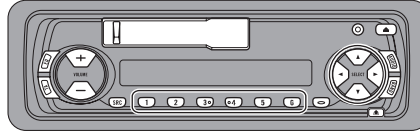


Service Manual

Pioneer

KEH-P4010R/X1M/EW



ORDER NO.
CRT2582

MULTI-CD CONTROL HIGH POWER CASSETTE PLAYER WITH RDS TUNER

KEH-P4010R

X1M/EW

KEH-P4010RB

X1M/EW

KEH-P4013R

X1M/EW

- This service manual should be used together with the following manual(s):

Model No.	Order No.	Mech. Module	Remarks
CX-1011	CRT2406	3L	Cassette Mech. Module:Mech.Description, Disassembly, Adjustment

- This service manual does not describe the CD test mode.

For the operations in the CD test mode, refer to the CD player's Service manual.

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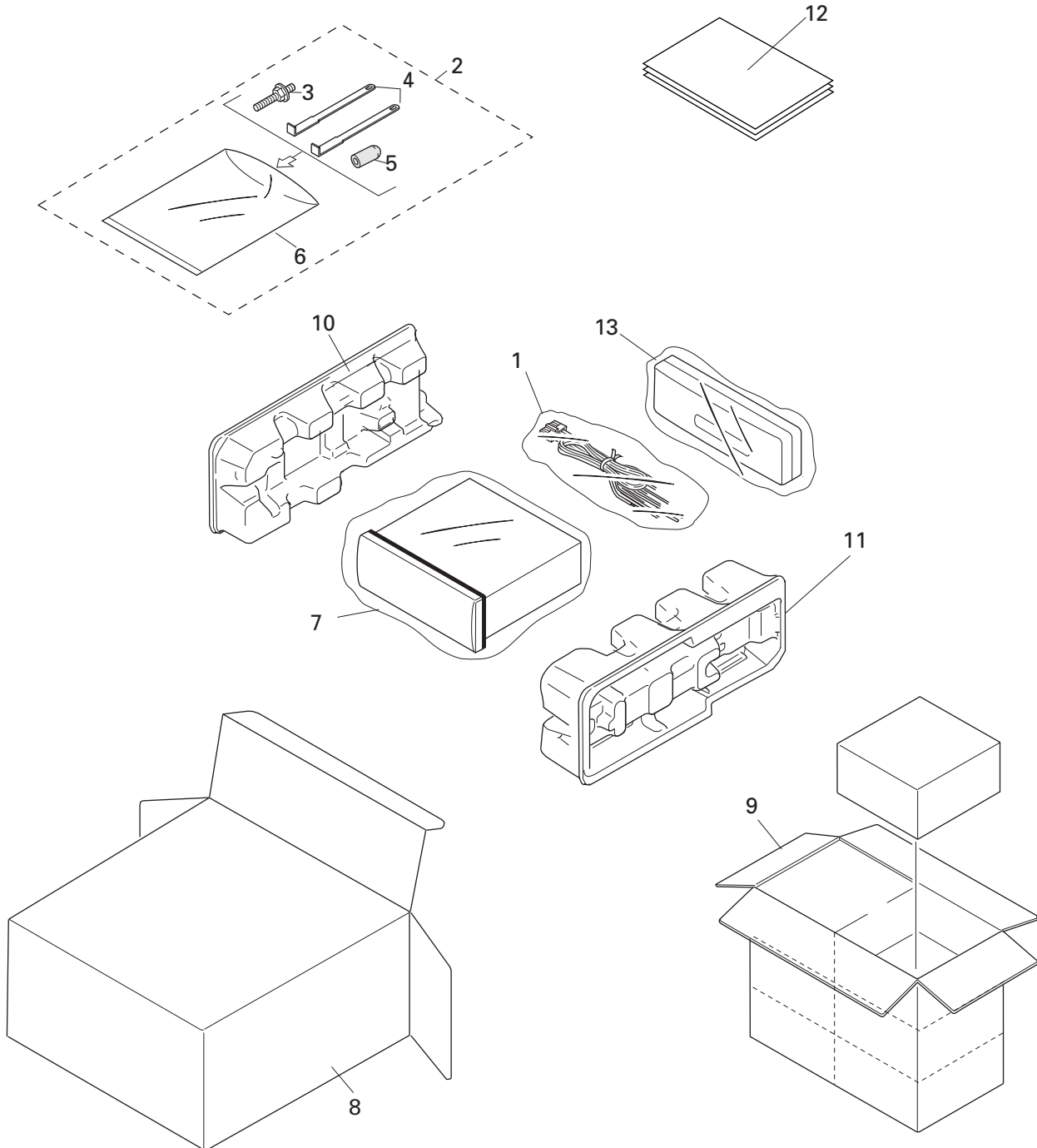
PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER EUROPE NV Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

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.

2. EXPLODED VIEWS AND PARTS LIST

2.1 PACKING



NOTE:

- Parts marked by “*” are generally unavailable because they are not in our Master Spare Parts List.
- Screws adjacent to ∇ mark on the product are used for disassembly.

(1) PACKING SECTION PARTS LIST

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Cord Assy	CDE6514	11	Protector	CHP2347
2	Accessory Assy	CEA1917	12-1	Owner’s Manual	CRD3286
3	Screw	CBA1304	12-2	Owner’s Manual	CRD3287
4	Handle	CNC5395	12-3	Installation Manual	CRD3293
5	Bush	CNV3930	*	12-4 Passport	CRY1013
*	6 Polyethylene Bag	E36-615	*	12-5 Warranty Card	CRY1157
	7 Polyethylene Bag	CEG-162	*	12-6 Caution Card	CRP1238
	8 Carton	See Contrast table(2)	13	Case Assy	CXB3520
	9 Contain Box	See Contrast table(2)			
	10 Protector	CHP2346			

(2) CONTRAST TABLE

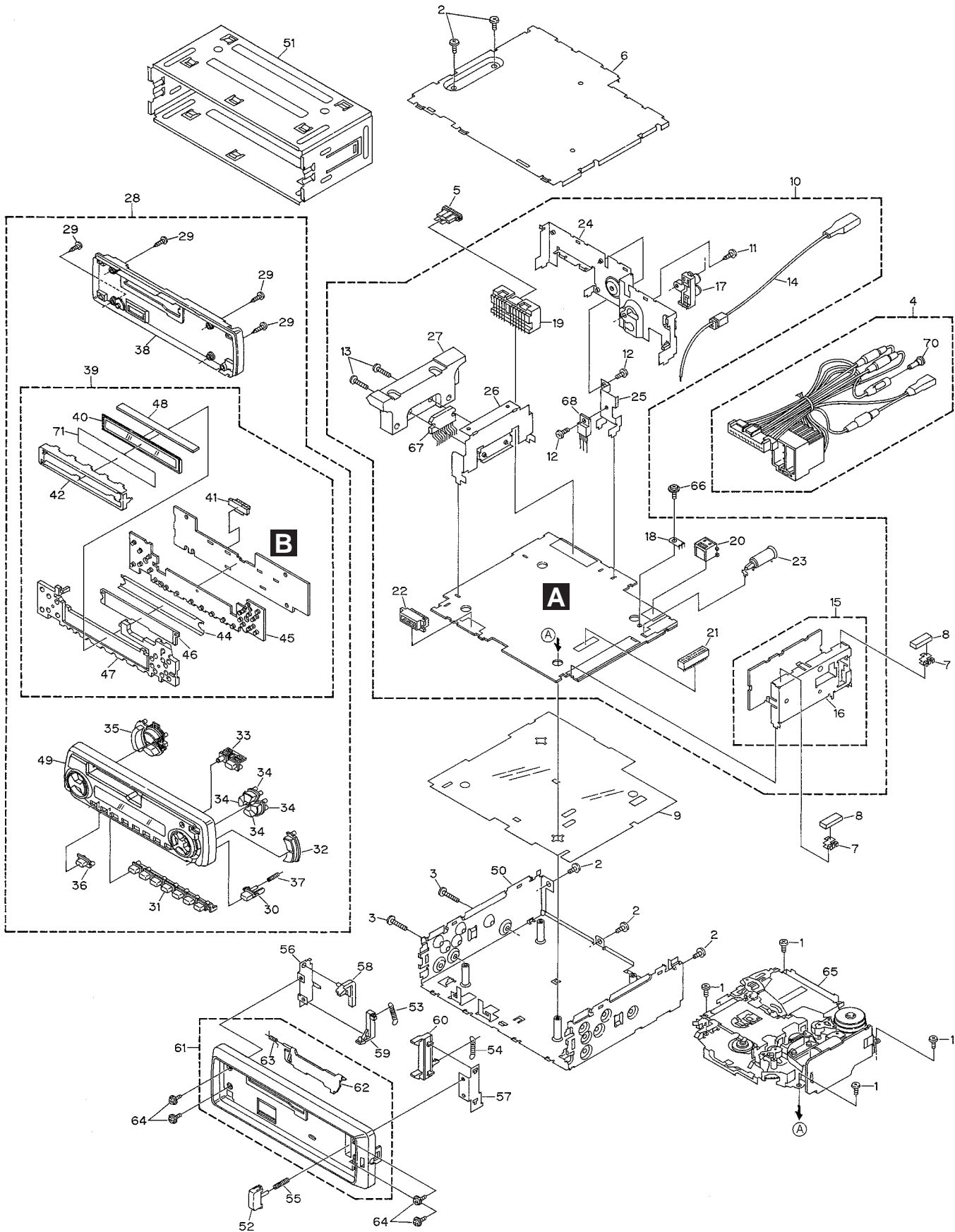
KEH-P4010R/X1M/EW, KEH-P4013R/X1M/EW and KEH-P4010RB/X1M/EW are constructed the same except for the following:

Mark No.	Symbol and Description	Part No.		
		KEH-P4010R/X1M/EW	KEH-P4013R/X1M/EW	KEH-P4010RB/X1M/EW
8	Carton	CHG4183	CHG4185	CHG4184
9	Contain Box	CHL4183	CHL4185	CHL4184

● Owner's Manual, Installation Manual

Model	Part No.	Language
KEH-P4010R/X1M/EW	CRD3286	English, Spanish, German
KEH-P4013R/X1M/EW	CRD3287	French, Italian, Dutch
KEH-P4010RB/X1M/EW	CRD3293	English, Spanish, German, French, Italian, Dutch

2.2 EXTERIOR



(1) EXTERIOR SECTION PARTS LIST

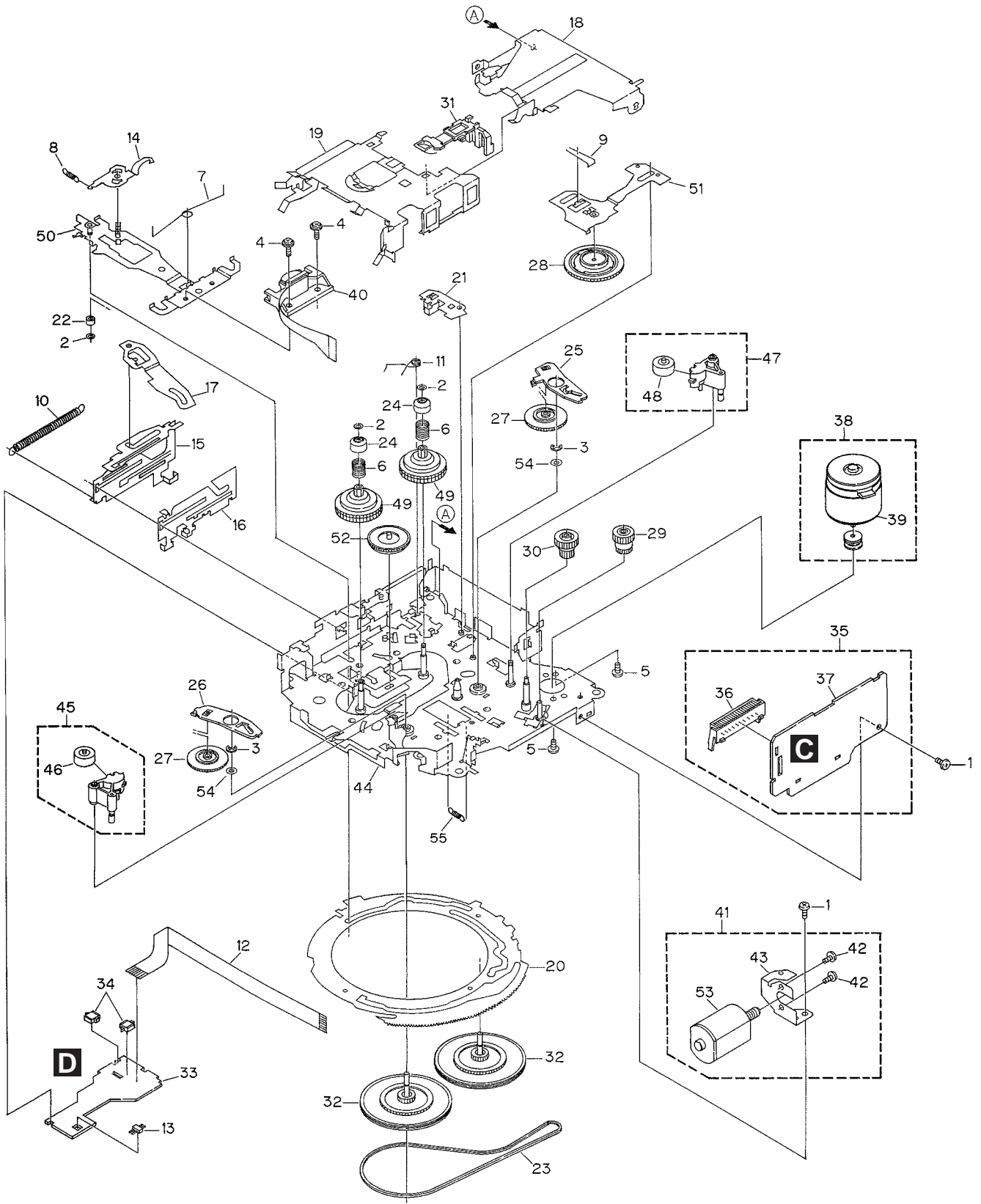
Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Screw	BSZ26P050FMC	36	Button(SOURCE)	CAC6851
2	Screw	BSZ30P050FMC	37	Spring	CBH2210
3	Screw	BSZ30P200FMC	38	Cover	See Contrast table(2)
4	Cord Assy	CDE6514	39	Keyboard Unit	See Contrast table(2)
5	Fuse(10A)	CEK1136	40	LCD(LCD1902)	See Contrast table(2)
6	Case	CNB2350	41	Connector(CN1901)	CKS3580
7	Holder	CNC5704	42	Holder	CNC9091
8	Cushion	CNM5210	43	•••••	
9	Insulator	CNM7083	44	Sheet	CNM7059
10	Tuner Amp Unit	See Contrast table(2)	45	Rubber	CNV6480
11	Screw	BPZ26P080FMC	46	Lighting Conductor	CNV6495
12	Screw	BSZ26P080FMC	47	Lighting Conductor	CNV6496
13	Screw	BSZ26P160FMC	48	Connector	CNV6497
14	Cord	CDE6450	49	Grille Unit	See Contrast table(2)
15	FM/AM Tuner Unit	CWE1562	50	Chassis Unit	See Contrast table(2)
16	Holder	CNC8815	51	Holder Unit	CXB6681
17	Pin Jack(CN301)	CKB1035	52	Button	CAC4836
18	Terminal(CN403)	CKF1059	53	Spring	CBH1834
19	Plug(CN952)	CKM1270	54	Spring	CBH1835
20	Connector(CN751)	CKS3408	55	Spring	CBH2182
21	Connector(CN602)	CKS3568	56	Bracket	CNC6135
22	Connector(CN601)	CKS3581	57	Bracket	CNC6791
23	Antenna Jack(CN401)	CKX1056	58	Arm	CNV4692
24	Panel	CNB2341	59	Arm	CNV4693
25	Holder	CNC6845	60	Arm	CNV4728
26	Holder	CNC7996	61	Panel Unit	See Contrast table(2)
27	Heat Sink	CNR1505	62	Door	See Contrast table(2)
28	Detach Grille Assy	See Contrast table(2)	63	Spring	CBH1838
29	Screw	BPZ20P100FZK	64	Screw	IMS20P030FZK
30	Button(DETACH)	See Contrast table(2)	65	Cassette Mechanism Module	EXK4170
31	Button(1-6)	CAC6822	66	Screw	ISS26P055FUC
32	Button(A,B)	CAC6823	67	IC(IC301)	TA8277H
33	Button(EJECT, BSM)	CAC6824	68	Transistor(Q951)	2SD2396
34	Button(CROSS)	CAC6825	69	•••••	
35	Button(+,-)	CAC6834	70	Terminal Cover	CKX-003
			71	Sheet	See Contrast table(2)

KEH-P4010R,P4010RB,P4013R**(2) CONTRAST TABLE**

KEH-P4010R/X1M/EW, KEH-P4013R/X1M/EW and KEH-P4010RB/X1M/EW are constructed the same except for the following:

Mark No.	Symbol and Description	Part No.		
		KEH-P4010R/X1M/EW	KEH-P4013R/X1M/EW	KEH-P4010RB/X1M/EW
10	Tuner Amp Unit	CWM7331	CWM7332	CWM7333
28	Detach Grille Assy	CXB6176	CXB6177	CXB6178
30	Button	CAC5789	CAC5929	CAC5789
38	Cover	CNS6171	CNS6172	CNS6171
39	Keyboard Unit	CWM7343	CWM7344	CWM7345
40	LCD(LCD1902)	CAW1634	CAW1634	CAW1618
49	Grille Unit	CXB6711	CXB6333	CXB6712
50	Chassis Unit	CXB6663	CXB6664	CXB6665
61	Panel Unit	CXB6715	CXB6716	CXB6715
62	Door	CAT2109	CAT2108	CAT2109
71	Sheet	Not used	Not used	CNM7157

2.3 CASSETTE MECHANISM MODULE



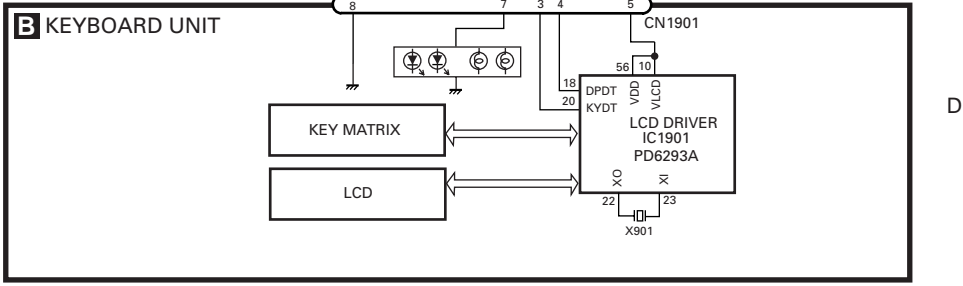
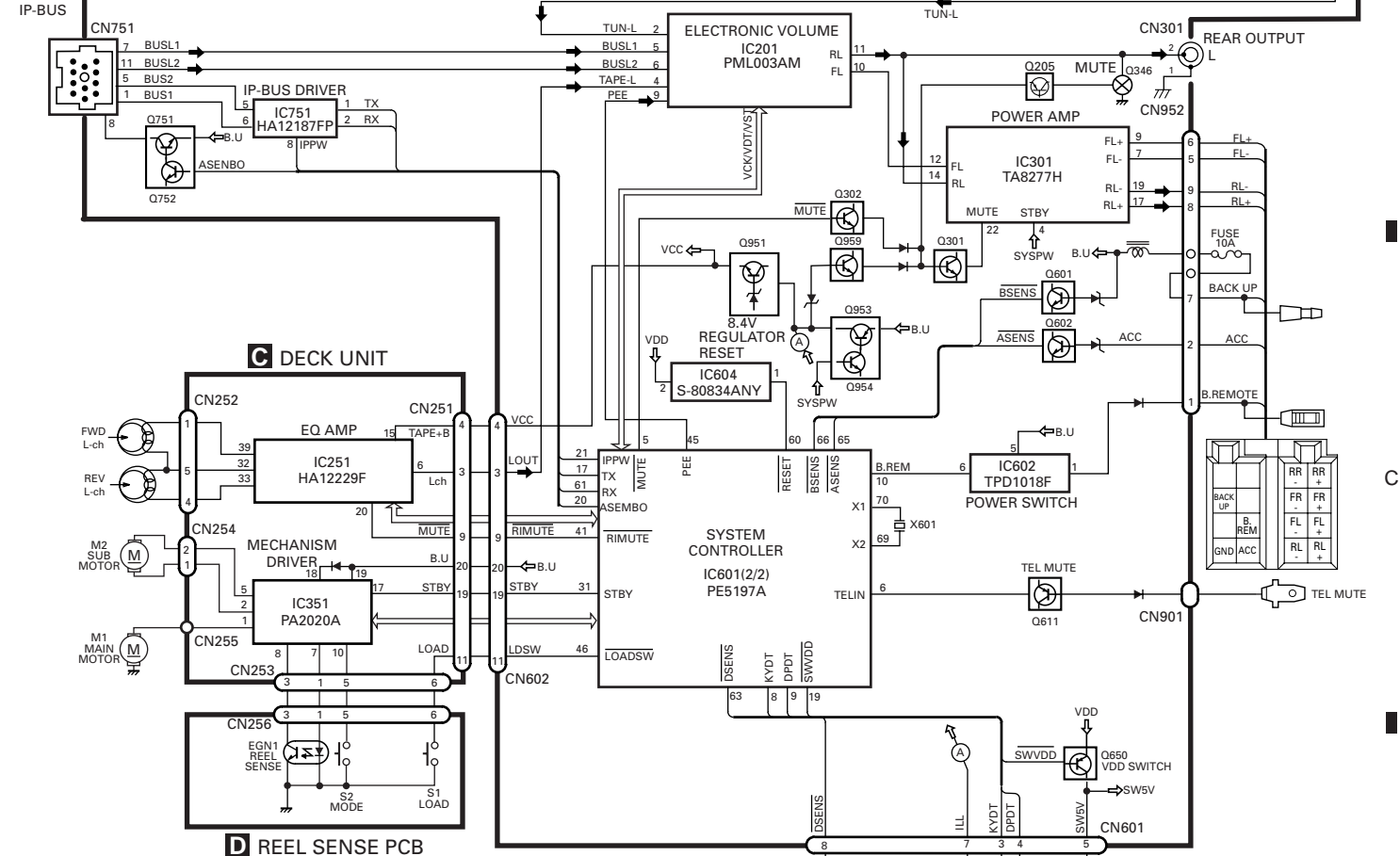
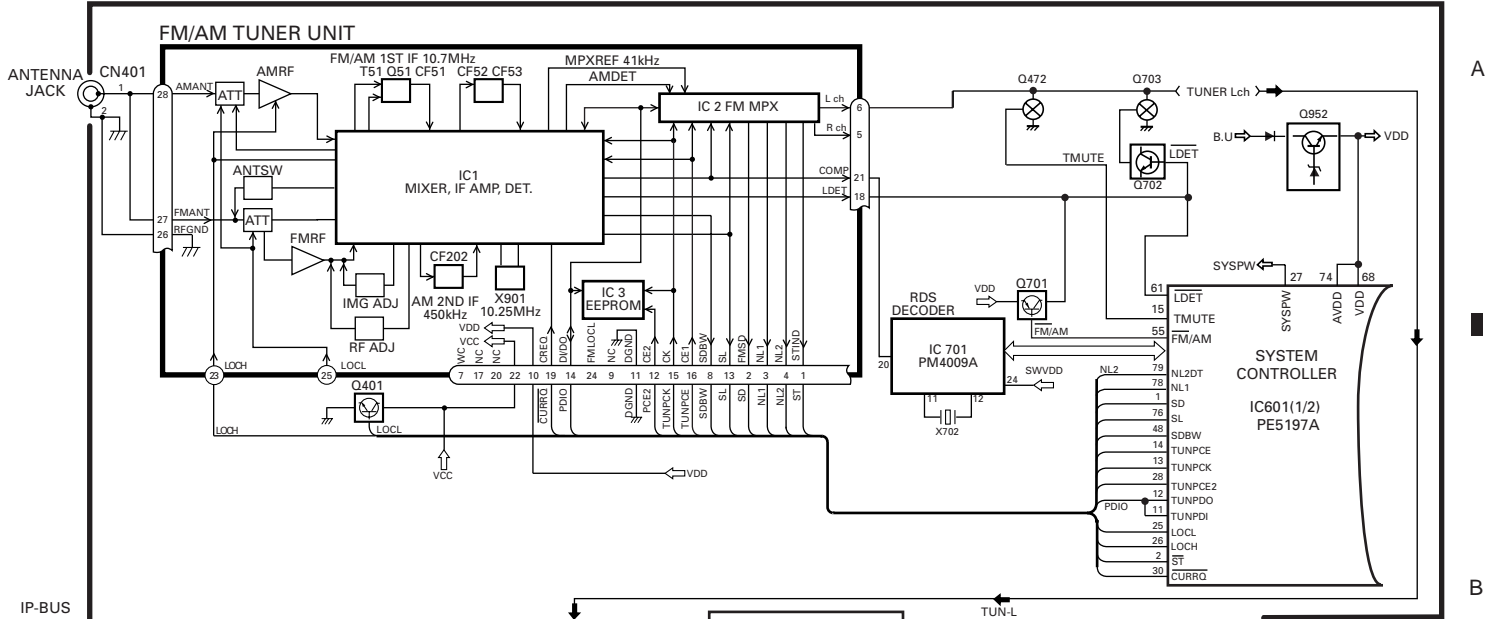
● CASSETTE MECHANISM MODULE SECTION PARTS LIST

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Screw	BSZ20P040FMC	31	Lever	ENV1551
2	Washer	CBF1037	32	Flywheel	ENV1554
3	Washer	CBG1003	33	Gathering PCB	ENX1068
4	Screw	EBA1028	34	Switch(S1,S2)	ESG1007
5	Screw	CBA1037	*	35 Deck Unit	EWM1032
6	Spring	EBH1531	36	Plug(CN251)	CKS3540
7	Spring	EBH1642	37	Gathering PCB	ENX1067
8	Spring	EBH1641	38	Motor Unit(M1)	EXA1491
9	Spring	EBH1626	39	Motor	EXM1028
10	Spring	EBH1627	40	Head Assy(HD1)	EXA1592
11	Spring	EBH1649	41	Motor Unit(M2)	EXA1580
12	Cord	EDD1024	42	Screw	BMZ20P022FMC
13	Photo-reflector(EGN1)	EGN1004	43	Bracket	ENC1528
14	Arm	ENC1526	44	Chassis Unit	EXA1615
15	Lever	ENC1544	45	Pinch Holder Unit	EXA1608
16	Lever	ENC1543	46	Pinch Roller	ENV1518
17	Arm	ENC1532	47	Pinch Holder Unit	EXA1607
18	Frame	ENC1533	48	Pinch Roller	ENV1518
19	Holder	ENC1534	49	Reel Unit	EXA1585
20	Gear	ENC1535	50	Head Base Unit	EXA1611
21	Arm	ENC1550	51	Lever Unit	EXA1587
22	Roller	ENR1040	52	Gear Unit	EXA1596
23	Belt	ENT1027	53	Motor Unit(Service)	EXX1055
24	Collar	ENV1508	54	Washer	HBF-179
25	Arm	ENV1539	55	Spring	EBH1537
26	Arm	ENV1540			
27	Gear	ENV1544			
28	Gear	ENV1547			
29	Gear	ENV1560			
30	Worm Wheel	ENV1566			

3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

3.1 BLOCK DIAGRAM

A TUNER AMP UNIT

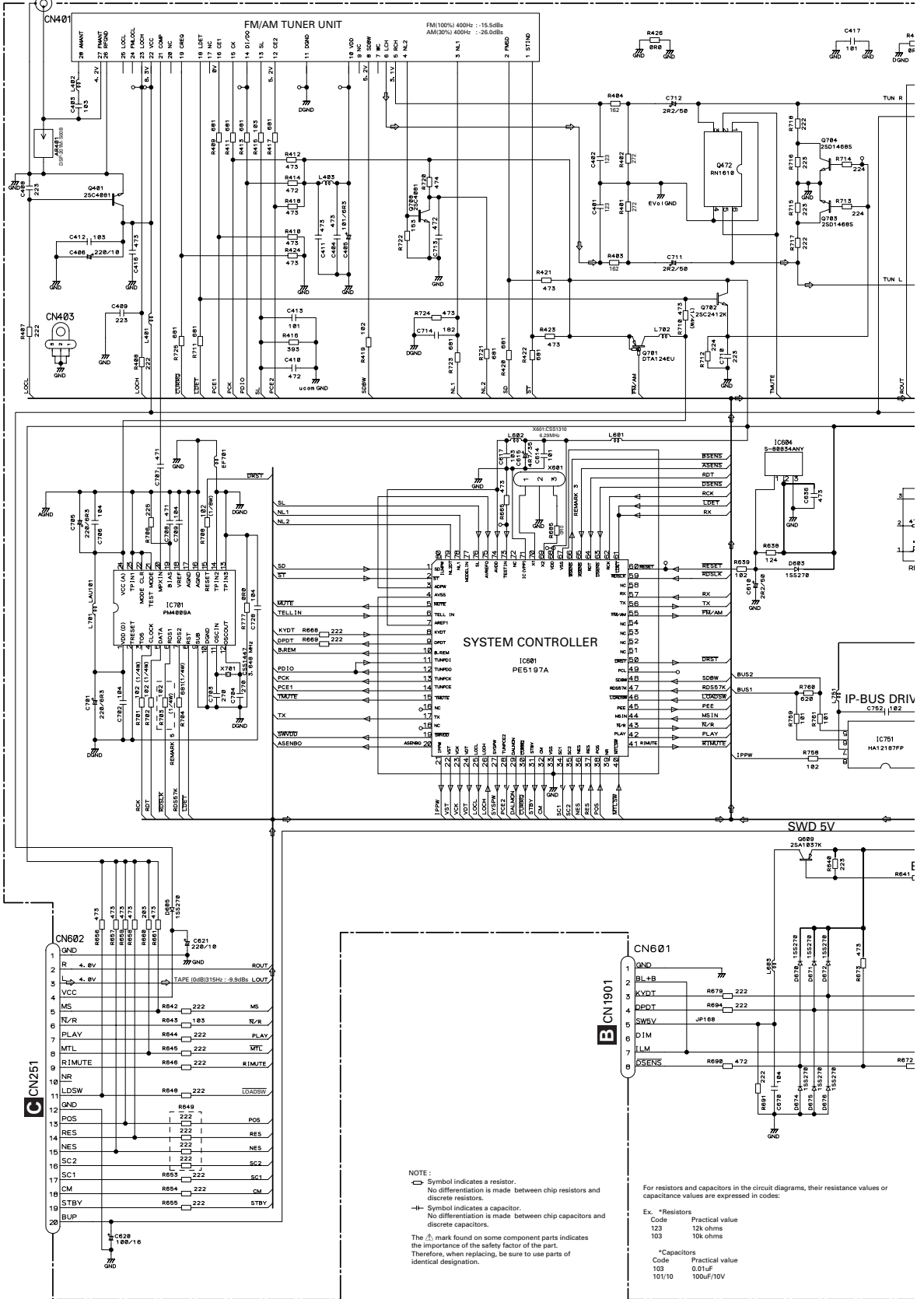
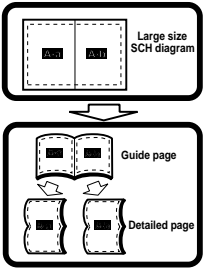


3.3 OVERALL CONNECTION DIAGRAM(GUIDE PAGE)

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

A-a

A ANTENNA JACK **A** TUNER AMP UNIT



NOTE:

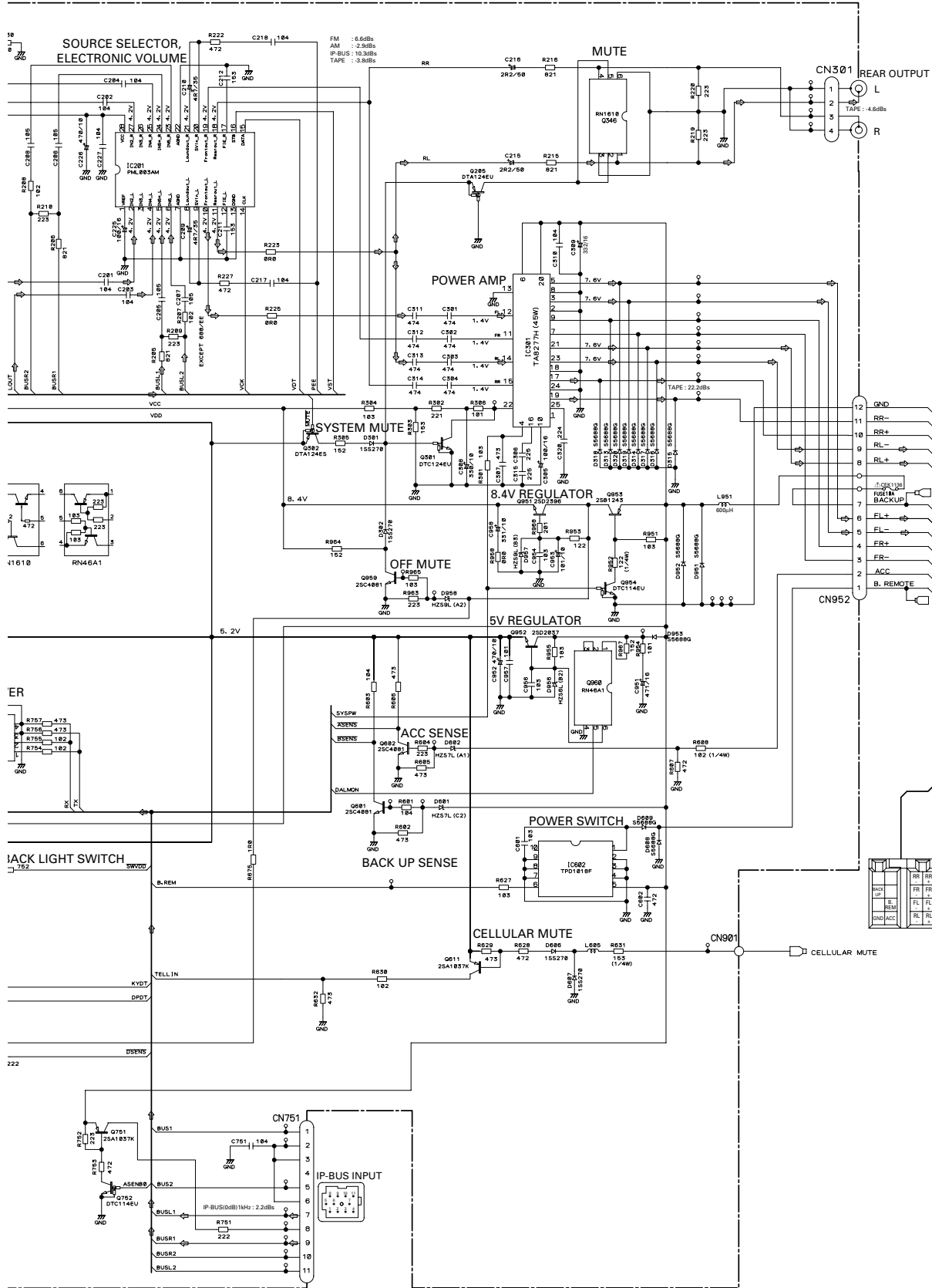
- Symbol indicates a resistor. No differentiation is made between chip resistors and discrete resistors.
- Symbol indicates a capacitor. No differentiation is made between chip capacitors and discrete capacitors.
- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

For resistors and capacitors in the circuit diagrams, their resistance values or capacitance values are expressed in codes.

Ex *Resistors
Code Practical value
123 12k ohms
103 10k ohms

*Capacitors
Code Practical value
103 0.01μF
101/10 100μF/10V

A-b



A

B

C

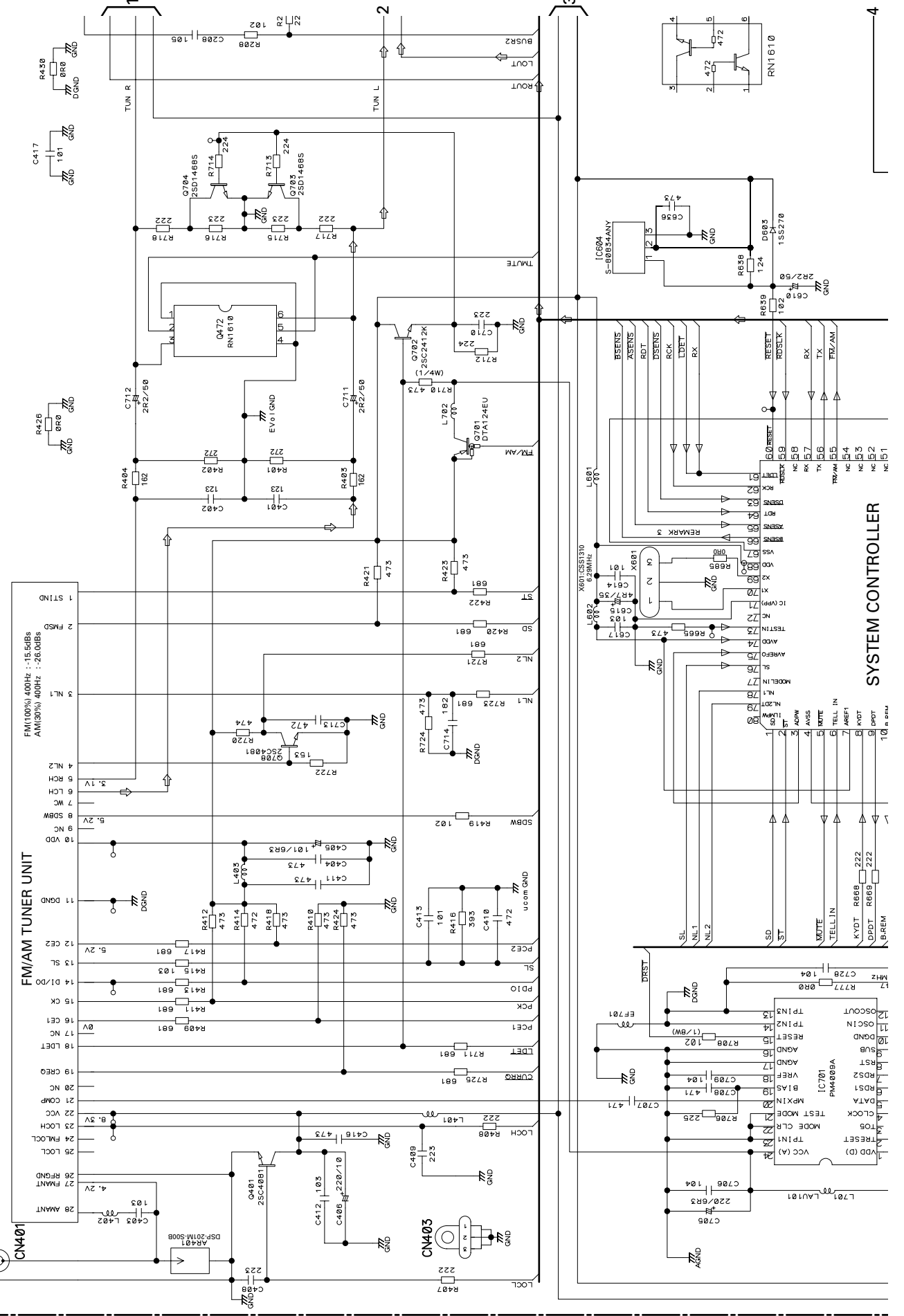
D



A TUNER AMP UNIT

A-a

ANTENNA JACK



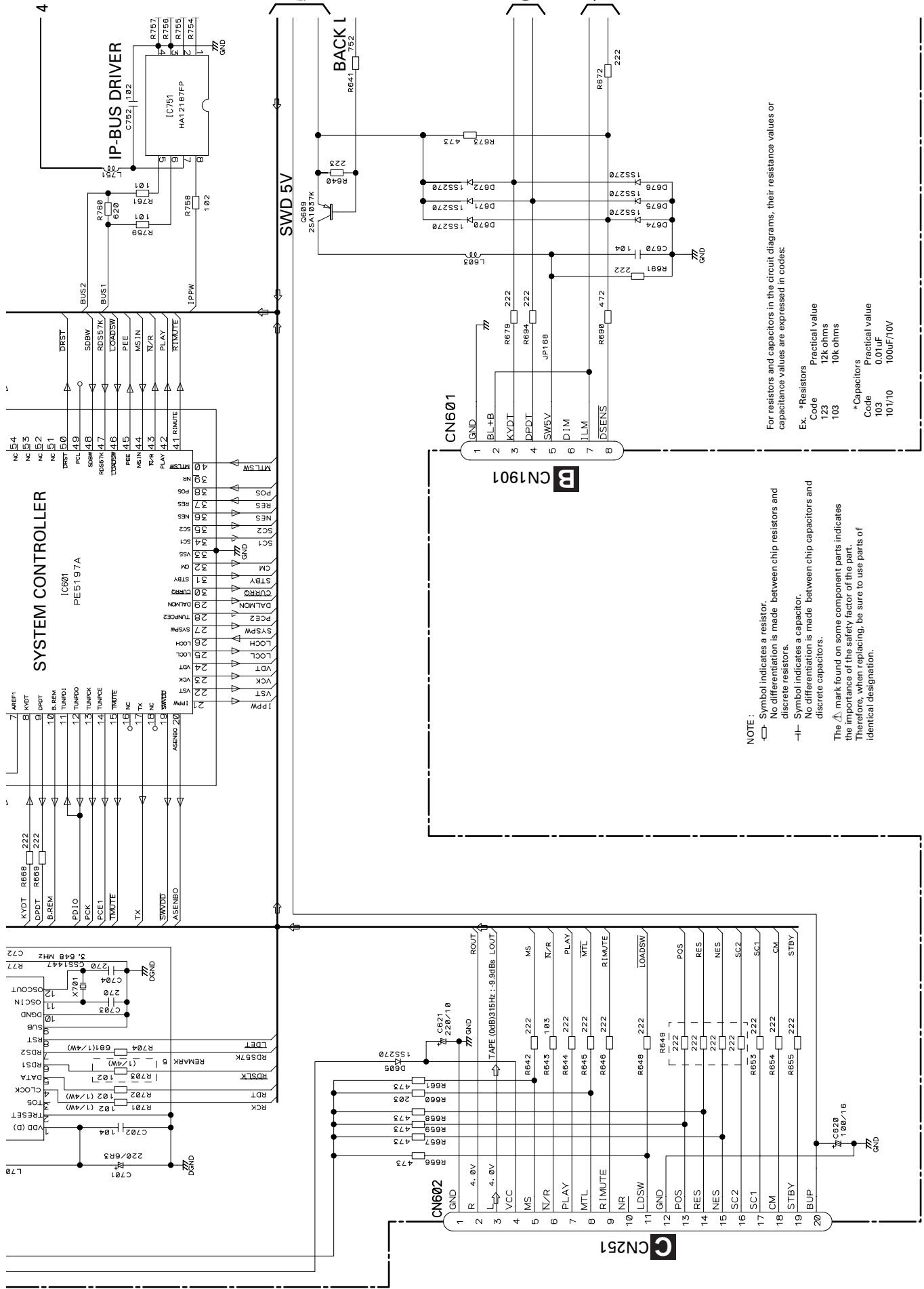
A-a A-b

A

B

C

D



NOTE:

- Symbol indicates a resistor.
- △ No differentiation is made between chip resistors and discrete resistors.
- |— Symbol indicates a capacitor.
- △ No differentiation is made between chip capacitors and discrete capacitors.

The Δ 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.

For resistors and capacitors in the circuit diagrams, their resistance values or capacitance values are expressed in codes:

Ex. *Resistors
 Code Practical value
 123 12k ohms
 103 10k ohms

*Capacitors
 Code Practical value
 101/10 100 μ F/10V

A-a A-b

A-a

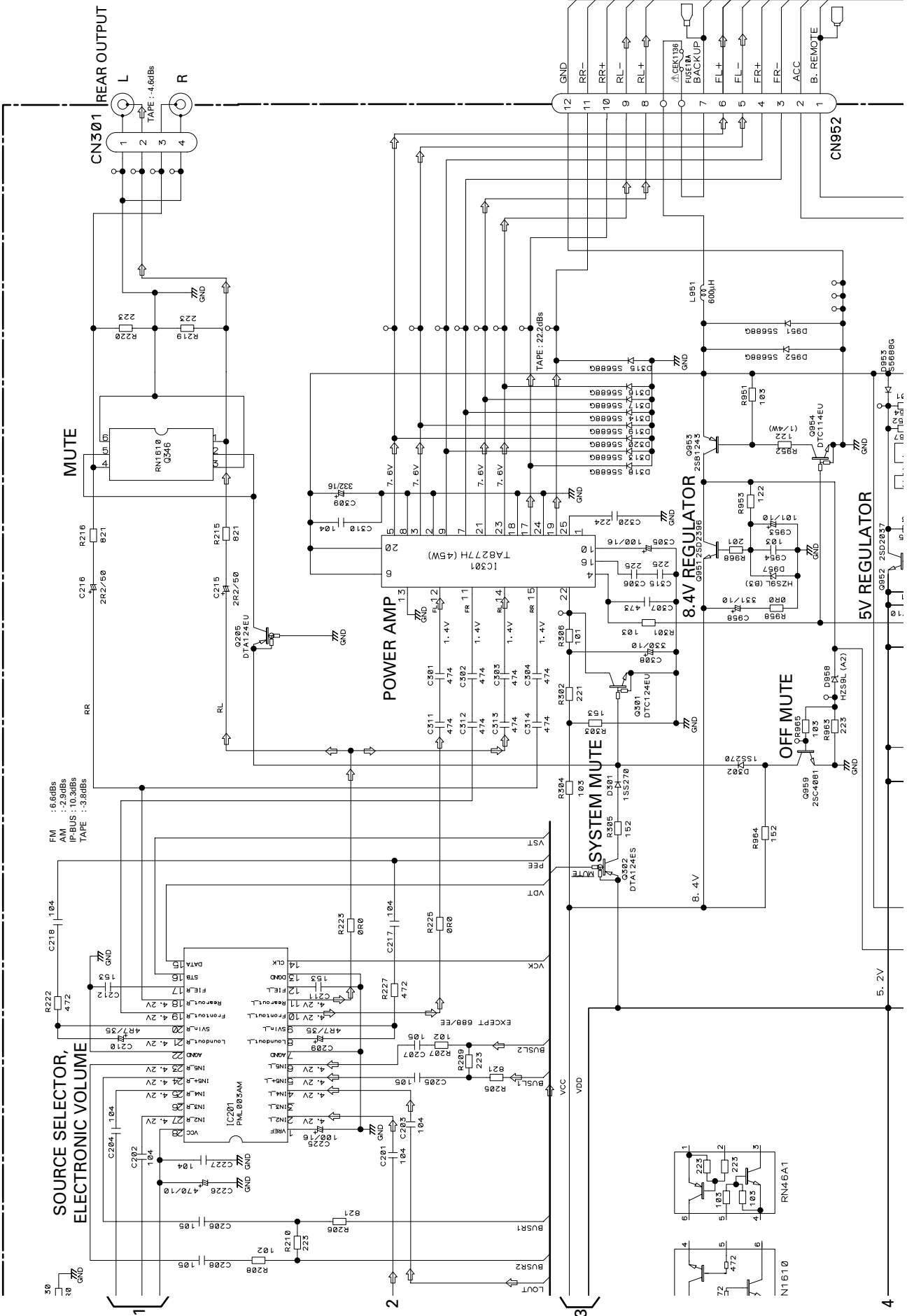
A-a A-b

A

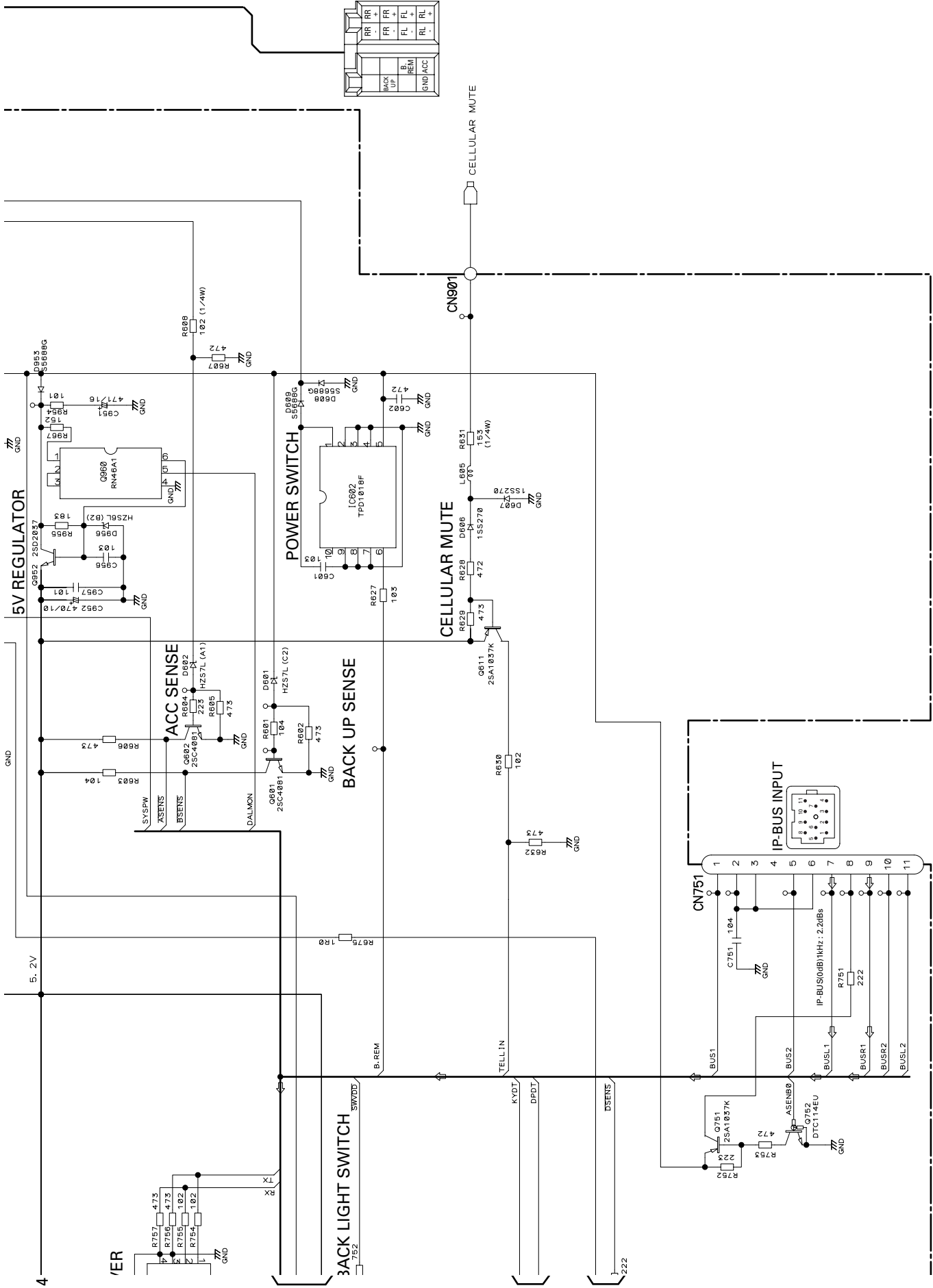
B

C

D



A-b



A-a A-b

A

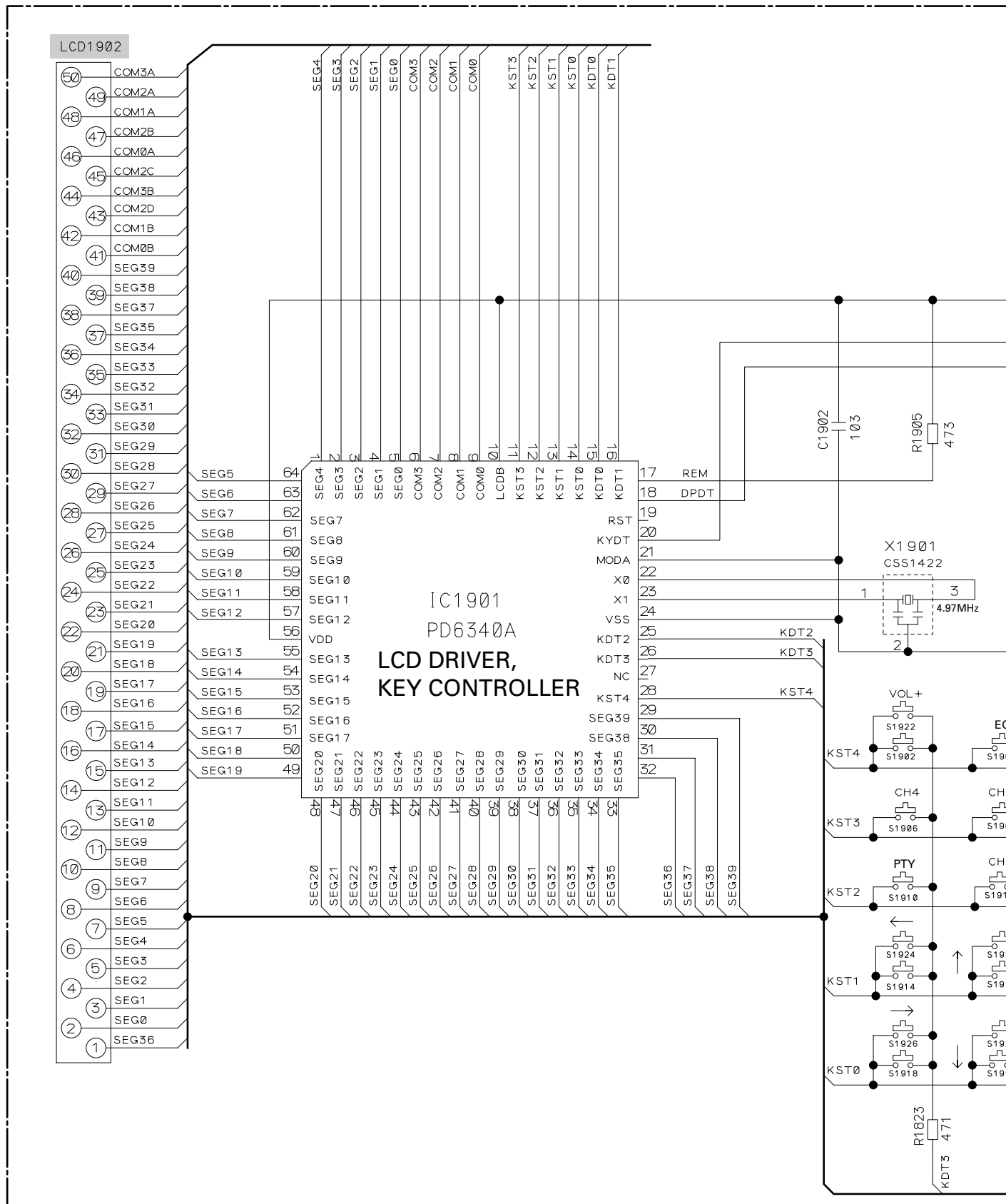
B

C

D

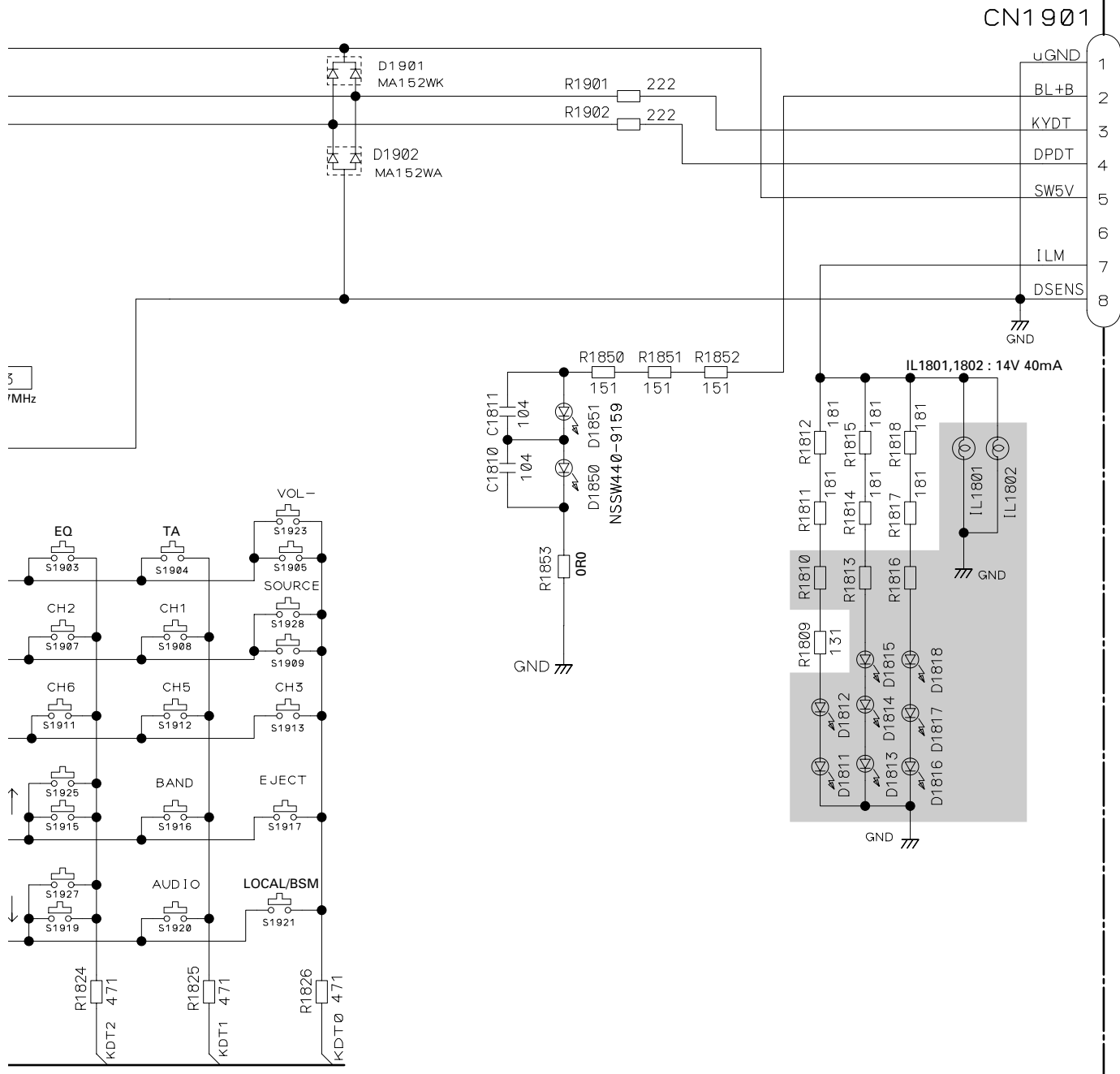
A-b

3.3 KEYBOARD UNIT



B KEYBOARD UNIT

	KEH-P4010R/X1M/EW	KEH-P4013R/X1M/EW	KEH-P4010RB/X1M/EW
D1811-1818	SML210PT	SML210DT	SML210VT
IL1801,1802	CEL1651	CEL1638	CEL1662
LCD1902	CAW1634	CAW1634	CAW1618
R1810,1813,1816	151	181	181

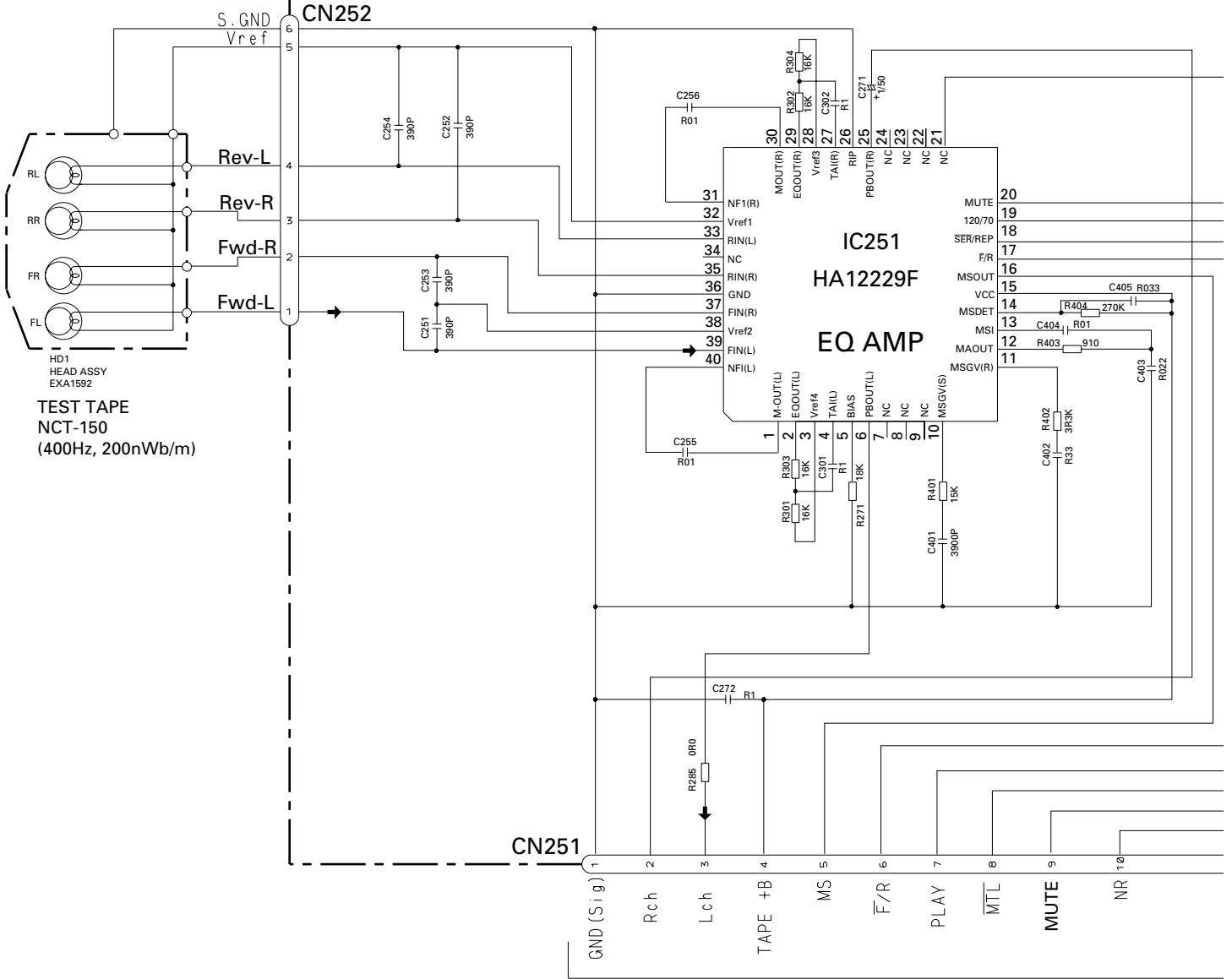


A CN601

B

3.4 CASSETTE MECHANISM MODULE

C DECK UNIT

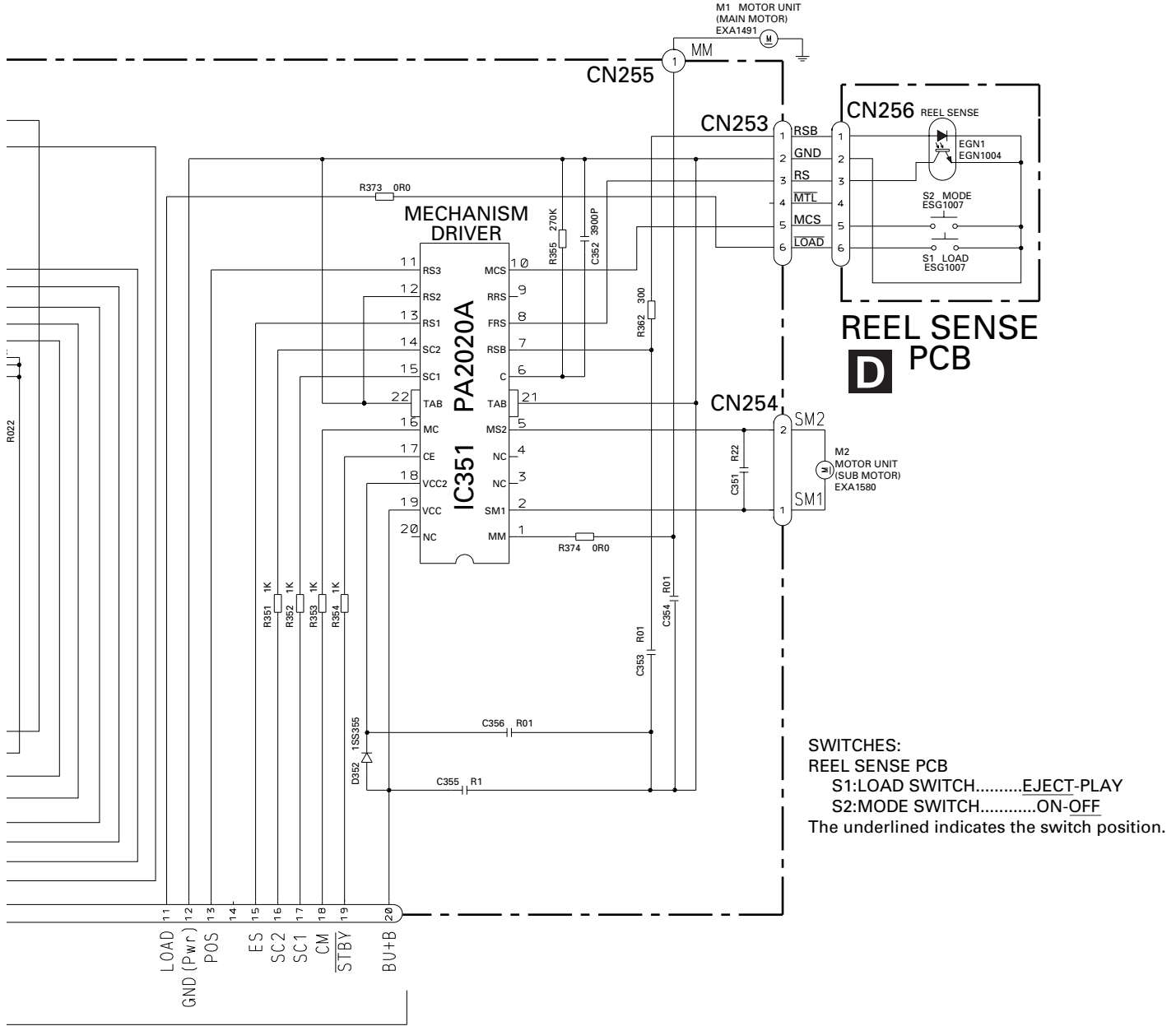


-8.24dBs±4dB

NOTE :

- Symbol indicates a resistor. No differentiation is made between chip resistors and discrete resistors.
- |— Symbol indicates a capacitor. No differentiation is made between chip capacitors and discrete capacitors.

Decimal points for resistor and capacitor fixed values are expressed as :
2.2 ~ 2R2
0.022 ~ R022



A

B

C

D

1 2 3 4

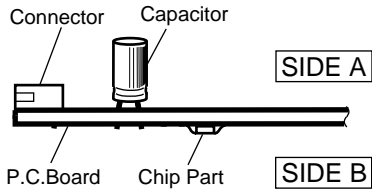
KEH-P4010R,P4010RB,P4013R

4. PCB CONNECTION DIAGRAM

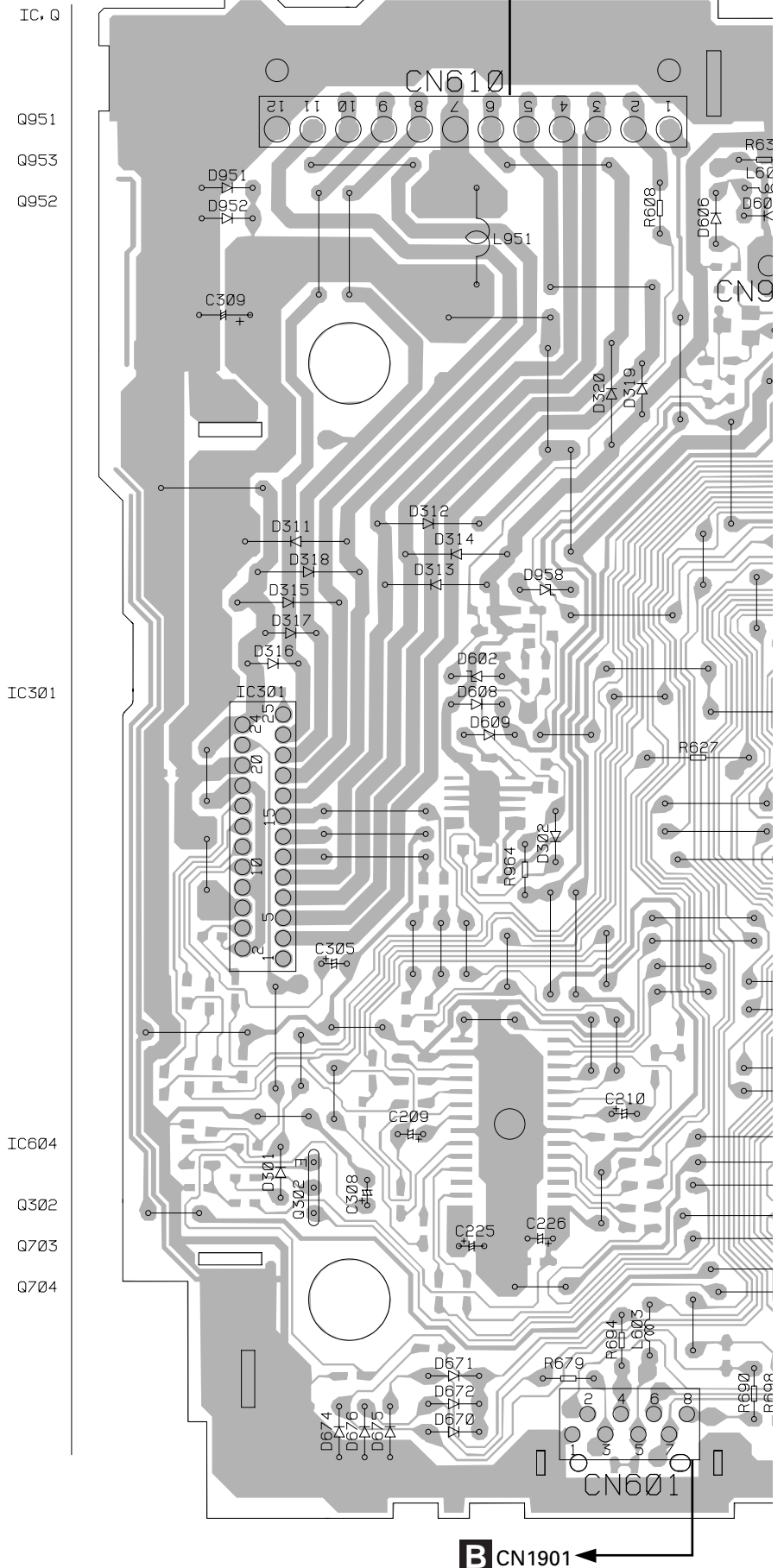
4.1 TUNER AMP UNIT

NOTE FOR PCB DIAGRAMS

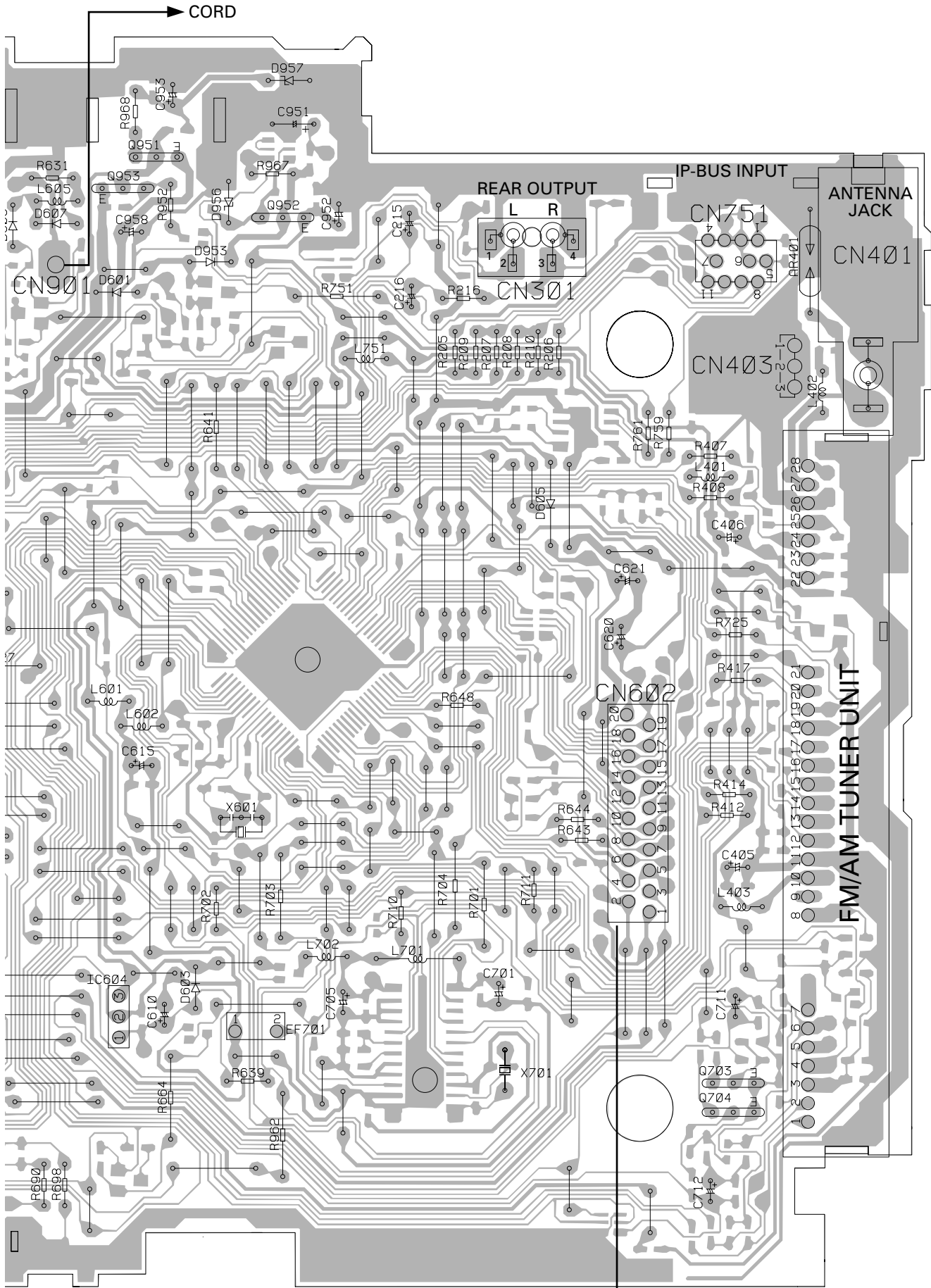
1. The parts mounted on this PCB include all necessary parts for several destinations. For further information for respective destinations, be sure to check with the schematic diagram.
2. Viewpoint of PCB diagrams



A TUNER AMP UNIT



SIDE A

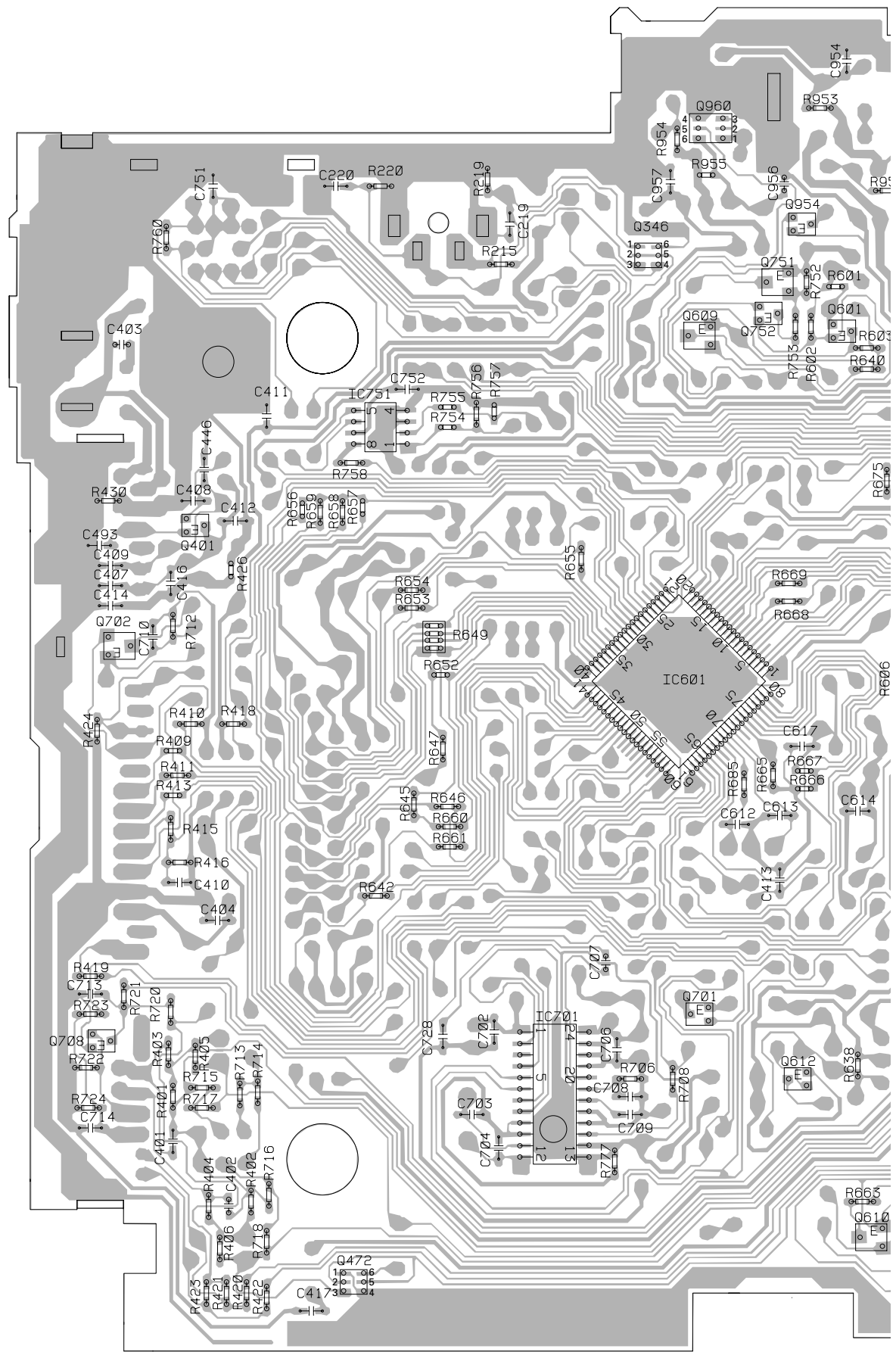


FRONT

CN251

A

A TUNER AMP UNIT



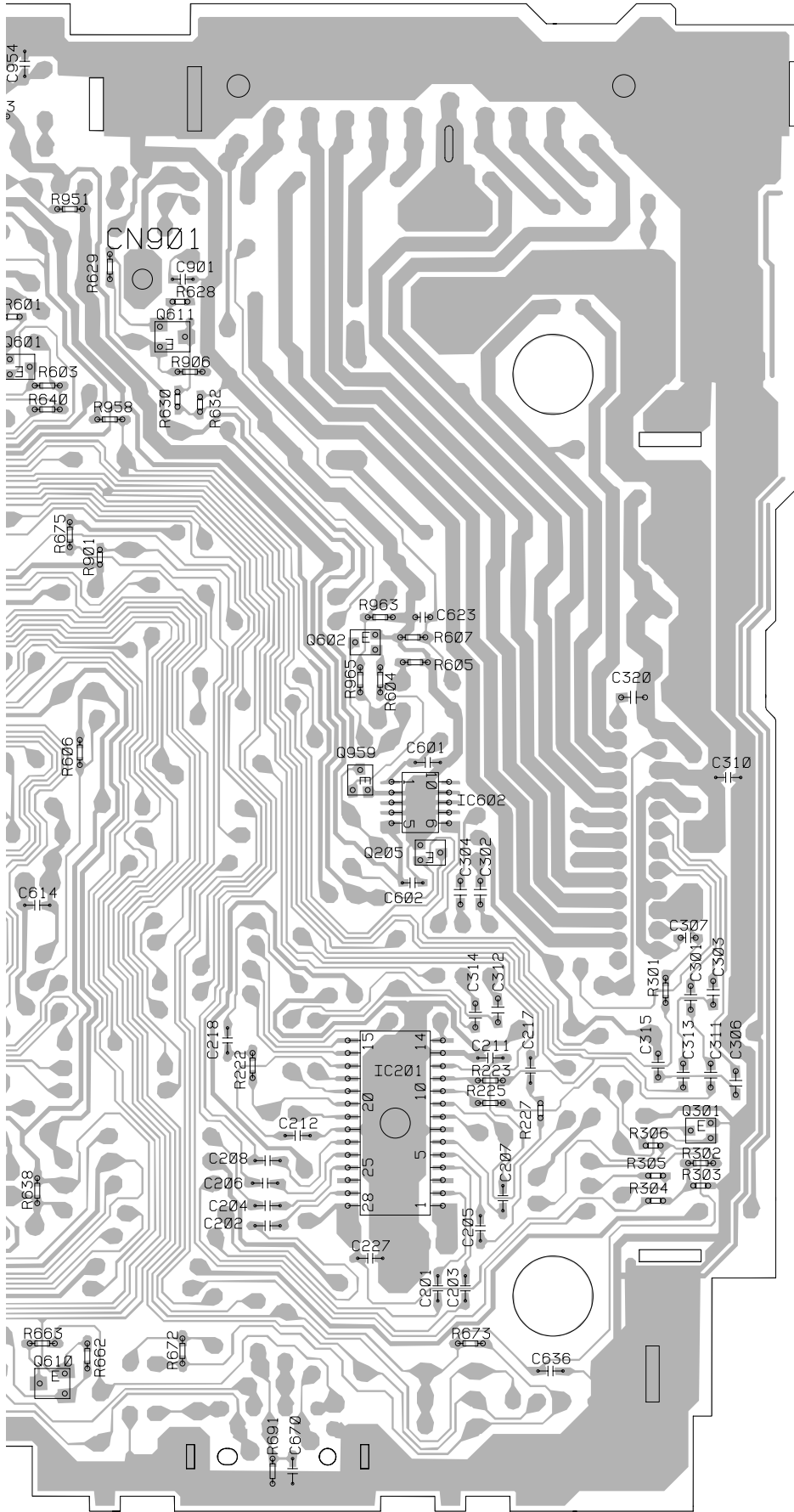
A

B

C

D

SIDE B



- IC 0
- Q960
- Q954
- Q346
- Q751
- Q611
- Q601
- Q609
- Q752
- IC751
- Q401
- Q602
- Q702
- Q959
- IC601
- IC602
- Q205
- Q205
- IC201
- Q301
- Q701
- IC701
- Q708
- Q612
- Q610
- Q472

A

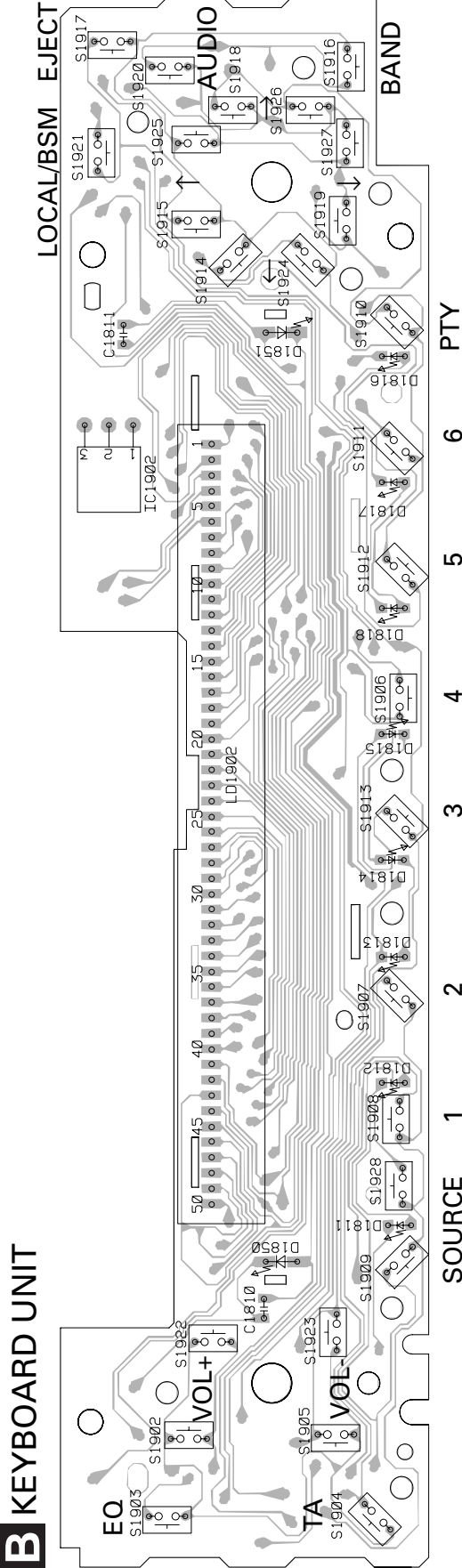
B

C

D

4.2 KEYBOARD UNIT

SIDE A



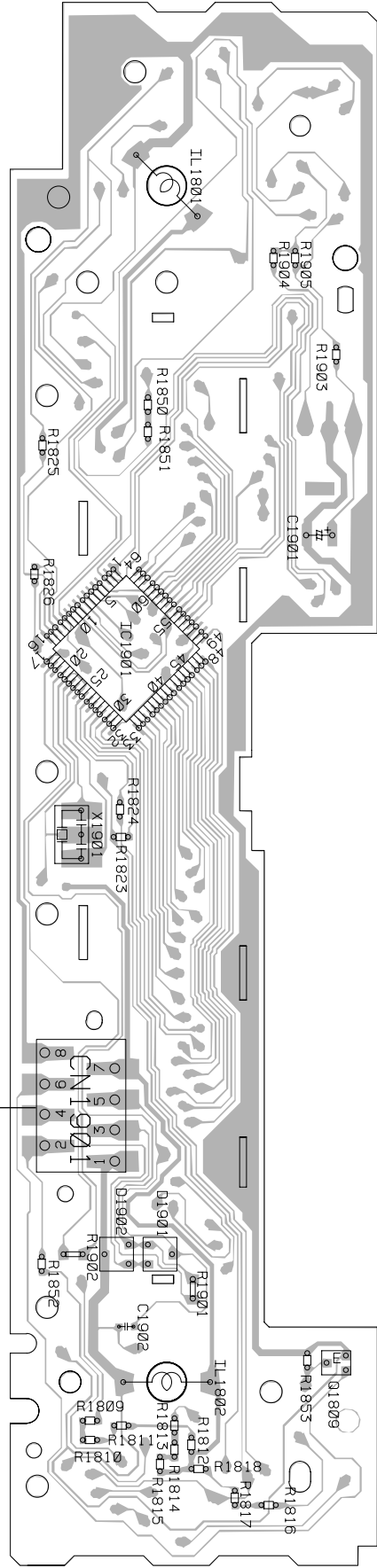
B KEYBOARD UNIT

IC. Q
IC1902

SIDE B

B KEYBOARD UNIT

A CN601



A B C D

B

IC-0

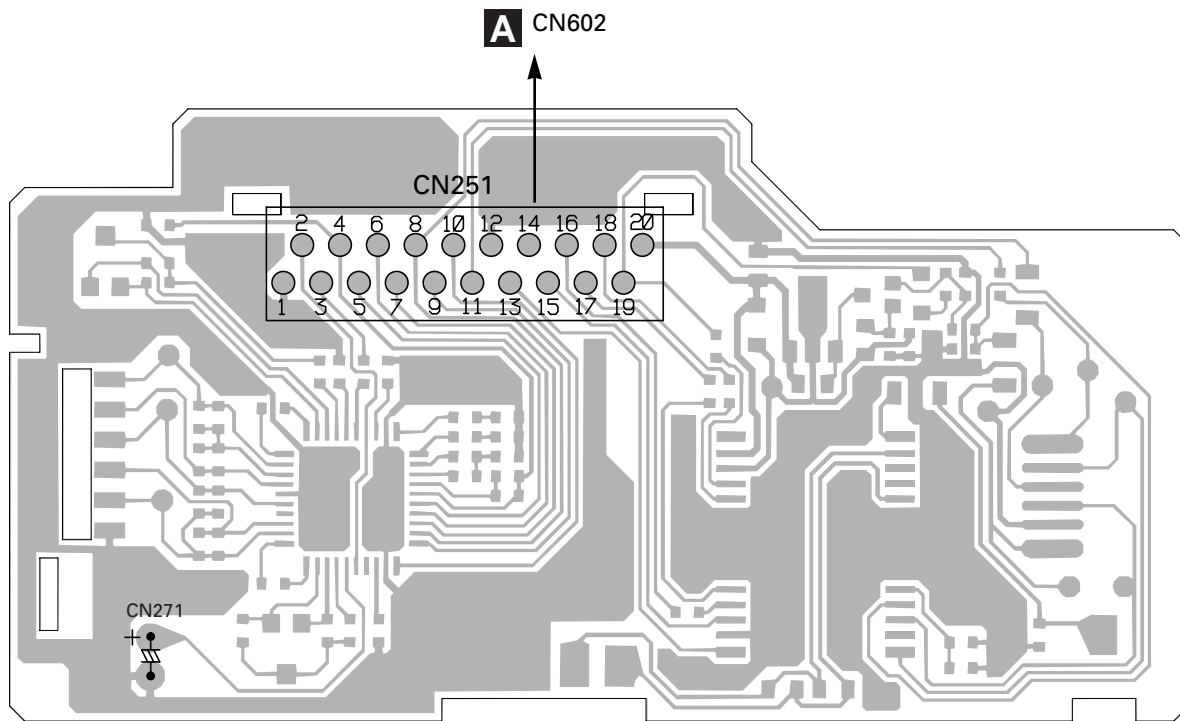
60810

106131

4.4 CASSETTE MECHANISM MODULE

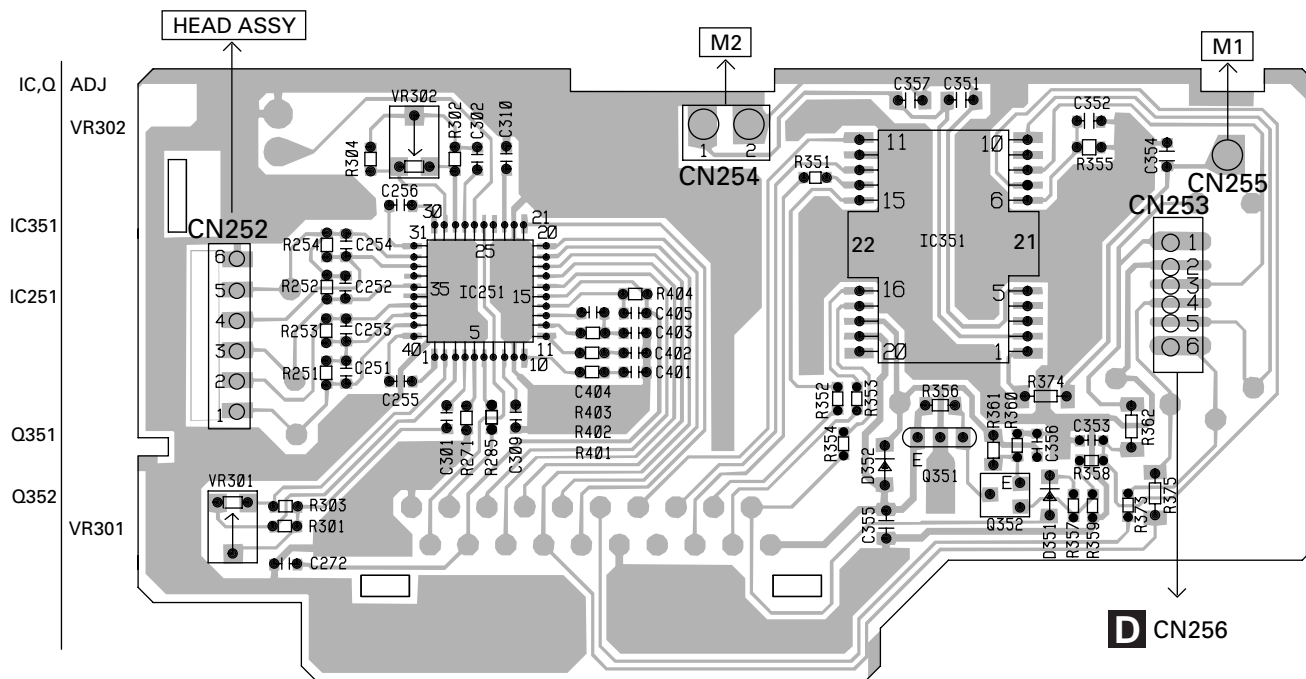
C DECK UNIT

SIDE A

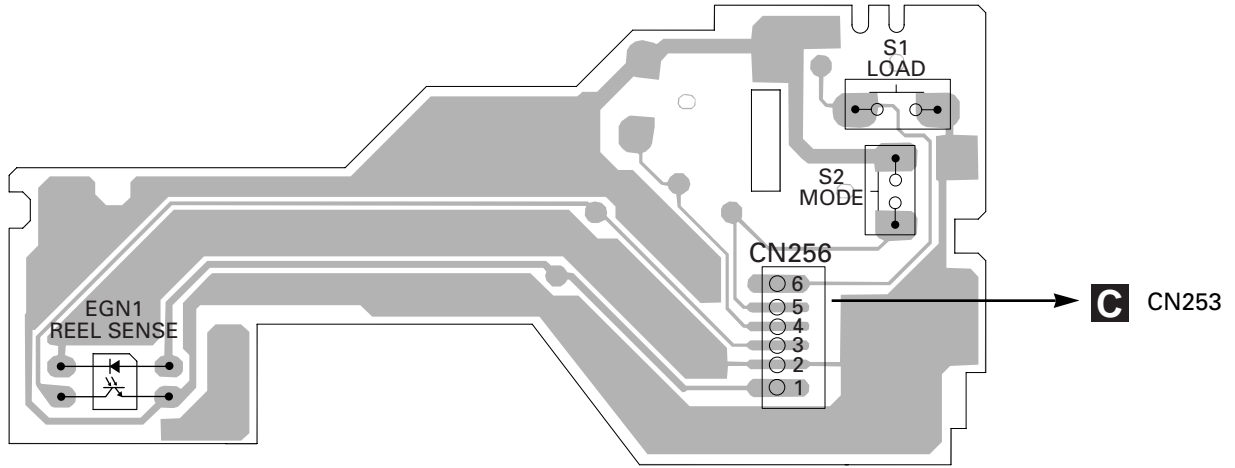


C DECK UNIT

SIDE B



D REEL SENSE PCB



5. ELECTRICAL PARTS LIST

NOTES:

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

Chip Resistor

RS1/○○○○○J,RS1/○○○○○J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

====Circuit Symbol and No.====Part Name	Part No.	====Circuit Symbol and No.====Part Name	Part No.
A Unit Number : CWM7331(KEH-P4010R/X1M/EW)		D 607 Diode	1SS270
Unit Number : CWM7332(KEH-P4013R/X1M/EW)		D 608 Diode	S5688G
Unit Number : CWM7333(KEH-P4010RB/X1M/EW)		D 609 Diode	S5688G
Unit Name : Tuner Amp Unit		D 670 Diode	1SS270
		D 671 Diode	1SS270
MISCELLANEOUS		D 672 Diode	1SS270
IC 201 IC	PML003AM	D 674 Diode	1SS270
IC 301 IC	TA8277H	D 675 Diode	1SS270
IC 601 IC	PE5197A	D 676 Diode	1SS270
IC 602 IC	TPD1018F	D 951 Diode	S5688G
IC 604 IC	S-80834ANY		
IC 701 IC	PM4009A	D 952 Diode	S5688G
IC 751 IC	HA12187FP	D 953 Diode	S5688G
Q 205 Transistor	DTA124EU	D 956 Diode	HZS6L(B2)
Q 301 Transistor	DTC124EU	D 957 Diode	HZS9L(B3)
Q 302 Transistor	DTA124ES	D 958 Diode	HZS9L(A2)
Q 346 Transistor	RN1610	L 401 Ferri-Inductor	LAU1R0M
Q 401 Transistor	2SC4081	L 402 Ferri-Inductor	LAU4R7K
Q 472 Transistor	RN1610	L 403 Ferri-Inductor	LAU1R0M
Q 601 Transistor	2SC4081	L 601 Ferri-Inductor	LAU2R2K
Q 602 Transistor	2SC4081	L 602 Inductor	LAU100K
Q 609 Transistor	2SA1037K	L 603 Ferri-Inductor	LAU2R2K
Q 611 Transistor	2SA1037K	L 605 Ferri-Inductor	LAU2R2K
Q 701 Transistor	DTA124EU	L 701 Ferri-Inductor	LAU101K
Q 702 Transistor	2SC2412K	L 702 Inductor	LAU100K
Q 703 Transistor	2SD1468S	L 751 Ferri-Inductor	LAU2R2K
Q 704 Transistor	2SD1468S	L 951 Choke Coil 600μH	CTH1168
Q 708 Transistor	2SC4081	X 601 Ceramic Resonator 6.29MHz	CSS1310
Q 751 Transistor	2SA1037K	X 701 Crystal Resonator 3.648MHz	CSS1447
Q 752 Transistor	DTC114EU	EF 701 Filter	CTF1071
Q 951 Transistor	2SD2396	AR 401 Serge Protector	DSP-201M-S00B
Q 952 Transistor	2SD2037		
Q 953 Transistor	2SB1243	RESISTORS	
Q 954 Transistor	DTC114EU	R 205	RD1/4PU821J
Q 959 Transistor	2SC4081	R 206	RD1/4PU821J
Q 960 Transistor	RN46A1	R 207	RD1/4PU102J
D 301 Diode	1SS270	R 208	RD1/4PU102J
D 302 Diode	1SS270	R 209	RD1/4PU223J
D 313 Diode	S5688G	R 210	RD1/4PU223J
D 314 Diode	S5688G	R 215	RS1/16S821J
D 315 Diode	S5688G	R 216	RD1/4PU821J
D 316 Diode	S5688G	R 219	RS1/16S223J
D 317 Diode	S5688G	R 220	RS1/16S223J
D 318 Diode	S5688G	R 222	RS1/16S472J
D 319 Diode	S5688G	R 223	RS1/16S0R0J
D 320 Diode	S5688G	R 225	RS1/16S0R0J
D 601 Diode	HZS7L(C2)	R 227	RS1/16S472J
D 602 Diode	HZS7L(A1)	R 301	RS1/16S103J
D 603 Diode	1SS270	R 302	RS1/16S221J
D 605 Diode	1SS270	R 303	RS1/16S153J
D 606 Diode	1SS270	R 304	RS1/16S103J
		R 305	RS1/16S152J
		R 306	RS1/16S101J

====Circuit Symbol and No.====Part Name	Part No.	====Circuit Symbol and No.====Part Name	Part No.
R 401	RS1/16S272J	R 679	RD1/4PU222J
R 402	RS1/16S272J	R 685	RS1/16S0R0J
R 403	RS1/16S162J	R 690	RD1/4PU472J
R 404	RS1/16S162J	R 691	RS1/16S222J
R 407	RD1/4PU222J	R 694	RD1/4PU222J
R 408	RD1/4PU222J	R 701	RD1/4PU102J
R 409	RS1/16S681J	R 702	RD1/4PU102J
R 410	RS1/16S473J	R 703	RD1/4PU102J
R 411	RS1/16S681J	R 704	RD1/4PU681J
R 412	RD1/4PU473J	R 706	RS1/16S225J
R 413	RS1/16S681J	R 708	RS1/16S102J
R 414	RD1/4PU472J	R 710	RD1/4PU473J
R 415	RS1/16S103J	R 711	RD1/4PU681J
R 416	RS1/16S393J	R 712	RS1/16S224J
R 417	RD1/4PU681J	R 713	RS1/16S224J
R 418	RS1/16S473J	R 714	RS1/16S224J
R 419	RS1/16S102J	R 715	RS1/16S223J
R 420	RS1/16S681J	R 716	RS1/16S223J
R 421	RS1/16S473J	R 717	RS1/16S222J
R 422	RS1/16S681J	R 718	RS1/16S222J
R 423	RS1/16S473J	R 720	RS1/16S474J
R 424	RS1/16S473J	R 721	RS1/16S681J
R 425	RS1/16S0R0J	R 722	RS1/16S153J
R 426	RS1/16S0R0J	R 723	RS1/16S681J
R 430	RS1/16S0R0J	R 724	RS1/16S473J
R 601	RS1/16S104J	R 751	RD1/4PU222J
R 602	RS1/16S473J	R 752	RS1/16S223J
R 603	RS1/16S104J	R 753	RS1/16S472J
R 604	RS1/16S223J	R 754	RS1/16S102J
R 605	RS1/16S473J	R 755	RS1/16S102J
R 606	RS1/16S473J	R 756	RS1/16S473J
R 607	RS1/16S472J	R 757	RS1/16S473J
R 608	RD1/4PU102J	R 758	RS1/16S102J
R 627	RD1/4PU103J	R 759	RD1/4PU101J
R 628	RS1/16S472J	R 760	RS1/16S620J
R 629	RS1/16S473J	R 761	RD1/4PU101J
R 630	RS1/16S102J	R 777	RS1/16S0R0J
R 631	RD1/4PU153J	R 951	RS1/16S103J
R 632	RS1/16S473J	R 952	RD1/4PU122J
R 638	RS1/16S124J	R 953	RS1/16S122J
R 639	RD1/4PU102J	R 954	RS1/16S101J
R 640	RS1/16S223J	R 955	RS1/16S183J
R 641	RD1/4PU752J	R 958	RS1/16S0R0J
R 642	RS1/16S222J	R 963	RS1/16S223J
R 643	RD1/4PU103J	R 964	RD1/4PU152J
R 644	RD1/4PU222J	R 965	RS1/16S103J
R 645	RS1/16S222J	R 967	RD1/4PU152J
R 646	RS1/16S222J	R 968	RD1/4PU201J
R 648	RD1/4PU222J		
R 649	RAB4C222J		
		CAPACITORS	
R 653	RS1/16S222J	C 201	CKSRYB104K16
R 654	RS1/16S222J	C 202	CKSRYB104K16
R 655	RS1/16S222J	C 203	CKSRYB104K16
R 656	RS1/16S473J	C 204	CKSRYB104K16
R 657	RS1/16S473J	C 205	CKSRYB105K6R3
R 658	RS1/16S473J	C 206	CKSRYB105K6R3
R 659	RS1/16S473J	C 207	CKSRYB105K6R3
R 660	RS1/16S203J	C 208	CKSRYB105K6R3
R 661	RS1/16S473J	C 209	CEJA4R7M35
R 665	RS1/16S473J	C 210	CEJA4R7M35
R 668	RS1/16S222J	C 211	CKSRYB153K25
R 669	RS1/16S222J	C 212	CKSRYB153K25
R 672	RS1/16S222J	C 215	CEJA2R2M50
R 673	RS1/16S473J	C 216	CEJA2R2M50
R 675	RS1/16S1R0J	C 217	CKSRYB104K16

KEH-P4010R,P4010RB,P4013R

====Circuit Symbol and No.====	Part Name	Part No.
C	218	CKSRYP104K16
C	225	CEJA100M16
C	226	CEJA470M10
C	227	CKSRYP104K16
C	301	CKSQYB474K16
C	302	CKSQYB474K16
C	303	CKSQYB474K16
C	304	CKSQYB474K16
C	305	CEJA100M16
C	306	CKSQYB225K10
C	307	CKSRYP473K16
C	308	CEJA330M10
C	309	CCH1368
C	310	CKSRYP104K16
C	311	CKSQYB474K16
C	312	CKSQYB474K16
C	313	CKSQYB474K16
C	314	CKSQYB474K16
C	315	CKSQYB225K10
C	320	CKSRYP224K16
C	401	CKSRYP123K25
C	402	CKSRYP123K25
C	403	CKSQYB103K50
C	404	CKSRYP473K16
C	405	CEJA101M6R3
C	406	CEJA220M10
C	408	CKSRYP223K25
C	409	CKSRYP223K25
C	410	CKSRYP472K50
C	411	CKSRYP473K16
C	412	CKSRYP103K50
C	413	CCSRCH101J50
C	416	CKSRYP473K16
C	417	CCSRCH101J50
C	601	CKSRYP103K50
C	602	CKSRYP472K50
C	610	CEJA2R2M50
C	614	CCSRCH101J50
C	615	CEJA4R7M35
C	617	CKSRYP103K50
C	620	CEJA100M16
C	621	CEJA220M10
C	636	CKSRYP473K16
C	670	CKSRYP104K16
C	701	CEJA220M6R3
C	702	CKSRYP104K16
C	703	CCSRCH270J50
C	704	CCSRCH270J50
C	705	CEJA220M6R3
C	706	CKSRYP104K16
C	707	CKSRYP471K50
C	708	CKSRYP471K50
C	709	CKSRYP104K16
C	710	CKSRYP223K25
C	711	CEJA2R2M50
C	712	CEJA2R2M50
C	713	CKSRYP472K50
C	714	CKSRYP182K50
C	728	CKSRYP104K16
C	751	CKSRYP104K16
C	752	CKSRYP102K50
C	951	CCH1183
C	952	CEJA470M10
C	953	CCH1179
C	954	CKSRYP103K50
C	956	CKSRYP103K50
C	957	CCSRCH101J50
C	958	CCH1181

3300µF/16V

470µF/16V

100µF/16V

330µF/10V

====Circuit Symbol and No.====Part Name Part No.

B Unit Number : CWM7343
(KEH-P4010R/X1M/EW)
Unit Name : Keyboard Unit

MISCELLANEOUS

IC	1901	IC	PD6340A
D	1811	LED	SML210PT
D	1812	LED	SML210PT
D	1813	LED	SML210PT
D	1814	LED	SML210PT
D	1815	LED	SML210PT
D	1816	LED	SML210PT
D	1817	LED	SML210PT
D	1818	LED	SML210PT
D	1850	LED	NSSW440-9159
D	1851	LED	NSSW440-9159
D	1901	Diode	MA152WK
D	1902	Diode	MA152WA
X	1901	Ceramic Resonator 4.97MHz	CSS1422
IL	1801	Lamp 14V 40mA	CEL1651
IL	1802	Lamp 14V 40mA	CEL1651
LCD	1902	LCD	CAW1634

RESISTORS

R	1809	RS1/16S131J
R	1810	RS1/16S151J
R	1811	RS1/16S181J
R	1812	RS1/16S181J
R	1813	RS1/16S151J
R	1814	RS1/16S181J
R	1815	RS1/16S181J
R	1816	RS1/16S151J
R	1817	RS1/16S181J
R	1818	RS1/16S181J
R	1823	RS1/16S471J
R	1824	RS1/16S471J
R	1825	RS1/16S471J
R	1826	RS1/16S471J
R	1850	RS1/16S151J
R	1851	RS1/16S151J
R	1852	RS1/16S151J
R	1853	RS1/16S0R0J
R	1901	RS1/10S222J
R	1902	RS1/10S222J
R	1905	RS1/16S473J

CAPACITORS

C	1810	CKSQYB104K16
C	1811	CKSQYB104K16
C	1902	CKSRYP103K50

B Unit Number : CWM7344
(KEH-P4013R/X1M/EW)
Unit Name : Keyboard Unit

MISCELLANEOUS

IC	1901	IC	PD6340A
D	1811	LED	SML210DT
D	1812	LED	SML210DT
D	1813	LED	SML210DT
D	1814	LED	SML210DT
D	1815	LED	SML210DT
D	1816	LED	SML210DT
D	1817	LED	SML210DT
D	1818	LED	SML210DT
D	1850	LED	NSSW440-9159

====Circuit Symbol and No.====Part Name	Part No.
D 1851 LED	NSSW440-9159
D 1901 Diode	MA152WK
D 1902 Diode	MA152WA
X 1901 Ceramic Resonator 4.97MHz	CSS1422
IL 1801 Lamp 14V 40mA	CEL1638
IL 1802 Lamp 14V 40mA	CEL1638
LCD1902 LCD	CAW1634

RESISTORS

R 1809	RS1/16S131J
R 1810	RS1/16S181J
R 1811	RS1/16S181J
R 1812	RS1/16S181J
R 1813	RS1/16S181J
R 1814	RS1/16S181J
R 1815	RS1/16S181J
R 1816	RS1/16S181J
R 1817	RS1/16S181J
R 1818	RS1/16S181J
R 1823	RS1/16S471J
R 1824	RS1/16S471J
R 1825	RS1/16S471J
R 1826	RS1/16S471J
R 1850	RS1/16S151J
R 1851	RS1/16S151J
R 1852	RS1/16S151J
R 1853	RS1/16S0R0J
R 1901	RS1/10S222J
R 1902	RS1/10S222J
R 1905	RS1/16S473J

CAPACITORS

C 1810	CKSQYB104K16
C 1811	CKSQYB104K16
C 1902	CKSRYB103K50

B Unit Number : CWM7345
(KEH-P4010RB/X1M/EW)
Unit Name : Keyboard Unit

MISCELLANEOUS

IC 1901 IC	PD6340A
D 1811 LED	SML210VT
D 1812 LED	SML210VT
D 1813 LED	SML210VT
D 1814 LED	SML210VT
D 1815 LED	SML210VT
D 1816 LED	SML210VT
D 1817 LED	SML210VT
D 1818 LED	SML210VT
D 1850 LED	NSSW440-9159
D 1851 LED	NSSW440-9159
D 1901 Diode	MA152WK
D 1902 Diode	MA152WA
X 1901 Ceramic Resonator 4.97MHz	CSS1422
IL 1801 Lamp 14V 40mA	CEL1662
IL 1802 Lamp 14V 40mA	CEL1662
LCD1902 LCD	CAW1618

RESISTORS

R 1809	RS1/16S131J
R 1810	RS1/16S181J
R 1811	RS1/16S181J
R 1812	RS1/16S181J
R 1813	RS1/16S181J

====Circuit Symbol and No.====Part Name	Part No.
R 1814	RS1/16S181J
R 1815	RS1/16S181J
R 1816	RS1/16S181J
R 1817	RS1/16S181J
R 1818	RS1/16S181J

R 1823	RS1/16S471J
R 1824	RS1/16S471J
R 1825	RS1/16S471J
R 1826	RS1/16S471J
R 1850	RS1/16S151J

R 1851	RS1/16S151J
R 1852	RS1/16S151J
R 1853	RS1/16S0R0J
R 1901	RS1/10S222J
R 1902	RS1/10S222J

R 1905	RS1/16S473J
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CAPACITORS

C 1810	CKSQYB104K16
C 1811	CKSQYB104K16
C 1902	CKSRYB103K50

C Unit Number : EWM1032
Unit Name : Deck Unit

MISCELLANEOUS

IC 251 IC	HA12229F
IC 351 IC	PA2020A
D 352 Diode	1SS355

RESISTORS

R 271	RS1/16S183J
R 285	RS1/16S0R0J
R 301	RS1/16S163J
R 302	RS1/16S163J
R 303	RS1/16S163J

R 304	RS1/16S163J
R 351	RS1/16S102J
R 352	RS1/16S102J
R 353	RS1/16S102J
R 354	RS1/16S102J

R 355	RS1/16S274J
R 362	RS1/8S301J
R 373	RS1/16S0R0J
R 374	RS1/8S0R0J
R 401	RS1/16S153J

R 402	RS1/16S332J
R 403	RS1/16S911J
R 404	RS1/16S274J

CAPACITORS

C 251	CKSRYB391K50
C 252	CKSRYB391K50
C 253	CKSRYB391K50
C 254	CKSRYB391K50
C 255	CKSRYB103K50

C 256	CKSRYB103K50
C 271	ECH0002
C 272	CKSRYB104K16
C 301	CKSRYB104K16
C 302	CKSRYB104K16

C 351	CKSQYB224K25
C 352	CKSRYB392K50
C 353	CKSRYB103K50
C 354	CKSRYB103K50
C 355	CKSQYB104K50

====Circuit Symbol and No.====	Part Name	Part No.
C 356		CKSRYB103K50
C 401		CKSRYB392K50
C 402		CKSRYB334K10
C 403		CKSRYB223K25
C 404		CKSRYB103K50
C 405		CKSRYB333K16

D Unit Number :
Unit Name : REEL SENSE PCB

S	1	Switch(LOAD)	ESG1007
S	2	Switch(MODE)	ESG1007
EGN	1	Photo-reflector	EGN1004

Miscellaneous Parts List

M	1	Motor Unit(MAIN)	EXA1491
M	2	Motor Unit(SUB)	EXA1580
HD	1	Head Assy	EXA1592

6. ADJUSTMENT

There is no information to be shown in this chapter.

7 GENERAL INFORMATION

7.1 DIAGNOSIS

7.1.1 DISASSEMBLY

● **Removing the Case (not shown)**

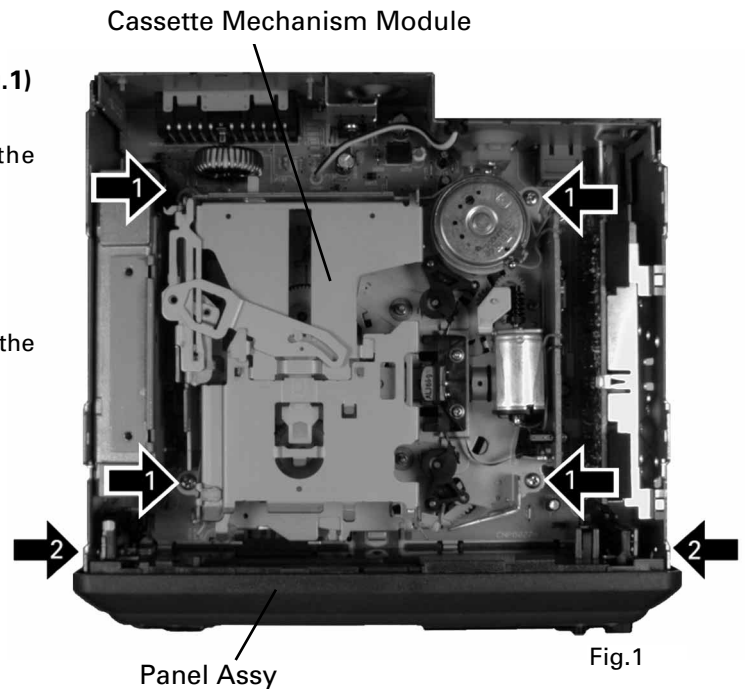
1. Remove the two screws.
2. Remove the Case.

● **Removing the Cassette Mechanism Module (Fig.1)**

- 1** Remove the four screws and then remove the Cassette Mechanism Module.

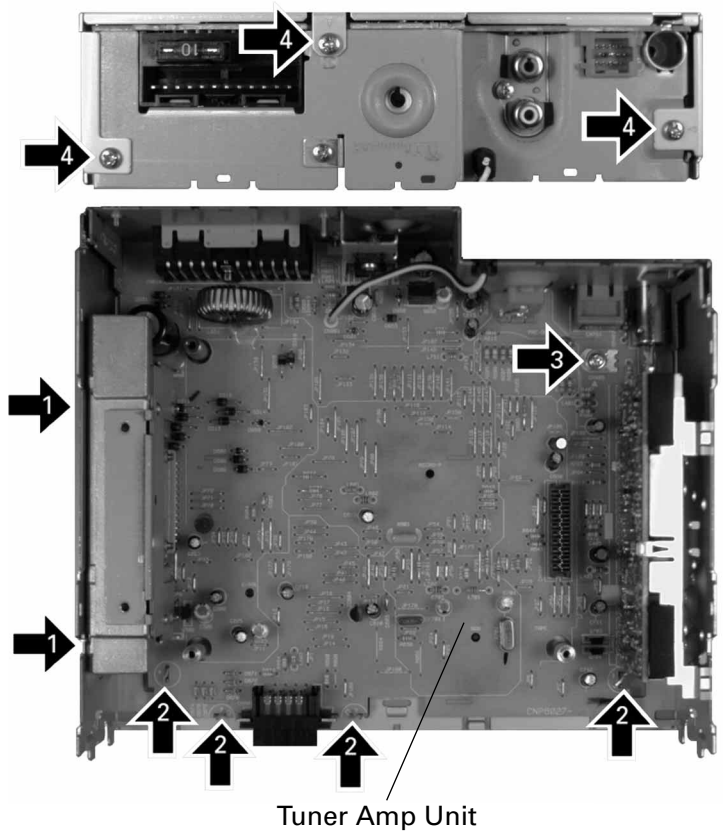
● **Removing the Panel Assy (Fig.1)**

- 2** Disconnect the two stoppers and then remove the Panel Assy.

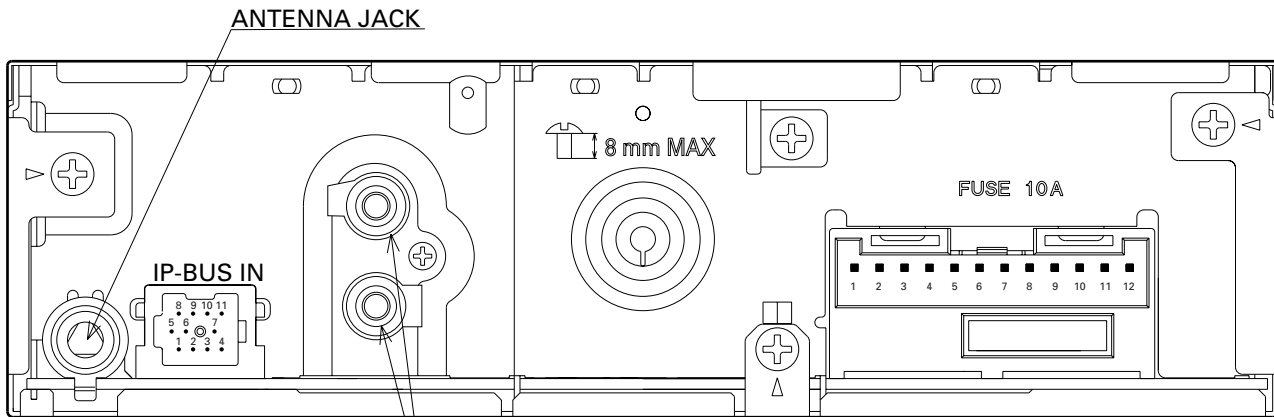


● **Removing the Tuner Amp Unit (Fig.2)**

- 1** Remove the two screws.
- 2** Straight the tabs at four locations indicated.
- 3** Remove the screw.
- 4** Remove the three screws and then remove the Tuner Amp Unit.



7.1.2 CONNECTOR FUNCTION DESCRIPTION



- 1. BUS+
- 2. GND
- 3. GND
- 4. NC
- 5. BUS-
- 6. GND
- 7. BUS L+ INPUT
- 8. ASEN B
- 9. BUS R+ INPUT
- 10. BUS R- INPUT
- 11. BUS L- INPUT

REAR OUTPUT

- 1. B.REMOTE
- 2. ACC
- 3. FR- OUTPUT
- 4. FR+ OUTPUT
- 5. FL- OUTPUT
- 6. FL+ OUTPUT
- 7. BACK UP
- 8. RL+ OUTPUT
- 9. RL- OUTPUT
- 10. RR+ OUTPUT
- 11. RR- OUTPUT
- 12. GND

7.2 PARTS

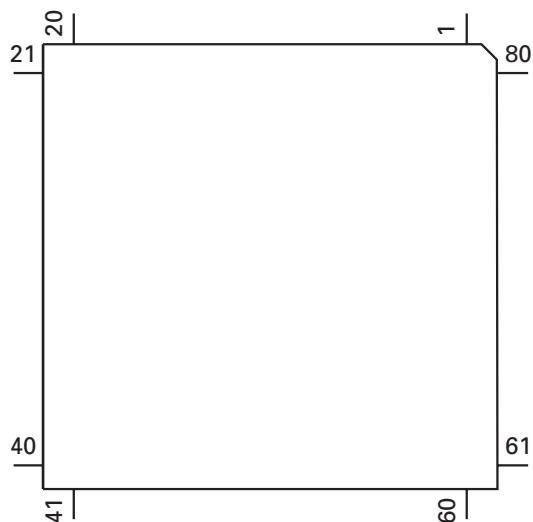
7.2.1 IC

● Pin Functions (PE5197A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	SD	I		Station detector input
2	\overline{ST}	I		FM stereo input
3	ADPW	O	C	A/D converter power supply output
4	AVSS			A/D converter GND
5	\overline{MUTE}	O	C	System mute output
6	TELLIN	I		Telephone mute input
7	AVREF1			A/D converter reference voltage
8	KYDT	I		Key data input
9	DPDT	O	C	Display data output
10	B.REM	O	C	B.REM control output
11	TUNPDI	I		PLL IC data input
12	TUNPDO	O	C	PLL IC data output
13	TUNPCK	O	C	PLL IC clock output
14	TUNPCE	O	C	PLL IC chip enable output
15	\overline{TMUTE}	O	C	Tuner mute output
16	NC			Not used
17	TX	O	C	IP BUS data output
18	NC			Not used
19	\overline{SWVDD}	O	C	Key board unit power supply control output
20	ASENBO	O	C	Slave power supply control output
21	IPPW	O	C	IP-BUS driver power supply output
22	VST	O	C	Strobe pulse output for electronic volume
23	VCK	O	C	Clock output for electronic volume
24	VDT	O	C	Data output for electronic volume
25	LOCL	O	C	Local L output
26	LOCH	O	C	Local H output
27	SYSPW	O	C	System power supply control output
28	TUNPCE2	O	C	EEPROM chip enable output
29	DALMON	O	C	DFS alarm output
30	\overline{CURRQ}	O		Tuner voltage FIX output
31	STBY	O	C	Cassette mechanism stand-by output
32	CM	O	C	Cassette mechanism capstan motor control output
33	VSS			GND
34	SC1	O	C	Cassette mechanism sub motor control output
35	SC2	O	C	Cassette mechanism sub motor control output
36	NES	I		Cassette mechanism forward end sense input
37	RES	I		Cassette mechanism reverse end sense input
38	POS	I		Cassette mechanism position sense input
39	NR	O	N	Cassette mechanism dolby NR ON/OFF select output
40	\overline{MTLSW}	I		Cassette mechanism metal tape sense input
41	RIMUTE	O	N	Cassette mechanism RI mute output
42	PLAY	O	C	Cassette mechanism tape MS filter select output
43	$\overline{N/R}$	I		Cassette mechanism tape direction input
44	MSIN	I		Cassette mechanism MS sense input
45	PEE	O	C	Beep tone output
46	\overline{LOADSW}	I		Tape loading sensor input
47	RDS57K	I		RDS 57kHz pulse count input
48	SDBW	O		SD bandwidth signal input
49	PCL	O	C	Clock adjustment output
50	\overline{DRST}	O	C	Decoder reset output
51-54	NC			Not used
55	FM/AM	O	C	RDS decoder power supply control output
56	TX	O	C	IP BUS data output
57	RX	I		IP BUS data input
58	NC			Not used

Pin No.	Pin Name	I/O	Format	Function and Operation
59	RDSLK	I		RDS LK signal input
60	RESET	I		Reset input
61	LDET	I		PLL lock sense input
62	RCK	O	C	FROM clock output
63	DSSENS	I		Grille detach sense input
64	RDT	I		FROM data input
65	ASSENS	I		ACC power sense input
66	BSSENS	I		Back up power sense input
67	VSS			GND
68	VDD			Power supply
69	X2			Crystal oscillator connection pin
70	X1			Crystal oscillator connection pin
71	IC			GND
72	NC			Not used
73	TESTIN	I		Test program mode input
74	AVDD			Power supply terminal
75	AVREF0			A/D converter reference voltage
75	SL	I		SD level input from tuner
77	MODEL	I		Model select input
78	NL1	I		RDS noise level input
79	NL2DT	I		RDS noise level input
80	ILMPW	O	C	Illumination power supply control output

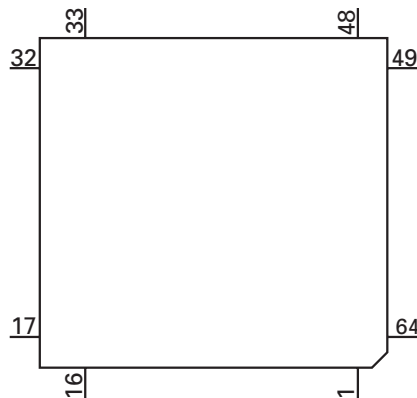
*PE5197A



Format	Meaning
C	C MOS
N	N Channel open drain

IC's marked by* are MOS type.
Be careful in handling them because they are very liable to be damaged by electrostatic induction.

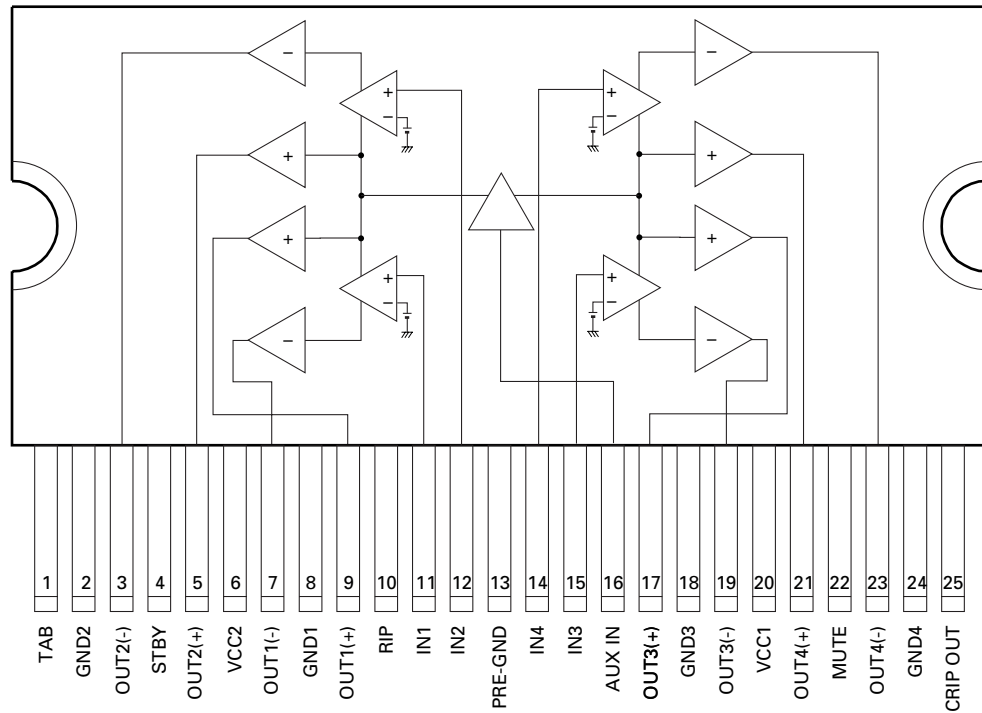
*PD6340A



● Pin Functions (PD6340A)

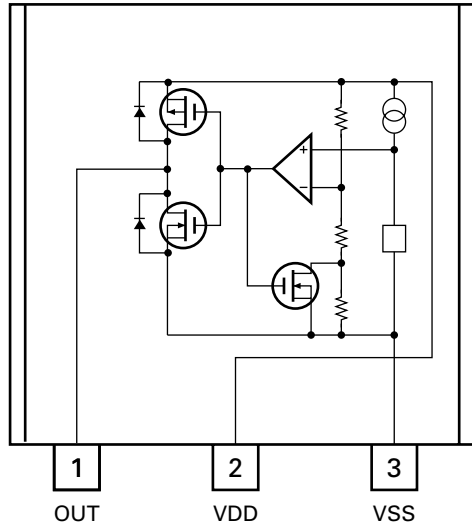
Pin No.	Pin Name	I/O	Function and Operation
1-5	SEG4-0	O	LCD segment output
6-9	COM3-0	O	LCD common output
10	VLCD		LCD drive power supply
11-14	KST3-0	O	Key strobe output
15,16	KDT0,1	I	Key data input (analogue input)
17	REM	I	Remote control reception
18	DPDT	I	Display data input
19	RST		Not used
20	KYDT	O	Key data output
21	MODA		GND
22	X0		Crystal oscillator connection pin
23	X1		Crystal oscillator connection pin
24	VSS		GND
25,26	KDT2,3	I	Key data input
27	NC		Not used
28	KST4	O	Key strobe output
29-55	SEG39-13	O	LCD segment output
56	VDD		Power supply
57-64	SEG12-5	O	LCD segment output

TA8277H

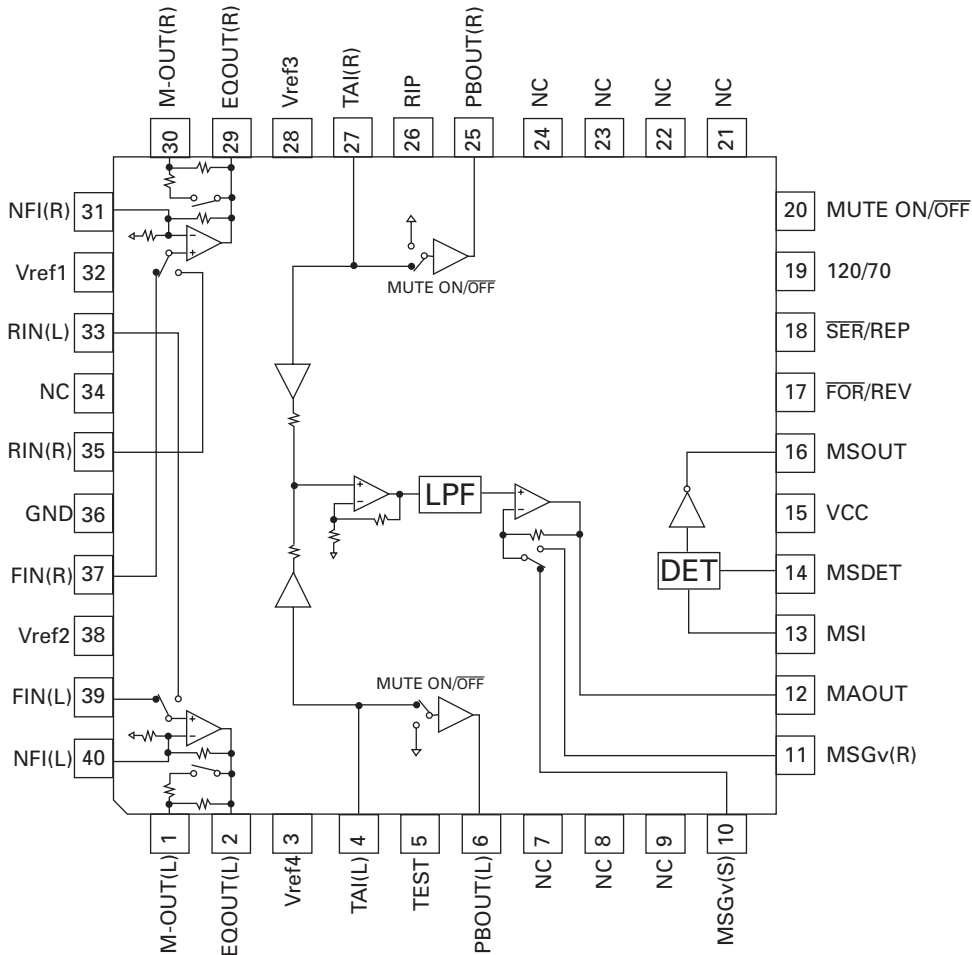


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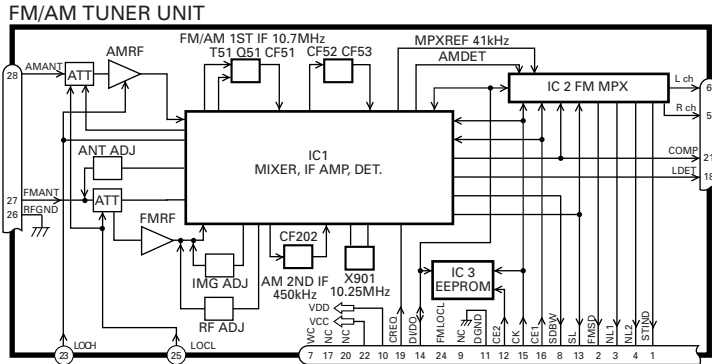
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HA12229F



● FM/AM Tuner Unit

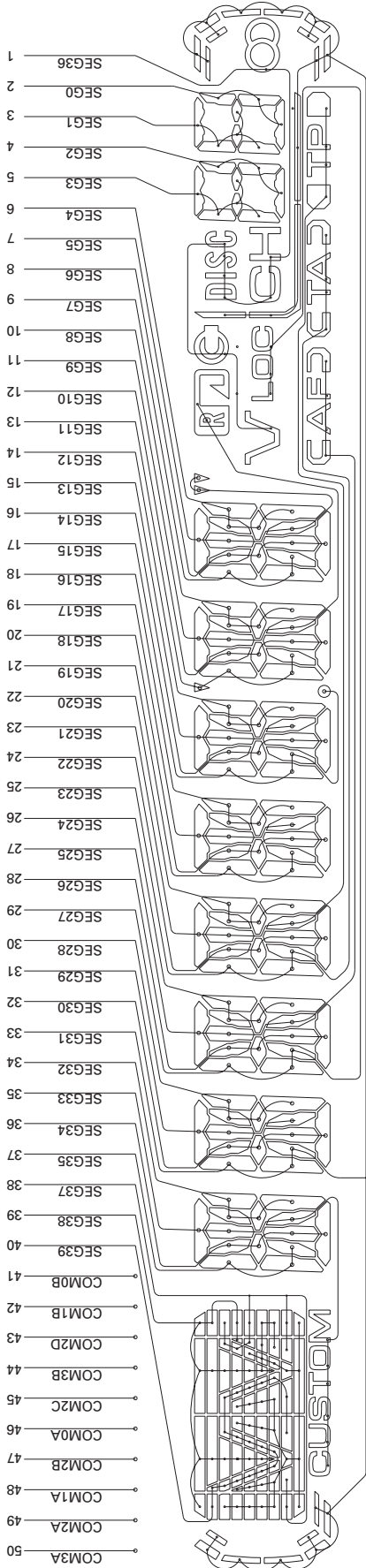


No.	Symbol	I/O	Explain	
1	STIND	O	stereo indicator	"Low" when the FM stereo signals are received. To be pulled up to the "VDD" at 47kΩ.
2	FMSD	O	FM station detector	"High" when signals are received. To be pulled up to the "VDD" at 47kΩ. Meanwhile, 10kΩ should be used when taking diver FIX trigger from here and "High: 0.9VDD or more" and "Low: 250mV or less". (Should satisfy the diver IC specifications)
3	NL1	O	noise level-1	"High" when noise is received. Output for the RDS. GND at 47kΩ //1,800pF.
4	NL2	O	noise level-2	"High" when noise is received. Output for the RDS. GND at 36kΩ //330pF.
5	Rch	O	R channel output	FM stereo "R-ch" signal output or AM audio output. Add the specified di-emphasis constant.
6	Lch	O	L channel output	FM stereo "L-ch" signal output or AM audio output. Add the specified di-emphasis constant.
7	WC		write control	EEPROM write control. Writing permissible at "Low". Normally open.
8	SDBW	O	SD bandwidth	SD bandwidth signal output. For detection of detuning data for the RDS.
9	NC			Not used
10	VDD		power supply	Power supply pin for the digital section. D.C. 5V +/- 0.25V. Be careful about overlapping noise in the logic section.
11	DGND		digital ground	Grounding for the digital section.
12	CE2	I	chip enable-2	EEPROM chip enable. Active a "Low" To be pulled up to the "VDD" at 47kΩ
13	SL	I/O	signal level	Received FM/AM signal level (strength) output. Connect the specified load resistor and capacitor (10k Ω + 39k Ω //4,700pF)
14	DI/DO	I/O	data input/ data output	Data input/Data output To be pulled up to the "VDD" at 47kΩ
15	CK	I	clock	Clock input To be pulled up to the "VDD" at 47kΩ
16	CE1	I	chip enable-1	AF-RF chip enable. Active at "High" To be grounded at 47kΩ
17	NC			Not used
18	LDET	O	lock detector	Active at "Low". To be pulled up to the "VDD" at 47kΩ
19	CREQ	I	current request	Active at "Low". To be grounded at 47kΩ
20	NC			Not used
21	COMP	O	composite signal	FM composite signal output. r out < 100Ω
22	VCC		power supply	Analog section power supply pin.D.C.8.4V +/- 0.3V
23	LOCH	I	local high	FM local high pin. When seeking local high, apply 5V together with "LOCL".
24	FMLOCL	I	FM local low	FM local low pin. When seeking local low, apply 5V to the base of the NPN transistor with which the specified resistor is being connected to the emitter. Keep it open in case of ordinary marketed models.
25	LOCL	I	local low	FM/AM local low pin. When seeking local low, apply 5V to the base of the NPN transistor. Since this pin is exclusive for AM when the FMLOCL is in use, do not drive it under FM.
26	RFGND		RF ground	Grounding for the antenna section.
27	FMANT	I	FM antenna input	FM antenna input. 75Ω. Serge absorber (DSP-201M-S00B) is necessary.
28	AMANT	I	AM antenna input	AM antenna input. High impedance. Connect to the antenna through an L (LAU type) of 4.7μH.To cope with the power transmission line hums, insert a series circuit consisting of an L (a coil of about 100mH) + R (a resistor of 470 Ω to 2.2kΩ) between the GND.

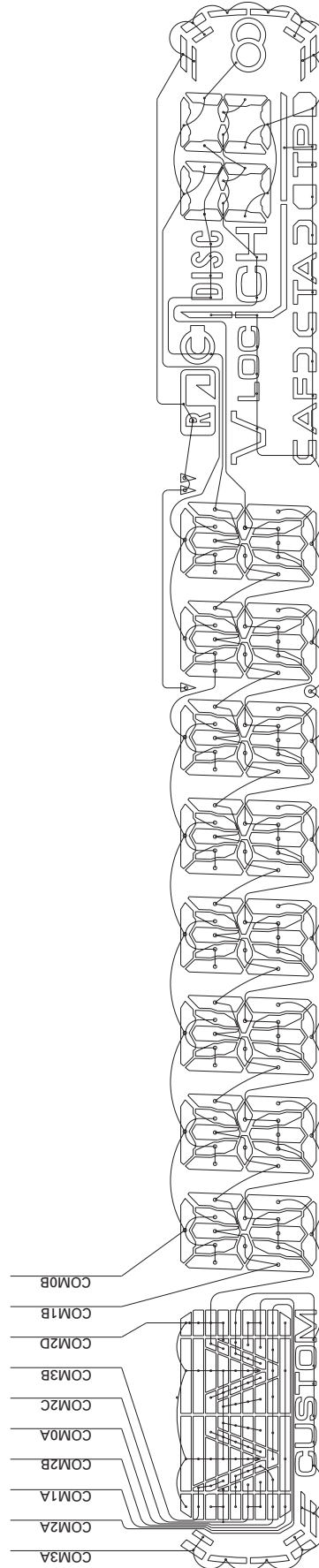
7.2.2 DISPLAY

● CAW1634(KEH-P4010R/X1M/EW, KEH-P4013R/X1M/EW), CAW1618(KEH-P4010RB/X1M/EW)

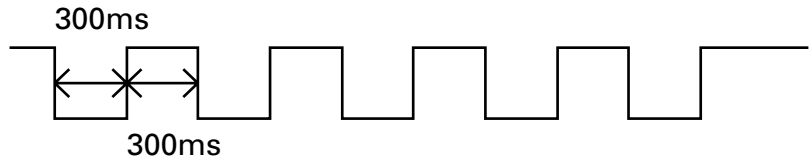
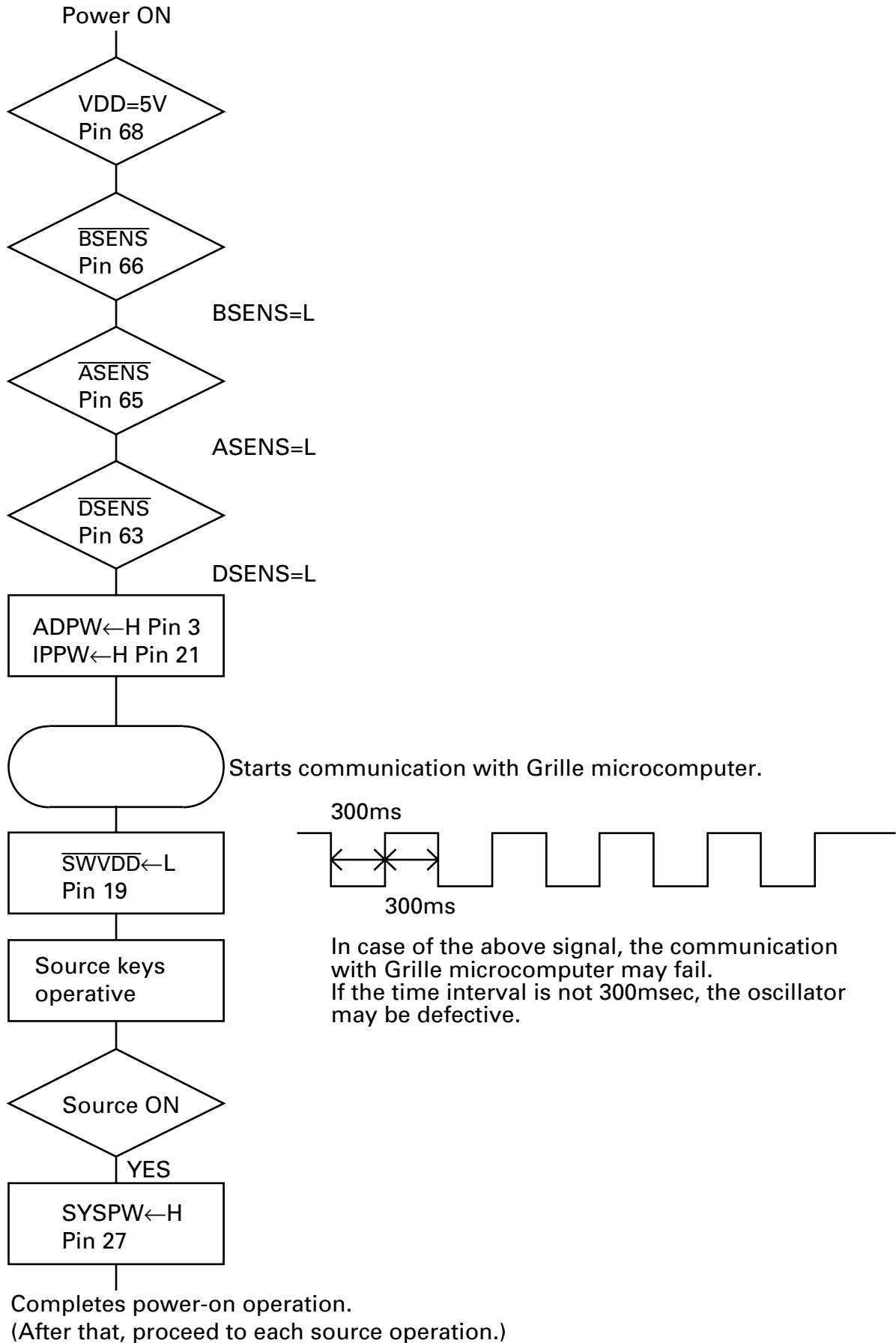
SEGMENT



COMMON



7.3 OPERATIONAL FLOW CHART

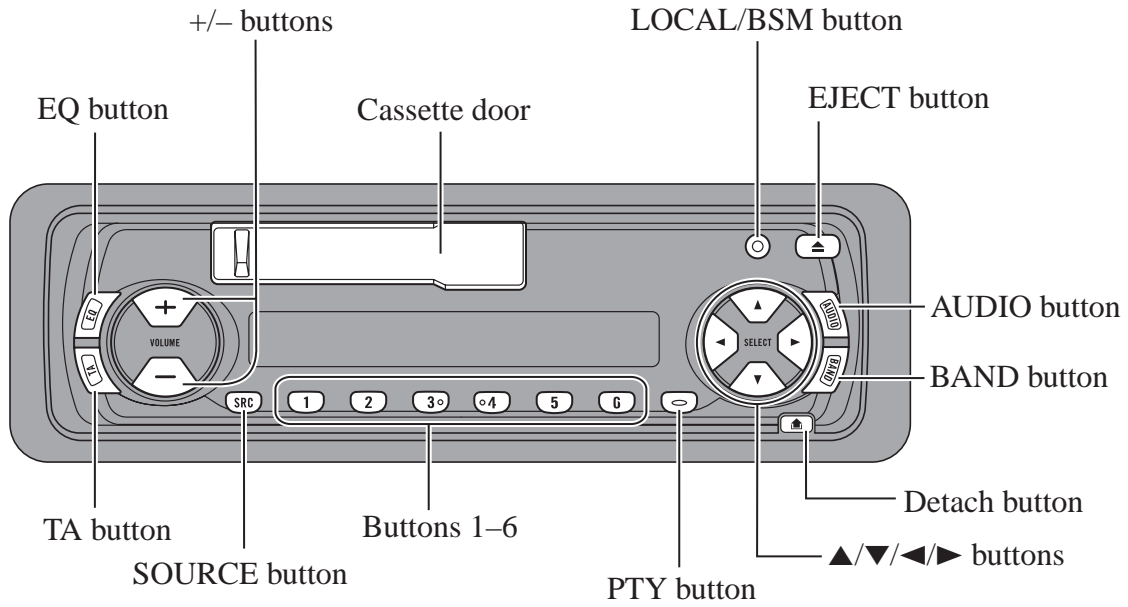


In case of the above signal, the communication with Grille microcomputer may fail. If the time interval is not 300msec, the oscillator may be defective.

8. OPERATIONS AND SPECIFICATIONS

8.1 OPERATIONS

Head Unit



Basic Operation

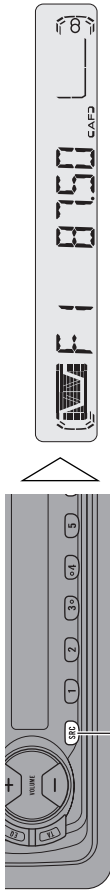
To Listen to Music

The following explains the initial operations required before you can listen to music.

Note:

- Loading a cassette in this product.

1. Select the desired source (e.g. Tuner).



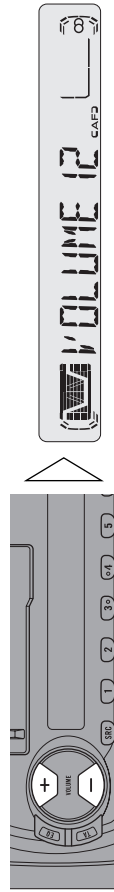
Each press changes the Source. ...

Each press of the SOURCE button selects the desired source in the following order:
Tuner → Tape → Multi-CD player → External Unit → AUX

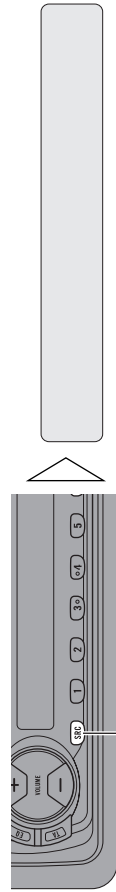
Note:

- External Unit refers to a Pioneer product (such as one available in the future) that, although incompatible as a source, enables control of basic functions by this product. Only one External Unit can be controlled by this product.
- In the following cases, the sound source will not change:
 - * When a product corresponding to each source is not connected to this product.
 - * When no tape is set in this product.
 - * When no magazine is set in the Multi-CD player.
 - * When the AUX (external input) is set to OFF.
- When this product's blue/white lead is connected to the car's Auto-antenna relay control terminal, the car's Auto-antenna extends when this product's source is switched ON. To retract the antenna, switch the source OFF.

2. Raise or lower the volume.



3. Turn the source OFF.



Hold for 1 second

Basic Operation of Tuner

This product's AF function can be switched ON and OFF. AF should be switched OFF for normal tuning operations.

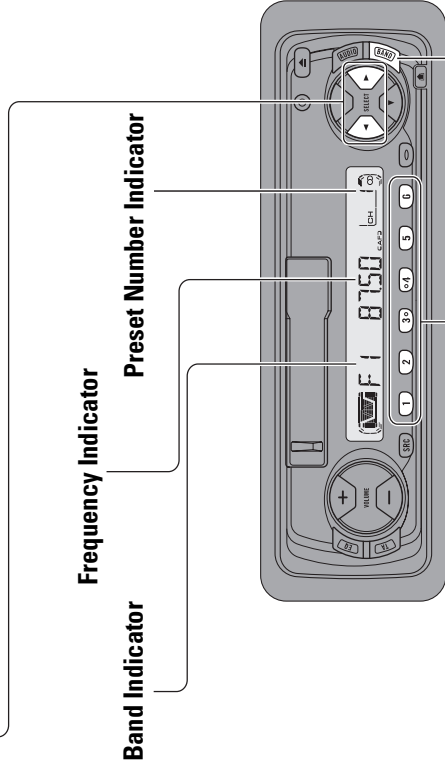
Manual and Seek Tuning

- You can select the tuning method by changing the length of time you press the ◀/▶ button.

Manual Tuning (step by step)	0.5 seconds or less
Seek Tuning	0.5 seconds or more

Note:

- If you continue pressing the button for longer than 0.5 seconds, you can skip broadcast stations. Seek Tuning starts as soon as you release the button.
- Stereo indicator "STEREO" lights when a stereo station is selected.



Preset Tuning

- You can memorize broadcast stations in buttons 1 through 6 for easy, one-touch station recall.

Preset station recall	2 seconds or less
Broadcast station preset memory	2 seconds or more

Note:

- Up to 12 FM stations (6 in F1 (FM1) and F2 (FM2)) and 6 MW/LW stations can be stored in memory.
- You can also use the ▲ or ▼ buttons to recall broadcast stations memorized in buttons 1 through 6.

Basic Operation of Cassette Player

Fast Forward/Rewind and Music Search

- Each press of the **▶** button selects **Fast Forward** or **Forward-Music Search**.
FF (Fast Forward) → F-MS (Forward-Music Search) → Normal Playback
- Each press of the **◀** button selects **Rewind** or **Rewind-Music Search**.
REW (Rewind) → R-MS (Rewind-Music Search) → Normal Playback

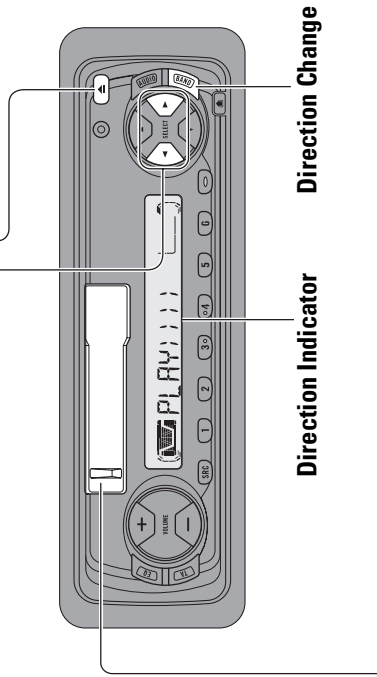
Note:

- Fast Forward/Rewind and Music Search can be canceled by pressing the BAND button.

Eject

Note:

- The Tape function can be turned ON/OFF with the cassette tape remaining in this product.



Cassette Loading Slot

Note:

- Don't insert any materials except for cassette into Cassette Loading Slot.

Basic Operation of Multi-CD Player

This product can control a Multi-CD player (sold separately).

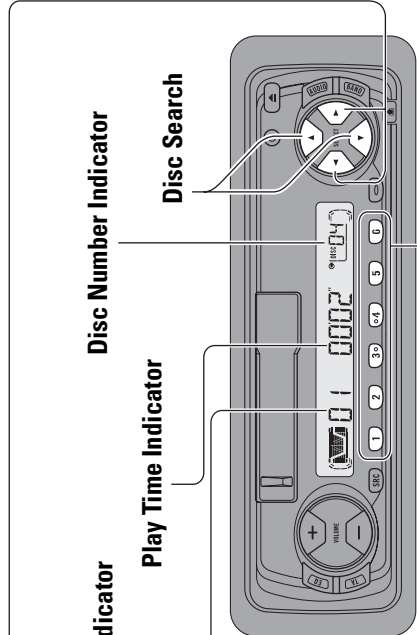
Track Search and Fast Forward/Reverse

- You can select between **Track Search** or **Fast Forward/Reverse** by pressing the **◀/▶** button for a different length of time.

Track Search	0.5 seconds or less
Fast Forward/Reverse	Continue pressing

Note:

- Multi-CD indicator "Ⓢ" lights when a Multi-CD source is selected.



Disc Number Search (for 6-Disc, 12-Disc types)

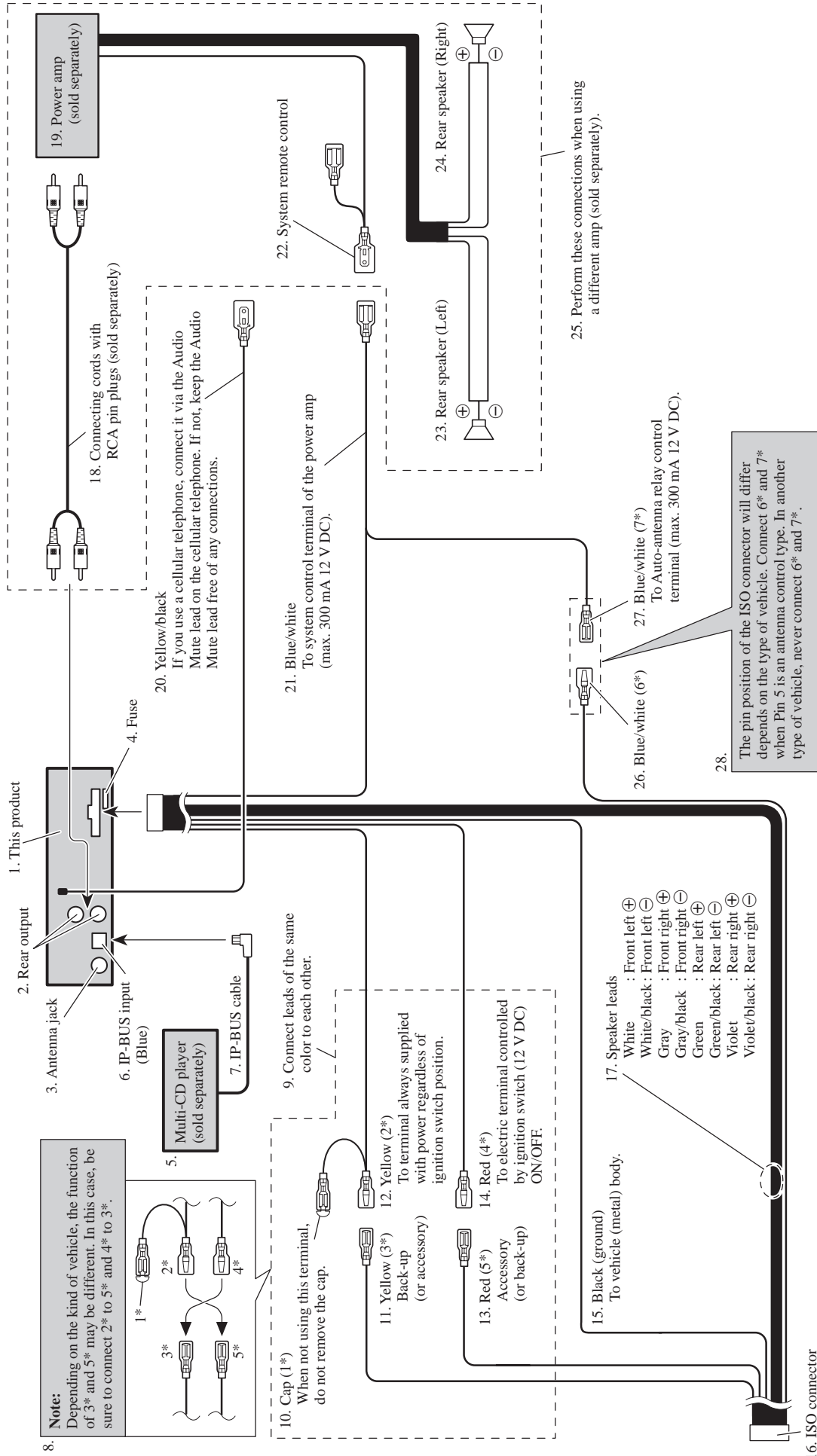
- You can select discs directly with the **1** to **6** buttons. Just press the number corresponding to the disc you want to listen to.

Note:

- When a 12-Disc Multi-CD Player is connected and you want to select disc 7 to 12, press the 1 to 6 buttons for 2 seconds.

Note:

- The Multi-CD player may perform a preparatory operation, such as verifying the presence of a disc or reading disc information, when the power is turned ON or a new disc is selected for playback. "READY" is displayed.
- If the Multi-CD player cannot operate properly, an error message such as "ERROR-14" is displayed. Refer to the Multi-CD player owner's manual.
- If there are no discs in the Multi-CD player magazine, "NO DISC" is displayed.



Note:
 In some vehicles, the ISO connector may be divided into two. In this case, be sure to connect to both connectors.

8.2 SPECIFICATIONS

General

Power source	14.4 V DC (10.8 – 15.1 V allowable)
Grounding system	Negative type
Max. current consumption	8.5 A
Electrode dark current	Less than 4 mA
Dimensions	
(mounting size)	178 (W) × 50 (H) × 155 (D) mm
(front face)	188 (W) × 58 (H) × 19 (D) mm
Weight	1.2 kg

Amplifier

Maximum power output	45 W × 4
Continuous power output	25 W × 4 (DIN45324, +B = 14.4 V)
Load impedance	4 Ω (4 – 8 Ω allowable)
Preout maximum output	
level/output impedance	2.2 V/1 kΩ
Equalizer (3-Band Equalizer)	
(Low)	Level: ±12 dB
(Mid)	Level: ±12 dB
(High)	Level: ±12 dB
Loudness contour	
(Low)	+3.5 dB (100 Hz), +3 dB (10 kHz)
(Mid)	+10 dB (100 Hz), +6.5 dB (10 kHz)
(High)	+11 dB (100 Hz), +11 dB (10 kHz)
	(volume: –30 dB)

Cassette player

Tape	Compact cassette tape (C-30 – C-90)
Tape speed	4.76cm/sec.(+0.14cm/sec., -0.05cm/sec.)
Fast forward/rewinding time	Approx. 100 sec. for C-60
Wow & flutter	0.09% (WRMS)
Frequency response	30 – 16,000 Hz (±3 dB)
Stereo separation	45 dB
Signal-to-noise ratio	61 dB (IEC-A network)

FM tuner

Frequency range	87.5 – 108 MHz
Usable sensitivity	
	9 dBf (0.8 μV/75 Ω, mono, S/N: 30 dB)
50 dB quieting sensitivity	15 dBf (1.5 μV/75 Ω, mono)
Signal-to-noise ratio	70 dB (IEC-A network)
Distortion	0.3% (at 65 dBf, 1 kHz, stereo)
Frequency response	30 – 15,000 Hz (±3 dB)
Stereo separation	40 dB (at 65 dBf, 1 kHz)

MW tuner

Frequency range	531 – 1,602 kHz (9 kHz)
Usable sensitivity	18 μV (S/N: 20 dB)
Selectivity	50 dB (±9 kHz)

LW tuner

Frequency range	153 – 281 kHz
Usable sensitivity	30 μV (S/N: 20 dB)
Selectivity	50 dB (±9 kHz)

Note:

- Specifications and the design are subject to possible modification without notice due to improvements.