

## SPECIFICATIONS

**Frequency Response:**

280-8,000 Hz (see Figure 2)

**Power Handling,****8 Hours, 6-dB Crest Factor:**

60 watts (500-5,000 Hz pink noise)

**Impedance,****Nominal:**

16 ohms

**Minimum on FC100:**

11.0 ohms

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

105 dB on FC100 horn

**Voice-Coil Diameter:**

5.08 cm (2.0 in.)

**Magnet Weight:**

0.45 kg (1.0 lb)

**Magnet Material:**

Strontium ferrite

**Flux Density:**

1.38 Tesla

**Construction:**

Rugged weatherproof finish for outdoor use.

**Mechanical Connection of Driver:**1 $\frac{3}{8}$ "—18 thread allows the 1829 to be mounted on most University Sound horns.**Dimensions,****Diameter:**

13.5 cm (5.3 in.)

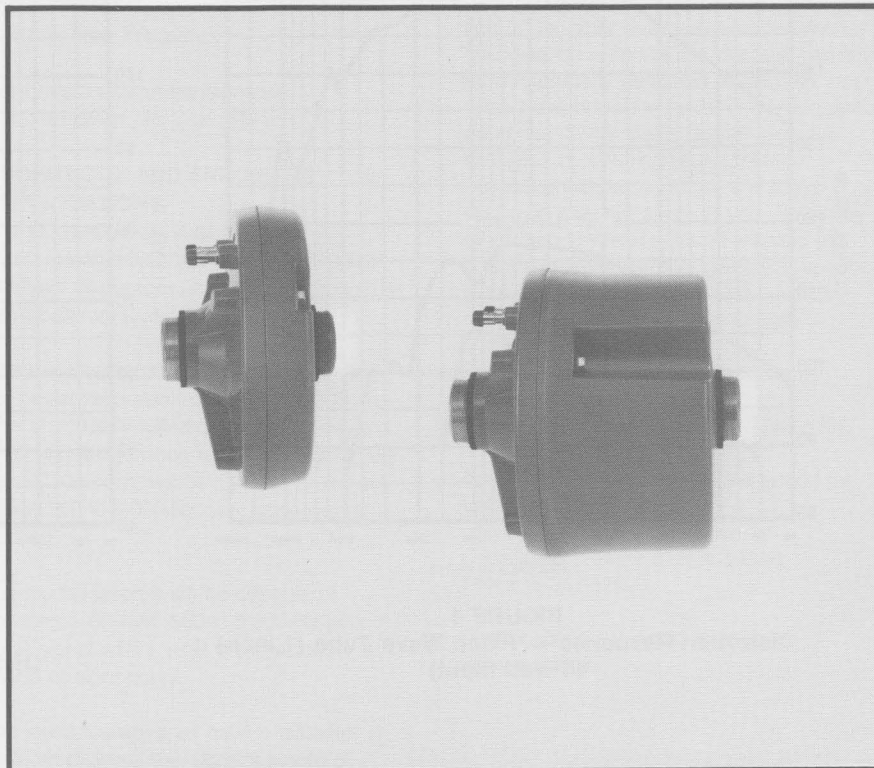
**Length,****1829:** 10.3 cm (4.1 in.)**1829T:** 16.2 cm (6.4 in.)**Net Weight,****1829:** 3.2 kg (7.0 lb)**1829T:** 4.5 kg (9.8 lb)**Shipping Weight,****1829:** 3.5 kg (7.8 lb)**1829T:** 4.8 kg (10.6 lb)**Recommended Horns:**

HC400

SMH

PH

FC100

**1829  
1829T****Convertible  
Drivers**

## DESCRIPTION

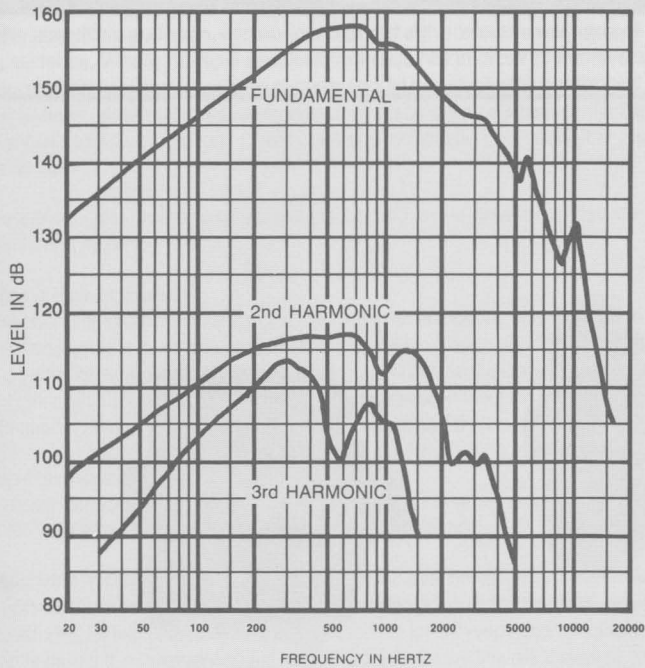
The University Sound 1829 and 1829T are heavy-duty convertible drivers for use in high-power public address installations.

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

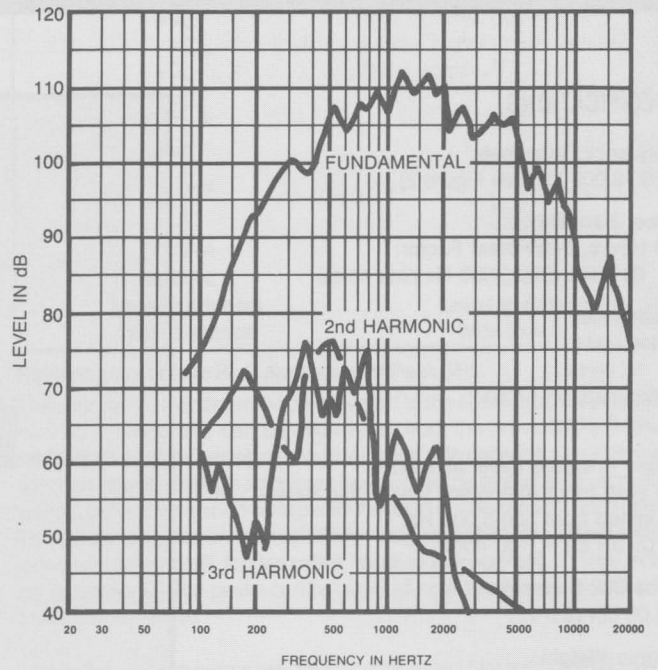
The transformer model (1829T) includes connections for 70 V distributed systems and a power tap select switch.

The exterior is finished in durable waterproof paint, and all metal parts have been treated for resistance to high humidity and fungus.

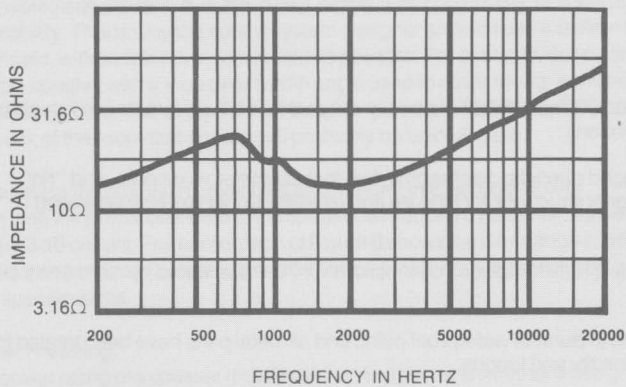
Ideal for both indoor and outdoor applications, these drivers are well suited for any installation requiring rugged high-power performance.



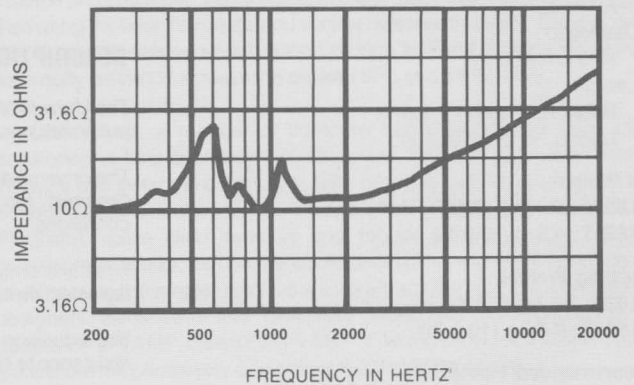
**FIGURE 1**  
Distortion Response — Plane Wave Tube (1 inch)  
(6-watt input)



**FIGURE 2**  
Distortion Response — FC100 Horn



**FIGURE 3**  
Impedance Response — Plane Wave Tube  
(1 inch)



**FIGURE 4**  
Impedance Response — FC100 Horn

| Horn  | SPL for 1 W @ 1 M |
|-------|-------------------|
| HC400 | 106 dB            |
| SMH   | 109 dB            |
| PH    | 108 dB            |
| FC100 | 105 dB            |

**TABLE I**  
Sound Pressure Level for 1829  
with Various Horns

#### INSTALLATION

For use with compound horns, remove both protective plastic caps and the plastic foam loading plug from the rear. Note: front end is the one with wiring terminals.

Next screw the large horn section onto the rear of the driver and the small section onto the front. Hand tighten to slightly compress rubber gaskets.

For use with all other horn types, rear cap and foam plug are left in place and firmly hand-tightened with horn attached to the front.

#### TRANSFORMER MODEL (1829T)

A transformer and power selection panel is installed in the base of the housing. Color coding for the transformer is listed in Table II.

|                  | Wire Color | Function                  |
|------------------|------------|---------------------------|
| <b>Primary</b>   | Black      | 70.7V speaker system      |
|                  | White      | Common for speaker system |
| <b>Secondary</b> | Blue       | 60W power tap             |
|                  | Brown      | 30W power tap             |
|                  | White      | 15W power tap             |
|                  | Red        | 7.5W power tap            |

**TABLE II**  
Line Transformer

#### 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 driver, amplifier, and transformer (if driver with built-in transformer is used), capacitor(s) in series with driver, or transformer primary is recommended. Table III (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 Table III

| 70-Volt Lines |           |             |
|---------------|-----------|-------------|
| Power         | Impedance | Capacitance |
| 60 W          | 83        | 10          |
| 30 W          | 166       | 5           |
| 15 W          | 333       | 2           |
| 8 W           | 625       | 1           |

**TABLE III — Series Protection Capacitors for 200 Hz and Below**

f = New Frequency

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

#### ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The loudspeaker(s) shall be of the compression-driver type having a rugged phenolic diaphragm and a high-temperature rated 5.08-cm (2.0-in.) voice coil.

The loudspeaker(s) shall exhibit essentially flat power response from 280 to 8,000 Hz with a smoothly rolled-off response beyond. Their sensitivity, when mounted on a University FC100 horn, will be 105 dB (1 W/1 m) with a 500-to-5,000-Hz pink noise signal applied.

The loudspeaker(s) will be capable of handling a 60-watt, 500-to-5,000-Hz pink noise signal with a 6-dB crest factor for a period of eight hours.

The loudspeakers shall have a diameter of 13.5 cm (5.3 in.), the 1829, a length of 10.3 cm (4.1 in.) and the 1829T, a length of 16.2 cm (6.4 in.). Both shall have a throat opening of 3.0 cm (1.2 in.) with a 1 $\frac{3}{8}$ "—18 thread for mounting.

The loudspeakers are the University Sound 1829T which includes a 70V line-matching transformer (see Table III) and weighs no more than 3.2 kg (9.8 lb), and the University Sound 1829 which has a nominal impedance of 16 ohms and weighs no more than 4.5 kg (7.0 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 of 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 absorptive 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 from 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

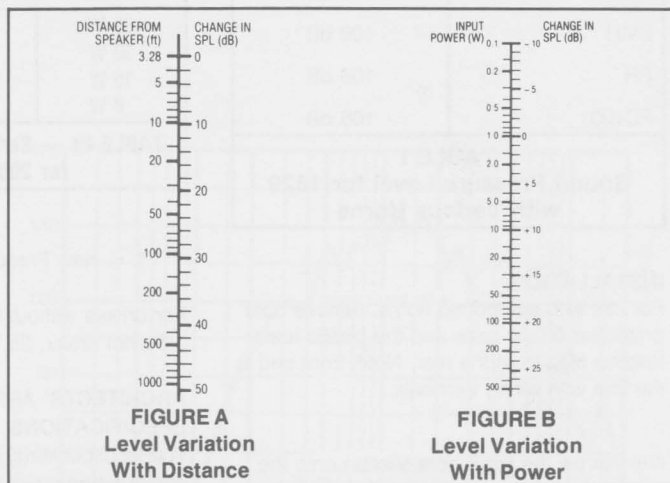
The reverberant field will begin to dominate typically at distances of 10 to 30 feet. This distance is greatest for the least reverberant rooms and speakers with narrow beamwidth angles. The frequency and beamwidth specifications provided by the data sheet are still required to obtain satisfactory distribution 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 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.



### 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 system 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.