Musical Instrument Loudspeaker
Instruction Manual

E110, E120, E130, E140, E145, E151

The E Series

For more than 30 years professional musicians have demonstrated an increasing preference for JBL musical instrument loudspeakers. The current E Series are the best sounding musical instrument loudspeakers JBL has ever made, and are designed and built to provide unmatched reliability. Under JBL's severe test conditions, size for size, no other musical instrument loudspeaker can match their ruggedness. In addition to superb sound, E Series loudspeakers are extremely efficient, delivering an unusually high acoustic output per watt of input.

There are six great musical instrument loudspeakers in the E Series. This manual explains how to achieve optimum performance from each of them.

E110 250 mm (10 in)

The E110 delivers more sound per amplifier watt than any other loudspeaker in its size class. Sustain is highly predictable and overtone characteristics are brilliant. The speaker is right at home with lead or rhythm guitar, keyboards, or stacked in a column for PA use.

E120 300 mm (12 in)

The E120 is the latest version of JBL's most popular musical instrument loudspeaker. Its efficiency and power capacity are greater than many extended range 380 mm (15 in) speakers. For use in guitar amplifiers, organs, electric pianos, or other applications.

E130 380 mm (15 in)

The E130 is JBL's most rugged and efficient extended range musical instrument loudspeaker. The large cone area provides considerably more output than smaller cones without sacrificing midrange or high frequency reproduction. An ideal choice when loudspeaker size is not restricted and maximum sound levels are desired.

E140 380 mm (15 in)

The E140 is specially designed for the bass guitarist or keyboard player who wants a bright, sharply defined sound. It is capable of producing extremely high sound pressure levels with efficiency that's unmatched by any other bass speaker except our own E145.

E145 380 mm (15 in)

The E145 has the most natural, uncolored sound that JBL has ever created in a bass instrument loudspeaker. Its low distortion characteristics and pure tonal quality make it the ideal choice for keyboards, organs, bass guitars, or P.A. systems. The E145 delivers pure bass notes at thunderous levels with high efficiency and power capacity.

E151 460 mm (18 in)

JBL's powerhouse loudspeaker. The E151 is made specifically for electric bass and is designed to sound great in horn loaded or reflex enclosures. Its sound audibly surpasses the punch found in other bass speakers in its size class. The E151 is recommended whenever a maximum amount of clean bass is required at high volume levels.

Mounting the Loudspeaker—General Instructions

Replacing an existing musical instrument loudspeaker with a JBL usually requires only basic hand tools. In most instances, it's simply a matter of removing the original unit and mounting the JBL in its place.

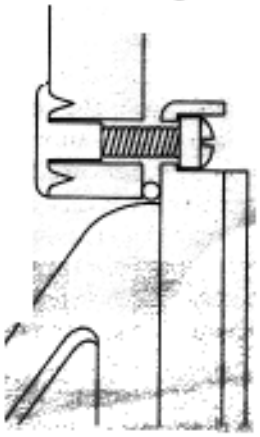
On rare occasions, however, internal bracing or paneling of some enclosures may have to be modified or relocated to provide clearance for a JBL loudspeaker's large magnetic structure or frame.

A few "original equipment" loudspeakers are mounted with wood screws. For the most satisfactory installation, we strongly suggest using the T-nuts and machine screws supplied beneath the packing material in the shipping carton. This mounting hardware allows JBL loudspeakers to be removed and reinstalled hundreds of times without damaging an enclosure. Instructions for installing the hardware are given in the following sections.

Front Mounting

After making a baffle cutout of appropriate size for the JBL loudspeaker, lay the enclosure on its back and place the loudspeaker in the baffle cutout. Using the loudspeaker frame as a template, insert a drill in each of the mounting holes and gently tap the drill two or three times with a small hammer. The resulting indentations on the front baffle are where the mounting holes should be drilled. (See chart.)

Front Mounting



Next, remove the loudspeaker, and drill a hole through each indentation. Insert T-nuts from behind the front baffle, tapping them with a hammer until they are flush.

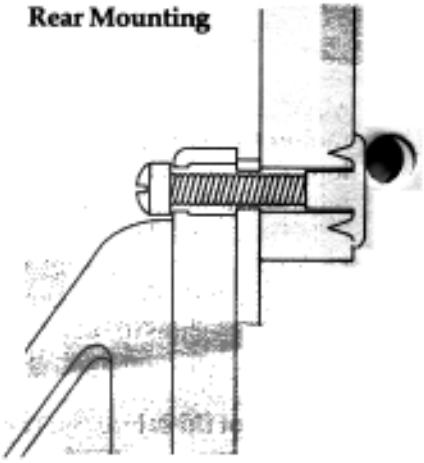
Place the loudspeaker in position after attaching input wires, and install the mounting screws, tightening them evenly and firmly. (To avoid frame warpage, do not tighten to excess.)

Rear Mounting

After making a baffle cutout of appropriate size for the JBL loudspeaker, drill the mounting holes in the manner described previously for front mounting.

Place the loudspeaker in position after attaching input wires, and install the mounting screws, tightening them evenly and firmly. (To avoid frame warpage, do not tighten to excess.)

Rear Mounting



MA15 Loudspeaker Mounting Kit Instructions

The MA15 Loudspeaker Mounting Kit simplifies front panel mounting of JBL 380 mm (15 in) loudspeakers and permits a degree of latitude in the diameter of the mounting cutout required on the enclosure baffle panel. This feature is often helpful when utilizing an enclosure in which the cutout has already been made. The kit consists of a sealing gasket, four cast clamps and four mounting screws with T-nuts. The clamps and mounting hardware can also be used for JBL 300 mm (12 in) and 460 mm (18 in) loudspeakers, but it will be necessary to make a sealing gasket specifically for such applications. Two MA15 kits should be used to mount the E151 460 mm (18 in) loudspeaker, due to the weight of this massive unit. The

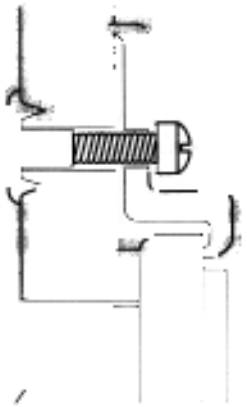
Mounting Dimensions

Loudspeaker	Baffle Cutout Diameter Front Mount[1]	Baffle Cutout Diameter Rear Mount	Bolt Circle Diameter	Frame Mounting Screw Drill Size	T-Nut Drill Size
E110	228 mm	222 mm	245 mm	5.4 mm	6 mm
	9 inches	8¾ inches	9⅝ inches	7/32 inch	#1
E120	280 mm	280 mm	294 mm	6.6 mm	6 mm
	11 1/16 inches	11 1/16 inches	11 9/16 inches	17/64 inch	#1
E130 E140 E145	355 mm	343 mm	370 mm	7 mm	6 mm
	13 31/32 inches	13½ inches	14 9/16 inches	9/32 inch	#1
E151	427 mm	422 mm	441 mm	6.6 mm	6 mm
	16 13/16 inches	16⅝ inches	17⅜ inches	17/64 inches	#1

1. When the MA15 mounting kit is used, baffle cutouts may be larger; as large as 286 mm (11¼ inches) for the E120; 335 mm (14¼ inches) for the E130 and E140; and 433 mm (17 1/16 inches) for the E151. Be certain that the loudspeaker is centered over the baffle cutout and that the sealing gasket on the baffle surface prevents air leaks around the frame or through the frame mounting screw holes.

MA15, however, cannot be used to mount E145 380 mm (15 in) loudspeaker, because the clamps will not fit the unit's frame.

To install, peel the protective backing from each gasket segment and apply the segments around the cutout (not shown). Drill four 8 mm (5/16) holes for the mounting screws; using a small hammer, tap each T-nut flush into the back of the panel.



With the enclosure on its back on a clean, padded surface, place the loudspeaker in position. Thread the Phillips-head mounting screws partially into their respective T-nuts and slip a cast clamp under each screw head so that the clamp's gripping edge is on the loudspeaker frame. Tighten the screws evenly, but avoid excessive force.

Power Capacity

Musical instrument loudspeakers receive their signal directly from a performer's instrument, with its wide dynamic range and explosive transients. Amplifier power and volume level are often very high—especially during live performances.

Because these conditions are so severe, we prefer the continuous sine wave method of rating the power capacity of JBL musical instrument loudspeakers. This laboratory standard test is far more demanding than actual performance situations, and provides a credible measure of a loudspeaker's power handling capacity.

Since a number of manufacturers continue to use the less stringent "continuous program power" rating, we have included these figures for your reference. The continuous program power rating is acceptable for loudspeakers used at home, because the dynamic range of music they reproduce has been greatly compressed in the recording process, and playback levels are relatively moderate. As a result, demands placed on home entertainment loudspeakers are far less critical than those used with amplified musical instruments.

The most common cause of damage to a loudspeaker in high power applications is overheating. A cone loudspeaker draws maximum power from an amplifier, and thus can be most easily overheated, when operating through the portion of the audio spectrum in which its minimum impedance—above system resonance—occurs. (Actually, impedance of all loudspeakers varies from low to high frequencies.) For this reason, we require E Series loudspeakers to withstand their full rated power at all frequencies within one-half octave above and below minimum impedance—and sustain such performance continuously for one hour without damage.

While other methods can be used to achieve even greater continuous sine wave power rating figures, such as testing for shorter lengths of time or testing at other than the loudspeaker's minimum impedance region, our tests and power ratings provide specifications that are very realistic—by commonly used standards, conservative.

Amplifier Power

When driven by a high intensity input signal, an amplifier can produce far more than its rated power, sending an extremely distorted signal to the loudspeaker. Since a loudspeaker will reproduce distortion as accurately as a "clean" signal, under certain conditions a severely distorted 75 watt signal may damage a loudspeaker more easily than an undistorted 150 watt signal. If loud volume levels are anticipated, an amplifier that has plenty of reserve power is preferable to a low powered unit which will distort more readily.

Whenever exceptionally high levels of acoustic output are required, more amplifier power and more loudspeakers are generally needed to obtain a significant increase in loudness. For example, even though two loudspeakers can deliver twice as much acoustic output as a single loudspeaker, they will not sound twice as loud. This is an inherent characteristic of human hearing and applies to any sound system. For one system to sound twice as loud as another, it must produce ten times as much acoustic power. For example, one E130 driven by a 100 watt amplifier will deliver twice the acoustic power as an E130 driven by a 50 watt amplifier. The more powerful system will be noticeably louder, but not twice as loud.

Enclosure Construction

Enclosures for musical instrument loudspeakers must be solidly built and all joints should be true and tight. Lock miter joints are ideal if you have access to the necessary milling machinery. Some lumber yards will cut panels to your requirements, miter and prepare edges for joining. Mating surfaces should be reinforced with glue blocks and wood-screwed at 100 mm (4 in) intervals to each surface to insure an airtight cabinet. An accumulation of small air leaks can introduce objectionable whistles and hisses, decreasing output in the low frequency region. All large panels should have 25 mm x 75 mm (1 in x 3 in) or 50 mm x 100 mm (2 in x 4 in) braces glued on edge about every 10 inches, fastened securely with screws to prevent vibration. Bass reproduction in particular benefits from rigid enclosure construction.

An enclosure should be constructed of (19 mm ¾ in) material throughout, either plywood or particle board (pressed wood). Outside dimensions are not overly critical, but no single dimension should be more than three times any other. For example, an enclosure with proportions of 1x2x5 is generally undesirable because the longest dimension is more than three

times greater than the shortest dimension.

The surface area of the loudspeaker chamber should be lined with a soft, absorptive material. The exact amount and placement of the acoustic damping material can be varied over wide limits and adjusted by trial and error to give varying degrees of midrange brightness. The less padding used, the brighter and more "live" the midrange. The lining can be attached to the cabinet walls by using spots of glue, upholstery tacks or staples.

Ordinary 25 mm (1 in) acoustic glass wool works very well for this purpose, although any other soft, fluffy, absorptive material (such as Kimsul, Tufflex or felt rug padding) will do equally well. These can be purchased from firms such as hardware stores, lumber yards, or others that specialize in insulation materials. We do not recommend the use of Celotex, foam rubber, Styrofoam, rock wool, acoustic tile, cork, cotton, rubberized rug padding or Kapok.

Enclosure Volume and Tuning

Recommended ranges of cabinet volumes are provided for the E Series speakers, as well as tuning specifications for a wide variety of enclosure sizes. Tunings are based on a port (open hole) of the specified area cut in a 19 mm (¾ in) thickness baffle panel.

Porting information contained in this chart has been developed from listening evaluations which yielded an optimum combination of extended low frequency response and mid-bass sound character. Since your sound depends on your instrument, amplifier, playing style, and many other factors, some variation in tuning may be necessary to obtain the particular tonal quality you desire. Tuning the enclosure higher (more port area) will result in stronger mid-bass performance at the expense of the very lowest tones. Tuning the enclosure lower (less port area) will extend the deep bass but will sacrifice the mid-bass accentuation.

Recommended Enclosure Volumes

E110, E120	30-85 litres	1-3 cubic feet
E130	55-115 litres	2-4 cubic feet
E140, E145, E151	85-225 litres	3-8 cubic feet

Ported enclosures with volumes within these ranges will provide optimum response for the E Series loudspeakers in their usual lead and bass instrument applications. When more than one loudspeaker is to be mounted in a single enclosure, the volume should be scaled accordingly. As an example, for two loudspeakers, approximately twice the enclosure volume is required. For some multiple loudspeaker applications, particularly for lead instrument use, it is often best to mount the loudspeakers in a practical cabinet size and leave the enclosure sealed.

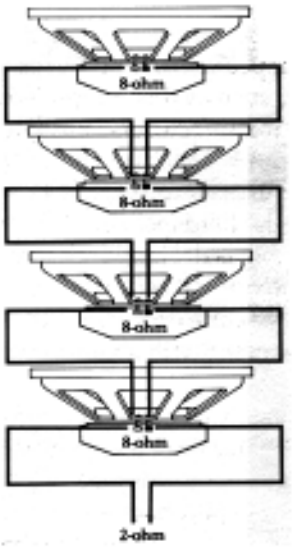
We do not recommend using E Series loudspeakers in open-back enclosures, such as those supplied with other manufacturers' amplifiers. The use of an E Series unit in an open-back enclosure can result in severe damage to the loudspeaker, since the cone assembly is designed specifically for a properly tuned reflex enclosure and excessive cone excursion can more easily occur with an improper enclosure.

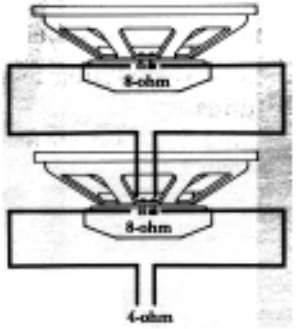
Some musicians, however, prefer the sound character of an open-back box. If an E Series loudspeaker is installed in an open-back enclosure, the maximum power applied to the speaker should not exceed 50% of its continuous sine wave rating. For example, an E130, which is rated at 150 watts continuous sine wave, should not have more than approximately 75 watts applied to it when mounted in an open-back box.

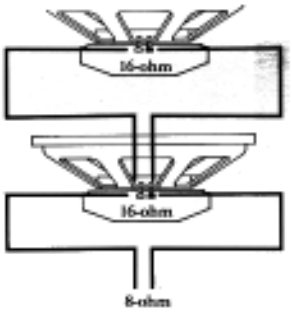
Internal Volume		Port Area E110/E120/E130 • E140/E145/E151			
Litres	Cubic Feet	cm^2	in^2	cm^2	in^2
28-42	1.0-1.5	52	8	—	—
43-57	1.6-2.0	64	10	—	—
58-71	2.1-2.5	77	12	—	—
72-85	2.6-3.0	90	14	—	—
86-99	3.1-3.5	103	16	65	10
100-113	3.6-4.0	129	20	116	18
114-128	4.1-4.5	181	28	135	21
129-141	4.6-5.0	233	36	155	24
142-155	5.1-5.5	258	40	168	26
156-169	5.6-6.0	290	45	181	28
170-185	6.1-6.5	348	54	194	30
186-197	6.6-7.0	374	58	206	32
198-212	7.1-7.5	419	65	226	35
213-225	7.6-8.0	465	72	245	38
226-240	8.1-8.5	503	78	258	40
241-253	8.6-9.0	542	84	271	42
254-269	9.1-9.5	581	90	290	45
270-281	9.6-10.0	632	98	323	50
282-297	10.1-10.5	684	106	348	54
298-310	10.6-11.0	723	112	387	60
311-326	11.1-11.5	761	118	419	65
327-338	11.6-12.0	800	124	452	70

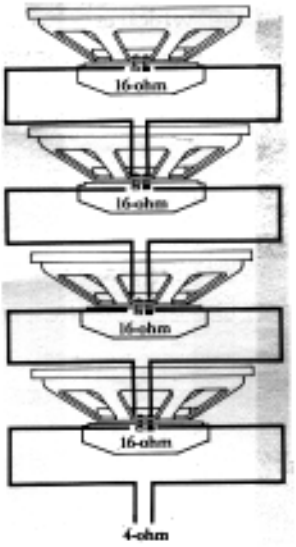
1 Porting information contained in this chart will provide the most uniform extended low frequency response. Some variation in port area may be necessary to obtain the particular sound you desire.

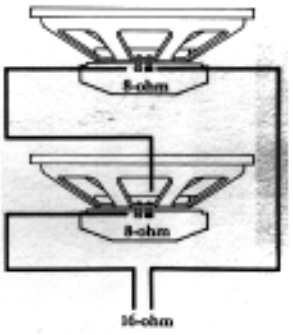
2 Port area may be converted to diameter using the formula $A=.25\pi D^2$.

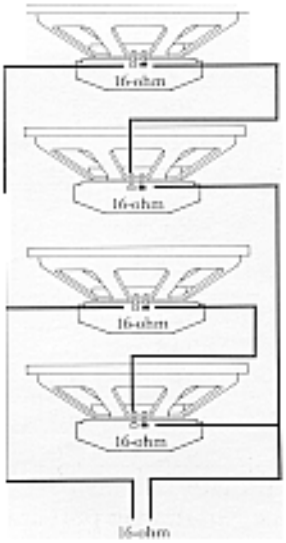


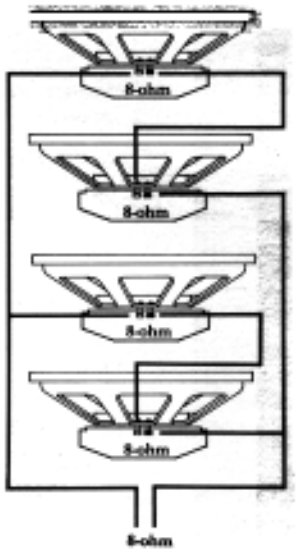












Wiring

When installing a single loudspeaker, the amplifier hook-up wires may be attached without regard to polarity.

If multiple loudspeakers are wired together, the following diagrams illustrate several common arrangements that will ensure proper polarity and impedance values. Consult the manufacturer of your amplifier to determine its optimum load impedance. If a choice must be made between an impedance higher or lower than that recommended by the manufacturer, select the higher impedance. An impedance value lower than that recommended may damage your amplifier or loudspeakers.

Service

Should your E Series musical instrument loudspeaker require service, return it to the JBL dealer from whom it was purchased. If it is not possible to contact a dealer, write directly to the JBL Customer Service Department describing the difficulty as fully as possible. Products returned to the factory must be sent prepaid to James B. Lansing Sound, Inc., 8500 Balboa Boulevard, Northridge, California 91329, U.S.A.

For Additional Information

If you have difficulty in achieving the fine performance of which your E Series musical instrument loudspeaker is capable, consult the JBL dealer from whom the unit was purchased. He is equipped with the knowledge required to provide expert advice and assistance. If he is unable to assist you, write directly to the JBL Professional Division explaining the difficulty in detail.