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Standing tall...

The Focal Grande Utopia EM Loudspeaker

by Roy Gregory

The third family of products to carry Focal's flagship Utopia designation, this latest iteration represents not just an evolution of the technology and thinking behind these speakers, but a ground-up reassessment of its implementation. So, while there are clear common factors that bind these new Utopia models to their predecessors (driver technology, complement and materials), there isn't a single element that hasn't been modified or changed, wholly or in part. In fact, the developments are so comprehensive and their implications so far reaching that they are beyond the scope of a single review. Which is why we started by looking at the simplest speaker in the range, the two-way stand-mounted Diablo, a model that incorporates the advances made to the established Beryllium tweeter and W Cone driver technologies, as well as touching on the sophisticated cabinet mapping technique that has been applied to the design and construction of the enclosure.

The Grande Utopia EM embodies all those advances and adds a few twists to the mix that only become possible when development budgets and product pricing become truly elastic.

As such, this review constitutes Part II, a second instalment of the story that started with CT's Diablo review in Issue 63, in which he notes the significant advances made by Focal in the areas of driver performance and cabinet design. Refinements in the diameter of the Beryllium tweeter and

the development of a new spaced motor assembly, shaped to maximize venting and minimize reflections have resulted in a lower resonant frequency, a 1.5 dB increase in efficiency and a 40 per cent reduction in distortion, increased thermal efficiency, greater dynamics and reduced compression. Laser cutting of the W sandwich cones used in the mid and bass drivers has improved sonic consistency and pair matching, while the sophisticated new cabinet mapping technology has allowed the creation of more efficient and rigid cabinet structures, shorn of the excess weight that stores mechanical energy, smearing musical information and anchoring the sound to the speakers, identifying them as its source.

The Grande Utopia EM matches those advances in midrange and high-frequency driver performance and enclosure design, with equivalent advances at low frequencies, in extending the Focus Time concept that governs the larger Utopia's curved baffle arrangement and in crossover developments to actually deliver the increased musical potential. Confronted with a structure as strikingly different as the latest Grande, it's easy to assume that it's an exercise in ostentatious aesthetics (at the possible expense of

performance) – especially when it's this big and this red! Well, the speaker comes in black and a subtle pale grey too – while anything, as they say, is possible. What's more, by presenting such a striking and well rounded form, the speakers make a statement,

rather than trying to hide or slip into the background – never a possibility with something this large!

Besides the superb standard of finish, the key factor in this success is the Bauhaus discipline to the design, its form absolutely dictated by function. But its revolutionary appearance pales into insignificance against the mechanical and technological developments that lurk beneath its skin, so let's examine each developmental aspect in turn.

Adjustable cabinet geometry...

Separate, stacked enclosure modules are nothing new in loudspeaker design, with many companies relying on the approach to fine tune arrival times and driver placement relative to the listening position – often in conjunction with a complex set of tables or formulae to calculate proper placement. Indeed, the first and second series Utopias used both separate cabinets and a curved displacement of the drivers to arrange them relative to the listening position.

However, despite a fair degree of cleverness in the actual placement and alignment of the drivers there was no escaping the inherent compromise ►



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► of a one size fits all approach. With the latest Grande, the speaker with the longest baffle and most drivers, Focal was determined to overcome that limitation. The problem, clearly, was how to make the individual modules movable relative to the listening position; the solution is both mechanically impressive and wonderfully elegant.

The Grande Utopia EM actually consists of a plinth and five cabinets, but is physically divided into three separate elements: the tweeter enclosure, the two boxes above it and the two boxes below that sit on the plinth. The top and bottom pairs are actually fixed assemblies, their boxes physically fixed together. The clever bit is that the tweeter cabinet moves relative to the bass and midrange below it, as does the midrange and mid-bass unit pairing above it, thus allowing the listener to tighten or loosen the baffle curve depending on listening distance. But with a speaker system that weighs around 260kg, the notion of adjusting these elements and then holding them stable whilst fixing them was clearly out of the question. Instead, Focal have implemented a mechanical arrangement of moving wedges that is simple, precise and repeatable. A drop down flap on the rear of the lower midrange cabinet contains (amongst other things) a beautifully machined crank handle. Fit it into the socket in the back of the tweeter cabinet and each turn raises or lowers the upper elements, the top two cabinets by exactly twice as much as the tweeter enclosure, thus preserving the correct arc. A mechanical/numerical counter

allows you to set the angles precisely and the whole exercise will take one person a matter of moments.

The end result contributes not only to the striking appearance of the Grande EM, but also to the easy optimization of its sound, with quite small adjustments in tilt having a profound effect on the presentation and balance of the sound.

Electromagnetic Bass Driver...

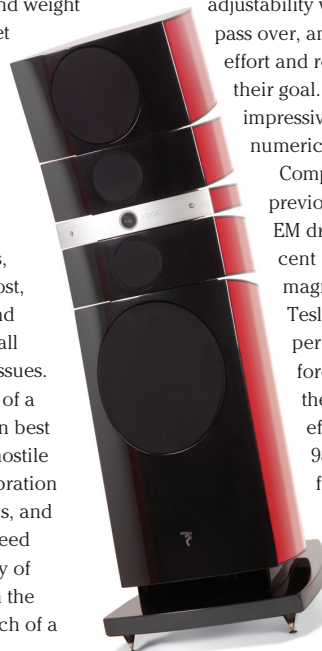
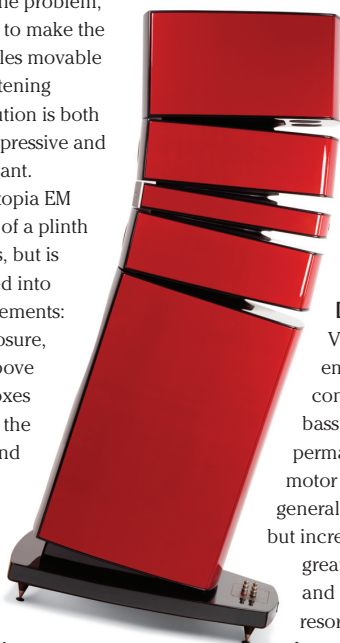
Virtually all loudspeakers employ what are now considered conventional bass units, employing permanent magnets in their motor systems. These are generally driven passively, but increasingly, in search of greater level, extension and control, designers are resorting to active drive at low-frequencies. It's an undeniably attractive option, offering far greater extension and weight from smaller cabinet volumes, as well as a degree of tuning adjustment to match room conditions.

However, it is not without its own set of compromises, with complexity, cost, amplifier quality and system integration all posing significant issues. After all, the inside of a speaker cabinet can best be described as a hostile environment for vibration sensitive electronics, and active crossovers need to match the quality of the preamp used in the system, not too much of a

challenge in an AV set up, but really hard to achieve in a high-end rig. And that's before we even get to the question of amplifier quality and top to bottom continuity.

For a speaker like the Grande, where size and cost were largely irrelevant and quality of performance is everything, another solution needed to be found. Perhaps typically, it came from combining forward thinking and new technology with a concept that, in hi-fi terms at least, could be described as positively ancient; the electromagnetic drive-unit. In the days before powerful amps and high-quality, high power permanent magnets, speaker manufacturers resorted to electromagnets to energize their drivers. You want more bass, more efficiency? Just turn up the power fed to the coil. Of course, it's not quite that simple, especially when applied to a driver and system with the power demands and bandwidth of the big Utopia, as RH explains in his sidebar. But the attraction of a driver with not just significantly greater power, but also an inbuilt level of adjustability was just too attractive to pass over, and Focal poured massive effort and resources into achieving their goal. The results are impressive, even from a purely numerical standpoint.

Compared to the driver in the previous Grande, the 400mm EM driver offers an 80 per cent increase in available magnetic field (from 0.93 Tesla to 1.75 Tesla), an 88 per cent increase in the force applied to accelerate the cone, increased efficiency (92.7dB to 98.6dB), a lower resonant frequency and an overall reduction in distortion by a factor of almost four; and all down to the nearly 7kg of copper wire ►



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► used in place of the magnets. Add in an adjustable output power supply, housed in a small separate enclosure and with six discrete steps from 1W to 75W, and you have the equivalent of 6dB in level adjustment, as well as an 'overdrive' setting!

The other big change in bass implementation is the move to a flow port arrangement, which feeds the output of the downward facing port through a wide, forward facing slot between the bottom of the cabinet and the plinth. This improves the port's interface with the room and also keeps it more consistent when it comes to boundary conditions.

Adjustable Crossover...

Like everything else in loudspeaker design, making the most of the advances made with the bass unit was a question of balance, weighing up how much of the benefit to spend on overall system efficiency, how much on adjustability. Setting the range of adjustment at $\pm 3\text{dB}$ allows an overall system efficiency of 94dB. As well as significant level compensation at low frequencies, this allows the elimination of subtractive components in the mid and treble crossovers, components that limit transparency and dynamic response.

But Focal wanted to further increase user optimization, and settled on a set of high-quality jumpers to give three-step settings that enable users to tweak crossover slopes between mid and treble, as well as tweeter and mid-bass levels and sub-bass Q. Add in the level control on the bass PSU and that's 1458 permutations. Thankfully, the discrete and repeatable nature of

each step makes the process simple to execute and easy to navigate. The upper range adjustments give a tilt and 'smoothness' function to compensate for the live-ness or balance of the room, but it's the ability to balance mid-bass and sub-bass levels against

low-bass Q that is critical to achieving the scale, presence and coherent dynamic range of which the Grande is capable, and which represents one of the key breakthrough developments.

However, one unforeseen effect of the elimination of subtractive elements as well as the increase in bass transparency and lower levels of low-frequency distortion was increased audibility of crossover component quality, necessitating in turn, a complete overhaul of crossover components (including the development of dedicated designs) and the selection (by blind listening) of new internal wiring. Only with these developments in place was it possible to fully realize the potential of all the other advances, finally

delivering the kind of step-change in low-frequency performance that characterized the impact of the Beryllium tweeter on the upper reaches of the second generation Utopia Bes.

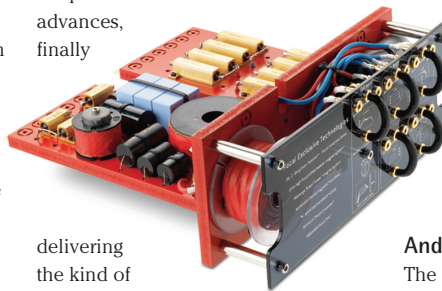
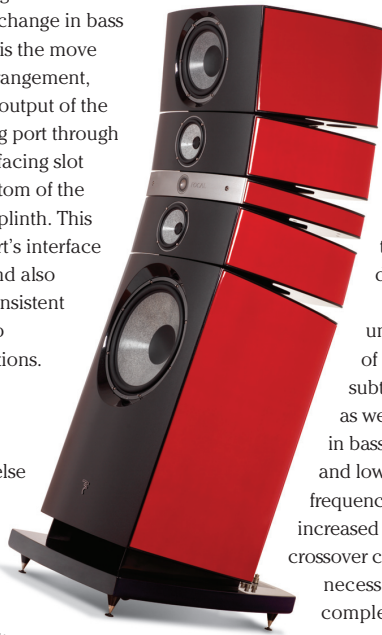
Feeding The Beast

Installing any speaker that weighs 260kg is always going to be an issue, but the Grandes proved easier than most. The fact that the top cabinet element is removable helps reduce the weight a little and the height to manageable proportions, while the integral casters allow you to roll the speaker straight out of its crate and into place – as well as helping with fine tuning once they're up and running and before installation of the (necessarily) substantial spikes. Once the speakers are in situ, the top box needs to be lifted into place (a two person job) and the power supplies connected. Then, you can finally start thinking about all those adjustments. I opted to position the speakers for optimum performance with the controls set flat before any further refinement, finally settling on a combination of 1.5dB mid and sub-bass cut with a notch increase in Q.

Two other points need to be made about the feeding of the Grandes: despite a 94dB sensitivity, small amps are out; and it matters how you feed the power supplies. On the latter point, don't skimp on the mains leads – you will hear the difference. And on the former, even the impressively linear, tactile and well-controlled 20 Watt output of the Vacuum State monoblocks didn't do justice to this speaker's frequency extremes. Around ten times that is a more sensible target, with the Levinson 383 and both the Ayre and Berning monoblocks all putting in sterling service. Power and load tolerance is definitely the order of the day.

And, finally... the sound!

The latest generation of speaker designs, notably the Avalons and Spondors among others, exhibit a level of sonic invisibility, an ability to stand aside from the music without leaving their mark on it that is quite unprecedented. But nor is it a



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► coincidence. Advances in driver design have in turn placed considerably greater demands on crossover configuration and component quality, revealing previously unsuspected levels of damage to the overall performance (and the root of the somewhat simplistic notion that the simpler a crossover the better – well yes, but not quite for the reasons we thought).

It's a development that Focal has matched with the Diablo, and even more impressively, with the Grande EM. To make a speaker that is this large, this complex and this adjustable – but is also the nearest thing to sonically invisible, is impressive indeed. That the Grande can do the small things so brilliantly and intimately, do poise and delicacy with a natural independence to the sound that mini monitors can only dream about is even more so. And while it's difficult to ignore anything this large and visually striking, shut your eyes or better still, turn out the lights, and the music will hang in its own acoustic, free of the speakers and their location, the scale matched to the venue and musical forces involved – small when it should be, effortlessly huge when it's called for.

Even early stereo mixes with their hard left/right placement don't betray the position of the Grandes, the instruments placed separate from and just behind the speakers themselves. Soundstages grow and shrink or simply evaporate according to the recordings themselves, but the signal and the picture it paints is always separate from the speakers holding the brush.

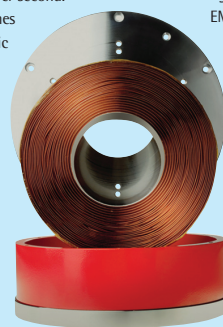
This ability to allow the music to exist independently of the system producing it speaks volumes about the quality of the speakers involved. It's a feat impossible to achieve without exceptional linearity from lowest bass to highest treble, without dynamic coherence that projects energy equally across that entire spectrum. Finally, you need tonal consistency too, a quality made easier to achieve with consistent driver materials across the range. Ironic

Electromagnetic Drive Units

The "EM" in the Grande Utopia EM's name stands for "electromagnetic," the drive principle employed in the woofer.

In a conventional drive unit, the power amplifier drives alternating current (the audio signal) through the voice coil, generating a varying magnetic field around the coil that is an analog of the audio signal. The varying magnetic field changes its orientation at the audio signal frequency because the audio signal is alternating current – the current flow reverses direction at the frequency of the audio signal. Send 1000Hz to the driver and the current flow through the voice coil reverses direction 1000 times per second. The voice coil then alternately pushes and pulls against the fixed magnetic field generated by the driver's permanent magnet, causing the voice coil to be pulled back and forth, and with it, the cone.

This approach, used in virtually all moving-coil loudspeaker drivers, runs up against the laws of physics. The magnetic field strength generated by fixed magnets is limited, which in turn places restrictions on the cone weight, how low in frequency the driver will play, and how sensitive the driver is. A heavy cone goes lower in frequency (all other factors being equal), but requires greater magnetic field strength surrounding the voice coil to drive it.



Focal's solution to this physics problem is to replace the driver's fixed magnets with a large coil that functions as an electromagnet. The coil is driven with direct current from an outboard power supply that plugs into an AC outlet. The current flow through the coil creates the magnetic field, against which the voice-coil-generated magnetic field pushes and pulls. The electromagnet produces a magnetic field strength in the gap (the area in which the voice coil sits) double that of a conventionally driven woofer. Consequently, the EM's woofer can be heavier (giving it a lower resonant frequency) yet simultaneously more efficient. Moreover, the woofer's bass output can be adjusted by varying the current through the electromagnetic coil. This is accomplished in the

EM via a rotary switch on the outboard supply that drives current through the electromagnetic coil. One can thus adjust the EM's bass output to better integrate the system into a variety of listening rooms.

The result of electromagnetic drive is a woofer with very high sensitivity (97dB for 1W) but very low resonance (24Hz). So, the woofer delivers lots of very low bass with very little input power. The price of this performance is the need for the outboard supply that has to be plugged

into an AC outlet, along with the sheer weight of the woofer. The EM's 400mm woofer weighs 63 pounds, 48 of which is the electromagnetic coil.

Robert Harley

then, that so much of the performance achievable from this boldly charismatic design is delivered by its least visible element, the crossover that hones and actually delivers the potential benefits of all those technological advances in driver and cabinet design.

It's hard to overstate just how crucial the configurable nature of both the cabinet and crossover are to the final results achieved. Sit and listen as a knowledgeable practitioner goes about the fine-tuning and you'll be astounded at the degree of difference even tiny changes make to the presentation and arrival of the music. This isn't a case of bending it into the shape you want; more a case of arriving at the shape it needs, because what happens is that the music becomes more and more integrated, moves further and further

from the plane and influence of the speakers, deeper and deeper into the realm of the natural and believable. It's almost trite to suggest that you'll know when it's right, but use acoustic music, especially with players or voices that you know and it really is that simple.

Time then, for an example of the Grande speaking in anger. Having composers conduct their own works is seldom a recipe for success, but Polski Radio's live concert SACD of Gorecki leading the National Polish Rado S.O. in his own *Third Symphony* is a stunning exception to that rule. It's a vast and stentorian work of three slow movements that might easily become sprawling and ponderous. Indeed, on many a system and despite the perfectly poised performance with its incredibly control of tension ►

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through tempo, the sheer weight of low frequency information simply overloads the speakers' ability to resolve and differentiate pitch, pace and texture. Never on the Grandes! Even the slow and low bowed entry is picked out perfectly, the individual bars and phrases distinct, the measured increase in intensity and tension, the resulting anticipation of the Cello entry, the inevitable arrival of the rest of the orchestra, building and building to the shattering climax built around the solo soprano part: it lives, it pulses, it breathes, drawing you into, immersing you in the sheer majesty of the music and he playing. But a 33-minute slow movement, even if you can't tear yourself away, is a long way round when it comes to making the point. That's made before a single note is played. Just listen to the opening, the eruption of applause, first from the choir stalls and then spreading around and across the auditorium as the conductor comes into view. Feel its warmth, its length, the explosive enthusiasm of a home crowd greeting a home-town hero, the way it reaches out and includes you. And as it settles, hear the sounds of the orchestra taking their seats, the shuffling of feet and setting of instruments and music stands. No random events these; instead you can hear the height and breadth of the stage, the gently terraced risers on which the orchestra is arranged, each incidental noise a part of a single organic whole. And as the hush descends with those deep, opening notes, the sense of presence, of human activity and attention is heightened by a sudden, stifled cough, just in front and to the left of you. Never



have I had such a sense of palpable presence, of attendance at a musical event. The Isis set new standards in this regard, but the Grande EM matches it and adds an effortless scale and genuinely unfettered dynamics to proceedings.

It's also a chameleon, the same ease with which it reveals changes in its own state of tune effortlessly exposing shortcomings in system set up and partnering equipment. The contrasting virtues of different front-ends, their

behaviour under warm up and the importance of carefully considered support have all rarely been clearer. A speaker like this attracts audiophiles like bees round a honey pot. I've been beating them off with a stick, but none of those who have slipped under the guard have gone away anything other than bowled over. Something else this Grande shares with the Isis – the ability to readjust a listener's notions of what is possible. Seldom has a speaker looked so striking and sounded so unlike it looks.

For many (most?), the cost of the Grandes and the space required to accommodate them will mean they remain a pipe-dream, but their tonal, spatial and temporal coherence, their extended bandwidth and truly astonishing dynamic capabilities (at both ends of the spectrum) puts them in a very select category indeed. They rub shoulders with the Isis – and probably Wilson's X2, although that's one speaker that I haven't had at home. This select group really are do it all speakers, whose weaknesses and shortcomings are more to do with practicality and matching than gross failings in performance. Indeed, they do less damage to the signal than a lot of matching electronics, which is food for thought...

From a company's point of view there are many different reasons to build a flagship speaker, from attention seeking to trickle down. But confronted by a £110,000 product, reviewers and potential purchasers need ask only one question: does this speaker go straight to the top of my "if I won the lottery" list? Well, as far as I'm concerned the Grand Utopia EM is firmly ensconced atop that pile, waiting to be shot at. Bring on the competition.

With the Grande Utopia EM, Focal has made a serious statement of intent, one that challenges the boundaries of speaker performance. That makes it worthy of more attention than we can give it here, and attention from more than one reviewer too.

This is one that will run and run, in the sense of other views and also other products, as much for what they say about the Grande as *vice versa*... ➤+

TECHNICAL SPECIFICATIONS

Type:	4-way floorstanding reflex loaded loudspeaker
Driver Complement:	1x IAL2 25mm inverted beryllium dome 2x 165mm W cone midrange 1x 270mm W cone mid-bass 1x 400mm W cone electro magnetic sub-bass
Bandwidth:	18Hz – 40kHz ±3dB
Sensitivity:	94dB
Nominal Impedance:	8 Ohms (3 Ohms minimum)
Crossover Frequencies:	80 / 220 / 2200Hz
Dimensions (WxHxD):	654 x 2012 x 880mm
Weight:	260kg ea.
Finishes:	Black, red, grey; Others to order.
Price:	£110,000

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