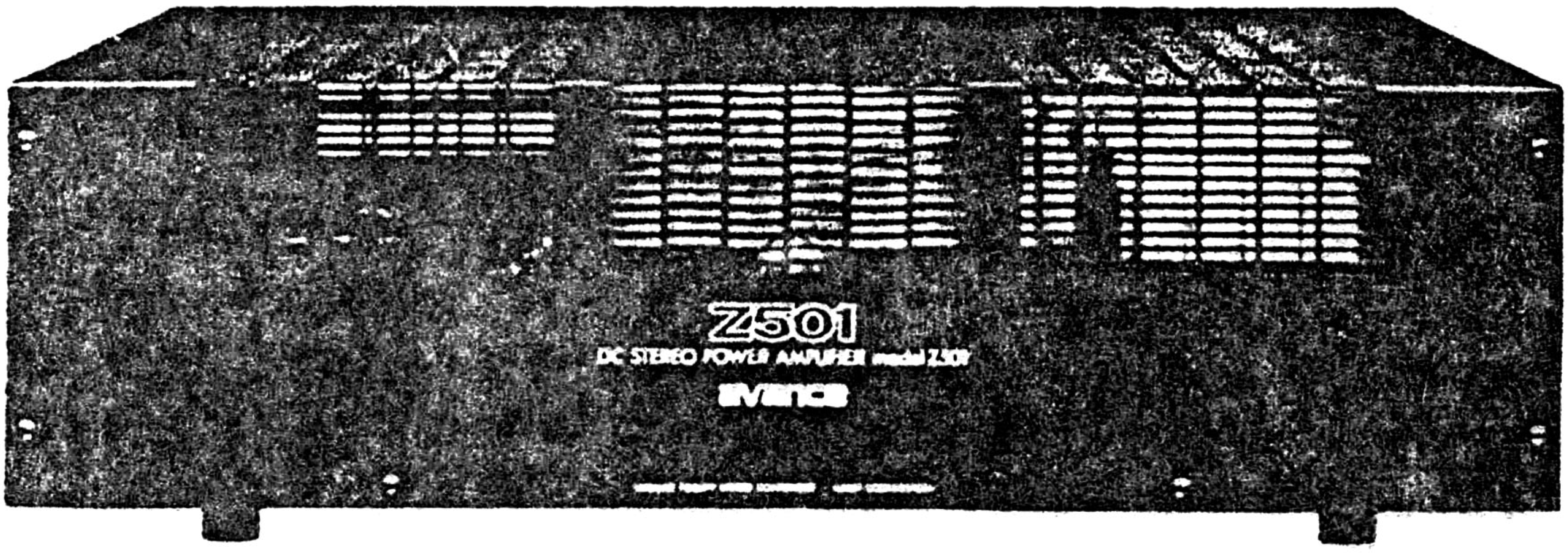
avance

SERVICE MANUAL



Z501

DC STEREO POWER AMPLIFIER

MANUFACTURED BY LUXKIT CORPORATION ; JAPAN

When the L-ch and R-ch amplifier is connected in BTL, the Z501 operates as a 300W monaural power amplifier. When the Operation Selector Switch is set to the "Class A" position, the Z501 becomes Class A operated monaural 25W power amplifier, and in this case maximum output power is extended to 100W including Class AB operation range.

Technical Specifications

	STEREO(Class A)	STEREO(Class AB)	MONAURAL
OUTPUT POWER	25W + 25W (8 ohms, both channels driven, 20Hz - 20kHz)	100W + 100W (8 ohms, both channels driven, 20Hz - 20kHz)	100W(8 ohms, 20Hz-20kHz, Class A) 300W(8 ohms, 20Hz-20kHz, Class AB)
Total Harmonic Distortion.	no more than 0.007% (8 ohms, 25W + 25W, 20Hz- 20kHz)	no more than 0.01% (8 ohms, 100W+100W, 20Hz-20kHz)	no more than 0.04% (8 ohms, 100W, 20Hz-20kHz, Class A) no more than 0.05% (8 ohms, 300W, 20Hz-20kHz, Class AB)
Rated I.M.:	no more than 0.005% (8 ohms, 25W+25W, 60Hz:7kHz=4:1)	no more than 0.007% (8 ohms, 100W+100W, 60Hz:7kHz=4:1)	no more than 0.015% (8 ohms, 100W, 20Hz-20kHz, Class A) no more than 0.015% (8 ohms, 300W, 20Hz-20kHz, Class AB)
Frequency Response:	5Hz - 200,000Hz (-1dB)		5Hz - 100,000Hz (-1dB)
Input Impedance:	90k ohms		
Signal-to-Noise Ratio:	105dB (IHF-A, input short-circuited)	115dB(IHF-A, input short-circuited)	110dB (IHF-A, Class A) 120dB (IHF-A, Class AB)
Residual Noise:	no more than 0.3mV	no more than 0.2mV	no more than 0.4mV
Channel Separation:	better than 80dB(1kHz)		
Damping Factor:	90 (8 ohms, 1kHz)		60 (8 ohms, 1kHz)
Power Consumption:	190W	max. 400W	max. 250W (Class A) max. 650W (Class AB)
Additional Features:	Input Level Control, Class A/Class AB Selector, Stereo/Monaural Selector, Speaker Protection Circuit by sensing DC, Excessive Current Limitter etc.		
Dimensions:	445(W) x 304(D) x 143(H) mm		
Weight:	Net 10.5 kgs		

Specifications and appearance design subject to change without notice.

Duo-Beta Circuit

The Duo-Beta circuit is a total circuit technique developed by LUXKIT CORPORATION; DC servo is coupled with the DC amplifier where optimum amount of negative feedback is applied.

Negative feedback is a circuit device to extend bandwidth and reduce distortion. But once the principles of feedback were discovered, is was often used as a corrective device rather than as basic element of circuitry. It can, however, cause as many problems as it can solve. Negative feedback can reduce total harmonic distortion (THD), but in so doint, can incrase transient intermodulation distortion (TIM). TIM is more disturbing to the listener, and a small percentage of TIM is worse than the same or even more THD.

Our designing policy was to create an amp of inherently good characteristics in the "open-loop" condition and then to apply the minimum amount of nogative feedback in the most effective way and our original DC servo circuit. Such circuitry used in the Z501 performs better without feedback than most do with.

DC Servo Circuit

The DC servo circuit is developed to obtain higher DC stability by feeding back the DC ingredients at the ultra low frequency below the audible frequency range. Although the cut-off frequency (DC servo begins operation) lies in the ultra low frequency beyond audible frequency range, auditory feeling differs much according to the fixed cut-off frequency.

The idea of optimum negative feedback tends to cause insufficient damping, but application of DC servo increases damping at the ultra low frequency range, which works to compensate the insufficiency.

When the cut-off frequency is set high, bass range becomes insufficient, while when it is set low, response becomes slow to cause deterioration of DC stability. Therefore, listening test is indispensable for setting the final cut-off frequency.

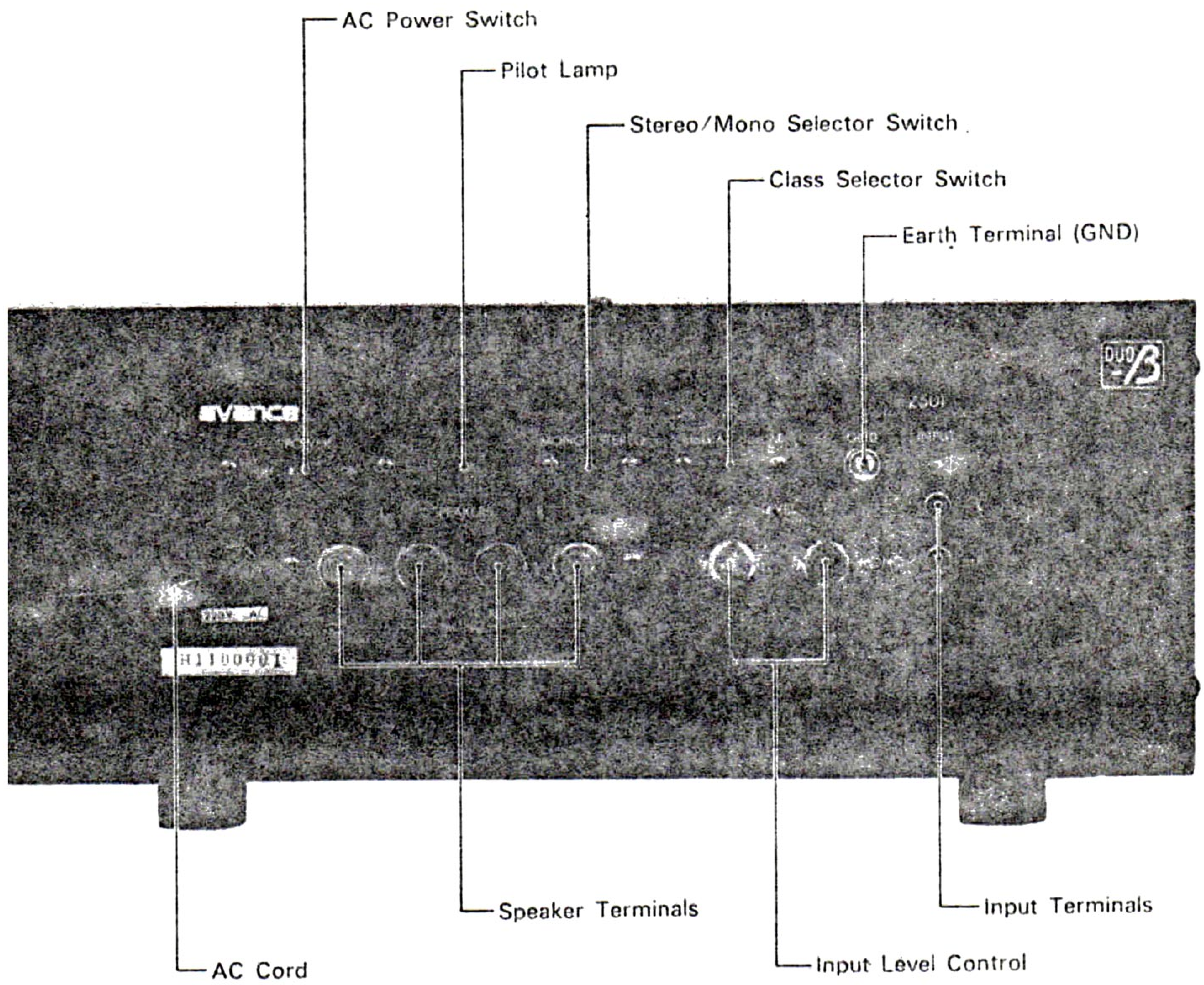
Selection between Class A and Class AB

Class A and Class AB operation can be selected by a switch. A relay selects the voltage at the output stage, and the switch selects the quiescent current. A huge output power of 100 watts per channel can be obtained in Class AB operation, while it becomes 25W per channel in Class A operation.

Monaural Connection (BTL)

The BTL (Balanced Transformer-Less) connection is the circuit where two pairs of SEPP circuit is connected in bridge, and loads are connected to each center point of the two pairs of SEPP circuits, and each pair of SEPP is driven by phase-inverted signal to obtain the output voltage two times as much as that of single SEPP circuit. In this case, the output power becomes four times as mucn as that of single SEPP circuit, but the actual power is reduced a little due to regulation of power transformer, etc. That is to say, two amplifiers are necessary for BTL connection, and each amplifier accepts in-phase signal and phase-inverted input signal respectively, and outputs of the two amplifier are synthesized in series at the output stage.

SWITCHES & TERMINALS



Blink of Pilot Lamp

When the Power Switch is selected to the "ON" position, the Pilot Lamp begins blinking, then it stays lit when the muting relay is turned on to put the amplifier in the perfect operational condition. The Pilot Lamp also blinks when the protector circuit is operated. The protector circuit operates when a DC voltage exceeding approximately $\pm 2.5V$ is detected at the Speaker Terminal.

Connection of Loudspeaker Systems

In case loudspeaker systems are connected to the Speaker Terminals of the Z501, note that the way of connection is different between STEREOPHONIC and MONAURAL use. Connect as per the following guide.

(1) STEREOPHONIC CONNECTION

Connect the (+) terminal of the Lch speaker system to the RED terminal (L), and the (-) terminal to the BLACK terminal (L) of the Z501 respectively. Likewise the (+) terminal of the Rch speaker system to the RED terminal (R), and the (-) terminal to the BLACK terminal (R).

(2) MONAURAL CONNECTION

Connect the (+) terminal of the speaker system to the RED terminal (R), and the (-) terminal to the RED terminal (L).

CAUTION: In case the Z501 is used in MONAURAL connection, use the two RED terminals for connection of the speaker system. At this time, never connect the REC terminal (L) [marked as (-)] to another two BLACK terminals or the GND terminal. In such a connection, output may be short-circuited to cause damage. The same can be applied when speaker selector, etc. is used for connection. Also, be careful that the core leads of speaker cable should not touch the panel surface or other cable leads.

Connection of Preamplifier

Connect the output of preamplifier to the Input Terminal of the Z501. In case the Z501 is used in STEREOPHONIC connection, be sure not to make mis-connection between the left and right channel. While when it is used in MONAURAL connection, the Rch Input Terminal accepts monaural input, and the Lch Input Terminal is grounded via 330-ohm resistor.

Selection between STEREO and MONAURAL

When the Z501 is used for stereophonic power amplifier, set the STEREO/MONAURAL Selector Switch to the "STEREO" position, while when it is used for monaural power amplifier, set the switch to the "MONO" position. Note that, when selection ismade between stereo and monaural, the Power Switch should be turned off, as otherwise noises are caused or normal operation may not be secured. To prevent mis-selection, be sure to fix the stopper after selection.

Selection betwen Class A/Class AB Operation

In case Class AB operation is desired, set the Operation Selector Switch to the "Class AB" position, while for Class A operation, set the switch to the "Class A" position. When the selection is made during playback, reproduction is cut off for approximately 5 seconds to prevent a thump noise, which is not a trouble.

NOTE: In case the Z501 is used for Class A operated monaural amplifier, the maximum output reaches 100 watts, but the range of class A operation is below 25 watts. The output power from 25W to 100 is driven out in Class AB operation.

Input Level Control

The signals applied to the Input Terminal can be adjusted to an appropriate level by use of the Input Level Control. When the Z501 is operated in monaural connection, only the Rch control is effective.

About Heat Generation

Since the Z501 is a power amplifier, heat may be generated much according to its operational condition. Especially when the Z501 is operated in Class A, temperature increases much even at idling (no input signal applied) condition. Therefore, more than 5cm-space should be given above the top bonnet of the Z501, and never remove the four legs to ensure sufficient ventilation.. The temperature rise caused by the generated heat does not matter for normal operation.

Placement of the Z501

The Z501 employes a huge power transformer, which generates some leakage flux. Therefore, it is advisable to set such components as MC head-amplifier or preamplifier that tends to be affected by the flux apart from the Z501 as much as possible.

Noises from Pipe-Centered Heat Sink

When the Z501 is operated in quiet atmosphere, you will sometimes hear noises from heat sink. The noise is caused when the liquid packed in the pipe is boiled up, which shows the heat sink operates normally.

ALIGNMENT PROCEDURE

1. Set up the unit

1) Input Level Control ---------------- Min.
2) MODE Switch ---------------- Stereo
3) Amplification Mode Selector --------- Class AB

2. Class AB

1) DC Offset
Connect a DC volt-meter to P1/Left, P2/Right; terminals on P.C.B. (CB-A501P), and adjust to turn "DC BALANCE" variable resistor so that the parameter comes within $\pm$0.1V. (Refer Fig. 1)

2) Bias (Idling) Current
Remove a white cable connected to J1/Left, J2/Right; terminals on P.C.B. (CB-A501P), and connect to it a DC ampere-meter (200-300mA). Adjust respectively to turn "AB-I" variable resistor to get 160mA in the ampere-meter. (Refer Fig. 1)

3. Class A

1) DC Offset
Connect a DC volt-meter to P1/Left, P2/Right; terminals on P.C.B. (CB-A501P), and adjust to turn "DC BALANCE" variable resistor so that the parameter comes within $\pm$0.1V.

2) Bias (Idling) Current
Remove a white cable connected to J1/Left, J2/Right; terminals on P.C.B. CB-A501P, and connect it to a DC ampere-meter (1.5-2.0A). Adjust respectively to turn "A-1" variable resistor to get 1.25A in the ampere-meter.

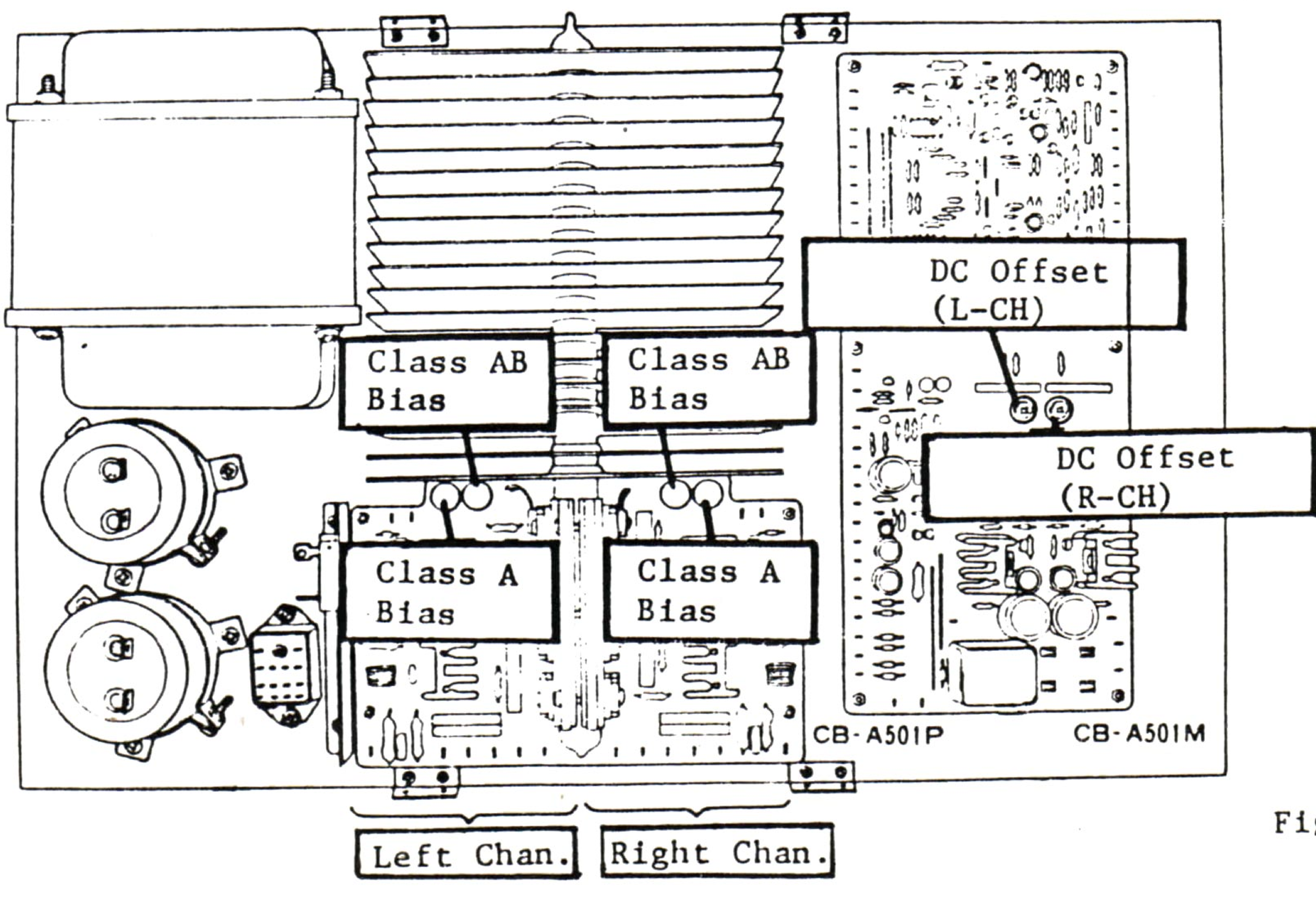


Fig. 1

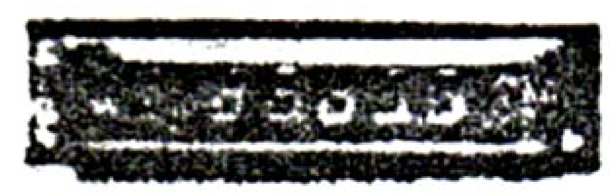
LED, VR, SW. other

Ref.No.	Stock No.	Description	Remark	Ref.No.	Stock No.	Description	Remark
O-8	UH5013	Center Bar		C-2	SP5055	Switch, Tuning, Muting, Rec Cal/ Clock Set	
O-11	LA5030	Front End	J				
	LA1916		F				
O-12	PT5124	Power Trans-former	FB, FG	C-3	SP5056	Switch	
				C-4	SR5061	Switch, Time Mode	
	PT5125		FZ				
	PT5126		FK	C-5	AT0015	Terminal, Output	
O-13	TT5011	F.L. Display					
				C-6	AT0086-A	Terminal, ANT.	
B-2	TD5029	LED, LD702uW		C-7	AC0051	AC. Autlet	
B-3	TD5030	LED, SPR-54MuW		C-8	BU0033	Bushing	FZ, FK
					BU0039		FB, FG
B-4	LA1052	Balun		C-9	UR5065	Bracket for lamp holder	
B-5	SP5034	Switch, Key					
				C-10	UR5062	L. Plate	
C-1	RV5074	VR, Output level		C-11	WZ5056	Holder, lamp	
				C-12	AS5056	Holder, Battery	


O-8


O-11


O-12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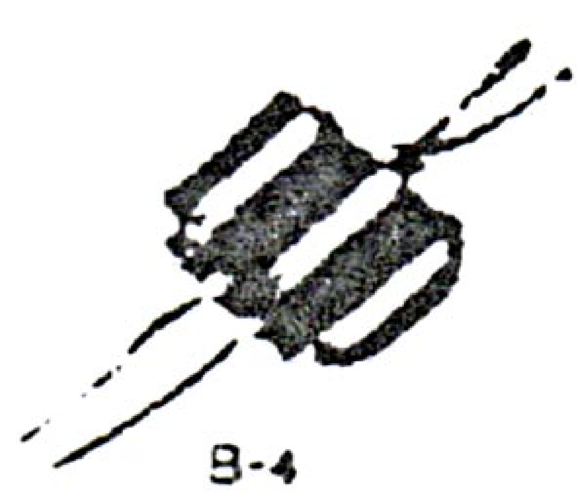
B-2


B-3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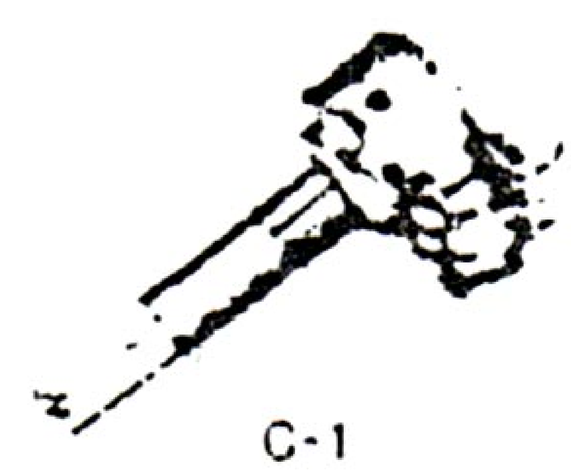
B-5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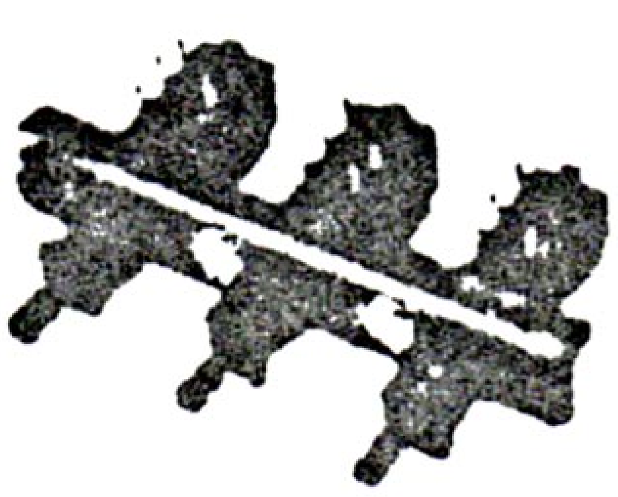
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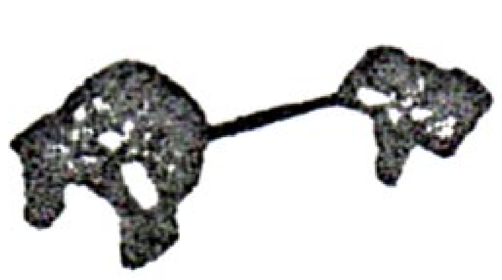
C-3


C-4


C-5


C-6


C-7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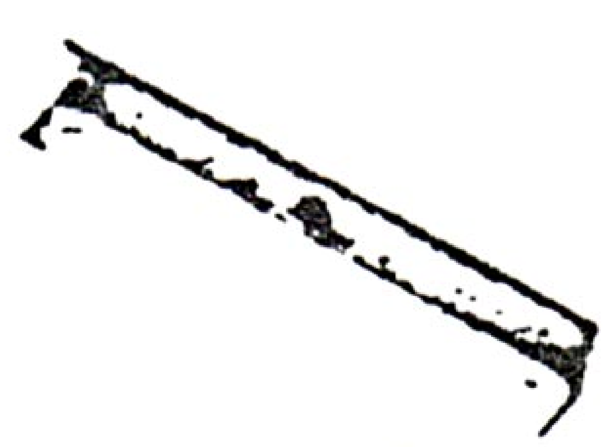
C-9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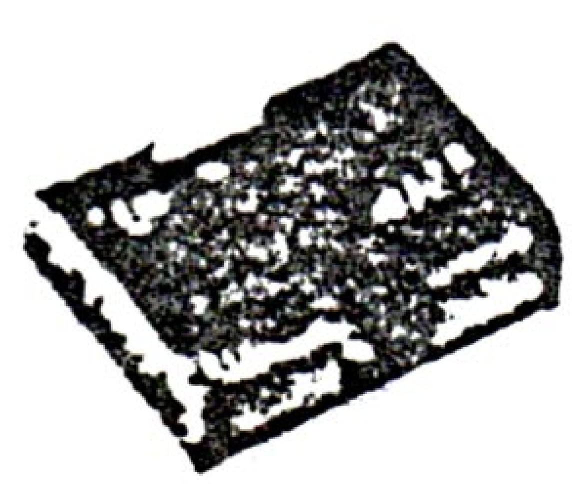
C-11


C-12

PARTS LIST --- P.C.B.

Remark
Capaciton: St --- Styrol, Mi --- Mica, Ac --- Ac cap.,
Fi --- Film, El --- Electro.

CB-A501 M --- Muting, Pre driven, Power Supply

Ref No.	Stock No.	Description	Remark
	RB0340	47ohm 1/4W	
	RB0346	82ohm 1/4W	
	RB0348	100ohm 1/4W	
	RB0350	120ohm 1/4W	
	RB0369	750ohm 1/4W	
	RB0364	470ohm 1/4W	
	RB0366	560ohm 1/4W	
	RB0376	1500ohm1/4W	
	RB0378	1800ohm1/4W	
	RB0382	2700ohm1/4W	
	RB0390	5600ohm1/4W	
	RB0400	15kohm 1/4W	
	RB0418	82kohm 1/4W	
	RB0428	220kohm1/4W	
	RB0426	180kohm1/4W	
	RB0444	1Mohm 1/4W	
	RD2608	12kohm 1/2W	
	RS5033	39kohm 1W	
	CQ0243	0.027µF Fi	
	CQ0260	0.068µF Fi	
	CQ5083	0.1µF Fi	
	CQ1334	1uF Fi	
	CQ0069	5600pF St	
	CM0164	5 pF Mi	
	CM0135	7 pF Mi	
	TD0197	DiodeUS1070	
	TD0060	Zener WZ061	
	TV0030	Varistor KB265C4	
	TR0237	TR2SA949	
	TR5005	TR2SA970	
	TR0236	TR2SC2229	
	TR5004	TR2SC2240	
	TF5004	FET2SK150Y	
	TC5002	ICNJM4558D	

Ref No.	Stock No.	Description	Remark
	RB0372	1000ohm1/4W	
	RB0380	2200ohm1/4W	
	RB0384	3300ohm1/4W	
	RB0388	4700ohm1/4W	
	RB0394	8200ohm1/4W	
	RB0396	10kohm 1/4W	
	RB0400	15kohm 1/4W	
	RB0404	22kohm 1/4W	
	RB0406	27kohm 1/4W	
	RB0412	47kohm 1/4W	
	RB0420	100kohm1/4W	
	RB0444	1Mohm 1/4W	
	RB0452	2.2mohm1/4W	
	RD2594	3300ohm1/2W	
	RS2714	47ohm 1W	
	RS5042	4700ohm2W	
	CQ0120	0.47µF	
	CE1721	100µF 16V	
	CE1729	22µF 25V	
	CE1739	10µF 35V	
	CE1743	100µF 35V	
	CE1777	10µF 100V	
	CE1778	22µF 100V	
	CE1782	220µF 100V	
	CE0937	100µF25V BP	
	TD0197	DiodeUS1070	
	TD0004	DiodeIN4004	
	TD0018	DiodeIK188	
	TD0023	Zener WZ071	
	TD0109	Zener WZ150	
	TR0043	TR2SA733	
	TR5005	TR2SA970	
	TR0029	TR2SC945	
	TR0264	TR2SC2235	
	TR5004	TR2SC2240	
	TR5014	TR2SA1011	
	TR5015	TR2SC2344	
	RT0010	Variable Resistor 47kohm(B)	
	AY0001	Relay MAT2B-CH	

CB-A501P --- Driver, Final

Ref No.	Stock No.	Description	Remark
	RB0350	120ohm 1/4W	
	RB0356	220ohm 1/4W	
	RS5049	56ohm 1/4W	
	RS5051	10ohm 1/2W	
	RS2709	10ohm 1W	
	RS5044	10ohm 2W	
	RS2591	220ohm 2W	
	RS5017	1000ohm 2W	
	RG0600	0.22ohm5Wx2	
	CQ0691	0.1uF Fi	
	CQ0120	0.47uF Fi	
	CM0114	22pF Mi	
	CM0068	100pF Mi	
	TD0069	DiodeIN4448	
	TV0020	Varistor STV-3H	
	TR0029	TR2SC945	

Ref No.	Stock No.	Description	Remark
	TR5014	TR2SA1011	
	TR5015	TR2SC2344	
	TR0294	Power TR. 2SA1106	
	TR0295	Power TR. 2SC2581	
	RT0007	Variable Resistor 470ohm	
	RT0008	Vaiable Resistor 1kohm	
	LA1020	Coil LUX1020	
	BE5007	Heat Sink T-220F 25mm	

Mounting Parts for Bottom Board

Ref No.	Stock No.	Description	Remark
	RB0446	1.2Mohm R25	
	RS5044	10ohm 2W	
	RS5014	4700ohm 3W	
	RG5009	0.47ohm 3W	
	CQ0111	2.2uF Fi	
	CU0012	0.01uF Ac	
	TD0004	DiodeIN4004	
	TD0122	Bridge Diode S15VB40	

Ref No.	Stock No.	Description	Remark
	AY5014	Relay MAT4-CHJ	
	CQ0170	CQ09-1H-471J St	
	CE1710	10TW47MS El	
	CM0056	33pF Mi	
	CE5062	15000uF 63V El	

NOTE

In this manual the parts, which differs depending on destination and mains voltage, are classified and indicated as follow.

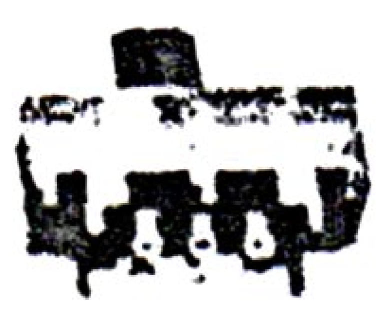
EB --- 240V For Australia (With Line Voltage Selector)
EG --- 240V For England, Oceania (With Line Voltage Selector)
EK --- 220V For Europe, South-East Asia, Middle East Asia, Middle South America (With Line Voltage Selector)
EZ --- 120V For North America, South East Asia, Middle East Asia, Middle South America (With Line Voltage Selector)

Cosmetic, V.Resistor, Switch, P.Transformer, Other

Ref No.	Stock No.	Description	Remark
E-1	RV5033	Variable Resistor (100KA)	
E-2	SS0014	Switch Slide (Mono, Stereo)	
E-3	SS5008	Switch Slide (Class A,AB)	
E-4	SS5025	Switch (Power)	
E-5	AT0015	Terminal (Input)	
E-6	AT0110	Terminal (Speaker)	
E-7	AH0020	Fuse Holder	
E-8	BU0033	Bushing	EK,EZ, FK,FZ
	BU0039		EB,EG
E-9	TD5013	LED	

Ref No.	Stock No.	Description	Remark
E-10	WH1019	Foot	
E-11	WZ5057	Metal-fitting for Bonnet	
E-12	WJ0001	Knob(Level)	
E-13	WZ5063	Switch Stopper	
O-1	BE5008	Heat Pipe	
O-2	WB5008	Bottom Board	
O-3	WB5009	Side Board A	
O-4	WB5010	B	
O-5	UC5042	Panel	
O-6	UG5028	Bonnet	
O-7	WS5090	Sticker	
O-8	PT5131	Power Trans. P-2552	E
	BK0022	Power Cord	EK
	BK0019		EZ,FZ
	BK0023		EG,EB


E-1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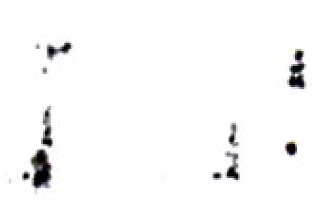
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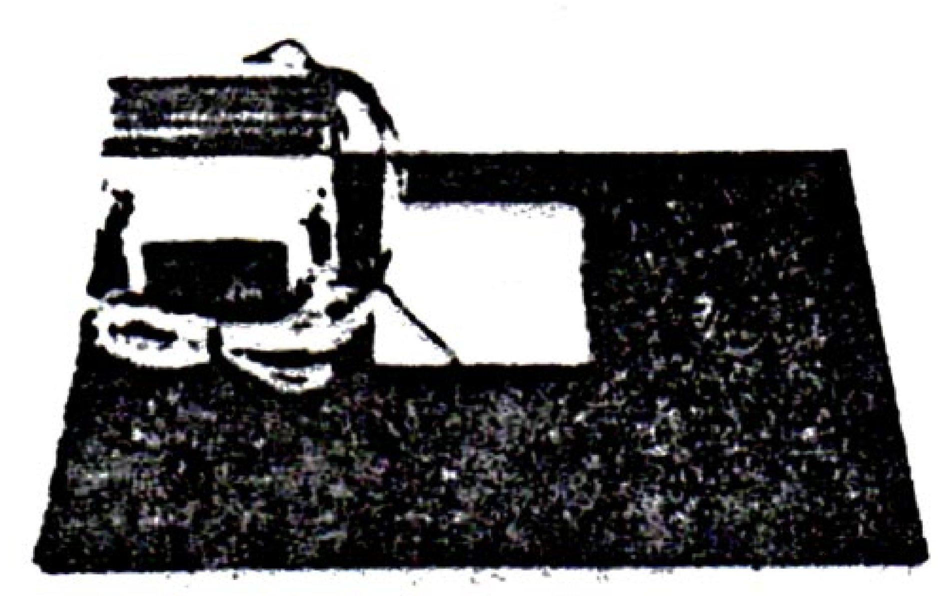
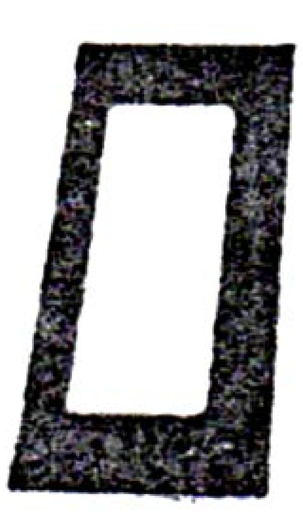
O-1


O-8 O-2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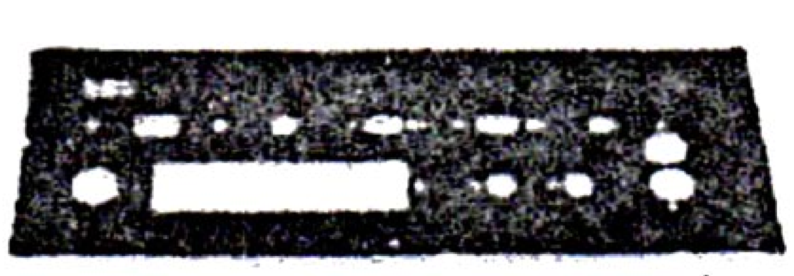
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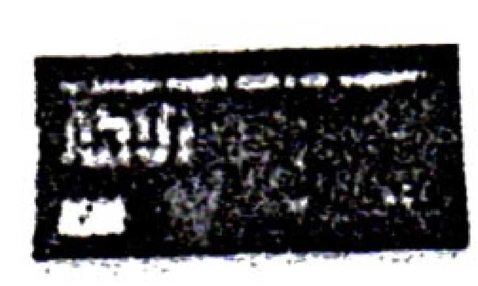
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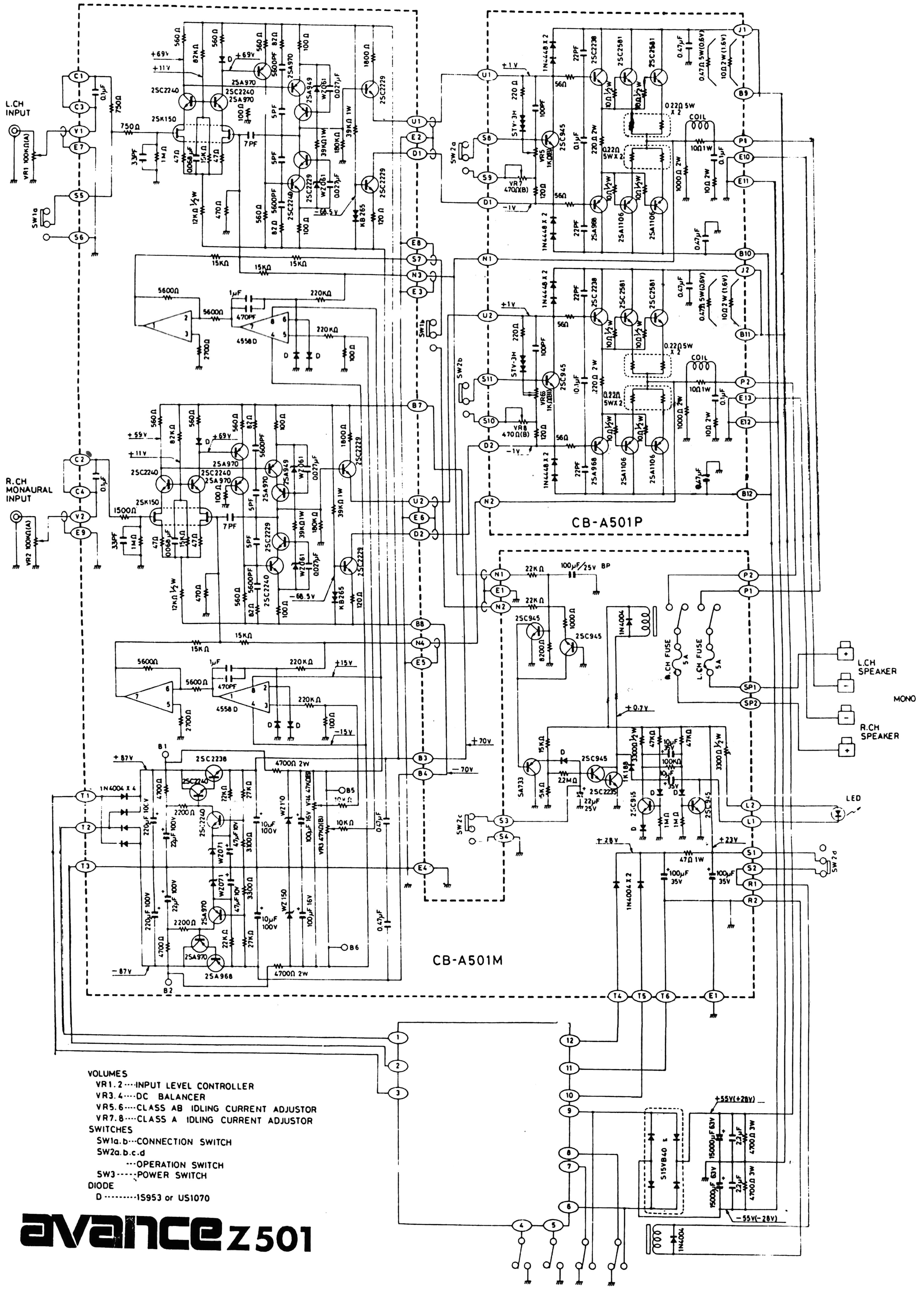
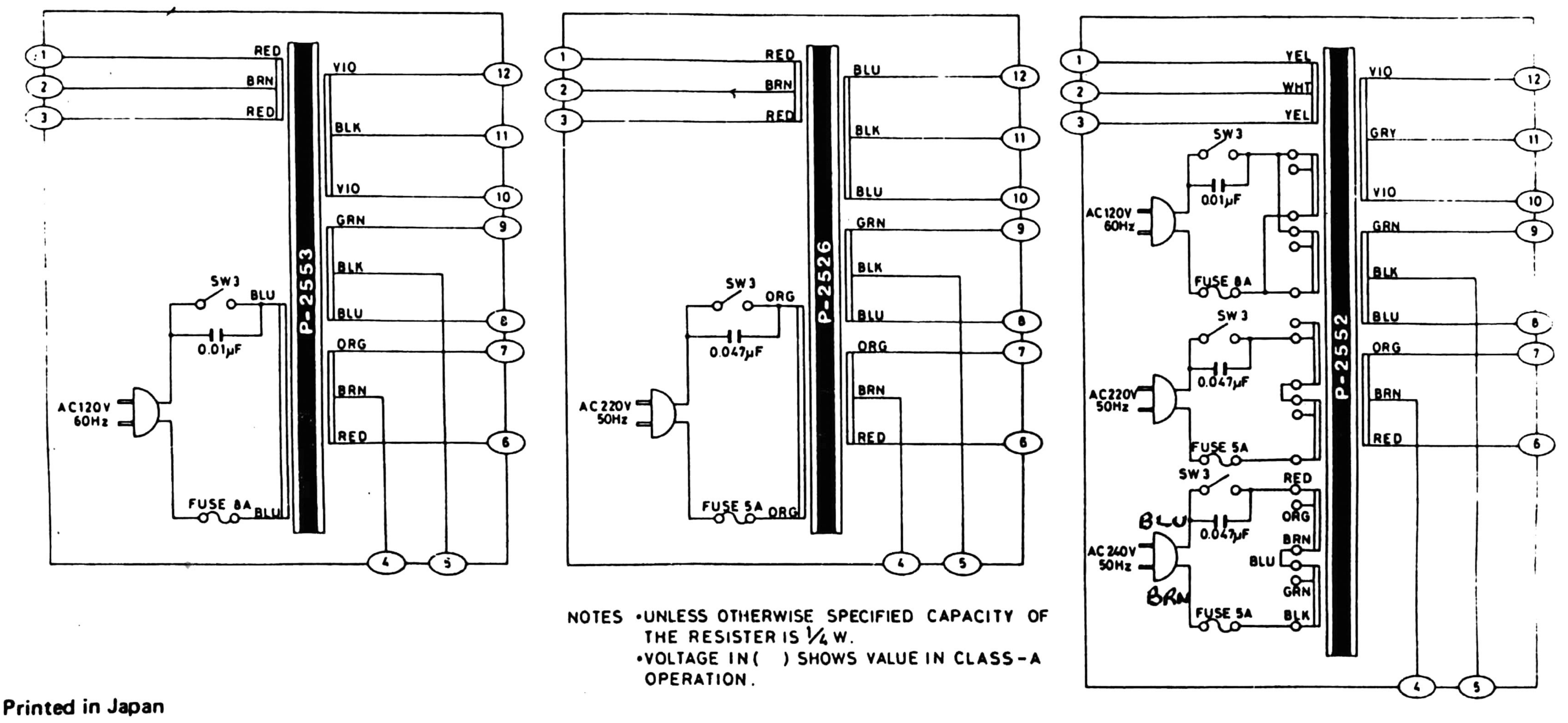


VOLUMES
VR1.2····INPUT LEVEL CONTROLLER
VR3.4····DC BALANCER
VR5.6····CLASS AB IDLING CURRENT ADJUSTOR
VR7.8····CLASS A IDLING CURRENT ADJUSTOR
SWITCHES
SW1a.b····CONNECTION SWITCH
SW2a.b.c.d
····OPERATION SWITCH
SW3·····POWER SWITCH
DIODE
D·········1S953 or US1070

avance Z501



NOTES
- UNLESS OTHERWISE SPECIFIED CAPACITY OF THE RESISTER IS 1/4 W.
- VOLTAGE IN( ) SHOWS VALUE IN CLASS-A OPERATION.