SPECIFICATIONS

Frequency Response:
25-1,000 Hz ±5 dB (TL303 enclosure)

Power Handling,
8 Hours, 6 dB Crest Factor:
60 watts (EIA Standard RS-426A)

Impedance,
Nominal:
8 ohms
Minimum:
5 ohms

Sound Pressure Level at 1 Meter, 1 Watt Input Averaged, Pink Noise Band-Limited from 500-5,000 Hz:
100 dB

Voice-Coil Diameter:
6.35 cm (2.50 in.)

Magnet Weight:
4.2 kg (9.3 lb)

Magnet Material:
Strontium ferrite

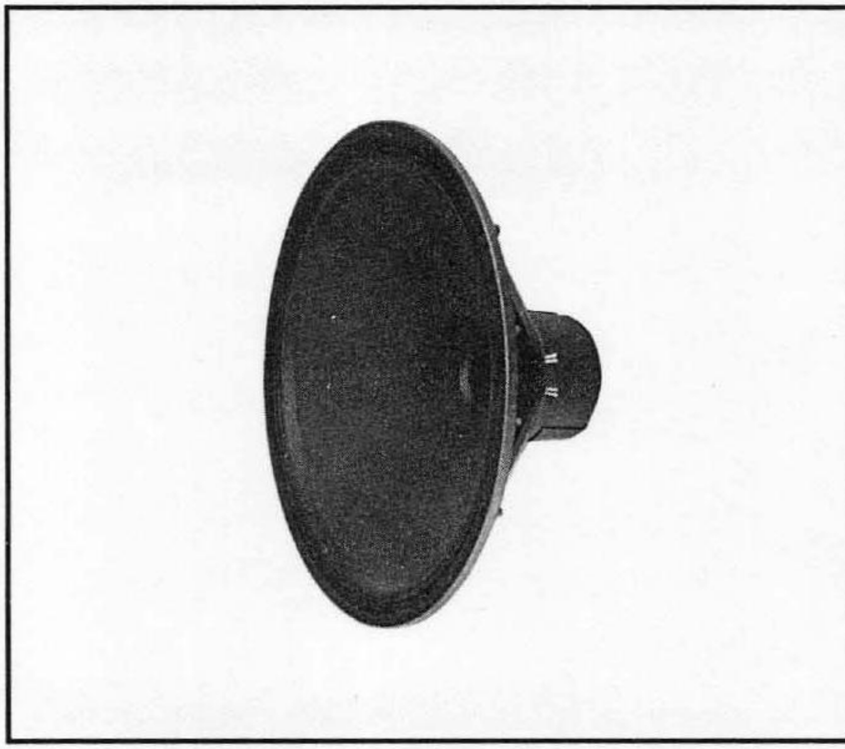
Flux Density:
1.3 Tesla

Construction:
One-piece cast aluminum frame

Dimensions,
Diameter:
75.6 cm (29.8 in.)
Depth:
34.1 cm (13.4 in.)

Net Weight:
15.4 kg (34.0 lb)

Shipping Weight:
16.8 kg (37.0 lb)



30W Bass Loudspeaker

DESCRIPTION

The University Sound 30W is a 30-inch woofer for use in systems requiring an extreme bass range.

A massive magnet structure, heavy duty edge-wound copper voice coil, and rigid polystyrene foam cone are combined in the 30W to provide high acoustic power in the low-frequency area of sound.

The speaker uses a 6.35 cm (2.50 in.) diameter voice coil and a strontium ferrite magnet assembled to a one-piece aluminum frame for durability.

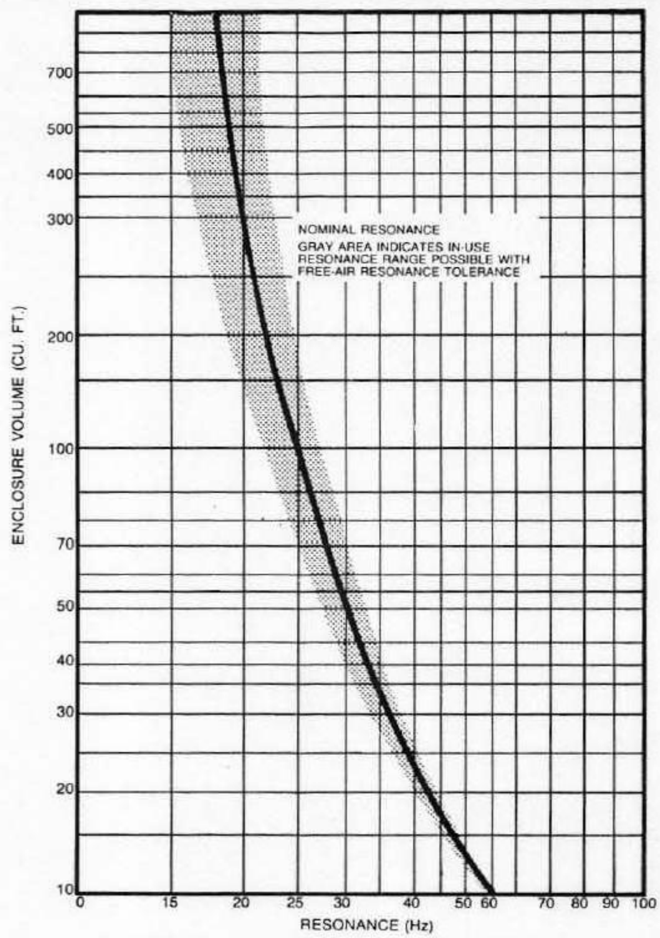
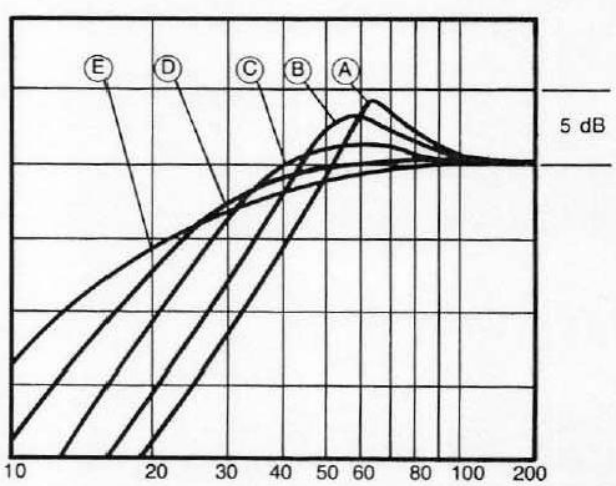


FIGURE 1 — Enclosure Volume vs. Resonance



Curve	Volume (cu. ft.)	Resonance	Anechoic Response at Resonance	Damping
A	8.5	60 Hz	+4 dB	Under —
B	12.5	50 Hz	+2 dB	Under —
C	22	40 Hz	0 dB	Under —
D	50	30 Hz	−2.5 dB	"Optimum"
E	300	20 Hz	−6 dB	Over —

FIGURE 2 — Response Curves

INSTALLATION

A number of enclosures may be suitable for mounting of the 30W, however, the sealed (acoustic suspension) types are recommended for best performance.

Figure 1 shows how speaker resonance varies as the volume of an enclosure changes and Figure 2 shows corresponding response curves under anechoic conditions.

As the enclosure gets smaller and speaker resonance goes up, the speaker tends to become overdamped. An "optimum" response curve is ideal for enclosure purposes and should be about 3-dB-down at resonance as shown by curve "D" in Figure 2. A change in damping has a broad effect as shown by curves "C" and "E" with enclosure ratios of 13 to 1.

ACOUSTIC DAMPING MATERIAL

An underdamped speaker can be compensated for through the use of acoustic resistance added inside the enclosure. Fiberglass builder's insulation, available in batts and rolls for use between joists and studs, is an inexpensive and effective damping material. Any paper or foil backing should be removed before inserting the fiberglass in the enclosure. Filling the enclosure until the fiberglass is slightly compressed will reduce the resonant frequency up to 10%, as well as slightly increasing the damping.

SYSTEM ENVIRONMENT

The space in which the speaker is used can affect its performance as much as any other factor involved. If the speaker is placed in an extremely large area, away from reflecting surfaces, its output will tend to be the same as anechoic or free-field conditions. If a speaker is placed against a solid wall, at the junction of two walls, or in a corner formed by three walls, (½ space, ¼ space, and ⅛-space conditions) the low frequency energy is contained in a smaller angle of radiation, and the bass response will tend to rise. In an extremely large space approximating free-field, a response curve which is somewhat underdamped may provide the most satisfying performance. On the other hand, close reflecting surfaces will tend to boost low-frequency response, making an overdamped (rolled off) free-field curve more desirable. This can be achieved through the use of a larger enclosure and/or fiberglass damping.

MASS LOADING

When enclosure volume is severely limited, mass loading can be used to reduce the resonant frequency at a slight sacrifice of efficiency. This principle is employed in the Patrician 800 system, yielding a modest size enclosure with the 30W for home use. The simplest method of mass loading involves increasing the air load on the front of the speaker by facing the speaker toward a rigid surface, such as a wall (Figure 3).

As the speaker is brought closer to the wall, the effective mass of air in front of the speaker increases, lowering the resonant frequency. Resonance can be lowered by as much as 25% with this technique. However, if cabinet space for a large enclosure is available, the conventional approach is preferable to mass loading.

ENCLOSURE CONSTRUCTION

Because any cabinet wall vibration is out of phase with the woofer cone, panel vibrations will cancel a portion of the woofer output. A concrete block enclosure is ideal, but far from practical! One-inch plywood walls, liberally braced with 2x4 sections, is a good compromise method of reducing panel vibration with manageable weight, cost, and ease of construction. Spacing of the 2x4 bracing on any panel should not exceed 24-inches in one direction.

Sixteen-inch spacing provides a more rigid panel and is more convenient to lay out, because most tape measures have sixteen-inch centers indicated for all stud spacing. All joints should be secured with a good grade of wood glue and coated nails, except for removable access panels. These should be secured with No. 8 x 2" woodscrews. Removable panels may be sealed with a closed-cell foam tape such as that used for weather-stripping, or with non-drying caulking compound.

Unlike most enclosures, there is no need to line the interior walls of the cabinet with fiberglass. The purpose of such a lining is to absorb standing waves inside the cabinet. However, the low frequencies of standing waves in 30W cabinets are not affected by a fiberglass lining on the cabinet walls. Adding fiberglass to the enclosure, as mentioned earlier, alters the response curve by lowering the system Q and also reduces the amplitude of standing waves inside the enclosure.

Mounting the 30W in a wall will probably necessitate the removal of more than 30 inches of one stud. Structural rigidity may be maintained through the use of a header and sill above and below the speaker. For convenience, the 30W may be secured to a one-inch plywood mounting baffle which is then screwed to the wall studs and framing. Before proceeding with the mounting of the 30W in this way, however, it is extremely advisable to consult with a competent architect or builder.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker shall be a low-frequency woofer with 2½-inch diameter edge-wound copper voice coil.

The loudspeaker will exhibit a frequency response from 25 to 1,000 Hz and be capable of handling a 60-watt pink noise signal with a 6 dB crest factor for a period of eight hours as per EIA Standard RS-426A.

The loudspeaker shall have a diameter of 75.6 cm (29.8 in.) and a depth of 34.1 cm (13.4 in.). The weight will not exceed 15.4 kg (34.0 lb).

The speaker shall have a nominal impedance of eight ohms. The University Sound Model 30W is specified.

WARRANTY (Limited) — University Sound Speakers and Speaker Systems (excluding active electronics) are guaranteed for five years from date of original purchase against malfuntion due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to University Sound. Unit will be returned prepaid. Warranty does not extend to finish, appearance items, burned coils, or malfunction due to abuse or operation under other than specfied conditions, including cone and/or coil damage resulting from improperly designed enclosures, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. Repair by other than University Sound will void this guarantee. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Service and repair address for this product:
University Sound, Inc., 600 Cecil Street, Buchanan, MI 49107 (AC/616-695-6831)

Applications and technical information for University Sound products:
University Sound, Inc., Attention Technical Coordinator, 600 Cecil Street, Buchanan, MI 49107 (AC/616-695-6831).

Specifications subject to change without notice.

BASIC GUIDELINES FOR THE USE OF HORNS AND DRIVERS WITHIN A SOUND SYSTEM.

DESIGNING FOR INTELLIGIBILITY AND ADEQUATE SPL ... is achieved, reverberation is minimized and intelligibility is maximized.

The following material explains these concepts in more detail and illustrates two design approaches.

What is Reverberation?

Reverberation is the persistence of sound within an enclosure, such as a room, after the original sound has ceased. Reverberation may also be considered as a series of multiple echoes so closely spaced in time that they merge into a single continuous sound. These echoes decrease in level with successive reflections, and eventually are completely absorbed by the room.

Non-Reverberant Environments

An open, outdoor space is considered to be a non-reverberant environment, as virtually all sound escapes the area without reflection.

Variations in Level Due to Distance for Non-Reverberant Environments

In non-reverberant environments, such as outdoors, sound pressure level will be reduced by half (6 dB) every time the distance form the speaker is doubled (this is called the inverse-square law). Figure A shows the dB losses to be expected as distance from the speaker is increased from the one-meter (3.28-foot) measuring distance typically used in SPL specifications.

Reverberant Environments

Where sound is reflected from walls and other surfaces, there is a point beyond which the "reverberant field" dominates and the sound pressure level is higher and more constant than predicted by using the inverse-square law alone.

Variations in Level Due to Distance for Reverberant Environments

The reverberant field will begin to dominate typically at distances of 10 to 30 feet. This distance is greatest for the least reverberant rooms and speakers with narrow beamwidth angles. The frequency and beamwidth specifications provided by the data sheet are still required to obtain satisfactory distribution of the direct sound (or direct field) from the loudspeaker(s), which still follows the inverse-square law. It is the direct signal that contributes to speech intelligibility. This is why the sound system designer should seek a uniform direct field, with as little reverberant field as possible. For example, consider a single speaker with a wide beamwidth angle used to cover a long, narrow, reverberant room. The direct field will be so far below the reverberant field at the back of the room that speech will probably be unintelligible.

Calculating Variations in Level Due to Changes in Electrical Power

Each time the power delivered to the speaker is reduced by one-half, a level drop of 3 dB occurs. The nomograph of Figure B shows the the change in dB to be expected as the power varies from the one-watt input typically used in SPL specifications.

Power Handling

The power rating of a speaker must be known to determine whether a design is capable of meeting the sound pressure level requirements of the system. The power rating combined with the sensitivity will enable a system designer to calculate the maximum sound pressure level attainable at a given distance.

FIGURE A
Level Variation
With Distance

FIGURE B
Level Variation
With Power

Powering to Achieve Both Average and Peak SPL

The average power that must be delivered to the speaker(s) to achieve the desired average SPL can be determined from the previously presented material on speaker sensitivity, level variation with distance and level variation with power. Enough additional power must be available to reproduce without distortion the short-term peaks that exist in voice and music program. This difference between the peak and average capability of a sound system, when expressed in dB, is often called "peak-to-average ratio," "crest factor" or "headroom." The peaks can be large, as noted earlier: at least 10 times the average (10 dB).

The better sound systems are designed for peaks that are 10 dB above the average, although 6 dB of headroom is sufficient for most general-purpose voice paging systems. The 10-dB peaks require amplifier power ten times that required for the average sound levels. The 6-dB peaks require four times the power.

Utilizing Speaker Beamwidth Information for Maximum Intelligibility

Knowing the beamwidth angle of a loudspeaker can aid in providing a uniform direct field in the listening area. After selecting a desired speaker location, the beamwidth angle needed to adequately cover the listeners without spilling over to the walls or ceilings must be determined. Once these angles are known, the correct speaker can be found by using catalog specifications.

Using Easy-VAMP™ and Floor-Plan Isobars

In some circumstances, it is desirable to use an approach that is more detailed than using the basic horizontal and vertical beamwidth angles. Environments which have excessive reverberation or high ambient noise levels make it especially difficult to achieve the desired SPL and intelligibility.

In recent years, a number of computer-based techniques have been developed to help sound system designers. Some of the more complex systems use personal computers, with relatively sophisticated graphics. Simpler systems, such as Electro-Voice's VAMP™ (Very Accurate Mapping Program), utilize clear overlays and require programmable scientific calculators. However, the hardware/software and training investment required to utilize even the simpler systems are not attractive to some sound systems designers. Because of this, University Sound has developed a special adaptation of VAMP, called Easy-VAMP™, which provides a similar design aid without the complexity and cost of the VAMP programs.

More information on both the Easy-VAMP™ and floor-plan isobars can be found in the University Sound Guide.

Part Number 530903—804
Litho in U.S.A.

University Sound™
a MARK IV company
600 CECIL STREET
BUCHANAN, MICHIGAN 49107