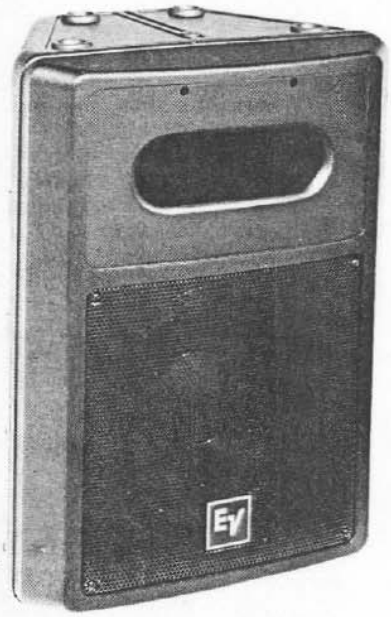
Electro-Voice®



Sb120a

400-Watt Powered Bass Module

- Internal, 400-watt power amp with fully balanced and isolated inputs and built-in crossover at 125 Hz
- Lightweight and compact (34 lb)
- Very strong structural-foam enclosure with integral handle and hanging points
- Stand mountable and arrayable
- High output—120 dB at 1 meter
- DL12sb 12-inch woofer with shallow-cone/deep-frame geometry for ultrahigh excursion of nearly one inch

SPECIFICATIONS:

SYSTEM

Frequency Response (swept sine-wave input, 10 feet on axis, anechoic environment normalized for 1 meter and a 1-watt speaker input; see Figure 1):
50-250 Hz

Low-Frequency 3-dB-Down Point:
50 Hz

Usable Low-Frequency Limit with X_p200 Processor (10-dB-down point):
43 Hz

Sound Pressure Level at 1 Meter, Maximum Gain and Amplifier at Clipping Threshold, 0 dBu (0.775 volts rms) into Balanced Input, Anechoic Environment, 50- to 200-Hz Average:
120 dB

Maximum Acoustic Output:
11.1 watts

Crossover Frequency (electrical):
125 Hz

Crossover Slope:
12 dB per octave

Dispersion Angle Included by 6-dB-Down Points on Polar Responses:
Essentially omnidirectional

Distortion, 0.1 Full Power Output,
Second Harmonic,
100 Hz: 4.5%
Third Harmonic,
100 Hz: 1.1%

Distortion, 0.01 Full Power Output,
Second Harmonic,
100 Hz: 1.1%
Third Harmonic,
100 Hz: 0.35%

Transducer Complement:
DL12sb 12-inch woofer

Box Tuning Frequency:
55 Hz

Enclosure Materials and Colors:
Black polypropylene structural foam

Optional Accessories:
100BK mounting stand
Mb200 mounting bracket

Other Product Available for Enhancement of Sb120a Performance:
X_p200 electronic system controller

Hanging Inserts:
Three metric M6 x 14 mm

Safety Approvals (in progress):
UL-813; CSA-C22.2; IEC-65 (ENG-0065); EMC Directive for European RFI/EMI emissions

Dimensions (see Figure 2),
Height:
58.7 cm (23.1 in.)
Width:
42.9 cm (16.9 in.)
Depth:
31.2 cm (12.3 in.)

Net Weight:
15.6 kg (34.4 lb)

Shipping Weight:
16.9 kg (37.3 lb)

AMPLIFIER

System Output Power (Class-D high-speed digital switching amplifier) (6-ohm load, 100- to 130-volt or 200- to-250-volt, 50/60-Hz ac line voltage):
400 watts

Dynamic Range:
80 dB

Residual Noise (maximum gain, 600-ohm source, 20- to 200-Hz bandwidth):
4.77 mV maximum

Power Bandwidth (–3 dB):
20-125 Hz

Frequency Response (±0.5 dB):
30-65 Hz

Total Harmonic Distortion (100 Hz),
4 Watts: 0.2%
40 Watts: 0.5%
400 Watts: 2.5%

Input,
Type:
True balanced, transformer-isolated differential
Sensitivity (for 400-Watt, unclipped output),
System Gain Control Full Clockwise:
0 dBu (0.775 volts)
System Gain Control Full Counterclockwise:
6 dBu (1.55 volts)
Impedance:
10 kilohms
Controls and Indicators:
System Gain control
Input Balance trim control
Amplifier Clip LED
Power on-off switch (illuminated when on)
Connectors:
Neutrik combination 1/4-inch tip-ring-sleeve (TRS) phone/3-pin female XLR-type jack in parallel with 3-pin male XLR-type jack (allows paralleling of Sb120a's)

Polarity (for positive sound pressure):
Pin 2 and tip of input connector positive

Efficiency:
85-95%

Power,
Requirement (per UL-813, maximum average, soft-start power supply):
100 watts
Minimum Service Amperage:
2 amps
Input Voltage,
Sb120a: 100-130 V, 50/60 Hz ac
Sb120a Export: 200-250 V, 50/60 Hz ac

FIGURE 1 — S_b120a Frequency Response
(1 watt/1 meter, anechoic environment)

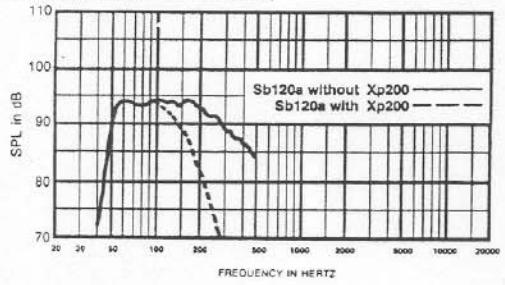


FIGURE 2 — S_b120a Dimensions

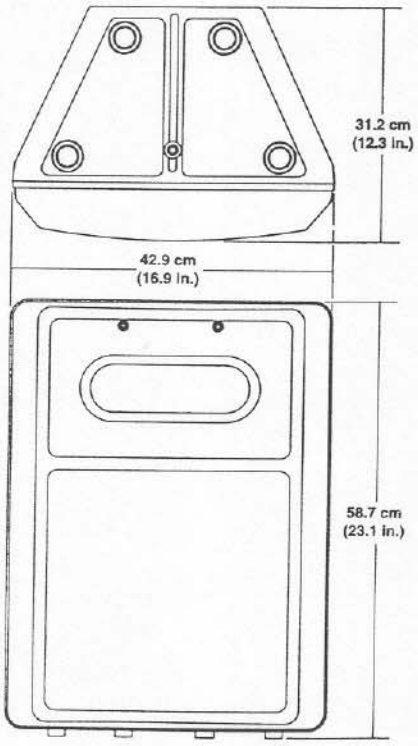
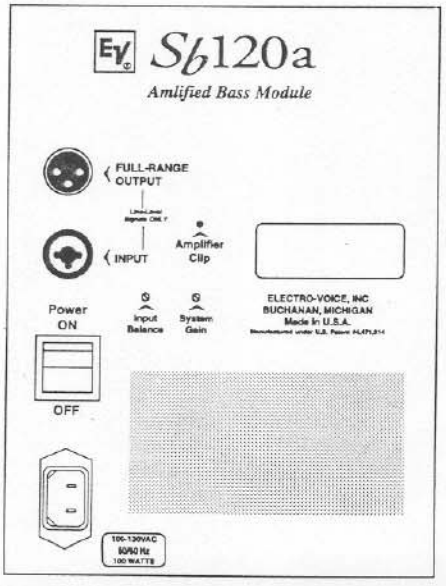


FIGURE 3 — S_b120a Back Panel



Input Connector: IEC
ac Line Cord (detachable, supplied),
Sb120a:
3.0-m (10-ft) two-conductor polarized cable
Sb120a Export:
2.5-m (8.2-ft) two-conductor nonpolarized cable with continental-Europe-type wall plug

GENERAL DESCRIPTION

The Electro-Voice S_b120a is an amplified, 400-watt bass module designed for sound reinforcement. Through the extensive use of computer-aided design and modeling, Electro-Voice engineers have developed a low-frequency enhancement system that combines the advantages of a long-throw 12-inch woofer, a high-impact polypropylene structural-foam cabinet, and state-of-the-art Class-D high-speed digital switching amplifier that contributes only 1.0 kg (2.2 lb) to overall system weight.

LOW-FREQUENCY DRIVER DESCRIPTION

The DL12sb low-frequency driver was specially developed for the S_b120a. Its shallow-cone/deep-frame geometry provides a very high peak-excursion ability of nearly one inch. At the heart of this driver is a magnetic structure optimized to yield the best possible Thiele-Small parameters to match both the tuned enclosure and the power amplifier.

A specially modified magnet structure is used so that it is physically impossible for the voice coil to ever hit the back plate ("bottom out"). Also, there is added clearance between the spider and the speaker frame, eliminating another problem usually encountered in woofers used for long-excursion applications. The woofer features beryllium copper lead wires, a low-mass edge-wound voice coil and high-temperature materials. The part of the magnet structure adjacent to the coil is insulated using the exclusive EV PROTEF™ process (U.S. Patent #4,547,632). The coil is driven by a massive, 16-lb magnet structure.

ENCLOSURE DESCRIPTION

The enclosure is constructed of high-impact polypropylene structural foam. It provides a stiff and extremely durable enclosure. Molded into the cabinet are an integral carrying handle and a stand socket for mounting on 1$^3/_8$-inch stands such as the Electro-Voice model 100BK. Rubber feet that are attached to the bottom of the cabinet and the mating sockets that are molded into the top provide a means of stacking systems. Three hanging inserts are also provided (three M6 x 14 mm).

AMPLIFIER DESCRIPTION

The power amplifier built into the S_b120a is a state-of-the-art Class-D high-speed digital switching amplifier that contributes only 1.0 kg (2.2 lb) to overall system weight. The combination of high power output and light weight is possible because the switching power supply eliminates the large filter capacitors and large, heavy transformers used in the power supplies of conventional amplifiers. Instead, the amplifier draws the power it requires directly from the ac line, at the moment it is required.

The Sb120a's power amplifier may be driven from the typical line-level source (see Electronics Installation and Operation section). It is equipped with two second-order, 12-dB-per-octave filters. The first is a high-pass filter at 20 Hz, for infrasonic speaker protection. The second is a low-pass filter at 125 Hz, which, in combination with the natural response of the DL12sb woofer/enclosure combination, provides the 250-Hz overall upper response limit noted in the specifications. (See Crossover section for more details.)

The amplifier contains a soft-start, regulated dc power supply that allows delivery of full rated power output even if the power line voltage falls to 100 V ac (200 V ac for the Sb120a Export). The soft-start feature prevents tripping circuit breakers when the equipment is turned on.

XP200 ELECTRONIC SYSTEM CONTROLLER

The optional Xp200 electronic system controller complements the characteristics of the Sb120a. Its mono-summed subwoofer outputs provide additional crossover and infrasonic protection. 24-dB-per-octave filters roll off response below 37 Hz and above 134 Hz. The Xp200 also includes a special low-frequency profile circuit that enhances the performance of the Sb120a. The amount of enhancement can be adjusted to suit the user's personal preference.

ELECTRONICS OPERATION AND INSTALLATION

To facilitate operation and installation, Sb120a back-panel detail is shown in Figure 3.

Precautions

Please read the entire data sheet before connecting the Sb120a to your system. For optimum performance, observe the following precautions:

1. Keep the ac power switch off while making connections.
2. Be certain that plugs and jacks are tightly mated. Loose connections cause hum, noise or intermittents that could damage your speakers.
3. Use the proper, high-quality shielded cables in your entire system. Low-capacitance cable is preferred.
4. Turn on the mixer, EQ and effects first. Wait eight to ten seconds, then turn on the Sb120a. This prevents any transient "pop" which could damage a loudspeaker.
5. Always begin with the mixer master faders at minimum. Wait a few seconds to turn up the volume.
6. Use restraint in operating controls. Move them slowly. Rapid movements could damage speakers through accidental amplifier clipping.
7. When switching the power switch off, be certain that there is no signal at the input of the Sb120a. If there is, a very distorted signal will be heard for a short period of time. (This does not indicate a problem.)
8. To prevent fire or electrical shock, do not expose the Sb120a to rain or excess moisture.

Signal Input

The Sb120a may be driven by any line-level signal source, balanced or unbalanced. **Caution: do not connect the output of a power amplifier to the input.** Although this should not damage the Sb120a, it is very likely to result in distorted sound quality because the output voltage of a power amplifier is typically high enough to severely clip the input of the Sb120a.

The combination connector accepts a balanced signal from either a 3-pin male XLR-type connector or a 1/4-in. tip-ring-sleeve (TRS) phone plug. The input connector also accepts an unbalanced signal from a standard, two-circuit 1/4-in. phone plug. (Balanced sources are least susceptible to noise and should be used when possible.)

Driving Multiple Sb120a's

The high, 10,000-ohm input impedance allows several Sb120a systems to be connected in parallel (daisy chained) to the usual single signal source, without undesirable loading effects on the source.

The 3-pin male XLR-type Full-Range Output connector is in parallel with the Input connector and should be used for this purpose. **Note: if the Input connector is connected to an unbalanced source via a standard, two-circuit 1/4-in. phone plug, an unbalanced signal will also be present at the Full-Range Output connector.** Pins 1 and 3 will be common and pin 2 will be hot.

Amplifier Controls and Indicators

The amplifier has minimal controls, for ease of use in the field.

The Power switch lights when the Sb120a is on and the system is getting power from a wall socket.

The System Gain control adjusts the output of the system in order to help balance the output of the Sb120a with the rest of your system. The fully clockwise setting has 0-dB attenuation and fully counterclockwise offers 6-dB attenuation.

The Amplifier Clip LED shows when the output of the amplifier begins to clip relative to the input signal. The clipping can be eliminated or reduced by turning down the System Gain control, or reducing the level at some other point in the sound system. Slight clipping is likely to be inaudible in normal use, and will not damage the DL12sb woofer. Very frequent, heavy clipping tends to produce a very distorted sound quality and in extreme cases could damage the DL12sb. In general, slight clipping on peaks is the recommended maximum operating level for the Sb120a.

The Input Balance control is used to "null out," or eliminate, hum and interference which may be picked up by the input cables or caused by an excessively high output impedance sometimes found in an inexpensive EQ or mixer. The nulling is done by ear. The Input Balance control optimizes the Sb120a's input signal for the quietest operation.

Ventilation

The metal amplifier plate on the rear of the enclosure serves as a thermal radiator to maintain the amplifier operating temperature within design limits. It is normal for this panel to become warm in use, particularly when the system is operated at high levels for a prolonged period of time. During operation, use care to ensure that there is at least one inch of space behind the panel to allow free circulation of air. Worst-case temperature rise is approximately 10 °C (50 °F).

CROSSOVER

The Sb120a is equipped with a built-in crossover, a second-order, 12-dB-per-octave low-passfilter at 125 Hz. In combination with the speaker/enclosure response, this filter provides the 250-Hz overall upper response limit noted in the specifications. The attenuation of frequencies above 250 Hz helps the bass enhancement not "muddy up" vocals or call attention to the physical location of the Sb120a.

The Sb120a may be driven by the low-frequency output of an external active crossover network. A crossover frequency in the range of 100-200 Hz is recommended. (The closer the crossover frequency is to 100 Hz, the least the overall sound quality will be affected by the enhancement of the bass module.)

The optional Xp200 electronic system controller provides a 24-dB-per-octave roll-off above 134 Hz.

SUBPASSBAND SPEAKER PROTECTION

The Sb120a has a built-in, 12-dB-per-octave high-pass filter at 20 Hz, for infrasonic speaker protection.

The Sb120a may be used with an external high-pass filter for additional infrasonic protection. For 12-dB-per-octave networks, a corner frequency as high as 47 Hz (0.8 the box tuning frequency) provides maximum protection without affecting sound quality. For higher roll-off rates, lower corner frequencies are permissible and provide essentially equivalent protection.

The sub output of the optional Xp200 electronic system controller provides a 24-dB-per-octave roll-off at 37 Hz.

MULTIPLE USE

The Sb120a may be used in multiples to increase acoustic output. A 6-dB increase in maximum acoustic output occurs when two speaker systems are placed side by side and paralleled. For operation at very low frequencies, the woofer cones "mutually couple," acting as one system with twice the effective cone area and twice the available amplifier power. Efficiency is doubled by the increased cone area to provide 3 dB more output, while the doubled power provides the potential for an additional 3-dB gain in maximum acoustic output.

Mutual coupling occurs when the center-to-center distance between woofers is less than one-half the wavelength. For the Sb120a crossed over at 250 Hz (the upper limit on frequency response provided by the built-in low-pass filter), the maximum distance for mutual coupling

across the band is about 69 cm (27 in.). For a crossover frequency of 137 Hz (the frequency provided by the optional X_p200 electronic system controller), the maximum distance for mutual coupling increases to about 1.25 m (4.1 ft). When the woofers are spaced greater than one-half the wavelength, the level increase is limited to the 3-dB increase in available amplifier power.

SYSTEM RESPONSE DUE TO THE ACOUSTICAL ENVIRONMENT

Several factors must be considered when determining the overall response of a speaker system in any listening environment. Physical characteristics of the room itself and placement of the speakers and listener can have considerable affect on SPL capability, perceived and/or measured frequency response and stereo imaging.

The low-frequency response of the S_b120a can be adversely affected by poor placement. The S_b120a was designed for quarter- or half-space use. This requires that the speaker system be positioned as close as possible to floor or wall surfaces (half space) or a floor/wall junction (quarter space). Corner placement, in most cases, will reinforce low frequencies the most. Also, placement in loose cavities or resonant mountings can seriously degrade the overall response.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker system shall consist of a 12-inch long-throw low-frequency transducer mounted in a two-piece vented enclosure made of black textured injection-molded polypropylene structural foam. The system will have a self contained Class-D high-speed digital switching power amplifier, with a second-order, 12-dB-per-octave low-pass network at a frequency of 125 Hz.

The loudspeaker system shall have an operating bandwidth of 50 Hz to 250 Hz. The sound pressure level shall be 120 dB at maximum gain, with an input signal of 0 dBu into the power amplifier's balanced input and the amplifier at clipping threshold, measured at 1 meter on the system axis.

The power amplifier section shall be capable of providing 400 watts into a 6-ohm reactive load with 0.5% total harmonic distortion at 100 Hz (typical). The power bandwidth shall extend from 20 Hz to 125 Hz. The amplifier shall accept both balanced and unbalanced inputs and have a maximum sensitivity of 0.775 volts for full output, and an input impedance of 10 kilohms.

There will be three metric M6 x 14-mm hanging inserts capable of supporting the system in a permanent installation application. The loudspeaker shall have a black, perforated metal grille covering the woofer. Overall dimensions shall be 58.7 cm (23.1 in.) high, 42.9 cm (16.9 in.) wide, 31.2 cm (12.3 in.) deep. The weight shall be 15.6 kg (34.4 lb).

The loudspeaker system shall be the Electro-Voice model S_b120a.

ELECTRO-VOICE UNIFORM LIMITED WARRANTY STATEMENT

Electro-Voice products are guaranteed against malfunction due to defects in materials or workmanship for a specified period, as noted in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual, beginning with the date of original purchase. If such malfunction occurs during the specified period, the product will be repaired or replaced (at our option) without charge. The product will be returned to the customer prepaid. **Exclusions and Limitations:** The Limited Warranty does not apply to: (a) exterior finish or appearance; (b) certain specific items described in the individual product-line statement(s) below, or in the individual product data sheet or owner's manual; (c) malfunction resulting from use or operation of the product other than as specified in the product data sheet or owner's manual; (d) malfunction resulting from misuse or abuse of the product; or (e) malfunction occurring at any time after repairs have been made to the product by anyone other than Electro-Voice or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Electro-Voice or any of its authorized service representatives together with proof of purchase of the product in the form of a bill of sale or receipted invoice. A list of authorized service representatives is available from Electro-Voice at 600 Cecil Street, Buchanan, MI 49107 (616/695-6831 or 800/234-6831) and/or Electro-Voice West, at 8234 Doe Avenue, Visalia, CA 93291 (209/651-7777 or 800/825-1242). **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are the only remedies provided to the customer. Electro-Voice shall not be liable for any incidental or consequential damages including, without limitation, injury to persons or property or loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **Other Rights:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Electro-Voice Speakers and Speaker Systems are guaranteed against malfunction due to defects in materials or workmanship for a period of five (5) years from the date of original purchase. The Limited Warranty does not apply to burned voice coils or malfunctions such as cone and/or coil damage resulting from improperly designed enclosures. Electro-Voice active electronics associated with the speaker systems are guaranteed for three (3) years from the date of original purchase. Additional details are included in the Uniform Limited Warranty statement.

Service and repair address for this product: Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (616/695-6831 or 800/234-6831).

Specifications subject to change without notice.

ELECTRO-VOICE a MARK IV company **600 Cecil Street, Buchanan, Michigan 49107**
MANUFACTURING PLANTS AT ■ BUCHANAN, MI ■ NEWPORT, TN ■ SEVIERVILLE, TN ■ OKLAHOMA CITY, OK ■ GANANOQUE, ONT.

Part Number 532116 — 94C2