University Sound.™

a MARK IV company

SPECIFICATIONS

Frequency Response:
850-8,000 Hz ±5 dB
(see Figure 3)

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

Transformer Taps and Impedances:
See Table 1

Sound Pressure Level at 1 Meter,
1 Watt Input Averaged, Pink Noise
Band-Limited from 800 to 5,000 Hz:
103 dB (single projector)

Beamwidth:
75° @ 2 kHz (see Figure 2)

Directivity Factor R_θ (Q):
12.6 @ 2 kHz

Usable Low-Frequency Limit:
500 Hz

Construction:
High-impact polypropylene with ultraviolet light-inhibiting mesa tan finish. Zinc diecast mounting base with steel strap joining the horns.

Voice-Coil Diameter:
2.54 cm (1.0 in.)

Magnet Weight:
0.16 kg (0.35 lb)

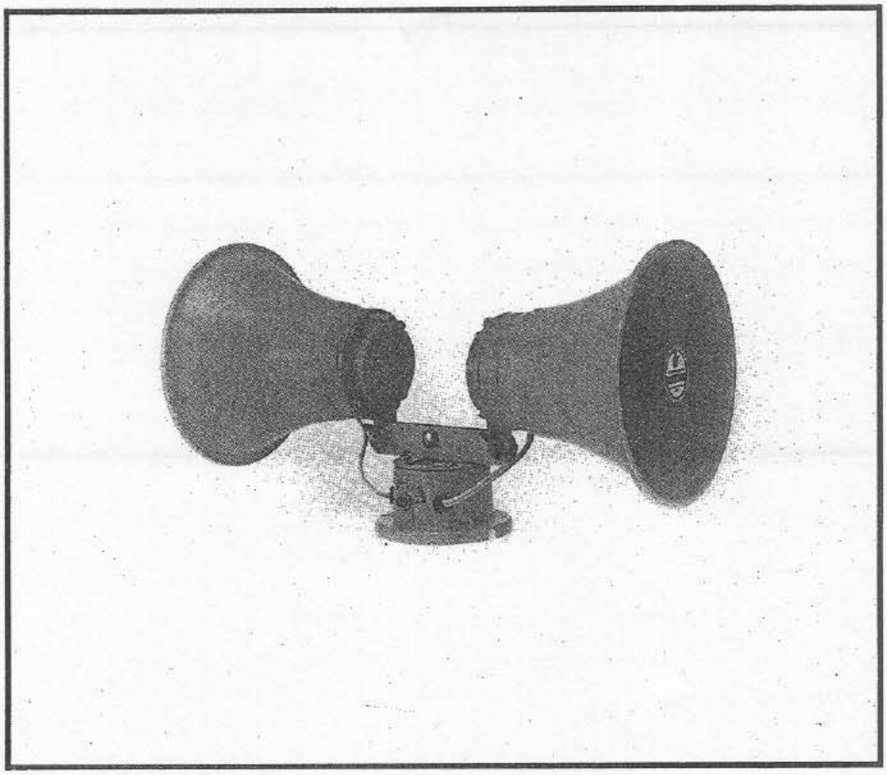
Magnet Material:
Strontium ferrite

Flux Density:
1.08 Tesla

Dimensions,
Height:
22.2 cm (8.8 in.)
Width:
41.9 cm (16.5 in.)
Depth:
19.0 cm (7.5 in.)

Net Weight:
2.0 kg (4.6 lb)

Shipping Weight:
2.3 kg (5.1 lb)



PA34T Bi-Directional Paging Projector

DESCRIPTION

The University Sound PA34T is a conservatively rated 30-watt bi-directional reentrant paging projector designed for indoor/outdoor applications, particularly for long, narrow areas such as hallways.

The drivers have rugged phenolic diaphragms, 1.0 inch diameter voice coils and "rim centered" ferrite magnet structures for long life and reliability under extreme operating conditions.

A diecast zinc mounting base house a 25V/70V line transformer and a screwdriver-operated power tap select switch.

Dispersion is of an angular bi-directional pattern, and with proper adjustment on a vertical mounting post, two PA34T's can provide 360° coverage.

The horns are molded from high-impact polypropylene and joined by a steel strap.

Ideal for both indoor and outdoor applications, these drivers are well suited for any installation requiring rugged, reliable performance.

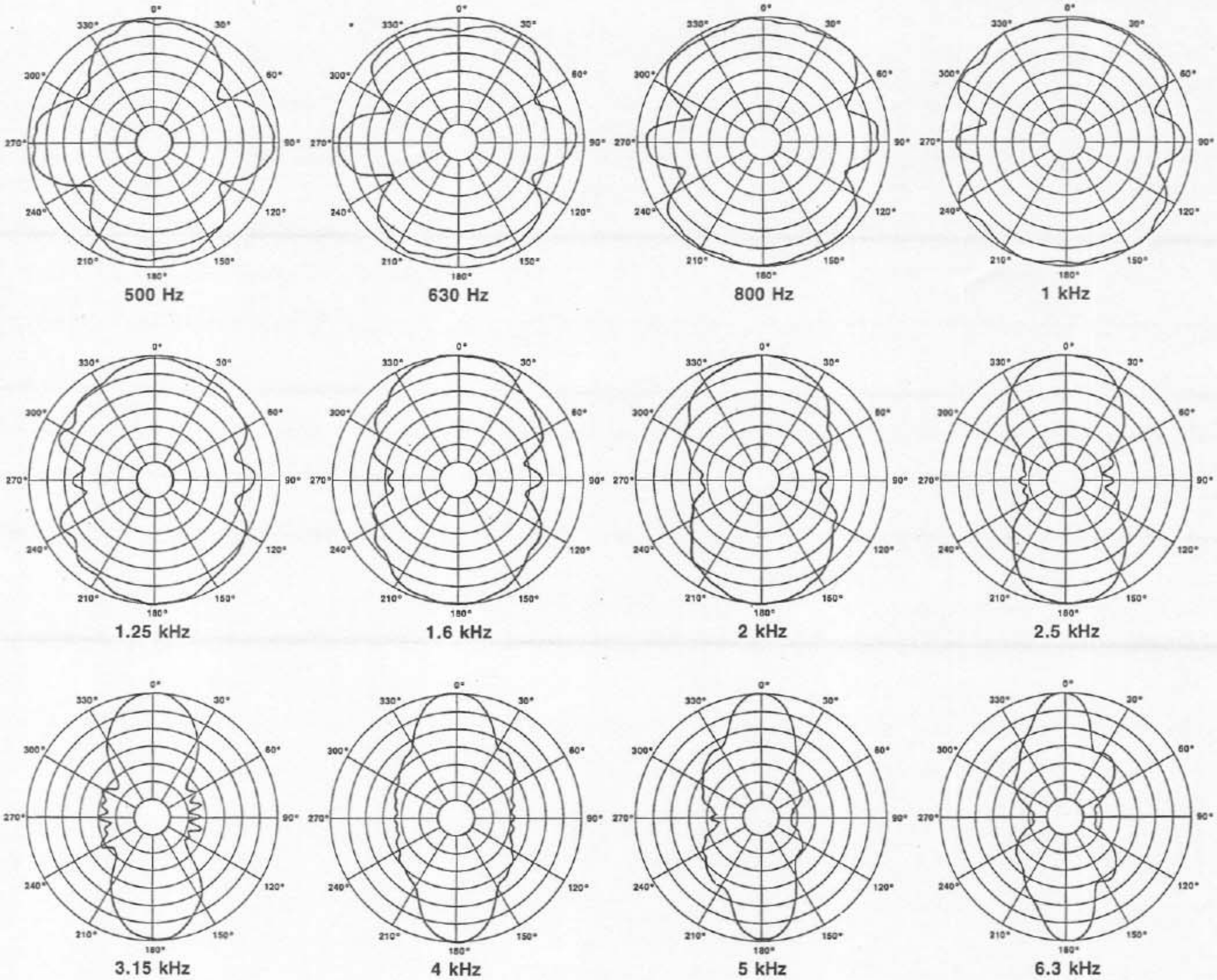


FIGURE 1
PA34T Polar Response

HORIZONTAL ——
VERTICAL - - - -

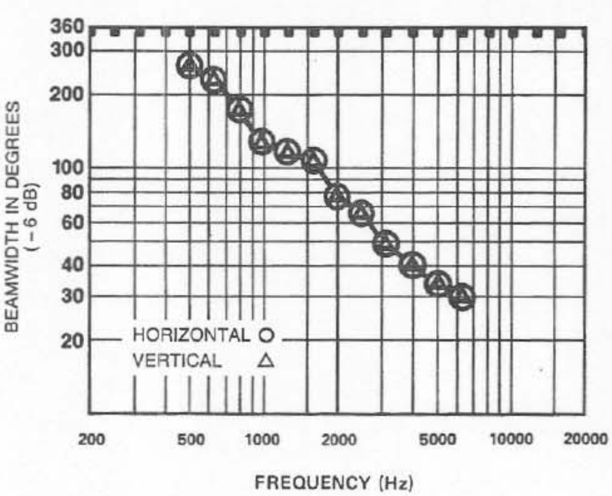


FIGURE 2
PA34T Beamwidth vs. Frequency

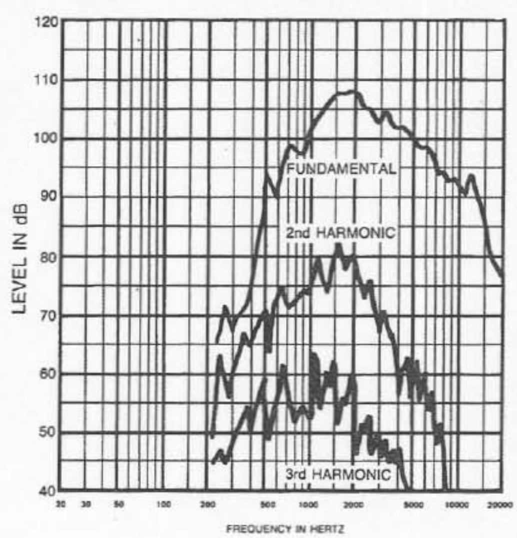


FIGURE 3
PA34T Frequency Response
(1 watt at 1 meter)

POLAR RESPONSE

The directional characteristics of the PA34T was measured by running a set of horizontal/vertical polar responses in University's large anechoic chamber, at each one-third-octave pseudo-random pink noise centered at the indicated frequencies. The measurement microphone was placed 6.1 m (20 ft.) from the horn mouth, while rotation was about the waveguide geometric apexes. These axes of rotation are quite close to the apparent (acoustic) apexes across the frequency range of measurement. Errors attributable to the slight differences between the geometric and acoustic apexes are reduced to an inconsequential level by the relatively long, 20-foot measuring distance. The horn was suspended freely with no baffle. The polar plots shown in Figure 1 display the results of these tests. The center frequency is noted on each plot. Horizontal and vertical polars are identical.

BEAMWIDTH

A plot of the PA34T's 6-dB-down total included beamwidth angle is shown in Figure 2 for each one-third-octave center frequency.

FREQUENCY RESPONSE

Figure 3 shows the axial frequency response of the PA34T. It was measured at a distance of 1 meter, using a swept sine wave.

INSTALLATION

The mounting base is permanently wired to the horn assembly so should not be removed.

A paper template is provided for easy installation on a 9.6-cm (3.8-in.) circle and needs only to be fixed in place and holes drilled where indicated. Number 10 screws are the minimum recommended size. Access to the screw holes is made easier by loosening the wingnuts and temporarily re-positioning the horns.

TRANSFORMER

A transformer and power selector switch are installed in the mounting base.

The level of the PA34T can be adjusted by moving the switch setting (see Table I); clockwise increases the power. Since the same switch and transformer are used for either the 70-volt or 25-volt line, the power setting depends on the amplifier output used — 70 volt or 25 volt.

CAUTION: When connected to a 70.7-volt line, do not use the two switch settings marked DO NOT USE as this may result in excessive power driving the PA34T.

LOW-FREQUENCY DRIVER PROTECTION

When frequencies below the low-frequency cutoff for the horn assembly are fed to the driver, excessive current might be drawn by the driver. For protection of driver, amplifier, and transformer (if driver with built-in transformer is used), capacitor(s) in series with driver or transformer primary is recommended. Table I (above) indicates recommended values. The values shown are for 200 Hz. Values for other frequencies can be determined by using the formula:

$$C = \left[C_{200} \times \frac{200}{f} \right]$$

C_{200} = Values shown in the following table

f = New Frequency

For drivers without transformers:
8-ohm driver, 25 V – 100 *mf*

150 V dc or 150 V non-polarized electrolytic, or two 150 V dc electrolytics of two times required value in series, back to back, for 70-volt lines.

	70-Volt Lines		25-Volt Lines	
Power	Impedance	Capacitance	Impedance	Capacitance
30 W	167	4 *mf*	--	--
15 W	335	2 *mf*	42	20 *mf*
7.5 W	670	1.0 *mf*	84	10 *mf*
3.7 W	1360	0.5 *mf*	170	50 *mf*
1.9 W	2700	0.3 *mf*	340	30 *mf*
.8 W	—	—	720	15 *mf*
.5 W	—	—	1610	6.5 *mf*
.2 W	—	—	3220	3.2 *mf*

TABLE I — Series Protection Capacitors for 200 Hz and Below

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker shall be bi-directional, utilizing two horns, having rugged phenolic diaphragms and high-temperature rated 1.0-inch diameter voice coils.

The axial frequency response will extend from 850 to 8,000 Hz and the horn shall exhibit a low-frequency cutoff of 500 Hz and a beamwidth of 75°
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 molded high-impact polypropylene capable of satisfactory mechanical performance in the temperature range of −40°C (−40°F) to 71°C (160°F) and not subject to sunlight embrittlement. Other major external speaker parts shall be diecast zinc finished in mesa tan baked enamel to match the molded horn pieces. All components shall be resistant to damage from weather, moisture, and fungus.

The mounting base has provisions for vertical adjustment of the two horns by loosening wingnuts.

The loudspeaker shall be 22.2 cm (8.8 in.) high, 41.8 cm (16.50 in.) wide and 18.0 cm (7.5 in.) deep. The loudspeaker shall be the University Sound PA34T and shall weigh no more than 2.0 kg (4.6 lb).

WARRANTY (Limited) — University Sound Speakers and Speaker Systems (excluding active electronics) are guaranteed for five years from date of original purchase against malfunction 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 specified 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 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.

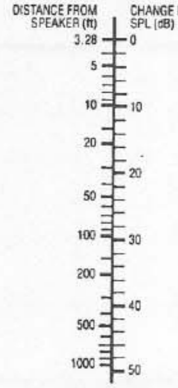


FIGURE A
Level Variation With Distance

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.

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