



Castle Acoustics

Richmond Classic 3i

The little Richmond Classic has been the entry-level model in Castle Acoustics' range since the company was first founded in 1973 and has been responsible for winning the company a bucket-load of 'Best Buy'—and other, similar,—awards over the past 36 years.

It was precisely because the Richmond Classic was so popular that I was not surprised when, shortly after International Audio Group (IAG) purchased Castle Acoustics, it decided that the Richmond Classic would be one of the first models 're-launched' under the Castle/IAG banner. And, if it's not putting the cart before the horse, I also was not surprised that IAG purchased Castle in the first place. Given that IAG already had a 'brand portfolio' that included such prestigious British loudspeaker brands as Quad, Wharfedale and Mission, adding Castle Acoustics was a natural fit.

The Equipment

If you were wondering why I used the term 'little' when describing the Richmond Classic 3i speakers, it's because they are! They stand just 280mm high and 165mm wide. They're not overly deep either. The depth of the cabinet is 218mm, but once you've fitted the grille and allow for the fact that the rear terminals stand a little proud of the rear of the cabinet, you need to allow an overall depth of 238mm for mounting them.

As you can see from the photographs ac-

companying this review, although the speaker cabinets are conventionally rectangular (though the sides, top and bottom of the cabinet are bevelled into a smooth curve where they meet the front baffle, which will improve performance if you don't use the grilles) the grille itself has one side cut away into a graceful curve. It's a very attractive look and a very clever example of industrial design at its best. It also means the left and right speakers are mirror-imaged, which means that unlike most small budget loudspeakers, you can very easily alter the perceived width of the stereo image at your listening position without altering the speakers' relative positions in your room, simply by swapping the 'left' and 'right' speakers! This is a very important benefit for small speakers, which are most often used in small rooms, and where the listening position is usually closer than when large floor-standers are used. Very few low-cost speakers come mirror-imaged these days, simply because it increases the cost of manufacturing.

You should also be able to see from the photograph that the driver lay-out itself is completely unconventional, with the bass/midrange driver at the top of the baffle and the tweeter offset to one side below it. In most cases, this is done so that the output of the bass/midrange driver isn't loaded by the surface on which the speakers are standing, but Castle doesn't mention its reasons in its litera-

ture. If you place the speakers on stands, or position them at the front of a shelf, so that there's no flat surface in front of the speaker, I'd suggest you mount the speakers so that the height of the tweeter is closest to the height of your ears when seated in front of the speakers. As always when positioning loudspeakers, it's worthwhile experimenting. The only drawback with positioning the Richmond Classics 3i speakers 'upside down' is that because the gold 'Castle' logo is fixed to the front baffle, the speakers will actually appear to the eye as being 'upside down.' It would have been nice if Castle had made it possible to rotate the logo.

The C004-model bass/midrange driver is rated by Castle as having a diameter of 130mm, which is the external diameter across the driver measured midway between the mounting holes. If you measure across the mounting holes, the external diameter is 150mm. However, the important diameter is the Thiele/Small diameter, from which the speaker's piston area (S_d) is derived, which in turn determines the size of the cabinet and port. The Thiele/Small diameter is 109mm, which gives an S_d of 93cm². The cone appeared to me to be made of woven Kevlar, but Castle's specifications say that it's actually strands of woven carbon fibre. This cone is bonded to a rubber surround suspension. The central dustcap is made from a hard polymer and is 'bullet-

“Castle is continuing to use a conventional—and substantially large!—ferrite magnet, so you won’t have to worry about the tweeter overheating and losing efficiency.”

shaped’ rather than dome-shaped. This type of cone/surround construction is excellent for use in Australia, because it’s highly impervious to ultraviolet radiation (which quickly destroys surround suspensions made from foam) and it’s also not hygroscopic, so the mass of the cone won’t increase when the humidity is high.

The chassis of the bass/midrange driver is incredibly solid, being cast from aluminium—and this is just as well, because it has to support a fairly substantial drive magnet, as well as a secondary flux-cancelling magnet bonded to the rear of the main drive magnet. The copper-coated aluminium wire voice coil is wound on a Kapton former and vented via a small hole in the rear of the magnet. The driver is fixed to the front baffle by four hex-head bolts, which screw into captive threads. This level of refinement is highly unusual on a speaker at the Richmond 3i’s price-point—particularly since the driver is also recessed into the front baffle.

The tweeter is a soft fabric (a low modulus polyamide, according to Castle’s specifications) that’s 19mm in diameter. It’s fixed inside a circular plate that’s 95mm in diameter and has a ‘relief’ version of Castle’s logo moulded into it. Unlike the bass/midrange driver, the tweeter is secured by three cross-head particle board screws, which are long enough to penetrate the 15mm thick baffle. I was pleased to see that Castle is continuing to use a conventional—and substantially large!—ferrite

magnet, so you won’t have to worry about the tweeter overheating and losing efficiency.

As with most speakers these days, the Castle Richmond Classic 3i’s crossover network is laid out on a PCB that’s then attached to the rear of the speaker terminal plate. However, unlike most, the PCB on the 3i is so large that you can’t extricate it through the rear terminal plate cut-out. The reason it’s so large is because it houses some very substantial components, including a trio of 5W cermet resistors, a quartet of capacitors and a brace of inductors (cross-mounted so there’s no magnetic interaction between them). All internal wiring is via multi-strand cable, hard-wired to the crossover network, but spade-connected at the driver ends. The inside of the enclosure is almost completely filled with synthetic acoustic wool, which is a much better choice than the fibreglass that’s often used. What I couldn’t find were any of the bituminous pads which, according to Castle’s website, were supposed to be fixed to the internal walls.

Not surprisingly, the Richmond Classic 3i is a bass reflex design. The black plastic port is 75mm long and 45mm in diameter. It exits on the rear panel, almost immediately above the terminal plate. Although the exit is flared, the internal entrance to the port is cut square. Also, although there’s a ‘roughened’ surface on the flare (somewhat reminiscent of B&W’s famous ‘dimples’), the inside of the port is otherwise super-smooth along its entire length.

The rear-terminal plate has two pairs of



gold-plated, banana-capable speaker terminals, ideal for bi-wiring which are normally bridged by gold-plated buss-bars. The speaker terminals are knurled to make them easier to tighten, but because there are four large terminals in a fairly small space, you may find it’s difficult to tighten them with your fingers—especially if, like me, you have large fingers! In this case, use a padded tool in order not to damage the gold-plating.

Below the terminal plate are two threaded sockets, on standard centres. These sockets will let you attach the Richmond Classic 3is to any standard after-market wall-mount bracket, various versions of which are readily available from all hi-fi stores. I personally think this is a much better approach than providing a ‘dedicated’ bracket, because it ends up being cheaper for consumers, and allows consumers more choice.

Castle Acoustics Richmond Classic 3i

Brand: Castle

Model: Richmond 3i

Category: Bookshelf Speakers

RRP: \$799

Warranty: Five Years

Distributor: Audio Dynamics Pty Ltd

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- Mirror Image
- Midrange linearity
- Cabinet size & quality



- Low efficiency
- Bass response
- Power handling

“excellent value for money for those who will be playing them at modest volume levels in a moderately small environment.”

Like all Castle loudspeakers, the Richmond Classic 3i is available in a selection of eight natural wood veneer finishes. My sample was veneered in Mahogany which, although very beautiful, was a little too dark for my liking, but that’s a personal call. I think I would have preferred any of the alternatives, which are Rosewood, Walnut, Cherry, Maple, Natural Oak, Antique Oak and Black Oak. Well, maybe not Black Oak either...

Listening Sessions

One advantage of the Castle Richmond 3is being so small is that you have maximum flexibility when mounting them. They’re inconspicuous when shelf-mounted, or in a home entertainment unit, and also if wall-mounted. The magnetic shielding means that you can put them close to an old-fashioned CRT monitor if you still have one. Obviously, where you mount them will greatly influence their performance, particularly in the bass, so we should look at some of the options. If you’re after the most accurate response, I had no

doubt that this was achieved with the speakers placed on stands, tweeter down, but with the stands sufficiently high that the tweeters were at ear level and aimed directly at the listening position. This results in outstanding midrange sound and excellent treble. Off-axis, the midrange remains the same, but the treble gets a little soft-sounding. Another plus of this mounting arrangement is the imaging, which is impressive. However, this mounting arrangement results in the least bass. Wall-mounting the speakers, or using them on shelves where their ports are fairly close to the wall, increases the bass somewhat, but affects the midrange clarity a little, and also impacts on the imaging.

I elected to use the speakers on stands. I did so partly because it’s quite unreasonable to expect much bass from a design like the Richmond 3is: simple physics argues against it. If you want only small speakers, but also want bass, you’re best advised to invest in a subwoofer. If you do this, go for a small subwoofer. The reason is simply that a small subwoofer is a better match, since it will be more ‘agile’ where it crosses to the 3i.

Powerhouses the Richmond Classic 3is are not. You don’t need much power to get them playing sweetly, but if you wind the volume up too far, they fairly quickly start to sound congested across the midrange and the overall quality of sound begins to harden-up relatively quickly. Adding a subwoofer proved a quick cure, so it appears it’s the demands of the low-bass that are responsible for this effect.

On stands, as I said, the midrange was outstanding. It was smooth, well-balanced and highly articulate. It can be auditioned to best effect with female vocals, but I was equally impressed when listening to male voices in the baritone and tenor ranges. I found that listening to male bass, the sound could become a bit chesty at times and looking for the reason for this, I played some solo piano and found that the upper bass was a little forward in the region about an octave below middle C. Not significantly forward, but enough to be noticeable if you listen carefully to works you know well. I was able to remove this forwardness quite easily by switching to an amplifier with a bass tone control and notching back the bass just a single notch. Rolling off the bass elec-

LAB REPORT

Readers interested in a full technical appraisal of the performance of the Castle Acoustics Richmond 3i 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.



tronically naturally also affected the level of much lower bass notes—kick drum and electric bass, but since these were well back in the mix anyway, I wasn’t concerned.

Conclusion

Castle’s Richmond Classic 3i design represents excellent value for money for those who will be playing them at modest volume levels in a moderately small environment. Adding a small powered subwoofer will deliver tangible improvements in deep bass response as well as in overall dynamics. *—greg borrowman*

Laboratory Test Results

The frequency response of the Castle Richmond 3i was very flat, as you can see from the graphs supplied by *Newport Test Labs*. (*Graph 1* is a composite graph, where the section of the trace below 850Hz is the averaged result of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter. Above the splice frequency, the response is the gated high-frequency response that's shown in *Graph 2*. You can see that there's a very definite bass boost centred at 150Hz that's around 5dB above the average level of the trace. I have little doubt this is the result of a deliberate strategy to try to compensate for the lack of bass below 100Hz (as evidenced by the steep roll-off from 150Hz down) to give the overall bass a bit of a lift. However, even when you factor in this lift, the overall frequency response of the Richmond 3i still falls within a pretty tight envelope—helped greatly by the linearity above 250Hz—such that its measured frequency response is 75Hz to 20kHz ± 3 dB. That's a remarkably good result for such a small loudspeaker.

Graph 2 shows the high-frequency performance in greater detail, thanks to the expanded horizontal graph scaling, but also shows the response of the Richmond 3i with and with-

out the speaker grille. You can see for yourself that there's not a lot in it. The two responses are equally 'flat' but without the grille you'll experience a slight (2dB) lift in high frequencies between 5kHz and 14kHz. This difference is so small, and the frequencies affected so high, that I don't think the difference would be audible. The same would be true for that 2.5dB difference between the two traces at 20kHz. Even if you can hear these differences, you may well find the 'with grille' response sounds a little smoother and more mellow than the 'sans grille' response.

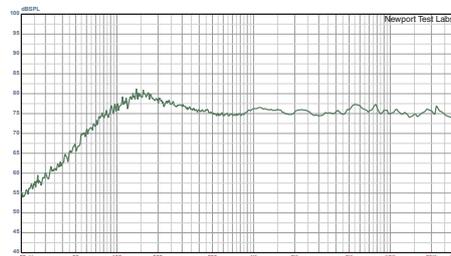
Low-frequency performance is shown in *Graph 3*. You can see that the bass/midrange driver's response starts rolling off below 150Hz to its null at 70Hz, which is the system tuning. Above 150Hz the driver rolls off quite slowly (in practise, somewhat less than is shown on the graph, because the nearfield measurement technique becomes increasingly unreliable with increasing frequency) but it's obvious there's some type of system resonance at around 1.2kHz, particularly since it seems to show up in the output of the bass reflex port as well, which is the trace below. As for the port itself, it's tuned for maximum output at 70Hz, exactly as it should be, and has a fairly conventional alignment. The port output rolls

off smoothly, without any resonances visible, up to 400Hz, but above this frequency there is some excess acoustic energy visible on the trace, particularly at 1.5kHz. Since the port is rear-firing, this is unlikely to have any audible effect.

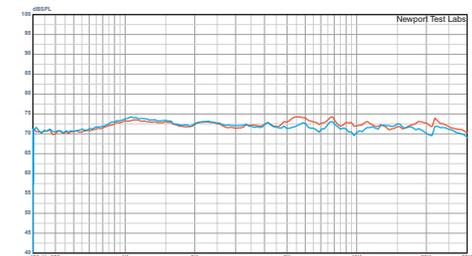
The impedance of the Richmond Classic 3i is relatively high, dropping below 6 Ω only between 8 and 16kHz, and the phase angle is particularly well-controlled, so it will be exceptionally easy to drive, even for something like a budget AV receiver. I couldn't see any evidence of cabinet resonances on the trace, but considering the small size of the panels, this is hardly surprising. What is surprising is that *Graph 4* shows that the crossover frequency is at 1.5kHz, which is lower than I would have expected, and means the tweeter will be required to work quite hard.

Newport Test Labs measured the sensitivity of the Richmond Classic 3i at 86dB SPL, 2dB less than the 88dB SPL claimed by Castle Acoustics. Speaker efficiency is difficult to measure, and different techniques give different results, and *Newport Test Labs'* methodology is particularly stringent, however, given the size of the bass/midrange driver's magnet and the size of the enclosure, I am just as certain that Castle's spec is a bit optimistic!

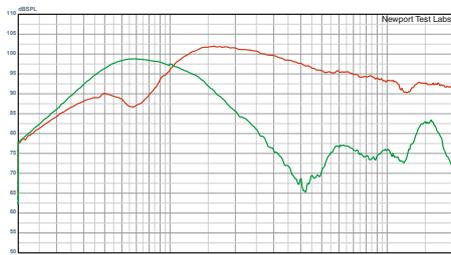
 Steve Holding



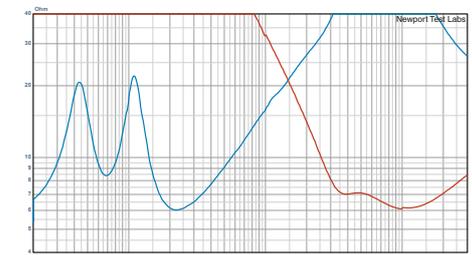
Graph 1. Composite frequency response. Trace below 850Hz is the averaged result of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter using pink noise test stimulus with capture unsmoothed. This has been manually spliced at 850Hz to the gated high-frequency response, an expanded view of which is shown in *Graph 2*. [Castle Richmond 3i Loudspeaker]



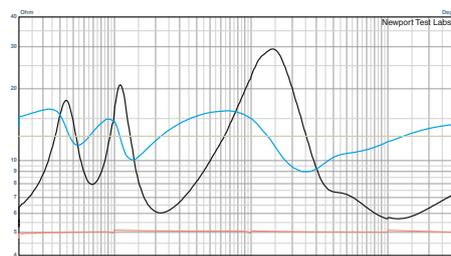
Graph 2. High-frequency response, expanded view. Test stimulus gated sine. Microphone placed at three metres on-axis with dome tweeter. Red trace shows response without loudspeaker grille, blue trace shows response with grille fitted. Lower measurement limit 400Hz. [Castle Richmond 3i Loudspeaker]



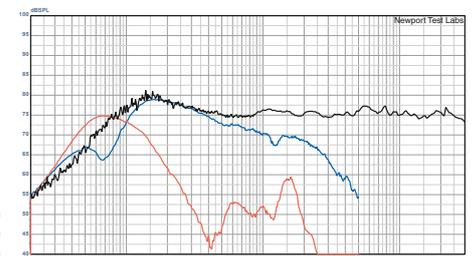
Graph 3. Low frequency response of woofer (red trace) and rear-firing bass reflex port. Nearfield acquisition. Port/woofer levels not compensated for differences in radiating areas. [Richmond 3i]



Graph 4. Impedance modulus of high-frequency driver (red trace) and low-frequency driver (blue trace) after unlinking high-pass and low-pass sections of the crossover network. [Castle 3i]



Graph 5. Impedance modulus (black trace) plus phase angle (blue trace). Red trace under is reference 5-ohm precision calibration resistor. [Castle Richmond 3i Loudspeaker]



Graph 6. Composite response plot. Red trace is output of bass reflex port. Dark blue trace is anechoic response of bass driver. Black trace is averaged in-room pink noise response below 850Hz spliced to gated high-frequency response. [Castle Richmond 3i Loudspeaker]