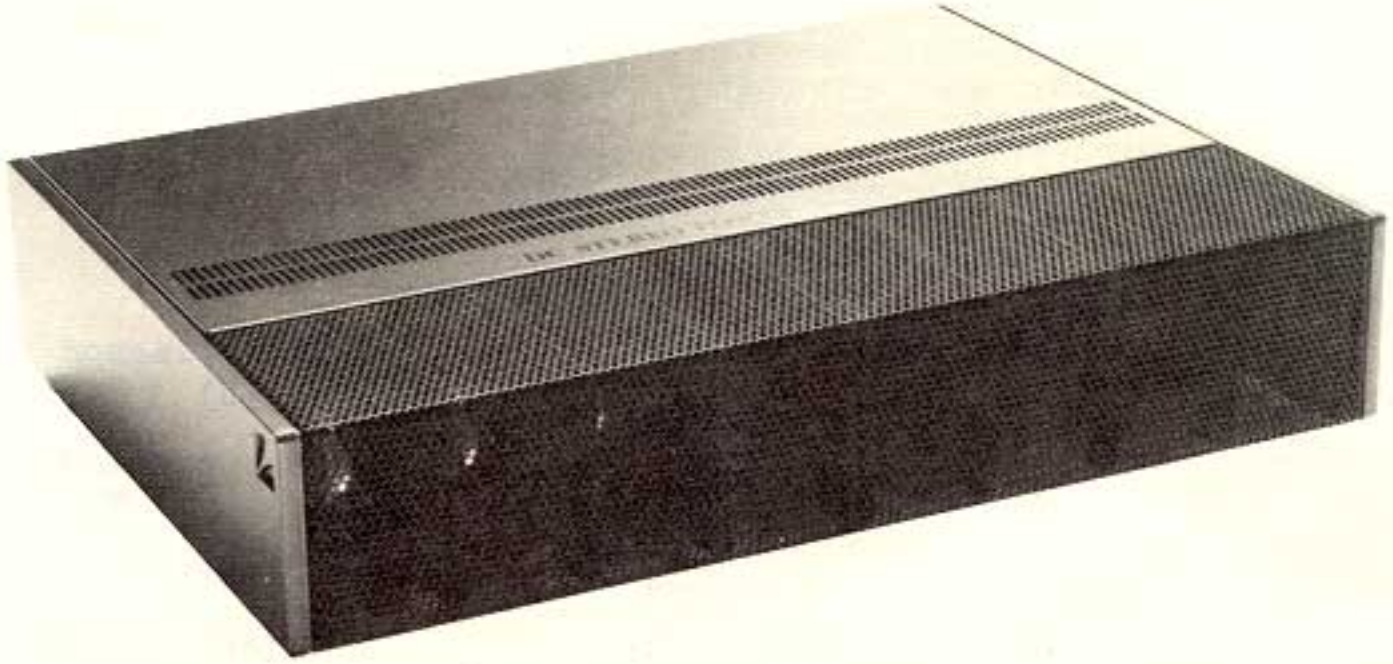
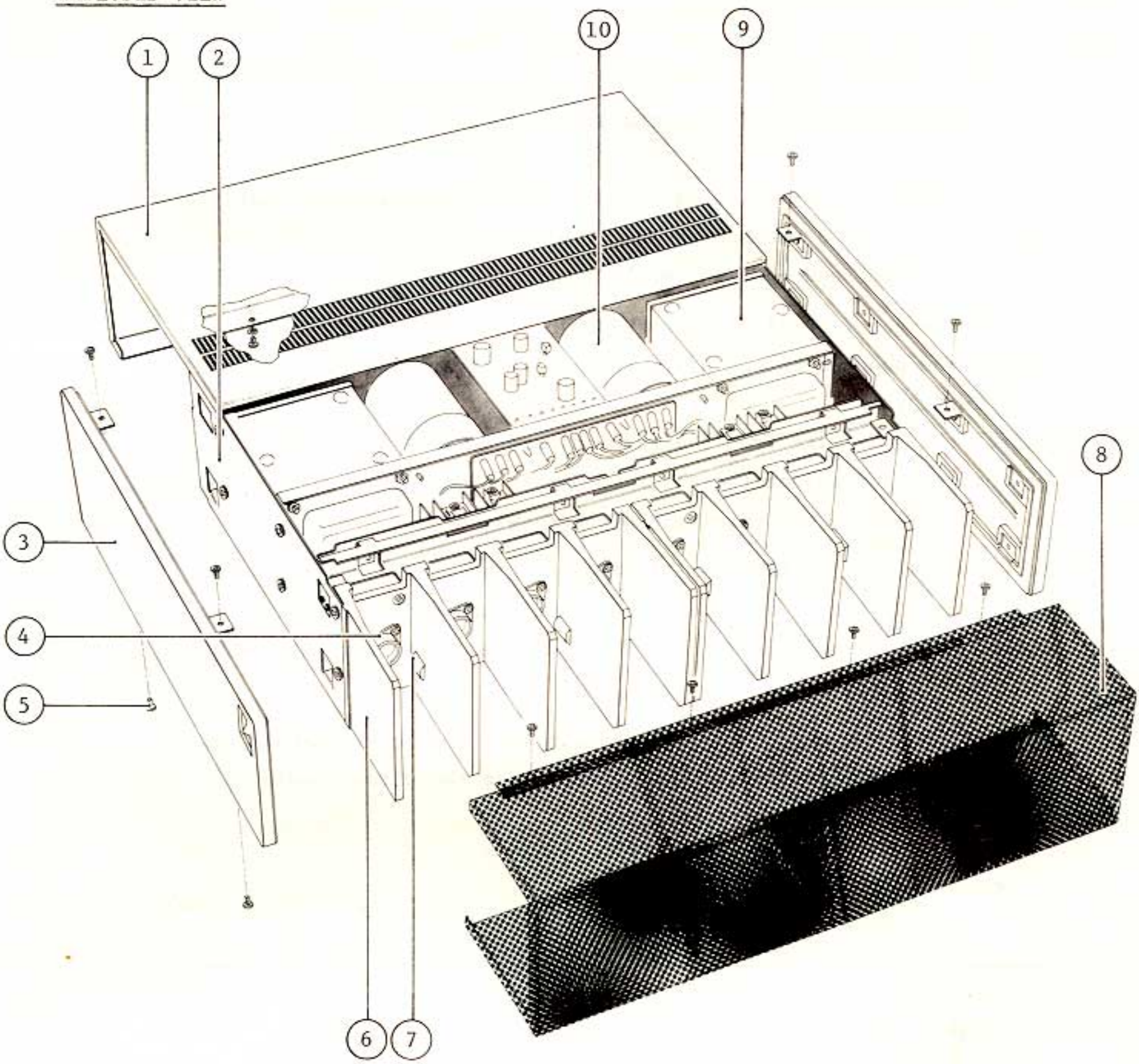
SERVICE MANUAL

SOLID STATE DC STEREO POWER AMPLIFIER M-12



EXPLODED VIEW



1.	UG1009	Bonnet (J)(S)
	UG1020	" (U)
2.	UA1036(6480)	Chassis
	UA1047(6481)	"
3.	WC1043	Side Panel
4.	BE1049	Heat Sink
5.	YAA30C06	Screw 3x6
6.	BE1043	Heat Sink
7.	WG1016	Pilot
8.	UG1003	Bonnet
9.	PT2232	Power Trans. (J)
	PT2233	" " (U)
	PT2234	" " (S)
10.	CE1411	Elrctrolytic x 2 10000μF x 2

Semi-fixed VR Adjustment

(1) AVR Output Voltage / PB-1132

Connect a DC volt meter (100V meter) in between the printed terminals of silk-printed "5,6,7,8" and the ground to confirm that the output is ±58V±5V.

Also confirm that the value should be ±58V±5V even in case that the mains voltage is decreased by 10%. (The value should be -58V on terminals "5,8" and +58V on "6,7".

(2) Idling Current / PB-1133 (1K(B) RT302)

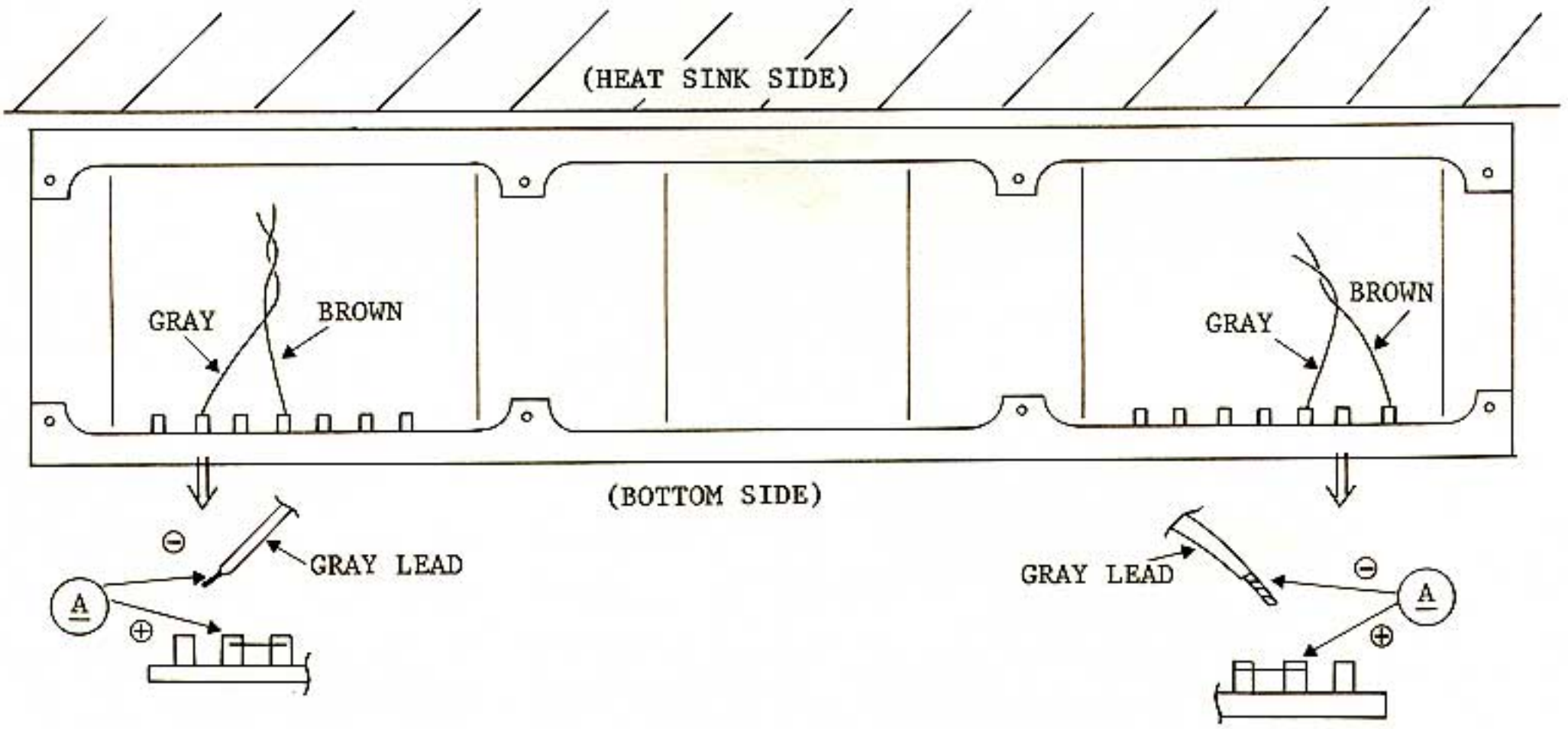
Detach the punched bottom palte to find the gray wire fixed on No.2 or 3 lug-terminal.

Detach the gray wire from the terminal and connect a DC ampere meter to the wire and adjust the RT302 to obtain 60mA $^{+10}_{-0}$ mA reading on the meter 5 minutes after turning the power switch on. See Fig. 1.

(3) DC Offset / PB-1133 (500-ohm(B) RT301)

Connect a DC volt to the speaker terminals and adjust the RT301 to obtain 0V±20mV reading on the meter 5 minutes after turning the power switch on. See Fig. 1.

(4) The gray wires should be soldered again onto the lug-terminals after Idling Current adjustment. But in that case the wires should be entirely discharged before soldering.



Replacement Parts List

Remarks

Capacitors: C.....Ceramic, E.....Electrolytic, MY....Mylar, G.....G Capacitor
S.....Styrol, T.....Tantalum MI....Mica, MP....MP capacitor
O.....Oil capacitor, TRIM.....Trimmer capacitor, AC....AC Capacitor
BP....Electrolytic Bi-Polar type

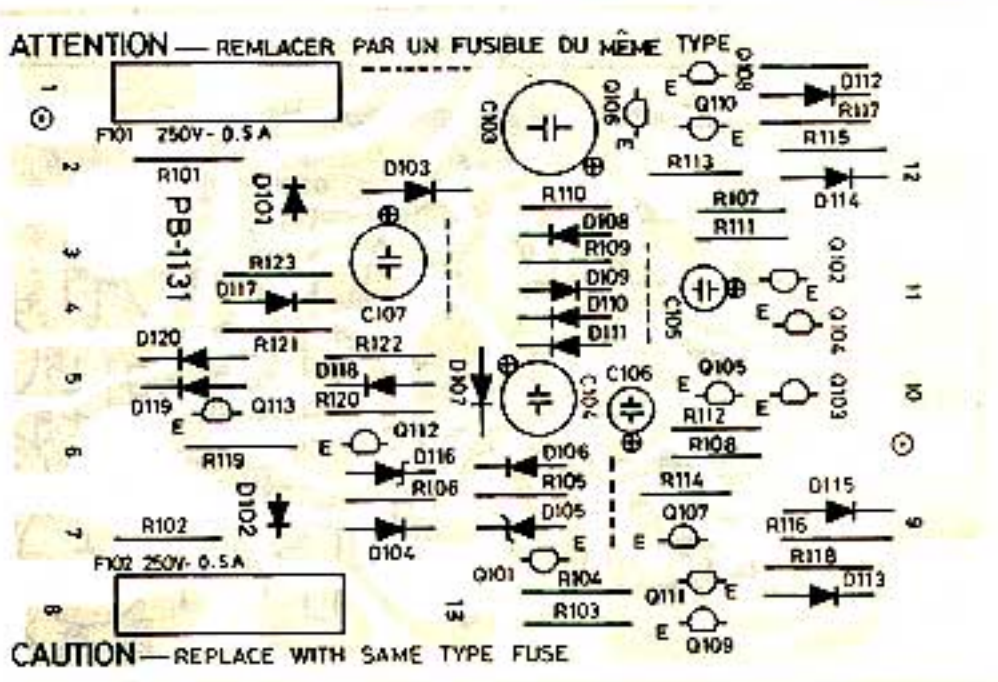
Resistors: ±10%, ±5%, 1/4W, unless specified otherwise

Type: (S).....Model for north European countries
(U).....Model for U.S.A. and CANADA
(E).....Standard model
(J).....Model for JAPAN

PB-1131

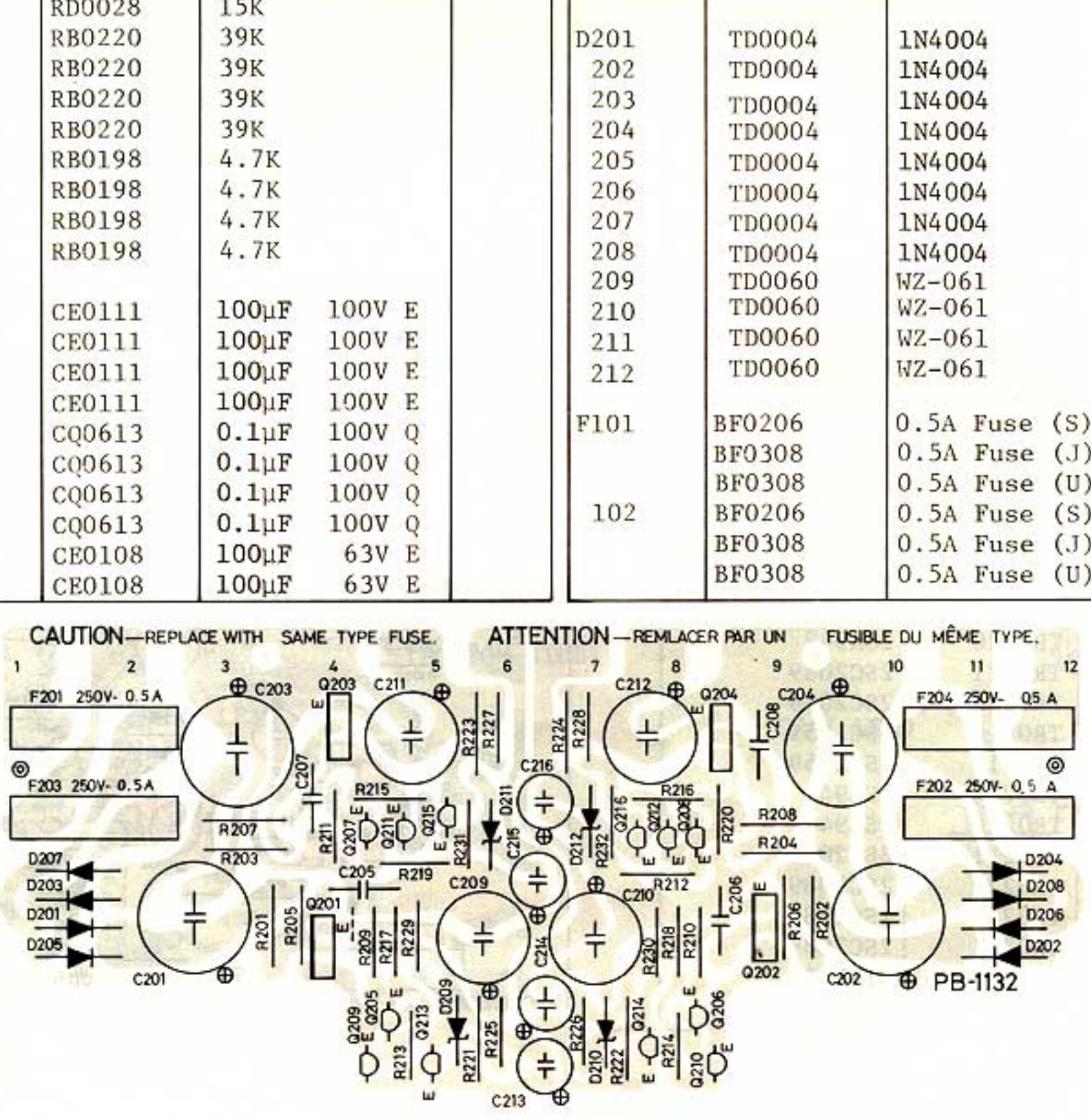
SYMBOL NO.	Stock NO.	DESCRIPTION	LOCATION
R101	RD0071	2.2	
102	RD0071	2.2	
103	RD0037	3.3K	
104	RD0029	12K	
105	RB0230	100K	
106	RB0242	330K	
107	RB0232	120K	
108	RB0232	120K	
109	RB0238	220K	
110	RB0238	220K	
111	RB0190	2.2K	
112	RB0190	2.2K	
113	RB0118	2.2	
114	RB0118	2.2	
115	RD0028	15K	
116	RD0028	15K	
117	RD0029	12K	
118	RD0029	12K	
119	RD0037	3.3K	
120	RD0032	8.2K	
121	RD0017	100K	
122	RD0017	100K	
123	RD0016	120K	
C103	CE0078	100μ 16V E	
104	CE0077	47μ 16V E	
105	CE0084	4.7μ 25V E	
106	CE0084	4.7μ 25V E	
107	CE0077	47μ 16V E	
Q101	TR0220	2SA942	
102	TR0221	2SC2089	
103	TR0221	2SC2089	
104	TR0219	2SC1959	
105	TR0219	2SC1959	
106	TR0220	2SA942	
107	TR0220	2SA942	
108	TR0221	2SC2089	
109	TR0221	2SC2089	
110	TR0221	2SC2089	
111	TR0221	2SC2089	
112	TR0220	2SA942	
113	TR0219	2SC1959	

SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
D101	TD0003	1N4003	
102	TD0003	1N4003	
103	TD0003	1N4003	
104	TD0003	1N4003	
105	TD0117	02BZ-3.3	
106	TD0116	1S2075	
107	TD0116	1S2075	
108	TD0116	1S2075	
109	TD0116	1S2075	
110	TD0116	1S2075	
111	TD0116	1S2075	
112	TD0018	1K188FM-1	
113	TD0018	1K188FM-1	
114	TD0018	1K188FM-1	
115	TD0018	1K188FM-1	
116	TD0117	02BZ-3.3	
117	TD0116	1S2075	
118	TD0116	1S2075	
119	TD0116	1S2075	
120	TD0116	1S2075	
F101	BF0206	5X20 0.5A(T)(S)	
101	BF0308	MF51NR-0.5A(J)	
101	BF0308	MF51NR-0.5A(J)	
102	BF0206	5X20 0.5A(T)(S)	
102	BF0308	MF51NR-0.5A(J)	
102	BF0308	MF51NR-0.5A(J)	



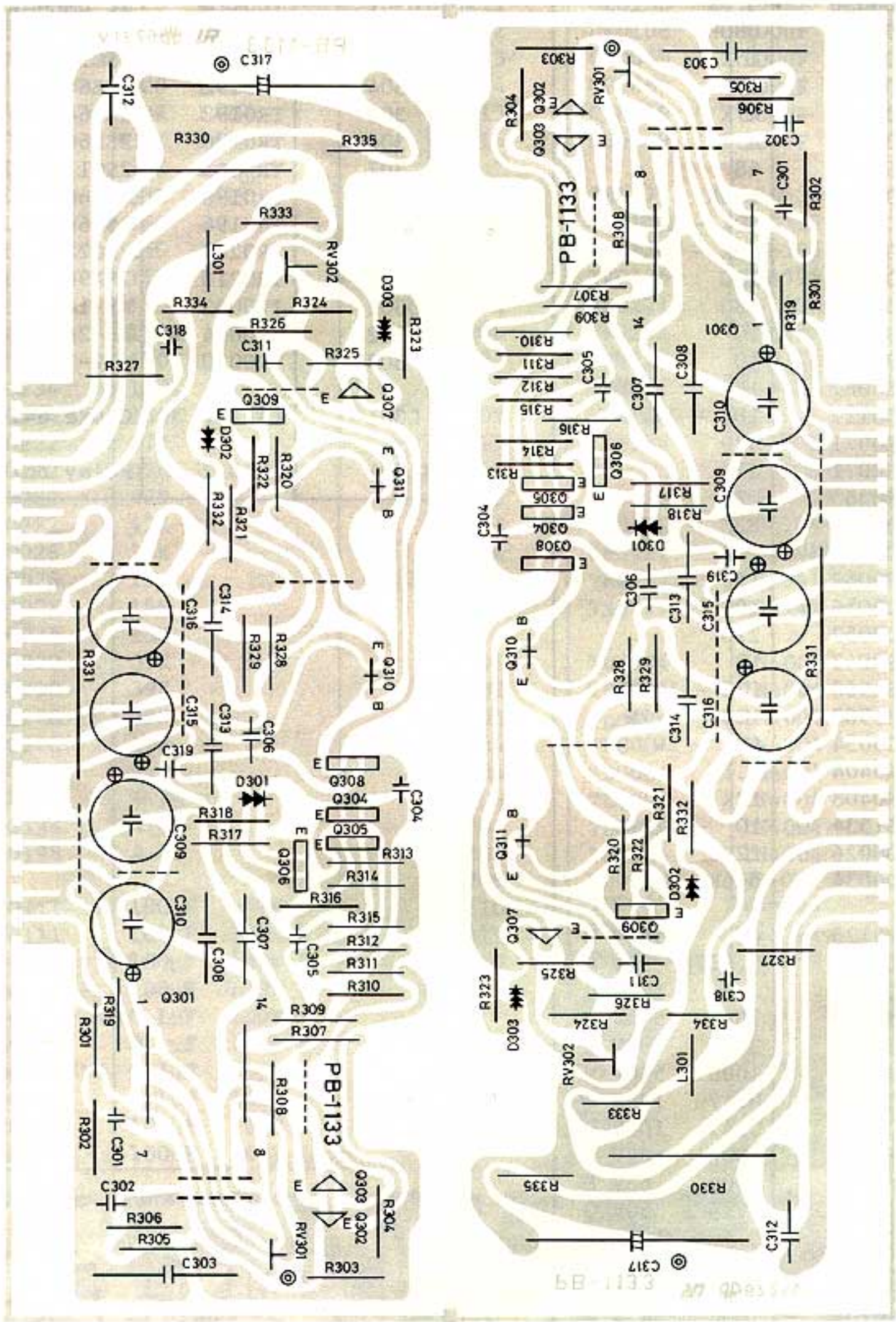
SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
R201	RD0362	220 1/2W	
202	RD0362	220 1/2W	
203	RD0362	220 1/2W	
204	RD0362	220 1/2W	
205	RD0111	33K 1/2W	
206	RD0111	33K 1/2W	
207	RD0111	33K 1/2W	
208	RD0111	33K 1/2W	
209	RB0162	150	
210	RB0162	150	
211	RB0162	150	
212	RB0162	150	
213	RB0234	150K	
214	RB0234	150K	
215	RB0234	150K	
216	RB0234	150K	
217	RB0222	47K	
218	RB0222	47K	
219	RB0222	47K	
220	RB0222	47K	
221	RD0028	15K	
222	RD0028	15K	
223	RD0028	15K	
224	RD0028	15K	
225	RB0220	39K	
226	RB0220	39K	
227	RB0220	39K	
228	RB0220	39K	
229	RB0198	4.7K	
230	RB0198	4.7K	
231	RB0198	4.7K	
232	RB0198	4.7K	
C201	CE0111	100μF 100V E	
202	CE0111	100μF 100V E	
203	CE0111	100μF 100V E	
204	CE0111	100μF 100V E	
205	CQ0613	0.1μF 100V Q	
206	CQ0613	0.1μF 100V Q	
207	CQ0613	0.1μF 100V Q	
208	CQ0613	0.1μF 100V Q	
209	CE0108	100μF 63V E	
210	CE0108	100μF 63V E	

SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
211	CE0108	100μF 63V E	
212	CE0108	100μF 63V E	
213	CE0069	100μF 10V E	
214	CE0069	100μF 10V E	
215	CE0069	100μF 10V E	
216	CE0069	100μF 10V E	
Q201	TR0177	2SD525	
202	TR0177	2SD525	
203	TR0176	2SB595	
204	TR0176	2SB595	
205	TR0221	2SC2089	
206	TR0221	2SC2089	
207	TR0227	2SA941	
208	TR0227	2SA941	
209	TR0227	2SA941	
210	TR0227	2SA941	
211	TR0221	2SC2089	
212	TR0221	2SC2089	
213	TR0221	2SC2089	
214	TR0221	2SC2089	
215	TR0227	2SA941	
216	TR0227	2SA941	
D201	TD0004	1N4004	
202	TD0004	1N4004	
203	TD0004	1N4004	
204	TD0004	1N4004	
205	TD0004	1N4004	
206	TD0004	1N4004	
207	TD0004	1N4004	
208	TD0004	1N4004	
209	TD0060	WZ-061	
210	TD0060	WZ-061	
211	TD0060	WZ-061	
212	TD0060	WZ-061	
F101	BF0206	0.5A Fuse (S)	
	BF0308	0.5A Fuse (J)	
	BF0308	0.5A Fuse (U)	
102	BF0206	0.5A Fuse (S)	
	BF0308	0.5A Fuse (J)	
	BF0308	0.5A Fuse (U)	



SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCA-TION
R301	RD0036	3.9K	
302	RD0007	680K	
303	RD0028	15K	
304	RD0028	15K	
305	RD0022	47K	
306	RD0032	8.2K	
307	RS1054	68	
308	RD0017	100K	
309	RD0110	39K - 1/2W	
310	RD0110	39K - 1/2W	
311	RD0056	100	
312	RD0046	680	
313	RD0069	10	
314	RD0069	10	
315	RS0087	1K	
316	RD0112	18K - 1/2W	
317	RS0071	470	
318	RS0071	470	
319	RN0360	120	
320	RD0111	33K - 1/2W	
321	RD0071	2.2	
322	RS0067	150	
323	RD0056	100	
324	RD0052	220	
327	RS0043	10	
328	RS1560	120 - 1/2W	
329	RS1560	120 - 1/2W	
330	RG0054	4.7 - 2W	
331	RN0404	8.2K	
332	RN0408	12K	
333	RS1534	10 - 1/2W	
334	RD0026	22K	
335	RD0034	5.6K	
C301	CM0125	47p 500V M	
302	CQ0123	0.027μ 50V Q	
303	CQ0605	2.2μ 100V Q	
304	CM0119	33p 500V M	
305	CM0119	33p 500V M	
306	CM0134	100p 500V M	
307	CQ0609	0.47μ 100V Q	
308	CQ0609	0.47μ 100V Q	
309	CE0103	100μ 63V E	
310	CE0103	100μ 63V E	
311	CQ0253	0.1μ 50V Q	
312	CQ0613	0.1μ 100V Q	
313	CQ0609	0.47μ 100V Q	
314	CQ0609	0.47μ 100V Q	
315	CE0108	100μ 63V E	
316	CE0108	100μ 63V E	
317	CE0400	100μ 16V E (B.P)	
318	CQ0126	0.01μ 50V Q	
319	CM0106	10p 500V M	
RV301	RT0068	500Ω(B)	
302	RT0015	1K(Ω)(B)	

SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCA-TION
Q301	TC0114	IC DML-01	
302	TR0165	2SC1775A	
303	TR0165	2SC1775A	
304	TR0192	2SB648	
305	TR0192	2SB648	
306	TR0196	2SD668	
307	TR0165	2SC1775A	
308	TR0196	2SD668	
309	TR0196	2SD668	
310	TR0209	2SC2238	
311	TR0210	2SA968	
D301	TV0003	KB-165	
302	TV0004	KB-265	
303	TV0020	STV-3H	
L301	LA1177	Choke 6415	
RL301	AY0032	Relay DC/12V	


PB-1133
C317
C312
R330
R335
R333
L301
RV302
C318
R327
R323
D303
Q303
Q302
Q307
Q309
D302
R320
R322
R321
R332
Q311
Q310
C314
C316
R328
R329
C306
C313
C315
C319
D301
R318
Q304
Q305
Q306
R313
R314
R316
R315
R312
R311
R310
R309
R307
C305
C307
C308
C310
R319
R301
Q301
R308
C303
R305
R306
C302
R304
RV301
R303
Q308
C309
C304

CHASSIS UNIT

SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
R001	RG0032	0.18 - 5W	
002	RG0032	0.18 - 5W	
003	RG0032	0.18 - 5W	
004	RG0032	0.18 - 5W	
005	RG0032	0.18 - 5W	
006	RG0032	0.18 - 5W	
007	RG0032	0.18 - 5W	
008	RG0032	0.18 - 5W	
009	RS0043	10	
010	RS0043	10	
011	RS0043	10	
012	RS0043	10	
013	RS0043	10	
014	RS0043	10	
015	RS0043	10	
016	RS0043	10	
017	RG2230	6 20W (J)	
C001	CU0006	0.022μ 250V U (S)	
	CU0033	0.022μ 250V U (J)	
	CU0065	0.022μ 120V U (U)	
002	CU0006	0.022μ 250V U (S)	
	CU0006	0.022μ 250V U (J)	
	CU0065	0.022μ 120V U (U)	
003	CU0006	0.022μ 250V U (S)	
	CU0033	0.022μ 250V U (J)	
	CU0065	0.022μ 120V U (U)	
Q001	TR0244	2SB681	
002	TR0244	2SB681	
003	TR0245	2SD551	
004	TR0245	2SD551	
005	TR0244	2SB681	
006	TR0244	2SB681	
007	TR0245	2SD551	
008	TR0245	2SD551	
D001	TD0110	S5VB40-F	
002	TD0110	S5VB40-F	
F001	BF0082	5A Fuse (J)	
	BF0082	5A Fuse (U)	
	BF0212	3.15A Fuse(D)	
002	BF0082	5A Fuse (J)	
	BF0082	5A Fuse (U)	
	BF0212	3.15A Fuse(S)	

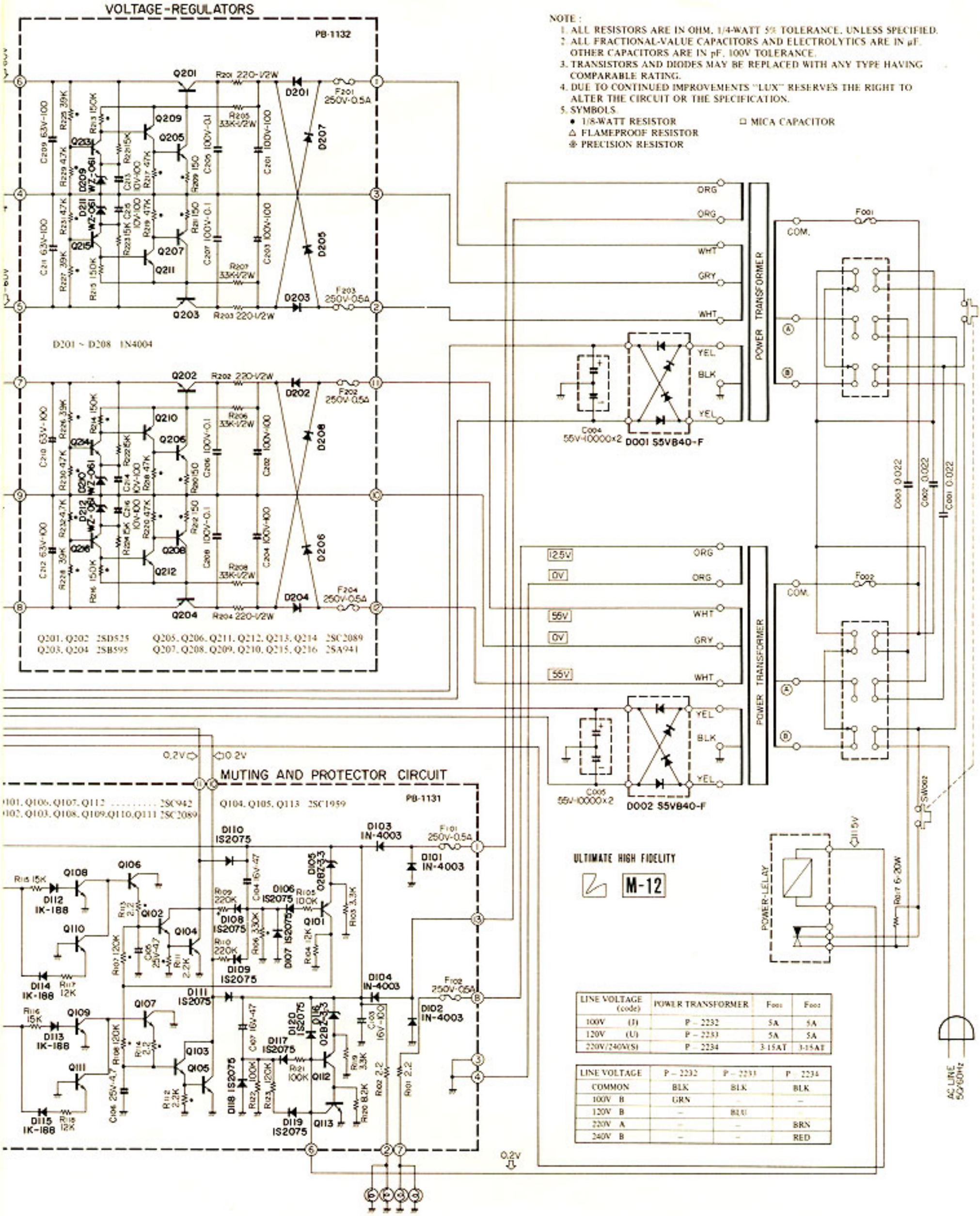
REAR-PANEL UNIT

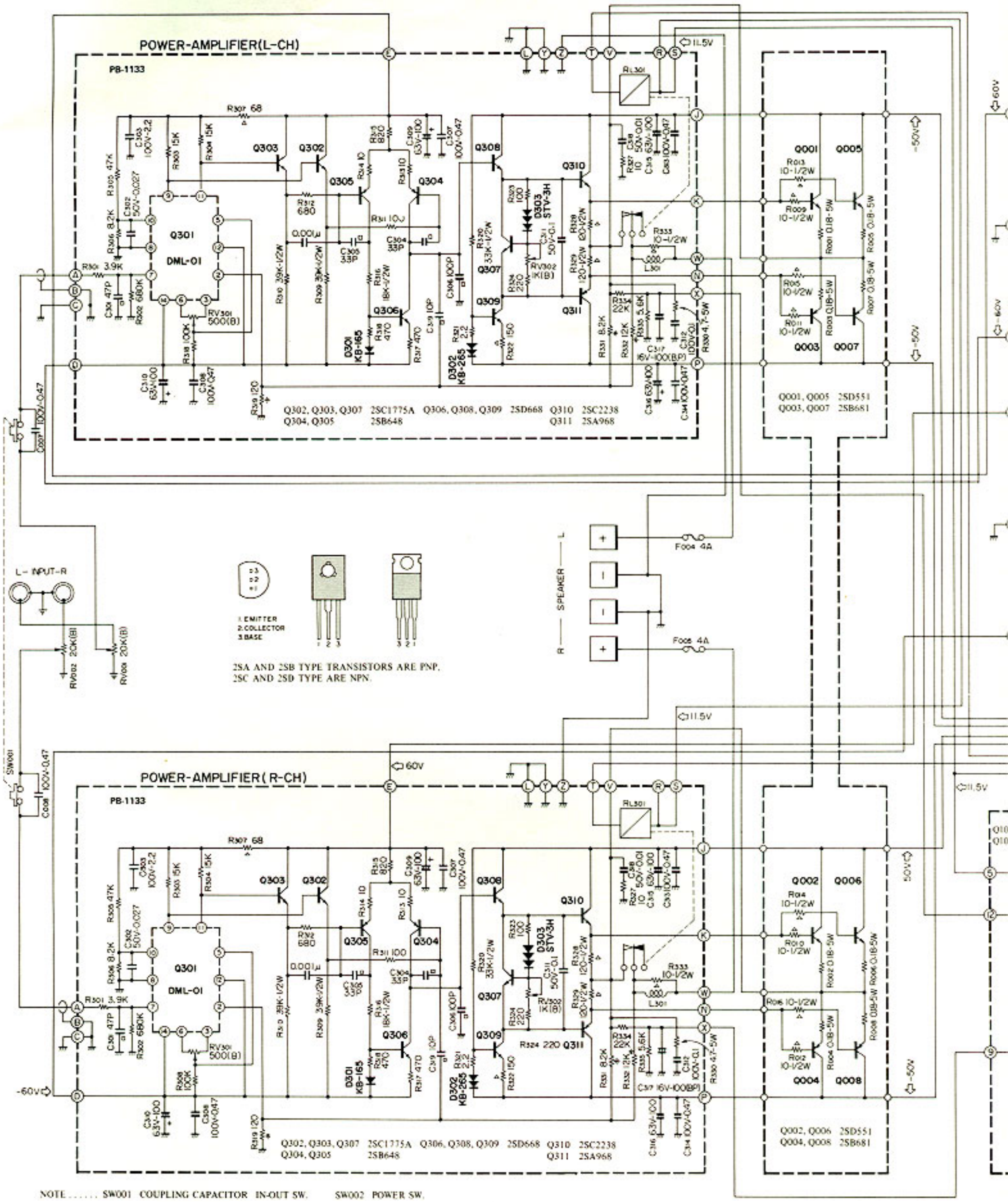
SYMBOL NO.	STOCK NO.	DESCRIPTION	LOCATION
C007	CQ0609	0.47μ 100V Q	
008	CQ0609	0.47μ 100V Q	
VR001	RV0171	20KB	
002	RV0171	20KB	
SW001	SS0014	Slide SW	
002	SS0015	Slide SW (J)	
	SS0015	Slide SW (U)	
	SS0016	Slide SW (S)	
F004	BF0213	4A Fuse (S)	
	BF0302	4A Fuse (J)	
	BF0082	5A Fuse (U)	
005	BF0213	4A Fuse (S)	
	BF0320	4A Fuse (J)	
	BF0082	5A Fuse (U)	

M-12 SPECIFICATIONS

Power Output:	80W minimum continuous per channel into 8-ohm loads, both channels driven at any frequency from 20Hz to 20,000Hz with no more than 0.006% total harmonic distortion.
Rated I.M.:	no more than 0.006% (8 ohms, 80W, 60Hz : 7kHz = 4 : 1)
Frequency Response:	DC - 100,000Hz (within -1dB)
Input Sensitivity:	600mV
Input Impedance:	20k ohms
Signal-to-Noise Ratio:	better than 110dB (IHF-A weighted, input short-circuited)
Channel Separation:	better than 80dB (20Hz - 30kHz)
Damping Factor:	150 (8 ohms, 1kHz)
Protection Circuits:	Speaker Protection Circuit by sensing DC drift, Overcurrent Protection Circuit.
Additional Features:	Input Capacitor IN/OUT Selector, Attenuator for both channels
Power Consumption:	320W (8 ohms, at maximum output) 400VA (CSA rated)
Dimensions:	436(W) x 328(D) x 95(H)mm (17-3/16" x 12-15/16" x 3-3/4")
Weight:	Net 14.5kgs (31.9 lbs.) Gross 16.5kgs (36.3 lbs.)

Specifications and appearance and design are subject to possible change without notice.


VOLTAGE-REGULATORS
PB-1132
Q201
R201 220-1/2W
D201
F201 250V-0.5A
Q209
Q205
R205 33K-1/2W
D207
D211 WZ-061
Q215
Q207
Q211
R207 33K-1/2W
D205
D203
F203 250V-0.5A
Q203
R203 220-1/2W
D201 ~ D208 1N4004
Q202
R202 220-1/2W
D202
F202 250V-0.5A
Q210
Q206
R206 33K-1/2W
D208
D212 WZ-061
Q216
Q208
Q212
R208 33K-1/2W
D206
D204
F204 250V-0.5A
Q204
R204 220-1/2W
Q201, Q202 2SD525
Q203, Q204 2SB595
Q205, Q206, Q211, Q212, Q213, Q214 2SC2089
Q207, Q208, Q209, Q210, Q215, Q216 2SA941
NOTE :
1. ALL RESISTORS ARE IN OHM, 1/4-WATT 5% TOLERANCE, UNLESS SPECIFIED.
2. ALL FRACTIONAL-VALUE CAPACITORS AND ELECTROLYTICS ARE IN μF. OTHER CAPACITORS ARE IN pF, 100V TOLERANCE.
3. TRANSISTORS AND DIODES MAY BE REPLACED WITH ANY TYPE HAVING COMPARABLE RATING.
4. DUE TO CONTINUED IMPROVEMENTS "LUX" RESERVES THE RIGHT TO ALTER THE CIRCUIT OR THE SPECIFICATION.
5. SYMBOLS.
• 1/8-WATT RESISTOR
△ FLAMEPROOF RESISTOR
※ PRECISION RESISTOR
□ MICA CAPACITOR
ORG
ORG
WHT
GRY
WHT
YEL
BLK
YEL
POWER TRANSFORMER
C004 55V-40000×2
D001 55VB40-F
12.5V
0V
55V
0V
55V
ORG
ORG
WHT
GRY
WHT
YEL
BLK
YEL
C005 55V-10000×2
D002 55VB40-F
F001
COM.
F002
COM.
C003 0.022
C002 0.022
C001 0.022
SW002
AC LINE 50/60Hz
0.2V
0.2V
MUTING AND PROTECTOR CIRCUIT
PB-1131
Q101, Q106, Q107, Q112 ..... 2SC942
Q102, Q103, Q108, Q109, Q110, Q111 2SC2089
Q104, Q105, Q113 2SC1959
D110 IS2075
D103 IN-4003
F101 250V-0.5A
D101 IN-4003
D105 0282-3.3
D106 IS2075
D108 IS2075
D107 IS2075
D109 IS2075
D104 IN-4003
F102 250V-0.5A
D102 IN-4003
D111 IS2075
D120 IS2075
D116 0282-3.3
D117 IS2075
D118 IS2075
D119 IS2075
D112 1K-188
D113 1K-188
D114 1K-188
D115 1K-188
Q108
Q106
Q102
Q104
Q110
Q107
Q109
Q103
Q105
Q111
Q101
Q112
Q113
ULTIMATE HIGH FIDELITY
M-12
POWER-LELAY
115V
R017 6-20W
AC LINE 50/60Hz
LINE VOLTAGE (code) | POWER TRANSFORMER | F001 | F002
100V (J) | P-2232 | 5A | 5A
120V (U) | P-2233 | 5A | 5A
220V/240V(S) | P-2234 | 3-15AT | 3-15AT
LINE VOLTAGE | P-2232 | P-2233 | P-2234
COMMON | BLK | BLK | BLK
100V B | GRN | – | –
120V B | – | BLU | –
220V A | – | – | BRN
240V B | – | – | RED



NOTE ..... SW001 COUPLING CAPACITOR IN-OUT SW. SW002 POWER SW.

Ample Power Output and Perfect Elimination of Notch Distortion:

Parallel push-pull operation at the output stage easily yields the rated output of 80W per channel into 8 ohms loads, 20 - 20,000Hz, with total harmonic distortion no more than 0.006%. Under this parallel push-pull system, the amount of current per one transistor can be set at low level, and good treble response is procured along with excellent linearity against electric current. Another feature is the large amount of Pcl(collector dissipation). Furthermore, specially selected high speed transistors at the output stage in combination with a unique circuit device to accelerate overall switching speed make it possible to perfectly eliminate notch distortion inherent in a class "B" amp. Thus, despite basic class "B" amp design the notch distortion is kept as low as that of a class "A" amp.

Realtime Processed DC Amp:

In the case of an audio amplifier which deals with ever-changing music signals, the problem of transient distortion, that is of vital importance to sonic quality (though difficult to define specification) has to be solved in addition to harmonic distortion shown in the form of a measurable specification. With conventional AC amp circuitry, a large amount of NFb is applied to suppress harmonic distortion, and the large capacitor in this NFb loop induces time lag, thus causing transient distortion. Removal of this harmful capacitor led us to the unique concept of a "Realtime Processed DC amp".

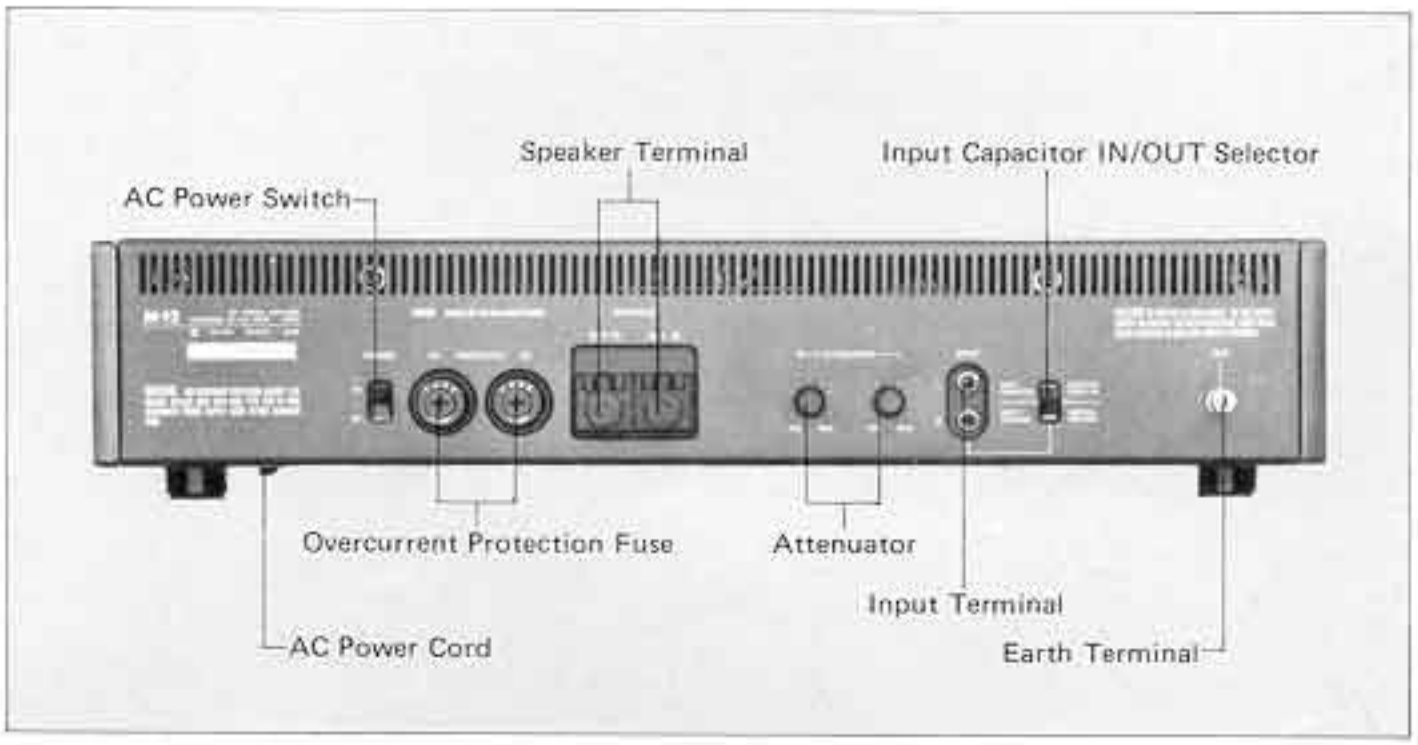
At the main amp circuit, an emitter-follower driven by constant current is provided to make the most of our exclusive DML-IC's (where differential amp circuit of dual FET and its auxiliary circuits are packed into a block) and also to improve load condition in the treble range at the pre-driver stage. Another emitter-follower with a constant current circuit is placed to isolate the pre-driver stage of class "A" operation immune from the influence of the pure complementary output stage of class "AB" operation.

Perfect Independent Power Supply for Right and Left Channels:

In the power supply section, 2 large-sized toroidal power transformers are combined with 2 huge electrolytic capacitors (10,000μF x 2), and even the constant current power supply section is separated into right and left channels. Such a perfect independent power supply system eliminates mutual interference between right and left channels at the power supply section ensuring a stable power supply to all circuits of amplifier.

Special DML-IC and Strictly Selected Componentry:

To remedy DC drift - the only drawback of a DC amp, we developed the exclusive DML-IC and the drift was suppressed to a low level equalling that of conventional AC amps. Stringent selection is applied to all componentry employed, and needless to say, sonic excellence is always taken into account.



M-12 SPECIFICATIONS

Power Output:	80W minimum continuous per channel into 8-ohm loads, both channels driven at any frequency from 20Hz to 20,000Hz with no more than 0.006% total harmonic distortion.
Rated I.M.:	no more than 0.006% (8 ohms, 80W, 60Hz : 7kHz = 4 : 1)
Frequency Response:	DC - 100,000Hz (within -1dB)
Input Sensitivity:	600mV
Input Impedance:	20k ohms
Signal-to-Noise Ratio:	better than 110dB (IHF-A weighted, input short-circuited)
Channel Separation:	better than 80dB (20Hz - 30kHz)
Damping Factor:	150 (8 ohms, 1kHz)
Protection Circuits:	Speaker Protection Circuit by sensing DC drift, Overcurrent Protection Circuit.
Additional Features:	Input Capacitor IN/OUT Selector, Attenuator for both channels
Power Consumption:	320W (8 ohms, at maximum output) 400VA (CSA rated)
Dimensions:	436(W) x 328(D) x 95(H)mm (17-3/16" x 12-15/16" x 3-3/4")
Weight:	Net 14.5kgs (31.9 lbs.) Gross 16.5kgs (36.3 lbs.)

Specifications and appearance and design are subject to possible change without notice.

LUX CORPORATION, JAPAN

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