



# Panaray® 302A Loudspeakers



## Overview

This application note covers the basic concepts for the application of the Panaray 302A loudspeakers in business music systems.

The Panaray 302A loudspeaker is ideally suited to background and foreground music in business music applications. The Panaray 302A loudspeaker is designed to deliver a full range response and high output without the use of active equalization, and is compatible with 70V, 100V, and 8 Ohm amplifiers. The Panaray 302A is capable of delivering up to 95dB<sub>SPL</sub> in a typical application with a 12ft (3.4m), mounting height.

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 100 dB<sub>SPL</sub>." In either case, the challenge is to gather the right set of requirements and convert them into a set of design criteria to use in creating 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

<b>Frequency Range</b>	75Hz – 16kHz ± 3dB
<b>Long Term Power Handling</b>	100 watts continuous
<b>Sensitivity</b>	82 dB-SPL @ 1W/1m (pink noise)
<b>Impedance</b>	6 Ohm
<b>Maximum Acoustic Output</b>	102dB-SPL @ 1m (pink noise)
<b>Dispersion</b>	178° Horizontal 93° 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 Panaray 302A loudspeakers.

## Design Guidelines

When creating a design that uses the Panaray 302A loudspeakers, you should consider the following:

- The Panaray 302A has a very wide coverage pattern that covers an area approximately 40ft x 25ft (12x7.5m)
- Recommended mounting height is between 8 and 16ft (2.4 to 4.8m).
- Maximum SPL for a typical application is between 87 and 95dB .
- A pitch of 10 degrees should be used for the Panaray 302A loudspeaker
- 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 Panaray 302A loudspeakers.

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

**STEP 2** Confirm that the Panaray 302A loudspeaker will meet your loudness requirement.

- A. On the chart below, locate the loudspeaker mounting height for this design.
- B. Draw a line down to the desired maximum SPL.
- C. Draw a horizontal line across the chart at your desired SPL level.
- D. 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 Panaray 302A 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.

# Panaray® 302A Loudspeakers



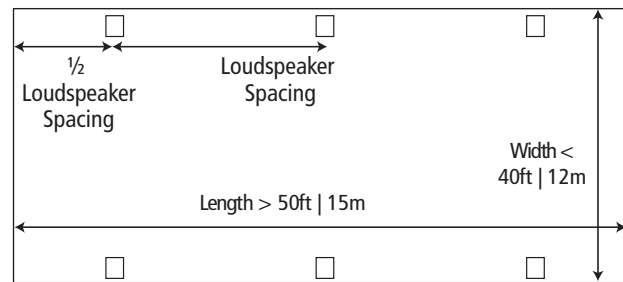
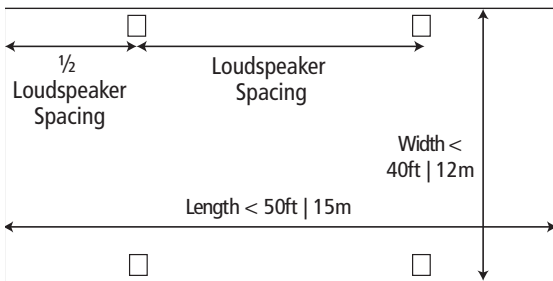
**STEP 4** Using your sketch of the room, create a loudspeaker layout using a Loudspeaker Spacing from the table below that meets your coverage requirement.

Coverage	Loudspeaker Spacing Distance
Premium	35ft   10.5
Standard	40ft   12m
Minimum	45ft   13.7m

A. If room is less than 50ft (15m) wide, place one 302A at half the Loudspeaker Spacing distance from each corner of the room.

OR

B. If the room length exceeds 50ft (15m), install additional 302A loudspeakers using the required speaker spacing distance.



**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.

Mount Height	m	2.4	3.0	3.6	4.2	4.8	dB <sub>SPL</sub>
	ft	8	10	12	14	16	
T	25	87	86	86	85	84	
A	50	90	89	89	88	87	
P	100	93	92	92	91	90	
	200	96	95	95	94	93	

D. Calculate the required amplifier power:

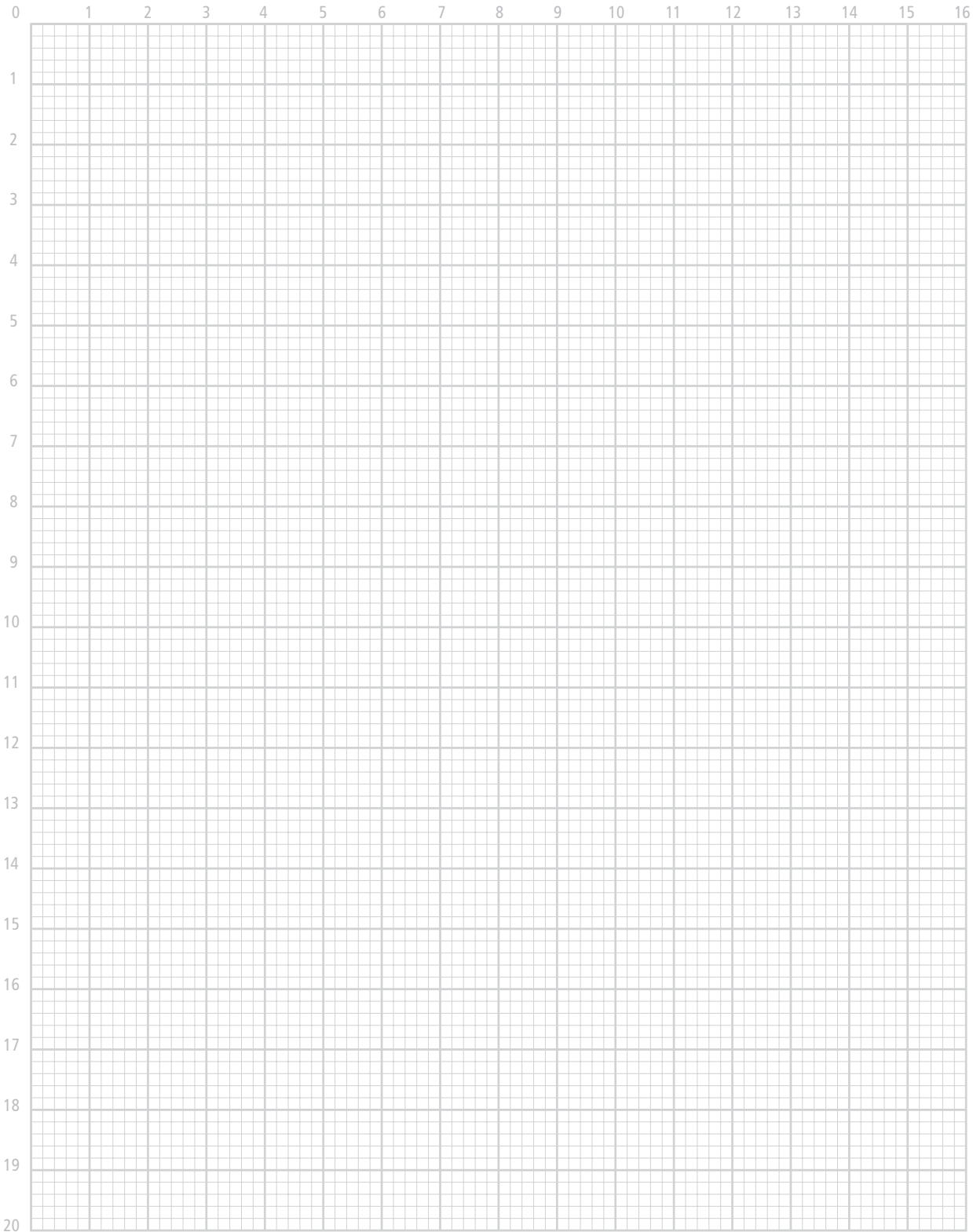
$$\frac{\text{Number of Loudspeakers}}{\text{Required Loudspeaker Tap}} \times \text{Power Required} = \text{Power Required}$$

E. Calculate the required amplifier size:

$$\frac{\text{Power Required}}{\text{Headroom}} \times 1.25 = \text{Amplifier Size}$$

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## DESIGN GUIDE



Project Name: \_\_\_\_\_

Contact: \_\_\_\_\_ Date: \_\_\_\_\_



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