144MHz FM TRANSCEIVER

TH-235A/E
TH-234
SERVICE MANUAL

KENWOOD

B51-8360-00 (B) 1189

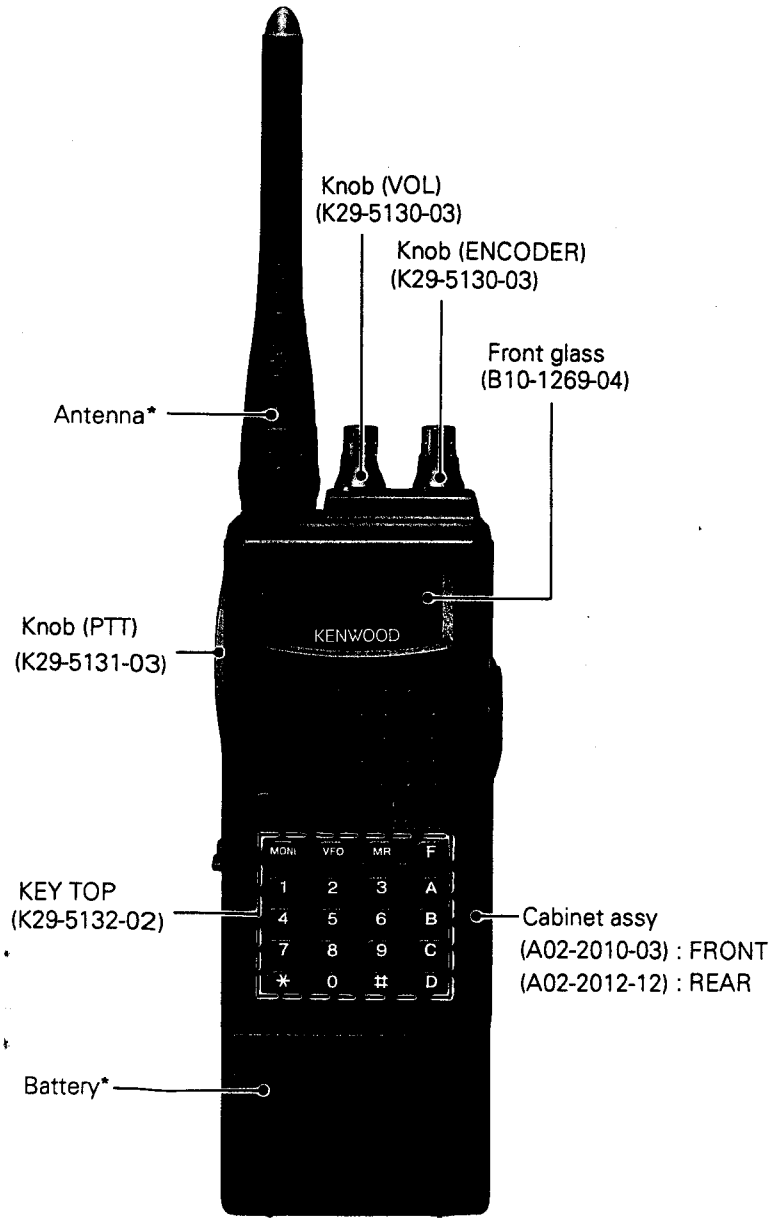

PHOTO is TH-235A

*Refer to parts list on page 18.

CONTENTS

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TH-235A/E/234

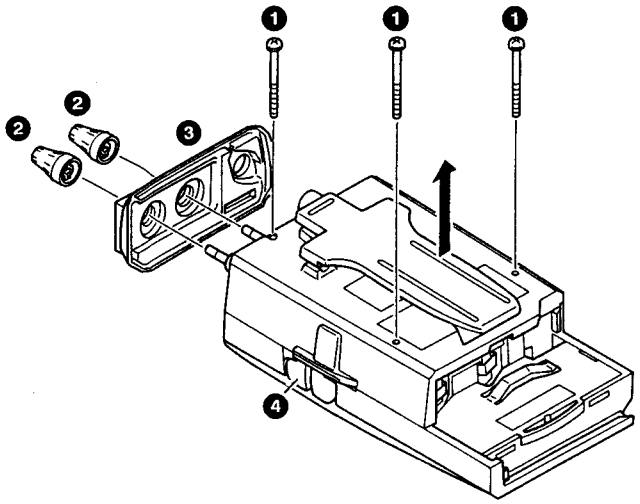
DESTINATION LIST

Model Name	Destination Mark	Destination	Unit No.	Operation Frequency Range (MHz)		Specification Frequency Range (MHz)		Step (kHz)	1750Hz Tone	Battery
				TX	RX	TX	RX			
TH-235A	K	USA	X57-5260-11	144~148	136~174	144~148	144~148	5	×	7.2V NiCd
TH-235A	K2	USA	X57-5260-11	144~148	136~174	144~148	144~148	5	×	
TH-235E	T	UK	X57-5260-51	144~146	144~146	144~146	144~146	12.5	○	7.2V NiCd
TH-235E	E	Italy, Germany	X57-5260-51	144~146	144~146	144~146	144~146	12.5	○	7.2V NiCd
TH-235E	E3	Spain, Holland, Belgium, France	X57-5260-51	144~146	144~146	144~146	144~146	12.5	○	7.2V NiCd
TH-235E	E4	Spain	X57-5260-51	144~146	144~146	144~146	144~146	12.5	○	12V NiCd
TH-235A	M	Asia	X57-5260-21	136~174	136~174	144~148	144~148	12.5	×	7.2V NiCd
TH-235A	M2	Latin America	X57-5260-21	136~174	136~174	144~148	144~148	12.5	×	7.2V NiCd
TH-235A	M3	Latin America	X57-5260-21	136~174	136~174	144~148	144~148	12.5	×	12V NiCd
TH-235A	A	Asia, Thailand	X57-5260-21	136~174	136~174	144~148	144~148	12.5	×	Mn Case
TH-234	A	Indonesia	X57-5260-21	136~174	136~174	144~148	144~148	12.5	×	Mn Case

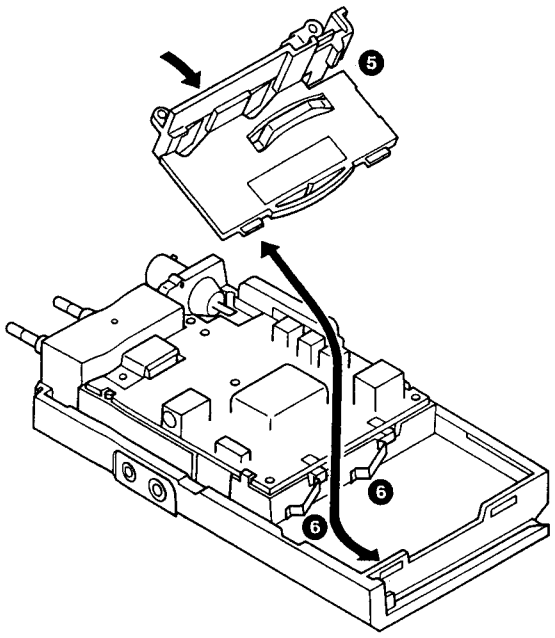
DISASSEMBLY FOR REPAIR

Removing the case.

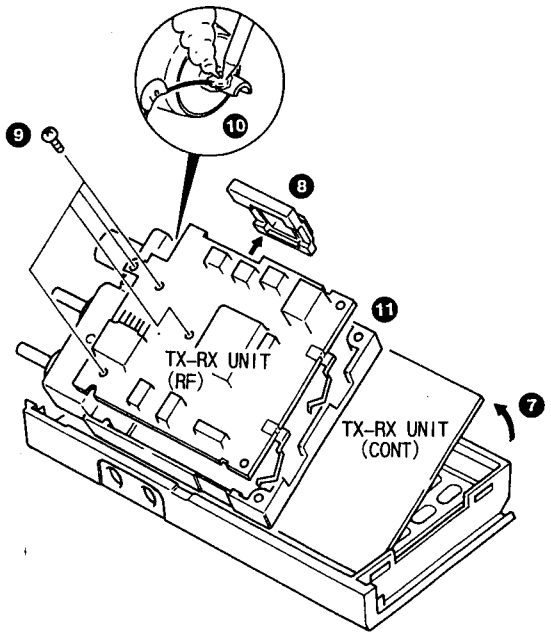
1. Remove the three long screws (❶) of the rear case. Then, remove the two knobs (❷), and remove the rubber panel (❸) while taking care not to give scar on it. Remove the rear case in the direction of the arrow. Remove the cap (❹) too.



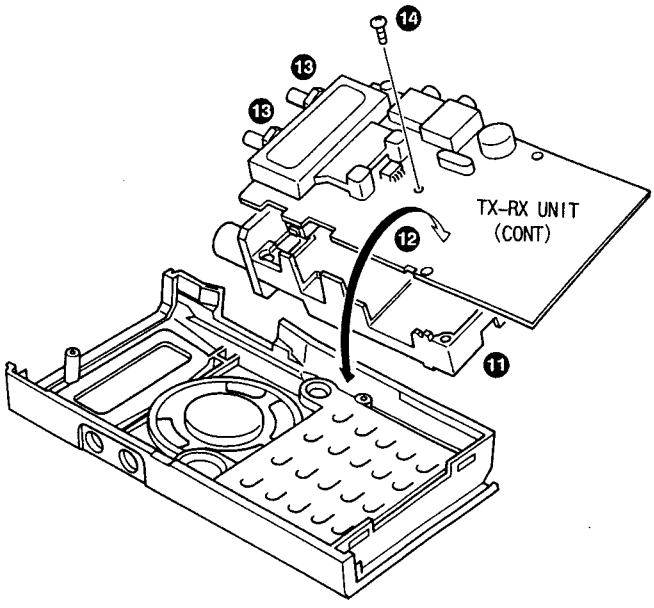
2. Remove the holder (❺) by lifting it up in the slanting upward direction while taking care not to bend the battery terminal (❻).



3. Remove the Chassis board while raising it in the direction of the arrow (❼).
   The knob (❽) is removed at the same time.
   The RF board can be removed from the chassis (❶❶) by removing the four screws (❾) and the soldering (❿).



4. Turn over the chassis board in the direction of the arrow (⓬).
   The Control board can be removed from the chassis (❶❶) by loosening the hexagon nut (⓭) and removing the screw (⓮).



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CIRCUIT DESCRIPTION

FREQUENCY CONFIGURATION

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

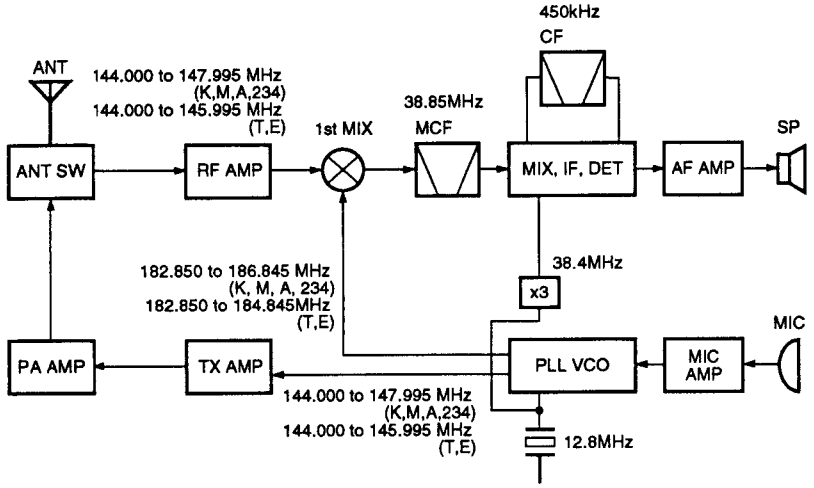

Fig. 1 Frequency configuration

Receiving system	Dobule superheterodyne system	
	First IF frequency	38.85MHz
	Second IF frequency	450kHz
Transmitting system	Direct conversion oscillating amplification system	
Modulation system	Variable reactance phase modulation	

Table 1 Basic configuration

RECEIVER SYSTEM

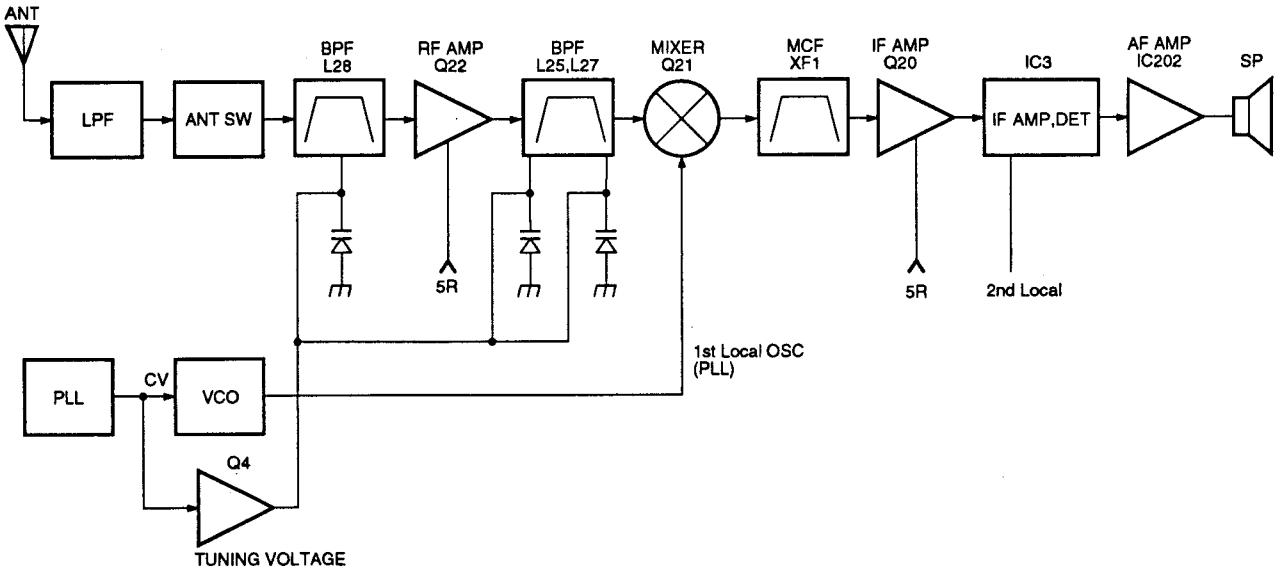

Fig. 2 Receiver section configuration

• RF amplifier

The signal from the antenna is passed through a low-pass filter and the transmission/reception selector circuit, and input to the RF amplifier.

The input signal is amplified by Q22. The unwanted frequency band of the signal is then eliminated by a band-pass filter.

This band-pass filter is a variable filter using a varicap, and operates so that it tunes to the receive frequency with the tuning voltage that is in proportion to the PLL lock voltage.

• First-stage mixer

The input signal is mixed with the first local oscillator output signal from the PLL circuit by the first-stage mixer Q21, producing a first IF signal. The unwanted frequency band of the first IF signal is eliminated by a two-stage monolithic crystal filters (MCF).

Item	Rating
Nominal center frequency (fo)	38.85MHz
Passband width	±7.5kHz more at 3dB
Attenuation band width	±25kHz less more at 40dB
Guaranteed attenuation	80dB or more at -910 kHz. Spurious : 20dB or more within ± 1MHz
Ripple	1dB or less
Insertion loss	3dB or less
Terminating impedance	500Ω/6pF

Table 2 MCF (L71-0491-05) characteristics (TX-RX unit XF1)

CIRCUIT DESCRIPTION

• IF amplifier

The first IF signal is amplified by Q20 and enters IC3 (FM signal processing IC) where it is mixed with the second local oscillator signal and so converted into the second IF signal. Here, the second local oscillator signal is generated by tripling the first local oscillator signal (12.8 MHz). The unwanted frequency band of the second IF signal is eliminated by ceramic filter CF1. The resultant signal is then amplified and detected.

Item	Rating
Center frequency of 6dB bandwidth(fo)	Within 450kHz±1.0kHz
6dB bandwidth	±7.5kHz or more
50dB bandwidth	±15kHz or less
Passband ripple	3dB or less
Guaranteed attenuation	45dB or more
Insertion loss	6dB or less
Input/output impedance	1.5kΩ

Table 3 Ceramic filter (L72-0944-05) characteristics (TX-RX unit CF1)

• AF amplifier

The frequency response characteristics of the audio signal output by the FM detector are corrected by the Q214 active high-pass filter and de-emphasis circuit consisting of R299 and C281.

The audio signal is then passed through an AF variable resistor and amplified by the power amplifier IC (IC202) to obtain the desired output.

• Squelch and mute circuit

The output signal which is detected by IC3 is input to the microprocessor analog port (pin-100) as the DC current. The input voltage to the microprocessor is A/D converted, and the microprocessor controls the MUTE, AFC0, and AFC1, thus controlling the audio signal. This port has hysteresis.

The microprocessor also controls the audio signal by controlling the MUTE, AFC0 and AFC1 during the CTCSS and DTSS operation modes.

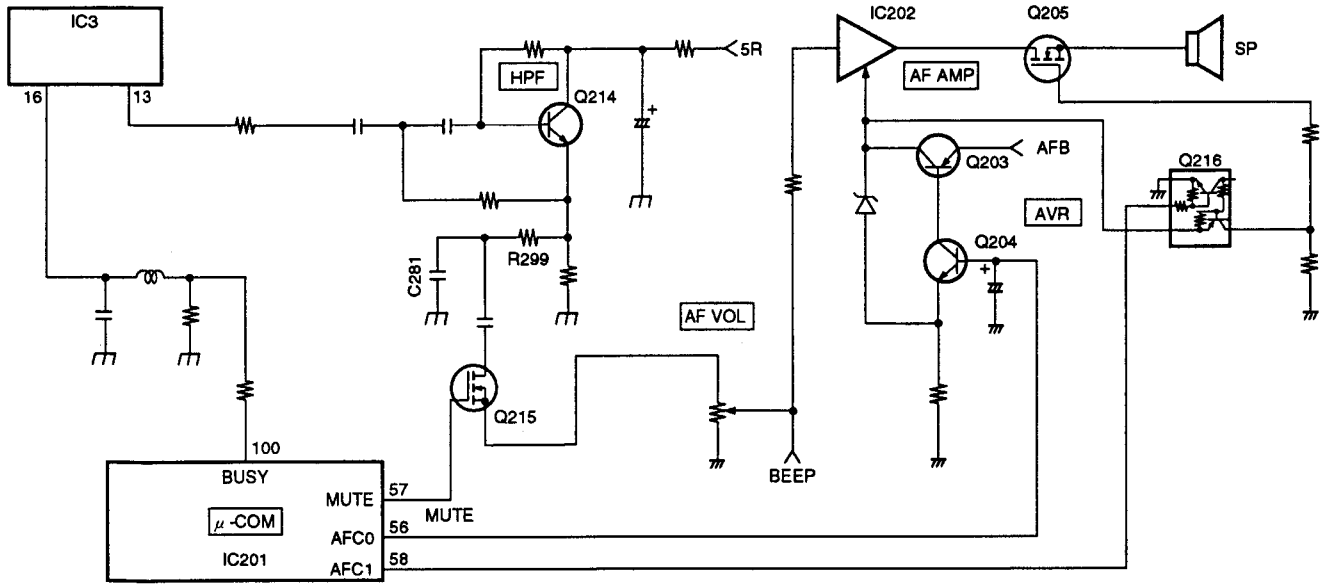

Fig. 3 AF amplifier, squelch and mute circuit

Conditions			MUTE	AFC0	AFC1
During transmission			L	L	L
During reception	Normal operation	When squelch is ON	L	L	L
		When squelch is OFF	H	H	H

MUTE : Muted when low.
AFC0 : Muted when low.
AFC1 : Muted when low.

Table 4 Mute operating conditions

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CIRCUIT DESCRIPTION

TRANSMITTING SYSTEM

• Microphone amplifier

The audio band of the signal coming from the microphone is corrected by the 6 dB/octave pre-emphasis circuit consisting of C264 and R271. The 18 dB/octave tone frequency component is eliminated by the high-pass filter consisting of C259, R277, C267 and R282, and the pre-emphasis circuit. This signal is amplified and limited by IC208 (1/2). Distortion components exceeding the audio band of the resultant signal are then eliminated by a splatter filter consisting of IC208 (2/2), and R284 and C268 with 18 dB/octave frequency correction.

The thermistor TH201 performs the deviation correction caused by temperature change.

• Modulation circuit

The audio signal from the microphone amplifier passes through the modulation adjustment variable resistor VR202, is applied the VCO varicap diode D6, and is phase-modulated by variable reactance.

• Drive and final circuit

The desired signal is produced directly by the VCO, and amplified to about 75 mVrms by the buffer amplifier. It is then amplified to about 1.4 Vrms by the drive circuit. The amplified signal is input to the power transistor Q14.
The audio signal is power-amplified to about 5 W output by the power transistor Q14.

• Transmission/reception selector circuit

The transmission output signal is passed through the transmission/reception selector circuit and low-pass filter to the antenna.

The transmission/reception selector circuit consisting of D12 and D14 is turned on during transmission and off during reception for switching the output signal.

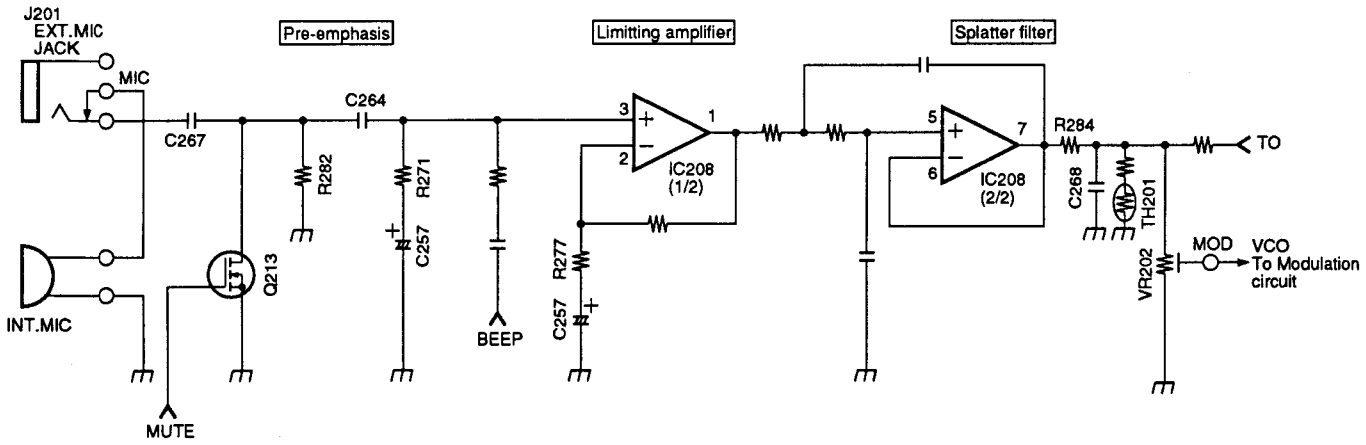

Fig. 4 Microphone amplifier

CIRCUIT DESCRIPTION

• APC and transmission output selector circuit

The automatic power control (APC) circuit is used to obtain a stable transmission current. This circuit detects the output power of the power transistor (Q14) and controls the APC voltage which then controls the transmission power.

The output amplitude of Q14 is rectified by D13 and D19, then compared with the reference voltage. Q16 forms a differential DC amplifier which controls the APC voltage that is generated by Q17 and Q18. This APC voltage controls the output of the drive amplifiers Q12 and Q13 to stabilize the transmission output power.

Either Hi power or the Low power of the transmission output is selected by the switch Q15 which changes the reference voltage.

• Temperature protection circuit

When the thermistor detects about 100°C, the temperature protection circuit turns Q23 on, reduces the APC voltage to prevent the drive amplifier and the power transistor from thermal breakdown.

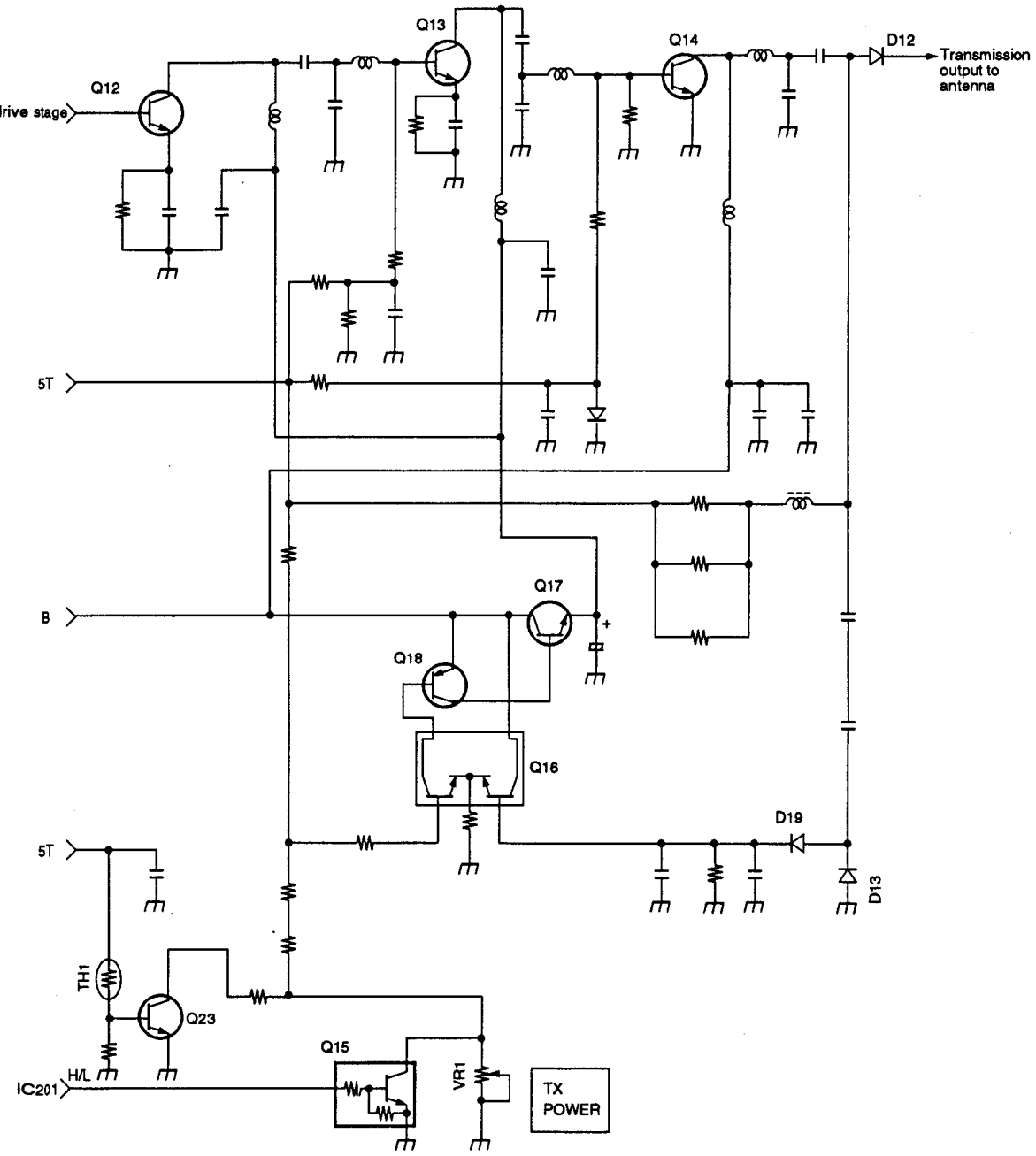

Fig. 5 APC circuit, transmission output selector circuit and temperature protection circuit

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CIRCUIT DESCRIPTION

PLL CIRCUIT

• PLL

Output from the 12.8 MHz reference oscillator consisting of X1 is divided by IC1 to produce a 5 kHz or 6.25 kHz reference frequency. The comparison frequency is obtained by amplifying the VCO output by Q5 and dividing it by the PLL IC (IC1).

5, 10, 12.5, 15, 20, 25, 50 or 100 kHz PLL synthesizer is implemented by phase-comparing the reference frequency with the comparison frequency obtained by dividing X1.

The pulse output from pins-18 and -20 of IC1 according to the difference between the reference frequency and the comparison frequency is passed through the charge pump (Q2 and Q3), and is removed the ripple by a low-pass filter to produce the lock voltage.

The power supply of the charge pump is raised to about 10 V from 5C by the DC-DC converter.

• VCO

The Colpitts oscillator using Q7 (FET) directly oscillates the desired frequency. The oscillating frequency is changed by applying the lock voltage to the varicap diodes D4 and D5. The T/R line goes "Low" during transmission. Q6 and D7 are turned off to change over the oscillating frequency.

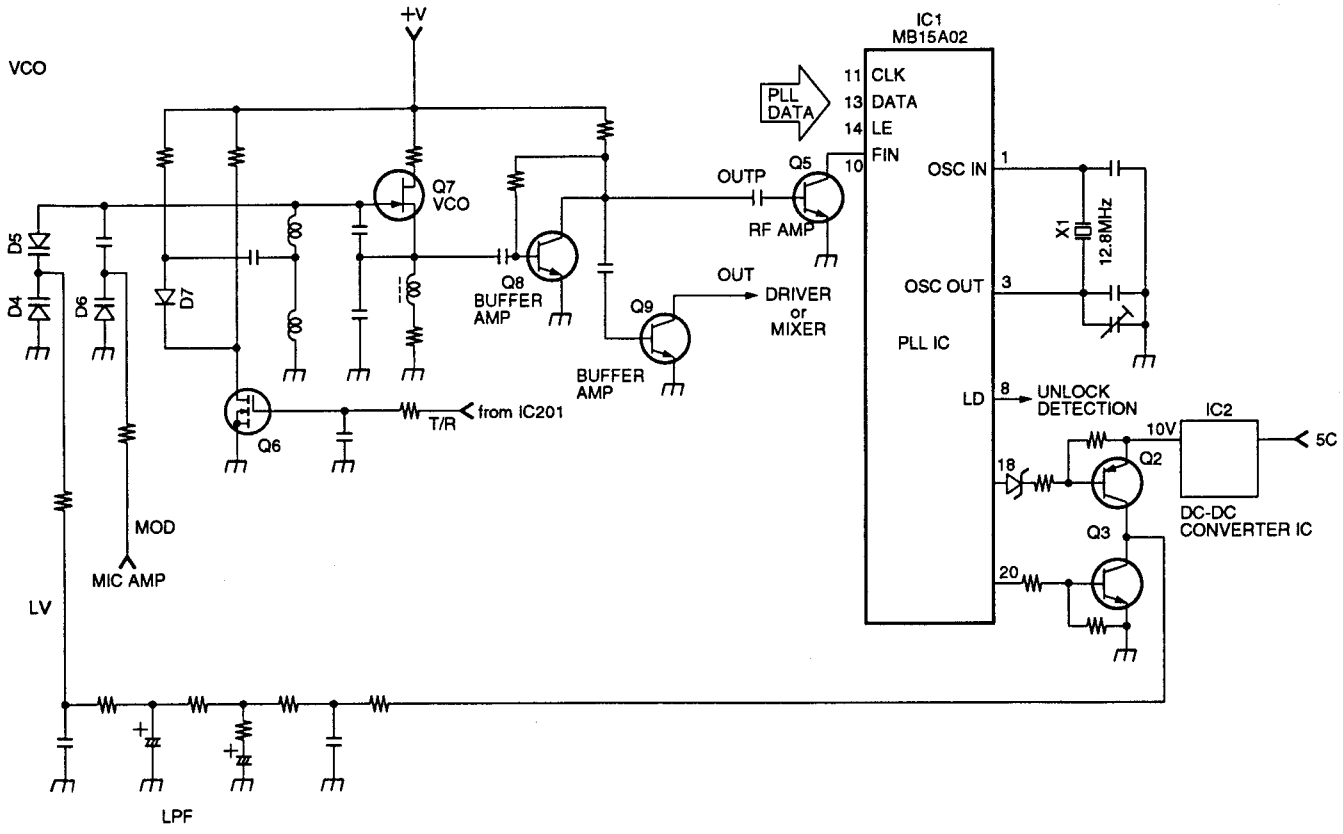

Fig. 6 PLL and VCO circuit

• Unlock detection circuit

When the PLL is unlocked, the output pulse from the LD pin (pin-8) of IC1 is waveform-shaped by D3, C5, R3 and C132 to set the LD terminal to the "High" level. The microprocessor monitors the voltage at the LD pin to control the transmission or reception selection timing.

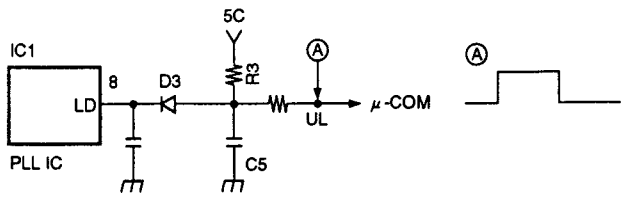

Fig. 7 Unlock detection circuit

CIRCUIT DESCRIPTION

DIGITAL CONTROL CIRCUIT

• Keys and rotary encoder circuit

The signals from the keys and rotary encoder are directly input to the microprocessor as shown in Figure 8.

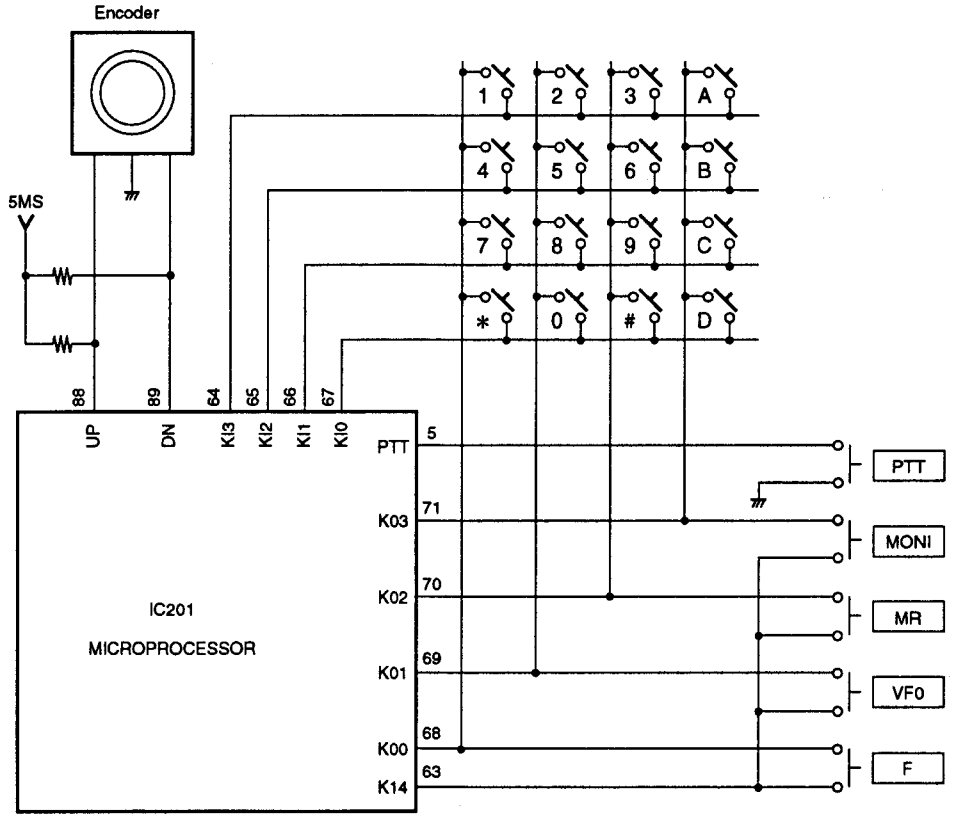

Fig. 8 Keys and rotary encoder circuit

CIRCUIT DESCRIPTION

• Reset and backup circuit

When the MB is turned on, a "High" level pulse resets the microprocessor (IC201). When the MB is turned off, the voltage detection IC (IC207) detects a 5M voltage drop and sets the output from "High" to "Low". When the microprocessor port INT goes "Low", the microprocessor outputs data to IC205 (EEPROM) and enters the backup mode. The EEPROM receives data while C232 is discharging and the data is internally written.

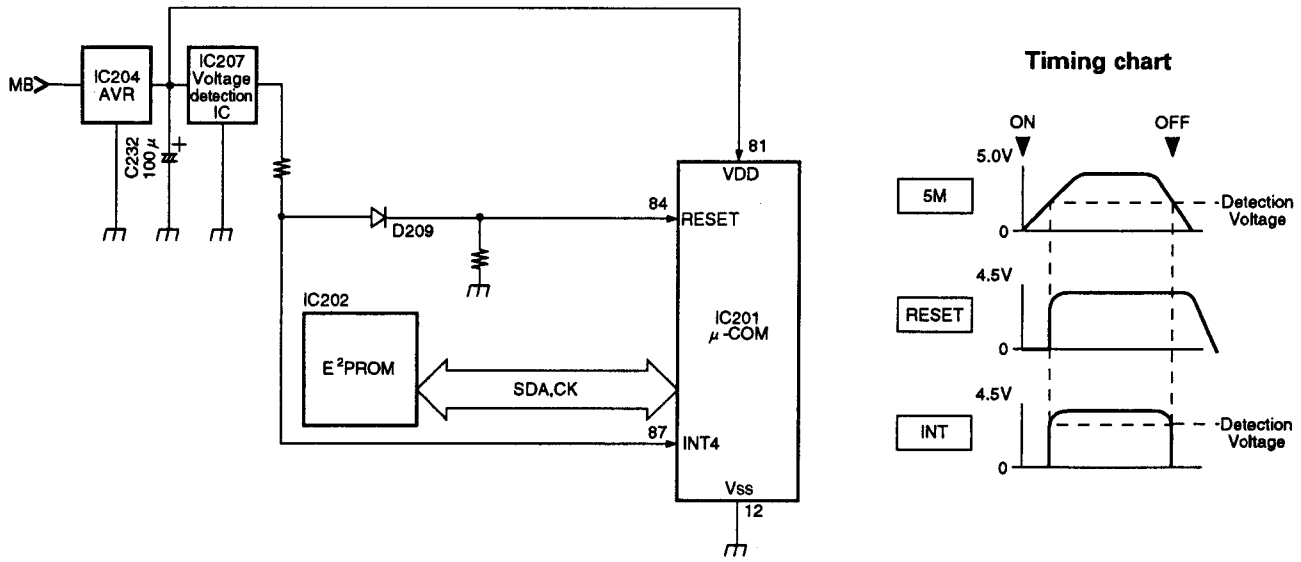

Fig. 9 Reset and backup circuit

• Battery voltage detection circuit

The power supply voltage is divided and input to the analog port (pin-2) of the microprocessor. When the input voltage is over 18V. "dCErr" message appears on display and warning sound beeps.

• Lamp circuit

When the microprocessor port LAMP goes "High" level, Q201 is turned on which turns on the LED.

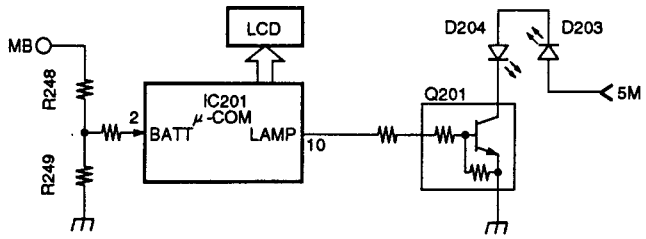

Fig. 10 Battery voltage detection circuit and lamp circuit

CIRCUIT DESCRIPTION

POWER SUPPLY CIRCUIT

• Nickel-cadmium battery charging circuit

The constant current circuit consisting of Q1 and D1 supplies the constant current of about 70 mA to the Nickel-cadmium battery from the external power supply connected to the DC IN pin. The constant current circuit does not work if any external power supply is connected to the DC IN pin.

• Power selector circuit

Configuration of the power supply circuit is shown in Figure 11. The power is distributed as shown.

- B — Power supply voltage of APC circuit and Q14
- AFB — Power supply voltage of AVR of the AF amplifier
- MB
  - 5M — VDD of IC201 (microprocessor), VDD of IC205 (EEPROM), VDD of IC207 (voltage detection), POWER switch and reference voltage of 5T and 5C
  - 5MS — VDD of IC203 (DTMF decoder IC), and reference voltage of 5T and 5C
- RB
  - 5C — VDD of Q8 and Q9 (VCO buffer amplifier), VDD of CTCSS, VDD of IC2 (DC-DC converter) and VDD of IC1 (PLL IC)
    - 5R — VDD of IC3 (FM IC) and VDD of receiver stage
  - 5T — VDD of IC208 (microphone amplifier), VDD of drive stage, bias voltage of protection circuit, and switch of D12 and D14 (transmission/reception selector switch)

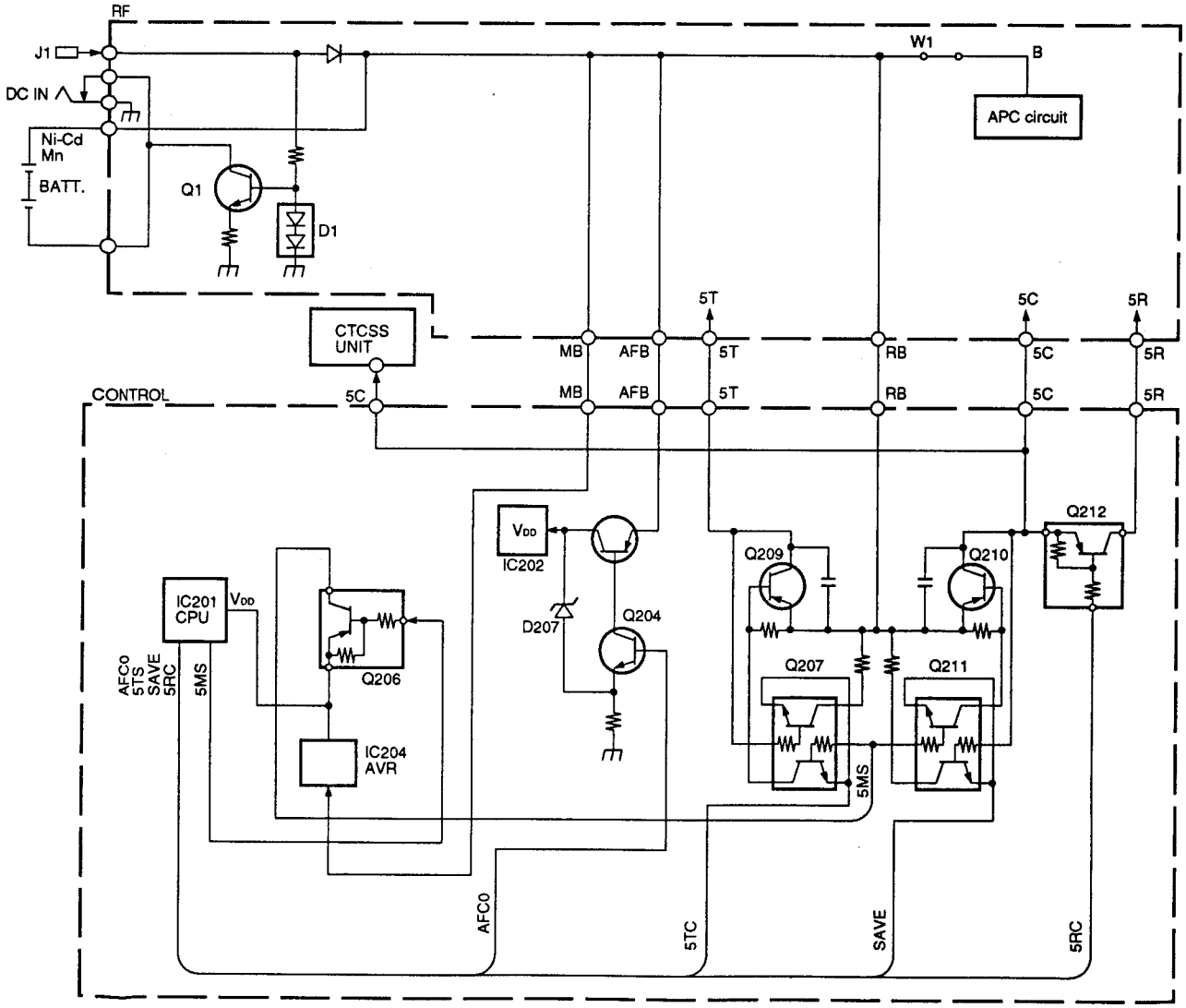

Fig. 11 Power supply circuit

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CIRCUIT DESCRIPTION

• Battery save circuit

The power circuit enters the battery save mode if no key is pressed for 10 seconds or more while the squelch is switched in during reception state (SCAN OFF).

In the battery save mode, the output signal from the SAVE pin of the microprocessor turns Q211 on and off with the on/off ratio of about 200 ms vs. about 800 ms (on/off ratio of about 200 ms vs. about 125 ms when the DTSS function and paging function are turned on.) As the result, power consumption in the standby state is reduced by controlling the 5C AVR consisting of Q210 which turns 5R on and off.

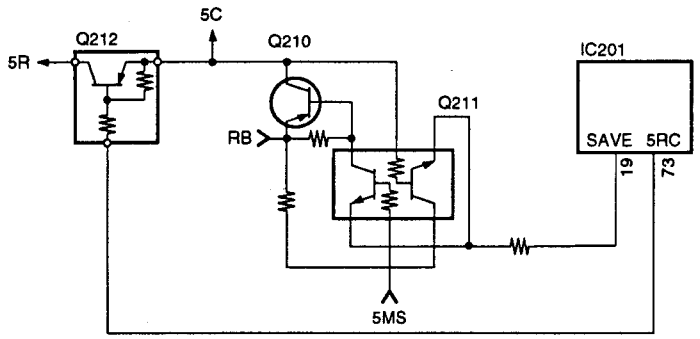
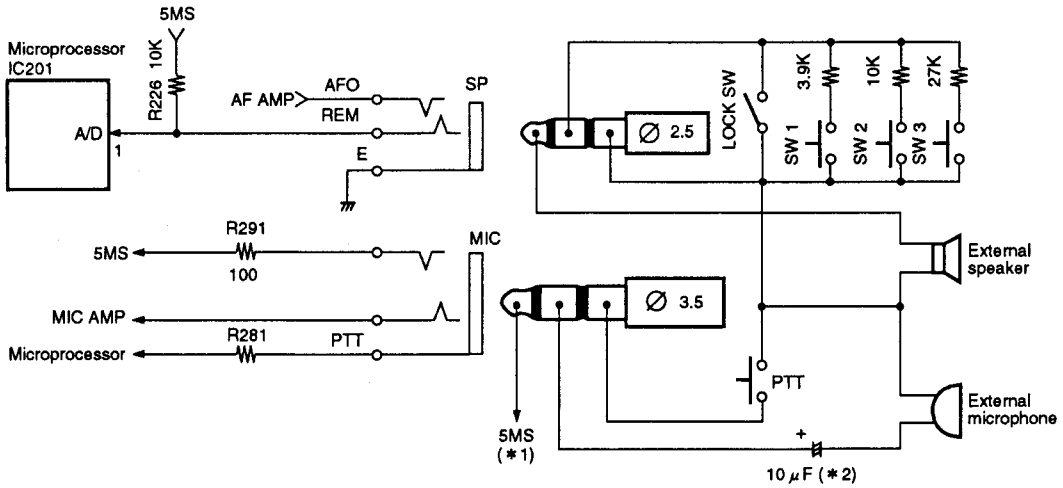


Fig. 12 Battery save circuit

• Remote control circuit

The remote control operation corresponding to the input digital voltage connected to the A/D pin, is performed by the remote control circuit.

The voltage at the A/D pin is normally maintained to about 5 V by means of R226. When the microphone button of the remote control unit is pressed, this voltage is changed to the voltage value divided by the resistor connected in series with the switch pressed and R226. The resultant voltage indicates which button is pressed.



*1 : Voltage appears from the internal 5MS line (5 V) via R291. It is about 4.5 V when 5 mA flows.

*2 : The capacitor is not necessary in the following cases: Make a direct connection.
When a capacitor to cut the DC voltage is connected to the external device.
When a two-terminal capacitor microphone is used as the external microphone.

Fig. 13 Speaker, microphone jack and remote control circuit

CIRCUIT DESCRIPTION

SUPPLIED CIRCUIT

• CTCSS

The tone frequency is set by the serial data from the microprocessor (IC201). The audio signal is input from the CI pin of the detection output.

When the tones agree, the SDO pin is set to "Low" level. The microprocessor monitors the SDO pin and makes the judgment to control the MUTE, AFC0 and AFC1 pins.

During the CTCSS signal transmission mode, the CTCSS signal is output from the microprocessor through a low-pass filter and modulated.

• DTSS

Input and output of the DTMF code is controlled by the serial data from the microprocessor. The audio signal is input from the CI pin as in the CTCSS. When the DTMF signal is detected, the data is sent to the microprocessor. The microprocessor judges if the codes agree. The MUTE, AFC0 and AFC1 pins are controlled in accordance with the result of the judgment.

During transmission of the DTMF signal, the DTMF signal is output from the microprocessor. The DTMF signal is modulated after passing through the microphone amplifier.

The MUTE pin goes "Low" level during transmission of the DTMF signal which mutes the MIC audio signal. At the same time, AFC0 and AFC1 are turned on enabling monitoring the DTMF signal from the SP.

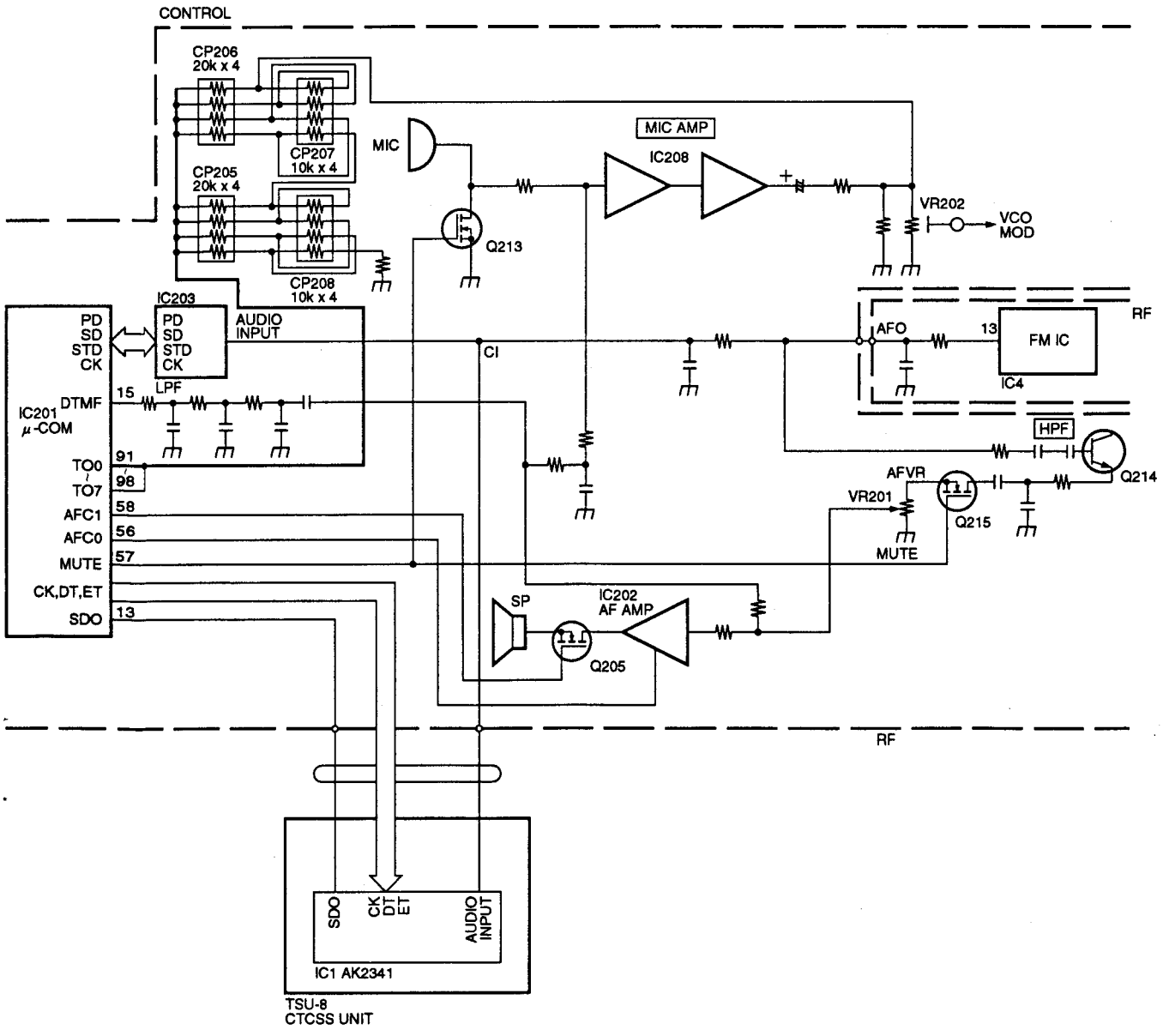


Fig. 14 Supplied circuit connection diagram (DTMF, CTCSS, BEEP and TONE)

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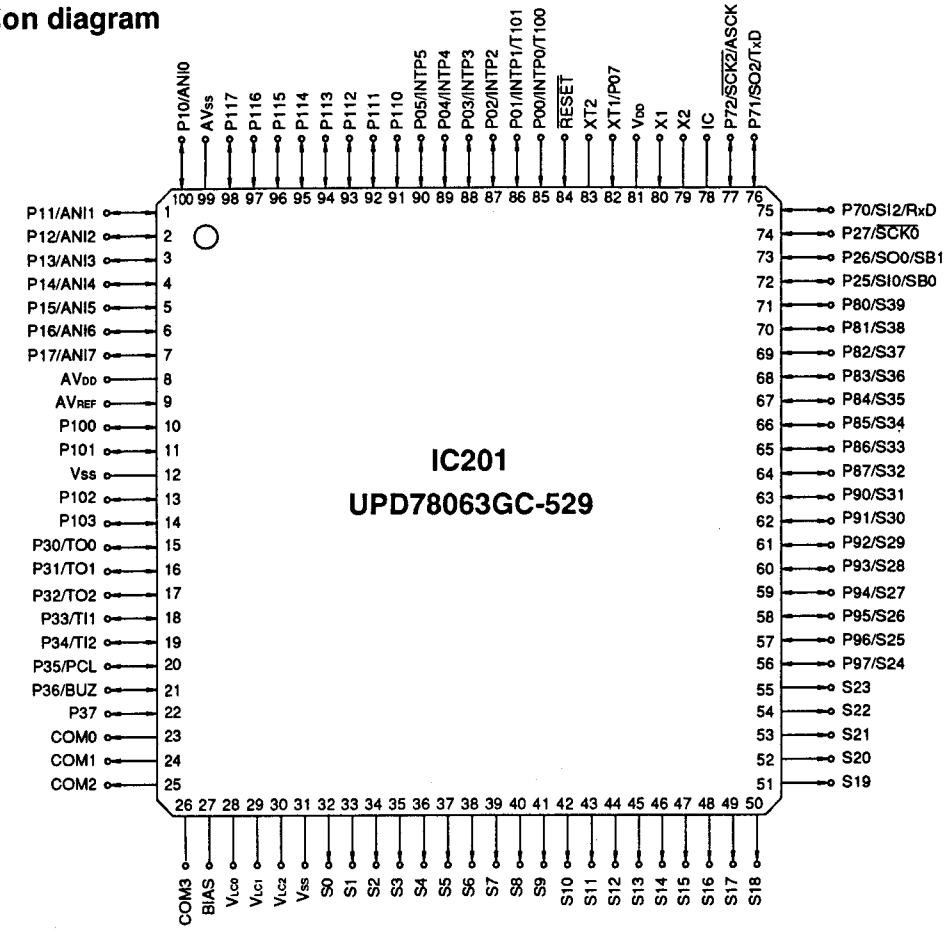
SEMICONDUCTOR DATA

Microprocessor : UPD78063GC-529 (IC201)

- **Pin connection diagram**



- **Pin function**

Pin No.	Pin name	Port name	I/O	Function
1	P11/ANI1	A/D	I	Voltage input for remote control switch
2	P12/ANI2	BATT	I	Battery voltage input
3	P13/ANI3	STD	I	DTMF detection signal input
4	P14/ANI4	SD	I	DTMF data input
5	P15/ANI5	PTT	I	PTT SW key-entry
6	P16/ANI6	CK	O	Clock output to CTCSS, DTSS, PLL, EEPROM
7	P17/ANI7	PD	O	DTMF power down control (H: Power down; L: Normal mode)
8	AV_{DD}	AV_{DD}	I	A/D converter power supply
9	AV_{REF}	AV_{REF}	I	A/D converter reference voltage input
10	P100	LAMP	O	Lamp control (H: On; L: Off)
11	P101	H/L	O	Transmission output switching control
12	V_{SS}	V_{SS}		Ground
13	P102	SDT	I	CTCSS match/unmatch detection pin (TSU-8) (L: Match; H: Unmatch)
14	P103	ET	I/O	TSU-8 connection check pin (H: Unconnected; L: Connected) TSU-8 enable pin
15	P30/TO0	DTMF	O	DTMF output
16	P31/T01	T/R	O	VCO shift selector (H: RX; L: TX)
17	P32/TO2	BEEP	O	Beep tone output, 1,750 Hz
18	P33/TI1	TEST	I	Line mode on-off control (H: Off; L: On)
19	P34/TI2	SAVE	O	Save control (H: On; L: Off)

SEMICONDUCTOR DATA

Pin No.	Pin name	Port name	I/O	Function
20	P35/PCL	4.19	O	Clock output to DTSS IC XIN (4.19 MHz)
21	P36/BUL	5TC	O	Sending side power supply control (H: Off; L: On)
22	P37	SDA	O	EEPROM data output pin
23	COM0	COM0	O	LCD common signal output pin 0 (Connect to LCD C0.)
24	COM1	COM1	O	LCD common signal output pin 1 (Connect to LCD C1.)
25	COM2	COM2	O	LCD common signal output pin 2 (Connect to LCD C2.)
26	COM3			Open
27	BIAS			Connect to V_{LCD} port.
28	V_{LC0}			Connect to BIAS port.
29	V_{LC1}			Connect to split resistor.
30	V_{LC2}			Connect to split resistor.
31	V_{SS}	V_{SS}		GND
32-55	S0-S23	SEG0-SEG23	O	LCD segment signal output pins
56	P97/S24	AFC0	O	Audio amplifier power supply control (H: Off; L: On)
57	P96/S25	MUTE	O	Mute control (H: Microphone mute; L: AF mute)
58	P95/S26	AFC1	O	Audio output on-off SW (H: On; L: Off)
59-62	P94/S27-P91/S30	SIN3-SIN0	I	Destination input pins
63	P90/S31	KI4	I	Key scan input pin 4
64	P87/S32	K13	I	Key scan input pin 3
65	P86/S33	K12	I	Key scan input pin 2
66	P85/S34	K11	I	Key scan input pin 1
67	P84/S35	K10	I	Key scan input pin 0
68	P83/S36	K00	O	Key scan output pin 0 (The scan output is latched when this pin is set at L.)
69	P82/S37	K01	O	Key scan output pin 1 (The scan output is latched when this pin is set at L.)
70	P81/S38	K02	O	Key scan output pin 2 (The scan output is latched when this pin is set at L.)
71	P80/S39	K03	O	Key scan output pin 3 (The scan output is latched when this pin is set at L.)
72	P25/S00	CH	I	Channel display (L: Normal mode; H: CH display mode)
73	P26/S00/SB1	5RC	O	Receiving side power supply control (H: Off; L: On)
74	P27/SCKO	EP	O	PLL enable pin
75	P70/SI2/RxD	RXD	I	RS-232C data input pin
76	P71/SO2/TxD	TXD	I/O	RS-232C data output pin
77	P72/SCK2/ASCK	DT	O	Data output to PLL, CTCSS
78	IC (V_{PP})	IC	I	Connect to GND.
79	X2	XIN		Connect to 4.19 MHz port.
80	X1	XOUT		
81	V_{DD}	V_{DD}	I	Power supply
82	XT1/P07	KEYCH	I	Channel display with key lock function (H: Normal mode; L: CH display mode with key lock)
83	XT2	–		Open
84	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$	I	Reset input pin (L: Reset)
85	P00/INTP0/TIO0	UL	I	Unlock detection pin (H: Lock; L: Unlock)
86	P01/INTP1/TIO1	PWR	I	Power key switch (300 ms or more)
87	P02/INTP2	INT	I	Power supply detection port (H: Power ON)
88	P03/INTP3	UP	I	Encoder data input
89	P04/INTP4	DN	I	Encoder data input
90	P05/INTP5	5MC	O	Main power on-off control (H: Off; L: On)
91-98	P110-P117	T00-T07	O	Tone output pins
99	AV_{SS}	AVSS	O	Analog power GND
100	P10/ANI0	BUSY	I	Squelch circuit voltage input

TH-235A/E/234

DESCRIPTION OF COMPONENTS

TX-RX Unit (X57-5260-XX)

O-11 : K, K2 O-51 : T, E, E3, E4 O-21 : M, M2, M3, A

Ref. No.	Use/Function	Operation/Conditions/Compatibility
IC1	PLL IC	
IC2	DC • DC converter	Outputs abt. twice the input voltage (5V).
IC3	FM IC	Second mixer, quadrature detector, AF output & noise amplifier output
IC201	Microprocessor	
IC202	AF power amplifier	
IC203	DTMF receiver	
IC204	5V AVR	
IC205	E^2PROM	
IC207	Voltage detection	
IC208	Microphone amplifier	Limiting amplifier, active low-pass filter
Q1	Constant-current circuit	Active when the Ni-Cd battery is charged.
Q2, Q3	Charge pump	
Q4	DC buffer amplifier	
Q5	RF amplifier	PLL IC, 10-pin IN (fin amplifier)
Q10	Ripple filter	
Q11	RF power amplifier	First stage of driver
Q12	RF power amplifier	
Q13	RF power amplifier	Final stage of driver
Q14	Transmitter power amplifier	
Q15	Transmitter power changeover SW	
Q16	APC differential DC amplifier	See the description of the APC circuit and transmitter switching circuit given in the Circuit Description section.
Q17, Q18	APC voltage control circuit	See the description of the APC circuit and transmitter switching circuit given in the Circuit Description section.
Q19	Local signal frequency tripler	Triples the input frequency of 12.8MHz to obtain the second local signal.
Q20	IF amplifier	MCF post amplifier
Q21	First mixer	144MHz band → 38.85MHz band
Q22	RF amplifier	144MHz first stage of receiving
Q23	Temperature protector	
Q201	Lamp switch	
Q203	AVR	AF amplifier power supply
Q204	Error amplifier	Q203 bias control
Q205	Mute switch	Receiver aural signal turns ON when this switch is positioned at "H".
Q206	5M SW	5M SW "L" : ON
Q207	5T SW	Q209 output control
Q209	AVR	5T
Q210	AVR	5C
Q211	5C SW	Q210 output control
Q212	5R SW	5R output control
Q213	Mute switch	Receiver aural signal turns OFF when this switch is positioned at "H".
Q214	Active high-pass filter	
Q215	Mute switch	Receiver aural signal turns ON when this Mute switch is set at position "H".

DESCRIPTION OF COMPONENTS

Ref. No.	Use/Function	Operation/Conditions/Compatibility
Q216	AF amplifier power SW	ON when this switch is positioned at "L".
D1	Constant-voltage circuit	
D2	Reverse-current protector	
D3	Waveform shaper	
D8	Quick charger	5C ripple filter
D10	RF SW	ON at sending
D11	Q14 protection diode	
D12, D14	Transmit-receive ON-OFF SW	ON at sending; OFF at receiving
D13, D19	APC circuit	
D15	Startup diode	Double voltage generator for IC2
D16, 17, 18	Receive shift	
D20, D24	Reverse-current protector	
D201, 202	Reverse-current protector	
D203, 204	LED	LAMP
D207	Constant-voltage circuit	AF amplifier power supply
D208, 209	Reverse-current protector	

VCO (X57-5260-XX)

Ref. No.	Use/Function	Operation/Conditions/Compatibility
Q6	Transmit-receive changeover SW	Frequency mode is 'receive' when this SW is positioned at "L".
Q7	Oscillation amplifier	
Q8, Q9	Buffer amplifier	
D4, D5	VCO frequency control	
D6	Modulator	
D7	Frequency shift	

TH-235A/E/234

PARTS LIST

* New Parts. ⚠ indicates safety critical components.
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.

TH-235A/E, 234

Ref. No.	Address	New parts	Parts No.	Description		Destination
1	1A	*	A02-2010-03	CABINET ASSY (FRONT)		
2	3A	*	A02-2012-12	CABINET (REAR)		
3	2B		A02-2042-02	BATTERY CASE ASSY (BT-10)	ACSY	A,234
4	3A	*	A62-0491-02	PANEL		
7	3A	*	B09-0358-03	CAP (SP/MIC/DC)		
8	1A	*	B10-1269-04	FRONT GLASS		
9	3B		B42-3394-14	STANDARD LABEL (FCC)		K,K2
9	3B	*	B42-5708-04	STICKER		M,M2,M3,A
9	3B	*	B42-5708-04	STICKER		234
10	3B		B42-5650-02	S/NO LABEL		
12	-	*	B42-5724-04	STICKER		K,K2,M
12	-	*	B42-5724-04	STICKER		M2,M3,A
12	-	*	B42-5724-04	STICKER		234
14	-		B46-0310-03	WARRNTY CARD	ACSY	T,E,E3,E4
17	-		B46-0469-00	WARRNTY CARD	ACSY	K,K2
18	-	*	B62-0750-00	INSTRUCTION MANUAL	ACSY	K,K2,T,E
18	-	*	B62-0750-00	INSTRUCTION MANUAL	ACSY	E3,E4,M
18	-	*	B62-0750-00	INSTRUCTION MANUAL	ACSY	M2,M3,A
19	-	*	B62-0751-00	INSTRUCTION MANUAL	ACSY	K,K2
19	-	*	B62-0751-00	INSTRUCTION MANUAL	ACSY	E3,E4
19	-	*	B62-0751-00	INSTRUCTION MANUAL	ACSY	M,M2,M3
20	-	*	B62-0752-00	INSTRUCTION MANUAL	ACSY	E
21	-	*	B62-0753-00	INSTRUCTION MANUAL	ACSY	E
22	-	*	B62-0754-00	INSTRUCTION MANUAL	ACSY	E3
23	-	*	B62-0755-00	INSTRUCTION MANUAL	ACSY	E3
26	-	*	B62-0790-00	INSTRUCTION MANUAL	ACSY	234
27	3A		B72-0881-04	MODEL NAME PLATE		E3
28	3A	*	B72-1181-04	MODEL NAME PLATE		K,K2
28	3A	*	B72-1182-04	MODEL NAME PLATE		T,E,E3,E4
28	3A	*	B72-1260-04	MODEL NAME PLATE		234
30	2A		E04-0181-05	RF COAXIAL CABLE RECEPTACLE		
31	-		E19-0254-05	AC CONVERSION PLUG	ACSY	M3
32	2A	*	E23-1021-04	TERMINAL (BATTERY)		
33	1A	*	E29-1159-05	INTER CONNECTOR		
36	2A	*	F10-2244-04	SHIELDING COVER (X tal)		
37	2A	*	F10-2245-04	SHIELDING COVER (TR)		T,E,E3,E4
38	3A		G11-0701-04	SHEET		E3
39	2A	*	G11-0797-04	SHEET (LCD)		
43	-	*	H12-3006-03	PACKING FIXTURE (BODY:LOWER)		
44	-	*	H12-3007-03	PACKING FIXTURE (BODY:UPPER)		
48	-	*	H12-3008-03	PACKING FIXTURE (CHAGER)		K,T,E,E3
48	-	*	H12-3008-03	PACKING FIXTURE (CHAGER)		E4,M3
49	-	*	H12-3009-03	PACKING FIXTURE (STD CHAGER)		M,M2
53	-	*	H13-1004-04	CARTON BOARD		T,A,234
54	-	*	H13-1010-04	CARTON BOARD		K,K2,T
54	-	*	H13-1010-04	CARTON BOARD		E,E3,E4
54	-	*	H13-1010-04	CARTON BOARD		M,M2,M3
55	-		H25-0762-04	BAG		
56	-	*	H52-0924-02	ITEM CARTON CASE		K,M3
56	-	*	H52-0925-02	ITEM CARTON CASE		K2,A
58	-	*	H52-0930-02	ITEM CARTON CASE		T,E,E3,E4
58	-	*	H52-0931-02	ITEM CARTON CASE		M,M2
59	-	*	H52-0971-02	ITEM CARTON CASE		234
61	2B	*	J19-1594-12	HOLDER		

TX-RX UNIT(X57-5260-XX)

Ref. No.	Address	New parts	Parts No.	Description		Destination
62	-	*	J29-0631-13	BELT HOOK	ACSY	
65	3A	*	K29-5130-03	KNOB (VOL/ENC)		
66	3B	*	K29-5131-03	KNOB (PTT)		
67	1B	*	K29-5132-02	KEY TOP		
A	2A		N30-2606-46	PAN HEAD MACHIN SCREW (BNC/TR)		
B	1A,2A		N83-2004-46	SCREW (PC BOARD)		
C	3A		N80-2024-45	SCREW (CASE)		
71	1A		T07-0326-05	LOUDSPEAKER (FULLRANGE)		
72	-		T90-0472-05	ANTENNA	ACSY	K,K2,T,E
72	-		T90-0472-05	ANTENNA	ACSY	E3,E4,M
72	-		T90-0472-05	ANTENNA	ACSY	M2,M3,A
73	-	*	T90-0638-05	ANTENNA	ACSY	234
76	-		W08-0437-05	CHARGER (AC120V/13.5V)	ACSY	K
76	-		W08-0438-15	CHARGER (AC230V/13.5V)	ACSY	T
76	-		W08-0440-05	CHARGER (AC230V/13.5V)	ACSY	E,E3
76	-		W08-0479-05	AC ADAPTER (AC120V/12V)	ACSY	M
76	-		W08-0480-05	AC ADAPTER (AC230V/12V)	ACSY	M2
79	-	*	W08-0503-05	CHARGER (AC120/230V 12V)	ACSY	M,M2
79	-	*	W08-0504-05	CHARGER (AC230V 16V)	ACSY	E4
79	-	*	W08-0505-05	CHARGER (AC120/230V 16V)	ACSY	M3
80	-		W09-0889-05	BATTERY ASSY (12V 950mAh)		E4,M3
81	-		W09-0890-05	BATTERY ASSY (7.2V 950mAh)		K,T,E,E3
81	-		W09-0890-05	BATTERY ASSY (7.2V 950mAh)		M,M2

TX-RX UNIT (X57-5260-XX)

C1			CK73GB1H102K	CHIP C	1000PF	K
C2			CC73GCH1H120J	CHIP C	12PF	J
C3			CK73GB1H103K	CHIP C	0.010UF	K
C4			CK73GB1H102K	CHIP C	1000PF	K
C5			CK73FB1E104K	CHIP C	0.10UF	K
C6			CC73GCH1H101J	CHIP C	100PF	J
C7			CK73GB1H102K	CHIP C	1000PF	K
C8 ,9			CC73GCH1H101J	CHIP C	100PF	J
C10			CK73FB1E104K	CHIP C	0.10UF	K
C11			C92-0507-05	CHIP-TAN	4.7UF	6.3WV
C12			CC73GCH1H090D	CHIP C	9PF	D
C13			CC73GCH1H270J	CHIP C	27PF	J
C14			C92-0555-05	CHIP-TAN	0.047UF	35WV
C15		*	C92-0697-05	TANTAL	3.3UF	16WV
C17 ,18			C92-0001-05	CHIP-C	0.1UF	35WV
C19 ,20			CK73GB1H103K	CHIP C	0.010UF	K
C21 ,22			CK73GB1H102K	CHIP C	1000PF	K
C24			CC73GCH1HR75C	CHIP C	0.75PF	C
C25 -27			CK73GB1H103K	CHIP C	0.010UF	K
C28			CC73GCH1H040C	CHIP C	4.0PF	C
C29			CC73GCH1H050C	CHIP C	5.0PF	C
C30			CK73GB1H102K	CHIP C	1000PF	K
C31			CK73GB1H103K	CHIP C	0.010UF	K
C32			CC73GCH1H0R5C	CHIP C	0.5PF	C
C33			CC73GCH1H030C	CHIP C	3.0PF	C
C34			CC73GCH1H330J	CHIP C	33PF	J
C35			CC73GCH1H100D	CHIP C	10PF	D
C36			CC73GCH1H120J	CHIP C	12PF	J
C37			CC73GCH1H470J	CHIP C	47PF	J
C38			CK73GB1H102K	CHIP C	1000PF	K

TH-235A : K, K2, M, M2, M3, A
TH-235E : T, E, E3, E4
TH-234 : 234

PARTS LIST

TX-RX UNIT(X57-5260-XX)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C39			C92-0560-05	CHIP-TAN	10UF	6.3WV	
C40			CC73GCH1H150J	CHIP C	15PF	J	
C41 ,42			CK73GB1H102K	CHIP C	1000PF	K	
C43			CC73GCH1H330J	CHIP C	33PF	J	
C44 -47			CK73GB1H102K	CHIP C	1000PF	K	
C48 ,49			CC73GCH1H150J	CHIP C	15PF	J	
C50			CK73GB1H102K	CHIP C	1000PF	K	
C51			CC73GCH1H270J	CHIP C	27PF	J	
C52			CC73GCH1H560J	CHIP C	56PF	J	
C53 -55			CK73GB1H102K	CHIP C	1000PF	K	
C56			CC73GCH1H330J	CHIP C	33PF	J	
C57			CK73GB1H103K	CHIP C	0.010UF	K	
C59			CC73GCH1H390J	CHIP C	39PF	J	
C61			C92-0625-05	ELECTRO	4.7UF	25WV	
C62			CK73GB1H102K	CHIP C	1000PF	K	
C63			CC73GCH1H0R5B	CHIP C	0.5PF	B	
C64			CC73GCH1H120J	CHIP C	12PF	J	
C65			CK73GB1H102K	CHIP C	1000PF	K	
C68			CC73GCH1H150J	CHIP C	15PF	J	
C69			CK73GB1H102K	CHIP C	1000PF	K	
C70			C92-0565-05	CHIP-TAN	6.8UF	10WV	
C71		*	C92-0694-05	TANTAL	10UF	16WV	
C72			CK73GB1H102K	CHIP C	1000PF	K	
C74			CK73GB1H472K	CHIP C	4700PF	K	
C76 ,77			CK73GB1H103K	CHIP C	0.010UF	K	
C78			CK73GB1H102K	CHIP C	1000PF	K	
C80			CK73FB1E104K	CHIP C	0.10UF	K	
C81			C92-0012-05	CHIP-TAN	22UF	6.3WV	
C82			CK73FB1E104K	CHIP C	0.10UF	K	
C83			C92-0560-05	CHIP-TAN	10UF	6.3WV	
C84			CK73GB1H103K	CHIP C	0.010UF	K	
C86			CC73GCH1H150J	CHIP C	15PF	J	
C88			CK73GB1H103K	CHIP C	0.010UF	K	
C89			CK73GB1H102K	CHIP C	1000PF	K	
C90			CC73GCH1H180J	CHIP C	18PF	J	
C91			CK73GB1H471K	CHIP C	470PF	K	
C92			CK73GB1H102K	CHIP C	1000PF	K	
C93			CC73GCH1H090D	CHIP C	9.0PF	D	
C95			CK73GB1H102K	CHIP C	1000PF	K	
C96			CC73GCH1H221J	CHIP C	220PF	J	
C97			CK73GB1H471K	CHIP C	470PF	K	
C99 ,100			CK73GB1H102K	CHIP C	1000PF	K	
C102			CC73GCH1H221J	CHIP C	220PF	J	
C103			CK73GB1H102K	CHIP C	1000PF	K	
C104			CC73GCH1H181J	CHIP C	180PF	J	
C106,107			CC73GCH1H560J	CHIP C	56PF	J	
C108			CC73GCH1H220J	CHIP C	22P	J	
C109			CC73GCH1H180J	CHIP C	18PF	J	
C110			CC73GCH1H070D	CHIP C	7.0PF	D	
C111			CC73GCH1H270J	CHIP C	27PF	J	
C112			CC73GCH1H030C	CHIP C	3.0PF	C	
C113			CC73GCH1H270J	CHIP C	27PF	J	
C114,115			CK73GB1H102K	CHIP C	1000PF	K	
C116			C92-0012-05	CHIP-TAN	22UF	6.3WV	
C118			CC73GCH1H090D	CHIP C	9.0PF	D	
C119			CC73GCH1H101J	CHIP C	100PF	J	
C120			CC73GCH1H220J	CHIP C	22PF	J	
C121,122			CK73GB1H102K	CHIP C	1000PF	K	
C123			CK73GB1H103K	CHIP C	0.010UF	K	
C131			CK73GB1H102K	CHIP C	1000PF	K	

Ref. No.	Address	New parts	Parts No.	Description			Destination
C132			CK73GB1H103K	CHIP C	0.010UF	K	
C135			CK73GB1H103K	CHIP C	0.010UF	K	
C136,137			CK73FB1E224K	CHIP C	0.22UF	K	
C138			CK73GB1H102K	CHIP C	1000PF	K	
C139			CC73GCH1H150J	CHIP C	15PF	J	
C140			CK73GB1H103K	CHIP C	0.010UF	K	
C141			CK73GB1C104K	CHIP C	0.10UF	K	
C142			CK73FF1C105Z	CHIP C	1.0UF	Z	
C143			CC73GCH1HR75B	CHIP C	0.75PF	B	
C144		*	C91-3065-05	CHIP C	10PF		
C211,212			CC73GCH1H150J	CHIP C	15PF	J	
C213-215			CK73GB1H102K	CHIP C	1000PF	K	
C216			CK73GB1E223K	CHIP C	0.022UF	K	
C218			C92-0005-05	CHIP-TAN	2.2UF	6.3WV	
C219			C92-0593-05	CHIP-ELE	33UF	10WV	
C220,221			CK73GB1H102K	CHIP C	1000PF	K	
C222			CC73GCH1H101J	CHIP C	100PF	J	
C223			C92-0560-05	CHIP-TAN	10UF	6.3WV	
C224			CK73GB1H332K	CHIP C	3300PF	K	
C225			CK73GB1H102K	CHIP C	1000PF	K	
C226			CK73FB1H473K	CHIP C	0.047UF	K	
C227			C92-0567-05	CHIP-TAN	68UF	6.3WV	
C228,229			CK73GB1H103K	CHIP C	0.010UF	K	
C230			CK73GB1H102K	CHIP C	1000PF	K	
C231			CK73GB1H103K	CHIP C	0.010UF	K	
C232			C92-0627-05	ELECTRO	100UF	6.3WV	
C233-235			CK73GB1H102K	CHIP C	1000PF	K	
C236			CK73EF1C105Z	CHIP C	1.0UF	Z	
C237,238			CK73GB1H103K	CHIP C	0.010UF	K	
C239			CK73FB1E104K	CHIP C	0.10UF	K	
C240-243			CK73GB1H102K	CHIP C	1000PF	K	
C245			CK73EF1C105Z	CHIP C	1.0UF	Z	
C247			CK73GB1H102K	CHIP C	1000PF	K	
C249			CK73GB1H102K	CHIP C	1000PF	K	
C250			C92-0576-05	CHIP-TAN	1.0UF	6.3WV	
C251			CK73EF1C105Z	CHIP C	1.0UF	Z	
C253			CK73GB1H102K	CHIP C	1000PF	K	
C254			CK73GB1H103K	CHIP C	0.010UF	K	
C255			CK73GB1H102K	CHIP C	1000PF	K	
C256			CK73GB1H682K	CHIP C	6800PF	K	
C257			C92-0005-05	CHIP-TAN	2.2UF	6.3WV	
C258			CK73GB1H821K	CHIP C	820PF	K	
C259			C92-0005-05	CHIP-TAN	2.2UF	6.3WV	
C260			CK73GB1H102K	CHIP C	1000PF	K	
C261			CC73GCH1H151J	CHIP C	150PF	J	
C262			CK73GB1H182K	CHIP C	1800PF	K	
C263			CK73GB1H102K	CHIP C	1000PF	K	
C264			CK73GB1E223K	CHIP C	0.022UF	K	
C265			CK73GB1H102K	CHIP C	1000PF	K	
C267			CK73GB1C473K	CHIP C	0.047UF	K	
C268			CK73GB1H103K	CHIP C	0.010UF	K	
C269			CK73FB1H393K	CHIP C	0.039UF	K	
C270			C92-0576-05	CHIP-TAN	1.0UF	6.3WV	
C271			CK73GB1H103K	CHIP C	0.010UF	K	
C272			C92-0507-05	CHIP-TAN	4.7UF	6.3WV	
C273			CK73GB1C393K	CHIP C	0.039UF	K	
C276			C92-0576-05	CHIP-TAN	1.0UF	6.3WV	
C277			CK73GB1H471K	CHIP C	470PF	K	
C278,279			CK73GB1E123K	CHIP C	0.012UF	K	
C280			C92-0005-05	CHIP-TAN	2.2UF	6.3WV	

TH-235A : K, K2, M, M2, M3, A
TH-235E : T, E, E3, E4
TH-234 : 234

TH-235A/E/234

PARTS LIST

TX-RX UNIT(X57-5260-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C281			CK73FB1E104K	CHIP C 0.10UF K	
C282			CK73FB1E683K	CHIP C 0.068UF K	
C283			CK73GB1H103K	CHIP C 0.010UF K	
C284			CK73GB1H332K	CHIP C 3300PF K	
C285			CK73GB1H102K	CHIP C 1000PF K	
C286			C92-0576-05	CHIP-TAN 1.0UF 6.3WV	
C287-289			CK73GB1H103K	CHIP C 0.010UF K	
C290			CK73FB1E104K	CHIP C 0.10UF K	
C291			CK73EB1H103K	CHIP C 0.010UF K	
C295			CK73GB1H102K	CHIP C 1000PF K	
C296			CC73GCH1H030C	CHIP C 3.0PF C	
C297			CK73GB1C104K	CHIP C 0.10UF K	
C298			CK73GB1E153K	CHIP C 0.015UF K	
C299			CK73GB1C104K	CHIP C 0.10UF K	
C300			CK73GB1C473K	CHIP C 0.047UF K	
101	2A	*	B11-1167-03	REFLECTOR (LCD)	
LCD	2A	*	B38-0771-05	LCD	
TC1			C05-0371-05	TRIMMER CAPACITOR 10PF	
102	2A	*	E29-1158-04	INTER CONNECTOR (LCD)	
CN2		*	E40-5861-05	PIN ASSY SOCKET (20P)	
CN201		*	E40-5860-05	PIN ASSY (20P)	
CN203			E40-5618-05	FLAT CABLE CONNECTOR (8P)	
J1		*	E03-0190-05	DC JACK	
J201			E11-0439-05	PHONE JACK	
J202		*	E11-0467-05	PHONE JACK	
103	1A	*	J21-8308-04	HARDWARE FIXTURE (LCD)	
CF1		*	L72-0944-05	CERAMIC FILTER (450K)	
L1			L92-0137-05	CORE	
L2			L92-0138-05	CORE	
L4		*	L40-4778-60	SMALL FIXED INDUCTOR (47NH)	
L5		*	L40-3378-60	SMALL FIXED INDUCTOR (33NH)	
L6			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
L7			L40-6871-35	SMALL FIXED INDUCTOR (68NH)	
L8			L40-5671-35	SMALL FIXED INDUCTOR (56NH)	
L9			L40-3371-35	SMALL FIXED INDUCTOR (33NH)	
L10			L40-3971-35	SMALL FIXED INDUCTOR (39NH)	
L12		*	L40-4775-60	SMALL FIXED INDUCTOR (47NH)	
L13		*	L40-2775-60	SMALL FIXED INDUCTOR (27NH)	
L14		*	L40-6875-60	SMALL FIXED INDUCTOR (68NH)	
L15		*	L40-3975-60	SMALL FIXED INDUCTOR (39NH)	
L16		*	L40-3375-60	SMALL FIXED INDUCTOR (33NH)	
L17		*	L40-4775-60	SMALL FIXED INDUCTOR (47NH)	
L18		*	L40-8285-60	SMALL FIXED INDUCTOR (820NH)	
L20			L40-5685-34	SMALL FIXED INDUCTOR (560NH)	
L21			L40-6885-34	SMALL FIXED INDUCTOR (680NH)	
L22			L40-1585-34	SMALL FIXED INDUCTOR (150NH)	
L23			L40-1085-34	SMALL FIXED INDUCTOR (100NH)	
L24		*	L40-1885-60	SMALL FIXED INDUCTOR (180NH)	
L25		*	L34-4486-05	COIL	
L26		*	L40-8285-60	SMALL FIXED INDUCTOR (820NH)	
L27		*	L34-4486-05	COIL	
L28		*	L34-4487-05	COIL	
L29		*	L40-1585-60	SMALL FIXED INDUCTOR (150NH)	
L30		*	L40-4775-60	SMALL FIXED INDUCTOR (47NH)	
L31			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
L32			L40-5671-34	SMALL FIXED INDUCTOR (56NH)	
L33			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
L34			L92-0138-05	CORE	
L35			L92-0137-05	CORE	
L36			L40-1271-35	SMALL FIXED INDUCTOR (12NH)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
L37		*	L34-4497-05	CORE	
L201			L33-0737-05	CHOKE COIL	
L202			L92-0131-05	CORE	
L203-206			L92-0138-05	CORE	
L207			L92-0132-05	CORE	
L208			L92-0138-05	CORE	
L209			L92-0131-05	CORE	
L210			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
L211-213			L92-0131-05	CORE	
L214-217			L92-0138-05	CORE	
L218,219			L92-0131-05	CORE	
X1		*	L77-1692-05	CRYSTAL RESONATOR (12.8MHZ)	
X201		*	L77-1693-05	CRYSTAL RESONATOR (4.1943MHZ)	
XF1		*	L71-0491-05	CRYSTAL FILTER (38.85MHZ)	
CP1			R90-0714-05	MULTI-COMP 10K X4	
CP202,203			R90-0724-05	MULTI-COMP 1K X4	
CP205,206		*	R90-0761-05	MULTI-COMP 20K X4	
CP207,208			R90-0714-05	MULTI-COMP 10K X4	
R1			RK73GB1J120J	CHIP R12 J 1/16W	
R2			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R3			RK73GB1J273J	CHIP R 27K J 1/16W	
R4			RK73GB1J100J	CHIP R 10 J 1/16W	
R5 ,6			R92-1252-05	CHIP R 0 OHM	
R7			RK73GB1J333J	CHIP R 33K J 1/16W	
R8			RK73GB1J223J	CHIP R 22K J 1/16W	
R9 ,10			RK73GB1J103J	CHIP R 10K J 1/16W	
R11			RK73GB1J392J	CHIP R 3.9K J 1/16W	
R12			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R13			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R14 ,15			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R16			RK73GB1J105J	CHIP R 1.0M J 1/16W	
R17			RK73GB1J101J	CHIP R 100 J 1/16W	
R18			R92-1252-05	CHIP R 0 OHM	
R19			RK73GB1J561J	CHIP R 560 J 1/16W	
R20			RK73GB1J823J	CHIP R 82K J 1/16W	
R21			RK73GB1J104J	CHIP R 100K J 1/16W	
R22			RK73GB1J563J	CHIP R 56K J 1/16W	
R23			RK73GB1J473J	CHIP R 47K J 1/16W	
R24			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R25			RK73GB1J221J	CHIP R 220 J 1/16W	
R26			RK73GB1J470J	CHIP R 47 J 1/16W	
R27			RK73GB1J124J	CHIP R 120K J 1/16W	
R28			RK73GB1J681J	CHIP R 680 J 1/16W	
R29			R92-1252-05	CHIP R 0 OHM	
R30			RK73GB1J124J	CHIP R 120K J 1/16W	
R31			RK73GB1J103J	CHIP R 10K J 1/16W	
R32			RK73GB1J104J	CHIP R 100K J 1/16W	
R33			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R34			RK73GB1J681J	CHIP R 680 J 1/16W	
R35			RK73GB1J562J	CHIP R 5.6K J 1/16W	
R36			RK73GB1J123J	CHIP R 12K J 1/16W	
R37			RK73GB1J330J	CHIP R 33 J 1/16W	
R38			RK73GB1J101J	CHIP R 100 J 1/16W	
R39			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R40			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R41			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R42			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R43			RK73GB1J270J	CHIP R 27 J 1/16W	
R45			RK73GB1J101J	CHIP R 100 J 1/16W	
R46			RK73GB1J470J	CHIP R 47 J 1/16W	

TH-235A : K, K2, M, M2, M3, A
TH-235E : T, E, E3, E4
TH-234 : 234

PARTS LIST

TX-RX UNIT(X57-5260-XX)

Ref. No.	Address	New parts	Parts No.	Description			Destination
R47			RK73FB2A3R9J	CHIP R	3.9	J 1/10W	
R48			RK73GB1J103J	CHIP R	10K	J 1/16W	
R49			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R50			RK73GB1J103J	CHIP R	10K	J 1/16W	
R51			RK73GB1J152J	CHIP R	1.5K	J 1/16W	
R52			RK73GB1J473J	CHIP R	47K	J 1/16W	
R53			RK73GB1J181J	CHIP R	180	J 1/16W	
R54			RK73GB1J101J	CHIP R	100	J 1/16W	
R55			RK73GB1J104J	CHIP R	100K	J 1/16W	
R58			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R59			RK73GB1J393J	CHIP R	39K	J 1/16W	
R60			RK73GB1J101J	CHIP R	100	J 1/16W	
R61			RK73GB1J474J	CHIP R	470K	J 1/16W	
R62			RK73GB1J684J	CHIP R	680K	J 1/16W	
R63			RK73GB1J272J	CHIP R	2.7K	J 1/16W	
R64			RK73GB1J271J	CHIP R	270	J 1/16W	
R65			RK73GB1J330J	CHIP R	33	J 1/16W	
R66			R92-1252-05	CHIP R	0 OHM		
R67			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R68			RK73GB1J103J	CHIP R	10K	J 1/16W	
R70			RK73GB1J103J	CHIP R	10K	J 1/16W	
R72			RK73GB1J104J	CHIP R	100K	J 1/16W	
R73			RK73GB1J470J	CHIP R	47	J 1/16W	
R74			RK73GB1J272J	CHIP R	2.7K	J 1/16W	
R75			RK73GB1J104J	CHIP R	100K	J 1/16W	
R76			RK73GB1J101J	CHIP R	100	J 1/16W	
R77			RK73GB1J104J	CHIP R	100K	J 1/16W	
R78			RK73GB1J152J	CHIP R	1.5K	J 1/16W	
R79			RK73GB1J332J	CHIP R	3.3K	J 1/16W	
R80			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R86			R92-1252-05	CHIP R	0 OHM		
R87			RK73GB1J560J	CHIP R	56	J 1/16W	
R88			RK73GB1J471J	CHIP R	470	J 1/16W	
R90			RK73GB1J391J	CHIP R	390	J 1/16W	
R91			RK73GB1J222J	CHIP R	2.2K	J 1/16W	
R92			RK73GB1J152J	CHIP R	1.5K	J 1/16W	
R93			RK73GB1J220J	CHIP R	22	J 1/16W	
R94 ,95			RK73GB1J101J	CHIP R	100	J 1/16W	
R96 ,97			RK73GB1J181J	CHIP R	180	J 1/16W	
R201-206			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R207			R92-1252-05	CHIP R	0 OHM		KK2TE
R207			R92-1252-05	CHIP R	0 OHM		E3E4
R210			R92-1252-05	CHIP R	0 OHM		K K2
R211,212			R92-1252-05	CHIP R	0 OHM		
R213-215			RK73GB1J104J	CHIP R	100K	J 1/16W	
R216-218			RK73GB1J473J	CHIP R	47K	J 1/16W	
R220			RK73GB1J100J	CHIP R	10	J 1/16W	
R221			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R222			RK73GB1J331J	CHIP R	330	J 1/16W	
R223,224			RK73GB1J473J	CHIP R	47K	J 1/16W	
R225			RK73GB1J272J	CHIP R	2.7K	J 1/16W	
R226			RK73GB1J103J	CHIP R	10K	J 1/16W	
R227			RK73GB1J100J	CHIP R	10	J 1/16W	
R228			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R229			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R230,231			RK73GB1J333J	CHIP R	33K	J 1/16W	
R232			RK73GB1J680J	CHIP R	68	J 1/16W	
R234			RK73GB1J824J	CHIP R	820K	J 1/16W	
R235			R92-1252-05	CHIP R	0 OHM		
R236			RK73GB1J103J	CHIP R	10K	J 1/16W	

Ref. No.	Address	New parts	Parts No.	Description			Destination
R237			RK73GB1J391J	CHIP R	390	J 1/16W	
R238			RK73GB1J123J	CHIP R	12K	J 1/16W	
R239			RK73GB1J473J	CHIP R	47K	J 1/16W	
R240			R92-1252-05	CHIP R	0 OHM		
R241			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R242			RK73GB1J100J	CHIP R	10	J 1/16W	
R243			RK73GB1J105J	CHIP R	1.0M	J 1/16W	
R246			RK73GB1J100J	CHIP R	10	J 1/16W	
R247			RK73GB1J103J	CHIP R	10K	J 1/16W	
R248			RK73GB1J105J	CHIP R	1.0M	J 1/16W	
R249			RK73GB1J274J	CHIP R	270K	J 1/16W	
R250			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R251			RK73GB1J104J	CHIP R	100K	J 1/16W	
R252			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R253			RK73GB1J473J	CHIP R	47K	J 1/16W	
R254			RK73GB1J334J	CHIP R	330K	J 1/16W	
R255			R92-1252-05	CHIP R	0 OHM		
R256,257			RK73GB1J473J	CHIP R	47K	J 1/16W	
R258			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R259			R92-1252-05	CHIP R	0 OHM		
R260,261			RK73GB1J332J	CHIP R	3.3K	J 1/16W	
R262			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R263			R92-1252-05	CHIP R	0 OHM		
R264			RK73GB1J471J	CHIP R	470	J 1/16W	
R265			RK73GB1J473J	CHIP R	47K	J 1/16W	
R266			RK73GB1J333J	CHIP R	33K	J 1/16W	
R267			RK73GB1J104J	CHIP R	100K	J 1/16W	
R268			RK73GB1J273J	CHIP R	27K	J 1/16W	
R269			RK73GB1J153J	CHIP R	15K	J 1/16W	
R270			RK73GB1J273J	CHIP R	27K	J 1/16W	
R271			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R272			RK73GB1J104J	CHIP R	100K	J 1/16W	
R273			RK73GB1J473J	CHIP R	47K	J 1/16W	
R274			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R275			RK73GB1J103J	CHIP R	10K	J 1/16W	
R276			RK73GB1J683J	CHIP R	68K	J 1/16W	
R277			RK73GB1J391J	CHIP R	390	J 1/16W	
R278			RK73GB1J823J	CHIP R	82K	J 1/16W	
R279,280			RK73GB1J104J	CHIP R	100K	J 1/16W	
R281			RK73GB1J101J	CHIP R	100	J 1/16W	
R282			RK73GB1J562J	CHIP R	5.6K	J 1/16W	
R283			R92-1252-05	CHIP R	0 OHM		
R284			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R285			RK73GB1J471J	CHIP R	470	J 1/16W	
R286			RK73GB1J102J	CHIP R	1.0K	J 1/16W	
R287			RK73GB1J100J	CHIP R	10	J 1/16W	
R288			RK73GB1J822J	CHIP R	8.2K	J 1/16W	
R289			RK73GB1J104J	CHIP R	100K	J 1/16W	
R290			RK73GB1J392J	CHIP R	3.9K	J 1/16W	
R291			RK73GB1J101J	CHIP R	100	J 1/16W	
R292			RK73GB1J103J	CHIP R	10K	J 1/16W	
R294			RK73GB1J272J	CHIP R	2.7K	J 1/16W	
R295			RK73GB1J472J	CHIP R	4.7K	J 1/16W	
R296			RK73GB1J224J	CHIP R	220K	J 1/16W	
R297			RK73GB1J152J	CHIP R	1.5K	J 1/16W	
R298			RK73GB1J392J	CHIP R	3.9K	J 1/16W	
R299			RK73GB1J182J	CHIP R	1.8K	J 1/16W	
R300			RK73GB1J103J	CHIP R	10K	J 1/16W	
R301			R92-1252-05	CHIP R	0 OHM		
R302			RK73GB1J474J	CHIP R	470K	J 1/16W	

TH-235A : K, K2, M, M2, M3, A
TH-235E : T, E, E3, E4
TH-234 : 234

TH-235A/E/234

PARTS RIST

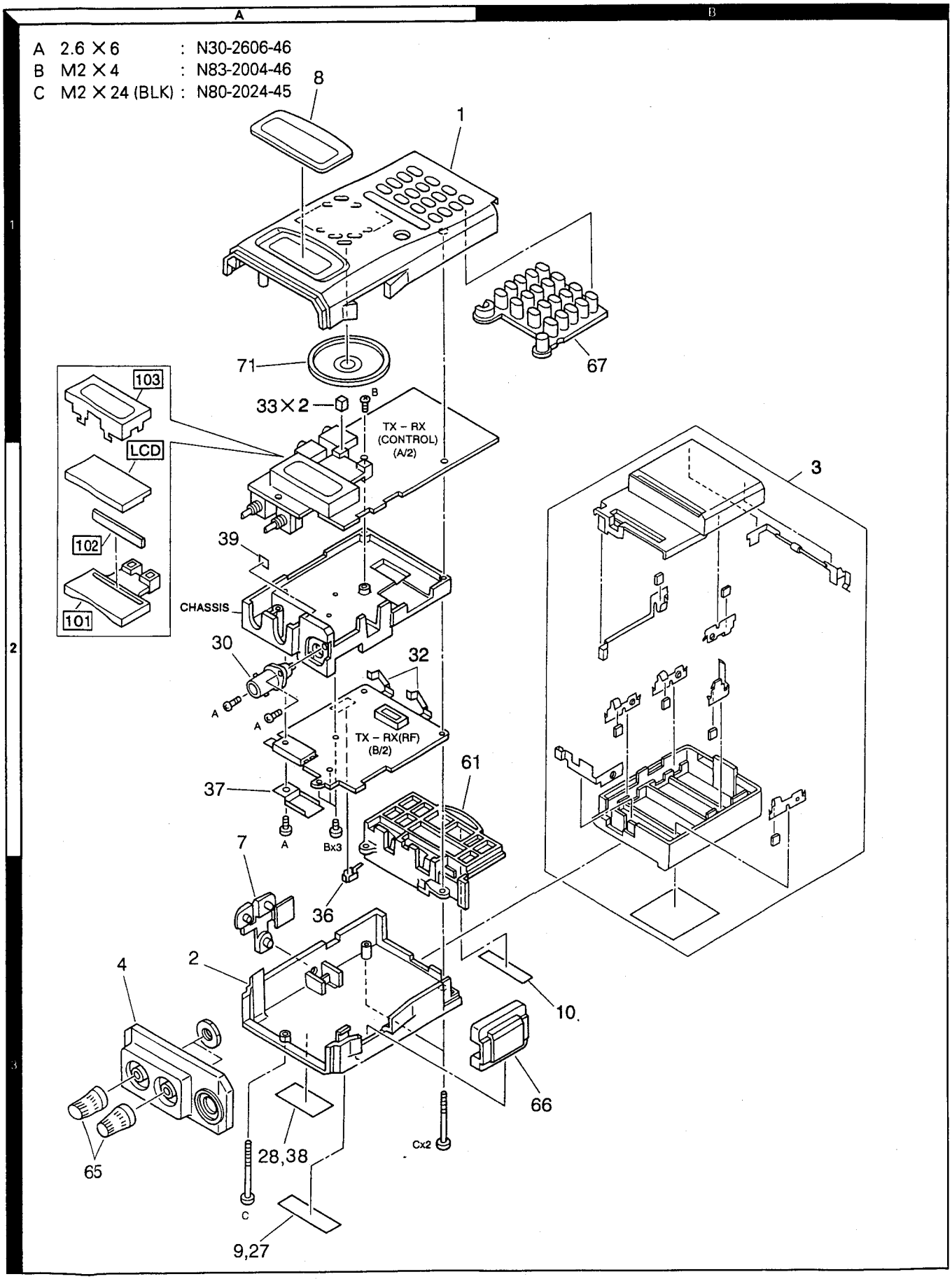
TX-RX UNIT(X57-5260-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R303-306			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R307			RK73GB1J470J	CHIP R 47 J 1/16W	
R309			RK73GB1J103J	CHIP R 10K J 1/16W	
R310,31			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R312			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R313,314			R92-1252-05	CHIP R 0 OHM	
R315			RK73GB1J103J	CHIP R 10K J 1/16W	
R316			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R317,318			RK73GB1J272J	CHIP R 2.7K J 1/16W	
R320			RK73GB1J103J	CHIP R 10K J 1/16W	
R322			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R323,324			RK73GB1J103J	CHIP R 10K J 1/16W	
R326,327			RK73GB1J103J	CHIP R 10K J 1/16W	
R328			RK73GB1J273J	CHIP R 27K J 1/16W	
R329			RK73GB1J563J	CHIP R 56K J 1/16W	
R335			RK73GB1J224J	CHIP R 220K J 1/16W	
R336-348			RK73GB1J103J	CHIP R 10K J 1/16W	
R350			RK73GB1J103J	CHIP R 10K J 1/16W	
R351			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R352-360			RK73GB1J103J	CHIP R 10K J 1/16W	
R362			RK73GB1J103J	CHIP R 10K J 1/16W	
R364-369			RK73GB1J103J	CHIP R 10K J 1/16W	
R370			RK73GB1J821J	CHIP R 820 J 1/16W	
W201,202			E37-0075-05	LEAD WIRE	K,K2,T
W201,202			E37-0075-05	LEAD WIRE	E,E3,E4
VR1			R12-6716-05	TRIMMING POT. 33K	
VR2			R12-6713-05	TRIMMING POT. 10K	
VR201		*	R31-0616-05	VARIABLE R 10K	
VR202			R12-6713-05	TRIMMING POT. 10K	
S201			S70-0414-05	TACT SWITCH	
MIC201		*	T91-0543-05	MICROPHONE	
D1			DA221	DIODE	
D2			SFPB-72VL	DIODE	
D3			MA110	DIODE	
D4 ,5		*	MA10301	DIODE	
D6			1SV214	VARI-CAP	
D7			MA2S077	DIODE	
D8			MA110	DIODE	
D10			1SS312	DIODE	
D11			MA110	DIODE	
D12			HSU277	DIODE	
D13			RB751V-40	DIODE	
D14			1SS312	DIODE	
D15			RB751V-40	DIODE	
D16 -18			HVU350	VARI-CAP	
D19			RB751V-40	DIODE	
D20			1SS357	DIODE	
D24			RB751V-40	DIODE	
D25		*	UDZ6.2 (B)	ZENER	
D201			HN2D01FU	DIODE	
D202			MA110	DIODE	
D203,204			B30-2143-05	LED	
D207		*	UDZ3.0 (B)	ZENER	
D208			1SS373	DIODE	
IC1		*	MB15A02	IC	
IC2			TC7660SEOA	IC	
IC3			TK14521V	IC	
IC201		*	UPD78063GC-529	IC (MPU)	
IC202		*	KIA6278F	IC	
IC203			LC73881M	IC (DTMF DECODER)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
IC204			S-81250PG-PD	IC	
IC205			AT2408N10SI2.5	IC (8kbit SERIAL EEPROM)	
IC207		*	RN5VL47C	IC (VOLTAGE DETECTOR)	
IC208		*	KIA4558F	IC	
Q1			2SD1483	TRANSISTOR	
Q2			2SA1832 (GR)	TRANSISTOR	
Q3			2SC4738 (GR)	TRANSISTOR	
Q4			2SK879 (Y)	FET	
Q5			2SC5108 (Y)	TRANSISTOR	
Q6			2SK1824	FET	
Q7			2SK508NV (K52)	FET	
Q8 ,9			2SC5108 (Y)	TRANSISTOR	
Q10		*	2SC4081 (S)	TRANSISTOR	
Q11			2SC5108 (Y)	TRANSISTOR	
Q12			2SC2954	TRANSISTOR	
Q13			2SC2053	TRANSISTOR	
Q14			2SC1971	TRANSISTOR (TX PA)	
Q15		*	DTC114EUA	DIGITAL TRANSISTOR	
Q16			FMW1	TRANSISTOR	
Q17		*	2SD1664 (Q,R)	TRANSISTOR	
Q18			2SA1832 (GR)	TRANSISTOR	
Q19 ,20			2SC4649 (N,P)	TRANSISTOR	
Q21			SGM2014M	FET	
Q22			2SK1215 (E)	FET	
Q23		*	2PC4081 (R)	TRANSISTOR	
Q201		*	DTC114EUA	DIGITAL TRANSISTOR	
Q203			2SB1132 (Q,R)	TRANSISTOR	
Q204		*	2PC4081 (R)	TRANSISTOR	
Q205			2SK1588	FET	
Q206		*	DTA114YUA	DIGITAL TRANSISTOR	
Q207		*	UMH3N	TRANSISTOR	
Q209,210			2SB1132(Q,R)	TRANSISTOR	
Q211		*	UMH3N	TRANSISTOR	
Q212		*	DTA114YUA	DIGITAL TRANSISTOR	
Q213			2SK1824	FET	
Q214		*	2PC4081 (R)	TRANSISTOR	
Q215			2SK1824	FET	
Q216		*	UMC2N	TRANSISTOR	
TH1		*	TMC347D40C	THERMISTOR	
TH2			157-101-65001	THERMISTOR	
TH201		*	TMC347D40C	THERMISTOR	
S202			W02-1795-05	ENCODER	

TH-235A : K, K2, M, M2, M3, A
TH-235E : T, E, E3, E4
TH-234 : 234

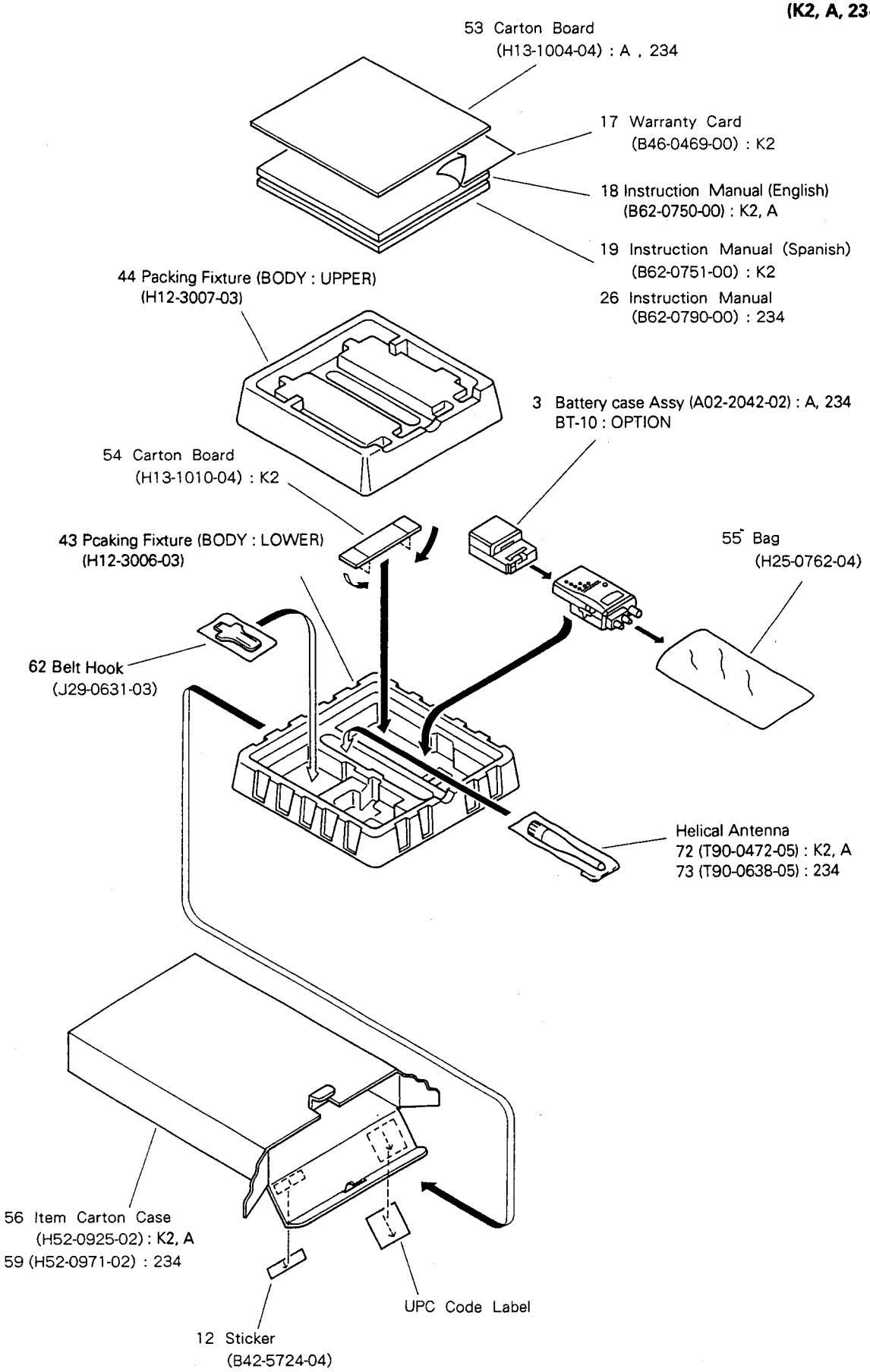
EXPLODED VIEW



TH-235A/E/234

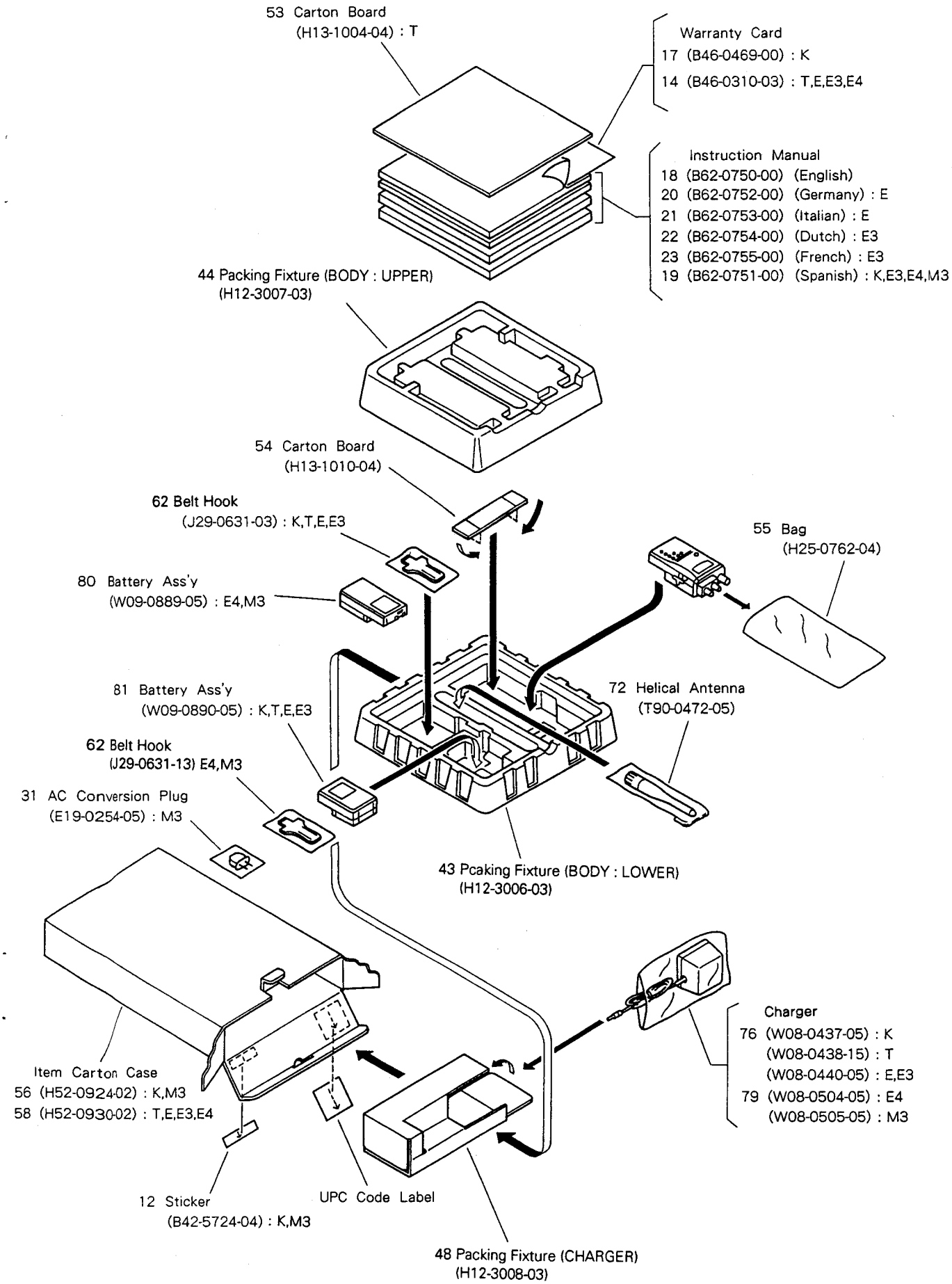
PACKING

(K2, A, 234 Type)



PACKING

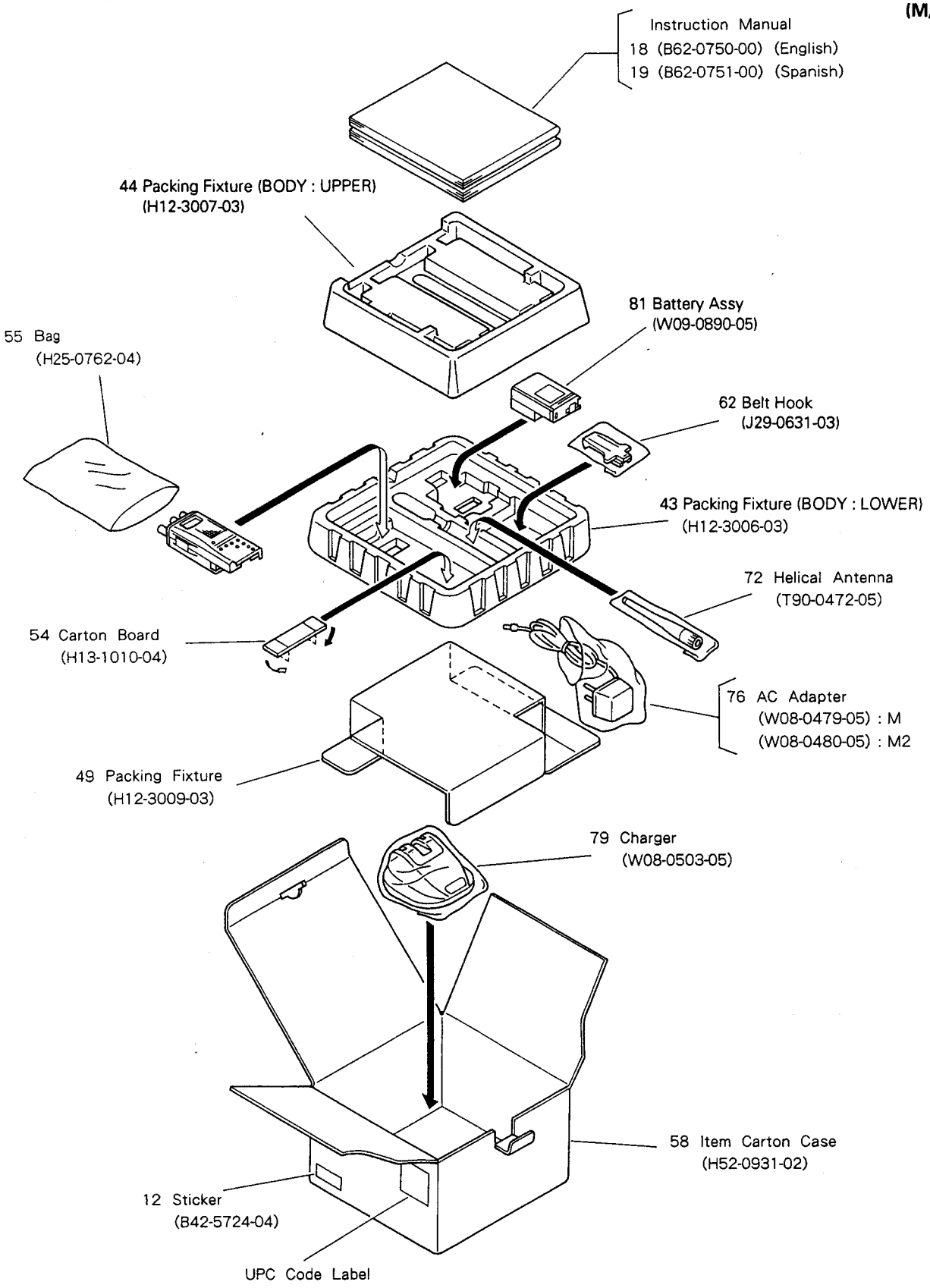
(K, T, E, E3, E4, M3 Type)



TH-235A/E/234

PACKING

(M, M2 Type)



TERMINAL FUNCTION

TX-RX Unit: RX ⟷ TX-RX Unit: Control

Connector	Pin No.	Pin name	Function
CN2, 201	1	EP	PLL IC enable signal
	2	UL	PLL unlock signal
	3	DT	Serial data signal
	4	CK	Clock signal
	5	5T	Power supply for Transmitting
	6	E	Ground
	7	BUSY	Squelch control signal
	8	E	Ground
	9	M0D	Modulation signal
	10	5R	Power supply for receiving
	11	H/L	Tx power switching signal
	12	E	Ground
	13	E	Ground
	14	T/R	VCO Transmit-receive switching signal
	15	E	Ground
	16	AFB	AF power amplifier supply voltage
	17	5C	PLL IC & VCO power supply
	18	MB	5C/5T/5R supply voltage
	19	AF0	Receiving audio signal
	20	RB	5M supply voltage

TX-RX Unit: Control ⟷ TSU-8 (optional)

Connector	Pin No.	Pin name	Function
CN203	1	CK	Clock signal
	2	DT	Serial data signal
	3	ET	TSU-8 enable signal
	4	NC	
	5	SDO	Tone match discriminating signal
	6	E	Ground
	7	3M	TSU-8 power supply
	8	CI	Signaling AF signal

TH-235A/E/234

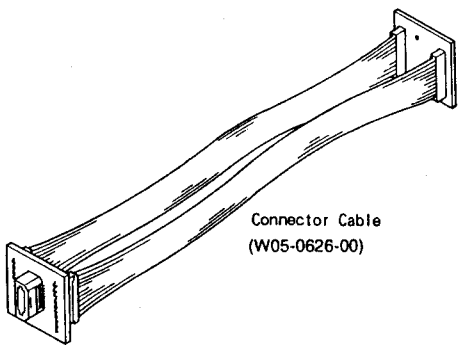
ADJUSTMENT

Required Test Equipment

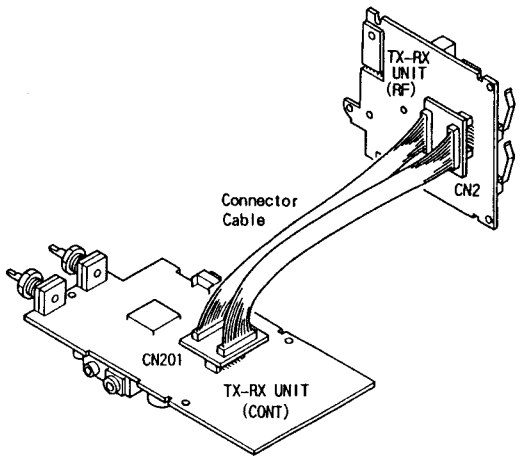
1. **Stabilized Power Supply**
   1)The Supply voltage can be changed between 5V and 18V, and the current is 3A or more.
   2)The standard voltage is 13.8V (DC IN) 12.0V (BATTERY TERMINAL).
2. **DC Ammeter (DC.A)**
   1)Class 1 ammeter (17 renges and other features).
   2)The full scale can be set to either 300mA or 3A.
   3)A cable of less internal loss most be used.
3. **Frequency Counter (f.counter)**
   1)Frequencies of up to 500MHz or so can be measured.
   2)The sensitivity can be changed to 250MHz or below, and measurements are highly stable and accurate (0.2ppm of so).
4. **Power Meter**
   1)Measurable frequency : Up to 500MHz.
   2)Impedance : 50Ω, unbalanced.
   3)Measuring range : Full scale of 10W or so.
   4)A standard cable (5D2W 1m) must be used.
5. **RF VTVM (RF V.M)**
   1)Measurable frequency : Up to 500MHz or so.
6. **Linear Detector**
   1)Measurable frequency : Up to 500MHz.
   2)Characteristics are flat, and CN is 60dB or more.
7. **Digital Voltmeter (DVM)**
   1)Voltage range : FS = 18V or so.
   2)Input resistance : 1MΩ or more.
8. **Oscilloscope**
   1)Measuring range : DC to 30MHz.
   2)Provides highly accurate measurements for 5 to 25MHz.
9. **AF Voltmeter (AF V.M)**
   1)Measurable frequency : 50Hz to 1MHz.
   2)Maximum sensitivity : 1mV or more.
10. **Spectrum Analyzer**
    1)Measuring range : DC to 1GHz or more.
11. **Standard Signal Generator (SSG)**
    1)Maximum frequency : 500MHz or more.
    2)Output : 0.05μV/–133dBm to 0.1V/–7dBm.
    3)Output impedance : 50Ω
12. **Tracking Generator (TG)**
    1)Center frequency : 50kHz to 500MHz.
    2)Frequency deviation : ± 35MHz.
    3)Output voltage : 100mV or more.
13. **Dummy Load**
    1)8Ω, 3W or more.
14. **Distortion Meter**
    1)Measurable frequency : 30Hz to 100kHz.
    2)Input level : 50mV to 10Vrms.

* If modulation is not specified for SSG, standard modulation is MOD. 1KHz, DEV. 3KHz, AF : 0.63V/8Ω.

Service jig for adjustment



How to use the jug

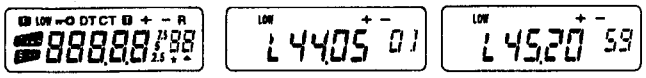


ADJUSTMENT

SERVICE ADJUSTMENT MODE (LINE MODE)

This unit has the built-in "LINE mode" which is used to perform and adjustment and inspection.

[How to set the LINE mode]
Turn on the main power of the unit,while shorting-circuit the TEST land (T) of the control unit board (component side) with GND.
Then the machine enters the LINE mode (initial value: 00 ch. 01 ch through 59 ch can be selected).



(All indications light.) **01ch** **59ch**

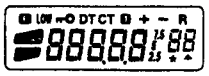
[Operating procedure]
1. You can select any desired channel in the LINE mode by either rotating the encoder or by calling the desired channel directly from the ten keys.
2. If the unit power is turned off while the unit is in the LINE mode,the last channel in the LINE mode is backed up in memory.
3. In the LINE mode,all channels are set to the split channels.

[How to cancel the LINE mode]
Perform the VFO RESET or ALL RESET to exit the LINE mode.

Note : Be sure to perform RESET whenever the service adjustment is completed.

Partial Reset (VFO)
Use to initialize all settings except the memory channels and Memory channel Lockout.
Press **[VFO] + POWER ON.**
- All indicators appear.
- Releasing **[VFO]** does Partial Reset.
- Default frequency is indicated.

All indication



Full Reset (Memory)
Use to initialize all settings.
Press **[F] + POWER ON.**
- All indicators appear.
- Releasing **[F]** does Full Reset.
- Default frequency is indicated.

Destination	VFO Frequency	Frequency Step Size	RX/TX Tone Frequency
K	144 MHz	5 kHz	88.5 Hz
T, E	144 MHz	12.5 kHz	1750 Hz
M, A, 234	144 MHz	12.5 kHz	88.5 Hz

1. Frequency Range

TYPE	Operating Frequency Range (MHz)		Specification Frequency Range (MHz)	
	TX	RX	TX	RX
K, K2	144~148	136~174	144~148	144~148
T, E, E3, E4	144~146	144~146	144~146	144~146
M, M2, M3, A, 234	136~174	136~174	144~148	144~148

ADJUSTMENT

2. Frequency Table for Adjustment and Inspection (Line Mode channel)

K, K2

CH	CONTENTS	RX f (MHz)	TX f (MHz)	SQUELCH	SAVE	POWER	TONE (Hz)	CTCSS (Hz)	DTSS
00	LCD & LAMP CHECK	–	–	–	–	–	–	–	–
01	LOCK VOLT. CHECK (LO)	144.050	144.000	0	OFF	LOW	–	–	–
02	LOCK VOLT. CHECK (CENTER)	146.050	146.000	0	OFF	LOW	–	–	–
03	LOCK VOLT. CHECK (HI)	147.950	147.975	0	OFF	LOW	–	–	–
04	LOCK VOLT. CHECK (LO EDGE)	136.050	136.000	0	OFF	HI	–	–	–
05	LOCK VOLT. CHECK (HI EDGE)	173.950	173.900	0	OFF	HI	–	–	–
06	POWER ALIGHNMENT (LO)	144.050	144.000	1	OFF	HI	–	–	–
07	POWER ALIGHNMENT (CENTER)	146.050	146.000	1	OFF	HI	–	–	–
08	POWER ALIGHNMENT (HI)	147.950	147.975	1	OFF	HI	–	–	–
09	TONE CHECK	146.050	146.200	2	OFF	LOW	67.0	–	–
10	TONE CHECK	146.050	146.200	2	OFF	LOW	151.4	–	–
11	TONE CHECK	146.050	146.200	2	OFF	LOW	250.3	–	–
12	CTCSS CHECK	145.150	145.150	2	OFF	LOW	–	67.0	–
13	CTCSS CHECK	145.150	145.150	2	OFF	LOW	–	88.5	–
14	DTSS CHECK	144.900	144.900	2	OFF	LOW	–	–	000
15	DTSS CHECK	144.900	144.900	2	OFF	LOW	–	–	111
16	TX-RX COMMUNICATION	144.800	144.800	2	OFF	LOW	–	–	–
17	RESERVE	146.140	145.000	0	OFF	LOW	–	–	–
18	RESERVE	145.900	145.500	0	OFF	LOW	–	–	–
19	RESERVE	147.200	146.500	0	OFF	LOW	–	–	–

M, M2, M3, A, 234

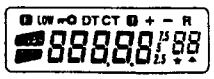
CH	CONTENTS	RX f (MHz)	TX f (MHz)	SQUELCH	SAVE	POWER	TONE (Hz)	CTCSS (Hz)	DTSS
20	LCD & LAMP CHECK	–	–	–	–	–	–	–	–
21	LOCK VOLT. CHECK (LO)	144.050	144.000	0	OFF	LOW	–	–	–
22	LOCK VOLT. CHECK (CENTER)	146.050	146.000	0	OFF	LOW	–	–	–
23	LOCK VOLT. CHECK (HI)	147.950	147.975	0	OFF	LOW	–	–	–
24	LOCK VOLT. CHECK (LO EDGE)	136.050	136.000	0	OFF	HI	–	–	–
25	LOCK VOLT. CHECK (HI EDGE)	173.950	173.900	0	OFF	HI	–	–	–
26	POWER ALIGHNMENT (LO)	144.050	144.000	1	OFF	HI	–	–	–
27	POWER ALIGHNMENT (CENTER)	146.050	146.000	1	OFF	HI	–	–	–
28	POWER ALIGHNMENT (HI)	147.950	147.975	1	OFF	HI	–	–	–
29	TONE CHECK	146.050	146.700	2	OFF	LOW	67.0	–	–
30	TONE CHECK	146.050	146.700	2	OFF	LOW	151.4	–	–
31	TONE CHECK	146.050	146.700	2	OFF	LOW	250.3	–	–
32	CTCSS CHECK	146.300	146.300	2	OFF	LOW	–	67.0	–
33	CTCSS CHECK	146.300	146.300	2	OFF	LOW	–	88.5	–
34	DTSS CHECK	144.900	144.900	2	OFF	LOW	–	–	000
35	DTSS CHECK	144.900	144.900	2	OFF	LOW	–	–	111
36	TX-RX COMMUNICATION	144.800	144.800	2	OFF	LOW	–	–	–
37	RESERVE	146.140	145.000	0	OFF	LOW	–	–	–
38	RESERVE	145.900	145.500	0	OFF	LOW	–	–	–
39	RESERVE	147.200	146.500	0	OFF	LOW	–	–	–

ADJUSTMENT

T, E, E3, E4

CH	CONTENTS	RX f (MHz)	TX f (MHz)	SQUELCH	SAVE	POWER	TONE (Hz)	CTCSS (Hz)	DTSS
40	LCD & LAMP CHECK	–	–	–	–	–	–	–	–
41	LOCK VOLT. CHECK (LO)	144.050	144.000	0	OFF	LOW	–	–	–
42	LOCK VOLT. CHECK (CENTER)	145.050	144.975	0	OFF	LOW	–	–	–
43	LOCK VOLT. CHECK (HI)	145.950	145.975	0	OFF	LOW	–	–	–
44	LOCK VOLT. CHECK (LO EDGE)	136.050	136.000	0	OFF	HI	–	–	–
45	LOCK VOLT. CHECK (HI EDGE)	173.950	173.900	0	OFF	HI	–	–	–
46	POWER ALIGHNMENT (LO)	144.050	144.000	1	OFF	HI	–	–	–
47	POWER ALIGHNMENT (CENTER)	145.050	144.975	1	OFF	HI	–	–	–
48	POWER ALIGHNMENT (HI)	145.950	145.975	1	OFF	HI	–	–	–
49	TONE CHECK	145.050	144.150	2	OFF	LOW	67.0	–	–
50	TONE CHECK	145.050	144.150	2	OFF	LOW	1750	–	–
51	TONE CHECK	145.050	144.150	2	OFF	LOW	250.3	–	–
52	CTCSS CHECK	144.950	144.950	2	OFF	LOW	–	67.0	–
53	CTCSS CHECK	144.950	144.950	2	OFF	LOW	–	88.5	–
54	DTSS CHECK	144.850	144.850	2	OFF	LOW	–	–	000
55	DTSS CHECK	144.850	144.850	2	OFF	LOW	–	–	111
56	TX-RX COMMUNICATION	144.800	144.800	2	OFF	LOW	–	–	–
57	RESERVE	144.140	145.000	0	OFF	LOW	–	–	–
58	RESERVE	145.900	145.500	0	OFF	LOW	–	–	–
59	RESERVE	145.200	145.700	0	OFF	LOW	–	–	–

3. Parts Arrangement



LCD DISPLAY

TC1 : Transmitting frequency
VR1 : TX Power
VR2 : Tuning voltage
VR202 : Maximum deviation
L25,L27,L28 : Band-pass filter
T : LINE mode voltage measurement terminal
LV : Locked voltage measurement terminal
TP1 : Band pass filter spectrum analyzer measurement terminal
TP2 : Tuning voltage measurement terminal

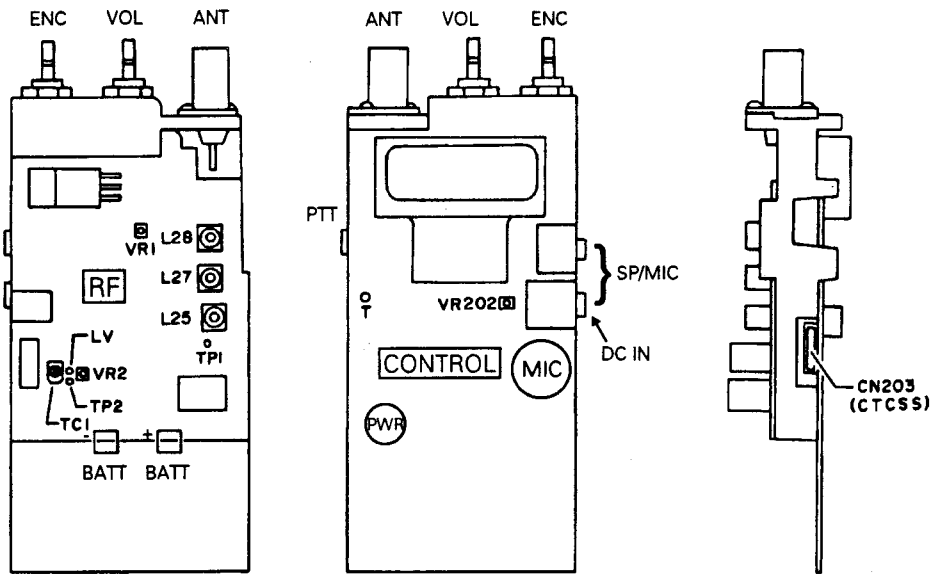


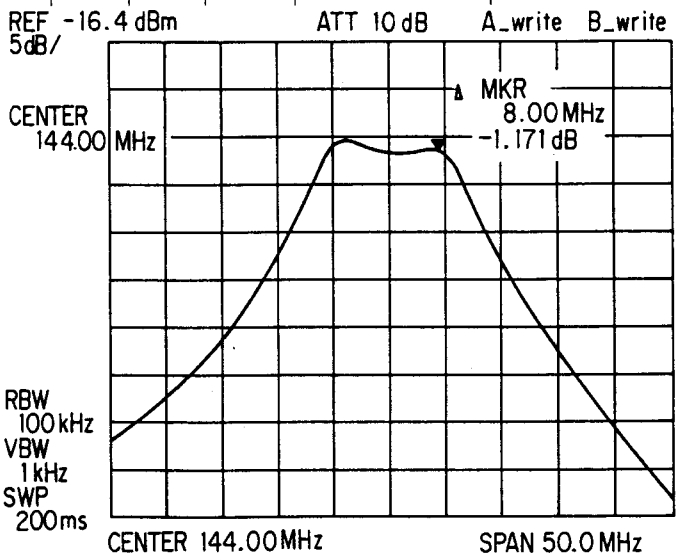
Fig.1

TH-235A/E/234

ADJUSTMENT

Common section

Item	Condition	Measurement point			Adjustment			Specification
		Test Equipment	Unit	Terminal	Unit	Parts	Methoud	
1.Setting	1)Connect the DC IN to the set. Power supply : DC IN 12.0V							
2.Line mode set up	1)Turn on the SET with Shorting the test point T.	Power meter F-counter DVM					Check	No indication error in all indication on. LAMP on (Both side).
3.Frequency adjustment	CH : 03 : **K** 25 : **M, A, 234** 43 : **T, E** Transmit			ANT	RF	TC1	Adjust	147.975MHz ± 50Hz : K 173.900MHz ±50Hz : M, A, 234 145.975MHz ± 50Hz : T, E
4.Lock volt. check (TX Lo)	CH : 01 : **K** 24 : **M, A, 234** 41 : **T, E** Transmit		RF	LV			Check	1.8~2.8V : K, T, E 1.0~2.0V : M, A, 234
5.Lock volt. check (RX Lo)	CH : 04 : **K** 24 : **M, A, 234** 44 : **T, E**						Check	1.0~2.0V
6.Lock volt. check (TX Hi)	CH : 03 : **K** 25 : **M, A, 234** 43 : **T, E** Transmit						Check	2.1~3.5V : K, T, E 5.2~8.2V : M, A, 234
7.Lock volt. check (RX Hi)	CH : 05 : **K** 25 : **M, A, 234** 45 : **T, E**						Check	4.0~6.2V
8.Tuning volt. Adjustment				TP2	RF	VR2	Adjust	3.7 ± 0.1V
9.BPF Adjustment (RX Lo)	CH : 01 : **K** 21 : **M, A, 234** 41 : **T, E** TG : **-40dBm**	Spectrum analyzer TG		TP1 ANT	RF	L25 L27 L28	Adjust	Refer to the follow waveform



Transmitter section

1.Hi power Adjustment	CH : 08 : **K** 28 : **M, A, 234** 48 : **T, E** Transmit	Power meter DC. A		ANT			Check	More than 5.5W
					RF	VR1	Adjust	5.0 ± 0.1W Less than 1.7A

ADJUSTMENT

Transmitter section

Item	Condition	Measurement point: Test Equipment	Measurement point: Unit	Measurement point: Terminal	Adjustment: Unit	Adjustment: Parts	Adjustment: Methoud	Specification
2.Hi power check	CH : 06 : **K** 26 : **M, A, 234** 46 : **T, E** Transmit	Power meter		ANT			Check	5.0 ± 0.3W
	CH : 07 : **K** 27 : **M, A, 234** 47 : **T, E** Transmit						Check	5.0 ± 0.3W
3.Hi power check (out of band, Lo Edge)	CH : 24 : **M, A, 234** Transmit						Check	More than 4.0W
4.Hi power check (out of band, hi edge)	CH : 25 : **M, A, 234** Transmit						Check	More than 1.5W
5.Battery terminal voltage:DC7.2V (1)Hi power check	CH : 08 : **K** 28 : **M, A, 234** 48 : **T, E** Transmit	Power meter DC. A					Check	More than 1.5W Less than 1.2A
(2)Lo power check	Press the C key. Transmit							0.6~1.7W Less than 0.8A
6.MAXdevition Adjustment	CH : 02 : **K** 22 : **M, A, 234** 42 : **T, E** AG : 1KHz/110mV LPF : 15KHz Transmit	Power meter modulation analyzer AG	CONT	MIC	CONT	VR202 (DEV)	Adjust	Larger frequency for the absolute value of peak. 4.2 ± 0.1KHz
7.MIC sensitivity check	AG : 1KHz/11mV Transmit						Check	2.3~3.8KHz
8.DTMF check	AG : Modulation off Press the 'D' key with Transmitting.						Check	2.3~3.9KHz
9.Tone check	CH : 09 : **K** 29 : **M, A, 234** 49 : **T, E** LPF : 3KHz HPF : 50Hz DE-EMP : 750µsec Transmit						Check	0.5~1.5KHz
	CH : 11 : **K** 31 : **M, A, 234** 51 : **T, E** Transmit							
10.Tone check (T, E, only)	CH : 50 Press the 'F' key with Transmitting.						Check	2.6~4.4KHz
11.Transmission S/N check	PRE DISPLAY (Modulation analyzer) : ON CH : 07 : **K** 27 : **M, A, 234** 47 : **T, E** LPF : 3KHz HPF : 300Hz DE-EMP : 750µsec Transmit						Check	More than 37dB

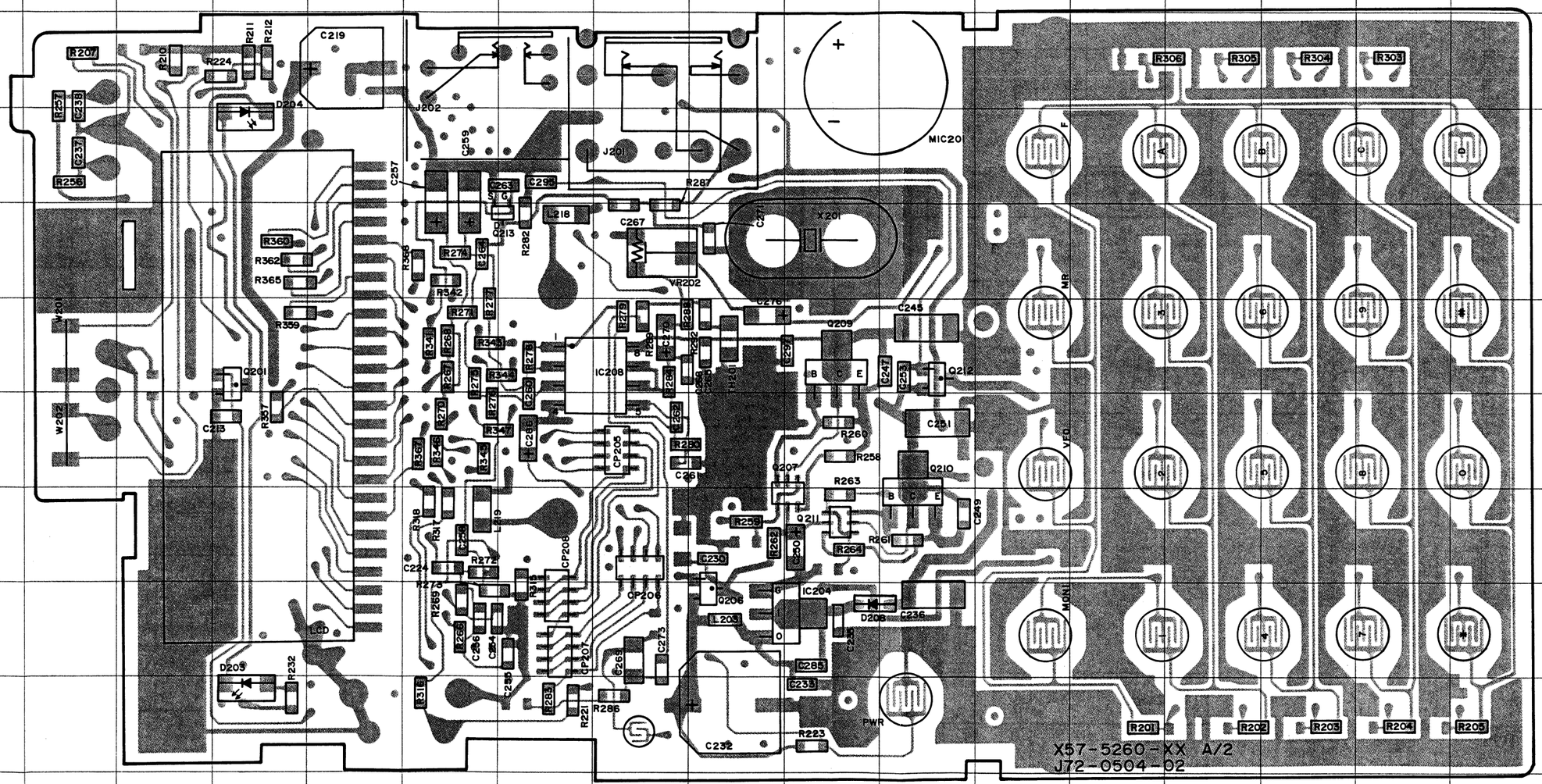
Receiver section

1.Distortion check	SSG ATT : -53.0dBm 07 : **K** 27 : **MA, 234** 47 : **T, E**	SSG AFVM oscilloscope distortion meter	CONT	ANT SP			Check	Less than 3%
2.Hum & noise S/N check	SSG MOD : OFF						Check	More than 40dB
3.RX sensitivity check (Lo edge)	CH : 01 : **K** 21 : **M, A, 234** 41 : **T, E** SSG ATT : -121.0dBm							More than 12dB SINAD

ADJUSTMENT

Receiver section

Item	Condition	Measurement point: Test Equipment	Measurement point: Unit	Measurement point: Terminal	Adjustment: Unit	Adjustment: Parts	Adjustment: Methoud	Specification
4.RX sensitivity check (Hi edge)	CH : 03 : **K** 23 : **M, A, 234** 43 : **T, E**	SSG AFVM oscilloscope distortion meter	CONT	ANT SP			Check	More than 12dB SINAD
5.RX sensitivity check (out of band, Lo Edge)	CH : 04 : **K** 24 : **M, A, 234** 44 : **T, E** SSG ATT : -119.0dBm						Check	More than 12dB SINAD
6.RX sensitivity check (out of band, Hi Edge)	CH : 05 : **K** 25 : **M, A, 234** 45 : **T, E** SSG ATT : -115.0dBm						Check	More than 12dB SINAD
7.Squelch writing (SQ level 1)	CH : 07 : **K** 27 : **M, A, 234** 47 : **T, E** SSG ATT : -126.0dBm						(1) Press the MR key. →"SET" is indicated. (2) Press the VFO key. →"SET 1" is indicated. (If indication is "SET E", press the VFO key.)	
8.Squelch writing (SQ level 2)	SSG ATT : -118.0dBm						(1) Press the VFO key. →"SET" is indicated. (If indication is "SET E", press the VFO key.) (2) Press the MR key.	
9.Forcible save function	CH : 07 : **K** 27 : **M, A, 234** 47 : **T, E** SSG ATT : OFF						(1) Press the B key. →"SA" is blinking. Indicator of ammeter repeats up and down in the constant cycle. (2) Press the B key again.	
10.Stand by current	SSG ATT : OFF						Check	Less than 65mA.
11.Squelch check (SQ level 1)	SSG ATT : OFF						Check	Squelch closes.
	SSG ATT : -125dBm							Squelch opens.
12.Squelch check (SQ level 2)	CH : 09 : **K** 29 : **M, A, 234** 49 : **T, E** SSG ATT : -125.0dBm						Check	Squelch closes.
	SSG ATT : -110.0dBm							Squelch opens.
13.CTCSS check	Connect the CTCSS UNT (TSU-8) to the CN203 (CONT UNIT) CH : 12 : **K** 32 : **M, A, 234** 52 : **T, E** Transmit the moniter set.	CTCSS UNIT (TSU-8)	CONT	CN203	(Moniter set) CH : 12 : K 32 : M, A, 234 52 : T, E The set can receive.			
	CH : 13 : **K** 33 : **M, A, 234** 53 : **T, E** Transmit the moniter set.				The set cannot receive.			
14.DTSS and shock noise check	CH : 14 : **K** 34 : **M, A, 234** 54 : **T, E** TX-RX communicate between the monitor set, and add on a little vibration to the set.	SSG		ANT	(Moniter set) CH : 14 : K 34 : M, A, 234 54 : T, E To be able to TX-RX communicate, and there is no shock noise.			
	CH : 15 : **K** 35 : **M, A, 234** 55 : **T, E** TX-RX communicate between the monitor.				Not to be able to TX-RX communicate			
15.Over voltage level writing	Connect the DC IN to the DCjack, and power on the set. DC power supply : 13.8V				(1)Press the MR key. →"SET" is indicated. (2)Press the F key →"SET b" is indicated. (3)Press the MR key. (4)Press the '#' key again. →"dCErr" is indicated and warning sound rings, (5)Press the '#' key again. →Frequency is indicated.			



TH-235A/E/234 PC BOARD VIEWS

CONTROL UNIT (X57-5260-XX) (A/2) Component side view

-11 : K, K2 -51 : T, E, E3, E4 -21 : M, M2, M3, A

CONTROL UNIT (X57-5260-XX) (A/2)
(Component side)

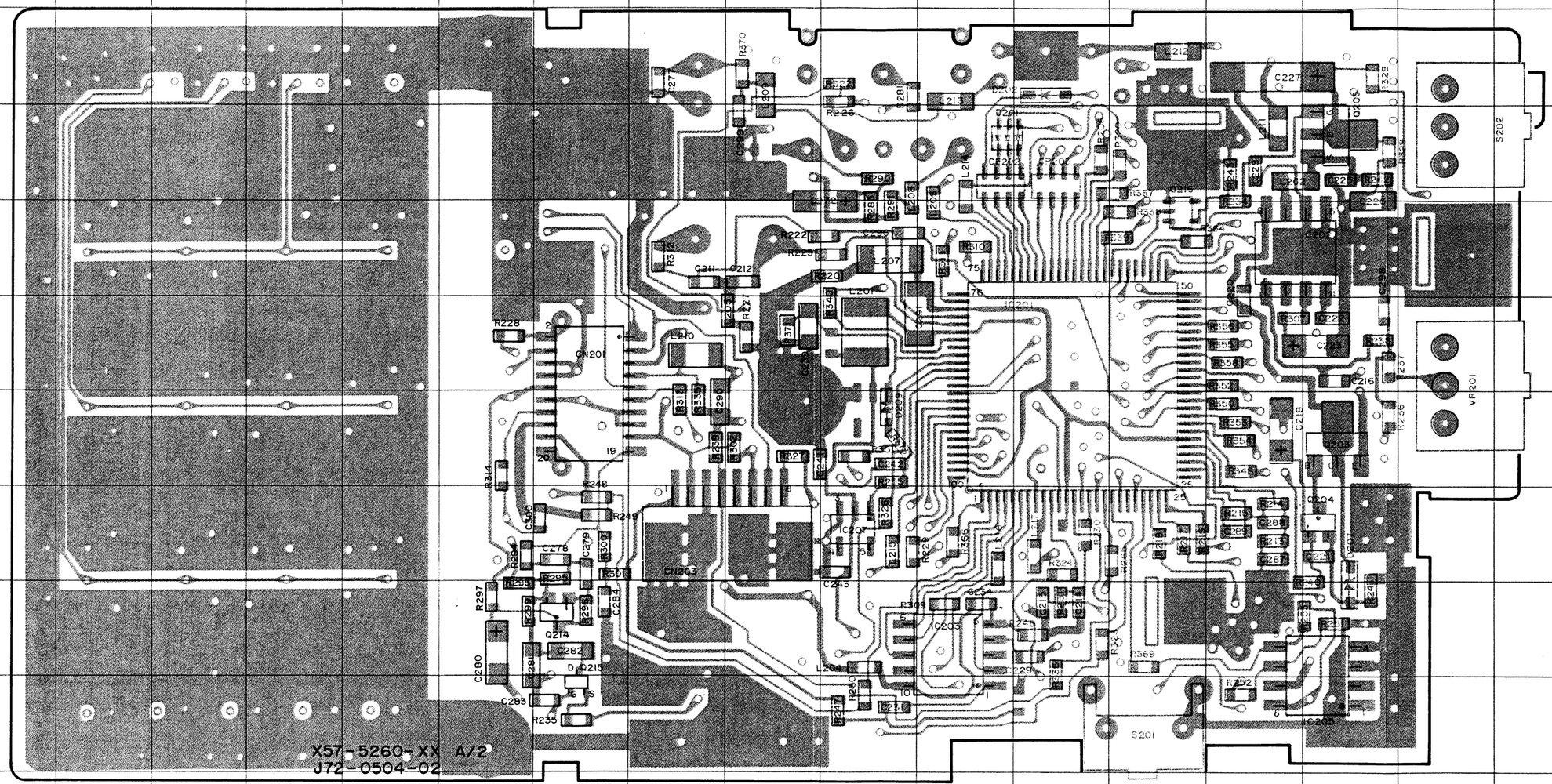
Ref No.	Address
IC204	9J
IC208	6H
Q201	6D
Q206	9I
Q207	8J
Q209	6R
Q210	7S
Q211	8J
Q212	6K
Q213	5G
D203	10D
D204	3D
D208	9J

S-8125OPG-PD

2SB1132
2SC2954

	Component side
Pattern 1	■
Pattern 2	☐
Pattern 3	☐
Pattern 4	☐
	Foil side

CONTROL UNIT (X57-5260-XX) (A/2) Foil side view
-11 : K, K2 -51 : T, E, E3, E4 -21 : M, M2, M3, A

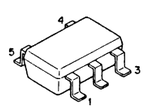


CONTROL UNIT (X57-5260-XX) (A/2)
(Foil side)

Ref No.	Address
IC201	6L
IC202	5O
IC203	9K
IC205	9O
IC207	8J
Q203	7O
Q204	8O
Q205	4O
Q214	9G
Q215	10G
Q216	5N
D201	4L
D202	3L
D207	8O
D209	7J

Component side
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Foil side

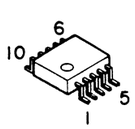
RN5VL45C



2PC4081
2SA1832
2SC4081
2SC4738
2SC5108

2SK1824

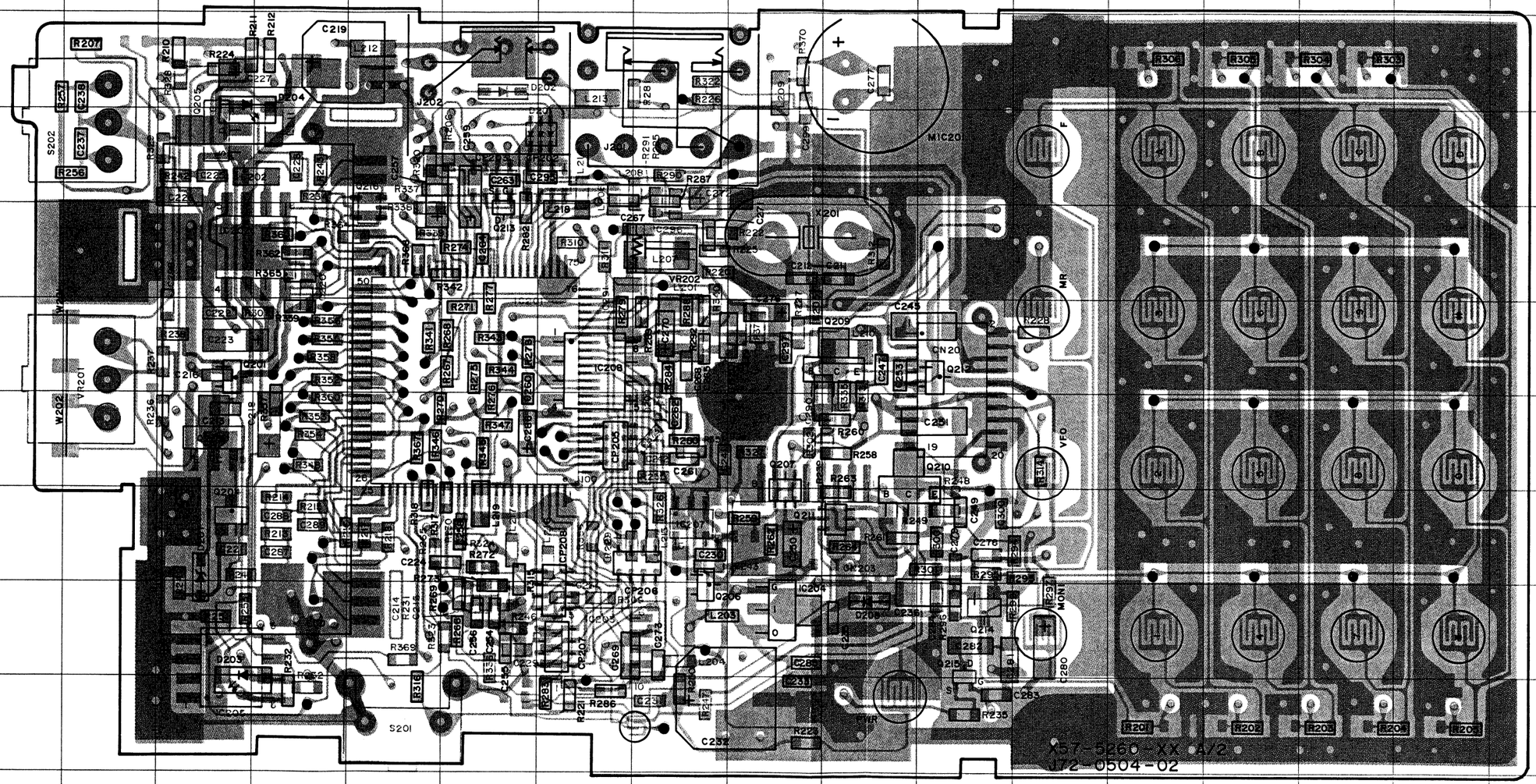
LC73881M



PC BOARD VIEWS TH-235A/E/234

Address
6L
5O
9K
9O
8J
7O
8O
4O
9G
10G
5N
4L
3L
8O
7J

CONTROL UNIT (X57-5260-XX) (A/2) Component side view + Foil side view
-11 : K, K2 -51 : T, E, E3, E4 -21 : M, M2, M3, A



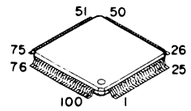
CONTROL UNIT
(X57-5260-XX) (A/2)
(Component side) + (Foil side)

Ref No.	Address
IC201	6Y
IC202	5V
IC203	9Z
IC204	9AB
IC205	9V
IC207	8AA
IC208	6Z
Q201	6V
Q203	7V
Q204	8V
Q205	4V
Q206	9AA
Q207	7AB
Q209	6AC
Q210	7AC
Q211	8AC
Q212	6AD
Q213	5Y
Q214	9AD
Q215	9AD
Q216	4X
D201	4Y
D202	3Y
D203	9V
D204	3W
D207	8V
D208	9AC
D209	7AA

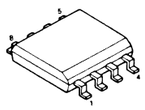
Component side
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Foil side

● Connect 1 and 4.

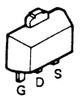
UPD78063GC-529



AT2408N10SI2.5
KIA6278F

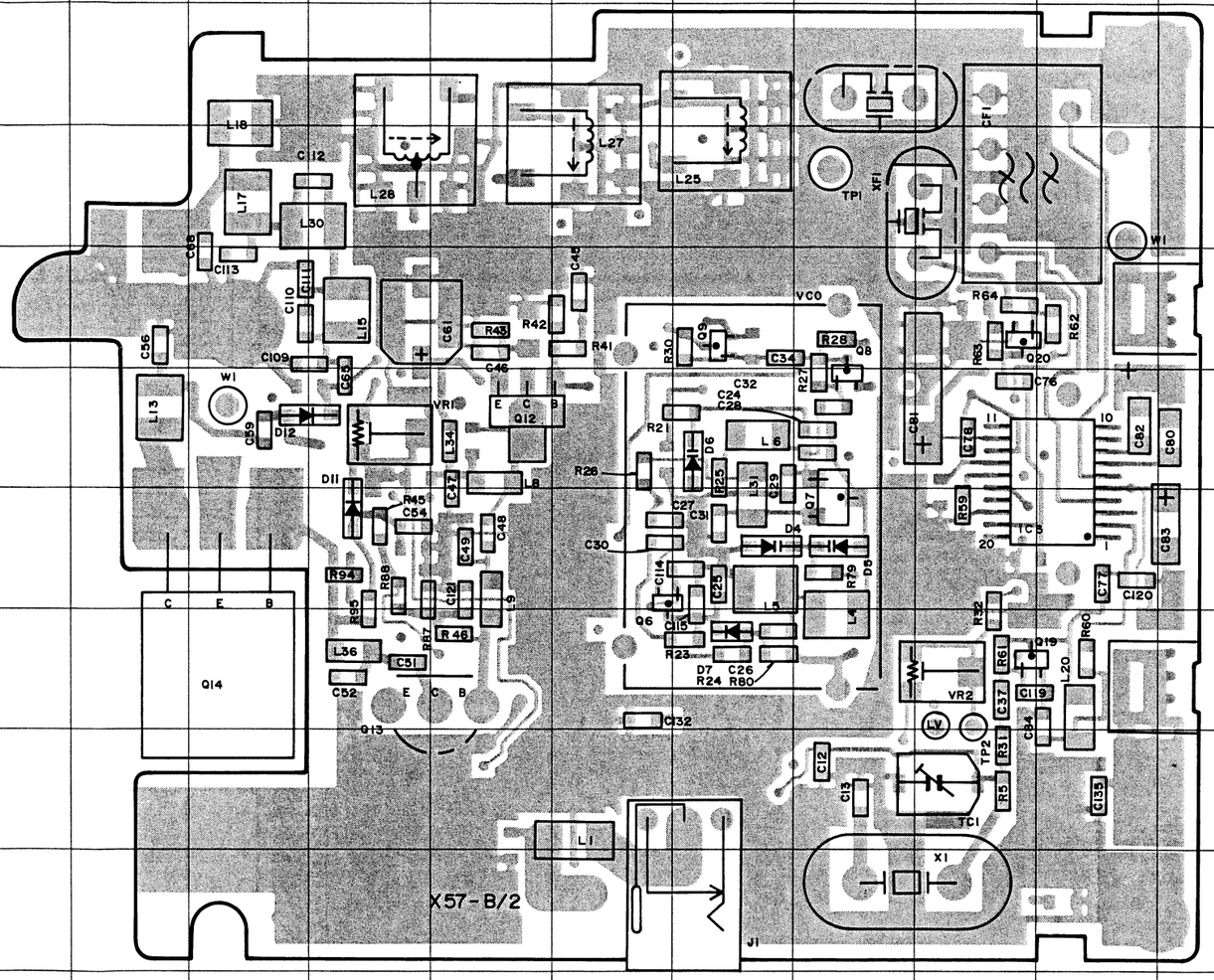


2SK1588



TH-235A/E/234 PC BOARD VIEWS

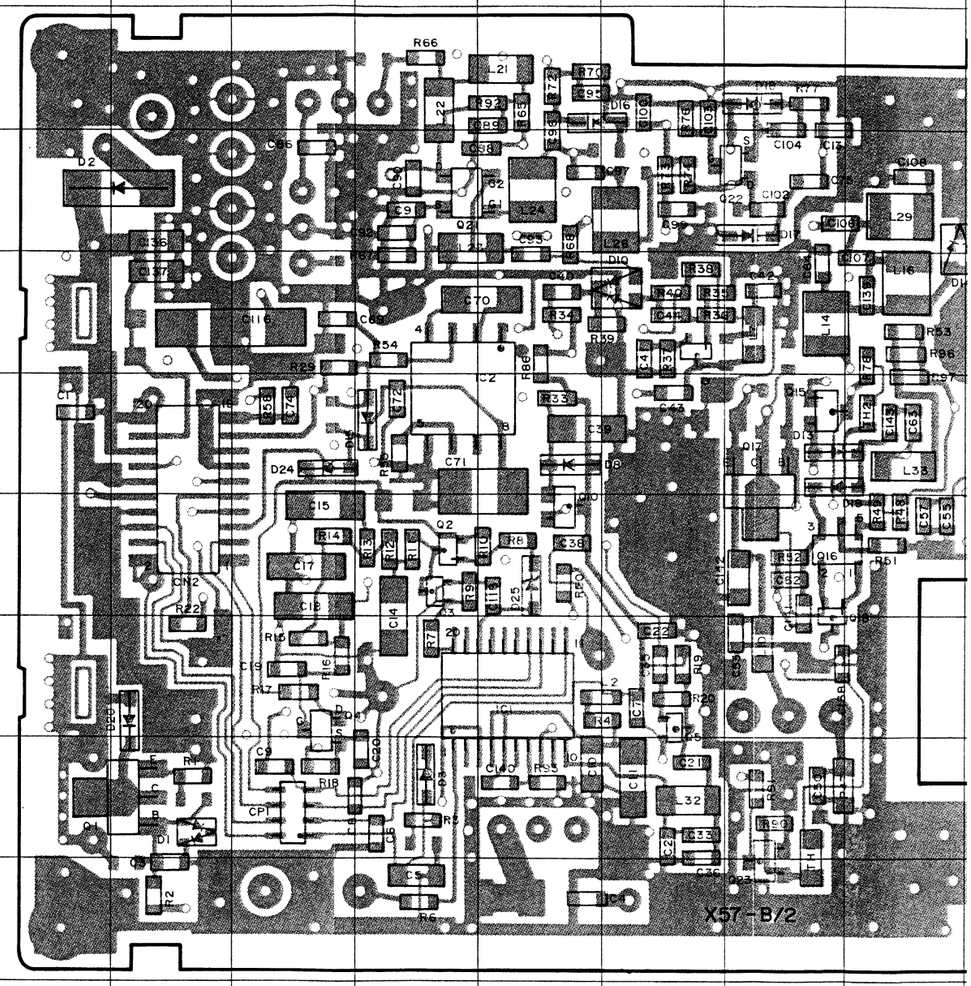
TX-RX UNIT (X57-5260-XX) (B/2) Component side view
-11 : K, K2 -51 : T, E, E3, E4 -21 : M, M2, M3, A



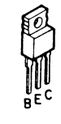
TX-RX UNIT(X57-5260-XX) (B/2)
(Component side)

Ref No.	Address
IC3	6J
Q6	7F
Q7	7H
Q8	5H
Q9	5G
Q12	6E
Q14	8C
Q19	8I
Q20	5I
D4	7G
D5	7H
D6	6G
D7	8G
D11	7D
D12	6C

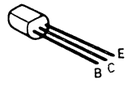
TX-RX UNIT (X57-5260-XX) (B/2) Foil side view
-11 : K, K2 -51 : T, E, E3, E4 -21 : M, M2, M3, A



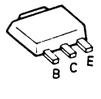
2SC1971



2SC2053



2SB1132
2SC2954



2SK1824

2PC4081
2SA1832
2SC4081
2SC4738
2SC5108

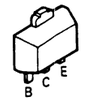
Component side

Pattern 1	
Pattern 2	
Pattern 3	
Pattern 4	

Foil side

2SK508NV
2SK879

2SD1483
2SD1664



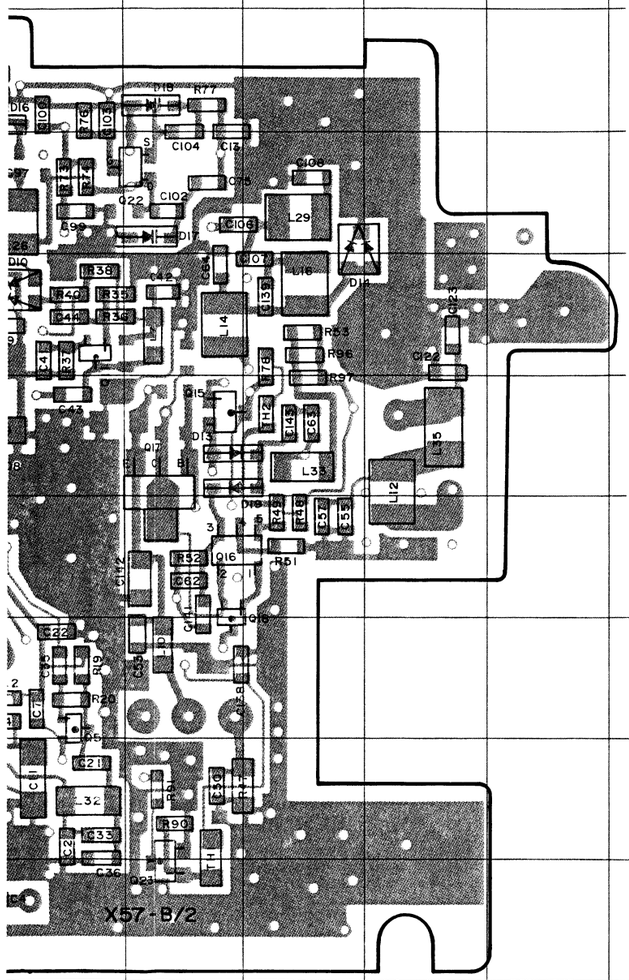
Component side

Pattern 1	
Pattern 2	
Pattern 3	
Pattern 4	

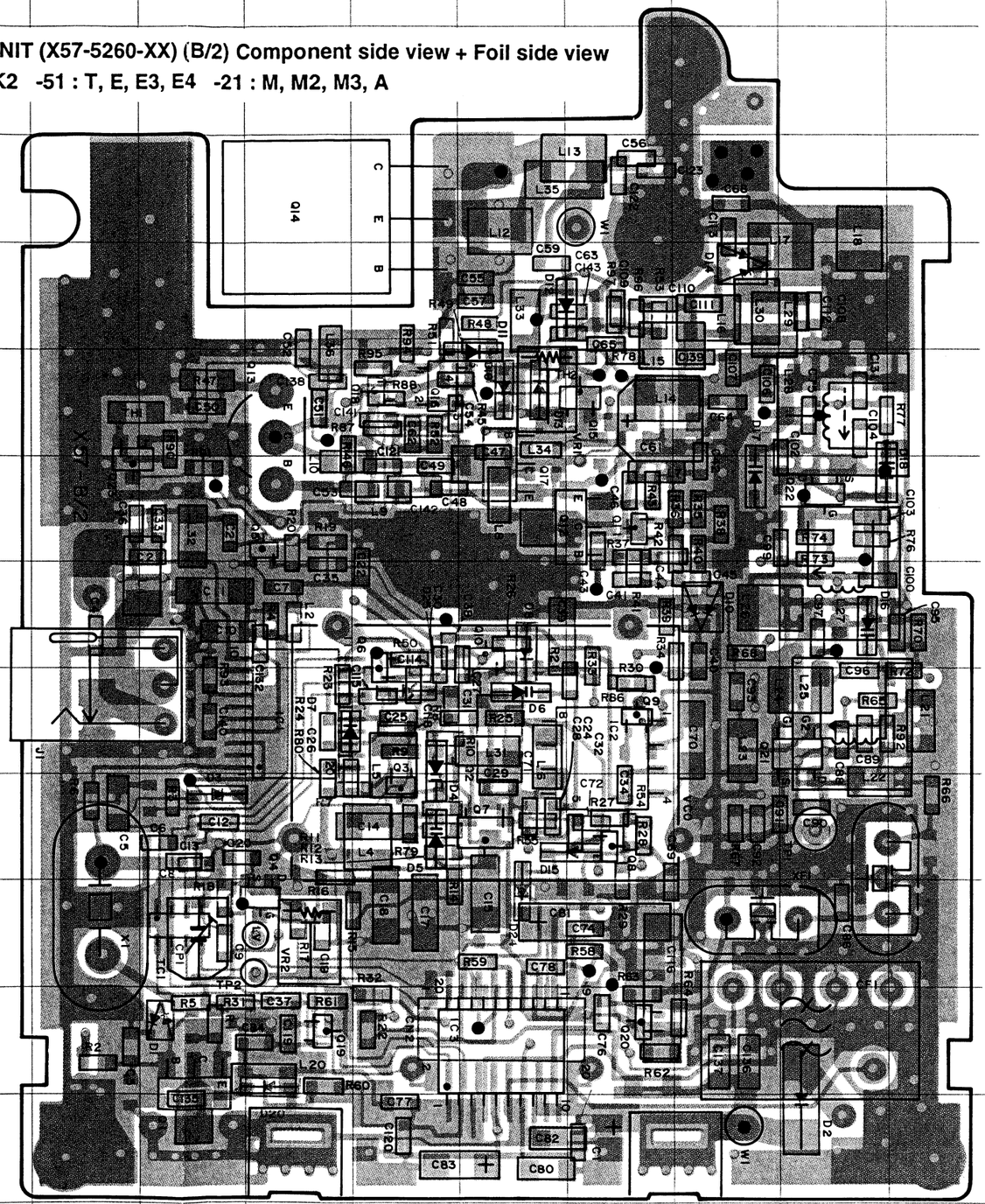
Foil side

TX-RX UNIT (X57-5260-XX) (B/2)
(Foil side)

Ref No.	Address
IC1	8R
IC2	6Q
Q1	9N
Q2	7Q
Q3	7Q
Q4	8P
Q5	8S
Q10	7R
Q11	5S
Q15	6T
Q16	7T
Q17	6T
Q18	7T
Q21	4Q
Q22	4T
Q23	9T
D1	9O
D2	4N
D8	6R
D14	4U
D15	6Q
D16	3R
D17	4T
D18	3T
D19	6T
D20	8O
D24	6P



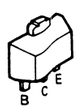
TX-RX UNIT (X57-5260-XX) (B/2) Component side view + Foil side view
-11 : K, K2 -51 : T, E, E3, E4 -21 : M, M2, M3, A



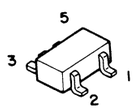
TX-RX UNIT
(X57-5260-XX) (B/2)
(Component side) + (Foil side)

Ref No.	Address
IC1	8AD
IC2	8AG
IC3	11AF
Q1	12AC
Q2	8AE
Q3	9AR
Q4	10AD
Q5	6AD
Q6	7AE
Q7	7AE
Q8	9AG
Q9	8AG
Q10	7AF
Q11	6AG
Q12	6AG
Q13	5AD
Q14	3AD
Q15	5AG
Q16	5AE
Q17	6AE
Q18	5AE
Q19	11AD
Q20	11AG
Q21	8AI
Q22	6AI
Q23	6AB
D1	11AC
D2	12AI
D3	9AC
D4	9AE
D5	9AE
D6	8AF
D7	8AD
D8	8AE
D10	7AH
D11	4AF
D12	4AF
D13	5AF
D14	4AH
D16	7AI
D17	6AH
D18	6AI
D19	5AF
D20	11AD
D24	10AF
D25	8AE

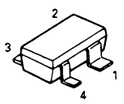
2SD1483
2SD1664



FMW1

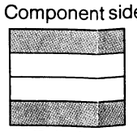


SGM2014M



Component side

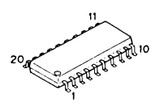
Pattern 1
Pattern 2
Pattern 3
Pattern 4



Foil side

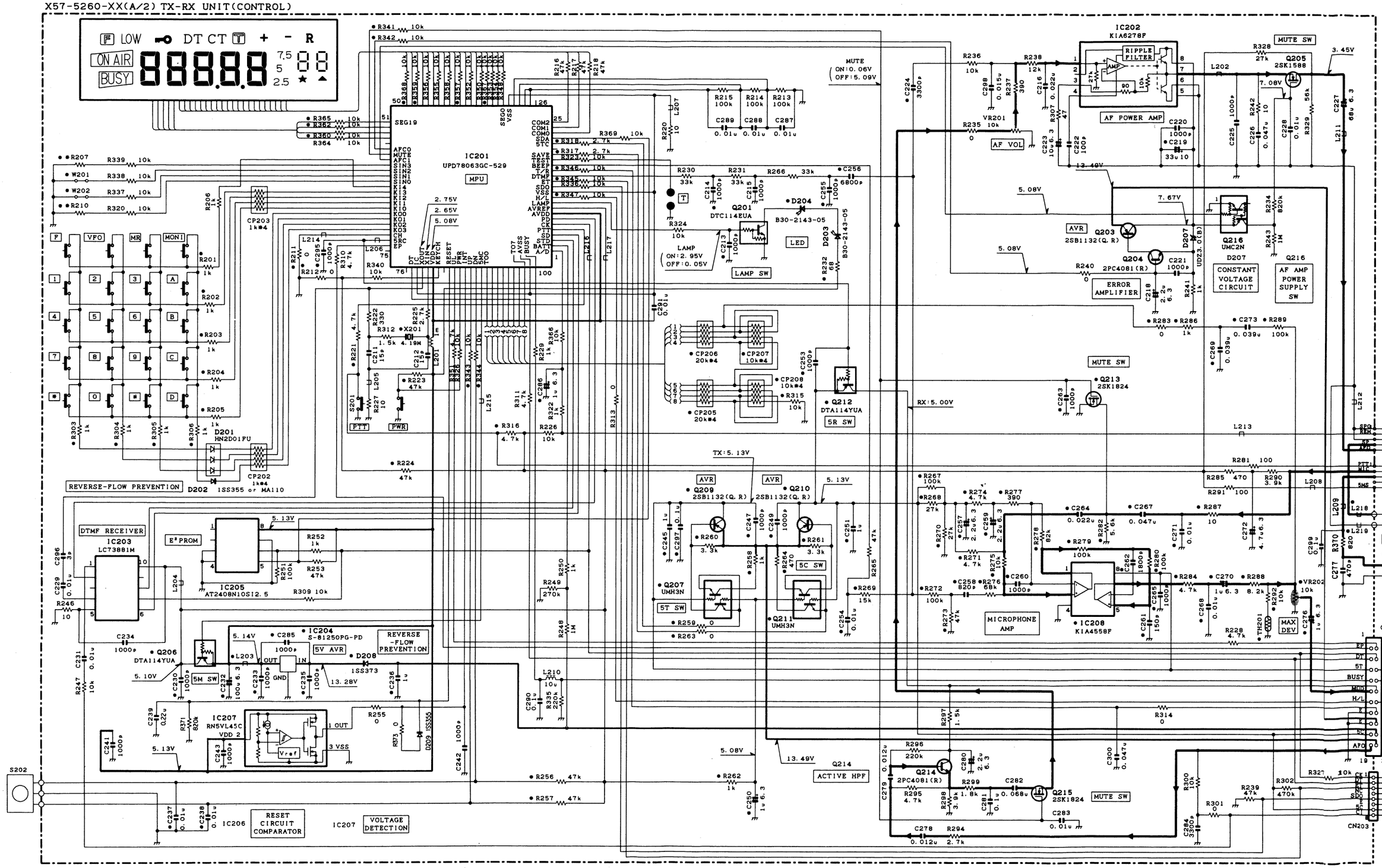
● Connect 1 and 4.

MB15A02
TK14521V



2SK1215

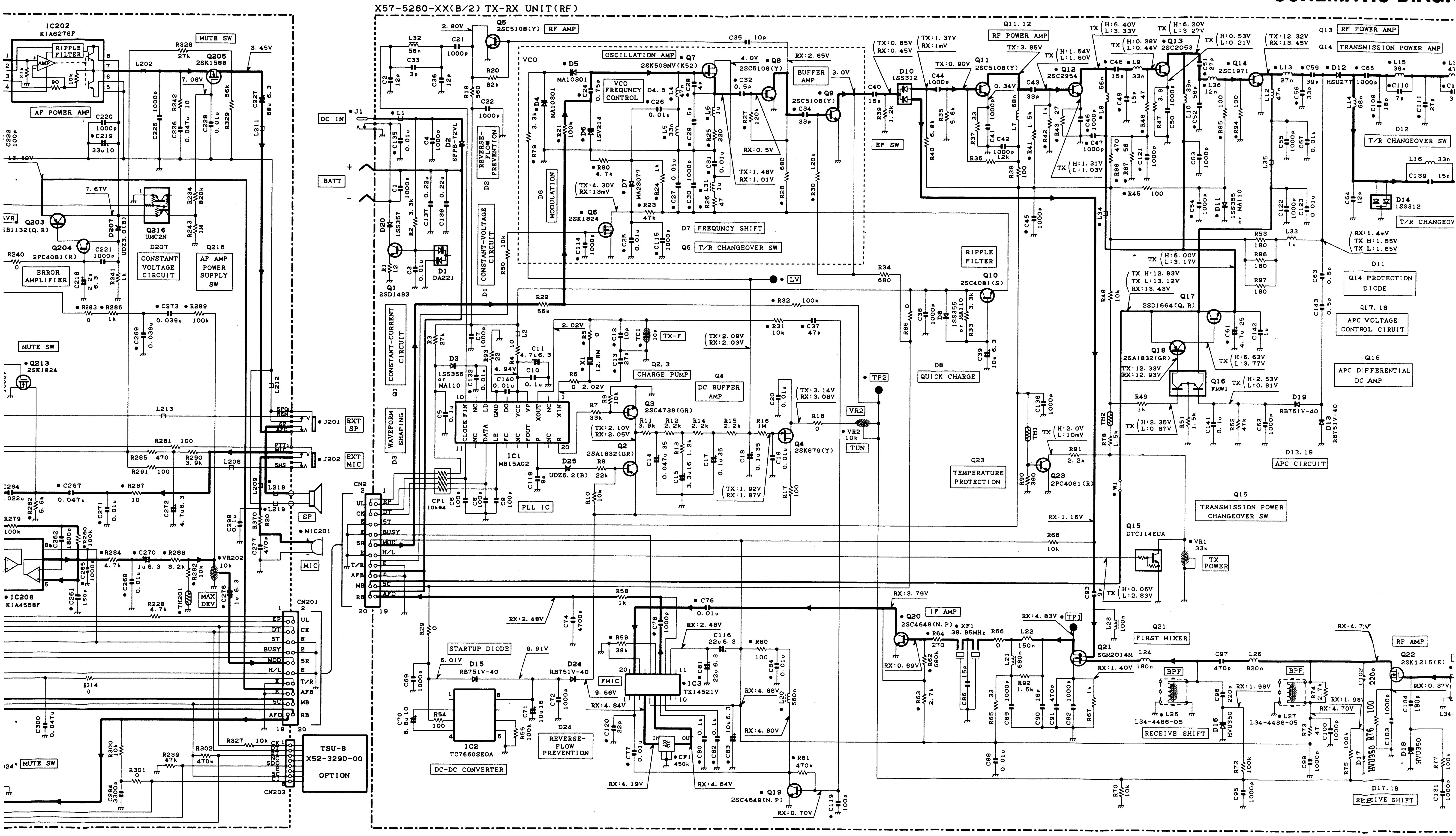
X57-5260-XX(A/2) TX-RX UNIT(CONTROL)



			R207	R210	W201	W202
0-11	(K, K2)	TH-235A	0	0	○	○
0-51	(T, E, E3, E4)	TH-235E	0	—	○	○
0-21	(M, M2, M3, A)	TH-235A, TH-234	—	—	—	—

IC201	:UPD78063GC-529	IC205	:AT2408N10SI2.5	Q201	:DTC114EUA	Q206, 212	:DTA114YUA	D201	:HN2D01FU	D207	:UDZ3.0(B)
IC202	:K1A6278F			Q203, 209, 210	:2SB1132(Q, R)	Q207, 211	:UMH3N	D202	:1SS355 or MA110	D208	:1SS373
IC203	:LC73881M	IC207	:RN5VL45C	Q204, 214	:2PC4081(R)	Q213, 215	:2SK1824	D203, 204	:B30-2143-05	D209	:1SS355
IC204	:S-81250PG-PD	IC208	:K1A4558F	Q205	:2SK1588	Q216	:UMC2N				

SCHEMATIC DIAGR



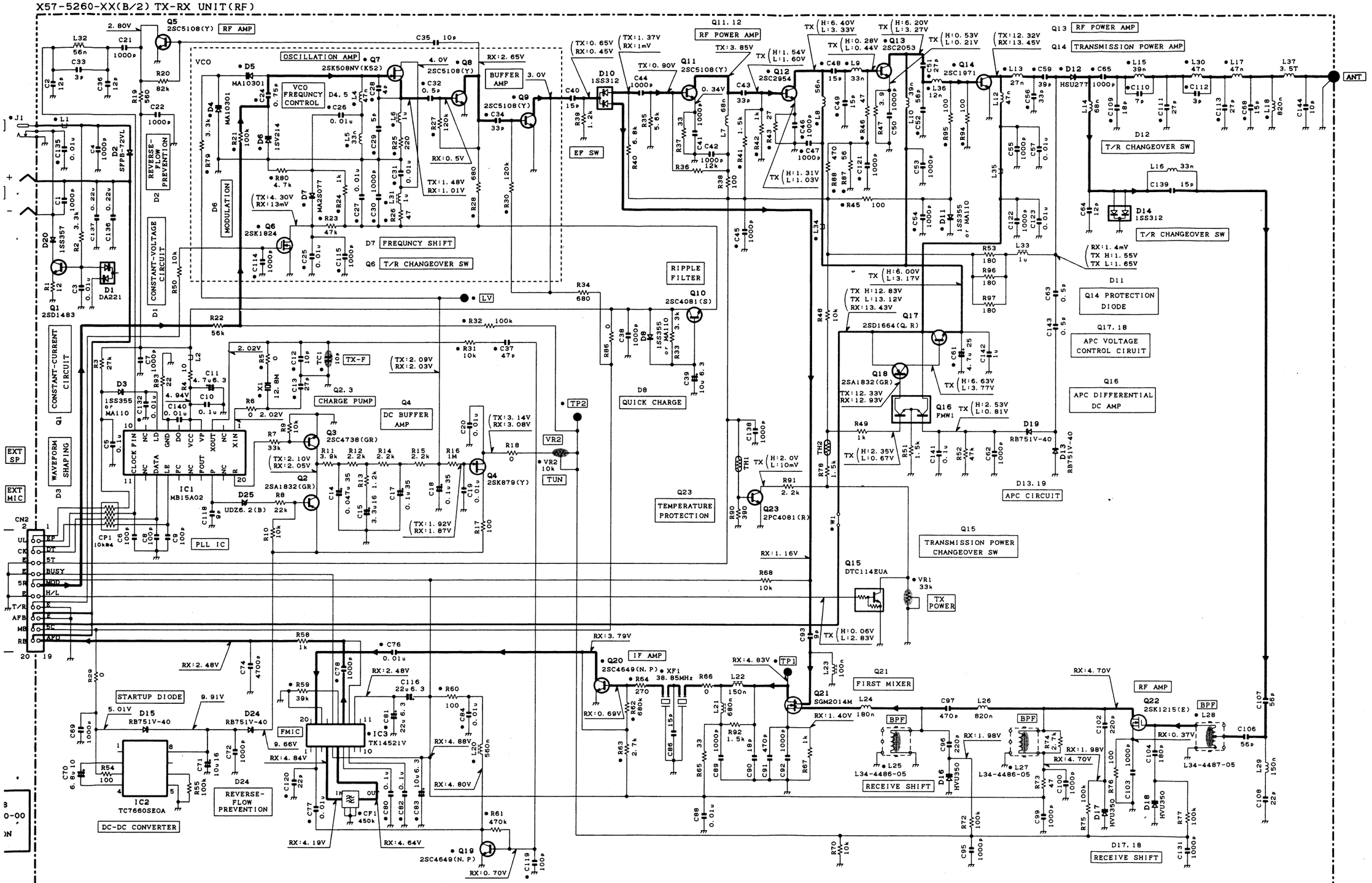
X57-5260-XX(B/2) TX-RX UNIT(RF)
IC202
K1A6278F
RIPPLE FILTER
AF POWER AMP
MUTE SW
Q205
2SK1588
Q203
Q204
2PC4081(R)
ERROR AMPLIFIER
Q216
UMC2N
D207
CONSTANT VOLTAGE CIRCUIT
Q216
AF AMP POWER SUPPLY SW
Q213
2SK1824
IC208
K1A4558F
MAX DEV
SP
MIC
EXT SP
EXT MIC
J201
J202
MIC201
CN201
CN203
TSU-8
X52-3290-00
OPTION
DC IN
BATT
J1
CONSTANT-CURRENT CIRCUIT
WAVEFORM SHAPING
CONSTANT-VOLTAGE CIRCUIT
REVERSE-FLOW PREVENTION
Q1
2SD1483
D1
DA221
D2
SFPB-72VL
RF AMP
Q5
2SC5108(Y)
VCO
OSCILLATION AMP
Q7
2SK508NV(K52)
Q8
2SC5108(Y)
Q9
2SC5108(Y)
BUFFER AMP
VCO FREQUNCY CONTROL
MODULATION
D6
Q6
2SK1824
D7 FREQUNCY SHIFT
Q6 T/R CHANGEOVER SW
LV
PLL IC
IC1
MB15A02
CHARGE PUMP
Q2.3
TX-F
Q3
2SC4738(GR)
Q2
2SA1832(GR)
DC BUFFER AMP
Q4
2SK879(Y)
VR2
TUN
TP2
QUICK CHARGE
D8
D10
1SS312
EF SW
Q11.12
RF POWER AMP
Q11
2SC5108(Y)
Q12
2SC2954
Q13
2SC2053
Q14
2SC1971
Q13 RF POWER AMP
Q14 TRANSMISSION POWER AMP
D12
HSU277
T/R CHANGEOVER SW
D14
1SS312
RIPPLE FILTER
Q10
2SC4081(S)
TEMPERATURE PROTECTION
Q23
2PC4081(R)
Q14 PROTECTION DIODE
D11
Q17.18
APC VOLTAGE CONTROL CIRUIT
Q17
2SD1664(Q.R)
Q18
2SA1832(GR)
Q16
APC DIFFERENTIAL DC AMP
Q16
FMW1
D19
RB751V-40
D13
RB751V-40
D13.19
APC CIRCUIT
Q15
TRANSMISSION POWER CHANGEOVER SW
Q15
DTC114EUA
VR1
TX POWER
STARTUP DIODE
D15
RB751V-40
D24
RB751V-40
IC2
TC7660SEOA
DC-DC CONVERTER
REVERSE-FLOW PREVENTION
FMIC
IC3
TK14521V
CF1
450k
Q19
2SC4649(N.P)
IF AMP
Q20
2SC4649(N.P)
XF1
38.85MHz
TP1
Q21
SGM2014M
FIRST MIXER
BPF
L34-4486-05
RECEIVE SHIFT
D16
HVU350
RF AMP
Q22
2SK1215(E)
D17.18
RECEIVE SHIFT

D207 :UDZ3.0(B)
D208 :1SS373
D209 :1SS355

IC1	:MB15A02	Q1	:2SD1483	Q5.8.9.11	:2SC5108(Y)	Q12	:2SC2954	Q16	:FMW1	Q22	:2SK1215(E)	D1	:DA221	D6	:1SV214
IC2	:TC7660SEOA	Q2.18	:2SA1832(GR)	Q6	:2SK1824	Q13	:2SC2053	Q17	:2SD1664(Q.R)	Q23	:2PC4081(R)	D2	:SFPB-72VL	D7	:MA2S077
IC3	:TK14521V	Q3	:2SC4738(GR)	Q7	:2SK508NV(K52)	Q14	:2SC1971	Q19.20	:2SC4649(N.P)			D3.8.11	:1SS355 or MA110	D10.14	:1SS312
		Q4	:2SK879(Y)	Q10	:2SC4081(S)	Q15	:DTC114EUA	Q21	:SGM2014M			D4.5	:MA10301	D12	:HSU277

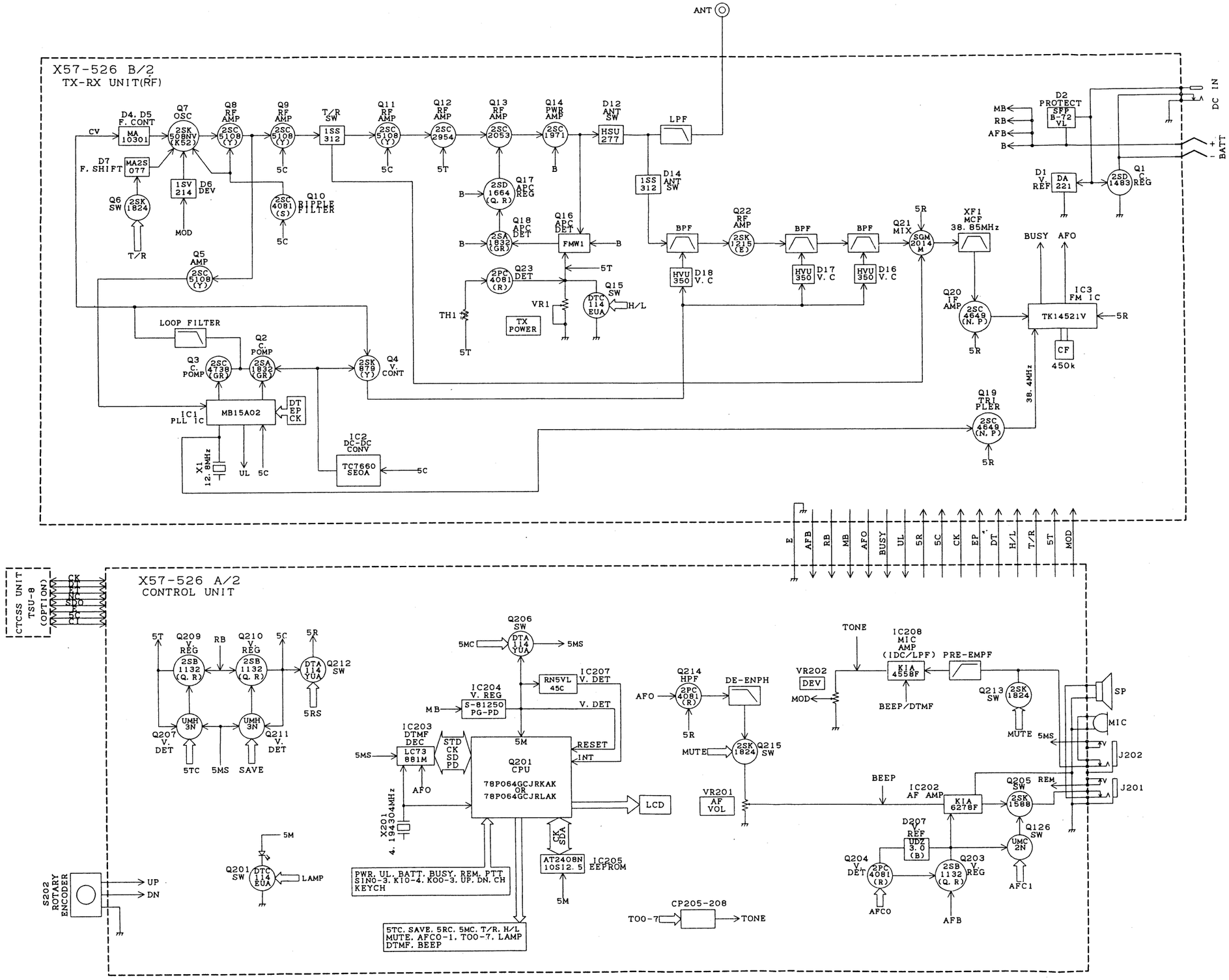
SCHEMATIC DIAGRAM TH-235A/E/234

X57-5260-XX(B/2) TX-RX UNIT(RF)

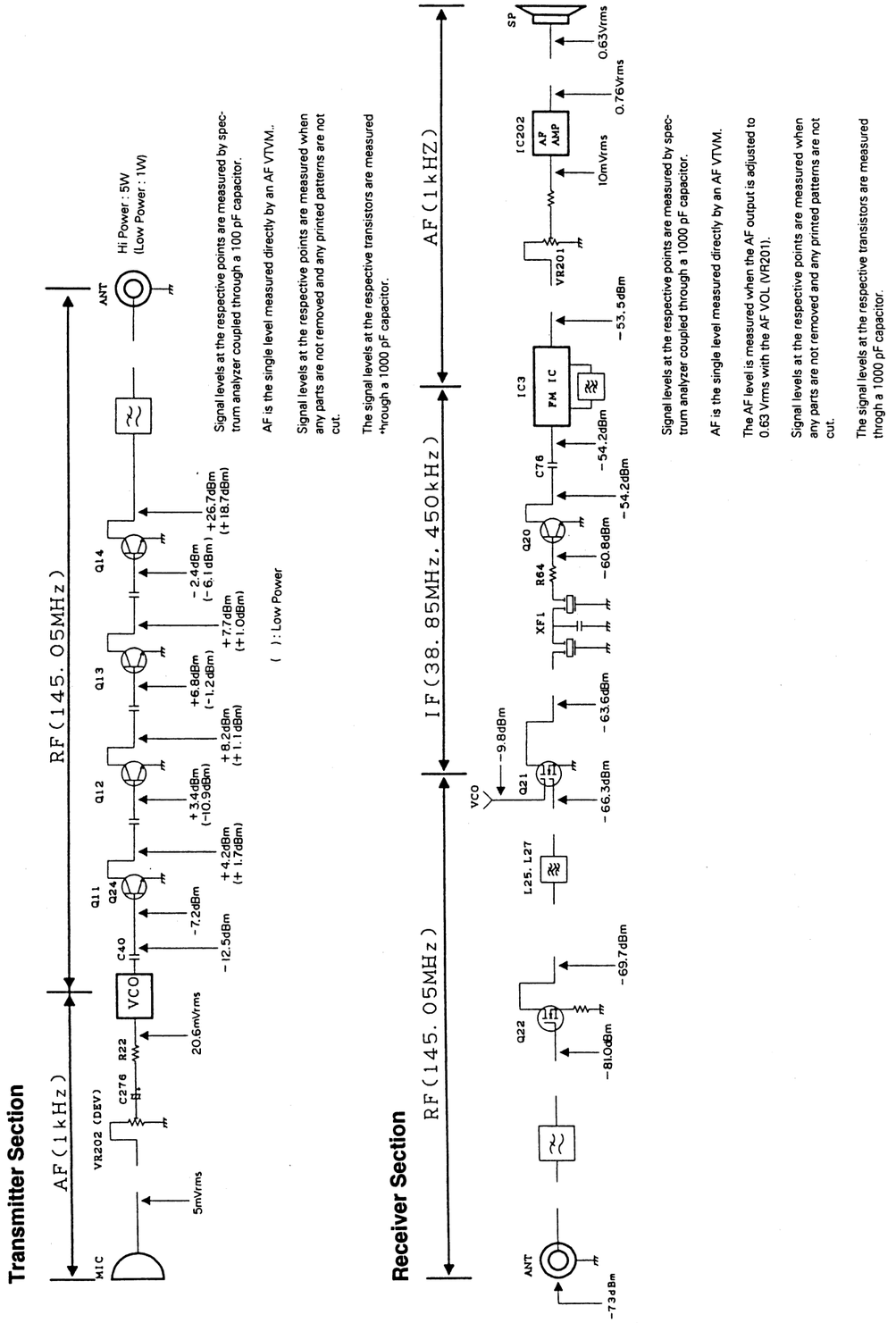


Note) ● Ref. No. : Parts of patt ern 1.

TH-235A/E/234 BLOCK DIAGRAM

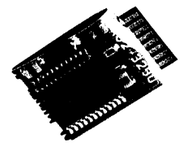


LEVEL DIAGRAM



OPTIONAL ACCESSORIES

TSU-8
CTCSS Unit

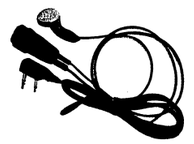


SMC-32
Speaker Microphone

SMC-33
Remote Control
Speaker Microphone

SMC-34
Remote Control
Speaker Microphone

EMC-3
Clip Microphone
with Earphone



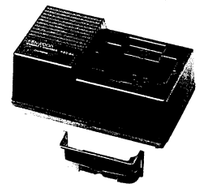
PB-36
Standard Battery
Pack
(7.2 V/950 mAh)

PB-37
High-power Battery
Pack
(12 V/950 mAh)

BT-10
Battery Case

BC-17
Wall Charger

KSC-8A
Compact Charger



KSC-14
Rapid Charger

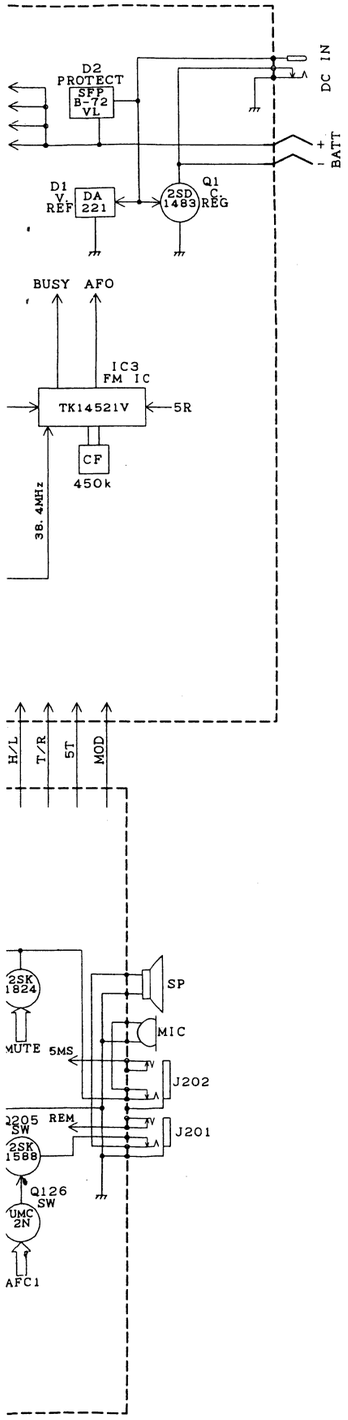
PG-2W
DC Cable

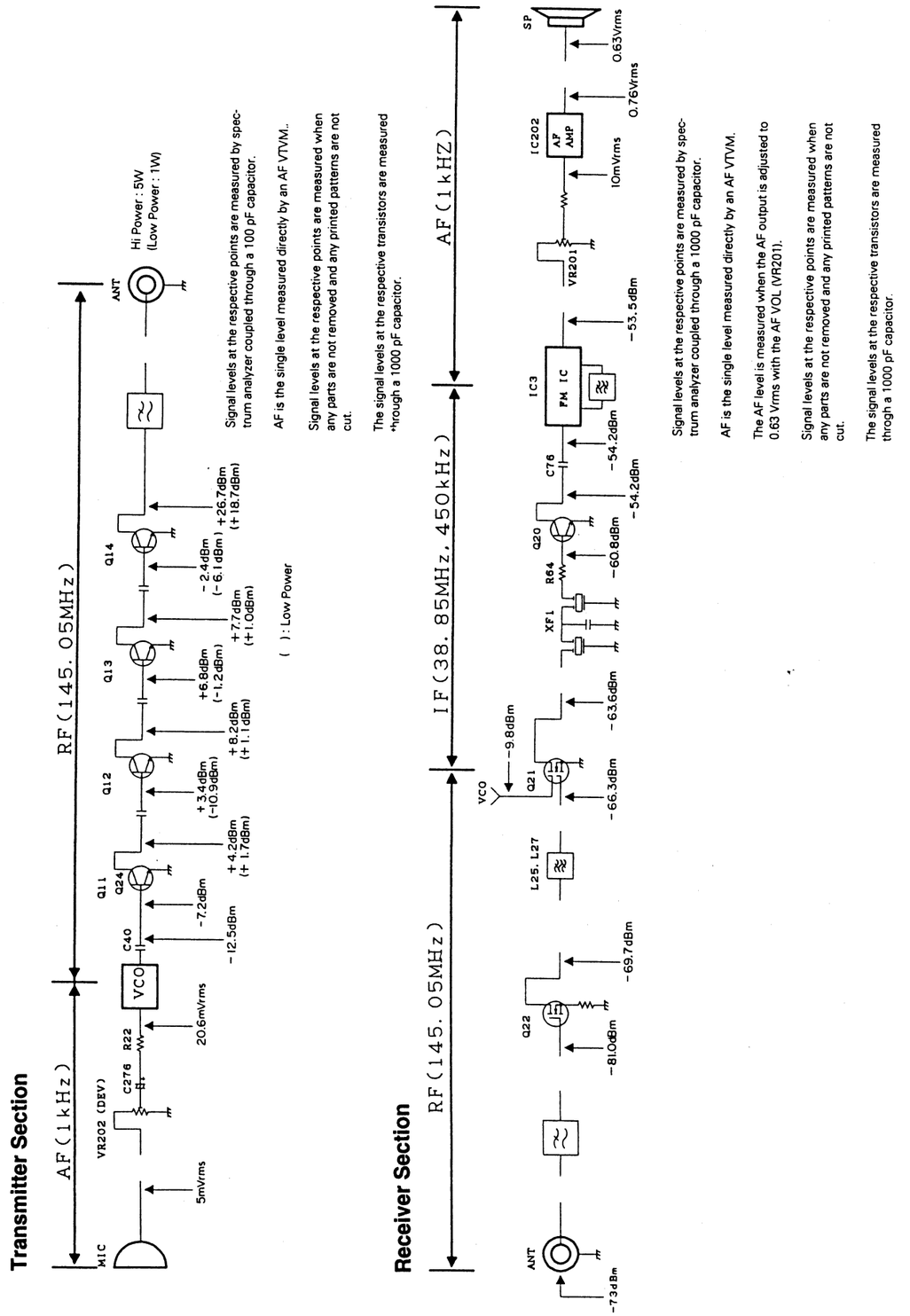
Not for use with the PB-37

PG-3J
Filtered Cigarette Lighter Cable

Not for use with the PB-37

WR-2
Water-resistant Bag

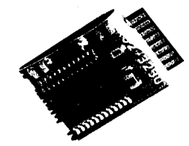




LEVEL DIAGRAM

OPTIONAL

TSU-8
CTCSS Unit



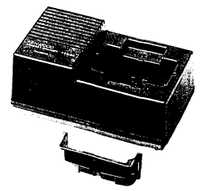
SMC-32
Speaker Microphon

EMC-3
Clip Microphone with Earphone

PB-36
Standard Battery Pack
(7.2 V/950 mAh)

BC-17
Wall Charger

KSC-8A
Compact Charger



Not for use with the PB-37

PG-3J
Filtered Cigarette Lighter Cable

Not for use with the PB-37

TH-235A/E/234

SPECIFICATIONS

TH-235A/E

GENERAL

Frequency Range	
U.S.A./Canada	144 to 148MHz
Europe	144 to 146MHz
General market	144 to 148MHz
Mode	F3E(FM)
Usable temperature range	–10°C to +50°C (+14°F to +122°F)
Rated Voltage	
External power supply (DC IN)	7.5 to 16.0V (13.8V)
Buttery terminals	6.8 to 15.0V (7.2V)
Current	
Receive with no signals	Average 50mA
Battery Saver ON	Approx. 14mA
Transmit with H,12.0V	Approx. 1.3A
Transmit with H,7.2V	Approx. 0.8A
Transmit with L,7.2V	Approx. 0.6A
Grounding method	Negative ground
Dimensions(WxHxD projections included)[1]	62.0x166.2x37.2mm 2.44x6.54x1.47in
Weight[2]	Approx. 361g(12.7oz):
Microphone impedance	2kΩ
Antenna impedance	50Ω

TRANSMITTER

Power output	
H,13.8V	Approx. 5W
H,12.0V	Approx. 5W
H,7.2V	Approx. 1.5W
L,7.2V	Approx. 1W
Modulation	Reactance
Maximum frequency deviation	With in ± 5kHz
Spurious emissions	–60dB or less

RECEIVER

Circuitry	Double conversion superhetrodyne
1st intermediate frequency	38.85MHz
2nd intermediate frequency	450kHz
Sensitivity(12dB SINAD)	0.2μV or less
Squelch sensitivity	0.13μV or less
Selectivity(-6dB)	12kHz or higher
Selectivity(-40dB)	28kHz or less
Audio output (10% distortion)	280mW or higher (8Ω load)

[1]With a PB-36 or BT-10 installed.
[2]PB-36 NiCd battery pack, antenna, and belt hook included.
Specifications are subject to change without due to development in technology.

TH-235A/E
TH-234

SPECIFICATIONS

TH-234

GENERAL

Frequency Range	144 to 148MHz
Mode	F3E(FM)
Usable temperature range	–10°C to +50°C
Rated Voltage	
External power supply (DC IN)	7.5 to 16.0V (13.8V)
Buttery terminals	6.8 to 15.0V (7.2V)
Current	
Receive with no signals	Average 50mA
Battery Saver ON	Approx. 14mA
Transmit with H,12.0V	Approx. 1.3A
Transmit with H,7.2V	Approx. 0.8A
Transmit with L,7.2V	Approx. 0.6A
Grounding method	Negative ground
Dimensions	
(WxHxD projections included)[1]	62.0x166.2x37.2mm
Weight[2]	Approx. 351g
Microphone impedance	2kΩ
Antenna impedance	50Ω

TRANSMITTER

Power output	
H,13.8V	Approx. 5W
H,12.0V	Approx. 5W
H,7.2V	Approx. 1.5W
L,7.2V	Approx. 1W
Modulation	Reactance
Maximum frequency deviation	With in ± 5kHz
Spurious emissions	–60dB or less

RECEIVER

Circuitry	Double conversion superhetrodyne
1st intermediate frequency	38.85MHz
2nd intermediate frequency	450kHz
Sensitivity(12dB SINAD)	0.2μV or less
Squelch sensitivity	0.13μV or less
Selectivity(-6dB)	12kHz or higher
Selectivity(-40dB)	28kHz or less
Audio output (10% distortion)	280mW or higher (8Ω load)

[1]With the BT-10 installed.
[2]BT-10,antenna,and belt hook included.
Specifications are subject to change without due to development in technology.

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