplifier passes through the D/A converter (IC8) again and goes to the VCO modulation input.

The other output signal from the summing amplifier passes through the D/A converter (IC8) again for the BAL adjustment, and the buffer amplifier (IC1 : 2/2), and goes to the VCXO modulation input.

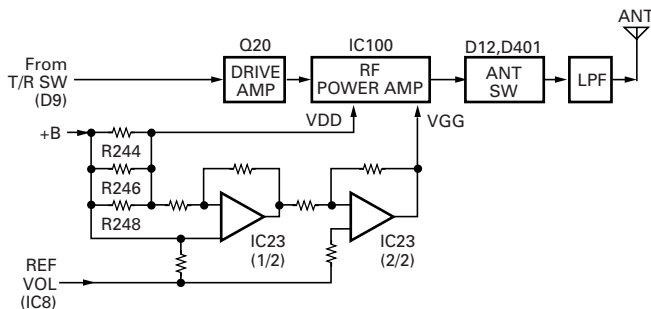


**Fig. 6 Microphone amplifier**

### 4-2. Drive and Final amplifier

The signal from the T/R switch (D9 is on) is amplified by drive amplifier (Q20) to 30mW.

The output of the drive amplifier is amplified by the RF power amplifier (IC100) to 5.0W (1W when the power is low). The RF power amplifier consists of two stages MOS FET transistor. The output of the RF power amplifier is then passed through the harmonic filter (LPF) and antenna switch (D12 and D401 is on) and applied to the antenna terminal.



**Fig. 7 Drive and final amplifier and APC circuit**

### 4-3. APC circuit

The APC circuit always monitors the current flowing through the RF power amplifier (IC100) and keeps a constant current. The voltage drop at R244, R246 and R248 is caused by the current flowing through the RF power amplifier and this voltage is applied to the differential amplifier (IC23 1/2).

IC23(2/2) compares the output voltage of IC23(1/2) with the reference voltage from IC8, and the output of IC23(2/2) controls the VGG of the RF power amplifier to make the both voltages to same voltage.

The change of power high/low is carried out by the change of the reference voltage. Q22,23 and 25 are turned on in transmit and the APC circuit is active.

## 5. Frequency Synthesizer Unit

### 5-1. Frequency synthesizer

The frequency synthesizer consists of the VCXO (X1), VCO (A1), PLL IC(IC14) and buffer amplifiers.

The VCXO generates 16.8MHz. The frequency stability is 1.5ppm within the temperature range of -30 to +60°C. The frequency tuning and modulation of the VCXO are done to apply a voltage to pin 1 of the VCXO. The output of the VCXO is applied to pin 8 of the PLL IC.

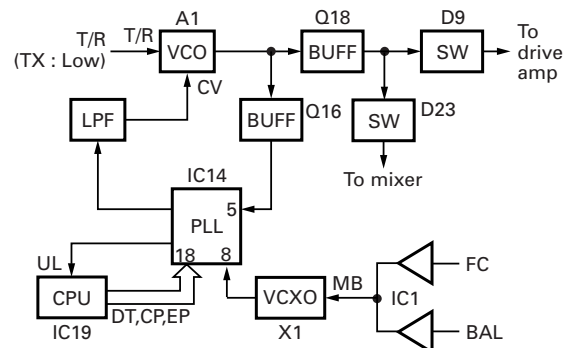
The TK-285's VCO consists of 2VCO and covers a dual range of the 261.85~294.85MHz (K,E), 284.85~314.85MHz ((N)M) and the 218~250MHz (K,E), 240~270MHz ((N)M).

The VCO generates 261.85~294.85MHz (K,E), 284.85~314.85MHz ((N)M) for providing to the first local signal in receive. In TX, the pin 3 of the VCO goes low and the VCO generates 218~250MHz (K,E), 240~270MHz ((N)M).

The output of the VCO is amplified by the buffer amplifier (Q16) and routed to the pin 5 of the PLL IC. Also the output of the VCO is amplified by the buffer amplifier (Q18) and routed to the next stage according to T/R switch (D9, D23).

The PLL IC consists of a prescaler, fractional divider, reference divider, phase comparator, charge pump. This PLL IC is fractional-N type synthesizer and performs in the 40, 50 or 60kHz reference signal which is eighth of the channel step (6.25kHz). The input signal from the pins 5 and 8 of the PLL IC is divided down to the 50kHz and compared at phase comparator. The pulsed output signal of the phase comparator is applied to the charge pump and transformed into DC signal in the loop filter (LPF). The DC signal is applied to the pin 1 of the VCO and locked to keep the VCO frequency constant.

PLL data is output from DT (pin 75). CP (pin 19) and EP (pin 47) of the microprocessor (IC19). The data are input to the PLL IC when the channel is changed or when transmission is changed to reception and vice versa.



**Fig. 8 PLL block diagram**



## CIRCUIT DESCRIPTION

### 6. Control Circuit

The control circuit consists of microprocessor (IC19) and its peripheral circuits. It controls the TX-RX unit and transfers data to and from the display unit. IC19 mainly performs the following;

- 1) Switching between transmission and reception by PTT signal input.
- 2) Reading system, group, frequency, and program data from the memory circuit.
- 3) Sending frequency program data to the PLL.
- 4) Controlling squelch on/off by the DC voltage from the squelch circuit.
- 5) Controlling the audio mute circuit by decode data input.
- 6) Transmitting tone and encode data.

#### 6-1. Memory circuit

Memory circuit consists of the CPU (IC19) and a flash memory (IC17).

A flash memory has a capacity of 2M bits and contains the transceiver control program for the CPU and the data for operating features.

This program can be easily downloaded from an external device.

#### • Flash Memory

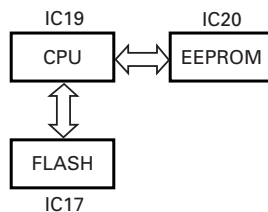
**Note :** The flash memory stores the data containing the FPU (KPG-62D) program, Security Number (MPT Serial Number) and firmware program (User mode, Test mode, Tuning mode, etc.).

This data must be reinstalled when replacing the flash memory.

#### • EEPROM

**Note :** The EEPROM stores tuning data (Deviation, Squelch, etc.)

Realign the transceiver after replacing the EEPROM.



**Fig. 9 Memory circuit**

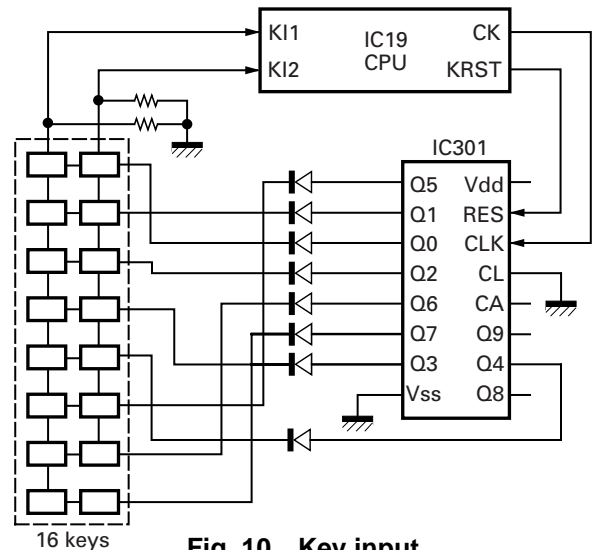
#### 6-2. Low battery warning

The battery voltage is monitored by the microprocessor (IC19). When the battery voltage falls below the voltage set by the Low Battery Warning adjustment, the red LED flashes to notify the operator that it is time to replace the battery. If the battery voltage falls even more (approx. 5.8V), a beep sounds and transmission is stopped.

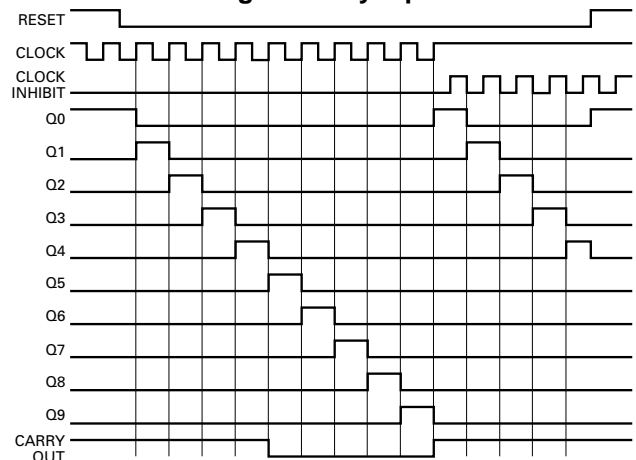
Low battery warning	Battery condition
The red LED flashes during transmission	The battery voltage is low but the transceiver is still usable.
The red LED flashes and continuous beep sounds while PTT pressed	The battery voltage is low and the transceiver is not usable to make calls.

#### 6-3. Key input

If the clock is supplied to CLK terminal when the RES terminal (CPU pin 78) of the decade counter (IC301) is set to Low, Q0 to Q7 become High sequentially. Normally, K11 and K12 are Low (pulled down). When any key is pressed, K11 or K12 become High. The CPU detects which key is pressed, according to the voltage of K11 and K12 and clock timing.



**Fig. 10 Key input**



**Fig. 11 Decade counter timing chart**

## CIRCUIT DESCRIPTION

### 7. Signalling Circuit

#### 7-1. Encode

- **Low-speed data (QT,DQT)**

Low-speed data is output from pin 1 of the CPU. The signal passes through a low-pass CR filter, and goes to the summing amplifier (IC7 1/2). The signal is mixed with the audio signal and goes to the VCO (A1) and VCXO (X1) modulation input after passing through the D/A converter (IC8) for BAL adjustment.

- **High-speed data (DTMF)**

High-speed data (HSD) is output from pin 2 of the CPU. The signal passes through a low-pass filter consisting of IC10, and provides a TX HSD tone and a RX HSD tone. TX HSD deviation making an adjustment by microprocessor is passed through the D/A converter (IC8) and then applied to the audio processor (IC13).

The signal is mixed with the audio signal and goes to the VCO and VCXO. The RX HSD tone is passed a summing amplifier (IC7 2/2). The D/A converter (IC8) for audio control, audio power amplifier and then to the speaker.

- **FFSK**

ESN utilizes 1200bps FFSK signal. FFSK signal is output from pin 6 of IC13. The signal passes through the D/A converter (IC8) for the FFSK deviation adjustment. and is routed to the VCO. When encoding FFSK, the microphone input signal is muted.

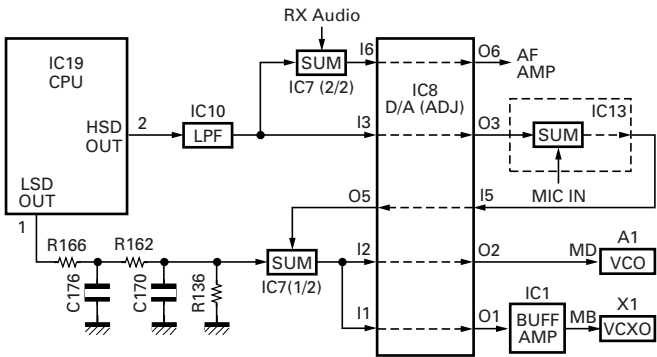


Fig. 12 Encode

#### 7-2. Decode

- **Low-speed data (QT,DQT)**

The demodulated signal from the IF IC (IC12) is amplified by IC4 (2/2) and passes through a low-pass filter (IC11) to remove audio components. The signal is input to pin 95 of the CPU.

The CPU digitizes this signal, performs processing such as DC restoration, and decodes the signal.

- **FFSK**

The FFSK input signal from the IF IC is amplified by IC4 (1/2) and goes to pin 5 of IC13. The signal is demodulated by FFSK demodulator in IC13. The demodulated data goes to the CPU for processing.

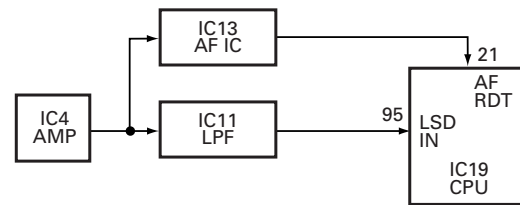


Fig. 13 Decode

### 8. Power Supply Circuit

Battery +B is supplied via a 3A fuse from the battery terminal connected to the TX-RX unit. After passing through the power switch, power supply (SB) is applied to the three AVRs. IC5 supplies 5V (5M) to the control circuit, and IC9 supplies 5V (5C) to common circuits. IC6 supplies to the TX circuit, the RX circuit and common circuits of needless save mode. During transmission, 5TC becomes Low and Q3 is turned ON to supply 5V (5T) to the TX circuit. During reception, 5RC becomes Low and Q2 is turned ON to supply 5V (5R) to the RX Circuit.

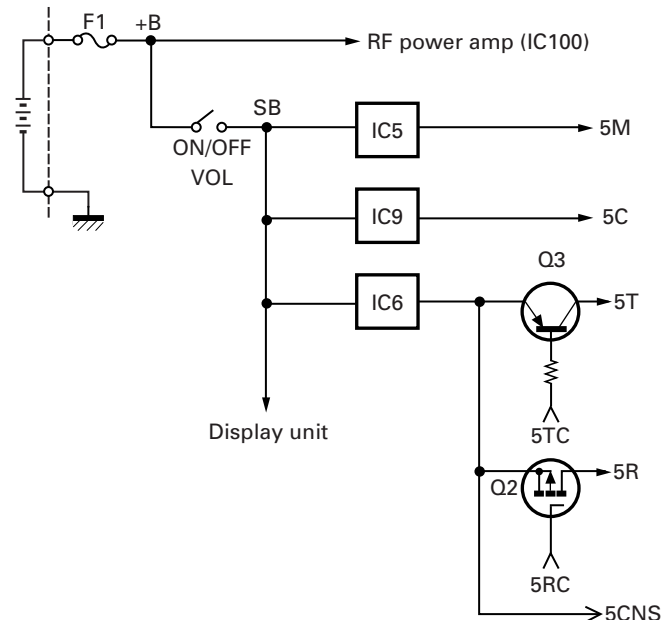


Fig. 14 Power supply circuit

# CIRCUIT DESCRIPTION / SEMICONDUCTOR DATA

## 9. Optional Board Terminal

Terminals for mounting the option board are provided at the bottom edge of the TX-RX unit. The table below shows the correspondence between the board and terminals. R37, R69, R249, R258, R259, R304, R305 may have to be removed depending on the type of option board being used.

Name	Function
SB	Battery (7.5V)
GND	Ground
TXD	Serial data
RXD	Serial data
SQ	Busy: high
LOK	Link acquired : low (TX mode)
DI/ANI	Modulation (ANI) input
DEO	Detect output
TXAI/MUTE	Modulation output from board or mic mute: low
TXAO	Modulation input to board
RXAI	Received signal input to board
RXAO	Received signal output from board
D1	Binary 1
D2	Binary 2
OPT	Scramble, Emergency:low
PTTIN	PTT switch signal input to board (TX:low)
5CNS	Battery (5V)
DI9	9600 bps data input
RXEMAO	Received signal output from board (after de-emphasis)
RXEMAI	Received signal input to board (after de-emphasis)
PTTOUT	PTT switch signal output from board (TX:low)
MONI	Busy:low
LAMP	Busy:low
AAC	Audio Amp Control signal output from board (Busy:high)
Audio Beep	Beep signal output from board.
AUX TXD	Serial data
AUX RXD	Serial data/Option switch port.
/EXT SW	

**Table 1 Terminal name and function**

## SEMICONDUCTOR DATA

**Microprocessor : 30620M8-394GP**  
**(TX-RX UNIT : IC19)**

### ■ Pin function

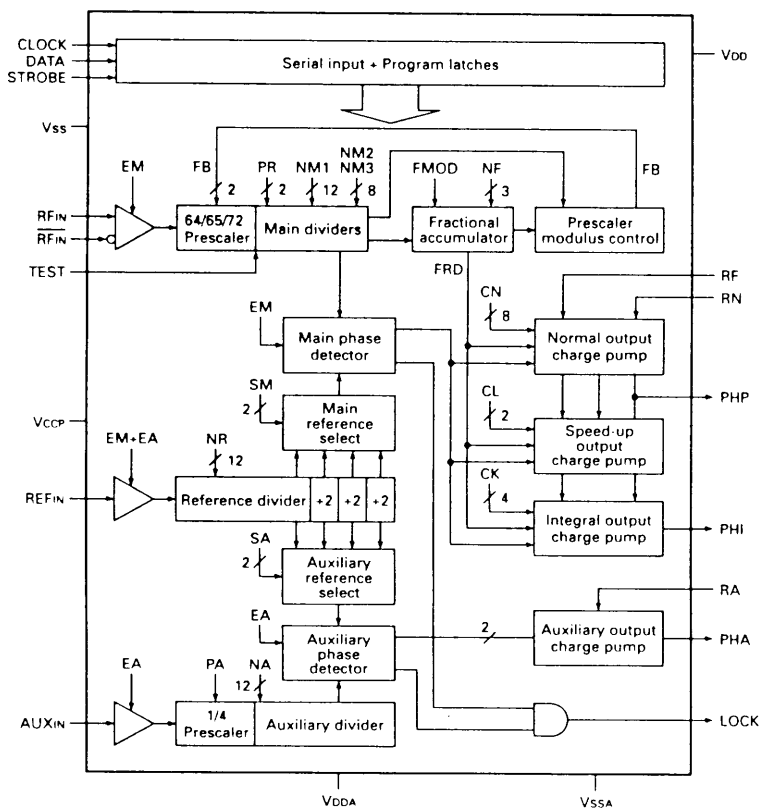
Pin No.	Port Name	I/O	Function
1	LSDOUT	O	Low speed data output.
2	HSDOUT	O	High speed data output.
3	HSDIN	I	High speed data input.
4	DTMSTD	I	DTMF decode IC data detect input.
5	SELF	I	Self programming mode input.
6	BYTE	I	+5V.
7	CNVSS	I	GND.
8	SFTOE	O	Shift register output enable.
9	LCDCS	O	LCD driver chip select output.
10	RESET	I	Microcomputer reset input.
11	XOUT	-	9.8304MHz (System clock).
12	VSS	-	GND.
13	XIN	-	9.8304MHz (System clock).
14	VCC	-	+5V
15	AUX	I	AUX switch input.
16	AFTRD	I	FFSK modulation data output timing pulse input.
17	AFRTM	I	FFSK demodulation data input timing pulse input.
18	EN2	I	Encoder pulse input 2.
19	PLLCLK	O	PLL IC clock output.
20	BEEP	O	Beep data output.
21	AFRDT	I	FFSK demodulation data input.
22	AFREG1	O	AF IC register switching data output 1.
23	AFREG2	O	AF IC register switching data output 2.
24	EEPDAT	O	EEPROM data output.
25	DACSTB	O	D/A converter IC data strobe output.
26	AFCLR	O	FFSK flame reset output.
27	SAVE	O	Battery save output.
28	LAMP	I	LAMP switch input.
29	AUXTXD	O	External Serial interface output.
30	AUXRXD	I	External Serial interface input.
31	PLLUL	I	PLL unlock detect input.
32	AFFFSKE	O	FFSK modulation enable (Enable active "H").
33	TXD	O	Serial interface output (ex. PC).
34	RXD	I	Serial interface input (ex. PC).
35	AFDAT	O	FFSK data output.
36	PTT	I	PTT switch input.
37	RDY	-	Not used.
38	ALE	-	Not used.
39	HOLD	-	Not used.
40	HLDA	-	Not used.
41	BLCK	-	Not used.
42	RD	-	Flash memory RD bus.
43	BHE	-	Not used.
44	WR	-	Flash memory WR bus.
45	DTMCLK	O	DTMF decode IC clock output.
46	CNTCLK	O	Common clock output.
47	PLLSTB	O	PLL IC data strobe output.
48	CS0	O	Flash memory chip enable.

## SEMICONDUCTOR DATA

Pin No.	Port Name	I/O	Function
49	A19	-	Not used.
50-59	A9-A18	-	Flash memory address bus.
60	VCC	-	+5V
61	A8	-	Flash memory address bus.
62	VSS	-	GND.
63-70	A0-A7	-	Flash memory address bus.
71	MONI	I	Monitor switch input.
72	EN4	I	Encoder pulse input 4.
73	EN3	I	Encoder pulse input 3.
74	EN1	I	Encoder pulse input 1.
75	MINDAT	O	Common data output.
76	KEY2	I	Key scan input 2.
77	KEY1	I	Key scan input 1.
78	RESET	O	Key scan IC reset output..
79-86	D0-D7	-	Flash memory data bus.
87	DTMDAT	I	DTMF decode IC data input.
88	PF	I	PF switch input.
89	VOL	I	Volume level input.
90	BATT	I	Battery voltage input.
91	ANLSQL	I	Squelch level input.
92	TEMP	I	Thermistor input.
93	RSSI	I	Received signal strength indicator input (RSSI).
94	AVSS	-	GND.
95	LSDIN	I	Low speed data input.
96	VREF	-	+5V
97	AVCC	-	+5V
98	SFTSTB1	O	Shift register data strobe output.
99	W/N	O	Wide/Narrow switching output.
100	AFSTB	O	AF IC data strobe output.

### PLL System : SA7025DK (TX-RX Unit : IC14)

#### ■ Block diagram



#### ■ Pin description

Pin No.	Symbol	Description
1	CLOCK	Serial clock input.
2	DATA	Serial data input.
3	STROBE	Serial strobe input.
4	VSS	Digital ground.
5	RFIN	Prescaler positive input.
6	$\overline{RFIN}$	Prescaler negative input.
7	VCCP	Prescaler positive Supply voltage. This pin supplies power to the prescaler and RF input buffer.
8	REFIN	Reference divider input.
9	RA	Auxiliary current setting; resistor to VSSA.
10	AUXIN	Auxiliary divider input.
11	PHA	Auxiliary phase detector output.
12	VSSA	analog ground.
13	PHI	Integral phase detector output.
14	PHP	Proportional phase detector output.
15	VDDA	Analog supply voltage. This pin supplies power to the charge pumps, Auxiliary prescaler, Auxiliary and Reference buffers.
16	RN	Main current setting; resistor to VSSA.
17	RF	Fractional compensation current setting; resistor to VSSA.
18	LOCK	Lock detector output.
19	TEST	Test pin; connect to VDD.
20	VDD	Digital supply voltage. This pin supplies power to the CMOS digital part of the device.

## DESCRIPTION OF COMPONENTS

### DISPLAY UNIT (X54-3210-13)

Ref. No.	Use/Function	Operation/Condition
IC300	IC	Audio power amplifier
IC301	IC	Counter /Key scan
Q300	FET	DC switch / INT MIC on/off
Q301	FET	DC switch
Q302	Transistor	DC switch / LED (Red) driver
Q303	Transistor	DC switch / LED (Green) driver
Q304	Transistor	DC switch
Q305	Transistor	Current driver / Audio amp AVR
Q306	Transistor	DC switch
Q307	Transistor	Current driver / LCD back light LED AVR
Q308	FET	DC switch / SP INT/EXT
Q309	Transistor	Temperature compensation
Q310	FET	Mute switch
D300	Zener diode	Surge absorption
D301	LED	LED / Red, Green
D302	Diode	Quick discharge /AF mute
D303	Zener diode	Voltage reference
D304	Diode	Voltage reference
D305~310	LED	LCD back light
D315~318	Diode	Reverse current prevention
D319~321	Zener diode	Surge absorption

### TX-RX UNIT (X57-619X-XX)

Ref. No.	Use/Function	Operation/Condition
IC1,2	IC	Buffer amplifier
IC3	IC	Voltage detector / Reset
IC4	IC	Buffer amplifier
IC5	IC	Voltage regulator / 5M
IC6	IC	Voltage regulator / 5V
IC7	IC	Buffer amplifier
IC8	IC	D/A converter (Adjustment)
IC9	IC	Voltage regulator / 5C
IC10	IC	Active filter / For HSDout
IC11	IC	Active filter / For LSDin
IC12	IC	FM IF system
IC13	IC	Audio processor
IC14	IC	PLL system
IC16	IC	DTMF decoder
IC17	IC	Flash memory
IC18	IC	Active DBM
IC19	IC	Microprocessor
IC20	IC	EEPROM
IC21,22	IC	Shift register / Output expander
IC23	IC	Comparator (APC)
IC24	IC	Analog switch
IC25	IC	Active filter
Q1	Transistor	Switch
Q2	FET	DC switch / 5R
Q3	Transistor	DC switch / 5T
Q4	Transistor	Noise amplifier / Squelch
Q5	FET	DC switch / Save
Q6	Transistor	2 <sup>nd</sup> IF W/N switch sets to on when Narrow

Ref. No.	Use/Function	Operation/Condition
Q7	Transistor	2 <sup>nd</sup> IF W/N switch sets to on when Wide
Q8	Transistor	Ripple filter
Q9	Transistor	DC switch / W/N audio amplitude adjust
Q10	Transistor	AF mute switch
Q11	FET	Mute switch
Q12	Transistor	IF amplifier
Q13	FET	Mute switch / MIC line mute
Q14	FET	DC switch
Q15	FET	DET mute
Q16	Transistor	PLL IC fin amplifier
Q17	FET	Mute switch / MIC line mute
Q18	Transistor	Buffer amplifier
Q19	Transistor	Clock frequency shift
Q20	Transistor	RF amplifier / TX driver
Q21	FET	DC switch
Q22	Transistor	DC switch
Q23	FET	DC switch
Q24	FET	RF amplifier
Q25	Transistor	DC switch
D1	Diode	Reverse protection
D2	Diode	Overload protection
D3	Diode	Reverse current protection
D4	Diode	Noise detection
D5	Diode	RF switch (2 <sup>nd</sup> IF wide/narrow)
D6	Diode	Current steering
D7	Diode	RF switch (2 <sup>nd</sup> IF wide/narrow)
D8	Diode	Voltage clamp
D9	Diode	TX/RX switch
D10	Diode	Overload protection
D11	Diode	Speed up
D12,14	Diode	ANT switch
D16,17	Diode	Varactor tuning
D18,19	Diode	Surge absorption
D20,21	Diode	Varactor tuning
D22	Diode	ANT switch
D23	Diode	TX/RX switch
D24	Diode	Voltage drop
D401	Diode	ANT switch
D402	Diode	Discharge

### SUB UNIT (X58-473X-XX)

Ref. No.	Use/Function	Operation/Condition
Q1	FET	DC switch
Q2,3	FET	VCO oscillation
Q4	Transistor	DC switch
Q5	Transistor	RF Buffer amplifier
D1-D8	Diode	Frequency control
D9	Diode	TX modulation

# TK-285/(N)

## PARTS LIST

\* New Parts.  $\Delta$  indicates safety critical components.  
 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.

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

TK-285/(N)

DISPLAY UNIT (X54-3210-13)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
<b>TK-285/(N)</b>						52	1A		K29-5157-03	KNOB (PTT)	
1	1A		A02-2055-53	CABINET ASSY (16KEYS)		53	1A		K29-5158-03	KEY TOP (PTT)	
2	3B		A62-0535-04	PANEL ASSY		54	1A		K29-5165-03	LEVER KNOB	
3	2C		B09-0363-03	CAP (SP/MIC) ACSY		55	1B		K29-5231-03	KNOB (VOL)	
4	2A		B38-0834-05	LCD ASSY		56	1B		K29-5232-03	KNOB (ENC)	
5	1B		B43-1106-14	BADGE (KENWOOD)		A	3B		N14-0569-04	CIRCULAR NUT(VOL.ENC)	
7	2C	*	B62-1264-00	INSTRUCTION MANUAL ACSY		B	3B		N30-2604-46	PAN HEAD MACHINE SCREW(ANT)	
8	3B	*	B72-1716-04	MODEL NAME PLATE	K	C	3A		N30-2610-46	PAN HEAD MACHINE SCREW(CASE)	
8	3B	*	B72-1717-04	MODEL NAME PLATE	(NJM)	D	2B		N67-2606-46	PAN HEAD SEMS SCREW W/P-MODULE)	
8	3B	*	B72-1768-04	MODEL NAME PLATE	E	E	3A,3B		N79-2025-46	PAN HEAD TAPTITE SCREW(TERMINAL)	
9	3B		E04-0416-05	RF COAXIAL RECEPTACLE(SMA)		F	2A,2B		N83-2005-46	PAN HEAD TAPTITE SCREW(UNIT)	
10	2B		E23-1104-04	TERMINAL (ANT)		57	2C		N99-2004-05	SCREW SET ACSY	
11	3A,3B		E23-1166-04	RELAY TERMINAL		58	3B		R31-0617-05	VARIABLE RESISTOR (POWER SW/VOL)	
14	2B		E37-0672-05	FLAT CABLE		59	2B		S70-0414-05	TACT SWITCH	
15	3A		E37-0673-05	LEAD WIRE WITH CONNECTOR (PTT)		SP	1B		T07-0714-05	SPEAKER	
16	1B		E37-0674-15	LEAD WIRE WITH CONNECTOR (SP)		ANT	2C		T90-0733-05	HELICAL ANTENNA ACSY	K,E
17	3B		E58-0440-05	SQUARE SOCKET (SP/MIC)		ANT	2C		T90-0734-05	HELICAL ANTENNA ACSY	(NJM)
18	3B	*	E72-0412-13	TERMINAL BLOCK		MIC	2B		T91-0579-05	MIC ELEMENT	
19	2B		F10-2272-03	SHIELDING CASE (DBM)		IC100	2B	*	M68779H	HYBRID IC(POWER MODULE)	(NJM)
20	3A		F10-2305-04	SHIELDING PLATE (PLL)		IC100	2B	*	M68779M	HYBRID IC(POWER MODULE)	K,E
21	2A		F10-2310-03	SHIELDING PLATE (LCD)		61	3B		W02-1814-05	ENCODER	
22	2A		F10-2340-03	SHIELDING CASE (VCO-OUT)		62	1D		W09-0900-35	BATTERY ASSY ACSY	E
23	2B		F10-2341-13	SHIELDING CASE (DBM/VCO)		63	3B		G13-1794-04	CUSHION(MCF)	
24	3B		F10-2353-14	SHIELDING PLATE (P-MODULE)		<b>DISPLAY UNIT (X54-3210-13)</b>					
25	2B		F10-2360-03	SHIELDING CASE (FRONT END)		D301			B30-2019-05	LED(RE/GR)	
26	3B		F20-1181-04	INSULATING SHEET		D305-310			B30-2171-05	LED	
27	2B		F20-3303-04	INSULATING SHEET (MIC/GND)		C301			CC73GCH1H470J	CHIP C 47PF J	
28	1A		G01-0881-04	COIL SPRING		C302			C92-0560-05	CHIP-TAN 10UF 6.3VV	
29	1B		G09-0418-05	KNOB SPRING (VOL,ENC)		C304			CK73FB1C474K	CHIP C 0.47UF K	
30	1B		G10-0799-04	FIBROUS SHEET (SP)		C305			CC73GCH1H101J	CHIP C 100PF J	
32	3A		G11-2544-04	SHEET (CHASSIS)		C307			CK73GB1C104K	CHIP C 0.10UF K	
34	3A		G11-2590-04	SHEET (PTT)		C308			CC73GCH1H101J	CHIP C 100PF J	
35	2A		G13-1731-04	CUSHION (LCD)		C309			CK73FB1C474K	CHIP C 0.47UF K	
36	3B		G13-1762-04	CUSHION (VOL/CHASSIS)		C310			CK73GB1C104K	CHIP C 0.10UF K	
37	3B		G13-1791-14	CUSHION (TERMINAL)		C311			CC73GCH1H470J	CHIP C 47PF J	
38	3B		G53-0811-03	PACKING (TOP)		C312			CK73GB1C104K	CHIP C 0.10UF K	
39	1B		G53-0896-02	PACKING (16KEYS)		C313			C92-0628-05	CHIP-TAN 10UF 10VV	
40	3A		G53-1510-04	PACKING (BATT+)		C314			C92-0647-05	TAN C 3.3UF 4VV	
41	3B		G53-1520-24	PACKING (TERMINAL)		C315			CC73GCH1H101J	CHIP C 100PF J	
42	2D		H12-3014-02	PACKING FIXTURE		C316,317			CC73GCH1H470J	CHIP C 47PF J	
43	1D		H13-1072-04	CARTON BOARD	K,(NJM)	C318			CC73GCH1H101J	CHIP C 100PF J	
44	3D	*	H52-1575-02	ITEM CARTON CASE	K,(NJM)	C321-333			CC73GCH1H470J	CHIP C 47PF J	
44	3D	*	H52-1613-02	ITEM CARTON CASE	E	C335-339			CC73GCH1H470J	CHIP C 47PF J	
45	1A		J19-1572-04	HOLDER		C340			CK73GB1E153K	CHIP C 0.015UF K	
46	2B		J21-8398-03	HARDWARE FIXTURE (P-MODULE)		C341-344			CC73GCH1H470J	CHIP C 47PF J	
47	2C		J29-0658-05	HOOK ACSY		CN300			E40-5891-05	FLAT CABLE CONNECTOR(24P)	
48	3A		J30-1263-04	SPACER(TERMINAL-)		CN301			E40-5892-05	FLAT CABLE CONNECTOR (14P)	
49	3B		J30-1264-04	SPACER(TERMINAL+)		CN302			E40-5662-05	PIN ASSY SOCKET(2P:SP)	
50	3B		J82-0045-05	FPC (VOL.ENC)		CN303			E40-5887-05	PIN ASSY(4P:PTT)	
51	3B		J82-0066-05	FPC (SQUARE SOCKET)		CN304			E40-5823-05	FLAT CABLE CONNECTOR(LCD)	

## PARTS LIST

DISPLAY UNIT (X54-3210-13)

TX-RX UNIT (X57-619X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
L300,301			L92-0141-05	FERRITE CHIP		Q309			2SC4617(S)	TRANSISTOR	
L302,303			L92-0138-05	FERRITE CHIP		Q310			2SK1824	FET	
L304,305			L92-0141-05	FERRITE CHIP		TH300			TN10-3S154JT	THERMISTOR	
L306,307			L92-0138-05	FERRITE CHIP		<b>TX-RX UNIT (X57-619X-XX)</b>					
L308,309			L92-0141-05	FERRITE CHIP		<b>0-11: K,E 0-21:(N)M</b>					
CP300,301			R90-0723-05	MULTI-COMP 47K X2		C1			CK73GB1H102K	CHIP C	1000PF K
CP302,303			R90-0724-05	MULTI-COMP 1K X4		C2,3			CK73GB1E103K	CHIP C	0.010UF K
R300			RK73GB1J103J	CHIP R 10K J 1/16W		C4-6			CK73GB1H102K	CHIP C	1000PF K
R301			RK73FB2A101J	CHIP R 100 J 1/10W		C7			CK73GB1C104K	CHIP C	0.10UF K
R302			RK73GB1J470J	CHIP R 47 J 1/16W		C8,9			CK73GB1E103K	CHIP C	0.010UF K
R303			RK73GB1J471J	CHIP R 470 J 1/16W		C10			CK73GB1H102K	CHIP C	1000PF K
R304			RK73GB1J182J	CHIP R 1.8K J 1/16W		C11			CK73GB1E103K	CHIP C	0.010UF K
R305			RK73GB1J104J	CHIP R 100K J 1/16W		C12			CC73GCH1H101J	CHIP C	100PF J
R306			R92-1252-05	CHIP R 0 OHM		C13			C92-0628-05	CHIP-TAN	10UF 10WV
R307			RK73GB1J821J	CHIP R 820 J 1/16W		C14			C92-0592-05	CHIP-TAN	4.7UF 6.3WV
R308			RK73GB1J153J	CHIP R 15K J 1/16W		C15			CK73GB1H102K	CHIP C	1000PF K
R309			R92-1252-05	CHIP R 0 OHM		C16			C92-0650-05	TANTAL	10UF 6.3WV
R310			RK73GB1J331J	CHIP R 330 J 1/16W		C17			CK73FB1C334K	CHIP C	0.33UF K
R311			RK73GB1J102J	CHIP R 1.0K J 1/16W		C18			C92-0628-05	CHIP-TAN	10UF 10WV
R312			RK73GB1J104J	CHIP R 100K J 1/16W		C19			C92-0592-05	CHIP-TAN	4.7UF 6.3WV
R313,314			RK73GB1J102J	CHIP R 1.0K J 1/16W		C20			CK73GB1C104K	CHIP C	0.10UF K
R315			RK73GB1J104J	CHIP R 100K J 1/16W		C21			CK73GB1H331K	CHIP C	330PF K
R316			RK73GB1J473J	CHIP R 47K J 1/16W		C22			C92-0592-05	CHIP-TAN	4.7UF 6.3WV
R317			RK73GB1J472J	CHIP R 4.7K J 1/16W		C23-25			CK73GB1H102K	CHIP C	1000PF K
R318			RK73GB1J104J	CHIP R 100K J 1/16W		C26			CK73GB1E223K	CHIP C	0.022UF K
R319-321			RK73GB1J820J	CHIP R 82 J 1/16W		C27-29			CK73GB1H102K	CHIP C	1000PF K
R324,325			RK73GB1J102J	CHIP R 1.0K J 1/16W		C30			CK73GB1C104K	CHIP C	0.10UF K
R326			RK73GB1J124J	CHIP R 120K J 1/16W		C31			CK73FB1A105K	CHIP C	1.0UF K
R327			RK73GB1J563J	CHIP R 56K J 1/16W		C32,33			CK73GB1H102K	CHIP C	1000PF K
R328			RK73GB1J124J	CHIP R 120K J 1/16W		C34			CK73GB1E103K	CHIP C	0.010UF K
R331			RK73GB1J103J	CHIP R 10K J 1/16W		C35			CK73GB1C104K	CHIP C	0.10UF K
R332			RK73GB1J272J	CHIP R 2.7K J 1/16W		C36,37			CK73GB1H102K	CHIP C	1000PF K
R333			RK73GB1J103J	CHIP R 10K J 1/16W		C38,39			CK73GB1C104K	CHIP C	0.10UF K
R336			R92-1252-05	CHIP R 0 OHM		C40			C92-0713-05	TAN C	10UF 6.3WV
R337			RK73GB1J472J	CHIP R 4.7K J 1/16W		C41			CK73GB1H102K	CHIP C	1000PF K
R338-341			RK73GB1J101J	CHIP R 100 J 1/16W		C42			CK73GB1C333K	CHIP C	0.033UF K
R342			R92-1252-05	CHIP R 0 OHM		C43			CK73GB1H102K	CHIP C	1000PF K
S301-303			S70-0457-05	TACT SWITCH(PTT)		C45			CC73GCH1H121J	CHIP C	120PF J
D300			NNCD6.8G	ZENER DIODE		C46			CK73GB1C104K	CHIP C	0.10UF K
D302			1SS373	DIODE		C47			CK73GB1H102K	CHIP C	1000PF K
D303			015AZ2.4-X	ZENER DIODE		C48			CK73GB1C104K	CHIP C	0.10UF K
D304			MA2S111	DIODE		C49			CC73GCH1H100D	CHIP C	10PF D
D315			IMN10	DIODE		C50			CK73GB1E103K	CHIP C	0.010UF K
D316,317			MA2S111	DIODE		C51			CC73GCH1H271J	CHIP C	270PF J
D318			IMN10	DIODE		C52			CK73GB1H102K	CHIP C	1000PF K
D319-321			015AZ6.8	ZENER DIODE		C53			CK73GB1E103K	CHIP C	0.010UF K
IC300			TDA7053AT	IC(AUDIO AMP)		C54			CK73GB1C104K	CHIP C	0.10UF K
IC301			MC74HC4017F	IC(COUNTNER)		C55			C92-0662-05	CHIP-TAN	15UF 6.3WV
Q300			2SJ243	FET		C56			CK73GB1H472K	CHIP C	4700PF K
Q301			UPA672T	FET		C57			CK73GB1H102K	CHIP C	1000PF K
Q302-304			2SC4617(S)	TRANSISTOR		C58			CK73GB1H222K	CHIP C	2200PF K
Q305			2SB798(DL,DK)	TRANSISTOR		C59			CK73GB1C273K	CHIP C	0.027UF K
Q306			2SC4617(S)	TRANSISTOR		C60			CK73GB1C104K	CHIP C	0.10UF K
Q307			2SB1132(Q,R)	TRANSISTOR		C61			CK73GB1E123K	CHIP C	0.012UF K
Q308			UPA672T	FET		C62			CK73GB1H122J	CHIP C	1200PF J
						C63			CK73GB1H102K	CHIP C	1000PF K

## PARTS LIST

TX-RX UNIT (X57-619X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C64,65			CC73GCH1H680J	CHIP C 68PF J		C132			CC73GCH1H220J	CHIP C 22PF J	
C66			CK73GB1C104K	CHIP C 0.10UF K		C133			CK73GB1E153K	CHIP C 0.015UF K	
C67,68			CK73GB1E103K	CHIP C 0.010UF K		C134			CK73GB1E103K	CHIP C 0.010UF K	
C69			CK73GB1C104K	CHIP C 0.10UF K		C135			CK73GB1C563K	CHIP C 0.056UF K	
C70			CC73GCH1H220J	CHIP C 22PF J		C136			CK73GB1E103K	CHIP C 0.010UF K	
C71			CK73GB1C683K	CHIP C 0.068UF K		C137			CC73GCH1H100D	CHIP C 10PF D	
C72			CC73GCH1H100D	CHIP C 10PF D		C138			CK73GB1H102K	CHIP C 1000PF K	
C73			CK73GB1C104K	CHIP C 0.10UF K		C139			CC73GCH1H220J	CHIP C 22PF J	
C74			CK73GB1E103K	CHIP C 0.010UF K		C140			C92-0592-05	CHIP-TAN 4.7UF 6.3WV	
C75			CK73GB1C104K	CHIP C 0.10UF K		C141			CK73GB1H102K	CHIP C 1000PF K	
C76			C92-0773-05	TAN C 15UF 6.3WV		C142			CC73GCH1H150J	CHIP C 15PF J	
C77			CK73GB1H562J	CHIP C 5600PF J		C143			C92-0714-05	TAN C 4.7UF 6.3WV	
C78			C92-0713-05	TAN C 10UF 6.3WV		C144			CK73FB1H563K	CHIP C 0.056UF K	
C79			C92-0656-05	TAN C 2.2UF 6.3WV		C146			CK73HB1H102K	CHIP C 1000PF K	
C80			CK73GB1H102K	CHIP C 1000PF K		C148			CK73GB1H102K	CHIP C 1000PF K	
C81			CK73GB1C333K	CHIP C 0.033UF K		C149			CC73GCH1H060D	CHIP C 6.0PF D	
C82			CC73HCH1H101J	CHIP C 100PF J		C154			CK73GB1H102K	CHIP C 1000PF K	
C83			CK73GB1H562J	CHIP C 5600PF J		C157			CK73GB1H102K	CHIP C 1000PF K	
C84			CK73GB1H102K	CHIP C 1000PF K		C158			CK73HB1C103K	CHIP C 0.010UF K	
C85			CK73GB1H562J	CHIP C 5600PF J		C159			CK73GB1C104K	CHIP C 0.10UF K	
C86			CK73GB1C333K	CHIP C 0.033UF K		C160			CC73GCH1H100D	CHIP C 10PF D	
C87			CK73GB1C104K	CHIP C 0.10UF K		C164			CK73GB1E103K	CHIP C 0.010UF K	
C88			CC73GCH1H820J	CHIP C 82PF J		C165			CC73GCH1H050C	CHIP C 5.0PF C	
C89			CK73GB1H102K	CHIP C 1000PF K		C166			CK73HB1C103K	CHIP C 0.010UF K	
C91			C92-0773-05	TAN C 15UF 6.3WV		C167			CC73GCH1H150J	CHIP C 15PF J	
C92			CK73GB1H272J	CHIP C 2700PF J		C168			CC73GCH1H270J	CHIP C 27PF J	
C93			CK73GB1C104K	CHIP C 0.10UF K		C169			CC73GCH1H1R5B	CHIP C 1.5PF B	
C94			CK73GB1H102K	CHIP C 1000PF K		C170			CK73GB1E103K	CHIP C 0.010UF K	
C95			CC73GCH1H330J	CHIP C 33PF J		C171			CK73HB1C103K	CHIP C 0.010UF K	
C96			CC73GCH1H030C	CHIP C 3.0PF C		C172			CC73GCH1H120J	CHIP C 12PF J	
C97,98			CK73GB1H272J	CHIP C 2700PF J		C175			CK73GB1C104K	CHIP C 0.10UF K	
C101			CK73GB1C104K	CHIP C 0.10UF K		C176			CK73GB1H472K	CHIP C 4700PF K	
C102			CC73GCH1H151J	CHIP C 150PF J		C177,178			CK73GB1H102K	CHIP C 1000PF K	
C103			CK73GB1H152J	CHIP C 1500PF J		C179			CK73GB1H471K	CHIP C 470PF K	
C104			CK73GB1H102K	CHIP C 1000PF K		C180,181			CK73GB1H102K	CHIP C 1000PF K	
C105			CK73GB1E103K	CHIP C 0.010UF K		C182			CK73GB1E103K	CHIP C 0.010UF K	
C106			CC73GCH1H030C	CHIP C 3.0PF C		C183			CC73GCH1H100D	CHIP C 10PF D	
C107			C92-0650-05	TANTAL 10UF 6.3WV		C184			CC73GCH1H270J	CHIP C 27PF J	
C108			C92-0714-05	TAN C 4.7UF 6.3WV		C186			CK73GB1H102K	CHIP C 1000PF K	
C109			CK73GB1C104K	CHIP C 0.10UF K		C187			CC73GCH1H270J	CHIP C 27PF J	
C110			CK73GB1H102K	CHIP C 1000PF K		C189,190			CK73GB1H102K	CHIP C 1000PF K	
C111			C92-0713-05	TAN C 10UF 6.3WV		C191			CK73HB1C103K	CHIP C 0.010UF K	
C112			CK73GB1H102K	CHIP C 1000PF K		C192,193			CK73GB1H102K	CHIP C 1000PF K	
C113			CK73GB1C104K	CHIP C 0.10UF K		C194			CC73GCH1H220J	CHIP C 22PF J	
C116,117			CK73GB1C104K	CHIP C 0.10UF K		C195			CC73GCH1H150J	CHIP C 15PF J	(N/M)
C119			CK73GB1C473K	CHIP C 0.047UF K		C195			CC73GCH1H160J	CHIP C 16PF J	K,E
C120,121			CK73GB1C104K	CHIP C 0.10UF K		C196			CK73HB1H102K	CHIP C 1000PF K	
C122			CK73GB1E103K	CHIP C 0.010UF K		C197			CC73GCH1H150J	CHIP C 15PF J	
C123,124			CK73GB1C104K	CHIP C 0.10UF K		C198			CK73FB1C474K	CHIP C 0.47UF K	
C125			C92-0003-05	CHIP-TAN 0.47UF 25WV	(N/M)	C199			CK73GB1H102K	CHIP C 1000PF K	
C125			C92-0519-05	CHIP-TAN 1.0UF 25WV	K,E	C200			C92-0565-05	CHIP-TAN 6.8UF 10WV	
C126			C92-0714-05	TAN C 4.7UF 6.3WV		C201			CC73GCH1H470J	CHIP C 47PF J	
C127			CK73GB1C104K	CHIP C 0.10UF K		C202			CC73GCH1H060B	CHIP C 6.0PF B	(N/M)
C128			CK73GB1H562J	CHIP C 5600PF J		C202			CC73GCH1H150J	CHIP C 15PF J	K,E
C129			CK73GB1H102K	CHIP C 1000PF K		C203			CK73GB1H102K	CHIP C 1000PF K	
C130			CK73GB1H562J	CHIP C 5600PF J		C204			CC73GCH1H220J	CHIP C 22PF J	(N/M)



## PARTS LIST

TX-RX UNIT (X57-619X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C204			CC73GCH1H330J	CHIP C 33PF J	K,E	C256,257			CK73HB1C103K	CHIP C 0.010UF K	
C205			CK73GB1H102K	CHIP C 1000PF K		C259			CK73GB1E103K	CHIP C 0.010UF K	
C206			CC73GCH1H180J	CHIP C 18PF J	(N)M	C260			CC73GCH1H270J	CHIP C 27PF J	
C206			CC73GCH1H220J	CHIP C 22PF J	K,E	C261			CK73GB1E103K	CHIP C 0.010UF K	
C207			CC73GCH1H020B	CHIP C 2.0PF B	(N)M	C262			CC73GCH1H010B	CHIP C 1.0PF B	K,E
C207			CC73GCH1H040B	CHIP C 4.0PF B	K,E	C263			CC73GCH1H010B	CHIP C 1.0PF B	(N)M
C208			CK73GB1E103K	CHIP C 0.010UF K		C263			CC73GCH1H1R5B	CHIP C 1.5PF B	K,E
C209			CC73GCH1H010B	CHIP C 1.0PF B	K,E	C265			CK73GB1C104K	CHIP C 0.10UF K	
C209			CC73GCH1H030B	CHIP C 3.0PF B	(N)M	C266			CC73GCH1H181J	CHIP C 180PF J	
C210,211			CK73GB1H102K	CHIP C 1000PF K		C267			CC73GCH1H680J	CHIP C 68PF J	
C212			CC73GCH1H070B	CHIP C 7.0PF B		C268			CK73GB1C104K	CHIP C 0.10UF K	
C213			CK73FB1C474K	CHIP C 0.47UF K		C401			CK73GB1C104K	CHIP C 0.10UF K	
C214			CC73GCH1H110J	CHIP C 11PF J	(N)M	C402			CC73GCH1H471J	CHIP C 470PF J	K,E
C214			CC73GCH1H130J	CHIP C 13PF J	K,E	C402			CK73GB1H681K	CHIP C 680PF K	(N)M
C215			CC73GCH1H101J	CHIP C 100PF J		C403			CC73GCH1H330J	CHIP C 33PF J	(N)M
C216			CC73GCH1H040B	CHIP C 4.0PF B		C403			CC73GCH1H390J	CHIP C 39PF J	K,E
C217			CC73GCH1H150J	CHIP C 15PF J	(N)M	C404			CK73GB1H102K	CHIP C 1000PF K	
C217			CC73GCH1H180J	CHIP C 18PF J	K,E	C405			CK73GB1C683K	CHIP C 0.068UF K	(N)M
C218			CK73GB1H102K	CHIP C 1000PF K		C405			CK73GB1H103K	CHIP C 0.010UF K	K,E
C219			CC73GCH1HR75B	CHIP C 0.75PF B	K,E	C406			CC73GCH1H330J	CHIP C 33PF J	(N)M
C219			CC73GCH1H010B	CHIP C 1.0PF B	(N)M	C406			CC73GCH1H470J	CHIP C 47PF J	K,E
C220			CC73GCH1H101J	CHIP C 100PF J		C407			CC73GCH1H180J	CHIP C 18PF J	(N)M
C221			CC73GCH1H030B	CHIP C 3.0PF B	K,E	C407			CC73GCH1H270J	CHIP C 27PF J	K,E
C221			CC73GCH1H050B	CHIP C 5.0PF B	(N)M	C408			C92-0602-05	CHIP-TAN 1.0UF 10WV	
C222			CK73GB1H102K	CHIP C 1000PF K		C410			C92-0714-05	TAN C 4.7UF 6.3WV	
C223			CC73GCH1H030B	CHIP C 3.0PF B		C411			CK73HB1H102K	CHIP C 1000PF K	K,E
C224-226			CK73GB1H102K	CHIP C 1000PF K		C412			CK73HB1A104K	CHIP C 0.10UF K	
C227			CC73GCH1H080B	CHIP C 8.0PF B	(N)M	C413,414			CK73HB1H102K	CHIP C 1000PF K	
C227			CC73GCH1H100C	CHIP C 10PF C	K,E	C421			CC73GCH1H471J	CHIP C 470PF J	
C228			CK73GB1H102K	CHIP C 1000PF K		CN1			E40-5823-05	FLAT CABLE CONNECTOR(10P)	
C229			CC73GCH1H470J	CHIP C 47PF J		CN2			E40-9517-05	PIN ASSY SOCKET(4P)	
C230			CK73GB1H102K	CHIP C 1000PF K	(N)M	CN3			E40-5890-05	FLAT CABLE CONNECTOR(24P)	
C233			CC73GCH1H040B	CHIP C 4.0PF B	(N)M	CN4			E23-0342-05	TEST TERMINAL	
C233			CC73GCH1H4R5B	CHIP C 4.5PF B	K,E	CN5-12			E23-1081-05	TERMINAL	
C234			CC73GCH1H470J	CHIP C 47PF J		F1			F53-0130-05	FUSE(3A)	
C235			CK73GB1E103K	CHIP C 0.010UF K		CD1			L79-1072-05	TUNING COIL	
C236			CK73GB1H102K	CHIP C 1000PF K		CF2			L72-0963-05	CERAMIC FILTER(455KHz)	
C237			CC73GCH1H100C	CHIP C 10PF C		L1			L92-0149-05	FERRITE CHIP	
C238,239			CK73GB1H102K	CHIP C 1000PF K		L2			L92-0138-05	FERRITE CHIP	
C241			CK73GB1H102K	CHIP C 1000PF K		L3			L40-4791-37	SMALL FIXED INDUCTOR(4.7UH)	
C242			CC73GCH1H070B	CHIP C 7.0PF B	(N)M	L4			L40-1091-37	SMALL FIXED INDUCTOR(1.0UH)	
C242			CC73GCH1H100C	CHIP C 10PF C	K,E	L5,6			L92-0138-05	FERRITE CHIP	
C243			CK73GB1H102K	CHIP C 1000PF K		L8			L92-0138-05	FERRITE CHIP	
C244			CC73GCH1H030B	CHIP C 3.0PF B		L9			L40-2771-36	SMALL FIXED INDUCTOR(27NH)	
C245			CK73GB1H102K	CHIP C 1000PF K		L10			L40-6871-36	SMALL FIXED INDUCTOR(68NH)	
C246			CC73GCH1H060B	CHIP C 6.0PF B	(N)M	L11,12			L92-0138-05	FERRITE CHIP	
C246			CC73GCH1H100C	CHIP C 10PF C	K,E	L14			L40-1081-36	SMALL FIXED INDUCTOR(100NH)	
C247			CC73GCH1H080B	CHIP C 8.0PF B	(N)M	L15			L40-3371-36	SMALL FIXED INDUCTOR(33NH)	
C247			CC73GCH1H090B	CHIP C 9.0PF B	K,E	L17			L40-4771-36	SMALL FIXED INDUCTOR(47NH)	
C248			CC73GCH1H180J	CHIP C 18PF J	(N)M	L18			L39-1272-05	TOROIDAL COIL	
C248			CC73GCH1H220J	CHIP C 22PF J	K,E	L19			L92-0138-05	FERRITE CHIP	
C249			CK73GB1H102K	CHIP C 1000PF K		L20			L40-4771-36	SMALL FIXED INDUCTOR(47NH)	
C251			CC73GCH1H390J	CHIP C 39PF J	(N)M	L21,22			L39-1272-05	TOROIDAL COIL	
C251-253			CK73GB1H102K	CHIP C 1000PF K	K,E	L24			L92-0138-05	FERRITE CHIP	
C252,253			CK73GB1H102K	CHIP C 1000PF K	(N)M	L25			L40-1081-36	SMALL FIXED INDUCTOR(100NH)	
C255			CK73GB1H102K	CHIP C 1000PF K							

## PARTS LIST

TX-RX UNIT (X57-619X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
L26			L92-0138-05	FERRITE CHIP	(N)JM K,E	R24			RK73GB1J473J	CHIP R	47K J 1/16W
L27		L40-3978-67	SMALL FIXED INDUCTOR(39NH)			R25			RK73GB1J472J	CHIP R	4.7K J 1/16W
L27		L40-4778-67	SMALL FIXED INDUCTOR(47NH)			R26			RK73GB1J473J	CHIP R	47K J 1/16W
L28		L92-0138-05	FERRITE CHIP			R27			RK73GB1J332J	CHIP R	3.3K J 1/16W
L29		L40-3375-54	SMALL FIXED INDUCTOR(33NH)			R28			RK73GB1J474J	CHIP R	470K J 1/16W
L30		L92-0149-05	FERRITE CHIP		R29			RK73GB1J184J	CHIP R	180K J 1/16W	
L31		L40-1278-67	SMALL FIXED INDUCTOR(12NH)		R30			RK73GB1J334J	CHIP R	330K J 1/16W	
L32		L34-4564-05	AIR-CORE COIL		R31			RK73GB1J102J	CHIP R	1.0K J 1/16W	
L33		L40-2278-67	SMALL FIXED INDUCTOR(22NH)		R32			RK73GB1J104J	CHIP R	100K J 1/16W	
L34		L40-1095-34	SMALL FIXED INDUCTOR(1UH)		R33			RK73GB1J184J	CHIP R	180K J 1/16W	
L35		L40-2288-67	SMALL FIXED INDUCTOR(220NH)		R34			RK73GB1J683J	CHIP R	68K J 1/16W	
L36		L40-1278-67	SMALL FIXED INDUCTOR(12NH)		R35			RK73GB1J220J	CHIP R	22 J 1/16W	
L37		L34-4567-05	AIR-CORE COIL		R36			RK73GB1J154J	CHIP R	150K J 1/16W	
L38		L40-2271-36	SMALL FIXED INDUCTOR(22NH)		R37			R92-1252-05	CHIP R	0 OHM	
L39		L34-4567-05	AIR-CORE COIL		R38			RK73GB1J101J	CHIP R	100 J 1/16W	
L40		L40-3978-67	SMALL FIXED INDUCTOR(39NH)	(N)JM K,E	R39			RK73GB1J472J	CHIP R	4.7K J 1/16W	
L40		L40-4778-67	SMALL FIXED INDUCTOR(47NH)			R40,41			RK73GB1J334J	CHIP R	330K J 1/16W
L41		L34-4567-05	AIR-CORE COIL			R42,43			RK73GB1J223J	CHIP R	22K J 1/16W
L43,44		L34-4564-05	AIR-CORE COIL			R44			RK73GB1J473J	CHIP R	47K J 1/16W
L45		L40-1092-81	SMALL FIXED INDUCTOR			R45			RK73GB1J472J	CHIP R	4.7K J 1/16W
L47,48		L34-4564-05	AIR-CORE COIL		R46,47			RK73GB1J223J	CHIP R	22K J 1/16W	
L49		L92-0138-05	FERRITE CHIP		R48			R92-1252-05	CHIP R	0 OHM	
L51		L40-2288-67	SMALL FIXED INDUCTOR(220NH)		R49			RK73GB1J223J	CHIP R	22K J 1/16W	
L401		L40-5678-96	SMALL FIXED INDUCTOR(56NH)		R50			RN73GH1J913D	CHIP R	91K D 1/16W	
L407,408		L34-4567-05	AIR-CORE COIL		R51			RN73GH1J683D	CHIP R	68K D 1/16W	
X1		L77-1789-05	TCXO (16.8MHZ)		R52			RN73GH1J913D	CHIP R	91K D 1/16W	
X2		L77-1760-15	CRYSTAL RESONATOR(44.395MHZ)		R53			RK73GB1J473J	CHIP R	47K J 1/16W	
X3		L77-1708-05	CRYSTAL RESONATOR(3.579545MHZ)		R54			RK73GB1J123J	CHIP R	12K J 1/16W	
X4		L78-0462-05	RESONATOR (9.8304MHZ)		R55			RN73GH1J333D	CHIP R	33K D 1/16W	
XF1	*	L71-0583-05	MCF (44.85MHZ)		R56			RK73GB1J472J	CHIP R	4.7K J 1/16W	
CP1		R90-0724-05	MULTI-COMP 1K X4		R57			RK73GB1J183J	CHIP R	18K J 1/16W	
CP2		R90-0718-05	MULTI-COMP 4.7K X4		R58			RK73GB1J184J	CHIP R	180K J 1/16W	
CP4,5		R90-0743-05	MULTIPLE RESISTOR 47K X2		R59			RK73GB1J564J	CHIP R	560K J 1/16W	
CP6-21		R90-0741-05	MULTIPLE RESISTOR 1K X2		R60			RK73GB1J123J	CHIP R	12K J 1/16W	
CP22-24		R90-0743-05	MULTIPLE RESISTOR 47K X2		R61			RK73GB1J103J	CHIP R	10K J 1/16W	
R1		RK73GB1J103J	CHIP R	10K J 1/16W	R62			RN73GH1J913D	CHIP R	91K D 1/16W	
R2		RK73GB1J473J	CHIP R	47K J 1/16W	R63			RK73GB1J474J	CHIP R	470K J 1/16W	
R3		RK73GB1J154J	CHIP R	150K J 1/16W	R64			RK73GB1J153J	CHIP R	15K J 1/16W	
R4		RK73GB1J104J	CHIP R	100K J 1/16W	R65			RK73GB1J103J	CHIP R	10K J 1/16W	
R5		RK73HB1J103J	CHIP R	10K J 1/16W	R66			R92-1252-05	CHIP R	0 OHM	
R6,7		RK73GB1J104J	CHIP R	100K J 1/16W	R67			RN73GH1J274D	CHIP R	270K D 1/16W	
R8		RK73HB1J472J	CHIP R	4.7K J 1/16W	R68			RK73GB1J223J	CHIP R	22K J 1/16W	
R9		RK73HB1J474J	CHIP R	470K J 1/16W	R69			R92-1252-05	CHIP R	0 OHM	
R10		RK73HB1J472J	CHIP R	4.7K J 1/16W	R70			RN73GH1J682D	CHIP R	6.8K D 1/16W	
R11		RK73GB1J104J	CHIP R	100K J 1/16W	R72			RK73GB1J155J	CHIP R	1.5M J 1/16W	
R12		RK73GB1J184J	CHIP R	180K J 1/16W	R73			RK73GB1J471J	CHIP R	470 J 1/16W	
R13		RK73GB1J333J	CHIP R	33K J 1/16W	R74			RK73GB1J183J	CHIP R	18K J 1/16W	
R14		RK73GB1J223J	CHIP R	22K J 1/16W	R75			RN73GH1J683D	CHIP R	68K D 1/16W	
R15		RK73GB1J104J	CHIP R	100K J 1/16W	R76			RK73GB1J474J	CHIP R	470K J 1/16W	
R16,17		RK73GB1J473J	CHIP R	47K J 1/16W	R77			RK73GB1J393J	CHIP R	39K J 1/16W	
R18		RK73GB1J154J	CHIP R	150K J 1/16W	R78			RN73GH1J682D	CHIP R	6.8K D 1/16W	
R19		RK73GB1J104J	CHIP R	100K J 1/16W	R79			RK73GB1J101J	CHIP R	100 J 1/16W	
R20		RK73HB1J104J	CHIP R	100K J 1/16W	R80			RK73GB1J152J	CHIP R	1.5K J 1/16W	
R21		RK73GB1J104J	CHIP R	100K J 1/16W	R81			RK73GB1J220J	CHIP R	22 J 1/16W	
R21		RK73GB1J683J	CHIP R	68K J 1/16W	R83			RK73GB1J184J	CHIP R	180K J 1/16W	
R22,23		RK73GB1J823J	CHIP R	82K J 1/16W	R84			R92-1252-05	CHIP R	0 OHM	

## PARTS LIST

TX-RX UNIT (X57-619X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R85			RK73GB1J103J	CHIP R 10K J 1/16W		R218			RK73GB1J220J	CHIP R 22 J 1/16W	
R86			RK73GB1J183J	CHIP R 18K J 1/16W		R219			RK73GB1J470J	CHIP R 47 J 1/16W	
R89			RK73GB1J102J	CHIP R 1.0K J 1/16W		R220			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R90			RK73GB1J153J	CHIP R 15K J 1/16W		R221			RK73GB1J271J	CHIP R 270 J 1/16W	
R91			RK73GB1J473J	CHIP R 47K J 1/16W		R239			R92-1252-05	CHIP R 0 OHM	
R93			RK73HB1J472J	CHIP R 4.7K J 1/16W	(N)M	R240			RK73GB1J331J	CHIP R 330 J 1/16W	
R93			RK73HB1J562J	CHIP R 5.6K J 1/16W	K,E	R243			RK73GB1J180J	CHIP R 18 J 1/16W	
R94			RK73HB1J473J	CHIP R 47K J 1/16W		R244			RK73EB2ER39K	CHIP R 0.39 K 1/4W	
R95			RK73GB1J394J	CHIP R 390K J 1/16W		R246			RK73EB2ER39K	CHIP R 0.39 K 1/4W	
R96			RK73GB1J122J	CHIP R 1.2K J 1/16W	K,E	R247			R92-1252-05	CHIP R 0 OHM	
R96			RK73GB1J182J	CHIP R 1.8K J 1/16W	(N)M	R248			RK73EB2ER39K	CHIP R 0.39 K 1/4W	
R97			RK73GB1J151J	CHIP R 150 J 1/16W		R249			R92-1252-05	CHIP R 0 OHM	
R99			RK73GB1J104J	CHIP R 100K J 1/16W		R250-252			RN73GH1J154D	CHIP R 150K D 1/16W	
R100			R92-1252-05	CHIP R 0 OHM		R253			RK73GB1J221J	CHIP R 220 J 1/16W	
R101			RK73GB1J560J	CHIP R 56 J 1/16W		R254-256			RN73GH1J154D	CHIP R 150K D 1/16W	
R102			RK73GB1J333J	CHIP R 33K J 1/16W		R257			RK73GB1J221J	CHIP R 220 J 1/16W	
R104			RK73GB1J102J	CHIP R 1.0K J 1/16W		R258,259			R92-1252-05	CHIP R 0 OHM	
R106			RK73GB1J470J	CHIP R 47 J 1/16W		R260			RK73GB1J103J	CHIP R 10K J 1/16W	
R107			RK73GB1J473J	CHIP R 47K J 1/16W		R261			RK73GB1J470J	CHIP R 47 J 1/16W	
R109			R92-1252-05	CHIP R 0 OHM		R262,263			RK73GB1J104J	CHIP R 100K J 1/16W	
R110			RK73GB1J220J	CHIP R 22 J 1/16W		R264			RK73GB1J181J	CHIP R 180 J 1/16W	
R114			RK73GB1J223J	CHIP R 22K J 1/16W		R265			RK73GB1J473J	CHIP R 47K J 1/16W	
R115			RK73GB1J184J	CHIP R 180K J 1/16W		R266			RK73GB1J823J	CHIP R 82K J 1/16W	
R116			RK73GB1J103J	CHIP R 10K J 1/16W		R267			R92-1252-05	CHIP R 0 OHM	
R118			RK73GB1J181J	CHIP R 180 J 1/16W		R268			RK73GB1J105J	CHIP R 1.0M J 1/16W	
R119			RK73GB1J101J	CHIP R 100 J 1/16W		R269			RK73GB1J223J	CHIP R 22K J 1/16W	
R120			RK73GB1J224J	CHIP R 220K J 1/16W		R270			RK73GB1J473J	CHIP R 47K J 1/16W	
R121			RK73GB1J222J	CHIP R 2.2K J 1/16W		R271			R92-1252-05	CHIP R 0 OHM	
R122			RK73GB1J181J	CHIP R 180 J 1/16W		R272			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R123			RK73GB1J183J	CHIP R 18K J 1/16W		R273			RK73GB1J103J	CHIP R 10K J 1/16W	
R127			RK73GB1J103J	CHIP R 10K J 1/16W		R276			RK73GB1J103J	CHIP R 10K J 1/16W	
R129			RK73HB1J104J	CHIP R 100K J 1/16W		R281			RK73GB1J331J	CHIP R 330 J 1/16W	
R132,133			R92-1368-05	CHIP R 0 OHM		R282,283			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R134			R92-1252-05	CHIP R 0 OHM		R284			R92-1252-05	CHIP R 0 OHM	
R136			RK73GB1J472J	CHIP R 4.7K J 1/16W		R294			RK73GB1J221J	CHIP R 220 J 1/16W	
R137			RK73HB1J103J	CHIP R 10K J 1/16W		R295			R92-1252-05	CHIP R 0 OHM	
R139,140			RK73HB1J473J	CHIP R 47K J 1/16W		R296,297			RK73HB1J473J	CHIP R 47K J 1/16W	
R143-151			RK73HB1J102J	CHIP R 1.0K J 1/16W		R298			R92-1252-05	CHIP R 0 OHM	
R155			RK73GB1J102J	CHIP R 1.0K J 1/16W		R300			R92-1252-05	CHIP R 0 OHM	
R159			RK73GB1J154J	CHIP R 150K J 1/16W		R303-305			R92-1252-05	CHIP R 0 OHM	
R161			R92-1252-05	CHIP R 0 OHM		R306			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R162			RK73GB1J103J	CHIP R 10K J 1/16W		R307			RK73GB1J272J	CHIP R 2.7K J 1/16W	
R163			RK73HB1J103J	CHIP R 10K J 1/16W		R308			RK73GB1J684J	CHIP R 680K J 1/16W	
R166			RK73GB1J223J	CHIP R 22K J 1/16W		R309			RK73GB1J271J	CHIP R 270 J 1/16W	
R167,168			R92-1252-05	CHIP R 0 OHM		R401			RK73GB1J224J	CHIP R 220K J 1/16W	
R177			RK73GB1J101J	CHIP R 100 J 1/16W		R402,403			RK73GB1J394J	CHIP R 390K J 1/16W	
R180			RK73GB1J473J	CHIP R 47K J 1/16W		R404,405			RK73GB1J104J	CHIP R 100K J 1/16W	
R184			RK73GB1J102J	CHIP R 1.0K J 1/16W		R406			RK73HB1J473J	CHIP R 47K J 1/16W	
R185			RK73GB1J470J	CHIP R 47 J 1/16W		R408			RK73GB1J223J	CHIP R 22K J 1/16W	
R189			RK73HB1J473J	CHIP R 47K J 1/16W		R409			RK73GB1J394J	CHIP R 390K J 1/16W	
R190			RK73GB1J472J	CHIP R 4.7K J 1/16W		R410			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R192			RK73GB1J122J	CHIP R 1.2K J 1/16W		R411			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R195			RK73GB1J222J	CHIP R 2.2K J 1/16W		R412			RK73HB1J331J	CHIP R 330 J 1/16W	
R199			RK73HB1J102J	CHIP R 1.0K J 1/16W		R413			RK73GB1J471J	CHIP R 470 J 1/16W	K,E
R202			RK73GB1J181J	CHIP R 180 J 1/16W		R413			RK73GB1J681J	CHIP R 680 J 1/16W	(N)M
R217			RK73HB1J473J	CHIP R 47K J 1/16W		R414			RK73HB1J184J	CHIP R 180K J 1/16W	

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## PARTS LIST

TX-RX UNIT (X57-619X-XX)

SUB UNIT (X58-4730-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R415,416			RK73GB1J474J	CHIP R 470K J 1/16W	
D1			1SR154-400	DIODE	
D2,3			MA2S111	DIODE	
D4			RB706F-40	DIODE	
D5			DAN222	DIODE	
D6			MA2S111	DIODE	
D7			DAN222	DIODE	
D8			RB706F-40	DIODE	
D9			MA2S077	DIODE	
D10			HZU5ALL	DIODE	
D11			MA742	DIODE	
D12			HVC131	DIODE	
D14			HVC131	DIODE	
D16,17			HVC350B	VARIABLE CAPACITANCE DIODE	
D18,19			DA221	DIODE	
D20,21			HVC350B	VARIABLE CAPACITANCE DIODE	
D22			HVC131	DIODE	
D23			MA2S077	DIODE	
D24			1SS373	DIODE	
D401			HVC131	DIODE	
D402			MA2S111	DIODE	
IC1,2			TC75W51FU	IC (BUFFER AMP)	
IC3			RN5VL42C	IC (VOLTAGE DETECTOR)	
IC4			TC75W51FU	IC (BUFFER AMP)	
IC5			S-81350HG-KD	IC (VOLTAGE REGULATOR/5M)	
IC6			NUJ7201U50	IC (VOLTAGE REGULATOR/5V)	
IC7			TC75W51FU	IC (BUFFER AMP)	
IC8			M62364FP	IC (D/A CONVERTER)	
IC9			TK11250BM	IC (VOLTAGE REGULATOR/5C)	
IC10			TC75SS1F	IC (ACTIVE FILTER)	
IC11			TC75W51FU	IC (ACTIVE FILTER)	
IC12			TA31136FN	IC (FM IF)	
IC13			TC35453F	IC (AUDIO PROCESSOR)	
IC14			SA7025DK	IC (PLL SYSTEM)	
IC16			LC73872M	IC (DTMF DECODER)	
IC17			AT29C020-90TI	IC (FLASH MEMORY)	
IC18			GN2011(Q)	IC (ACTIVE DBM)	
IC19			30620M8-394GP	IC (CPU)	
IC20			AT2416N10SI2.5	IC (EEPROM)	
IC21,22			BU4094BCFV	IC (SHIFT REGISTER)	
IC23			NJM2904V	IC (APC)	
IC24			TC7S66FU	IC (ANALOG SWITCH)	
IC25			TC75W51FU	IC (ACTIVE FILTER)	
Q1			DTC144EE	DIGITAL TRANSISTOR	
Q2			2SJ243	FET	
Q3			2SA1745(6,7)	TRANSISTOR	
Q4			2SC4617(S)	TRANSISTOR	
Q5			2SJ243	FET	
Q6			DTA144EE	DIGITAL TRANSISTOR	
Q7			DTC144EE	DIGITAL TRANSISTOR	
Q8			2SC4617(S)	TRANSISTOR	
Q10			DTC144EE	DIGITAL TRANSISTOR	
Q11			2SK1824	FET	
Q12			2SC5108(Y)	TRANSISTOR	
Q13-15			2SK1824	FET	
Q16			2SC5108(Y)	TRANSISTOR	

Ref. No.	Address	New parts	Parts No.	Description	Destination
Q17			2SK1824	FET	
Q18			2SC5108(Y)	TRANSISTOR	
Q19			2SC4619	TRANSISTOR	
Q20			2SC4988	TRANSISTOR	
Q21,22			DTC114EE	DIGITAL TRANSISTOR	
Q23			2SK1824	FET	
Q24			3SK239A	FET	
Q25			DTA144EE	DIGITAL TRANSISTOR	
TH1			157-302-65801	THERMISTOR	
TH401			157-104-65001	THERMISTOR	
A1			X58-4730-10	SUB UNIT	K,E
A1			X58-4730-21	SUB UNIT	(N)M
<b>A1: SUB UNIT (VCO) X58-4730-XX</b> <b>-10:K, E -21:(N)M</b> The A1 is replaceable as a unit assembly so individual parts are not kept in stock.					
C1			CK73HB1C103K	CHIP C 0.010UF K	
C2			CC73HCH1H100B	CHIP C 10PF B	
C3			CK73HB1H102K	CHIP C 1000PF K	
C4			CC73HCH1H180J	CHIP C 18PF J	(N)M
C4			CC73HCH1H330J	CHIP C 33PF J	K,E
C5			CC73HCH1H470J	CHIP C 47PF J	(N)M
C5			CC73HCH1H820J	CHIP C 82PF J	K,E
C6			CC73HCH1H120J	CHIP C 12PF J	
C7			CK73HB1C103K	CHIP C 0.010UF K	
C9			CC73HCH1H0R5B	CHIP C 0.5PF B	
C10			CK73HB1H102K	CHIP C 1000PF K	
C11			CC73HCH1H070B	CHIP C 7.0PF B	
C12			CC73HCH1H120J	CHIP C 12PF J	
C13			CC73HCH1H030B	CHIP C 3.0PF B	(N)M
C13			CC73HCH1H050B	CHIP C 5.0PF B	K,E
C14			CC73HCH1H100B	CHIP C 10PF B	(N)M
C14			CC73HCH1H150J	CHIP C 15PF J	K,E
C15			CC73HCH1H0R5B	CHIP C 0.5PF B	
C16			C92-0606-05	CHIP-TAN 4.7UF 10WV	
C17			CC73HCH1H0R5B	CHIP C 0.5PF B	
C18			CK73HB1C103K	CHIP C 0.010UF K	
C19			CK73HB1H102K	CHIP C 1000PF K	
C20			CC73HCH1H120J	CHIP C 12PF J	
C21			CK73HB1C103K	CHIP C 0.010UF K	
TC1,2			C05-0384-05	CERAMIC TRIMMER CAP(10P/8)	
CN1,2			E40-5622-05	PIN ASSY(3P)	
L1			L40-3391-37	SMALL FIXED INDUCTOR(3.3UH)	
L2			L40-1091-37	SMALL FIXED INDUCTOR(1.0UH)	
L3			L40-4791-37	SMALL FIXED INDUCTOR(4.7UH)	
L4			L40-2291-37	SMALL FIXED INDUCTOR(2.2UH)	
L5			L34-4573-05	AIR-CORE COIL	
L6			L34-4574-05	AIR-CORE COIL	(N)M
L6			L34-4575-05	AIR-CORE COIL	K,E
L7			L92-0138-05	FERRITE CHIP	
L8			L40-5675-44	SMALL FIXED INDUCTOR(56.0NH)	(N)M
L8			L40-6875-44	SMALL FIXED INDUCTOR(68.0NH)	K,E
R1			RK73HB1J334J	CHIP R 330K J 1/16W	
R2			RK73HB1J473J	CHIP R 47K J 1/16W	
R3			RK73HB1J274J	CHIP R 270K J 1/16W	

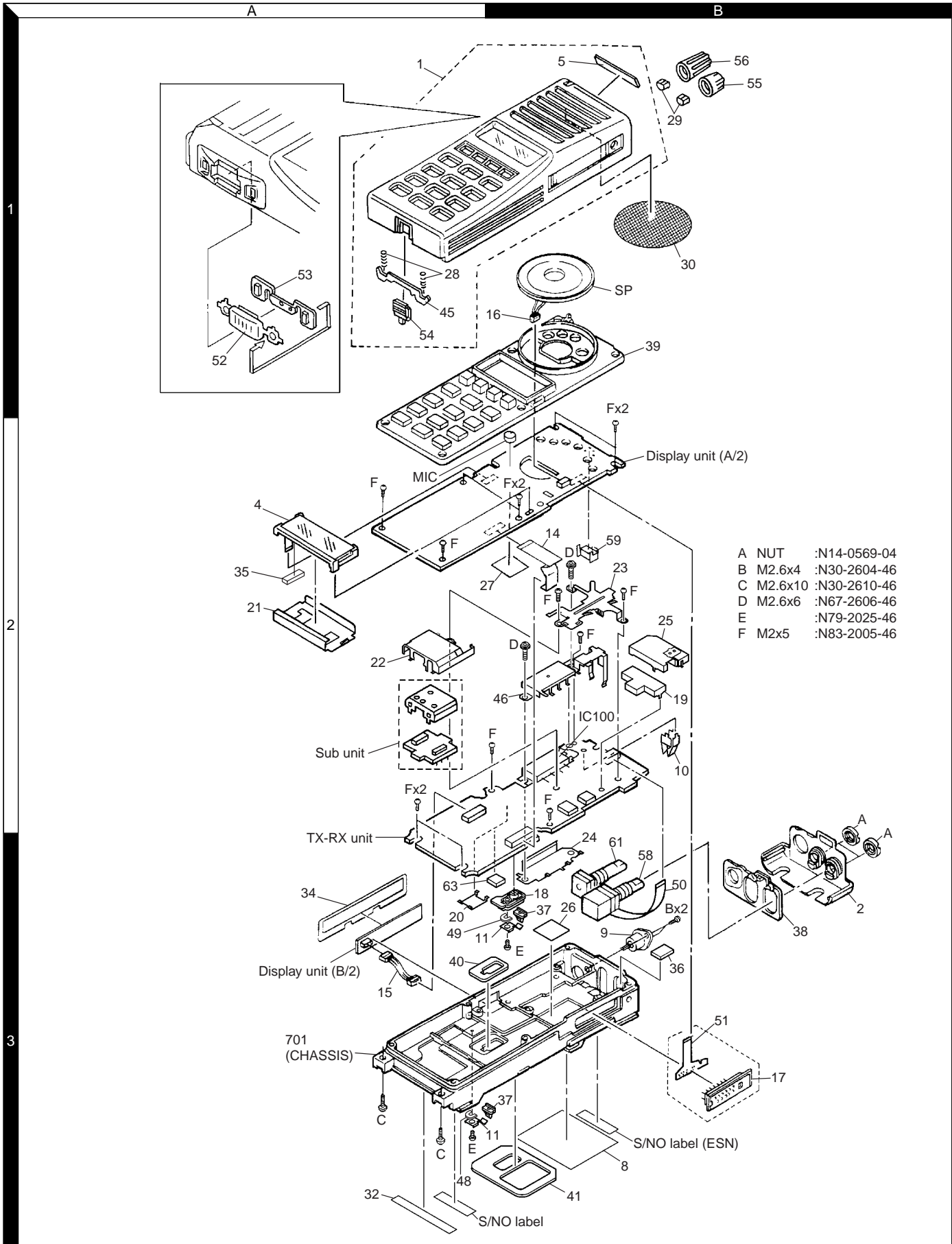
## PARTS LIST

SUB UNIT (X58-4730-XX)

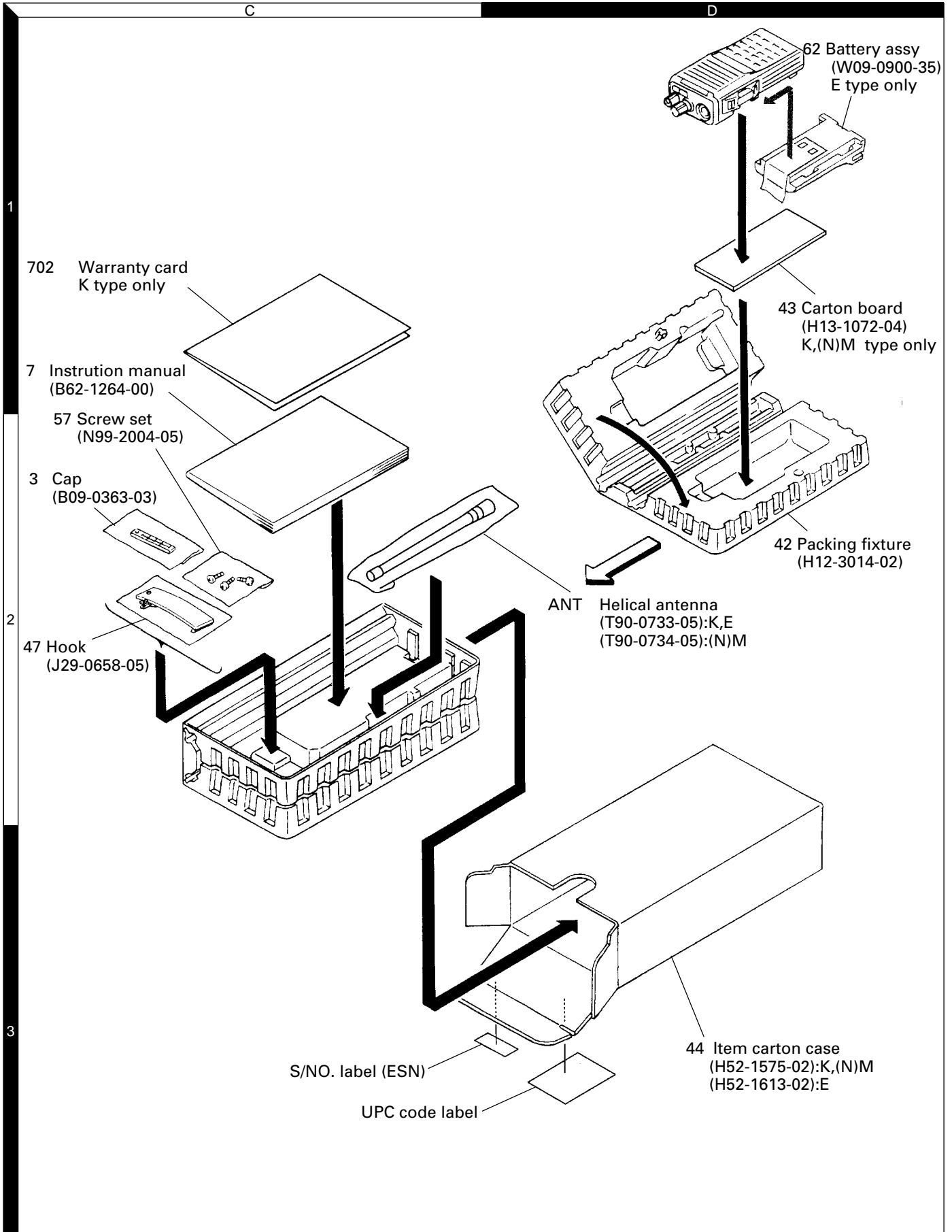
Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R4			RK73HB1J104J	CHIP R 100K J 1/16W							
R5,6			RK73HB1J391J	CHIP R 390 J 1/16W							
R7			RK73HB1J334J	CHIP R 330K J 1/16W							
R8			RK73HB1J470J	CHIP R 47 J 1/16W							
D1-8			HVC350B	VARIABLE CAPACITANCE DIODE							
D9			HVC351	VARIABLE CAPACITANCE DIODE							
Q1			2SJ243	FET							
Q2,3			2SK508NV(K52)	FET							
Q4			UMC4	TRANSISTOR							
Q5			2SC5108(Y)	TRANSISTOR							

# TK-285/(N)

## EXPLODED VIEW



## PACKING



## ADJUSTMENT

### Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	217 to 270MHz Frequency modulation and external modulation. -127dBm/0.1μV to greater than -47dBm/1mV
2. Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω. 217 to 270MHz or more. Vicinity of 10W
3. Deviation Meter	Frequency Range	217 to 270MHz.
4. Digital Volt Meter (DVM)	Measuring Range Input Impedance	10mV to 10V DC High input impedance for minimum circuit loading.
5. Oscilloscope		DC through 30MHz.
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz. 0.2ppm or less.
7. Ammeter		5A.
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz. 1mV to 10V.
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more. 0 to 1V.
10. Distortion Meter	Capability Input Level	3% or less at 1kHz. 50mV to 10Vrms.
11. 16Ω Dummy Load		Approx. 16Ω, 3W.
12. Regulated Power Supply		5V to 10V, approx. 5A Useful if ammeter equipped.

### ■ The following parts are required for adjustment

#### 1. Antenna connector adapter

The antenna connector of this radio uses an SMA terminal. Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

#### Note

When the antenna connector adapter touches the knob, draw out the knob to mount the connector.

#### 2. Universal connector

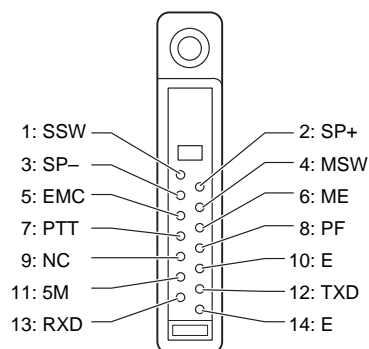
Use the interface cable (KPG-36) for PC tuning or the lead wire with plug (E30-3287-18) and screw (N08-0535-08) for panel tuning. Connect the plug to the universal connector of the radio and tighten the screw.

The lead wire with plug (E30-3287-18) and screw (N08-0535-08) terminals are as follows. Numbers are universal connector terminal numbers.

#### Caution

1. When connecting the plug to the universal connector of the radio, a short circuit may occur. To prevent this, be sure to turn the radio POWER switch off.
2. Since the RX AF output is a BTL output, there is a DC component. Isolate this with a capacitor or transformer as shown in the figure.
3. Do not connect an instrument between red or black and GND.

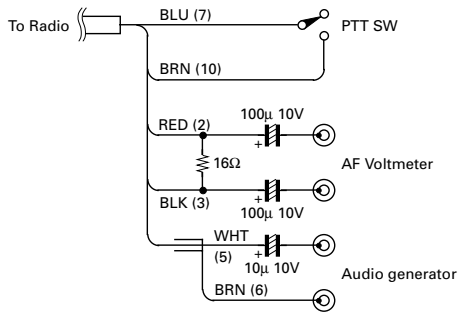
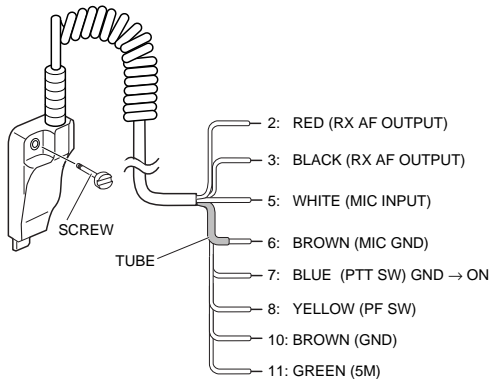
#### • Universal connector





## ADJUSTMENT

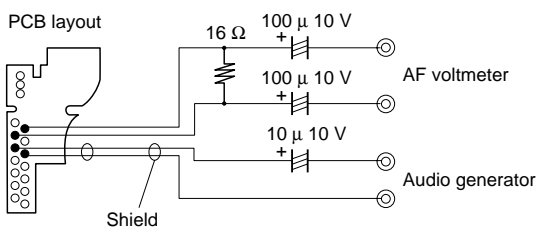
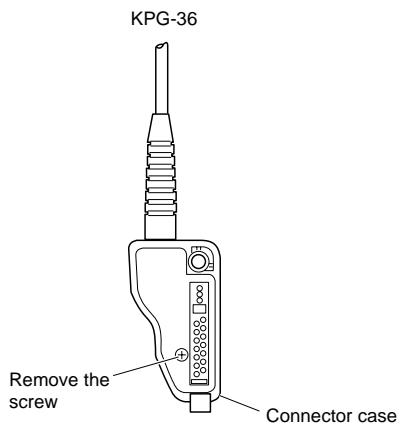
### • Panel tuning



### • PC tuning

Connect the wires to the PCB in the connector case of interface cable.

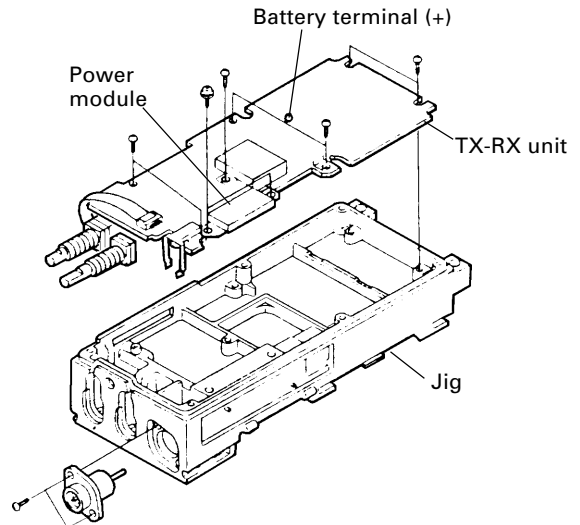
For output the wires out of the connector case, need to process the connector case.



### Repair Jig (Chassis)

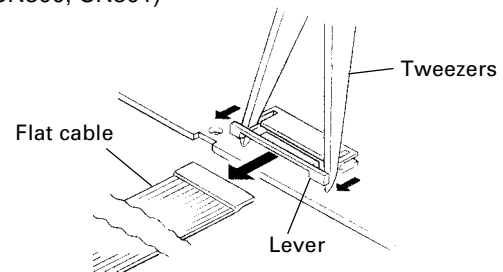
Use jig (part No.: W05-0825-00) for repairing the TK-285.

The jig facilitates the voltage check and protects the module when the voltage on the flow side of the TX-RX unit is checked during repairs.

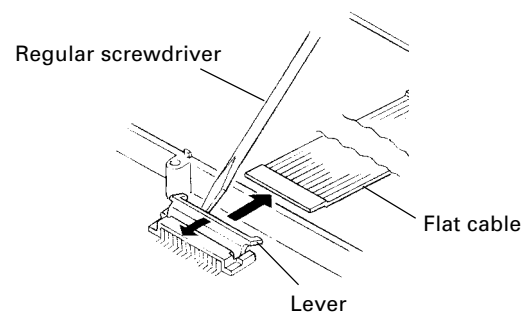


### How to Remove the Flat Cable

1. Gently draw out both sides of the connector lever uniformly in the direction of the arrow with tweezers. (CN300, CN301)



2. Gently rise up the connector lever in the direction of the arrow with a fine regular screwdriver or tweezers. (CN1, CN3, CN304)



## ADJUSTMENT

### Test Mode



#### ■ Test mode operating features

This transceiver has a test mode. **To enter test mode, press [B] key and turn power on. Hold [B] key until test channel No. and test signalling No. appears on LCD.** Test mode can be inhibited by programming. To exit test mode, switch the power on again. The following functions are available in test mode.

#### • Controls

Controls	"FNC" appears	"FNC" not appears
[PTT]	Used when making a transmission.	Used when making a transmission.
[AUX]	Release FNC	Unused
[CALL]	Release FNC	Monitor ON and OFF.
[CLEAR]	Lamp ON/OFF	No Func
[A]	FFSK 1200bps and 2400bps.	Sets to the Tuning mode.
[B]	Release FNC	FNC ON.
[C]	Compander function ON and OFF.	RF power HIGH and LOW.
[D]	Best shift ON and OFF.	Changes signalling.
[O] to [9], and [#],[*]	Release FNC No Func	No Func
[ENCODER]	Release FNC	Changes channel.

#### • LCD indicator

"SCN"	Unused
" 	Lights at Compander ON.
"LO"	Lights at RF Power Low.
"P"	Unused
"MON"	Lights at monitor ON.
"SVC"	Unlock
" 	Lights at FFSK 2400bps.

#### • LED indicator

Red LED	Lights during transmission. Blinks at the low battery voltage warning.
Green LED	Lights when there is a carrier.

#### • Sub LCD indicator

"FNC"	appears at Function ON.
-------	-------------------------

#### ■ Frequency and signalling

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.

#### Frequency (MHz) (K, E type)

Channel No.	RX frequency	TX frequency
1	233.05000	234.10000
2	217.05000	218.10000
3	249.95000	249.90000
4	227.00000	227.00000
5	227.20000	227.20000
6	227.40000	227.40000
7 ~ 16	—	—

#### Frequency (MHz) (M type)

Channel No.	RX frequency	TX frequency
1	255.05000	255.10000
2	240.05000	240.10000
3	269.95000	269.90000
4	260.00000	260.00000
5	260.20000	260.20000
6	260.40000	260.40000
7 ~ 16	—	—

#### Signalling

Signalling No.	RX	TX
1	None	None
2	None	100Hz Square wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 210.7Hz	QT 210.7Hz
6	QT 250.3Hz	QT 250.3Hz
7	DQT 023N	DQT 023N
8	DQT 754I	DQT 754I
9	None	DTMF tone 9
10	None	Single Tone 1600Hz (HSD OUT)
11	None	Single Tone 1200Hz (MODEM OUT)
12	None	Single Tone 1800Hz (MODEM OUT)
13	None	FFSK(PN pattern)
14	FFSK(CODE)	FFSK(CODE)

#### • Preparations for tuning the transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

When ever the transmitter is turned, the unit must be connected to a suitable dummy load (i.e. power meter).

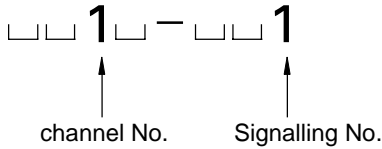
The speaker output connector must be terminated with a 16Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

## ADJUSTMENT

- **Transceiver tuning**  
(To place transceiver in tuning mode)

Channel appears on LCD. Set channel according to tuning requirements.

### LCD display (Test mode)



Press [A], now in tuning mode. Use [◀ C] button to write tuning data through tuning modes, and channel selector knob to adjust tuning requirements (1 to 256 appears on LCD).

Use [D ▶] button to select the adjustment item through tuning modes. Use [B] button to adjust 3 or 5 point tuning.

### LCD display (Tuning mode)



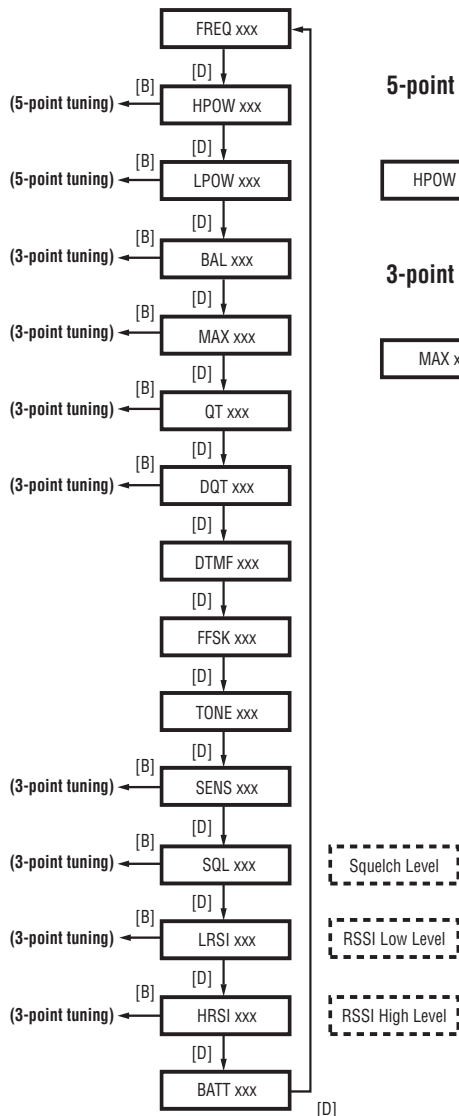
### Panel Tuning Mode (K, E type)

TEST Ch	RX frequency (MHz)	TX frequency (MHz)
L	217.05000	218.10000
L2	225.05000	226.10000
C	233.05000	234.10000
H2	241.05000	242.10000
H	249.95000	249.90000

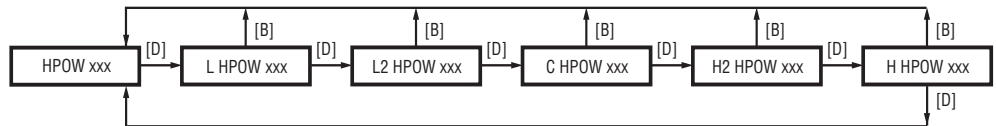
### Panel Tuning Mode(M type)

TEST Ch	RX frequency (MHz)	TX frequency (MHz)
L	240.05000	240.10000
L2	247.55000	247.60000
C	255.05000	255.10000
H2	262.55000	262.60000
H	269.95000	269.90000

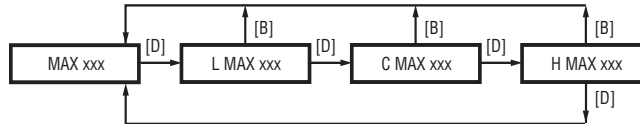
### ■ Tuning mode



### 5-point tuning ex. RF Power High



### 3-point tuning ex. Max Deviation



## ADJUSTMENT

### Common Section


Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage:7.5V 2) SSG Standard modulation MOD:1kHz, DEV:1.5kHz							
2. VCO lock voltage	<b>[Panel Test Mode]</b> 1) CH-Sig:2-1	Power meter DVM	Panel TX-RX	ANT CV (CN14)			Check	0.8V or more
RX	2) CH-Sig:3-1							4.4V or less
TX	3) CH-Sig:2-1 PTT:ON							0.8V or more
	4) CH-Sig:3-1 PTT:ON							4.4V or less

### Transmitter Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency Adjust	1) Adj item [FREQ] Adjust [***] PTT:ON	Power meter Am meter	Panel	ANT	Panel	Encoder knob	Center frequency ± 100Hz (Note:) After replacing the TCXO (X1), align using KPG-62D.	
2. Max Power Check	1) Adj item [HPOW] Adjust [256] 2) Adj item [L HPOW] → [L2 HPOW] → [C HPOW] → [H2 HPOW] → [H HPOW] Adjust [256] PTT:ON						Check	5.2W or more (L, H CH 4.9W)
3. High Power Adjust	1) Adj item [HPOW] Adjust [***] 2) Adj item [L HPOW] → [L2 HPOW] → [C HPOW] → [H2 HPOW] → [H HPOW] Adjust [***] PTT:ON					Encoder knob	5.0W	±0.1W 2.2A or less
4. High Power Check	<b>[Panel Test Mode]</b> 1) CH-Sig:1-1 PTT:ON 2) CH-Sig:2-1 PTT:ON 3) CH-Sig:3-1 PTT:ON						Check	4.8~5.2W 2.3A or less
5. Low Power Adjust	1) Adj item [LPOW] Adjust [***] 2) Adj item [L LPOW] → [L2 LPOW] → [C LPOW] → [H2 LPOW] → [H LPOW] Adjust [***] PTT:ON						0.8W	±0.1W 1.0A or less
6. Low Power Check	<b>[Panel Test Mode]</b> 1) CH-Sig:1-1 Set low power (Push [C]) PTT:ON 2) CH-Sig:2-1 PTT:ON 3) CH-Sig:3-1 PTT:ON						Check	0.5~1.5W 1.2A or less

## ADJUSTMENT

## Transmitter Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
7. DQT Balance Adjust	1) Adj item [BAL] Adjust [***] LPF:3kHz HPF:OFF 2) Adj item [L BAL] → [C BAL] → [H BAL] Adjust [***] PTT:ON	Power meter Dev meter Oscilloscope AG AF VTVM	Panel	ANT universal connector	Panel	Encoder knob	Make the demodulation waves into square waves.	
8. Max DEV Adjust	1) Adj item [MAX] Adjust [***] AG:1kHz / 80mV Dev meter filter LPF:15kHz HPF:OFF 2) Adj item [L MAX] → [C MAX] → [H MAX] Adjust [***] PTT:ON						1.85kHz (According to the larger +,-)	±50Hz
9. MIC Sensitivity Check	<b>[Panel Test Mode]</b> 1) CH-Sig:1-1 AG:1kHz / 8mV LPF:15kHz PTT:ON						Check	1.2~2.0kHz
10. QT Deviation Adjust	1) Adj item [QT] Adjust [***] LPF:3kHz HPF:OFF 2) Adj item [L QT] → [C QT] → [H QT] Adjust [***] PTT:ON		Panel	ANT universal connector	Panel	Encoder knob	0.35kHz	±50Hz
11. DQT Deviation Adjust	1) Adj item [DQT] Adjust [***] LPF:3kHz HPF:OFF 2) Adj item [L DQT] → [C DQT] → [H DQT] Adjust [***] PTT:ON							
12. DTMF Deviation Adjust	1) Adj item [DTMF] Adjust [***] LPF:15kHz HPF:OFF PTT:ON						1.45kHz	±0.05kHz
13. FFSK Deviation Adjust	1) Adj item [FFSK] Adjust [***] LPF:15kHz HPF:OFF PTT:ON						1.45kHz	±0.05kHz

## ADJUSTMENT

## Transmitter Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
14.TONE Deviation Adjust	1) Adj item [TONE] Adjust [***] LPF:15kHz HPF:OFF PTT:ON	Power meter Dev meter Oscilloscope AG AF VTVM	Panel	ANT universal connector	Panel	Encoder knob	1.45kHz	±0.05kHz
15.BATT Detection Writing	1) Adj item [BATT] Adjust [***] PTT:ON	Power meter DVM	Panel	ANT BATT terminal	Panel	Encoder knob	After pressing the PTT switch, confirm that one predeter- mined numeric in the range 1 to 256 appears and then press [C] key. That numeric will be stored in memory.	BATT terminal voltage:6.2V
16.BATT Detection Check	<b>[Panel Test Mode]</b> 1) CH-Sig:1-1 BATT terminal voltage:6.5V PTT:ON 2) BATT terminal voltage:5.7V PTT:ON						Check	No blinking of LED  Blinking of LED

## Receiver Section [Panel Tuning Mode except when Panel TEST Mode is specified.]

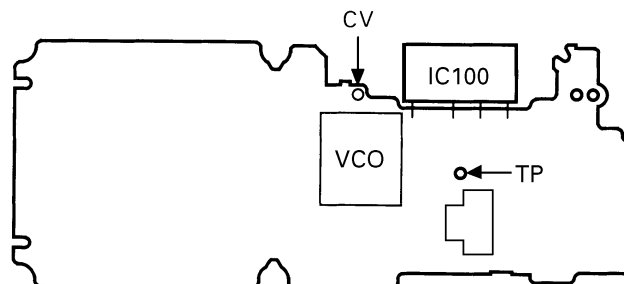
Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Sensitivity Adjust	1) Adj item [SENS] Adjust [***]  2) Adj item  [L SENS] → [C SENS] → [H SENS] Adjust [***] SSG OUT:-118dBm (0.28μV) MOD:1kHz / ±1.5kHz	SSG  AF VTVM Oscilloscope	Panel	ANT  Universal Connector	Panel	Encoder knob	Adjust for maximam SINAD.	14dB SINAD or more.
2. Sensitivity Check	<b>[Panel Test Mode]</b> 1) CH-Sig:1-1 SSG OUT -117dBm (0.316μV) (MOD:1kHz / ±1.5kHz)						Check	12dB SINAD or more
3. Squelch (Preset) Adjust	1) Adj item [SQL] Adjust [***] SSG OUT: 12dB SINAD level +2dB 2) Adj item [L SQL] → [C SQL] → [H SQL] Adjust [***]						Adjust to point of opening squelch.	

## ADJUSTMENT

**Receiver Section** [Panel Tuning Mode except when Panel TEST Mode is specified.]

Item	Condition	Measurement			Adjustment			Specifications/ Remark
		Test equipment	Unit	Terminal	Unit	Parts	Method	
4. RSSI (Low) Adjust	1) Adj item [LRSI] Adjust [***] SSG OUT: 12dB SINAD level	SSG	Panel	ANT	Panel	Encoder knob	After input signal from SSG,press [D] key. That numeric will be stored in memory.	
	2) Adj item  [L LRSI] → [C LRSI] → [H LRSI] Adjust [***]							
5. Squelch (Preset) Check	<b>[Panel Test Mode]</b> 1) CH-Sig:1-1 SSG OUT: 12dB SINAD level						Check	Squelch must be opened.
	2) SSG OUT:OFF							Squelch must be closed.
6. RSSI (High) Adjust	1) Adj item [HRSI] Adjust [***] SSG OUT: -70dBm (70.7μV)						After input signal from SSG,press [D] key. That numeric will be stored in memory.	
	2) Adj item  [L HRSI] → [C HRSI] → [H HRSI] Adjust [***]							

**Adjustment points**  
TX-RX unit (X57-619X-XX)  
component side view



## TERMINAL FUNCTION

CN No.	Pin No.	Name	I/O	Function
<b>TX-RX UNIT (X57-619X-XX): TX-RX section</b>				
CN1	1	B	O	Power input after passing through the fuse.
	2	B	O	Power input after passing through the fuse.
	3	SB	I	Power output after power switch.
	4	SB	I	Power output after power switch.
	5	5M	O	5V.
	6	VOL	I	Volume level input for audio control.
	7	E	-	GND
	8	EN2	I	Encoder pulse input.
	9	E	-	GND
	10	EN1	I	Encoder pulse input.
CN2 for X54-SW section	1	MON	I	Normally; 5V. MON when connected GND.
	2	LAMP	I	Normally; 5V. LAMP when connected GND.
	3	PTT	I	Normally; 5V. transmit when connected GND.
	4	GND	-	GND
CN3 for X54-Display unit	1	AF	O	Audio output.
	2	AFE	-	Audio GND.
	3	NC	-	Not use.
	4	PF	I	External PF signal input.
	5	CK	O	Clock data output.
	6	RXD	I	Serial control signal input.
	7	TXD	O	Serial control signal output.
	8	DT	O	Data output for LCD driver/decade counter.
	9	KRS	O	Key scan IC reset output.
	10	KI1	I	KEY input
	11	KI2	I	KEY input
	12	GND	-	GND
	13	5M	O	5V.
	14	AM	O	Audio mute signal output. Mute: "L". Unmute: "H"
	15	CS	O	LCD driver chip select output.
	16	NC	-	Not use.
	17	PTT	I	PTT signal input.
	18	AUX	I	AUX key input.
	19	LR	O	TX LED control. Normally: 0V, lighting: 5V.
	20	LG	O	RX LED control. Normally: 0V, lighting: 5V.
	21	LBL	O	Backlight LED control. Normally: 0V, lighting: 5V.
	22	ME	-	MIC GND.
	23	MIC	I	MIC signal input.
	24	SB	O	Power output after power switch.
<b>DISPLAY UNIT (X54-3210-13 A/2) : DISPLAY section</b>				
CN300 for X57-TX-RX unit	1	SB	I	Power input after power switch.
	2	MIC	O	MIC signal output.
	3	ME	-	MIC GND.
	4	LBL	I	Backlight LED control. Normally: 0V, lighting: 5V.
	5	LG	I	RX LED control. Normally: 0V, lighting: 5V.
	6	LR	I	TX LED control. Normally: 0V, lighting: 5V.
	7	AUX	O	AUX key output.

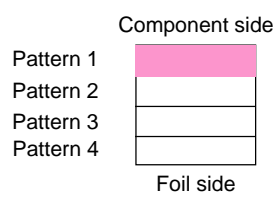
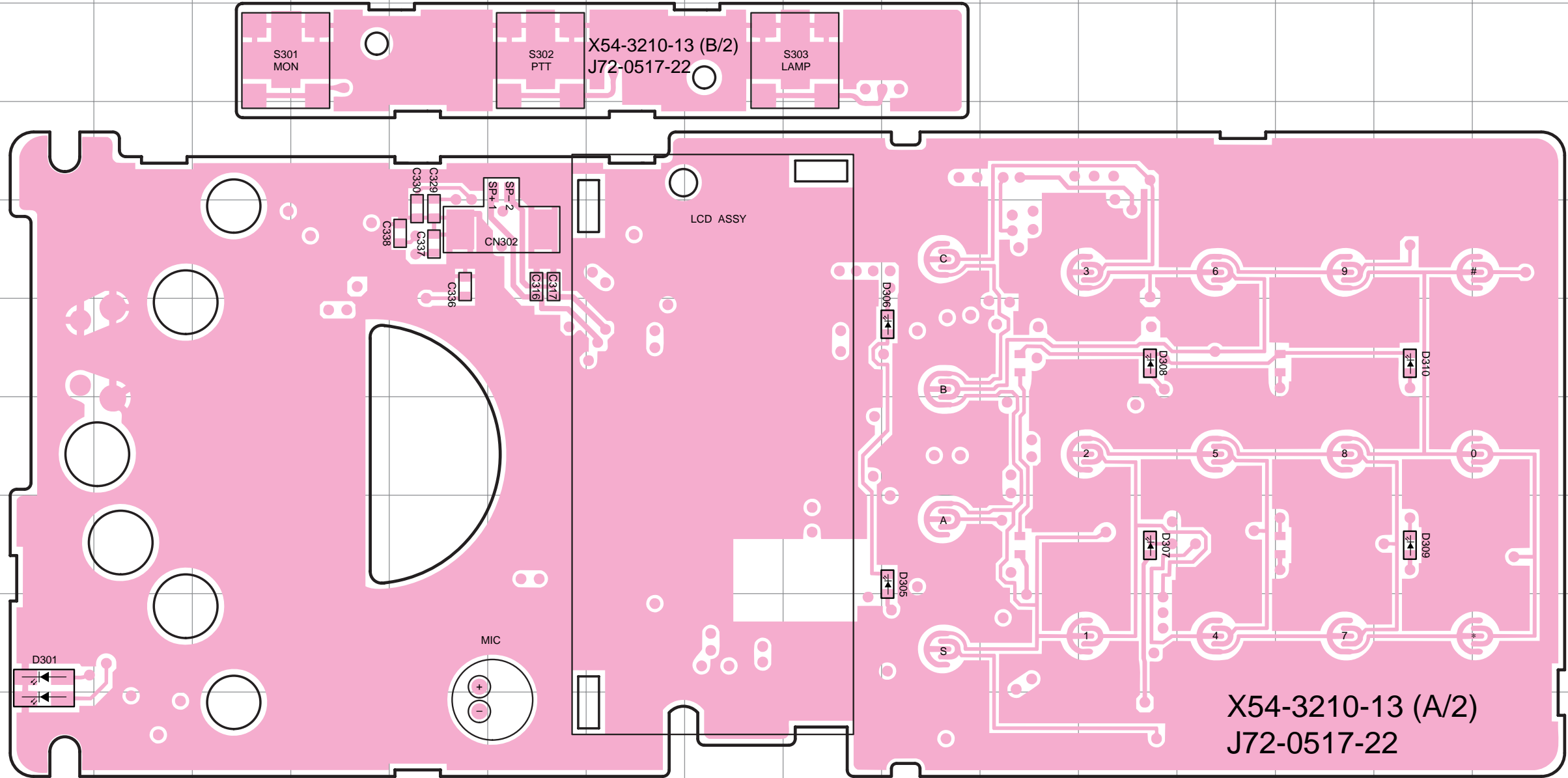
CN No.	Pin No.	Name	I/O	Function	
	8	PTT	O	PTT signal output.	
	9	NC	-	Not use.	
	10	CS	I	LCD driver chip select input.	
	11	AM	I	Audio mute signal input. Mute: "L", Unmute: "H"	
	12	5M	I	5V.	
	13	GND	-	GND	
	14	KI2	O	KEY output	
	15	KI1	O	KEY output	
	16	KRS	I	Key scan IC reset input	
	17	DT	I	Data input for LCD driver/decade counter.	
	18	TXD	I	Serial control signal input.	
	19	RXD	O	Serial control signal output.	
	20	CK	I	Clock data input.	
	21	PF	O	External PF signal output.	
	22	NC	-	Not use.	
	23	AFE	-	Audio GND.	
	24	AF	I	Audio input.	
	CN301	1	SSW	I	EXT/INT speaker switch input.
		2	SP+	O	BTL output + for external speaker.
		3	SP-	O	BTL output - for external speaker.
		4	MSW	I	EXT/INT MIC switch input.
		5	EMC	I	External microphone input.
		6	ME	-	External microphone ground.
		7	PTT	I	External PTT input.
8		PF	I	Programmable function key input.	
9		NC	-	Not use.	
10		E	-	GND	
11		5M	O	5V output	
12		TXD	O	Serial data output.	
13		RXD	I	Serial data input.	
14		NC (E)	-	Not use (GND)	
CN302	1	SP	O	Output for internal speaker.	
	2	E	-	GND	
CN304	1	NC	-	Not use.	
	2	LEDK	I	Backlight LED control.	
	3	LEDA	O	Backlight LED control.	
	4	VCI	O	LCD power supply.	
	5	SOD	O	Serial data output for LCD driver.	
	6	SID	I	Serial data input for LCD driver.	
	7	SCLK	O	Clock data output for LCD driver.	
	8	CS	O	LCD driver chip select output.	
	9	Vcc	O	5V	
	10	GND	-	GND	
<b>DISPLAY UNIT (X54-3210-13 B/2) : SW section</b>					
CN303 For X57-TX-RX unit	1	MON	O	Normally; 5V.,MON when connected GND.	
	2	LAMP	O	Normally; 5V, LAMP when connected GND.	
	3	PTT	O	Normally; 5V, transmit when connected GND.	
	4	GND	-	GND	



DISPLAY UNIT (X54-3210-13) Component Side View

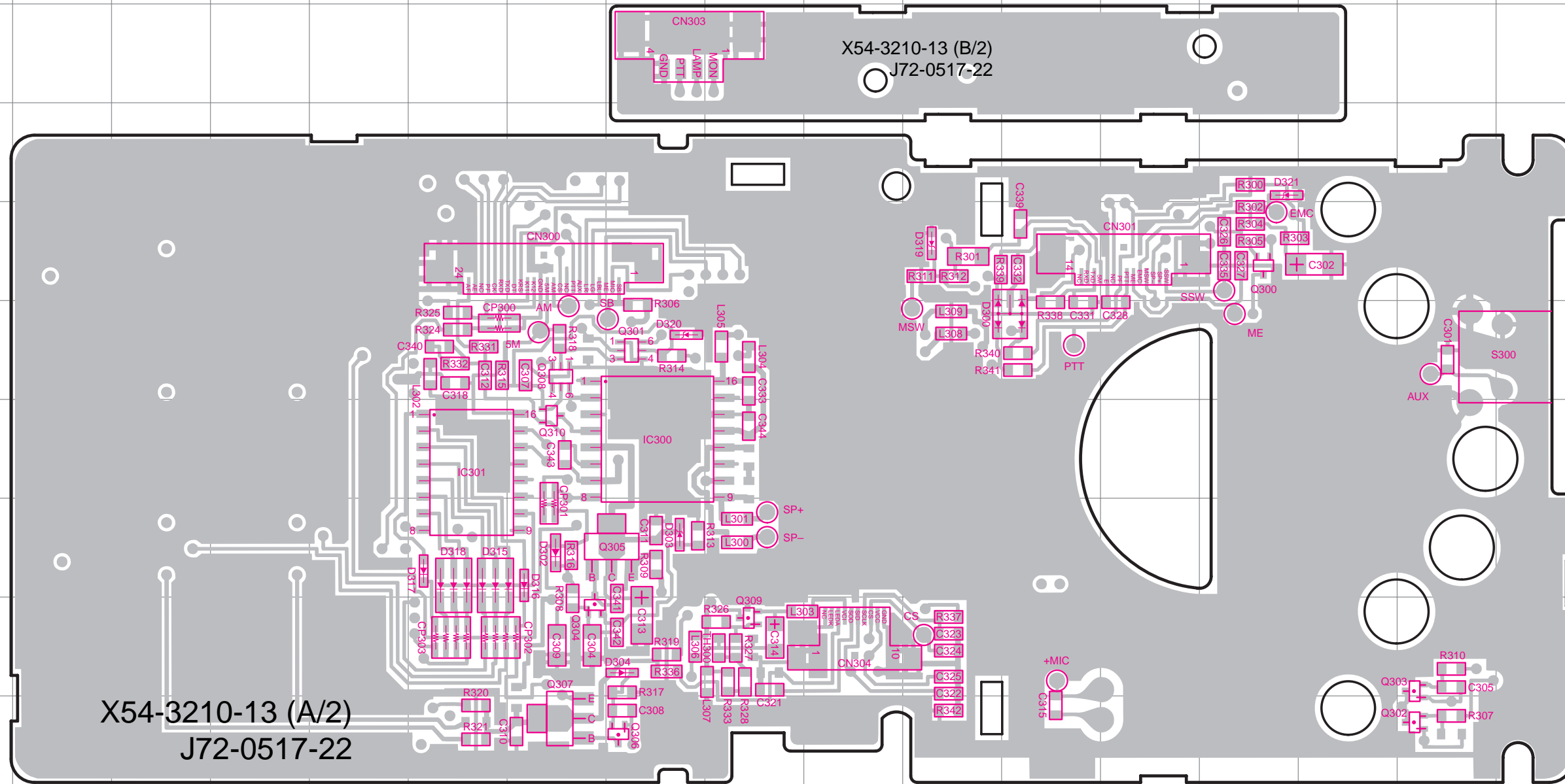
DISPLAY UNIT (X54-3210-13)

Ref. No.	Address
D301	9C
D305	8L
D306	6L
D307	8N
D308	6N
D309	8Q
D310	6Q



# TK-285/(N) PC BOARD VIEW

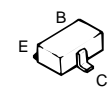
DISPLAY UNIT (X54-3210-13) Foil Side View



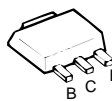
DISPLAY UNIT (X54-3210-13)

Ref. No.	Address
D300	6L
D302	8G
D303	8H
D304	9H
D315	8F
D316	8G
D317	8F
D318	8F
D319	5K
D320	6H
D321	4N
IC300	7H
IC301	7F
Q300	5N
Q301	6H
Q302	10P
Q303	9P
Q304	9G
Q305	8H
Q306	10H
Q307	10G
Q308	6G
Q309	9I
Q310	7G

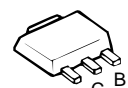
2SC4617



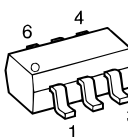
2SB1132



2SB798



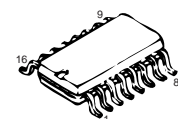
UPA672T



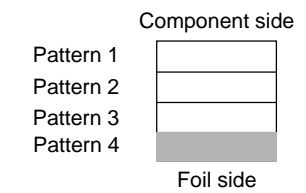
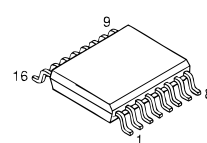
2SJ243  
2SK1824



TDA7053AT



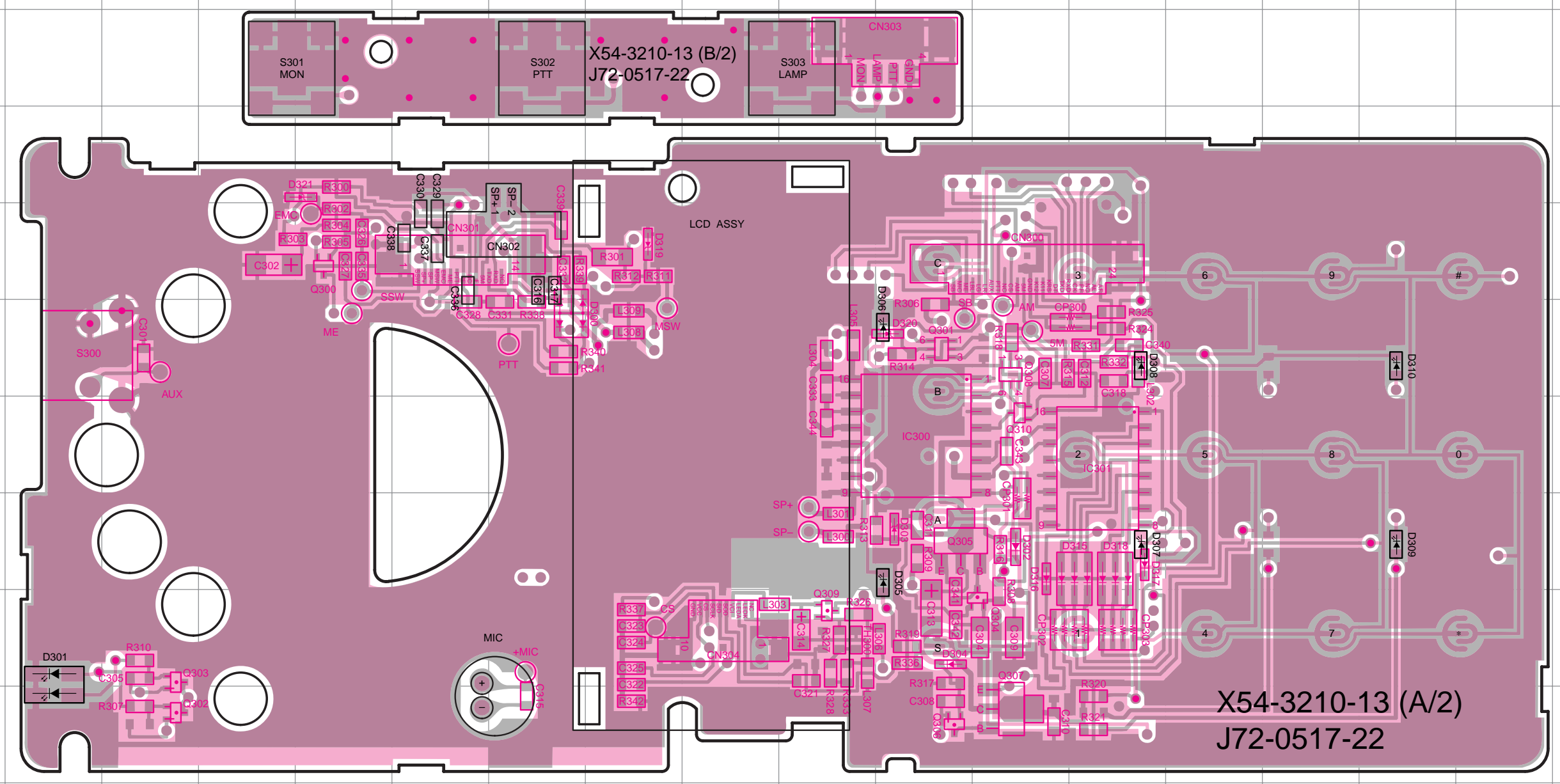
MC74HC4017F



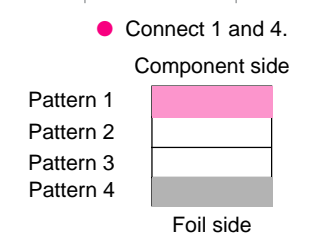
## DISPLAY UNIT (X54-3210-13) Component Side + Foil Side View

### DISPLAY UNIT (X54-3210-13)

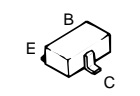
Ref. No.	Address
D300	6H
D301	9C
D302	8M
D303	8L
D304	9L
D305	8L
D306	6L
D307	8N
D308	6N
D309	8Q
D310	6Q
D315	8N
D316	8M
D317	8N
D318	8N
D319	5I
D320	6L
D321	4F
IC300	7L
IC301	7N
Q300	5F
Q301	6L
Q302	10D
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Q305	8L
Q306	10L
Q307	10M
Q308	6M
Q309	9K
Q310	7M



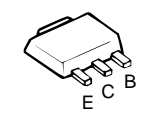
X54-3210-13 (A/2)  
J72-0517-22



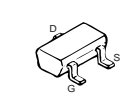
2SC4617



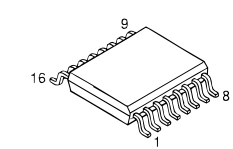
2SB798



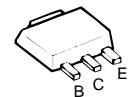
2SJ243  
2SK1824



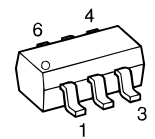
MC74HC4017F



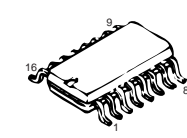
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UPA672T

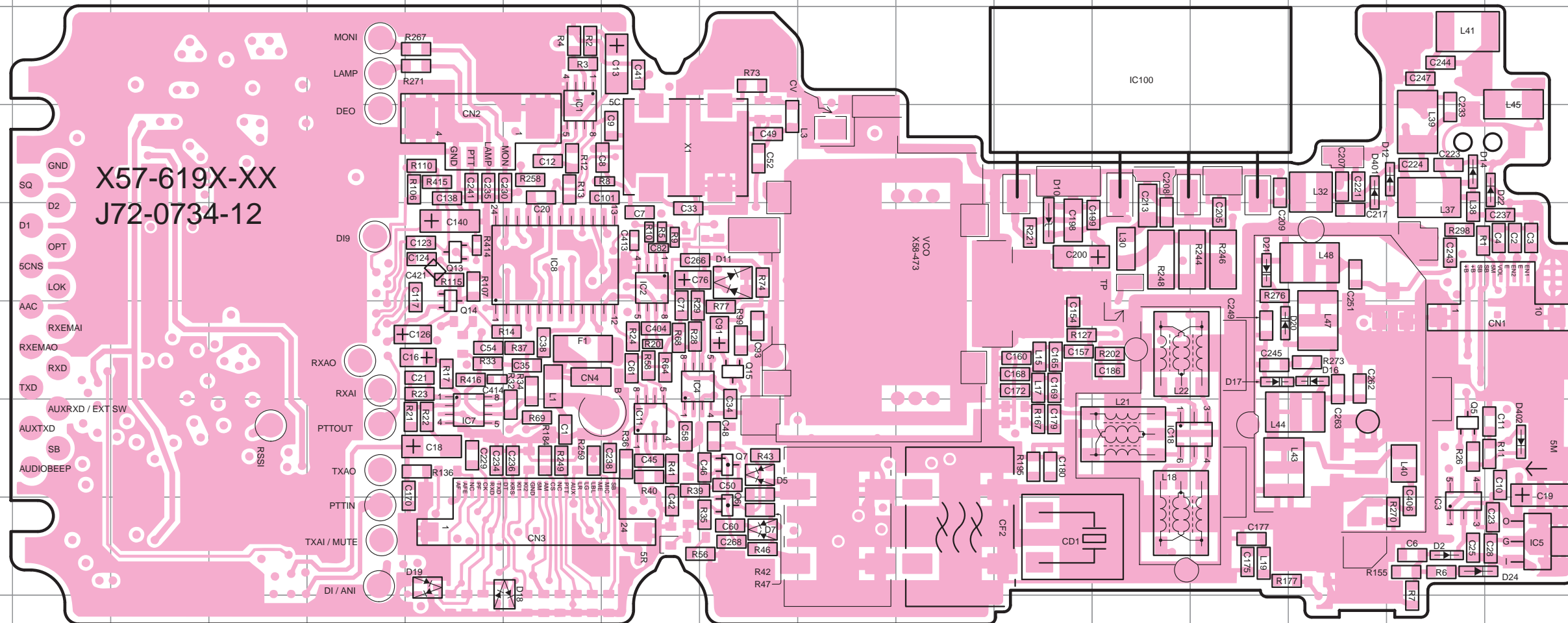


TDA7053AT



# TK-285/(N) PC BOARD VIEW

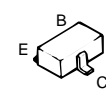
TX-RX UNIT (X57-619X-XX) Component Side View  
0-11: K, E, 0-21: (N)M



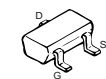
TX-RX UNIT (X57-619X-XX)

Ref. No.	Address
D2	8P
D5	7I
D7	8I
D10	5L
D11	5I
D12	4P
D14	4P
D16	6O
D17	6N
D18	9G
D19	8F
D20	6N
D21	5N
D22	4Q
D24	8Q
D401	4O
D402	7Q
IC1	4G
IC2	5H
IC3	8P
IC4	6I
IC5	8Q
IC7	7F
IC8	5G
IC11	7H
IC18	7N
Q5	7P
Q6	8I
Q7	7I
Q13	5F
Q14	6F
Q15	6I

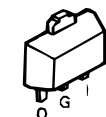
DTA144EE  
DTC144EE



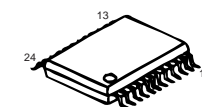
2SJ243  
2SK1824



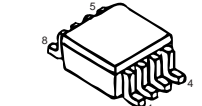
S-81350HG-KD



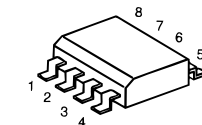
M62364FP



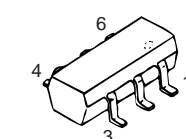
TC75W51FU



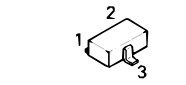
RN5VL42C



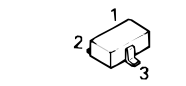
GN2011



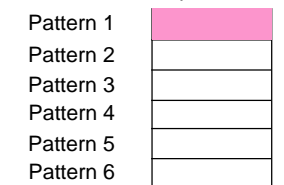
DA221



MA742



Component side



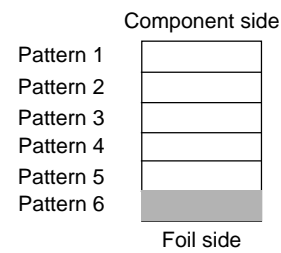
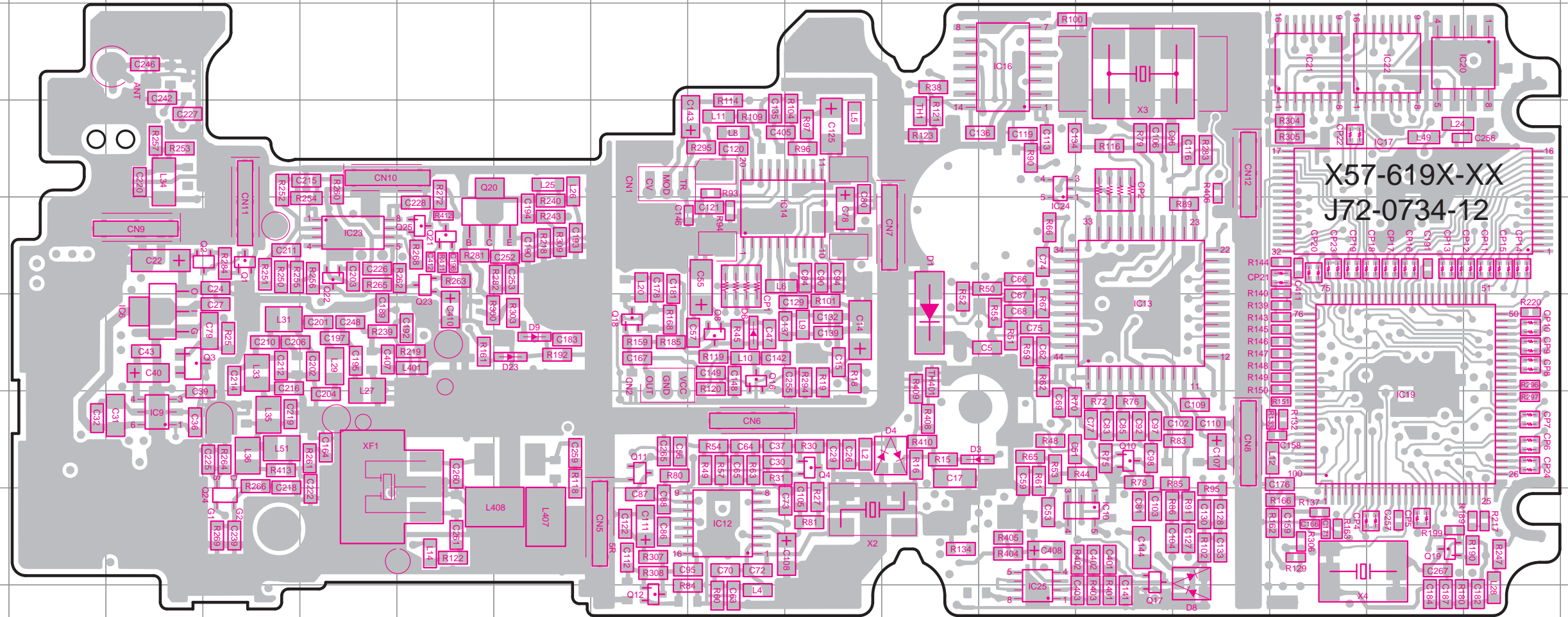
Foil side

# PC BOARD VIEW TK-285/(N)

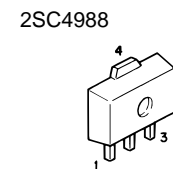
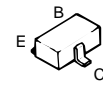
## TX-RX UNIT (X57-619X-XX) Foil Side View 0-11: K, E, 0-21: (N)M

### TX-RX UNIT (X57-619X-XX)

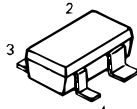
Ref. No.	Address
D1	6L
D3	7M
D4	7L
D6	6J
D8	8O
D9	6H
D23	6H
IC6	6D
IC9	7D
IC10	8N
IC12	8J
IC13	6N
IC14	5K
IC16	3M
IC17	4Q
IC19	7Q
IC20	3Q
IC21	3P
IC22	3Q
IC23	5F
IC24	4M
IC25	9M
Q1	5E
Q2	5D
Q3	6D
Q4	7K
Q8	6J
Q10	7N
Q11	7I
Q12	9I
Q16	6J
Q17	9N
Q18	6I
Q19	8Q
Q20	5G
Q21	5G
Q22	5F
Q23	5G
Q24	8E
Q25	5G



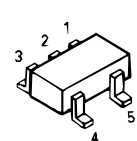
DTA144EE  
DTC114EE  
DTC144EE  
2SA1745  
2SC4617  
2SC4619  
2SC5108



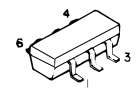
3SK239A



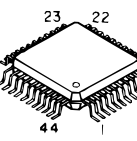
TC75S51F  
TC7S66FU



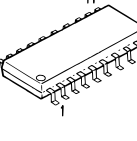
TK11250BM



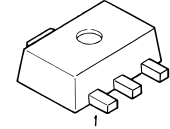
TC35453F



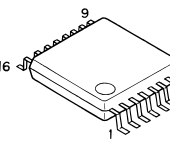
SA7025DK



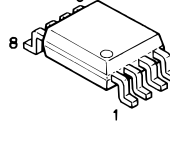
NJU7201U50



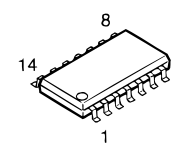
BU4094BCFV



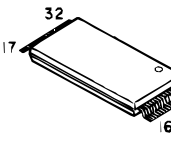
NJM2904V



LC73872M

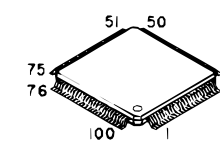


AT29C020-90TI

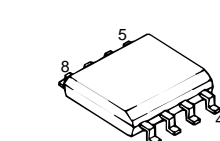


TA31136FN

30620M8-394GP



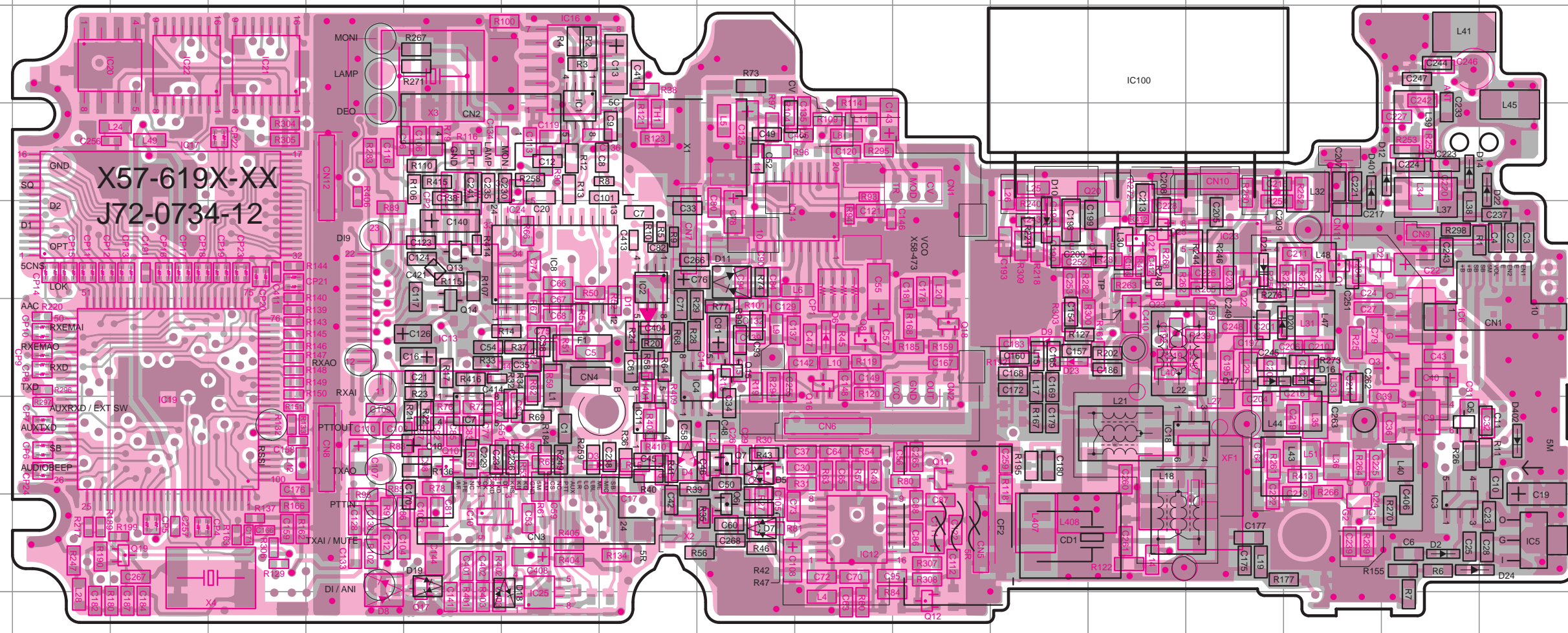
AT2416N10SI2.5



TA31136FN

# TK-285/(N) PC BOARD VIEW

TX-RX UNIT (X57-619X-XX) Component Side + Foil Side View  
0-11: K, E, 0-21: (N)M



## TX-RX UNIT (X57-619X-XX)

Ref. No.	Address
D1	6H
D2	8P
D3	7G
D4	7I
D5	7I
D6	6J
D7	8I
D8	8F
D9	6L
D10	5L
D11	5I
D12	4P
D14	4P
D16	6O
D17	6N
D18	9G
D19	8F
D20	6N
D21	5N
D22	4Q
D23	6L
D24	8Q
D401	4O
D402	7Q
IC1	4G
IC2	5H
IC3	8P
IC4	6I
IC5	8Q
IC6	6P
IC7	7F
IC8	5G
IC9	6P
IC10	6F
IC11	7H
IC12	8J
IC13	6F
IC14	6I
IC16	6G
IC17	4C
IC18	7N
IC19	7C
IC20	3C
IC21	6D
IC22	3C
IC23	5N
IC24	4G
IC25	9G
Q1	5O
Q2	5O
Q3	6P
Q4	7I
Q5	7P
Q6	8I
Q7	7I
Q8	5J
Q9	5I
Q10	7F
Q11	7K
Q12	9K
Q13	5F
Q14	5F
Q15	6I
Q16	6J
Q17	6F
Q18	6K
Q19	6C
Q20	5M
Q21	5M
Q22	5N
Q23	5M
Q24	8O
Q25	5N

DTA144EE  
DTC114EE  
DTC144EE  
2SA1745  
2SC4617  
2SC4619  
2SC5108

2SJ243  
2SK1824

TK11250BM

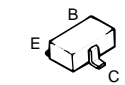
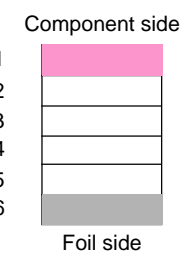
SA7025DK

NJM2904V

RN5VL42C

TA31136FN

● Connect 1 and 6.



TC75S51F  
TC7566FU

AT29C020-90T1

NJU7201U50

M62364FP

LC73872M

30620M8-394GP

DA221

2SC4988

S-81350HG-KD

TC35453F

BU4094BCFV

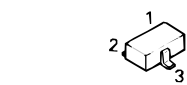
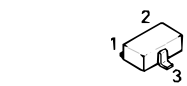
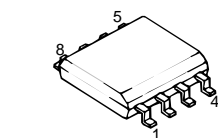
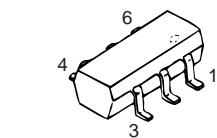
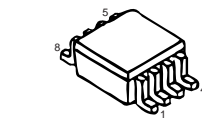
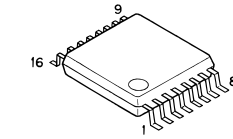
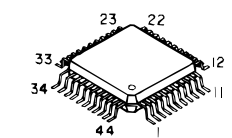
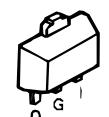
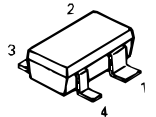
TC75W51FU

GN2011

AT2416N10SI2.5

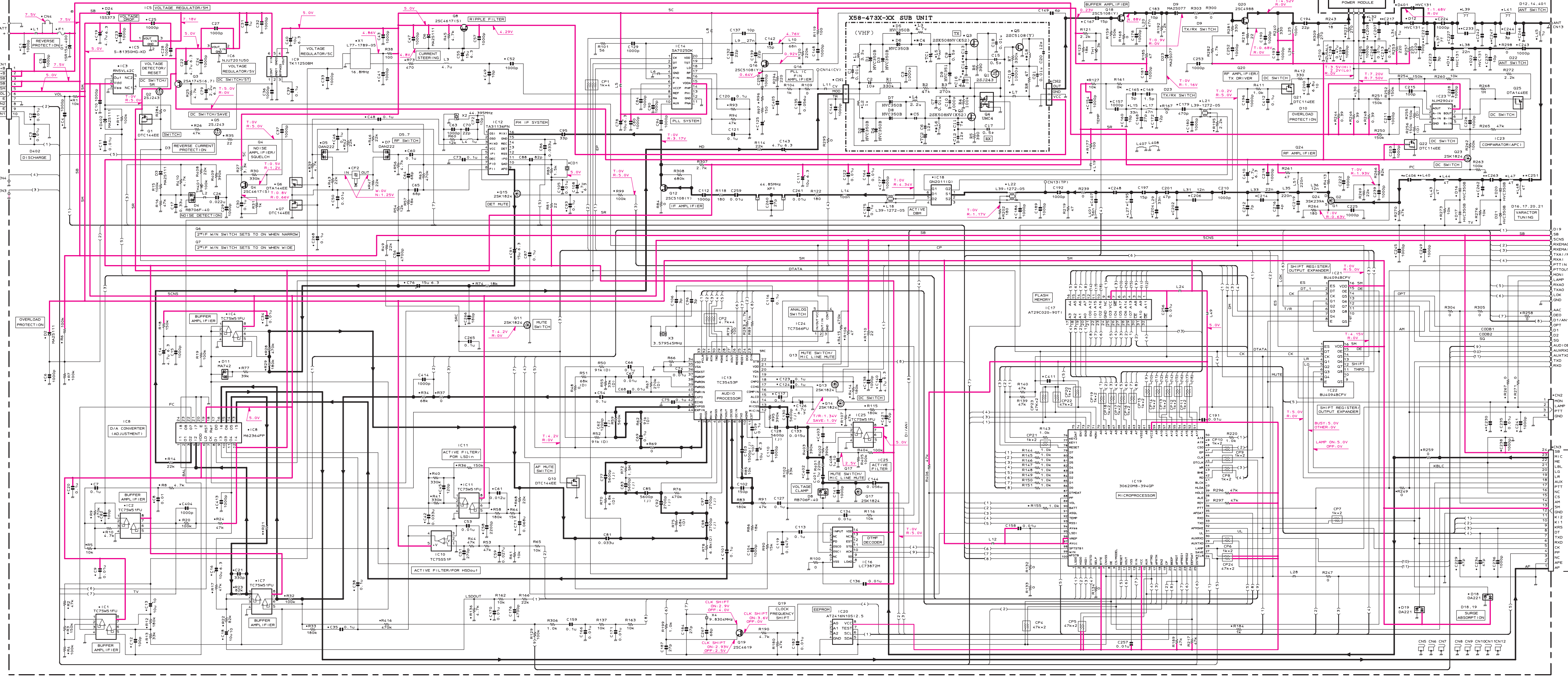
MA742

3SK239A

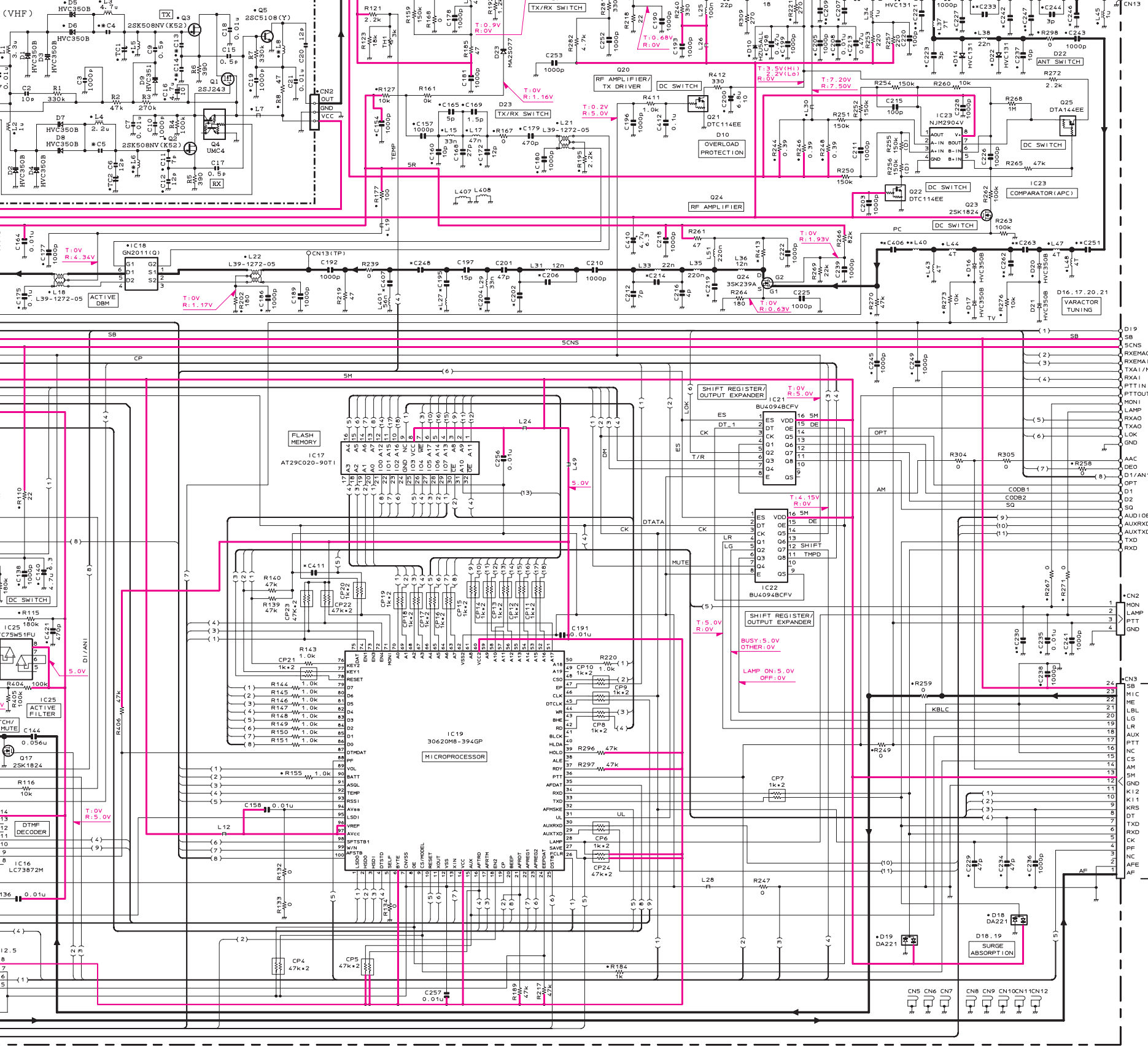


# SCHEMATIC DIAGRAM TK-285/(N)

## X57-619X-XX TX-RX UNIT



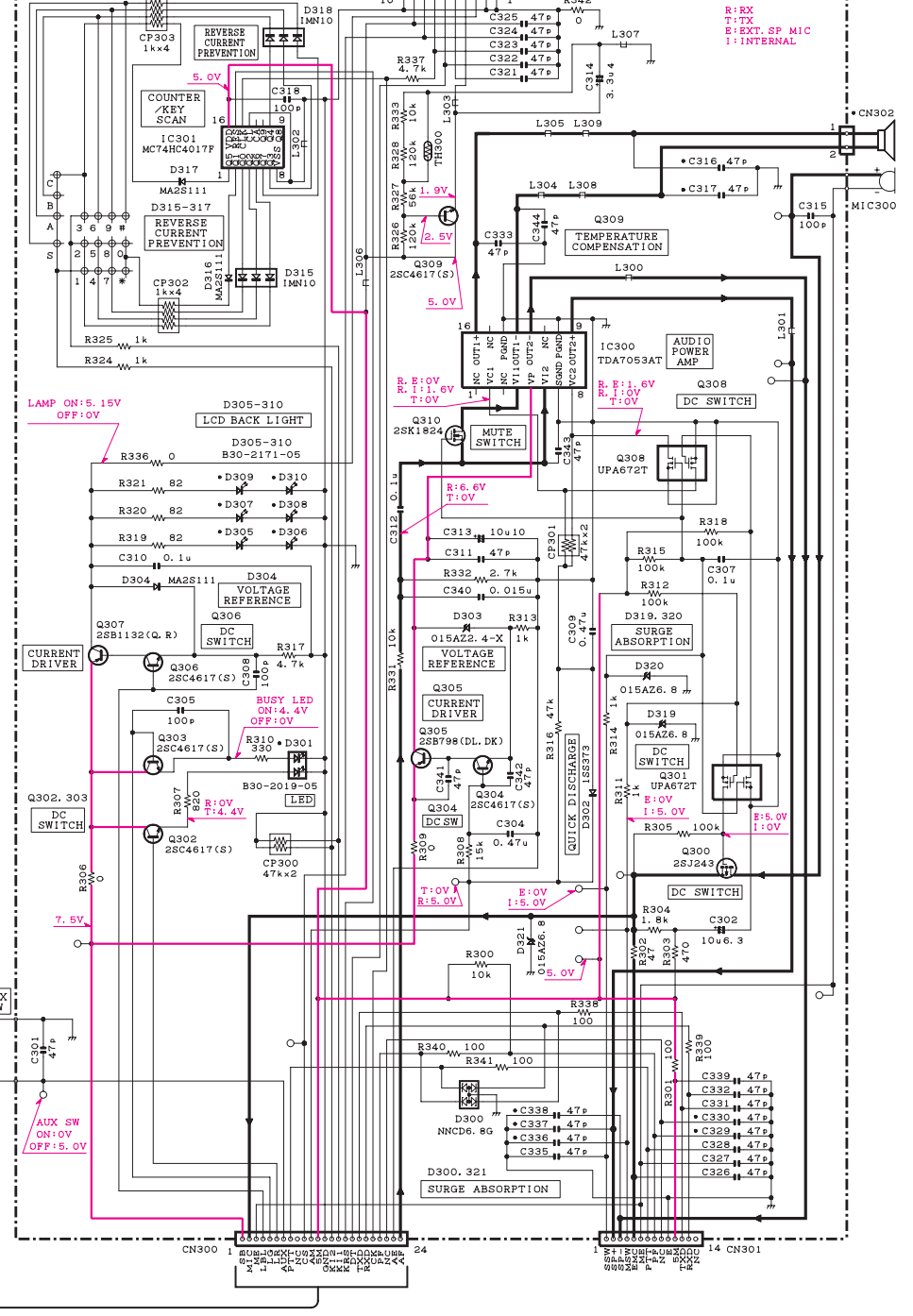
## X58-473X-XX SUB UNIT



## X54-3210-13 B/2 SWITCH SECTION



## X54-3210-13 A/2 DISPLAY UNIT

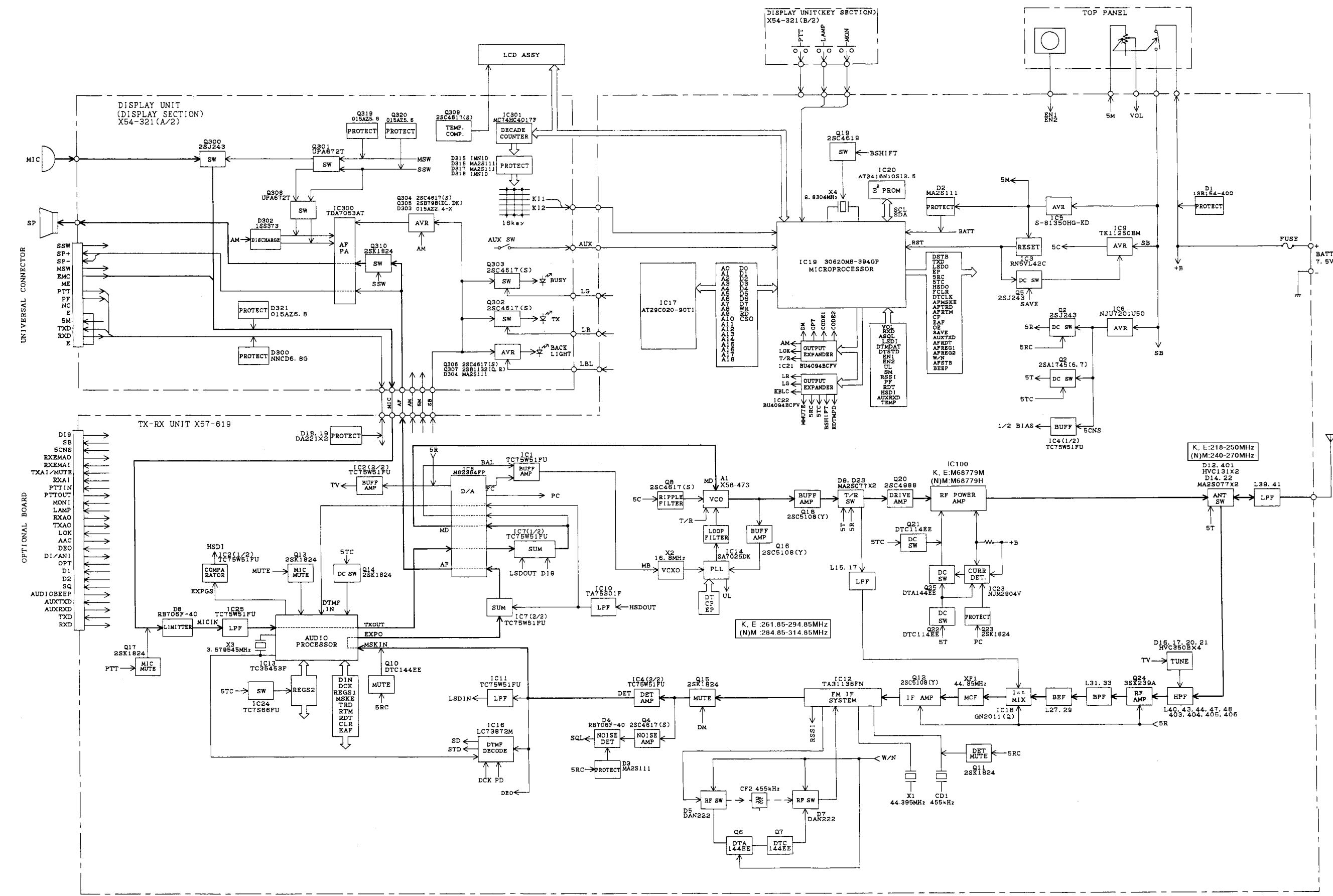


X57-619X-XX	C125	C195	C202	C204	C206	C207	C209	C214	C217	C219	C221	C227	C230	C233	C242	C246	C247	C248	C251	C262	C263	C402	C403	C405	C406	C407	C411	R21	R93	R96	R413	L27	L40
0-11	K.E	1u	25	16p	15p	33p	22p	4p	1p	13p	18p	0.75p	3p	10p	NO	4.5p	10p	10p	9p	27p	1000p	68k	5.6k	1.2k	470	47n	47n	47n	47n	47n	47n		
0-21	NM	0.47u	25	16p	15p	33p	22p	4p	1p	13p	18p	0.75p	3p	10p	NO	4.5p	10p	10p	9p	27p	1000p	68k	5.6k	1.2k	470	47n	47n	47n	47n	47n	47n		

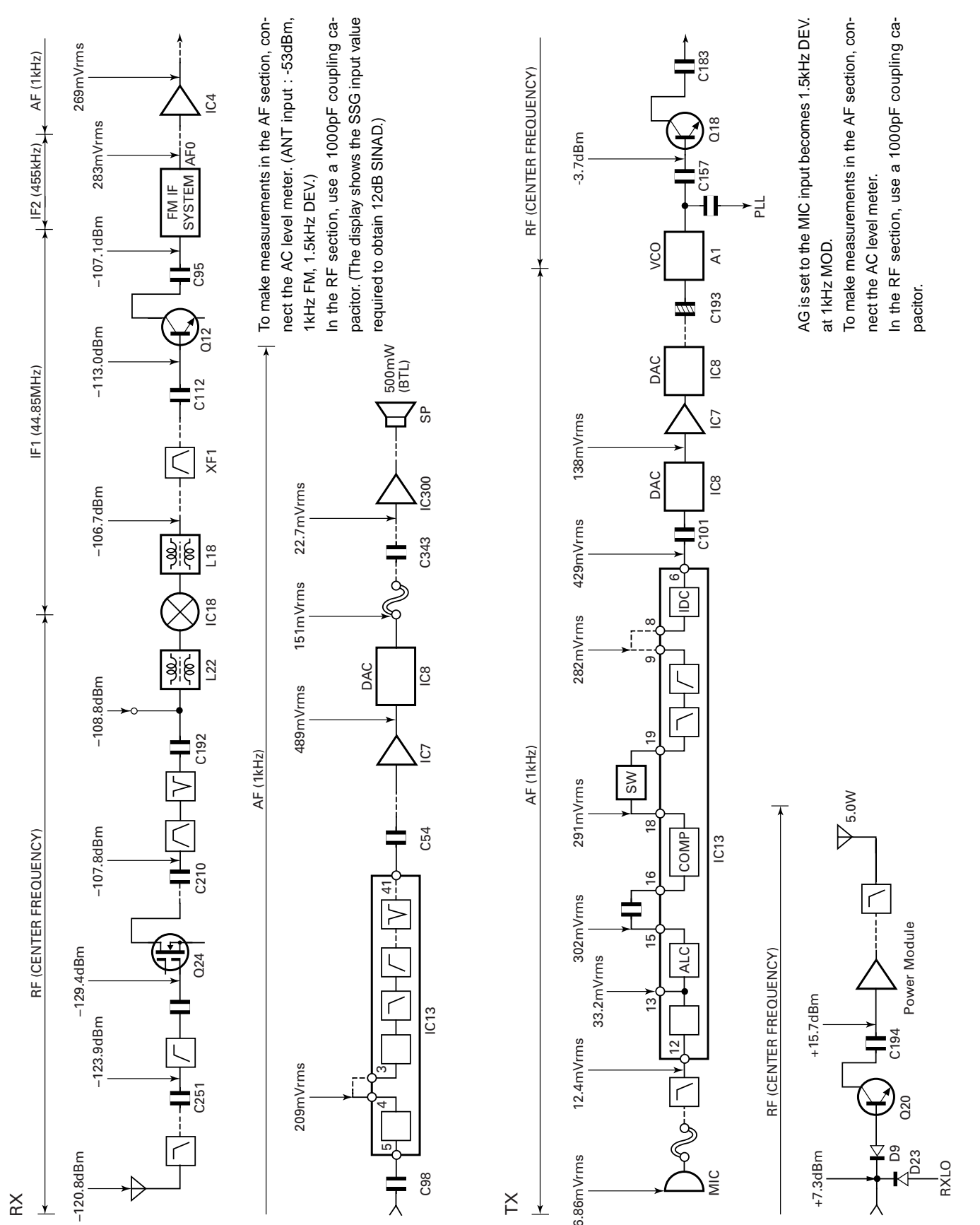
Note: Component marked with a dot (●) are parts of pattern 1.

# TK-285/(N) TK-285/(N)

## BLOCK DIAGRAM



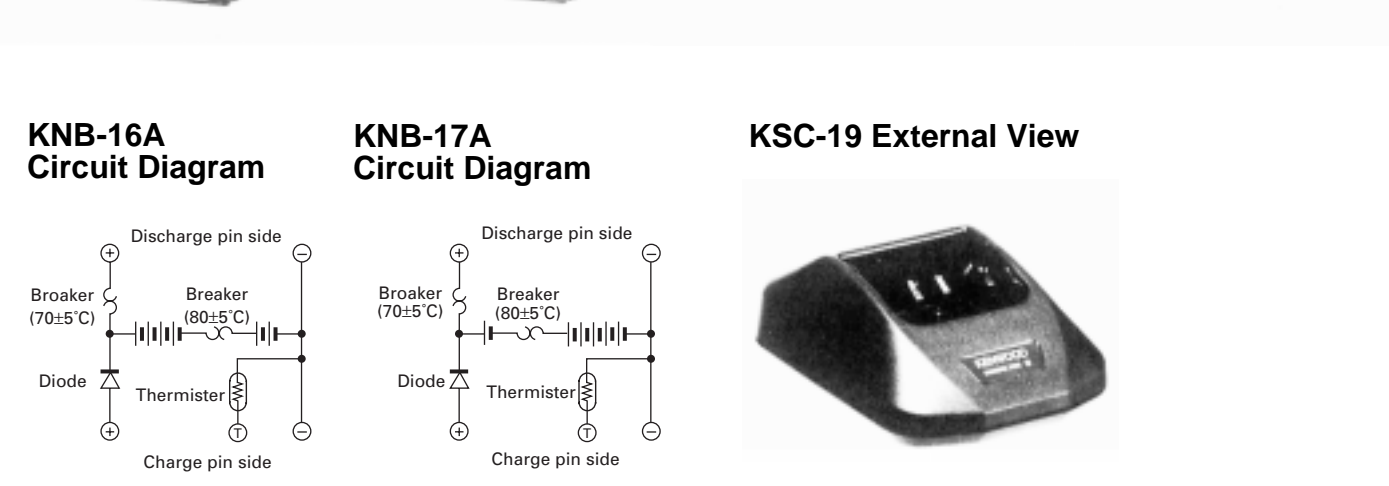
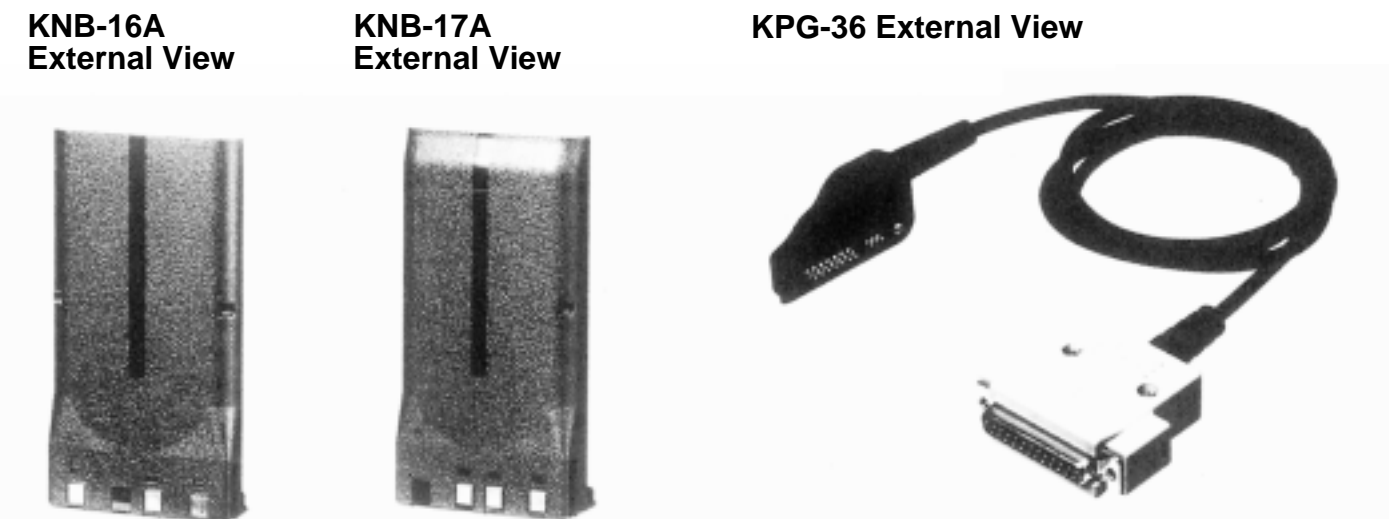
## LEVEL DIAGRAM



# TK-285/(N)

# TK-285/(N)

## KNB-16A/17A (Ni-Cd BATTERY) / KPG-36 (PROGRAMMING INTERFACE CABLE) / KSC-19 (CHARGER)



### KNB-16A Specifications

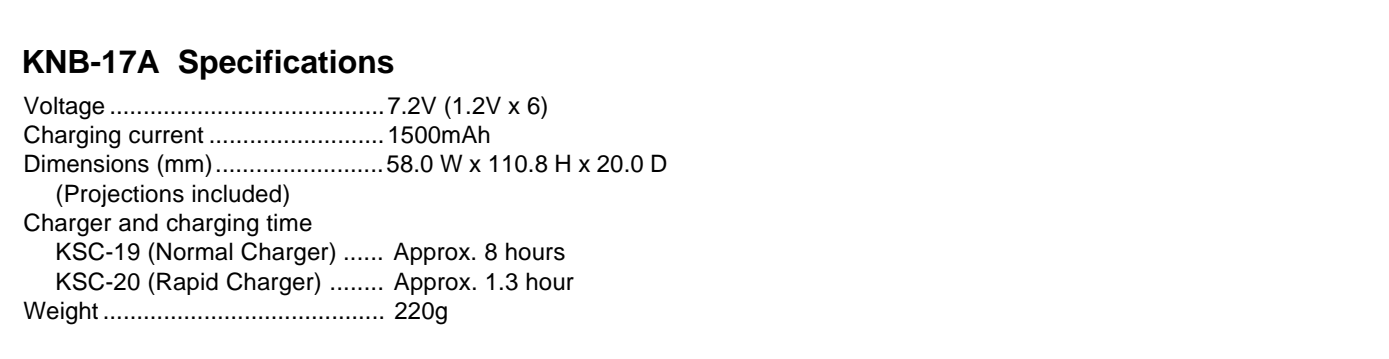
Voltage	7.2V (1.2V x 6)
Charging current	1100mAh
Dimensions (mm)	58 W x 110.8 H x 17.2 D (Projections included)
Charger and charging time	
KSC-19 (Normal Charger)	Approx. 8 hours
KSC-20 (Rapid Charger)	Approx. 1 hour
Weight	180g

### KNB-17A Specifications

Voltage	7.2V (1.2V x 6)
Charging current	1500mAh
Dimensions (mm)	58.0 W x 110.8 H x 20.0 D (Projections included)
Charger and charging time	
KSC-19 (Normal Charger)	Approx. 8 hours
KSC-20 (Rapid Charger)	Approx. 1.3 hour
Weight	220g

### KSC-19 Charging

KNB-16A	
Voltage	7.2V
Battery capacity	1100mAh
Charging time	Approx. 8 hours
KNB-17A	
Voltage	7.2V
Battery capacity	1500mAh
Charging time	Approx. 8 hours



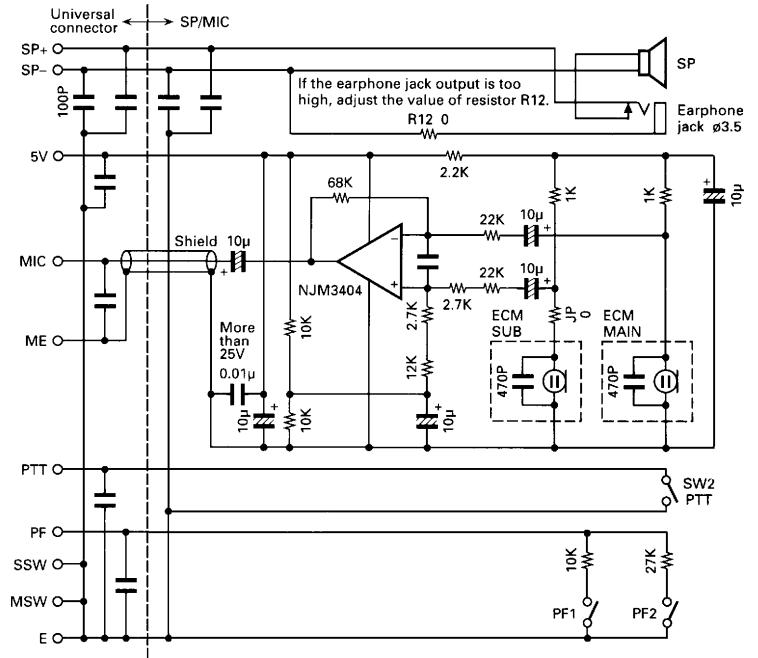


## KMC-25 (SPEAKER MICROPHONE)

### External View



### Circuit Diagram



### Specifications

- Microphone
  - Impedance ..... 2k $\Omega$
  - Sensitivity ..... -65dB $\pm$ 4.0dB at 1kHz
- Speaker
  - Impedance ..... 16 $\Omega$
  - Input ..... 0.5W
  - Maximum input ..... 1.5W
- Dimensions ..... 62W x 81 H x 29 D (mm)
- Weight (With plug cord) ..... Approx. 0.17kg

# TK-285/(N)

## SPECIFICATIONS

### General

Frequency Range	
RX, TX.....	K, E : 217 to 250MHz (RX) 218 to 250MHz (TX) (N)M : 240 to 270MHz (TX, RX)
Channel Spacing .....	12.5kHz (PLL channel stepping, 6.25kHz)
Battery Voltage .....	DC 7.5V $\pm$ 20%
Battery Life (Conventional Mode).....	More than 8 hours at 5-5-90 duty cycle with KNB-16A battery More than 10 hours at 5-5-90 duty cycle with KNB-17A battery
Temperature Range .....	-30°C to +60°C (-22°F to + 140°F)
Dimension and Weight	
With KNB-16A (1100mAh battery) .....	5.33" (135mm) H x 2.29" (58mm) W x 1.34" (34mm) D 1.01lbs (460g)
(Dimensions not including Protrusions, Weight includes antenna and belt hook)	

### Receiver (Measurements made per TIA/EIA-603, ETS)

RF Input Impedance .....	50 $\Omega$
Sensitivity	
12dB SINAD .....	0.28 $\mu$ V
Selectivity .....	63dB (EIA), 63dB (ETS)
Intermodulation .....	65dB (EIA), 65dB (ETS)
Spurious (Except for IF 1/2) .....	70dB
Frequency Stability .....	$\pm$ 0.00025% (-30°C to +60°C)
Channel Spread .....	33MHz : K, E 30MHz : (N)M
Audio Power Output .....	500mW at 16 $\Omega$ less than 5% distortion

### Transmitter (Measurements made per TIA/EIA-603,ETS)

RF Power Output	
Hi .....	5W
Low .....	1W
RF Output Impedance .....	50 $\Omega$
Spurious .....	-70dB (EIA), -36dBm $\leq$ 1GHz, -30dBm >1GHz (ETS)
Modulation .....	8K50F3E, 7K50F2D (E, (N)M) 11K0F3E, 10K5F2D (K)
FM Noise .....	-40dB
Audio Distortion .....	Less than 3%
Frequency Stability .....	$\pm$ 0.00025% (-30°C to +60°C)
Channel Spread .....	32MHz : K, E 30MHz : (N)M

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