Service Manual

ORDER NO.
RRV2345

DUAL DRIVE AMPLIFIER

M-AX10

THIS MANUAL IS APPLICABLE TO THE FOLLOWING MODEL(S) AND TYPE(S).

Type	Model	Power Requirement	Remarks
	M-AX10		
KU/CA	◯	AC120V	
NY	◯	AC230V	

CONTENTS

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PIONEER EUROPE NV Haven 1087, Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE. LTD. 253 Alexandra Road, #04-01, Singapore 159936

T – ZZV JULY. 2000 Printed in Japan

1. SAFETY INFORMATION

This service manual is intended for qualified service technicians ; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.

Health & Safety Code Section 25249.6 – Proposition 65

NOTICE
(FOR CANADIAN MODEL ONLY)
Fuse symbols (fast operating fuse) and/or (slow operating fuse) on PCB indicate that replacement parts must be of identical designation.

REMARQUE
(POUR MODÈLE CANADIEN SEULEMENT)
Les symboles de fusible (fusible de type rapide) et/ou (fusible de type lent) sur CCI indiquent que les pièces de remplacement doivent avoir la même désignation.

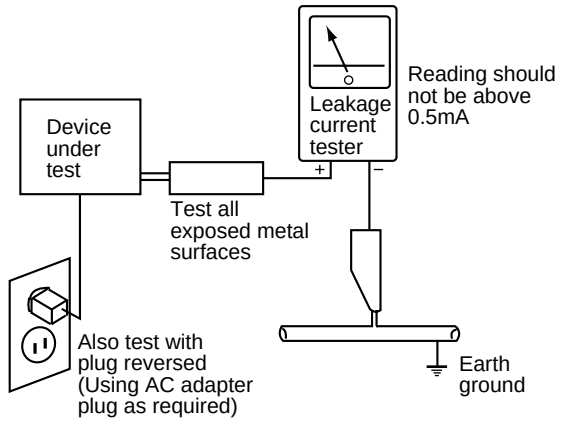
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

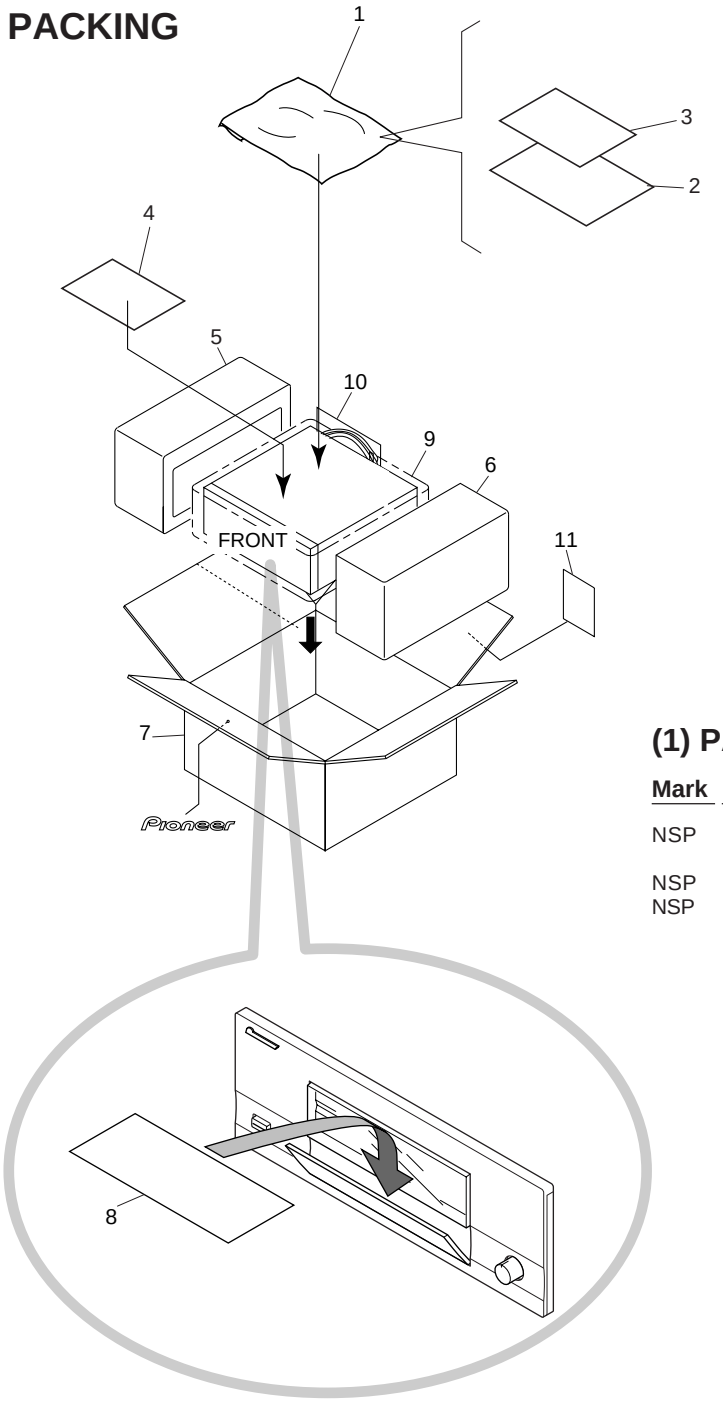
The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

2. EXPLODED VIEWS AND PARTS LIST

NOTES: ● *Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.*
● *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
● *Screws adjacent to ▼ mark on the product are used for disassembly.*

2.1 PACKING



(1) PACKING PARTS LIST

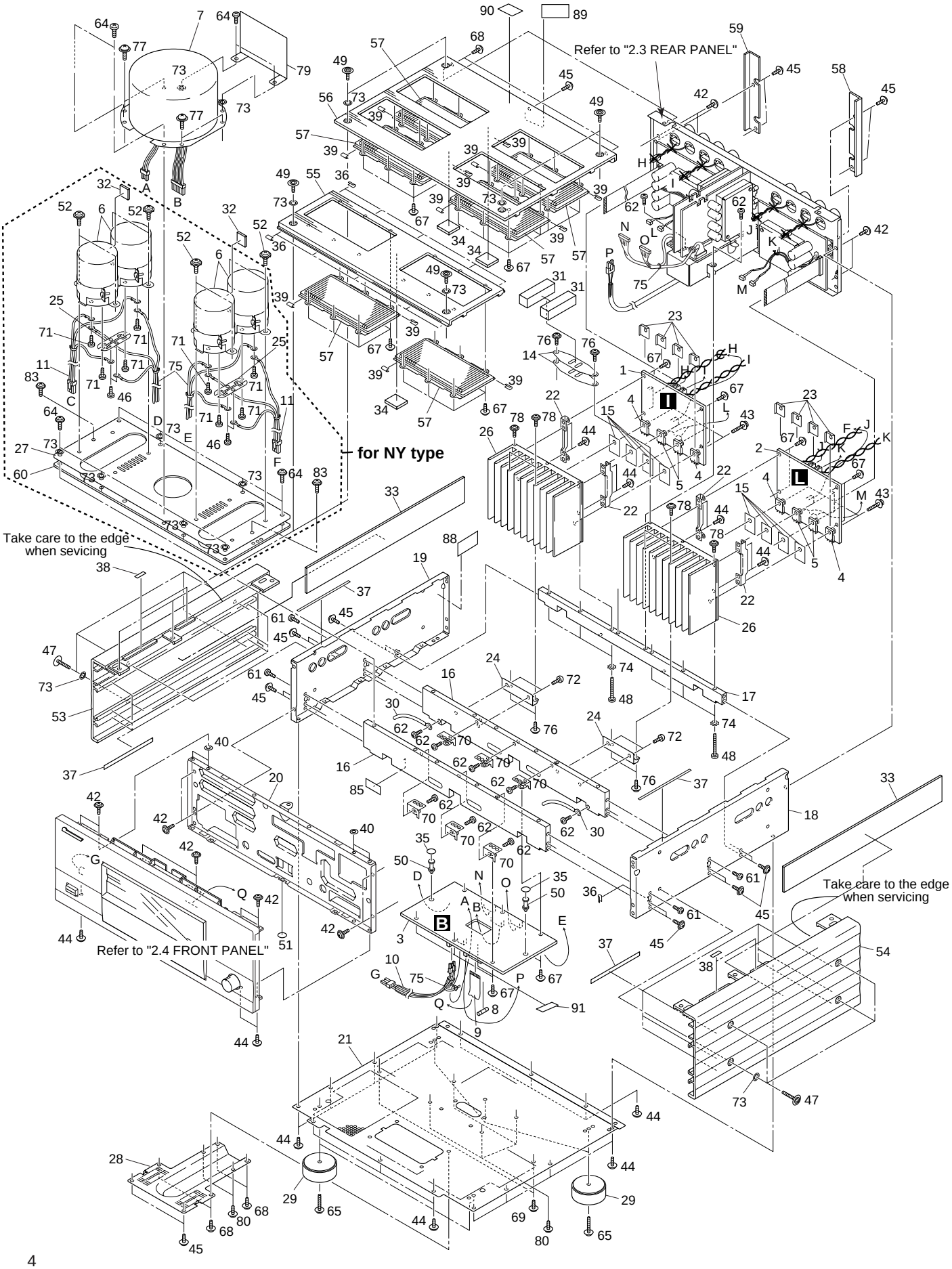
Mark	No.	Description	Part No.
NSP	1	Literature Bag	AHG-117
	2	Instruction Manual (E)	ARB7217
NSP	3	Warranty Card	See Contrast table (2)
NSP	4	Warranty Card	See Contrast table (2)
	5	Styrol Protector L	AHA9014
	6	Styrol Protector R	AHA9015
	7	Packing Case	See Contrast table (2)
	8	Door Sheet	AHG7064
	9	Mirror Mat	RHC1024
	10	Polyester Bag	VHL1004
	11	Recycle Label	See Contrast table (2)

(2) CONTRAST TABLE

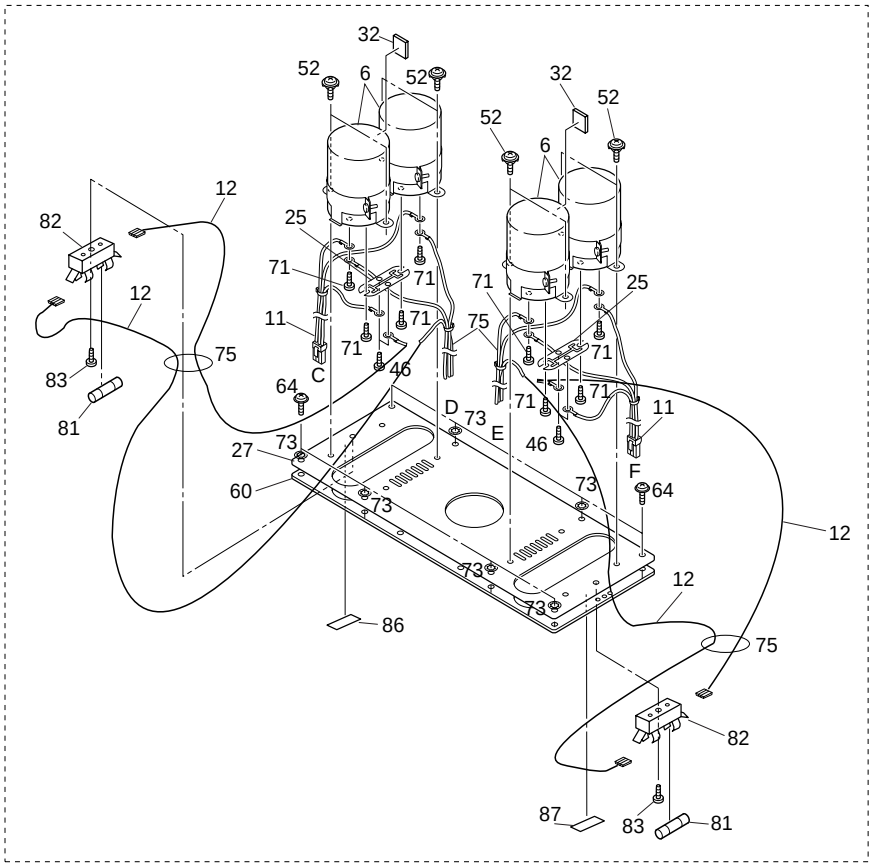
M-AX10/KU/CA and M-AX10/NY are constructed the same except for the following:

Mark	No.	Symbol and Description	Part No.		Remarks
			M-AX10/KU/CA	M-AX10/NY	
NSP	3	Warranty Card	ARY7045	Not used	
NSP	4	Warranty Card	Not used	ARY7022	
	7	Packing Case	AHD7875	AHD7874	
	11	Recycle Label	ARW7091	Not used	

2.2 EXTERIOR


Refer to "2.3 REAR PANEL"
for NY type
Take care to the edge when sevicing
Refer to "2.4 FRONT PANEL"
Take care to the edge when servicing

for KU type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(1) EXTERIOR PARTS LIST

Mark	No.	Description	Part No.
	1	C.AMP (L) ASSY	See Contrast table (2)
	2	C.AMP (R) ASSY	See Contrast table (2)
	3	POWER SUPPLY ASSY	See Contrast table (2)
⚠	4	Power MOS FET (Q1,Q2,Q5,Q6)	IRFP140
⚠	5	Power MOS FET (Q3,Q4,Q7,Q8)	IRFP9140
	6	Electric Capacitor(C1-C4)	ACH7156
⚠	7	Power Transformer	See Contrast table (2)
⚠	8	Fuse (FU1)	See Contrast table (2)
	9	16P FFC 60V (J17)	ADD7155
⚠	10	Wire with 2P Housing (J18)	ADX7336
⚠	11	Cable (J9,J10)	ADX7337
NSP	12	Cable (J23,J24)	See Contrast table (2)
	13	• • • • • • • • • •	
	14	PCB Holder (PLS)	AEC7316
	15	Plate	AEE7030
	16	Stay L (MET)	ANA9006
	17	Stay S (MET)	ANA9007
	18	Side Frame R	ANA9008
	19	Side Frame L	ANA9009
	20	Panel Stay (MET)	AND7033
NSP	21	Bottom Plate	ANF7012
	22	PCB Holder	ANG1474
	23	Transistor Cover L	ANG1724
	24	L Type Plate	ANG7248
	25	Earth Plate	ANG9102
NSP	26	Heat Sink (AL)	ANH7105
	27	Sub Inner Plate (MET)	ANK7080
	28	AC Code Cover (MET)	ANK9024
	29	Insulator	ANL7012
	30	Cord Clamper	RNH-184
NSP	31	Spacer	AEB7168
NSP	32	Spacer	AEB7170
NSP	33	Damping Plate	AMR7280
NSP	34	Damping Plate	AMR7281
	35	Cushion A	PED1001
NSP	36	Sheet	PED1006
NSP	37	Tape	PNM-045
NSP	38	Tape	PNM1160
NSP	39	Tape	PNM1249
NSP	40	Washer (Plastic)	RBF-085
	41	• • • • • • • • • •	
	42	Screw	ABA1011
	43	Screw	ABA1082
	44	Screw (Steel)	ABA1192
	45	Screw (Steel)	ABA1193
	46	Screw (Steel)	ABA1207
	47	Screw (Steel)	ABA7006
	48	Screw (Steel)	ABA7045
	49	M4 SH Screw	ABA7051
	50	PCB Spacer (3 × 12)	AEC1372
	51	Washer (PVC)	RBF1034
	52	Screw	VBA1056
	53	Side AL L	AAH7033
	54	Side AL R	AAH7034
	55	Top Plate F (AL)	AAH7035
	56	Top Plate R (AL)	AAH7036
	57	Bonnet Escutcheon	AAK7658
	58	Rear Mole R	AAP7056
	59	Rear Mole L	AAP7057
	60	Innner Plate (MET)	ANK7081
	61	Screw	BBT30P100FCC
	62	Screw	BBT30P080FCC
	63	• • • • • • • • • •	
	64	Screw	IBZ40P140FCC
	65	Screw	BBZ40P180FCC
	66	• • • • • • • • • •	
	67	Screw	IBZ30P060FCC
	68	Screw	IBZ30P080FCC
	69	Screw	IBZ40P080FCC
	70	PCB Holder (MET)	ANG9101
	71	Screw	PMZ40P060FCU
	72	Screw	VBZ35P080FMC
	73	Washer (CU)	WG40FCC
	74	Washer	WH30FUC
	75	Binder	ZCA-SKB90BK
	76	Screw	ABA1050
	77	Screw	IBZ40P080FCC
	78	Screw	ABA1208
	79	Trans Shield	ANK7074
	80	Screw	VCZ30P100FMC
⚠	81	Fuse (FU2,FU3)	See Contrast table (2)
⚠	82	Fuse Holder	See Contrast table (2)
	83	Screw	BBZ40P080FCC
	84	UL Caution Card	AAX-313
NSP	85	IPC Caution Label	See Contrast table (2)
NSP	86	Fuse Card	See Contrast table (2)
NSP	87	Fuse Card	See Contrast table (2)
NSP	88	Micro Fuse Caution Card	See Contrast table (2)
	89	65 Label	See Contrast table (2)
NSP	90	FCC Label	See Contrast table (2)
NSP	91	Fuse Card	See Contrast table (2)

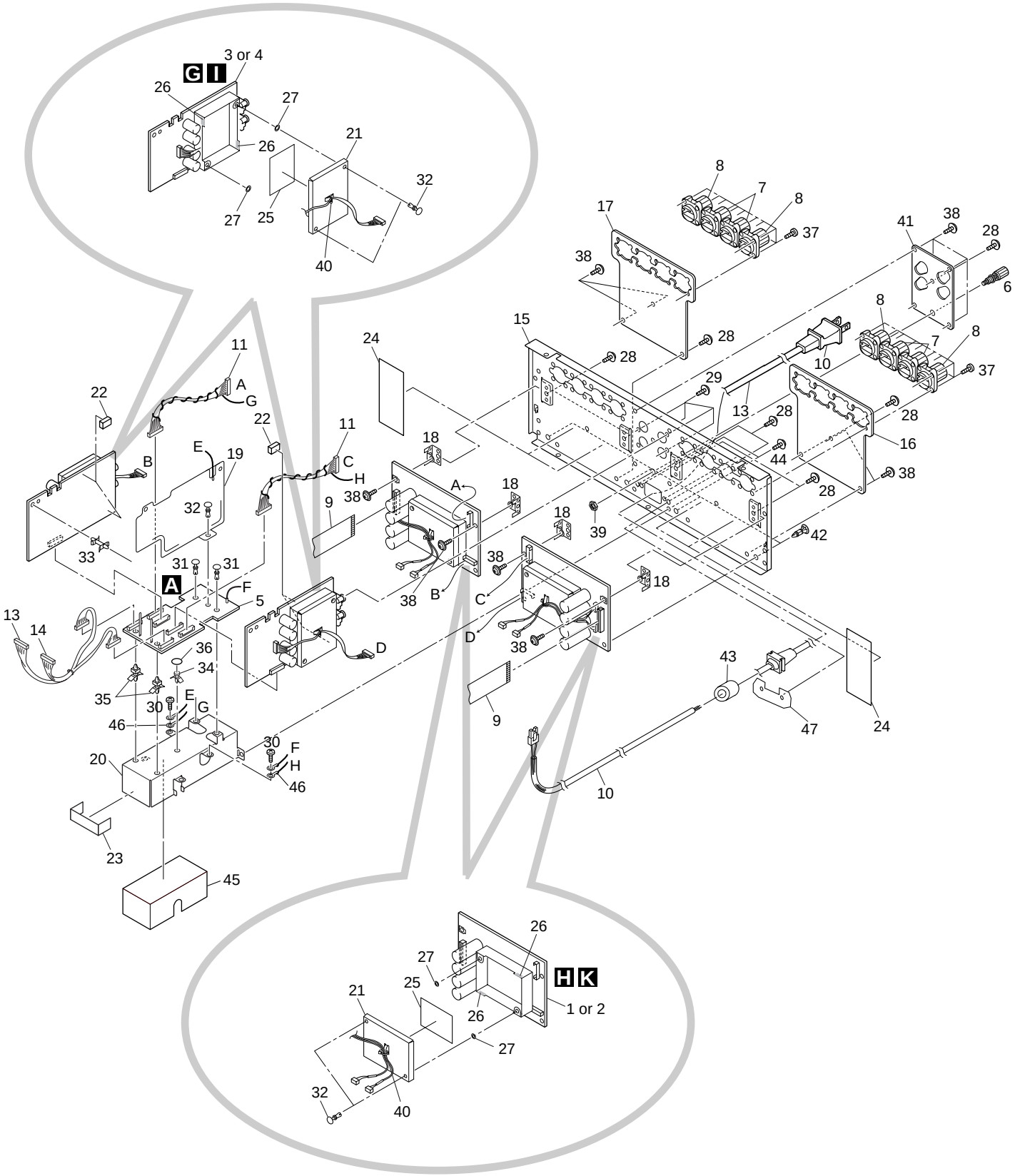
Refer to next page about Contrast table (2).

(2) CONTRAST TABLE

M-AX10/KU/CA and M-AX10/NY are constructed the same except for the following:

Mark	No.	Symbol and Description	Part No.		Remarks
			M-AX10/KU/CA	M-AX10/NY	
	1	C. AMP(L) ASSY	AWX7673	AWX7280	
	2	C. AMP(R) ASSY	AWX7674	AWX7281	
	3	POWER SUPPLY ASSY	AWX7664	AWX7662	
⚠	7	Power Transformer	ATS7277	ATS7251	
⚠	8	Fuse (FU1)	VEK1029 (10A)	REK-106 (4A)	
NSP	12	Cable (J23,J24)	ADX7335	Not used	
⚠	81	Fuse (FU2,FU3)	AEK7069 (20A)	Not used	
⚠	82	Fuse Holder	AKR7002	Not used	
NSP	85	IPC Caution Label	AAX7784	Not used	
NSP	86	Fuse Card	AAX7795	Not used	
NSP	87	Fuse Card	AAX7796	Not used	
NSP	88	Micro Fuse Caution Label	AAX7810	Not used	
	89	65 Label	ARW7050	Not used	
NSP	90	FCC Label	VRW1559	Not used	
NSP	91	Fuse Card	Not used	AAX1589	

2.3 REAR PANEL



(1)REAR PANEL PARTS LIST

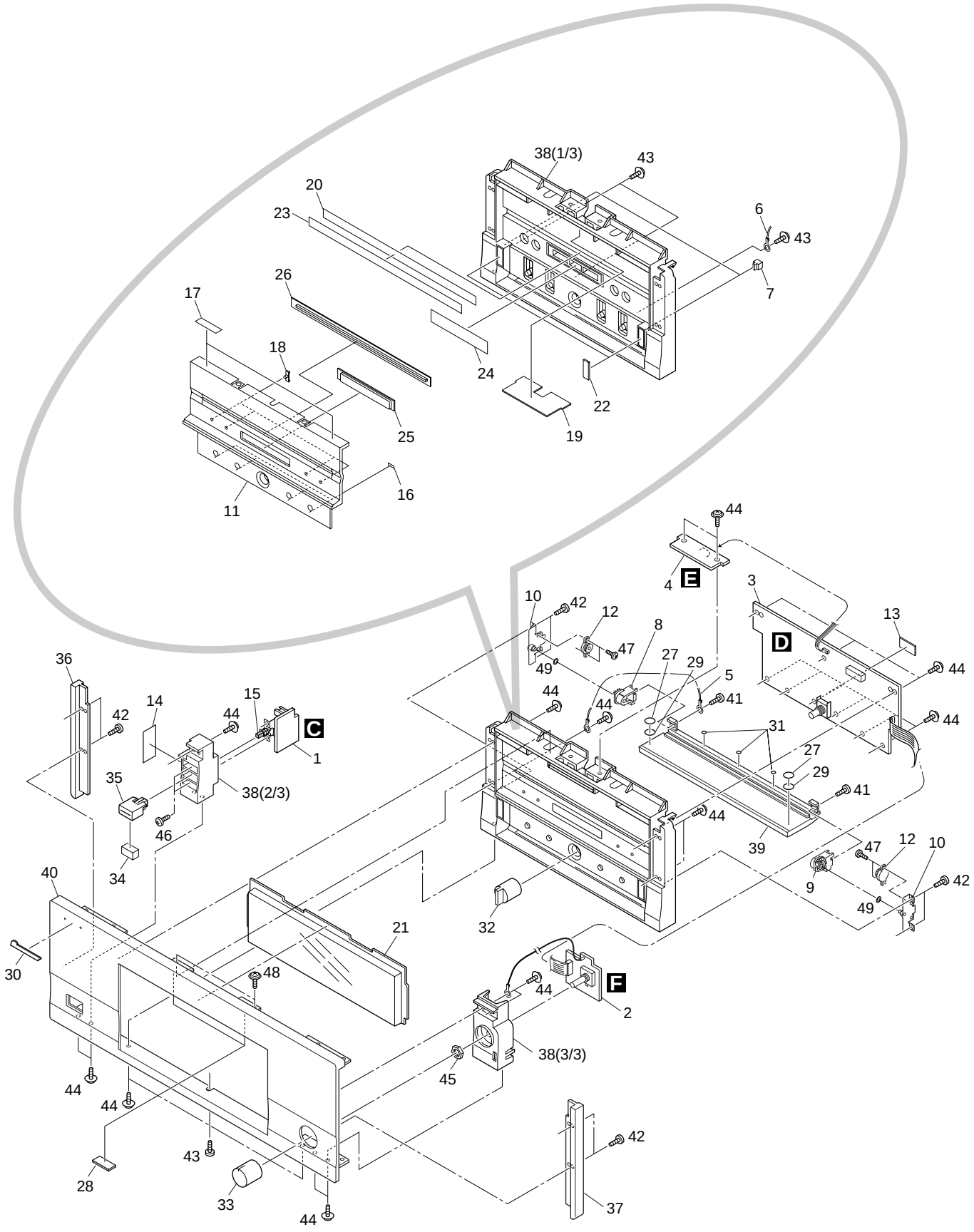
Mark	No.	Description	Part No.
	1	V.AMP (L) ASSY	AWX7278
	2	V.AMP (R) ASSY	AWX7279
	3	INPUT (L) ASSY	AWX7273
	4	INPUT (R) ASSY	AWX7274
NSP	5	JOINT ASSY	AWX7283
	6	Ground Terminal	AKE-046
	7	Speaker Terminal 1P (CN1,CN2,CN5,CN6)	AKE7009
	8	Speaker Terminal 1P (CN3,CN4,CN7,CN8)	AKE7010
	9	23P FFC 60V (J5,J6)	ADD7154
⚠	10	AC Cord with Plug	See contrast tabel (2)
	11	11P Housing Wire (J3,J4)	ADX7278
	12	• • • • • • • • • •	
	13	Connector Assy (J7)	PG10MM-F15
	14	Connector Assy (J8)	PG10MM2F15
	15	Rear Panel (MET)	ANC7820
	16	Rear Panel Plate R	See contrast tabel (2)
	17	Rear Panel Plate L	See contrast tabel (2)
	18	PCB Holder (MET)	ANG9101
	19	Shield Plate(PLS)	ANK7076
	20	AC Shield L	ANK9025
	21	Shield Cover	ANK9026
NSP	22	Spacer	AEB7169
NSP	23	Tape	AEH7008
NSP	24	Damping Plate	AMR7278
NSP	25	Damping Plate	AMR7281
NSP	26	Tape	PNM1249
	27	Fiber Washer	RBF1045
	28	Screw	ABA1192
	29	Screw	BBT30P100FCC
	30	Screw	ABA1207
	31	Rivet	AEC-441
	32	Nylon Rivet	AEC7242
NSP	33	PCB Spacer (14)	DEC1387
	34	Card Spacer	DEC1772
	35	PC Support	VEC1549
	36	Cushion A	PED1001
	37	Screw	BBZ30P080FCC
	38	Screw	IBZ30P060FCC
	39	Nut	NK70FCU
	40	Binder	ZCA-SKB90BK
	41	Input Plate (MET)	ANG7274
	42	Locking Card Spacer	VEC1596
	43	Ferrite Core	See contrast tabel (2
	44	Screw	ABA1011
	45	AC Shield Case (PLS)	ANK7075
NSP	46	Earth Lead Wire	DE025BF0
	47	AC Cord Spacer	ANG1153

(2) CONTRAST TABLE

M-AX10/KU/CA and M-AX10/NY are constructed the same except for the following:

Mark	No.	Symbol and Description	Part No.		Remarks
			M-AX10/KU/CA	M-AX10/NY	
⚠	10	AC Cord with Plug	ADG7041	ADG7038	
	16	Rear Panel Plate R	ANC7288	ANC7285	
	17	Rear Panel Plate L	ANC7289	ANC7286	
	43	Ferrite Core	Not used	ATX1031	

2.4 FRONT PANEL



● FRONT PANEL PARTS LIST

Mark	No.	Description	Part No.
NSP	1	SW ASSY	AWX7282
NSP	2	VR ASSY	AWX7334
	3	FRONT ASSY	AWX7276
NSP	4	LED ASSY	AWX7277
NSP	5	Cord with Plug	ADH7022
NSP	6	Cord with Plug (J20)	DE005VF0
	7	Magnet	AMF7003
	8	Door Hinji L (PLS)	AMR9199
	9	Door Hinji R (PLS)	AMR9200
	10	Door Assy (MET)	ANG9100
	11	Inner Panel (AL)	ANB7184
	12	Damper Assy	AXA9013
NSP	13	Spacer	AEB7169
NSP	14	Damping Plate	AMR7282
NSP	15	Tape	PNM1249
NSP	16	Cushion A	REB1060
NSP	17	Cushion B	REB1061
	18	LED Lens	AAK2459
	19	LED Filter S(PLS)	AAK7657
	20	LED Film (PLS)	AAK7669
	21	Display Panel L (PLS)	AAK9044
	22	Cover	AAK9045
	23	LED Filter L (PLS)	AAK9046
	24	Mode Panel (PLS)	AAK9047
	25	Mode Lens (PLS)	AAK9048
	26	Panel S (PLS)	AAK9049
	27	Door Cushion	AED9014
	28	Tape	AEH7009
	29	Door Yoke (MET)	ANB7187
	30	Name Plate G (AL)	PAN1377
	31	Cushion A	PED1001
	32	Knob S (PLS)	AAB7200
	33	Knob M (AL)	AAB7201
	34	Block	ANL7015
	35	Power Button (ABS)	VNK4159
	36	Side Panel L (AL)	AAH7037
	37	Side Panel R (AL)	AAH7038
	38	Panel Base (PLS)	AMB9020
	39	Door Panel (AL)	ANB7182
	40	Front Panel (AL)	ANB7183
	41	Screw	BBT30P080FCC
	42	Screw	BBZ30P080FCC
	43	Screw	IBZ30P060FCC
	44	Screw	IBZ30P080FCC
	45	Nut	NK90FCU
	46	Screw	PMH30P060FMC
	47	Screw	PSZ20P060FMC
	48	Screw (STEEL)	ABA1050
	49	Washer (PLS)	ABF7007

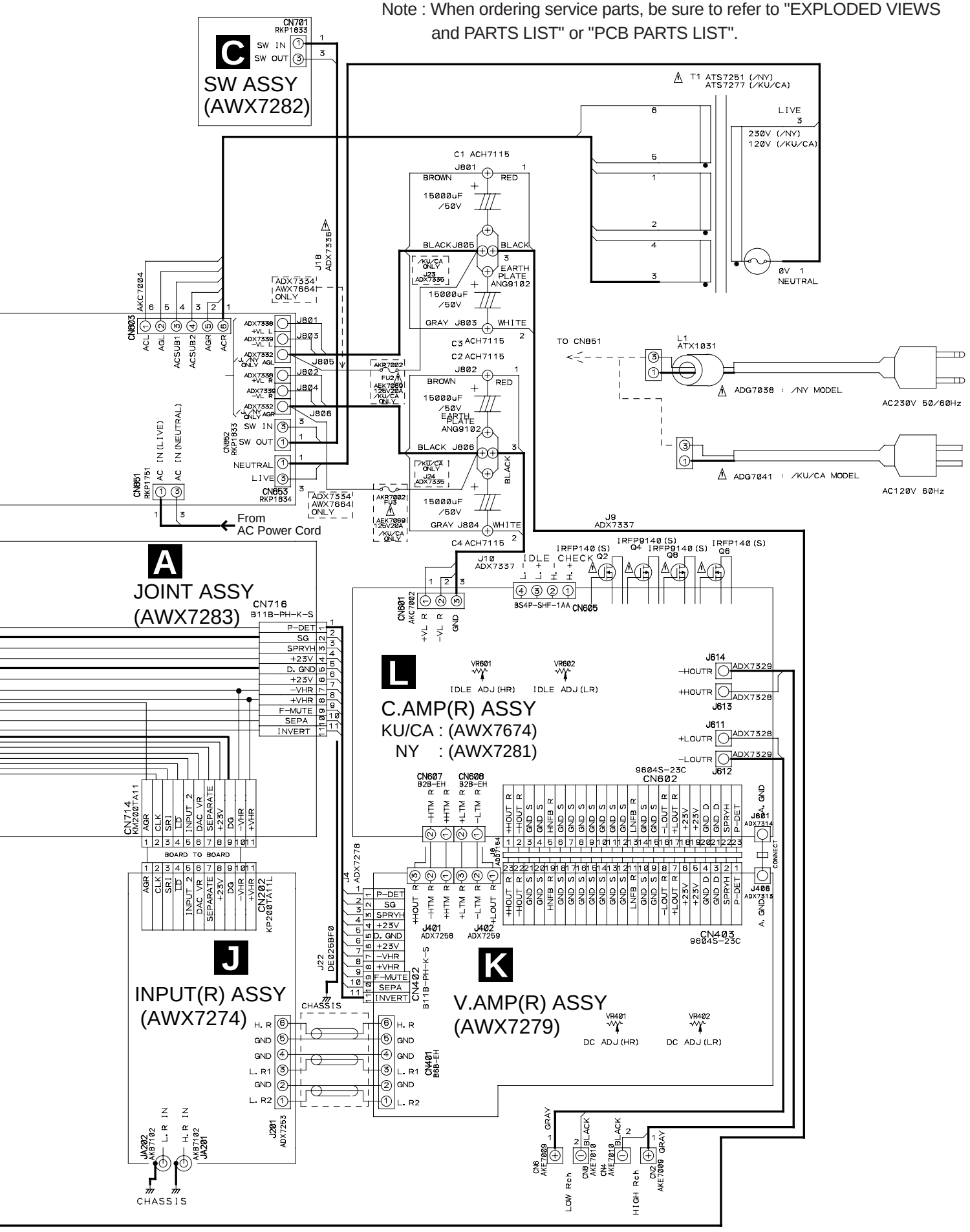
3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

3.1 OVERALL CONNECTION DIAGRAM AND JOINT ASSY

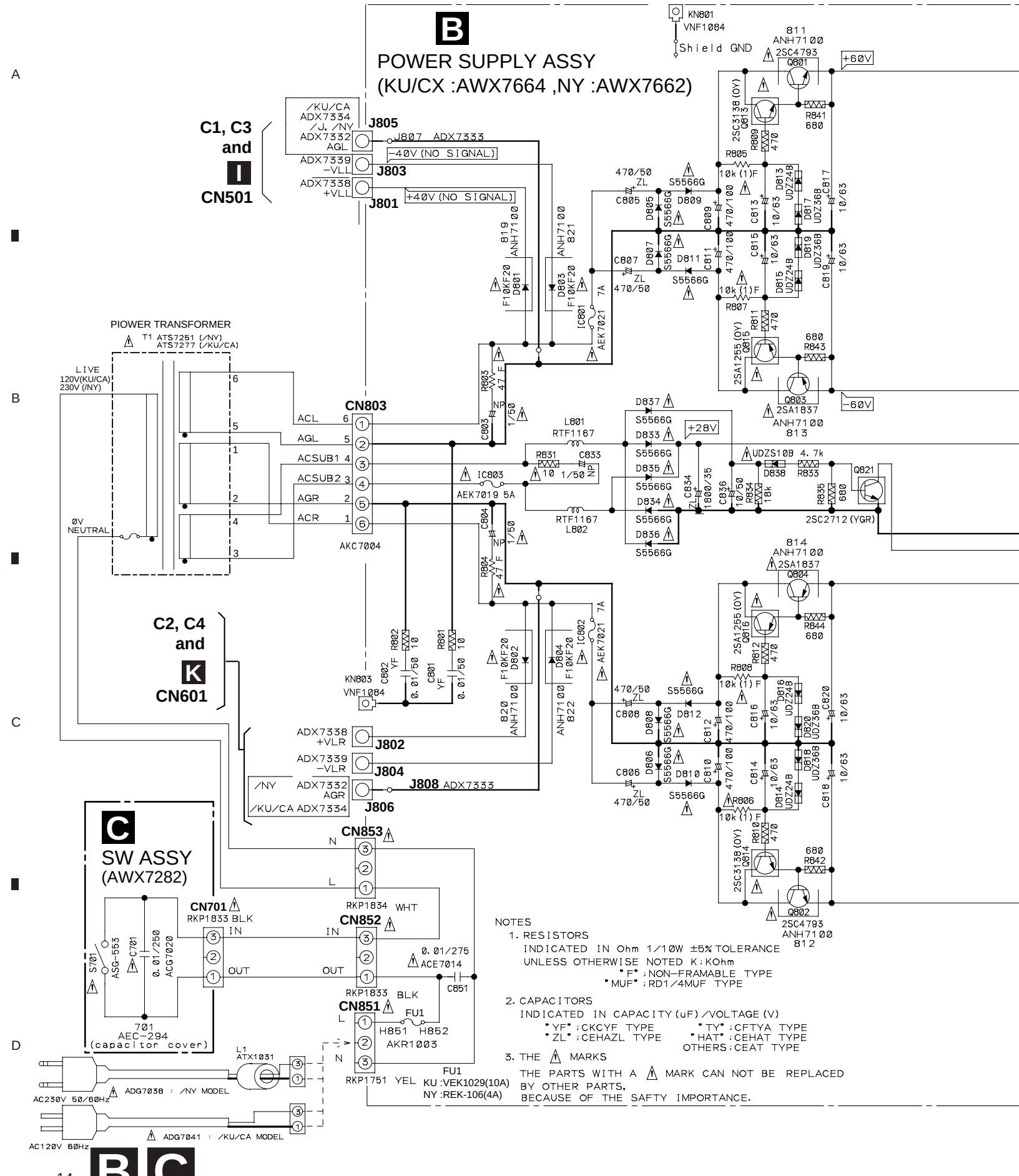
	M-AX10/KU/CA	M-AX10/NY
AF Complex (A) Assy	AWM7410	←
INPUT (L) Assy	AWX7273	←
INPUT (R) Assy	AWX7274	←
JOINT Assy	AWX7283	←
SW Assy	AWX7282	←
VR Assy	AWX7334	←
AF Complex (B) Assy	AWM7507	AWM7506
P. SUPPLY Assy	AWX7664	AWX7662
FRONT Assy	AWX7276	←
LED Assy	AWX7277	←
POWER AMP Assy	AWH7003	AWH7002
V. AMP (L) Assy	AWX7278	←
V. AMP (R) Assy	AWX7279	←
C. AMP (L) Assy	AWX7673	AWX7280
C. AMP (R) Assy	AWX7674	AWX7281

NOTES
1. THE ⚠ MARK FOUND ON SOME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THEREFORE, WHEN REPLACING, BE SURE TO USE PARTS OF IDENTICAL DESIGNATION.

Note : When ordering service parts, be sure to refer to "EXPLODED VIEWS and PARTS LIST" or "PCB PARTS LIST".



3.2 POWER SUPPLY, SW ASSY

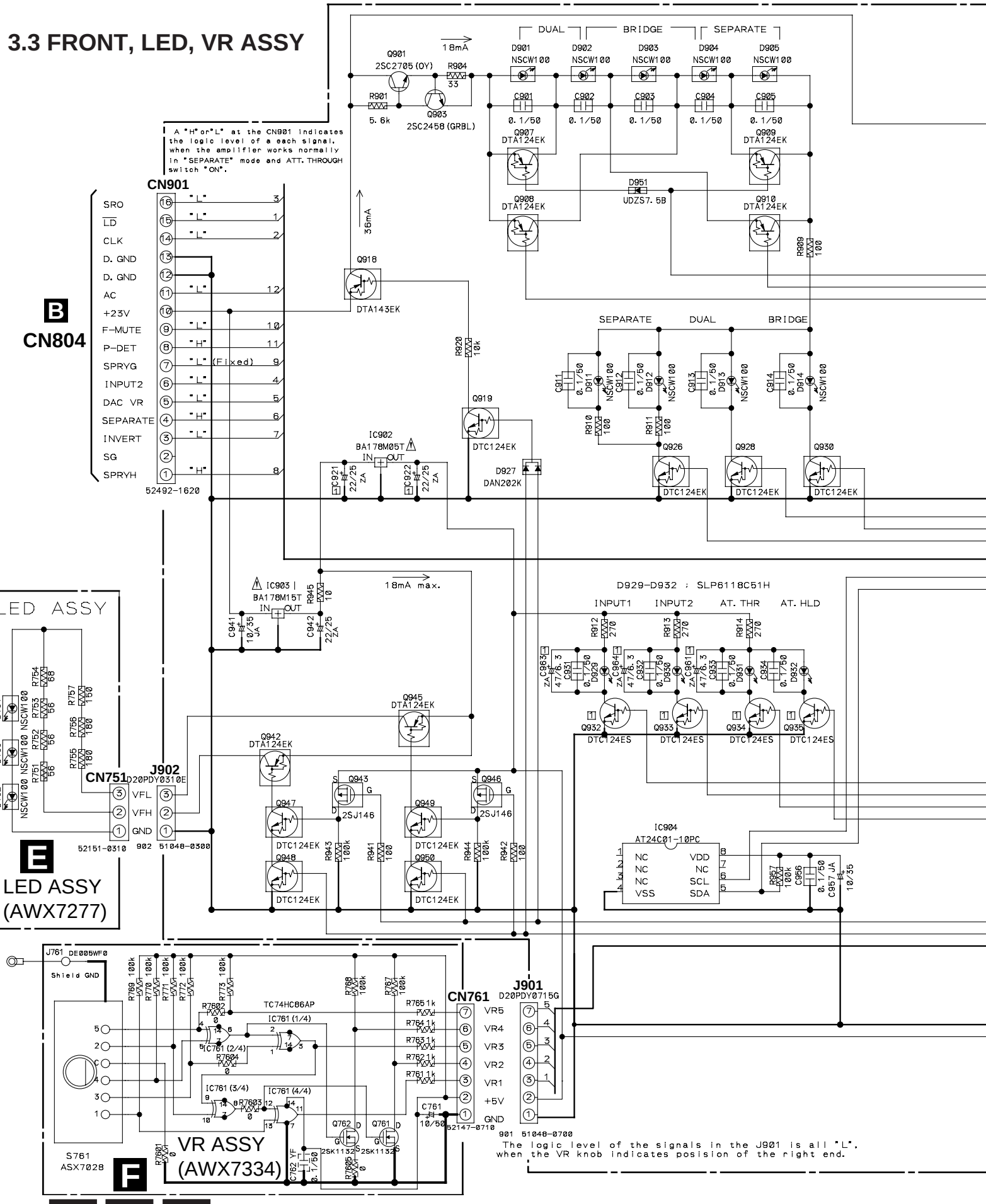


	M-AX10/NY	M-AX10/KU/CA
AF Complex (B) Assy	AWM7506	AWM7507
P. SUPPLY Assy	AWX7662	AWX7664
LED Assy	AWX7277	←
FRONT Assy	AWX7276	←

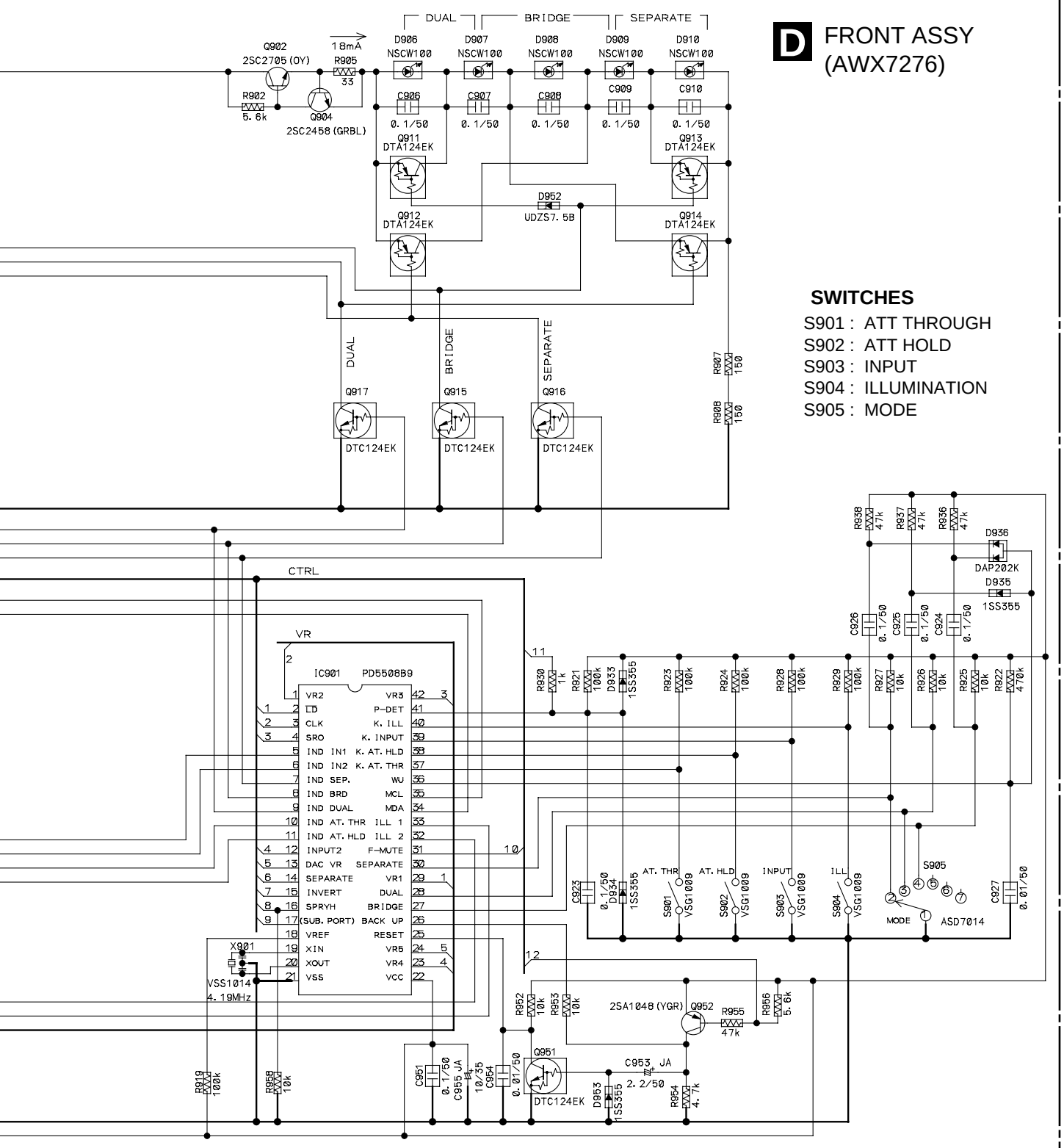
• NOTE FOR FUSE REPLACEMENT

CAUTION - FOR CONTINUED PROTECTION AGAINST RISK OF FIRE. REPLACE WITH SAME TYPE AND RATINGS ONLY.

3.3 FRONT, LED, VR ASSY



D FRONT ASSY (AWX7276)



SWITCHES

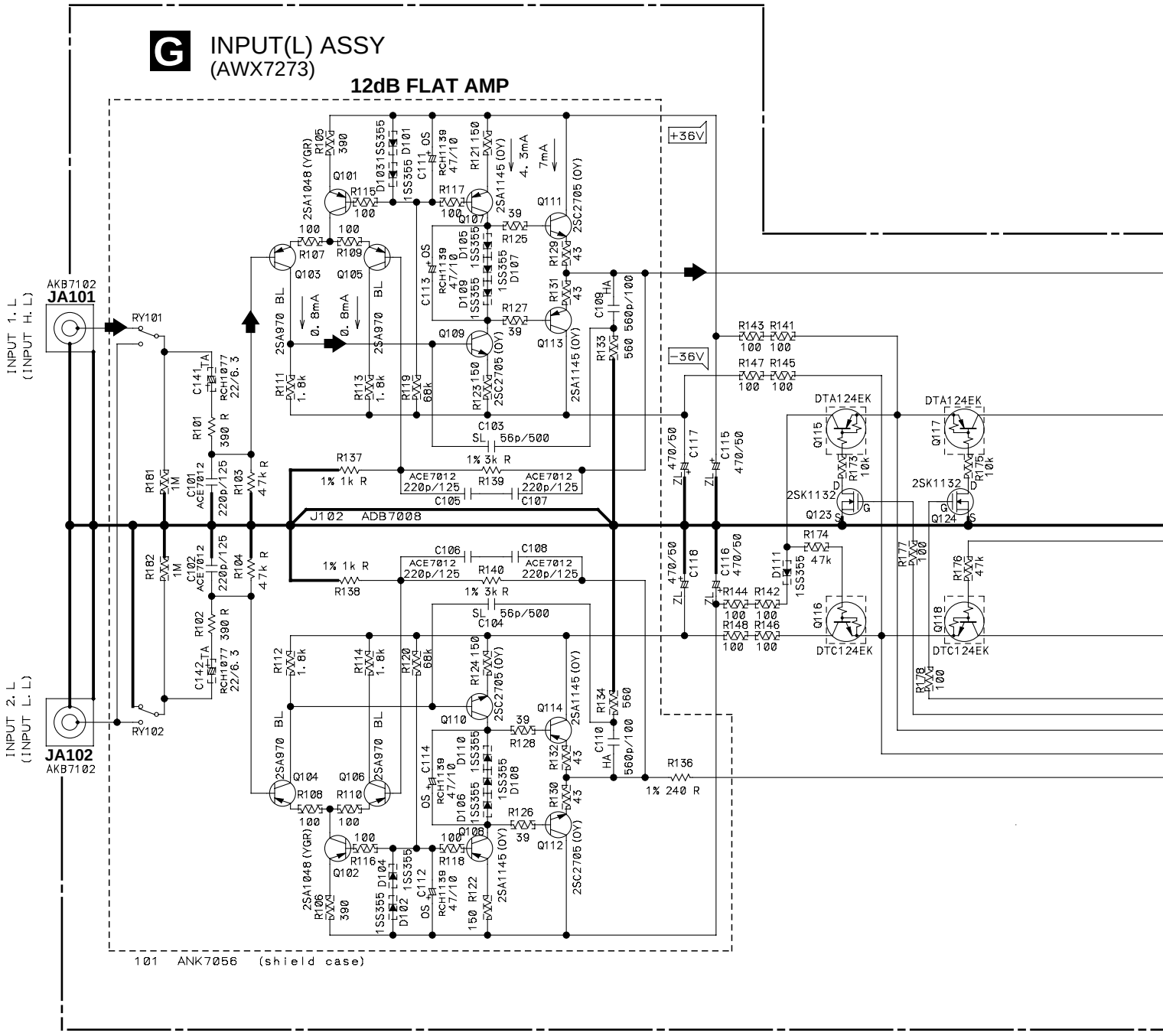
S901 : ATT THROUGH
S902 : ATT HOLD
S903 : INPUT
S904 : ILLUMINATION
S905 : MODE

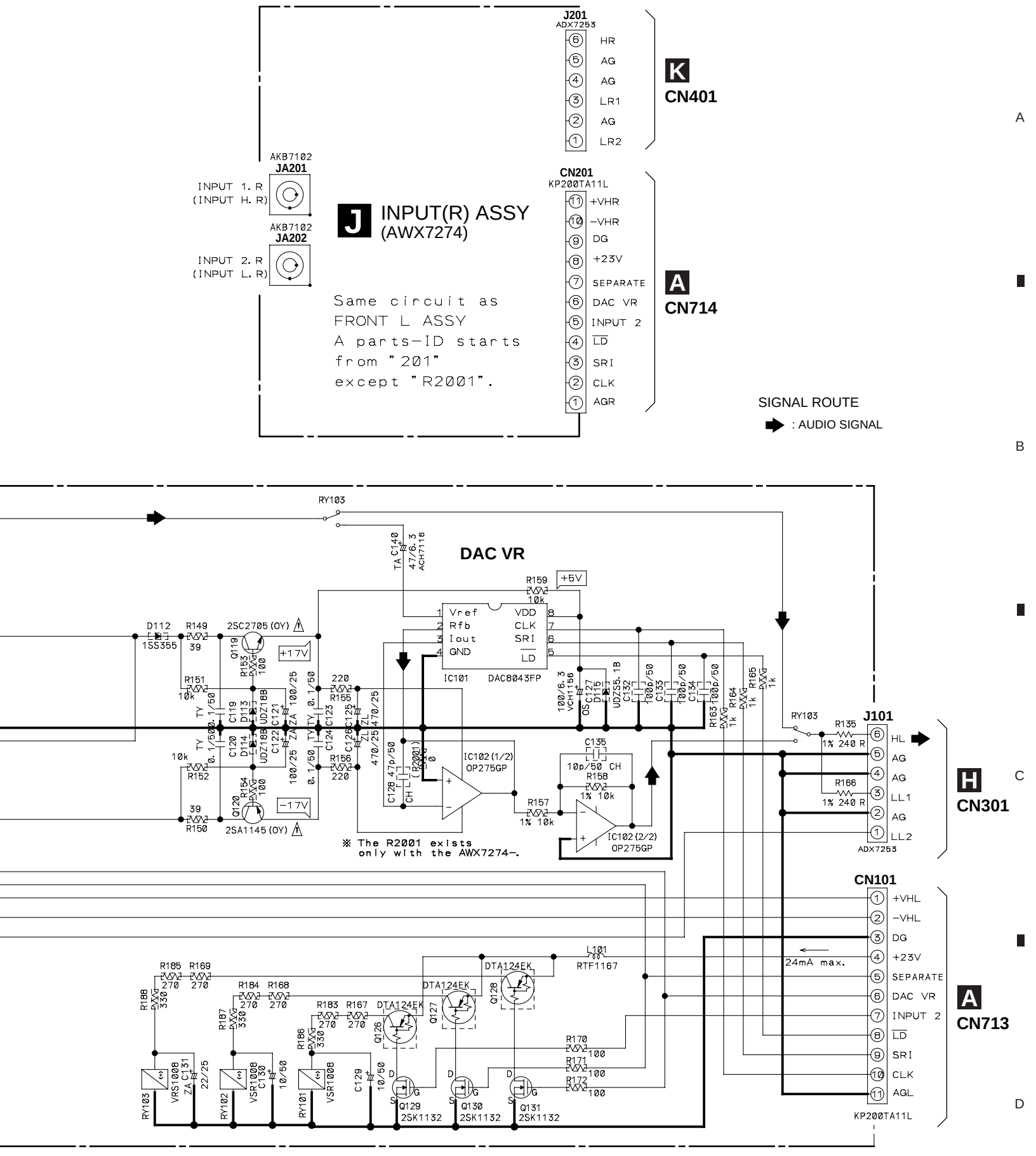
NOTES

1. RESISTORS
   INDICATED IN Ohm 1/10W ±5% TOLERANCE UNLESS OTHERWISE NOTED K:KOhm
2. CAPACITORS
   INDICATED IN CAPACITY(uF)/VOLTAGE(V)
   ⊣⊢ :CKSQYF TYPE "JA" :CEJA TYPE "ZA" :CEHAZA TYPE
3. THE ⚠ MARKS
   THE PARTS WITH A ⚠ MARK CAN NOT BE REPLACED BY OTHER PARTS, BECAUSE OF THE SAFETY IMPORTANCE.

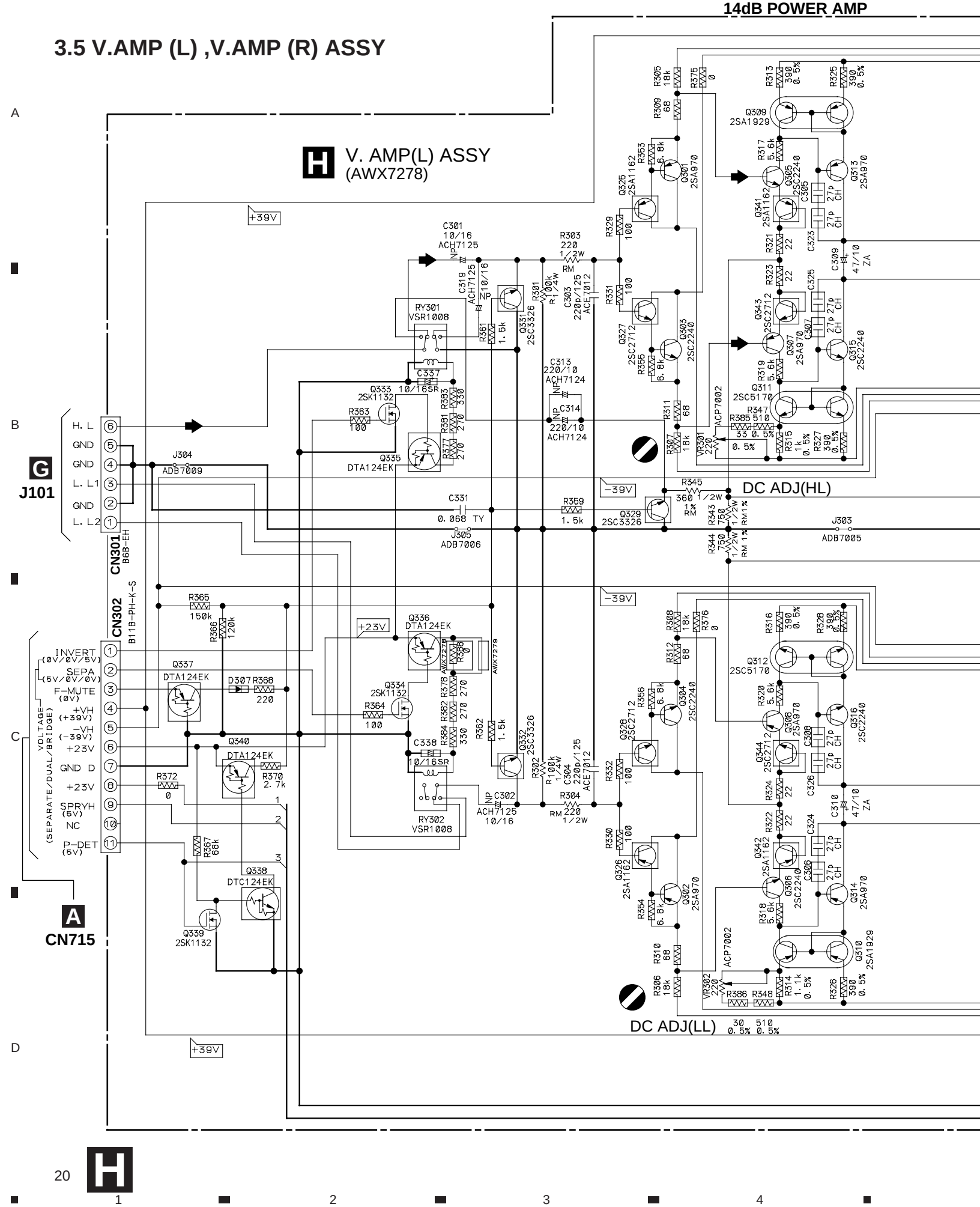
3.4 INPUT (L), INPUT (R) ASSY

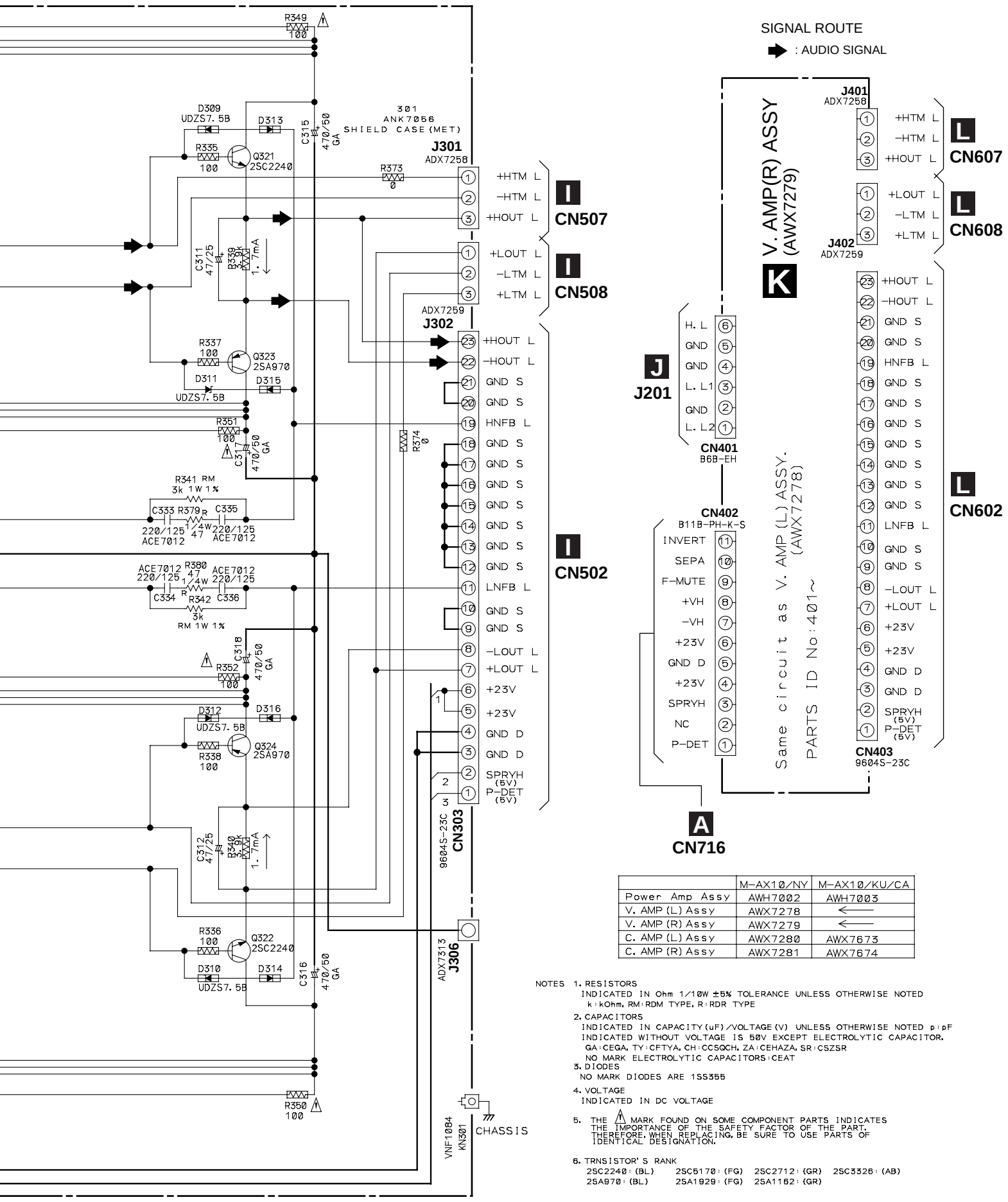
NOTES
1. RESISTORS
INDICATED IN Ohm 1/10W ±5% TOLERANCE
UNLESS OTHERWISE NOTED K:KOhm
R:RDR1/4W TYPE
2. CAPACITORS
INDICATED IN CAPACITY (uF)/VOLTAGE (V)
UNLESS OTHERWISE NOTED p:pF
"TA":TANTALUM TYPE "YF":CKSQYF TYPE
"TY":CFTYA TYPE "ZA":CEHAZA TYPE
"HA":CQHA TYPE "ZL":CEHAZL TYPE
"OS":OS-CON OTHERS:CEAT TYPE
"CH":CCSQCH TYPE
3. THE ⚠ MARKS
THE PARTS WITH A ⚠ MARK CAN NOT BE REPLACED BY OTHER PARTS, BECAUSE OF THE SAFETY IMPORTANCE.




J201
ADX7253
6 HR
5 AG
4 AG
3 LR1
2 AG
1 LR2
K
CN401
AKB7102
JA201
INPUT 1. R
(INPUT H. R)
AKB7102
JA202
INPUT 2. R
(INPUT L. R)
J INPUT(R) ASSY
(AWX7274)
Same circuit as
FRONT L ASSY
A parts-ID starts
from "201"
except "R2001".
CN201
KP200TA11L
11 +VHR
10 -VHR
9 DG
8 +23V
7 SEPARATE
6 DAC VR
5 INPUT 2
4 LD
3 SRI
2 CLK
1 AGR
A
CN714
SIGNAL ROUTE
: AUDIO SIGNAL
DAC VR
RY103
+5V
+17V
-17V
IC101 DAC8043FP
IC102(1/2) OP275GP
IC102(2/2) OP275GP
2SC2705(OY)
2SA1145(OY)
※ The R2001 exists only with the AWX7274-.
J101
ADX7253
HL
AG
AG
LL1
AG
LL2
H
CN301
CN101
+VHL
-VHL
DG
+23V
SEPARATE
DAC VR
INPUT 2
LD
SRI
CLK
AGL
KP200TA11L
24mA max.
A
CN713
DTA124EK
RTF1167
Q129 2SK1132
Q130 2SK1132
Q131 2SK1132

3.5 V.AMP (L) ,V.AMP (R) ASSY





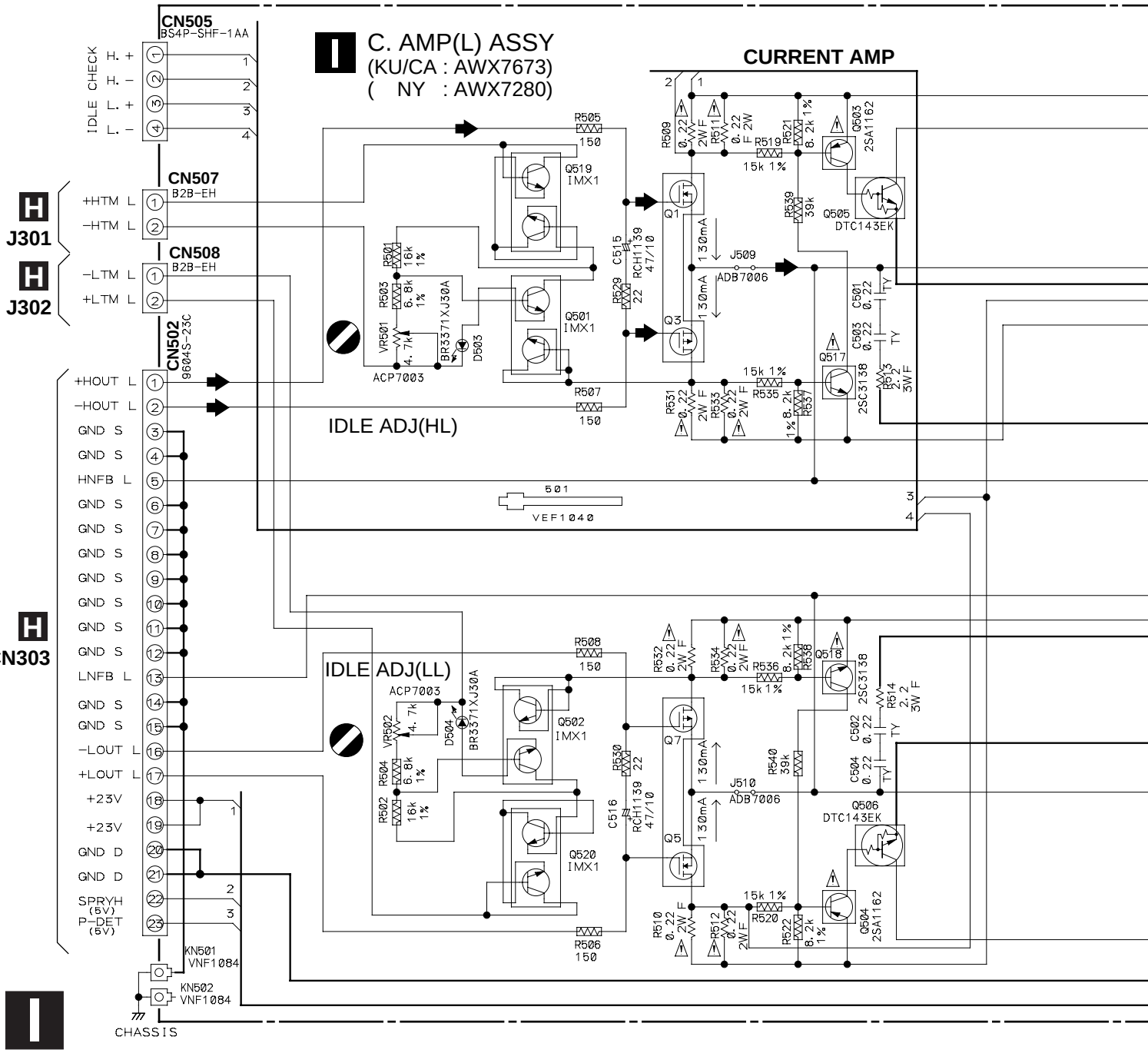
	M−AX10/NY	M−AX10/KU/CA
Power Amp Assy	AWH7002	AWH7003
V. AMP (L) Assy	AWX7278	←
V. AMP (R) Assy	AWX7279	←
C. AMP (L) Assy	AWX7280	AWX7673
C. AMP (R) Assy	AWX7281	AWX7674

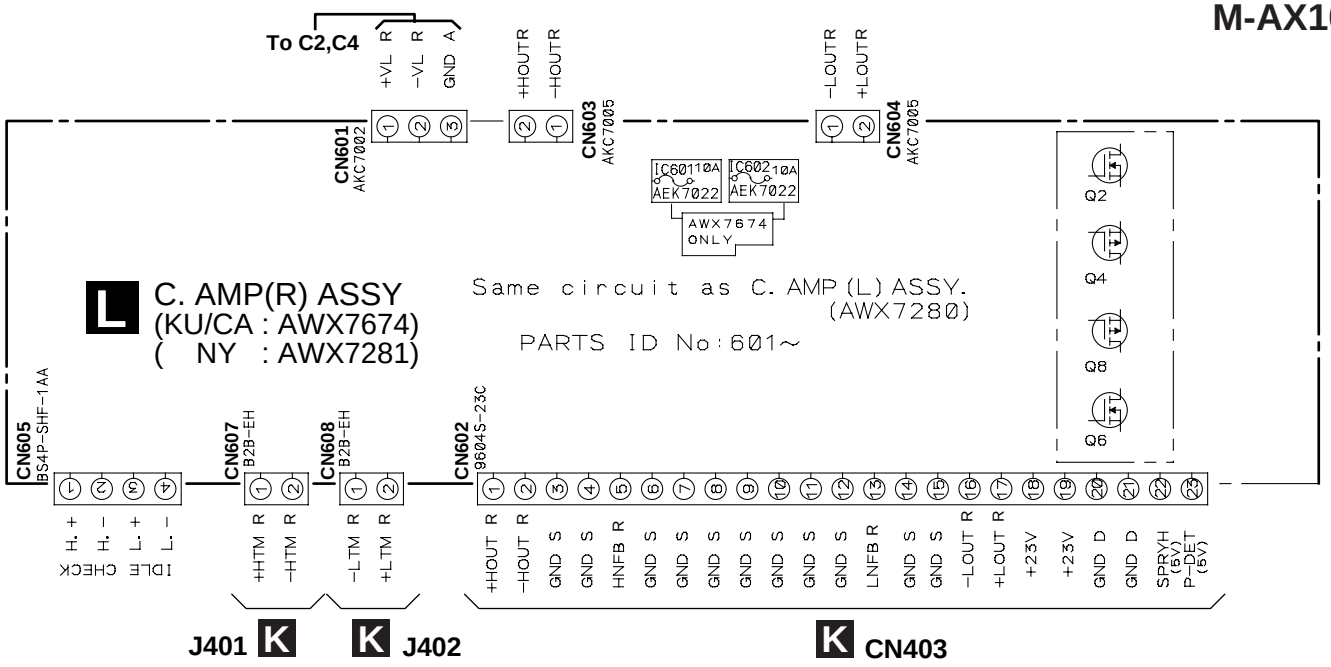
NOTES
1. RESISTORS
INDICATED IN Ohm 1/10W ±5% TOLERANCE UNLESS OTHERWISE NOTED
k:kOhm, RM:RDM TYPE, R:RDR TYPE
2. CAPACITORS
INDICATED IN CAPACITY(uF)/VOLTAGE(V) UNLESS OTHERWISE NOTED p:pF
INDICATED WITHOUT VOLTAGE IS 50V EXCEPT ELECTROLYTIC CAPACITOR.
GA:CEGA, TY:CFTYA, CH:CCSQCH, ZA:CEHAZA, SR:CSZSR
NO MARK ELECTROLYTIC CAPACITORS:CEAT
3. DIODES
NO MARK DIODES ARE 1SS355
4. VOLTAGE
INDICATED IN DC VOLTAGE
5. THE ⚠ MARK FOUND ON SOME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THEREFORE, WHEN REPLACING, BE SURE TO USE PARTS OF IDENTICAL DESIGNATION.
6. TRNSISTOR'S RANK
2SC2240:(BL) 2SC5170:(FG) 2SC2712:(GR) 2SC3326:(AB)
2SA970:(BL) 2SA1929:(FG) 2SA1162:(GR)

3.6 C.AMP (L), C.AMP (R) ASSY

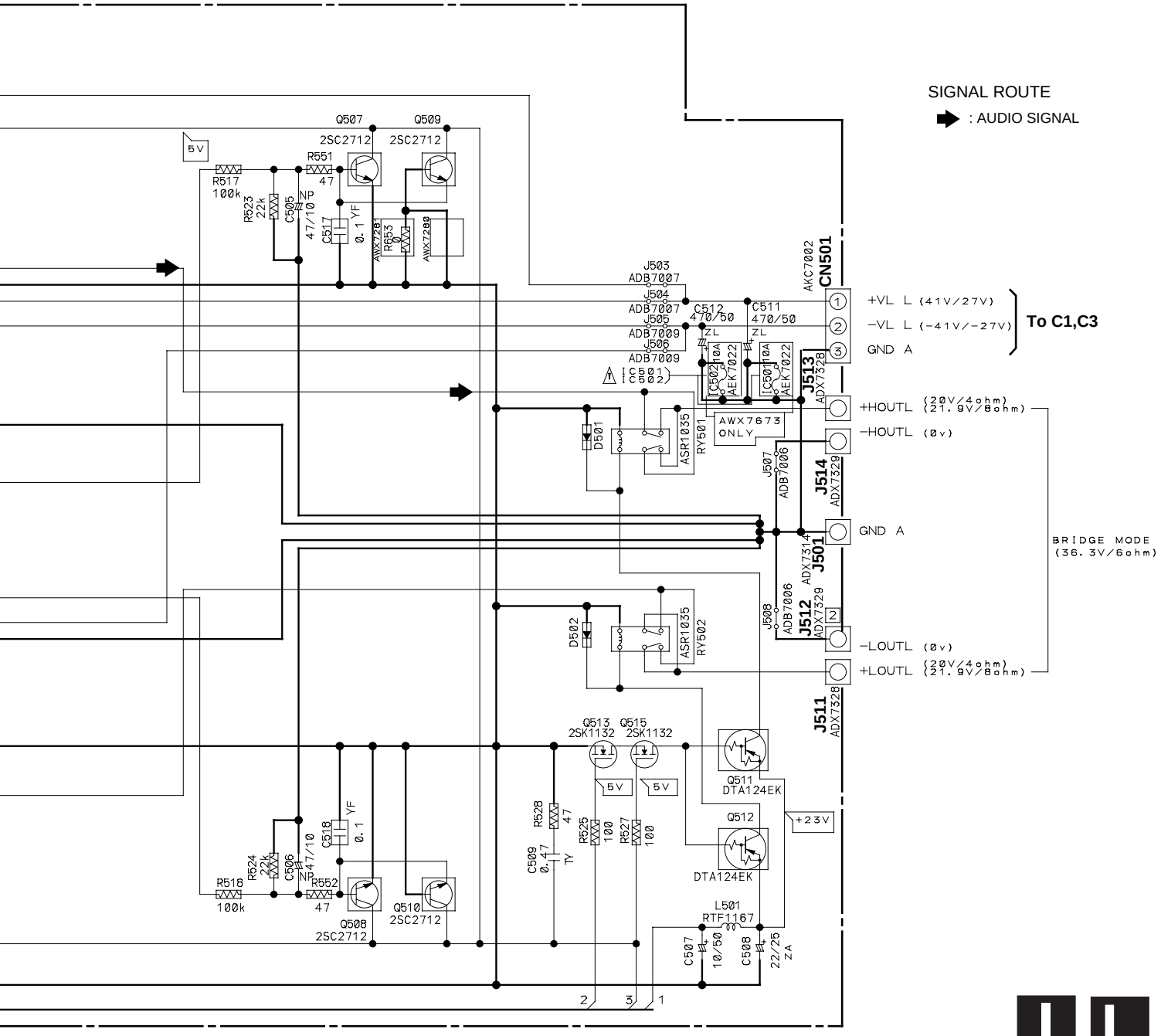
NOTES 1. RESISTORS
INDICATED IN Ohm 1/10W ±5% TOLERANCE UNLESS OTHERWISE NOTED
k : kOhm, F : NON-FRAMABLE TYPE.
2. CAPACITORS
INDICATED IN CAPACITY (uF) / VOLTAGE (V) UNLESS OTHERWISE NOTED p : pF
INDICATED WITHOUT VOLTAGE IS 50V EXCEPT ELECTROLYTIC CAPACITOR.
TY : CFTYA, YF : CKSQYF, ZA : CEHAZA, ZL : CEHAZL.
NO MARK ELECTROLYTIC CAPACITORS : CEAT
3. DIODES
NO MARK DIODES ARE 1SS355
4. VOLTAGE
INDICATED IN DC VOLTAGE : NO SIGNAL/220W*2ch 6ohm (BRIDGE MODE)
5. THE ⚠ MARK FOUND ON SOME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THEREFORE, WHEN REPLACING, BE SURE TO USE PARTS OF IDENTICAL DESIGNATION.
6. TRNSISTOR' S RANK
2SC3138 : (OY) 2SA1162 : (YGR) 2SC2712 : (YGR)

CAUTION
FOR CONTINUED PROTECTION AGAINST RISK OF FIRE.
REPLACE ONLY WITH SAME TYPE NO. 491010 FOR
IC501, IC502, IC601 AND IC602 MFD. BY LITTELFUSE INC.





SIGNAL ROUTE
: AUDIO SIGNAL



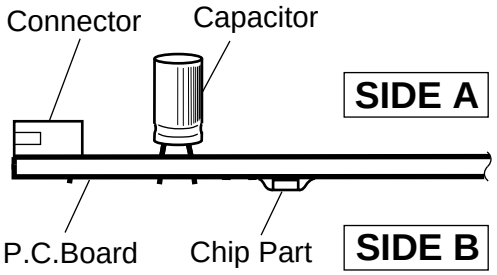
4. PCB CONNECTION DIAGRAM

NOTE FOR PCB DIAGRAMS :

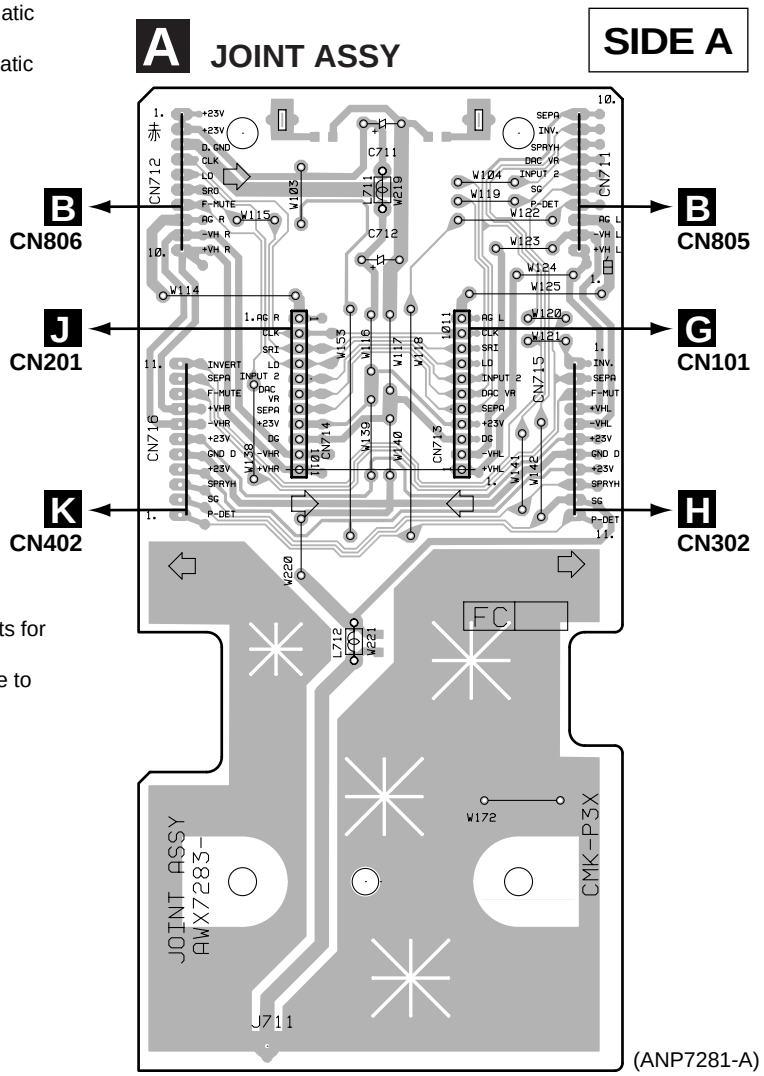
1. Part numbers in PCB diagrams match those in the schematic diagrams.
2. A comparison between the main parts of PCB and schematic diagrams is shown below.

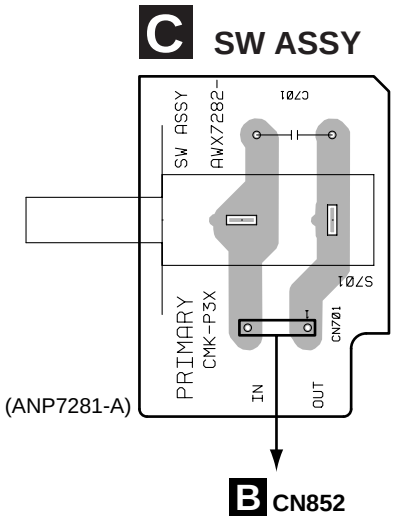
Symbol In PCB Diagrams	Symbol In Schematic Diagrams	Part Name
B C E	B C E B C E	Transistor
B C E	B C E B C E	Transistor with resistor
D G S	D G S D G S	Field effect transistor
		Resistor array
		3-terminal regulator

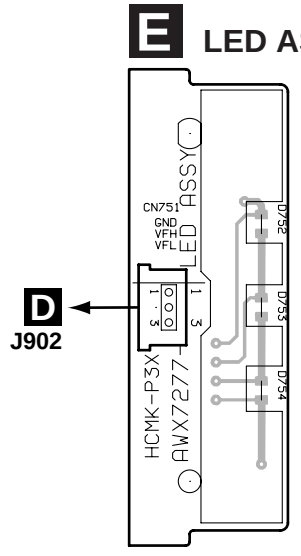
3. The parts mounted on this PCB include all necessary parts for several destinations.
   For further information for respective destinations, be sure to check with the schematic diagram.
4. View point of PCB diagrams.

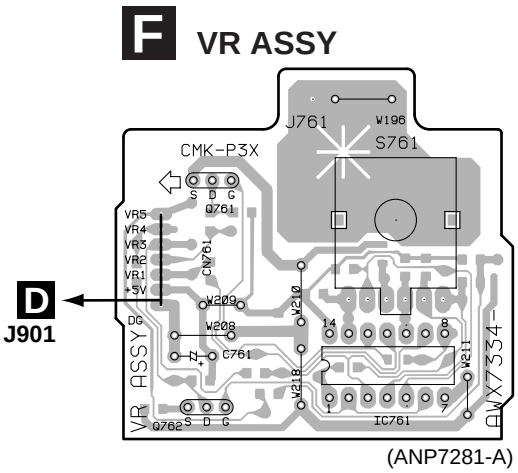


4.1 JOINT, SW, LED, VR ASSY



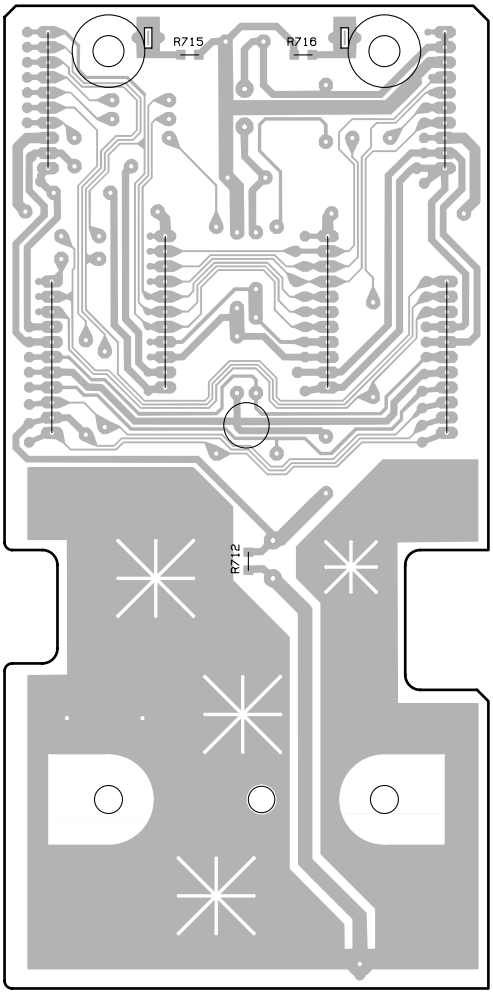






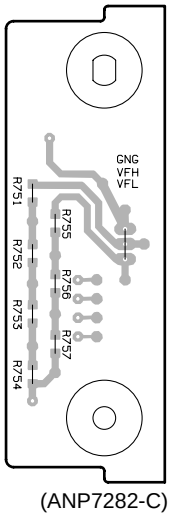
SIDE B

A JOINT ASSY



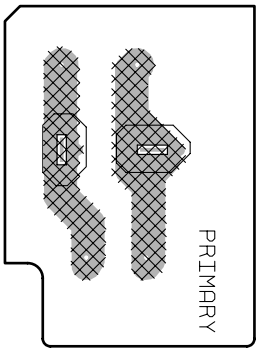
(ANP7281-A)

E LED ASSY



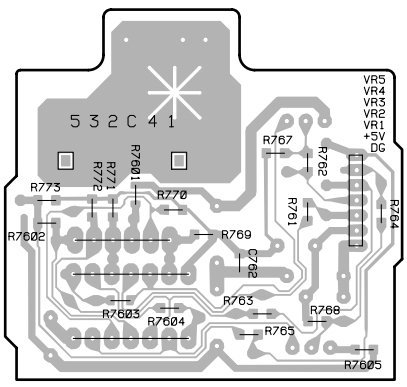
(ANP7282-C)

C SW ASSY



(ANP7281-A)

F VR ASSY

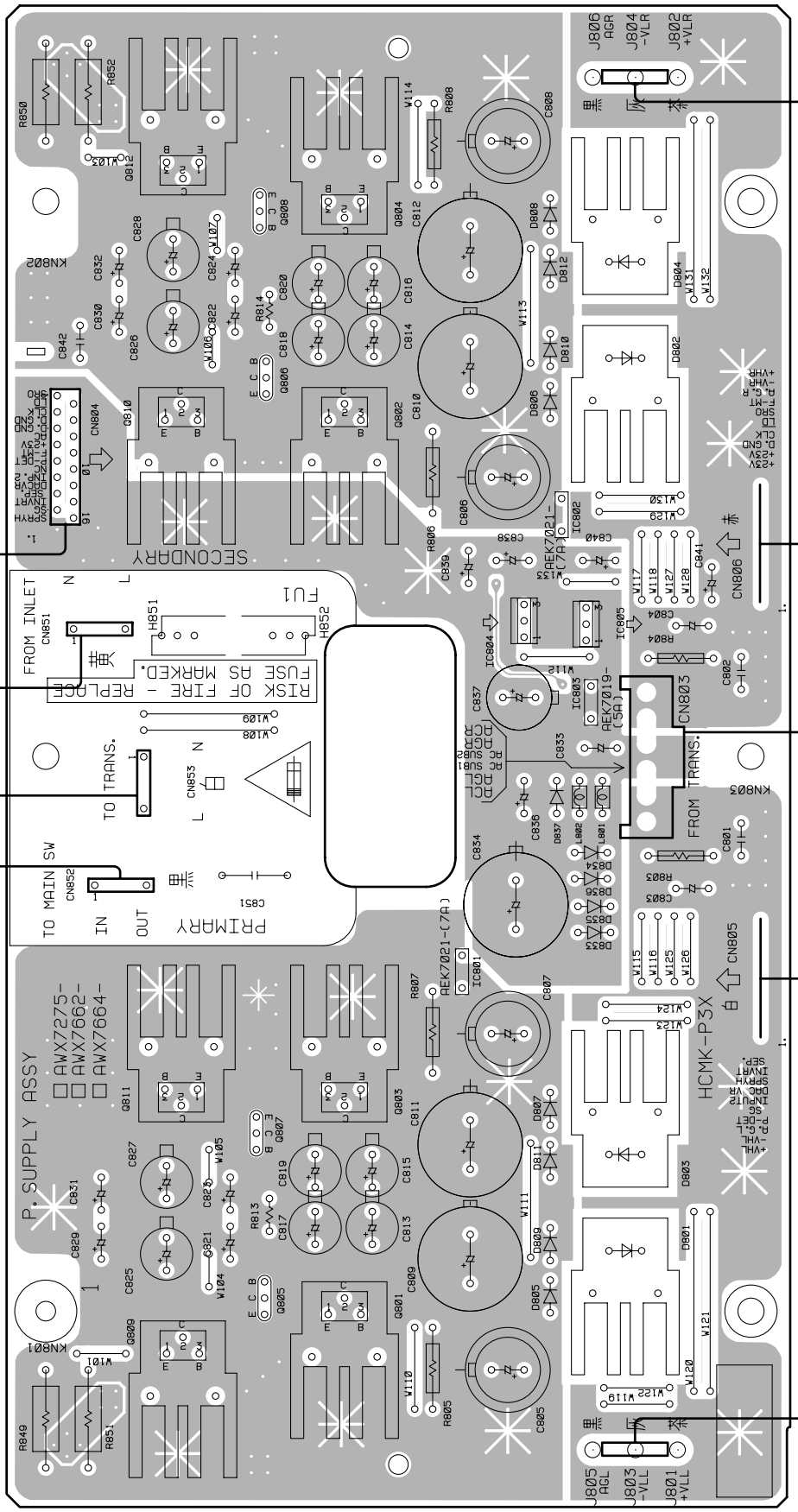


(ANP7281-A)

4.2 POWER SUPPLY ASSY

B POWER SUPPLY ASSY

SIDE A



L CN601

A CN712

A CN711

I CN501

D CN901

C CN701

AC POWER CODE

POWER TRANSFORMER

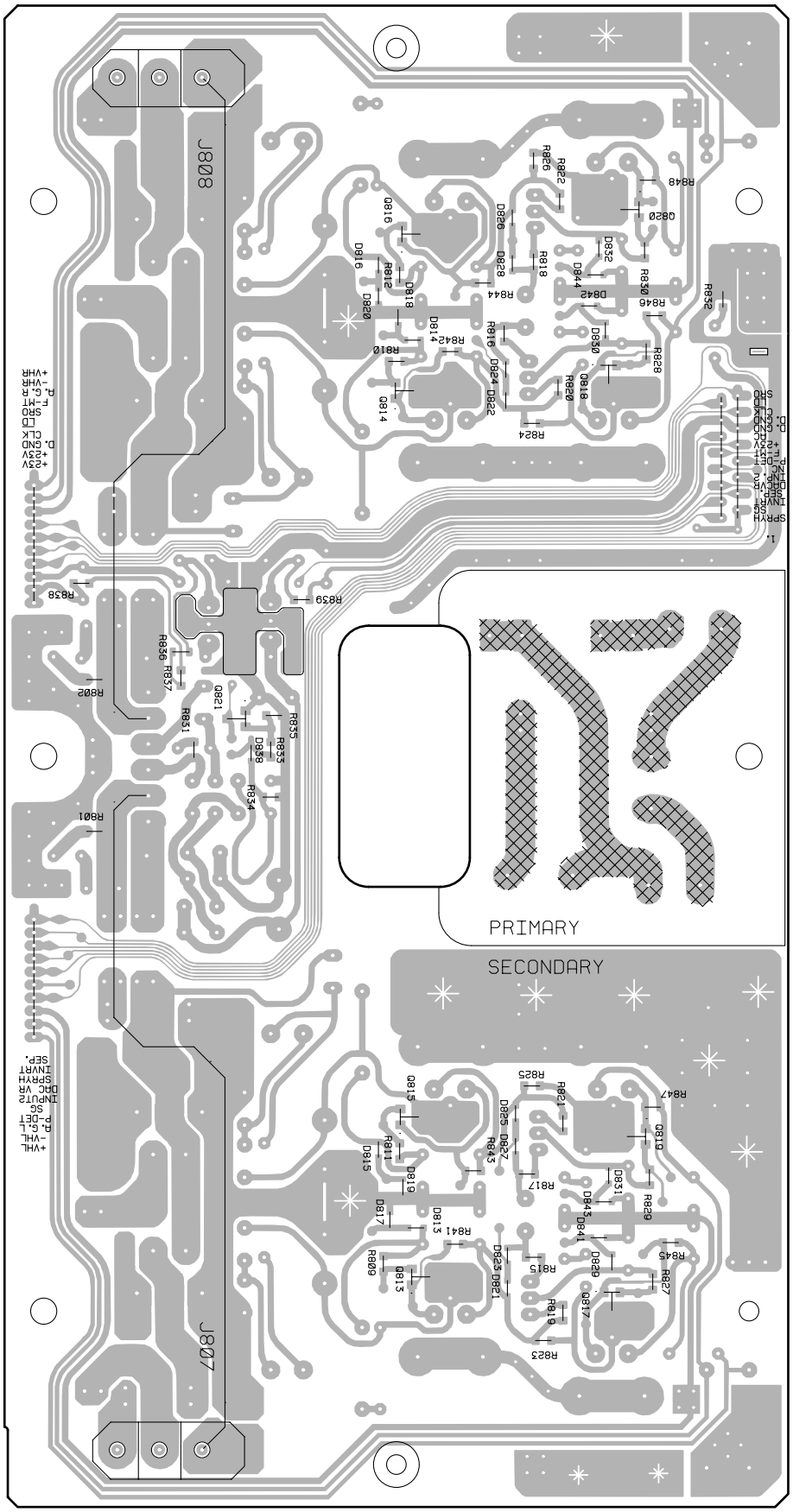
POWER TRANSFORMER

(ANP7282-C)

Q812	Q808	Q804	IC801	IC802	IC805
Q810	Q806	Q802		IC804	IC803
Q811	Q807	Q803			
Q809	Q805	Q801			

B POWER SUPPLY ASSY

SIDE B



(ANP7282-C)

Q821

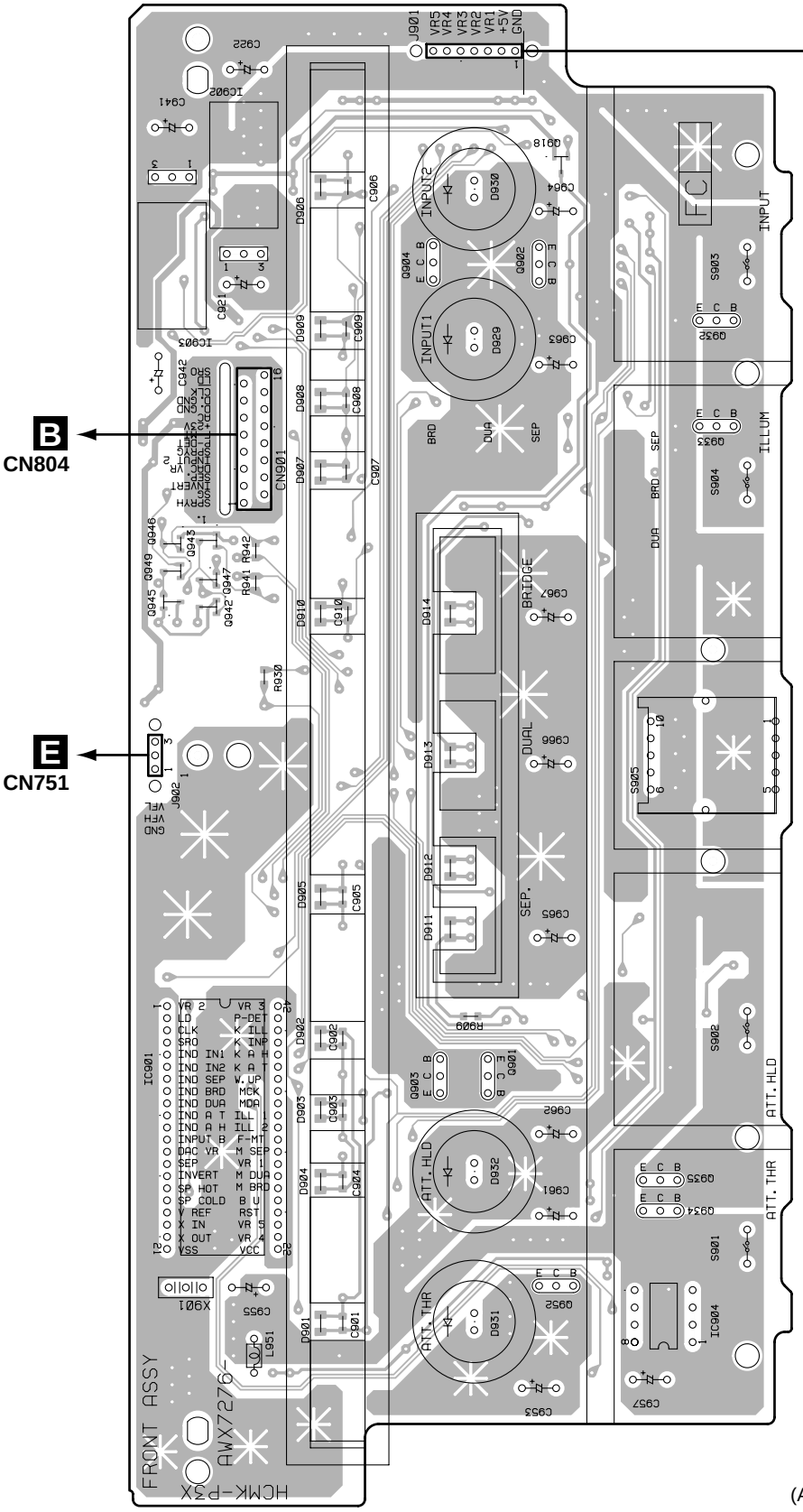
Q816
Q814
Q815
Q813

Q818 Q820
Q817 Q819

4.3 FRONT ASSY

D FRONT ASSY

SIDE A



F CN761

B CN804

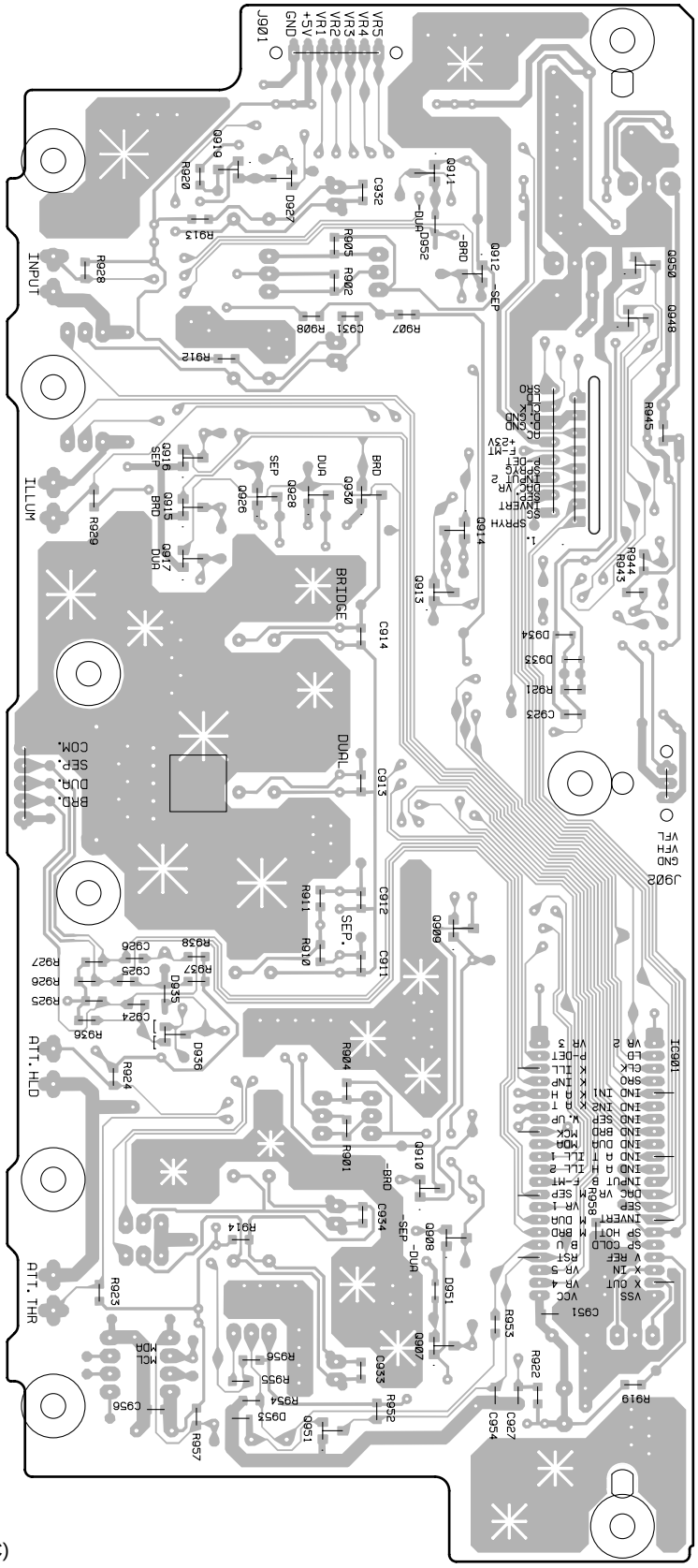
E CN751

(ANP7282-C)

IC903	IC902	Q904	Q901	Q918	Q935	Q932	
Q946	Q943	Q903		Q902	Q934	Q933	
Q949	Q947			Q952	IC904		
Q945	Q942						
	IC901						

D FRONT ASSY

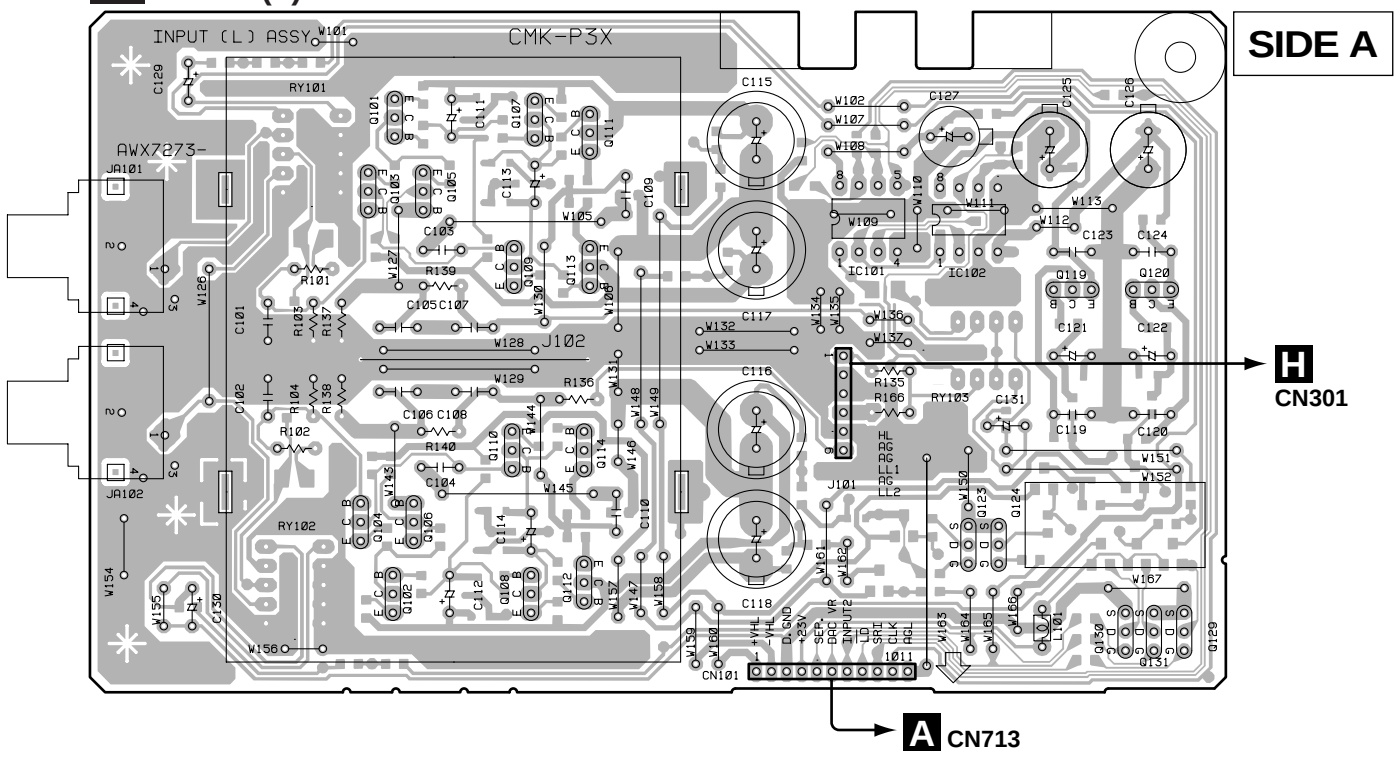
SIDE B



(ANP7282-C)

4.4 INPUT(L) ASSY

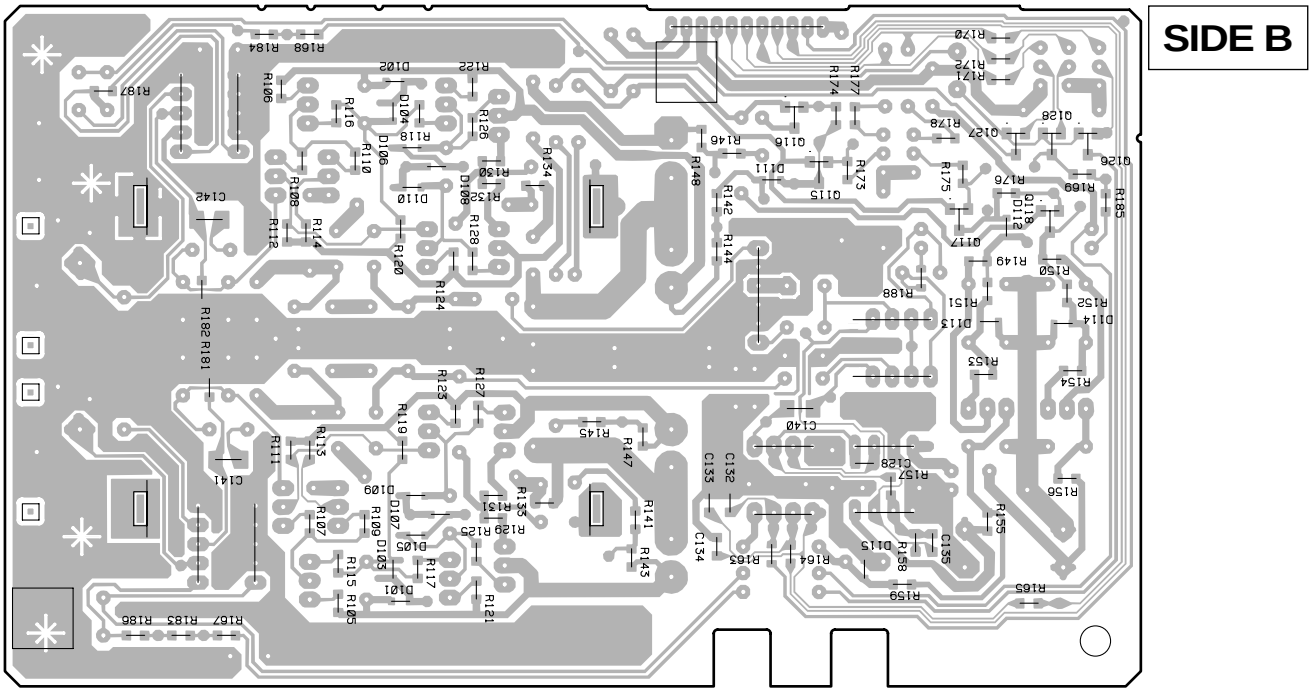
G INPUT(L) ASSY



Q101 Q106 Q107 Q110 Q111 Q114 IC101 IC102 Q119 Q120 Q129–Q131

(ANP7281-A)

G INPUT(L) ASSY

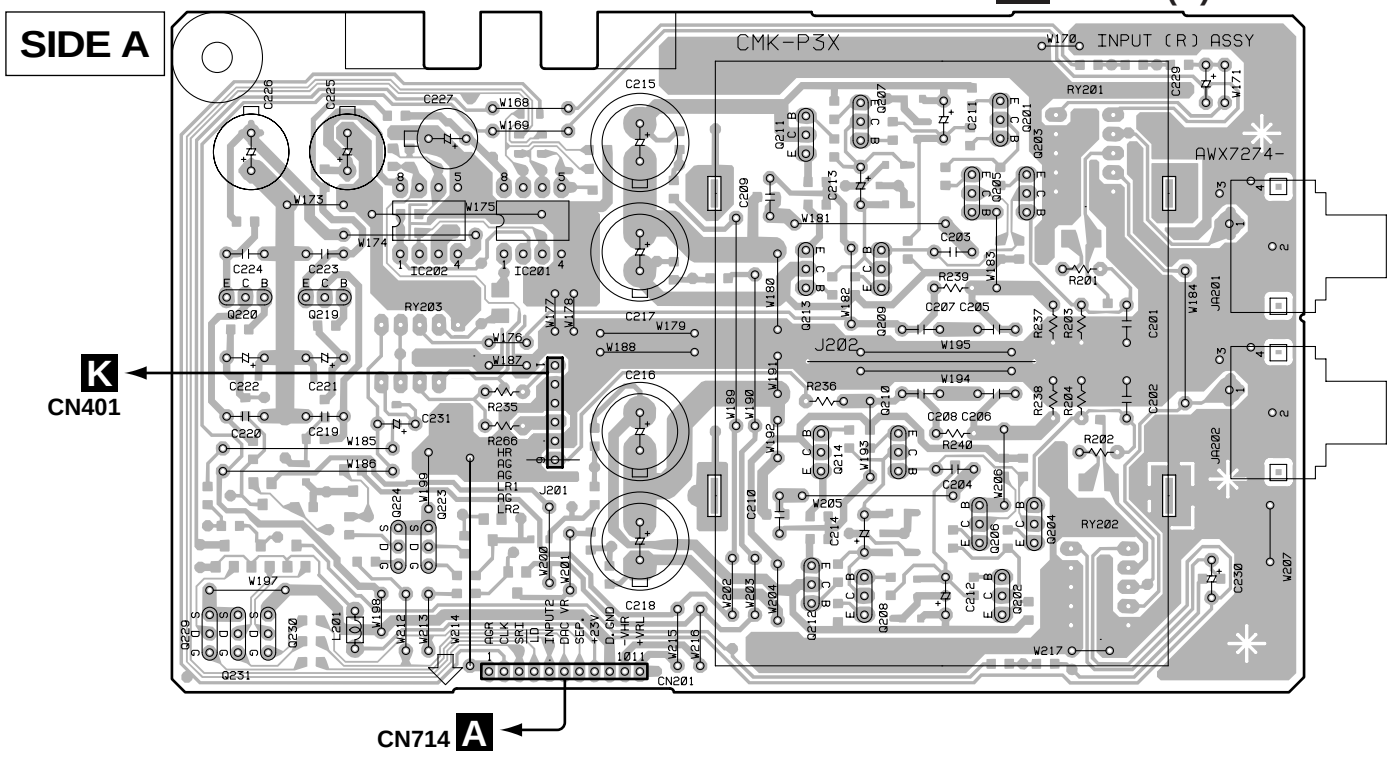


Q116 Q115 Q117 Q126–Q128 Q118

4.5 INPUT(R) ASSY

J INPUT(R) ASSY

SIDE A

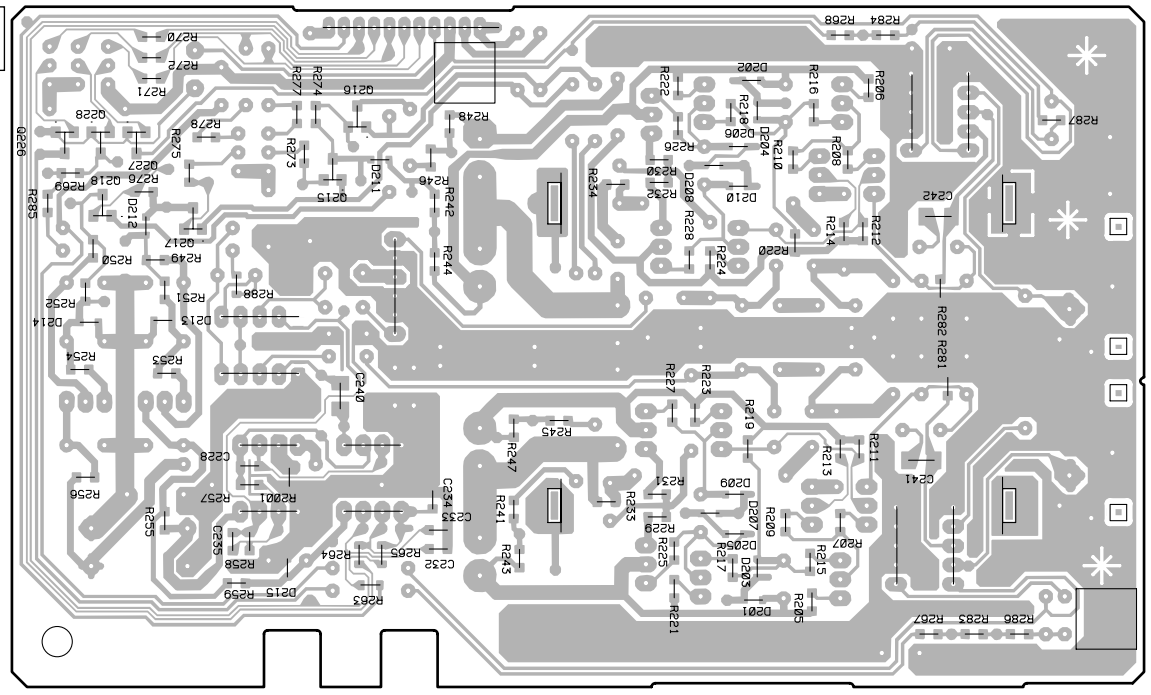


Q220 Q219 IC202 IC201 Q211 Q207 Q201
Q229–Q231 Q214 Q210 Q206

(ANP7281-A)

J INPUT(R) ASSY

SIDE B

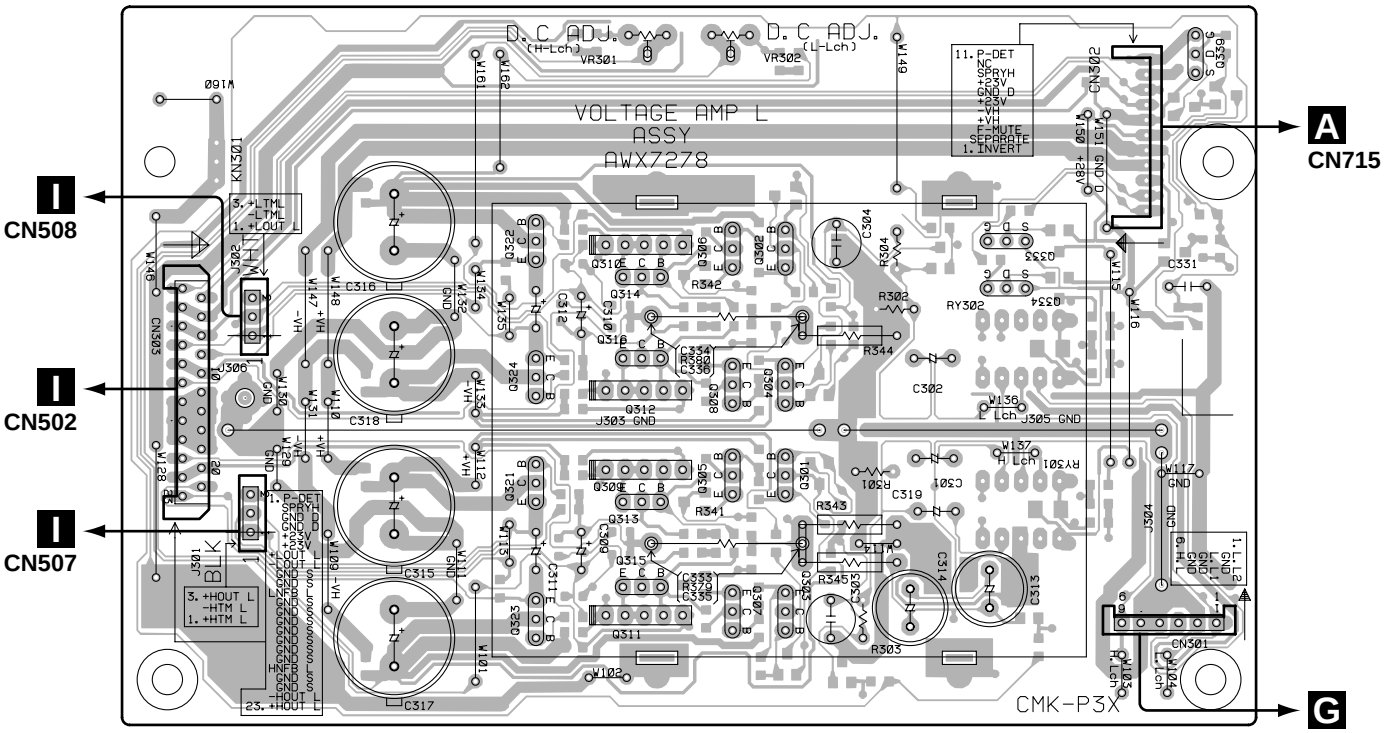


Q226–Q228 Q217 Q216
Q218 Q215

4.6 V. AMP(L) ASSY

H V. AMP(L) ASSY

SIDE A



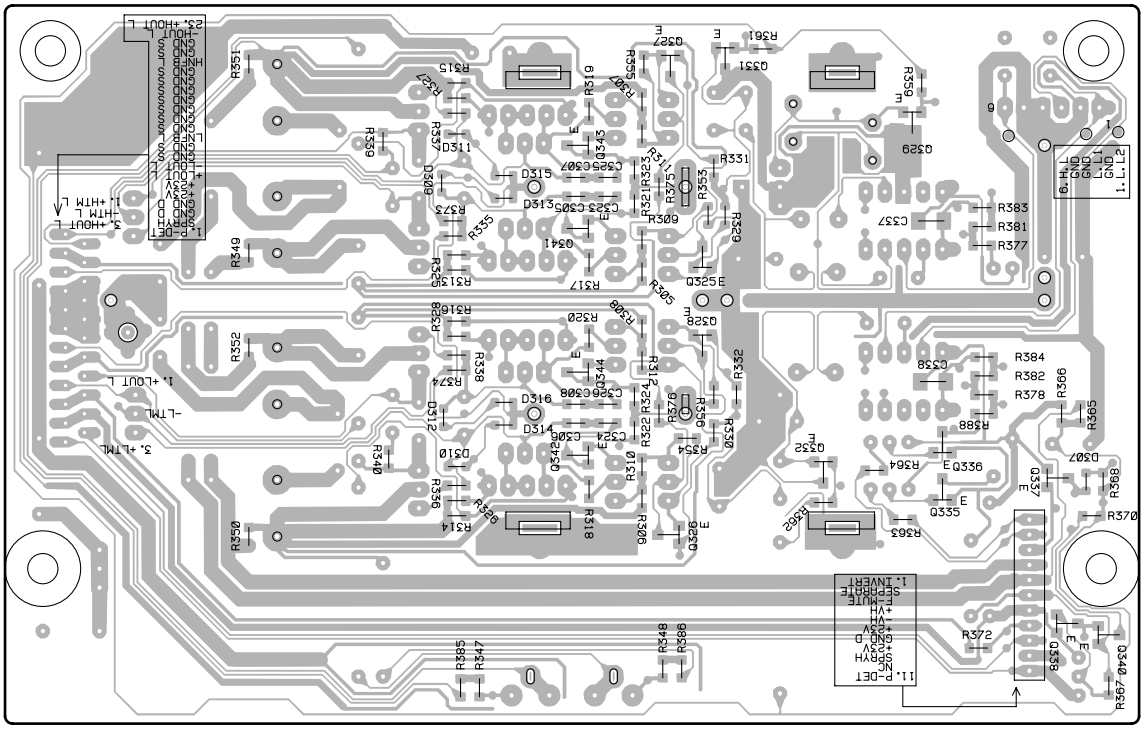
VR301 VR302

Q321 — Q324 | Q309 — Q316 | Q305 — Q308 | Q301 — Q304 | Q333 Q334

(ANP7294-C)

H V. AMP(L) ASSY

SIDE B

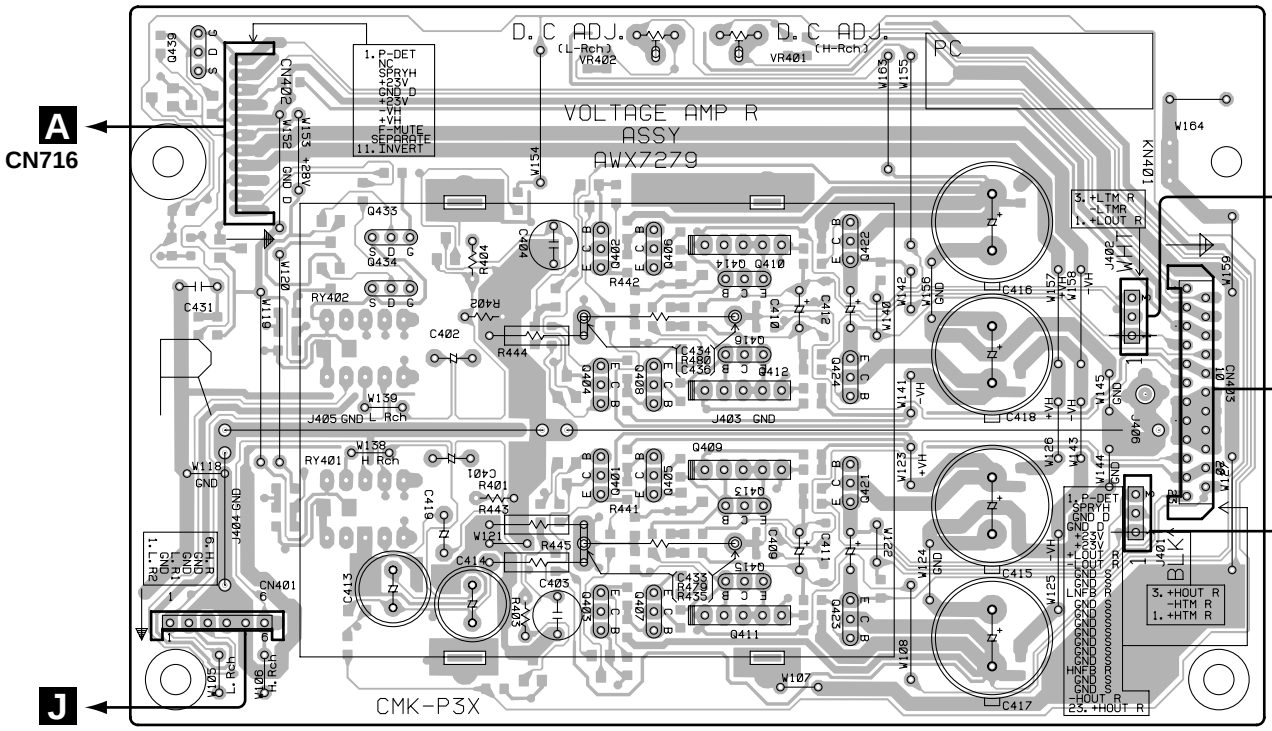


Q341 — Q344 | Q325 — Q328 | Q331 | Q332 | Q329 Q336 Q335 | Q337 Q338 | Q340

4.7 V. AMP(R) ASSY

SIDE A

K V. AMP(R) ASSY



VR402 VR401

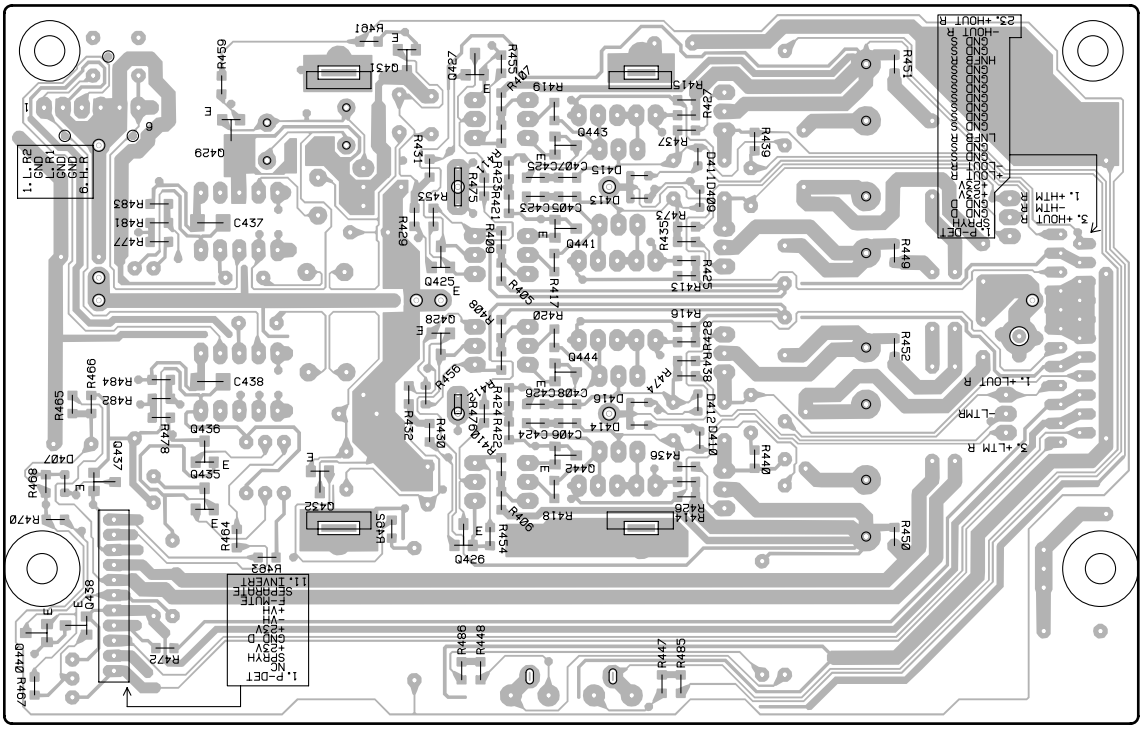
Q433 Q434 | Q401 Q405 | Q409 | Q421

Q404 Q408 | Q416 | Q424

(ANP7294-C)

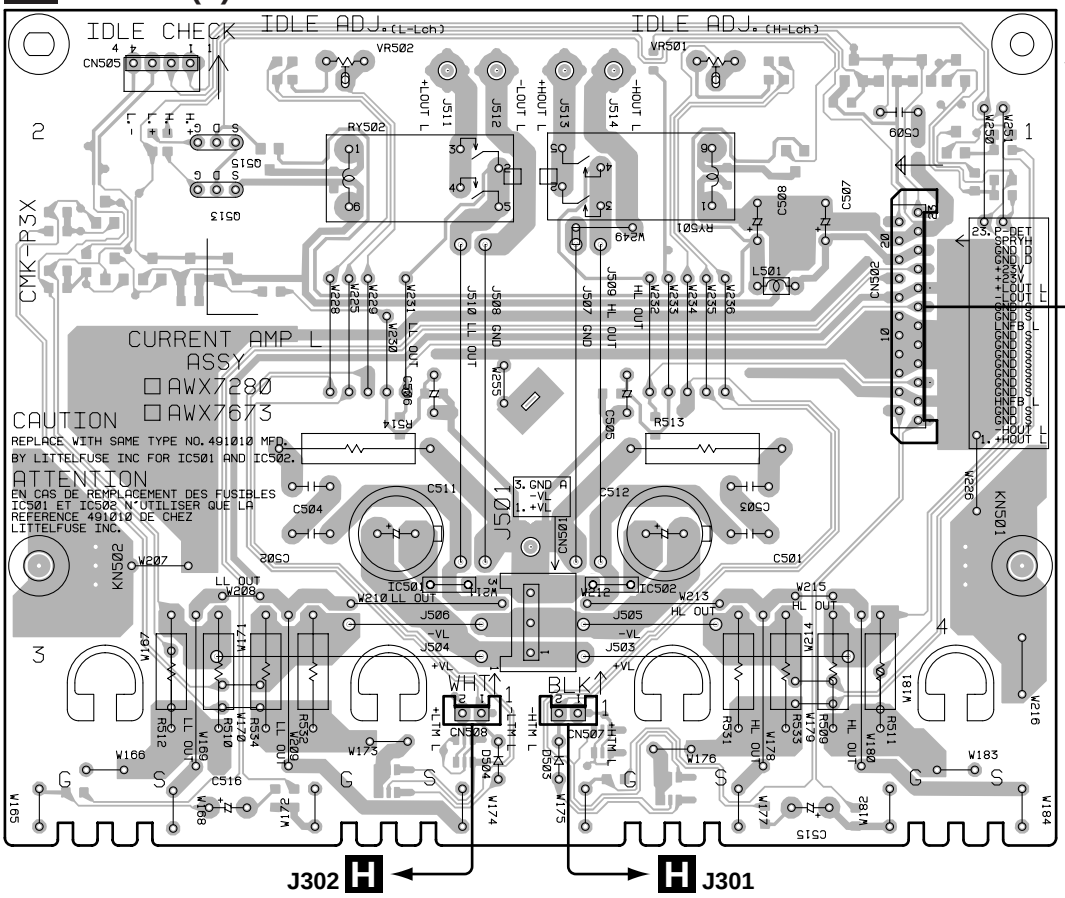
SIDE B

K V. AMP(R) ASSY



M-AX10
4.8 C. AMP(L) ASSY

C. AMP(L) ASSY



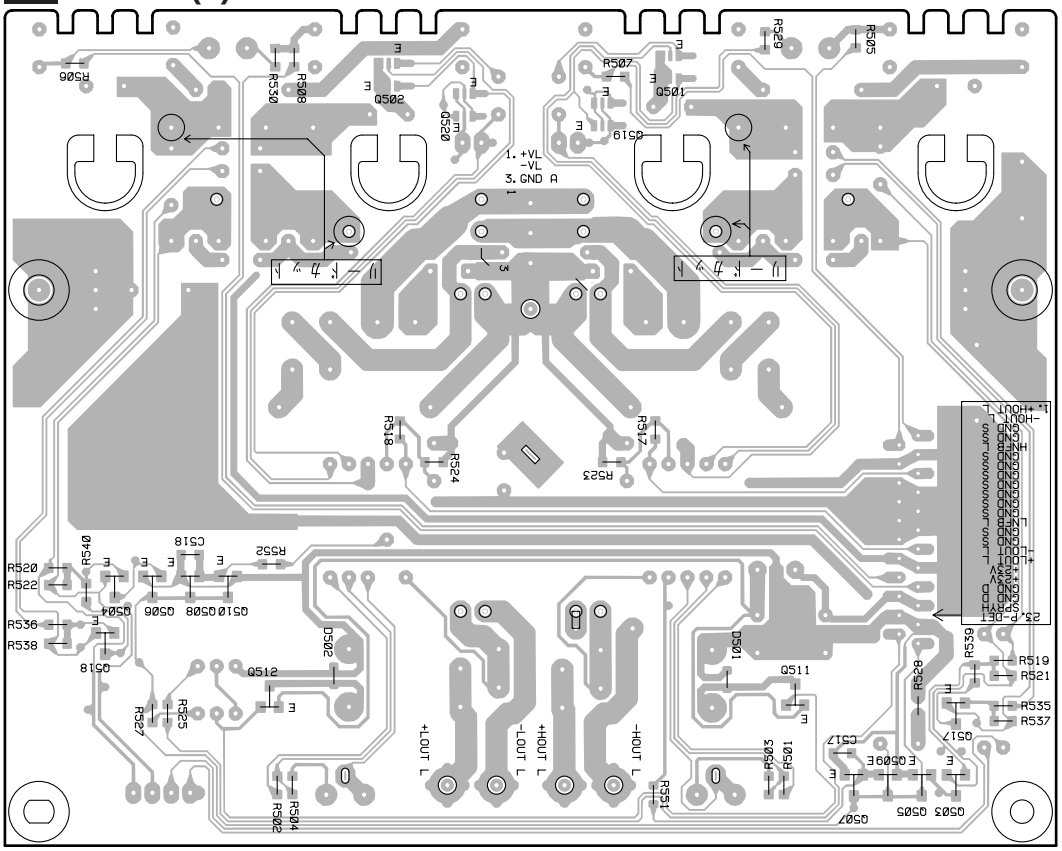
VR502, VR501

Q515

Q513

(ANP7294-C)

C. AMP(L) ASSY



Q502, Q501

Q520, Q519

Q504, Q506, Q508, Q510

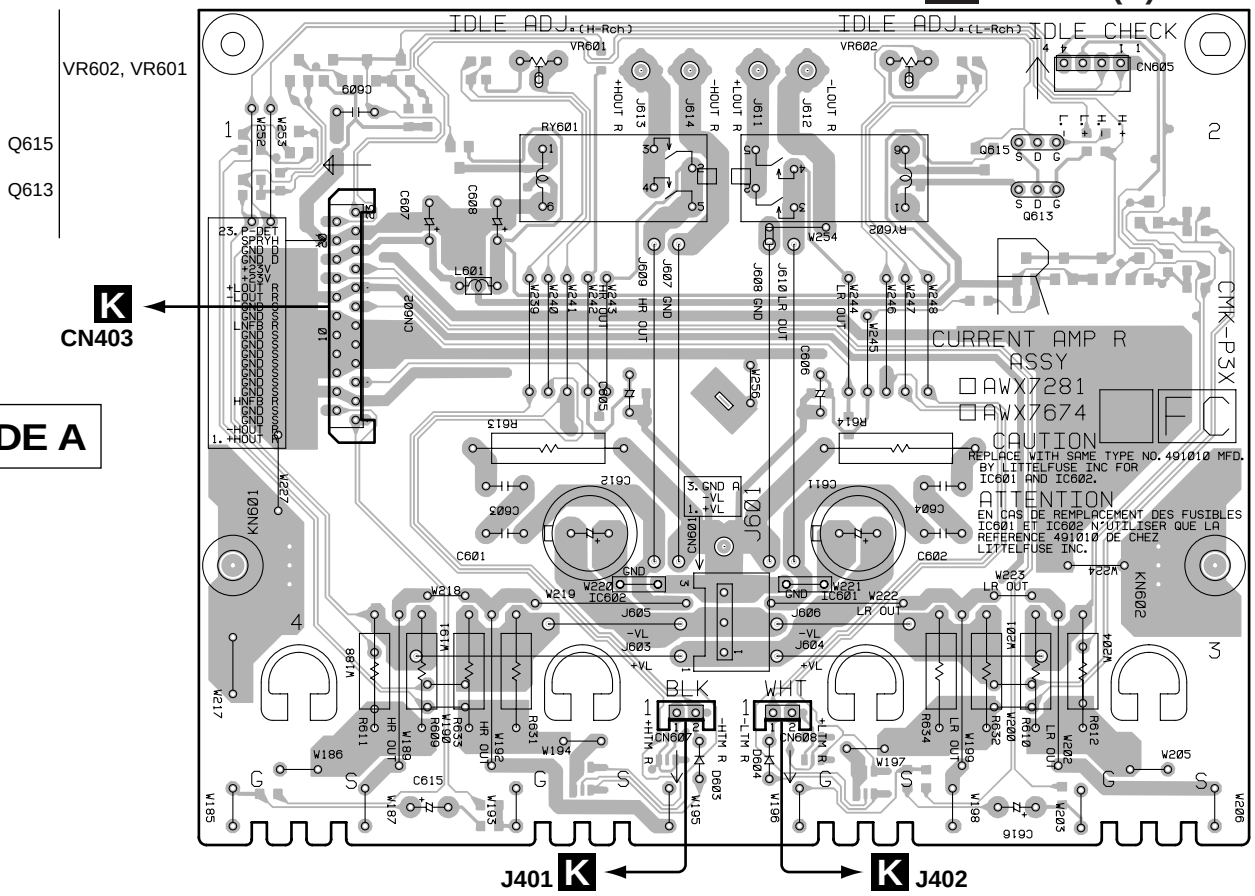
Q518

Q512, Q511, Q517

Q507, Q509, Q505, Q503

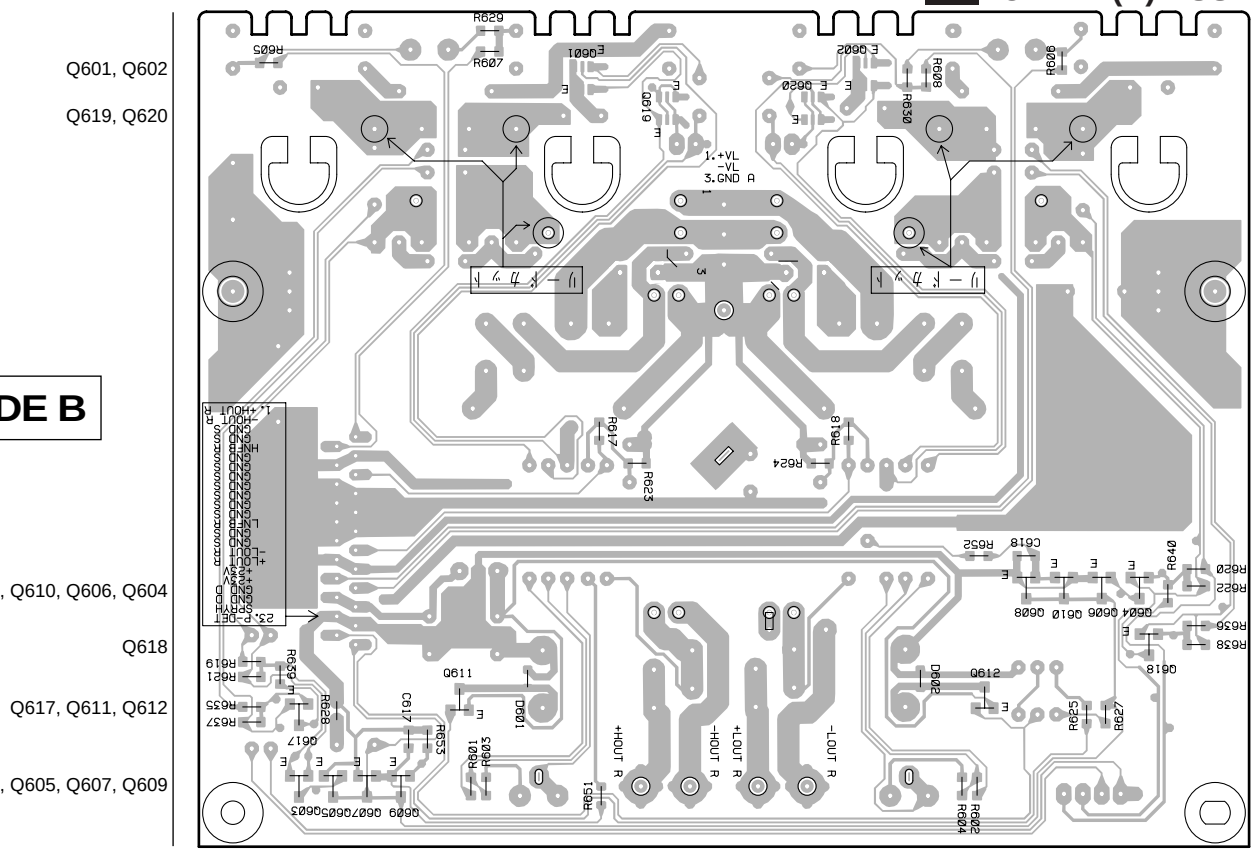
4.9 C. AMP(R) ASSY

L C. AMP(R) ASSY



(ANP7294-C)

L C. AMP(R) ASSY



5. PCB PARTS LIST

NOTES: ●*Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.*
●*The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
●*When ordering resistors, first convert resistance values into code form as shown in the following examples.*
Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).
560 Ω → 56 × 10¹ → 561 ..... RD1/4PU 5 6 1 J
47k Ω → 47 × 10³ → 473 ..... RD1/4PU 4 7 3 J
0.5 Ω → R50 ..... RN2H R 5 0 K
1 Ω → 1R0 ..... RS1P 1 R 0 K
Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).
5.62k Ω → 562 × 10¹ → 5621 ..... RN1/4PC 5 6 2 1 F

CONTRAST OF PCB ASSEMBLIES

Mark	Symbol and Description	Part No.		Remarks
		M-AX10 /KU/CA	M-AX10 /NY	
NSP	POWER AMP ASSY	AWH7003	AWH7002	
	├V. AMP (L) ASSY	AWX7278	AWX7278	
	├V. AMP (R) ASSY	AWX7279	AWX7279	
	├C. AMP (L) ASSY	AWX7673	AWX7280	
	└C. AMP (R) ASSY	AWX7674	AWX7281	
NSP	AF COMPLEX (A) ASSY	AWM7410	AWM7410	
	├INPUT (L) ASSY	AWX7273	AWX7273	
	├INPUT (R) ASSY	AWX7274	AWX7274	
NSP	├SW ASSY	AWX7282	AWX7282	
NSP	├JOINT ASSY	AWX7283	AWX7283	
NSP	└VR ASSY	AWX7334	AWX7334	
NSP	AF COMPLEX (B) ASSY	AWM7507	AWM7506	
	├POWER SUPPLY ASSY	AWX7664	AWX7662	
	├FRONT ASSY	AWX7276	AWX7276	
NSP	└LED ASSY	AWX7277	AWX7277	

I C.AMP (L) ASSY

AWX7673and AWX7680 are constructed the same except for the following:

Mark	Symbol & Description	Part No.		Remarks
		AWX7673	AWX7680	
⚠	IC501,IC502	AEK7022	Not used	IC Protector (10A/125V)

L C.AMP (R) ASSY

AWX7674and AWX7681 are constructed the same except for the following:

Mark	Symbol & Description	Part No.		Remarks
		AWX7674	AWX7681	
⚠	IC601,IC602	AEK7022	Not used	IC Protector (10A/125V)

B POWER SUPPLY ASSY

AWX7664and AWX7662 are constructed the same except for the following:

Mark	Symbol & Description	Part No.		Remarks
		AWX7664	AWX7662	
⚠	R849 -R852	Not used	RS2LMF222J	

Mark	No.	Description	Part No.

A JOINT ASSY

COILS AND FILTERS

	L711,L712		RTF1167

CAPACITORS

	C711,C712		CEAT100M50

RESISTORS

	Other Resistors		RS1/10S□□□J

OTHERS

	CN711,CN712	10P MT CONNECTOR	1-173981-0
	CN713,CN714	11P PLUG	KM200TA11
	711,712	PCB BINDER	VEF1040

B POWER SUPPLY ASSY (AWX7664)

SEMICONDUCTORS

⚠	IC803		AEK7019
⚠	IC801,IC802		AEK7021
⚠	IC804,IC805		BA178M24T
⚠	Q815,Q816,Q819,Q820		2SA1255
⚠	Q803,Q804,Q811,Q812		2SA1837
	Q805,Q806		2SA970
	Q807,Q808		2SC2240
	Q821		2SC2712
⚠	Q813,Q814,Q817,Q818		2SC3138
⚠	Q801,Q802,Q809,Q810		2SC4793
	D821-D828		1SS355
⚠	D801-D804		F10KF20
⚠	D805-D812,D833-D837		S5566G(TPB2)
	D829-D832		UDZ16B
	D813-D816,D841-D844		UDZ24B
	D817-D820		UDZ36B
⚠	D838		UDZS10B

COILS AND FILTERS

	L801,L802		RTF1167

CAPACITORS

⚠	C851 (0.01µF/250V)		ACE7014
	C803,C804,C833		CEANP1R0M50
	C829-C832,C836		CEAT100M50
	C813-C820		CEAT100M63
	C809-C812		CEAT471M2A
	C821-C824		CEATR10M2A
	C838,C840		CEHAT100M50
	C839,C841		CEHAZA220M25
	C825-C828		CEHAZL101M50
	C834		CEHAZL182M35
	C837		CEHAZL331M35
	C805-C808		CEHAZL471M50
	C842		CFTYA224J50
	C801,C802		CKCYF103Z50

RESISTORS

⚠	R803,R804		RD1/4LMF470J
	R813,R814		RD1/4MUF124J
⚠	R831,R839		RS1/10S100J
⚠	R815-R818		RS1/10S101J
⚠	R819-R822		RS1/10S301J
⚠	R836-R838		RS1/10S3R3J
⚠	R805-R808		RS1LMF103J
	Other Resistors		RS1/10S□□□J

OTHERS

	CN805,CN806	10P MT CONNECTOR	1-173981-0
	CN804	16P CONNECTOR	9604S-16C
	H851,H852	FUSE CLIP	AKR1004
	811-822	HEAT SINK	ANH7100
⚠	CN851	AC CODE SOCKET	RKP1751
⚠	CN852	AMP U-P CONNECTOR	RKP1833
⚠	CN853	AMP U-P CONNECTOR	RKP1834
	805	PCB BINDER	VEF1040
	KN801-KN803	EARTH METAL FITTING	VNF1084

C SW ASSY

SWITCHES AND RELAYS

⚠	S701		ASG-553

CAPACITORS

⚠	C701 (0.01µF/250V)		ACE7014

OTHERS

⚠	CN701	AMP U-P CONNECTOR	RKP1833

D FRONT ASSY

SEMICONDUCTORS

	IC904		AT24C01-10PC
⚠	IC902		BA178M05T
⚠	IC903		BA178M15T
	IC901		PD5508B9
	Q952		2SA1048
	Q903,Q904		2SC2458
	Q901,Q902		2SC2705
	Q943,Q946		2SJ146
	Q907-Q914,Q942,Q945		DTA124EK
	Q918		DTA143EK
	Q915-Q917,Q919,Q926,Q928		DTC124EK
	Q930,Q947-Q951		DTC124EK
	Q932-Q935		DTC124ES
	D933-D935,D953		1SS355
	D927		DAN202K
	D936		DAP202K
	D901-D914		NSCW100-8511
	D929-D932		SLP6118C51H
	D951,D952		UDZS7.5B

COILS AND FILTERS

	X901 (4.19MHz)		VSS1014

SWITCHES AND RELAYS

	S905		ASD7014
	S901-S904		VSG1009

CAPACITORS

	C921,C922,C942		CEHAZA220M25
	C961,C963,C964		CEHAZA470M6R3
	C941,C955,C957		CEJA100M35
	C953		CEJA2R2M50

Mark	No.	Description	Part No.
	C927,C954		CKSQYF103Z50
	C901-C914,C923-C926		CKSQYF104Z50
	C931-C934,C951,C956		CKSQYF104Z50

RESISTORS

	Other Resistors		RS1/10S□□□J

OTHERS

	902	3P CABLE HOLDER	51048-0300
	901	7P CABLE HOLDER	51048-0700
	CN901	16P CONNECTOR	52492-1620
	J902	3P JUMP WIRE	D20PDY0310E
	J901	7P JUMP WIRE	D20PDY0715G

E LED ASSY

SEMICONDUCTORS

	D752-D754		NSCW100-8511

RESISTORS

	All Resistors		RS1/10S□□□J

OTHERS

	CN751	3P JUMPER CONNECTOR	52151-0310

F VR ASSY

SEMICONDUCTORS

	IC761		TC74HC86AP
	Q761,Q762		2SK1132

SWITCHES AND RELAYS

	S761		ASX7028

CAPACITORS

	C761		CEAT100M50
	C762		CKSQYF104Z50

RESISTORS

	All Resistors		RS1/10S□□□J

OTHERS

	CN761	7P JUMPER CONNECTOR	52147-0710

G INPUT (L) ASSY

SEMICONDUCTORS

	IC101		DAC8043FP
	IC102		OP275GP
	Q101,Q102		2SA1048
	Q107,Q108,Q113,Q114		2SA1145
⚠	Q120		2SA1145
	Q103-Q106		2SA970
	Q109-Q112		2SC2705
⚠	Q119		2SC2705
	Q123,Q124,Q129-Q131		2SK1132
	Q115,Q117,Q126-Q128		DTA124EK
	Q116,Q118		DTC124EK
	D101-D112		1SS355
	D113,D114		UDZ18B
	D115		UDZS5.1B

Mark	No.	Description	Part No.

COILS AND FILTERS

	L101		RTF1167

SWITCHES AND RELAYS

	RY101-RY103		VSR1008

CAPACITORS

	C101,C102,C105-C108 (220pF)		ACE7012
	C140 (47µF)		ACH7116
	C103,C104		CCCSL560K2H
	C135		CCSQCH100D50
	C132-C134		CCSQCH101J50
	C128		CCSQCH470J50
	C129,C130		CEAT100M50
	C121,C122		CEHAZA101M25
	C131		CEHAZA220M25
	C125,C126		CEHAZL471M25
	C115-C118		CEHAZL471M50
	C119,C120,C123,C124		CFTYA104J50
	C109,C110		CQHA561J2A
	C141,C142 (22µF)		RCH1077
	C111-C114 (47µF/10V)		RCH1139
	C127 (100µF/6.3V)		VCH1156

RESISTORS

	R137,R138		RDR1/4VM1001F
	R135,R136,R166		RDR1/4VM2400F
	R139,R140		RDR1/4VM3001F
	R101,R102		RDR1/4VM391J
	R103,R104		RDR1/4VM473J
	R157,R158		RS1/10S1002F
	Other Resistors		RS1/10S□□□J

OTHERS

	J101	6P HOUSING SHIELD WIRE	ADX7253
	JA101,JA102	PIN JACK(1P)	AKB7102
	CN101	11P SOCKET	KP200TA11L

H V. AMP (L) ASSY

SEMICONDUCTORS

	Q325,Q326,Q341,Q342		2SA1162
	Q309,Q310		2SA1929
	Q301,Q302,Q307,Q308		2SA970
	Q313,Q314,Q323,Q324		2SA970
	Q303-Q306,Q315,Q316		2SC2240
	Q321,Q322		2SC2240
	Q327,Q328,Q343,Q344		2SC2712
	Q329,Q331,Q332		2SC3326
	Q311,Q312		2SC5170
	Q333,Q334,Q339		2SK1132
	Q335-Q337,Q340		DTA124EK
	Q338		DTC124EK
	D307,D313-D316		1SS355
	D309-D312		UDZS7.5B

SWITCHES AND RELAYS

	RY301,RY302		VSR1008

CAPACITORS

	C303,C304,C333-C336 (220pF)		ACE7012
	C313,C314 (10µF)		ACH7124
	C301,C302,C319 (10µF)		ACH7125

Mark	No.	Description	Part No.
	C305-C308,C323-C326		CCSQCH270J50
	C311,C312		CEAT470M25
	C315-C318		CEGA471M50
	C309,C310		CEHAZA470M10
	C331		CFTYA683J50
	C337,C338		CSZSR100M16

RESISTORS

	R303,R304	RDM1/2P221J
	R345	RDM1/2P3600F
	R343,R344	RDM1/2P7500F
	R341,R342	RDM1P3001F
	R379,R380	RDR1/4PM470J
	R301,R302	RDR1/4VM104J
	R315	RS1/10S1001D
⚠	R349-R352	RS1/10S101J
	R314	RS1/10S1101D
	R386	RS1/10S30R0D
	R385	RS1/10S33R0D
	R313,R316,R325-R328	RS1/10S3900D
	R347,R348	RS1/10S5100D
	VR301,VR302 (220Ω)	ACP7002
	Other Resistors	RS1/10S□□□J

OTHERS

CN303	23P CONNECTOR	9604S-23C
J301	2WIRE SHIELD HOUSING	ADX7258
J302	2WIRE SHIELD HOUSING	ADX7259
KN301	EARTH METAL FITTING	VNF1084

I C. AMP (L) ASSY (AWX7673)

SEMICONDUCTORS

⚠	IC501,IC502 IC PROTECTOR(10A)	AEK7022
⚠	Q503,Q504	2SA1162
	Q507-Q510	2SC2712
⚠	Q517,Q518	2SC3138
	Q513,Q515	2SK1132
	Q511,Q512	DTA124EK
	Q505,Q506	DTC143EK
	Q501,Q502,Q519,Q520	IMX1
	D501,D502	1SS355
	D503,D504	BR3371XJ30A

COILS AND FILTERS

	L501	RTF1167

SWITCHES AND RELAYS

	RY501,RY502	ASR1035

CAPACITORS

	C505,C506	CEANP470M10
	C507	CEAT100M50
	C508	CEHAZA220M25
	C511,C512	CEHAZL471M50
	C501-C504	CFTYA224J50
	C509	CFTYA474J50
	C517,C518	CKSQYF104Z50
	C515,C516 (47µF/10V)	RCH1139

RESISTORS

	R519,R520,R535,R536	RS1/10S1502F
	R501,R502	RS1/10S1602F
	R503,R504	RS1/10S6801F
	R521,R522,R537,R538	RS1/10S8201F
⚠	R509-R512,R531-R534	RS2LMFR22J
	R513,R514	RS3LMF2R2J
	VR501,VR502 (4.7KΩ)	ACP7003
	Other Resistors	RS1/10S□□□J

OTHERS

CN502	23P CONECTOR	9604S-23C
CN507,CN508	2P TOP POST	B2B-EH
501	PCB BINDER	VEF1040
KN501,KN502	EARTH METAL FITTING	VNF1084

J INPUT (R) ASSY

SEMICONDUCTORS

	IC201	DAC8043FP
	IC202	OP275GP
	Q201,Q202	2SA1048
	Q207,Q208,Q213,Q214	2SA1145
⚠	Q220	2SA1145
	Q203-Q206	2SA970
	Q209-Q212	2SC2705
⚠	Q219	2SC2705
	Q223,Q224,Q229-Q231	2SK1132
	Q215,Q217,Q226-Q228	DTA124EK
	Q216,Q218	DTC124EK
	D201-D212	1SS355
	D213,D214	UDZ18B
	D215	UDZS5.1B

COILS AND FILTERS

	L201	RTF1167

SWITCHES AND RELAYS

	RY201-RY203	VSR1008

CAPACITORS

	C201,C202,C205-C208 (220pF)	ACE7012
	C240 (47µF)	ACH7116
	C203,C204	CCCSL560K2H
	C235	CCSQCH100D50
	C232-C234	CCSQCH101J50
	C228	CCSQCH470J50
	C229,C230	CEAT100M50
	C221,C222	CEHAZA101M25
	C231	CEHAZA220M25
	C225,C226	CEHAZL471M25
	C215-C218	CEHAZL471M50
	C219,C220,C223,C224	CFTYA104J50
	C209,C210	CQHA561J2A
	C241,C242 (22µF)	RCH1077
	C211-C214 (47µF/10V)	RCH1139
	C227 (100µF/6.3V)	VCH1156

RESISTORS

	R237,R238	RDR1/4VM1001F
	R235,R236,R266	RDR1/4VM2400F
	R239,R240	RDR1/4VM3001F
	R201,R202	RDR1/4VM391J
	R203,R204	RDR1/4VM473J

Mark	No.	Description	Part No.
	R257,R258		RS1/10S1002F
	Other Resistors		RS1/10S□□□J

OTHERS

	J201	6P HOUSING SHIELD WIRE	ADX7253
	JA201,JA202	PIN JACK(1P)	AKB7102
	CN201	11P SOCKET	KP200TA11L

K V. AMP (R) ASSY

SEMICONDUCTORS

	Q425,Q426,Q441,Q442	2SA1162
	Q409,Q410	2SA1929
	Q401,Q402,Q407,Q408	2SA970
	Q413,Q414,Q423,Q424	2SA970
	Q403-Q406,Q415,Q416	2SC2240
	Q421,Q422	2SC2240
	Q427,Q428,Q443,Q444	2SC2712
	Q429,Q431,Q432	2SC3326
	Q411,Q412	2SC5170
	Q433,Q434,Q439	2SK1132
	Q435-Q437,Q440	DTA124EK
	Q438	DTC124EK
	D407,D413-D416	1SS355
	D409-D412	UDZS7.5B

SWITCHES AND RELAYS

	RY401,RY402	VSR1008

CAPACITORS

	C403,C404,C433-C436 (220pF)	ACE7012
	C413,C414 (10µF)	ACH7124
	C401,C402,C419 (10µF)	ACH7125
	C405-C408,C423-C426	CCSQCH270J50
	C411,C412	CEAT470M25
	C415-C418	CEGA471M50
	C409,C410	CEHAZA470M10
	C431	CFTYA683J50
	C437,C438	CSZSR100M16

RESISTORS

	R403,R404	RDM1/2P221J
	R445	RDM1/2P3600F
	R443,R444	RDM1/2P7500F
	R441,R442	RDM1P3001F
	R479,R480	RDR1/4PM470J
	R401,R402	RDR1/4VM104J
	R415	RS1/10S1001D
⚠	R449-R452	RS1/10S101J
	R414	RS1/10S1101D
	R486	RS1/10S30R0D
	R485	RS1/10S33R0D
	R413,R416,R425-R428	RS1/10S3900D
	R447,R448	RS1/10S5100D
	VR401,VR402 (220Ω)	ACP7002
	Other Resistors	RS1/10S□□□J

OTHERS

	CN403	23P CONNECTOR	9604S-23C
	J401	2WIRE SHIELD HOUSING	ADX7258
	J402	2WIRE SHIELD HOUSING	ADX7259
	KN401	EARTH METAL FITTING	VNF1084

Mark	No.	Description	Part No.

L C. AMP (R) ASSY (AWX7674)

SEMICONDUCTORS

⚠	IC601,IC602	IC PROTECTOR(10A)	AEK7022
⚠	Q603,Q604		2SA1162
	Q607-Q610		2SC2712
⚠	Q617,Q618		2SC3138
	Q613,Q615		2SK1132
	Q611,Q612		DTA124EK
	Q605,Q606		DTC143EK
	Q601,Q602,Q619,Q620		IMX1
	D601,D602		1SS355
	D603,D604		BR3371XJ30A

COILS AND FILTERS

	L601	RTF1167

SWITCHES AND RELAYS

	RY601,RY602	ASR1035

CAPACITORS

	C605,C606	CEANP470M10
	C607	CEAT100M50
	C608	CEHAZA220M25
	C611,C612	CEHAZL471M50
	C601-C604	CFTYA224J50
	C609	CFTYA474J50
	C617,C618	CKSQYF104Z50
	C615,C616 (47µF/10V)	RCH1139

RESISTORS

	R619,R620,R635,R636	RS1/10S1502F
	R601,R602	RS1/10S1602F
	R603,R604	RS1/10S6801F
	R621,R622,R637,R638	RS1/10S8201F
⚠	R609-R612,R631-R634	RS2LMFR22J
	R613,R614	RS3LMF2R2J
	VR601,VR602 (4.7kΩ)	ACP7003
	Other Resistors	RS1/10S□□□J

OTHERS

	CN602	23P CONNECTOR	9604S-23C
	CN607,CN608	2P TOP POST	B2B-EH
	601	PCB BINDER	VEF1040
	KN601,KN602	EARTH METAL FITTING	VNF1084

6. ADJUSTMENT

6.1 IDLE CURRENT ADJUSTMENT

The idle current is adjusted in two steps: coarse and fine. Note that the adjustment value for fine adjustment depends on the elapsed time from the coarse adjustment.
For the points to be adjusted or measured, see Table 6-1 and Fig. 6-1.
For the adjustment timing and values, see Table 6-2.
Be sure to turn VR501, VR502, VR601 and VR602 fully counter-clockwise before turning the power on.

Table 6-1 Adjustment points of idle current

Channel	L High ch	L Low ch	R High ch	R Low ch
Adjustment point	VR501	VR502	VR601	VR602
Measurement point	CN505	CN505	CN605	CN605
	Between pins 1 and 2	Between pins 3 and 4	Between pins 1 and 2	Between pins 3 and 4

Table 6-2 Adjustment values of idle current

	Adjustment Timing		Adjustment value (Pin voltage)
Coarse Adjustment	Power ON immediately		14.5mV ± 1.0mV
Fine Adjustment	Elapsed time from the coarse adjustment	More than 5 min. and less than 10 min.	16.0mV ± 0.5mV
		More than 10 min. and less than 15 min.	15.5mV ± 0.5mV
		More than 15 min. and less than 30 min.	15.0mV ± 0.5mV
		More than 30 min.	14.5mV ± 0.5mV

6.2 DC OFFSET ADJUSTMENT

Adjust the DC offset with the power on immediately before fine adjustment of the idle current.
For the points to be adjusted or measured, and the adjustment values, see Table 6-3 and Fig. 6-1.

Table 6-3 DC offset adjustment method

Channel	Adjustment Point	Measurement Point	Adjustment Value
L High ch	VR301	Apply channel speaker terminals (Red, Black)	0V ± 10mV
L Low ch	VR302		
R High ch	VR401		
R Low ch	VR402		

6.3 OPERATION CHECK OF THE PROTECTION CIRCUIT

While supplying a sine wave of 1 Hz, 1.2 Vrms in DUAL MODE, with ATT.THROUGH OFF, increase the volume level and check that the protection circuit activates before the level reaches the maximum value. It works about before twelve o'clock position.

CAUTION : This check mode may damage the speaker(s) when it is connected to the output terminal. It is recommended that output terminal is open at this check mode.

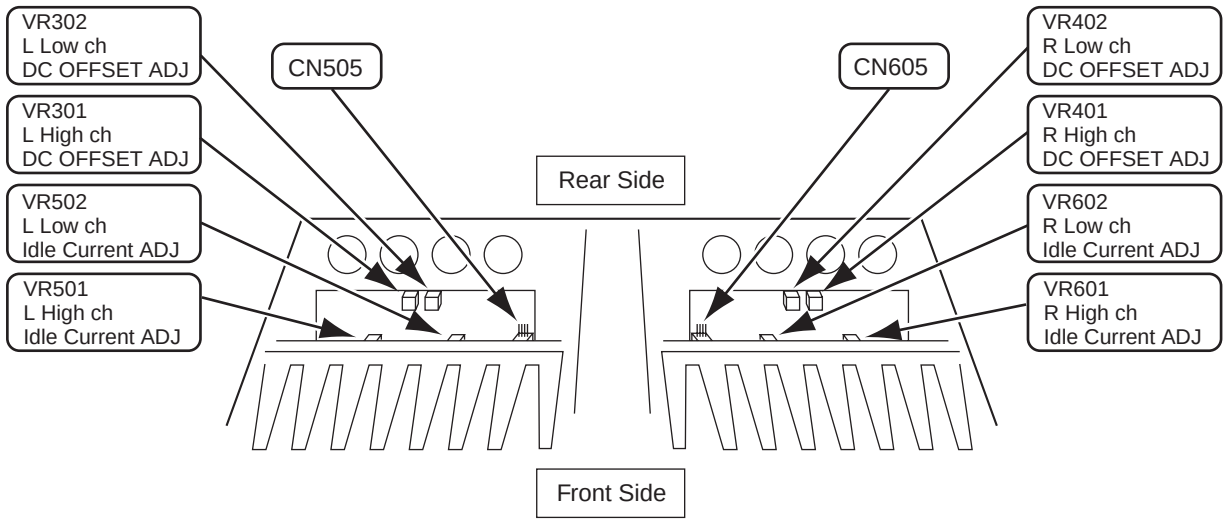


Fig. 6-1 Adjustment and measurement points

7. GENERAL INFORMATION

7.1 IC

• The information shown in the list is basic information and may not correspond exactly to that shown in the schematic diagrams.

●List of IC

PD5508B9, DAC8043FP

■ PD5508B9 (FRONT ASSY : IC901)

• Control Microcomputer

● Pin Function

No.	Mark	Pin Name	I/O	Pin Function
1	P53	VR2	I	
2	P17/Srdy/A10	LD	O	Serial I/O pins
3	P16/CLK/A9	CLK	O	
4	P15/Sout/A8	SRD	O	
5	P14/Sin/A7	IND. IN1	O	
6	P13/T1/A6	IND. IN2	O	Timer output
7	P12/T0/A5	IND. SEPA	O	
8	P11/A4	IND.BRD	O	
9	P10	IND. DUAL	O	
10	P27/IN7	IND. ATT.THROUGH	O	Analog input
11	P26/IN6	IND. ATT. HOLD	O	
12	P25/IN5	INPUT2	O	
13	P24/IN4	DACVR	O	
14	P23/IN3/A3	SEPARATE	O	
15	P22/IN2/A2	INVERT	O	
16	P21/IN1/A1	SPRYH	O	
17	P20/IN0/A0	SPRYG	O	
18	Vref/CE	Vref	-	Reference voltage input
19	Xin	Xin	I	Clock input
20	Xout	Xout	O	Clock output
21	Vss	Vss	-	Power supply voltage input
22	Vcc	Vcc	-	Power supply voltage input
23	P50/Xcin	VR4	I	
24	P51/Xcout	VR5	I	
25	RESET	RESET	I	Reset input
26	P30/INT0/A11	BACKUP	I	External inrerrupt input
27	P31/INT1/A12	BRD.	I	
28	P32/CNTR0/OE	DAL.	I	Timer input
29	P33/CNTR1/Vpp	VR1	I	
30	P40/A13	SEPA	I	
31	P41/A14	FMT	O	
32	P42	ILL2	O	
33	P43	ILL1	O	
34	P00/D0	SDA	I/O	Key ON wake-up function
35	P01/D1	SCL	O	
36	P02/D2	MD WKUP	I	
37	P03/D3	ATT. THROUGH	I	
38	P04/D4	ATT. HOLD	I	
39	P05/D5	INPUT	I	
40	P06/D6	ILL.	I	
41	P07/D7	P-DET	I	
42	P52	VR3	I	

Following item "1."~"7." (P.43~P.51) describe about the specifications of IC901 PD5508B9.

● SPECIFICATIONS

1. Basics

1.1 Reset

Perform the reset when connecting the AC power supply.

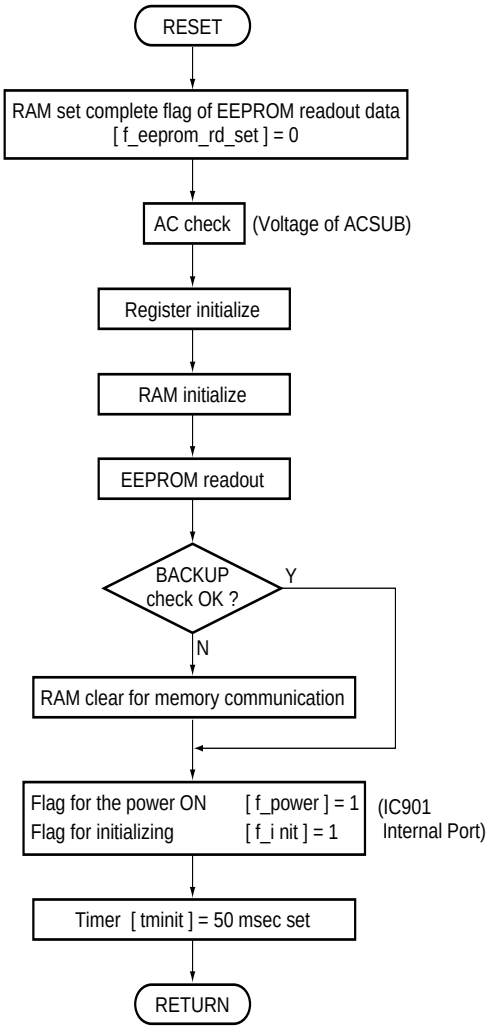


Fig. Flow chart of RESET

Perform reading from the EEPROM while RAM is being initialized after the AC power is turned on (port 25 (Pin25) (RESET): L).
Set the read data to RAM using "initcont" after resetting is completed.
(See "2. Initializing.(P.44)")

1.2 BACKUP Mode

Backup is performed when the AC power is turned off.
SPRYH (port 16) and SPRYG (port 17) are set to "L" 10 ms after the BACKUP port becomes "L."
All the indicators and lamps go dark.
Execution of the BACKUP processes (port processing and register processing) begins 30 ms later.
Last memory writing to the EEPROM is performed each time a key is operated, but not performed in the backup processes.

Port processing
1) I/O ports are specified as output ports.
2) Output ports are set to "L."

Backup targets
INPUT1/2, ATT.THROUGH, ATT. HOLD (The level value is also backed up when ON), ILL.
(The VOLUME level and mode settings at the mechanical switch are checked each time the power is turned on.)

	BRD.	DUAL	PRO.
ILL	Bright / dark / off		
INPUT	1/2		——
ATT. THR	ON/OFF		
ATT. HOLD	——	——	ON/OFF
ATT. LEVEL	——	——	At ATT. HOLD ON only

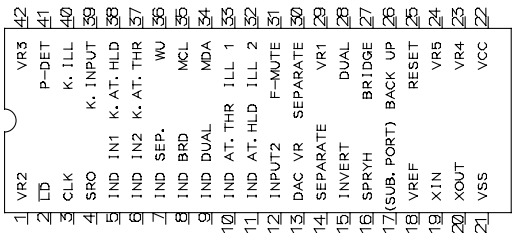
As writing to ROM may require 40 ms at maximum, 5 V will be supplied to the microcomputer for about 100 ms after the AC power is turned off at the hardware.

The data to be written are composed of the following 3 bytes:

1	Bit 0	ILL1	ON/OFF
	Bit 1	ILL2	ON/OFF
	Bit 2	INPUT	1/2
	Bit 3	ATT. THROUGH	ON/OFF
	Bit 4	ATT. HOLD	ON/OFF
	Bit 5	SEPARATE	ON/OFF
	Bit 6	DUAL	ON/OFF
	Bit 7	BRIDGE	ON/OFF
2		VOLUME position (5 bit) * At ATT. HOLD ON only	
3		BACKUP code	

Communication is made using ports 34 (SDA) and 35 (SCL) as output ports.

IC901 PD5508B9



1.3 Last Memory

Last memory writing to the EEPROM (IC904:AT24C01-10OC) is performed each time a key is operated.
Input-independent last memory is not provided.
The ILL and ATT.THROUGH settings remain the same in switching between INPUT 1 and 2.

1.4 TEST Mode

None

1.5 SILENT Mode

The unit can enter SILENT mode in a condition other than the following:

- The BACKUP port is "L." (BACKUP mode)
- A volume operation is being processed. ┐
- A key input is being processed. ┘ (normal operation mode)
- Caution status for mode switching (caution indication state at the operation of OPERATION MODE SW during Power-On state)

When 200 ms have elapsed after such a process is completed, the unit can enter SILENT mode.

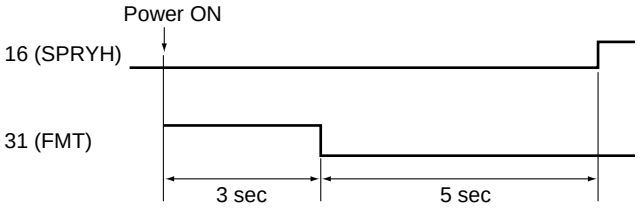
The unit restarts upon key input, a volume operation, mode switching, or P-DET input.
The timer is set for 5-second restarting.
When 200 ms have elapsed after the restarting process is completed, the unit can enter SILENT mode again.

(SILENT mode : The control μ-com enter the low power consumption mode and stops the oscillation of system clock.)

1.6 POWER ON/OFF

(1) POWER ON

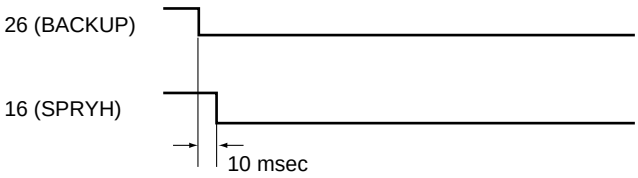
After POWER ON, port 16 (SPRYH)(Pin16) is set to "L" and port 31 (FMT)(Pin31) is set to "H."
Port 31 (FMT) is set to "L" after 3 seconds, and muting is set to OFF.
After another 5 seconds (8 seconds after POWER ON), ports 16 (SPRYH) and 17 (SPRYG)(Pin17) are set to "H," and relay is set to ON.



(2) POWER OFF

Port 16 (SPRYH)(Pin16) is set to "L" 10 ms after POWER OFF (port 26 (BACKUP)(Pin26) becomes "L").

Ports that must be processed other than port 16 are operated immediately after this.



2. Initializing

The main routine starts after reset processing.
Normal processing starts after the initializing process is completed with "initcont".

The data read during the reset processing are written to RAM.
(See the "1. Basics"(P.43).)
If the MODE switch was not operated during the POWER OFF period, the read data are written to RAM.
If the MODE switch was operated during the POWER OFF period, the default settings are made.

Default: INPUT1
ATT.THROUGH OFF
ATT.HOLD OFF
ILL Bright

Then the timers are set.
Refer to the next page Fig.1.

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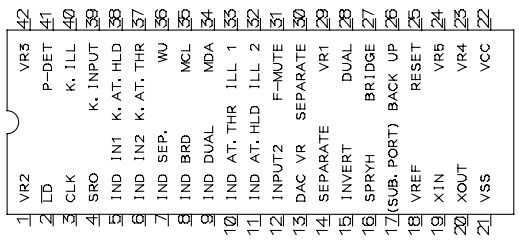


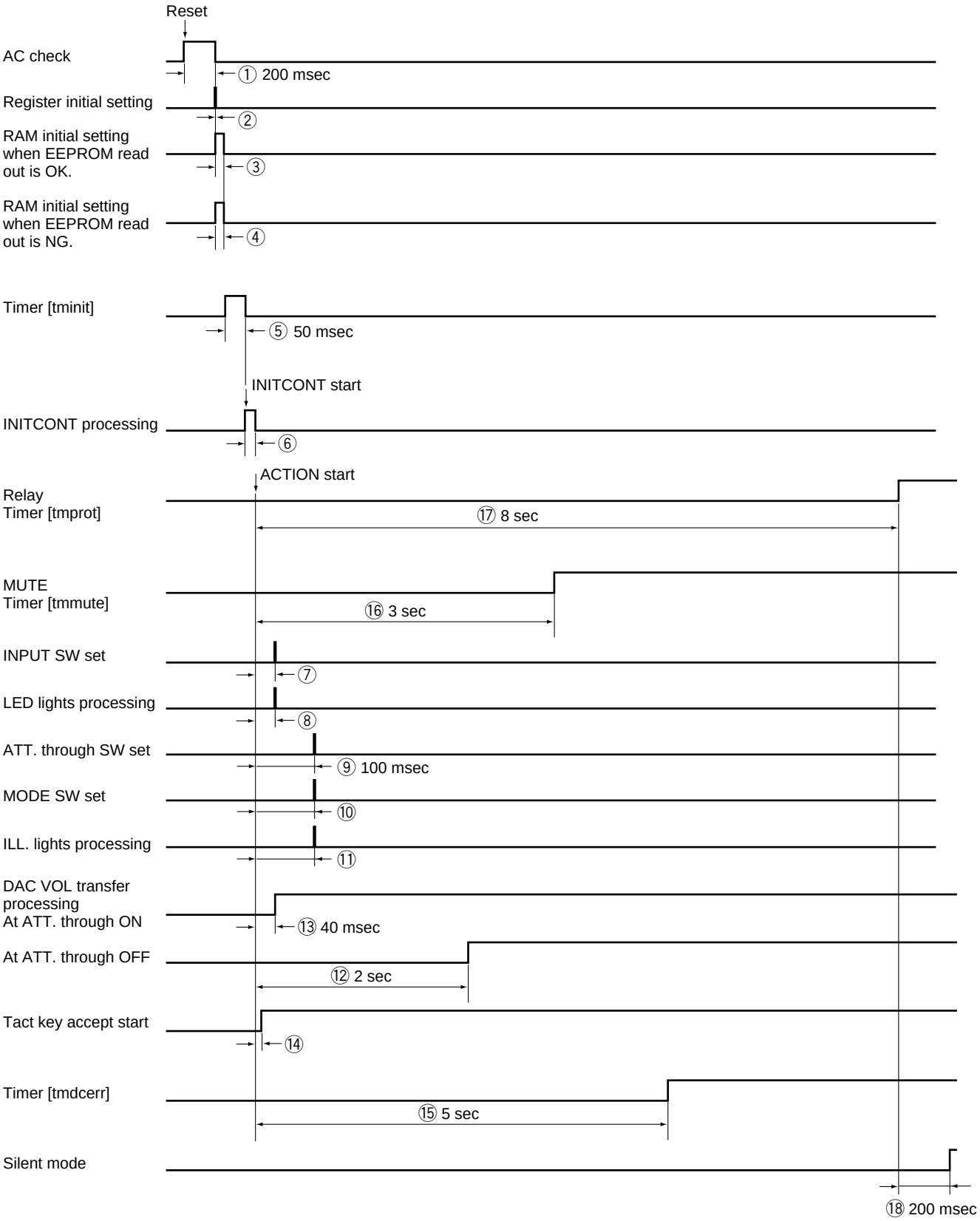
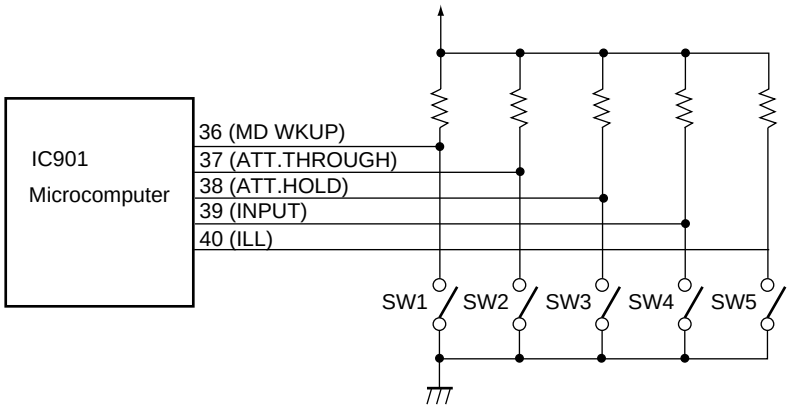
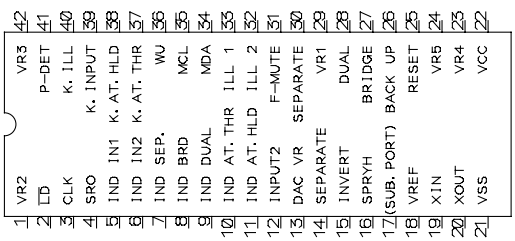


Fig.1 Timing chart of initializing process from the reset

3. Key Input (IC901)



IC901 PD5508B9



Key input, indicators and processes

Key Input Port	ACT	Indicator Process Port	Contents of Process		
			DUAL	BRIDGE	SEPARATE
37 (ATT. THROUGH)	L	10 (IND ATT. THROUGH)	Alternates "H" and "L" alternately at each key input.	Alternates "H" and "L" alternately at each key input.	Alternates "H" and "L" alternately at each key input. Key disabled with ATT.HOLD ON.
39 (INPUT)	L	5 (IND IN1) 6 (IND IN2)	Sets INDIN1 and INDIN2 to "H" and "L" alternately at each key input.	Sets INDIN1 and INDIN2 to "H" and "L" alternately at each key input.	Key disabled. Both INDIN1 and INDIN2 always lit ("H").
38 (ATT. HOLD)	L	11 (IND ATT. HOLD)	Key disabled. Always "L".	Key disabled. Always "L".	Alternates "H" and "L" at each key input. Key disabled with ATT. THROUGH ON.
40 (ILL)	—	None	———	———	———

Key Input Port	ACT	Indicator Process Port	Contents of Process		
			DUAL	BRIDGE	SEPARATE
37 (ATT. THROUGH)	L	13 (DAC VR)	ON : "H" OFF : "L"	ON : "H" OFF : "L"	ON : "H" (VOL invalid) OFF : "L" (VOL valid) Key disabled with ATT. HOLD ON.
39 (INPUT)	L	12 (INPUT2)	INPUT1 : "L" INPUT2 : "H"	INPUT1 : "L" INPUT2 : "H"	Fixed at L.
38 (ATT. HOLD)	L	———	Key disabled.	Key disabled.	ON : HOLD data valid VOL invalid OFF : VOL valid Key disabled with ATT. THROUGH ON.
40 (ILL)	L	32 (ILL2) 33 (ILL1)	Cycles Bright/Dark/Off at each key input. (ILL1, ILL2) Bright (H, L) Dark (L, H) Lamp Off (H, H) LED Off (L, L) Factory setting: Bright (H, L)		

3.1 Key Inputs

A key input becomes valid after 40 ms, to eliminate chatter.
The ATT.THROUGH key input from OFF to ON becomes valid when the key is held pressed for 2 seconds.

3.2 Switch inputs

The MODE switch (rotary switch) setting is read when the power is turned on.
The switch operation with POWER ON is invalid.
(See "7. WARNING."(P.50))

4. KEY PROCESSING (IC901)

4.1 ATT.THROUGH Switching

The ATT.THROUGH key input from ON to OFF becomes valid when the key is held pressed for 2 seconds.
Any other key input during these 2 seconds is invalid.
When switching from OFF to ON, the key input becomes valid at normal timing.

Port 16 (SPRYH)(Pin16) is set to "L" 10 ms after ATT.THROUGH switching signal input, and relay is set to OFF.
After another 30 ms, the INDICATOR port is processed.
Port 31 (FMT)(Pin31) is set to "H," and muting is set to ON.
Switching process is performed 100 ms after ATT.THROUGH switching signal input.

When switching ATT THROUGH from ON to OFF:
Data transfer to the DAC IC is performed 2 seconds after the key input.

When switching ATT.THROUGH from OFF to ON:
Port 2 (LD), port 3 (CLK), and port 4 (SRD) are fixed to "L" before DACVR (pin 13) is set to "L," 30 ms after relay becomes OFF.
(See "6. DAC Volume Transfer."(P.49))

After another 2 seconds, port 31 (FMT)(Pin31) is set to "L," and muting is set to OFF.
After another 3 seconds, port 16 (SPRYH)(Pin16) is set to "H," and relay becomes OFF.

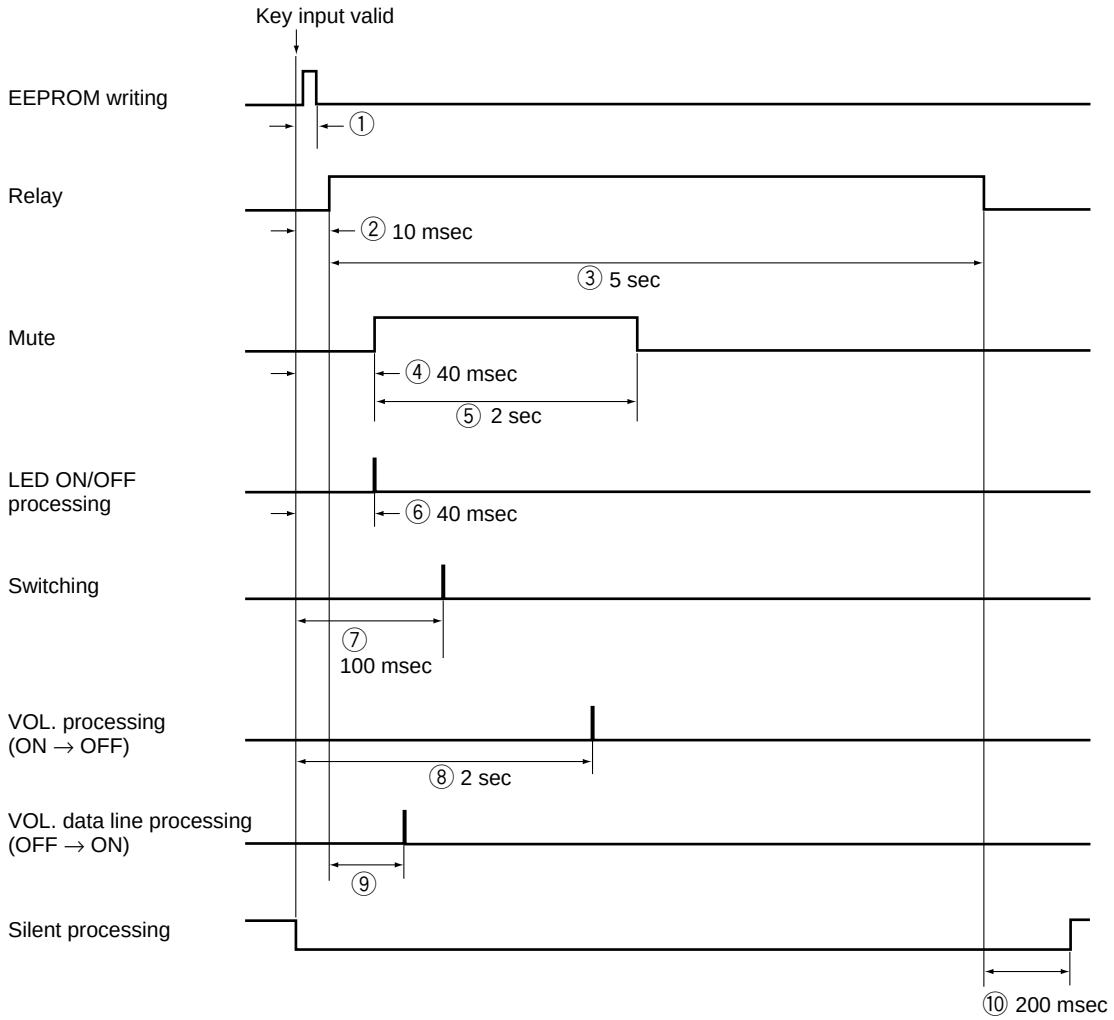


Fig.2 Timing chart when ATT. through key is pressed

4.2 INPUT switching

INDICATOR port processing and switching process start 30 ms after INPUT key input [port 39 (INPUT)(Pin39): "L"].
No muting process is performed.

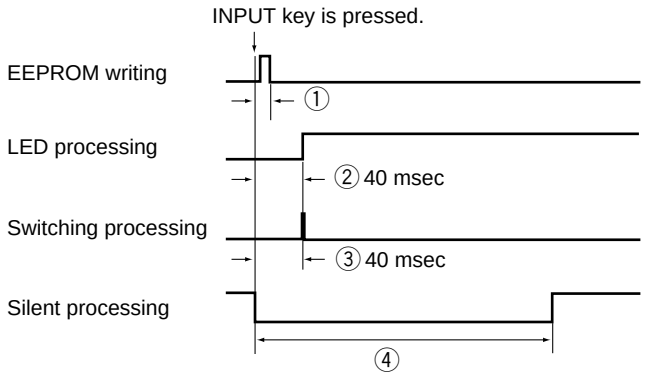


Fig.3 Timing chart when INPUT key is pressed

4.3 ATT.HOLD Key Processing

Upon ATT.HOLD key input, the specified current volume value is held.
While ATT.HOLD is ON, the volume level stays at the held value even if the volume control is operated.
In Muting mode (when the power is turned on or ATT. THROUGH is switched from ON to OFF), the ATT.HOLD key is disabled.

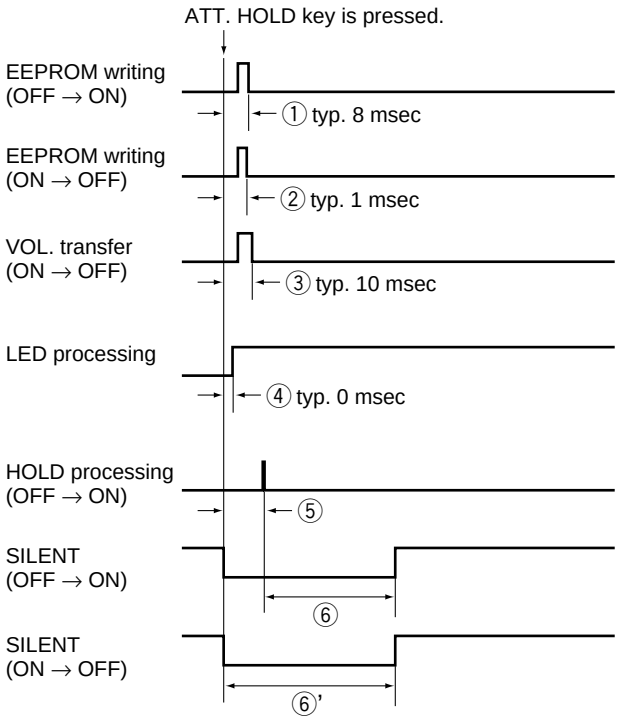


Fig.4 Timing chart when ATT. HOLD key is pressed

4.4 ILL Key Processing

Each press of the key cycles Bright, Dark, Lamp Off, and LED Off.

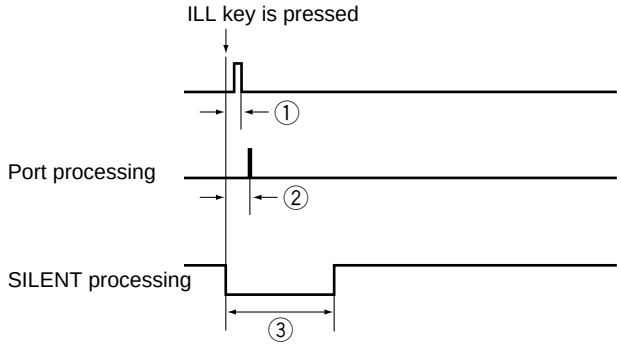


Fig.5 Timing chart when ILL key is pressed

4.5 VOL Key Processing

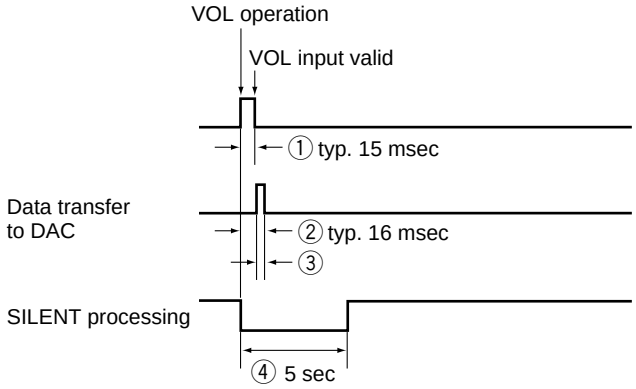


Fig.6 Timing chart when volume is input

4.6 Invalid Key Input

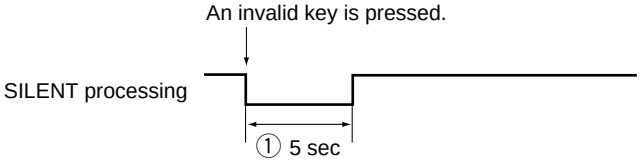


Fig.7 Timing chart when an invalid key is pressed

5. Mode Switching Processing (IC901)

Select the mode of the speakers using the MODE switch (rotary switch).
Any of three modes (BRIDGE, DUAL and SEPARATE) can be selected.

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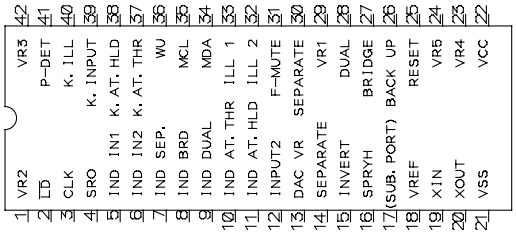


Table Mode select indicator processing

Mode Input Port	ACT	Indicator Process Port	Contents of Process
27 (BRIDGE)	L	8 (IND BRD.)	Sets to "H".
28 (DUAL)	L	9 (IND DUAL)	Sets to "H".
30 (SEPA.)	L	7 (IND SEPA.)	Sets to "H".

Table Mode select port processing

Mode Input Port	ACT	Contents of Process Process Port					
		12 (INPUT2)	13 (DACVR)	14 (SEPARATE)	15 (INVERT)	16 (SPRYH)	17 (SPRYG)
27 (BRIDGE)	L	INPUT1 : "L"	ATT. through : "L"	"L"	ATT. through : "H"	"H"	"L"
		INPUT2 : "H"	ATT. exist : "H"		ATT. exist : "H"		
28 (DUAL)	L	INPUT1 : "L"	ATT. through : "L"	"L"	ATT. through : "L"	"H"	"L"
		INPUT2 : "H"	ATT. exist : "H"		ATT. exist : "L"		
30 (SEPA.)	L	Fixed at "L"	ATT. through : "L"	"H"	ATT. through : "L"	"H"	"L"
			ATT. exist : "H"		ATT. exist : "L"		

The MODE switch is disabled while power is ON.
(See "7. WARNING.")

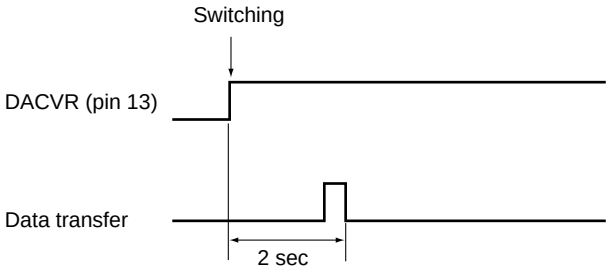
6. DAC Volume Transfer (IC901)

When the status of port 29 (VR1) changes, port 29 (VR1), port 30 (VR2), port 42 (VR3), port 23 (VR4), and port 24 (VR5) are checked to detect the VOLUME position.
With DUAL, BRIDGE, or SEPARATE, the attenuation volume is read from the VOLUME position/ATT volume table and transferred to the DAC IC in Serial mode (MSB first).

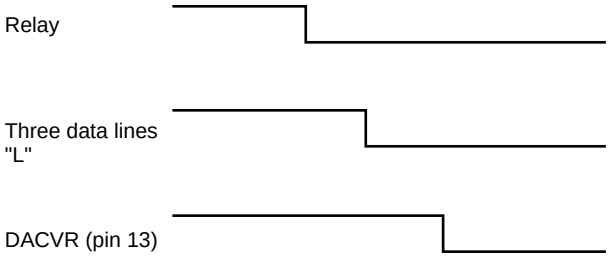
When the transfer is completed, LD (port 2) is set to "L" then returned to "H."

When ATT.THROUGH is ON or port 13 (ATT.THROUGH) is "L," port 2 (LD), port 3 (CLK), and port 4 (SRD) are fixed at "L." Then the data are transferred again when port 13 (ATT.THROUGH) is set to "H."

When switching ATT.THROUGH from ON to OFF or when turning power ON:
Data transfer is performed 2 seconds after the switch is operated.



When switching ATT THROUGH from OFF to ON or when turning the power ON:
Port 2 (LD), port 3 (CLK), and port 4 (SRD) are fixed at "L" before DACVR (pin 13) is set to "L," 30 ms after relay becomes OFF.



Data transfer is performed once in the following conditions and terminated:
- When the power is turned on
- When the VOL is operated
- When ATT.THROUGH is switched from ON to OFF
- When ATT.HOLD is switched from ON to OFF

Position	Binary Code	BRIDGE / DUAL			PROCESSOR		
		Attenuation (dB)	Serial Data		Attenuation (dB)	Serial Data	
31	00000	0	FFF		0.0	FFF	
30	00001	-2	CB4	-2.0021	-0.5	F19	-0.5021
29	00010	-4	A17	-4.0026	-1.0	E41	-1.0016
28	00011	-6	804	-6.0015	-1.5	D75	-1.5013
27	00100	-8	65E	-8.0013	-2.0	CB4	-2.0021
26	00101	-10	50E	-10.0064	-2.5	BFE	-2.5023
25	00110	-12	404	-12.0052	-3.0	B53	-3.0001
24	00111	-14	331	-14.0006	-3.5	AB0	-3.5028
23	01000	-16	289	-16.0002	-4.0	A17	-4.0026
22	01001	-18	203	-18.0089	-4.5	987	-4.5008
21	01010	-20	199	-20.0106	-5.0	8FE	-5.0030
20	01011	-22	145	-22.0074	-5.5	87D	-5.5039
19	01100	-24	102	-24.0127	-6.0	804	-6.0015
18	01101	-26	CD	-26.0100	-6.5	791	-6.5025
17	01110	-28	A3	-28.0013	-7.0	725	-7.0008
16	01111	-30	81	-30.0333	-7.5	6BE	-7.5043
15	10000	-32	66	-32.0731	-8.0	65E	-8.0013
14	10001	-34	51	-34.0754	-8.5	603	-8.5003
13	10010	-36	40	-36.1215	-9.0	5AC	-9.0057
12	10011	-38	33	-38.0937	-9.5	55B	-9.5043
11	10100	-40	28	-40.2039	-10.0	50E	-10.0064
10	10101	-42	20	-42.1421	-10.5	4C6	-10.5037
9	10110	-44	19	-44.2863	-11.0	482	-11.0010
8	10111	-46	14	-46.2245	-11.5	441	-11.5045
7	11000	-48	10	-48.1627	-12.0	404	-12.0052
6	11001	-50	C	-50.6615	-12.5	3CB	-12.5007
5	11010	-52	A	-52.2451	-13.0	394	-13.0072
4	11011	-54	8	-54.1833	-13.5	361	-13.5048
3	11100	-56	6	-56.6821	-14.0	331	-14.0006
2	11101	-58	5	-58.2657	-14.5	303	-14.5040
1	11110	Infinity	0	#NUM!	-15.0	2D8	-15.0025

7. WARNING

7.1 Protection

When abnormal amplifier output is detected, the protection relay and function muting are controlled to warn the user.

When P-DET (port 41) becomes "L," FMT (port 31) is set to "H" and port 16 (SPRYH) is set to "L" immediately.

At the same time, ILL indicators flash in 1-second cycle.
(ILL1, ILL2) = (H, L) ↔ (L, L) (ILL1=port33(Pin33)
Flashing : Mode illumination light ILL2=port32(Pin32))
Mode indicator
Panel light
When the POWER OFF key is pressed, POWER OFF processing is performed. (All other keys are disabled.)

Refer to 7.2 PROTECTION CIRCUIT about the circuit explanation.

7.2 Mode Switching

Mode switching is allowed only when the power is OFF.

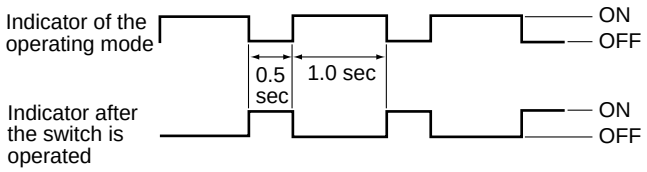
If mode switching is performed with the power ON, relay is set to OFF. When the previous status is restored, relay is returned to ON.

As a caution, the LED of the selected mode and the LED of the operating mode flash with the timing shown below.
When the MODE switch is returned to its original setting, the LED flashing as a caution stops, and normal status is resumed.

The MODE switch is read every loop.

When the MODE switch is operated when the ILL indicator is dark, the indicator is forcibly turned on.
When the MODE switch setting matches the operating mode setting, the ILL mode resumes its original status.

Relay is set to OFF in the MODE CAUTION status.



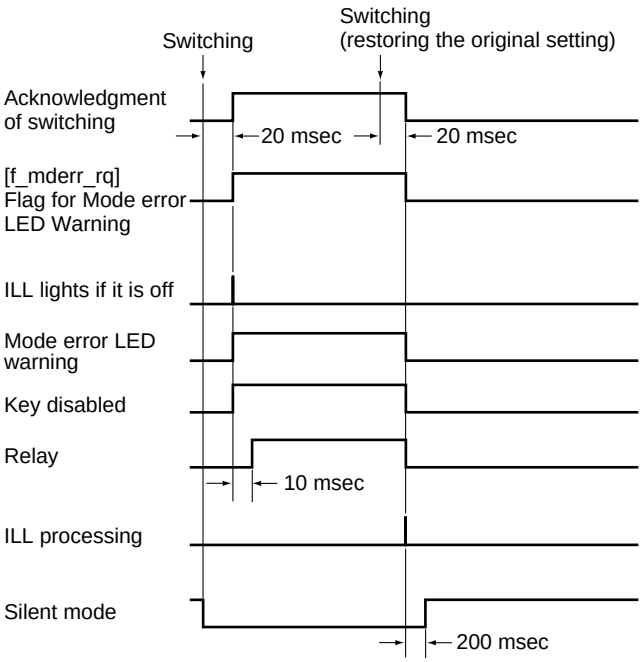


Fig.8 Timing of mode switching error processing

7.3 Warning when switching ATT.THROUGH from OFF to ON

When ATT.THROUGH is switched from OFF to ON, the key becomes valid when it is held pressed for 2 seconds.
The ATT.THROUGH ON/OFF LED flashes during those 2 seconds.

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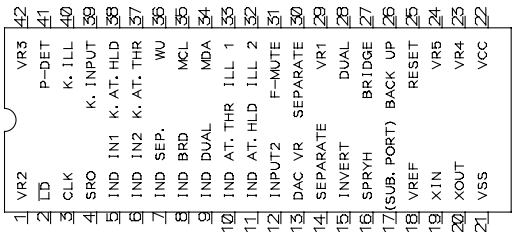
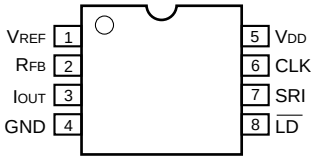


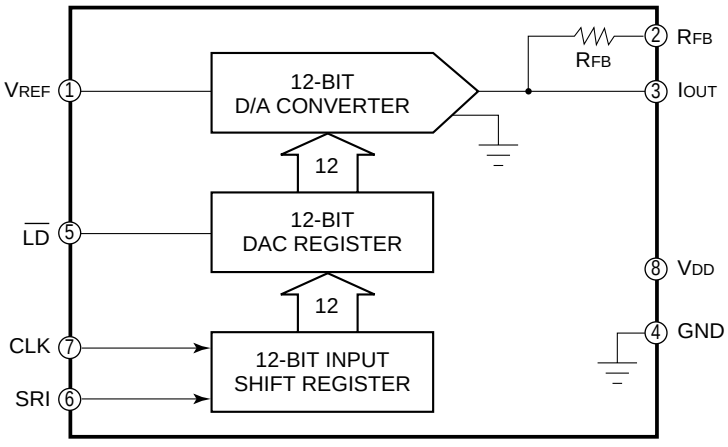
■ DAC8043FP (INPUT(L) ASSY : IC101, INPUT(R) ASSY : IC201)

- **D/A Converter IC**

● Pin Assignment (Top View)



● Block Diagram



7.2 PROTECTION CIRCUIT

The protection circuits are provided for this unit. When these protection circuits are activated ,the hardware muting is activated and muting and the output relays are controlled by the microcomputer.

There are two protection circuits.

1) DC voltage detection at the output
2) Overcurrent detection due to the short circuit at the load end

1. DC voltage detection circuit

At the High-CH (Low-CH) output current amp of C.AMP (L)ASSY, DC voltage is detected by Q507 and Q509 (Q508 and Q510) and these transistors turned ON and P-DET signal becomes Low. When P-DET signal becomes Low ,relay control Tr. Q515 ,Q511 and Q512 becomes open and shut down the relay RY501 and RY502. Also microcomputer receive P-DET Low signal and activate the mute circuit and set OFF the relay control Tr. Q513.

2. Overcurrent detection circuit

At the High-CH (Low-CH) output current amp of C.AMP (L)ASSY, (+) side overcurrent is detected by Q503 and Q505 (Q518,Q504 and Q506) and these transistors turned ON and P-DET signal becomes Low. Following is same as above.
(–) side overcurrent is detected by Q517,Q503 and Q505 (Q504 and Q506) and these transistors turned ON and P-DET signal becomes Low. Following is same as above.

Refer to next page FIg.1 about the circuit description.

3. Starting condition of the protection circuit

The above protection circuits works under the following condition.

DC voltage detection	:	about over ± 3V
Overrcurrent detection	:	about over 14~15A

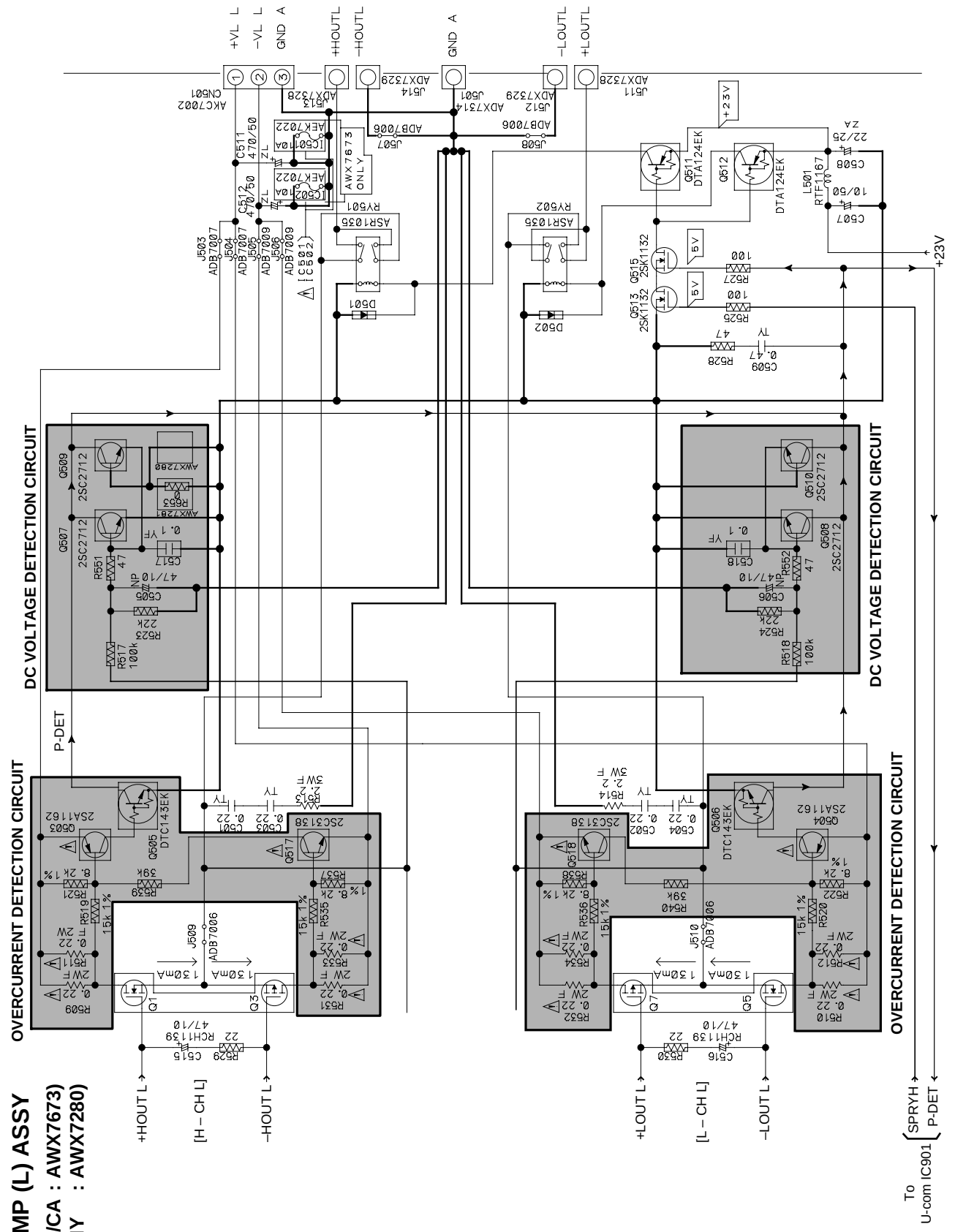


Fig.1 PROTECTION CIRCUITS

7.3 DESCRIPTIONS

7.3.1 Product Overview

Features of this product

■ Three-mode drive power amplifiers

This product is equipped with power amplifiers for two right and two left channels (total of 4 channels).
Three types of speaker drive formats can be selected.

1. SEPARATE mode

The product functions as a 4-channel power amplifier (115 watts, 4 ohms for each of 4 channels). By connecting to a 2-way channel divider, a high-grade multi-amplifier system can be established. Using two units of this product provides a Hi-Fi surround system for up to 8 channels. The product can also be used for DVD multi-channel audio, DOLBY DIGITAL, and DTS applications.

2. DUAL mode

By connecting speakers that conform to tandem-wiring use, a Bi-amplifier (tandem amplifier) system can be established. By driving tweeters and woofers separately with different amplifiers, interference between speaker units is virtually eliminated. Thus, super hi-fi stereo playback with a high degree of purity is enabled.

3. BRIDGE mode

The product functions as bridge-output high-power amplifiers (230 watts, 6 ohms for each of 2 channels).

■ Symmetrical twin-stereo structure

High-performance stereo amplifiers are symmetrically mounted left and right.
Of course in SEPARATE or DUAL mode, enlargement of a large current loop can be eliminated even in BRIDGE mode, restraining sound degradation due to magnetic coupling, which is a disadvantage of bridge amplifiers. The important parts are isolated by shield plates and shield cases to achieve excellent channel separation at high frequencies (104 dB or more at 20 kHz between the left and right channels). You can enjoy high-grade stereophonic playback in a rich sound field.

■ Advanced direct-energy MOSFET power amplifiers

This product employs MOSFETs of larger capacity than with conventional models. For insulation between each large heat sink and MOSFET, a quite small zero-resistance ceramic sheet is employed to improve the radiation characteristics. Not only a rise in temperature with continuous signal input, but also instantaneous rises in temperature with pulse-type input can be minimized.
For higher sound quality, the response speed to an input of large sound volume and the clarity are highly improved.
In addition, a newly developed Z (ZETT) BIAS circuit that precisely reproduces the thermal factors of a MOSFET is mounted for temperature compensation for the idle current. This drastically improves the drift of the idle current which may greatly affect sound quality, and enables playback at constantly stable sound quality immediately after you turn on the power.

■ Wide-range linear circuit

The wide range linear circuit has been enhanced to improve DC stability by newly employing highly accurate parts of 0.5% error and single-chip dual transistors for a completely discrete structure that uses no DC servo or operational amplifier.
This enables natural and clear playback of low frequencies by keeping NFB stable from very low frequencies.

■ DAC (Digital Accurate Control) attenuator

A high-precision 12-bit D/A converter of ladder resistance type is used.
Advantages of the DAC attenuator (when compared with conventional mechanical sliding-type controls)

1. Excellent S/N in practical usage
2. The frequency response is not affected by the attenuation volume setting.
3. The attenuation volume can be programmed. This product provides two curves, for high-frequency attenuation in a multi-amplifier system and for normal volume control.
4. No tracking error (gain error between channels)
5. No signal irregularity from vibration, providing pure sound
6. The operation block and the circuit block can be separated. The signal path length can be minimized by free layout.

■ Large-sized super ring toroidal transformer

A large-sized super ring toroidal transformer of 450 VA is employed for the lowest possible loss and lowest impedance at the power block. In addition, repression of power harmonics, which has been regarded as impossible with large-capacity toroidal transformer, has been achieved, enabling powerful and smooth playback at high speeds.

■ Silent control microcomputer

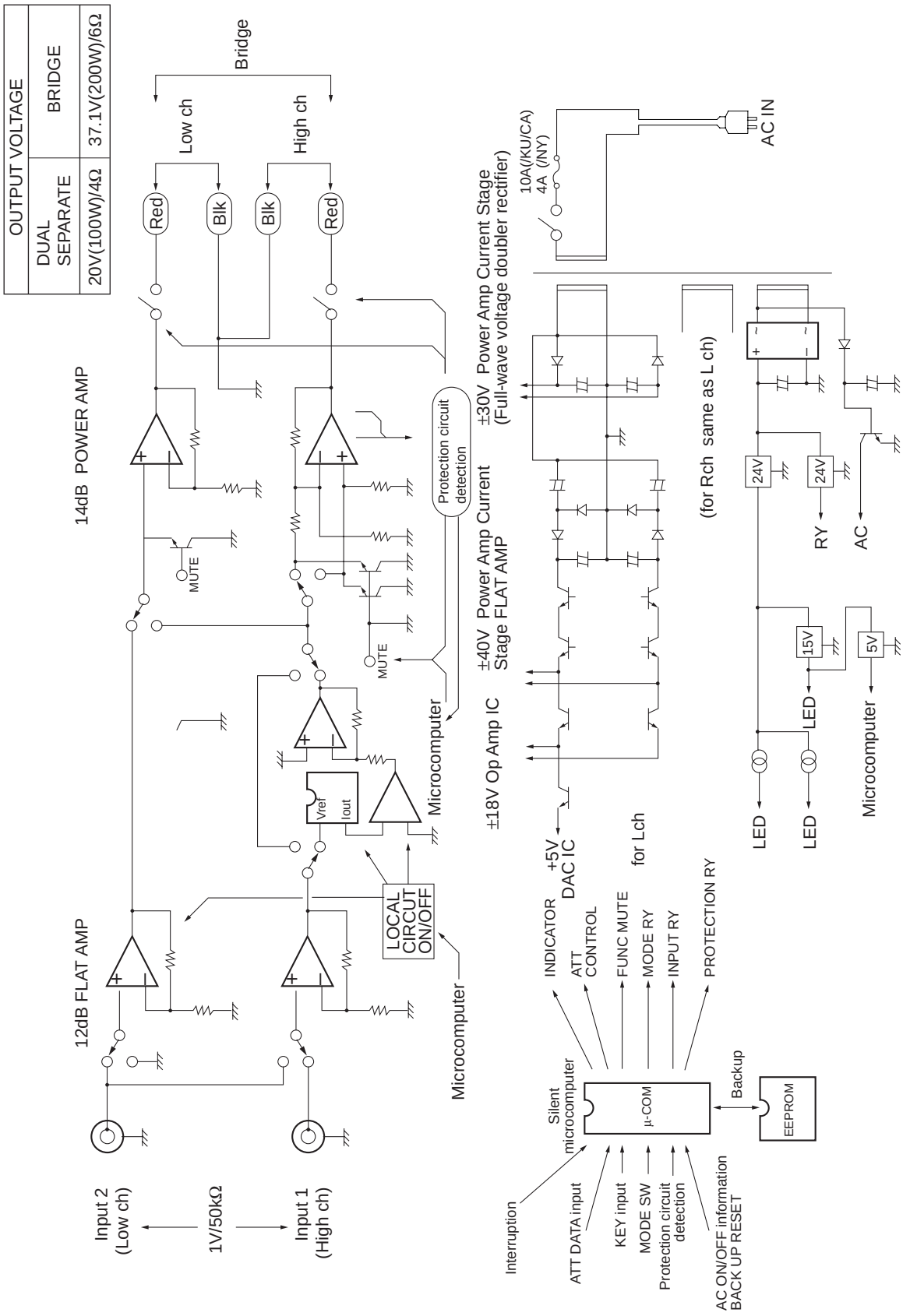
When the knobs and buttons are not operated, the control microcomputer enters Low-Power-Consumption mode (system clock oscillation stops). This decreases power consumption, and eliminates high-frequency interference caused by clock oscillation to maintain high sound quality. In addition, the microcomputer continuously monitors the amplifier status and if it detects an abnormality, it immediately activates the protection circuit. By using the microcomputer in combination with the conventional hardware-protection circuit, higher reliability and safety are ensured.

■ Ultra-Low-Impedance Power Circuit

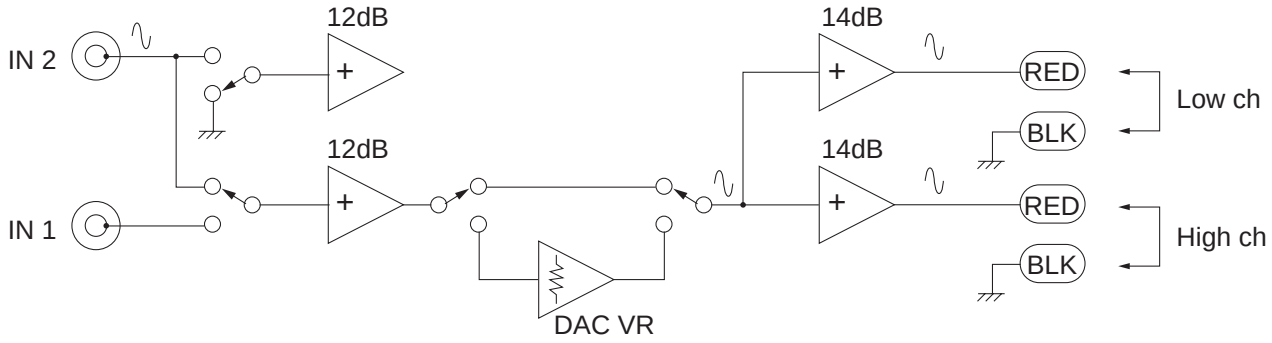
Power de-coupling by an ultra-low-impedance condenser, ample jumper lines and a No. 16 wire power cable are employed for very low impedance in the power and ground lines.
In the low frequency range, channel separation is greatly improved (achieving 115 dB at 20 Hz) by decreasing ground common impedance.
In the high frequency range, the rise in impedance due to the inductance component is suppressed, for higher frequency stability. Thus a power amplifier that is virtually impervious to changes in speaker impedance and connection cables has been created.

7.3.2 Circuit Description

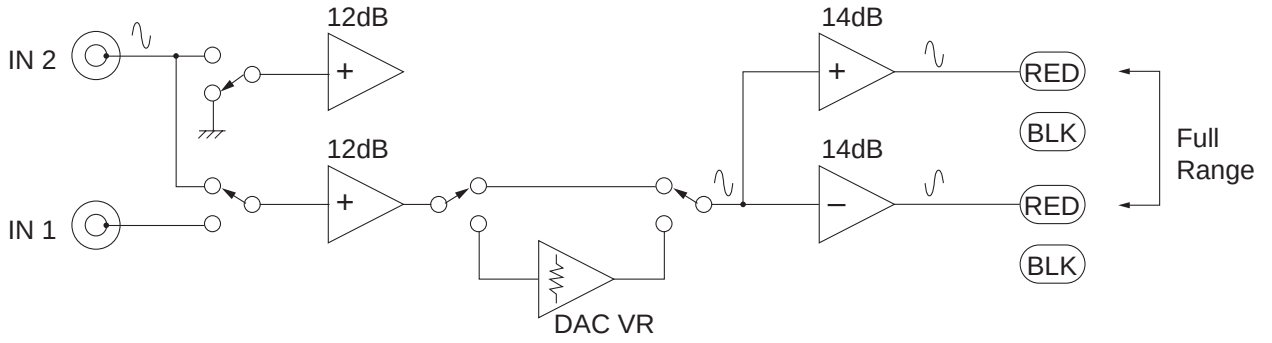
■ Block Diagram



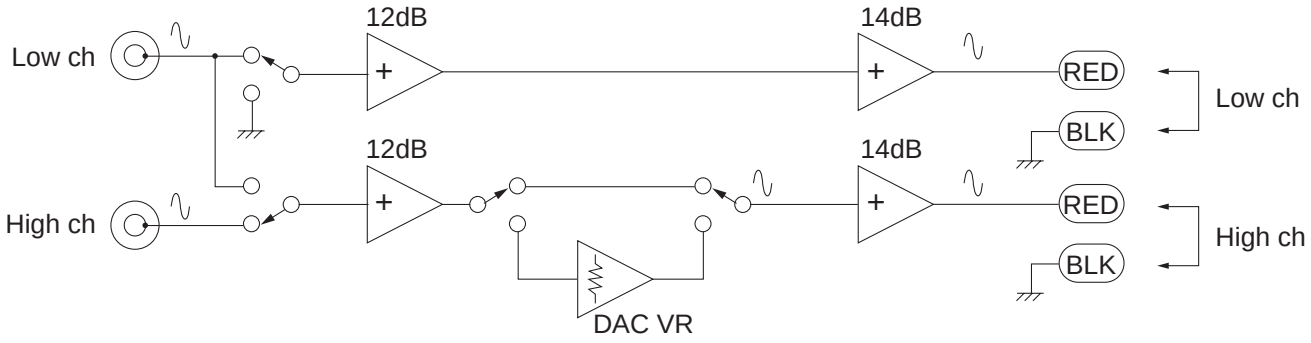
■ Each mode of block diagram



– Dual Drive Mode –



– Bridge Drive Mode –



– Separate Drive Mode –

Descriptions of the Block Diagram

1. INPUT switching block

Four small-signal relays for individual channels are used for input signal switching.

2. 12-dB flat amplifier block

The input signal is amplified by 12 dB (4 times) to increase the input level at the DAC attenuator block to improve the dynamic range and signal-to-noise ratio.
In DUAL or BRIDGE mode, the flat amplifier on the low-channel side is shut down by the LOCAL CIRCUIT OFF circuit.
The circuits are mounted in a shielded box to completely eliminate electrostatic and magnetic coupling.

3. DAC attenuator block

Attenuator section

This is a digitally controlled high-precision analog attenuator that uses a ladder resistance block of R-2R-type DAC ICs for volume control. The signal is input to the Vref (reference-voltage) terminal and the attenuated signal current is obtained from the Iout (current-output) terminal. The signal at this terminal is converted to a voltage signal by an I-V converter of the operational amplifier. An output signal of the same phase as the input signal is obtained through inversion by the operational amplifier. The attenuation volume adjustment is controlled using serial data from the microcomputer.

Control section

A 5-bit (31-position) digital rotary switch is used. The rotation angle and information can be sent to the microcomputer, enabling the silent function (Low-Power-Consumption mode) of the microcomputer.

Two DAC ICs are used for two individual channels. There is no mechanical contact, resulting in fewer errors in attenuation volume and gang errors within 0.1 dB at any position. The attenuation volume can be flexibly adjusted by the microcomputer software.
With this product, it can be set in 2-dB steps (up to -58 dB) in BRIDGE mode and in 0.5 dB steps (up to -15 dB) in SEPARATE mode. When this product is used in combination with a preamplifier, you can bypass the DAC attenuator block using the ATT.THROUGH function. For this bypass switching, the same small-signal relay as with the INPUT switching clock is used.

4. 14-dB power amplifier block

Pioneer's original "Direct-Energy MOSFET Amplifier" and "Wide-Range Linear Circuits" are mounted. The circuits function as the inversion/noninversion switching amplifier on the high-channel side and as an inversion amplifier in BRIDGE mode.
This eliminates the necessity for an inversion amplifier otherwise essential for a bridge amplifier.

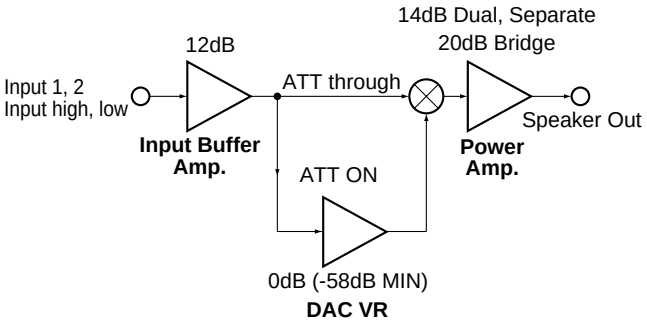
5. Protection circuit

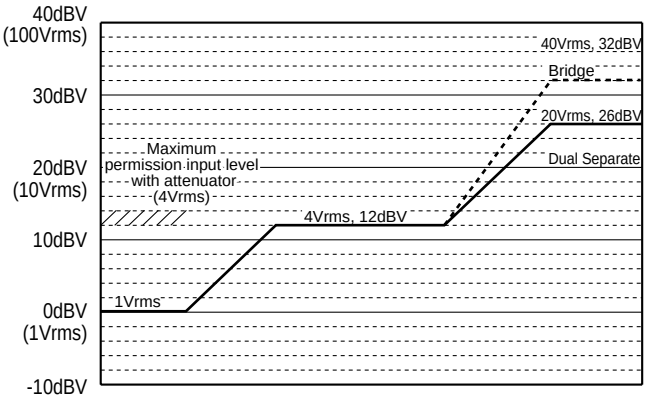
When a DC voltage at the output end or a short circuit at the load end is detected, hardware muting is activated and muting and output relays are controlled by the microcomputer.
When a short circuit at the load end is detected, a resistance inserted between the MOSFET drain power sources is used (for current detection) in place of a bridge detection circuit, a device greatly affected by the phase difference between the output power voltage and current.
Thus, possible malfunction of the protection circuit in practical use is prevented.

6. Power block

A large (450-VA) Super Ring is employed for the transformer.
The second coils are separated into three coil windings for left channel, right channel, and a subcircuit.
For the power amplifier, a full-wave voltage doubler rectifier system is used to suppress high-frequency current.
For the voltage amplifier, a half-wave voltage doubler rectifier system is used to obtain the specified voltage without using additional coils. Each signal stage has a local stabilized power source, and the lamps are driven at a constant current for low power consumption.

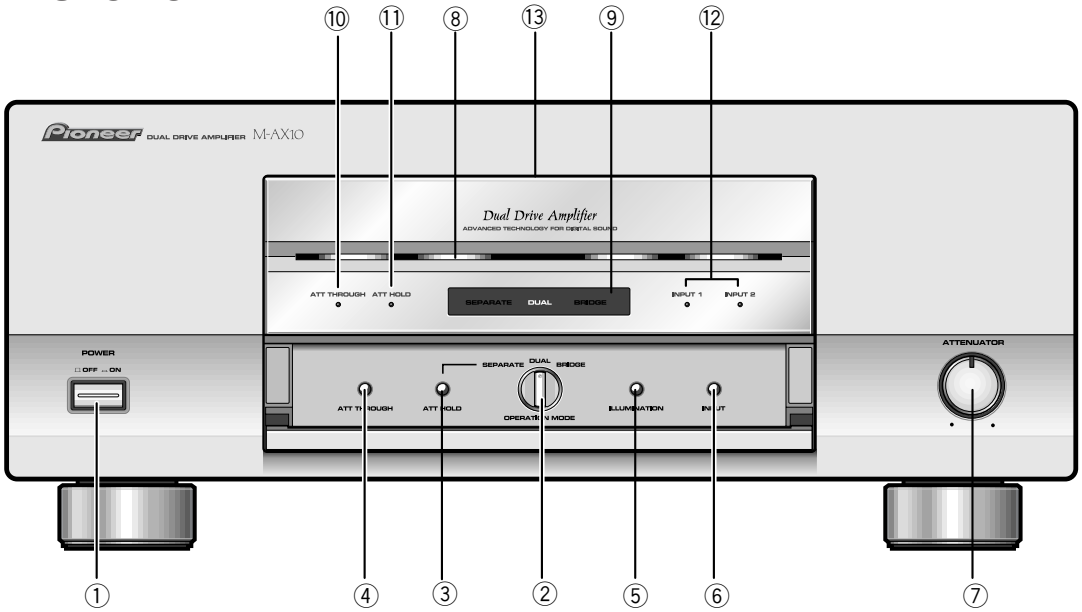
■ Level Diagram





9. PANEL FACILITIES AND SPECIFICATIONS

■ FRONT SECTION



① **POWER**

Press to switch the appliance on and off.

② **OPERATION MODE**

Use this to switch between the three modes: bridge,dual and separate. Be sure to turn the power off before switching between modes. Switching with the power on will activate the warning circuit. The mode illumination light and mode indicator will flash, and the output will be muted.
If it happens, you should turn the operation mode switch back to its original position. The flashing will stop, and your M-AX10 will return to normal.

③ **ATT HOLD**

This button is activated only if the OPERATION MODE switch is pointing to SEPARATE.
Press the ATT HOLD (attenuator hold) button while in separate mode allows whatever attenuation has been set with the ATTENUATOR knob to be retained.
Pressing it again will cancel the operation.
Note,however, that it is not possible to turn ATT HOLD on and off while the output is muted (eight seconds after switching the power on).

④ **ATT THROUGH**

BEWARE: If this button is used ,the volume will be herted at maximum level.
Pressing the ATT THROUGH button for two seconds or longer causes the sound to be output through the speakers without passing through the attenuator circuit. However, because the mute circuit is activated, thereis no sound for five seconds after the button is depressed. The sound will emerge from the speakers **five seconds** after the ATT THROUGH button is pressed. **Note that it will be maximaum volume.**
Pressing the button again will cancel the operation.

⑤ **ILLUMINATION**

Pressing the ILLUMINATION button once, twice or three times alters the brightness of the panel light, mode indicator as indicated below.
Pressing it a fourth time will return the lights to their initial settings.

	Panel light	**Mode illumination light**	**Mode indicator**
initial setting	Bright	On	On
Press once	**Dim**	**On**	**On**
Press twice	Off	On	On
Press three times	**Off**	**Off**	**Off**

⑥ **INPUT**

This button allows you to switch between INPUT 1 and INPUT 2. Note,however,that this is not possible if the the OPERATION MODE switch is set to SEPARATE.

⑦ **ATTENUATOR**

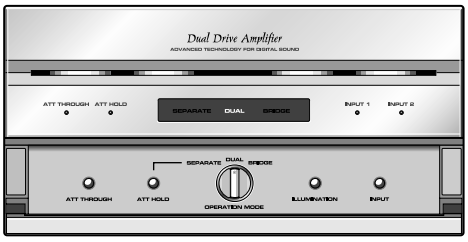
This Knob allows you to adjust the attenuation in 31 stages.In dual and bridge modes it functions as a volume control : 0 dB when turned full right, and - ∞ when turned full left. In Separate mode it functions as an attenuator for adjusting the volume of the high-frequncy channel (0 to -15 dB,in 0.5 dB steps): turning it to the left lowers the volume.

⑧ **MODE ILLUMINATION LIGHT**

The lamp display changes as illustrated below depending on whether the OPERATION MODE switch is set to BRIDEGE, DUAL or SEPARATE. Switching operations modes while the power is on will activate the warning circuit and cause the mode illumination light to flash.

Bridge mode

Dual mode



Separate mode

⑨ **MODE INDICATOR**

The lettering lights up to show whether the OPERATION MODE switch is pointing to BRIDGE, DUAL ,SEPARATE. Switching operation modes while the power is on will activate the warning circuit and cause the mode indicator to flash.

⑩ **ATT THROUGH INDICATOR**

This indicator lights up when ATT THROUGH is ON.

⑪ **ATT HOLD INDICATOR**

This indicator lights up when ATT HOLD is ON.

⑫ **INPUT INDICATORS**

These indicators light up to show whether INPUT 1 or INPUT 2 has been selected. They both light up in Separate mode.

⑬ **PANEL LIGHT**

This illuminates the display panel.

METHODS OF CONNECTION

The M-AX10 has four built-in amplifier channels, which can be connected by means of three different operation modes: BRIDGE ,DUAL and SEPARATE. You may select the mode which best suits your purpose and the equipment you are connecting to your M-AX10.

Bridge conection

- The four channels are connected two by two, so as to act as two high-output amplifier channels.
- Output comprises two 230 W/ 6 Ω (DIN),200 W/ 6 Ω (FTC) channels.
- Your speakers must be at least 6 Ω .

Dual conection

- The four channels act as two parallel sets of twin amplifier channels.
- Output comprises two 110 W/ 3 Ω (DIN),90 W/ 3 Ω (FTC) channels.
- Speakers with bi-wire terminals will allow you to achieve high-quality sound.

Separate conection

- The channels act separately as four amplifier channels.
- Output comprises two 110 W/ 3 Ω (DIN),90 W/ 3 Ω (FTC) channels.
- Connecting a channel divider will allow you to use the appliance as an amplifier for a multi-channel system.
- You can adjust the volume of speakers connected to the HIGH channels (INPUT 1) in a range from 0 to 15 dB. You can also retain the attenuation once you have set it.
- Speakers connected to the LOW channels (INPUT 2) will always be at maximum volume.

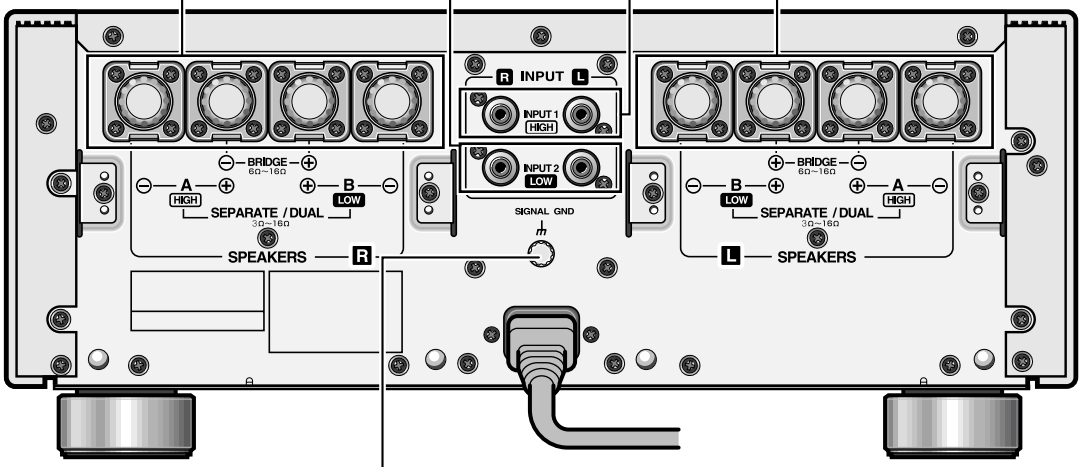
■ REAR SECTION

INPUT 2
This is an input terminal for connecting CD players,control amplifiers,channel dividers and other components.

INPUT 1
This is an input terminal for connecting CD players,control amplifiers,channel dividers and other components.

SPEAKERS (R)
These are terminal for right-hand speakers.

SPEAKERS (L)
These are terminal for left-hand speakers.



Earth
This is used for an earth connection with a source appearance equipped with an earth-floating function.

BEWARE

When connecting,make sure that the power switch is off,and the power cord is disconnected from the power supply.
The terminals are arranged symmetrically. Special care is required when connecting the speaker cords:
failure to connect them in the correct manner for the desired mode will result in lost or imperfect sound.

The rear and under sections of this appliance are copper plated to ensure high quality sound. It may somtimes happen that marks are left during the plating process,but this does not affect performance.

■ SPECIFICATIONS

Amplifier Section
(U.S model only)
When set to Bridge mode:
Continuous average power output is 200 Watts* per channel, min.,at 6 ohms from 20 Herz to 20,000 Herz with no more than 0.2% total harmonic distortion.**

When set to Dual mode ,Seaprate mode:
Continuous average power output is 90 Watts* per channel, min.,at 3 ohms from 20 Herz to 20,000 Herz with no more than 0.2% total harmonic distortion.**

Continuous power output
(driven simultaneously at 20Hz to 20kHz) **
(European mode only)
Bridge mode
T.H.D. 0.15% 6 Ω ..... 220W × 2
T.H.D. 0.09% 8 Ω ..... 190W × 2
Dual, Seaprate mode
T.H.D. 0.15% 3 Ω ..... 100W × 4
T.H.D. 0.09% 4 Ω ..... 90W × 4
T.H.D. 0.08% 8 Ω ..... 60W × 4

DIN Continuous power output
(driven simultaneously at 1kHz)
(European mode only)
Bridge mode
T.H.D. 1% 6 Ω ..... 230W × 2
T.H.D. 1% 8 Ω ..... 200W × 2
Dual, Seaprate mode
T.H.D. 1% 3 Ω ..... 110W × 4
T.H.D. 1% 4 Ω ..... 105W × 4
T.H.D. 1% 8 Ω ..... 65W × 4

Total harmonic distortion **
Bridge mode
20 Hz to 20 kHz,100W, 8Ω 0.08%
Dual, Seaprate mode
20 Hz to 20 kHz,30W, 8Ω 0.06%

Input sensitivity/Impedance
INPUT 1,2 ..... 1V/47kΩ

Frequency Response
INPUT 1,2 ..... 5Hz to 150 kHz +0dB, -3dB

Damping factor (1kHz/20Hz to 20kHz)
..... 400/300

Signal-to Noise ratio (IHF short circuit, A network
ATT THROUGH ON)
INPUT 1,2 ..... 125dB

Channel separation(20Hz to 20 kHz)
Bridge mode 104dB
Dual, Seaprate mode 115dB

Power supply/Mischellaneouse
Power requirements
U.S.model AC120V 60Hz
European model AC230V 50/60Hz

Power comsumption
U.S.model 370W
European model 400W

Dimensions ..... 440 (W) × 420 (D) × 178 (H) mm
$17^{5}/_{16}$ (W) × $16^{1}/_{2}$ (D) × 7 (H)in.)
Weight (without package) ..... 25.8 kg (56 lbs 14oz)

Accessories
Operation instructions 1
Warranty card 1

NOTE
Specifications and design subject to possible modifications without notice ,due to improvement.

** Mesured pursuant to the Federal Trade Commissions' Trade Regulation rule on Power Claims for Amplifier.*

*** Mesured by Audio Spectrum Analyzer.*