By Vance Dickason

Three New ScanSpeak Illuminator Tweeters from Tymphany

I have been anxiously awaiting the next generation of transducers from ScanSpeak, dubbed the Illuminator series. This month, Tymphany sent me three new ScanSpeak Illuminator neodymium motor tweeters: the D3004/602000 1″ soft dome, the D3004/602010 1″ soft dome, and the D2004/302000 0.75″ soft dome.

All three tweeters are based on the D29 ScanSpeak series and share many common features including wide surround coated cloth domes (very similar shape to the Vifa DX, the ScanSpeak Air Circ D3004/66000), metal die cast aluminum back can enclosures, neodymium ring magnet motors, die cast aluminum face plates, and metal protective grilles. ***Photos 1-3*** show that the metal can is indented in the back to thermally couple the can to the motor system such that the can acts as a heatsink as well as an acoustic cavity.

D3004/602010

I started testing with the D3004/602010 by generating a stepped sine wave impedance measurement using the LinearX LMS analyzer. The result of the 300-point impedance sine wave sweep is given in ***Fig. 1***. The tweeter resonance is 425Hz, with the obvious damping from the large rear cavity. Tymphany's specification sheet confirms this and gives the T/S parameters as Qms = 2.5, Qes = 0.97, and Qts = 0.7. Minimum impedance for this tweeter is 3.109Ω at 3.1kHz with a measured Re = 2.95Ω.

Following the impedance measurements, I recess-mounted the ScanSpeak tweeter in a small enclosure that had a baffle area of about 9″ × 4″ and measured the on- and off-axis frequency response at 2.83V/1m. ***Figure 2*** depicts the on-axis response. Frequency response for the 602010 is a rather flat ±1.4dB from 1.46kHz-12.0kHz, and ±2dB from 1.2kHz to 23kHz. ***Figure 3*** gives the on- and off-axis response. Off-axis the device is -5.8dB down at 10kHz from the on-axis response with respect to the 30° off-axis curve and -9.8dB at 45° off-axis, again with respect to the on-axis response. ***Figure 4*** illustrates the normalized version of ***Fig. 3***. In terms of production consistency, the two-sample SPL comparison is depicted in ***Fig. 5***, indicating the two samples were well matched with some minor variation in the 3-6kHz region.

Next, I used the Listen Inc. SoundCheck analyzer to measure the impulse response with the tweeter recess-mounted on a large 4′ × 2′ baffle. Importing this data in the Listen Inc. SoundMap software produced the cumulative spectral decay plot (waterfall) shown in ***Fig. 6***. While there are no major resonances indicated in this plot, it is very difficult to correlate long decay resonances with subjective performance. ***Figure 7*** gives the short time Fourier transform (STFT) displayed as a surface plot. Last, I set the 1m SPL to 94dB (5.56V) and the sweep range to 2kHz-20kHz and measured the 2nd and 3rd harmonic distortion at 10cm (***Fig. 8***). This is shown in order to see the relationship between 2nd and 3rd harmonic distortion; however, correlation to subjective preference based on THD is not well established.

D3004/602000

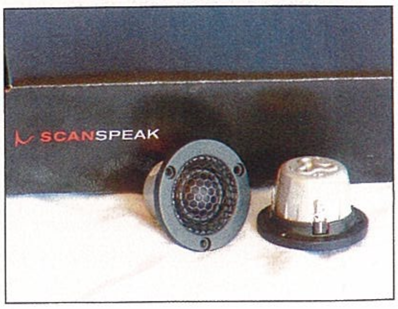
ScanSpeak's D3004/602000 is basically a smaller cavity version of the D3004/602010. Following the same measurement protocol, the first measurement was to produce an impedance plot using a LMS 300-point impedance sine wave sweep as given in ***Fig. 9***. The tweeter resonance with this smaller cavity occurs at 701Hz, with a measured Re = 3.95 and Tymphany quoted T/S parameters of Qms = 4.15, Qes = 1.6, and Qes = 1.15. The minimum impedance was 3.1Ω at 3.05kHz.

I proceeded to recess-mount the 602000 in a small enclosure that had a baffle area of about 9″ × 4″ and measured the on- and off-axis frequency response at 2.83V/1m with a 100-point gated sine wave sweep from 300Hz to 40kHz. ***Figure 10*** shows the on-axis response. The frequency response is a very flat and smooth ±1.68dB from 695Hz-12.8kHz and ±2dB from 660Hz to 17.5kHz. ***Figure 11*** illustrates the on- and off-axis response. Off-axis the device is -3dB down at 10kHz from the on-axis response with respect to the 30° off-axis curve and -7dB at 45° off-axis, again with respect to the on-axis response. ***Figure 12*** illustrates the normalized version of ***Fig. 11***.

PHOTO 1: D3004/602010.

PHOTO 2: D3004/602000.

PHOTO 3: D2004/602000.



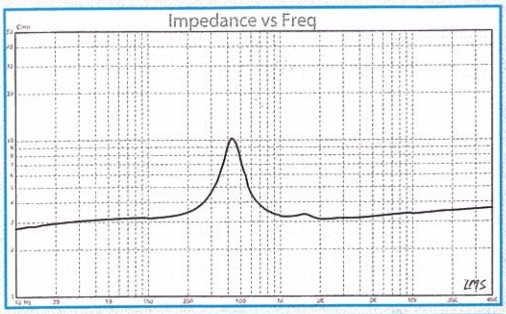


FIGURE 1: ScanSpeak D3004/602010 free-air impedance plot.

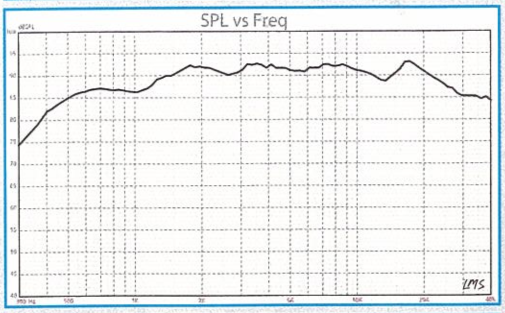


FIGURE 2: D3004/602010 on-axis response.

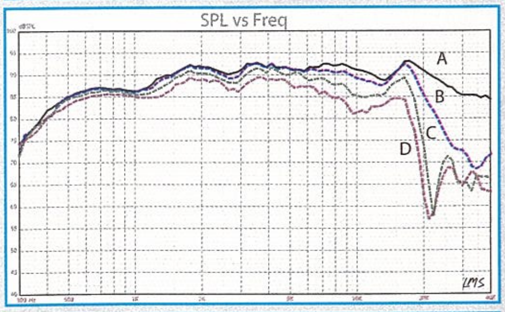


FIGURE 3: D3004/602010 horizontal on- and off-axis frequency response (A = 0°; B = 15°; C = 30°; D = 45°).

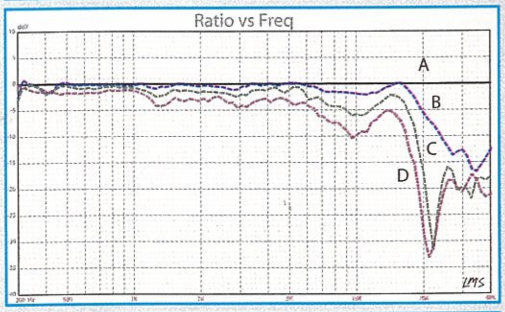


FIGURE 4: D3004/602010 normalized on- and off-axis frequency response (A = 0°; B = 15°; C = 30°; D = 45°).

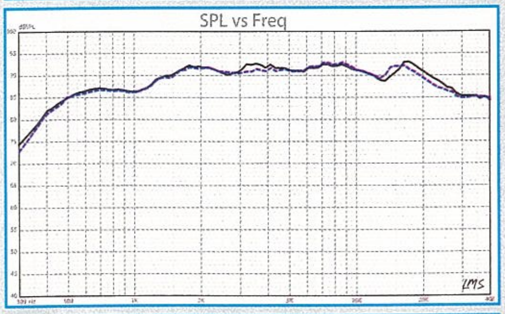


FIGURE 5: D3004/602010 two-sample SPL comparison.

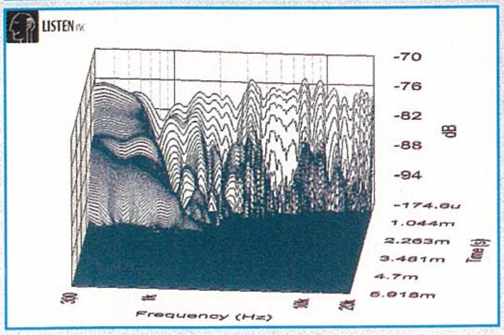


FIGURE 6: D3004/602010 SoundCheck CSD waterfall plot.

In terms of production consistency, the two-sample SPL comparison is depicted in ***Fig. 13***, indicating the two samples were well matched with some minor variation in the 2.5-5kHz region.

Following the LMS sequence of measurements, I again fired up the SoundCheck analyzer to measure the impulse response with the tweeter recess-mounted on a large 4′ × 2′ baffle. Importing this data in the SoundMap software produced the cumulative spectral decay plot (waterfall) shown in ***Fig. 14***. ***Figure 15*** gives the STFT displayed as a multi-color surface plot. Last, I set the 1m SPL to 94dB (5.3V) and the analyzer range to 2kHz-20kHz and measured the 2nd and 3rd harmonic distortion at 10cm (***Fig. 16***).

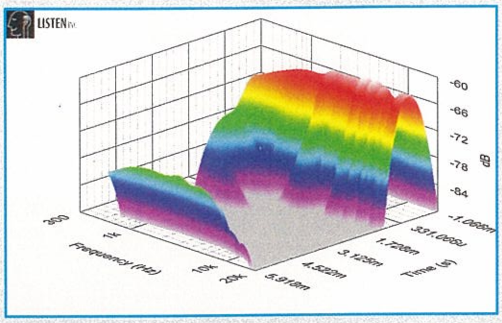


FIGURE 7: D3004/602010 SoundCheck STFT surface intensity plot.

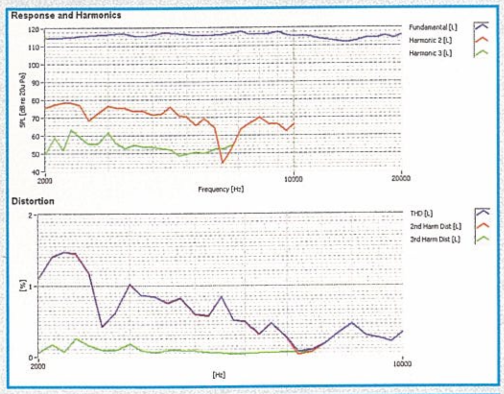


FIGURE 8: ScanSpeak D3004/602010 SoundCheck distortion plots

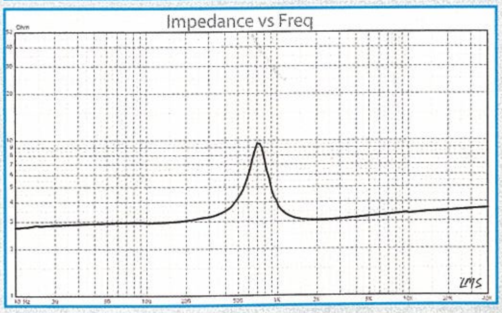


FIGURE 9: ScanSpeak D3004/602000 free-air impedance plot.

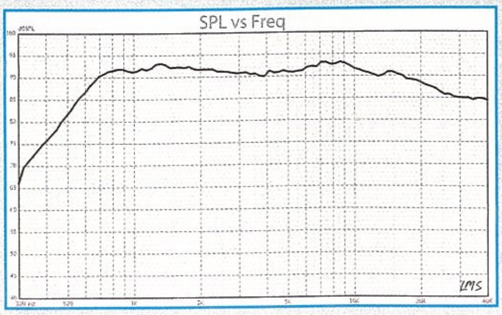


FIGURE 10: D3004/602000 on-axis response.