144/430(440)MHz FM DUAL BANDER

TH-G71A/E

SERVICE MANUAL

KENWOOD

B51-8406-00(B) 940

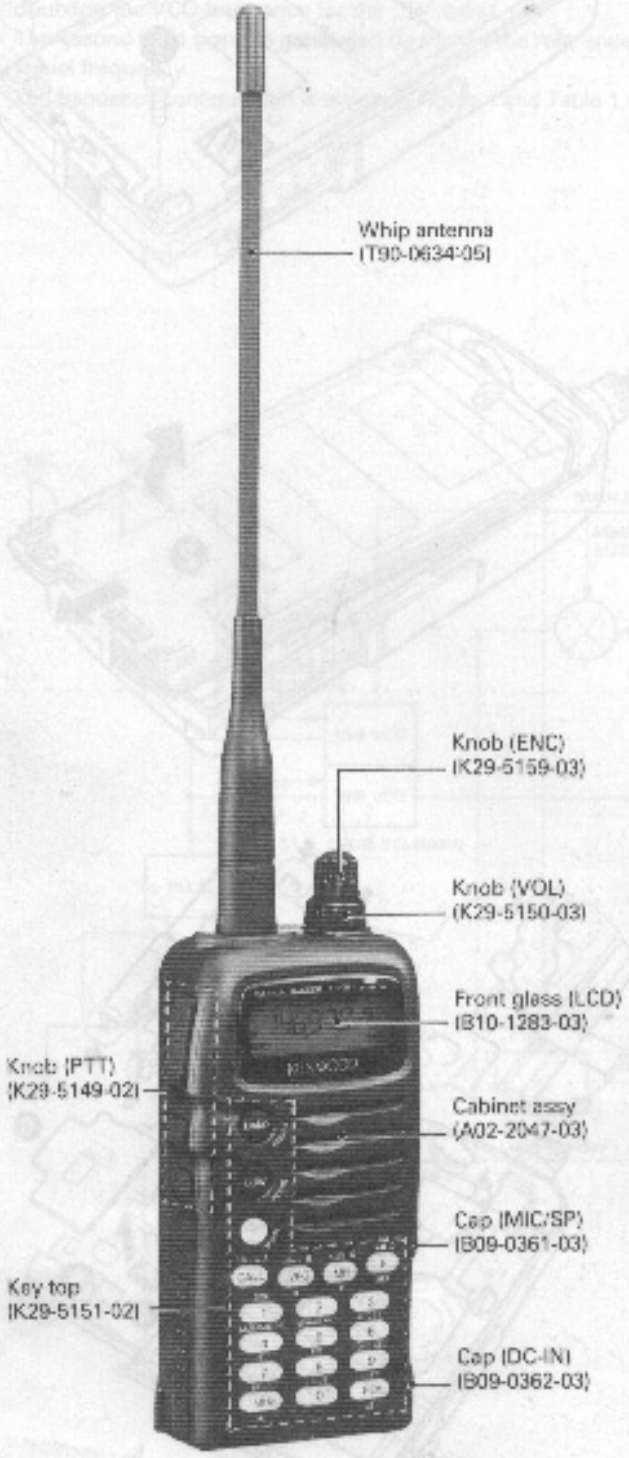
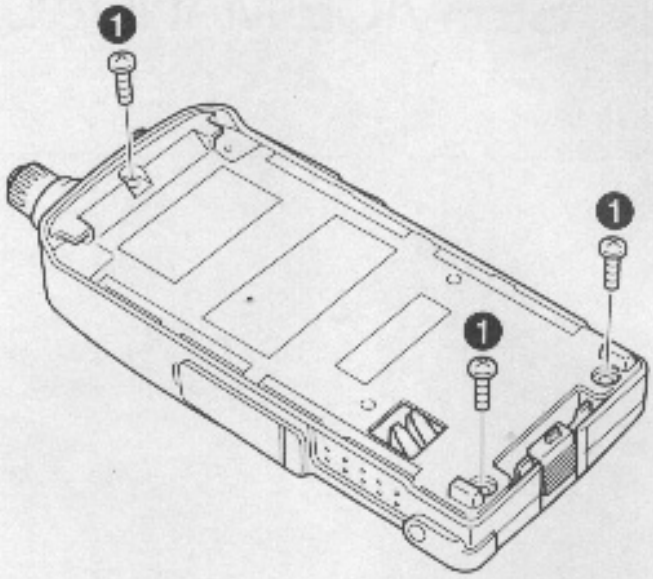


Photo is TH-G71A

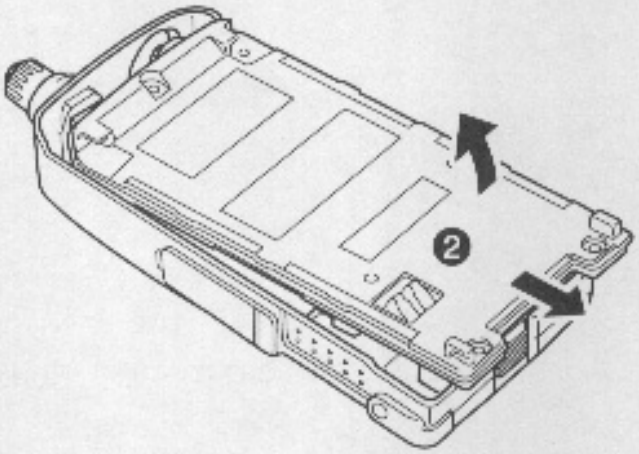
CONTENTS

DISASSEMBLY FOR REPAIR

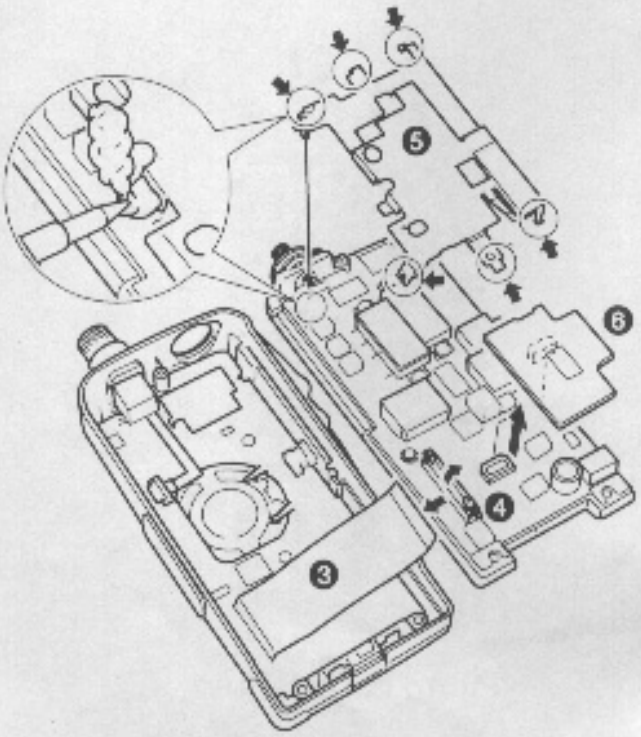
1. Remove the battery pack and whip antenna, then remove the three screws (❶) holding the chassis.



2. Pull the chassis slowly from the antenna side towards the direction shown by the arrow (❷). The antenna connector comes apart and the upper case is separated from the lower case. (However, the flat cable is connected.)



3. The flat cable (❸) can be removed by releasing the connector stopper (❹). The TX-RX unit is attached to the chassis and the switch unit is attached to the front case.
4. The component side of the TX-RX unit is opened by removing the six (❺) soldered points from the shield cover. The daughter board is connected with a connector. Remove the board by lifting it in the direction indicated by the arrow(❻).



Precautions for assembly

- Install the chassis in the case before installing the ANT gasket.
- Check that the PTT installation fixture and the ground spring are inserted all the way in.

CIRCUIT DESCRIPTION

1. Frequency configuration

- The TH-G71A/E has two VCOs for the VHF and UHF bands, but has only one PLL.
  Both VHF and UHF band signals cannot be received at the same time.
- The first local signal for the VHF and UHF bands are generated by the VCO.
- The first local signal for the 800MHz band is produced by doubling the VCO frequency for the UHF band.
- The second local signal is generated by tripling the reference signal frequency.
- The frequency configuration is shown in Figure 1 and Table 1.

Receiving system	Double conversion super heterodyne		
		UHF	VHF
	1st LOCAL (38.85MHz)	Lower	Upper
	2nd LOCAL (450KHz)	Lower	Lower
Transmitting	Direct conversion oscillating amplification		
Modulation	Variable reactance phase		

Table1

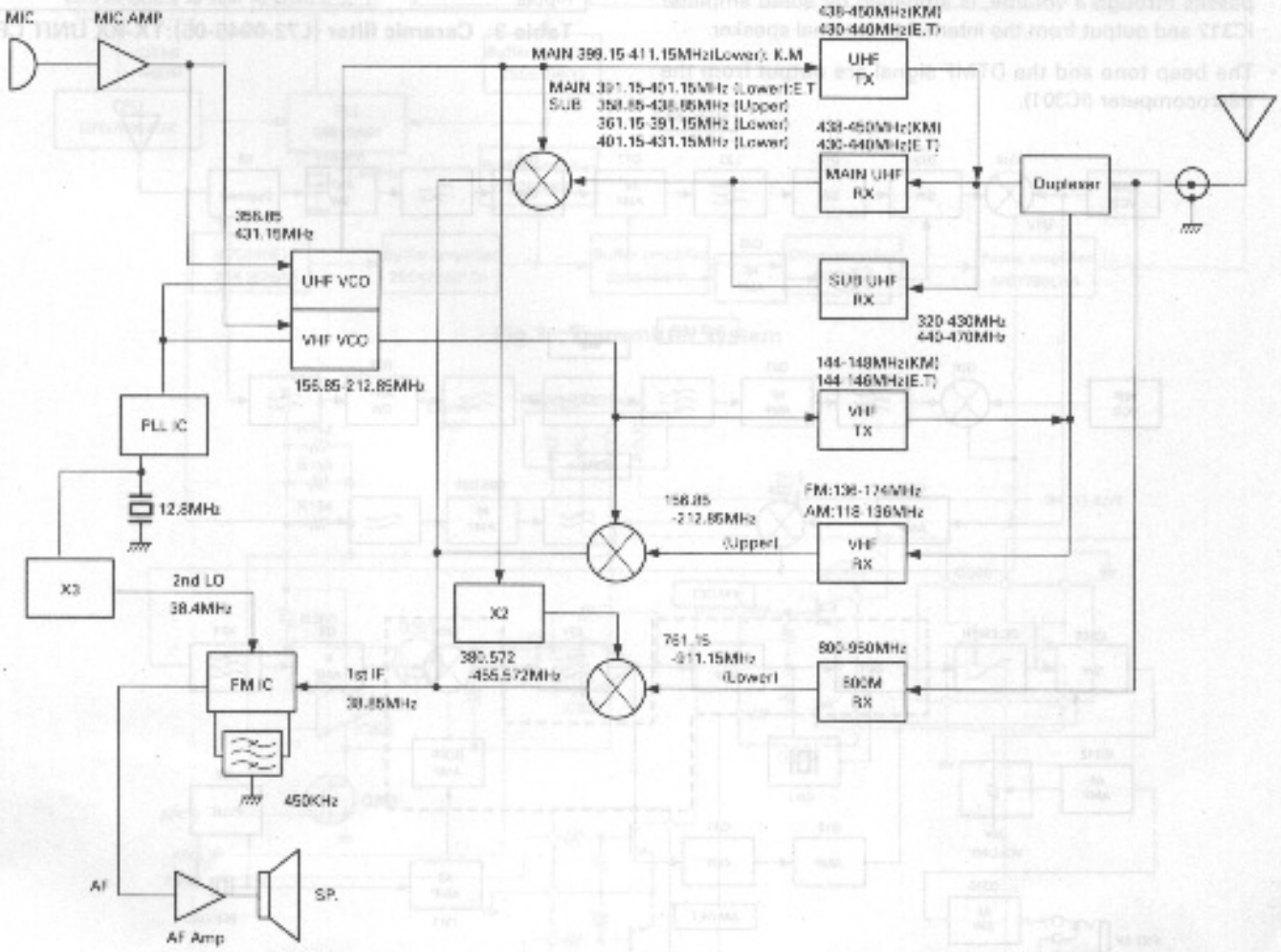


Fig.1 Frequency configuration

CIRCUIT DESCRIPTION

2. Receiver system

■ UHF reception

The first local signal (Lower Hetero • • • • Upper Hetero for 300 to 400 MHz reception.) generated by the U-VCO is mixed with the desired signal to produce a 38.85-MHz IF signal. It is then mixed with the second local signal (Lower Hetero) generated by the X1 crystal oscillator circuit to produce an audio signal.

■ VHF reception

The first local signal (Upper Hetero) generated by the V-VCO is mixed with the desired signal to produce a 38.85-MHz IF signal. It is then mixed with the second local signal (Lower Hetero) generated by the X1 crystal oscillator circuit to produce an audio signal.

■ 800MHz band reception

The first local signal (Lower Hetero) generated by doubling the U-VCO frequency is mixed with the desired signal to produce a 38.85-MHz IF signal. It is then mixed with the second local signal (Lower Hetero) generated by the X1 crystal oscillator circuit to produce an audio signal.

■ Audio circuit

- The audio signal (AF) detected by IC4 passes through IC5 (AF switch), and is filtered by Q309. The resulting signal passes through a volume, is amplified by audio amplifier IC312 and output from the internal or external speaker.
- The beep tone and the DTMF signal are output from the microcomputer (IC301).

Receiver system

Item	Rating
Center frequency (fo)	38.85MHz
Pass bandwidth	3dB or less at ± 7.5kHz or more
Attenuation bandwidth	36dB or less at ± 25kHz or less
Guaranteed attenuation	fo ± 1MHz or less at80dB or more
Spurious	fo ± 1MHz or less at40dB or more
Ripple	1.0dB or less
Minimal damage	3.0dB or less
Terminating impedance	550 Ω ± 10% // 2.5pF ± 0.5pF

Table 2: MCF(L71-0481-05):TX-RX UNIT XF1

Item	Rating
Center frequency (fo)	450 ± 1.5kHz
6dB bandwidth	± 7.5kHz or more
40dB bandwidth	± 15.0kHz or less
Guaranteed attenuation	450kHz ± 100kHz or less at 27dB or more
Insertion loss	450kHz or less at 6dB or less
Ripple	± 5.0kHz or less at 1.5dB or less

Table 3: Ceramic filter (L72-0945-05):TX-RX UNIT CF1

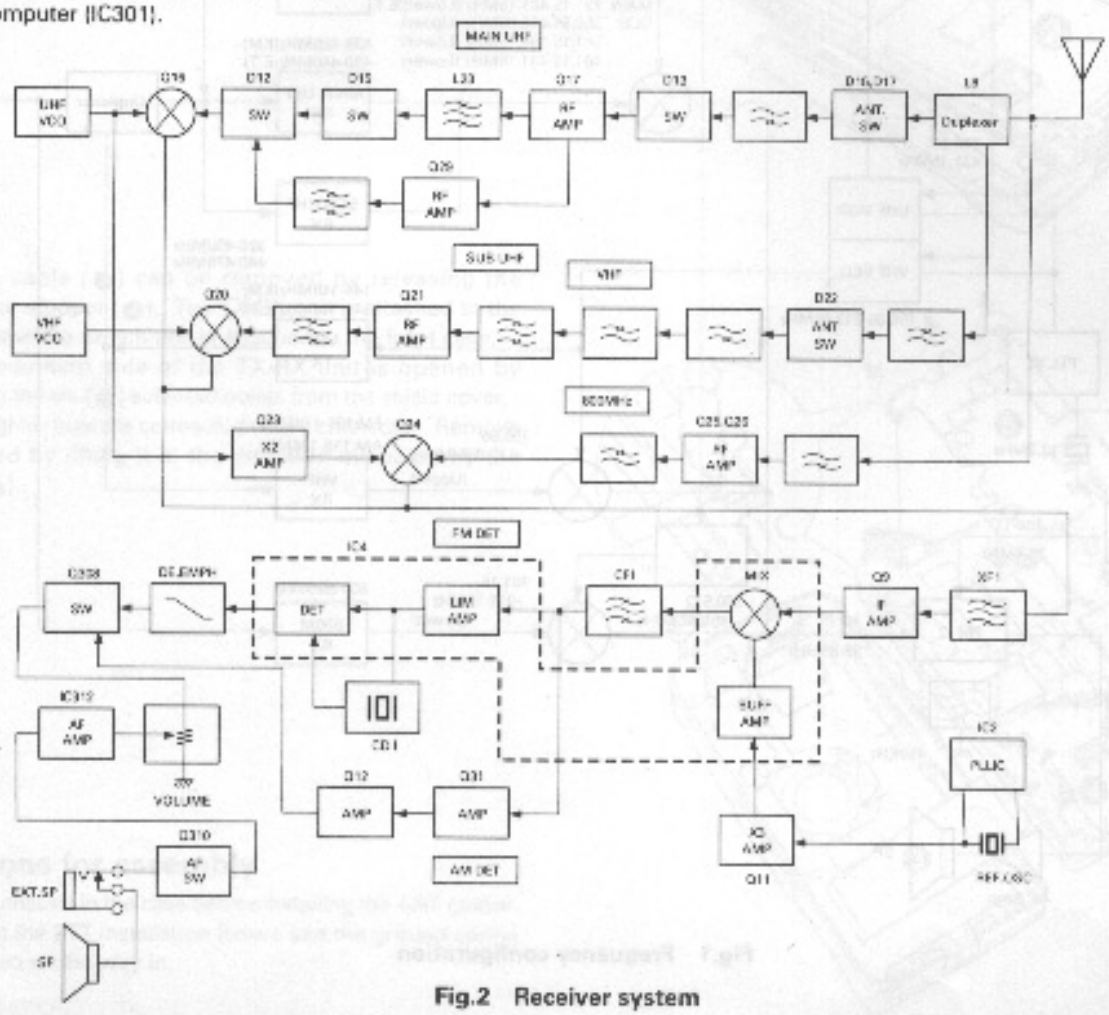


Fig.2 Receiver system

CIRCUIT DESCRIPTION

3. Transmitter system

- The transmitter system is shown in Figure 3.

■ Modulator Circuit

IC313 switches between the internal and external microphones. The audio signal from the microphone is pre-emphasized, limiter-amplified and splatter-filtered by IC311. Frequency shifts are adjusted by VR330 and VR331.

The modulation signal is applied to the varicap for VCO modulation for the VHF and UHF and reactance-modulated.

When the DTMF is used, the input terminal is opened by IC311.

■ Driver and final amplifier

The UHF band VCO output is amplified by three amplifiers, and the VHF band VCO output is amplified by two amplifiers. The resulting signal goes to the power module for each band. The signal then passes through the antenna switch for each band and the chip duplexer (L8) and goes to the antenna.

■ APC circuit

The APC circuit detects the drain current of the power module and controls the transmission output to provide stable transmission output. The voltage at R152, R153, and R154 is amplified by IC302 and Q301, and the difference between the resulting voltage and the reference voltage of each frequency from port 44 of IC301 is detected by IC303 to determine the APC voltage.

The APC voltage is used to control the control pin of the power module.

■ Temperature protection circuit

If the thermistor detects about 80°C, IC301 reduces the APC voltage to prevent thermal breakdown of the power module.

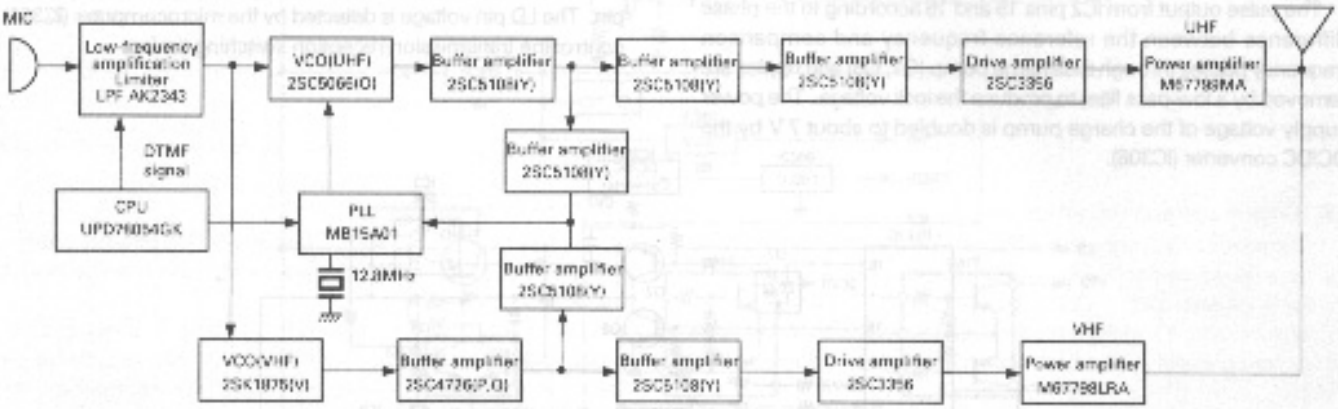


Fig.3 Transmitter system

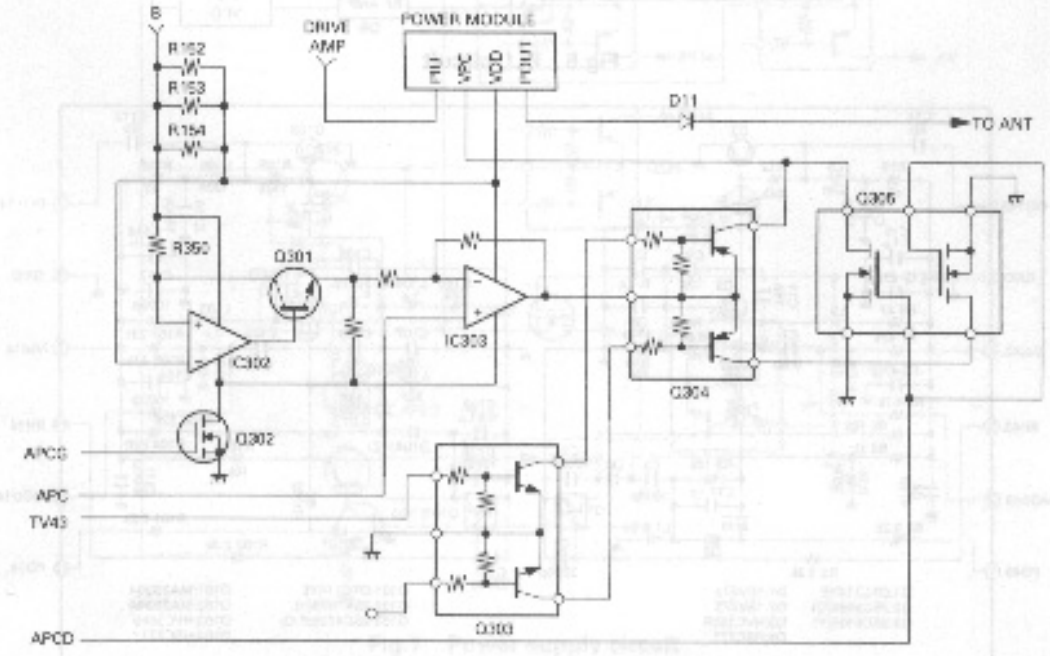


Fig.4 APC circuit (UHF only)

CIRCUIT DESCRIPTION

4. PLL circuit

A single PLL circuit is shared for both the VHF and UHF bands.

The internal oscillator circuit of the PLL IC (IC2) is used as the reference oscillator to supply the oscillation signal to the tripling transistor that produces the PLL reference signal and the second local oscillator signal.

■ Reference oscillator circuit

X1: The 12.8MHz crystal is oscillated by IC2, and the reference signal frequency is divided to produce the 5kHz or 6.25kHz reference frequency.

■ Phase comparison

The comparison frequency is produced by amplifying the VCO output by Q5 (UHF) or Q6 (VHF) and dividing it by the pulse-swallow type PLL IC (IC2). The PLL synthesizer with 5kHz, 6.25kHz, 10kHz, 12.5kHz, 15kHz, 20kHz, 25kHz, 30kHz, 50kHz and 100kHz steps is configured by comparing the phases of the reference frequency obtained by dividing X1.

■ Lock voltage (VCO control voltage)

The pulse output from IC2 pins 15 and 16 according to the phase difference between the reference frequency and comparison frequency passes through the charge pump (Q7, Q8) and ripples are removed by a low-pass filter to produce the lock voltage. The power supply voltage of the charge pump is doubled to about 7 V by the DC/DC converter (IC308).

■ VCO (KCH36)

The KCH36 contains two VCO circuits.

The UHF VCO is a colpitts oscillation circuit consisting of a bipolar transistor Q2 that generates the desired frequency directly. The oscillation frequency is varied by applying the VCO control voltage to the varicap D1 and D2. The SHIFT pin goes low during reception to turn Q1 and D4 OFF and change the oscillation frequency. The audio signal is applied to the varicap D3 and the oscillation frequency is modulated during transmission.

The VHF VCO is a colpitts oscillation circuit consisting of FET: Q102 that generates the desired frequency. The oscillation frequency is varied by applying the VCO control voltage to the varicap D101 and D102. The SHIFT pin goes high during reception to change the oscillation frequency of Q101 and D104. The audio signal is applied to the varicap D103 and the oscillation frequency is modulated during transmission.

■ Unlock detection circuit

When the PLL is unlocked, a low signal is output from the IC2 LD pin. The LD pin voltage is detected by the microcomputer (IC301) to control the transmission/reception switching timing.

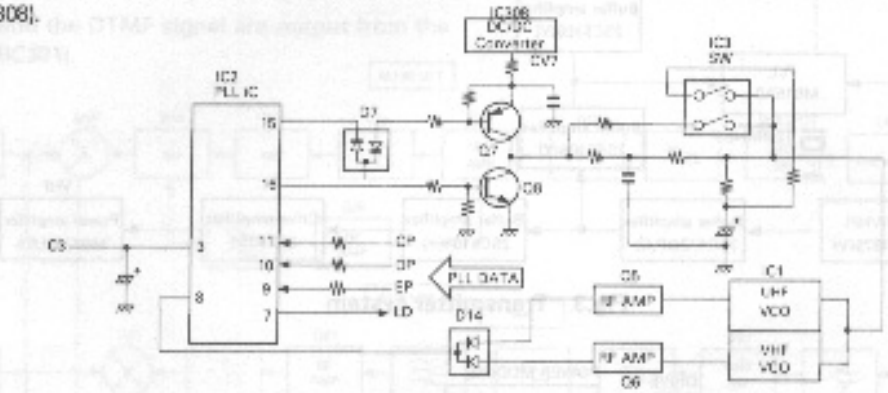


Fig.5 PLL circuit

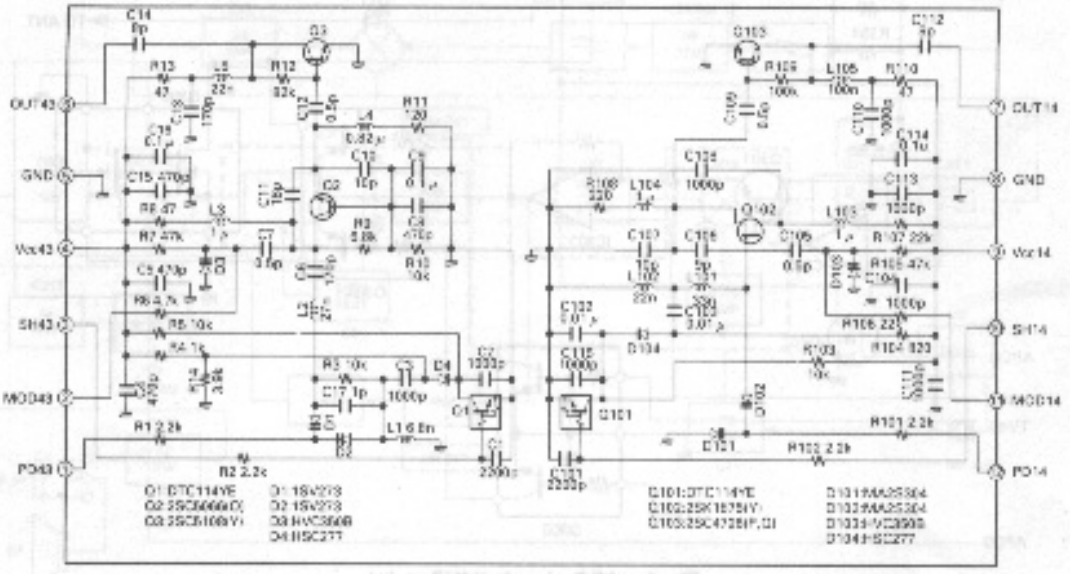


Fig.6 VCO circuit (KCH36)

CIRCUIT DESCRIPTION

5. Powor supply circuit

■ Ni-Cd battery charging circuit

The constant-current circuit (Q321, D322) supplies about 70 mA to the Ni-Cd battery from the external power supply connected to the DC IN terminal. The constant-current circuit does not work if no external power source is connected to the DC IN terminal.

■ Power switching circuit

The power supply circuit is configured as shown in Figure 7. This circuit provides power to the following components:

B — RB : Power to the power module
- M3 : Power to the microcomputer, EEPROM, and reset circuit
- M3S : Power to the LCD, external speaker/microphone, DC/DC converter, microphone changeover switch, and AF AVR reference voltage
- C3 : Baseband IC, BUSY/ON AIR LED, PLL circuit (C3U, C3V), receiver circuit (RV36, RV43, RV80, RV14, AMV, IFV)
- TV : Power to the transmitter circuit (TV14, TV43)

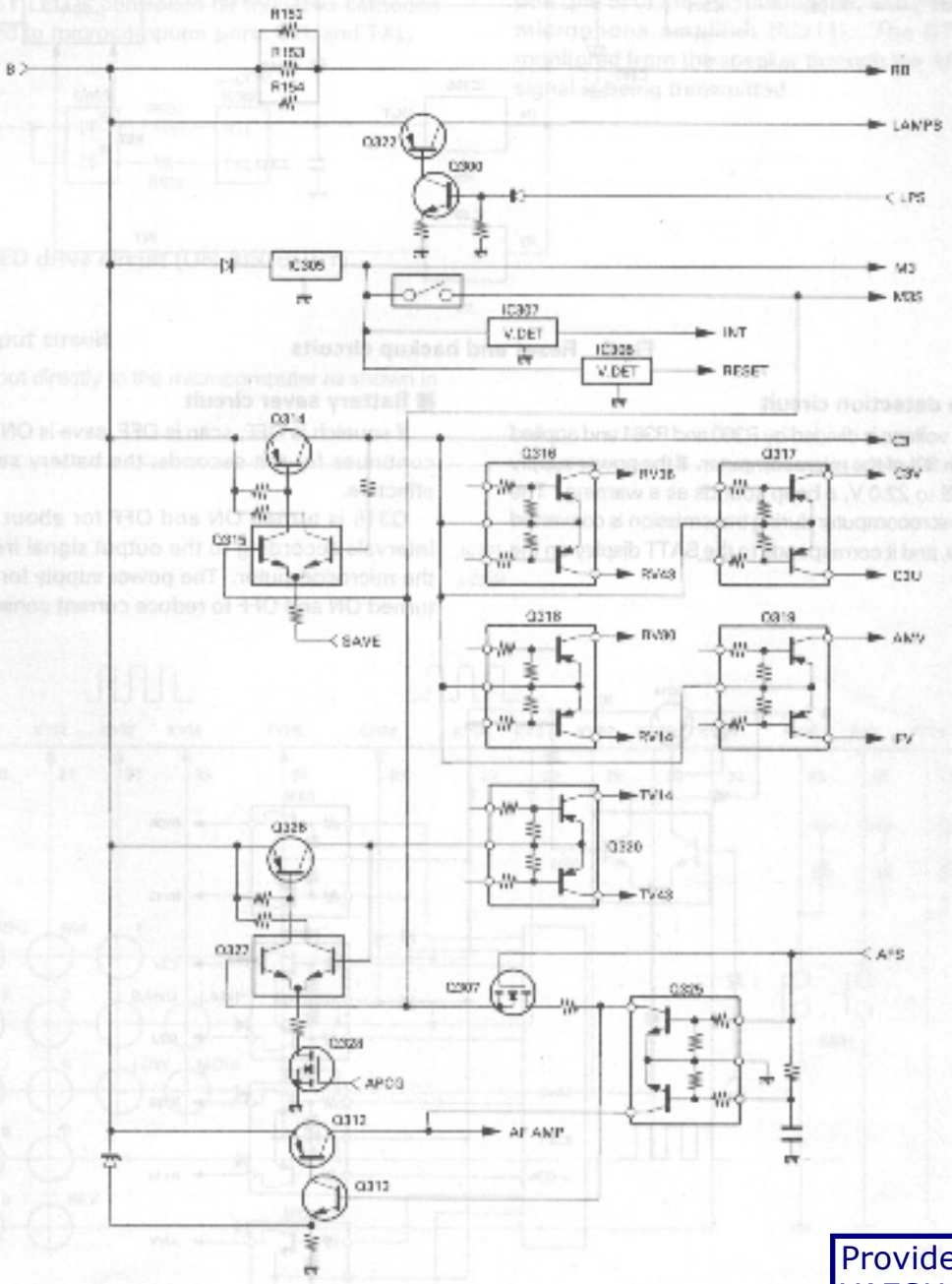


Fig.7 Power supply circuit

CIRCUIT DESCRIPTION

6. Microcomputer and peripheral circuits

■ Reset and backup circuits

When power is supplied to the set, the reset circuit makes the VDD and INT ports of the microcomputer (IC301) high due to C353 charging.

The RST port becomes active when the microcomputer starts operation, and goes inactive after the time constant determined by R368 and C357.

If the voltage provided to the set falls and IC305 cannot supply a sufficient voltage to the load, the voltage drop (3.0 V) at the output side of IC305 is detected and the INT port goes low. The microcomputer enters the backup mode, outputs data to IC309 (EEPROM), then enters the stop mode. The EEPROM receives and stores data while C353 is discharging. If the voltage falls below 2.5 V, the voltage detection IC (IC306) detects the voltage drop, and makes the RST port active low.

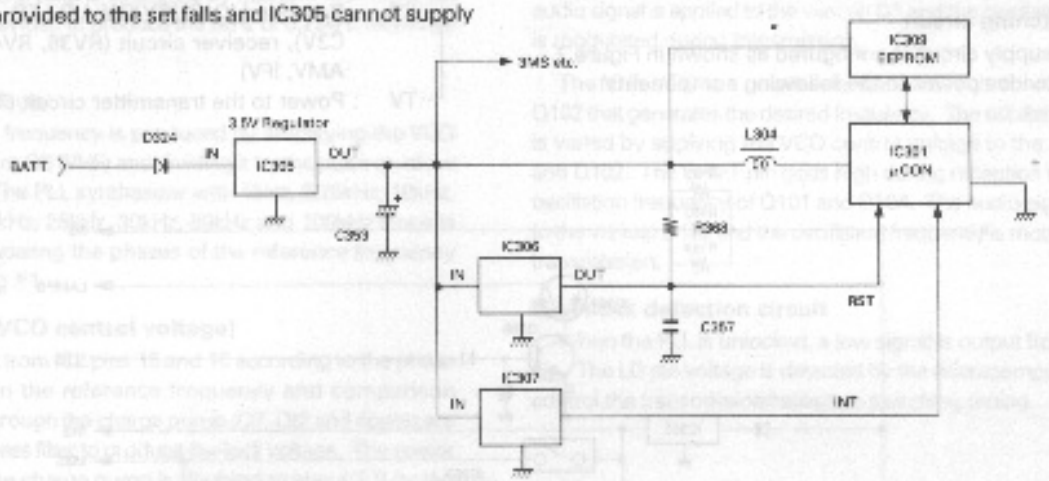


Fig.8 Reset and backup circuits

■ Battery voltage detection circuit

The power supply voltage is divided by R360 and R361 and applied to the analog port (pin 80) of the microcomputer. If the power supply voltage exceeds 17.5 to 22.0 V, a beep sounds as a warning. The voltage input to the microcomputer during transmission is converted from analog to digital, and it corresponds to the BATT display on the LCD.

■ Battery saver circuit

If squelch is OFF, scan is OFF, save is ON, or a key input state continues for ten seconds, the battery save mode becomes effective.

Q315 is turned ON and OFF for about 150 ms at 1000ms intervals according to the output signal from the SAVE pin of the microcomputer. The power supply for each component is turned ON and OFF to reduce current consumption at standby.

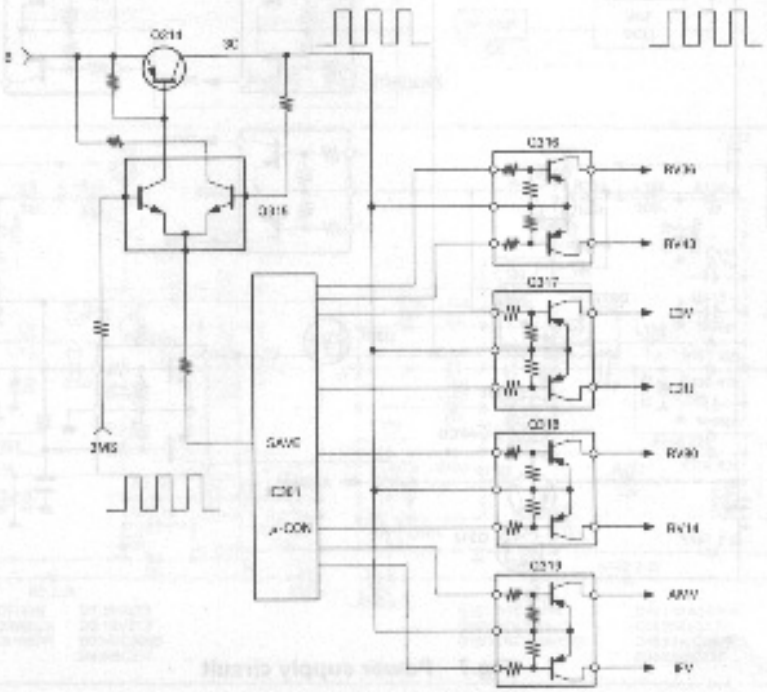


Fig.9 Battery saver circuit

CIRCUIT DESCRIPTION

■ LED drive circuit

The LCD and key illumination LED comprise the lamp AVR and are controlled with the LPS port (pin 16) of the microcomputer.

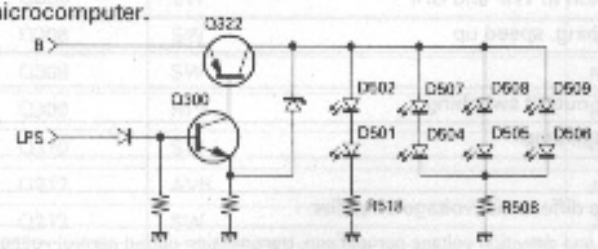


Fig.10 LED drive circuit (KEY LED)

The ON AIR/BUSY LED is controlled by the D503 cathodes which are connected to microcomputer ports BYL and TXL.

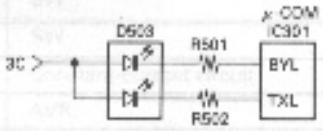


Fig.11 LED drive circuit (ON AIR/BUSY)

■ Key/encoder input circuit

The signals are input directly to the microcomputer as shown in Figure 12.

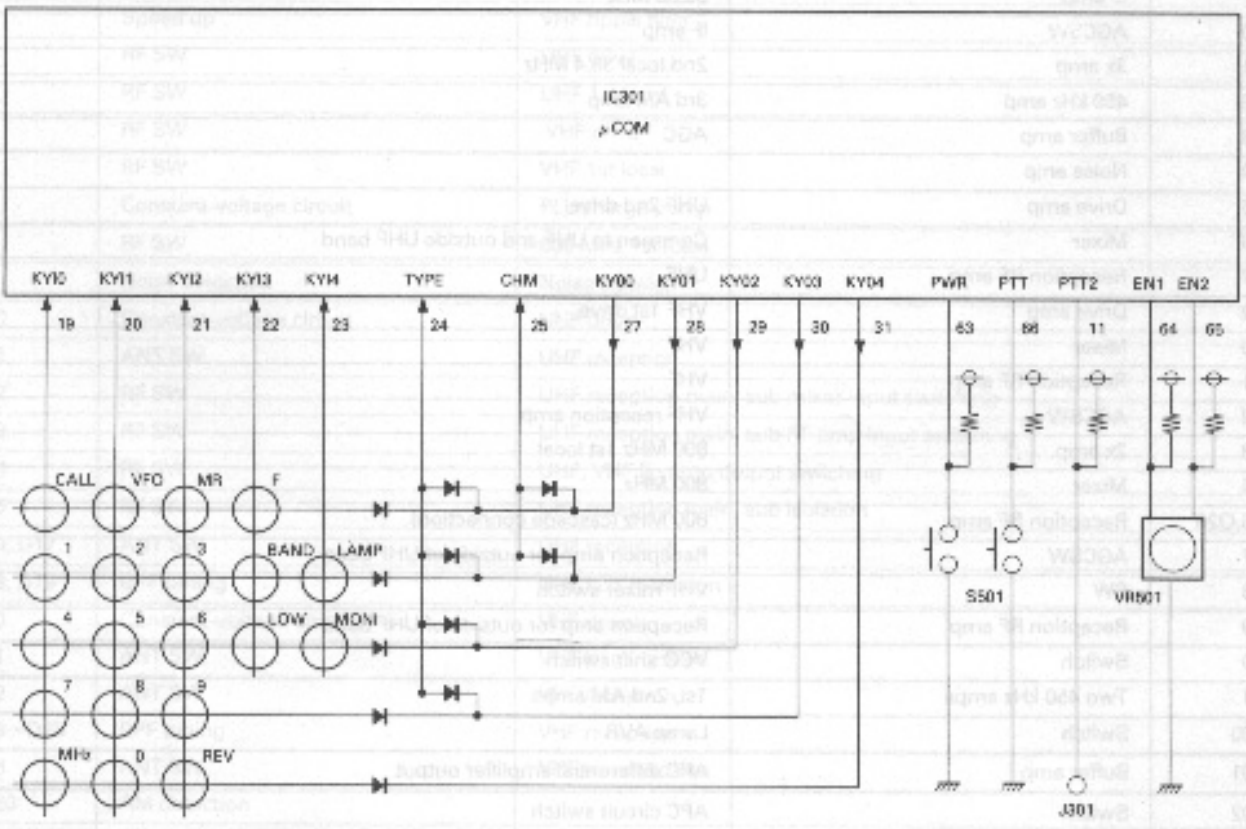


Fig.12 Key/encoder input circuit

■ CTCSS circuit

Tone frequency is set according to the serial data from the microcomputer (IC301). The tone signal passes through the deemphasis circuit and the amplifier (IC311) and goes to the CTCSS circuit.

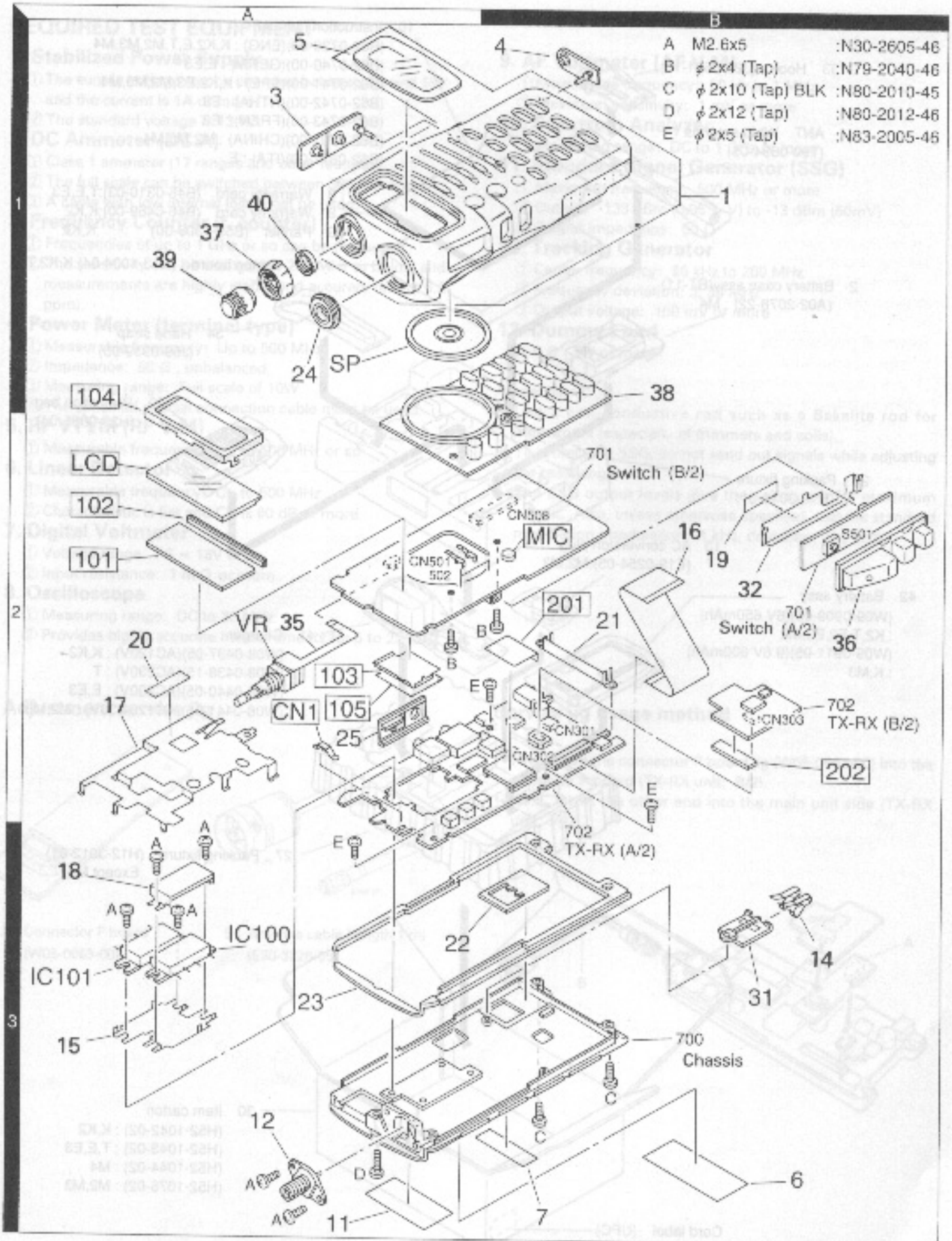
If the tone matches, IC311 pin 14 goes low. The microcomputer checks the SDO pin and controls the MUTE and AFC pins of IC311.

To transmit a CTCSS signal, the signal output from IC311 pin 18 is synthesized with the audio signal and a modulated signal is output from IC311 pin 4.

■ DTMF

When a DTMF signal is transmitted, it is output from the DTMF port (pin 5) of the microcomputer, and modulated through the microphone amplifier (IC311). The DTMF signal can be monitored from the speaker through the AF amplifier while the signal is being transmitted.

EXPLODED VIEW



Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. Stabilized Power Supply
① The supply voltage can be changed between 3V and 16V and the current is 1A or more.
② The standard voltage is 13.8V.

2. DC Ammeter (DC.A)
① Class 1 ammeter (17 ranges and other features)
② The full scale can be switched between 300 mA and 3A.
③ A cable with low internal loss must be used.

3. Frequency Counter (f. counter)
① Frequencies of up to 1 GHz or so can be measured.
② The sensitivity can be changed to 250 MHz or below and measurements are highly stable and accurate (about 0.2 ppm).

4. Power Meter (terminal type)
① Measurable frequency: Up to 500 MHz
② Impedance: 50 Ω , unbalanced
③ Measuring range: Full scale of 10W
④ The specified special connection cable must be used.

5. RF VTVM (RF V.M)
① Measurable frequency: Up to 500 MHz or so

6. Linear Detector
① Measurable frequency: Up to 500 MHz
② Characteristic is flat and CN is 60 dB or more.

7. Digital Voltmeter
① Voltage range: FS = 16V or so
② Input resistance: 1 M Ω or more

8. Oscilloscope
① Measuring range: DC to 30 MHz
② Provides highly accurate measurements for 5 to 25 MHz

9. AF Voltmeter (AF V.M)
① Measurable frequency: 50 Hz to 1 MHz
② Maximum sensitivity: 1 mV or more

10. Spectrum Analyzer
① Measuring range: DC to 1 GHz or more

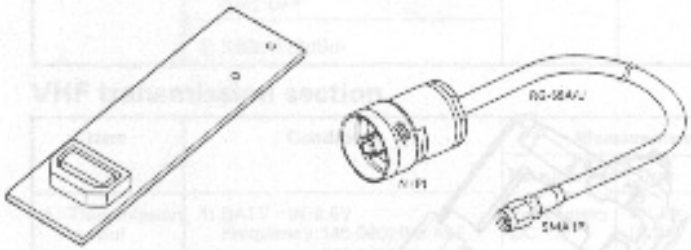
11. Standard Signal Generator (SSG)
① Maximum frequency: 500 MHz or more
② Output: -133 dBm (0.05 μ V) to -13 dBm (50mV)
③ Output impedance: 50 Ω

12. Tracking Generator
① Center frequency: 50 kHz to 200 MHz
② Frequency deviation: ± 35 MHz
③ Output voltage: 100 mV or more

13. Dummy Load
① 8 Ω , 3W or more

Preparations
- Use a non-conductive rod such as a Bakelite rod for adjustment (especially of trimmers and coils).
- To protect the SSG, do not send out signals while adjusting the receiving unit.
- The SSG output levels give the values are for maximum output. Also, unless otherwise specified, use the standard modulation (modulation: 1 kHz, deviation: ± 3 kHz).

Adjustment service jig

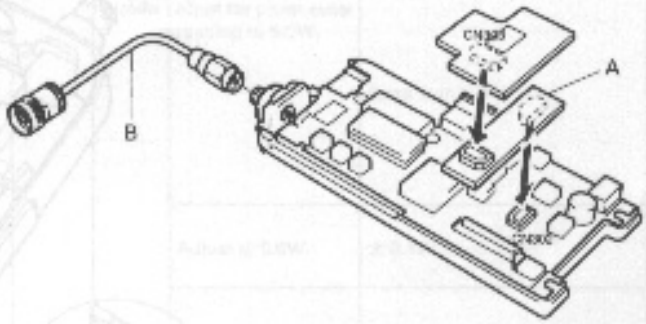


A : Connector P board (W05-0663-00)

B : Antenna cable (length 1 m) (E30-3226-05)

Service jig usage method

- First, insert the connector P board jig (W05-0663-00) into the daughter P board (TX-RX unit: B/2).
- Next, insert the other end into the main unit side (TX-RX unit: A/2).



ADJUSTMENT

How to use the "Set Mode"

About the Set mode

When this TH-G71A/E is set to Set mode, the following levels can be set.

1. The squelch critical point for each band
2. The S meter first lighting for each band
3. The S meter all lighting for each band
4. The HI/LO/EL transmission output for each band
5. The reference voltage for overvoltage alarms (13.8V)

The levels set with set mode are written into the E²PROM. Therefore, this data is retained even if the power is cut off or the device is reset.

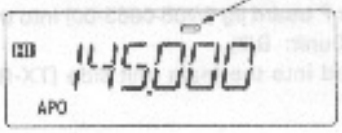
When the E²PROM is replaced, it is necessary to write (set) all these items again.

Setting procedure

1. Open up the main unit and with the power ON, briefly short the Set points (see figure below) on the component side of the switch unit (B/2) (with tweezers or the like).
   The beeper beeps and the ⊟ mark flashes on the display to show that the device has entered Set mode.
2. The functions of the keys in Set mode are as follows.

(1) :Squelch critical point setting
(2) :S meter S1 (1st lighting) level setting
(3) :S meter S5 (all lighting) level setting
(4) :Overvoltage alarm reference voltage (13.8V) identification setting
(5) :Overvoltage alarm check mode (alarm beeps)
(6) :Ending (5)
(PTT) + (0) + (ENC) : Transmission output level setting
(BAND) :144/430MHz bands
(LOW) :Transmission output (HI/LO/EL) switching
(In Set mode, the F key are not accepted.)

For 144MHz bands Flashing



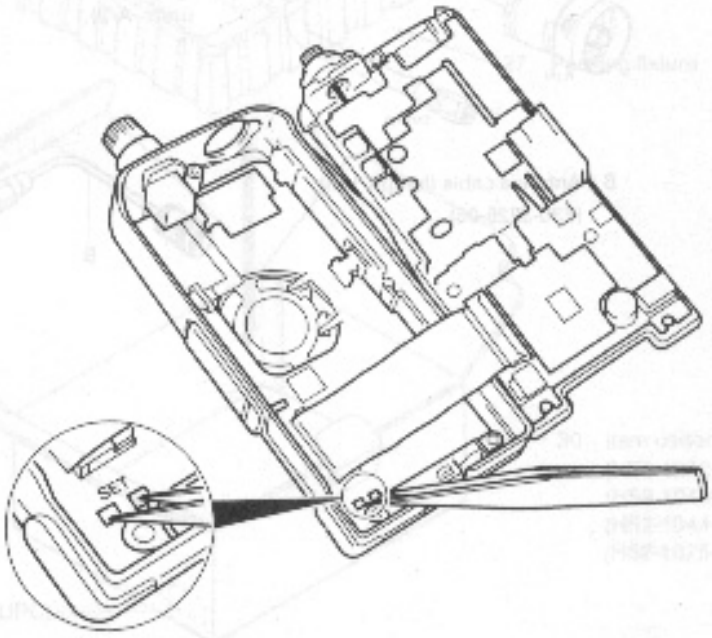
3. Input the SSG level to be set for each band from the ANT terminal and press the Set key. (See table below.)

Key pressed / Band (SSG frequency)	SQ level (1)	S1 level (2)	S5 level (3)
VHF Band 145.020MHz:E,T 146.020MHz:K,M	-124dBm	-120dBm	-105dBm
UHF Band 435.020MHz:E,T 445.020MHz:K,M	-124dBm	-120dBm	-105dBm
AIR Band 118.000MHz	-124dBm	-120dBm	-105dBm
300MHz Band 340.000MHz	-124dBm	-120dBm	-105dBm
800MHz Band 860.000MHz	-124dBm	-120dBm	-105dBm

Note : The SSG uses standard modulation.

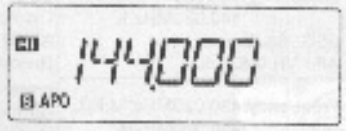
4. Overvoltage alarm reference voltage (13.8V) identification setting
   Apply the terminal voltage 13.8V ± 0.05V from the stabilized power supply to the external power supply terminal (DC-IN), then press the (4) key.
   Next, press the (5) key and check that the alarm sounds.
5. Set mode is ended by switching OFF the power.

Note 1 : Since these settings overwrite the previous data, they can be set independently and in any order.



ADJUSTMENT

Section common to transmission and reception

Item	Conditions	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting and reset	1) External power supply connection DC-IN terminal voltage: 13.8V 2) All-lit display check While pressing the F key, switch the POWER switch ON. 3) All reset Within ten seconds after the all-lit display, press the F key again.							LCD all lit display  Default setting display after all reset 

VHF reception section

Item	Conditions	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Helical (BPF)	1) Tracking generating output: 45 dBm Center: 145.000 MHz:E,T 146.000 MHz: K,M Span: 50 MHz REF: -20 dBm	Tracking generator Spectrum analyzer	TX-RX (A/2)	ANT TP	TX-RX (A/2)	L41 L40 L39	The maximum level of the two markers is aligned to within 2 dB.	See Figure 1.
2. Large input S/N	1) Frequency: 145.020 MHz:E,T 146.020 MHz: K,M SSG: -53dBm	SSG Oscilloscope AFVM Distortion meter Ammeter Dummy load		ANT SP			S/N check (AF - VR: 0.63V/8 Ω) Audio output check (AF - VR: MAX)	35 dB or more. 1.3V or more.
3. Sensitivity	1) Frequency: 144.020MHz SSG: -121dBm AF - VR: 0.63V/8 Ω 2) Frequency: 145.020MHz:E,T 146.020MHz:K,M						Check	12 dB SINAD or more.
4. Current consumption	1) Frequency: 144.020MHz SSG: OFF						Check	70 mA or less.
5. S meter	1) Frequency: 144.020MHz SSG: -120dBm ± 6dBm	SSG Oscilloscope		ANT SP		LCD	Check	At least one lit
	2) SSG: -105dBm ± 6dBm							All lit
6. Squelch	1) Frequency: 144.020MHz SSG: OFF						Check	Squelch must be closed.
	2) SSG: -112dBm							Squelch must be opened.

VHF transmission section

Item	Conditions	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1 Transmission output	1) BATT - IN: 9.5V Frequency: 145.060MHz:M,E,T 146.060MHz: K Set to Set mode.	Power meter DC - A	TX-RX (A/2)	ANT	Panel	Display encoder	Turn the encoder and adjust the power meter reading to 5.0W.	± 0.2W
	2) Transmission output switching: HI PTT transmission Press 0 key during transmission. After setting, press 0 key again. Return to PTT.							(Less than 1.6A)
	3) DC - IN: 6.0V Transmission output switching: LO Same method as 2)						Adjust to 0.5W.	± 0.1W
	4) DC - IN: 6.0V Transmission output switching: EL Same method as 2)						Adjust to 50 mW.	± 10mW
2 DEV	1) Frequency: 145.060MHz: M,E,T 146.060MHz: K AG: 1kHz/70mV PTT: ON	Power meter Linear detector Oscilloscope		ANT	TX-RX (A/2)	VR331	Adjust to 4.2 kHz with larger ±	± 100Hz
	2) AG: 20 dB down: (1 kHz/7 mV) PTT: ON	AG AFVM		MIC			Check (mic sensitivity)	± 1.8 - 2.6kHz

ADJUSTMENT

UHF reception section

Item	Conditions	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Large input S/N	1) Frequency:430.020MHz:M,E,T :440.020MHz:K SSG:-53dBm AF • VR:0.63V/8 Ω	SSG Oscilloscope AFVM Distortion meter Ammeter Dummy load	TX-RX (A/2)	ANT SP			Check	35dB or more.
2. Sensitivity	1) Frequency:430.020MHz:M,E,T :440.020MHz:K SSG:-121dBm						Check	12dB SINAD or more.
	2) Frequency:435.020MHz:M,E,T :445.020MHz:K							
3. Current consumption	1) Frequency:430.020MHz:M,E,T :440.020MHz:K SSG:OFF						Check	70mA or less.
4. S meter	1) Frequency:430.020MHz:M,E,T :440.020MHz:K SSG:-120dBm ± 6dBm	SSG Oscilloscope	TX-RX (A/2)	ANT SP		LCD	Check	At least one lit
	2) SSG:-105dBm ± 6dBm							All lit
5. Squelch	1) Frequency:435.020MHz:M,E,T :445.020MHz:K SSG:OFF						Check	Squelch must be closed.
	2) SSG:-112dBm							Squelch must be closed.

UHF transmission section

Item	Conditions	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Transmission frequency	1) Frequency:439.980MHz:M,E,T :449.980MHz:K PTT:ON	Power meter F counter	TX-RX (A/2)	ANT	TX-RX (A/2)	TC1	Set to display frequency	± 200Hz
2. Transmission output	1) BATT • IN:9.6V Frequency:435.000MHz:M,E,T :445.000MHz:K Set to Set mode	Power meter DC-A		ANT	Panel	Display encoder	Turn the encoder and adjust the power meter reading to 5.0W.	± 0.2W
	2) Transmission output switching: HI PTT transmission Press 0 key during transmission. After setting, press 0 key again. Return to PTT.							(Less than 1.9A)
	3) DC • IN:6.0V Transmission output switching: LO Same method as 2)						Adjust to 0.5W.	± 0.1W
	4) DC • IN:6.0V Transmission output switching: EL Same method as 2)						Adjust to 50 mW.	± 10mW
3. DEV	1) Frequency:435.000MHz:M,E,T :445.000MHz:K AG:1kHz/70mV PTT:ON	Power meter Linear detector Oscilloscope		ANT	TX-RX (A/2)	VR333	Adjust to 4.2 kHz with larger ± .	± 100Hz
	2) AG:20dB down:1 kHz/7 mV PTT:ON	AG AFVM		MIC			Check (mic sensitivity)	± 1.8~2.6kHz
4. DTMF DEV	1) In transmitted state, press the D key.						DTMF DEV Check	± 2.2~4.2kHz
5. TONE DEV	1) Frequency:435.000MHz:M,E,T :445.000MHz:K Press F key → 6 key to display "CT". PTT:ON						Display check TONE DEV Check	"CT" display lit ± 0.4~1.2kHz

ADJUSTMENT

118,300,800MHz Band reception section

Item	Conditions	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
Sensitivity	118MHz Band 1) Frequency:118.000MHz SSG:-121dBm	SSG Oscilloscope AFVM Distortion meter Ammeter Dummy load	TX-RX (A/2)	ANT SP			Check	12dB SINAD or more
	300MHz Band 2) Frequency:340.000MHz SSG:-121dBm							
	800MHz Band 3) Frequency:860.000MHz SSG:-117dBm							

Parts layout diagram

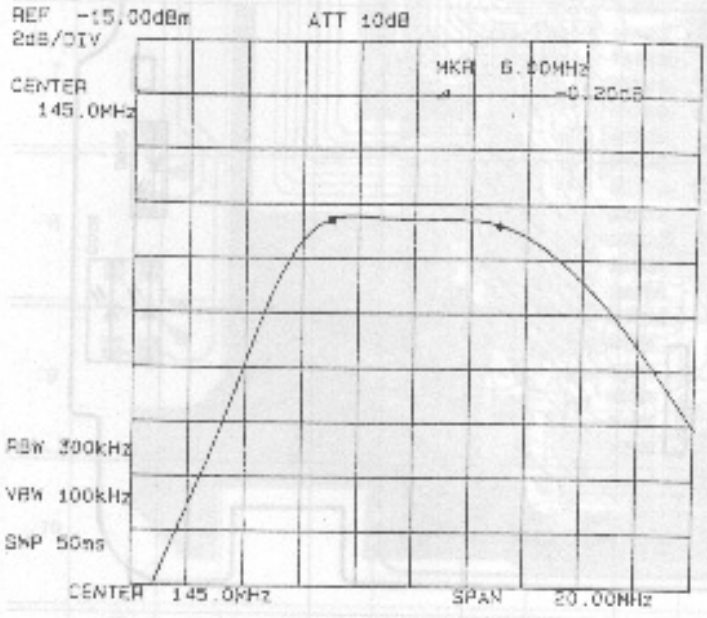
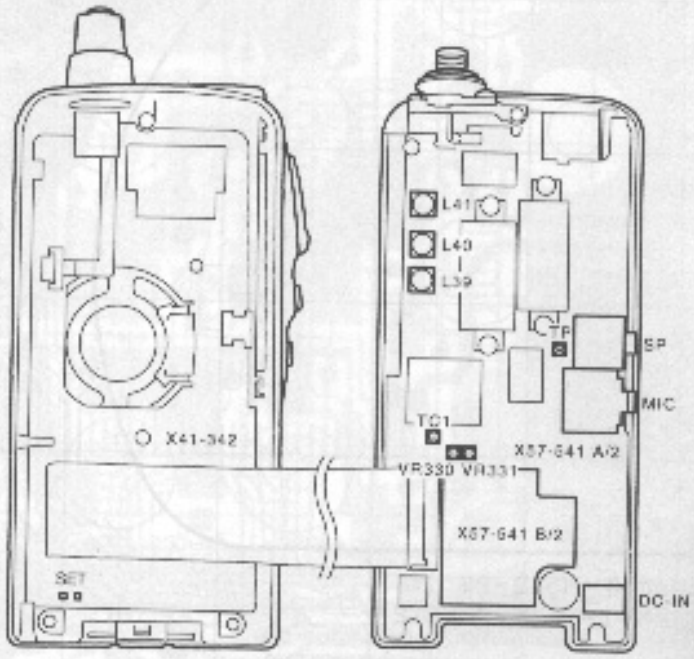


Figure 1. Helical (BPF) Adjustment Waveform
VHF Band



SWITCH unit

SET : Set mode test point

TX-RX unit (A/2)

L41,40,39 : VHF helical
TC1 : Transmission frequency (UHF)
VR330 : DEV(UHF)
VR331 : DEV(VHF)
TP : Helical adjustment (spectrum analyzer point)

PC BOARD VIEWS TH-G71A/E

PTT UNIT (X41-342X-XX) (A/2) Component Side View 0-11:K,K2,0-21:M2,M3 ,M4,2-71:T,E,E3

Component side

Pattern1	
Pattern2	
Pattern3	
Pattern4	
Pattern5	
Pattern6	

Foil side

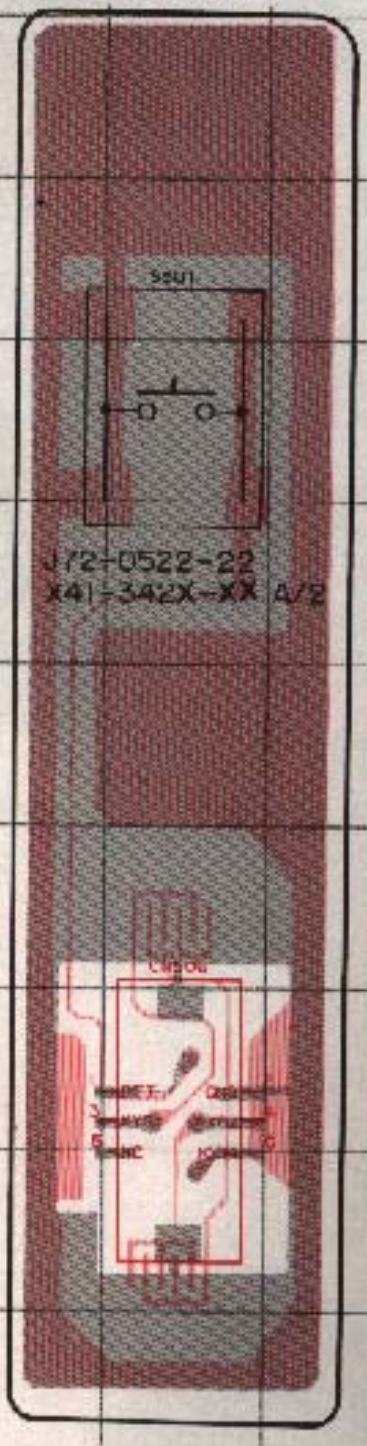
PTT UNIT (X41-342X-XX) (A/2) Foil Side View 0-11:K,K2,0-21:M2,M3 ,M4,2-71:T,E,E3

Component side

Pattern1	
Pattern2	
Pattern3	
Pattern4	
Pattern5	
Pattern6	

Foil side

PTT UNIT(X41-342X-XX) (A/2)Component Side View+Foil Side View 0-11:K,K2,0-21:M2,M3 ,M4,2-71:T,E,E3



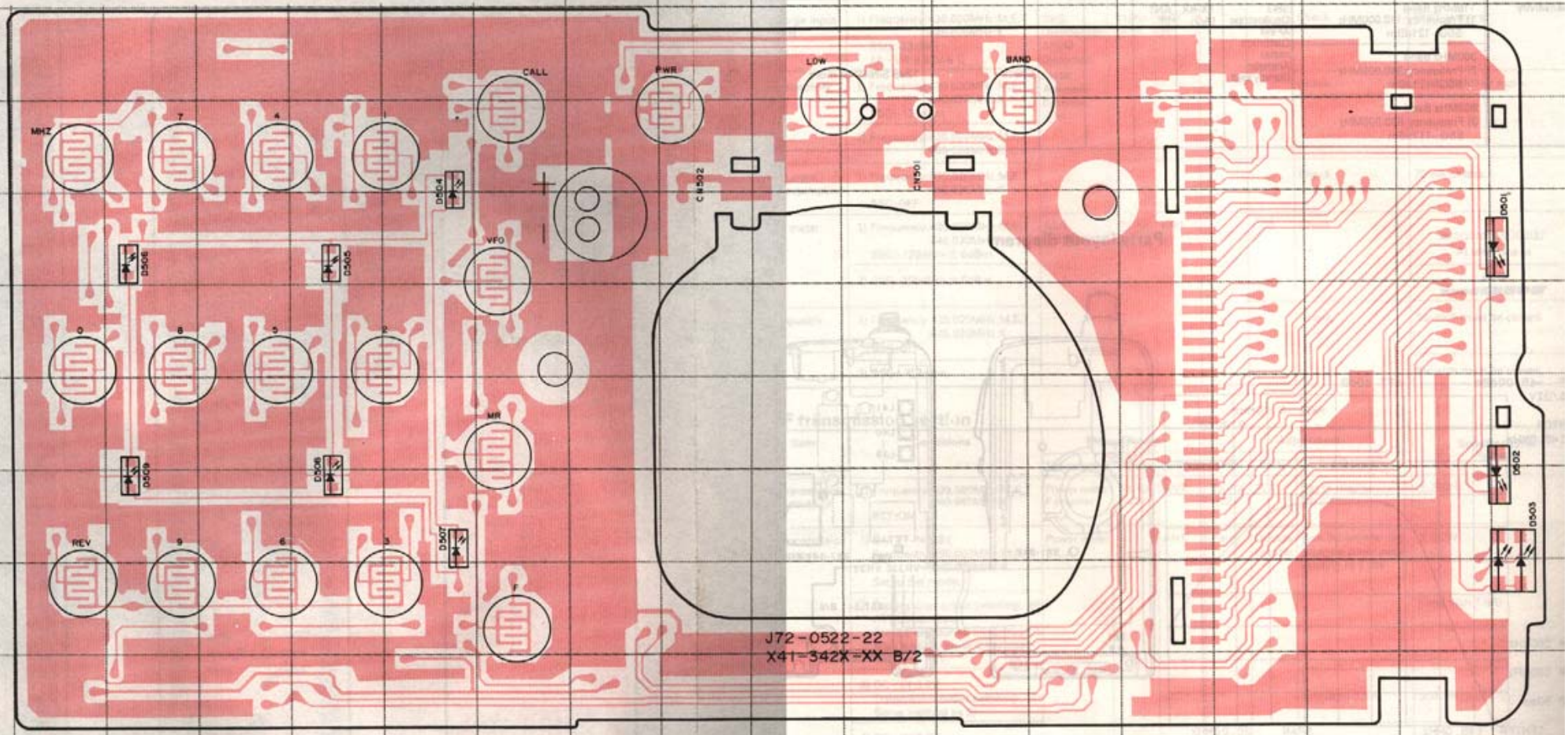
Component side

Pattern1	
Pattern2	
Pattern3	
Pattern4	
Pattern5	
Pattern6	

Foil side

TH-G71A/E PC BOARD VIEWS

KEY UNIT (X41-342X-XX)(B/2) Component Side View
0-11:K,K2,0-21:M2,M3,M4,2-71:T,E,E3



Component side

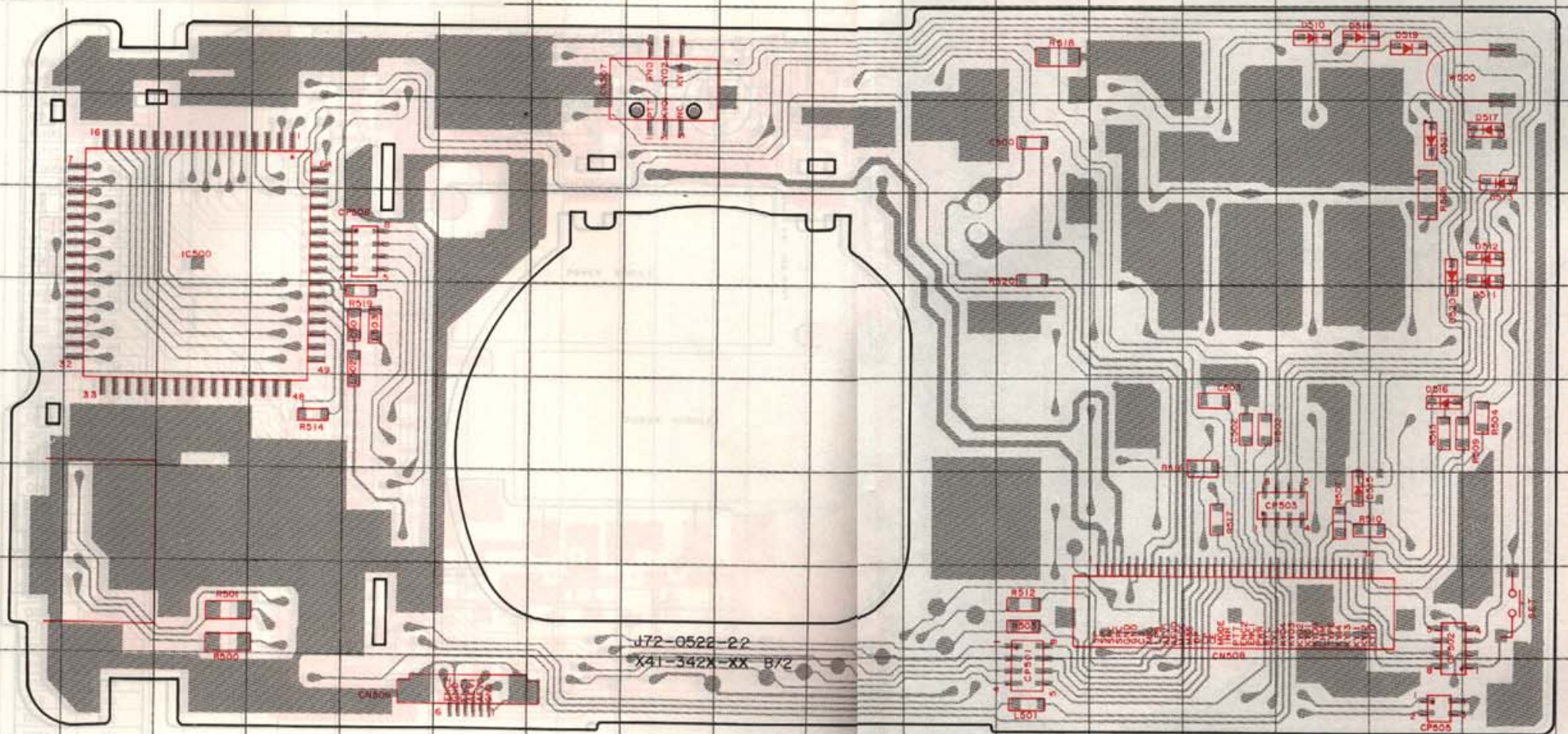
Pattern1	
Pattern2	
Pattern3	
Pattern4	
Pattern5	
Pattern6	

Foil side

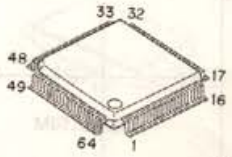
KEY UNIT (X41-342X-XX)
(B/2)(Component side)

Ref.NO.	Address
D501	5S
D502	8S
D503	8S
D504	4G
D505	5F
D506	5D
D507	8G
D508	7F
D509	8D

KEY UNIT (X41-342X-XX)(B/2) Foil Side View
0-11:K,K2,0-21:M2,M3,M4,2-71:T,E,E3



Component side
Pattern1
Pattern2
Pattern3
Pattern4
Pattern5
Pattern6
Foil side



NJU6433F

KEY UNIT (X41-342X-XX)
(B/2)(Foil side)

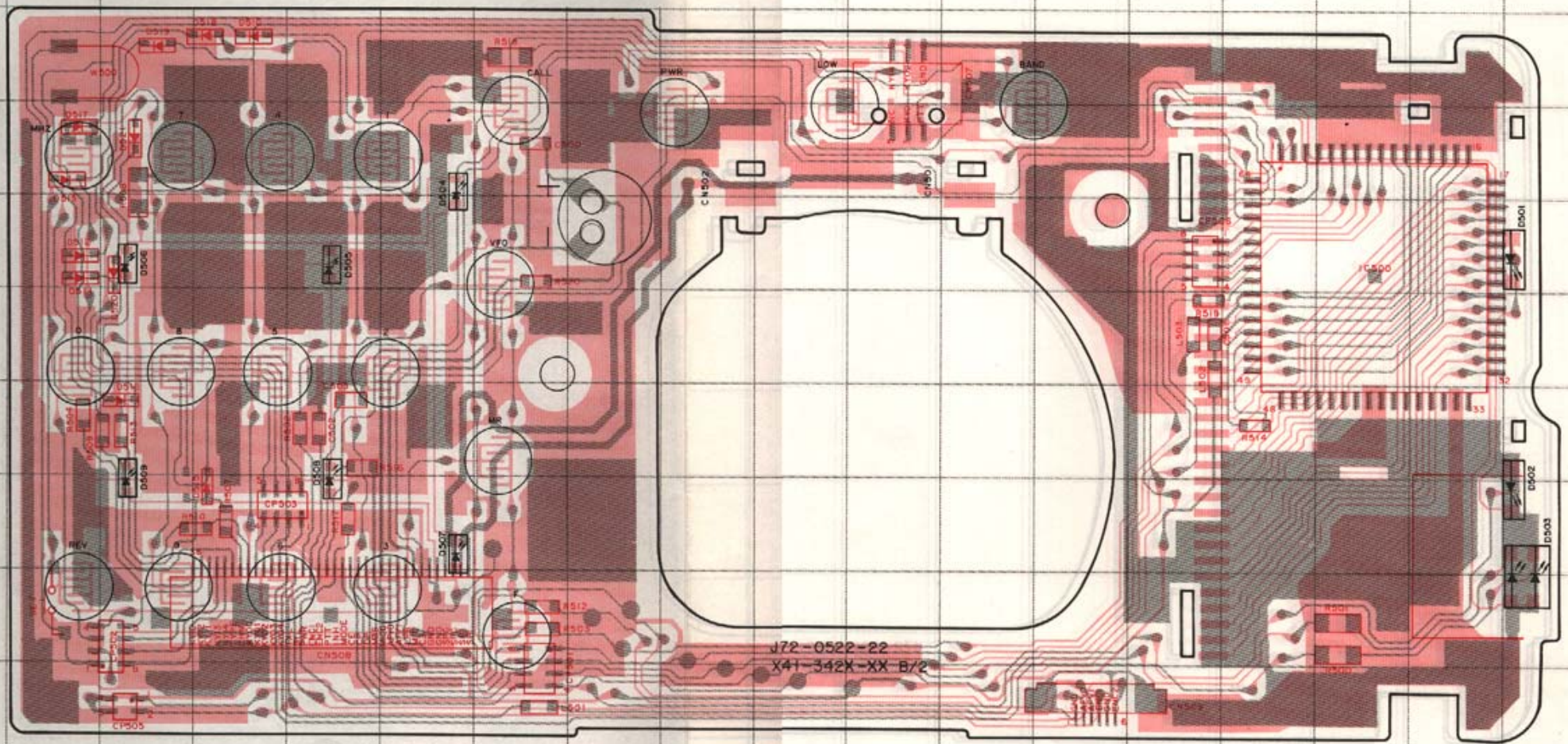
Ref.NO.	Address
IC500	5C
D510	3O
D511	5Q
D512	5Q
D513	4Q
D515	8O
D516	7P
D517	4Q
D518	3O
D519	3P
D520	5P
D521	4P

TH-G71A/E PC BOARD VIEWS

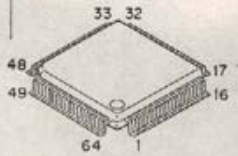
KEY UNIT (X41-342X-XX)
(B/2)(Component side) + (Foil side)

Ref.NO.	Address
IC500	5Q
D501	5S
D502	8S
D503	8S
D504	4G
D505	5F
D506	5D
D507	8G
D508	8F
D509	8D
D510	3E
D511	5C
D512	5C
D513	4C
D515	8E
D516	7D
D517	4C
D518	3E
D519	3D
D520	5D
D521	4D

KEY UNIT(X41-342X-XX)(B/2) Component Side View+Foil Side View
0-11:K,K2,0-21:M2,M3,M4,2-71:T,E,E3

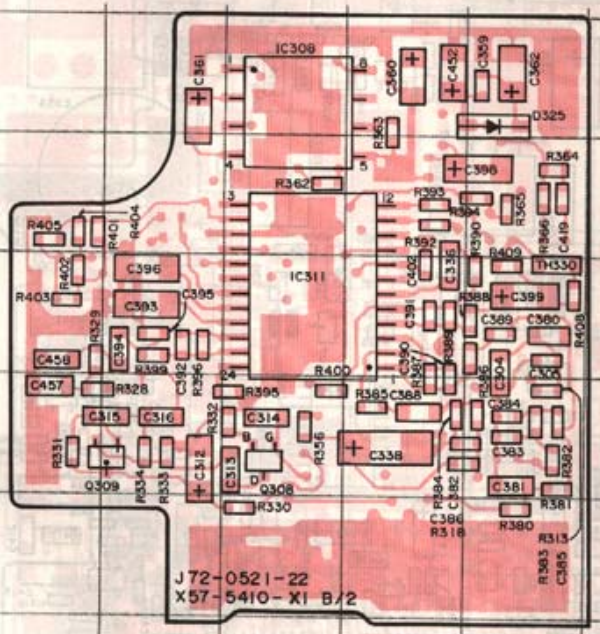


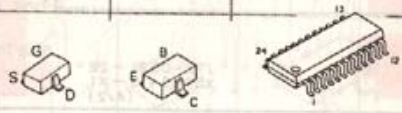
Component side
Pattern1
Pattern2
Pattern3
Pattern4
Pattern5
Pattern6
Foil side

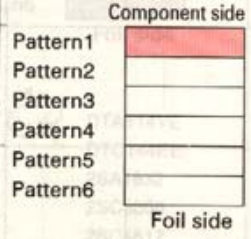


NJU6433F

TX-RX UNIT (X57-5410-XX)(B/2) Component Side View -11:K,K2,-21:T,E,E3,M2,M3,M4



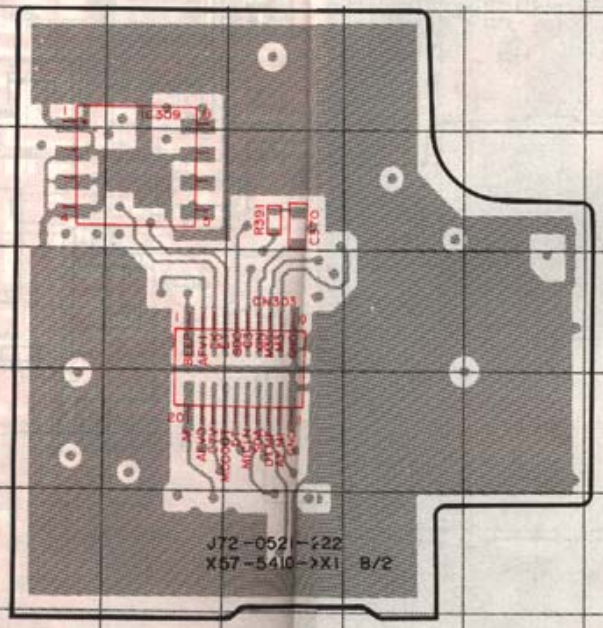


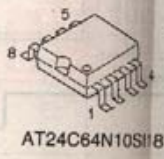


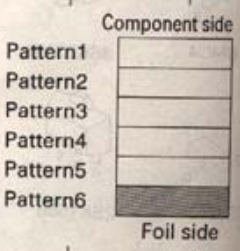
TX-RX UNIT (X57-5410-XX)
(B/2)(Component side)

Ref.NO.	Address
IC308	4D
IC311	6D
Q308	7D
Q309	7C
D325	4F

TX-RX UNIT (X57-5410-XX)(B/2) Foil Side View -11:K,K2,-21:T,E,E3,M2,M3,M4



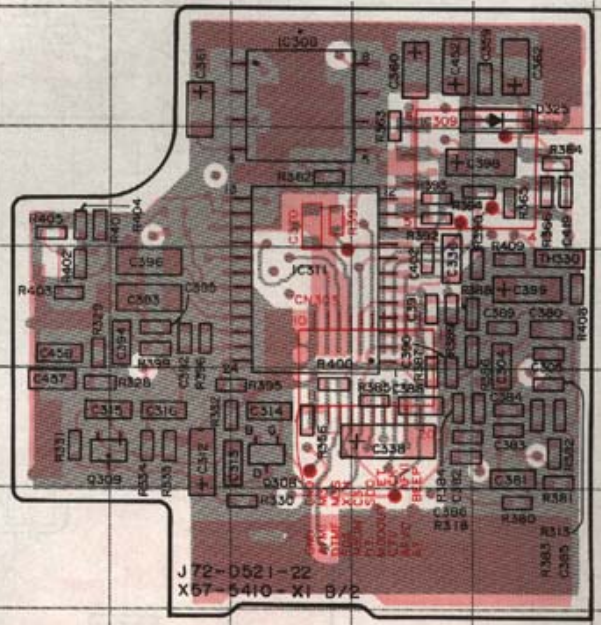




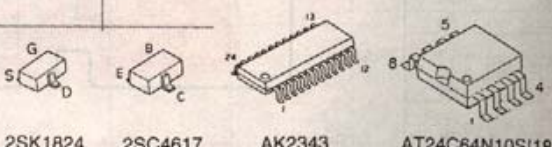
TX-RX UNIT (X57-5410-XX)
(B/2)(Foil side)

Ref.NO.	Address
IC309	5I

TX-RX UNIT(X57-5410-XX)(B/2) Component Side View+Foil Side View -11:K,K2,-21:T,E,E3,M2,M3,M4

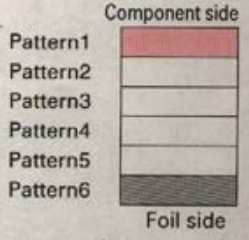


● Connect 1 and 6

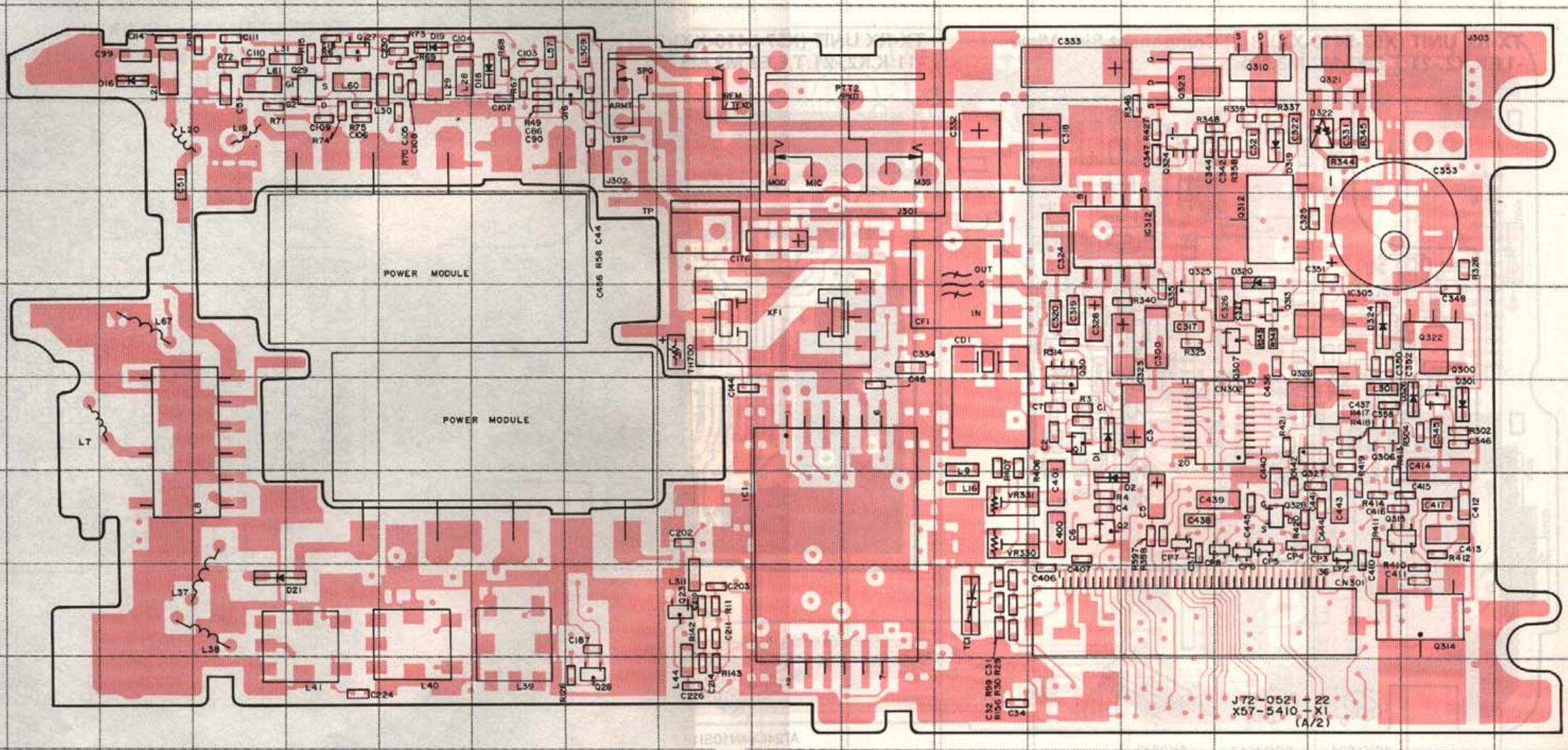


TX-RX UNIT (X57-5410-XX)
(B/2)(Component side) + (Foil side)

Ref.NO.	Address
IC308	4P
IC309	5Q
IC311	6P
Q308	7P
Q309	7O
D325	4R



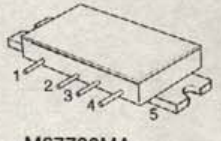
TX-RX UNIT (X57-5410-XX)(A/2) Component Side View
-11:K,K2,-21:T,E,E3,M2,M3,M4



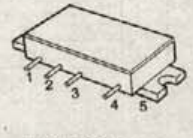
Component side

Pattern1
Pattern2
Pattern3
Pattern4
Pattern5
Pattern6

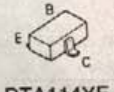
Foil side



M67799MA



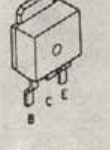
M67798LRA



DTA114YE
DTC144EE
2SC4617
2SC5108

2SB1188

2SD1483



2SB1184

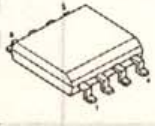
UMC4

2SJ243

3SK239A

2SK1588

UPA572T

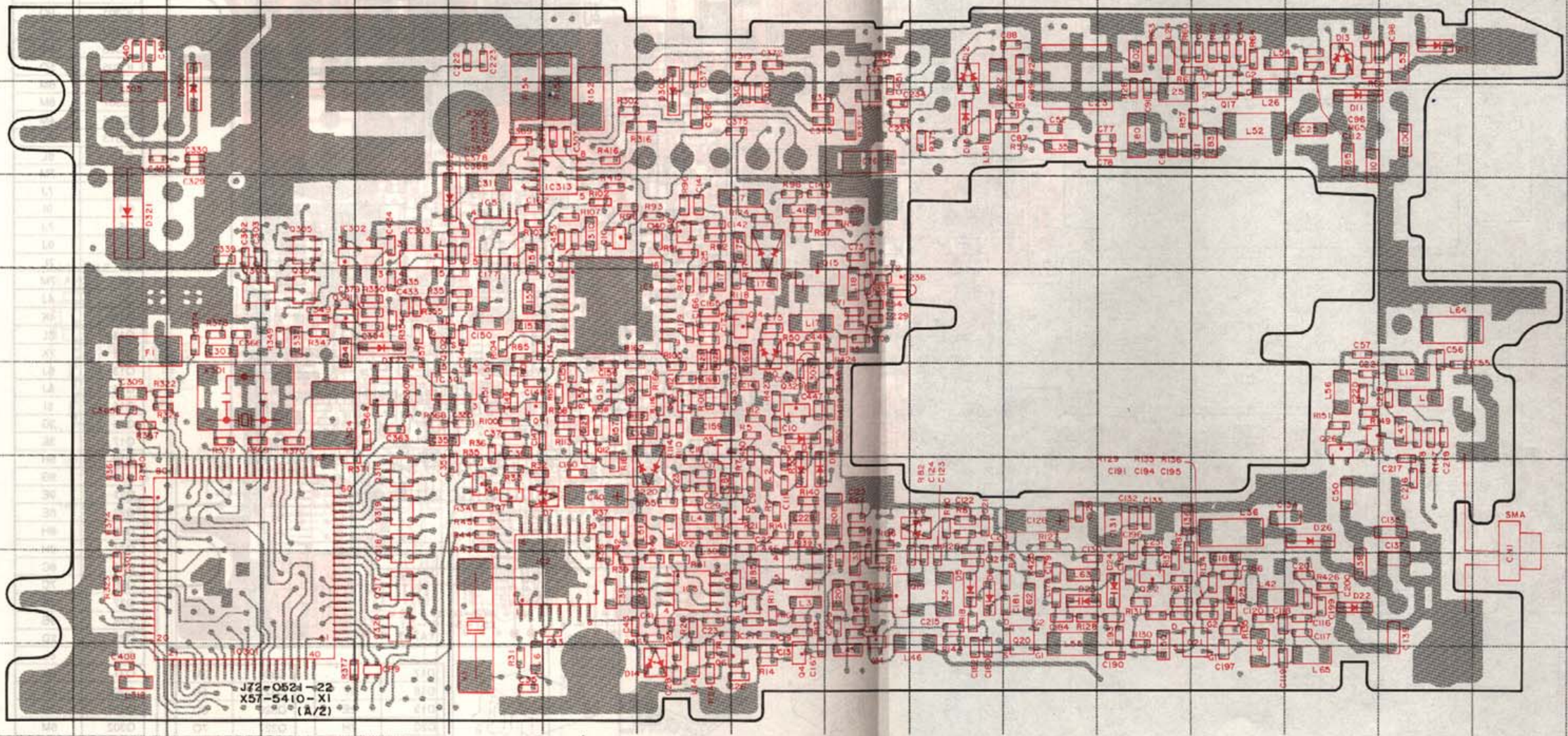


KIA6278F

KCH36

DA221

TX-RX UNIT (X57-5410-XX) (A/2)Foil Side View
-11:K,K2,-21:T,E,E3,M2,M3,M4



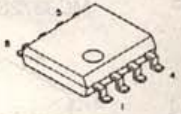
Component side

Pattern1
Pattern2
Pattern3
Pattern4
Pattern5
Pattern6

Foil side

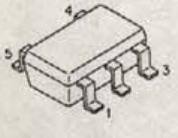
2SA1832
2SC3356
2SC4617
2SC4738
2SC5108

UMA10N
UMA11N

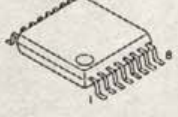


TC4W53FU

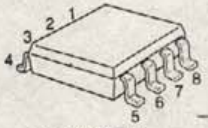
UPA672T



RN5VL30C
RN5VT25A



MB15A01

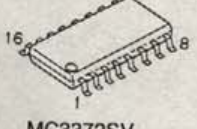


TC4W66FU

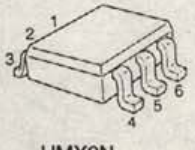
2SK1824

3SK239A

LMC7101BIM5

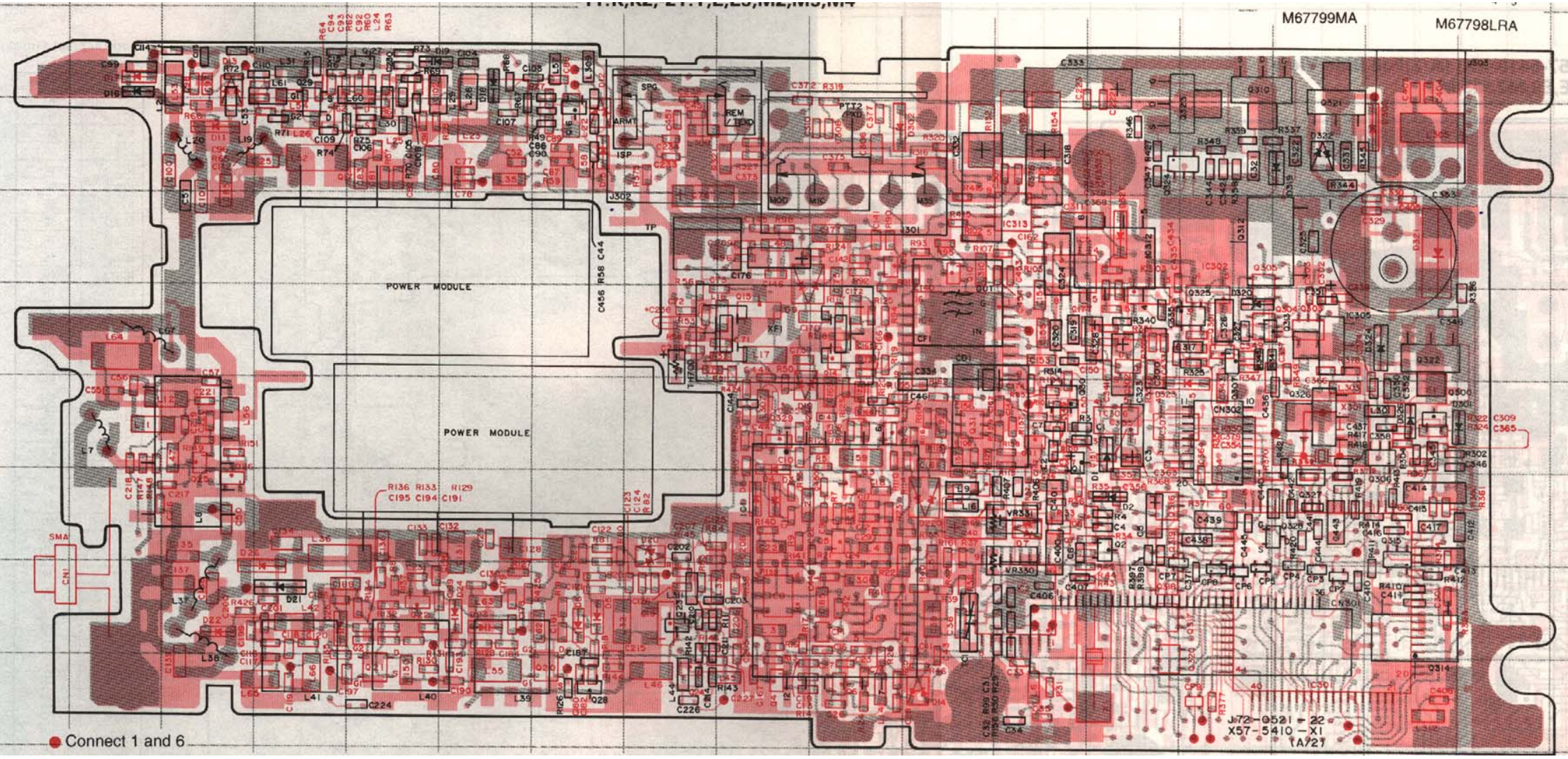


MC3372SV



UMX2N

D17	3P
D20	8K
D22	9O
D23	9L
D24	9M
D25	9N
D26	8O
D220	8H
D300	4C
D302	4H
D321	5B
D323	6E
D327	5E


M67799MA
M67798LRA
POWER MODULE
POWER MODULE
SMA
CN1
Connect 1 and 6
J72-0521-22
X57-5410-X1
TA727

X57-5410-XX (B/2) RF DAUGHTER UNIT

X41-342X-XX(B/2) KEY UNIT

X57-5410-XX (A/2) RF UNIT

X41-342(A/2) PTT UNIT

X41-342X-XX
D501, 502 : B30-2143-05
D503 : B30-2131-05
D504-509 : B30-2157-05
D510-513, 515-521 : MA2S111
IC500 : NJU6433F

0-11	K, K2
0-21	M2, M3, M4
2-71	T, E, E3

MULTIPLEXER

IC312 AUDIO AMP

D319 SPEED UP

D300 CONSTANT VOLTAGE

CONSTANT-CURR

LCD DRIVER

2-COLOR LED

REVERSE CURRENT PREVENTION

D510-521

:B30-2143-05
:B30-2131-05
:B30-2157-05
:MA2S111
:NJU6433F

		D511	D513
0-11	K. K2	MA2S111	MA2S111
0-21	M2. M3. M4	MA2S111	NO
3-71	T. E. E3	NO	MA2S111

X57-541-

D1. 2. 301. 319	:MA2S111	D12-14	:DAN235E	D302. 327
D3-6. 8. 15-17. 22	:MA2S077	D18. 19. 23-25	:HVC350B	
D7. 10. 20. 322	:DA221	D300	:1SS357	Q1. 2. 10. 12-
D9. 220	:RB706F-40	D320. 326	:MAZS05600	22. 27. 300.
D11. 21. 26	:HVU131	D321	:SPPB-72VL	Q3-6. 16. 23-
		D323-325	:RB751V-40	Q7

A/2) RF UNIT

CN302

IC303. 303
RAIL INPUT OP AMP

DEV(UHF) VR330 47k
DEV(VHF) VR331 47k

IC312
AUDIO AMP

D319
SPEED UP

IC303
LMC7101BIM5

IC302
LMC7101BIM5

3. 5V REGULATOR
IC305
S-81335MG-KI

3. 0V
DETECTOR

2. 5V
DETECTOR

IC306
RN5VT25A

X301
L78-0367-05

IC307
RN5VL30C

Q310
2SK1588

Q323
2SK1588

Q324
UMC5

Q306
UMC5

Q313
2SC4617(R)

Q307
2SJ243

Q325
UPA572T

Q326
2SB1188(Q)

Q327
UMW1

Q315
UMW1

Q316
UMA11N

Q317
UMA11N

Q318
UMA11N

Q319
UMA11N

Q321
CONSTANT-CURRENT CIRCUIT

D300
CONSTANT VOLTAGE

D322
CONSTANT VOLTAGE

AVR

IC301
MICROCOMPUTER

SW

PTT

S501

L312

L305

F1

Note) • Ref.NO : Parts of pattem1

D302. 327	:DTZ3. 9(B)
Q1. 2. 10. 12-14. 22. 27. 300. 309. 313	:2SC4617(R)
Q3-6. 16. 23-26. 328	:2SC5108(Y)
Q7	:2SA1832(GR)
Q8. 301	:2SC4738(GR)
Q9. 11	:2SC4649(N. P)
Q15. 19	:2SC3356
Q17. 20. 21. 29	:3SK239A
Q28	:DTC144EE
Q30	:UMC4
Q31	:UMX2N
Q302. 308. 328	:2SK1824
Q303	:UMG1
Q304. 316-319	:UMA11N
Q305	:UPA672T
Q306	:UMC5
Q307	:2SJ243
Q310. 323	:2SK1588
Q312. 314	:2SB1184(Q. R)
Q315. 327	:UMW1
Q320	:UMA1ON
Q321	:2SD1483
Q322. 326	:2SB1188(Q)
Q324	:UMC5
Q325	:UPA572T
IC1	:KCH36
IC2	:MB15A01
IC3	:TC4W66FU
IC4	:MC3372SV
IC5	:TC4W53FU
IC8	:TA75S01F
IC100	:M67798LRA
IC101	:M67799MA

VHF. UHF VCO

Q4-6 RF AMP

IC1 KCH36

IC2 MB15A01 PLL IC

IC3 2-CIRCUIT ANALOG SW

IC4 MC3372SV

IC5 TC4W53FU MULTIPLEXER

3. 0V DETECTOR

PWM RECTIFICATION

IF AMP

Q31 TWO 450kHz AMP

Q12 450kHz AMP

BUFFER AMP

AM DETECTION

FM SW

AGCSW

NOISE DETECTION

NOISE AMP

OSCILLATOR

MIXER

SQUELCH TRIGGER

LIMITER AMP

FILTER AMP

AF AMP

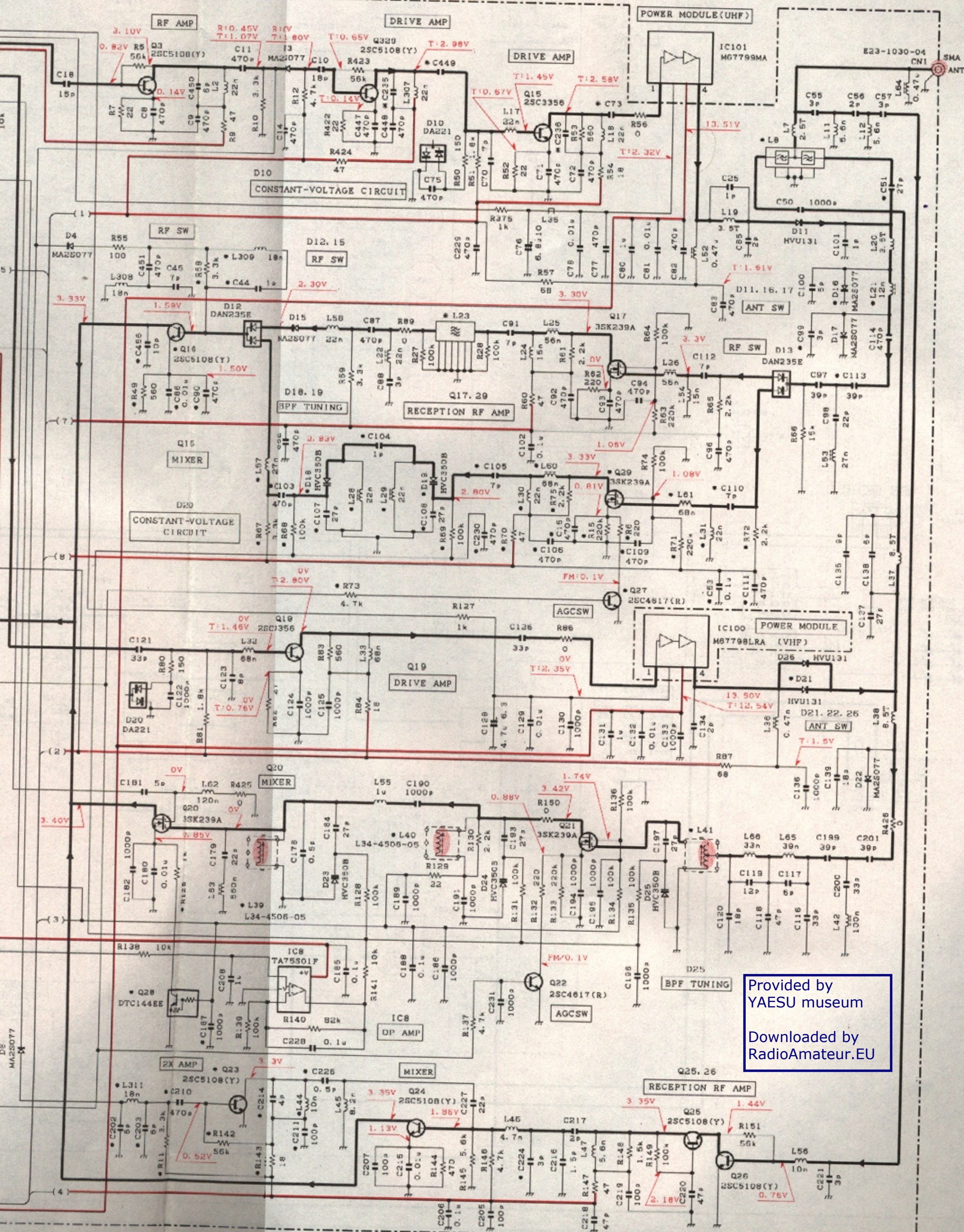
DEMODULATOR

SCHEMATIC DIAGRAM TH

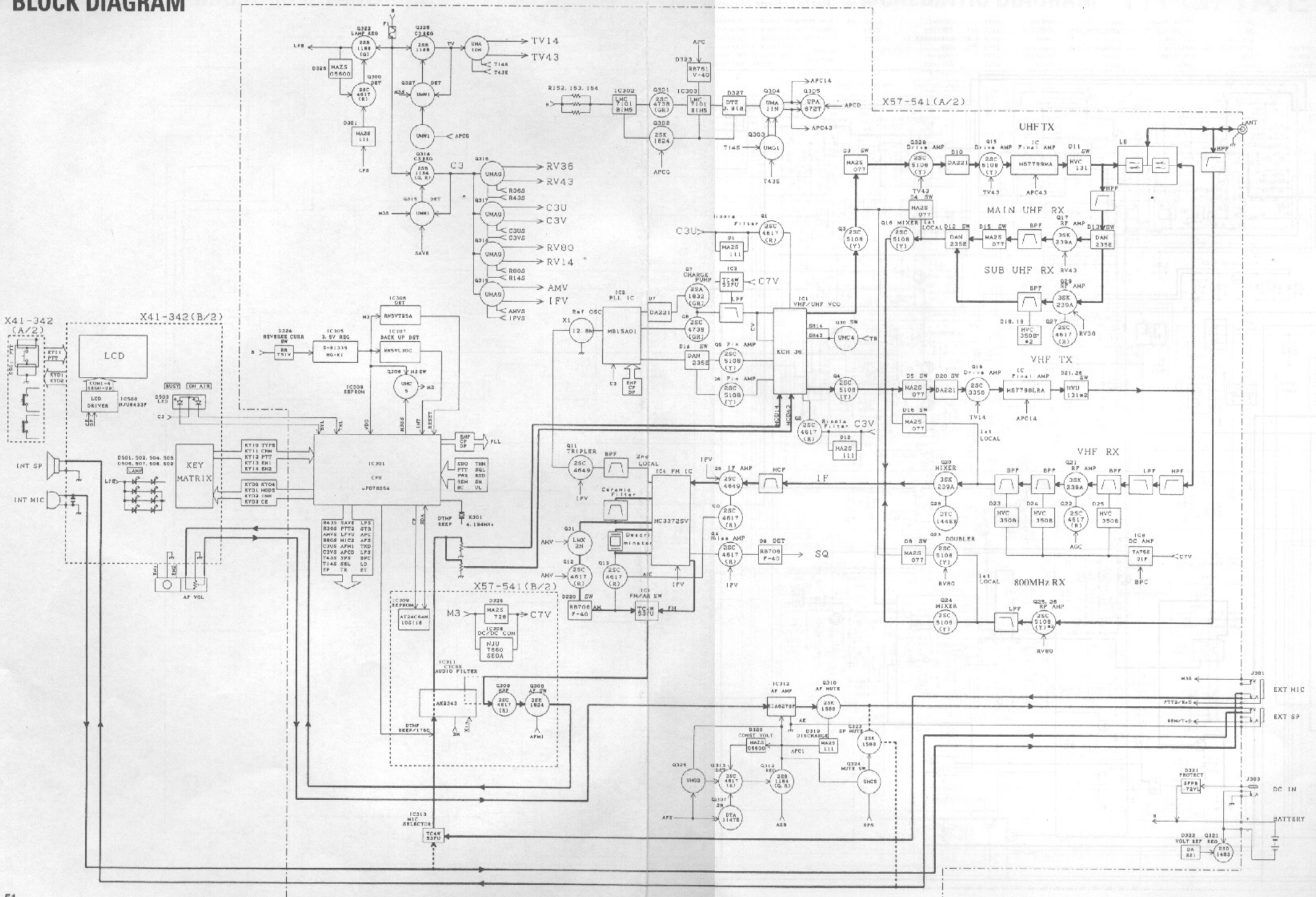
Parts of pattem1.

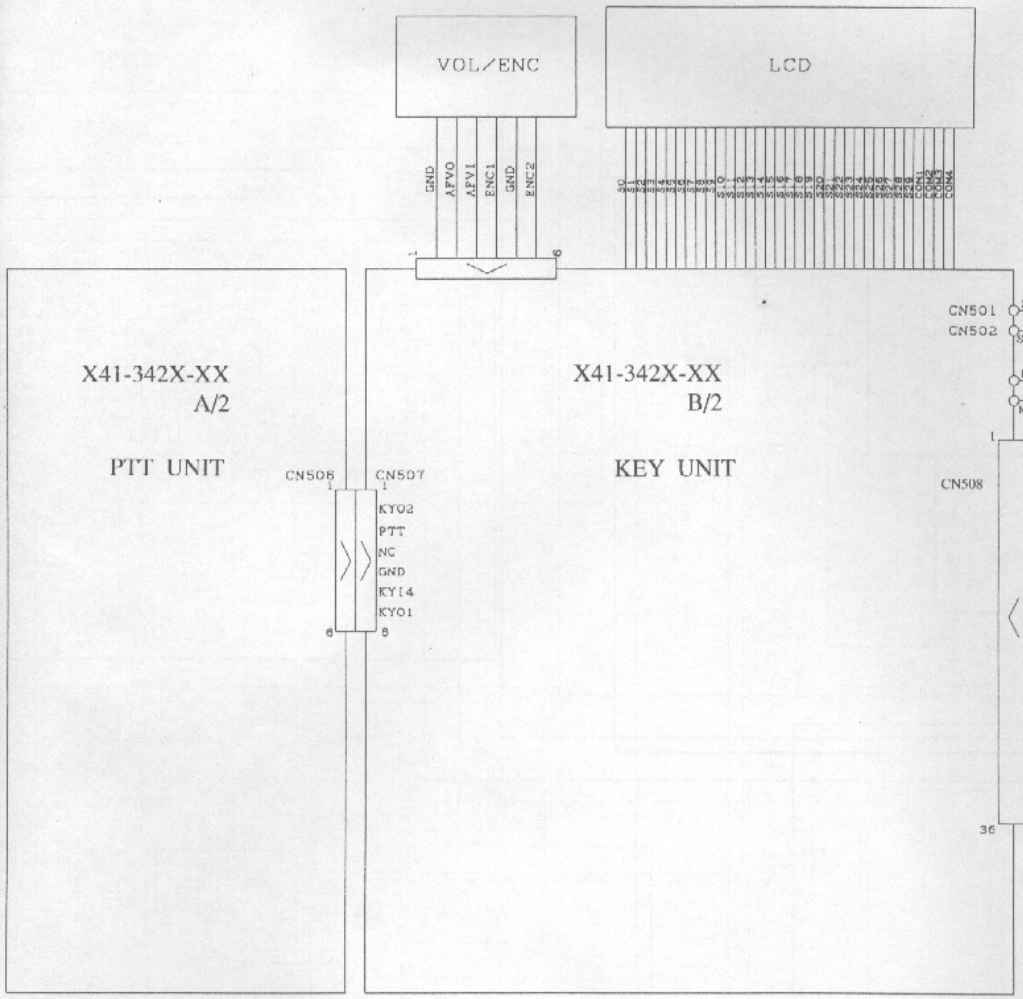
IC3	:TC4W66FU	IC301	:UPD78054GK-538(0-11)	IC308	:TC7660SEOA
IC4	:MC3372SV	IC301	:UPD78054GK-541(0-21)	IC309	:AT24C64N10SI18
IC5	:TC4W53FU	IC302. 303	:LMC7101BIM5	IC311	:AK2343
IC8	:TA75S01F	IC305	:S-81335HG-KI	IC312	:KIA6278F
IC100	:M67798LRA	IC306	:RN5VT25A	IC313	:TC4W53FU
IC101	:M67799MA	IC307	:RN5VL30C		

		IC301	L23	D302	C73	C232-234	C235	C23
0-11	K. K2	UPD78054GK-538	L79-1493-05	NO	15p	NO	NO	NO
0-21	T. E. E3. M2. M3. M4	UPD78054GK-541	L79-1492-05	DTZ3. 9(B)	470p	100p	6p	7p



BLOCK DIAGRAM

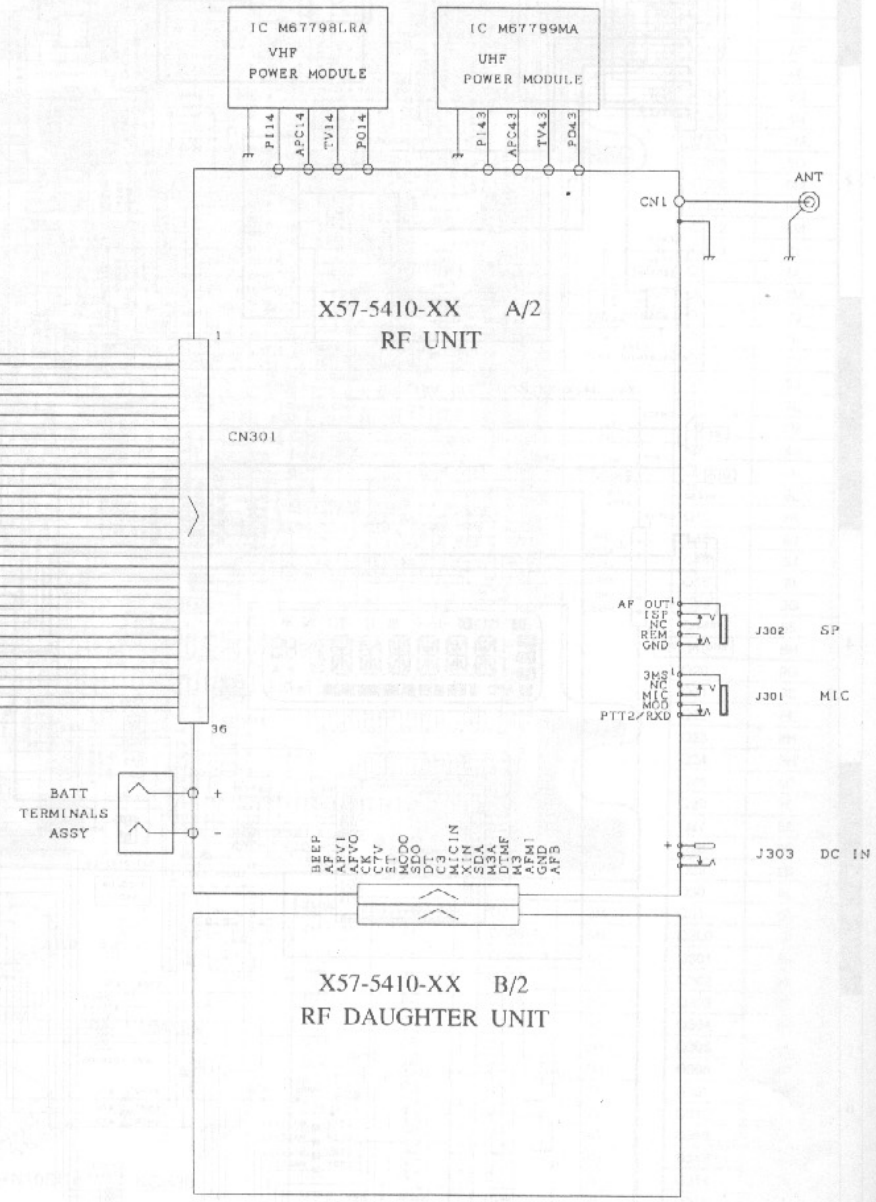




Model Name	Destination Symbol	Destinations	TX-RX Unit	SWITCH Unit
TH-G71A	K	USA	X57-5410-11	X41-3420-11
TH-G71A	K2	USA	X57-5410-11	X41-3420-11
TH-G71A	M2	General market	X57-5410-21	X41-3420-21
TH-G71A	M3	General market	X57-5410-21	X41-3420-21
TH-G71A	M4	General market	X57-5410-21	X41-3420-21
TH-G71E	E	Germany Italy	X57-5410-21	X41-3422-71
TH-G71E	E3	Belgium Holland Spain France	X57-5410-21	X41-3422-71
TH-G71E	T	England	X57-5410-21	X41-3422-71

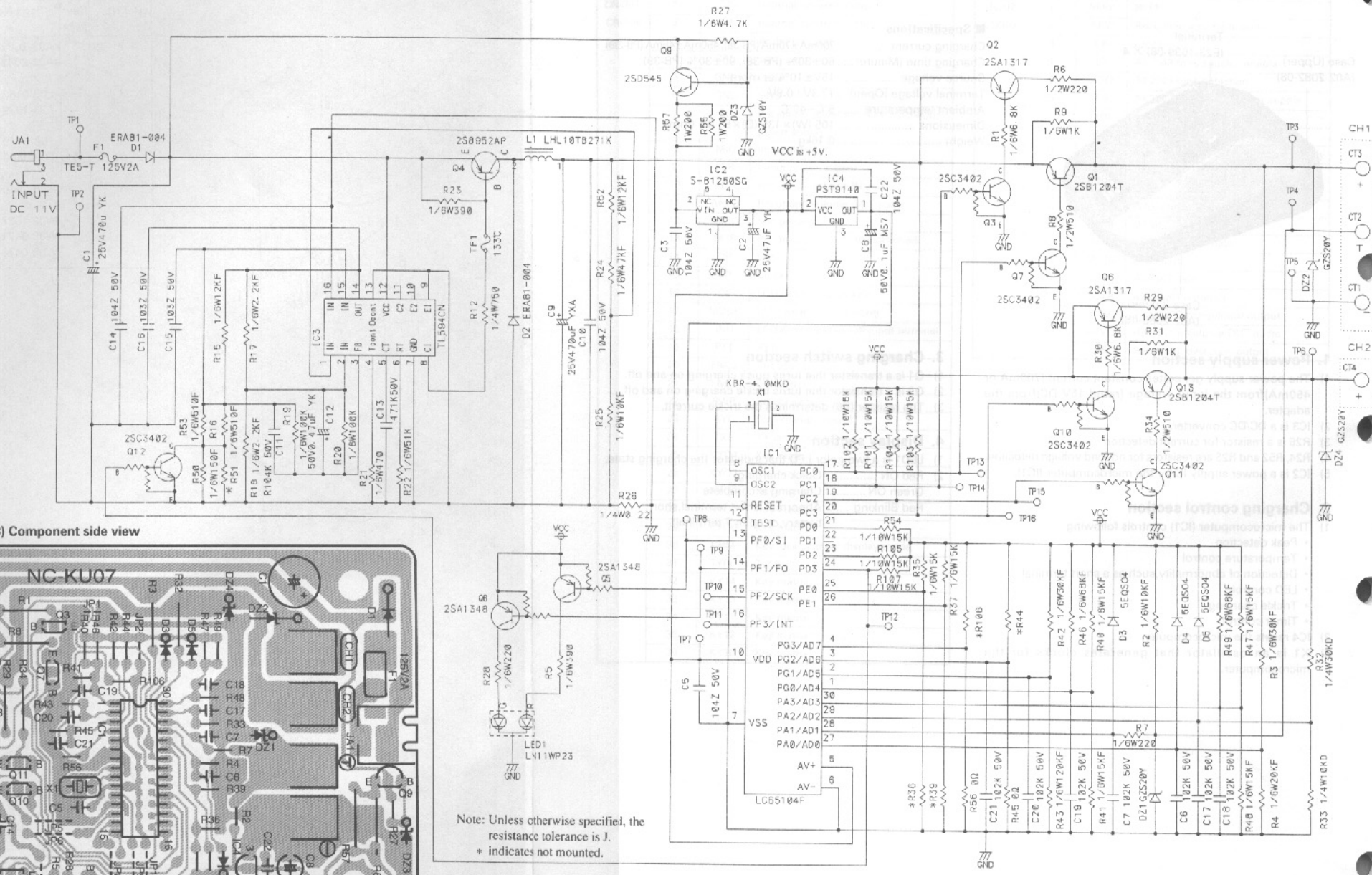
TH-G71A/E

WIRING DIAGRAM



BC-19 RAPID CHARGER

■ CIRCUIT DIAGRAM (W02-1928-08)



Note: Unless otherwise specified, the resistance tolerance is J.
* indicates not mounted.

■ PC BOARD VIEW (W02-1928-08) Component side view

TH-G71A/E

SPECIFICATIONS

General		VHF Band	UHF Band
Frequency range	U.S.A./Canada	144 to 148 MHz	438 to 450 MHz
	General Market	144 to 148MHz	430 to 440MHz
	Europe	144 to 146MHz	430 to 440MHz
Mode		F3E(FM)	
Usable temperature range		-20°C to+60°C (-4 °F to+140 °F)	
Rated voltage	External power supply (DC IN)	5.5to 16.0V (13.8V)	
	Battery terminals	4.5to 15.0V (6.0V)	
Current	Receive with no signals	Approx. 70mA	
	Battery Saver ON	Average 30mA	
	Transmit with HI,13.8V (DC IN)	Approx. 1.7A	Approx. 2.1A
	Transmit with HI,9.6V (battery terminals)	Approx. 1.7A	*Approx. 1.8A
	Transmit with HI,6.0V (battery terminals)	Approx. 1.3A	Approx. 1.5A
	Transmit with LOW,6.0V (battery terminals)	Approx. 500mA	
	Transmit with EL,6.0V (battery terminals)	Approx. 300mA	
Ground method		Negative	
Dimensions (W × H × D,projections included) [1]		54 × 112 × 33.5mm / 2.13 × 4.41 × 1.32in	
Weight [1,2]		Approx.330g/11.6oz	
Microphone impedance		2k Ω	
Antenna impedance		50 Ω	
Transmitter		**VHF Band**	**UHF Band**
Power output	HI,13.8V	6W	5.5W
	HI,9.6V	Approx. 5W	
	HI,6.0V	Approx. 2.5W	Approx.2.2W
	LOW,6.0V	Approx. 0.5W	
	EL,6.0V	Approx. 50mW	
Modulation		Reactance	
Maximum frequency deviation		Within ± 5kHz	
Spurious emissions		-60dB or less	
Receiver		**VHF Band**	**UHF Band**
Circuitry		Double conversion superheterodyne	
1st intermediate frequency		38.85 MHz	
2st intermediate frequency		450 kHz	
Sensitivity (12dB SINAD)		0.18 μ V or less	
Squelch sensitivity		0.1 μ V or less	
Selectivity (-6dB)		12kHz or more	
Selectivity (-40dB)		28kHz or less	
Audio output (10%distortion)	9.6V (battery terminals)	500mW or higher (8 Ω load)	
	6.0V (battery terminals)	300mW or higher (8 Ω load)	

[1] With a PB-38 installed

[2] PB-38,antenna,and belt hook included

Specifications are subject to change without notice due to advancements in technology.

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