

NEC

Authentic series

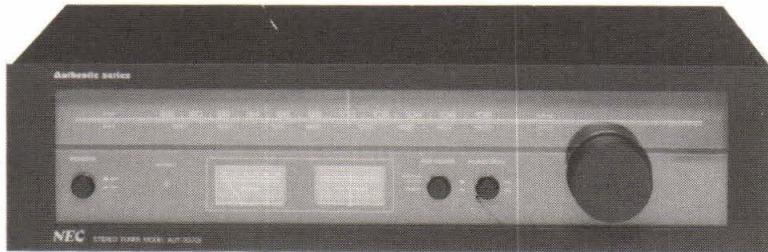
MODEL AUT-5000E
TYPE(BS)/(BS)R

STEREO TUNER

SERVICE MANUAL



**Better Service
Better Reputation
Better Profit**



Specifications

FM SECTION

Frequency Range	: 87.5 MHz – 108 MHz
Usable Sensitivity	: 2.0 μ V
Signal to Noise Ratio	: 65dB
Capture Ratio	: 2.0dB
Alternate Channel Selectivity	: 50dB
Total Harmonic Distortion	: 0.4%(Stereo)
Stereo Separation	: 40dB (1kHz)

AM SECTION

Frequency Range	: 535kHz – 1605kHz
Usable Sensitivity	: 300 μ V/m
Signal to Noise Ratio	: 50dB

POWER REQUIREMENTS : AC 220V, 50Hz

DIMENSIONS : 400(W) x 100(H) x 260(D) mm.

WEIGHT : 3.9kg.

NOTE: Design and specifications are subject to change without notice.

Nippon Electric Co.,Ltd.

TOKYO, JAPAN

Disassembly Instructions

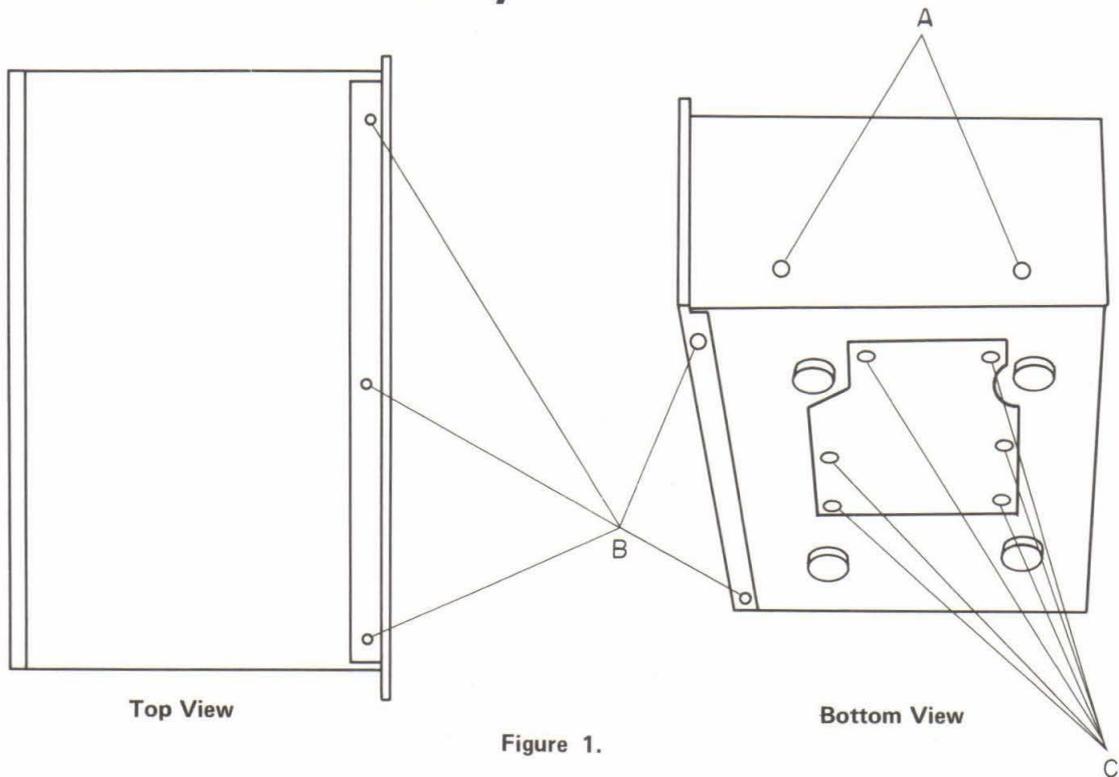


Figure 1.

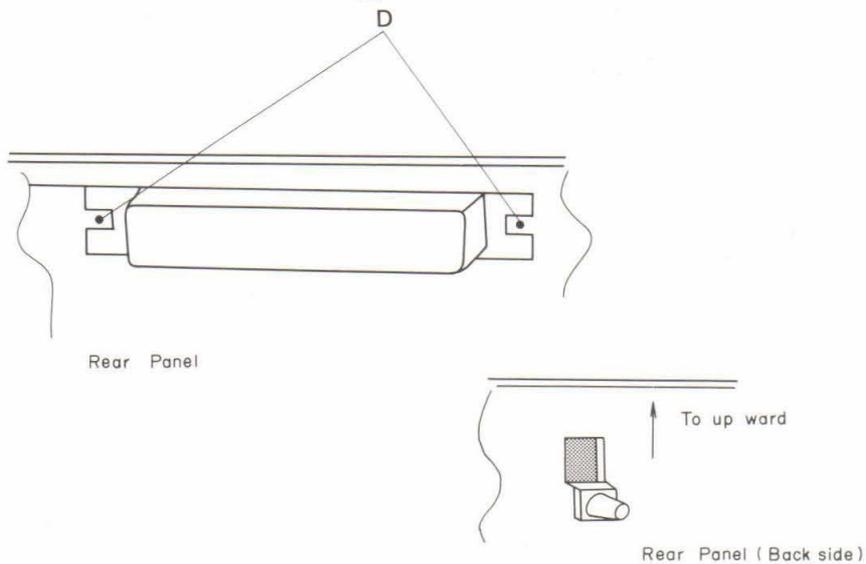
Removing cabinet top and bottom cover. See Figure 1.

1. Remove 4 cabinet screws (A) from left and right sides and lift off cabinet.
2. Remove six bottom cover screws (C) and lift off bottom cover.

Removing front panel. See Figure 1.

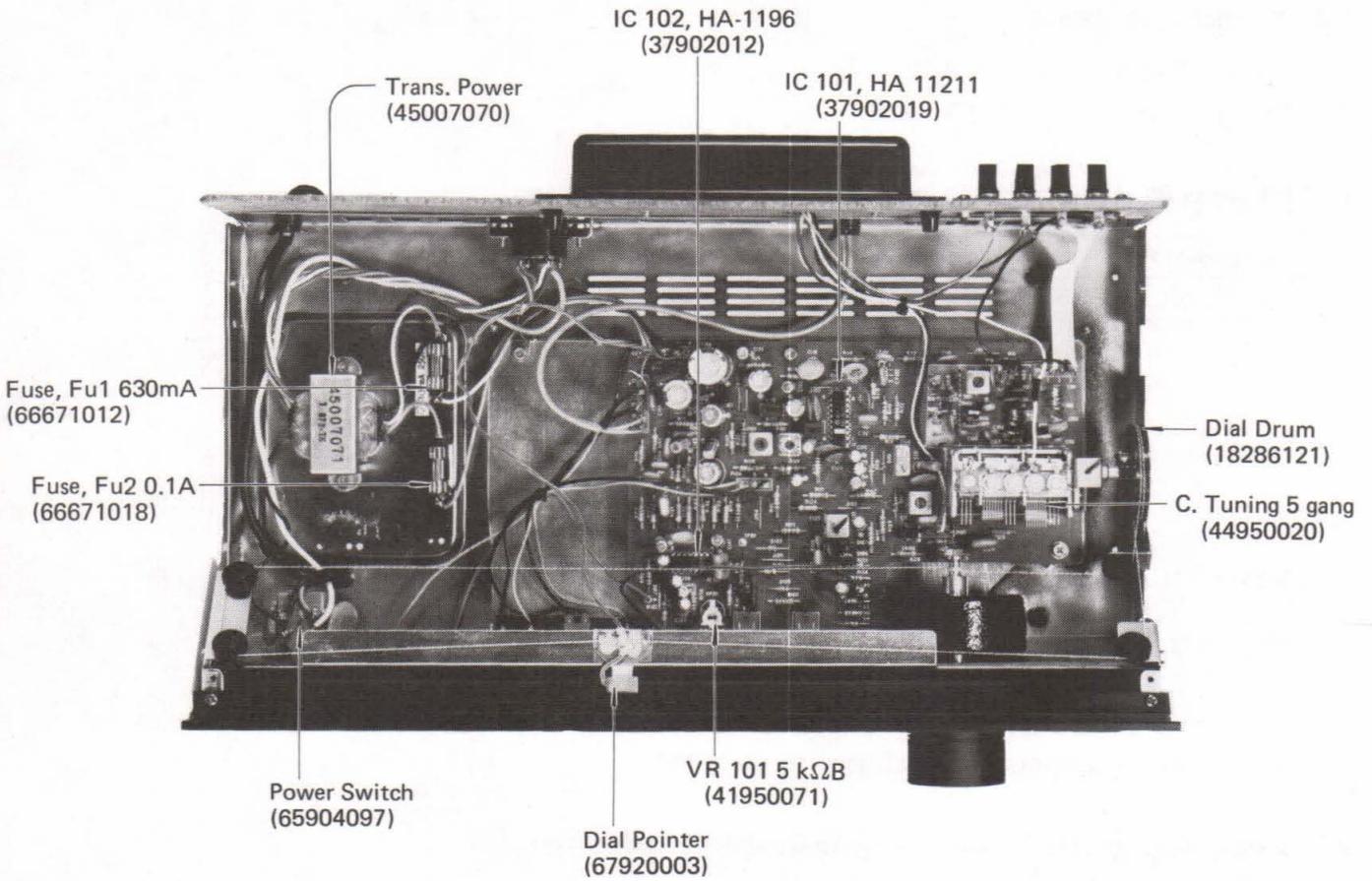
1. Remove 5 screws (B) from chassis and lift off front panel.

Removing Antenna Cover



1. Remove two Ant. cover mounting screws (D)
2. Then push up ward and remove it.

Parts Location



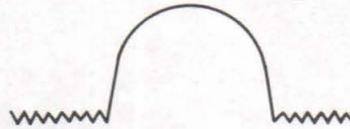
Alignment Method

FM IF Alignment (Fig. 1)

- (1) Function Switch : "FM AUTO"
- (2) Muting Switch : "OFF"

1. Selectivity Curve Alignment (To use IF Sweep Generator & Oscilloscope)

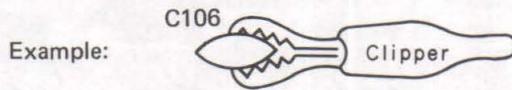
Alignment Point	Alignment Method	Signal Input Point	Signal Output Point
T101	Save Height max., Symmetric	C106 ↔ P101 - 3	P117 ↔ P104 - P(GND)



Example of Scope Wave Form

Fig. 2

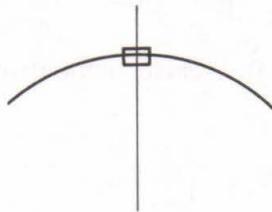
NOTE: 1) For input from C106, clip the capacitor itself for loose coupling



2) Alignment to be done with weak input signal

2. S curve alignment (Fig. 3) (To use IF Sweep Generator & Oscilloscope)

Alignment Point	Alignment Method	Signal Input Point	Signal Output Point
T102 (White)	To align by-centering Tuning Meter Needle	C106 ↔ P103 - 3(GND)	P101 ↔ P104 - 6(GND)
T103 (Red)	To align at optimal point of linearity		



Turning Meter



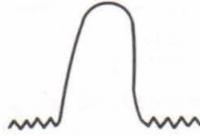
Example of Scope Wave

Fig. 3

AM IF Alignment (Fig. 4) (To use IF Sweep Generator & Oscilloscope)

(1) Function Switch : "AM"

Alignment Point	Alignment Method	Signal Input Point	Signal Output Point
T104	Wave Height max. Symmetric	Ext. AM Ant. Terminal	TP101 ↔ P104 – 6(GND)



Example of Wave Form
Fig. 4

- NOTE:**
- 1) The connection to TP101 to be cut with a Film Capacitor 0.47 - 1 μ F.
 - 2) Alignment to be done with Weak Input

FM Alignment

1. Alignment of receiving frequency range

SSG Frequency	VC Position	Alignment Point	Alignment Method	Signal Input Point	Signal Output Point
87.5 MHz	Capacitance max.	L107	In receiving Position	Antenna Terminal	Output Jacks
109 MHz	Capacitance min.	TC103			

2. Tracking alignment

SSG Frequency	VC Position	Alignment Point	Alignment Method	Signal Input Point	Signal Output Point
90 MHz	90 MHz tuning point	L101, ~ L105	– To have max. Sensitivity –	Antenna Terminal	Output Jacks
106 MHz	106 MHz tuning point	TC101, TC102			

NOTE: Alignment to be done with very weak input

3. Distortion alignment

SSG Frequency	SG Output	Mod. Frequency	Modulation	Tuning Point	Alignment Point	Signal Output Point
98 MHz	1 mV	1,000 Hz	\pm 75 kHz Dev.	98 MHz, Center	T103	Output Jacks

NOTE: Adjust T103 Core for Optimal Dist. Point

4. FM stereo alignment

- (1) VCO Alignment
- (2) Separation Alignment

SSG Frequency	SG Output	Mod. Frequency	Tuning Point	Alignment Point	Alignment Method	Signal Output Point	Needed Equipment	Modulation
98 MHz	1 mV		98 MHz	VR101	Adjust OSC Freq. to 76 kHz	TP102→P104-6(GND)	Frequency Counter	0

NOTE: After adjust above method, receiving stereo signal then confirm separation.

AM RF alignment

1. Receiving frequency range alignment

SSG Frequency	VC Position	Alignment Point	Signal Input Point	Signal Output Point	Alignment Method
515 kHz	Capacitance max.	L109	Bar Antenna	Output Jacks	In receiving Position
1700 kHz	Capacitance min.	TC105			

2. Tracking alignment

SSG Frequency	VC Position	Alignment Point	Signal Input Point	Signal Output Point	Alignment Method
600 kHz	Tuning Point	Bar Antenna Coil	Bar Antenna	Output Jacks	To have Sensitivity max.
1400 kHz		TC104			

NOTE: Alignment to be done with weak input

Alignment Point Diagrams

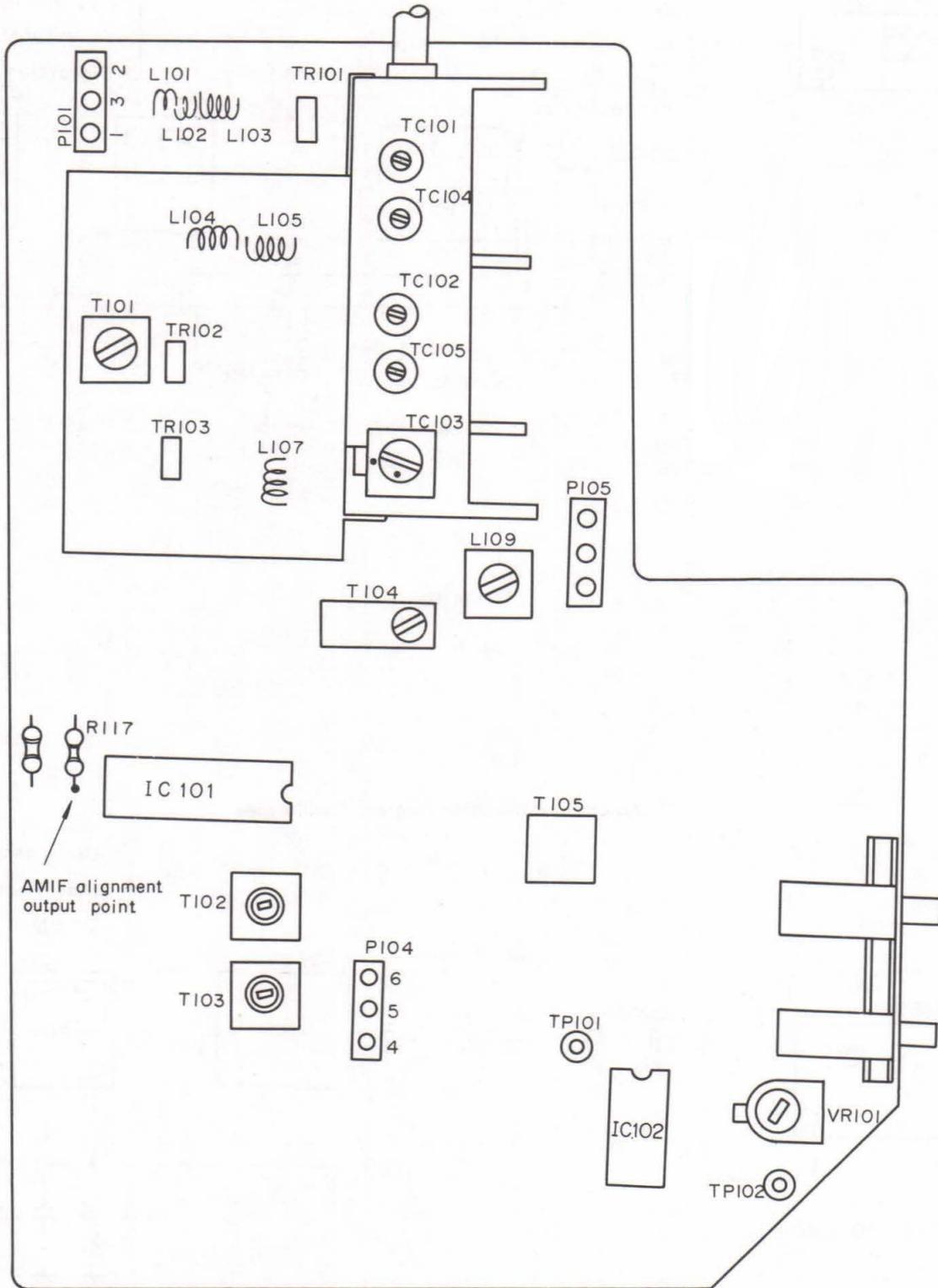


Figure 5.

FM Equipment Connection Diagrams

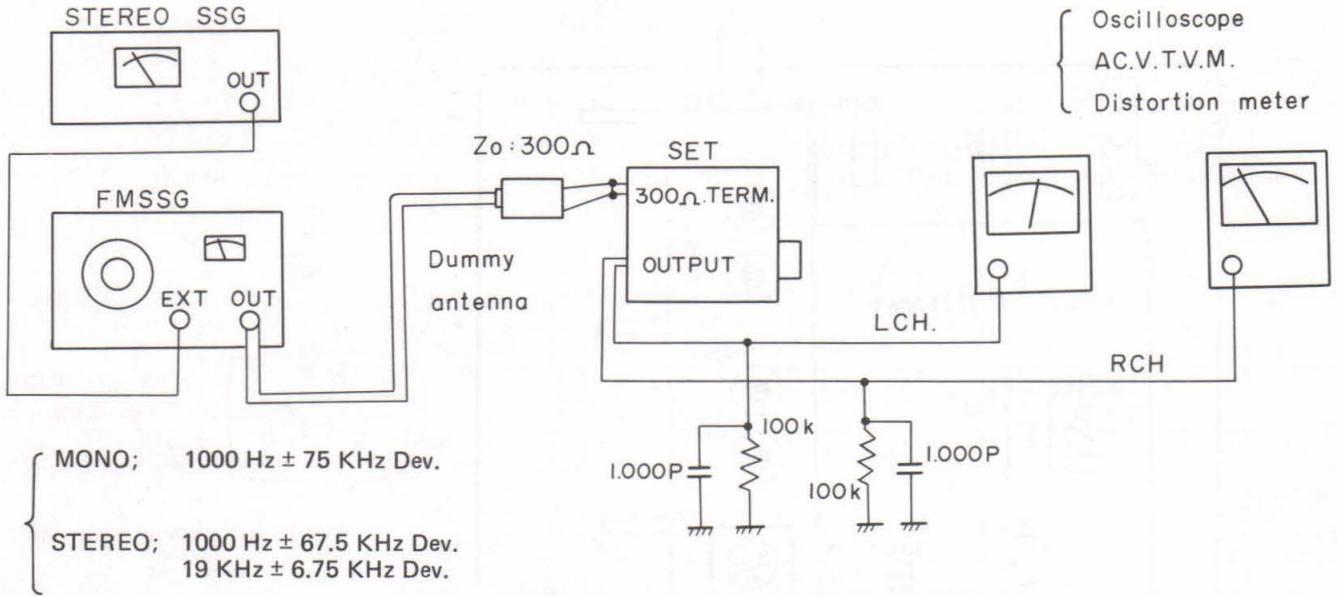


Figure 6.

AM Equipment Connection Diagrams Oscilloscope

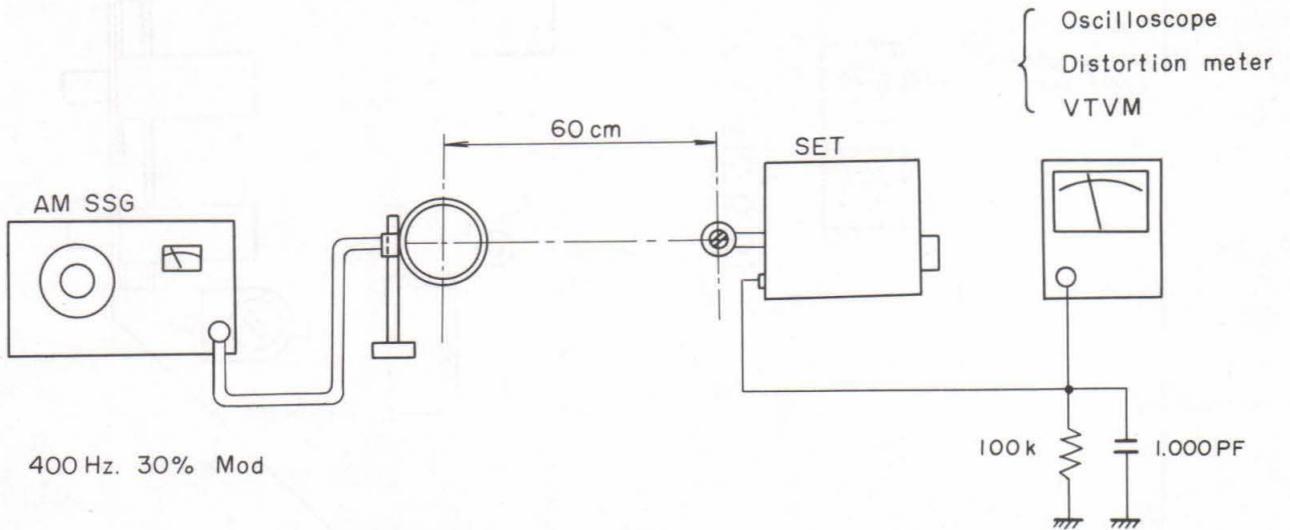
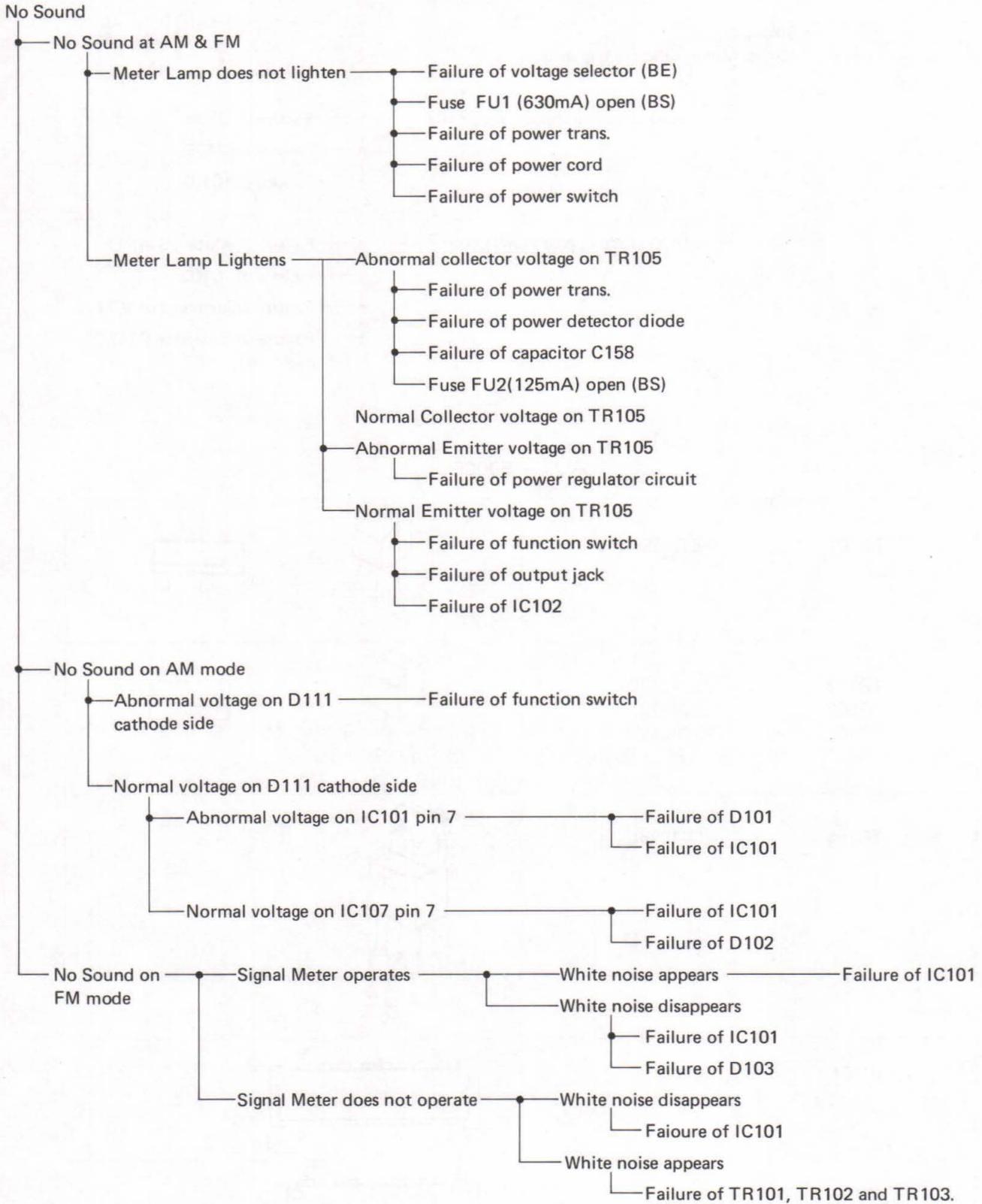
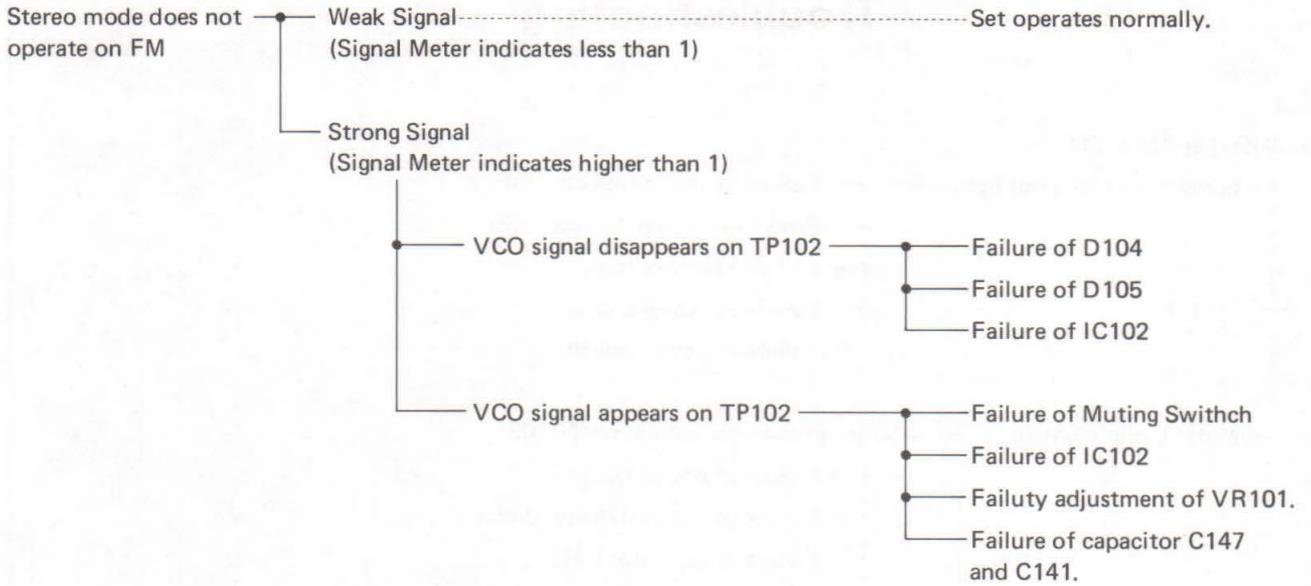


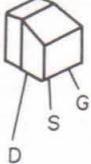
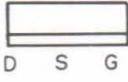
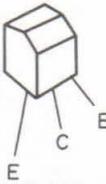
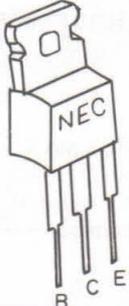
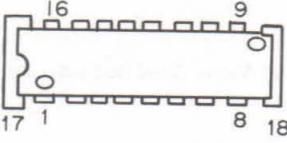
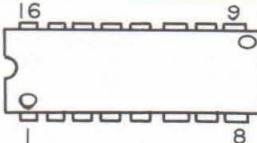
Figure 7.

Troubleshooting

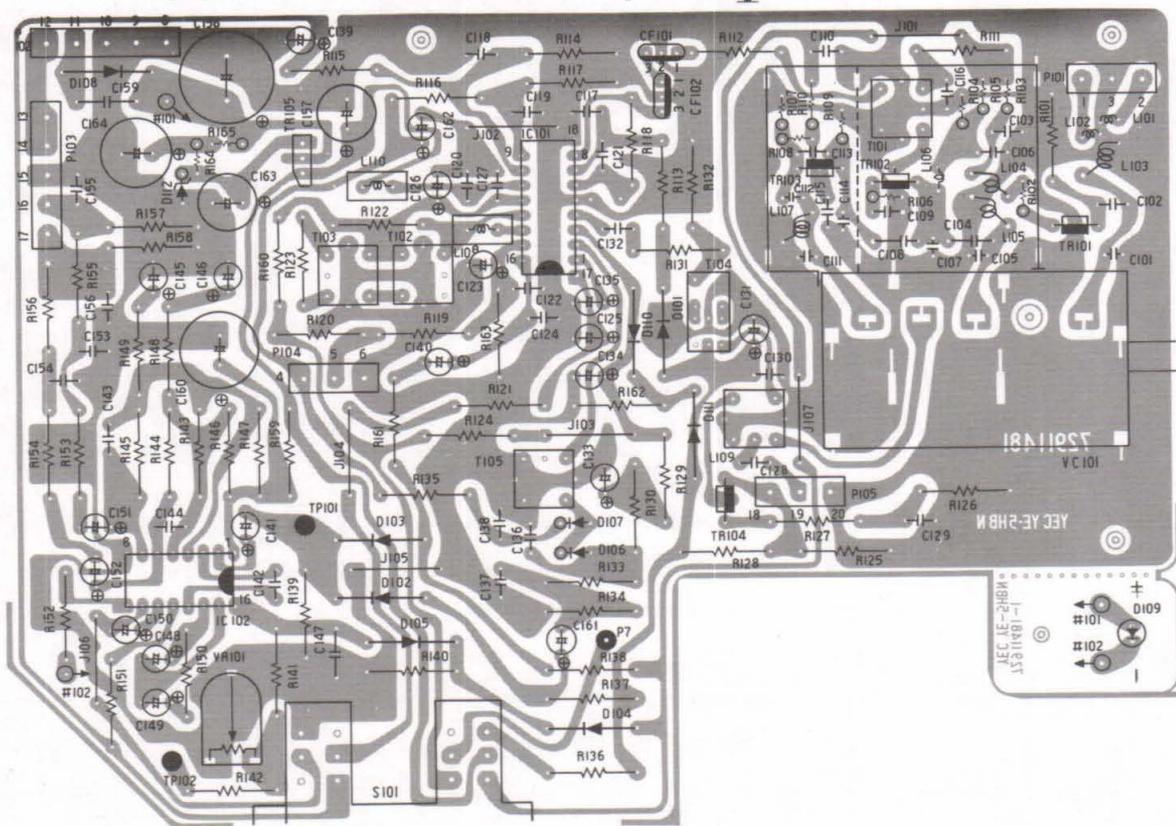




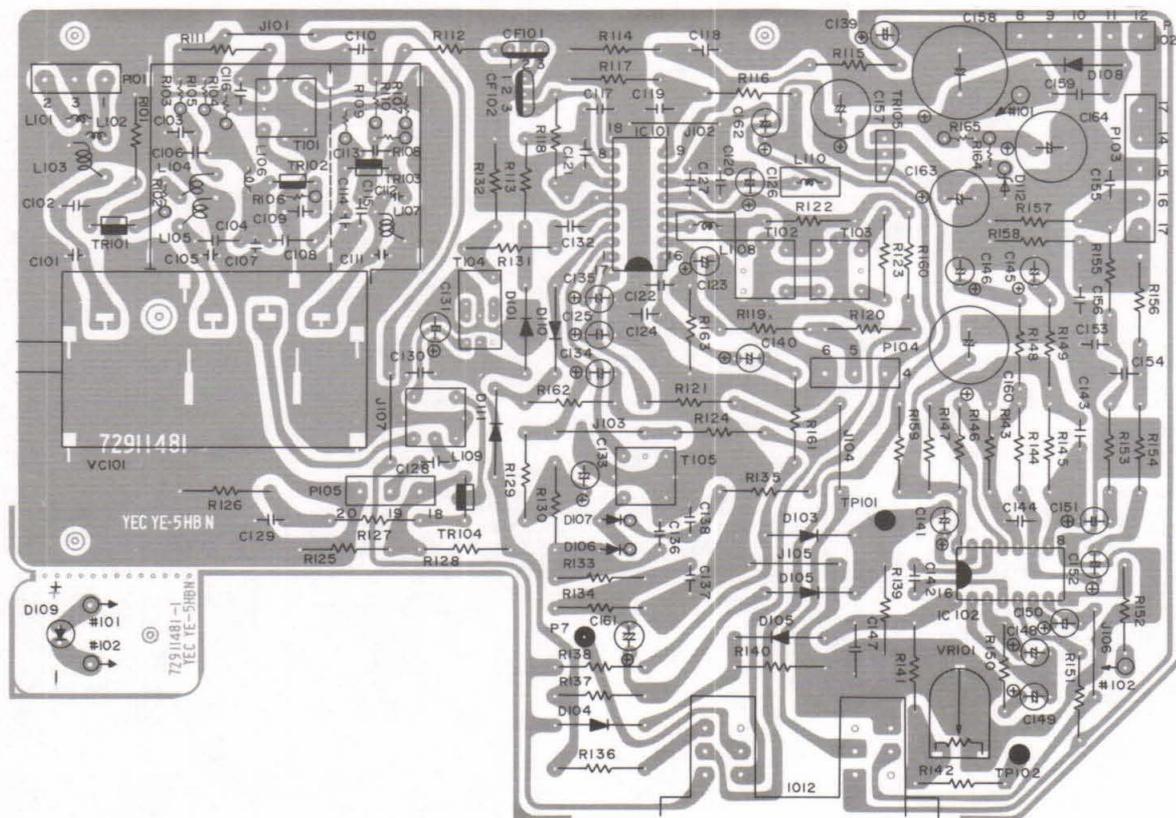
AUT - 5000E

TR101	FET. 2SK55D	 
TR102 TR103 TR104	2SC1342B 2SC461B 2SC454B	 
TR105	2SC1096L	
IC101	HA11211	
IC102	HA1196	

Main PWB ASS'Y (Component Side)



Main PWB ASS'Y (Solder Side)



Replacement Parts List

SYMBOL NO.	PART NO.		DESCRIPTION	Q'TY	REMARKS
	5000E(BS)R	5000E(BS)			

Semiconductors

Transistors

TR105	35047526	Transistor, 2SC-1096L	1	
TR103	35944402	Transistor, 2SC-461B	1	
TR102	35946702	Transistor, 2SC-1342B	1	
TR104	35946802	Transistor, 2SC-454B	1	
TR101	35990704	Transistor, FET 2SK-55D	1	

Diodes

D101 ~ 105, 110, 111	36001009	Diode, Si. IS-2473	7	
D106, 107	36002513	Diode, Ge. 20A90	2	
D112	36003042	Diode, Zener RD13E-B	1	
D108	36107065	Rectifier Si. F14A	1	
D109	36904031	Led TLR114	1	

Integrated Circuits

IC102	37902012	Integrated Circuit, HA-1196	1	
IC101	37902019	Integrated Circuit, HA-11211	1	

Resistors

R111, 112, 127	40102149	R. Carbon, 100Ω 5% ¼W	3	
R120	40102153	R. Carbon, 150Ω 5% ¼W	1	
R160	40102161	R. Carbon, 330Ω 5% ¼W	1	
R131	40102167	R. Carbon, 560Ω 5% ¼W	1	
R135, 136	40102171	R. Carbon, 820Ω 5% ¼W	2	

SYMBOL NO.	PART NO.		DESCRIPTION	Q'TY	REMARKS
	5000E(BS)R	5000E(BS)			
R133, 150, 152	40102173		R. Carbon, 1k Ω 5% $\frac{1}{4}$ W	3	
R126	40102177		R. Carbon, 1.5k Ω 5% $\frac{1}{4}$ W	1	
R123	40102179		R. Carbon, 1.8k Ω 5% $\frac{1}{4}$ W	1	
R115	40102181		R. Carbon, 2.2k Ω 5% $\frac{1}{4}$ W	1	
R155, 156	40102183		R. Carbon, 2.7k Ω 5% $\frac{1}{4}$ W	2	
R122, 132, 140, 153, 154, 161	40102191		R. Carbon, 5.6k Ω 5% $\frac{1}{4}$ W	6	
R148, 149	40102193		R. Carbon, 6.8k Ω 5% $\frac{1}{4}$ W	2	
R125	40102195		R. Carbon, 8.2k Ω 5% $\frac{1}{4}$ W	1	
R119, 139, 157, 158	40102197		R. Carbon, 10k Ω 5% $\frac{1}{4}$ W	4	
R121	40102199		R. Carbon, 12k Ω 5% $\frac{1}{4}$ W	1	
R141	40102203		R. Carbon, 18k Ω 5% $\frac{1}{4}$ W	1	
R116	40102205		R. Carbon, 22k Ω 5% $\frac{1}{4}$ W	1	
R117, 129, 130, 146, 147	40102209		R. Carbon, 33k Ω 5% $\frac{1}{4}$ W	5	
R114, 124, 144, 145	40102213		R. Carbon, 47k Ω 5% $\frac{1}{4}$ W	4	
R118, 134, 137, 138, 162	40102215		R. Carbon, 56k Ω 5% $\frac{1}{4}$ W	5	
R128	40102217		R. Carbon, 68k Ω 5% $\frac{1}{4}$ W	1	
R143	40102219		R. Carbon, 82k Ω 5% $\frac{1}{4}$ W	1	
R101, 142, 151	40102221		R. Carbon, 100k Ω 5% $\frac{1}{4}$ W	3	
R113, 163	40102225		R. Carbon, 150k Ω 5% $\frac{1}{4}$ W	2	
R159	40102641		R. Carbon, 47 Ω 5% $\frac{1}{4}$ W	1	
R102, 103, 110	40112149		R. Carbon, 100 Ω 5% $\frac{1}{4}$ W	3	
R106, 165	40112173		R. Carbon, 1k Ω 5% $\frac{1}{4}$ W	2	
R164	40112175		R. Carbon, 1.2k Ω 5% $\frac{1}{4}$ W	1	
R109, 166	40112177		R. Carbon, 1.5k Ω 5% $\frac{1}{4}$ W	2	
R104	40112183		R. Carbon, 2.7k Ω 5% $\frac{1}{4}$ W	1	
R107, 108	40112197		R. Carbon, 10k Ω 5% $\frac{1}{4}$ W	2	
R105	40112205		R. Carbon, 22k Ω 5% $\frac{1}{4}$ W	1	
VR101	41950071		R. Variable 5k Ω B	1	

Capaticors

C159	42019575	C. Ceramic, 500V 0.01 μ F	1	
C501, 502	42606007	C. Ceramic, 250V 4700pF	2	
C136, 138	42110425	C. Ceramic, 50V 0.01 μ F	2	
C103	42110925	C. Ceramic, 50V 0.01 μ F	1	
C109, 110, 115, 116	42110929	C. Ceramic, 50V 0.022 μ F	4	
C117 ~ 122, 127, 130	42110933	C. Ceramic, 50V 0.047 μ F	8	
C124	42331075	C. Ceramic, 50V 330pF 10%	1	
C112	42332010	C. Ceramic, 50V 5pF	1	
C114	42332015	C. Ceramic, 50V 10pF	1	
C111	42332031	C. Ceramic, 50V 27pF	1	

SYMBOL NO.	PART NO.		DESCRIPTION	Q'TY	REMARKS
	5000E(BS)R	5000E(BS)			
C113	42332033		C. Ceramic, 50V 33pF	1	
C107, 108	42333010		C. Ceramic, 50V 3pF	2	
C104	42333015		C. Ceramic, 50V 8pF	1	
C101, 105	42333027		C. Ceramic, 50V 15pF	2	
C102, 106	42333047		C. Ceramic, 50V 1000pF 5%	2	
C147	42407145		C. Mica, 50V 470pF 5%	1	
C155, 156	42754051		C. Mylar, 50V 1000pF	2	
C153, 154	42754057		C. Mylar, 50V 3300pF	2	
C128, 132, 137	42754063		C. Mylar, 50V 0.01 μ F	3	
C129, 142	42754071		C. Mylar, 50V 0.047 μ F	2	
C143, 144	42970017		C. Poly, 50V 820pF 5%	2	
C149	43980027		C. Elec., 25V 3.3 μ F	1	
C150	43980049		C. Elec., 50V 0.22 μ F	1	
C148	43980054		C. Elec., 50V 1.5 μ F	1	
C131, 140, 141, 145, 146, 151, 152	43991028		C. Elec., 16V 10 μ F, B	7	
C126	43991031		C. Elec., 16V 47 μ F	1	
C157, 160, 163	43991032		C. Elec., 16V 100 μ F	3	
C164	43991048		C. Elec., 25V 220 μ F	1	
C158	43991051		C. Elec., 25V 1000 μ F	1	
C123	43991065		C. Elec., 50V 0.47 μ F	1	
C134, 139, 162	43991066		C. Elec., 50V 1 μ F	3	
C125, 133, 135, 161	43991068		C. Elec., 50V 3.3 μ F	4	

Transformer and Coils

L106	61052047	Coil, Filter 2.2 μ H	1	
L110	61060003	Coil, Filter 2.2 μ H	1	
T104	61131002	Filter, Ceramic 455KHz	1	
T102	61902030	IFT 10.7MHz	1	
T103	61902031	IFT 10.7MHz	1	
T105	61902032	IFT 455KHz	1	
T101	61902033	IFT 10.7MHz	1	
108	61903024	Coil, Bar Ant.	1	
L109	61904351	AM OSC Coil	1	
L101	61904357	FM RF Coil	1	
L102	61904358	FM RF Coil	1	
L103	61904359	FM RF Coil	1	
L104	61904360	FM RF Coil	1	
L105	61904361	FM RF Coil	1	
L107	61904366	FM RF Coil	1	
L108	61911084	Coil, Filter 180J	1	

SYMBOL NO.	PART NO.		DESCRIPTION	Q'TY	REMARKS
	5000E(BS)R	5000E(BS)			
CF101, 102	61919005		Filter, Ceramic 10.7mH 8Ω	2	
101	45007070		Trans. Power	1	

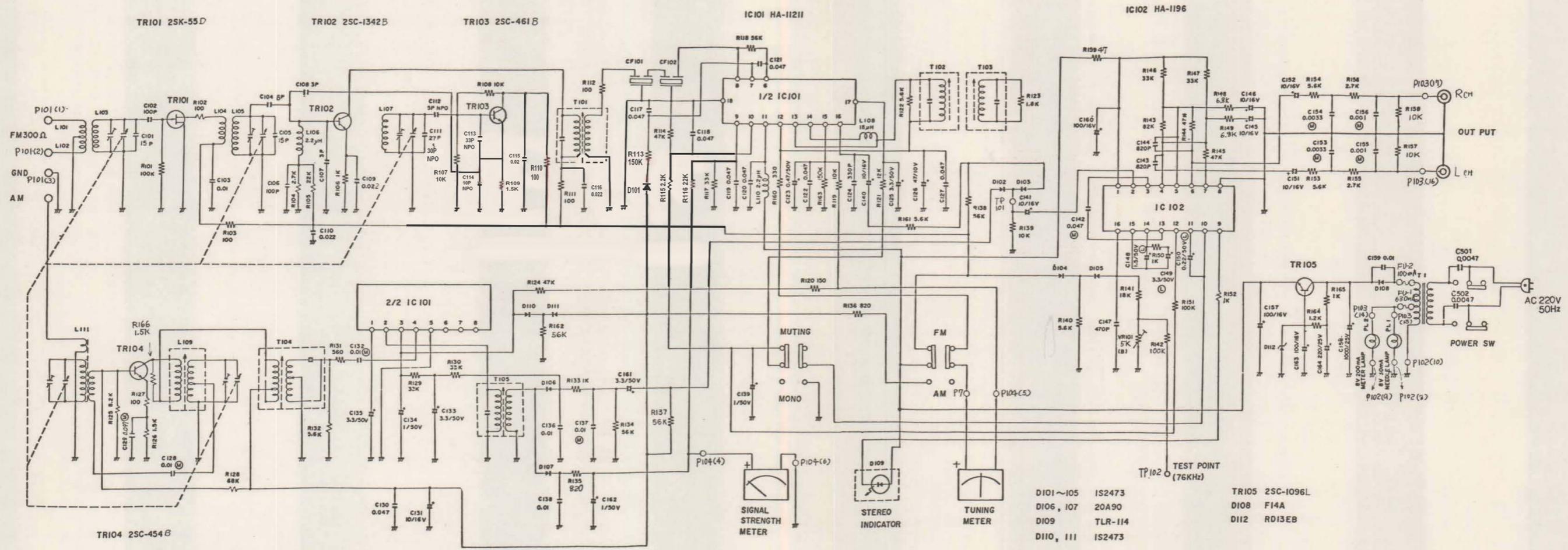
Electrical Parts

VC	44950020		C. Tuning 5 Air	1	
	62910005	62910008	Ant., FM	1	
S101	65904094		Switch, Button (FM. Mode/Function) 100V 0.5A	1	
110	67901501		Lamp, Pilot 8V 250mA	1	
102	67920003		Dial Pointer with Lamp	1	
106	67950216		Meter (Tuning)	1	
	79759052		Line Cord KEMA	1	
111	87297101		TUN PWB UNIT ASS'Y	1	
FU1	66671012		Fuse, 630mA	1	
FU2	66671018		Fuse,	1	
	67950217		Meter (Signal)	1	
	70905120		FM-Socket	1	
	70905125		Socket, AM Ant.	1	
	71205031		Fuse Holder 1P	2	
	65904097		Power Switch SEMKO	1	

Mechanical Parts

24	11622821		Eylet	1	
	18282841		Combination Band BK-1	2	
22	18286121		Dial, Drum	1	
4	18286191		Ant. Holder	2	
3	18402701		Ant. Cover	1	
	18511841		Coil, Spring	1	
15	18512011		Pointer	1	
20	18603301		Cushion, Piece L	1	
	18603311		Cushion, Piece S	2	
	18707971		Dial, Filter	1	
8	18708771		Dial Scale	1	
210	18850871		Push Rivet	4	
212	18851751		Special Nut	1	
20	18603133		Cushion, Piece L	1	

Schematic Diagram AUT-5000E(BS)/(BS)R



- | | | | |
|------------|---------|-------|-----------|
| D101 ~ 105 | IS2473 | TR105 | 2SC-1096L |
| D106, 107 | 20A90 | D108 | F14A |
| D109 | TLR-114 | D112 | RD13EB |
| D110, 111 | IS2473 | | |

SYMBOL NO.	PART NO.		DESCRIPTION	Q'TY	REMARKS
	5000E(BS)R	5000E(BS)			
21	18603141		Cushion, Piece R	1	
12	18286011		Pulley NIF	4	
14	18511984		Chassis Ass'y	1	
16	18512021		Tuning Jig	1	
17	18512221		Reed Holder	1	
19	18603121		Insulator Sheet UL	1	
23	18511841		Spring	1	
25	24280261		Wire Clamper	2	
103	70906058		Plug Cord, Pin	1	
104	79759093		Power Cord, SEMKO	1	
105	67950217		Signal Meter	1	
107	71905079	—————	Terminal Screw 4P	1	
201	18852671		Special Screw	4	
202	91283056		Screw, 2CPTX x 3 x 8 x 3KF	10	
203	91012051		Screw, CPIMS x 2 x 8 x 15BF	2	
204	23850871		Screw, (M3 x 5)	4	
205	24851541		Screw, FT x 3 x 6 x 15BF	6	
206	91510201		Screw, PIWA x 2 x 15BF	2	
208	91013066		Screw, CPIMS x 3 x 10 x 3KF	2	
209	91430301		Screw, AHEXIN x 3 x 15BF	2	
211	24851801		Push Rivet	1	
213	18851761		Special Washer	1	

Knobs

5	18455891	Knob Ass'y (Tuning)	1	
6	18455881	Push, Button (Function/FM Mode/Power)	3	

Cabinet

1	18354461	Cabinet	1	
2	18354951	Plate, Rear	1	
13	18511971	Plate, Bottom	1	
	18512161	Shield Case	1	
9	88297631	Panel Front S. Ass'y	1	
11	18284951	Foot UL	4	

Accessories

	18753101	Label	1	
	78911162	78911161	Instruction Book	1

SYMBOL NO.	PART NO.		DESCRIPTION	Q'TY	REMARKS
	5000E(BS)R	5000E(BS)			
		23750891	Serial Number Label	1	
		70906060	Din Plug Cord	1	

Packing Materials

	18801031	Bag, Polyethelene (1/12)	1	
	18803931	Filler, Carton A	2	
	18804041	Protection, Bag	1	
	18804441	Carton Box	1	
	19800672	Bag-B, Plyetheylene	2	

