BEYOND 324 LIVE...

DIGITAL 328

32 Channel Digital Mixing Console

LX7

24 to 40 Input Live Mixing Consoles

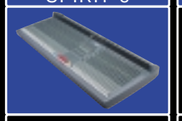
LIVE 4²

12 to 40 Channel 4 Group Live Mixing Consoles

LIVE 3²

8 to 24 Channel 3-Buss Live Mixing Consoles

SPIRIT 8



16 to 40 Channel 8-Buss Live Mixing Consoles

MONITOR 2

24 to 40 Channel Stage Monitor Consoles

POWERSTATION

16 & 24 Channel Powered Live Mixing Consoles

POWERPAD

Compact 10 Input Mixing Console with 2 x 30W power amp

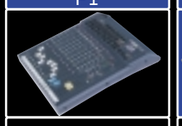
FX16

16 Mono Channels with onboard Lexicon Effects

FX8

8 Mono Channels with onboard Lexicon Effects

F1



6 or 8 Mono & 4 Stereo Inputs

SX

12 Mono & 4 Stereo Inputs

NOTEPAD

4 Mono & 2 Stereo Inputs

ABSOLUTE

A Range of Professional Nearfield Monitors

Spirit 324 Live is part of the extensive range of Spirit professional audio equipment. In the studio, on stage and front-of-house, Spirit designs are synonymous with versatility, innovation and sonic excellence.

Since Spirit's inception in 1991 the Company has forged an unrivalled reputation designing and manufacturing high quality, low cost live mixing consoles. The award-winning Folio range has consistently set the standard for all compact mixers, while the Absolute range of nearfield studio monitors are now employed in some of the world's top studios.

Launched in 1998, Spirit's multi-award-winning Digital 328 console revolutionised digital mixing with a unique, user friendly interface. Digital 324 Live shares and develops this proven technology, introducing new levels of compact, feature-packed performance to the live arena.

For details of the complete Spirit range contact your local dealer or visit our website where you'll find comprehensive details of every product, including information on users, downloadable PDF brochures, technical support and user group information.

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Part N° A4: ZL0547 US: ZL0548 02/2000 E&OE

324 LIVE DIGITAL

32 INPUT LIVE SOUND DIGITAL MIXING CONSOLE

- 16 Mic/Line Inputs plus 16 T-DIF Digital Inputs
- AES/EBU and S/PDIF Input and Outputs
- 4 Groups; 4 Matrices
- Left, Right and Mono Busses
- Automation System tailored to Live Sound
- Comprehensive MIDI Event List capability
- 16 MIDI Controllers on faders

AN OVERVIEW OF 324 LIVE

324 Live is a compact digital mixer which addresses the unique requirements of the Live Sound reinforcement engineer. Equally comfortable touring with a small band, installed in a Theatre, or providing vocal reinforcement in a Place of Worship, 324 Live is equipped as standard to handle a wide variety of Sound Reinforcement tasks.

Based on the proven technology of the Digital 328 console, 324 Live boasts much of the standard featureset of its powerful Project Studio sibling. However, to reflect the unique requirements of Live Sound mixing, 324 incorporates a number of adaptations and new features designed to assist the Live Sound operator in creating the desired mix with the minimum of fuss.

The compact footprint of the console belies the power behind the front panel. With up to 32 inputs plus 2 stereos, 4 Auxiliary sends, 2 internal FX units with dedicated sends and returns, 4 Groups, 4 Matrices, Left/Right and Mono busses, 324 Live delivers exceptional flexibility in a small package.

Brochure conventions

To help you identify or locate controls and functions on the control surface and connector fields, the wording that appears adjacent to the relevant control or connector is shown in the text using small capitals.

For example, a Select control is shown as SEL.

Abbreviations, such as LED or MIDI, are shown using full capitals.

THE KEY TO 324'S OPERATION

In Live Sound, speed of operation is everything. The unpredictable nature of Live Sound - variations in the performances on stage, the fluctuating audience size, problem microphones - demands that any piece of Live Sound mixing equipment offers fast and intuitive control over its featureset.

At the heart of the operation of 324 Live is the E-Strip - a concept inherited from the 328. The E-Strip is essentially a conventional channel strip, turned through 90 degrees so that it sits horizontally in the console rather than vertically.

This allows the strip to perform two key functions: it offers a conventional complete channel strip for any selected channel, or a view of one function across a number of channels.

It is this flexibility that allows the audio parameters of 324 Live to be viewed and edited with minimal fuss. Checking for the cause of a hot send to an FX device, for example, is as simple as selecting the appropriate Aux to be viewed on the E-Strip, and identifying the channel with the excessive send level. Viewing the complete EQ for a microphone input can be achieved with a single press of the appropriate Select switch.

AUTOMATION

Why use Snapshot Automation Live?

During almost any performance, the nature of Live performers and Live performance spaces requires that the user make adjustments to the console settings to compensate for the changing situation.

In addition to this, the user is often required to make fast and accurate predetermined changes to EQ, Levels, Routing and Aux sends, which need to happen regardless of the variance in performance. This is where automation comes in. With just a small amount of preparation time, an operator can program in a number of different console settings ("snapshots"), and then step between these with a single button press. This means that the user is now free to concentrate on the business of mixing the performance, rather than trying to remember which switch presses have to be made at the end of the next song.

However, there can be problems with Live automation - if the performance deviates radically from the planned material, then the settings programmed into some channels for upcoming scenes may well be highly inappropriate. At this point, the user needs a way of quickly removing just a FEW channels from the snapshot system, while keeping the bulk of the console under automated control.

This need gave rise to the ISO(late) switch, present on all Input channels. Pressing the ISO switch protects that channel from the Automation system, but still allows full manual access by the user.

MUTING

In addition to manual MUTE control, 324 Live offers 4 Mute groups. Assigning input channels to a Mute Group will result in all those channels being Muted when the Mute Group Master is Muted. This is particularly helpful when rehearsing, as it allows Muting of similar channel types - e.g. Radio mics, Keyboards, or Drums - with a single keypress.

MIDI

As well as console audio parameters, 324 Live is capable of sending MIDI information when a cue is recalled. The user may define a number of MIDI events to occur with each cue (choosing from Note ON, Note OFF, or Program Change).

MIDI is extremely useful for triggering external sound FX (via Note ON sent to a MIDI Sampler), or for setting up the desired FX Patches in external FX devices (via Program Changes sent to the remote device).

Of course, when the snapshot containing MIDI is recalled, the console audio parameters are also recalled from memory. This means that a Sound Effect triggered by a cue can be routed, processed via the two Lexicon FX, subgrouped and routed to a matrix in one cue, then be processed completely differently in the next.

The console will also respond to incoming MIDI Program Change data, which is mapped to Snapshot recall.

SECURITY

It is often necessary for a single operator of a Live console to leave the desk unattended in a venue at certain points during setup, and before the show. During that time, the temptation of so many controls can occasionally prove too much for audience members, and the carefully-prepared mix can be quickly undone.

To help prevent unauthorised use of the desk, 324 Live employs a Security function, enabled with the LOCK key adjacent to the CUE LED display. Various levels of lockout are offered, from OFF (nothing locked), through combinations of faders, automation, and switches, to ALL (every function locked out).

A permanent lockout could be counter-productive, so the console may be unlocked either with the appropriate keystroke, or by powering down, then repowering the console, so an operator can always regain complete control of any 324 Live should the need arise.

MATRICES

324 Live offers 4 Matrix outputs on dedicated balanced XLR connectors. These additional outputs are most commonly employed as sends to individual speaker positions in a distributed system, allowing the operator to feed a specified amount of the Group 1-4, Left/Right and Mono buss signals into each Matrix output.

This can be particularly useful when trying to improve vocal intelligibility in a room, as the operator can increase the balance of Vocals against Music in certain parts of the room without affecting the Main mix.

OPERATIONAL EXAMPLES

The benefits of Digital mixing consoles extend beyond simply the capability to accurately reset the parameters from scene to scene. The user interface of 324 Live incorporates features that would simply not be possible on an analogue equivalent.

FADERS

Although 324 Live has an exceptionally small footprint, it is still capable of handling some 32 mono inputs and 15 outputs. Control over these inputs is achieved via the 16 motorised faders, operating in 3 "BANKS", or pages.

It is fader paging that is often criticised when engineers consider using a digital console, as they feel that it takes too long to find a channel, and furthermore it is too risky to have only some of the channels visible, and the remainder "hidden" in a separate page.

However, the reality is that any channel on 324 Live is no more than a single button press away - the three FADER BANK switches above the fader panel give instant access to the three main fader pages. This is only a view function, and does not in any way affect the audio.

Pressing BANK A brings up the 16 Mic/Line Inputs

Pressing BANK B brings up the 16 T-DIF Digital Inputs

Pressing MASTERS brings up all the Buss Output faders - Groups, Matrices, Auxiliaries, FX sends and Main Outs.

Note that, even when a bank is changed, a channel SELected to the E-Strip remains on the E-Strip until another channel is selected or a ROTARY CONTROL switch is pressed to reassign the E-Strip to other duties. This means that it is possible to flip to another FADER BANK to view levels without losing a main microphone from the E-Strip.

One of the main problems with paged faders is that a "hidden" channel could overload briefly, and the operator would miss the peak as they were viewing a different Bank at the time.

To assist with this issue of "hidden" channels peaking, an additional ALT PK LED below the channel meters illuminates to denote that the channel in that slot on the hidden bank has peaked. This way, it is possible to monitor the peak LEDs of all 32 channels without paging at all, and access to the problem channel is never more than a button press away.

QUERY MODE

Although routing and switching of channels may be performed via SELection of the channel to the E-Strip and pressing the individual switches, 324 Live also allows switch information to be viewed "in reverse". That is, instead of selecting a channel and looking at all the parameters for that one channel, the operator may

choose a switch and view the status of that switch across all channels. This feature is called "Query mode", and is activated by pressing and holding the appropriate channel switch in the SELECT panel.

As an example, to check which channels have been routed to GRP1, the operator would usually press the SELect switch for each channel in turn to verify whether GRP1 was active or not for that switch.

However, with Query mode, pressing and holding the GRP1 switch will result in the SELect switches on each channel showing the status of the GRP1 switch for that input. Settings may be edited simply by pressing the appropriate SELect switch, which will toggle the status ON/OFF.

ISOLATE

Automation on a Live Sound mixer is very helpful, as long as the show goes as planned. Inevitably, however, things go wrong: a radio mic taped in the hairline moves an inch, requiring more gain and a new EQ; a musician adjusts their output level on stage, meaning a trimmed fader position on that input.

At this point, although the changes can easily be made manually, as soon as the next snapshot is recalled the channels will be reset to their setting for that snapshot - undoing all the careful adjustments.

To combat this, 324 Live uses a feature called ISOlate to protect individual channels from Automation system replay. When a snapshot is recalled it will replay the data as expected to all channels **except** those with ISO activated. Note that this feature only affects replay to the console - settings on ISOlated channels will be stored along with all other data when a snapshot is created.

Thanks to the Query function, ISOlating a series of inputs in an emergency is a very fast process. Dropping the first four microphones from automation, for example, involves just pressing and holding the ISOlate function, and pressing the SELect switch on the appropriate channels. Those microphones are now "safe", and may be edited manually without the risk of the console overwriting the settings.

CHANNEL COPY

It can often be useful to copy data selectively from one channel to another. This is not only useful for fast setup, but also during a performance. In the event of a microphone line going down, it offers a very quick way of copying the entirety of a channel setup from one input to another if a mic has to be repatched to a different input, leaving only the analogue input trim and HPF settings to be manually matched.

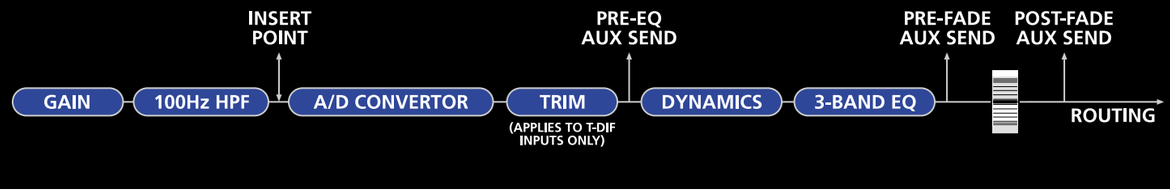
Copying of channel data is a two-button process. Pressing and holding the SELect switch for the source channel will put the console into copy mode. At this point (still with the source SELect held), pressing any other channel SELect will result in the source channel data being copied across to the destination channels. Additional presses of other SELect switches will continue to copy that information to those channels.

In certain setup situations, a more specific type of copy may be required. Take an example where all channels need to be routed to the MIX (for a house system), but also to GRP1/2 for an additional stereo feed for Broadcast, and to GRP3 for a Mono backstage feed. Setting up a single channel with the appropriate routing takes just a couple of seconds, but multiple settings would take a while. Even Query mode doesn't help much here, since there are multiple settings to be copied, and it is not possible to press and hold multiple switches.

This is where selective copy comes in.

This allows the operator to copy only certain parameters of the source channel to the destination channel. Setting the copy function to copy only ROUTING, then performing a normal copy SELecting all required destination channels will give the desired result with minimal fuss.

Although 324 Live is a digital mixing console, and most console functions are therefore performed in a generic DSP "block", the signal path can be shown in much the same way as that of an equivalent analogue console.



INPUTS, METERING & CONNECTIONS

ANALOGUE INPUTS

324 Live offers 16 Mic / Line inputs, referred to as BANK A. Connection to these is via either the balanced XLR connector, or the balanced 1/4" TRS Jack.

Each of the 16 inputs benefits from Spirit's UltraMic+ preamp. This renowned design provides some 28dB of headroom, and 66dB of gain range with sensitivity adjustable from +6dBu to -60dBu. This wide range allows simple and fast control over Live microphone signals, where unpredictable levels pose a constant challenge.

Immediately after the gain control sits a steep 18dB per octave high-pass filter – invaluable in helping remove microphone handling noise, excessive proximity effect and low frequency stage "rumble".

The final stage before conversion of the audio into the digital domain is an Insert point, allowing connection of external processing devices in the analogue domain. Although the integrated Dynamics Processors on 324 Live allow extensive processing of incoming signals, there are times when only that favourite old valve Compressor will fit the bill.

Metering

The sixteen 10-segment, peak-reading LED meters on 324 Live may be selected to display levels for the Mic/Line (BANK A) inputs, the Digital T-DIF (BANK B) inputs, or the Master Outputs. They may also be configured to show the gain reduction applied by Dynamics processors inserted into any given channel.

Below each meter is an ALT PK LED. Since 324 Live can handle up to 32 inputs (BANK A and BANK B), and only 16 of these may be metered at any time, there is a good chance that a peaking channel may not currently be shown on the meters. To assist in finding such peaking channels, the ALT PK LED below each meter will illuminate to show that the associated channel on the bank not currently selected for metering (the "hidden" bank) has peaked. The user may then select that bank for more detailed viewing and editing, or choose to ignore that warning.

REAR CONNECTOR PANEL

324 Live supports a total of 32 channel inputs : 16 conventional Mic/Line inputs (BANK A), and 16 additional inputs in the form of two 8-way bi-directional Digital T-DIF connectors (BANK B).

Each of the T-DIF connectors will support 8 inputs (and 8 outputs), which might come from a T-DIF equipped Digital Multitrack Tape machine or Computer Soundcard, or from one of the optional Spirit Digital T-DIF Interfaces.

Using the Mic/Line T-DIF interface, for example, 8 additional fully-featured Mic/Line inputs (plus 8 outputs) with separate Phantom power switches may be connected to each port. Fitting two of these results in a 324 Live with 32 conventional Mic/Line inputs.

The console also offers a Digital Stereo input, in the form of a Sample Rate Converted S/PDIF or AES/EBU Input. This stereo input has all the digital capabilities of the Mono inputs, but level control is via a rotary encoder rather than a linear fader.

THE E-STRIP AND CHANNEL SELECT

The unpredictable nature of Live sound demands fast and intuitive access to channel controls. When the pressure's on, the engineer has no time to plough through pages of options and graphs, but needs to get to the critical controls quickly and smoothly.

The "layered", paged approach of a digital mixing console could easily have reduced this accessibility. However, 324 Live employs the "E-Strip" – the same class-leading interface as its sister console, the Digital 328.

Based on the idea of a conventional channel strip rotated through 90 degrees, this multi-function strip is the heart of 324 Live's user interface, and is the key to fast Live operation.

The E-Strip works in one of two modes – Channel Select or Function Select – selected automatically depending on the user's last keypress. These two modes offer two different views of the same channel information; either a complete view of the information for one channel, or a view of one particular function across all channels.

CHANNEL SELECT

In Channel Select mode, the E-strip offers a conventional channel strip, oriented from left to right across the 16 encoders rather than vertically. Above each channel fader is an associated SEL(ect) switch. Pressing SELect on any channel will result in that channel being presented on the E-Strip for viewing and editing of the channel parameters. The 3-band parametric EQ, the sends to the 4 Auxiliaries and 2 FX, and Pan are all now adjusted simply by moving the associated controls.

Since the SELect switch is associated with the channel fader below, selecting channels on BANK B is as simple as pressing the BANK B switch in the FADER BANK area (bringing the BANK B inputs onto the faders), then SELecting the appropriate channel.

This mode is particularly useful when configuring channels during rehearsal and setup. It might be appropriate to view each channel in detail as each performer plays or sings into their microphone, and make the required detailed adjustments to their EQ and sends.

Channel mode is fine when editing one channel in detail. However, if, for example, an FX unit is suddenly being overloaded, it would be useful to see which channels were sending to that Auxiliary, and in what quantity. That's where Function Select mode comes in.

FUNCTION SELECT

In Function Select mode, the 16 encoders will show a single selected function from the E-Strip across all channels. To take the above example, pressing the AUX1 switch above the E-Strip will turn all the encoders into AUX1 send controls for the channels below. It is now a simple task to locate the offending channel, and reduce the send level.

Apart from the channel sends, the E-Strip Function may also be set to LEVEL. In this mode, the 16 encoders show and edit the channel level for those channels not on the faders. So, when BANK A inputs are on the faders, BANK B inputs are on the encoders and vice versa.

This gives access to level control for all 32 Inputs without the need for paging.

COPYING DATA

It is often useful to copy channel parameters from one input to another. When aligning EQs across three backing vocal mics, for example, or when an instrument is repatched from one input to another. Copying channel information on 324 Live is accomplished simply by pressing and holding the SELect switch on the source channel, then pressing the SELect switch on the desired destination channel(s).

CHANNEL SWITCHES

The Select Panel

When a channel is SELected onto the E-strip, the SELECT panel to the right of the fader tray becomes active for that channel. The SELECT panel contains all the switches usually associated with an audio channel: Soloing, Muting, Audio Routing. Pressing any of these switches will toggle the state for the currently selected channel.

Just as with the E-Strip, the Select panel can operate in a secondary mode. Pressing and holding any of the switches in the Select panel will result in the console going into "Query" mode. In this state, the SELect switches above each of the channel faders take the function of the switch being held in the Select panel. Pressing and holding the MIX switch, for example, will display the ROUTE TO MIX status for each channel by illuminating the SELect button for the associated input, which may also be used for editing the status.

FADER SWITCHES

These are dedicated to key channel functions, and operate just as their Select Panel equivalents, but their status is available to view and edit regardless of which channel is SELected. It is therefore possible to toggle EQ in/out, MUTE channels or SOLO channels without having to SELect the channel first.

CHANNEL FUNCTIONS

Phase

Drops that channel 180 degrees out of phase. Particularly useful for undermiking snares, and emergency fixes for out-of-phase wiring.

DIR PRE

Derives the Direct output for that channel before the channel fader, so fader movements no longer have any effect on the level sent.

DIR=CHAN

The source for the Digital outputs carried on the T-DIF connectors may be selected to be Group outputs 1-4 (pattern repeated 3 times to cover the 16 direct outputs) or Direct from BANK A channels 1-16. When DIR=CHAN is selected, the source of the associated Direct output is the channel path. When it is off, the source is the associated Group.

DIR ON

Activates the channel Direct output.

EQ

The EQ on 324 Live is a 3-band fully parametric type.

HF: ±15dB Swept / Shelving 1kHz-20kHz, Q 0.3-2.8

MF: ±15dB Swept 200Hz-8kHz, Q 0.3-2.8

LF: ±15dB Swept / Shelving 40Hz-800kHz, Q 0.3-2.8

Mute

The MUTE switch mutes all sends from the associated channel – even those Aux and FX sends set to derive their feed PRE- channel fader. Only the Direct output is unaffected.

Solo

The Solo switch activates the current SOLO mode for the associated channel. Solo modes available are:
PFL: prefade listen – useful for troubleshooting instruments during a performance, as the SOLOed channel appears only in the engineer's headphones and the Monitor outputs.
AFL: after fade listen – useful for confirming the real output level of a fader.
SIP (Solo in Place): leaves the SOLOed channel and any channel defined as SIP-safe unaffected, but mutes all other inputs to the console, effectively leaving only the SOLOed channel running through the selected outputs. Useful for hearing an individual instrument through the full-range system.

SIP SAFE

A partner function to SOLO IN PLACE, SIP SAFE protects the associated channel from SIP muting. This is very useful when SIPed channels should ideally be heard with their associated FX returns. Arming SIP SAFE on the FX Returns will result in the FX remaining intact when any channel is SIPed.

GRP1 / GRP2 / GRP3 / GRP4

The Group switches will route the post-fade signal for the associated channel to Groups 1 through 4. Groups may be linked together into pairs for ease of stereo subgroup operation if required.

Mix

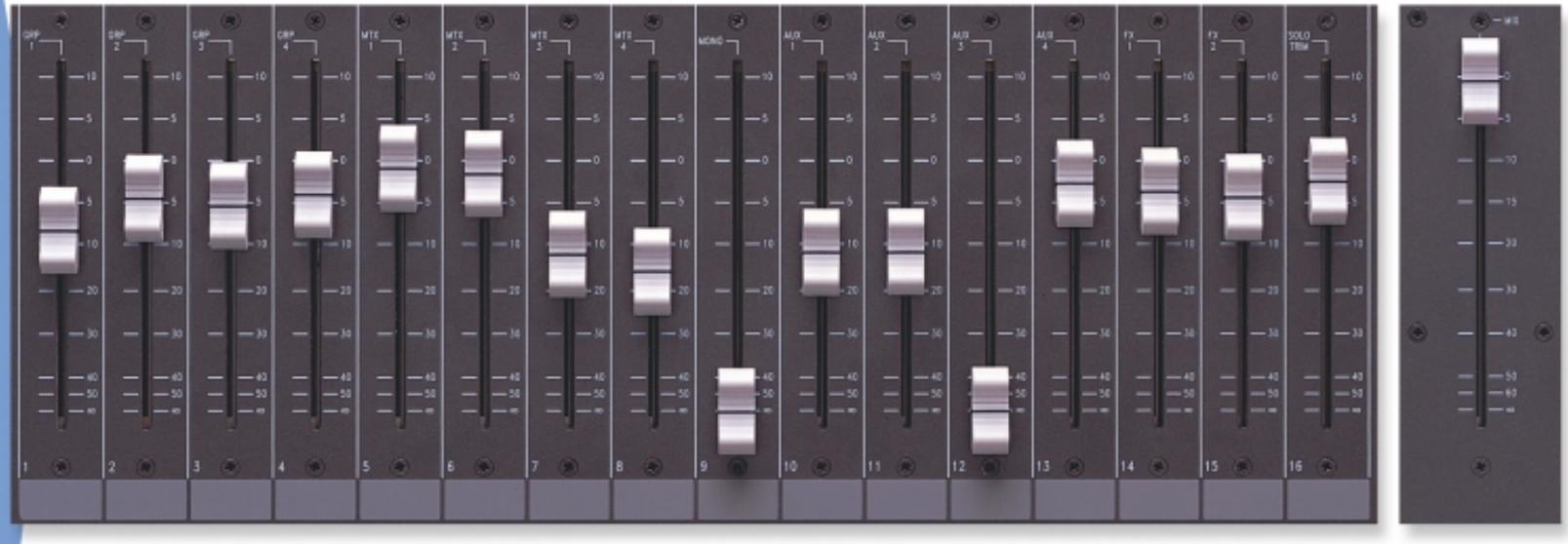
The MIX switch routes the post-fade signal from the associated channel to the Left/Right Mix buss.

Mono

The MONO switch routes the post-fade signal from the associated channel to the MONO buss.

SPIRIT BY SOUNDCRAFT

DIGITAL 324
FADERS & MASTER CONTROL SECTION



FADER TRAY

The Faders on 324 Live are of the 100mm motorised type. They will apply a gain range of -∞ to +10dBu for all input channels, and -∞ to 0dBu (Unity) on all output faders.

The input or output BANK to be affected by the faders is selected in the FADER BANK panel. Here, the operator may select either BANK A (Inputs 1-16), BANK B (Inputs 17-32), or the MASTERS BANK (all output masters except L/R).

In addition, a second press on the currently illuminated BANK switch will activate a fourth "hidden" mode of the faders: in this mode, the 16 faders will act as 16 Assignable MIDI Continuous Controller Masters. Up to 64 MIDI Controller Maps, or "Presets", may be stored in 324 Live for later recall.

MASTER CONTROL SECTION

The Master section of 324 Live houses the controls for the internal Snapshot automation system, general console configuration, and the integrated Lexicon FX and Dynamics units.

Automation

The Automation system in a Live sound console needs to be intuitive, clear and sufficiently flexible to allow for the inevitable variances in the performance from night to night, show to show.

324 Live's internal snapshot automation system allows up to 100 Snapshots of the console status to be created for later recall. All primary digital audio parameters are reset, along with the parameters of both the FX and Dynamics units.

In addition to the console audio, 324 Live also permits up to 10 MIDI Events to be tagged onto each Snapshot. These Events may be Program Changes (ideal for resetting external FX or Sampler devices) or Note On messages (with duration and velocity, great for triggering Samplers to replay Sound FX).

This integration of MIDI with the Audio in the console means that 324 Live is equally at home either as the core of a completely automated sceneset / FX replay system for Theatre sound, or as the centrepiece of a PA rig with recall of external FX units.

Replay

Once snapshots are stored in the Cue List, they may be recalled in sequence using the NEXT and LAST switches.

The NEXT switch simply steps sequentially from one Cue to the next, and the LAST switch recalls the previously recalled cue. LAST is a "press and hold" function to help prevent accidental LAST Cue recall.

In addition to the Cue name and snapshot number in the main LCD, for clarity the current Cue number is also displayed in a large format LED display in the centre of the Master section. In order to avoid accidental erasure of important data, this display also includes an "E" to denote that a Cue slot is empty and may be safely overwritten. To the right of the main digits, an "o" symbol denotes the presence of MIDI Event programming in the Cue, so the user is alerted to the presence of MIDI in that Cue, and therefore the possibility of SFX being triggered by that Snapshot.

Cues may also be recalled out of sequence, using the CUE SCROLL function. Pressing CUE SCROLL reconfigures the PARAM encoder in the centre of the Master section as a Scroll wheel for the Cue list. This allows the user to move the cursor quickly through the Cue list. Pressing RECALL when the required Cue is shown will replay that data to the console.

Navigation Switches

To assist in fast navigation of the LCD screens, four Page Selection switches are placed around the display, which access key elements of the 324 Live Setup menu hierarchy. These allow direct access to the MIDI, Snapshot, Presets (FX, DYN and MIDI) and Menu switches.

Jump & Mark

Since it is often useful when programming to move back and forth between two pages (for example between the MIDI Continuous Controller programming page and the MIDI Event programming page), 324 Live uses a Jump and Mark concept, using the F1 and F2 keys as assignable page markers. Pressing and holding the F1 or F2 switch when the desired page is present on the LCD will result in the page location being stored into that F key. Pressing the F key at any point thereafter will return the user to the stored page location for that key.

Console Lock

It is often necessary for the operator to leave a Live Sound console unattended (pre-show, problem-solving during a show, etc.) and during that time, the control surface of a mixer can sometimes prove too much of a temptation for members of the audience. Pressing and holding the padlock symbol switch allows the operator to activate the LOCKOUT function, which results in the illumination of the console surface being deactivated, and the faders being parked at the bottom of their travel.

Various levels of lockout are available, ranging from combinations of Faders or Automation to the whole surface, so the security level can be set as appropriate.

Audio will continue to pass when the console is in a LOCKED state.

Unlocking the desk is achieved either by pressing and holding the lock switch, or by cycling power to the console.

MUTE GROUPS, STEREO INPUTS, FX, LINKS & OUTPUTS

MUTE GROUPS

Mute Groups offer the Live Sound operator an extremely effective way of eliminating certain groups of unwanted channels from the Mix with a single button press. Each channel on 324 Live may be assigned to none, any or all of the 4 Mute groups. When the Mute Group Master switch is pressed for a Mute Group, all channels assigned to that Mute Group will be muted.

This is particularly useful during rehearsal periods, when trying to identify problem areas in a mix, or when handling a large number of radio mics with performers frequently leaving or entering the stage. Putting different groups of radio users into different Mute Groups depending on when they are onstage will allow simple muting of sets of mics as performers come and go, without having to create snapshots.

Mute groups can also be used to create Mix "blocks" to assist in troubleshooting the mix. It might be appropriate, for example, to put the whole band into MUTE Group 1, the Radio mics onto MUTE Group 2, the FX returns onto MUTE Group 3, and the Matrix outputs onto MUTE Group 4. The operator now has a number of single switch presses which will remove or add certain elements of the mix, and can easily listen to Radio Mics, Radios plus Band, Radios with FX, Radios without FX, and so on.

Configuring Mute Group assignments is achieved by pressing and holding the appropriate Mute Group Master switch, at which point the channel SELect switches will toggle channels into or out of that Group.

Mute Group assignment and status may be included in console snapshots if required.

STEREO INPUTS

In addition to the 32 channel inputs, 324 Live offers an additional pair of stereo inputs. These take the form of an Analogue Stereo input (which can derive its signal either from a pair of 1/4" balanced Jacks, from the digital S/PDIF, or from the digital AES/EBU inputs), and one Digital Stereo input, which derives its signal from either the S/PDIF or the AES/EBU inputs.

Both stereo channels have associated SELect switches, and may therefore be assigned to the E-Strip with access to all the EQ, Routing and Soloing features of the conventional Mono inputs. Only the DIRECT OUT is unavailable.

LEXICON FX

324 Live includes two dedicated Lexicon FX units, which offer a huge range of high quality FX including some of the renowned Lexicon Reverb algorithms. The outputs from these devices appear at the FX1 and FX2 Return encoders, which can be selected onto the E-Strip for EQ and Routing using the dedicated SELect switches.

Auxiliary (external) and FX (internal) sends from Input Channels may be defined as Pre- or Post-fader per send. That is, Aux 1-4 and FX1 and FX2 may be independently configured such that sends from channels are affected by channel fader movements, or remain static regardless of channel fades. Pre-fade sends are most often used for artist foldback (which most artists prefer to remain at a consistent level), Post-fade sends most often for connection of external FX devices.

For monitor applications, sends configured as Pre-fade may also be defined as Pre- or Post-EQ (note that Pre-EQ sends are also Pre-Dynamics).

CHANNEL / GROUP LINK

324 Live allows linking of pairs of Groups or Channels. Groups are usually linked to facilitate handling of stereo subgroups, but this can also be useful to set up identical feeds to two different destinations (e.g. broadcast split).

Channels are linked to allow for stereo pairs of inputs (e.g. synthesizer pairs). The scope of channel links may be defined as required, but is usually set to all parameters except Pan.

OUTPUTS

Output capabilities are paramount when choosing a Live console, and 324 Live caters for a wide variety of applications.

Auxiliaries

For connection to external FX processing, or artist foldback, 4 Auxiliary sends are provided on 1/4" balanced jacks. Should more than 4 sends be required, the FX1 and FX2 sends (which carry the signals to the Internal Lexicon FX units) may be assigned to appear at the FL1 and FL2 Floating outputs on balanced male XLRs. The signals will continue to reach the Internal FX units, but using FL1 and FL2 a full 6 Auxiliary busses can be broken out in the analogue domain.

Main Outputs

Main (Left / Right) Mix outputs appear on a pair of balanced male XLRs. The Mono buss does not have a dedicated output, but instead defaults to FL1 output on a balanced male XLR.

Groups

The 4 Group busses on 324 Live do not have dedicated outputs, but attaching an optional Mic/Line Interface unit and defeating the DIR=CHAN switches on four channels will result in the Group busses appearing on the balanced 1/4" jack connections of the Mic/Line Interface.

Alternatively, 2 of the Groups may be assigned to the FL1 and FL2 assignable outputs, on balanced male XLRs.

Matrices

The 4 Matrix outputs on 324 Live appear on dedicated balanced male XLRs, and can derive their feed from Groups 1-4, the Left/Right Mix Buss, or the Mono Buss.

Although usually employed for speaker feeds, mapping groups to matrices 1:1 (GRP1-MTX1 etc) could be used to break out the 4 Groups on XLR outputs.

Monitors

Monitor outputs are provided on 1/4" balanced jacks, with an associated output level control. Monitor outputs are intended for use with small powered nearfield monitor speakers, and will by default carry the MIX signal. The default signal is over-ridden by any SOLO operation performed on the console.

Headphones

A headphone output is provided on 1/4" stereo jack, with an associated output level control. The headphones will carry an amplified duplicate of the signal sent to the Monitors.

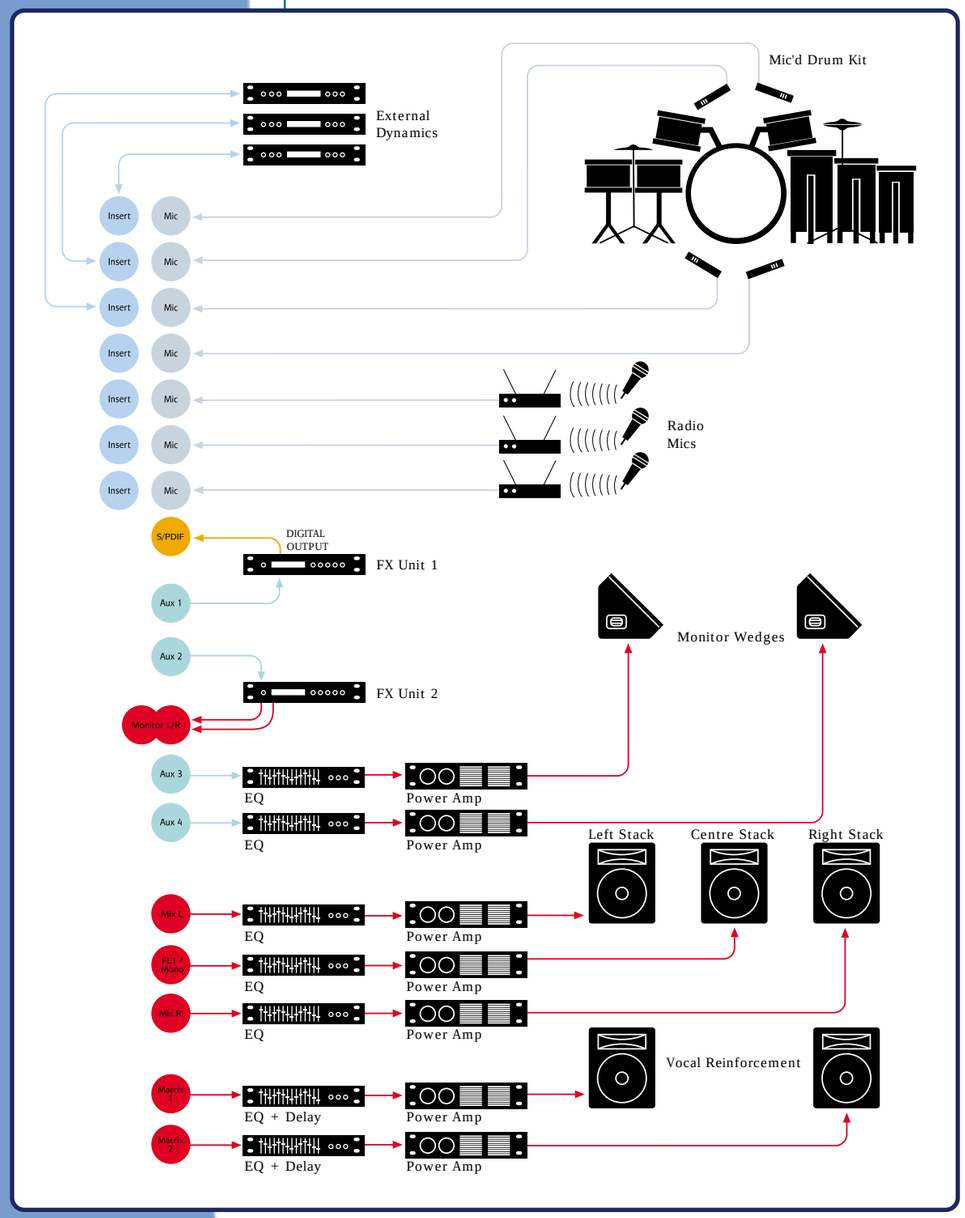
Talkback

A talkback control is provided to allow the engineer to speak to certain outputs, which may correspond to the performers onstage, to particular parts of the room, or to backstage areas. Signal is derived from a single female XLR, with an associated gain control.

APPLICATION

Using 324 Live

Here is an example of a simple live setup using 324 for music sound reinforcement. For increased vocal intelligibility, a centre cluster is being fed from the 324 and Matrix 1 & 2 are employed to provide sound to the rear of the auditorium via delays.



INTERFACE OPTIONS, SPECIFICATIONS

MIC/LINE INTERFACE

The Mic/Line interface converts either of the digital T/DIF ports on the rear of 324 Live into true Mic/Line inputs. It will also provide 8 balanced outputs, which may carry either the 4 Group outputs or 8 Direct channel outputs. The mic amp is designed with exactly the same characteristics as those of the 324 Live.

Features include:
8 x Balanced XLR Inputs
8 x Balanced TRS Inputs
8 x Insert Points
8 x Balanced Direct Outputs
8 x Individual +48V Phantom Power switches
8 x Individual High Pass Filters @ 100Hz, 18dB/octave
8 x 4-stage meter per channel
8 x UltraMic+ Pre-Amps

Frequency Response: ±0.5dB, 10Hz-20kHz.
THD: 0.05% @ 1kHz.
Crosstalk: 95dB @ 1kHz.
Dynamic Range: >110dB

AES/EBU INTERFACE

This converts either of the digital T/DIF ports on the rear of 324 Live into 4 pairs of AES/EBU connectors, allowing 4 AES/EBU inputs and outputs to be connected. The outputs may carry Group or Direct output signals.

1U half rack size, separate power supply.

Frequency Response: ±0.5dB, 10Hz-20kHz.
THD: 0.02% @ 1kHz.

ANALOGUE INTERFACE

Converts either of the digital T/DIF ports on the rear of 324 Live into 8 analogue phono (RCA) inputs and 8 analogue phono (RCA) outputs.

Allows an analogue multitrack recorder or 8 extra analogue inputs to be connected, and allows the Group or Direct outputs to be fed to units accepting analogue inputs.1U half rack size, separate power supply.

Frequency Response: ±0.5dB, 10Hz-20kHz.
THD: 0.05% @ 1kHz.
Crosstalk: 80dB @ 1kHz.
Dynamic Range: >93dB

324 Live Specifications

Frequency Response
Measured 20Hz to 20kHz @ 1kHz (+4dBu into 600Ω): +0.5dB / -1.5dB

Analogue to Digital Conversion
Mic/Line Inputs 24-bit, 128 x oversampling
Stereo Inputs 24-bit, 128 x oversampling

Digital to Analogue Conversion
Mix Outputs 24-bit, 128 x oversampling
Aux Outputs 24-bit, 128 x oversampling

Internal Processing 24-bit, 56-bit bussing

SRC
Sample Rate Conversion Range on Digital Inputs: 30kHz-50kHz

Dynamic Range
Digital Input to Mix Output: 104dB
Mic Input to Mix Output: 101dB
Stereo Input to Mix Output: 99dB

Noise
Mic Equivalent Input Noise (150Ω source): -127dBu
Mix Output with Mix Fader down: <-86dBu
Mix Output with Mix Fader at Unity: <-86dBu
Mix Output with Mix Fader at Unity, 32 Channels routed with Faders at Unity: <-74dBu

Total Harmonic Distortion
Mic Input 1kHz @ 30dB gain, to Mix Output at +14dBu: <0.005%

Crosstalk
Input to Input: >90dB
Fader Attenuation: >86dB
Channel Mute Attenuation: >86dB

Sampling Frequency
Internal: 44.1kHz

Power Consumption 100W

Weight 14.4kg / 31.7lb