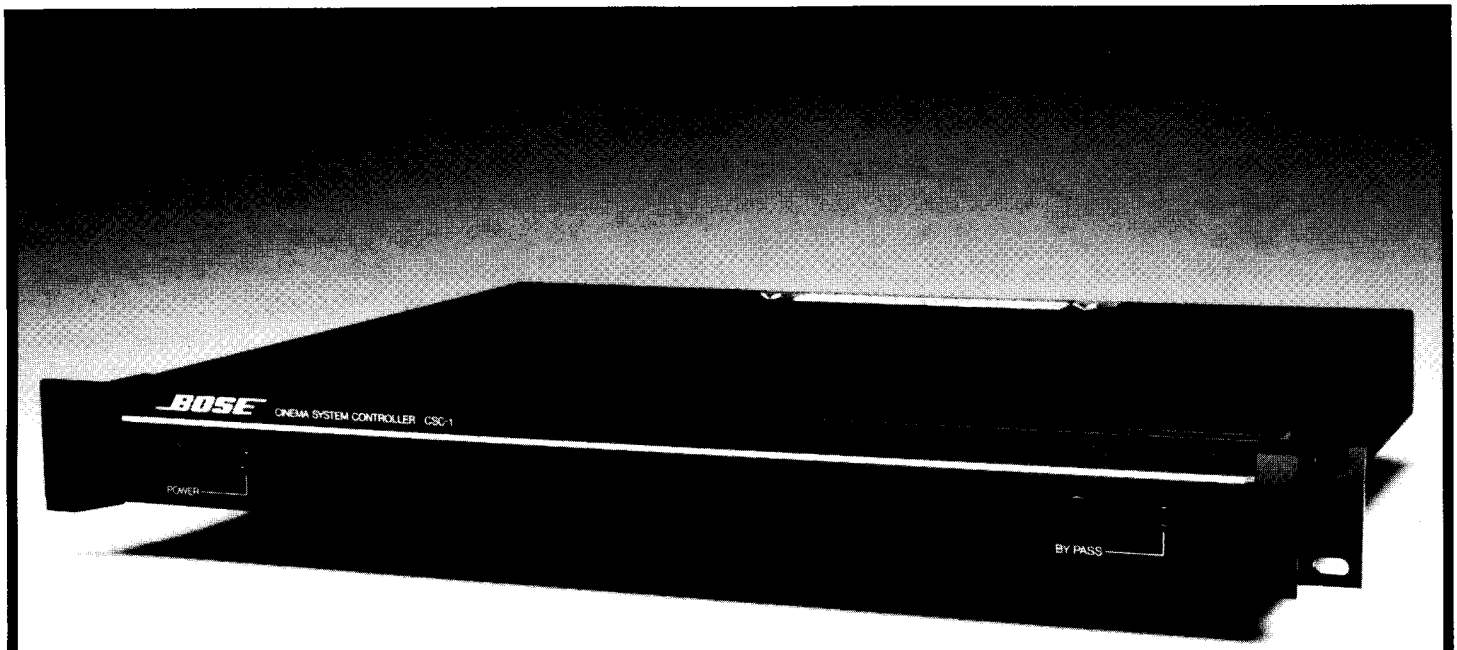
BOSE
Better sound through research.

CINEMA SYSTEM CONTROLLER- Model CSC-1



SPECIFICATIONS

Input Impedance
4.0 KΩ, balanced
42 KΩ, Unbalanced

Maximum Output
Into 600 Ω, 12.0 dBV (4.0 VRMS)
Into 10 KΩ, 18.0 dBV (8.0 VRMS)

Dynamic Range
> 113 dB

Total Harmonic Distortion
≤ 0.06 %

Power Requirements
100 VAC, ±10%; 50-60 Hz
120 VAC, ±10%; 50-60 Hz
220/240 VAC, ±10%; 50-60 Hz

Output Impedance
600 Ω

Channel Separation
≥ 75 dBV

Bass Channel Gain
Adjustable: ± 6.0 dB

Weight
3.3 lbs (1.5 Kg)

Frequency Bands
Left/Right Channels, 125 Hz -20 KHz
Bass Channel, 25 -125 Hz
Surround Channel, 80 Hz -20 KHz

Environmental
Temperature Range, 0° C to 70° C
Relative Humidity, 20% to 95%

Dimensions
19" W x 1.73" H x 15.75" D
(48.4 cm x 4.4 cm x 40.0 cm)

Noise ("A" Weighted)
≤ 20 μV

AWCS Compressor
Threshold: 40 V (200 W)
Compression: 15 dB
Attack Time: 2 mS
Release Time: 100 mS

SERVICE MANUAL

THEORY OF OPERATION

The Bose® Cinema System Controller (CSC-1) is a multi-channel, active equalizer for use in 35 mm Dolby® Stereo movie theaters. The CSC-1 is a part of the Bose Wave System which also includes; the Bose 802™, 102™ and Acoustic Wave® Cannon (AWCS) loudspeakers.

The CSC-1 consists of 5 input channels. The left, right and center channels are high-pass filtered, compensated for screen loss and equalized for reproduction through the 802's. The surround channel is equalized for reproduction through the 102's.

The Bass channel is derived from the summation of the bass, left, right and center channels. This summed signal is band-pass filtered from 28 Hz to 125 Hz and then equalized for reproduction through the Acoustic Wave Cannon System.

Because of variances in speaker placement, number of speakers and acoustic loading between movie houses, the CSC-1 permits matching of the bass channel output to the front channel output by means of a rear panel gain control.

The AWCS driver is protected by a feedback limiting circuit which monitors the amplifier output and turns on when the 40 Volt (200 W) threshold is exceeded.

An emergency, straight-wire bypass switch is provided. The switch will bypass every channel function in the controller and direct the input to the center channel output only.

NOTE: Attempt to recreate the customer's problem and note any discrepancies with the specifications given in the test procedure.

TEST PROCEDURE

Necessary Equipment: Signal (sine wave) Generator, Oscilloscope, Distortion Analyzer w/an "A" weighted filter, and a Voltmeter.

Note: If the distortion analyzer does not have an "A" weighted filter an external filter is needed.

Gain Test:

1. Connect the CSC-1 as in **Fig 1.**
2. Adjust the frequency of the signal generator to **750 Hz.**
3. Adjust the output level of the signal generator to **0.775 VRMS.**
4. Measure the gain at the left channel output.
   Output: 0.8 VRMS ±0.2 VRMS.
5. Repeat steps (1 to 4) for the right and center channels.
6. Connect the signal generator to the bass channel input.
7. Adjust the frequency of the signal generator to **30 Hz.**
8. Adjust the output level of the signal generator to **100 mV.**
9. Turn the AWCS level adjust fully clockwise.
10. Measure the gain at the bass channel output.

    Output: ≥ 750 mV.

11. Connect the signal generator to surround channel.
12. Adjust the frequency of the signal generator to 750 Hz.
13. Adjust the output level of the signal generator to 0.775 VRMS.
14. Measure the gain at the surround channel output.

Output: 0.8 VRMS ±0.2 V

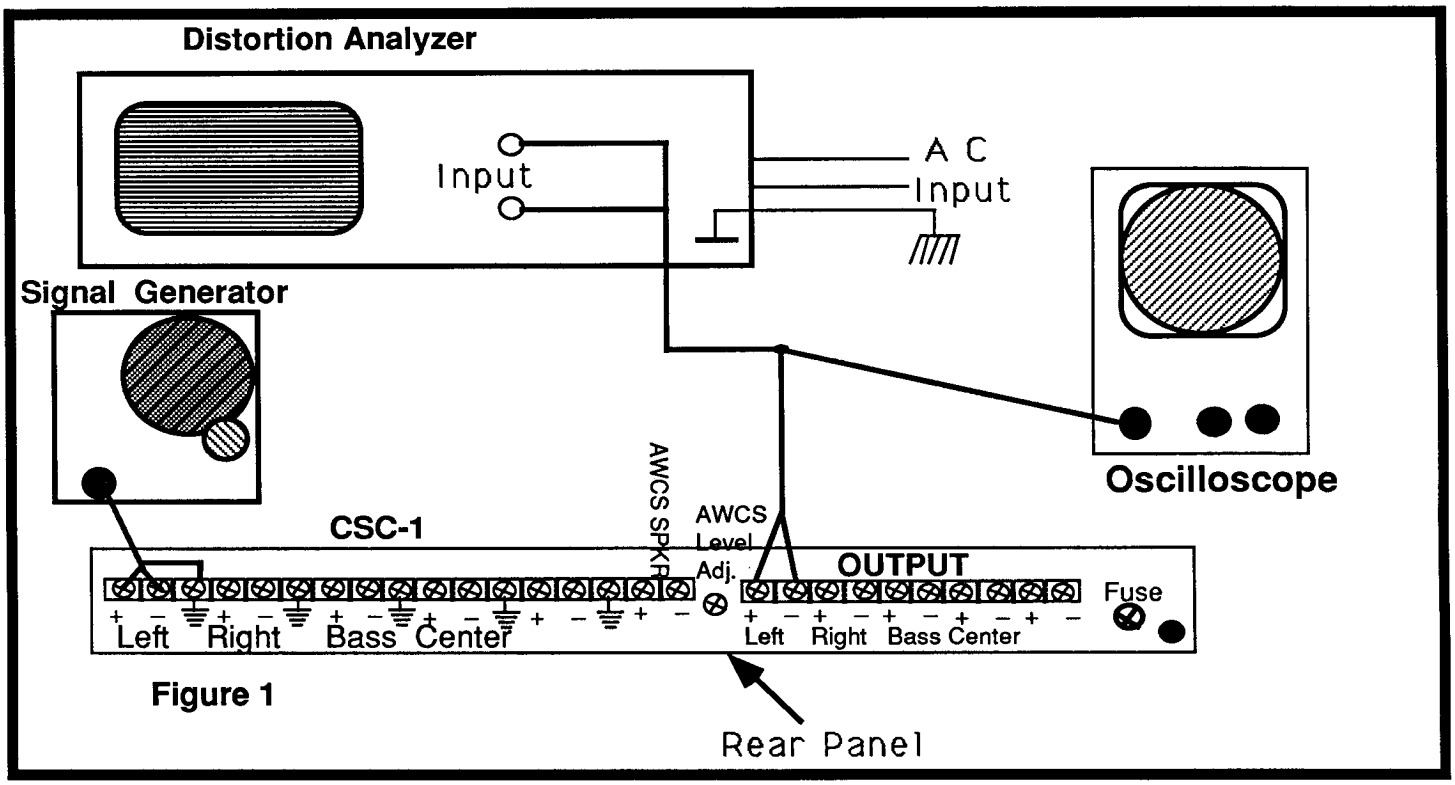


Figure 1

Frequency Response Test:

1. Connect the CSC-1 as in Fig 1.
2. Adjust the frequency of the signal generator to **750 Hz.**
3. Adjust the signal generator's output level until the left channel output measures **0.775 VRMS.** **This is 0 dB reference Level.**
4. Refer to Table 1 and make the appropriate signal generator adjustments. Verify the response with the Table below.

FREQUENCY	OUTPUT LEVEL
750 Hz	0 dB
100 Hz	-3.0 dB ±1.5 dB
200 Hz	2.25 dB ±1.5 dB
10.0 KHz	18.5 dB ±2.0 dB
15.0 KHz	20.8 dB ±2.0 dB
20.0 KHz	19.0 dB ±3.0 dB

5. Repeat the previous steps in this test for right and center channels.
6. Verify the response with the Table above.
7. Connect the signal generator to bass channel input.

8. Turn the AWCS level adjust fully clockwise.
9. Connect the signal generator to the bass channel input.
10. Adjust the frequency of the signal generator to **60 Hz.**
11. Adjust the signal generator's output level until the left channel output measures **0.775 VRMS.** **This is 0 dB reference Level.**
12. Refer to the Table below and make the appropriate signal generator adjustments.
13. Verify the response with the Table immediately below.

FREQUENCY	OUTPUT LEVEL
60 Hz	0 dB
30 Hz	5.5 dB ±2.0 dB
120 Hz	-4.0 dB ±2.0 dB

14. Connect the signal generator to the surround channel input.
15. Adjust the frequency of the signal generator to **1.0 KHz.**
16. Adjust the signal generator's output level until the surround channel output measures **0.775 VRMS.** **This is 0 dB reference Level.**
17. Refer to the Table below and make the appropriate signal generator adjustments.
18. Verify the response with the Table below.

FREQUENCY	OUTPUT LEVEL
1.0 KHz	0 dB
85 Hz	14.5 dB ±2.0 dB
12 KHz	15.5 dB ±2.0 dB

Distortion Test:

1. Connect the CSC-1 as in **Figure 1.**
2. Adjust the frequency of the signal generator to **1.0 KHz.**
3. Adjust the signal generator's output level until the left channel output measures **1.0 VRMS.**
4. Measure the distortion at left channel output.

   Output: ≤ 0.06%

5. Repeat steps (1 to 3) for right and center channels.
6. Measure the distortion at right and center channel outputs.

   Output: ≤ 0.06%

7. Connect the signal generator to bass channel input.
8. Adjust the frequency of the signal generator to **30 Hz.**
9. Adjust the signal generator's output level until the bass channel output measures **1.0 VRMS.**
10. Measure the distortion at bass channel output.

    Output: ≤ 0.06 %

11. Repeat steps (1 to 4) for surround channel.
12. Measure the distortion at surround channel output.

    Output: ≤ 0.06 %

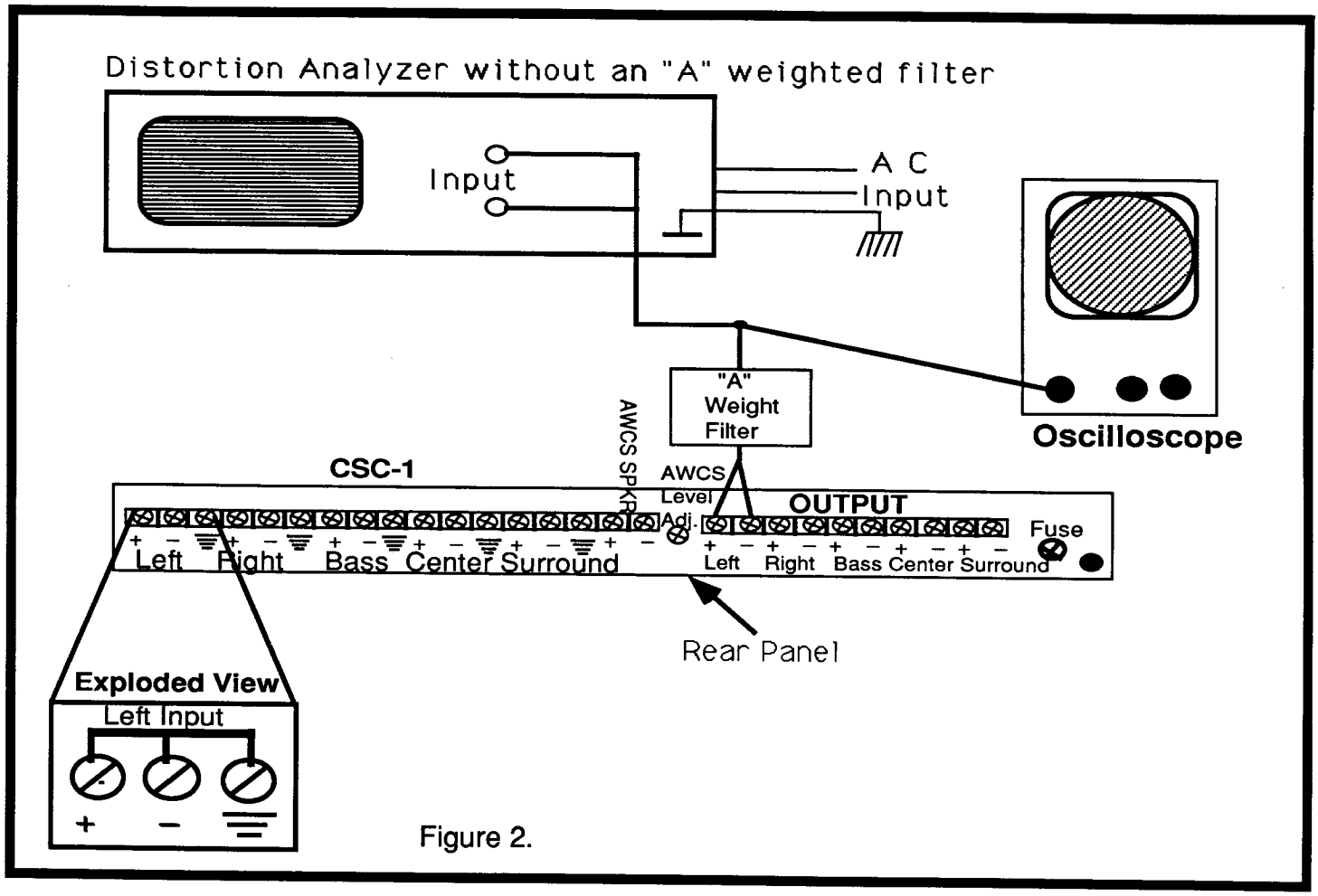


Figure 2.

"A" Weighted Noise Test:

1. Connect the CSC-1 as seen in Figure 2.
2. Short the positive (+) and negative (-) inputs to ground as in Figure 2 (exploded view).
3. Measure the noise at left channel output.

   Output: ≤ 20 μV

4. Repeat steps (1 to 2) for the right, center, and surround channels.
5. Verify the above noise specification.

AWCS Protection Circuit Test:

1. Connect the CSC-1 as seen in Figure 3.

NOTE: Power Amplifier must be able to deliver 400 watts into an 8Ω resistive load.

2. Adjust the signal generator to **30 Hz.**
3. Adjust the signal generator's output level until the power output measures **22.5 Volts.**
4. NOTE the input level to the CSC-1 and increase this level by **20 dB.**
5. Measure the signal level at the amplifier's output.

   Output: ≤ 50 Volts

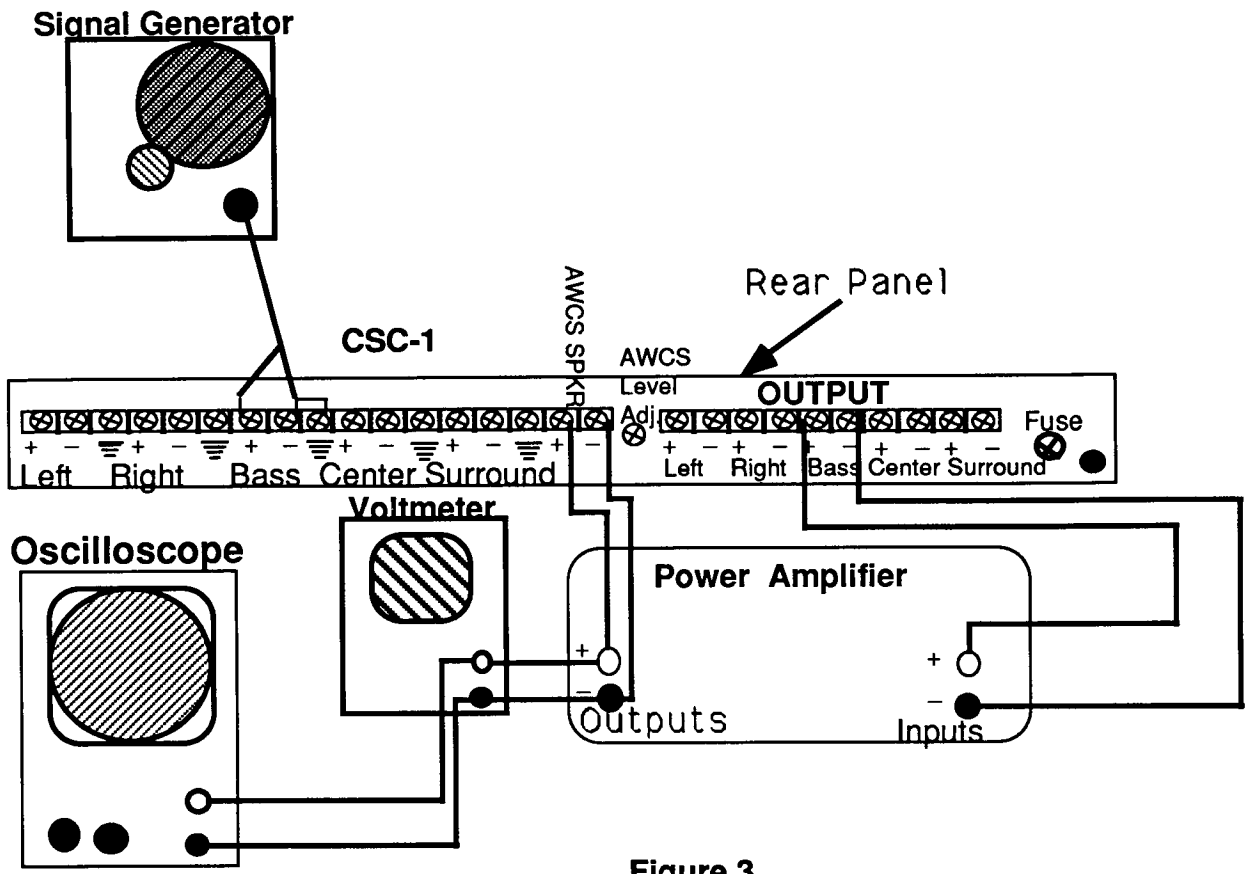


Figure 3.

COMPONENT TROUBLESHOOTING

1. Remove the unit cover [refer to Cover Removal in the Disassembly Procedure], verify that all internal screws are secured and the wiring is intact and undamaged.

2. Check the PC boards for any evidence of charred components.

3. Pin-pointing frequency response problems may be made easier by measuring the output of each EQ. stage and comparing it with the approporiate response given in Figure 4.

4. Check the power supplies. ± 15.0 volts should be evident at the output of the power supplies and at all the op. amps.

5. Check for a "virtual ground" (i.e. 0 volts) at the op. amp. inputs. Also check for DC offset and excessive noise at the op. amp. outputs.

6. Op. amp. thermal problems may be easily checked by carefully touching each of the op. amps to verify proper operating temperature.

DISASSEMBLY PROCEDURE

COVER REMOVAL:

Locate and remove the four(4) screws(002D) securing the top cover(001D) to the chassis (001G) using a Phillips #2 screwdriver.

REAR PANEL REMOVAL:

Locate and remove the four(4) screws(901G) securing the rear panel (900G) to the chassis (001G) using a Phillips #1 screwdriver.

RACK HANDLE REMOVAL:

Locate and remove the four (4) screws(011G) securing both handle racks(010B) to the front panel(020B) using a Phillips #1 screwdriver.

FRONT PANEL REMOVAL:

Locate and remove the six (6) screws[3 (005G) & 3 (006G)] securing the front panel(002B) to the front bracket(002G) and the chassis(001G) using a Phillips #1 screwdriver.

PCB REMOVAL:

Note: The PCBs interface with each other via a connective cord and the headers on each connective cord are soldered to the PCBs.

General: De-solder the terminal pins to remove the headers from the PCBs.

1. Locate and remove the six (6) screws(002G) securing the PCB**(PE00)** to the chassis(001G) using a Phillips #1 screwdriver.

Note: PCBs(PP00, PV50, PW50 & PW00) are secured to terminal strips(JV01 & JV03).

2. Locate and remove the two (2) screws(903G) securing the **terminal strip** (to the appropriate PCB) to the rear panel(900G)using a Phillips #1 screwdriver.
Carefully remove the appropriate **terminal strip** from the rear panel(900G).

3. Locate and remove the screw(904G) securing PCB**(PH50)** to the rear panel(900G) using a Phillips #1 screwdriver.

4. Locate and remove the two (2) screws(907G) securing PCB**(PW60)** to the rear panel(900G) using a Phillips #1 screwdriver.

Note: The PCBs(**P850 & P860**) are both secured to the heatsink(040G) and the chassis(001G).

5. Locate and remove the screw(041G) securing the appropriate **voltage regulator** to the chassis (001G) using a Phillips #1 screwdriver.

6. Locate and remove the two (2) screws(026G) securing PCB**(PP50)** to the chassis(001G) using a Phillips #1 screwdriver.

7. Locate and remove the screw(009G) securing the PCB**(P870)** using a Phillips #1 screwdriver.

8. Locate and remove the two (2) screws(009G) securing the power switch**(PP00)** using a Phillips #1 screwdriver.

TRANSFORMER REMOVAL:

Locate and remove the four (4) screws(009G) securing the **voltage regulator**(L001) using a Phillips #1 screwdriver.

REASSEMBLY PROCEDURE

COVER REPLACEMENT:

Align the top cover**(001D)** to the chassis**(001G)** and secure with the four (4) screws using a Phillips #2 screwdriver.

REAR PANEL REPLACEMENT:

Align the rear panel**(900G)** to the chassis**(001G)** and secure with the four (4) screws using a Phillips #1 screwdriver.

RACK HANDLE REPLACEMENT:

Align the appropriate rack handle**(0101B)** to the front bracket(002G) and secure with the four (4) screws using a Phillips #1 screwdriver.

FRONT PANEL REPLACEMENT:

Align the front panel**(002B)** to the chassis(001B) and front bracket(002G), then secure with the six (6) screws using a Phillips #1 screwdriver.

PCBs REPLACEMENT:

Note: The headers on each connective cord must be soldered to the PCBs.

General: Solder the terminal pins to the replacement Pcb.

1. Align PCB**(PE00)** to the chassis(001G) and secure the four screws using a Phillips #2 screwdriver.

Note: PCBs(PV50, & PW00) are secure to terminal strips (JV01 & JV03).

2. Align the **appropriate terminal strip** to the rear panel(900G) and secure the four screws using a Phillips #1 screwdriver.

3. Align PCB**(PH50)** to the rear panel(900G) and secure the screw using a Phillips #2 screwdriver.

4. Align PCB**(PW60)** to the rear panel(900G) and secure the two (2) screws using a Phillips #2 screwdriver.

Note: The PCBs**(P850 & P860)** must be secured to the heatsink(040G) and the chassis.

5. Align the **appropriate voltage regulator** to the chassis(001G) and secure the screw using a Phillips #1 screwdriver.

6. Align PCB**(PP50)** to the chassis(001G) and secure the two (2) screws using a Phillips #1 screwdriver.

7. Align PCB**(P870)** to chassis(001G) and secure the screw using a Phillips #1 screwdriver.

8. Align the power switch**(PP00)** to chassis(001G) and secure the two (2)screws using a Phillips #1 screwdriver.

TRANSFORMER REPLACEMENT:

Align the power transformer(L001) to chassis(001G) and secure the four (4)screws using a Phillips #1 screwdriver.

PARTS LIST

NOTE: PLEASE REFER TO COMPONENT LOCATION FOR ASSISTANCE IN FINDING ELECTRONIC COMPONENTS.

Part Number	Description		Qty	Ref. Desig.
141607	Front Panel			002B
141608	Knob, Power			003B
141609	Bushing			004B
141610	Handle, Rack			010B
141611	B.H. Tapped Screw	B3 x 10		011B
141612	Lid, Top Cover			001D
141613	B.T. Screw	B4 x 8		002D
141614	Chassis, Main			001G
141615	Bracket, Front			002G
141616	F.H. Taptite Screw	F3 x 6		006G
141617	Clamper			008G
141618	P.H. Taptite Screw	P3 x 6		012G
141619	Clamper			013G
141620	H.Head Bolt, S.F	H4 x 8		020G
141621	B.H.M. Screw	B3 x 6	5	005G,09G,25G,26G, 904G
141622	Lug			030G
139454	B.H. Tapped Screw	B4 x 6		031G
141623	HeatSink			040G
141624	B.H.M Screw	B3 x 12		041G
141625	Hexagon Nut			042G
141626	Buffer			050G
141627	Rear Panel [U]			900G
141628	Rear Panel [N]			900G
139447	B.H. Tapped Screw	B3 x 8		901G
141629	Bushing, AC Power Cord			902G
141630	B.H. Tapped Screw	B4 x 15		903G
141631	F.H Taptite Screw	F3 x 8		905G
141633	Label, Caution [U]			001R
141634	Label, Caution [N]			002R
141635	Label, Caution [N]			003R
139486	Label [N]			006R
141636	Label [U]			007R
141637	Indicator, Serial No. [U]			009R
141638	Indicator, Serial No. [N]			009R
141639	Label			010R
141646	Packing Case			001S
141647	Cushion			002S
141648	Reinforcing			004S
141649	Polyethylene Bag			005S
141650	Polyethylene Sheet			006S

Part Number	Description		Qty	Ref. Desig.
141651	Leg			007S
141652	Polyethylene Bag		2	008S,011S
141653	P.H.M. Screw, inch			010S
141654	B.H.M. Screw	B6 x 12		
141655	Label, Bar Cord			011R
141656	Indicator, Serial No.			012R
141640 ⚠	Fuse, 0.5A/250 V [U]			F001
141641 ⚠	Fuse, 315 mA/250 V [N]			F001
141642 ⚠	Jack, Fuse Holder [U]			J001
141643 ⚠	Jack, Fuse Holder [N]			J001
141644 ⚠	Power Transformer [U]			L001
141645 ⚠	Power Transformer [N]			L001
127395 ⚠	A.C. Power Cord [U]			W001
127394 ⚠	A.C. Power Cord [N]			W001
142052	Terminal, 17P			JV01
142053	Terminal, 10P			JW03
139163	Resistor, 220 Ω, ±5%		2	RW02,07
139164	Resistor, 1.0 KΩ, ±5%, 1/2 W		2	RN01,02
139170	Resistor, 332.0 KΩ		3	RG42,RH42,RJ42
139176	Resistor, 10.0 KΩ		23	RG12,20,RH17,19,20,23,24,27, 28,31,35,37,RJ08,09,14,RK12, 15-18,R801-3
139177	Resistor, 4.7 KΩ, ±5%			RW05
139184	Resistor, 61.9 Ω			RH16
139185	Resistor, 22.0 KΩ, ±5%		3	RG33,RH30,RJ20
139347	Resistor, 1.0 kΩ		24	RG01-04,10,11,16,18,43,44, RH01-04,13,43,44, RJ01-04,43, 44,RW08
139348	Resistor, 86.6 KΩ			RG09
139372	Resistor, 511 Ω		3	RG32,RH29,RJ19
139374 ⚠	Resistor, 10 Ω, ±5%		14	RG34,35,43,44, RH01-04, 40,41, RJ21,22, RK19,20
141453	Resistor, 12.1 KΩ			RG07
141455	Resistor, 13.3 KΩ		5	RG19,RH11,12,25,26
141465	Resistor, 56.2 KΩ		6	RH07-10,RH21,22
141713	Resistor, 46.4 kΩ, ±5%		3	RG05,RH05,RJ05
141714	Resistor, 1.91 kΩ		3	RG06,RH06,RJ06
141715	Resistor, 237 KΩ			RG08
141716	Resistor, 20.5 KΩ		2	RG13,RK11
141717	Resistor, 2.74 KΩ			RG14
141718	Resistor, 23.7 KΩ		2	RG15,31
141719	Resistor, 4.64 KΩ		8	RG17,RH18,32,RJ10-12,15,RK14
141720	Resistor, 6.81 KΩ			RG21
141721	Resistor, 17.8 KΩ		2	RG22,24
141722	Resistor, 162.0 KΩ			RG23
141723	Resistor, 22.6 KΩ		3	RG25,RJ07,13
141724	Resistor, 2.05 KΩ		2	RG26,28
141725	Resistor, 464 Ω			RG27
141726	Resistor, 8.25 KΩ		3	RG29,RJ16,17
141727	Resistor, 133.0 KΩ			RG30
141728	Resistor, 154 KΩ			RH14
141847	Resistor, 121 KΩ			RH15
141877	Resistor, 82.5 KΩ			RJ18
141878	Resistor, 100 KΩ			RK13
141848	Resistor, 220 KΩ, ±5%			RW01
141849	Resistor, 33 Ω, ±5%			RW04
141854	Resistor, Variable 20 KΩ			RH51
141879 ⚠	Resistor, 100Ω, ±5%, 1/6 W			RN04

Part Number	Description	Qty	Ref. Desig.
141862 ⚠	Resistor, 35.7 Ω, 1/6W		RN03
142048	Resistor, 680Ω, ±5%		RH33
142049	Resistor, 330 Ω, ±5%		RH36
142054 ⚠	Resistor, 100 Ω,±5%,1W		RW06
139158 ⚠	Capacitor, Ceramic, 0.01 µF/400V	3	CP01,51,52
139417	Capacitor, Ceramic, 220 pF, ±10%	10	CE25,26,CG25,26,CH25,26, CF25,26,CJ25,26
141861	Capacitor, Elect. 10 µF/50 V		CN01
127376	Diode, 1SS133	20	DE01-04,DF01-04, DG01-04, DH01-04,DJ01-04
141880 ⚠	Zener, Diode, MA1160M		DK05
141886	L.E.D., GL-5PR5		DK51
132660 ⚠	Diode, DSF10C	9	DW01,D801-04,DN01-04
141851	IC, NJM5532SD	14	QE01-03,QF01-03,QG01-03, QH01-03,QJ01,02
127374	IC, CA3080E		QH04
141881	IC, NJM4560SD	2	QK02
141870	IC, NJM79M15FA		Q851
141868	IC, NJM78M15FA		Q861
141872	L.E.D. GL-5PG5		D871
141882	Transistor, 2SC536SP		QK03
136316 ⚠	Transistor, 2SA1246		QW01
136317 ⚠	Transistor, 2SC3114		QW02
141852	Relay, SZ-2104	3	LW01-03
141883	Push Switch, By Pass		SK01
139149	Terminal, Earth	2	J804,JP55
141853	P.W. Board, Bass Level Adj.		PH50
141855	Terminal, GND		JH52
141856	Connective Cord, 3P	5	WH51,WF01,WN01,W851, W861
141884	P.W. Board, BY Pass Ind.		PK50
141885	Connective Cord, 3P	2	WK51,WE01
141857	P.W. Board, Power Switch		PP00
141858	Push Switch, Power		SP01
141859	P.W. Board, Primary Connection		PP50
141887	P.W. Board, Input Terminal		PV00
141888	Connective Cord, 2P		WG01
141889	Connective Cord, 3P		WH01
141860	P.W. Board Input, Input Terminal/Comp		PV50
142055	Photo Unit, PC817		QN01
142051	Connective Cord, 3P		WJ01
141864	P.W. Board, Output Terminal		PW00
141866	Connective Cord, 6P		WW01
141890	P.W. Board, Output Terminal		PW50
141891	Connective Cord, 4P		WW02
141867	P.W. Board, Positive Supply		P850
141869	P.W. Board, Negative Supply		Q860
141871	P.W. Board, Power Ind.		P870
141873	Connective Cord, 3P		W871

QJ01, P #8

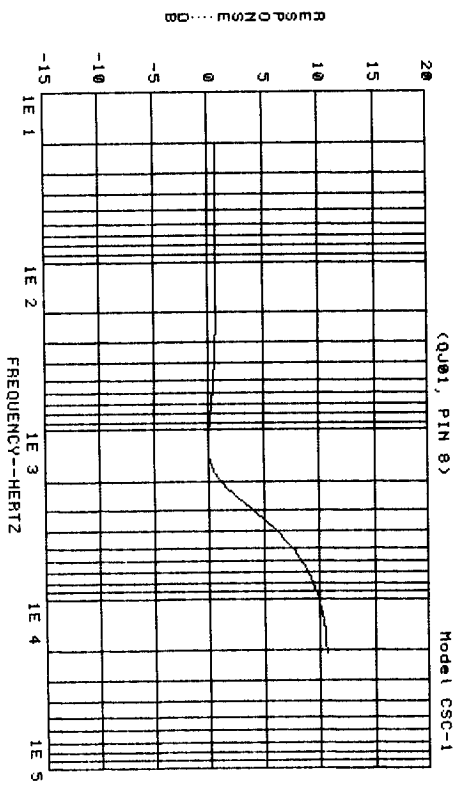


Figure 4a

QJ02, P #2

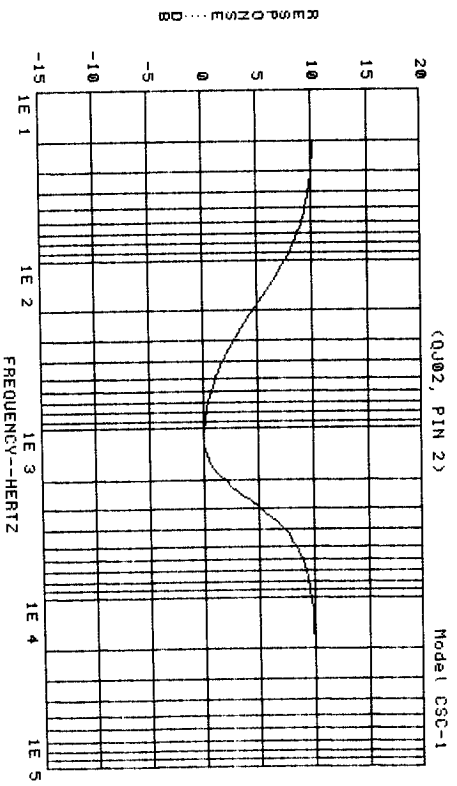


Figure 4b

QE01, P #8

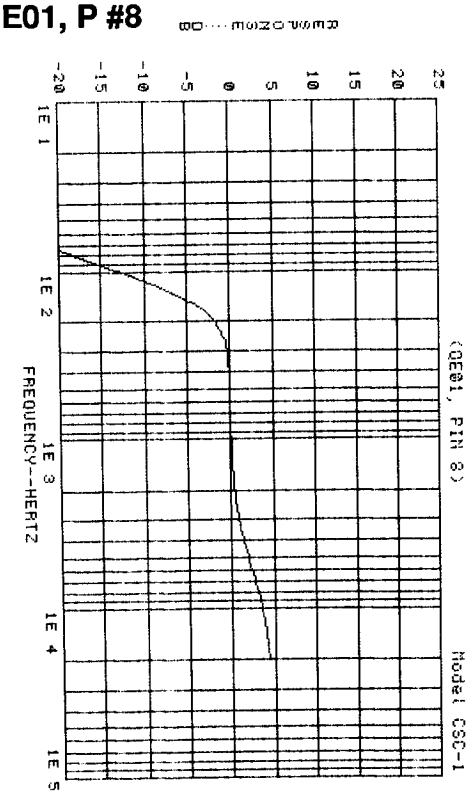


Figure 4c

QE02, P #2

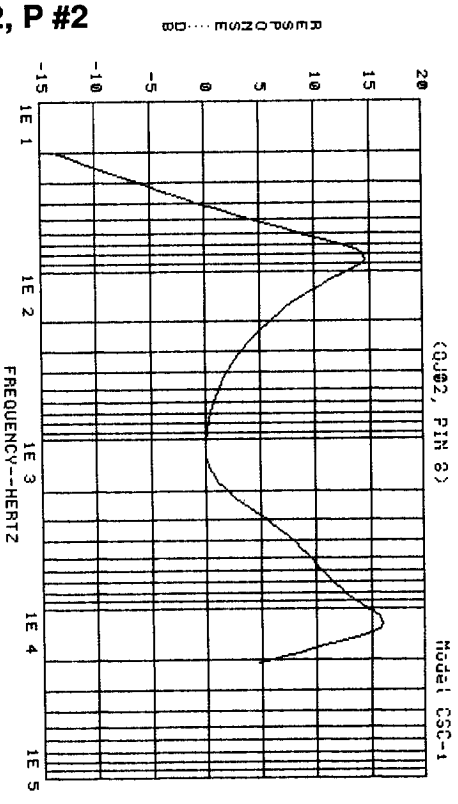


Figure 4d

QJ02, P #8

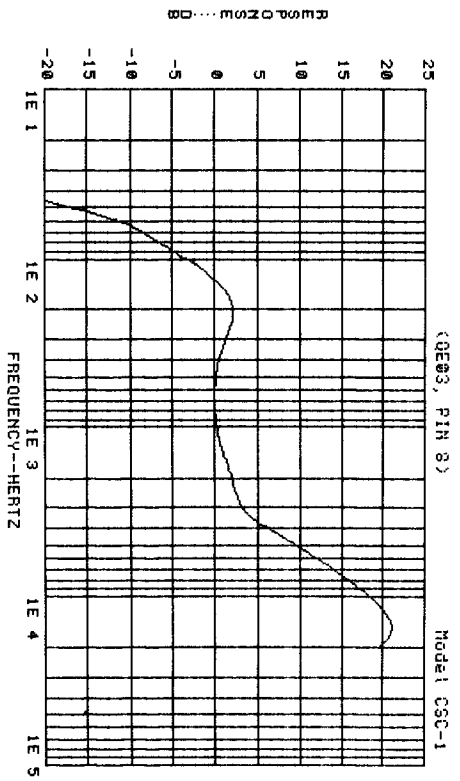


Figure 4e

QE02, P #8

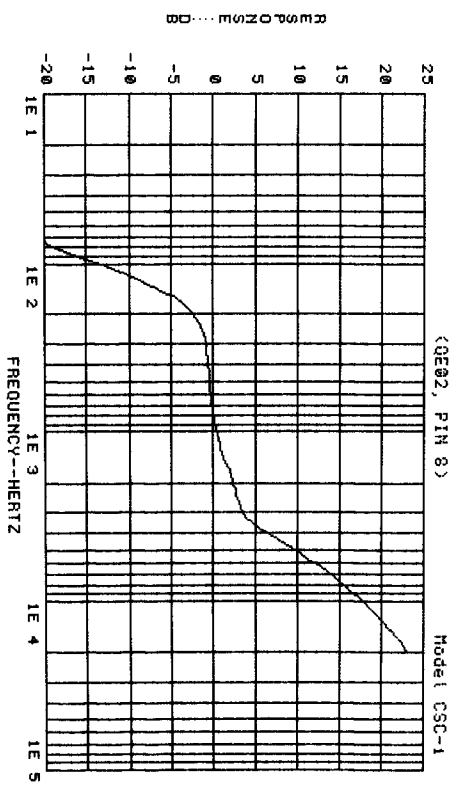


Figure 4f

QE03, P #2

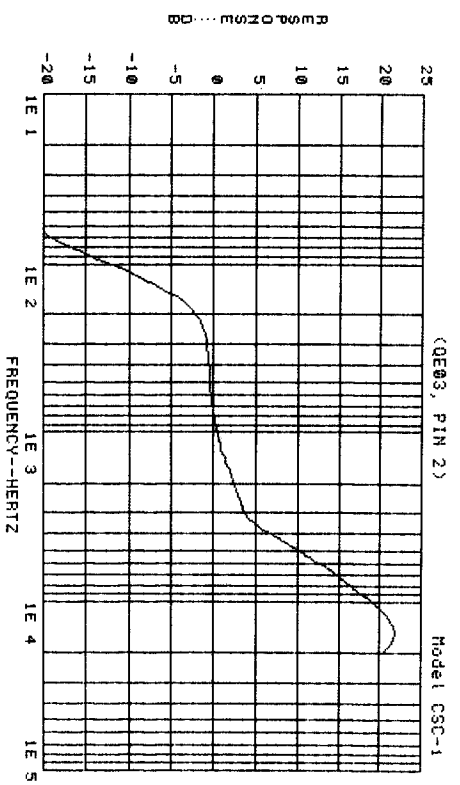


Figure 4g

QE02, P #2

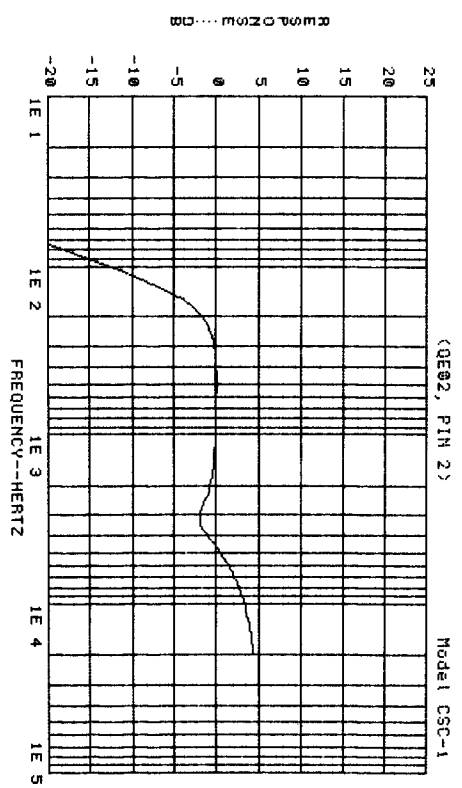
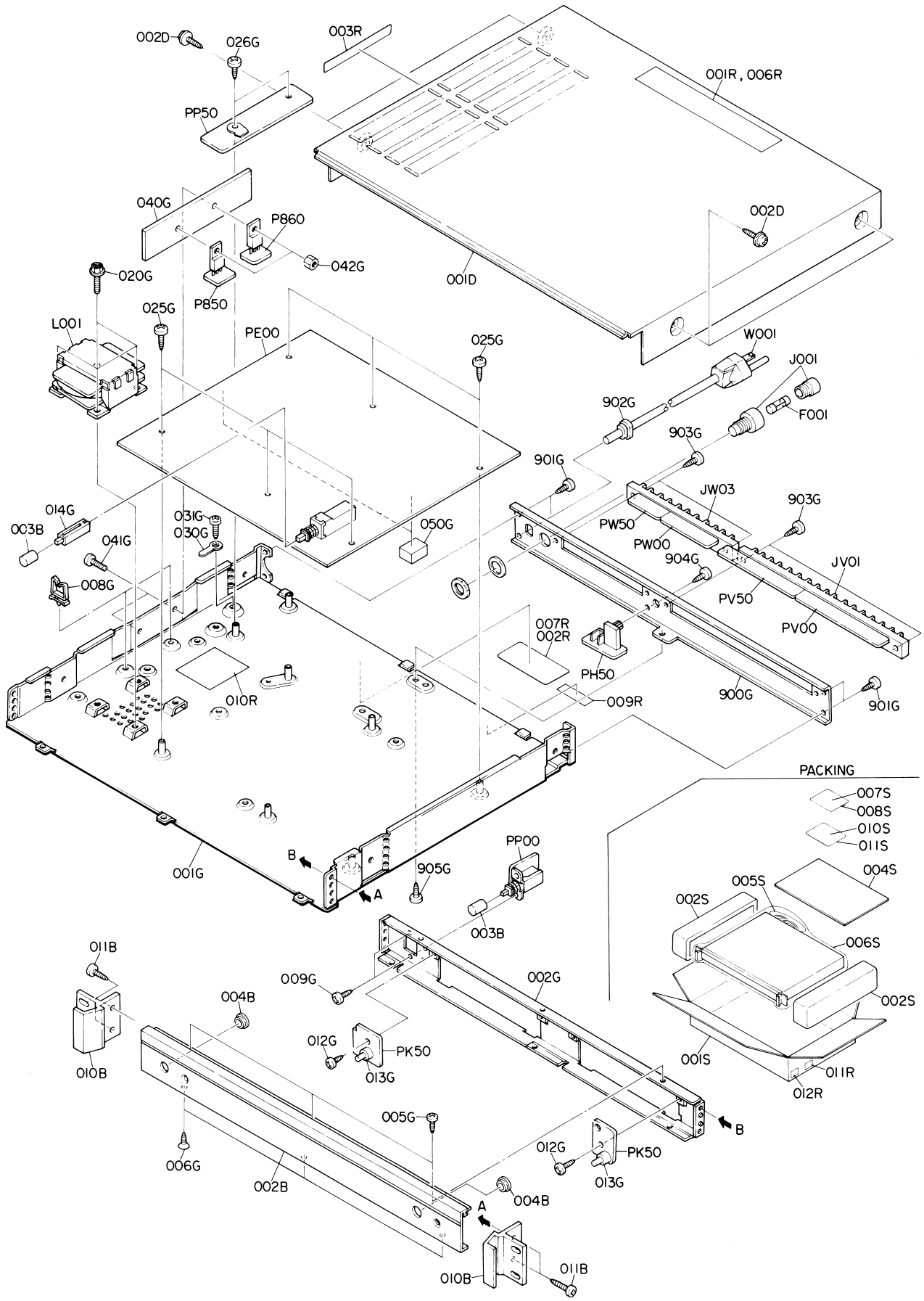
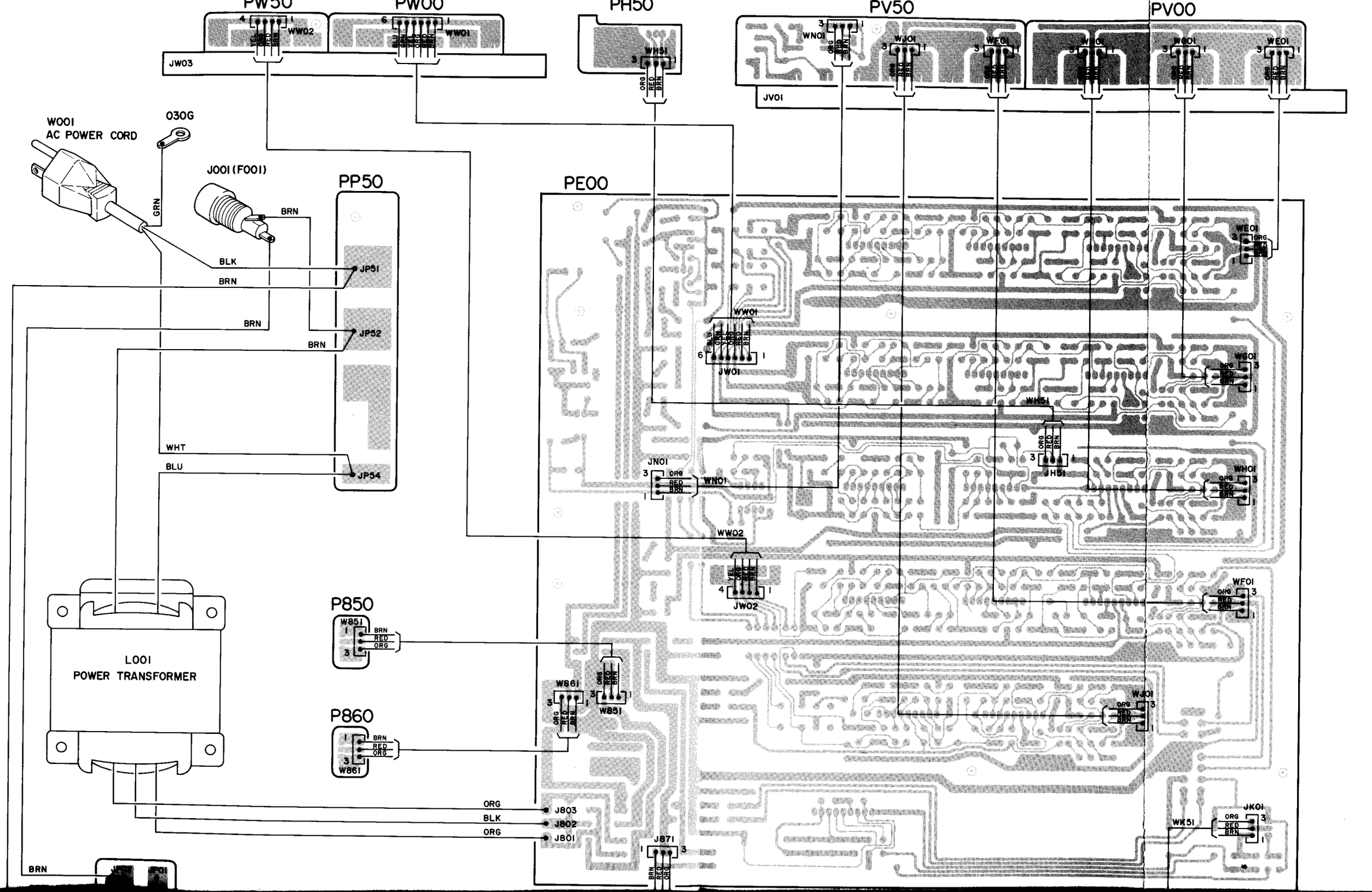


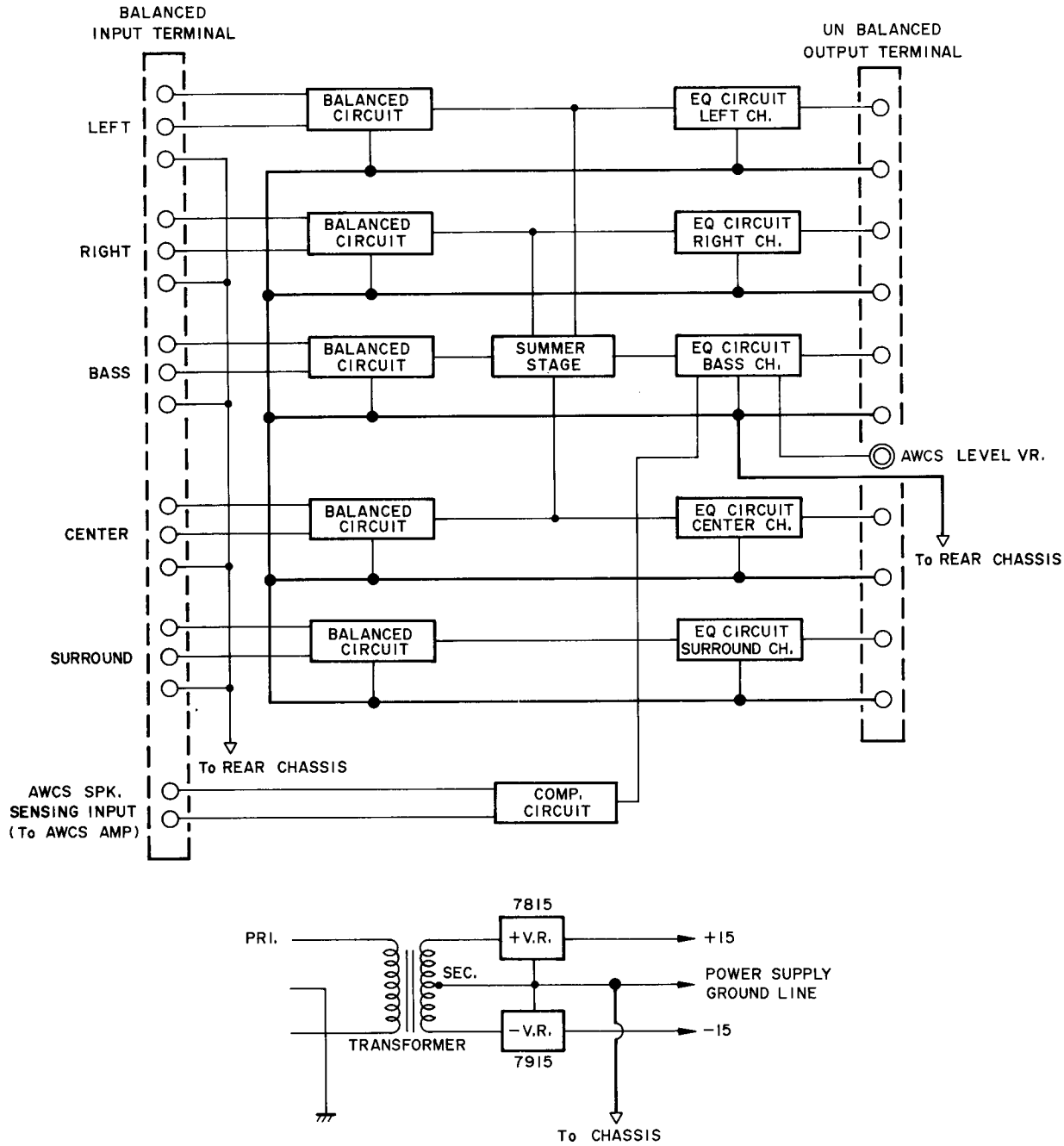
Figure 4h

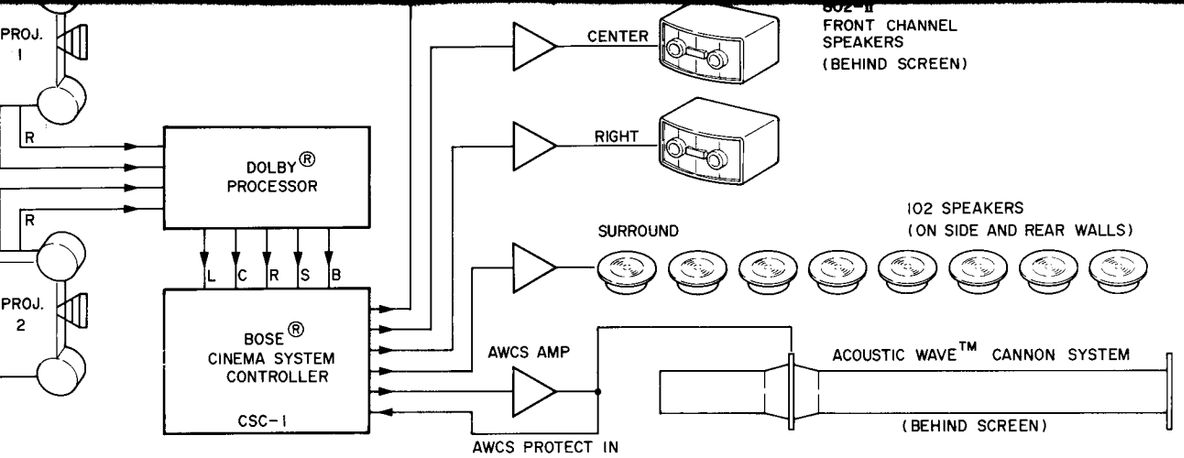
EXPLODED VIEW AND PARTS LIST (CSC-1)




PW50
PW00
PH50
PV50
PV00
JW03
WW02
WW01
WH51
WN01
WJ01
WE01
WG01
JV01
W001
AC POWER CORD
030G
J001 (F001)
GRN
BRN
BLK
PP50
JP51
JP52
JP54
WHT
BLU
PE00
WW01
JW01
JN01
WN01
JH51
WH01
WF01
JK01
WK51
WJ01
WG01
WE01
JW02
L001
POWER TRANSFORMER
P850
W851
P860
W861
J803
J802
J801
J871
ORG
RED
BRN
YEL
BLU
GRN
VIO

GROUND CIRCUIT DIAGRAM (CSC-1)





SIGNAL FLOW DIAGRAM OF 35MM DOLBY STEREO THEATER
USING BOSE CINEMA SOUND SYSTM

INEMA SYSTEM CONTROLLER BLOCK DIAGRAM (CSC-1)