

# DENON

Hi-Fi AM-FM Stereo/Tuner

## SERVICE MANUAL MODEL TU-501 SOLID STATE AM-FM STEREO TUNER



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# NIPPON COLUMBIA CO., LTD.

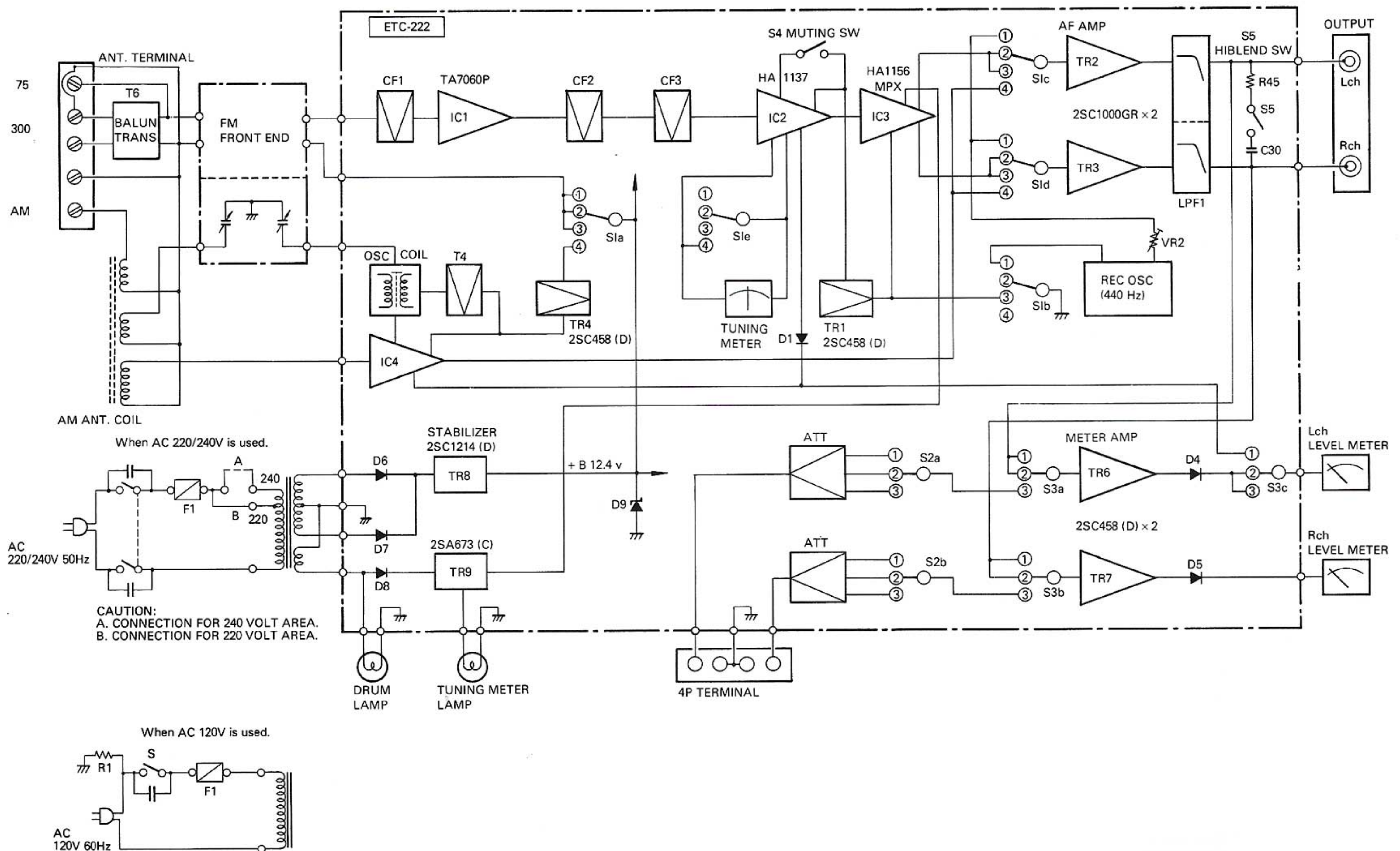
# SPECIFICATIONS

<b>CIRCUIT SYSTEM:</b>	Super heterodyne
<b>FM SECTION</b>	
Tuning Frequency:	88 to 108 MHz
Intermediate Frequency:	10.7 MHz
Antenna Impedance:	300 ohm and 75 ohm
Usable Sensitivity:	1.8 $\mu$ V (IHF)
Effective Selectivity:	78 dB
Signal to Noise Ratio:	75 dB
Total Harmonic Distortion:	MONO 0.1%
	STEREO 0.15%
Capture Ratio:	1.2 dB
AM Suppression:	60 dB
Image Rejection:	90 dB
IF Rejection:	90 dB
Spurious Rejection:	90 dB
Stereo Separation:	45 dB (at 1 kHz)
	40 dB (at 50 Hz to 10 kHz)
Carrier Leak	65 dB (19 kHz, 38 kHz)
Rated Output:	1V/1.5 kohm

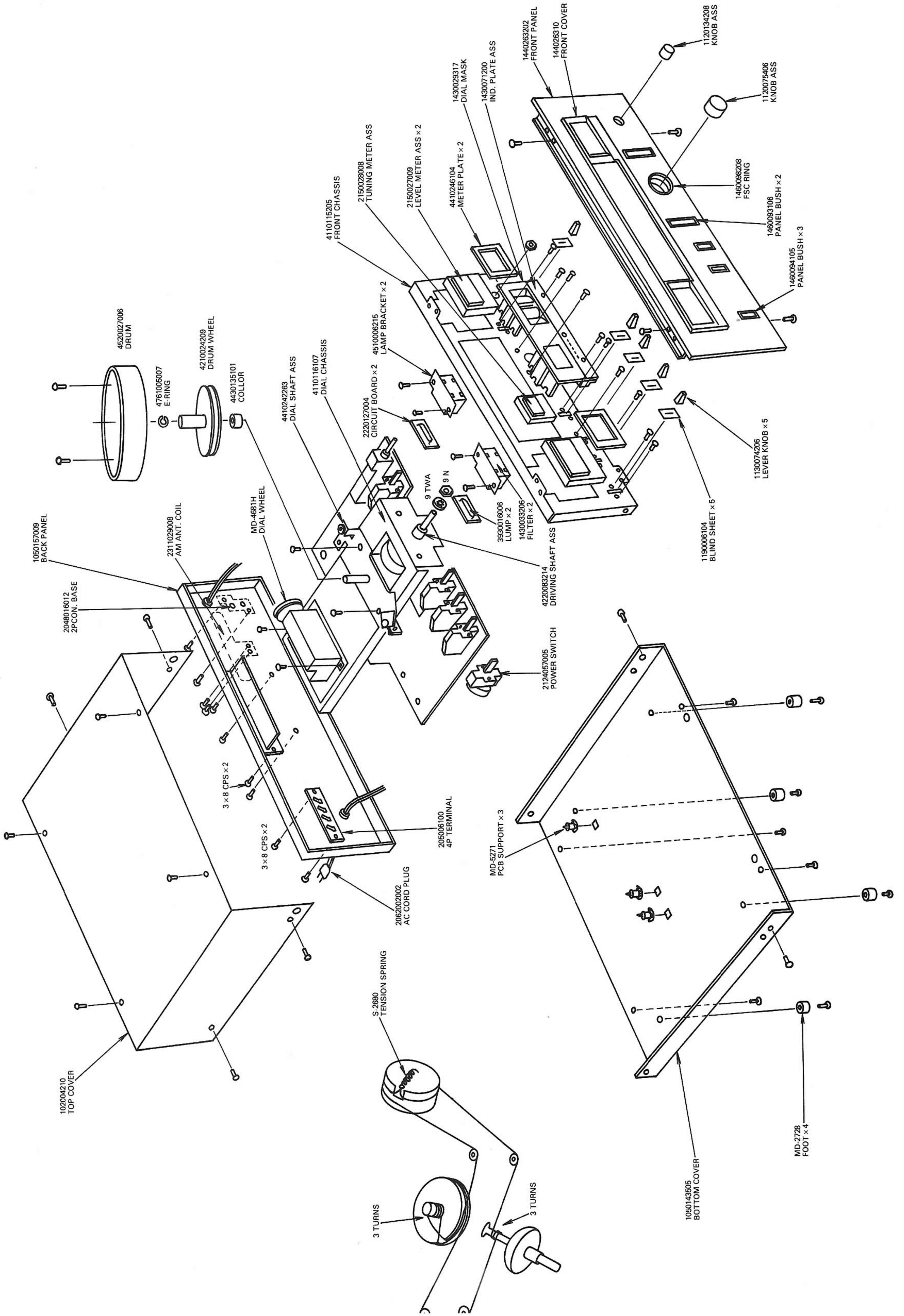
<b>AM SECTION</b>	
Tuning Frequency:	525 to 1630 kHz
Intermediate Frequency:	455 kHz
Usable Sensitivity:	300 $\mu$ volt/m
Image Rejection:	55 dB
IF Rejection:	40 dB
Harmonic Distortion:	0.4%
Signal to Noise Ratio:	55 dB
<b>LEVEL METERS</b>	
Indication Error:	$\pm$ 0.2 dB (Form AMP. + 10 dB to + 30 dB) at 1 kHz
Frequency Response:	20 Hz to 15 kHz $\pm$ 0.5 dB
<b>POWER SOURCE:</b>	
	AC 220/240 volt, 50 Hz
	AC 120 volt, 60 Hz (for U.S.A and Canada)
<b>POWER CONSUMPTION:</b>	
	10 watt, 11 watt (for Canada and U.S.A)
<b>DIMENSIONS:</b>	
	16-59/64" (430 mm)W $\times$ 5-25/32" (146 mm)H $\times$ 11-59/64" (303 mm)D
<b>WEIGHT:</b>	
	14.6 lbs. (6.6 kg)

These contents are subject to alteration without prior notice.

# BLOCK DIAGRAM



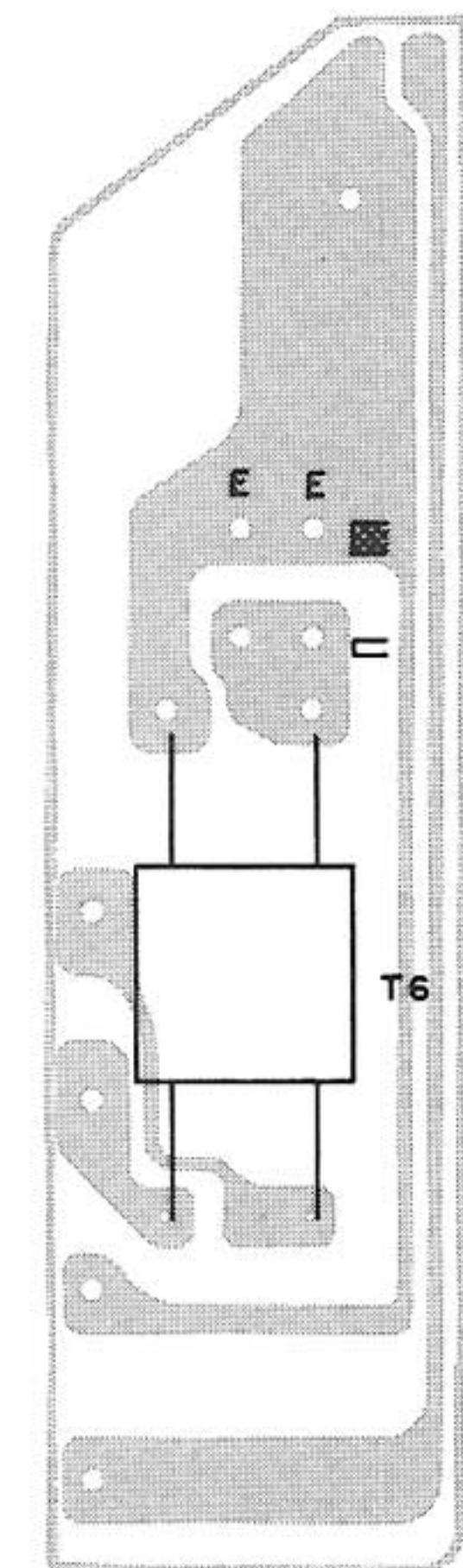
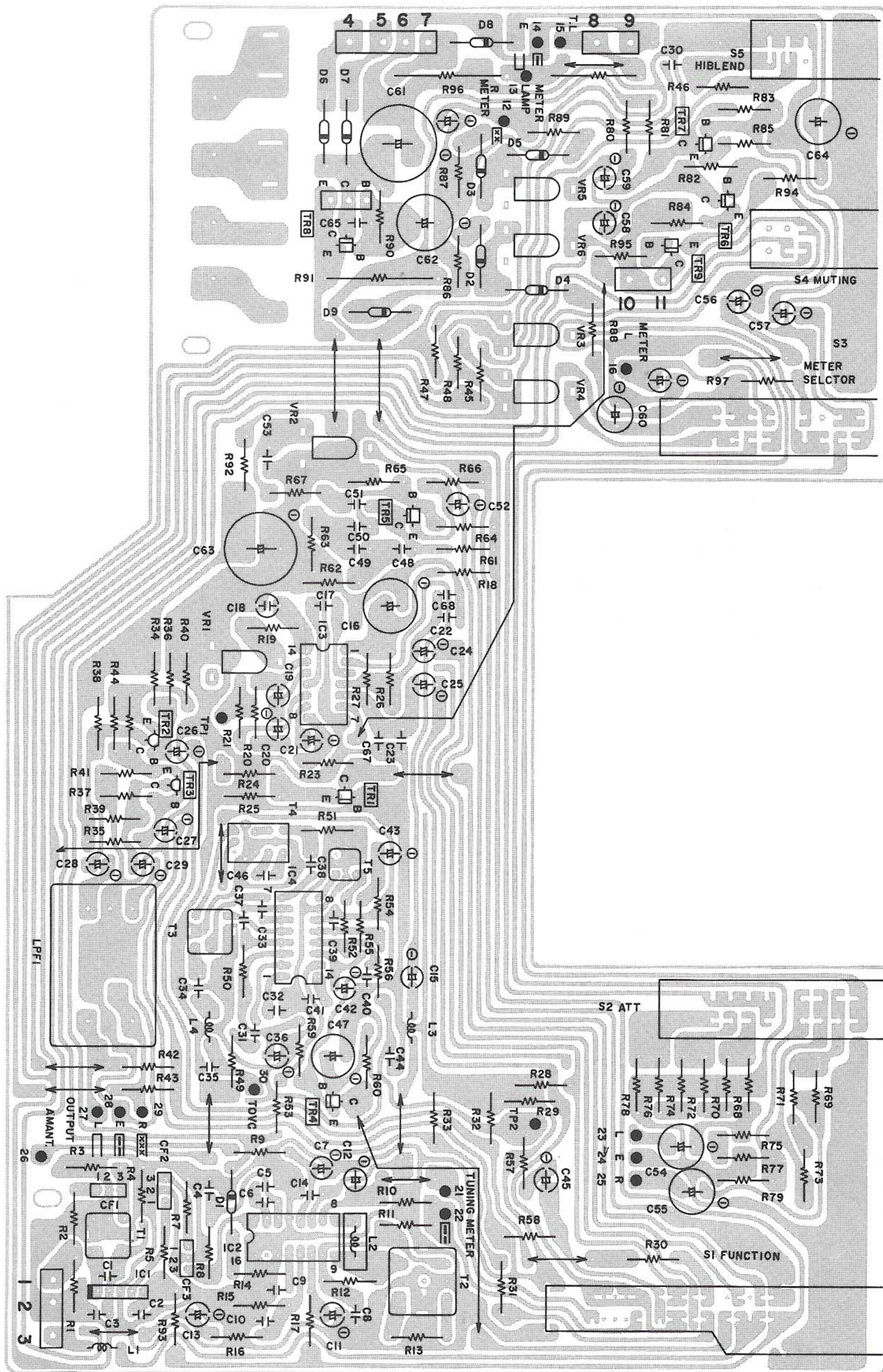
DISASSEMBLY INSTRUCTIONS



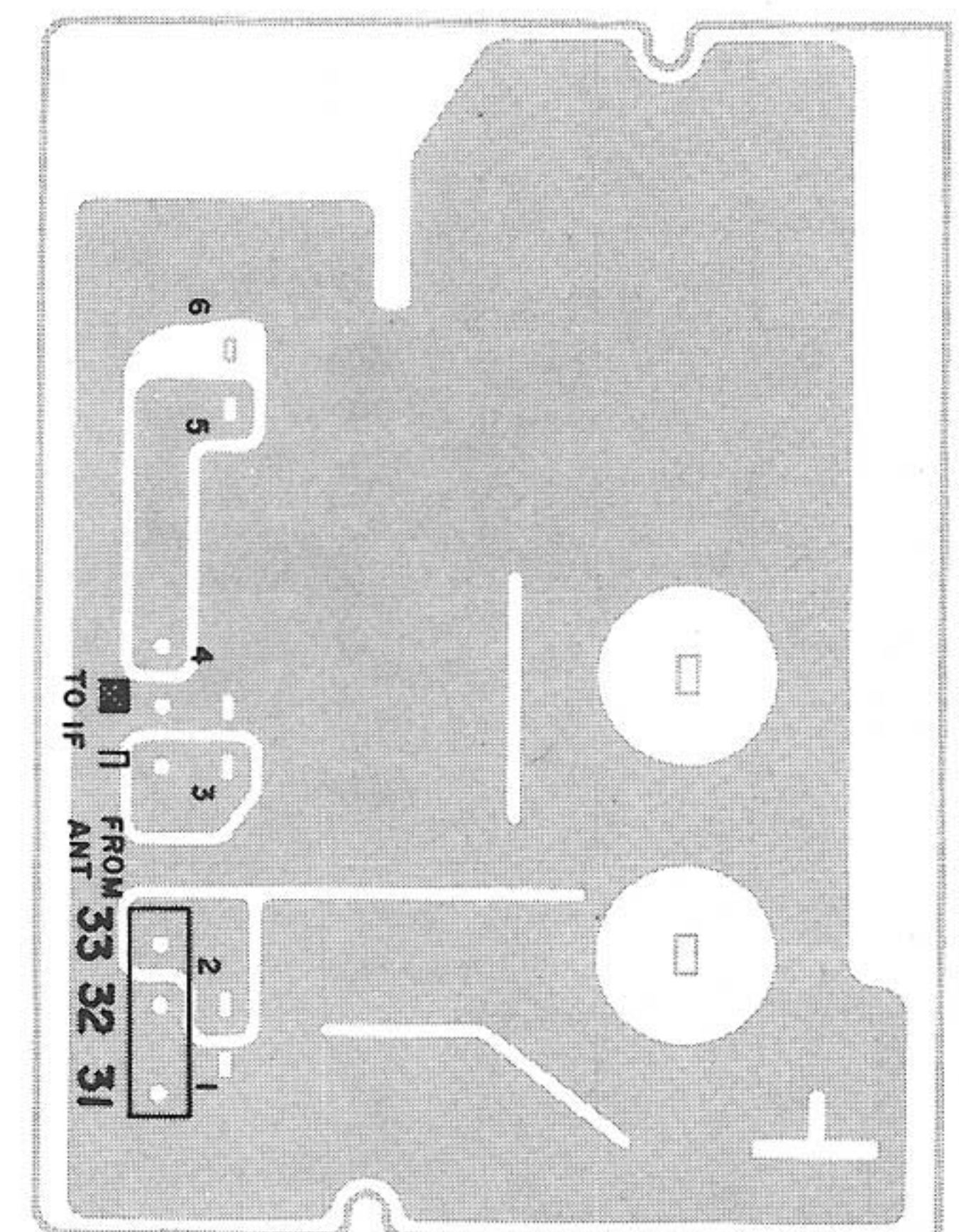
PRINTED CIRCUIT BOARD PATTERNS AND PARTS LIST

TUNER UNIT ETC-222B-1

ETC-222B-2



ETC-222B-3



## TUNER UNIT ETC-222B

Ref. No.	Part No.	Descriptions			
<b>Semi-conductors</b>					
IC1	2630031007	TA-7060P			
2	2630051003	HA-1137			
3	2630043008	HA-1156			
4	2630057007	HA-1197			
TR1,4,5,6,7	2730021043	2SC458(D)			
2, 3	2730098034	2SC1000GR			
8	2730112017	2SC1214(C)			
9	2710040028	2SA673(C)			
D1	2760049011	1S2076A			
2, 3, 4, 5	2760002029	1N60TV			
6, 7, 8	2760191008	W03C			
9	2760182004	1Z12A			
<b>Inductors</b>					
L1	TRT-565H18	820 $\mu$ H	INDUCTOR		
2	2312005034	20 $\mu$ H	INDUCTOR		
3, 4	TRT-565H23	3.3 $\mu$ H	INDUCTOR		
<b>Capacitors</b>					
C1	2533623004	68pF $\pm$ 5%	50V	CERAMIC CAPACITOR	
2,3,4,5, 6,8,9,10	2531024003	0.01 $\mu$ F+ 80%, - 20%	50V	CERAMIC CAPACITOR	
11, 15, 24 25, 26, 27	2544015009	10 $\mu$ F	16V	ELECTROLYTIC CAPACITOR	
12, 45	2544043000	0.47 $\mu$ F	50V	ELECTROLYTIC CAPACITOR	
13,19,56, 57,	2544044009	1 $\mu$ F	50V	ELECTROLYTIC CAPACITOR	
14	2533627000	100pF $\pm$ 5%	50V	CERAMIC CAPACITOR	
16, 64	2544019005	220 $\mu$ F	16V	ELECTROLYTIC CAPACITOR	
17,21,41, 53,	2551122008	0.047 $\mu$ F $\pm$ 5%	50V	PLASTIC FILM CAPACITOR	
18	2556091008	470pF $\pm$ 5%	50V	PLASTIC FILM CAPACITOR	
20, 43	2544033007	3.3 $\mu$ F	35V	ELECTROLYTIC CAPACITOR	
22, 23, 33	2551121025	0.01 $\mu$ F $\pm$ 5%	50V	PLASTIC FILM CAPACITOR	
28,29,58, 59	2544066003	2.2 $\mu$ F	50V	ELECTROLYTIC CAPACITOR	
30, 44	2551121041	0.015 $\mu$ F $\pm$ 5%	50V	CERAMIC CAPACITOR	
31,37,38, 39,65	2531024003	0.01 $\mu$ F+ 80, - 20 $\mu$ F	50V	CERAMIC CAPACITOR	
32, 40	2531004007	0.001 $\mu$ F $\pm$ 10%	50V	CERAMIC CAPACITOR	
34	2556087009	330pF $\pm$ 50%	50V	PLASTIC FILM CAPACITOR	
35	2533603008	10pF $\pm$ 0.5pF	50V	CERAMIC CAPACITOR	
36, 52	2544015009	10 $\mu$ F	16V	ELECTROLYTIC CAPACITOR	
42	2544034006	4.7 $\mu$ F	35V	ELECTROLYTIC CAPACITOR	
46	2533619005	47pF $\pm$ 5%	10V	CERAMIC CAPACITY	
47	2544018006	100 $\mu$ F	10V	ELECTROLYTIC CAPACITOR	
48, 49, 50	2551121067	0.022 $\mu$ F $\pm$ 5%	50V	PLASTIC FILM CAPACITOR	
54, 55	2544049004	47 $\mu$ F	50V	ELECTROLYTIC CAPACITY	

Ref. No.	Part No.	Descriptions		
C60	2544017007	47 $\mu$ F	16V	ELECTROLYTIC CAPACITY
61	2544041002	470 $\mu$ F	35V	ELECTROLYTIC CAPACITY
62	2544037003	47 $\mu$ F	35V	ELECTROLYTIC CAPACITY
63	2544028009	100 $\mu$ F	25V	ELECTROLYTIC CAPACITY
67, 68	2551120055	0.0027 $\mu$ F $\pm$ 5%	50V	PLASTIC FILM CAPACITOR
<b>Resistors</b>				
R1, 70, 71	2410310003	680 ohm $\pm$ 5%	1/4 watt	CARBON FILM RESISTOR
2, 18	2410296004	180 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
3, 4	2410306004	470 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
5, 20	2410308002	560 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
7, 97	2410312001	820 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
8,52,84,85	2410302008	330 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
9, 14	2410340002	12 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
10, 49	2410298002	220 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
11	2410336003	8.2 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
13, 16, 66	2410322004	2.2 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
15	2410354001	47 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
17, 93	2410270004	15 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
19, 25	2410342000	15 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
23, 28, 29, 32, 33, 58	2410362006	100 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
24,36,37,67	2410350005	33 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
26,27,30,	2410331008	5.1 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
31,45,56, 86,87,88, 89,90,92	2410314009	1 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
34, 35	2410374007	330 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
38,39,42, 43	2410326000	3.3 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
40, 41	2410300000	270 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
44,61,62,63	2410330009	4.7 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
46, 82, 83	2410765001	1 Mohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
47,48,54, 55,57,60,95	2410338001	10 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
50	2410318005	1.5 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
51	2410324002	2.7 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
53	2410304006	390 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
59	2410294006	150 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
64	2410376005	390 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
65	2410368000	180 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
68,69,80,81	2410334005	6.8 kohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
72, 73	2410280007	390 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
74, 75	2410297003	200 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
76, 77	2410271003	16 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
78, 79	2410290000	100 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
91	2440088017	150 ohm $\pm$ 5%	2watt	METAL OXIDE FILM RESISTOR
94	2410266005	10 ohm $\pm$ 5%	1/4watt	CARBON FILM RESISTOR
96	2440070009	4.7 ohm $\pm$ 5%	2watt	METAL OXIDE FILM RESISTOR

## CHASSIS GROUP PARTS LIST

Ref. No.	Part No.	Descriptions
	2311029008	AM ANT. COIL
	DL-7231H	ANT. GUIDE ASS
	2150028008	TUNING METER ASS
	2150027009	LEVEL METER ASS
	4520014307	POINTER
	4210024209	DRUM WHEEL
	4520027006	DRUM
	2335025114	POWER TRANS
	2061015003	FUSE 0.5A (TIME LAG)
	2020012005	FUSE HOLDER
	2124057005	LEVER SWITCH (FOR POWER SWITCH)
	1120075406	KNOB ASS (FOR TUNING)
	1120134208	KNOB ASS (FOR FUNCTION)

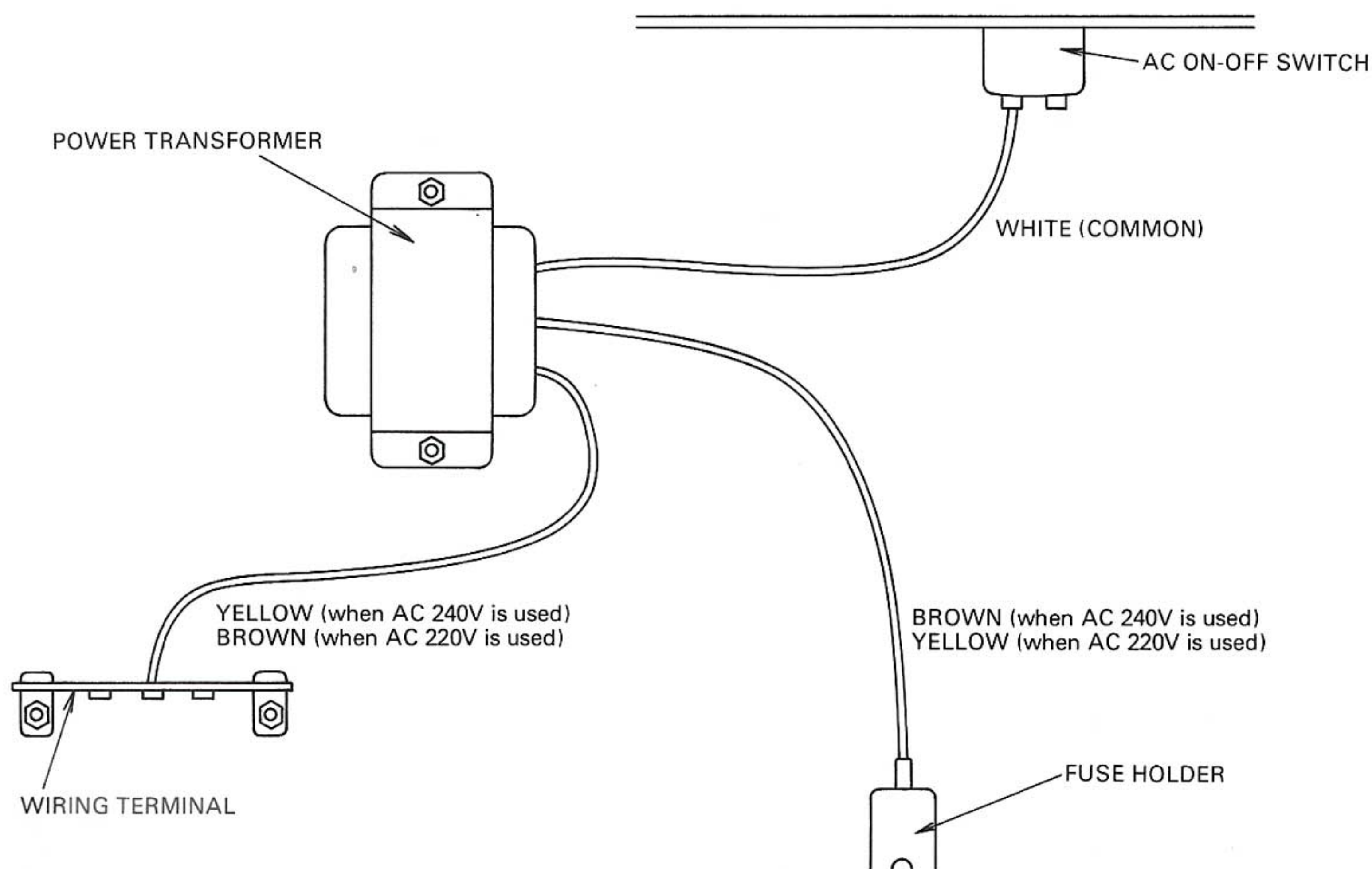
Ref. No.	Part No.	Descriptions
	1130074206	LEVER KNOB (FOR POWER, HIGH-BLEND, MUTING, METER SELECTOR AND EXT-ANT.)
	1440263202	FRONT PANEL
	1430026310	FRONT COVER
	1430029317	DIAL MASK
	1430071200	IND. PLATE ASS
	4220083214	DRIVING SHAFT ASS
	MD-4681H	DIAL WHEEL
	1020044210	TOP COVER
	1050143505	BOTTOM COVER
	1050157009	BACK PANEL
	3930016006	LAMP (8V, 0.2A)
	2220127004	CIRCUIT BOARD
	2050061000	4P. TERMINAL

## METHOD OF ADJUSTMENTS

INPUT SIDE								OUTPUT SIDE				
STEP	ITEM	DIAL SETTING	INSTRUMENT	FREQ.	INPUT LEVEL	MODULATION	COUPLING	INSTRUMENT	CONNECTION	ADJUST	ADJUST LIMIT	REMARKS
FM SECTION												
1	T <sub>2</sub> preadjust				no signal			tuning meter		bottom core of T <sub>2</sub>	center position of tuning meter	
2		98 MHz	FM SG	98 MHz	60 dB $\mu$	1 kHz, 100%	Ant. 300 $\Omega$ terminal	tuning meter		Adjust dial so the tuning meter reading is at the center.		
3	T <sub>2</sub> Detector Trans.	same	same	same	same	same	same	distortion meter	output terminal (L)	top core of T <sub>2</sub>	minimum distortion	Check discrepancies in (1) by means of (3) and adjust if necessary.
4	19 kHz	same	same	same	same	same	same	frequency counter	Through 100 k $\Omega$ to TP <sub>1</sub>	VR <sub>1</sub>	19 kHz $\pm$ 100 Hz	Tuning at center position of tuning meter.
5	T <sub>1</sub>	same	Stereo modulator, FM SG	same	80 dB $\mu$	1 kHz, 45% (L or R) PL 10%	same	distortion meter	output terminal (L or R)	T <sub>1</sub>	minimum distortion	Tuning at center position of tuning meter.
6	Front end IFT.	same	same	same	same	same	same	same	same	Front end IFT	same	The following item not necessary if under 0.2% up to this point.
7	T <sub>1</sub>	same	same	same	60 dB $\mu$	same	same	same	same	T <sub>1</sub>	check to ensure under this is 0.2%.	If above 0.2%, adjust T <sub>1</sub> to within 0.15% to 0.2%.
8	—	—	—	—	no signal	—	—	tuning meter	—	—	center position of tuning meter	If not at the center, readjust (1) to (7).
9	DIAL CALIBRATION	—	—	—	—	—	—	same	—	with VC blades in retracted condition, adjust pointer to edge of dial and secure.		
88 MHz		FM SG	88 MHz	40 dB $\mu$	—	Ant. 300 $\Omega$ terminal	same	—	—	center position of tuning meter	frequency limit 88 MHz $\pm$ 170 kHz 98 MHz $\pm$ 100 kHz 108 MHz $\pm$ 170 kHz Check to ensure that the discrepancy is within the rated value when adjusting to 88 and 108 MHz respectively. If it does not conform, readjust with LO, CTO of Frontend.	
98 MHz		same	98 MHz	same	—	same	same	—	—	same		
108 MHz		same	108 MHz	same	—	same	same	—	—	same		
AM SECTION												
1	AM IF wave form		SWEEP. SG	455 kHz $\pm$ 10 kHz	—	—	bar antenna with loop antenna	oscilloscope	TP <sub>2</sub>	T <sub>4</sub>	adjust close to standard wave form	
2	DIAL CALIBRATION	600 kHz	AM SG	600 kHz	—	400 Hz 30%	same	VTVM	TP <sub>2</sub> or output terminal	T <sub>3</sub>	tune at	
3		1400 kHz	same	1400 kHz	—	same	same	same			tune at	
4	Repeat step (2) and (3) and adjust so the discrepancy is under $\pm$ 10 kHz and $\pm$ 20 kHz at 600 kHz and 1,400 kHz respectively.											
5	TRACKING	600 kHz	AM SG	600 kHz	—	400 Hz 30%	bar antenna with loop antenna	VTVM	TP <sub>2</sub> or output terminal	bar antenna	maximum	Insert screwdriver on the side opposite to the bar antenna lead wire and turn.
6		1400 kHz	same	1400 kHz	—	same	same	same	same	AM ANT. VC Trimmer	maximum	
7	Repeat steps (5) and (6) and adjust for minimum tracking error.											
LEVEL METER												
		—	O.S.C	1 kHz	2.45V	—	external input	level meter	—	VR 5 and 6	level meter 0dB	METER SW: POWER OUT EXT. ATT.: 10 dB
INDICATION OF TUNER OUTPUT												
		98 MHz	FM SG	98 MHz	60 dB $\mu$	100%	Ant. 300 $\Omega$ terminal	level meter	—	VR 3 and 4	level meter 0 dB	METER SW: LEVEL
CIRCUIT OF RECORDING LEVEL CHECK												
1	Adjustments of tuner output level indications to be completed.											
2								level meter	—	VR <sub>2</sub>	level meter -6 dB	FUNCTION SW: REC LEVEL

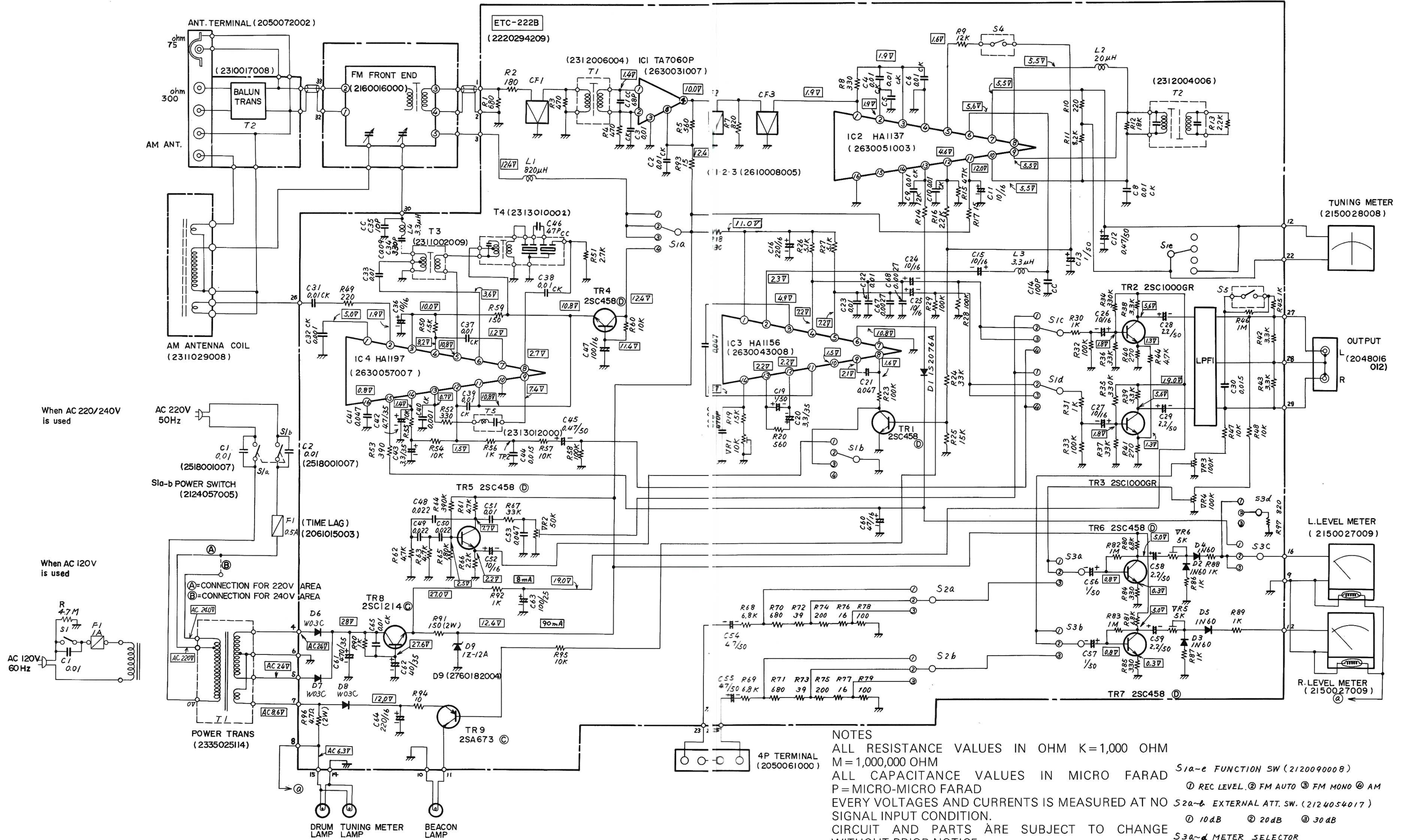
## VOLTAGE CHANGEOVER

If change of voltage is necessary, as shown in figure.



WIRING DIAGRAM

WIRING DIAGRAM



NOTES  
 ALL RESISTANCE VALUES IN OHM K=1,000 OHM  
 M = 1,000,000 OHM  
 ALL CAPACITANCE VALUES IN MICRO FARAD  
 P = MICRO-MICRO FARAD  
 EVERY VOLTAGES AND CURRENTS IS MEASURED AT NO SIGNAL INPUT CONDITION.  
 CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

S1a-e FUNCTION SW (2120090008)  
 ① REC LEVEL. ② FM AUTO ③ FM MONO ④ AM  
 S2a-b EXTERNAL ATT. SW. (2124054017)  
 ① 10dB ② 20dB ③ 30dB  
 S3a-d METER SELECTOR  
 ① POWER OUT ② LEVEL ③ SIGNAL/R.LEVEL  
 S4 MUTING SW. (2124075003)  
 S5 HIBLEND SW. (2124075003)

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# DENON

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