2-m FM HANDHELD TRANSCEIVER

TH-26A/AT/E

SERVICE MANUAL

KENWOOD

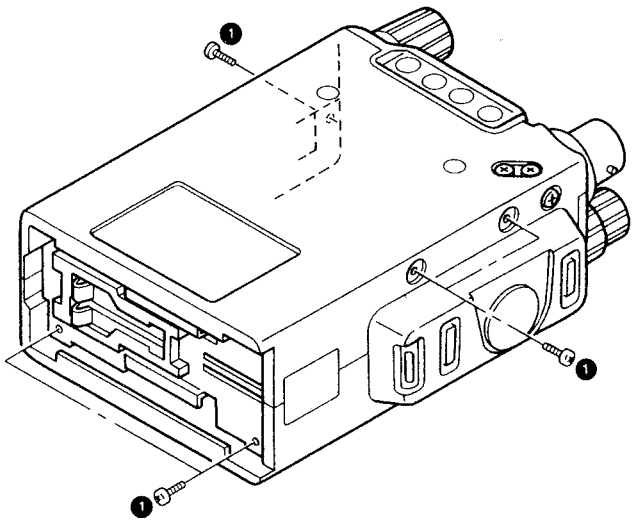
B51-8040-00 (A) 959

CONTENTS

DISASSEMBLY FOR REPAIR

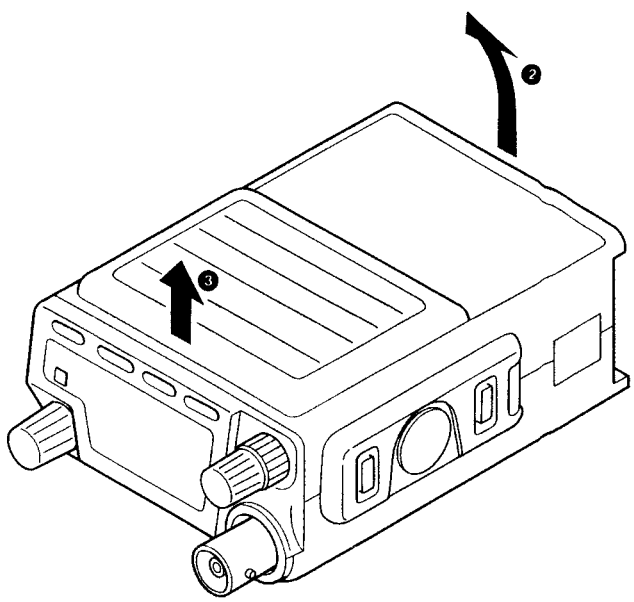
1. Removing the Case

1) Remove the two screws from the front-case side of the bottom plate, as well as the three screws from both sides of the front and rear cases ①.



2) Raise the bottom plate ② and detach the panel side ③ of the front case by pulling it up.

Note: Use care when pulling ③ so the FPC cable in the front case is not cut.

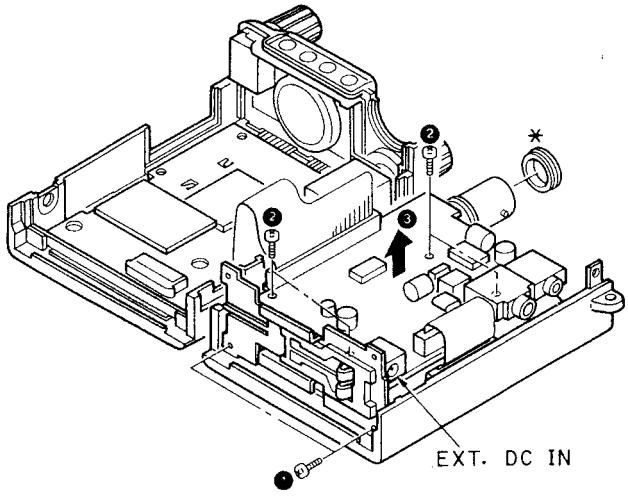


DISASSEMBLY FOR REPAIR

2. Removing the TX/RX Unit (A/2)

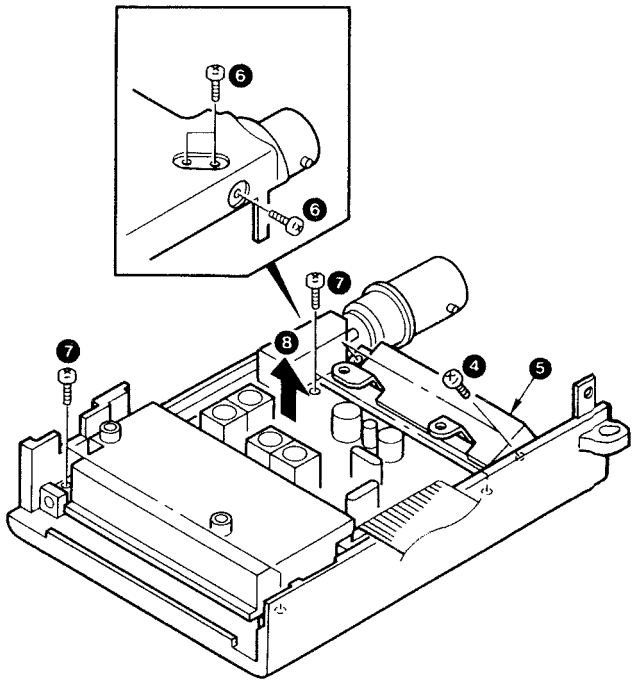
1) For the TH-26A/AT/E, remove the two screws clamping the bottom plate ①.
2) Remove the four screws ② clamping the TX/RX unit (A/2).
3) Raise the TX/RX unit (A/2) until it is off the rear case ③.
4) Remove the rubber ring of the ANT connector (*)

Note: The control unit and TX/RX unit (A/2, B/2) can be checked by connecting an external power supply to EXT DC IN without unplugging the FPC cable.



3. Removing the TX/RX Unit (B/2)

1) Remove the two screws ④ clamping the power module and remove the shield case ⑤. Now the power module can be replaced by unsoldering its lead wire.
2) Locate the three screws ⑥ clamping the ANT connector. Remove them from the rear case.
3) Remove the four screws ⑦ clamping the TX/RX unit (B/2) and pull out B/2.

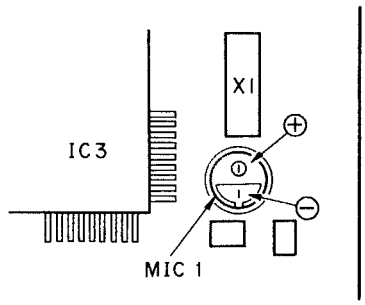


DISASSEMBLY FOR REPAIR

4. Removing the Control Block

1) Removing the condenser microphone (MIC 1) only
   - The condenser microphone can be changed without removing the control unit.
   - Unsolder the FPC. Raise the FPC and pull out the microphone unit alone in the upward direction.

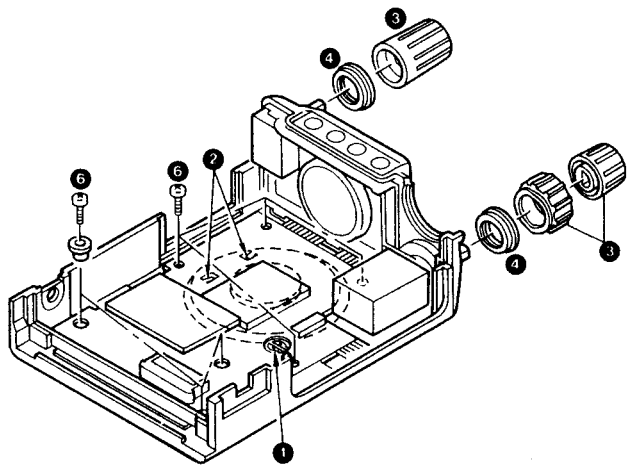
Note: Polarity of condenser microphone
The condenser microphone should be installed to the polarity shown.

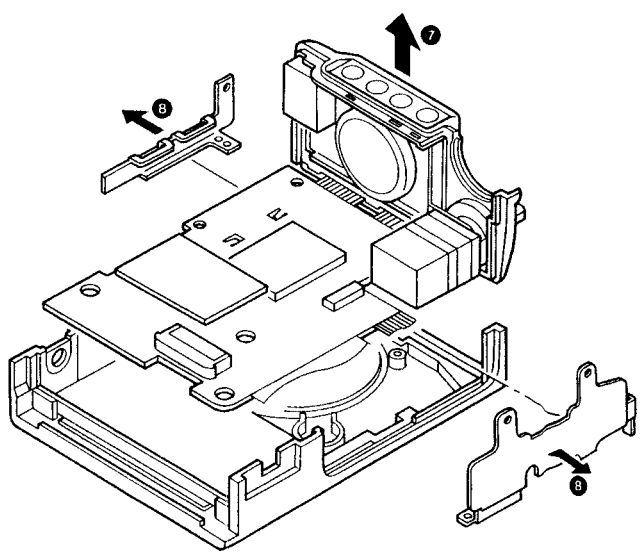


2) Removing the control unit

Note: Before removing the control unit (W02-16xx-xx), the two FPCs ② must be unsoldered off the speaker (SP1).

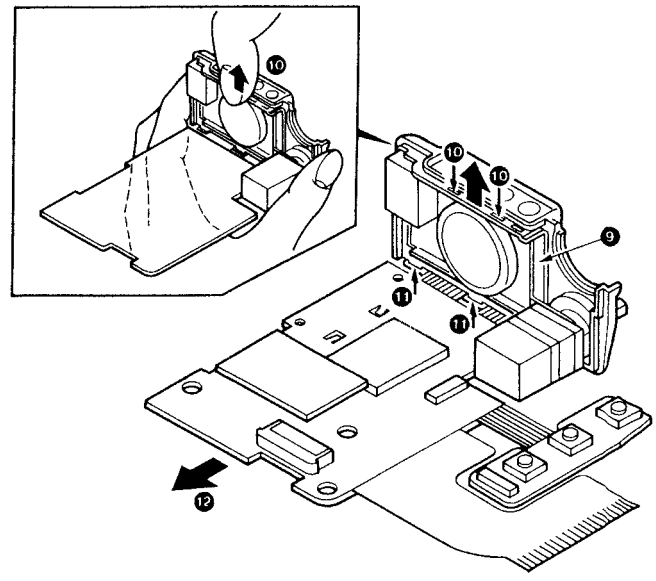
- When disassembling the LCD block as well, remove the knobs ③ and nuts ④ of the squelch and encoder.
- Remove the seven screws ⑥ clamping the control unit.
- Hold the front panel and pull up the control unit off the front case ⑦.
- Remove the control unit clamps ⑧.



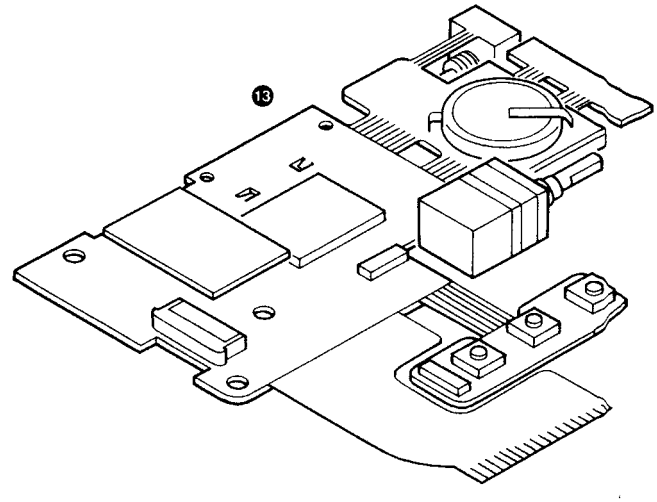


DISASSEMBLY FOR REPAIR

- When detaching the LCD block from the front panel, pull the edge of the front panel in the arrowed direction (➡) until the claw of the clamp ⑨ comes off the groove ⑳.
- Release the claws on the bottom of the front panel from the grooves ⑪.
- Free the clamp ⑨ and slowly slide the control unit ⑫ toward you until it comes off the front panel. (The FPC cable should not be exerted with undue force.)



- The figure below shows how the control unit looks after it is disassembled.



CIRCUIT DESCRIPTION

1. Frequency Configuration

The frequency configuration is shown in Table 1 and Figure 1.

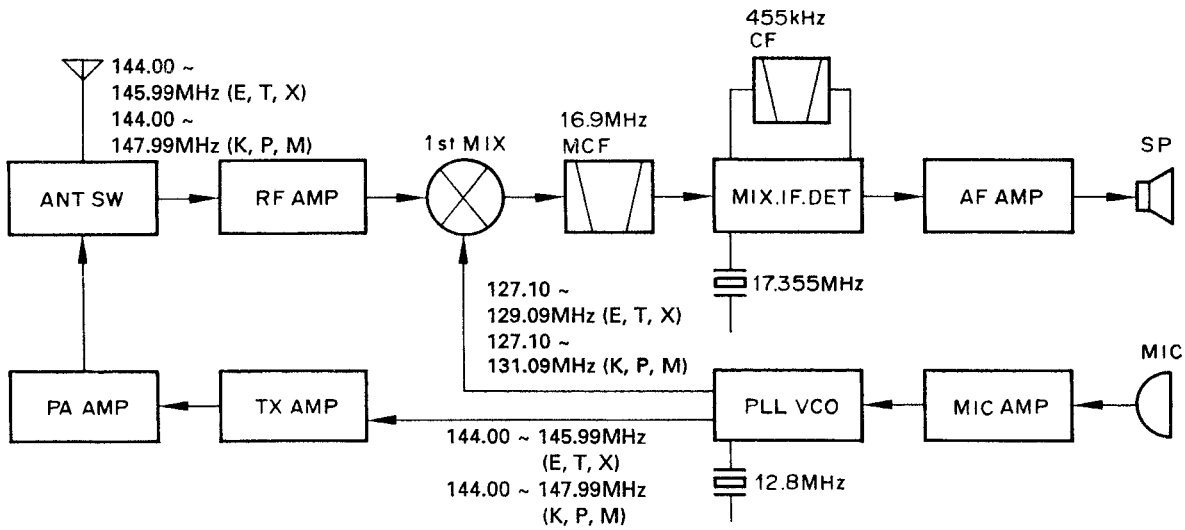


Fig. 1 Frequency configuration

Receiving System	Double conversion techniques	
	1st IF frequency	16.9 MHz
	2nd IF frequency	455 kHz
Transmitting System	Direct frequency division	
Modulation	Reactance	

Table 1 Configuration

2. Receiver System

1) RF amplifier

Incoming signals from the antenna pass through a low-pass filter and the transmit/receive switching circuit and enter the RF amplifier section. The signals are amplified by two RF amplifiers, Q23 and Q25.

Undesirable signals are removed by a bandpass filter that uses vari-cap tuning.

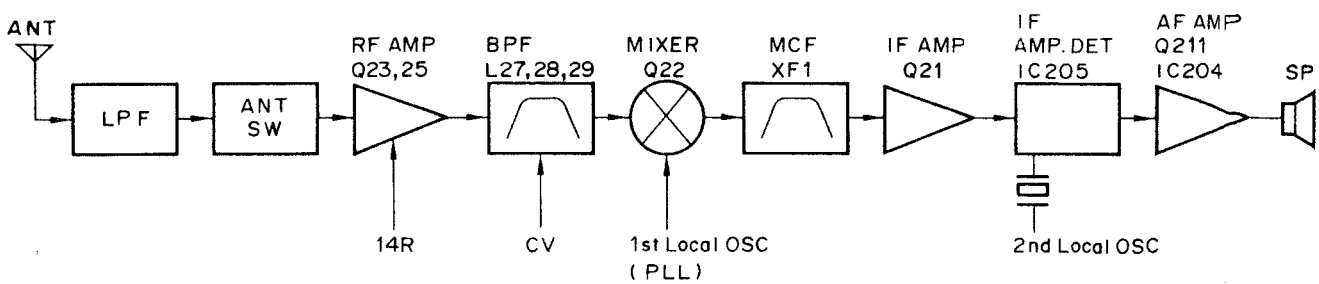


Fig. 2 RX section block diagram

2) First mixer

The signal is then mixed with the first local oscillator signal, from the PLL circuit, by Q22 to produce the first intermediate frequency (IF) signal.

The first IF signal passes through a two stage monolithic crystal filter circuit (MCF) to further remove undesired signals.

Item	Rating
Nominal center frequency (f_0)	16,900kHz
Pass band width	±7.5kHz or more at 3dB
Attenuation band width	±25kHz or less at 40dB ±45Hz or less at 60dB
Guaranteed attenuation	70dB or more within ±1MHz (Spurious: 40dB or more at f_0 ~ f_0 +500kHz, 80dB or more at ±890 ~ 930kHz)
Ripple	1.0dB or less
Insertion loss	2.0dB or less
Terminal impedance	1.8kΩ/0pF

Table 2 MCF (L71-0276-05) (TX-RX unit XFI)

3) IF amplifier

The first IF signal is amplified by Q21, and then enters IC205 (FM processing IC). Here the signal is mixed with the second local oscillator signal by IC205 to produce the second IF signal. The second IF signal passes through a ceramic filter to remove undesired signals, and is then reapplied to IC205 for farther amplification and demodulation.

Item	Rating
Nominal center frequency (f_0)	455kHz ±1.5kHz
6dB band width	±7.5kHz or more
40dB band width	±15kHz or less
Guaranteed attenuation	1.5dB or less
Ripple	27dB or more
Insertion loss	6dB or less
I/O matching impedance	1.5kΩ

Table 3 Ceramic filter (L72-0362-05) (TX-RX unit CF201)

CIRCUIT DESCRIPTION

4) AF amplifier

The frequency characteristics of the detected FM audio signal are corrected by the de-emphasis circuit composed of R252 and C261 and active high-pass filter circuit Q211. The audio signal passes through the AF volume control and is amplified to the desired level by the power amplifier IC204.

5) Squelch and mute circuit

The output from the squelch circuit composed of IC205 and Q212 is applied to pin 12 of the microprocessor via the SC pin. The microprocessor controls the MUTE1 and MUTE2 lines according to the SC input logic and other functional conditions, in order to controls the audio.

The microprocessor also controls MUTE1, MUTE2 and the audio when the bell function, CTCSS, or DTSS operates.

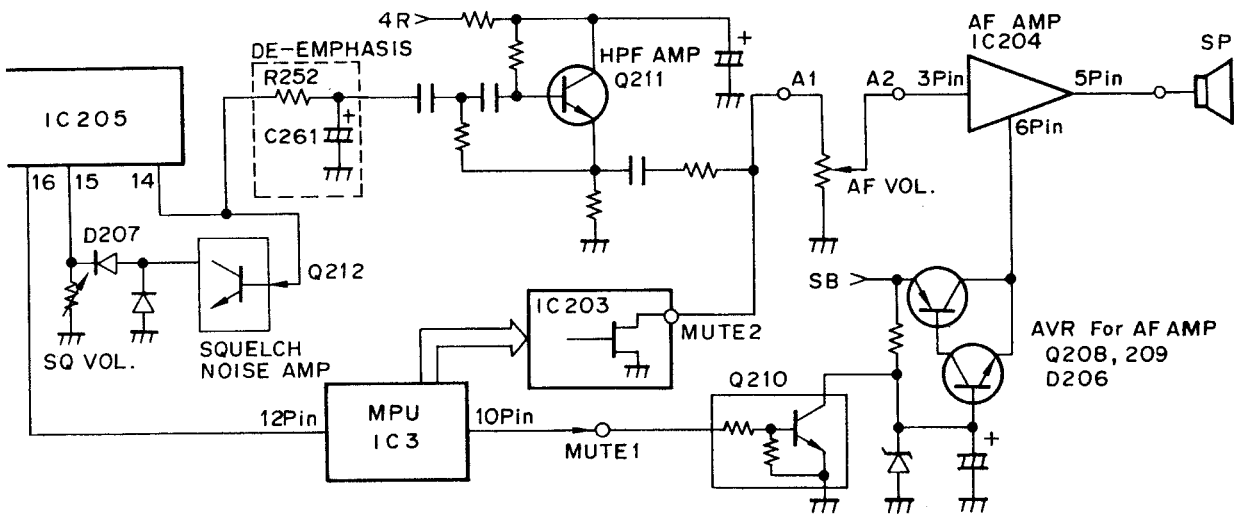


Fig. 3 AMP Squelch and Mute Circuit

Condition			MU1	MU2
TX			H	H
RX	Normal operation	When squelch ON	H	H
		When squelch OFF	L	L
	Bell operation	When waiting	H	H
		At reception (bell operation)	L	H

Mute operation when "H"

Table 4 Mute Operating Conditions

CIRCUIT DESCRIPTION

6) S-meter circuit

The signal for the S-meter is obtained from pin 12 of IC205 as a DC control voltage corresponding to the input signal level and is applied to pin 14 of the microprocessor. This DC voltage is A/D converted and is used to control the S-meter display of the LCD.

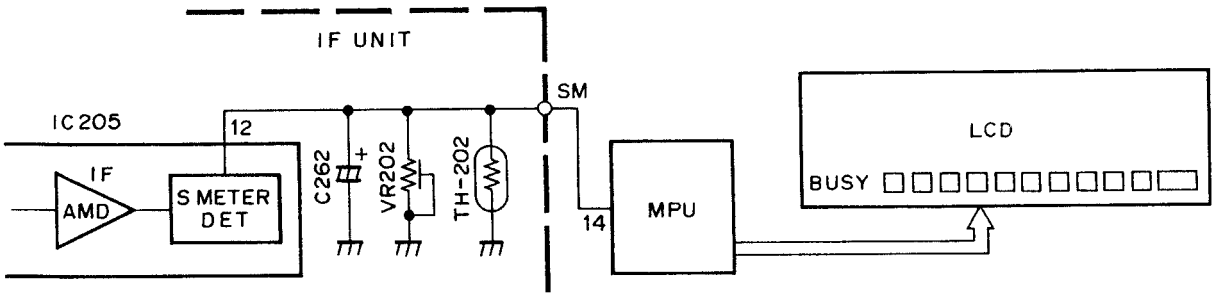


Fig. 4 S-Meter Circuit

3. Transmitter System

1) Microphone amplifier circuit

The signal from the microphone passes through a 6dB/oct pre-emphasis circuit composed of C216 and R209, and is then amplified and limited by IC201 (1/2). Distorted signals components outside the audio band are removed by the splatter filter composed of IC201 (2/2).

2) Modulation circuit

The output from the microphone amplifier passes through the microphone gain control VR201, and is applied to the VCO varactor diode (D2).

3) Drive and final circuit

The desired transmit signal is generated directly by the VCO, and is amplified by buffer amplifiers Q2 and Q3 to approximately 0 dBm. The signal is further amplified to approximately 14 dBm by Q8 and Q9. The amplified signal passes through pin diode D5 for transmit output adjustment and enters the power module IC1. The power module is a two stage amplifiers and amplifier the power to about 5 W.

4) Transmit/receive switching circuit

The transmitter output passes through the transmit/receive switching circuit and low-pass filter, and is fed to the antenna. The transmit/receive switching circuit is composed of D7 and D18, which are both on in the transmit mode and off in the receive mode.

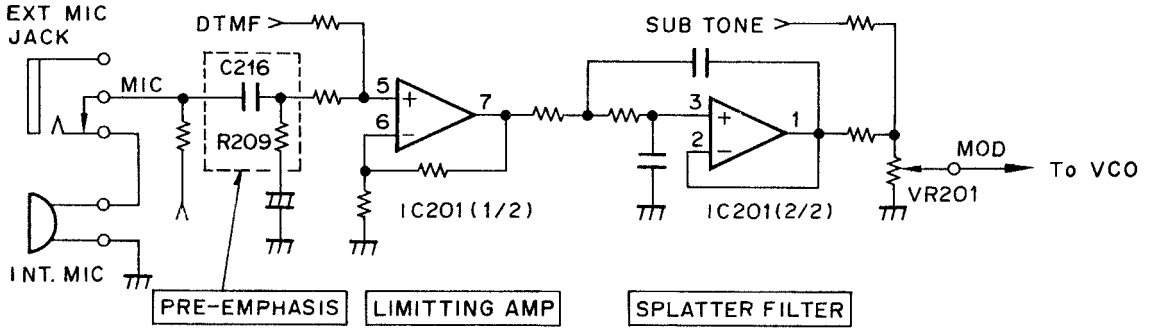


Fig. 5 MIC AMP CIRCUIT

CIRCUIT DESCRIPTION

5) APC circuit and transmitter output switching circuit

The automatic power control (APC) circuit supplies stable transmission power. It works by detecting the collector current of the final unit of the power module.

The comparator (IC206) compares the transmit output adjustment reference voltage generated by zener diode (D208) and voltage dividers VR203 and VR204 with the detection voltage at R268 and R269 proportional to the collector voltage of the final module.

An APC voltage proportional to the difference between the reference voltage and the detection voltage appears at the output pin (pin 6) of IC206. The APC voltage controls the attenuation of diode D6 on the input side of the power module and keeps the transmitter output stable.

When the transmitter output changeover switch is set to LO, Q214 turns on. changes the reference voltage, and keeps the transmit output at about 0.5 W.

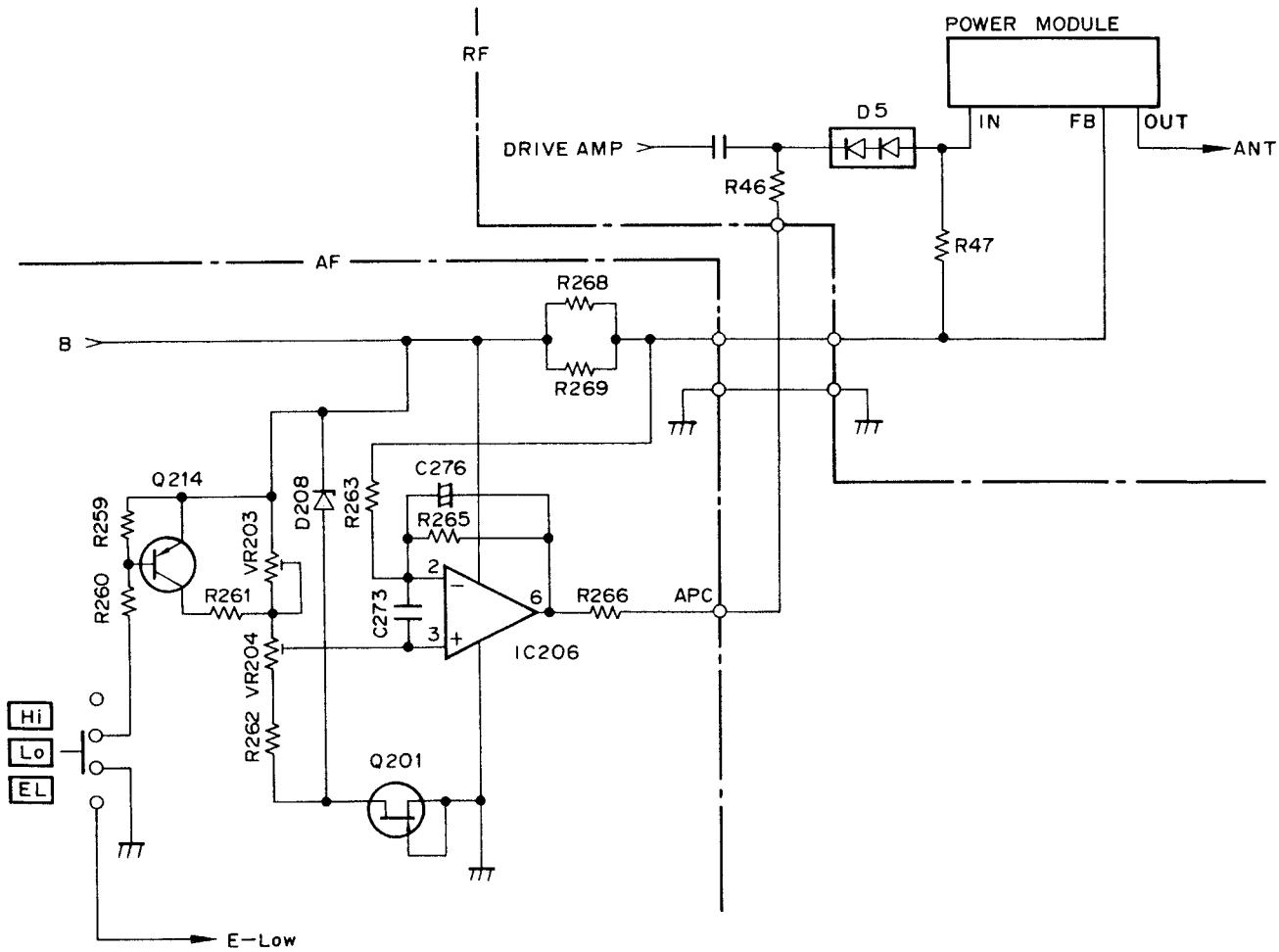


Fig. 6 APC Circuit and Transmitter output Switching Circuit

CIRCUIT DESCRIPTION

6) Economic low-power circuit

The economic low-power circuit supplies the drive output directly to the antenna. The current consumption is lowered since the power module bias is switched off. When the transmitter power changeover switch is set to EL, the EL pin is grounded, and the transmitter circuit performs the following operations:

① Q16 and Q15 turn off, and the 5T line of the power module switches 0 V. At the same time, D7 turns off, and the power module output circuit opens.

② Q12 and Q14 turn off, Q13 turns on, and D5 turns off, so the drive output is no longer fed to the power module.

③ Q17 turns on, Q10 turns off, then D16 and D17 turn on. Q11 turns off, then D18 turns off, so the drive output is fed to the antenna through D16, C69, D17 and L18.

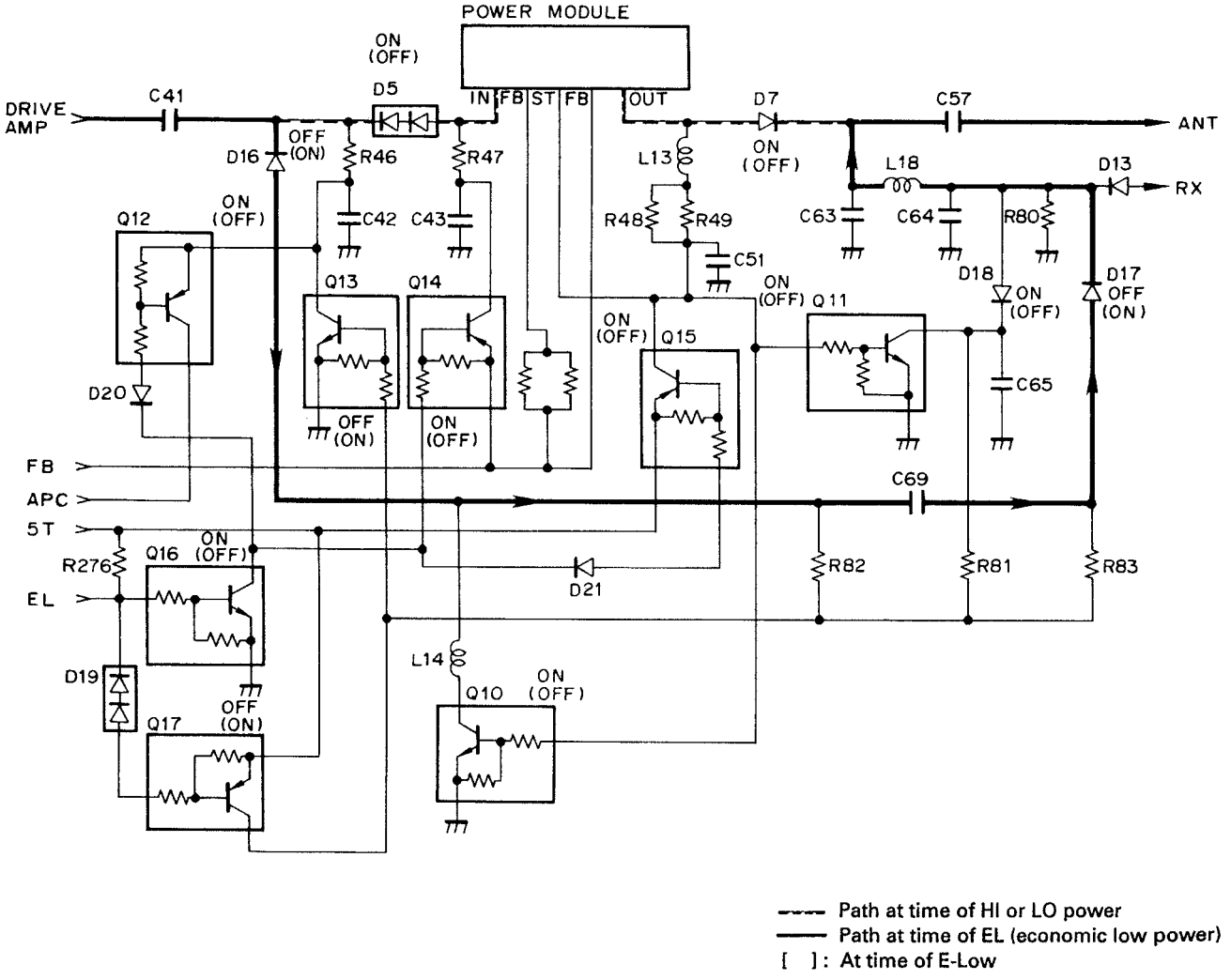


Fig.7 Economic Low-Power Circuit

4. PLL Circuit

1) PLL

The minimun frequency step of the PLL circuit is 5 kHz.

The reference oscillator frequency of X1 (12.8 MHz) is divided by IC1 to produce the 5 kHz or 6.25 kHz reference frequency. The comparison frequency is obtained by amplifying the VCO output with Q5 and then dividing it with the pulse-swallow PLL IC IC1. The PLL circuit, has 5 kHz, 10 kHz, 12.5 kHz, 15 kHz, 20kHz, and 25kHz steps and is configured by comparing the phases of the reference frequency generated by dividing X1 with the comparison frequency.

2) VCO

The desired frequency is directly generated by oscillator FET Q1. The frequency of oscillation is changed by applying the VCO control voltage to varactor diode D1 and D6. The T/R pin is " L " in receive mode, and the oscillation frequency range is switched by turning D3 off.

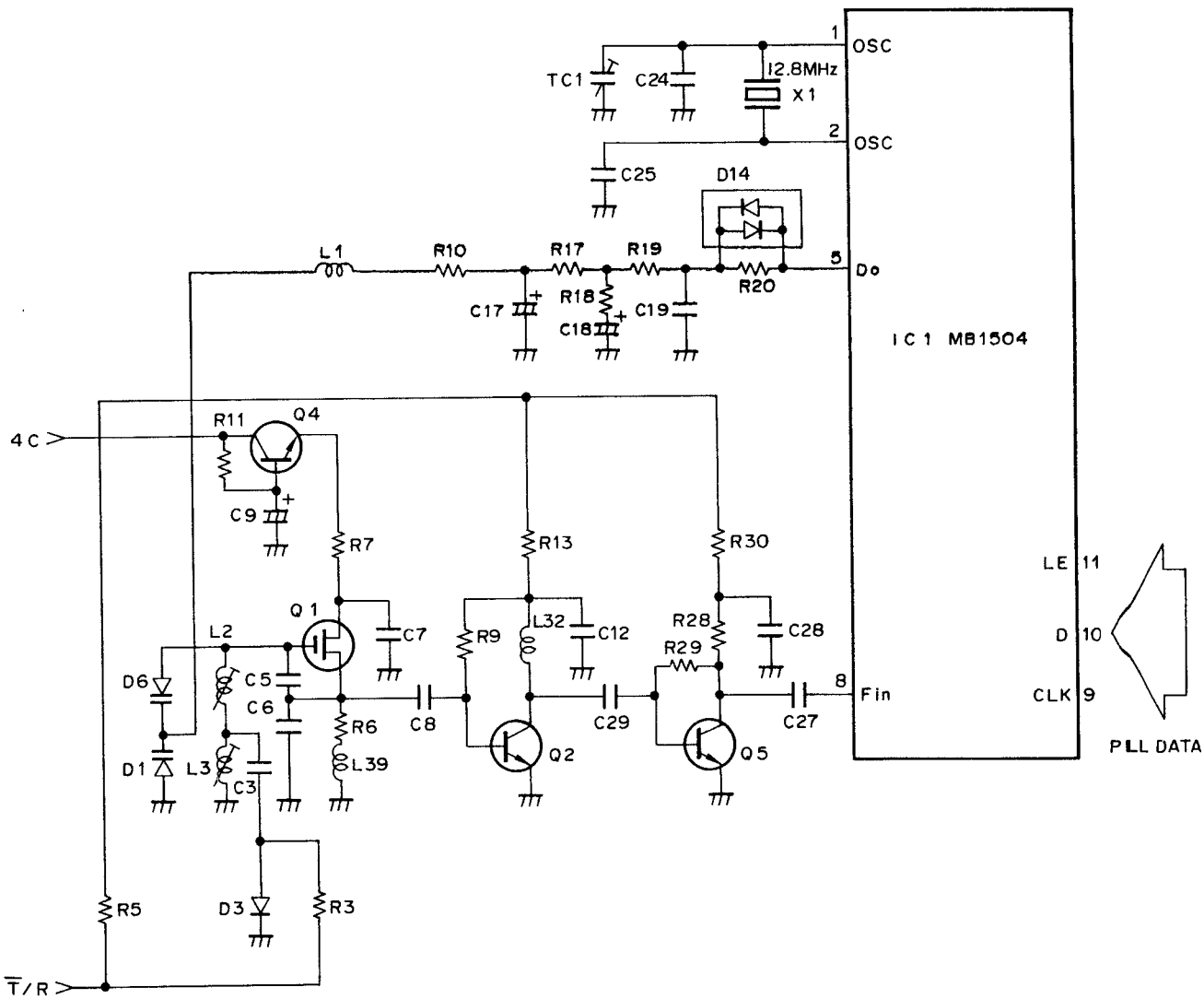


Fig .8 PLL and VCO Circuit

CIRCUIT DESCRIPTION

3) Unlock detection circuit

When the PLL is unlocked, the signal applied to the LD pin (pin 7) of IC1 is shaped by D23, R101, C107 and IC3, causing and the UL pin to go " H " the timing of transmit/receive switching is controlled by the microprocessor, which monitors the voltage on the UL pin.

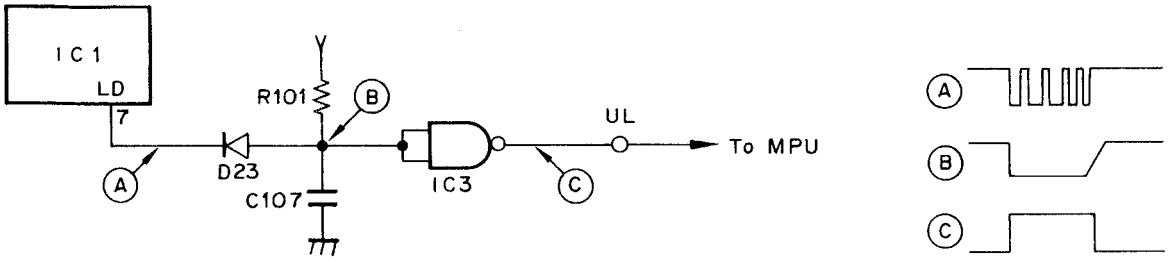


Fig.9 Unlook Detection Circuit

5. Digital Control Circuits

1) Key, rotary encoder circuit

The signal is applied directly to the microprocessor as shown in Figure 10.

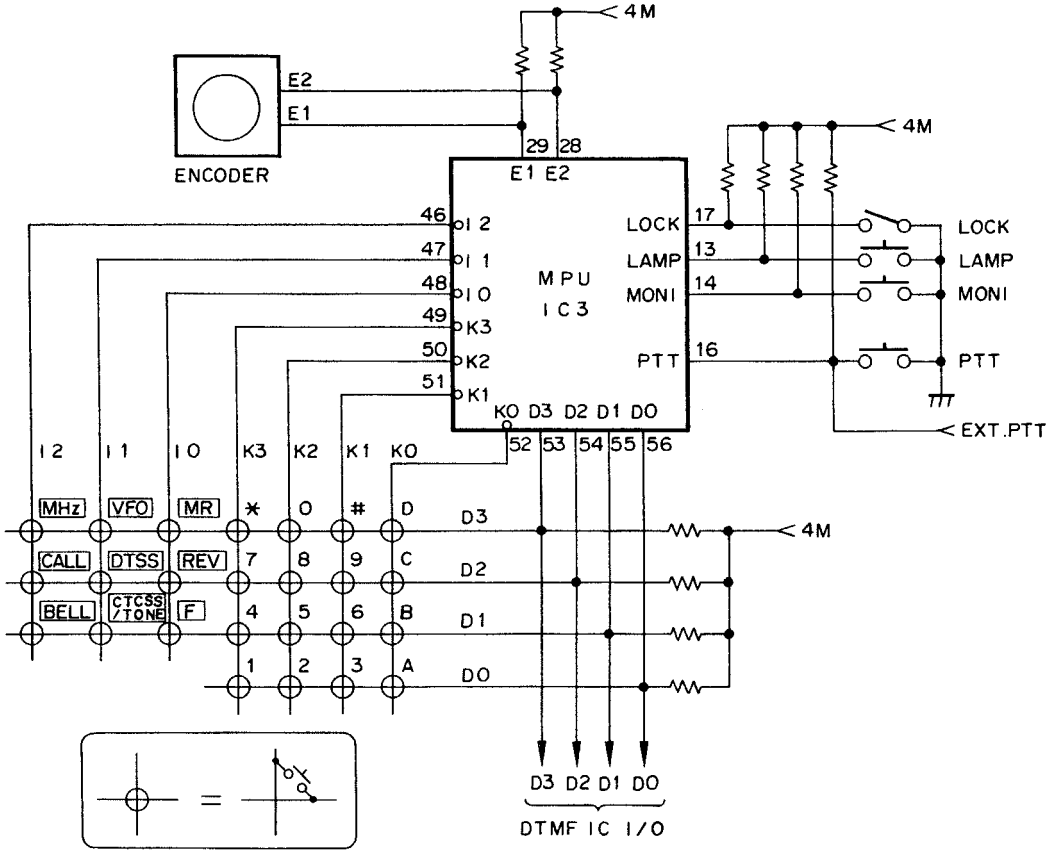


Fig. 10 Key, Encoder Input Circuit

CIRCUIT DESCRIPTION

2) Reset and backup circuit

When the power is switched on, reset circuit C23 and Q3 provides a low pulse of about 1 ms duration to reset the microprocessor. When the power is switched off, the backup detection IC IC4 detects the voltage drop in the 5V line, and changes the output level from high to low. When microprocessor port VF goes low, the microprocessor enters the backup mode.

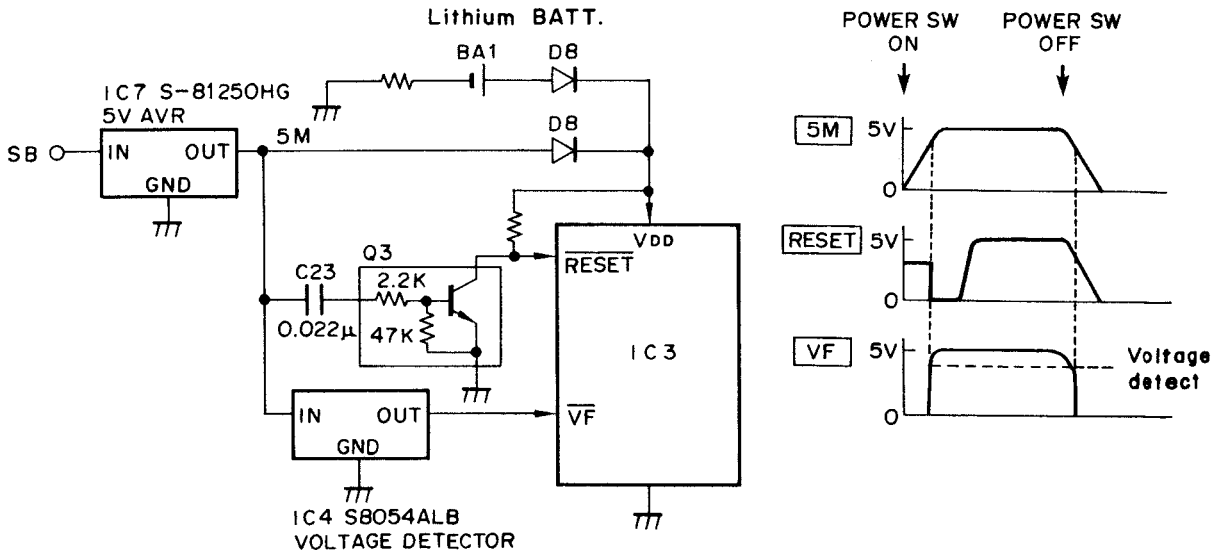


Fig. 11 Reset and Backup Circuit

3) Tone encode circuit

For the subtone, a tone signal of 67.0 to 250.3 Hz is generated by D/A converting the square waves output to B0 to B6 of IC3 by IC5. The signal passes through a low-pass filter R283 and C292 in the TX-RX unit, is mixed with the microphone amplifier output, and modulated by the VCO circuit.

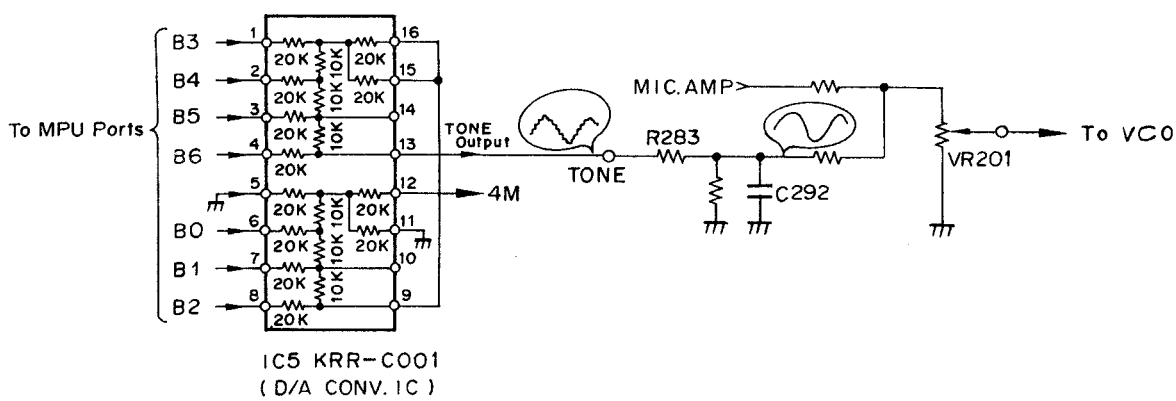


Fig. 12 Tone Encode Circuit

CIRCUIT DESCRIPTION

4) Battery voltage detection circuit

The battery voltage detection circuit divides the power supply voltage and inputs it to the analog port of the microprocessor. The voltage input to the microprocessor is A/D converted to control the BATT display of the LCD.

5) Lamp circuit

The LED is turned on and off by switching the 4M voltage with the output from the LAMP pin of the microprocessor.

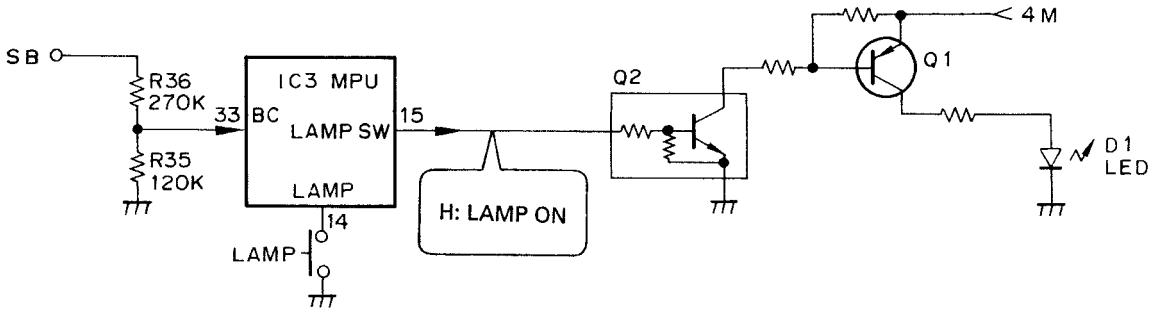


Fig. 13 Battery Voltage Detection Circuit and Lamp Circuit

6) Shift register circuit

Serial data is sent to the shift register IC (TX-RX unit IC203) from the microprocessor. The control output of the shift register is shown in Figure 14.

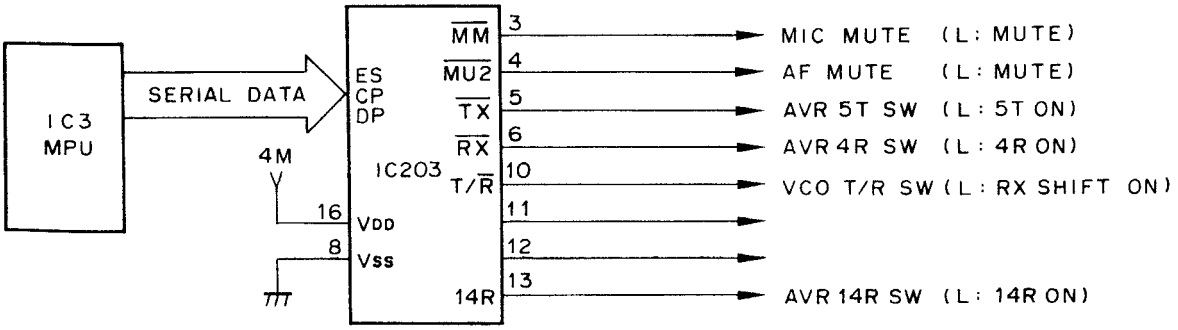


Fig. 14 Shift Resistor : IC203

CIRCUIT DESCRIPTION

6. Power Supply Circuits

1) Power switching circuit (The codes in brackets indicate pin names.)

The power switching circuit generates the 4.5V [4M] reference voltage by stabilizing the voltage at the DC IN pin or BATT pin with IC207 and Q216. The 5V [5T] output in transmit mode, the 4.5V [4R, 14R] output in receive mode, and the 4.5V [4C] output in both modes are generated by switching the 4M voltage via the microprocessor. IC7 in the control unit generates 5V [5M] for the control circuit.

2) Battery save and automatic power off.

If no key is pressed for 10 seconds with squelch off, the power save circuit activated. Q220 is alternately turned on and off with a ratio of about 1:4 by the signal output from the SAVE pin of the microprocessor. The RX and 14R pins of IC203 are also turned on and off alternately. When the pins are off, Q207 and Q221 are off, the voltages for 4C, 4R, and 14R are not generated and the current consumption is reduced. If no key is pressed for 60 minutes and squelch remains closed. The system enters the auto power off (APO) mode, and Q221 and Q207 go off.

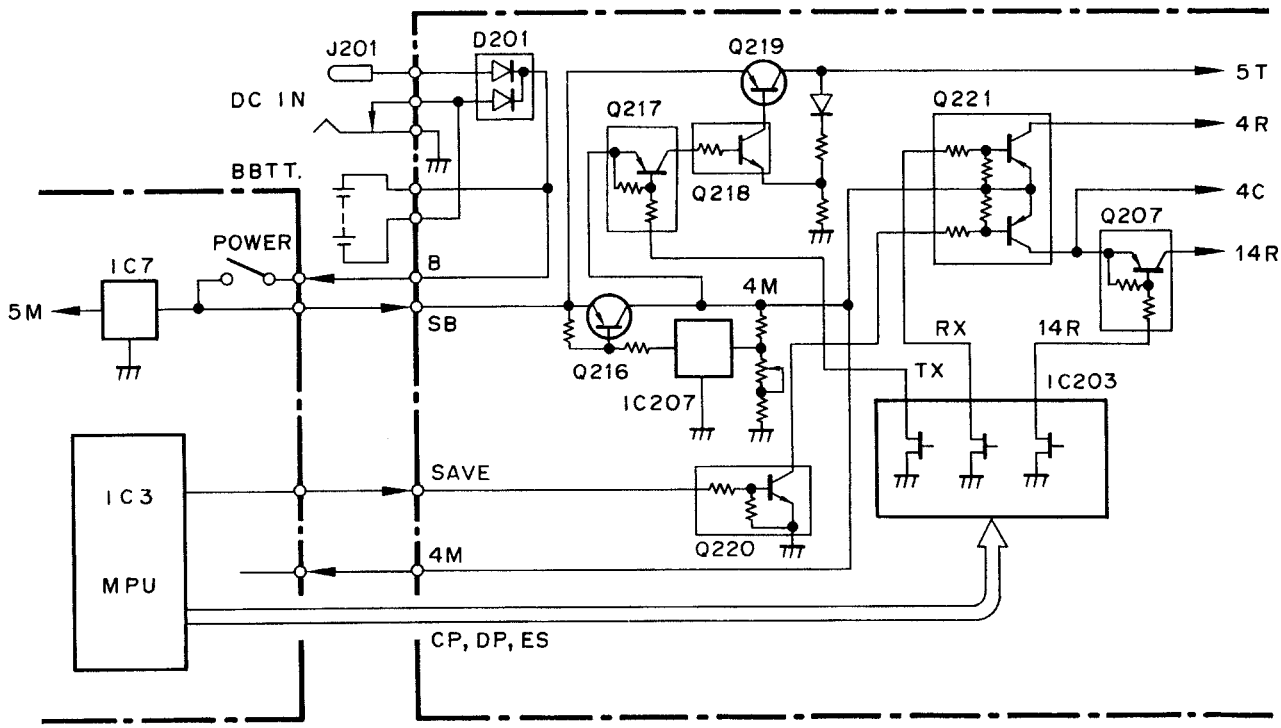


Fig. 15 Power Supply Circuit

CIRCUIT DESCRIPTION

7. Additional Circuits

1) CTCSS

The CTCSS circuit sets the tone frequency according to serial data from the microprocessor. The audio signal passes through the de-emphasis circuit and buffer amplifier Q213 and is applied to the RD pin by the detection output. When the tone matches, the SDO pin goes high. The microprocessor checks the SDO pin and controls the MUTE1 pin.

2) DTSS

The DTSS inputs and outputs DTMF codes according to parallel data from the microprocessor. The audio signal is input from the RD pin in the same way as with the CTCSS, and when a DTMF signal is detected, the data is sent to the microprocessor. The microprocessor checks the code, and controls the MUTE1 pin.

When the microprocessor sends a DTMF code corresponding to the numeric key input, the DTMF signal is sent from the IC and modulated by the microphone amplifier. When the DTMF signal is transmitted, the MM (microphone mute) pin off IC203 goes high to mute the audio signal from the microphone.

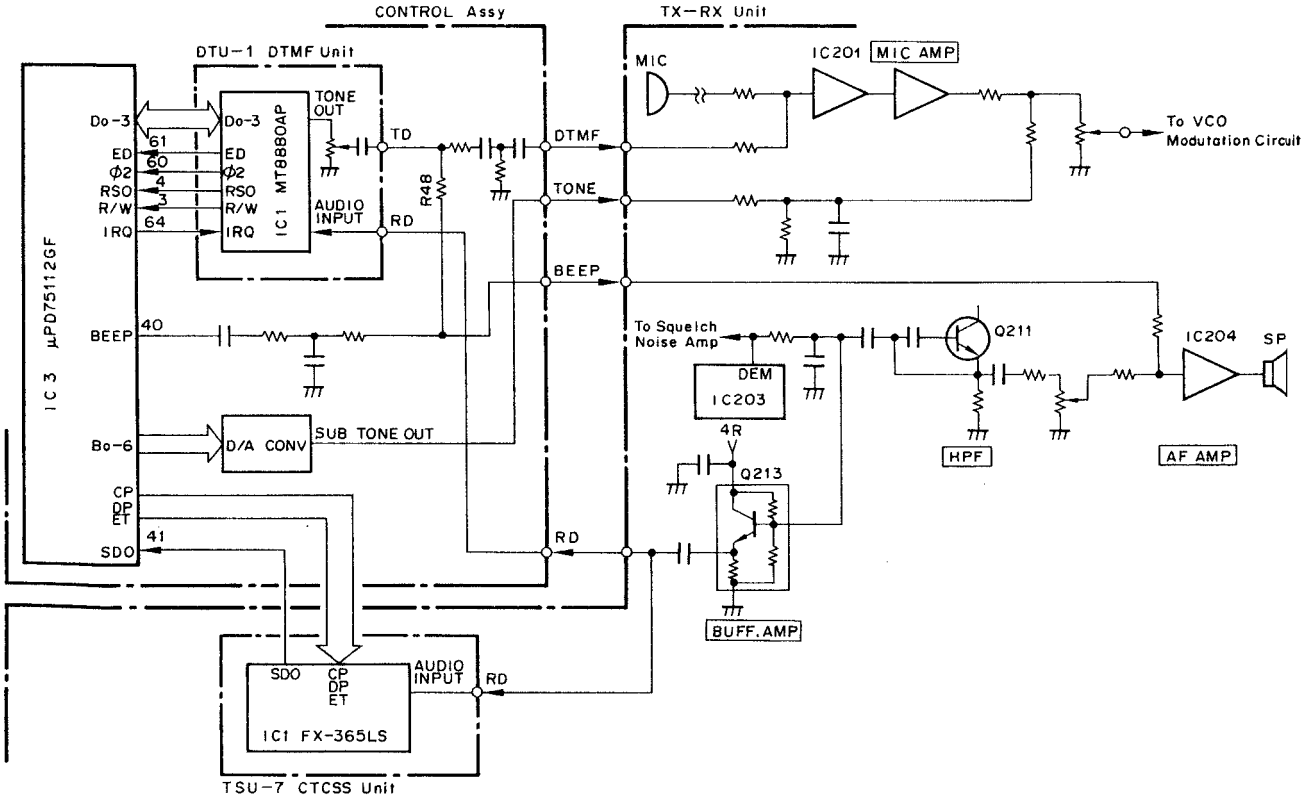


Fig. 16 Additional Circuits (DTMF, CTCSS, BEEP, TONE)

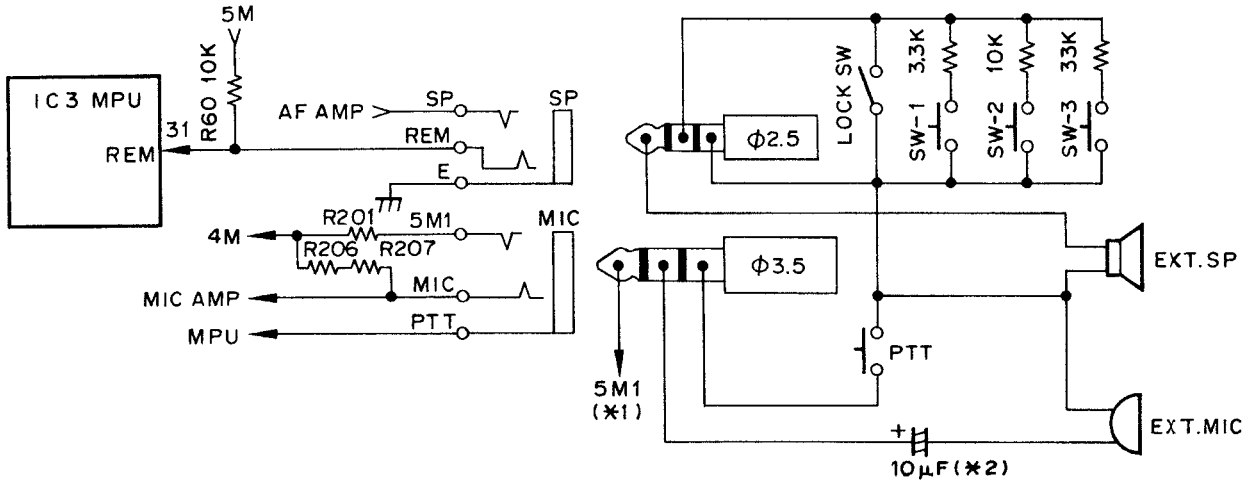
CIRCUIT DESCRIPTION

3) Remote control circuit

The remote control circuit A/D converts the voltage at the REM (remote) pin of the microprocessor and performs remote operations according to the voltage. The voltage at the REM pin is maintained at about 4.5 V by R60. When the switch on the remote control microphone is pressed, the voltage divided by the resistor in series with the switch and R60 appears and is used to determine which switch has been pressed.

4) 1750Hz tone circuit (E and T type only)

The microprocessor outputs 1750Hz square waves, which pass through low-pass filter R29 and C17, are mixed with the DTMF signal line, then fed to the microphone amplifier.



(*1) Voltage appears from the internal 4M line (4.5V) via R201

(*2) In the next case, the capacitor is not required.

Make the connection directly.

- In the case when a capacitor to cut DC voltage is connected to the external device
- In the case when a two-terminal condensor microphone is used as the external microphone

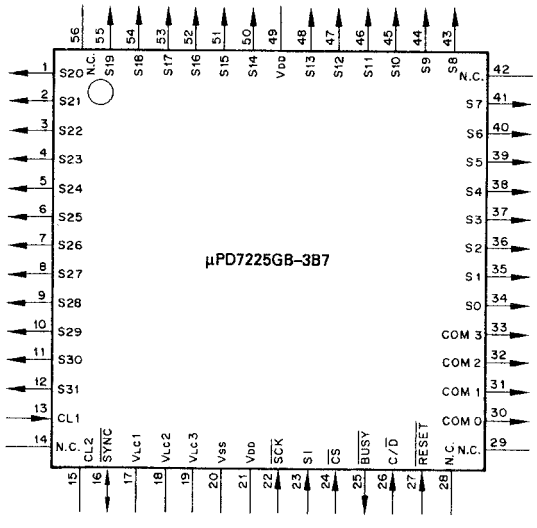
Fig. 17 Ext. SP, Ext. MIC and Remote control circuit

SEMICONDUCTOR DATA

1. LCD driver μPD7225GB-3B7 (Control Unit: IC2)

- Explanation of terminals

Pin No	Port name	I/O	Function
1~ 8	S20~S27	O	Segment drive signal output
9~12	S27~S31	-	Not used
13	CL1	-	R connection for CLOCK signal generation
14	NC	-	Not used
15	CL1	-	R connection for CLOCK signal generation
16	SYNC	-	Not used
17	VCL1	-	LCD driveing power supply
18	VCL2	-	LCD driveing power supply
19	VCL3	-	GND
20	VSS	-	GND
21	VDD	-	+4V
22	SCK	I	Shift clock input
23	SI	I	Serial data input
24	CS	I	Inable data input
25	BUSY	O	DATA input control
26	C/D	I	Command/data select input
27	RES	I	RESET input
28	NC	-	Not used
29	NC	-	Not used
30~32	COM0~COM2	O	Common signal output
33	COM3	-	Not used
34~41	S0~S7	O	Segment signal output
42	NC	-	Not used
43~48	S8~S13	O	Segment signal output
49	VDD	-	Not used
50~55	S14~S19	O	Segment signal output
56	NC	-	Not used



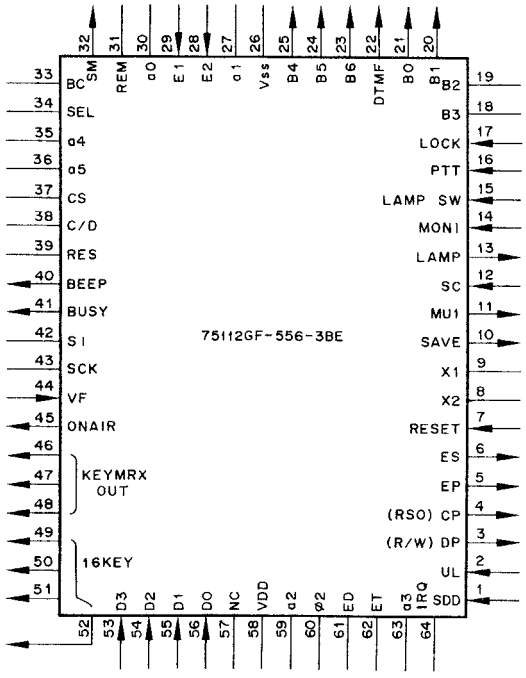
2. MPU 75112GF-556-3BE (Control Unit: IC3)

- Explanation of terminals

Pin No	Port name	I/O	Function
1	SDO	I	CTCSS tone DET. input: "L": same tone,"H": other
2	UL	I	PLL unlock DATA input: "L": lock, "H": unlock
3	DP	O	PLL,Tone and Shift resistor DATA output
4	CP	O	PLL,Tone and Shift resistor CLOCK output
5	EP	O	INABLE output (PLL)
6	ES	O	INABLE output (Shift resistor)
7	RESET	I	Reset voltage input
8	X2	I	CLOCK OSC.
9	X1	I	CLOCK OSC.
10	SAVE	O	Power save control data output
11	MU1	O	AF AMP control data output: "L": OFF, "H": ON
12	SC	I	BUSY data input: "H": BUSY
13	LAMP	O	LAMP control data output
14	MONI	I	MONI SW data input
15	LAMP SW	I	1750Hz TONE SW : "L": OFF, "H": ON
16	PTT	I	PTT SW data input : "L": PTT SW-OFF, "H": PTT SW-ON
17	LOCK	I	LOCK SW data input : "L": ON, "H": OFF
18	B3	O	Sub tone data output: bit3
19	B2	O	Sub tone data output: bit2
20	B1	O	Sub tone data output: bit1
21	B0	O	Sub tone data output: bit0
22	DTMF	O	DTMF data output
23	B6	O	Sub tone data output: bit6
24	B5	O	Sub tone data output: bit5
25	B4	O	Sub tone data output: bit4
26	VSS	-	GND
27	a1	I	Destination
28	E2	I	Encoder data input
29	E1	I	Encoder clock
30	a0	I	Destination
31	REM	I	Remote control data input
32	SM	I	S-meter analog data input
33	BC	I	BATT voltage analog data input (TX)
34	SEL	I	Destination
35	a4	I	Destination
36	a5	I	Destination
37	CS	O	Chip selecter for LCD driver IC
38	C/D	O	Command/Data switching for LCD driver IC
39	RES	O	Reset of LCD driver IC
40	BEEP	O	BEEP output
41	BUSY	O	BUSY control: "H" BUSY
42	SI	O	DATA for LCD driver IC
43	SCK	O	CLOCK for LCD driver IC

SEMICONDUCTOR DATA

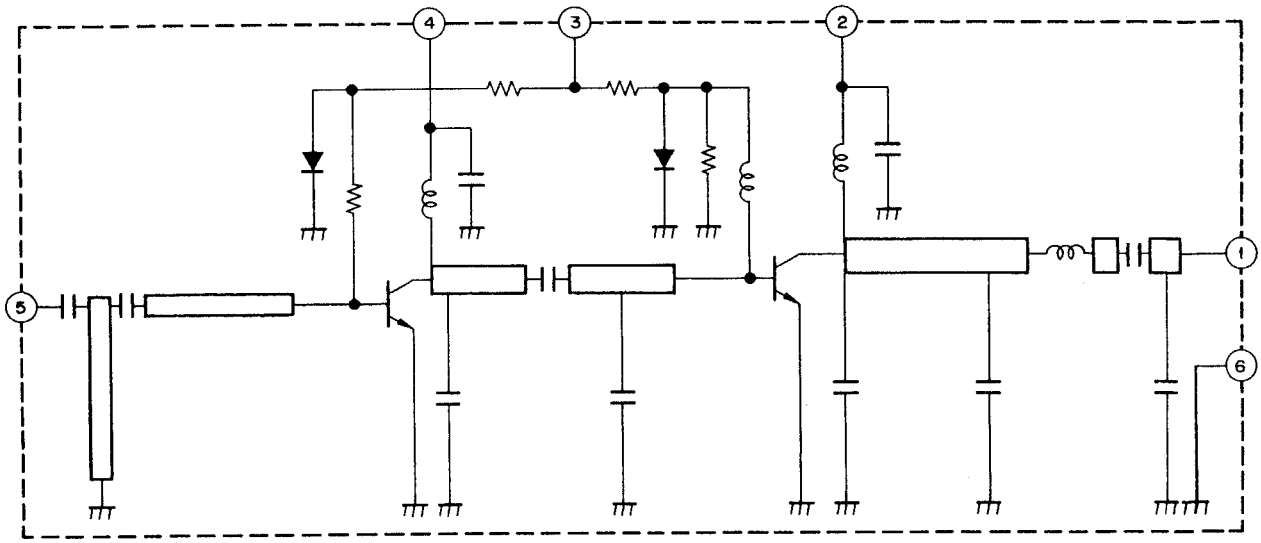
Pin No	Port name	I/O	Function
44	VF	I	BUCK-UP detection
45	ON AIR	O	LED control : "L" TX
46	KEYMRX OUT	O	KEY MATRIX data output
47			
48			
49	16KEY	O	KEY MATRIX data output (DTMF)
50			
51			
52			
53	D3	I	KEY MATRIX data input
54	D2		
55	D1		
56	D0		
57	NC	-	Open
58	VDD	-	+4V
59	a2	I	Destination
60	02	O	CLOCK for DTMF
61	ED	O	Inable for DTMF
62	ET	O	Inable for CTCSS
63	a3	I	Destination
64	IRQ	I	DTMF IC IRQ/CP



SEMICONDUCTOR DATA

3. Power module M67748LR

- Equivalent circuit diagram



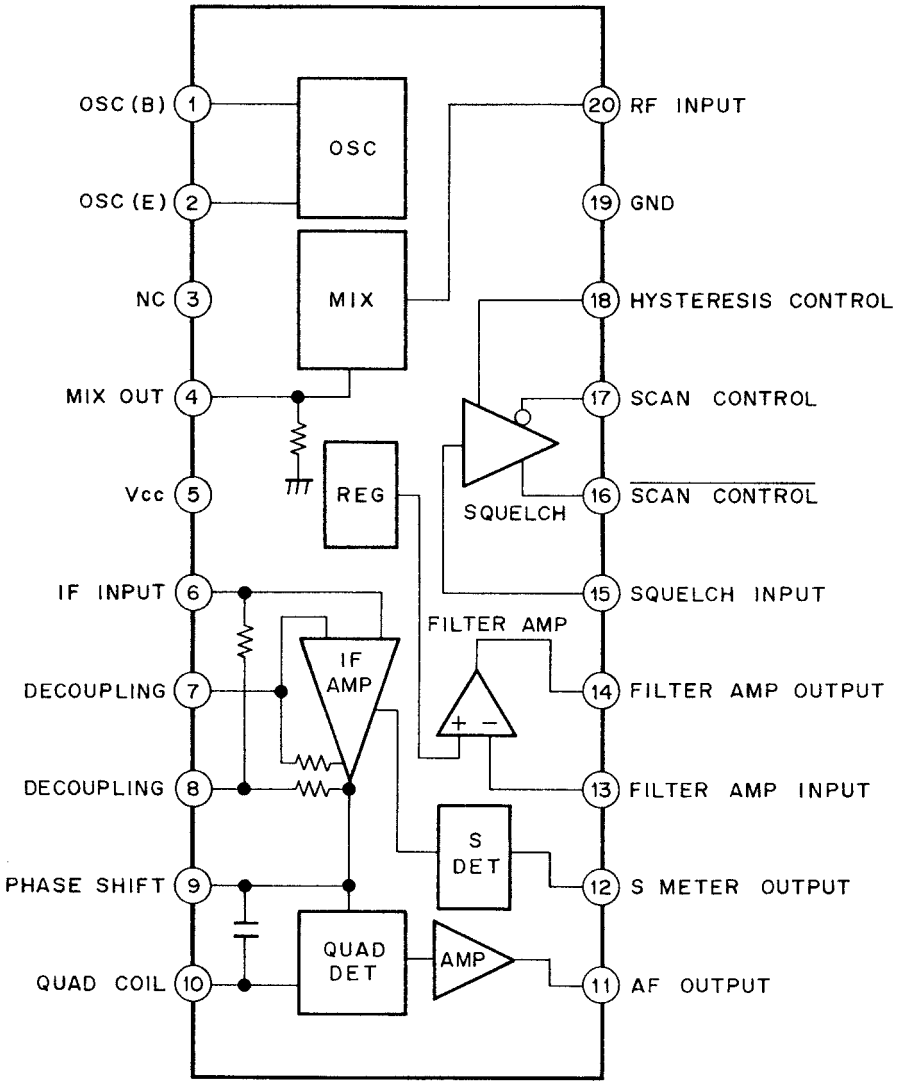
Electrode configuration
1. Output terminal
2. End power supply terminal
3. Base bias power supply terminal
4. First power supply terminal
5. Input terminal
6. Fin (earth)

- Electrical characteristics (Maximum rating)
  M67748LR

Item	Symbol	Tc (°C)	Conditions	Rating	Unit
Power supply voltage	V_{CC}	25	Z1 = 50 Ω	16	V
Bias voltage	V_{bb}	25		6	V
Total current	I_{CC}	25		4	A
Input voltage	P_{in}	25	$V_{CC}1 \leqq 12.5V$, Zg = Z1 = 50 Ω	40	mW
Output power	P_{out}	25	$V_{CC}1 \leqq 12.5V$, Zg = Z1 = 50 Ω	10	W
Case temperature during operation	$T_C(_{OP})$			–30 ~ +110	°C
Storage temperature	T_{stg}			–40 ~ +11-0	°C

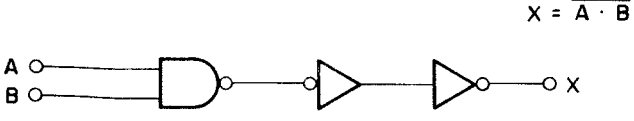
SEMICONDUCTOR DATA

4. FM signal process IC TK10486MT1 (TX-RX unit: IC205)

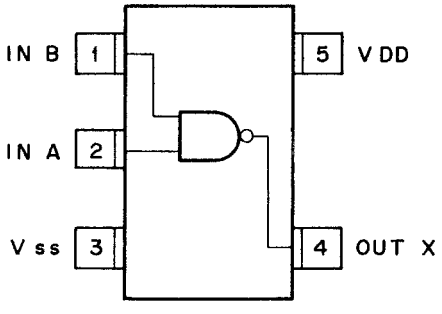


5. Unlock detection IC TC4S11F (TX-RX unit: IC3)

- Logic diagram

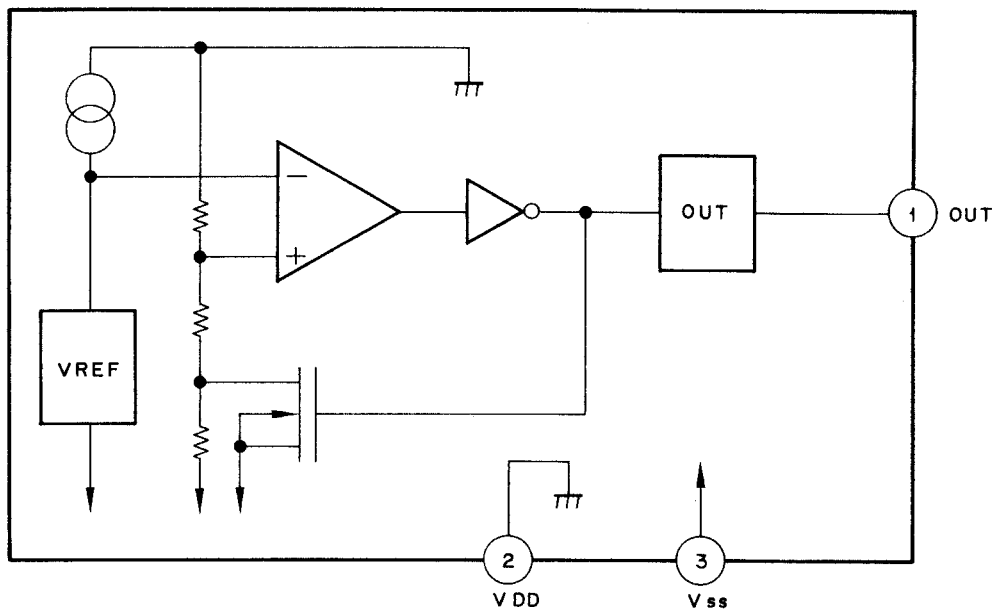


- Terminal connection diagram

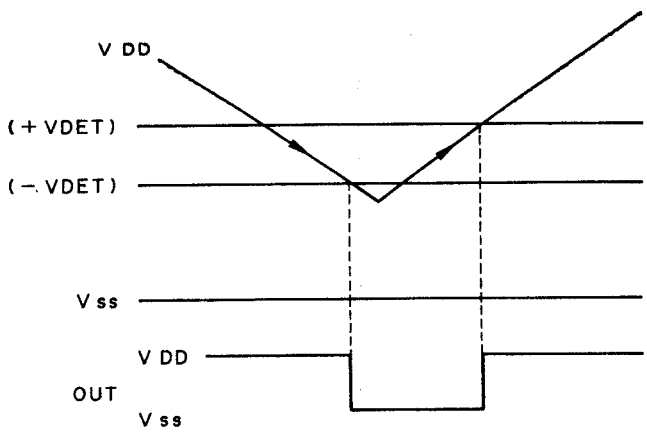


6. Back-up detection IC S-8054ALB (Control ASSY: IC4)

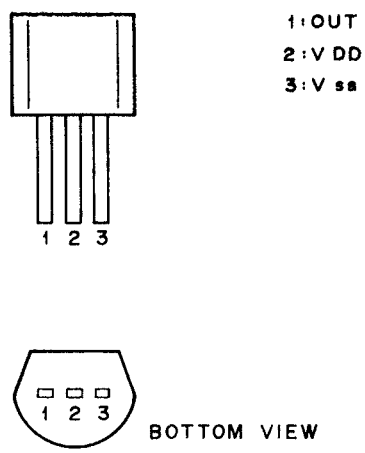
- Block diagram



- Timing chart

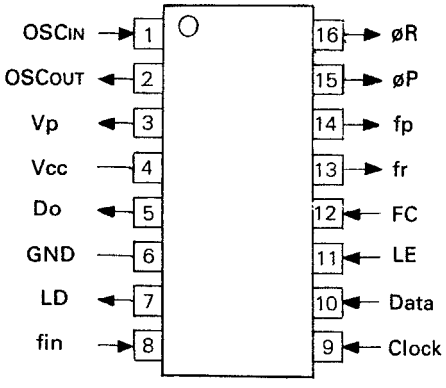


- Pin layout

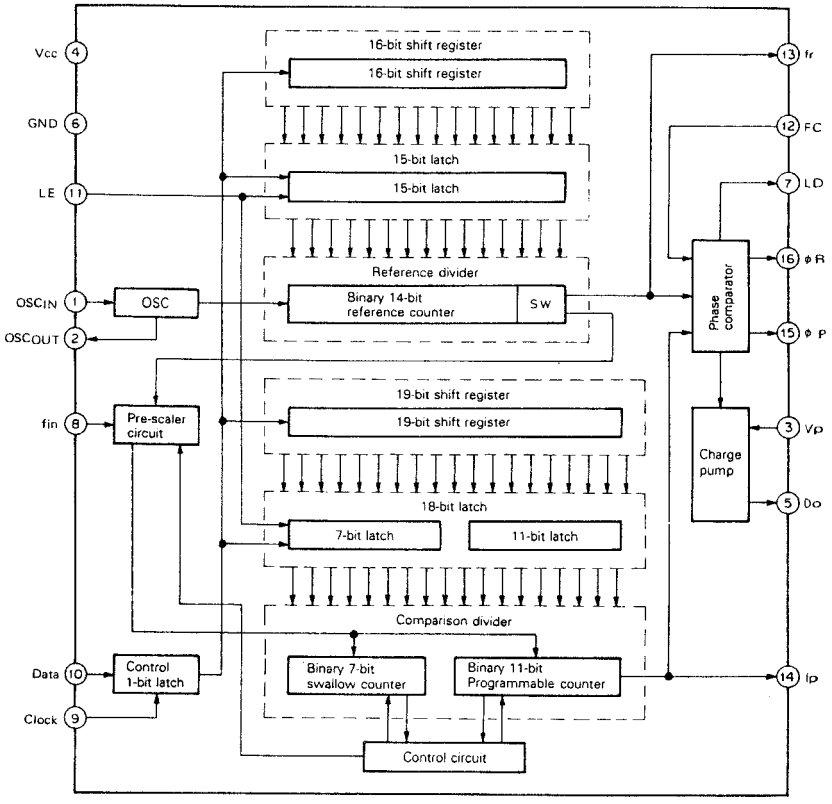


7. PLL IC MB1504 (TX-RX unit: IC1)

- Terminal connection diagram



- Block diagram



- Explanation of terminals

Pin No.	Name	I/O	Function
1	OSCIN	I	Terminal for crystal connection.
2	OSCOUT	O	(OSCIN = Oscillator circuit input terminal, OSCOUT = Oscillator circuit output terminal)
3	VP	O	Power supply terminal for charge pump output.
4	Vcc	–	Power supply terminal.
5	Do	O	Charge pump output terminal. Phase characteristics are inverted according to the setting of the FC terminal.
6	GND	–	Ground terminal.
7	LD	O	Phase detector output terminal. Normally high. Low for the period of about the phase difference between fr and fp.
8	fin	I	Prescaler input terminal. Input with AC coupling.
9	Clock	I	Clock input input terminal for 19-bit and 16-bit shift register. Read data during rise of clock pulse.
10	Data	I	Serial data input terminal in binary code. When high, send data to 15-bit latch. When low, send data to 18-bit latch.
11	LE	I	Load enable signal input terminal. When high, send contents of shift register to latch (includes pull up resistor).
12	FC	I	Phase switch terminal of phase detector. When low, the charge pump and phase detector characteristics invert (includes pull up resistor).
13	fr	O	Monitor terminal of phase detector input. Output equivalent to reference divider.
14	fp	O	Monitor terminal of phase detector input. Output equivalent to programmable divider.
15	øP	O	Phase detector output terminal for external charge pump.
16	øR	O	Phase characteristics are inverted according to the setting of the FC terminal.

8. Shift resister MB88307FP (TX-RX unit: IC203)

- Input timing

Item	Symbol	Terminal	Condition	Rating		Unit
				Main	Max	
Reset signal pulse width	t_{w1}	$\overline{\text{Reset}}$	Fig. 1	100	—	ns
Load signal pulse width	t_{wz}	LOAD	Fig. 1	200	—	ns
Shift clock frequency	f_C	sc	Fig. 2	—	2	MHx
Shift clock sycle time	t_{cyc}	sc	Fig. 2	0.5	—	µs
Shift clock pulse width	P_{WCH} P_{WCL}	sc	Fig. 2	200	—	ns
Shift clock rise time, fall time	t_{cr} t_{cf}	sc	Fig. 2	10	100	ns
Data input setup time	t_{su}	si	Fig. 2	100	—	ns
Data input hold time	t_H	si	Fig. 2	50	—	ns

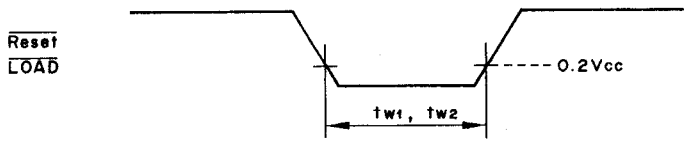


Fig. 1

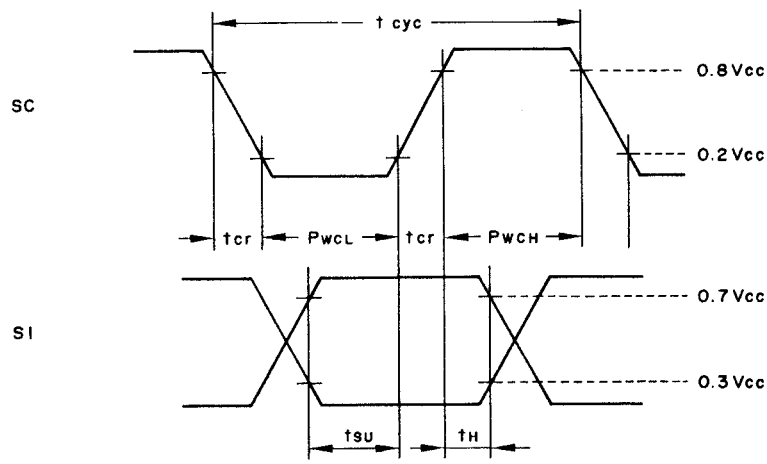


Fig. 2

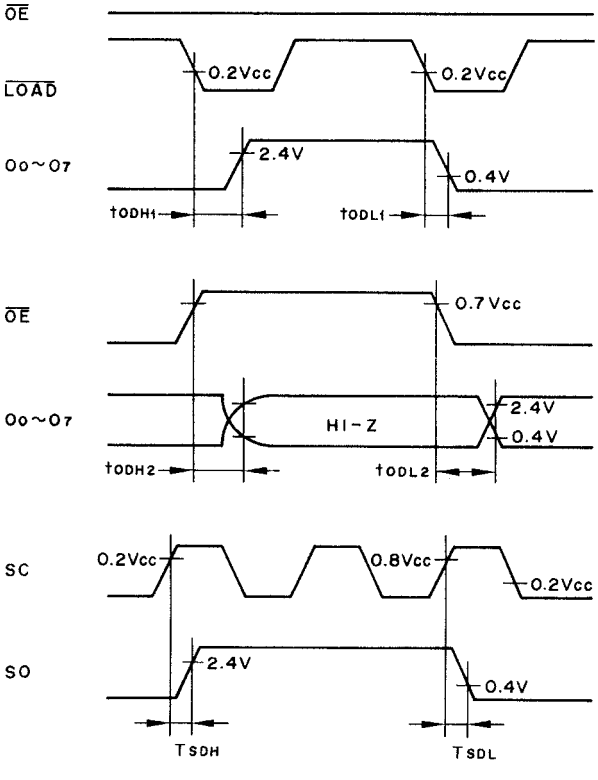
SEMICONDUCTOR DATA

- **Output timing**

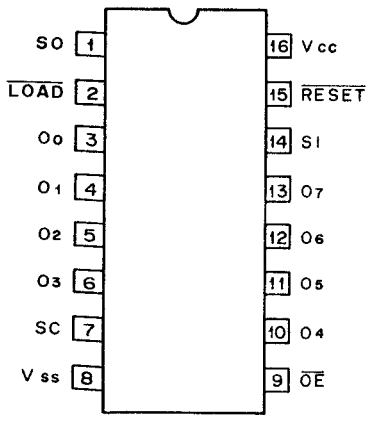
(T_a = –40 ~ +85°C, V_{CC} = 5.0V ±10%, V_{SS} = 0V)

Item	Symbol	Terminal	Rating		Unit
			Min	Max	
0 port delay time	t_{ODH1}	0_0 ~ 0_7	—	500	ns
	t_{ODL1}		—	200	ns
	t_{ODH2}		—	500	ns
	t_{ODL2}		—	500	ns
Serial port dely time	t_{SDH}	SO	—	500	ns
	t_{SDL}		—	200	ns

Load : 50pF + 1.2k Ω



- **Terminal layout (Top view)**



DESCRIPTION OF COMPONENTS

1. Control Ass'y (W09-****-*5)

Element Number	Aplication/Operation	Operation/Condition/Interchangeability
IC2	LCD Driver	
IC3	MPU	See semiconductor DATA
IC4	Voltage Detecter	MPU Back up : 5M Voltage become 4.0 ~ 4.3 V or less
		Sub tone signal D/A converter
IC5	D/A Converter	5M
IC7	AVR	ON when LAMP SW is pressed
Q1	LED Switching	ON when LAMP SW is pressed
Q2	LED Switching	See circuit description Fig. 11
Q3	MPU Reset	ON when LAMP SW is pressed
D1	LCD Light Up	ON when TX
D3	ON AIR Display	
D4 - D6	Reverse Power Prevention	
D8	Reverse Power Prevention	

2. TX-RX unit (X57-3510-00)

Element Number	Application/Operation	Operation/Condition/Intergeability
IC1	PLL	See semiconductor DATA
IC3	UNLOCK detection	"H" when UNLOCK
IC201 (1/2)	Mic AMP	Limiter AMP
IC201 (2/2)	Mic AMP	Active LPF
IC203	Shift register	See circuit description
IC204	AF AMP	3 Input 5 Output
IC205	FM IC	See semiconductor DATA
IC206	Comparator	APC voltage control
IC207	4.5 [V] AVR	4M
Q1	VCO	
Q2	VCO Buff. AMP	
Q3	RF AMP	TX AMP
Q4	Lipple filter	
Q5	RF AMP	
Q6	RF AMP	VCO AMP for RX
Q8	RF AMP	TX Pri-drive AMP
Q9	RF AMP	TX drive AMP
Q10, Q17	E-Low switching	See circuit description
Q11	Diode switching	TX : ON, RX : OFF, E-LOW : OFF
Q12 ~ Q17	E-Low switching	See circuit description
Q21	1st IF AMP	1st IF : 16.9 MHZ
Q22	1st MIX	From 2m BAND to 16.9 MHZ

DESCRIPTION OF COMPONENTS

Element Number	Application/Operation	Operation/Condition/Intergeability
Q23, Q25	RF AMP	2m BAND
Q24	DC Buff. AMP	Fpr varo-cap. tune voltage
Q201	Constant current	
Q207	14R switching	RX : ON
Q208, Q209	AVR	For IC204 (AFA)
Q210	AF mute	See circuit description
Q211	HPF	
Q212	Noise AMP	SQ 1 noise AMP
Q213	AF AMP	For CTCSS, DTSS
Q214	TX power switching	Low power : ON
Q215	TX power switching	E-Low : OFF
Q216	AVR	4M
Q217	5T switching	YC : ON
Q218, Q219	AVR	5T
Q220	4C switching	See circuit description
Q221	4C, 4R switching	See circuit description
Q222	TX power switchings	TX : ON
D1	VCO voltage control	
D2	Modulation	
D3	Frequency shift	TX : ON
D4	Temperature compensation	Drive AMP Q9
D5	ATT	
D6	VCO voltage control	
D7	TX-RX switching	
D8, D9	Vari-cap. tuning	
D11	Vari-cap. tuning	
D12	Surge voltage absorption	
D13	RF Switching	RX : ON
D14	Charge pump	PLL LPF
D15	Vari-cap tuning	
D16 ~ D21	Reverse current prevention	See circuit description
D22	Quick charge	
D23	Waveform shaping	
D24	Level shift	
D201	Reverse voltage protection	
D205	Reverse current prevention	
D206	Reference voltage	8.2V
D207	SQ. noise detection	
D208	Reference voltage	3.9V
D209	Voltage shift	

TH-26A/AT/E

⁎ New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Telle 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	Destination 仕向	Remarks 備考
TH-26A/AT/E						
		*	A02-0941-04	PLASTIC CABINET	TE	
0	3A, 3B	*	A01-1096-04	REAR CASE		
1	1B	*	A02-0939-04	PLASTIC CABINET	KP	
1	1B	*	A02-0940-04	PLASTIC CABINET	M1M2M3	
1	1B	*	A02-0940-04	PLASTIC CABINET	M4X	
2	2B	*	A20-7048-04	SW COVER	KM1M2	
2	2B	*	A20-7048-04	SW COVER	M3M4XP	
2	2B	*	A20-7049-04	SW COVER	TE	
3	2A	*	A20-7065-04	PANEL ASSY		
4	1B	*	A21-1535-04	DRESSING PANEL	M1M2M3	
4	1B	*	A21-1535-04	DRESSING PANEL	M4TEX	
5	2B		A40-0621-04	BOTTOM PLATE		
		*	B40-7625-04	MODEL NAME PLATE	KP	
		*	B40-7626-04	MODEL NAME PLATE	M1M2M3	
		*	B40-7626-04	MODEL NAME PLATE	M4	
		*	B40-7627-04	MODEL NAME PLATE	X	
		*	B40-7628-04	MODEL NAME PLATE	TE	
		*	B42-3391-04	OPERATION CARD		
			B42-3394-04	LABEL (FCC NO.SHIEL)	K	
6	2A	*	B09-0318-03	CAP		
7	1A	*	B09-0319-04	CAP		
9			B46-0410-20	WARRANTY CARD	K	
9			B46-0419-00	WARRANTY CARD	E	
9			B46-0422-00	WARRANTY CARD	P	
10		*	B50-8339-00	INSTRUCTION MANUAL		
-			B09-0312-04	CAP (PB-10)	KM3M4T	
-			B09-0312-04	CAP (PB-10)	EXP	
C1			CC45SL1H470J	CERAMIC 47PF J		
13	3A		E04-0168-15	BNC RECEPTACLE		
14	2B		E23-0605-14	TERMINAL		
15	2B	*	E23-0638-04	TERMINAL		
16	3A	*	E23-0640-04	MOUNTING HARD WARE		
17	3A	*	E31-6126-05	FLAT CABLE		
58			E19-0254-05	AC PLUG (ACCY)	M3M4	
			F20-0587-04	INSULATING BOARD		
18		*	F07-0896-13	COVER		
19	2A	*	F10-1423-04	SHIELDING PLATE		
20	1B		F19-0650-04	BLIND PLATE		
21	3B		F20-0595-04	INSULATING SHEET		
22	3A		F29-0435-05	INSULATOR		
23	2B		G13-0852-04	CUTTION		
24			H11-0808-14	PACKING FIXTURE	KTX	
24			H13-0823-04	PACKING FIXTURE	M1M2M3	
24			H13-0823-04	PACKING FIXTURE	M4EP	
25			H13-0818-04	BUFFER		
26			H13-0841-04	BUFFER	KM1M2T	
26			H13-0841-04	BUFFER	EXP	
27		*	H01-9626-04	ITEM CARTON BOX	KP	
27		*	H01-9627-04	ITEM CARTON BOX	M1M2M3	
27		*	H01-9627-04	ITEM CARTON BOX	M4	

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

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27		*	H01-9628-04	ITEM CARTON BOX	X	
27		*	H01-9629-04	ITEM CARTON BOX	TE	
28		*	H10-2688-02	POLYSTYRENE FOAMED FIXTURE		
29			H25-0077-03	PROTECTION BAG	M1M2	
30			H25-0085-04	PROTECTION BAG		
59		*	H11-0840-04	BUFFER	M3M4	
31	2B		J19-1426-03	HOLDER		
32	1B	*	J21-4289-03	MOUNTING HARDWARE		
33	3B	*	J21-4290-04	MOUNTING HARDWARE		
34	1A	*	J21-4291-04	MOUNTING HARDWARE		
35	1B	*	J21-4292-04	MOUNTING HARDWARE		
36			J29-0424-04	BELT HOOK		
37	2B		J39-0434-04	SPACER		
38			J69-0312-04	HAND STRAP		
39	2A	*	J69-0321-05	O RING		
40	3A	*	J69-0322-04	O RING		
41	2A	*	K29-4547-04	KNOB ASSY (AF VOL)		
42	2A	*	K29-4548-04	KNOB ASSY (SQ)		
43	2A	*	K29-4549-04	KNOB ASSY (ENCODER)		
44	2B	*	K29-4550-04	KNOB ASSY (H/L)		
45	1B	*	K29-4551-04	KNOB ASSY (F LOCK)		
46	2B	*	K29-4552-03	KNOB ASSY (PTT)		
47	2A	*	K29-4553-04	KEY TOP		
48	2A	*	K29-4554-04	KEY TOP		
49	2B	*	K29-4564-04	KNOB (RELEASE)		
A			N09-2025-05	SCREW		
B			N09-2028-05	SCREW		
C			N09-2064-05	SCREW		
D		*	N09-2086-05	SCREW		
E		*	N09-2087-05	SCREW		
F		*	N14-0545-04	NUT		
G			N35-2003-41	BINDING HEAD MACHINE SCREW		
H			N35-2003-45	BINDING HEAD MACHINE SCREW		
I			N35-2605-41	BINDING HEAD MACHINE SCREW		
50	2A		R23-9403-05	TRIM POT. 50K/10K		
51		*	T90-0407-05	ANTENNA		
52	2B		T91-0381-05	MICROPHONE		
SP1	1A		T07-0257-05	LOUDSPEAKER(FULLRANGE)		
IC1		*	M67748LR	IC(POWER MODULE)		
			W03-2015-05	KEY BOARD ASSY (DTMF)	KP	
			W09-0394-05	LITHIUM BATTERY		
			W09-0534-05	BATTERY CHARGER (120/230V)	M3M4	
53		*	W02-1601-05	ENCODER		
54	2A, 2B	*	W02-1603-05	CONTROL UNIT	KP	
54	2A, 2B	*	W02-1604-05	CONTROL UNIT	M1M3X	
54	2A, 2B	*	W02-1605-05	CONTROL UNIT	M2M4	
54	2A, 2B	*	W02-1606-05	CONTROL UNIT	TE	
54	2A, 2B	*	W02-1607-05	CONTROL UNIT	E	
60		*	W09-0535-05	BATTERY PACK (PB-10)	KM3M4T	
60		*	W09-0535-05	BATTERY PACK (PB-10)	EXP	
61			W09-0315-25	BATTERY CHARGER (120V)	KP	
61			W09-0317-15	BATTERY CHARGER (220V)	E	

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UE: AAFES(Europe) X: Australia

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DTMF UNIT (X 52-3160-00)
TX-RX UNIT (X 57-3510-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
61			W09-0318-15	BATTERY CHARGER (240V)	T	
61		*	W09-0522-05	BATTERY CHARGER (240V)	X	
		*	X52-3160-00	DTMF UNIT	KP	
55	2A,2B	*	X57-3510-21	TX-RX UNIT		
DTMF UNIT (X 52-3160-00)						
C1			CK73EB1E104K	CHIP C 0.10UF K		
C2		*	CK73FB1E104K	CHIP C 0.10UF K		
C3			CK73EB1E104K	CHIP C 0.10UF K		
C4			CK73GB1H471K	CHIP C 470PF K		
C5 ,6			CC73GCH1H300J	CHIP C 30PF J		
C7			CK73GB1H103K	CHIP C 0.01UF K		
C8			CC73GCH1H101J	CHIP C 100PF J		
C9		*	CK73FB1E104K	CHIP C 0.10UF K		
CN1		*	E40-5342-05	PIN CONNECTOR		
X1		*	L78-0061-05	RESONATOR		
R1 ,2			RK73GB1J104J	CHIP R 100K J 1/16W		
R3			RK73GB1J334J	CHIP R 330K J 1/16W		
R4			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R5			RK73GB1J223J	CHIP R 22K J 1/16W		
R6			RK73GB1J103J	CHIP R 10K J 1/16W		
VR1		*	R12-6527-05	TRIM POT. 68K		
IC1		*	MT8880AP	IC		
TX-RX UNIT (X 57-3510-21)						
C2			CC73G1H010C	CHIP C 1PF C		
C3 ,4			CK73GB1H103K	CHIP C 0.01UF K		
C5			CC73GCH1H050C	CHIP C 5PF C		
C6			CC73GCH1H030C	CHIP C 3PF C		
C7			CK73GB1H103K	CHIP C 0.01UF K		
C8			CC73GCH1H0R5C	CHIP C 0.5PF C		
C9			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C10			CK73GB1H102K	CHIP C 1000PF K		
C11			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C12			CK73GB1H103K	CHIP C 0.01UF K		
C13			CC73GCH1H100D	CHIP C 10PF D		
C14			CK73GB1H102K	CHIP C 1000PF K		
C15 ,16			CK73GB1H103K	CHIP C 0.01UF K		
C17		*	C92-0501-05	CHIP TAN 1.5UF 6.3WV		
C18			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C19		*	CK73GB1H392K	CHIP C 3900PF K		
C20 ,21			CK73GB1H103K	CHIP C 0.01UF K		
C22		*	CK73FB1E104K	CHIP C 0.10UF K		
C23			CK73GB1H103K	CHIP C 0.01UF K		
C24			CC73GCH1H180J	CHIP C 18PF J		
C25			CC73GCH1H560J	CHIP C 56PF J		
C26 -28			CK73GB1H102K	CHIP C 1000PF K		
C29 ,30			CC73GCH1H100D	CHIP C 10PF D		
C31			CK73GB1H102K	CHIP C 1000PF K		
C32			CK73GB1H103K	CHIP C 0.01UF K		
C33			CC73GCH1H100D	CHIP C 10PF D		
C34 ,35			CK73GB1H102K	CHIP C 1000PF K		
C36			CC73GCH1H220J	CHIP C 220PF J		

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TX-RX UNIT (X 57-3510-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C37			CK73GB1H102K	CHIP C 1000PF K		
C38			CK73GB1H103K	CHIP C 0.01UF K		
C39 ,40			CK73GB1H102K	CHIP C 1000PF K		
C41			CC73GCH1H080D	CHIP C 8PF D		
C42 -44			CK73GB1H102K	CHIP C 1000PF K		
C45		*	C92-0038-05	ELECTRO 22UF 16WV		
C46			CK73GB1H102K	CHIP C 1000PF K		
C47		*	C92-0045-05	ELECTRO 22UF 6.3WV		
C48			CK73GB1H102K	CHIP C 1000PF K		
C49		*	CK73FB1E104K	CHIP C 0.10UF K		
C50		*	C92-0040-05	ELECTRO 47UF 16WV		
C51 ,52			CK73GB1H102K	CHIP C 1000PF K		
C55			CC73GCH1H070D	CHIP C 7PF D		
C56			CC73GCH1H080D	CHIP C 8PF D		
C57			CC73GCH1H470J	CHIP C 47F J		
C58 ,59			CC73GCH1H120J	CHIP C 12PF J		
C60			CC73GCH1H180J	CHIP C 18PF J		
C61			CC73GCH1H120J	CHIP C 12PF J		
C62			CC73GCH1H150J	CHIP C 15PF J		
C63			CC73GCH1H070D	CHIP C 7PF D		
C64			CC73GCH1H120J	CHIP C 12PF J		
C65 -66			CK73GB1H102K	CHIP C 1000PF K		
C69			CK73GB1H102K	CHIP C 1000PF K		
C74			CK73GB1H102K	CHIP C 1000PF K		
C80			CK73GB1H102K	CHIP C 1000PF K		
C81			CK73GB1H103K	CHIP C 0.01UF K		
C82			CK73FB1H223K	CHIP C 0.022UF K		
C83			CC73GCH1H101J	CHIP C 100PF J		
C84			CC73GCH1H080D	CHIP C 8PF D		
C85			CC73GCH1H390J	CHIP C 39PF J		
C86			CK73FB1H223K	CHIP C 0.022UF K		
C87			CC73GCH1H030C	CHIP C 3PF C		
C88			CK73GB1H102K	CHIP C 1000PF K		
C89			CK73GB1H103K	CHIP C 0.01UF K		
C90		*	CC73GCH1H680J	CHIP C 68PF J		
C91			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C92			CC73GCH1HR75C	CHIP C 0.75PF C		
C93		*	CC73GCH1H680J	CHIP C 68PF J		
C94			CC73GCH1H030C	CHIP C 3PF C		
C95			CC73GCH1HR75C	CHIP C 0.75PF C		
C96		*	CC73GCH1H680J	CHIP C 68PF J		
C97			CK73GB1H103K	CHIP C 0.01UF K		
C98			CK73GB1H102K	CHIP C 1000PF K		
C99			CC73GCH1H101J	CHIP C 100PF J		
C100			CK73GB1H102K	CHIP C 1000PF K		
C101,102			CC73GCH1H101J	CHIP C 100PF J		
C103-105			CK73GB1H102K	CHIP C 1000PF K		
C107			CK73GB1H103K	CHIP C 0.01UF K		
C108			CK73GB1H102K	CHIP C 1000PF K		
C109			CC73GCH1H101J	CHIP C 100PF J		
C110			CC73GCH1H270J	CHIP C 27PF J		
C111			CK73GB1H102K	CHIP C 1000PF K		
C115			CK73GB1H102K	CHIP C 1000PF K		
C201-208			CK73GB1H102K	CHIP C 1000PF K		
C209			CK73GB1H102K	CHIP C 1000PF K		

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TX-RX UNIT (X 57-3510-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格			Destination 仕向	Remarks 備考
C210			CK73FF1E154Z	CHIP C	0.15UF	Z		
C211			CK73GB1H102K	CHIP C	1000PF	K		
C212			CE04NW1C101M	ELECTRO	100UF	16WV		
C213			C92-0507-05	CHIP-TAN	4.7UF	6.3WV		
C214			CK73GB1H102K	CHIP C	1000PF	K		
C215		*	C92-0518-05	CHIP-TAN	0.22UF	8WV		
C216			CK73FB1H223K	CHIP C	0.022UF	K		
C217			CK73GB1H102K	CHIP C	1000PF	K		
C218			C92-0507-05	CHIP-TAN	4.7UF	6.3WV		
C219			CK73GB1H103K	CHIP C	0.01UF	K		
C220		*	C92-0517-05	CHIP-TAN	2.2UF	4WV		
C221			CK73GB1H102K	CHIP C	1000PF	K		
C222			CK73GB1H103K	CHIP C	0.01UF	K		
C223			CC73GCH1H151J	CHIP C	150PF	J		
C224			CK73GB1H182K	CHIP C	1800PF	K		
C225			CK73GB1H103K	CHIP C	0.01UF	K		
C226			C92-0507-05	CHIP-TAN	4.7UF	6.3WV		
C227			CK73FB1E473K	CHIP C	0.047UF	K		
C228		*	CK73EF1E334Z	CHIP C	0.33UF	Z		
C229			CK73GB1H102K	CHIP C	1000PF	K		
C231			C92-0521-05	CHIP-TAN	0.47UF	20WV		
C237			CK73GB1H102K	CHIP C	1000PF	K		
C238			C92-0004-05	CHIP-TAN	1.0UF	16WV		
C239			CK73GB1H103K	CHIP C	0.01UF	K		
C240			CK73GB1H102K	CHIP C	1000PF	K		
C241		*	C92-0040-05	ELECTRO	47UF	16WV		
C242			C90-2052-05	ELECTRO	68UF	10WV		
C243		*	C92-0047-05	ELECTRO	47UF	6.3WV		
C244			C92-0513-05	CHIP-TAN	3.3UF	6.3WV		
C245		*	CK73FB1E473K	CHIP C	0.047UF	K		
C248			CK73FB1H273K	CHIP C	0.027UF	K		
C249		*	C92-0045-05	ELECTRO	22UF	6.3WV		
C250,251			CK73FB1H223K	CHIP C	0.022UF	K		
C252			C92-0004-05	CHIP-TAN	1.0UF	16WV		
C253			C92-0005-05	CHIP-TAN	2.2UF	6.3WV		
C254			CK73FB1H223K	CHIP C	0.022UF	K		
C255			CK73GB1H102K	CHIP C	1000PF	K		
C256		*	CK73FB1E104K	CHIP C	0.10UF	K		
C257-260			CK73GB1H102K	CHIP C	1000PF	K		
C261			C92-0001-05	CHIP-TAN	0.1UF	35WV		
C262			C92-0005-05	CHIP-TAN	2.2UF	6.3WV		
C263			CC73GCH1H820J	CHIP C	82PF	J		
C265			CC73GCH1H330J	CHIP C	33PF	J		
C266,267		*	CK73FB1E104K	CHIP C	0.10UF	K		
C268			CC73GCH1H820J	CHIP C	82PF	J		
C269		*	CK73FB1E104K	CHIP C	0.10UF	K		
C270			C90-2050-05	ELECTRO	33UF	6.3WV		
C271,272		*	CK73FB1E104K	CHIP C	0.10UF	K		
C273			CK73GB1H102K	CHIP C	1000PF	K		
C275			CC73GCH1H151J	CHIP C	150PF	J		
C276		*	C92-0519-05	CHIP-TAN	1UF	25WV		
C279			CK73GB1H102K	CHIP C	1000PF	K		
C280		*	CK73FB1E473K	CHIP C	0.047UF	K		
C281			CK73GB1H102K	CHIP C	1000PF	K		
C282			CK73GB1H103K	CHIP C	0.01UF	K		

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Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C283-286			CK73GB1H102K	CHIP C 1000PF K		
C287		*	C92-0047-05	ELECTRO 47UF 6.3WV		
C288			CK73GB1H102K	CHIP C 1000PF K		
C289		*	C92-0045-05	ELECTRO 22UF 6.3WV		
C290,291			CK73GB1H102K	CHIP C 1000PF K		
C292		*	CK73FB1E183K	CHIP C 0.018UF K		
C294-298			CK73GB1H102K	CHIP C 1000PF K		
TC1			C05-0371-05	TRIMMING CAP		
TC2			C05-0370-05	TRIMMING CAP		
CN1			E40-5224-05	FLAT CABLE CONNECTOR		
CN2			E40-5179-05	PIN ASSY		
CN201		*	E40-5247-05	FLAT CABLE CONNECTOR		
CN202			E40-5224-05	FLAT CABLE CONNECTOR		
CN203		*	E40-5343-05	CONNECTOR (CTCSS)		
J201		*	E03-0170-05	DC JACK		
J202			E11-0429-05	EXT.MIC JACK		
J203		*	E11-0439-05	EXT.SP JACK		
TP1		*	E23-0342-05	TERMINAL		
TP201		*	E23-0342-05	TERMINAL		
W201		*	E31-6119-15	CONNECTING WIRE		
		*	F10-1428-04	SHIELDING PLATE (LPF)		
		*	F10-1430-03	SHIELDING PLATE (PLL)		
			J30-0545-05	SPACER (XF1)		
CD201			L79-0817-05	CRYSTAL DISC.		
CF201			L72-0362-05	CERAMIC FILTER (455KHZ)		
L1			L40-1092-48	SMALL FIXED INDUCTOR		
L2		*	L34-2369-05	COIL		
L3		*	L34-2367-05	COIL		
L4			L40-2211-48	SMALL FIXED INDUCTOR		
L5			L40-1082-48	SMALL FIXED INDUCTOR		
L6			L40-8272-48	SMALL FIXED INDUCTOR		
L8			L40-8272-48	SMALL FIXED INDUCTOR		
L10 ,11		*	L92-0130-05	CHIP INDUCTOR		
L12			L40-1021-14	SMALL FIXED INDUCTOR		
L13			L40-2292-48	SMALL FIXED INDUCTOR		
L14			L40-1092-48	SMALL FIXED INDUCTOR		
L15			L34-1210-05	COIL		
L16 ,17			L34-0893-05	COIL		
L18			L34-1224-05	COIL		
L19			L34-0893-05	COIL		
L26		*	L34-4224-05	COIL		
L27 -29		*	L34-4233-05	COIL		
L31		*	L34-2365-05	COIL		
L32 ,33			L40-3382-48	SMALL FIXED INDUCTOR		
L34			L40-1092-48	SMALL FIXED INDUCTOR		
L35		*	L92-0130-05	CHIP INDUCTOR		
L36			L40-4772-48	SMALL FIXED INDUCTOR		
L37			L40-2292-19	SMALL FIXED INDUCTOR		
L38		*	L92-0130-05	CHIP INDUCTOR		
L39			L40-1092-48	SMALL FIXED INDUCTOR		
L201		*	L39-0484-05	COIL		
X1			L77-1358-05	CRYSTAL RESONATOR (12.8MHZ)		
X201			L77-1357-05	CRYSTAL RESONATOR (17.355MHZ)		

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XF1			L71-0276-05	MCF (16.9MHZ)		
R1			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R2			RK73GB1J104J	CHIP R 100K J 1/16W		
R3 ,4			RK73GB1J471J	CHIP R 470 J 1/16W		
R5			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R6			RK73GB1J151J	CHIP R 150 J 1/16W		
R7			RK73GB1J221J	CHIP R 220 J 1/16W		
R8			R92-1252-05	CHIP R 0 ΩHM		
R9			RK73GB1J104J	CHIP R 100K J 1/16W		
R10			RK73GB1J101J	CHIP R 100 J 1/16W		
R11			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R12 ,13			RK73GB1J101J	CHIP R 100 J 1/16W		
R14			RK73GB1J104J	CHIP R 100K J 1/16W		
R15			RK73GB1J221J	CHIP R 220 J 1/16W		
R16			RK73GB1J101J	CHIP R 100 J 1/16W		
R17			RK73GB1J331J	CHIP R 330 J 1/16W		
R18			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R19			RK73GB1J221J	CHIP R 220 J 1/16W		
R20			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R21 -23			RK73GB1J103J	CHIP R 10K J 1/16W		
R24			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R25			RK73GB1J101J	CHIP R 100 J 1/16W		
R27		*	RK73GB1J330J	CHIP R 33 J 1/16W		
R28			RK73GB1J681J	CHIP R 680 J 1/16W		
R29			RK73GB1J104J	CHIP R 100K J 1/16W		
R30			RK73GB1J101J	CHIP R 100 J 1/16W		
R32			R92-1252-05	CHIP R 0 ΩHM		
R33			RK73GB1J104J	CHIP R 100K J 1/16W		
R35			RK73GB1J101J	CHIP R 100 J 1/16W		
R37			RK73GB1J682J	CHIP R 6.8K J 1/16W		
R38			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R39			RK73GB1J101J	CHIP R 100 J 1/16W		
R40			RK73GB1J220J	CHIP R 22 J 1/16W		
R41			RK73GB1J331J	CHIP R 330 J 1/16W		
R42			RK73GB1J681J	CHIP R 680 J 1/16W		
R43			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R44			RK73GB1J270J	CHIP R 27 J 1/16W		
R45			RK73GB1J561J	CHIP R 560 J 1/16W		
R46 -49			RK73GB1J271J	CHIP R 270 J 1/16W		
R50			RK73GB1J104J	CHIP R 100K J 1/16W		
R51			R92-1252-05	CHIP R 0 ΩHM		
R58			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R59		*	RK73FB2A220J	CHIP R 22 J 1/10W		
R60			R92-1252-05	CHIP R 0 ΩHM		
R61			RK73GB1J334J	CHIP R 330K J 1/16W		
R62			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R63			RK73GB1J471J	CHIP R 470 J 1/16W		
R64		*	RK73FB2A220J	CHIP R 22 J 1/10W		
R65 ,66			RK73GB1J470J	CHIP R 47 J 1/16W		
R67			RK73GB1J561J	CHIP R 560 J 1/16W		
R68 -70			RK73GB1J104J	CHIP R 100K J 1/16W		
R71			R92-0670-05	CHIP R 0 ΩHM		
R72			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R73			RK73GB1J100J	CHIP R 10 J 1/16W		

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R74 ,75			RK73GB1J103J	CHIP R 10K J 1/16W		
R76		*	RK73GB1J5R6J	CHIP R 5.6 J 1/16W		
R77 ,78			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R79			R92-1252-05	CHIP R 0 ΩHM		
R80			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R81			RK73GB1J473J	CHIP R 47K J 1/16W		
R82			RK73GB1J681J	CHIP R 680 J 1/16W		
R83			RK73GB1J391J	CHIP R 390 J 1/16W		
R84 ,85			R92-0670-05	CHIP R 0 ΩHM		
R86			R92-1252-05	CHIP R 0 ΩHM		
R87			R92-0670-05	CHIP R 0 ΩHM		
R88			RK73GB1J103J	CHIP R 10K J 1/16W		
R89			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R90			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R101			RK73GB1J104J	CHIP R 100K J 1/16W		
R103			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R201,202			RK73GB1J101J	CHIP R 100 J 1/16W		
R203			RK73GB1J823J	CHIP R 82K J 1/16W		
R204			RK73GB1J473J	CHIP R 47K J 1/16W		
R205			RK73GB1J100J	CHIP R 10 J 1/16W		
R206			RK73GB1J471J	CHIP R 470 J 1/16W		
R207			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R208			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R209			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R210			RK73GB1J224J	CHIP R 220K J 1/16W		
R211			RK73GB1J103J	CHIP R 10K J 1/16W		
R212			RK73GB1J223J	CHIP R 22K J 1/16W		
R213			RK73GB1J273J	CHIP R 27K J 1/16W		
R214			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R215			RK73GB1J391J	CHIP R 390 J 1/16W		
R216			RK73GB1J154J	CHIP R 150K J 1/16W		
R217,218			RK73GB1J104J	CHIP R 100K J 1/16W		
R219			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R220			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R221			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R222			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R223			RK73GB1J563J	CHIP R 56K J 1/16W		
R224			RK73GB1J153J	CHIP R 15K J 1/16W		
R225			RK73GB1J223J	CHIP R 22K J 1/16W		
R226			R92-1252-05	CHIP R 0 ΩHM		
R227			RK73GB1J224J	CHIP R 220K J 1/16W		
R232			RK73GB1J153J	CHIP R 15K J 1/16W		
R234			RK73GB1J151J	CHIP R 150 J 1/16W		
R235			RK73GB1J103J	CHIP R 10K J 1/16W		
R236			RK73GB1J100J	CHIP R 10 J 1/16W		
R237-239			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R240			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R241			RK73GB1J104J	CHIP R 100K J 1/16W		
R242			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R243			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R244			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R245			RK73GB1J101J	CHIP R 100 J 1/16W		
R246			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R247			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R248			RK73GB1J274J	CHIP R 270K J 1/16W		

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TH-26A/AT/E

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TX-RX UNIT (X 57-3510-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R249			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R250			RK73GB1J681J	CHIP R 680 J 1/16W		
R251			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R252			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R253			RK73GB1J681J	CHIP R 680 J 1/16W		
R254,255			RK73GB1J473J	CHIP R 47K J 1/16W		
R256			R92-1252-05	CHIP R 0 OHM		
R257			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R258			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R259			RK73GB1J103J	CHIP R 10K J 1/16W		
R260			RK73GB1J223J	CHIP R 22K J 1/16W		
R261			RK73GB1J101J	CHIP R 100 J 1/16W		
R262			RK73GB1J563J	CHIP R 56K J 1/16W		
R263			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R265			RK73GB1J474J	CHIP R 470K J 1/16W		
R266			RK73GB1J471J	CHIP R 470 J 1/16W		
R268,269		*	R92-1257-05	RESISTOR 0.47 1/2W		
R273			R92-1252-05	CHIP R 0 OHM		
R274			R92-0679-05	CHIP R 0 OHM		
R276			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R277			RK73GB1J221J	CHIP R 220 J 1/16W		
R278			RK73GB1J331J	CHIP R 330 J 1/16W		
R279			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R280			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R281			RK73GB1J331J	CHIP R 330 J 1/16W		
R282			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R283			RK73GB1J104J	CHIP R 100K J 1/16W		
R284			RK73GB1J123J	CHIP R 12K J 1/16W		
R286			R92-0679-05	CHIP R 0 OHM		
R288			R92-0679-05	CHIP R 0 OHM		
R289-293			R92-1252-05	CHIP R 0 OHM		
R295-297			R92-0679-05	CHIP R 0 OHM		
R298-300			R92-1252-05	CHIP R 0 OHM		
R301,302			R92-0679-05	CHIP R 0 OHM		
TH202			R92-0680-05	THERMISTOR 7.5K		
VR201		*	R12-6532-05	TRIM POT. 470K		
VR202		*	R12-6527-05	TRIM POT. 68K		
VR203			R12-6497-05	TRIM POT. 10K		
VR204			R12-6495-05	TRIM POT. 4.7K		
VR205		*	R12-6491-05	TRIM POT. 1K		
D1		*	MA333	DIODE		
D2		*	1SV214	DIODE		
D3			MA77	DIODE		
D4			DA204U	DIODE		
D5			1SV172	DIODE		
D6			1T33C	DIODE		
D7			MI808	DIODE		
D8 ,9		*	MA333	DIODE		
D11		*	MA333	DIODE		
D12			HSM88AS	DIODE		
D13			1SS312	DIODE		
D14			HSM88AS	DIODE		
D15		*	MA333	DIODE		
D16 -18			1SS312	DIODE		
D19 -22			DA204U	DIODE		

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TX-RX UNIT (X 57-3510-21)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
D23			DAN202U	DIODE		
D24			DA204U	DIODE		
D201		*	EA61FC1F	DIODE		
D205			DAN202U	DIODE		
D206			02CZ8.2Y	ZENER DIODE		
D207			HSM88AS	DIODE		
D208			02CZ3.9Y,Z	ZENER DIODE		
D209			DAN202U	DIODE		
IC1			MB1504	IC(PLL FREQ SYNTHESIZER)		
IC3		*	TC4S11F	IC		
IC201			NJM4560M	IC(OP AMP X2)		
IC203		*	MB88307FP	IC		
IC204		*	NJM386BD	IC		
IC205			TK10486M	IC(FM IF)		
IC206			LM301AD	IC(OP AMP)		
IC207		*	M5236(ML)	IC(IC)		
Q1			2SK238(K17)	FET		
Q2			2SC4215(Y)	TRANSISTOR		
Q3			2SC4083	TRANSISTOR		
Q4		*	2SC4117(BL)	TRANSISTOR		
Q5			2SC4083	TRANSISTOR		
Q6			2SC4215(Y)	TRANSISTOR		
Q8			2SC4215(Y)	TRANSISTOR		
Q9			2SC4093	TRANSISTOR		
Q10		*	DTC124EU	DIGITAL TRANSISTOR		
Q11			DTC114EU	DIGITAL TRANSISTOR		
Q12			DTA144EU	DIGITAL TRANSISTOR		
Q13			DTC114EU	DIGITAL TRANSISTOR		
Q14		*	DTA114EU	DIGITAL TRANSISTOR		
Q15		*	DTB113ZK	DIGITAL TRANSISTOR		
Q16		*	DTC124EU	DIGITAL TRANSISTOR		
Q17		*	DTA114EU	DIGITAL TRANSISTOR		
Q21			2SC4215(Y)	TRANSISTOR		
Q22			2SK882(Y)	FET		
Q23			2SC3937	TRANSISTOR		
Q24			2SK882(Y)	FET		
Q25			2SC4215(Y)	TRANSISTOR		
Q201		*	2SK879(GR)	FET		
Q201		*	2SK879(Y)	FET		
Q206		*	FMA5	DIGITAL TRANSISTOR		
Q207		*	DTA114EU	DIGITAL TRANSISTOR		
Q208		*	2SB798(DK)	TRANSISTOR		
Q208		*	2SB798(DL)	TRANSISTOR		
Q209		*	2SC4116(BL)	TRANSISTOR		
Q209		*	2SC4116(GR)	TRANSISTOR		
Q210			DTC144EU	DIGITAL TRANSISTOR		
Q211,212		*	2SC4116(BL)	TRANSISTOR		
Q211,212		*	2SC4116(GR)	TRANSISTOR		
Q213			FMU1	DIGITAL TRANSISTOR		
Q214		*	2SA1586(GR)	TRANSISTOR		
Q214		*	2SA1586(Y)	TRANSISTOR		
Q215			DTC114EU	DIGITAL TRANSISTOR		
Q216		*	2SB798(DK)	TRANSISTOR		
Q216		*	2SB798(DL)	TRANSISTOR		
Q217		*	DTA143ZU	DIGITAL TRANSISTOR		

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TX-RX UNIT (X 57-3510-21)
CONTROL UNIT (W 02-160X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
Q218		*	DTC114TU	DIGITAL TRANSISTOR		
Q219		*	2SB798(DK)	TRANSISTOR		
Q219		*	2SB798(DL)	TRANSISTOR		
Q220		*	DTC124TU	DIGITAL TRANSISTOR		
Q221		*	FMA5	DIGITAL TRANSISTOR		
Q222			DTC114EU	DIGITAL TRANSISTOR		
TH201			157-252-43001	THERMISTOR		
CONTROL UNIT (W 02-160X-XX)						
			A33-0413-08	REFLECTOR		
C1			CK73GB1E223K	CHIP C 0.022UF K		
C2 ,3			CK73GB1H471K	CHIP C 470PF K		
C4 ,5			CK73GB1E223K	CHIP C 0.022UF K		
C6 ,7			CC73GCH1H101J	CHIP C 100PF J		
C8 -16			CK73GB1H471K	CHIP C 470PF K		
C17 ,18			CK73FB1H473K	CHIP C 0.047UF K		
C19			CC73GCH1H470J	CHIP C 47F J		
C20			CK73GB1H471K	CHIP C 470PF K		
C23			CK73FB1H223K	CHIP C 0.022UF K		
C24			CC73GCH1H101J	CHIP C 100PF J		
C25 -27			CK73GB1H471K	CHIP C 470PF K		
C28			CK73GB1E223K	CHIP C 0.022UF K		
C29			CK73GB1H222K	CHIP C 2200PF K		
C30			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C31			CK73GB1H122K	CHIP C 1200PF K		
C32			CK73GB1H471K	CHIP C 470PF K		
C33			CK73GB1E223K	CHIP C 0.022UF K		
C34			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C35			CK73GB1H471K	CHIP C 470PF K		
C36			CC73GCH1H101J	CHIP C 100PF J		
C37			CC73GCH1H470J	CHIP C 47F J		
C38			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C39			CC73GCH1H101J	CHIP C 100PF J		
C40 -42			CC73GCH1H470J	CHIP C 47F J		
C43			CC73GCH1H101J	CHIP C 100PF J		
			E29-0484-08	CONNECTOR		
CN2			E40-5344-05	CONNECTOR		
CN3			E40-5361-05	CONNECTOR		
JP1			E31-6162-08	JUMPER PIN		
			G13-0966-08	DUMMY CONNECTOR		
			J21-4299-08	MOUNTING HARDWARE		
L1			L33-0737-05	COIL		
X1			L78-0066-05	CRYSTAL		
R1			RK73GB1J184J	CHIP R 180K J 1/16W		
R2			R92-1252-05	CHIP R 0 OHM		
R3 -7			RK73GB1J473J	CHIP R 47K J 1/16W		
R8			RK73GB1J471J	CHIP R 470 J 1/16W		
R10			RK73GB1J333J	CHIP R 33K J 1/16W		
R11			RK73GB1J183J	CHIP R 18K J 1/16W		
R12			RK73GB1J121J	CHIP R 120 J 1/16W		
R13			RK73GB1J103J	CHIP R 10K J 1/16W		
R14			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R15 -19			RK73GB1J473J	CHIP R 47K J 1/16W		

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CONTROL UNIT (W 02-160X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
R20			RK73FB2A473J	CHIP R 47K J 1/10W		
R21 ,22			R92-0670-05	CHIP R 0 ΩHM		
R24 -26			R92-0670-05	CHIP R 0 ΩHM		
R27 ,28			RK73GB1J473J	CHIP R 47K J 1/16W		
R29			RK73GB1J183J	CHIP R 18K J 1/16W		
R30			RK73GB1J104J	CHIP R 100K J 1/16W		
R31 -34			RK73GB1J473J	CHIP R 47K J 1/16W		
R35			RK73FB2A124F	CHIP R 120K F 1/10W		
R36			RK73FB2A274F	CHIP R 270K F 1/10W		
R37			RK73GB1J473J	CHIP R 47K J 1/16W		
R39			RK73GB1J473J	CHIP R 47K J 1/16W		
R41 ,42			RK73GB1J473J	CHIP R 47K J 1/16W		
R45			RK73GB1J223J	CHIP R 22K J 1/16W		
R46			RK73GB1J564J	CHIP R 560K J 1/16W		
R48			RK73GB1J274J	CHIP R 270K J 1/16W		
R49 -53			RK73GB1J473J	CHIP R 47K J 1/16W		
R56 -58			R92-0670-05	CHIP R 0 ΩHM		
R59			RK73GB1J224J	CHIP R 220K J 1/16W		
R60			RK73GB1J103J	CHIP R 10K J 1/16W		
R61			RK73GB1J223J	CHIP R 22K J 1/16W		
R62			RK73GB1J224J	CHIP R 220K J 1/16W		
R63			RK73GB1J473J	CHIP R 47K J 1/16W		
R64			RK73GB1J330J	CHIP R 33 J 1/16W		
R64			R92-1252-05	CHIP R 0 ΩHM		
R65			RK73GB1J224J	CHIP R 220K J 1/16W		
R66 ,67			R92-1252-05	CHIP R 0 ΩHM		
R70			RK73GB1J101J	CHIP R 100 J 1/16W		
R70 ,71			R92-1252-05	CHIP R 0 ΩHM		
R71			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R72 -74			R92-1252-05	CHIP R 0 ΩHM		
R75 -76			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R78			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R79			R92-1252-05	CHIP R 0 ΩHM		
VR1			R23-9403-05	TRIM POT. 50K/10K		
SW10 -12			S40-1420-05	SWITCH		
SW13			S31-1420-05	SWITCH		
SW14			S31-0406-05	SWITCH		
MIC1			T91-0381-05	MICROPHONE		
			B38-0327-08	LCD		
D1			LN01301C(Q)	LED		
D3			B30-0842-05	LED		
D4 -5			1SS272	DIODE		
D6			1SS309	DIODE		
D8			DAN202U	DIODE		
IC2			UPD7225GB-3B7	IC		
IC3			75112GF-556-3BE	IC		
IC4			S-8054ALB-LM-T1	IC(IC)		
IC5			R90-0711-05	RESISTOR BLOCK		
IC7			S-81250HG-RD-T1	IC		
Q1			2SA1586(Y)	TRANSISTOR		
Q2			DTC114EU	TRANSISTOR		
Q3			DTC123JU	TRANSISTOR		
EN1			W02-0900-05	ENCODER		

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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 12.0V.

2. DC Ammeter
1) Class 1 ammeter (17 ranges and other features)
2) The full scale can be set to either 300mA or 3A.
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 (0.2 ppm or so).

4. Power Meter
1) Measurable frequency : Up to 500MHz
2) Impedance : 50Ω, unbalanced
3) Measuring range : Full scal 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 measurments for 5 to 25 MHz.

9. AF Voltmeter (AF VTVM)
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 500MHz
2) Frequency deviation : ±35MHz
3) Output voltage : 100mV or more

13. Dummy Load
1) 8Ω, 3W or more

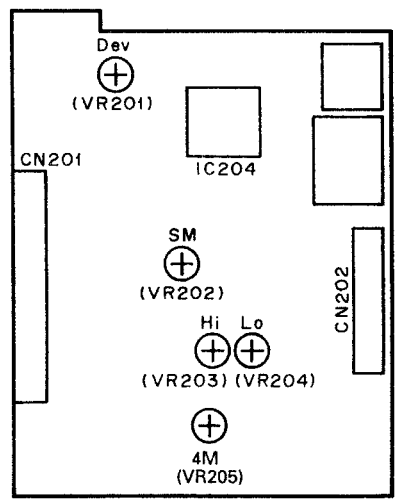
PREPARATION

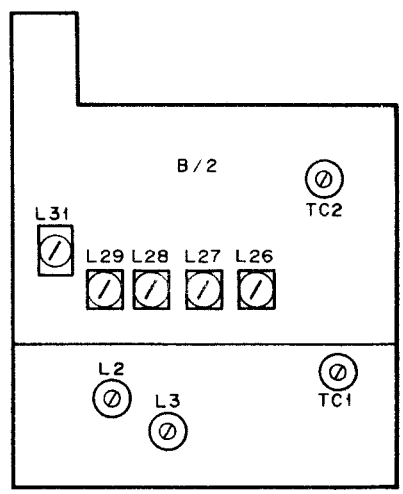
- Set the unit in the receiving mode and set the controls as follows, unless otherwise specified.

POWER/VOL	ON
SQL VR	MIN
F.LOCK	OFF
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 indicated SSG output levels are for maximum output.

ADJUSTMENT POINTS (Top View)





ADJUSTMENT

TX－RX COMMON ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/ Remarks
		Test-equip.	Unit	Terminal	Unit	Parts	Method	
1. Reset	POWER SW: OFF							
	Hold down F key POWER SW: ON							
2. 4M ADJ	Power supply voltage:13.8V	DCVM	TX-RX	TP201	TX-RX	VR205	4.5V	4.45~4.55V

PLL ADJUSTMENT

1. Reference frequency		Frequency:144.98MHz PTT: ON	F.Counter Power meter	TX-RX	ANT	TX-RX	TC1	144.98MHz	±50Hz
2. VCV	TX	Frequency:144.98MHz	DCVM		TP1(CV)		L2	1.7V	±0.01V
	RX	Frequency:145.04MHz					L3	1.7V	±0.01V

TX ADJUSTMENT

1. Power adjustment (Repeat 2~3 times)	Frequency: 144.98MHz Power: E-LOW PTT: ON	Power meter	TX-RX	ANT	TX-RX	TC2	MAX	
	Frequency: 144.98MHz Power: HIGH PTT: ON					VR203	5.5W	±0.5W
	Frequency: 144.98MHz Power: LOW PTT: ON					VR204	0.5W	±0.1W
	Frequency: 144.98MHz Power: E-LOW PTT: ON						Check	Approx. 25mW
	Frequency: 144.98MHz Power: E-LOW DC input: 7.2V PTT: ON						Check	2W or more
2. DEV.	Frequency: 144.98MHz AG output: 40mV, 1KHz. PTT: ON	Power meter AG Linear detector F.Counter				VR201	±4.2KHz	±200Hz
	Frequency: 144.98MHz AG output: 4mV, 1KHz. PTT: ON						Check	±2.3~3.7KHz
3. TONE	Frequency: 144.98MHz TONE: ON PTT: ON				CTCSS unit	VR1	0.5KHz	±0.5~1KHz
4. DTMF	Frequency: 144.98MHz PTT: ON F and 8 key: Push				DTMF unit	VR1	±3KHz	±200Hz
5. 1750Hz TONE (E.T type only)	Frequency: 144.98MHz 1750 key: Push						Check	±2.5~4.5KHz

RX ADJUSTMENT

1. Reception sensitivity	Frequency:144.98MHz SSG output: -9dBμV MOD: 1KHz DEV: ±3KHz	Oscilloscope SSG AF V.M Distortion meter	TX-RX	SP	TX-RX	L31, 29 28, 27	AF MAX	SINAD: 12dB or more
						L26	Distortion : MIN.	SINAD: 12dB or more
2. S-meter	Frequency: 144.98MHz SSG output:12dBμV	S-meter				VR202	Adjust VR202 the 7th segment is just terned on	"——"is one pair

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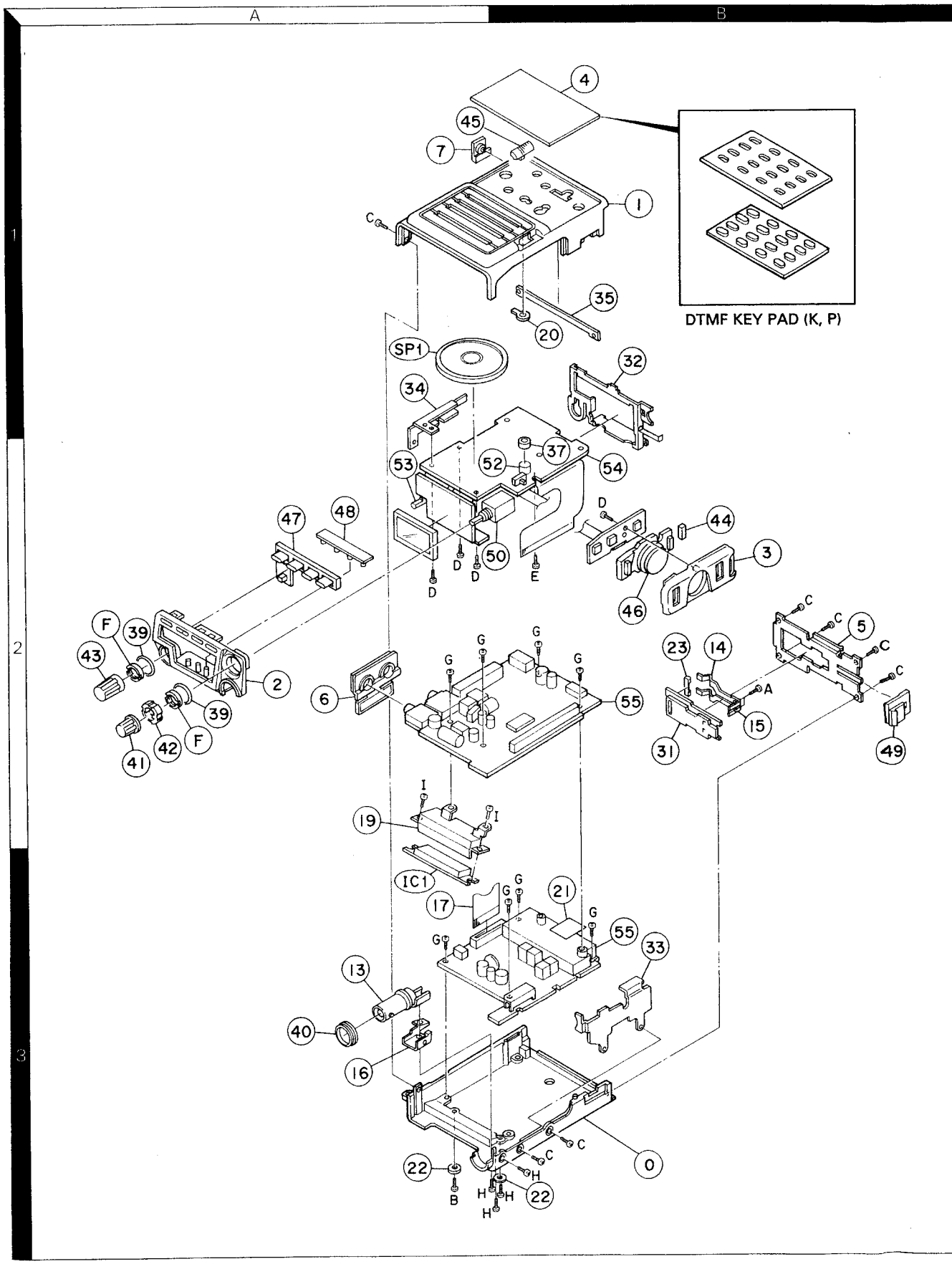
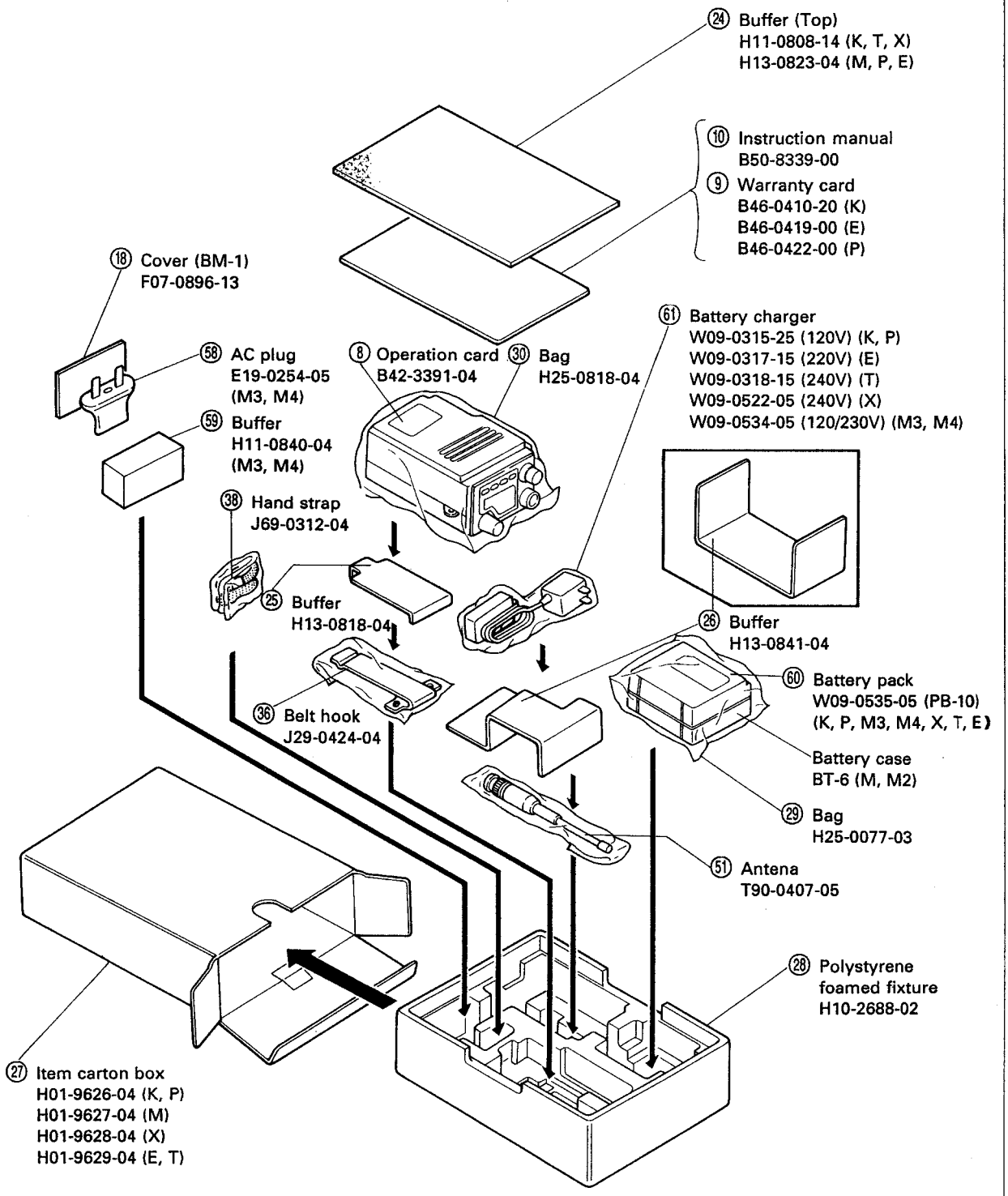
EXPLODED VIEW



PACKING



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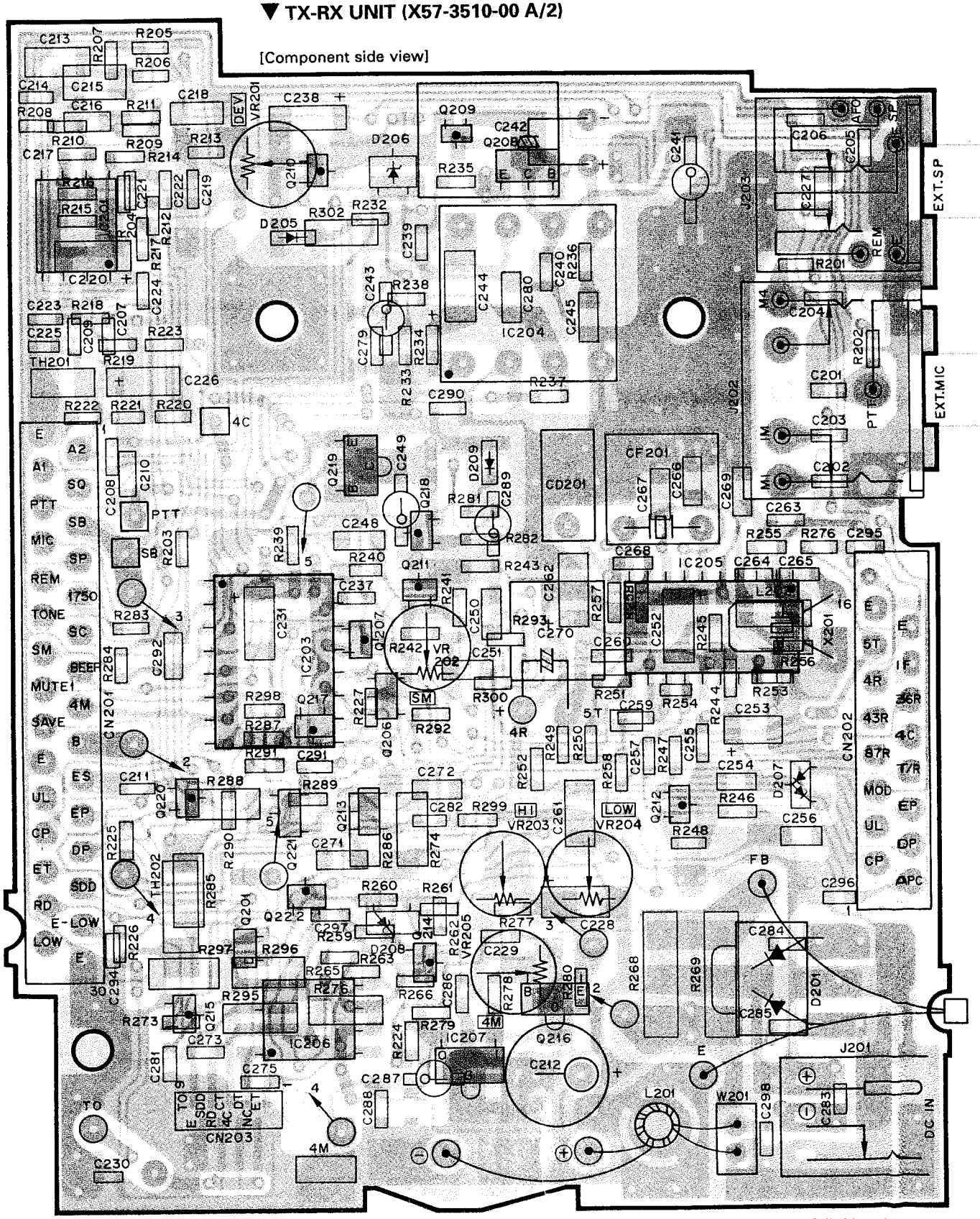
PC BOARD VIEW

▼ TX-RX UNIT (X57-3510-00 A/2)

[Component side view]



: Component side pattern : Foil side pattern

Q201: 2SK879 (GR or Y)
Q206, 221: FMA5
Q207: DTA114EU
Q208, 216, 219: 2SB798 (DK or DL)
Q209, 211, 212: 2SC4116 (BL or GR)
Q210, 215, 222: DTC114EU
Q213: FMU1
Q214: 2SA1586 (GR or Y)
Q217: DTA143ZU
Q218: DTC114TU
Q220: DTC124TU

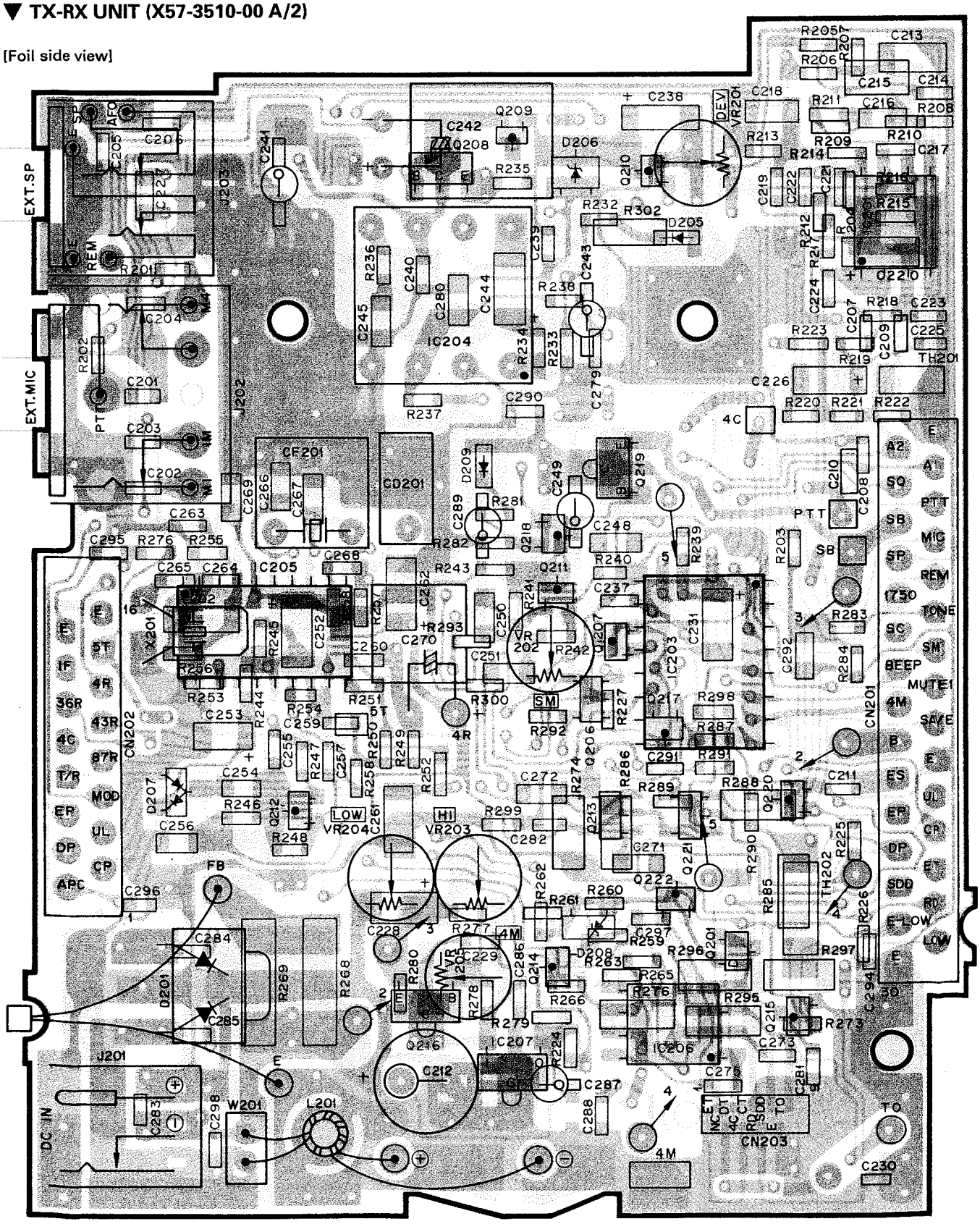
D201: EA61FCIF
D205, 209: DAN202U
D206: 02CZ8.2Y
D207: HSM88AS
D208: 02CZ3.9Y

IC201: NJM4560M
IC203: MB88307FP
IC204: NJM386BD
IC205: TK10486M
IC206: LM301AD
IC207: M5236 (ML)

PC BOARD

▼ TX-RX UNIT (X57-3510-00 A/2)

[Foil side view]



Q201: 2SK879 (GR or Y)
Q206, 221: FMA5
Q207: DTA114EU
Q208, 216, 219: 2SB798 (DK or DL)
Q209, 211, 212: 2SC4116 (BL or GR)
Q210, 215, 222: DTC114EU

Q213: FMU1
Q214: 2SA1586 (GR or Y)
Q217: DTA143ZU
Q218: DTC114TU
Q220: DTC124TU

D201: EA61FCIF
D205, 209: DAN202U
D206: 02CZ8.2Y

D207: HSM88AS
D208: 02CZ3.9Y

IC201: NJM4560M
IC203: MB88307FP
IC204: NJM386BD

IC205: TK10486M
IC206: LM301AD
IC207: M5236 (ML)

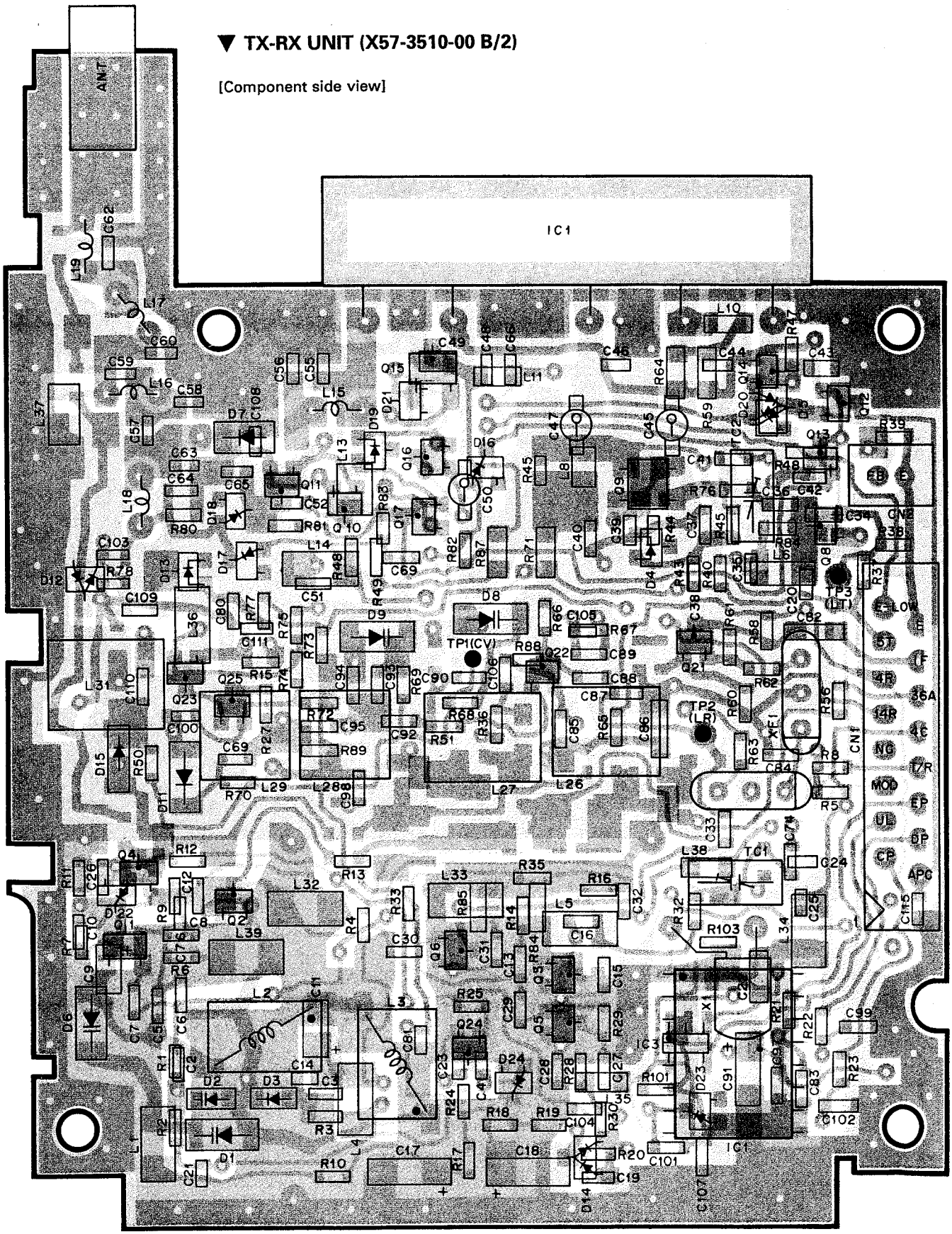
: Component side pattern : Foil side pattern

TH-26A/AT/E

PC BOARD

▼ TX-RX UNIT (X57-3510-00 B/2)

[Component side view]



: Component side pattern : Foil side pattern

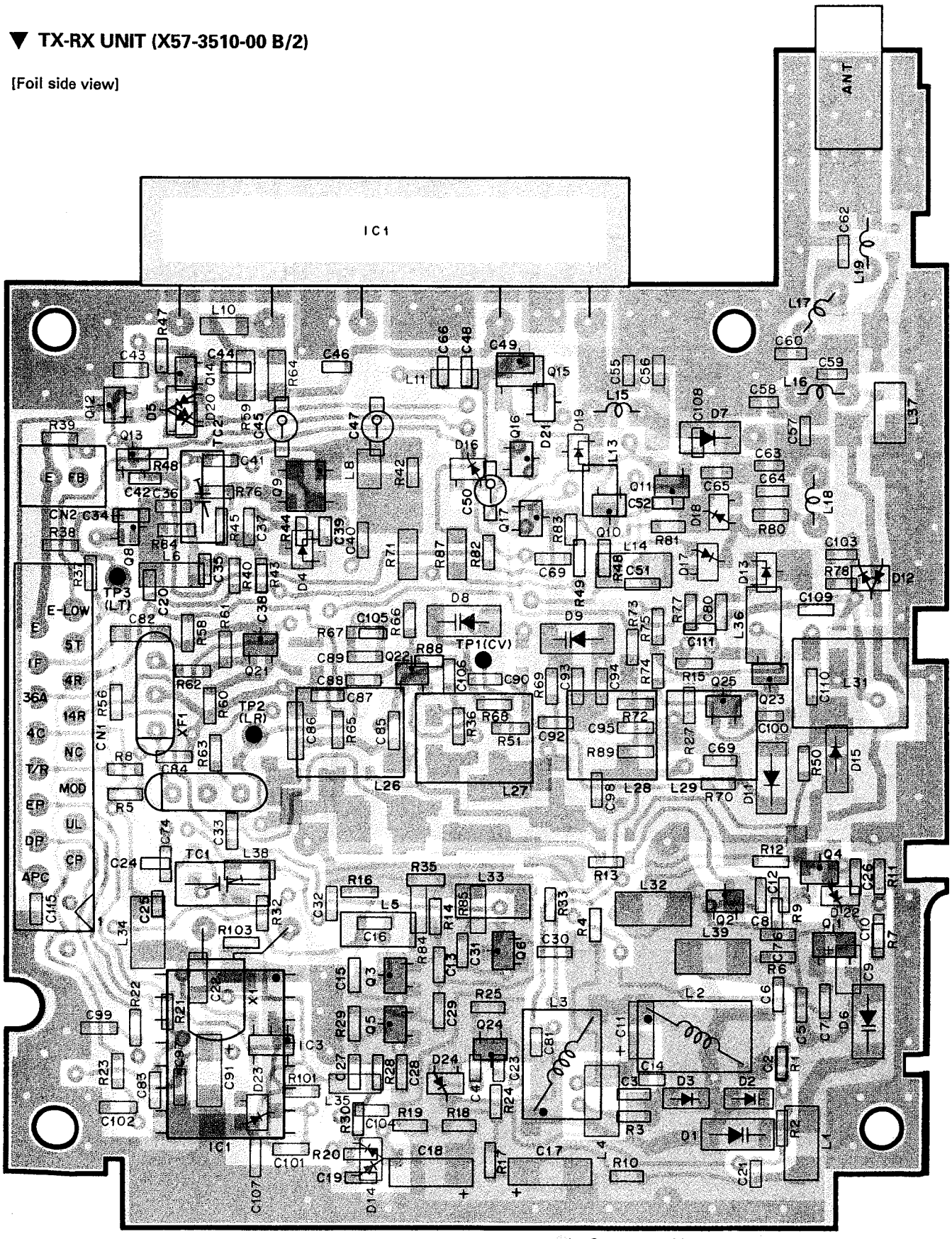
Q1: 2SK238 (K17)
Q2, 6, 8, 21, 25: 2SC4215 (Y)
Q3, 5, 18-20: 2SC4083
Q4: 2SC 4117 (BL)
Q9: 2SC 4093
Q10, 16: DTC124EU
Q11, 13: DTC114EU
Q12, 14, 17: DTA114EU
Q15: DTB113ZK
Q21: 2SC4215 (Y)
Q22, 24: 2SK882 (Y)
Q23: 2SC3937

D1, 8, 9, 11, 15: MA333
D2: 1SV214
D3: MA77
D4, 19-20, 24: DA204U
D5: 1SV172
D6: 1T33C
D7: M1808
D12, 14: HSM88AS
D16-18: 1SS312
D23: DAN 202U
IC1: MB1504
IC3: TC4S11F

PC BOARD

▼ TX-RX UNIT (X57-3510-00 B/2)

[Foil side view]



: Component side pattern : Foil side pattern

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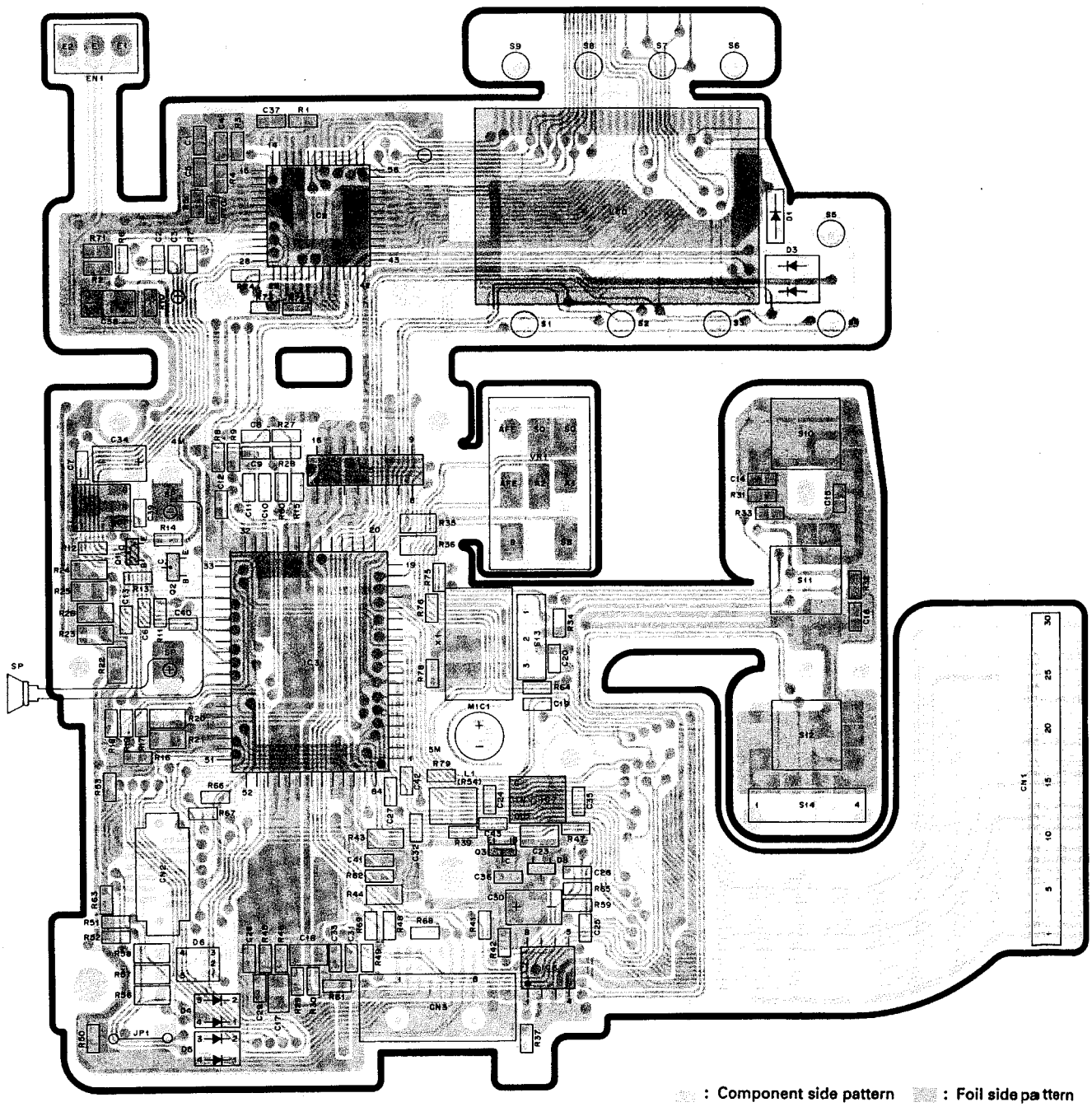
Q2, 6, 8, 21, 25: 2SC4215 (Y)
Q3, 5, 18-20: 2SC4083
Q4: 2SC 4117 (BL)
Q9: 2SC 4093
Q10, 16: DTC124EU
Q11, 13: DTC114EU
Q12, 14, 17: DTA114EU
Q15: DTB113ZK
Q21: 2SC4215 (Y)
Q22, 24: 2SK882 (Y)
Q23: 2SC3937
D1, 8, 9, 11, 15: MA333
D2: 1SV214
D3: MA77
D4, 19-20, 24: DA204U
D5: 1SV172
D6: 1T33C
D7: M1808
D12, 14: HSM88AS
D16-18: 1SS312
D23: DAN 202U
IC1: MB1504
IC3: TC4S11F

TH-26A/AT/E

PC BOARD

▼ Control ASSY (WO2-XXXX-XX)

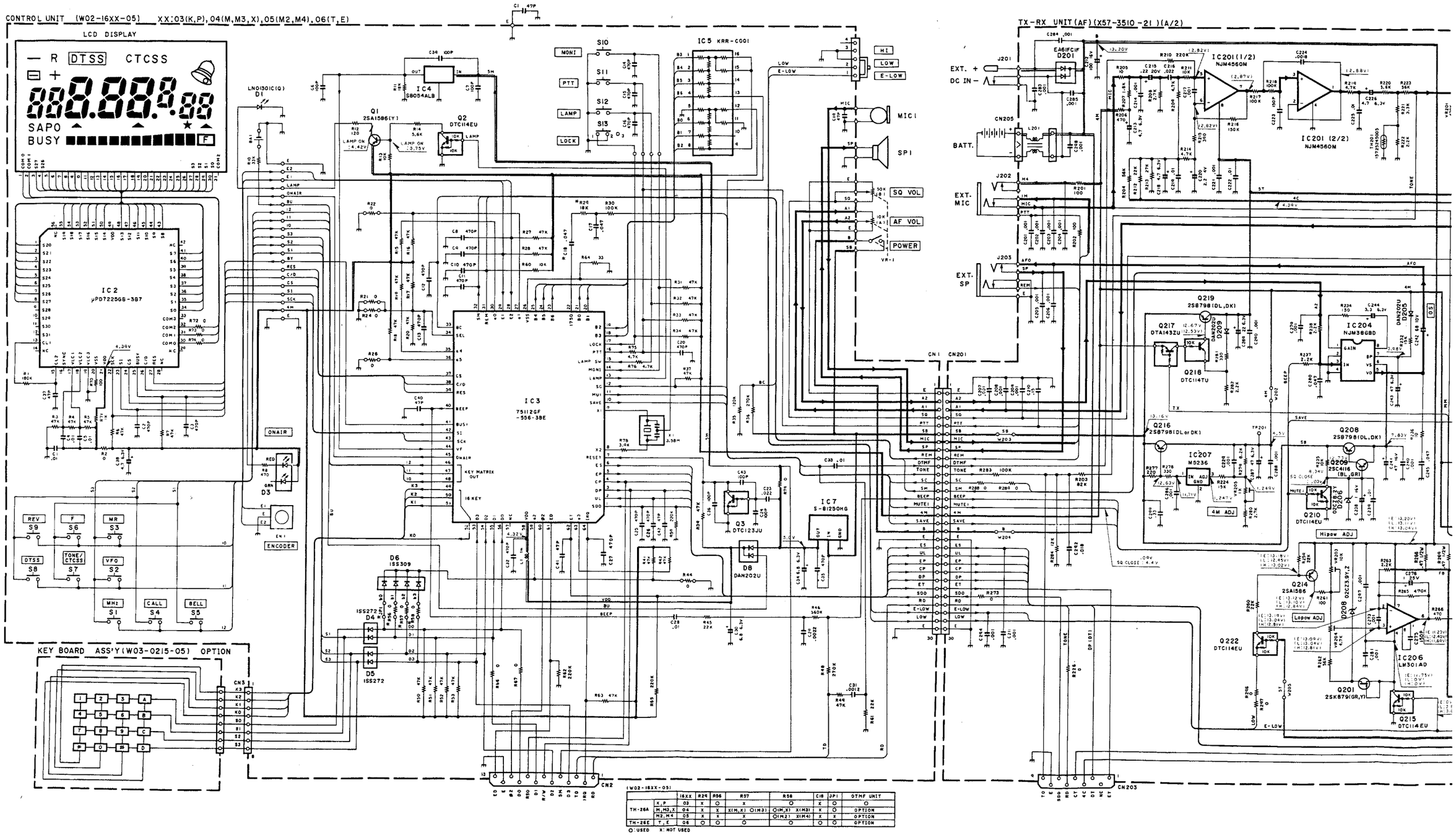
[Component side view]



: Component side pattern : Foil side pattern

D1: LN01301C (Q)
D3: B30-0842-05
D4-5: 1SS272
D6: 1SS309
D8: DAN202U
IC2: UPD7225GB-3B7
IC3: 75112GD-556-3BF
IC4: S-8054ALB-LM-T1
IC7: S-81250HG-RD-T1
Q1: 2SA1586 (Y)
Q2: DTC114EU
Q3: DTC123JU

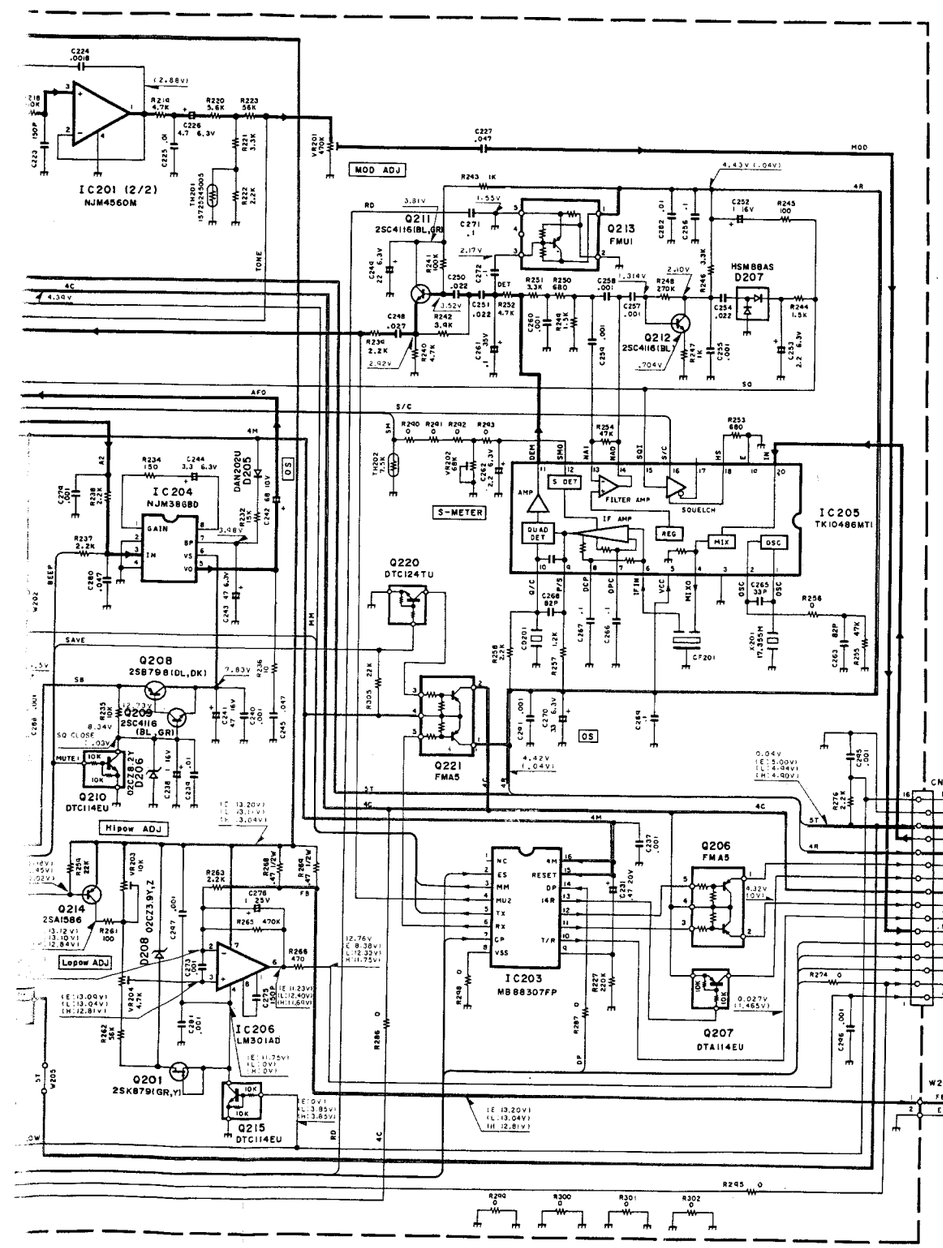
SCHEMATIC DIAGRAM

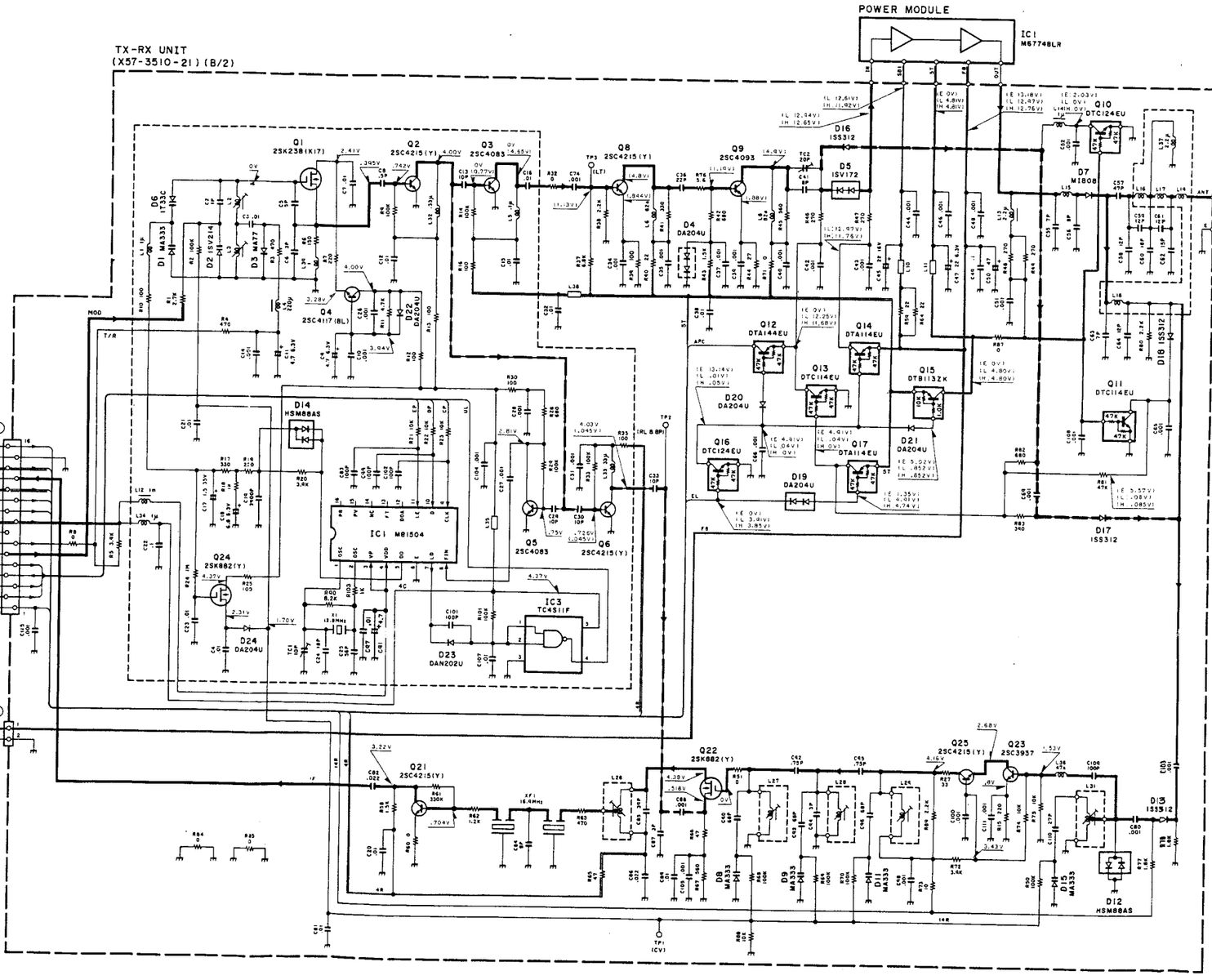


		16XX	R29	R56	R57	R58	C18	JP1	DTMF UNIT
TH-26A	K,P	03	X	O	X	O	X	O	O
	M,M3,X	04	X	X	O(M,X)	O(M3)	O(M,X)	X(M3)	X	O	OPTION
	M2,M4	05	X	X	X		O(M2)	X(M4)	X	X	OPTION
TH-26E	T,E	06	O	O	O		O		O	O	OPTION

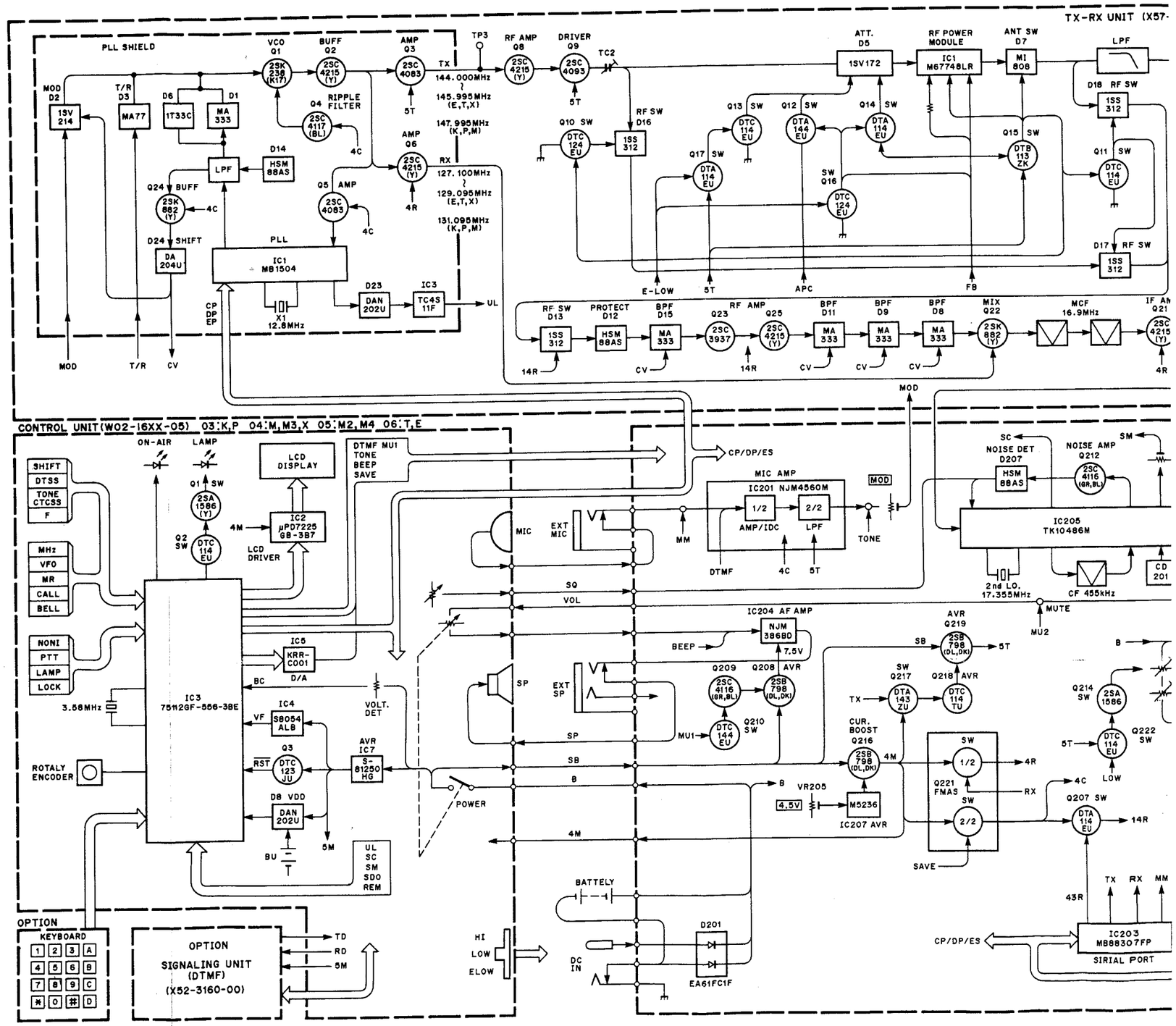
O:USED X:NOT USED

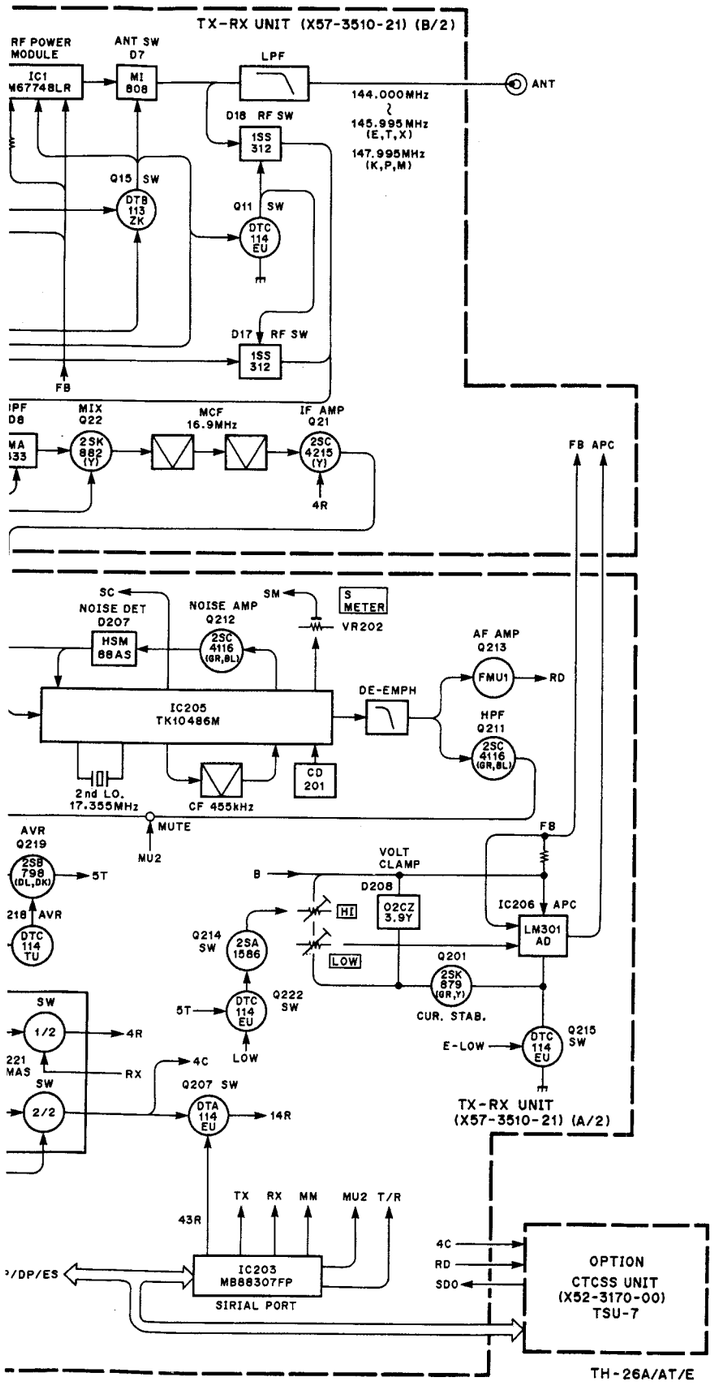
TH-26A/AT/E



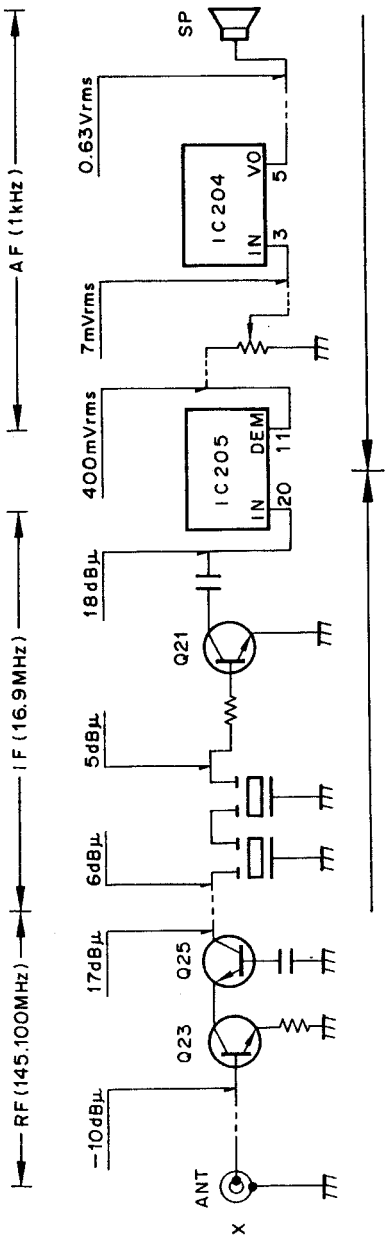


BLOCK DIAGRAM



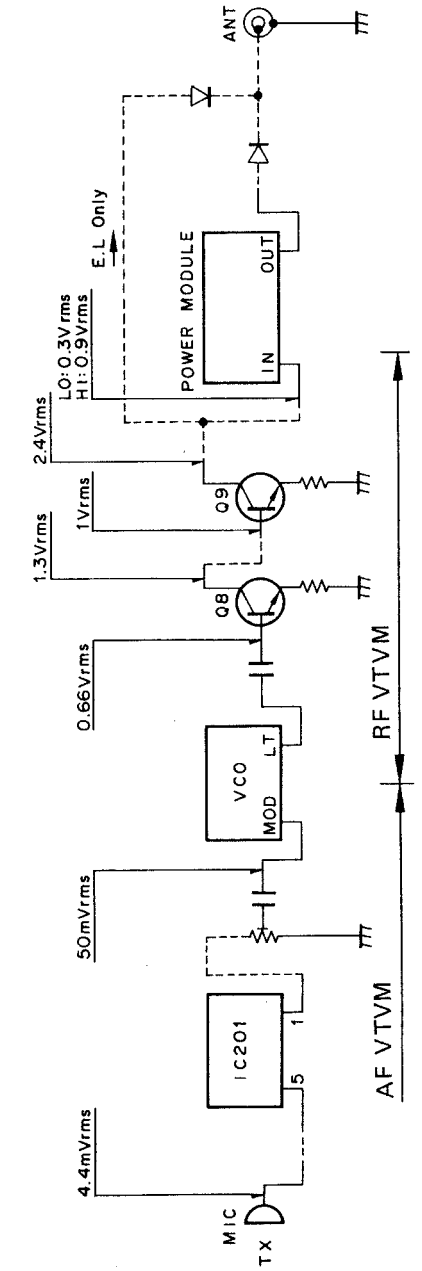


LEVEL DIAGRAM



Each of the levels plotted from the RF to the 1st IF is the level which can provide 12 dB SINAD for an SSG through 0.01 μF ceramic capacitor.

The AF level is the value measured by an AF VTVM when an SSG signal of 40 dBμ EMF modulated with a 1 kHz MOD and a 3 kHz DEV is received and the AF output is adjusted to 0.63 V/8 ohms using AFVOL.



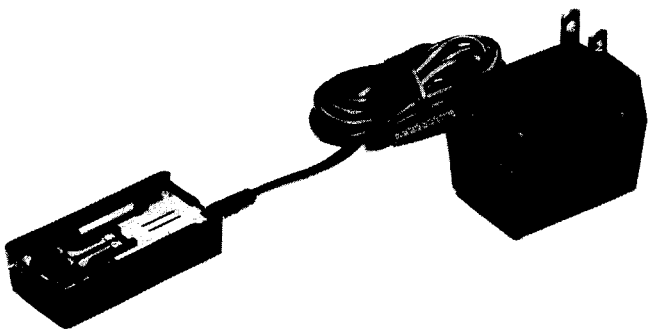
ANY Output
E.L : About 16dBm (Spectrum Analyzer)
LO : (Power meter)
HI : (Power meter)

- DC INPUT: 13.8V
- 146.0 MHz (K, P)
  145.0 MHz (E, M, X)
- Adjust AG so that the MIC jack input has a 3 kHz DEV with a 1 kHz MOD.

TH-26A/AT/E

BC-9 (BATTERY CHARGER)
BT-6 (AAA MANGANESE/ALKLINE BATTERY CASE)

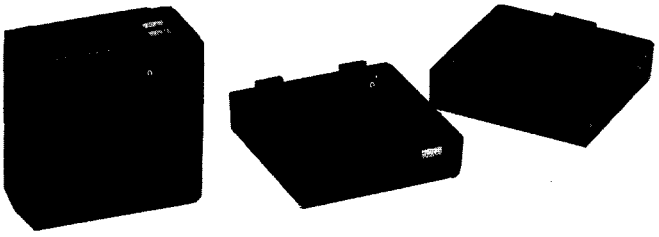
BC-9 EXTERNAL VIEW



BC-9 PARTS LIST

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

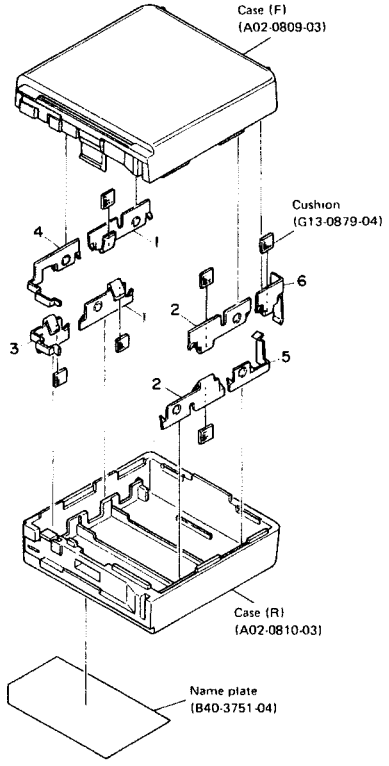
BT-6 EXTERNAL VIEW



BT-6 PARTS LIST

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

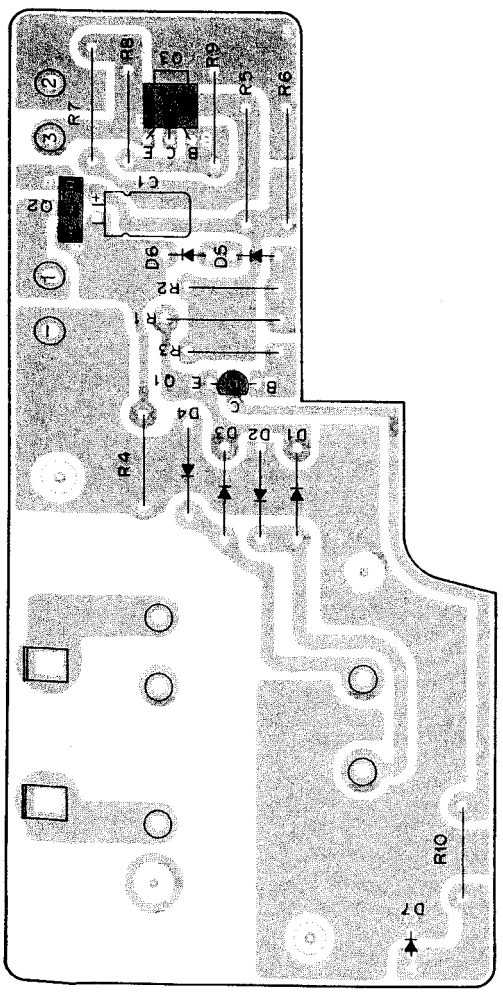
BT-6 DISASSEMBLY



BC-10 (COMPACT CHARGER)

BC-10 EXTERNAL VIEW

BC-10 PC BOARD VIEW



BC-10 PARTS LIST

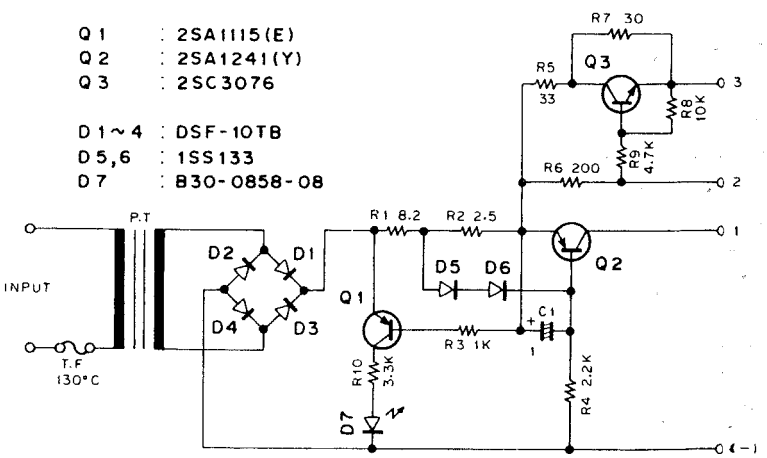
* : New Parts

Ref. No.	New Parts	Parts No.	Description
		A02-0828-08	Case (Upper) **K,M,M2**
		A02-0829-08	Case (Upper) **X,T,W**
		A02-0832-08	Case (Lower)
D7		B30-0858-08	LED SR615D
		B50-8203-08	Instruction manual **K,M,M2,X,W**
		B50-8204-08	Instruction manual **T**
		E30-2097-08	AC power cord **K,M,M2**
		E30-2098-08	AC power cord **X**
		E30-2099-08	AC power cord **T**
		E30-2100-08	AC power cord **W**
		L01-8027-08	Power transformer 220V **M,W**
		L01-8111-08	Power transformer 120V **K,M2**
		L01-8152-08	Power transformer 240V **X,T**
		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 CIRCUIT DIAGRAM

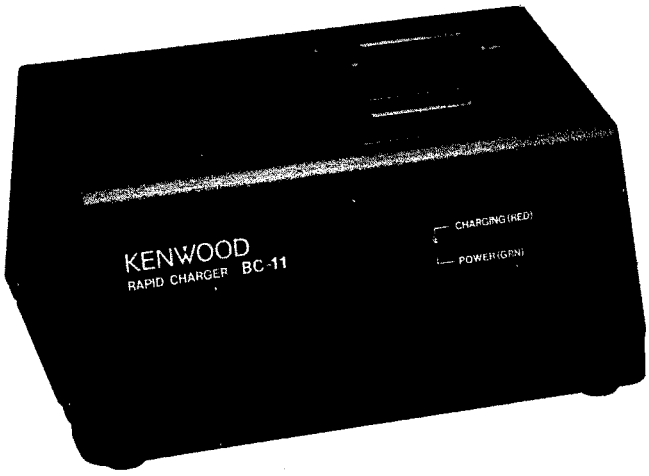
Q 1 : 2SA1115(E)
Q 2 : 2SA1241(Y)
Q 3 : 2SC3076

D 1~4 : DSF-10TB
D 5,6 : 1SS133
D 7 : B30-0858-08



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 and PB-11 Ni-Cd batteries for TH-26, TH-46.

Theory of Operation

The operation of each block is explained below.

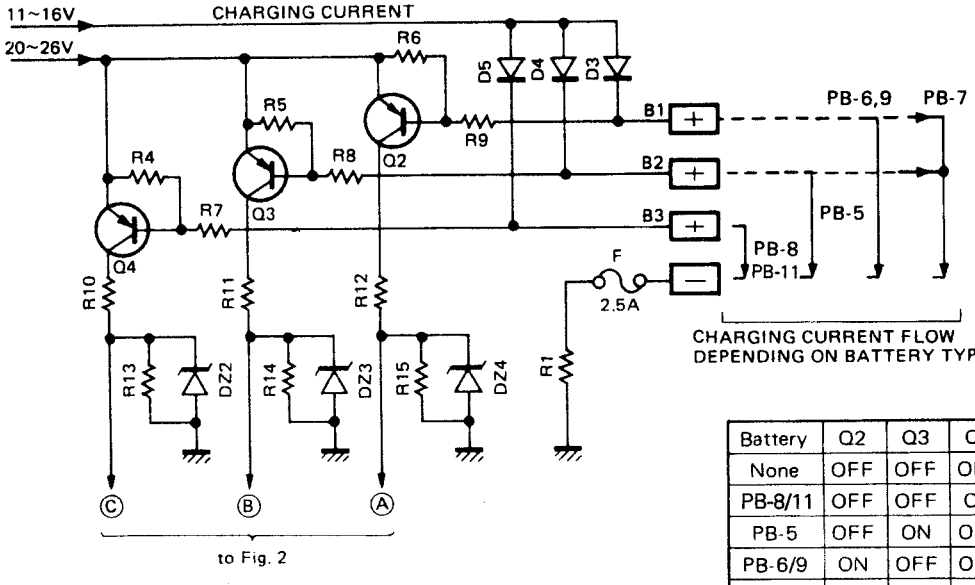
1) + 11V AVR Circuit

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 Ⓐ in **Figure 1**. Similarly when a PB-5/7 is inserted Q3 : 2SA608E turns on and approximately 11V is provided at output B . When a PB-8/11 is inserted Q4 : 2SA608E turns on and approximately 11V is provided at output C .



Battery	Q2	Q3	Q4
None	OFF	OFF	OFF
PB-8/11	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

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

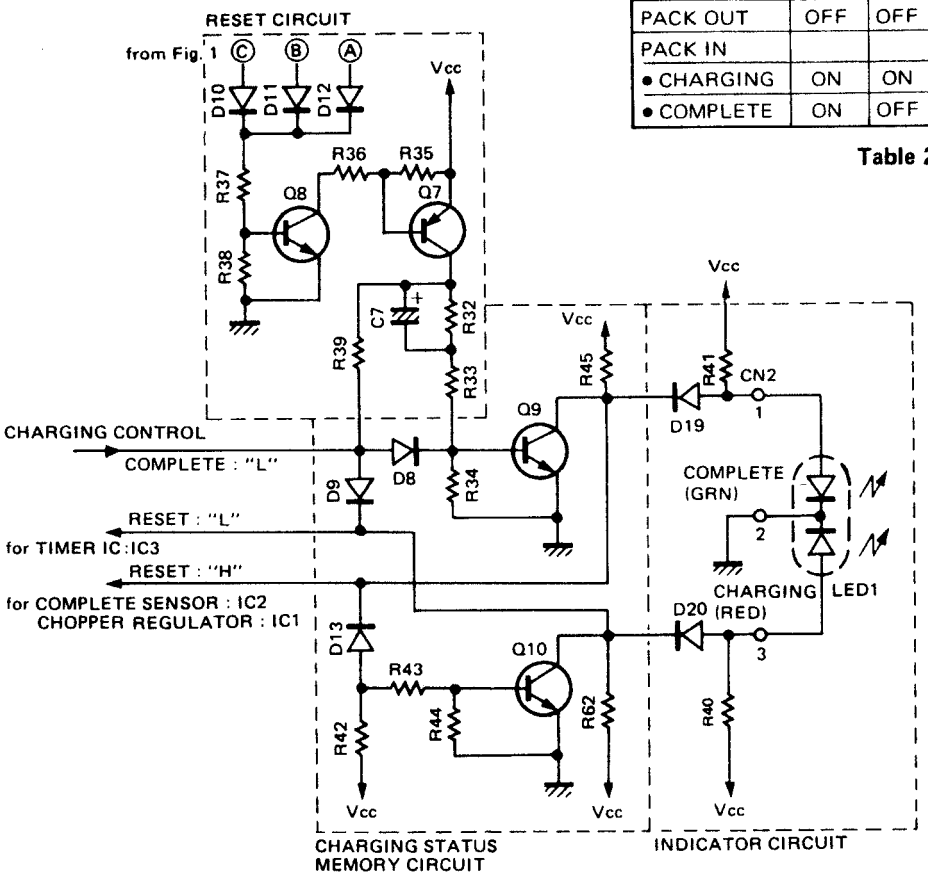


Fig. 2 Reset Circuit/Charge Status Memory Circuit/Display Circuit Block Diagram

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-8/11	L	L	H	L	L
PB-9	H	L	H	L	H

Table 3

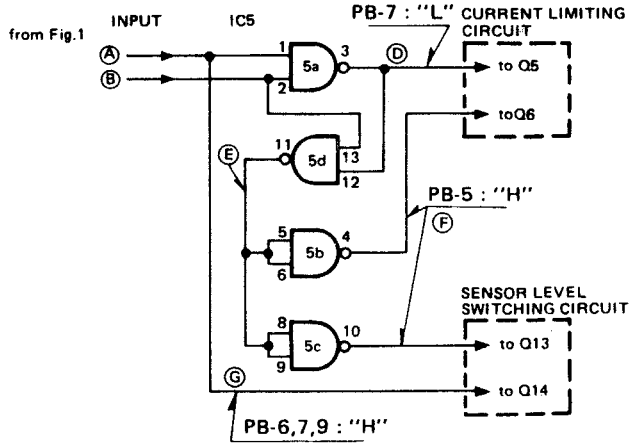


Fig. 3 Battery Recognition Circuit Block Diagram

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 (V_{REF}) used as a comparison standard for limiting the charging current. The V_{REF} 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} MAX (A) = V_{REF} (V)/0.15(Ω)

	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-8/11	OFF	OFF	0.25V	1.7A
PB-9	OFF	OFF	0.25V	1.7A

Table 4

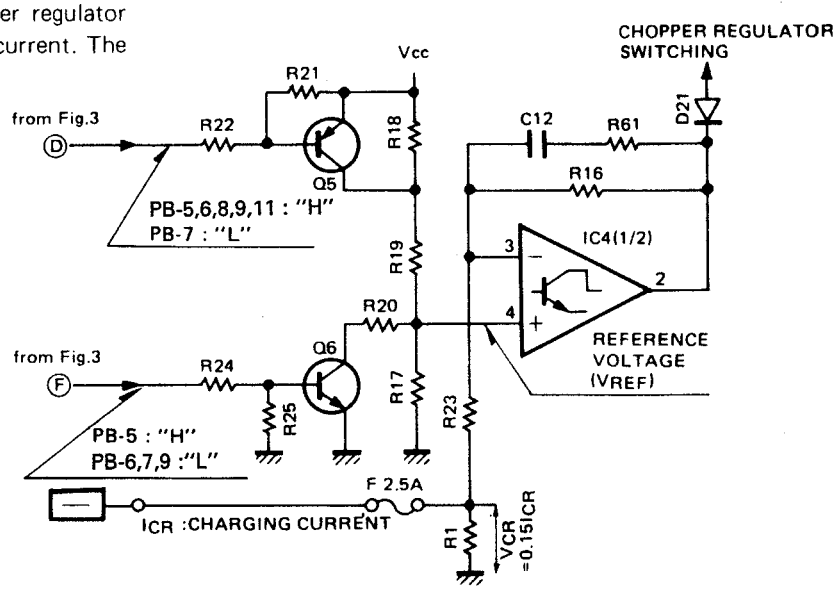


Fig. 4 Charging Current Limiting Circuit Block Diagram

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-8/11	7.6	OFF	OFF
PB-9	2.0	OFF	ON

Table 5

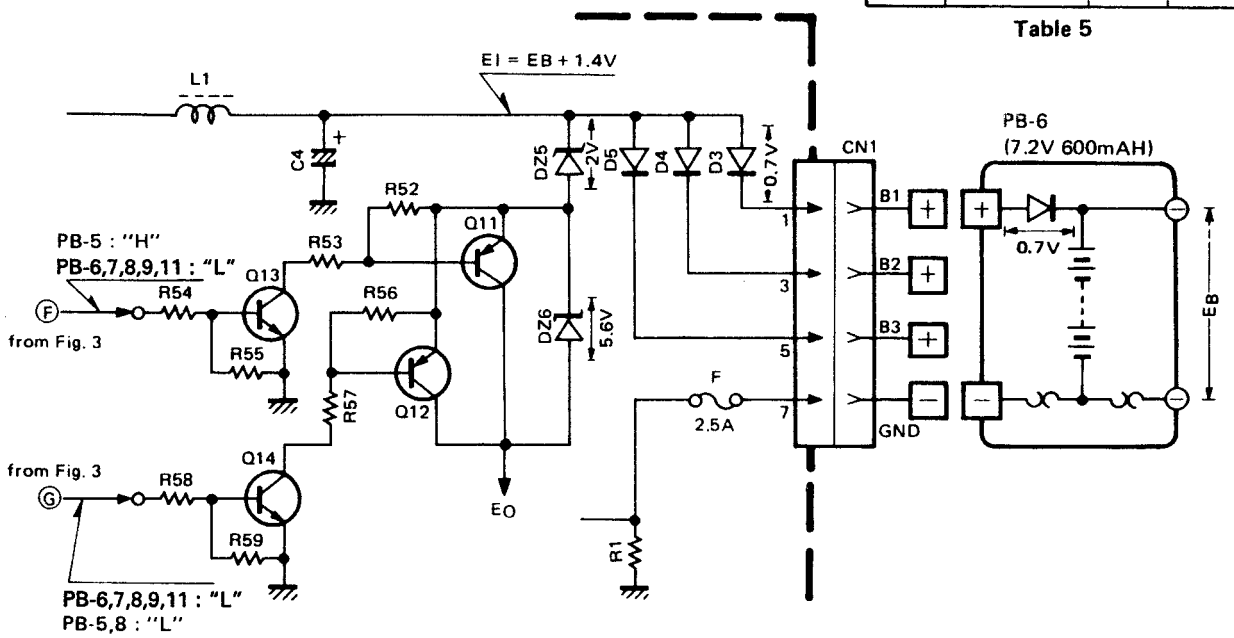


Fig. 5 Sensor Level Switching Circuit Block Diagram

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 . . . . . (1)

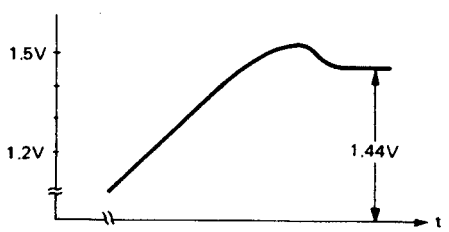


Fig. 6 The pin voltages while the Ni-CD Battery is charging

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.

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 ΔV 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.

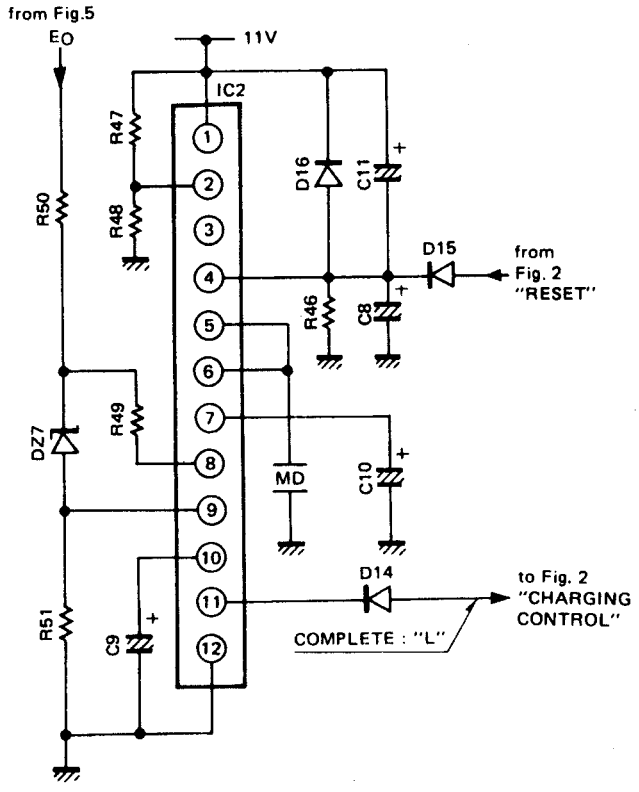


Fig. 7 Charging Status Detect Circuit Block Diagram

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).

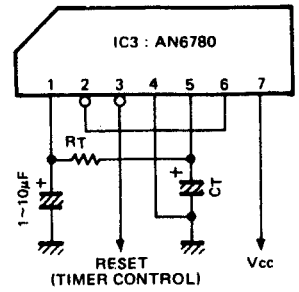


Fig. 8 Timer Circuit Block Diagram

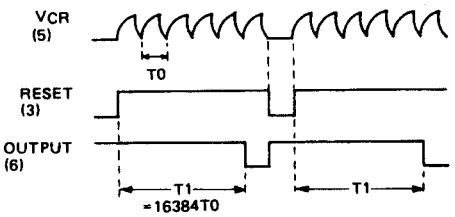


Fig. 9 TIMER TIME T1(s) ≈ 11RT(KΩ)·CT(μF)
TIMER TIME T1(s) ≈ 11×47(KΩ)·10(μF) = 5170 (s)

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.

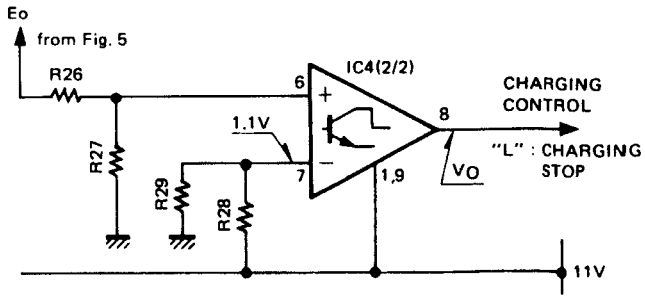


Fig. 10 Voltage Comparator Circuit Block Diagram

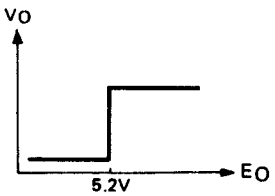


Fig. 11

BC-11 (RAPID CHARGER)

× New Parts
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Telle 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	Destination 仕向	Remarks 備考
				BC-11			
	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		
				CHARGE CONTROL UNIT (W02-0399-08)			
	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

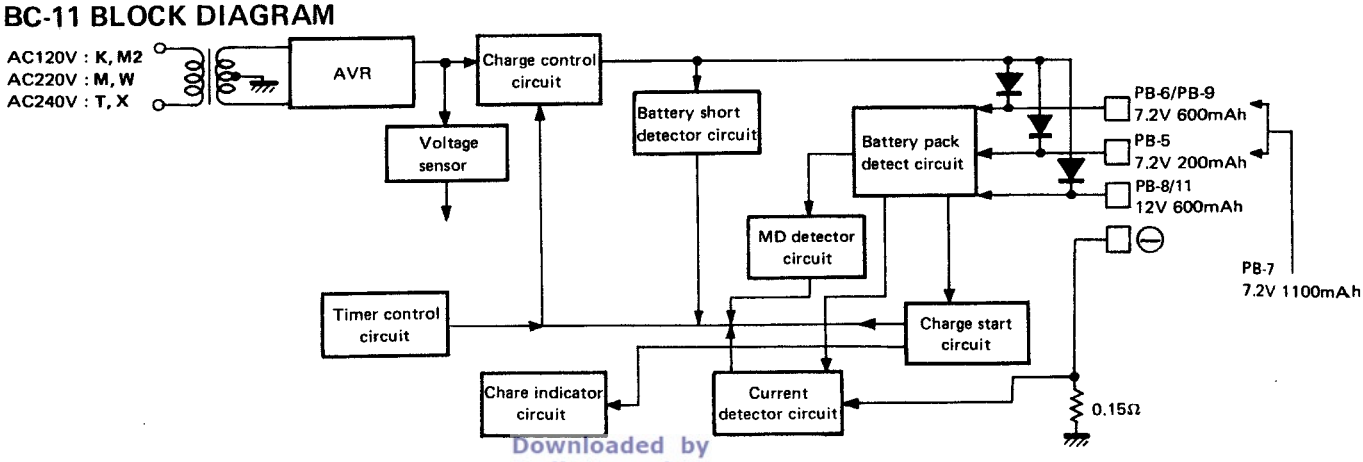
⚠ indicates safety critical components.

BC-11 (RAPID CHARGER)

× New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

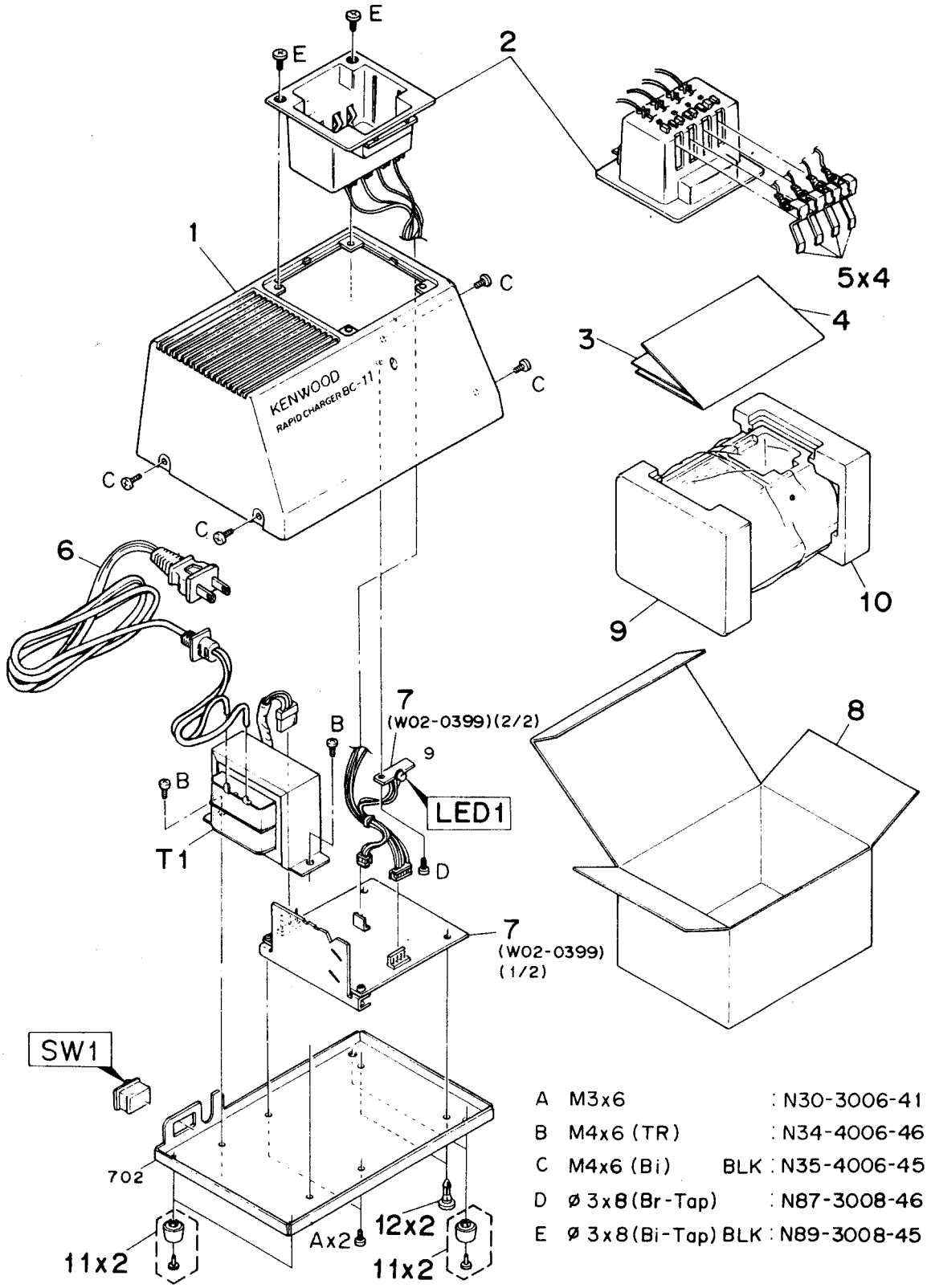
Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
MD			C91-1038-08	ELECTRO		
⚠ F1			F05-2525-05	FUSE (2.5A)	W,X	
⚠ F1			F06-2522-05	FUSE (2.5A)	M,M2,T	
⚠ F1			F06-2523-05	FUSE (2.5A)	K	
–			J13-0039-05	FUSE HOLDER	W	
L1			L33-0694-08	CHOKE COIL (470μH)		
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 (RAPID CHARGER)

BC-11 DISASSEMBLY/PACKING



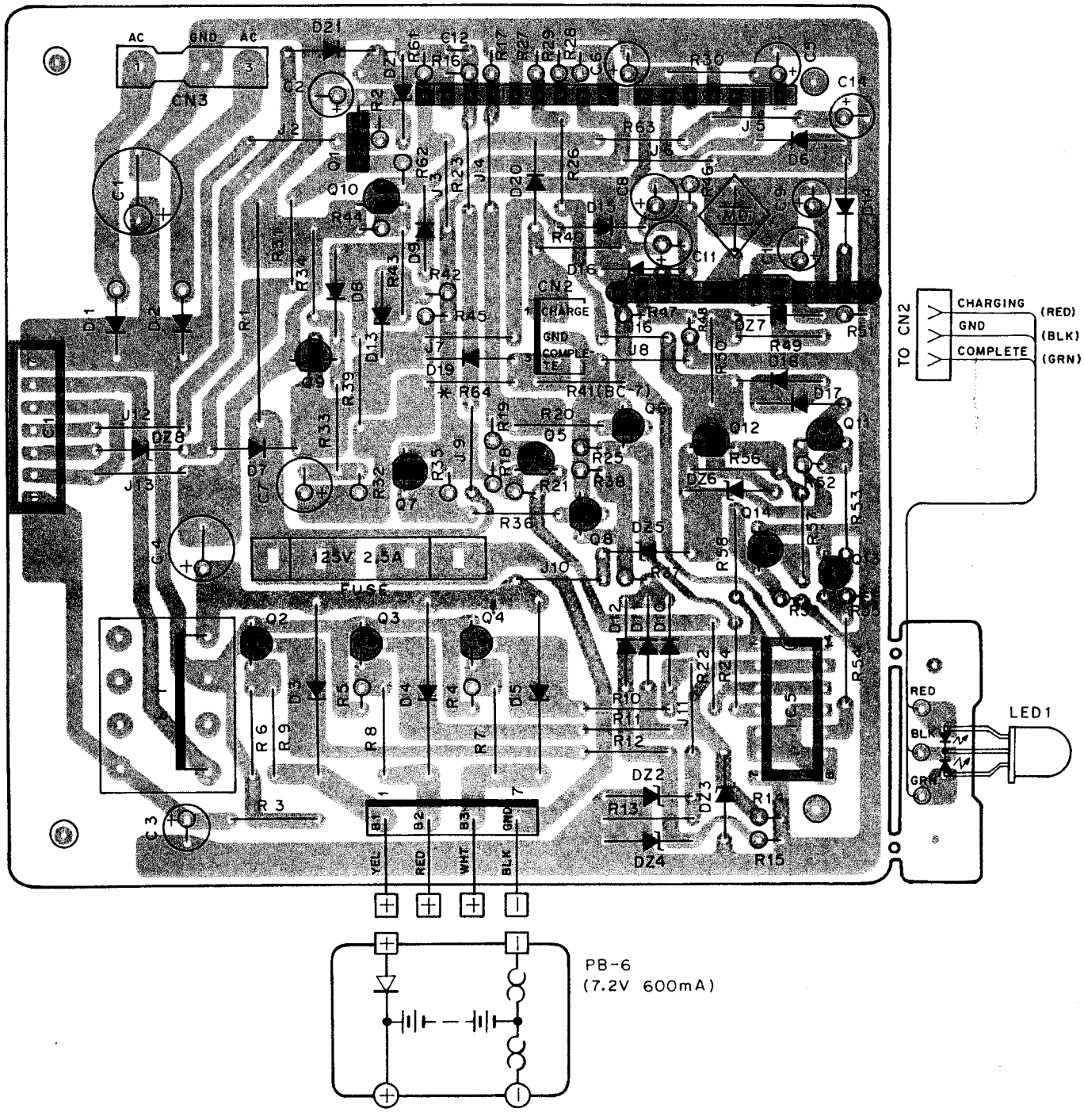
A	M3x6		: N30-3006-41
B	M4x6 (TR)		: N34-4006-46
C	M4x6 (Bi)	BLK	: N35-4006-45
D	ø 3x8 (Br-Tap)		: N87-3008-46
E	ø 3x8 (Bi-Tap)	BLK	: N89-3008-45

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

TH-26A/AT/E

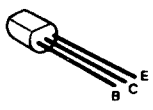
BC-11 (RAPID CHARGER)

BC-11 PC BOARD VIEW

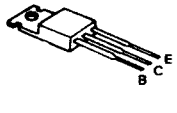


Q1 : 2SD600F,KF Q2–5,7,11,12 : 2SA608E,F Q6,8–10,13,14 : 2SC536E,F
IC1 : STK772B IC2 : KCH-1003 IC3 : AN6780 IC4 : LA6393S IC5 : LC4011B
D1–5 : DSA26B D6–16,19–21 : DS442
DZ1 : GZA11Y DZ2–4 : GZA10Z DZ5 : GZA2.0X DZ6 : GZA5.6X DZ7 : GZA7.5Y DZ8 : GZA3.0X

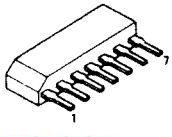
2SA608E
2SA608F



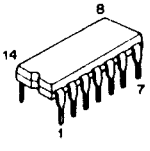
2SC536E 2SD600F
2SC536F 2SD600KF



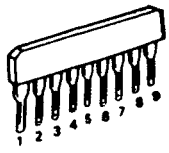
AN6780



LC4011B

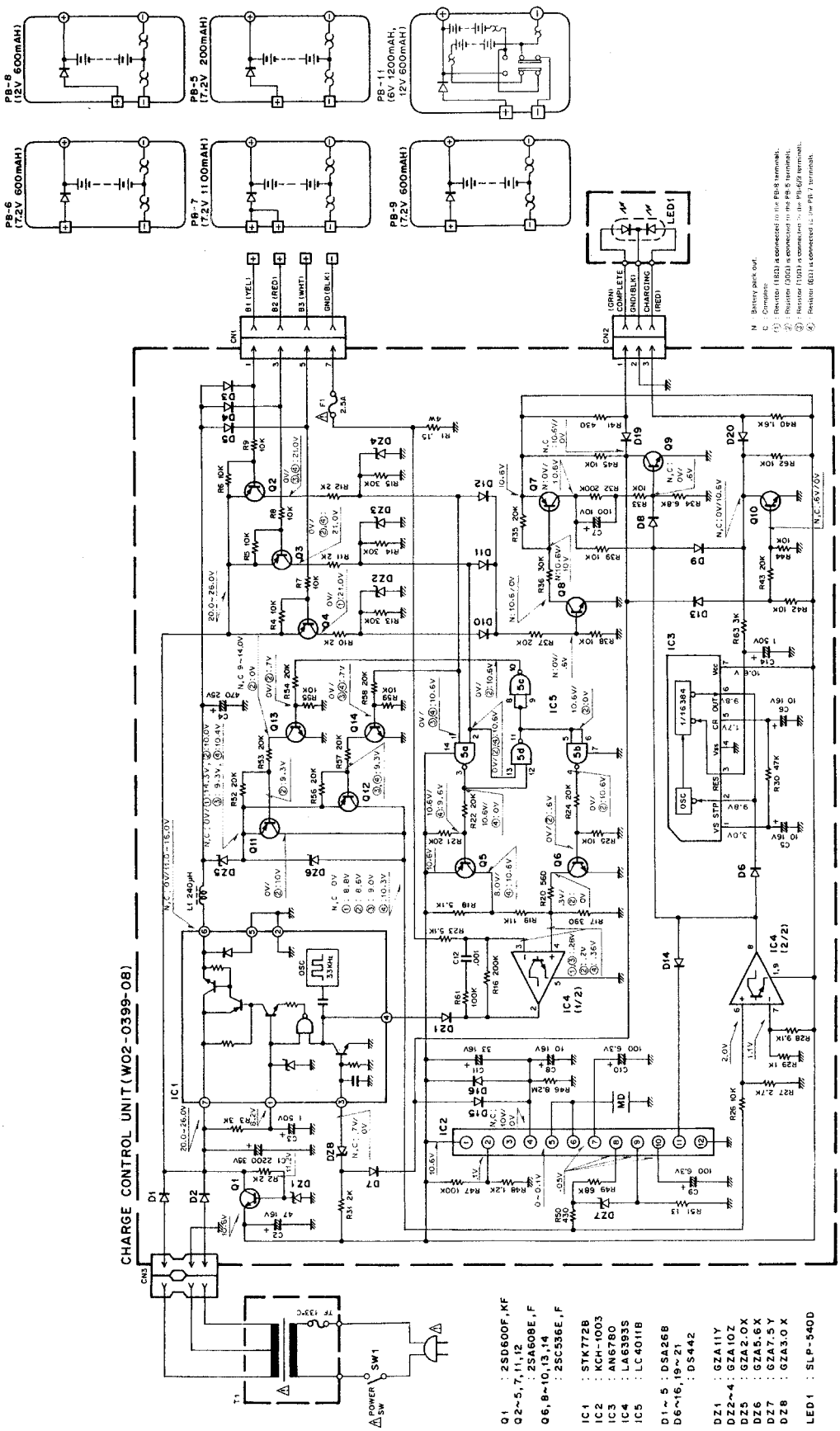


LA6393S



BC-11 (RAPID CHARGER)

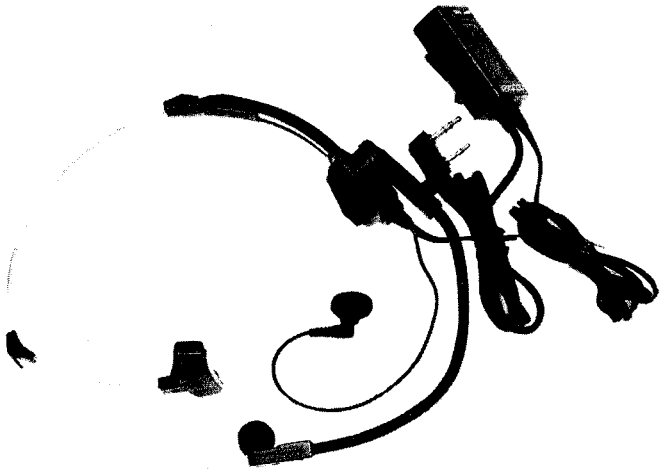
BC-11 CIRCUIT DIAGRAM



TH-26A/AT/E

HMC-2 (HEAD SET WITH VOX & PTT)

HMC-2 EXTERNAL VIEW



HMC-2 PARTS LIST

* : New Parts

Ref. No.	New Parts	Parts No.	Description
		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
VR1		R05-4422-08	Potentiometer 50kΩ
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

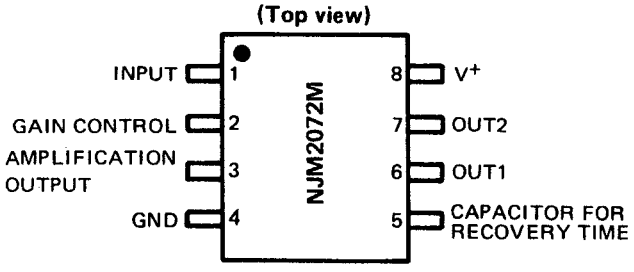
HMC-2 SPECIFICATIONS

Electrical characteristic

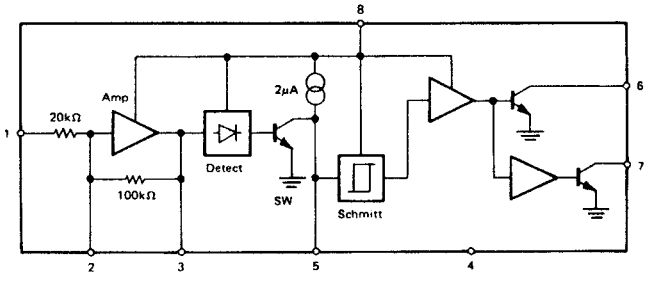
- **Earphone**
  - Diameter φ19
  - Impedance 19Ω (1000Hz)
  - Max. input power 50mW
- **Microphone**
  - Output sensitivity . . −67.5dB (0dB = 1V/μbar 1000Hz)
  - Output impedance 1.6kΩ (1000Hz)

HMC-2 SEMICONDUCTOR DATA

- **Terminal connection diagram**



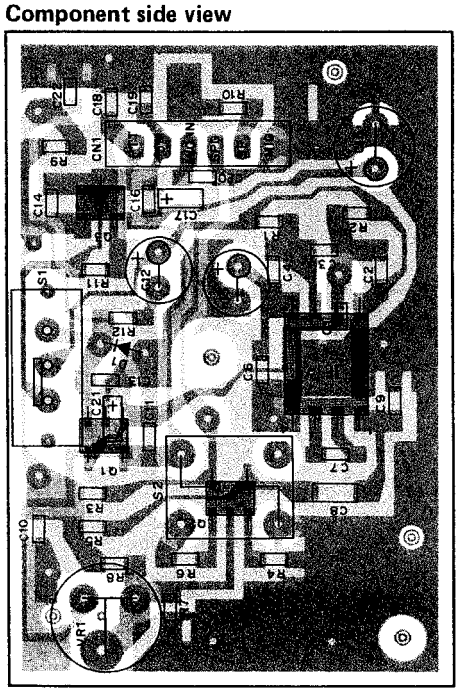
- **Block diagram**



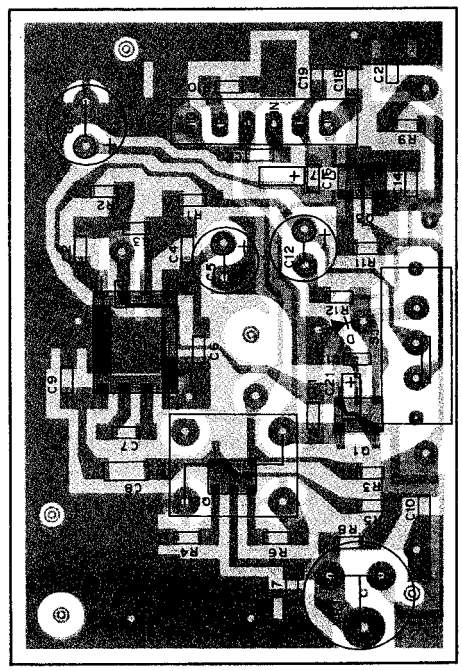
HMC-2 (HEAD SET WITH VOX & PTT)

HMC-2 PC BOARD VIEWS

Component side view



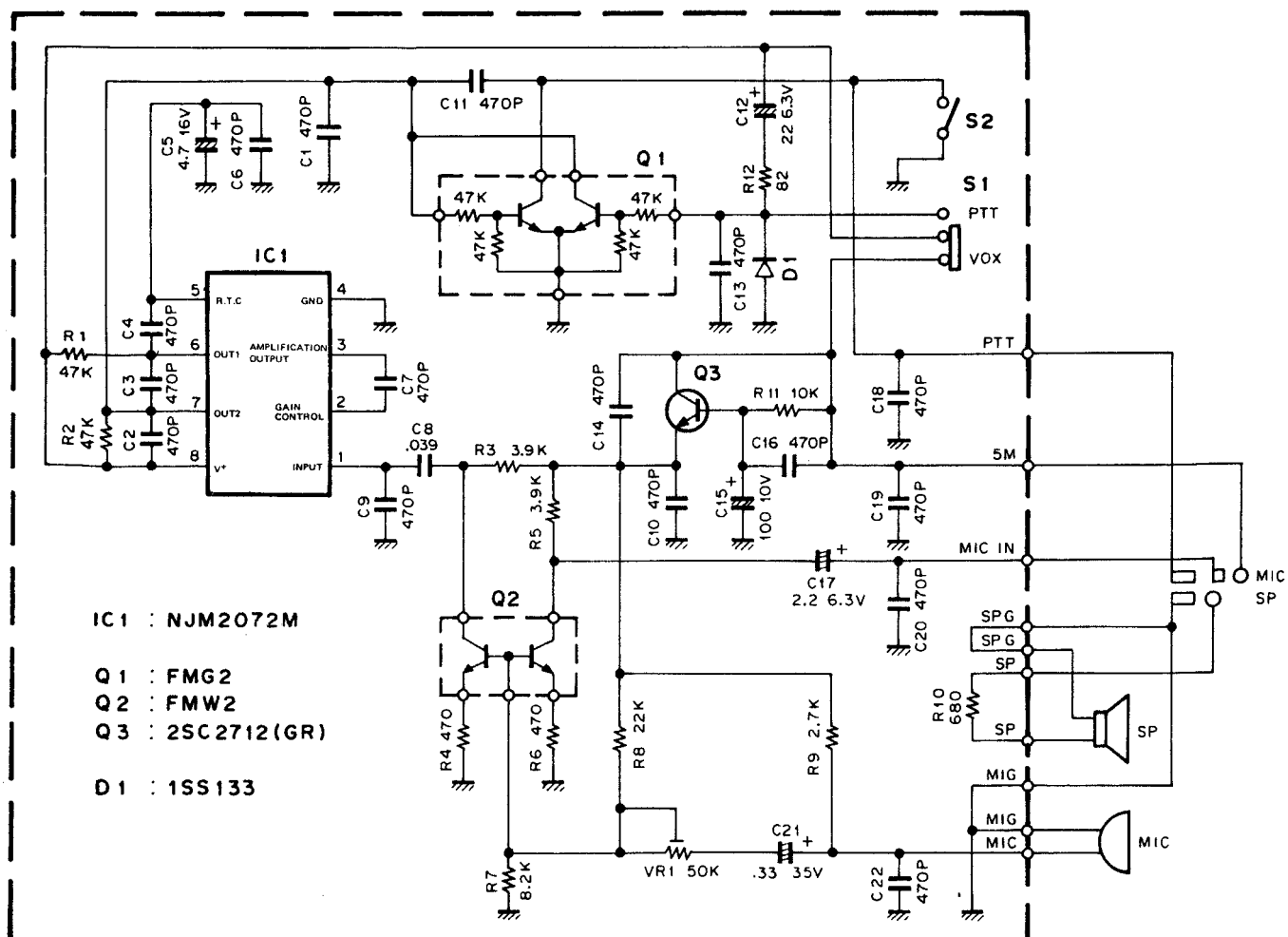
Foil side view



: Component side

: Foil side

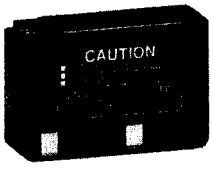
HMC-2 CIRCUIT DIAGRAM



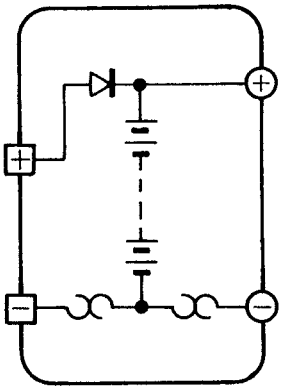
TH-26A/AT/E

PB-5/6/7/8/9/10/11 (Ni-Cd BATTERY)

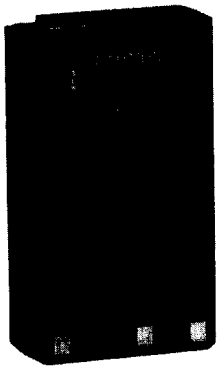
PB-5 EXTERNAL VIEW



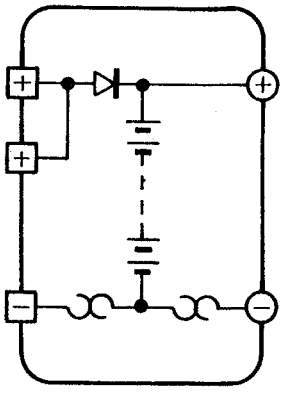
PB-5 CIRCUIT DIAGRAM



PB-7 EXTERNAL VIEW



PB-7 CIRCUIT DIAGRAM



PB-5 SPECIFICATIONS

Electrical characteristic

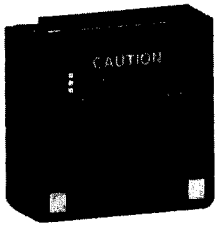
Voltage	7.2V (1.2V x 6)
Charging current	200mAh
Dimensions	58 W x 36.5 (39.5) H x 29.5 D (mm)
Weight	80g

PB-7 SPECIFICATIONS

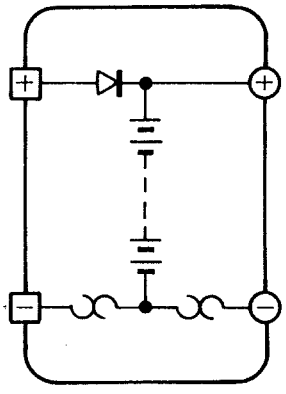
Electrical characteristic

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

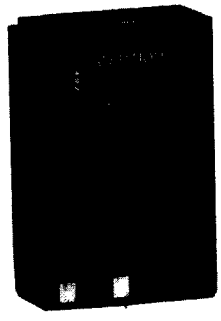
PB-6 EXTERNAL VIEW



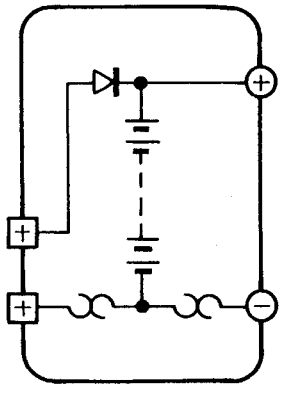
PB-6 CIRCUIT DIAGRAM



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

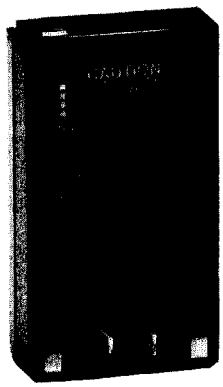
PB-8 SPECIFICATIONS

Electrical characteristic

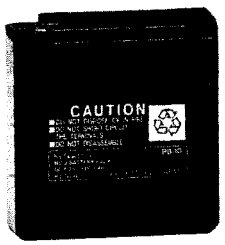
Voltage	12V (1.2V x 10)
Charging current	600mAh
Dimensions	58 W x 84 (87) H x 29.5 D (mm)
Weight	270g

PB-5/6/7/8/9/10/11 (Ni-Cd BATTERY)

PB-9 EXTERNAL VIEW

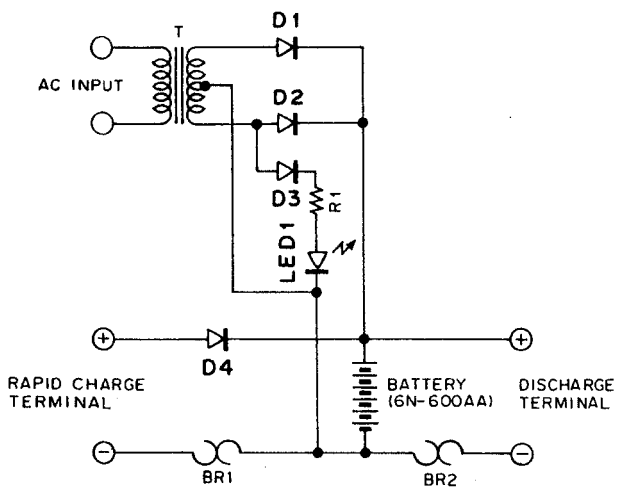


PB-10 EXTERNAL VIEW

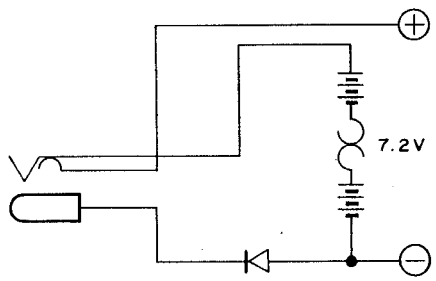


PB-11 EXTERNAL VIEW

PB-9 SCHEMATIC DIAGRAM



PB-10 SCHEMATIC DIAGRAM



PB-10 SPECIFICATIONS

Electrical characteristic

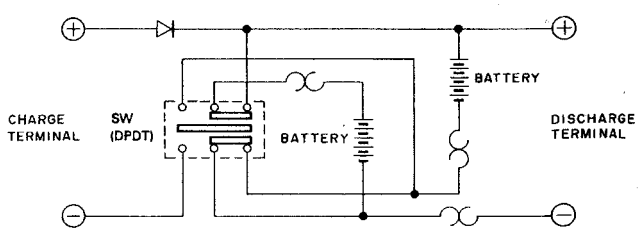
Voltage ..... 7.2V (1.2V x 6)
Charging current 600mAh
Dimensions ..... 58W x 55.5 (58.5) H x 29.5 D (mm)
Weight 180g

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-11 SCHEMATIC DIAGRAM



PB-5/6/7/8/9/11 CHARGING TIME

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

Unit : Hour

PB-11 SPECIFICATIONS

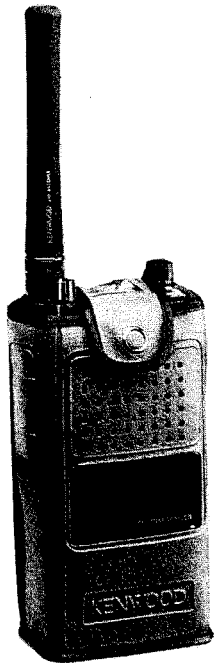
Electrical characteristic

Voltage ..... (A) 12V (1.2V x 10) (B) 6V (1.2V x 5)
Charging current ..... (A) 600mAh (B) 1200 mAh
Dimensions ..... 58 W x 98.5 (101.5) H x 29.5 D (mm)
Weight 300g

TH-26A/AT/E

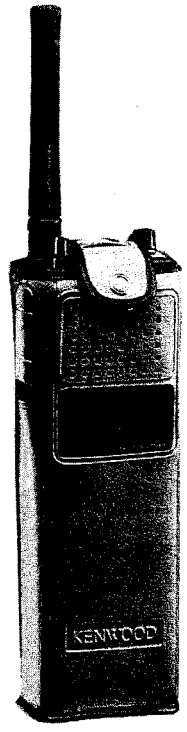
SC-24/25/26 (SOFT CASE)
MB-5 (MOBILE BRACKET)/WR-1 (WATERPROOF CASE)

SC-24 EXTERNAL VIEW

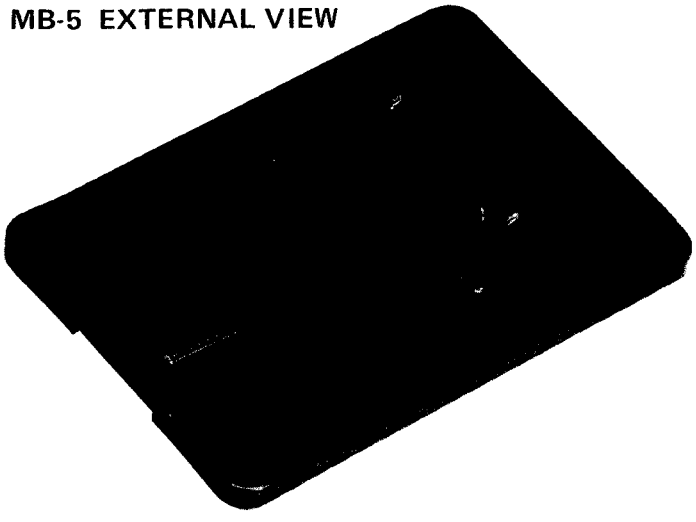


SC-25 EXTERNAL VIEW

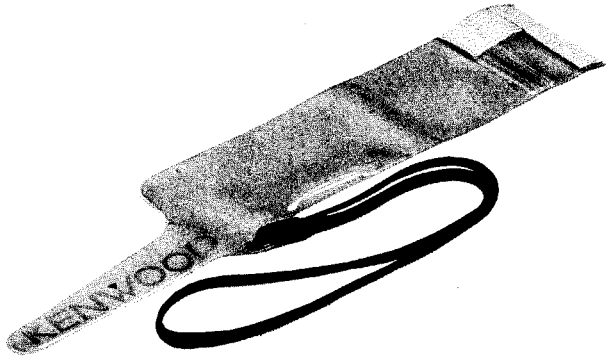
SC-26 EXTERNAL VIEW



MB-5 EXTERNAL VIEW



WR-1 EXTERNAL VIEW



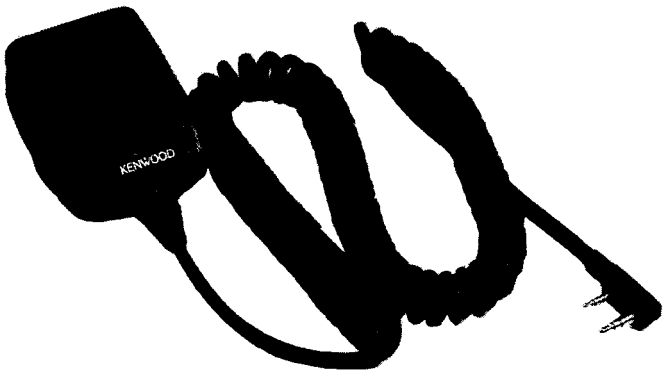
MB-5 PARTS LIST

* : 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 . . . . . φ45 (mm)
  - Impedance 8Ω
  - Rated input power 0.15W
  - Max. input power 0.3W
- **Microphone**
  - Sensitivity . . . . . 66dB ± 3dB at 1300Hz
  - Output impedance . . . . . 2kΩ ± 30% at 1000Hz

SMC-32 SPECIFICATIONS

Electrical characteristic

- **Speaker**
  - Diameter . . . . . φ28 (mm)
  - Impedance 8Ω
  - Rated input power 0.5W
  - Max. input power 1W
- **Microphone**
  - Sensitivity . . . . . 66dB ± 3dB at 1300Hz
  - Output impedance . . . . . 2kΩ ± 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

SMC-33 SPECIFICATIONS

SMC-33 SPECIFICATIONS

Electrical characteristic

- **Speaker**
  Diameter ..... ϕ28(mm)
  Impedance 8Ω
  Rated input power 0.5W
  Max.input power 1W
- **Microphone**
  Sensivity ..... 58dB±3dB (0dB = IV/μbar) at 1300Hz
  Output impedance ..... 2kΩ ± 30% at 1000 Hz

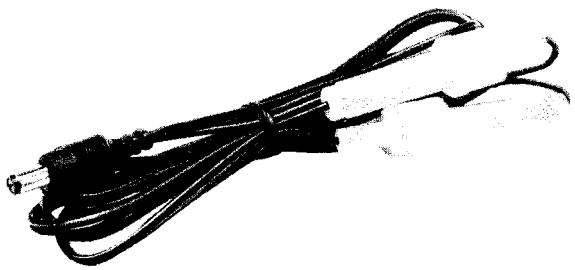
SMC-33 PARTS LIST

* : New Parts

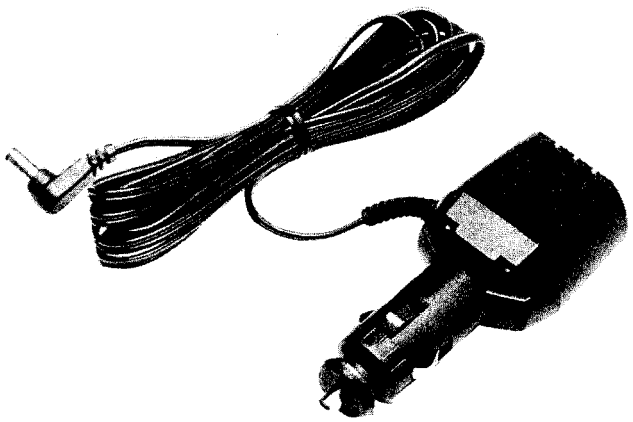
Ref No.	New Parts	Parts No.	Description
		E30-2196-08	Microphone with Speaker
		T91-0392-05	Condenser MLC

PG-2W (DC CORD)/PG-3F (PLUG WITH CORD)

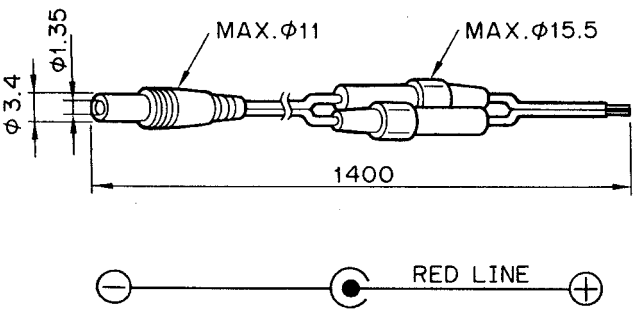
PG-2W EXTERNAL VIEW



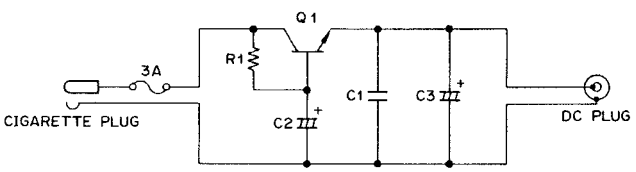
PG-3F EXTERNAL VIEW



PG-2W MAIN EXTERNAL DIMENSIONS



PG-3F CIRCUIT DIAGRAM



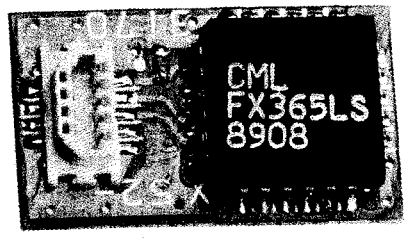
Q1 : 2SD717 (O,Y)
R1 : 22Ω 1/4W

C1 : 0.001μF 50V
C2 : 2.200μF 16V
C3 : 100μF 16V

TH-26A/AT/E

TSU-7 (CTCSS UNIT)

STU-7 PC BOARD VIEW



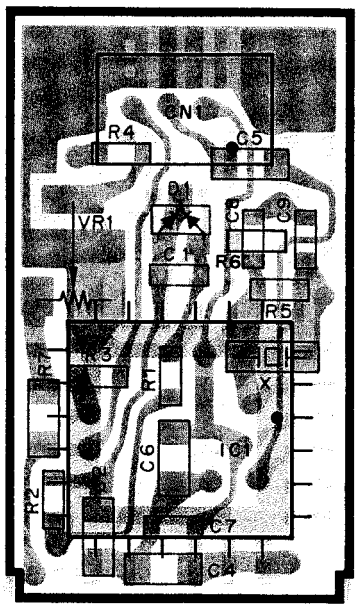
TSU-7 PARTS LIST

Ref. No	Address	Part	Parts No.	Description	Destination	Remarks
TSU-7 (X52-3170-00)						
			G10-0692-04	CUTTION		
			H21-0704-04	CUTTION		
X1		*	L78-0062-05	XTAL (1MHz)		
IC1		*	FX365LS	IC		
D1			DAN202U	DIODE		
VR1			R12-6427-05	TRIM. POT. (47K)		
R1			RK73BG1J105J	CHIP R J 1M		
R2			RK73BG1J824J	CHIP R J 820K		
R3			RK73BG1J154J	CHIP R J 150K		
R4			RK73BG1J103J	CHIP R J 10K		
R5			RK73BG1J105J	CHIP R J 1M		
R6			RK73BG1J473J	CHIP R J 47K		
C1			CK73GB1H471K	CHIP C K 470pF		
C2-6			CK73FB1E104K	CHIP C K 0.1UF		
C7			CK73GB1H471K	CHIP C K 470pF		
C8. 9			CC73GCH1H221J	CHIP C J 220pF		

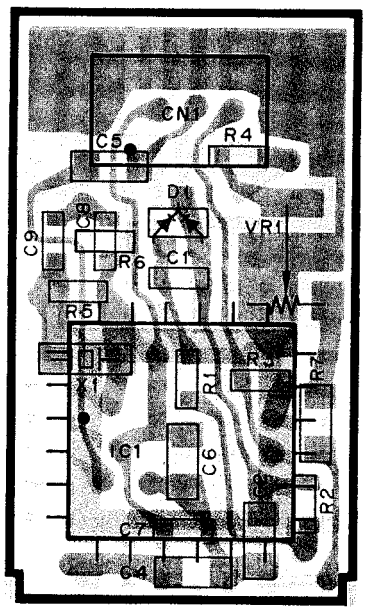
TSU-7 (CTCSS UNIT)

TSU-7 PC BOARD VIEWS

[Component side view]

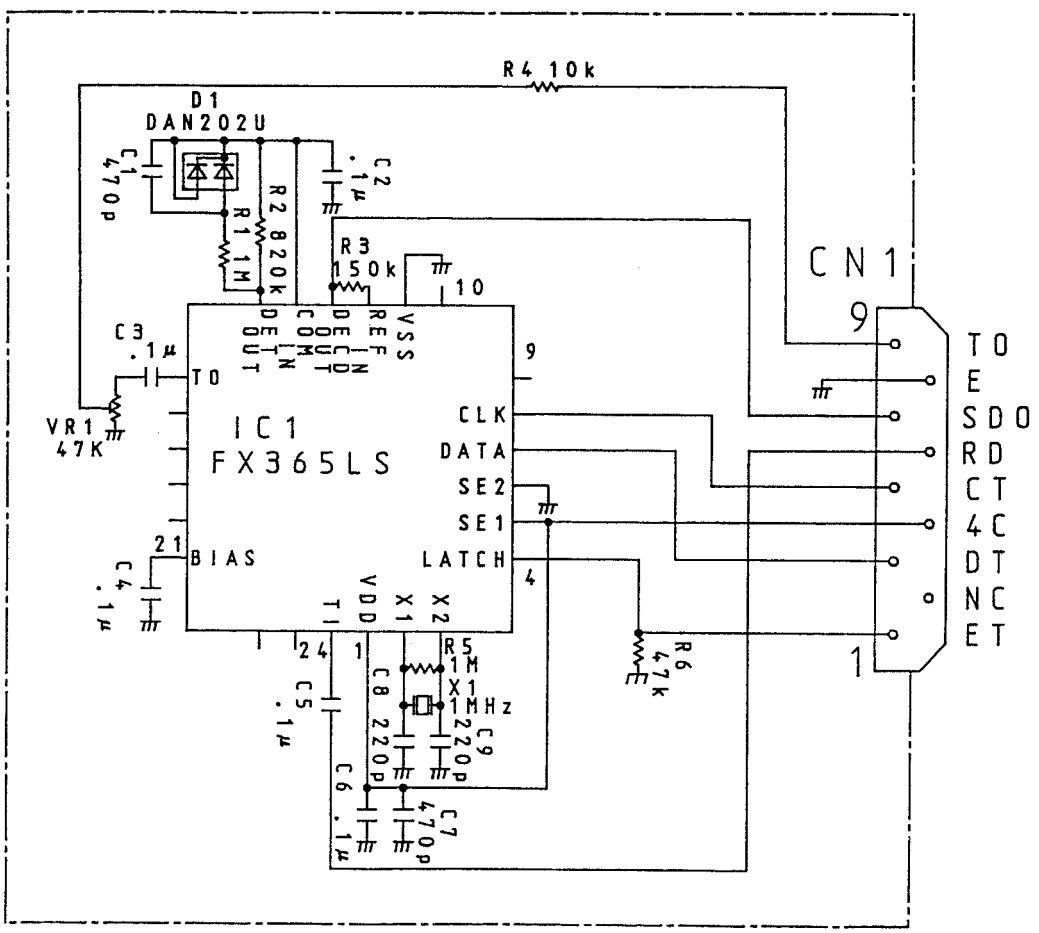


[Foil side view]



: Component side pattern : Foil side pattern

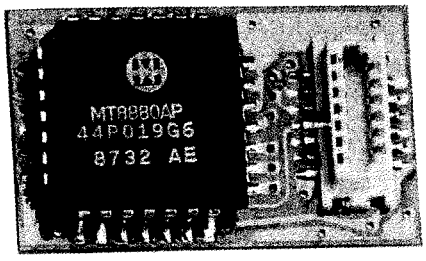
TSU-7 CIRCUIT DIAGRAM



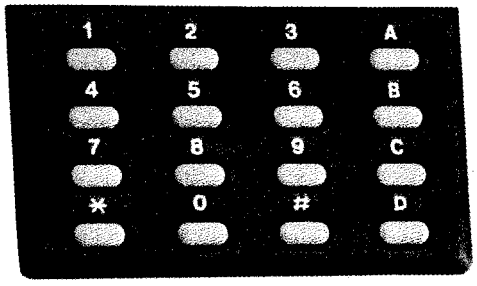
TH-26A/AT/E

DTU-1 (DTMF UNIT)/DTP-1 (KEY PAD UNIT)

DTU-1 EXTERNAL VIEW



DTU-1 EXTERNAL VIEW



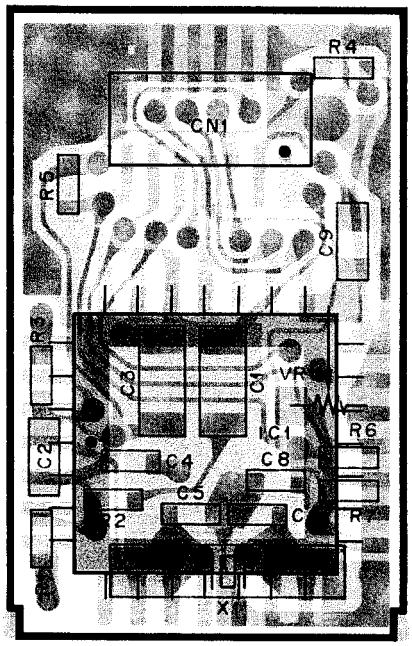
DTU-1 PARTS LIST

Ref. No	Address	Part	Parts No.	Description			Destination	Remarks
DTU−1 (X52−3160−00)								
			G10-0692-04	CUTTION				
			H21-0704-04	CUTTION				
X1		*	L78-0061-05	XTAL (3.58MHz)				
IC1		*	MT8880AP	IC				
VR1			R12-6428-05	TRIM. POT. (68K)				
R1. 2			RK73BG1J104J	CHIP R	J	100K		
R3			RK73BG1J334J	CHIP R	J	330K		
R4			RK73BG1J332J	CHIP R	J	3.3K		
R5			RK73BG1J223J	CHIP R	J	22K		
R6			RK73BG1J103J	CHIP R	J	10K		
C1-3			CK73FB1E104K	CHIP C	K	0.1UF		
C4			CK73GB1H471K	CHIP C	K	470pF		
C5. 6			CC73GCH1H330J	CHIP C	J	33pF		
C7			CK73GB1H103K	CHIP C	K	0.01UF		
C8			CC73CH1H101J	CHIP C	J	100pF		
C9			CK73FB1E104K	CHIP C	K	0.1UF		

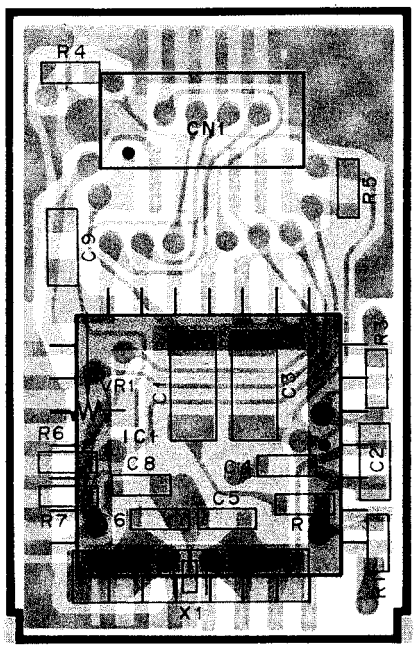
DTU-1 (DTMF UNIT)

DTU-1 PC BOARD VIEWS

[Component side view]

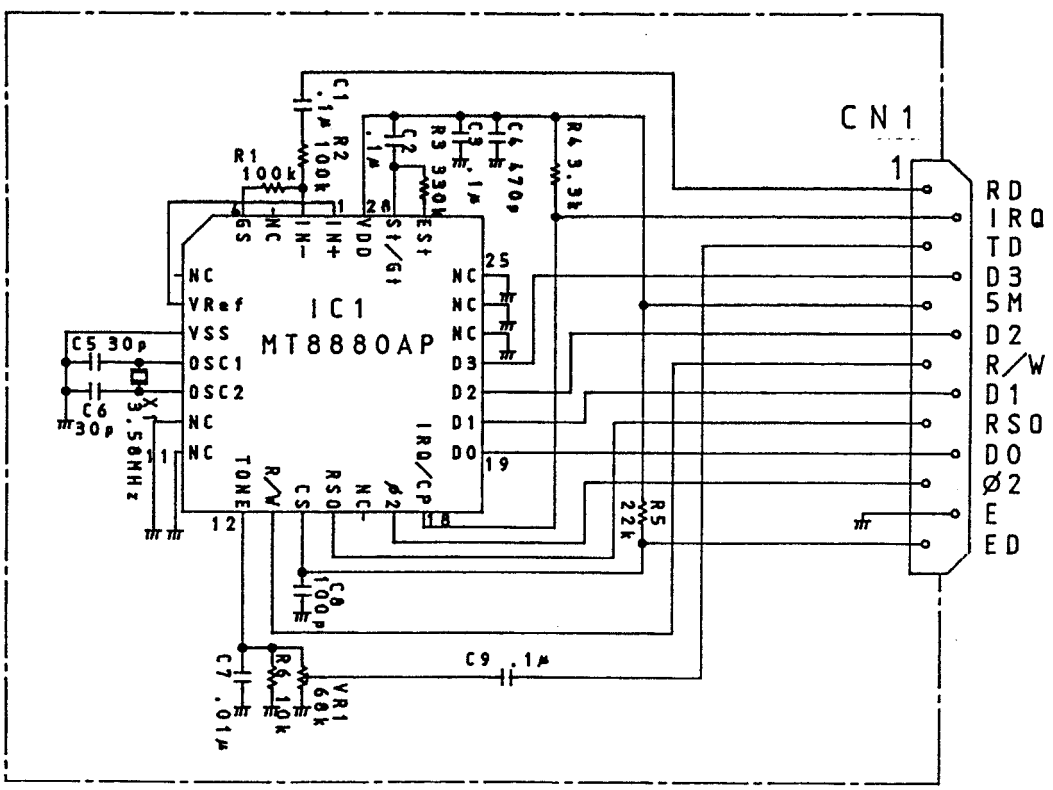


[Foil side view]



: Compon side pattern : Foil side pattern

DTU-1 CIRCUIT DIAGRAM



TH-26A/AT/E

SPECIFICATIONS

GENERAL	FREQUENCY RANGE	U.S.A. version		144 ~ 148 MHz
		European and U.K. version		144 ~ 146 MHz
		Others		144 ~ 148 MHz
	MODE			F3E (FM)
	MEMORY CHANNELS			20 X 1 (Call Channel)
	ANTENNA IMPEDANCE			50 Ω
	POWER REQUIREMENT	External power supply		6 ~ 16 VDC (13.8 VDC nominal)
		Battery terminal		5 ~ 15 VDC
	CURRENT DRAIN	HI	13.8 V (Ext. power suppply)	Less than 1.5 A
			7.2 V (Battery)	Approx. 1.0 A
		LO transmit mode		Approx. 0.5 A
		EL transmit mode		Approx. 0.12 A
		RECEIVE mode with no signal		Approx. 55 mA
		BATTERY SAVER mode		Approx. 17 mA
		AUTOMATIC POWER OFF mode		Approx. 6 mA
	GROUND			Nagative
	DIMENSIONS (W x H x D)	Projections not included		58 x 13.5 x 29.5 mm (2-9/32" x 5-11/32" x 1-5/32")
		Projections included		68.5 x 147.5 x 34 mm (2-11/16" x 5-13/16" x 1-11/32")
	WEIGHT	With NiCd Battery and Antenna		380 g (0.84 lbs)
	OPERATING TEMPERATURE			–20°C ~ +60°C (–4°F)
	MICROPHONE IMPEDANCE			2 kΩ
TRANSMITTER	OUTPUT POWER	HI	13.8 V (Ext. power supply)	More than 5 W
			7.2 V (Battery)	Approx. 2.5 W
		LO		Approx. 0.5 W
		EL		Approx. 20 mW
	MODULATION			Reactance
	MAXIMUM FREQUENCY DEVIATION			±5 kHz
	SPURIOUS RADIATION			Less than –60 dB
RECEIVER	DUTY CYCLE OPERATION			1 minute transmission 3 minutes reception recommended
	CIRCUITRY			Double conversion superheterodyne
	INTERMEDIATE FREQUENCY	1st IF		16.9 MHz
		2nd IF		455 kHz
	SENSITIVITY	12 dB SINAD		Less than 0.18 µV
	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) distortion)			More than 200 mW

Note
Circuit and ratings are subject to change without notice, due to development in technology.

KENWOOD CORPORATION

Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745, U.S.A.

KENWOOD ELECTRONICS DEUTSCHLAND GMBH
Rembrücker Str. 15, 6056 Heusenstamm, West Germany

KENWOOD ELECTRONICS BENELUX N.V.
Mechelsesteenweg 418 B-1930 Zaventem, Belgium

TRIO-KENWOOD FRANCE S.A.
13, Boulevard Ney, 75018 Paris, France

KENWOOD LINEAR S.P.A.
20125, Milano-via Arbe, 50, Italy

KENWOOD ELECTRONICS AUSTORALIA PTY. LTD.
(INCORPORATED IN N.S.W.)
4E. Woodcock Place, Lane Cove, N.S.W. 2066, Australia

KENWOOD & LEE ELECTRONICS, LTD.
Wang Kee Bilding, 5th Floor, 34-37, Connaught Road, Central, Hong Kong

KENWOOD ELECTRONICS CANADA INC.
P.O. BOX 1075, 959 Gana Court, Mississauga, Ontario, Canada L4T 4C2