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DO NOT ADJUST

Good, high efficiency 'speakers don't come cheap, unless you fancy a bit of DIY. Clive Meakins builds the Adire Audio HE10.1 High Efficiency Speaker.

Low powered valve amps thrive on efficient, easy to drive speakers. This is particularly true of zero feedback Single-ended Triode (SET) and Parallel Single-ended (PSE) amplifiers. An SET or PSE sounds better the less is asked of it, there is a general rule that says the best sound is from the first watt. Without doubt, you don't want to be regularly listening the last watt of an SET or PSE, distortion will be high.

Those who have genuinely low power amps, 1W or 2W will need to be looking at speakers that are rated at 104dB+ efficiency. These will usually have horn enclosures and may use a single full-range driver often from Lowther or Fostex. There are those who say you've not experienced dynamics until you've heard a 100dB+ speaker but unfortunately such speakers tend to have a large footprint, finicky placement and reveal the beast itself: hum.

The 9W Billie 300B SETs from www.diyhifisupply.com that I reviewed in February 2002 work very well indeed with my relatively typical "audiophile" 90db speakers. My Mordaunt Short Performance 860 speakers are no longer made but are a good example of a £2,000 floorstander. Efficiency is just acceptable at 90db, ease of drive whilst not arduous is not ideal, even so they proved a good match for the Billies.

THE CHOICE

I just had to find out what the Billies would do when coupled with a more ideal speaker. The Adire Audio HE10.1 speaker looked to be promising. It has a quoted 95.5dB sensitivity, bass extends down to around 50Hz and impedance is a genuine 8 ohm that doesn't dip lower than 6.5 ohms.

Adire Audio trade via the internet at www.adireaudio.com. They are based in Seattle, the home of Grunge music and, of course, Boeing. As your speaker kit will need to make use of a Boeing or similar to get to you, this inevitably puts the price up. Fortunately Adire Audio sell the HE10.1 as a

kit minus the wood. The kit costs \$299, shipping should be around \$110 and there will also be local duty to pay. All this is admittedly a little expensive, but not so bad as to make the speakers a poor proposition. There is little competition to the HE10.1 and all-in they cannot be described as expensive. Expect to pay around £150 for custom made stands that suit these speakers, if you should so desire.

So, what do you get for your money? The bass/mid driver is a ten inch paper cone Eminence Beta 10CX with a 90 degree conical horn through the middle of the voice coil. The tweeter is a one-inch compression driver built to Adire Audio specifications; it is made to be mounted coaxially in the bass/mid. In addition to the drivers you get the reflex ports and all crossover components. Non-polar capacitors are from Solen, as are the inductors. The crossover frequency is set to 2.4kHz and is 6th order Linkwitz Riley. The crossover network is not bi-wired. Dan Wiggins at Adire told me they found no benefit from bi-wiring - good news as this keeps your speaker cable costs down. You also receive Polyfill stuffing, internal wire, nuts and bolts. Everything is present except the wood and tools. The cabinet size will be 17.5" high x 12" wide x 13.5" deep and the reflex port is located at the front, so placement nearer a rear wall is a possibility.

What specialist tools do you need? I used



HE 10.1 on the custom made Atacama Stand

an inexpensive electric router, jigsaw and detail sander. You'll need a small workbench with clamps. Also, a virtual necessity are about 6 clamps to hold everything in place while the glue dries during final assembly. Maybe you can get away with using masking tape to hold the wood in place but it's not going to give the best result. If you simply must buy finished speakers or a flat pack kit, then these are available from www.diyacable.com. Shipping MDF from the US will be expensive so check the freight rates. I elected to build the cabinets from scratch. The best results could be had from using Baltic birch ply and this should not require a veneer finish. The alternative is MDF. This is more forgiving to work with and with these being my first scratch build speakers for over 30 years I took the MDF route.

DOWN TO WORK

The assembly instructions can be downloaded from www.adireaudio.com. They give cabinet dimensions (in inches) but no advice on the

JST YOUR SET



Adire's compression tweeter

techniques to build them. Instructions on building the crossovers are much more detailed. I got my local timber merchant to cut the panels to size for me. If you use my construction method this is what you'll need for a stereo pair:

Top/Bottom (4)	305mm x 343mm (12" x 13.5")
Sides (4)	343mm x 425mm (13.5" x 16.75")
Front/Back (4)	285mm x 425mm (11.25" x 16.75")

To ensure the cabinets are rigid it is necessary to use a router to create simple joints in the MDF (bought as 18 or 19mm). I set the router for a 9mm deep cut that was 18mm across. Cuts were made around the four inside edges on the tops and bottoms. The sides were cut along the inside edge of the verticals. I used the router outside wearing a mask. The dust was unbelievable, be prepared for it.

Next I glued and clamped the cabinets. After a day for the glue to dry I used a detail sander to smooth off the joints, which were pretty accurate in the first place. Rapping the cabinets with my knuckles showed them to be reasonably dead sounding. You could add an internal brace, though I don't think it's strictly necessary, and you'll need to increase the cabinet volume by the volume of the brace. The instructions say there is no need to recess the main driver so you just need to

cut a round hole for this and the reflex port and, finally, a rectangle for the binding posts cup. You need to drill the bass/mid driver mounting holes for the hex bolts and the special "T" nut for inside the speaker. This nut skewers itself into the MDF.

Last of all comes the crossover. You'll need a piece of MDF or similar for the circuit

board. The instructions are very cautious, recommending wire wrapping the components and only soldering after testing it. Whilst I applaud caution, the crossovers will offer little challenge to those who have built their hardwired SET amps to drive these speakers. I simply soldered the connections then tested the crossover with an old, full range, car speaker using a solid-state amp. There's no point risking destroying the HE10.1 drive units or taking out an exotic valve amp. I decided to veneer the speakers later because, as must happen to most people, I couldn't wait to use them. Again, I used a solid-state amp to test them and initially run them in. Valve amps don't like running without a load so if something did go wrong the consequences could be dire.

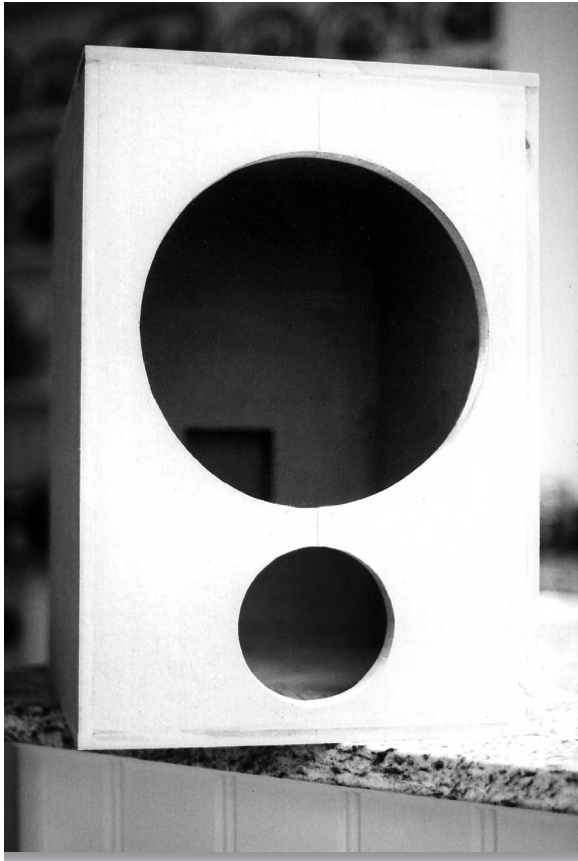
SATISFACTION GUARANTEED

For the first 3 minutes the HE10.1s sounded dreadful. Then they started to sound OK so I left them running for a couple of hours, had dinner went back to listen with a Meridian 588 CD player, Michell Orca preamp and Billie 300B SETs. Initially I had to use 40cm stands, but these were far too low. The HE10.1s were placed in my normal speaker position,



Tweeter coaxially mounted in the woofer

feature



MDF cabinet ready for crossover and driver mounting

80cm from the rear wall and 70cm from the sides. This position worked fine. Results were pretty good with the non-ideal stands. Two weeks later my custom made stands arrived from Atacama. These are a 4 pillar design, with a top plate 300mm x 355mm and a base plate 350mm x 400mm. Overall height is 55cm. I strongly recommend mass loading the pillars; otherwise they sing along with the music. I used sand. The stand and speaker combination is impressive looking and will be improved once I get around to veneering the cabinets.

Before I describe the sound of the HE10.1 I'd better list some of the changes to the Billie 300B SETs since I reviewed them. The SRPP driver has been reconfigured to be a Mu Stage, the last power supply capacitor has been changed from an electrolytic to a lower value ICW polypropylene. There is a 20uF capacitor connected in Ultrath path mode; that is from B+ to the top of the cathode resistor. The 300B grid leak resistor has been replaced by a grid choke from Stevens & Billington. This has also allowed me to delete the gridstopper. The capacitor across 300B cathode resistor is now made up from paralleled Mylar capacitors and finally the 300B dc

heater now uses Schottky diodes with a CRC stage to compensate for the lower voltage drop of schottkys. DIYing your SET means you can really individualise it, great fun! The greatest improvement was the gridchoke followed by the Mu Stage and Schottky heaters. Most of these upgrades and others are available from www.diyhifisupply.com.

Listening to the HE10.1s, four areas impressed immediately in my 18ft x 15ft room: bass, soundstage, treble quality and integration. Whilst these are not full range speakers, many will be perfectly happy to use them without a subwoofer. I found the bass went down relatively low, albeit at a much reduced level. Talking to Dan Wiggins about this he said they used an over-damped alignment that results in a gentle roll-

off.

Soundstage? Simply magnificent. This is a combination of the speaker itself and the benign load the speaker places on the Billies. This combination of the speaker and amps is wonderful. I've heard some say that they like

SETs because they make music sound as though it is "lit from within". This is a good description of the HE10.1 plus Billies.

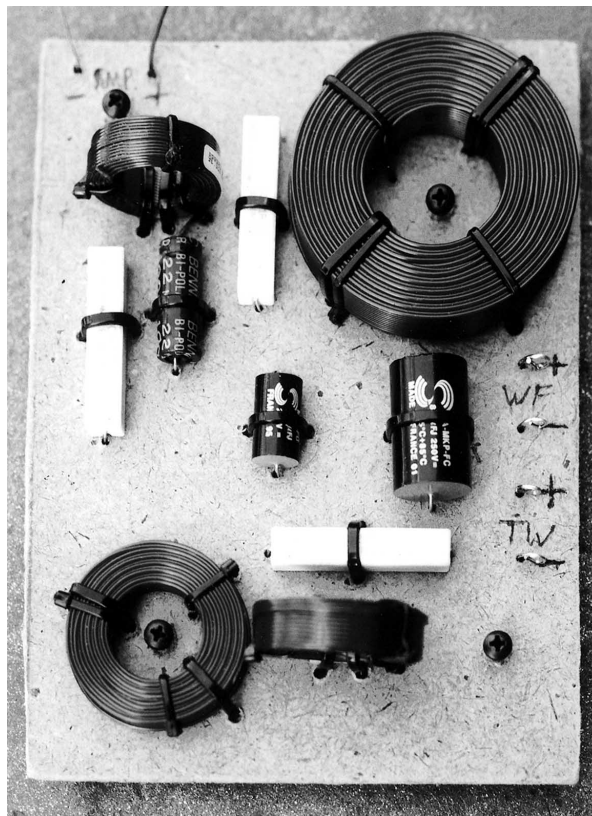
The compression tweeter sounds quite unlike any dome tweeter I've ever heard. It has bell-like clarity with no smearing or tizzyness, hi-hats take on a different quality entirely when compared to my Mordaunt Short 860s.

Using an Assemblage DAC 2.6 Signature wasn't as successful. Much the same qualities were there but the soundstaging and treble were clearly being held back. Feed these speakers with a top quality source such as the Meridian 588 and they will reward you. I would not say they are especially unforgiving but to sound really special they need a well sorted front-end. The speakers are slightly sweet sounding without any mushiness. As you would hope from coaxial drivers, spatial integration is ideal. It is also hard to pick any holes in the sonic integration between the drivers so, top marks here too.

Back to using the 588, the system has so much life and clarity with very good macro dynamics and fantastic micro dynamics. Vocal intonation and subtle interplays between instruments are beautifully reproduced. The sweet spot for the ideal listening position is wide. Turning to the bottom-end, to extract the last octave of bass I connected my two REL Storm subwoofers. I found them very easy to integrate, probably due to the gently rolling-off bass. The subs settings were not far away from the settings I use for the Mordaunt Shorts which are supposed to go much lower than the HE10.1, reinforcing my view that the HE10.1 bass goes lower than at first appears.

With the Mordaunt-Shorts, the Billies sounded great with most music but Pink Floyd is an example that didn't quite work. Bring on the HE10.1 and the problem is solved and I now hear much more deeply into the mix. I'm not suggesting that orchestral music played in a large room will work with 9W. There still are limits but these won't apply for most people. So, how loud is 9W with a 95.5db speaker? Enough to make my ears ring after listening for a few minutes at high volume. You'll either be trying to go deaf or have a large room if you find there's not enough horsepower here.

I had to find out to what extent the SETs were responsible for the sound I was hearing so, I connected up my Michell Alecto 100W solidstate monoblocks. The results were in line with what you might expect. The Alectos had greater authority in the



The completed crossover design



Eminence Beta 10CX driver

bass, the Billies showed greater alacrity in the mid and top-end. The Billies had the better separated and defined soundstage. The "lit from within" characteristic to music was somewhat dimmer with the Alectos with less emotion being reproduced. I would describe the Alectos with the HE10.1 as impressive; with the Billies I'd use the word magical. Choose the seasoning (amplifier) to match your taste.

I found that I could hear much larger differences in recording quality than I'm used to and the same is true for different makes of valves. Indeed I could have written my May 2002 review of 300Bs much more quickly with the HE10.1s. The results would have been the same but the revealing nature of the speakers would have made for much more rapid auditioning.

TWEAK-TASTIC

Finally, I couldn't resist trying some even better parts in the crossover. It would be possible to replace every component in the crossover with expensive parts but it wouldn't make sense to spend so much given the original cost of the HE10.1. I discussed the options with Audiocom and decided to change the Solen capacitor and inductor that are in series with the tweeter along with the internal wiring for both drivers. In went a 0.39mH Corobar Iron Dust Core inductor (£13.70 / pair), resulting in greater clarity and improved soundstage. There was generally more bite to strings and instruments that go "ding"; vocals seemed unchanged.

Next in went Teflon insulated, silver clad

OFC wire. There are two sizes. I used thin (0.25) for the tweeter and thick (0.45) for the bass, 4 x 0.8m per cabinet (£22 for both speakers, 8 x 1m). This gave a sweeter and more refined sound. There was also a touch more authority and depth to the bass. Lastly I swapped the Solen 1.8uF capacitor for a better polypropylene, an Audyn KP SN (£14.80 / pair). This gave a more open and detailed sound, coupled with a lack of harshness. Strangely, bass seems to have better definition too. Improving one end of the frequency spectrum sometimes changes the perception of the other end. I'd rate the wire and capacitor changes of equal importance with the inductor in 3rd place. Whilst these changes are not night and day, the speakers are great as standard anyway, they do add that little bit extra. Music was

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sweeter sounding with more detail and a little snappier too; it timed better.

There is no question that the combination of the HE10.1 and a 9W SET amplifier shows great synergy. A 2A3 SET should work well too with a reduced maximum sound level. Mind you, the WAD 2A3 PSE should be a similar league to a 300B SET. By the time you read this, Adire Audio should have released their HE8.1 and HE12.1 to give you more options on efficiency, size and bass extension. The HE10.1 is great value and shows what we are missing with less efficient speakers. Lower power amplification generally offers more immediacy and delicacy; if you value these qualities then the HE10.1s make going this route a breeze.

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Hey presto - the finished item, hopefully!