

spirit digital three two eight



INTERFACE

328

Mixing with Spirit Digital 328

DESIGNED &
BUILT IN THE
UK BY
SOUNDCRAFT



SPIRIT
by Soundcraft

We all know that there's a revolution going on in the world of audio – the digital revolution. Analogue technology is giving way to digital in every field, from studio recording to location broadcast, and like all good revolutions it means more power to the individual. But revolutions are confusing things, and many people are still bewildered by the concepts, issues and choices of the brave new digital world. So we at Spirit thought it would be a good idea to explain a few basics of digital audio, and how digital mixing fits into every field of professional audio.

"This is the digital console that actually does what most others claim to do: it provides an intuitive analogue-style user interface. While all controls are assignable, the invention of the E-strip is a stroke of genius, which gives instant access to all controls at once on the selected channel... this desk has the best user interface of any digital mixer in the sub-£10,000 bracket. All in all it is a delight to use – a real peach!"

BENEDICK GRANT, AUDIO MEDIA



ALAN
BRANCH
Producer/Engineer



GAËTAN SCHURRER
Programmer/Producer



PETER RAEURN
Owner/Producer



ROBB ALLAN
Front of House
Engineer



MATT SAVAGE
Head of Sound - Theatre Royal, York



MAKING CONNECTIONS

In order to interface easily with a wide variety of audio systems, a digital mixer needs both digital and analogue audio connections. In the case of the Spirit Digital 328, digital multitracks and multi-channel PC-based digital audio systems (including ADAT, Tascam DA Series machines, Pro Tools, Cubase VST, Deck etc.) can be connected via its TDIF and ADAT optical connections. There are two sets of 8-channel ins and outs using these formats, giving you up to 16 channels

of digital I/O for group outputs and tape returns. In addition to these, both AES/EBU and SPDIF interfaces are supported for stereo inputs and outputs.

As far as analogue connections are concerned, the Spirit Digital 328 has 16 analogue mic/line mono input channels, each with an associated analogue insert point, plus five sets of stereo inputs (feeding two stereo input channels), two sets of 2-track inputs, and four analogue auxiliary sends. Further analogue inputs and outputs are available via optional breakout

boxes that connect to the 328's TDIF inputs and outputs, so that tape and group output connections can be made with analogue multitrack recorders, PA rigs, and outboard processors.

The quality of a digital mixer's analogue circuitry is as important as its digital core. After all, there's no point in using high-quality converters if your mic pre-amps or stereo analogue inputs aren't up to scratch. In the case of the Spirit Digital 328, the analogue input and output circuitry draws on the unique design heritage of Spirit and Soundcraft analogue mixers – the input channels even feature Spirit's acclaimed UltraMic+™ pre-amp.



POWER TO THE PEOPLE

WHY GO DIGITAL?

For many of us, exactly how a mixer does its stuff is irrelevant – what counts is audio quality, and the functionality of the desk. The Spirit Digital 328 scores on both counts: its 56-bit internal processing and 24-bit A-to-D and D-to-A conversion delivers exceptional audio quality at a very reasonable cost; and because it's digital, you get far more control in terms of facilities like automation, than on any analogue mixer. When you've set up a mix, you can save the state of the whole desk as a 'snapshot', and recall it – and therefore every setting on the desk – at the touch of a button or against timecode. Use the 328 with any MIDI sequencer, and you have dynamic automation of every mix parameter. That's why the Spirit Digital 328 will often simply replace an analogue mixer, doing exactly what its predecessor did and more.

But sometimes what happens inside a mixer is important. If you work with digital multitracks, and samplers or keyboards with digital outputs, the Spirit Digital 328 gives you an all-digital recording path – multi-channel digital I/O is built in – and the quality of your finished product will be improved as a result. Two internal Lexicon effects units provide pro studio reverb, delay and other effects, and twin dynamics processors allow compressors, limiters and gates to be inserted almost anywhere in the 328's signal path – all in the digital domain, without adding the noise created by going through several sets of A-to-D and D-to-A converters.

BY REPRESENTING EVERYTHING AS DATA, DIGITAL SYSTEMS CAN EASILY INCORPORATE CONTROL FEATURES SUCH AS AUTOMATION

At the most basic level, analogue electronics deal with continuously variable quantities – voltages and currents, for example – whereas digital electronics deal with quantities that can only take discrete values. Digital electronics do this by dealing with 1s and 0s, represented by the difference between a switch being on or off, or a voltage being present or not. But how does this relate to audio?

What we perceive as sound is actually a vibration in the air. Hit a cymbal and it vibrates, transmitting the movement to the air around it, and as the vibrations are passed on to more and more air molecules a series of pressure waves are created. As long as the frequency of these vibrations is within the range of human hearing (roughly 20 to 20,000 cycles per second, depending on your age), we hear them as sound waves, and when they reach our ear drum we hear the cymbal. But if we want to do anything more with this sound – record it, for example – we need to turn it into something that we can

manipulate more easily than pressure waves in air.

In analogue audio circuits, sound waves are represented by electrical signals. At one end of a typical audio chain, a microphone uses the vibrations of air against its diaphragm to generate a varying electrical current, and at the other a speaker uses a varying electrical current to produce vibrations in the air next to its cone. Analogue electronics are always prone to noise – at the very least because the random thermal motion of electrons in components will produce some noise – though this can be minimised through good circuit design, the use of high quality components, and good construction.

In digital equipment, the audio waveform is represented by a series of numbers. An analogue signal can be turned into digital form with an analogue-to-digital converter, which measures an analogue input voltage at regular intervals and generates a sample (a number that represents the instantaneous strength

of the signal) each time. A converter that runs at a sampling rate of 44.1kHz samples the signal 44,100 times per second, and in a well-designed converter the size of the samples should be in direct proportion to the input voltage. A 16-bit converter can resolve 65,536 levels; a 20-bit converter can resolve 1,048,576 levels.

Because numbers can be described with absolute precision, digital audio signals can be copied and passed from one machine to another, or from one part of a digital mixer to another, with no loss of signal quality. An analogue signal, on the other hand, cannot be passed through any component without affecting it slightly.

By representing everything as data, which is very easy to manipulate in extremely complex ways, digital systems can easily incorporate control features such as automation. Because everything happens in software, things like EQ and level don't necessarily correspond to any 'real' devices such as faders or pots, and the interface of a

digital mixer can take whatever form the designer chooses. Although it would be possible to create a digital mixer with a control for every parameter, such a mixer would be much more expensive than one in which fewer assignable controls are used. The Spirit Digital 328, for example, uses clearly laid-out assignable controls, and behaves like a traditional mixer rather than a computer. All major desk operations can be achieved with a few simple and intuitive control inputs, and you hardly ever need to refer to the LCD screen. Nonetheless, you have the flexibility that comes with controls that can change at the touch of a button – one minute you're adjusting levels, the next you're sending out MIDI controller messages. And if you want to go beyond the 328's own control surface, you can use any major sequencer program running on any computer platform to map the Spirit 328 controls to on-screen graphic controls.

DIGITAL & ANALOGUE

WHAT'S THE DIFFERENCE?

USING STEREO INPUTS

Most synths and samplers have stereo outputs, so you need stereo input channels to handle them properly. As well as its five pairs of stereo input channels – which have the same EQ, aux, and routing facilities as the mono channels – the Spirit Digital 328 also allows you to link two adjacent mono input channels as a stereo pair. Hit the channel Select button, press and hold Group Link, then press the second channel's Select button, and that's it. Any EQ or routing changes you make to one channel are now duplicated in the other, making it easy to get the best out of multiple stereo sources – you could have dynamic control over EQ on up to 18 sets of stereo inputs, for example. You can also copy settings from any channel to any other channel with just two button-pushes – press and hold Select on the first channel, then press Select on the other.

AES/EBU (or AES3): A digital audio interface standard for stereo signals. The letters stand for Audio Engineering Society and European Broadcasting Union.

Aliasing: Distortion in a digital audio signal, produced by input frequencies that exceed one-half the sampling rate.

Anti-Aliasing Filter: A filter in an analogue-to-digital converter which passes only that part of an analogue signal below one-half of the sampling rate.

Asynchronous: Two or more digital signals in which the clocks are not synchronised.

Azimuth Recording: The method used in DAT recorders, ADAT and DTRS format recorders, in which rotating heads placed at an angle to the passing tape write and read tracks diagonally across the tape.

Distortion: Undesirable degradation of an audio signal between the inputs and outputs of a device.

Dither: Low-level noise added to a digital signal to improve quantising linearity, and therefore audio quality, especially when reducing the bit resolution of a signal – e.g. taking a 24-bit signal down to 16-bit so that a DAT recorder can record it digitally.

FSD: Full scale digital – the analogue level at which an analogue-to-digital converter reaches the end of its number range. Also called 0dBfs.

Headroom: Range of signal levels between standard operating level and level at which clipping or overload occurs. High-bit – (as in "high-bit recording") using sample resolutions greater than 16-bit.

Jitter: Small, instantaneous timing errors in the timing of signal changes or transitions in a digital signal, leading to distortion. See phase-locked loop.

MMC: MIDI Machine Control. A protocol which allows the transport controls of compatible equipment to follow fast forward, rewind and other commands generated from the master device.

Noise Shaping: Using non-random noise, with certain frequency bands lower in volume, to dither a signal, thereby achieving an improved signal-to-noise ratio.

Non-Linear: A data storage and retrieval method which allows instant manipulation of data from any point in the data sequence.

Oversampling: The use of very high sampling rates (multiples of the base sample rate) in converters, allowing simpler analogue filters. This results in improved audio quality.

PCM: (Pulse Code Modulation) The most common technique for converting an analogue signal to digital.

Phase-Locked Loop: An electronic circuit which restores a jittery signal to a stable timebase.

Quantisation: The division of an input voltage (representing an audio signal) into discrete bands in order to derive whole numbers that can be used in digital processors.

RDAT: Stereo digital recording format using rotary heads on 3.81mm tape cassettes. More commonly called DAT.

Random Access: The retrieval method used by non-linear data systems.

Resolution: As in sample resolution. The accuracy with which the original analogue audio signal is measured. More bits (i.e. higher resolution) allow a more faithful recording to be made, and therefore mean better sound, but can place more demands on processing, data busses etc.

Sample Rate: The rate at which samples are generated or passed through a digital audio system – 48kHz, 44.1kHz, and 96kHz are among the most commonly-used rates.

Sampling: A process in which some continuous variable is measured at discrete (usually uniform) intervals.

Sony 9-pin: A remote control protocol which allows control of transport functions of remote devices, particularly professional VTR and some multitrack audio recorders.

SPDIF: (Sony/Philips Digital InterFace) 'consumer' digital audio interface very similar to AES/EBU. Carried via coaxial phono or optical connections.

Wordclock: A timing reference signal, shared and passed between digital devices, which ensures accurate and consistent timing of digital audio so that data can be transferred between devices successfully.

A-Z OF DIGITAL AUDIO

"By offering a combination of total recall, moving

fader automation, and onboard Lexicon effects

processing, the Digital 328 takes a unique niche

in the digital console market."

STEVE LA CERRA, EQ MAGAZINE, USA

digital
three two eight

Alan Branch is a busy man. Among others, he's worked with Primal Scream, Eternal, Boy George, Simply Red, Shane MacGowan and the Popes, The Cure, Depeche Mode and producer Adrian Sherwood. Between producing Bedlam's debut album and preparing to work on a Sinéad O'Connor project, we caught up with him at Livingstone Studios where he's riding the faders for Seventh Sun – an established R'n'B production outfit now signed to Warners as artists.

Alan uses his own portable studio for much of his work – a studio now based around a Spirit Digital 328. It also includes Korg Prophecy and Roland JV1080 synths,

plus a PC with an E-magic AudioWerk audio card and Logic Audio, that provides 24 tracks of recording. "It's a great songwriting set-up," he says. "The instant recall is first class, in that it lets me jump from one song to another and have the mix exactly as it should be. My production work is increasing, so I wanted to be able to have a personal system that I can use for mastering recordings – and this does it at the right price. I'm very impressed that you don't have to go to menus all the time, and you use very few button pushes in working the desk. You just select a channel, add EQ and effects..."

Like most producers with plenty of big studio experience, Alan likes to see faders move when he uses dynamic automation. "Also, to me the fact that the faders are full-size [100mm] is important – smaller faders just don't do it for me. I noticed that first off."

And in that all-important area of EQ? "It's very analogue sounding – I don't think of it as digital. It seems as if a lot of work has gone into it. The overlapping bands are right, and it has a good feel. I never liked 'looking' at EQ on a display of some kind. You should use your ears to get the EQ right, and that's how I work with the Spirit."

RECORDING

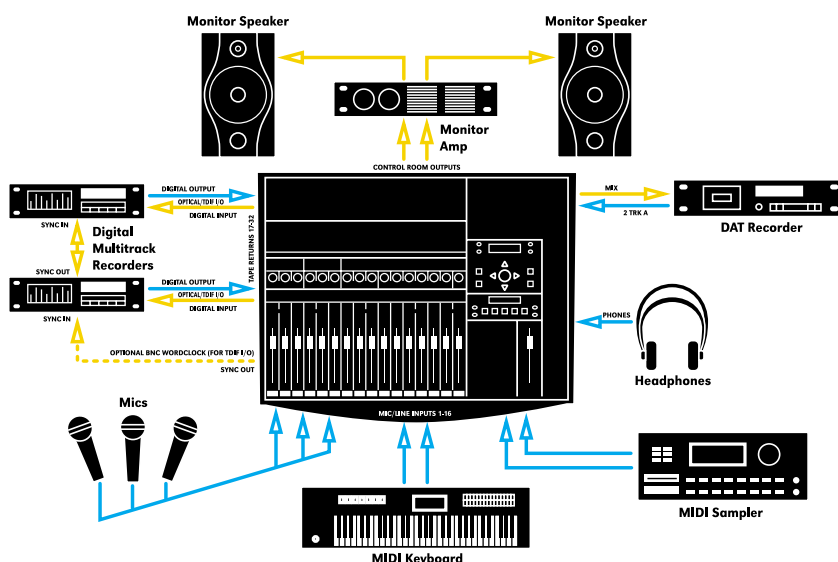
SEVENTH SUN

"It's a great songwriting set-up.

The instant recall is first class, in that it lets me jump from one song to another and have the mix exactly as it should be. The onboard Lexicons are very handy also."

ALAN BRANCH, PRODUCER/ENGINEER

ALAN BRANCH
Producer/Engineer



MULTITRACK RECORDING

In the world of multitrack recording, a clean signal path is more important now than ever before. Whatever your recording medium, a digital mixer is the best way to achieve it. But for anyone using digital recording media, the Spirit Digital 328 can deliver the benefits of an all-digital signal path, keeping the audio in the digital domain during the

entire recording, mixing and mastering process.

As the songwriting and recording process merges into producing, helped by the popularity of integrated MIDI/audio sequencers such as Logic Audio, Cubase VST and Cakewalk, mixers which can work alongside these tools are ideal for today's musicians and producers.

GAËTAN SCHURRER

Programmer/Producer

Gaëtan Schurrer, aka Naughty G, has some of the biggest names in pop on his CV – M-People and Simply Red are among those to benefit from his programming skills. But for now he's left big London studios behind, setting up a temporary studio in a house near Oxford. The project? Producing the debut UK album by Gintare, a solo artist now signed to Parlophone after establishing herself in Eastern Europe.

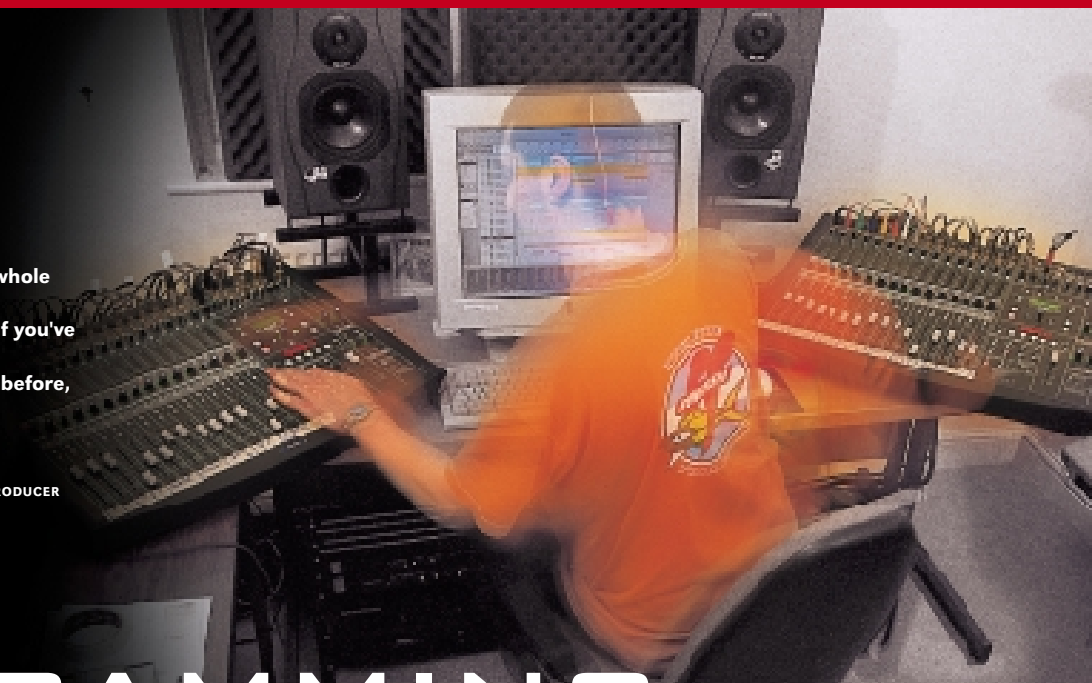
"We can get very close to our final sound," he explains, "I'll just take the computer into the studio to mix – and the only reason I'm going into a studio is that I need a dead room with really good monitoring. Actually, the biggest noise problem here is fans on the computer. When I'm going from the desk to the computer and back, there's no sonic loss anywhere." Gaëtan has two Spirit 328s, cascaded via the proprietary digital connection and effectively operating as a single mixer. ADAT optical connections link both desks to a Macintosh G3. "I have all the keyboards going in in stereo with linked channels. And having the stereo channels is great. Ste 1 even allows four different stereo inputs to be mixed, and you've got full channel facilities on all the channels – EQ, Aux and FX sends, the full group routing."

Gaëtan uses MIDI to allow full dynamic automation, and believes in using more than just level and pan. "It's very useful to be able to automate effects and EQ. It's so easy to hit record in Logic, do an EQ sweep or send some drums into delays – those changes just come straight back when you run the song again. The automation, and the whole desk, is very user-friendly. It's really easy to work out which channels are routed to which groups, or the mix bus, or where EQ is used. I've used a lot of digital desks and it's all much easier to figure out on the Spirit. If you've used a desk with knobs on before, you can use this."



"The automation, and the whole desk, is very user-friendly. If you've used a desk with knobs on before, you can use this."

GAËTAN SCHURRER, PROGRAMMER/PRODUCER



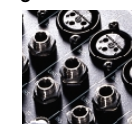
PROGRAMMING

GINTARE

CONVERTERS

Moving between the worlds of analogue and digital is one of the most critical aspects of modern audio equipment. Once a signal is in digital form, it's fairly robust, but converting to and from analogue offers a chance for audio quality to degrade significantly. In order to

capture input signals as faithfully as possible, analogue-to-digital converters should offer high bit resolution – 16 or 18-bit converters are looking rather outgunned in these days of 20 and even 24-bit converters. The Spirit Digital 328 has 24-bit 128-oversampling A-to-D and D-to-A



converters, well exceeding the resolution of established media such as DAT (16-bit), and allowing use with 24-bit systems such as newer PC-based recording platforms.



BROADCAST SOUNDTREE MUSIC

"It doesn't sound too digital, but has the flexibility of a digital desk. It's compact, and the EQ is pretty damn good, so it made a lot of sense."

PETER RAEURN, OWNER/PRODUCER

PETER RAEURN Owner/Producer

Music production company Soundtree Music is fast growing in a number of exciting areas. The sounds emerging from its top floor studio above the Portobello Road have already featured on numerous network TV ads. A year after Peter Raeburn launched the company, among the varied work in hand is an "African remix album" which features some well known producers on the London dance scene, as well as music for products such as Levi, Lynx, Vauxhall, Adidas and the Times, amongst others. Soundtree Music, now joined by Karen Laryea, focuses attention on a number of talented writers and producers. Peter is currently developing a female artist plus, in his own words, "We are about to start work on a number of feature films where the 328 will be used on a daily basis."

Peter's track record over the past five years includes work as a music supervisor and producer on several feature films (including Lars von Triers' 'Breaking The Waves'), researching, placing and clearing music for commercials and films.

For much of Soundtree's work, the ability to use snapshots and dynamic automation to switch between and recall projects was a major selling point. As Peter explains "If I send a job to a client

on Monday - an ad, for example - by Wednesday I'm on to something completely different. If the client calls up on Thursday and asks for a small change, I can call the whole project up and just about run it off again. Before, I'd spend much longer getting as close as possible to the original mix, so this is much better."

As an independent operator, the financial factor was also important. The mixing desk had to be affordable. The fact that it is digital was not so much of an issue, as it had all the qualities and facilities which are currently required at the Soundtree Music studio. "It doesn't sound too digital, but has the flexibility of a digital desk. It's compact, and the EQ is pretty good, so it made a lot of sense."

The group of freelance producers and artists who use Soundtree have also found the transition from analogue to digital mixing a relatively painless one. "There was some initial resistance from a couple of die-hard analogue mixer users", says Peter, "but they are getting used to it. This is very intuitive if you're used to an analogue desk."

WORDCLOCK AND TIMECODE

Any digital recording or playback system in which the various units are connected via their digital rather than their analogue audio connections, **must be wordclock synchronised** to the same sample rate to avoid data transfer problems. By ensuring that all units send, receive and process their data streams in a precisely simultaneous manner, this avoids a major source of distortion and poor audio quality. Imagine a simple set-up of a DAT recorder's digital output feeding a mixer's digital input. They are both using a 44.1kHz sampling rate, but their clocks are not synchronised. The mixer's input should have 44,100 'slots' every second that have to be filled by samples, and the DAT recorder should be

sending it 44,100 samples every second. But if there is only a slight drift in one of the clocks, some of those samples will be missed or will 'jump' a place, and that means distortion.

So, in any system that sends digital audio between several different devices, one unit should be the wordclock 'master', and the others should be 'slaves'. When booting up, the wordclock master should be booted first, followed by the wordclock slaves. An integrated digital audio system which includes a digital console should have the console as its wordclock master.

Timecode synchronisation is different to wordclock synchronisation, but is equally important in its own way. Both timecode

and wordclock are required. While wordclock operates in the background, smoothing out digital audio connections, timecode is a more visible means of running recording and playback devices in sync with one another, and with sequencers and desk automation.

Timecode is a signal that carries a regular series of absolute time values (hrs:mins:secs:frames).

There are different frame rates (hinting at timecode's origins in the need for a means to synchronise film equipment), of 24, 25, 30 of '30-drop' frames per second. Again, one device is defined as the master, and its timecode keeps every other recorder running along in synchronisation.



DIGITAL INTERFACE STANDARDS & CONNECTIONS

There are several standards for connecting digital audio devices. The stereo standards include AES/EBU and SPDIF (on optical or co-axial connectors). Multi-channel standards include TDIF (as used on Tascam's DA88) and the ADAT optical interface, both of which support eight tracks. The 328 will support multiple digital formats simultaneously, although each port will only support one format at any time. Both the SPDIF optical and ADAT optical interfaces use the same hardware, so if you're wondering why your ADAT tape returns aren't working with your 328, make sure that you haven't mixed up two optical leads and plugged in a DAT recorder by mistake.

Most digital interfaces can operate at several bit resolutions, so as to work with as many combinations of equipment as possible. Equipment at the receiving end usually recognises the resolution of the incoming signal, but you may have to set resolution at the source. The Spirit Digital 328 supports 16, 20 and 24-bit resolution for its AES/EBU and SPDIF interfaces.

When turning on all the components in a digital audio system, the wordclock master device should be booted first, then the other units should be turned on in the order they come in the audio chain. You may need to re-configure some devices to sync to an external clock after every boot.

Digital interfaces	Support on Spirit Digital 328
AES/EBU Input	Stereo channels or effect returns
SPDIF input	Stereo channels, effect returns, or 2-track return
AES/EBU output	Mix, effects sends or aux sends
SPDIF output	Mix, effects sends or aux sends
ADAT	Two sets of 8-channel inputs and outputs
TDIF	Two sets of 8-channel inputs and outputs

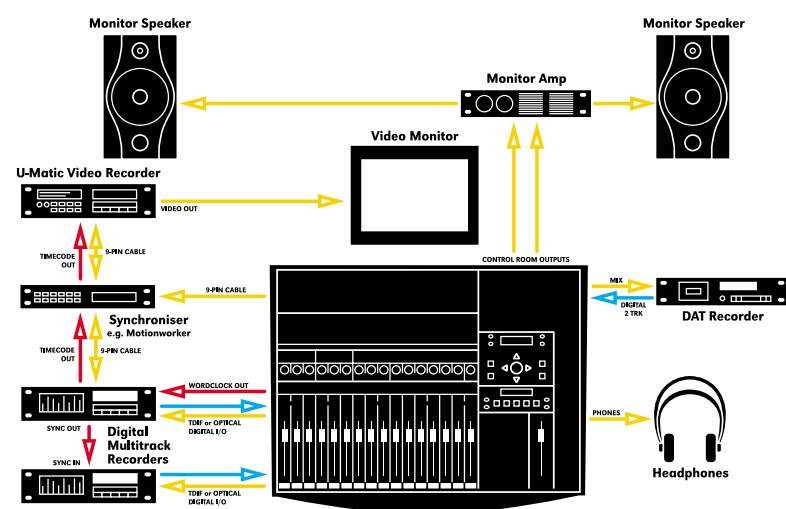
- The 328 can provide a master wordclock source (44.1kHz or 48kHz) via the following outputs: TDIF, ADAT, BNC, AES, SPDIF
- The 328 can slave to wordclock appearing at the following inputs: BNC, AES, SPDIF

USING THE E-STRIP



The Spirit Digital 328's E-strip is designed to operate exactly like a regular analogue mixer channel strip rotated through 90 degrees, with the familiar 3-band EQ controls, four aux sends, two effects sends (to two internal processors), and pan control. As well as being familiar, it's easy to use: just hit the select button for the channel you want, and the E-strip's continuous rotary controllers put all the channel EQ, aux and pan facilities at your fingertips. A ring of LEDs around each controller shows you the current setting for each parameter – a precise parameter value is displayed on the 328's master LCD. Channel features that are used less often, such as bus routing and phase reverse, are controlled via the master section.

THE BIG PICTURE



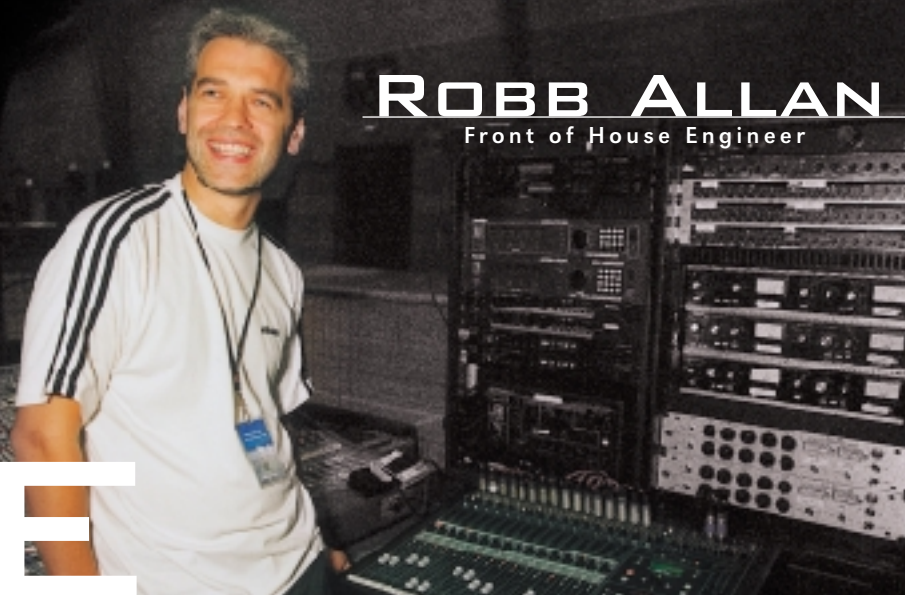
Mixing sound for picture is different to pure audio applications. It often involves fewer channels and smaller, more expensive, rooms, and therefore favours small but powerful mixers. Studios may need to switch quickly between projects, and turn work around very fast – so automation, via snapshots and dynamic control, is increasingly regarded as essential. And of course, the ability to integrate with video as well as audio recorders is vital.

"Although it has all the features of a digital desk, its layout and controls are more like a conventional board. The E-strip is what makes it easy to use,"

ROBB ALLAN, FRONT OF HOUSE ENGINEER

ROBB ALLAN

Front of House Engineer



LIVE

MANIC STREET PREACHERS

The Manic Street Preachers' recent UK mini-tour featured a Spirit Digital 328 as a key component of the FOH setup. As engineer Robb explains, it meant he could add automation to the show without compromising his choice of main desk. "I'm using the board for effects returns. What I was looking for was something that was a total recall digital board, and I wanted to use a Midas XL3 as the main mixer

– I like the sound, and I only need the recall for the returns. Also, there are things that I can do on the Spirit that the Midas can't do – like with the panning, for example. I toured with a digitally-controlled analogue desk last year, but to be honest I found it a bit stressful. Using the Spirit makes it physically removed from the main board, so it's easier to deal with." The compact size of the 328 means that Robb can place

the desk where he wants it, directly in front of his effects rack. "Although it has all the features of a digital desk, its layout and controls are more like a conventional board. The E-strip is what makes it easy to use," he observes.

During the show, Robb uses the desk's Snapshots to recall the correct set-ups for each song, and makes small adjustments on the fly, responding to the inevitable uncertainties of live performance and new venues. "We had a week's rehearsal before the tour so, even with

the new material, I was able to program the lot beforehand." And, as far as sound quality is concerned, Robb's 328 has delivered more than enough. "The board is completely clean, no noise at all – the only analogue part is the input gain. And the EQ is fine, 100 percent more than I need."

From an article first published in Audio Media.



digital
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"Unusually, for a digital desk, the EQ has an analogue sound to it...designer Graham Blyth has put a lot of work into the EQ."

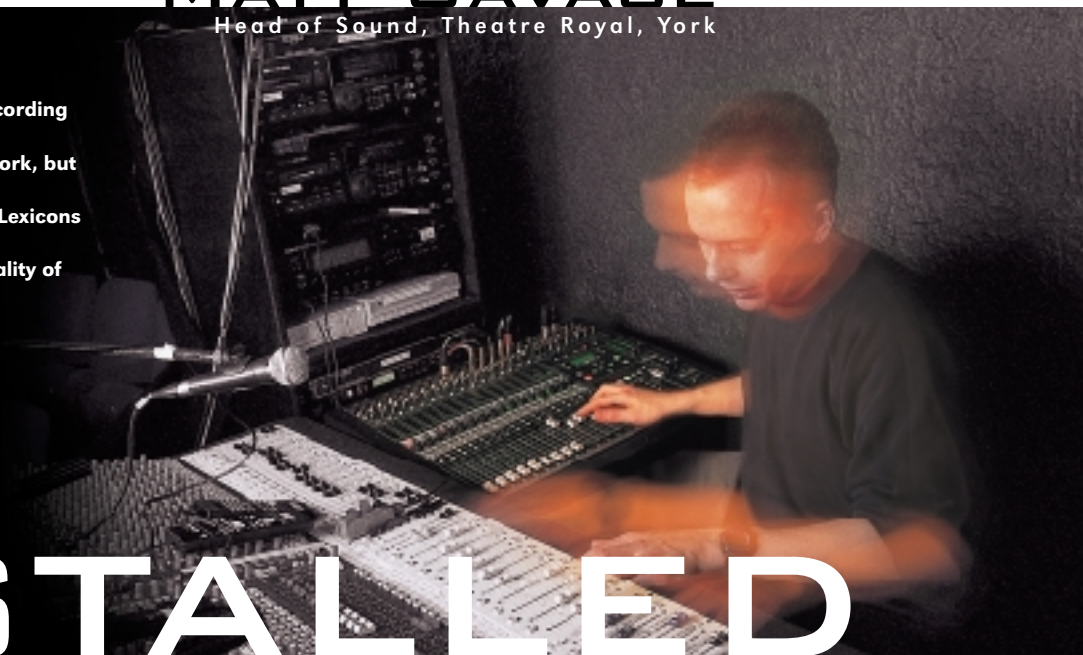
PAUL WHITE, SOUND ON SOUND MAGAZINE

MATT SAVAGE

Head of Sound, Theatre Royal, York

"It's mostly a dedicated recording desk, for doing pre-show work, but because it has a couple of Lexicons inside it's improved the quality of effects work"

MATT SAVAGE, HEAD OF SOUND



INSTALLED

THE THEATRE ROYAL, YORK

York's Theatre Royal has become the first theatre in the country to take delivery of the Spirit Digital 328, thanks to a recent overhaul of its sound system. "It's mostly a dedicated recording desk, for doing pre-show work, but because it has a couple of Lexicons inside it's improved the quality of effects work," says Head of Sound Matt Savage. Using the 328 alongside a 48-channel Soundcraft Series FIVE, and various MD and CD playback sources, has also extended the possibilities for creative EQ work, and added a valuable facility to the mixing side of the operation – recallability.

"Also, the analogue feel of it, in terms of the interface, is important. I can put it in the hands of a touring company and they'll be OK with it. Apart from that, I also use casual staff here, and they might be phased by the learning curve of a menu-driven desk."

The shows currently benefiting from the re-vamp are a kids' show, with performances during the day, and 'Bouncers' (a play by John Godber) in the evening. Both productions use the 328, though it's the kids' show that is the more demanding. "It's a play with poetry and music, and uses a few radio mics as well as a guy with a couple of keyboards – and it's all played live. Bouncers is mainly playback, current hits and classics from MD and CD."

THE SECRETS OF GOOD DIGITAL EQ

As the man who designed the classic British EQ that graces thousands of Spirit and Soundcraft desks around the world, Graham Blyth knows a thing or two about how equalisation should work. As he explains, a major part of giving the Spirit Digital 328 the right EQ is in how it appears to the user.

"I felt it was important to avoid extremes of bandwidth, to limit each of the frequency bands. I happen to think that there are certain parameters and limits that are right for good EQ, and we should use those. When I designed the Series 8000 EQ, people were very happy with the range covered, so that's the basis for it."

The quality of the Spirit Digital 328's sound, particularly at the low end, has been commented on by many users. Without getting too technical, Graham explains that it is "the extreme nature of the coefficients involved that tends to make good bass performance a problem for digital systems. We took particular care over areas like the way that the LF shelving filter works, and that the transition from parametric to shelving characteristics [turning

the Shape knob on the HF and LF filters beyond its broadest point turns the filter from a parametric into a shelving type] is as smooth as possible.

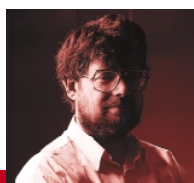
"I do not like the approach of every frequency band being 20Hz to 20kHz, or every control having as great a range as possible. If you choose the ranges properly, then your controls have the right resolution where you need it,



and feel better to use. You don't need to look at a display, because your ears tell you what's happening, and it relates to tactile feedback from your fingers, and the LED ring around the control. With Aux sends for example, you want most of the

control's resolution to be above -40dB, because anything below that just won't be used."

He's also particularly proud of the user interface. "The whole work surface has worked out very well. It's just the right concept, and very little has changed since the first drawings. In fact we even removed a few controls for the sake of clarity and simplicity. Everything should be easy and intuitive, and this design means you can query something and interact at the same time. So let's say you want to see which channels are routed to the mix, you just hold down the Route To Mix button and you can see at a glance with a single button push, and change the status of any channel with a second."



Belfast	Marcus Musical Instruments	01232 322871	London (continued)	Way Out West	0181 744 1040
Birmingham	Musical Exchanges	0121 248 5868		LMC Audio Systems	0181 743 4680
	LMC Audio Systems	0121 359 4535		Raper and Wayman	0181 800 8288
Bournemouth	Eddie Moor's Music Ltd	01202 395135		HHB Communications Ltd	0181 962 5000
Bristol	Sound Control Bristol	0117 934 9955		Studio Spares	0171 482 1692
Cambridge	Music Village	01223 316091		Music Lab	0171 388 5392
Chester	Dawsons Music	01244 348606	Manchester	Sound Control	0161 877 6262
Coventry	Musical Exchanges	01203 635766	Newcastle upon Tyne	Sound Control	0191 232 4175
Dublin	Control Techniques Ireland (CTI)	(00353) 14545400	Norwich	Academy of Sound	01603 666891
Dundee	Sound Control	01382 225619	Nottingham	Academy of Sound	0115 958 1888
Dunfermline	Sound Control	01383 732273		The M Corporation (TMC)	0115 947 4070
Edinburgh	Sound Control	0131 557 3986	Oxford	PMT Ltd	01865 248083
Glasgow	Sound Control	0141 204 0322	Ringwood	The M Corporation (TMC)	01425 470007
Guildford	Andertons Music Co	01483 456777	Romford	Music Village (Chadwell Heath)	0181 598 9506
Leeds	Academy of Sound	0113 240 5077	Sheffield	Academy of Sound	0114 264 0000
	LMC Audio Systems	0113 272 7508		Sound Control	0114 221 3007
Leicester	Academy of Sound	0116 262 4183	Shepperton	Marquee Audio	01932 566777
Liverpool	Dawsons Music	0151 709 1455	Southend on Sea	PMT Ltd	01702 436501
	Studiocare	0151 236 7800	Stockport	Dawsons Music	0161 477 1210
London	Turnkey	0171 379 5148	Stoke on Trent	Academy of Sound	01782 205100
	Digital Village (Acton)	0181 992 5592	Wakefield	KGM Sound Control	01924 371766
	Digital Village (Barnet)	0181 440 3440	Warrington	Dawsons Music	01925 632591
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