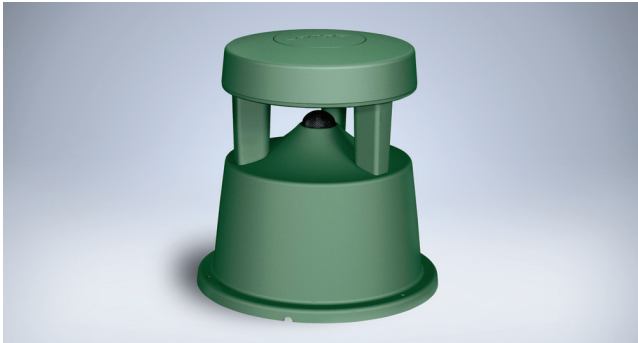




FreeSpace® 360P Series II



Overview

This application note covers the basic concepts for the application of the FreeSpace 360P Series II loudspeaker in business music systems.

The FreeSpace 360P Series II loudspeaker is ideally suited to background and foreground music in outdoor applications. The unique design of the FreeSpace 360P-II delivers a full range response across a 360° area. The FreeSpace 360P-II loudspeaker is compatible with 70V and 100V amplifiers, and is capable of delivering up to 90dB SPL in a typical application with a 15ft (4.8m), speaker to listener distance.

All system designs begin with a set of requirements. The system requirements can be as simple as “it has to sound great,” or as detailed as “it must have an output level of 100dB SPL”. In either case the challenge is to gather the right set of requirements, and then turn them into a set of design criteria that you can use to create your design.

The three key requirements that you need to identify in order to deliver the right business music sound system are:

LOUDNESS What sound pressure level is required for this application?

RESPONSE What bandwidth is required for the type of program material that will be used?

COVERAGE How consistent must the sound be across the entire coverage area?

Product Specifications

Frequency Range	70Hz – 15kHz ± 3dB
Long Term Power Handling	80 watts continuous
Sensitivity	87 dB-SPL @ 1W/1m (pink noise)
Impedance	N/A
Maximum Acoustic Output	100 dB-SPL @ 1m (pink noise)
Dispersion	360° Horizontal 50° Vertical

Each of these requirements can be easily converted into a specification that we can use to create our system design. If we understand the customer’s needs in these three areas, we can deliver a design that will, at a minimum, meet their needs, and at best, exceed their expectations.

For the purposes of this application note we will assume that you are familiar with the system requirements for a business music system, and are ready to focus on the creation of a speaker layout using the FreeSpace 360P-II loudspeakers.

Design Guidelines

When creating a design that uses the FreeSpace 360P Series II loudspeakers, you should consider the following:

- The FreeSpace 360P-II is designed for in or above ground installation.
- Listeners should always be at least 3ft (1m), away from the nearest FreeSpace 360P-II.
- Maximum SPL for a typical application is between 85 and 90dB_{SPL}.
- Always add 25% headroom to your amplifier to accommodate various types of program material.

Design Worksheet

Use the following worksheet to create a design using the FreeSpace 360P Series II loudspeakers.

STEP 1 Using the graph paper on the last page, create a sketch or drawing of the room.

STEP 2 Confirm that the FreeSpace 360P Series II loudspeaker will meet your loudness requirement.

- On the chart below, locate the loudspeaker mounting height for this design.
- Draw a line down to the desired maximum SPL.
- Draw a horizontal line across the chart at your desired SPL level.
- All of the loudspeakers listed below the line will meet your loudness requirement.

		Maximum Continuous Output Level											
Loudspeaker Mounting Height	m	2.4	3.0	3.6	4.2	4.8	5.5	6.1	6.7	7.3	8.0	10.0	
	ft	8	10	12	14	16	18	20	22	24	26	32	
LOUDSPEAKER	DS 16S / SE	90	89	89	88	87	86	85					
	360P-II	94	93	92	90	89	88	87					
	FreeSpace 3	96	95	95	94	93							
	Model 32SE	96	96	95	94	93	92	91	90				
	DS 100SE	98	97	97	96	95	94	93	92	92	91	89	
	FreeSpace 203	98	97	97	96	95							
	DS 16F	99	97	94	91	90	88	87					
	102F	105	100	98	95	94	92	91	90	89	88		
	DS 100F	107	103	102	99	98	96	95	94	93	92	89	
	Model 32	107	103	100	97	96	94	93	92	91	90		

STEP 3 Confirm that the FreeSpace 360P Series II loudspeaker will meet your Response Requirement.

Vocal Range	Full Range	Extended Range
DS 16S & SE	203	FreeSpace 3
DS 16F	360P-II	
Model 32	DS 100SE	Any vocal range loudspeaker combined with a FreeSpace 3 bass module.
Model 32SE	DS 100F	
102F		

NOTE: If the loudspeaker that meets your response and loudness requirement does not meet your mounting needs, select one that provides more bandwidth, and also meets your mounting needs.

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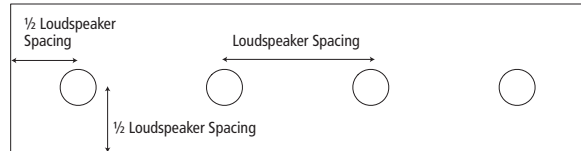
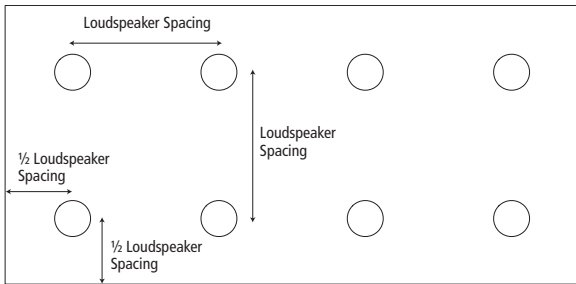
STEP 4 Using your sketch of the room, create a loudspeaker layout using a Loudspeaker Spacing from the table below that meets your coverage requirement.

Coverage	Loudspeaker Spacing Distance
Premium	10ft 3.0m
Standard	20ft 6.0m
Minimum	30ft 9.0m

A. For large open areas, use a square spacing pattern.

OR

B. For edges and walkways use a linear spacing pattern.



STEP 5 Calculate the required amplifier size. Use the Tap Chart below to determine which loudspeaker tap is required for this design.

- Locate the loudspeaker mounting height for this design.
- Draw a line down to the desired maximum SPL.
- Draw a horizontal line across the chart to read the required loudspeaker tap.
- Calculate the required amplifier power:

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Number of Loudspeakers Required Loudspeaker Tap Power Required

E. Calculate the required amplifier size:

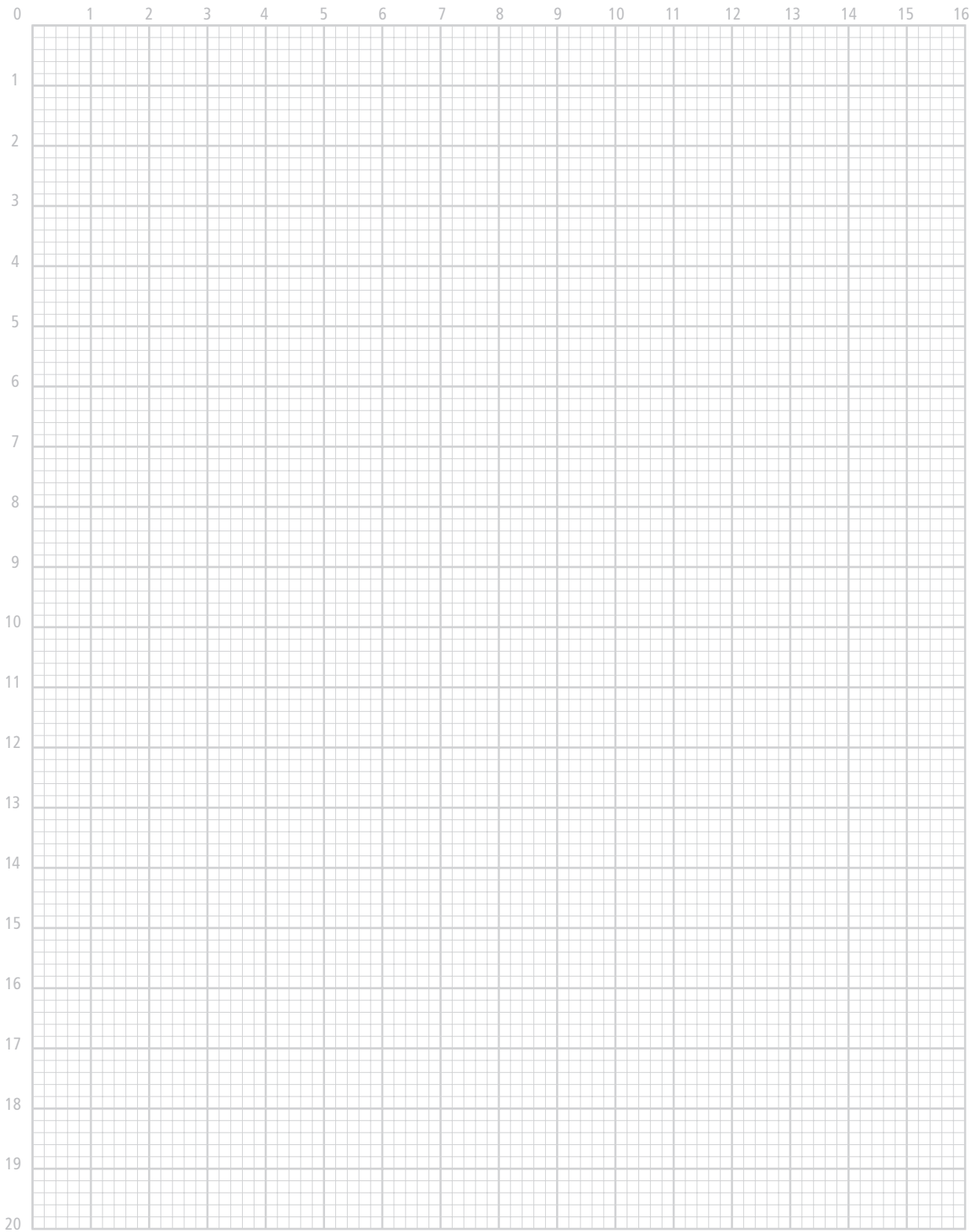
$$\underline{\hspace{2cm}} \times 1.25 = \underline{\hspace{2cm}}$$

Power Required Headroom Amplifier Size

Listener Distance	m	3	4.5	6	dB _{SPL}
	ft	10	15	20	
T	10	87	84	81	
A	20	90	87	84	
P	40	93	90	87	
	80	96	93	90	

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DESIGN GUIDE



Project Name: _____

Contact: _____ Date: _____



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