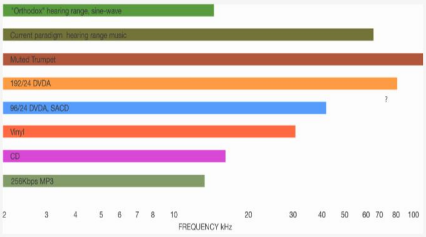
So how can we improve our hi fi to benefit from the best of digital audio?

Measurement



GRAPH 1

Listening tests conducted by Townshend Audio and others have identified the lack of extended high frequency

response as one of the shortcomings. This is illustrated clearly in Graph 1, which shows:

1 the orthodox range of hearing to 20 kHz.

2 The emerging belief that hearing extends to well over 60 kHz.

3 The range of sound from a harmonically rich instrument, for example a muted trumpet

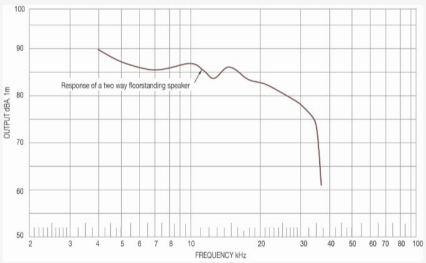
4 The response of current mass media, including MP3, FM radio, Digital TV etc, extending only to 15 kHz.

5 The response of CD, where the upper limit is 21 kHz (proclaimed in 1983 as "perfect sound forever").

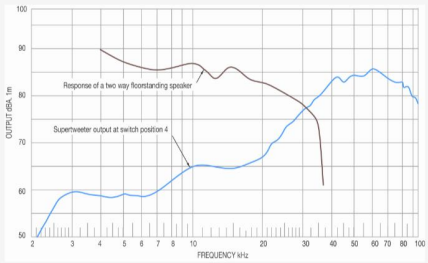
6 The response of vinyl (LP albums), up to 40 kHz under ideal conditions.

7 The response of digital audio, including 96kHz/24 bit DVDA/WAV and SACD, extending to about 50kHz.

8 Last, and far and away the best, the response of 192kHz/24 bit digital audio, extending to around 90kHz.



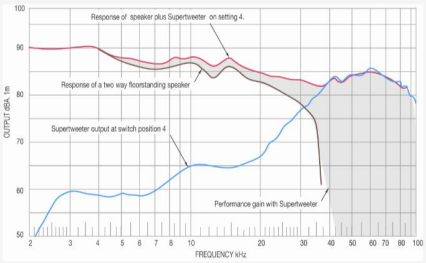
GRAPH 2



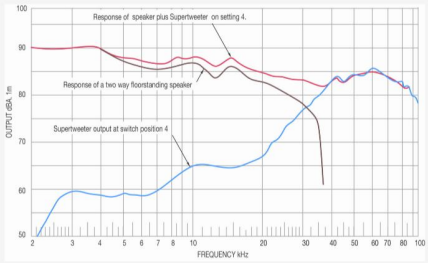
GRAPH 3

Graph 2 shows the response of a typical high quality speaker with a quality dome tweeter; it is clear that the high frequency response is falling away above about 10 kHz, and the important high frequencies are clearly attenuated.

Graph 3 shows the same speaker with the Townshend Supertweeter response superimposed. It is clear that the Supertweeter output mirrors the speaker output below 30 kHz, but supplies the important high frequency content above this frequency.



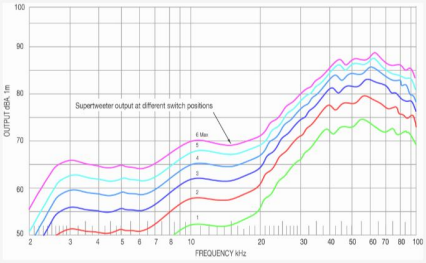
GRAPH 4



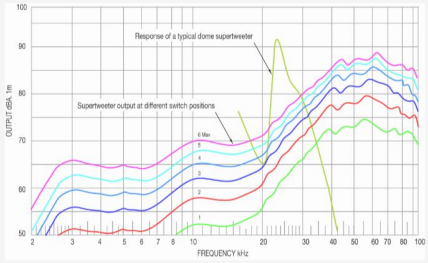
Graph 5

Graphs 5 and 6 show the range of Supertweeter sensitivity that may be selected by adjusting the Supertweeter level

control to match the sensitivity of a range of different partnering speakers.



GRAPH 6



Graph 7

It is clear from Graphs 4 and 5 that the Supertweeters have a small, but surprisingly significant effect on the response between 5 kHz and 20 kHz.

Low distortion in this part of the frequency range is crucial for pleasant sound and it is here that the Supertweeter has a distinct advantage over the commonly-used dome tweeter, because the component that radiates the sound, the ribbon, measures a mere 25mm long x 5mm wide x 0.01mm thick and weighs in at a minuscule 0.003 grams!

Compare this with the moving mass of a dome tweeter, which is rarely below 3 grams, i.e. radiates the sound, the ribbon measures a mere 25mm long x 5mm wide x 0.01mm thick and weighs in at a minuscule 0.003 grams!

Compare this with the moving mass of a dome tweeter, which is rarely below 3 grams, i.e. 1000 times heavier than the ribbon.

The ribbon can accelerate and decelerate much faster than the dome because it is so light and also because it is driven by a very powerful electromagnetic force over the entire area of the moving surface.

With a dome, there is inevitably some compression and tension in the mechanical parts that connect the tweeter coil to the dome and flexure in the dome itself.

This leads to a particular distortion which cannot occur in the case of the ribbon. This effect is shown in Graph 7, which illustrates the response of a popular dome Supertweeter compared with the Townshend Supertweeter.