

North D25-06S

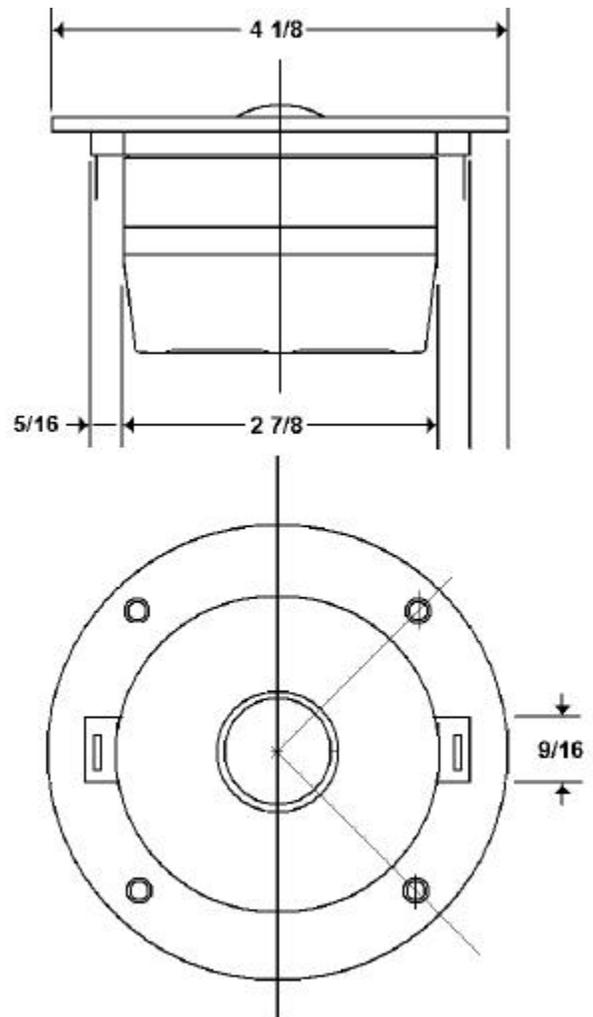
High performance silk dome tweeter for cabinets six to ten inches in width

FEATURES:

- 25 mm Hand-Coated Silk Dome
- Underhung Geometry
- 1.0mm p-p excursion
- MAPD-loaded rear chambers
- Reinforced Back Cup
- Low Resonance
- High Excursion
- High Sensitivity
- Excellent Dispersion
- Tinsel Voice Coil Leads
- Light Magnetic-Fluid Cooling
- Replaceable Butterfly Assembly
- Heavy Duty Gold-Plated Connectors
- Injection-Molded Face Plate
- Recessed Mounting Screws
- Sheildable
- Broken In and Individually Tested
- Provided in Match Pairs
- **\$36 per Matched Pair**

SPECIFICATIONS:

Nominal Impedance: 6 Ohm
DC Resistance: 5.0 Ohm
Bandwidth: 1800 Hz-20kHz
Sensitivity: 90.25dB @ 2.83V, 1m
Voice Coil Diameter: 25mm
Voice Coil Height: 1.8mm
Air Gap Height: 2.8mm
Linear Excursion: 1.0 mm
Resonance Frequency: 950 Hz



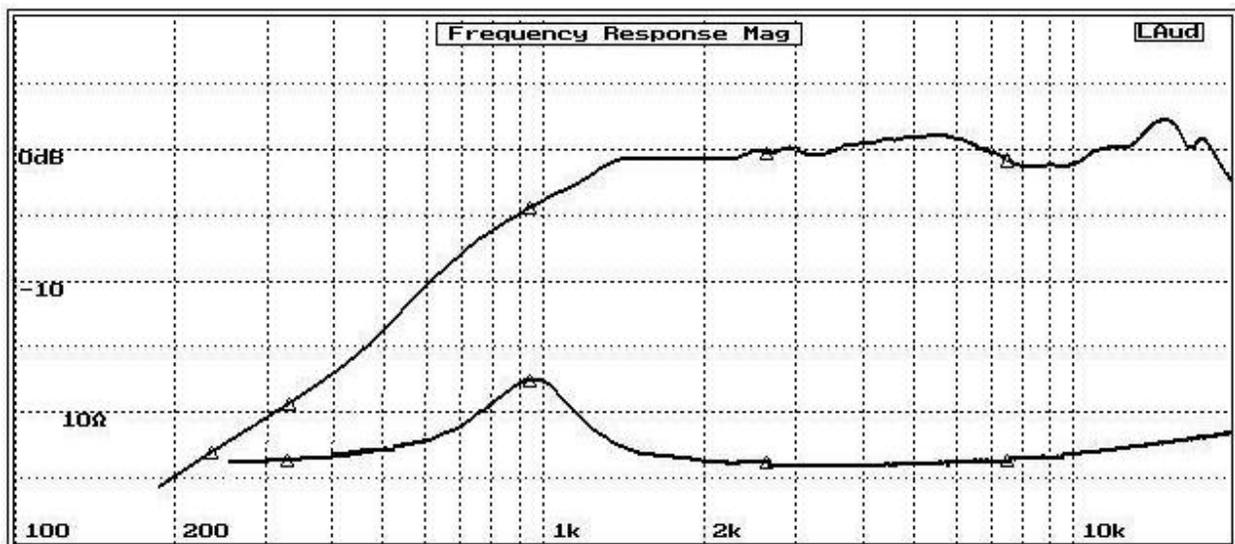
Components of the North D25-06S tweeter are manufactured exclusively for the North Acoustics division of North Creek Music Systems. Final assembly, testing and matching is done in our own facilities in New York, USA.

North Creek Music Systems

PO Box 1120, Old Forge NY 13420; www.NorthCreekMusic.com

DESIGN GOALS:

- Excellent Listenability
- Sensitivity minimum 90dB @ 2.83V
- Frequency Response ± 1.5 dB
- Resonance frequency below 1kHz
- Impedance resonance peak below 15 Ω
- Magnetic fluid for cooling only
- 1.0 mm p-p linear excursion
- Smooth response to 20kHz on axis
- -1.5dB frequency response shelf from 1.5kHz to 3.0kHz.
- Faceplate same as Scan Speak D2905
- Simplified Crossover Design



Anechoic 2pi Frequency Response Curves on axis, and impedance

DESIGNER'S NOTES:

This tweeter was conceived of as a silk dome destined for applications similar to those of existing North Creek Music Systems' and North Acoustics' loudspeakers. All of these designs feature the Scan-Speak D2905 series of tweeters, as we have found this tweeter to be the most natural sounding available.

Silk is the preferred diaphragm material as it is readily available, extremely resilient, easily coated, bonds well to voice coil assembly, and has a unique sonic "character" that this designer prefers. A silk dome will have well controlled output up to 20kHz and, properly treated, will not exhibit sibilant emphasis, brittleness or sharpness.

25mm was chosen as the voice coil diameter because this tweeter is being designed specifically for applications where the crossover frequency is above 1.8kHz (defined as the -6dB point of the electrical transfer function) and the electrical crossover slope is 12dB/octave or greater. A 25mm dome exhibits superior off axis response to a 28mm dome, and because it is lighter has better transient response.



North D25-06S Frequency Response 0 degrees, 5 degrees and 15 degrees (anechoic 1 meter)

The curve above is the North D25-06S in a 2-pi anechoic environment, measured at 1 meter on axis, 5 degrees, and 15 degrees. Angular variance is negligible up to 10kHz, and at 20kHz is only -5dB.

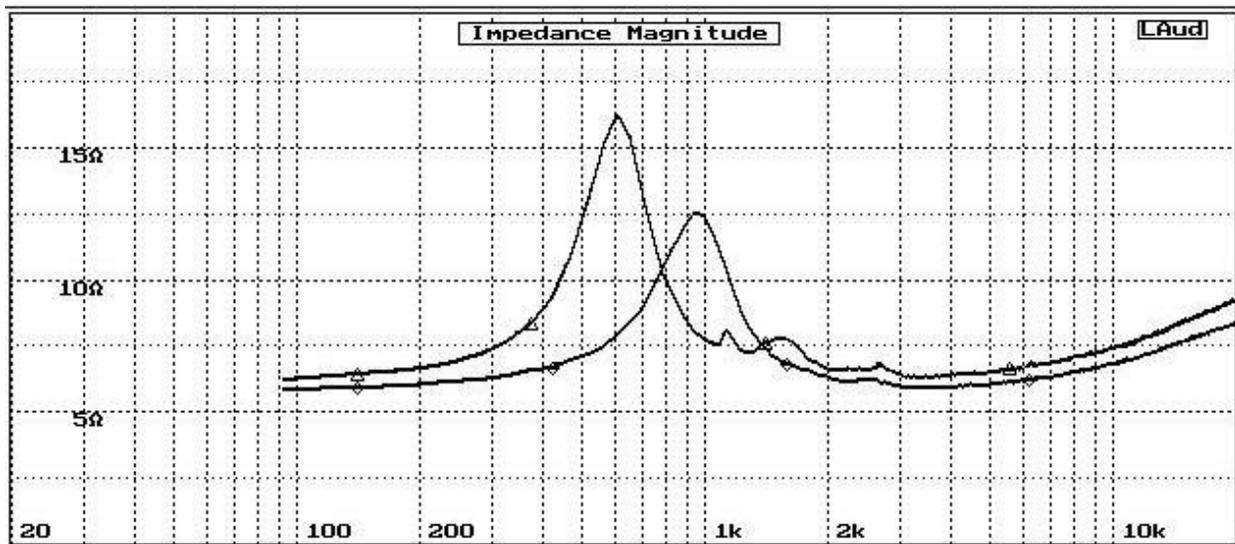
Most tweeters rely on magnetic fluid in the gap to increase the tweeter's power handling by providing thermal conduction from the voice coil to the motor, as well as to provide some level of damping of tweeter's resonance. The intention of the damping is to minimize resonance "ringing", and to lower the impedance peak at resonance, as a high impedance at resonance mismatches the crossover network and can drive the tweeter into overexcursion. The most common tweeter failure mode is failure of the voice coil lead and tinsel lead solder joint due to mechanical stress. The drawback of magnetic fluid is that the mechanism of adding damping is essentially viscous drag to the voice coil, therefore the tweeter dome, at all frequencies.



Most chambered dome tweeters employ a very soft half roll surround to allow the lowest resonance frequency. A 25mm dome with a half-roll suspension can still achieve a fundamental mechanical resonance of only a few

hundred Hz. The drawback to this approach is that under high excursion even at frequencies well above resonance, the half roll surround becomes nonlinear, leading to harmonic distortion.

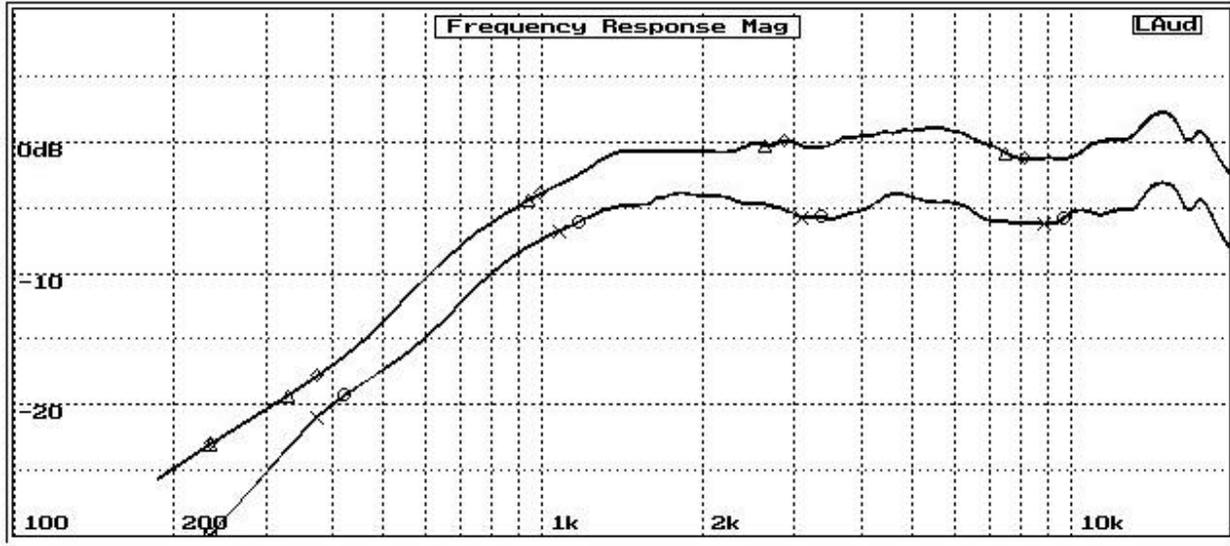
The intention here is to house the dome in an "MAPD" alignment (Multichamber Aperiodic Progressive Damping) , where the primary chamber loads the dome near acoustic suspension, improving the dome's linearity under high excursion, whilst the secondary, aperiodically-coupled chamber provides low frequency damping. This approach allows the application of low viscosity magnetic fluid, which acts primarily as a thermal conductor with minimal viscous drag on the voice coil throughout the tweeter's pass band.



Impedance in free air and with MAPD loading

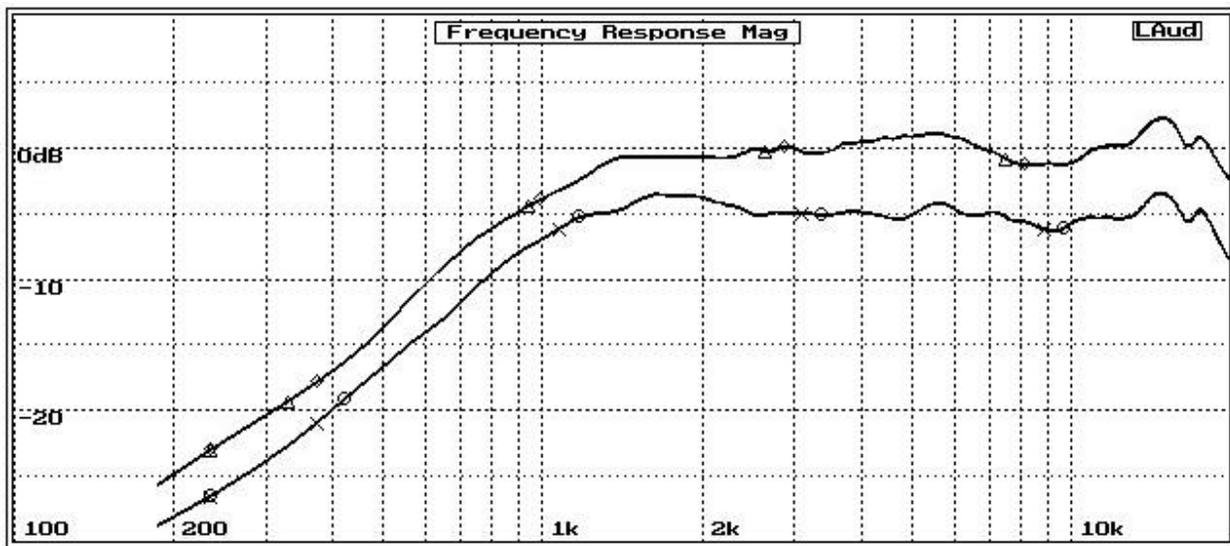
Above is the impedance curve of the North D25-06S dome with the rear chamber removed, so it is operating in "free air", compared to the same diaphragm in our MAPD - type motor assembly. The fundamental resonance is raised from 600 Hz to 950 Hz ($\Delta=1.5$), whilst the impedance peak drops from 18 Ohms to only 12.5 Ohms.

The design goal of a -1.5dB shelf from the low frequency corner to about 3kHz. The reason for this shelf is that the tweeter is intended for cabinets ranging from 6" to 10" (15cm to 25cm) in width. Cabinets within this range exhibit a "hump" in their diffraction/dispersion transfer function centered at about 2kHz and ranging from 1 to 4dB. The width and gain of the "hump" is specific to the geometry of the cabinet. Introducing a shelf in the driver's 2π anechoic response through the appropriate frequency range allows the product of the driver's transfer function and the cabinet's transfer function to be flatter through this region, simplifying crossover design and allowing for flatter response overall.



North D25-06S 2-pi response and 4-pi response in an 8" cabinet (North Creek Okara II - Ikemo)

Above is the North D25-06S 2-pi anechoic response (upper curve) and 4-pi anechoic response in an 8" wide cabinet (North Creek *Okara II - Ikemo*), both measured at one meter. The 4-pi measurement is moved -5dB for clarity. The difference in relative frequency response at 2kHz is 2.5dB, which is gain caused by the boundary condition of the cabinet width. Were this tweeter to exhibit flat frequency response in a 2-pi environment, it would have a 2.5dB peak here and be very difficult to cross over smoothly.



North D25-06S 2-pi response and 4-pi response in an 9.5" cabinet (North Creek Borealis - Aurora)

Above is the North D25-06S 2-pi anechoic response (upper curve) and 4-pi anechoic response in a 9.5" wide cabinet (North Creek *Borealis - Aurora*), both measured at one meter. Again, the 4-pi measurement is moved -5dB for clarity. The difference in relative frequency response at 2kHz is 2.8dB, which again is boundary condition gain.

FINISHING TOUCHES

Other than excellent impedance and frequency response characteristics, we added the following details....

- 1) The face plate is exactly the same size as the Scan Speak D2905/9500. We did this so that we would not have to re-tool the North Creek Music cabinets for this tweeter; all North Creek cabinets will accept either tweeter.
- 2) Terminals are 1/4", heavy-duty gold-plated brass and accept 1/4" quick connects.
- 3) The mounting screw positions are recessed to accept a standard #6 driver screw.
- 4) We can provide this tweeter shielded for a small additional fee.
- 5) We provide the tweeters in matched pairs or quads, broken in and with curves, at no additional charge.



SUBJECTIVE SOUND QUALITY

This tweeter is very good - sweet, liquid, detailed, and not in the least bit bright or sibilant. We have incorporated it into both the North Creek *Okara II - Ikemo* and the North Creek *Borealis - Aurora*, and the listening impression from everyone who has heard them is that this tweeter achieves 95% of the performance of the Scan-Speak D2905/9500, at a fraction of the price.

Developing a crossover for this tweeter is simplified because of its unique frequency contour - the 1.5dB dip at 2kHz and the 0.5dB rise in the top octave. We successfully employ simple low-Q second order networks with sensitivity adjustment and no additional circuitry or compensation is required - only one (bypassed) capacitor and one resistor in the signal path.

We like to think of it as the *second best* tweeter money can buy.

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