Allen & Heath ZED-R16
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It's about time! After being conspicuously absent from the studio recording console business for nearly ten years, Allen & Heath has introduced the new ZED R16. Clearly studio oriented, the R16 combines a 16-channel analog mixer with discrete mic preamps, four band (two mid bands fully parametric) EQ, four auxiliary sends, control room outputs with alternate speakers outputs, two studio monitor feeds, 18 channels of 24-bit Firewire I/O up to 96 kHz sample rate, 16 channels of ADAT optical I/O, and comprehensive MIDI control for DAW integration. In addition, it can also serve as a versatile live sound mixer with the bonus of recording outputs.

Still being pretty much of a DAW weenie, I was eager to get my hands on this new console - it looked like a way to stay in my analog comfort zone while taking advantage of the editing and processing power of a computer. I'm not an analog zealot, but sitting behind a real mixing console just makes me mix better and faster than with a computer.

Features

Don't Let The Buttons Fool Ya'
While mixers with digital I/O are no longer revolutionary, what sets the R16 apart from the pack is the routing flexibility to and from the computer controlled by the four buttons beside each fader where bus assigns usually live. One selects whether the A/D converter is fed directly from the mic preamp or after the insert jack and channel EQ. Two other buttons route the D/A converter output either through the full channel path including the Insert and EQ, or direct to the fader. Even when mixing in the DAW, you can route a track out to a mixer channel and back, essentially turning the console channel into an analog plug-in.

The fourth button converts the fader to a MIDI controller. In MIDI mode, the channel still passes audio but the fader is bypassed, creating a unity gain analog summing bus for your in-the-box mix. By assigning the computer mix to the ZED's L/R bus, you can compare the analog summed mix with the digital mix at the press of a button. Main Insert jacks provide one last chance to route your mix through your favorite bus compressor.

The main mix is available to the computer for live-to-stereo recording, but here's one of the R16's few gotchas – that channel pair (as well as the digital input ahead of the master fader) is unavailable at 2x sample rates, so you can't record a 96 kHz stereo mix directly to the computer. A&H is looking into this and may have a solution with a firmware update.

If you know studio mixing consoles, you'll feel right at home here, though there are some unique features worth mentioning. The two line level stereo Studio Outputs are good candidates for headphone feeds. Their source. selected by a group of pushbuttons, includes the L/R mix and each of the four Aux Sends; pressing multiple buttons sums the sources. The studio players can get, for example, a custom mix in their phones using an Aux bus, the control room stereo mix, perhaps with some "more me" or "more cowbell," or a click track. Stereo Inputs 1-2 include a two band equalizer and sends to the Aux 1 and 2 buses as well as the main L/R bus. Stereo Inputs 3-4 go directly to the L/R bus.

A pair of Tape outputs (2TRK 2) duplicates the main outputs but 6 dB lower. This might save your bacon if you're recording with one of today's mini recorders with inputs that can be overdriven by the output level of a modern console. Those outputs can also be fed from the 2TRK 1 inputs for copying. Either set of 2TRK Inputs can be routed to the main outputs for reference listening or intermission music.

Aux Sends 1 and 2 are pre-fader, 3 and 4 are post-fader. Both are post EQ and post-Mute. Jumpers on the channel cards can be changed to re-arrange these, but the manual is apologetic about the difficulty in accessing the jumpers (nor does it identify them). There are two sets of Control Room outputs to accommodate main and alternate speakers. These can be fed from the main mix, the stereo return from the computer, or either of the 2TRK inputs.

All the knobs and faders feel solid and smooth. Ergonomics are excellent - everything is right where you'd expect it to be. My one complaint, in fact just about my only complaint, is the panel color and finish. It's a darkish gray hammertone with a high gloss and white lettering. In many lighting situations, there's enough glare to make legends somewhat difficult to read. I would have passed this off as a failing of my old, tired eyeballs, but two visiting engineers who got their hands and eyes on it while it was here made the same comment. The case is steel, weighing in at just about thirty pounds. It's built in England.

Under The Hood
The ZED is constructed like a traditional console. Rather than the one large board with controls poking up through holes in the top panel typical of many modern mixers, each channel is on its own circuit board with ribbon cables and plug-on daughter boards tying them together. Pots are secured to the panel with nuts.

While this is indeed modular construction, it's no picnic to remove a channel board. Most are partially covered either by the digital I/O board or power supply. Further, a solid wire is strung through all of the modules, soldered to each one, and terminating at the power supply ground point. It's not surprising that the R16 exhibits no Pin 1 (poor internal grounding) problems. The digital board uses surface mounted components, though with exception of the op-amps, analog

boards are all old school through-hole assemblies. The internal power supply uses a standard IEC detachable power cable..

The brains for the digital side of the R16 are a TC Advanced Technologies (TCAT) DICE jr chip which handles all of the digital routing and interfacing. Channels 1-16 A/D conversion is handled by Cirrus Logic CS5368 chips. D/A conversion employs the Burr-Brown PCM1404. The main L/R digital I/O is handled by a Cirrus Logic CS4271 codec.

One of the dirty little secrets about Firewire-connected audio gear is that some of it is fussy about the chipset in the computer's Firewire host interface. While A&H doesn't have a recommended list of host controllers, the TCAT folks have tested their DICE chip several popular Firewire chipsets and have had good results with VIA 6306 and 6308, TI TSB43AB23, and Agere FW-2306 chipsets. They've encountered problems with NEC chipsets. Forewarned is forearmed.

In Use

The Analog Side
It was hard to resist checking out the R16's digital I/O capabilities as soon as I opened the carton, but first I wanted to find out how good a mixing console it was. I wasn't disappointed. Patching a 16-track project on my Mackie HDR24/96 recorder into the line inputs, I was pleased with the clean mix, loads of headroom, and how pleasant the EQ sounded. It's not surgical even at the narrowest bandwidth (Q of about 5) but effective in controlling leakage without sounding harsh or hollow. The 100 Hz high pass filter effectively took care of some wind rumble (this was a live outdoor recording).

A variety of mics all sounded good through the ZED's preamps, virtually indistinguishable from a Mackie Onyx, and in my book, that's a good thing. Maximum gain from mic input to main output with the channel and master faders set to their 0 dB (unity) position is 60 dB, typical and adequate for most applications and most mics.

The action of the gain trim control is quite smooth. The most used 20-40 dB range is well spread out around "noon" but there are no surprising jumps in gain at the low and high extremes of the knob's rotation that I've observed on a few modern mixers.

Mic preamp input impedance is nearly 3 kΩ, a pretty good match for modern microphones, but an SM-57 will sound better with a lower impedance load. Phantom power is a solid 47.5V with no droop when powering twelve assorted mics (all I had handy). There's no mic/line input switch - plugging in a mic will swamp out a connected line input so you can't everything plugged in all the time.

Jumping into the digital world for a moment, with the input trim at its 1 o'clock position, -35 dBu at the mic input equates to -16 dBFS. This is a comfortable gain structure for a reasonably strong singer about 6 inches from a typical modern microphone. At maximum gain, the preamp's low frequency response drops about 3 dB at 20 Hz; at 35 dB gain, it's flat to below 20 Hz.

The R16's mic inputs aren't as quiet as I'd like. With the channel and main faders set for unity gain, gain trim at maximum, fader panned fully to one side (total gain of 61 dB), and the mic input terminated with a 150Ω resistor, noise level at the output is -61.5 dBu, more than what the -128.5 dBu EIN claimed in the specs would predict. With maximum gain, some hiss is audible, and visible (about –75 dBFS) on the DAW's input level meter. I didn't find it to be objectionable, but if I don't mention it, someone else will.

The main outputs are a cross-coupled balanced configuration, giving the same level whether they're connected to a balanced or unbalanced input with Pin 3 grounded. Maximum output level before clipping is +27 dBu, and that's mighty hot.

The Digital Side
What's the first thing you do when you get a new gadget that connects to your computer? Usually you install its driver from the included disk, hook it up, and discover that the driver is outdated. The second thing you do is go to the manufacturer's web site for the update. There's no driver disk in the box (though the R16 ships with a copy of Sonar LE) - the manual directs you to the web site for the driver. I expect that as the product matures, a driver disk will ship with it, but honestly, I like their direct approach. I used a Windows XP computer for my evaluation, but the driver also works with Vista, and rather than depend on Apple's Core Audio system, there's a Mac driver as well.

I wish I could say that all I did was load the driver, plug in the Firewire cable, set up the DAW to use the ZED's inputs and outputs, and all was well. It actually was that simple to set up, and indeed, it did work fine out of the box . . . for a little while anyway. Then it started clicking, and soon became nasty digital hash weakly modulated with music. I've used this computer with several other Firewire audio devices with no problems, so I figured that this was finally my turn in the barrel, chasing down incompatibility between the DICE Firewire I/O and the computer's Firewire port . The next week was spent trying various tweaks, different cables, even a different computer with a different Firewire host interface, to no avail. A huge tip of the hat goes to both folks at A&H and TCAT for their prompt and really well informed tech support. I received a yet a newer (unreleased at the time) driver and learned more about the DICE family than I ever expected to need to know, but to no avail. We ultimately concluded that there was a problem with the console's Firewire circuit board. A close inspection

and a minute on my bench with a soldering iron implemented a recent modification that hadn't made it to my console, and all seemed to be well after that.

The digital I/O section is like a box of A/D and D/A converters pre-wired to logical points in the analog console. Purists will record straight off the mic preamps (the *real* purists will complain that they have to send their big bucks preamps through the mixer's input stage) but old-school duffers will appreciate having the channel EQ available at the touch of a button when experience tells us to clean up that noise and leakage now so we won't have to do it later.

Normally you'll monitor the analog inputs when tracking (true zero latency), but should you want to monitor through the DAW, that's just a button away. Going through Nuendo 4 in its fastest monitor mode, latency from mic in to monitor out with no plug-ins is just over 1 millisecond, and that's small enough to be usable if you want to use true "tape deck style" monitoring while tracking. The beauty of having a full analog console at your disposal is that you can add suitable-for-monitoring outboard effects and processors without adding latency, then use your DAW plug-ins for final mixdown where monitor latency is of no concern.

The digital path sounds very good, the result of high quality A/D and D/A converter chips supported by good design. They'll hold their own against all but top quality stand-alone converters and add good value to the console.

The converters used for the main mix output and return (a single chip A/D/A) are a notch lower grade than those used in the main channels. This, plus the fact that they're disabled above 48 kHz sample rate, seems a bit odd to me since this is, in essence, your "master" path. When mixing analog and recording the mix back to the computer, you're not going through the best converter in the console. Equally important, when mixing in the DAW but monitoring through the console, you want to listen through your best D/A converter. You can, of course, route the DAW mix back through the better grade channel converters, but then you're going through the console's full signal path on the way to the Control Room outputs. Name your poison.

The ADAT optical I/O is a bit tricky. Normally the console uses its internal clock for data synchronization. When using the ADAT I/O, it's necessary to synchronize the word clocks in the ADAT recorder and console. Normally the recorder would be set to synchronize to the incoming data from the mixer, however not all ADAT-input devices are capable of doing this. If the ADAT can't be the clock slave, the mixer must be configured to synchronize to the ADAT's output. This is possible, but the the ZED's clock source is switched from the driver control panel, necessitating a Firewire connection. Unfortunately the clock slave status doesn't stick once you power down the mixer, so you really can't take it out in the field without a computer and record to your ADAT.

MIDI Controls

In addition to the sixteen main faders that can become MIDI continuous controllers (CC), there are four dedicated CC MIDI faders, twelve CC rotary knobs, twelve note on/off buttons, and five MIDI Machine Control (MMC) transport buttons. Defaults are MIDI Channel 16 and MMC Device ID 127. With some manual dexterity (holding down buttons while pressing other buttons) and the knowledge of how to count in binary, the MIDI channel can be changed, though the MMC Device ID is fixed, at least in the present version.

The ZED doesn't have built-in support for common control surface protocols such as HUI or Mackie Control, so it's necessary (call it "flexible") to assign whatever DAW functions you wish to control from the console to the appropriate MIDI CC or note on/off data. This is tedious but straightforward using the MIDI Learn mode in Sonar LE and probably most other contemporary DAWs. DAW control via the Firewire connection is the default setup, but there's also a standard 5-pin MIDI OUT for controlling external devices such as reverbs.

The MIDI control section is the most colorful part of the console, with each button illuminated with an LED. Since there's no way to indicate response to a button, the lights are always on, which I found a bit distracting.

Summary

If I were designing a product like this, It would look and function a whole lot like the ZED R16. That's pretty high praise, and Allen & Heath deserves a big pat on the back. It sounds excellent, it's flexible, and logically laid out – all the things you want in a mixing console. A&H has taken quite a leap of faith that there will be customers for a console at this price point that integrates nicely with a DAW and works like a console, because, by golly, it *really is* a console. It's a new product, it has some room to evolve, and it will do so if the user base is there.

While I have my wish list of enhancements, my list of quibbles is short and pretty inconsequential. The manual could use some expansion, but there's a growing collection of supplemental material on the web site. While Sonar LE that's included with the mixer is a little skimpy (limited to eight active inputs) it's enough to get started. Give the panel a new matte-black paint job and I'll take it.

Update –
In September 2010 Allen & Heath announced the GS-R24 series, a "grown up" version of the ZED R-16. The new model offers an integrated meter bridge, motorized faders (an option), 24 input channels, 32 Firewire channels, even a new, more readable paint job. I'm eager to get my hands on one.