Service Manual

MMR-77

FM/AM 2 BAND RECEIVER

CONTENTS

SPECIFICATION.

FM. ELECTRICAL PERFORMANCE

Model: MMR-77	Brand:SANGEAN	Temp: ° C	R.H.: %	Date:2005/06/15

Test Item	Condition			Value		Test no.			Unit
	Input	Output	freq	Nom.	Lim	1.	2.	3.	
Tuning Range		S/N=6dB	Min	87.5	±0.5				MHz
			Max	108.5	±0.5				
Intermediate freq.		S/N=6dB		10.7	±0.15				MHz
Max. Sensitivity		S/N=6dB	90MHz 98MHz 106MHz	12 12 12	18 18 18				dBu
Usable Sensitivity		S/N=30dB	90MHz 98MHz 106MHz	20 20 20	26 26 26				dBu
Image Rejection		S/N=6dB	106MHz	26	20				dB
I.F. Rejection		S/N=6dB	90MHz		50				dB
3db Limiting (10mv)	80dBu		98MHz	18	24				dBu
Min. output	60dBu			1.5	3				mV
Tuning Ind. Sens.				26	32				dBu
Auto. Scan. Stop. Sens.									
Stereo indicator Sens.									
Buzzer freq	60dBu			2.5	±0.2				KHz
Buzzer Lever				2.5	2.0				V_{P-P}
S/N				46	40				dB
Current Consumption RO 10mw				30	36				mA
Am. Suppression (1mV)					26				dB
Audio fidelity -6dB				4500	4000				Hz
				100	150				Hz
Output Power(75Khzdev)		Max.		120	100				mW
		10%T.H.D.		120	100				
T. H. D. (75KHz dev.)				1.5	3				%
Over load capacity		10%T. H.D.		100	90				dBu
Calibration		S/N=6dBu	90MHz 98MHz 106MHz	±1000	±1500				KHz
Lowest Batt. Volt.	60dBu			1.8	2.0				V

Supply Voltage: DC 3 V	R.O.: 50mW	Load: 8 Ohm	Modulation: 1KHz Mod./22.5KHz Dev.

Remark:	Approved by	Released/Tested by
( )首件產品 ( )客戶抽測: ( )成品 ( )例行抽測 ( )業務樣品: ( )半成品(V)新機種 ( )工程變更:		

SPECIFICATION.

MW. ELECTRICAL PERFORMANCE

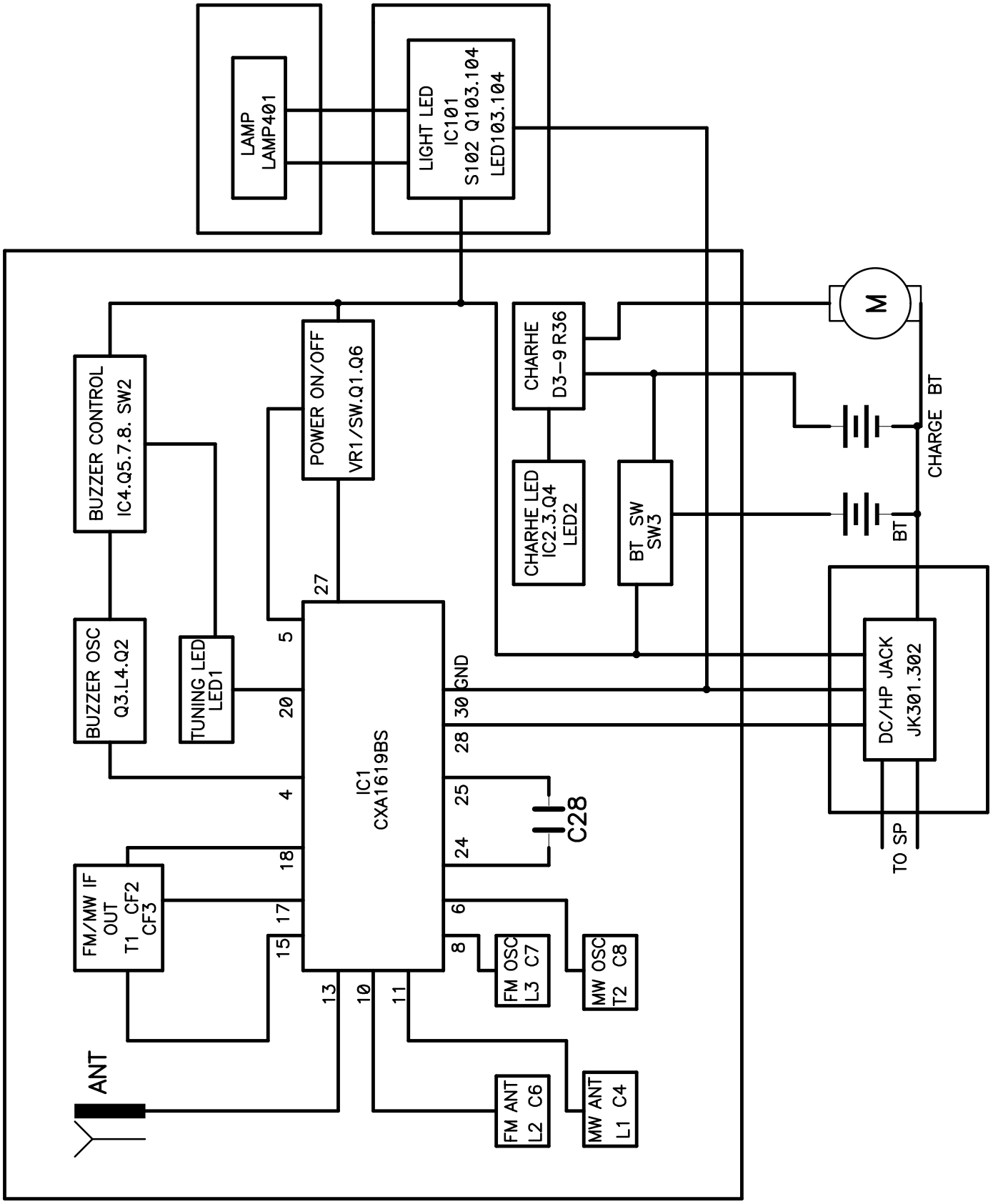
Model: MMR-77	Brand:SANGEAN	Temp: ° C	R.H.: %	Date: 2005/05/15

Test Item	Condition			Value		Test no.			Unit
	Input	Output	freq	Nom.	Lim	1.	2.	3.	
Tuning Range			Min	515	525				KHz
			Max	1750	1710				
Intermediate freq.		S/N=6dB	Min	460	±3.5				KHz
Max. Sensitivity		S/N=6dB	600KHz 1000KHz 1400KHz		56 56 56				dBu/m
Usable Sensitivity		S/N=20dB	600KHz 1000KHz 1400KHz	58 56 56	64 64 64				dBu/m
Image Rejection		S/N=6dB	1400KHz	26	20				dB
I.F. Rejection		S/N=6dB	600KHz	40	40				dB
Selectivity(±10KHz)		S/N=6dB	1000KHz	26	20				dB
Bandwidth(-6dB)	Mod400Hz	S/N=6dB			4-9				KHz
T. H. D.	74dBu/m			3	5				%
Lowest Batt. Volt.	74dBu/m			1.8	2.0				V
Hum Modulation	100dBu/m								dB
Tuning Ind. Sens.				56	62				dBu/m
Auto. Scan. Stop. Sens.									dBu/m
S/N Ration	74dBu/m				30				dB
Current Consumption	74dBu/m	10mW		34	28				mA
1m/120T out 10mW	74dBu/m			30	±3				m
Freq. Response (-6dB)	74dBu/m			100	150				Hz
				2200	2000				Hz
Output Power(80%dev)	74dBu/m	MAX		120	100				mW
		10%T.H.D.		120	100				
Over load capacity	80%mod.	10%T. H.D.		100	90				dBu/m
A. G. C. F. O. M.	100dBu/m			46	40				dB
Calibration		S/N=6dBu	600KHz 1000KHz 1400KHz	±50	±70				KHz
Whistle Modulation	74dBu/m		2IF/3IF		10				%

Supply Voltage: DC 3V	R.O.: 50mW	Load: 8 Ohm	Modulation: 1000Hz/30%

Remark:	Approved by	Released/Tested by
( )首件產品 ( )客戶抽測: ( )成品 ( )例行抽測 ( )業務樣品: ( )半成品(V)新機種 ( )工程變更:		

BLOCK DIAGRAM



ALIGNMENT INSTRUCTIONS

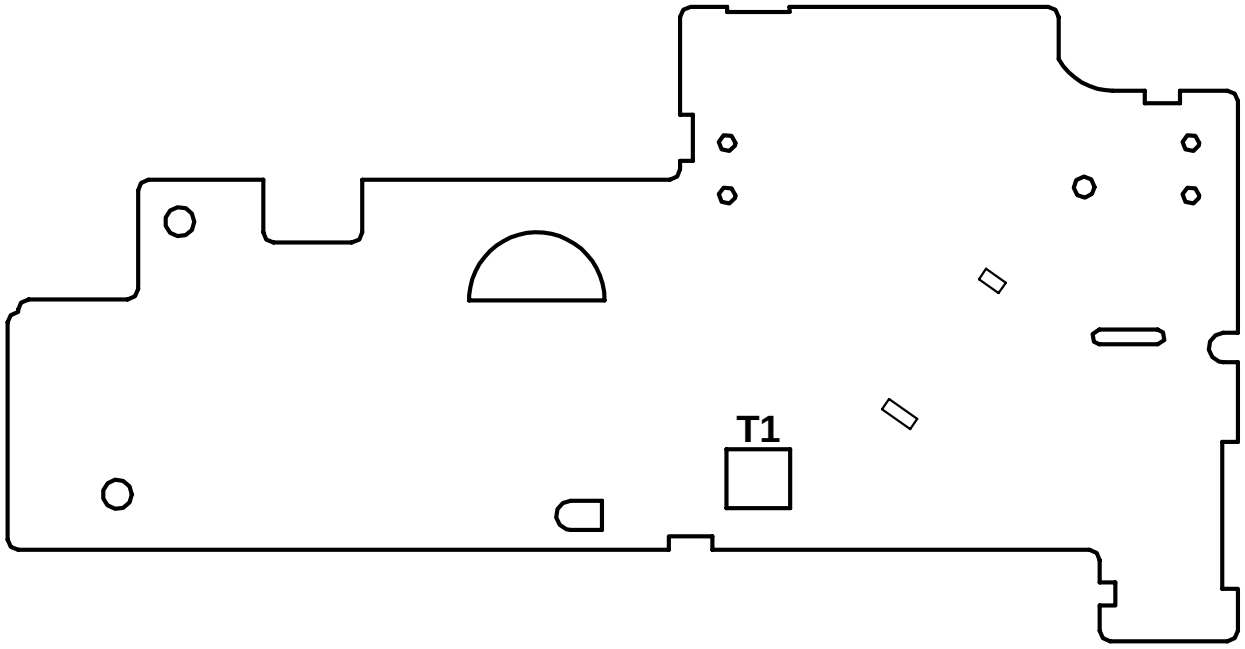
1. ALIGNMENT FOR AM IF

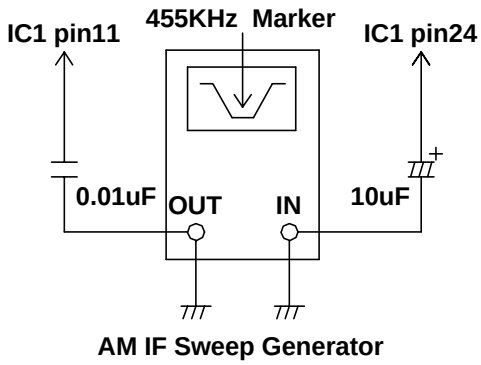
a. Required Instrument
AM IF Sweep Generator with Scope

b. Alignment Procedure

Mode	Adjustment	Procedure
AM	T1	(1) Set the power switch to ON position. (2) Connect the input terminal of the AM IF sweep generator in series with a 10uF capacitor to the IC1 pin24. (3) Connect the RF output terminal of the AM IF sweep generator in series with a capacitor 0.01uF capacitor to the IC1 pin11. (4) Adjust T1 to have a maximum output with a marker frequency of 455KHz on the sweep scope.

c. Instrument Connection





AM IF Sweep Generator

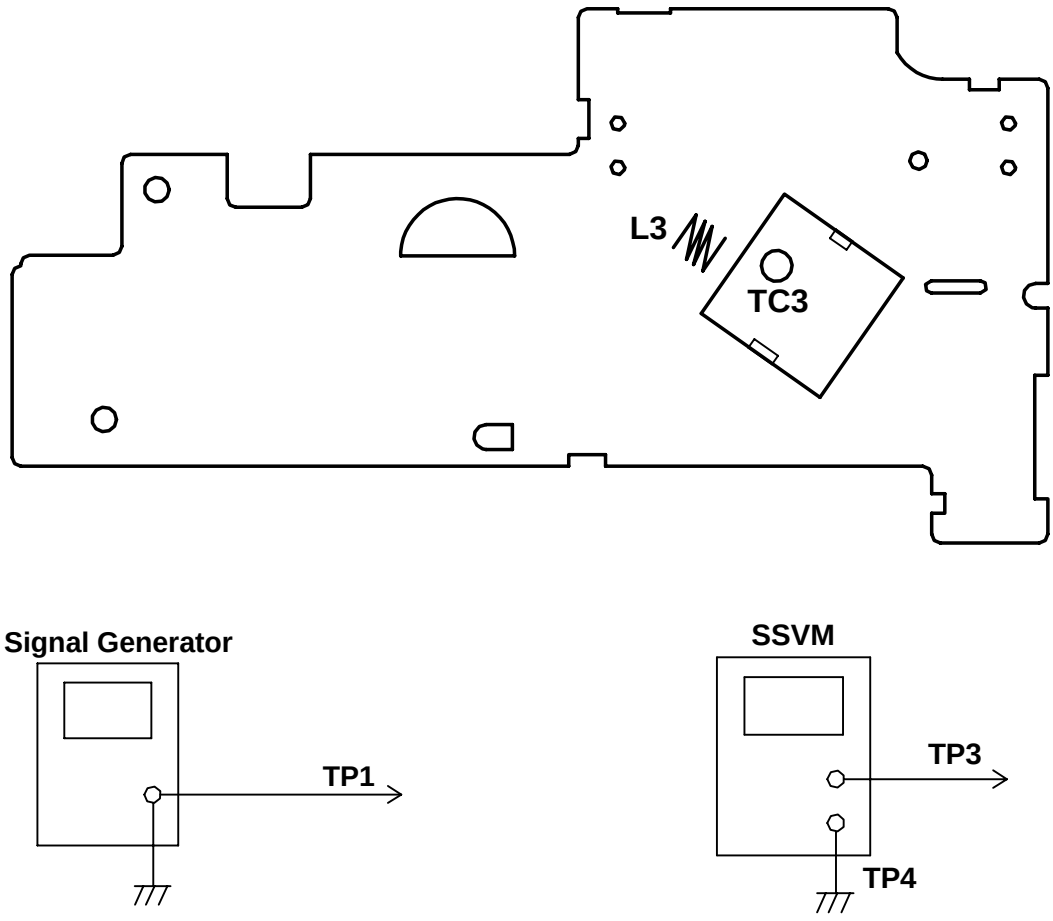
2. ALIGNMENT FOR FM FREQUENCY RANGE

a. Required Instruments
FM RF signal generator
SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
FM	L3 TC3	(1) Set the power switch to ON position. (2) Connect a SSVM to the AF out (TP3 and TP4). (3) Connect the FM signal generator to the input terminal of TP1. (4) Set frequency of the signal generator to the standard FM band, with frequency deviation to 22.5KHz, 1KHz modulation. (5) With the tuning gang fully closed, set signal generator to 87.5MHz±0.5MHz and adjust L3 (stretch or squeeze) for maximum reading on SSVM. (6) With the tuning gang fully open, set signal generator to 108MHz±0.5MHz, adjust TC3 for maximum reading on the SSVM. (7) Repeat steps (5) and (6) until best sensitivity is obtained at both frequencies.

c. Instrument Connection



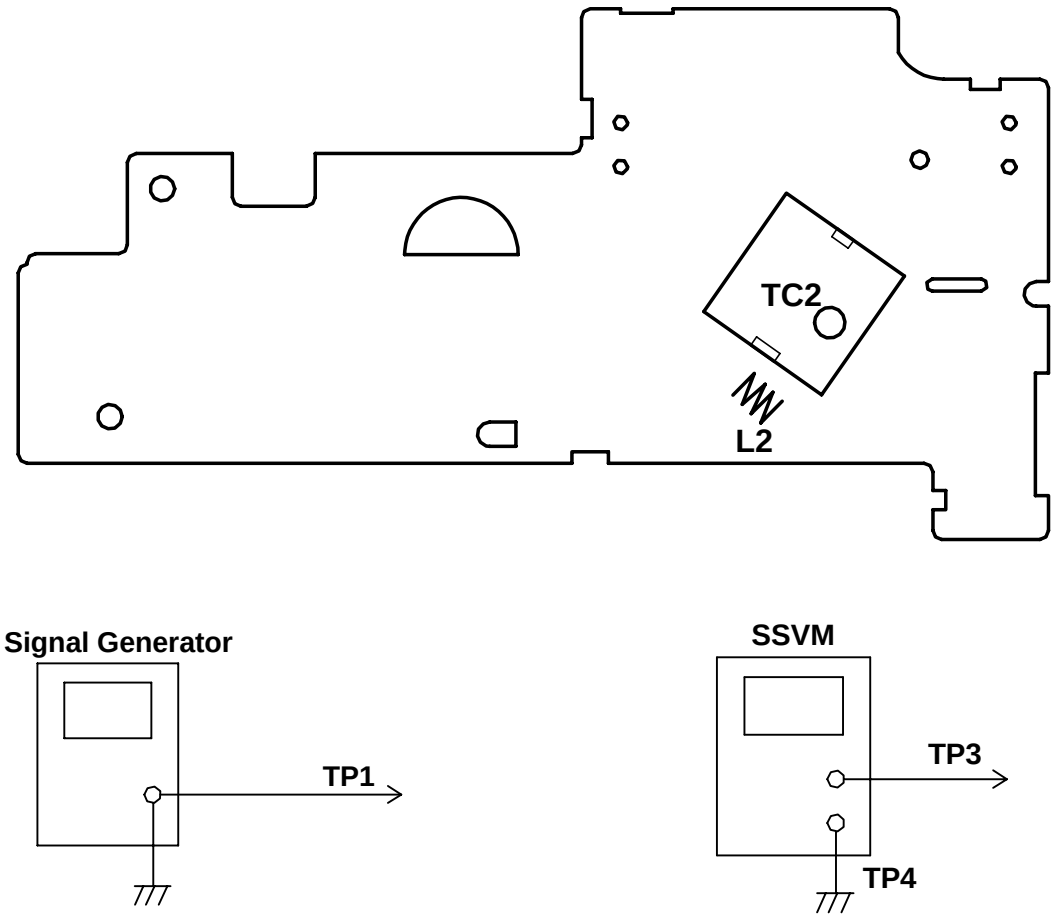
3. ALIGNMENT FOR FM SENSITIVITY

a. Required Instrument
FM RF signal generator
SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
FM	L2 TC2	(1) Set the power switch to ON position. (2) Connect a SSVM to the AF out (TP3 and TP4). (3) Connect the FM signal generator to the input terminal of TP1. (4) Set frequency of the signal generator to the standard FM band, with frequency deviation to 22.5KHz, 1KHz modulation. (5) Set signal generator to 90MHz and adjust L2 (stretch or squeeze) for maximum reading on SSVM. (6) Set signal generator to 106MHz and adjust TC2 (stretch or squeeze) for maximum reading on SSVM. (7) Repeat steps (5) and (6) until best sensitivity is obtained at both frequencies.

c. Instrument Connection



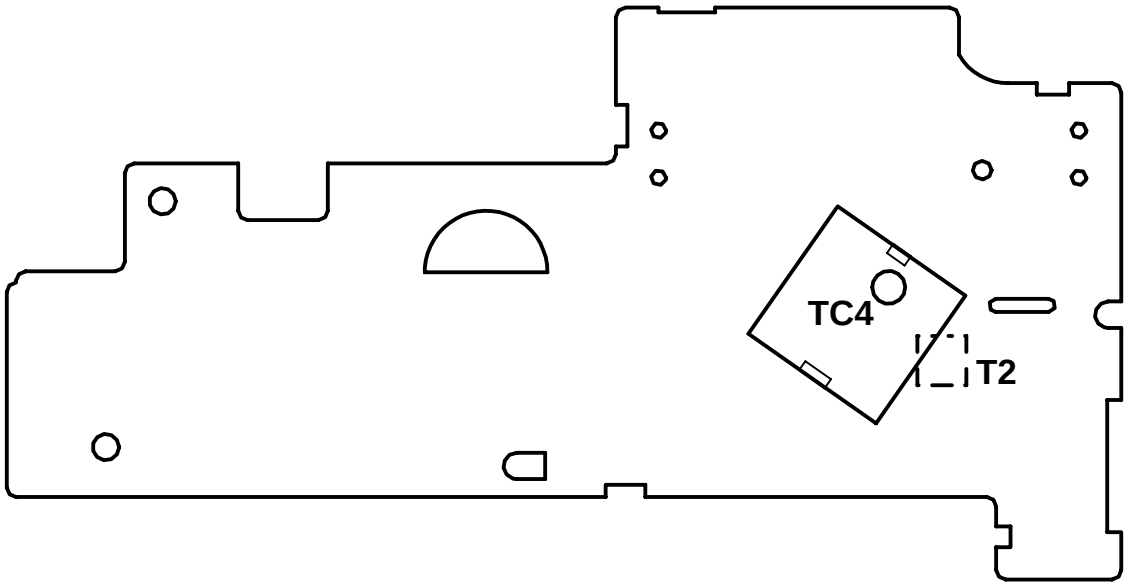
4. ALIGNMENT FOR MW FREQUENCY

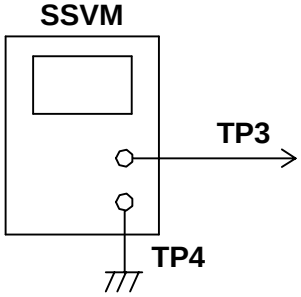
a. Required Instrument
RF signal generator
SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
MW	T2 TC4	(1) Set the power switch to ON position. (2) Connect a SSVM to the AF out (TP3 and TP4). (3) Connect the AM signal generator to the loop antenna (4) Set signal generator to 511KHz, with 30% modulation set tuning gang fully closed, and adjust T2 for T2 for maximum reading on SSVM. (5) Set signal generator to 1735KHz set tuning gang fully open, and adjust TC4 maximum reading on SSVM. (6) Repeat steps (4) and (5) until best sensitivity is obtained at both frequencies.

c. Instrument Connection





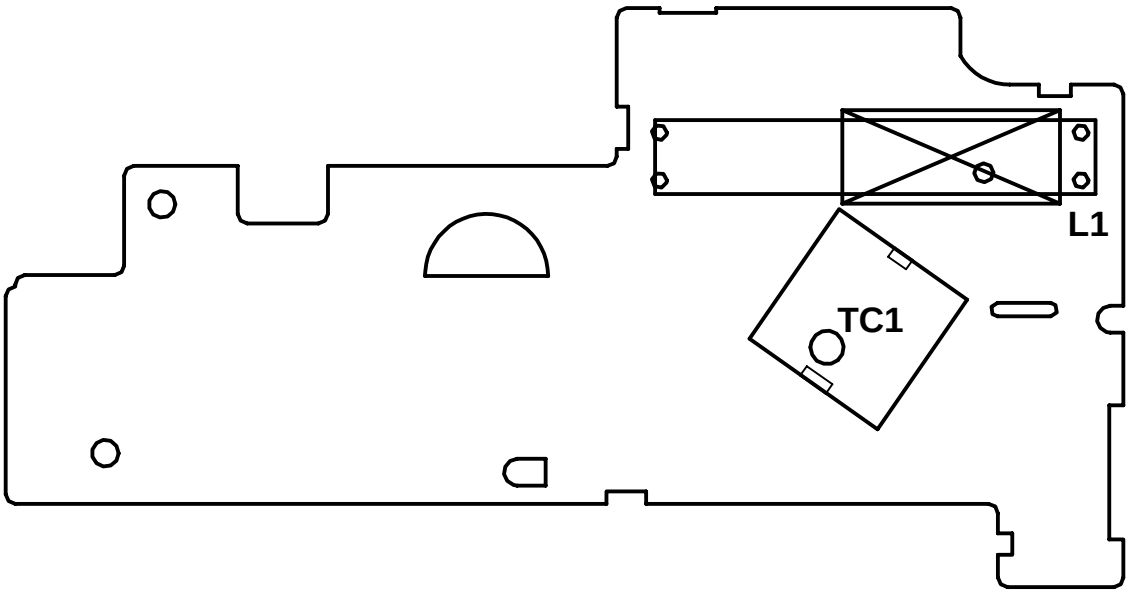
5. ALIGNMENT FOR MW SENSITIVITY

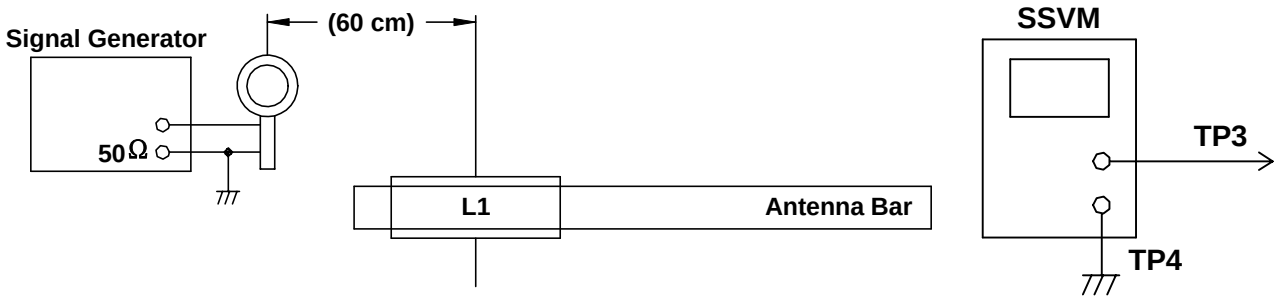
a. Required Instrument
RF signal generator
SSVM

b. Alignment Procedure

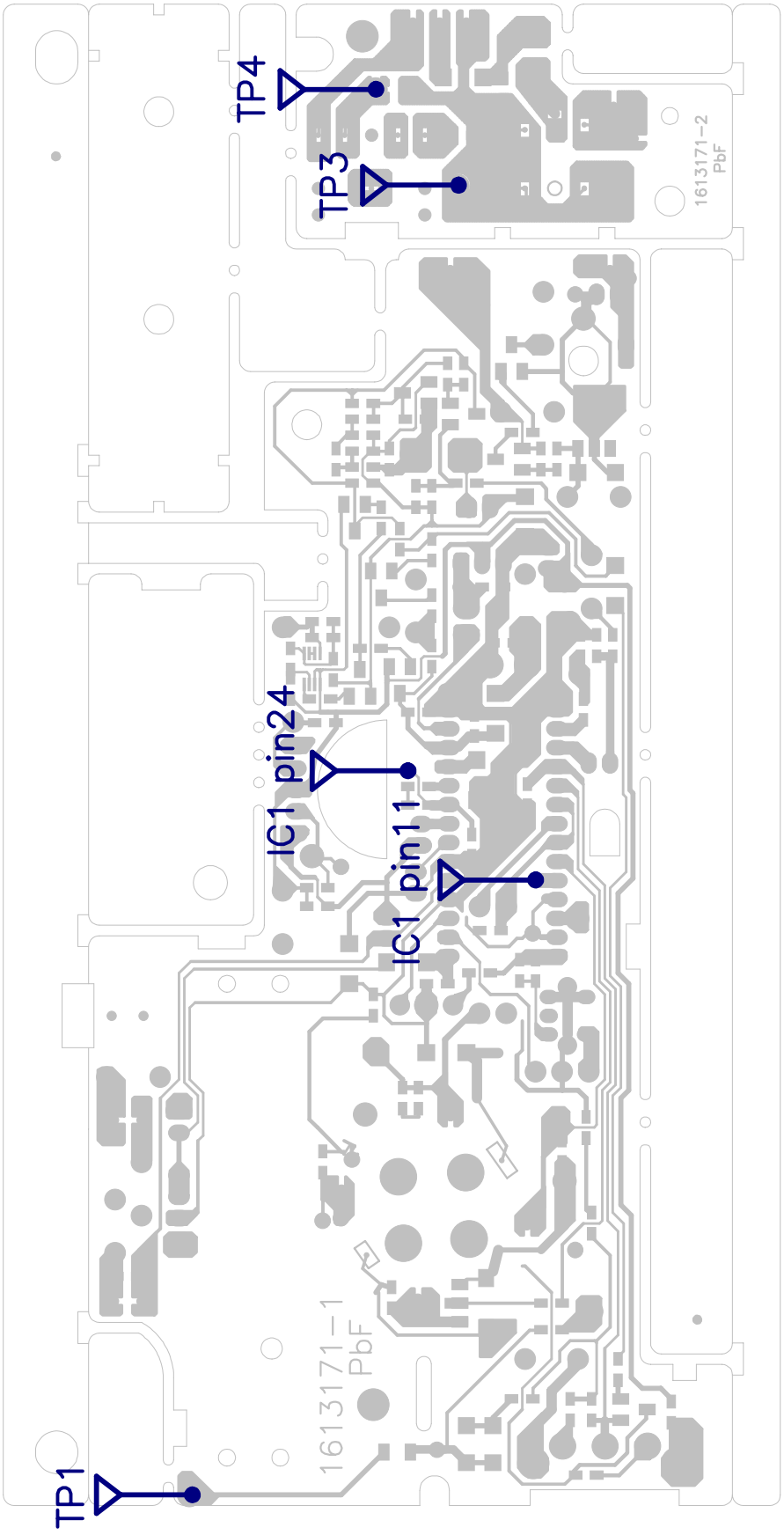
Mode	Adjustment	Procedure
MW	L1 TC1	(1) Set the power switch to ON position. (2) Connect a SSVM to the AF out (TP3 and TP4). (3) Connect the AM signal generator to the loop antenna (4) Set signal generator to 600KHz, with 30% modulation set tuning to signal, and adjust L1 for maximum reading on SSVM. (5) Set signal generator to 1400KHz set tuning to signal, and adjust TC1 for maximum reading on SSVM. (6) Repeat steps (4) and (5) until best sensitivity is obtained at both frequencies.

c. Instrument Connection

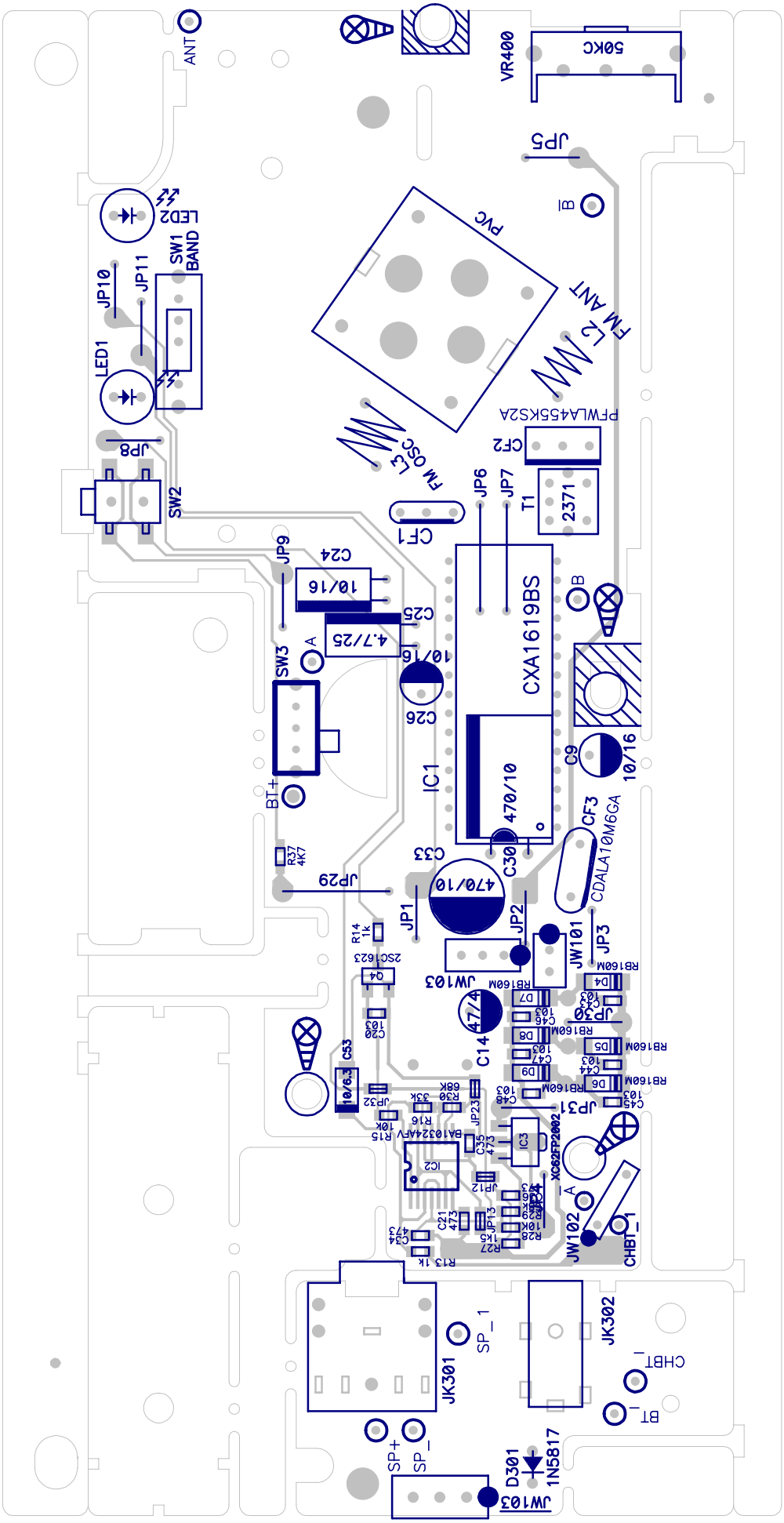




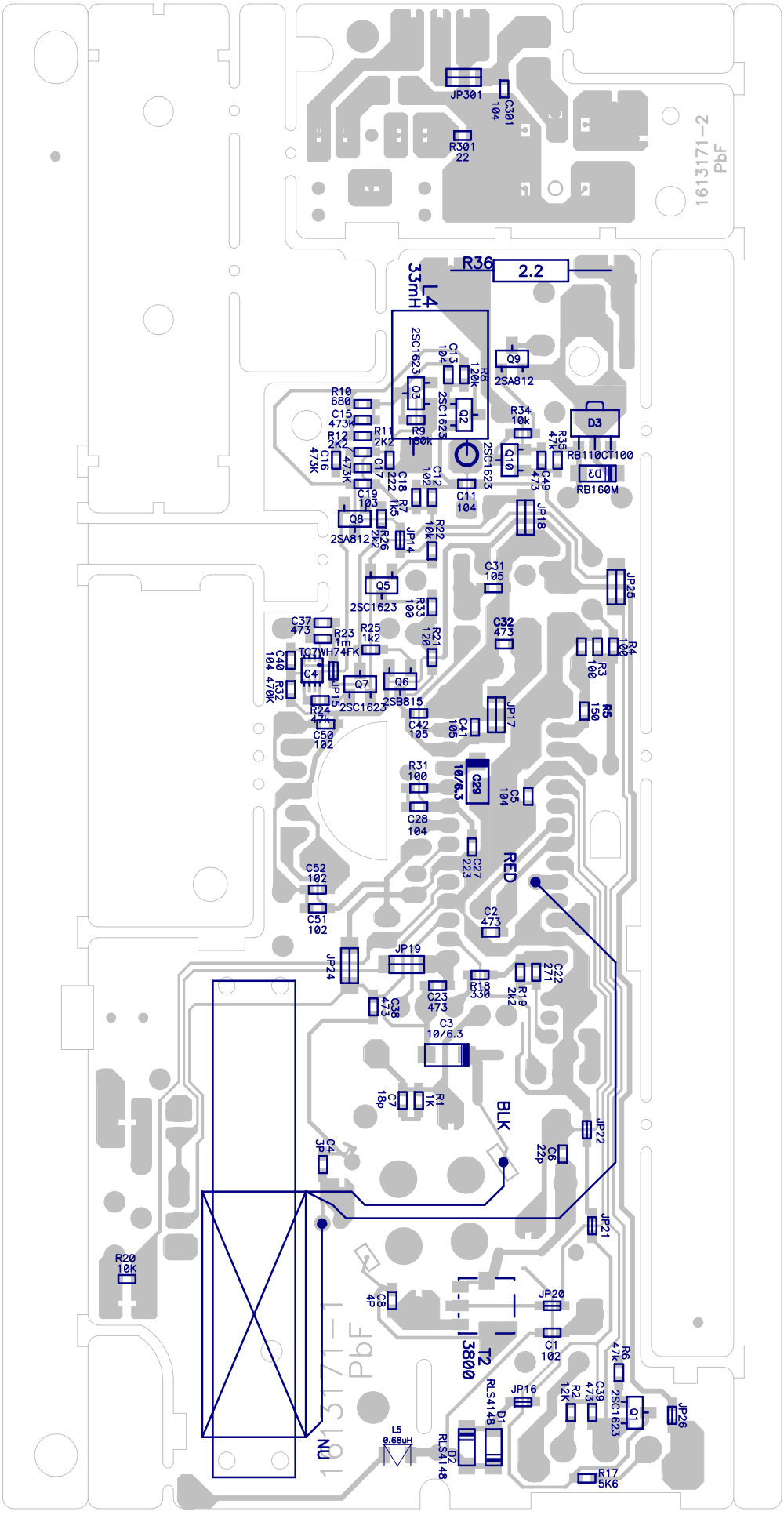
TEST POINTS DIAGRAM



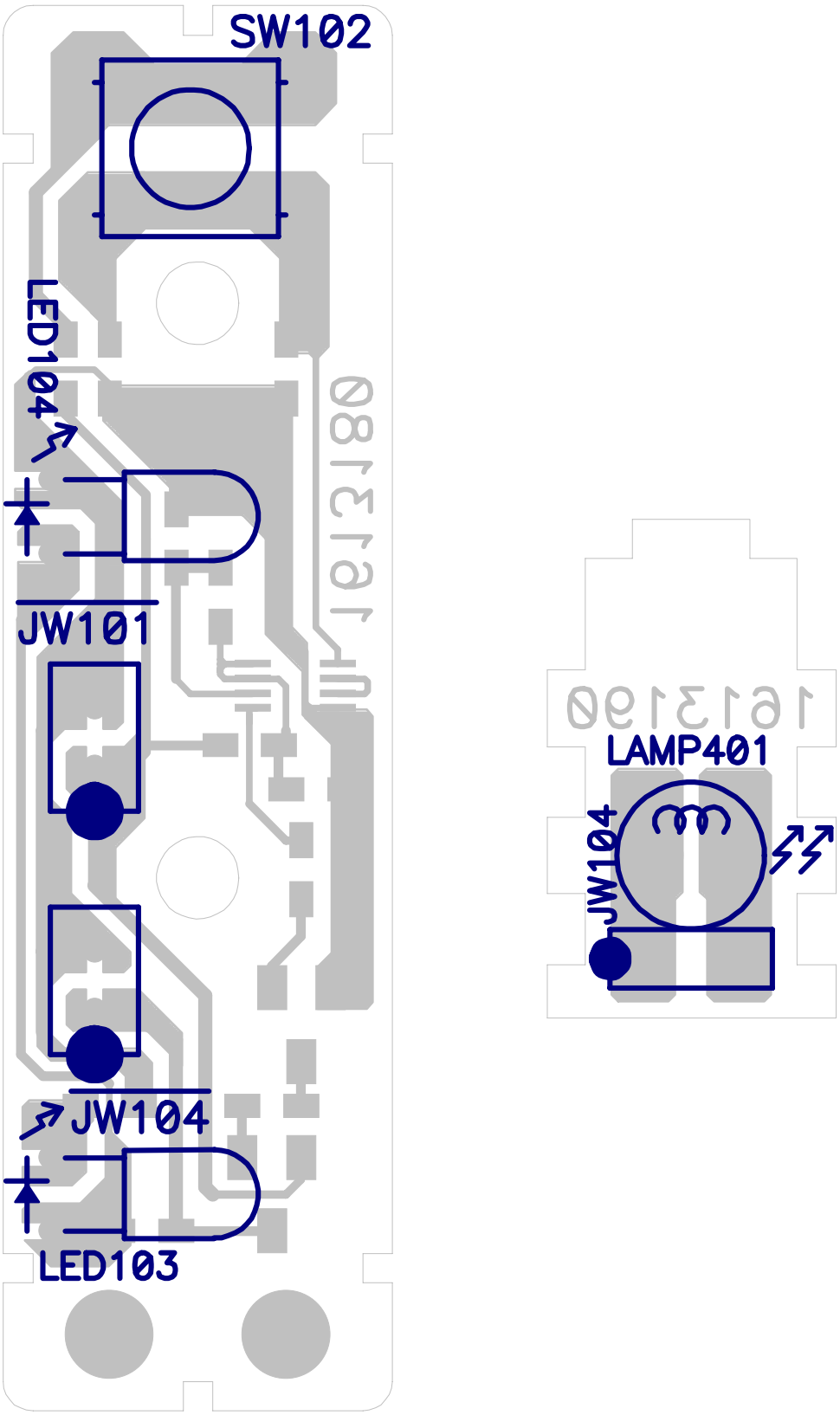
MAIN PCB TOP VIEW



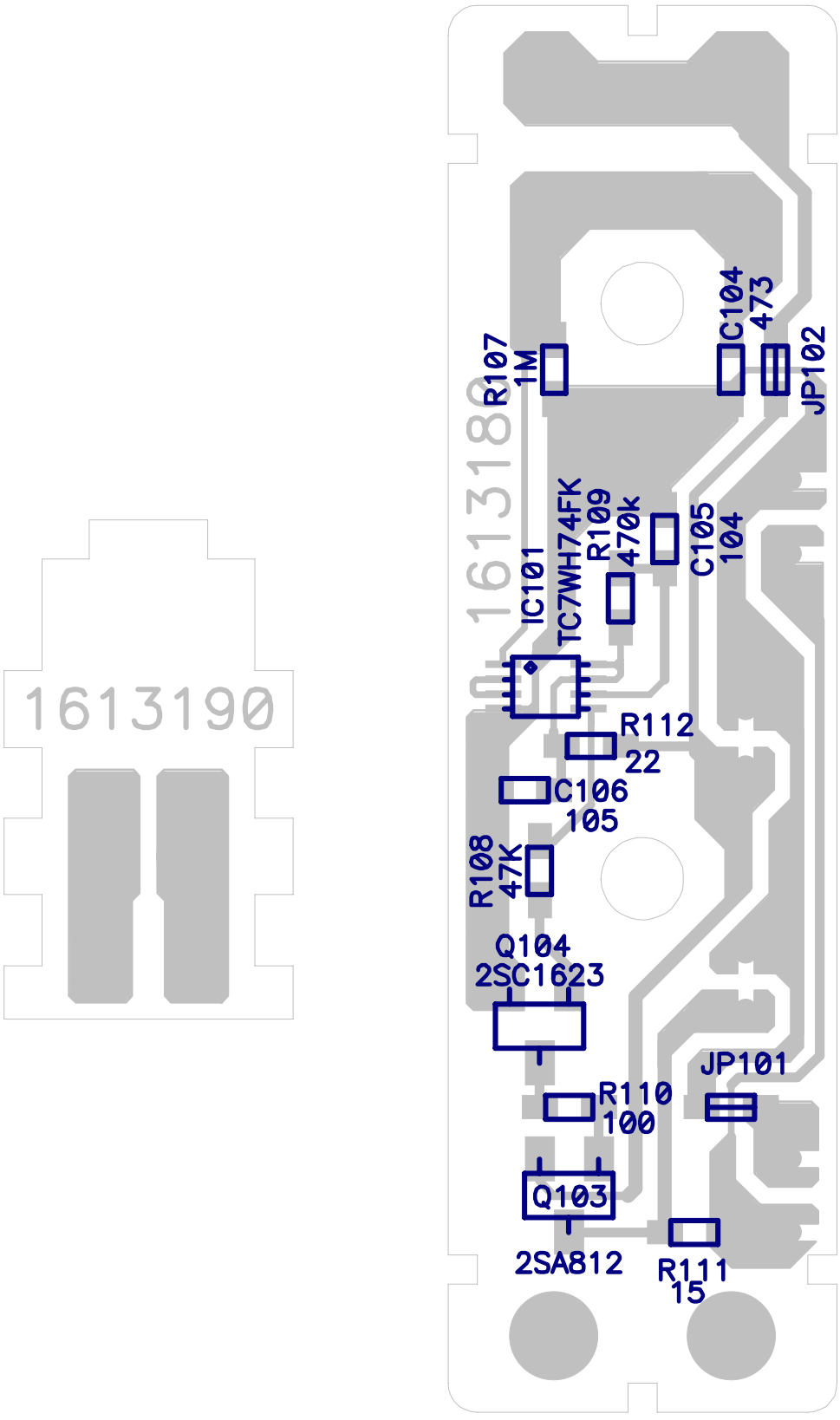
MAIN PCB BOTTOM VIEW



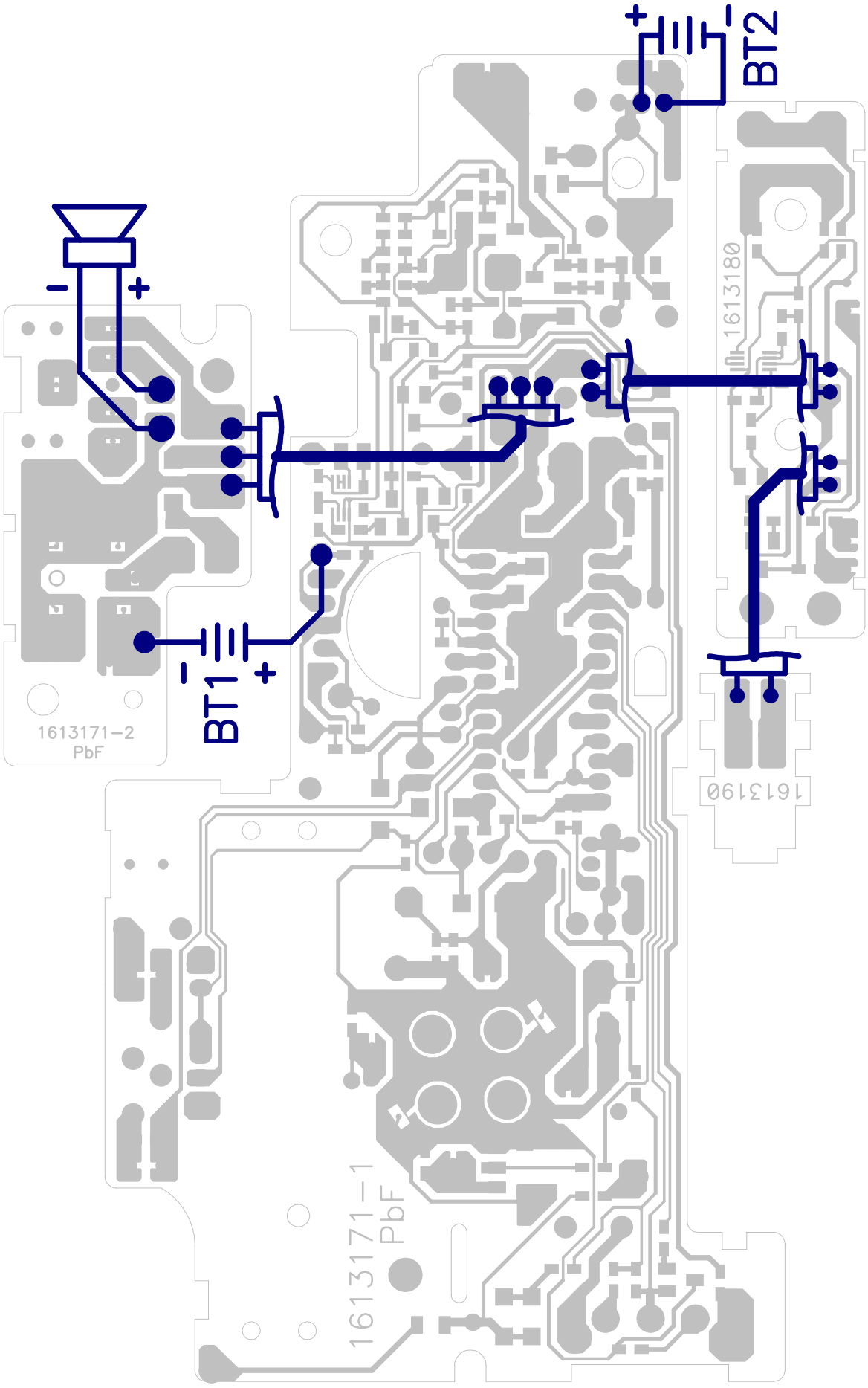
CONTROL PCB TOP VIEW



CONTROL PCB BOTTOM VIEW

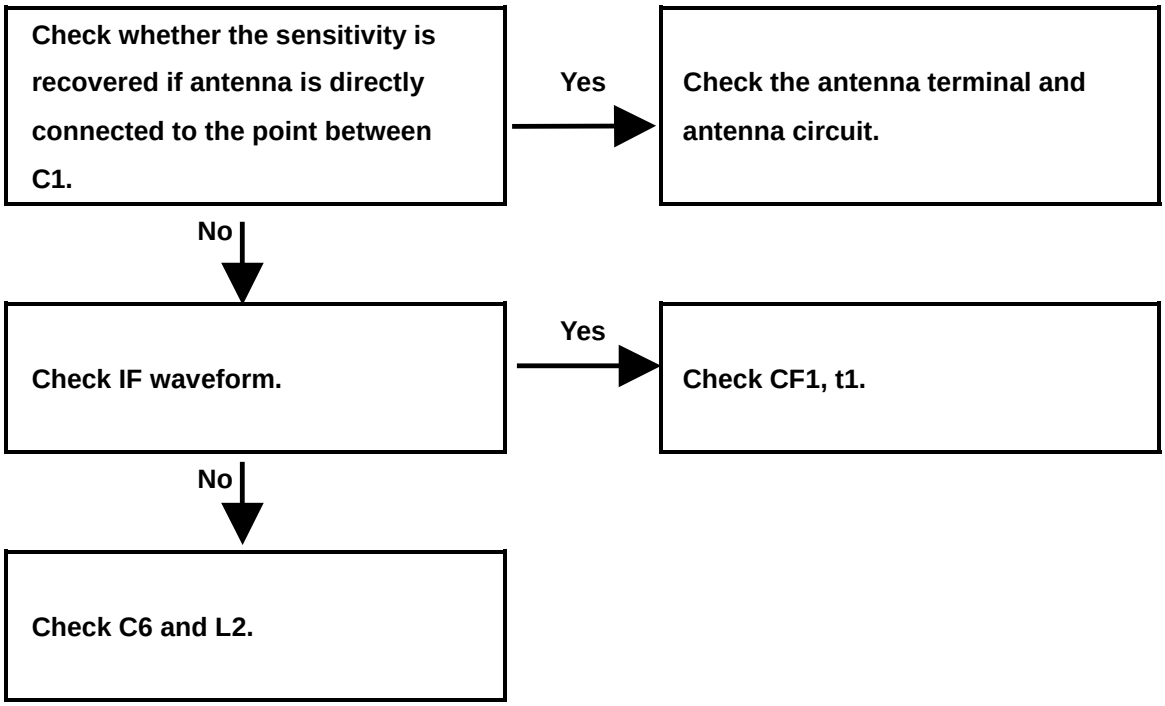


WIRING DIAGRAM

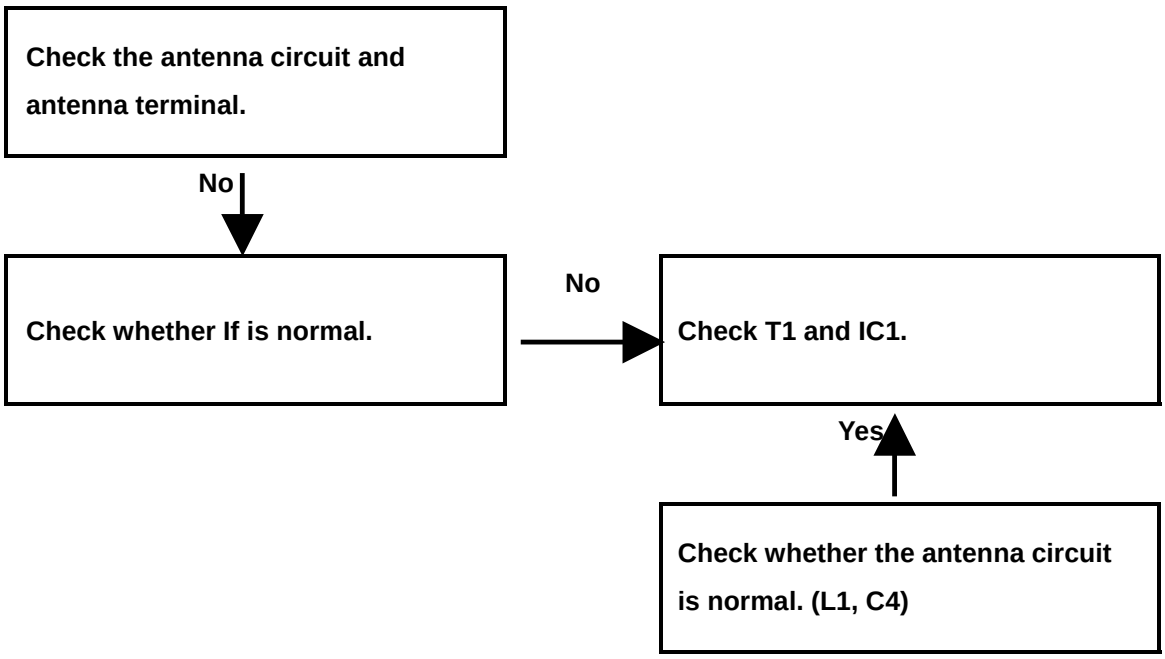


TROUBLESHOOTING FLOW CHART

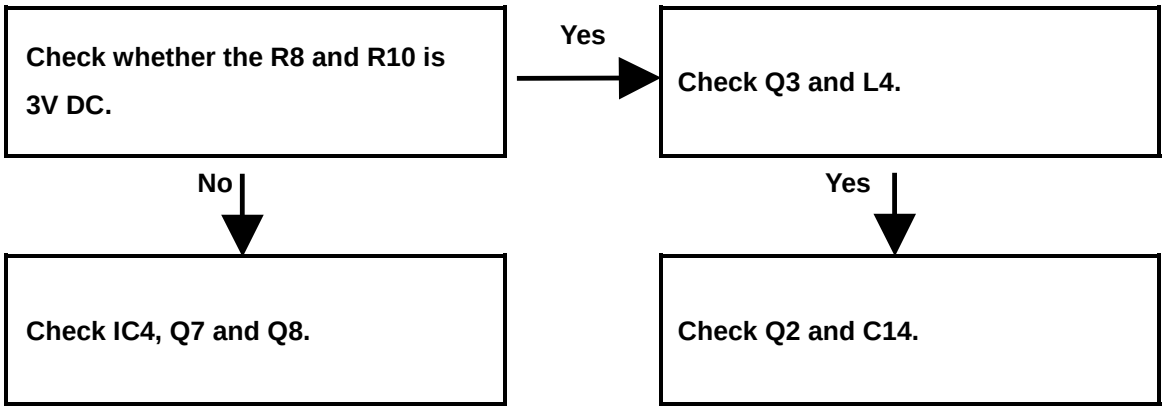
(1) Weak sensitivity on FM mode



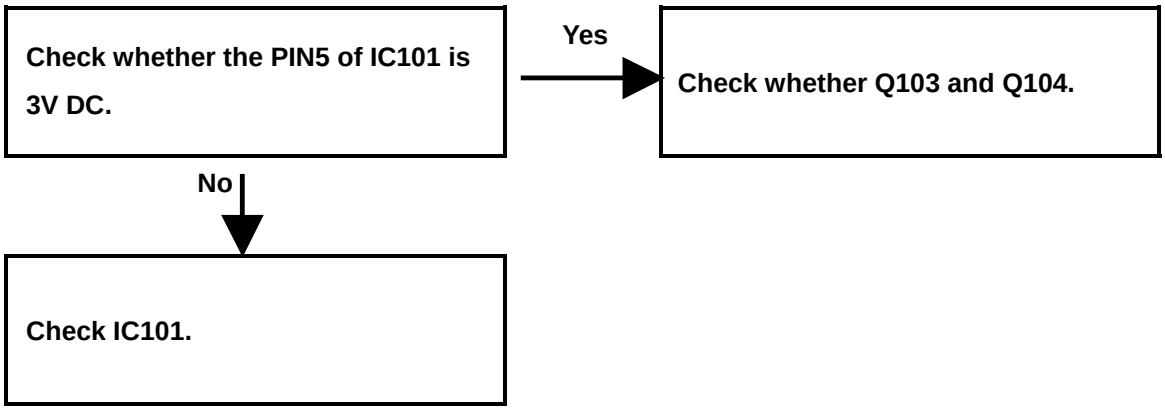
(2) Weak sensitivity in AM band



(3) Buzzer can not be turned on



(4) Light can not be turned ON



ELECTRICAL PARTS LIST

R9994

PART NO	DESCRIPTION	Q'TY	REMARK
1012860	IC CXA 1619BS	1	IC 1,
1012892-A	CH IC XC62FP2002PRN PbF	1	IC 3,
1014100-A	CH IC BA10324AFV PbF	1	IC 2,
1014110	CH IC TC 7W74FK	2	IC 4,101,
1020211	CH TR 2SB815 B7	2	Q 6,103,
1020230-A	CH TR 2SA812-T1B-A M6PbF	2	Q 8,9,
1020240-A	CH TR 2SC1623T1B-AL6	8	Q 1-5,7,10,104,
1041190T	DIODE 1N5817-T	1	D 301,
1041280-A	CH SCHOTTKY RB160M-40PbF	7	D 3-9,
1046011	CH DIODE MM4148	2	D 1,2,
1050350	LED RED 3φ 20E4SRTS	1	LED2,
1053090	LED GRN 3φ RT3-5034 YGS	1	LED1,
1053210-A	LED GRN 3φHL304GC2E-010	2	LED103,104,
1111301	BAR COIL 1301	1	L 1,
1122371	ADJ. COIL 2371	1	T 1,
1123800	ADJCOIL 3800 613ANA034AH	1	T 2,
11311D1J	CH WOUND IND. 0.68uHJ-E	1	L 5,
1136704-A	FIXED COIL 33mH PbF	1	L 4,
1143150	SP.COIL 4.0x3.75Tx0.6I	1	L 2,
1144070	SP COIL 4.5x2.5Tx0.7I	1	L 3,
1200301	PVC MQ-22125-RN343-0	1	PVC
1316425-A	R-VR 50KB F-12SH2	1	VR 1,
1613171	PCB A RF-G77	1	
1613180	PCB C MMR-77	1	
1613190	PCB D MMR-77	1	
1621020-A	SPK 50mm 8Ω 0.4W	1	
1630280-A	SLIDE SW.1P2C(G) PbF	1	SW 3,
1631050	TACT SW 1P1C	1	SW 2,
1631632	TACK SW.130±30gf 5mm	1	SW 102,
1631680-A	SLIDE SW 1P3C PbF	1	SW 1,
1640180	JACK HP TC38-061-01 BLK	1	JK 301,
1647150-A	DC JACK 595J1-02KBA PbF	1	JK 302,
1660281-A	DISCRI CDALF10M7GA016-B0	1	CF 3,
1664021-A	FILTER PFWLF455KS2A-A0	1	CF 2,
1664120-A	FILTER SFELF10M7GAA0-B0	1	CF 1,
1680070	LAMP 3x10x6.35 3V/250mA	1	LAMP 401
1701012	A2001WR2-2P	1	CON201,
1850304	H.S.TUBE 1.5φx20mm	1	
1900760	MOTOR KDF-29	1	
1900770-A	BATT.RECHARGE AAAx2	1	GP
2149120	ANT TERMINAL PIN	1	BT+,
444754NT0	EL 475M 25V 4x7	1	C 25,
441063NT0	EL 106M 16V 4x7	3	C 9,24,26,
444760NT0	EL 476M 4V 4x7	1	C 14,
441072PT0	EL 107M 10V 5x11	1	C 302,
4900304S	EL 477M 6.3V 6.3x11-S	1	C 30,
4900304T0	EL 477M 6.3V 6.3x11	1	C 33,
4B10612	CH TA 106M 6.3V 3.2x1.6	3	C 3,29,53,
5410267-A	CH CC 102K 50V X7R-C	5	C 1,12,50,51,52,
5410361-A	CH CC 103K 50V X7R-C	8	C 19,20,43-48,
5410458-A	CH CC 104Z 16V Y5V-C	6	C 5,11,13,28,40,301,
5410557-A	CH CC 105Z 10V F-C	4	C 31,41,42,106,
5422001-A	CH CC 220J 50V NPO-C	1	C 6,
5422261-A	CH CC 222K 50V X7R-C	1	C 18,
5422367-A	CH CC 223K 25V X7R-C	1	C 27,
5427101-A	CH CC 271J 50V NPO-C	1	C 22,
5430001-A	CH CC 300J 50V NPO-C	1	C 7,

ELECTRICAL PARTS LIST

R9994

PART NO	DESCRIPTION	Q'TY	REMARK
5447331-A	CH CC 473K 25V B-C	3	C 15-17,
5447365-A	CH CC 473Z 50V Y5V-C	13	C 2,21,23,32,34,35-39, 49,104,105,
6130114	CH RD 1/16W 15J-C PbF	1	R 111,
6130116	CH RD 1/16W 22J-C PbF	2	R 112,301,
6130124	CH RD 1/16W 100J-C PbF	6	R 3,4,14,31,33,110,
6130125	CH RD 1/16W 120J-C PbF	1	R 21,
6130126	CH RD 1/16W 150J-C PbF	1	R 5,
6130130	CH RD 1/16W 330J-C PbF	1	R 18,
6130133	CH RD 1/16W 560J-C PbF	1	R 10,
6130136	CH RD 1/16W 1KJ-C PbF	2	R 1,13,
6130137	CH RD 1/16W 1.2KJ-C PbF	1	R 25,
6130138	CH RD 1/16W 1.5KJ-C PbF	2	R 7,27,
6130140	CH RD 1/16W 2.2KJ-C PbF	5	R 11,12,19,26,102,
6130144	CH RD 1/16W 4.7KJ-C PbF	1	R 37,
6130145	CH RD 1/16W 5K6J-C PbF	1	R 17,
6130148	CH RD 1/16W 10KJ-C PbF	5	R 15,20,22,28,34,
6130149	CH RD 1/16W 12KJ-C PbF	1	R 2,
6130154	CH RD 1/16W 33KJ-C PbF	1	R 16,
6130156	CH RD 1/16W 47KJ-C PbF	4	R 6,24,35,108,
6130158	CH RD 1/16W 68KJ-C PbF	2	R 29,30,
6130161	CH RD 1/16W 120KJ-C	1	R 8,
6130163	CH RD 1/16W 180KJ-C	1	R 9,
6130168	CH RD 1/16W 470KJ-C	2	R 32,109,
6130172	CH RD 1/16W 1MJ-C PbF	2	R 23,107,
6130194	CH RD 1/16W OJ-C PbF	13	JP 12-16,20-23,26,32, 101,102,
6150194	CH JUMP OJ-B PbF	6	JP 17-19,24,25,301,
6480604	RDF 2W 2.2J SM15(MG)	1	R 36,
8000010	W/JUMP 5(10)0.6mm	13	JP 1-5,8-11,30,31,201, 202,
8000040	W/JUMP 10(10)0.6mm	3	JP 6,7,29,
8050200-A	W/TERMINAL 50(2.5)W	1	ANT1,
8170340	W/PVC 35(6+6)BLK	2	BT_,CHBT_1
8170847	W/PVC 60(6+6)VIL	1	B
8171443	W/PVC 90(6+6)ORN	1	A
8172442	W/PVC 140(6+6)RED	1	BT+
8591710	W/PVC/2 100(6+6) RED/WHT	1	JW 104,
8592790-A	W/PVC/3 60(3+6)R/W/B	1	JW 103,
8592820-A	W/2 140(6+6) R/W	1	SP+-
8592840-A	W/2 100(5+3)	1	CH BT
8592900-A	W/PVC/2 60(6+6)R/B	1	JW 101,

MECHANICAL PARTS LIST

MMR-77

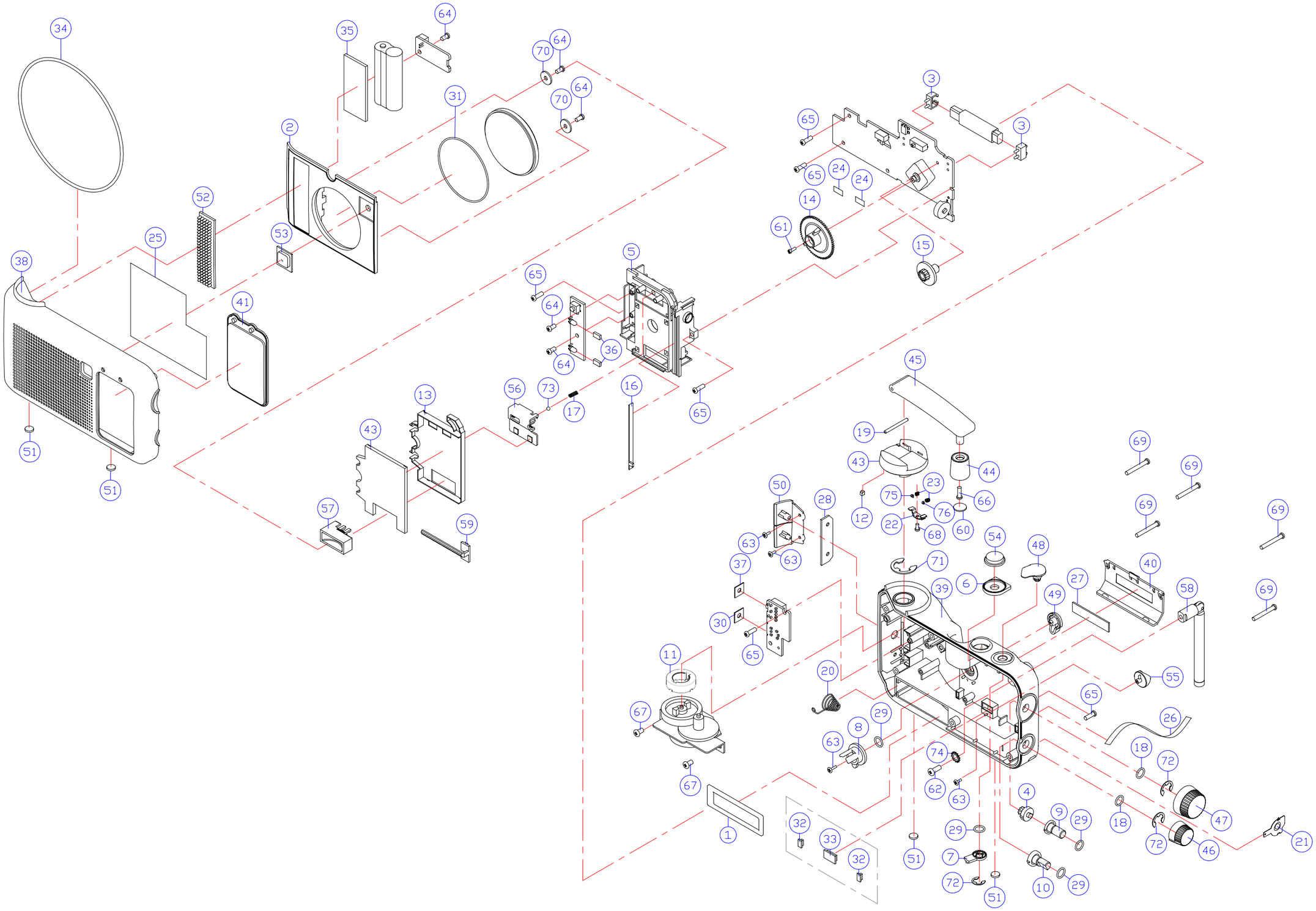
Ref no	PART NO.	DESCRIPTION	Q'TY	DWG NO.	REMARK
1	20N6000	BATTERY CASE HOLDER	1	A4-N6-29A	
2	20N6010	SPEAKER HOLDER	1	A2-N6-30A	
3	20N6030	BAR ANT HOLDER	2	A4-N6-32A	
4	20N6060	TUNING SHAFT GEAR	1	A4-N6-35A	
5	20N6080	CHASSIS	1	A2-N6-37A	
6	20N6090	BUZZER KNOB HOLDER	1	A4-N6-38A	
7	20N6100	BAND KNOB SHAFT	1	A4-N6-39A	
8	20N6110	BATT.SELECT KNOB HOLDER	1	A3-N6-40A	
9	20N61201	TUNING SHAFT	1	A4-N6-41A	
10	20N6130	VOLUME KNOB SHAFT	1	A4-N6-42A	
11	20N61401	CRANK BASE HOLDER	1	A4-N6-64A	
12	20N6150	PIN HOLDER	1	A4-N6-65A	
13	20N6160	BACK LIGHT HOLDER	1	A2-N6-31B	
14	20N6170	GEAR DRUM	1	A3-N6-33B	
15	20N6180	TERMINAL GEAR	1	A3-N6-34B	
16	20N6190	POINTER GEAR	1	A3-N6-36B	
17	2111005A	SPR CLICK	1	A4-N6-29A	
18	21B1110A	ROTARY KNOB RING	2	A4-WR1-52A	
19	21N6000	PIN	1	A4-N6-05A	CRANK HANDLE
20	21N6010	BATTERY SPRING	1	A4-N6-45A	
21	21N6020	BATTERY CONTACT(+)	1	A4-N6-06A	
22	21N6040	CRANK PLATE	1	A4-N6-58A	
23	21N6050	CRANK BASE SPRING	2	A4-N6-60A	
24	22L4020	HEMELON	2	A4-523-40	
25	22N6000	NET	1	A4-N6-54A	
26	22N6010	RIBBON	1	A4-N6-55A	BACK COVER
27	23N6000	BATTERY COVER SPONGE	1	A4-N6-44A	
28	23N6010	PC PLATE	1	A4-N6-57A	
29	24N60001	O-RING φ6	4	A4-N6-02A	
30	24N6020	DC JACK SPONGE	1	A4-N6-04A	
31	24N6030	SPEAKER PACKING	1	A4-N6-09A	
32	24N6040	BATTERY CASE RUBBER-A	2	A4-N6-46A	
33	24N6050	BATTERY CASE RUBBER-B	1	A4-N6-47A	
34	24N6060	FRONT CABINET PACKING	1	A4-N6-48A	
35	24N6070	NIMH BATTERY SPONGE	1	A4-N6-49A	
36	24N6080	RUBBER SPACER	2	A4-N6-51A	
37	24N6090	PHONE JACK SPONGE	1	A4-N6-56A	
38	301N601	FRONT CABINET	1	A1-N6-12A	
39	303N601	BACK COVER	1	A1-N6-13A	
40	304N601	BATTERY COVER	1	A3-N6-14A	
41	305N601	DIAL WINDOW	1	A4-N6-22A	
42	306N601	DIAL SCALE LENS	1	A3-N6-23A	
43	308N64M	CRANK BASE	1	A3-N6-15A	
44	309N64M	CRANK HANDLE	1	A3-N6-16A	
45	310N601	CRANK	1	A3-N6-17A	
46	311N601	VOLUME KNOB	1	A3-N6-19A	
47	312N6011	TUNING KNOB	1	A3-N6-18A	
48	313N64M	BAND KNOB	1	A3-N6-20A	
49	314N64M	BATTERY SELECT KNOB	1	A3-N6-21A	
50	316N601	JACK COVER RUBBER	1	A3-N6-27A	
51	316N64M1	FOOT RUBBER	4	A4-N6-28A	
52	316N64M3	HAND RUBBER	1	A3-N6-26A	
53	318N601	LIGHT KNOB	1	A3-N6-08A	
54	325N64M	BUZZER KNOB	1	A3-N6-07A	
55	330N601	ROD ANT HOLDER	1	A4-N6-50A	
56	331N64M	BAND KNOB HOLDER	1	A3-N6-24A	
57	346N601	LAMP HOLDER	1	A3-N6-60A	

MECHANICAL PARTS LIST

MMR-77

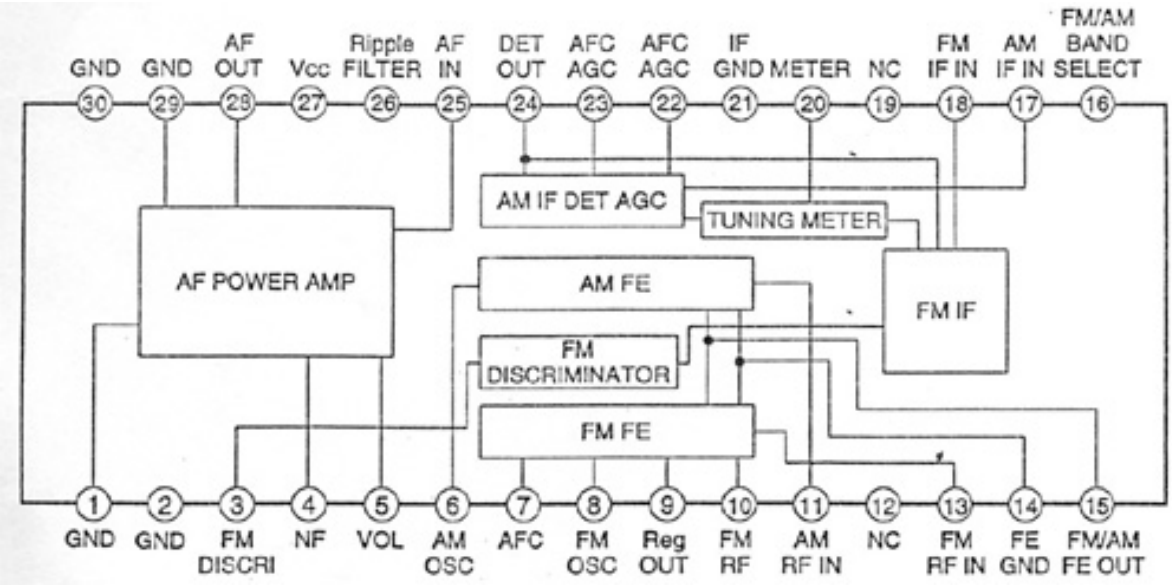
Ref no	PART NO.	DESCRIPTION	Q'TY	DWG NO.	REMARK
58	360N64M	ROD ANTENNA	1		
59	361N64M	POINTER	1	A3-N6-25A	
60	370N64M1	CRANK HANDLE COVER	1	A4-N6-11A	
61	9000042	SCREW JMP 1.7x4(NI)	1		PVC
62	9003082	SCREW JMP 3x8(NI)	1		ROD ANTENNA
63	9090014	SCREW M1.4x4.5(NI)	4		JACK COVER RUBBERx2 BATTERY SELECT KNOBx 1/BACK COVERx1
64	9102052	SCREW PTP 2.6x5(NI)	5		SPEAKERx2/C PCBx1/D PCBx2
65	9102082	SCREW PTP 2.6x8(NI)	6		CHASSISx4/B PCBx1 BACK COVERx1
66	9152082	SCREW PTPW 2.6x8(NI)	1		CRANK
67	9153082	SCREW PTPW 3x8(NI)	2		MOTOR
68	9191052	PTX 2x5(NI)	1		CRANK BASE
69	9202162	SCREW PTP 2.6x16(NI)	5		BACK COVER
70	9901027A	WASHER 2.7mm	2	A4-N6-10A	SPEAKER
71	9905100-A	E-RING φ10	1		
72	9905400-A	E-RING φ4mm	3		
73	9907040	STEEL BALL	1		
74	9910005	SPRING WASHER	1		ROD ANTENNA
75	308N64ML	PULLY-L	1	A4-N6-62A	
76	308N64MR	PULLY-R	1	A4-N6-61A	

EXPLODED VIEWS

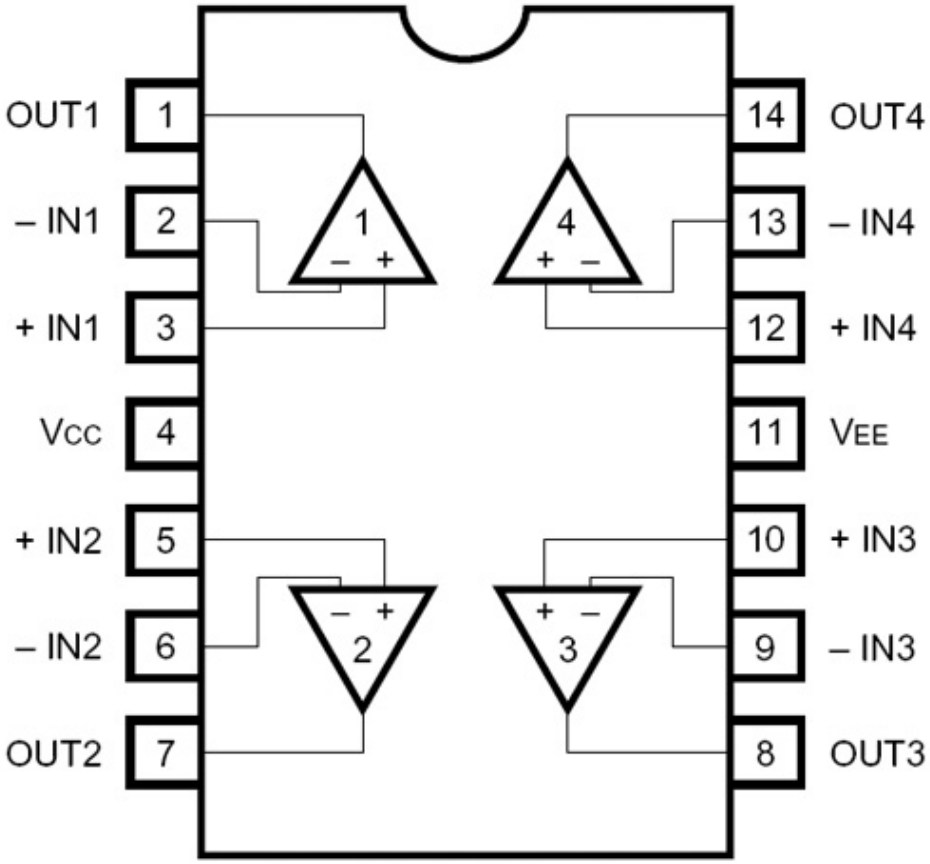


IC CIRCUIT BLOCK DIAGRAM

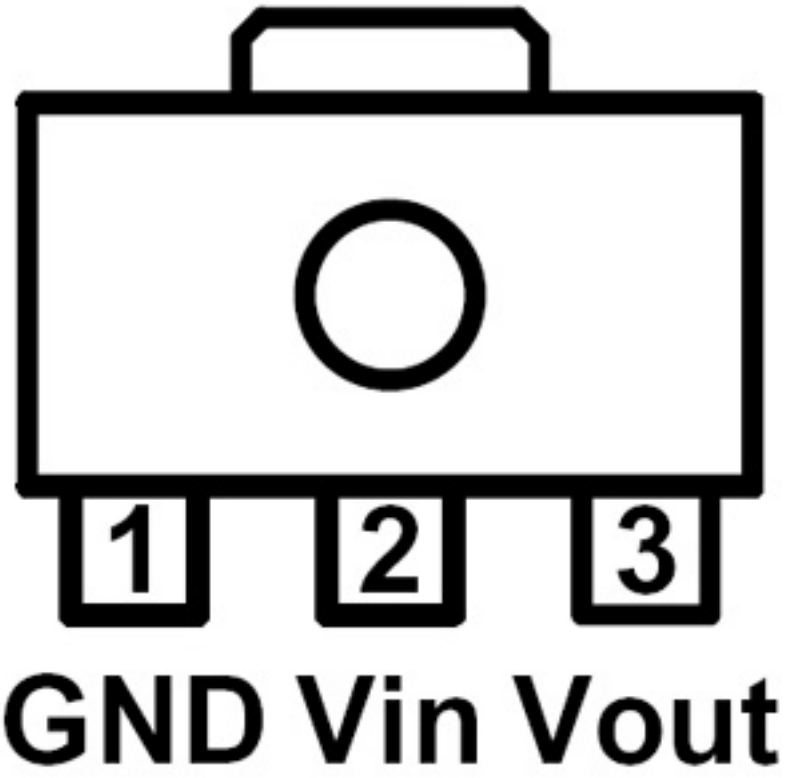
1. IC1 – CXA1619BS



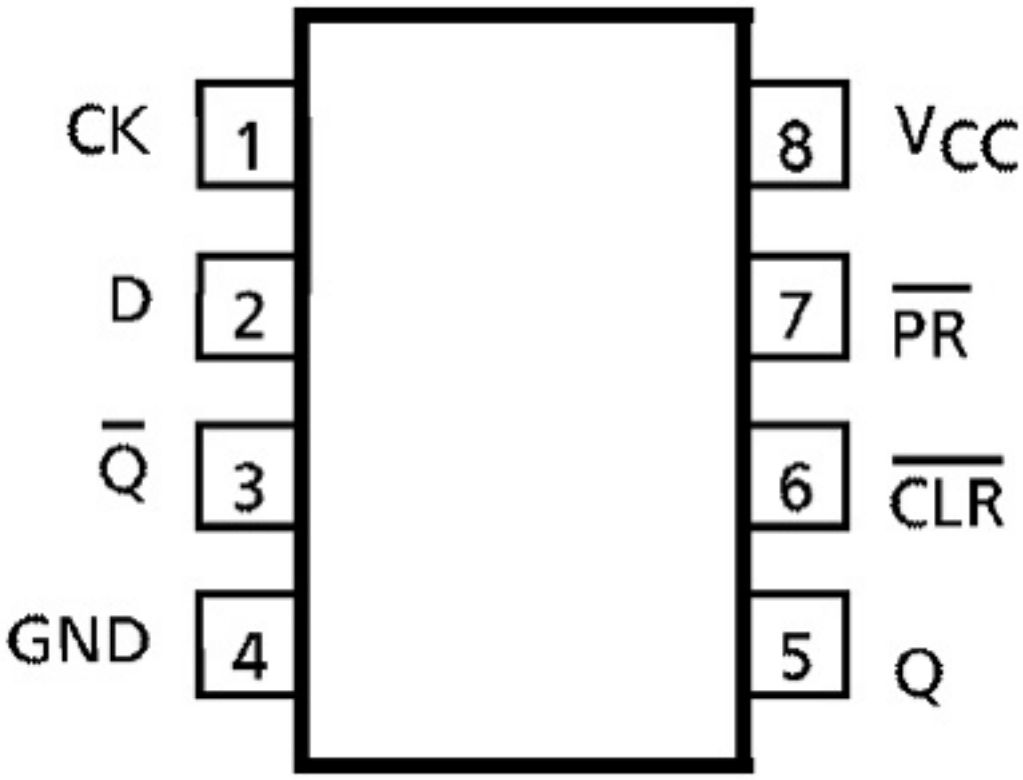
2. IC2 – BA10324AF



3. IC3 – XC62AP2002PR



4. IC4 & IC101– TC7WH74FK



IC AND TRANSISTOR VOLTAGE CHART

IC1 – CXA1619BS

PIN	FM	AM	PIN	FM	AM
1	0	0	**16**	1.38	0
2	0	0	**17**	0.02	0
3	2.25	2.73	**18**	1.41	0
4	1.5	1.50	**19**	0	0
5	0.22	0.22	**20**	2.95	3.00
6	1.26	1.27	**21**	0	0
7	1.26	1.27	**22**	1.12	1.50
8	1.26	1.27	**23**	1.37	1.09
9	1.26	1.27	**24**	1.42	1.01
10	1.26	1.27	**25**	0	0
11	1.26	1.27	**26**	2.69	2.70
12	0	0	**27**	3.00	3.00
13	0.35	0	**28**	1.55	1.52
14	0	0	**29**	0	0
15	0.55	0.22	**30**	0	0

IC2 – BA10324AF

PIN	C OFF	C ON
1	0	0.03
2	0	0.41
3	0	0.50
4	0	3.80
5	0	0.50
6	0	0.41
7	0	2.65
8	0	0
9	0	0.41
10	0	0.34
11	0	0.50
12	0	0
13	0	0.41
14	0	0

IC3 – XC62FD2002

PIN	C OFF	C ON
1	0	2.00
2	0	0
3	0	3.80

IC4 & IC101 – TC7WH74FK

PIN	R ON	B ON
1	0	0
2	3.50	0
3	3.50	0
4	0	0
5	0	3.04
6	2.98	2.98
7	3.05	3.05
8	3.05	3.05

✳ **R ON = RADIO ON**

B ON = BUZZER ON

C OFF = CHARGE OFF

C ON = CHARGE ON

Transistor

		R ON	B ON
Q1	E	1.27	1.27
	B	0.06	1.84
	C	0.21	1.25
Q2	E	0.35	2.98
	B	0.35	1.35
	C	0	0.85
Q3	E	0.32	2.95
	B	0.2	0.55
	C	0	0
Q5	E	3.00	0.05
	B	0.30	0.60
	C	0	0
Q6	E	3.00	3.00
	B	3.00	2.31
	C	3.00	3.00
Q7	E	3.00	0
	B	0	0.64
	C	0	0
Q8	E	0.30	3.00
	B	3.00	2.33
	C	0	3.00

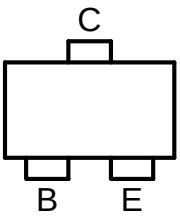
		C OFF	C ON
Q4	E	0	0
	B	0	0.68
	C	0	0
Q9	E	0	3.60
	B	0	2.90
	C	0	3.63
Q10	E	0	0
	B	0	0.60
	C	0	0

		L OFF	L ON
Q101	E	0	2.95
	B	3.05	2.34
	C	3.05	3.05
Q102	E	3.01	0
	B	0	0.59
	C	0	0

∗ **R ON = RADIO ON**
B ON = BUZZER ON
C OFF = CHARGE OFF
C ON = CHARGE ON
L OFF = LIGHT OFF
L ON = LIGHT ON

SEMICONDUCTOR LEAD IDENTIFICATIONS

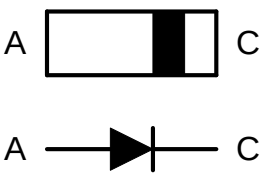
Transistors



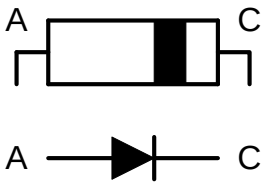
2SC1623
2SA812
2SB815

(E:Emitter C:Collector B:Base)

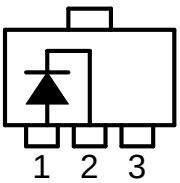
Diodes



RLS4148
RB160M



IN5817



RB110CT100

(A:Anode C:Cathode)

SCHEMATIC DIAGRAM