 By Vance Dickason (United States)

A FaitalPRO Compression Driver and the STH100 Horn

Loudspeaker features a Ketone polymer annular-shaped diaphragm

For this month's article, I put one of FaitalPRO'S new compression drivers, the HF106 along with a FaitalPRO STH100 Elliptical Tractrix horn to the test (see **Photo 1**). The HF106 is a new edition to the company's series of 1" diameter compression drivers that use Ketone polymer diaphragms. The entire series is designed to be used with the STH100 horn.

FaitalPRO HF106

The HF106, like the entire series, is an interesting compression driver that shares several unique features with the other models. It includes a Ketone polymer annular-shaped diaphragm and an annular-shaped phase plug (note the HF100, the HF104, and the HF105 use radial-shaped phase plugs). The driver's throat diameter is 25.4 mm (1") with the diaphragm coupled to a 44 mm (1.73") diameter voice coil wound on a Kapton former with aluminum wire. Other features include a neodymium ring magnet, a cast aluminum body, 60-W AES-rated power handling (120-W

Photo 1: Faital's HF106 compression driver is shown coupled with the STH100 horn.

Photo 2: Faital's STH100 horn is shown without a driver.

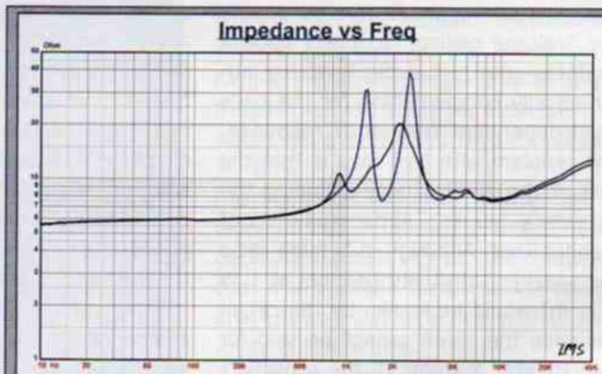

Figure 1: Faital HF106/STH100 free-air impedance plot

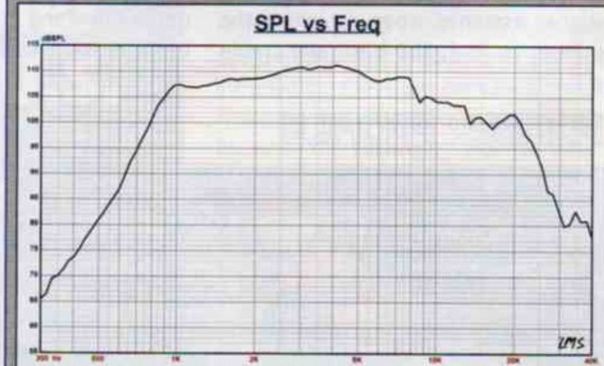

Figure 2: Faital HF106/STH100 on-axis frequency response

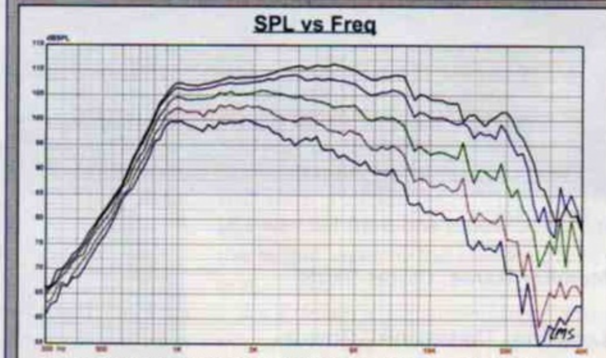

Figure 3: Faital HF106/STH100 horizontal on- and off-axis frequency response (0 = solid; 15° = dot; 30° = dash; 45° = dash/dot; 60° = dash)

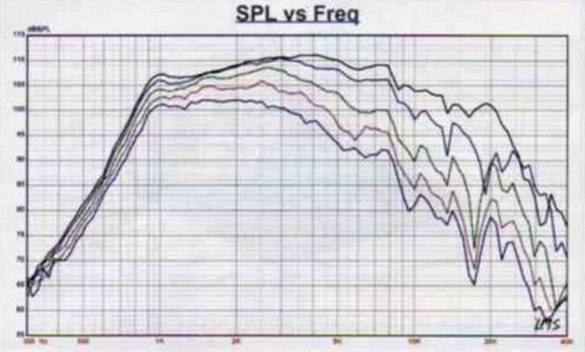

Figure 4: Faital HF106/STH100 vertical on- and off-axis frequency response (0° = solid; 15° = dot; 30° = dash; 45° = dash/dot; 60° = dash)

Figure 5: Faital HF106/STH100 normalized horizontal on- and off-axis frequency response (0° = solid; 15° = dot; 30° = dash; 45° = dash/dot; 60° = dash)

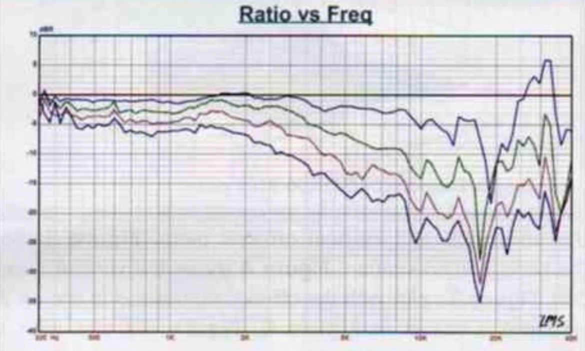

Figure 6: Faital HF106/STH100 normalized vertical on- and off-axis frequency response (0° = solid; 15° = dot; 30° = dash; 45° = dash/dot; 60° = dash)

Figure 7: Faital HF106/STH100 two-sample SPL comparison

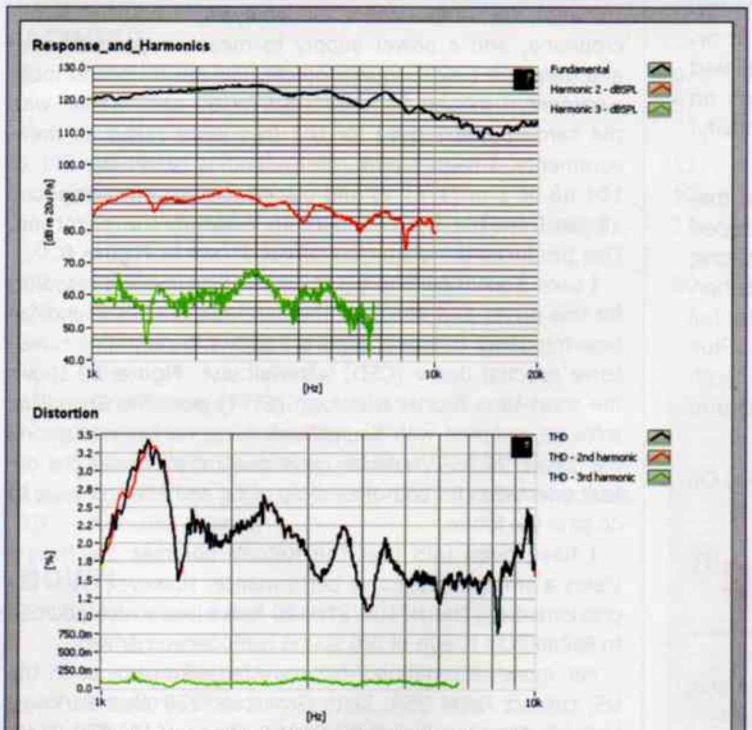

Figure 8: Faital HF106/STH100 SoundCheck distortion plots

maximum), and solderable aircraft terminals. The STH100 horn supplied with the HF106 driver has a 1" diameter throat with 80° horizontal × 70° vertical short elliptical tractrix flare (see **Photo 2**).

I used the LinearX LMS analyzer to produce the 200-point stepped sine wave impedance plot shown in **Figure 1**. The solid black curve shows the HF106 mounted on the STH100 horn and the dashed blue curve represents the compression driver without the horn. With a measured 5.4-Ω Re, the HF106/STH100's minimum impedance was 7.65 Ω at 8.9 kHz.

For the next test sequence, I mounted the HF106/STH100 combination in an enclosure with a 10" × 15" baffle and used a 100-point gated sine wave sweep to measure the horizontal and vertical on- and off-axis at 2.83 V/1 m. **Figure 2** displays the compression driver/horn combination's on-axis frequency response. With a 110-dB, 1-W/1-m rated sensitivity, it has a 111.3-dB, 2.83-V/1-m peak output at 4.1 kHz. The sound pressure level (SPL) profile measures ±4.5 dB from 1 to 10 kHz. (The HF106's recommended crossover frequency is a 1.3-kHz minimum with a second-order network.) Since this horn's coverage is 80° horizontal × 70° vertical, you wouldn't expect much difference in

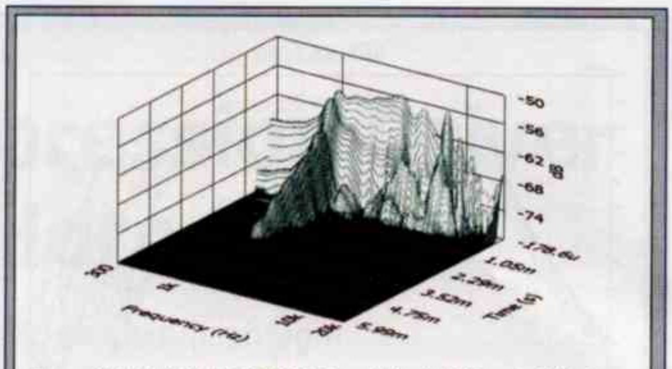

Figure 9: Faital HF106/STH100 SoundCheck CSD waterfall plot

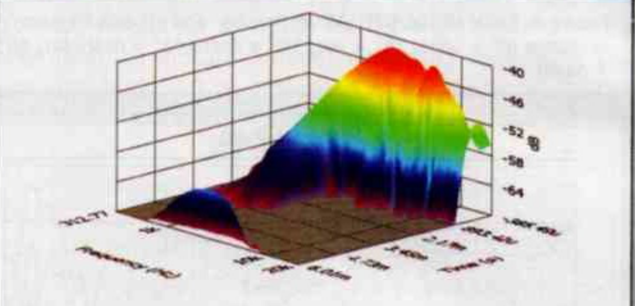

Figure 10: Faital HF106/STH100 STFT plot

the horizontal and vertical off-axis plots. **Figure 3** shows the horizontal orientation. **Figure 4** shows the vertical orientation. **Figure 3**'s plot with the off-axis normalized to the on-axis response is shown in **Figure 5**. **Figure 4**'s plot with the off-axis normalized to the on-axis response is shown in **Figure 6**. **Figure 7** shows the two-sample SPL comparison. Both samples are closely matched.

For the remaining tests, I used the Listen SoundCheck software, the AmpConnect ISC analyzer, a 0.25" SCM microphone, and a power supply to measure the distortion and generate time-frequency plots. For the distortion measurement, I mounted the HF106/STH100 combination with the same baffle I used for the frequency response measurements. I used a pink noise stimulus to set the SPL to 104 dB at 1 m (1.73 V) and placed the Listen microphone 10 cm from the horn's mouth to measure the distortion. This produced the distortion curves shown in **Figure 8**.

I used SoundCheck to get a 2.83-V/1-m impulse response for this driver and imported the data into Listen's SoundMap time-frequency software. **Figure 9** shows the resulting cumulative spectral decay (CSD) waterfall plot. **Figure 10** shows the short-time Fourier transform (STFT) plot. The SoundMap software, supplied with SoundCheck 12.0, no longer supports the classic "MLSSA" waterfall curve orientation. I used the default orientation for both SoundMap plots, and I will continue to do so in the future.

I have been told that the Ketone polymer diaphragm yields a smooth subjective performance. However, from the previous data, the HF106/STH100 looks like a nice addition to FaitalPRO's lineup of pro sound compression drivers.

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