

SERV. 30 794  
STEREO AMPLIFIER

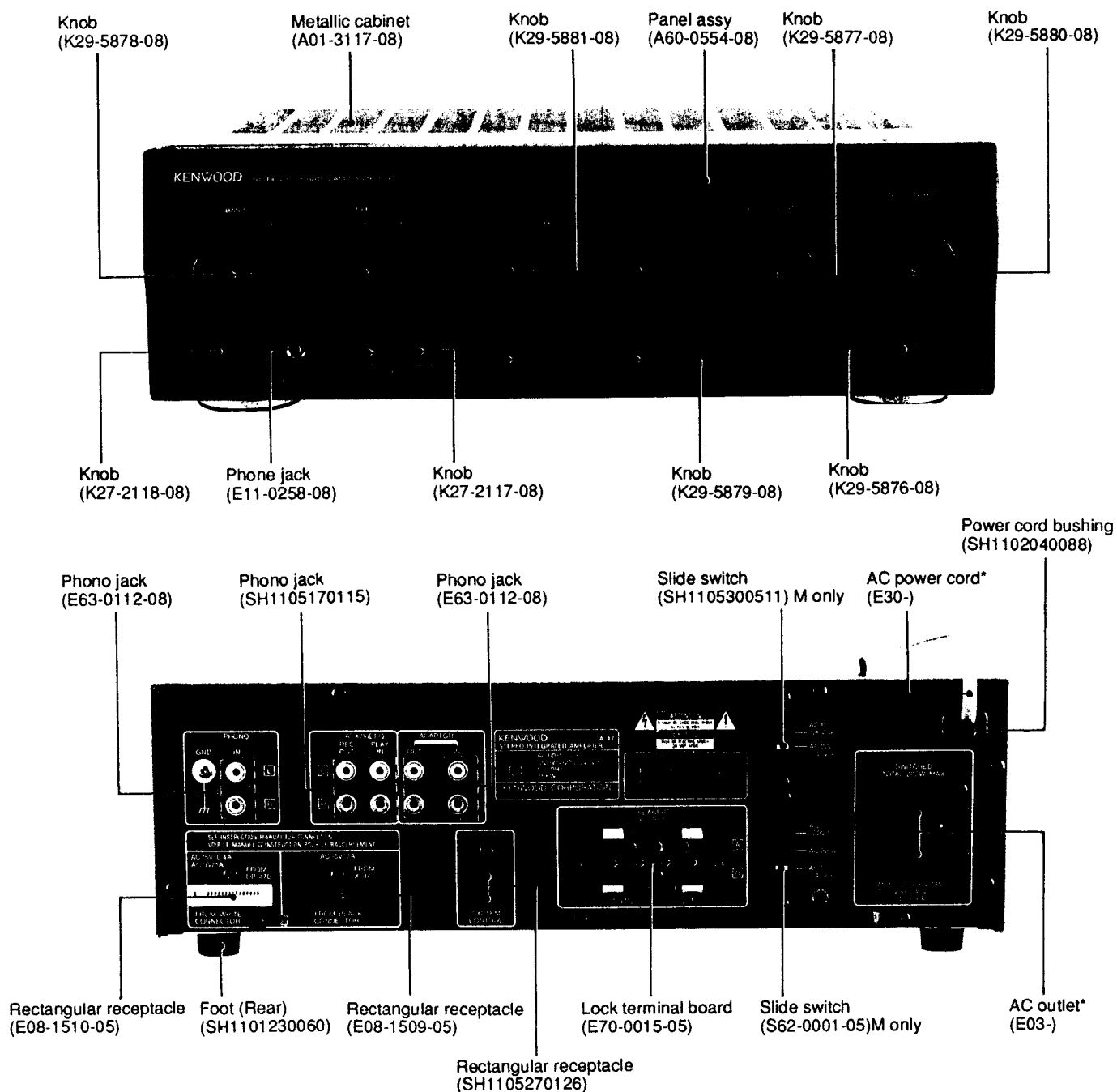
# A-47

## SERVICE MANUAL

(M-47)

# KENWOOD

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B51-4733-00 (S) 2443

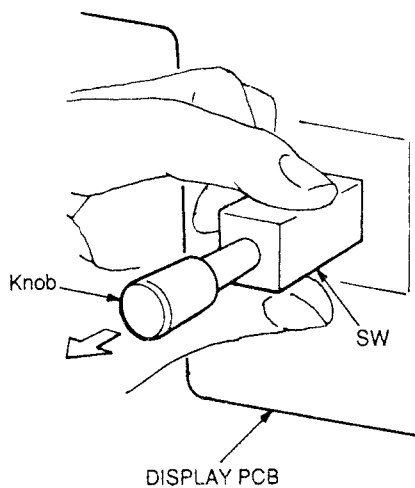


\* Refer to parts list on page 18.

## CONTENTS

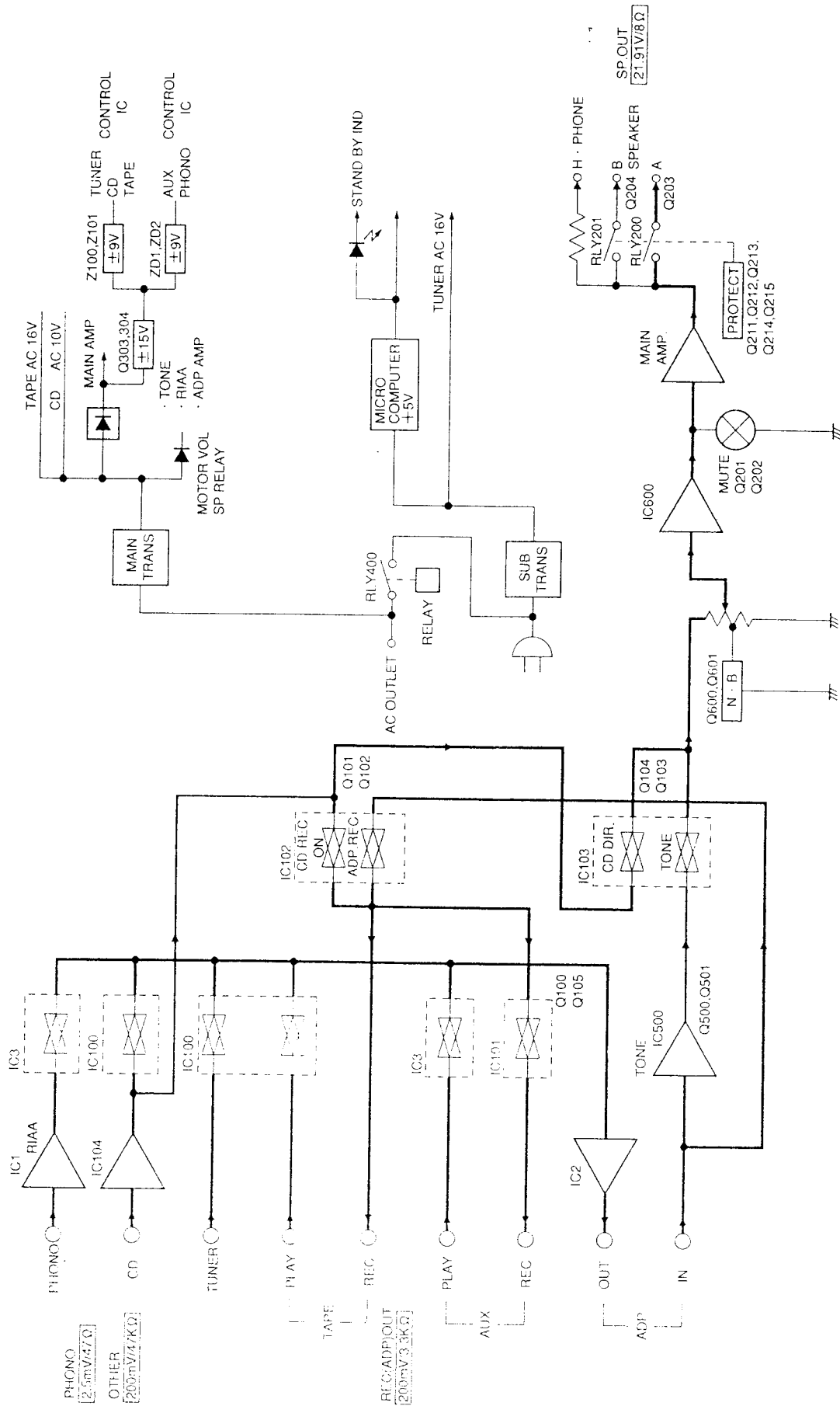
BLOCK LEVEL DIAGRAM.....	3	PC BOARD (AUDIO Unit).....	9
CIRCUIT DESCRIPTION.....	4	PC BOARD (CONTROL Unit).....	11
ADJUSTMENT.....	6	SCHEMATIC DIAGRAM.....	13
REGLAGE.....	6	EXPLODED VIEW.....	17
ABGLEICH.....	6	PARTS LIST.....	18
WIRING DIAGRAM.....	7	SPECIFICATIONS.....	BACK COVER

### Removing the Control Knobs of SP Selector Switches (S500 and S501)



Fix the upper and lower white molded parts of the switches manually and pull out the control knobs straightly.

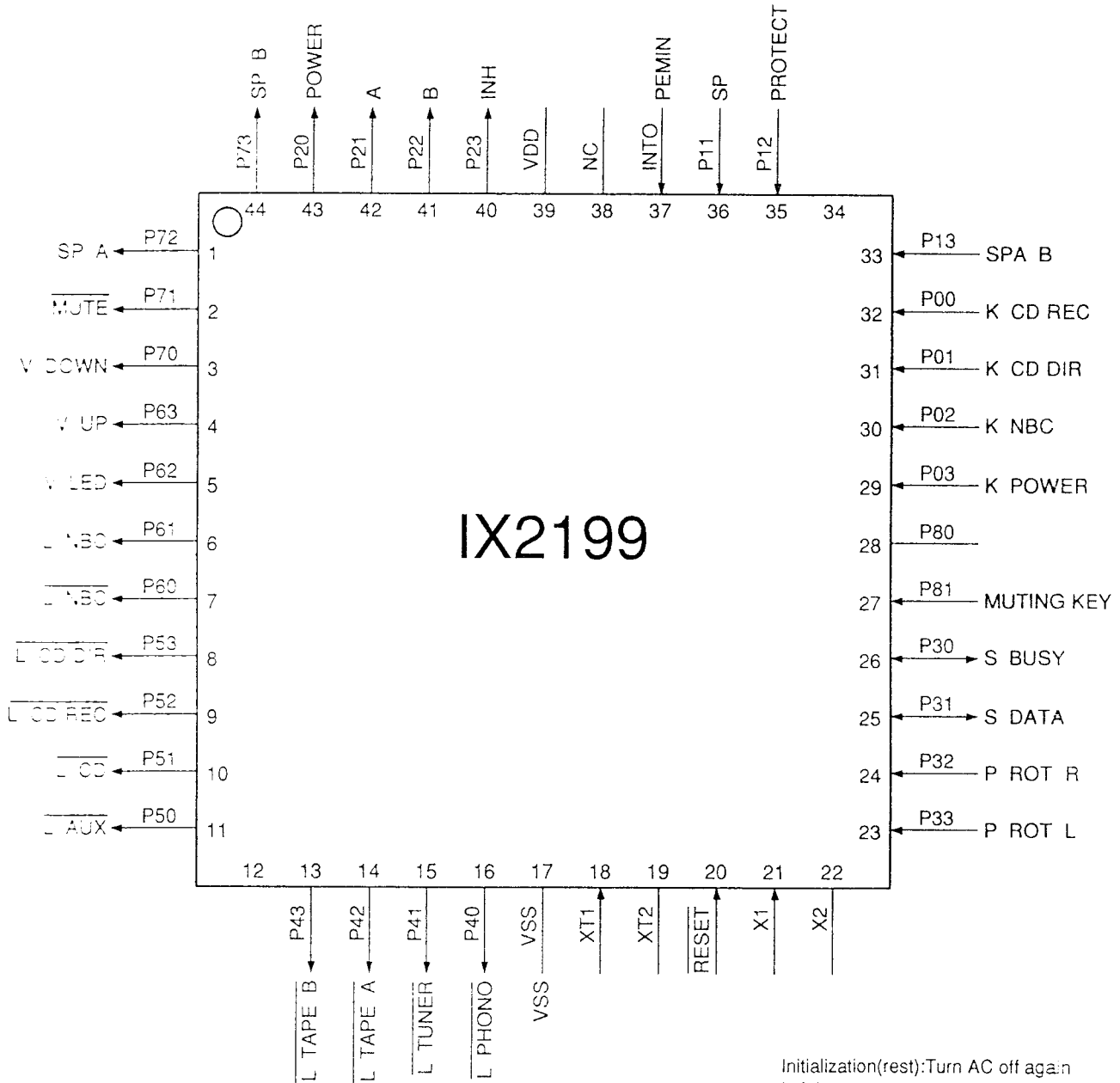
# BLOCK LEVEL DIAGRAM



# CIRCUIT DESCRIPTION

Amp Microprocessor: IX2199 (MAIN PCB: IC501)

Pin Connection



# CIRCUIT DESCRIPTION

Pin Function: IX2199 (MAIN PCB: IC501)

Pin No.	Pin name	I/O	Name	Description
1	P72	OUT	SP A	Speaker relay A
2	P71	OUT	MUTE	Mute
3	P70	OUT	V DOWN	Volume down
4	P63	OUT	V UP	Volume up
5	P62	OUT	V LED	Volume LED
6	P61	OUT	L NBC	NB circuit LED
7	P60	OUT	L NBC	NB circuit ON/OFF
8	P53	OUT	L CD DIR	CD direct LED
9	P52	OUT	L CD REC	CD REC LED
10	P51	OUT	L CD	CD LED
11	P50	OUT	L AUX	AUX/DAT LED
13	P43	OUT	L TAPE B	TAPE B LED
14	P42	OUT	L TAPE A	TAPE A LED
15	P41	OUT	L TUNER	TUNER LED
16	P40	OUT	L PHONO	PHONO LED
17	Vss		Vss	GND
18	XT1	IN		GND
19	XT2			Open
20	RESET	IN		Reset signal input port
21	X1	IN		Oscillator
22	X2			Oscillator
23	P33	IN	P ROT L	Rotary encoder L
24	P32	IN	P ROT R	Rotary encoder R
25	P31	I/O	S DATA	Serial data
26	P30	I/O	S BUSY	Serial busy
27	P81	IN	MUTING KEY	Key muting
28	P80			
29	P03	IN	K POWER	Key power
30	P02	IN	K NBC	Key NB circuit
31	P01	IN	K CD DIR	Key CD direct
32	P00	IN	K CD REC	Key CD REC
33	P13	IN	SP A.B.	Speaker A and B on/off
35	P12	IN	PROTECT	Detects protection
36	P11	IN	SP	SP on/off
37	INT0	IN	PEMIN	Remote control input pin
38	NC			+5V
39	VDD			+5V
40	P23	OUT	INH	Control 4052. INH
41	P22	OUT	B	Control 4052. B
42	P21	OUT	A	Control 4052. A
43	P20	OUT	POWER	Power
44	P73	OUT	SP B	Speaker relay B

# ADJUSTMENT / REGLAGE / ABGLEICH

## ADJUSTMENT

No.	ITEM	INPUT SETTINGS	OUTPUT SETTINGS	AMPLIFIER SETTINGS	ALIGNMENT POINTS	ALIGN FOR	FIG.
1	IDLE CURRENT	—	Connect a DC voltmeter across TP201 (L) TP202 (R) (MAIN PCB)	VOLUME: 0	VR201 (L) VR202 (R) (MAIN PCB)	3.3 - 6.6 mV (Before get up heat.)	(a)

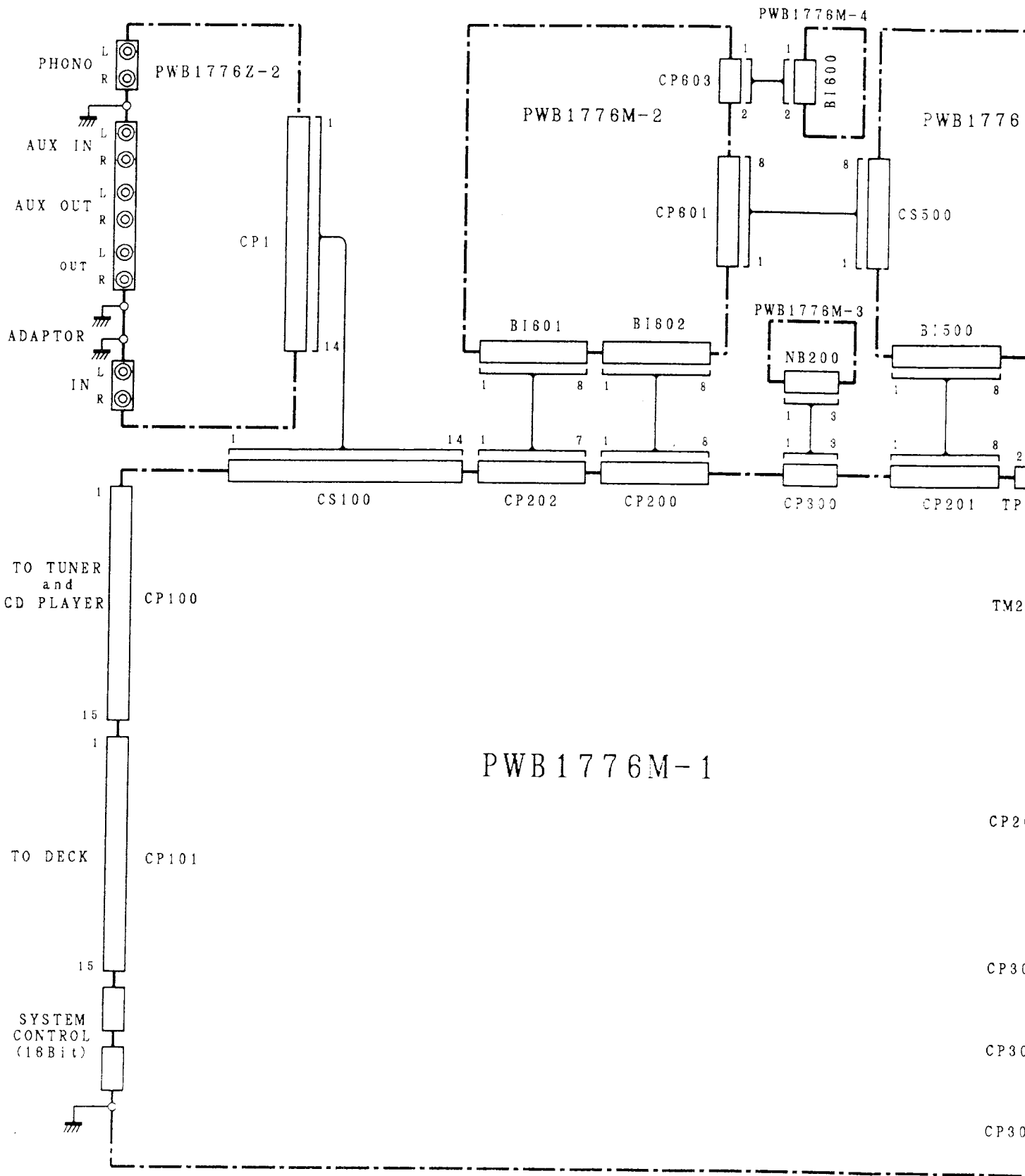
## REGLAGE

N°	ITEM	REGLAGE DE L'ENTREE	REGLAGE DE LA SORTIE	REGLAGE DE L'AMPLIFICATEUR	POINT DE L'ALIGNEMENT	ALIGNER POUR	FIG.
1	COURANT DE PLARISATION	—	Connecter un voltmètre de CC sur TP201 (G) TP202 (D) (MAIN PCB)	VOLUME: 0	VR201 (G) VR202 (D) (MAIN PCB)	3.3 - 6.6 mV. (Avant que l'appareil chauffe)	(a)

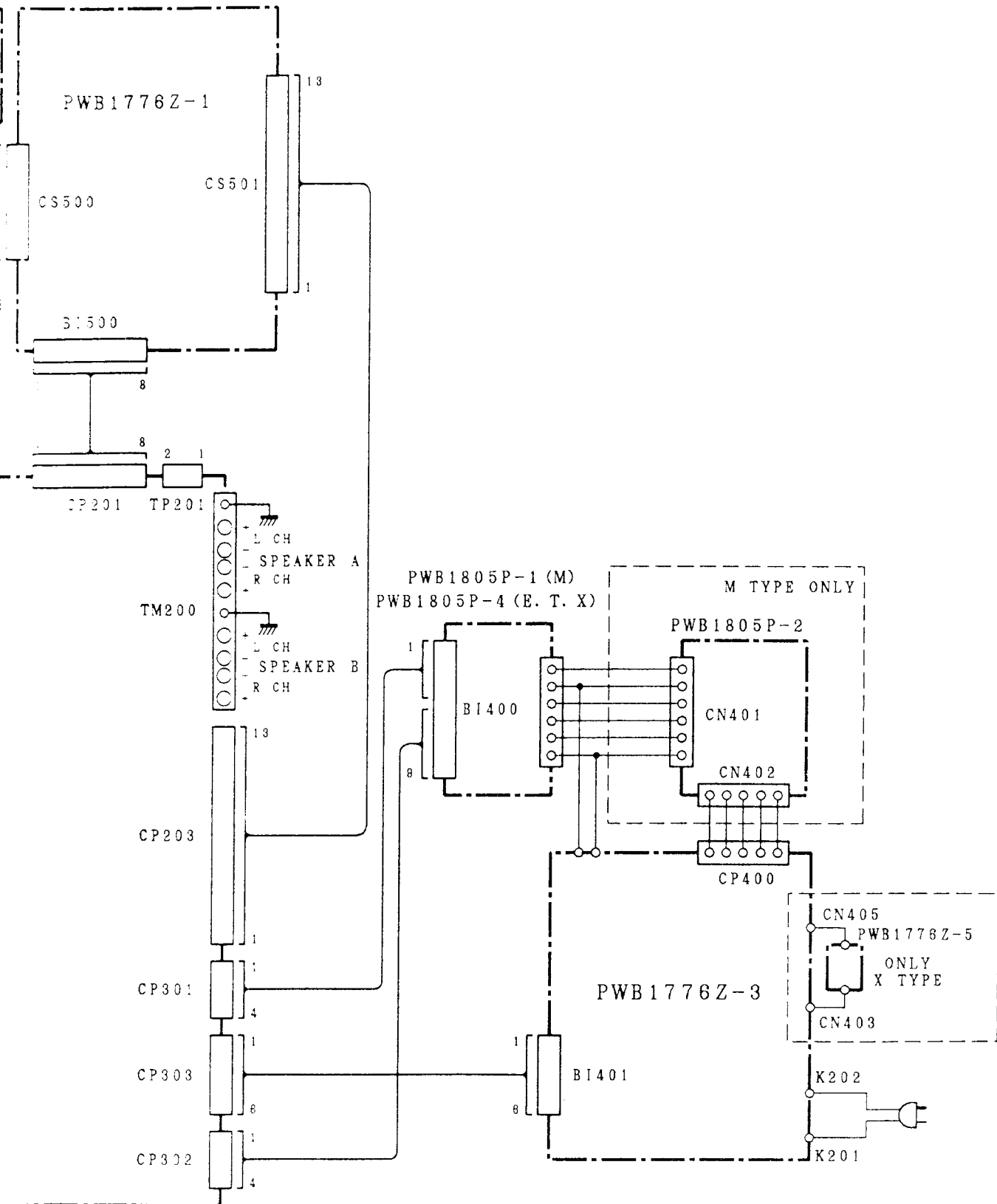
## ABGLEICH

NR.	GEGENSTAND	EINGANGS-EINSTELLUNG	AUSGANGS-EINSTELLUNG	VERSTÄRKER-EINSTELLUNG	ABGLEICH-PUNKTE	ABGLEICHEN FÜR	ABB.
1	LEERLAUFSTROM	—	Einen Gleichspannungsmesser über TP201 (L) TP202 (R) anschießen. (MAIN PCB)	VOLUME: 0	VR201 (L) VR202 (R) (MAIN PCB)	3.3 - 6.6 mV (Vor dem Warmlaufen)	(a)

# WIRING DIAGRAM



# A-47

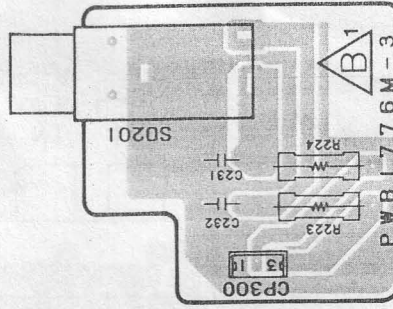




PC BOARD (Component side view) AUDIO Unit

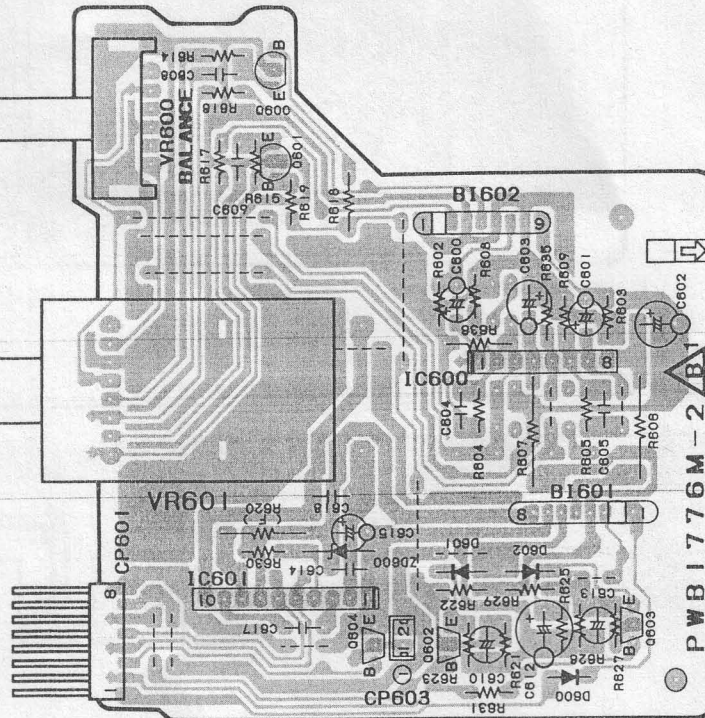
2  
3  
4  
5  
6  
7

PHONES

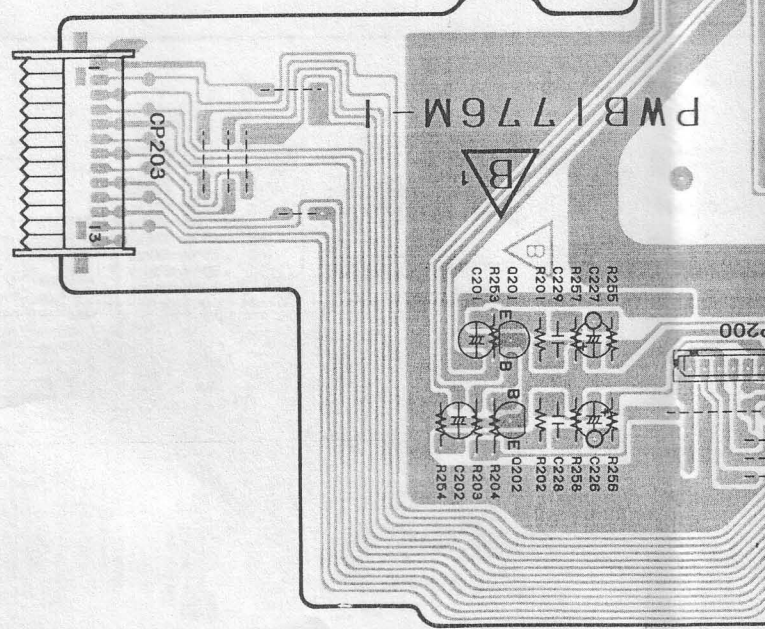
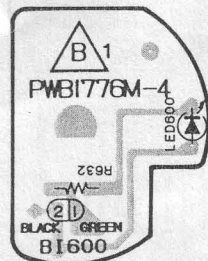


BALANCE

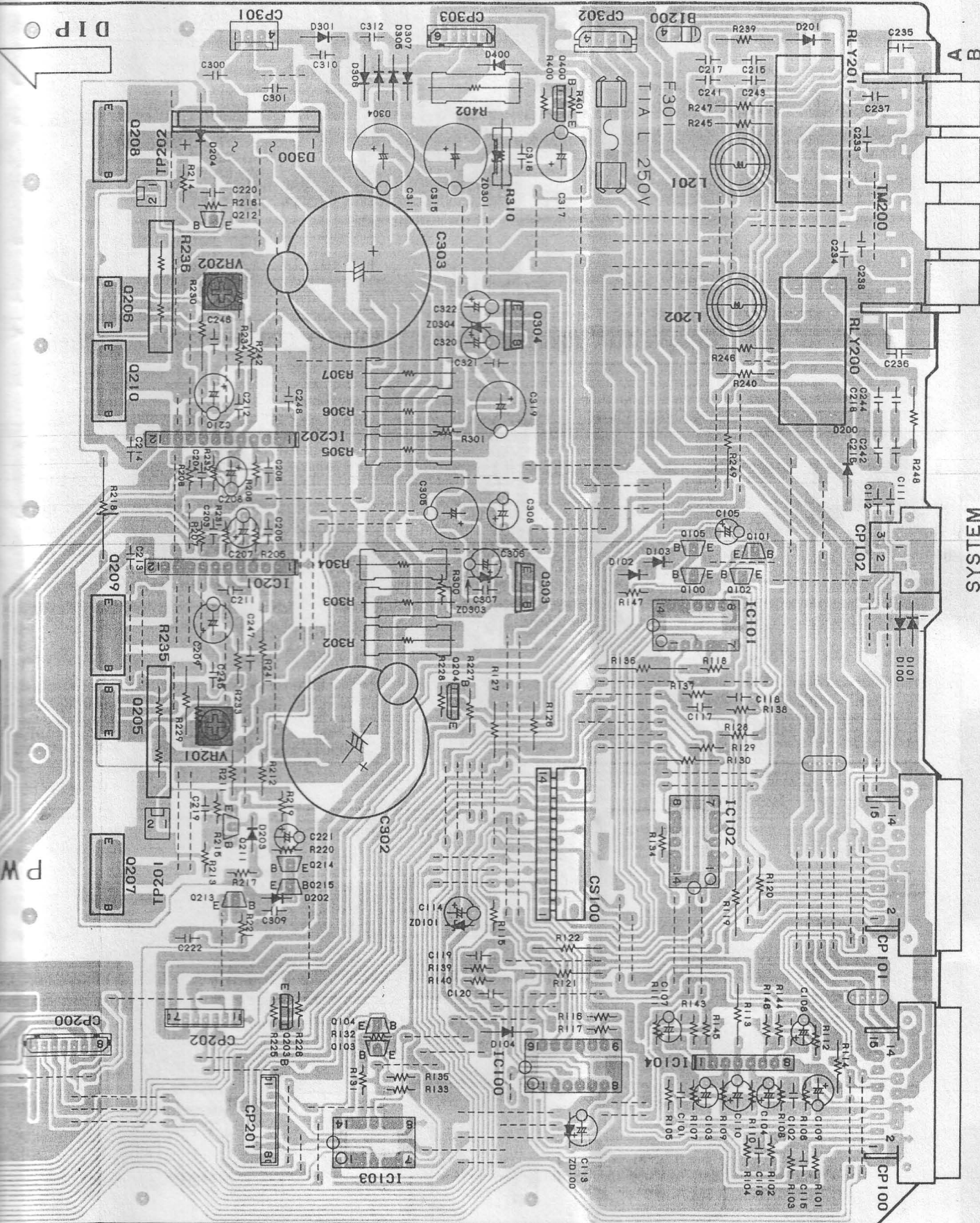
VOLUME CONTROL



← FRONT



DIP



SPEAKERS

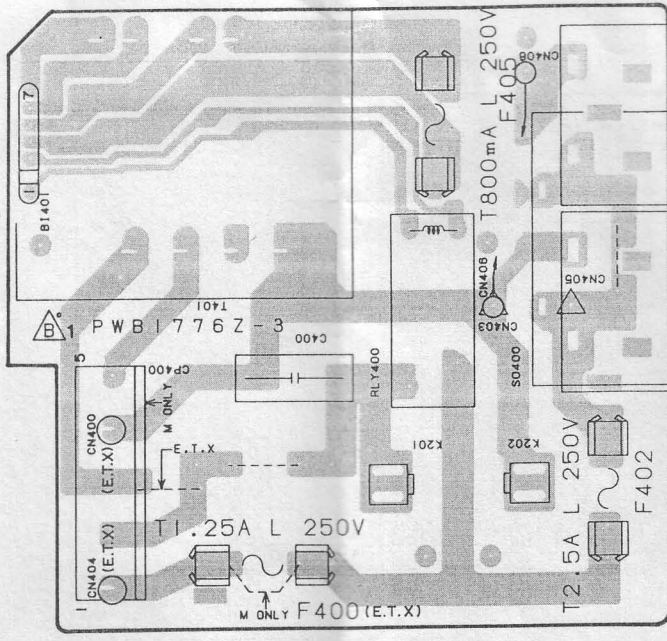
SYSTEM CONTROL

FROM BLACK CONNECTOR  
 AC 15V/2A  
 4-X

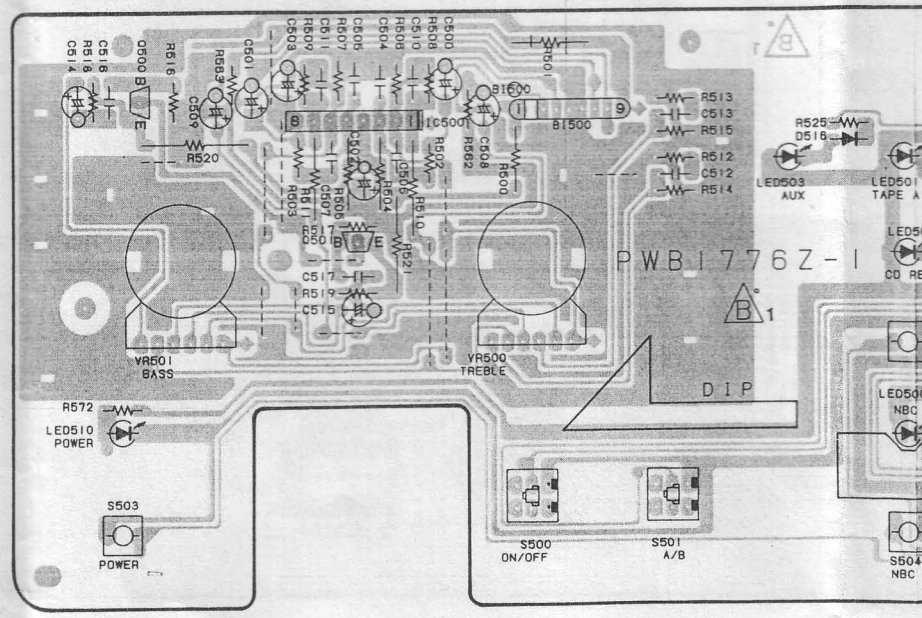
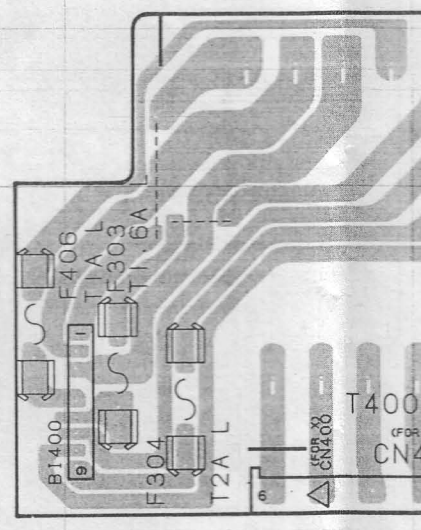
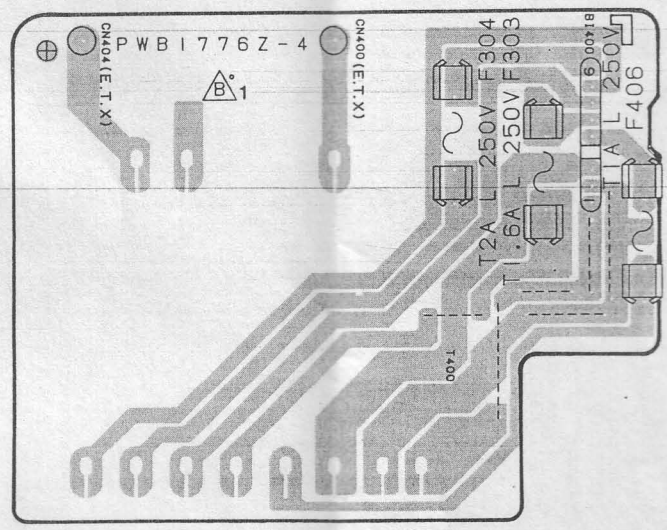
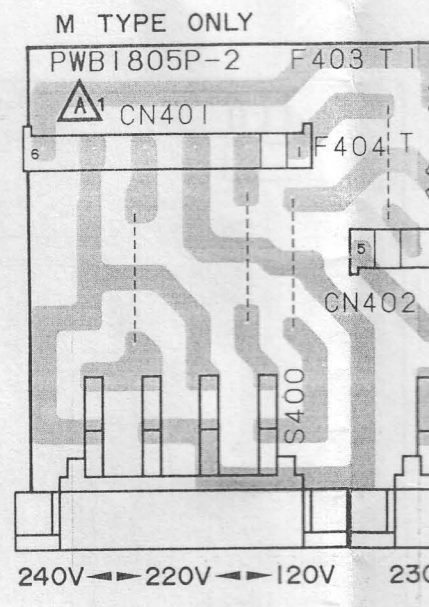
FROM WHITE CONNECTOR  
 AC 9V/1A  
 AC 15V/0.5A  
 DP-470



K L M N O  
**PC BOARD (Component side view) CONTROL Unit**

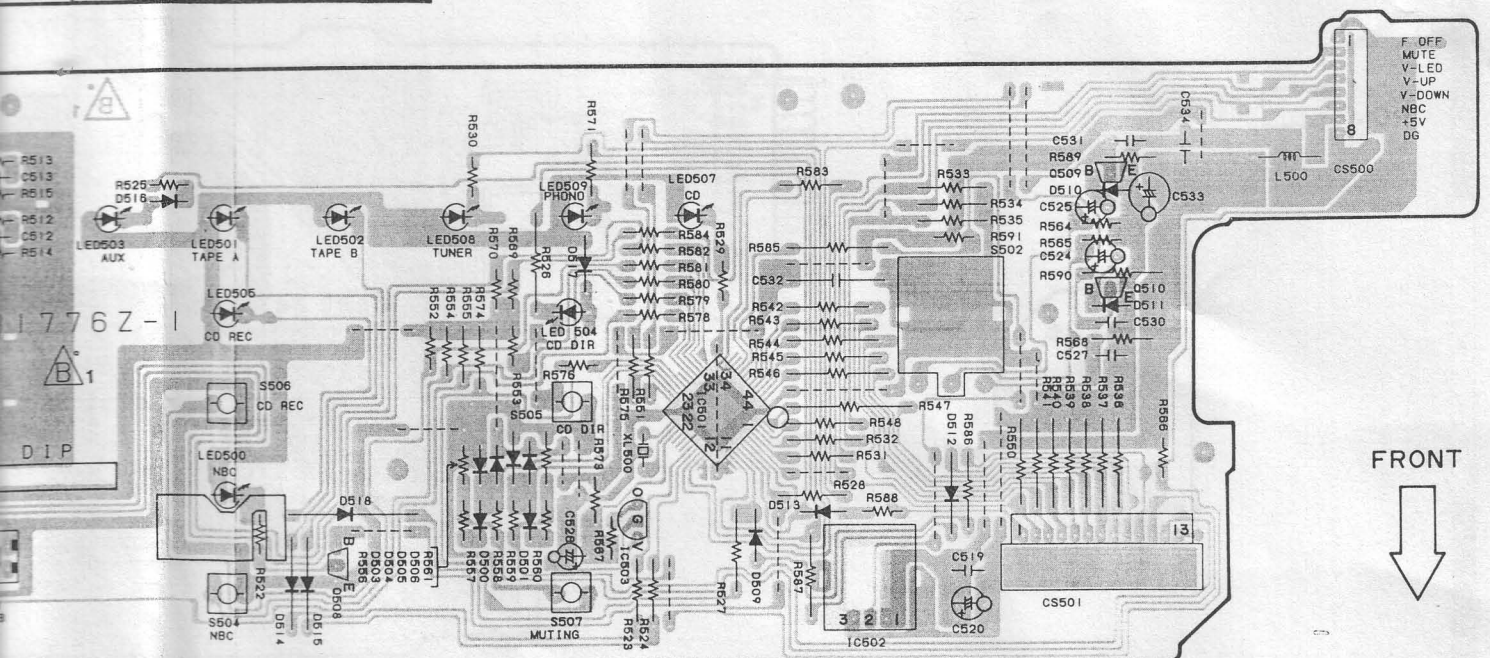
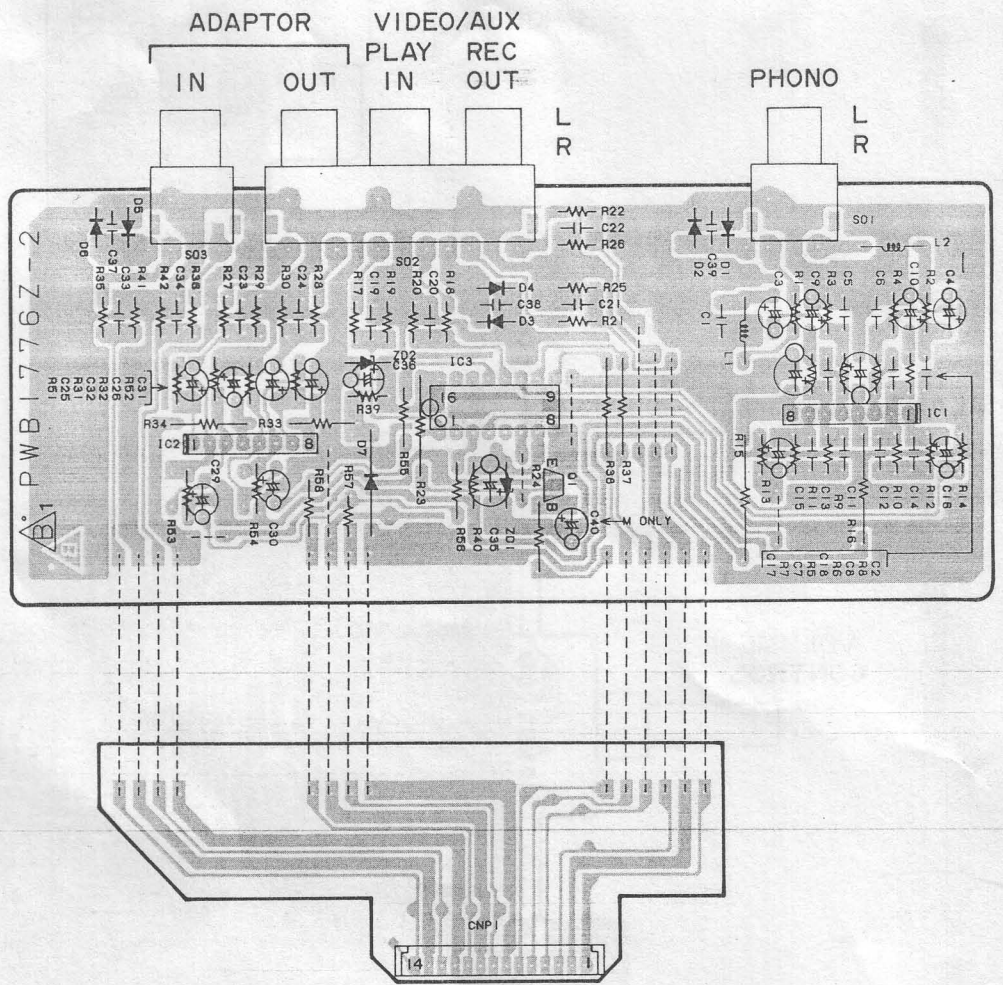
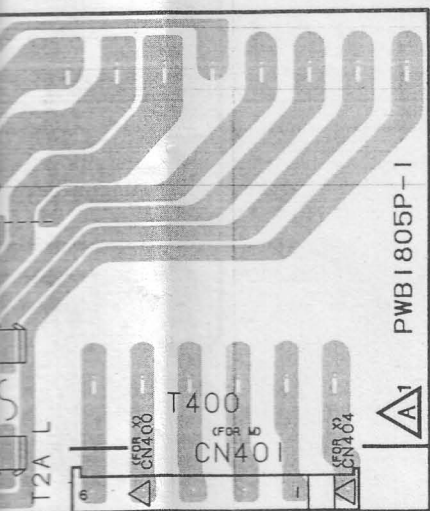
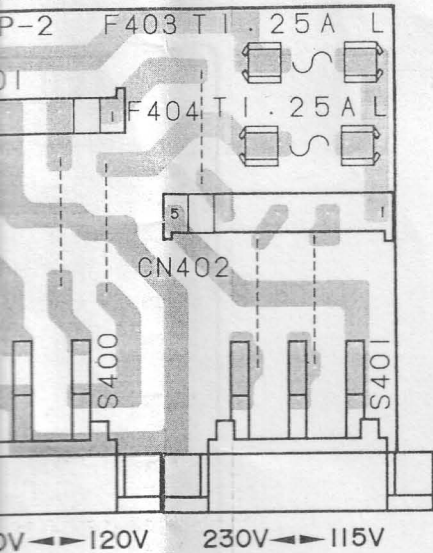


AC OUTLET



2  
3  
4  
5  
6  
7

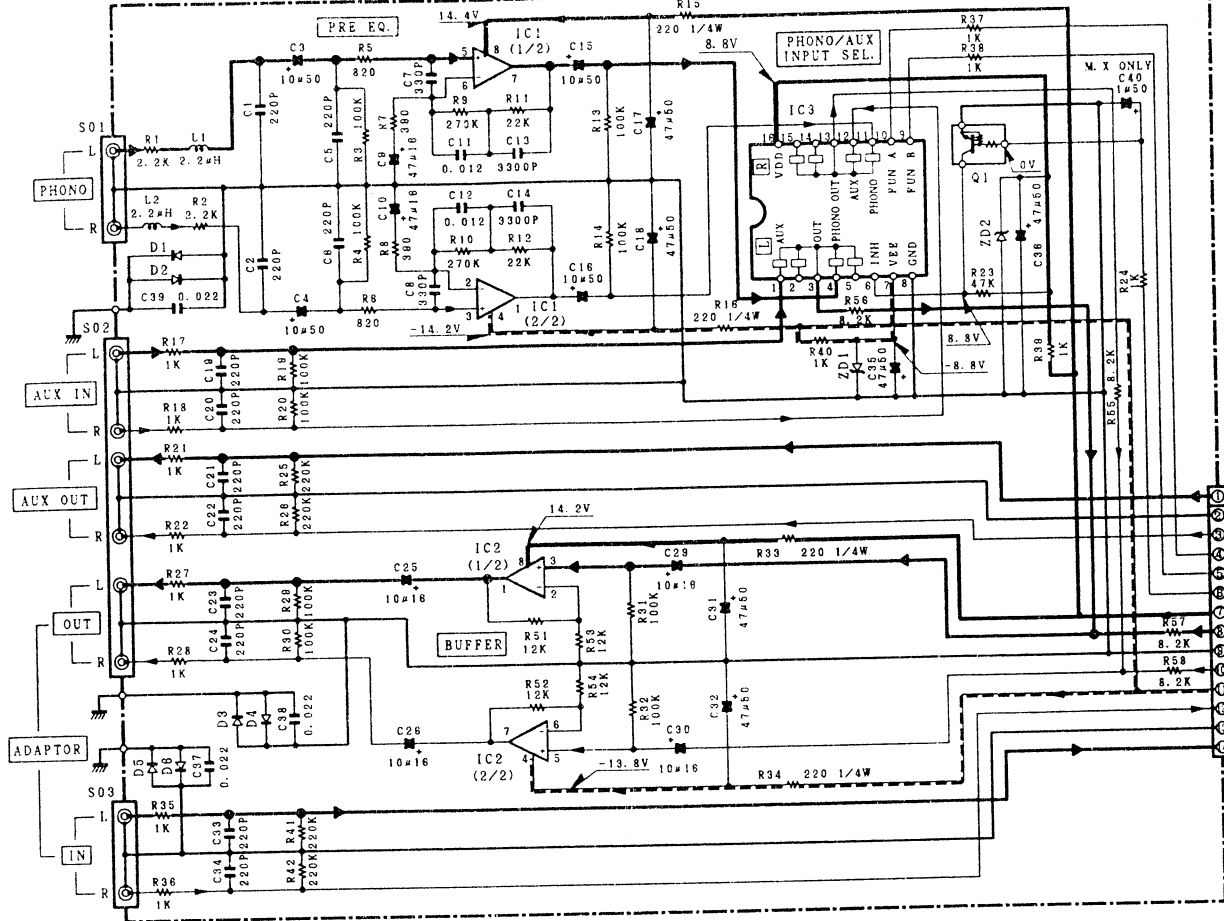
ONLY





IC1 : M5218AL Q1 : DTC114YS  
 IC2, 500 : BA15218N1 D1~7 : 1SS133  
 IC3 : TC4052BP ZD1, 2 : MTAJ9R1A

PWB1776Z-2



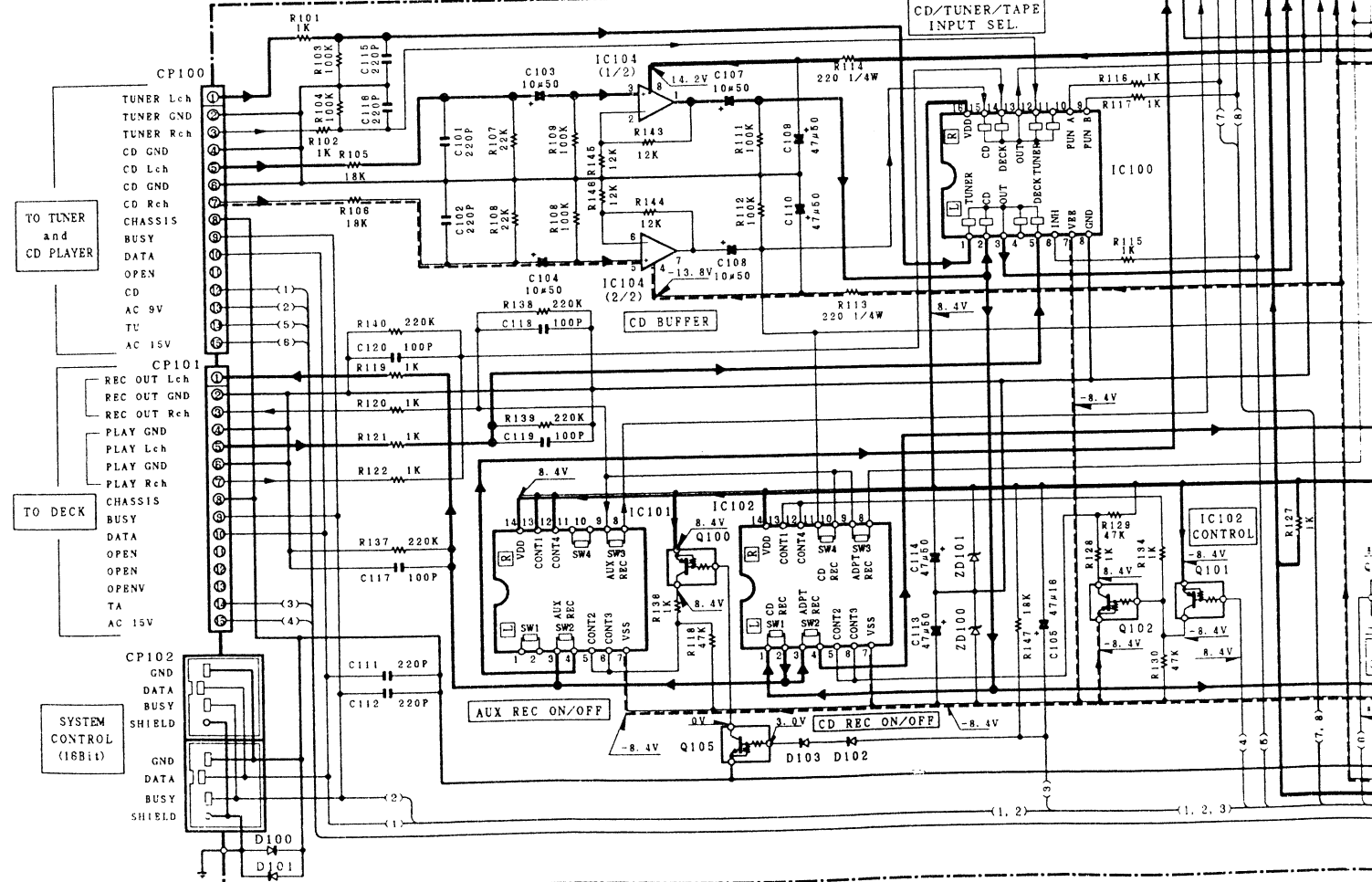
IC100 : TC4052BP  
 IC101~103 : TC4066BP  
 IC104, 600 : BA15218N1  
 IC201, 202 : UCPL122BP  
 IC601 : LB1641

Q100, 101 : DTA114YS  
 104, 213 :  
 Q102, 103 : DTC114YS  
 604 :  
 Q105 : DTC114YS  
 Q201, 202 : 2SC2878  
 600, 601 :  
 Q203, 204 : 2SD1855  
 Q205, 206 : 2SC3420  
 Q207, 208 : 2SC3180  
 Q209, 210 : 2SA1200  
 Q211, 212 : 2SC1740  
 214, 215 :  
 Q303 : 2SD201  
 Q304 : 2SB137  
 Q400 : 2SD1855  
 Q602, 603 : 2SA930

DESTINATION	
COUNTRY	A
ENGLAND	
EUROPE	
AUSTRALIA	
GENERAL MARKET	

DESTINATION	
COUNTRY	A
ENGLAND	
EUROPE	
AUSTRALIA	
GENERAL MARKET	

PWB1776M-1



DESTINATION	
COUNTRY	A
ENGLAND	
EUROPE	
AUSTRALIA	
GENERAL MARKET	

AUX OUT Lch	(1)
A GND	(2)
AUX OUT Rch	(3)
FUN A	(4)
FUN B	(5)
INH	(6)
+15V (A)	(7)
A GND	(8)
ADPT OUT LCH	(9)
+15V (A)	(10)
A GND	(11)
ADPT IN R	(12)
A GND	(13)
ADPT IN L	(14)

TO TUNER and CD PLAYER	
TUNER Lch	(1)
TUNER GND	(2)
TUNER Rch	(3)
CD GND	(4)
CD Lch	(5)
CD GND	(6)
CD Rch	(7)
CHASSIS BUSY	(8)
DATA	(9)
OPEN	(10)
CD	(11)
AC 9V	(12)
TU	(13)
AC 15V	(14)

TO DECK	
REC OUT Lch	(1)
REC OUT GND	(2)
REC OUT Rch	(3)
PLAY GND	(4)
PLAY Lch	(5)
PLAY GND	(6)
PLAY Rch	(7)
CHASSIS BUSY	(8)
DATA	(9)
OPEN	(10)
OPEN	(11)
OPENV	(12)
TA	(13)
AC 15V	(14)

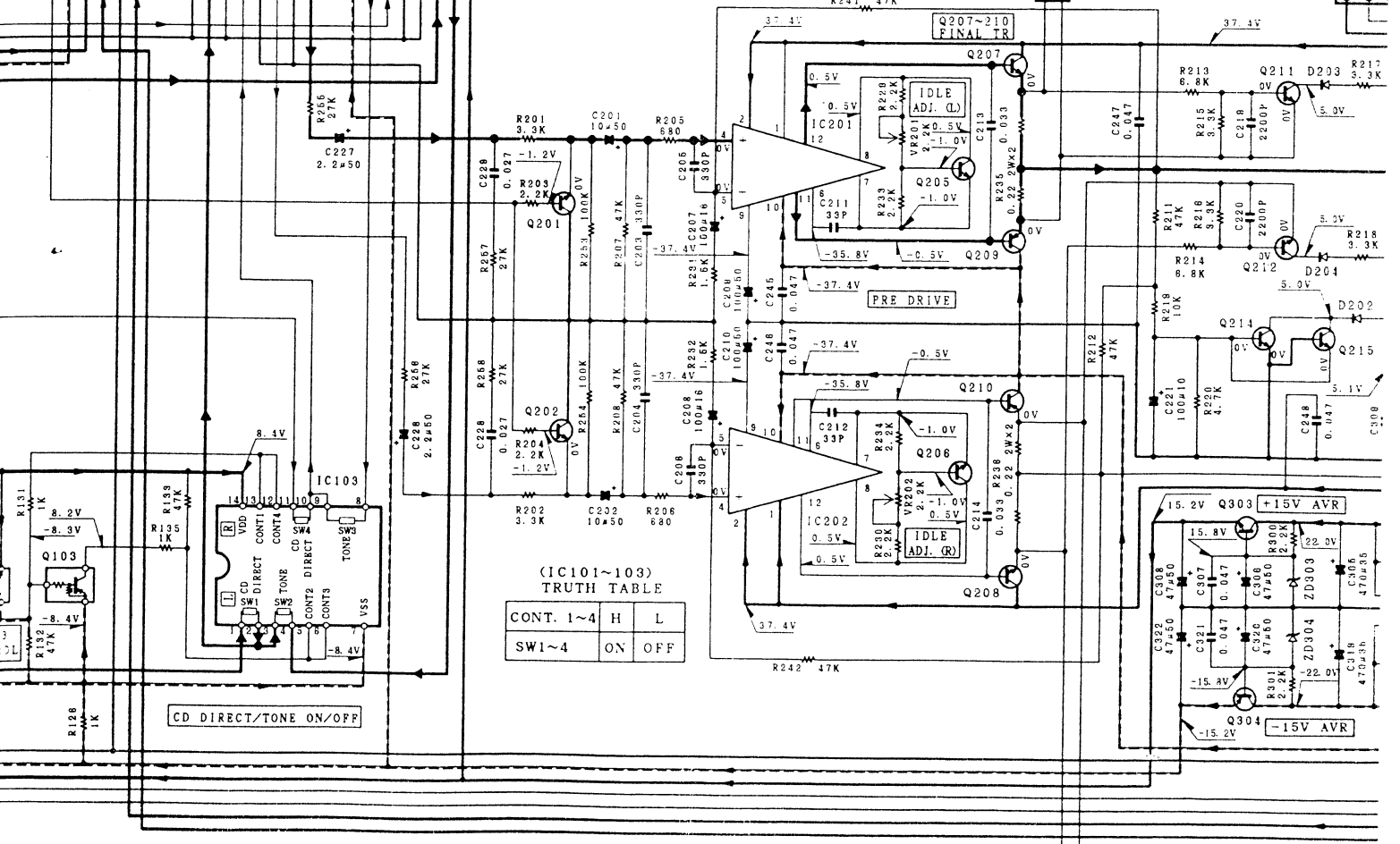
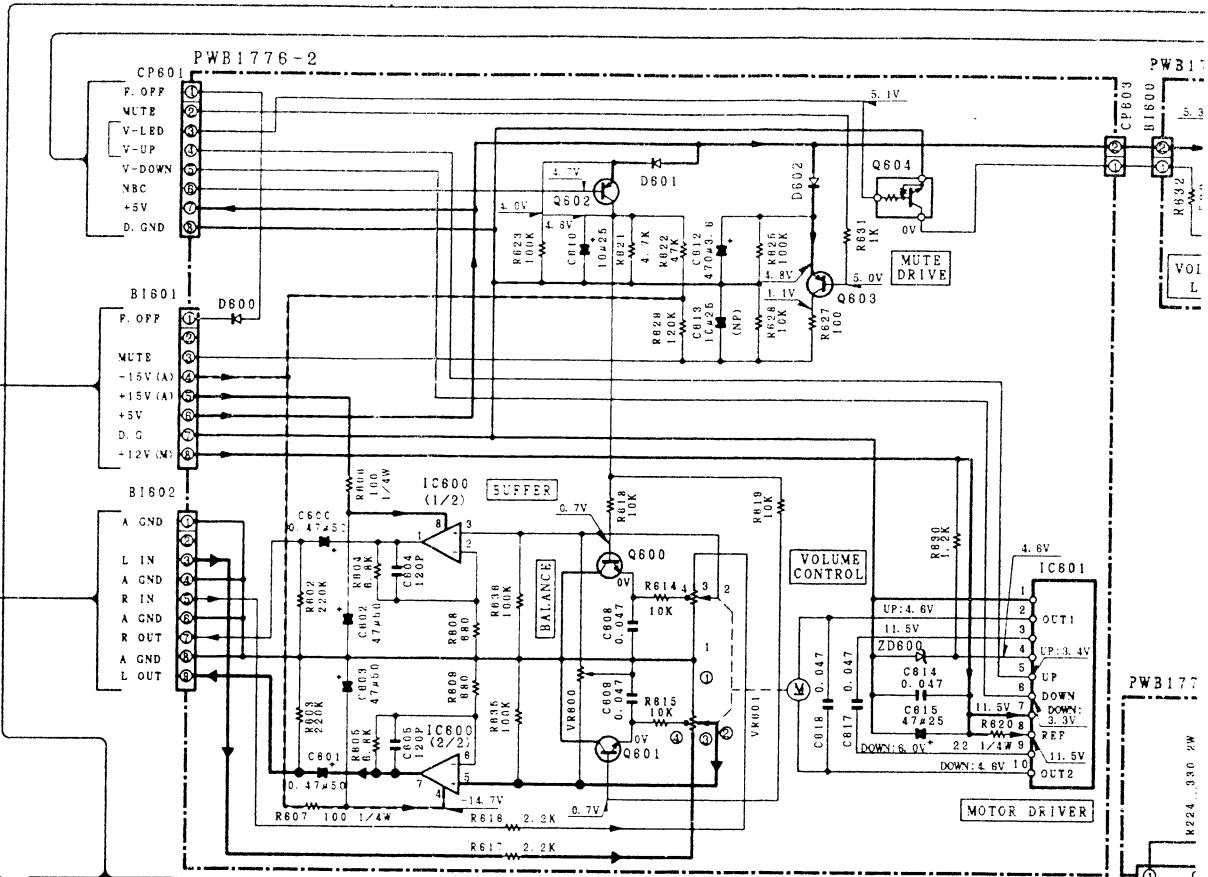
SYSTEM CONTROL (16Bit)	
GND	(1)
DATA	(2)
BUSY	(3)
SHIELD	(4)
GND	(5)
DATA	(6)
BUSY	(7)
SHIELD	(8)

- D100~104 : 1SS133
- 202~204
- 600~602
- D200, 201 : RL104T
- 301, 400
- 304~307
- D300 : D5SBA20
- ZD100, 101 : MTZJ9.1A
- ZD301 : MTZJ5.1B
- ZD303, 304 : MTZJ16BT
- ZD600 : MTZJ4.7A

R245	C233	L201
~R248	C234	L202
	C241	
	~C244	
YES	YES	YES
YES	YES	YES
NO	NO	NO
NO	NO	NO

R302	
~R307	
ABB.	
T	1K 3W
E	1K 3W
X	680
NET	M 680

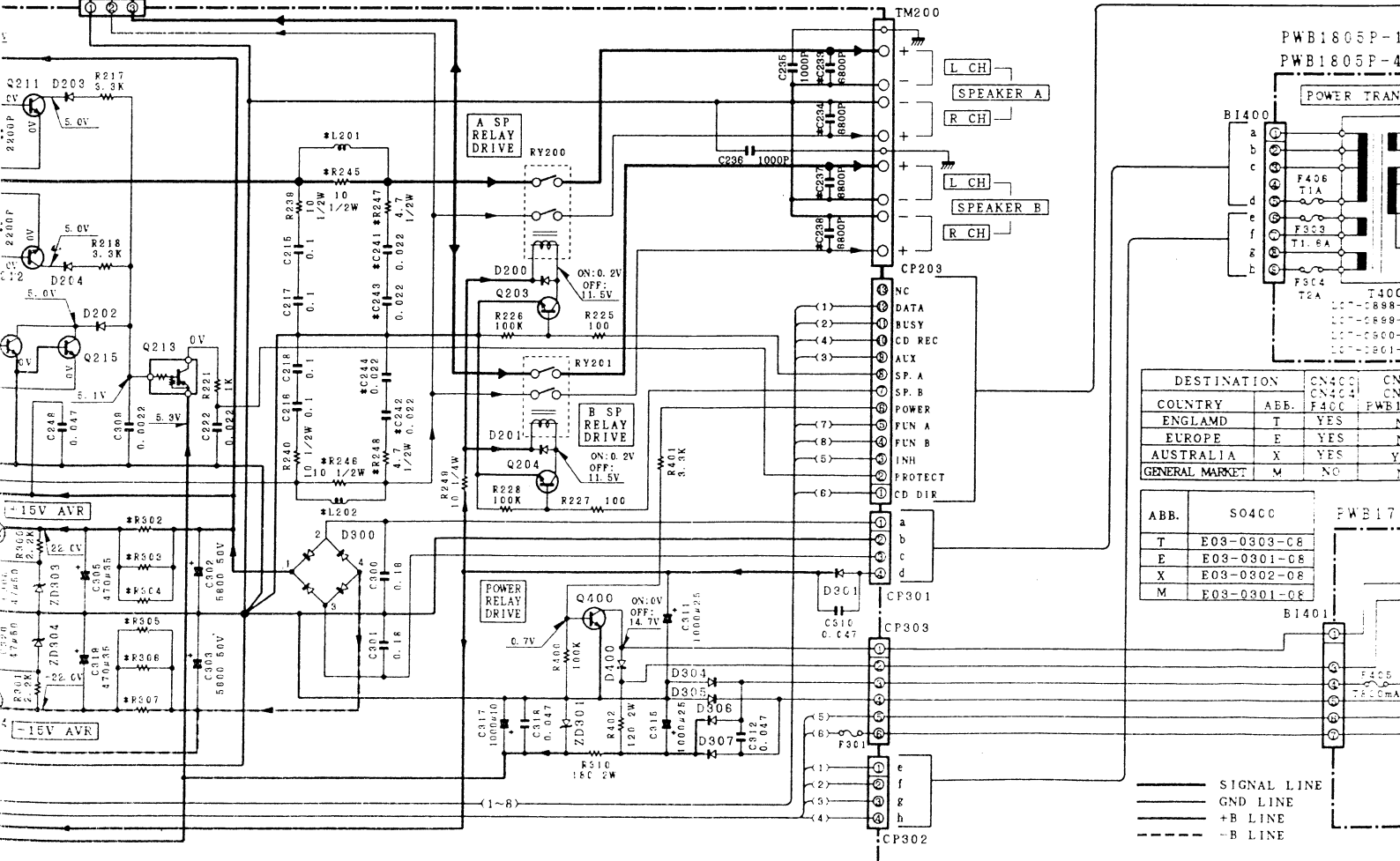
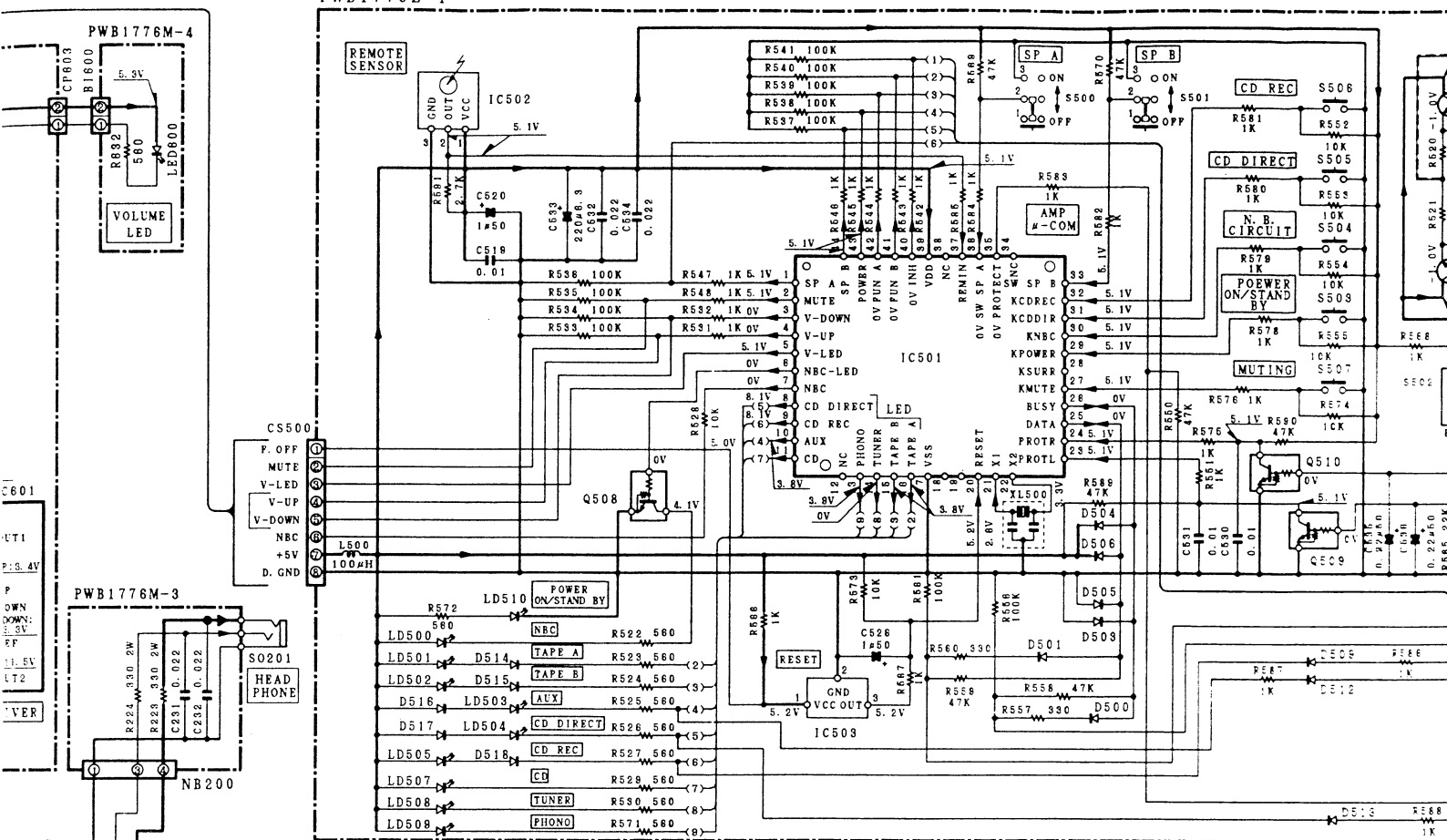
CP202	
A GND	
L IN	
R IN	
A GND	
R OUT	
A GND	
L OUT	
CP200	
-15V (A)	
TN (R)	
AP (R)	
A GND	
AP (L)	
TN (L)	
CP201	
+15V (A)	



(IC101~103)  
TRUTH TABLE

CONT. 1~4	H	L
SW1~4	ON	OFF

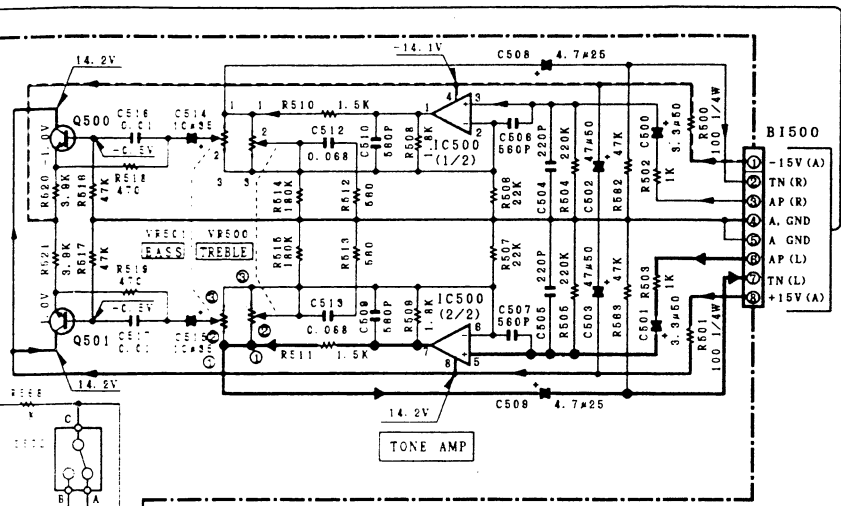
PWB17762-1



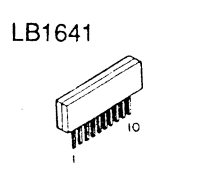
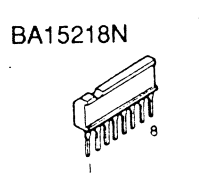
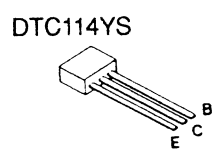
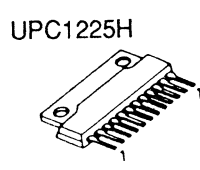
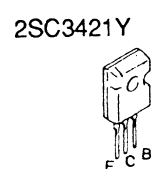
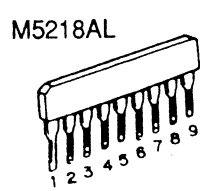
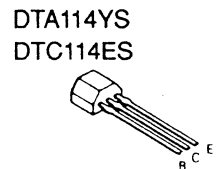
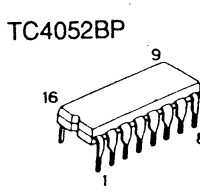
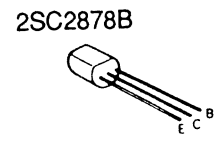
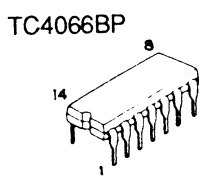
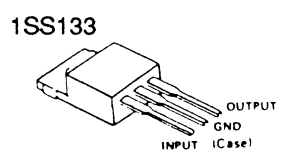
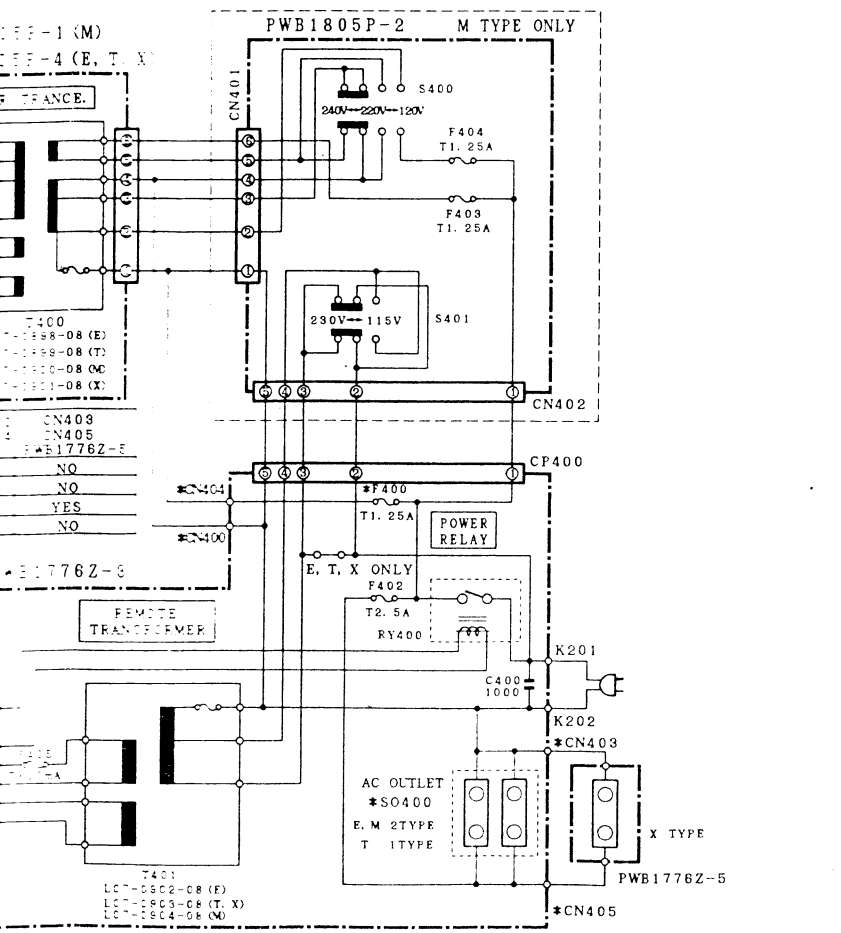
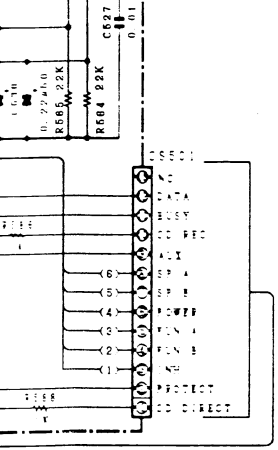
DESTINATION	CN400	CN401	CN402
COUNTRY	ABB	F400	PWB1
ENGLAND	T	YES	N
EUROPE	E	YES	N
AUSTRALIA	X	YES	Y
GENERAL MARKET	M	NO	N

ABB.	S0400	PWB17
T	E03-0303-08	
E	E03-0301-08	
X	E03-0302-08	
M	E03-0301-08	

— SIGNAL LINE  
 — GND LINE  
 — +B LINE  
 - - - B LINE



- PWB1776Z-1
- IC2, 500 : BA15218N1
  - IC3 : TC4052BP
  - IC501 : RH-1X2189AFZZ
  - IC502 : VHLSPS4201AFZZ
  - IC503 : PST600D
- 
- Q508~510 : DTC114YS
  - Q500, 501 : 2SC1740SR
- 
- D500, 501 : 1SS133
  - 503~506, 509
- 
- LD500 : SLR34VC3
  - LD501~505 : SLR34VC
  - 507~510



**CAUTION:** For continued safety, replace safety critical components only with manufacturer's recommended parts (refer to parts list). ⚠ indicates safety critical components. To reduce the risk of electric shock, leakage-current or resistance measurements shall be carried out (exposed parts are acceptably insulated from the supply circuit) before the appliance is returned to the customer.

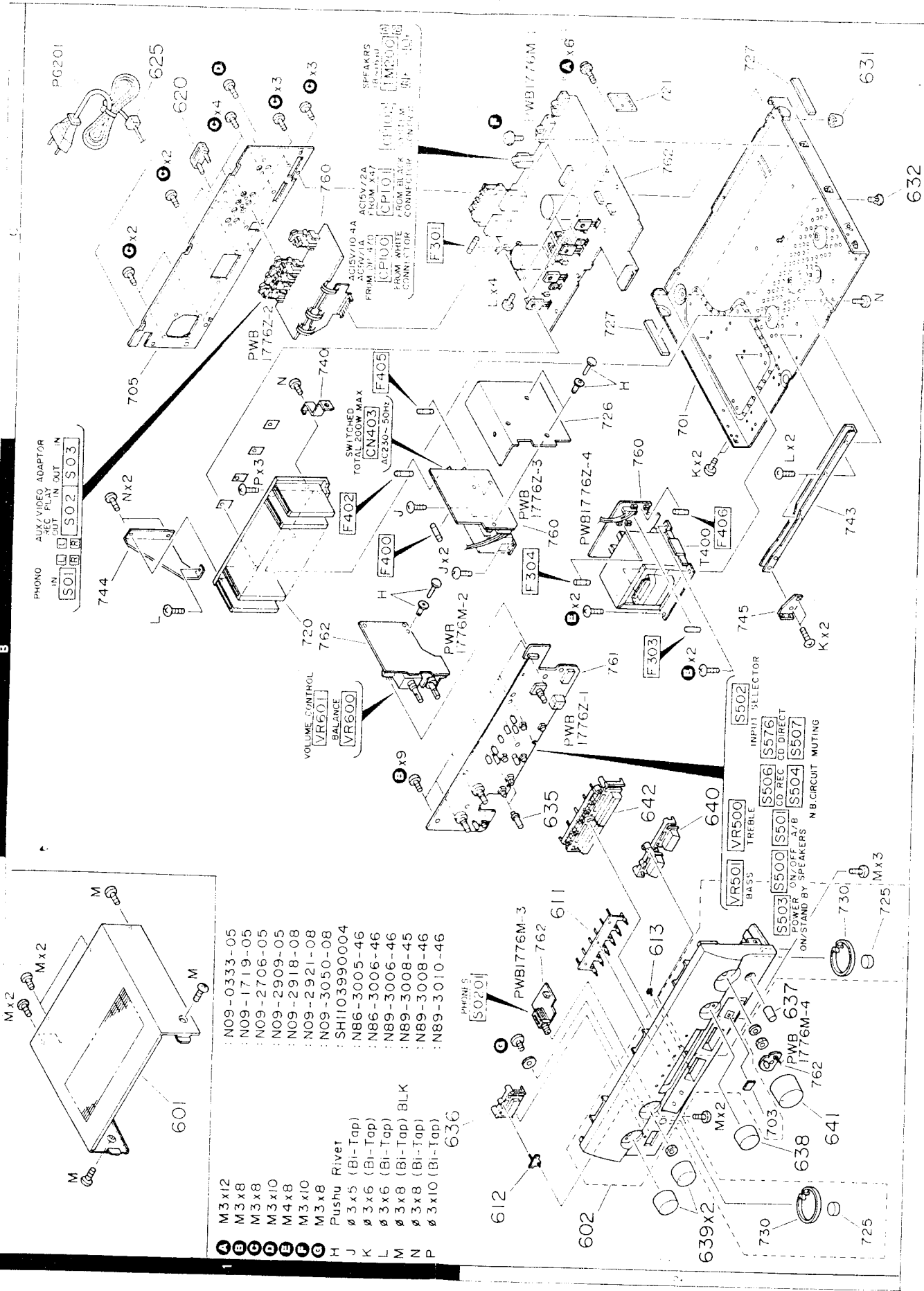
DC voltages are as measured with a high impedance voltmeter with no signal input. Values may vary slightly due to variations between individual instruments or/and units.

Les tensions c.c. doivent être mesurées avec un voltmètre à haute impédance sans signal d'entrée. Les valeurs peuvent différer légèrement du fait des variations inhérentes aux appareils et aux instruments de mesure individuels.

Die angegebenen Gleichspannungswerte wurden mit einem hochohmigen Spannungsmesser ohne Eingangssignal gemessen. Dabei schwanken die Meßwerte aufgrund von Unterschieden zwischen einzelnen Instrumenten oder Geräten u. U. geringfügig.



**EXPLODED VIEW**



- A M3x12
- B M3x8
- C M3x8
- D M3x10
- E M4x8
- F M3x10
- G M3x8
- H Pushu Rivet
- J ø 3 x 5 (Bl-Tap)
- K ø 3 x 6 (Bl-Tap)
- L ø 3 x 6 (Bl-Tap)
- M ø 3 x 8 (Bl-Tap) BLK
- N ø 3 x 8 (Bl-Tap)
- P ø 3 x 10 (Bl-Tap)
- 1 N09-0333-05
- 2 N09-1719-05
- 3 N09-2706-05
- 4 N09-2909-05
- 5 N09-2918-08
- 6 N09-2921-08
- 7 N09-3050-08
- 8 SH1103990004
- 9 N86-3005-46
- 10 N86-3006-46
- 11 N89-3006-46
- 12 N89-3008-45
- 13 N89-3008-46
- 14 N89-3010-46

Parts with the exploded numbers larger than 700 are not supplied

PARTS LIST

No.2

Ref. No. 参照番号	Address 位	Address New Part 新	Parts No. 部品番号	Description 部 品 名 / 規 格	Description 部 品 名 / 規 格	Destr. Re- nation marks 仕 向 備考
C9	110	*	CE04KW1C470M	47UF	ELECTR0	
C11	112		SH1125900162	0.012UF J	CERAMIC	
C13	114		SH1125900164	3300PF J	CERAMIC	
C15	116		CE04KW1H100M	10UF 50WV	ELECTR0	
C17	118		CE04KW1H470M	47UF 50WV	ELECTR0	
C19	124		CC45SL1H211J	220PF J	CERAMIC	
C25	126		CE04KW1C100M	10UF 16WV	ELECTR0	
C29	130		CE04KW1C100M	10UF 16WV	ELECTR0	
C31	132		CE04KW1H470M	47UF 50WV	ELECTR0	
C33	134		CC45SL1H211J	220PF J	CERAMIC	
C35	136		CE04KW1H470M	47UF 50WV	ELECTR0	
C37	138		CK45FF1H232Z	0.022UF Z	CERAMIC	
C40	140		CE04KW1H101M	1.00UF 50WV	ELECTR0	MX1
C44	144		CC45SL1H211J	220PF J	CERAMIC	
C101	102		CE04KW1H100M	10UF 50WV	ELECTR0	
C103	104		CE04KW1H100M	10UF 50WV	ELECTR0	
C105	106		CE04KW1C470M	47UF 16WV	ELECTR0	
C107	108		CE04KW1H101M	10UF 50WV	ELECTR0	
C109	110		CE04KW1H470M	47UF 50WV	ELECTR0	
C111	112		CC45SL1H211J	220PF J	CERAMIC	
C113	114		CE04KW1H470M	47UF 50WV	ELECTR0	
C115	116		CC45SL1H211J	220PF J	CERAMIC	
C117	118		CC45SL1H101J	100PF J	CERAMIC	
C201	202	*	SH1105940135	10UF 50WV	NP-ELECT	
C203	206		CC45SL1H331J	330PF J	CERAMIC	
C207	208		CE04KW1C101M	100UF 16WV	ELECTR0	
C209	210		CE04KW1H101M	100UF 50WV	ELECTR0	
C211	212		CC45SL1H330J	33PF J	CERAMIC	
C213	214	*	SH1255900094	0.033UF J	FILM	
C215	218		SH1255900079	0.1UF J	CERAMIC	
C219	220		SH1125900145	2200PF K	CERAMIC	ET
C221	222		CE04KW1A101M	100UF 10WV	ELECTR0	
C226	226		CK45FF1H232Z	0.022UF Z	CERAMIC	
C228	228		CE04KW1H282M	2.8UF 50WV	ELECTR0	
C231	232	*	SH1165900085	0.027UF K	CERAMIC	
C233	234	*	SH115900277	0.022UF Z	CERAMIC	
C235	236		CK45FF1E102K	6800PF J	FILM	ET
C237	238	*	SH115900277	6800PF J	FILM	ET
C241	244		CK45FF1H232Z	0.022UF Z	CERAMIC	
C245	248		CK45FF1H473Z	0.047UF Z	CERAMIC	
C300	301	*	SH1305900734	0.18UF J	FILM	
C302	303	*	SH1105900385	5600UF 50WV	ELECTR0	
C305	306	*	SH1105900403	4700UF 35WV	ELECTR0	
C306	307		CE04KW1H470M	47UF 50WV	ELECTR0	
C307	308		CK45FF1H473Z	0.047UF Z	CERAMIC	
C308	309		CE04KW1H470M	47UF 50WV	ELECTR0	
C310	311	*	SH1125900195	2200PF J	FILM	
C311	312		CK45FF1H473Z	0.047UF Z	CERAMIC	
C312	313		CK45FF1H473Z	0.047UF Z	CERAMIC	
C315	316		CE04KW1E102M	1000UF 25WV	ELECTR0	
C316	317		CK45FF1H473Z	0.047UF Z	CERAMIC	
C319	320		CE04KW1H471M	1000UF 6.3WV	ELECTR0	
C420	321		CE04KW1H470M	470UF 35WV	ELECTR0	

USA, Canada  
 Y: Yes, N: No, U: Unknown  
 Y: Yes, N: No, U: Unknown  
 X: Available, M: Member Area

No.1

Ref. No. 参照番号	Address 位	Address New Part 新	Parts No. 部品番号	Description 部 品 名 / 規 格	Description 部 品 名 / 規 格	Destr. Re- nation marks 仕 向 備考
601	1A	*	A01-3117-08	METALIC CABINET		
602	2A	*	A60-0354-08	PANEL ASSY		
611	2A	*	B11-0274-08	INDICATOR	INPUT	
612	2A	*	B11-0275-08	INDICATOR	POWER	
613	2A	*	B11-0276-08	INDICATOR	NB CIRCUIT	X
			B46-0096-33	WARRANTY CARD		
			B46-0310-03	WARRANTY CARD		
626	1C	*	SH1105240052	PIN		
PG201	1C	*	E30-2750-08	AC POWER CORD		X
PG201	1C	*	E30-2753-08	AC POWER CORD		T
PG201	1C	*	SH1105000038	AC POWER CORD		ME
			H50-0825-08	ITEM CARTON CASE		ETX
			H50-0826-08	ITEM CARTON CASE		MI
			H10-5728-08	POLYSTYRENE FOAMED FIXTURE L		
			H10-5729-08	POLYSTYRENE FOAMED FIXTURE R		
			H12-2185-08	PACKING FIXTURE		
			H25-1612-08	PROTECTION BAG		
625	1C	*	SH1102040086	POWER CARD BUSHING		
631	2C	*	SH1101230060	REAR FOOT		
632	2C	*	SH1104130267	UNIT HOLDER		
635	2B	*	K27-2117-08	KN09 SPEAKER		
636	2A	*	K27-2118-08	KN08 POWER		
637	2A	*	K29-5876-08	KN08 BALANCE		
638	2A	*	K29-5877-08	KN08 INPUT SELECTOR		
639	2A	*	K29-5878-08	KN08 TONE		
640	2B	*	K09-5879-08	KN08 NB CIRCUIT MUTING		
641	2A	*	K29-5880-08	KN08 VOLUME		
642	2B	*	K29-5881-08	KN08 CD DIRECT, CD REC		
1400	2B	*	L07-0898-08	POWER TRANS		E
1400	2B	*	L07-0899-08	POWER TRANS		T
1400	2B	*	L07-0900-08	POWER TRANS		MJ
1400	2B	*	L07-0901-08	POWER TRANS		X
A	2C		N09-0333-05	TAPPING SCREW (3X12)		
B	1B		N09-1719-05	TAPTITE SCREW (3X8)		
C	1C		N09-2706-05	TAPTITE SCREW (3X8)		
D	1C		N09-2909-05	TAPTITE SCREW (3X10)		
E	2B		N09-2918-08	SCREW (4X8)		
F	2C		N09-2921-08	SCREW (3X10)		
G	2A	*	N09-3050-08	SCREW (3X8)		
H	1B, 2C	*	SH1103990004	PUSHU RIVET		
J	1B, 2C	*	N86-3005-46	BINDING HEAD TAPTITE SCREW		
K	2B		N86-3006-46	BINDING HEAD TAPTITE SCREW		
L	1B, 2B		N89-3006-45	BINDING HEAD TAPTITE SCREW		
M	1A, 2A		N89-3008-45	BINDING HEAD TAPTITE SCREW		
N	1B, 1C		N89-3008-46	BINDING HEAD TAPTITE SCREW		
P	1B		N89-3010-46	BINDING HEAD TAPTITE SCREW		
<b>ELECTRICAL UNIT</b>						
C1	2		CC45SL1H221J	220PF J	CERAMIC	
C3	14		CE04KW1H100M	10UF 50WV	ELECTR0	
C5	16		CC45SL1H221J	2200PF J	CERAMIC	
C7	18		CC45SL1H331J	330PF J	CERAMIC	

USA, Canada  
 Y: Yes, N: No, U: Unknown  
 Y: Yes, N: No, U: Unknown  
 X: Available, M: Member Area

No.4

No.3



## PARTS LIST

\* New Parts  
 Parts without Parts No. are not included.  
 Les articles sans numéro de pièce ne sont pas inclus.  
 Teile ohne Parts No. werden nicht geliefert.

No.5

Ref. No. 参照番号	Address 位置	Parts No. 部品番号	Description 部品名 / 规格	Desti- nation 任務
L0501-505		* SLR34VC	LED	
L0507-510		* SLR34UC	LED	
LE0600		* SLR34UC	LED	
Q1		DTC114YS	DIGITAL TRANSISTOR	
Q100, 101		DTA114YS	DIGITAL TRANSISTOR	
Q102, 103		DTC114YS	DIGITAL TRANSISTOR	
Q104		DTA114YS	DIGITAL TRANSISTOR	
Q105		DTC114ES	DIGITAL TRANSISTOR	
Q201, 202		ZSC2878B	TRANSISTOR	
Q203, 204		ZSD1858R3	TRANSISTOR	
Q205, 206		ZSC3421Y	TRANSISTOR	
Q207, 208		ZSC3180NR	TRANSISTOR	
Q209, 210		ZSA1263NR	TRANSISTOR	
Q211, 212		ZSC1740SR	TRANSISTOR	
Q213		DTA114YS	DIGITAL TRANSISTOR	
Q214, 215		ZSC1740SR	TRANSISTOR	
Q303		ZSD2012	TRANSISTOR	
Q304		ZSB1375	TRANSISTOR	
Q400		ZSD1858R3	TRANSISTOR	
Q500, 501		ZSC1740SR	TRANSISTOR	
Q508-510		DTC114YS	DIGITAL TRANSISTOR	
Q600, 601		ZSC2878B	TRANSISTOR	
Q602, 603		ZSA933SR	TRANSISTOR	
Q604		DTC114YS	DIGITAL TRANSISTOR	
Z01, 2		MTZ59.1A	ZENER DIODE	
ZD100, 101		MTZ59.1A	ZENER DIODE	
ZD301		MTZ5.1B	ZENER DIODE	
ZD303, 304		MTZ3168T	ZENER DIODE	
ZD600		MTZ34.7A	ZENER DIODE	

L:Standard  
 Y:Y (For East, Hawaii)  
 Y:Y:ES (Europe)

K:USA  
 T:England  
 X:Australia

P:Canada  
 E:Europe  
 M:Other Areas

① Includes safety related components.

# SPECIFICATIONS

<b>Rated power output</b>	
(IEC/NF) from 63 Hz to 12,500 Hz, 0.7% T.H.D.	
at 8Ω .....	45W + 45W
(EIAJ) 1kHz, 10% T.H.D.	
at 6Ω .....	60W + 60W
Total harmonic distortion (1kHz, 8Ω) .....	
0.02% at 20W	
Signal to noise ratio (IHF-A)	
PHONO (MM) .....	72dB for 2.5mV input
CD, TAPE .....	94dB for 200mV input
Input sensitivity/impedance	
PHONO (MM) .....	2.5mV/47kΩ
CD, TAPE .....	200mV/47kΩ
Tone controls	
BASS .....	± 10dB (at 100Hz)
TREBLE .....	± 10dB (at 10kHz)
General	
Power consumption .....	145W (E, T)
	155W (M, X)
Dimensions .....	W: 360 mm
	H: 119 mm
	D: 330 mm
Weight .....	7.4 kg
AC outlets (switched) .....	2 (Total 200W max.)
(For AUSTRALIA) .....	1 (200W max.)

KENWOOD follows a policy of continuous advancements in development.  
For this reason specifications may be changed without notice.

KENWOOD poursuit une politique de progrès constants en ce qui concerne le développement.  
Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

KENWOOD strebt ständige Verbesserungen in der Entwicklung an.  
Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.

#### Note:

Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on the U.S.A. (K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

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