January 2000

$10.00 $5.00

Studio Sound

The International Professional Audio Magazine

For Recording, Postproduction and Broadcast

Exclusives

Marantz PMD650
Digital Audio Denmark ADDA 2402
Audio-Technica AT4047/SV
Sennheiser Series 3053/54
RME Project Hammerfall
Audio Service DAIS
Tube Tech SMC2A
Calrec Alpha 100

Australian Ideal

Studios 301

Stuart Little's Big Production
Broadcasting Big Ben for 2000
Hotrodding the Studer 827

The Youth Interview

www.americanradiohistory.com
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On suffering technology and schoolgirls’ stardom

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January 2000 Studio Sound
Suffering around

THIS MONTH IT IS THE TURN of the VHS machine. A long-standing fixture in the armamentarium of the family 'entertainment' system it was bought as a 'manager's special' from a reputable high street store. Of course 'manager's special' meant that the unit had been returned faulty from new, but had been fully reconditioned by the manufacturer and carried the full warranty.

What attracted me was the price (naturally) and the excitement I felt at seeing the words '4-head' emblazoned on the flap (I'm in audio and that rings a bell for me). I was pressed by the fact that the machine's predecessor had just expired with a tape in it (I'd already had it repaired once for a price not dissimilar to what I had paid for it originally), and the unmistakable signs of Postman Pat and Noddy withdrawal symptoms were rife. A remote control with 'slow-mo' and the fact it was 'stereo' tipped me over the edge. The machine coped magnificently, and without adverse effects, during its brief induction period as a post-box and temporary store for crayons and jigsaw pieces. Life was good with stereo and a remote. It churned its first tape about a year ago, embarrassingly one that was borrowed and had to be replaced, but this was attributed to operator error. I've now had to buy three replacement video-cassettes even though the tape path is cleaned regularly and the loading mechanism works perfectly again and again with the lid off, tensions are good, nothing is worn or bent. That's because for 99.5% of the time it works perfectly.

The unerring desire to work around is definitely an audio thing. I have a suspect channel on my mixer, won't use certain convertor outputs on certain boxes, dislike the attack characteristic of certain gates, can recognise by sight the dodgy cables that I horde 'just in case', and frequently have to use monitors that I'm not altogether happy with.Yet I manage. It's why I have developed a peculiar and highly stylised method of loading the VHS machine which seems to do the trick. It's the devil's own work, but I'll never buy another.

Zenon Schoepe, executive editor

School's out

CATCHING A TELEVISION news item explaining how the major record companies are now breaking new acts to younger children through 'school tours' recently brought it all back. Just when it has seemed impossible for the majors to do any more damage to the recording studio business, they developed a new marketing ploy so casually destructive it renewed my respect for their resourcefulness. You have to hand it to 'em—who'd have envisaged virginal girl-bands lip-syncing on school stages they had left just months earlier?

At the heart of the problem is the majors' abject failure to maintain the status of pop music when the CD and the Gameboy arrived. Faced with a choice between investing in tomorrow's artists or milking yesterday's catalogue, they did the first wrong thing. They did the second wrong thing when they pretended they hadn't done the first, and accepted the overtures of pop's Swengalis to cover up. The charts were flooded with pretty puppets and formulaic productions while the real appeal of musical expression was systematically destroyed. The elitism of learning to play instruments and audiences was lost to good looks, good co-ordination and mindless co-operation. The recording studios, of course, were caught between falling equipment costs and failing record company bookings.

Little wonder then that youth culture found greater pleasure in computers and nightclubs.

Little wonder because both possessed the essential element the majors had neglected: mystique.

Magical recording studios have surrendered their secrets on children's television programmes week after week. 'Star' status has become a tradable commodity—the stuff of good fortune and competition prizes. And now children see pop music laid bare on the school stage.

Entering a nightclub you still cross the threshold to the make-believe world that once fuelled proto-pop stars' dreams and filled their music. A world of fantasy where rules change moment by moment, and reason defers to expression.

The atmosphere is created by common consent, with no one person in control and no guarantee of longevity. Here, by virtue of the passive consent of the record companies, the DJ continues to enjoy what the recording artist has lost to the record companies' poor judgement. No wonder that it is now easier to sell a dance anthem than a ballad...

Tim Goodyer, editor
Great Studios Of The World

“We are all impressed with the sonic quality of the MT and its ease of operation. The new console will ensure that MG Sound maintains its ‘pole position’ as one of the world’s premier recording and mixing studios.”

Eva Böhm, Studio Manager, MG Sound Studios.

MG Sound Studios, BÖHM & Co GmbH, Salzgries 16, 1010 Vienna Phone: +43 (0)1 535 6404

Solid State Logic

International Headquarters
Begbroke, Oxford, OX3 1RU, England
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E-mail: sales@solid-state-logic.com
http://www.solid-state-logic.com
The other two facilities include Hit Factory New York and Miami's Criteria Studios. Meanwhile, LA's Acoustics Arts CD and mixing and mastering facilities has a Martinsound MultiMAX multichannel mixing console, The Digital Barn, the facility's surroundsound studio and graphic design office. The MultiMAX is to be used to control five Genelec 1031A close-field speakers and a dedicated subwoofer, and to switch between alternative sets of speakers and monitor sources. Mixing and mastering at The Digital Barn are performed with a 12-track SADIE 24-96 DAW and Mackie dbb digital console, a CAD-class A-analogue desk, Apogee, HDO3), converters, and a comprehensive selection of outboard. Current projects include a remix of the first seven fresh Aire albums for American Gramophone Records. 

Euphonic, US. Tel: +1 650 855 0400. Acoustic Arts, US. Tel: +1 760 723 8851. Martinstown, US. Tel: +1 800 582 3555. Dutch-based Markt Recording Studios has added a Pro Tools 24 system to its recording-mixing-facilities. The installation includes Logic Audio Platinum, Amp Audio France, Vocaline, TCWorks工作masterX and Soundreplacer plug-ins. Located near Eindhoven, Markt has a 96-channel, automated Trident II Design & Mitsubishi X8500 machines and lists Soul Sills Jewzy B among its clients. Markant Studios, The Netherlands. Tel: +31 40 2246130. Digidezign, UK. Tel: +44 1753 653322. China's first and presently only stage art venue, Stage Play Art, has installed two ARX SX-1200, 12 ARX SX-1500, 10 ARX ZR-850, and 1 ARX ZR-350 power amplifiers; and a MDDX 2.1 10 EQ-15; seven EQ-61; and a MAXXPLI signal processors. The installation is part of the Black Box Act Hall. Email: sales@arx.com.au. Berlin's ARD broadcasting station has equipped all of its journalists' audio workstations with Janger VAH(TM) digital voice processors, specifically developed for this project. Signal processing is based on the VAP92 processor; the system is being remotely controlled by an NT network capable of holding personal preset data for each journalist on the system. Jünger Audio, Germany. Tel: +49 30 6777 210. Ireland's leading television company Telegael and Welsh-based postproduction firm Barjovic in the UK have teamed up to build a £1m OB vehicle commissioned by Aontel Teo. The Aontel OBV is to be equipped with a Soundcraft Series FIVE console and will cater for a range of client requirements including sport, music, current affairs and light entertainment primarily in Ireland and the UK. It will support up to 12 cameras, eight VTRs, vision mixing, DVE and graphics. Soundcraft, UK. Tel: +44 1707 655000. Japanese TV Tokyo has installed an AMS Neve VXS multiformat analogue mixing console for a new facility. The 72-input desk is in Tennozu Studio 1 where it will handle music recording for television broadcast. Osaka’s Yomiuri TV, meanwhile, has ordered a 48-fader AMS Neve Libra digital postproduction console for its 1st MA audio post suite where it replaces an SSL 4000E desk. And in Shizuoka, AV post operation Imaga has upgraded Room 5’s Logic 7 to Logic DFC status complete with Encore automation where it will support surround working. The Premier Arts music engineering school in Tokyo, Aonka, Nagoya and Sapporo following the successful of a 9000X analogue consoles for its various colleges in Tokyo, Osaka, Nagoya and Sapporo.

Aontel OBV. Tel: +81 3 3458 9200. AMS Neve, UK. Tel: +44 1282 457011. SSL, Japan. Tel: +81 3 5474 1144. Canada’s film production house Deluxe Toronto has installed a dual-operator Euphonic System 5-4 digital console, the world’s first multi-operator installation. The desk is located in Theatre 6, one of four dubbing stages at the facility that includes Foley and ADR theatres, three episodic television mixing studios, eight digital editing suites, 30’ i/m editing rooms, three telecinze transfer suites and a screening theatre. Theatre 6 is a 5.1 film dubbing room, designed for 24-bit digital audio operation and a suite of Markant Studios 24-bit consoles, Tascam MMX-9B players. The plans are currently underway to combine picture playback from a nonlinear Doremi Labs V1 video deck, Deluxe produces film release prints for Universal, Miramax, New Line Cinema, Sony and other film entertainment companies. Net: www.euphonic.com. A US-based artist and producer Ian Brodie has taken one of the first Aident ASP8024 consoles in the territory for his floating studio on the River Thames. The Lightning Seeds’ mentor’s desk will be partnered with an Otari RADAR hard-disc recording and editing system having been craned in to replace a Neve console. Dorset’s new Conventino Studios joins Brodie’s barge in pairing an ASP8024 and RADAR while Stroud’s dbb Studios has incorporated an 8024 in the refurbished of one of its studios where it will run with a Tascam DA-88 and two DA-38s Abbey Road Studios. Meanwhile, has taken six KRK EK-Box bottom sub speaker systems for 5.1 applications whilst Air Lyndhurst and the Sound House have installed CD-Base sound effects library software. Abbey Road, UK. Tel: +44 171 266 7000. AIR Lyndhurst, UK. Tel: +44 171 279 0660. Expotexus. Tel: +44 171 1923 252998. KRK, UK. Tel: +44 171 841 1600. Nagra, UK. Tel: +44 1727 810002. Net: www.euphonic.com.

Software pirates

Internet: Pirates in Nashville, Tampa, Florida, Lawrence, Kansas, and Portland, Texas, have all admitted to posting software in newsgroups on the Internet and soliciting others to access and copy the software "without the authority or permission of the copyright owners". But as the war were all under the watchful eye and lucrative umbrella of Copyright Control Services, they have been forced to make settlements with CCS in order to support it and its clients’ anti-piracy campaign and to settle the copyright and other legal claims of the copyright owners against the infringers. Each infringer also agreed to destroy all copies of the pirated software and not use any means to infringe the copyrighted software in the future.

Another company in Georgetown, Texas, although stating that it was ‘unaware of the infringements’ CCS claimed were distributed on the Internet via the company’s equipment agreed, nevertheless, to pay a settlement to CCS in order to assist CCS in defraying expenses associated with their investigations. In addition, the company agreed to inspect their servers, disks and files to determine if there was infringing software and to take all reasonable precautions to ensure that their facilities would not be used in the future to provide access to others’ software.

A US: New York’s new independent post facility Penny Lane Studios has purchased two Fairlight FAME2 systems and a Fairlight MediaLink server for its West 19th Street location. The brain-child of an old hand in the NYC postproduction scene Penny Lane will serve Bobby Sorrentino’s clients in the city’s booming advertising and television markets. The studios feature two audio rooms and an Avid video editing suite and is designed to address a changing landscape. ‘My clients are getting increasingly tech-savvy,’ commented Sorrentino. ‘If I had a non-proprietary system, they would certainly question a premium rate for time on the same system that project recordists are charging $30.00 an hour for. They’re looking for more and more performance and more features, that’s why all the best respected facilities in New York are now using Fairlight.’ Sorrentino’s roster of clients includes Nickelodeon, Walter Thompson, McCann-Erickson Partners & Shevack, Newcastle Partners, Kidvertisers, VH1 and MTV.

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Music: John Lennon... John Lennon... John Lennon..., we're coming! www.americanradiohistory.com
UK: Abbey Road hosted a celebration of the Beatles Abbey Road album held by American broadcaster MJI late last year. The party lasted three days and saw 14 US radio station jocks host their shows and included a live remote broadcast to America. In attendance was a string of notable guests including Steve Hackett, Asia, Bill Wyman, Yoko Ono, Chrissy Hind, Ken Townsend, Mike Vernon and Mick Glossop.

SIEL 2000
France: The Paris Expo at Porte-de-Versailles will host SIEL Night & Show on 6th-9th February as a trade show dedicated to the Nightlife industry. It aims to attract professionals involved in the decoration, lighting, sound system, DJ equipment and items for parties and special events and is described as the new place for meetings and exchanges reserved exclusively for all those working in the nightlife industry.

A concept area will showcase the entertainment venue of the year 2000 while other attractions will include a Net Forum and a technique centre for DJs. Conference headings are given as Auditorium Sound Level Restrictions, a Constraint or a Necessity?, Show Lighting Techniques: Take to the Streets, Issues based on the Merger and Integration of firms Working in the Domain of Live Events, and Conventions and Live Events. Large Format Image and Sound Experiences.

SIEL, France: Tel: +33 1 4766 9553.
Email: comisili@wanadoo.fr

HHB surrounded
UK: After a lay-off of a good many years, HHB recently returned to the venue at London Zoo once occupied by its annual Digital Audio Information Exchange to host a one-day conference on multichannel sound. There was, unsurprisingly a heavy presence from Dolby, who explained Dolby Digital encoding, distribution with reference to Dolby E and a valuable insight into the world of its associated Metadata that was supplemented by input from te electronic on multichannel ambience simulation and creation and acoustician Neil Grant who looked at the role of diffusion in the context of multichannel monitoring.

The conference was well organised and attended, and rewarding for the attendee. The section on Metadata, in particular, was fascinating and ultimately will be extremely relevant to anyone involved in the production of multichannel material as it holds the key to the translation and interpretation of programme.

HHB, UK: Tel: +44 20 8962 5000.

3i takes SSL
UK: Industry console supplier SSL has announced its change of ownership from Carlton to 3i plc, Investors in Industry. The news was presented with enthusiasm by SSL Marketing Director John Andrews in the company’s 30th year and came with the assurance that SSL ‘will continue to concentrate on its core business of designing, manufacturing and supporting the world’s finest audio consoles for the music, broadcast, post and film industries’.
SSL, UK: Tel: +44 1865 842300.

Broadcast census
UK: In an attempt to address training requirements in the UK media industries, a cross-industry working party will conduct Britain’s first broadcasting census early this year. Developed by the Audio-Visual Industries Training Group under the chair of Roger Laughton (Bournemouth University School of Media Arts & Communications), the programme involves the government department for Culture, Media and Sport alongside Skillset. Laughton commented: ‘We’re starting by finding out what’s good and what’s missing, then we’ll try to identify the strategy that will enable us to make the most of the drive and talents of our people will be crucial in making sure that the current views and aspirations of our industry are collected, analysed and focused so that future policy reflects industry need.
Skillset, UK: Tel: +44 171 534 5300.
January 2000
23–27
MIDEM 2000
Palais des Festivals, Cannes, France.
Contact: Jane Garton, Reed MIDEM.
Tel: +33 4 91 90 44 39.
Email: jane_garton@reedmidem-paris.com.
24–27
Broadcast, Film and Audio, BFA 2000
Bombay Exhibition Centre, Mumbai, India.
Contact: Jasubhai Media.
Tel: +91 22 6542363.

February
3–5
SMPTÉ Advanced Motion Imaging Conference
Fairmont Hotel, San Francisco, California, US.
Contact: Bryan Niel, SMPTÉ.
Tel: +1 914 761 1100 ext 10.
Email: smpte@smpte.org.

6–9
SIELE 2000
Contact: Reed-OIP.
Tel: +33 1 41 90 48 45.
Fax: +33 1 41 90 48 29.
Email: srie@reed-oip.fr.

8
AES Lecture:
Rights, Management and Technology for Delivering Audio on the Internet
Gilwell & Brownsea suite, Baden Powell House, South Kensington, London SW7, UK.
Refreshments 6.30pm.
Lecture 7pm.
Contact: AES.
Tel: +44 1628 663 725.
Fax: +44 1628 667 002.
Email: uk@aes.org.
Net: www.aes.org/sections/uk.

17–20
ITS Technology Retreat
Hyatt Regency Suites, Palm Springs, California, US.
Contact: Nancy Zern, ITS.
Tel: +1 703 319 0800.
Fax: +1 703 319 1120.
Email: nancyzern@erols.com.

19–22
108th AES
Palais des Congrès, Paris, France.
Contact: Hermann A O Wilms.
Tel: +32 2 345 7971.
Email: 108th@exhibits.aes.org.

March
5–7
Entech 2000
The Dome, Sydney Showground & Exhibition Centre, Homebush, Sydney, Australia.
Contact: Caroline Fitzmaurice, Connections Publishing.
Tel: +61 2 9876 3530.
Fax: +61 2 9876 5715.
Email: caroline@connpub.com.au.

14
AES Lecture:
Understanding A-D and D-A Converter Measurements
Gilwell & Brownsea suite, Baden Powell House, South Kensington, London SW7, UK.
Refreshments 6.30pm.
Lecture 7pm.
Contact: AES.
Tel: +44 1628 663 725.
Fax: +44 1628 667 002.
Email: uk@aes.org.
Net: www.aes.org/sections/uk.

15–19
ProLight & Sound 2000
Frankfurt, Germany.
Tel: +49 61 750 11.
Fax: +49 61 750 0.
Email: info@verwaltung.mbb- octanorm.de.

26–29
SIB International

Rimini Trade Fair Centre, Rimini, Italy.
Contact: Ente Autonomo Fiera di Rimini.
Tel: +39 541 711 711.
Net: www.fierarimini.it.

April
12–14
Optical Disc
Tokyo Big Sight, Tokyo International Exhibition Centre, Japan.
Contact: MSG.
Tel: +81 3 3359 0894.
Fax: +81 3 3359 9328.
Email: msg.tokyo@msg.co.jp.

May
8–9
AES UK Conference
Moving Audio: pro-audio networking and transfer
Church House, London, UK.
Refreshments 6.30pm.
Lecture 7pm.
Contact: AES.
Tel: +44 1628 663 725.
Fax: +44 1628 667 002.
Email: uk@aes.org.
Net: www.aes.org/sections/uk.

June
3–6
Nightwave
Rimini Trade Fair Centre, Rimini, Italy.
Contact: Ente Autonomo Fiera di Rimini.
Tel: +39 541 711 711.
Net: www.fierarimini.it.

6–9
Broadcast Asia 2000, Cablesat 2000 and Professional Audio Technology
Suntec Centre, Singapore.
Contact: Singapore Exhibition Services.
Tel: +65 233 8625.
Fax: +65 835 3040.
Email: jke@esmont.net.com.

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TC Icon

Icon /ˈaɪkən/ n 1 [An object acting as mediator between man and the ideal] 2 [A symbol having cultural significance and the capacity to excite or objectify a response]

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TCUK@TCELECTRONIC.COM - WWW.TCELECTRONIC.COM

www.americanradiohistory.com
NOMINATIONS

1. Large scale console
   AMS Neve Libra Post; Calrec Alpha 100; Euphonix System 5; Midas Heritage 2000; Tosa tx3000B; Soundtracs DS-M

2. Medium to small scale console
   Allen & Heath ML5000; Audient ASP8024; D&R Airlab; Kloz Digital Spherion; Mackie DBB; MTA 924; Soundcraft Series Two; Soundcraft Series 15; Studer On-Air 5000; TL Audio VTC; Tri-Tech TS-24; Roland VM3100 Pro

3. Outboard dynamics
   Avalon 747SP; dbx Quantum; Drawmer DC2476; joemeek C2; TL Audio Valve Classic C-1; Tube-Tech SM2CA

4. Outboard preamp
   Aphex 1100; Presonus MP20; Summit MP4X; TL Audio Valve Classic PA-1

5. Outboard equaliser
   Focusrite ISA430; KT DN422M; Summit MPE200; Summit EQ200; TL Audio Valve Classic EQ-2

6. Outboard Reverb
   Eventide Orville; Roland SRV3030; Quantex Yardstick; Sony DRE-S777

7. Combined outboard device
   Eventide Orville; Focusrite ISA430; joemeek V6Q; Jünger Audio Accent 1; TC Intonator

8. Monitors
   ATC SCM70SL; Genelec 1036A; HHB Circle 3; Muro MA1; PMC MB1S; Tannoy Reveals Active; Westlake LCS-75

9. Microphone
   Audio Technica AT895; Audio Technica AT4047S; DPA 351; Earthworks SR7; GT Electronics AM40; joemeek JM47; Neumann Series 180; Sennheiser Evolution wireless

10. Convertors
    Apogee PSX100; Euphonix multi-channel convertors; Prism ADA8; Weiss SFC2 SRC

11. Audio editor
    DAR Storm; Digidesign Pro Tools V5.0; Soundscape REd

12. Audio recorder
    Digidesign Pro Tools MIX plus; Euphonix R1; Fairlight Merlin; Marantz PMD650; Sony MDS-E11; Sony MDJE530; Soundscape REd; Studer A827 Gold; Tascam D40

13. Desktop duplication
    No nominations

14. Location portable equipment
    Copper CS208; Marantz PMD650; You/Com ReporterMate

15. Plug-ins
    Aphex Big Bottom; Digidesign Bruno/Reso; Digidesign Sound Replacer; CEDAR Declick 96 (SADIE); CEDAR Declick (Soundscape); Line6 Amp Farm; Steinberg TL Audio EQ-1; Wave Mechanics Pure Pitch/Pitch Doctor

16. Special category
    CEDAR BRX+ debuzzers; CEDAR AZX+ azimuth corrector; Neutrik Minilator MR 1; mSoft ServerSound; Symbolic Sound Kyma 5

VOTES CAN BE CAST by photocopying or cutting out the page opposite, filling in and returning it to: SSAIRAs Nominations, Studio Sound, 8 Montague Close, London Bridge, London SE1 9UR, UK. Fax: +44 171 407 7102. Alternatively, you can email the category numbers and your nominations to SSAIRAs@unmf.com

Readers will only be allowed to vote once. Readers may only vote for one product in each category.

Your reader identification number is the digit-number starting with a zero that is located in the middle of the top row of your Studio Sound address label. In all instances the inclusion of the reader identification number is essential.

The objective is to identify equipment that genuinely warrants recognition for being special in some way.

Readers are not obliged to vote in all categories and their attention is drawn to Special Category 16 which serves as a 'catch all' for any products not covered in the other categories.

Any questions can be directed to Zenon Schoep and Tim Goodyer at Studio Sound. Tel: +44 171 940 8500.

10 January 2000
www.prostudio.com/studiosound  Studio Sound
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Studio Sound  www.prostudio.com/studiosound

January 2000
Calrec Alpha 100

A bold step for a small but historically significant British desk manufacturer, Calrec’s Alpha bodes well for its future. Zenon Schoepe witnesses true evolution

With its earliest assignable desk attempts still earning there keep some 14 years down the line with the likes of the BBC, NRK and Turner Broadcast among others, Calrec has considerable experience in the discipline. It is therefore with considerable interest that the arrival of its Alpha 100 all digital broadcast desk has been greeted.

Following on from the digital test-bed of its radio oriented X Series the Alpha is clearly a significant step towards the company’s digital future. Yet it already has something of a history, as it is derived from the successful T Series digitally controlled analogue board. When the T Series was conceived it was designed to run a digital engine but Calrec claims that at the time it could not build one that was as reliable enough, redundant enough or affordable enough and opted instead for the DCA route. However, it did employ a control system that could be ported in the future and this was proved by the appearance of the Digital T Series at NAB two years ago which sported a traditional T Series worksurface controlling a new digital rack. A rethink was in order though as the T Series had been designed fourteen years earlier and control devices were now cheaper and the opportunity to improve the worksurface in the light of such things as multichannel sound and improved router control possibilities was taken.

Like many other digital desks around, the Alpha is SHARC-based, but unlike many manages to get 12 stereo channels or 18 mono channels on one board of six SHARC. Price-wise its largely equivalent to a similarly sized T Series with savings or premiums incurred by the number and type of I-Os specified.

The Alpha is multichannel-able, has flexible I-O routing and all processing available to all the signal paths all the time. An NT PC runs a snapshot recall system for reset of all the desk parameters in under 60ms from Flash ROM and is involved in the desk set up and naming routines. This computer also tracks all desk activity but is not essential for the fundamental operation of the console. Alpha uses a ported version of the same control system found in the T Series which has proved to be eminently reliable after working in the field for five years.

The production version of the desk is a 2-rack system with a control rack and a separate DSP system rack plus analogue and digital I-O racks. I-O options include a mic-line card, line-only card and AES-EBU inputs. Analogue racks talk to digital I-O racks via a proprietary bulk I-O card which handles 128 channels. You can run two analogue input tracks and these connect to the digital input track which has a bulk I-O receiver card to take the analogue inputs, and some DSP cards that take the AES-EBU format bulk I-O format signals and put them on TDM buses. Signals then go from that I-O rack to a DSP rack via what Calrec calls a V-bus high speed bus which connects the racks together. The DSP rack has a control card that can have a redundant spare and spares can also be carried for DSP cards. There is only one type of DSP card in the system and this acts for the signal processing and the DSP that takes the AES-EBU signals and puts them on the TDM.

The control processor or rack controls the worksurface and consists of hub controllers for up to ten panels and these do not have a hot redundant spare and models are not known, although Calrec’s experience with the original T Series suggests that reliability is exemplary. However, if you should lose a panel you can transfer control to the screen.

Panels are connected via SCSI type cables to the racks and can be unplugged hot and the system boots from cold in 9s and the control surface can be reset in under-1s with continued passing of audio.

Worksurface panels can be arranged according to taste, and the worksurface is scalable and incorporates layers but these are not obligatory. If you really want a straight 96-fader worksurface then you can have one.

System limit is 14+ channels as 96 stereo channels and 48 mono channels which is bigger than any desk Calrec has ever been asked to build for live broadcast. Additionally more inputs can be connected to the system than there are channels via routers and accessed on the snapshots. The desk can be split into operators and loaded with addition duplicate panels and there are a host copy, global and default functions p.

The T Series speciality of being able to swap and move channels around the desk at will.

In line with Calrec’s approach to assign ability there’s a Central Assignable Section something that the company invented, lest we forget, which accesses all a channel’s parameters at the touch of an access button. Channels can be accessed locally from a fader panel or centrally from the CAS.

Core to everything, which will be reassuring to most, is minimum use of the computer screen which helps to manage the memory system, permits titling, and provides screen displays if you want them. However, it must be used for setting the desk up and naming inputs physical inputs. It also performs the diagnostics of the system.

The fader panel has a moving fader with PFL and indicators for MS, dynamics, filters and EQ selection. A meter looks at input gain post input stage, channel direct output level or dynamics gain reduction. A channel On indicator follows with peak indicator, touch sensor, and nulling lights should the motor fader fail.

The desk’s two layers are referred to as A, which corresponds to the colour green, and B, which is amber. Any fader can be a channel, a group or stereo or mono and you tell the user what a fader is. More indicators tell if the channel in question is a RCA-type master or slave and allocation is performed by holding and pressing the master and then pressing switches in channels that are to be slaved to it. The system also works in reverse for interrogation purposes.

A channel cut-on button is accompanied by AFL and a twin line alphanumeric display that indicates what is on each layer and changes colour according to which layer is being accessed.

Above the fader panel you will find what Calrec calls Wild controls, but others
refer to as freely assignable rotary controls. You get four with associated displays and these can be split into twos to serve the two layers of associated channels.

Assignment of Wild rotary is simply a matter of choosing the channel, and then identifying the Wild control and its controlled parameter in the CAS by clicking the switch on the relevant pot by depressing it. A further batch of indicators show channel statuses and routeings. There also are four buttons activating Rear AFL, direct talkback, which talks to the direct output of every channel, an AUTO MODE button, which is likely to be incorporated into any future dynamic automation process, and a button which can be assigned for the user to perform any existing switch function on the desk.

The input panel offers two inputs per channel for snapshotting across them. There's fine gain on a pot, coarse gain in 6dB steps on nudge buttons, SRC, and patching balance control. The front-back channel panning switches including tone and HF controls, rear panner, AFL, and bypass and divergence with bypass plus Centre only routing.

Each channel can have an insert and these have in-out, preEQ and pre-post fader switching. The Direct out can receive tone, and talkback and can be AFLed along with the mix minus bus. Again it can be preEQ and pre-post fader and dropped on to the Mix Minus bus. The I-O matrix panel takes care connection making and the business of snapshotting, recalling and previewing. Main outputs are allocated on-screen only and the alteration of these is password protected for reasons.

There's a 4-hand equaliser on every channel which mimics that on the T Series with two variable Q centre bands with overlapping frequencies plus an HF and LF in shelving or bell. It can be flatted, bypassed, placed in the channel or dynamics and has a useful alternative setting as a type of EQ undo. High and low-pass filters are fully variable and overlapping and can be inserted in the channel or dynamics together with a notch function.

There are 20 mono or ten stereo auxes on the desk accessed by ten sets of rotary controls each with an associated display, on off, pre/post switching, gain and gain. Aux channels are the same principle on a separate panel with meters, gain, cut, AFL, and an INTERROGATE button. A direct input is also available on auxes. A full dynamics set is available on each channel and the main outputs and groups, and is presented on a panel in the CAS. You get a compressor-limiter with bypass and an expander-door also with bypass plus gain makeup and gain reduction meter. Pre-post switching is included along with a keyed side chain (EQ and filters can be part of the side chain) with listen and four link buses.

Routing is available to eight mono or stereo groups, the four main outputs, which can be specified as multi-channel in the menu set-up routine, and 48 multitrack outputs. The last of these, because they have your individual channel to track output levels with tone and talk to them, can serve as a matrix output for what I am told the Americans refer to as IFB (Interrupted Feed Backs). Track outputs levels can be pre-post EQ or fader and can also send the mix minus signal to the multitrack with monoing of stereo groups. There's much more and you can interrogate the routing from here as well in what amounts to a section that is beyond the normal understanding of the word 'flexible'. The same can be said of the talkback features.

The Monitor section is based on a master selector and two preselector. There's a separate on button for small loudspeakers complete with a volume control, plus dim, cut, and monitor balance. The master selector permits listening to the main output in mono, stereo or surround and the same applies to the remaining three mains. You can also listen to off-air with decoding. Preselector 1 gives mono and stereo outputs for all four outputs and surrounds for all outputs while preselector 2 gives access to all the auxes, groups, PFL, tone and another 32 external sources which can be mono, stereo or surround. Decoder remotes are included and you can solo the 5.1 channels and defeat the LFE. I cannot even begin to touch on the full facilities of the Alpha and the available space here where there is depth to the features and the thought that has gone into it that is quite frankly best appreciated first hand and hands on. I was conscious that I was in the presence of greatness. Anyone who has run a T Series will be more than comfortable with the Alpha and anyone who is familiar with an analogue Calrec will be see immediate operational clues and principles. Everyone else will have to soldier on with what I consider to be a triumph of ergonomics.

You can tell that the Alpha is a very serious and very desirable desk that manages to understated the fact. The Alpha worksurface amounts, by my calculation, to the fourth generation of assignable surface for Calrec and it really does show because there is a maturity in the presentation that is lacking in digital desk early attempts.

There's really not that much wrong with the T Series worksurface but taking the opportunity to redesign it has distilled the concept still further.

Most particularly it is the manner in which functions have been selected for grouping into individual panels and how they are arranged in the panels that shows off unmistakable traces of experience. This panel approach is not exclusive to Calrec, but no one does it quite like them. You won't need to look to any other panel for an associated function, everything is where it should be and expect it to be. There are the operational points like the simplicity of Wild control assignment and metering control—things that were performed on screen on the T Series. The colour coddling of the layers makes a huge difference to clarity. I love the small parameter value displays despite the fact that at first encounter I thought they were too small to be useful. Viewing angle is actually very good, as is all illuminated indication, and once your sitting behind the desk the quirky little displays feed back a lot of information which can be grasped with a glance once you get the hang of the way that they work.

Like all refined systems the Alpha allows a choice of ways of achieving the same ends. Some are more direct while others are more appropriate when you are doing something else and this is the sort of area in which the truly distinctive and innovative digital desks are putting space between themselves and the competition. But then it should be so and it's what differentiates a digital desk at this level. Speed is one thing but is often confused with the matter of operator convenience. When the balance is right it adds to the feeling of being in control and that the desk is on your side when working in a high pressure environment day after day. Yes, of course I'm impressed with the Alpha and part of this has to do with the fact that I can understand where it has come from and I can appreciate the work that has gone into it to get it where it is. There seems to be none of the unavoidable trade-off that often occurs with the leap from analogue to digital. Alpha is true evolution which offers target end users familiarity, a leap in functionality and swathes of added value. It's a brilliant concept, it's a brilliant desk, it deserves to do well, it will do well.

The future of professional audio is safe in the hands of companies like Calrec.
Marantz PMD650

Carefully conceived and long awaited, Marantz' PMD650 portable MiniDisc recorder promises professional performance.

Neil Hillman put it to the test

By all accounts, it has been a difficult gestation. Firstly the processor would not perform nearly as efficiently as was expected, so back to conception went the PMD650. And back too went the expected date of delivery—several times.

During the process, some rather soul-searching questions have been asked of this machine by Marantz. And it shows. It shows in the enviable quality of build, the ease of operation, the audio integrity and baring the inevitable few, but very few, minor blemishes that any new product might subjectively present, it arrives in our mixer pouches or on our sound trolleys as a robust and hearty newcomer—albeit without time code.

'TC or not TC, that is the question; whether 'tis nobler in the mind to suffer the slings and arrows of outrageous camera-folk—who bale every time the sound department approacheth the camera to check sync'. The time-code debate is interesting as it tends to expose two camps—obviously those for and those against the necessity of inclusion but more specifically, I would suggest, between recordists operating to film and to video. Productions working on film are very much more likely to depend on the time-honoured clapper-board for synchronising sound to picture, allowing the labs who develop the film overnight to also offer a synching service of rushes the next day. This has certainly been my experience of film-location recording on dramas, commercials, even a travel-documentary series. Mind you, on that particular example of classic British cinematography where the technical ignorance of the director and the producer was exceeded only by their arrogance, the 'sync' was something you washed your hands in.

In short, if you perceive the need to use MiniDisc on location as your recording medium, this is the de facto machine. No doubt—and it costs less than £1,000 (UK). Its key features include phantom power, SP and LP recording giving up to 74 minutes stereo or 148 minutes of mono recording, one-touch instant recording, prerecord memory cache allowing 2s of pre-hear before the RECORD button is pushed and a 20s stereo or 40s mono audio buffer to eliminate the corruption of material due to knocks and shocks during record, playback or during that delicate time when the machine is writing to the TOC.

The top face of the slim, black machine—conveniently sized to slip into a Portabrace mixer front pocket—is the engine room housing 23 individual switches, yet maintaining an uncluttered and logical layout. The bottom quarter of the machine is taken full width by the in-built 200mW speaker grille which in the bottom right-hand corner reveals the inbuilt microphone. The remaining left half of the top face houses the spring activated disc door, disappointingly a rather flimsy metal pressing, undamped, and in contrast to the feel of the rest of the machine, how secure this door is against the ingress of water or dust gave me some cause for concern. Below the door are the two slider switches for power on/off and disc eject, the powering switch noticeable by its red slider. The right-hand half of this face is given over to a slightly raised bank of switches, the dynamics of the machine controlled through three rows of three slider switches dedicated to Record mode (switching between SP and LP); Source (switching between the stereo XLR inputs, mono on the left channel or internal mic) and the headphone-speaker source selector (allowing access to the left, right or stereo channels). The middle bank of three switches allows for mic attenuation of the inputs between 0dB, -15dB or -30dB; Input Level to be switched between mic or line level; and the limiter to be operating in either ALC mode, fixed limiter mode—which was happy to hold steady signals to the machines reference level of -12dB with respect to digital 0dB, while transient peaks crept up to -2dB—or Manual, in effect switching the limiter out of the chain. The bottom row of three dynamics switches are a 3-position ANC—Ambient Noise Control in Marantz speak, but high-pass and low-pass filters to the rest of us—with roll over frequencies of 125Hz for high pass, flat, or a band pass of 125Hz to 3kHz, an input SELECT to switch between analogue or digital signals and an ON-OFF switch for the 'LSR' Level Sync Recording option, which enables a trigger from a user-set threshold level of an analogue input signal of either -60dB, -40dB, -20dB or -10dB to automatically commence recording if the machine is sitting in the Record-Pause mode.

A row of five smaller buttons below these switches address the disc directly. REPEAT enables the whole disc to either repeat play the contents of the whole disc or a single selected track, or in conjunction with the
When only the best will do. When no compromises are acceptable. When sonic performance rules. These are some of the criteria in selecting a 9098i. Along with its sonic integrity, the feature set is also equally impressive. Recall, dual moving fader automation, built in dynamics and indisputably superior mic preamps and equalizers. The 9098i combines the best characteristics of vintage consoles with features demanded in today's mix environment. We invite you to audition a 9098i and experience the finest mixing console ever created.
A-B/DEL switch next to it, a selected part of a single track—ideal for the playback of musical numbers being filmed in discontinuous parts. The TITLE button opens the disc for the titling of the disc or just a single track; character toggles between upper-case letters, lower-case letters, numbers or symbols—the 'Forward' or 'Reverse' transport keys scroll up and down the desired figure-set—and ENTER fixes the selection and moves the cursor along the script.

The EDIT up-down twin push-buttons present access to the menu display on the front face and scroll either up or down the options to Divide, Combine, Move, Erase or All Erase tracks, adjust the machine’s clock and calendar or adjust the system presets. These presets are: Power Management which beeps when the machine has been inactive for 5 minutes or 5 minutes before the battery is exhausted; the signal level for the ‘Level Sync Recording’ function, variable as previously described between -60dB to -10dB; New Track Time—the time after the analogue input signal has dropped below the ‘LSR’ threshold before a new track number is written to disc, variable between 2s, 3s, 5s or 10s; Track Increment to enable the automatic allocation of a new track number while in LSR mode; prerecording Time—variable between 0.5s and 2s before Record is pressed; and Battery type in use—selectable between either alkaline or NiCd, and designed to give the battery display a fighting chance to gauge the state of discharge.

The system presets also provide for a sampling-rate convertor SRC to be switched in or out. When selected On, digital signals routed through the Digital In jack are also output on the Digital Out jack at 44.1kHz. With the SRC set to Off, signals appearing on the Digital In jack at either 32kHz or 48kHz are converted to 44.1kHz for recording purposes, but still appear at the original sampling rate on the Digital Out jack. The last of the system presets allows for the Serial Copy Management System (SCMS) to be switched on or off.

The transport controls are divided between this top face and the front face. The STOP and PLAY-PAUSE buttons sit on the top face and next to the recessed and semishrouded BACKSPACE button, that when pressed while in Record cancels the recording and returns the machine to the Record-Pause mode and the point on the disc that recording began.

The front face of the PMD650 carries a large display window that shows track number, track title; whether SP or LP recording is selected, battery level as an icon either full, half-full or empty and twin bar graph level metering calibrated between infinity and 0dB, with steps marked at -40dB, -20dB, -12dB, -6dB and -2dB. An Over level is set to the right of 0dB. The metering should be bigger scale than it is, with the lion's share of available space being given over to track titling during Stop or Playback mode or date information during Record. This is secondary information, and the ability to quickly scan a display and get an instantly recognisable confirmation of the temperature of the recording must be given primary importance and hence impact on the eye. To the left of the display glass is the 3Ω, ¼-inch headphone socket which disables the speaker, and above it is the volume pot for both the headphones and the speaker; the speaker is also defeated when the machine is in Record. To the right of the display window are the RECORD-PAUSE button and the dual function RECORD-MARK sprung slider switch, conspicuous by its red cap. This switch takes the machine directly into recording and

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while in Record, another dab on the switch will mark the current point on the track, and increment the track number upwards for each subsequent key press, providing at least 1s has elapsed between marks. A red LED illuminates when in Record and flashes when in Record-Pause; a more frenetic flashing indicates that the battery voltage is low. Below these two switches are buttons to illuminate the display—either momentarily, or sustained if held for over 1s and a display button that toggles the disc information. In Stop mode it changes the read-out in the display window between disc information, time available for recording, and current date and time; in Record mode between time elapsed during recording, time available for recording and current date and time and in Playback mode between time elapsed on current track, time remaining on current track, time remaining on the disc and the date and time of the recording. The last switch on the front face sits under the record slider and acts as a Key Lock, defeating all functions on this panel except for the display light switch. At the right-hand end of the front panel are the dual-concentric record level pots, graduated 0-10 and in my opinion in need of either a heavy friction pad or a locking device to prevent movement inside a mixer bag taking the record level either up or down at random.

The GENELEC 1036A Center channel Active Monitor System

The GENELEC 1036A Large Control Room Monitor System brings NEW true meaning to the words “surround system integration”. Two systems defining a NEW true Balance of Power.

The Marantz PMD650 is delightfully straightforward to use and clearly much thought has been given to the end user. Its been a long time coming, and it looked good in trade-press ads operating times for 8 AA 1.5V alkaline batteries is 3 1/2 hours for recording and 4 hours for playback or 2 1/2 hours for recording and 3 hours for playback when using the 9.6V rechargeable NiCd battery pack.

The Marantz PMD650 is delightfully straightforward to use and clearly much thought has been given to the end user. There are welcome safety measures such as a backup of the Table Of Contents being written whenever a recording commences (Pre-UTOC) in case of a power loss, enabling previously recorded material to be retrieved; or when in dual mono mode the left channel carries signals up to 0dB, but in case of an unforeseen overload, the right channel is recorded 15dB lower allowing a high quality backup to be available.

In a long time coming, and it certainly showed promise and looked good in trade-press ads a full 18 months ago. But now at last it is here, a little later than expected, and frankly I think you are going to want to buy one. Hundreds of us will.
Choosing the right audio matrix for a broadcast centre is a critical task.
Rob James connects with the Audio Service Digital Audio Interconnection System

MATRIX is an evocative word in large-scale broadcast television. It conjures up images of the very heart of a production centre where all roads lead not to Rome but to the matrix. In Audio Service’s Digital Audio Interconnection System (DAIS) an on-screen X-Y matrix replaces the manual patching of audio sources to destinations. This is accomplished by using a PC to control a crosspoint router or routers. The idea is hardly new but the Audio Service solution is significantly different to other router and matrix systems using off-the-shelf Yamaha YGDAI I-O cards of the CD8 series (and compatibles – cards that fit the 02R and 03D mixers) to form the basis of a comprehensive router and format convertor.

A single DAIS rack-frame can accept up to 14 single-height or 5 dual-height interface cards inserted vertically (dual height cards actually take up more physical space than the name implies). Each rack can handle up to 72 stereo crosspoints (144 channels) depending on the cards fitted. It can also function as the master wordclock generator in an installation at either 44.1kHz or 48kHz sampling rates.

All the ‘synchronous’ cards must be locked to a single clock. This can be internal or external wordclock or derived from input one of any digital card. However, it is also possible to fit four of Audio Service’s own ‘asynchronous’ cards in the horizontal slots. This effectively gives you two routers in one box – a 16 x 16 AES/EBU (stereo) that relies on all its sources and destinations being synchronous to an external reference, and a maximum 56 x 56 (stereo) with combinations of YGDAI cards. All routing is done in stereo.

It is technically feasible to unpack stereo AES-EBU streams and route them as independent mono sources but this would greatly increase the system’s cost and complexity. The YGDAI cards output synchronous digital silence in the absence of an input signal. When an assignment is made there is no delay and no clicks or spats. A source may be routed to up to seven destinations but, as might be expected, multiple sources to a single destination are not permitted.

Using the supplied Windows application, the sync source and other parameters are set and connections made and broken. The main window displays a matrix of squares that represents crosspoints with a hierarchical tree display on the left that may be hidden if the user requires a larger view of the matrix. The hierarchical structure allows a number of patch assignments to be stored for instant recall (by double-clicking) associated with a particular view of the matrix. Changing between patch assignments within a view leaves the rest of the matrix untouched. This can be very useful where a large and complex system requires frequent changes to only a few sections. Complete global setups can be mapped to function keys 1-12. Patch assignments can be saved for particular jobs and the connections made instantly. This is a vast improvement on the time-consuming chore of manual patching. Audio Service will also supply the control protocols to users wishing to create a custom application, perhaps controlled via a touchscreen. There is nothing to prevent any half-way competent programmer ‘rolling their own’.

If an application requires an 8 x 8 or 16 x 16 single-format router, there are alternatives which are more cost-effective. If, however, the application demands anything much larger, perhaps with a complex mix of formats, DAIS starts to make financial sense. Add to this buffering and improvement of jitter, analogue and sample-rate conversion options, and the versatility of the concept becomes apparent. If 56 x 56 isn’t big enough Audio Service has a couple of answers. Version 1 gives an 80 x 80 matrix with 56 digital inputs and outputs and 24 stereo analogue inputs and outputs controlled from a single DAIS matrix display. Version 2 effectively links two units – 2 x (56 x 56) matrices with 24 stereo buses (48 channels) between the two this is currently controlled from two DAIS Matrix displays.

I suggest costing a conventional patchbay solution (including all the wiring and format convertors) and comparing with the cost of a matrix. (Leaving aside costing in the potential time savings.) The result may well provide a pleasant surprise.
digital confidence

In today’s rapidly evolving market landscape, confidence in new technology has to be earned. With the abundance of equipment being introduced, can you depend on your supplier, the product reliability, and the life-span? Can you know if you’ve allowed for all the possibilities of new technologies, digital input/output configurations and new standards of automation which may appear without warning?

The solution is simple. A product supplied by a manufacturer with over a quarter of a century of experience, having now installed more than 350 digital consoles and gained a reputation for a cast iron commitment to user support.

The solution is elegant. The new Soundtracs DS-3 digital production console, integrated within the dynamic control surface of the DS-3 lies a uniquely futuristic approach to console ergonomics. Breathtakingly easy to operate at the same time as exceeding the requirements of the World’s most demanding facilities and operators.

Gain confidence in the digital future, investigate the new DS-3

FEATURES
- 56 digital channels
- 24 bit conversion
- 96kHz and operation option
- Simultaneous stereo, LCRS and 5.1
- 15 fader work surface
- Interactive touch screens
- Instant reset
- Comprehensive automation
- Advanced machine control
- C.D. and dynamics presets
- Four band parametric equalizers
- 32 x 4 monitor matrix

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Sennheiser Series 3053/54

Turning radio mic technology around, Sennheiser has developed a new in-ear monitoring-foldback system Neil Hillman puts his ear to the ground

WHILE RADIO microphones remain the fastest growing sector of the pro-audio market, the small move sideways for manufacturers to the parallel technology of in-ear monitoring cannot be far behind. It makes good sense for them to package what is essentially the same technology, but for two different applications, and increase their market profile and recoup development costs at a greater rate than they otherwise might. Lectro for instance has achieved this brilliantly with the TS/R5 Interruptable Fold Back, based on the sophisticated tracking front-end of the UCR 300 UHF diversity radio microphone, and are quietly making huge in-roads into broadcast studios on this side of the Atlantic. But that system is more focused as a presenter/on-air talent talkback feed, premixed in the control room, and geared to the precise requirements of broadcasters. This Sennheiser option is of a more general nature, offering FM stereo dual-channel capability, but without as much processing sophistication as the Lectro. But it should nonetheless enjoy popularity as both in-ear monitoring for stage performers and as a useful television studio tool for presenters, as an interruptable foldback with production talkback on one channel and programme sound on the other.

The stereo transmitter for the system is the SR 3054-U, a 19-inch 1U-high rack-mounted device with 16 UHF transmission frequencies preprogrammed in four groups between 450MHz-960MHz, and all inputs on the rear panel leaving a clean and clear front panel. A twin-transmitter version—the SR 3056-U—duplicates the features described for the SR 3054-U. The AF inputs to the transmitter are on electronically balanced female XLR sockets, fed at a nominal -10dBu and internally adjustable. The frequency response is given as 40kHz-15kHz, with the signal-to-noise ratio of the overall link being greater than 90dBu. The signal is stereo FM with a pilot tone, with Sennheiser’s own HiDyn stage wideband compander system designed to increase the signal-to-noise ratio by compressing the AF level on the transmitter at 2:1, and then expanding by a similar amount the signal at the receiver. Interestingly, I pressed the receiver system into use in an emergency on location by transmitting to it for production monitoring purposes from a Sony WRT 820 pocket transmitter. Surprisingly, the receiver worked very well despite —I assume—a difference in pilot tones between the Sony and the Sennheiser, with precious little discernible loss in range or audio quality, merely a reduction in output level at the earpiece due in part to the compressed signal remaining unexpanded; a long shot that paid off. Other components on the back face are an IEC mains socket with cable grip, accepting an input of 115V to 230V at either 50Hz or 60Hz; a BNC antenna connector for either a ‘stubby’ placed directly on the unit or a feeder for a remotely sited antenna. Suitable products offered are the Sennheiser 2003 passive directional UHF antenna or the GZA 1036-9 ground plane antenna. The final connector is a 15-pin sub-D socket programming interface for the Sennheiser SMCD software, which facilitates frequency programming of the units and programmable control of the Series 3000 rackmounted receivers through a comprehensive Windows-RS485 platform.

The front face of the transmitter carries four small display windows, with the On-Off switch on the right-hand side nearest to the rackmount handles. This switches just the low voltage of the secondary of the magnetic core integrated mains transformer, its high efficiency reducing the residual consumption of power. The handles at each end of the front face are solid cast, sculpted, and predrilled and tapped to accept a front mounting of the BNC antenna connector if required. To the left of the power switch are three small push-buttons mounted in line above each other, the top two marked with up and down arrows respectively, which when pressed together toggle the unit’s transmission output between mono or stereo. The largest display window carries a LCD segment that aligns with the legends of either mono on or stereo off depending on the selection made. When in Mono mode, only the right AF signal is transmitted. The bottom button is marked set and is used to change the transmission frequency. When this button is pressed, the 1-inch by ½-inch display window that shows the frequency in use as a 6-digit LCD read-out, flashes the headline ‘Frequency’

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20 January 2000

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If the Sennheiser company is firmly lodged into the collective psyche of audio users, it is due in part to being spread strongly across consumer, semipro and professional markets, the latest entry to the in-ear monitoring arena will further this progress and 100%. Under normal conditions this is at 100%. The final two displays are again vertical 16 bar graphs, paired to show deviation of the AF signal and calibrated bottom to top in steps of 3%, 10%, 25%, 50% and 100%. A ‘+’-inch, 16Ω headphone socket is available for monitoring the output, with an associated volume knob next to it.

The 3k05-U receiver is robustly built—a die-cast grey, cigarette-packet sized unit, with a curious curved contour along the right-hand side of its otherwise square sides. The bottom of this curved side houses the battery flap, a strongly sprung affair in similar metal, that reminded me in operation very much of the opening doors on boyhood set models of car—1937 MG TC to be precise. The 9V MN1604 battery occupies the full width of the bottom third of the case and offers an operating life of around 5 hours with a medium volume setting; this time can be reduced by a couple of hours if the unit is driven hard however. The square, left-hand side of the unit houses all adjustments and settings bar output volume—in a recess—with the rotary channel selector of 16 channels marked Hexagonal fashion on F. Above is a tiny RF squelch rotary control knob, adjusted to prevent hiss on the system with the transmitter switched off; a slider switch for headphone linear either ‘on’ or ‘off’ and a similar slider switch for selection of either Stereo or Focus output. The Focus option mixes both left and right input signals and routes them as a mono signal to both left and right outputs. The rotary balance control at the top of this left-hand side during Focus selection adjusts the relative levels of the two separate channels in the mono mix, or in the stereo position adjusts the balance between the left and right stereo signal. The top face has a pleasingly large combined off-on switch and volume pot, calibrated Off-10. In the centre of this panel is the 3mm stereo headphone-earpiece socket and next to it the beautifully machined Lemo antenna connector.

The front face carries two LEDs at the top right-hand corner, for the front marked RF a green display indicates that an RF signal is being received and for the other, marked on-low Batt, a red constant display shows that the receiver is switched on and that the battery carries sufficient voltage. A flashing red LED shows that about 15 minutes of operating life is left in the battery and it should be replaced. The back panel of the receiver carries the familiar Sennheiser spring belt-clip and also a table of the operating frequencies corresponding to the 16 channels available for selection. The stereo channel separation of the 2 x 3.52W outputs is given as greater than 45dB, and in use it was possible to isolate left information from right easily enough; the 2 x 100mW output leaving plenty in hand on the volume knob for tired performance ears.

If the Sennheiser company is firmly lodged into the collective psyche of audio users, it is due in part to being spread strongly across consumer, semi-pro and professional markets, and now as part of the mid-priced 3000 series of radio products, the latest entry to the in-ear monitoring arena will further this progress. With the SR 3054-U transmitter priced at £1,100 (UK) and the EK 3053-U receiver priced at £700 (UK), both semi-pro and professional stage users—as well as some applications in a television studio—may well benefit from a good product at a reasonable price.
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Focusrite ISA 430

Combining the best of the best into a single outboard unit, Focusrite’s Producer Pack is certain to win plenty of accolades. Dave Foister offers the first.

If you were able to carry your own rack of signal processing around with you, what would be in it? For many people, it would include something from Focusrite, particularly the classic Neve-designed ISA range. The 110 equaliser was what started it all for Focusrite, becoming the standard outboard EQ to deal with the perceived shortcomings of the onboard facilities of otherwise excellent consoles, and the 110’s circuit found its way into the mammoth Focusrite consoles as the standard EQ. Further outboards followed, all based on the same central design philosophy, including dynamic control and mic preamps. Those who wish they could carry a set of these around in a single box need wish no longer: the ISA430 is the fulfillment of that wish.

With this in mind the 430 is dubbed the Producer Pack, containing as it does a complete Rupert Neve-designed signal path that can apply a whole chain of sought-after Focusrite treatments to a single mono signal. It offers, folded neatly into a 2U-high package, a 110 circuit as Rupert designed it. Many will therefore be familiar with the layout; it starts with a pair of swept filters, then has a pair of overlapping parametric bands, and finally has shelving bands at each end with switched turnover frequencies just like the classic old Neve console EQ.

Many will be familiar with the layout of the ISA 430; it starts with a pair of swept filters, then has a pair of overlapping parametric bands, and finally has shelving bands at each end with switched turnover frequencies just like the classic old Neve console EQ.

In the normal scheme of things the signal then passes to the EQ, which is the original Neve preamp, with comprehensive EQ and a full set of dynamic processors, coupled with a Neve transformer-based mic preamp. The preamp also has a line input and a front-panel instrument input (duplicated on the back), with controls for coarse and fine gain, phantom and phase reverse. One of the functions of the big vu meter is to show the input level post the preamp.

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By comparison the gate is unusually sophisticated, although it still shares the ISA10’s vintage heritage according to Focusrite. It can be switched to operate as an expander, and has a range control as well as most of the usual set. It is slightly unusual in having only a switch to alter the attack time yet having a variable control for the hold time. A little more numeric calibration is provided than on the compressor, and a row of five calibrated green rings shows how much gain reduction is occurring. There is an extra switch to introduce hysteresis into the threshold operation, so that its closing threshold is lower than its opening threshold, in order to avoid chatter on long tails. In conjunction with the rest of the control complement this makes for extremely fast and tolerant setup; you’d be hard pressed to find a front end gate than this in or out of a dedicated box. For frequency-conscious gating the availability of the various EQ sections to modify the side chain is even more useful than it is in the compressor. The entire dynamics section has a Link socket to allow two 430s to operate in tandem.

One possible use of EQ in the compressor control is de-essing, yet this makes complex setups unnecessary by having a dedicated de-esser following the gate. This uses an optocoupler and operates extremely simply, with a swept frequency control and a threshold for the chosen frequency. Finding the band that requires attention is made easier by yet another side-chain input switch, this time giving only the contents of the narrow filter pass band, making it very simple to identify the problem area. An LED shows when it is doing its stuff.

The last process is a limiter whose operation is enabled by a single switch and shown by a single red LED. Although it looks like the simplest limiter you could find, almost an afterthought, it is in fact a 3-band device using a separate optocoupler stage for each band. The lack of control is more than compensated for by its separate treatment and different attack time ranges for the three bands — the kind of specialist approach that might be expected from a mastering limiter. This is alongside a final output level control, joined by a knob for mixing in a second input source that we shall come to later. The 430’s final signal output level is shown on a horizontal...
"The A/D linearity is simply excellent and compares favourably to many of the best converter packages available."
Frank Wells, Audio Media

"I found it lent itself particularly to big fat sounds, which just seemed to fall effortlessly out of it."
Dave Foister, Studio Sound

"What is really clear is that this unit is great for processing individual elements of a mix, as well as adding the final sheen. In some respects calling the unit a mastering processor underplays its applications."
Jon Musgrave, The Mix

"If you're one of those people who are always wondering why professional material always sounds more 'produced' than the work you do at home, the DC2476 could go a long way towards helping you discover the secret."
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- AES/EBU, SPDIF digital in/out

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**DC2476 Masterflow Digital Processor**

![DC2476 Digital Processor](image)
< LED meter above the main vu meter. If this selection of treatments seems powerful enough, more flexibility still is provided by a simple switched patching system that can change the number of processors around in various ways. For one thing, like any mixer channel the 430 has an insert point, which is available on the back panel on balanced XLRs and whose return level can be shown on the vu meter as its final option. The insert can be placed in the chain before the EQ, between the EQ and the dynamics, or after the dynamics as the final process, simply by cycling round the three options with a push-button switch. Similarly the dynamics can be shifted in bloc to come before the equaliser in the signal path, again with the option to place the insert wherever you like. Besides all this, if all you want for a particular job is the use of the microphone preamp, and you want to shorten the signal path as far as possible, a separate output is provided at the output of the preamp.

As a final twist, the dynamics section can be split off from the main path to operate entirely independently, while the main signal passes through the preamp and the EQ. In this mode the whole dynamics chain is accessed by means of the insert point connectors and becomes effectively a separate unit. This apparently simple feature adds hugely to the bang-per-pound appeal of the unit; where others give you a very nice signal path that can only deal with one signal at a time, the 430 gives you two top-notch Focusrite outboards in the one box.

Any more than a cursory glance over the front panel reveals that there is yet more to come. So far what we have is perhaps one of the most desirable analogue signal paths in the business; bolted on to the end of it is Focusrite's more recent digital expertise in the form of a high-performance analogue to digital converter. This is an optional card that can be user-fitted in a slot on the back panel (it took me 15 minutes), although the necessary connections are already in place on the front. The controls select the various sampling rates and word lengths—up to 96kHz and 24 bits. The card carries outputs in AES-EBU and S/PDIF (SACD and optical) formats, and a BNC for word clock or Pro Tools SuperClock synchronisation. There are two small switches, one for 75Ω termination of the sync input and one to select between two analogue output reference levels.

The 430's internal signal path appears on the left leg of the stereo output, and there is a further line input direct into the converter's other channel. The two output signals appear on the uio meters above the vu, and the external input has its own gain control. This is useful in the Sum mode, where the two signals are mixed in mono to both digital channels. Besides this, there is a 3-pole jack that breaks the internal link to the left channel, allowing a stereo analogue signal to be connected straight to the converters while the analogue sections remain available via the analogue ins and outs. This means that the 430 can function, simultaneously and without breaking sweat, as a parametric EQ, a dynamics processor, and a 24-bit stereo converter, all fully independent from each other.

At its most extreme, this would seem to allow two channels of an analogue desk to use the 430's EQ and dynamics independently, while the desk's stereo bus feeds the 430's converters directly in place of its own internal bus. Surprisingly (and usefully), the limiter operates in stereo on the converter inputs as a safety net separate from the rest of the dynamics. It would be obvious by now that the ISA430 Producer Pack offers even more than its front panel would suggest. The prospect of a chain of Focusrite processors inheriting the fundamental characterisations that established Focusrite in the first place would be enough to sell the 430; the extraordinary flexibility that comes with it, controlled so simply from a well thought out front panel, makes it outstanding.

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One look at the back panel and it's easy to see why the HHB CDR850 leaves other CD recorders where they belong: in the bedroom! XLR and RCA analogue inputs and outputs, an AES/EBU digital input, optical and coaxial SPDIF digital I/Os and parallel remote control, the CDR850's comprehensive connectivity perfectly complements its class leading sound quality and ease of use.

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Before you buy a CD recorder, it pays to check around the back. See both sides of the HHB CDR850 at your nearest dealer.
Digital Audio Denmark ADDA 2402

One of today's essentials is the convertor, through which an audio system can be made or broken. Rob James preaches conversion.

In the early days of commercially available digital-audio equipment, its advantages over many existing analogue devices outweighed and obscured its disadvantages. In recent years, the disadvantages have become more obvious, even to those not blessed with 'golden ears'. The vexed questions of bit depth and sampling rate are eclipsed by a more fundamental problem. There is an old saying in computing circles. GIGO (Garbage In, Garbage Out). One of the greatest contributions to whether a digital device sounds good is the quality of the analogue to digital conversion and vice versa.

The ADDA 2402 is a full-duplex 2-channel A-D and D-A convertor. It also functions as a 2-channel D-D convertor able to convert between any of the six sample rates provided by the internal clock—32kHz, 44.1kHz, 48kHz, 64kHz, 88.2kHz and 96kHz. It will also convert between consumer and professional flavours of AES-EBU. Rear panel connections start with a combined IEC mains socket, switch and fuse. Seven XLRs deal with balanced analogue in and out, AES-EBU digital in and out and external AES-EBU sync. Four 2-pole jacks cater for unbalanced analogue I-O. Balanced analogue is at +18dBu maximum and unbalanced at +4dBu maximum. Optical TosLink and co-axial S/PDIF connections are provided for S/PDIF.

The chalk-white front panel is dominated by a pair of 19-segment LED bar graph, analogue input, peak meters. These are calibrated to light the right most red LED at 0dBFS. Down to -20dBFS the scaling resolution is in increments of 2dBFS allowing the common operating levels to be set. All the keys are small, grey, oblong buttons with currently selected digital input. If there is no valid external input the unit defaults to internal and no other source may be selected. The front panel POWER key puts the unit into Standby mode.

By dint of the number of connection possibilities the ADDA 2402 can form the nucleus of a small system, eliminating the need for a patchfield. The analogue and digital inputs are selected using the analogue and digital input keys. The DIGITAL OUTPUT SOURCE key switches between analogue and digital inputs—that is, it switches between digital-to-digital, sample rate, and ADDA conversion. The analogue outputs always carry the converted output of the selected digital input source. The Dither function employs a psychoacoustic noise-shaping filter.

Early A-D convertor designs required a brick wall analogue low-pass filter at the Nyquist frequency (half the sampling rate) to avoid highly undesirable aliasing artefacts. The design and construction of such a filter is problematic being both difficult and expensive to do well. These filters also introduce delay. To quote John Watkinson, 'As the slope tends to vertical, the delay caused by the filter goes to infinity; the quality is marvellous but you don't live to hear it.' Techniques such as oversampling are claimed to remove the requirement for an analogue filter allowing much gentler (and cheaper to manufacture) filter designs to be employed in the digital domain. Many convertor designs allow a small amount of aliasing distortion at high frequencies on the grounds that it is unlikely to be heard. At the 1999 AES conference in Munich, Richard Black presented a paper identifying a type of distortion, Allinging Intermodulation Distortion or AID that arises when there is aliasing distortion present, accompanied by intermodulation distortion above a certain level. The IM distortion is introduced by analogue devices and or transducers such as loudspeakers. The AID and IM can mix and generate new audible frequencies.

In order to avoid AID Digital Audio Denmark has implemented Nyquist frequency stop-band filtering using a Crystal Semiconductors device. The trade-off in this case is the -3dB bandwidth is reduced to 19.3kHz at 44.1kHz sampling rate. Using higher sampling rates such as 96kHz the aliasing distortion moves up in frequency to an area where IM distortion has little effect rendering such strategies unnecessary.

With proper design, there is no proven justification for the use of high sampling rates. However, their use avoids the necessity for expensive precision filters and, along with increased bit depth, allows more margin for error.

The unit takes a few seconds to calibrate when first switched on and recalibrates when a different rate is selected. It is a good idea to recalibrate once it has had a chance to warm up. Any convertor ultimately stands or falls on subjective audio quality. The ADDA 2402 acquires itself honourably by being inaudible in all the listening tests I devised. It is highly convenient to operate and the meters are bright and easy to read with just the right peak hold duration.

At the asking price, the ADDA2402 is competitive as a simple upgrade to existing integrated convertors. However, it has the considerable bonus of multiformat inputs and outputs and sample-rate conversion. Add to this the degree of future proofing conferred by its 24-bit, 96kHz sampling capabilities and Digital Audio Denmark may well have found themselves an ideal niche in the market. This unit should appeal to small studios looking for high-quality conversion and connectivity and especially for DAW and transfer setups.

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Tascam, US, Tel: +1 323 726 0303.

**Marantz CD players**
Designed to fulfil the requirements of DJ, sound installation, recording studio, post, broadcast and on-air applications the Marantz 300 Series of professional CD players comprises three units. The entry level PMD330 offers all the standard features of a professional machine while the PMD331 and PMD340 include a 10s anti-shock buffer, instant start and advanced pitch control and bend features. The top of the range PMD340 additionally incorporates an industrial grade transport mechanism and optical pickup unit with integrated preamp. Features include CD-RW playback, CD text, frame search, index search, programmable point memory, digital pitch control ±12%, end monitor, 10-key pad, fading start, backlit transport controls, backlit LCD and adjustment-free mechanism with digital servo.

Marantz, UK, Tel: +44 1753 686 080.

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Audionics, UK, Tel: +44 114 242 2333.

**Audio-Technica AT4047/SV**

Bringing nostalgia up to date, Audio-Technica has released a FET condenser mic. Dave Foister catches up with the past.

EVEN NOSTALGIA has to move with the times. Perhaps it runs on a parallel track, so that we always yearn for things from a certain set distance in the past. Whatever the reason, this year's classic and vintage stuff is newer than last year's. We've done the valve microphone thing now, and it's time to move on to two decades behind 40FET microphones, with the help of Audio Technica. Try not to worry about the fact that the whole reason valve microphones were rediscovered was a feeling in some quarters that FET's were a retrograde step.

The AT4047/SV is the latest addition to Audio Technica's acclaimed 4000 series of audio condenser microphones, the range that began with the surprise of its year, the 4033. In many respects the new model is very closely linked to the 4033, it shares its shape, its essential functionality and its accessory range, but adds a vibe that harks back to the sixties and seventies.

Like the 4033, the new microphone is a simple cunodoid side-fire type, with the familiar shape that makes the basket surrounding the capsule substantially bigger than the remaining body length. The standard means of support is the supplied suspension mount, a simple but well designed affair that grips the microphone purely by means of its rubber bands; these drop neatly into grooves around the housing. It has a big locking lever and holds the microphone well.

Audio-Technica's slick manufacturing quality is now well known, and the 4047 once again is immaculately built and finished. It comes with two switches for optional functions, and while these are out of the way of fiddling fingers they are still accessible, even when the microphone is in the suspension mount. The polar pattern is fixed at cardioid, and so the only switches are for the high-pass filter and the pad. The filter is a sensible one, rolling off at 12dB per octave low enough to be useful, but low enough not to eat into the sound unnecessarily. The pad attenuates by 10dB, and with this in place Audio Technica claims a maximum SPL handling of no less than 159dB for 1% THD. With a specified equivalent noise level of 9dB SPL, this makes for an impressive wide dynamic range and a performance that is certainly in line with current media—unlike some of the original models it is attempting to emulate.

The finish of the microphone is part of the chosen retro image. Once all microphones were this satin nickel colour, but now black has taken over, a trend AT normally follows with its own models. The silver-matte finish remains attractive, however, and when applied to the 4047 unfailingly reinforces the image it is trying to present.

But the cosmetic statements, of course, really beside the point if you're trying to produce something that recreates a microphone style from the past, the sound is all that matters. There are one or two manufacturers around who might benefit from being reminded of that, but Audio-Technica is certainly not one of them. The 4047's literature refers to it as 'a contemporary replication of vintage condenser technology' and whatever has been done is primarily in the interests of producing a sonic character.

The character in question is, perhaps, even harder to define than the elements that constitute the sound of a valve microphone, but the important thing is that when you push the fader up on the 4047 you know they've got it right. The result is something of silvery sheen to the sound of an early big FET microphone, you know it doesn't go all the way up into the functionary stratosphere, but as far as it goes it is clean, bright and smooth. That's what the 4047 has too, coupled with the expected warm bass end, giving the subtle contour that makes this kind of microphone so good for vocals. This is one of its obvious applications, for it does it very well, producing an instantly familiar type of sound that immediately reduces the amount of further processing that will be required.

That's not to say that the 4047 is obviously coloured to the extent that its usefulness is restricted. On the other obvious candidates for a big condenser it performs as you would want it to, with a big flattering sound on saxophone, detail and warmth on trumpet, and so on; an accomplished all-rounder without having to be clinically flat to achieve it.

What ever recording technology is around in fifty years' time, you can bet someone will be recreating the classic sound of the Sony DTC1000, or the vintage character of an early ADAT—but better, of course. The trend starts here with a deliberate replication of something that originally replaced the valve sound that we've been trying so hard to replicate up to now because we didn't like what it replaced. Make of it philosophically what you will; the 4047 does what it sets out to do, with the bonus of modern technical specs and premium reliability and consistency, and will surely have a place in many armouries.

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Studio Sound  www.prostudiom.com/studiosound

January 2000 31
Tube Tech SMC2A

Another valve based compressor in a rackmount? Correct but Tube Tech has put some daylight between itself and the competition by making this one multiband. Zenon Schoepe indulges.

Continuing the dynasty of well thought out and interesting outboard processors with valves in them, Tube Tech has come out with the SMC2A which qualifies as the first valve based multiband compressor. A stereo device with transformer balanced XLR connectors and optical elements, gain reduction is performed in three bands which are fed from two variable 6dB/octave crossover point pots which dictate how the spectrum is split in to low, mid and high bands.

The high/mid split sweeps from 1.2kHz to 6kHz while the low/mid crossover spans 60Hz to 1.2kHz with the use of a x1 and x4 multiplier switch. The optimum summing design is such that the three bands are flat within ±0.25dB when each band's gain controls are set at the same level.

Each band has an identical compressor with fully variable threshold (-20dB to 0dB) and a band gain reduction meter. Band gain sweeps from 0dB to +10dB while a master output gain pot offers the same at the end of the chain.

I initially felt that the lack of individual band by-passes was something of an oversight but extended use taught me to appreciate the fact that results are achieved by effectively mixing the component band contributions and winding off bands' gain controls allows the remainder to be heard in isolation as an altogether more satisfactory arrangement than simply being able to 'flat' the bands individually. The beauty is that you can apply the compression where you want it or where it is needed only. Alternatively you can simplify matters for yourself by winding the crossovers to their extremes to give yourself the broadest midrange as an easy starting point and then dial in top and bottom.

Selection of the crossover points is crucial for optimum operation of the SMC2A and needs to be set on a per program basis. The reason for this is that you have to be careful of large disparities in amounts of compression on signals around the crossover points. If an important or obvious portion of the programme is centred at or around the crossover and you apply a liberal dollop of compression in the low band and a more restrained amount in the mid, under certain circumstances you will be able to hear the two chunks of the signal being worked on separately.

This is true of other multiband devices that offer tunable ranges and it's pretty obvious that you don't plonk the crossover aside a student kick drum in a mix unless of course you've altered the effect.

However, this effect can be particularly good when applied to solo instruments by using just one channel; it's a shame that the unit isn't dual channel but I'd shudder to think how bulky and expensive it would become. But you can get phenomenally sophisticated and unique compression on solo drums, for example. This is something that reminds you constantly that there are glass balls involved then this is the box to buy in bulk.

The ability to apply ultra deep frequency compression in isolation selectively will appeal to those targeting dance floors. Narrow band treatment can do wonders to vocals in a mix and I was surprised at just how much high band valve compression you get spread on and get away with.

This is an exquisite piece of machinery. I have tried a number of variations on the multiband dynamics theme in analogue and digital incarnations and while I am yet to find one that I positively dislike all have their own very definite character and I would certainly rate some above others for particular tasks. The character inherent in a particular box's processing is multiplied when it becomes multiband which is maybe to be expected. To this end I am stating the obvious when I say that the SMC2A sounds like Tube Tech with its characteristic roundness and theixaess of the original signal's audio spectrum.

What you loose with the multiband approach is the immediacy and speed of broadband gain reduction adjustment—you choose the box and simply dial in more or less according to what you want. What you gain is a quantum leap in control of the precise nature of the compression which I have to admit I was never believed was possible with valve based processing. Although you become skilled in applying it, the SMC2A is not as fast to use because your options are tripled and you are invited to analyse what you are attempting and positively encouraged to experiment once you get close and you won't be able to resist. To say that 'mastery of mastering' should not denigrate the myriad of uses it has in the control room.

The results are incredibly impressive on all counts and applications. It also does a good very good job of approximating the sound of other tube type compressors because you can frequency bias the processing very finely.

If you are prepared to invest the time in becoming truly familiar with this unit then it will be the only valve compressor you'll need. Try it and prepare to be amazed.

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January 2000

www.prostudio.com/studiosound

Indigo speakers

The Indigo Home and Studio range of speakers aim to deliver studio playback monitors for the home. The range features no internal wadding, hardwired second order crossovers, 21mm MDF cabinets, and controlled dispersion HF units. Drivers employ neodymium magnets, kapton voice coil formers, laminated paper cones, constant curvature waveguides.

Indigo One is a compact monitor with magnetic shielding for home studios, broadcast control rooms and DAW applications. Indigo Two is a landscape format monitor for similar applications but well suited to surround playback. Indigo Three is described as a powerful, high performance monitor designed with phase accuracy for nearfield listening as a priority using a titanium dome HF and a 170mm laminated cone LF.

Indigo, UK Tel: +44 1480 861175.

Radio on-air

The Airbit radio on-air console is D&R's solution for applications where features and functions must not obstruct operational simplicity. A simple control surface combined with intelligent instantly reconfigurable digital functions enables customisation to a station's requirements through the use of a personalised chip card holding all important functional data. Additional features include a welded steel frame that accommodates a maximum of 16 triple input modules, which could include Telco modules plus the master section with script space. The main outputs are electronically balanced and the majority of connectors are on the back panel of each module.

D&R, Netherlands. Tel: +31 2940 418 014.

STM 99 modular mics

Drawing on 20 years of experience in miking brass and woodwind in studio situations, the STM modular series offers a versatility in top-quality shock-mounts and exchangeable elements. Top of the line is the 'deep and warm' sounding STM-99 large diaphragm element. The patents pending mounting systems are suitable for studio situations and give the player the freedom of movement. SD Systems designs each microphone system for a specific instrument, picking up the complete sound spectrum in the right way. The mics are fixed in the optimum acoustical positions on the instrument and extensive research has been conducted to find which sound pattern each instrument produces, which sort of element matches the instrument's sound and where to position the elements.

SD Systems, The Netherlands. Tel: +31 20 692 6413.
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Crane Song Trakker

Building on the reputation of the STC-8, Crane Song's Trakker brings class-A prestige to the party. George Shilling makes tracks.

The TRAKKER is a new mono compressor-limiter from Crane Song. Similar in appearance and circuitry to the STC-8 Stereo Compressor (Studio Sound, November 1999), the differences manifest themselves in class-A electronics, solid construction from steel and aluminium, and a bluey-green colour scheme for the front panel.

Although the Trakker's workings are squeezed into a 1U-high rack space, it is a fairly deep box and feels decidedly heavy—no doubt due to the large toroidal transformer and multitudinous heatsinks. These seem generously over specified, as the unit feels fairly cool for a class A unit. Designer David Hill has a boffin's obsessive attention to detail in all areas, an example of which is the options of four different (internal) voltage settings. Using the 230V setting instead of 240V in a 240V environment would probably not be disastrous, but perhaps the unit might run hotter. Input and Output XLRs are accompanied by a DB9 connector for attaching a fully balanced side chain, and a DB15 for linking up to a further seven Trakkers. In this mode, the Trakker claims to, err, track within 0.1dB for accurate surround sound program compression. Also in this mode, only the slaves' Gain controls are active. These unusual connectors make things neat and tidy, but could be a nuisance in any situation other than a permanent installation, due to their non-standard nature.

On the front panel are gently damped rotary controls for Threshold, Attack, Release, Knee and Output Gain, and a 16-position switch for mode selection. Legending could be better, but is a slight improvement over that on the STC-8: the mode switch is here accompanied by colour-coded tabs. The variable knobs are mostly given scales of 1-10, which is sensible as settings interact and are dependent on program and mode. They seem to vary to always provide a perfect range of adjustment. These are a joy to use. Output Gain is simply that—no attenuation can be achieved with this knob, simply a make-up of up to 14dBs, which is perfect. The long tap meter is superb, retaining accurately to what one hears when set to Gain Reduction mode. There is also an Output Level indication available. Toggle switches are provided for power, meter, link, and hardwired bypass, in which mode compression is still metered, which can be handy or confusing depending on your point of view.

The 16-position switch offers four modes, with the same four variations of each mode. I don't know why there are not two 4-position switches, which would have made operation simpler and mode comparison easier. The four quadrants of the switch equate to modes Hard, Soft, Optical and Air Optical compressor characteristics. Hard returns to the knee, (the knee knob is for fine tuning), and this mode effectively turns the unit into a peak limiter. Optical aims to emulate the sound of certain vintage units, and when the other knobs are set to recommended settings, this is a fairly convincing replication of a vintage Teletronix LA3 compressor. Air Optical mode adds a small high frequency boost to replicate compensatory treble-lift circuits found in certain vintage valve compressors.

The four sub-modes found within each main four sections are related to amplifier colouration: Clean, Vintage (tube or 'old-style') and crossover designs are licensed from PMC's Nomex honeycomb and employs transmission line design. It uses a custom-built 6/9-inch flat piston woofer constructed from a carbon fibre/Nomex honeycomb and a high power handling 11-inch silk dome tweeter. The two drivers are integrated by discrete low-noise active crossovers and the dual 120W amp and crossover designs are licensed from Bryston. User-controls provide for input level adjustment with LF roll-off, HF tilt and HF tilt that can be defeated on a push-button. The XBA-A MKII is described by PMC as an excellent dedicated speaker for the 1 effects channel and partner to the TBI and LBI nearfield monitors. It includes its own internal crossovers which remove the LF below 90Hz from the satellite speakers and routes it via its own dual coil bass drivers. Features include a new look cabinet in style with the IB15 and SB100 products, rotatable back panel for horizontal or vertical placement, radiused front for improved air flow, easy reading wiring legend for input and output, an optional front face grille and usable bass extension to 25Hz.

PMc, UK. Tel: +44 1707 393002.

Interpreter booth

Brahler ICS M83H interpreter booth.
NEW TECHNOLOGIES

plies with ISO4043 and exceeds the industry standard for sound-proofing criteria. It can accommodate two interpreters but through its modular construction can easily be expanded to accommodate three and special clips facilitate simple assembly by one individual. The booth consists of lighter laminated panels and the inside surface is covered with a hard-wearing felt while a rubber seal for the door further sound attenuation. Brahler claim it is the most efficient and cost-effective of its type available. Brahler ICS, UK.Tel:+44 1223 411601.

Windspoil

Rycote's Windspoil wind-reduction device can be used with any mic fitted with a Rycote Softie and Softie mount. It works by reducing wind noise on the rear of the mic and is said to have no discernable influence on audio quality. Total wind-noise reduction is claimed to be more than 30dB.

Rycote, UK. Tel:+44 1453 759338.

90 Series from Wharfedale

Developed from the successful 2180 series which continues in production, the 90 Series offers increased power handling and high sound pressure levels from a range of compact boxes. With three models available, each speaker uses 8-inch reinforced pulp cone woofers (featuring a 50mm high temperature voice coil) with Ferrofluid cooled 25mm titanium domed HF units; all designed in house by Wharfedale. The 2190 and 3190 speakers also feature the 'Baker Effect Array', by mounting two HF drive units perpendicular to each other, and carefully contouring the crossover network, the speakers are able to reproduce a dramatic stereo effect in almost any listening position. The 90 Series consists of three models. The 2090 and 2190 are rated at 200W (programme) with a nominal impedance of 8Ω. The principal model of the range, the 3190, delivers 350W (programme) with a nominal impedance of 4Ω. The 3190 is loaded with two 25mm tweeters as well as two 8-inch woofers.

Wharfedale, UK. Tel: +44 1480 431 737.

Vegas Pro

Vegas Pro features a multithreaded architecture designed to 'squeeze over the top' real-time performance from a Windows PC. It is able to perform nondestructive edits during playback, run multiple plug-in effects and mix file properties, bit depths and sampling rates. The system has 24/96 capability, accommodates 'unlimited' tracks and includes DirectX support. It can support creation of streaming media for Windows Media Technologies 4.0 and RealNetworks Real System 62 file formats plus mp3. It can also incorporate timeline metadata for class-A'. Clean with VCA artefacts and Vintage with VCA artefacts. Vintage paths add colouration set to replicate that found when using triode tube circuits and single-ended class-A transistor circuits, which translates as second harmonic colouration, with third harmonic clipping is approached. I compared a Urei LA3A and found that to replicate the ratio characteristics a higher knee setting than suggested was necessary. Air Optical mode was very similar-sounding. I also compared a Teltronix LA2A to Optical Vintage, and this again required a steeper knee setting than recommended to match those characteristics, but once dialled in, sounded convincing. The differences between these modes can be fairly subtle, dependent on program and other settings, but it should be noted that all controls interact, and the Optical settings especially have an element of program-dependency. VCA artefacts are only apparent when the gain is changing, only on faster settings are the colourations apparent. Vintage VCA adds the most extreme colouration, with an apparent emphasis and added dynamism in the high-mid frequencies and an obvious presence boost in the region associated with guitar string finger noise or vocal detail. On drums, extremely fast settings sound terrific, especially with a steep knee. The differences between the modes are more obvious in these extreme circumstances. With slower settings, instruments are especially clean and detailed, and vocals really cook. This unit is excellent in sound quality and operation. It is difficult to make it sound bad or distort in a nasty way. All deliberate colourations are subtle, and the overall impression is always of cleanliness and supreme signal integrity. Sometimes it is impossible to decide on the suitability of one particular subtly different setting over the other 15. But it would take a long time to really get to know this machine, and perhaps that is the beauty of it. I would love to spend some more time with it.
RME Project Hammerfall

If grand title equals impressive specification, RME's Intelligent Audio Solutions Dig!9652 PC Interface Card should be a gem. Rob James put it to the test.

The German Design house, RME Intelligent Audio Solutions has offered a range of soundcards for some time now. The latest example is the implausibly named Project Hammerfall. This provides 24 channels of optical ADAT I-O, ADAT sync and stereo SPDIF I-O together with wordclock I-O on a single, tiny PCI card.

The connectors for all this will not physically fit into the space available in a single PC back-plane slot so a daughter board is employed that carries optical connectors for channels 17-24, the BNC connectors for wordclock I-O and a LED to indicate a valid wordclock input. The daughter board connects to the card via a ribbon cable and does not require a second PCI slot. If the third ADAT and wordclock I-Os are not required it is not necessary to install the daughter board. A break-out cable splits the 9-pin sub-D connection into a pair of phono for SPDIF and a further 9-pin for ADAT sync. The SPDIF outputs are actually transformer balanced with no ground connection. This, together with a 'professional' setting that increases the voltage to 2.5V, makes direct AES-EBU connections possible. There is also an internal digital input on the card for connection to a CD-ROM drive.

Two cards can co-exist for a total of 104 input and output channels. 96kHz operation is enabled by simple splitting—each 96kHz channel occupies two ADAT interface channels and indeed, two ADAT tracks on a standard ADAT recorder if you want to record or replay on this medium.

ASIO drivers are supplied for Windows 98 and NT-Windows 2000. The latest release also has Windows 98 MME drivers. Mac drivers are under development.

Once installed, the visible evidence of Project Hammerfall’s presence is a hammer icon in the tray and a shortcut on the desktop. Clicking the hammer opens the DIGI652 Settings dialogue box. Project Hammerfall is unusual in that any changes made to settings take immediate effect. There is no need to click OK or exit the dialogue. This can be very useful when trying out different buffer sizes or sync modes in order to minimise latency and glitches, although the buffer settings are only applicable using ASIO.

RME has concentrated on optimising performance under ASIO by allowing the bus-mastering Hammerfall to handle audio drive access with little or no CPU involvement. They have also employed a 96kHz PCI bus FIFO to reduce the possibility of glitching. The claimed processor hit using ASIO is ZERO. Since few applications are currently capable of using ASIO drivers I was interested in the performance under MME with applications such as the Sek D Samplitude. Purely subjectively there is a gain over other cards. Not massive but tangible. I found I could reduce buffer sizes for a given project with obvious consequential benefits to latency.

RME has also implemented enhanced ZLM (Zero Latency Monitoring) when used with a suitable ASIO application, or suitable MME applications such as Samplitude, allowing multi-track monitoring without glitching. The Intelligent Autosync function constantly scans all inputs for a valid clock signal. If a signal is found that corresponds to the current sample playback-rate sync is switched from the internal crystal. It is also possible to set a preferred sync reference. If a valid reference is present here it will be used as the master. This can_N be useful in systems which include non-synchronisable sources—like most CD players. The SyncCheck function continuously monitors the sync status of all inputs. Three states are indicated: No Lock indicates that there is no valid signal present. Lock means valid signal present and Sync equals valid synchronous signal present. The board will rapidly lock to any rate between 25kHz and 105kHz. The claimed jitter performance is remarkably good at less than 2ns on the ADAT inputs. Another useful function allows the audio bit in the SPDIF header to be set to 'non-audio'. This is essential when sending Dolby AC-3 streams to external decoders. A suite of applets is also included entitled DIGIcheck. This provides high precision meters and diagnostic functions.

Project Hammerfall makes a good case for the use of ASIO drivers. With any luck it should provoke more software developers into supporting ASIO. With well thought out software, reduced latency and versatile connectivity Project Hammerfall advances the state of play in PC audio interface cards. Now all we need is better disk controllers and drivers optimised for audio. Meanwhile RME has raised expectations and reduced the cost of getting into something closer to genuinely visible, professional multichannel PC audio.

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www.prostudio.com/studiosound
Studio Sound

New Technologies

Advanced Internet content authoring
Sonic Foundry, US. Tel: +1 608 256 3133.

MP3 Audio Machine
Alcorn McBride has introduced a stand-alone audio source for background, triggered or interactive audio applications. The MP3 Audio Machine uses a real-time clock to play tracks at predetermined times or to select different random playlists depending upon the time of day. It can receive new audio across the Internet via a modem, or via Ethernet interface and store the audio on removable memory card with a optional internal hard disk accommodating hundred of hours of audio. Audio can be created and edited using a PC with software provided and then copy the MP3 or WAF files to the storage media. Clips can be triggered using push-buttons or controlled via RS-232. The book-sized device can work in high vibration environments such as roller coasters, and runs on mains or battery. Alcorn McBride, US.Tel: +4 079 296 5800.

Multichannel meters
Designed for multichannel working, Logic's Ultra-VU 1 and 7.1 meters are based on the company's Ultra-VU meter. Six or eight LED bar graphs are packed into a single enclosure with analogue or digital inputs. Analogue inputs are bridging and accurate balance is maintained. The display is composed of 62 LEDs with true 300ms VU meter backlash with peak indication and hold. Operated modes selectable from the front panel include loudness filter and fine resolution. The packages are the same size for both versions, only differing in the number of vertical meters, and the power supply is in a separate enclosure and can be located away from the console. A Super-VU 5.1 surround meter is also available that draws from the Ultra version predominantly in the use of 40-LED bar graphs. The latest addition to the Logic's stereo meter line is the Tru-VU model that is based on the curved LED meter face found on the company's ROC digital consoles. It represents the true 500ms VU bullistric standard along with a peak display. The two meters come in a rackmount that is similar to the company's analogue 2VUB and contains the power supply, connectors and controls.
P&E, UK, Tel: +44 1223 415 459.

www.americanradiohistory.com
interface with your intuition

TASCAM's engineers are dedicated to delivering ever more recording power, at an ever greater cost advantage: providing musicians and engineers with access to the most creative resources digital technology can provide.

This advanced third generation TASCAM 36-input digital console provides unparalleled levels of processing, audio quality and control at the heart of any recording system, including full 24-bit audio, moving faders, snapshot and dynamic automation, programmable FX and dynamics, fully parametric EQ, proper machine control, full MIDI, Sync and word clock capabilities, and the most versatile I/O capabilities of any recording console in its class.

Most importantly of all, the TM-D4000 offers a control surface and operating system that interfaces directly with your intuition. And for future proofing the TM-D4000 is readily expandable with a full range of interchangeable T/CIF, AES and ADAT™ digital and balanced analogue (24-bit AD/DA) I/O expansion cards, and plug-in 8-channel high quality mic pre-amps (MA-ADA), 8-channel 24-bit DAC (IF-DAB) and 8-channel ADAT to T/CIF (IF-TAD) convertor units.

At just £27919 (inc. VAT) - inclusive of meter bridge and PC based dynamic automation software - the TM-D4000 represents something altogether different in the 8-bus digital mixer market - a breakthrough.
Neil Karsh is the Vice President of Audio Services for New York Media Group. Recently, Karsh selected LSR monitoring systems for two of his Manhattan facilities, Lower East Side and East Side Audio.

"We've installed the first of our LSR 5.1 surround systems at East Side Audio and it's a great addition. The sound is extremely clear and is enjoyed by our mixers and our clients. Everyone is very pleased with the result."
From punk beginnings to Brits 'Producer of the Year', Youth has a flair for marrying innovation with success. Richard Buskin talks originality, performance and lesbianism with the producer, remixer and musician.

Toying with another artist's compositions is never easy, but for a recognised producer-songwriter it can be a particularly tricky issue given the sensibilities and fragile egos in play. Such is the predicament that occasionally confronts Youth, the 1998 Brits 'Producer of the Year' who has carved out a solidly contemporary niche courtesy of his recent production work with acts such as The Verve, Embrace, Vanessa Mae and Crowded House. A new album by The Audience features compositional contributions in addition to production work, continuing the pattern set with the likes of Blue Pearl, The Orb and Killing Joke (of which he himself was a founder member). Yet Youth is quick to point out that credit should only be taken when the service has been requested well in advance.

'This issue can really screw up a session,' he says. 'You might feel that you really want to hear a song use a different chord or you might get an idea for a line, but the artists are trying to establish their own identity and their own writing credentials and you can ruin their confidence by adding your opinion. Within the studio everybody's role has to be clearly defined, because once you're in there you're all in there together, and even the tape op contributes. History, therefore, is to define our roles beforehand, and if I'm asked to co-write with an artist then that's what I'll do. Sometimes I might put a line in and sometimes I might come up with the melody, and at the end of the day it'll be credited as a co-write. If, however, I'm just commissioned as a producer and I don't think the song is there, then I'll tell them what I think is wrong and I'll ask them to change it.

'Once we're into the album I'll actually give them lines. I've done that on a number of occasions otherwise I'll only ask for what I've been asked to do, but I will give 200 per cent. This issue can come up when I'm working with keyboard players, programmers, even tape ops, because the tape op can be playing around with a guitar during a tea break and the guitarist will say, 'I love that. I'll have that,' and what do you do? So, when this kind of thing happens I tell people to give whatever you've got to give, but be careful when you give it because it's not always been asked for. If the composer says, 'I want to give you a bit more for that, I want to give you some publishing,' then great, but don't expect it.'

Born Martin Glover, Youth—who took his name from reggae artist Big Youth—was only 15 years old when he quit full-time education in 1977, abandoning plans to go to art school in favour of answering an ad to play bass in punk outfit The Rage.

'I had never actually played bass before,' he now recalls. 'I'd learned how to play guitar after doing a deal with my chemistry teacher at school; if he'd teach me a few chords on the guitar I'd play some songs at his Christian folk meeting. Then I persuaded the music teacher at school to show me how to take the chords that the chemistry teacher had taught me and play them on the piano without having to go through all of the grades. He agreed to do that, and straight afterwards I started writing songs. You see, listening to music always left me feeling dissatisfied. At first I'd get turned on by it, but then I'd be left hanging when they changed key or went to a different chord. So, I was more into sort of learning a few chords and then just getting them to loop, almost like we do now.

'Two weeks after auditioning for The Rage, Youth was on a tour supporting The Adverts and The Saints. I told the manager I was 18 although I was only 15,' he now recalls. 'Years later I bumped into him, he was driving a London cab, and when I told him how I'd lied about my age he said, 'Well, you know I told you I was 21? I was only 17.'

'At the first rehearsal I didn't know where to plug the guitar lead in, and I plugged it into the back of the speaker instead of the amp. The drummer was watching me and he said, 'Have you done this before?' I said, 'I'm not really familiar with this equipment.' He said, 'I'll show you once, and that's it,' and he did and I learned really fast.

'Talk about flying by the seat of his pants. What's more, six months later the Youthful one had dispensed with Rage, and, in an intriguing sideways move, became the lone male member in a lesbian punk band named The Stilletos.

'That was just a laugh,' he asserts.
However, another six months on, he came to the realisation that he was fed up with just having a laugh. Thus, in more serious pursuit of his musical ambitions, he hooked up with Jazz Coleman, Paul Ferguson and Geordie Walker to form Killing Joke. Still only 17, but with two John Lydon records already under his belt, Youth had far more studio and touring experience than his older colleagues, and before long he was also a partner in the band's own label and management, as well as a deal with EG Records that enabled Killing Joke to produce themselves and license the ensuing recordings. This was the blueprint for the first three albums.

'I left the band when I was 23, and the last album that we did together, [Revelations], was my first experience working with another producer,' says Youth. 'That was with Conny Plank, and it was an amazing experience. He was the only producer who we could all agree on, and that was because he had produced Kraftwerk. Conny died about 15 years ago, but he was a central figure in that whole 'Kraut Rock' scene. He had produced Stockhausen and Brian Eno—both of whom we were really into—and so, working with him in Germany, we really felt that we were doing something different. We were doing music that we wanted to do, but which was still relatively obscure and unknown, and I just think that I was so lucky to be there at that time. That music has become such a big part of the alternative music influence, and we managed to get touched by it just as that era was winding down.'

Now more attuned to working in the studio than going out on the road, Youth quit Killing Joke in 1983, and immersed himself in work as a producer of electronic music while also launching a funk rock outfit called Brilliant.

'We ended up being signed to Warners,' he recalls. 'We had two drummers and two bass players on stage, and my production instincts told me that I couldn't really translate that sound in the studio, so I thought that we'd go the other way and do really electronic and really pop. We therefore got in Stock, Aitken & Waterman to cowrite and produce an album with us, and it was a disaster. We didn't get any hits and we almost drove them mad, because we were a band and they were just starting to work with the likes of Kylie. There again, being that at the same time that we were doing this dance music I was producing all of this industrial material for the American market, working with Waterman was very good experience for me. I mean, what those guys were doing was quite anarchic, bringing in import dance records, Pete saying, "We'll use that bass line," borrowing another record's chords, another record's beat. They were like samplers, and we thought that was really refreshing after being in bands where everyone was concerned with being completely unique and original.'
‘That left me re-evaluating what the criteria were to be an artist. After all, what is it to be original? You know, sometimes you try to be original and it’s just bollocks. No one understands it or relates to it, and when I investigated the whole concept of originality it became clear that, whatever the culture, it still has to have a point of reference and come from a certain school of thought or a certain scene. Whether you’re dealing with hip-hop or whatever, to some extent you have to go with what is already known in order for people to be able to relate to it. If you go too far left-field it becomes avant-garde and only certain people in certain cliques will understand it, and even then they’ll only understand it if it’s presented to them in a way that they’re familiar with, so it’s still coming from a certain school.

I had to understand all of this stuff if I was going to produce and be good at it, because part of being a producer is bridging those two worlds. It’s working with the raw material and saying, ‘Okay, I can help you produce this so that people will understand it in a commercial medium.’ I mean, working with Stock, Aitken & Waterman was a paradox; I thought they’d be really banal and superficial—and I think a lot of their work was—but their actual approach was quite radical for us. Up until then there was this whole thing of ‘I’m not going to do a chorus, because everyone does choruses and I’m going to be an original artist. I’m going to be unique and I’m not going to play those notes.’ Actually, with Killing Joke, by the time of the third album it was like that and we were having massive arguments about whether or not we should have a chorus.

‘These experiences really come in handy for what I do now, because I work with a lot of young bands who go through that process. I counsel them and encourage them to embrace those [pop structural] limitations, because by embracing them you can get a higher quality of result. Of course, it makes it harder, because you have to embrace the cliché and then transcend it, and a great songwriter and a great artist will do that and they’ll have a No.1 record.’

Sample The Verve’s Youth-produced singles, ‘The Drugs Don’t Work’ and ‘Bitter Sweet Symphony’, which went to No.1 and No.2 in the UK charts respectively and which both adhere to a very simple pop format arrangement, managing to transcend the clichés by way of their sincerity and emotional depth.

‘What’s most important is what you’re saying as a writer or as an artist, what emotion you’re projecting and the depth that you’re going to. The songs aren’t the hard part—that’s just positioning the mics—but the backing stops with the song and the performance. You’ve got to have great songs, and you can encourage the artists to go deeper in terms of their songwriting by showing them where the gauge is, playing them great songs and recounting experiences that you’ve had where songs have moved people profoundly. If the songs are there it’s a joy, because you can produce them in a number of ways, and the hard part then amounts to deciding on what is the definitive way.

‘I actually record songs in a number of different ways sometimes, faster, slower, different keys, and I don’t >
<think that's unusual. I spend a lot of time in pre-production working out what the arrangements are, not only for the song but for each of the musicians in a rehearsal setup, so the pressure is on. They're not worried about spending loads of money or loads of strange people who are walking around, prodding them and positioning them with mics. They're in their home territory and they're comfortable and they're relaxed, so we can get a lot of work done and I can settle on the arrangements.

My background as a writer and an artist enables me to go directly to those areas, and see what I need before we ever get into the studio. As a result, when we do get into the studio all I have to focus on is the emotional depth of the performance, and I'm not being distracted by whether or not that middle eight is right or whether or not the bass line is helping the melody. I've already done all that.

Concentrating on performance is, I think, an art in itself. It requires making sure that the engine, the management and the roadies have all got everything there on time, and that they're confident and competent. Everything has to be set up quickly so that there's not much waiting around, and then you have to get the band playing early. I mean, if you've spent all day setting up and then have dinner before they start playing at 7 or 8 o'clock in the evening, it's going to be really hard to get a good performance out of them. The problem is, a lot of people really want it to be great, because they've worked all day, they have all spent months and months coming to this point, and they want to leave the studio on the first day with a good vibe. So, they end up staying around all night trying to get it, and it just throws the whole thing off kilter.

You've therefore got to start early every day, and you've also got to be very flexible. You've got to understand what the needs of the band are; what they are like personality-wise, what their temperaments are, and what they have been doing. You know, if they've just been on tour for 18 months, if they've just done another album, if they've never done an album before—all of these things will determine what studio and what working conditions you should employ in order to get the maximum performance out of them, and of course for different bands that means different things.'

In the case of The Verve, they had already attempted to record their ultimately chart-topping Urban Hymns album with two different producers before recruiting the services of Youth.

Their way of working was to stay up for three nights and wait for the moment,' he says. 'It just wasn't happening for them, and so my approach was to start in the studio at 10 o'clock in the morning, have takes by 3 o'clock and be overworking by dinner-time. No drugs or booze, maybe a bit of smoking, but no more than that while we were focused on the project. At that point they were already washed out with the other approach, and so they thought this was a relief and said, "Okay, yeah, let's try it."

As a result, we got it really fast. On the other hand, with bands like Crowded House who had worked with Mitchell Froome—who is a very conservative producer—and who had brought in session musicians for the rhythm section, I'd say, "Let's go out to the country and let our hair down". I'd encourage them to experiment.

You've got to make the work exciting, because otherwise it's a very clerical task. Most engineers, I think, don't appreciate that. They're just thinking about the technical hurdles and how they can get around them technically.>
Home Comforts

YOUTH'S HOME setup, located in an upstairs bedroom, includes a 24-channel Mackie console with a 24-channel extension, 16-bit and 24-bit Pro Tools, Urei and DBX compressors, Focusrite and Moog EQs, an H3000, a pair of Roland reverbs and a DAT machine, not to mention a K250C, several old analogue keyboards, an assortment of guitars and plenty of old pedals. All of this writing and preproduction takes place here, such as making film music ready to score for orchestra, and the facility can also be used in a postproduction sense to edit and compile the CDs that he puts together for the record labels.

'I've also been mastering some Killing Joke material here with Jazz,' says Youth, 'and I'm managing to get to grips more with the engineering as I'm working alone as a one-man show. At times I get a programmer in to help me, and so again I'm always learning while still trying to keep an objective distance from it, because a big part of being a producer is being objective when you get a little near to the rock face.'

The Verve went to the top of the British charts with Youth's productions of 'Bittersweet Symphony' and 'The Drugs Don't Work'.

< They move the band around like they're actors on a set, and that can make for a very uninspired atmosphere and stale performances. I think a lot of producer-engineers fall into that trap and make competent but very predictable records. What I try to do is find out what will create a magical atmosphere that enables something special to happen.

Nevertheless, the man who once remixed a host of records by artists ranging from Marc Almond, Tom Jones, Lisa Stansfield, Erasure, Kool & the Gang, Fine Young Cannibals, Wet Wet Wet and Pop Will Eat Itself to Malcolm McLaren, The Shamen, The Cult, INXS, Siouxsie & the Banshees, Psychedelic Furs, Art of Noise, U2 and Jimi Hendrix, asserts that around 10 to 15 years of production experience is required in order to have the goods to achieve that something special.

'It's a mystery, and to really understand the elephant traps that are there you have to go through them,' he says. 'No amount of preparation will compensate for a day's experience of failure. I made a lot of records in the eighties and early nineties, experimenting and confronting flat atmospheres and wondering why, and then working it out. Sometimes it was because I'd expect them to be where my head was at, whereas I think a lot of it is down to you working out what they need, and what you all need to get you buzzing and turned on. That will hopefully compensate for the mundane drudgery of waiting for the technology to work or whatever. You can make the process a lot more fun and a lot more exciting, and also you get that creative momentum going. So you get a lot more ideas and you get inspired to do different things, because you've got a lot more choices.'

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E B WHITE'S POPULAR 1945 novel, Stuart Little, is Columbia Pictures' 1999 Christmas major-cinema release. It combines live action, digital character animation and effects presenting director Rob Minkoff with the challenge of merging Sony Pictures Imageworks visual effects (Godzilla, City of Angels, Contact) with live action. The story chronicles the experiences of a mouse adopted by a human family, and who embarks on adventures with a variety of characters, including his nemesis, Snowbell the cat (voiced by The Lion King's Nathan Lane). Geena Davis and Hugh Laurie play Little's adopted parents, while Michael J Fox supplies the voice for a coming-of-age tale that focuses on a small, yet intimate portrait of contemporary middle-class New York.

In essence, this big-screen adaptation of America's beloved children's story can be compared to such films as Babe, Toy Story and A Bug's Life in that the world is seen from a decidedly different point of view. The chief difference between these films and Stuart Little is in the dimension of performance-based, photo-realistic digital character creation. Where Toy Story and A Bug's Life created digital characters, they were synthetic characters populating a synthetic world. In Babe, a combination of techniques including photographing real animals, animatronic animals and digital facial replacement were employed to create the talking animals. In contrast, the character of Stuart Little was created by entirely synthetic means and integrated into a real world. From both the visual effects and sound points of view, both sets of artists began with the same basic elements—the sound of the voice actor and nothing else. What the finished movies contain reflects the collective effort of a team charged with creating something big from very little.

Supervising Sound Editor on the project was Larry Mann, an LA-based freelance editor who assembled his editorial crew at Sony Picture Entertainment's multimounted postproduction lot in Culver City, to work on the intricate sound design required to create the intimate world of Stuart Little. The supervisor has worked in the past on such films as The Quick and the Dead with director Sam Raimi, Soul Food, with George Tillman, Jr. and Extreme Measures, with Michael Apted; sound editing chores have included Meet Joe Black, Anaconda, Con Air, The Rock, Waterworld, The Shadow and Patriot Games. (He has also worked on a number of TV shows, including Chicago Hope, and several Movies of the Week for TNT, and Disney.)

Mann says that he worked closely with picture editor Tom Finan, to determine the basic pacing of the film, but was left pretty much on his own to develop the individual 'sound signatures' and overall 'sonic theme' for the picture. (Mann had worked previously with Finan on Pet Sematary, and Problem Child.) 'Our biggest challenge,' he considers, 'was to create such a convincing sound environment for the CGI character of Stuart Little, that audiences would forget that he was, in fact, computer-generated, and treat him just as if he was a . . . mouse that was confused about being human.

'We also focused on creating a larger-than-life sonic signature that we could transition into when the action entered Stuart's World, as we referred to it. Being small we wanted to capture that essential feeling of experiencing the world from Stuart's perspective.

'So whenever we were seeing or experiencing the action through Stuart's eyes—and there are several high-energy chases sequences where this approach became particularly appropriate, including a journey in a boat through the lake in New York's Central Park—the large objects around Stuart needed to be 'amplified' and enlarged to make it obvious that not only were we now in Stuart's inner world but that we were kind of overawed by it, just as children are when they first experience the big city, for example.'
worked previously with the mixing team on *Extreme Measures*. In early January 2000, Massey and Hemphill moved across town to the John Ford Theatre at Fox Studios' new dubbing complex.)

Mann's first assistant editor was Ann Ducommun, who also functioned as 'Information Central' as the supervising sound editor put it; Suhail Kafity handled FX editing, with Steve Ticknor (who also handled several Temp Dubs); Cindy Marty supervised ADR editing, plus prerecords; Fred Stafford was an ADR editor; Linda Folk handled ADR editing; Dave Arnold and Duke Brown handled dialogue and ADR editing, plus prerecords; Mark Pappas was Foley supervisor, working with Foley editor Gary Wright while Chris Winter oversaw the inloading of production dialogue and related files into the Pro Tools workstations from OMF files created by the picture editors. Wright was also responsible for managing hard drives, co-ordination the inload of sound effects, preludes, laybacks, assisting the editors and Pro Tools management, troubleshooting, and so on.

All sound editing was handled on individual Digidesign Pro Tools systems, working from production dialogue recorded onto time-code DAT machines plus effects pulled from >

The editorial sound-crew for *Stuart Little*. At the back (left to right): Suhail Kafity, FX editor; Mark Pappas, Foley supervisor; Duke Brown, dialogue and ADR editor; Larry Mann supervising sound editor; Paul Wood, director of engineering and R&D, Sony Pictures Studios; and Steve Ticknor, FX editing and temp dub mixer. In front (left to right): Dave Arnold, dialogue, ADR, effects and Foley editor; Linda Folk, ADR editor; Ann Ducommun, first assistant; Cindy Marty, supervising ADR editor; Larry Goodman, director of sound, video and projection, Sony Pictures Studios; Chris Winter, digital assistant editor
Mann's extensive library of analogue and digital elements. ‘We were also able to playback our edited Pro Tools session projects on the (re)recording stage via removable hard drives loaded into the new Sony DADR-5000 116-channel digital dubbers, which are now fully file-compatible. ‘That way we could playback elements directly from the Sony drives featured on the William Holden stage used to remix Stuart Little.’

Extensive Foley elements and ADR were also recorded directly to DADR-5000 hard drives that were loaded into Pro Tools for editing.

Because of the CGI nature of the film’s main character, all that the editorial team had in the way of production sound was the prerecorded voice of Michael J. Fox. As Supervising Foley Artist Gary Hecker explains, ‘We had to create everything else in Stuart’s world, including all of his footsteps, clothing rustles, movements, slides and the myriad other sonic seasonings that a mouse makes as it moves around. I placed myself—quite literally—in Stuart’s shoes, and created his whole environment on the Foley stage. (to make) the CGI character appear real and totally believable on the screen. Our intention was to bring life to this charming, computer-generated character.’

Creating all of the Foley elements for the boat race through New York’s Central Park was particularly demanding, Hecker recalls. ‘Rather than pull sound-effect elements, we created all of the dynamic sounds of the wind, water, sails here on the Foley stage. We recorded stereo sails slips—so that the mixer could establish a very realistic-sounding perspective—plus mono water splashes, waves, winds, and a whole slew of ‘detailing’ elements that (Larry Mann) thought would be required to convince the audience that Stuart Little—his inner world—was really in trouble on this “Sea in Central Park.’ and join him in his anxiety and excitement.’

Assisting Hecker on the Foley stage at Sony Pictures was Michael Broonberg, working with engineer Richard Duarte.

‘Normally, an editor will pull standard effects for water, winds and one or two other elements,’ Hecker says. ‘We wanted to create a total environment, and the only way we concluded we could do that was to actually recreate the Central Park lake on the Foley stage.’

An added bonus, Hecker offers, was that all sounds were in hard sync with picture, thus saving the sound effects editors many man-hours of resyncing effects from a library, or recorded specifically for an action sequence. On these busy reels, Foley Elements were recorded across 16 tracks of Pro Tools for editing by the editorial team ready for the temp mixes and predubs. ‘Foley is used to complement the library of sound effects,’ Mann offers.

In late October, the series of predubs were going extremely well, Mann reports. ‘But we are already four revisions behind the picture changes.’

Steve Ticknor, FX editor and temp dub mixer in one of Sony Pictures’ mix-to-picture suites. The room features a 32-channel 4-layer Digidesign Pro Control mixing system, linked to a fully loaded Pro Tools digital audio workstation with three 8:8:8 converters for 24-channel I/O. An Otari picmix handles multichannel monitoring and loudspeaker assignment, with PEC-DIR control switching for two Sony DADR-5000 digital dubbers.

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refining for the Finals and SDDS Print Mastering from late November until early December of this year.

A key contributor to the various temp dubs was Steve Ticknor, who was able to use Sony Pictures custom-developed mix-to-picture suite to quickly create a more realistic sounding temporary mix than might be possible on a conventional dubbing stage. Ticknor also handled sound-effects editing.

'Because of the speed and flexibility offered by this configuration,' Ticknor reasons, 'I could offer the director different ideas about the way we might realise his wish for the "inner" and "outer" worlds of Stuart Little, and how these might be achieved in a realistic and meticulous way. We needed to 'Make the familiar sound unfamiliar.' For example, I was able to sweeten the sounds of water with underwater sounds to enrich the track, and make it more enveloping for the audience.'

The Foley crew for Stuart Little. From left to right: supervising Foley artist, Gary Hecker; Foley engineer, Richard Duarte; and Foley artist Michael Broomberg.

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Broadcasting Big Ben's Millennium chimes was not a ground-breaking project it was one that would demand a thousand years for a second take. **Kevin Hilton** watched

**EACH CITY, each country has its own way of counting down to the start of a new year. New York has Dick Clark and his drooping ball; Tokyo has its huge display screen above the streets; and London has the chimes of Big Ben.**

Because it was the start of a new millennium, there could be no risk that the country (and those listening to the BBC World Service) would not get to hear those famous chimes and know for sure that it was time to join hands and sing ‘Auld Lang Syne’.

The BBC has its own land-link connection to the microphones in the clock tower of the Houses of Parliament, which it has had for many years. A mis-conception in this matter is that the clock tower is mistakenly thought to be Big Ben itself. The name in fact relates to the 15.7-tonne bell inside, which was cast at the Whitechapel Bell Foundry in 1858. It is known as Big Ben after Benjamin Hall, the first Commissioner of Works in London at the time.

Last year, things were different. The BBC was to relay the chimes for its broadcasts as usual but was taking its feed from the Millennium Dome in Greenwich, south-east London, where those attending the building's opening night had to be able to hear them as well. Doing what everyone else in the country does—turning on the radio for that brief but all-important time—would not be enough, given the high profile dignitaries in attendance, royalty and heads of state among them.

The New Millennium Experience Company (NMEC), which built and operates the Dome, was asked to ensure that the chimes could be recorded and transmitted without fear of a last minute appearance by the Millennium Bug. Simon Daniels, deputy head of broadcast engineering for NMEC summed up the pressurised situation: ‘Because there were to be so many important people at the Dome on New Year’s Eve, we had to find an absolutely secure method of recording the chimes.’

As is well documented, the Dome has been fully equipped with audio-visual equipment for the live entertainment and informative displays it contains. What is less well known is that it has comprehensive broadcast facilities, as the BBC was taking a live relay of the main live show, featuring music by Peter Gabriel, in the countdown to the chimes.

The central TV facilities complex, or International Broadcasting Centre (IBC), is equipped to receive, mix and distribute TV signals to and from the world. It also features Internet broadcasting links and a full radio broadcast suite. This includes a postproduction area, two identical broadcast studios and a talk area, that can be linked to either studio.

Simon Daniels commented on these facilities. ‘We envisaged that the studios would be used by a variety of broadcasters during the Operational Year. As walk-in facilities, they are very comprehensive, offering CD, MD, DAT, cassette, tuner, effects units, communications, ISDN and phone lines.’

Building redundancy is commonplace in modern broadcast installations but it was felt it be imperative to ensure that the chimes of Big Ben came through. For this installation we’ve doubled up on everything, so effectively we’ve two separate audio channels to allow for total redundancy,’ explained Daniels. We routed the chimes directly through two Focusrite Red 7 mic pre-amps, which went into two Sonifex Redbox RB-DA6 distribution amplifiers feeding an ISDN unit and a microwave link. Whichever route we took the audio, whether through the ISDN unit, or the microwave link, we were covered. We even had two UPS units, one for each set of equipment.

The microwave link went directly from Big Ben to the BT Tower in the West End of London and then on to the Millennium Dome site. The intention was to avoid sending the signal through any switching centres. It was ensured that the ISDN line numbers were ex-directory and a sub-addressing technique was used, both methods to avoid any possibility of wrong numbers being answered and engaging the line.

The big task facing engineers during this installation process was getting everything up to the bell, which can only be reached by a narrow spiral staircase. Simon Daniels recalls that it took 15 minutes to get to the top of the tower, without any equipment. ‘Getting ISDN lines and telephone lines up to Big Ben was no joke either—it took two weeks to work out how to get the cabling up there.’

The BBC also took a feed of the signal that was generated by NMEC, with its own land-link as a backup, again to guard against any possible Y2K problems. ‘This was a very big event and we just couldn’t take any risks of failure,’ said Daniels. To this end, three clock engineers were due to be on site to ensure both that Big Ben did not fall and that it was on time.

Initially there were plans to synchronise Big Ben to the Rugby radio clock signal, which generates a time pulse that is generally considered to be the most accurate and which is used by all broadcasters in the UK. This would have been done using electromechanical devices, but permission was denied to tamper with the clock’s mechanism.

Back at the Dome, a comprehensive array of communications and distribution equipment was laid on to ensure most types of connection. The IBC featured four twin Sonifex DHY02 digital telephone, with the manufacturer’s Redbox unit being used interfaces for VHS tape machines and ONdigital digital television decoders and so on Redbox RB-DA6 distribution amplifiers were additionally installed into the Media Centre, which was used for press briefings and has facilities for radio and TV news staff to take audio feeds for broadcast.

It may seem a lot of effort just to hear a clock chime the hour but given which clock it was and which hour, the precautions seem perfectly understandable, particularly as missing the chimes is, subconsciously, a heinous crime.
Making a Promise

As a last fundraising gesture of the millennium, musicians gathered to record a version of a Stones' classic for the Children's Promise album.

Kevin Hilton is on a promise

BIG EVENT like the end of a millennium calls for big gestures. Big tops, big wheels, big parties. Some thought it should also prompt big thoughts, making people consider others. At the turn of the year, turn of the century, countless people in the UK pledged their last hour's earnings of the old millennium in aid to create a better future for the children of the new millennium.

Such a big undertaking as the Children's Promise campaign needed the best possible publicity. The last 20 years of the 20th century saw the development of a highly successful way of raising both money and awareness—the charity record. The Children's Promise organisers chose the Jagger-Richards classic—a phrase often over-used but that applies here—It's Only Rock 'n' Roll (But I Like It), on which 37 artists sang or played in perhaps the biggest virtual musical gathering of its kind. The list is an odd mix of near-legendary old timers (BB King, James Brown, Joe Cocker), current and potentially long-term favourites (Robbie Williams, The Corrs, Jamiroquai), and the most likely short-lived but commercially important (S Club Seven, Boyzone). And Robin Williams.

Nobody knows the logistics involved better than producer Arthur Baker, who, with Steve Van Zandt, pulled together the anti-apartheid anthem 'Sun City'. On this kind of project, you don't know for sure who you're going to get,' he says. Baker's concept was to create a tribute record, both to the old millennium in general and rock 'n' roll in particular. He knew he needed a good cross-section of artists, but started out with big older names—James Brown, BB King, Herbie Hancock and percussionist Ray Barretto—to demonstrate his pulling power. The first four artists gave us an average age of 64,' he continues, 'and the idea of this record was to make money, and young kids are the lowest common denominator. We were told by (BBC) Radio 1 that it wouldn't get played unless it had younger artists on it.'

Technology has changed considerably in the 15 or so years since 'Sun City' was recorded. Children's Promise was not an easy proposition but digital made the prospect of recording artists wherever they were more viable. 'The idea was to record people in their own situations, wherever they happened to be,' explains location recordist Ian Duncan, 'so that they really couldn't refuse to do it.'

The mobile rig was put together by studio equipment hire company Gearbox, who were also asked to record the associated engineers and musicians Merv de Peyer was approached but couldn't do it—although he mixed the whole project—but recommended Ian Duncan. A former Digidesign staffer, but now freelance, Duncan had been working with Gearbox to put together a Pro Tools package based around a G3 PowerBook and a US-built, 4-slot Magma expansion chassis. Lugging this onto aeroplanes and into taxis, Baker and Duncan cornered the majority of artists who could not make it to the handful of studio sessions. At the end of May last year, BB King was the first down, back-stage at the Royal Albert Hall in London after a gig. Later, it was Bonnie Raitt on her tour bus and notoriously difficult R&B diva Mary J Blige in a London hotel room. 'Some of the recordings we did in dressing rooms sounded better than the studio tracks,' comments Baker wryly.

Conventional sessions took place largely in London. After the first four singers had been recorded and the project's momentum kicked in, a day was booked at AIR Lyndhurst, where Robin Williams, Annie Lennox, Chrissie Hynde, Womack & Womack and Status Quo all made their contributions. Skin (of Skunk Anansie) was recorded at Abbey Road, with others dropping in to Mayfair and Whitfield Street Studios. In these cases, the Pro Tools rig was tied-line into the studio, with the artist in the booth in the traditional way.

Everybody sang or played to a basic backing track, that had been laid down at Mayfair Studios by drummer Clive Deemer, bassist St Johns and Merv de Peyer on piano. To this 2-track recording were added guitar parts by BB King, Steve Cradock (Ocean Colour Scene), Parfitt and Rossi (Status Quo) and Keith Richards—because it wouldn't be the same without that famously sloppy sound—plus middle-eight keyboards by Herbie Hancock and the percussion of Ray Barretto. A guide vocal was sung by Steve Carney, who didn't make it onto the finished track.

Arthur Baker had a good idea of who he wanted to sing what, although, in the beginning, he made sure that as much as possible was laid down by artists. 'In those early stages, everyone sang one or two lines in each verse, he says. 'I had to make sure that we had everything covered. Some of them, like Kid Rock, knew the song and he sang the whole thing. Mary J Blige didn't know it and just did a line at the beginning and one at the end.'

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The Pro Tools onboard MiXPlus facility was used heavily, as each vocal part (37 of them) had its own fader on the desks. 'Every vocal had a bit of its own sound,' says de Peyer. 'The idea was that each singer should sound like themselves and be totally recognisable but not so loud that they drowned out the backing. For the singers I was less familiar with, I listened to their records and tried to emulate them.'

After the initial mix was completed and two days before it was due to be delivered, it was confirmed that the composers of the song would make an appearance. Both Mick Jagger and Keith Richards were in the US at the time and so went into Capitol Studios in Los Angeles and ISDNed their parts to London (as did Ozzy Osbourne). 'Because of who it is, their bits had to be quite prominent,' explains de Peyer, 'and Mick asked to lay down the whole track, not just fit a line in. I didn't have to recall the full track, I just broke into the instrumental mix, having an a cappella vocal along side. I used a similar method to take out the sample of "Whole Lotta Love" because we weren't allowed to use it.

Nonlinear music recording is more of a reality than ever before, but, as with any thing computer-based, there are still occasional problems. Ian Duncan admits to two instances. There were a few bugs in the software,' he recalls. 'Because we had to run with time code for the video playback, I put it into a loop each time we set up. But if you set a pre-roll before the loop, it doesn't go into record. We discovered this when Annie Lennox laid down her part. It held things up a bit and she got bad tempered but we got things going as quickly as we could.

The other problem was when we recorded the Corrs. We were at the Metropole Hotel during Net Aid, when a lot of artists came in. Andrea (Corrs. lead singer) had done the main line and was doing some harmonies and ad libs when one of the drives just ran down for no reason. But it booted up quickly and we carried on.'

With the Children's Promise organisers and BBC producers having a say in the final mix—some vocals parts were extended if the video shots were particularly good, as in the case of Natalie Imbruglia—the final mix was saved to Pro Tools, backed up on CD-R and mastered from DAT at Metropolis. The record was released on 15th December and immediately joined the race for the Christmas No.1. But, given the intentions behind the project, that was hardly the point.
Choosing the right audio Codec.

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IT IS INCREDIBLE that you will meet people who believe that digital desks are still a thing of the future, that the technology is still not proven and that it is yet to impact with any sort of force. If you're talking to someone in high end music recording then there will be an element of truth in it as gradually the most important large digital console, AMS Neve's Capricorn, had the market to itself for years until the arrival of Sony's Oxford, SSL's MT and most recently Euphonix Series 5. Other disciplines are far more advanced but there are logistical and cultural reasons why the take up of digital desks in different market sectors has been staggered.

Core to this all is the requirement for the necessary technology to be available, able enough and affordable enough for manufacturers to create products with. The sheer variety of digital desks now being offered across the board means that even the most jaded and die-hard analogue power-user must concede that this is now in place even though they may wish to fault them on operational details. Beyond this take up is then governed by different combinations of user-interface and user-acceptance, matters of speed and convenience, cost savings, timing, the maturity of the technology and that irresistible lure of affordable functionality.

Live sound is the last bastion of analogue resistance and is an interesting case study in how entry requirements have to be met before the digital desk is considered. Digital desks like AMS Neve's Logic 2 and TOA's offerings have been installed in theatres for fixed FOH mixing in small numbers for some years but a transportable equivalent was not available until small French company Innova Son took the bull by the horns with its Sensory console and the derivatives that followed. Touring live sound still concerns itself predominantly with analogue sound chains and while the restartability afforded by a digital desk finds a natural application on the stage, apathy greeted digitally-controlled analogue equivalents. The engineers seemed happiest with the straightforward operation and bullet proof reliability of analogue but this scenario throws up another condition that is apparent in any new market being addressed by digital desks and that is that users want to have a choice of systems.

Yamaha's long-awaited live desk the PM1D looks to address this issue and will surely spur others to enter the arena. The pieces are in place to serve the revolution and the leading edge of touring live sound in two years' time will be dramatically different from what it is today. The engineers will have conquered the operational changes, they will not be happy to work without the increased functionality and they will already be making demands on the manufacturers to push the technology envelope to the extreme.

Post-production is by far the most sophisticated and experienced of digital desk markets and owes this position to a willingness to absorb and adapt to digital in the early stages. As a companion to hard disk editing systems digital desks were seen as facilitators, assignability was not an issue when it offered hontiful control and compact size and was operated by the same engineer every day. Post trail-blazed the refinement of digital desks with AMS Neve having its desk range on progress made here and SSL also offering integrated desk-recorder-editor combinations. Most manufacturers can find uses for their desks in post but most recently Soundtracs has addressed the market with a range of specific products which now includes the mixer-recorder DS-Mark.

Recording is an example of the time being right for the adoption of digital desks despite the fact that flagship analogue desks continue to make a lot of sense. It has been a change in working practices brought about by a need to work in different formats that has drawn attention to digital desks for facilities looking to capture the multiformat business. The Capricorn added a film corging panel relatively early in its development as a clue to the realisation of the digital desk in recording applications. The Oxford added multi-format capability and these sorts of features were stipulated as standard issue on the MT and Series 5 at their launch highlighting their appropriateness for...
Broadcast take-up of digital consoles demonstrates that digital can be integrated into a studio infrastructure and yield increased convenience and speed. The complexity of manufacturing digital systems would seem to be at odds with the requirement to make products suitable to the particular working practices of individual national and subnational broadcasters. It is difficult in the context of analog yet digital manufacturers have managed to create new supplied niches within the niche, such as OB vans. Once a broadcaster becomes convinced of technology it adopts it wholesale leading to large markets for players like Lawo, Stage Tec, SSL, Calrec, Studer, Otan, AMS Neve, Klark and Art pedestal with room in production duties for associated digital music recording desks. Benefits through the increased ability to create live broadcasts and the integration into digital sound chains are obvious, but there are also savings to be made with, for example, one well equipped truck able to perform the functions of two on a live broadcast.

Radio is an example of how savings through digital can be made while adding functionality, issues that are paramount importance in instances where whole radio stations can be put together for substantially less than many major broadcasters spend on reeling a single studio. It also relates to major shift in emphasis that is occurring in radio. A studio's major investment used to be its mixing console as the centre of all activities. Today, the most important investment a radio station makes is in its automation system because this can call all the shots and make all the difference. In such an environment the console has been shifted in to the wings but it has to be digital to integrate.

Analogue on-air radio desks are in simple but the digital ones are simpler still and with the added advantages of absolute capabilities of available DSP they are a demonstration of absolute refinement of function. A few faders and switches for the DJ are supplemented by deeper levels of programmability accessed and set up by the station technicians. Players of note who subscribe to this mantra include Calrec, Klark, Digital, Studer, Sennheiser, Audio, Logitec, Analogue, Audio, Broadcast and Engineering. Soundcraft.

At the opposite end of the spectrum the once 'totally conservative' film industry has astounded all by going digital with a vengeance. As well as serving as a realisation of established cut-in-grain film working practices it serves to remind that digital desks can increase efficiency and free creativity and that film sound is under economic pressures, the same as any other discipline. Most importantly the creation of limited digital boards is an indication of the maturity of the technology as these consoles push the envelope of what is possible in high-pressure, high-dollar, high-volume environments day in, day out. AMS Neve, SSL, Harrison, Stage Tec and Otan have all set up stalls in the film theatre.

What cannot be overlooked with digital is its capability. Challenged at the very high end by digitally-controlled analogue boards, the features and automation capabilities of even a modestly priced digital console are streets ahead of anything that came before it in its price range. This affordable functionality has impacted on everyone who is involved in audio but that resemblance is only by Yamaha TDM1000, Yamaha 01V or Spirit 324, Allen & Heath Icon, the Roland, the LEI range or even to Panasonic WR-D7, Yamaha 03D, legendary O2R, Tascam TDM4000 or Mackie DB—still set a standard in their own right.

Most significantly, they have exposed users to the particular working practices of those consoles and have demonstrated, for example, to control them with concepts and methods, demonstrated it, and allowed them to experience the benefits and the downsides at first hand rather than having to rely on handed down insight. This has made digital desks a true people's revolution that has introduced a currency of language that is applicable all the way up the scale and allows a range of concepts and implementations to be understood. It could be argued that such a democratisation of experience and knowledge never existed between the low end and the upper end in the heyday of analogue. Progress has been good.

The take up of digital desks in different market sectors tells you more about the freedom of adaptability of the engineers involved and the real-life integration issues that they face than any other measure. Home recordists are free to be taken by the affordability of the functionality it is being offered, functionality that would be beyond the depth of their pockets in the analogue domain. Recordists look for flagship products that can serve as a magnet for business but that resemble the operational processes of existing flagship analogue consoles for a largely transitory engineer's base. Postproduction still operates on the engineer's room principle and can be geared up around the specific requirements of the operator employing levels of assignability, for example, that would perhaps be unacceptable in other spheres. Broadcasters are driven by the convenience and suitability of a digital desk within the framework of how it chooses to work and transmits its operators accordingly. Radio stations have a control of digital's ability to hide its complexity beneath a blatantly simple surface while saving costs and film requires a desk big enough to cover all eventualities with digital's automation serving, in the hands of experienced desk drivers, as the means by which it all can be controlled and fixed.

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A SELF-CONFESSIONAL DICTATOR and madman, Tom Misner has little time for any additional accusations levelled at him by his critics. And he's taken plenty as founder and mentor of the School of Audio Engineering. If a recent article in The Australian Financial Review Magazine valuing Misner at roughly $900m has fuelled their disdain, his latest venture will leave many of them speechless. His purchase of Sydney's Studios 301 and their subsequent relocation and refurbishment puts Misner into the premier league of the world's music recording studios somewhere close to Abbey Road. For the modest investment of some $8.2m, he is now running the world's second longest-established studio and only orchestral facility south of the equator.

'It's a number of things,' he responds with gentle satisfaction from behind his new office desk. 'First, it's a statement. Second, I've put my money where my mouth is—I've been teaching acoustics at SAE and to prove to myself and everybody at SAE that I can actually do it, I've done it.

The result is a magnificent 2-room music recording studio complete with three programming rooms, a multimedia suite and mastering facility in Alexandria, Sydney. The two main control rooms are identically designed and equipped, differing only in that where Studio 1 has a Neve VR Legend console, Studio 2 has an SSL 4060 G+. The acoustic, aesthetic, monitoring and outboard aspects of the rooms match closely enough for Misner to rate them closer than the Harris Grant rooms at Nashville's Starstruck. Add to this the fact that the mastering operation already handles 70 percent of Australian recordings and that 301 had secured the music recording duties for the forthcoming Star Wars Episodes in advance of its opening, and you can share Misner's satisfaction.

In fact, his relaxed manner sits in sharp contrast to the frenzied readying of the studio for this evening's opening party and, for that matter, Misner's own involvement in the 301 project. Or perhaps the bullet-proof windows and door are doing a hand.

'This was the old Commonwealth Bank,' he offers in explanation. 'This was the manager's office and the tape store was the bank vault, although the staff reckon I go in there to count my money...' The vault served yet another purpose during the soundproofing of the studio, demonstrating to the building team that thick walls and heavy doors are only part of the story. But the whole episode is a story with some interesting lessons for Misner's detractors, as its architect demonstrates.

'There is an irony to the whole story. I never wanted a studio because I was teaching people and I didn't want to put myself in a position to compete with the people I'm trying to present my students to. But strangely enough, Jim Taig the manager of Studios 301 in 1994 turned up at an accreditation meeting I was having with the government—unannounced, I didn't know who he was. He walked in with an 80-90 page document to say why the industry in Australia didn't want the SAE to be recognised. To cut a long story short, he was general manager at 301 but he was also in partnership with another school—which has since closed—and he was using 301 to push the course. The government didn't want to know because they have procedures that they follow, and I wrote to EMI who were then the owners of 301. What that resulted in was me thinking that if they were going to attack me, I would attack back. So I bought the first VR into the country and set it up at my school in a mixing room—just a mixing room, nothing lavish.

'I was then on the lookout to move my room and turn it into an orchestral recording studio because there were none in Australia. So I found a building and started work on what was initially to become Mirage Studios—because that was the name of my mixing room.'

The stage was set for the entrance of Martin Henge, ex-Abbey Road manager then working as a consultant in his home territory of Australia. Then Studios 301 came up for sale... 'It was going broke not because business was bad but because it was badly managed.' Misner opens, with characteristic frankness. Half the equipment was leased, it was heavily overstuffed and it was getting tired. So I bought it off EMI lock, stock and barrel. I took it on with the Phoenix room—the SSL studio—which was very nice but it was tired. I wanted to get rid of Jim Taig, because I have a long memory, and I wanted to reinvest in the mastering side. Then I decided to really make a world-class studio of it.

It's an odd move, given the decline of the professional recording studio in other parts of the world.

In terms of business, the only people who are going to survive are going to be at the very top or at the very bottom,' Misner asserts, 'and what used to be the top a few years ago is now little better than a home studio and is going to die. I've observed this world wide, and Australia is in the same boat as the rest of the world.'

Leaving 301 destined never to recover its cost...

'It cannot make money,' Misner agrees. 'Doing the sums, my top rate—my orchestral rate—is $2,000 a day, normal mixing rate is $1,400 which is half or less of London rates. And that's for this facility—with every effect known to mankind in here. You can't make money on that kind of investment. My instruction to the guys here is that I don't want to pay to keep it going. If the revenue covers their wages and the expenses here, whatever extra there is >
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Tom Misner: 'I've built my ideal studio'

< make my own mistake, dig my own grave and be buried in it. I don't need somebody else to do it for me. Everybody makes mistakes and I don't want to blame somebody else for mine. The buck always stops with me. Nothing happens without my involvement—every detail from the skating boards up.

Misner's attention to detail extends to coordinating his efforts with others in Sydney. The second biggest film studio outside of Hollywood opened last week and is five minutes away from here—Fox. And we've synchronised the way we do things here with Fox such that Fox deliberately did not build a big recording studio. They have sound stages and so but they do not have a huge recording studio because we have one here with all the same dubbers and same matrix so that we can easily exchange projects between us.

'We're now doing Star Wars 2 and 3, the last two Star Wars in Sydney. Fox is doing a lot of the filming and postproduction and we're doing the music. The reason is that labour is cheaper, even the experts, and with films like The Matrix, The Green Mile, Mission Impossible 2, we've proved that Australia is of world standard.'

Like Kevin Costner's character in Field of Dreams, Misner is confident that having built a world-class recording studio, international clients will arrive on his doorstep.

'It is very practical to attract overseas people here,' he says. At Studios 301 now we have probably two requests a month from overseas people wanting to come over here. We've just had Alanis Morissette and Puff Daddy in the old studio—but they look around and it's nice but the old room is not an A room. People like coming to Australia; Sydney is a nice town, we mostly understand each other, and it's a safe part of the world to be in. On the film side we're already attracting huge amounts of work partly because it's the only orchestral room here but more importantly the American's are flocking down here because they don't have to pay repeats to the musicians. They book the Sydney Symphony, record the thing, thank you very much, bye... In the States you keep paying the band forever; you do not pay repeats here because the Australian copyright laws are different.

We have bookings already. It's fully booked through February, March and April. My first client is actually in one of the programming rooms now. It's the musical production of Peter Pan that's over here from Germany. It's a major musical production and a major client. The next three clients are all projects of mine. I'm producing albums, one for a very successful Australian artist called Grace Knight who had hits in England and the States with a band called Eurogliders. Another act is Tina Martin for ASC Records. She's just come back from Nashville to record here with us. And the third is for Doug Williams. So I'm going to be doing quite a lot of production work in one studio throughout February. Richard Lush will be in the other studio doing all of February with Peter Pan. What I'm after is 4-day or 5-day mixing sessions rather than longer sessions because where I see the studio placed is for people who record at home. The gear you can have at home is excellent; if you've got an ADAT or Pro Tools and a Mackie at home, it's great. It's what made the studios go broke, by the way. But you can't mix at home. You can program, play, record at home but to get a really good vocal sound and to do the really big polishing you need a big studio. You need the acoustic, the desk, the outboard and—what people forget—you need the atmosphere. That makes you work better.'
Putting his money where his mouth is once again, Misner expects to be one of his own major clients.

'I've been working in Nashville and Europe, engineering as a hired gun,' he explains. 'Now my intention is to spend two or three months a year in Europe and then spend the rest of the time working here in the studio. I've got five albums where I'm confirmed as the producer-engineer and I want to do them here—and I will be very seriously pissed off if the studio gets too busy.

The queue of people needing Misner's guidance over colour schemes and carpet laying is lengthening. The catering for tonight's party is calling and photographs have to be approved before they can be entrusted to the hands of visiting journalists.

'It takes a sick mind to build a studio, I can tell you that,' Misner concludes. 'You have to be crazy to start with and it makes you even more crazy. It's 12 hours a day full on. It's chaos.

'But I've built my ideal studio. I am completely happy—100 percent. You can never please everyone so there's always somebody who's going to come in and say it's crap but I am totally happy because I had in my mind my vision of how the studio ought to look and now seeing it has been my achievement. The concern now is that I could not build a better studio. So what's next? It's a life's work and it's done, so I'm looking for something else.'

Surely it's a worthy challenge for a perfectionist to seek imperfection in his own creation. Misner smiles.

'I haven't seen anything I would change about the studio yet, but I will. It may be that better lighting comes along or something. It's just a matter of time.'
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That change is inevitable is accepted, only rates of change remain to be agreed; writes **Dan Daley**

In Charles Dickens' *A Christmas Carol*, Marley's ghost visits upon his erstwhile business partner three visions of things to come, that are as yet to be. But what if Dickens were writing about pro-audio instead of the human condition?

If Marley's first spectral foreshadowing of what Scrooge would become and why, a similar visit by some studio haunt would reveal a smug and complacent landscape of studios that, like the banking and phone monopolies of yesteryear, had a steady stream of clients for which those facilities were the sole resort when it came time to make a record or post a picture. The second spook would reveal a brawling and bloody fast End tableau in which facilities itemed in numbers, and the older ones had to fight with a huge influx of young newcomers for the best parts of the Christmas goose. And Marley's final visitation would be dressed in a Prada suit, small ponytail and an MA from Wharton, scaring you not with long, bony fingers pointed towards the gates of eternal damnation but with a smiling wonder—she picks up the check—that you didn't buy AOL when it was $20 per share.

**Europe: Roamin' holiday**

Keeping in touch with your business while on the road is becoming as frustrating as it is tempting writes **Barry Fox**

The music, concert and recording industries were early into email use, it cuts across the time zones that fragment an international business. Similarly, GSM cellphones can roam around Europe, with charges billed to a ‘home country’ account avoiding hotel surcharges. And using a cellphone with a PC provides access where there are no lines or sockets, or if digital switchboard lines that can try a modem. Here with some hard-won tips and warnings for European users.

The cost of roaming GSM calls is usually between one and two pounds a minute, and that's for incoming as well as outgoing calls because you pay for all the international legging. I recently tried a Motorola Trihand GSM phone in Nevada and California, and found it 'gave good roaming' on the PCS system. You need a trihand as opposed to a dual-hand phone because PCS works at 1900MHz, while GSM works at 900/1800MHz. The phone must be manually switched because the bands overlap. Expect one from Nokia soon.

The new free Internet services, like Freeserve, can only be accessed by calling back to a UK number. The GSM modem speed is limited to 56kbps, compared to a download speed of 56kbps with a fixed line modem. If your email contains any junk mail and bloated Word file attachments, the GSM access cost is horrendous. If you subscribe to a world-wide service, like Compuserve or AOL, you can access your mailbox with local calls to local nodes. These will still be expensive if you use a roaming cellphone, but hotels usually charge a sensible rate for local calls, and some (like the Model 6 chain in the US) even offer them free. Last year AOL bought Compuserve, and launched a new service called Compuserve 2000. This uses similar software to AOL, and subscribers are encouraged to migrate from the existing Compuserve Version 2, 3 and 4 systems to new 2000.

Think very carefully before you make the move—you will almost certainly lose your original email address because the new system shares the same address list as AOL, and virtually every imaginable name has long since been taken foreign access numbers before leaving the UK, simply by dialling them long distance. This saves the hassle of setting up a laptop dial screen after crawling off a long haul flight. But some of the CS2000 numbers can only be dialled from inside the foreign country. While in Berlin I wasted around £15 on failed GSM calls. The modem repeatedly connected to a local CS2000 node, handset shut down and dropped the line. Other times the connection worked, proving that the setup was correct. Compuserve promised to check, but never got back to me.

Compuserve 2000 levies access surcharges on calls made from some foreign countries. The online help is ambiguous over what these charges are, not explaining whether they are per access, hour or minute. The telephone Help Line is all at

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www.prostudio.com/studiosound Studio Sound
Historycasting

Sixty years of broadcasting have shared their time with incredible technical advances, appalling military invasions and curious social comment writes Kevin Hilton

The History of broadcasting stopped and started in 1939. Just before the first regular television service in America, the BBC suspended its TV transmissions with the start of World War II. Manufacturers concentrated efforts on producing equipment for the war effort—with the manufacture of radio sets stopping for the duration—but research continued that would greatly affect future broadcasting.

In 1940, CBS in New York experimented with colour TV transmissions based on the semi-mechanical field sequential system. It would be another 13 years before a full service began, introducing among the first broadcast acronyms, NTSC. Two major drawbacks to this system were that viewers could slip, forcing viewers to manually adjust the picture, and it made the full horror of Lucille Ball's red hair a terrifying apparition.

I Love Lucy first appeared in 1951 and is still an important show because it was an early independent production, which was subsequently to be filmed in front of an audience using a 3-camera system rather than transmitted live and without it, today's cable and satellite channels would have a gaping hole in their schedules. It was also the first American comedy to be exported to Britain and was shown on commercial TV in the UK when it started in 1955, paving the way for a generation of children who grew up during the eighties and early nineties believing that all comedy was American. Perhaps Winston Churchill was right when he called commercial TV the 'tuppenny ha'penny Punch & Judy Show'.

In Japan, NHK had broadcast the first Japanese drama production in 1940. The war again caused a hiatus and it was not until 1953 that both public service and commercial services resumed full-time working. The development of national television services started to roll out from the late forties, different countries with different priorities not establishing services until relatively late. Mainland European services appeared during the fifties, while the Republic of Ireland did not get its own TV until 1961, but when BBC transmissions could be received by some in the country long before that.

The fifties are referred to as the Golden Age of Television, but it did give us the soap opera during the early to mid sixties. TV still keeps people in their homes today, but only because they inculcate us with something might be worth watching, not because it is.

In 1956, Ampex produced the first professional video tape machine (RCA had demonstrated pictures on magnetic tape two years earlier), a 2-inch machine that was widely used (the BBC bought its first units in 1950) as broadcasters looked for an alternative to film. In 1958, radio Luxembourg filled the gap to a certain extent, but it was left to opportunistic entrepreneurs to do the rest. Radio Luxembourg and Cadena Cuatro went on air in 1951, and were at least 11 'pirate' radio stations in the US in 1951. In 1958, there were at least 11 pirate radio stations in the US in 1958. By the mid-sixties, there were 15 pirate radio stations in the US, and these stations were known as 'space stations'.

The BBC launched its second TV service on 20th April 1954, although, due to a power failure, BHBC actually went on air on 28th April. We can all remember the first TV set we saw in a shop window, whether it was a combined radio and television set for £2.50 or a set costing £2.50 per hour. Over a period of a month I have been asked to comment on how US companies could justify a £2.50 per access surcharge for access in the US. I remember thinking, 'enough of this nonsense' and to migrate back to the old Compuserve. But the migration obstacle course takes several days and incoming mail is lost during the changeover period. I would not now trust Compuserve to redirect mail sent to my abandoned CS2000 address.
Studer A827

The Studer A827 was the final analogue 2-inch machine manufactured by Studer and replaced the legendary A820. But it was not perfect, and its refinement is described here.

STUDER'S A827 WAS developed in 1989 as a more moderately priced alternative to the ultra successful A820. Much of its technology, the tape transport, is derived from the A820 although the audio section was completely redesigned for the new model. Consequently, instead of four different PCBs for each channel (reproduce ampl, record ampl, sync amp, HF driver) resulting in a total of 96 PCBs per 24-track machine, the A827 uses a single PCB. It also combines two channels per PCB requiring just 12 PCBs to handle the whole audio section. The onboard audio control keys available to the A820 were replaced, leaving audio control to be performed using either a Studer remote control or a parallel audio interface (part no 21328 540.00), which allows track arming from a SSL console.

Since it's introduction, the A827 has become one of the most sought after analogue multitracks. George Martin's famous Air Studios in the UK have recently begun introducing the A827 as an integral part of its extensive repertoire of equipment.

As mentioned previously, the tape transport on the A827 is completely compatible with the Studer A820 and so all transport features of the A820 are incorporated into the A827 but revised software gives an increased total of around 100 programmable functions and key commands. One of the A827's strengths is its ability to store two different tape sorts for all speeds—listed as Tape A and Tape B. Equalisation is stored internally on the Audio MPU and can be easily accessed via two switches on the deck plate. Drop-in and drop-out speeds were also improved on the A827. Fig. 1 shows the audio block diagram, you will notice that the A827 runs on four separate MPUs (unlike the A820 which runs on five) because the A827's meterbridge only carries the vu meters and audio signals. The A820 needed a fifth MPU to control the audio alignment which is not available on the A827. Looking at the audio block diagram (Fig.1) in further detail it contains the following PCBs:

The Master to Audio IF converts the 8-bit parallel data bus into a serial bus and enables the time elapse counter. It reads in data from the head block identifier to open the corresponding audio data memory automatically when the corresponding headblock is inserted. This means that the A827 will detect if you have on either an 8-track, 16-track or 24-track headblock. The head identifier PCB (1.820.795.00) is attached to a D-type connector on each individual headblock.

The Communication Controller converts the serial bus back into an 8-bit parallel data bus. It also provides the interface for audio remote control or SSL IF (track arming from mixing desk, part number 1.328 540.00) and the interface for data protection on PC or on tape (either via external cable or direct, without cable).

The Audio MPU enables the required audio signal path and the corresponding head(s) as well as control of drop-in and drop-out commands and the corresponding timing. It also adjusts the audio signal to the correct level (via D-A converters) and memorises audio data (buffered RAM) or the three different head blocks and for two different brand of tapes.

The Generator unit provides internal tone generation for simplified audio alignment (60Hz, 125Hz, 1kHz, 10kHz, 16kHz) with connection for external input and allows connection (via BNC) of an external tone generator and supply signal to all audio channels. It was standard only on the A827 Gold edition, available separately as part number 1.827.725.00.

The External NIS Controller allows control of an external noise reduction system (Dolby or Telcon) to switch the unit to NIS coding or decoding in the correct timing.

The Multichannel bus driver splits the audio data and control bus into three identical buses to operate a group of eight channels (a group of eight channels consists of one audio basis board and four audio electronics PCB). One such group

For further details contact: support@studercnch or service@studercnuk
is required for 8-channel recorder, two for 16-track and three for 24-track).

The Audio Basics Board contains a chip that selects D-As and switches on the audio electronics boards. It generates the 153.6kHz bias and erase frequency outputs of the 307.2kHz clock signal from the TD MPU (square wave). It commands for the Ready/Safe LEDs on the panel, supplies the four supply voltages (defective fuses indicated by red LED).

The Reproduce preamp adds gain to the small audio signal from the reproduce head to a safe level to prevent internal interference.

It is worth noting that the A827 head-block is 100% compatible with an A820 headBlock. Part numbers for individual heads for both machines (2-inch 24-track) are: Record head, 1.317.780.00, Reproduce head, 1.317.785.00, Erase head, 1.216.826.00.

Earlier models of the Studer A827 were equipped with 715 PCB, there is now a modification to improve the drop-in/drop-out timing which will upgrade the PCB to 1.827.717.00. Some software needs to be changed as well as hardware modifications (for further info contact http://www.studer.ch/company2.htm)

Audio Electronics Board 1.827.710.81 for improved monitoring at record drop in when in Sync mode (Jumper JS 17 on the Audio MPU must be removed to enable new monitor timing (Fig 2). An additional relay has been added to enable separately the erase and record head. New jumpers JP 2/JP 301/JP 302/JP 502 allow ability to have the repro signal on the sync outputs. All the PCBs must be replaced for upgrade, to enable new timing all PCBs must be index 81 or 82. (Note: The PCB 1.827.710.00 can not be upgraded for these features.)

It was discovered under certain air conditions, that some machines experienced discharges of static loads off the tape. To remedy this Studer developed a non-anodised guide roller, it is advisable that you exchange guide rollers, part number 1.820.490.01.

In 1999 to celebrate Studer's history with the 2-inch format, an A827 Gold Edition was designed. Limited to just 95 units the Gold Edition is easily recognisable with its black-wooded side panels, gold head-stack and gold plate with a commemorative signature of Dr Willi Studer. From a technical point of view the gold edition comes with a built-in test generator and RS232 interface. From an audio point of view by refining head manufacturing techniques Studer has improved head gap scatter. Without a doubt the Studer A827 Gold Edition is likely to become a real collector's item in the future.

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RMS

RMS is one of those terms that crops up every day in audio. But what does it mean? John Watkinson explains and suggests that it gets used too often.

DIRECT CURRENT CIRCUITS are easy to deal with. The voltage and current are constant and calculating the power delivered is simple because that is also constant. Fig.1a shows the necessary expressions. However, when the voltage is alternating as it does in power distribution systems and in audio, things are harder because nothing is constant.

Sine waves are used in AC power and any periodic audio waveform can be synthesised from sine waves, so it makes sense to start with the sine wave. The sine wave is the only waveform which contains a single frequency, so it can be called a pure tone. Fig.2 shows a constant-speed rotation viewed along the axis so that the motion is circular. Imagine, however, the view from one side in the plane of the rotation. From a distance only a vertical oscillation will be observed and if the position is plotted against time the resultant waveform will be a sine wave. Geometrically it is possible to calculate the height or displacement because it is the radius multiplied by the sine of the phase angle.

Thus the sine wave describes one dimension of a rotation with respect to time.

The phase angle is obtained by multiplying the angular velocity ω (rad/s) by the time t. Note that the angular velocity is measured in radians per second whereas frequency f is measured in rotations per second or hertz (Hz). As a radian is unit distance at unit radius (about 57°) then there are 2 π radians in one rotation.

Thus the phase angle at a time t is given by sin(ωt) or sin(2 π ft).

Imagine a second viewer who is at right angles to the first viewer. He will observe the same waveform, but at a different time. The displacement will be given by the radius multiplied by the cosine of the phase angle. When plotted on the same graph, the two waveforms are phase-shifted with respect to one another. In this case the phase shift is 90° and the two waveforms are said to be in quadrature. Incidentally the motions on each side of a steam locomotive are in quadrature so that it can always get started (the term used is quartering).

Note that the phase angle of a signal is constantly changing with time whereas the phase-shift between two signals can be constant. It is important that these two are not confused.

Fig.1a shows that the power dissipated in a resistance is proportional to the square of the applied voltage. Put another way, the voltage goes as the square root of the power. Fig.1b shows what happens with a sinusoidal voltage. The power waveform is a sine squared function. The squaring process makes the power positive on both positive and negative cycles of the voltage so the power waveform is unipolar. Trigonometrically, squaring a sine wave results in a raised cosine waveform.

Fig.1c shows that there are three power levels of interest here. Twice per cycle the instantaneous power is zero, and equally twice per cycle there is an instantaneous power peak. Logically there must be some mean power level in between which would deliver the same energy long-term as a DC source at that power level.

As energy is given by the product of power and time, the energy must be the area under the raised cosine power curve. The mean power would be a constant waveform with the same area below it. Fig.1d shows that as the half cycles of a cosine wave are symmetrical we can do some cut-and-paste with the energy. If we cut off the tops of the raised cosine, they will fit exactly into the troughs, producing a constant power with the same mean. Clearly the mean power is exactly half the peak power as in Fig.1c, where both are measured in watts.

Fig.3a shows that if we take two voltage sources, one DC and one alternating, in which the peak voltage of the alternating source equals the DC voltage, the DC source will deliver twice the power into a resistive load. To those who understand the process this is obvious, but those who prefer what to why don't want to get a different answer just because the voltage is alternating. The solution is to redefine the way that voltage is expressed in alternating signals so that redefined volts AC and volts DC give the same mean power with a resistive load.

The redefined voltage would be whatever fraction of the peak voltage would deliver half as much mean power as the peak voltage would deliver instantaneously. As power goes as the square of the voltage, the redefined AC voltage is obtained by dividing the peak voltage by the square root of two. Clearly when the voltage is squared, the two roots multiply together to give a factor of two which halves the power.

Fig.3b shows the calculations. The next step is to decide what to call the redefined voltage. This becomes clear by following the process. The instantaneous power goes as the square of the voltage. We then take the mean of that power, then find what continuous voltage would deliver the same power,

Fig.2: Constant-speed rotation sine and cosine waves
Fig.1: Power calculations

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rms logic, power, sinusoidal simple voltage which to obtain a number of power measurements and voltage is that the power in an AC system is the same as in a DC system. If it's the same power, we don't need a different unit.

In the power domain there is no squared term, thus from Eq. 1, t is clear that the power is just the product of the current times the voltage. The peak power and the correct unit is Watts peak or watts (pk). On other occasions in order to be certain that we are not using peak power, the correct term is Watts mean. When the load is not a pure resistor the situation changes. If the load is an inductor such as the primary of a transformer, the current isn't in phase with the voltage. In a perfect inductor the current is in quadrature with the voltage and the mean product of these two is zero. The instantaneous product isn't zero. In some parts of the cycle power is flowing into the magnetic circuit whereas in other parts it flows out again.

A transformer feeding a pure inductor will be handling significant current and voltage, but not delivering any mean power, so measuring its capacity in Watts isn't useful. The stress on the transformer doesn't change with phase angle, so the correct term to use here is the voltamp or VA.

For marketing purposes we can define any unit of power we like to get large numbers to put in the brochure. The result is just this side of dishonesty, but it allows the sale of 50W peak music power active loudspeakers for personal computers which come with a 4W mains power supply. Or was that a 4,000W supply?

which involves taking the root.

As the same power would be dissipated by a DC voltage whose value was equal to the square root of the mean of the square of the AC voltage, the volt rms (root mean square) is used. An AC signal of a given number of volts rms will dissipate exactly the same amount of power in a given resistor as the same number of volts DC.

For a sine wave the rms voltage is obtained by dividing the peak voltage Vpk by the square root of two. However, for a square wave the rms voltage and the peak voltage are the same. Most moving coil AC voltmeters only read correctly on sine waves, whereas many electronic meters incorporate a true rms calculation which will give a correct reading on an arbitrary waveform.

On an oscilloscope it is often easier to measure the peak to peak voltage which is twice the peak voltage. The rms voltage cannot be measured directly on an oscilloscope since it depends on the waveform, although the calculation is simple in the case of a sine wave.

It should be clear that when a sinusoidal voltage is applied to a resistor there will be sinusoidal current. The power is also proportional to the square of the current, and following the above logic, when a voltage measured in volts rms is applied to a resistor measured in ohms the current will be measured in amps rms.

Power is also obtained by the product of current and voltage, thus in an AC system, multiplying volts rms by amps rms gives the power in watts. Not watts rms but just watts, period.
C OINCIDING with the 40th anniversary of the Mini, the 40th anniversary of Studio Sound and the 40th anniversary of the executive editor, Studio Sound entered the traditional annual rush to retrieve the first of the Beaujolais Nouveau as part of the Great Ormond Street Hospital for Sick Children organised charity challenge. Sponsorship of the Mini of driver Zenon Schoepe and navigator wife Susan was generously donated by the pro-audio industry's leading manufacturers and suppliers with over £3,000 raised for the charity.

Starting on the Tuesday before the third Thursday in November on which the Beaujolais is released, cars left from sub-zero Calais at midnight to wend their way down to the Loret et Fils vineyards near Macon, alarmingly near the Swiss border. Thankfully not a race, the aim was to get to the destination in the least number of miles. 'Studio Sound 40' gave a surprisingly good account of itself despite being by far the smallest and least powerful car in company that included Jags, Big Healeys, Lotus and a variety of far more modern and more comfortable cruisers. Mind you, Issigonis' finest creation came in to its sturdo footed own when the snow started to fall and settle as it did for the last 200km. Weather conditions were said to be the worst for the event this decade.

The car won the 'Media' category and arrived at the vineyard after 461 miles which included a 20-mile penalty for taking up the option of giving up the mid-way check point in Paris a miss. Kind experienced challengers described this as 'respectably' close to the overall winner who completed 421 miles.

Those who wish to learn how long it took should apply privately in writing as there is a chance that small children may get to read this. Suffice to say that the figures can't possibly tell the whole story. Memory is already fading. fingers can now be unfolded from their wheel grip position, hearing has returned to normal and the decision to lower and stiffen the suspension is being reconsidered.

With the wine collected for the sponsors, the return journey started early on Thursday morning and was greeted with snow for another 250km which metamorphosed into tyre-deep sludge. We arrived home with little change out of 1,100 miles after 45 hours. A great event and a deserving cause supported wonderfully by the pro-audio industry sponsors to whom I have been asked to extend the grateful thanks of Great Ormond Street Hospital. Next year? Yes
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