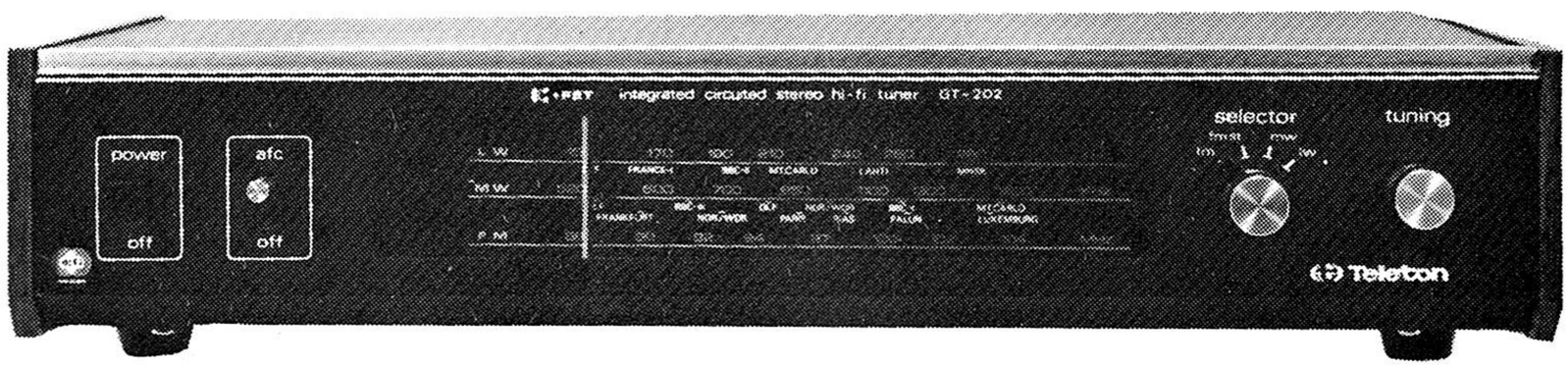
Teleton

FM, MW, LW stereo tuner

model GT-202

SERVICE MANUAL

www.teleton.electro.mitsubishi.com



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SPECIFICATIONS

A. BANDS:

1).	MW BAND	510	– 1630	KHz
2).	LW BAND	145	– 350	KHz
3).	FM BAND	87.5	– 104	MHz

B. CONTROLS:

1). Tuning control
2). Band Switch (Rotary) FM , FM STEREO , MW , LW
3). FM AFC ON-OFF

C. ANTENNA

1). Ferrite Rod for MW , LW
2). Ext. Ant. MW , LW and FM (300 Ohm Symmetry or 75 ohm coaxial cable.)

D. EXTERNAL CONNECTIONS

1). TUNER OUT. DIN 5P Jack
2). Ext. ANTENNA Terminal
3). GND Terminal

E. CHASSIS AND CIRCUIT

1 F.E.T.
9 Transistors
8 Diodes
1 Rectifier
3 I . C .
Capacitive tuning ; AM2gang , FM3gang.

F. POWER SUPPLY ; AC115V 50Hz/230V 50Hz

G. NET WEIGHT ; 3.15kg

H. DIMENSIONS

(W) (H) (D)
390 x 230 x 80mm

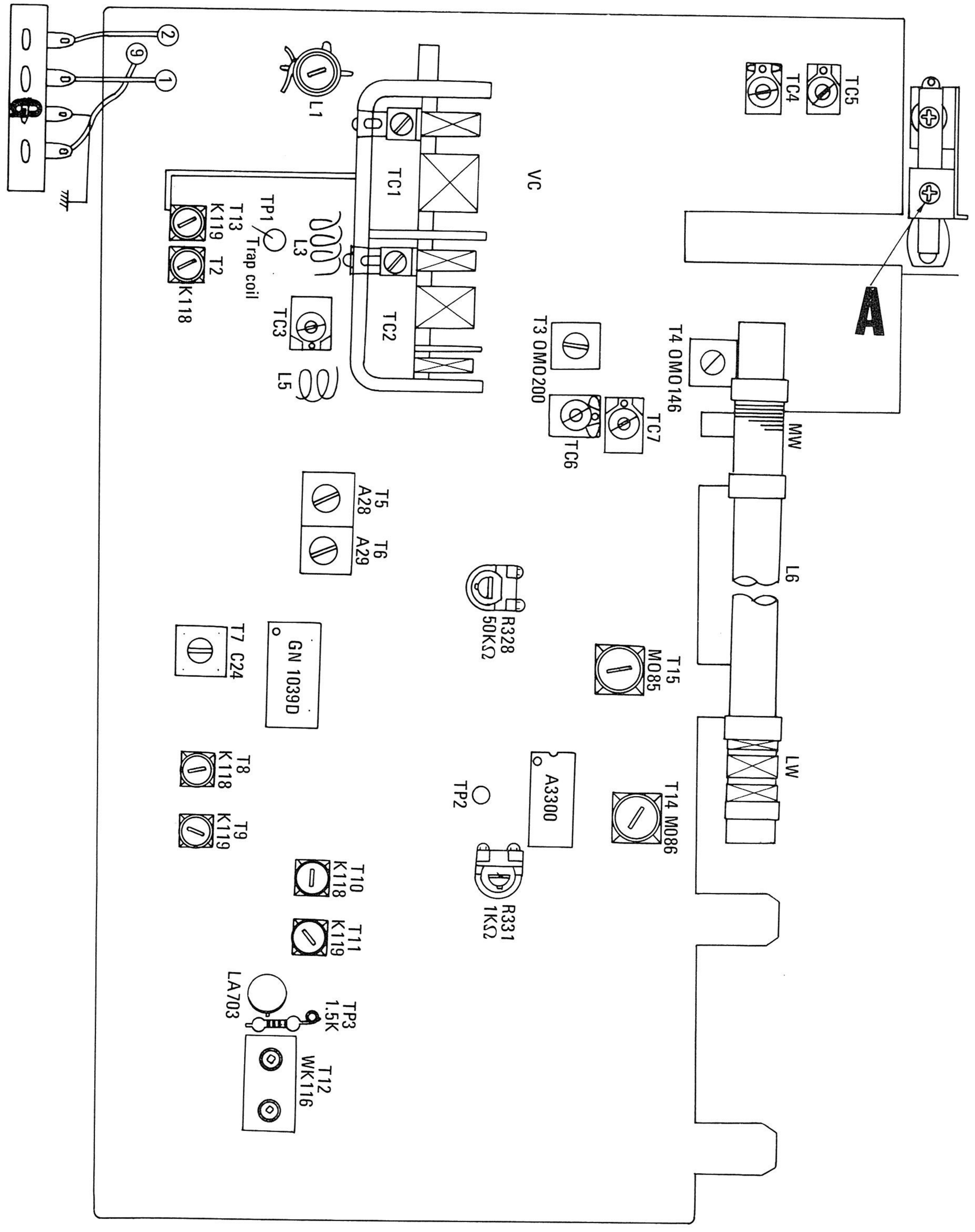


Fig. 1

ALIGNMENT

1. Alignment of 460KHz I. F. T.

1) Measuring Equipment and Tools

* Signal Generator : 460KHz 400Hz 30%Mod., 80%Mod.
* Output Meter : Input Impedance more than 100K ohms
* Oscilloscope
* Distortion Meter
* External Modulator (Audio Osc. 3KHz)
* ⊖ Driver for Adjustment

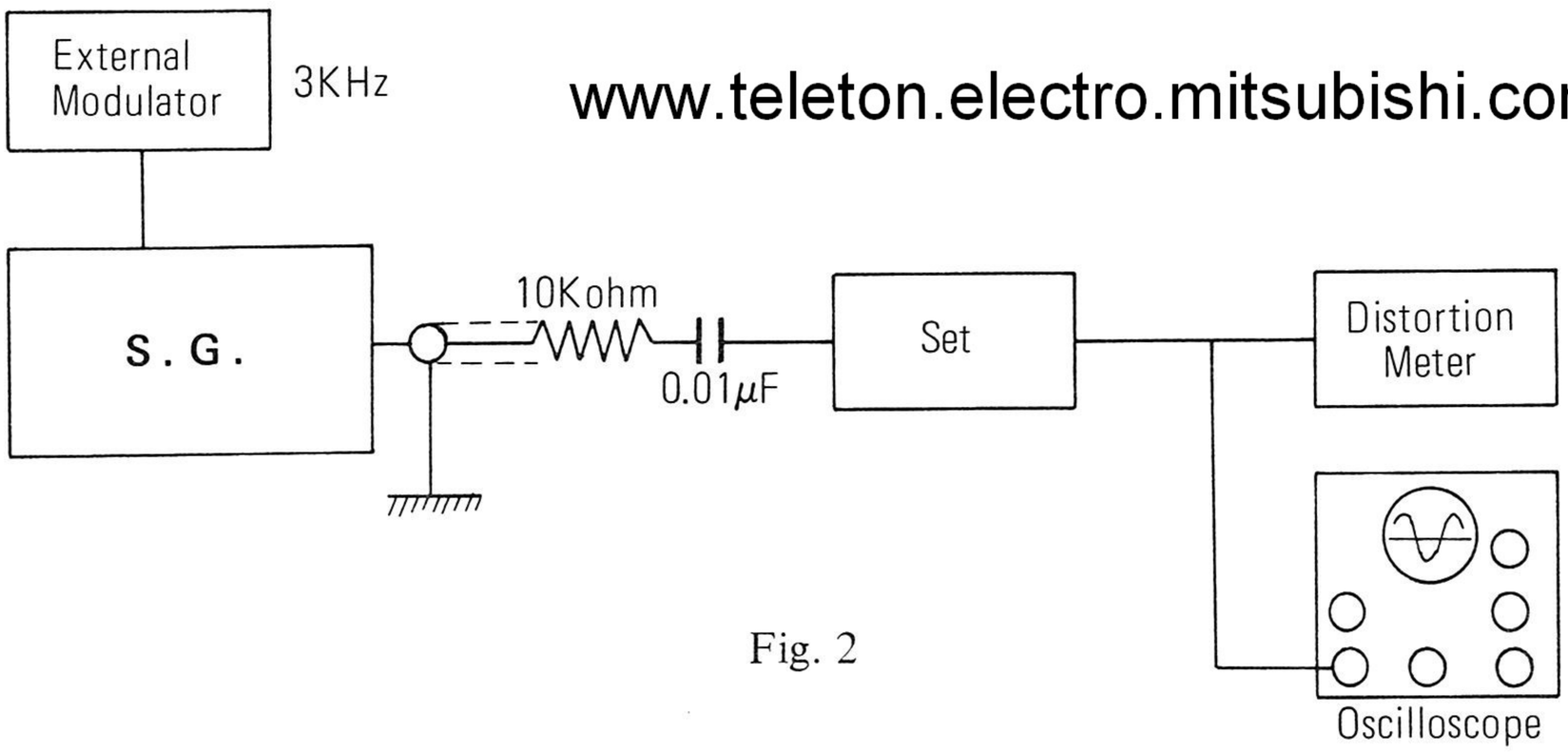


Fig. 2

2) Connection between Set and Measuring Equipment.

ⓐ Connect 10K ohm resistor, 0.01μF capacitor in series to MW, LW antenna terminals (terminal NO.⑨ and terminal Ⓖ) of the Set, as shown in Fig. 2.

ⓑ Set the Selector to MW, then Switch on.

ⓒ Set V. C. at maximum. (Freq. min.)

ⓓ Adjust T5, T6, T7 I.F.T. cores for maximum output with 460KHz, 400Hz 30% modulated input signal. Make S.G. output moderate as getting output on oscilloscope larger as the adjustment completed. (Alignment should with signal as small as possible.)

ⓔ Adjust T5, T6 cores for maximum output with 460KHz, 3KHz 30% modulated signal.

ⓕ Adjust T7 core for minimum clipping and maximum output with 1mV, 460KHz, 400Hz 80% modulated input signal. (shown in Fig. 3)

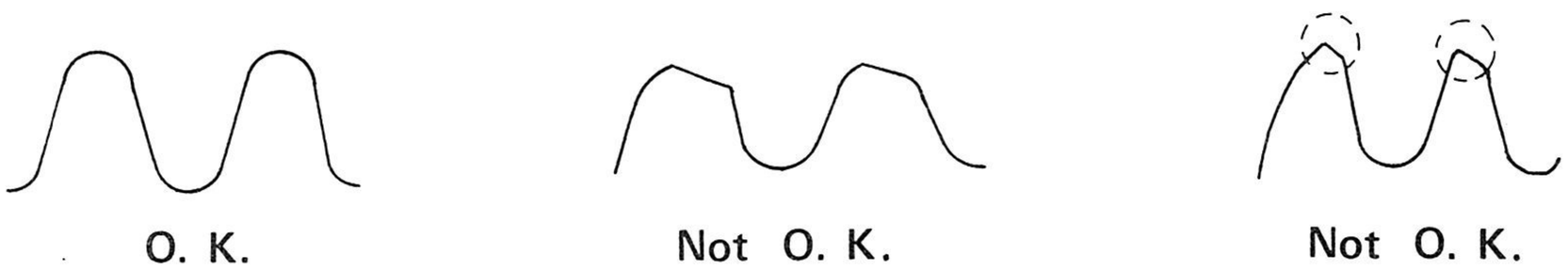


Fig. 3

2. Alignment of 10.7MHz I. F. T.

1) Measuring Equipment and Tools

* 10.7MHz Signal–Generator with 75 KHz Mod.
* Oscilloscope
* ⊖ Driver for adjustment
* Adjusting rod (Square hole)

2) Alignment

ⓐ Set the selector switch to FM position.
ⓑ Connect S.G. output to TP1 through 4.7K ohm resistor and 0.01μF capacitor.
ⓒ Connect Oscilloscope to output terminal.
ⓓ Adjust T12 core for maximum output with modulated 75KHz S.G. input signal.
ⓔ Lessen S.G. signal to 1/3 of max. output wave form, and then adjust cores, T2, T13, T8, T9, T10 and T11 in this order for maximum output reduce S.G. signal if the output signal becomes too big, in order to prevent clipping.
ⓕ Adjust cores, T2, T13, T8, T9, T10 and T11 finely for minimum distortion wave form, when output wave forms appear distorted.
ⓖ Adjust core T12 for maximum output and minimum distortion.

3. A M Tuner Alignment

1) Measuring Equipment and Tools

* AM Standard Signal Generator : 145KHz~355KHz , 510KHz~1620KHz , 400Hz 30% Modulation
* Oscilloscope
* Output meter
* ⊖ Driver for adjustment
* Adjusting rod for Tracking

2) Alignment (Note; Align LW Band first.)

◎ LW BAND

Step	S.G. Freq.	Set	Adjusting Point	Remark
1	145KHz	V.C. Cap. Max.	Osc. Coil T3	See Fig. 1
2	355KHz	V.C. Cap. Min.	Osc. Trimmer Tc6	〃
3	160KHz	160KHz	Antenna Coil L6,Lw	〃
4	320KHz	320KHz	Antenna Trimmer Tc4	〃

ⓐ Repeat Steps 1 and 2 twice.
ⓑ Repeat steps 3 and 4 several times.
ⓒ Fix antenna coil L6, LW with high melting point wax after completed adjustment.

◎ MW BAND

Step	S.G. Freq	Set	Adjusting Point	Remark
1	510KHz	V.C. Cap. Max.	Osc. Coil T4	See Fig.1.
2	1630KHz	V.C. Cap. Min.	Osc. Trimmer Tc7	"
3	600KHz	600KHz	Antenna Coil L6,MW	"
4	1300KHz	1300KHz	Antenna Trimmer Tc5	"

4. F M Tuner Alignment

1) Measuring Equipment and Tools

* FM Standard Signal Generator : 87.4~145MHz, 400Hz, 22.5KHz Dev.
* Oscilloscope
* Output Meter
* ⊖ Driver for adjustment

2) Adjustment

Step	S.G. Freq	Set. Tuning Freq.	Adjusting Point	Remark
1	87.4MHz	V.C. Cap. Max.	Osc. Coil L5	See Fig.1.
2	104.5MHz	V.C. Cap. Min.	Osc. Trimmer Tc3	"
3	90 MHz	90MHz	RF Coil L1 Antenna Coil L3	"
4	102MHz	102MHz	RF Trimmer Tc1 Antenna Tc2	"

ⓐ Repeat steps 1 and 2 twice.

ⓑ Repeat steps 3 and 4 several times.

5. Alignment of FM MPX circuit

1) Measuring Equipment and Tools

* FM Standard Signal Generator : 87.4~104.5MHz , 400Hz
* FM Stereo Modulator
* ⊖ Driver for adjustment

2) Alignment of Stereo Modulator

* 19KHz Pilot Signal : 7.5KHz (10%)
* L - R Main Signal : 33.75KHz (45%)
* L + R Main Signal : 33.75KHz (45%)
* Modulation Freq. : 400Hz

3) Alignment

ⓐ Tune Set for maximum output after above conditions completed.

ⓑ Set the Semi-Fixed resistor R331 , R328 to center position.

◎ Separation Alignment

ⓐ Adjust T15 core to light stereo indicator lamp , after tuning maximum output with (L + R) + 19KHz modulated signal.

ⓑ Adjust T14, T15 cores for maximum output in L side with (L - R) + 19KHz modulated signal.
Observing wave forms on oscilloscope with L + 19KHz modulation, then change modulation to R + 19KHz, if the wave form is normal (no clip, no peak). Adjust R331 (1K ohm) to minimize output wave forms.

ⓒ Next, adjust it so as R side output minimum with L + 19KHz modulated wave. When the difference of L and R separation is more than 3dB, tune T15 finely to lessen the difference of separation between L and R.

ⓓ After adjustment completed, fix T14, T15 with locking paint.

◎ Adjustment of stereo Indicator Lamp Level

ⓐ On the set of whitch separation adjustment completed, adjust output of the set maximum in R side, with modulator output to R.

ⓑ Set S.G. output to 26 dB, adjust Semi-Fixed resistor R328 to light the lamp.

ⓒ Check switching level by increasing S.G. output slowly from a lower level.

6. Adjustment of Leaf Switch

1) Instruments to be used
* Amplifier
* Speaker
* ⊖ or ⊕ Driver for adjustment

2) Preparation for adjustment

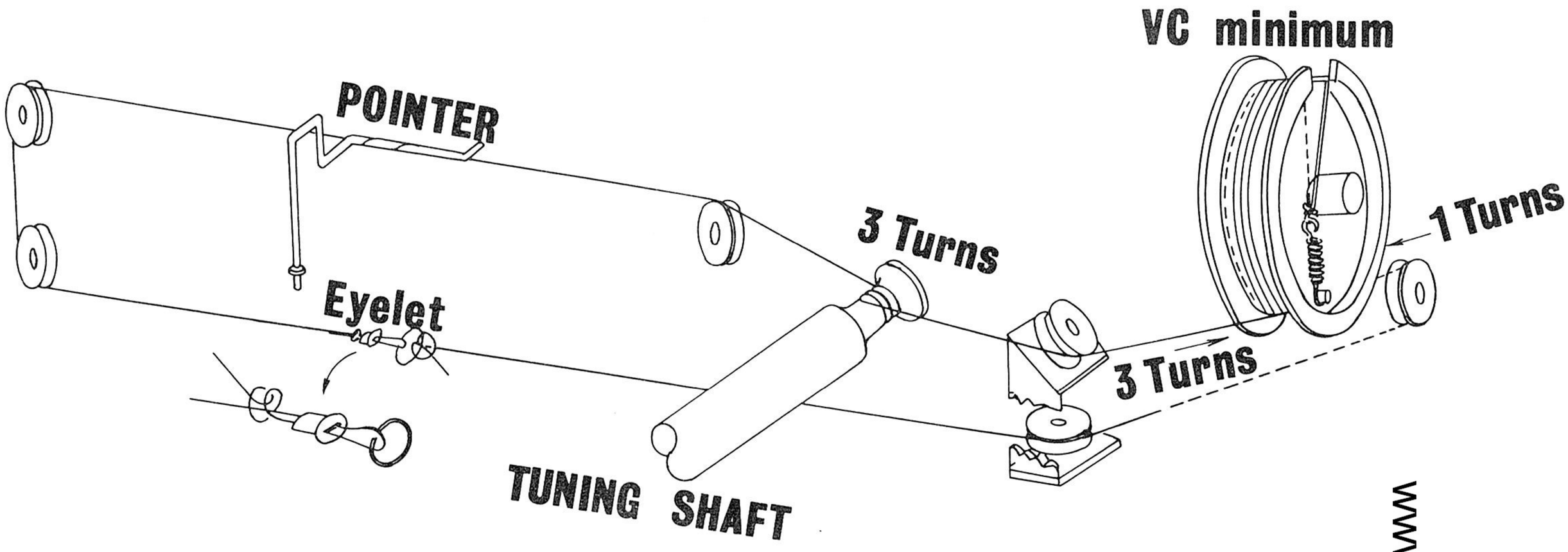
ⓐ Connect the output terminal of amplifier to speaker.

ⓑ Connect the Set to AUX terminal of amplifier.

ⓒ Adjust Volume of amplifier moderately.

3) Adjustment
Rotating the Selector switch, adjust screw **A** (See Fig. 1) for selector noise minimum. And then lock the screw **A** with paint.

DIAL STRINGING



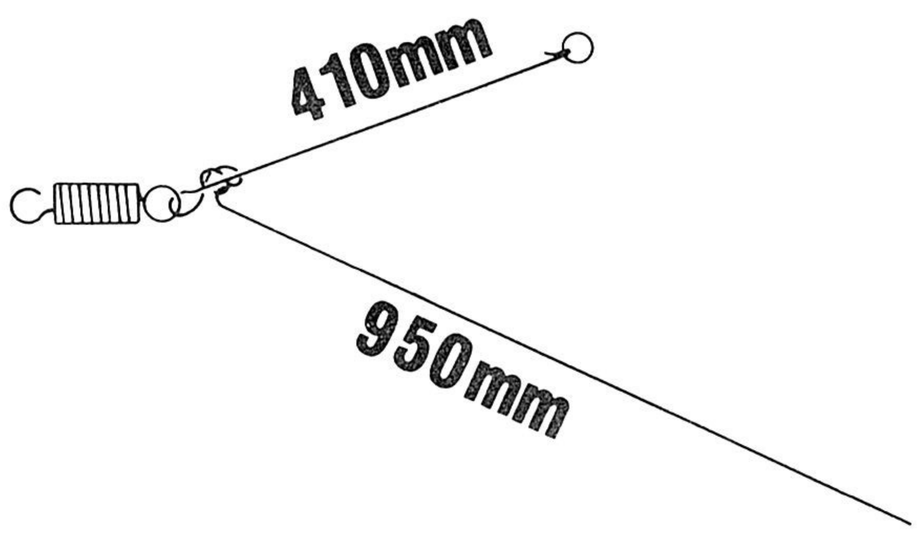


Fig. 4

PARTS LOCATION

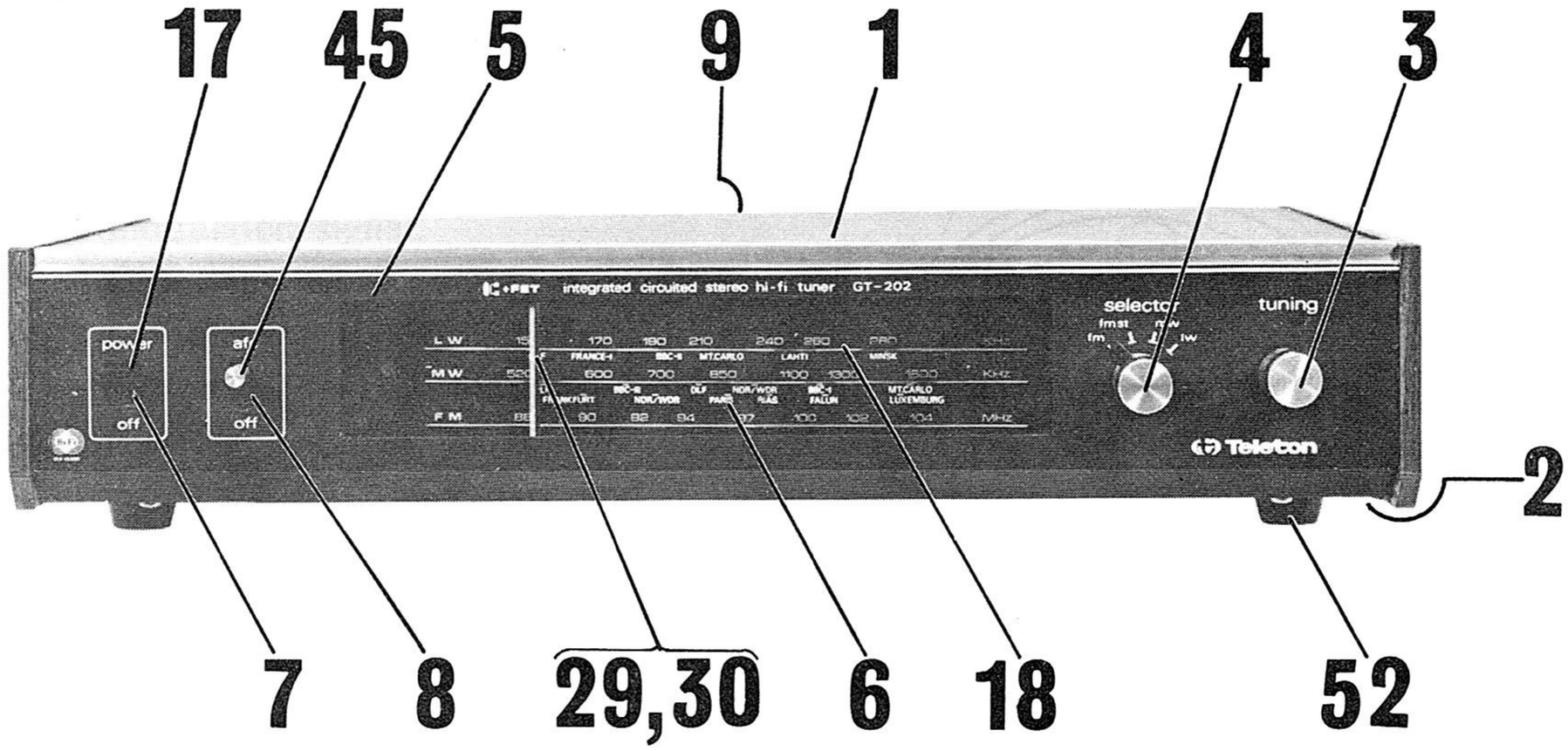


Fig. 5

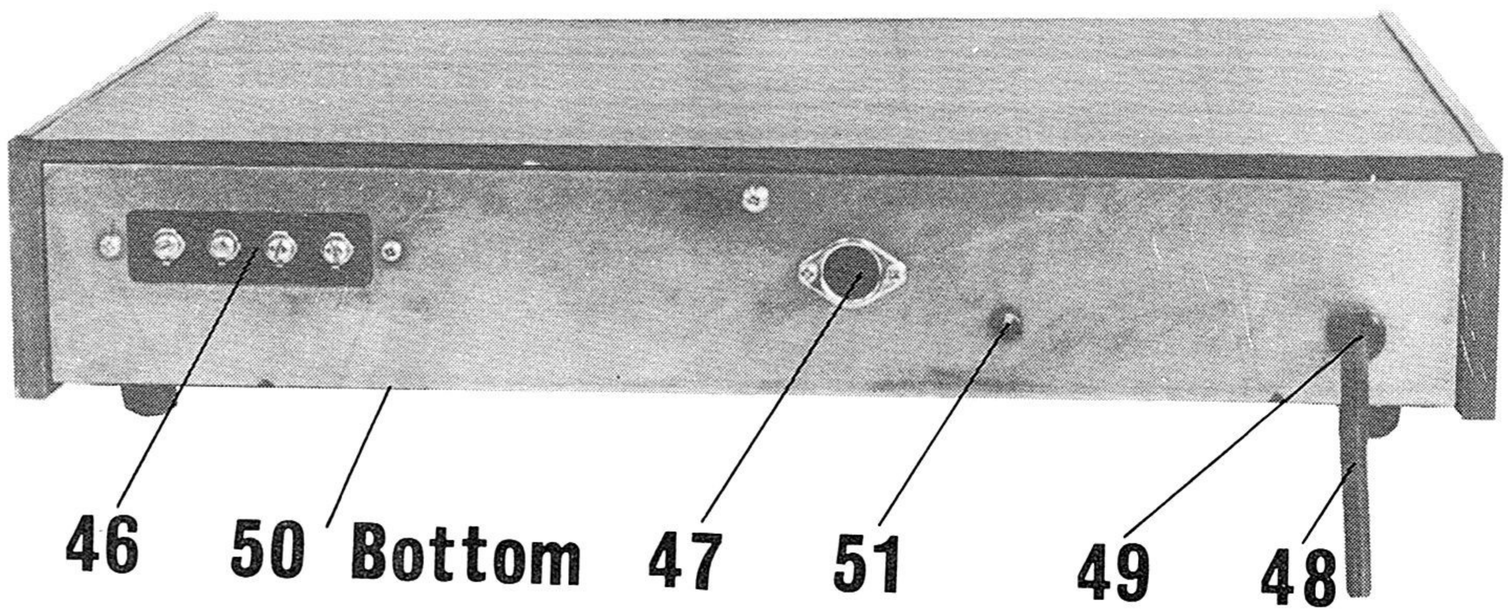


Fig. 6

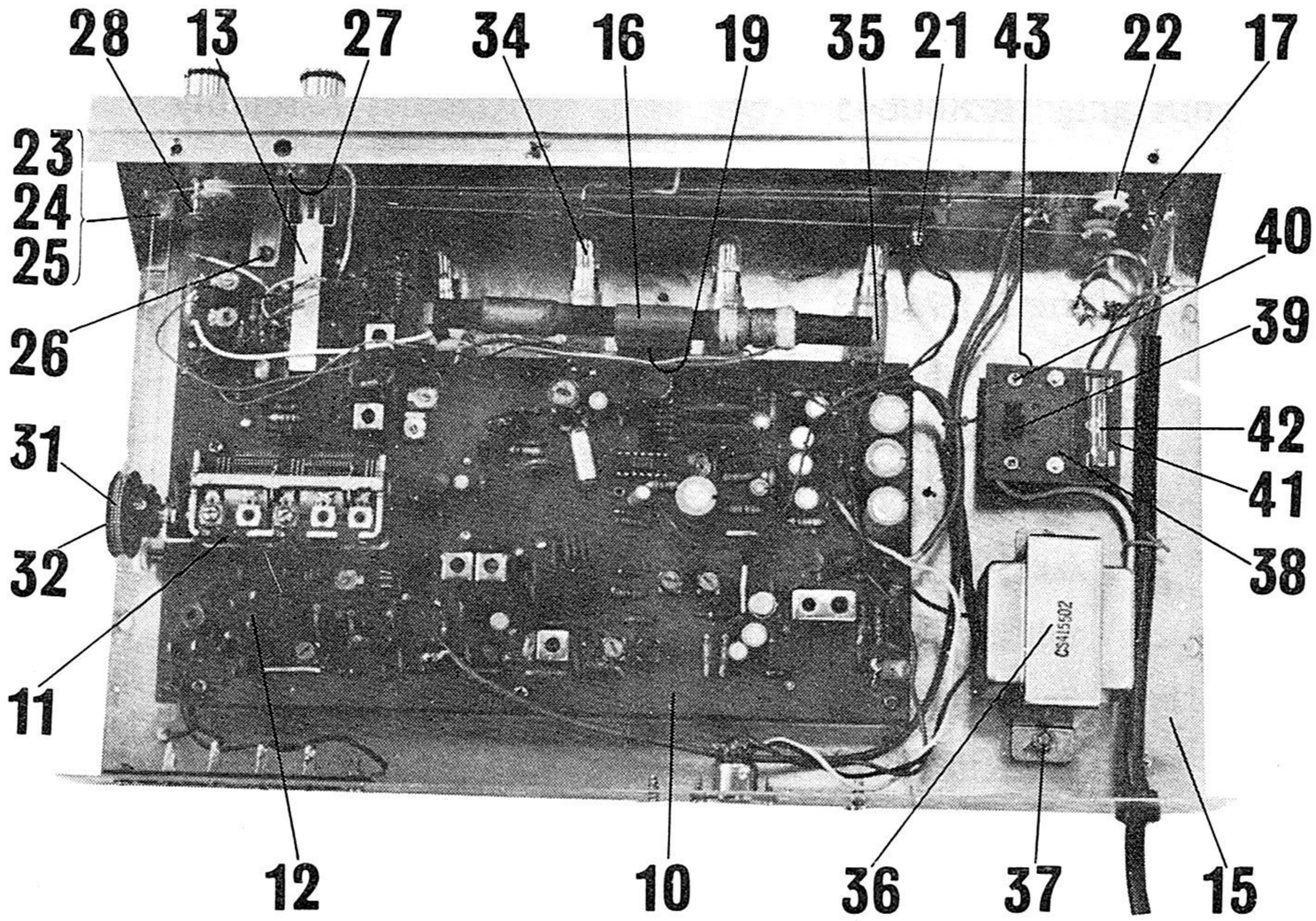


Fig. 7

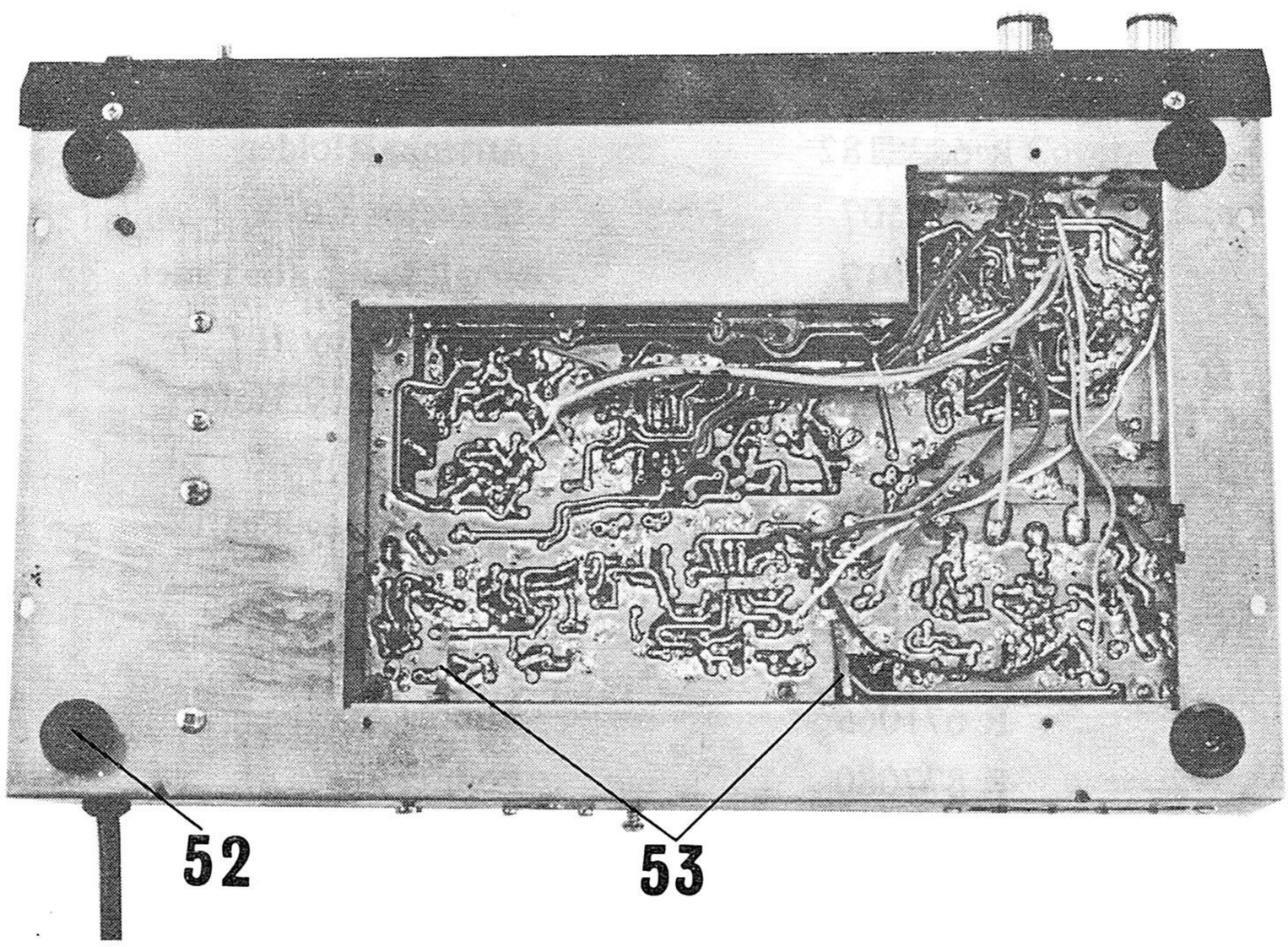


Fig. 8

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1	R 840645	Cabinet Assembly
2	H 630074	Setting Metal
3	R 871218	Selector Knob (No. 218)
4	R 871233	Knob (No. 233)
5	R 636712	Panel
6	R 860577	Dial Window
7	H 850353	Power Switch Mask
8	H 850354	Lever Switch Mask
9	R 890556	Name Plate
10	R 530313	P. C. Board
11	R 261016	Variable Condenser
12	R 651625	Shield Board
13	R 421039	Slide Rotary Switch
14	R 651226	Terminal Board
15	R 610335A	Deck
16	R 62653	Core Holder
17	H 425028	Lever Type Power Switch
18	R 860576	Dial Plate
19	R 6338182	Antenna Holder
20	R 830507	Indicator Cover
21	R 411017	Small Lamp for Panel
22	H 677054	Small Pulley H
23	R 633183	Small Pulley Holder
24	R 67286	Small Pulley
25	R 67264	Small Pulley Shaft
26	R 651626	Angle
27	R 428002	Leaf Switch
28	R 671065	Tuning Shaft
29	R 877080	Pointer
30	H 850105	Pointer Felt
		Dial Cord
31	H 810167	Pulley
32	H 700019	Pulley Spring

REF. NO.	PART NO.	DESCRIPTION
33	H 700020	Cord Stringing Ring
34	R 411023	Pilot Lamp
35	R 633059	Lamp Socket
36	R 110118	Power Transf.
37	R 651628	Special Washer
38	H 810227	Switch Holder
39	H 425020	Slide Switch
40	H 850211	Switch Mask
41	R 43304	Fuse Holder
42	R 412001	0.7A Power Fuse
43	H 810228	Switch Spacer
44	H 850355	Switch Fiber
45	H 425029	Lever Switch
	H 677094	Switch Knob
46	R 433007	Antenna Terminal Board
47	R 438012	5P DIN Jack
48	R 440040	Power Cord with Plug
49	R 811071	Cord stopper
50	R 610334	Bottom Cover
51	R 921011	Earth Terminal Screw
52	N 830465	Rubber Foot
53	T 63061	Earth Ribbon

REF. NO.	PART NO.	DESCRIPTION
Resistors		
R 108		22ohm 1/4W ± 10% Solid Resistor
R 116		47ohm 1/4W ± 10% Solid Resistor
R 102		100ohm 1/4W ± 10% Solid Resistor
R 117		
R 107		220ohm 1/4W ± 10% Solid Resistor
R 103		
R 112		330ohm 1/4W ± 10% Solid Resistor
R 104		5.6Kohm 1/4W ± 10% Solid Resistor
R 111		6.8Kohm 1/4W ± 10% Solid Resistor
R 110		8.2Kohm 1/4W ± 10% Solid Resistor
R 105		33Kohm 1/4W ± 10% Solid Resistor
R 114		47Kohm 1/4W ± 10% Solid Resistor
R 101		100Kohm 1/4W ± 10% Solid Resistor
R 115		
R 106		1.5Kohm 1/4W ± 10% Solid Resistor
R 113		470Kohm 1/4W ± 10% Solid Resistor
R 109		2.7Kohm 1/4W ± 10% Solid Resistor
R 312		220ohm 1/4W ± 10% Carbon Resistor
R 308		,,
R 307		,,
R 313		,,
R 317		4.7ohm 1/4W ± 10% Carbon Resistor
R 337		,,
R 336		,,
R 311		100ohm 1/4W ± 10% Carbon Resistor
R 307		,,
R 219		,,
R 213		,,
R 220		,,
R 325		,,
R 316, 123		,,
R 324		330ohm 1/4W ± 10% Carbon Resistor

REF. NO.	PART NO.	DESCRIPTION
R 319		470ohm 1/4W ± 10% Carbon Resistor
R 332		〃
R 204		〃
R 120		〃
R 205 R 306		680ohm 1/4W ± 10% Carbon Resistor
R 301		1Kohm 1/4W ± 10% Carbon Resistor
R 221		〃
R 320		〃
R 321		〃
R 217		〃
R 211		〃
R 201		1.5Kohm 1/4W ± 10% Carbon Resistor
R 314		〃
R 315		〃
R 407		〃
R 408		〃
R 210 R 216		2.2Kohm 1/4W ± 10% Carbon Resistor
R 333		4.7Kohm 1/4W ± 10% Carbon Resistor
R 212		〃
R 203		〃
R 218		〃
R 206 R 214		8.2Kohm 1/4W ± 10% Carbon Resistor
R 304		10Kohm 1/4W ± 10% Carbon Resistor
R 303		〃
R 322		〃
R 323		〃
R 209		〃
R 208		〃
R 215		〃

REF. NO.	PART NO.	DESCRIPTION
R 302 R329 R 327		15Kohm 1/4W ± 10% Carbon Resistor
R 305		33Kohm 1/4W ± 10% Carbon Resistor
R 326		100Kohm 1/4W ± 10% Carbon Resistor
R 401 R 402		470Kohm 1/4W ± 10% Carbon Resistor
R 318		1Mohm 1/4W ± 10% Carbon Resistor
R 409 R 410		220ohm 1/4W ± 5% Carbon Resistor
R 335		3.3Kohm 1/4W ± 10% Carbon Resistor
R 334		〃
R 411		〃
R 412		〃
R 207		68Kohm 1/4W ± 10% Carbon Resistor
R 330		〃
R 405		〃
R 406		〃
R 403 R 404		180Kohm 1/4W ± 10% Carbon Resistor
R 501		22ohm 1/2W ± 10% Solid Resistor
R 502		47ohm 1/2W ± 10% Solid Resistor
R 503		〃
R 504		6ohm 2W ± 5% Cement Resistor

REF. NO.	PART NO.	DESCRIPTION
Capacitors		
C 111 C 332		2PF ± 0.5PF Titanium Capacitor
C 101		3PF ± 0.5PF Titanium Capacitor
C 202		5PF ± 0.5PF Titanium Capacitor
C 109		10PF ± 0.5PF Titanium Capacitor
C 312		,,
C 119		15PF ± 5% Titanium Capacitor
C 218 C103		18PF ± 5% Titanium Capacitor
C 108 C 201		12PF ± 5% Titanium Capacitor
C 321		30PF ± 5% Titanium Capacitor
C 102		,,
C 106		,,
C 114		,,
C 304		100PF ± 5% Titanium Capacitor
C 329		,,
C 330		,,
C 327		,,
C 110		150PF ± 5% Titanium Capacitor
C 205 C 207		200PF ± 5% Titanium Capacitor
C 120		8PF ± 0.5PF SH Titanium Capacitor
C 115 C 116		10PF ± 0.5PF SH Titanium Capacitor
C 212		70PF ± 0.5PF SH Titanium Capacitor
C 318		40PF ± 0.5PF SH Titanium Capacitor
C 206		60PF ± 0.5PF SH Titanium Capacitor
C 219		330PF ± 5% Polystylene Capacitor
C 338		2500PF ± 5% Polystylene Capacitor
C 340		10000PF ± 5% Polystylene Capacitor
C 211		150PF ± 5% Polystylene Capacitor
C 122, C 121		0.01μF ± $^{100}_{0}$ PF Titanium Capacitor

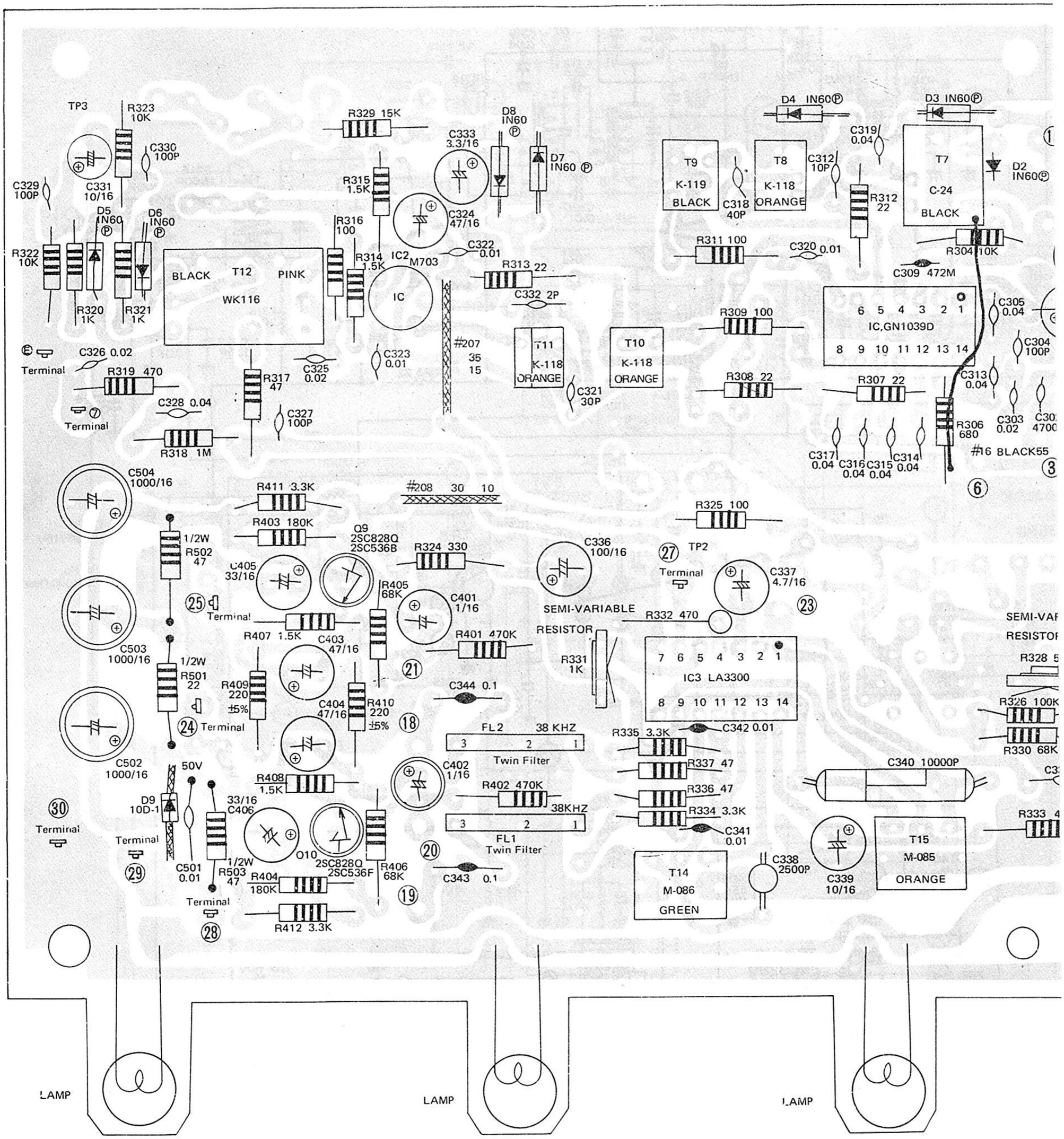
REF. NO.	PART NO.	DESCRIPTION
Capacitors		
C 320, C 322		0.01μF ± $^{100}_{0}$ PF Titanium Capacitor
C 323, C 117		,,
C 107, C 105		,,
C 104, C 113		,,
C 112, C 118, C 345		,,
C 310, C 311		0.02μF ± $^{100}_{0}$ PF Titanium Capacitor
C 303, C 325		,,
C 221, C 204		,,
C 326		,,
C 301, C 203		0.04μF ± $^{100}_{0}$ PF Titanium Capucitor
C 209, C 213		,,
C 220, C 216		,,
C 215, C 328		,,
C 319, C 305		,,
C 316, C 317		,,
C 315, C 314		,,
C 313		,,
C 501		0.01μF ±$^{100}_{0}$ PF 50WV Titanium Capacitor
C 302		4700PF ± 20% Mylar Capacitor
C 309		,,
C 214		,,
C 306		,,
C 210		0.01μF ± 20% Mylar Capacitor
C 217		,,
C 341		,,
C 342		,,
C 208		0.022μF ± 20% Mylar Capacitor
C 344		0.1μF ± 20% Mylar Capacitor
C 343		,,
C 335		,,
C 401, C 402		1μF/16V Electrolytic Capacitor

REF. NO.	PART NO.	DESCRIPTION
C 334 C 337		4.7μF/16V Electrolytic Capacitor
C 308		10μF/16V Electrolytic Capacitor
C 331		〃
C 339		〃
C 403		47μF/16V Electrolytic Capacitor
C 404		〃
C 324		〃
C 336		100μF/16V Electrolytic Capacitor
C 502		1000μF/16V Electrolytic Capacitor
C 503		〃
C 504		〃
C 332		3.3μF/16V Electrolytic Capacitor
C 405 C 406		33μF/16V Electrolytic Capacitor
C 307		0.47μF/16V Electrolytic Capacitor

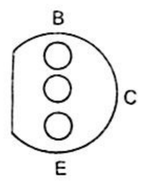
REF. NO.	PART NO.	DESCRIPCION
	Transistors, Diodes, Coils	
Tr2, Tr3		2SC1359B Transistor
Tr4, Tr5		〃
Tr6, Tr7		〃
Tr8		2SC828P Transistor
Tr9, Tr10		2SC828Q or 2SC536F Transistor
Tr1		3C–18P FET or 2SK19GR
IC1		GN1039D IC
IC3		LA3300 IC
IC2		LM703 IC
D2, D3 D4, D5 D6, D7		IN60 P Diode
D8		
D1		IS2139B Vari–Cap.
D9		10D-1 Silicon Diode
L1	R 141050	FM Antenna Transf.
L7		390μH Ferry Inductance
L2, L4	H 130005	1μH Trap Coil
TC3 TC5 TC7	R 213006	1T8M Trimmer Condenser
TC6 TC4	R 213014	IT16M Trimmer Condenser
T4	R 160146	AM Oscillator Coil
T3	R 160200	LW Oscillator Coil
T5	R 151071	AM IFT (A–28)
T6	R 151072	AM IFT (A–29)
T7	R 151031	AM IFT (C–24)
T2, T8 T10, T11	R 151089	FM IFT (K118)
T9, T13	R 151090	FM IFT (K119)
T12	R 151078	FM IFT (WK–116)

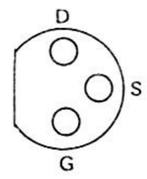
REF. NO.	PART NO.	DESCRIPCION
T15	R 151085	19KHz Coil (M–085)
T14	R 151086	38KHz Coil (M–086)
R331	R 382012	1Kohm Semi–Fixed Resistor
R328	R 382013	50Kohm Semi–Fixed Resistor
FL1, FL2	R 290011	38KHz Twine Filter
L6	R 180245	Antenna Coil

PARTS LOCATION OF MW, LW, FM TUNER

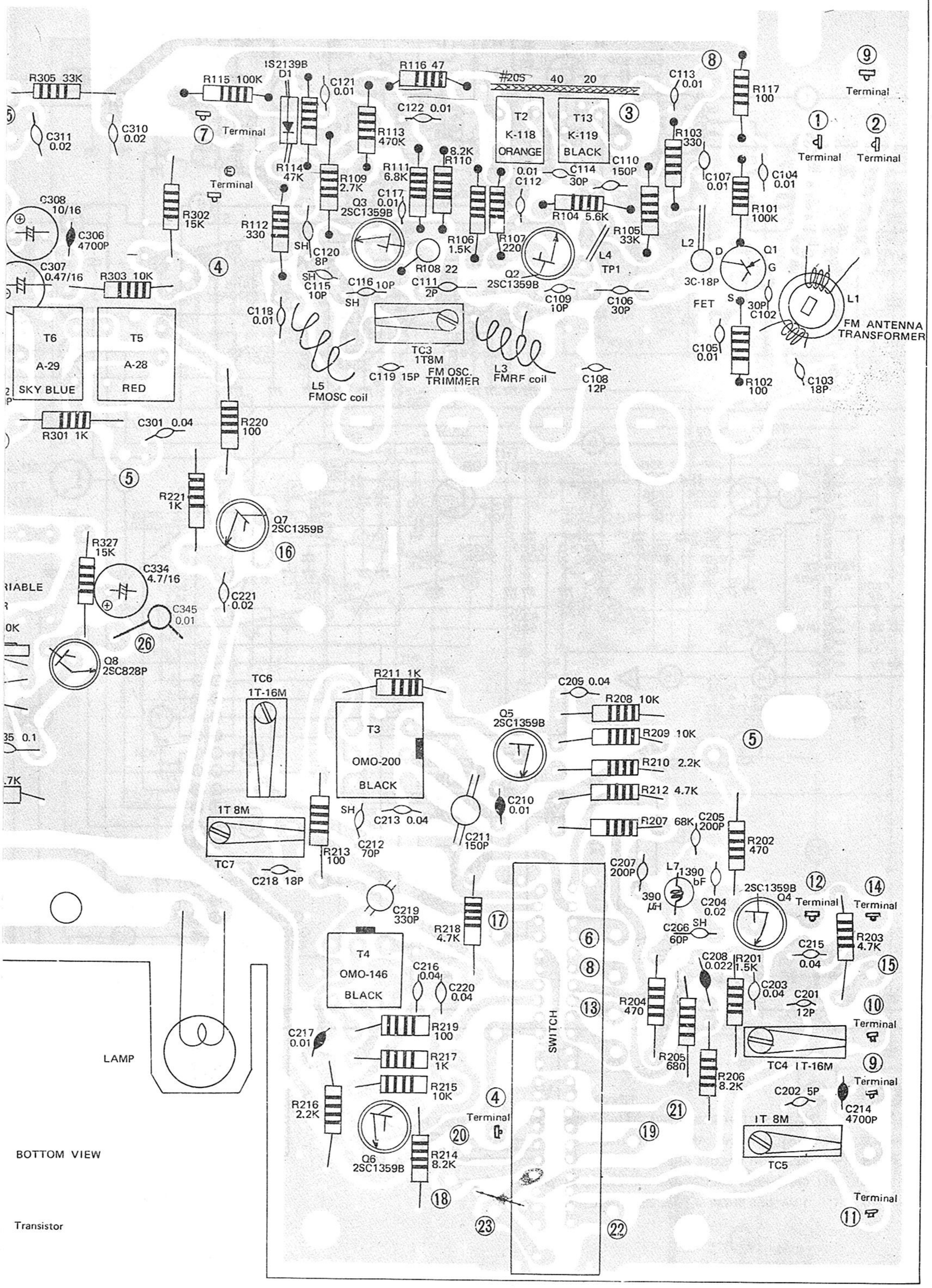


NOTE
① ～ ㉚ : Connecting Point NO.
for Lead wire (See SCHEMATIC DIAGRAM)

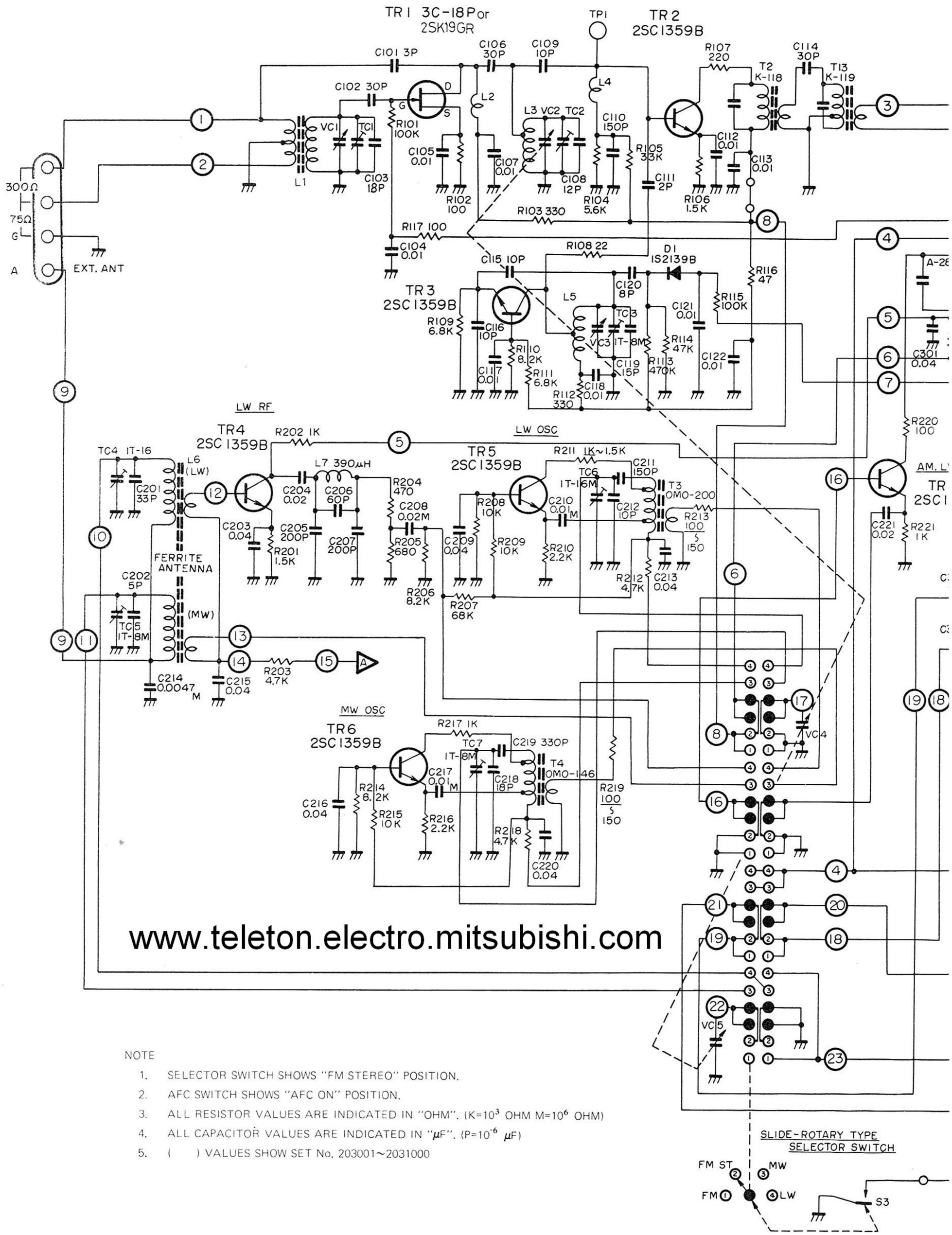




and MPX PC BOARD (TOP VIEW)



SCHEMATIC DIAGRAM GT-202



NOTE

1. SELECTOR SWITCH SHOWS "FM STEREO" POSITION.
2. AFC SWITCH SHOWS "AFC ON" POSITION.
3. ALL RESISTOR VALUES ARE INDICATED IN "OHM". ($K=10^3$ OHM $M=10^6$ OHM)
4. ALL CAPACITOR VALUES ARE INDICATED IN "μF". ($P=10^{-6}$ μF)
5. ( ) VALUES SHOW SET No. 203001~2031000