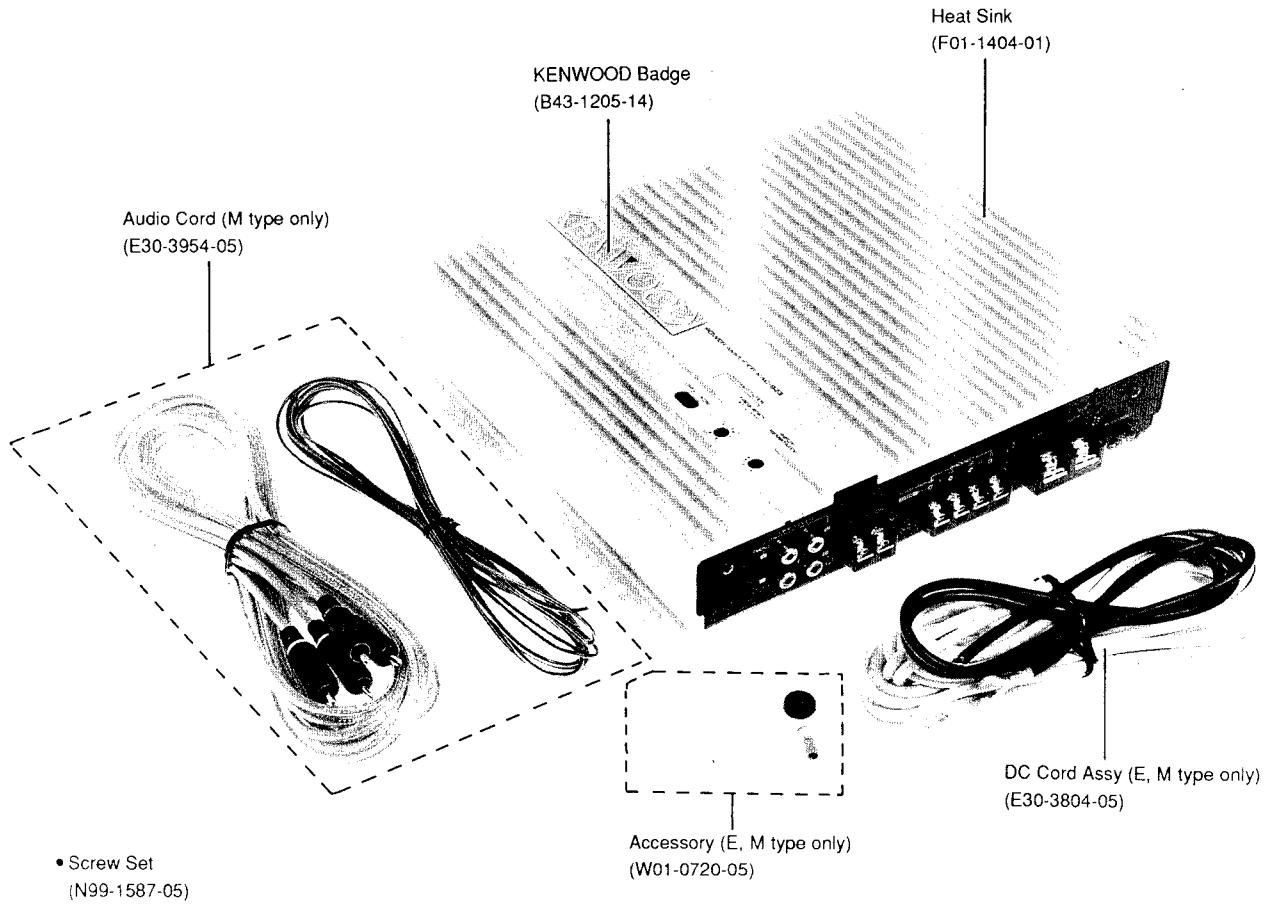


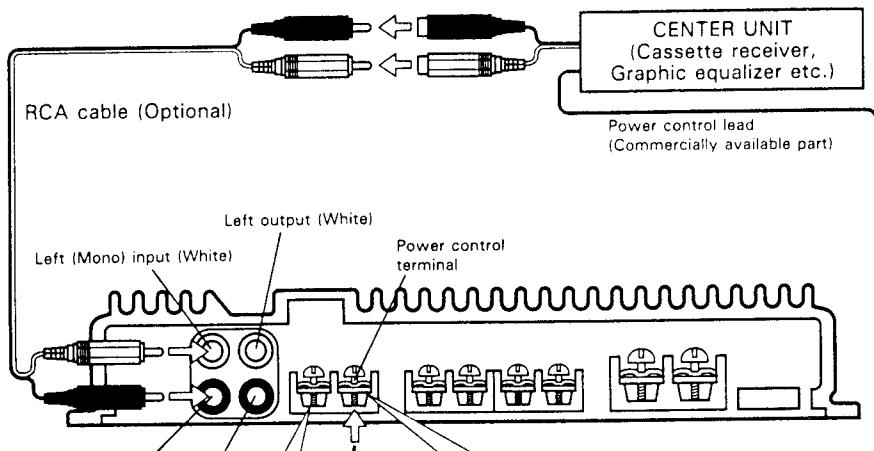
POWER AMPLIFIER

KAC-923**SERVICE MANUAL****KENWOOD**© 1992-4 PRINTED IN JAPAN
B51-6460-00 (B) 3687

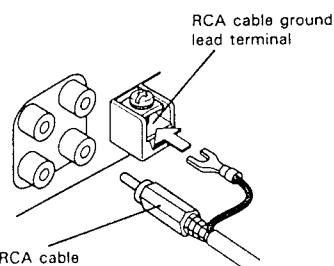
Description	Parts No.	Destination		
		K type	M type	E type
Panel assy	A20-7837-03	<input type="radio"/>	<input type="radio"/>	
	A20-7838-03			<input type="radio"/>
SUB-instruction manual	B59-0707-00		<input type="radio"/>	
Instruction manual	B64-0187-00	<input type="radio"/>	<input type="radio"/>	
	B64-0188-00			<input type="radio"/>
DC cord assy	E30-3804-05		<input type="radio"/>	<input type="radio"/>
Audio cord	E30-3954-05		<input type="radio"/>	
Item carton case	H01-9428-04	<input type="radio"/>	<input type="radio"/>	
	H01-9431-04			<input type="radio"/>
Accessory	W01-0720-05		<input type="radio"/>	<input type="radio"/>
Audio unit	X09-3690-10	<input type="radio"/>	<input type="radio"/>	
	X09-3692-71			<input type="radio"/>

CONNECTIONS

■ System connection



- When using an RCA cable with a ground lead attached, connect the ground lead to this terminal.



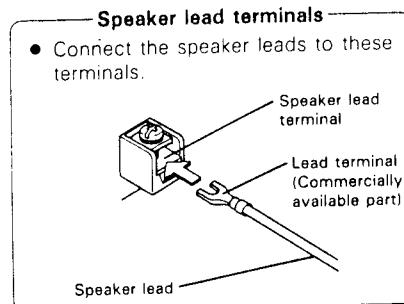
▲ CAUTION

- Do not use this terminal for power source grounding. This unit will not operate if the power source ground wire is connected to this terminal.

■ Speakers and Power lead connection

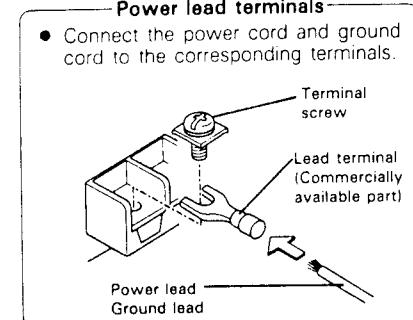
Speaker lead terminals

- Connect the speaker leads to these terminals.

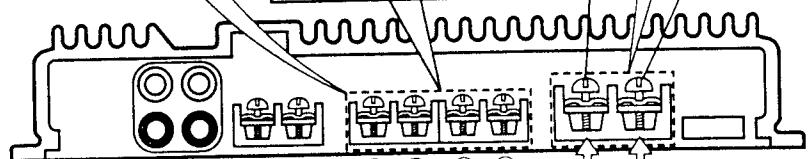


Power lead terminals

- Connect the power cord and ground cord to the corresponding terminals.

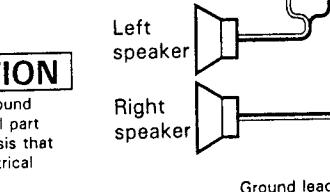


Operation switch	Speaker terminal polarity
Stereo position	L + L - R - R +
Tri-mode position	L + L - R + R -
Bridged/Mono position	+ - - -

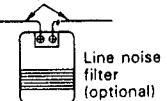


▲ CAUTION

- Connect the ground leads to a metal part of the car chassis that acts as an electrical ground passing electricity to the battery's minus (-) terminal.
- Do not turn the power ON if the ground leads are not connected.



- If a buzzing noise is heard from the speakers when the engine is running, connect a line noise filter (sold separately) to each of the power leads.



▲ WARNING

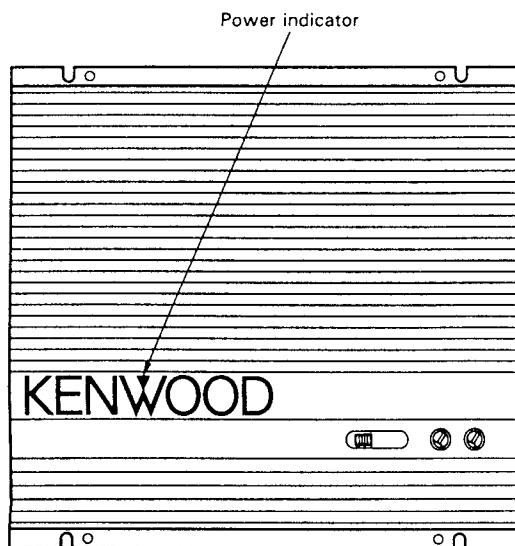
- To prevent fire caused by a short in the wiring, connect a fusible link or breaker between the battery and power terminals.

PROTECTION FUNCTION

Protection function

- This unit is equipped with a protection function for protecting this unit and your speakers from various accidents or problems that can occur.
- When the protection function activates, the unit stops operating and the power indicator lights green to indicate that the protection function is activated.

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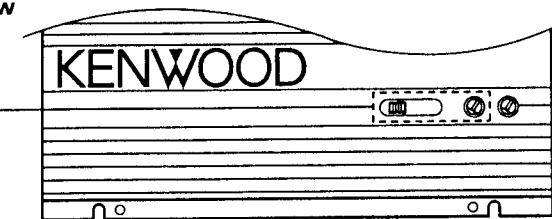


The protection function activates in the following situations:

- When a speaker output contacts ground.
- When the unit malfunctions and a DC signal is sent to the speaker outputs.
- When the temperature of internal parts exceeds 120°C (248°F). [When the temperature exceeds 80°C (176°F), the cooling fans operate to cool the unit. However, if the temperature continues to rise regardless of the cooling fan operation, the protection function will activate to shut down the unit.]
- When a ground lead of the center unit (cassette receiver, CD receiver, etc.) or this unit is not connected to a metal part serving as an electrical ground passing electricity to the battery's minus \ominus terminal. [In this case, the power indicator does not light.]

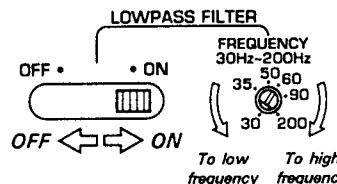
CONTROLS

■ Top view



• Low pass filter system

When this switch is set to ON, this unit can be used as a dedicated low output (sub woofer) power amplifier. The knob on the right-hand side adjusts the maximum output frequency (low pass frequency). When this system is turned ON, the output of the unit becomes monaural (L+R).



• Input sensitivity control

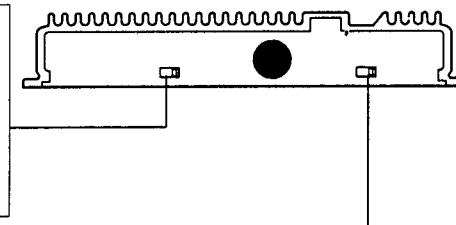
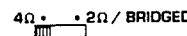
Adjust this control according to the pre-out level of the center unit connected to this unit.

Center unit preout level	Amplifier input sensitivity
300 mV	MAX
800 ~ 1000 mV	0.3 V

■ Side view

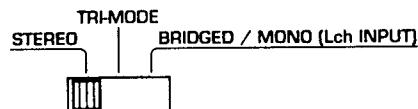
• Speaker switch

When the impedance of connected speakers is 4 Ω , set the switch to the left. When the impedance is 2 Ω or the output is bridge type, set the switch to the right.



• Operation switch

This switch can be used to configure the unit for a wide variety of applications.



STEREO position:

Set to this position to use the unit as a normal stereo amplifier.

TRI-MODE position:

Set to this position to use the unit as a stereo amplifier while at the same time obtaining a bridged output.

BRIDGED/MONO position:

Set to this position to use the unit as a monaural amplifier with a bridged output.

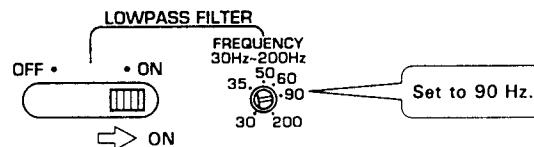
LOW PASS FILTER SYSTEM

■ SYSTEM EXAMPLE

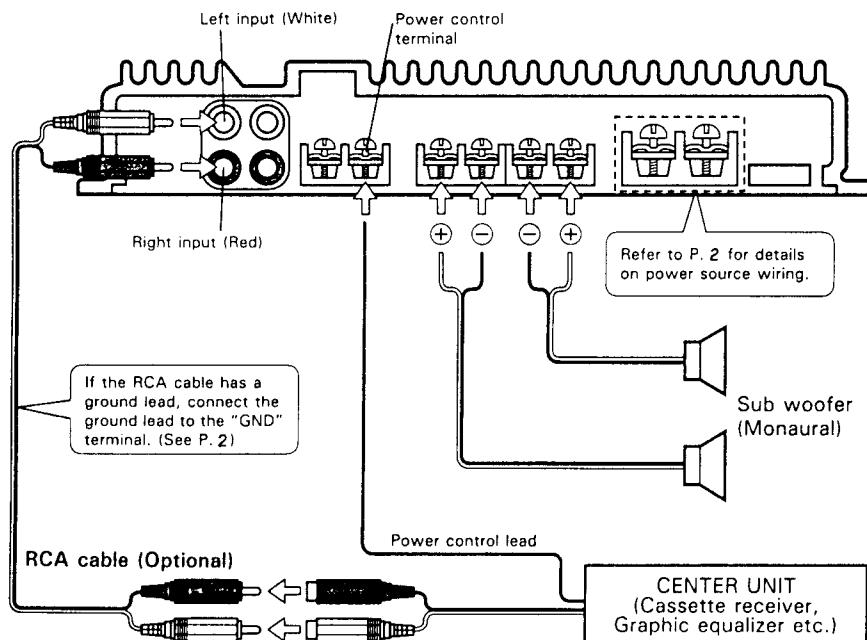
You can use the built-in low pass filter function to configure the following type of system.

- Sub woofer system for output frequencies of less than 90 Hz.

<Low pass filter adjustment>



<Connection>



BRIDGED/MONURAL SYSTEM

■ SYSTEM EXAMPLE

This unit can be used as a monaural amplifier by setting the operation switch to the Bridged/Mono position. This allows you to combine two units to create a high-powered sound system.

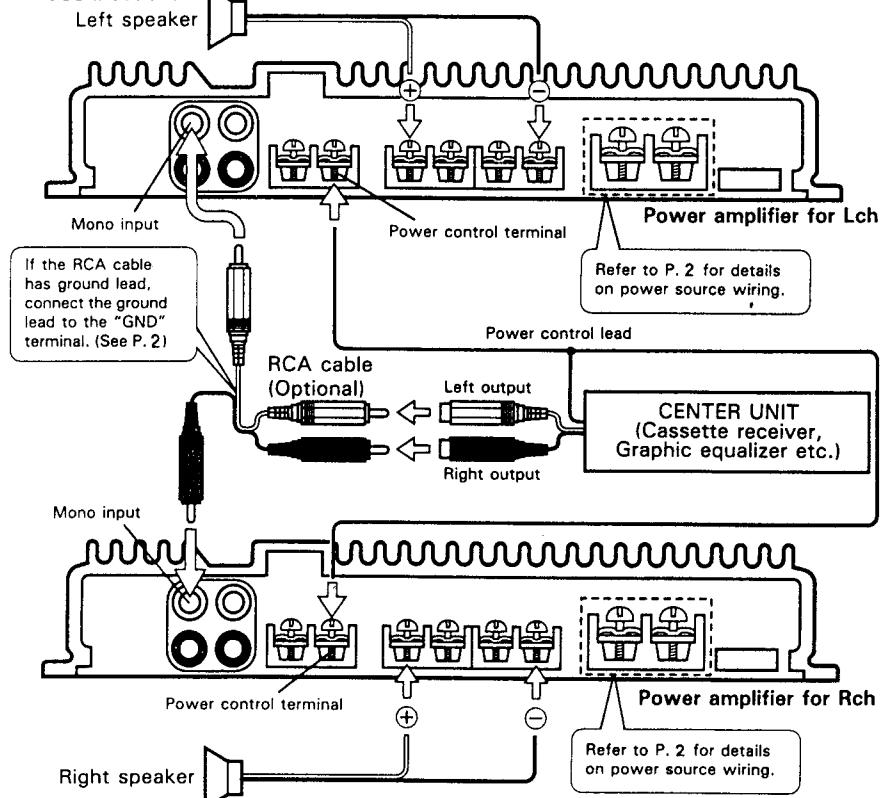
<Operation switch setting>

TRI-MODE
STEREO BRIDGED / MONO (Lch INPUT)

<Speaker switch setting>

4Ω • 2Ω / BRIDGED

<Connection>



▲ CAUTION

- Be sure that the combined impedance of your speaker system as seen from the KAC-923/823 is at least 2 ohms. An impedance of less than 2 ohms will damage the amplifier.

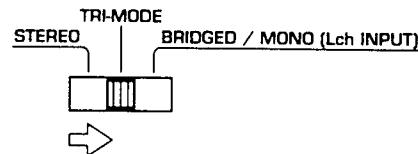
TRI-MODE

By setting the switch to the Tri-mode position, you can obtain a stereo output and a bridged output at the same time, allowing you to connect both a pair of normal stereo speakers and a woofer.

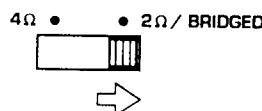
This setup enables you to use the frequency cut-off characteristics of coils and capacitors (see below) to configure your own multi-way speaker system.

- Coil (L): Passes low frequencies and blocks high frequencies. (Low pass)
- Capacitor (C): Passes high frequencies and blocks low frequencies. (High pass)

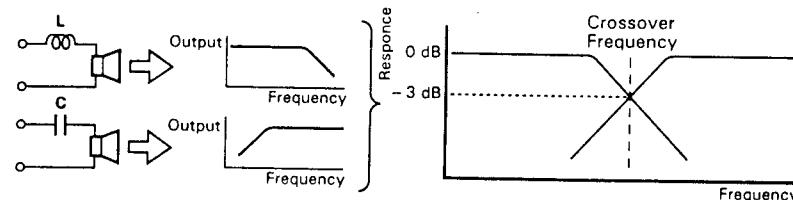
<Operation switch setting>



<Speaker switch setting>



■ 6dB/octave for High and Low pass filter



■ Table of content for 6dB

Cross over frequency	Speaker impedance			
	2 ohm		4 ohm	
	L (Coil)	C (Capacitor)	L (Coil)	C (Capacitor)
80 Hz	4.0 mH	1000 μF	8.0 mH	500 μF
100 Hz	3.2 mH	800 μF	6.4 mH	400 μF
150 Hz	2.1 mH	530 μF	4.2 mH	270 μF
200 Hz	1.6 mH	400 μF	3.2 mH	200 μF

- If the coils and capacitors are not available in the values listed, coils and capacitors with similar or close values can be used without affecting the performance in practical use.
- Coils and capacitors not listed in the above table can be determined using the following formulas.

$$C = \frac{159000}{f_c \times R} \text{ } (\mu\text{F}) \quad L = \frac{159 \times R}{f_c} \text{ } (\text{mH})$$

f_c = Cut of Frequency (Hz) R = Speaker Impedance (Ω)

■ SYSTEM EXAMPLE

- 2 way speaker system

- Use 4 ohm speakers.

- 6dB/oct. slope

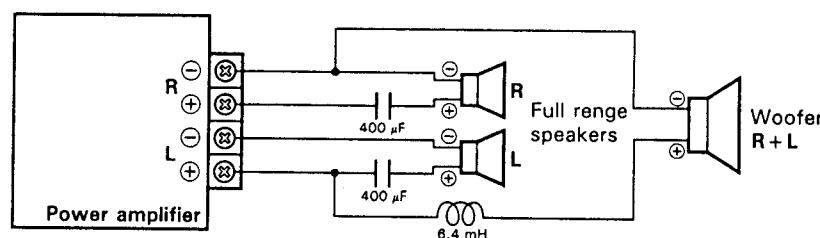
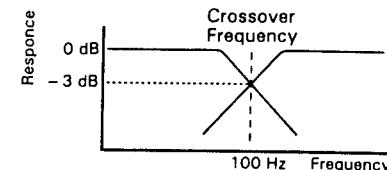
- Full range speaker:

100 Hz or more

- Woofer: 100 Hz or less

From the table on the previous page, the coil and capacitors required for the above system are as follows:

- Capacitors for full-range speakers : 400 μF (Withstand voltage: 50 V or more)
- Coil for woofer : 6.4 mH (Current capacity: 5 A or more)



▲ CAUTION

- Be sure that the combined impedance of your speaker system as seen from the KAC-923/823 is at least 2 ohms. An impedance of less than 2 ohms will damage the amplifier.

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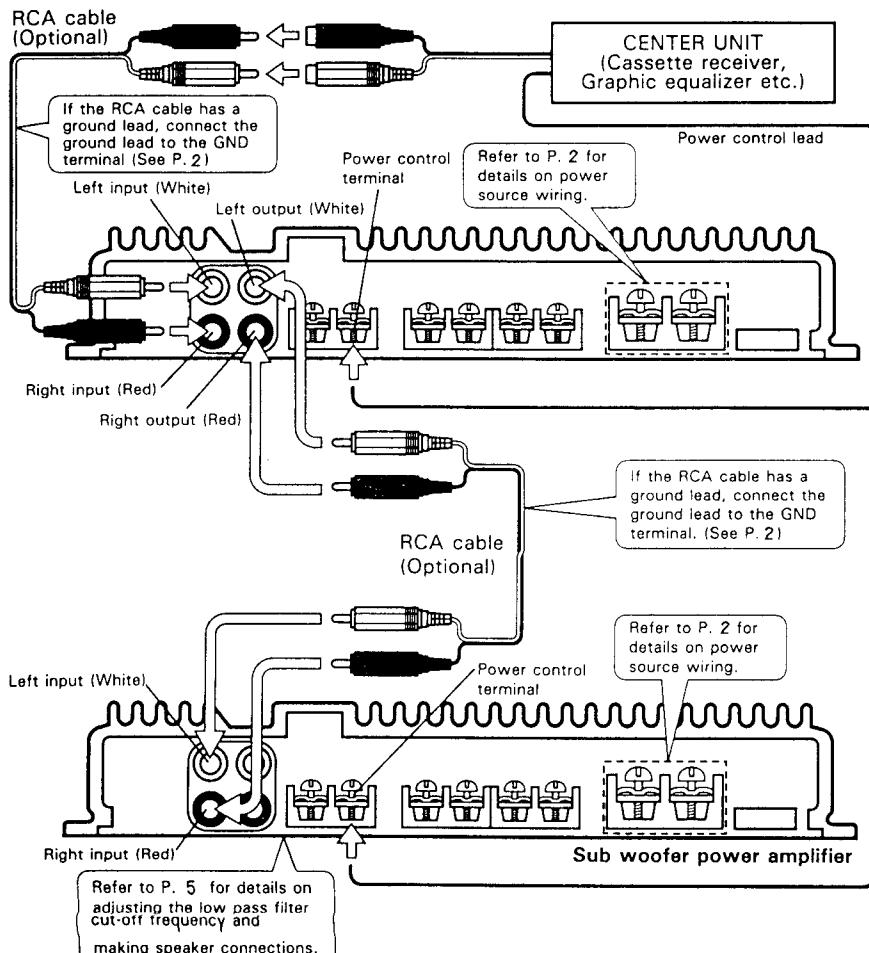
USING THE RCA LINE IN AND OUT TERMINALS

There are times when you may want to add another power amplifier to your system for expansion purposes such as driving a sub woofer. This unit is equipped with a line output which makes it easy to add another power amplifier to your system.

■ SYSTEM EXAMPLE

- Two amplifiers are used in the system, with one used as a normal stereo power amplifier and the other used as a sub woofer power amplifier.

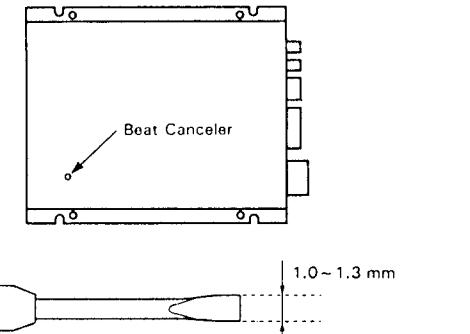
<System connection>



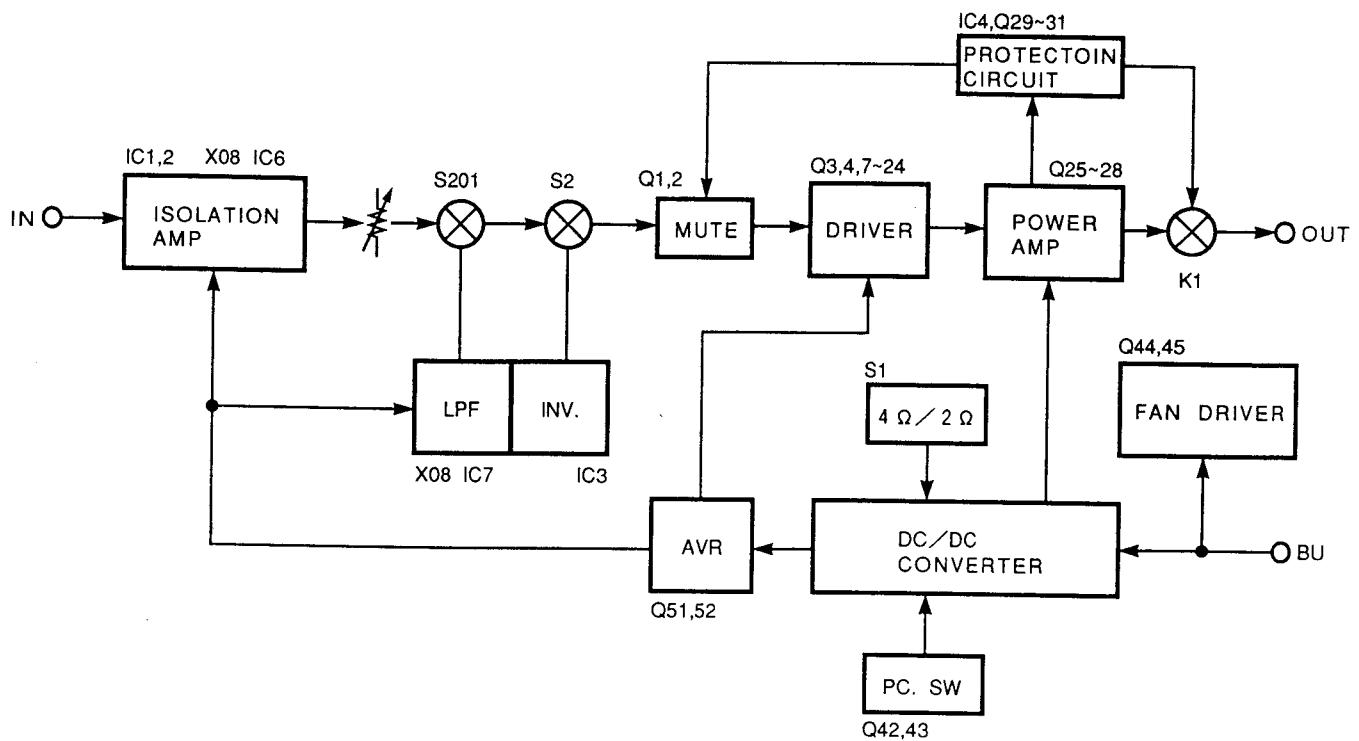
<Refer to P. 2 for details on power lead connections.>

TROUBLESHOOTING GUIDE

What often appears to be a malfunction is often due to user error in operation or connection. When trouble occurs with your unit, please check the following before calling for service.

Symptom	Cause	Remedy
No sound. (No sound from one side.)	A speaker cord has become unconnected.	Check the speaker cord connections.
The sound quality is bad. (The sound is distorted.)	1. The speakers are connected to the same wires. 2. A speaker cord is pinched by a screw in the car body.	1. Connect each speaker terminal to its respective speaker output. 2. Check the speaker wiring.
Beat noise is heard when listening to AM radio broadcasts.	Use a screwdriver to adjust the "Beat Canceler" on the bottom of the unit.	 <p>Beat Canceler 1.0 ~ 1.3 mm Screwdriver</p>

BLOCK DIAGRAM

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KAC-923

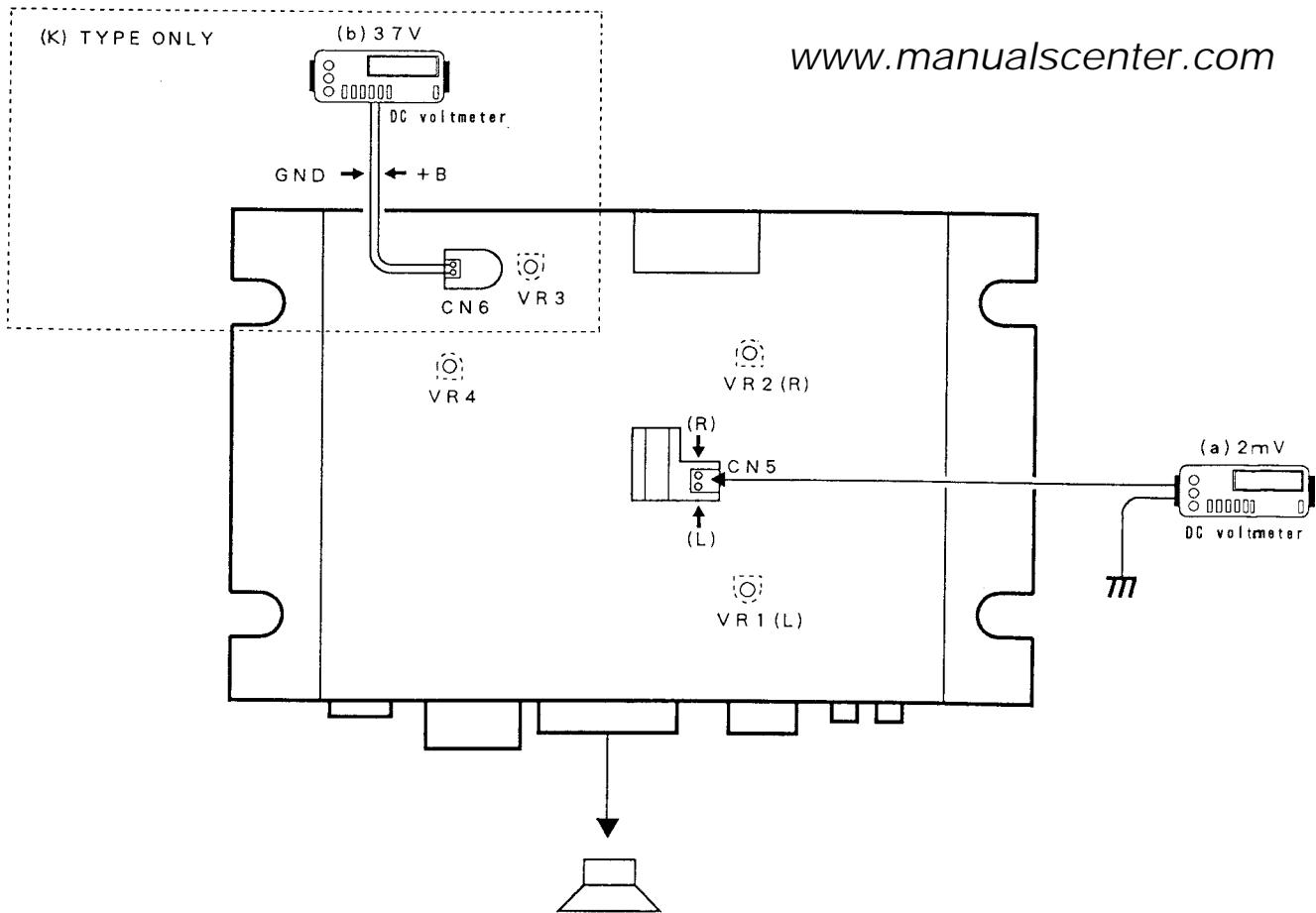
DESCRIPTION OF COMPONENTS

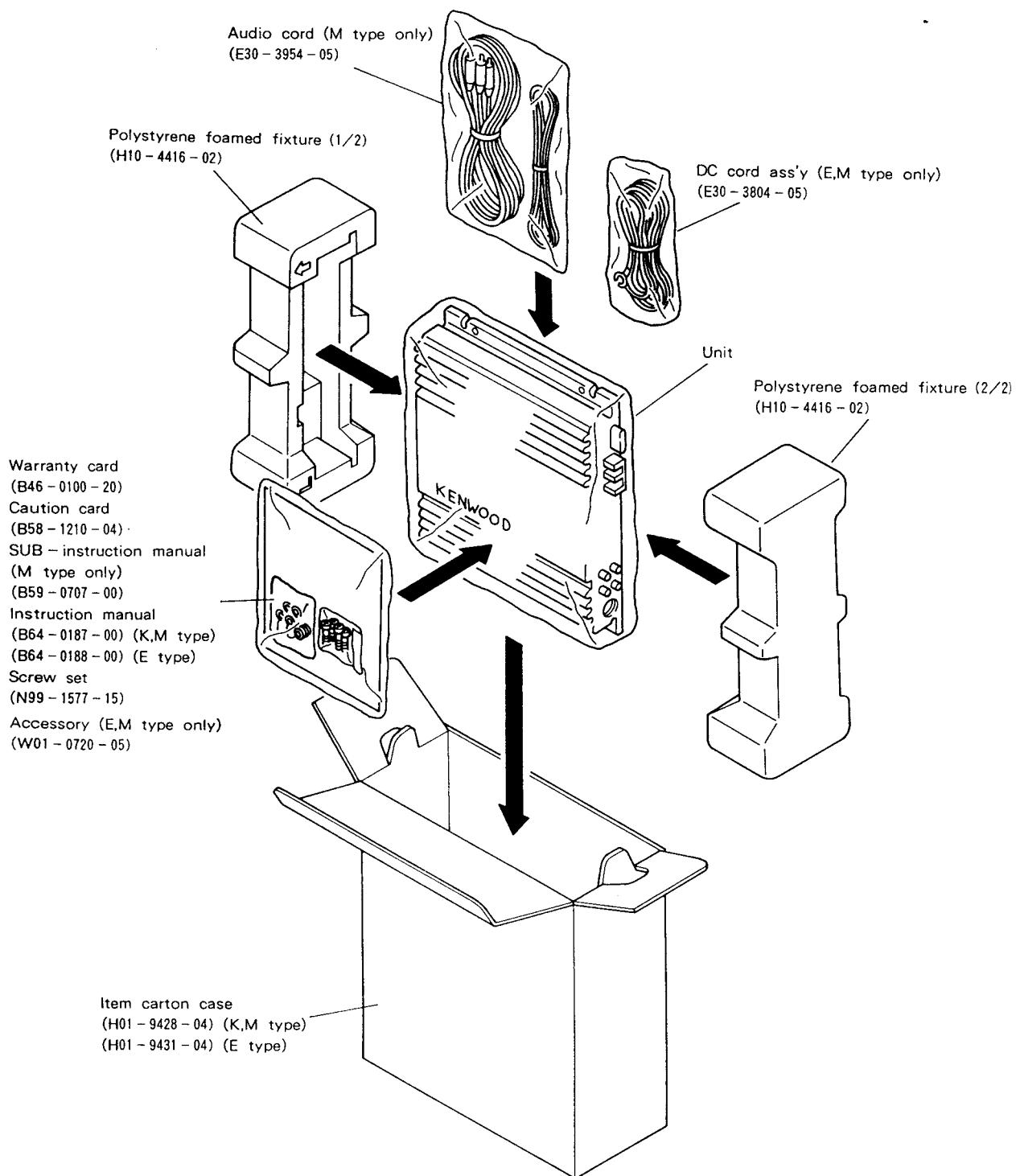
Audio Unit (X09-369X-XX) (incl. X08-2540-10)

Reference No.	Reference Name	Function	Description
IC1, 2, 6 (IC6 is on X08-2540-10)	NPC4570C	Isolation amplifier	Eliminates noise from automobile entering the amplifier input.
IC3	NJM4558D	Inverter	Inverter for bridge circuit.
IC4	μ PC1237HA	Protection	Detects overload, DC offset and P.CON.
IC5	μ PC494C	Switching regulator	Oscillator for DC/DC converter. (PWM control with 0-10 destination model.)
IC7 (IC7 is on X08-2540-10)	NJM4558D	LPF	LPF for sub-woofer.
Q1, 2	2SC945 (A) (Q, P)	Input muting	Protects the relay contact by functioning at an earlier timing than the relay when the amplifier is turned ON or OFF.
Q3, 4	2SK389	Input differential amplifier	Determines the amplifier gain based on the input signal applied to one input and negative feed back applied to the other input.
Q7 to 10	2SA992 (F, E)	Second-stage differential amplifier	
Q15, 16	2SC2631 (Q, R)	Cascode stage	
Q17, 18	2SA1123 (Q, R)	Current mirror	Load to cascode stage of the differential amplifier.
Q19, 20	2SC3419	Temperature compensation	
Q21, 22	2SC2590 (Q, R)	Power amplifier drive	
Q23, 24	2SA1110 (Q, R)		
Q25, 26	2SC4886	Power stage	
Q27, 28	2SA1860		
Q29, 30	2SC1845 (F, E)	Current detector	
Q31	2SA992 (F, E)		Detects over-current and controls IC4.
Q32 to Q37	IRFIZ34	Switching power stage	
Q55, 56			
Q38, 39	2SC945 (A) (Q, P)	Switching driver	
Q40, 41	2SA733 (A) (Q, P)		
Q42	2SA1534A (R, S)	Power switch	Supplies power to IC5.
Q43	2SC945 (A) (Q, P)	P.CON "ON" detector	
Q44	2SA733 (A) (Q, P)	Fan drive	
Q45	2SC3940A (R, S)		Detects temperature using TH3 and activates the fan.
Q46, 47 (X08-2540-10)	2SA1561	Operation indicator driver	When Q46 is ON, the amplifier is in the protection mode. When Q47 is ON, the amplifier is in the operation mode.
Q51	2SD1266BD (Q, P)	AVR	
Q52	2SB941BD (Q, P)		120V regulated voltage.

ADJUSTMENT

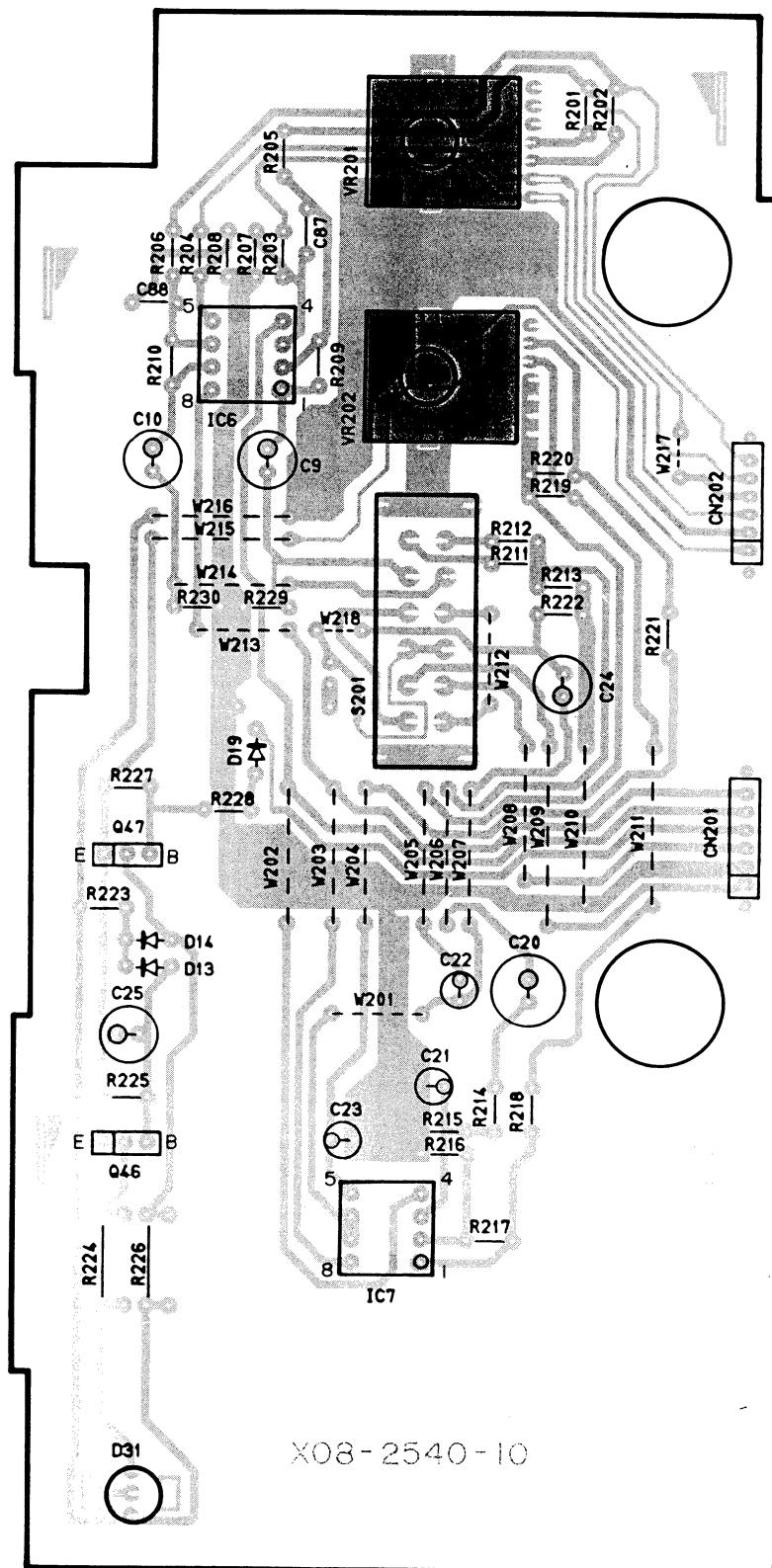
No.	ITEM	INPUT SETTINGS	OUTPUT SETTINGS	RECEIVER SETTINGS	ALIGNMENT POINTS	ALIGN FOR	FIG.
Connect a cassette receiver, etc.							
1	IDLE CURRENT	—	Connect a DC voltmeter to CN5	Volume: 0	VR1(L) VR2(R)	After sufficient aging, adjust to 2mV	(a)
2	BEAT CANCELER	—	—	Receive an AM station.	VR4	Only in case beat noise is heard, adjust to minimize it.	
K TYPE ONLY							
3	SUPPLY VOLTAGE	Set S1 to the 4-ohm position.	Connect a DC voltmeter to CN6	Volume: 0	VR3	Adjust to 37V.	(b)





PC BOARD (Component side view)

Preamplifier unit (X08-2540-10)



Refer to the schematic diagram for the values of resistors and capacitors.

G

H

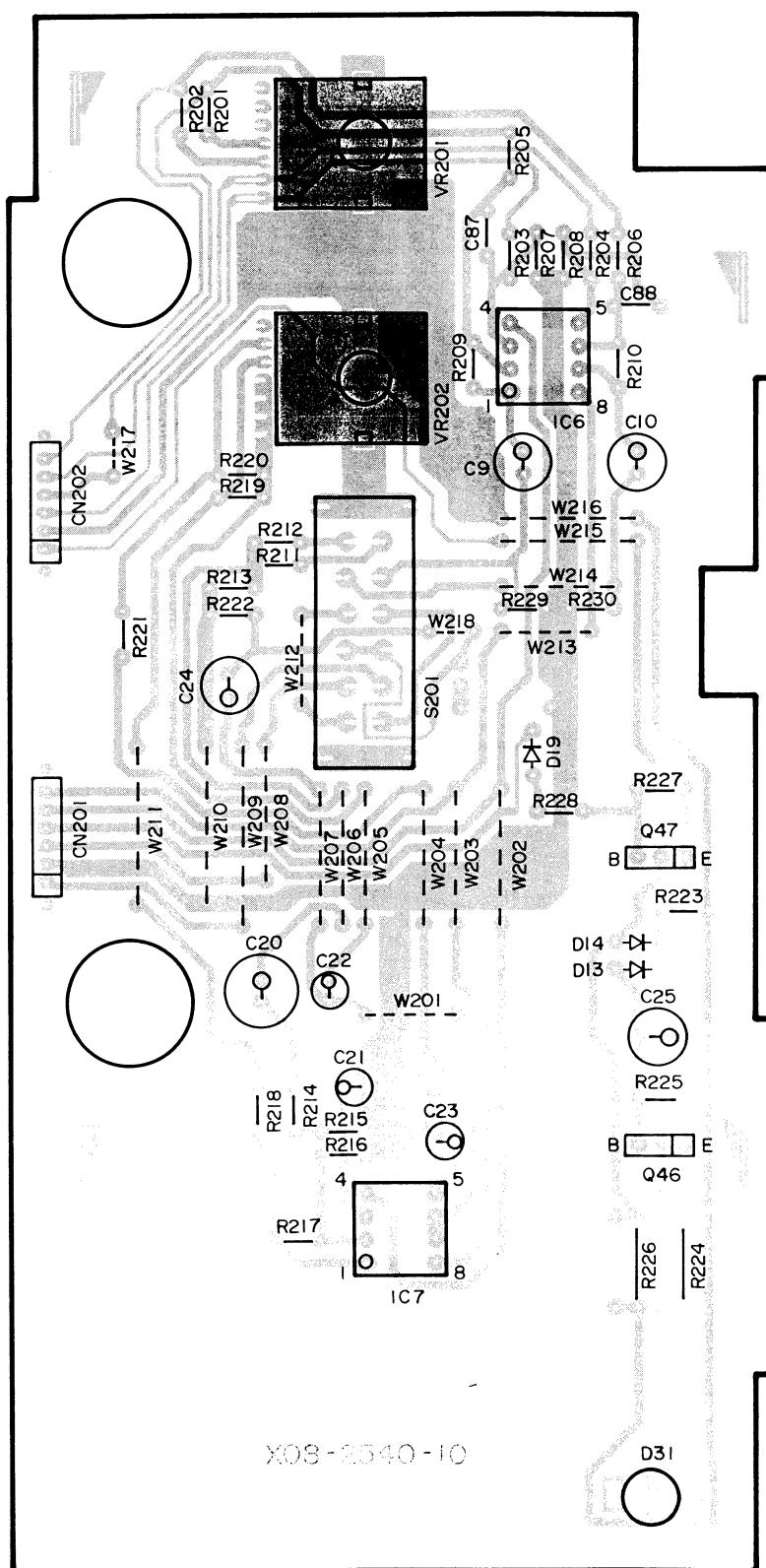
I

J

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PC BOARD (Foil Side View)

Preamplifier unit (X08-2540-10)



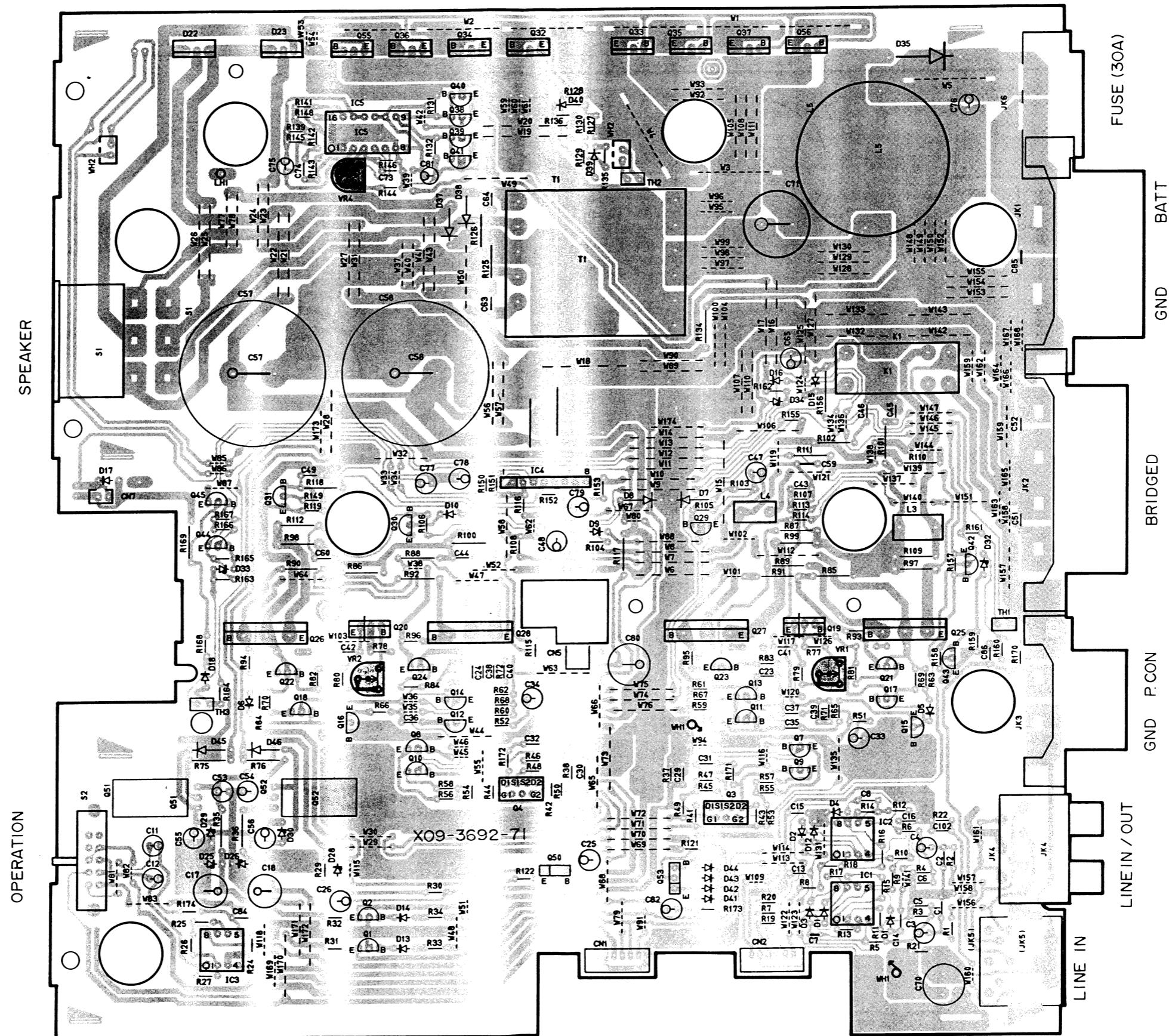
X08 - 2540 - 10

Refer to the schematic diagram for the values of resistors and capacitors.

PC BOARD (Component side view)

Audio unit (X09-3692-71) E TYPE

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Ref. No.	Address
IC	Q
1	6D
2	6D
3	6F
4	5E
7	5G
8	5E
9	5G
10	5E
11	5F
12	5E
13	5F
14	5E
15	5G
16	5D
17	5G
18	5D
19	5G
20	5D
21	5G
22	5D
23	5F
24	5E
25	5G
26	5D
27	5F
28	5E
29	4F
30	4E
31	4C
32	1E
33	1F
34	1E
35	1F
36	1E
37	1F
38	2E
39	2E
40	2E
41	2E
42	4H
43	5H
44	4C
45	4C
50	6E
51	6C
52	6D
53	6F
55	1D
56	1G
1	6GG
2	6GG
3	7D
4	4E
5	2D

Refer to the schematic diagram for the values of resistors and capacitors.

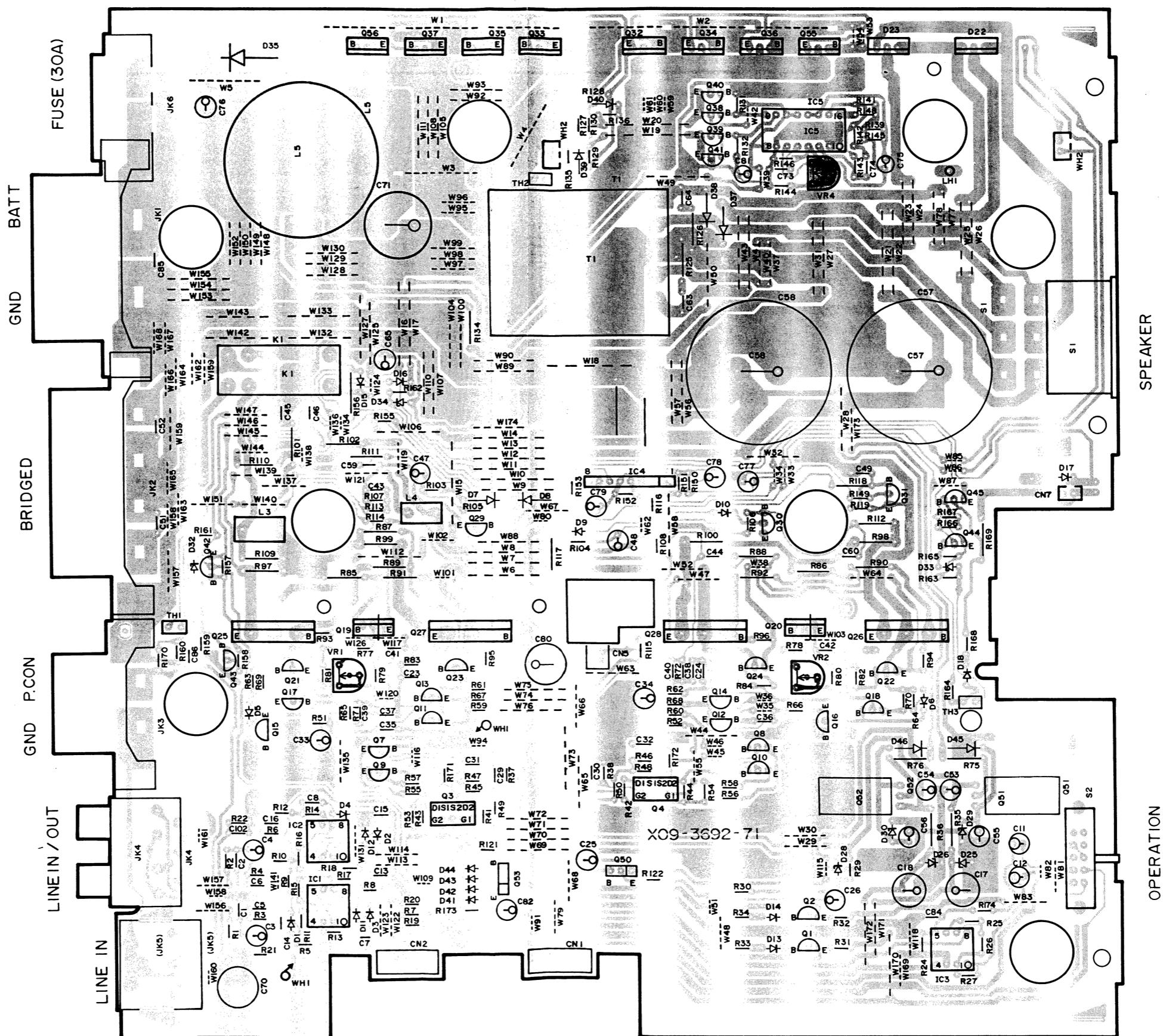
K L M N O P Q R S T

PC BOARD (Foil Side View)

Audio unit (X09-3692-71) E TYPE

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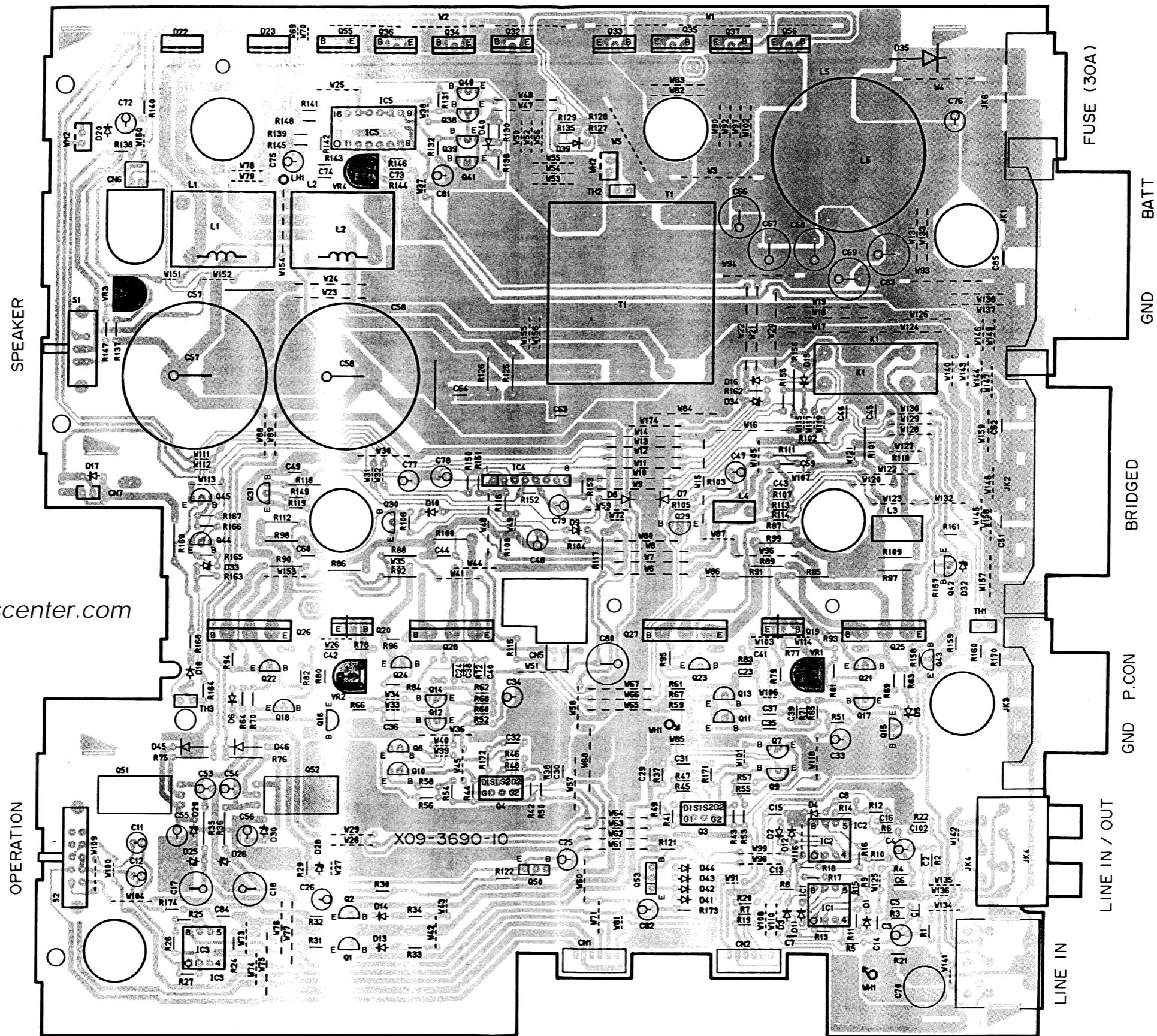
Ref. No.	Address
IC	Q
1	6Q
2	6Q
3	6O
4	6P
7	5O
8	5Q
9	5O
10	5Q
11	5O
12	5Q
13	5O
14	5Q
15	5N
16	5Q
17	5N
18	5Q
19	5O
20	5Q
21	5N
22	5R
23	5O
24	5Q
25	5N
26	5Q
27	5O
28	5P
29	4O
30	4Q
31	4R
32	1P
33	1P
34	1Q
35	1O
36	1Q
37	1O
38	2Q
39	2Q
40	2Q
41	2Q
42	4N
43	5N
44	4R
45	4R
50	6P
51	6R
52	6Q
53	6O
55	1Q
56	1O
1	6N
2	6N
3	6R
4	4P
5	2Q



Refer to the schematic diagram for the values of resistors and capacitors.

PC BOARD (Component side view)

Audio unit (X09-3690-10) K, M TYPE

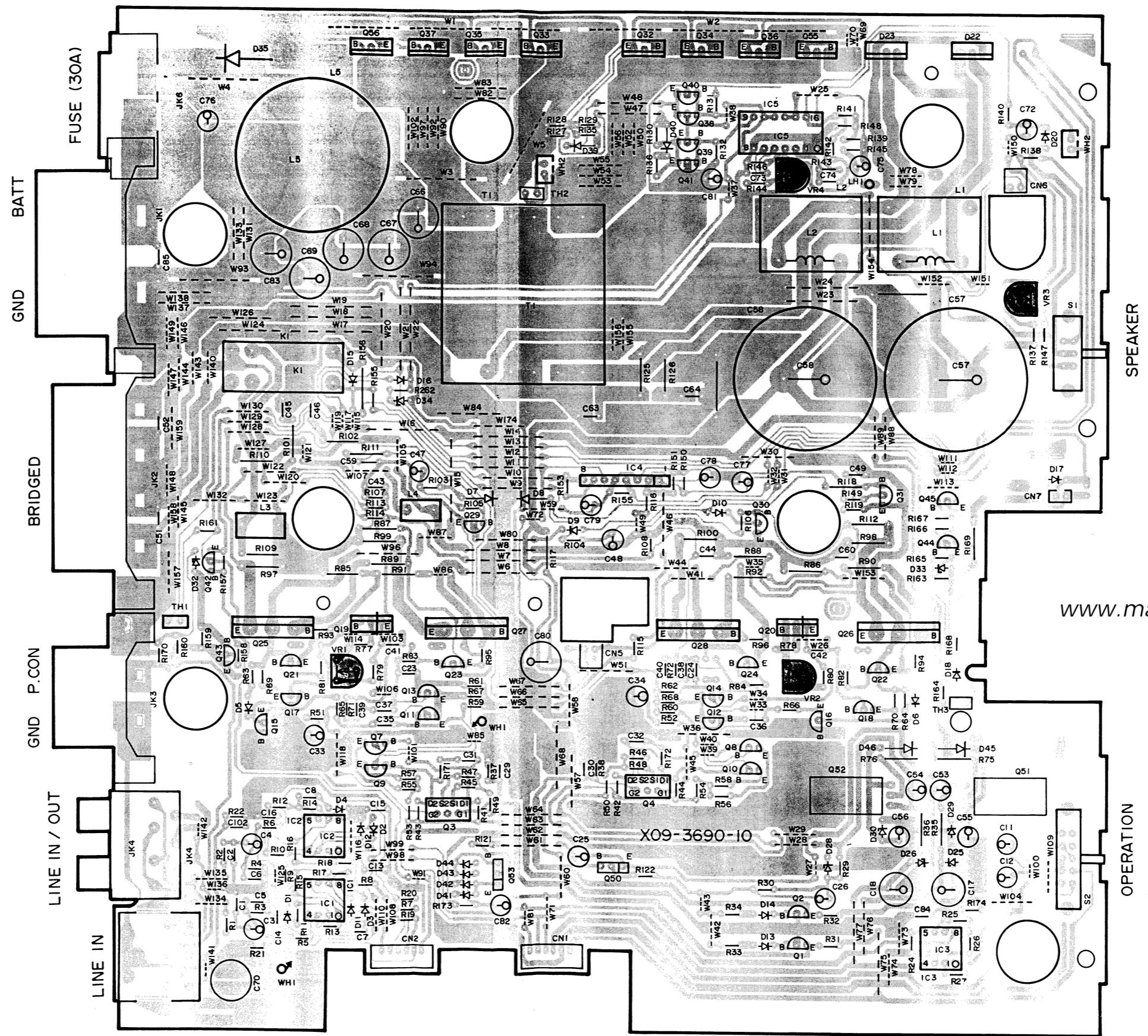


Ref. No.	Address
IC	Q
1	6D
2	6D
3	6F
4	5E
7	5G
8	5E
9	5G
10	5E
11	5F
12	5E
13	5F
14	5E
15	5G
16	5D
17	5G
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21	5G
22	5D
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25	5G
26	5D
27	5F
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29	4F
30	4D
31	4D
32	1E
33	1F
34	1E
35	1F
36	1D
37	1F
38	2E
39	2E
40	2E
41	2E
42	4H
43	5H
44	4C
45	4C
50	6E
51	6C
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1	6G
2	6G
3	6C
4	4E
5	2D
6	1G

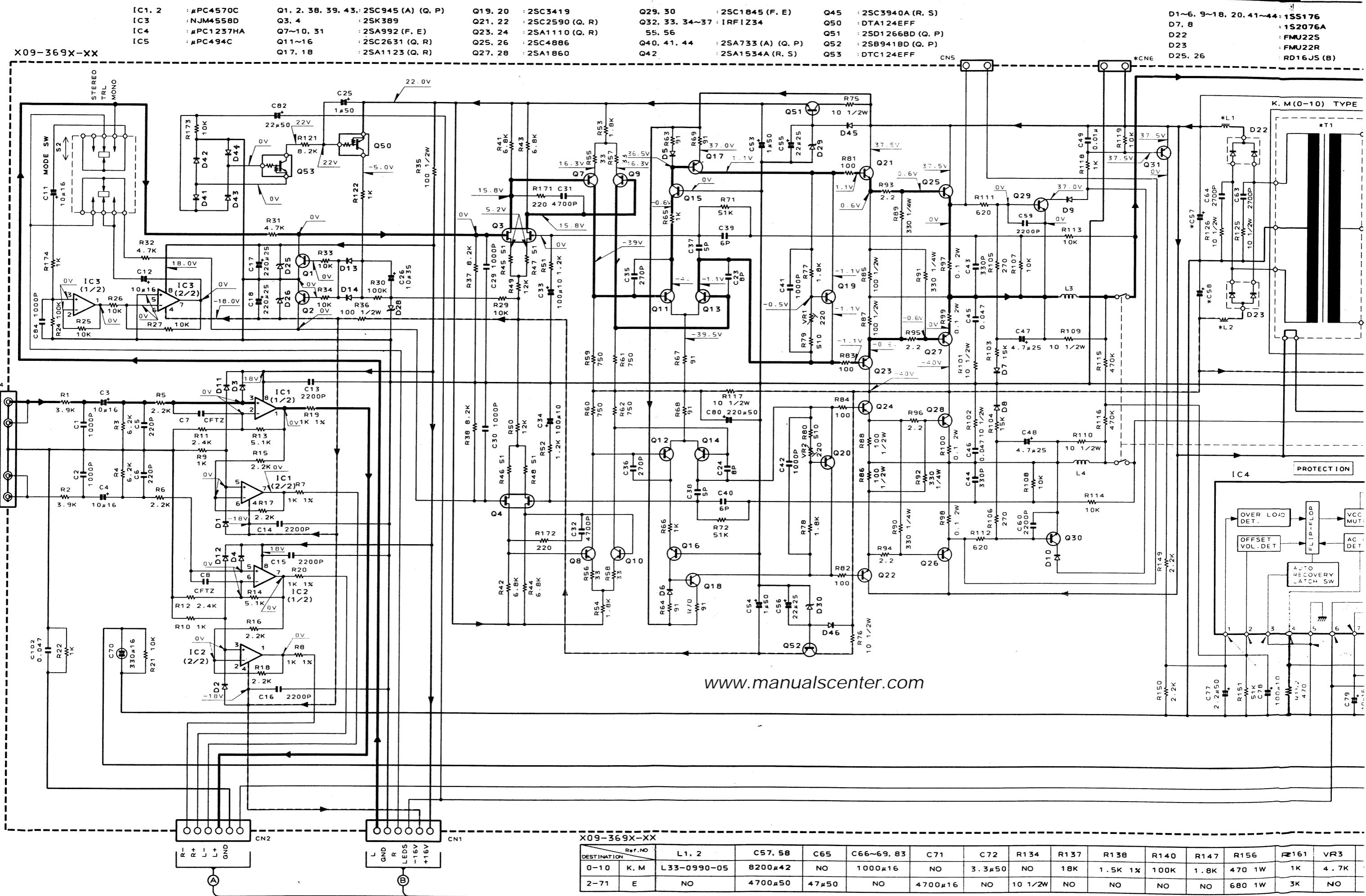
PC BOARD (Foil Side View)

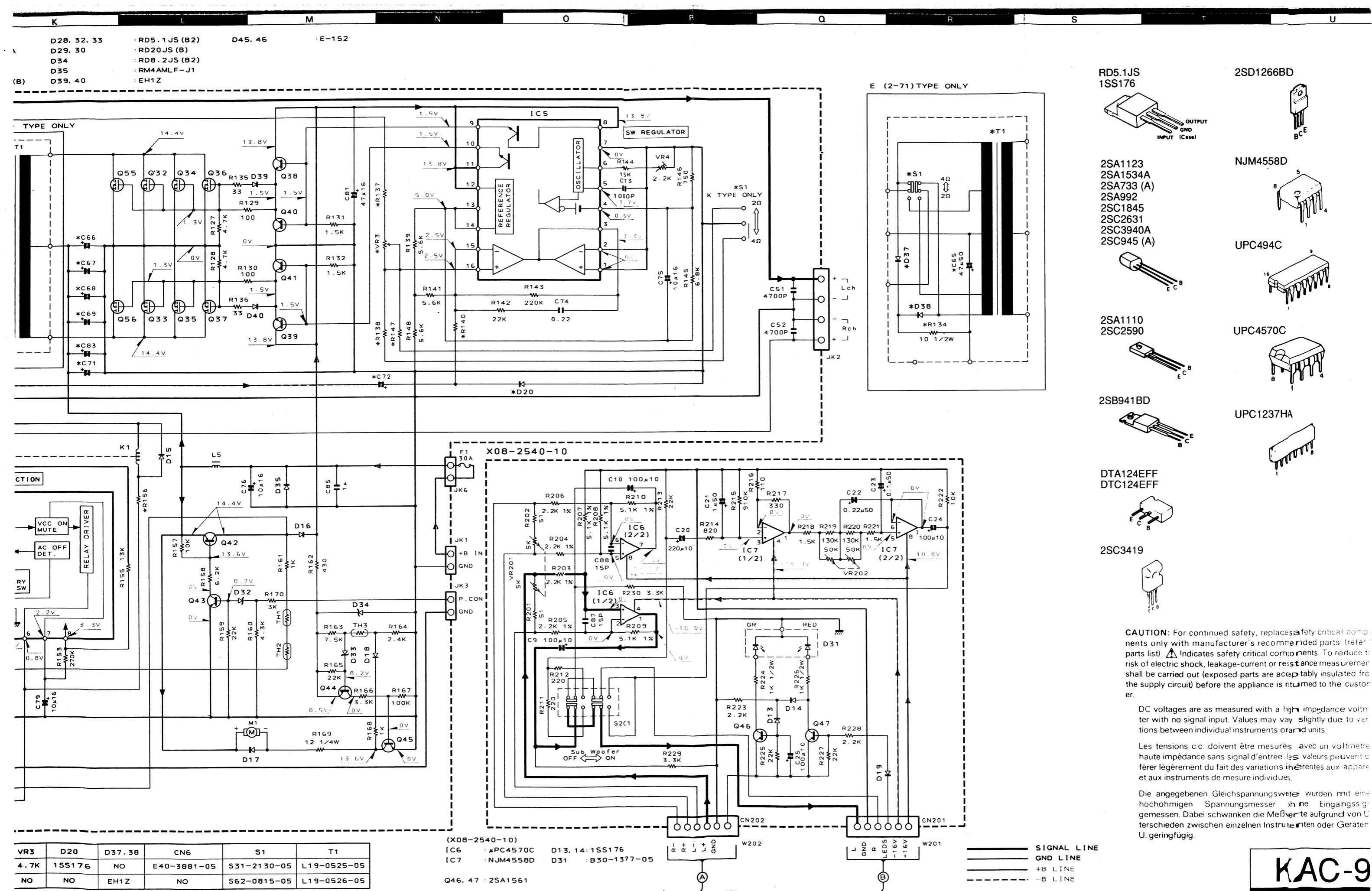
Audio unit (X09-3690-10) K, M TYPE

Ref. No.	Address
IC	Q
1	6Q
2	6Q
3	6O
4	6P
7	5O
8	5Q
9	5O
10	5Q
11	5O
12	5Q
13	5O
14	5Q
15	5N
16	5Q
17	5N
18	5R
19	5O
20	5Q
21	5N
22	5R
23	5O
24	5Q
25	5N
26	5R
27	5O
28	5Q
29	4O
30	4Q
31	4R
32	1P
33	1P
34	1Q
35	1O
36	1Q
37	1O
38	2Q
39	2Q
40	2Q
41	2Q
42	4N
43	5N
44	4R
45	4R
50	6P
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56	1O
1	6N
2	6N
3	6R
4	4P
5	2Q

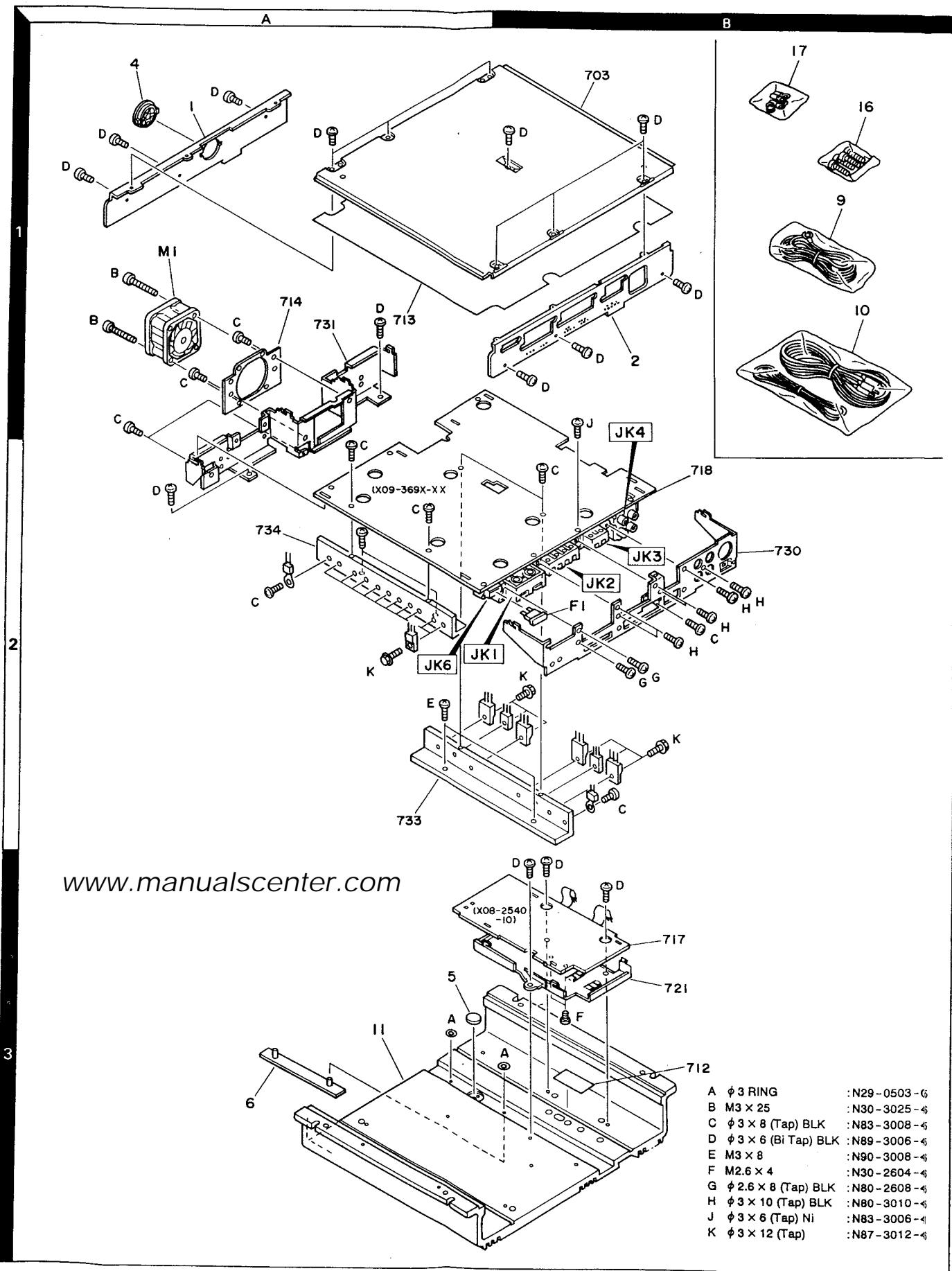


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EXPLODED VIEW



Parts with the exploded numbers larger than 700 are not supplied.

KAC-923

PARTS LIST

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Ref. No. 参照番号	Address 位 置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
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KAC-923

1	1A	*	A20-7837-03	PANEL ASSY	KM	
1	1A	*	A20-7838-03	PANEL ASSY	E	
2	1B	*	A23-5057-03	REAR PANEL		
4	1A		B07-2028-14	ESCUTCHEON		
5	3A	*	B19-0907-04	LIGHTING BOARD		
			B46-0100-20	WARRANTY CARD		
			B58-1210-04	CAUTION CARD	M	
		*	B59-0707-00	SUB-INSTRUCTION MANUAL		
				INSTRUCTION MANUAL	KM	
		*	B64-0187-00	INSTRUCTION MANUAL	E	
		*	B64-0188-00			
9	1B	*	E30-3804-05	DC CORD ASSY (CRITICAL)	EM	
10	1B	*	E30-3954-05	AUDIO CORD	M	
11	3A, 3B	*	F01-1404-01	HEAT SINK		
F1	2B		F05-3033-05	FUSE (30A)		
M1	1A		F09-1208-05	FAN		
		*	H01-9428-04	ITEM CARTON CASE	KM	
		*	H01-9431-04	ITEM CARTON CASE	E	
		*	H03-3499-04	OUTER CARTON CASE		
			H10-4416-02	POLYSTYRENE FOAMED FIXTURE		
			H25-0321-04	PROTECTION BAG (600X315X0.03)		
			H25-0336-04	PROTECTION BAG (170X250X0.03)		
16	1B	*	N99-1577-15	SCREW SET		
A	3A	*	N29-0503-05	RETAINING RING (3)		
B	1A		N30-3025-46	PAN HEAD MACHIN SCREW		
C	1A, 2B		N83-3008-45	PAN HEAD TAPTRITE SCREW		
D	1A, 1B		N89-3006-45	BINDING HEAD TAPTRITE SCREW		
E	2A		N90-3008-46	PAN HEAD MACHIN SCREW		
17	1B	*	W01-0720-05	ACCESSORY	EM	

PREAMPLIFIER UNIT (X08-2540-10)

D31		*	B30-1377-05	LED			
C9 , 10			CE04CW1A101M	ELECTRO	100UF	10WV	
C20			CE04CW0J221M	ELECTRO	220UF	6.3WV	
C21			C90-2608-05	ELECTRO	1.0UF	50WV	
C22			C90-2604-05	ELECTRO	0.22UF	50WV	
C23			C90-2602-05	ELECTRO	0.1UF	50WV	
C24 , 25			CE04CW1A101M	ELECTRO	100UF	10WV	
F	3B		N30-2604-46	PAN HEAD MACHIN SCREW			
R203-206			R92-2102-05	METAL FILM	2.2K	D 1/6W	
R207-210			R92-2103-05	METAL FILM	5.1K	D 1/6W	
VR201			R10-2622-05	POTENTIOMETER(5K)			
VR202			R10-4645-05	POTENTIOMETER(50K)			
S201			S62-0810-05	SLIDE SWITCH			
D13 , 14			1SS176	DIODE			
IC6			UPC4570C	IC(OP AMP X2)			
IC7			NJM4558D	IC(OP AMP X2)			
Q46 , 47			2SA1561	TRANSISTOR			

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AUDIO UNIT (X09-369X-XX) 0-10: KM, 2-71: E								
C1 ,2			CK45FB1H102K	CERAMIC	1000PF	K		
C3 ,4			CE04DW1C100M	ELECTRO	10UF	16WV		
C5 ,6			CC45FSL1H221J	CERAMIC	220PF	J		
C7 ,8			CC45SL1H151J	CERAMIC	150PF	J		
C11 ,12			CE04DW1C100M	ELECTRO	10UF	16WV		
C13 -16			CK45FB1H222K	CERAMIC	2200PF	K		
C17 ,18			CE04DW1E221M	ELECTRO	220UF	25WV		
C23 ,24			CC45FSL1H080D	CERAMIC	8.0PF	D		
C29 ,30			CF92FV1H102J	MF	1000PF	J		
C31 ,32			CF92FV1H472J	MF	4700PF	J		
C33 ,34			CE04DW1A101M	ELECTRO	100UF	10WV		
C35 ,36			CC45FSL1H271J	CERAMIC	270PF	J		
C37 ,38			CC45FSL1H050C	CERAMIC	5.0PF	C		
C39 ,40			CC45FSL1H060D	CERAMIC	6.0PF	D		
C41 ,42			CF92FV1H102J	MF	1000PF	J		
C43 ,44			CC45FSL1H331J	CERAMIC	330PF	J		
C45 ,46			CF92FV1H473J	MF	0.047UF	J		
C47 ,48			CE04DW1E4R7M	ELECTRO	4.7UF	25WV		
C49			CK45FB1H102K	CERAMIC	1000PF	K		
C51 ,52			CF92FV1H472J	MF	4700PF	J		
C53 ,54			CE04DW1H010M	ELECTRO	1.0UF	50WV		
C55 ,56			CE04DW1E220M	ELECTRO	22UF	25WV		
C57 ,58			C90-1618-05	ELECTRO	4700UF	50WV		
C57 ,58		*	C90-2772-05	ELECTRO	8200UF	50WV	E	KM
C63 ,64			CF92FV1H272J	MF	2700PF	J		
C65	*		C90-2724-05	ELECTRO	47UF	50WV	E	
C66 -69			C90-2660-05	ELECTRO	1000UF	16WV	KM	
C70			C90-2576-05	NP-ELECT	330UF	16WV		
C71	*		C90-2690-05	ELECTRO	4700UF	16WV	E	KM
C72			CE04DW1H3R3M	ELECTRO	3.3UF	50WV		
C73			CF92FV1H102J	MF	1000PF	J		
C74			CF92FV1H224J	MF	0.22UF	J		
C75 ,76			CE04DW1C100M	ELECTRO	10UF	16WV		
C77			CE04DW1H2R2M	ELECTRO	2.2UF	50WV		
C78			CE04DW1A101M	ELECTRO	100UF	10WV		
C79			CE04DW1C100M	ELECTRO	10UF	16WV		
C80			CE04DW1H221M	ELECTRO	220UF	50WV		
C81			CE04DW1C470M	ELECTRO	47UF	16WV		
C82			CE04DW1H220M	ELECTRO	22UF	50WV		
C83			C90-2660-05	ELECTRO	1000UF	16WV	KM	
C102			CF92FV1H473J	MF	0.047UF	J		
JK1			E70-0804-05	SCREW TERMINAL BOARD(PWR)				
JK2			E20-0479-05	SCREW TERMINAL BOARD(4P)(SP)				
JK3			E20-0239-05	SCREW TERMINAL BOARD(2P)(P.C.)				
JK4			E13-1401-05	PHONO JACK				
JK6	▲	*	J13-0601-05	FUSE HOLDER	(CRITICAL)			
L1 ,2		*	L33-0990-05	CHOKE COIL			KM	
L3 ,4		*	L39-0085-05	PHASE-COMPENSATION COIL				
L5		*	L33-0991-05	CHOKE COIL				
T1		*	L19-0525-05	TRANSFORMER FOR CONVERTER			KM	
T1		*	L19-0526-05	TRANSFORMER FOR CONVERTER			E	

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C	2B		N83-3008-45	PAN HEAD TAPTITE SCREW		
G	2B		N80-2608-45	PAN HEAD TAPTITE SCREW		
H	2B		N80-3010-45	PAN HEAD TAPTITE SCREW		
J	1B		N83-3006-41	PAN HEAD TAPTITE SCREW		
K	2A		N87-3012-46	BRAZIER HEAD TAPTITE SCREW		
R7 , 8			R92-2101-05	METAL FILM 1K D 1/6W		
R15 -18			R92-2102-05	METAL FILM 2.2K D 1/6W		
R19 , 20			R92-2101-05	METAL FILM 1K D 1/6W		
R35 , 36			RD14DB2H101J	SMALL-RD 100 J 1/2W		
R75 , 76			RD14DB2H100J	SMALL-RD 10 J 1/2W		
R85 -88			RD14DB2H101J	SMALL-RD 100 J 1/2W		
R97 -100			R92-0205-05	METAL-PLATE 0.1 K 2W		
R101, 102			RD14DB2H100J	SMALL-RD 10 J 1/2W		
R109, 110			RD14DB2H100J	SMALL-RD 10 J 1/2W		
R117			RD14DB2H100J	SMALL-RD 10 J 1/2W		
R125, 126			RD14DB2H100J	SMALL-RD 10 J 1/2W		
R134			RD14DB2H100J	SMALL-RD 10 J 1/2W	E	
R156			RS14KB3A471J	FL-PROOF RS 470 J 1W	KM	
R156			RS14KB3A681J	FL-PROOF RS 680 J 1W	E	
VR1 , 2			R12-0092-05	TRIMMING POT.(220 Ω)		
VR3			R12-1069-05	TRIMMING POT.(4.7K Ω)	KM	
K1			S76-0804-05	MAGNETIC RELAY		
S1			S31-2130-05	SLIDE SWITCH	KM	
S1	*		S62-0815-05	SLIDE SWITCH	E	
S2	*		S62-0814-05	SLIDE SWITCH		
D1 -6			1SS176	DIODE		
D7 , 8			1S2076A	DIODE		
D9 -18			1SS176	DIODE		
D20			1SS176	DIODE	KM	
D22			FMU22S	DIODE		
D23			FMU22R	DIODE		
D25 , 26			RD16JS(B)	ZENER DIODE		
D28			RD5.1JS(B2)	ZENER DIODE		
D29 , 30			RD20JS(B)	ZENER DIODE		
D32 , 33			RD5.1JS(B2)	ZENER DIODE		
D34			RD8.2JS(B2)	ZENER DIODE		
D35			RM4AMLF-J1	DIODE		
D37 -40			EH1Z	DIODE	E	
D39 , 40			EH1Z	DIODE	KM	
D41 -44			1SS176	DIODE		
D45 , 46			E-152	DIODE		
IC1 , 2			UPC4570C	IC(OP AMP X2)		
IC3			NJM4558D	IC(OP AMP X2)		
IC4			UPC1237HA	IC(POWER AMP)		
IC5			UPC494C	IC(SWITCHING REGULATOR)		
Q1 , 2			2SC945(A)(Q, P)	TRANSISTOR		
Q3 , 4			2SK389	TRANSISTOR		
Q7 -10			2SA992(F, E)	TRANSISTOR		
Q11 -16			2SC2631(Q, R)	TRANSISTOR		
Q17 , 18			2SA1123(Q, R)	TRANSISTOR		
Q19 , 20			2SC3419	TRANSISTOR		
Q21 , 22			2SC2590(Q, R)	TRANSISTOR		
Q23 , 24			2SA1110(Q, R)	TRANSISTOR		
Q25 , 26		*	2SC4886	TRANSISTOR		

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Q27 , 28		*	2SA1860	TRANSISTOR		
Q29 , 30			2SC1845(F, E)	TRANSISTOR		
Q31			2SA992(F, E)	TRANSISTOR		
Q32 -37		*	IRFIZ34	FET		
Q38 , 39			2SC945(A)(Q, P)	TRANSISTOR		
Q40 , 41			2SA733(A)(Q, P)	TRANSISTOR		
Q42			2SA1534A(R, S)	TRANSISTOR		
Q43			2SC945(A)(Q, P)	TRANSISTOR		
Q44			2SA733(A)(Q, P)	TRANSISTOR		
Q45			2SC3940A(R, S)	TRANSISTOR		
Q50			DTA124EFF	DIGITAL TRANSISTOR		
Q51			2SD1266BD(Q, P)	TRANSISTOR		
Q52			2SB941BD(Q, P)	TRANSISTOR		
Q53			DTC124EFF	DIGITAL TRANSISTOR		
Q55 , 56		*	IRFIZ34	FET		
TH1 , 2		*	PTH9M04BC222T	POSITIVE RESISTOR		
TH3		*	ERTD2FHL103S	THERMISTOR		

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