650-R2 Reinforcement Subwoofer

Operating Instructions

The Meyer Sound 650-R2 is a high-power subwoofer loudspeaker designed to extend the power bandwidth of Meyer Sound reinforcement systems to 30 Hz. The system consists of two 18-inch cone drivers in a heavily braced 14 cu. ft. vented enclosure. The dimensions of the cabinet are submultiples of 90", the U.S. internal truck width standard. The cabinet is fitted with handles and high-density rubber casters.

The 650-R2 is designed to be operated as a system with the Meyer Sound B-2EX Control Electronics Unit. The B-2EX comprises electronic crossover, Meyer Sound exclusive SpeakerSense™ driver protection circuitry, and amplitude and phase response alignment circuitry optimized for the loudspeaker.

Meyer Sound Laboratories, Inc.
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Berkeley, CA 94702

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Amplifier Requirements

The 650-R2 requires a professional quality two-channel power amplifier capable of delivering up to 350 watts per channel into 8 ohms or 750 watts per channel into 4 ohms (FTC rating). Use of amplifiers of lower power will not allow the full power and headroom of the 650-R2 system to be realized. Where the B-2EX Control Electronics is used, the 650-R2 will safely handle amplifiers rated at up to 1500 watts per channel **if the B-2EX Safe switch is engaged**.

Note. The 650-R2 may be used with any of the following Meyer Sound Control Electronics Units: B-2, B-2A, B-2AEX and B-2EX. **Only the B-2AEX and B-2EX contain excursion protection circuitry to allow use with amplifiers rated over 750 watts at 4 ohms.**

Connections

The connection terminals of the 18-inch driver appear on an EP-type 4-pin connector located on the rear of the 650-R2 cabinet. Pin assignments for this connector are:

Pin 1 — Driver 2, common (–)
Pin 2 — Driver 1, common (–)
Pin 3 — Driver 1, hot (+)
Pin 4 — Driver 2, hot (+)

(When the cabinet is fitted with an EP-5 connector, pin 5 is unconnected.)

The minimum wire size for connections between the 650-R2 and the power amplifier should be 14 gauge.

Note: If you are using standard Meyer Sound loudspeaker cables and adapters, simply connect the female end of the loudspeaker cable to the 650-R2, the male end of the cable to the Meyer Sound subwoofer pigtail adapter, and the banana connector of the adapter to your amplifier outputs. For connections between the B-2EX and the power amplifier, refer to the B-2EX Operating Instructions.

Verifying System Polarity

All Meyer Sound loudspeaker systems are thoroughly tested in all stages of manufacture and the correct polarity of individual cabinets is assured. However, polarity reversal is possible in systems with multiple amplifier connections. A single cabinet or component that is out of polarity with the rest of the system will cause phase cancellation, resulting in a noticeable decrease in SPL and possible component damage.

The polarity of individual cabinets may be tested with a 9 volt battery, and Meyer Sound's SIM® System II or a spectrum analyzer can be used, with a noise source, to test for correct polarity between cabinets.

1. Single cabinets.

- First verify polarity of the drivers by connecting a 9 volt battery at the end of the loudspeaker cable:

EP connector	**Battery**
Pin 1	- terminal
Pin 4	+ terminal

- The woofer cone should move outward toward the cabinet front face.
- Now repeat the process with the other driver, connecting pin 2 to the minus terminal and pin 3 to the plus.

2. Multiple cabinets.

- Each cabinet should first be tested as above.
- Input the pink noise source to the B-2EX.
- Connect one cabinet and advance the pink noise to a convenient measuring level. Position the measuring microphone on the axis between two adjacent cabinets, and about 6 feet distant. Note the frequency response and overall level
- Leaving the first cabinet connected, connect the adjacent one and observe the analyzer display. The entire curve should jump up in level, indicating correct addition between the loudspeakers. A polarity reversal between the loudspeakers will show up as severe cancellation.

Similarly, connect the rest of the cabinets in the array one by one, looking for correct addition as each loudspeaker is connected. (It will be necessary to reposition the microphone.)

Note: A polarity reversal within a subwoofer system can result in severe damage to the drivers. It is strongly recommended that polarity testing be done at low levels and with the appropriate equipment.

Verifying Crossover to Full-Range System

Phase cancellations very often occur between subwoofers and the full-range system that they supplement, dependent upon their placement, because of the long wavelengths at which they operate. For example, the wavelength of sound at 100 Hz is approximately 11 feet, so a displacement of 5 ½ or 16 ½ feet between the subwoofers and the main system will cause them to be out of phase with one another at 100 Hz. This will result in cancellation at that frequency.

In some placements of 650-R2's, there may be such a phase cancellation at crossover. But in other placements, or in similar placements with different boundary conditions, this cancellation may not occur. In all cases, the correct polarity for the subwoofer is the connection that results in good addition at the crossover frequency (100 Hz).

The 650-R2 should always be tested to verify its behavior at crossover to the main system, and this may be done through frequency response verification using Meyer Sound's SIM® System II or a third-octave RTA with pink noise. If there is a cancellation at approximately 100 Hz, reverse the polarity of the subwoofers.

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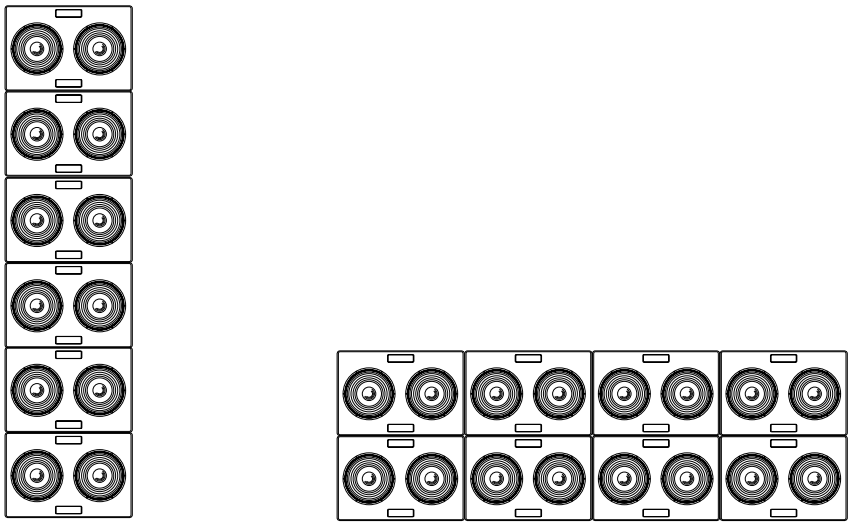
Arraying

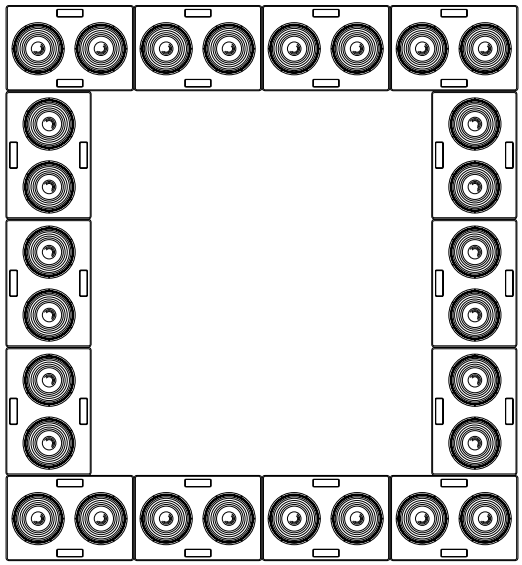
The 650-R2 Subwoofer adds very well in arrays. Because of the long wavelengths of low frequencies, small 650-R2 arrays will tend to be essentially omnidirectional. Larger arrays may be constructed, however, which can provide the directional control required to project the low-frequency energy forward efficiently.

Some examples of such arrays are shown in the illustrations below. Line arrays of 650-R2's, either vertical or horizontal, have been used effectively in many concert systems for both indoor and outdoor reinforcement. Arrays exceeding 10 feet in their primary (longest) dimension can provide 180° or tighter coverage angles (-6 dB points). A horizontal array can be curved on a 10-foot radius to tighten the coverage further. Hybrid arrays may be formed combining both horizontal and vertical line elements.

A unique circular array is also shown. Arranged in a suitable mounting frame with a full-range loudspeaker system rigged in the center, this array provides very good projection characteristics. It has been used successfully in theme park applications.



Horizontal and Vertical Line Arrays of 650-R2's



650-R2's Arranged in a Ring Array (Mounting Frame Not Shown)

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Specifications

Acoustlcal — 650-R2/B-2EX System

Frequency Response[1]	35 to 110 Hz ±4dB
Maximum SPL[2]	
Continuous	125 dB
Peak	130 dB

650-R2 Loudspeaker

Driver Complement	Two MS-18 18" cone driver, 8 ohms each
Enclosure	14 cu. ft. vented, multi-ply Finnish Birch
Finish	Black textured, carpeted or weather protected (optional)
Physical Dimensions	45"H x 30"W x 22½"D
Weight	176 lbs (79.8 kg)
Protective Grill	Perforated steel screen, charcoal-gray foam covering
Connector	EP-4 male (EP-5 male, Europe only)
Wheels	Two 3" diameter rubber tread rigid self-lube casters

Notes:

1. **Measured 1 meter on axis, half space conditions, pink noise input, in third octave bands.**
2. **Loudspeaker driven by power amplifier rated at 350 W into 8 ohms, weighted noise signal source.**

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