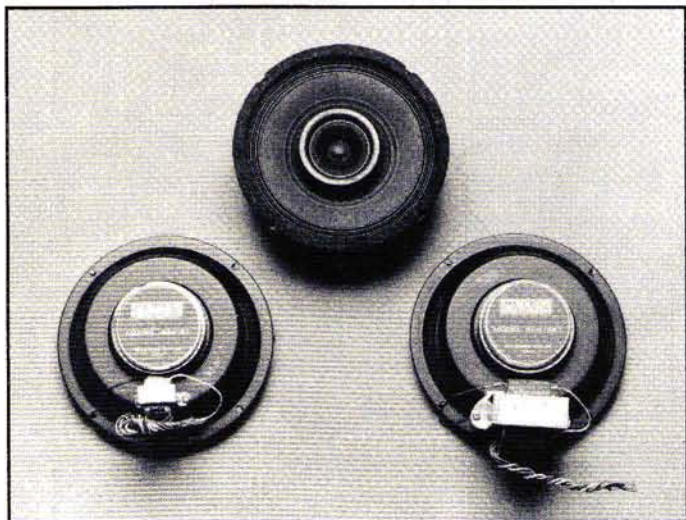




# 409 "E" Series 8" Duplex® Premium Ceiling Loudspeakers



## KEY FEATURES

- ★ Offers Wide Dispersion, High Efficiency
- ★ Dual Magnet Construction

## PRIMARY SPECIFICATIONS

**System Type:** Two-way, full range, Duplex® loudspeaker system.

**Pressure sensitivity:** 97 dB SPL  
(1W, 500Hz - 3kHz,  
re: 20μPa, see note 1).

**Frequency Response:** 85 Hz - 18 kHz  
(see Figure 1, Note 2)

**Power Handling:** 32 watts, 85 Hz - 18 kHz,  
AES method (see note 3).

**Maximum Long Term  
Output:** 110.8 dB SPL  
(32 watts input, 1m,  
re: 20μPa, see note 4).

**Impedance:** 6.0 ohms minimum  
at 11 kHz.  
8.0 ohms nominal.

**Components:** 8 inch, high efficiency, low  
frequency driver with a  
coaxially mounted, 2.5 inch  
cone tweeter.

## DESCRIPTION

The Altec Lansing **409** "E" series Duplex® loudspeaker systems are two-way loudspeakers with 8-inch low-frequency cones and high-temperature voice-coil assemblies coaxially mounted with wide-dispersion cone tweeters. The dual magnet construction allows each speaker to be structurally, magnetically, electrically and mechanically independent of the other. The **409** "E" series utilize a single section crossover network, centered at 2500Hz and providing 6dB of attenuation for each element outside its operating range.

The **409-ST** (with **15700** transformer) and the **409-4T** (with **15704** transformer) both offer a selection of 0.5, 1, 2 and 4W. The **409-8T** (with **15708** transformer) offers a selection of 1, 2, 4 and 8W. The **409-16T** (with **15716** transformer) offers 2, 4, 8 and 16W and the **409-32T** (with **15732** transformer) offers a 4, 8, 16, 32W selection.

The **5281-W** grille is available as an accessory, and provides an attractive means to conceal the

loudspeaker in ceiling or wall installations. The perforated grille is finished in semi-gloss white enamel. Other grilles available include the **5281-S** (satin aluminum), **5282-W** and **5284-WM** (both are square grilles).

Five sealed, metal ceiling-type enclosures are offered with the **409** "E" series. Each is made of heavy-gauge, rugged cold rolled steel, under-coated to prevent panel resonance, and finished with rust-inhibiting paint. The enclosures are classified as Utility or Deluxe. Utility model numbers are as follows; **5183-X**, **5184-E**, and **5184-N**. Deluxe enclosures are lined with glass wool blankets. Deluxe model numbers are as follows; **5181-XM**, **5182-XM**, **5184-X** and **5189-X**. These components are designed to work together as a complete system of in-ceiling loudspeakers and accessories. They give wide dispersion, high-efficiency, high-maximum output, ease of installation, and wide range reproduction of music or voice.

**Crossover Network:** Two-way at 2500 Hz with 6dB per octave tweeter protection.

**Input Terminals:** 0.212 inch push-on type connectors.

**Accessories:**

**Grilles:** 5281-W, 5281-S, 5282-W, 5284-W

**Enclosures:** 5183-X, 5184-X, 5184-E, 5184-N

**Dimensions,**

**Diameter:** 8.13in (20.65cm)

**Depth:**

**409-8E:** 3.25in (8.3cm)

**409-ST:** 3.86in (9.8cm)

**409-4T:** 4.13in (10.5cm)

**409-8T:** 4.50in (11.4cm)

**409-16T:** 4.86in (12.4cm)

**409-32T:** 5.38in (13.7cm)

**Net Weight:**

**409-8E:** 2.8 lbs (1.3 kg)

**409-ST:** 3.1 lbs (1.4 kg)

**409-4T:** 3.3 lbs (1.5 kg)

**409-8T:** 4.0 lbs (1.8 kg)

**409-16T:** 4.5 lbs (2.0 kg)

**409-32T:** 5.0 lbs (2.3 kg)

**Shipping Weight:**

**409-8E:** 3.3 lbs (1.5 kg)

**409-ST:** 3.6 lbs (1.6 kg)

**409-4T:** 3.8 lbs (1.7 kg)

**409-8T:** 4.5 lbs (2.0 kg)

**409-16T:** 5.0 lbs (2.3 kg)

**409-32T:** 5.5 lbs (2.5 kg)

**Finish:** Black.

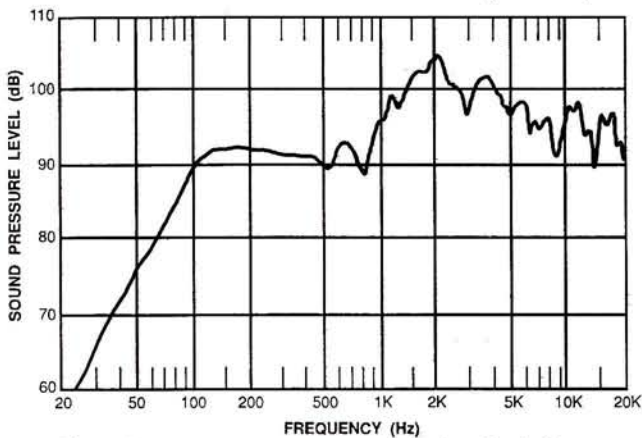


Figure 1. Amplitude Response

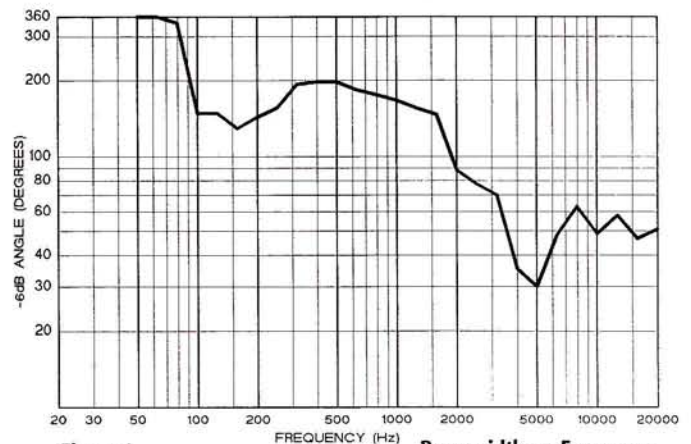


Figure 2. Beamwidth vs. Frequency

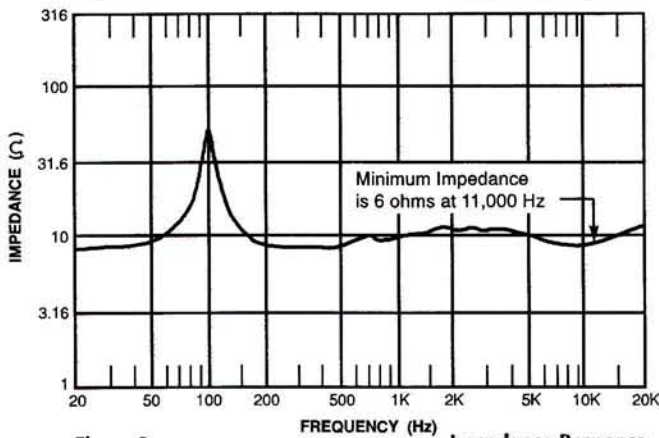


Figure 3. Impedance Response

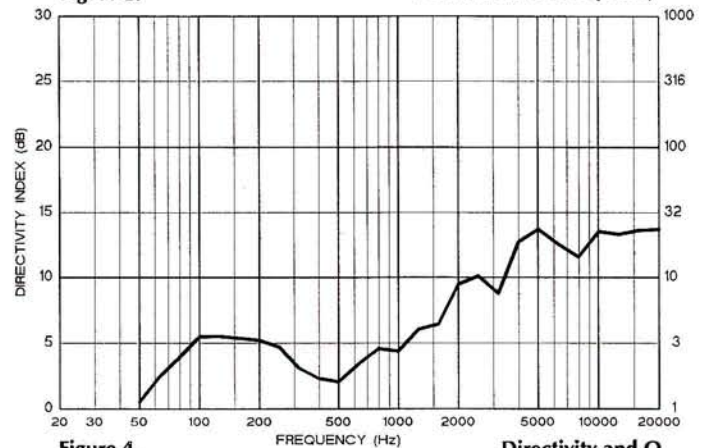


Figure 4. Directivity and Q

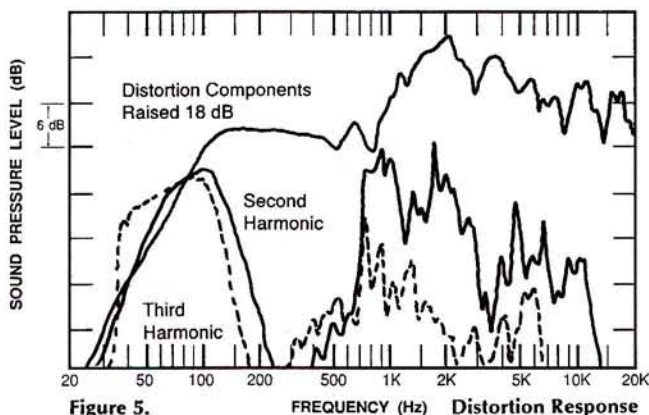


Figure 5. Distortion Response

**409-8E - THEILE-SMALL PARAMETERS**

<b>Free Air Resonance, <math>f_s</math>:</b>	90 Hz
<b>Equivalent Volume Compliance, <math>V_{as}</math>:</b>	0.61 ft. <sup>3</sup>
<b>Total Q, <math>Q_t</math>:</b>	1.54
<b>Electrical Q, <math>Q_{es}</math>:</b>	1.78
<b>Mechanical Q, <math>Q_{ms}</math>:</b>	11.53
<b>Volume Displacement, <math>V_D</math>:</b>	1.95 in <sup>3</sup>
<b>Reference Efficiency:</b>	0.71%

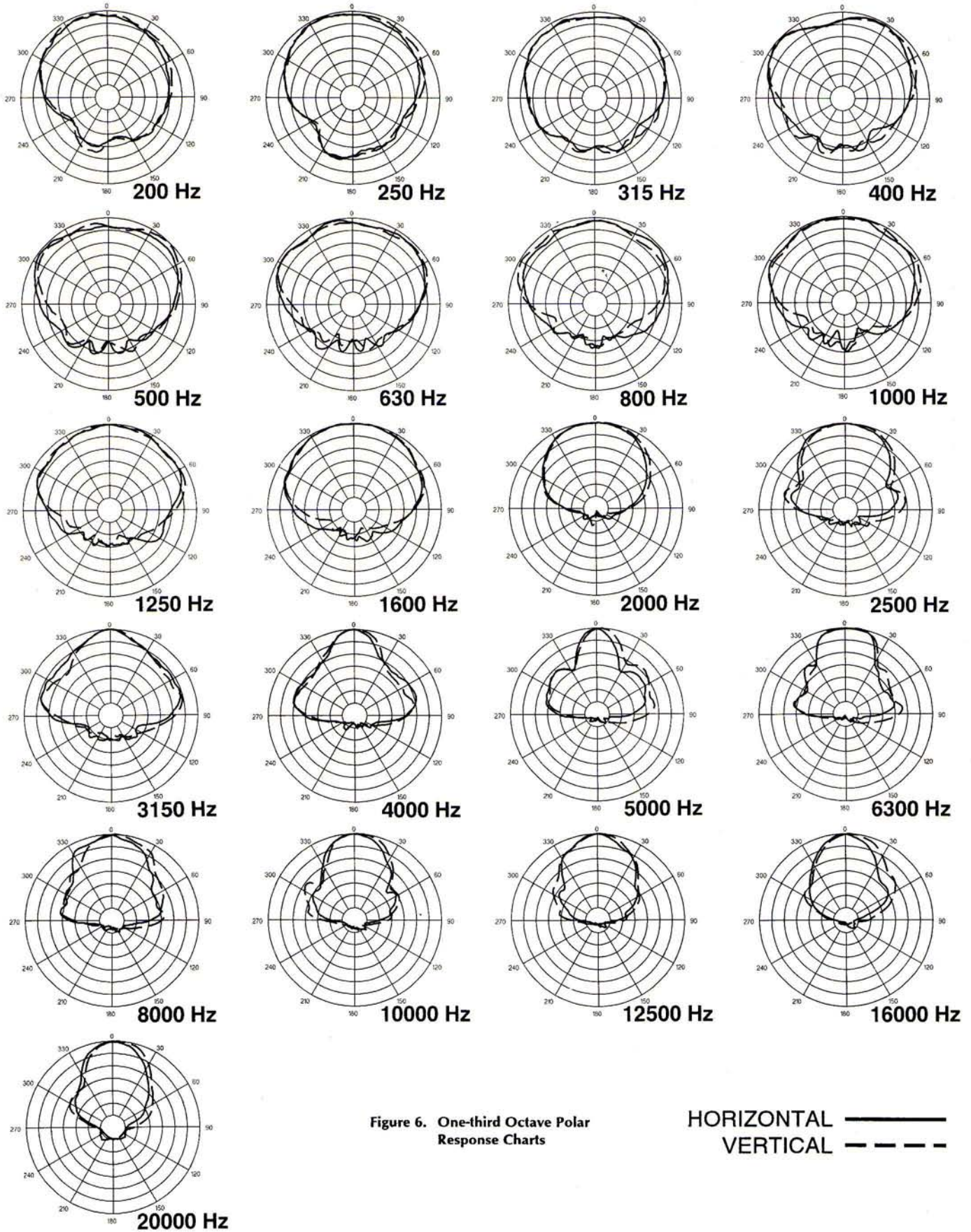


Figure 6. One-third Octave Polar Response Charts

HORIZONTAL ———  
 VERTICAL - - - -

NOTE: MEASUREMENTS WERE MADE IN A 1.5 FT<sup>3</sup> CLOSED ENCLOSURE

## NOTES ON MEASUREMENT CONDITIONS

1. Pink noise signal, one Watt calculated using  $E^2/Z_{min}$ , 3.16 measurement distance referred to one meter.
2. On-axis, one Watt calculated using  $E^2/Z_{min}$ , 3.16 meter measurement distance referred to one meter, low frequencies corrected for anechoic chamber error.
3. This system rating patterned after the A.E.S method for individual driver, where the test signal is pink noise with a 6dB crest factor over the bandwidth of the system, with power calculated using the  $E^2/Z_{min}$ , for two hours.
4. This measurement made under the same conditions as Pressure Sensitivity, but at rated power, and takes into account any power compression effects due to non-linearities in the system.
5. Distortion components invalid above 10kHz. The distortion at any given frequency may be found by graphically taking the difference between the fundamental and harmonic, and adding the number of Decibels which the harmonic has been raised on the graph and apply the formula:  

$$\text{percent distortion} = 100 \times 10^{-(\text{difference in dB}/20)}$$

## SPECIFICATIONS - TRANSFORMERS

### Frequency Response:

<b>15700:</b>	100 Hz to 10 kHz, +/-1 dB
<b>15704, 15708</b>	
<b>15716, 15732:</b>	50 Hz to 15kHz, +/-1 dB

### Insertion Loss:

<b>15700:</b>	1.0 dB
<b>15704, 15708</b>	
<b>15716, 15732:</b>	0.5 dB

**Secondary Impedance:** 8 ohms (all)

### Primary Impedances and Power Drawn, nominal 70v:

<b>15700</b>	<b>15708</b>	<b>15716</b>	<b>15732</b>
<b>15704</b>			
10000Ω	5000Ω	2500Ω	1250Ω
0.5 W	1.0 W	2.0 W	4.0 W
5000Ω	2500Ω	1250Ω	625Ω
1.0 W	2.0 W	4.0 W	8.0 W
2500Ω	1250Ω	625Ω	312Ω
2.0 W	4.0 W	8.0 W	16 W
1250Ω	625Ω	312Ω	156Ω
4.0 W	8.0 W	16 W	32 W

**Connection Type:** Bunch tinned wires for soldering or crimping.

## ARCHITECT'S AND ENGINEER'S SPECIFICATIONS

### 409 "E" SERIES DUPLIX LOUDSPEAKERS

The loudspeaker shall be a Duplex® type with a 8-inch low-frequency cone and a high-temperature voice coil assembly coaxially mounted with a wide dispersion cone tweeter. The Duplex® loudspeaker shall meet the following criteria. AES power rating shall be 32 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, 97 dB SPL at 1 meter (95 dB at 4 feet) on axis with

one watt of band-limited pink noise from 500 Hz to 3 kHz (ref. 20 μPa). 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 Duplex® loudspeakers shall be the Altec Lansing models **409-8E**, **409-ST** (with **15700** transformer), **409-4T** (with **15704** transformer), **409-8T** (with **15708** transformer), **409-16T** (with **15716** transformer) and the **409-32T** (with **15732** transformer).



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P.O. BOX 26105 ● OKLAHOMA CITY, OK 73126-0105 ● U.S.A. ● (405) 324-5311 or FAX: (405) 324-8981  
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