Bose® EdgeMax™

EM90 and EM180 Loudspeaker

Service Manual

Reference Number 778844-SM Rev.01

Table of Contents

CAUTION: The Bose® EdgeMax® Loud Speaker contains no user-serviceable parts. To prevent warranty infractions, refer servicing to warranty service stations or factory service.

WARRANTY

The Bose EdgeMax Loud Speaker is covered by a limited 5-year warranty.

Product Description

EdgeMax™ in-ceiling premium loudspeakers. EdgeMax loudspeakers feature proprietary Bose® Phase Guide® technology, provides room-filling coverage while improving overall sound quality compared to the performance of conventional ceiling loudspeakers. Designed for mounting near wall boundaries, EdgeMax loudspeakers project high-frequency sound throughout rooms up to 65 feet (20 m) wide using only perimeter mounting locations and can effectively cover an area that would require up to four conventional conical-coverage models. Thus, EdgeMax loudspeakers eliminate the need for conventional ceiling speakers mounted in the center of rooms, or surface-mount loudspeakers mounted on walls. And because of their unique design and consistent coverage pattern, EdgeMax loudspeakers enable installers to move efficiently through the installation, creating a great-looking *and* great-sounding end result. Additionally, EdgeMax loudspeakers produce excellent intelligibility for speech and full-frequency response for music, making it ideal for retail, commercial, industrial, institutional and residential applications.

EdgeMax in-ceiling premium loudspeakers are available with two different horizontal coverage patterns. EdgeMax EM90 models provide nominal 90-degree horizontal coverage and are intended for in-ceiling mounting near room corners. EdgeMax EM180 models provide nominal 180-degree horizontal coverage and are intended for in-ceiling mounting near wall boundaries centered along target coverage zones. Both models feature 75-degree asymmetrical vertical coverage, which is optimized for ceiling heights between eight feet and 20 feet.
Key features of EdgeMax in-ceiling premium loudspeakers:

PhaseGuide technology, which provides unique asymmetrical vertical coverage pattern designed for room-filling sound when mounted in-ceiling near wall boundaries

1.3-inch diaphragm compression driver for best-in-class audio quality with superior frequency response and coverage consistency versus typical dome tweeters

Eight-inch woofer with wall-boundary loading, which provides extended bass impact.

Two-way passive crossover with 8-ohm or 70V/100V transformer taps.

New mounting-clamp system for fast, easy installs.

Magnetically attached grill for quick access to wiring and tap settings.

UL1480 listing for air-handling (plenum) space installation.

Easy installation, saving integrators time in the field.

Specifications

Single Loudspeaker Performance	EM90		EM180	
Frequency Response (+/- 3 dB) (1)	70 - 16,000 Hz			
Frequency Range (-10 dB)	60 - 18,000 Hz			
Recommended High-Pass Protection Filter	70 Hz with minimum 12-dB / octave filter			
Loudspeaker EQ	Recommended			
Overload Protection	PTC			
Nominal Coverage Pattern (H x V)	90° H x Asymmetrical 75° V (-90° to -15° referenced to ceiling) aimed across room		180° H x Asymmetrical 75° V (-90° to -15° referenced to ceiling) aimed across room	
Crossover	1 kHz (passive 2-way crossover with integrated 70V/100V transformer)			
	EM90		**EM180**	
Power Handling, long-term continuous	125 W	150 W	125 W	150 W
Power Handling, peak	500 W	600 W	500 W	600 W
Sensitivity (SPL / 1W @ 1m) (2)	97 dB	97 dB	94 dB	94 dB
Calculated Maximum SPL @ 1 m (3)	118 dB	119 dB	115 dB	116 dB
Calculated Maximum SPL @ 1 m, peak	124 dB	125 dB	121 dB	122 dB
Nominal Impedance	8Ω (transformer bypass tap setting)			
Transformer Taps (70/100V)	70 V: 2.5, 5, 10, 20, 40, 80 W, 8Ω (125 W)			
	100 V: 5, 10, 20, 40, 80 W, NC, 8Ω (125 W)			
Transducers				
Low Frequency	1 x 8-inch woofer (1.5-inch voice coil)			
High Frequency	1 x compression driver (1.3-inch voice coil)			
Physical				
Enclosure Material	PC/ABS front baffle, integrated steel formed back can			
Grill	Micro perforated steel, powder-coated finish, white			
Environmental	Indoor only			
Connectors	Euro block 6-pin connector with loop-through and front baffle access			
Mounting/Suspension	System: Auto-Hold, spring-loaded, mounting system			
	Mounting: Four (4) Auto-Hold Mounting Arms			
	Secondary Attachment Points: Four (4) safety cable tabs with M6 diameter holes			
Accessories, Included	Tile Bridge with two (2) slotted L-bracket secondary attachment points			
Accessories, Optional	Black grille, rough-in pan for new construction			
Dimensions	Grille (W x H): 390 x 390 mm (15.4 x 15.4”)			
	Back can (W x H): 339 x 339 mm (13.3 x 13.3”)			
	Ceiling Cutout (W x H): 345 x 345 mm (13.58 x 13.8 “)			
	Depth: 236 mm (9.3”)			
Maximum Ceiling Thickness	78 mm (3 in)			
Net Weight, Loudspeaker with grille	10.07 kg (22.2 lbs.)			
Net Weight, Tile Bridge	1.41 kg (3.10 lbs.)			
Shipping Weight	12.84 kg (28.3 lbs.)			

Part List Notes

1. The individual parts located on the PCBs are listed in the Electrical Part List.

2. 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.

3. ⚠ This part is critical for safety purposes. Failure to use a Bose recommended part may result in a safety hazard and may void the regulatory certification.

Packaging Parts List

Em90 and Em180 Loudspeaker

Item Number	Description	Part Number	Qty.	Note
1	CUSHION, EPE, PG90/180 CARTON	799319-001S	1	
2	GUIDE, INSTALL, EM90/EM180LDSPKR	792495-0010	1	
3	SHIELD, PAINT, SVCE	788635-001S	1	
4	TEMPLATE, CUT-OUT, CRDBRD, B FLUTE, SVCE	789385-001S	1	
5	KIT, GRILLE, WHITE, SVCE	788330-021S	1	
	KIT, GRILLE, ARTIC WHITE, SVCE	788330-022S	1	
6	END CAP, PACKAGING, TOP	797588-001S	1	
7	CORNER PAD, PG90/180 CARTON	799318-001S	2	
8	POLYBAG, 700.0MM X 700.0 LDPE, SVCE	789377-001S	1	
9	PROTECTOR, PHASE GUIDE, 90 DEG, SVCE	785479-001S	1	
	PROTECTOR, PHASE GUIDE, 180 DEG, SVCE	784457-001S	1	
10	TAPE, EPE, FILM, PG90/180 CARTON	799320-001S	1	
11	SUPPORT, CORRUGATED, PG90/180 CARTON	799317-001S	1	
12	ENDCAP, PACKAGING, BOTTOM	797589-001S	1	
13	ASSY, TILE BRIDGE, SVCE	787922-001S	1	
14	CARTON, PG90/180, SVCE	789368-001S	1	

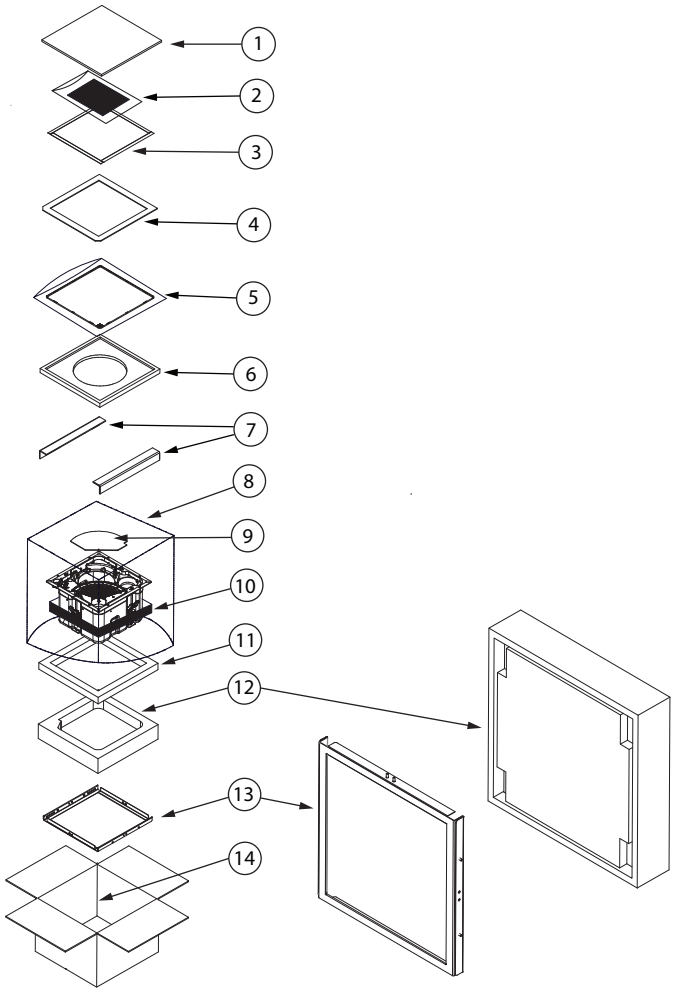


Figure 1 Packaging View

Main Assembly Part List

EM90 and EM180 Loudspeaker

Item Number	Description	Part Number	Qty.	Note
1	NUT, 10-24, ACORN	787928-0110	4	
2	SCREW, ANCHOR	777181-0110	4	
3	PCB ASSY, CROSSOVER, 90	783116-001S	1	
	PCB ASSY, CROSSOVER, 180	786219-001S	1	
4	WOOFER, 8IN	778402-001S	1	
5	ASSY, TRANSFORMER/SWITCH, 80 WATT	781821-001S	1	
6	DRIVER, COMPRESSION, FERRITE, 1 IN	778675-001S	1	
7	GASKET, ENCLOSURE, SEAL	796130-0010	1	
8	KNOB, SVCE	784193-011S	1	
9	CAP, TORQUE SLIP, ANCHOR, SVCE	781449-011S	4	
10	PLUG, 6P, MALE, 2ESDP-6P	792047-001S	1	

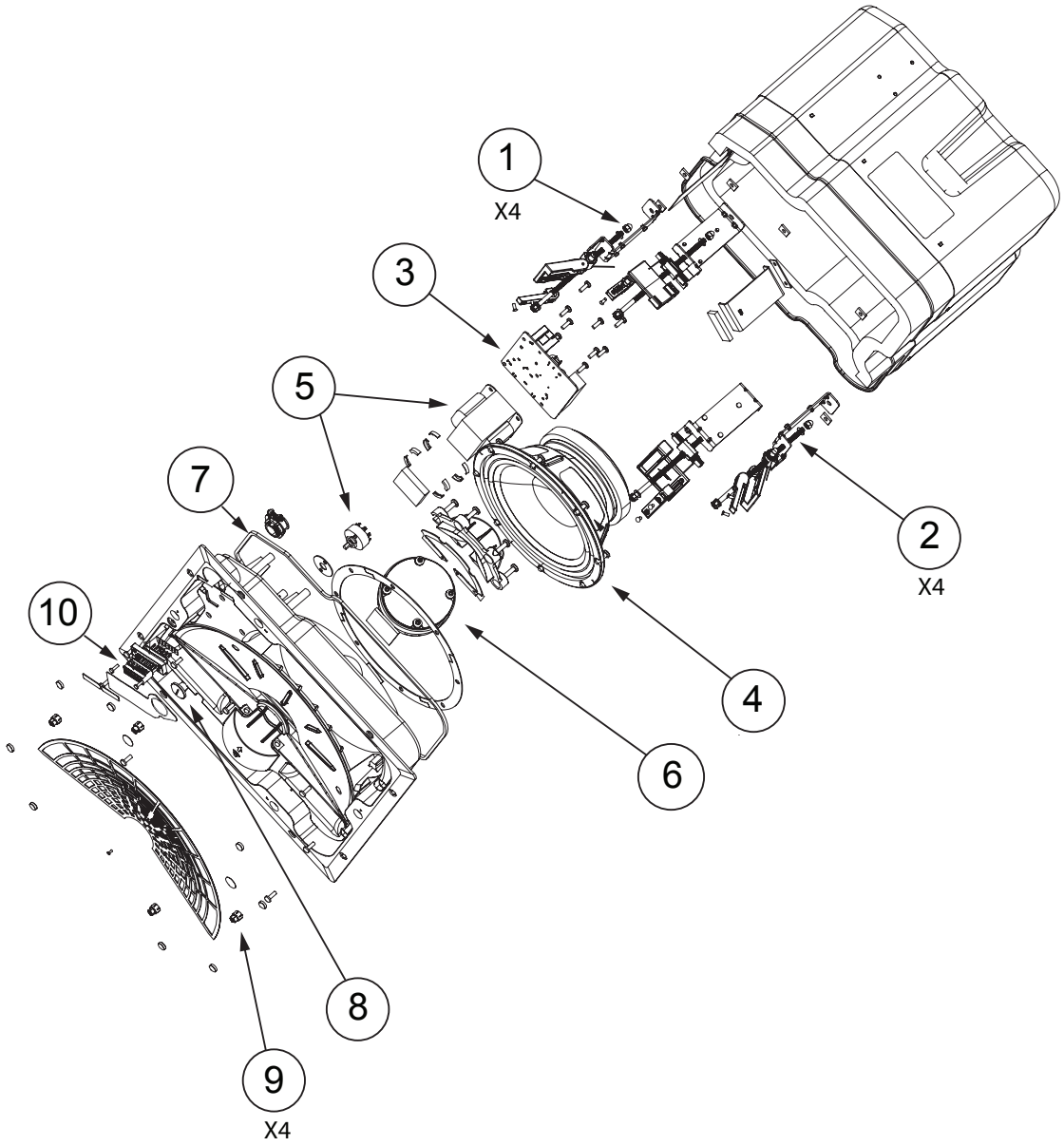


Figure 2 Main Assembly Exploded View

Schematic Diagrams

EM90 and EM180 Loudspeakers

EM90 Crossover

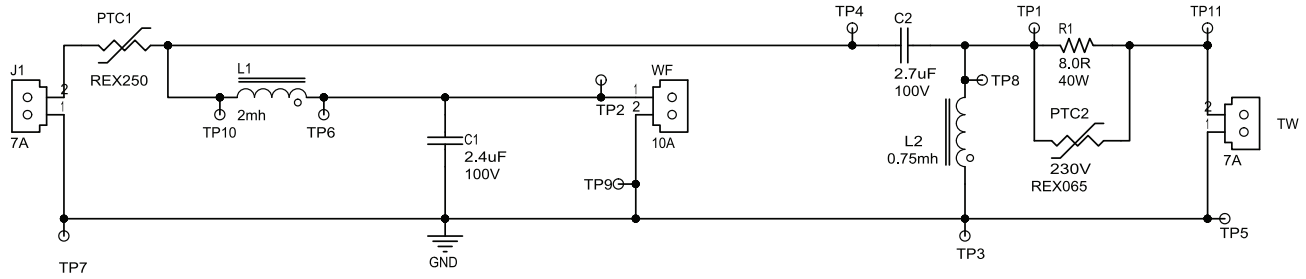


Figure 3

EM180 Crossover

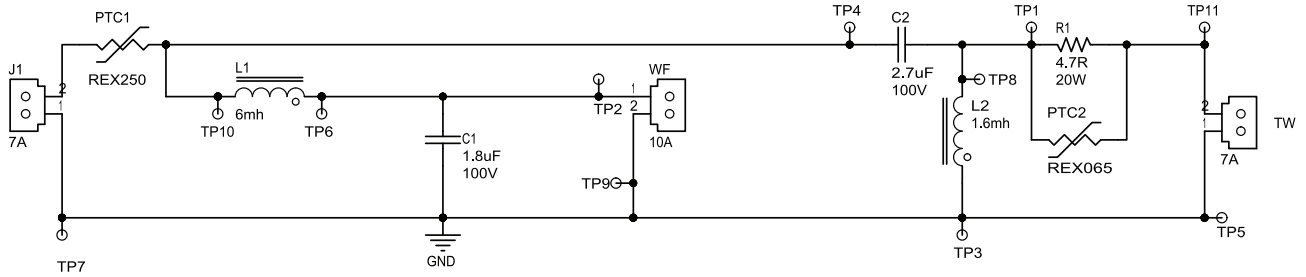
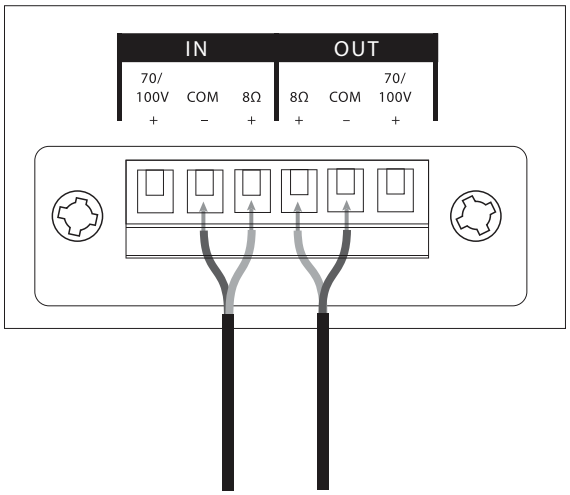
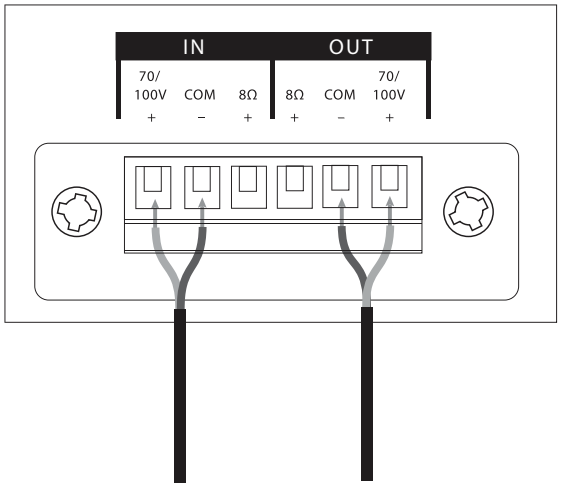


Figure 4

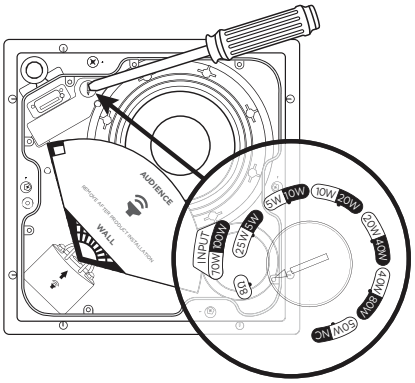
Connector Diagrams



8 Ohm



70V/100V



70V						
2.5W*	5W	10W	20W	40W	80W	8Ω
5W*	10W	20W	40W	80W	NC**	
100V						

Figure 5

Disassembly Procedure

1. Grille Removal

1.2 Remove the magnetically mounted grille from the Edgemax assembly by lifting on the edges. Figure 6.

Note: A lanyard is attached to the grille and a brush clip is attached at the opposite end. Removal of the brush clip will be necessary to place the grille off to the side, as shown in figure 6. A green arrow in figure 7 indicates where the brush clip is seated.

Figure 6

1.3 There are 8 non replaceable magnets on the outer edge of the baffle to secure the grille as indicated by the red arrows in figure 7.

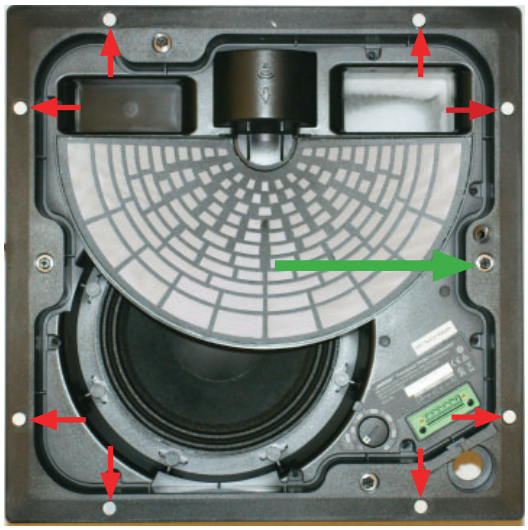


Figure 7

2. Baffle Disassembly

2.1 Perform procedure 1.

2.2 Remove the eight screws indicated by the red arrows as shown in figure 8.

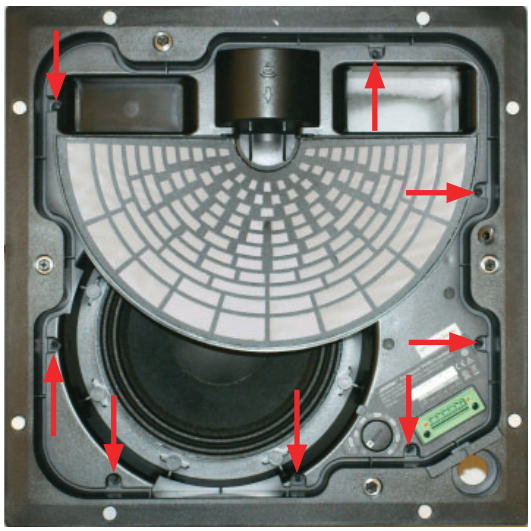


Figure 8

Disassembly Procedure

2.3 The four red arrows shown in figure 9, reference the four anchor bolts that secure the baffle to the enclosure. The anchor bolts must be loosened to separate the baffle from the enclosure.

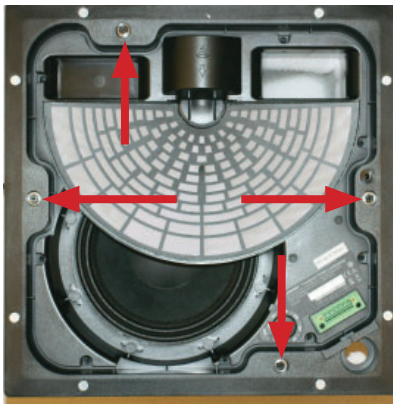


Figure 9

2.4 Figure 10 shows one of the four anchor bolt 5/16 head and washer and figure 11 indicates the 5/16 acorn nut and washer. Figure 12 shows an example of removal.

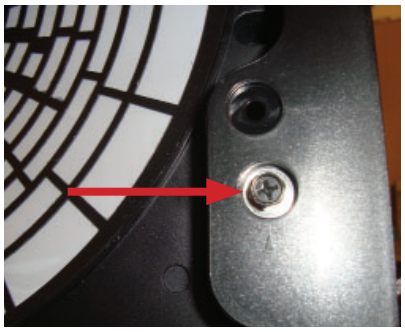


Figure 10

2.5 When removing the acorn nut as shown in figure 11 from the anchor bolt, take care not to lose the washer, indicated by the red arrow.

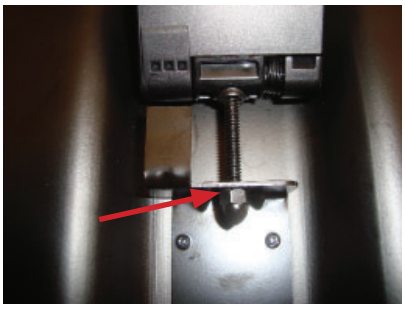


Figure 11

Note: A 5/16 nut driver and a 5/16 open end socket will be required as shown in figure 12. The acorn nut is secured to the anchor bolt threads with Loctite 263.

Note: During reassembly, apply Loctite 263 to the anchor bolt screw threads to secure the acorn nut, then tighten to 2.5kg-cm (2in-lbs.).

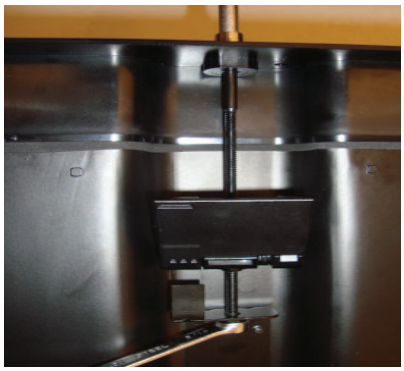


Figure 12

Disassembly Procedure

2.6 Carefully lift off the baffle from the enclosure, taking care not to damage the baffle or internal components as shown in figure 13.

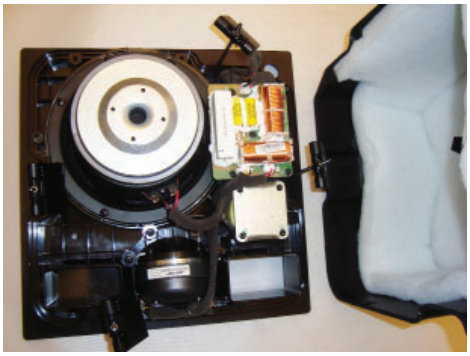


Figure 13

3. Driver Removal

3.1 Refer to the disassembly procedures, see above.

3.2 Remove the two screws indicated by the red arrows shown in figure 14. These screws secure the front of the driver flange bracket to the baffle.

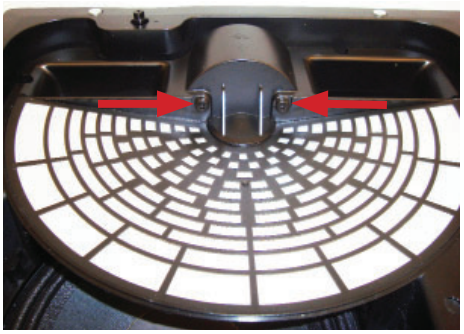


Figure 14

3.3 Remove the negative and positive wires from the driver terminals as indicated by red arrows shown in figures 15 and 16. The negative terminal is smaller than the positive terminal. When the driver is mounted to the baffle, the negative terminal should be located on the left and the positive terminal will be located on the right as shown in Figure 16.

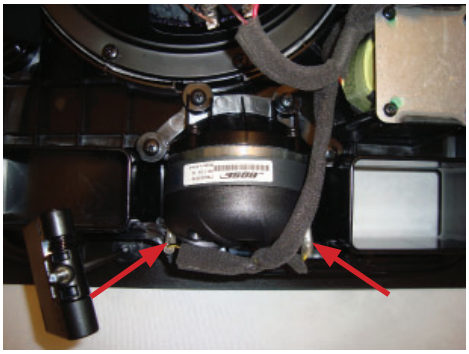


Figure 15

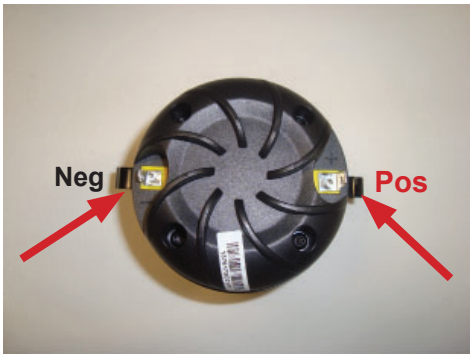


Figure 16

Disassembly Procedure

3.4 Remove the four screws indicated by the red arrows as shown in figure 17. The driver and driver flange will come off as an assembly.

Note: During remounting of the driver flange to the baffle, do not tighten the six screws until all are threaded in position, then tighten, as there is a possibility of cross threading one of the screws.

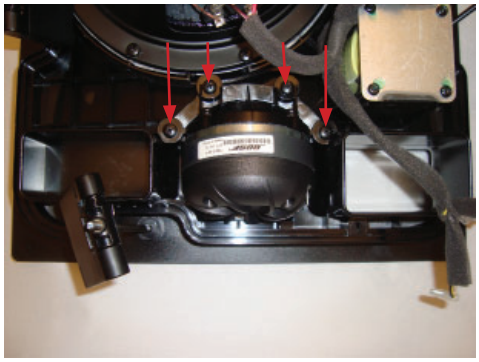


Figure 17

4. Removal of the driver flange

4.1 Remove the two screws indicated by the red arrows in figures 18 and 19. The driver flange will be reused and not supplied as a service part.

Figure 18

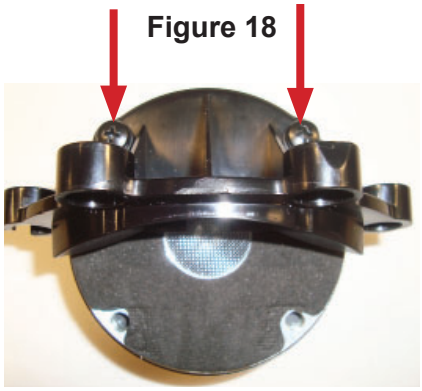


Figure 19

5. Crossover Removal

5.1 Perform procedure 1 and 2.

5.2 Remove the five T20 Torx screws that secure the crossover assembly to the baffle as shown in figure 20.

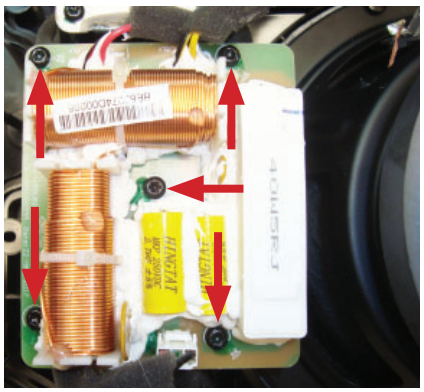


Figure 20

Disassembly Procedure

5.3 Remove the input connector from the crossover as indicated by the red arrow in Figure 21.

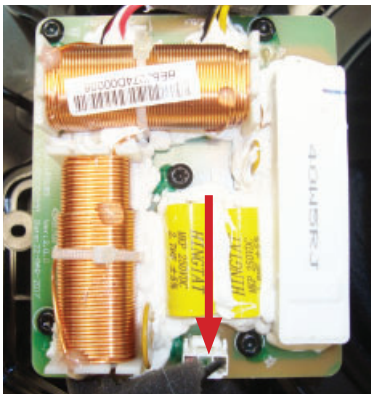


Figure 21

Note: The crossover can be placed off to the side as shown in figure 22.

Figure 22

6. Woofer Removal

6.1 Perform procedure 5 to remove the crossover. The crossover must be removed to access the woofer screws.

6.2 Remove the positive and negative wires from the woofer as shown in figure 23.

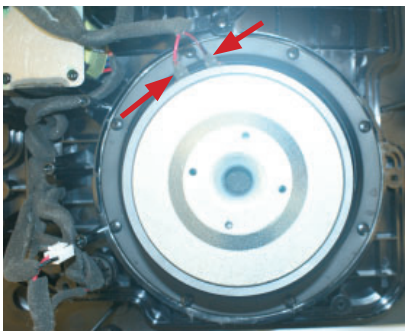


Figure 23

6.3 Remove the eight screws that secure the woofer to the baffle as shown in figure 24. Carefully remove the woofer.

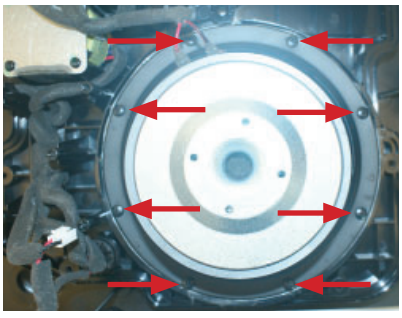


Figure 24

Disassembly Procedure

7. Transformer and Switch Assembly Removal

7.1 Refer to procedures 1 and 2.

7.2 Remove the four T20 Torx screws securing the metal plate to the baffle assembly as shown by red arrows in figure 25.

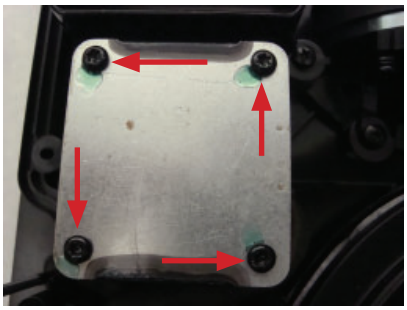


Figure 25

7.3 After removing the four screws, carefully lift out the transformer and it place off to the side as shown in figure 26.

Figure 26

7.4 Figure 27 shows the rotary switch wiring, included in this assembly will be the switch, transformer and wiring harness.

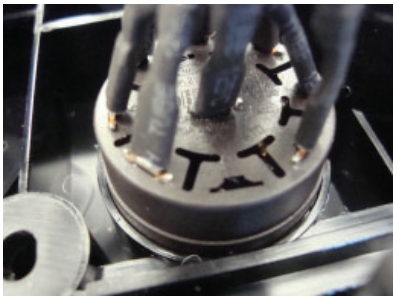


Figure 27

7.5 Figure 28, shows the rotary switch knob as indicated by the red arrow. use a small flat bladed, non abrasive pry tool to remove the knob exposing the half inch nut that secures the rotary switch to the baffle.

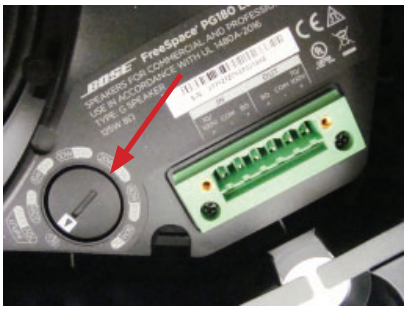


Figure 28

Disassembly Procedure

7.6 Remove the one half inch nut to remove the switch from the baffle as indicated by the red arrow, shown in figure 29.

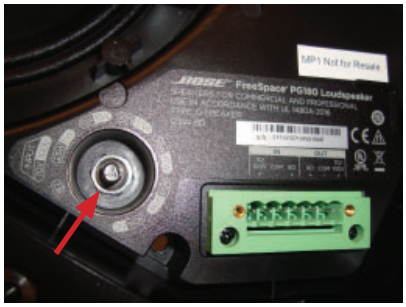


Figure 29

7.7 Figure 30, Lift out the switch.

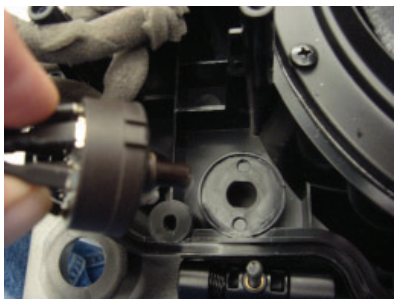


Figure 30

7.8 Figure 31 shows the 6 pin female connector barrier strip, this is not a serviceable part. It is sealed to the baffle to prevent air leaks.

Note: The 6 pin female connector barrier strip, is not part of the transformer/rotary assembly nor is it a serviceable part. When the transformer/rotary switch assembly is replaced, there are two wires, white and pink that must be replaced on the barrier strip. Technicians should note wire position/ placement before removing from the barrier strip pins to insure the replacement wires are reinstalled to the proper pin terminals.

Figure 31

7.9 Figure 32, shows the white and pink wires that are installed on the barrier strip. These wires must be removed and replaced with the replacement harness, transformer and switch assembly.

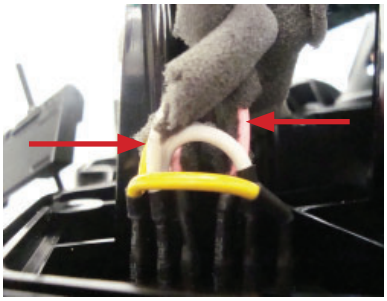


Figure 32

Enclosure and Baffle Gasket

8. Enclosure Gasket

8.1 The enclosure and the baffle have gaskets to prevent air leaks. The enclosure gasket is glued as indicated by red arrows in figure 33.
The green arrows indicate the non glued baffle gasket. The baffle gasket may become dislodged during disassembly.

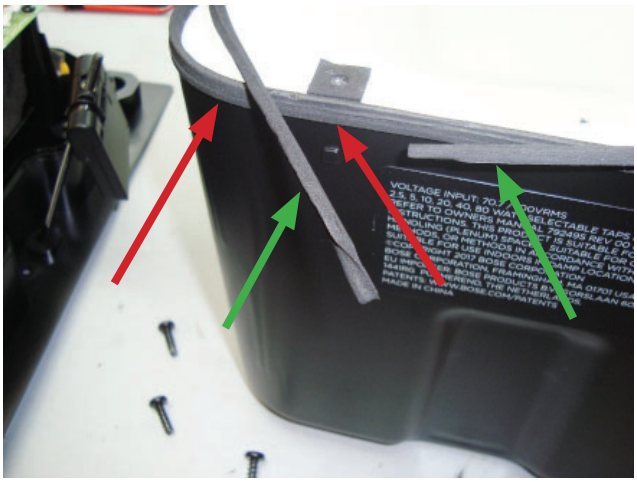


Figure 33

9. Baffle Gasket

9.1 The baffle gasket is placed inside the channel, located on the outside perimeter of the baffle, as indicated by red arrows shown in figure 34.

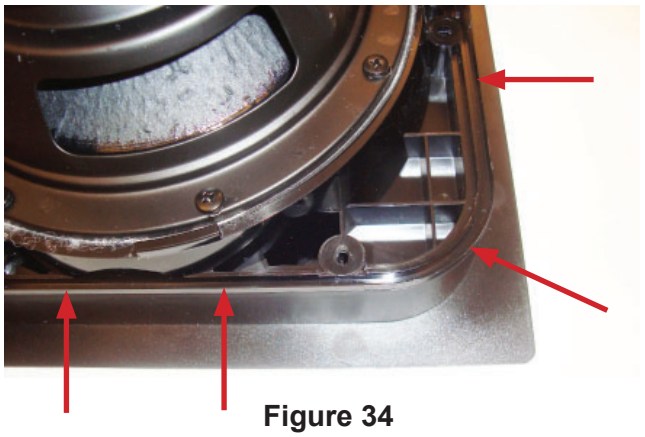


Figure 34

9.2 If the baffle gasket is damaged during disassembly, it is a service part and can be replaced as shown in figure 35.

Note: Make sure that when reinserting the baffle gasket, that each end of the gasket is contacting, ensuring that no air leaks will occur.

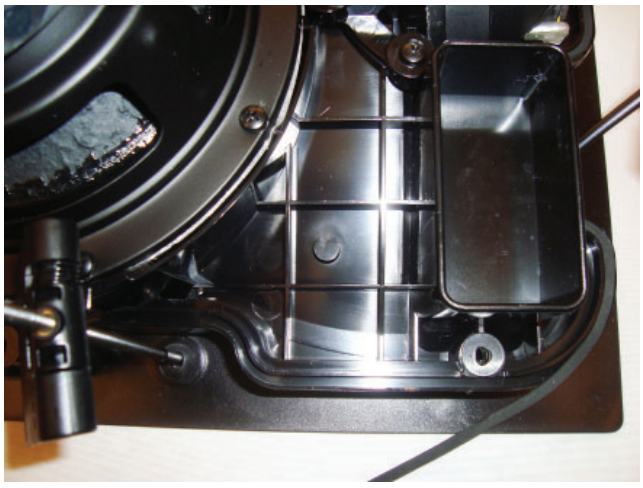


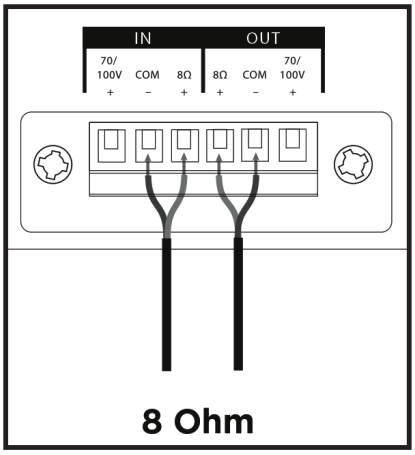
Figure 35

Test Procedures

EM90 and EM180 Test Procedures

Equipment Required:
- Audio signal generator
- Male, 6 pin plug, Dinkle, PT: 792047-001S
- Audio amplifier

Male, 6 pin plug diagram



1. Phase Test

1.1 Remove the grille, procedure 1.

Note: For connection references, refer to the Male 6 pin diagram posted on this page or refer to page 8, figure 5, 8 Ohm diagram.

1.2 Place one hand on the woofer and gently touch the dust cap or cone with fingers. Momentarily apply a voltage of 9 Vdc, ± 1Vdc to the 8 ohm input terminal of the 6 pin plug observing positive and negative polarity.

1.3 Verify the woofer moves outward.

2. Air Leak Test

2.1 Apply a 10 Hz, 10 Vrms, ± 1 Vrms to the 8 ohm input.

2.2 Slowly increase the input frequency to 70 Hz.

2.3 Listen carefully for air leaks at all gaskets and joints. Replace any speaker that has a rubbing or ticking noise.

3. Rub and Tick Test

3.1 Apply a 10 Hz, 10Vrms, ± 1 Vrms signal to the 8 ohm input.

3.2 Listen carefully for buzzes, rattles or other extraneous noises from the driver, woofer or the enclosure.

4. System Sweep with Grille Attached

4.1 Install grille. Apply a 70 Hz, 10 Vrms, ± 1Vrms signal to the speaker input.

4.2 Change the oscillator frequency slowly from 70 Hz to 3 KHz, 10 Vrms, ± 1 Vrms into the speaker. Listen carefully for any buzz or rattle from the grille.

4.3 Replace any defective driver causing a buzz noise or is defective. There must not be buzzes, ticks, rubs, bottoming sounds, air leaks or other unwanted acoustic noises.

REVISION HISTORY

DATE	REV	CN	DESCRIPTION	PAGES AFFECTED
10/2017	00		INITIAL RELEASE	ALL
11/2019	01		Added Arctic White Grille	5

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