

## Panaray<sup>®</sup> Sound System 502 Array, Bass Box and Controller




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# SAFETY INFORMATION

1. Parts that have special safety characteristics are identified by the  symbol on schematics or by special notes on the parts list. Use only replacement parts that have critical characteristics recommended by the manufacturer.
2. Make leakage current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the unit to the customer. Use the following checks to perform these measurements:

**A. Leakage Current Hot Check** - With the unit completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 "Leakage Current for Appliances" and Underwriters Laboratories (UL) UL6500 / UL60065 / IEC 60065 paragraph 9.1.1. With the unit AC switch first in the ON position and then in OFF position, measure from a known earth ground (metal waterpipe, conduit, etc.) to all exposed metal parts of the unit (antennas, handle bracket, metal cabinet, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the unit power cord plug in the outlet and repeat test. ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

**B. Insulation Resistance Test Cold Check** - (1) Unplug the power supply and connect a jumper wire between the two prongs of the plug. (2) Turn on the power switch of the unit. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and each exposed metallic cabinet part on the unit. When testing 3 wire products, the resistance measured to the product enclosure should be between 2 and infinite MOhms. Also, the resistance measured to exposed input/output connectors should be between 4 and infinite MOhms. When testing 2 wire products, the resistance measured to exposed input/output connectors should be between 4 and infinite MOhms. If it is not within the limits specified, there is the possibility of a shock hazard, and the unit must be repaired and rechecked before it is returned to the customer.

**CAUTION: The Bose® Panaray® 502® Sound System contains no user-serviceable parts. To prevent warranty infractions, refer servicing to warranty service stations or factory service.**

## PROPRIETARY INFORMATION

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF BOSE CORPORATION WHICH IS BEING FURNISHED ONLY FOR THE PURPOSE OF SERVICING THE IDENTIFIED BOSE PRODUCT BY AN AUTHORIZED BOSE SERVICE CENTER OR OWNER OF THE BOSE PRODUCT, AND SHALL NOT BE REPRODUCED OR USED FOR ANY OTHER PURPOSE.

## WARRANTY

The Bose Panaray 502C Controller is covered by a limited 1-year warranty. The Panaray 502A array speaker and Panaray 502B bass module are covered by a 5-year limited warranty.

# SPECIFICATIONS

## 502A Array Specifications

Dimensions:	23.5"H x 5.75"W x 6.73"D (59.7x14.6x17.1 cm)
Weight:	15 lbs. (6.8 kg.)
Transducer Complement:	5 - 4.5 " (11.4 cm) drivers
Enclosure Material:	High-impact polystyrene
Nominal Impedance:	8 Ohms, 6.4 Ohms minimum
Sensitivity:	90 dB SPL (1W, 1m, 130 Hz-15 kHz)
Maximum Acoustic Output:	112 dB SPL average, 121 dB SPL peak
Frequency Range:	130 Hz - 15 kHz
Port Tuning Frequency:	135 Hz
Amplifier Power (Recommended):	150 - 600 watts continuous into 8 Ohms
Long-term power handling:	150 watts continuous
Beamwidth:	120° horizontal, 70° vertical
Input Connections:	Parallel wired barrier strip (US/Can.) Parallel wired XLR (Euro/Aus/UK/Japan)
Fusing:	4 ampere AGC (Buss) or 3AG (Littlefuse)

# SPECIFICATIONS

## 502B Bass Module Specifications

Dimensions:	31.0"H x 14.0"W x 15.5"D (78.7x 35.6x 39.4 cm)
Weight:	80 lbs. (36.4 kg.)
Transducer Complement:	1 - 12" woofer (high power)
Enclosure Material:	3/4" resin-core, vinyl wrapped
Port:	High-impact polystyrene
Nominal Impedance:	8 Ohms, 6.4 Ohms minimum
Sensitivity:	90 dB SPL (1W, 1m, 55 Hz-150 Hz)
Maximum Acoustic Output:	115 dB SPL average, 122 dB SPL peak
Frequency Range:	50 Hz - 150 Hz
Power Handling:	450 watts continuous
Amplifier Power (Recommended):	450 - 1200 watts continuous into 8 Ohms
Input Connections:	2 parallel wired barrier strip (US/Can) 2 parallel wired XLR (Euro/Aus/UK/Japan) 2 parallel wired Speakon® connectors
Fusing:	7 ampere AGC (Buss) or 3AG (Littlefuse)

## 502C Controller Specifications

Dimensions:	120V/Barrier Strip 220-240V/XLR	1.75"Hx19.0"Wx8.75"D (4.4x48.3x22.2cm) 1.75"Hx19.0"Wx8.0"D (4.4x48.3x20.3cm)
Weight:		5.5 lbs. (2.5 kg.)
Chassis material:		16 gauge steel with painted/zinc coated finish
Cover plate material:		Brushed aluminum,painted
Input Connections:		Balanced barrier strip (US/Can) Balanced XLR (Euro/Aus/UK/Japan)
Output Connections:		Balanced barrier strip (US/Can) Balanced High frequency & Low frequency XLR (Euro/Aus/UK/Japan)

# SPECIFICATIONS

## 502C Controller Specifications (continued)

Input Impedance:	Balanced input, -10 dB level - 14k Ohms Balanced input, +4 dB level - 6k Ohms Unbalanced input (+ input), -10 dB level: 12k Ohms Unbalanced input (+ input), +4 dB level: 4k Ohms
Output Impedance:	100 Ohms nominal
Input Level:	-10 dB or +4dB, selectable
Output Level:	8.0 Vrms maximum into 600 Ohms
Low Frequency (LF) Output Mode:	Sum or normal
LF Output Level:	-18 dB to +3 dB, variable
Crossover Frequency:	140 Hz (Bi-amp), Roll-off slope: -18dB/octave
THD:	Midrange distortion of HF output: - 0.1% at 5V, 600 Hz Low frequency distortion of LF out: - 0.1 % at 5V, 80 Hz
Output Noise:	Bi-amp mode, HF outputs - 90 $\mu$ V Bi-amp mode, LF outputs - 40 $\mu$ V Passive mode, - 90 $\mu$ V
Offset:	All channels - 15mV
Power Requirements:	120 VAC,50/60 Hz, 12 watts (US/Can) 230 VAC,50/60 Hz, 12 watts (Euro) 100 VAC,50/60 Hz, 12 watts (Japan) 240 VAC,50/60 Hz, 12 watts (Aus/UK)

# ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICE HANDLING

This unit contains ESDS devices. We recommend the following precautions when repairing, replacing or transporting ESDS devices:

- Perform work at an electrically grounded work station.
- Wear wrist straps that connect to the station or heel straps that connect to conductive floor mats.
- Avoid touching the leads or contacts of ESDS devices or PC boards even if properly grounded. Handle boards by the edges only.
- Transport or store ESDS devices in ESD protective bags, bins, or totes. Do not insert unprotected devices into materials such as plastic, polystyrene foam, clear plastic bags, bubble wrap or plastic trays.

## PARTS LISTS AND EXPLODED VIEWS

The following section contains parts lists and exploded views for the Panaray® sound system. The parts lists are broken down as follows:


- 502®A Array Parts List and Exploded View
- 502A Packaging Parts List and Exploded View
- 502B Bass Box Parts List and Exploded View
- 502B Packaging Parts List and Exploded View
- 502C Controller Main Assembly Parts List and Exploded View
- 502C Packaging Parts List and Exploded View
- 502C Electrical Parts List
- Accessory Kits Parts Lists and Exploded Views

**NOTE:** The notes section for the entire parts list is contained on page 8.

**CAUTION:** Use only accessory kit parts that are specified by Bose® Corporation in this service manual. Substitute parts may not have the same safety characteristics as the original parts.



# PARTS LIST NOTES

1. This part is not normally available from Customer Service. Approval from the Field Service Manager is required before ordering.
2. This part splits into 2 pieces. Each piece fits onto a corner of the bass box.
3. Current European units should contain 2 owner's manuals: the original version, P/N 143585, and the German version of the owner's manual, P/N 171941. Future production units (except in North America) will contain owner's manuals in 5 languages (German, French, Italian, Spanish and English).
4. This illustration is typical of the internal layout of the 502<sup>®</sup> except as follows: (1) Barrier strip connectors are used in the US/Canada version only. XLR connectors are used on all non-US versions, and (2) The nut connected to the line cord is used on the US/Canada, UK and Australian units only.
5.  This part is critical for safety purposes. Failure to use a substitute replacement with the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards.
6. Refer to the 502C Electrical Parts List for components located on the PCB assembly.
7. This part is not illustrated.
8. These screws hold regulators U13 and U14 to the heatsink.
9. Early production runs of the 502C have 4 screws (instead of 2) that secure the cover to the chassis.
10. Early production runs of the 502C with XLR connectors have 12 screws (instead of 6) that secure the connectors to the chassis.
11. Early production runs of the 502C have 6 screws (instead of 4) that secure the front plate to the cover and chassis.
12. Early production runs of the 502C with XLR connectors have 5 screws (instead of 2) that secure the PCB to the chassis.
13. The line cord assembly consists of the following items:
  - (1) Line Cord-P/N 147428 (US/Canada), P/N 147430 (Euro), P/N 147429 (Japan), P/N 149025 (UK), P/N 149026 (Aus.),
  - (2) Strain Relief Bushing - P/N 144010 (US/Canada/UK/Aus), P/N 144011 (Euro/Japan),
  - (3) Connector Housing - P/N143964, and
  - (4) Connector Pin - P/N 143992. These parts are all safety controlled components. See Note 5.

# PACKAGING PART LIST

502A Array (see Figure 1)

Item Number	Description	XLR and Barrier Version Product code 003840, 004931, 004932 and 004933	*Speakon Version Product code 040170 and 040171	Qty	Note
1	Literature Kit-Panaray <sup>®</sup> which consists of:	149271	-	1	
A	Polybag	103351	103351	1	
B	Owner's Manual	143585	292721		
C	Registration Card	122157	-		
D	Warranty Service List	122766	-		
E	Envelope	122785	-		
2	Packing, Foam	143573	172321	2	
3	Polybag	106595	-	1	
4	Carton, 502A	143572	172541	1	
-	AU/NZ WARR SLIP SHEET 8.5 X 5.5	355731-0010	355731-0010	1	

\*Product code 040170 (gray) and 040171 (white) are the RoHS compliant version of the 502A. Only RoHS compliant parts listed in the above chart can be used in the 502A with product code 040170 and 040171.

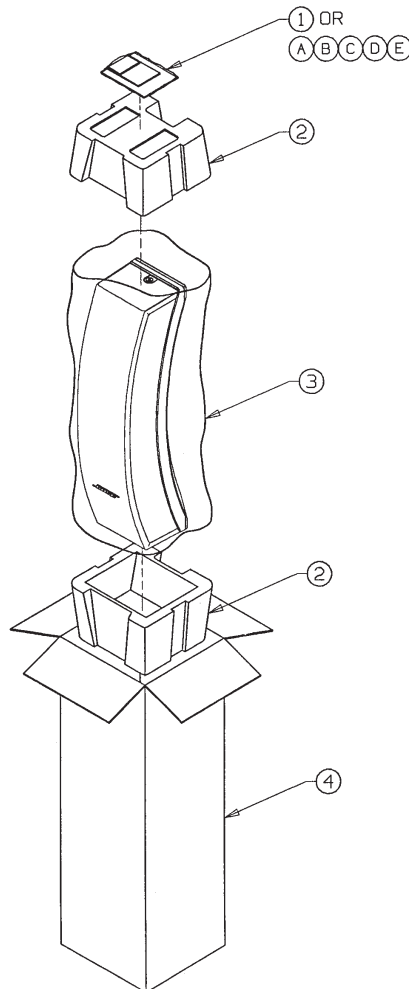


Figure 1. 502A Array Packaging View

# PACKAGING PART LIST

502B Bass Box (see Figure 2)

Item Number	Description	XLR and Barrier Version PC 003841, 019769, 004934, 004935, 004936, 007698	*Speakon® Version PC 040090 and 040091	Qty	Note
1	Literature Kit-Panaray® Which consists of:	149271	-	1	
A	Polybag	103351	103351	1	
B	Owners Manual	143585	292040	1	
C	Registration Card	122157	-	1	
D	Warranty Service List	122766	-	1	
E	Envelope	122785	-	1	
2	Packing End Cap, EPS (XLR and Barrier versions) Packing End Cap, EP (Speakon version)	139955 -	- 258886	4	2
3	Polybag	119320	119320	1	
4	Carton, 502B	143558	258887	1	
-	AU/NZ WARR SLIP SHEET 8.5 X 5.5	355731-0010	355731-0010	1	

\*Product code 040090 (black) and 040091 (white) are a RoHS compliant version of the 502B. Only RoHS compliant parts listed in the above chart can be used in the 502B with product code 040090 and 040091.

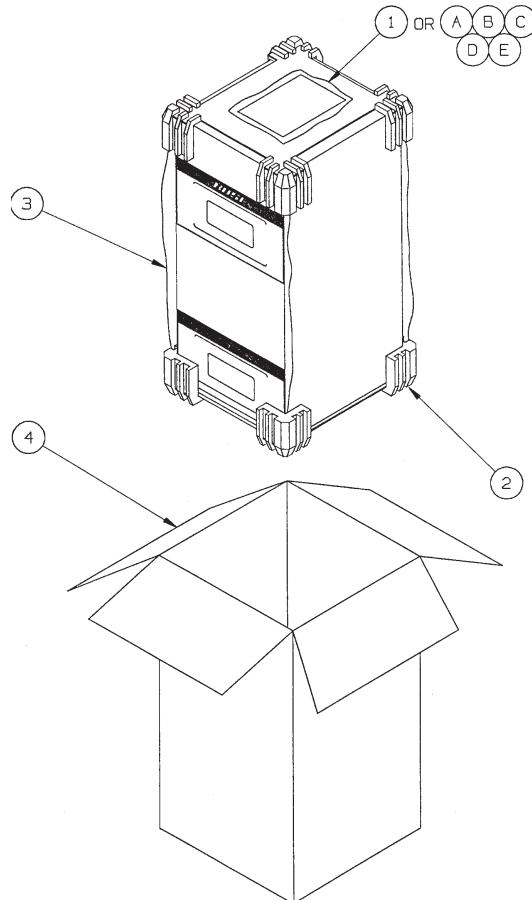


Figure 2. 502B Bass Box Packaging Exploded View

# PACKAGING PART LIST

502C Controller (see Figure 3)

Item Number	Description	Part Number	Qty.	Note
1	Crease Sheet, Die Cut	149823	1	
2	Literature Kit, Panaray <sup>®</sup> , Consists of:	149271	1	3
A	Poly bag	103351	1	
B	Owner's Manual	143585	1	
	Owner's Manual (German language)	171941	1	
C	Card, Registration	122157	1	
D	List, Warranty Service	122766	1	
E	Envelope	122785	1	
3	Poly bag	110892	1	
4	Insert	148354	1	
5	Carton, 502C	148353	1	

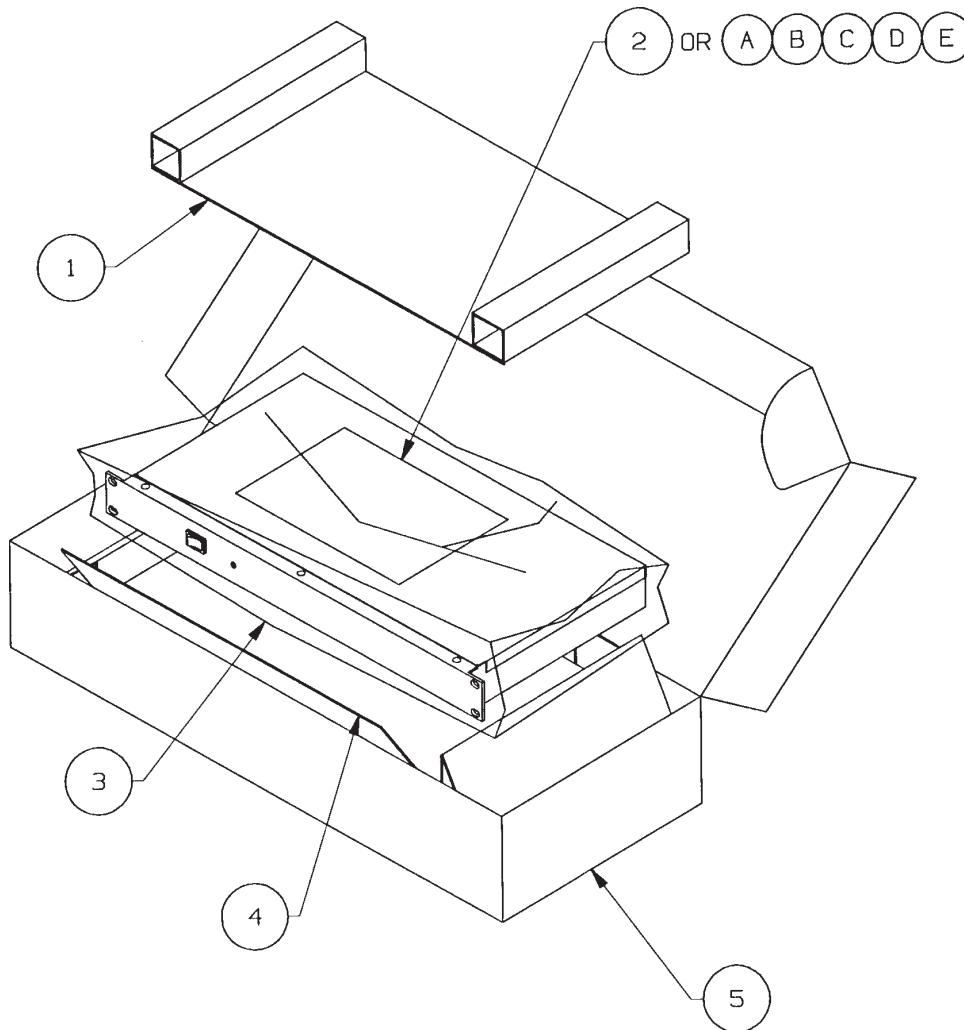


Figure 3. 502C Controller Packaging View

# MAIN PART LIST

502A Array (see Figure 4)

Item Number	Description	Part Number	Qty.	Note
1	Grille, Pro Gray Grille, Arctic White	142342-01 142342-02	1	
2	Insert, Threaded, Mach, M8x10.5, Gray Insert, Threaded, Mach, M8x10.5, Wht	143552-01 143552-02	2	
3	Nameplate, Dark Gray/Arctic White Nameplate, Dark Arctic White/Dark Gray	130718-1B21 130718-1C31	1	
4	Nut, Push-On, .078	125786	2	
5	Driver, 4.5"	291025-001	5	
6	Screw, HIRS, 8-10x5/8, PAN, XRC/SQ	289388-010	20	
7	Gasket, Driver, 4.5"	128407	5	
8	Resistor, 3Ω, 5%, 15W, WW	119094-3R0	1	
9	Capacitor, 5μF, Mylar	102770	1	
10	Tape, Foam	118223	2	
11	Terminal, Connector, Wire wrap	118008	4	
12	Inductor, .75mH, Air core	293515-001 or 347682-0010	1	
13	Washer, Flat Aluminum	123840	1	
14	Gasket, Connector Panel	290316-001	1	
15	Screw, 8-10, OVL HD, 1/2", BK (Gray) Screw-8-10, OVL HD, 1/2", Zn (White) Screw, Tapp, 8-10x .5, OVL CSK, BLK	148378-08 148379-08 290978-08	4	Non-RoHS Non-RoHS RoHS
16	Connector Panel, XLR, Gray Connector Panel, XLR, White Connector Panel, Barrier, Gray Connector Panel, Barrier, White Connector Panel, Speakon®, Gray Connector Panel, Speakon, White	142344-01 142344-02 142344-03 142344-04 287072-003 287072-002	1	Non-RoHS Non-RoHS Non-RoHS Non-RoHS RoHS RoHS
17	Fuse holder, Knob with O-Ring	149268	1	
18	Fuse-Standard Delay, 4A	104715-400	1	
19	Fuse holder Body	149269	1	
20	Washer, Neoprene	149270	1	
21	Screw, Tapp, 4-16x1/2, PAN (XLR) Screw, HIRS, 8-10x3/4, PAN (Barrier) Screw, M2.6x5/8, Phillips, Flat (Speakon)	145724-08 137527-12 -	4 2 4	Non-RoHS Non-RoHS RoHS
22	Connector, XLR, Dual Connector, Barrier Strip, 4 pos. Connector, Speakon, Panel Mount	145717 148976-04 258213	1 1 2	Non-RoHS Non-RoHS Non-RoHS
23	Gasket, XLR Connector Gasket, Barrier Gasket, Speakon (inc. with item 22)	146874 171243 -	1 1 2	Non-RoHS Non-RoHS RoHS
24	Batting, Polyester	142360	2	
25	Foam, Acoustic	142361	1	
26	Fuse holder Nut	171731	1	

Product code 040170 (gray) and 040171 (white) are a RoHS compliant version of the 502A. Only RoHS compliant parts listed in the above chart can be used in the 502A with product code 040170 and 040171.



# MAIN PART LIST

502B Bass Box (see Figures 5 and 6)

Item Number	Description	Part Number	Qty.	Note
1	Cap, Top/Bottom, Gray	182582-0P	2	
	Cap, Top/Bottom, White	294312		
2	Bolt-Mounting	143580	8	
3	Acoustic Foam	145705	3	
4	Bracket, Structural	290979	4	
5	Nut, Hex, Mach Screw, 7/16-14	290980-4414	8	
6	Washer, Lock, Ext, Stl, Zinc Plate	108261-43	8	
7	Screw, HIRS, 8-10x3/4, HEXW, Hex	293205-010	16	
8	Safety, Hook	171556	2	
9	Screw, 6-10x1/2,PAN,XRC/SQ	290294-08	4	
10	Access Panel, Gray, XLR	142349-8RU	1	Non-RoHS
	Access Panel, White, XLR	142349-9RU	1	Non-RoHS
	Access Panel, Gray, Barrier	142349-8SU	1	Non-RoHS
	Access Panel, White, Barrier	142349-9SU	1	Non-RoHS
	Access Panel, 502 BEX, Black	142349-0CP	1	Non-RoHS
	Access Panel, Gray, Speakon	292035-001	1	RoHS
	Access Panel, White, Speakon	292035-002	1	RoHS
11	Fuse holder, Knob with O-Ring	149268	1	
12	Fuse holder Body (includes nut)	149269	1	
13	Washer, Neoprene	149270	1	
14	Fuse, Standard Delay,7A	104715-700	1	
15	Foam Tape	103068	4	
16	Screw, Tapp, 4-16x1/2, (XLR)	145724-08	8	Non-RoHS
	Screw, HIRS, 8-10x3/4, (Barrier)	289388-16	2	RoHS
	Screw, Tapp, 8-11x1, (Speakon)	288374-016	4	RoHS
17	Connector , XLR, Dual	145717	2	Non-RoHS
	Connector, Barrier Strip, 4 pos.	148976-04	1	RoHS
	Connector, Speakon	258213-002	2	RoHS
18	Gasket, XLR Connector	146874	2	Non-RoHS
	Gasket, Barrier	171243	1	RoHS
	Gasket, Speakon	252384	2	RoHS
19	Fuse holder Nut	171731	1	
20	Insert, Barbed, 10/32"x 20mm	145712-03	8	
21	Screw, Mach, 10-32x 1-1½, PAN	291008-24	8	
22	Woofers, 12" (used with PC 003841, 019769, 004934, 004935, 004936, 007698 and 010744 only)	144392	1	Non-RoHS
	Woofers, 12" (used with PC 040090 and 040091 only)	291380-0020		RoHS
23	Screw, Mach, 8-10 x 1, PAN, Gray	289388-016	12	
	Screw, Mach, 8-10 x 1, PAN, White	289388-016	12	

\*Product code 040090 (black) and 040091 (white) are a RoHS compliant version of the 502B. Only RoHS compliant parts listed in the above chart can be used in the 502B with product code 040090 and 040091.

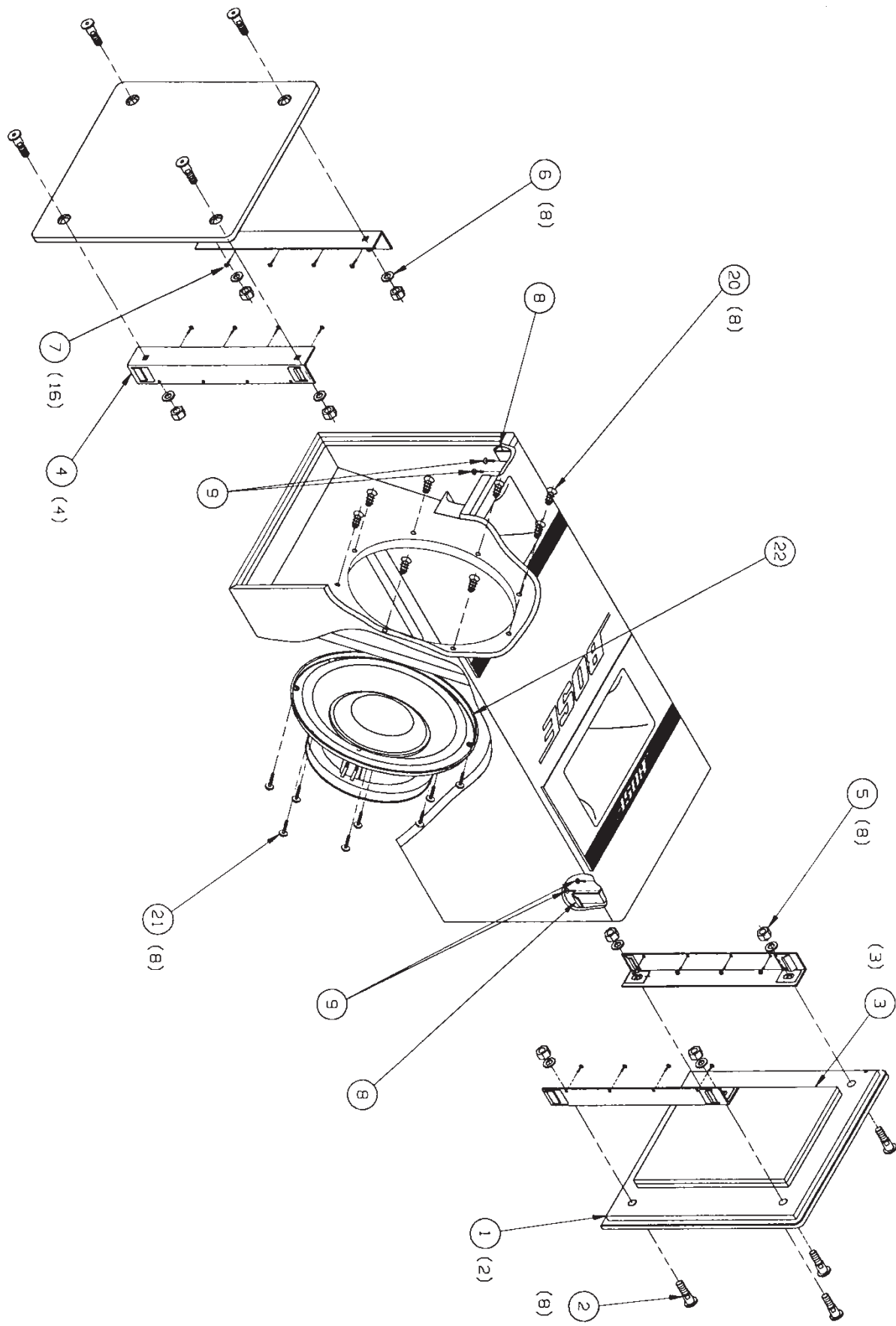
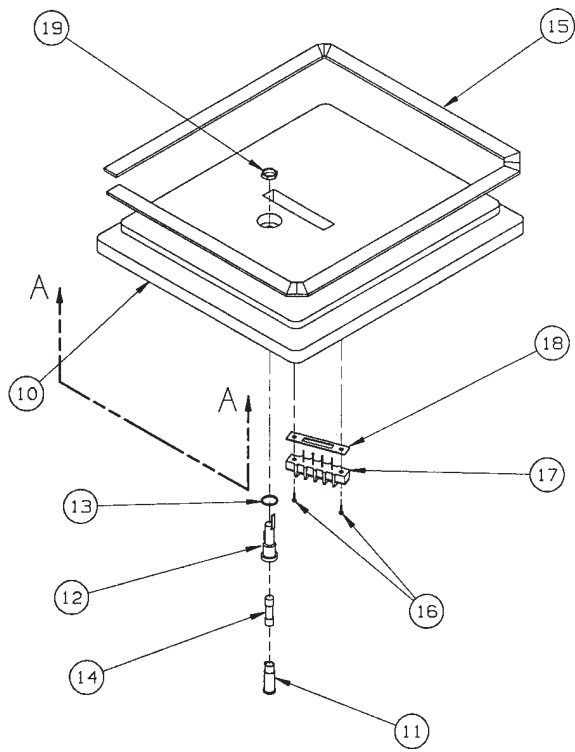
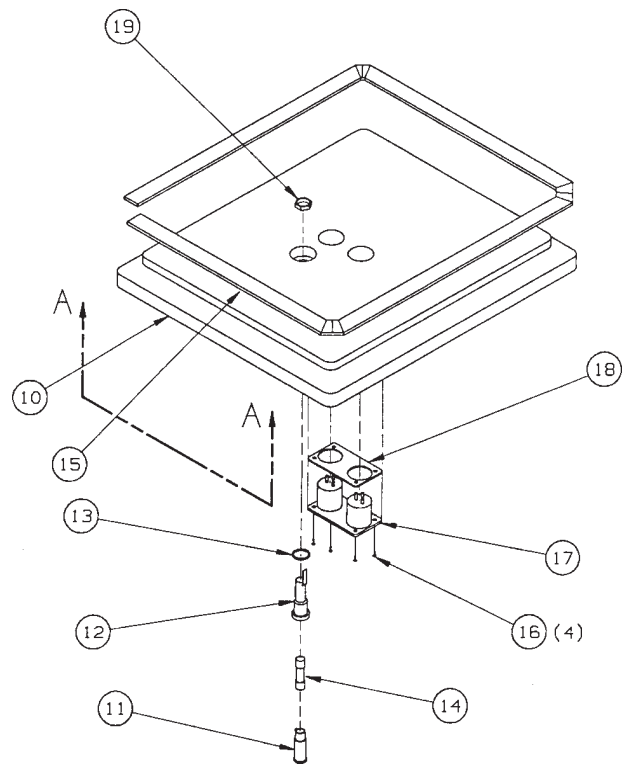


Figure 5. 502B Bass Box Exploded View

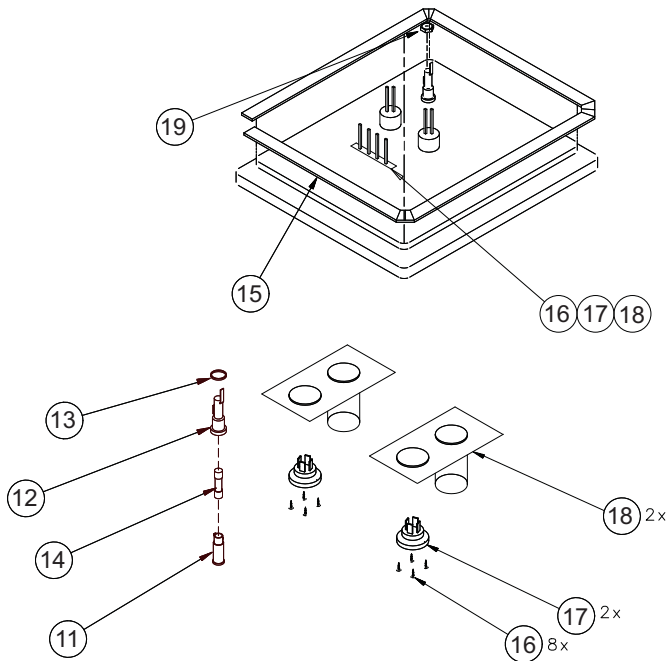




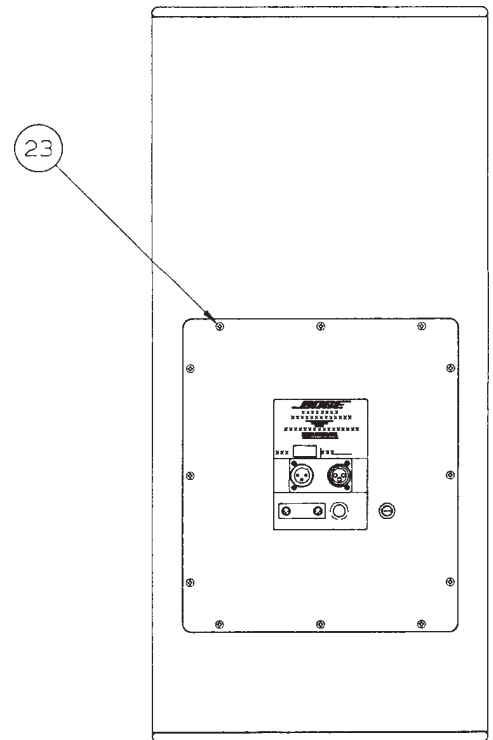
**Barrier Strip Version**



**XLR Version**



**Speakon® Version**







VIEW A-A  
(XLR VERSION SHOWN)

**Figure 6. 502B Access Panel and Connector Views**

# MAIN PART LIST

502C Controller (removable front panel version) (see Figure 7)

Item Number	Description	Part Number	Qty.	Note
1	Cover, Chassis, 502C	173003	1	
2	Screw, Tapp, 4-40x.375, PAN, TORX (US/Can.)	170284-06	2	9
	Screw, Tapp, 4-40x.375, PAN, TORX (Euro/UK/Aus/Japan)	170284-06	8	9,10
3	Plate, Front, Rack Mount Kit	173004	1	
4	Screw, Tapp, 4-40x.312, BTN, XREC	170285-05	4	11
5	Lens, LED, Clear, Front Panel	144023	1	
6	Switch, Rocker, SPST, AC Power	143960	1	5 
7	PCB Assembly, 502C (US/Can)	143940-1	1	1, 6
	PCB Assembly, 502C (Euro/UK/Aus/Japan)	143940-2	1	1, 6
8	Screw, Mach, 4-40x.25, PAN, TORX (US/Can)	171796-04	5	12
	Screw, Mach, 4-40x.25, PAN, TORX (Euro/UK/Aus/Japan)	171796-04	2	
9	Transformer, 120V (US/Can.)	143950-1	1	5
	Transformer, 220-240V (Euro/UK/Aus)	143950-2		
	Transformer, 100V (Japan)	143950-3		
10	Nut, Hex, STND, Washer, KEPS	118260-08	2	
11	Insulator, Standoff, PCB	143948	1	1, 5 
12	Connector, Barrier Strip Assy, 6 position (US/Can.)	143971	3	
13	Screw, Tapp, 4-40x.5, PAN, TORX (US/Can.)	170284-08	6	
14	Nut, Hex, #8-32, Steel (US/Can/UK/Aus.)	103237-832	1	
15	Line Cord, 3 wire (US/Can.)	143975	1	5, 13 
	Line Cord, 2 wire (Euro)	143977		
	Line Cord, 2 wire (Japan)	143976		
	Line Cord, 3 wire (UK)	149023		
	Line Cord, 3 wire (Aus)	149024		
16	Heatsink, PCB Mount	147165	1	1
-	Screw, Tapp, 4-40x.375, PAN, XREC	170284-06	4	7, 8
-	Chassis, 502, US/Canada	173002-01	1	1
	Euro/UK/AUS/Japan	173002-02	1	

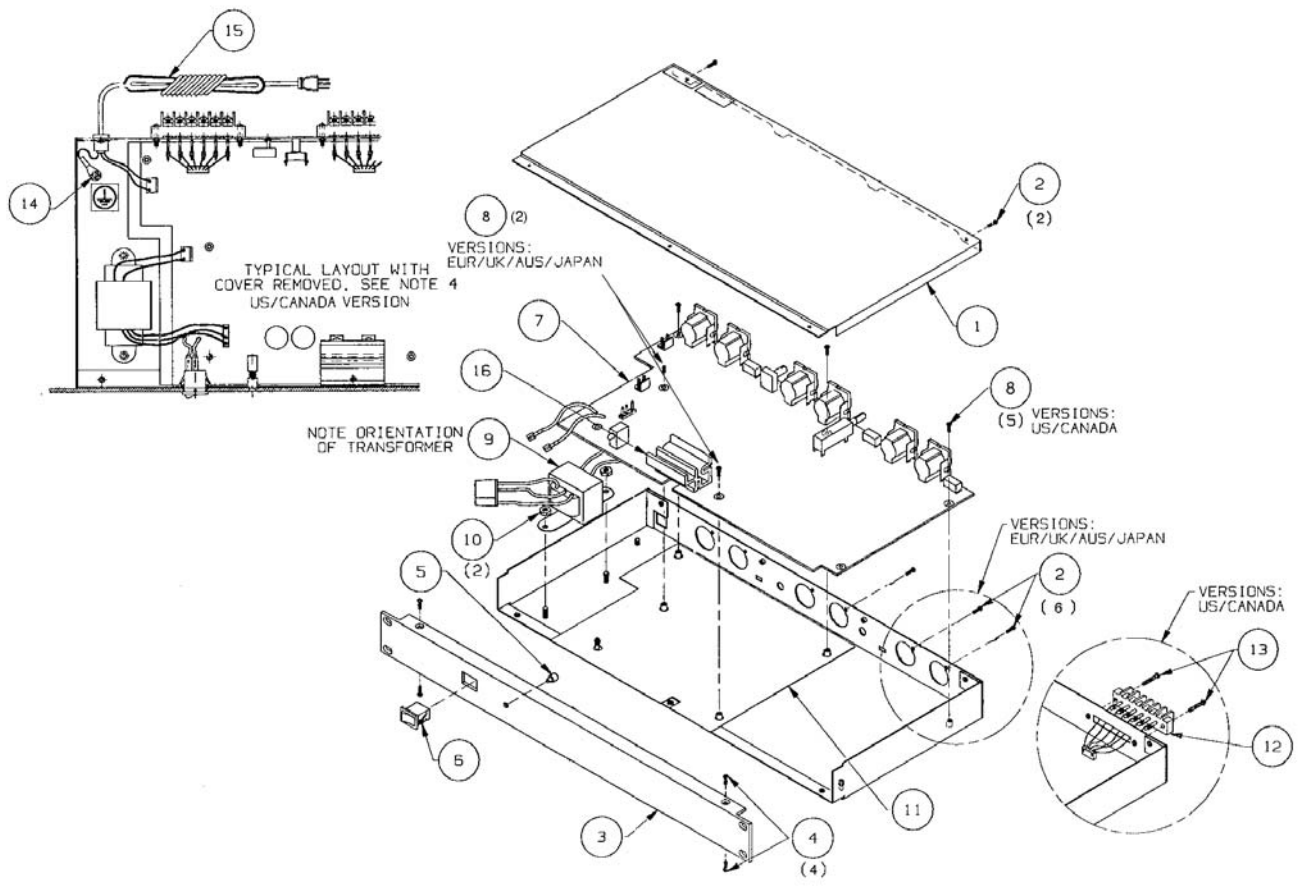


Figure 7. 502C Controller Exploded View (removable front panel version)

# MAIN PART LIST

502C Controller (one-piece chassis version) (see Figure 8)

Item Number	Description	Part Number	Qty/ Assy.	Note
1	Screw, 6-32, Mach, Flat, Xrec	190623-008	5	
2	Screw, Mach, 4-40x.25, PAN, XREC	103140-04	9	
3	Clip, Heatsink	188599	2	
4	XFMR, US/Canada/Japan, 100V/120V EUR/AUS/UK, 220V/240V	180128-1 180128-2	1 1	⚠ 5
5	Nut, Hex, 8-32, Keps	118260-08	3	
6	Insulator, 9.25x7.56x.015, D/C	143948	1	⚠ 1, 5
7	Switch, Power, Rocker, SPST	143960	1	⚠ 5
8	Lens, LED, Clear, Chassis	144023	1	
9	Chassis, 502®, US/Canada Euro/UK/AUS/Japan	198373-001 198373-002	1 1	1
10	Screw, Tapp, 4-40x.375, PAN, XREC	170284-06	6	
11	PCB Assy, 502 (all versions)	143940-2	1	1, 6
12	Cover, Chassis, Controller	198374-001	1	
13	Line Cord, 3-Wire, USA/Canada 2-Wire, EU 2-Wire, Japan 3-Wire, UK 3-Wire, Aus	173242 173243 173244 173245 173246	1 1 1 1 1	⚠ 5
14	Tape, Foam, 0.50"	198408	1	

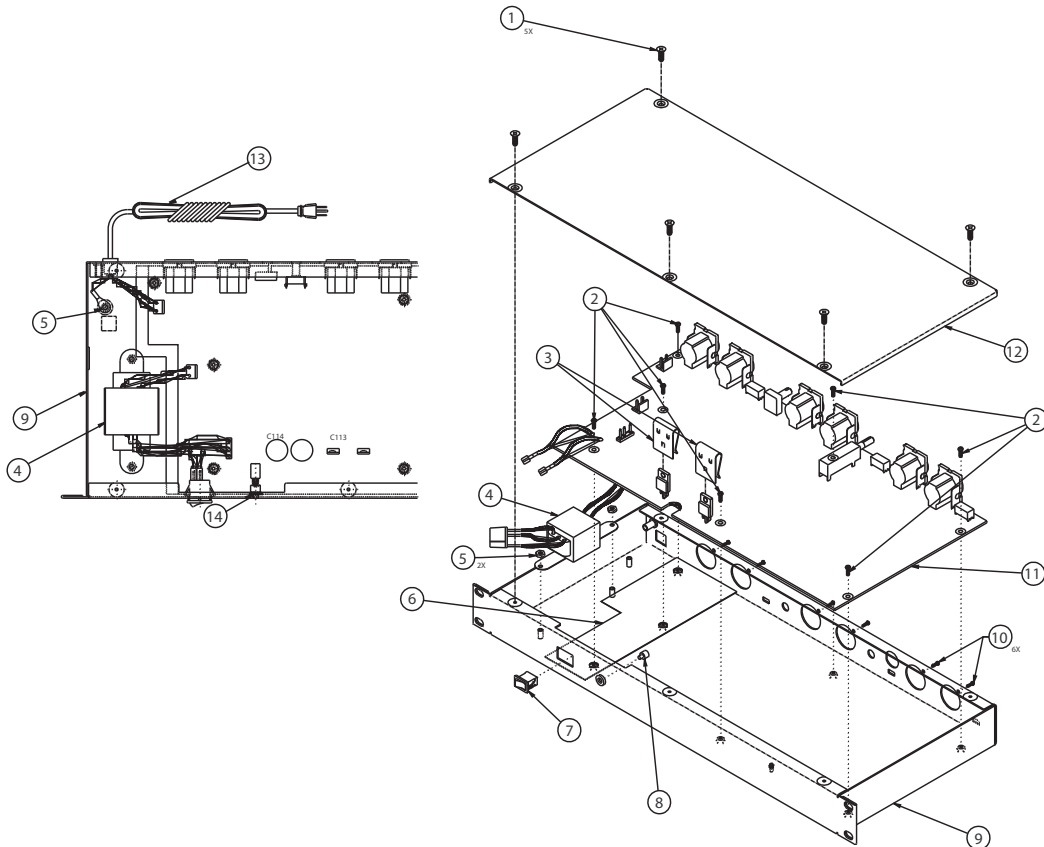


Figure 8. 502C Controller Exploded View (one-piece chassis version)

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Resistors

Reference Designator	Description	Part Number	Note
W1	0 Ohm Jumper, Chip	124896	
W2	0 Ohm Jumper, Chip	124896	
W3	0 Ohm Jumper, Chip	124896	
W4	0 Ohm Jumper, Chip	124896	
W5	0 Ohm Jumper, Chip	124896	
W6	0 Ohm Jumper, Chip	124896	
W7	0 Ohm Jumper, Chip	124896	
W8	0 Ohm Jumper, Chip	124896	
W9	0 Ohm Jumper, Chip	124896	
W10	0 Ohm Jumper, Chip	124896	
W11	0 Ohm Jumper, Chip	124896	
W12	0 Ohm Jumper, Chip	124896	
W13	0 Ohm Jumper, Chip	124896	
R1	1K, 1/8W, 1%, Chip	124894-1001	
R2	1K, 1/4W, 52mm, MF, 1%	121245-2211001	
R3	1K, 1/4W, 52mm, MF, 1%	121245-2211001	
R4	1K, 1/8W, 1%, Chip	124894-1001	
R5	100K, 1/4W, 52mm, CF, 2%	121243-1211042	
R6	100K, 1/4W, 52mm, CF, 2%	121243-1211042	
R7	2K, 1/8W, 1%, Chip	124894-2001	
R8	8.06K, 1/8W, 1%, Chip	124894-8061	
R9	8.06K, 1/8W, 1%, Chip	124894-8061	
R10	2K, 1/8W, 1%, Chip	124894-2001	
R11	3.65K, 1/8W, 1%, Chip	124894-3651	
R12	2K, 1/8W, 1%, Chip	124894-2001	
R13	4.02K, 1/8W, 1%, Chip	124894-4021	
R13	4.02K, 1/8W, 1%, Chip	124894-4021	
R14	4.02K, 1/8W, 1%, Chip	124894-4021	
R14	4.02K, 1/8W, 1%, Chip	124894-4021	
R15	30.1K, 1/8W, 1%, Chip	124894-3012	
R17	2K, 1/8W, 1%, Chip	124894-2001	
R18	2.32K, 1/8W, 1%, Chip	124894-2321	
R19	13K, 1/8W, 1%, Chip	124894-1302	
R20	100K, 1/8W, 1%, Chip	124894-1003	
R21	511 Ohm, 1/8W, 1%, Chip	124894-5110	
R22	3.16K, 1/8W, 1%, Chip	124894-3161	
R23	1.33K, 1/8W, 1%, Chip	124894-1331	
R24	0 Ohm Jumper, Chip	124896	
R25	274 Ohm, 1/8W, 1%, Chip	124894-2740	
R26	274 Ohm, 1/8W, 1%, Chip	124894-2740	
R27	18.2K, 1/8W, 1%, Chip	124894-1822	
R28	8.66K, 1/8W, 1%, Chip	124894-8661	
R29	6.34K, 1/8W, 1%, Chip	124894-6341	
R30	2.21K, 1/8W, 1%, Chip	124894-2211	
R31	1.91K, 1/8W, 1%, Chip	124894-1911	
R32	43.2K, 1/8W, 1%, Chip	124894-4322	

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Resistors (continued)

Reference Designator	Description	Part Number	Note
R33	3.92K, 1/8W, 1%, Chip	124894-3921	
R34	2.43K, 1/8W, 1%, Chip	124894-2431	
R35	2K, 1/8W, 1%, Chip	124894-2001	
R36	41.2K, 1/8W, 1%, Chip	124894-4122	
R37	3.01K, 1/8W, 1%, Chip	124894-3011	
R38	6.81K, 1/8W, 1%, Chip	124894-6811	
R39	6.81K, 1/8W, 1%, Chip	124894-6811	
R40	4.75K, 1/8W, 1%, Chip	124894-4751	
R41	5.90K, 1/8W, 1%, Chip	124894-5901	
R42	5.11K, 1/8W, 1%, Chip	124894-5111	
R43	221K, 1/8W, 1%, Chip	124894-2213	
R44	1.10K, 1/8W, 1%, Chip	124894-1101	
R45	49.9K, 1/8W, 1%, Chip	124894-4992	
R46	68.1K, 1/8W, 1%, Chip	124894-6812	
R47	6.98K, 1/8W, 1%, Chip	124894-6981	
R48	5.49K, 1/8W, 1%, Chip	124894-5491	
R49	14K, 1/8W, 1%, Chip	124894-1402	
R50	14K, 1/8W, 1%, Chip	124894-1402	
R64	0 Ohm Jumper, Chip	124896	
R65	1K, 1/8W, 1%, Chip	124894-1001	
R66	1K, 1/4W, 52mm, MF, 1%	121245-2211001	
R67	1K, 1/4W, 52mm, MF, 1%	121245-2211001	
R68	1K, 1/8W, 1%, Chip	124894-1001	
R69	2K, 1/8W, 1%, Chip	124894-2001	
R70	8.06K, 1/8W, 1%, Chip	124894-8061	
R71	8.06K, 1/8W, 1%, Chip	124894-8061	
R72	2K, 1/8W, 1%, Chip	124894-2001	
R73	3.65K, 1/8W, 1%, Chip	124894-3651	
R74	2K, 1/8W, 1%, Chip	124894-2001	
R75	4.02K, 1/8W, 1%, Chip	124894-4021	
R75	4.02K, 1/8W, 1%, Chip	124894-4021	
R76	4.02K, 1/8W, 1%, Chip	124894-4021	
R77	30.1K, 1/8W, 1%, Chip	124894-3012	
R79	2K, 1/8W, 1%, Chip	124894-2001	
R80	2.32K, 1/8W, 1%, Chip	124894-2321	
R81	13K, 1/8W, 1%, Chip	124894-1302	
R82	100K, 1/8W, 1%, Chip	124894-1003	
R83	511 Ohm, 1/8W, 1%, Chip	124894-5110	
R84	3.16K, 1/8W, 1%, Chip	124894-3161	
R85	1.33K, 1/8W, 1%, Chip	124894-1331	
R86	0 Ohm Jumper, Chip	124896	
R87	274 Ohm, 1/8W, 1%, Chip	124894-2740	
R88	274 Ohm, 1/8W, 1%, Chip	124894-2740	
R89	18.2K, 1/8W, 1%, Chip	124894-1822	
R90	8.66K, 1/8W, 1%, Chip	124894-8661	
R91	6.34K, 1/8W, 1%, Chip	124894-6341	

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Resistors (continued)

Reference Designator	Description	Part Number	Note
R92	2.21K, 1/8W, 1%, Chip	124894-2211	
R93	1.91K, 1/8W, 1%, Chip	124894-1911	
R94	43.2K, 1/8W, 1%, Chip	124894-4322	
R95	3.92K, 1/8W, 1%, Chip	124894-3921	
R96	2.43K, 1/8W, 1%, Chip	124894-2431	
R97	2K, 1/8W, 1%, Chip	124894-2001	
R98	41.2K, 1/8W, 1%, Chip	124894-4122	
R99	3.01K, 1/8W, 1%, Chip	124894-3011	
R100	4.75K, 1/8W, 1%, Chip	124894-4751	
R101	5.90K, 1/8W, 1%, Chip	124894-5901	
R102	5.11K, 1/8W, 1%, Chip	124894-5111	
R103	221K, 1/8W, 1%, Chip	124894-2213	
R104	1.10K, 1/8W, 1%, Chip	124894-1101	
R105	49.9K, 1/8W, 1%, Chip	124894-4992	
R106	68.1K, 1/8W, 1%, Chip	124894-6812	
R107	6.98K, 1/8W, 1%, Chip	124894-6981	
R108	5.49K, 1/8W, 1%, Chip	124894-5491	
R109	14K, 1/8W, 1%, Chip	124894-1402	
R110	14K, 1/8W, 1%, Chip	124894-1402	
R113	0 Ohm Jumper, Chip	124896	
R117	0 Ohm Jumper, Chip	124896	
R120	0 Ohm Jumper, Chip	124896	
R125	0 Ohm Jumper, Chip	124896	
R127	5.6K, 52mm, CF, 1/2W, 5%	121243-1515625	
R128	100K, 1/4W, 52mm, CF, 2%	121243-1211042	
R129	100K, 1/4W, 52mm, CF, 2%	121243-1211042	
R130	4.75K, 1/8W, 1%, Chip	124894-4751	
R131	4.75K, 1/8W, 1%, Chip	124894-4751	
R132	4.75K, 1/8W, 1%, Chip	124894-4751	
R133	2.43K, 1/8W, 1%, Chip	124894-2431	
R134	4.75K, 1/8W, 1%, Chip	124894-4751	
R135	4.75K, 1/8W, 1%, Chip	124894-4751	
R136	4.75K, 1/8W, 1%, Chip	124894-4751	
R137	2.43K, 1/8W, 1%, Chip	124894-2431	
R138	4.75K, 1/8W, 1%, Chip	124894-4751	
R139	4.75K, 1/8W, 1%, Chip	124894-4751	
R140	4.75K, 1/8W, 1%, Chip	124894-4751	
R141	2.43K, 1/8W, 1%, Chip	124894-2431	
R142	4.75K, 1/8W, 1%, Chip	124894-4751	
R143	4.75K, 1/8W, 1%, Chip	124894-4751	
R144	4.75K, 1/8W, 1%, Chip	124894-4751	
R145	2.43K, 1/8W, 1%, Chip	124894-2431	
R146	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R147	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R148	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R149	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	



# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Resistors (continued)

Reference Designator	Description	Part Number	Note
R150	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R151	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R152	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R153	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R154	4.75K, 1/8W, 1%, Chip	124894-4751	
R155	4.75K, 1/8W, 1%, Chip	124894-4751	
R156	0 Ohm Jumper, Chip	124896	
R157	10K, 1/2W, 52mm, CF, 5%	121243-1511035	
R158	47.5K, 1/8W, 1%, Chip	124894-4752	
R159	47.5K, 1/8W, 1%, Chip	124894-4752	
R160	1K, 1/8W, 1%, Chip	124894-1001	
R161	4.32K, 1/8W, 1%, Chip	124894-4321	
R162	0 Ohm Jumper, Chip	124896	
R166	20K, 1/8W, 1%, Chip	124894-2002	
R167	1K, 1/8W, 1%, Chip	124894-1001	
R168	4.32K, 1/8W, 1%, Chip	124894-4321	
R169	0 Ohm Jumper, Chip	124896	
R173	20K, 1/8W, 1%, Chip	124894-2002	
R174	681 Ohm, 1/8W, 1%, Chip	124894-6810	
R175	681 Ohm, 1/8W, 1%, Chip	124894-6810	
R176	681 Ohm, 1/8W, 1%, Chip	124894-6810	
R177	681 Ohm, 1/8W, 1%, Chip	124894-6810	
R180	221K, 1/8W, 1%, Chip	124894-2213	
R182	0 Ohm Jumper, Chip	124896	
R183	221K, 1/8W, 1%, Chip	124894-2213	
R184	49.9K, 1/8W, 1%, Chip	124894-4992	
R185	49.9K, 1/8W, 1%, Chip	124894-4992	
R191	47.5 Ohm, 1/8W, 1%, Chip	124894-47R5	
R192	47.5 Ohm, 1/8W, 1%, Chip	124894-47R5	
R193	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R194	47 Ohm, 1/4W, 52mm, CF, 2%	121243-1214702	
R195	47.5 Ohm, 1/8W, 1%, Chip	124894-47R5	
R196	47.5 Ohm, 1/8W, 1%, Chip	124894-47R5	
R197	47.5 Ohm, 1/8W, 1%, Chip	124894-47R5	
R198	47.5 Ohm, 1/8W, 1%, Chip	124894-47R5	
R199	6.81K, 1/8W, 1%, Chip	124894-6811	
R200	10K, 1/8W, 1%, Chip	124894-1002	
R201	17.8K, 1/8W, 1%, Chip	124894-1782	
R203	221 Ohm, 1/8W, 1%, Chip	124894-2210	
R204	221 Ohm, 1/8W, 1%, Chip	124894-2210	
R205	47.5K, 1/8W, 1%, Chip	124894-4752	
R207	47.5K, 1/8W, 1%, Chip	124894-4752	
R208	10K, 1/8W, 1%, Chip	124894-1002	
R209	47.5K, 1/8W, 1%, Chip	124894-4752	
R210	475 Ohm, 1/8W, 1%, Chip	124894-4750	
R212	4.75K, 1/8W, 1%, Chip	124894-4751	



# ELECTRICAL PART LIST

502C Controller Main PCB Assembly


Capacitors

Reference Designator	Description	Part Number	Note
C1	1000pF, 10%, Chip	124956-1022	
C2	1000pF, 10%, Chip	124956-1022	
C3	22 $\mu$ F, 35V, Electrolytic	119944-220	
C4	22 $\mu$ F, 35V, Electrolytic	119944-220	
C5	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C6	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C7	100pF, 5%, Chip	124956-1012	
C8	100pF, 5%, Chip	124956-1012	
C9	.01 $\mu$ F, 5%, Film	137127-103	
C10	680pF, 10%, Ceramic	137269-681	
C11	.01 $\mu$ F, 5%, Film	137127-103	
C12	0.0047 $\mu$ F, 5%, Film	137127-472	
C13	0.0047 $\mu$ F, 5%, Film	137127-472	
C14	.01 $\mu$ F, 5%, Film	137127-103	
C15	.01 $\mu$ F, 5%, Film	137127-103	
C16	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C17	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C18	.1 $\mu$ F, 5%, Film	137127-104	
C19	.047 $\mu$ F, 5%, Film	137127-473	
C20	.1 $\mu$ F, 5%, Film	137127-104	
C21	100pF, 5%, Chip	124956-1012	
C22	.1 $\mu$ F, 5%, Film	137127-104	
C23	.1 $\mu$ F, 5%, Film	137127-104	
C24	.47 $\mu$ F, 5%, Film	137127-474	
C25	.1 $\mu$ F, 5%, Film	137127-104	
C26	.1 $\mu$ F, 5%, Film	137127-104	
C27	.47 $\mu$ F, 5%, Film	137127-474	
C28	.47 $\mu$ F, 5%, Film	137127-474	
C29	.22 $\mu$ F, 5%, Film	137127-224	
C30	.22 $\mu$ F, 5%, Film	137127-224	
C31	.1 $\mu$ F, 5%, Film	137127-104	
C32	.1 $\mu$ F, 5%, Film	137127-104	
C33	.22 $\mu$ F, 5%, Film	137127-224	
C34	.022 $\mu$ F, 5%, Film	137127-223	
C35	.18 $\mu$ F, 5%, Film	137127-184	
C36	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C37	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C47	1000pF, 10%, Chip	124956-1022	
C48	1000pF, 10%, Chip	124956-1022	
C49	22 $\mu$ F, 35V, Electrolytic	119944-220	
C50	22 $\mu$ F, 35V, Electrolytic	119944-220	
C51	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C52	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C55	100pF, 5%, Chip	124956-1012	
C56	100pF, 5%, Chip	124956-1012	
C57	.01 $\mu$ F, 5%, Film	137127-103	

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly




Capacitors (continued)

Reference Designator	Description	Part Number	Note
C58	680pF, 10%, Ceramic	137269-681	
C59	.01μF, 5%, Film	137127-103	
C60	0.0047μF, 5%, Film	137127-472	
C61	0.0047μF, 5%, Film	137127-472	
C62	.01μF, 5%, Film	137127-103	
C63	.01μF, 5%, Film	137127-103	
C64	0.1μF, +80/-20%, Chip	124959-104	
C65	0.1μF, +80/-20%, Chip	124959-104	
C66	.1μF, 5%, Film	137127-104	
C67	.047μF, 5%, Film	137127-473	
C68	.1μF, 5%, Film	137127-104	
C69	100pF, 5%, Chip	124956-1012	
C70	.1μF, 5%, Film	137127-104	
C71	.1μF, 5%, Film	137127-104	
C72	.47μF, 5%, Film	137127-474	
C73	.1μF, 5%, Film	137127-104	
C74	.1μF, 5%, Film	137127-104	
C75	.47μF, 5%, Film	137127-474	
C76	0.1μF, +80/-20%, Chip	124959-104	
C77	0.1μF, +80/-20%, Chip	124959-104	
C78	.47μF, 5%, Film	137127-474	
C79	.22μF, 5%, Film	137127-224	
C80	.22μF, 5%, Film	137127-224	
C81	.1μF, 5%, Film	137127-104	
C82	.1μF, 5%, Film	137127-104	
C83	.22μF, 5%, Film	137127-224	
C84	.022μF, 5%, Film	137127-223	
C85	.18μF, 5%, Film	137127-184	
C86	0.1μF, +80/-20%, Chip	124959-104	
C87	0.1μF, +80/-20%, Chip	124959-104	
C95	Jumper, 0 Ohm	139942	
C97	0.1μF, +80/-20%, Chip	124959-104	
C98	0.1μF, +80/-20%, Chip	124959-104	
C99	0.1μF, +80/-20%, Chip	124959-104	
C100	0.1μF, +80/-20%, Chip	124959-104	
C101	100pF, 5%, Chip	124956-1012	
C102	100pF, 5%, Chip	124956-1012	
C103	100pF, 5%, Chip	124956-1012	
C104	100pF, 5%, Chip	124956-1012	
C105	100pF, 5%, Chip	124956-1012	
C106	100pF, 5%, Chip	124956-1012	
C107	100pF, 5%, Chip	124956-1012	
C108	100pF, 5%, Chip	124956-1012	
C109	.0047μF, 1KV, Ceramic, 20%, (US/Can)	103447	5 

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Capacitors (continued)

Reference Designator	Description	Part Number	Note
C109	.0047 $\mu$ F, 20%, Metallized Paper, (Euro/UK/Aus/Japan)	146354	5 
C110	10,000pF, +80/-20%, Chip	124959-103	
C111	10,000pF, +80/-20%, Chip	124959-103	
C112	10,000pF, +80/-20%, Chip	124959-103	
C113	2200 $\mu$ F, 50V, 105C, Electrolytic, 20%	144000-222H	5 
C114	2200 $\mu$ F, 50V, 105C, Electrolytic, 20%	144000-222H	5 
C115	1 $\mu$ F, 50V, Electrolytic	137265-1R0	
C116	1 $\mu$ F, 50V, Electrolytic	137265-1R0	
C117	1 $\mu$ F, 50V, Electrolytic	137265-1R0	
C118	1 $\mu$ F, 50V, Electrolytic	137265-1R0	
C119	100pF, 5%, Chip	124956-1012	
C120	100pF, 5%, Chip	124956-1012	
C129	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C130	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C131	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C132	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C133	10,000pF, +80/-20%, Chip	124959-103	
C142	1000pF, 10%, Chip	124956-1022	
C143	1000pF, 10%, Chip	124956-1022	
C144	1000pF, 10%, Chip	124956-1022	
C145	1000pF, 10%, Chip	124956-1022	
C146	1000pF, 10%, Chip	124956-1022	
C147	1000pF, 10%, Chip	124956-1022	
C148	1000pF, 10%, Chip	124956-1022	
C149	1000pF, 10%, Chip	124956-1022	
C150	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C151	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C152	22 $\mu$ F, Bi-polar, Electrolytic, 20%	147522-220	
C153	22 $\mu$ F, 35V, Electrolytic	119944-220	
C154	22 $\mu$ F, 35V, Electrolytic	119944-220	
C155	22 $\mu$ F, 35V, Electrolytic	119944-220	
C156	22 $\mu$ F, 35V, Electrolytic	119944-220	
C157	22 $\mu$ F, 35V, Electrolytic	119944-220	
C158	22 $\mu$ F, 35V, Electrolytic	119944-220	
C159	22 $\mu$ F, 35V, Electrolytic	119944-220	
C160	22 $\mu$ F, 35V, Electrolytic	119944-220	
C161	0.1 $\mu$ F, +80/-20%, Chip	124959-104	
C162	100pF, 5%, Chip	124956-1012	
C163	100pF, 5%, Chip	124956-1012	
C164	100pF, 5%, Chip	124956-1012	

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Diodes

Reference Designator	Description	Part Number	Note
Z1	Bridge, 100V, 1A	143952	
D1	1N4531, 5mm	136603	
D2	1N4531, 5mm	136603	
D3	1N4531, 5mm	136603	
D4	1N4531, 5mm	136603	
D5	1N4531, 5mm	136603	
D6	1N4531, 5mm	136603	
D7	1N4531, 5mm	136603	
D8	1N4531, 5mm	136603	
D9	1N4148, 52mm, Axial	116997 or 121501	
D10	1N4531, 5mm	136603	
D11	1N4148, 52mm, Axial	116997 or 121501	
D12	1N4531, 5mm	136603	
D13	1N4148, 52mm, Axial	116997 or 121501	
D14	1N4531, 5mm	136603	
D15	1N4148, 52mm, Axial	116997 or 121501	
D16	1N4531, 5mm	136603	
D17	1N4148, 52mm, Axial	116997 or 121501	
D18	1N4531, 5mm	136603	
D19	1N4148, 52mm, Axial	116997 or 121501	
D20	1N4531, 5mm	136603	
D21	1N4148, 52mm, Axial	116997 or 121501	
D22	1N4531, 5mm	136603	
D23	1N4148, 52mm, Axial	116997 or 121501	
D24	1N4531, 5mm	136603	
D25	Zener, 18V, 1W, 5%	116995-4746A	
D26	Zener, 18V, 1W, 5%	116995-4746A	
D27	Zener, 18V, 1W, 5%	116995-4746A	
D28	Zener, 18V, 1W, 5%	116995-4746A	
D29	Zener, 18V, 1W, 5%	116995-4746A	
D30	Zener, 18V, 1W, 5%	116995-4746A	
D31	Zener, 18V, 1W, 5%	116995-4746A	
D32	Zener, 18V, 1W, 5%	116995-4746A	
D33	Zener, 18V, 1W, 5%	116995-4746A	
D34	Zener, 18V, 1W, 5%	116995-4746A	
D35	Zener, 18V, 1W, 5%	116995-4746A	
D36	Zener, 18V, 1W, 5%	116995-4746A	
D37	1N4531, 5mm	136603	
D38	1N4531, 5mm	136603	
D39	1N4531, 5mm	136603	
D40	Zener, 7.5V, 1W, 5%	116995-4737A	
D41	LED, Green, Right Angle Mount	144027	
D42	1N4531, 5mm	136603	
D43	1N4531, 5mm	136603	

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

## Transistors

Reference Designator	Description	Part Number	Note
Q1	NPN, 2SC2812, 50T23	134741	

## Integrated Circuits

Reference Designator	Description	Part Number	Note
U1	Op Amp, Quad	144008	
U2	Op Amp, Quad	144008	
U3	Op Amp, Quad	144008	
U4	Op Amp, Quad	144008	
U6	Op Amp, Quad	144008	
U7	Op Amp, Quad	144008	
U8	Op Amp, Quad	144008	
U9	Op Amp	108568	
U10	Op Amp	108568	
U11	Op Amp	108568	
U12	Op Amp	108568	
U13	Regulator, Voltage, 3 terminal, +15V	143858	
U14	Regulator, Voltage, 3 terminal, -15V	143806	
U15	LM399N	137929	

## Potentiometers and Switches

Reference Designator	Description	Part Number	Note
R126	Potentiometer, Dual-Ganged, 10K	143959-103	
S1	4P4T, PCB Mount	143957	
S2	Slide, DPDT	143958	
S3	Slide, DPDT	143958	
S4	Slide, DPDT	143958	



## Relays

Reference Designator	Description	Part Number	Note
K1	Relay, 24VDC, 4P4T	144017	
K2	Relay, 24VDC, 4P4T	144017	

# ELECTRICAL PART LIST

502C Controller Main PCB Assembly

Connectors

Reference Designator	Description	Part Number	Note
J1	Harness Assy, Quick Disconnect	143968	5 
J2	Harness Assy, Quick Disconnect	143968	5 
J3	XLR, Female (Euro/Japan/UK/Aus)	189222-001	
J4	XLR, Female (Euro/Japan/UK/Aus)	189222-001	
P1	Header, 2 pin	143963	
P2	Header, 2 pin	143963	
P3	Header	143965	
P4	Header, 12 pin	170250	
P5	Header, 12 pin	170250	
P6	Header, 6 pin (US/Can.)	143974	
P7	Header, 6 pin (US/Can.)	143974	
P8	Header, 6 pin (US/Can.)	143974	
P9	XLR, Male (Euro/Japan/UK/Aus)	144004	
P10	XLR, Male (Euro/Japan/UK/Aus)	144004	
P11	XLR, Male (Euro/Japan/UK/Aus)	144004	
P12	XLR, Male (Euro/Japan/UK/Aus)	144004	

# DISASSEMBLY PROCEDURES

## 502A Array Procedures

**Note:** Refer to Figure 9 for the following procedures.

### 1. Grille Removal

**1.1** Remove the 2 screws (2) located on each end of the grille (1) using a 7/64" hex wrench. Grasp the grille on both ends and pull it away from the array.

### 2. Driver Removal

**2.1** Perform procedure 1.

**2.2** Remove the 3 screws (6) that secure the driver (5) to the array.

**2.3** Lift the driver carefully away from the array. Make a note of the wiring configuration and cut the wires connected to the driver terminals as close to the terminals as possible.

#### **Re-assembly Notes:**

1. Be sure to observe polarity when connecting the replacement driver. Refer to the wiring diagram, Figure 10.
2. Be sure that the driver gasket is properly aligned so that it makes an airtight seal.

### 3. Passive Component Removal

**3.1** Perform procedure 1.

**3.2** Remove the 2 drivers located on the end of the array opposite the serial number (refer to procedure 2 above), but do not cut any wires.

**3.3 Resistor (8) or capacitor (9) removal:** Unwrap the component's leads from its wirewrap terminal (11), and remove the component from the array.

**3.4 Inductor (12) removal:** Remove the screw (6) and washer (13) that secure the inductor to the array. Cut the inductor leads as close to the terminals as possible.

## 4. Connector Panel Removal

**4.1** Remove 4 screws (15) that secure the panel (16) to the array.

**4.2** Grasp the panel and pull it away from the array.

**Re-assembly Note:** When re-installing the connector panel, ensure that the panel gasket is correctly positioned so that it makes an airtight seal.

## 5. Barrier Strip Connector Removal

**5.1** Remove the 2 screws (21) that secure the connector (22) to the connector panel (16).

**5.2** Unwrap the wires from the barrier strip terminals, and remove the connector.

**Re-assembly Note:** When re-installing the barrier strip, ensure that the gasket is correctly positioned so that it makes an airtight seal.

## 6. XLR Connector Removal

**6.1** Remove the 4 screws (21) that secure the connector (22) to the connector panel (16).

**6.2** Make a note of the wiring configuration and cut the connector's leads as close to its terminals as possible. Remove the connector from the array.

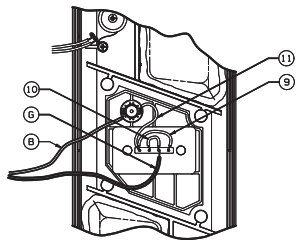
#### **Re-assembly Notes:**

1. Observe polarity when connecting the replacement XLR connector. Use the notes from step 6.2.
2. When re-installing the XLR connector, ensure that the gasket is correctly positioned so that it makes an airtight seal.

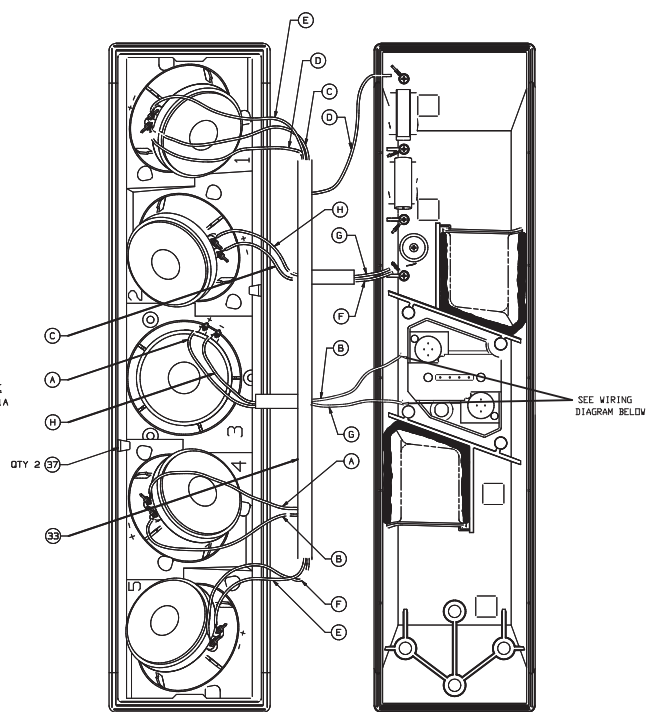
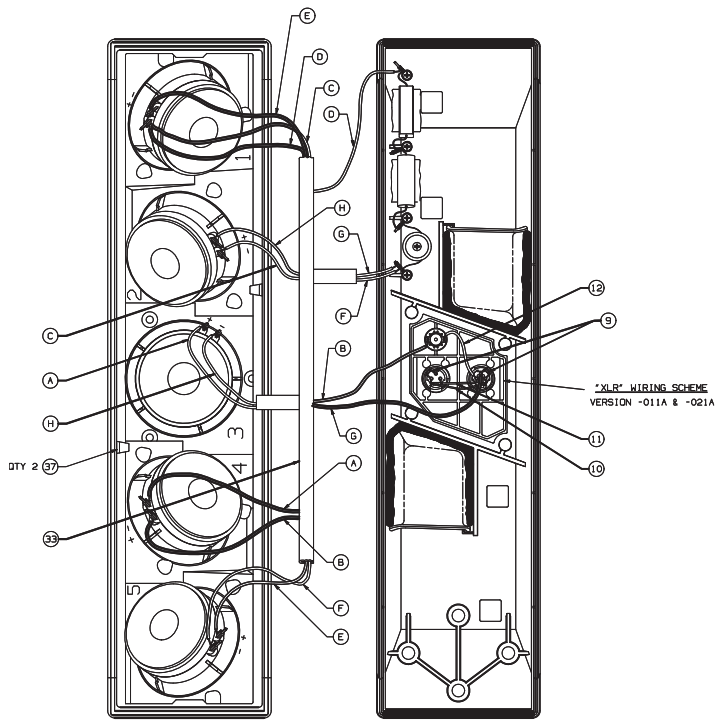








"BARRIER" WIRING SCHEME  
VERSION -031A & -041A



VARIATION "XLR" -011A -021A				
WIRE RUN CHART				
RUN NO.	COLOR	AWG	FROM	TO
A	BROWN	20	DRIVER 4 -	DRIVER 3 *
B	RED	20	DRIVER 4 +	FUSE, TOP
C	ORANGE	20	DRIVER 2 -	DRIVER 1 *
D	YELLOW	20	DRIVER 1 +	RESISTOR
E	GREEN	20	DRIVER 1 -	DRIVER 5 *
F	BLUE	20	DRIVER 5 -	INDUCTOR
G	BLACK	20	INDUCTOR	XLR CONN IN-
H	GREY	20	DRIVER 3 -	DRIVER 2 *

XLR

VARIATION "BARRIER" -031A -041A				
WIRE RUN CHART				
RUN NO.	COLOR	AWG	FROM	TO
A	BROWN	20	DRIVER 4 -	DRIVER 3 *
B	RED	20	DRIVER 4 +	FUSE, TOP
C	ORANGE	20	DRIVER 2 -	DRIVER 1 *
D	YELLOW	20	DRIVER 1 +	RESISTOR
E	GREEN	20	DRIVER 1 -	DRIVER 5 *
F	BLUE	20	DRIVER 5 -	INDUCTOR
G	BLACK	20	INDUCTOR	BARRIER -
H	GREY	20	DRIVER 3 -	DRIVER 2 *

BARRIER

WIRE RUN CHART				
RUN NO.	COLOR	AWG	FROM	TO
A	BROWN	20	DRIVER 4 -	DRIVER 3 *
B	RED	20	DRIVER 4 +	FUSE, TOP
C	ORANGE	20	DRIVER 2 -	DRIVER 1 *
D	YELLOW	20	DRIVER 1 +	RESISTOR
E	GREEN	20	DRIVER 1 -	DRIVER 5 *
F	BLUE	20	DRIVER 5 -	INDUCTOR
G	BLACK	20	INDUCTOR	NL4.1 -1
H	GREY	20	DRIVER 3 -	DRIVER 2 *

SPEAKON

Figure 10. 502A Array Wiring Diagram

# DISASSEMBLY PROCEDURES

## 7. Speakon® Connector Removal

**7.1** Remove the 4 screws that secure the connector to the connector panel (16).

**7.2** Make a note of the wiring configuration and cut the connector's leads as close to its terminals as possible. Remove the connector from the array.

### Re-assembly Notes:

1. Observe polarity when connecting the replacement XLR connector. Use the notes from step 6.2.
2. When re-installing the connector, ensure that the gasket is correctly positioned so that it makes an airtight seal.

## 8. Fuseholder Removal

**8.1** Remove the connector panel using procedure 4.

**8.2** Remove the fuseholder nut (26) from the fuseholder body (19).

**8.3** Unsolder the wires from the fuseholder terminals.

## 502B Bass Module Procedures

**Note:** Refer to Figures 11 and 12 for the following procedures.

## 9. Access Panel Removal

**9.1** Remove 12 screws (23) that secure the access panel (10) to the unit.

**9.2** Partially insert one of the screws into a screw hole. Using the screw as a lever, carefully remove the access panel.

## 10. Woofer Removal

**10.1** Remove the access panel using procedure 9.

**10.2** Remove the 8 screws (21) that secure the woofer (22) to the unit.

**10.3** Make a note of the wiring configuration and disconnect the wires from the woofer terminals. Carefully pull the woofer away from the unit.

### Re-assembly Notes:

1. Observe polarity when connecting the woofer harness wires to the woofer.
2. Align the woofer gasket to provide an airtight seal.

## 11. Barrier Strip Connector Removal

**11.1** Remove the 2 screws (16) that secure the connector (17) to the access panel (10).

**11.2** Make a note of the wiring configuration and unwrap the wires from the connector terminals. Remove the connector.

### Re-assembly Notes:

1. Use the note from step 10.2 to ensure proper wiring connections.
2. Align the connector gasket to provide an airtight seal.

## 12. XLR Connector Removal

**12.1** Remove the 4 screws (16) that secure the connector (17) to the access panel (10).

**12.2** Make a note of the wiring configuration and cut the connector leads as close to the terminals as possible. Remove the connector.

### Re-assembly Notes:

1. Use the note from step 12.2 to ensure proper wiring connections.
2. Align the connector gasket to provide an airtight seal.

## 13. Fuseholder Removal

**13.1** Remove the access panel using procedure 9.

**13.2** Remove the fuseholder nut (19) from the fuseholder body (12).

**13.3** Unsolder the wires from the fuseholder terminals.

# DISASSEMBLY PROCEDURES

## 14. Speakon® Connector Removal

**14.1** Remove the 4 screws that secure the connector to the access panel.

**14.2** Make a note of the wiring configuration and cut the connector leads as close to the terminals as possible. Remove the connector.

### Re-assembly Notes:

1. Use the note from step 14.2 to ensure proper wiring connections.
2. Align the connector gasket to provide an airtight seal.

## 15. Fuseholder Removal

**15.1** Remove the access panel using procedure 9.

**15.2** Remove the fuseholder nut (19) from the fuseholder body (12).

**15.3** Unsolder the wires from the fuseholder terminals.

## 502C Controller Disassembly Procedures

### Notes:

1. Refer to Figure 14 or 15 for the following procedures.
2. Later production units have fewer screws than earlier units. These quantity differences are noted in the procedures below.
3. Unless otherwise specified, a T-10 Torx bit is recommended for screw removal.

## 16. Top Cover/Front Plate Removal

**WARNING:** Be sure to unplug the unit from the AC Mains before removing the top cover. There are hazardous voltages inside the chassis.

**16.1** Remove the 2 screws (2) that secure the top cover (1) to the back of the chassis. Earlier units will have 4 screws.

**16.2** Remove the 2 top screws (4) that secure the top cover to the front plate (3). Earlier units will have 3 screws on top.

**16.3** Slide the top cover out from under the front plate, and lift it off the unit.

**16.4 Front Plate Removal:** There are two screws (4) on the bottom that hold the front plate to the chassis. Remove the screws and washers and pull the front plate away from the chassis.

## 17. Main PCB Removal

**17.1** Remove the top cover and front panel using procedure 16.

**17.2** Disconnect the following connectors: P6-P8 (barrier strip connectors only), P1 (line cord assembly), P2 and P3 (transformer connectors).

**17.3 XLR version:** Remove the 6 screws (2) that secure connectors (J3, J4, P9-12) to the chassis. Earlier units have 12 screws.

**17.4** Carefully scrape the glue away from the terminals of power switch S5 (6). Disconnect the terminals.

**17.5 Barrier strip version:** Remove the 5 screws (8) that secure the Main PCB (7) to the chassis.

**17.6 XLR version:** Remove the 2 screws (8) which secure the Main PCB to the chassis. Earlier units have 5 screws.

**17.7** Squeeze the 2 metal posts (not shown—they are located in the 2 front corners of the PCB) that secure the Main PCB to the chassis bottom. Lift the PCB straight up.

**17.8** Slide the PCB out towards the front of the unit and pull it away from the chassis.

# DISASSEMBLY PROCEDURES

## 18. Transformer Removal

**18.1** Remove the top cover using procedure 16.

**18.2** Disconnect P2 (transformer primary) and P3 (transformer secondary) from the Main PCB (7).

**15.3** Remove the two 11/32" hex nuts (10) and washers that secure the transformer (9) to the chassis.

**15.4** Lift the transformer out of the chassis.

## 16. Barrier Strip Connector Removal

**16.1** Remove the top cover using procedure 16.

**16.2** Remove the 2 screws (13) that secure the connector (12) to the chassis.

**16.3** Disconnect either P6, P7 or P8 and pull the connector through the cutout in the chassis.

## 17. XLR Connector Removal

**17.1** Remove the top cover and front panel using procedure 16.

**17.2** Remove 6 screws (2) that secure the connectors to the chassis.

**17.3** Remove the Main PCB using procedure 27.

**17.4** Unsolder the connector (J3, J4, P9-12) from the Main PCB (7). Lift out the connector.

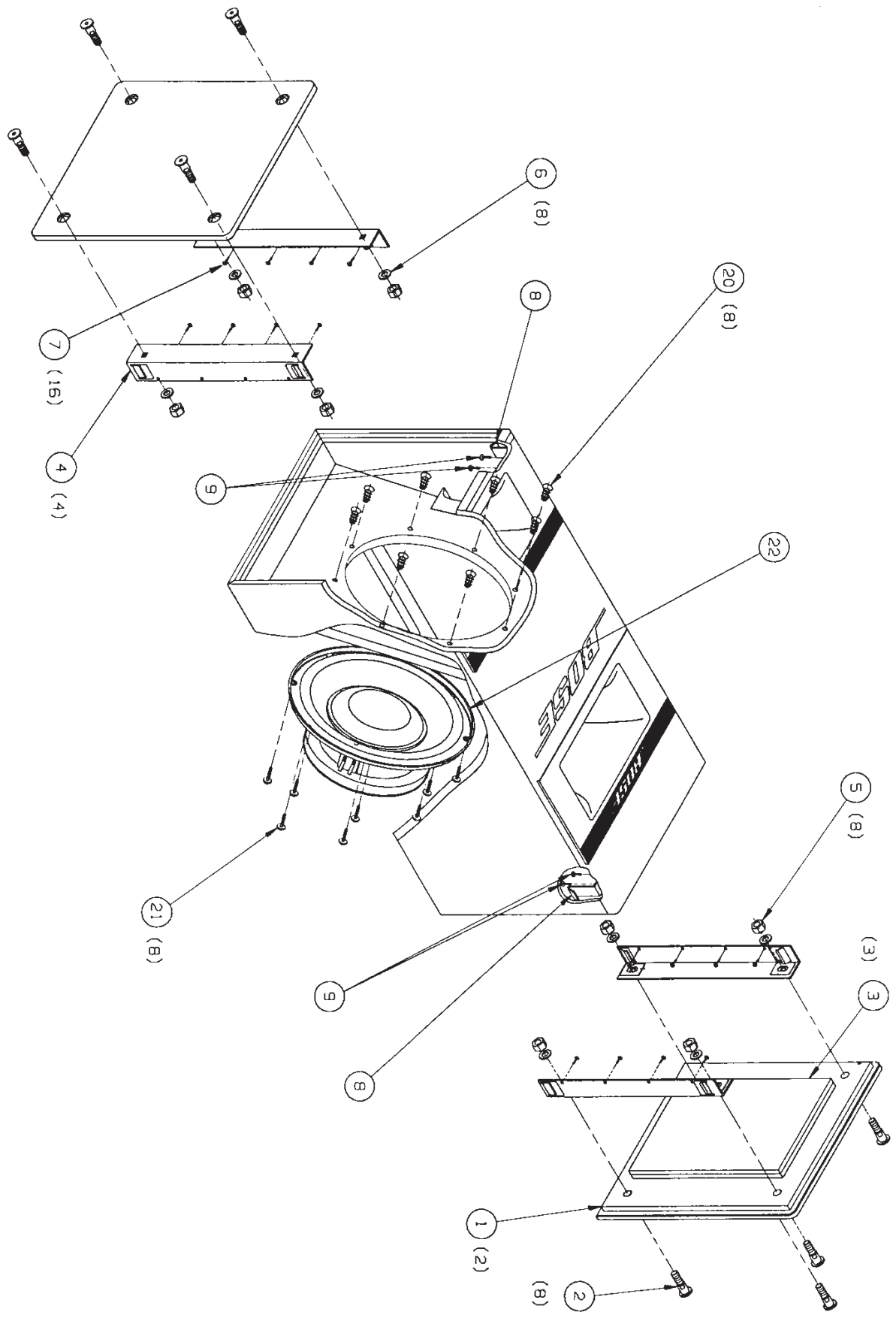
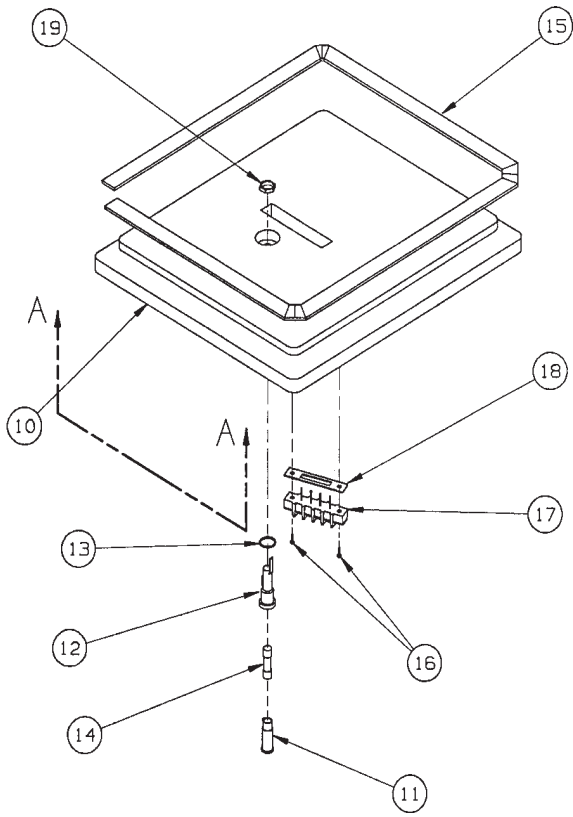
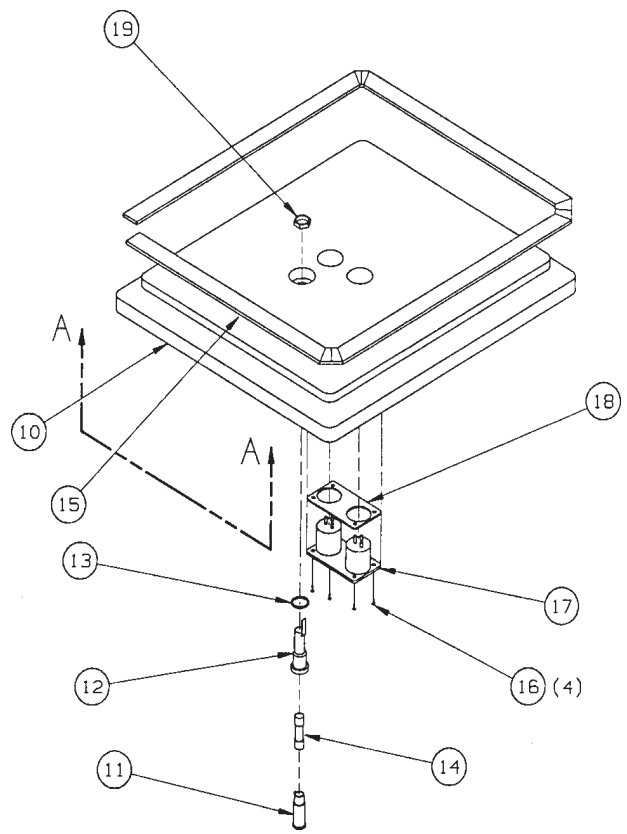


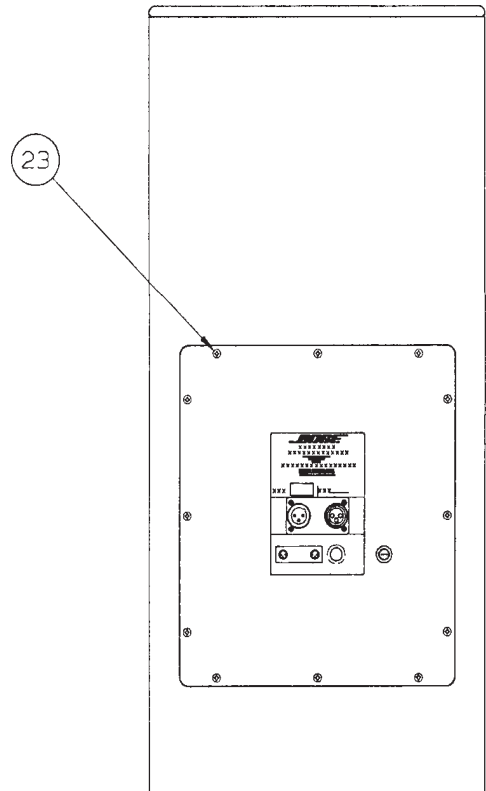
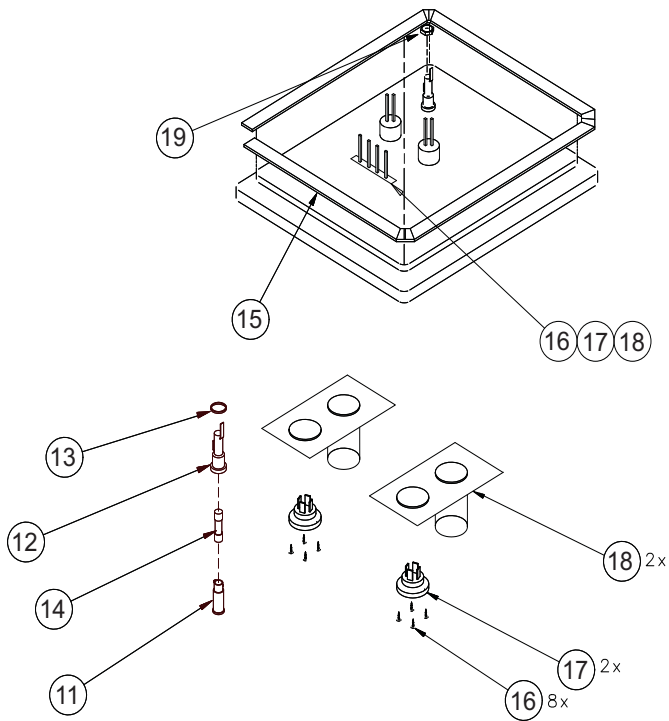
Figure 11. 502B Bass Module Exploded View



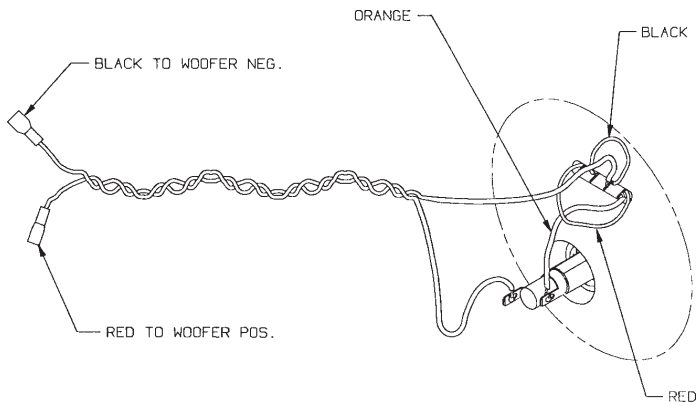
**Barrier Strip Version**



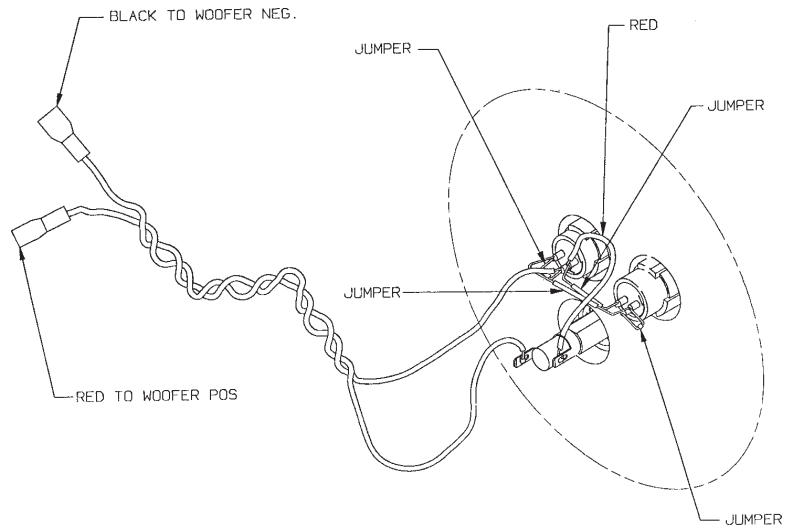
**XLR Version**



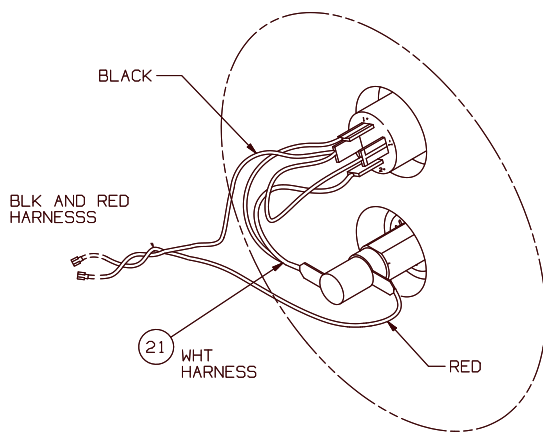
**Figure 12. 502B Bass Module Connector and Access Panel**



BARRIER STRIP WIRING DIAGRAM



XLR WIRING DIAGRAM



SPEAKON WIRE DIAGRAM

Figure 13. 502B Bass Module Wiring Diagrams





# TEST PROCEDURES

## 502A Array Test Procedures

**Note:** All 502A procedures involve connecting test equipment to the array's input terminals. For the XLR input pin assignment, see Figure 16 below.

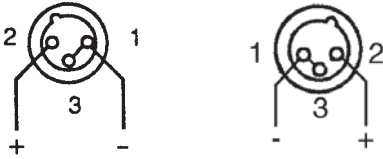


Figure 16. XLR input pin assignment

### 1. Phase Test Male

**1.1** Remove the grille using disassembly procedure 1.

**1.2** Apply an 8V DC voltage level to the array's input terminals. Be sure to observe polarity.

**1.3** The cones of all 5 drivers should move outward with the application of the DC voltage.

### 2. Air Leak/Rub and Tick Test

**2.1** Apply an 8 Vrms, 10 Hz signal to the array's input terminals.

**2.2 Air Leak Test:** Block the ports. Listen for air leaks around the drivers and all cabinet joints. If there is a "whooshing" noise, there is probably an air leak in one of these locations. Repair any air leaks as required.

**2.3 Rub and Tick Test:** No extraneous noises such as rubbing, scraping, or ticking should be heard. To distinguish between normal suspension noise and rubs or ticks, displace the cone of the driver slightly with your fingers. If the noise can be made to go away or get worse, it is a rub or a tick, and the driver should be replaced. If the noise stays the same, it is normal suspension noise and the driver is fine. Suspension noises will not be heard with program material.

## 3. Shading Network Test

**3.1** Apply a 2 Vrms, 2.5 kHz signal to the array's input terminals.

**3.2** Connect a 3 Ohm, 1W resistor in series between the positive (+) amplifier output and the array's positive (+) input.

**3.3** Measure the voltage across the resistor. It should be approximately  $.49V \pm 0.1$  Vrms.

**3.4** If the measured voltage is outside the specified range, check the following:  
(1) Make sure that the passive components are a 3 Ohm resistor, .75 mH inductor, and 5 $\mu$ F capacitor.  
(2) Check all driver connections against the 502A wiring diagram in Figure 10.

## 4. Sweep Test

**4.1** Apply an 8 Vrms, 10 Hz signal to the array's input terminals.

**4.2** Sweep the oscillator slowly from 10 Hz to 5 kHz. There should not be any buzzes or rattles from within the array enclosure. Redress any wire or component that buzzes. A "whooshing" noise at around 140 Hz is acceptable.

## 502B Bass Module Test Procedures

**Note:** All 502B procedures require connecting test equipment to the bass box's input terminals. For the XLR input pin assignment, see Figure 16.

### 1. Phase Test

**1.1** Insert one hand into the bottom port of the 502B. Gently touch the dust cap or cone of the woofer. (The woofer is located above the port hole).

**1.2** Apply a 20 Vdc level to the 502B's input terminals. Be sure to observe polarity when applying the DC level. The woofer cone should move outward towards the bottom of the bass box.

# TEST PROCEDURES

1.3 If the woofer cone deflects inward, check all wiring.

## 2. Woofer Air Leak/Rub and Tick Test

2.1 Apply a 20 Vrms, 10 Hz signal to the 502B's input terminals.

**2.2 Air Leak Test:** Block the ports. Listen for air leaks around the cabinet. If there is a hissing or "whooshing" noise, there is probably an air leak. Repair any air leaks as required.

**2.3 Rub and Tick Test:** No extraneous noises such as rubbing, scraping, or ticking should be heard. To distinguish between normal suspension noise and rubs or ticks, displace the cone of the woofer slightly with your fingers. If the noise can be made to go away or get worse, it is a rub or a tick, and the woofer should be replaced. If the noise stays the same, it is normal suspension noise and the driver is fine. Suspension noises will not be heard with program material.

## 3. Sweep Test

3.1 Apply a 20 Vrms, 10 Hz signal to the 502B bass module input terminals.

3.2 Sweep the oscillator slowly from 10 Hz to 300 Hz. There should not be any loud, extraneous sounds. If there are any loud buzzes or distortion, the woofer may be defective.

**Note:** A "whooshing" noise from the port around 55 Hz and 105 Hz is acceptable. There should not be any buzzes or rattles from within the 502B enclosure. Redress any wire or component that buzzes or rattles.

## 502C Controller Test Procedures

### Test Setup

**Input Connections:** Connect an audio signal generator to the positive (+) and negative (-) input terminals for Channels 1 or 2. These procedures assume that the person performing these tests is using test equipment with unbalanced inputs and outputs. Refer to Figure 17 for connection information).

**Output Connections:** Connect test equipment to the positive (+) and negative (-) output terminals for Channels 1 or 2 (low and high frequency outputs).

All tests should be performed for both channels.

All test equipment must be isolated from ground (floated).

Some settings on the controller may need to be changed for the various procedures. These settings will be indicated throughout the test procedures. Refer to Figure 18 for a diagram of the controller's back panel.

The controls on the back panel should be set as follows (unless otherwise specified):

- Mode switch should be set at 2 (Bi-Amp)
- Output mode switch should be set at normal
- Input switches should be set at +4 dB
- Low frequency level potentiometer should be set at +3 dB

### 1. Clipping Headroom Test

1.1 Apply a 4.73 Vrms, 600 Hz signal to the input terminals.

1.2 Distortion (at an output voltage of 6.29 Vrms) should measure -1% (measure across the High Frequency outputs).

# TEST PROCEDURES

## 2. Gain Test

2.1 Set the input switches to -10 dB.

2.2 Apply a 100 mVrms, 600 Hz signal to the input terminals.

2.3 Measure the gain at the high frequency outputs. The gain (referenced to the input) should be  $16.5 \pm 1.0$  dB.

2.4 Change the input level switches to +4 dB.

2.5 Measure the gain at the high frequency outputs. The gain (referenced to the input) should be  $2.5 \pm 1.0$  dB.

## 3. Sum Output Mode Gain Test

3.1 Set the input switches to +4 dB.

3.2 Set the output mode switch to Normal and the low frequency level potentiometer to +3 dB.

3.3 Apply a 100 mVrms, 80 Hz signal to the 502C's input terminals.

3.4 Measure the gain at the Channel 1, low frequency output. The gain (referenced to the input) should be  $8.7 \pm 1.0$  dB.

## 4. Frequency Response of High Frequency (HF) Output (Full Range Mode)

4.1 Set the mode switch to 1 (Full Range).

4.2 Apply a 100 mVrms, 600 Hz signal to the 502C's input terminals and reference your dB meter to this frequency.

4.3 Measure the frequency response across the HF outputs according to the following table.

<u>Frequency (Hz)</u>	<u>Response (dB)</u>
40	$-24.5 \pm 2.0$
140	$+4.3 \pm 1.5$
600	REF
2200	$+3.5 \pm 1.5$
5000	$+12.5 \pm 1.5$
15000	$+19.0 \pm 1.5$

## 5. Frequency Response of HF Output (Bi-Amp Mode)

5.1 Set the mode switch to 2 (Bi-Amp).

5.2 Apply a 100 mVrms, 600 Hz signal to the 502C input terminals and reference your dB meter to this frequency.

5.3 Measure the frequency response across the HF outputs according to the table below.

<u>Frequency (Hz)</u>	<u>Response (dB)</u>
40	$-28.5 \pm 2.0$
140	$+3.7 \pm 1.5$
600	REF
2200	$+3.5 \pm 1.5$
5000	$+12.5 \pm 1.5$
15000	$+19.0 \pm 1.5$

## 6. Frequency Response of Low Frequency (LF) Output (Bi-Amp Mode)

6.1 Apply a 100 mVrms, 80 Hz signal to the 502C input terminals and reference your dB meter to this frequency.

6.2 Measure the frequency response across the LF outputs according to the table below.

<u>Frequency (Hz)</u>	<u>Response (dB)</u>
40	$-6.2 \pm 2.0$
80	REF
100	$+1.3 \pm 1.0$
300	$-17.5 \pm 2.0$

## 7. Midrange Distortion (Full Range Mode)

7.1 Set the mode switch to 1 (Full Range).

7.2 Apply a 3.75 Vrms, 600 Hz signal to the 502C input terminals.

# TEST PROCEDURES

**7.3** Measure the distortion across the HF outputs. It should be - .1%.

## **8. High Frequency Distortion (Full Range Mode)**

**8.1** Apply a 890 mVrms, 5 kHz signal to the 502C input terminals.

**8.2** Measure the distortion across the HF outputs. It should be - .2%.

## **9. Low Frequency Distortion (Bi-Amp Mode)**

**9.1** Set the mode switch to 2 (Bi-Amp).

**9.2** Apply a 1.6 Vrms, 80 Hz signal to the 502C input terminals.

**9.3** Measure the distortion across the LF outputs. It should be - .1%.

## **10. Midrange Distortion (Bi-Amp Mode)**

**10.1** Apply a 3.75 Vrms, 600 Hz signal to the 502C input terminals.

**10.2** Measure the distortion across the HF outputs. It should be - .1%.

## **11. High Frequency Distortion (Bi-Amp Mode)**

**11.1** Apply a 890 mVrms, 5 kHz signal to the 502C input terminals.

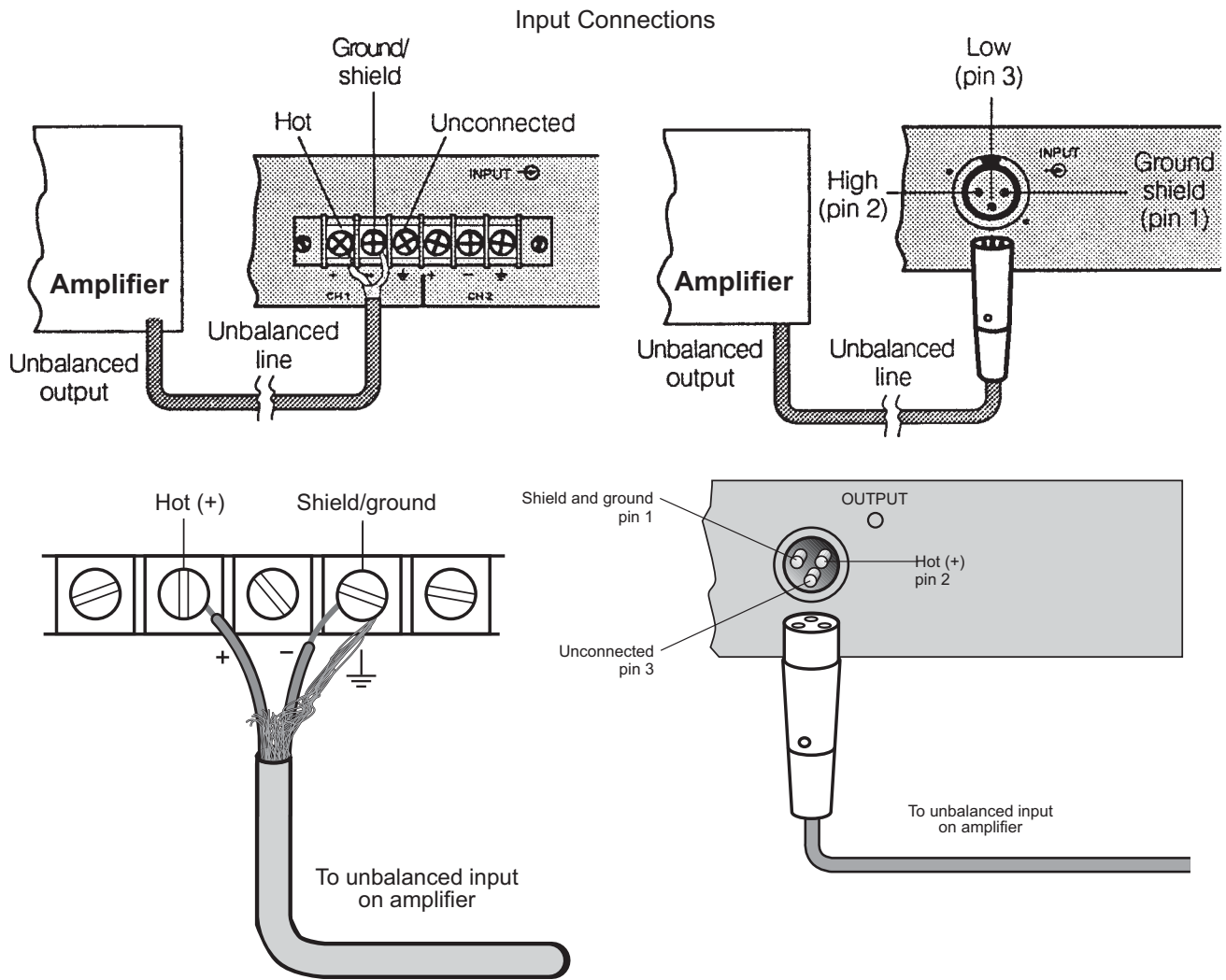
**11.2** Measure the distortion across the HF outputs. It should be - .2%.

## **12. Channel Separation (Bi-Amp Mode)-High Frequency**

**12.1** Set the mode switch to 2 (Bi-Amp).

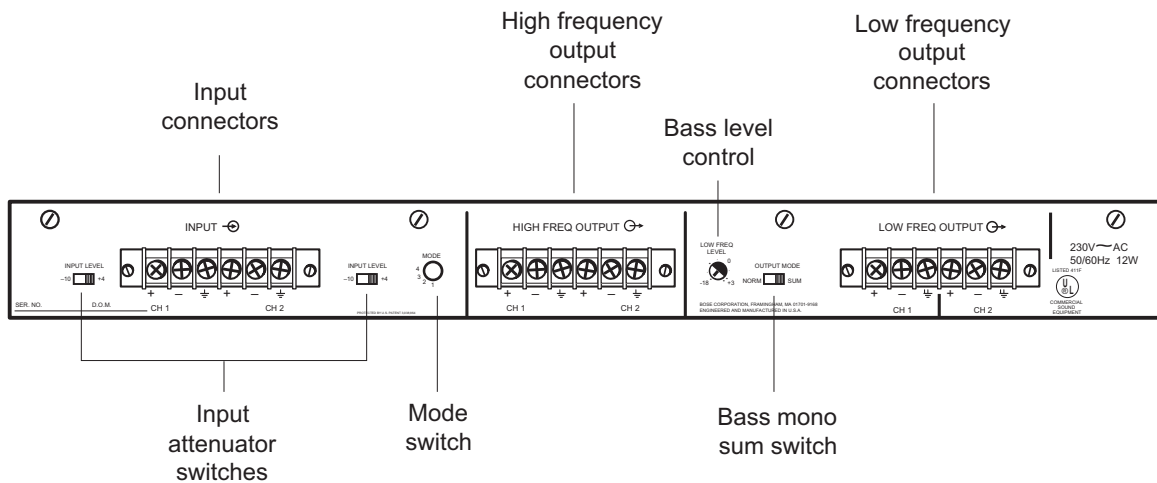
**12.2** Apply a 3.75 Vrms, 600 Hz signal to the 502C's input terminals.

**12.3** Measure the channel separation across the HF outputs. It should be  $\geq 40$  dB.



### Output Connections

**Figure 17. Unbalanced Connections**



**Figure 18. 502C Controller Back Panel (Barrier Strip Version Shown)**

# ACCESSORY KIT PART LIST

502A PSA-5 Stand Adapter Parts List (see Figure 19)

Item Number	Description	Part Number	Qty.	Note
1	Mounting Bracket	148513	2	1
-	Hardware Kit, Consists of:	173535	1	
2	Thumbscrew, M8x25mm, Black	173355	4	
2	Washer, Thumbscrew	173356	4	
3	Bolt, Button Head, 5mm, M8x12mm, Black	148526-02	8	
4	Bolt, Button Head, 5mm, M8x20mm, Black	148526-10	2	
5	Lock washer, M8	173450	10	
6	Allen Wrench, 5mm	148544-1	1	
-	Poly bag, Hardware	173358	1	7
-	Instruction Sheet	148515	1	1, 7
-	Poly sleeve	173357	2	1, 7
-	Carton, RSC	173359	1	1, 7
-	Carton, Divider	173360	1	1, 7

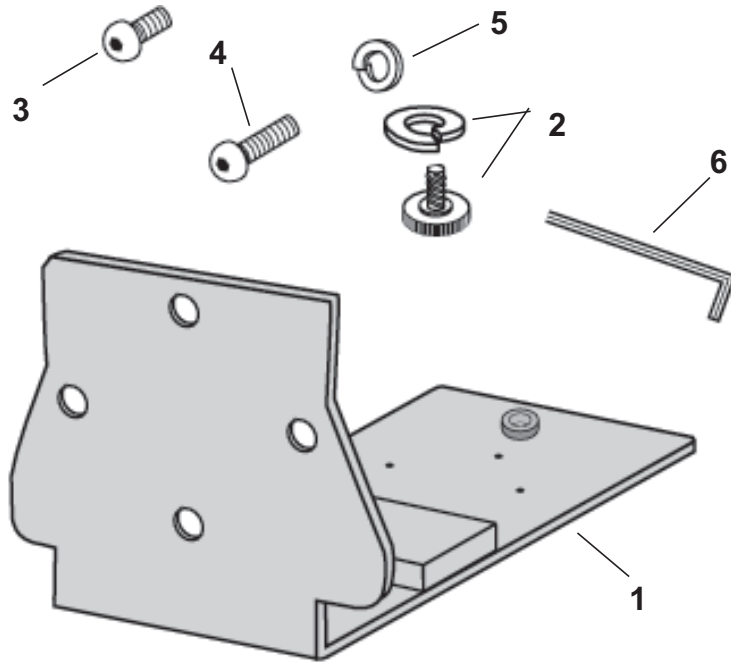


Figure 19. PSA-5 Stand Adapter Kit

# ACCESSORY KIT PART LIST

502A CSB-5A Suspension Bracket Kit Parts List (see Figure 20)

Item Number	Description	Part Number	Qty.	Note
1	Suspension Bracket	148519	2	1
-	Hardware Kit, Consists of:	173536	1	
2	Screw, Mach., Socket Cap, M8x12mm	148514	7	
2	Lock washer, M8	173450	7	
3	Quick Link, 1/8"	148520-1	5	
4	Allen Wrench, 6mmx3"	148544-2	1	
-	Poly bag, Hardware	173362	1	7
-	Instruction Sheet	148521	1	1, 7
-	Poly sleeve, Bracket	173361	2	1, 7
-	Carton	173363	1	1, 7
-	Carton Divider	173364	1	1, 7

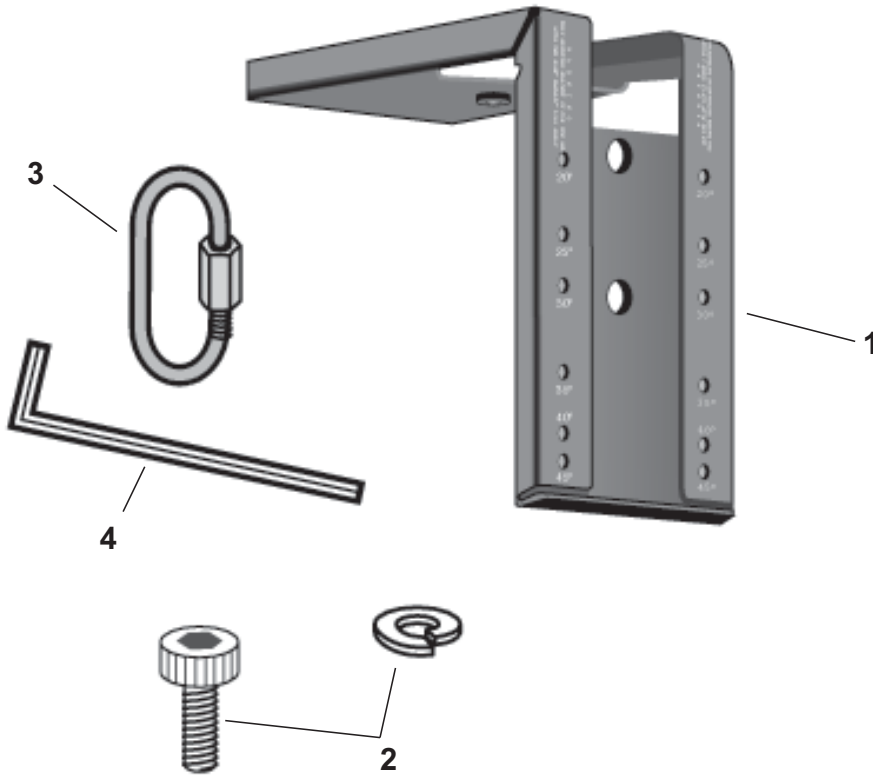


Figure 20. CSB-5A Suspension Bracket Kit

# ACCESSORY KIT PART LIST

502B CSB-5B Suspension Bracket Kit Parts List (see Figure 21)

Item Number	Description	Part Number	Qty.	Note
1	Left Angle Bracket	147005-1	1	1
1	Right Angle Bracket	147005-2	1	1
-	Hardware Kit, Consists of:	173537	1	
2	Screw, Hex Head, Mach., M8x20mm	148545-10	5	
2	Lock washer, M8	173450	5	
3	Quick Link, 3/16"	148520-2	2	
-	Poly bag, Hardware	173376	1	7
-	Instruction Sheet	148527	1	1, 7
-	Poly sleeve, Bracket	173375	2	1, 7
-	Tube, Packing	173377	1	1, 7
-	Carton, Divider	173378	1	1, 7

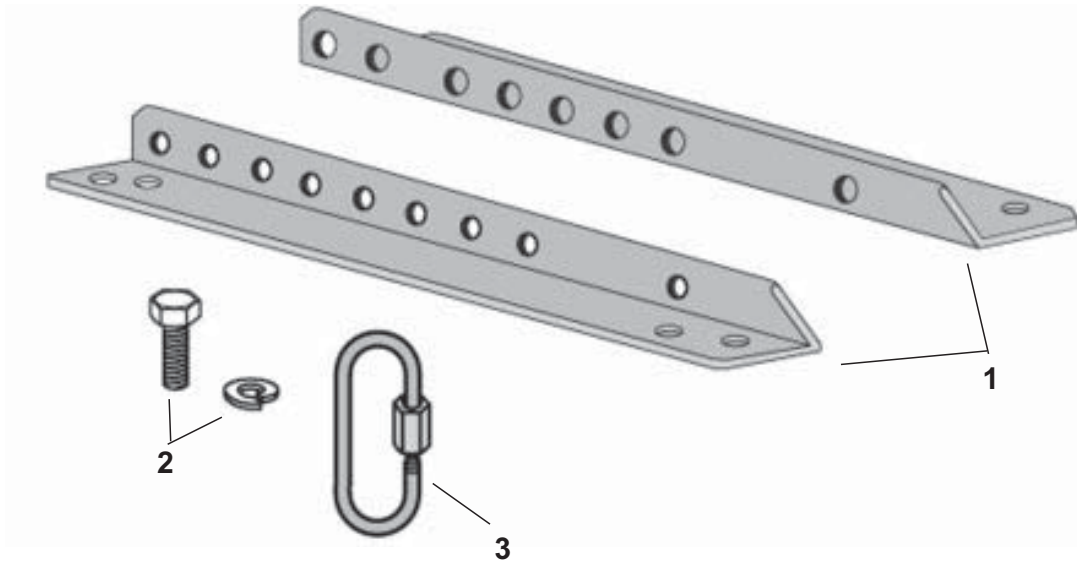


Figure 21. CSB-5B Suspension Bracket Kit



# ACCESSORY KIT PART LIST

502A WBP-5 Bi-Pivot Bracket Kit Parts List (see Figure 22)

Item Number	Description	Part Number	Qty.	Note
1	Wall Plate Assembly	146995	2	1
2	Attachment Plate, Stamped Metal	149030	2	1
-	Hardware Kit, Consists of:	173534	1	
3	Screw, Socket Head Cap, M8x25mm	148505	2	
3	Nut, Elastic, 8mm	148542	2	
4	Screw, Socket Head Cap, M6x25mm	148541	2	
4	Nut, Elastic, 6mm	148543	2	
5	Safety Cable	148506	2	
6	Allen Wrench, 5mm	148544-1	1	
7	Allen Wrench, 6mm	148544-2	1	
8	Bolt, Button Head, 5mm, M8x16mm	148526-06	11	
8	Lock washer, M8	173450	11	
-	Poly bag (Hardware)	173370	1	7
-	Instruction Sheet	148509	1	1, 7
-	Poly sleeve, Wall Plate Assembly	173371	2	1, 7
-	Poly sleeve, Attachment Plate	173372	2	1, 7
-	Carton, RSC	173373	1	1, 7
-	Carton, Divider	173374	1	1, 7

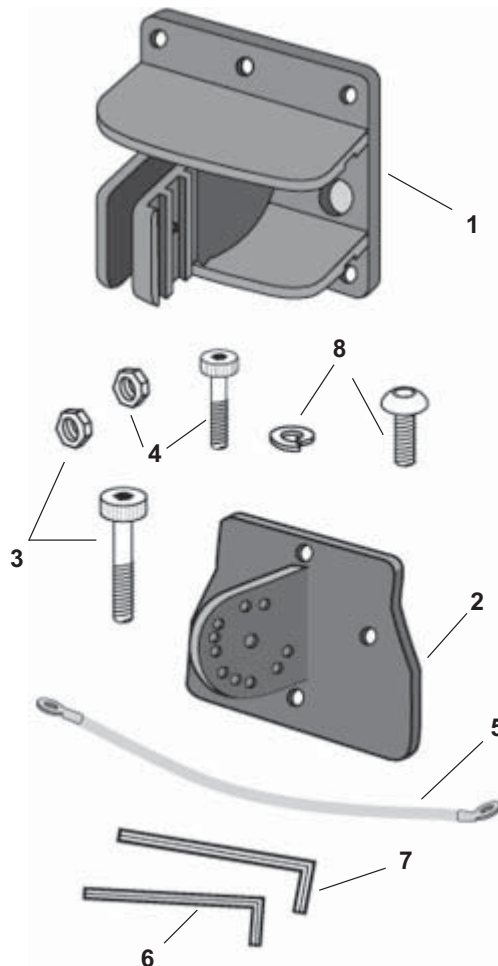


Figure 22. WBP-5 Bi-Pivot Bracket Kit

# ACCESSORY KIT PART LIST

502A WCB-5 U-Bracket Kit Parts List (see Figure 23)

Item Number	Description	Part Number	Qty.	Note
1	U-Bracket	148531	2	1
1	Bushing	148532	4	1
-	Hardware Kit, Consists of:	173533	1	
2	Locking Bracket	148536	2	
3	Safety Cable	148506	2	
4	Bolt, Button Head, 5mm, M8x12mm	148526-02	7	
5	Bolt, Button Head, 5mm, M8x20mm	148526-10	5	
6	Lock washer, M8	173450	11	
7	Thumbscrew, M5x10mm	145750	3	
8	Allen Wrench, 5mmx70mm	148544-1	1	
-	Poly bag, Hardware	173367	1	7
-	Instruction Sheet	148537	1	1, 7
-	Poly sleeve, U-Bracket	173365	2	1, 7
-	Poly bag, Locking Bracket	173366	2	1, 7
-	Carton, RSC	173368	1	1, 7
-	Carton, Divider	173369	1	1, 7

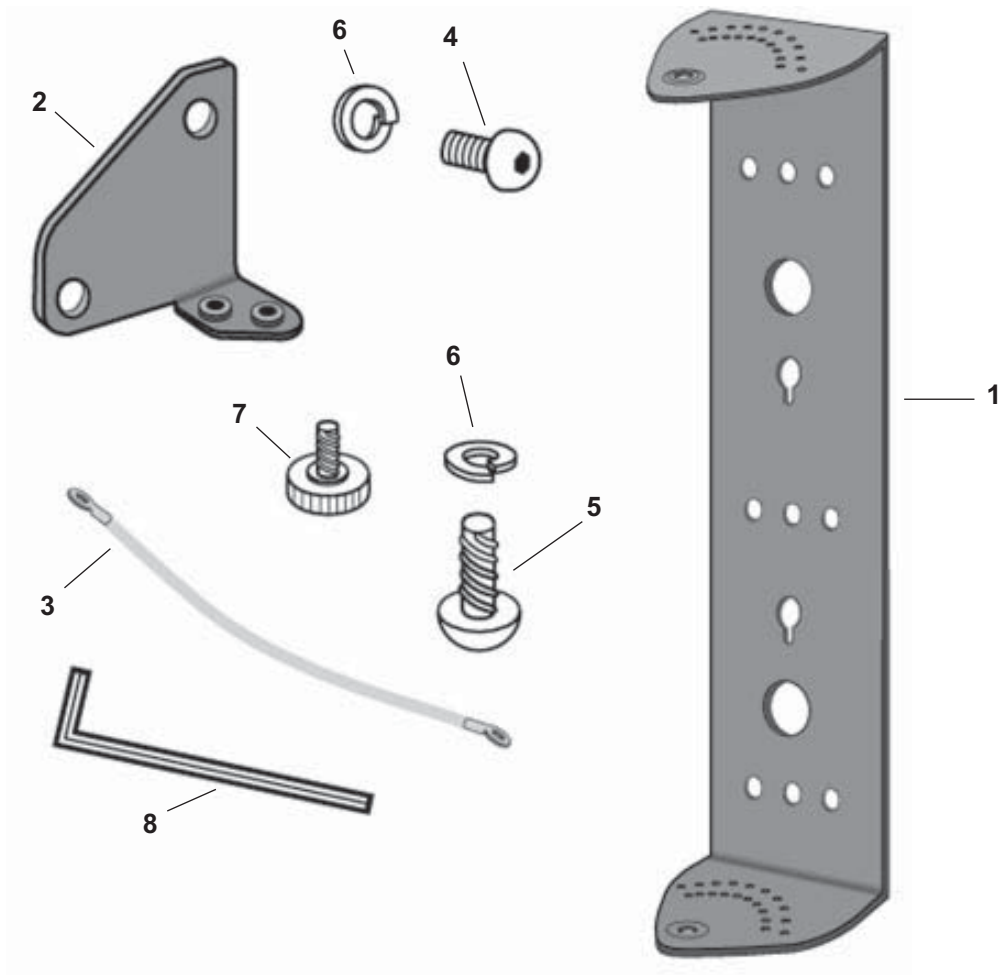


Figure 23. WCB-5 U-Bracket Kit

# ACCESSORY KIT PART LIST

502A CVT-5 Transformer Assembly Kit Parts List (Figure 24)

Item Number	Description	XLR and Barrier Version, PC 003841, 019769, 004934, 004935, 004936, 007698	Speakon® Version, PC 040170 and 040171	Qty	Note
-	CVT-5 XFMR Assy Kit (Gray) CVT-5 XFMR Assy Kit (White) Which consists of	007699 007890	040089 040088	1	
1	Transformer	143576	172030	1	5 ⚠
2	Foam Adhesive	119604	119604	N/A	
3	Cover-Transformer (Gray) (White)	142358-01 142358-02	142358-01 142358-02	1	5 ⚠
4	Gasket-Transformer Cover	143554	143554	1	5 ⚠
5	Gasket Barrier	146873	146873	1	5 ⚠
6	Connector- Barrier	148976-04	148976-04	1	5 ⚠
7	Screw-#8	137527-12	137527-12	4	
8	Owners Manual	172164	172164	1	
9	Poly bag	173379	173379	1	
10	Carton	173380	173380	1	

\*Product code 040170 (black) and 040171 (white) are a RoHS compliant version of the 502A. Only RoHS compliant parts listed in the above chart can be used in the 502A with product code 040170 and 040171.

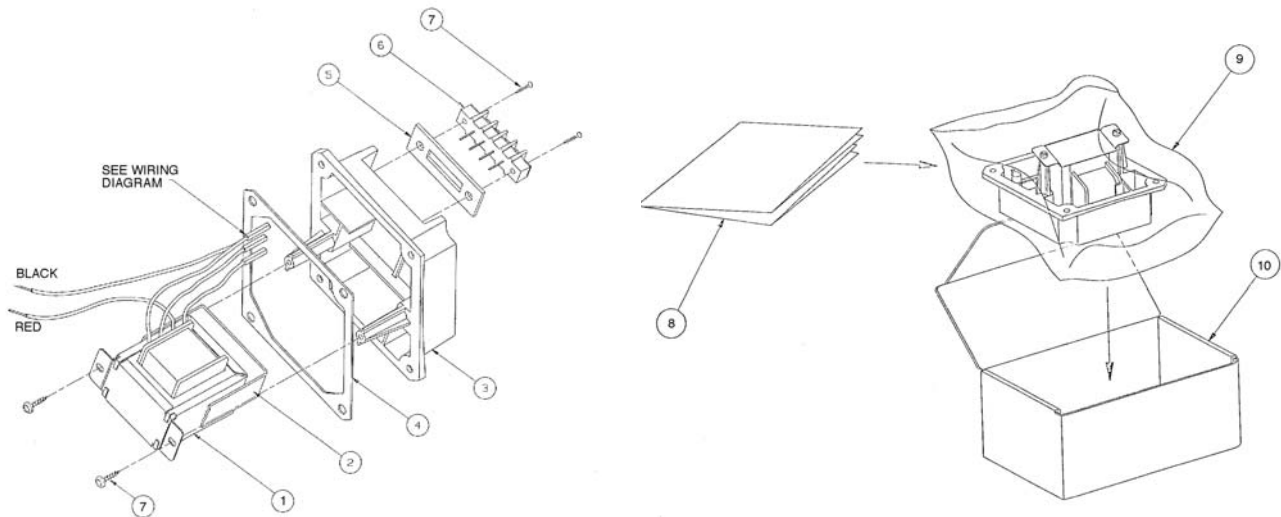
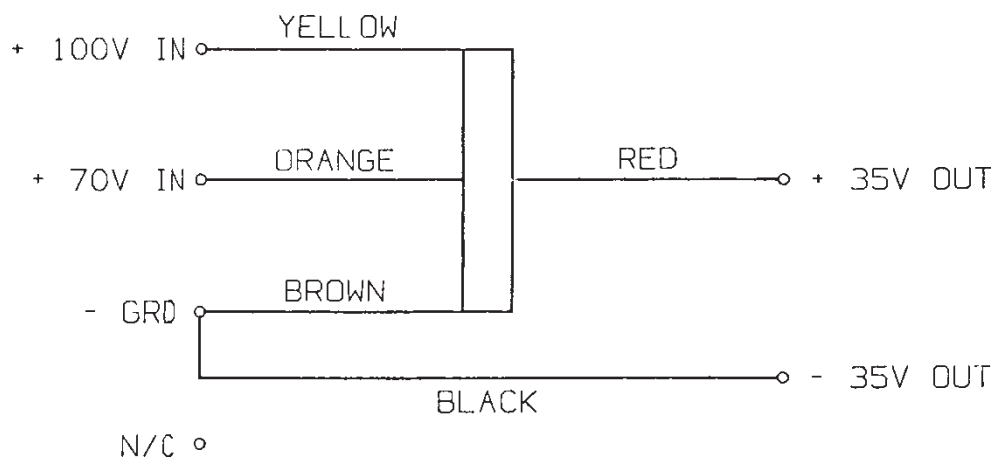


Figure 24. CVT-5 Exploded View and Packaging



**Figure 25. CVT-5 Schematic**

# THEORY OF OPERATION

## 502C Controller

The following provides an overview of 502C electrical operation. Equalization curves are referenced and are located at the end of this section. Additionally, the 502C block diagram and schematic should be referenced as required.

### 1. Differential Input Stage

The input stage features protection against RFI (radio frequency interference), ESD (electrostatic discharge), and overvoltage. Referring to the Channel 1 circuit, R2/C1, R1/C120, R3/C2, and R9,10/C7 provide low pass filtering to reduce the possibility of RFI. Diodes D1-D4, D25, and D26 provide input clamping to protect against overvoltage and ESD.

Op-amp U1 amplifies the difference between the + and - input pins, and converts it to a single ended signal that drives the equalizers. Gain switch S3 selects between two gains, a high gain setting for -10dB sources and a low gain setting for +4db sources.

### 2. Equalizer for High Frequency Outputs

Op-amps U1, U2 and U3 constitute the principal equalization for the high frequency output. Each stage makes a contribution to the total low or high frequency contouring required by the loudspeaker. Op-amp U4 (pins 12, 13 and 14) implements a high pass filter suitable for the Full Range mode, while op-amp U4 (pins 8, 9, and 10) is selected for a high pass filter with a higher corner frequency for use in the Bi-amp mode. The circuitry is duplicated for both channels. Refer to the high frequency equalization curves for more information about the stage by stage response of the equalizer.

### 3. Output mode switch, Low frequency level control, and Normal/Sum mode stage

Output mode switch S2 (on the rear panel) controls op-amp summing amplifier U6 (pins 5, 6, and 7). In the normal mode, the stage is not used, and the Channel 1 and Channel 2 low frequency outputs pass independent, 2-channel bass to 2 bass cabinets. In the sum mode, Channels 1 and 2 are combined, and this "mono" bass signal appears at the Channel 1 low frequency output only. Potentiometer R126 (on the rear panel), Low Frequency Level, provides for adjustment of the signal sent into the low frequency equalizer.

### 4. Equalizer for Low Frequency Outputs

After the normal/sum stage, there is op-amp stage U7 (pins 12, 13, and 14) and op-amp equalizer stages U7 (pins 8, 9, and 10), U8 (pins 12, 13, and 14), and U8 (pins 8, 9, and 10). The equalizer provides high pass, low pass, and contouring equalization. See the low frequency equalization curves for more information about the stage by stage response of the equalizer.

### 5. Mode switch

Rotary switch S1 is located on the rear panel. It selects the four operating modes for the Panaray® system. Currently, only Modes 1 (Full range) and 2 (Bi-Amp) are supported.

# THEORY OF OPERATION

## 6. Output stage

**NOTE:** The components mentioned in this paragraph are for the high frequency output only.

The output stage is compatible with balanced signal transmission systems. Inverting op-amp stage U9 (pins 1, 2, and 3) provides the output signal. Diodes D9, D10, D29 and D30 provide output clamping to protect against overvoltage and ESD. Relays K1 and K2 clamp the outputs to ground to protect against power on/off transients. When the relay is de-energized, as when the AC power is off, the outputs are clamped. About 1.2 seconds after the power is turned on, the relay is energized by transistor Q1 and allows audio to pass through the controller. When the power is turned off, a fast acting detector de-energizes the relays to protect against power off transients.

**NOTE:** In earlier production units (before August 1993), the output stage was differential. Not only was the positive (+) output pin driven, but the negative (-) output pin was also driven (out of phase). The output stage was changed so that only the positive (+) output pin is driven, while the negative (-) output pin is connected to signal ground through a series impedance identical to that of the positive (+) output pin. This alternative output stage design has improved characteristics into a variety of real world installation conditions. Both versions produce the same output level when received by a balanced input.

## 7. Power Supply

The 502C uses full wave bridge rectifier Z1 and regulators U13 and U14 to develop the +/-15 volt supply needed by the op-amps.

## 8. Turn On/Off Muting Circuit

Relays K1 and K2 clamp the outputs and are controlled by three sections of quad comparator U15. U15 (pins 8, 9 and 14) drives the relay control transistor Q1 by pulling the relay-coil terminal to nearly 15 volts. This energizes the relay for normal audio operation. At power on, U15 (pins 8, 9 and 14) is prevented from energizing the relay until capacitor C152 can be charged up sufficiently. This takes about 1.2 seconds, and mutes any turn-on transients. At power off, U15 (pins 2, 4, and 5) quickly detects the loss of AC power and causes Q1 to snap quickly off. This de-energizes the relay in about 100 ms, before any transients can reach the output.

## 9. Troubleshooting Tips

If a differential output test generator isn't available, connect the generator ground to the 502C ground terminal, and the generator hot lead to the negative (-) input terminal. Leave the positive (+) terminal unconnected.

If you need to connect the 502C outputs to a single-ended (not differential) instrument, connect the 502C output ground to the instrument ground, and the 502C positive (+) output terminal to the instrument hot pin. Leave the negative (-) output pin unconnected.

Since the 502C is a two channel device, you can troubleshoot any problem occurring in only one channel more easily by applying the identical signal to both Channel 1 and Channel 2 inputs and signal tracing stage by stage, comparing the signal as it passes through the various stages. In general, the corresponding Channel 1 and Channel 2 stages share the left and right hand sides of the respective op-amps. This makes it easier to compare the stages.

# THEORY OF OPERATION

## Troubleshooting Tips (continued)

With a nominal AC power input voltage (100, 115, or 230, depending on the country), the AC voltages at the transformer secondary between P3-1 and P3-3 should be 41.3 Vrms.

With a cold (i.e.-room temperature) power transformer, you should expect primary and secondary resistances of:

For the 100 VAC version:

between P2-1 and P2-2: 41.8 Ohms  
between P3-1 and P3-3: 6.9 Ohms

For the 115 VAC version:

between P2-1 and P2-2: 45.4 Ohms  
between P3-1 and P3-3: 6.3 Ohms

For the 230/240 VAC version:

between P2-1 and P2-2: 195 Ohms  
between P3-1 and P3-3: 7.1 Ohms

## Other DC voltages that are of use in troubleshooting:

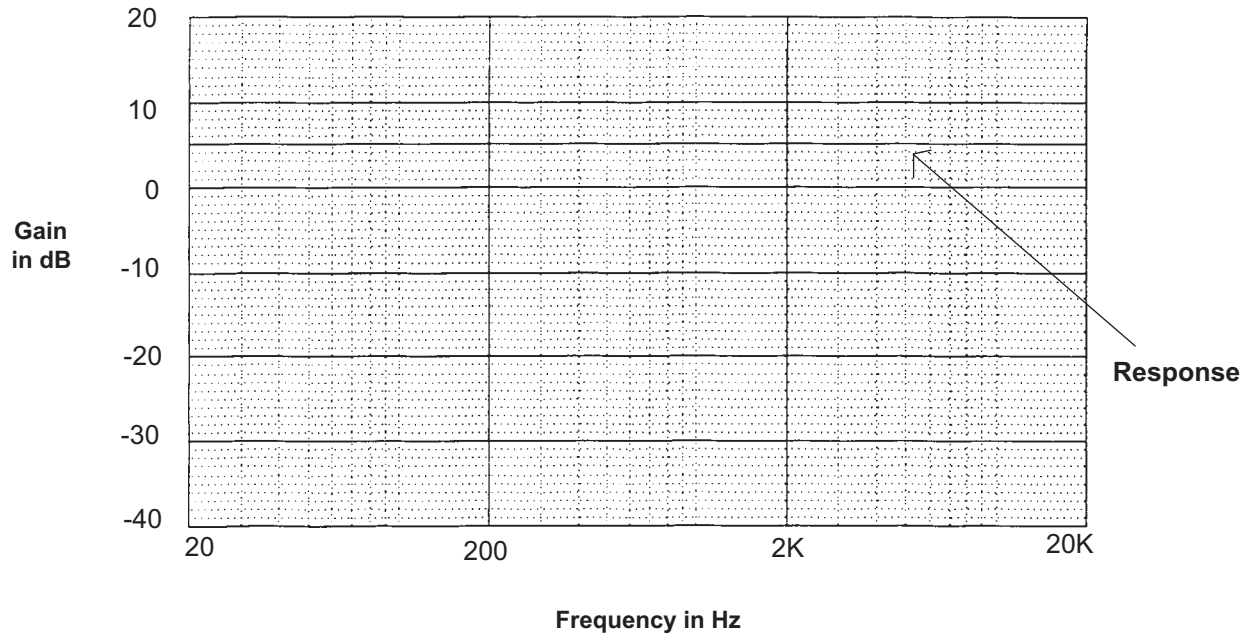
Turn On/Off Muting Circuit

Typical DC voltages after 2 seconds wake up

U15-1	Section not used
U15-2	+13.5
U15-3	-15.0
U15-4	+1.15
U15-5	+3.2
U15-6	Section not used
U15-7	Section not used
U15-8	+7.5
U15-9	+13.5
U15-10	+7.5
U15-11	+9.7
U15-12	-15.0
U15-13	+13.5
U15-14	-13.9
Q1-collector	-14.7

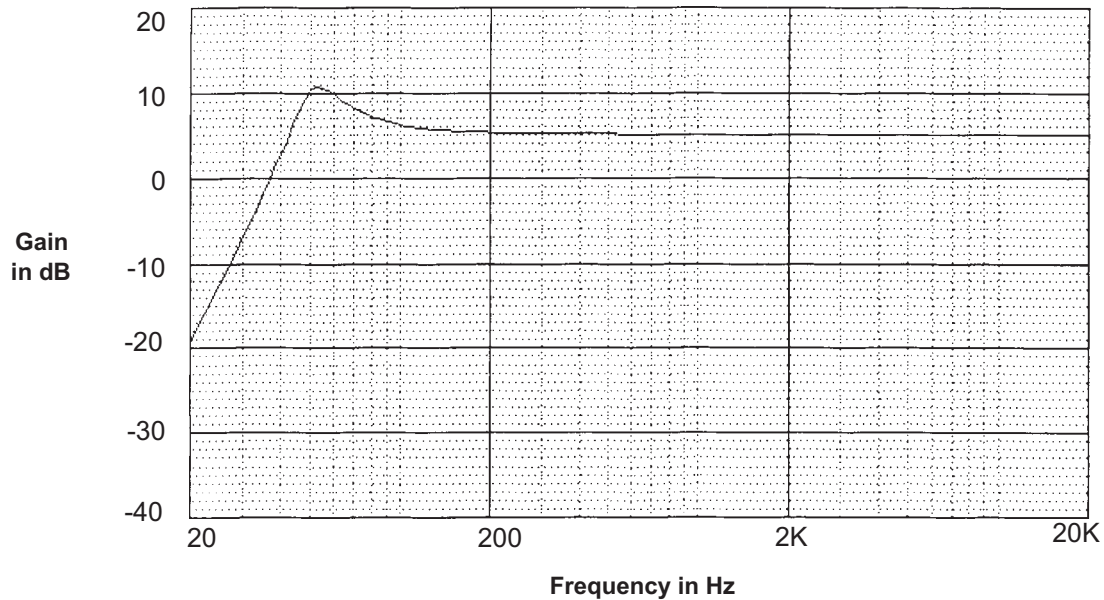
Power Supply

U13-1	+26.0
U14-2	-26.0



Output is measured from U7 pins 1 and 14. 502C controls are set at: Mode 2 (Bi-amp), Output Mode: Normal, Low Frequency level: +3dB, and Input Level: +4dB.

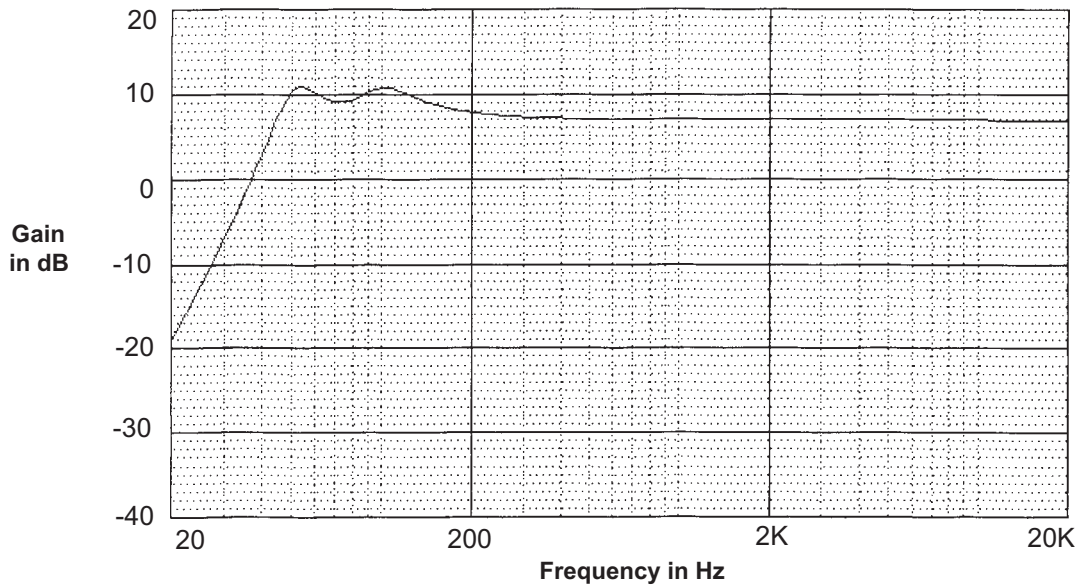
**Figure 26. Low Frequency EQ**



Output is measured from U7 pins 7 and 8. 502C controls set as in Figure 26.

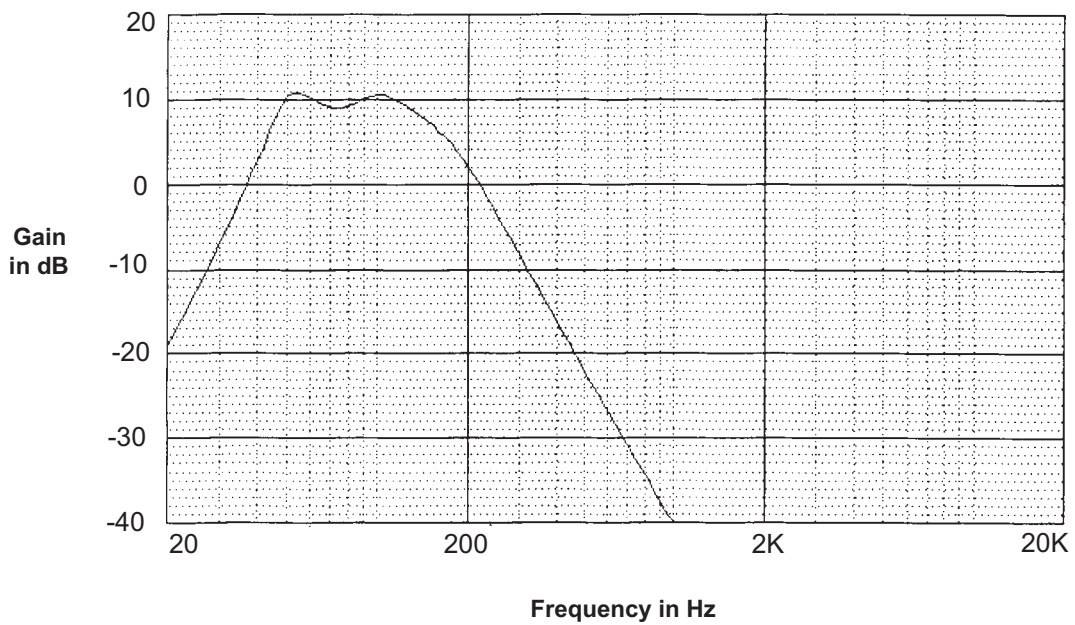
**Figure 27. Low Frequency EQ**





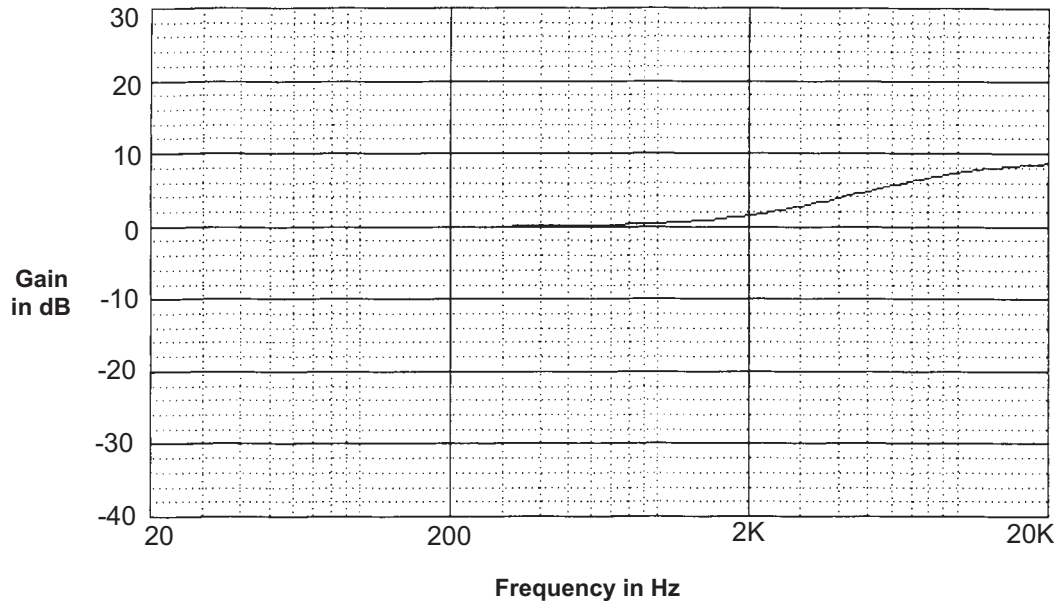
Output is measured from U8 pins 1 and 14. 502C controls set as in Figure 26.

**Figure 28. Low Frequency EQ**



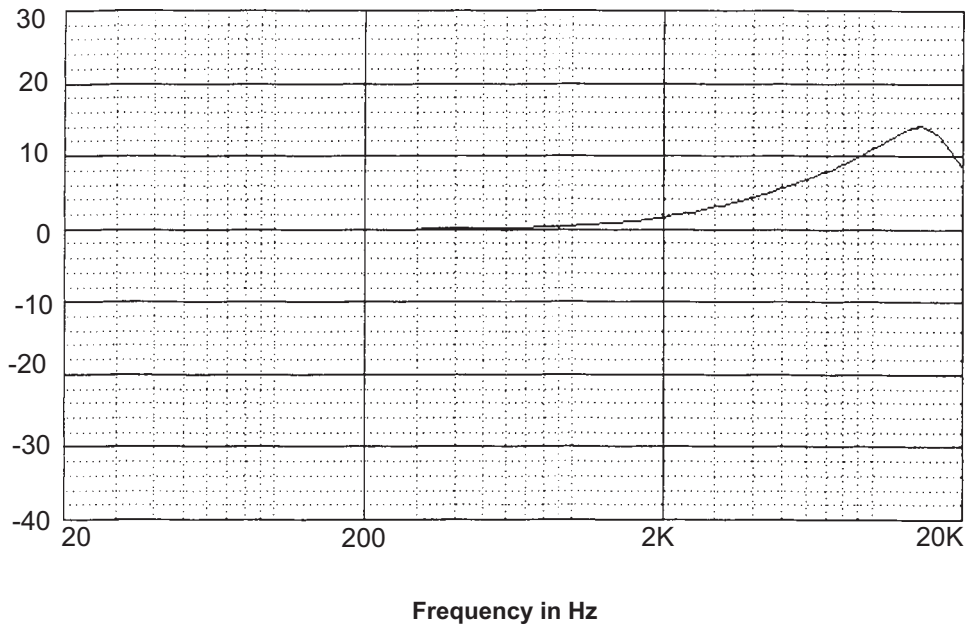
Output is measured from U8 pins 7 and 8. 502C controls set as in Figure 26.

**Figure 29. Low Frequency EQ**



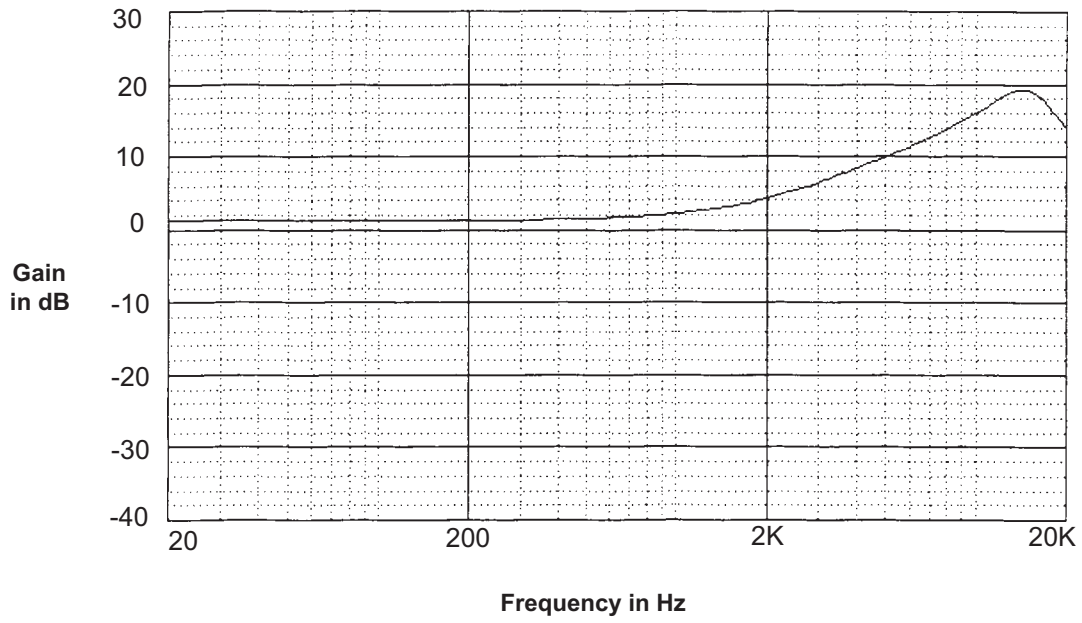
Output is measured from U1 pins 7 and 8. 502C controls set as in Figure 26.

**Figure 30. High Frequency EQ**



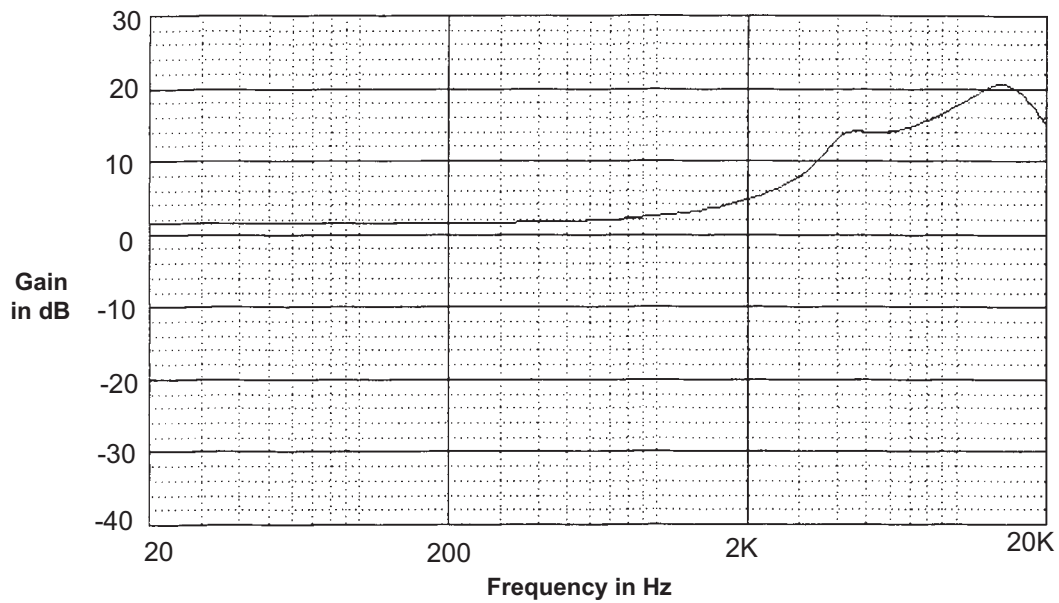
Output is measured from U2 pins 1 and 14. 502C controls set as in Figure 26.

**Figure 31. High Frequency EQ**



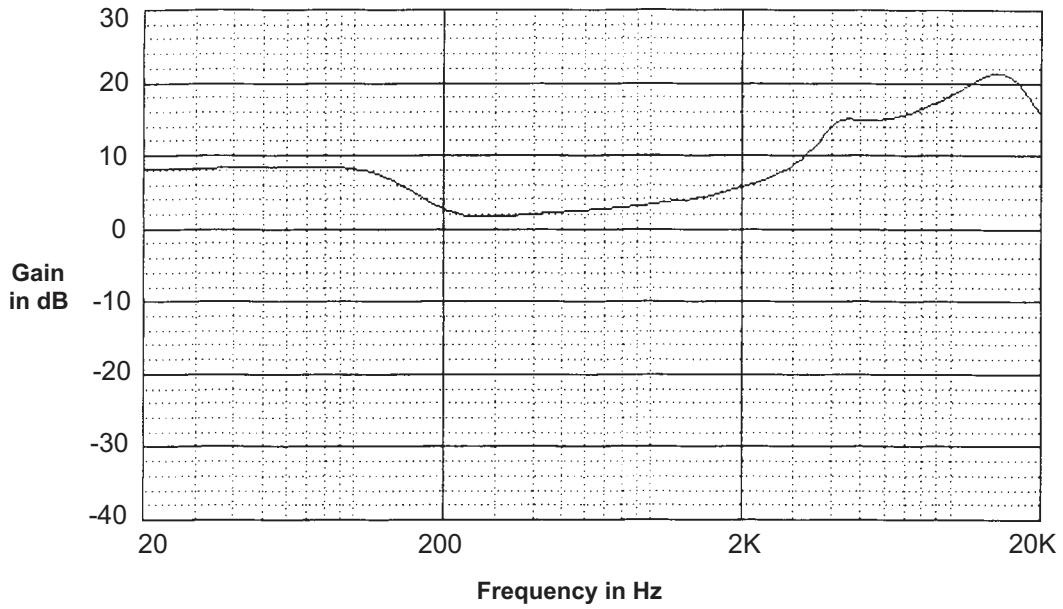
Output is measured from U2 pins 7 and 8. 502C controls set as in Figure 26.

**Figure 32. High Frequency EQ**



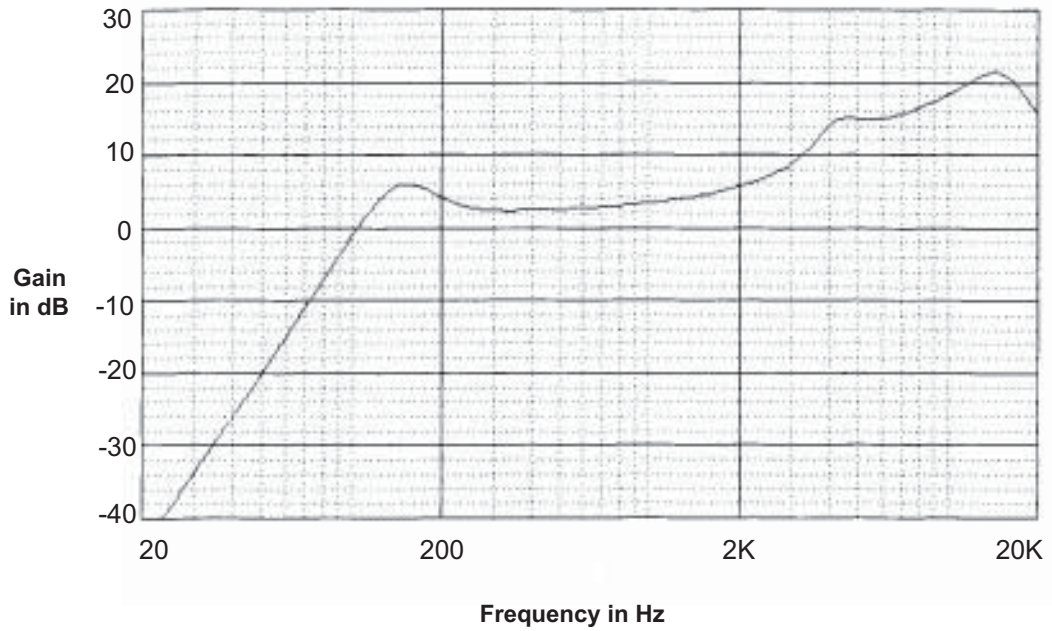
Output is measured from U3 pins 1 and 14. 502C controls set as in Figure 26.

**Figure 33. High Frequency EQ**



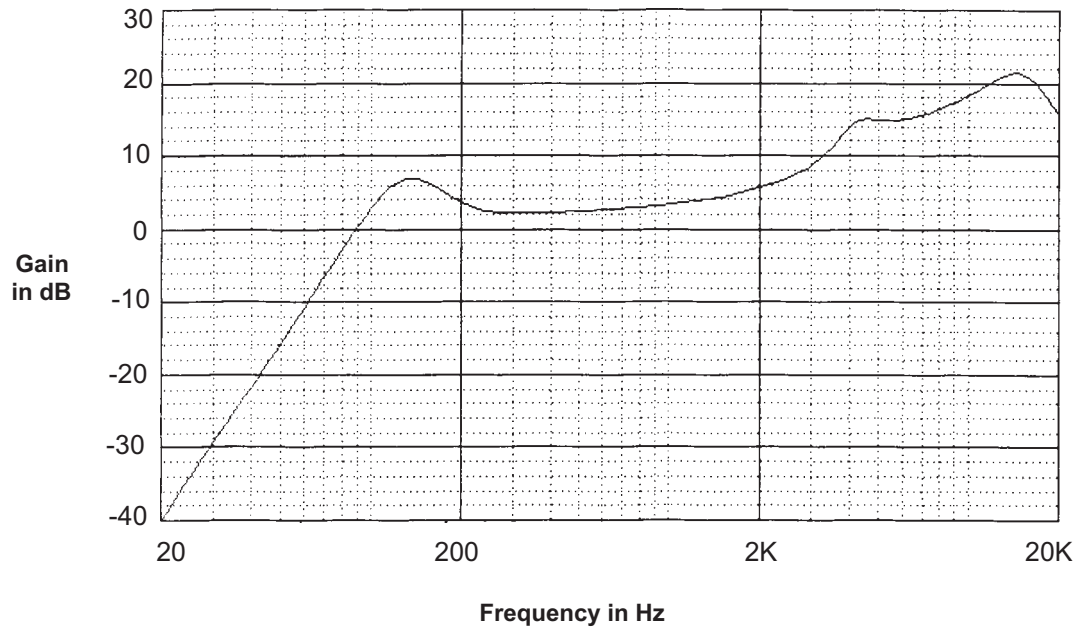
Output is measured from U3 pins 7 and 8. 502C controls set as in Figure 26.

**Figure 34. High Frequency EQ**



Output is measured from U4 pins 7 and 8. 502C controls set as in Figure 26.

**Figure 35. High Frequency EQ**



Output is measured from U4 pins 1 and 14. 502C controls set as in Figure 26 except: Mode switch is set to 1 (Full Range Mode).

**Figure 36. High Frequency EQ**

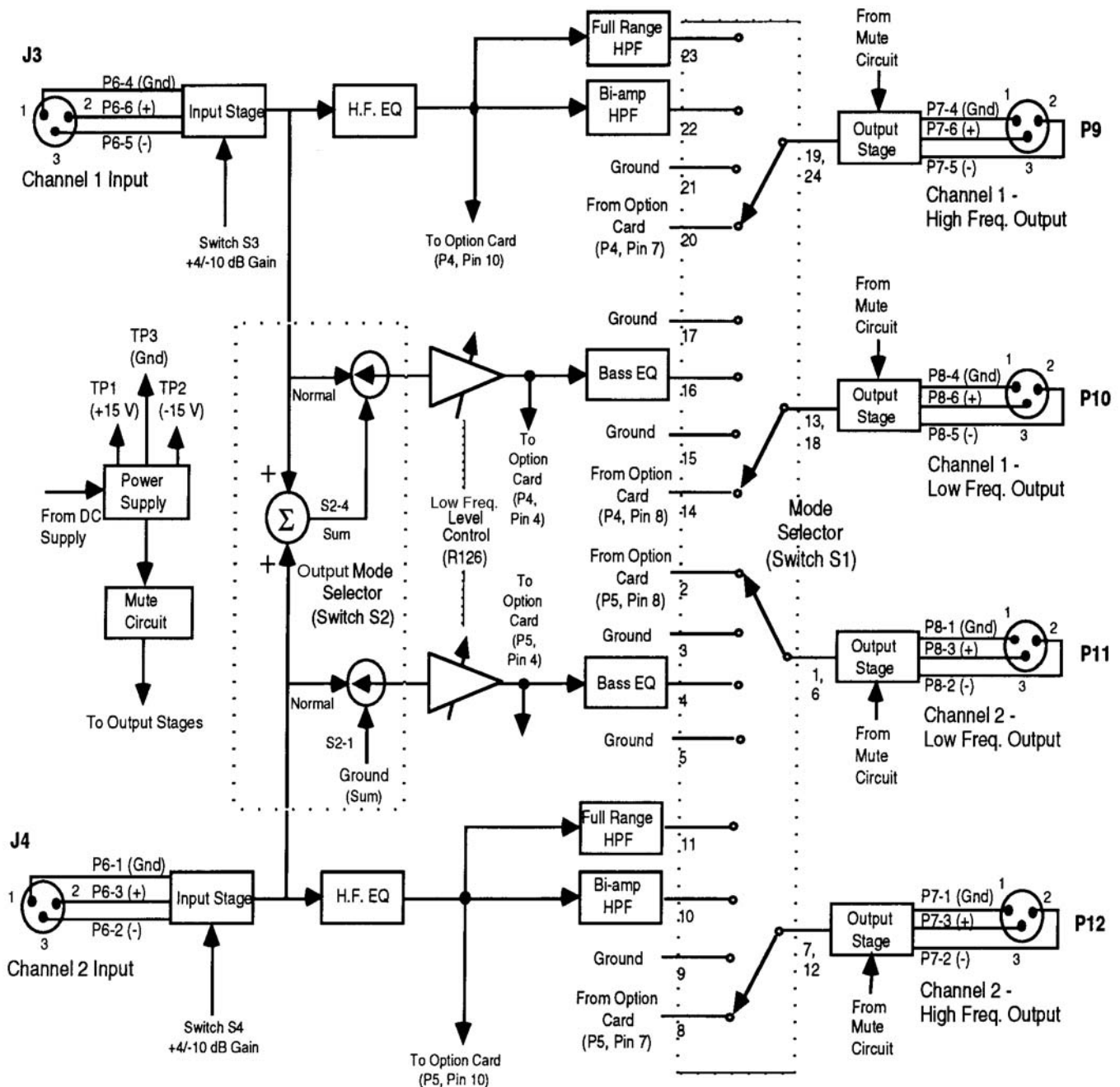


Figure 37. 502C Controller Block Diagram

## SERVICE MANUAL REVISION HISTORY

Date	Revision Level	Description of Change	Change Drive By	Pages Affected
5/93	01	Changed 502C's J3, J4 XLR part number to 189222-001.	Part Number Change	29
5/05	02	Revised Figure 21 to correct exploded view. Added service manual revision page. Updated front and back covers.	Error	38
6/06	03	Speakon® Version and RoHS compliant parts added.	New Version, RoHS parts	18, 19, 22, 23, 24, 36, 37, 40, 42, 43, 62
6/12	04	Changed Inductor, .75mH, Air core part number from 293515-001 to 347682-0010	ECN	13

SPECIFICATIONS AND FEATURES SUBJECT TO CHANGE WITHOUT NOTICE

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