Allen & Heath dLive S Class Digital Mixing Systems

By: Mel Lambert

The Allen & Heath dLive S Class comprises a series of three control surfaces that connect via a high-speed network to variable-capacity I/O boxes containing the audio-processing engine, in addition to extension modules and the firm's other live-sound components. The S3000 control surface features a single control screen and provides 20 faders across six programmable layers for 120 full-featured channel strips, while the S5000 boasts a pair of control screens with 28 faders and six layers for 168 channel strips, and the top-of-the-line S7000 incorporates two control screens, 36 on-surface faders, and six layers for 216 channel strips. In the dual-screen models, a left-hand display is dedicated to the control of all channel-strip adjustments and in-use settings, while the right-hand display handles system setup and control parameters; on the S3000, a single screen can be switched to provide either function.

Described as a distributed digital mixing system that provides a highly flexible solution for installed and touring live-sound applications, the dLive S Class separates the mix engine from the control surface, thereby locating audio I/O and processing closer to the stage sound sources, and also providing enhanced system control and networking capabilities. Currently, three modular, flight-case mounted MixRacks are available: the 7U DM32, which offers 32 mic/line inputs and 16 XLR line outs; the 8U DM48, with 48 mic/line ins and 24 XLR outs; and the 10U DM64, with 64 mic/line ins and 32 XLR outs. MSRP ranges from $26,998 for an S3000 control surface linked to a DM32 MixRack, on up to $38,998 for an S7000/DM64 combination.

Serving as the processing heart of a dLive system, each MixRack houses an XCVI processing engine, which pro-

vides a maximum of 128 input channels and 64 mix outputs at a 96kHz sampling frequency—all with full signal processing—plus companion analog I/O, control, and networking ports; AES3 inputs feature sample-rate conversion, while AES outputs can be switched to run at 48kHz or 44.1kHz. In essence, the attached surface serves as a network controller; it also offers its own analog and digital I/O plus networking ports. Up to three DX Expanders can be networked to the control surface, as well as ME Series personal mixing controllers and ultra-compact IP6/8 remote controllers. While, typically, the networked MixRacks connect directly to a dLive control surface, they can also be controlled simultaneously or even without a surface using dLive Director software via a PC/Mac laptop, or an iPad running dLive MixPad, or via TCP/IP from the company's IP Series remotes and third-party controllers. Each MixRack chassis can be set up as a freestanding unit for either shelf or floor operation; for rental, touring, and portable use, the firm recommends use of a professional-grade flight case with a shock-mounted internal rack frame.

Each S Class control surface includes a fully assignable layout with what Allen & Heath refers to as the "Harmony UI" user interface with an integrated touch screen using pinch, swipe, and drag–and-drop gesture control, together with wraparound controls mapped to corresponding on-screen functions. Three pages of assignable rotaries are provided per screen, plus 26 assignable soft keys. A very handy widget area can be freely configured to put scenes, level meters, effects setting, and a host of user-selectable control elements directly in front of the operator. The surface also offers engineer's wedge and IEM fader strips with flexible multipoint metering. USB-based stereo recording and playback is available via a dedicated front-panel port. Usefully,

the backlit screens made from armored glass are bright enough to accommodate daylight sessions.

A dual-redundant, hot-swappable power supply is optional on S Series surfaces and RM Series MixRacks, with automatic switchover; the surface also features an ultra-quiet internal fan design. (All surfaces and I/O racks ship with a single PSU fitted; a second PSU can be user-added.) Unboxed, the S3000 measures 34.3" x 28.7" x 16.3" (WxHxD) and weighs just 62lb; the S5000 measures 43.9" x 28.7" x 16.3" and weighs 77lb; and the S7000 measures 52.2" x 28.7" x 16.3" and weighs 90lb.

The XCVI processing engine houses a 160- by 64-channel FPGA multicore with a 96-bit accumulator that is said to offer a remarkably low latency of just 0.7mS from input to output. A total of 36 parallel virtual processing cores form the FPGA array, with a reported 10,000 cross-point calculations per sample for each six-core

block; it also provides a 3,000-by-3,000 reconfigurable router. Allen & Heath has also implemented its proprietary embedded channel plug-ins with DEEP processing. The configurable 64-bus architecture can be set for group, FX, aux, matrix, multiple PAFL or main outputs, with a choice of LR, LCR, or up to 5.1-channel configurations for the latter. Also available are a total of 16 RackFX DSP-based effects with dedicated stereo returns, together with multiple PFLs from channels and 24 DCA functions, plus a built-in signal generator and RTA for system measurement and calibration.

The MixRack's analog mic/line inputs feature remote-controllable pre-amps for balanced or unbalanced sources, with integral gain, 20dB pad and 48V settings; a dedicated indicator lights when phantom voltage is detected at the source socket, whether it is internally or externally sourced. A newly developed active-pad pre-amp design is said to offer

enhanced sound transparency. All I/O ports are freely assignable to any input channel using either an I/O or processing/pre-amp screen. Line-level outputs on balanced, +4dBu XLR ports are relay-protected to prevent power on/off thumps. The MixRack is said to take approximately 15 seconds to boot and start passing audio signals.

Optional interfaces available for system expansion, digital mic splitting, recording, or distributed audio networking include 96kHz Waves SoundGrid with 128 x 128 I/O, gigaACE, and fiber optic cards, as well as iLive/GLD cards—M-Dante, M-Waves, M-ES-V2, M-ACE, and M-MADI—to provide a 64 x 64, 48kHz interface with built-in sample rate conversion. Unboxed, the DM32 measures 19" x 12.3" x 12.8" (WxDxH) and weighs 33lb; the DM48 measures 19" x 12.3" x 14.5" and 39lb; and the DM64 measures 19" x 12.3" x 18" and 46lb.

Networking control surfaces to I/O racks and expansion units

Networking between the control surface and MixRack is via a pair of EtherCON gigabit Ethernet ports—main and backup; IEEE 802.3 Layer 2-compliant—while a second pair of RJ45 network ports connects to a laptop or a wireless router for use with the firm's dLive editor or iOS apps. Each CAT5e (or higher) cable carries bidirectional 96kHz audio and control signals; the system automatically switches to the backup cable in case of failures, with no audio dropout. Up to 330'/100m cables can be used for interconnects. The DX links are via dual-redundant etherCON ports for connection to a pair of expanders over Fast Ethernet; a single cable carries 32 x 32 channels of 96kHz audio and control; a third DX chassis can be connected to the in-use control surface.

A dedicated ME etherCON port is provided on the rear-panel of each DM
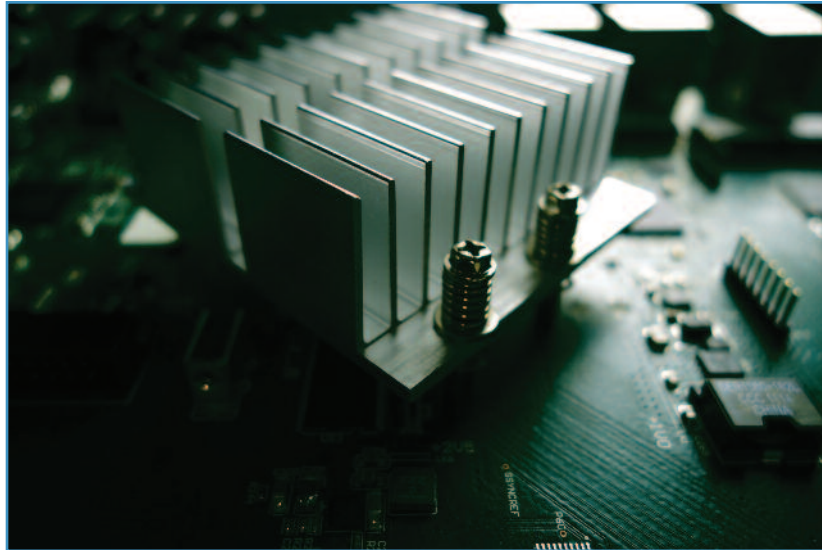
XCVI processing engine circuit board.

rack for the Allen & Heath ME personal mixing system; a single CAT5e (or higher) cable carries 40 channels of 48kHz audio, channel names, and stereo links to an ME-1 mixer for daisy-chaining, or an ME-U hub for power and audio distribution. BNC

connectors for word clock I/O enable synchronization from an external audio clock, or output a clock signal for connected devices. Finally, each surface offers both 1/4" and 1/8" jacks and level control for the built-in headphone amplifier; output follows the system's

PAFL selection.

Each mic/line pre-amp is said to offer a 110dB dynamic range, with a quoted -60 to +15dBu input sensitivity, -92dB system signal-to-noise, analog gain of +5 to +60dB in 1dB steps, and 20Hz — 30 kHz, +0/-0.8dB frequency response; the 0dB meter calibration is -18dBFS (+4dBu at the XLR output) and a maximum output level of +22dBu. A-to-D and D-to-A conversion is via 24-bit Delta-Sigma units.

And while these numbers are indeed impressive, a major consideration for potential customers will be how the dLive S Class sounds. Allen & Heath has an enviable reputation within the analog domain—the company's small- and medium-format iLive consoles, launched in 2011, are to be found in numerous installations around the world and are known for their sonic fidelity and sweet "British-sound" character. That legacy is followed into the new dLive Series, partly through the analog front-end and output stages that have been integrated directly from existing analog designs, but also through the care and attention that was expended on the DSP-based dynamics, equalization, and effects sections, with the latter being based on classic designs from a number of manufacturers. All in all, the dLive has been developed to offer the type of sonic clarity we might expect from a manufacturer with a strong analog heritage, and one that hires talented designers to develop all-digital derivatives.

Allen & Heath Unveils dLive C Class at NAMM 2017

Targeted at AV, installation, and live-event applications, the new dLive C Class comprises a compact range of surfaces and MixRacks that utilize the same 96kHz XCVI FPGA core that powers the flagship dLive S Class consoles; the new offerings also share the latter's DEEP processing architecture, allowing dynamics and equalization sections, plus processing emulations to be inserted directly within inputs and mix channels. The new range includes the ultra-compact C1500 control surfaces—Allen & Heath's first 19" rack-mountable dLive controller— together with the single-screen C2500 and twin-screen C3500 surface, plus three new MixRacks: CDM32, CDM48, and CDM64. All systems are plug-and-play-compatible with S Class systems, including automation settings and soundcheck recordings.

The MixRack's integral XCVI core enables 128 inputs with full processing and 16 dedicated stereo FX returns, plus a configurable 64-mix-bus architecture, again with full processing on all mix channels. Each surface and rack features a 128-channel I/O port, supported by optional networking cards, including Dante, Waves, MADI, and fibreACE optical. C Class components also are compatible with S Class and ME personal mixing systems.

"The challenge was to make a next-generation digital mixing experience accessible to people who don't want to carry or install a large-footprint, pro-touring rig," says Nic Beretta, Allen & Heath's head of product marketing. "For hire companies, the C Class is a powerful, versatile workhorse for everything from corporate events to regional festivals. In houses of worship, theatres, and other venues it has the depth to handle any performance without eating into the seating space, and we're confident it's also the most accessible mixing system in its class."

Prices range from $6,500 for a CDM32 MixRack that can be controlled by an Apple iPad, for example, to $21,500 for a C3500/CDM64 combination. Unlike S Class models, as a cost-saving the new C Class systems feature a single power supply, with no provision for redundant backups.

Reportedly, some 340 meetings, teleconferences, and roundtables were held with live-sound engineers to research the pros and cons of appropriate topologies and user interfaces, prior to the dLive's official launch at NAMM 2016 and then at ProLight + Sound/Musikmesse in Frankfurt last spring. The three-year R&D/development program is said to have cost over $5 million.

The user interface

The dLive Harmony user interface, as I discovered during a specially organized session at Pacific Coast Entertainment in Huntington Beach, south of Los Angeles, is a joy— extremely easy to learn, with controls placed precisely where you would expect them to be, only a screen or on-surface button click away via streamlined menus. All channel parameters can be brought to the screen with a single press of a fader-strip SEL key that lets the user access controls for input or mix channels to which it is assigned; the S5000/S7000's left screen is always dedicated to channel processing, while the S3000 incorporates the same visuals into its dedicated system screen. Wraparound controls are fully color-coded for speedy operation, while dedicated areas show parameter values and the status of each corresponding control, some of which are configurable or user-assignable within the adjacent widget areas. Hitting any of these target areas cause the associated tab to open within the main screen area. All in all, it is an easy and highly intuitive user experience to master.

The main screen area features dedicated pre-amp controls for analog gain, digital trim, 48V phantom, pad, and polarity, plus a peak indicator, together with high- and low-pass filter frequencies and an in/out switch. Preset libraries of user settings can also be stored and recalled for the channel or processing block currently being controlled, with a pop-up menu for recalling, storing, overwriting, or deleting a library.

Setup is simple: holding down a key and tapping on any highlighted screen area turns on a configure mode; in listen mode, the same action lets the user monitor the signal at that point in the selected channel path, with the audio temporarily overwriting the PAFL bus and associated level meters. The PEQ, or parametric equalization, section includes width, center frequency, and gain controls for four discrete EQ bands, with a dedicated screen area displaying EQ parameters and/or response curve, either individually for all bands or full-range. The two blocks of three assignable rotaries over three layers per screen come to life to match the corresponding response screen—couldn't be easier.

All in all, the control paradigm very closely matches what we are familiar with for current-generation smartphones and tablets. Point at something, adjust the control, and move on, with precise indication of the parame-

ters available if and when you think it appropriate. I would estimate that a sound engineer will be up and running on a dLive controller within 20-30 minutes—the time it takes to access the relevant startup section and proceed to develop signal paths though the DSP elements. If you are returning to a previously stored basic system configuration—as would be the case in probably 95% of sessions—then it's just a matter of refining current system parameters to include a new drum-mic array, for example, or to develop revised monitor mixes; it takes just a couple of minutes.

The widget area comprises a dedicated screen-display area that maps parameters for assigned controls and corresponding thumbnail indicators, with free assignment of target settings of rotary controls, plus toggling between three discrete layers. Usefully—and here is the whole rationale of the on-surface widgets—the "soft" rotaries can be set to follow channel selection, active mix, or locked to a specific channel path; for strip rotary, their function is selected using the strip rotary mode keys as described earlier. These rotary controls adjust pre-amp gain, pan, sends to the active mix, and four assignable functions; the LED color matches the active function, with red for gain and yellow for pad, etc.

In contrast to the controller screen, the right-hand system screen on S5000/S7000 surfaces displays status, master setup, memory management menus, and more parameters. The left widget area can be configured to display multiple functions—maybe a scrollable scenes list—while on the single-screen S3000 controller, the real estate is dedicated to channel-processing parameters; on all screens, the lower widget area can again be configured to display other functions—maybe a scrollable meter bridge. Talking of level meters, these can be set to access input meters, FX meters, mix meters, RTA, spectrogram, and four customizable views.

Other sections handle set up of the system's 16 RackFX units with I/O patching via cross points, a fully programmable scene manager with cue lists and scene safes, plus creation of up to 16 VCA gang groups that link selected parameters across multiple channels. A MixRack setup provides access to mixer bus configuration, input stereo configuration, network settings, user profiles, and other parameters, while surface setup handles assignment of fader strip layouts, soft keys, and custom rotary functions, together with routing assignment for the target channel. Usefully, pressing "home" restores a familiar state to the control surface, with default active layers, screen modes, active mix, strip-rotary mode, and channel LCD view; it does not affect channel processing, strip layout, illumination, or any other setting that has been stored in a scene setting. Finally, an upper USB port handles mono/stereo recording of 16/24-bit WAV files at 96kHz, and playback at a choice of 44.1, 48, or 96kHz sample rates, while a lower

USB port offers data transfer of show files, libraries, event logs, and firmware updates.

In addition to the six layers of fader strips per bank, the latter can be linked together to provide, for example, all input strips across maybe two banks to remain in sync when changing layers; the user can also freeze or lock a channel in place across all available layers. A selected graphic equalizer/GEQ can be mapped across the faders for individual mix control, with frequency values shown on LCD displays and meters displaying RTA activity—a handy feature for maybe ringing out monitors, or identifying problematic frequencies. The fader-strip meter comprises a 22-segment display and six-segment gain reduction section; a useful indicator warns that a signal at several points in the signal path is within 5dB of clipping.

A master mix setting places send levels and assignments for the associated channel or masters onto the fader strips—or strip rotaries when these are in "sends" mode. The normal mix mode sets input strips as channel faders, and master strips as master-mix faders; the same control affects aux and FX sends with master strips now presenting all sends from the target input channel.

In a nutshell

Mixing live sound puts additional pressure on technology and its operators. To maintain that important immediacy between performers and their audiences, and being prepared to handle virtually any eventualities, means that the I/O capabilities have to be flexible and the console control surface easy to use. The dLive S Class provides sufficient mixing power and flexibility to handle even the most demanding of live sessions. Its distributed system with modular MixRacks and control surfaces offering DEEP processing and embedded plug-ins is a powerful combination. Folding in a touring-grade construction and redundant, hot-swappable power supplies adds rugged confidence for touring users.

Ultra-low latency across 128 input channels and 64 mix outputs with full processing and flexible bus architecture are elegantly enabled by the system's Harmony user interface with touch screen and wraparound controls. Connectivity is ensured with optional networking cards that accommodate Dante, Waves SG, ACE, and MADI, as well as direct compatibility with the company's ME Series personal-mixing system. Small wonder that, reportedly, some 1,200 dLive S Class consoles have already been delivered to customers around the world.

Stop Press: At the recent NAMM Show in Anaheim, Allen & Heath announced a V1.4 firmware upgrade, which adds advanced dynamic processing with the DYN8 plug-in to provide four bands of dynamic EQ and four bands of multiband compression; DCA spill, which routes component channel levels to adjacent on-surface faders; a speedy virtual soundcheck mode; plus a Dimension Chorus Rack FX unit, modeled after the popular Roland Dimension-D SDD-320 unit. New additions to the DEEP embedded plug-ins comprise a Peak 76 compressor/limiter emulation of the classic UREI 1176 LN unit, plus a multi-stage ducking processor. Also new is an option to output graphic displays to a third, independent view on an external monitor. In addition, the current one-year free product warranty has been extended to three years.

My sincere thanks to Mike Bangs, Allen & Heath USA's live-sound/touring manager, for a guided tour of a large-format dLive S Class Digital Console at Pacific Coast Entertainment. And to Ryan Steidinger, PCE's CEO, for providing playback space within his well-equipped Huntington Beach facility. 🔊