

Electro-Voice®
a gulton company

Model T35A Horn Tweeter

SPECIFICATIONS:

(All acoustic measurements made in an anechoic environment with tweeter mounted on a 2 ft. by 2 ft. baffle, ¼-inch thick.)

Frequency Response, with X36 Crossover, 1 Meter on Axis, Swept One-Third-Octave Random Noise:
± 3 dB 3,500-15,000 Hz

Sound Pressure Level at 1 Meter, 1 Watt into Nominal Impedance, Averaged over Rated Frequency Response Range:
104 dB

Dispersion Angles Included by 6-dB-Down Points on the Polar Responses, Indicated Octave Bands of Random Noise, Tweeter Long Axis Vertical,

Horizontal,
4,000 Hz: 155°
8,000 Hz: 90°
16,000 Hz: 60°

Vertical,
4,000 Hz: 145°
8,000 Hz: 105°
16,000 Hz: 60°

Minimum Crossover Frequency:
3,500 Hz

Power Capacity above 3,500 Hz at 8 Ohms,

Long-Term Average:

5 watts

Short-Term (10 ms):

50 watts

Impedance,

Nominal:

8 ohms

Minimum (above 3,500 Hz):

7 ohms

Voice Coil,

Diameter:

25.4 mm (1 in.)

Material:

Aluminum

DC Resistance:

6.2 ohms

Magnet,

Material:

Ceramic

Weight:

226.8 g (8.0 oz)

Included in Building Block Kit:

BB1A

Optional Accessory:

STR tweeter protector

Dimensions, Overall (also see Figure 1):

50.8 mm (2 in.) wide

133.4 mm (5.25 in.) high

59.7 mm (2.35 in.) deep

Net Weight:

850.5 g (1 lb, 14 oz)

DESCRIPTION AND APPLICATIONS

The T35A horn tweeter is designed for use above 3,500 Hz in high-efficiency speaker systems. The T35A replaces the classic T35, the most widely used high-output high-frequency transducer in the world. The T35A is similar to the T35 except that it employs a ceramic magnet instead of the T35's Alnico material. The acoustic performance of the T35A is identical to that of the T35.

The T35A complements Electro-Voice full-range cone speakers (SP8C, SP12C, SP15A) and midrange components (8HD/1824M, BB4B building block kit) by providing smooth, extended high-frequency response. An integral diffraction horn provides a useful combination of wide dispersion, small size, and convenient mounting.

FREQUENCY RESPONSE

Figure 2 shows the on-axis frequency response of the T35A with and without the recommended X36 crossover, with the tweeter mounted on a 2-foot by 2-foot flat baffle, ¼-inch thick (see Installation section). The measurement was made in an anechoic (echoless) environment with a swept ⅓-octave random noise input and a microphone distance of one meter.

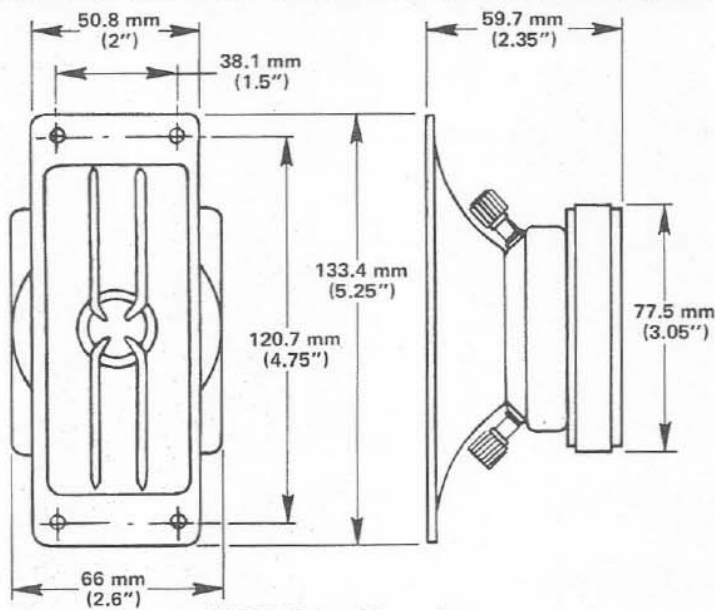


FIGURE 1 - Dimensions

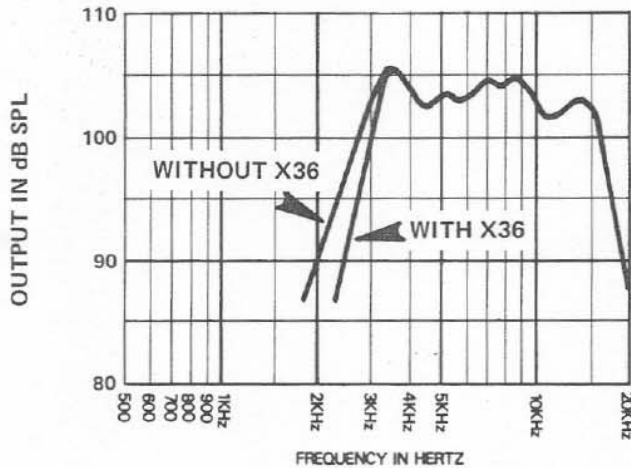


FIGURE 2 - Axial Frequency Response, 1 Watt, 1 Meter
(see text for detailed test conditions)

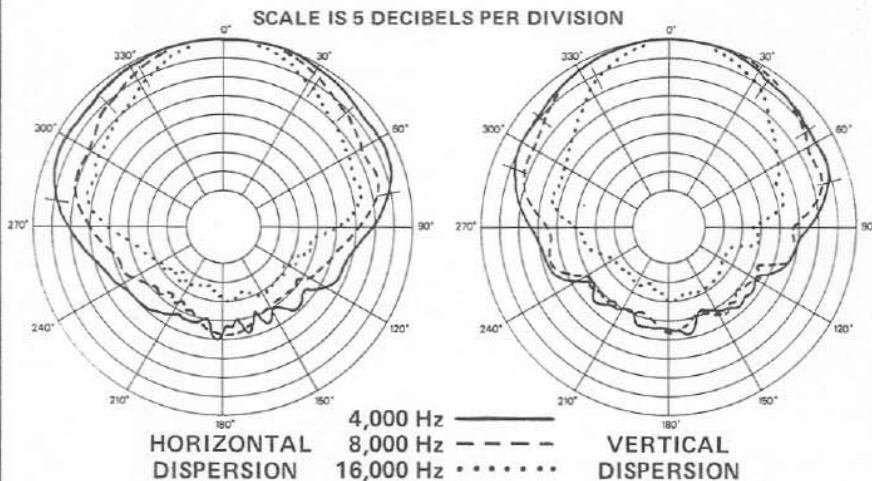


FIGURE 3 - Octave-Band Polar Response and 6-dB-Down Beamwidth, Tweeter Long Axis Vertical
(see text for detailed test conditions)

DISPERSION

Figure 3 shows the polar response and 6-dB-down beamwidth (coverage angle) of the T35A mounted on the baffle described above. Measurements were made in an anechoic environment with octave-band-limited random noise at 4,000, 8,000, and 16,000 Hz with a microphone distance of 10 feet. The left-hand chart shows the horizontal (side-to-side) dispersion with the tweeter's long axis vertical. The right-hand chart shows the vertical (up-and-down) dispersion with the same tweeter orientation.

CROSSOVER AND LEVEL ADJUSTMENT

A crossover with a crossover frequency no lower than 3,500 Hz should always be used with the T35A. This prevents the entrance of lower frequencies which will damage the tweeter voice coil. The Electro-Voice X36 3,500-Hz crossover is appropriate for matching the T35A to all EV full-range cone speakers and midrange components. An AT38 level control will be required to match the sensitivity of the T35A to that of the other speaker components.

INSTALLATION

Tweeter Orientation

The T35A's diffraction horn provides the widest overall horizontal dispersion when its long axis is vertically oriented (see Figure 3). Therefore, this orientation is recommended for most applications. However, as can be seen from Figure 3, dispersion in the other plane is quite wide so that fine performance can be obtained with the long tweeter axis horizontal, if physical limitations so dictate.

Mounting to the Speaker Baffle

The T35A must be mounted on the rear of the speaker baffle (rear mounting), since the magnetic structure is too large to permit front mounting through the hole cut for the horn. The baffle opening should be $1\frac{1}{8}$ inch by $4\frac{7}{32}$ inch. In addition, the rear surface of the speaker baffle should be routed out to bring the portion of the baffle on which the tweeter is mounted down from the usual $\frac{3}{4}$ inch to $\frac{1}{4}$ inch. For baffles thicker than about $\frac{1}{4}$ inch, the smooth frequency response shown in Figure 2 is modified by the diffraction effect of the baffle opening edges. While a $\frac{3}{8}$ -inch-thick baffle has only a moderate effect (limited to downward deviations of 1-2 dB), a $\frac{3}{4}$ -inch-thick baffle provides considerable downward deviation in the 4,000-5,500 Hz range (up to 7 dB) and should be avoided unless the tweeter is crossed over at 6,000 Hz or above. (NOTE: the deviations described affect only the on-axis frequency response. The total output of the tweeter is essentially unaffected. Therefore, the audible effect of the baffle edge diffraction is not as great as the on-axis response deviations themselves would indicate.) The routed portion of the speaker baffle should be concentric with the

tweeter baffle opening. A rectangle 2¼ inch by 5½ inch allows ample clearance for the horn.

For the thin baffle thicknesses described above, the T35A should be attached to the baffle board with #8-32 or #8-40 nuts and bolts. If the T35A is mounted on a thicker ¾-inch baffle, #8 x ¾-inch wood screws will suffice.

SYSTEM WIRING

22-gauge or larger stranded wire should be used to connect the T35A as shown in Figures 4 and 5. Figure 4 illustrates a two-way system utilizing the X36 3,500-Hz crossover. Figure 5 shows a three-way system which adds the 8HD horn, the 1824M midrange driver, and the X8 800-Hz crossover.

Relative Polarity of System Components

The relative polarity of the low-frequency, mid-frequency and high-frequency system elements can influence system response in the crossover regions. This is so because in the crossover region two components are operating and their combined output can range from additive ("in phase") to cancelling ("out of phase"). A general polarity rule is not possible because system response is influenced not only by phase shift which is a predictable part of the crossover slope rate but also by phase shifts which are unique to the particular speaker components and their physical placement. Also, for relatively high crossover frequencies, the wavelengths (distance between sound pressure maxima) are short relative to typical component dimensions so that the relative polarity of a woofer and tweeter usually makes little or no difference in the frequency response near crossover. However, when systems are used in stereo pairs, the relative polarity of each system should be identical, to provide a stable stereo image.

Two-Way Systems. In two-way systems utilizing the T35A and X36 crossover, the relative polarity of the woofer and tweeter does not affect the frequency response near crossover. However, Figure 4 shows the tweeter and woofer connected in like polarity, with the common (negative) crossover output going to the negative (black) terminals of both components. This assures proper stereo imaging.

Three-Way Systems. In three-way systems employing the 8HD/1824M and the X8 crossover, the midrange/tweeter array and the woofer should be connected to be of opposite polarity. Figure 5 shows the common (negative) output of the X8 800 Hz crossover connected to the negative (black) woofer terminal and the In (positive) terminal of the X36. Note, however, that the 8HD/1824M and T35A are connected to be of like polarity.

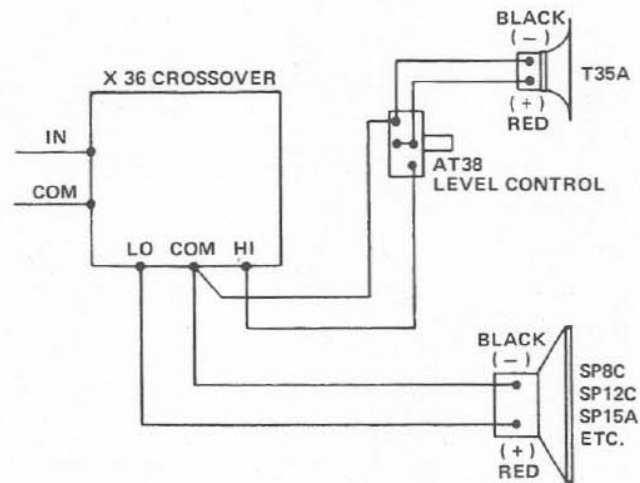


FIGURE 4 – Two-Way System Wiring

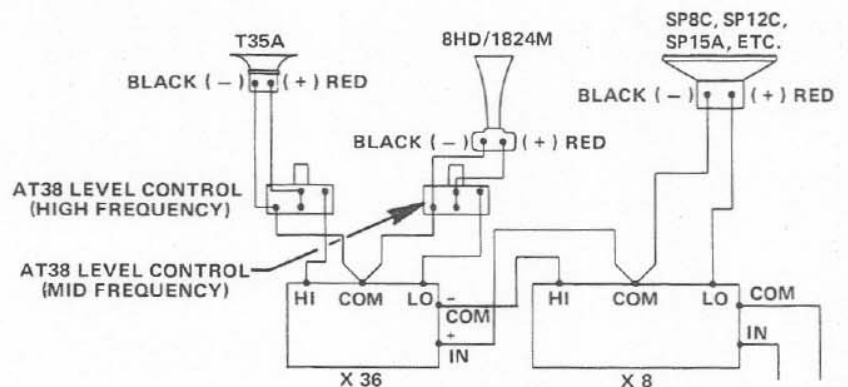


FIGURE 5 – Three-Way System Wiring
(note phase reversal between X8 and X36)

SETTING THE TWEETER LEVEL CONTROL

Counterclockwise (downward) adjustment of the AT38 level control will normally be required to match the output of the T35A to the sensitivity of the woofer. One of the best ways to adjust the level control in the home is to advance it to the point where a well-recorded human voice sounds natural: not too "dull" and lacking in "liveness" yet without a "harsh" quality or excessive sibilance. Familiarity with the sound of live un-amplified concert music is also helpful.

POWER HANDLING CAPACITY

The light moving system required for good high-frequency reproduction limits tweeter power capacity to about 5 watts long-term average and 50 watts short-term (10 ms). Therefore, any sine wave test signal should not exceed 6.3 volts RMS (5 watts into the T35A's 8-ohm nominal impedance). However, when the tweeter level control is adjusted for flat response in multi-way systems and normal program material is played (including studio recordings of contemporary rock music), the portion of the power which actually reaches the tweeter is a small fraction of the total power to the system. Thus, the limiting factor on system power capacity is almost always the woofer. This is so because (1) program material has an energy content that declines rapidly above 1,000 Hz or so and (2) the level control, as it is turned down, reduces

substantially the power at the system's input terminals that reaches the tweeter itself.

Where unusual conditions might overpower the T35A, the optional STR tweeter protector is useful. Its electronic circuit temporarily interrupts power to the tweeter if the long-term average exceeds 5 watts but will pass the much higher short-term peaks which do not harm the tweeter but are necessary for realistic reproduction. Situations where the STR is appropriate include:

1. Extremely high level playback of program material with unusually heavy high-frequency content.
2. Applications where the system amplifier is operated beyond its capacity in an effort to get the desired loudness. As the amplifier's capability is exceeded, its output waveform is "clipped," producing high-frequency distortion products which not only sound harsh but also are fed directly to the tweeter and can exceed its power capacity. Note that such damaging clipping distortion is more likely to occur with smaller amplifiers, so that a larger power amplifier which avoids clipping of the musical signal is actually safer for the tweeter.
3. High-speed winding of a recorded tape on a deck without tape lifters

and with the volume at normal playback levels. The high-frequency energy generated is extreme and can easily exceed tweeter power capacity.

WARRANTY (Limited)

Electro-Voice High Fidelity Speakers and Accessories 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 the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not cover finish or appearance items or malfunction due to abuse or operation at other than specified conditions. Repair by other than Electro-Voice or its authorized service agencies will void this warranty.

For correct shipping address, instructions on return of Electro-Voice products for repair, and locations of authorized service agencies, please write: Service Department, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (Phone: 616/695-6831).

Electro-Voice also maintains complete facilities for non-warranty service of EV products.

Specifications subject to change without notice.



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