T+A Elektroakustik

Criterion TCI 2E Loudspeakers

Some clever designers buck contemporary trends by intelligently and innovatively implementing older, proven, technologies to create new state-of-the-art end-products. That's my take on the design of the Criterion TCI 2E speaker from Germany's T+A Elektroakustik. This speaker combines distinctive cabinet geometry and construction, and an electrostatic tweeter (one of the oldest speaker technologies), with conventional dynamic drivers and transmission line bass loading—also one of the oldest of the driver loading techniques—in a clever re-working that makes this design not only completely modern but also unique.

Starting with the cabinet, I'd have to say that this is the most unusual form in all of hi-fi. The tall speaker's upper portion—which houses the electrostatic tweeter—is a narrow, tapered and rounded shape that from the listening position presents a pleasant optical illusion that tricks the eye into seeing a twisted or 'wrung' enclosure shape. This unusual form is possible due to the use of multiple laminate sheets—from nine to eleven layers of 2mm laminate—that have been manipulated and curved using pressure, heat and microwave energy. The internal transmission line is constructed from MDF and terminates via a slot at the bottom of the cabinet. Transmission lines have traditionally been used to extend bass response by using the bass driver's rear energy and channelling it through a series of internal tunnels. When properly applied and designed, this form of bass loading can provide very deep and dynamic bass. The non-parallel curved shape itself (only the front baffle is straight) serves to strengthen the whole structure, helps to eliminate internal resonances, and makes for a pleasing-to-the-eye presence.

The T+A-designed electrostatic tweeter resembles a miniaturised 'Mini-Me' MartinLogan panel. T+A quotes its operating range as 2–45kHz. Electrostatic tweeters can provide wide dispersion and very fast transient response without the inherent timbral colourations an enclosure can incur. The proprietary carbon-fibre 180mm-diameter midrange driver is also spec'd with a very wide frequency range (250Hz to 2kHz), thereby avoiding crossover anomalies in this crucial area. It takes over from the transmission-line-loaded twin carbon-fibre 220mm-diameter bass drivers. A visual inspection of the drivers revealed the midrange's central phase plug had the most precise tolerance relationship to its surrounding diaphragm I have ever seen; evidence not only of superb engineering but also the driver's potential true pistonic action. Overall frequency range is quoted as 30Hz to 45kHz (no +dB or –dB points are given), sensitivity at 90dBSPL at 1m and impedance is rated at a not-too-demanding 4Ω. The TCI 2E measures 1,200×270×400mm and weighs 54kg.

The back of the enclosure houses more controls than your average loudspeaker. For starters, there's a set of WBT bi-wiring terminals linked by proper cable jumpers. Widely used on European products, I find these terminals rather cramped, especially with the cable jumpers, if used with heavy spade lugs. Above the binding posts, three switches provide contouring of the bass, midrange and treble response in three positions –1.5dB, 'Lin'

(Linear 0dB) and +1.5dB. An IEC connector and an on/off switch control power for the electrostatic tweeter. Power activation is displayed via a tiny LED just below the tweeter and the speaker smartly turns off if it doesn't sense a signal after a few minutes and automatically powers-up when signal is again fed.

My review sample was finished in natural maple—a variety of other finishes is available—and was absolutely gorgeous. Both the quality of the veneer and its application were faultless. Head-to-toe, I rated the workmanship, component quality and fit and finish as outstanding.

Finally, T+A is very proud of the fact that all materials and processes used to manufacture its products are environmentally sound, right down to the lack of PVC in the packing and packaging and the use of non-CFC Styrofoam. Further, all materials used are entirely recyclable. Commendable!

Sound Criteria

My listening room is neither overly reverberant nor acoustically over-damped, so I placed the Criterions where I know that floor-standers will most often work best and left the equaliser rocker switches in their 'Lin' (neutral) positions. Brief experimentation with these controls revealed clearly audible sonic differences between the positions that in appropriate environments would render meaningful improvements. During the audition stage I used both the supplied spikes and rubber feet without noticeable sonic difference.

The sound of the T+A Criterions is much like the speaker itself: big and bold. I had little doubt about the effectiveness of the transmission line and its effect of augmenting the performance of the twin 10-inchers. The speaker has a rich bass register that goes deep and tight. Acoustic or electric bass, synthesiser and organ pieces were always strongly portrayed, full-bodied and rhythmical; the sort of bass that propels the music along. Dance music aficionados will love this speaker for its dominant and powerful bass foundation. Rock fans will appreciate the depth and fast-paced rhythm on offer. And even classical connoisseurs will treasure the Criterion's lower register's ability to enhance ambience and acoustic space as well as its handling of deep-voiced percussive instruments such as tympani.

> "Head-to-toe, I rated the workmanship, component quality and fit and finish as outstanding."

At the other extreme of the frequency range, where the electrostatic tweeter lives, the high treble information was reproduced with delicacy and fine detail but simultaneously, with precise and fast attack. Cymbals, bells and the like sounded tonally correct and diverse, with clear distinctions between the musician striking, brushing or tapping the instruments. This is a very clean and airy driver that always sounds natural and is an easy listen, never sounding harsh or even slightly bright. Don't mistake this for over-politeness though, this is a very special tweeter indeed, with a level of resolution that separates instrumental strands and extends the soundstage to a remarkable depth. A striking example during the auditions was on *Fanfare for the Common Man,* where the single horn seemed to come from my next-door neighbour's backyard.

This of course leaves us with the midrange, which is handled by a custom-designed driver that is admirably capable of integrating, both in terms of balance and tonally, with the powerful bass units and the very fast electrostatic tweeter… no mean feat considering the disparate technologies and materials involved. Male and female vocals projected well into the room with controlled sibilance and a very enjoyable sense of presence. Separation from this driver was also impressive, and like the tweeter, following individual instruments in complex mixes was made easy.

High playback levels with dynamic musical content neither confused nor congested this driver. The very lightweight diaphragm always behaved in such a snappy manner that it was easily able to keep up with the very fast electrostatic tweeter.

Conclusion

There is no doubt the T+A Criterion TCI 2E speakers will require a considerable financial outlay. However, what the astute music lover gets in return for his or her investment is a reproducer that is substantially built from high-quality materials using advanced and environmentally-friendly manufacturing procedures. It has been skilfully engineered using both tried-and-true and progressive technologies that have resulted, most importantly, in a superb sound quality. That the styling will complement any décor is the icing on the very tasty cake. *Wunderbar*!

Edgar Kramer

- Outstanding build and engineering
- Powerful, detailed and delicate sound

- Cramped speaker binding posts
- 240v power leads required

T+A Criterion TCI 2E Loudspeaker

Brand: T+A Elektroakustik
Model: Criterion TCI 2E
Category: Loudspeaker
Warranty: Three Years
RRP: $19,000
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LAB REPORT

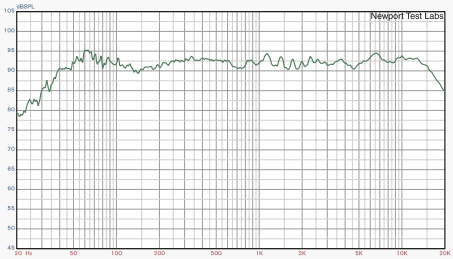
Readers interested in a full technical appraisal of the performance of the T+A Criterion TCI2E Loudspeakers should continue on and read the LABORATORY REPORT published on the following pages. Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.

Test Results

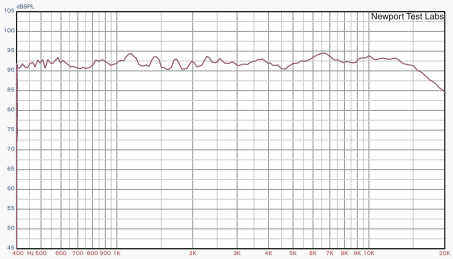
The electrostatic tweeter in the T+A TCI 2E presents a unique problem with high-frequency measurement, because the large area of the tweeter diaphragm means there are multiple path-lengths to the element of the measuring microphone, which inevitably results in some phase cancellation at high frequencies. This effect is clearly evident above 15kHz on *Graph 1* and *Graph 2*. It's also evident on *Graph 4*, but because this last graph uses pink noise rather than discrete tones, there is less cancellation than on the other two graphs. The fact that the human ear doesn't work quite like a microphone diaphragm—as well as the fact that you have two ears—means this same effect won't happen when listening, notwithstanding that few people over the age of 40 can hear frequencies above 16kHz anyway, which is where the graph makes it appear as if the TCI 2E's response begins to roll off. As I hope I've made clear, this roll-off is simply a measurement problem caused by the electrostatic tweeter panel: please be assured that the frequency response of the T+A TCI 2E extends well above 30kHz!

You can see from *Graph 1* that the TCI 2E's response is very flat, extending from 38Hz to 16kHz ±3dB as graphed. However, the upper limit should be extended, as noted in the introductory paragraph, so the response is actually at least 38Hz to 30kHz ±3dB. (The extended high-frequency response was measured using a sound pressure level meter that lacked a graph output, and its upper measurement limit is 30kHz). Note, too, the accuracy of the TCI 2E's spectral balance, so that all the small variations in the response basically 'hinge' about the 92.5dBSPL calibration, rather than skewing from being (say) mostly 3dB high in the bass and 3dB low in the treble. There seems to be a slight 'floor bounce' effect between 100–200Hz, but at only –2.5dB, it's of no real consequence. The TCI 2E's high-frequency response is shown in an expanded fashion in *Graph 2*. Even when the trace is magnified, you can see that it's still superbly flat and balanced.

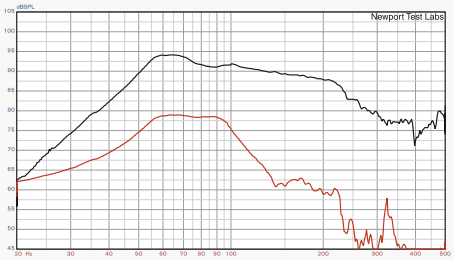
Newport Test Labs has captured the TCI 2E's low-frequency performance using the nearfield microphone technique, which simulates the bass response you'd get if the speaker were placed in an anechoic chamber. You can see the woofer's response extends nice and flat down to 55Hz, after which it rolls off very smoothly and regularly at 18dB per octave. Since the far-field trace extends flat down to 38Hz, you can see the extra reach enabled by the transmission line. The lower trace shows the speaker's output at the exit of the transmission line, not compensated for the differences in radiating area between the TL exit and the woofer(s). You can see, however, that the exit operates between 20Hz and 130Hz, with peak output between 45Hz and 115Hz.



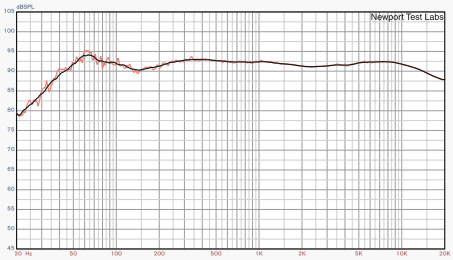
Graph 1. Frequency response. Composite plot. Response below 610Hz is unsmoothed pink noise test stimulus. Response above 610Hz is the far-field on-axis gated sine trace. [T+A Criterion TCI 2E]



Graph 2. High-frequency response, expanded view. Test stimulus gated sine. Microphone placed at three metres on-axis with dome tweeter. Lower measurement limit 400Hz. [T+A Criterion TCI 2E]



Graph 3. Low frequency response of front-firing transmission line exit (red trace) and upper woofer. Nearfield acquisition. Not compensated for differences in radiating areas. [T+A Criterion TCI 2E]



Graph 4. Frequency response using pink noise test stimulus. Red trace is unsmoothed aquisition. Black trace shows post-processed trace smoothed to one-third octave. [T+A TCI 2E]

"Note, too, the accuracy of the TCI 2E's spectral balance, so that all the small variations in the response basically 'hinge' about the 92.5dBSPL calibration"

The final graph (*Graph 4*) shows the frequency response of the TCI 2E using pink noise, both unsmoothed (red trace) and after being passed through an external third-octave filter (black trace). This graph shows the smoothed response to extend from 35Hz to 20kHz±3dB. Efficiency was measured at 87.2dBSPL at a distance of one metre, for an input of 2.83V. This is close enough to T+A's specification that it makes no difference, though T+A's uses a highly unusual method of expressing efficiency, effectively stating that you need 2.1-watts of input power to realise 90dBSPL at one metre. It may be that the EU now requires speaker manufacturers to use this method. I'll look into it. In the meantime, 'excellent' is how I'd characterise the measured performance of T+A's TCI 2E loudspeakers.

Steve Holding

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