

# TH-75A/E

## SERVICE MANUAL

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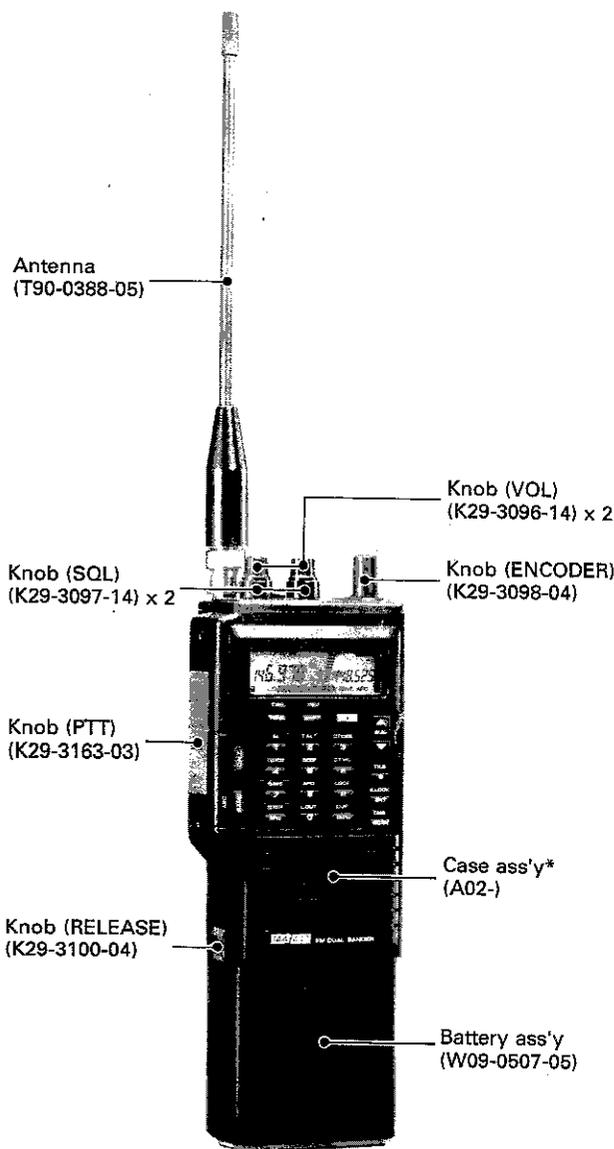


Photo is TH-75A.

\* Refer to parts list on page 25.

**Danger**

Never attempt to disassemble the final module.  
It contains Beryllium oxide.

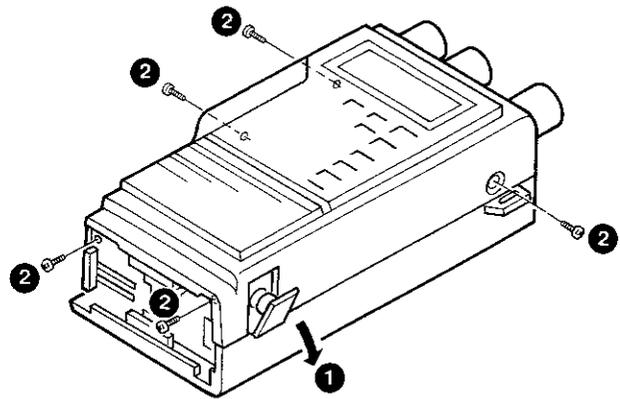
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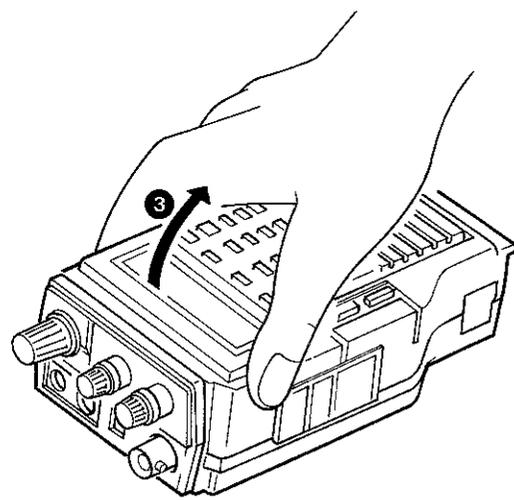
## DISASSEMBLY FOR REPAIR

### Disassembly procedure

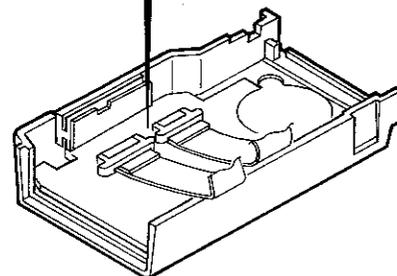
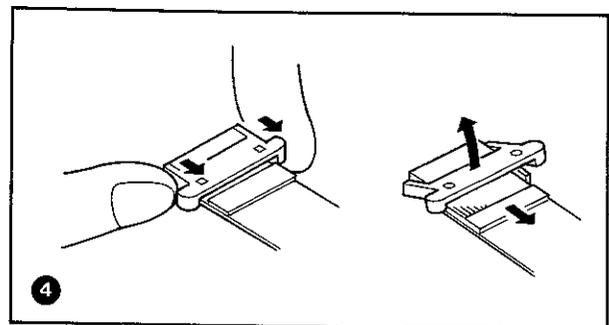
1. Remove the DC IN cap from the jack (1).
2. Remove the two screws on the front case side of the bottom plate, then remove the three screws from both sides of the front case (2).



3. Remove the front case from the panel side (3). The panel is firmly engaged with the front case.



4. Disconnect the flat cable by pulling and lifting the control-side connector (4). Take care not to raise it excessively.



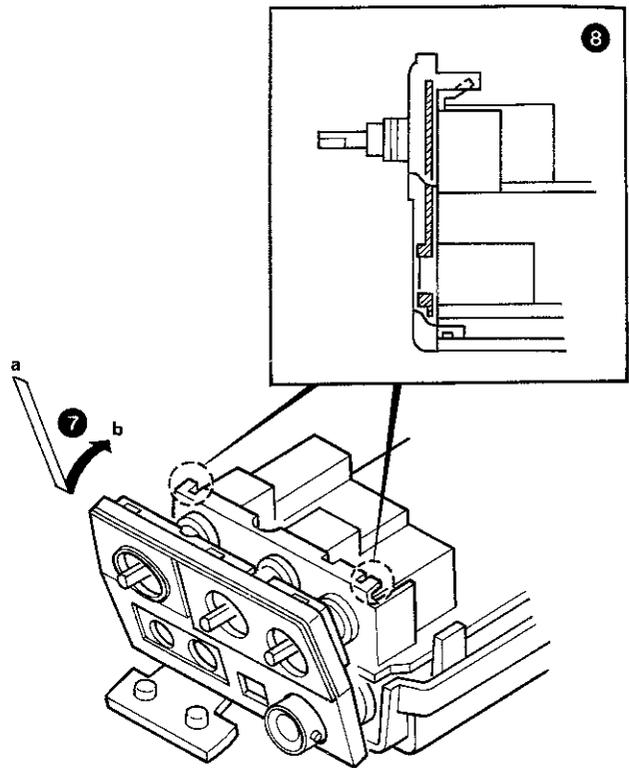
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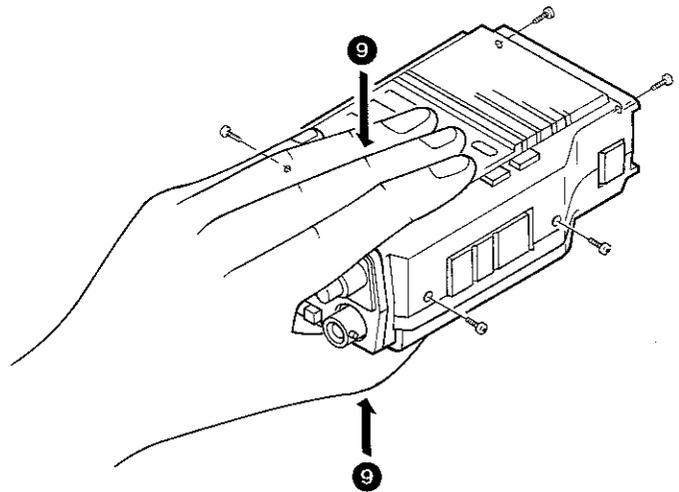
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## DISASSEMBLY FOR REPAIR

7. To install the panel, insert the panel on the rear case side, then stand it in the direction of b (7).
8. The panel is fastened by claws on the subpanel. Push the panel until it clicks (8).



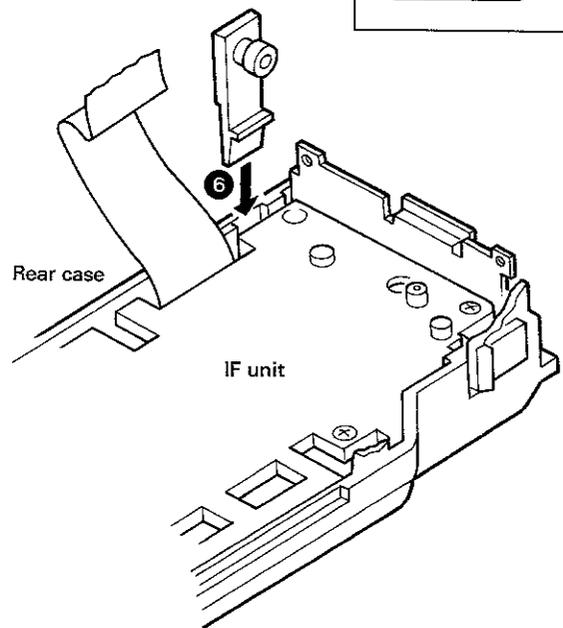
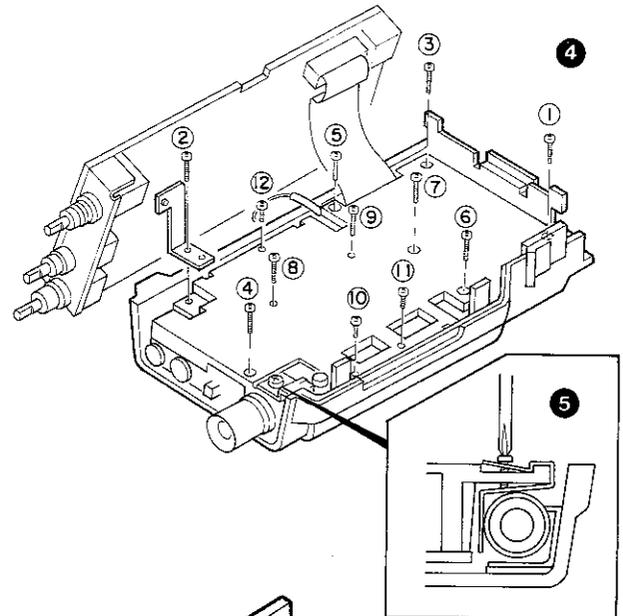
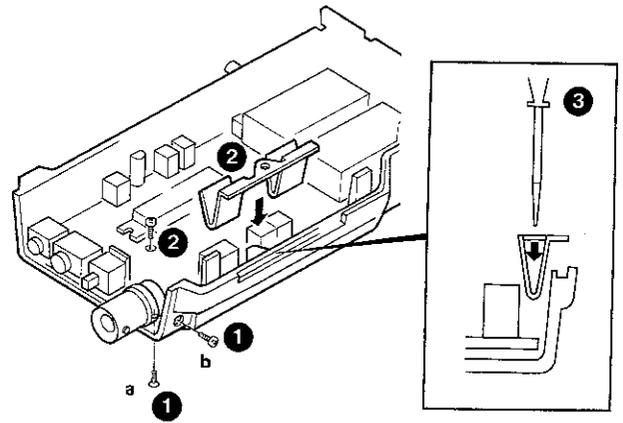
9. To install the front case, tighten the screws while holding the rear case and front case (9).



## DISASSEMBLY FOR REPAIR

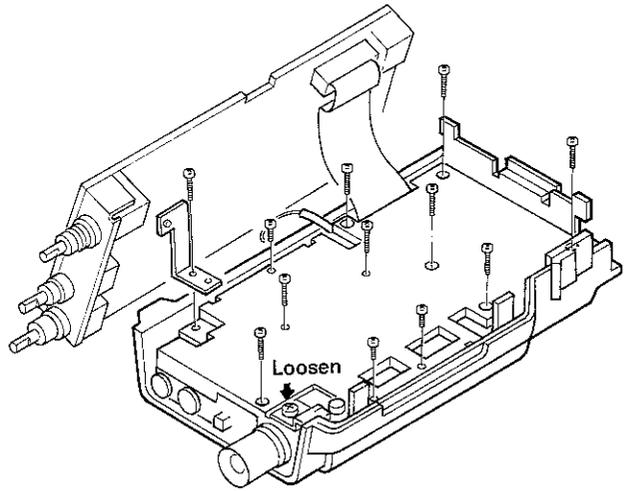
### Assembly procedure

1. To fasten the TX-RX unit with screws, tighten the BNC receptacle in the order of a to b ( ① ).
2. Before installing the shield cover, check that a screw and a helical ground spring are attached under the HI/LO switch ( ② ).
3. Push the helical plate spring at the bent part with a standard screwdriver ( ③ ).
4. Tighten the screws diagonally from the lower left. Tighten the screw holding the power module at the end ( ④ ).
5. Lightly tighten the screw holding the BNC receptacle and plate spring (torque: 1 kgf-cm) ( ⑤ ).
6. If the DC jack cap comes off, insert it between the rear case and shield cover, then install the IF board ( ⑥ ).

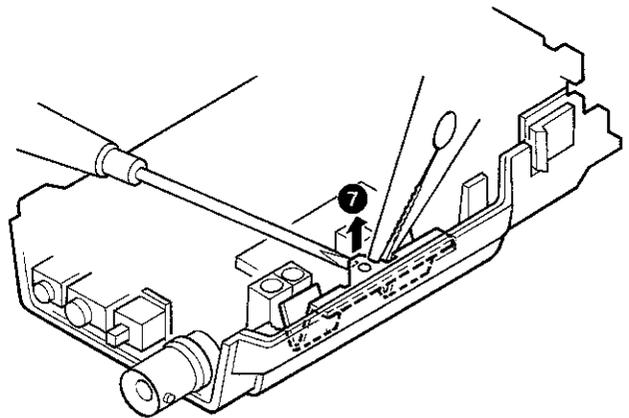


## DISASSEMBLY FOR REPAIR

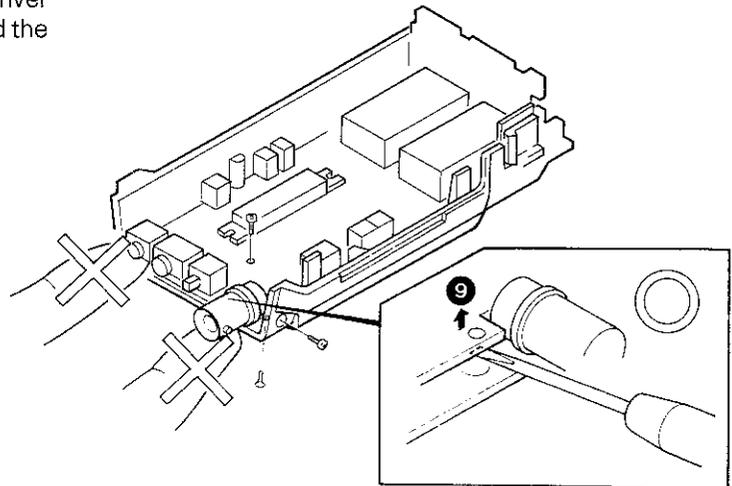
- To remove the shield cover (die-cast), loosen the screw holding the BNC receptacle with the plate spring, then remove 12 other screws.



- Removing the helical plate spring (7)  
 When a standard screwdriver is used, insert it between the plate spring and boss and twist it.  
 When a pincer is used, raise the plate spring by grasping the part projected from the boss of the plate spring with the pincer.

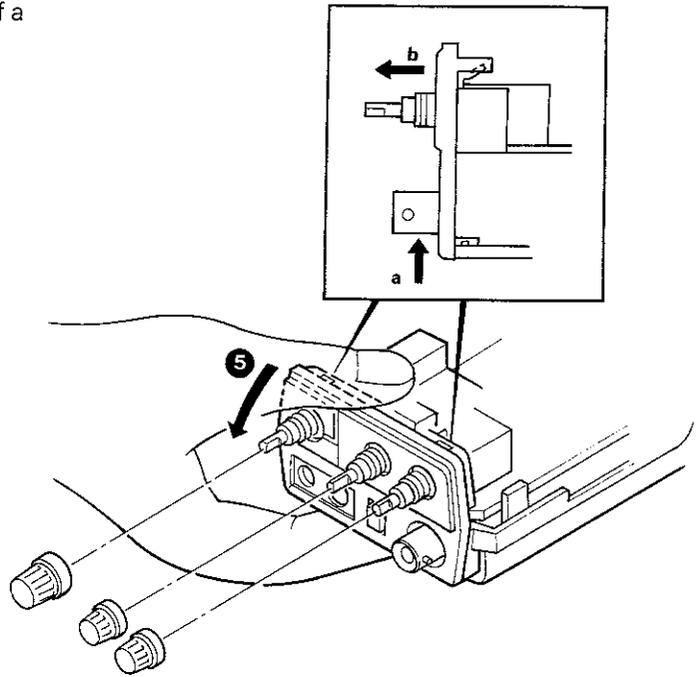


- To place the TX-RX unit on its side, use a screwdriver from the position shown in the figure; never hold the SP jack, HI/LO switch, or BNC receptacle (9).

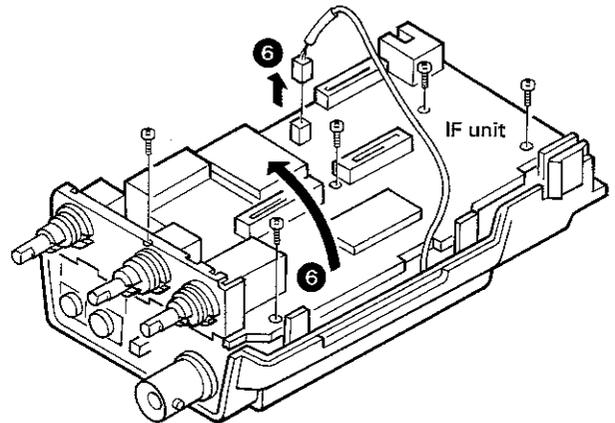


## DISASSEMBLY FOR REPAIR

5. Remove the panels by raising them in the order of a to b to the front case side (5).



6. To place the IF unit on its side, disconnect the IF signal line connector on the UHF side (6).



# CIRCUIT DESCRIPTION

## Circuit Configuration by Frequency

The TH-75A/E incorporates a PLL synthesizer, operates with a digital VFO, and enables selection of a channel step of 5, 10, 12.5, 20, or 25kHz.

Since the 144MHz and 430MHz (M,M2,X,T,W), 440MHz (K,P) band receivers have independent PLLs and IFs, they can receive signals simultaneously.

In the 144MHz band receiver, an incoming signal is attenuated to a first intermediate frequency (IF) of 16.9 MHz using the first local oscillator frequency from 127.1 to 129.095MHz (T,W), 127.1 to 131.095MHz (K,P,M,M2,X). The first IF signal is further attenuated with a second local oscillator frequency of 16.445MHz (T,W), 17.355MHz (K,P,M,M2,X) to generate a second IF of 455kHz.

In the 430/440MHz band receiver, an incoming signal is attenuated to a first IF of 59.525MHz using the first local oscillator frequency from 370.475 to 380.470MHz (M,M2,X,T,W), 380.475 to 390.470MHz (K,P). The first IF signal is further attenuated with a second local oscillator frequency of 59.07MHz to generate a second IF of 455kHz.

Both the 144MHz and 430/440MHz band receivers are double-conversion.

The transmitter consists of a PLL circuit that enables direct modulation and direct frequency division in both bands. Signals from the PLL circuit are amplified by a linear amplifier for transmission.

## Receiving System

The TH-75A/E incorporates a built-in duplexer since it uses a common antenna for the 144MHz and 430/440MHz bands.

### • 144MHz band

An incoming 144MHz band signal from the antenna passes through a low-pass filter, duplexer, and antenna switches D216 (MI308) and D217 (1SV154). The signal is amplified by RF amplifier Q216 (2SK360), and unnecessary components are removed by a bandpass filter. The resultant signal is fed to first mixer Q217 (2SK882) which mixes it with the first local oscillator signal and converts it to the first IF (16.9MHz).

This signal is passed through two monolithic crystal filters (MCFs) to remove unnecessary components, then fed into the VHF IF daughter unit (X58-3610-01). The FM IC IC1 (TK10487M) mixes the IF signal with the second local oscillator signal to generate a second IF of 455kHz which passes through ceramic filter CF1 into IC1 again for amplification. It is detected and becomes an AF signal.

The AF signal output from the VHF IF daughter unit is passed through analog switches IC4 and IC6 (TC4066BF) and a high-pass filter into a power amplifier for amplification, then output to the speaker.

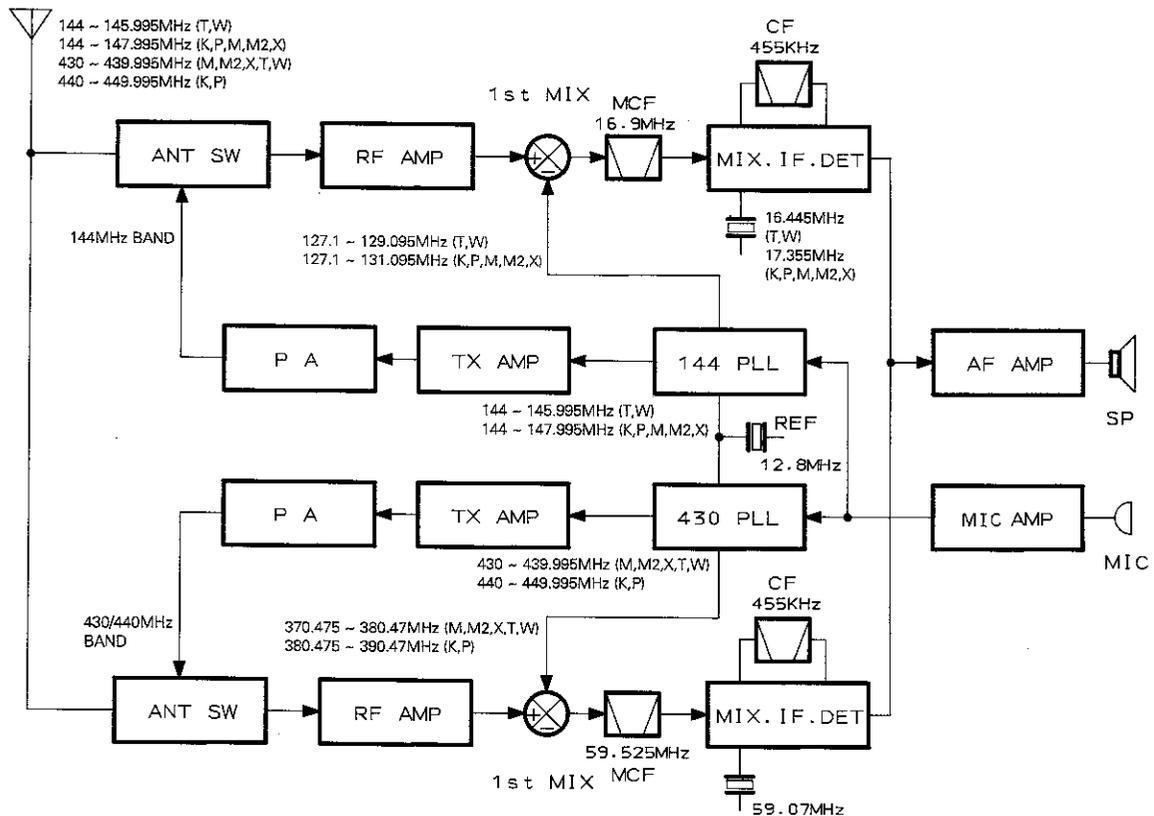


Fig. 1 Circuit configuration by frequency

## CIRCUIT DESCRIPTION

### • 430/440MHz band

An incoming 430/440MHz band signal from the antenna passes through a low-pass filter, duplexer, and antenna switches D207 and D208 (MI308). The signal is amplified by RF amplifiers Q207 and Q208 (2SC4226), and unnecessary components are removed by two helical blocks. The resultant signal is fed to first mixer Q209 (2SC4226) which mixes it with the first local oscillator signal and converts it to the first IF (59.525 MHz).

This signal is passed through two MCFs to remove unnecessary components, then fed into the UHF IF daughter unit (X58-3510-00). The FM IC IC1 (TK10485M) mixes the IF signal with the second local oscillator signal to generate a second IF of 455kHz which passes through ceramic filter CF1 into IC1 again for amplification. It is detected and becomes an AF signal.

The processing for the 144MHz band is independent of that for the 430/440MHz band up to this stage, but after AF detection, the processing is common for both bands.

Item	Rating
Nominal center frequency (fo)	16,900kHz
Pass bandwidth	fo ± 7.5kHz or more at 3dB
Attenuation bandwidth	fo ± 25kHz or less at 40dB fo ± 45kHz or less at 60dB
Guaranteed attenuation	70dB or more within fo ± 1MHz Spurious : 40dB or more at fo ~ fo + 500kHz, 80dB or more within ±890 ~ 930kHz
Ripple	1.0dB or less
Insertion loss	2.0dB or less
Terminal impedance	1.8kΩ / 0pF

**Table 1 MCF (L71-0276-05) (TX-RX unit XF1)**

Item	Rating
Nominal center frequency (fo)	59.525MHz
Pass bandwidth	fo ± 8.5kHz or more at 3dB
Attenuation bandwidth	fo ± 25kHz or less at 25dB fo ± 75kHz or less at 60dB
Guaranteed attenuation	40dB or more within fo ± 75 ~ 1,000kHz 80dB or more at fo - 910kHz
Ripple	1.0dB or less
Insertion loss	4.0dB or less
Terminal impedance	380Ω / 3.5pF

**Table 2 MCF (L71-0290-05) (TX-RX unit XF2)**

Item	Rating
Center frequency of 6dB bandwidth (fo)	455kHz ± 1.5kHz
6dB bandwidth	± 7.5kHz or more
40dB bandwidth	± 15kHz or less
Ripple	1.5dB or less (455kHz ± 1.5kHz)
Guaranteed attenuation	27dB or more within fo ± 100kHz
Insertion loss	6dB or less
terminal impedance	1.5kΩ

**Table 3 Ceramic filter (L72-0362-05) (IF unit CF1)**

### • Squelch circuit

The 144MHz and 430/440MHz band receivers each have an IF daughter unit and output a BUSY signal for squelch control.

The BUSY signal, output from pin 15 of IC1, is generated by rectifying the noise amplified by Q1 in the IF daughter unit by double voltage by D1 and controlling the level with the SQL VR so that the squelch is off. When the squelch is on, the audio amplifier power is usually switched off; however the TH-75A/E has a fast squelch mode in which the audio amplifier power is on even if the squelch is on.

### • S-meter circuit

S-meter signals are output from pin 12 of IC1 in the IF daughter unit. These signals are fed directly into the microprocessor to control the S-meter section of the LCD.

S-meter signals are used for both the 144MHz and 430/440MHz band receivers. The S-meter display shows the main channel only. Two signals work as a pair and display in six levels.

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# CIRCUIT DESCRIPTION

**• Audio signal switching and mute circuits**

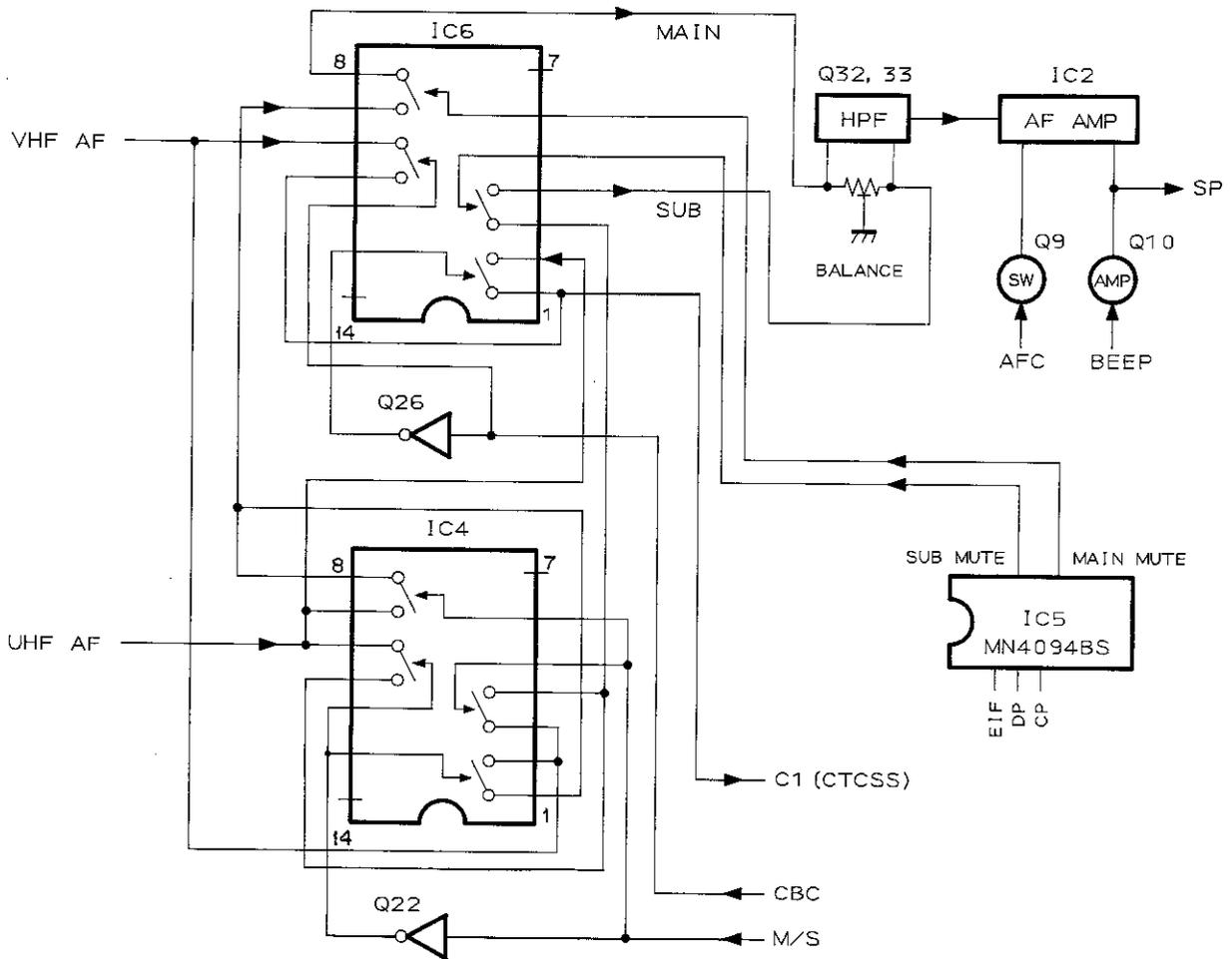
In the DUAL mode, the AF signals for the 144MHz and 430/440MHz bands for the main channel and subchannel are switched by M/S signal. When the M/S signal is high, the 144MHz band becomes the subchannel and the 430/440MHz band becomes the main channel. When the M/S signal is low, the 144MHz band becomes the main channel and the 430/440MHz band becomes the subchannel.

When the tone alert function and CTCSS function are on, the main channel and subchannel are muted by the MUTE signal output from IC5 and, at the same time, the AFC goes high and the IC2 power is switched off.

When a channel becomes busy, the AFC goes low, the IC2 power is switched on, and the busy channel is unmuted. In the single mode, the mute circuit operates so that the subchannel is always off.

The CTCSS switches the CI input to the option TSU-6 to the 144MHz and 430/440MHz bands by CBC signal so that either the main channel or subchannel may be selected. When the CBC is high, the 144MHz band is selected.

Various beep tones and tone alert sounds are directly output from the speaker by Q10. When a beep or tone alert tone is being output, the AFC goes high and switches the IC2 power off to cut off audio signals.



**Fig. 2 Main/Sub audio switching circuit**

## CIRCUIT DESCRIPTION

### Transmitting System

#### • Outline

Transmitter signal are obtained by directly VCO frequency for both the 144MHz and 430/440MHz bands. Variable reactance modulation is performed by directing the microphone circuit to the varactor diode of the VCO.

#### • Modulation circuit

An audio signal from the microphone is fed into the microphone amplifier daughter unit (X58-3620-XX); passed through the pre-emphasis, limiter amplifier, and splatter filter; then output from the MOD pin. To match the VCO modulation sensitivity of the 144MHz band with that of the 430/440MHz band, the modulation of the 144MHz band is adjusted by VR1 and the modulation of the 430/440MHz band is adjusted by VR2. Since the modulation sensitivity of the 430/440MHz band is higher than that of the 144MHz band, VR2 is inserted in the MOD line by Q31 (2SJ144) when transmitting from the 430/440MHz band. VR2 is shorted when transmitting from the 144MHz band to match the modulations.

Signals output from the MOD pin enter each VCO and are modulated directly with a varactor diode with variable reactance. When DTMF is used, the DTMF monitor tone is output from the speaker. Signals from the MIC are cut off by Q20.

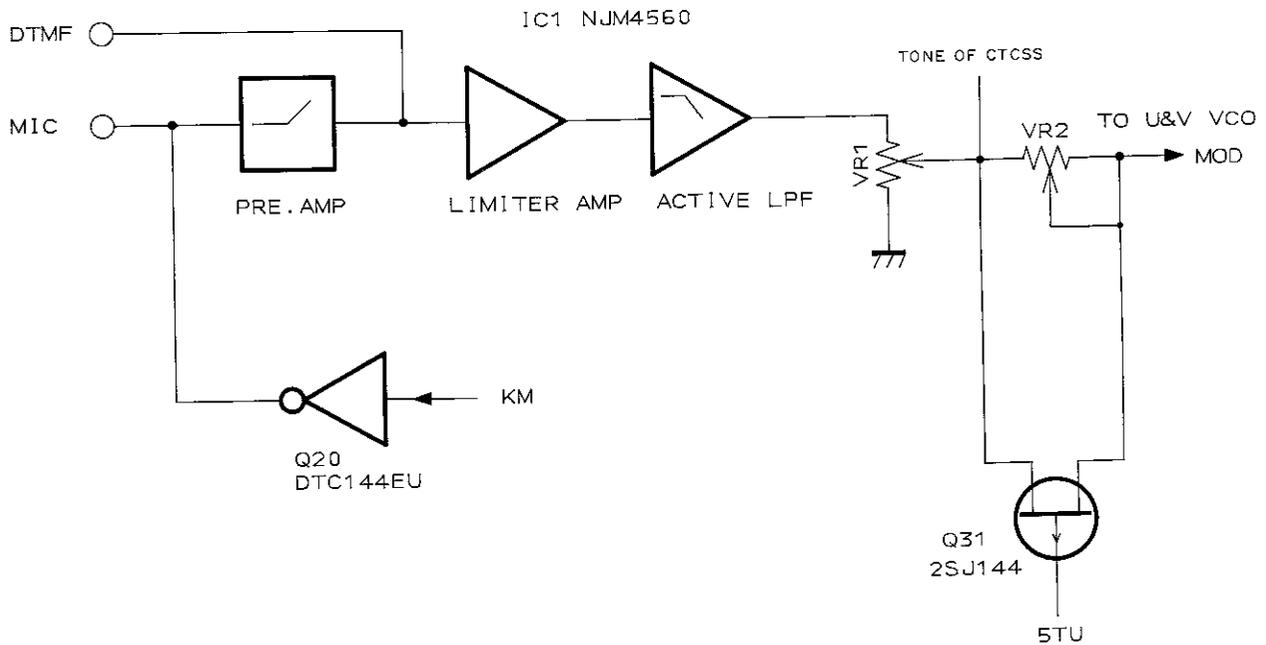


Fig. 3 Modulation circuit

# CIRCUIT DESCRIPTION

• **Drive and final circuit**

The VCO output signals are amplified by two amplifiers in both the 144MHz and 430/440MHz bands and are further amplified by the RF power module. The signals are supplied to the antenna via the antenna changeover switch, duplexer, and LPF. Figure 4 shows a block diagram of the transmitting system.

• **H/L power switching**

The power level is switched to high or low by Q1. When the H/L SW is set to ON (H/L: L), Q1 is set on, and VR3 and VR4 are disconnected. This increases the reference voltage and the CONT voltage, raises the attenuation of the diode, and reduces the input level. Thus, the power becomes low.

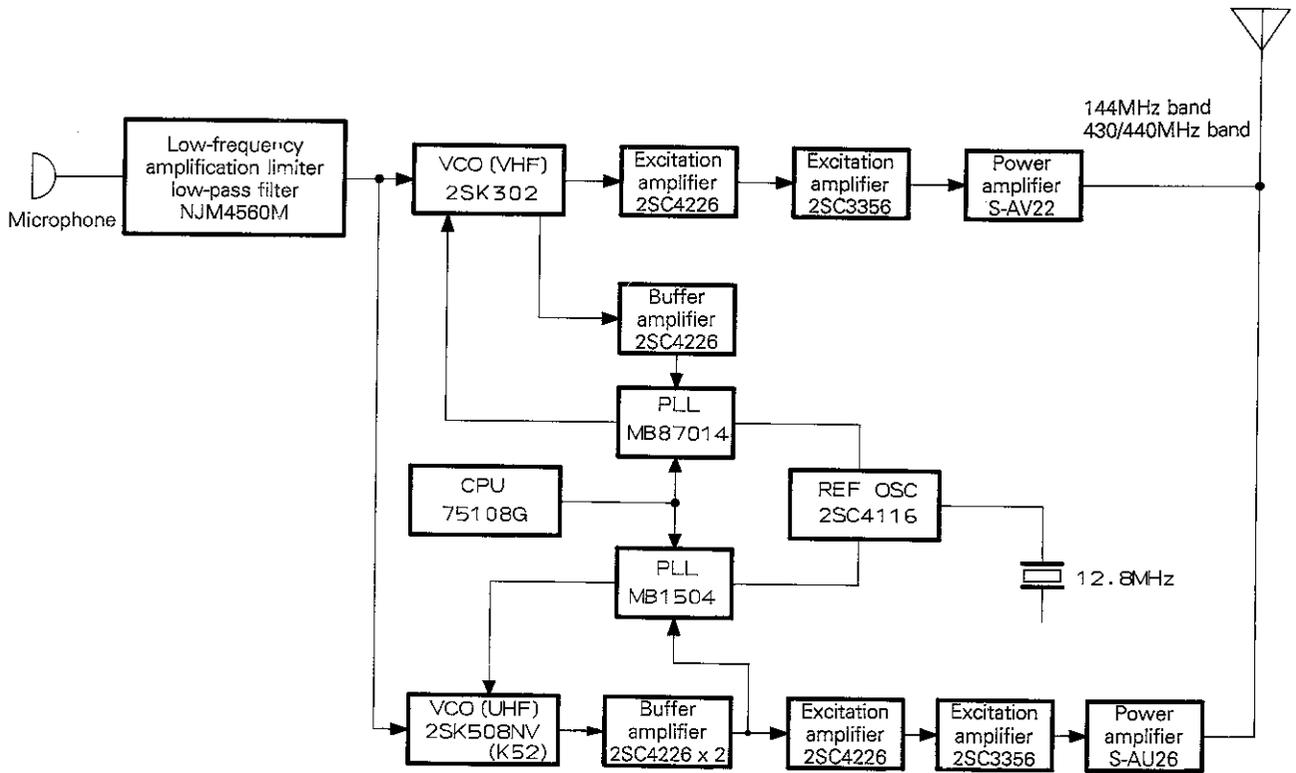


Fig. 4 Transmitter system block diagram

## CIRCUIT DESCRIPTION

### • APC circuit

The APC circuit provides stable transmission power. It detects the current of the final module and controls the input level of the power module.

When Q6 is set on in the transmit mode, the APC circuit is activated. In the 430/440MHz band, for example, IC3 compares the 3.9V generated by D3 with the reference voltage divided by VR3 and VR5. If the voltage

drop is high, the CONT voltage is increased; if the drop is low, the CONT voltage is reduced to keep the current constant. The CONT pin controls the attenuation of the diode on the input side of the power module and changes the input level.

Thus, the circuit can keep current variations within several dozens mA even if the power module is excessively loaded.

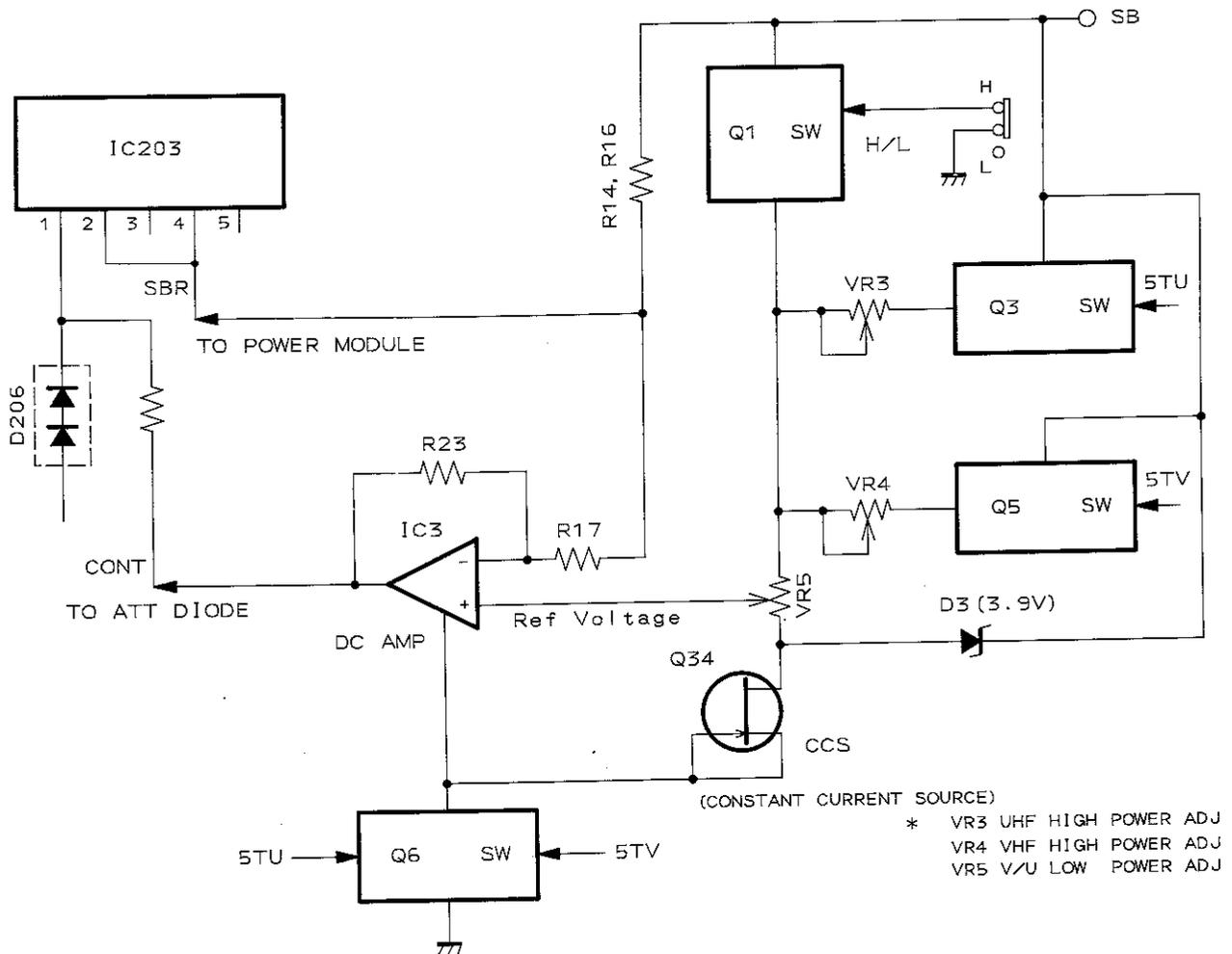


Fig. 5 APC circuit

# CIRCUIT DESCRIPTION

## Power Supply Circuit

The TH-75A/E operates its with power supply voltage SB and 5V for transmission (5T), 5V for reception (5R), 5V for transmission and reception (5C), and 5V for microprocessor and microphone (5M). These voltages are generated by the AVR circuit.

The 5T, 5R, and 5C are divided into 5TV, 5RV, and 5CV for the 144MHz band and 5TU, 5RU, and 5CU for the 430/440MHz band. Figure 6 shows a block diagram of the power supply circuit.

5C is produced by the AVR of Q2 and Q21. When UA is high, Q11 supplies 5CV, and when VA is high, Q13 supplies 5CV. 5RU and 5RV are output in the receive mode in the same way. 5CU, 5CV, 5RU, and 5RV are all provided during simultaneous reception.

5T is supplied by the AVR of Q4 and Q23 when either TU or TV goes high. When TU is high, 5RU is switched off and 5TU is supplied even if Q18 is on.

5M is produced by 5V IC IC1.

### • Save circuit

5C and 5R are switched on and off with a ratio of 1 : 4 by the SAVE signal output from the microprocessor. When SAVE goes high, Q16 is set off and does not supply 5C. This saves current consumption when the system is awaiting reception. When the squelch is closed and no key is pressed for 1 hour or longer, the power is switched off.

	Save operation	Power off operation
Operation starting time	Squelch is closed and no key is pressed for 10 seconds or longer.	Squelch is closed and no key is pressed for 1 hour or longer.
Restore method	Receive a signal, Open squelch, or Press a key.	Press the MONI key. Set the power switch to on again.

Table 4

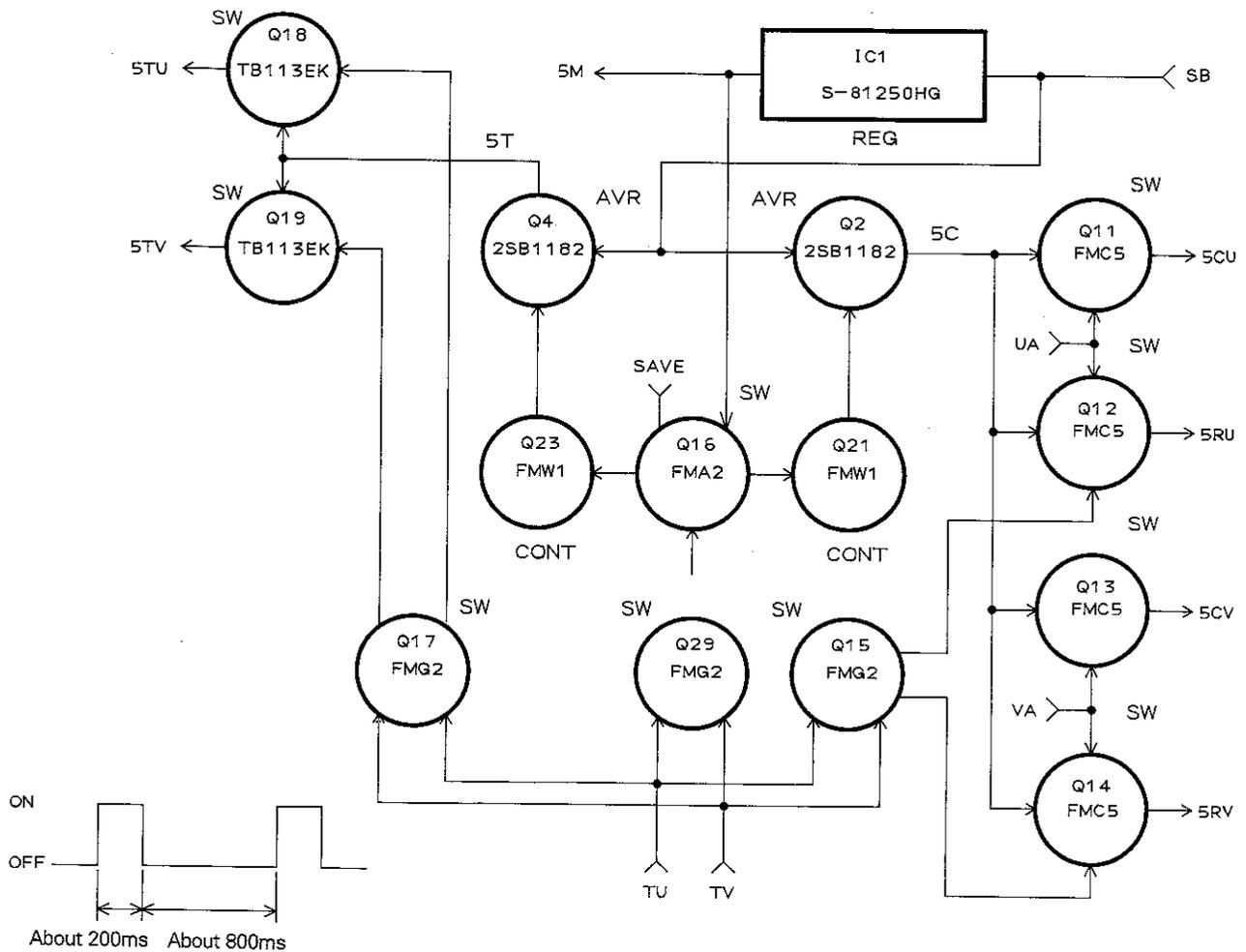


Fig. 6 Power supply circuit

## CIRCUIT DESCRIPTION

### PLL Synthesizer Block

In the TH-75A/E, the 144MHz band PLL system is independent of the 430/440MHz band PLL system. A comparison frequency of 5kHz is obtained by dividing the reference oscillator frequency of 12.8MHz by 2560. Each of the 144MHz and 430/440MHz band PLL systems directly generates the target frequency.

TX and RX VCOs are switched by TXU/TXV output from IC5 (MN4094BS). To use a wide range of frequencies, the oscillator frequency is shifted by SHU/SHV.

The 430/440MHz band PLL system forms an external loop of the charge pump of Q201 and Q202 to improve performance. Each of the PLL systems has a prescaler in the IC to implement the pulse swallow system.

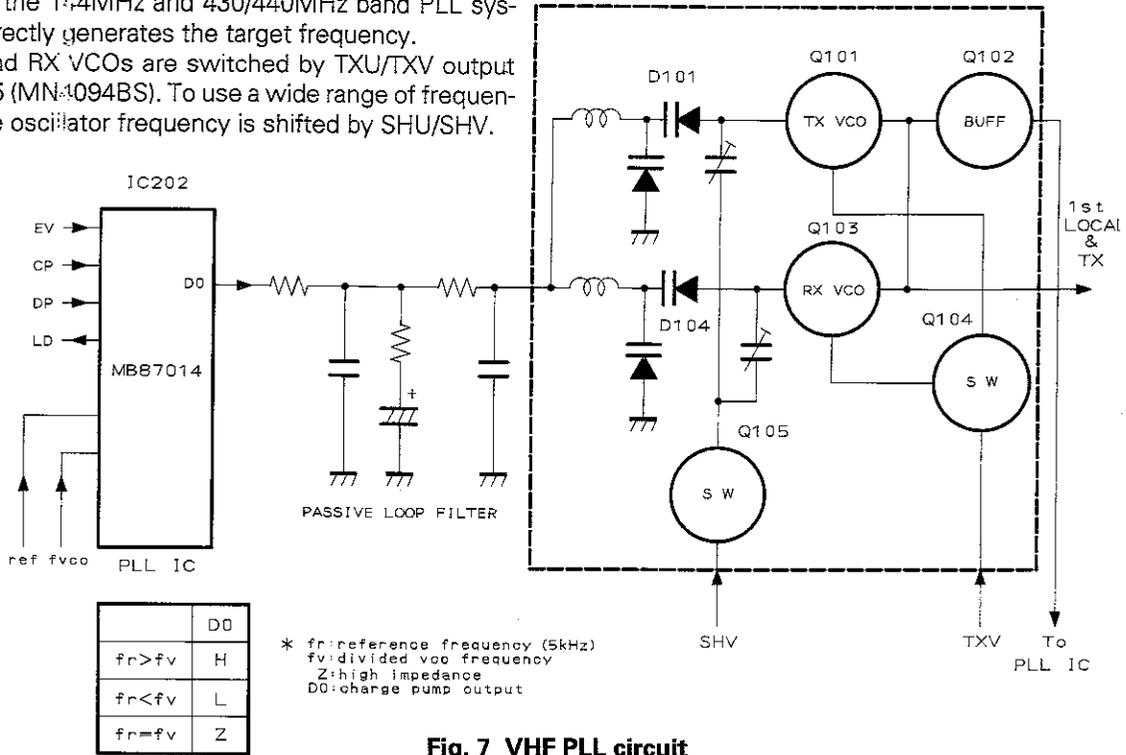


Fig. 7 VHF PLL circuit

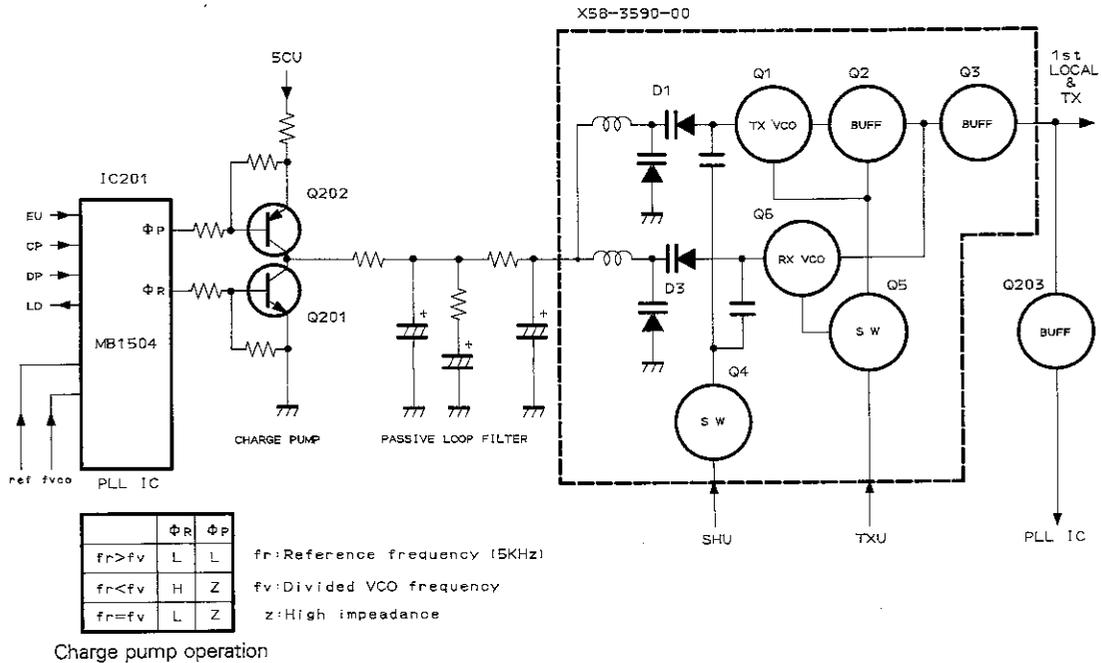


Fig. 8 UHF PLL circuit

# CIRCUIT DESCRIPTION

## Microprocessor and Peripheral Circuits

### • Reset/Backup circuit

The reset/backup circuit is operated by detecting the 5M voltage. The microprocessor is reset by applying the pulse generated when the POWER switch is set to ON to the RESET pin of the microprocessor as a low pulse by C5 and Q1 (2SC4116(Y)). For the backup, when the 5M voltage falls below about 4.5V (4.3 to 4.6V), the IC2 (S-8054ALR-LN) output level goes low. When the microprocessor receives this output via the VF pin, it enters the backup mode.

If the 5M voltage increases suddenly, the microprocessor is reset by the reset circuit of C5 and Q1. If the voltage rises gradually, the leading edge at which the IC2 output level changes from low to high is detected and the microprocessor is reset internally.

### • DTMF

The DTMF signals are produced by converting digital signals output from pins 10 to 17 of the microprocessor to analog signals with ladder resistor CP4.

### • Lamp circuit

When the LAMP switch is set to ON, the LAMP pin of the microprocessor goes high, and the lamp power is switched on. The lamp is on for 5 seconds. D5 is a constant-current circuit which protects the lamp from overcurrent.

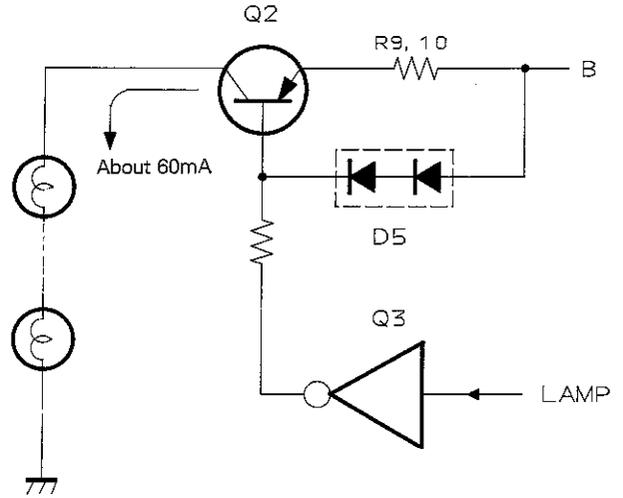


Fig. 10 Lamp circuit

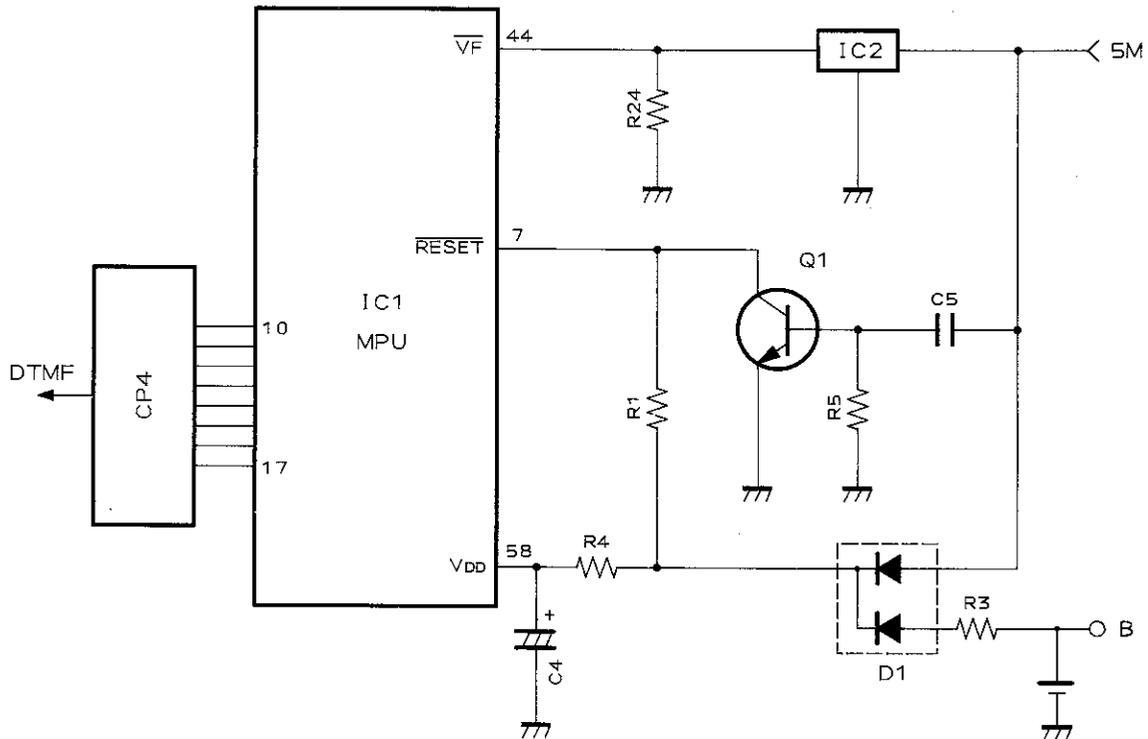
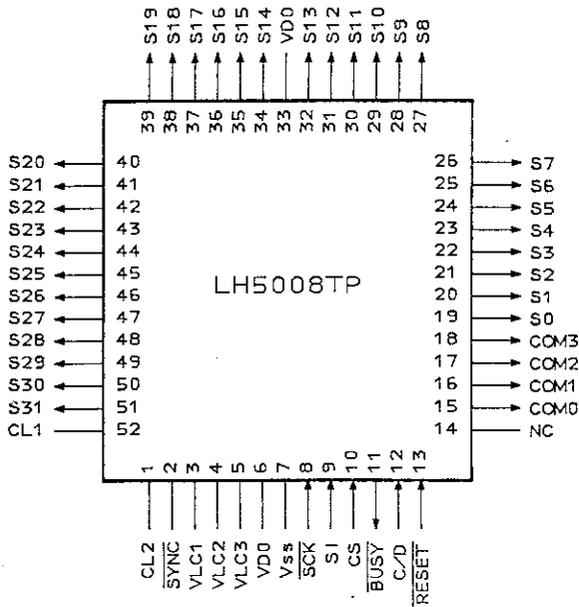


Fig. 9 Reset and backup circuit

## SEMICONDUCTOR DATA

### LCD driver : LH5008TP (Control unit IC3)

• Terminal connection diagram



• Explanation of terminals

Pin No.	Name	I/O	Function
1	CL2	-	Internal clock oscillation resistance pin.
2	SYNC	-	Unused.
3, 4	VCL1, VCL2	-	LCD drive power supply.
5	VCL3	-	Ground.
6	VDD	-	+5V power.
7	VSS	-	Ground.
8	SCK	I	Shift clock input.
9	SI	I	Serial data input.
10	CS	I	Enable input "L" : data can be input, "H" : memory contents are output.
11	BUSY	O	Data input control "L" : disable, "H" : enable.
12	C/D	I	Input data identification input "L" : data, "H" : command.
13	RESET	I	Reset input.
14	NC	-	Unused.
15 ~ 18	COM0 ~ COM3	O	Common drive output.
19 ~ 32	S0 ~ S13	O	Segment drive output.
33	VDD	-	+5V power.
34 ~ 51	S14 ~ S31	O	Segment drive output.
52	CL1	-	Internal clock oscillation resistance pin.

### Mode switching : MN4094BS (TX-RX unit IC5)

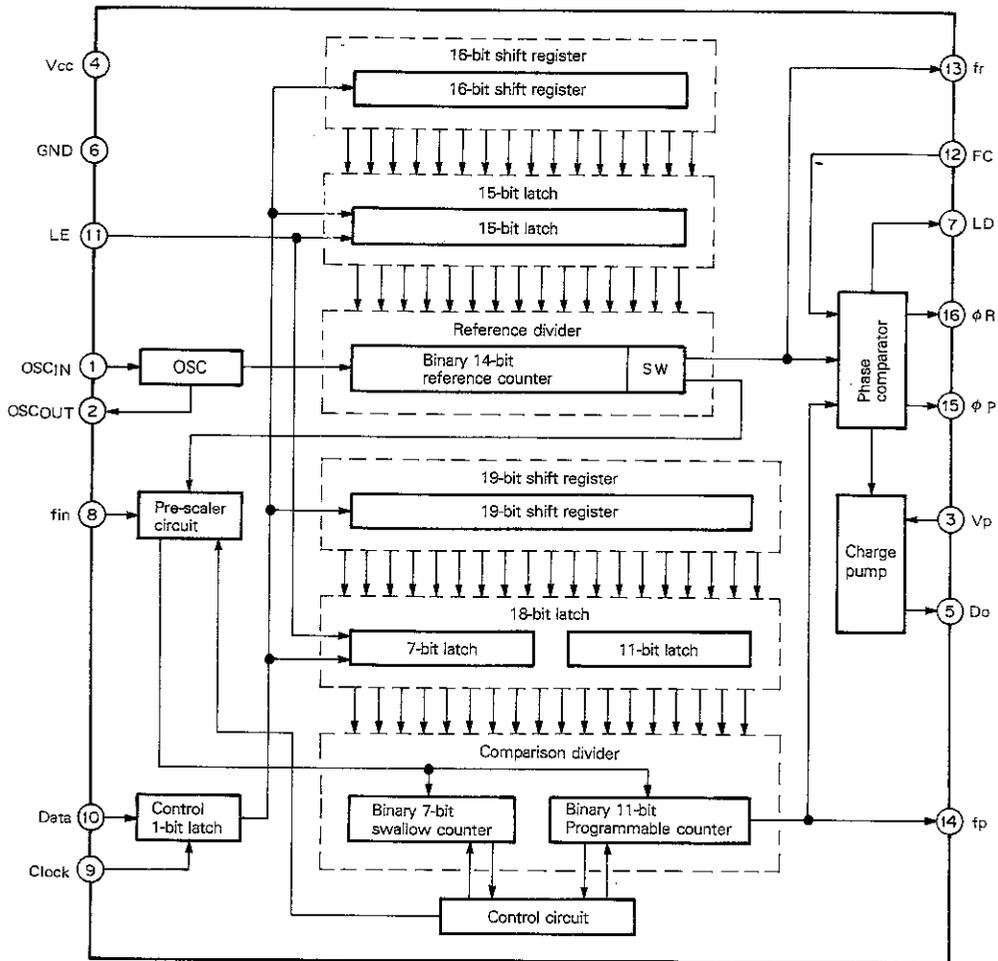
• Explanation of terminals

Pin No.	Name	I/O	Function
1	STROBE	I	EIF enable
2	SERIAL IN	I	DP data
3	CLOCK	I	CP clock
4	Q1	O	SHU "H" : UHF low band, "L" : UHF high band
5	Q2	O	SHV "H" : VHF low band, "L" : VHF high band
6	Q3	O	TXV "H" : VHF transmit mode, "L" : other modes
7	Q4	O	TXU "H" : UHF transmit mode, "L" : other modes
8	GND	-	Ground
9	QS	O	Unused
10	QS'	O	Unused
11	Q8	O	UA "H" : UHF circuit operates, "L" other modes
12	Q7	O	VA "H" : VHF circuit operates, "L" other modes
13	Q6	O	MAIN "H" : main AF line on, "L" : main AF line off/BEEP output
14	Q5	O	SUB "H" : sub AF line on, "L" : sub AF line off/BEEP output
15	OE	I	"H" when data capture mode
16	Vcc	-	Power supply

# SEMICONDUCTOR DATA

## UHF PLL IC : MB1504 (TX-RX unit IC201)

### • Block diagram



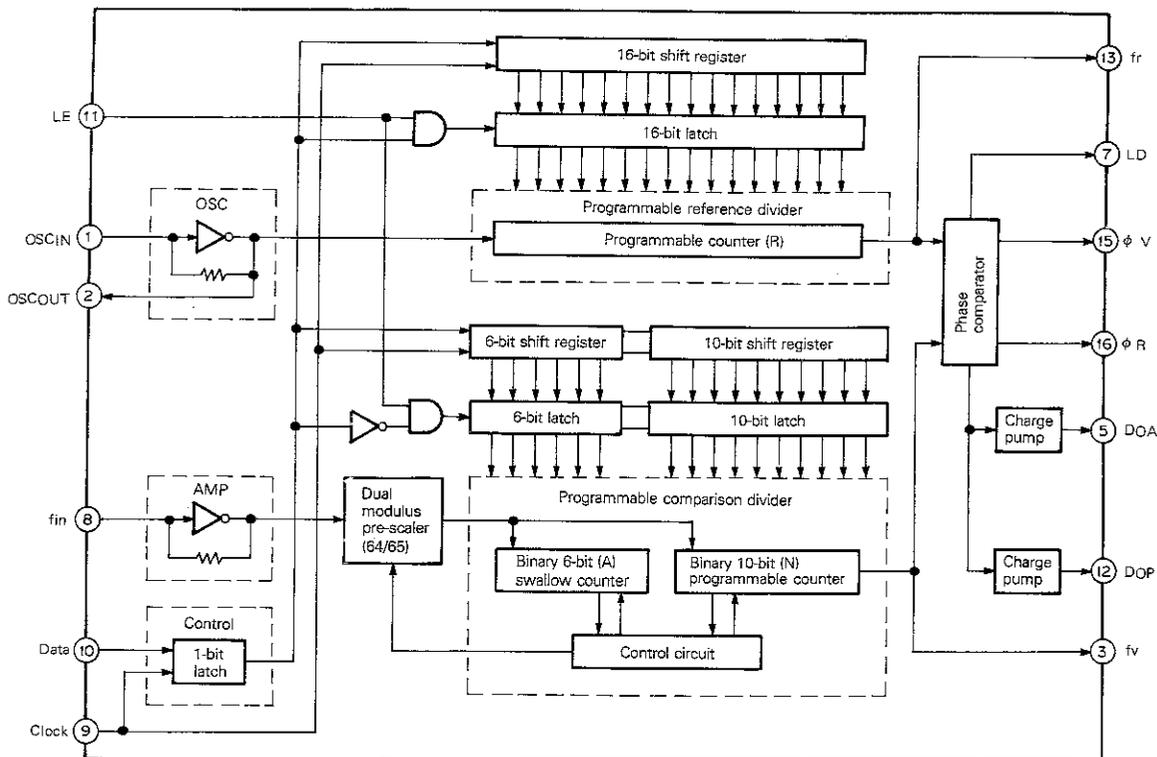
### • Explanation of terminals

Pin No.	Name	I/O	Function
1	OSCIN	I	Input pin of the reference divider to which the crystal oscillator is connected.
2	OSCOUT	O	(OSCIN = Oscillator circuit input pin, OSCOUT = Oscillator circuit output pin)
3	Vp	-	Power pin for charge pump output.
4	Vcc	-	Power pin.
5	Do	O	Output pin for the built-in charge pump. Phase characteristics are reversed by setting the FC pin.
6	GND	-	Ground pin.
7	LD	O	Output pin for phase comparator. Usually, LD : "H", LD : "L" during the time equivalent to the phase difference between fr and fp.
8	fin	I	Input pin for prescaler. Input by AC connection.
9	Clock	I	Clock input pin for 19-bit shift register and 16-bit shift register. Data is read at a rising edge of the clock pulse.
10	Data	I	Serial data input pin for binary code. The last bit of the data is a control bit. "H" : Send data to the 15-bit latch      "L" : Send data to the 18-bit latch
11	LE	I	Load enable signal input pin. When LE : "H" (or open), the contents of the shift register are sent to the latch by combining it with the control bit of serial data (with a pull-up resistor).
12	FC	O	Phase comparator phase switching pin. When FC : "L", the phase characteristics of the charge pump and phase comparator are reversed (with a pull-up resistor).
13	fr	O	Phase comparator input monitor pin. Equivalent to the output of the reference divider.
14	fp	O	Phase comparator input monitor pin. Equivalent to the output of the comparison divider.
15	φP	O	Output pin of the phase comparator for the external charge pump. Phase characteristics are reversed by setting the FC pin. Note : φP pin is N-ch open drain output.
16	φR	O	

## SEMICONDUCTOR DATA

### VHF PLL IC : MB87014 (TX-RX unit IC202)

• Block diagram



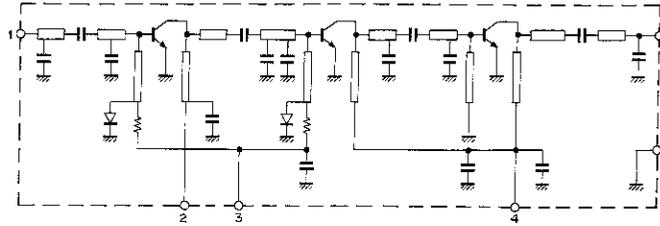
• Explanation of terminals

Pin No.	Name	I/O	Function
1	OSCIN	I	Crystal and capacitor connection pin.
2	OSCOUT	O	External clocks can be input from OSCIN.
3	fv	O	Phase comparator input monitor pin. Equivalent to comparison divider output.
4	VDD	-	Power pin.
5	DOP	O	Low-pass filter connection pin (passive). Reference divider output fr is related to comparison divider output fv as follows : <ul style="list-style-type: none"> <li>• fr &gt; fv : Drive mode (DOP = High)</li> <li>• fr = fv : High impedance</li> <li>• fr &lt; fv : Sink mode (DOP = Low)</li> </ul>
6	Vss	-	Ground pin.
7	LD	O	Phase comparator output pin. "H" is output when locked. "L" is output when unlocked.
8	fin	I	Input pin for prescaler. Input by AC connection.
9	Clock	I	Clock input pin for shift register. Data is read at a leading edge of the clock pulse.
10	Data	I	Serial data input pin for shift register. The last bit of the data is used as a control bit.
11	LE	I	Load enable signal input pin. When LE : "H" (or open), the contents of the shift register are sent to the latch on the reference or comparison side by combining them with the control bit of serial data (with a pull-up resistor).
12	DOA	O	Low-pass filter connection pin (active). Reference divider output fr is related to comparison divider output fv as follows : <ul style="list-style-type: none"> <li>• fr &gt; fv : Sink mode (DOA = Low)</li> <li>• fr = fv : High impedance</li> <li>• fr &lt; fv : Drive mode (DOA = High)</li> </ul>
13	fr	O	Phase comparator input monitor pin. Equivalent to the output of the reference divider.
14	NC	-	Not connected.
15	øV	O	Low-pass filter connection pin (differential filter), Reference divider output fr is related to comparison divider output fv as follows : <ul style="list-style-type: none"> <li>• fr &gt; fv : øV = High, øR = Low</li> <li>• fr = fv : øV = High, øR = High</li> <li>• fr &lt; fv : øV = Low, øR = High</li> </ul>
16	øR	O	

# SEMICONDUCTOR DATA

## UHF power module : S-AU26 (TX-RX unit IC203)

### • Equivalent circuit



- 1 : High-frequency input (Pi)
- 2 : VCON pin (V1)
- 3 : VBB bias pin (V2)
- 4 : Vcc pin (V3)
- 5 : High-frequency output (Po)
- 6 : Ground (flange)

### • Maximum rating (Tc = 25°C)

Item	Symbol	Condition	Rating	Unit
Power supply voltage	Vcc	Zg = Zl = 50Ω	15	V
Control voltage	VCON		15	V
Bias voltage	VBB		5.5	V
Input voltage	Pi		24	mW
Output voltage	Po		10	W
Total current	It		4	A
Case temperature during operation	Tc(opr)	-	-30 ~ +100	°C
Storage temperature	Tstg	-	-40 ~ +110	°C

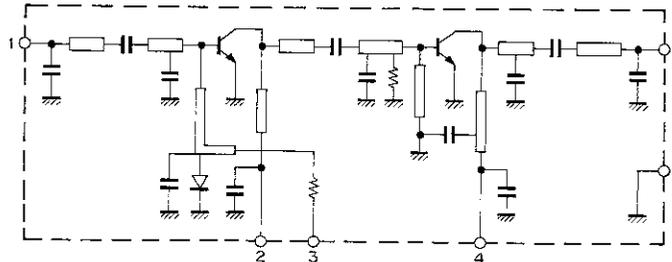
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### • Electrical characteristics

Item	Symbol	Measurement condition	Min	Typ	Max	Unit	
Frequency range	frange	-	430	-	450	MHz	
Output power	Po(1)	Pi = 12mW VBB = 5V Zg = Zl = 50Ω	7	-	-	W	
Total efficiency	ηT		Vcc = VCON = 12.5V	36	-	-	%
Secondary harmonics	HRM(1)		-	-	-15	dBc	
Tertiary harmonics	HRM(2)		-	-	-30	dBc	
Output power at low voltage	Po(2) Po(3)		Vcc = VCON = 8V Vcc = VCON = 6.4V	3 1.5	-	-	W

## VHF power module : S-AV22 (TX-RX unit IC204)

### • Equivalent circuit



- 1 : High-frequency input (Pi)
- 2 : VCON pin (V1)
- 3 : VBB bias pin (V2)
- 4 : Vcc pin (V3)
- 5 : High-frequency output (Po)
- 6 : Ground (flange)

### • Maximum rating (Tc = 25°C)

Item	Symbol	Condition	Rating	Unit
Power supply voltage	Vcc	Zg = Zl = 50Ω	15	V
Control voltage	VCON		15	V
Bias voltage	VBB		5.5	V
Input voltage	Pi		30	mW
Output voltage	Po		10	W
Total current	It		4	A
Case temperature during operation	Tc(opr)	-	-30 ~ +100	°C
Storage temperature	Tstg	-	-40 ~ +110	°C

### • Electrical characteristics

Item	Symbol	Measurement condition	Min	Typ	Max	Unit	
Frequency range	frange	-	144	-	148	MHz	
Output power	Po(1)	Pi = 15mW VBB = 5V Zg = Zl = 50Ω	7	-	-	W	
Total efficiency	ηT		Vcc = VCON = 12.5V	40	-	-	%
Secondary harmonics	HRM(1)		-	-	-15	dBc	
Tertiary harmonics	HRM(2)		-	-	-25	dBc	
Output power at low voltage	Po(2) Po(3)		Vcc = VCON = 8V Vcc = VCON = 6.4V	3.5 1.5	-	-	W

# SEMICONDUCTOR DATA

## Microprocessor : 75108G-E82-1B (Control unit IC1)

### • Explanation of terminals

Pin No.	Pin name	I/O	Function	Pin No.	Pin name	I/O	Function
1	P41	O	Destination setting.	32	PTH02	AI	VHF S-meter input (AI : analog input)
2	P40	O	MN4094BS enable.	33	PTH01	AI	BATT check in transmit mode (AI : analog input)
3	P53	O	Cut off MIC input during DTMF output. "H" during DTMF output, Usually "L".	34	PTH00	-	Unused (ground).
4	P52	O	Data (PLL, TSU-6 (CTCSS), MN4094BS).	35	TI0	I	VHF BUSY input. "H" : not busy, "L" : busy
5	P51	O	Clock (PLL, TSU-6 (CTCSS), MN4094BS).	36	TI1	I	UHF BUSY input. "H" : not busy, "L" : busy
6	P50	O	VHF PLL enable.	37	P23	O	LH5008TP CS chip select.
7	RESET	I	Reset input.	38	P22	O	LH5008TP RES reset.
8,9	X2, X1	I	Clock oscillation pin.	39	P21	O	LH5008TP C/D. "H" : command, "L" : data
10~13	P63~P60	O	DTMF output.	40	P20	O	Beep output.
14~17	P73~P70	O	DTMF output.	41	P03/SI	I	LH5008TP BUSY input.
18	P83	O	UHF PLL enable.	42	P02/SO	O	LH5008TP data.
19	P82	O	TSU-6 (CTCSS) enable.	43	P01/SCK	O	LH5008TP clock.
20	P81	O	"H" in VHF TX mode, "L" in other modes.	44	P00/INT4	I	Backup/normal operation switching. "H" : normal operation, "L" : backup
21	P80	O	"H" in UHF TX mode, "L" in other modes.	45	P123	O	SAVE control. "H" : save, "L" : normal
22	P93	O	Main/sub switching. "H" : VHF sub, "L" : VHF main	46	P122	-	Unused.
23	P92	O	TSU-6 (CTCSS) VHF/UHF switching. "H" : VHF, "L" : UHF	47,48	P121, P120	O	Key output signal.
24	P91	O	AF amplifier, power amplifier control. "H" : OFF, "L" : ON	49~52	P133~P130	O	Key output signal.
25	P90	O	Lamp on/off control. "H" : ON, "L" : OFF	53~56	P143~P140	I	Key input signal.
26	Vss	-	Ground.	57	NC	-	Unused.
27	P13/INT3	I	UHF unlock detection. "H" : unlock, "L" : lock	58	Vbd	-	Power supply.
28	P12/INT2	I	VHF unlock detection. "H" : unlock, "L" : lock	59	P33	I	PTT switch detection. "H" : PTT off, "L" : PTT on
29	P11/INT1	I	Encoder down input. "H" : fixed position, "L" : when switching	60	P32	I	CTCSS tone match signal. "H" : match, "L" : no match
30	P10/INT0	I	Encoder up input. "H" : fixed position, "L" : when switching	61	P31	O	Destination setting.
31	PTH03	AI	UHF S-meter input (AI : analog input)	62	P30	I	Destination input.
				63	P43	O	Destination setting.
				64	P42	O	Destination setting.

## DESCRIPTION OF COMPONENTS

## CONTROL UNIT (X53-3200-XX) -11 : K,P -21 : M,M2,X -61 : T,W

Component	Use/Function	Operation/Condition/Compatibility
IC1	Microprocessor	
IC2	Backup detect	Backup when output changes from high to low.
IC3	LCD driver	
Q1	Reset output	
Q2	Lamp power supply	60mA constant current.
Q3	Lamp switch	LAMP "H" : ON.
D1	Microprocessor power supply	
D2 ~ 4	Destination	
D5	For setting constant current	

## TX-RX UNIT (X57-3370-XX) -11 : K,P,M,M2,X -61 : T,W

Component	Use/Function	Operation/Condition/Compatibility
IC1	5V AVR for 5M	
IC2	AF power amplification	
IC3	DC amplification	APC.
IC4	Switch	VHF/UHF main/sub select and CTCSS switching.
IC5	Mode switching	TXU/TXV, SHU/SHV, MAIN,SUB, VA, UA signal output.
IC6	Switch	VHF/UHF main/sub select and CTCSS switching.
IC201	UHF PLL IC	
IC202	VHF PLL IC	
IC203	UHF transmit power amplification	
IC204	VHF transmit power amplification	
Q1	H/L power select switch	HI : ON, LOW : OFF.
Q2	AVR for 5C and 5R	Usually 5V, SAVE : ON/OFF.
Q3	Switch	UHF HI power : ON.
Q4	AVR for 5T	5V in transmit mode.
Q5	Switch	VHF HI power : ON.
Q6	Switch	ON in transmit mode.
Q7	AF amplifier power control	About 8V output.
Q8	AF amplifier power control	
Q9	Switch	AFC "H" : AF amplifier ON.
Q10	Amplifier for beep	BEEP "H" : ON.
Q11	5CU power switch	UA "H" : ON.
Q12	5RU power switch	UA "H", TU "L" : ON.
Q13	5CV power switch	VA "H" : ON.
Q14	5RV power switch	VA "H", TV "L" : ON.
Q15	5R switch	TU, TV "L" : ON.
Q16	5T, SAVE switch	TU, TV "H" : 5T ON, SAVE "H" : 5C OFF.
Q17	5TV, 5TU switch	TU, TV "H" : ON.
Q18	5TU switch	TU "H" : ON.
Q19	5TV switch	TV "H" : ON.
Q20	Microphone input switch	MIC input cut when DTMF output is on.
Q21	5C, 5R control	

## DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q22	M/S switch	
Q23	5T control	
Q24	UHF UNLOCK signal output	"H" : UNLOCK.
Q25	VHF UNLOCK signal output	"H" : UNLOCK.
Q26	Switching of VHF/UHF input to TSU-6 (CTCSS)	
Q27	VHF 1st IF 16.9MHz amplification	
Q28	UHF 1st IF 59.525MHz amplification	
Q29	5T switch	TU, TV "H" : ON.
Q31	VHF, UHF modulation switch	
Q32, 33	HPF	
Q34	Constant current source	
Q35	Pop noise absorption switch	
Q201, 202	Charge pump	
Q203	UHF PLL loop amplification	
Q204	Reference oscillator	
Q205, 206	UHF transmit amplification	
Q207, 208	UHF receive RF amplification	
Q209	UHF receive 1st mixer	
Q211	5RU switch	TXU "L" : ON.
Q214, 215	VHF transmit amplification	
Q216	VHF receive RF amplification	
Q217	VHF receive 1st mixer	
Q218	VHF band shift switch	SHV "H" : ON.
D1	Revere connection prevention	
D2	BATT protection when external DC is used	
D3	APC constant-voltage diode	
D4	Microphone amplification 5T	
D5	Level shift	
D201	Level shift	
D202	Q204 power supply	
D203	UHF receive switch	ON in receive mode.
D204	UHF transmit switch	ON in transmit mode.
D205	Q206 bias	
D206	Control of RF signal input to IC203	Control by CONT voltage.
D207, 208	UHF transmit/receive changeover switch	ON in transmit mode.
D210	UHF receive switch	
D211	UHF receive over-input prevention	
D212	Q214 power supply	ON in transmit mode.
D213	VHF receive changeover	ON in receive mode.
D215	Control of RF signal input to IC204	Control by CONT voltage.
D216, 217	VHF transmit/receive changeover	ON in transmit mode.
D218 ~ 221	Varactor diode tuning	Operates when SHV is on.
D222	UHF transmit/receive changeover	ON in transmit mode.

# DESCRIPTION OF COMPONENTS

## VCO(X58-3590-00)

Component	Use/Function	Operation/Condition/Compatibility
Q1	UHF transmit VCO	
Q2	UHF VCO transmit buffer	
Q3	UHF VCO buffer	
Q4	UHF oscillation frequency shift switch	SHU "H" : ON.
Q5	Transmit/receive VCO changeover switch	
Q6	UHF receive VCO	
Q101	VHF transmit VCO	
Q102	VHF VCO buffer	
Q103	VHF receive VCO	
Q104	Transmit/receive VCO changeover switch	
Q105	VHF oscillation frequency shift switch	SHV "H" : ON.
D1	UHF TX VCO tuning	
D2	UHF TX VCO shift	SHU "H" : ON.
D3	UHF RX VCO tuning	
D4	UHF RX VCO shift	SHU "H" : ON.
D101	VHF TX VCO tuning	
D102	VHF TX VCO shift	SHV "H" : ON.
D103	VHF RX VCO tuning	
D104	VHF RX VCO shift	SHV "H" : ON.

## UHF IF (X58-3610-00) VHF IF (X58-3610-01)

Component	Use/Function	Operation/Condition/Compatibility
IC1	FM IC	Receive 1st IF amplifier, 2nd OSC, 2nd mixer, 2nd IF amplifier, DISC (11) : AF amplifier output (12) : S-meter output (15) : Noise amplifier output (20) : IF signal input
Q1	Noise amplifier	
D1	Double-voltage rectification	

## MIC AMP (X58-3620-XX) -00 : T,W -11 : K,P,M,M2,X

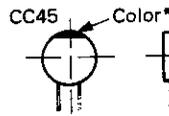
Component	Use/Function	Operation/Condition/Compatibility
IC1	Amplification	Limiter amplifier, active low-pass filter.

# TH-75A/E

## PARTS LIST

### CAPACITORS

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



#### Capacitor value

- 0 1 0 = 1pF
- 1 0 0 = 10pF
- 1 0 1 = 100pF
- 1 0 2 = 1000pF = 0.001μF

1 0 3 = 0.01μF

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

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

#### Temperature Coefficient

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

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

Example CC45TH = -470±60 ppm/°C

#### Tolerance

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

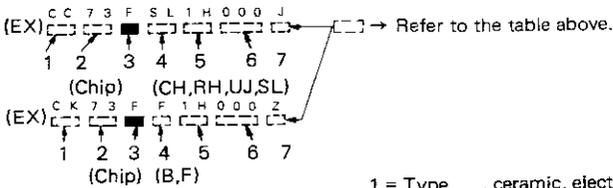
Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Less than 10 pF

#### Rating voltage

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

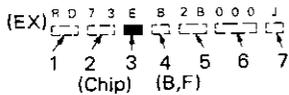
#### Chip capacitors



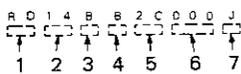
- 1 = Type ..... ceramic, electrolytic, etc.
- 2 = Shape ..... round, square, etc.
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Voltage rating
- 6 = Value
- 7 = Tolerance.

### RESISTORS

#### Chip resistor (Carbon)



#### Carbon resistor (Normal type)



#### Dimension

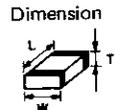
Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

#### Dimension

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

#### Rating wattage

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



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# PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

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

Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
<b>TH-75A/E</b>						
1	3A	*	A02-0814-13	PLASTIC CABINET(CHARGE ADAPT.)		
4	2A	*	A40-0622-04	BOTTOM PLATE(CHARGE ADAPTER)		
4	2A	*	A01-1070-22	METALLIC CABINET(REAR)		
4	2A	*	A02-0877-13	CASE ASSY	KP	
4	2A	*	A02-0876-13	CASE ASSY	M1M2X	
4	2A	*	A02-0879-13	CASE ASSY	TW	
5	3A	*	A20-7004-04	PANEL		
6	3B	*	A40-0621-04	BOTTOM PLATE		
8	1B		B42-2454-04	S/NO LABEL (ITEM CARTON BOX)		
11	3B	*	B42-3301-04	LABEL (LA)	K	
11	3B	*	B09-0315-14	CAP(FOR DC JACK)		
11	3B	*	B40-3897-04	MODEL NAME PLATE	KP	
11	3B	*	B40-3898-04	MODEL NAME PLATE	M1M2X	
11	3B	*	B40-3899-04	MODEL NAME PLATE	TW	
12	3B	*	B42-2437-04	S/NO LABEL (RADIO)		
-			B46-0410-20	WARRANTY CARD	K	
-			B46-0419-00	WARRANTY CARD	W	
-			B46-0422-00	WARRANTY CARD	P	
-		*	B50-8275-00	INSTRUCTION MANUAL		
C350			CC45CH1H020C	CERAMIC 2.0PF C		
15	3B	*	E31-6027-15	CONNECTING WIRE,DC INPUT 2P		
16	3B	*	E04-0168-15	RF COAXIAL CABLE RECEPT.(BNC)		
23	2B	*	E23-0494-14	DC INPUT TERMINAL(-)		
24	3B	*	E23-0605-14	DC INPUT TERMINAL(+)		
24	3B	*	E23-0620-04	TERMINAL(BNC)		
25	1A	*	E31-3490-05	CONNECTING WIRE,TX-RX-CONT 16P		
26	1B	*	E31-3491-05	CONNECTING WIRE,TX-RX 18P		
30	2B	*	F11-1129-13	SHIELDING COVER(UP.SIDE OF RF		
31	1A	*	F19-0650-04	BLIND PLATE(MIC)		
32	2B	*	F20-1020-14	INSULATING BOARD(IF)		
33	3B	*	F20-1023-04	INSULATING BOARD(REAR CASE)		
34	3B	*	F29-0435-05	INSULATOR(BELT HOOK)		
38	3A	*	G11-0627-04	SOFT TAPE(CONNECTING WIRE 16P)		
39	2A	*	G11-0628-04	SOFT TAPE(CONNECTING WIRE 18P)		
40	2B	*	G02-0505-05	KNOB FIXED SPRING(VOL,ENCODER)		
40	2B	*	G02-0580-14	LEAF SPRING(BNC)		
40	2B	*	G02-0581-04	LEAF SPRING(UHF BPF)		
41	1B	*	G10-0666-04	FORMED PLATE(FOR CTCSS)	KP	
43	2B	*	G13-0626-04	FORMED PLATE(VCO)		
44	3B	*	G13-0852-04	FORMED PLATE(DC INPUT TERMINAL		
46	3B	*	G16-0514-04	SHEET(REAR CASE)		
47	1B	*	G16-0525-04	SHEET(PTT)		
48	3A	*	G53-0560-13	PACKING(PANEL)		
-		*	H11-0808-14	POLYSTYRENE PLATE(TOP)		
-		*	H13-0801-04	PROTECTION PLATE(CHARGER)		
-		*	H13-0818-04	PROTECTION PLATE(BELT HOOK)		
-		*	H13-0823-04	PROTECTION PLATE	M1M2W	
-		*	H01-8240-04	ITEM CARTON BOX(TH-75A)	KP	
-		*	H01-8241-04	ITEM CARTON BOX(TH-75A)	M1M2X	
-		*	H01-8242-04	ITEM CARTON BOX(TH-75E)	TW	

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-		*	H10-2660-02	POLYSTYRENE FOAMED FIXTURE		
-			H25-0103-04	PROTECTION BAG(RADIO 125X250)		
			J29-0424-04	BELT HOOK(ACSY)		
50	3A		J69-0312-04	HAND STRAP(ACSY)		
51	2A		J19-1426-03	HOLDER (BATT.TERMINAL)		
52	2A	*	J21-4223-04	MOUNTING HARDWARE(BOTTOM CASE)		
			J21-4262-04	MOUNTING HARDWARE(CASE SIDE)		
53	1B	*	J21-4263-14	MOUNTING HARDWARE(PTT)		
54	1A	*	J21-4264-04	MOUNTING HARDWARE(SP)		
55	1A		J30-0550-04	SPACER (SP)		
56	1A		J31-0526-04	SPACER (MIC)		
57	3A		J69-0311-05	RING (BNC)		
60	3A		K29-3096-14	KNOB (VOL,BAL)		
61	3A		K29-3097-14	KNOB (SQL)		
62	3A		K29-3098-04	KNOB (ENCODER)		
63	3B		K29-3100-04	KNOB (RELEASE)		
64	1B	*	K29-3163-03	KNOB (PTT)		
65	2A	*	K29-3164-14	KNOB (KEY.TOP)		
A	3B		N09-2064-05	SCREW(BOTTOM PLATE) M2X3.5		
B	3B		N09-2023-05	SCREW(BNC PLATE) M2X3		
C	3B		N09-2025-05	SCREW(DC TERMINAL) Ø1.7X3		
D	1A		N09-2026-05	SCREW(SP. CONTROL) Ø2X3.5		
E	3B		N09-2028-05	SCREW(BELT HOOK) M3X4		
F	2B		N30-2012-46	MACHINE SCREW(SHIELDING COVER)		
G	2B		N30-2612-46	MACHINE SCREW(POWER MODULE)		
H	3B		N33-2005-45	MACHINE SCREW(BNC)		
J	2A, 1B		N35-2003-45	MACHINE SCREW(BNC, PTT, CASE)		
K	1B, 2B		N35-2004-46	MACHINE SCREW(PC BOARD)		
R1			RD14BB2B223J	RD 22K J 1/8W	M1M2TW	
R2			RD14BB2B223J	RD 22K J 1/8W	X	
		*	T90-0388-05	ANTENNA(ACSY)		
70	1A	*	T07-0257-05	LOUDSPEAKER(FULLRANGE)		
71	1A	*	T91-0372-05	MICROPHONE(ELECTRO)		
			W09-0382-15	BATTERY CHARGER (120V)	K	
			W09-0385-05	BATTERY CHARGER (120V)	M2P	
			W09-0386-05	BATTERY CHARGER (240V)	X	
			W09-0387-05	BATTERY CHARGER (240V)	T	
			W09-0388-05	BATTERY CHARGER (220V)	MW	
			W09-0507-05	BATTERY ASSY(PB-6)(ACSY)		
74	1B		X52-3100-00	CTCSS UNIT(TSU-6)	KP	
75	1A, 1B	*	X53-3200-11	CONTROL UNIT	KP	
75	1A, 1B	*	X53-3200-21	CONTROL UNIT	M1M2X	
75	1A, 1B	*	X53-3200-61	CONTROL UNIT	TW	
76	1A, 2B	*	X57-3370-11	TX-RX UNIT	KM1M2X	
76	1A, 2B	*	X57-3370-11	TX-RX UNIT	P	
76	1A, 2B	*	X57-3370-61	TX-RX UNIT	TW	
<b>CONTROL UNIT (X53-3200-XX) -11 : K,P -21 : M,M2,X -61 : T,W</b>						
A1	3C	*	A33-0412-14	REFLECTOR(LCD)		
A2	3C	*	B38-0314-05	LCD ASSY		
PL1 ,2			B30-0849-05	LAMP		

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A3 CN1 ,2	3C	*	E29-0481-04 E40-5305-05	CONNECTOR (LCD) PIN CONNECTOR(16P)		
A4	1C		F20-0567-04	INSULATING BOARD (LITHIUM BAT.)		
A5 A6	3C 1C	*	J21-4265-04 J99-0311-04	MOUNTING HARDWARE (LCD) ADHESIVE SHEET (LITHIUM BATT.)		
X1			L78-0043-05	RESONATOR 4.19MHZ		
CP1 ,2 CP3		*	R90-0708-05	MULTI-COMP 1KX5		
R1		*	R90-0709-05	MULTI-COMP 4.7KX5		
R2			RK73GB1J473J	CHIP R 47K J 1/16W		
R3			RK73GB1J472J	CHIP R 4.7K J 1/16W		
			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R4			RK73GB1J470J	CHIP R 47 J 1/16W		
R5		*	RK73GB1J563J	CHIP R 56K J 1/16W		
R6			RK73GB1J104J	CHIP R 100K J 1/16W		
R7 ,8			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R9 ,10		*	RK73GB1J270J	CHIP R 27 J 1/16W		
R11		*	RK73GB1J392J	CHIP R 3.9K J 1/16W		
R12			RK73GB1J100J	CHIP R 10 J 1/16W		
R13 -16			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R17 ,18			RK73GB1J473J	CHIP R 47K J 1/16W		
R19			RK73GB1J224J	CHIP R 220K J 1/16W		
R20			RK73GB1J104J	CHIP R 100K J 1/16W		
R21 ,22			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R23			RK73GB1J103J	CHIP R 10K J 1/16W		
R24 ,25			RK73GB1J473J	CHIP R 47K J 1/16W		
R26			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R27 -29			RK73GB1J473J	CHIP R 47K J 1/16W		
R30			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R31			RK73GB1J184J	CHIP R 180K J 1/16W		
R32			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R33			RK73GB1J101J	CHIP R 100 J 1/16W		
R34			RK73GB1J473J	CHIP R 47K J 1/16W		
R35 -38			RK73GB1J103J	CHIP R 10K J 1/16W		
S1 -3			S40-1420-05	TACT SWITCH		
C1 -3			CK73GB1H471K	CHIP C 470PF K		
C4			C92-0509-05	TANTAL 10UF 6.3WV		
C5			CK73FB1E473M	CHIP C 0.047UF M		
C6 -9			CK73GB1H471K	CHIP C 470PF K		
C10			CK73GB1H102K	CHIP C 1000PF K		
C11 -17			CK73GB1H471K	CHIP C 470PF K		
C18			CK73GB1E103K	CHIP C 0.01UF K		
C19 ,20			CK73GB1H471K	CHIP C 470PF K		
C21			CC73GCH1H680J	CHIP C 68PF J		
C22			CK73GB1H102K	CHIP C 1000PF K		
CP4			KRR-C001	IC(CHIP NETWORK)		
D1			DAN202U	CHIP DIODE		
D2 -4			MA110	CHIP DIODE	KP	
D2 ,3			MA110	CHIP DIODE	M1M2X	
D3 ,4			MA110	CHIP DIODE	TW	
D5			DA204U	CHIP DIODE		
IC1		*	75108G-E82-1B	MPU		

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IC2 IC3 Q1 Q2 Q3 IC4 BA1	1C	*	S-8054ALR-LN LH5008TP 2SC4116(Y) 2SB1182F5(Q) DTC144EU KRR-C001 W09-0326-05	IC(VOLTAGE DETECTOR) IC(LCD CONTROLLER/ DRIVER) CHIP TRANSISTOR CHIP TRANSISTOR DIGITAL TRANSISTOR IC LITHIUM BATTERY		
<b>TX-RX UNIT (X57-3370-XX) -11 : K,P,M,M2,X -61 : T,W</b>						
TC201			C05-0349-05	TRIMMING 10PF		
A201 CN1 CN2 ,3 CN4 CN5 ,6		*	E29-0482-14 E40-5186-05 E40-5224-05 E40-5226-05 E40-5321-05	TERMINAL(GND) PIN CONNECTOR (9PIN) PIN CONNECTOR (16PIN) PIN CONNECTOR (18PIN) PIN CONNECTOR (2PIN)		
CN7 CN201 J1 J201 J202		*	E40-5179-05 E40-5226-05 E03-0165-05 E11-0428-15 E11-0429-05	PIN CONNECTOR (2PIN) PIN CONNECTOR (18PIN) DC JACK PHONE JACK (SP) PHONE JACK (MIC)		
TP1 ,2 W1 W2 W201 W202		*	R92-1061-05 E31-6016-05 E31-6017-15 E31-6019-15 E31-6018-15	TERMINAL CONNECTING WIRE (IF-CTCSS) CONNECTING WIRE CONNECTING WIRE (RF-IF UHF) CONNECTING WIRE (RF-IF VHF)		
W203		*	E31-6020-05	CONNECTING WIRE (RF-IF 9PIN)		
A7 A203 A204 A205		*	F20-1025-04 F10-1402-04 F10-1403-04 F10-1404-04	INSULATING BOARD SHIELDING PLATE (VHF) SHIELDING PLATE (UHF) SHIELDING PLATE		
A206,207		*	G11-0629-14 J30-0545-05	SHIELDING TAPE (VCO) SPACER		
L1 L2 L3 L4 L5 -10		*	L92-0127-05 L40-4701-14 L34-4051-05 L34-4116-05 L92-0123-05	BEAS CORE SMALL FIXED INDUCTOR 47UH COIL 16.9MHZ COIL 59MHZ BEAS CORE		
L201-203 L204 L205 L206 L207			L92-0123-05 L40-1092-14 L40-1021-14 L40-2272-80 L92-0123-05	BEAS CORE SMALL FIXED INDUCTOR 1UH SMALL FIXED INDUCTOR 1MH SMALL FIXED INDUCTOR 22NH BEAS CORE		
L208 L209 L210-212 L213,214 L215			L40-3391-14 L40-1021-14 L40-2272-80 L40-1872-80 L40-1261-80	SMALL FIXED INDUCTOR 3.3UH SMALL FIXED INDUCTOR 1MH SMALL FIXED INDUCTOR 22NH SMALL FIXED INDUCTOR 18NH SMALL FIXED INDUCTOR 120NH		
L216 L218 L219 L220 L221-223		*	L40-8272-80 L33-0680-05 L40-1092-14 L34-2340-05 L34-4118-05	SMALL FIXED INDUCTOR 82NH CHOKE COIL SMALL FIXED INDUCTOR 1UH COIL COIL		
L224			L40-8272-80	SMALL FIXED INDUCTOR 82NH		

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L225		*	L92-0127-05	BEAS CORE		
L226		*	L34-1261-05	COIL(2.9T)		
L227			L33-0680-05	CHOKE COIL		
L228		*	L34-1266-05	COIL(2,1.5T)		
L229-231		*	L34-1264-05	COIL(2,2.5T)		
L232,233		*	L34-1263-05	COIL(2,3.5T)		
L234		*	L34-1269-05	COIL		
L235		*	L34-1266-05	COIL(2,1.5T)		
L236		*	L34-1271-05	COIL(2,8.5T)		
L237		*	L34-1272-05	COIL(2,7.5T)		
L238		*	L34-1273-05	COIL(2,13T)		
L239			L34-1187-15	COIL		
L240		*	L34-1264-05	COIL(2,2.5T)		
L242		*	L79-0860-05	HELICAL BLOCK		
L243		*	L79-0861-05	HELICAL BLOCK		
L244		*	L92-0127-05	BEAS CORE		
L245			L40-1281-80	SMALL FIXED INDUCTOR 120NH		
L246		*	L34-1275-05	COIL(2.5,1T)		
X1			L77-1357-05	CRYSTAL RESONATOR 17.355MHZ	KM1M2X	
X1			L77-1357-05	CRYSTAL RESONATOR 17.355MHZ	P	
X1			L77-1389-05	CRYSTAL RESONATOR 16.445MHZ	TW	
X2		*	L77-1401-05	CRYSTAL RESONATOR 59.070MHZ		
X201			L77-1358-05	CRYSTAL RESONATOR 12.8MHZ		
XF1			L71-0276-05	CRYSTAL FILTER 16.9MHZ		
XF2		*	L71-0290-05	CRYSTAL FILTER 59.525MHZ		
			N14-0526-24	NUT		
CP201,202		*	R90-0709-05	MULTI-COMP 4.5KX5		
R1		*	RK73GB1J332J	CHIP R 3.3K J 1/16W		
R2			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R3			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R4		*	RK73GB1J274J	CHIP R 270K J 1/16W		
R5			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R6		*	RK73GB1J274J	CHIP R 270K J 1/16W		
R7		*	RK73GB1J332J	CHIP R 3.3K J 1/16W		
R8			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R9 ,10			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R11		*	RK73GB1J272J	CHIP R 2.7K J 1/16W		
R12			RK73GB1J151J	CHIP R 150 J 1/16W		
R13			RK73GB1J471J	CHIP R 470 J 1/16W		
R14			RD14DB2HR10J	SMALL-RD 0.10 J 1/2W		
R15		*	RK73GB1J182J	CHIP R 1.8K J 1/16W		
R16			RD14DB2HR10J	SMALL-RD 0.10 J 1/2W		
R17			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R18			KR73GB1J102J	CHIP R 1.0K J 1/16W		
R19			RK73GB1J333J	CHIP R 33K J 1/16W		
R20			RK73GB1J473J	CHIP R 47K J 1/16W		
R21 ,22			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R23			RK73GB1J474J	CHIP R 470K J 1/16W		
R24		*	RK73GB1J560J	CHIP R 56 J 1/16W		
R25 ,26			RK73GB1J104J	CHIP R 100K J 1/16W		
R27			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R28			RK73GB1J474J	CHIP R 470K J 1/16W		
R29		*	RK73GB1J392J	CHIP R 3.9K J 1/16W		
R30		*	RK73GB1J154J	CHIP R 150K J 1/16W		

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R31		*	RK73GB1J392J	CHIP R 3.9K J 1/16W		
R32			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R33			RK73GB1J103J	CHIP R 10K J 1/16W		
R35		*	RK73GB1J334J	CHIP R 330K J 1/16W		
R36		*	RK73GB1J122J	CHIP R 1.2K J 1/16W		
R37			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R38			RK73GB1J471J	CHIP R 470 J 1/16W		
R39			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R40 ,41			RK73GB1J104J	CHIP R 100K J 1/16W		
R42 ,43			RK73GB1J333J	CHIP R 33K J 1/16W		
R44		*	RK73GB1J122J	CHIP R 1.2K J 1/16W		
R45		*	RK73GB1J334J	CHIP R 330K J 1/16W		
R46			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R47		*	RK73GB1J331J	CHIP R 330 J 1/16W		
R48			RK73GB1J103J	CHIP R 10K J 1/16W		
R49		*	RK73GB1J272J	CHIP R 2.7K J 1/16W		
R50			RK73GB1J100J	CHIP R 10 J 1/16W		
R51		*	RK73GB1J334J	CHIP R 330K J 1/16W		
R52			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R53			RK73GB1J100J	CHIP R 10 J 1/16W		
R54			RK73GB1J473J	CHIP R 47K J 1/16W		
R55			RK73GB1J103J	CHIP R 10K J 1/16W		
R56 ,57			RK73GB1J473J	CHIP R 47K J 1/16W		
R58			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R59		*	RK73GB1J821J	CHIP R 820 J 1/16W		
R60			RK73GB1J104J	CHIP R 100K J 1/16W		
R61 ,62			RK73GB1J223J	CHIP R 22K J 1/16W		
R69		*	RK73GB1J105J	CHIP R 1.0M J 1/16W		
R70			RK73GB1J104J	CHIP R 100K J 1/16W		
R71			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R73			RK73BB2B101J	CHIP R 100 J 1/8W		
R74			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R75			RK73GB1J103J	CHIP R 10K J 1/16W		
R76			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R77			RK73GB1J103J	CHIP R 10K J 1/16W		
R78			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R80 -82			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R83		*	RK73GB1J272J	CHIP R 2.7K J 1/16W		
R84 -86			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R201-203			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R204,205			RK73GB1J123J	CHIP R 12K J 1/16W		
R206			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R207,208			RK73GB1J123J	CHIP R 12K J 1/16W		
R209			RK73GB1J103J	CHIP R 10K J 1/16W		
R210			RK73GB1J123J	CHIP R 12K J 1/16W		
R211			RK73GB1J103J	CHIP R 10K J 1/16W		
R212			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R213			RK73GB1J561J	CHIP R 560 J 1/16W		
R214		*	RK73GB1J272J	CHIP R 2.7K J 1/16W		
R215			RK73GB1J561J	CHIP R 560 J 1/16W		
R216			RK73GB1J101J	CHIP R 100 J 1/16W		
R217		*	RK73GB1J273J	CHIP R 27K J 1/16W		
R218		*	RK73GB1J683J	CHIP R 68K J 1/16W		
R219			RK73GB1J561J	CHIP R 560 J 1/16W		
R220			RK73GB1J101J	CHIP R 100 J 1/16W		

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R221		*	RK73GB1J223J	CHIP R 22K J 1/16W		
R222			RK73GB1J390J	CHIP R 39 J 1/16W		
R223			RK73GB1J103J	CHIP R 10K J 1/16W		
R224			RK73GB1J153J	CHIP R 15K J 1/16W		
R225			RK73GB1J471J	CHIP R 470 J 1/16W		
R226			RK73GB1J103J	CHIP R 10K J 1/16W		
R227			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R228		*	RK73GB1J681J	CHIP R 680 J 1/16W		
R229			RK73GB1J561J	CHIP R 560 J 1/16W		
R230			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R231, 232			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R233			RK73GB1J151J	CHIP R 150 J 1/16W		
R234			RK73GB1J101J	CHIP R 100 J 1/16W		
R235			RK73GB1J153J	CHIP R 15K J 1/16W		
R236			RK73GB1J823J	CHIP R 82K J 1/16W		
R238		*	RK73GB1J332J	CHIP R 3.3K J 1/16W		
R239			RK73GB1J103J	CHIP R 10K J 1/16W		
R240		*	RK73GB1J560J	CHIP R 56 J 1/16W		
R241			RK73GB1J220J	CHIP R 22 J 1/16W		
R242			RK73GB1J561J	CHIP R 560 J 1/16W		
R243			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R244			RK73GB1J471J	CHIP R 470 J 1/16W		
R245			RK73GB1J103J	CHIP R 10K J 1/16W		
R246			RK73GB1J220J	CHIP R 22 J 1/16W		
R247			RK73GB1J820J	CHIP R 82 J 1/16W		
R248, 249		*	RK73GB1J271J	CHIP R 270 J 1/16W		
R250			RK73GB1J101J	CHIP R 100 J 1/16W		
R251, 252			RK73FB2A101J	CHIP R 100 J 1/10W		
R254		*	RK73GB1J822J	CHIP R 8.2K J 1/16W		
R256			RK73GB1J103J	CHIP R 10K J 1/16W		
R257		*	RK73GB1J273J	CHIP R 27K J 1/16W		
R258		*	RK73GB1J270J	CHIP R 27 J 1/16W		
R259			RK73GB1J471J	CHIP R 470 J 1/16W		
R260			RK73GB1J220J	CHIP R 22 J 1/16W		
R261			RK73GB1J103J	CHIP R 10K J 1/16W		
R262		*	RK73GB1J273J	CHIP R 27K J 1/16W		
R263			RK73GB1J220J	CHIP R 22 J 1/16W		
R264		*	RK73GB1J122J	CHIP R 1.2K J 1/16W		
R266		*	RK73GB1J822J	CHIP R 8.2K J 1/16W		
R267			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R268			RK73GB1J391J	CHIP R 390 J 1/16W		
R276			RK73GB1J470J	CHIP R 47 J 1/16W		
R277			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R278		*	RK73GB1J822J	CHIP R 8.2K J 1/16W		
R279			RK73GB1J100J	CHIP R 10 J 1/16W		
R280		*	RK73GB1J680J	CHIP R 68 J 1/16W		
R281			RK73GB1J561J	CHIP R 560 J 1/16W		
R282		*	RK73GB1J122J	CHIP R 1.2K J 1/16W		
R283			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R284		*	RK73GB1J680J	CHIP R 68 J 1/16W		
R286			RK73GB1J561J	CHIP R 560 J 1/16W		
R287, 288		*	RK73GB1J271J	CHIP R 270 J 1/16W		
R289			RK73GB1J101J	CHIP R 100 J 1/16W		
R290, 291			RK73FB2A101J	CHIP R 100 J 1/10W		
R292			RK73GB1J101J	CHIP R 100 J 1/16W		

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R293			RK73GB1J220J	CHIP R 22 J 1/16W		
R294			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R295			RK73GB1J104J	CHIP R 100K J 1/16W		
R296		*	RK73GB1J121J	CHIP R 120 J 1/16W		
R297			RK73GB1J470J	CHIP R 47 J 1/16W		
R298		*	RK73GB1J392J	CHIP R 3.9K J 1/16W		
R299-301			RK73GB1J104J	CHIP R 100K J 1/16W		
R302			RK73GB1J101J	CHIP R 100 J 1/16W		
R303		*	RK73GB1J821J	CHIP R 820 J 1/16W		
R305			RK73GB1J104J	CHIP R 100K J 1/16W		
R306			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R339			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R340			RK73GB1J101J	CHIP R 100 J 1/16W		
R341			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R343		*	RK73GB1J681J	CHIP R 680 J 1/16W		
R344,345			RK73GB1J000J	CHIP R 0.0 J 1/16W		
VR1			R23-9403-05	POTENTIOMETER SW/SQ/AF		
VR2		*	R23-9406-05	POTENTIOMETER SQ/BAL		
VR3,4			R12-3444-05	TRIMMING POT. 10K		
VR5			R12-1433-05	TRIMMING POT.4.7K		
VR6			R12-1437-05	TRIMMING POT.3.3K		
S201			S40-2458-05	PUSH SWITCH HI/LOW		
C1			CK73GB1H471K	CHIP C 470PF K		
C2			C90-2049-05	ELECTRO 15UF 6.3WV		
C3			CK73GB1H471K	CHIP C 470PF K		
C4			CE04NW1C470M	ELECTRO 47UF 16WV		
C5			CK73GB1H471K	CHIP C 470PF K		
C6			CE04NWOJ470M	ELECTRO 47UF 6.3WV		
C7 -9			CK73GB1H471K	CHIP C 470PF K		
C10			CE04NWOJ470M	ELECTRO 47UF 6.3WV		
C11 -13			CK73GB1H471K	CHIP C 470PF K		
C14			CE04NWOJ470M	ELECTRO 47UF 6.3WV		
C15			CE04NWOJ100M	ELECTRO 10UF 16WV		
C16			CE04NWOJ470M	ELECTRO 47UF 6.3WV		
C18			CE04NW1C470M	ELECTRO 47UF 16WV		
C19,20			CK73GB1H471K	CHIP C 470PF K		
C21			C92-0004-05	CHIP-TAN 1UF 16WV		
C22			CC73FSL1H151J	CHIP C 150PF J		
C24			CE04NW1A101M	ELECTRO 100UF 10WV		
C25,26			CK73GB1H471K	CHIP C 470PF K		
C27			CE04NW1A470M	ELECTRO 47UF 10WV		
C28			C92-0002-05	CHIP-TAN 0.22UF 35WV		
C30			C92-2095-05	ELECTRO 10UF 6.3WV		
C31			CK73GB1H471K	CHIP C 470PF K		
C32			C90-2095-05	ELECTRO 10UF 6.3WV		
C33			CK73GB1H471K	CHIP C 470PF K		
C34			CE04NW1A330M	ELECTRO 33UF 10WV		
C35			CK73GB1H471K	CHIP C 470PF K		
C36			CE04NW1H010M	ELECTRO 1.0UF 50WV		
C37			CK73GB1H471K	CHIP C 470PF K		
C38 -39			CK73FB1E223K	CHIP C 0.022UF K		
C40			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C41			C92-0004-05	CHIP-TAN 1UF 16WV		

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C42		*	CK73GB1H681K	CHIP C 680PF K		
C43			CK73GB1E103K	CHIP C 0.01UF K		
C44			C90-2050-05	ELECTRO 33UF 6.3WV		
C45			CC73GCH1H180J	CHIP C 18PF J		
C46		*	CC73GCH1H150J	CHIP C 15PF J		
C47			CK73GB1E103K	CHIP C 0.01UF K		
C48			C93-0510-05	CHIP C 1.0UF K		
C49			CK73GB1H471K	CHIP C 470PF K		
C50			C93-0510-05	CHIP C 1.0UF K		
C51			CK73GB1H102K	CHIP C 1000PF K		
C52			CK73FB1E273K	CHIP C 0.027UF K		
C53			CK73FB1E223K	CHIP C 0.022UF K		
C54			C90-2050-05	ELECTRO 33UF 6.3WV		
C55			CK73GB1H471K	CHIP C 470PF K		
C56			CC73GCH1H070D	CHIP C 7.0PF D		
C57			CK73GB1H471K	CHIP C 470PF K		
C58			C92-0004-05	CHIP-TAN 1UF 16WV		
C59			CK73GB1H471K	CHIP C 470PF K		
C60			C92-0004-05	CHIP-TAN 1UF 16WV		
C61			CK73GB1H471K	CHIP C 470PF K		
C62			CE04NWOJ330M	ELECTRO 33UF 6.3WV		
C63 -67			CK73GB1H471K	CHIP C 470PF K		
C68			CE04NW1E4R7M	ELECTRO 4.7UF 25WV		
C69 -76			CK73GB1H471K	CHIP C 470PF K		
C77			C92-0004-05	CHIP-TAN 1UF 16WV		
C78			CK73GB1H471K	CHIP C 470PF K		
C79			C92-0004-05	CHIP-TAN 1UF 16WV		
C81 -88			CK73GB1H471K	CHIP C 470PF K		
C89			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C90 -94			CK73GB1H471K	CHIP C 470PF K		
C95			C91-1015-05	FILM 0.18UF 63WV		
C96 -100			CK73GB1H471K	CHIP C 470PF K		
C107			CE04NWOJ221M	ELECTRO 220UF 6.3WV		
C108			CK73EB1E104K	CHIP C 0.10UF K		
C109, 110			CK73GB1E103K	CHIP C 0.01UF K		
C111-115			CK73GB1H471K	CHIP C 470PF K		
C116			C92-0004-05	CHIP-TAN 1UF 16WV		
C117			CK73GB1H471K	CHIP C 470PF K		
C120			C90-0890-05	TANTAL 1UF 16WV		
C201			CK73GB1E103K	CHIP C 0.01UF K		
C202-205			CK73GB1H471K	CHIP C 470PF K		
C206			C92-0002-05	CHIP-TAN 0.22UF 35WV		
C207			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C208			C92-0513-05	CHIP-TAN 3.3UF 6.3WV		
C209			CE04NWOJ470M	ELECTRO 47UF 6.3WV		
C210			CK73GB1H471K	CHIP C 470PF K		
C211			C92-0001-05	CHIP-TAN 0.1UF 35WV		
C212			CE04NWOJ221M	ELECTRO 220UF 6.3WV		
C213			CK73GB1E103K	CHIP C 0.01UF K		
C214			CK73GB1H471K	CHIP C 470PF K		
C215		*	CC73GCH1H101J	CHIP C 100PF J		
C216			CK73GB1H331K	CHIP C 330PF K		
C217			CC73GCH1H270J	CHIP C 27PF J		
C218			CC73GCH1H390J	CHIP C 39PF J		
C219			CK73GB1E103K	CHIP C 0.01UF K		

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C220, 221			CK73GB1H102K	CHIP C 1000PF K		
C222			CK73GB1H471K	CHIP C 470PF K		
C223			CK73FB1E473M	CHIP C 0.47UF M		
C224			CE04NW0J470M	ELECTRO 47UF 6.3WV		
C225			C90-2094-05	ELECTRO 68UF 6.3WV		
C226			CK73FB1E473M	CHIP C 0.047UF M		
C227			CK73GB1H471K	CHIP C 470PF K		
C228			CE04NW0J221M	ELECTRO 220UF 6.3WV		
C229			CK73GB1H102K	CHIP C 1000PF K		
C230			CK73FB1H471K	CHIP C 470PF K		
C231			CK73GB1H471K	CHIP C 470PF K		
C232, 233			CK73FB1H471K	CHIP C 470PF K		
C234			CK73FB1H103K	CHIP C 0.010UF K		
C235			CK73GB1H471K	CHIP C 470PF K		
C236			CC73GCH1H070D	CHIP C 7.0PF D		
C237			CK73FB1H471K	CHIP C 470PF K		
C238			CK73GB1H471K	CHIP C 470PF K		
C239			CK73FB1H471K	CHIP C 470PF K		
C240			CK73FB1H103K	CHIP C 0.010UF K		
C241			CC73GCH1H070D	CHIP C 7.0PF D		
C242, 243			CK73GB1H471K	CHIP C 470PF K		
C244		*	CC73GCH1H150J	CHIP C 15PF J		
C245			CK73GB1H471K	CHIP C 470PF K		
C246, 247		*	CC73GCH1H050C	CHIP C 5.0PF C		
C248			CK73GB1H471K	CHIP C 470PF K		
C249			CK73GB1E103K	CHIP C 0.01UF K		
C250, 251			CK73GB1H471K	CHIP C 470PF K		
C252			CC73GCH1H070D	CHIP C 7.0PF D		
C253			CK73GB1H471K	CHIP C 470PF K		
C254			CK73GB1E103K	CHIP C 0.01UF K		
C255			CK73GB1H471K	CHIP C 470PF K		
C256			CC73FCH1H0R5C	CHIP C 0.5PF C		
C257			CK73GB1H471K	CHIP C 470PF K		
C258			CC73GCH1H070D	CHIP C 7.0PF D		
C259			CK73GB1H102K	CHIP C 1000PF K		
C262			CK73GB1H102K	CHIP C 1000PF K		
C263, 264			CK73GB1H471K	CHIP C 470PF K		
C265		*	CC73GCH1H090D	CHIP C 9.0PF D		
C266			CK73GB1H102K	CHIP C 1000PF K		
C267			CK73FB1H102K	CHIP C 1000PF K		
C268, 269			CK73GB1H102K	CHIP C 1000PF K		
C270			CC73GCH1H180J	CHIP C 18PF J		
C271			CK73GB1H102K	CHIP C 1000PF K		
C272		*	CC73GCH1H100D	CHIP C 10PF D		
C273			CK73GB1E103K	CHIP C 0.01UF K		
C274-276			CK73GB1H102K	CHIP C 1000PF K		
C277			C90-2049-05	ELECTRO 15UF 6.3WV		
C278		*	CC73GCH1H470J	CHIP C 47PF J		
C279			CC73GCH1H020C	CHIP C 2.0PF C		
C280			CK73GB1E103K	CHIP C 0.01UF K		
C281			CK73GB1H102K	CHIP C 1000PF K		
C282			CC73GCH1H040C	CHIP C 4.0PF C		
C283			CK73GB1H102K	CHIP C 1000PF K		
C284			CC73GCH1H080D	CHIP C 8.0PF D		
C285			CC73GCH1H0R5C	CHIP C 0.5PF C		

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C286			CC73GCH1H080D	CHIP C 8.0PF D		
C287		*	CC73GCH1H050C	CHIP C 5.0PF C		
C288			CC73GCH1H0R5C	CHIP C 0.5PF C		
C289			CC73GCH1H080D	CHIP C 8.0PF D		
C290			CC73GCH1H040C	CHIP C 4.0PF C		
C291			CK73GB1H102K	CHIP C 1000PF K		
C292, 293			CC73GCH1H270J	CHIP C 27PF J		
C294			CK73GB1E103K	CHIP C 0.01UF K		
C295			CC73GCH1H270J	CHIP C 27PF J		
C296			CK73FB1H102K	CHIP C 1000PF K		
C297-299			CK73GB1H471K	CHIP C 470PF K		
C300			C90-2049-05	ELECTRO 15UF 6.3WV		
C301			C90-2039-05	ELECTRO 15UF 16WV		
C302			CK73GB1H471K	CHIP C 470PF K		
C303, 304			CC73FCH1H020C	CHIP C 2.0PF C		
C305			CC73FCH1H100D	CHIP C 10PF D		
C306			CC73FCH1H020C	CHIP C 2.0PF C		
C307			CC73FCH1H090D	CHIP C 9.0PF D		
C308			CC73FCH1H020C	CHIP C 2.0PF C		
C309			CC73FCH1H070D	CHIP C 7.0PF D		
C310			CC73FCH1H050C	CHIP C 5.0PF C		
C311			CC73FCH1H030C	CHIP C 3.0PF C		
C312			CC73FCH1H050C	CHIP C 5.0PF C		
C313			CC73FCH1H030C	CHIP C 3.0PF C		
C314			CC73FCH1H1R5C	CHIP C 1.5PF C		
C315			CC73FCH1H040C	CHIP C 4.0PF C		
C316			CC73GCH1H180J	CHIP C 18PF J	KMM2XP	
C316, 327			CC73GCH1H220J	CHIP C 22PF J	TW	
C317			CC73GCH1H040C	CHIP C 4.0PF C		
C318			CC73GCH1H220J	CHIP C 22PF J	KMM2XP	
C318			CC73GCH1H270J	CHIP C 27PF J	TW	
C319			CC73GCH1H070D	CHIP C 7.0PF D		
C320			CC73GCH1H270J	CHIP C 27PF J	KMM2XP	
C320			CC73GCH1H300J	CHIP C 30PF J	TW	
C321			CC73GCH1H080D	CHIP C 8.0PF D		
C322			CK73GB1H471K	CHIP C 470PF K		
C323-326			CK73GB1H102K	CHIP C 1000PF K		
C327			CC73GCH1H220J	CHIP C 22PF J		
C328			C91-0757-05	CERAMIC 1000PF J		
C329-332			CK73GB1H471K	CHIP C 470PF K		
C333			CC73GCH1H030C	CHIP C 3.0PF C		
C334			CC73GCH1H101J	CHIP C 100PF J		
C335			C91-0745-05	CERAMIC 100PF J		
C336			CK73FB1H471K	CHIP C 470PF K		
C338			CK73GB1H471K	CHIP C 470PF K		
C340			CK73GB1H471K	CHIP C 470PF K		
C342, 343			CK73GB1E103K	CHIP C 0.01UF K		
C344			CK73FB1H103K	CHIP C 0.01UF K		
C345			CK73FB1E223K	CHIP C 0.022UF K		
C346			CK73GB1E103K	CHIP C 0.01PF K		
C347			CK73FB1E223K	CHIP C 0.022UF K		
C348			C90-2108-05	ELECTRO 2.2UF 16WV		
C349			CK45B1H472K	CERAMIC 4700PF K		
C350			CC45CH1H020C	CHIP C 2PF C		
D1, 2		*	ERC61-004	CHIP ZENER DIODE		

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D3		*	02CZ3.9	CHIP DIODE		
D4		*	1SS301	CHIP DIODE		
D5			MA110	CHIP DIODE		
D201			DA204U	CHIP DIODE		
D202		*	1SS301	CHIP DIODE		
D203,204			MA77	CHIP DIODE		
D205			DA204U	CHIP DIODE		
D206			1SV172	CHIP DIODE		
D207,208			MI308	DIODE		
D210		*	1SS312	CHIP DIODE		
D211			HSM88AS	CHIP DIODE		
D212			MA110	CHIP DIODE		
D213			1SS277	DIODE		
D215			1SV172	CHIP DIODE		
D216			MI308	DIODE		
D217		*	1SV154	DIODE		
D218-221			MA360	CHIP DIODE		
D222			MA77	CHIP DIODE		
IC1			S-81250HG-RD	IC(VOLTAGE REGULATOR/ +5V)		
IC2			BA525	IC(AF POWER AMP/ 700MW)		
IC3			LM301AD	IC(OP AMP)		
IC4			TC4066BF	IC(BILATERAL SWITCH X4)		
IC5			MN4094BS	IC(8BIT SHIFT,STORE BUS R)		
IC6			TC4066BF	IC(BILATERAL SWITCH X4)		
IC201		*	MB1504	IC(PLL FREQ SYNTHESIZER)		
IC202		*	MB87014	IC		
IC203		*	S-AU26	PWR MODULE UHF		
IC204		*	S-AV22	PWR MODULE VHF		
Q1			DTA144EU	DIGITAL TRANSISTOR		
Q2			2SB1182(Q)	TRANSISTOR		
Q3 ,5		*	FMC4	DIGITAL TRANSISTOR		
Q4			2SB1182(Q)	TRANSISTOR		
Q6			FMG2	DIGITAL TRANSISTOR		
Q7			2SB1182(Q)	TRANSISTOR		
Q8			2SC4116(GR)	CHIP TRANSISTOR		
Q9		*	DTA144WU	DIGITAL TRANSISTOR		
Q10		*	DTC143XU	DIGITAL TRANSISTOR		
Q11 -14		*	FMC5	DIGITAL TRANSISTOR		
Q15			FMG2	DIGITAL TRANSISTOR		
Q16		*	FMA2	DIGITAL TRANSISTOR		
Q17			FMG2	DIGITAL TRANSISTOR		
Q18 ,19		*	DTB113EK	DIGITAL TRANSISTOR		
Q20			DTC144EU	DIGITAL TRANSISTOR		
Q21			FMW1	DIGITAL TRANSISTOR		
Q22			DTC144EU	DIGITAL TRANSISTOR		
Q23			FMW1	DIGITAL TRANSISTOR		
Q24		*	DTA124EU	DIGITAL TRANSISTOR		
Q25			DTA114YU	DIGITAL TRANSISTOR		
Q26			DTC144EU	DIGITAL TRANSISTOR		
Q27 ,28			2SC4215(Y)	CHIP TRANSISTOR		
Q29			FMG2	DIGITAL TRANSISTOR		
Q31			2SJ144(GR)	CHIP FET		
Q32 ,33			2SC4116(GR)	CHIP TRANSISTOR		
Q34			2SK208(GR)	CHIP FET		
Q35			DTC114EU	DIGITAL TRANSISTOR		

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Q201			2SC3324(B)	CHIP TRANSISTOR		
Q202		*	2SA1312(B)	CHIP TRANSISTOR		
Q203		*	2SC4226(R23,24)	CHIP TRANSISTOR		
Q204			2SC4116(GR)	CHIP TRANSISTOR		
Q205		*	2SC4226(R23,24)	CHIP TRANSISTOR		
Q206			2SC3356	CHIP TRANSISTOR		
Q207-209		*	2SC4226(R23,24)	CHIP TRANSISTOR		
Q211		*	DTA143XU	DIGITAL TRANSISTOR		
Q214		*	2SC4226(R23,24)	CHIP TRANSISTOR		
Q215			2SC3356	CHIP TRANSISTOR		
Q216		*	2SK360(B)	CHIP FET		
Q217		*	2SK882(Y)	CHIP FET		
Q218			DTC144EU	DIGITAL TRANSISTOR		
A1		*	W02-0845-05	ENCODER		
		*	X58-3590-00(U)	SUB UNIT	UHF VCO	
		*	X58-3590-00(V)	SUB UNIT	VHF VCO	
		*	X58-3610-00	SUB UNIT	UHF IF	
		*	X58-3610-01	SUB UNIT	VHF IF	
		*	X58-3620-00	SUB UNIT	MIC AMP	TW
		*	X58-3620-11	SUB UNIT	MIC AMP	KM1M2X
		*	X58-3620-11	SUB UNIT	MIC AMP	P
<b>UHF VCO (X58-3590-00 (U))</b>						
TC1 ,2		*	C05-0370-05	TRIMMING CAP 20PF		
		*	E23-0486-05	TERMINAL		
L1			L40-8272-80	SMALL FIXED INDUCTOR 82NH		
L2		*	L33-0702-05	CHOKE COIL 33NH		
L3			L40-2281-80	SMALL FIXED INDUCTOR 220NH		
L4 ,5			L40-2272-80	SMALL FIXED INDUCTOR 22NH		
L6		*	L33-0718-05	CHOKE COIL 39NH		
L7 ,8			L40-1092-19	SMALL FIXED INDUCTOR 1UH		
R1			RK73GB1J101J	CHIP R 100 J 1/16W		
R2			RK73GB1J100J	CHIP R 10 J 1/16W		
R3			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R4			RK73GB1J103J	CHIP R 10K J 1/16W		
R5			RK73GB1J104J	CHIP R 100K J 1/16W		
R6			RK73GB1J470J	CHIP R 47 J 1/16W		
R7 ,8			RK73GB1J123J	CHIP R 12K J 1/16W		
R9			RK73GB1J391J	CHIP R 390 J 1/16W		
R10		*	RK73GB1J331J	CHIP R 330 J 1/16W		
R11			RK73GB1J223J	CHIP R 22K J 1/16W		
R12			RK73GB1J103J	CHIP R 10K J 1/16W		
R13			RK73GB1J391J	CHIP R 390 J 1/16W		
R14			RK73GB1J104J	CHIP R 100K J 1/16W		
R15			RK73GB1J103J	CHIP R 10K J 1/16W		
R16			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R17 ,18			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R19			RK73GB1J103J	CHIP R 10K J 1/16W		
R20			RK73GB1J471J	CHIP R 470 J 1/16W		
R21			RK73GB1J223J	CHIP R 22K J 1/16W		
C1			CK73GB1H471K	CHIP C 470PF K		
C2			C92-0509-05	TANTAL 10UF 6.3WV		

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C3			CK73GB1H471K	CHIP C 470PF K		
C4			CC73GCH1H030C	CHIP C 3.0PF C		
C5			CK73GB1H471K	CHIP C 470PF K		
C6			CC73GCH1H030C	CHIP C 3.0PF C		
C7		*	CC73GCH1HR75C	CHIP C 0.75PF C		
C8		*	CC73GCH1H050C	CHIP C 5.0PF C		
C9			CC73GCH1H040C	CHIP C 4.0PF C		
C10			CK73GB1H102K	CHIP C 1000PF K		
C11			CK73GB1H471K	CHIP C 470PF K		
C12			CC73GCH1H0R5C	CHIP C 0.5PF C		
C13			CK73GB1H471K	CHIP C 470PF K		
C14			CK73GB1E103K	CHIP C 0.010UF K		
C15			CC73GCH1H030C	CHIP C 3.0PF C		
C16 ,17			CK73GB1H471K	CHIP C 470PF K		
C18			CK73GB1E103K	CHIP C 0.010UF K		
C19		*	CC73GCH1H050C	CHIP C 5.0PF C		
C20			CC73GCH1H020C	CHIP C 2.0PF C		
C21			CK73GB1E103K	CHIP C 0.010UF K		
C22 -24			CK73GB1H471K	CHIP C 470PF K		
C25			CC73GCH1H070D	CHIP C 7.0PF D		
C26			CC73GCH1H040C	CHIP C 4.0PF C		
C27			CC73GCH1H270J	CHIP C 27PF J		
C28		*	CC73GCH1H100D	CHIP C 10PF D		
C29			CC73GCH1H080D	CHIP C 8.0PF D		
C30			CC73GCH1H040C	CHIP C 4.0PF C		
C31 ,32			CK73GB1H471K	CHIP C 470PF K		
C33			CC73GCH1H010C	CHIP C 1.0PF C		
D1			MA344B	CHIP DIODE		
D2			MA77	CHIP DIODE		
D3			MA344B	CHIP DIODE		
D4			MA77	CHIP DIODE		
Q1			2SK508NV(K52)	CHIP FET		
Q2 ,3		*	2SC4226(R23,24)	CHIP TRANSISTOR		
Q4			DTC144EU	DIGITAL TRANSISTOR		
Q5		*	FMG1	DIGITAL TRANSISTOR		
Q6			2SC3838KZB	CHIP TRANSISTOR		
<b>VHF VCO (X58-3590-00 (V))</b>						
TC101,102		*	C05-0369-05	TRIMMING CAP 6PF		
			E23-0486-05	TERMINAL		
L101			L40-3391-19	SMALL FIXED INDUCTOR 3.3UF		
L102		*	L34-2347-05	COIL		
L103			L40-4792-81	SMALL FIXED INDUCTOR 4.7UF		
L105			L40-3391-19	SMALL FIXED INDUCTOR 3.3UF		
L106		*	L34-2346-05	COIL		
R101			RK73GB1J101J	CHIP R 100 J 1/16W		
R103			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R104,105			RK73GB1J104J	CHIP R 100K J 1/16W		
R106			RK73GB1J220J	CHIP R 22 J 1/16W		
R107			RK73GB1J561J	CHIP R 560 J 1/16W		
R109,110			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R111			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R112			RK73GB1J561J	CHIP R 560 J 1/16W		
R113			RK73GB1J470J	CHIP R 47 J 1/16W		

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R114			RK73GB1J153J	CHIP R 15K J 1/16W		
R115			RK73GB1J123J	CHIP R 12K J 1/16W		
R116			RK73GB1J223J	CHIP R 22K J 1/16W		
C101			CK73GB1H102K	CHIP C 1000PF K		
C102			C92-0509-05	TANTAL 10UF 6.3WV		
C104			CC73GCH1H0R5C	CHIP C 0.5PF C		
C105			CC73GCH1H470J	CHIP C 47PF J		
C106			CC73GCH1H060D	CHIP C 6.0PF D		
C107			CK73GB1E103K	CHIP C 0.010UF K		
C108			CC73GCH1H030C	CHIP C 3.0PF C		
C109			CK73GB1H102K	CHIP C 1000PF K		
C110			CK73GB1E103K	CHIP C 0.010UF K		
C111			CK73GB1H102K	CHIP C 1000PF K		
C114, 115			CK73GB1H102K	CHIP C 1000PF K		
C117			CK73GB1H102K	CHIP C 1000PF K		
C118			CK73FB1H473M	CHIP C 0.047UF M		
C120		*	CC73GCH1H150J	CHIP C 15PF J		
C121			CC73GCH1H100D	CHIP C 10PF D		
C122			CC73GCH1H060D	CHIP C 6.0PF D		
C123			CK73GB1H102K	CHIP C 1000PF K		
C124			CC73GCH1H030C	CHIP C 3.0PF C		
C125-127			CK73GB1H102K	CHIP C 1000PF K		
C128, 129			CC73GCH1H020C	CHIP C 2.0PF C		
D101			MA344B	CHIP DIODE		
D102, 103			MA77	CHIP DIODE		
D104			MA344B	CHIP DIODE		
Q101			2SK302(GR)	CHIP FET		
Q102		*	2SC4226(R23, 24)	CHIP TRANSISTOR		
Q103			2SC3838KZB	CHIP TRANSISTOR		
Q104			FMG2	DIGITAL TRANSISTOR		
Q105			DTC144EU	DIGITAL TRANSISTOR		
<b>IF (X58-3610-XX) -00 : UHF -01 : VHF</b>						
C1			CK73EB1E104K	CHIP C 0.10UF K		
C2			C92-0004-05	CHIP-TAN 1UF 16WV		
C3			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C4			CK73FB1E223K	CHIP C 0.022UF K		
C5 -8			CK73FB1H102K	CHIP C 1000PF K		
C10			CK73FB1H102K	CHIP C 1000PF K		
C11			C92-0001-05	CHIP TAN 0.1UF 35WV		
C13			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C14			CC73FCH1H150J	CHIP C 15PF J		U
C14			CC73FCH1H330J	CHIP C 33PF J		V
C15			CC73FCH1H220J	CHIP C 22PF J		U
C16			CC73FCH1H820J	CHIP C 82PF J		V
C16			CK73FB1H103K	CHIP C 0.010UF K		U
C17 -19			CK73EB1E104K	CHIP C 0.10UF K		
C20			CC73FCH1H820J	CHIP C 82PF J		
C21			CK73FB1E223K	CHIP C 0.022UF K		V
C21			CK73FB1H103K	CHIP C 0.010UF K		U
CN1		*	E40-5293-05	PIN CONNECTOR		
CD1			L79-0817-05	DISCRIMINATOR CDBM455C7		
CF1			L72-0362-05	CERAMIC FILTER CFUM455B		
L1			L40-3982-81	SMALL FIXED INDUCTOR 0.39UH		U

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R1			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R2			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R3			RK73FB2A102J	CHIP R 1.0K J 1/10W		U
R3			RK73FB2A821J	CHIP R 820 J 1/10W		V
R4			RK73FB2A274J	CHIP R 270K J 1/10W		
R5			RK73FB2A473J	CHIP R 47K J 1/10W		
R6			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R7			RK73FB2A332J	CHIP R 3.3K J 1/10W		
R8			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R9			RK73FB2A681J	CHIP R 680 J 1/10W		
R10			RK73FB2A103J	CHIP R 10K J 1/10W		U
R10			RK73FB2A473J	CHIP R 47K J 1/10W		V
R11			RK73FB2A122J	CHIP R 1.2K J 1/10W		
R12			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R13			R92-0670-05	CHIP R 0 OHM		V
R14			RK73FB2A681J	CHIP R 680 J 1/10W		
R15			RK73FB2A101J	CHIP R 100 J 1/10W		
TH1			R92-0680-05	THERMISTOR		
VR1			R12-6452-05	TRIMMING POT.100K		
D1			HSM88AS	CHIP DIODE		
IC1			TK10485M	IC		U
IC1			TK10487M	IC		V
Q1			25C2712(GR)	CHIP TRANSISTOR		
<b>MIC AMP (X58-3620-XX) -00 : T,W -11 : K,P,M,M2,X</b>						
C1			CK73FB1E223K	CHIP C 0.022UF K		
C2			CK73GB1H471K	CHIP C 470PF K		
C3			C92-0002-05	CHIP-TAN 0.22UF 35WV		
C4 -6			CK73GB1E103K	CHIP-TAN 0.01UF K		
C7			CK73GB1E152K	CHIP-TAN 1500PF K		
C8 ,9			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C10 ,11			CK73GB1H471K	CHIP C 470PF K		
C12			CC73GCH1H151J	CHIP C 150PF J		
C13			CK73GB1H182K	CHIP C 1800PF K		
C14			CK73FB1H103K	CHIP C 0.010UF K		
C15			C92-0507-05	CHIP TAN 4.7UF 6.3WV		
CN1		*	E40-5292-05	PIN CONNECTOR		
R1		*	RK73GB1J272J	CHIP R 2.7K J 1/16W		
R2			RK73GB1J104J	CHIP R 100K J 1/16W		
R3			RK73GB1J103J	CHIP R 10K J 1/16W		
R4			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R5			RK73GB1J473K	CHIP R 47K K 1/16W		
R6			RK73GB1J100J	CHIP R 10 J 1/16W		
R7			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R8			RK73GB1J391J	CHIP R 390 J 1/16W		
R9			RK73GB1J223J	CHIP R 22K J 1/16W		
R10 ,11			RK73GB1J473K	CHIP R 47K K 1/16W		
R12			RK73GB1J104J	CHIP R 100K J 1/16W	TW	
R12			RK73GB1J563J	CHIP R 56K J 1/16W	KM1M2X	
R12			RK73GB1J563J	CHIP R 56K J 1/16W	P	
R13			RK73GB1J104J	CHIP R 100K J 1/16W		
R14			RK73GB1J000J	CHIP R 0.0 J 1/16W		
R15			RK73GB1J104J	CHIP R 100K J 1/16W		
R16			RK73GB1J472J	CHIP R 4.7K J 1/16W		

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R17			RK73GB1J103J	CHIP R 10K J 1/16W		
R18			RK73GB1J392J	CHIP R 3.9K J 1/16W	TW	
R18			RK73GB1J562J	CHIP R 5.6K J 1/16W	KM1M2X	
R18			RK73GB1J562J	CHIP R 5.6K J 1/16W	P	
VR1		*	R12-6450-05	TRIMMING POT. 47K		
VR2		*	R12-6452-05	TRIMMING POT. 100K		
C2			CK73GB1H471K	CHIP C 470PF K		
C4 -6			CK73GB1E103K	CHIP C 0.01UF K		
C7		*	CK73GB1H152K	CHIP C 1500PF K		
C10 ,11			CK73GB1H471K	CHIP C 470PF K		
C12		*	CC73GCH1H151J	CHIP C 150PF J		
C13		*	CK73GB1H182K	CHIP C 1800PF K		
IC1			NJM4560M	IC(OP AMP X2)		
TH2		*	NT732ATD202K	CHIP THERMISTOR 2K		

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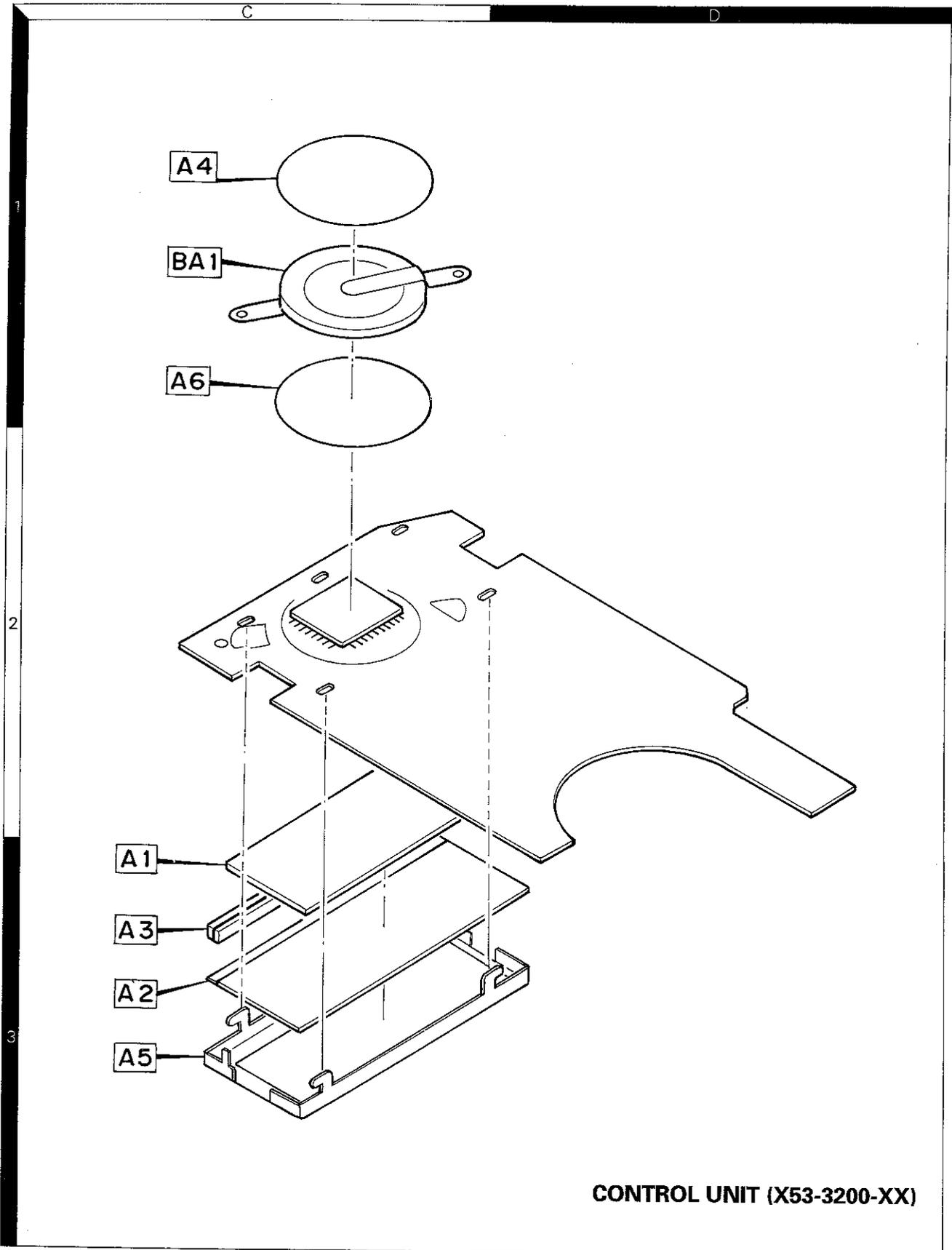
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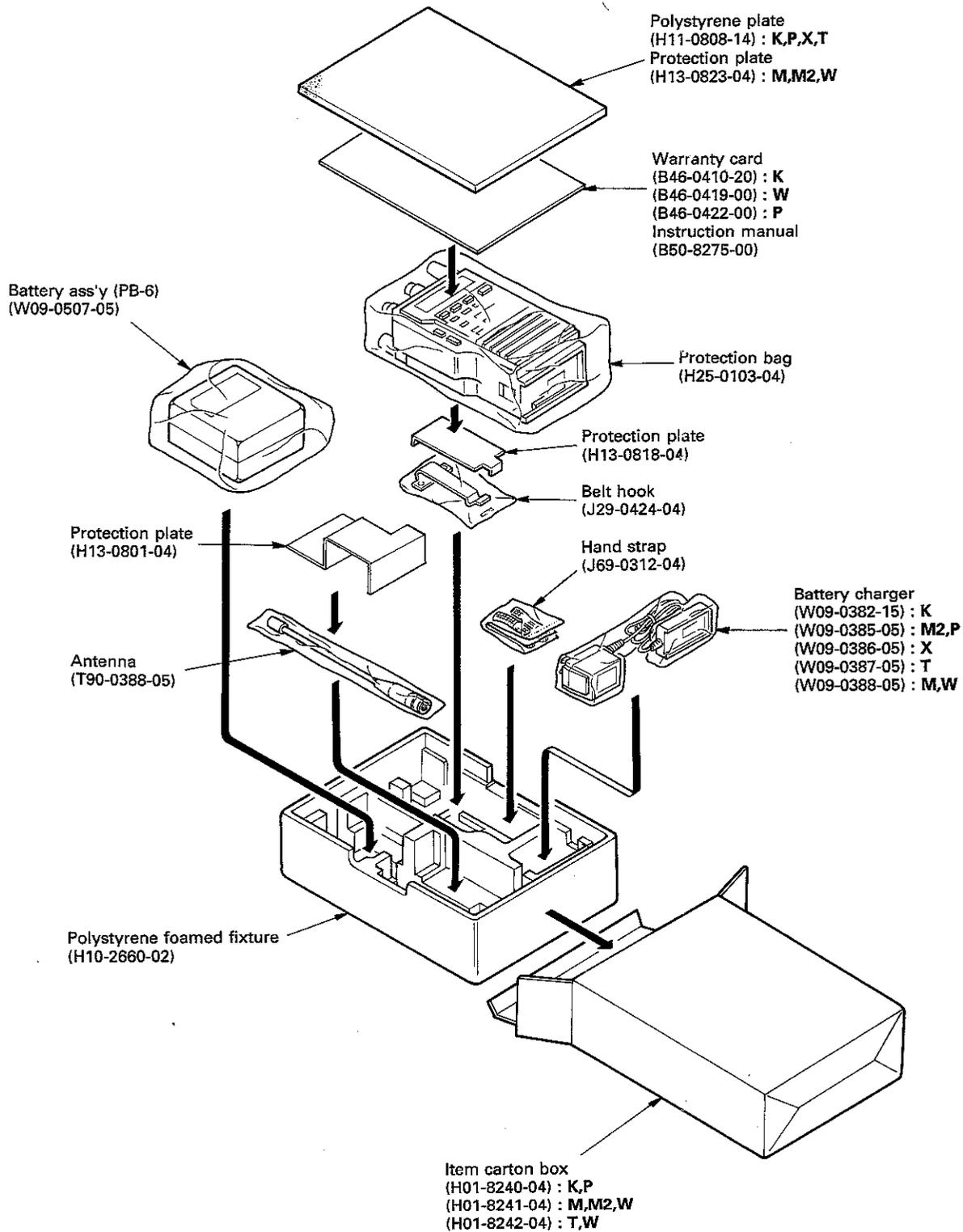


# DISASSEMBLY



CONTROL UNIT (X53-3200-XX)

## PACKING



# ADJUSTMENT

## Required test equipment

- 1. Stabilized Power Supply**
  - 1) The supply voltage can be changed between 5V and 18V, and the current is 3A or more.
  - 2) The standard voltage is 13.8V.
- 2. DC Ammeter**
  - 1) Class 1 ammeter (17 ranges and other features).
  - 2) The full scale can be set to either 300mA or 1A.
  - 3) A cable of less internal loss must be used.
- 3. Frequency Counter (f. counter)**
  - 1) Frequencies of up to 1GHz or so can be measured.
  - 2) The sensitivity can be changed to 250MHz or below, and measurements are highly stable and accurate (0.2ppm or so).
- 4. Power Meter**
  - 1) Measurable frequency : Up to 500MHz.
  - 2) Impedance : 50Ω, unbalanced.
  - 3) Measuring range : Full scale of 10W or so.
  - 4) A standard cable (5D2W 1m) must be used.
- 5. RF VTVM (RF V.M)**
  - 1) Measurable frequency : Up to 500MHz or so.
- 6. Linear Detector**
  - 1) Measurable frequency : Up to 500MHz.
  - 2) Characteristics are flat, and CN is 60dB or more.
- 7. Digital Voltmeter**
  - 1) Voltage range : FS = 18V or so.
  - 2) Input resistance : 1MΩ or more.
- 8. Oscilloscope**
  - 1) Measuring range : DC to 30MHz.
  - 2) Provides highly accurate measurements for 5 to 25MHz.
- 9. AF Voltmeter (AF V.M)**
  - 1) Measurable frequency : 50Hz to 1MHz.
  - 2) Maximum sensitivity : 1mV or more.

## 10. Spectrum Analyzer

- 1) Measuring range : DC to 1GHz or more.

## 11. Standard Signal Generator (SSG)

- 1) Maximum frequency : 500MHz or more.
- 2) Output : -20dB/0.1μV to 120dB/1V.
- 3) Output impedance : 50Ω

## 12. Tracking Generator

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

## 13. Dummy Load

- 1) 8Ω, 3W or more.

## Preparation

- Set the unit in the receiving mode and set the controls as follows, unless otherwise specified.

POWER/VOL ..... ON  
 BALANCE VR ..... CENTER  
 VHF SQL VR ..... MIN  
 UHF SQL VR ..... MIN  
 HI/LOW ..... HI

- 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 indicted SSG output levels are for maximum output.

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## ADJUSTMENT

### TX-RX COMMON ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Reset	1) While holding the M key down, set the POWER switch to ON.							Display MAIN : 433.000 <b>M,M2,X,T,W</b> MAIN : 440.000 <b>K,P</b> SUB : 144.000 SAVE : ON APO : ON
2. Voltage confirmation	1) External power supply voltage : 9V							
	2) SBR	DC V.M	TX-RX (B/3)	R14			Check	8.6V
	3) 5C			Q2 collector				5.0V
	4) 5M			L2				
	5) 5R		UHF IF	7P (5R)				
	6) AFB		TX-RX (B/3)	Q7 collector				8.2V
	7) 5T PTT : ON			Q4 collector				5.0V

### PLL ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. VHF VCV	1) FREQ. : 144.02MHz	DC V.M	TX-RX (A/3)	C225 (LVV)	VHF VCO	TC102	2.0V	±0.2V
	2) PTT : ON	Power meter				TC101		
2. UHF VCV	1) FREQ. : 439.98MHz		UHF VCO	TP3 (LVU)	UHF VCO	TC2	3.0V	±0.2V
	2) PTT : ON					TC1		
3. Transmit frequency	1) FREQ. : 439.975MHz <b>M,M2,X,T,W</b> FREQ. : 449.975MHz <b>K,P</b>	f. counter Power meter		ANT	TX-RX (A/3)	TC201	439.975MHz <b>M,M2,X,T,W</b> 449.975MHz <b>K,P</b>	±100Hz

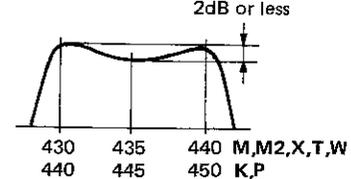
### VHF RX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. BPF	1) Tracking generator output : -40dBm	Tracking generator		ANT	TX-RX (A/3)	L220~L223		
	Connect the spectrum analyzer to TP2.	Spectrum analyzer	TX-RX (A/3)	TP2				
2. IF adjustment	1) FREQ. : 145.050MHz <b>M,M2,X,T,W</b> FREQ. : 146.050MHz <b>K,P</b> MODE : Single BAL VR : Center SSG output : -53dBm/50µV SSG MOD : 1kHz SSG DEV : ±3kHz	Oscilloscope AF V.M Distortion meter SSG		EXT.SP ANT	TX-RX (B/3)	L3	Minimum distortion	5% or less.
	3. Receive sensitivity	1) FREQ. : 144.050MHz SSG output : -122dBm/0.18µV 2) FREQ. : 145.050MHz <b>M,M2,X,T,W</b> FREQ. : 146.050MHz <b>K,P</b>					Check	SINAD 12dB or higher.

# ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
3. Receive sensitivity	3) FREQ. : 145.950MHz <b>M,M2,X,T,W</b> FREQ. : 147.950MHz <b>K,P</b>	Oscilloscope AF V.M Distortion		EXT.SP			Check	SINAD 12dB or higher.
4. Squelch	1) FREQ. : 145.050MHz <b>M,M2,X,T,W</b> FREQ. : 146.050MHz <b>K,P</b> SSG output : OFF V SQL VR : At the point where noise disappears.	meter SSG		ANT			Check	Knob position 9 : 00 to 11 : 30
	2) SSG output : -129dBm/0.079µV							Squelch is open.
	3) SSG output : -116dBm/3.5µV V SQL VR : MAX							
5. S-meter	1) FREQ. : 145.050MHz <b>M,M2,X,T,W</b> FREQ. : 146.050MHz <b>K,P</b> SSG output : -95dBm/4µV				VHF IF	VR1	Adjust VR1 so that last segment set off.	
	2) SSG output : -93dBm/5µV						Check	All segments on.
	3) SSG output : -127dBm/0.1µV							All segments off.

## UHF RX ADJUSTMENT

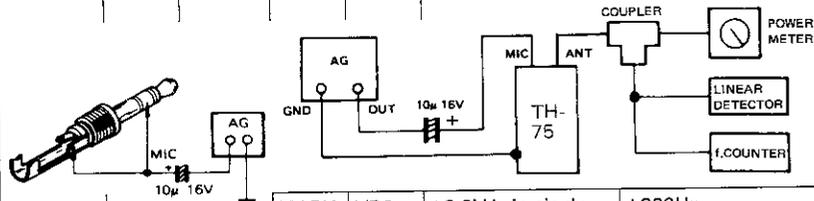
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. BPF	1) Tracking generator output : -40dBm  Connect the spectrum analyzer to TP1.	Tracking generator  Spectrum analyzer		ANT  TP1	TX-RX (A/3)	L242 L243		2dB or less 
2. IF adjustment	1) FREQ. : 435.050MHz <b>M,M2,X,T,W</b> FREQ. : 445.050MHz <b>K,P</b> MODE : Single BAL VR : Center SSG output : -53dBm/50µV SSG MOD : 1kHz SSG DEV : ±3kHz	Oscilloscope AF V.M Distortion meter SSG		EXT.SP  ANT	TX-RX (B/3)	L4	Minimum distortion	5% or less.
3. Receive sensitivity	1) FREQ. : 430.050MHz <b>M,M2,X,T,W</b> FREQ. : 438.050MHz <b>K,P</b> SSG output : -122dBm/0.18µV						Check	SINAD 12dB or higher.
	2) FREQ. : 435.050MHz <b>M,M2,X,T,W</b> FREQ. : 445.050MHz <b>K,P</b>							
	3) FREQ. : 439.950MHz <b>M,M2,X,T,W</b> FREQ. : 449.950MHz <b>K,P</b>							
4. Squelch	1) FREQ. : 435.050MHz <b>M,M2,X,T,W</b> FREQ. : 445.050MHz <b>K,P</b> SSG output : OFF U SQL VR : At the point where noise disappears.						Check	Knob position 9 : 00 to 11 : 30
	2) SSG output : -127dBm/0.1µV							Squelch is open.
	3) SSG output : -129dBm/0.079µV U SQL VR : MAX							

## ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
5. S-meter	1) FREQ. : 435.050MHz <b>M,M2,X,T,W</b> FREQ. : 445.050MHz <b>K,P</b> SSG output : -107dBm/1µV	Oscilloscope AF V.M Distortion meter			UHF IF	VR1	Adjust VR1 so that last segment set off.	
	2) SSG output : -104dBm/1.45µV	SSG					Check	All segments on.
	3) SSG output : -126dBm/0.12µV							All segments off.

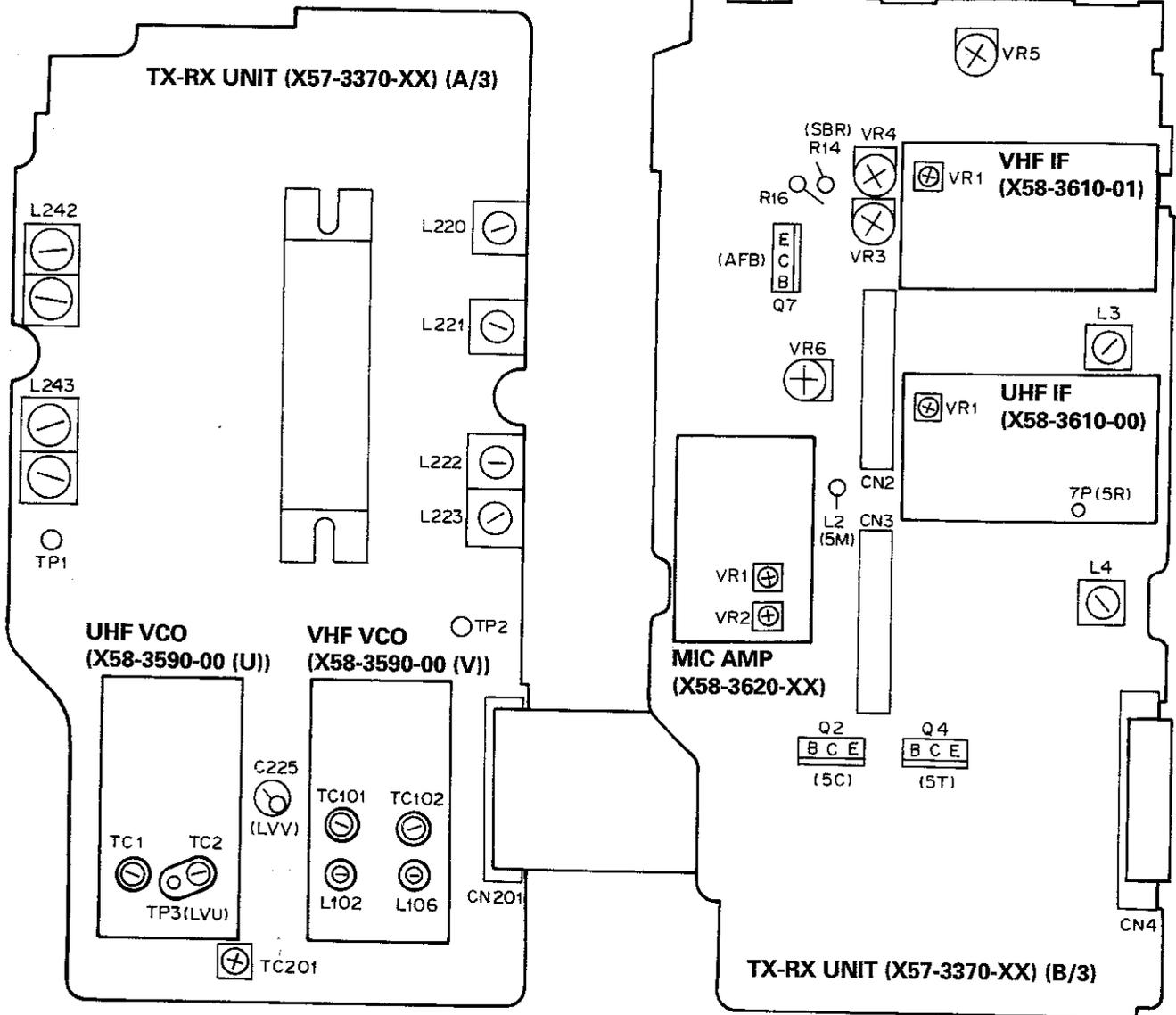
### TX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
1. Power	1) External power supply voltage : 13.8V FREQ. : 144.975MHz <b>M,M2,X,T,W</b> FREQ. : 146.000MHz <b>K,P</b> HI/LOW SW : LOW PTT : ON	Power meter Ammeter		ANT	TX-RX (B/3)	VR5	0.3W	±0.2W 0.8A or less.	
	2) HI/LOW SW : HI PTT : ON					VR4	MAX Set to 5.2W.	5.5W or more. 1.7A or less.	
	3) FREQ. : 434.975MHz <b>M,M2,X,T,W</b> FREQ. : 444.975MHz <b>K,P</b> HI/LOW SW : HI PTT : ON					VR3	MAX Set to 5.2W.	5.5W or more. 1.7A or less.	
	4) HI/LOW SW : LOW PTT : ON							Check	0.3 to 1.0W.
2. Modulation	1) FREQ. : 145.975MHz <b>M,M2,X,T,W</b> FREQ. : 147.975MHz <b>K,P</b> AG : 1kHz/50mV <b>T,W</b> AG : 1kHz/80mV <b>K,P,M,M2,X</b> PTT : ON	Power meter Linear detector f. counter AG Oscilloscope AF V.M		ANT	MIC AMP	VR1	±4.2kHz (+/- greater)	±200Hz	
	2) FREQ. : 434.975MHz <b>M,M2,X,T,W</b> FREQ. : 444.975MHz <b>K,P</b> PTT : ON			MIC			VR2		
	3) AG : 1kHz/5mV <b>T,W</b> AG : 1kHz/8 ~ 12mV <b>K,P,M,M2,X</b>								±2.6 to 3.5kHz
3. DTMF	1) AG : OFF PTT : ON Δ key : Push 7 key : Push				TX-RX (B/3)	VR6	±3.0kHz in single tone. (+/- greater)	±200Hz f : 1613 to 1653Hz	
	2) 0 key : Push PTT : ON						Check	0.7 to 1.7kHz	
4-1.TONE DEV <b>K,P</b>	1) TONE key : Push PTT : ON						Check	±0.5 to 1kHz	
4-2.TONE DEV <b>T,W</b>	1) TONE key : Push							±2.5 to 3.5kHz f : 1740 to 1760Hz Display "T" on. Into the transmit mode.	



# ADJUSTMENT

## Adjustment point



**(X57-3370-XX) (A/3)**  
 TC201 : Transmit frequency  
 L202~223 : VHF BPF  
 L242,243 : UHF BPF

**(X58-3590-00 (U))**  
 TC1,2 : UHF VCV

**(X58-3590-00 (V))**  
 TC101,102 : VHF VCV  
 L102,106 : VHF VCV

**(X57-3370-XX) (B/3)**  
 L3 : VHF IF  
 L4 : UHF IF  
 VR3 : UHF high power  
 VR4 : VHF high power  
 VR5 : UHF low power  
 VR6 : DTMF

**(X58-3610-00)**  
 VR1 : UHF S-meter

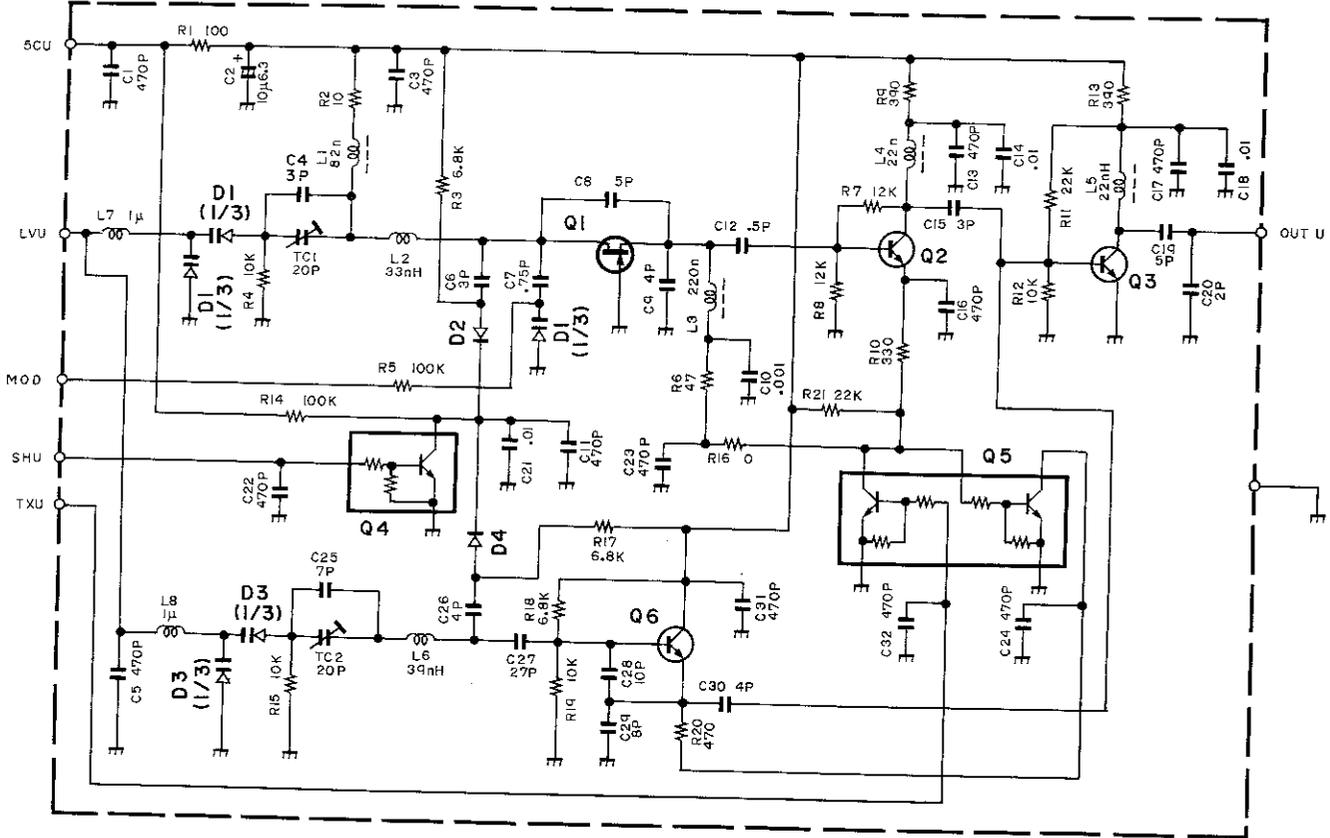
**(X58-3610-01)**  
 VR1 : VHF S-meter

**(X58-3620-XX)**  
 VR1 : VHF modulation  
 VR2 : UHF modulation

# TH-75A/E CIRCUIT DIAGRAM / PC BOARD VIEWS

## UHF VCO (X58-3590-00 (U))

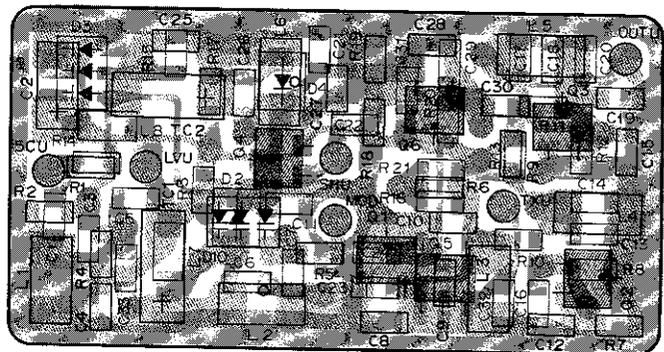
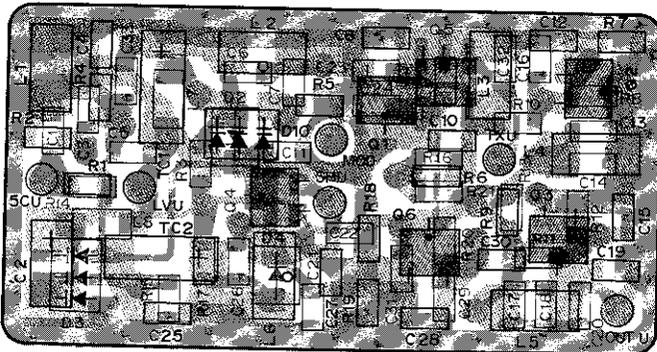
(X58-3590-00) (UHF)



- |      |                 |      |          |
|------|-----------------|------|----------|
| Q1   | : 2SK508NV(K52) | D1,3 | : MA344B |
| Q2,3 | : 2SC4226       | D2,4 | : MA77   |
| Q4   | : DTC144EU      |      |          |
| Q5   | : FMG1          |      |          |
| Q6   | : 2SC3838       |      |          |

UHF VCO (X58-3590-00 (U))  
Component side view

UHF VCO (X58-3590-00 (U))  
Foil side view



2SC3838KZB  
2SC4226  
DTC144EU



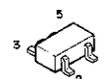
2SK302



2SK508NV

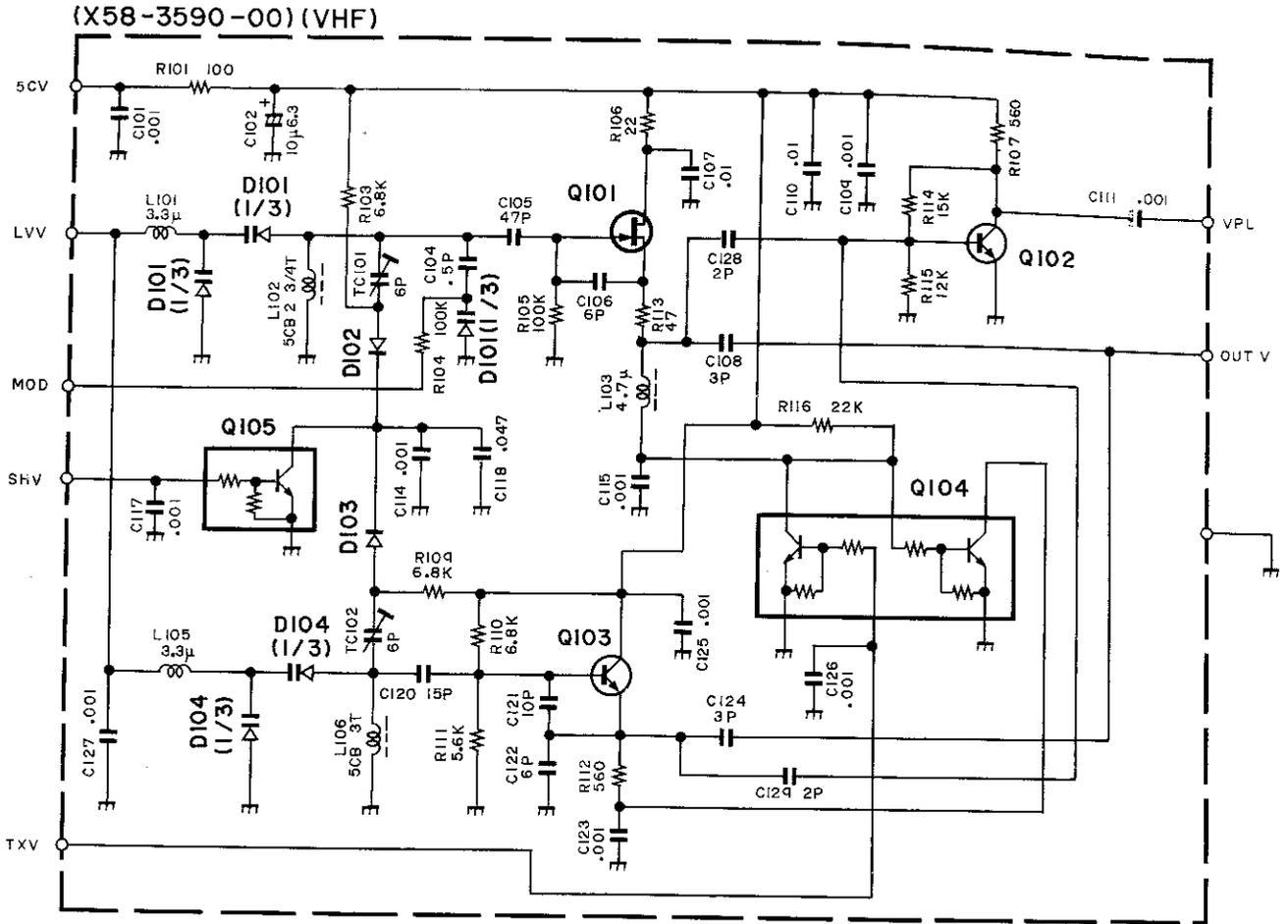


FMG1  
FMG2



# CIRCUIT DIAGRAM / PC BOARD VIEWS TH-75A/E

## VHF VCO (X58-3590-00 (V))



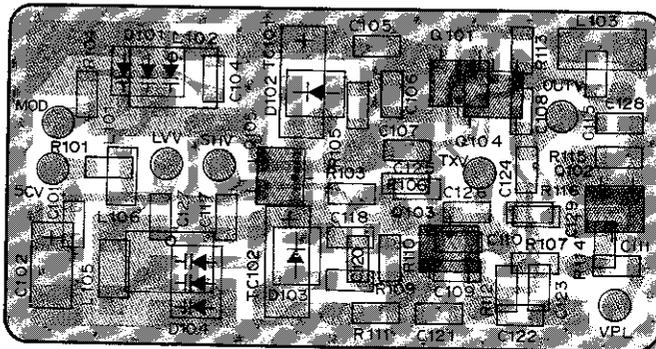
- |                   |                   |
|-------------------|-------------------|
| Q101 : 2SK302     | D101,104 : MA344B |
| Q102 : 2SC4226    | D102,103 : MA77   |
| Q103 : 2SC3838KZB |                   |
| Q104 : FMG2       |                   |
| Q105 : DTC144EU   |                   |

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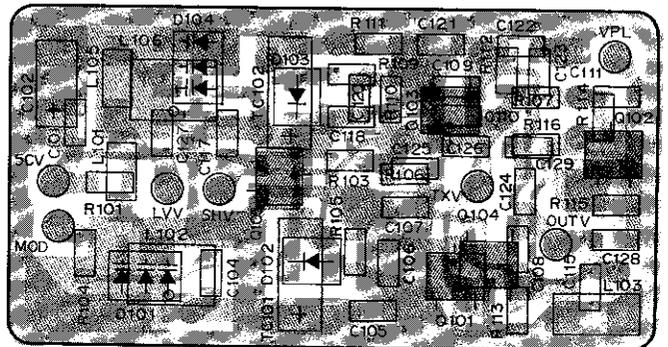
downloaded by

Amateur Radio Directory

**VHF VCO (X58-3590-00 (V))**  
Component side view



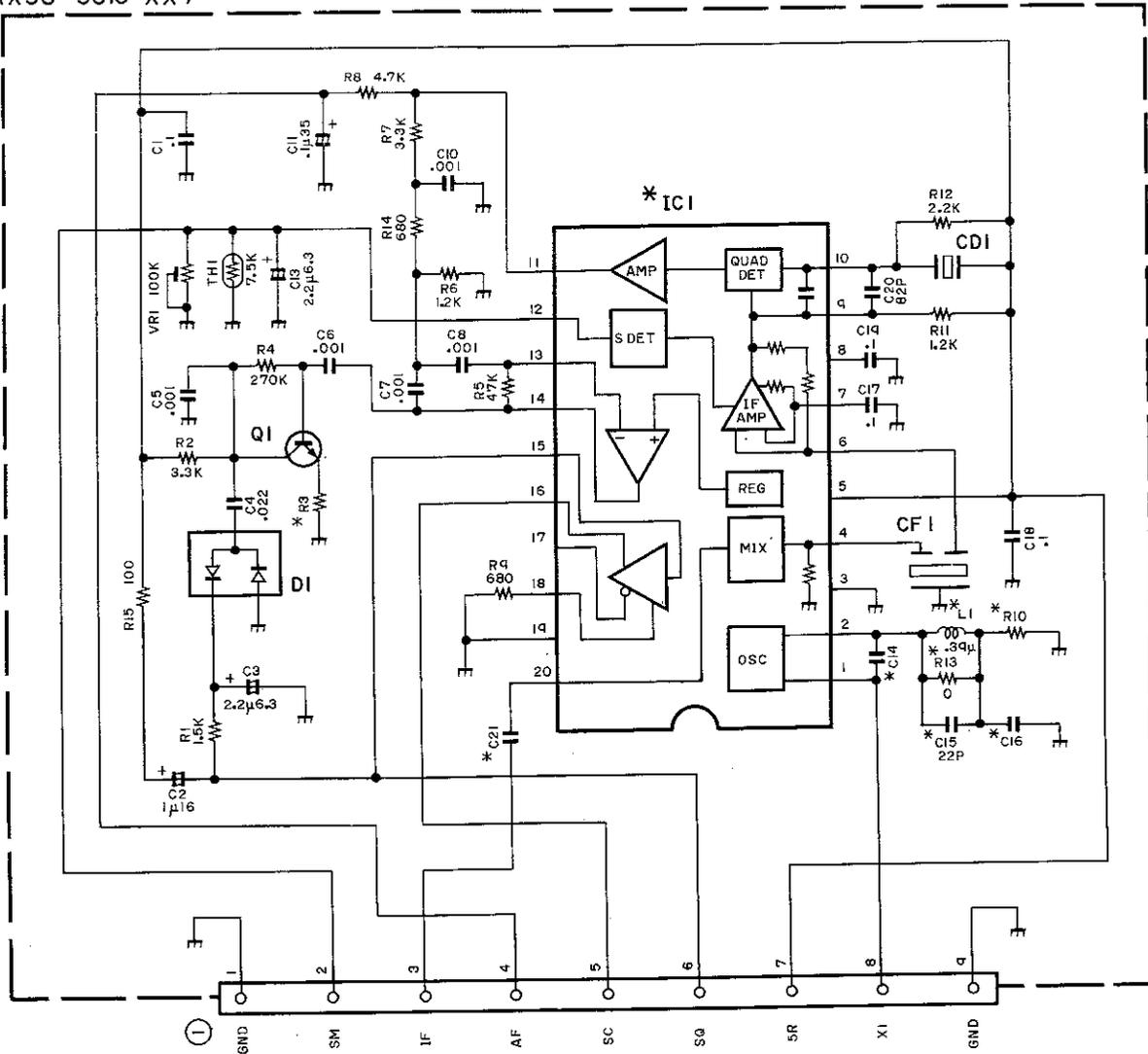
**VHF VCO (X58-3590-00 (V))**  
Foil side view



# TH-75A/E CIRCUIT DIAGRAM / PC BOARD VIEWS

IF (X58-3610-XX) -00 : UHF -01 : VHF

(X58-3610-XX)

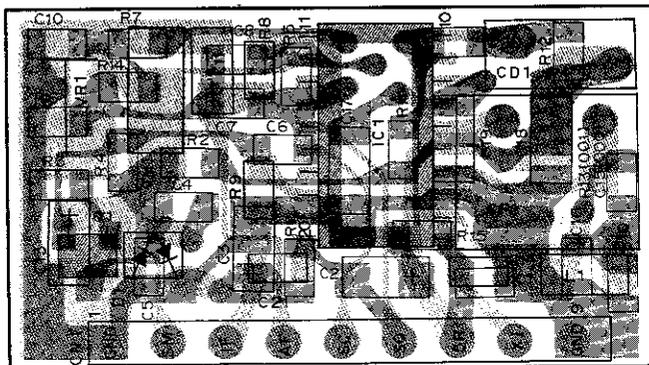


- Q1 : 2SC2712(GR)
- D1 : HSM88AS
- CD1 : CDBM455C7
- CF1 : CFUM455E

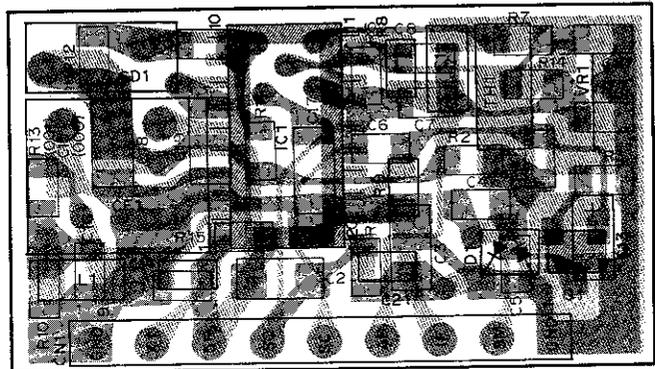
	IC1	C14	C15	C16	C21	R3	R10	R13	L1
-00 UHF	TK10485M	15P	O	.01	.01	1K	10K	X	O
-01 VHF	TK10487M	33P	X	82P	.022	820	47K	O	X

O : USED  
X : NOT USED

IF (X58-3610-XX) Component side view



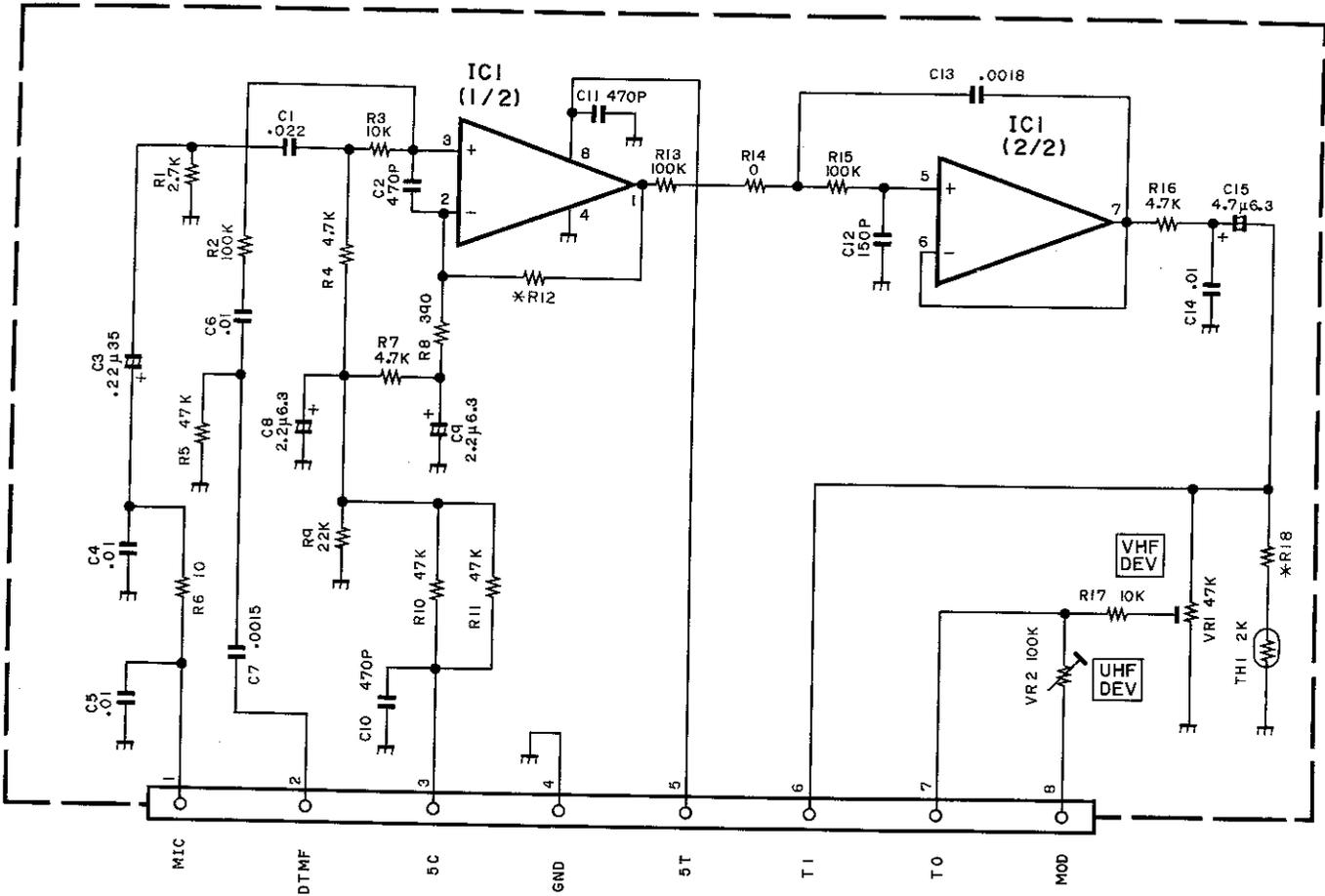
IF (X58-3610-XX) Foil side view



# CIRCUIT DIAGRAM / PC BOARD VIEWS TH-75A/E

MIC AMP (X58-3620-XX) -00 : T,W -11 : K,P,M,M2,X

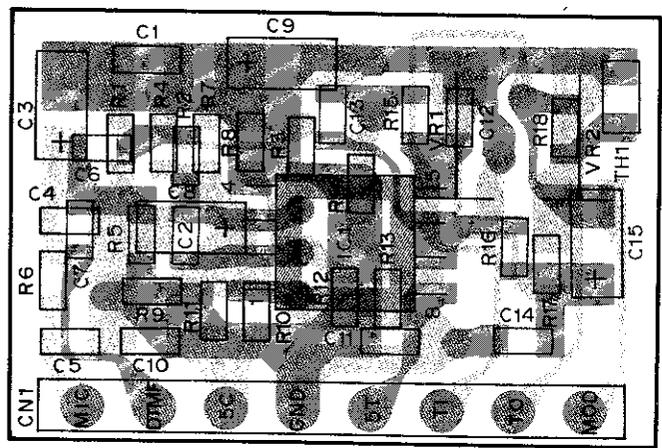
(X58-3620-XX)



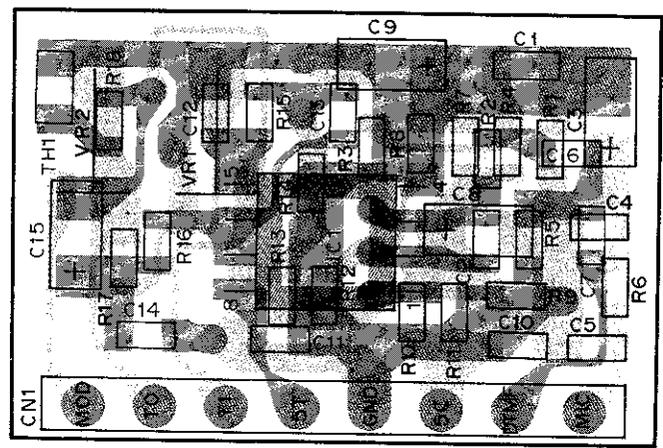
IC1 : NJM4560M

	R12	R18
-00	100K	3.9K
-11	56K	5.6K

**MIC AMP (X58-3620-XX)**  
Component side view



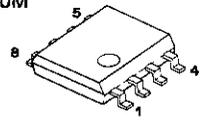
**MIC AMP (X58-3620-XX)**  
Foil side view



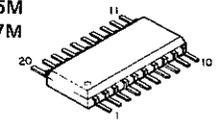
2SC2712



NJM4560M



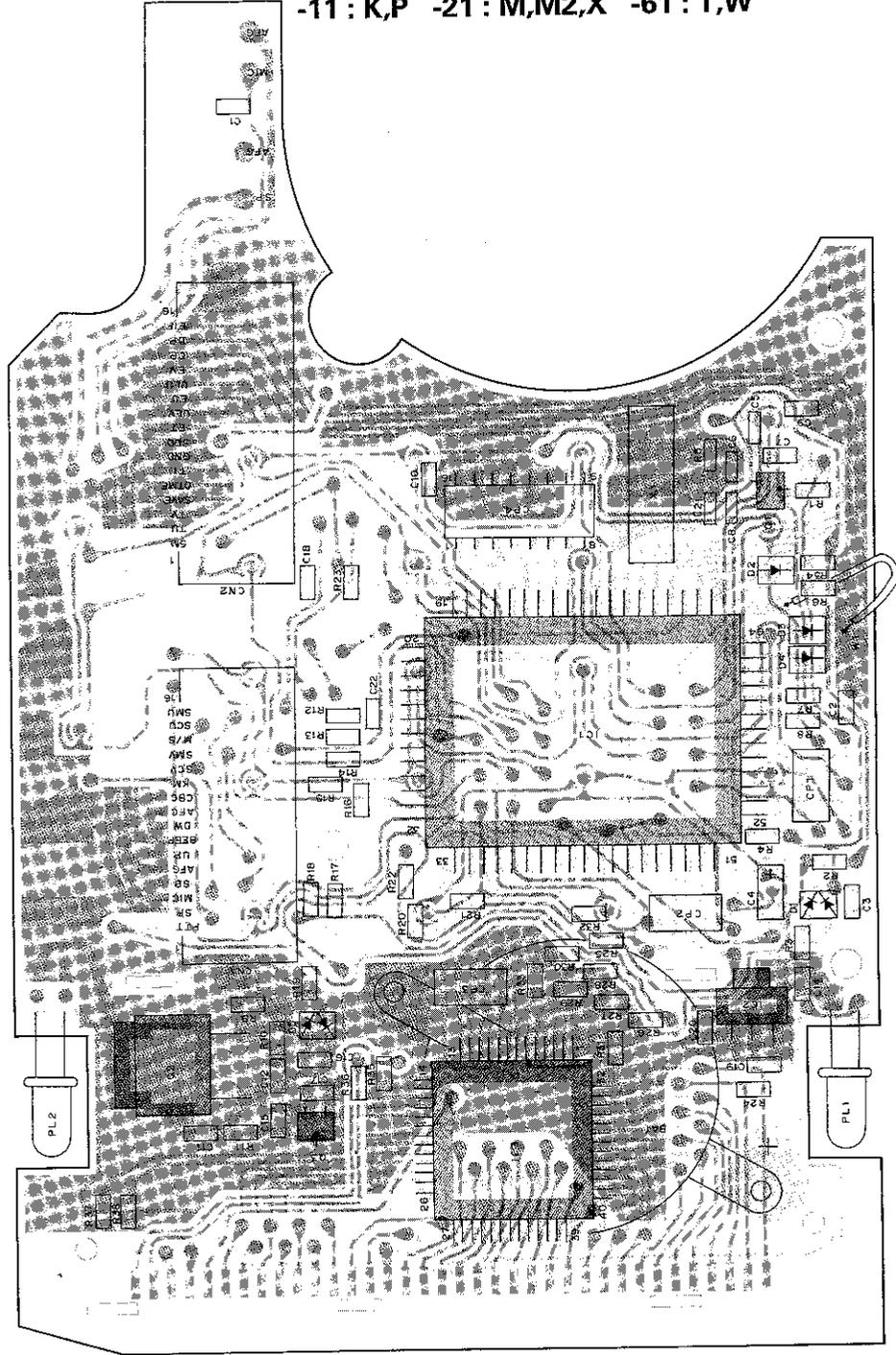
TK10485M  
TK10487M



# TH-75A/E PC BOARD VIEW

CONTROL UNIT (X53-3200-XX) Component side view

-11 : K,P -21 : M,M2,X -61 : T,W



IC1 : 75108G-E82-1B IC2 : S-8054ALR-LN IC3 : LH5008TP IC4 : KRR-C001  
 Q1 : 2SC4116(Y) Q2 : 2SB1182F5(Q) Q3 : DTC144EU  
 D1 : DAN202U D2-4 : MA110 D5 : DA204U

**TX-RX UNIT (X57-3370-XX) (A/3) -11 : K,P,M,M2,X -61 : T,W**  
**Component side view**

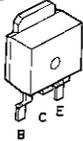
2SA1312 DTA143XU  
 2SC3324 DTC144EU  
 2SC3356  
 2SC4116  
 2SC4226



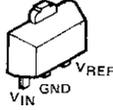
2SK360  
 2SK822



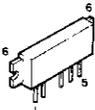
2SB1182F5



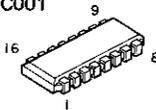
S-8054ALR-LN



S-AU26  
 S-AV22



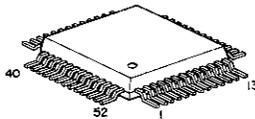
KRR-C001



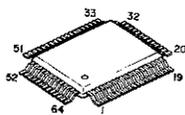
MB1504  
 MB87014AFP



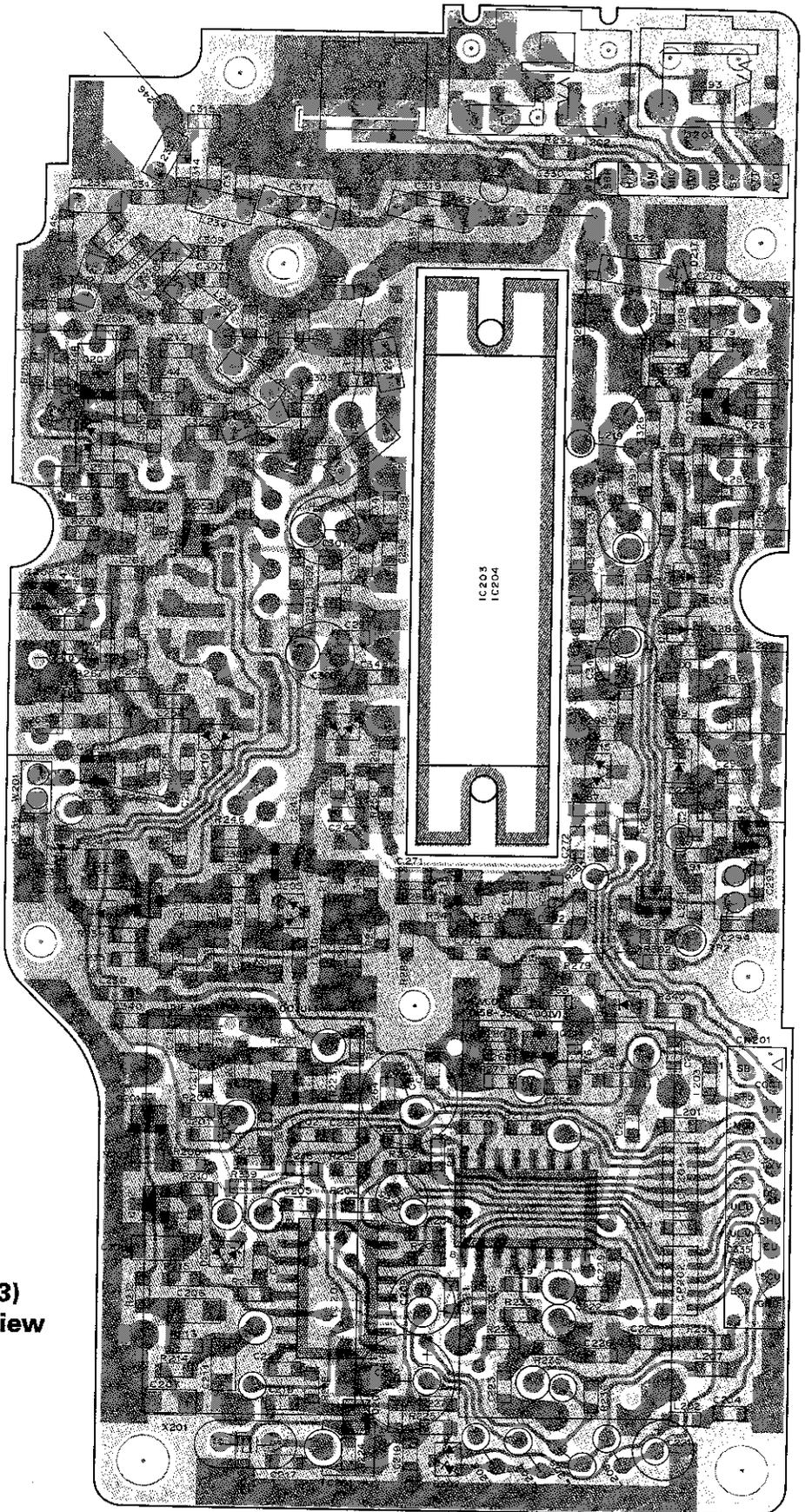
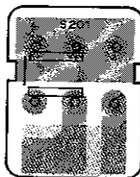
LH5008TP



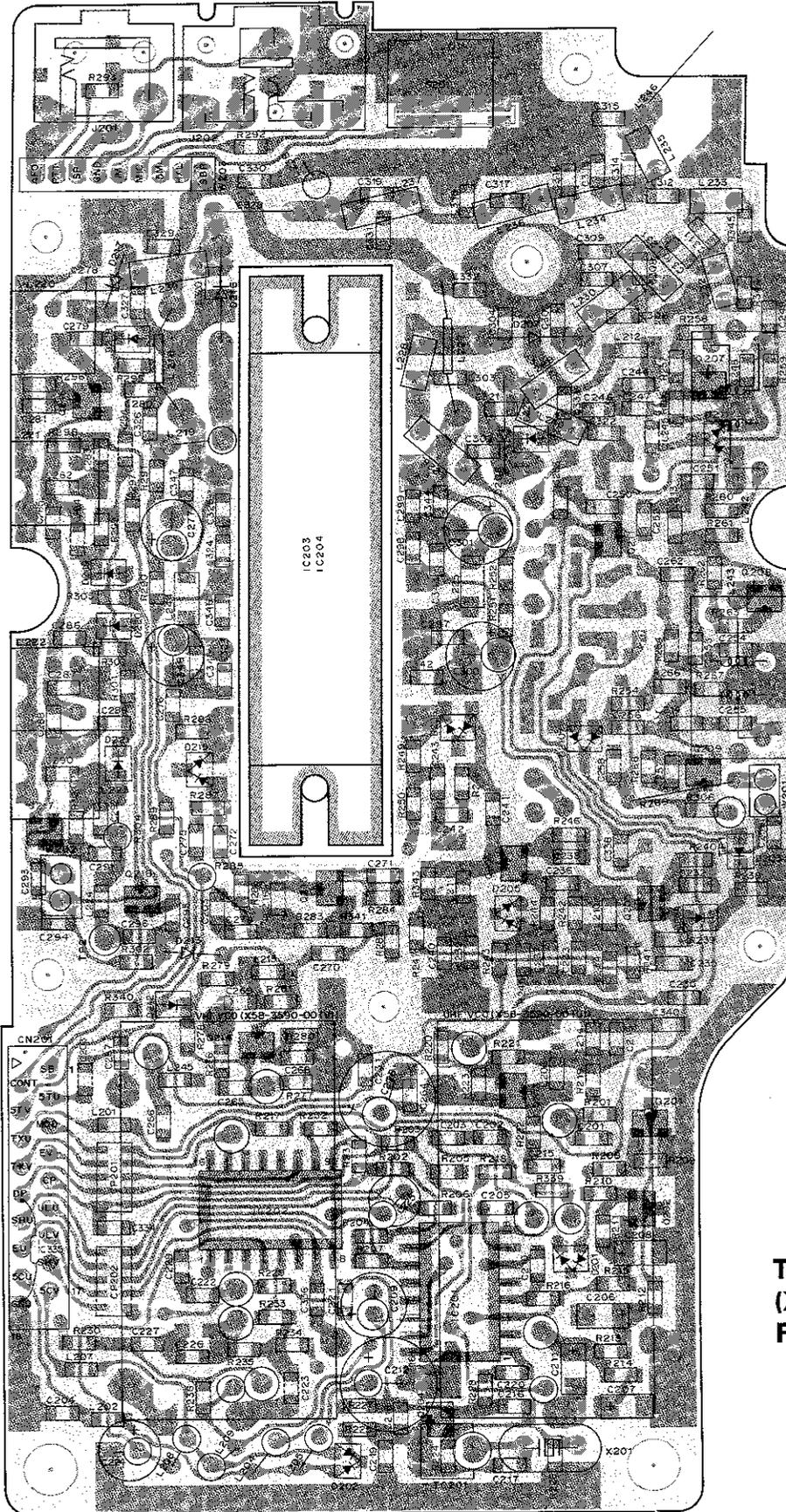
75108G-E82-1B



**TX-RX UNIT  
 (X57-3370-XX) (C/3)  
 Component side view**

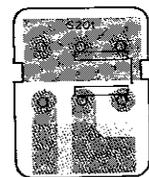


**TX-RX UNIT (X57-3370-XX) (A/3)**  
**Foil side view**



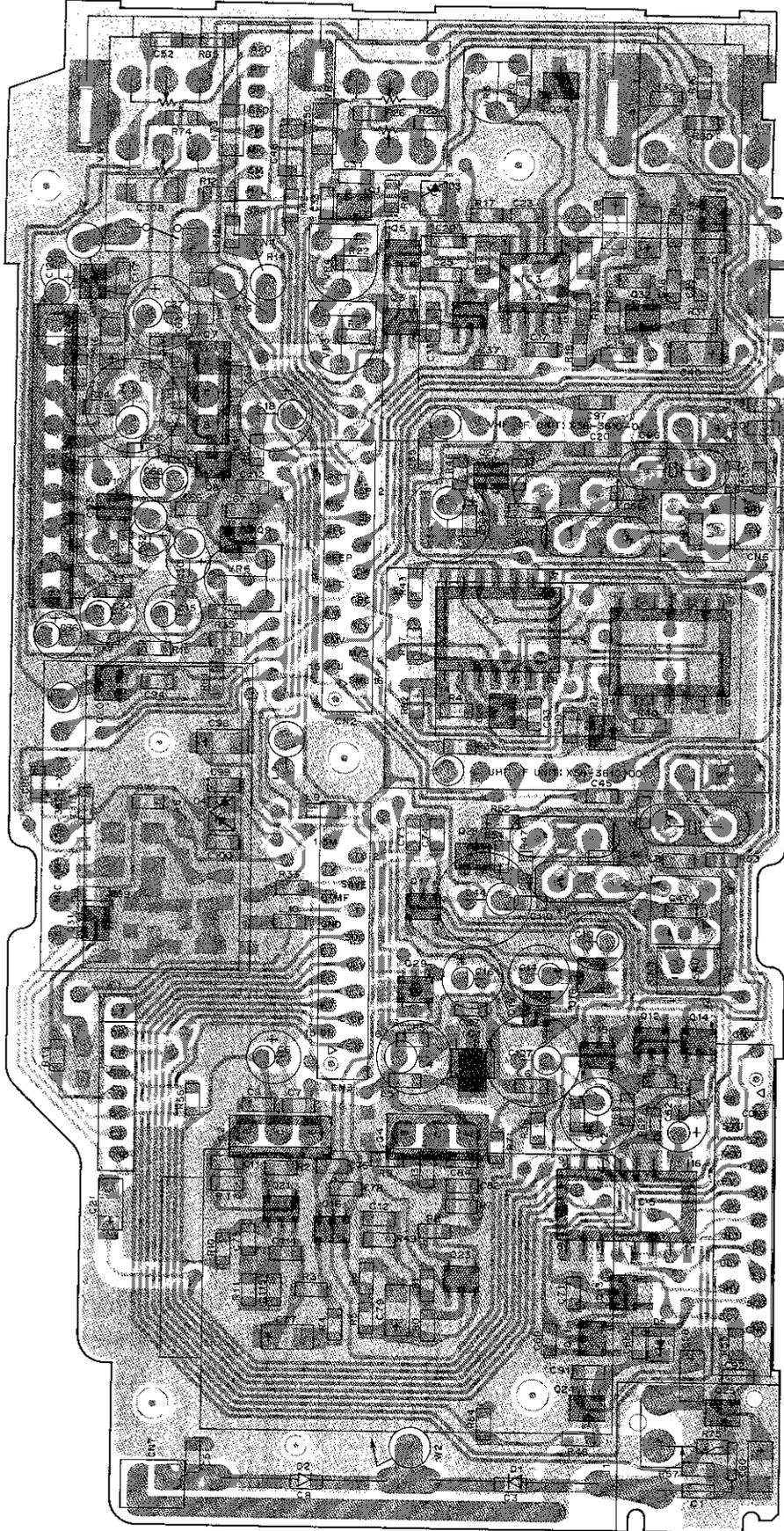
- IC201 : MB1504 IC202 : MB87014AFP IC203 : S-AU26 IC204 : S-AV22
- Q201 : 2SC3324(B) Q202 : 2SA1312(B) Q203, 205, 207-209, 214 : 2SC4226(R23,24) Q204 : 2SC4116(GR) Q206, 215 : 2SC3356
- Q211 : DTA143XU Q216 : 2SK360(E) Q217 : 2SK882(Y) Q218 : DTC144EU
- D201, 205 : DA204U D202 : 1SS301 D203, 204, 222 : MA77 D206, 215 : 1SV172 D207, 208, 216 : M1308 D210 : 1SS312
- D211 : HSM88AS D212 : MA110 D213 : 1SS277 D217 : 1SV154 D218-221 : MA360

**TX-RX UNIT**  
**(X57-3370-XX) (C/3)**  
**Foil side view**



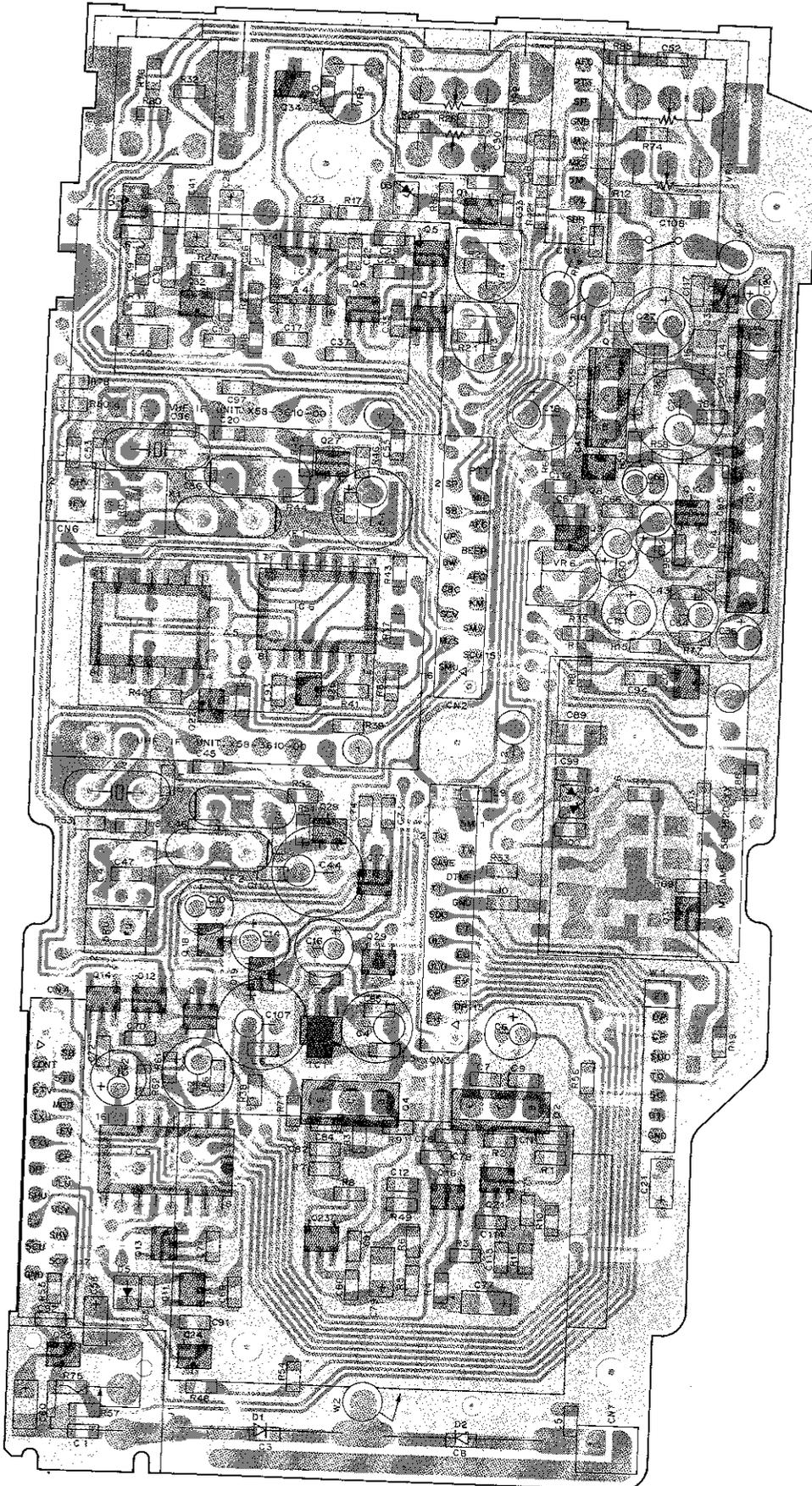
# TH-75A/E PC BOARD VIEWS

TX-RX UNIT (X57-3370-XX) (B/3) -11 : K,P,M,M2,X -61 : T,W  
Component side view



- IC1 : S-81250HG-RD IC2 : BA526 IC3 : LM301AD IC4, 6 : TC4066BF IC5 : MN4094BS
- Q1 : DTA144EU Q2, 4, 7 : 2SB1182(Q) Q3, 5 : FMC4 Q6, 15, 17, 29 : FMG2 Q8, 32, 33 : 2SC4116(GR) Q9 : DTA144WU Q10 : DTC143XU
- Q11-14 : FMC5 Q16 : FMA2 Q18, 19 : DTB113EK Q20, 22, 26 : DTC144EU Q21, 23 : FMM1 Q24 : DTA124EU Q25 : DTA114YU
- Q27, 28 : 2SC4215(Y) Q31 : 2SJ144(GR) Q34 : 2SK208(GR) Q35 : DTC114EU
- D1, 2 : ERC81-004 D3 : 02CZ3.9 D4 : 1SS301 D5 : MA110

**TX-RX UNIT (X57-3370-XX) (B/3)**  
**Foil side view**



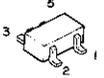
- 2SC4116
- 2SC4215
- DTA114YU
- DTA124EU
- DTA144EU
- DTA144WU
- DTB113EK
- DTC114EU
- DTC143XU
- DTC144EU



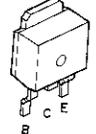
- 2SJ144
- 2SK208



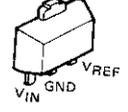
- FMA2
- FMC4
- FMC5
- FMG2
- FMW1



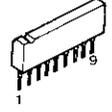
- 2SB1182



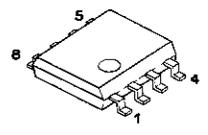
- S-81250HG-RD



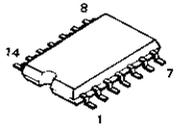
- BA526



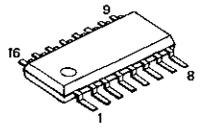
- LM301AD



- TC4066BF



- MN4094BS

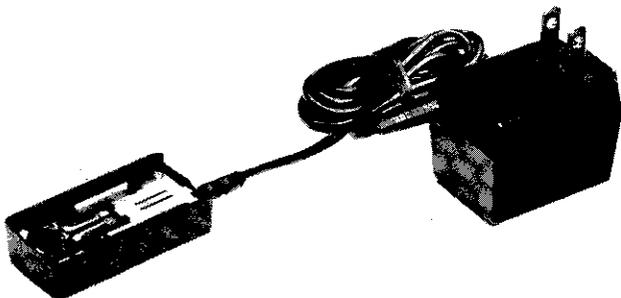


2  
3  
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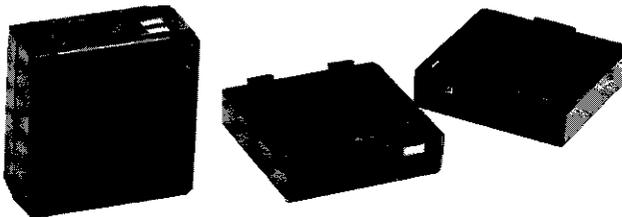
# BC-9 (BATTERY CHARGER)

# BT-6 (AAA MANGANESE / ALKALINE BATTERY CASE)

BC-9 EXTERNAL VIEW



BT-6 EXTERNAL VIEW



BC-9 PARTS LIST

\* : New Parts

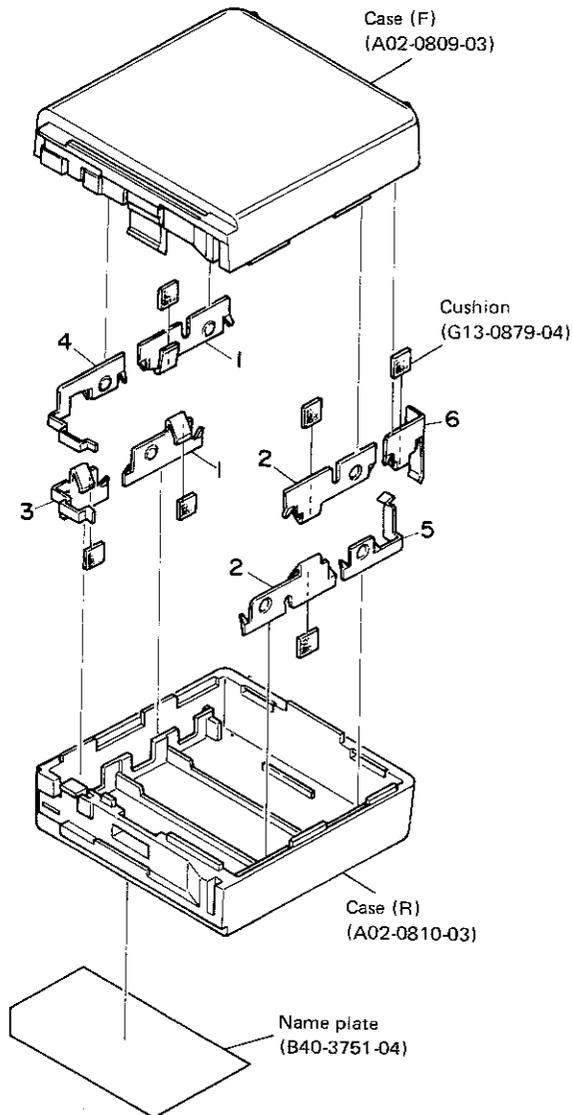
Ref. No.	New Parts	Parts No.	Description
		A02-0814-03	Case (Charge adapter)
		A40-0622-04	Bottom plate
		B42-3301-04	Label (LA) (K)
		E23-0494-04	Terminal ⊖
		E23-0605-04	Terminal ⊕
		G13-0852-04	Cushion
		J19-1426-03	Terminal holder

BT-6 PARTS LIST

\* : New Parts

Ref. No.	New Parts	Parts No.	Description
1		E23-0496-04	Terminal A
2		E23-0497-04	Terminal B
3		E23-0498-04	Terminal C
4		E23-0499-04	Terminal D
5		E23-0500-04	Terminal E
6		E23-0601-04	Terminal F

BT-6 DISASSEMBLY



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## BC-10 (COMPACT CHARGER)

BC-10 EXTERNAL VIEW

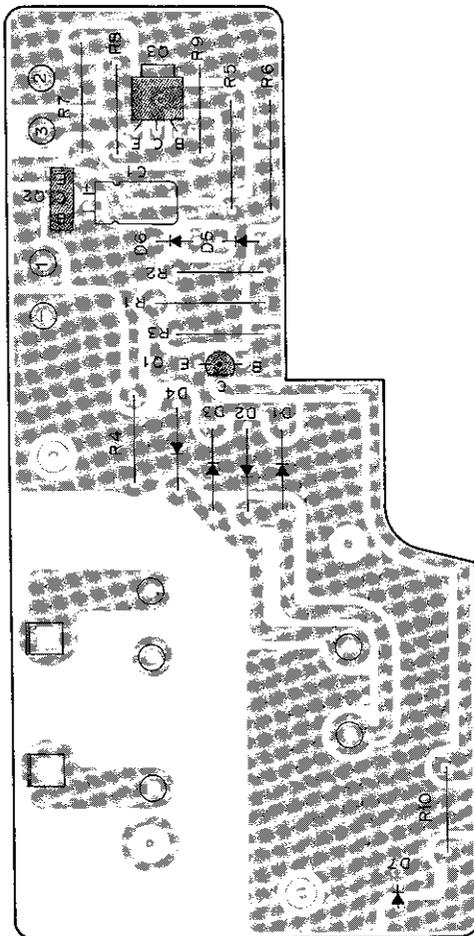


BC-10 PARTS LIST

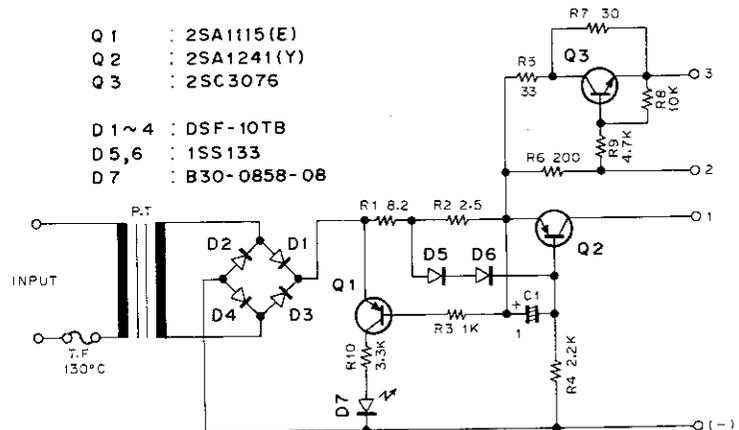
\* : New Parts

Ref. No.	New Parts	Parts No.	Description
D7		A02-0828-08	Case (Upper) <b>K,M,M2</b>
		A02-0829-08	Case (Upper) <b>X,T,W</b>
		A02-0832-08	Case (Lower)
		B30-0858-08	LED SR615D
		B50-8203-08	Instruction manual <b>K,M,M2,X,W</b>
		B50-8204-08	Instruction manual <b>T</b>
		E30-2097-08	AC power cord <b>K,M,M2</b>
		E30-2098-08	AC power cord <b>X</b>
		E30-2099-08	AC power cord <b>T</b>
		E30-2100-08	AC power cord <b>W</b>
Q1		L01-8027-08	Power transformer 220V <b>M,W</b>
		L01-8111-08	Power transformer 120V <b>K,M2</b>
		L01-8152-08	Power transformer 240V <b>X,T</b>
	W02-0805-08	Module	
Q1		2SA1115(E)	Transistor
Q2		2SA1241(Y)	Transistor
Q3		2SC3076	Transistor
D1-4		DSF-10TB	Diode
D5, 6		1SS133	Diode

BC-10 PC BOARD VIEW



BC-10 CIRCUIT DIAGRAM



# BC-11 (RAPID CHARGER)

## BC-11 EXTERNAL VIEW



## BC-11 CIRCUIT DESCRIPTION

### General

The BC-11 is a rapid charger for the PB-5 to PB-9 Ni-Cd batteries for TH-25, TH-45, TH-55 and TH-75.

### Theory of Operation

The operation of each block is explained below.

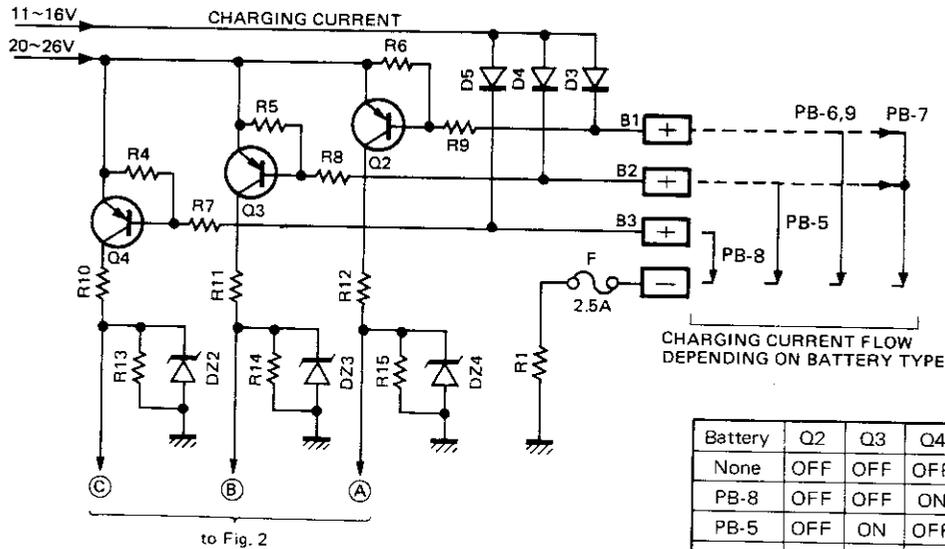
#### 1) + 11V AVR Circuit

This AVR circuit, consisting of a 2SD600F transistor (Q1) and DZA11Y Zener diode (DZ1) provides an output of approximately +11V as the reference voltage for the charging circuit consisting of IC2 to IC5.

#### 2) Battery Pack Detect Circuit

This circuit detects whether a battery pack is inserted in the charger. Outputs from this circuit are routed to the reset circuit and the battery recognition circuit.

When a PB-6 or PB-9 is inserted in the charger, a small amount of current flows from Q2 : 2SA608E through R9 to the charging terminal B1 and Q2 turns on. As a result, an output of approximately 11V appears at (A) in Figure 1. Similarly when a PB-5 or PB-7 is inserted Q3 : 2SA608E turns on and approximately 11V is provided at output (B). When a PB-8 is inserted Q4 : 2SA608E turns on and approximately 11V is provided at output (C).



Battery	Q2	Q3	Q4
None	OFF	OFF	OFF
PB-8	OFF	OFF	ON
PB-5	OFF	ON	OFF
PB-6/9	ON	OFF	OFF
PB-7	ON	ON	OFF

Table 1

Fig. 1 Battery Pack Detect Circuit Block Diagram

BC-11 (RAPID CHARGER)

3) Reset Circuit/Charge Status Memory Circuit/  
Display Circuit

The reset circuit initializes the charging status memory circuit.

	Q8,Q7	Q9	Q10	LED1
PACK OUT	OFF	OFF	ON	—
PACK IN				
● CHARGING	ON	ON	OFF	RED
● COMPLETE	ON	OFF	ON	GRN

Table 2

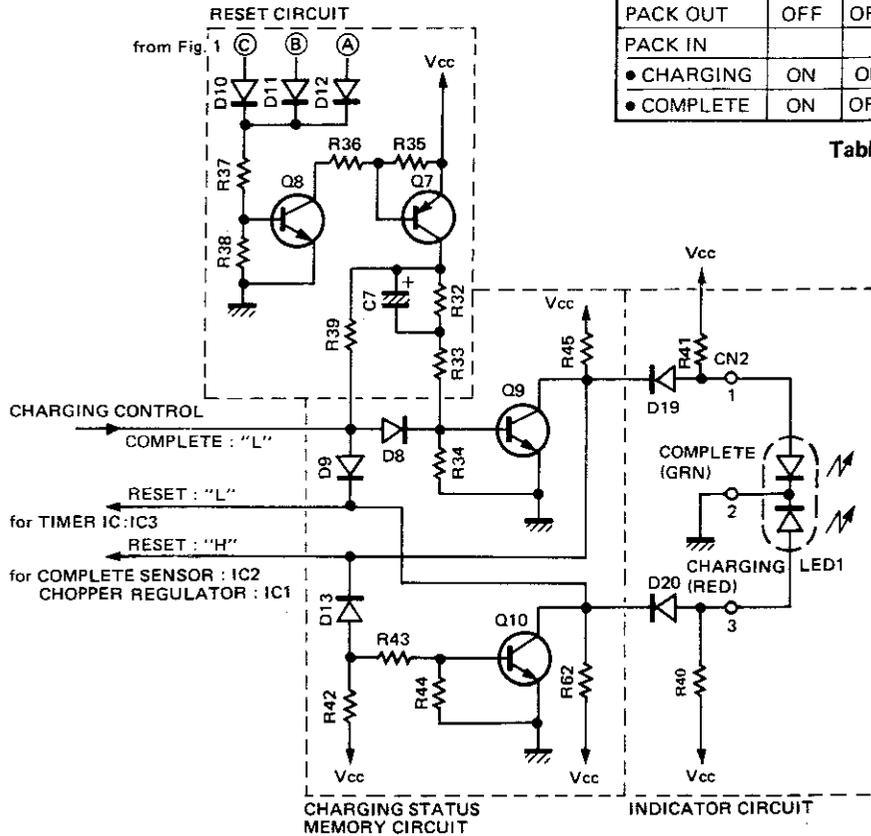


Fig. 2 Reset Circuit/Charge Status Memory Circuit/Display Circuit Block Diagram

The charge status memory circuit is an R-S flip-flop configured from transistors and resistors. The two states of the flip-flop are called COMPLETE and CHARGING. Outputs from the flip-flop drive the LED in the indicator circuit and reset the timer, complete sensor, and chopper regulator. In the COMPLETE state Q9 : 2SC536E is off and Q10 : 2SC536E is on. In the CHARGING state Q9 is on and Q10 is off.

When a battery pack is not inserted, Q8 : 2SC536E and Q7 : 2SC536E turn off. As there is no base voltage to Q9, Q9 also turns off. The base of Q10 receives enough bias from Vcc to turn on, resulting in 0V at the collector. The current flow through R41 to the COMPLETE indicator in LED1 which glows green, because of Q9 if off.

When the battery pack is inserted Q8 and Q7 turn on. As soon as Q7 turns on, charging current flows through R33, R34, and Q9 to C7 and Q9 turns on. The base voltage of Q10, which is connected to Q9 through diode D13, then drops and Q10 turns off. Since Q10 is off, current flows through R40 to the CHARGING indicator in LED1, which glows red to indicate that the battery is charging. When charging of C7 is completed, on-current continues to flow to the base of Q9 through R39 and D8.

When charging is completed the complete sensor (IC2) outputs a Low ("L") signal that ends the flow of current to the base of Q9, turning Q9 off. As a result current flows through R41 to the COMPLETE indicator in LED1, which glows green to indicate that charging is complete.

# BC-11 (RAPID CHARGER)

## 4) Battery Recognition Circuit

The battery recognition circuit uses NAND logic to recognize the battery type from the outputs from the battery pack detect circuit. Outputs from this circuit are sent to the charging current limiting circuit and sensor level switching circuit.

	INPUT		OUTPUT		
	A	B	D	F	G
PB-5	L	H	H	H	L
PB-6	H	L	H	L	H
PB-7	H	H	L	L	H
PB-8	L	L	H	L	L
PB-9	H	L	H	L	H

Table 3

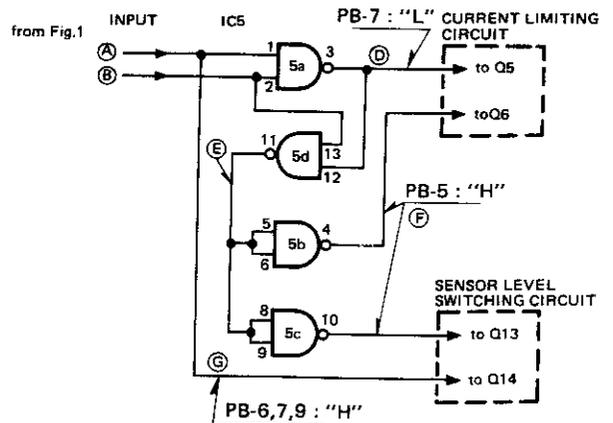


Fig. 3 Battery Recognition Circuit Block Diagram

## 5) Charging Current Limiting Circuit

This circuit receives the output of the battery recognition circuit and limits the charging current according to the type (current capacity) of battery. The charging current ICR is detected as a voltage drop across R1 (0.15Ω), which is provided to pin 3 of the operational amplifier IC4(1/2) : LA6393A. Pin 4 receives a reference voltage (VREF) used as a comparison standard for limiting the charging current. The VREF is changed by ON and OFF of Q5 and Q6 (See Table 4).

Pin 2 of IC4 : LA6393S provides "L" output when  $V_{REF} < V_{CR}$ , stopping the operation of the chopper regulator (IC1 : STK772B) and reducing the charging current. The charging current is limited by the formula :

$$I_{CR \text{ MAX}} (A) = V_{REF} (V) / 0.15(\Omega)$$

	Q5	Q6	VREF	ICR MAX
PB-5	OFF	ON	0.15V	1.0A
PB-6	OFF	OFF	0.25V	1.7A
PB-7	ON	OFF	0.36V	2.4A
PB-8	OFF	OFF	0.25V	1.7A
PB-9	OFF	OFF	0.25V	1.7A

Table 4

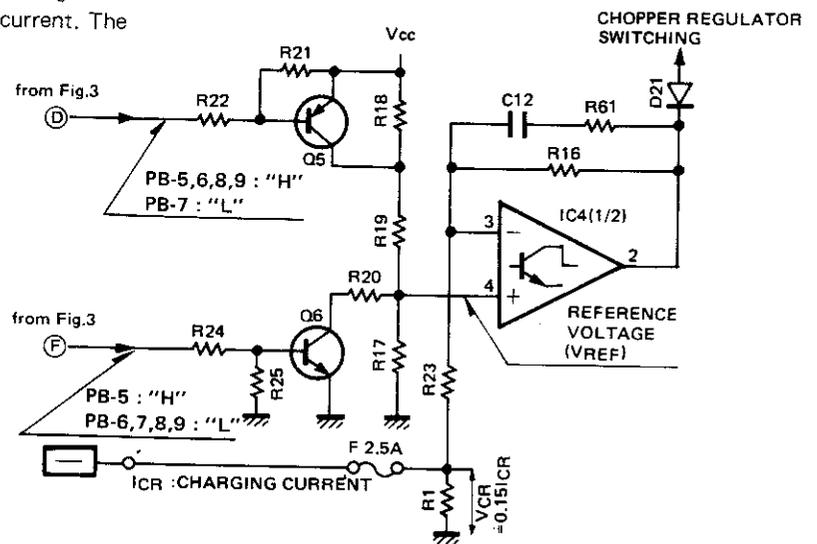


Fig. 4 Charging Current Limiting Circuit Block Diagram

## BC-11 (RAPID CHARGER)

### 6) Sensor Level Switching Circuit

This circuit receives the output of the battery recognition circuit and aligns the voltages supplied to the charging status detect circuit according to the battery type (voltage) so that they are nearly equal at completion of charging.

	SHIFT Es(V)	Q11	Q12
PB-5	2.0	ON	OFF
PB-6	2.0	OFF	ON
PB-7	2.0	OFF	ON
PB-8	7.6	OFF	OFF
PB-9	2.0	OFF	ON

Table 5

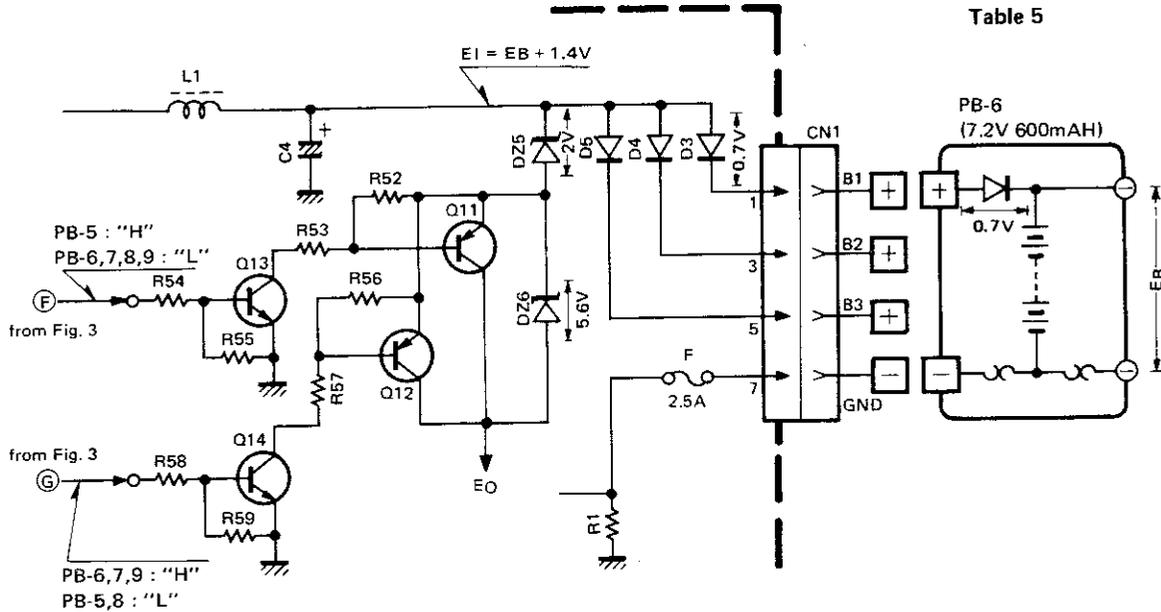


Fig. 5 Sensor Level Switching Circuit Block Diagram

The pin voltages while the Ni-Cd battery is charging are approximately 1.2 times the voltages at the completion of charging. (See **Figure 6**.)

The battery terminal voltage EB is as follows:

Approximately 14.4V for the PB-8

Approximately 8.6V for the PB-5, 6, 7, 9

The charging line voltage EI is the EB voltage plus a 1.4V voltage drop added by a diode.

$$EI = EB + 1.4V \dots (1)$$

The EI voltage is output with a level shift as the voltage EO to the charging status detect circuit via Zener diode DZ6 and diodes D17 and D18. The amount of the shift is controlled by switching Q11 : 2SA608E and Q12 : 2SA608E on and off. (See **Table 5**.) If Eq. (1) is substituted into EO in **Table 5**, the results are:

$$PB-8 : EO = EB - 6.2V$$

$$PB-5, 6, 7, 9 : EO = EB - 0.6V$$

At the completion of charging the value is approximately 8V.

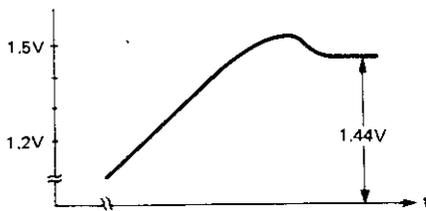


Fig. 6 The pin voltages while the Ni-CD Battery is charging

## BC-11 (RAPID CHARGER)

### 7) Charging Status Detect Circuit

This circuit detects the completion of charging and outputs a signal to stop charging. When no battery pack is inserted or charging is completed, a High ("H") Reset signal is applied to D15. When a battery is inserted the Reset signal applied to D15 is cleared. When the Reset signal is cleared, pin 4 of IC2 : KCH-1003 holds the reset state due to the charge in C8 for the duration of the R46-C8 time constant, then goes "L" to clear the reset state. Pins 8 and 9 of IC2 receive divided portions of the battery voltage. These inputs are tracked as the charging is performed in the long-term memory capacitor "MD". As the Ni-Cd battery charges, the battery voltage reaches a peak, then declines. (See **Figure 6**.) The MD stores the peak voltage, which is compared with the divided voltages at pins 8 and 9. When the difference  $\Delta V$  is the same, a "L" signal is output from pin 11 to indicate that charging is complete. The signal indicating completion of charging is applied to the charging status memory circuit.

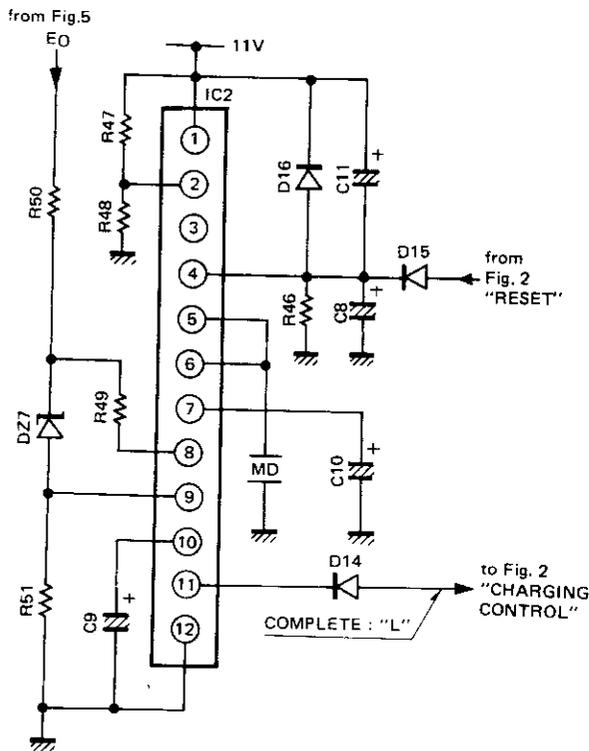


Fig. 7 Charging Status Detect Circuit Block Diagram

### 8) Timer Circuit

Battery defects may result in charging continuing indefinitely without completion, so this timer outputs a signal that stops charging approximately 1.7 hours after charging begins. When charging begins and the Reset signal is cleared at pin 3, IC3 : AN6780 begins counting. At the first count of 16384 pin 6 goes from "H" to "L". The output from pin 6 is connected to the Stop input (pin 2), so the output of IC3 is held in the "L" state until IC3 receives another Reset signal (for example, when the battery is removed).

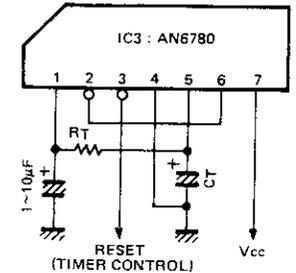


Fig. 8 Timer Circuit Block Diagram

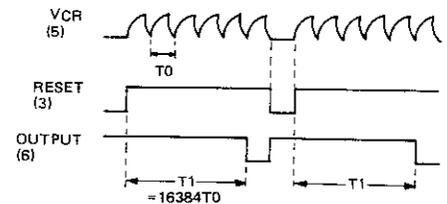


Fig. 9  
TIMER TIME  $T_1$  (s)  $\approx 11RT(K\Omega) \cdot CT(\mu F)$   
TIMER TIME  $T_1$  (s)  $\approx 11 \times 47(K\Omega) \cdot 10(\mu F) = 5170$  (s)

### 9) Voltage Comparator Circuit

This circuit monitors the output (EO) of the sensor level switching circuit and indirectly detects abnormal conditions in the battery pack connected to the charging terminal. When the EO voltage falls to 5.2V or lower, the charging control line goes "L" to halt charging.

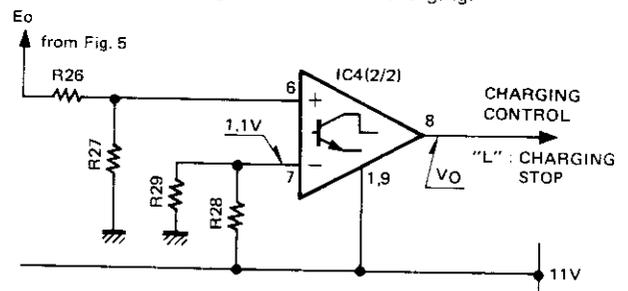


Fig. 10 Voltage Comparator Circuit Block Diagram

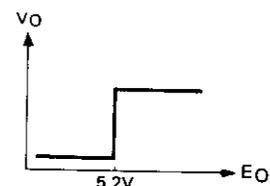


Fig. 11

## BC-11 (RAPID CHARGER)

× New Parts

Parts without Parts No. are not supplied.

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

Teile ohne Parts No. werden nicht geliefert.

### BC-11 PARTS LIST

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名/規格	Desti- nation 仕向	Re- marks 備考
<b>BC-11</b>						
1	1A		A02-0815-08	CASE		
2	1A,1B		A02-0817-08	BATTERY POCKET		
3	1B		B46-0411-00	WARRANTY CARD	K	
4	1B		B50-8134-08	INSTRUCTION MANUAL		
5	1B		E23-0604-05	TERMINAL		
△ 6	2A		E30-2038-08	AC CORD	K,M,M2	
△ 6	2A		E30-2072-08	AC CORD	W	
△ 6	2A		E30-2073-08	AC CORD	T	
△ 6	2A		E30-2095-08	AC CORD	X	
8	2B		H01-8128-08	ITEM CARTON CASE		
9	2B		H10-2584-02	POLYSTYRENE FOAMED FIXTURE (L)		
10	2B		H10-2585-02	POLYSTYRENE FOAMED FIXTURE (R)		
11	3A		J02-0439-05	FOOT		
12	3A		J39-0424-05	SPACER		
△ T1	2A		L01-8081-08	POWER TRANSFORMER (AC120V)	K,M2	
△ T1	2A		L01-8112-08	POWER TRANSFORMER (AC220V)	M,W	
△ T1	2A		L01-8122-08	POWER TRANSFORMER (AC240V)	T,X	
A	3A		N30-3006-41	MACHINE SCREW (M3 X 6)		
B	2A,1B		N34-4006-46	MACHINE SCREW (M4 X 6 TR)		
C	2A,1B		N35-4006-45	MACHINE SCREW (M4 X 6 BI) BLK		
D	2A		N87-3008-46	TAPTITE SCREW (φ3 X 8 BR)		
E	1A		N89-3008-45	TAPTITE SCREW (φ3 X 8 BI) BLK		
SW1	3A		S36-1407-05	POWER SW		
7	3B		W02-0399-08	CHARGE CONTROL UNIT		
<b>CHARGE CONTROL UNIT (W02-0399-08)</b>						
C1			CE04EW1V222M	ELECTRO 2200μF 35WV		
C2			CE04EW1C470M	ELECTRO 47μF 16WV		
C3			CE04EW1H010M	ELECTRO 1μF 50WV		
C4			CE04EW1E471M	ELECTRO 470μF 25WV		
C5,6			CE04EW1C100M	ELECTRO 10μF 16WV		
C7			CE04EW1A101M	ELECTRO 100μF 10WV		
C8			CE04EW1C100M	ELECTRO 10μF 16WV		
C9,10			CE04EW0J101M	ELECTRO 100μF 6.3WV		
C11			CE04EW1C330M	ELECTRO 33μF 16WV		
C12			CK45B1H102K	CERAMIC 0.001μF 50WV		
C14			CE04EW1H010M	ELECTRO 1μF 50WV		

E: Scandinavia & Europe H: Audio Club K: USA P: Canada W: Europe

A: Saudi Arabia T: England U: PX (Far East, Hawaii)

UE: AAFES (Europe) X: Australia M: Other Areas

△ indicates safety critical components.

# BC-11 (RAPID CHARGER)

× New Parts

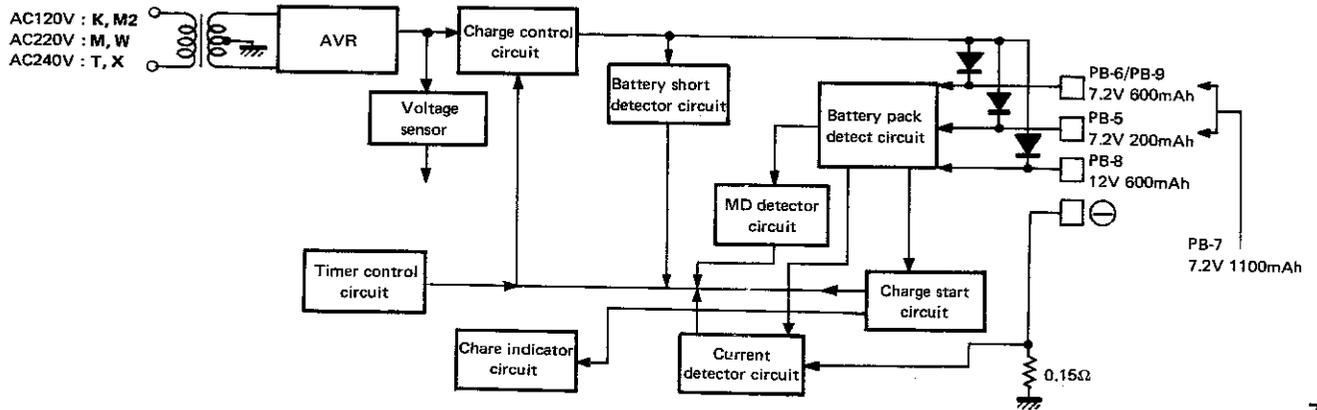
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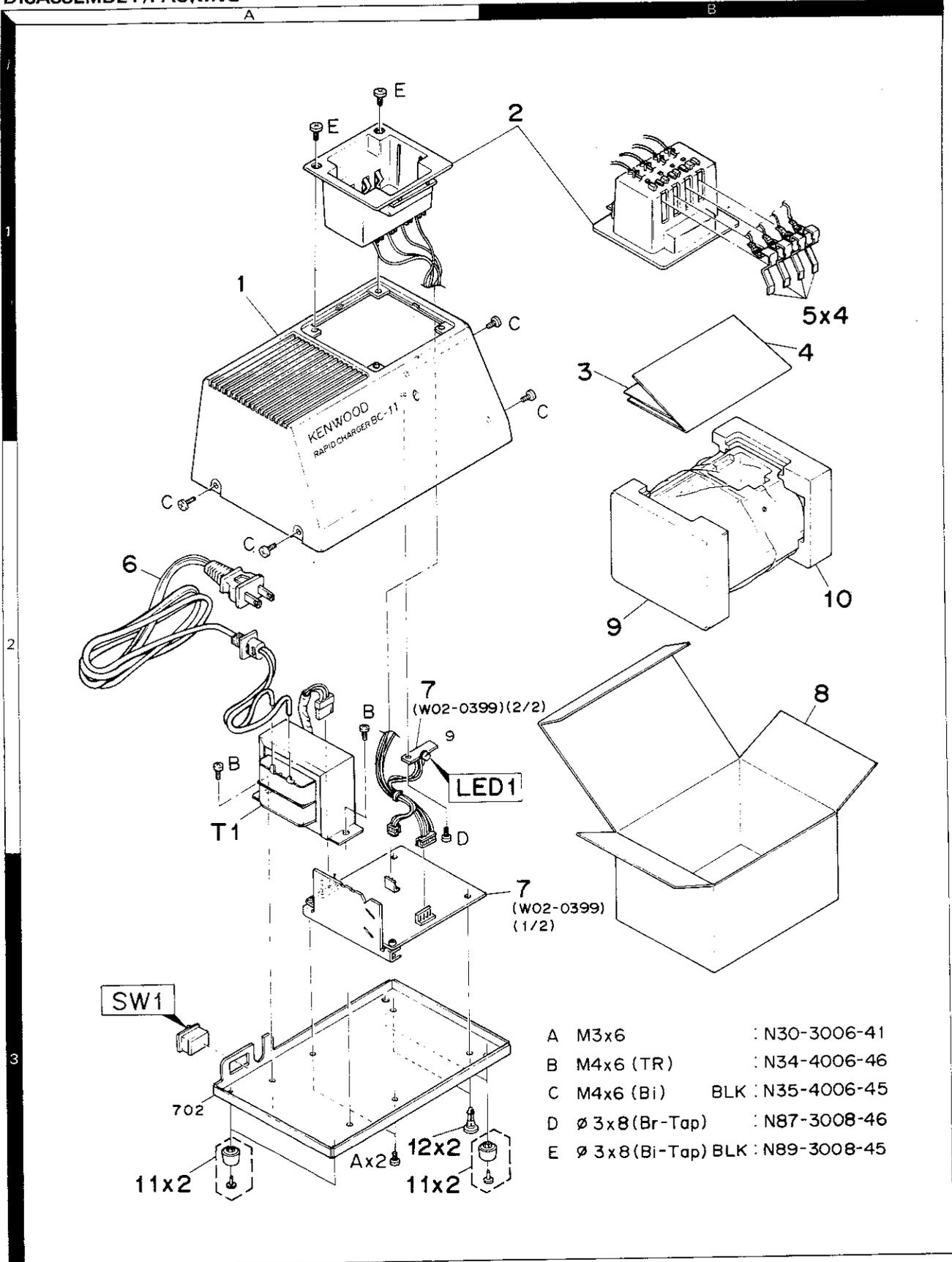
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MD			C91-1038-08	ELECTRO		
△ F1			F05-2525-05	FUSE (2.5A)	W,X	
△ F1			F06-2522-05	FUSE (2.5A)	M,M2,T	
△ F1			F06-2523-05	FUSE (2.5A)	K	
—			J13-0039-05	FUSE HOLDER	W	
L1			L33-0694-08	CHOKE COIL (470μH)		
R1			R92-0683-08	FL-PROOF 0.15Ω 4W		
D1-5			DSA26B	DIODE		
D6-16			DS442	DIODE		
D19-21			DS442	DIODE		
DZ1			GZA11Y	ZENER DIODE (11V)		
DZ2-4			GZA10Z	ZENER DIODE (10V)		
DZ5			GZA2.0X	ZENER DIODE (2V)		
DZ6			GZA5.6X	ZENER DIODE (5.6V)		
DZ7			GZA7.5Y	ZENER DIODE (7.5V)		
DZ8			GZA3.0X	ZENER DIODE (3V)		
IC1			STK772B	IC (CHOPPER REGULATOR)		
IC2			KCH-1003	IC (VOLTAGE SENSOR)		
IC3			AN6780	IC (TIMER)		
IC4			LA6393S	IC (DUAL OP IC)		
IC5			LC4011B	IC (QUADRUPLE NAND GATE)		
Q1			2SD600F,KF	TRANSISTOR		
Q2-5			2SA608E,F	TRANSISTOR		
Q6			2SC536E,F	TRANSISTOR		
Q7			2SA608E,F	TRANSISTOR		
Q8-10			2SC536E,F	TRANSISTOR		
Q11,12			2SA608E,F	TRANSISTOR		
Q13,14			2SC536E,F	TRANSISTOR		
LED1	2A		SLP-540D	LED (RED/GRN)		

## BC-11 BLOCK DIAGRAM



BC-11  
DISASSEMBLY/PACKING

## BC-11 (RAPID CHARGER)

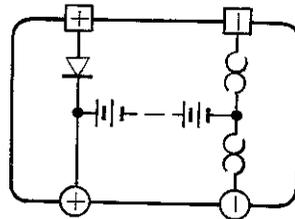
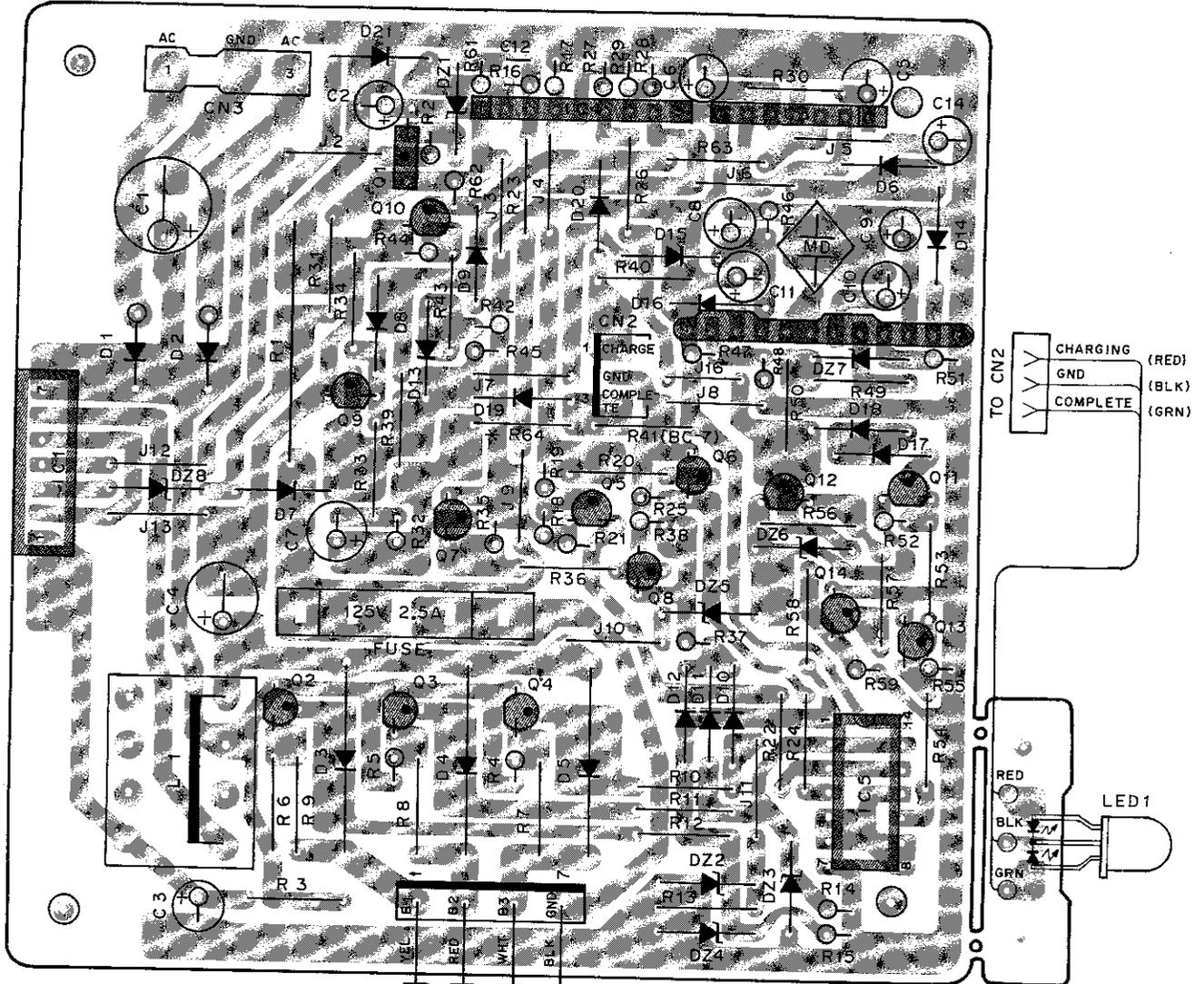


- A M3x6 : N30-3006-41
- B M4x6 (TR) : N34-4006-46
- C M4x6 (Bi) BLK : N35-4006-45
- D Ø 3x8 (Br-Tap) : N87-3008-46
- E Ø 3x8 (Bi-Tap) BLK : N89-3008-45

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

# BC-11 (RAPID CHARGER)

## BC-11 PC BOARD VIEW



PB-6  
(7.2V 600mA)

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Amateur Radio Directory

- Q1 : 2SD600F,KF Q2-5,7,11,12 : 2SA608E,F Q6,8-10,13,14 : 2SC536E,F  
 IC1 : STK772B IC2 : KCH-1003 IC3 : AN6780 IC4 : LA6393S IC5 : LC4011B  
 D1-5 : DSA26B D6-16,19-21 : DS442  
 DZ1 : GZA11Y DZ2-4 : GZA10Z DZ5 : GZA2.0X DZ6 : GZA5.6X DZ7 : GZA7.5Y DZ8 : GZA3.0X

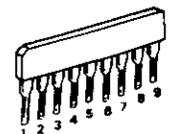
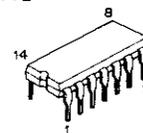
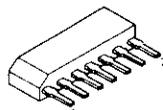
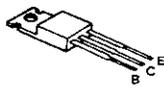
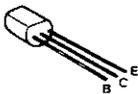
2SA608E  
2SA608F

2SC536E 2SD600F  
2SC536F 2SD600KF

AN6780

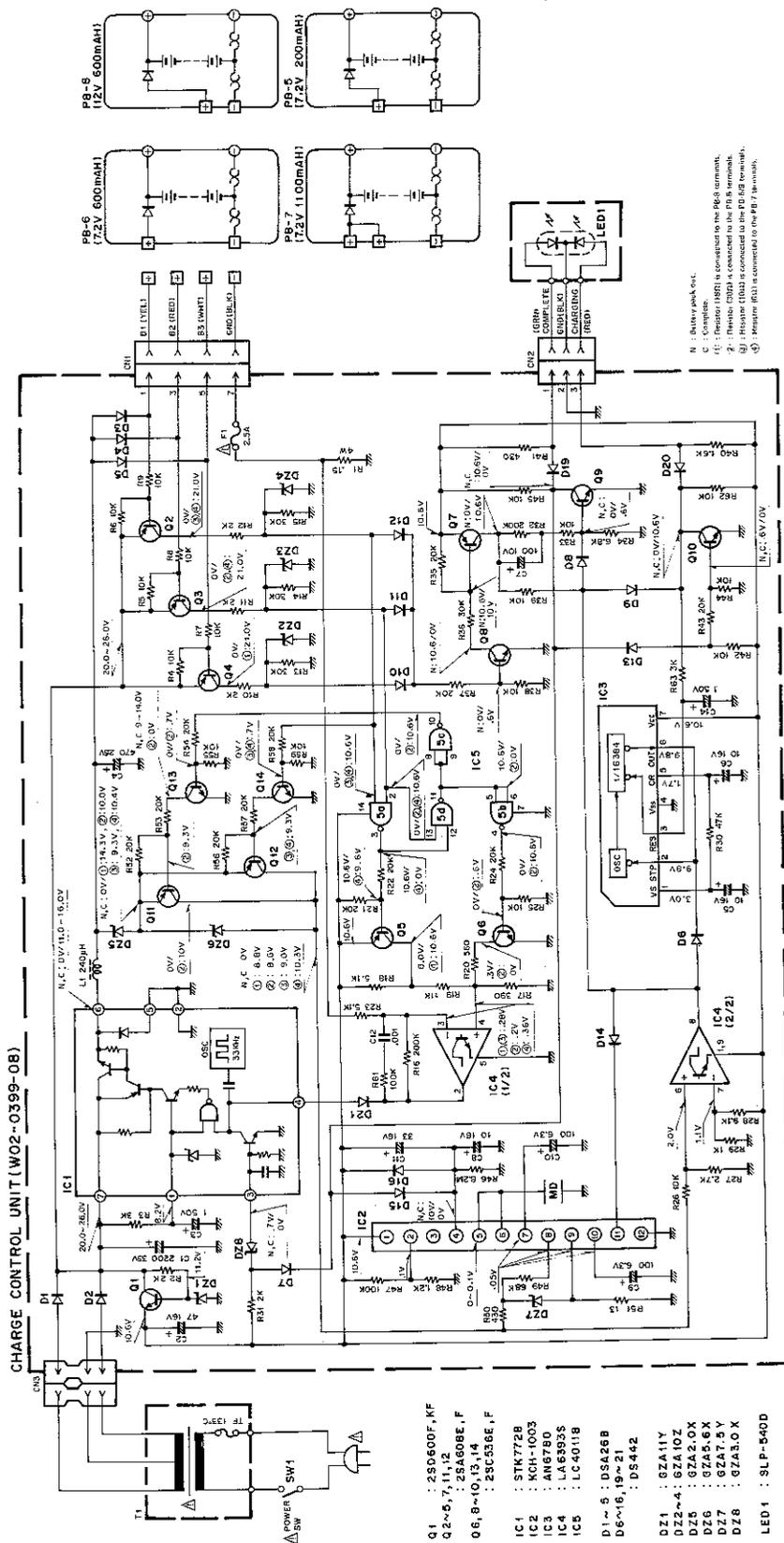
LC4011B

LA6393S



## BC-11 (RAPID CHARGER)

### BC-11 CIRCUIT DIAGRAM



# HMC-2 (HEAD SET WITH VOX & PTT)

## HMC-2 EXTERNAL VIEW



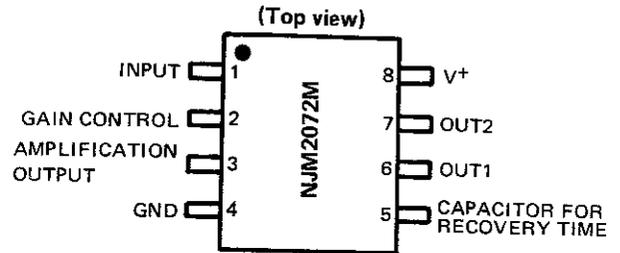
## HMC-2 SPECIFICATIONS

### Electrical characteristic

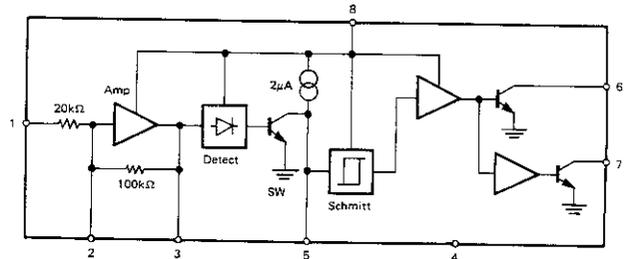
- **Earphone**
  - Diameter . . . . .  $\phi 19$
  - Impedance . . . . .  $19\Omega$  (1000Hz)
  - Max. input power . . . . . 50mW
- **Microphone**
  - Output sensitivity . . . . .  $-67.5\text{dB}$  ( $0\text{dB} = 1\text{V}/\mu\text{bar}$  1000Hz)
  - Output impedance . . . . .  $1.6\text{k}\Omega$  (1000Hz)

## HMC-2 SEMICONDUCTOR DATA

### • Terminal connection diagram



### • Block diagram



## HMC-2 PARTS LIST

\* : New Parts

Ref. No.	New Parts	Parts No.	Description
VR1		A02-0840-08	Case (Front)
		A02-0841-08	Case (Rear)
		E30-2088-08	Cable with plug
		F09-0418-08	Microphone pad
		F09-0419-08	Ear pad
		J29-0427-08	Clip
		R05-4422-08	Potentiometer 50k $\Omega$
	S1	S31-1416-08	Slide switch PTT/VOX
	S2	S50-1413-05	Tact switch PTT
		T18-0056-08	Earphone with cable
	T91-0373-18	MIC ass'y	
	W02-0806-18	VOX/PTT unit	
Q1	FMG2	Digital transistor	
Q2	FMW2	Digital transistor	
Q3	2SC2712(GR)	Chip transistor	
IC1	NJM2072M	IC	
D1	1SS133	Diode	

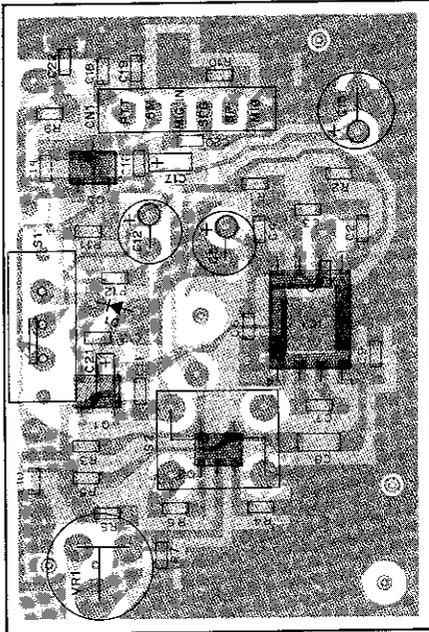
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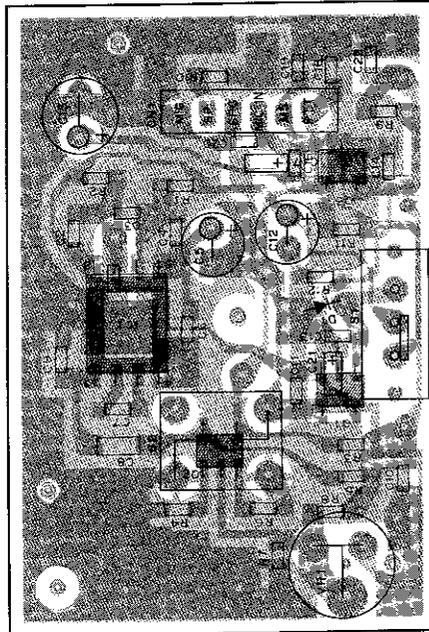
## HMC-2 (HEAD SET WITH VOX & PTT)

### HMC-2 PC BOARD VIEWS

Component side view

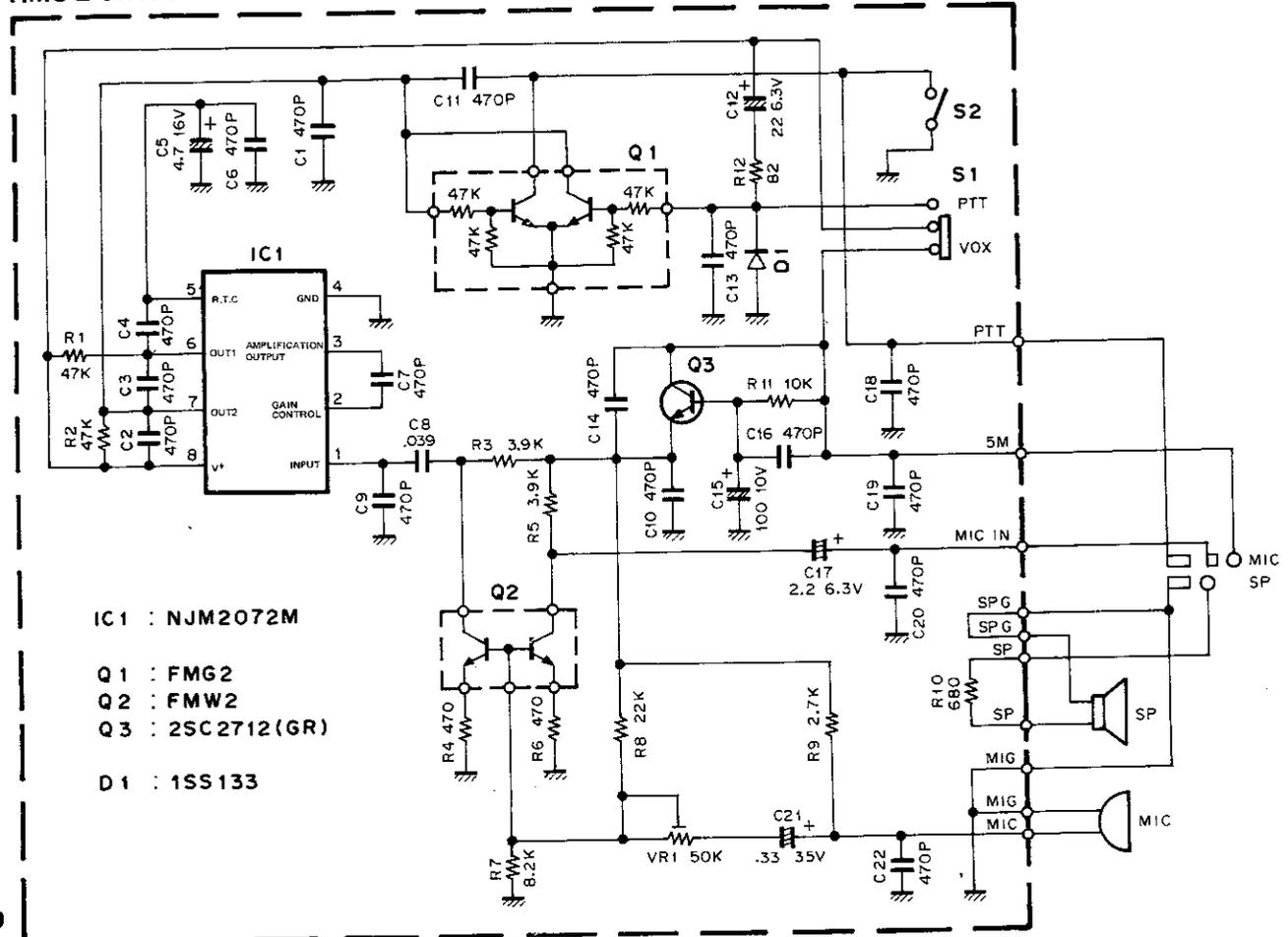


Foil side view



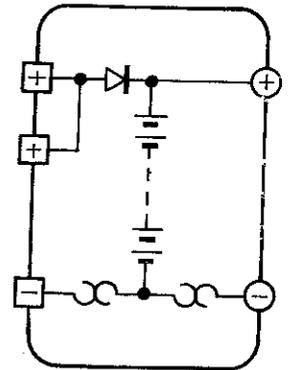
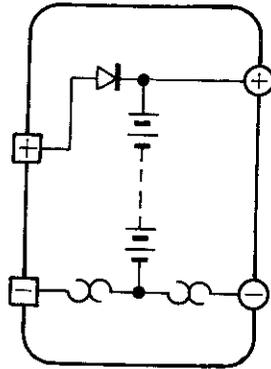
 : Component side  
 : Foil side

### HMC-2 CIRCUIT DIAGRAM



# PB-5 / 6 / 7 / 8 (Ni-Cd BATTERY)

PB-5 EXTERNAL VIEW    PB-5 CIRCUIT DIAGRAM    PB-7 EXTERNAL VIEW    PB-7 CIRCUIT DIAGRAM



## PB-5 SPECIFICATIONS

### Electrical characteristic

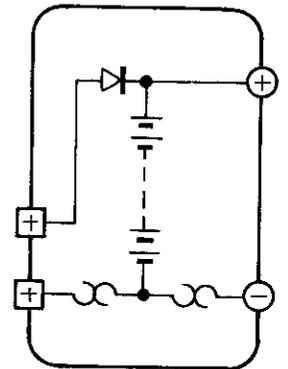
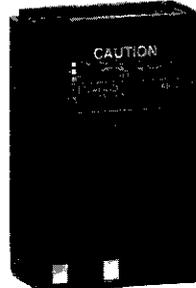
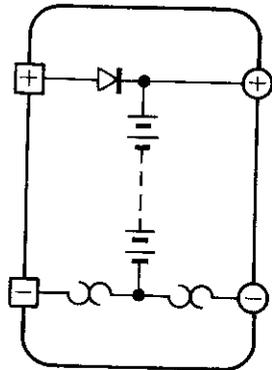
Voltage ..... 7.2V (1.2V x 6)  
 Charging current ..... 200mAh  
**Dimensions** ..... 58 W x 36.5 (39.5) H x 29.5 D (mm)  
**Weight** ..... 80g

## PB-7 SPECIFICATIONS

### Electrical characteristic

Voltage ..... 7.2V (1.2V x 6)  
 Charging current ..... 1100mAh  
**Dimensions** ..... 58 W x 98.5 (101.5) H x 29.5 D (mm)  
**Weight** ..... 300g

PB-6 EXTERNAL VIEW    PB-6 CIRCUIT DIAGRAM    PB-8 EXTERNAL VIEW    PB-8 CIRCUIT DIAGRAM



## PB-6 SPECIFICATIONS

### Electrical characteristic

Voltage ..... 7.2V (1.2V x 6)  
 Charging current ..... 600mAh  
**Dimensions** ..... 58 H x 55.5 (58.5) H x 29.5 D (mm)  
**Weight** ..... 180g

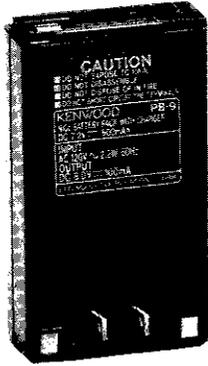
## PB-8 SPECIFICATIONS

### Electrical characteristic

Voltage ..... 12V (1.2V x 10)  
 Charging current ..... 600mAh  
**Dimensions** ..... 58 W x 84 (87) H x 29.5 D (mm)  
**Weight** ..... 270g

## PB-5/6/7/8/9 (Ni-Cd BATTERY)

### PB-9 EXTERNAL VIEW



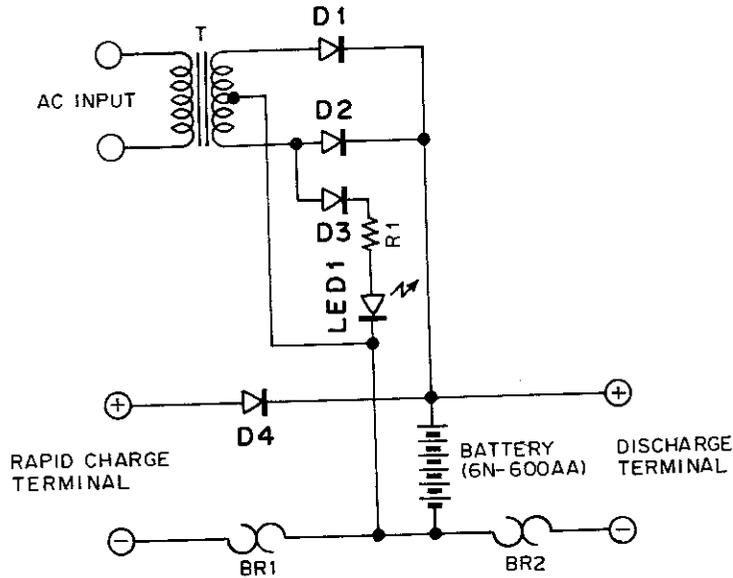
### PB-9 SPECIFICATIONS

#### Electrical characteristic

Voltage . . . . . 7.2V (1.2V x 6)  
 Charging current . . . . . 600mAh  
 Charging input . . . . . AC 100 to 120V, 50/60Hz, 2.2W  
 Charging output . . . . . DC 8.0V, 100mA  
 Charging time . . . . . Approx. 10 hours

**Dimensions** . . . . . 58 W x 98.5 (101.5) H x 29.5 D (mm)  
**Weight** . . . . . 260g

### PB-9 SCHEMATIC DIAGRAM



### PB-5/6/7/8/9 CHARGING TIME

Battery Charger	PB-5	PB-6	PB-7	PB-8	PB-9
BC-9		15	30		
BC-10	8	8	15	8	8
BC-11	1	1	1	1	1

Unit : Hour

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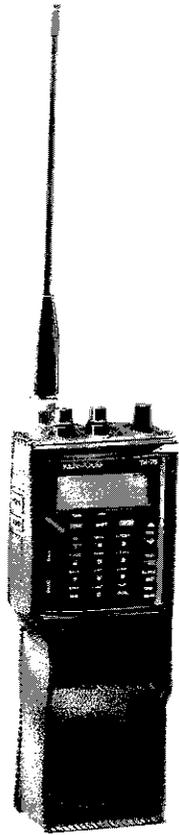
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**SC-22 / 23 (SOFT CASE)**

**TH-75A/E**

**MB-5 (MOBILE BRACKET) / WR-1 (WATERPROOF CASE)**

SC-22 EXTERNAL VIEW



With PB-5, PB-6 or BT-6.

SC-23 EXTERNAL VIEW

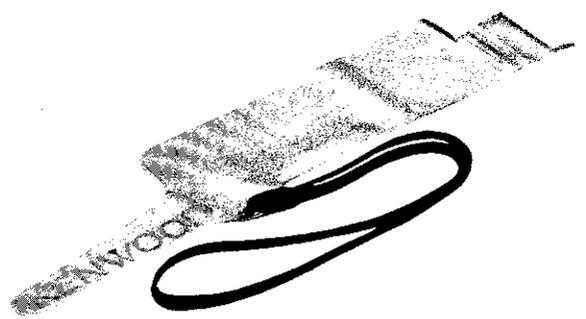


With PB-7, PB-8 or PB-9.

MB-5 EXTERNAL VIEW



WR-1 EXTERNAL VIEW



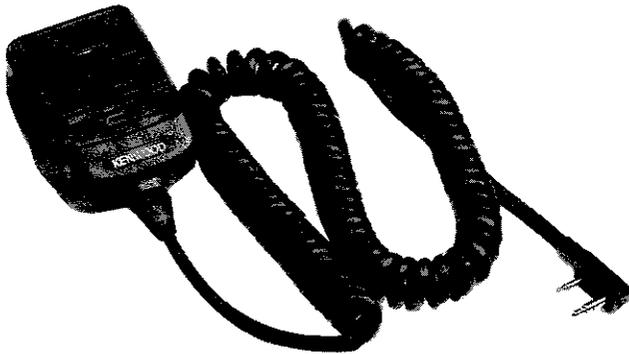
**MB-5 PARTS LIST**

\* : New Parts

Ref. No.	New Parts	Parts No.	Description
		N99-0320-05	Screw set

## SMC-31 / 32 (SPEAKER MICROPHONE)

SMC-31 EXTERNAL VIEW



SMC-32 EXTERNAL VIEW



### SMC-31 SPECIFICATIONS

**Electrical characteristic**

- **Speaker**
  - Diameter . . . . .  $\phi 45$  (mm)
  - Impedance . . . . .  $8\Omega$
  - Rated input power . . . . . 0.15W
  - Max. input power . . . . . 0.3W
- **Microphone**
  - Sensitivity . . . . .  $66\text{dB} \pm 3\text{dB}$  at 1300Hz
  - Output impedance . . . . .  $2\text{k}\Omega \pm 30\%$  at 1000Hz

### SMC-32 SPECIFICATIONS

**Electrical characteristic**

- **Speaker**
  - Diameter . . . . .  $\phi 28$  (mm)
  - Impedance . . . . .  $8\Omega$
  - Rated input power . . . . . 0.5W
  - Max. input power . . . . . 1W
- **Microphone**
  - Sensitivity . . . . .  $66\text{dB} \pm 3\text{dB}$  at 1300Hz
  - Output impedance . . . . .  $2\text{k}\Omega \pm 30\%$  at 1000Hz

### SMC-31 PARTS LIST

\* : New Parts

Ref. No.	New Parts	Parts No.	Description
		D10-0605-08	PTT lever
		E30-2110-05	Curl cord ass'y
		J19-1360-08	Clip
		T07-0219-08	Speaker
		T97-1024-08	Microphone

### SMC-32 PARTS LIST

\* : New Parts

Ref. No.	New Parts	Parts No.	Description
		E30-2127-08	Curl cord ass'y

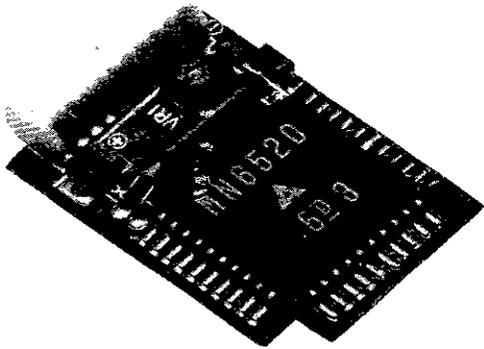
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# TSU-6 (CTCSS UNIT)

## TSU-6 EXTERNAL VIEW



## TSU-6 PARTS LIST

Ref No.	New Parts	Parts No.	Description
<b>CTCSS UNIT (X52-3100-00)</b>			
C1		CK73FB1H102K	Chip C 1000pF K
C2		C92-0010-05	Tantal 6.8μF 6.3WV
C3		C90-2082-05	Tantal 22μF 4.0WV
C4,5		CK73EB1E104K	Chip C 0.1μF K
C6		CK73EB1H223K	Chip C 0.022μF K
C7		CK73EB1E104K	Chip C 0.1μF K
C8,9		CC73FCH1H150J	Chip C 15pF J
C10		CK73FB1H102K	Chip C 1000pF K
C11		CK73FB1E473M	Chip C 0.047μF M
C12		C92-0507-05	Chip tan 4.7μF 6.3WV
C13		C92-0510-05	Chip tan 3.3μF 4.0WV
		E40-5152-05	Pin connector (10P)
X1		L77-1313-05	X'tal resonator 4.194304MHz
R1~10		RK73FB2AXXXJ	Chip R
R11		R92-0670-05	Chip R 0Ω
R12~14		RK73FB2AXXXJ	Chip R
VR1		R12-3460-05	Trimming pot. 33kΩ
Q1		DTC144TK	Digital transistor
Q2		DTA114EK	Digital transistor
Q3		2SC2712(GR)	Chip transistor
IC1		MN6520	IC
IC2		MN4094BS	IC

## TSU-6 FINE ADJUSTMENT OF TONE FREQUENCY

The tone frequency can be fine adjusted with an interval of 0.5% step over the range of 0 to +1.5%. Ground the T1 (pin 10) and T2 (pin 9) of IC1 to obtain the desired frequency.

	T1	T2
0%	X	X
+0.5%	○	X
+1.0%	X	○
+1.5%	○	○

○ : GND, X : OPEN

Table 3

## TSU-6 REFERENCE DATA

### TH-25's condition and MN4094BS (IC2) relationship

CTCSS switch	TONE switch	TX/RX	MN4094BS terminal		
			Q5	Q6	Q1 ~ 4, 7, 8
OFF	OFF	TX	L	H	L
		RX	L	H	L
	ON	TX	L	L	See table 2
		RX	L	H	L
ON	OFF	TX	L	L	See table 2
		RX	H	L	
	ON	TX	L	L	
		RX	H	L	

Q1 ~ 4, 7, 8 : Tone frequency setting

Q5 : TX/RX switch for MN6520 (IC1). "H" : RX, "L" : TX.

Q6 : Power switch for MN6520 (IC1). "H" : OFF, "L" : ON.

Table 1

### Tone frequency and MN6520 (IC1) relationship

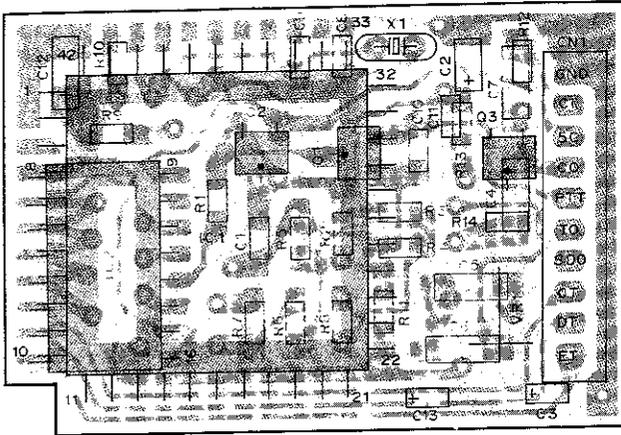
Tone frequency (Hz)	MN6520 terminal					
	S6	S5	S4	S3	S2	S1
	MN4094BS terminal					
	Q1	Q2	Q3	Q4	Q7	Q8
67.0	L	H	H	H	L	H
71.9	L	H	H	H	L	L
74.4	L	H	H	L	H	H
77.0	L	H	H	L	H	L
79.7	L	H	H	L	L	H
82.5	L	H	H	L	L	L
85.4	L	H	L	H	H	H
88.5	L	H	L	H	H	L
91.5	L	H	L	H	L	H
94.8	H	H	H	L	L	H
100.0	H	H	H	L	L	L
103.5	H	H	L	H	H	H
107.2	H	H	L	H	H	L
110.9	H	H	L	H	L	H
114.8	H	H	L	H	L	L
118.8	H	H	L	L	H	H
123.0	H	H	L	L	H	L
127.3	H	H	L	L	L	H
131.8	H	H	L	L	L	L
136.5	H	L	H	H	H	H
141.3	H	L	H	H	H	L
146.2	H	L	H	H	L	H
151.4	H	L	H	H	L	L
156.7	H	L	H	L	H	H
162.2	H	L	H	L	H	L
167.9	H	L	H	L	L	H
173.8	H	L	H	L	L	L
179.9	H	L	L	H	H	H
186.2	H	L	L	H	H	L
192.8	H	L	L	H	L	H
203.5	H	L	L	H	L	L
210.7	H	L	L	L	H	H
218.1	H	L	L	L	H	L
225.7	H	L	L	L	L	H
233.6	H	L	L	L	L	L
241.8	L	H	H	H	H	H
250.3	L	H	H	H	H	L

Table 2

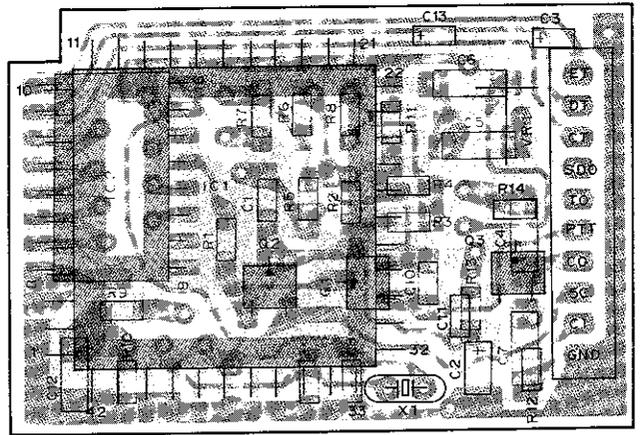
## TSU-6 (CTCSS UNIT)

### TSU-6 PC BOARD VIEWS

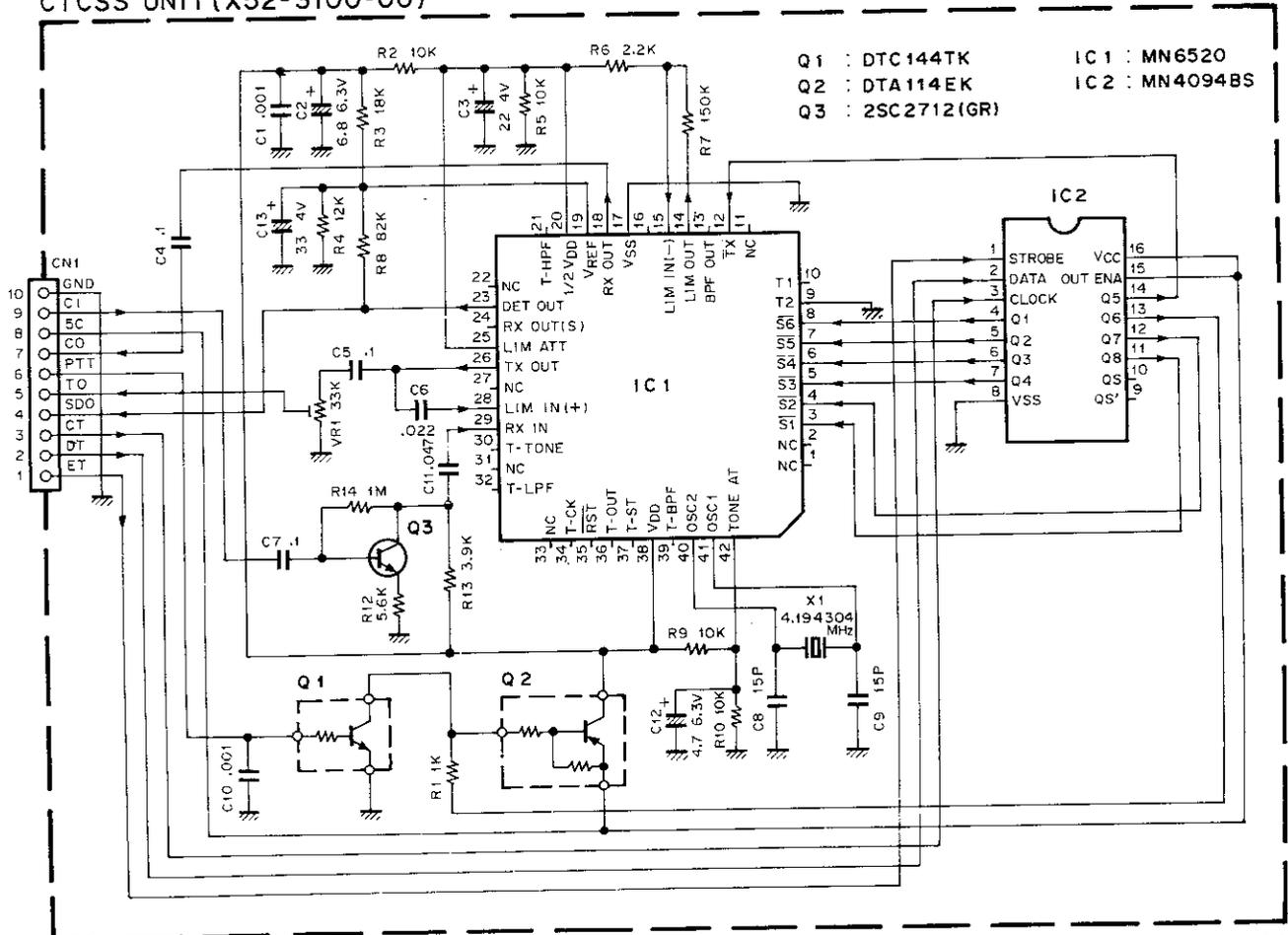
Component side view



Foil side view



### TSU-6 CIRCUIT DIAGRAM CTCSS UNIT (X52-3100-00)



## SPECIFICATIONS

		2 m Band	70 cm Band	
FREQUENCY RANGE (MHz)	TH-75A U.S.A. version	.144 to 148	438 to 450	
	TH-75E European and U.K. version	144 to 146	430 to 440	
	TH-75A Others	144 to 148	430 to 440	
MODE		F3E (FM)		
MEMORY CHANNELS		10+1	10+1	
FREQUENCY STEP (kHz)		5, 10, 15, 20, 12.5, 25		
ANTENNA IMPEDANCE (Ω)		50		
POWER REQUIREMENT		6.3~16 (7.2 VDC nominal)		
GENERAL CURRENT DRAIN	TRANSMIT mode	HI 13.8 V	Approx. 1.4 A	Approx. 1.5 A
		9 V (with BT-6)	Approx. 1.2 A	Approx. 1.3 A
		7.2 V (with PB-5/6/7/9)	Approx. 1 A	Approx. 1.1 A
	Single band	LO transmit mode	Approx. 0.6 A	Approx. 0.6 A
		RECEIVE mode with no signal	Approx. 45 mA	Approx. 50 mA
		BATTERY SAVER mode	Approx. 12 mA	Approx. 13 mA
		Dual band	RECEIVE mode with no signal	Approx. 83 mA
	Dual band	BATTERY SAVER mode	Approx. 20 mA	
AUTOMATIC POWER OFF mode		Approx. 3 mA		
GROUND		Negative		
DIMENSIONS (W×H×D)	Projections not included (mm)	58×179×29.5 (2.3×7×1.2 inch)		
	Projections included (mm)	74×193×40 (2.9×7.6×1.6 inch)		
WEIGHT (g)	With NiCd Battery and Antenna	510 (1.1 lbs.)		
OPERATING TEMPERATURE		-20°C ~ +50°C (-4°F ~ 122°F)		
MICROPHONE IMPEDANCE		2 kΩ		
TRANSMITTER OUTPUT POWER	HI	13.8 V	More than 5 W	
		9 V (with BT-6)	Approx. 3 W	Approx. 2.5 W
		7.2 V (with PB-5/6/7/9)	Approx. 1.5 W	Approx. 1.5 W
	LO	Approx. 0.5 W		
MODULATION		REACTANCE		
MAXIMUM FREQUENCY DEVIATION (kHz)		±5		
SPURIOUS RADIATION		HI/LO	Less than -60 dB/-50 dB	
CIRCUITRY		DOUBLE CONVERSION SUPERHETERODYNE		
INTERMEDIATE FREQUENCY	1st IF (MHz)	16.9	59.525	
	2nd IF (kHz)	455		
SENSITIVITY		12 dB SINAD	Less than 0.16μV	Less than 0.18μV
SQUELCH SENSITIVITY		Less than 0.1 μV		
SELECTIVITY	-6 dB	More than 12 kHz		
	-40 dB	Less than 28 kHz		
AUDIO OUTPUT POWER (across 8 Ω load 10% distortion)		More than 400 mW/at 9 V		

**NOTES:**

1. Circuit and ratings are subject to change without notice due to advancement in technology.
2. Recommended duty cycle: 1 minute Transmission, 3 minutes Reception

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