™ **University Sound®**

a MARK IV company

SPECIFICATIONS

Frequency Response:
500-8,000 Hz ±5 dB
(see Figure 3)

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

Impedance,
8 ohms

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

Horizontal Beamwidth:
85° @ 2 kHz (see Figure 2)

Vertical Beamwidth:
85° @ 2 kHz (see Figure 2)

Directivity Factor R_θ (Q):
9.7 @ 2 kHz

Usable Low-Frequency Limit:
450 Hz

Construction:
Non-resonant Cycolac horn material and durable diecast mounting bracket. Resistant to environmental extremes

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

Magnet Weight:
0.28 kg (0.63 lb)

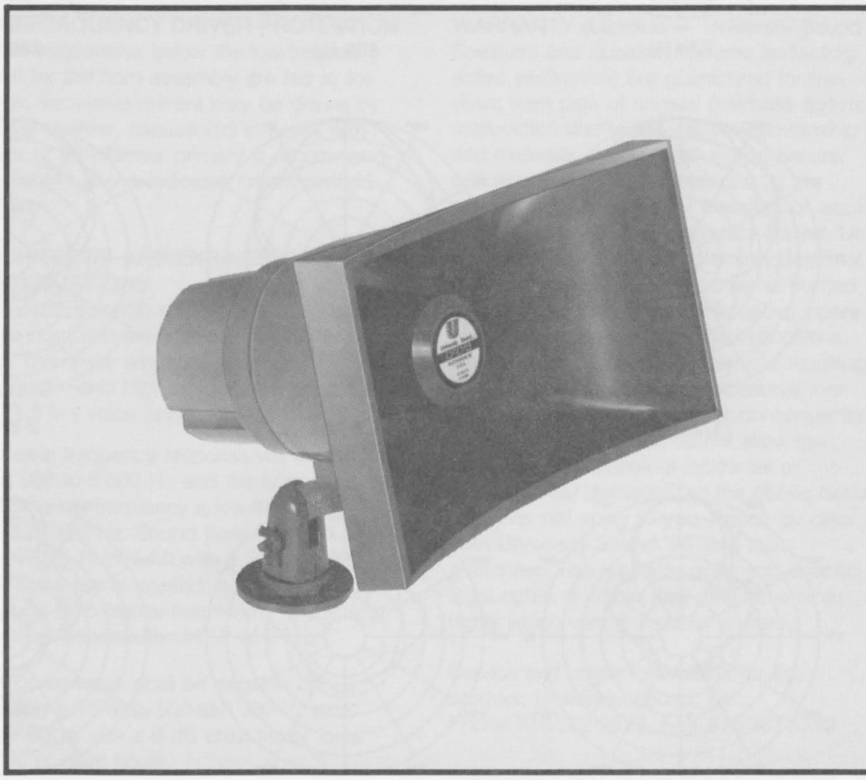
Magnet Material:
Strontium ferrite

Flux Density:
1.15 Tesla

Dimensions,
Height:
17.1 cm (6.8 in.)
Width:
30.2 cm (11.9 in.)
Depth:
26.4 cm (10.4 in.)

Net Weight,
CFID15-8: 1.7 kg (3.4 lb)
CFID15T: 1.7 kg (3.8 lb)

Shipping Weight,
CFID15-8: 1.7 kg (3.8 lb)
CFID15T: 1.9 kg (4.3 lb)



CFID15-8 CFID15T Paging/Talk-Back Speaker

DESCRIPTION

The University Sound CFID15-8 and CFID15T are conservatively rated 15-watt wide angle paging projectors designed for high speech clarity under difficult noise conditions.

The drivers employ rugged phenolic diaphragms, 1.5-inch diameter voice coils and "rim centered" ferrite magnet structures for long life and reliability.

The transformer model CFID15T includes connections for 25 V and 70 V distributed systems and a screwdriver operated power tap select switch.

The nominal 85° horizontal by 85° vertical coverage pattern, together with a low-frequency cutoff of 450 Hz, provides excellent articulation in demanding applications.

The CFID15-8 (CFID15T) is molded from non-resonant and weatherproof Cycolac. Exclusive Uni-Lok swivel mount allows precision mounting in a variety of installations. The gland nut connection insures a weather-tight seal.

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

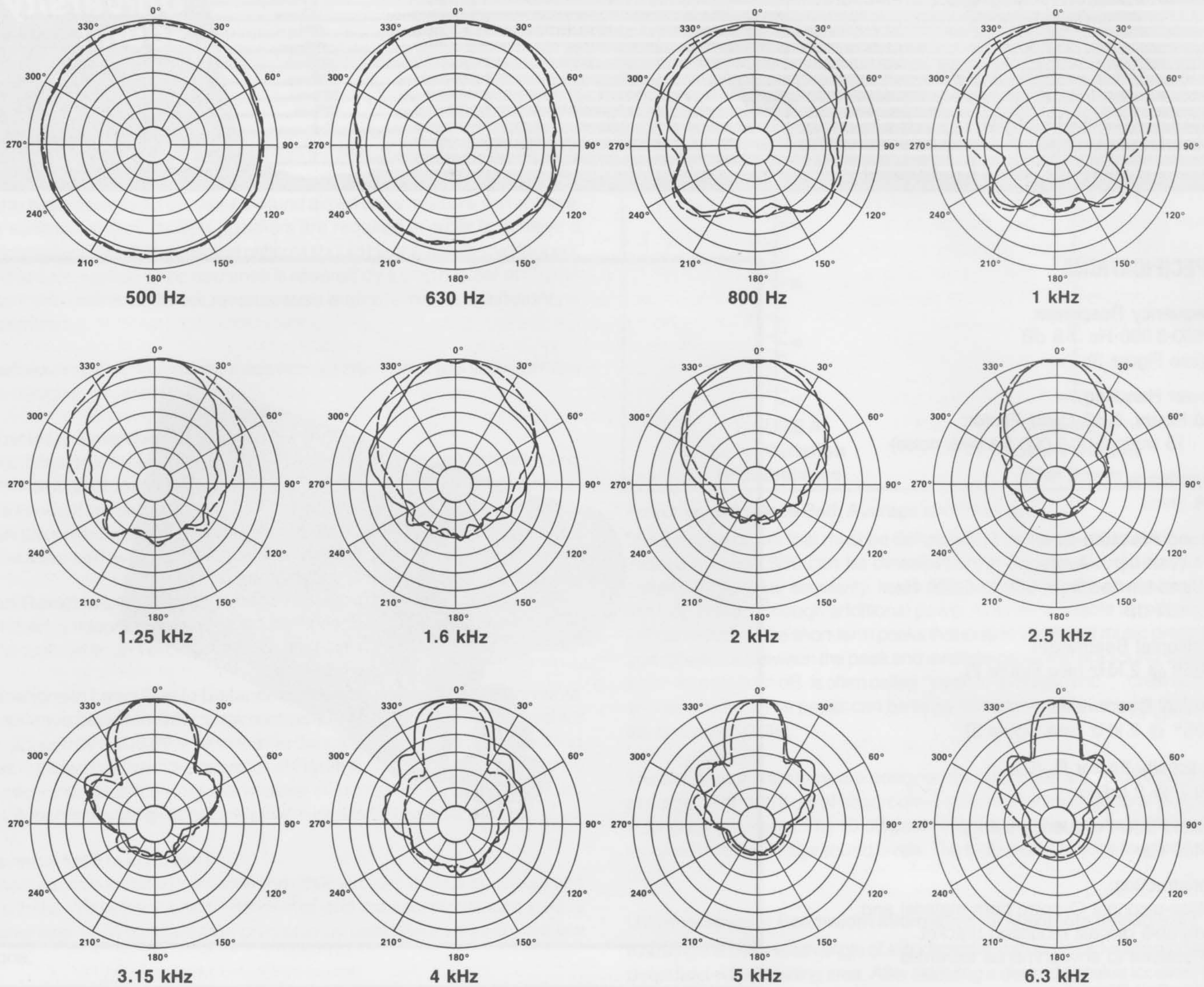


FIGURE 1
CFID15 Polar Response

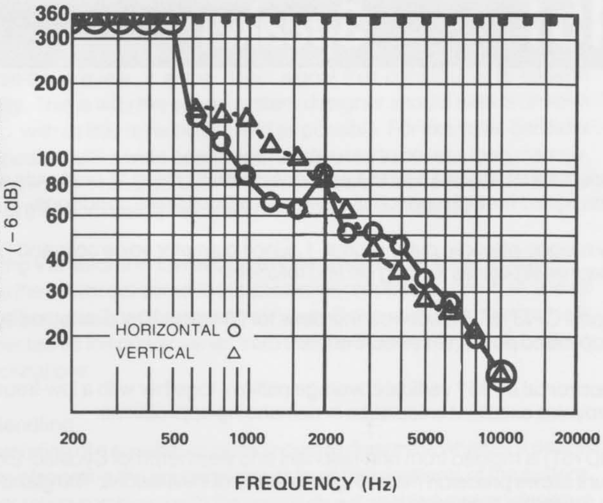


FIGURE 2
CFID15 Beamwidth vs. Frequency

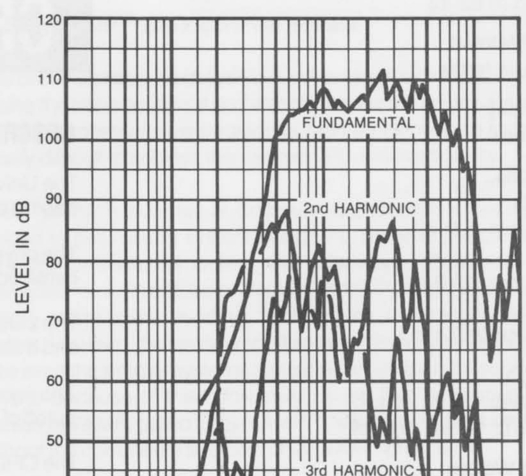


FIGURE 3
CFID15 Frequency Response
(1 watt at 1 meter)

POLAR RESPONSE

The directional characteristics of the CFID15 were measured by running a set of horizontal/vertical polar responses, in University's large anechoic chamber, at each one-third-octave center frequency. The test signal was 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. The polar plots shown in Figure 1 display the results of these tests. The center frequency is noted on each plot. The wider plot on each chart is the horizontal polar (–) and the narrower plot is the vertical polar (– – –).

BEAMWIDTH

A plot of the CFID15'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 CFID15. It was measured at a distance of 1 meter, using a swept sine wave.

INSTALLATION

Loosen the gland nut in the side of the driver housing enough to admit the loudspeaker wire/cable. Alternately, a ½-inch conduit fitting can be substituted for the gland nut. However, the sealing washer must be retained.

The Uni-Lok swivel mount allows the speaker to be precisely positioned and locked in place. A mounting plate is furnished with the Uni-Lok but ½-inch pipe may be used instead.

To flush mount the horn, finish drilling the four pre-drilled holes from the rear four corners and insert #8 machine screw toggle bolts or screws to secure the unit from the front.

A foam insert (CFID15F) is available to screen against nesting birds and insects.

TRANSFORMER MODEL (CFID15T)

A transformer and power selector switch are installed in the rear housing.

The level of the CFID15T may be adjusted by moving the switch setting; clockwise increases the power.

	70-Volt Lines		25-Volt Lines	
Power	**Impedance**	**Capacitance**	**Impedance**	**Capacitance**
15 W	350	2 *mf*	45	20
10 W	500	1.3 *mf*	63	13 *mf*
5 W	1000	0.7 *mf*	125	7 *mf*
2.5 W	2000	0.4 *mf*	250	4 *mf*
1.25 W	4000	0.2 *mf*	500	2 *mf*
1.25 W	4000	0.2 *mf*	500	2 *mf*
0.65 W	8000	0.1 *mf*	1000	1 *mf*

TABLE I — Series Protection Capacitors for 200 Hz and Below

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 transformer, capacitor(s) in series with driver or transformer primary is recommended. Table I above indicates recommended values.

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker(s) shall have a rectangular reflex horn with an exponential expansion rate. The driver employs a rugged phenolic diaphragm and high-temperature rated 3.81 cm (1.5 in.) voice coil.

The axial frequency response will extend from 500 to 8,000 Hz and the horn shall exhibit a low-frequency a low-frequency cutoff of 450 Hz. Sound pressure level will be 107 dB (1 W/1 M) with a 500-to-5,000-Hz pink noise signal applied, and the horn will produce a horizontal beamwidth of 85° and a vertical beamwidth of 85° at 2 kHz.

The loudspeaker shall be capable of handling a 15-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 weatherproof Cycolac capable of satisfactory mechanical performance in extreme weather conditions with a field-replaceable plug-in diaphragm and voice coil assembly (spare part #344).

A gland nut shall be provided for a weather-tight seal and a Uni-Lok swivel mount for rotation in both the horizontal and vertical planes. The Uni-Lok shall fit standard ½-inch pipe thread.

The loudspeakers shall be the University Sound CFID15T, which includes a 70 V/25 V line matching transformer and weighs no more than 1.7 kg (3.8 lb) and the University Sound CFID15-8, which has a nominal impedance of 8 ohms and weighs no more than 1.5 kg (3.4 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.

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.

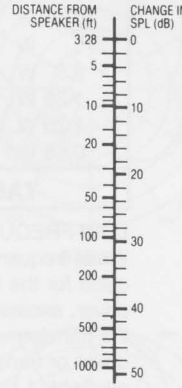


FIGURE A
Level Variation With Distance

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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