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FreeSpace® DS 16F Loudspeaker

Service Manual

Reference Number 303290-SM Rev. 00

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CAUTION: The Bose® FreeSpace DS 16F loudspeaker contains no user-serviceable parts. To prevent warranty infractions, refer servicing to warranty service stations or factory service.

Warranty

The Bose FreeSpace DS 16F loudspeaker is covered by a five year transferable limited warranty.

Accessories

Description	Product Code
Model 16 tile bridge (6 pack)	029830
Model 16 rough-in pan (6 pack)	029831
Model 16 retrofit kit (6 pack)	030096
PC-16 plenum cover (6 pack)	031144
Model 16 pendant mount kit, black	030094
Model 16 pendant mount kit, white	030095

Safety and Regulatory Compliance

The FreeSpace® DS 16F loudspeaker has passed extensive testing and complies with the following specifications and uses:

- Listed to ANSI/UL 1480-2005
- Fire Protective Signaling Use – UL CategoryUUMW, File Number S 3241. Control Number42S9. Not for use with DC-supervised systems.
- General-Purpose Use – UL Category UEAY, FileNumber S 5591 Control Number 3N89.
- Suitable for use indoors in damp locations.
- Suitable for installation using Class 1, Class 2 orClass 3 wiring methods in accordance with NFPA70, National Electric Code, 2002, Article 640.
- Suitable for use with fire alarm circuit wiringmethods in accordance with NFPA 70,National Electric Code, 2002, Article 760.
- Suitable for use in air handling plenum spaceswith a model PC-16 Plenum Cover installed.
- UL-2043, Fire Test and Visible Smoke Releasefor Discrete Products and their Accessories Installed in Air Handling Spaces.
- NFPA 70, National Electric Code, 2002, Article300-22 (c).
- NFPA 90-A, 2002, Installation of Air Conditioningand Ventilation Systems, Paragraph 4.3.10.2.6.5.
- EMC Directive 89/336/EEC and Article 10 (1) ofthe directive, EN50081-1 and EN50082-1 as signified by the CE mark.

The DS 16F also has been designed to therequirements defined in the following Europeanregulatory specifications for combination systems:

- British Standard Code of Practice BS 5839, Part8 (with PC-16).
- Tested to IEC60268-5.

Product Description

The DS 16F loudspeaker is a 16-watt, ported loudspeaker system utilizing one 2.25" (57mm) full-range driver. The loudspeaker is designed for installation in ceilings up to 20ft (6.1m) high. An optional pendant-mount accessory allows the loudspeaker to be hung from open ceilings.

The loudspeaker has a nominal ratedimpedance of 8 ohms and is wired in parallel with a line voltage matching (step-down) transformer with a selector switch appropriate for various output taps. The loudspeaker input connections allow for direct connection to either 70V, 100V or low-impedance amplifiers.

Exposed cosmetic surfaces of the loudspeaker are paintable, and the acoustically transparent grille component is formed of powder-coated steel.

Each loudspeaker has a bandwidth of 90 Hz – 16 kHz and a maximum continuous acoustic output of 96 dB-SPL, referenced to a full bandwidth pink noise input at 1 meter at the loudspeaker’s rated power.

The input connection consists of a three-position barrier connector with a pre-wired ceramic connector. The loudspeaker meets numerous standards for combination music and evacuation systems around the world.

Power settings available are: 1W, 2W, 4W, 8W, 16W @ 70V; 2W, 4W, 8W, 16W @ 100V; and 16W @ 8½ (when referenced to IEC noisefor 100 hours). The nominal dispersion is 140°conical coverage pattern at -6 dB (average 1 – 4 kHz).

Specifications

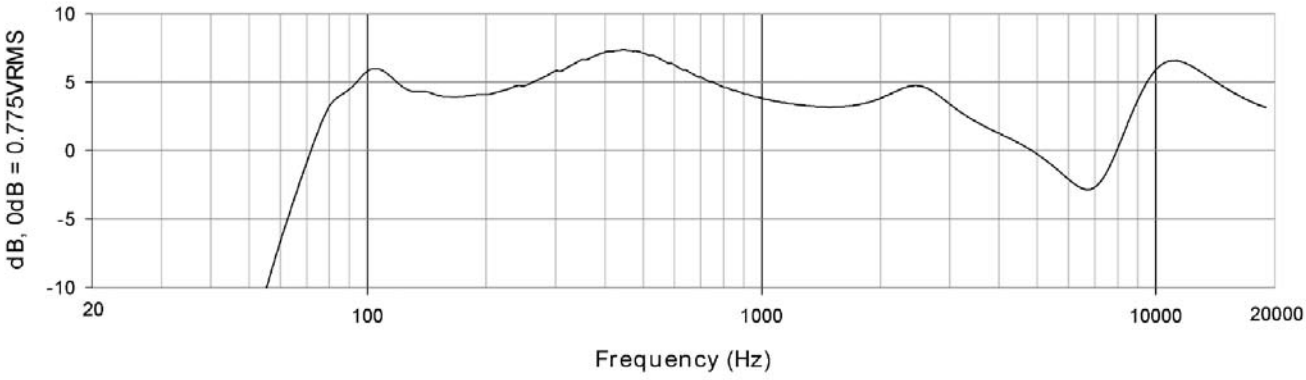
Electrical

Power Handling:	16W
Nominal Impedance (transformer bypass):	8 Ohms
Sensitivity at 1W @ 1m	84dB SPL
Maximum SPL: (pink noise at 1m at rated power)	96 dB SPL 102 dB SPL (peak)
Frequency Range (-3dB):	90 Hz - 16 kHz
Beamwidth (-6 dB point, average 1 -4 kHz):	140 degrees conical

Mechanical

Driver Complement:	One 2.25” (57mm) full-range driver
Construction Features:	Enclosure: PC/ABS rated at UL94 5VA Grille: Power coated steel Integral quick-install mounting features Three mounting points at the rear of the housing for pendant mounting
Dimensions:	Outer flange diameter: 9.4” (239mm) Ceiling hole diameter: 8” (203mm) Height to top of housing: 6.2” (158mm)
Weight:	Product: 4.4 lb (1.9kg) Shipping: 6 lb (2.7kg)
Finish:	Textured black or white finish with a contoured, powder coated steel grille. Both the enclosure and grille can be painted.
Connectors:	Three-terminal barrier strip with a pre-wired ceramic connector

Recommended Loudspeaker Equalization Curve



Packaging Part List

FreeSpace® DS 16F Loudspeaker

Item Number	Description	Bose® Part Number	Vendor Part Number	Note
1	SHIELD, PAINT	-	1450-6700+0	4
2	OWNER'S MANUAL	299985	4301-7010+1	
3	PE BAG	-	1497-4732+0	4
4	PAPER STRIP	-	1450-7900+0	4
5	PE BAG	-	1497-4222+0	4
6	INNER CARD 1	324246-0010	1450-6340+0	
7	INNER CARD	324243-0010	1450-6180+2	
8	PE FORM 2	324241-0010	1493-0301+0	
9	PE FORM 1	324242-0010	1493-0291+0	
10	CARTON	313540	1436-0202+2-2	

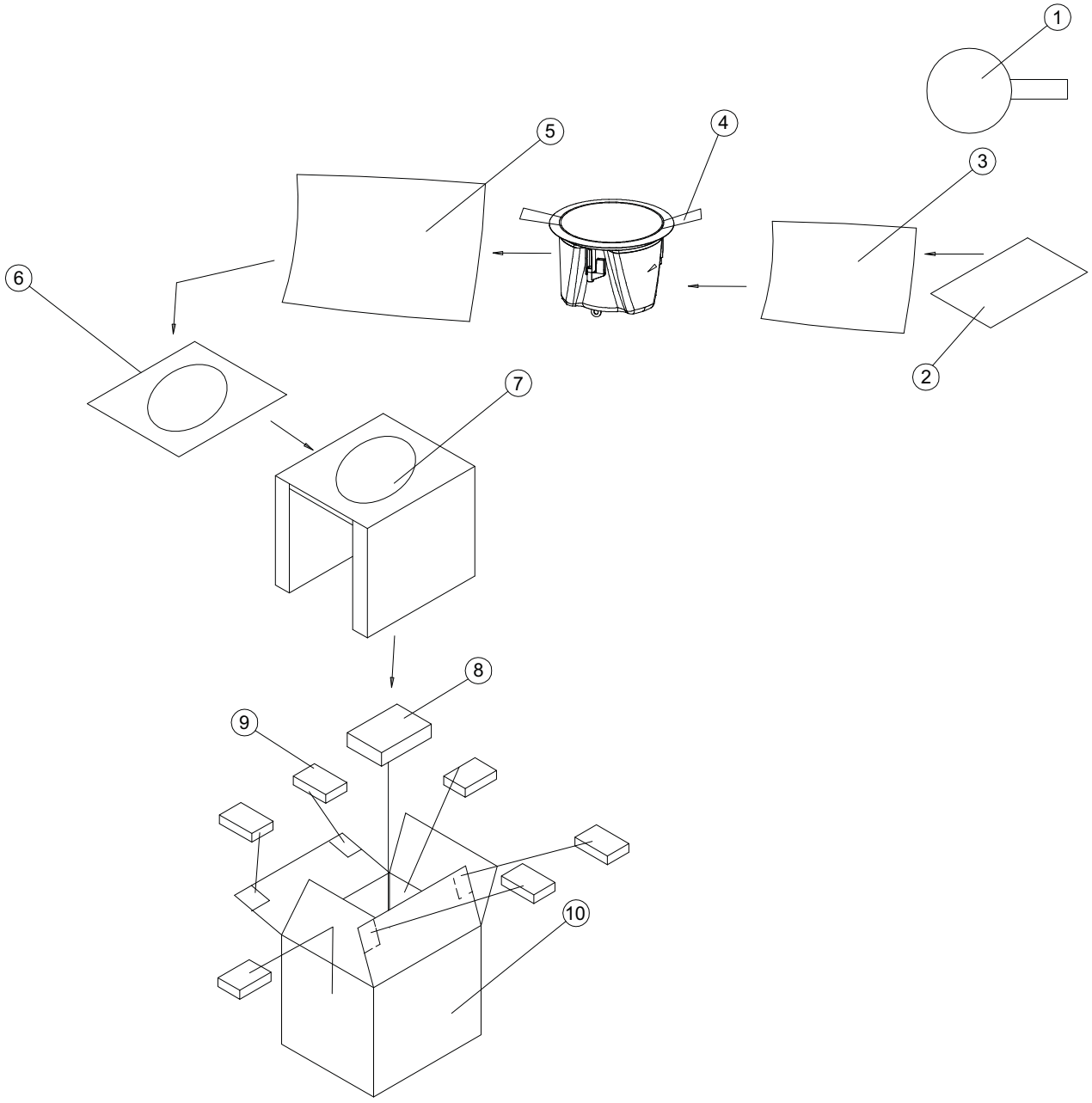


Figure 1. FreeSpace DS 16F Loudspeaker Packing View

Main Part List

FreeSpace® Model 16F

Item Number	Description	Bose● Part Number	Vendor Part Number	Qty.	Note
1	WOOD SCREW, M4x12, 6.8	-	2910-4012+3000	16	4
2	SCREW, #8-32, WIRE CLAMP	-	2AZZ-0007+ZZZZ	6	4
3	TERMINAL, 20x30x10, BS02XC		4135-6241+0	3	
4	ANCHOR BLACK WHITE	 303892 303893	 4154-4982+1 4154-4981+1	3	
4	WIRE, CON, #20, UL1015, L160	-	7012-6999+0	1	
5	BAFFLE, WHITE	-	4154-5064/5+6	1	4
6	SCREW, CLASS 1, PAN, M3.5x7	-	2A10-3575+3000	3	4
7	DRIVER, 2.25” (57MM) INDOOR	298081	8900-3840+0	1	
8	KNOB	295898-003	2447-3602+1	1	
10	EVA GASKET, 5x500	-	4153-3331+0	1.5	4
11	EVA GASKET, 3x515	-	4149-0311+0	1.5	4
12	SWITCH, ROTARY		5200-4933+1	1	
13	CAP, ELECTROLYTIC, 200uF, 63V, 10%, NP, ALUM	-	8910-0810+0	1	
14	WIRE ASSY, W110&SLEEVE	-	7012-6369-+0	1	
15	XFMR, AUDIO, 70/100V	296602	1806-3573+5	1	
16	ENCLOSURE, DS16F	-	4154-5051/2+2	1	4
17	TERMINAL, CERAMIC BLOCK	-	2113-1956+0	1	3
18	THERMAL FUSE, RATED 100C	-	8910-3595+1	1	3
19	UL 1007, WHITE	-	1681-0090+C	0.1	
20	SCREW, T4.0x20MM, TAPPING	-	2910-4020+3000	2	4
21	JUNCTION BOX, BS02XC	-	1404-6501+1	1	
22	CLIP, RETAINING	-	4135-2391+0	1	
23	GRILLE KIT W/LOGO, BLACK GRILLE KIT W/LOGO, WHITE	296711 296712	4135-2262+1 4135-2263+1	1	
24	BOSE LOGO, BLACK, NO CLIP BOSE LOGO, WHITE, NO CLIP	303977 303895	4154-4992+0 4154-4991+0	1	

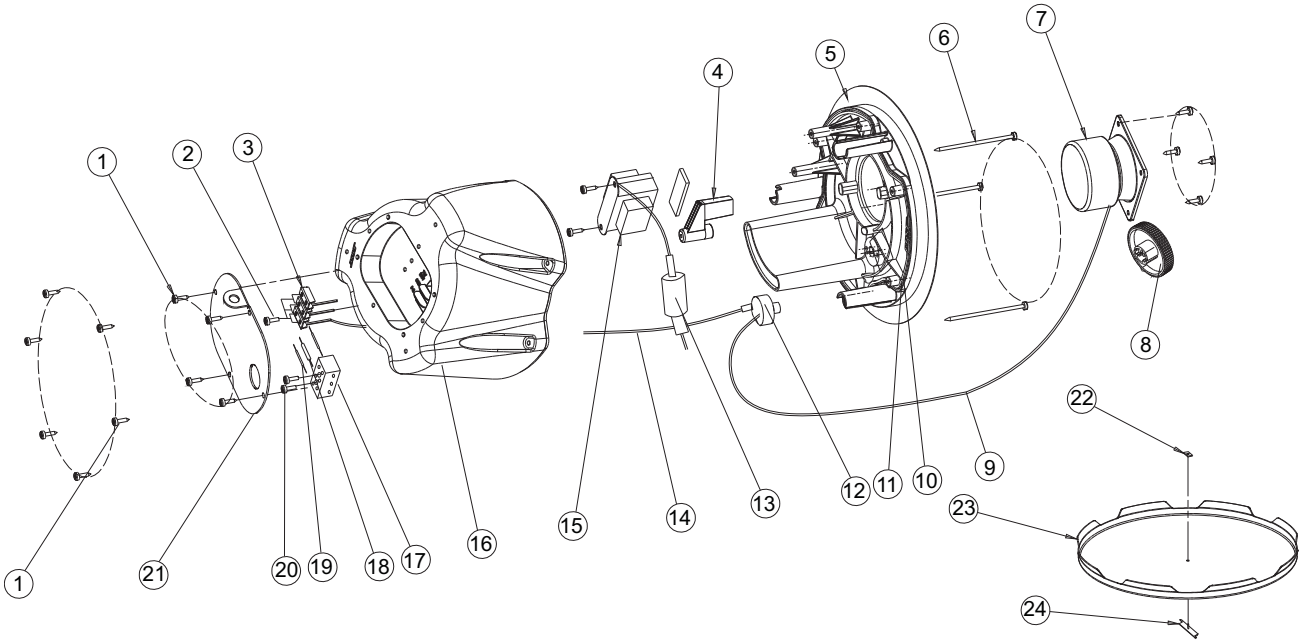


Figure 2. FreeSpace DS16F Exploded View

Disassembly Procedures

Note: Refer to the figure below for the following procedures.

1. Grille Removal

1.1 Carefully pull the grille (23) away from the baffle (5). Take care to not mark the surface of the grille or the baffle.

2. Driver Removal

2.1 Perform procedure 1.

2.2 Remove the four screws that secure the driver (7) to the baffle (5).

2.3 Unplug the two faston connectors from the wiring harness. Lift out the driver.

3. Rotary Switch Removal

3.1 Perform procedure 1.

3.2 Remove the TAP select knob (8).

3.3 Remove the six screws that secure the baffle (5) to the enclosure (16).

3.4 Make a note of the wiring configuration and unplug the three wires from the input terminals.

3.5 Remove the nut that secures the rotary switch (12) to the baffle. Lift out the rotary switch.
Re-assembly Note: Be sure the rotary switch is facing the correct direction and be sure the lock washer is at "7" position when you place the rotary switch onto the baffle.

4. Transformer Removal

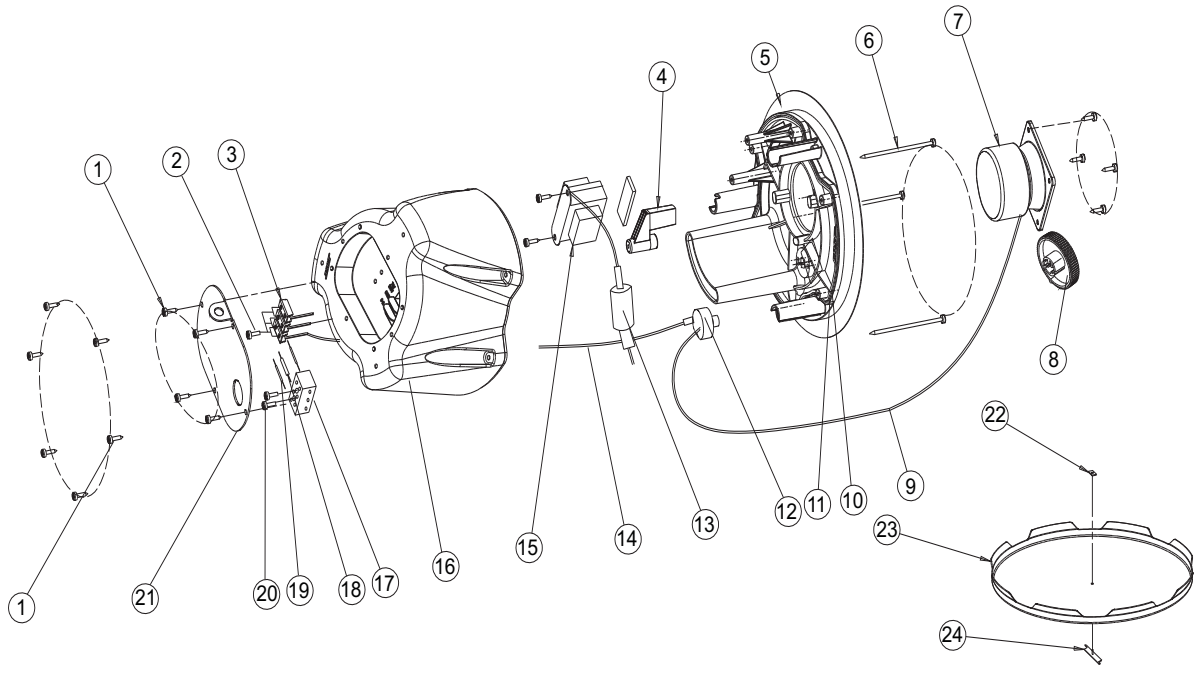
4.1 Perform procedure 1.

4.2 Remove the six screws that secure the baffle (5) to the enclosure (16).

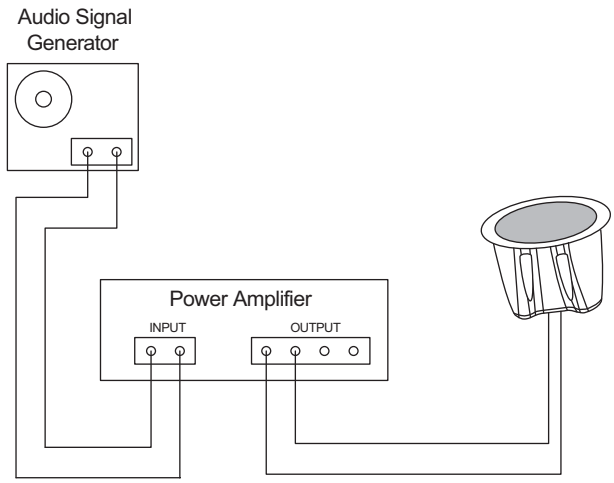
4.3 Make a note of the wiring configuration and unplug the three wires from the input terminals.

4.4 Remove the nut that secures the rotary switch (12) to the baffle.

4.5 Remove the screws that secure the transformer (15) to the baffle. Lift out the transformer.
Re-assembly Note: Be sure the rotary switch is facing the correct direction and be sure the lock washer is at "7" position when you place the rotary switch onto the baffle.



Test Procedures



FreeSpace DS 16F Test Setup Diagram

1. Phase Test

1.1 Turn the rotary switch to the 8 Ohm position and apply a +6V DC level to the input terminals with the positive lead connected to the 8 Ohm terminal and the negative lead connected to the COM terminal.

1.2 The driver should move outward when the DC voltage level is applied.

2. Air Leak, Rub and Tick Test

2.1 Set up the system as shown in the figure above.

2.2 For the air leak, rub and tick, and power sweep tests, all listening will be done at a distance not to exceed 1 foot if the ambient noise level is greater than 65dB. An air leak is considered to exist when audible while facing the baffle of the speaker assembly.

2.3 Apply a 6Vrms, 20Hz signal to the 8 Ohm input terminals with the rotary switch at the 8 Ohm setting.

Reject any speaker with air leaks, except for air leaks resulting from a defective driver or gaskets. Replace any driver that has a rubbing or ticking noise.

Small (quiet) ticks are acceptable if they cannot be heard at a distance of 1 foot.

Note: There is a normal suspension noise. To distinguish between a rub or tick and suspension noise, displace the cone slightly with your finger. If the rubbing can be made to go away, or gets worse, then it is a rub or a tick. If the noise stays the same, it is suspension noise.

3. System Sweep Test

3.1 Set the rotary switch to the 8 Ohm position.

3.2 Apply a 6Vrms, 80Hz signal to the input terminals. Sweep the oscillator frequency slowly from 80Hz to 16kHz. Listen carefully for buzzes, rattles or other extraneous noises from the driver or from the internal parts. A whooshing noise from the port around 80Hz is acceptable.

4. Transformer Tap Select Check

4.1 Apply a 70Vrms, 100Hz signal to the input of the loudspeaker under test. Slowly change the tap selection on the unit from the high position (16W) to the 1W position. A decrease in level should be heard for each descending tap.

SPECIFICATIONS AND FEATURES SUBJECT TO CHANGE WITHOUT NOTICE

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