SPECIFICATIONS

Frequency Response:
500-7,000 Hz ± 5 dB
(see Figure 3)

Power Handling,
8 Hours, 6-dB Crest Factor:
30 watts (500-5,000 Hz pink noise)

Impedance, Nominal:
8 ohms

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

Horizontal Beamwidth:
60° @ 2 kHz (see Figure 2)

Vertical Beamwidth:
60° @ 2 kHz (see Figure 2)

Usable Low-Frequency Limit:
350 Hz

Construction:
Heavy gauge spun aluminum and baked-
on acrylic finish combined for weather-
proof construction.

Voice-Coil Diameter:
3.81 cm (1.5 in.)

Magnet Weight:
0.24 kg (0.53 lb)

Magnet Material:
Strontium ferrite

Flux Density:
1.2 Tesla

Dimensions,
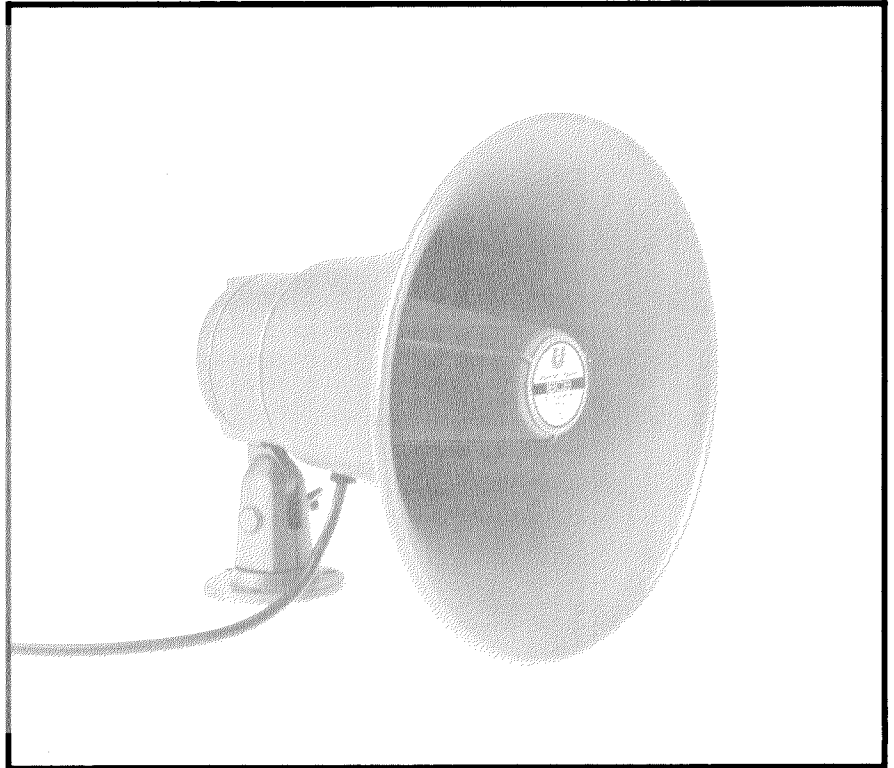**Diameter:**
26.0 cm (10.3 in.)
Depth:
22.9 cm (9.0 in.)

Net Weight:
1.4 kg (3.2 lb)
Shipping Weight:
2.0 kg (4.3 lb)

IBC8   Paging Speaker

DESCRIPTION

The University Sound IBC8 is a conservatively rated 30-watt paging or public address loudspeaker for use under adverse ambient noise conditions.

The driver employs a rugged phenolic diaphragm, 1.5-inch diameter voice coil and "rim centered" ferrite magnet structure for long life and reliability under extreme operating conditions.

A 6-inch vinyl-jacketed cable, phased and color coded, is provided for connecting to the IBC8.

A 60° dispersion angle and a low-frequency cutoff of 350 kHz provides excellent articulation in demanding applications.

The IBC8 is contructed from heavy gauge spun aluminum and bake ¹-on acrylic finish. A painted steel swivel bracket provides maximum mounting flexibility and ease of installation.

Ideal for both indoor and outdoor applications, this horn and driver unit is ideal for any require-ment where rugged, reliable performance is necessary.

FIGURE 1
IBC8 Polar Response

HORIZONTAL ———
VERTICAL − − − −

FIGURE 2
IBC8 Beamwidth vs. Frequency

FIGURE 3
IBC8 Frequency Response
(1 watt at 1 meter)

DIRECTIONAL PERFORMANCE

The directional characteristics of the IBC8 were measured by running a set of polar responses in University's large anechoic chamber. The test signal was one-third-octave-band-limited pseudo-random pink noise centered at the ISO standard frequencies indicated in Figure 1.

Additional typical data is provided in Figure 2 which indicates 6-dB-down beamwidth versus frequency for an IBC8.

FREQUENCY RESPONSE

Figure 3 shows the axial frequency response of the IBC8. It was measured at a distance of 1 meter, using a swept sine wave.

LOW-FREQUENCY DRIVER PROTECTION

When frequencies below the low-frequency cutoff for the horn assembly are fed to the driver, excessive current may be drawn by the driver. For protection of the driver and amplifier, capacitor(s) in series with the driver, is recommended.

For 8-ohm driver, 25 V-100 mf.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker shall be the University Sound Model IBC8 integral horn and loudspeaker utilizing a rugged phenolic diaphragm and high-temperature rated 1.5-inch voice coil.

The axial frequency response will extend from 500 to 7,000 Hz. Sound pressure level will be 107 dB (1 W/1 M) with a 500-to-3,000-Hz pink noise signal applied, and the horn will produce a sound dispersion of 60° at 2 kHz.

The loudspeaker shall be capable of handling a 30-watt, 500-to-5,000-Hz pink noise signal with a 6-dB crest factor for a period of eight hours.

The horn shall be heavy gauge spun aluminum, capable of satisfactory mechanical performance in the temperature range from −40°C (−40°F) to 71°C (160°F) and impervious to adverse conditions. The mounting base shall be steel, and the horn and base finished in baked-on gun metal gray acrylic.

The mounting base shall provide orientation adjustment in all three planes. Vertical adjustments are made by loosening a single wingnut on the mounting base.

The loudspeaker shall be 26.0 cm (10.3 in.) in diameter, and 22.9 cm (9.0 in.) deep.

The loudspeaker shall be the University Sound IBC8, which has a nominal impedance of eight ohms and weighs no more than 1.4 kg (3.2 lb).

Service and repair information for this product: University Sound, Inc., Phone 818/362-9516, FAX 818/367-5292.

Applications and technical information for University Sound products: University Sound, Inc., Technical Coordinator, Phone 818/362-9516, FAX 818/367-5292.

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

The Basic Idea

Many sound systems would have better performance if the following basic principles are kept in mind. Speakers with the appropriate coverage patterns should be chosen, aimed and powered to achieve a uniform direct field in the highly absorbtive audience, with no sound aimed at the reflective wall and ceiling surfaces. Where multiple speakers are required in order to achieve a uniform direct field, their coverage patterns should be only slightly overlapped, so that each section of the audience is covered by a single speaker. To the extent this ideal 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
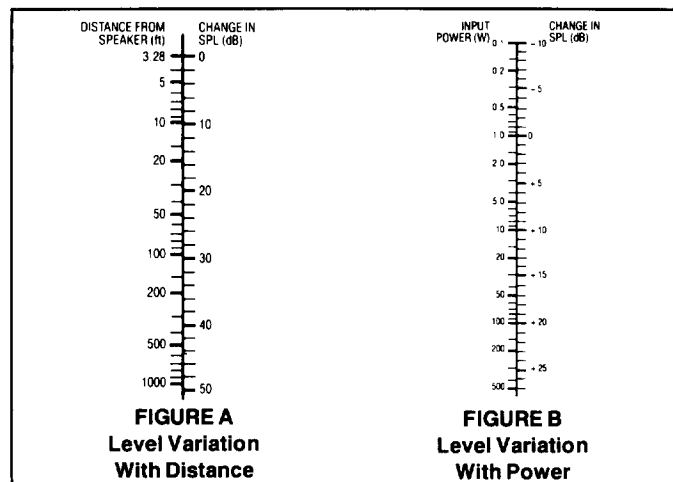
Powering to Achieve Both Average and Peak SPL

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.