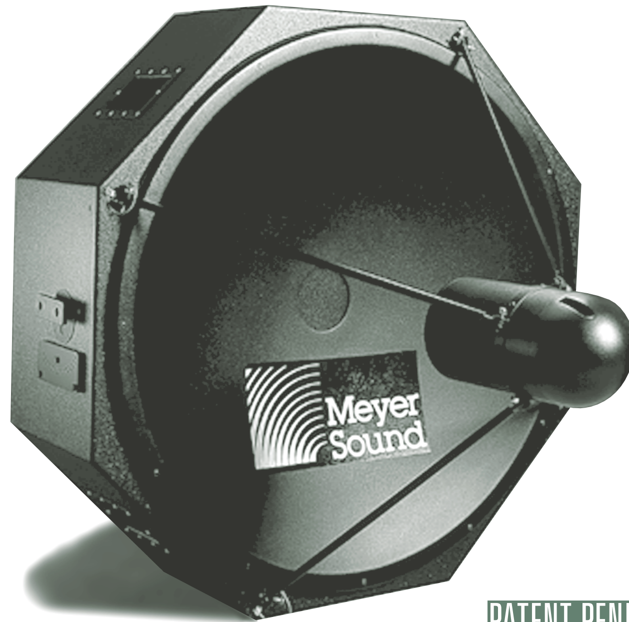
SB-1 *Q&A*

The Meyer Sound SB-1 Parabolic Sound Beam is a powerful, long-throw device for projecting mid- and high-frequency energy over distances from 100 to 500 feet. By producing an extremely narrow, tightly controlled beam of sound energy, the SB-1 enables very effective long-range "fill" coverage in large-scale sound reinforcement applications.

The SB-1 comprises an optimized aspherical waveguide with 2-inch throat (4-inch diaphragm diameter) compression driver feeding a large parabolic reflector, and a 12-inch cone driver mounted at the center of the reflector. Built-in electronics include dual complementary MOSFET class AB/H amplifiers with 1240 watts total power output, TruePower™ Limiting driver protection, and frequency and phase response alignment circuitry. This powerful combination of components provides flat response from 500 Hz to 15 kHz and 110 dB peak SPL output at 100 meters.



PATENT PENDING

Why did Meyer create the SB-1?

The SB-1 is intended to solve one of the most common problems in large-scale reinforcement: assuring effective high-frequency reproduction at great distances from the main PA.

Traditional solutions for long-range high-frequency projection have employed narrow-coverage horns (also called "long throw" horns). But the sound pressure produced from a horn decreases by 6 dB with each doubling of distance from the source, and this substantially limits its useful range. Certain methods for stacking or arraying horns can increase the system's throw by effectively moving the acoustical source farther behind the array, but these techniques break down at propagation distances greater than about 100 feet.

The SB-1 Sound Beam is the first practical alternative to horns for large-scale long-throw applications. It produces sound waves whose SPL decreases by as little as 3 dB per doubling of distance, with flat response and consistent bandwidth over five octaves — and its pattern remains consistent for distances up to 500 feet.

What Meyer systems is it designed to work with?

The SB-1 can be used to supplement any large-scale long-throw main PA system, including those comprised of MSL-3s, MSL-4s, MSL-5s, MSL-6s, or MSL-10s in any combination.

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SB-1 *Q&A continued*

Why use the SB-1 rather than delayed loudspeaker arrays?

Delayed loudspeakers are a common and effective alternative to long-throw horns, but there are some constraints in their application.

As shown in Figure 1a, because the fill speakers are physically separated from the main array(s), they can only be aligned for seats that lie directly on their primary axis. For all other seats in their coverage area, varying differences in path length from the main PA can cause cancellations that degrade the frequency response. In small-to-moderate sized installations, the path length differences are generally small enough that cancellations occur only at very high frequencies. But in large-scale applications requiring very long throws, cancellations can develop in the upper midrange, where they can be much more destructive of fidelity.

By contrast, because of its ability to project over very long distances, the SB-1 can be placed with the main PA array. When the fill coverage emanates from the same physical location as the main system, path-length differences are eliminated, and flat response can be achieved with far fewer system adjustments.

In enclosed performance arenas, delay speakers also excite the boundaries of the space from multiple locations, producing uncorrelated reflections that compromise intelligibility. This problem can be minimized by carefully controlling the speakers' coverage patterns and band-limiting their response, but only at the expense of complicating the system design and its setup/alignment.

Because the SB-1 maintains consistent 10-degree coverage across its full range of operation, it can be arrayed and aimed so that virtually all of its energy falls on — and is substantially absorbed by — the audience. Destructive reverberation is greatly reduced, the "critical distance" substantially increases, and clarity is enhanced. Indeed, listeners have commented that the SB-1 makes a large sound system seem much closer to them, as though they were listening to studio monitors in the near field!

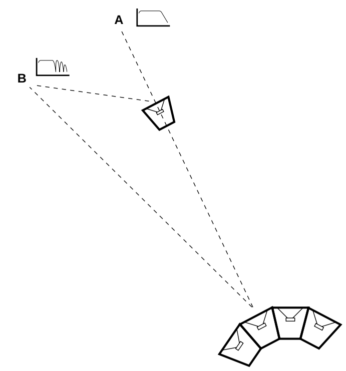

Figure 1A

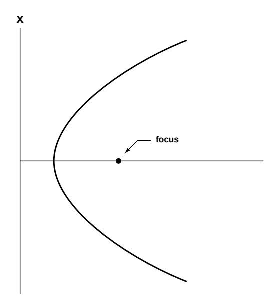

Figure 2A

How does the SB-1 work?

The SB-1 achieves a very narrow coverage angle and plane-wave propagation by taking advantage of a large paraboloid reflecting surface. A parabola is a simple, mathematically-described curve (Figure 2a) that possesses a unique focal point. A paraboloid surface is formed by sweeping a parabola around the primary axis that extends through center of the curve and its focus, so as to describe a three-dimensional dish. If sound energy radiates from a source at the focus and is directed onto the paraboloid surface, it is reflected outward in a path parallel to the curve's primary axis (Figure 2b). The paraboloid thereby becomes a highly directional emitter of plane (flat) wavefronts which are capable of propagating over long distances with minimal loss — much like an acoustic spotlight.

Despite the efficiency of parabolic reflectors, they have not been used in sound reinforcement until now because conventional designs are hampered by a limited frequency range (with substantial lobing in the lower frequencies) and inconsistent beamwidth (varying with frequency). The SB-1 addresses and overcomes both of these shortcomings.

Low-frequency lobing is controlled in the SB-1 by a 12-inch cone driver

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mounted at the center of the dish. The cone is driven by special band-limiting and phase manipulating circuitry that uses phase cancellation to suppress side lobes in the range of 500 Hz to 1 kHz. This sophisticated scheme reduces the amplitude of the side lobes by over 50 dB, substantially extending the usable mid-frequency response.

Constant beamwidth with frequency is achieved by feeding the SB-1 reflector from an optimized aspherical horn that is placed at the focal point of the dish. Developed using high-resolution measurement in an anechoic environment, this horn enables the SB-1 to achieve a uniform 10-degree beamwidth at frequencies up to 15 kHz.

Is the SB-1 made for permanent installations only, or is it portable?

The SB-1 physical packaging has been designed to satisfy both fixed and portable applications. For shipping, the high-frequency pod and its mounting arms are disassembled and packed in a stowage space that is accessed through a hatch on the top of the dish. A removable front cover protects the dish surface and 12-inch cone from damage, and the enclosure is fitted with handles so that it can be easily maneuvered.

How is it mounted/rigged?

Meyer Sound offers a mounting yoke. Fabricated of heavy-gauge steel tubing, this rugged rigging fixture suspends the SB-1 dish from one point on each side, allowing it to be swung through more than 300 degrees for maximum freedom of vertical aiming. Two hanging points (one on either side) are provided so that the assembly can be flown. Alternatively, the yoke allows placing the SB-1 free-standing on a scaffold or catwalk above the main system.

How is the SB-1 arrayed and aimed?

The SB-1 provides a consistent 10 degrees of coverage over a range of 100 to 500 feet and projects a circular coverage pattern. Best performance is attained when multiple units are placed with the main PA array and splayed in an arc at 8 degree angles. This provides a slight overlap between the patterns of adjacent units for more even coverage. A surveyor's transit, placed atop the cabinet for sighting, is handy for fine adjustments in aiming.

How can I predict coverage from the SB-1 when planning a system installation?

The SB-1 projects a circular pattern with a consistent 10-degree coverage angle. As a rule of thumb, the diameter of the projected circle can be estimated by multiplying the distance from the SB-1 by .175 — so, at 300 feet, for example, the maximum coverage diameter is about 53 feet. Alternatively, if you are working from a plan view of the venue, you can use a protractor to lay out 10-degree coverage wedges (remember to overlap them eight degrees center-to-center for smoother coverage).

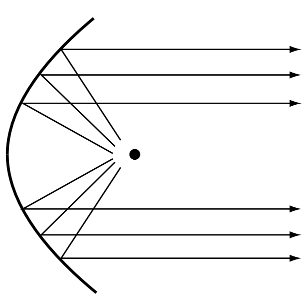


Figure 2B

What is the maximum distance at which the SB-1 will project over 100 dB SPL?

Under ideal conditions, the SB-1 can deliver over 100 dB SPL at its full design throw of 500 feet. In practice, however, the SPL at long distances can be affected by atmospheric conditions — especially at the highest frequencies. The best propagation of sound waves occurs when the air is either very hot and moist, or very cold and dry. In more moderate conditions, attenuation due to air loss may exceed 3 dB per doubling of distance from the SB-1.

Interestingly, unlike conventional horn systems, two adjacent SB-1s can be aimed into the same coverage area for an increase of 6 dB in SPL — without producing cancellations. This unique property of the SB-1 can be exploited to compensate for air losses.

Can the SB-1 be modified to work below 500 HZ?

No, the 500 Hz limit is determined by the laws of physics: it is the lowest frequency (longest wavelength) at which the parabolic reflector remains effective. To provide the same narrow directivity at lower frequencies would require a vastly larger dish.

Except in special circumstances, however, there is generally little need for a highly directional low-frequency device. As reinforcement professionals know from experience, low frequencies travel farther (that is, are less quickly absorbed by the air) than high ones, so long throw capability is less of an issue. If the need arises to steer very low frequencies so as to avoid them spilling into unwanted coverage areas, selective phase cancellation techniques are more economical to implement than very large parabolic dishes.

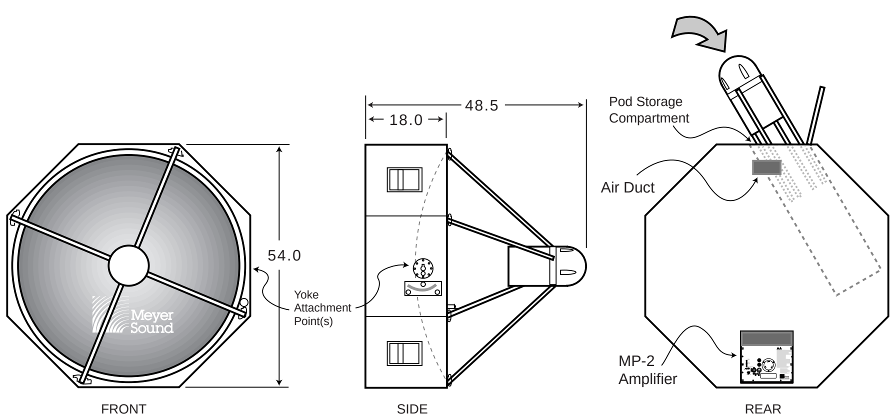
Is the SB-1 weather-resistant?

While the SB-1 is designed and constructed to withstand touring and intermittent outdoor use, it is not designed for permanent outdoor installations. A weather-resistant version is in development; contact your Meyer Sound representative or the factory technical support department for details.

Meyer Sound Laboratories has devoted itself to designing, manufacturing, and refining components that deliver superb sonic reproduction. Every part of every component is designed and built to exacting specifications and undergoes rigorous, comprehensive testing in the laboratories.

Research remains an integral, driving force behind all production. Meyer strives for sound quality that is predictable and neutral over an extended lifetime and across an extended range.

SB-1 PHYSICAL DIMENSIONS



LISTED 3K59 COMMERCIAL AUDIO SYSTEM

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