in 1995 as a high-frequency ribbon manufacturer. The device Bohzen sent to *Voice Coil*, the CQ76 ribbon tweeter, is portrayed in the company literature as a unique (patent number ZL200820128865.6) ribbon tweeter design, which is visually apparent in the accompanying photo. The CQ in the tweeter's name is an acronym of Chinese pinyin "Chuan-dao-pian Qu-dong," which in English means "ribbon loudspeaker based on slice-conducted technology." Bohzen also makes two other versions of this design: the CQ76-H, a single-ribbon horn-loaded version recommended for high-SPL line-source applications, and the CQ76-2H, a dual-ribbon horn- loaded design.


Photo 3: Bozhen New Audio Lab's CQ76 ribbon tweeter

The CQ76 utilizes a 20-mm × 80-mm pleated aluminum diaphragm (there is also a paper diaphragm version available) making it look like an air-motion transformer without the front-located magnets (see **Photo 3**). The pleats are each mechanically connected to a section of the voice coil (see **Figure 17**). The CQ76 is a closed-back design and uses a fairly large cavity. Other features for this design include the injection-molded back cavity, a bushed aluminum faceplate, a black mesh

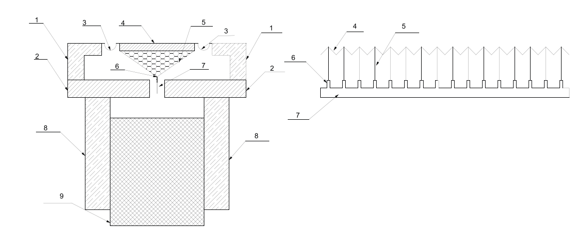
Figure 17: Diagram of Bohzen CQ76's ribbon motor

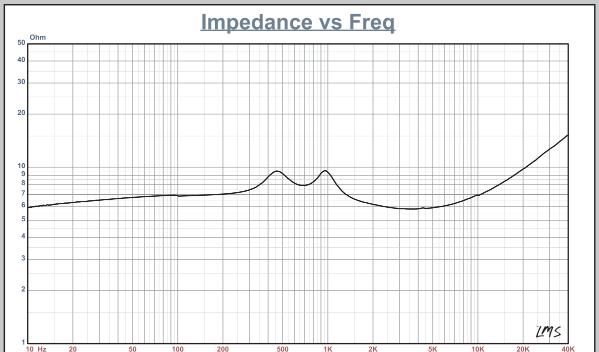

Figure 18: Bohzen CQ76 impedance plot

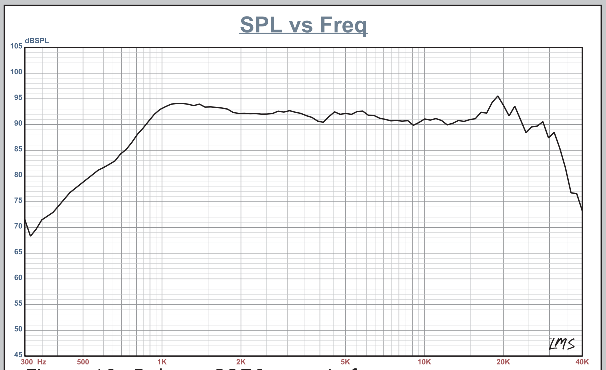

Figure 19: Bohzen CQ76 on-axis frequency response

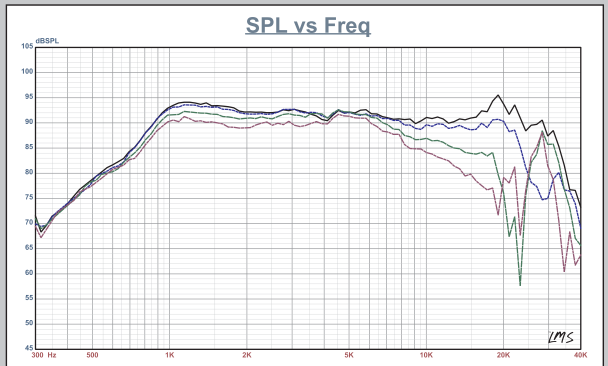

Figure 20: Bohzen CQ76 on and off-axis horizontal frequency response (0° = solid black; 15° = dot blue; 30° = dash green; 45° = dash/dot purple)

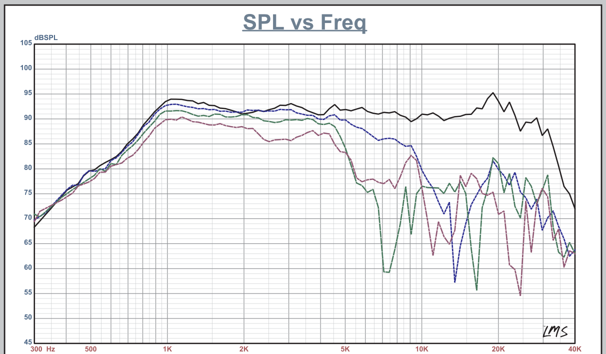

Figure 21: Bohzen CQ76 on and off-axis vertical frequency response (0° = solid black; 15° = dot blue; 30° = dash green; 45° = dash/dot purple)

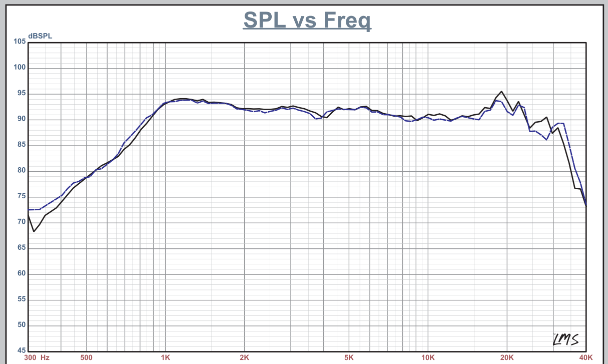

Figure 22: Bohzen CQ76 two-sample SPL comparison

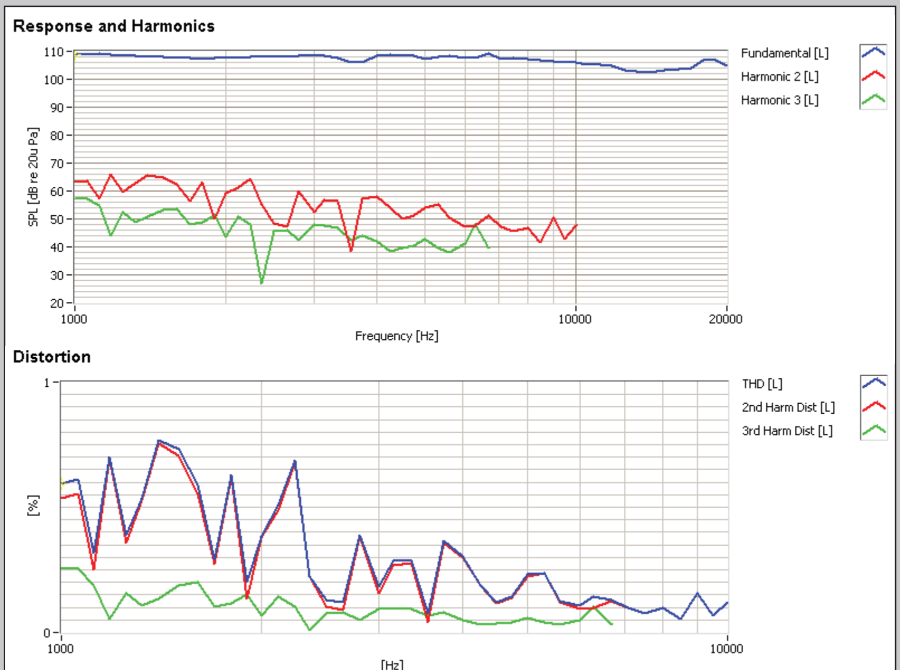

Figure 23: Bohzen CQ76 SoundCheck distortion plot

screen protecting the diaphragm, and a pair of gold binding posts for terminals.

I commenced analysis of the CQ76 by performing a 300-point impedance curve (see **Figure 18**). Unlike most ribbon devices, this transducer's impedance features a twin peak suggesting a complex cavity, plus a reactive rise in the impedance above 4 kHz. DCR for the CQ76 measured 3.6 Ω with a minimum impedance of 4.3 Ω at 3.7 kHz.

Following the impedance measurement, I mounted the CQ76 in an enclosure with a 6″ × 12″ baffle area. I measured the on- and off-axis SPL with sweeps at 0°, 15°, 30°, and 45° using gated 100-point 2.83-V/1-m sine wave sweeps from 300 Hz to 40 kHz. I took data in the horizontal and vertical planes. **Figure 19** shows the Bohzen CQ76's on-axis response. The Bohzen CQ76's frequency response was a smooth and even ±2 dB from 875 Hz to 18 kHz, peaking up to approximately 5 dB at 19 kHz before beginning its low-pass roll off.

**Figure 20** shows the on- and off-axis frequency response in the horizontal plane, which is somewhat like the typical directivity of a 1″ dome tweeter. Since the aspect ratio of the CQ76's aperture is like most ribbons, there is substantial directivity in the vertical plane (see **Figure 21**). The two-sample SPL comparison is shown in **Figure 22**, indicating that both CQ76s were closely matched.

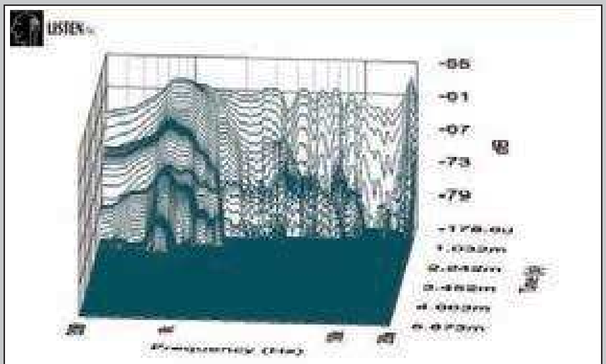

Figure 24: Bohzen CQ76 SoundMap CSD graph

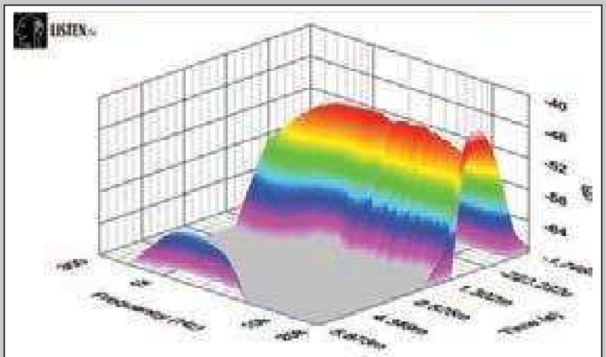

Figure 25: Bohzen CQ76 SoundMap STFT plot

For the last batch of measurements, I fired up the Listen SoundCheck analyzer with the SCM microphone and SoundConnect preamp/power supply. I used the built in pink noise generator and SLM utilities to set the SPL to 94 dB/1 m (0.59 V). Next, I relocated the 0.25" SCM microphone to 10 cm from the Bohzen CQ76's faceplate and received the distortion curves shown in **Figure 23**. Note that the stimulus was limited to 1 kHz as its lowest frequency.

For the final measurement on the Bohzen New Audio Lab ribbon tweeter, I performed an impulse measurement, then imported the data into the Listen SoundMap software, windowed out the room reflections, and created the CSD shown in **Figure 24**. The STFT is shown in **Figure 25**. For more information, visit www.bzspeakers.com. ***VC***

## Submit Samples to Test Bench

Test Bench is an open forum for OEM driver manufacturers in the industry. All OEMs are invited to submit samples to *Voice Coil* for inclusion in the Test Bench column.

Driver samples can include any sector of the loudspeaker market, including transducers for home audio, car audio, pro sound, multimedia, or musical instrument applications. Contact *Voice Coil* Editor Vance Dickason to discuss which drivers are being submitted.

All samples must include any published data on the product, patent information, or any special information to explain the functioning of the transducer. Include details on the materials used to construct the transducer (e.g., cone material, voice coil former material, and voice coil wire type). For woofers and midrange drivers, include the voice coil height, gap height, RMS power handling, and physically measured Mmd (complete cone assembly, including the cone, surround, spider, and voice coil with 50% of the spider, surround, and lead wires removed). Samples should be sent in pairs to:

Vance Dickason Consulting
333 South State Street, #152
Lake Oswego, OR 97034
(503-557-0427)
vdconsult@comcast.net