

Lake Mesa Quad EQ

Lake Technology offers a radical new approach to EQ. Andy Stewart heads forth into this revolutionary audio landscape.

Do you ever sit back sometimes and marvel at the sheer quantity of products available to the audio community these days? The Big Bang in home studios has generated (or resuscitated) so many new (and old) companies that produce a veritable spiral galaxy of products that the collective background hum of gear vying for our hard-earned dollar can often bring on purchasing paralysis faster than a snake bite. The options can be mind-boggling and no-one wants to get 'bitten' by a manufacturer and wind up with a piece of junk sitting in their rack. You know the box: that 'must-have' lemon that soon proved unworthy of even the power it consumed. No-one can afford those costly purchasing mistakes.

But how much choice do we really have? Despite the *quantity* of options, and as ironic as it may seem, some would say we actually have *less* choice nowadays. After all, most manufacturers tend to play follow-the-leader when it comes to audio design while others, on close inspection, build their inventory with 'off-the-shelf' products, putting the bulk of their energies behind marketing and packaging rather than research and development. Not all companies do this, of course, but regardless, most of our choices lie in branding rather than invention... and invention costs money.

Illusion of Choice

One area of audio control that perfectly illustrates this illusion of choice, this 'fizzer' of inventiveness, is the mysterious world of EQ. Sure there are endless choices between analogue and digital, valve or solid state, plug-ins and boxes you plug in, but the reality is there are basically only two EQ options you can choose from: graphic and parametric. Within these two paradigms there have been famous success stories like Pultec (and some infamous renditions as well); but why in the 21st century are we continually served only these two options? Have we simply accepted that there is no other way?

Well, now there's a third way: the Lake Technology Mesa Quad EQ. The 'Mesa' EQ, designed primarily by two Australians, Bruce Jackson and David McGrath (responsible for breakthroughs in audio technology

like convolution reverb and the first ever parametric EQ in an live audio console), dispenses with several 'traditional' concepts of equalisation to produce a filter set that's so intuitive (and powerful) that it seems almost unbelievable that no-one has designed it before. Not to put too fine a point on it, the Lake Technology Mesa Quad EQ is to EQ what the car was to the horse and cart. Graphic and parametric alternatives suddenly look very antiquated alongside this DSP-driven digital behemoth.

Home on the Mesa

The name 'Mesa' [pronounced May-sa] is actually borrowed from the Spanish term for a land formation found in the south-western United States [think: Road Runner or John Wayne – CH]. But why in God's name am I telling you this? Well, because Mesa landscapes are essentially flat-topped ranges with raking sides, and this shape is what characterises one of the EQ 'templates' that make up the building blocks of this EQ. But before we dive headlong into the complex world of this device, and the even more complex world of the EQ shapes it can create, let's just establish a few facts so we're all on the same page.

What it is...

In the simplest terms, the Mesa Quad EQ is a DSP-driven single rack unit digital device with four physical inputs and outputs (served by both analogue XLR and digital 25-pin connectors). Signal feeding into the hardware unit is exquisitely converted into a binary stream (at 24-bit/96k) and all tonal manipulation of sound occurs in this realm (the DSP runs at 96k utilising extended precision, 40-bit floating-point processing). The final re-constituted signal is then sent out of the unit digitally *and* simultaneously as an analogue signal (i.e., the digital and analogue outputs work concurrently), allowing the unit to act as a 'split' if required.

Designed primarily as a system EQ for large PAs, and based on a section of the Lake Contour (which has been around for a few years now), the Mesa is a hybrid device in a sense – a combination of powerful hardware



and software but with the traditional controls of neither. It has no 'analogue' knobs or switches on the front panel like conventional EQ (graphic or parametric), and its software interface controls the parameters of the equaliser in a unique way. It's more analogous to something like a Lexicon 480L digital reverb, where the noisy fan-cooled hardware processor preferably hides in a machine room and the 'LARC' (in this case a wireless tablet PC with a stylus/pen tool which I used during the review) acts as the control interface.

Hardware

The hardware unit itself has only rudimentary controls, which consist mainly of eight mute switches, one for each of the four inputs and outputs. These recessed buttons also act as secondary function switches that allow for a complex range of utility control (provided you can remember the sequence of obscure button presses that provide them!). The only other features of the front panel are basic level metering, a large SEL (Select) button and an ethernet port (for connection to your PC). 'Round the back, connectivity includes two more ethernet ports: one to interface a PC as per the front panel, the other to daisy-chain with another Mesa. Alongside these are the aforementioned analogue and digital audio connections, and the remaining RS232 port is for diagnostic assessment at the manufacturing level – effectively the belly button of the unit! Suffice it to say, the hardware processor by and large discourages you from interacting with it. It would perhaps be better off with a sticker across the front that might read: "What are you doing here? Please refer to the tablet PC for effective control information."

The processor unit is utilitarian in the extreme, and physically quite revealing of its 'live sound' pedigree: its fan is noisy, it makes no attempt whatsoever to appear 'cutting edge' (in fact, in some ways it, ironically, looks old-hat) and its large four-segment display is best read from twenty feet away. This is not a glib reference to a 'poor design approach' or a cheap visual interface, however. The unit's display is *designed* to be legible from a distance, and the bright white LED that illuminates in response to any communicated signal from a PC is visible from a hundred yards! So when the unit's managing the system EQ for a PA in the Sydney Entertainment Centre, for instance, you can (with the wireless tablet PC system I was using) make real-time adjustment to the EQ via its ethernet protocol from the uppermost seat at the back of the venue, and see which unit (assuming you're using more than one) flashes in response to the communiqué.

The Mesa Quad EQ, along with the Lake Contour, is being used throughout the world in exactly this role right now, controlling whole systems and individual line array components from a single software interface (one PC can happily manage as many units as your ethernet system can support) with a level of sophistication that was beyond people's wildest imagination not so long ago.

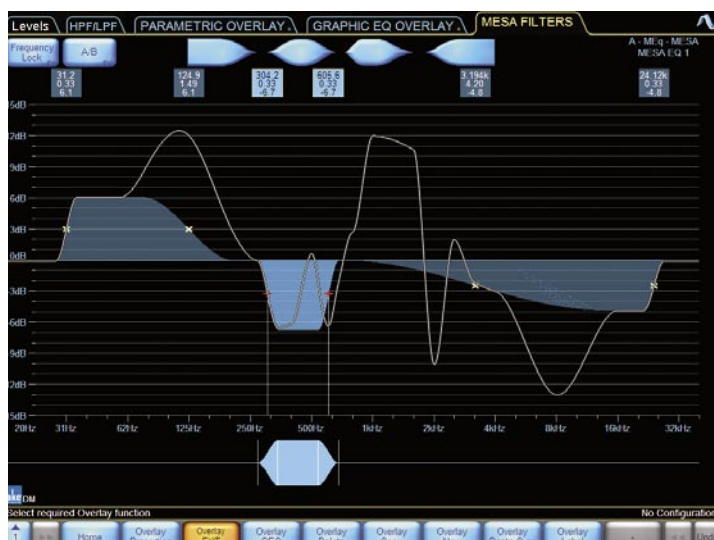


Fig. 1. A typical EQ 'Overlay' screen showing the distinctive blue EQ 'templates' that provide powerful new equalisation options.

But as revolutionary as it may seem, the Mesa runs the risk of being pigeonholed as a 'live' product (albeit an extraordinary one) thus making it somehow unworthy of, or inappropriate for, recording studios, television and broadcast facilities and even well-to-do home studios. This is, of course, rubbish. Certainly the Mesa's primary role is obvious (its genesis was borne out of advancements in concert PA management courtesy of Bruce Jackson's overactive imagination) and much of its complex software is geared specifically to line array management and even customisable stage setups. But the unit is perfectly viable in any environment where high quality EQ is required. And make no mistake; the Mesa is more powerful than any other EQ – period.

Exploring the Mesa Landscape

To jump right into the guts of what the Mesa offers as an alternative to graphic and parametric EQ designs (even though it is itself entirely capable of both), we first need to introduce ourselves to the software interface. Double-clicking the program file (the Mesa currently offers PC software only, running Windows 98SE and upwards) opens the software to reveal a relatively simple interface. Like its hardware, the software aesthetic is not glamorous but it's certainly very effective once you get to know it. At the bottom of the main screen 'home page' (the program fills the screen entirely) are menu options (also accessible from the keyboard's F-keys) consisting of large blue, orange and grey 'buttons' that provide different menu options depending on where you are in the software. Regardless, these buttons are always visible along the bottom strip allowing simple navigation down into the depths of (or back to the surface of) the program without ever feeling lost. Along the top of the screen are 'Overlay' controls, which consist of menu tabs that allow you to

switch between the various EQs acting on any given channel (remembering there are four input and output channels in the Mesa).

Simply clicking on – or in my case, ‘tapping on’ with my tablet PC’s stylus/pen – the ‘Modules’ button at the bottom of this screen reveals four EQs. These are easily placed into the workspace by dragging and dropping them anywhere in the void. This action is equivalent to turning on a hardware analogue EQ or activating a plug-in. From there it’s a simple case of tapping one of the EQ icons to open up the blank EQ canvas lurking beneath it. At the top of this new EQ screen four solid and distinct blue EQ ‘templates’ become visible. These include High and Low shelves, Bell and the new Mesa design (see Fig. 1, previous page).

An Embarrassment of Riches

Clicking on any of these shapes selects your ‘filter’ of choice (latching it to your mouse/stylus and changing the shape from blue to orange), and after you’ve dragged it into the working area, clicking it again or tapping the screen with the stylus drops it onto the EQ display window and arms it ready for action... all very simple. What’s extraordinary is that you can drag a veritable army of these four filter shapes into the workspace in any combination you choose and move them anywhere at all along the frequency spectrum, providing more EQ control over a single channel than anyone (apart from large PA systems managers) could ever realistically utilise. Alternatively, this ‘parametric’-style EQ can take the form of a digital ‘graphic’ at the tap of a button. In either form, this EQ window is described as an ‘Overlay’ – and is the equivalent of patching in a Pultec or inserting a plug-in. But if that’s not enough tonal control over your audio signal, the unit’s massively powerful DSP engine allows up to a staggering *seven* more of these ‘Overlays’ per channel, (it’s like having eight EQs on the one console channel strip). The digital routing options further allow each channel to be influenced by identically featured group EQs, high/low pass filters and even a comprehensive digital compressor/limiter replete with sophisticated metering. All of these different features are easily navigated around by simply clicking/tapping the clearly labelled, customisable tabs at the top of the screen, and the buttons at the bottom. As you add new overlays, so another menu tab appears at the top for easy access.

The combination of this effectively limitless number of EQ controls acting on any single output is then combined together in real time to produce a tonal outcome that is graphically represented by an EQ line typical of most software plug-ins. So, for instance, if the channel Overlay you’re viewing has its own EQ settings as well as being under the tonal influence of three more Overlays acting on that same channel, a stereo group EQ and perhaps a LPF (for good measure), the sum total of all these filters, Mesas, bell curves, graphic and shelving EQs is represented clearly by this line.

The Filter Overlay

Grabbing a conventional bell curve or shelving EQ will quickly introduce you to the look (and sound) of the Mesa EQ’s control interface. Each instance (or band) of EQ appears in several ways in the display. A bell EQ’s parameters, for instance, are represented numerically above its graphic display equivalent in an elegant little box with three values inside it (six for a Mesa filter): Frequency, Q (i.e., bandwidth) and Gain. As the centre frequency of the bell is moved around on the display – as you search for your ‘sweet spot’ aurally in real time like any analogue filter – the box and its numbers move around with it, always remaining directly above the centre of the bell to keep you clearly informed of that filter’s parameters. The manipulation of the EQ curves with a tablet PC stylus/pen (a highly recommended option for driving the Mesa EQ) provides for hours of fun, and whichever EQ is selected (or ‘live’) can be manoeuvred around the screen from anywhere by the pen tool or mouse. There is no need to adjust the amplitude with fiddly unforgiving cursors – as long as the filter is ‘active’ (illustrated by little red crosses on the EQ curves themselves) a stylus pen or mouse can adjust it from anywhere on the screen. Very nice.

Similarly, *below* the main graphic display rides a smaller version of the EQ band you’re currently modifying. This is where the ‘elegant solution’ to complex EQ manipulation presents itself to the user. All parameters of control, apart from amplitude, can be intuitively adjusted by this graphic display. This solution was inspired by the need to cope with the six parameters of adjustment available to a Mesa curve (see Fig. 2.).

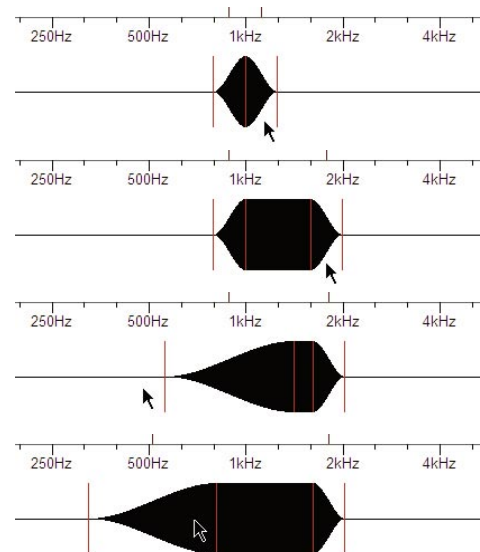


Fig. 2. Like Aussie Rules goal posts, placing the stylus/cursor in either one of the two ‘out-on-the-full’ regions of the Mesa filter adjusts the slope (which pivots around the centre of symmetry of the cosine shape), ‘behinds’ adjust the width of the flat Mesa region, and ‘goals’ move the entire filter back and forth along the frequency spectrum. It’s as simple as that (provided you’re not into Rugby League).

The Mesa Exposed

It's high time we explained what this shape offers and how it functions, so hold onto your hats.

The Mesa curve, technically speaking, is formed out of a raised cosine filter, the mathematical effects

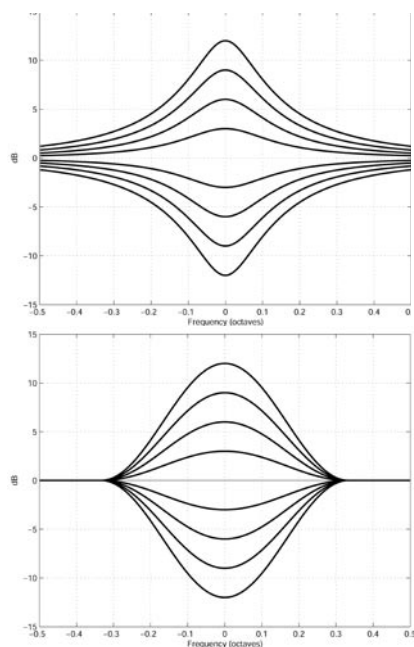


Fig. 3. Conventional 'bell' EQ (top) and the raised cosine filter alternative (above).

of which allow improved precision of frequency manipulation. In plain English, this means that no matter how much you boost or cut this EQ, the affect on the neighbouring frequencies outside the region of influence (bandwidth) is always zero. This is nothing like the behaviour of a conventional parametric 'bell', which tends to 'eat into' the adjacent frequencies supposedly outside this 'selected' region. This is best explained by the two simple graphs in Fig. 3.

A parametric EQ cannot actually define a bandwidth absolutely (contrary to popular belief), because the 'skirts' of a bell are always changed by the magnitude (boost/cut) of the frequency

selected. Think of it like a steel ball on a trampoline; as the ball gets heavier the width of the 'depression' it forms inevitably gets wider. With the raised cosine filter, however, the bandwidth can be determined absolutely because the cosine is itself a symmetrical shape. So no matter how heavy the ball gets, the trampoline is only stretched downwards around the parameters you set. When this shape is applied as a graphic EQ, the symmetrical nature of this raised cosine has the ability to create truly flat regions, as the magnitude response can

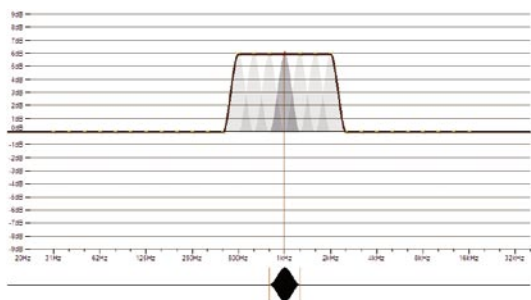


Fig. 4. Raised Cosine Graphic

sum to flat with neighbouring frequencies, rather than the higgledy piggledy curves analogue graphic EQs create. (See Fig 4)

Asymmetrical Control

Where the Mesa is most extraordinary, however, is in its ability to provide asymmetrical control over bandwidth, or to put it another way: two Q-controls. Where a parametric EQ limits you to a symmetrical bell shape – only the breadth of which can be adjusted

– the Mesa can be any combination of steep on one side and gentle on the other. This fact alone marks an extraordinary departure from conventional EQ processes, but it doesn't end there. Not only are there effectively two independently controllable slopes, the apex is no longer a single selected frequency (as per a parametric), it's an infinitely adjustable flat region, or Mesa. The extent of this extra control is quite breathtaking once the concept sinks in.

What this means is that you can have, for example, a steep 1/10 octave lift of 6dB at 30Hz, a flat line from there to 75Hz with a six-octave slope gradually making its way from there back to zero. Stick that in your parametric EQ and smoke it! Imagine how much a sound can be savaged by 20 of these filters all piled into the one Overlay... and that's before we even reach for the seven other EQs per channel, our filters or groups! The power of the Mesa Quad EQ to manipulate (or mangle) the audio signal is quite incredible, and all of this power occurs phase coherently and in real time! The resultant EQ curve in the wrong hands can end up looking like the crazed drawings of a madman frustrated by his Etch-a-Sketch. Be warned, if you thought your garden variety plug-in EQ had the potential to bite into your sound, just wait 'til you try the Mesa. This is the Velociraptor of EQ – dangerous in the extreme when let loose on an unsuspecting audio signal.

Bulldozing the Landscape

I could easily take up half the pages of AT elaborating further on the depth and breadth of the Mesa and its implication for EQ as we know it, but I would surely put the few remaining readers who have come this far soundly to sleep. Suffice it to say, I have scarcely scratched the surface of this unit's capabilities. So if you're in any way serious about audio, you owe it to yourself to try out the Mesa Quad EQ. It's expensive and complex but the rewards from getting to know it are extraordinary. There really has never been an EQ like this in the history of audio, but at some point in the future, the Mesa design may be as commonplace as the trusty parametric. One thing's for sure, the audio landscape has been changed forever.

If you're interested in taking a look at the Mesa software, a fully-fledged version is available for free download at: www.lake.com



Distributed by

• ATT Audio Controls

Phone: (03) 9379 1511

Email: info@attaudiocontrols.com

Web: www.attaudiocontrols.com or www.lake.com

Price

• POA