

## Panaray<sup>®</sup> Model 310M and 620M Loudspeakers



**Model 310M Loudspeaker**



**Model 620M Loudspeaker**

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**CAUTION: The Bose® Panaray Model 310M and 620M Loudspeakers contain 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 Model 310M and 620M Loudspeakers are covered by a limited 5-year transferable warranty.

## Product Description - Model 310M Loudspeaker

### Overview:

The Panaray® Model 310M Loudspeaker is a floor monitor intended for smaller indoor applications, such as churches and auditoriums where the model 402, 502A, MA12 and 802 loudspeakers are used for the main system.

The loudspeakers are designed with two specifically designed flat panels that allow the speaker to be used in two different configurations: Vertically positioned at a 40 degree (near field) angle and at a 60 degree angle for far field.

The Panaray Model 310M Loudspeakers are manufactured in black and white.

### Enclosure:

The enclosure is a plastic cabinet made of linear low density polyethylene. The volume of the enclosure including ports is approximately 650 cubic inches with approximate dimensions of 14.22x12.52x8.43" (361mmx318mmx214mm).

### Drivers:

The Model 310M loudspeakers use three (3) 2.25" drivers and one (1) 5.25" driver. A total of three (3) 2.5" drivers are located in an articulated array with all the dustcaps in a line. Driver 1 is angled at +20 degrees. Driver 2 is angled 0 degrees (straight ahead) and driver 3 is angled at -20 degrees.

The drivers are mounted on the front baffle with four (4) steel powder coated Philips head screws with a thread lock material.

### Input Area:

The speaker has two (2) Neutrik® NL4 SpeakOn® connectors mounted on the panel located in a pocket on the rear panel. The input panels are countersunk.

### Grille/Logo:

The grille is a perforated pre-coat galvanized steel grille with a powder coat. The logo is silk-screened onto the vertical band between the two perf patterns. The arctic white variant has an adhered scrim cloth.

### Handle:

The speaker is provided with two (2) integral handles for convenient transportation by a single person.

### Packaging:

The system packaging consists of the following components:

- One black or white speaker
- Carton
- Owner's Manual
- One polyethylene bag for cosmetic protection

## Product Description - Model 620M Loudspeaker

### Overview:

The Panaray® Model 620M Loudspeaker is a floor monitor intended for smaller indoor applications, such as churches and auditoriums where the model 402, 502A, MA12 and 802 loudspeakers are used for the main system. The Model 620M loudspeaker is located on the floor.

The enclosure is designed with three specifically designed flat panels that allow the speaker to be used in three different configurations. Panel one allows for vertical orientation at a 40 degree angle; panel two allows for vertical orientation at 60 degrees; panel three allows for horizontal orientation at a 45 degree angle.

The Panaray Model 620M Loudspeakers are manufactured in black and white.

### Enclosure:

The enclosure is a plastic cabinet made of linear low density polyethylene. The volume of the enclosure including ports is approximately 900 cubic inches with approximate dimensions of 20.55x10.39x12.52" (522mmx264mmx318mm).

### Drivers:

The Model 620M loudspeakers use six (6) 2.25" drivers and two (2) 5.25" drivers. A total of six (6) 2.5" drivers are located in an articulated array with all the dustcaps in a line. Drivers 1, 3, and 5 are angled at +20 degrees. Drivers 2, 4, and 6 are angled at -20 degrees.

The drivers are mounted on the front baffle with four (4) steel powder coated Philips head screws with a thread lock material.

### Input Area:

The speaker has two (2) Neutrik® NL4 SpeakOn® connectors mounted on the panel located in a pocket on the rear panel. The input panels are countersunk.

### Grille/Logo:

The grille is a perforated pre-coat galvanneal steel grille with a powder coat. The logo is silk-screened onto the vertical band between the two perf patterns. The arctic white version has an adhered scrim cloth.

### Handle:

The speaker is provided with two (2) integral handles for convenient transportation by a single person.

### Packaging:

The system packaging consists of the following components:

- One black or white speaker
- Carton
- Owner's Manual
- One polyethylene bag for cosmetic protection

# Specifications - 310M Loudspeakers

## Acoustical Specifications

Frequency Range:	70Hz to 16kHz
Sensitivity:	90dB SPL @ 1W/1M
Compression:	< 3 dB with 200W watt sine wave
Distortion:	< 30% at 200W sine wave
Port Noise:	< -40dB (from fundamental)
Radiation Pattern:	120 x 60 degrees averaged from 1 to 8 kHz

## Electrical Specifications

Driver Complement:	1 - 5 1/4" Woofer and 3 - 2 1/4" Twiddlers
Impedance:	8 Ohms
Power Handling:	100 Watts
Input Connectors:	2 - Neutrik® Speakon® NL4 four-pole connectors
Crossover Frequency:	200Hz
Maximum Sound Pressure Level:	110 dB SPL @ 1m (pink noise)

## External Dimensions

Single Speaker:	14.22x12.52x8.43" (361x318x214mm)
Packed System:	18.26x17.00x12.32" (464x432x313mm)
System Weight:	13.6 lbs (6.2 kg)
Packaged System Weight:	16.25 lbs (7.4 kg)

## Specifications - 620M Loudspeakers

### Acoustical Specifications

Frequency Range:	70Hz to 16kHz
Sensitivity:	91dB SPL @ 1W/1M
Compression:	< 3 dB with 400W watt sine wave
Distortion:	< 30% at 400W sine wave
Port Noise:	< -40dB (from fundamental)
Radiation Pattern:	120 x 40 degrees averaged from 1 to 8 kHz


### Electrical Specifications

Driver Complement:	Two - 5 1/4" Woofers and Six - 2 1/4" Twiddlers
Impedance:	8 Ohms
Power Handling:	200 Watts
Input Connectors:	2 - Neutrik® Speakon® NL4 four-pole connectors
Crossover Frequency:	200Hz
Maximum Sound Pressure Level:	114 dB SPL @ 1m (pink noise)

### External Dimensions

Single Speaker:	20.55x10.39x12.52" (522x264x318mm)
Packed System:	24.88x13.50x17.30" (632x342x440mm)
System Weight:	22.2 lbs (10.1 kg)
Packaged System Weight:	26.0 lbs (11.8 kg)

## PART LIST NOTES

1. This part is not normally available from Customer Service. Approval from the Field Service Manager is required before ordering.
2. The individual parts located on the PCBs are listed in the Electrical Part List.
3.  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.
4. This part is referenced for informational purposes only. It is not stocked as a repair part. Refer to the next higher assembly for a replacement part.

# PACKAGING PART LIST

Panaray® Model 310M Loudspeaker

Item Number	Description	Qty.	Bose® Part Number	Vendor Part Number	Note
-	KIT, CARTON (INCLUDES FILLERS AND CARTON ONLY) 310M BLACK SPEAKER 310M WHITE SPEAKER	1	295586-001 295586-002	- -	
1	GUIDE, INSTALL	1	-	4301-7219+0	4
2	BAG, POLY (INSTALL GUIDE)	1	-	1497-4092-0	4
3	PACKING, FOAM, UPPER	1	-	1490-4561+0	4
4	PACKING, FOAM, LOWER	1	-	1490-4571+0	4
5	BAG, POLY	1	-	1497-7492+0	4
6	CARTON	1	-	1437-6901+0-2	4

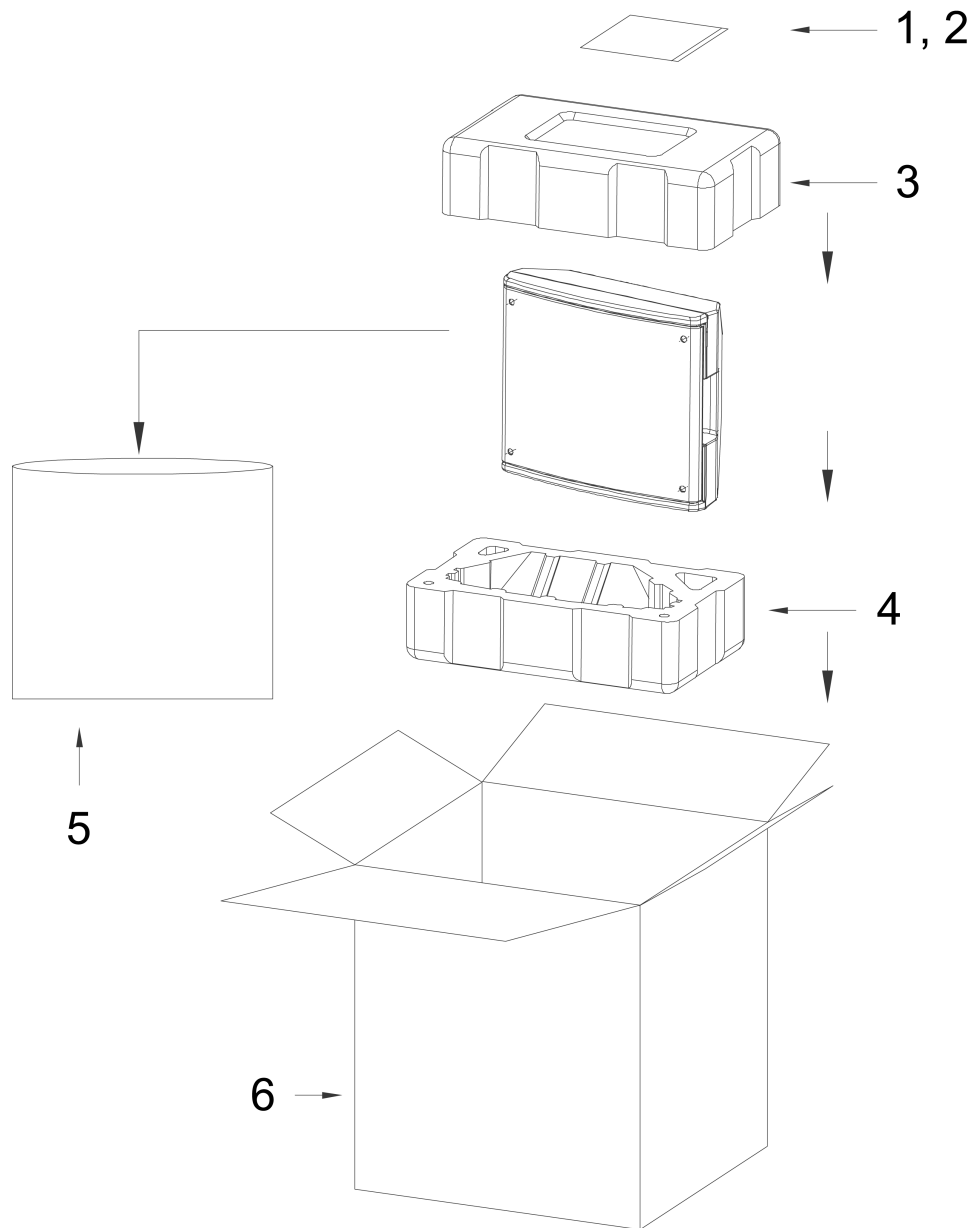


Figure 1. Panaray Model 310M Loudspeaker Packaging View



# PACKAGING PART LIST

Panaray® Model 620M Loudspeaker

Item Number	Description	Qty.	Bose® Part Number	Vendor Part Number	Note
-	KIT, CARTON (INCLUDES FILLERS AND CARTON ONLY) 620M BLACK SPEAKER 620M WHITE SPEAKER	1	295585-001 295585-002	- -	
1	GUIDE, INSTALL	1	-	4301-7219+0	4
2	BAG, POLY (INSTALL GUIDE)	1	-	1497-4092-0	4
3	PACKING, FOAM, UPPER	1	-	1490-4581+0	4
4	PACKING, FOAM, LOWER	1	-	1490-4591+0	4
5	BAG, POLY	1	-	1497-1072-4	4
6	CARTON	1	-	1437-7001+0-2	4

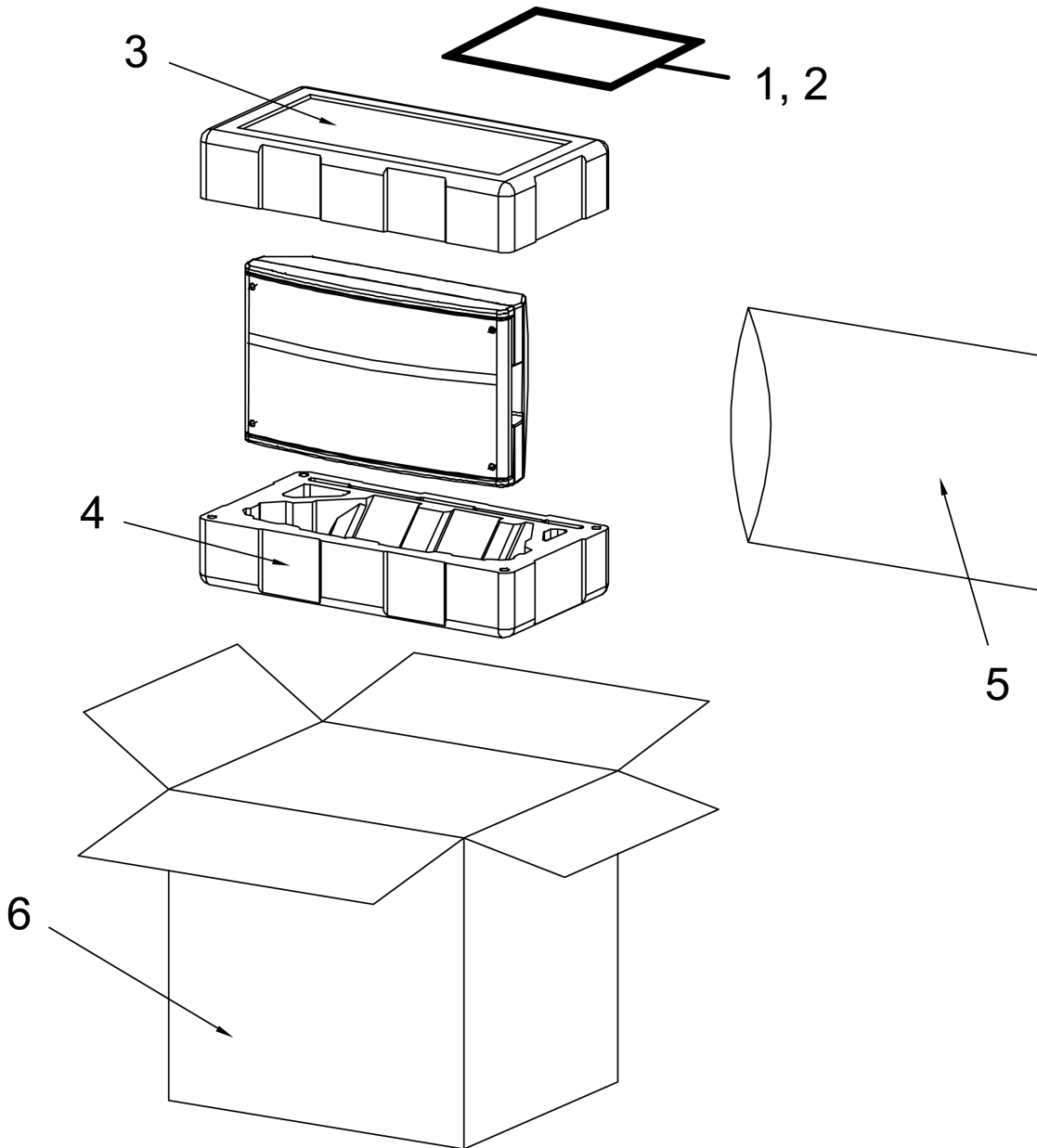
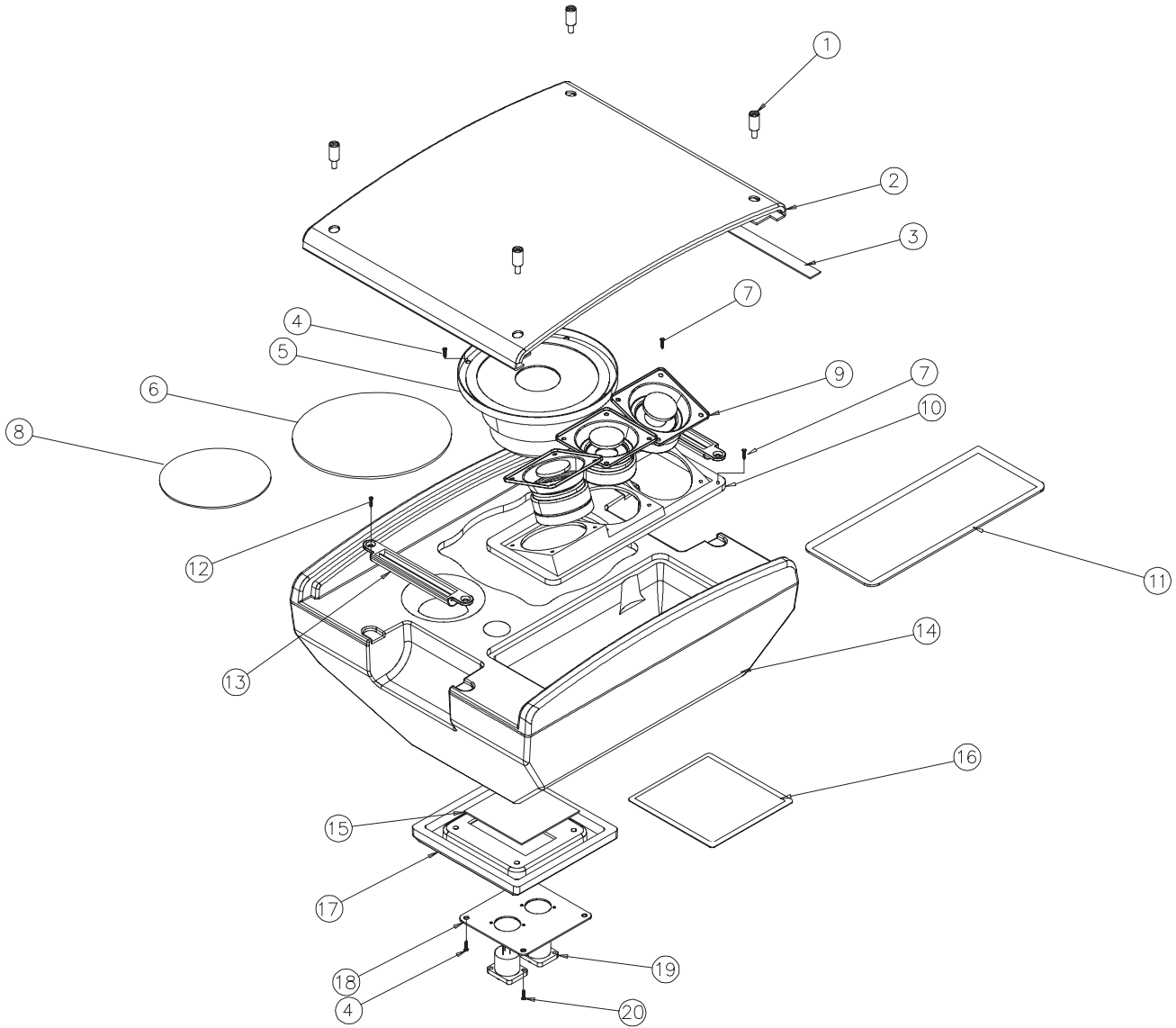


Figure 2. Panaray Model 620M Loudspeaker Packaging View

# MAIN PART LIST

Panaray® Model 310M Loudspeaker (see Figure 3)

Item Number	Description	Qty.	Bose® Part Number	Vendor Part Number	Note
1	FASTENER, GRILLE, STEEL	4	-	4135-6181+0	4
2	GRILLE, BLACK GRILLE, WHITE	1	293306-001 293306-002	4135-6131+0 4135-6132+0	
3	PEF GASKET FOR GRILLE	2	-	4149-0881+0	4
4	SCREW, M4x10 (FOR INPUT PANEL AND 5.25" DRIVER)	8	-	2904-4010-3000	4
5	DRIVER, WOOFER, 5.25"	1	293304	WF-FM000C-EN	
6	PEF GASKET FOR 5.25" WOOFER	1	-	4153-3471-0	4
7	SCREW, M4x14 (FOR DRIVER PANEL AND 2.25" DRIVERS)	18	-	2954-4014-3000	4
8	EVA GASKET FOR 5.25" WOOFER	1	-	4153-3591-0	4
9	DRIVER, 2.25"	3	293318	8900-3790+0	
10	DRIVER PANEL (PC/ABS)	1	293322-001	4155-1741+0	
11	PEF GASKET FOR DRIVER PANEL	1	-	4149-0701+0	4
12	SCREW, M4x11 (FOR HANDLE)	4	-	2951-4011+5000	4
13	HANDLE, PC/ABS, BLACK HANDLE, PC/ABS, WHITE	2	293309-001 293309-003	4155-1761+0 4155-1762+0	
14	ENCLOSURE, BLACK ENCLOSURE, WHITE	1	293323-001 293323-002	1467-5601+0 1467-5602+0	4
15	CROSSOVER ASSEMBLY	1	293324	-	
16	3M TAPE, 9MMx5MIL	-	-	9500-9018+0	4
17	REAR BUMPER (SBR) BLACK REAR BUMPER (SBR) WHITE	1	293325-001 293325-003	4157-1011+0 4157-1012+0	
18	INPUT PANEL, BLACK INPUT PANEL, WHITE	1	293326-001 293326-002	1405-8001+0 1405-8002+0	
19	CONNECTOR, NL4, NEUTRIK®	2	-	2113-3140+0	4
20	SCREW, M3x10, FOR NL4 CONNECTORS	4	-	2950-3010+3000	4

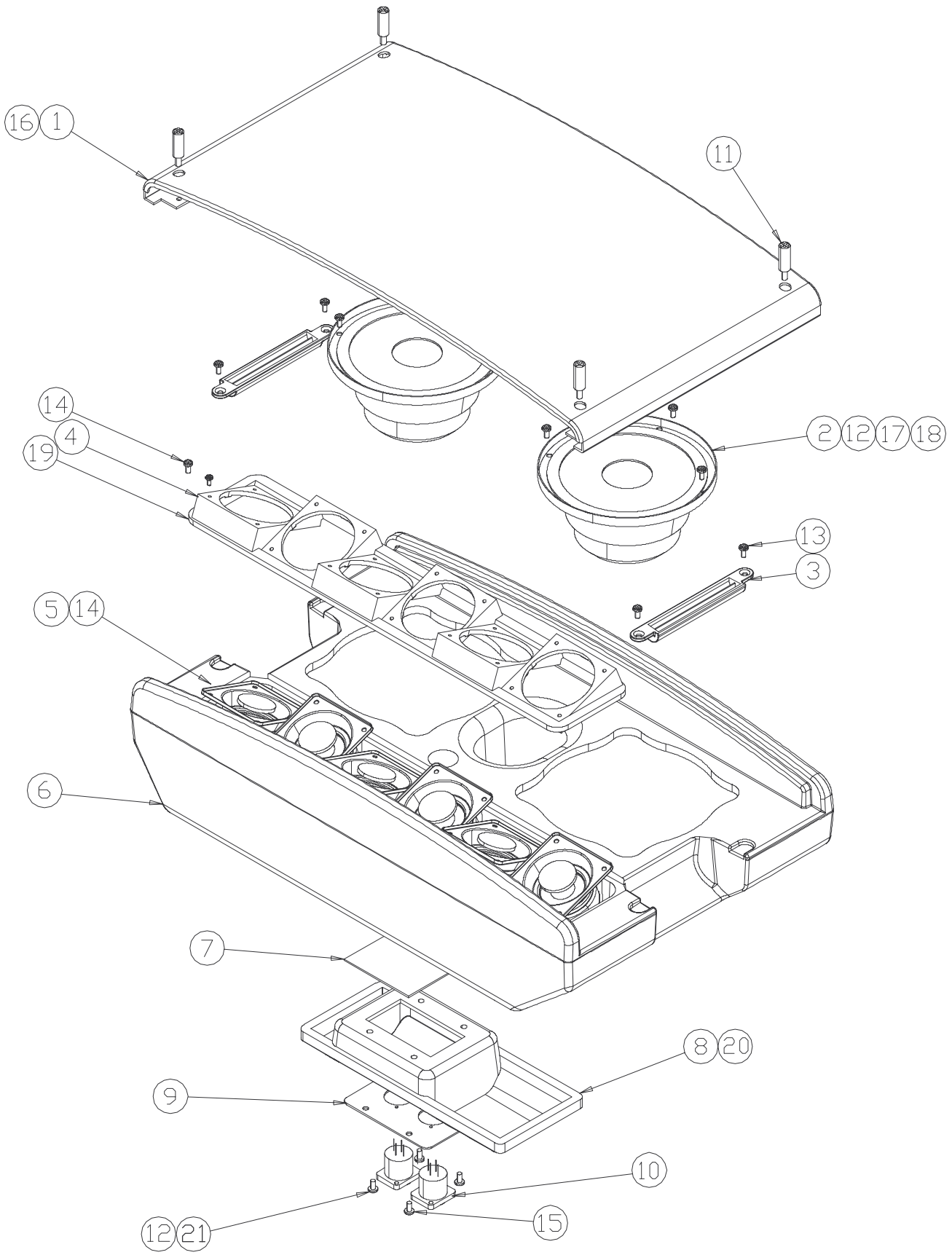


**Figure 3. Panaray® Model 310M Exploded View**

# MAIN PART LIST

Panaray® Model 620M Loudspeaker (see Figure 4)

Item Number	Description	Qty.	Bose® Part Number	Vendor Part Number	Note
1	GRILLE, BLACK GRILLE, WHITE	1	293305-001 293305-002	4135-6041+0 4135-6042+0	
2	WOOFER, 5.25"	2	293304	WF-FM000C-EN	
3	HANDLE, BLACK HANDLE, WHITE	2	293309-001 293309-003	4155-1761+0 4155-1762+0	
4	DRIVER PANEL	1	293310-001	4155-1751+0	
5	DRIVER, TWIDDLER, 2.25"	6	293311	WF-BS021C-EN	
6	ENCLOSURE, BLACK ENCLOSURE, WHITE	1	293312-001 293312-002	1467-5701+0 1467-5702+0	4
7	CROSSOVER ASSEMBLY	1	293313	-	
8	REAR BUMPER, BLACK REAR BUMPER, WHITE	1	293314-001 293314-003	4157-1001+0 4157-1002+0	
9	INPUT PANEL, BLACK INPUT PANEL, WHITE	1	293316-001 293316-002	1405-8001+0 1405-8002+0	
10	CONNECTOR, NL4 NEUTRIK®	2	-	2113-3140+0	4
11	SCREW (FOR GRILLE)	4	-	4135-6171+0	4
12	SCREW, M4, BLACK (FOR WOOFER AND INPUT PANEL)	12	-	2904-4010-3000	4
13	SCREW, M4 (FOR HANDLE)	4	-	2954-4014+5000	4
14	SCREW, M4 (FOR 2.25" DRIVER AND DRIVER PANEL)	34	-	2954-4014-3000	4
15	SCREW, M3 (FOR NL4 NEUTRIK CONNECTORS)	4	-	2950-3010+3000	4
16	GASKET FOR GRILLE	2	-	4149-0881+0	4
17	GASKET FOR WOOFER, EVA	2	-	4153-3591-0	4
18	GASKET FOR WOOFER, PEF	2	-	4153-3471-0	4
19	GASKET FOR DRIVER PANEL	1	-	4149-0701+0	4
20	ADHESIVE, 3M	-	-	9500-9018+0	4
21	SCREW, INPUT PANEL, WHITE (ALTERNATE FOR 12 ABOVE)	4	-	-	4



**Figure 4. Panaray® Model 620M Exploded View**

# DISASSEMBLY PROCEDURES

## Panaray® Model 310M Loudspeaker

Refer to the figure at right for the following procedures.

### 1. Grille Removal

**1.1** Remove the four screws (1) using a Phillips-head screwdriver.

**1.2** Lift off the grille (2).

### 2. Handle Removal

**2.1** Perform procedure 1.

**2.2** Remove the two screws (12). Lift off the handle (13).

### 3. Woofer Removal

**3.1** Perform procedure 1.

**3.2** Remove the four screws (4).

**3.3** Lift out the woofer (5) and disconnect the wires from the terminals.

**Re-assembly Notes:** Be sure to observe polarity when connecting the new woofer to the wiring harness.

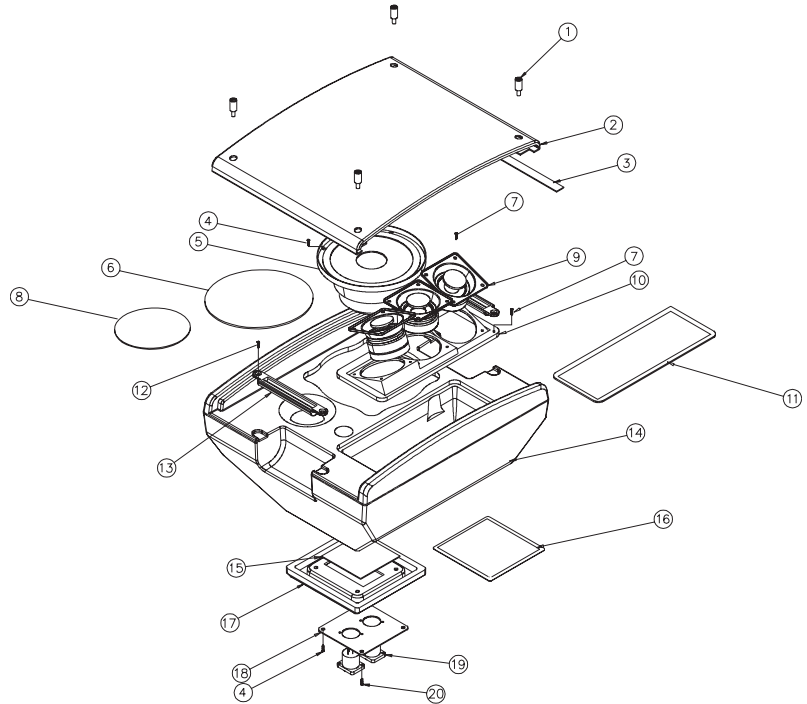
### 4. Tweeter Driver Removal

**4.1** Perform procedure 1.

**4.2** Remove the four screws (7).

**4.3** Lift out the driver (9) and disconnect the wires from the terminals.

**Re-assembly Notes:** Be sure to observe polarity when connecting the new driver to the wiring harness.



### 5. Neutrik® Speakon® Jack Removal

**5.1** Remove the two screws (20) for the jack you wish to remove.

**5.2** Lift off the input jack (19). Cut the wires as close to the jack as possible. Refer to the wiring diagram in the back of this manual when installing the new jack.

### 6. Crossover Assembly Removal

**6.1** Perform procedure 3.

**6.2** Disconnect the crossover harnesses from the woofer, tweeters and input jacks.

**6.3** Remove the four nuts that secure the crossover assembly (15) to the input panel (18). Lift out the crossover assembly.

# DISASSEMBLY PROCEDURES

## Panaray Model 620M Loudspeaker

Refer to figure at right for the following procedures.

### 1. Grille Removal

1.1 Remove the four screws (11) using a Phillips-head screwdriver.

1.2 Lift off the grille (1).

### 2. Handle Removal

2.1 Perform procedure 1.

2.2 Remove the two screws (13). Lift off the handle (3).

### 3. Woofer Removal

3.1 Perform procedure 1.

3.2 Remove the four screws (12).

3.3 Lift out the woofer (2) and disconnect the wires from the terminals.

**Re-assembly Notes:** Be sure to observe polarity when connecting the new woofer to the wiring harness.

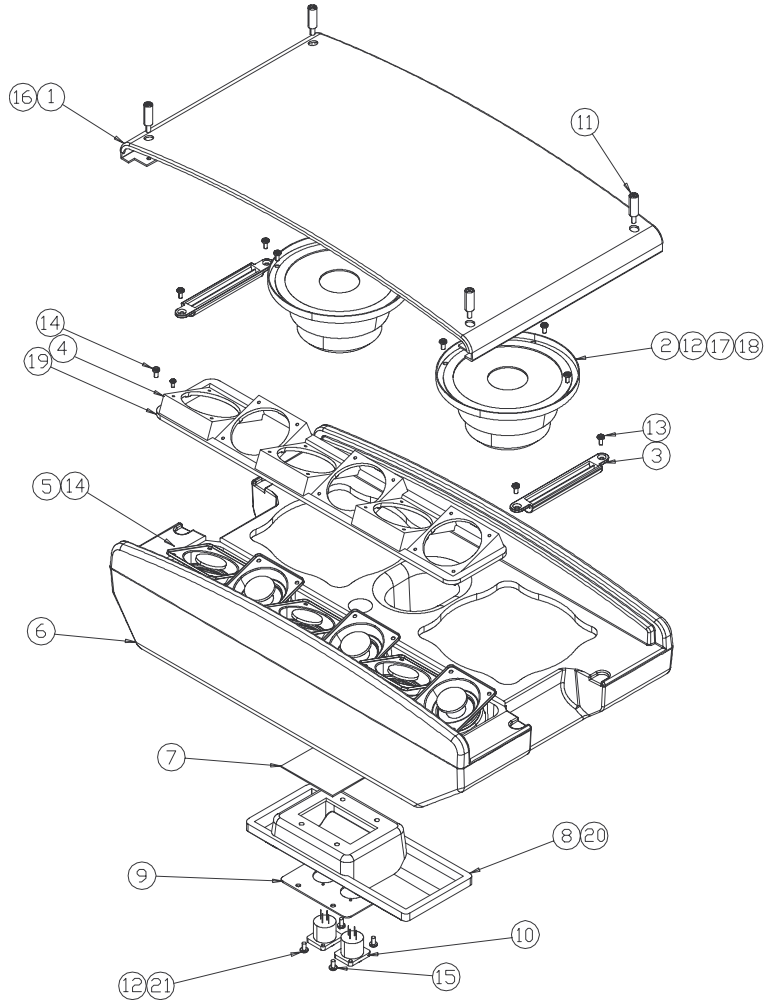
### 4. Tweeter Driver Removal

4.1 Perform procedure 1.

4.2 Remove the four screws (14).

4.3 Lift out the driver (5) and disconnect the wires from the terminals.

**Re-assembly Notes:** Be sure to observe polarity when connecting the new driver to the wiring harness.



### 5. Neutrik® Speakon® Jack Removal

5.1 Remove the two screws (15) for the jack you wish to remove.

5.2 Lift off the input jack (10). Cut the wires as close to the jack as possible. Refer to the wiring diagram in the back of this manual when installing the new jack.

### 6. Crossover Assembly Removal

6.1 Perform procedure 3.

6.2 Disconnect the crossover harnesses from the woofer, tweeters and input jacks.

6.3 Remove the four nuts that secure the crossover assembly (7) to the input panel (9). Lift out the crossover assembly.

# TEST PROCEDURES

## 1. Phase Test

**1.1** Observing polarity, momentarily apply a 12VDC level to pin 1+ and 1- of the Neutrik NL4 connector.

**1.2** While applying the DC voltage, observe the drivers. They should all move outward when the voltage is applied. Correct the wiring on any drivers that move inward instead of outward during this test.

## 2. Rub and Tick Test

**2.1** Apply a 10Hz, 20Vrms signal directly to the terminals of the driver under test. Refer to the disassembly procedures in this manual for the speaker under test to find out how to remove the driver.

**2.2** Listen for any extraneous noises such as rubbing, scraping or ticking.

**Note:** To distinguish between normal suspension noise and rubs or ticks, displace the cone slightly with your fingers. If the noise stays the same, it is normal suspension noise and the driver is fine. Suspension noise will not be heard with program material.

## 3. System Sweep Test

**3.1** Apply a 10Hz, 20Vrms (310M speaker) or 30Vrms (620M speaker) signal to pin 1+ and pin 1- of the Neutrik NL4 connector.

**3.2** Sweep the audio signal generator from 10Hz up to 70Hz.

**3.3** Verify that there are no extraneous noises such as buzzes or rattles.

## 4. Air Leak Test

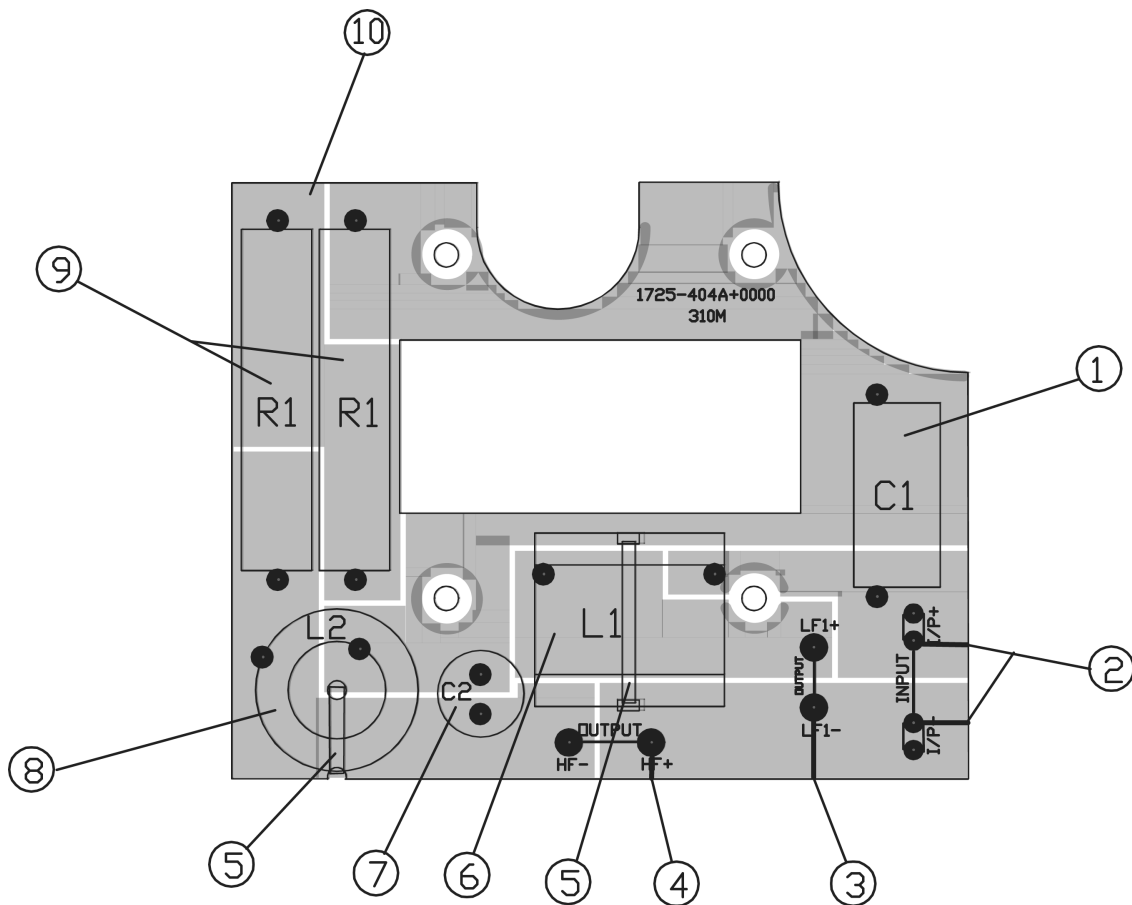
**4.1** Apply a 70Hz, 20Vrms (310M speaker) or 30Vrms (620M speaker) signal to pin 1+ and pin 1- of the Neutrik NL4 connector.

**4.2** Listen for any air leaks around the rear panel, input panel, woofer and handles.



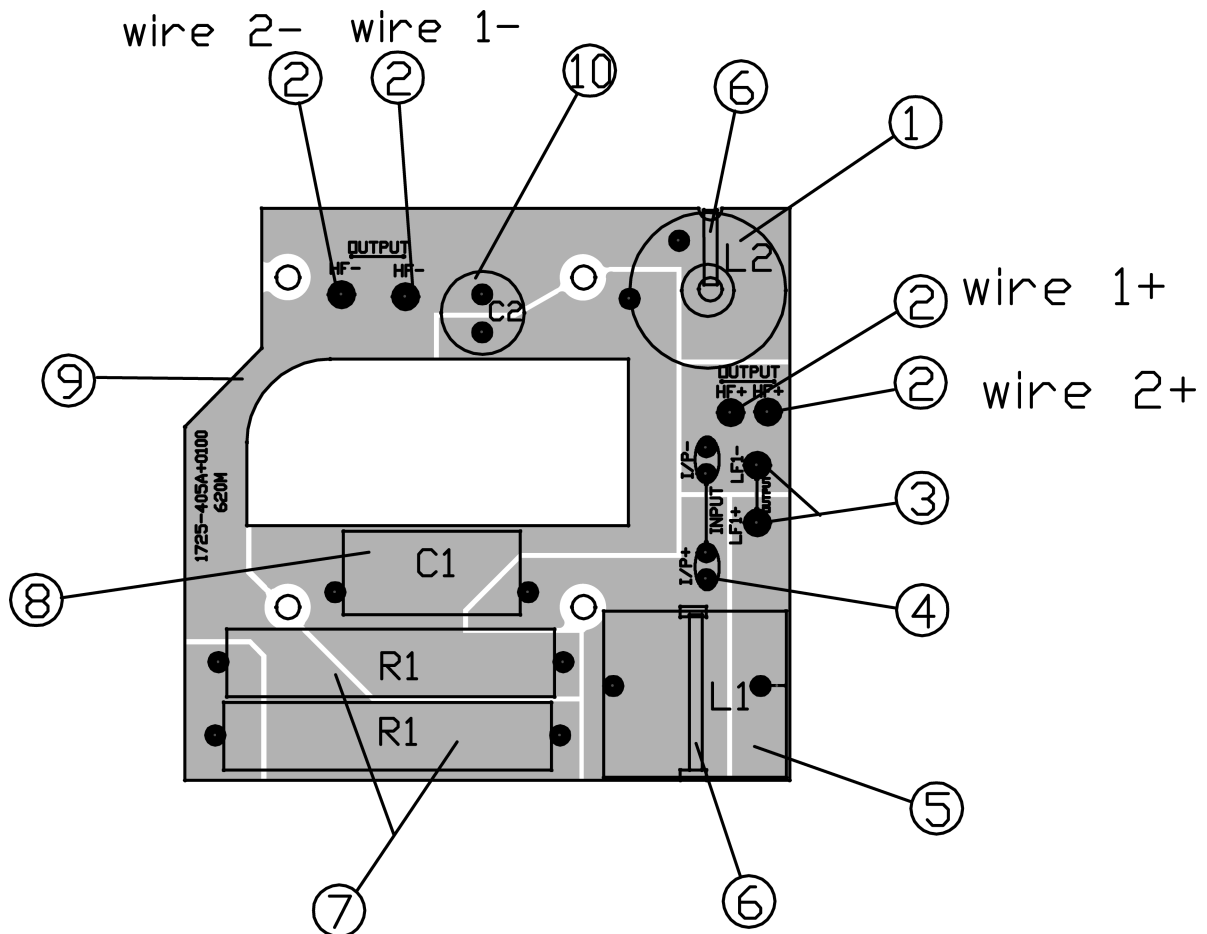
# Model 310M Crossover Board Layout Diagram

Item Number	Ref. Des.	Description	Bose® Part Number	Vendor Part Number	Qty.	Note
-	-	CROSSOVER PCB ASSY CONSISTS OF:	293324	-	1	
1	C1	33UF +/-10%, 100V, DF <10%	-	157H-3361+1-Y\$	1	4
2	TML	TERMINAL, OUTPUT	-	4132-1551-0	2	4
3	LF	#18AWG, TWIN, BL/BK, 250MM	-	7012-2440+0	1	4
4	HF	#18AWG, TWIN, RED/BK, 400MM	-	7012-2450+0	1	4
5	TIE	CABLE TIE, 150MM	-	6360-1371+0	2	4
6	L1	3MH +/-2.5%, D 0.8MM	-	1806-2689-0	1	4
7	C2	5UF +/-5%, 50V, DF MAX 3%	-	157F-505J-5-YO	1	4
8	L2	0.95MH +/-5%, AIR CORE	-	1804-2200+0	1	4
9	R1	4 OHM, 20W, 5%, RWR, AL	-	4741-4ROJ-1	2	4
10	PCB	CROSSOVER PCB, BARE	-	1725-404A+0000	1	4

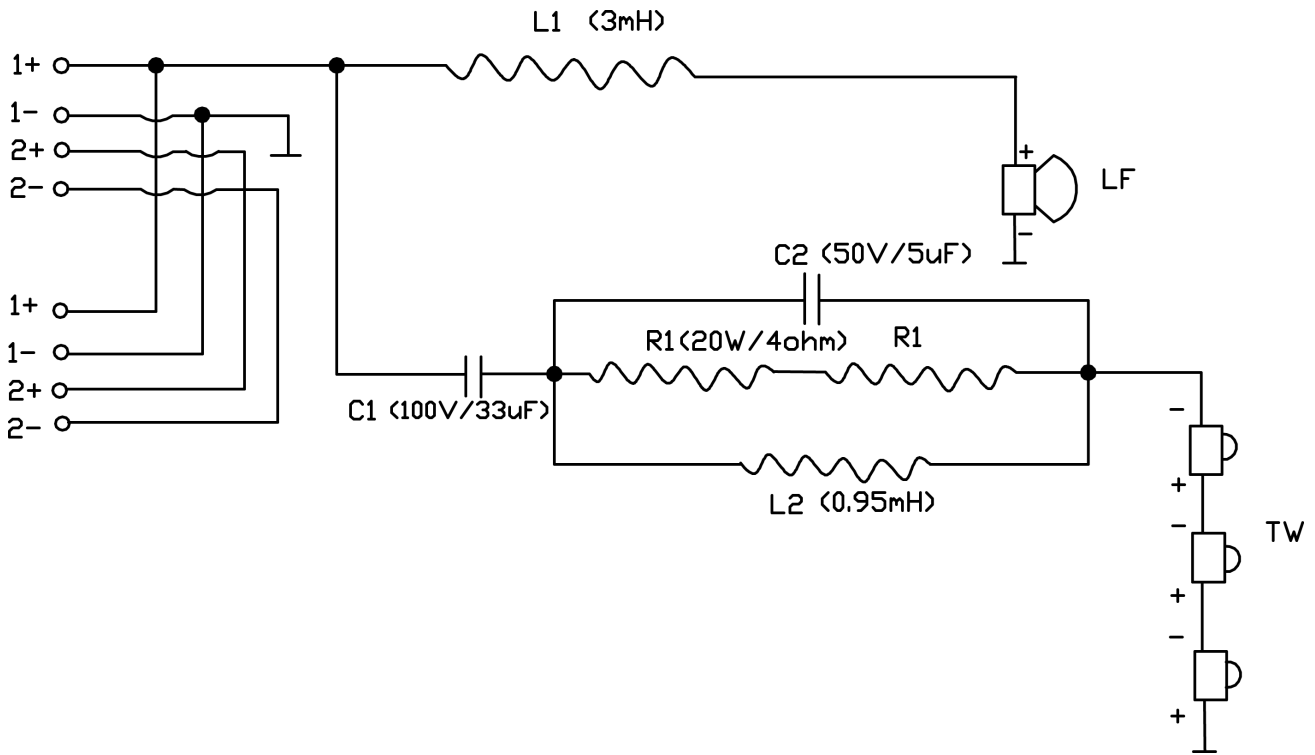


## Model 620M Crossover Board Layout Diagram

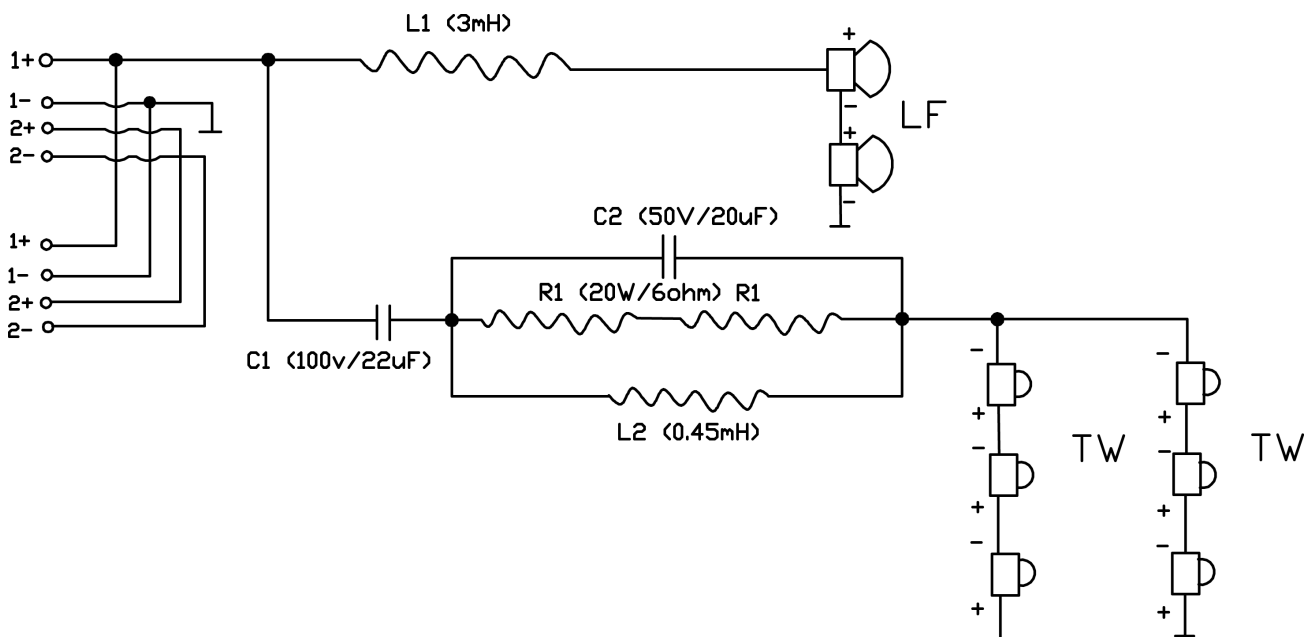
Item Number	Ref. Des.	Description	Bose® Part Number	Vendor Part Number	Qty.	Note
-	-	CROSSOVER PCB ASSY CONSISTS OF:	293313	-	1	
1	L2	0.45MH +/-5%, AIR CORE	-	1804-2190+0	1	4
2	HF	#18AWG, TWIN, BL/BK, 500MM	-	7012-2450+0	1	4
3	LF	#18AWG, TWIN, RED/BK, 400MM	-	7012-2440+0	1	4
4	TML	TERMINAL, OUTPUT	-	4132-1551-0	2	4
5	L1	3MH +/-2.5%, D 0.8MM	-	1806-2689-0	1	4
6	TIE	CABLE TIE, 150MM	-	6360-1371+0	2	4
7	R1	6 OHM, 5%, RWR, 20W, AL	-	4741-4ROJ-1	2	4
8	C1	22UF +/-10%, 100V, DF<10%	-	157H-3361+1-Y\$	1	4
9	PCB	CROSSOVER PCB, BARE	-	1725-404A+0000	1	4
10	C2	20UF +/-10%, 50V, DF<10%	-	157F-505J-5-YO	1	4



## Model 310M Crossover Board Wiring Diagram



## Model 620M Crossover Board Wiring Diagram



## Service Manual Revision History

Date	Revision Level	Description of Change	Change Driven By	Pages Affected
1/06	00	Document released at revision 00.	Service manual release	All

**SPECIFICATIONS AND FEATURES SUBJECT TO CHANGE WITHOUT NOTICE**

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