FURUNO

SERVICE MANUAL

MARINE VHF
HANDHELD TRANSCEIVER

MODEL **FM-55**

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·Your Local Agent/Dealer

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PUB. No. SME-54600-A
(HIMO) FM-55

C O N T E N T S

SPECIFICATIONS OF MARINE VHF TRANSCEIVER FM-55

GENERAL

1. Frequency Range	TX: 155.050 to 163.900 MHz RX: 155.050 to 163.900 MHz
2. Class of Emission	Frequency modulation with a pre-emphasis of 6dB/octave (phase modulation)
3. Number of Channels	1) All channels for ITU 2) U.S. and Canadian Weather, 10ch 3) Up to 74 Private channels (factory-programmed) * USA channels are available for U.S. market
4. Channel Spacing	25 kHz
5. Communication System	Simplex and semi-duplex
6. Antenna	Helical whip (BNC connector provided for external 50-ohm antenna)
7. Power Supply	Ni-Cd battery pack (BP-507, BP-807, BP-509 or BP-512)
8. Ambient Temperature	-20°C to +55°C
9 Dimensions	65(W) x 170(H) x 44(D)mm, 600g (with Battery Pack BP-507, BP-807 or BP-509) 65(W) x 190(H) x 44(D)mm , 650g (with Battery Pack BP-512) * Dimensions do not include projections and controls.

TRANSMITTER

1. RF Output Power	5, 3, 2 or 1W, subject to authority approval Reducible to below 1W for 5-2W version, and about 0.5W for 1W version
2. Frequency Stability	±1.5 kHz (-15°C to +55°C)
3. Frequency Deviation	±5 kHz max.
4. Modulation AF Response	Modulation index within +1 or -3 dB relative to its value at 1000 Hz for modulation frequencies 300 - 3000 Hz
5. Spurious Emissions	Less than 2.5uW

RECEIVER

1. Receiving System	PLL synthesizer, Double superheterodyne
2. AF Output Power	Approx. 250/500mW into 8 ohm speaker (see table below.)
3. AF Response	6 dB/oct de-emphasis +1, -3 dB for 300 - 3000 Hz
4. Sensitivity	SINAD 12 dB: 0.32 uV (-10 dBu) 20 dB: 0.50 uV (-6 dBu)
5. Adjacent Channel Selectivity	70 dB (+15 to +35°C, nominal supply) 60 dB (-20 to +55°C, 90/130% supply)
6. Spurious Response	70 dB (apart more than 25 kHz)
7. Intermodulation	70 dB
8. Squelch	Threshold 0.1 uV. Tight 0.2 uV

BATTERY PACK (Ni-Cd type)

Type		BP-507	BP-509	BP-807	BP-509	BP-512
Capacity		450mAH		850mAH	450mAH	450mAH
No. of cells		6	8	6	8	10
Voltage		7.2V	9.6V	7.2V	9.6V	12V
TX output		1W/0.5W		2W/1W	3W/1W	5W/1W
AF output		250mW		250mW	500mW	500mW
Power consump.	TX	0.85A or less		0.85A or less	1.1A or less	1.3A or less
	RX	150mA or less		150mA or less	200mA or less	200mA or less
	ST-BY	less than 200mA				
Operating time		4 hours		4 hours	2 hours	2 hours
Battery life		More than 300 charges/discharges (Duty cycle TX:RX:ST-BY = 1:1:8)				
Charging hours		For 450mAH type Battery Pack, approx. 15 hours with Wall Charger (BC-500) and 1 to 1.5 hours with Tabletop Quick Charger (BP-501, BP-503 or BP-506)				

EQUIPMENT LIST

(Standard)

1. Main Unit
2 Ni-Cd Battery Pack BP-507, BP-807, BP-509 or BP-512
3 Wall Charger BC-500 for 110/220VAC
4 Helical Whip Antenna
5 Earphone
6 Vinyl Case
7 Hand Strap
8 Belt Clip

(Optional)

1 Tabletop Quick Charger BC-501 for one radio or BC-503 for 3 radios
2 External Speaker/Microphone
3 Hard Case (Holster type)
4 Shoulder Belt

FREQUENCY/CHANNEL LIST

MARINE VHF CHANNEL FREQUENCIES (INTERNATIONAL VERSION)

Channel	Ship Transmit	Ship Receive	Type of Operation
01	156.050	160.650	Public Correspondence, Port Operation
02	156.100	160.700	Public Correspondence, Port Operation
03	156.150	160.750	Public Correspondence, Port Operation
04	156.200	160.800	Public Correspondence, Port Operation
05	156.250	160.850	Public Correspondence, Port Operation
06	156.300	156.300	Safety
07	156.350	156.950	Public Correspondence, Port Operation
08	156.400	156.400	Intership
09	156.450	156.450	Port Operation
10	156.500	156.500	Port Operation
11	156.550	156.550	Port Operation
12	156.600	156.600	Port Operation
13	156.650	156.650	Bridge-to-bridge, Navigational
14	156.700	156.700	Port Operation
15	156.750	156.750	Coast-to-ship, 1W
16	156.800	156.800	Distress, Safety and Calling
17	156.850	156.850	State-controlled, Ship-to-coast, 1W
18	156.900	161.500	Port Operation
19	156.950	161.550	Port Operation
20	157.000	161.600	Port Operation
21	157.050	161.650	Port Operation
22	157.100	161.700	Port Operation
23	157.150	161.750	Public Correspondence
24	157.200	161.800	Public Correspondence
25	157.250	161.850	Public Correspondence
26	157.300	161.900	Public Correspondence
27	157.350	161.950	Public Correspondence
28	157.400	162.000	Public Correspondence
60	156.025	160.625	Public Correspondence, Port Operation
61	156.075	160.675	Public Correspondence, Port Operation
62	156.125	160.725	Public Correspondence, Port Operation
63	156.175	160.775	Public Correspondence, Port Operation
64	156.225	160.825	Public Correspondence, Port Operation
65	156.275	160.875	Public Correspondence, Port Operation
66	156.325	160.925	Public Correspondence, Port Operation
67	156.375	156.375	Port Operation
68	156.425	156.425	Port Operation
69	156.475	156.475	Port Operation
71	156.575	156.575	Intership, Port Operation
72	156.625	156.625	Intership
73	156.675	156.675	Port Operation
74	156.725	156.725	Port Operation
77	156.875	156.875	Intership, 1W
78	156.925	161.525	Port Operation
79	156.975	161.575	Port Operation
80	157.025	161.625	Port Operation
81	157.075	161.675	Port Operation
82	157.125	161.725	Port Operation, Public Correspondence
83	157.175	161.775	Public Correspondence
84	157.225	161.825	Port Operation, Public Correspondence
85	157.275	161.875	Public Correspondence
86	157.325	161.925	Public Correspondence
87	157.375	161.975	Public Correspondence
88	157.425	162.025	Public Correspondence

MARINE VHF CHANNEL FREQUENCIES (USA VERSION)

Channel	Ship Transmit	Ship Receive	Type of Operation
01	156.050	156.050	Port Operation, Commercial
02	156.100	156.100	
03	156.150	156.150	
04	156.200	156.200	
05	156.250	156.250	
06	156.300	156.300	Intership Safety
07	156.350	156.350	Commercial
08	156.400	156.400	Commercial (Intership)
09	156.450	156.450	Commercial and Non-commercial
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial
12	156.600	156.600	Port Operation
13	156.650	156.650	Bridge-to-bridge, Navigational, 1W
14	156.700	156.700	Port Operation
15		156.750	Environmental (Receive Only)
16	156.800	156.800	Distress, Safety and Calling
17	156.850	156.850	State-controlled, Ship-to-coast, 1W
18	156.900	156.900	Commercial
19	156.950	156.950	Commercial
20	157.000	161.600	Port Operation
21	157.050	157.050	US Government
22	157.100	157.100	Coast Guard Liaison
23	157.150	157.150	US Government
24	157.200	161.800	Public Correspondence
25	157.250	161.850	Public Correspondence
26	157.300	161.900	Public Correspondence
27	157.350	161.950	Public Correspondence
28	157.400	162.000	Public Correspondence
60	156.025	160.625	
61	156.075	160.675	
62	156.125	160.725	
63	156.175	156.175	Vessel Traffic Service (USCG)
64	156.225	160.825	
65	156.275	156.275	Port Operation
66	156.325	156.325	Port Operation
67	156.375	156.375	Commercial (Intership)
68	156.425	156.425	Non-commercial
69	156.475	156.475	Non-commercial
71	156.575	156.575	Non-commercial
72	156.625	156.625	Non-commercial (Intership)
73	156.675	156.675	Port Operation
74	156.725	156.725	Port Operation
77	156.875	156.875	Port Operation (Intership), 1W
78	156.925	156.925	Non-commercial
79	156.975	156.975	Commercial
80	157.025	157.025	Commercial
81	157.075	157.075	US Government
82	157.125	157.125	US Government
83	157.175	157.175	US Government
84	157.225	161.825	Public Correspondence
85	157.275	161.875	Public Correspondence
86	157.325	161.925	Public Correspondence
87	157.375	161.975	Public Correspondence
88	157.425	157.425	Commercial (Intership)
WX1		162.550	Weather (Receive Only)
WX2		162.400	Weather (Receive Only)
WX3		162.475	Weather (Receive Only)
WX4		162.425	Weather (Receive Only)
WX5		162.450	Weather (Receive Only)
WX6		162.500	Weather (Receive Only)
WX7		162.525	Weather (Receive Only)
WX8		161.650	Weather (Receive Only)
WX9		161.775	Weather (Receive Only)
WX0		163.275	Weather (Receive Only)

PRIVATE CHANNELS (Version 1.0)

CH	FREQUENCY TX	FREQUENCY RX	
00	156.000	156.000	
29	157.450	162.050	
30	157.500	162.100	
31	157.550	162.150	
32	157.600	162.200	
33	157.650	162.250	
34	157.700	162.300	
35	157.750	162.350	
36	157.800	162.400	
37	157.850	162.450	*1
37	157.850	157.850	*2
38	157.900	162.500	
39	157.950	162.550	
40	158.000	162.600	
41	158.050	162.650	
42	158.100	162.700	
43	158.150	162.750	
44	158.200	162.800	
45	158.250	162.850	
46	158.300	162.900	
47	158.350	162.950	
48	158.400	163.000	
49	158.450	158.450	
50	158.500	158.500	
51	155.625	155.625	
52	155.650	155.650	
53	155.675	155.675	
54	155.700	155.700	
55	155.725	155.725	
56	155.750	155.750	
57	155.775	155.775	
58	155.800	155.800	
59	155.825	155.825	
70	156.525	156.525	
75	156.775	156.775	
76	156.825	156.825	
89	157.475	162.075	
90	157.525	162.125	
91	157.575	162.175	
92	157.625	162.225	
93	157.675	162.275	
94	157.725	162.325	
95	157.775	162.375	
96	157.825	162.425	
97	157.875	162.475	
98	157.925	162.525	
99	157.975	162.575	

CH	FREQUENCY TX	FREQUENCY RX	
A0	155.050	155.050	
A1	155.500	155.500	
A2	155.525	155.525	
A3	155.575	155.575	
A4	156.750	156.750	
A5	157.300	157.300	
A6	157.400	157.400	
A7	157.500	157.500	
A8	157.600	157.600	
A9	157.700	157.700	
B0	157.800	157.800	
B1	159.300	159.300	
B2	160.300	160.300	
B3	160.975	160.975	
B4	161.000	161.000	
B5	161.025	161.025	
B6	161.050	161.050	
B7	161.075	161.075	
B8	161.100	161.100	
B9	161.375	161.375	
C0	161.400	161.400	
C1	161.425	161.425	
C2	161.450	161.450	
C3	161.475	161.475	
C4	162.575	162.575	
C5	163.900	163.900	*1
C5	155.850	155.850	*2

*1: For USA, UK, CANADA and CHINA

*2: Countries other than *1

CHAPTER 1. CIRCUIT DESCRIPTION

The FM-55 handheld transceiver consists of an RF board, AF board, CPU board, keyboard and LCD display. See the block diagram on page D-1.

1-1. Receiver

RF Stage

The receiver is a double superheterodyne system with intermediate frequencies of 16.9MHz and 455kHz.

An incoming signal is fed to the RF amplifier Q206 through the low-pass filter and antenna switching circuit. The low-pass filter, composed of C243 to C247 and L206 to L208 works only for transmitter. The output of Q206 is applied to the band-pass filter consisting of triple resonant circuits (L212 to L214 and C255 to C259).

In the first mixer Q207, the received signal is converted into 16.9MHz 1st IF signal. The local frequency injected to the 1st mixer, ranging from 156.05 to 163MHz depending on the channel selected, is generated from the voltage controlled oscillator U201. The resultant 1st IF signal is fed to complex FM IF module U207 via ceramic filter FL201.

FM IF Amplifier

All the basic functions to convert the 1st IF signal into an audio signal are included in this FM IF module; local oscillator, mixer, IF amp, discriminator, filter amplifier and squelch detector. The FM IF module converts the 16.9MHz IF signal into 455kHz 2nd IF signal by mixing the output from the 2nd local oscillator (16.445MHz). The discriminator demodulates the 2nd IF signal into an audio signal of 300Hz to 3kHz.

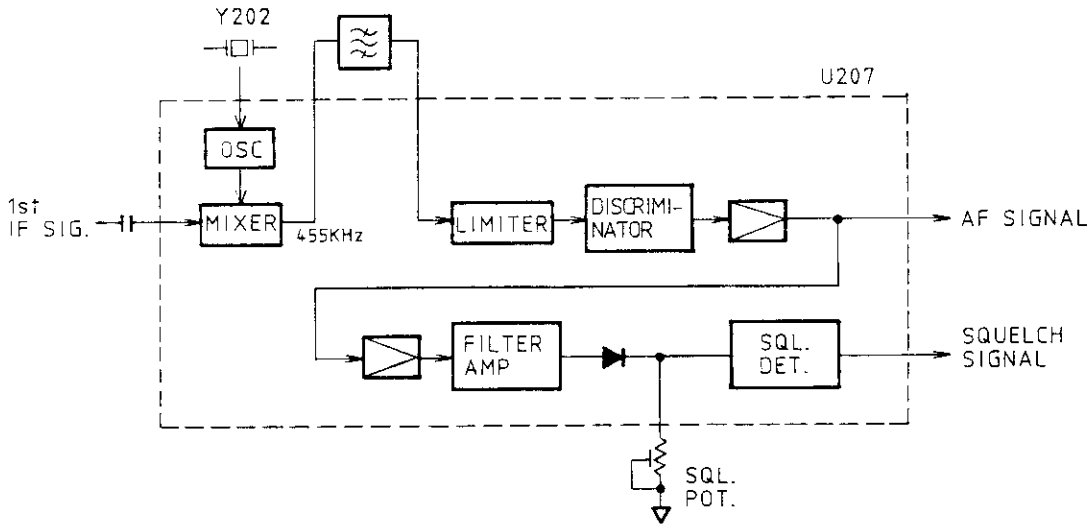


Fig.1-1 FM IF amp.

Squelch/AF amp

The discriminator output is also fed to the filter amplifier where only the noise component is taken out. After being rectified and smoothed, the extracted noise is compared with the bias voltage set by the squelch potentiometer in the squelch detector. If the noise level is high, the squelch detector produces the "squelch signal" to mute the audio output. This squelch signal is also sent to the CPU and used for judging the presence or absence of an incoming signal in the dual watch operation.

Buffer amplifier Q502 on the AF board prohibits noise from U207 to go thru the audio amplifier U505 when the squelch signal is detected, and delivers the beep sound generated by the CPU to the AF amplifier.

U503 logic (2) detects operation of the PTT switch, and controls the DC switching circuits U507 and U506. U504 logic (1), in combination with U503 logic (2), controls transmission-reception switching functions, beep generation, squelch performance and TX muting.

Audio amplifier U505 delivers nominal 300/500mW audio signal to an 8 ohm built-in loudspeaker.

1-2. Transmitter

The voice signal from the microphone is pre-emphasized in the mic amplifier U501 and is delivered, via limiter CR501 and low-pass filter U502, to the VCO circuit for frequency modulation.

During reception, +5V power supplied to the above mentioned circuit is switched off to isolate the VCO from the mic amplifier, which may otherwise cause unwanted modulation of the RX 1st local frequency.

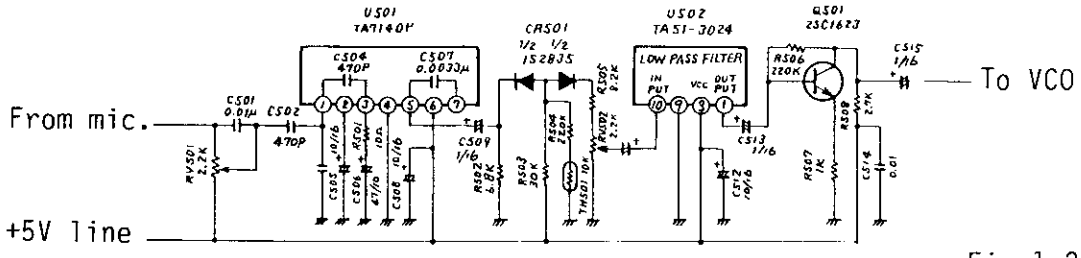


Fig.1-2

PLL

A desired channel frequency is generated by the PLL synthesizer consisting of the 12.8MHz reference oscillator, phase comparator, VCO, prescaler and programmable counter as shown on Fig.1-3.

U203 is composed of a phase comparator, frequency divider, shift register and programmable counter. The frequency divider counts down the reference oscillator frequency of 12.8MHz to 25kHz which establishes the channel spacing of this transceiver.

When the phase-lock loop is in the state of "lock", VCO U201 produces channel frequency of 25kHz times N in crystal accuracy, where N is an integer the programmable counter is set to be divided. The CPU in the microprocessor recognizes the channel number when the keyboard is operated, and accesses the ROM (Read-Only-Memory) to take out the corresponding channel data "N" among channel information stored in it.

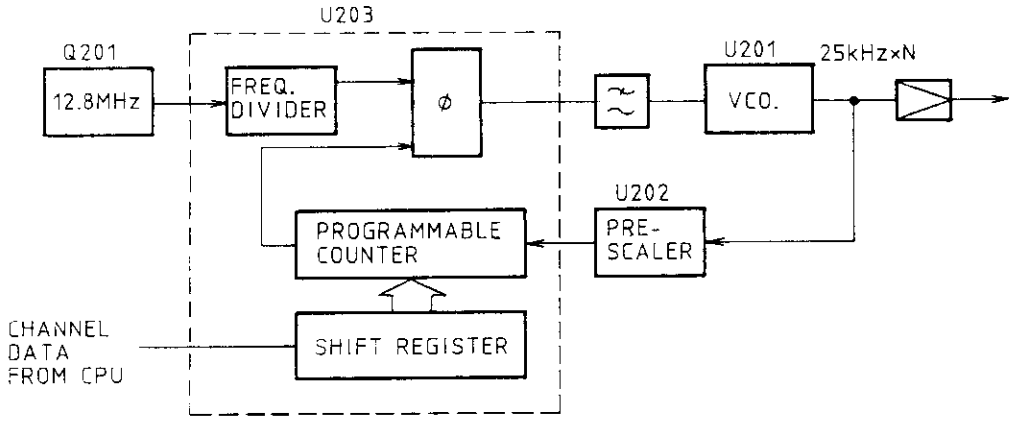


Fig.1-3 PLL

The shift register in U203 receives this channel data from the CPU in serial format and converts it into parallel data in order to preset the programmable counter.

When an invalid channel (29 thru 59, 89 thru 99, etc) is selected, it is automatically disabled by internal memory U1. Invalid channels cause the display to blink and the transmitter and the receiver to become inoperative. After blinking for 2 seconds, the equipment is set to a previous valid channel.

TX/RF Output

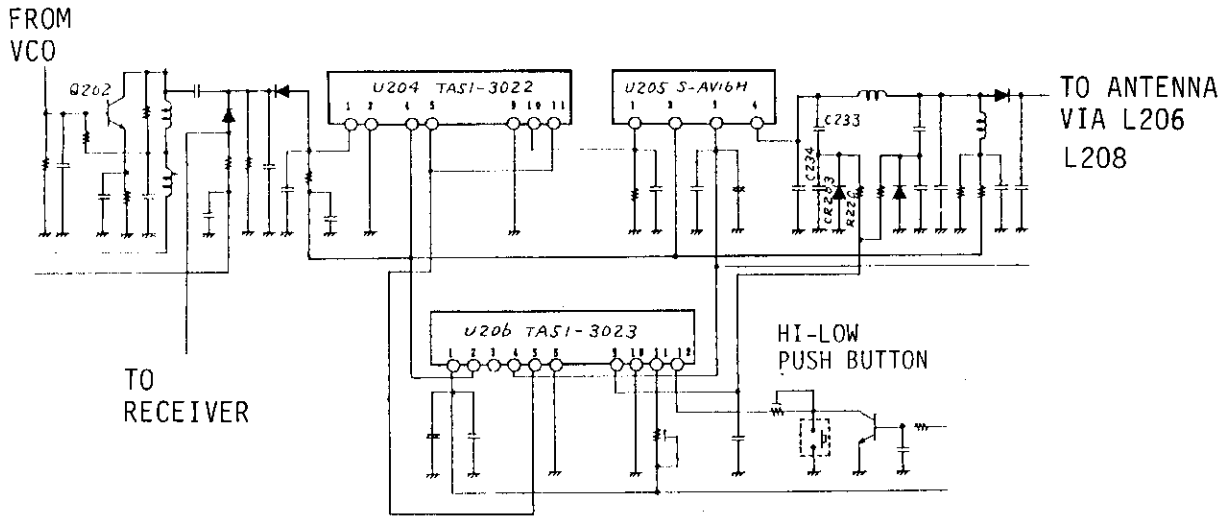


Fig.1-4 TX/RF output

An established channel frequency is taken from the VCO through the buffer Q202 to the diode switching circuit, which transfers the VCO output to either the transmitter driver stage or the receiver mixer circuit.

TX/RF amplifier U204 contains two stages of driver transistors of which the line voltage is controlled by the voltage shift action of power controller U206; the voltage at pin number 5 of U206 varies with the selection of the HI-LOW push button, resulting in switch over of the output power.

To provide stable output power irrespective of voltage deviation of the battery and to avoid abnormal emission, a negative feedback loop is employed in the TX power stage. The loop consists of C226, C227, CR203, R215 and U206, and controls the line voltage of U204 in the same way as the output power setting.

The band-pass filter consisting of L206 thru L208 filters out frequency components higher than 156.05 thru 163 MHz to minimize spurious emission.

1-3. System Controller

Microprocessor U1 comprises a 4-bit CPU, ROM(4096 x 8 bits), RAM(224 x 4 bits), 8-bit parallel serial interface, and LCD controller/driver. The Read-Only Memory (ROM) stores instructions for intended operation associated with the keyboard entry. Weather channels are also stored in the ROM for the USA version. Random-Access Memory (RAM) controls memory write-read operation in maximum 10 memory addresses. The CPU inhibits transmission on specific channels according to the ITU or relevant authorities' requirements, and controls high-low output selection, PLL synthesizer, squelch level, beep generation, etc.

1-4. Low Voltage Detector

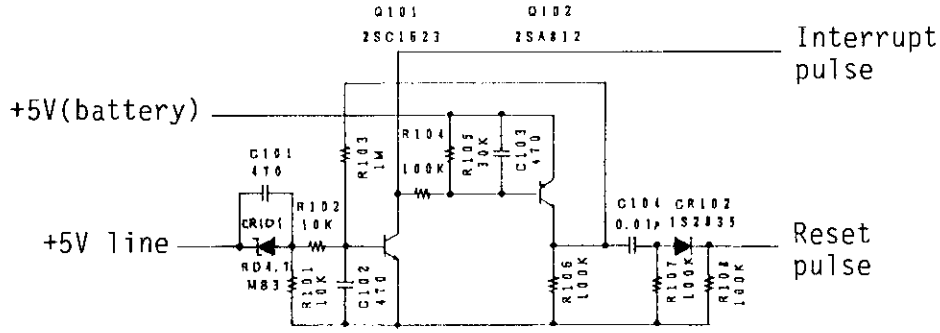


Fig.1-4 Low voltage detector

Q101 and Q102 form a low-voltage detector. The detector generates an interrupt pulse when the +5V line voltage drops below 4.7V and locks

the CPU to preserve the status of the present keyboard settings, otherwise the CPU will operate abnormally, causing loss of memory contents. On the other hand, the reset pulse triggers the CPU at the moment of power-on to recall the previous settings.

CHAPTER 2. ADJUSTMENT

This chapter describes the basic technical data required for checking or alignment of the equipment. Because most parts are made up of high integar modules and employ thick-film technology, thereby reducing physical size and providing stable performance, only a few adjustments are required, unlike the conventional type of VHF transceiver

To gain access to the potentimeters inside the unit for adjustment, see page 2-3, "Disassembling the Unit".

2-1. Necessary Test Instrument

test instrument	minimum requirement	used for
Multimeter		Voltage check
RF Power Meter	Dummy terminated impedance: 50 ohms Capacity: 5W Freq. range: 200MHz	Power check
VHF Freq. Counter	Freq. range: DC - 200MHz	Freq. check
Directional Coupler & Termination	Impedance: 50 ohms	
Linear detector (Deviation meter)	Freq range: 140 - 170MHz Deviation range: 3 - 10 kHz	Deviation check
Oscilloscope	Freq. response: DC - 200MHz Sensitivity: 10mV/div.	
VHF/FM Sig. Generator	Freq range: 200MHz max. Output level: -15 to +110dBu Output impedance: 50 ohms	Sensitivity check
Distortion Meter		

2-2. Precaution on Adjustment

* Do not to forget to connect the dummy antenna (terminator) before operating the transmitter.

* Do not depress the PTT switch during receiver check. If the transmitter is accidentally operated while a signal generator is connected to the antenna terminal, the signal generator may be damaged.

* Transmitter output power should be checked at rated power supply voltage.

* Transmitter adjustment should be done on channel 16.

2-3. RF Output Power

Battery voltage		12V	9.6V	7.2V	7.2 - 12V
Output power	Nominal	5W	3W	2W	1W
	Ratings	4.5 - 5W	2.5 - 3.3W	1.8 - 2.4W	0.7 - 0.95W
	Reduced	below 1W			0.5W

1. Connect RF power meter to the antenna terminal.
2. Press the HI-LOW button to select "high power".
3. Depress the PTT switch and adjust RV201 on RF board so that the meter indicates rated output power of the unit.
4. Press again the HI-LOW button to select "low power".
5. Adjust RV202 to below 1W.

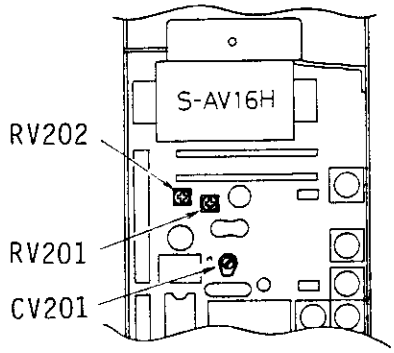


Fig.2-1

2-4. Carrier Frequency

1. Connect the directional coupler and frequency counter to the antenna plug.
2. Press the PTT switch and adjust CV201 on the RF board for rated frequency (tolerance: 156.8MHz ± 1.254kHz).

2-5. Modulation

1. Connect the distortion meter to the antenna plug thru the directional coupler.
2. Connect the AF oscillator to the mic input and apply an audio signal of -35dBm ± 4dBm (0dBm = 1mW/600 ohms).
3. Adjust RV501 for modulation of 60%.
4. Increase the SG output by 20 dB and adjust RV502 so that the modulation is 100% or below for an audio input from 300 to 3000Hz.

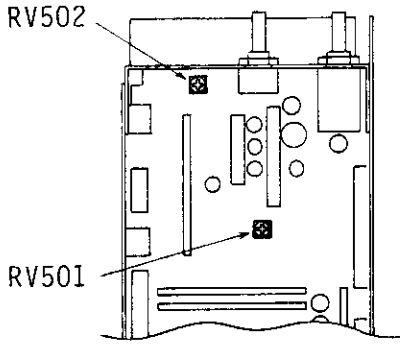


Fig.2-2

2-6. Receiver Sensitivity

1. Connect the distortion meter across the speaker (or 8 ohm resistive load).
2. Connect the VHF/FM signal generator, set to 30dBu modulated signal (1kHz, 60%), to the antenna terminal.
3. Adjust frequency of signal generator for max. AF output.
4. Gradually decrease the output level of the signal generator to approx. -10dBu, and confirm that SND/ND ratio of more than 12dB is obtained.

2-7. Disassembling the Unit

1. Push the release switch upward and slide off the battery pack from the body.
2. Unscrew the five panhead screws ⓐ thru ⓔ and remove the rear panel.
3. Take out the battery pack guide plate by loosening the four flathead screws.
4. Holding the unit with the front panel facing downward, press the battery contact to detach the main chassis from the front panel (although the wires are still connected between the front panel and the main chassis).
5. To unlock the stopper, disconnect plugs A and B while pushing out the catches at both sides of the jacks.
6. Unscrew the four flat-head screws ⓕ thru ⓘ, disconnect the plugs C and D in the same manner as plugs A and B, then separate the RF board from AF board assemblies.

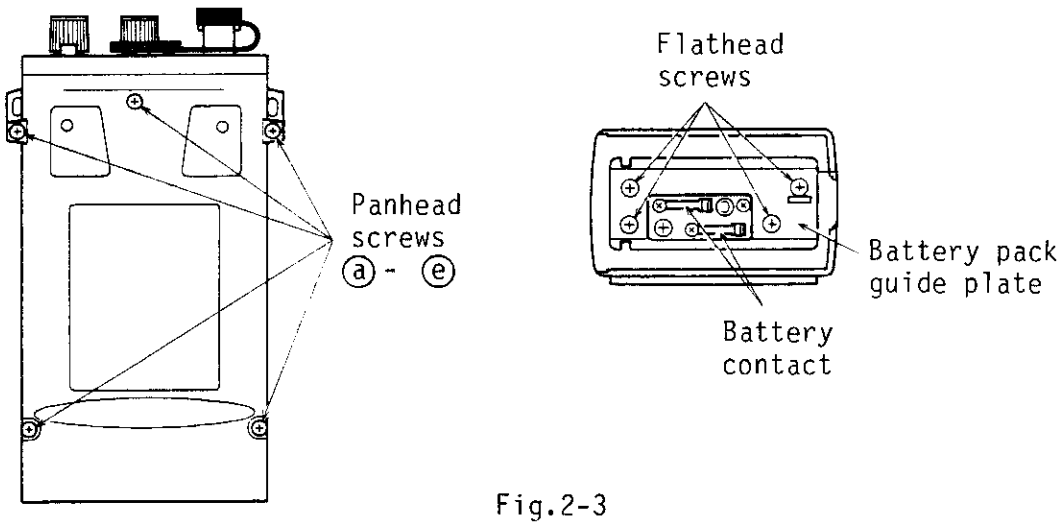
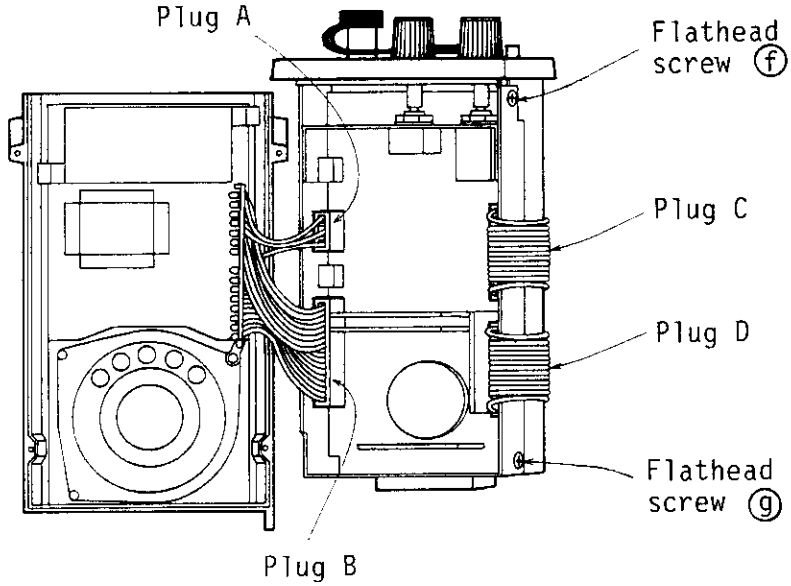


Fig.2-3



Flathead screws ⓗ and ⓘ are located on the opposite side of ⓕ and ⓖ.

Fig.2-4

CHAPTER 3. CHANGE OF SPECIFICATIONS

The FM-55 is available in 3 versions: international, USA and special versions. Where permitted, these versions may be locally modified by cutting or adding the jumper links on the CPU board as follows.

> CAUTION
>
> This instructions is prepared to be used by authorized FURUNO agents or dealers to preset the equipment to comply fully with their local regulations and minor restrictions. Please carefully read the instructions and follow the recommended procedures for preset operations.
>
> FURUNO will assure no responsibility for inconvenience or disturbance to communications due to inadequate or unlowful presetting of the equipment.
>
> Please note again that the preset must be done by the authorized dealer, not by the operator or owner of the equipmet.

3-1. Change of Specifications

1. Switch off the transceiver and remove the front panel by loosening the nine fixing screws. As for the disassembling procedure, see page 2-3, section 2-7, "Disassembling the Unit".

2. There are three link spots at the left corner on the rear of the front panel as illustrated below. These spots are opened or shorted according to whether you need AUTO SCAN, PRIVATE CHANNELS and USA/INT switchover.

SPOT	STATUS	FUNCTION
U/I	short	USA/INT switchover, Weather mode accessible
	open	Beep sound on/off selectable
P	short	Private mode inhibited
	open	Private mode accessible
S	short	Auto scanning disabled
	open	Auto scanning activated

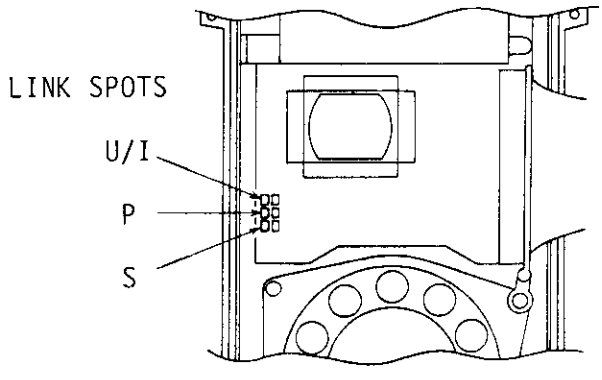


Fig.3-1 CPU Board

3-2. Programming Private Channel

A maximum 10 private channels are programmable. These channels must be programmed according to the private channel list on page v.

Programming procedure

1. For the sets before S/No. 516-0030, cut the link spot P on the CPU board to enable private channel selection. This change is not necessary for the sets having S/No. 516-0031 and after. (They are delivered with this link open.)

2. Find the socket for private channelization on the RF board. See Fig. 3-2. The socket must be set as in Fig. 3-2(b). Replace the socket as in Fig. 3-2(a).

3. Turn on the power. The transceiver is now put in the private channel mode, and the legend "PRV", private address "1", and the contents of the address are displayed. When no channel is programmed yet, "-" will be displayed.

4. Enter the desired private channel number in 2 digits selected from the private channel list. The channel numbers "A", "B", and "C" are represented by "16", "MR" and "X" keys, respectively.

5. Move to the desired private address with the [▲] or [▼] keys. Repeat step 4.

6. Return the socket as in Fig. 3-2(b). Assemble the equipment, and the transceiver can be operated on the loaded private channels according to the operator's manual.

Note: Transmission is inhibited while private channels are programmed.

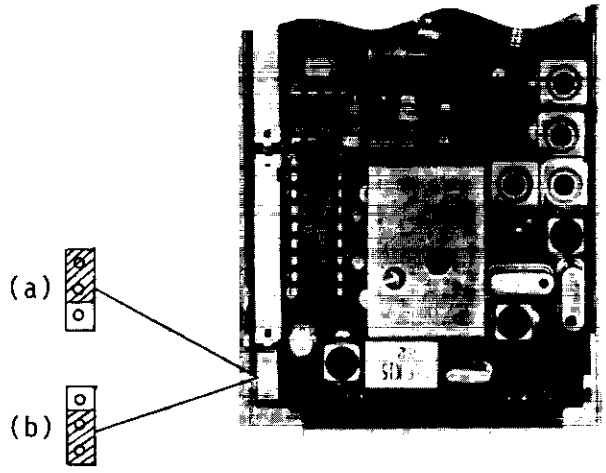
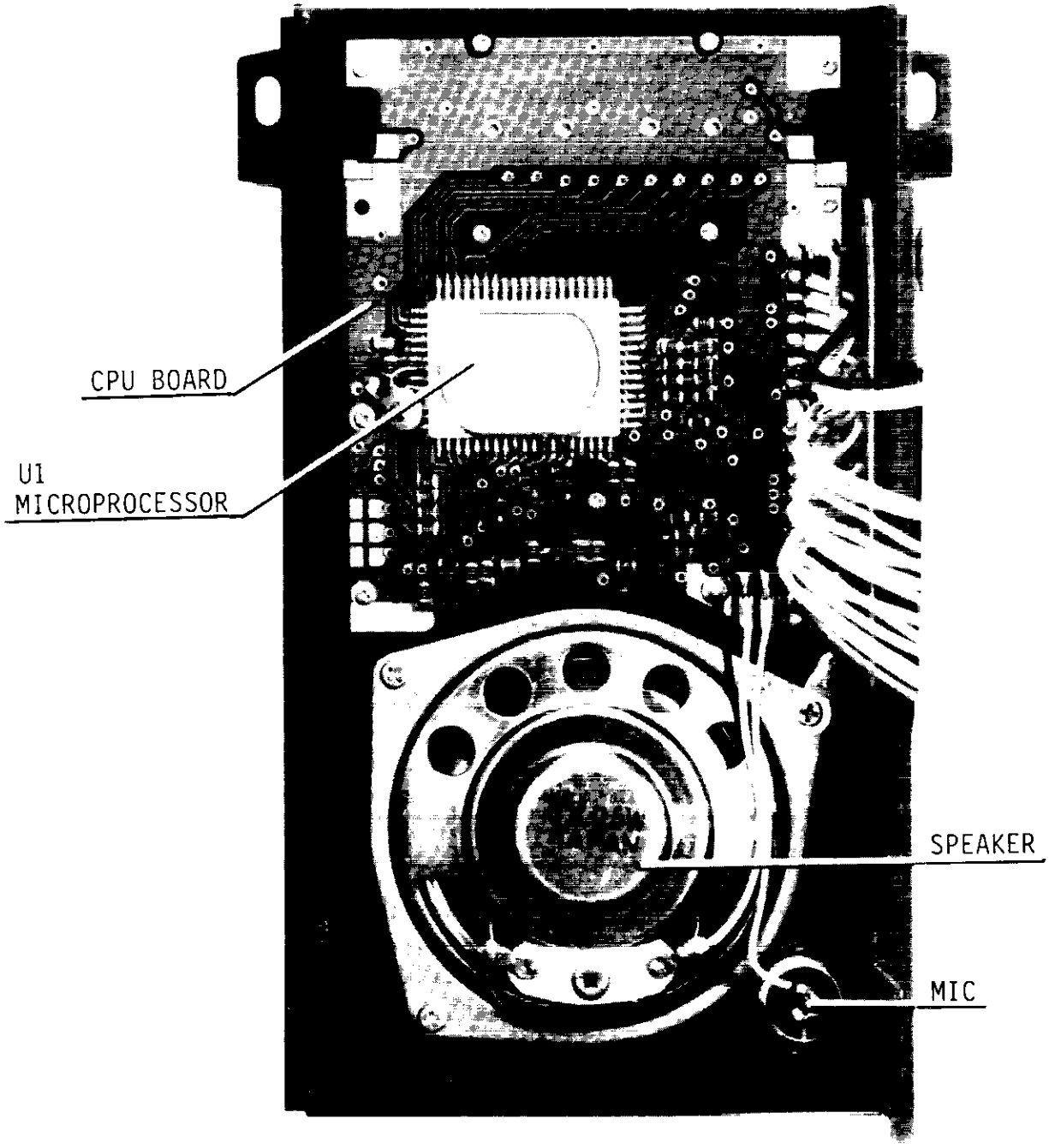


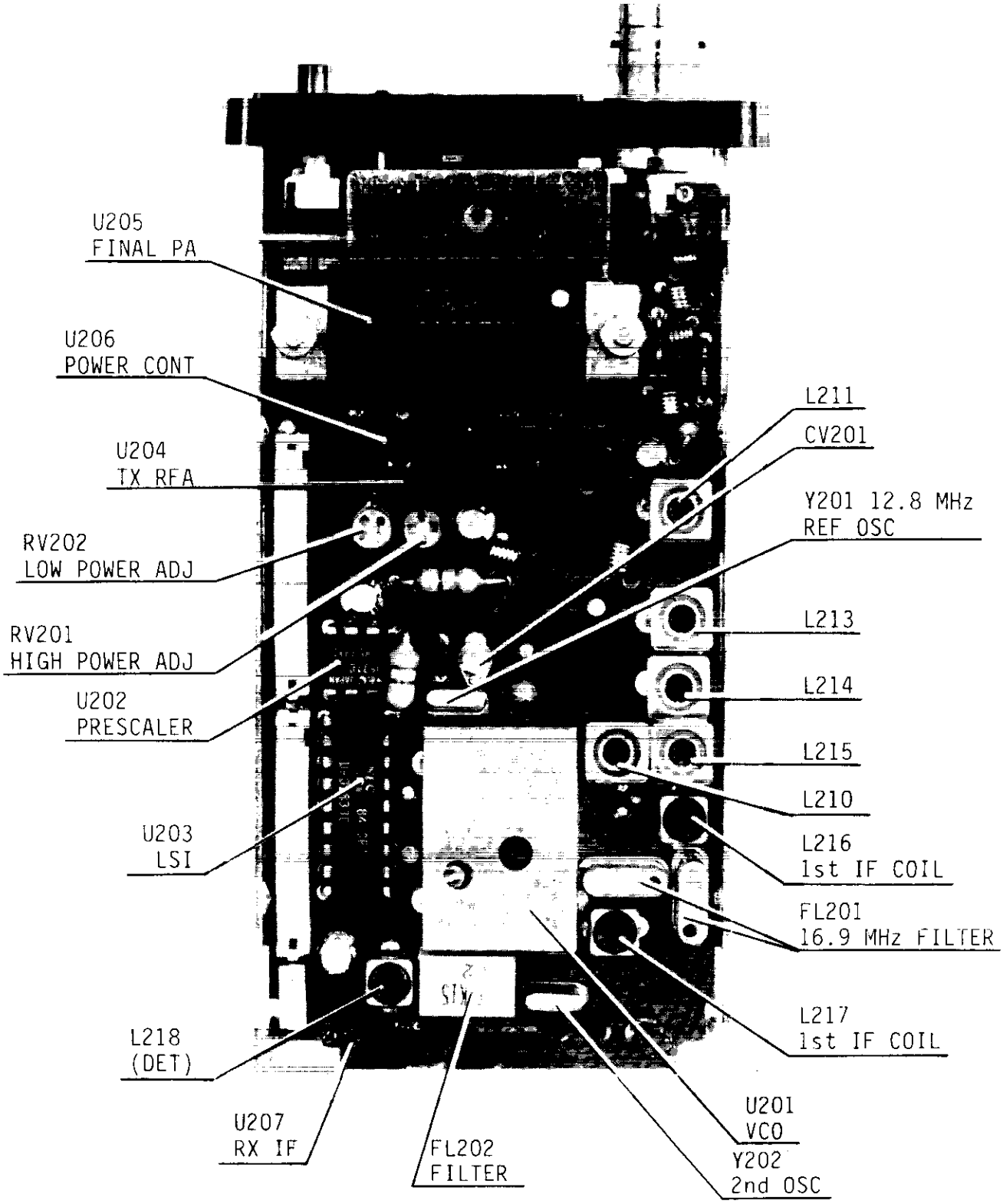
Fig.3-2 RF Board

CHAPTER 4. PARTS LOCATION

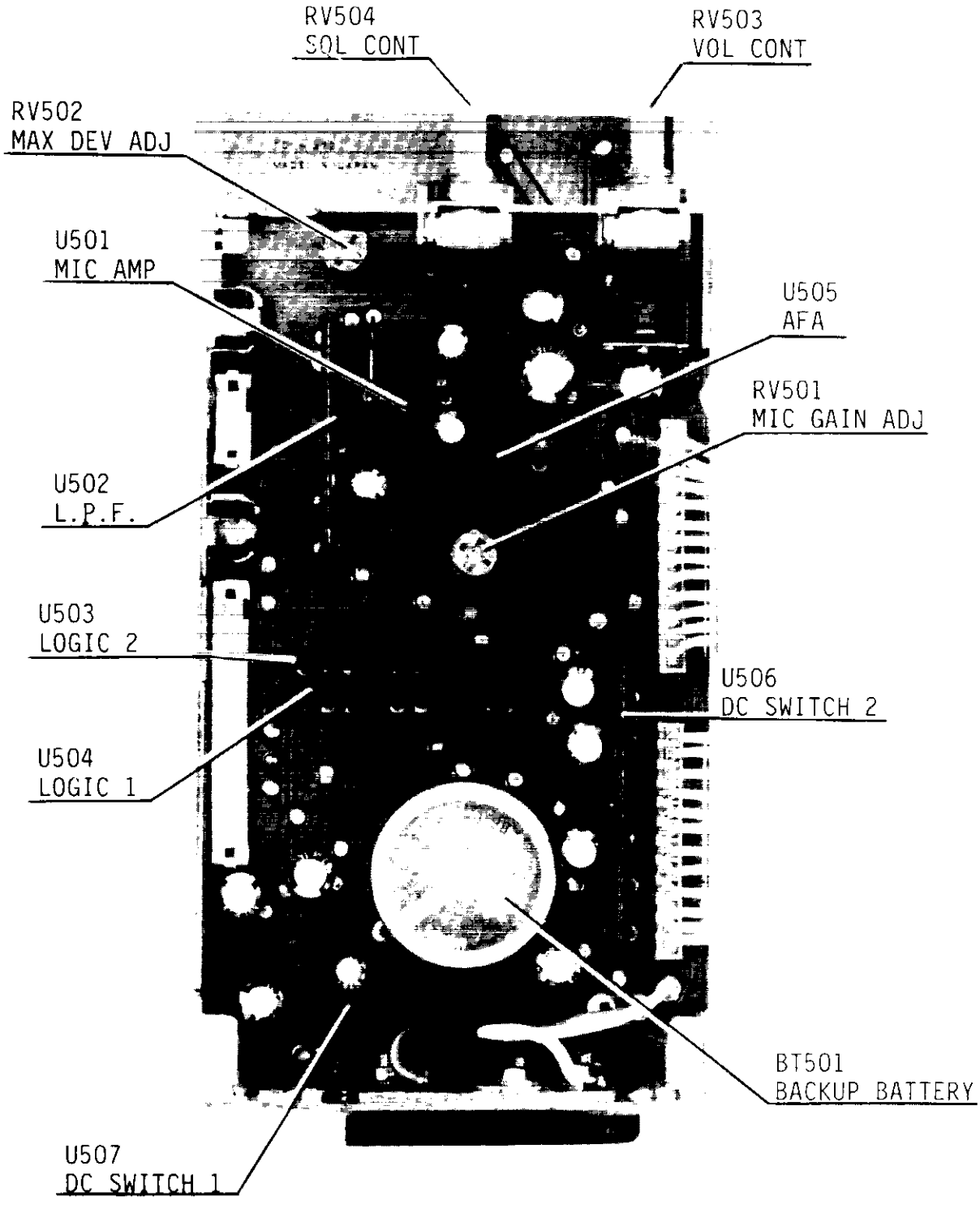
4-1. Front Chassis Rear View (CPU Board)



4-2. RF Board


U205
FINAL PA
U206
POWER CONT
U204
TX RFA
RV202
LOW POWER ADJ
RV201
HIGH POWER ADJ
U202
PRESCALER
U203
LSI
L218
(DET)
U207
RX IF
FL202
FILTER
L211
CV201
Y201 12.8 MHz
REF OSC
L213
L214
L215
L210
L216
1st IF COIL
FL201
16.9 MHz FILTER
L217
1st IF COIL
U201
VCO
Y202
2nd OSC

4-3. AF Board


RV504
SQL CONT
RV503
VOL CONT
RV502
MAX DEV ADJ
U501
MIC AMP
U505
AFA
RV501
MIC GAIN ADJ
U502
L.P.F.
U503
LOGIC 2
U506
DC SWITCH 2
U504
LOGIC 1
BT501
BACKUP BATTERY
U507
DC SWITCH 1

CHAPTER 5. TECHNICAL DATA

This chapter describes the major function and block diagram of the semiconductors used in FM-55, to assist circuit analysis and check.

The manufacturer on the list is abbreviated as follows.

NEC : Nippon Electric
TOS : Toshiba
SEK : Seiko
TAM : Tama

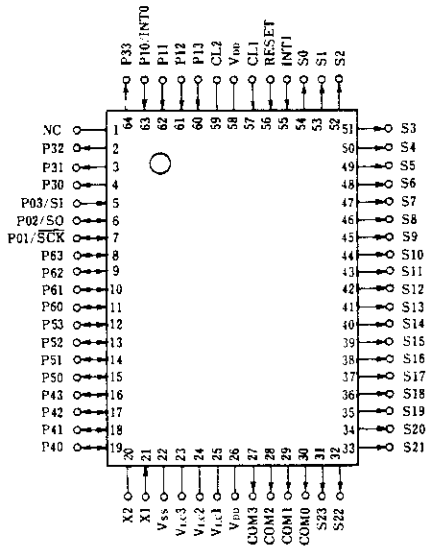
SYMBOL	TYPE	FUNCTION	MFR	CODE NO.
U101	uPD7503	Microprocessor	NEC	6036750302
U201	TA51-3029	VCO	TAM	0051302901
U202	uPB571C	Prescaler	NEC	6036057101
U203	uPD2833C	PLL	NEC	6036283301
U204	TA51-3022	TX RF amplifier	TAM	0051302201
U205	S-AV16H	RF power amplifier	TOS	6012001601
U206	TA51-3023K1	Power controller, for 5-2W	TAM	0051302301
	TA51-3023K2	" for 1W	TAM	0051302302
	TA51-3023K3	" for 2W	TAM	0051302303
U207	TA51-3031	IF amplifier	TAM	0051303101
U501	TA7140P	Mic amplifier	TOS	6012714001
U502	TA51-3024	Low-pass filter	TAM	0051302401
U503	TA51-3028	Logic (2)	TAM	0051302801
U504	TA51-3027	Logic (1)	TAM	0051302701
U505	TA7368P	Linear amplifier	TOS	6012736801
U506	TA51-3026	DC switch (2)	TAM	0051302601
U507	TA51-3025	DC switch (1)	TAM	0051302501
U508	S-81250HG	Regulator	SEK	6032812501
U601	T302001	LCD	SEK	3038302001

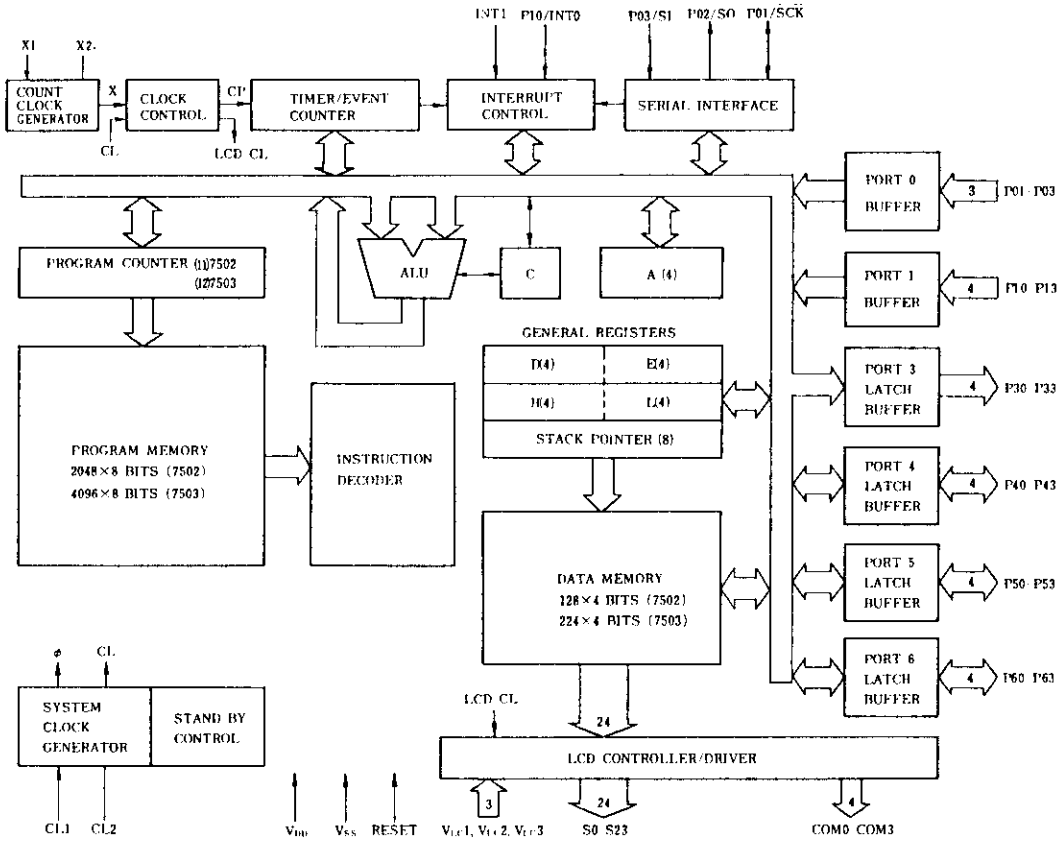
U101 uPD7503

Single Chip 4-bit Microprocessor

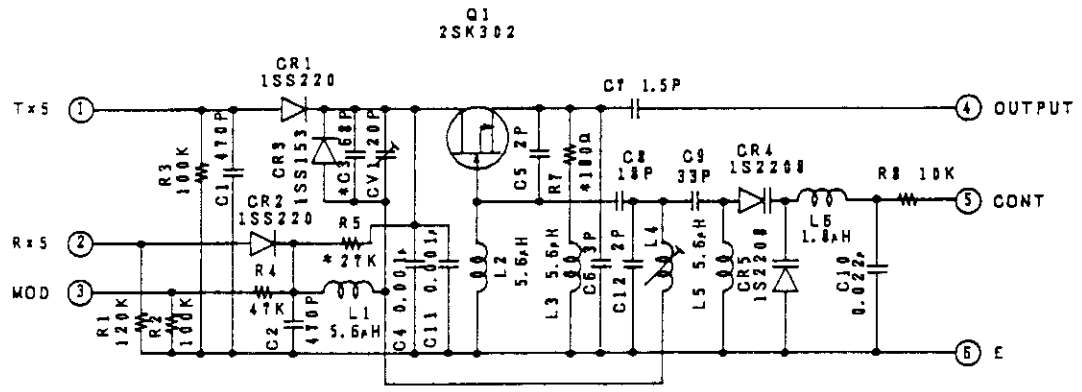
4-bit parallel processing
92 instructions
Instruction cycle: 10 us/200 kHz
Program Memory
    ROM: 4096 x 8 bits
Data Memory
    RAM: 224 x 4 bits
Interrupt functions:
    2 x external, 2 x internal
8-bit timer/event counter
8-bit serial interface
23 i/o lines
LCD controller/driver
    Segment outputs: 24
    Common outputs: 4

(Top View)

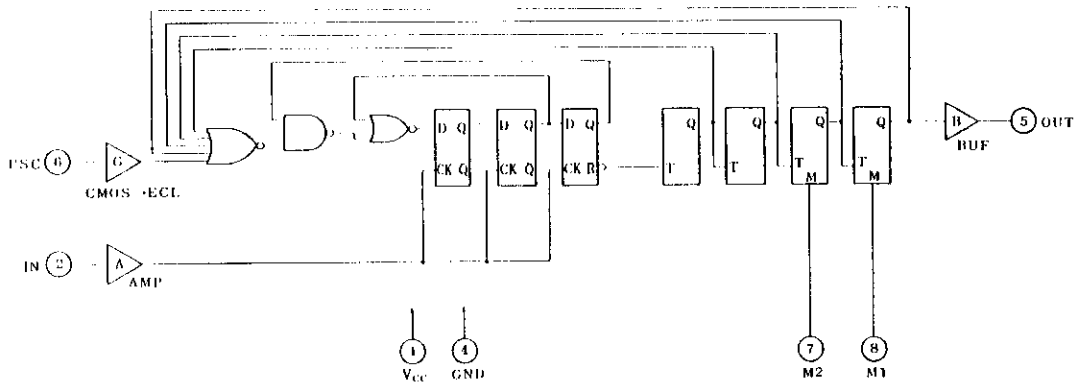




U201 TA51-3029

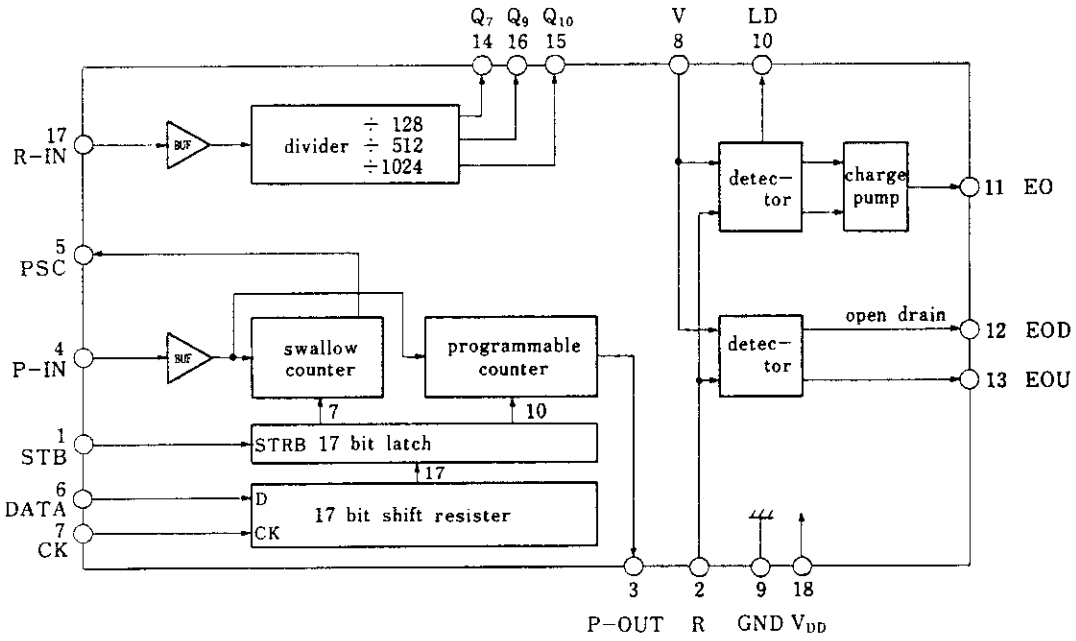


U202 uPB571C

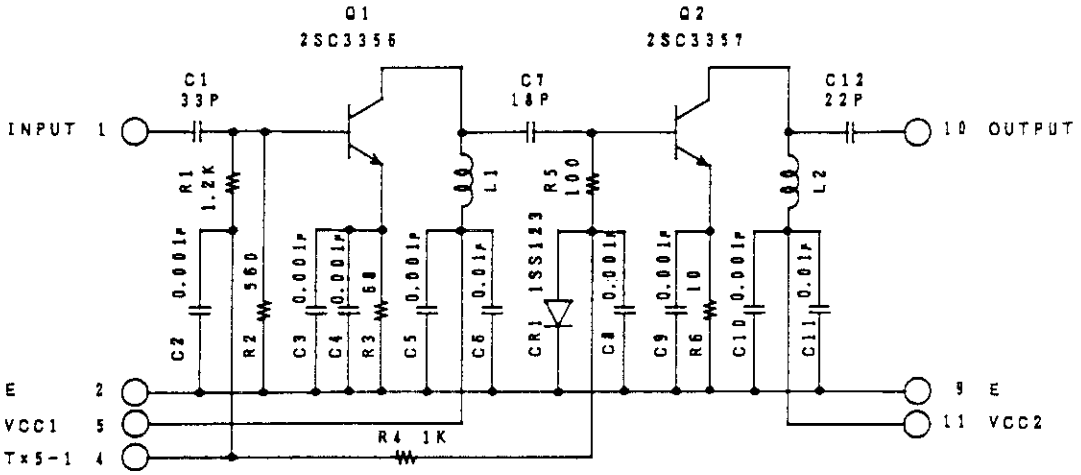


U203 uPD2833C

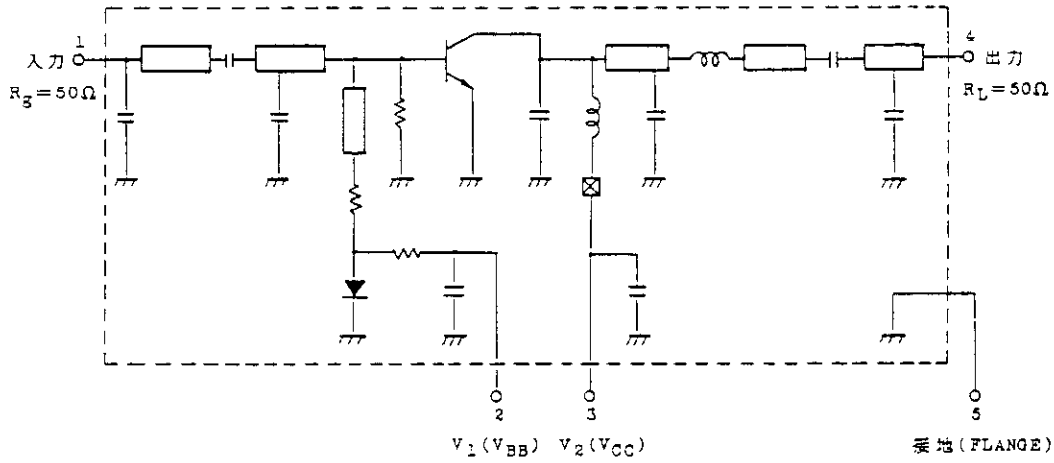
Block Diagram



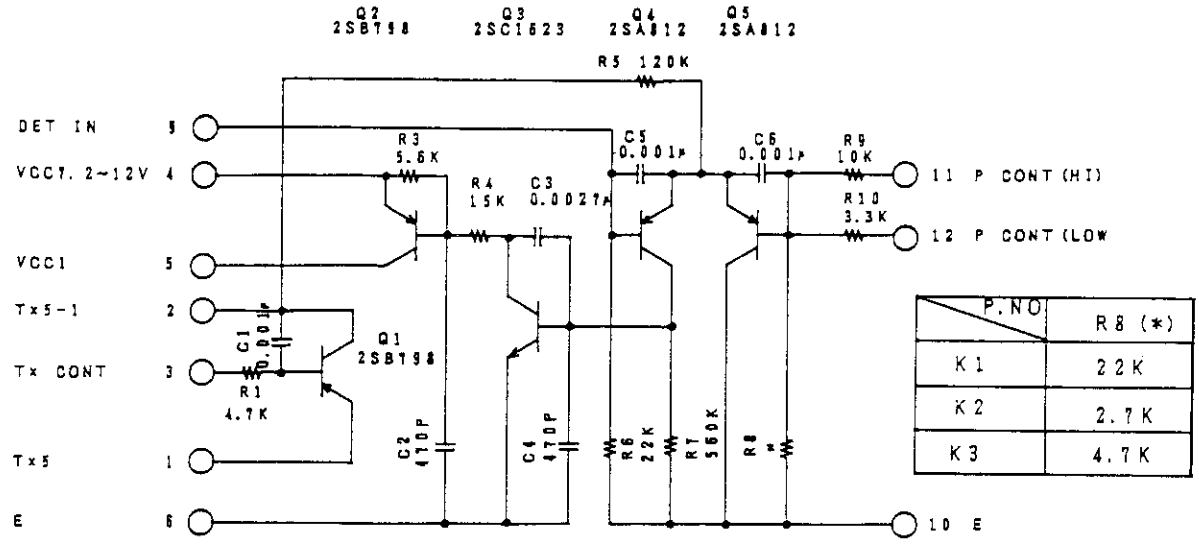
U204 TA51-3022



U205 S-AV16H

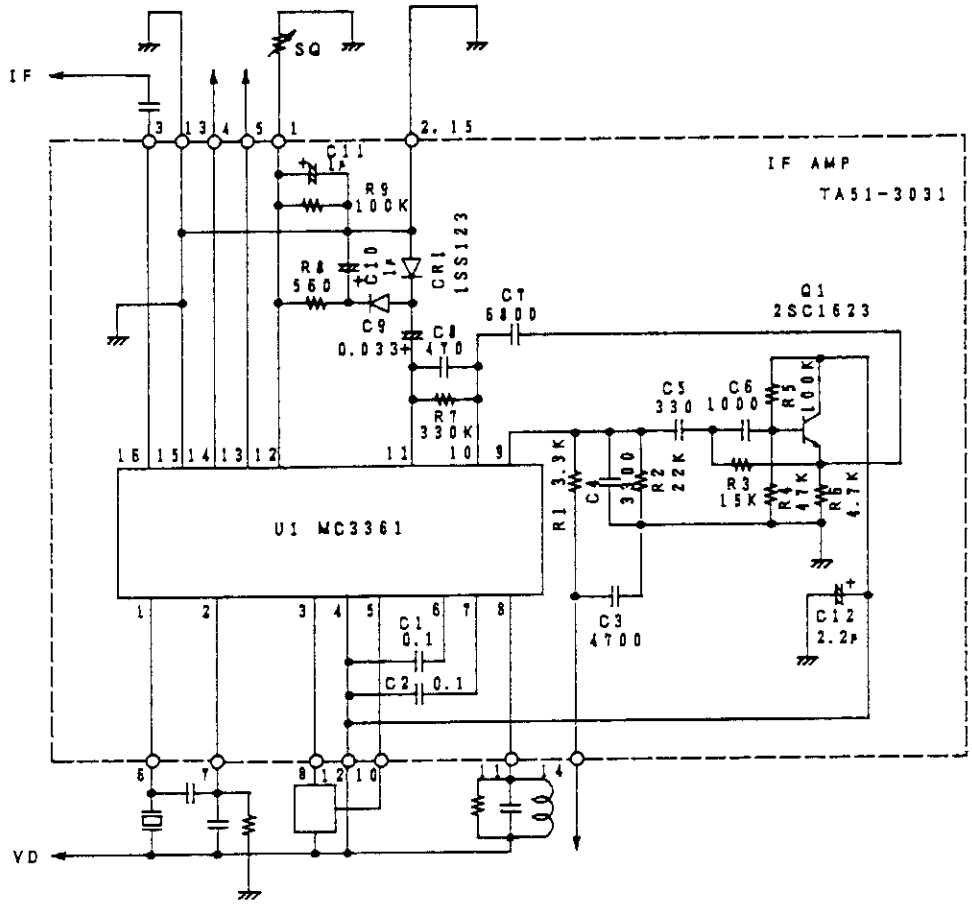


U206 TA51-3023K1

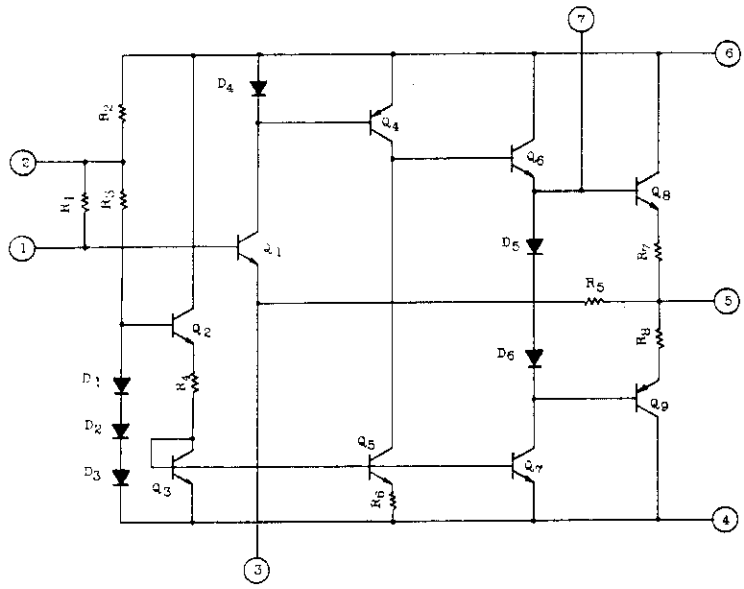


P.NO	R8 (*)
K1	22K
K2	2.7K
K3	4.7K

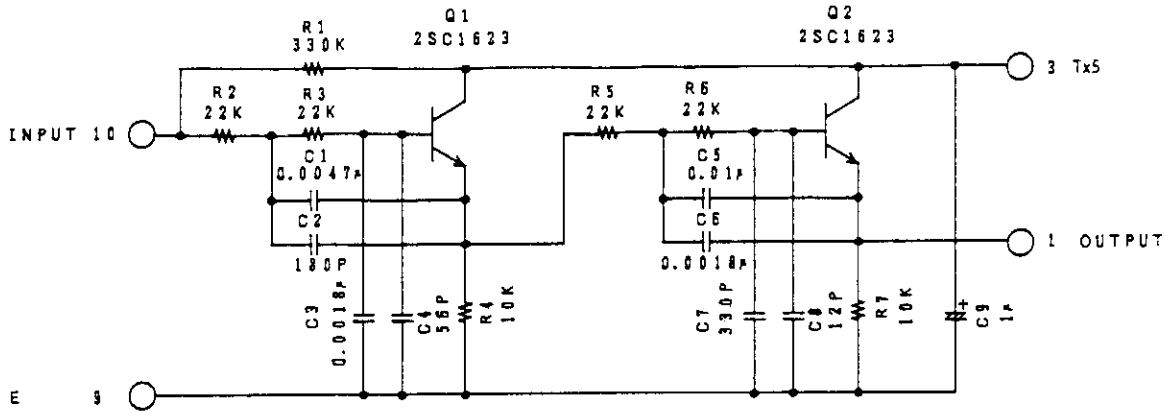
U207 TA51-3031



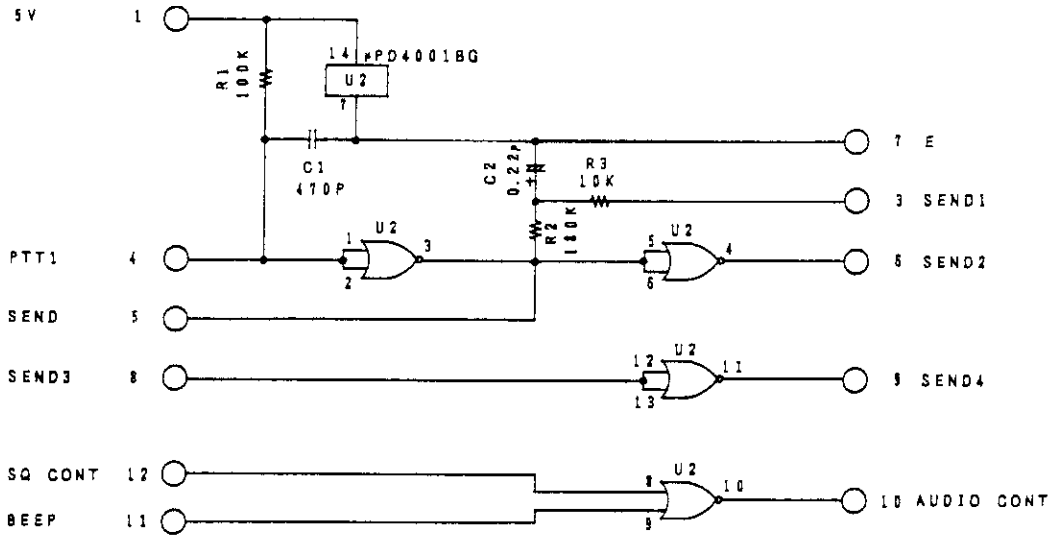
U501 TA7140P



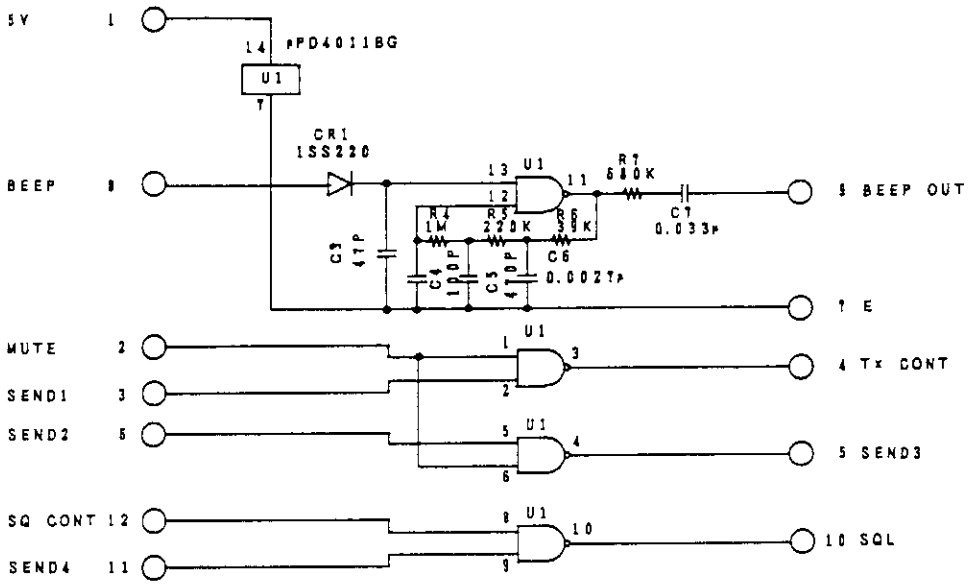
U502 TA51-3024



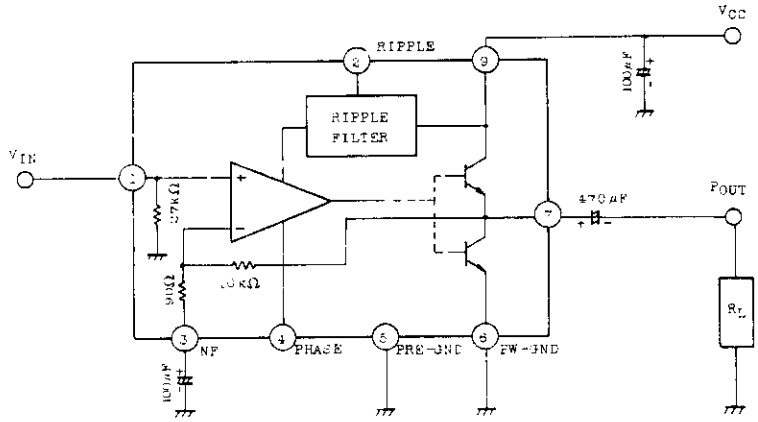
U503 TA51-3028



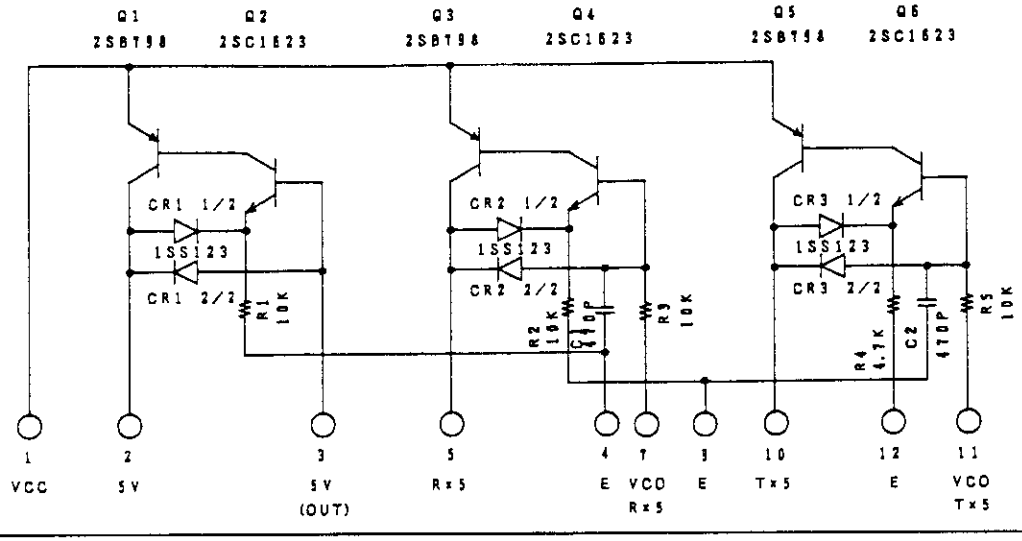
U504 TA51-3027



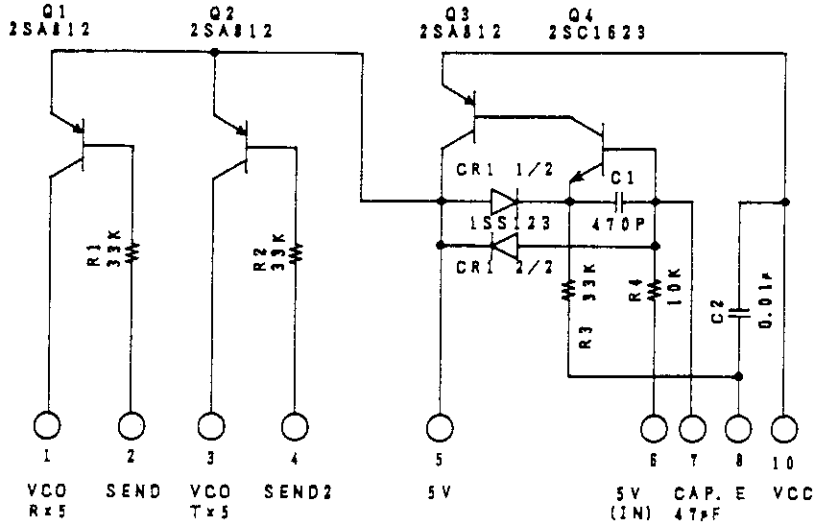
U505 TA7368P



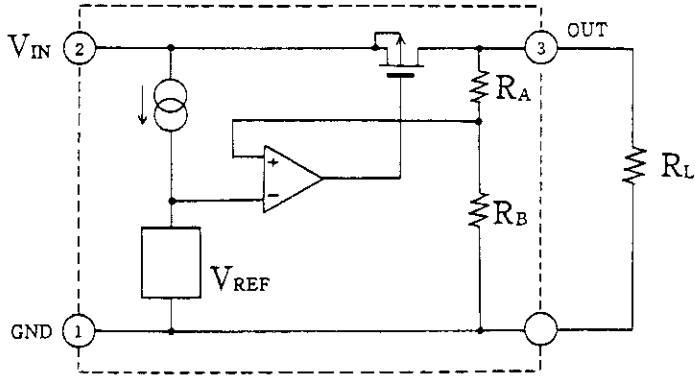
U506 TA51-3026



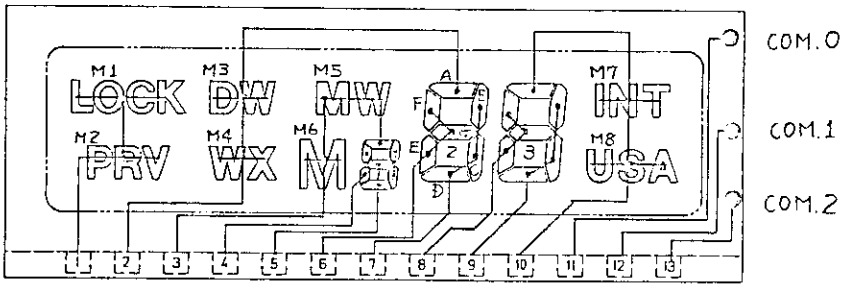
U507 TA51-3025



U508 S-81250HG



U601 T302001



FM-55 MAINTENANCE PARTS LIST

NO.	NAME	TYPE	CODE NO.	Q'TY	REMARKS
1	SPEAKER	S45G03-3	7036450301	1	
2	KNOB	TA11-1345	0011134501	1	
3	REAR CASE	TC11-1340	0011134001	1	with gasket
4	POTENTIOMETER	RK0941111 20kohm	1015200302	1	
5	POTENTIOMETER	RK0941110 100kohm	1015100401	1	
6	LITIUM BATTERY	CR2032T2	7010203201	1	
7	ANTENNA	TA11-6044	0011604401	1	
8	GASKET	TA11-1368K2	0011136802	1	
9	FRONT CASE ASSY	TA11-3069K1	0011306901	1	
	Front case				
	CPU board				
	Speaker				
	PTT switch				
	LCD				
10	CHASSIS A ASSY	TA11-3068K1	0011306801	1	
	Chassis A				
	RF board				
	Top panel				
11	CHASSIS B ASSY	TA11-3067	0011306701	1	
	Chassis B				
	AF board				

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
	CPU BOARD (Dwg. No. C5460-004-A)	
	CAPACITOR	
C 101	2004470111	C3K21P1HR471K
C 102	=C 101	-
C 103	=C 101	-
C 104	2004100311	C3K21P1HR103K
C 105	2004330001	C2C21P1HCG330J
C 106	=C 104	-
C 107	=C 104	-
C 108	=C 104	-
C 109	=C 104	-
C 110	=C 104	-
	DIODE	
CR101	5008047003	RD4.7MB3
CR102	5001283501	1S2835
CR103	=CR102	-
CR104	=CR102	-
CR105	=CR102	-
CR106	=CR102	-
	LAMP	
DS101	7026000101	RM3-5V30
DS102	=DS101	-
	TRANSISTOR	
Q 101	4011162301	2SC1623L4
Q 102	4009081201	2SA812M4
R 101	1004100301	RMC1/10 10KnJ
R 102	=R 101	-
R 103	1004100501	RMC1/10 1MnJ
R 104	1004100401	RMC1/10 100KnJ
R 105	1004300301	RMC1/10 30KnJ
R 106	=R 104	-
R 107	=R 104	-
R 108	=R 104	-
R 109	=R 104	-
R 110	=R 104	-
R 111	=R 104	-
R 112	=R 104	-
R 113	1004160401	RMC1/10 160KnJ
R 114	=R 101	-
R 115	=R 101	-
R 116	=R 101	-
R 117	1004120301	RMC1/10 12KnJ
R 118	=R 104	-
R 119	=R 104	-
R 120	=R 104	-
R 121	=R 104	-
	INTEGRATED CIRCUIT	
U 101	6036750302	μPD7503G-710-12
	CAPACITOR	
C 601	2004470101	C2C21P1HCG471J
	SPEAKER	
LS601	7036450301	S45G03-3
	MICROPHONE	
MK601	7037008001	EM80

NOTE:
備考:

RF BOARD

(Dwg. No. C5460-003-A)

CAPACITOR

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
C 201	2004220311	C3K21P1HR223K
C 202	=C 201	-
C 203	2006100602	S991C106ME1
C 204	2004040001	C2C21P1HCG040C
C 205	2004100311	C3K21P1HR103K
C 206	2020100104	USR1C101MCA
C 207	=C 205	-
C 208	2004100211	C3K21P1HR102K
C 209	2008100502	SVA1C105M1
C 211	2004470111	C3K21P1HR471K
C 212	=C 211	-
C 213	=C 211	-
C 214	=C 208	-
C 215	2004070001	C2C21P1HCG070C
C 216	2004270001	C2C21P1HCG270J
C 217	2004220102	C2C31P1HCG221J
C 218	2004430001	C2C21P1HCG430J
C 219	=C 205	-
C 220	=C 205	-
C 221	2004180001	C2C21P1HCG180J
C 222	2004100101	C2C21P1HCG101J
C 223	=C 208	-
C 224	2004240001	C2C21P1HCG240J
C 225	=C 208	-
C 226	2004200001	C2C21P1HCG200J
C 227	=C 208	-
C 228	2004080001	C2C21P1HCG080C
C 229	=C 208	-
C 230	2020470004	USR1C470MCA
C 232	2004150001	C2C21P1HCG150J
C 233	2004100001	C2C21P1HCG100J
C 234	2004120001	C2C21P1HCG120J
C 235	=C 233	-
C 236	=C 234	-
C 237	=C 233	-
C 239	=C 208	-
C 240	=C 234	-
C 241	=C 232	-
C 242	=C 208	-
C 243	=C 232	-
C 244	2004300001	C2C21P1HCG300J
C 245	2004020001	C2C21P1HCG020C
C 246	=C 244	-
C 247	2002150013	HE40SJCH150K
C 249	=C 224	-
C 250	=C 222	-
C 251	=C 234	-
C 252	2004030001	C2C21P1HCG030C
C 253	=C 208	-
C 254	2021100003	USA1C100MCA
C 255	=C 208	-
C 256	=C 211	-
C 257	=C 211	-
C 259	=C 244	-
C 260	=C 204	-
C 261	=C 252	-
C 262	=C 234	-
C 263	=C 208	-
C 264	=C 211	-
C 265	=C 252	-
C 266	=C 228	-
C 267	2004010001	C2C21P1HCG010C
C 268	=C 233	-
C 269	2004015001	C2C21P1HCG1R5C
C 270	=C 228	-
C 271	=C 205	-
C 274	=C 205	-
C 275	=C 234	-
C 277	=C 224	-
C 278	2004470211	C3K21P1HR472K
C 279	=C 278	-
C 280	=C 205	-

NOTE:
備考:

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
C 281	=C 208	-
C 282	2004390001	C2C21P1HCG390J
C 283	2004560001	C2C21P1HCG560J
C 285	=C 205	-
C 286	=C 230	-
C 287	2008100405	SVA1V104M1
C 289	=C 211	-
C 290	=C 211	-
C 291	=C 232	-
C 292	=C 233	-
C 293	=C 226	-
DIODE		
CR201	5001015301	1SS153
CR202	=CR201	-
CR203	=CR201	-
CR204	=CR201	-
CR205	5009030101	MI301
CR206	=CR205	-
CR207	5001220801	1S2208
CR208	5004211001	SEL2110R
CR209	=CR207	-
CR210	=CR201	-
VARIABLE CAPACITOR		
CV201	2019100101	CV38D1001
FILTER		
FL201	7034161502	16F15B
FL202	7035001501	CLF-K15
JACK		
J 201	7033083601	HSJ0836-01-310
J 202	7033110201	HSJ1102-01-010
J 203	7030001201	TVL-P12P-D1
J 204	7030001301	TVL-P13P-D1

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
COIL		
L 201	3008245501	2455L
L 202	3003470102	LAL04NA471K
L 203	3008244501	2445L
L 204	3003056012	LAL03NA5R6K
L 205	3008304501	3045L
L 206	=L 203	-
L 207	=L 203	-
L 208	=L 203	-
L 209	3005339501	07P3395N
L 210	3005700331	07P003TS
L 211	=L 201	-
L 212	3005453002	07P4530Y
L 213	=L 212	-
L 214	=L 212	-
L 215	3005504411	05E044T
L 216	=L 215	-
L 217	3005504512	05E045L
TRANSISTOR		
Q 201	4011222301	2SC2223F13
Q 202	4011335601	2SC3356
Q 203	=Q 202	-
Q 204	4011162301	2SC1623L4
Q 205	=Q 204	-
Q 206	=Q 202	-
Q 207	4016030201	2SK302GR
Q 208	=Q 201	-
Q 209	=Q 201	-
Q 210	=Q 201	-
RESISTOR		
R 201	1004100301	RMC1/10 10KnJ
R 202	=R 201	-
R 203	1004470101	RMC1/10 470nJ
R 204	1004100201	RMC1/10 1KnJ
R 205	1004220401	RMC1/10 220KnJ

NOTE:
備考:

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
R 207	1004820301	RMC1/10 82KnJ
R 208	1004820201	RMC1/10 8.2KnJ
R 209	1004220301	RMC1/10 22KnJ
R 210	1004100101	RMC1/10 100nJ
R 211	1004150201	RMC1/10 1.5KnJ
R 212	1004470201	RMC1/10 4.7KnJ
R 213	1004560201	RMC1/10 5.6KnJ
R 214	1004270101	RMC1/10 270nJ
R 215	=R 204	-
R 216	=R 201	-
R 217	=R 209	-
R 218	=R 201	-
R 219	1004220101	RMC1/10 220nJ
R 220	=R 212	-
R 221	=R 212	-
R 222	=R 201	-
R 223	=R 203	-
R 224	1004470301	RMC1/10 47KnJ
R 225	=R 209	-
R 226	1004680201	RMC1/10 6.8KnJ
R 227	=R 203	-
R 228	1004100401	RMC1/10 100KnJ
R 229	=R 210	-
R 232	=R 213	-
R 233	1004270201	RMC1/10 2.7KnJ
R 234	=R 201	-
R 235	1004560401	RMC1/10 560KnJ
R 236	=R 224	-
R 237	1004560101	RMC1/10 560nJ
R 238	=R 219	-
R 239	=R 211	-
R 240	1004470001	RMC1/10 47nJ
R 241	=R 204	-
R 242	1004022002	RMC1/10 2.2nK
R 243	=R 224	-
R 244	1004330401	RMC1/10 330KnJ
R 245	=R 212	-
R 246	=R 208	-
R 247	=R 242	-
R 248	1004680301	RMC1/10 68KnJ
R 249	1004270301	RMC1/10 27KnJ
R 250	=R 201	-
THERMISTOR		
RT201	1014512001	TDS-A120D
POTENTIOMETER		
RV201	1011220301	H0521A22KnB
RV202	1011220201	H0521A2.2KnB
SWITCH		
S 201	7032220001	SPPH22
INTEGRATED CIRCUIT		
U 201	0051302901	TA51-3029
U 202	6036057101	μPB571C
U 203	6036283301	μPD2833C
U 204	0051302201	TA51-3022
U 205	6012001601	S-AV16H
U 206-1	0051302301	TA51-3023K1 *1
U 206-2	0051302302	TA51-3023K2 *2
U 206-3	0051302303	TA51-3023K3 *3
U 207	0051303101	TA51-3031
CRYSTAL		
Y 201	0011604701	TA11-6047
Y 202	0011604801	TA11-6048

NOTE:
備考: *1: 5 to 2W
*2: 1W
*3: 2W

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
	AF BOARD	
	(Dwg. No. C5460-005-A)	
	BATTERY	
BT501	7010203201	CR2032T2
	CAPACITOR	
C 501	2004100311	C3K21P1HR103K
C 502	2004470111	C3K21P1HR471K
C 504	=C 502	-
C 505	2021100003	USA1C100MCA
C 506	2024470602	S891A476MD1
C 507	2004330211	C3K21P1HR332K
C 508	=C 505	-
C 509	2008100502	SVA1C105M1
C 511	=C 509	-
C 512	=C 505	-
C 513	=C 509	-
C 514	=C 501	-
C 515	=C 509	-
C 516	2020470004	USR1C470MCA
C 517	=C 501	-
C 518	=C 501	-
C 520	2008100405	SVA1V104M1
C 521	=C 520	-
C 522	=C 516	-
C 523	2004470211	C3K21P1HR472K
C 524	2006100602	S991C106ME1
C 525	2004470001	C2C21P1HCG470J
C 526	2020100104	USR1C101MCA
C 527	=C 501	-
C 528	=C 516	-
C 529	=C 520	-
C 531	=C 516	-
C 532	=C 516	-
C 533	=C 516	-
C 534	=C 516	-
C 535	2006100503	S991E105MA1
C 536	=C 505	-
C 537	=C 502	-
C 538	=C 502	-
C 539	2020330005	USR1E330MCA
C 540	=C 501	-
C 541	=C 539	-
C 542	=C 502	-
	DIODE	
CR501	5001283501	1S2835
CR502	5001283701	1S2837
CR503	=CR502	-
CR504	=CR502	-
CR505	=CR502	-
CR506	5008091001	RD9.1MB1
CR507	=CR502	-
CR508	5001012301	1SS123
	JACK	
J 501	7030000301	TVL-P03P-D1
J 502	7030001301	TVL-P13P-D1
	TRANSISTOR	
Q 501	4011162301	2SC1623L4
Q 502	=Q 501	-
Q 503	=Q 501	-
Q 504	=Q 501	-
Q 505	4010079811	2SB798DM
Q 506	4009061201	2SA812M4
	RESISTOR	
R 501	1004100001	RMC1/10 10nJ
R 502	1004680201	RMC1/10 6.8KnJ
R 503	1004300301	RMC1/10 30KnJ
R 504	1004220401	RMC1/10 220KnJ
R 505	1004820201	RMC1/10 8.2KnJ

NOTE:
備考:

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
R 506	=R 504	-
R 507	1004100201	RMC1/10 1KnJ
R 508	1004270201	RMC1/10 2.7KnJ
R 510	1004100401	RMC1/10 100KnJ
R 511	=R 510	-
R 512	=R 510	-
R 514	=R 510	-
R 515	1004330401	RMC1/10 330KnJ
R 516	1004100101	RMC1/10 100nJ
R 517	1004120201	RMC1/10 1.2KnJ
R 518	1004560201	RMC1/10 5.6KnJ
R 520	=R 516	-
R 521	1004470301	RMC1/10 47KnJ
R 522	1004120301	RMC1/10 12KnJ
R 523	1004100301	RMC1/10 10KnJ
R 524	=R 523	-
R 526	=R 523	-
R 527	1004470101	RMC1/10 470nJ
R 528	=R 518	-
R 529	=R 501	-
THERMISTOR		
RT501	1014031001	TH-C310
POTENTIOMETER		
RV501	1011220201	H0521A2.2KnB
RV502	=RV501	-
RV503	1015200302	RK0941111 20KnB
RV504	1015100401	RK0941110 100KnB
SWITCH		
S 501	7032091001	KHH10910
S 502	=S 501	-

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
INTEGRATED CIRCUIT		
U 501	6012714001	TA7140P
U 502	0051302401	TA51-3024
U 503	0051302801	TA51-3028
U 504	0051302701	TA51-3027
U 505	6012736801	TA7368P
U 506	0051302601	TA51-3026
U 507	0051302501	TA51-3025
U 508	6032812501	S-81250HG

NOTE:
備考:

SYMBOL 記号	CODE NO. コード番号	TYPE 型名

TABLETOP QUICK CHARGER

(Dwg. No. C5460-009-A)

CAPACITOR

C 001	2012100205	TLB1V102MAA
C 002	2004470211	CCK21P1HR472K
C 003	2008100601	SVC1A106M
C 004	=C 002	-
C 005	2004100311	CCK21P1HR103K
C 006	=C 005	-

DIODE

CR001	5005124111	U1BZ41
CR002	=CR001	-
CR003	=CR001	-
CR004	=CR001	-
CR005	5001012301	1SS123
CR006	5001283501	1S2835
CR007	=CR001	-
CR008	5008051000	RD5.1MB
CR009	=CR006	-
CR010	=CR006	-
CR011	=CR008	-
CR012	=CR006	-
CR013	=CR005	-
CR014	=CR005	-
CR015	=CR008	-
CR016	5004411001	SEL4110R
CR017	5004411001	SEL4110R
CR018	=CR017	-

FUSE

F 001	7003000201	φ6.4*30 0.5A

FUSE HOLDER

FX001	7019000101	ﾌｭｰｽﾎﾙﾀﾞｰ

JACK

J 001	7015000501	B5P-SHF-1AA

TRANSISTOR

Q 001	4010077201	2SB772Q
Q 002	4012056001	2SD560LB
Q 003	4011162302	2SC1623L5
Q 004	=Q 003	-
Q 005	=Q 003	-
Q 006	=Q 003	-
Q 007	4009081202	2SA812M5
Q 008	=Q 003	-
Q 009	=Q 003	-
Q 010	=Q 003	-
Q 011	=Q 003	-
Q 012	=Q 003	-
Q 013	=Q 003	-

RESISTOR

R 001	1004100001	RMC1/10 10ΩJ
R 002	1004100301	RMC1/10 10KΩJ
R 003	=R 002	-
R 004	=R 002	-
R 005	=R 002	-
R 006	=R 002	-
R 007	1004300201	RMC1/10 3KΩJ
R 008	1004300101	RMC1/10 300ΩJ
R 009	1004062002	RMC1/10 6.2nK
R 010	=R 009	-
R 011	=R 009	-
R 012	=R 009	-
R 013	=R 009	-
R 014	1004100201	RMC1/10 1KΩJ
R 015	=R 014	-

NOTE:
備考:

SYMBOL 記号	CODE NO. コード番号	TYPE 型名
R 016	=R 014	-
R 017	=R 002	-
R 018	=R 002	-
R 019	1004510301	RMC1/10 51KnJ
R 020	=R 002	-
R 021	=R 002	-
R 022	=R 002	-
R 023	=R 002	-
R 024	=R 002	-
R 025	=R 019	-
R 026	=R 007	-
R 027	=R 002	-
R 028	1004270401	RMC1/10 270KnJ
R 029	=R 008	-
R 030	=R 014	-
R 031	1004470401	RMC1/10 470KnJ
R 032	=R 028	-
	SWITCH	
S 001-1	7029500101	MS-500A-B-RI
	INTEGRATED CIRCUIT	
U 001	6021916002	TC9160F
U 002	6032805404	S-8054HN-CB

SYMBOL 記号	CODE NO. コード番号	TYPE 型名

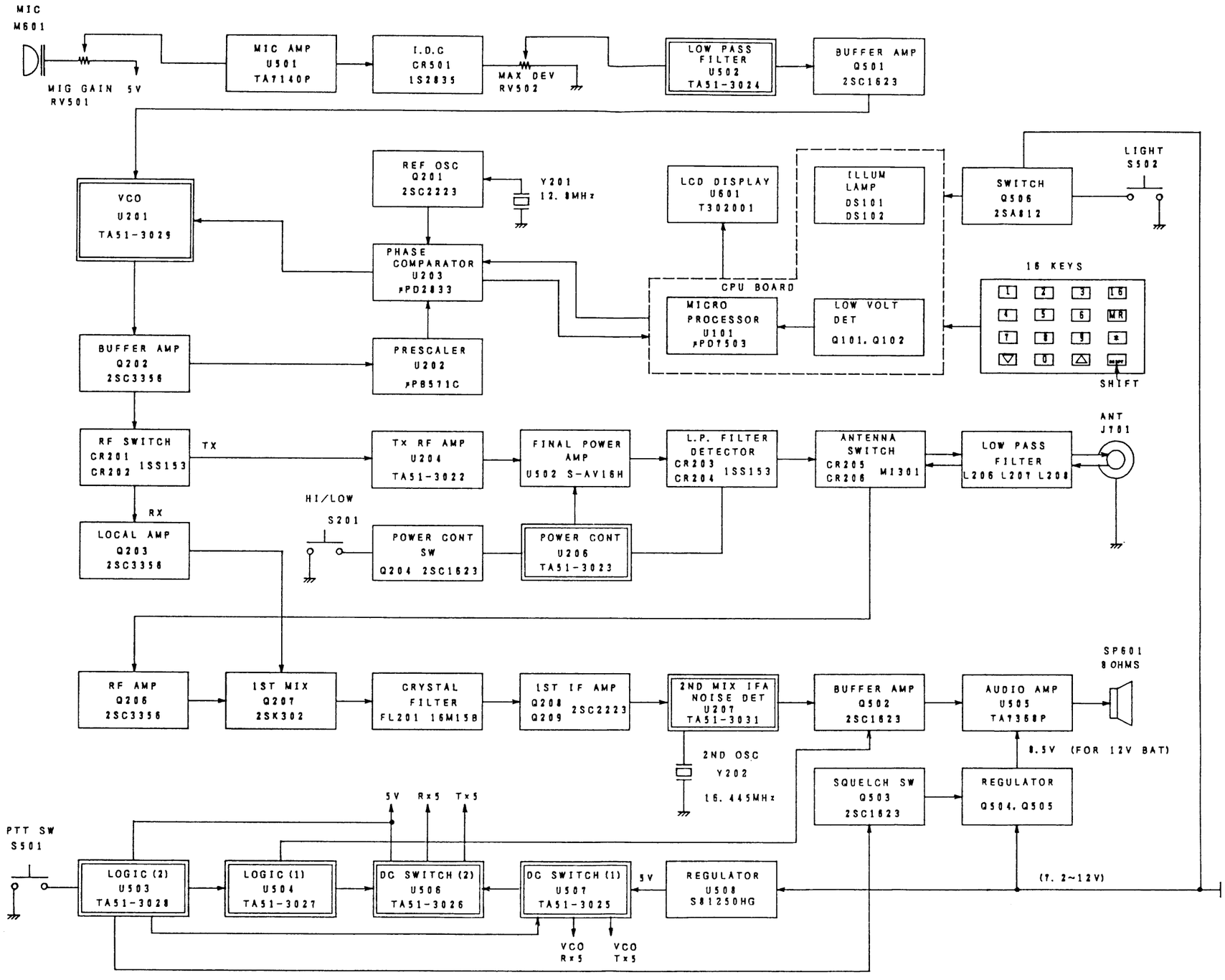
NOTE:
備考:

SYMBOL 記号	CODE NO. コード番号	TYPE 型名		SYMBOL 記号	CODE NO. コード番号	TYPE 型名
BATTERY PACK (Dwg. No. C5460-008-A)						
DIODE						
CR951-1	5008056011	RD5.6JSB1	*1			
CR951-2	5008075011	RD7.5JSB1	*2			
CR951-3	5008091012	RD9.1JSB2	*3			
CR952	5010010201	SR1K-2				
CR953	5011810401	ERB81-004				
JACK						
J 951	7033077901	HEC0779-01-030				
RESISTOR						
R 951-1	1005470301	RD1/4S47KnJ	*1			
R 951-2	1005470301	RD1/4S47KnJ	*2			
R 951-3	1005470301	RD1/4S47KnJ	*3			
R 952-1	1008100121	RSF1B100nJ	*1			
R 952-2	1008510021	RSF1B51nJ	*2			
R 952-3	8019006001	ϕ0.6	*3			
SWITCH						
S 951	7009000101	RDE185A				

NOTE:
備考: *1: For 7.2V
*2: For 9.6V
*3: For 12V

FURUNO

S-1

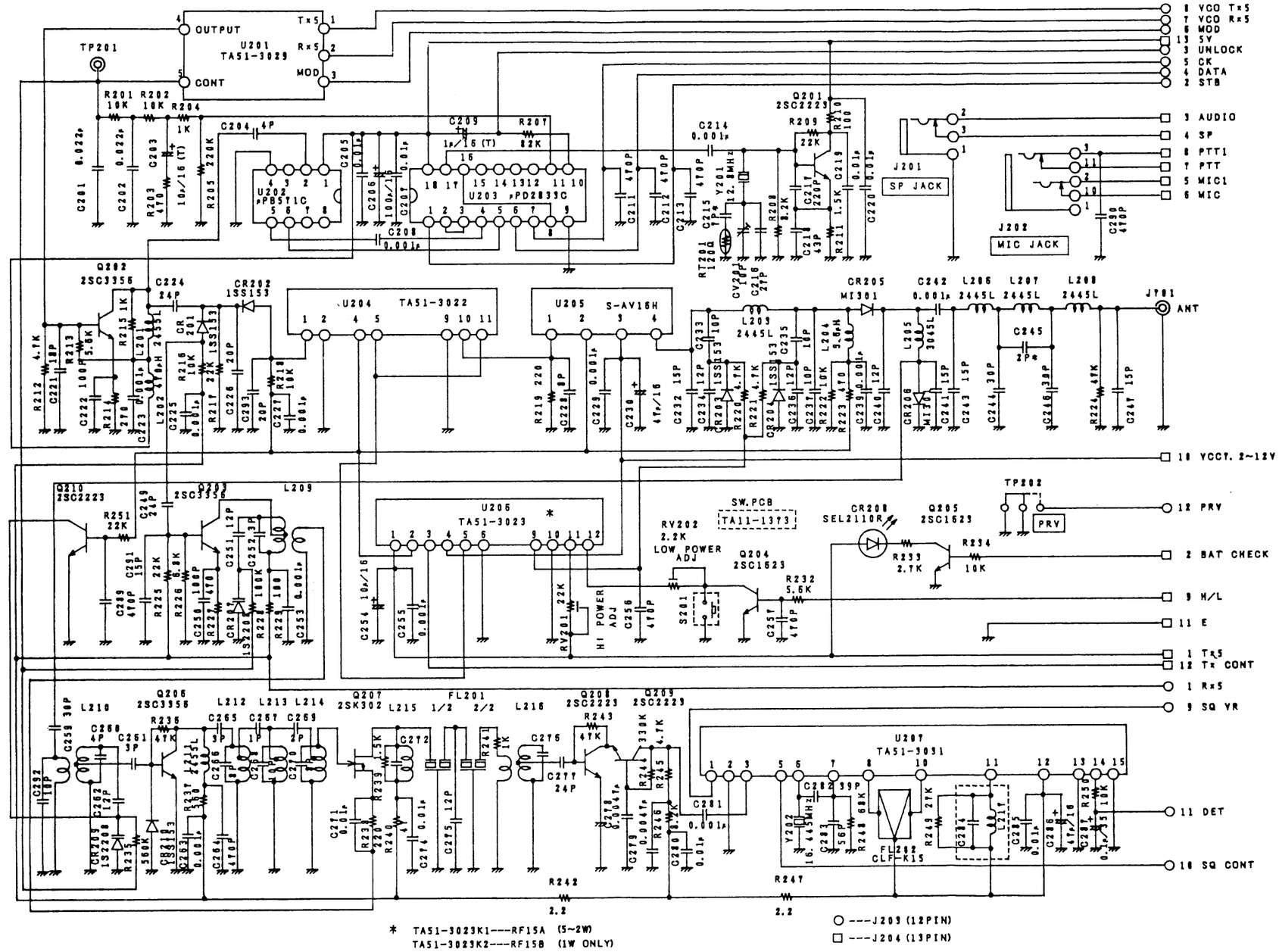


承認 APPROVED	JULY.22.'87 T.NAKANO	名称 TITLE	FM-55 ブロック図 BLOCK DIAGRAM
検図 CHECKED	July.22.'87 M.IKEDA		
製図 DRAWN	July.22.'87 H.MORI	図番 DWG.NO.	C5460-006-A

FURUNO ELECTRIC CO., LTD.

FURUNO

S-2

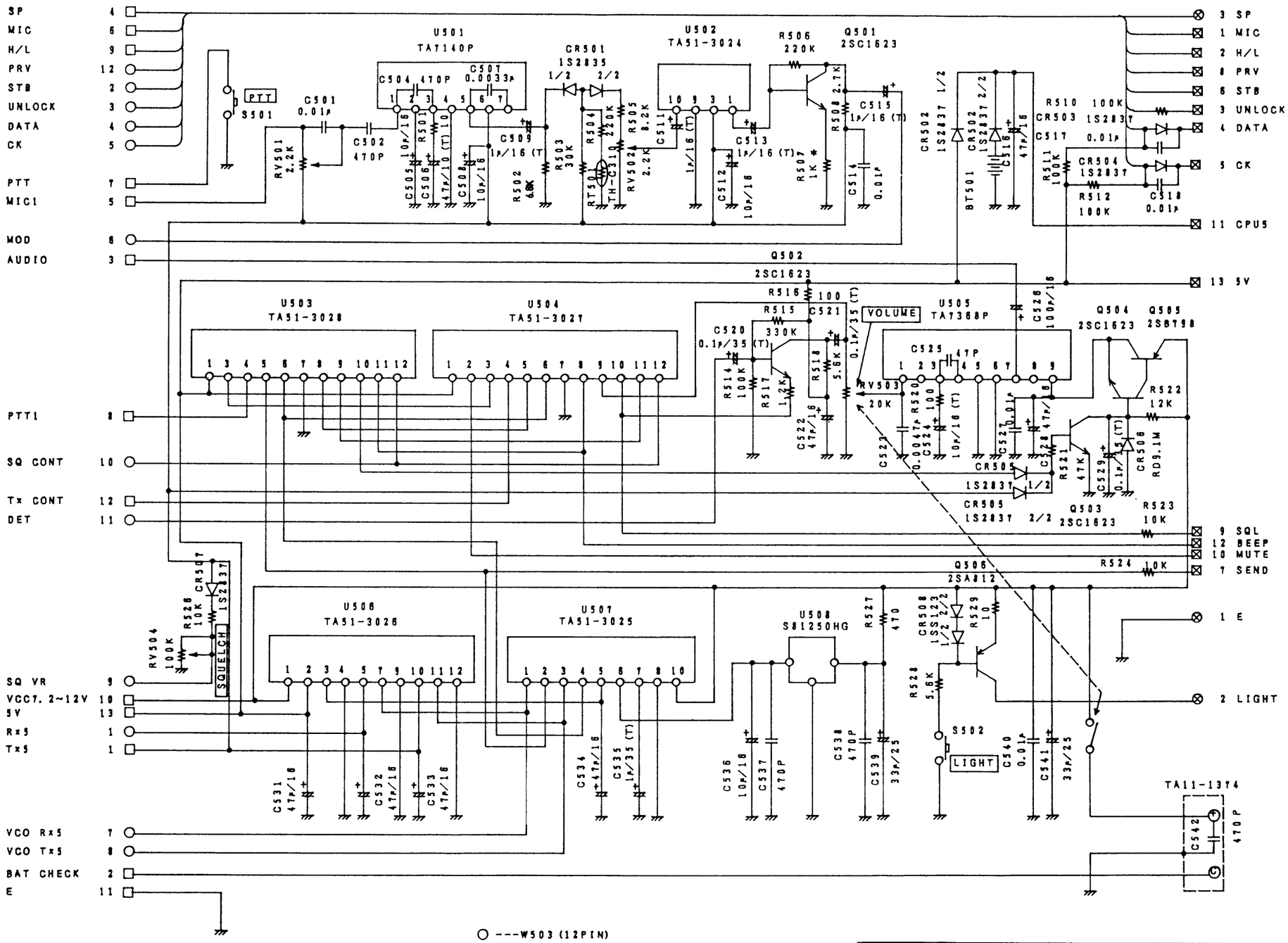


承認 APPROVED	JULY. 22. '87 T. NAKANO	名称 TITLE	FM-55 RF 基板 RF BOARD
検図 CHECKED	July. 22. '87 M. IKEDA		
製図 DRAWN	July. 22. '87 H. MORI	図番 DWG. NO.	C5460-003-A

FURUNO ELECTRIC CO., LTD.

FURUNO

S-3



承認 APPROVED	JULY. 22. '87 T. NAKANO	名称 TITLE	FM-55 AF基板 AF BOARD
検図 CHECKED	July. 22. '87 M. IKEDA		
製図 DRAWN	July. 22. '87 H. MORI	図番 DWG. NO.	C5460-005-A

FURUNO ELECTRIC CO., LTD.

NOTE1

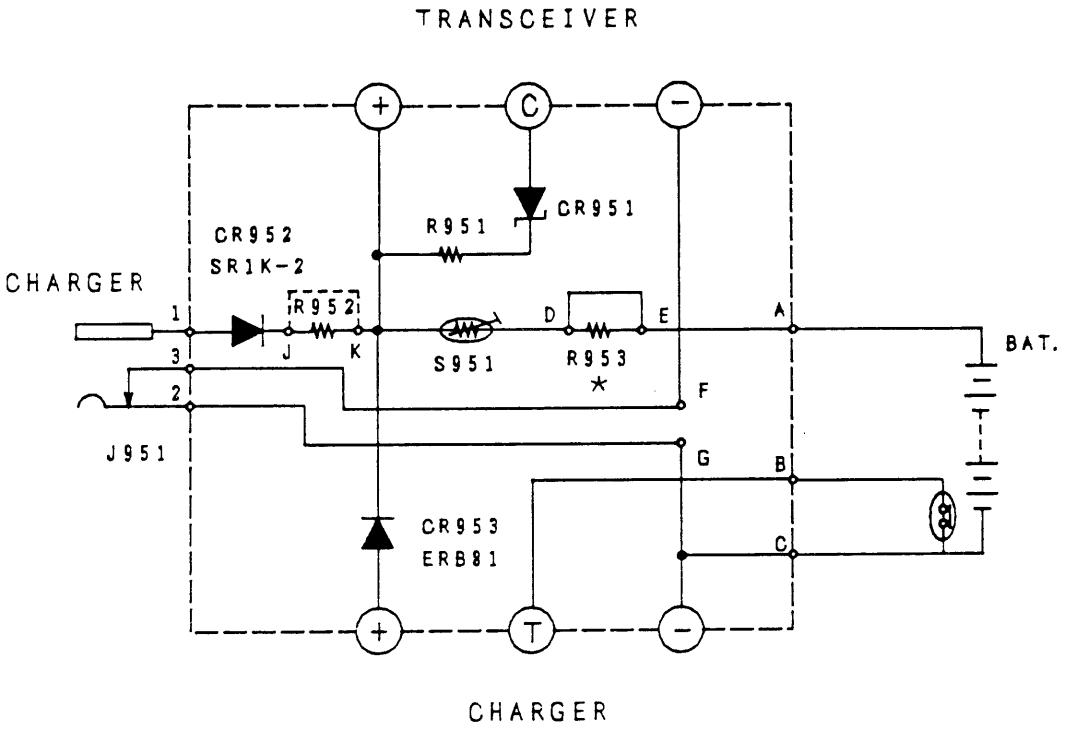
TYPE	S	P	U/I
A	×	×	—
B	×	×	×
C	—	×	×

— CONNECTED
× CUT

Q101 2SC1623
Q102 2SA812
U601 LCD T302001
SP601
M601
C601 470P
C101 470
R102 10K
CR101 RD4.7 MB3
R101 10K
C102 470
R103 1M
R104 100K
R105 30K
C103 470
C104 0.01μ
CR102 1S2835
R106 100K
R107 100K
R108 100K
R109 100K
R110 100K
R111 100K
R112 100K
C105 33
R113 160K
S P U/I
NOTE1
C109 0.01μ
C110 0.01μ
μPD7503 U101
S2 S1 S0 INT1 RESET CL1 VDD CL2 P13 P12 P11 P10 P33
S22 S23 COM0 COM1 COM2 COM3 VDD VLC1 VLC2 VLC3 VSS X1 X2
NC P32 P31 P30 SI SO SCK P63 P62 P61 P60 P53 P52 P51 P50 P43 P42 P41 P40
R114 10K
R115 10K
R116 10K
R117 12K
C106 0.01μ
C107 0.01μ
C108 0.01μ
R118 100K
R119 100K
R120 100K
R121 100K
CR103 1S2835
CR104 1S2835
CR105 1S2835
CR106 1S2835
1 2 3 16
4 5 6 MR
7 8 9 *
▽ 0 △
SHIFT
DS101
DS102
⊗ ---W101 (3PIN)
⊠ ---W102 (13PIN)
MIC 1
SP 3
CPUS 11
5V 13
E 1
PRV 8
LIGHT 2
MUTE 10
BEEP 12
STB 6
DATA 4
CK 5
H/L 2
SEND 7
SQL 9
UNLOCK 3

承認 APPROVED	JULY.22.'87 T. NAKANO	名称 TITLE	FM-55 CPU基板 CPU BOARD
検図 CHECKED	July.22.'87 M. IKEDA		
製図 DRAWN	July.22.'87 H. MORI	図番 DWG. NO.	C5460-004-A

FURUNO ELECTRIC CO., LTD.



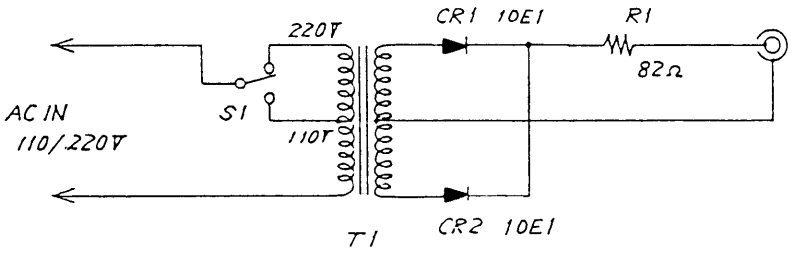
TYPE	R951	R952	CR951
BP-507 (7.2V 450mAH)	47K	100 1W	RD5.6JSB1
BP-807 (7.2V 800mAH)	47K	100 1W	RD5.6JSB1
BP-509 (9.6V 450mAH)	47K	51 1W	RD7.5JSB1
BP-512 (12V 450mAH)	47K	Shorted	RD9.1JSB2

* Not mounted in standard set

FM-55	品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	JULY.22.'87 T.NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	バッテリーパック BATTERY PACK
検図 CHECKED	July.22.'87 M.IKEDA	尺度 SCALE	/		
製図 DRAWN	July.22.'87 H.MORI	重量 WEIGHT	kg	図番 DWG.NO.	C5460-008-A

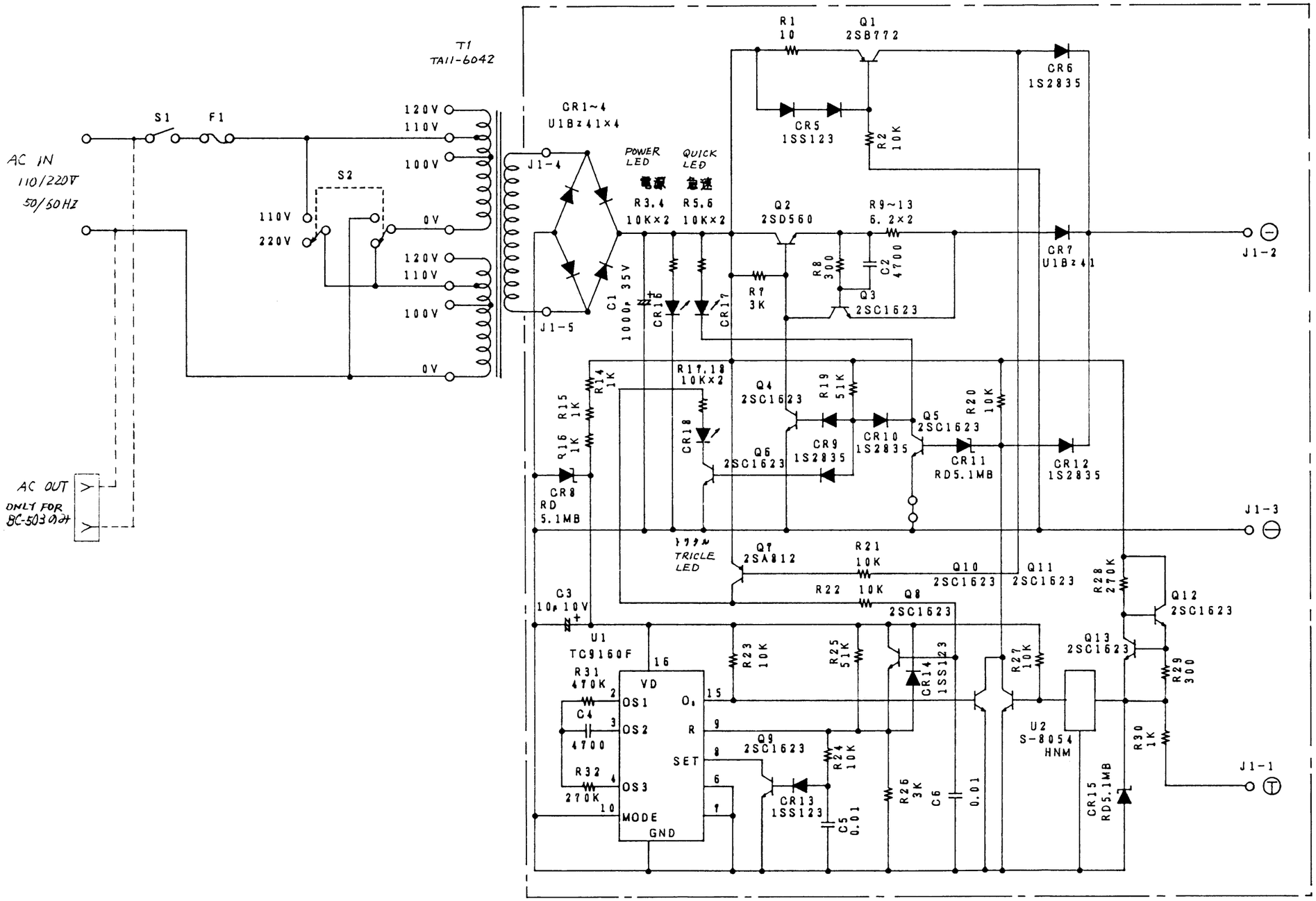
FURUNO ELECTRIC CO., LTD.



FM-55	品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	JULY・22・'87 T. NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	ウォールチャージャー BC-500 WALL CHARGER
検図 CHECKED	July・22・'87 M. IKEDA	尺度 SCALE	/		
製図 DRAWN	July・22・'87 H. MORI	重量 WEIGHT	kg	図番 DWG.NO.	C5460-007-A

FURUNO ELECTRIC CO., LTD.



BC-503は [ ] で囲まれた回路を３系統内蔵している。
The BC-503 is composed of three circuits, one of which is encircled with [ ].

FM-55/UF-6

承認 APPROVED	Aug. 7 '87 T. NAKANO	名称 TITLE	一連／三連急速充電器
検図 CHECKED	Aug. 7 '87 M. IKEDA	BC-501/503	TABLETOP QUICK CHARGER
製図 DRAWN	Aug. 7 '87 H. MORI	図番 DWG. NO.	C5460-009-A

FURUNO ELECTRIC CO., LTD.