University Sound™

a MARK IV company

SPECIFICATIONS

Frequency Response:
85-18,000 Hz ± 5dB
(See Figure 1)

Power Handling:
15 watts (EIA RS-426A)

Impedance:
Nominal:
8 ohms
Minimum:
6 ohms (8 kHz)

Sound Pressure Level at 1 Meter, 1 Watt Input, 200-4,000Hz Average:
96 dB

Voice-Coil Diameter:
2.54 cm (1.00 in.)

Magnet Weight:
0.32 kg (0.72 lb)

Magnet Material:
Barium ferrite

Flux Density:
1.2 Tesla

Speaker Frame:
22 ga. stamped steel

Color, Frame:
Black

Dimensions,
CS815/CS815T,
Diameter:
20.6 cm (8.1 in.)
Height:
7.1 cm (2.8 in.)

Net Weight,
CS815:
1.3 kg (2.8 lbs)
CS815T:
1.4 kg (3.1 lbs)

Shipping Weight,
CS815:
1.5 kg (3.3 lbs)
CS815T:
1.6 kg (3.6 lbs)

Transformer Input (CS815T):
25-, 70.7-, or 100-volt line

CS815
CS815T

Full-Range Loudspeaker

DESCRIPTION

The University Sound CS815 and CS815T loudspeaker systems are high quality 8-inch, full-range coaxial loudspeakers for distributed sound systems. The dual magnet construction allows each speaker to be structurally, magnetically, electrically and mechanically independent of the other. The CS815 series utilize a single section crossover network, centered at 3kHz, and providing 6dB of attenuation for the tweeter. They provide wide dispersion, high-efficiency, ease of installation and wide range reproduction of music or voice.

To insure long-term reliability in installations the CS815 is designed to handle 15 watts continuous power (60 watts peak) of shaped white noise signal for eight hours per EIA Standard RS-426A.

The CS815T is provided with a transformer that offers a selection of 0.5, 1, 2 and 4W, delivered to the loudspeaker system.

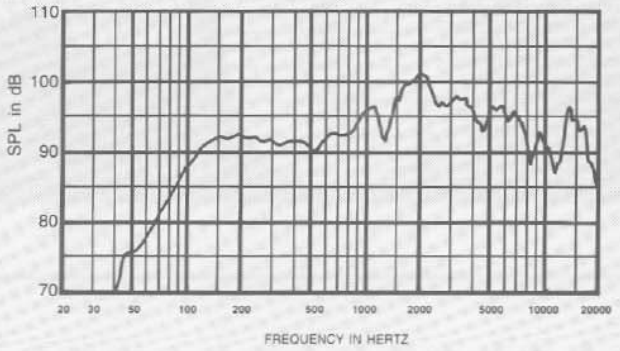


FIGURE 1 — Axial Frequency Rsponse 1 Watt/1 Meter

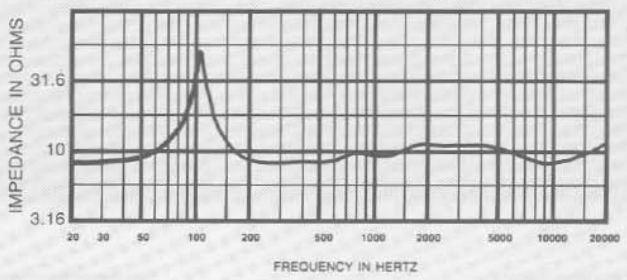
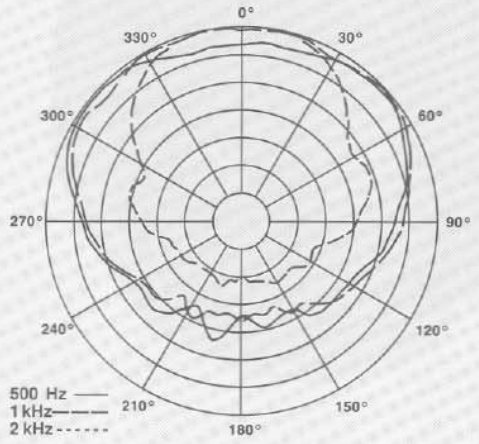


FIGURE 2 — Input Impedance vs. Frequency



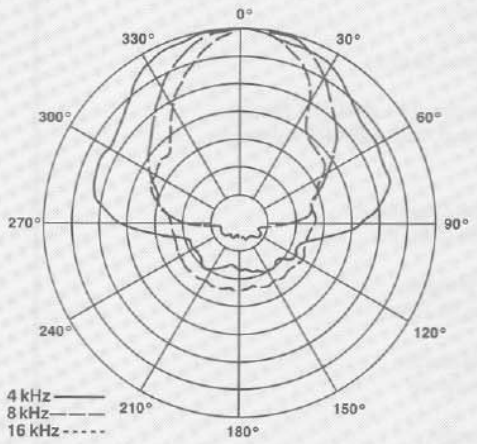


FIGURE 3 — CS815 Polar Response in 1.8 ft³ Sealed Box 4V RMS of 1/3-Octave-Band-Limited Noise in Anechoic Environment, 20 Feet on Axis (5 dB per division)

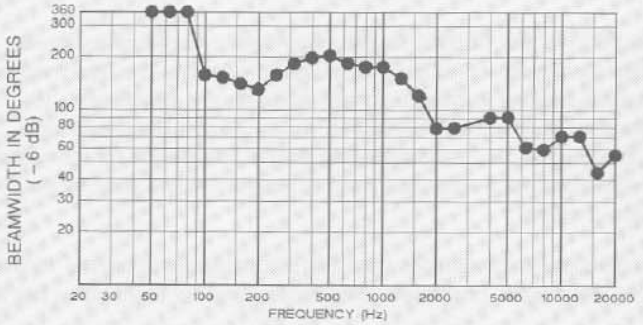


FIGURE 4 — CS815 Beamwidth vs. Frequency in 1.8 ft³ Sealed Box

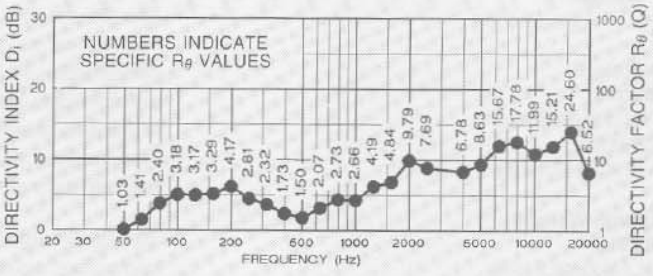


FIGURE 5 — CS815 Directivity Factor and Directivity Index vs. Frequency in a 1.8 ft³ Sealed Box

LINE VOLTAGE	25V	70.7V	100V
	0.5 W	0.5 W	1.0 W
	1.0 W	1.0 W	2.0 W
	2.0 W	2.0 W	4.0 W
	4.0 W	4.0 W	——

TABLE 1 — Rating of Secondary Taps

DIRECTIONAL PERFORMANCE

The directional characteristics of the CS815 in a 1.8 cubic-foot vented enclosure were measured by running a set of polar responses in EV's large anechoic chamber. The test signal was 1/3-octave-band-limited pseudo-random pink noise centered at the ISO standard frequencies indicated in Figure 3.

Additional typical data is provided in Figures 4 and 5 which indicate 6-dB-down beamwidth versus frequency and directivity factor, respectively, for a CS815 in the test enclosure.

POWER HANDLING TEST

The CS815 is designed to withstand the power test described in EIA standard RS-426A. The EIA test spectrum is applied for eight hours. To obtain the spectrum, the output of a white noise generator (white noise is a particular type of random noise with equal energy per bandwidth in Hz) is fed to a shaping filter with 6-dB-per-octave slopes below 40 Hz and above 318 Hz. When measured with usual constant-percentage-bandwidth analyzer (one-third-octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1200 Hz with a 3-dB-per-octave slope above 1200 Hz. This shaped signal is sent to the power amplifier with the continuous power set at 15 watts into the EIA equivalent impedance (10.5 volts true RMS). Amplifier clipping sets instantaneous peaks at 6 dB above the continuous power, or 60 watts peak (21.1 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

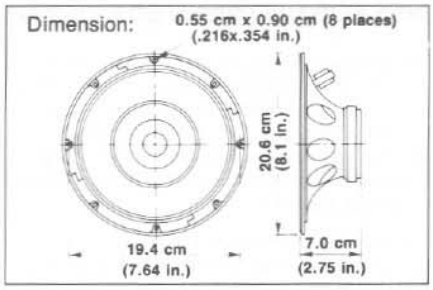
RECOMMENDED CONNECTIONS

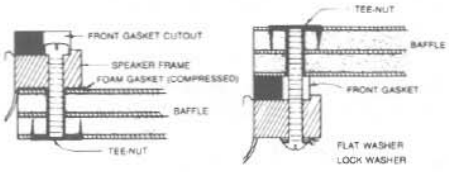
The CS815 is a nominal 8-ohm impedance loudspeaker with a 15-watt input capability. However, it is also available with transformer. The CS815 utilizes a 4-watt, 25/70.7/100-volt universal line matching transformer with power taps ranging from 0.25 to 4 watts. The transformer is mounted to the frame and the secondary winding is accessible for the user to select any of the power taps indicated in Table 1. For use with 100 V lines, connect to the 70.7 V primary winding, and use Table 1 above to determine the wattage ratings of the various secondary winding taps. Do not use the tap marked 4 W.

All wattages marked for the various taps refer to the load on the amplifier, with the insertion loss of the transformer being less than 1 dB.

RECOMMENDED ENCLOSURES AND BAFFLES

The CS815 and CS815T are designed to fit on standard 8-inch ceiling speaker baffles. Additionally, these loudspeakers will accommodate the use of any standard back enclosure with a diameter of 8.6 inches or greater and a depth of at least 3.5 inches. Larger back volumes will increase the lower frequency output. The frequency response of a CS815 in a 1.8-cubic-foot back enclosures is shown in Figure 1.





FRONT MOUNT REAR MOUNT

Mounting:

The CS815 may be front- or rear-mounted against either surface of its mounting flange and requires a 18.4 cm (7.25 in.) diameter cutout and a 19.5 cm (7.68 in.) bolt circle. Normal fasteners up to 5 mm (0.20 in.) will fit through the eight holes in the frame. The CS815 is designed for mounting on standard ceiling speaker baffles.

ARCHITECT'S AND ENGINEER'S SPECIFICATIONS CS815 SERIES COAXIAL LOUDSPEAKERS

The loudspeaker shall be a coaxial type with a 8-inch low-frequency cone and a high-temperature voice coil assembly coaxially mounted with a wide dispersion cone tweeter. The coaxial loudspeaker shall meet the following criteria. AES power rating shall be 15 watts of band limited pink noise (85 Hz to 18 kHz, 6 dB crest factor). Frequency response, uniform from 85 Hz to 18 kHz. Pressure sensitivity, 96 dB SPL at 1 meter (94 dB at 4 feet) on axis with one watt of band-limited pink noise from 500 Hz to 3 kHz (ref. 20 uPa). Minimum impedance, 6.0 ohms. The loudspeaker shall be 8.13 in (20.65 cm) in diameter and _in (_ cm) deep and shall weigh _ lbs (_kg).

The coaxial loudspeakers shall be the University Sound models CS815 and CS815T with 4W transformer.

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.

For warranty repair and service information on University Sound products, contact: University Sound, Inc., 13278 Ralston Avenue, Sylmar, CA 91342-7607; Phone: 818-362-9516; FAX: 818-362-3463; Attention: Customer Service Department.

For technical assistance, contact the Technical Services Representative at University Sound, Inc.

Repair locations:

Speaker products including LR Line radiators, PI Series speakers, CDP848AT, CDP850T, Musicastor100, FC100, Interface Series, MC Series, SP Series, and TK60: University Sound, Inc., 600 Cecil Street, Buchanan, MI 49107; Attention: Service Department.

For Rocky Mountain and Western U.S.: University Sound, Inc., 8234 Doe Avenue, Visalia, CA 91391; Attention: Service Department.

All other paging speakers and speaker products: University Sound, Inc., 10500 West Reno, Oklahoma City, OK 73125; Attention: Service Department.

Specifications subject to change without notice.

BASIC GUIDELINES FOR DISTRIBUTED CEILING SPEAKER SYSTEM

Concept. The basic goals for a distributed ceiling speaker system are intelligibility and adequate SPL. Speakers with the proper coverage pattern should be chosen, spaced appropriately and powered to achieve a uniform direct field at listener ear level.

Even Coverage vs. Cost. Uniformity of sound coverage for a ceiling speaker installation increases with greater speaker density, but the cost of the installation also goes up.

Two basic loudspeaker placement patterns are normally used. These are the traditional square and hexagonal patterns as shown in Figure 1. For the square pattern either one side of the square or one diagonal is aligned parallel to one of the room walls. In the case of the hexagonal pattern, one of the diagonals is usually aligned parallel to one of the walls.

For each of the patterns a choice should be made as to the amount of ovelap. These are referred to here as 1) edge to edge, 2) minimum overlap and 3) center to center. These options are also shown in Figure 1. There will be maximum and minimum SPL levels (relative to the on-axis SPL for a single speaker), and the difference between the SPL_{max} and SPL_{min} gives an indication of the quality of the installation.

Table 2 gives typical values for the six basic patterns. A 2-dB (or less) variation in SPL will be virtually imperceptable, whereas a 6-dB variation might be significant, but again may be adequate for many installations. At this stage the installer needs to make a cost vs. quality-of-coverage decision.

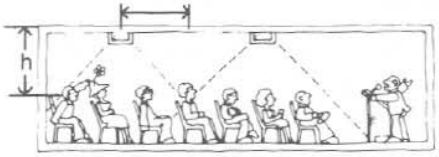
The radius 'r' of the coverage circle is calculated using the formula below, where $\emptyset$ is the −6 dB beamwidth at the highest frequency of interest and 'h' is the distance between the ceiling and ear level (determined by whether the audience is seated or standing).

$$\frac{r}{h} = \tan\emptyset$$

Example. The CS410 is to be used in an installation requiring speech reinforcement, so an upper frequency limit of 4 kHz is selected, and 'h' is 6 feet. From the beamwidth curve $\emptyset = 45°$.

$$r = \tan\emptyset \times h = 6 \text{ feet}$$

Adequate Headroom. Speakers used in distributed systems almost always use matching transformers in order to econmically distribute amplifier power to each loudspeaker.

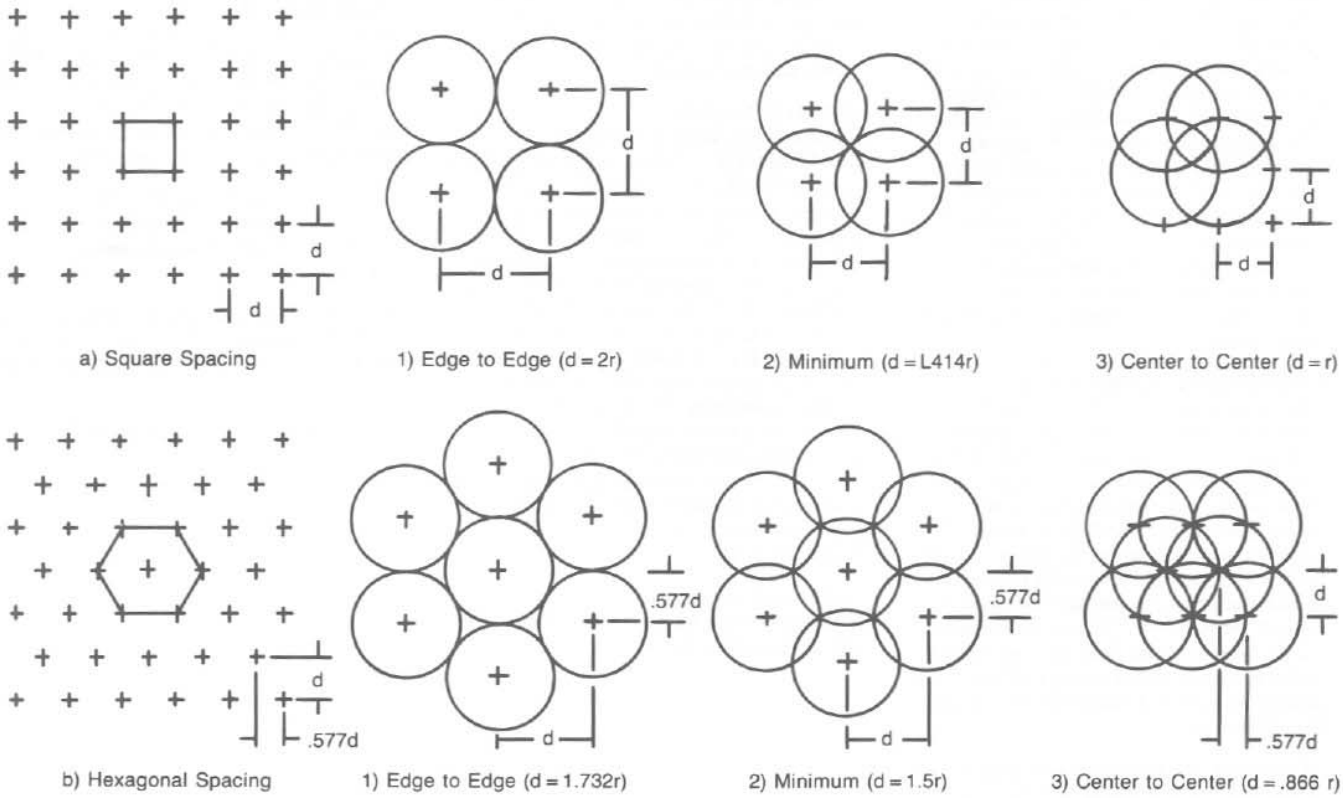


	L_{max}(dB)	L_{min}(dB)	$L_{max}L_{min}$(dB)
Square Edge to Edge	0.66	−3.69	4.35
Hexagonal Edge to Edge	0.95	−4.45	5.40
Square Minimum	2.02	−0.02	2.04
Hexagonal Minimum	1.36	−1.23	2.59
Square Center to Center	5.17	3.78	1.39
Hexagonal Center to Center	5.38	4.21	1.17

TABLE 2 — SPL changes for various patterns relative to on-axis value for a single speaker.

It is a simple matter to choose the appropriate transformer tap based upon the average SPL desired, the loudspeaker sensitivity, and the distance between the loudspeaker and the listener. The tap selected for a speaker may vary from room to room; however, the total *average* power required is easily calculated by summing the individual loudspeaker power tap settings.

Be aware that short-term peaks which exist in voice and music, although contributing little to perceived loudness, can be 10 dB or more above the average level. Thus, an amplifier with at least 6 dB (four times) headroom above the simple power summation should be used to avoid distortion on peaks.



a) Square Spacing — 1) Edge to Edge (d = 2r) — 2) Minimum (d = L414r) — 3) Center to Center (d = r)

b) Hexagonal Spacing — 1) Edge to Edge (d = 1.732r) — 2) Minimum (d = 1.5r) — 3) Center to Center (d = .866 r)

FIGURE 1 — Basic Ceiling Speaker Patterns

Part Number 531874 – 207
Litho in U.S.A.

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