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March 1999

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FOR RECORDING, POSTPRODUCTION AND BROADCAST

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FORTIETH ANNIVERSARY ISSUE

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TAKING TEA WITH MUSSOLINI
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Soundings
Professional audio, post and broadcast news

SSAIRAs
Voting time for Studio Sound's 1999 awards

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The events calendar for the attentive professional

Letters
Your chance to have your say in your magazine

Anniversary supplement
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Exclusive: digital sound system management

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Sound samplers for sound design

Adgil Director 9800
Exclusive: surround monitor management

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New mics from the Groove Tubes stable

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Exclusive: new side-fire contender

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Comment
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SSAIRAs. Time to Vote
Vote for the equipment of your choice for inclusion in Studio Sound's 1999 Audio Industry Recognition Awards. See page 10.

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Studio Sound March 1999
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Investment value

MANY FALSE CLAIMS ARE SPREAD about the relative merits of investing in one technology as opposed to another. Indeed if you do the rounds then you will hear some preposterous claims made about ludicrous depreciation values of high-end gear generally by lower-end manufacturers who would dearly like to see themselves as competitors. One thing is certain though, buy in the early stages of any technology, and unless you are exceedingly lucky, then you will be penalised harshly if you look upon that purchase from the perspective of investment. For example, does anybody out there want to buy my old 14.4 modem? Think about that and get back to me. On the other hand, I’d feel fairly confident that I could get an acceptable proportion back on the purchase price of certain large-frame analogue consoles after a year or two of making money using them or I could buy particular bits of new outboard that I know will hold their prices if I ever wanted to sell them.

When you buy into quality you buy into something that lasts and if you use it to make money rather than leave it covered in a dust sheet then it is even better. Quality was never the issue with that 14.4 modem because at the time it was state-of-the-art, it was about price. It seemed expensive, but now something else does the same thing a few times faster for much the same money and now I would probably only just be able to give it away to someone who knows even less about modernism than I do.

The trick is to invest in quality and in something that is proven to be a good idea in the first place. Quality lasts and if you can use it in your business and it makes your life easier and a little more pleasurable then what ever it costs it is worth it.

You may have noticed that this is Studio Sound’s 40th anniversary issue. No other professional audio magazine has lasted 40 years. That tells you that it has proved to be a good idea, that readers use it in their business, and that it brings them enough little pleasure each month for them to continue reading it. You have to take the quality as read.

Zazen Schoepe, executive editor

Code red

I LIKE TO READ. I read all sorts of stuff—you never know where you might find something interesting or useful, or both. I know it is unfashionable, but I even read equipment manuals. Read what you want into that.

Reading about other people reading manuals puzzles me. It happens almost every time I read an equipment review. As far as I can make out, people want manuals but they don’t want to read them. The implication is that an ideal piece of kit—whether it is being judged from a review or usage point of view—is self-explanatory. It is either so straightforward that it needs no explanation or its operating system is capable of guiding you through its use at whatever level is appropriate to your needs—with the reservation that the manual covers all aspects of operation and backs this up with specifications and diagrams in a multitude of languages. Obviously.

So what do you want of an equipment manual? Should it be a big, thick paper volume that covers everything from plugging in and switching on through block schematics to component listings, complete with a comprehensive table of contents and an index (as demanded by most reviewers)? Or should a single sheet of A4 littered with bullet points and signed off with a help-line number suffice?

Even the concept of an equipment manual is up for discussion. Should it be a conventional paper affair, its floppy electronic sister or a distant cousin with an email address? The paper option is reassuringly tactile and useful in a remarkable number of situations, but electronic media are more readily updated; manual downloads from a Web site being second only to software downloads in terms of currency.

But what makes our current situation unique is not just the intervention of electronic means of disseminating a set of operating practices and parameters, it is the hard fact that there has never been so many pieces of equipment and systems to learn about. And the healthier and more diverse their respective development curves, the greater the necessity for reading about them.

So you tell me (or you might prefer to write), what do we need from a 21st Century equipment manual: reference, guidance or a set of contact numbers?

Tim Goodyer, editor

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March 1999 Studio Sound
Great Studios Of The World

PRODUCTION NOTES

Founded in 1984, Medley Studio plays an important role in the Scandinavian recording industry, attracting major European projects for both recording and mixing. The recent installation of a 64 channel SL 9000 J Series continues Medley’s commitment to providing its clients with the highest possible level of sonic performance, with the new console already used by the renowned producer/remix team Collater & Joe on a number of sessions, including the mixing of 4 tracks on the hit CD release ‘Another Level’.

“Clarity, depth and punch are essential to the way we work” says the team. “The 9000 bus is all and easy takes you where you wanna go. The automation is accurate and at the same time easy to use. The console structure also leaves a door open for a last minute overdub... it makes life so much easier...”

Solid State Logic

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Fax: +44 (0)1865 842118
E-mail: sales@solid-state-logic.com
http://www.solid-state-logic.com
Buyer memorial

UK: There will be a memorial celebration for Bob Auger, the celebrated recording engineer, on 30th April. A service will be held at St George’s Martyr, Queen Square, London WC1 at 4pm featuring personal and musical tributes from some of those who worked with Bob during his 42 years of music recording. Although best known for the hundreds of classical recordings he made for leading record labels, Bob was also involved in rock, jazz, brass, live and film and TV recordings. He died suddenly last December while in the middle of a recording for Opera Itala with whom he had enjoyed a relationship with for more than 20 years. Bob was 71 and is survived by his wife and two children.

March 1999 Studio Sound
**DVD-Audio specifications**

Tokyo: Although details are still scarce, the DVD Forum has announced the approval of v1.0 of the DVD-Audio disc following some 18 months of discussion and last June's v0.9 spec. The announcement makes DVD-Audio the fifth DVD format to be ratified following DVD-Video, DVD-ROM, DVD-RAM and DVD-R.

Briefly, sampling frequencies are 44.1kHz, 48kHz, 96kHz, 176.4kHz and 192kHz. 16-bit, 20-bit and 24-bit rates are supported. A minimum of 9.6Mbps transfer rate will exist between a new format. Multi-channel recordings will be folded down to provide unmodified compatibility. Copies of the DVD-Audio Forum discussion full text available in the spring. Victor Company of Japan, Tel: +81 3 544 1 980.

**White House, White Paper**

US: The AES has presented a White Paper entitled Networking Audio and Music Using Internet2 and Next-Generation Internet Capabilities to the American White House. The presentation was made to representatives of the National Economic Council, the Office of Science and Technology Policy and the Office of the Vice President to highlight the technical and policy steps the AES regards as necessary to assure improved audio quality over advanced networks. It is the first time the AES has presented a formal White Paper.

The history of leaving scraps of bandwidth for audio should not be repeated, said Elizabeth Cohen of the AES. The AES believes that preserving and creating pathways for high-quality audio experiences should be an essential part of all next-generation Internet initiatives. We are committed to helping establish full compatibility between the pro-audio world and Internet technology.

The presentation involved John Strawn introducing the AES Internet2 White Paper and focused on improving the practicability and technicalities of audio and music applications. Our meeting was very encouraging, Strawn commented. We are in a position today to expedite the move to improve audio over the Internet2 and other NGI systems and the administration is eager to move forward with this work.

The National Economic Council subsequently enlisted the AES Committee to prepare a comprehensive list of university-based R&D-oriented music and audio departments that the White House then intends to mandate to advertise it of music and audio research over Internet2. Net: www.aes.org www.internet2.edu

**Japan:** Disney has shifted its attention to Tokyo's Shiki Spring Theatre for the next production of its Lion King. Staged by one of Japan's leading theatre companies, the Shiki Theatre Company, and with sound design adapted from Tony Meola's earlier work by Shiki's Mr Kanamori, the production uses a 98-input Cadac J-type FOH console with 106 motorised faders and eight programmable dual-input channels. Next stop is Osaka's MBS theatre and another Cadac console. Cadac, UK: Tel: +44 1582 404202.

**UK:** Abbey Road found Studios 1, 2, 3 and its Penthouse involved in making the music for Richard Curtis' romantic comedy, Notting Hill recently. Produced by Duncan Kenworthy (who was responsible for Four Weddings and a Funeral with Curtis), the music for Notting Hill was composed by Trevor Jones, performed by the LSO. It was recorded by Simon Rhodes on Sony PCM-3348 and mixed on the Penthouse Capricorn by Gareth Cousins to Genex and Pro Tools systems. Abbey Road, UK: Tel: +44 171 266 7000.

**Grammy**

US: Neumann has been awarded a Technical Grammy at the 38th Grammy Awards hosted at the Shrine Auditorium in Los Angeles. The award is presented to an individual and/or company for contributions of outstanding technical significance in the field of recording as recommended by the Recording Academy's Technical Committee. The first Technical Grammy was awarded in 1990; past winners include Ray Dolby and Rupert Neve.

**Swedish TV**

Sweden: A 5-year agreement has been signed between the leading provider of Swedish television operating systems, OpenTV, and the country's digital terrestrial network operator, Senda, to provide interactive television in Sweden starting in April this year. There will be ten national services and two regional services for each of the country's five regions.

The project marks the first application of the American OpenTV technology and software which will be made available under licence to broadcasters, receiver manufacturers, network operators, service providers and application developers. OpenTV is an end-to-end digital technology for the development of interactive services capable of being supported by digital satellite, cable and terrestrial distribution. It is presently available to 6m UK BskyB subscribers and 2m US EchoStar subscribers. Net: www.senda.se www.opentv.com
1. **Large scale console**
   - Amptec Stone-D001: D&B Octagon
   - Innovis Son Sentury; SSL Axiom-MT

2. **Medium to small scale console**
   - Allen & Heath GS3000; Panasonic WR-DA7; Soundcraft 4B00; Spirit 32B
   - Tascam TM-D/1000; Yamaha DSP Factory: Yamaha O1V

3. **Outboard dynamics**
   - DBX DDP: Purple Audio MC76
   - TC Electronic Finalizer Express
   - Thermionic Culture Phoenix; TL Audio
   - Ivory C-5021; SPL Transient Designer

4. **Outboard preamp**
   - CLM Dynamics DB2005; DBX 786
   - Grace Design Lunatc V2; Neotek
   - MicMax; PreSonus M180
   - TC Electronic Gold Channel

5. **Outboard equaliser**
   - BSS Opal DPR94; CLM DB500
   - Expounder; LA Audio DiGeQ
   - Manley Massive Passive stereo tube EQ
   - Millennia Media NSE-2; SPL Qure

6. **Outboard reverb**
   - Eventide DSP4500; Lexicon PCM91
   - TC Electronic M3000

7. **Combined outboard device**
   - Alesis Q20: Antares ATR-1; Eventide DSP4500; Focusrite Platinum Voicemaster
   - Lexicon PCMB1; Thermionic Culture
   - Vulture: Tube Tech MECA

8. **Monitors**
   - Acoustic Energy AE2: Pro; B&W Nautilus
   - 801; Fender TRM; Harbeth Monitor 30 pro active; Genelec 1030; KRK V8; Miller & Kreisel
   - MPS-2510; Miller & Kreisel
   - MPS-5410; Spendor SA300; Studer A5

9. **Microphone**
   - AKG C4000B; Alesis GT AM126; Audio
   - Technica AT-4060; Audix C111; Brauner
   - Valves; CAD VX2; Neumann M147

10. **Converters**
    - Neumann TL103; Rode Broadcaster
    - Rode NTV; Shure KSM32

11. **Audio editor**
    - Lucid Technology AD9624/DA9624;
    - Waves L2

12. **Audio recorder**
    - Akai DD8 Plus; Alesis XT20;
    - DMR PAN; HHR CDR850; Marantz
    - CR630; Marantz CDR640; Otari P020;
    - Otari RADAR II; Sonosax Stellar: II
    - Tascam DA-45HR; Tascam CDR5000

13. **Desktop duplication**
    - Dataform S900; Dataform CD2CD
    - Otari CDP50; TraxData TraxCopier

14. **Location portable equipment**
    - Denon DM-P707; Filmtech LP56; Monitor
    - S1000; Sonosax Stella: II
    - Terrasonde Toolbox

15. **Comms**
    - No nominations received

16. **Plug-ins**
    - Sonic Foundry Sound Code: TC Electronic Master X; TC Electronic Unity;
    - Waves Renaissance EQ

17. **Special category**
    - Adapl Director (monitor controller); Akai
    - S5000 (sample); CB Electronics SR-3 (synthesiser); Detron AirePatch
    - Recall (patchbay); DigiDesign ProControl
    - (hardware controller); Dolby DP569
    - (encoder); LA Audio SPX2 (source
    - selector); Magtrax MusicBox (monitor
    - controller); Maretch MultMax 9
    - (monitor controller); Miller & Kreisel
    - LFE-4 (monitor); Sonorus Studi/O; PCI
    - interface card); Studio Technology
    - StudioComm 68/69 (surround
    - controller); Zonal 999 (mag tape)

### Ways to vote

Readers are eligible to vote and this will be verified by the requirement for readers to quote their unique reader identification number.

The unique reader identification number is the 9-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 unique reader identification number is essential.

**Studio Sound** are eligible to vote and this will be verified by the requirement for readers to quote their unique reader identification number.

**Ways to vote**

Readers can vote for one product in each category in four ways:

1. By filling in the form and posting it to: SSAIRAs, Studio Sound Magazine
   - Miller Freeman Entertainment
   - 8 Montague Close, London Bridge
   - London SE1 9ER, UK
2. By faxing the form to: +44 171 407 7102
3. By emailing their unique reader identification number, the category numbers and their votes to: SSAIRAs@vrnet.com
4. By filling in the interactive voting form on the Studio Sound web-site:
   - www.pristudio.com/studiosound

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

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 1**" which serves as a 'catch all' for any products not covered in the other categories.

Any questions can be directed to Zenon Scheppe and Tim Goodyer at Studio Sound. Tel: +4 1 71 910 8513.
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SSAIRA FAX VOTE

SSAIRA FAX: +44 407 761 02

Studio Sound March 1999
Gold Channel

DIGITALLY ENHANCED MIC PRE-AMP
The TC Electronic Gold Channel is a Digitally Enhanced Microphone pre-amplifier and a DSP signal refinement toolbox. Plug in your microphone, connect the Gold Channel’s outputs to any analogue or digital recorder, and safely capture your signal in the best possible recording quality.

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The Engineering Group at TC Electronic was given carte blanche to create the optimal studio effects processor. Being musicians and studio engineers themselves, they have a feel for what is needed in modern high-grade processors. The library of effects includes: Reverb, Pitch Shift, Delay, Chorus, Ambience, Equalization, De-esser, Phasing, Compression, Gates, Expansion, Limiting, and Stereo Enhancement.

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Setting the new industry standard with the VSS3 technology the M3000 is the best sounding, most versatile and easiest to use professional reverb today and well into the future. Combining the ultimate control of directivity in the early reflections with a transparent and harmonically magnificent tone, the art of reverbation is brought to a new and higher level.

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The Finalizer Express is the fast and efficient way to turn your mix into a professional master! Based upon the TC Electronic Multi-Award winning Finalizer Mastering Technology, it delivers the finishing touches of clarity, warmth and punch to your mix, putting the world of professional mastering within your reach.

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The Finalizer Plus gives you the extensive and complete range of controls you need to add the finishing touches to your mix. Compared to the Finalizer Express, the Finalizer Plus offers an even wider range controls allowing you to fine-tune every aspect of the mastering process.
Budgeting for failure
IN YOUR 'ECONOMIES OF FAIL' editorial (Studio Sound, January 1999) you have latched on to a trend which I may say, I saw coming nearly three years ago.

I enclose a copy of an article which was simultaneously published in the Stage, Screen and Radio journal of BECTU and the newsletter of The Association of Motion Picture Sound (AMPS). I was angry when I wrote it, and still am.

I do not think that your hearing is at fault. Rather, the problem seems to be one of physical deformation; a mysterious shortening of the upper limbs of producers and accountants, such that they can no longer reach the bottom of the pocket containing the production budget. Mind you, when there were working agreements in place between production companies and the industry trade unions, proper crewing on all types of production was assured.

Should you wish to refer to any of the points made, in print, I have no objection, but if you wished to reproduce the complete article, I should appreciate a call first, since I'm not sure that the original publication did me any favours. I needed to say what I felt.

Patrick Heigham, Technitrack, UK

Rounding on DTS
'YEAR IN REVIEW' (Studio Sound, January 1999) made interesting reading since most of the contributors referred to 5.1 music. A couple of them also referred to DTS and we are always glad of the mention though it is always a pity when Barry Fox takes the side of the juggernaut.

Barry has championed many Davids over the years but in this case, there seems to be some reluctance. However, notwithstanding any past problems that he may have had with obtaining the information he desired from DTS, I can assure him that there is software available and most of it is playabale in Region 2 as well as Region 1. This is in addition to the 120 Laserdiscs and 110 CDs already produced. The hardware is selling in numbers that have consistently surpassed the manufacturers' expectations in virtually every country and we are very confident that 1999 will be a year that sees DTS firmly established as an alternative that offers quality product on all DVD formats.

I can assure Barry that the many investors in DTS, large and small, are not the sort of people that will 'pay whatever it takes to keep the ship afloat' and that our business is independent of real sales to fund the company. We do believe that it is in everybody's interest to have a choice which should offer a better solution than AC-3 for all applications. I think it should be noted that without the intervention of DTS, the final proposal for DVD-Audio would be very much poorer than it is now. DTS offers an ideal alternative to allow cross-platform playback of DVD-A and DVD-A without the need to buy a second player. We believe that this is in the interests of the consumer as well as those people who still care about audio quality.

We look forward to the next 'Year in Review' confident that we will still be worthy of a mention.

Chris Hollebone, Director of European Operations, DTS (UK) Ltd

Barry Fox replies
CAN YOU PLEASE CITE me the DTS DVD Videos that are now available to buy and will play on either R1 or R2 players and where can they be bought? Also, my understanding of the DVD Audio spec v1.0 is that it does not make DTS mandatory, as DTS had requested, and the only major change is the firm specification of MLP. Is this correct?

Chris Hollebone replies:
THE FOLLOWING Universal titles are released and are R1 and R2 compatible: Waterworld, Liar, Liar, Dante's Peak, and Daylight. Also available is the DTS spec v1.0 is that it does not make DTS mandatory, as DTS had requested, and the only major change is the firm specification of MLP. Is this correct?

Chris Hollebone, Director of European Operations, DTS (UK) Ltd

Reviews, 20kHz and beyond
THANKS FOR Raising the matter of the unfinished R&D work that is sold to us harmless clients. It is true that we pay money instead of getting paid for doing field-test work. It's all like a bad dream, isn't it?

Of course it's not, it's reality. But I have two observations:

First, the traditional pro-audio user was used to buying hardware with all hardware components installed according to specifications. Any missing resistor, op-amp, or even a wire would have been easily detected, mostly during final test. Second, computer-based systems made it possible for anybody to buy and run a digital audio editor or whatever on a PC or Mac. At least a lot of people who lack audio experience will recognise the nice software bugs imminent in mixing automation, and editors.

Thanks also for David E. Blackmer's marvellous article, 'Beyond 20kHz'. It should be clear to everybody in the audio world that 'can we hear beyond 20kHz?' is the wrong question. More important questions (as we have to double disc space, clock rates) are 'what is the dimension of the difference sampling at 48kHz or 90kHz' and 'who can benefit from this difference'?

Finally, who wants to pay the extra money for extra listening experience? I think we are still looking for satisfying answers.

Reiner Oppelland, Bauer Studios, Ludwigsburg, Germany

March 1999 Studio Sound
THE WORLD'S LEADING FACILITIES ARE MOVING AHEAD...

- "We were so impressed with our first DPC-II installed in SuperOupe, we have just ordered our 8th."
  - Neil Karsh, New York Media Group

- "The DPC-II is no compromise but the best for both location recording and post."
  - Steve Williams, Sound Moves

- "With all new leading ledge technology you look for 'how fast?' and 'how much'? Nothing comes close to our DPC-II's on either price or speed."
  - Scott Jackson, Magmasters

- "I wish we had a DPC-II in all our dubbing theatres."
  - Peter Brown, SD Post

- "The DPC-II's sonic performance, stability and comprehensive, yet user friendly, automation has proven to us that we made the right choice."
  - Rob Power, Salter Street

- DPC-II: rapidly becoming the de-facto standard for digital production consoles.

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- Windows: Polyphonic Waveplayer with DirectSound, DirectShow AVI-Player (QuickTime)
- Windows: SoundDiver Autolink, AMT, 64 MIDI Ports
- Individually zoomable tracks in Arrange Window
- Multi Track Record for MIDI (up to 16 times)
- Multiple Sequence Editing in Matrix Editor
- Environment: Macro- and Alias-Objects and much more
- Enhanced User Interface with complete localization (multiple languages) plus many more improvements

Emagic proudly presents the new
Logic Audio

4.0
in the pursuit of excellence
XTA DP226

Before digital moved in, managing large and complex sound systems was achieved with chinchographs, notes, intercoms and people. Terry Nelson looks at XTA’s bid to streamline the process.

One of the undoubted advantages of digital electronics lies in the area of control. This is particularly true for systems where you want to be able to set up different variations of a configuration and come back to them at the touch of a button rather than sorting through reams of paper to find the right notes.

The touring sound industry has recently been applying techniques that have been around for some time in fixed installations, but for various reasons have not been in widespread use for mobile systems. A typical example is the ability to control subsystems within a large sound-reinforcement rig without having to rely on intercom signals to someone at the amp racks in order to tweak the various loudspeaker feeds.

Earlier amplifier control systems, such as the Crest NexSys, set out to address this problem, but it would appear that the wish to control large rigs has been answered by the appearance of what tend to be known as speaker management systems. These units combine facilities such as crossover functions, LPF, delay, and so on, and can generally be networked in order to provide an expandable control system to meet changing requirements. One of the latest recruits to this select club is the XTA DP226 Speaker Management System.

The most obvious comparison that can be made is with the Lab Gruppen DSP 244 Studio Sound (September 1989), but where the Swedish unit leans towards the design side with its use of dha Audio View software package, the XTA system is resolutely geared towards in-the-field operation.

Coming out of the box, the 1U-high chassis immediately impresses with its smart deep blue finish and layout. And as we shall see, its beauty is more than simply skin deep.

The unit offers two input channels and six output channels, which can be configured in five different formats: 2 x 2-way plus summed subwoofer output and summed auxiliary output; 2 x 3-way; 1 x 3-way plus 2 summed auxiliary outputs or from Input B for full-range or 2-way operation; 1 x 5-way plus summed auxiliary output; 1 x 6-way.

Before getting into the features, a quick look at the front and rear panels is in order. Moving from left to right, there is a 2-line LCD screen, six function keys (BACK, NEXT, MENU, ENTER, QUIT, BYPASS), three velocity-sensitive parameter control knobs (EQ, Q, GAIN) above a PCM-CIA card slot, two Input sections and six output sections. Each I/O section is equipped with a 6-segment LED meter, with key with LED indicator and GAIN key.

Colour coding is simple yet effective, with all keys and buttons being light grey with the exception of the readily visible red LED buttons.

The rear panel features eight XLR connectors for the balanced inputs and output plus In-Out XLRs for RS-485, MIDI, In DIN connector and 9-pin socket for RS232 connection to an external computer. The panel is completed with an IEC mains connector with spare fuse holder and rocker on-off switch.

Turning the unit on brings the current software release to the screen (now v2.0) and also a message indicating the wake-up time remaining before the unit becomes operational. The configuration of the system is also indicated (2 x 3-way crossover). The wake-up time is programmable and is very useful for avoiding unpleasant surprises.

The test unit defaulted to all outputs muted on power-up, but, again, this can be programmed for the opposite. The mute indicator LEDs are also very clear.

All digital units have their particular operating structure and accessing the configuration and setup of the DP226 is via the MENU, ENTER, BACK, NEXT and QUIT keys. Pressing the first time calls up the main menu and this allows step-by-step configuration of the unit via the various submenus.

At this point, it will be helpful to have a look at the signal path and features offered by the DP226. The two input channels are followed by the LED meter which indicates from -2dB to 0dB with the five lower LEDs (four green and one orange) and digital overload with the top red LED. The signal then passes through a mute control, a variable gain control, 8-band parametric EQ section and delay section.

The six output sections each have variable high-pass and low-pass filter sections with a selection of characteristics (Bessel, Butterworth, Linkwitz-Riley) and slopes, 3-band parametric EQ, delay section, variable gain control, limiter with LED meter and mute control. The limiter indicator ranges from -2dB to 0dB headroom, with the orange LED indicating limiter threshold and the top red LED indicating 4dB of limiting.

Setting up the unit is logical and starts with the Input Memory to be recalled then moves on into the various setup pages for the different functions.

I found this to be very comprehensive and fairly easy to use, though I do feel that the sequences of the keys is somewhat confusing at first. The submenus include the recalling and storing of memories as well as defining a new

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So what does the DP226 have to offer? As can be seen, it manages to combine a lot of functions into a modest chassis and virtually do away with a rack-load of separate components. Again, starting with the input channels, each of the 8 bands of the parametric EQ section has a range of 20Hz–20kHz and may also be configured as a LF-HF shelving filter. This feature alone provides the necessary EQ to setup systems without recourse to external equalisers—you put the EQ where you need it. XTA very kindly provide a large range on the EQ sections (–30dB and +15dB) plus a very narrow bandwidth for nosh applications. The delay section allows either the whole system to be aligned to a signal source (such as a very loud backline) or for use in subsystems.

The outputs have much of the same facilities, with the exception that the EQ section is a 5-band affair (still more than enough for the correction of most drivers) and that there are limiters. These either have an automatic setting for attack and release derived from the high-pass filter frequency of the output channel or these parameters may be set manually. Threshold is set manually in both modes of operation.

Access to the settings for each channel is accomplished with the press of the appropriate gain button. This brings up the gain setting for the channel and the other features such as Polarity, Delay, HPF & LPF, parametric sections and limiters are cycled through with the next key. The actual settings are changed with the three rotary encoders (GAIN, Q, GAIN). However, I cannot help feeling that things could be cleaner by using a different labelling for the three knobs as the terms are fairly standard. The gain setting is fairly common sense, but I would have thought that a layout on the LCD screen that just refers to particular settings for the three knobs to be clearer—especially in crisis situations where you suddenly have to stop and think that changing delay times is a mixture of frequency and Q. What do you think, XTA?

This aside, all settings are precise and the fine increments for the delay sections allow speakers to be time aligned exactly in order to provide a common wavefront.

Space precludes an in-depth look at all of the individual features but it should be clear by now that the DP226 is a powerful processing package for the setup, alignment and tuning of a sound reinforcement system or studio monitors for that matter.

This review would be incomplete without reference to the AudioCore computer control software and this was updated by downloading from the XTA Web site literally just before closing this report. The software is now up to v4.08 and the main new feature is Array Control (which has been developed specially for the Rolling Stones current tour).

The software allows online and offline editing for units plus network control of up to 32 DP226 units (or other XTA equipment) and makes life much easier in terms of accessing the various parameters of the system. In particular, the ability to visualise the EQ and HPF-LPF curves while making changes is very useful.

The Array Control feature is very powerful and allows up to 21 Zones to be created to control up to 192 outputs. Various security measures such as Solo or Mute lockout or unauthorised access can be implemented and there are two main modes for setup and performance. The control of the zones is via three main screens—Faders, Up-Down and Meters—where six zone groups are each assigned four master faders (rather like VGA groups) or up-down nudge buttons. These are made sufficiently large for use with touchscreens. The meter page just shows the metering for the zones.

The XTA DP226 Speaker Management System is a full stand-alone unit and is an immediate replacement for many sound reinforcement system control racks—it really does do it all and extremely well. Add to this the AudioCore software and you have very precise control of large and complicated systems. If you are interested in the even coverage of the audience through the use of short-throw, medium-throw and long-throw subsystems, or any other variations, this is the unit for you. Need I say more?
Akai S5000 & S6000

Misunderstood ever since their inception, samplers have continued to reinvent themselves on a regular basis. Jim Betteridge talks sound design and Akai’s new samplers.

THOUGH DESIGNED PRIMARILY for musical performance applications, the sampler has long been a favoured tool of sound designers, the world over. Akai really captured the European sampler market in 1988 with their S1000, and all its professional samplers since then (S1100, S2000 and S3000 families) have been variations on the same basic model.

Though seasoned Akai fans will swear by their front-panel ergonomics there are many more newcomers who will swear at them. Lacking the schematic simplicity of a multitrack hard-disk system the sampler will always be a more challenging tool; and, indeed, the previous Akai models, like those from other manufacturers, have been a touch fiddly.

For musicians this is, perhaps, less important, but when your client is paying by the hour and you have promised to create ‘a little bit of magic’ before 5pm, that crouching, myopic stance does not inspire hope. I am happy to say that, with the all-new S6000, the knee pads and the Optrex can hit the trash. This is, ergonomically, a whole new world.

The S6000 is top of the range. Its 41-high frame has a detachable front-control panel that acts as a full-function wired remote. It has 128-voice polyphony, 16 unbalanced jack outputs (all capable of being stereo pairs) plus two balanced XLR outputs (parallel of jacks 1 & 2) and two balanced XLR inputs plus three programmable user-keys. The 41-high S5000 has a fixed front panel, eight unbalanced jack outputs (expandable to 16), no XLRs, 6-voice polyphony (expandable to 128) and no user keys. For the purposes of this report, I shall refer to the S6000, although most comments are equally relevant to the S5000.

To make the outputs unbalanced on a flagship machine like this I think is a big mistake. With all the video, SCSI, digital, time code and RF signals floating about these days, who does not live in fear of noise? Do not throw away those balancing boxes.

A long-time opponent of the mouse and the drop-down menu, the Akai design team’s preference is for the clearly marked button. Other manufacturers have successfully incorporated VGA monitors and mice into their systems, but it was felt here that most studios and musicians have enough screens already and that a smaller, neater alternative was preferable. Hence, all operations centre around a 120mm x 88mm (viewable area) monochrome ICD. Down each side of the screen are eight soft keys and along the bottom are the main function keys, much as you’d find on the S3000 et al (Multif, FX, Edit Sample, Edit Program, Record, Utilities, Save And Load). To the right is a good-size data knob, a 14-key numeric pad and a few other miscellaneous buttons. With a big screen and 16 soft keys, you are never too many keystrokes away from your target field.

Unless your budget is very tight it has got to be worth shelling out for the S6000 with its detachable control panel. Sitting back with that baby in your lap you soon establish a double-handed Game Boy strategy that, for my money, shows the mouse-menu alternative a clean pair of heels. There is no question that you can see more information at once on a 17-inch monitor, but most of the time you do not need to see more than the ICD shows. Most, a program offering a Mac-PC front end for other Akai samplers, may or may not be rewritten for the new machines; it depends on user demand. It has to be said that co-opting the Mac OS or Windows to help with the housekeeping offers significant benefits in the file management department (sadly lacking on the S6000 itself), but many of these facilities can be gained by using commercially available Mac-PC programs linked to the S6000 via SCSI.

This openness to third-party editors is new to the Akai family and is largely due to the fact that, unlike previous models, the S6000 uses the WAV format as its basic building block.

The new models cannot yet read other manufacturers’ sample libraries—such as those of E-mu, Ensoniq and Roland—which is a big shame, but apparently soon to be rectified. You can read the S1000, S1100 and S3000 libraries including Multis, Programs and mono and stereo samples. Unlike previous models, the new system makes little distinction between stereo and mono samples. A small graphic in the Edit Sample page tells you whether it is one or the other, but otherwise a sample is a sample. This is generally quite convenient when sampling anew, but when loading stereo samples from older models’ libraries, where left and right sides of a stereo sample are seen separately, this means that you have to duplicate your actions for each side of the sample. Conversely, you are unable to address each side of a new stereo sample separately. Apparently, these two issues are to be addressed for future updates.

From the moment you turn the machine on it is apparent that the new interface is streets ahead of the old. For instance, the initial screen is a systems page showing you what hardware you’ve got loaded—diskettes, hard drives, how much RAM, effects boards, ADAT I-O and qwarry keyboard. Hit >
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<the load key followed by the select disk soft key and all attached disks are listed. Scroll down to your target disk, press select disk and you get a list of folders (same as volumes on previous models). Separate keys allow you to open, close or load a folder or get info which includes the date and time the folder, program or sample was created—a future sort by option, no doubt. If you open a folder you see the list of Programs followed by all the samples. Scroll down to your target sample. hit the audition sample key, and you hear it straight off disk, no loading or deleting as of old. This is extremely useful for SFX work.

In general, those who know their way around the S6000 will feel at home here, although the ergonomics are vastly improved. Some particularly nice new features are to be found in the Edit Sample pages. These include the play from and play to keys allowing you to quickly find an edit point: the Extract function that lets you quickly create a new sample from a region of a longer one (rather than having to copy and Trim) and finally a quarter keyboard socket—about time.

In addition to two reverb only devices, the new effects board, the EL20, offers two multieffect units including distortion, ring mod, rotary speaker effects. EQ modulation (chorus, flanger), pitch shifting, delay, and reverb. Each Keygroup has an individual send to each of these four processors, so for many applications you could get by without external effects.

For sound design work the sampler offers huge advantages over the hard disk system. Especially when used in conjunction with a MIDI keyboard and computer-based MIDI sequencer, the level and detail of control over a sound is unmatched. With two independent sets of MIDI (In, Thru, Out) ports offering 32 channels, 128 voice polyphony, 16 outputs, up to 128 Multis loadable at a time and 256 RAM and significantly improved filters and EQ, you are unlikely to run short of space in any direction. You can also record virtual samples straight to disk and playback as many as your disk's performance will allow. While these may be useful for non-time-specific audio tracks, under MIDI control all you can do is trigger them from their start point and let them run, so they are no replacement for a proper hard disk system. The S6000 has no EFD facility and no way of firing off samples against code, so you really do need a MIDI sequencer of some kind. There is a MIDI file player, but this is not working in the initial software release. There is space for a hard drive internally, or a jaz drive can be fitted to the front panel.

Though excellent in principle and design, it does seem that these new models were released before all bugs could be ironed out. The rather primitive disk handling needs some work, there are timing and polyphony problems when reaching maximum polyphony and the machine cannot currently read PC WAV CD-ROMs. These deficiencies spoil the impact of what is otherwise a powerful and well-designed machine. But Akai claims to have them all in hand, and by the time you read this it may well be sorted out (updates free at www.akai.com). Assuming this is the case, I for one am glad to have a sampler with all of its kind but, at last, a truly humane interface.
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Adgil Director 9800

While surround sound is attracting considerable interest from modest facilities, it is fundamental to up-market business. **Rob James** assesses a professional surround monitor management system.

The **Director** is an expandable, modular system for controlling the increasingly complex monitoring requirements for surround mixing. This is a 'big league' unit and therefore not directly comparable with the more modest Studio Technologies StudioComm 68/69 and Magtrax Music Box units (**Studio Sound** October 1998, Jan 1999). In addition to these 'plug-and-play' units, both Studio Technologies and Magtrax offer custom up-market solutions that compete more directly with the Adgil and Otari PicMix systems.

**Director** consists of two main building blocks—a mainframe and a remote. In fact there are three alternative remotes available to suit differing requirements. The 9822 supports up to 12 sources plus a 'wild' source together with LCRS and stereo speaker systems. The 9824 extends the speaker system to 5.1 channels and stereo, while the 9840 allows up to 30 sources plus a wild source, and up to eight speaker channels.

The mainframe is a 512-high rack mount with a number of front-panel controls. At the rear are 16 card slots plus the power supply connection (IEC) and switch. Each of the first ten slots can contain either a 9802 (factory configured for 9804N user-configurable) input card. Each card provides eight input channels, each of which may be assigned to one bus. Slot 11 takes a 9803 In/put Send card, that also doubles as the bus amplifier. Slot 12 contains the 9804 Insert Return card, that also includes the mono summing amp. In slot 13 is the Master Output card, 9805.

This has four main outputs, LCRS and two auxiliary stereo outputs. A multitrack trimpot is provided for each output. Slot 14 can contain either a 9805-25 2-channel slave output card or the 4-channel version. 9805-18 depending on the requirement for 5.1 or 7.1 monitoring. The 9805-SO solo input card is in Slot 15 and the 9806 Microprocessor Communication Controller is in Slot 16. This comes with a Y adaptor to split the connections between a 9-pin D-connector for the remote control and a 15-pin D-connector for GPIOs.

GPIOs provide for external PEC: Direct switching and tally, red-light or cue-light switching, talkback muting, external Dim and Solo 1 & 2. The two external Solos are provided for multi-operator consoles with split solo arrangements. Also provided are a couple of open collector outputs to switch a matrix encoder-decoder (a Dolby SEU—SO 4) when changing between LCRS and one of the stereo outputs. All audio connections are on 25-pin D-connectors with pin-outs conforming to the Tascam convention.

The main panel has a bright, backlit, 2-line LED that is used in conjunction with a rotary shaft encoder and ten internally illuminated keys to control and programme the unit. The top row of six consists of a mode key, four re/ve recall keys and a mode key. The other four, on either side of the encoder are cursor keys for navigation.

The configuration supplied for review consisted of a mainframe with a configurable 9808 input card and a factory configured 6+2 9802 input card, the insert send and return cards, a 9805-4M master out and a 2-channel slave for 5.1 use.

The neat desktop remote uses the same keys and knobs as the mainframe plus a mono level pot. The keys are arranged as four rows of six. The top row is used together with the shift key to select any or all of the 12 possible sources. It is simple and quick to make multiple selections for multimon-Iting. In Group mode, four sets of sources may be defined on the mainframe as Group 1, Group 2, PEC and Direct. These can then be compared with a single key press on the group master source or by using an external PEC-DIRECT key via the GPIO. Alternatively, when not in Group mode, sets of sources can be defined from the remote.

The second row is L, R, C, SR, SL and stereo output enables—the lights light when channels are active and flash when muted. These keys also double as solo selects when the SOLO mode is selected on the mainframe. I generally prefer the opposite convention of output mutes with the lights lit when muted as this makes it easier to see at a glance why it's all gone quiet.

In the third row are the shift key, wild key, split a, b and c Keys and a mona key. The wild key selects or deselects an assigned group of input channels from a source card independently of all other source selections. The wild key may also be assigned as Group 2 master, split a and b select multichannel monitors, depending on which output cards are fitted, c selects the alternative stereo monitors. >
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When 0.375dB increments. The
from nothing
put level by
switching.

The mono key selects a source or
summed sources to L, C or R speakers
or all three. The actual sources and
destinations are programmed on the Direc-
tive mainframe. Programming of various
functions, including PEC-Direct sources,
bus assignments and so on can also be
programmed from the remote. A lot of
the programming becomes more direct
on the remote since more keys are avail-
able. For example, when you are program-
ing the input, the corresponding input LED
will be lit as well as all the sources it is assigned to and its output
bus. If you want to change the bus assign-
ation you simply press on the enable
key that corresponds to that bus. This is
far more intuitive than using cursor keys
and quicker to do than describe.

The bottom row has the cut key,
which can be programmed to provide
a momentary action for cueing or to
toggle a latch output for reel light
switching. The insert key switches
the speaker source before or after the insert
point. The level key attenuates the out-
put level by a preset amount, anything
from nothing to -89.625dB or mute in
0.375dB increments. The final keys are
 SPL and which allow two fixed moni-
toring levels to be set in increments of
0.375dB attenuation from maximum.
The shaft encoder remains active. When the knob is moved off the selected preset level the LED
extinguishes. When the knob is back at the
preset level the LED re-illuminates.

The Director system is a comprehen-
sive monitoring package. Monitoring
systems are very much a matter of
personal likes and dislikes, and I have
plenty of prejudices born out of years
of mixing. I would have liked to see a
way of locking out the volume knob to
prevent inadvertent changes to the moni-
toring level, and a decibel read-out on
the remote. Many mixers use different
levels during premixing to the recom-
ended SPL for the final mix. I also still
feel channels should be lit when muted
not active (although they do flash when
muted). In fact, I appreciate why Adgil
has chosen to use this logic; the output
channel LEDs also show which buses are
active for the selected source(s) and
speakers which would be difficult to
achieve with the reverse logic.

Other than these minor gripes, I want
to deliver a little praise. Unlike the units
previously tested, the Director
has been powered up or
down without producing
large hump/plop/crash noises. Further, it wakes up with the
CUT key active. I think this
should be kindergarten stuff
on professional equipment, but sadly it
is not always the case. The audio per-
formance is subjectively excellent—
transparent and silent.

Adgil says it has recently upgraded
the top of the line 9840 remote to sup-
port 80 LEDs showing exactly which
inputs are selected and adding an
alphanumeric SPL display. Adgil will also quote for custom controls and soft-
ware so, if you wanted the output channels
enable keys illuminated when muted this might be possible.

With the range of possibilities on offer,
there is in fact possible to specify a sys-
tem to cater for almost any current
requirement. The remote is small and it
would be fairly easy to integrate into a
panel and the system has the advantage
of expandability allowing a studio to
start with a relatively modest system and
add to it as your requirements change.

A fully expanded system with the
9840 remote offers the possibility of up
to 80 inputs with two 8-channel outs
plus one stereo. A subsystem is also
available that can work in tandem with
a Director system or function as a stand-
alone format selector and/or equaliser.

The Format selector is a
matrix, that maps any of
eight inputs to any of ten
outputs with a total of three
subwoofer outs. Mappings
can be stored as presets with
to four on dedicated
keys. Equaliser boards may be added
that function as 5-band parametrics
or subwoofer crossovers.

The Director feels right—which is half
the battle with this type of unit—and I
enjoyed using it.
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Alesis GT microphones

Extending its influence on audio, Alesis has brought out Groove Tubes and bought its microphones to market. **Dave Foister** goes shopping.

If there's a good idea doing the rounds, Alesis won't be far away. Given the track record it was only a matter of time before the company brought us its own microphones in another step towards the total Alesis studio, and here we have a range of four very closely related condenser microphones covering all the favourite flavours. Although they go under the name of GT Electronics (since Alesis has acquired Groove Tubes), they have Alesis engraved on the back and AM (Alesis Microphones?) as the model designation, and the whole presentation smacks of familiar Alesis style.

The other notable Alesis characteristic is a fondness for jumping in at the deep end, and these microphones follow that trend too. There is nothing entry-level about the range, but a clear aim for up-market applications reflected in the specs, the styling and the engineering. The four models divide neatly into two levels of operational sophistication, each offered in a choice of two circuit topologies. Thus the AM51 and AM52 have class-A solid-state electronics, the AM61 and AM62 provide the same pairing with valve electronics. It is Groove Tubes that gives the range its GT designation, as the 51 and 61 use a circuit built around a Groove Tubes GT5840M, a military spec subminiature valve chosen for its low distortion, superior signal-to-noise ratio and minimum sensitivity to mechanical vibration.

It is standard practice, if you want your microphone to be taken seriously, to make it look like a Neumann, and few others look as much like a U87 from a distance (sideways on anyway) as the GTs. There are more curves, but the basic shape and the size are very similar. Inside is a large—more than 1 inch—capsule, that is single-sided in the 51 and 61 and has two diaphragms in the 52 and 62, and below the dense mesh grille are the switches set in a ring. Just what switches are fitted depends on the model.

The most basic are the 51 and 61, fixed at cardioid with nothing more than bass cut and a 10dB pad to select. The 52 adds a 3-position polar pattern switch giving cardioid, Omni and figure-of-eight, while the top-of-the-range 62 has an additional switch giving super-cardioid as a variant of the basic cardioid position. Thus the 62 has less than four switches around its circumference, all clearly labelled and positive in operation.

Simple stand mounts are supplied with all four, attaching by means of a big screw-in collar at the base and locked with a handle. The valve models also come with a suspension mount (available as an optional extra on the others) that clamps on to the body with a twisting cam mechanism. The mount grips the microphone where it can solely by means of friction with the rubber bands in the mount, and I must say I was not inspired with enough confidence to hang it upside down. There is a further, more elaborate mount available for all the models that incorporates a mesh screen pop filter.

The inclusion of the shock mounts for the valve microphones adds even more to the supplied kit, so that by the time the power supply and cables are added the whole thing needs a flight case four times the size of the simple aluminium carrying box that the solid-state ones come in. The power supply is very simple and basic, as all the switched functions are on the microphone itself; all it has is a power switch with associated 6.3V, an XLR output, and a 6-pin XLR input for the supplied cable. The cable is sturdy to the extent of being a bit stiff, and its length is none too generous, but then the PSU can be sited on the floor near the microphone if necessary as there's nothing to adjust and it is built to have trucks driven over it.

Indeed the build quality of the whole range is good, with a reasonable finish and an adequately reassuring feeling of ruggedness. Inside the PCBs are well built with some evident hand wiring and the valves cushioned comfortably in their own rubber suspension.

I must admit to having expected a certain flavour from the GT microphones, and to having been pleasantly contradicted. Alesis has never been backward in coming forward, and I would not have been surprised to find a brash, listen to what I can do character in them, especially the valve versions. As it turns out, this is far from the truth, as the sleek elegance of the appearance is paralleled in the performance. The specs look good, with tight, well-extended frequency responses, and the resulting smoothness is quite a surprise. There is no shortage of high frequencies, but they are presented in proportion to the rest of the spectrum to give a very natural balanced sound. They are complemented too by the smooth bass extension that makes the whole full and warm. The difference between the valve and solid-state versions is surprisingly small, but nonetheless worthwhile, with just a fraction more warmth and presence from the tube 6xs, which in fact come over as the flatter and more natural of the pairs. When close on to saxophones both types coped without strain, and inside a piano results were good, with a spaced 51/61 pairing delivering a surprisingly good stereo image. I was also confronted with a penny whistle, and this showed the good detail and the low noise floor of the 62.

These and all the other sources showed the GTs to be excellent all-rounders, not the sort whose character can get in the way of true flexibility. Given the need for a cardioid pattern and a natural sound, the four are quite interchangeable, the patterns distinguishing the 5xs from the valve flavour being just noticeable on the 6xs. No cheap substitutes these, the Alesis GTs deserve to be taken seriously in the market they have been so boldly launched into.

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HHB Circle 5A

Studio Sound's 'bench test' loudspeaker reviews continue with the Circle 5A. Keith Holland reports

The HHB Circle 5A is a 2-way, active loudspeaker comprising a 200mm polymer cone bass driver, a 28mm soft-dome tweeter and built-in power supply, amplifiers and active crossover electronics. The drive-units are arranged vertically and are magnetically shielded. The cabinet has external dimensions of 120mm high by 255mm wide by 300mm deep and is equipped with a small, oval port beneath the bass driver. The back panel is dominated by a large heat sink with vertical fins, alongside which are the mains socket and switch, switchable balanced (XLR) or unbalanced (phone) line-input sockets and a master volume control. Sensibly, these features are protected from possible damage by a stout metal bar. HHB specify the power amplifiers to be 120W for the woofer and 70W for the tweeter, but no maximum output figures are given. Although fairly conventional in design and layout, the Circle 5A has one striking feature; the cone of the bass driver is purple.

Fig. 1 shows the on-axis frequency response and harmonic distortion for the HHB Circle 5A. The response is seen to fall to keep within ±3dB limits, due to a peak between 500Hz and 2kHz, and a non-uniform high-frequency response, but it stays within ±5dB from 50Hz to 20kHz. The low frequency roll-off is approximately third order with the -10dB point at about 45Hz. The low frequency harmonic distortion performance is acceptable, with the second harmonic rising to -35dB (1.8%) at 60Hz but maintained well below -40dB (1%) from 140Hz upwards; the third and higher harmonics lie below -40dB throughout the bandwidth.

The horizontal off-axis performance (Fig.5) is well behaved, with slight evidence of mid-range narrowing between 500Hz and 3kHz, the high frequencies are seen to roll off smoothly with little evidence of side-lobing. The vertical off-axis performance (Fig.6) demonstrates the familiar crossover interference problem due to the physical spacing of the drivers, but is otherwise well controlled.

The time domain performance of the Circle 5A is demonstrated in the step response (Fig. 5), the power cepstrum (Fig. 4), the acoustic centre (Fig. 2) and the waterfall plot (Fig. 7). The step response shows a rapid rise and smooth, even decay which are characteristic of good crossover design and time alignment, but the distinct reflections at about 150μs and 300μs, which are most probably cabinet edge diffraction effects, can be seen in the power cepstrum; these reflections are responsible for the non-uniform on-axis response evident in Fig. 1. The acoustic centre is seen to reach a maximum of just over 2m behind the loudspeaker at low frequencies; a good result, that is borne out by the waterfall plot which demonstrates a rapid initial decay at low frequencies.

Overall, the HHB Circle 5A is a good performer; the very good time-domain response is marred somewhat by a ragged on-axis frequency response. The loudspeaker could be expected to fair well under less than ideal acoustic conditions as transients are well preserved and the off-axis response is reasonably well controlled.

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Drawmer MX60

Competitively priced, Drawmer's voice channel offers much to the recording market. **George Shilling** compares it to after shave.

IN THE HIGH-END voice-channel market, it is easy to forget that Drawmer's Vacuum Tube 1960 was an early entrant. A sign of the times, perhaps, but Drawmer's latest marks its entry to the crowded budget-end of this market. The Front End MX60 is a comprehensive mic-line channel for studio and live applications. Drawmer has drawn on its many years of dynamic processing experience to encompass everything anyone might require of such a unit into a compact and very conveniently priced unit.

I was initially surprised by the sheer physical weight of this fairly shallow 1U-high box. For a cheap unit, it is extremely robust, an internal metal brace spanning the entire width and holding most of the pots via long shafts above an enormous single circuit board. Upon this are mounted raw upon raw of small components. The bottom main transformers is heavy, but not especially large. There are separate top, bottom, front and back panels, with double section integral rack ears.

The front panel is smartly black-painted over brushed aluminium. The gauges and knobs are marked clearly, despite the small lettering necessitated by the sheer number of features. Knobs are all small and stiffly damped, much the same as those on the ubiquitous DS201 Dual Gate. The pointers are clear, but they are a size that makes small adjustments and reads a little tricky. Every button has an LED, except the VOLUME button on the de-esser. There are LED meters for Input, Output and Compression, and trims for the gate and de-esser operation, making it easy to see what is happening.

The back panel features Mic Input XLR. Line Out XLR and balanced and unbalanced line in, operating at +4 or -10dB respectively. All line connections can be used simultaneously, which is useful for level conversion.

In addition there is a TRS insert jack that comes before any internal processing or metering. Volume conversion is tricky, as one has to remove the lid, change the internal fuse and locate links, but I would imagine this is an infrequent requirement.

The front panel is logically arranged. On the left is a high-impedance Instrument jack with a selector switch, a pad and a useful switch that adds some well-chosen upper-mids to livens up flat-sounding DI guitars. A +20dB button boosts quiet electric guitar signals. Next to the gain pot is a MIC and button, a phase switch, phantom power button and 1000Hz HP filter. The mic circuit sounds remarkably clean and very quiet, so unsurprisingly a little smaller sounding next to the fine vintage Neve I used for comparison.

The Dynamics, EQ and TubeSound sections can be individually selected. The Dynamics section includes a simple gate with three-speed knob and two release settings, and this works well with no clicks. The de-esser compresses only high-frequency content. The VOLUME switch shifts the frequencies affected. However, it is a little tricky to set up without losing brightness on non-sibilant parts of the vocal, and rarely needs to be set higher than 1/2 (on a scale going up to 10). The compressor features auto attack and release and sounds similar to earlier transistor Drawmers, which I confess would not be my first choice for vocals like these, as the de-esser is, well, de-esser and sounds squally if set with a ratio higher than 2:1.

The EQ has basic shelving HF and LF cut-offs at 4.5kHz and 100Hz respectively, and a wide-ranging fully parametric mid. With 18dB cut-boost on all bands, this is extremely powerful and works well, but sounds little

**AMS Neve gets ESP for 96k**

AMS Neve will show a new processing platform for its range of digital consoles at NAB Called ESP! and introduced as the third generation of proprietary processing platform, the new processor cards use 0.6 micron silicon technology and feature 21 AMS Neve custom ASICs to turbocharge DSP chips and provide the processing power required for the 3-position DFG that offers more than 500 audio paths with control surfaces typically featuring over 100 faders, plus 3 master control sections. The scalable nature of ESP means that large and compact AMS Neve consoles can benefit from this technology and advantages include 96kHz-readiness. The company says that while many digital designs are dependent solely on the core DSP processor, its own use of 21 dedicated ASICs boosts performance by remapping processor inputs and outputs. It claims that the resultant turbo-charged DSP can handle 1,250 external accesses per wordclock comparison, for example, to the SHARC processor's 833. Meanwhile, the Libra Pro digital console will debut. Frame sizes of 24, 36 or 48 faders provide control of up to 96 fully featured channels and is 96kHz ready through its use of ESP. Features include complete format flexibility in up to 8-channel, a dedicated monitor panel provides inserts for a surround matrix-processing, while automated joysticks and the use of Encore automation system bring the automation benefits of the DFC. Machine Control provides direct control of six machines via Sony 9-pin plus two additional transports via ES Bus. 24-bit hard disk editing capabilities may also be added to the system by the addition of an AudioFile.

**Antares modeller**

A studio DSP processor, the AMM-1 mic modeller is claimed to make any 'reasonably full-range microphone to sound like virtually any other.' Company engineers have created digital models of a wide variety of mics, and the combination of selecting models for the source and target mics processes the incoming signal. The process can also be used at mixdown to 'change the mic on an already recorded track. New mic models will be available for download.'

**Drawmer Distribution, Charlotte St. Business Centre, Wakefield WF1 1UH, UK. Tel: +44 1924 378669. Fax: +44 1924 290460. US: QM1 October Hill Road, Holliston, MA 01746, US. Tel: +1 508 429 6881. Fax: +1 508 429 7135.**
Soundcraft Series 15

The thunder of small broadcast desks has been stolen by the deluge of affordable digital consoles, but analogue has much to offer as Zenon Schoepe discovers.

Shown in Prototype at the last BRC and with shipping starting at the beginning of this year, the Series 15 builds on a history of compact broadcast radio desks from Soundcraft that includes the successful SAC200. Most particularly similarities are apparent between the new board and the Series 10, although it is important to note that the Series 10 never had the production options that the Series 15 has, even though things like the metering options are extremely similar. Soundcraft is pitching the new desk in two variants—in production and broadcast versions. These are differentiated by the presence of groups in the former while the broadcast version is very similar to the established Series 10. While this categorisation creates a distinction you can in effect combine all the available modules in a single frame. The underlying idea is that you can buy a stripped down on-air version for the main studio output, and a production version for jingles, and any other origination work in the same facility, or use a hybrid arrangement to perform both sets of tasks.

Frames are splittable to accommodate centrally positioned play list screens and come in 16, 24 and 32 module sizes with the only essential modules being the monitor and master. The variety of modules and options is extensive and including the metering these amount to about 35 in total. Prices start from £1,000 and extend up to £10,000.

All the mono inputs are dual mic inputs, the aux bus is stereo with fixed 3-band EQ with bypass and high-pass filter. Other features include a pan pot, simple gain trim, and fader starts and cue lights on each channel with jumper settings allowing a wide variety of custom options and functions to be activated.

The main difference of the production version of the mono input is the inclusion of.

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DP226 SPEAKER MANAGEMENT SYSTEM

Building on the phenomenal success of the DP200, the DP226 continues the reputation for sound quality in a product aimed squarely at the most demanding applications of the sound reinforcement, installation and studio market.

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Outro

A few words on the Bottleneck, a recently released digital processor for presizing, effects, and processing. The Bottleneck offers a range of effects including delay, reverb, distortion, and a variety of other audio processing tools. It is designed for use in broadcast and production environments, providing high-quality audio processing with ease of use.

This concludes the article on the Bottleneck and its applications in audio production. Thank you for reading.
micron, gold sputtered capsule running to discrete FET electronics in a cardoid pattern, complete with a 85Hz rolloff and switchable 10dB pad.

ADK, US. Tel: +1 503 772 3007.

C2 launched

Claiming to offer the home recordist the same big sounds that the JoeMeek compressor has been offering professionals, the new C2 additionally has new technology of its own which have allowed the unit to be smaller and cheaper at $199 inc. VAT UK. Features include stereo photo-optical compression, floating balanced inputs and outputs, a Dynamic Image control for maintaining stereo image integrity even under extreme compression, an 8-knob 'smooth response' input meter, 5-knob compression meter arc automatically variable ratio to input gain link.

JoeMeek, UK. Tel: +44 1626 33948.

Presonus preamp

Presonus’s MP20 2-channel discrete microphone preamp use Class A, discrete input buffers with Jensen transformers, twin servo gain stages, and no capacitors in the signal path. Features include phantom power, phase reverse, -20dB pad, and individual routing to the group outputs. Audio is routed to the group outputs. Audio is routed to the group outputs.

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AKG C 4000B microphone

Taking its cues from AKG's own C414 and C12, the new C4000B is set to turn heads. Dave Foister's review is as follows:

SO ASSYD ULS IS AKG at offering quality microphones at all levels that it sometimes seems there is a danger of underestimating its top pro models with the high-performing entry-level ones. Those pining for a C12VR can, perhaps, be comforted with a SolidTube, feeling that they have the essence of the AKG valve sound without having to break the bank. Similarly there have been a few microphones that could claim to be a poor man's 414, undercutting the old workhorse's price without sacrificing much in the way of quality. Of course the 414 is rapidly becoming the poor man's 414 as its price in the UK at least has plummeted, bringing a real industry standard within reach of much more modest studios.

But now the most modest of all may prefer to look at the new C4000B. A big side-fire condenser inheriting characteristics from several existing models. In appearance it resembles the top half of a SolidTube, with a big cylindrical head finished in the same champagne colour and with a similar tinfoil grille. In fact its housing is completely different, as is its seemingly identical suspension mount, but the family resemblance is clear and, perhaps, heralds a new house style.

Internally the C4000B builds on experience from the 414, C12, and C4000, the previous entry-level 414-style model. Its 1-inch capsule is a dual-diaphragm assembly, each diaphragm being manufactured from a special gold-plated plastic foil, the gold being only on the outer surface to avoid internal shorts under conditions of high SPL. The important breakthrough is that this is an electron condenser; the first time this technique has been used in a capsule this big. Coupled with a transformerless output stage that is effectively a transformerless version of the SolidTube's valve circuit, the result is to all intents and purposes a completely new microphone.

The twin diaphragms, of course, allow the selection of various polar patterns, and the C4000B has three on offer: cardioid, hypercardioid and omni. The presence of hypercardioid, where perhaps figure-of-eight might have been expected is indicative of AKG's interest in capturing some of the live market with this model. The switch for selecting the pattern is on the front, below the grille, roughly where the red windows on the SolidTube shows the glowing valve heater.

On the back are the other two standard switches: a 10dB pad and for a high-pass filter, rolling off 12dB per octave below 100Hz. These are slightly awkward to get to when the microphone is in its suspension mount.

The suspension mount is the only method of stand mounting supplied with the C4000B, and it is a particularly neat design that allows very quick installation, removal and adjustment of the microphone. The base of the C4000B has a cylindrical protrusion carrying the output XLR, and this protrusion is clamped by a ring in the mount. A simple twist-lock clutch mechanism secures the microphone firmly in place and can be loosened very easily to remove it or to adjust the direction the microphone is facing. It is perfectly happy hanging upside down, and given the relatively light weight of the C4000B, the whole assembly seems almost over the top, no bad thing in my book. The mount even incorporates strain relief slots for gripping the attached cable. The kit is completed by a foam windscreen in deep royal blue.

The apparently lightweight construction of the C4000B is deceptive, as one would hope from its pedigree. You could be forgiven for thinking the housing was plastic by its feel and mass, but in fact it is all metal in the interests of both robustness and RF immunity. According to AKG's literature it is expected to be able to handle normal studio rough handling, as well as withstand SPLs up to 155dB with the pad.

The appeal of a microphone like this is always going to be in its vocal abilities, and here I was able to put it up alongside a 414 UL and a SolidTube for comparison. At first hearing there was little to choose between the C4000B and the 414, with the SolidTube offering a little more presence and body. Closer inspection revealed the differences, however, as the C4000B showed itself to be a little brighter and not quite so full down below. Having said that, there were one or two voices that benefited from the slight upper mid enhancement and for these the C4000B was the microphone of choice.

In other situations it proved to be an excellent all-rounder, with a distinct large-diaphragm character complemented by good detail and clarity. I used it on several brass and reed instruments to good effect, with no reservations about its SPL handling. At the same time its good noise performance meant that acoustic guitar was no problem either.

With its combination of smoothness and character, its versatile pattern selection, and its undeniable similarity to the sound of a 414, the C4000B looks to be a good deal of interest, and these interested are unlikely to be disappointed.
"I've been expecting you" the album: Mastered and listened to in Robbie's front room on PMC.
Mindprint En-Voice & DI-Mod 24/48

A new slant on the voice-channel processor, Mindprint is set to make a mark. Tim Goodyer assesses its voice channel.

The DI-Mod 24/48 is smooth and adequately powerful with the HF section operating within the specifications of a 70dB high-pass filter, input and output gain controls and global effects enable switching. The precision of an instrument requires an output jack, no unsightly connections appear along the front, making the feel of the window aesthetically appropriate even if it serves no functional purpose.

The rear panel is well furnished with mic XLR and 48v phantom switch, line level input XLR and balanced jack, output XLR and balanced jack, and ground lift switch. An additional mic input jack, two S/PDIF phone outputs and 44.1kHz and 48kHz switch replace a blanking plate if the DI-Mod 24/48 digital interface is fitted (by wielding a screwdriver and plugging in a single jumper).

Switching between mic and line inputs, and analog and digital inputs is achieved by a pair of front-panel push buttons. This facility adds to the usefulness of the En-Voice considerably as the analogue and digital connection operate concurrently (as do the jack and XLR outputs), and since the DI-Mod card carries two audio channels it can be used to serve a pair of En-Voice.

Level metering uses green LEDs up to 0dB, three yellow LEDs up to +6dB and a red at +8dB. With the white legend LED is the push button, each section of the EQ and compressor are individually switcheable with red LED indicating their selection. The high and low EQ sections are ±15dB, ±6dB and -6dB bell filters—these EQ spans 20Hz to 30kHz and uses a wider Q on bass than it can, while the high EQ spans 20kHz to 22kHz with a fixed curve. Mid EQ is parametric 100Hz-1kHz, ±15dB with Q variable between 0.15 and 3. The compressor has 1kHz ±12dB and compressor (1:1-6) pots and soft and hard push buttons, and a 120dB that operates conventionally (right to left). Allied with the recirculation control is a corresponding LED in the output section that glows green, yellow, or red dependent upon how hard the valve is being driven. The threshold and compression controls work conventionally with the soft button adequately substituting for comprehensive attack and release in most situations. The filter reduces the compressor's response to sub 300Hz signal content.

In use, the preamp is quiet and comfortably meets expectations at this price point ($399.50, including DI-Mod 24/48). The

QC is well furnished with mic XLR and 48v phantom switch, line level input XLR and balanced jack, output XLR and balanced jack, and ground lift switch. An additional mic input jack, two S/PDIF phone outputs and 44.1kHz and 48kHz switch replace a blanking plate if the DI-Mod 24/48 digital interface is fitted (by wielding a screwdriver and plugging in a single jumper).

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Putting audio to picture has been a sound move for many recording facilities, but it involves learning a new generation of equipment. Rob James profiles video projectors for small studios.

SOUND-FOR-PICTURE, multimedia and computer games all present opportunities for studios previously dedicated to audio-only work. All the more so since the cost of putting together both the audio and picture reproducing equipment has been decimated over recent years.

Ten years ago, I was working as a film dubbing mixer in television—at which time pictures had almost always been optically projected. Depending on the size and age of the dubbing theatre, the projectors used were either modified cinema devices with intermittent mechanisms (which gave the highest picture quality) or continuous motion types. The latter varied from prismatic devices with dubious picture quality but high-speed capabilities to amazingly complex machines with an array of moving mirrors which managed to achieve high-quality pictures and speed—at a price. Subsequently, budget and space constraints led to the adoption of film 'scanners', which were essentially low-quality telecine machines, feeding television monitors. This change was very unpopular with clients and mixers alike.

The managerial justification for abandoning projection in TV dubbing theatres was two-fold. There was a simultaneous increase in the use of single-camera video for projects previously shot on film, and a realisation that the end-product is for TV broadcast, thus a television is a reasonable thing on which to view work-in-progress. The latter argument, however, did not convince for several reasons. For a start, it is something akin to the idea that, if the audience will hear a soundtrack through a 3-inch loudspeaker, this would be a good thing to use as a main monitor when mixing. While I trust that it is unnecessary to demolish this argument here, it is certainly more difficult to detect synchronisation problems when peering at a (relatively) tiny picture. And while it may be desirable to review a programme in 'domestic' conditions, when you are constantly shifting focus from screen to console to meters to cue-sheets, it is far easier to cope with a decent-sized image. Last, and by no means least, it is important to understand the psychology of television and other programme makers. Although it should be perfectly obvious to anyone an insert in a magazine programme or a minor documentary is not in the same league as the latest Hollywood blockbuster, every director, editor and mixer at least subconsciously associates their tiny opus with the 'big screen'. Seeing their work projected makes them feel good, and, if they feel good they are likely to come back to your facility.

The upshot of all this is that we fitted a video projector which, despite other shortcomings of the particular room, attracted and retained new clients as well as mollifying the existing ones. Feature-film dubbing theatres have already been obliged to adopt video projection because of the changes in methods brought about by nonlinear
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ector manufacturers are using one of
three alternative ways of generating a
ected image from a video signal
— Cathode Ray Tubes (CRTs), Liquid
ystal Displays (LCDs) and Digital Light
rocessing (DLP). Whatever the under-
lying technology, a number of charac-
teristics are desirable. Image resolution
s quoted in lines for analogue projec-
tors and often in pixels for digital or as
VGA, SVGA or XGA. The latter des-
crations refer to the data display resolu-
tions found in PCs. I would suggest the
minimum requirement for this applica-
tion should be 500 lines in analogue terms, a million pixels or XGA resolu-
tion (1024 x 768).

Equally important is image brightness,
which is usually quoted in ANSI lumens. Few projectors in this class will
produce an acceptable image in any-
thing other than controlled lighting con-
ditions. This should be the norm for
a good working environment and in any
case adds to the atmosphere and sense
of occasion at the mix. To avoid the
necessity of working in gloom, look for
outputs upwards of 500 lumens. Another thing to watch for is the con-
trast range—a good guide here is to
check how dark the blacks are in rela-
tion to the highlights on the kind of
material you are likely to work on.

The first method uses CRT’s (Cathode
Ray Tubes) which are similar in many
respects to a conventional television
tube. Three tubes are employed for red,
green and blue, each with its own lens
to focus the image. The advantages
of CRTs are a filmic quality to the image,
especially with models based on Sony
tubes, reasonably long tube life (10,000
hours or more) and image resolution.
The disadvantages are bulk and weight,
the cost of replacement tubes and
straints on positioning. Zoom lenses
not, to my knowledge, available on CRT
projectors which means image size can
only be varied by changing lenses,
which is not always possible, or by phys-
ically moving the whole projector. Due
to the need to precisely align the sepa-
rate images generated by the three tubes
and the number of variable parameters
for convergence and geometry, CRT
projectors are complex and time con-
suming to adjust for optimum results.
Practically, this limits you to fixed instal-
lations as moving a CRT projector, even
by small amounts, will necessitate re-
alignment. Once adjusted, a fixed CRT
projector should require only occasional
attention until the tubes wear out,
though internal cleaning may be nec-
essary on models where the lenses are
not hermetically sealed to the tubes.

DLP projectors use small panels to
produce the image with a light source
behind the screen usually a tungsten
halogen, metal halide or UHP lamp. The
number of pixels on the panel or pan-
els fixes the resolution. Each pixel is
individually addressable; higher reso-
nution (and cost) models employ three
panels, one each for red, green and
blue. Due to the physical construction
of the panels each pixel has a ‘black’
border. If too low a resolution is cho-
sen for the required screen size the indi-
vidual pixels become visible resulting
in the so-called ‘chicken-wire’ effect.
Switching of individual pixels is rela-
tively slow which can result in blurring
of fast movement.

DLP models use the same types of light
source as LCD except that the image is
produced by light reflected from an array
of tiny, electronically tilted, mirrors.
These mirrors are located on the sur-
facer of a kind of integrated circuit de-
veloped by Texas Instruments, and
known as a DMD (digital mirror device).
Either a single chip or three DLP chips
may be employed. In a single-chip projec-
tor, colour images are produced using a
rotating tricolour filter. The mirror
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images to be built up, as well as for:
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the contrast to be controlled. At high magnifications the pixel structure will become visible but this is generally better than the LCD types.

LCD and DLP share a number of common pros and cons: There is no geometry or convergence adjustment to worry about and installation can be as simple as plug and play. Lamp life varies according to model from a few hundred hours to perhaps 6,000 hours. Halogen lamps, in particular, are prone to aging. In some cases the lamps are not user-replaceable. Lamp costs are also highly variable. You are well advised to establish the true cost per thousand hours. Due to the cooling required, dust becomes an issue and filters may have maintenance intervals as low as 100 hours. If internal cleaning becomes necessary, it is best left to the manufacturer or service agent.

On the plus side, images are generally brighter than those of CRTs at the same price point. Zoom lenses are frequently fitted and long-throw lenses are available for some models. The units are generally more compact and far lighter than their CRT counterparts and can be readily moved from studio to studio.

With almost all projectors noise can be a problem due to cooling fans. There are several ways of improving this. The projector can be mounted in a soundproofed box or, if the throw distance from projector to screen is suitable, in a separate room. It may be possible to use the studio air conditioning to provide cooling and modify the projector so that the internal fans only switch on when the aircon fails or when the internal temperature exceeds the manufacturer’s recommendations. This was the chosen solution in my old theatre.

If the projector cannot be mounted at the optimum height, keystone adjustment will be needed to correct the angle of the lens to the screen, which would otherwise result in a non-rectangular image. Most, if not all, CRT projectors have this function, but it is worth checking for on LCD and DLP types. One or two have a ‘shift lens’ that performs the same function. Many projectors are primarily designed for presentation work with computer-generated graphics, and as a result the colour balance may not be ideal for video and film work with skin tones and pale shades appearing washed out and unnatural.

In the age of digital TV, the ability to vary the picture aspect ratio is becoming important. As a minimum, look for cinema’s 16:9 in addition to the conventional 4:3 TV ratio. Image enhancing tricks such as ‘line doubling’ and ‘line interpolation’ are starting to appear on machines in this price range, which significantly enhance the picture.

Alongside that of the projector, the importance of the screen should not be neglected. A white wall may be usable but purpose-designed screens offer better brightness and colour rendition by reflecting the light in a narrower angle. This means the usable viewing angle is more restricted, but within this the image is considerably enhanced. Woven glass screens can help to subjectively improve image quality by controlling the scatter coefficient. There are also perforated screens available if you want to mount the front speakers behind the screen. However, this is really only practical with relatively large screens and viewing distances.

If the studio is not suitable for front projection, there are a couple of viable viewing alternatives. Rear-projection televisions are available as complete projector-screen unit in screen sizes up to 56-inch diagonal and more in some territories. Their advantages and disadvantages are much the same as the front projectors apart from the sheer bulk. If a 42-inch to 56-inch diagonal is sufficient, plasma screens are beginning to appear, albeit at rather high prices. These offer subjective image quality on a par with the better projectors and are thin enough to hang on the wall. But, if the space is suitable, there is something about a front-projected image, which is ultimately, more satisfying than the alternatives. Once you have worked with projected pictures you are unlikely to be happy with anything else.

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AMERICAN CONTEMPORARY music found itself at a crossroads in 1950. On the surface it was business as usual for the major record labels—white pop and country music remained segregated from black blues and rhythm & blues styles—yet the lines were about to be blurred by the kind of interracial cross-pollination that had already taken place in the world of Jazz. Around the nation, independent labels were building bridges across the colour divide courtesy of white entrepreneurs whose love of music outweighed their financial aspirations; among them Sam Phillips in Memphis, the Chess brothers in Chicago, and Ahmet Erigun and Herb Abramson at New York's Atlantic Records. In Los Angeles, a pair of 17-year-olds were about to build a bridge of their own.

Leiber & Stoller are still collaborating on a variety of projects following the success of Smokey Joe's Café, a Broadway musical constructed around more than 35 of their hits. The bridge would span the buck-dance rhythm of Willie Mae Thornton's 'Hound Dog' to the Brechtian cabaret of Peggy Lee's 'Is That All There Is?' the white gospel intonations of Elvis Presley's 'Don't'; to the definitive rock 'n' roll songs of his legendary pre-Army films and the irresistible novelty numbers of The Coasters to the infectious Latin-tinged pop ballads of Ben E King and The Drifters. In short, Jerry Leiber and Mike Stoller were preparing to write many of rock's most memorable and evocative songs. In the process, they were to establish and redefine many of its parameters.

Inductees into the Songwriters' Hall of Fame, the Record Producers' Hall of Fame and The Rock & Roll Hall of Fame, Leiber & Stoller are still collaborating on a variety of projects following the success of Smokey Joe's Café, a Broadway musical constructed around more than 35 of their hits. Yet it wasn't a likely partnership to begin with—two Jewish kids, one a gregarious extrovert and frustrated actor who penned blues lyrics, the other a guy of few words with a love of boogie-woogie and orthodox training as a pianist.

Leiber had first become acquainted with the blues while hanging out at his mother's grocery store in a predominantly black section of his native Baltimore, before rediscovering the music via the radio following his move to Los Angeles. Stoller had started collecting the records of Pinetop Smith, Albert Ammons and Meade Lux Lewis after hearing African American teenagers playing boogie-woogie at an interracial summer camp when he was seven. His instrumental efforts were later aided by lessons from noted pianist and composer James P Johnson before the Stoller family relocated from New York to the West Coast.

So it was that, by their mid-teens, Leiber and Stoller found themselves in the same city, and, as they each came to realise, facing similar career predicaments. Neither could cut it as performers—Leiber's acting ambitions had been scaled down to selling Cokes at a small theatrical group, while Stoller had been forced to acknowledge his own limitations as a jazz musician. 

The songs of Jerry Leiber and Mike Stoller helped carry American popular music through the fifties, sixties and beyond. Richard Buskin charts the history of countless classic hits.
Lieber subsequently turned to songwriting in tandem with a drummer named Jerry Horowitz during his junior year at high school. Said drummer, however, didn’t have as much time as his colleague to dedicate to their extracurricular craft, and so gave Lieber the name and number of a pianist with whom he had played a local gig the week before, Jerry Leiber called Mike Stoller the very next day.

"Mike was a very hip, laid-back jazz musician," Leiber now recalls. "I said, ‘Are you Mike Stoller?’ He said, ‘Yup.’ I said, ‘You play the piano, right?’ He said, ‘Yup.’ I said, ‘You read music, don’t you?’ He said, ‘Yup.’ I said, ‘Can you write music?’ He said, ‘Yup.’ I said, ‘Do you think you could arrange music?’ He said, ‘Yup.’ I said, ‘Well, Jerry Horowitz told me to call you because he said you might be interested in writing songs. Would you be interested in writing songs?’ He said, ‘Nope.’"

Stoller’s recollection is of going through a walk-in on the phone: "I said really didn’t want to write songs because I was sure it was something that I wouldn’t like. He said, ‘Whaddya like?’ and I said, ‘Bird [Charlie Parker], Prez [Estate Young], Thelonious Monk, Stravinsky and Bartok.’ I was more or less telling him to get lost, but he was persistent and good-natured. He said, ‘Well, nevertheless, I think we ought to meet to discuss it,’ and I really thought he was talking about something I would hate.

‘I was making the attempt because I was desperate to have somebody to work with,’ Leiber explains. ‘I just stayed on the phone with him for 20 or 25 minutes and finally convinced him to let me come over to his house for a few minutes’
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< urging him to invite me over.

At that time he was a retired kid, very quiet, very passive, and when I went over to see him he was talking about jazz and Dizzy Gillespie and Bird and all of those cats. I knew very little about hop and I couldn't care less, but I knew a little bit about some boogie-woogie piano players and a couple of blues singers, star names like Lightnin' Hopkins, T-Bone Walker, Louis Jordan and Josh White. I had a spiral notebook with me and he said, "You write your songs in that book?" I said, "Yes." He said, "Do you mind if I take a look at it?" I said, "No." He handed him the book. He was sitting on the couch, the piano was in the far corner, and as he started ambolding towards the piano and leaning his way through the book he stopped at the third or fourth page and said, "Hey man, these aren't songs. I mean they're not 'blue-moon-in-June songs. These are the blues." And he looked at me and smiled, and he said, "I love the blues!"

It was a real surprise to find out that this young white fellow named Jerome Leiber wanted to be a songwriter. Almost exclusively in that idiom," adds Stoller.

I thought he would be writing what in those days jazz guys considered to be the worst possible put-down, which was something commercial.

There and then Leiber and Stoller started writing together. They composed two songs on that afternoon in 1950, and thus commenced a partnership that has lasted and flourished to this day.

'Usually what happened in the beginning was a kind of spontaneous combustion', Mike Stoller explains. 'We'd be in a little smoky-filled room in my house, and Jerry—who is a great comedian and a very funny fellow—would walk around screaming some phrases based upon whatever inspired him, and that was usually me jamming at the piano. If something sounded good we'd stop and we'd examine it and we'd work on it. While he was the words and I was the music he'd write a line. I'd write a word or a line back sometimes, and he would say, "Yeah, that's great, but don't go down on that note, go up on it." We'd get into big fights about whether the note went up or down or whether the word was "and" or "but", and out of all of that came some songs, and some of them I guess were pretty good.'

At first they were completely within the realm of writing the groove, says Leiber, and a lot of this was not melody writing but rhythm writing. The melody writing came later with pieces like 'Kansas City', but all of the early pieces were eight or 12-bar blues orientated. A lot of that stuff came from the way I sang it. I would sing something in the style of a certain artist. Later on Mike became a little more critical about the lyrics he would say, "Hey, I don't know if that is the best word", and we could have an arm wrestle over that. However, I've always felt that, even though I won that battle 99% of the time, the interaction and the disagreement and the challenge created something better.'

Mike Stoller is equally philosophical: 'As Jerry frequently says, "Leiber & Stoller is the longest running argument in History". Nevertheless, we are not only collaborators and partners but also the best of friends, and we have been for 48 years now.

By way of their friendship with pioneer music publisher and producer Lester Sill, L & N were introduced to the heads of numerous independent labels in LA and New York. While Sill's influence helped pave the way for early projects with Jimmy Witherspoon, Charles Brown, Floyd Dixon, Amos Milburn and Little Esther Phillips, it was black arrangers and producers like Maxwell Davis and Johnny Otis who enabled two inexperienced young white guys who were dealing with a black idiom and musical art form to gain the trust and respect of such seasoned artists. In the 'autumn of 1952, Lester Sill set up an Otis band rehearsal for a tour featuring the talents of Big Mama Thornton, Little
Mike Stoller is equally philosophical: "As Jerry frequently says, 'Leiber and Stoller is the longest running argument in history'. Nevertheless, we are not only collaborators and partners but also the best of friends, and we have been for 48 years now."

I was pounding this kind of buck-dance beat and I was singing, "You ain't nothing but a hound dog." In actual fact what Leiber started out singing was a lot rawer than that, as he was aiming for something along the lines of 'Dirty Motherfucker', a song popularised by Berry Lewis among others and originally entitled 'Dirty Motherfucker'.

I was looking for something as insinuating as that but I couldn't get it, because everything I went to was too coarse and at that time would not have been playable on the air, he recalls. "Mike said, 'You know, 'hound dog' sounds pretty good to me'," he said. "That's kinda polite", but he said, "Well, I think it's just right. I think if you go the other way you're gonna sell that record to ten collectors, whereas if you stay with 'hound dog' it could have a much broader appeal". So, I wrote three quarters of the lyrics on the way to his house, and when we got there Mike went to the piano and set the buck-dance rhythm, and 10 or 15 minutes later I wrote down the finished song which was essentially a raw shout. We then got in his car and went back to Johnny's place.

"I walked in with the song on a piece of paper in my hand, and as Big Mama was breathing she snatched it away in a devilishly playful way. She said, "Oh yeah, well what's this?" She was being kind of snide and she started to croon 'Hound Dog'. I thought that she was putting me on, because the way that she was doing it was completely inappropriate, but then it struck me that she didn't know what it was. She was just crooning, because she liked to croon like the lead singer of the Coasters (Billy Guy) who would always say, "Man, give me a ballad (ballad). I'm tired of singing these rhythm songs and these novelty songs. Give me a ballad..."—and after she made two or three passes at it I said, "Mama, it don't go like that". She looked at me and I wished that I had never said this. It looks could kill, I would have been a cinder.

'She said, "How do it go?" I said, "Well, if you let me..." She said, "You do whatever you want," and then, "Hey white boy, don't tell me how it go. I SHOW you how it go". She put one finger inside the left side of her mouth and one finger inside the right and she pulled it like kids do when they're making faces, and then she stuck her tongue out and it looked like it came out about a mile, and she wagged it so fast that it looked like it was going to take off. She did this to the band and the band fell off the stand, howling with laughter, and she said, >
"That's the way it go. It go like THAT!" 
Johnny Otis came over and he said, "What's going on here?" and I shrugged and said, "I don't know. She must be pissed off with something". He said, "Mama", and she looked over and you could tell right away that there was immediate respect. She came over and he said, "Do you want a hit?" Reluctantly she said, "Mmm-hmm". He said, "Well, these two boys maybe can get you a hit. Now stop the nonsense and let him show you the way it go".

"Mike went over to the piano and sitting there was Lady Dee, this black dyke with a 20-inch neck and muscular 18-inch arms wearing an elegant outfit and high heels, and she was so nasty looking that he did not want to approach her. We soon found out, however, that she was a sweetheart of a person, and she made room for him and he sat down. I got up on the stand with the band and we did 'Hound Dog', and after we finished they all applauded. I sang it once, Mama heard what I did and did it better. It was metrically more or less the way I did it, but she brought a whole new world to it with her vocal quality. Her shouting, her growling, her doing it created a whole dimension of melodrama and charisma that made it so much better.

The next day we went into Radio Recorders [in Hollywood] and when I looked out from the control room I saw that on drums we had the road drummer [heard 'KC' Beill, and right away I knew we were in trouble. We were so precise about everything, nothing could be out of place, not even a sixteenth of a beat, but Johnny—who'd played the drums when we rehearsed the song the previous day—was producing the record and so Mike and I decided to sweat it out and see what happened. After two bars of take one I could tell it was a dead issue, because the drummer had turned the beat completely around and the cadence and the emphasis were wrong. After the whole thing was finished, since I was always the more outspoken and aggressive one, I told Johnny, "This is not going to work, man", and I explained that when we'd rehearsed it in his studio he had been playing drums to a buck-dance beat that created a certain rhythmic pulse. This underpinned the vocal as well as the guitar solo that Pete Lewis played, and Johnny said, "You think it matters that much?" I said, "Yeah, I think it matters to the point where it's the difference between a hit and an okay record. This is an okay record, but if you go out there and play drums we'll make a hit".

Mike Stoller: 'I got up on the stand with the band and we did 'Hound Dog', and after we finished they all applauded. I sang it once, Mama heard what I did and did it better. It was metrically more or less the way I did it, but she brought a whole new world to it with her vocal quality. Her shouting, her growling, her doing it created a whole dimension of melodrama and charisma that made it so much better.'
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He said, "Who's going to produce it?" I said, "Mike and I will. What's there to produce? We've got the technician here, there's nothing to do." He said, "Okay man." He was completely affable about it, he got on the drums, in one take it was all over and it was the biggest rhythm and blues hit in the history of the music business up until that time.

Big Mama Thornton's 'Hound Dog' was released in 1953, the same year that Leiber & Stoller launched their own publishing company, sales operation and Spark Records label with an investment of just $3,500. Soon successful recordings such as 'Riot In Cell Block No. 9' and 'Loop-de-Loop Mambo' by The Robins—later to become The Coasters—began to attract the attention of major labels like Capitol and Decca, and they in turn would commission L&S to write some more hit songs.

'We would present these companies with material and they would make records that didn't sound like blues,' says Stoller. "You know, they sounded like some kind of swing music and they missed the point.' There was no name for that, and in that respect at Spark we were like many guys who owned record companies. A lot of them, like the Chess brothers, were ostensibly in the studio making records, although maybe we did more because we also wrote a lot of the songs, and it was only quite some time after Atlantic hired us to make records for them that we started to get credit for making them.

'At first the response from Jerry Wexler was, 'Well, many times do you want your name on the label? You wrote the song and we tell everybody that you made it. We tell Waxie Maxie our distributor in Washington that you made it...,' and we said, "But it's not >
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< on the label." Atlantic finally saw the point when we made some records that we hadn't written, and, as far as I know, it was they who came up with the credit "producer" and it stuck.

It was Ahmet and Nesuhi Ertegun, together with Jerry Wexler, who eventually persuaded L&S to give up their own company and make records for Atlantic. Jerry Leiber would coach the singers on interpretation while Mike Stoller mostly worked on the arranging and playing the piano. 'We'd rehearse the artists for like two weeks straight and then go in and cut four sides,' says Stoller. 'While I was playing piano Jerry would be in the booth, and that's the

Ahmet and Nesuhi Ertegun, together with Jerry Wexler, eventually persuaded L&S to give up their own company and make records for Atlantic. Jerry Leiber would coach the singers on interpretation while Mike Stoller mostly worked on arranging.
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Nevertheless, when they were commissioned to write songs for Elvis Presley's movies they enjoyed no such autonomy. Presley's manager, the conniving, self-styled Colonel Tom Parker, ensured that he was pulling all of the strings that he himself had attached to his client. This included a deal with music publishers Hill & Range that amounted to Elvis only recording songs of which he would gain a hefty slice of the publishing, as well as—on occasion—a wholly unearned co-composition credit. Still, although Leiber & Stoller were more than happy to write songs for the newly crowned King of Rock 'n' Roll, they only did so when asked and without a share of the credit. Hardly desperate for the work, they didn't feel obliged to adhere to all of the Colonel's rules.

'We owed Jean Aberbach of Hill & Range the score to what would become ?Jailhouse Rock', and we had come from California to New York supposedly to deliver it,' recalls Jerry Leiber. 'We checked into a 2-bedroom suite at the Gorham Hotel, and Mike was so excited about the jazz acts that were in town that he said, "Hey, let's take off a couple of days first and go around the clubs." So we did that, and on about the fourth or fifth day, after having received a number of phone calls asking for the score, the doorbell rang, we opened it and there was Jean Aberbach. In his thick Austrian accent he said, "Vere is my score to my movie?" This was, like, Thursday and so we said, "We'll do it this week-end." He said, "You'll do it thees week-end? No, you'll do it thees minute." He pulled up the couch, he pushed it in front of the door, and he stretched out on it, put his coat over himself like a blanket and he closed his eyes. Mike and I had no choice, so we went to the piano that had been rented and in about four or five hours we wrote four songs, "Jailhouse Rock", "Treat Me Nice", (You're So Square) Baby, I Don't Care" and 'I Want To Be Free". They hadn't even planned to do a musical number in the jail, so I said, "Let's do one. This is a musical, not Scarface".

L&S would subsequently also compose many of the most famous numbers for Presley's next movie, King Creole, yet a realisation that art was taking a back seat to commercial greed soured the relationship, and some run-ins with the Colonel and his cronies terminated it. 'Mike and I agreed that this was a dead-end street," says Leiber. 'Of course, it was also a license to print money—I mean, every time we'd write a song it would sell two, three, four million, and where could you find that? Writers go searching for something like that all their lives, but strangely enough, while we were as ambitious as anybody else, we were bore and we didn't give a goddamn.'

They did not need to. In 1957 the two men had both moved to New York, since when they had been composing and producing a string of hits for The Coasters that provided them with an altogether more satisfying form of musical expression. Here was Jerry Leiber the actor, the comedian, the playwright, the sketch-writer. 'It was what I did naturally without even trying,' he says. 'I could get it all in the dialogue, the >

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jokes and the attitude, with the musical dimensions supporting all of it.'

'We never planned things based upon marketing, we just wrote to amuse ourselves,' adds Mike Stoller. 'In the case of "Yakety Yak", for instance, it started out with me playing something kind of funny on the piano and Jerry shouting one line, "Take out the papers and the trash". I yelled back, "Or you don't get no spending cash!" and then we wrote the song in about half an hour. It was spontaneous, it just happened, and with The Coasters that kind of material sounded great. Of course it wasn't as steeped in the blues as some of the other songs that we\'d written, but at that time we were still writing numbers that were closer in form to the blues. "Love Potion No.9", although it\'s not exactly 12-bar blues in the traditional sense, is an amusing song, but it\'s not of the same genre as, say, "Yakety Yak" or "Charlie Brown"."

In 1961 Leiber & Stoller moved into the Brill Building, famous for the incredible cache of songwriters that it housed under one roof, and several of them were duly called upon when Atlantic\'s production schedule meant that L&S could not supply all of the needs for material. At the same time, the two of them were in the process of creating a sound that still encapsulates the optimism of an era sandwiched in between the first wave of rock 'n roll and the onset of psychedelia. It is not that strings had never been employed on pop records before, but the material and the rhythms to which they were applied made for unique results.

'We were working on 'There Goes My Baby' and I started to play a line, and Jerry said, "That sounds like violins," recalls Mike Stoller. 'I said, "Hey, why not? Let\'s try it", and so we recorded it with an R&B rhythm section, five fiddles and a cello in the studio at the same time. When Jerry Wexler and Ahmet Ertegun heard it they thought it was horrible, but we said, "There\'s something about it that\'s interesting", and when it came out it was a No.1 hit on both the pop and R&B charts. That then gave us the idea of utilising a lot more rich orchestral colours as well as Latin and Brazilian percussion instruments together with the South American baião rhythm, and that became a kind of good way to keep our interest up in terms of the sound, and so forth.

'As time went by, the record company then became concerned with the cost of the recording sessions, because we went from using a 5-piece band to having 20 to 30 musicians in the studio, and the idea of us going a half hour overtime panicked them. I remember them calling us on the carpet after the session that we did with Ben E. King, when we went half an hour or an hour overtime to get four songs done. Ultimately, of course, it turned out all right, because two of the songs became hits - 'Spanish Harlem' and 'Stand By Me' were done at the same session.

'Occasionally guesting as the fifth rhythm guitarist on the big Drifters recording sessions was one Phil Specto, future production legend, but then still a virtual unknown who L&S had flown to New York on the recommendation of Lester Sill. 'We took him on as an apprentice and signed him to a writing and production deal that he later disavowed,' says Mike Stoller. 'Phil is actually a very talented fellow, but he has vaguely taken credit for several of the things that we did, such as the hit version of "Chapel of Love" by The Dixie Cups, which he actually recorded with The Ronettes, "Save the Last Dance for Me", which he possibly played on but definitely didn\'t produce, and "Lavender Blue" by Sammy Turner, which we produced before he was even around.

For the record, as the result of a chance meeting between the three men while walking in New York City one day in 1963, Spector did get to play the...
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guitar solo on his former employers’ production of The Drifters’ hit, ‘On Broadway’. Leiber & Stoller subsequently ran their own Red Bird label for a couple of years, before taking a well-earned sabbatical from the business and then returning to form in 1969 with Peggy Lee’s rendition of ‘Is That All There Is?’ The song signalled yet another new direction in the career of its composer-producers, while the title proved to be fairly apt considering their probable thoughts towards the end of the session.

Peggy Lee is a woman of very few takes, yet on this occasion her patience was tested as the band ran through the song 30 times before they finally hit pay-dirt. Still, it was worth it. ‘Take 36 was the best take of anything I had ever made in my life outside of take one of Big Mama’s “Hound Dog”,’ asserts Jerry Leiber. ‘Mike and I both knew it at that very instant, and everybody in the band was also smiling. It was perfect.’

‘A kid named Sandy Lehrman-Haupt was the technician, and at first I had been nervous because he’d earned a reputation for being one of Ken Kesey’s Merry Pranksters (a hippie troupe that had taken a well-publicised LSD-drenched bus trip through California in 1965). But when I spoke with him, he sounded very bright and very able, and so I let the fears blow away. Anyway, he’s playing take 36 back to us, and we’re listening and we’re listening and there’s nothing. We don’t hear a thing. Suddenly he looks at me and his face is ahen. “Oh my god”, he says, “I’ve put it on in Erase mode”. He had erased the best take of our lives. What could we say to Peggy? She was out there with her hands on her hips waiting to hear the playback, and she knew that it was the greatest take she’d ever made. Finally she put her coat on and she left, and I took the tape over to another studio and spent three and a half weeks making 48 edits between 11 different takes to get the performance. That’s what was put out on the record, and, although it is good it does not compare to that one take which was wiped. That’s the only time in 48 years that this happened to us, and it had to be then.’

During the 1970s L&S worked in London with Stealer’s Wheel and Elkie Brooks, by which time things had moved on considerably from the way of working in the fifties and early sixties. Artist attitudes were more relaxed, sessions were booked for entire days and there was no longer any obligation to record four sides in three hours.

‘That’s why in the early days we did a great deal of preparation,’ says Mike Stoller, ‘working with The Robins and later The Coasters for weeks in order to get the harmonies and the backgrounds right. We didn’t want to waste any money in the studio because it was expensive—even though by today’s standards it was nothing—and I think that our records for the most part show that kind of preparation.

‘Those days a recording sessions start with a click track and a bass, and guys who are on a great record may never even meet each other. That’s a very different experience from something that is done simultaneously and it produces a very different result. When Jerry and I started it was “go for broke”. You know, if the vocalist sang a wrong word you either left the wrong word in when the track sounded great or you stopped it and started again from scratch. You had no ability to redo the vocal without redoing the band, and, although you gained a lot from the ability to do that with the advent of multitrack, you lost something very special from the situation where everybody was going for broke... But hey, it’s a brave new world, and it’s changing all the time.’
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Having used the first Star Wars film to establish Dolby Stereo, Dolby is looking to The Phantom Menace to launch Digital Surround EX

Kevin Hilton uncovers a thickening plot

A LONG TIME AGO in a galaxy far, far away... there was a film that made an indelible impression on movie-goers and movie-makers. Regardless of its Saturday morning serial story or the fact that other pictures—primarily 2001: A Space Odyssey—had already taken us into space and beyond, Star Wars brought special effects into the mainstream and made everyone look and listen to feature films in a different way. And now... even longer ago, but still in a galaxy far, far away, a new film promises to do this all over again. Star Wars Episode I: The Phantom Menace is the first of the three sequels to the original trilogy that appeared during the late 1970s and early 1980s. As the advertising tag line says: 'Every generation has a legend. Every journey has a first step. Every saga has a beginning.' While this new movie will tell the early story of Obi-wan Kenobi and Anakin Skywalker, the father of Luke who became Darth Vader, it is a continuation of the technological story that began with Star Wars (or Episode IV: A New Hope, to give it its full title) back in 1977.

George Lucas, writer and director of that first movie, marshalled all the technical tools available to him at the time—including Dolby's still relatively new Stereo Surround cinema sound system—to deliver an aural and visual assault. Under the banner of the Lucasfilm organisation, he established Industrial Light and Magic (ILM) to develop new visual effects, Skywalker Sound to push audio design and postproduction and THX to set standards for playback in the cinema and in the home.

There is the general misconception that Star Wars was the first Dolby Stereo encoded movie. This distinction goes to Ken Russell's Lisztomania (1975), with surround channels subsequently added to the system and used for the first time a year later on the remake of A Star is Born, starring Barbra Streisand. This movie used the technology mostly during the concert sequences, but it was Star Wars where it was used to its full extent: the sensation of the Imperial battle cruiser passing overhead as it pursues Princess Leia's ship is still one of the classic cinema sound moments.

The Phantom Menace can truly claim to be the first example of a new audio technology, as it features Dolby's latest cinema playback technology, Digital Surround EX. This is a 6.1-channel system that takes the discrete 5.1 construction of the company's established Digital Surround format (front left, centre, front right, rear left, rear right and a sub bass) and adds a third, matrixed rear channel. In effect, The Phantom Menace features phantom sound.

Just as Dolby Stereo has its precedents in the 1935 stereo version of Abel Gance's Napoleon Bonaparte, Alan Blumlein's experiments with optical film stock earlier that decade, the Fantasound system Disney developed for Fantasia (1940) and other three-channel systems, EX is not a wholly new idea. The 1956 Rex Harrison vehicle Around the World in 80 Days had featured a third surround channel, and, more recently, Dolby itself has been looking at ways to develop such an additional feature into its existing technology, albeit not for such an immediate launch.

The urgency and impetus came from Gary Rydstrom, director of creative operations at Skywalker Sound and an Oscar-winning sound mixer (for Jurassic Park), who is up for a possible two statuettes for his work on Saving Private Ryan. After The Lost World (1997), he had become frustrated with exist-
ing technology; despite the two discrete rear channels of the three main digital cinema systems, he felt that they still could not effectively recreate how sound passes smoothly over and above a listener and from side to side. 'I wanted audiences to be completely encircled by surround, as well as hear sounds played directly behind them,' Rydstrom has said. 'I wanted to develop a format that would open up new possibilities and place sounds exactly where you would hear them in the real world.'

With this in mind, Skywalker Sound approached Sony SDDS, DTS and Dolby, asking whether it was possible for them to develop a digital system with three rear channels. When told that it would not, Rydstrom decided to look within the Lucasfilm organisation and began talking to THX. 'The reservations that the three digital companies had were, that to have a third surround channel in the digital domain would mean upgrades to theatre systems and additional coding,' explains Kurt Schwenk, director of THX's professional division. 'So Gary came to us and we talked about a system enhancement.'

Somewhere in the process, Dolby became aware of THX's work and, as it was already engaged in future development of such an enhancement, the two companies decided to merge their projects and try for a single patent (which is still pending). 'Everything was almost all in place when it was decided to merge the work,' says Schwenk, 'but it made sense because Dolby is a manufacturing company and they can handle the pro side of the business. THX only manufactures the cross-over that is used as a part of complete systems and this is the first time the pro side of our operation has come up with a new technology.'

Previously, THX Pro had not been closely identified with a specific manufacturer. Instead it has approved various brands for use in its theatrical installations, which it designs and then licences to operators. Around this relatively small industry there are rumblings of disquiet over THX and Dolby working together in this way, but Schwenk says a major point for his company was that EX had to be backwards compatible, having the ability to work with all three digital cinema systems (SDDS, DTS and Dolby). To this end, DTS is due to officially announce its own decoding box at the upcoming CineExpo show.

The Dolby add-on box, the SA10, contains the decoding circuits and the surround equalisation for the three rear channels. Ioan Allen, vice president of Dolby Labs, says that this device took up the majority of the development process, adding that a matrix was felt to be the best option under the circumstances. 'We were faced with the question of how to do this without reducing the bit size or optical size of the film,' he says. 'The task was how to do it without radical changes or endangering print quality. A discrete system would have meant hardware changes and two separate types of print, which drives distributors mad, so it was decided to code the extra channel into the existing surround channels, with Dolby Surround at the front, using phase technology.'

Allen says that the decoding process is similar to Pro Logic, Dolby's domestic system, but that the encoding is 'very different.' The development work was overseen by Ray Callahan, director of cinema products, the division within Dolby that works on future projects. Despite using a specialised matrix, Callahan says that mixing engineers will not have to alter their present working practices. There have been concerns that some facilities will not be able to cope with the new format, even if they are equipped for 5.1, but Dolby states that everything should be fine if a flexible enough console is used.

'If the decision is made to go EX, then the dubbing stage will have to be set up to take it,' Callahan concedes. 'The entire back wall of the room will have to be dedicated to the surround.' He adds that mixers will have to work with three surround files but that these are just additions to the current format as the front components of Dolby Digital remain as they are. In terms of other parts of the process, he says, 'The optical transfer is identical and there will be no changes to the print, it will still be a single inventory.' In theatres, installations with a SA10 will automatically switch over for EX working. Those that are not equipped will run as nor—

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WITH A RUN OF BBC costume dramas under his belt, a controversial Channel 4 gay drama, *Queer as Folk* just completed and work on several Charles Dickens adaptations under way, music mixer Steve Parr could be forgiven for breaking for tea. Accepting Franco Zeffirelli's invitation to *Tea With Mussolini*, however, found him with just a day and a half to turn a stack of digital multitracks into a 5.1-channel music mix for the Italian movie legend.

Portraying Zeffirelli's own childhood in Florence, the film charts the fortunes of a child left in the care of a Jewish American millionairess and three eccentric English spinster, in an Italy preparing for war. Played by a group of eccentric actresses including Judy Dench, Maggie Smith, Joan Plowright, Cher and Lily Tomlin, the family faces deportation and contacts Mussolini to assure him of their support—the dictator obligingly invites them to tea. Producers Ricardo Tozzi and Clive Parsons, meanwhile, had invited noted Italian composers Stefano Arnaldi and Alessio Vlad to come up with an accompanying orchestral score, and Roman recording studio The Forum to get it onto multitrack tape. Postproduction supervisor Alastair Hopkins provided the recommendation that brought Parr to the party and Twickenham Films' Dean Humphries was waiting to add the music to his dub.

The Italians wanted to mix in London because 'we're more conversant with 5.1 than they are in Rome,' Humphries explains.

'Two Italian people arrived carrying a bunch of half-inch tapes, some track sheets in Italian and a copy of the score.'

Working on a major feature film in a minimal timescale tests facility and ability to the full. Franco Zeffirelli takes tea with Mussolini, while Steve Parr and Dean Humphries take cues from Italy and Tim Goodyer takes notes.

Parr recounts from his Hear No Evil operation in central London. 'They had finished recording on Sunday night, the tapes arrived here Monday lunchtime and I had until Tuesday night to mix them.'

'The recording was done in the space of two or three days with a large orchestra—about 70 or 80 pieces—and there were 11 think. 48 cues,' he tells the engineer. 'I was with the conductor in Rome and he did a very good job of getting it down in that time. He recorded onto two Sony PCM1324s with quite a few ambient mics. There were no click tracks, they just ran the tape live with the film so there was quite a lot of calculation to be done. I had the film on a patient so I could work out the offsets and lock the 352's to that. But it was nice for me because there was no click spill—just the count-ins from the conductor.'

Historically, music for film is delivered as a stereo or LCR mix and the dubbing mixer creates the rear channels with delay and reverb. Having completed some dozen mixes over the last year, Parr is adamant about the value of mixing film music in surround, claiming that it not only gives a film a better soundtrack but also makes the task of dubbing easier.

'It's the divide between the music studios and the dubbing studios,' he observes. 'Very often postproduction people don't know what music people do, and music people don't know what postproduction people do.'

One of the problems we've had in the past is that a music mix that has been made to be good for CD release doesn't sound as good or cohesive over a cinema sound system,' confirms dubbing mixer Dean Humphries. Adding the centre speaker makes a mix warmer and more cohesive, and gives us a lot more flexibility.'

'But any decent studio is capable of delivering a 5.1 mix,' Parr asserts, and it makes so much difference to the emotional impact of a film. I find it intensely irritating when I go to see a big-budget American movie and the music is flat and one-dimensional. I think it's largely a failure of communication because there is often no one person who is >
responsible for the sound. So it takes the music engineer to tell the dubbing
engineer he wants to mix in 5.1, and it takes the mix engineer to speak to the
composer to speak to the producer to get the budget set aside to go into a 5.1
studio. We’ve found the dubbing mixers who have taken 5.1 mixes off us
really love it because they’re dubbing mixers, not music mixers, he concludes.
Mixes in 5.1 are a big boon to us all,” Humphries concurs. ‘Two-track music
mixes just don’t sound as good: 5.1 is doing us a world of service.’
Alistair Hopkins had worked on The Debt Collector—a Channel 4 production
that had been mixed in 5.1 by Parr—before becoming involved in Teri
With Mussolini, and its surround status was secure. The results seem to justify
everyone’s faith.
‘It is a full-sounding scene without you being particularly aware that it is a sur-
round mix,’ says Parr. ‘It was only when we collapsed it into stereo that we won-
dered where everything had gone.’ Mussolini’s cues fall into three or four
types—the full orchestra; a chamber orchestra; the strings on their own; a
couple cues recreating the music of the forties. Although the full orchestra
took up some 10 channels (plus effects) of Hear No Evil’s Euphonix CS2000 console on its way to a Tascam DA-88, the main mix is based around five ambient
mics that were placed left-centre-right, and an additional pair spread further left and right
around the orchestra.
That was a great way of setting up the surround mix,’ Parr enthuses. ‘The front three mics are
placed forward of the front speakers and the other two provide the
rear. This was a very orchestral score so we statically placed instruments
around you and pulled them away from the wall. You’re not aware, say, that
there’s an oboe in the far-left corner, you just know that there’s an oboe in the
room that had a different acoustic space than the flute. And it works very well.’
The punishing recording schedule meant that many of the takes contained
mistakes. Alternative takes were used where available, but much of the mixing
effort went into repairing others that had to be used. Here the use of ambient
as opposed to close mics could be regarded as problematic.
‘In a situation where you’ve got a large
recorded orchestra in a room, you can’t
simply get rid of the second violins,’ Parr argues, because they pop up all over the
place. What you have to think about is that close mics on an orchestra are
really not that close. The problems normally come from the woodwind and the
brass—if you’ve got a loud brass passage it’s always going to swamp the
strings and if there are hummers in there all you can do is pull down the relevant
mics as much as possible. You have to weigh up each situation as you find it.
I spent a few hours getting the sound of the orchestra right, and the rest of it
was balancing from the score and fixing any bits and pieces. The repair ele-
ment was probably 25% of the time.’
Of his general approach, Parr says: I do a few mixes and get a feel for the
music and for the sound, and when I’ve got something I’m happy with I save the
Euphonix settings as a snapshot. That then becomes the basis for all the other
mixes: although I may come back to those first mixes later on if my feel for
the film has changed.
The same principle applies when I’m recording. It takes musicians, even the
best musicians, an hour to settle in—to playing with each other, getting a feel
for the genre of the music, getting comfortable in the room and with the head-
phone balance. That’s why it’s better not to record critical cues at the begin-
ing of a session and it’s the same with mixing—I never start with the opening
tracks. I always start with the non-criti-
cal parts and then go back to them if there’s time at the end. By using the
snapshot process I can apply it any-
where. It would be very difficult to do
that with a non-resettable desk and so
the sound of the last mixes may be quite
different from those at the start.
In terms of treatments, the project was
straightforward; the outboard was set
and left for the duration of the mix. The
main acoustic space was provided by a
Lexicon 224X, with supporting reverbs
from a PCM80, PCM60 and 200, a
Yamaha Rev™ for percussion, and
SPX900s for anything else.
‘The Lexicon 224X has got four out-
puts because it was designed with quad
in mind,’ Parr explains. ‘Not a lot of peo-
ple use them, but I use the front pair
panned inward of the left and right
channels, so there’s a little bit going to
the centre, and then I feed the B and D
outputs in and centre at the back. Also
I use different reverbs for different sets
of speakers because when you’re work-
ing in surround, you don’t just have a
plane at the front and a plane at the
back, there are planes all around you.’
Limiting a surround mix is made easy
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Very easily you can say, because centre for different of dialogue. There obviously you can’t have film can’t compressors limiting ‘Quite often when they’re putting together very music the sync dialogue and adjust in the film if...” he offers, ‘hut you put the composer, the last thing we want is for the dubbing mixer to have to pull the whole music track down.’ ‘That’s spot on,’ Humphries agrees. ‘A mix that can’t be toyed with can’t be adapted.’

While he likes to view a film at the start of a session, owing to the extremely short time scale of the project, Parr was unable to view ‘Teen With Missalteri’ before beginning to mix the music. ‘You can get a very distorted view of what’s going on,’ he agrees, ‘especially as you tend to mix cues generally. So doing all the big orchestral stuff first means zapping about all over the place.’ Instead he had to settle for an outline of the plot...

‘I can tell you what it was about,’ he offers, ‘but it is invaluable to get a feel for the whole film if possible.’ The same argument can be extended to the director when evaluating the music mix— a scenario for which Parr has developed a procedure for ‘auditioning’. Running the film from start to finish and performing a live dub balancing the music and dialogue on the fly, allows the director to hear and comment on the music in the context of the completed film. ‘It’s very valuable because they get an overview,’ he explains. ‘They take notes and leave me with directions to adjust a viola on a particular cue which I can do very easily. I feel I can get a better artistic job done by working like that. We’ve shown it to a lot of the people who have worked here and they’re all completely sold on it.’

Between accommodating the requirement for surround music mixing and advancing the cause of the music soundtrack, Parr has set himself a demanding brief — and one that is complicated by the uptake of DVD. But he is anxious to draw a distinction between the musical and cinematographic aspect of the medium.

‘There are two factors,’ he offers. ‘One is mixing for cinema and the other is mixing music for DVD at home. When mixing for cinema you don’t want to have anything too localised because you’re dealing with a very large space with people sitting very close to some of the speakers. The majority of people at home will set up their non-matching speakers wherever they want in a non-ideal listening environment, so all you can do is the best job you can on the mix knowing that the listening environment is likely to be even less ideal than the average stereo listening environment.’

Perhaps forthcoming standards will help make multichannel audio work more straightforward. If not, it will take the likes of Steve Parr to help us make sense of it for ourselves and for our market.
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DO NOT UNDERESTIMATE the power of audio. Of course, that is hardly anything someone working in the pro-audio industry needs to be told. Nor anyone working in telecoms—an industry built on allowing people to talk to one another down wires. Don't underestimate the power of audio as a communication tool. Not only that, but the power of audio to reshape the Internet itself and the net's relationship to the telecoms and music industries. The Internet was once primarily about text, then text augmented by graphics—as always, in the service of communication. The underlying Internet Protocol (IP) was never designed to accommodate, let alone facilitate, real-time delivery of digital audio (or video) data. Yet that has not stopped people with visions for the broadband movement from turning into a reality—from using the Internet to provide just that (a process commonly referred to as streaming). RealNetworks—a company having started out in 1996 as Progressive Networks—streaming very poor quality monophonic audio over then-common 14.4k dialup Internet connections with its proprietary RealAudio technology—now has in excess of 50 million unique registered users of its latest generation (and much improved) RealPlayer audio and video-streaming software. Last year it saw a 500% increase in use of the software, according to independent online measurements from Media Metrix. Today, RealNetworks is the undisputed heavyweight champ of streaming media technology, with a more than 85% share of the streaming media delivery market.

Similarly, in the mid-nineties a few small software companies, clearly agreeing with BT's mantra 'It's good to talk', had the audacity to create programs which used the Internet as a medium for making free international 'telephone calls'. Again, the audio quality was poor, and there were many limitations to practical use. Yet today, IP Telephony (Voice over IP, VoIP) is turning into a business that is driving the adoption of IP networking for digital voice delivery in the telecoms industry. Facilitating the entry of new players. Typically these are referred to as 'next-gen telcos' and are helping to exert downward pressure on call prices.

Meanwhile, file-based delivery of audio over the Internet—specifically, of music tracks—is stirring up the record industry, which sees its established practice and distribution infrastructure being challenged, and fears the impact of online music piracy on profits and the attitudes of a young generation. While companies like Cerberus, Liquid Audio and a2b Music have sprung upon the past couple or so years to provide systems for secure online music delivery and commerce that are designed to work with the existing record industry rights and payments infrastructure, an alternative grass-roots ground swell of anti-industry sentiment has coalesced around MP3 perceptual audio coding compression technology. MP4 (MPEG-1 Layer II) is notorious for being the audio format of choice for online music piracy, and the record companies have played this angle to the hilt, but the fact is that there's a fast-growing legitimate MP4 scene consisting of artists who want to explore other ways of getting their music out to people, and even making money from it. MP4 itself is not illegal. It is an audio compression technology, and some independent record companies as well as other emerging online companies, such as Platinum Entertainment and Good-Noise, are building secure e-commerce systems around MP4.

In fact, the technologies for secure credit-card-based online sales and downloading of digital content are by now well established, and Internet users are starting to become comfortable with online buying. The technology to encode and play MP4 audio files is widely available in the form of inexpensive or free software programs for a range of computer platforms (most notably Windows). The latest playback development, however, is the portable MP4 player, in the form of Diamond's Multimedia's Rio PMP300, Sachan's MPMan, and Samsung's Yppp range. These compact Walkman-styled players cost around $200 and use 16Mb flash memory cards rather than tapes or discs to store music. MP4 files loaded into a PC from the Internet or a CD-ROM can be transferred via the computer's parallel port interface to the player, freeing MP4 from the desktop.

Towards the end of last year, the RIAA took Diamond to court in an attempt to delay release of the Rio, claiming that it was in breach of the US Audio Home Recording Act for not implementing SCRMs and not paying royalties per device. That action was unsuccessful, and Rio was not deemed a recording device. However, Rio and its ilk point up another problem exercised the record industry: how to control what users can or cannot do with a digital music file once it has been downloaded. While closed systems like Liquid Audio and a2b Music take pains to restrict what users can do with a music file once they've downloaded it, there's no limitation built into MP3 files to prevent copying. Ideally, the record industry would like to implement copy control in downloadable music files, probably via some form of digital watermark encoded into the digitised audio signal.

However, the popular momentum behind MP4 would seem to be unstoppable, with an increasing number of web sites, independent labels, and even name artists (when their record companies do not force them to remove the tracks) offering MP4 tracks free or for sale via the Internet. A leading MP4 site (MP4.com) hosts over 6000 MP4-encoded tracks by upwards of 2000 artists, with each artist (individually or >

**The Musical Internet**

Developments in the telecoms, and Internet industries are set to have a profound effect on the ways in which music is distributed and consumed. Simon Trask explores a rapidly changing landscape.
top-down. At the same time, the contrast between MP3 and the likes of Liquid Audio and 2812 Music is one of an open, non-proprietary system on the one hand versus closed, proprietary systems on the other. Both of these contrasts can also be found in the current "OS war" between open-source Linux and closed OSs like Windows and Mac OS.

Downloadable music is hardly going to overturn a multibillion dollar industry (most estimates see online sales rising to about 5% of total over the next few years), but even the majors now recognise that it is a reality they have to deal with, if only to ensure that they have a say in how the technology and the market develop.

At the end of last year, the leading record companies and a number of major computer industry companies got together under the auspices of the RIAA (Recording Industry Association of America) to announce the Secure Digital Music Initiative. This is the recording industry's attempt to regain the initiative, so to speak, in downloadable music. In line with the SDMI's objectives, the five major record companies—BMG, EMI, Sony, Universal, and Warner Bros.—have joined forces with IBM to trial secure music downloads using IBM technology allied to high-speed cable modem delivery.

The Madison Project, as the trial is known, is to take place in San Diego, California, starting in the Spring, with around 1000 cable modem subscribers recruited as participants. Initially the majors will be making some 1,000 albums as well as a selection of singles available for secure online credit card purchase via an online store created especially for the trial, rising to some 2,000-2,500 albums by the end of the trial. The cable modem technology will allow the participants to download a 60-minute album in under 10 minutes. Speaking at a press conference to publicise the trial, Larry Kestell, Executive VP of Advanced Technology at the Universal Music Group said both the development of the industry and its future earnings will be directly proportional to the rollout of broadband connectivity in the US.

The original "pirate MP3 scene" took off on college campuses where students had networks and bandwidth that made MP3 files easily downloadable (not to mention uploadable) despite their size. The standard compressed ratio results in around 1MB per minute of music, so even a 3-minute pop song is a non-trivial download for most home Internet users, who are on 28.8k dial-up modems. This is one reason why so-called "burn and mail" CD compilation sites have sprung up on the Internet. Essentially, these sites allow visitors to make up their own compilation of licensed tracks, typically after listening to 30-second track extracts in RealAudio or, increasingly, Liquid Audio streaming format, then pay for them via secure online credit-card transaction, after which the compilation company will burn a CD and mail it to the buyer.

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majors have refused to license tracks to these companies. Independents have generally been more responsive; genre-site CDuctive has been particularly successful in attracting dance and indie rock labels. What’s interesting about sites like CDuctive is that they put compilation power into the hands of buyers rather than record companies, and can provide recommendation features, such as top ten downloads and suggested compilations. It’s this sort of slippage of record company power that the majors don’t like.

Downloadable tracks can fit easily into this compilation site format, and some sites are beginning to offer liquid audio downloads of selected tracks as an alternative, but the limitations of 28.8k download times are bound to put off many people. However, all this is set to change sooner rather than later with the introduction of new high-speed data access technologies into the home (and I don’t mean ISDN). Two technologies are in the frame: ADSL (Asynchronous Digital Subscriber Line) and cable modems. ADSL technology is a telco offering, as it allows high-speed data access over existing copper wiring. The States, being ahead of the game as usual, is already seeing a gradual roll-out of both technologies by telcos and cable companies, offering download speeds in the megabits rather than kilobits range, meaning that a track will take seconds rather than minutes to download. This is potentially the majors’ nightmare, with everyone having access to the sort of high-speed bandwidth that facilitated the original MP3 pirating scene. At the same time, it provides the basis for making secure, rights-based online music sales a viable commercial proposition.

Cable service is much more widely offered in the States than in the UK, making a battle between ADSL and cable modems very real there; it remains to be seen whether cable modems will have much impact in the UK. Meanwhile, BT has been trialling ADSL in North and West London since last Autumn, and is saying that it will be rolling out ADSL nationally later this year, after the trial ends in the Summer. The company originally trialled ADSL-based Video On Demand services in Ipswich back in 1995-96, and the technology is proven. The current trial includes several major UK Internet Service Providers, such as Virgin.net, and is aimed more at getting the implementation right.

ADSL offers one regular voice and one high-speed data channel down a single copper-wire line, which means that users will be able to make voice calls and access the Internet at the same time without having to invest in a second line. The trial system is providing a 2Mbps download rate and 256kbps upload rate, and BT say that these will be the rates adopted for commercial rollout. Although ADSL technology can offer up to 8Mbps/1Mbps rates, the rates that BT are adopting can operate at distances of up to three kilometres from the local exchange, which BT says will include most phone users in the UK.

Installation will require a special ADSL modem and a 10baseT Ethernet connection into the computer for the data channel. One of the most interesting features of ADSL is that its data channel is always on, which translates to instant access to the Internet, that is there is no dialling up, it also means no busy signal and no getting bumped off. If you dedicate the data channel to your ISP connection, it also means constant access to the Internet—rather like having a leased line, in fact, only with a lower upload than download rate. One possibility here is that anyone could run a web server from a computer in their home. Always-on high-bandwidth
access could also lead to many more people listening to web-based radio stations and other online 'webcasters'.

While the voice channel will be priced in the regular way (timed calls), the data channel presents an interesting challenge for BT in deciding what pricing model to adopt. The company says it won't be starting to consider this until the Spring, but the implications are that some sort of subscription model will be required. In the States, a monthly flat-rate subscription appears to be the norm—BellSouth's FastAccess ADSL service, for instance, is priced at $59.95 for unlimited monthly usage, plus a $199.95 charge for the modem and related equipment and a $99.95 installation charge.

According to a BT representative, data volume-based charging (probably banded) will be one possibility under consideration. However, given that the commercial purpose of offering fast Internet access is to facilitate 'media-rich' (data-intensive) services on the Web, it won't make any sense to discourage access to these services.

Meanwhile, new UK company Edge Technologies has announced the launch of the Edge Network, an ATM-ADSL network which it describes as the first UK-wide broadband network capable of delivering access speeds of up to 6Mbps. This is a service aimed at businesses, with a 1Mbps ADSL connection working out at around £500 per month. Over the next year or so, the UK and Europe as a whole, is set to see the emergence of many new network service providers offering voice and data services built on optical networks running Internet Protocol and providing Virtual Private Networks to businesses wanting to create extranets for networking offices, tele-workers, suppliers and customers.

A company called Global TeleSystems Group is introducing what it calls the first high-capacity transport platform in Europe to use IP and DWDM on its own optical network, and claims that a capacity increase of more than 10 times that of current operational IP networks will be possible.

DWDM (Dense Wave Division Multiplexing) technology expands the carrying capacity of optical networks by up to 40 times by dividing a single optical signal into multiple channels or wavelengths. In this way, a single optical fibre can carry more than a million simultaneous calls. At the same time, new developments such as mesh-networking protocol and spatial mode transformation are promising to cut the cost of DWDM-based optical systems considerably.

These sorts of developments are dramatically scaling up the bandwidth available in the network to meet the media-rich, broadband requirements of both consumer and business-to-business markets.
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_We have CLICK FREE input on T.A.O. recording. YES it really works!_
EVERYTHING YOU MIGHT expect of an up-and-coming Latino music producer is embodied in Victor Di Persia—jet-black hair pulled into a tight ponytail, Speedo sunglasses squinting over the hood of a Mercedes-Benz 520, hands gesturing broadly as he speaks in an assertive, accented baritone. But he is not quite Latino. Born in Rome of an electronics businessman and a Cuban-born mother, his production career is still nascent, but as an engineer, Di Persia has impeccable credits including work with Arturo Sandoval, jazz flautist Nestor Torres and torchy Argentinian vocalist Sandro.

It is as a studio owner—recently the newest one in Miami—that Di Persia represents the pro-audio Zeitgeist. He firmly believes you can be a producer with a personal studio that is also commercially available, and that you can use a studio as the foundation for a production career and still make it viable as a stand-alone business.

OceanVu’s current incarnation sits in a 2-storey pastel-coloured building (which is to say, anonymous, in this low-slung, pastel town) in the City of Miami. The first thing that grabs attention, though, comes as soon as you enter: a set of rails beside the steps leading up the purposeful graffiti-decorated hall from the entrance on which a custom-made trolley rides, pulled by a portable winch on the main floor, used to load in equipment. Once inside, the floor is divided into compact suites of offices and lounges orbiting the studio. The main studio is 22ft x 33ft, with a rectangular airlock serving as both a 10ft x 15ft iso booth and entrance to the control room, a 15ft x 10ft machine room (which doubles as an iso booth) follows that one along the same wall. The facility was ultimately designed by John Arthur, whose Miami-based John Arthur Design Group has done a number of facilities in town, as well as in Atlanta and South America. The original floor plan was done by another Miami designer, Ross Alexander, with whom Di Persia had a parting of the ways just after construction began. Acoustical cloud panels hover near the rooms portals, partially deadening what is a remarkably live space designed to hold the five-piece to seven-piece bands that typically comprise Latino records yet keep the sessions intimate.

The recording studio and the iso booth were intended to be percussive spaces, but controllable spaces. Arthur explains, using the clouds and moveable acoustical panels. The spacious 26ft x 24ft control room was also designed to be accommodating to recording. The control room is based on a distributed acoustics design, says Arthur. You control the hot and cold spots with a balance of absorption and reflection, soft and hard surfaces. But we designed it in such a way that Victor can add diffusion later if he feels it’s necessary.

Di Persia makes a point of how he likes to record in the control room, even acoustical instruments and vocals. I hate the distance and isolation that the talkback button puts between you and the artist,” he explains. This determined the studio’s layout to a large degree.

Acoustical cloud panels hover near the rooms portals, partially deadening what is a remarkably live space designed to hold the 5-piece to 7-piece bands that typically comprise Latino records yet keep the sessions intimate with large windows (one of which is a tropical fish tank) facing out above the 56-fader (6-channel) Euphonix CS5000 console and the glass doors of the two isolation booths facing directly into the control room. The ability to see what a musician’s hand is about to do is critical in being able to do good punches, especially if a musician is working...
<with an instrument that you’re not familiar with, Arthur comments. ‘That happens every day in Miami. For instance, someone comes in with a berembatu so I just ask, ’where’s the best place to put a microphone on this thing?’

‘Having as much visual connection with the musicians as possible is also important in being able to gauge their emotions. That’s a big part of what it takes to be a good engineer—understanding that emotion is a major part of where music comes from and doing what you can to capture that as well as a performance. And being able to do that regularly is something that come with experience.’

The 18-year-old Di Persia arrived in New York City in 1980, in the dead of winter, and the climate quickly sent him south. The weather was better, but the economic climate could not have been worse—the record industry had crashed in the wake of discos and Miami’s glory years with The Bee Gees, Eric Clapton and the Eagles were over. A career as a DJ held little promise, and he began knocking on studio doors.

‘I didn’t have any audio skills and my English wasn’t very good,’ he recalls. Instead, he got a job repairing microfilm machines. A few months into the job, he passed by the offices of MCI that were based in Miami in its pre-Sony acquisition days. Recognising the name, he applied for a job there, but couldn’t pass the advanced written technical test. A year later, having enrolled in a local technical college, he re-applied and became a field repair technician working on both consoles and tape machines.

He remained there for three years, not only working but also making several contributions under a company-sponsored incentive programme that rewarded employees for technical innovations. One of Di Persia’s contributions was a way to wire a Molex connector with four pins instead of six, making the other two connections with jumpers inside the desk, which saved time and money. During this time, he decided the focus of his career in sound should be as an engineer and producer. Set on a career in production, he left MCI in 1984 and again began knocking on studio doors. This time, however, the doors were opening, in large part because Miami was an MCI town and people were eager for a factory-trained tech. He secured an assistant technical engineer position at Criteria Studios, still the doyen of the Miami studio community, and which was still owned by founder Mac Emmerman. He progressed to assisting on sessions and his career choice was seemingly under way when disaster struck. He was assigned to transfer the master of a record by future Miami Vice television series star Philip Michael Thomas from a single 12-inch reel to two 10-1/2-inch reels in preparation for making a cassette duplication master. Also aligning a nearby machine, his concentration drifted... ‘I let my concentration drift and then I heard this horrible noise,’ he recalls grimly, the recollection still painful in his memory.

March 1999 Studio Sound
Victor Di Persia: 'I came back to the transfer room and the tape was all over the floor, completely stretched out. The tape had exceeded the flange and gotten tangled in the machine. I figured my career was over.'

'I came back to the transfer room and the tape was all over the floor, completely stretched out. The tape had exceeded the flange and gotten tangled in the machine. I figured my career was over.'

It nearly was, hacking up masters was not a universal practice in the days of analogue mastering. Fortunately, an engineer in Los Angeles had made a digital copy on an early Mitsubishi X-802 track deck, but Di Persia's internship at Criteria was over. 'I felt like the world had ended,' he recalls. 'I had left MGM where I had benefits to do an unpaid internship at Criteria. Now I had nothing.'

But this would not be a typical American rags-to-riches tale without a happy ending. During his brief tenure at Criteria, Di Persia befriended singer Betty Wright, who helped him get on at International Sound Studios. 'Two days before that, I was down and out,' he recalls. 'That's what I love about the studio business—anything can happen.'

At International, a classic scenario kicked in—the lead engineer on a session called in sick, and Di Persia found himself in the driver's seat on a 15-piece big-band session, cutting backing tracks for singers on one of the dozens of cruise ships that call Miami home. 'I would never have volunteered for that session, but once I did it, I had a whole new level of confidence in myself,' he says. 'That was a real career turning point.'

His turning point as a producer was less epiphanic, but it did introduce him to the ins and outs of studio ownership. Latino producer Eddie Martinez was building MIDI-land in Miami and asked Di Persia to help. Once there, artists he engineered for began to solicit his artistic as well as his technical opinions. The business arrangement with Martinez didn't evolve as Di Persia had hoped, but it made him realize that he would need his own studio to pursue his production career. The good news was that, by then, he had built a significant reputation as an engineer among Miami's Latino music community. After freelancing for three years Di Persia opened the first OceanVu, in a 1,500 ft space in a commercial building in downtown Miami with a Tascam 3700 console with automation and four Alesis ADATs.

At that time pop artists such as Mariah Carey and Celine Dion were realizing the potential of the Latin market and recording additional tracks in Spanish.

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'I could always keep them running,' Di Persia says proudly. 'And I used to make bets with people that I could synch my four ADATs up in less than a second, and I used to prove it with a stopwatch.'

Another legacy is Di Persia's predilection for inexpensive outboard gear. He has a Lexicon 480L, and a few other high-end pieces, but his racks are filled with Alesis Microverbs, Lexicon LP half-space units, and other less-than-pricey bits. It's part of a pragmatic parsimony that Di Persia brings to the business of studio ownership, producing an interesting mix of high and low end. 'If you're only using certain expensive pieces of equipment occasionally, it makes more sense to rent them and invest the money in the studio in other ways,' he explains. Besides, the Microverb is cheap and gives you a cool distortion that you can't get out of a high-end piece.'

The high end is represented by the CS3000, that he chose mainly for its automation, though he also likes the sound and the way it looks in the room. 'I like that I can automate everything, right down to the EQ,' he says. 'That's very practical for a one-room studio because you can switch between

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The future hit Miami with a bang, only days before OceanVu's opening with the acquisition by The Hit Factory of Miami's famed Criteria Recording Studios, lock, stock and nicotine-stained barrel.

Sessions quickly and still retain the information from interrupted sessions. It's also a great production tool, especially for the way that Latin music is changing, mixing salsa and rock in the same song. You can switch between radically different EQs right on the downbeat and at the same time do minutes and other automation moves.

Like other engineers, Di Persia admits he was initially intimidated by the CS3000's learning curve. However, he says, he tackled it because he loved the idea of the challenge, and has come to prefer its multiple-layer design. The training was very good, and once you get used to the soft knobs, you realise that this is the way the future is going, so you better get used to it now.

The future hit Miami with a bang, only days before OceanVu's opening with the acquisition by The Hit Factory of Miami's famed Criteria Recording Studios, lock, stock and nicotine-stained barrel. The merging of the facilities, which between them cover over 65 years of American studio recording history comes amid a growing flurry of mergers and take-overs which has also seen Nashville's Emerald Recording acquiring the bankrupt

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Masterfonic and Seventeen Grand buying Love Shack Studios, with both acquirers openly acknowledging that they are on the prowl for more. London's Metropolis Mastering purchased New York's Sterling Mastering last year was a transatlantic tie-up, but the Hit Factory-Criteria deal is the first multi-city US proposition. It has engendered some initial concern among Miami area studios, some which see The Hit Factory's arrival as a veritable invasion of Yankees with enough firepower to conquer regional market share. Most, though, including Di Persia, see the upside of the move as something that will raise the bar in Miami for all studios, and bring in a lot of work that otherwise would have stayed in New York or elsewhere.

'The Latin market didn't really exist on anything near this level 10 years ago,' Di Persia says. 'This sale of Criteria is going to make Miami even more of a major music centre. If your studio is good and your service level is high, then the Hit Factory's arrival is actually going to help.'
The 106th Convention of the Audio Engineering Society will be held on May 8-11 1999 at the M.O.C. Congress Center in Munich. The AES Convention offers the most effective opportunity in Europe for an exhaustive survey of new audio technologies as well as for meeting top people, with a programme including a wide variety of presentations (papers, seminars, workshops, technical tours). Suppliers of equipment and services from all sectors of the industry will be in Munich, along with the foremost authoritative speakers.

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A Paper Empire

STUDIO SOUND was born, not inappropriately, above a London violin emporium a few hundred yards from BBC Broadcasting House—if you need a new string you can still get one on the ground floor of 99 Marten House Street. A great barber occupied a rear basement, whence mixed essences of hair-cream and aftershave evaporated up the staircase to the offices of Miles Henslow Publications. Mr Henslows himself, a former journalist on the Drapers' Record, was the founder and principal beneficiary of the monthly journal Hi-Fi News. A rival publisher (Douglas Brown, late of the News Chronicle) had the temerity to set up a monthly called Tape Recording & Hi-Fi, Henslow expressed his irritation at this transgression into his territory by starting The Tape Recorder. I joined Henslow's staff in July 1963 and threw myself into a world of manual typewriters, Cow Gun, galleys, black-and-white pictures, litho plates and the company dogs (also black and white).

One year on, Henslow sold Hi-Fi News and

the TAPE RECORDER

Front cover: The Penthouse Studio at Abbey Road features a 120-input AMS Neve Capricorn digital mixing console. Designed by Acoustic Design Group's Sam Tawshen and John Flynn, the room is equipped for 5.1 surround sound mixing. Inset: Abbey Road's first EMI/Neve custom console was ordered in 1974 and designed with a distinctive L-shaped layout. Abbey Road is a long time user of B&W monitors. The Penthouse features B&W Nautilus 801 monitors. These are a development of the Matrix 801 monitors which are used by the majority of the world's classical music studios.

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1959-1964 Readers are encouraged to build their own really portable do-a-yourself clockwork tape recorder. They are reminded of the accompanying role of side projectors and continue to be updated on equipment in the world of one. From Russ Conway's 'It's music at your finger tips thanks to Grundig.'
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Session Notes

YES, I REMEMBER Volume 1, Issue 1. I used to await eagerly the appearance of the Tape Recorder on the newsstands with its exciting promise of quality recording via the Gramadec or the mechanical excellence of the Truvox. First there was Grundig, then later there was Simon and Vortex, with Revox setting standards of quality that us poor amateurs with our home-builts could only dream about.

In common with a few other enthusiasts, I eventually became a professional and was able to indulge these early fantasies, only to find that professionalism didn't bring contentment; only a slightly better view of the awful imperfections in the art of sound recording and reproduction. With the benefit of hindsight, I can see that my attitude has always been a combination of both rebellious and reaction. I refuse to accept 'new' as being always better and have a considerable penchant for searching out earlier solutions to problems that we have today and re-evaluating both the premise and the solution.

The Tape Recorder, and latterly Studio Sound, were always important publications to our earlier efforts in professional mixer manufacture (remember the Alice 8:28) and my own contributions to Studio Sound started in 1973. These were mostly factual and hopefully interesting morsels of technical development mixed with opinion. By the early eighties my style had moved firmly towards the controversial and was entering realms of conjecture and experimentation. The opinions expressed were far from orthodox (all equalisers should be banned). An understanding of the physics of the velocity of sound in varying conditions of humidity, temperature and pressure is fundamental to good monitoring and mixing, and nobody knows anything about stereo (except me of course). Together with my good friend Steve Dove (now a consultant in Philadelphia), we had an occasional rant at most of the technology available at the time. It was good fun and intentionally stimulating, and in hindsight, a reflection of the restlessness that we felt in a world that we were impatient to improve.

I can clearly remember 17 years ago conducting some experiments on the importance of differential volume and time delays on stereo imaging using my son Danny (then five years old) as a guinea-pig. I played simple mono music samples to him via a pan pot and a delay line on one side and got him to point to the apparent sound source. I wondered then where all this was leading and how we would look back on such primitive experiments from the year 2000.

In the seventies we lived in a world where analogue ruled. Where digital control of analogue was possible, but difficult (we built the first digitally controlled mixer with fully balanced analogue throughout) and when a good stereo tape machine cost about three months average wages. All things electronic were expensive.

Even then, gone were the days when everything was built to last, there were the beginnings of production engineering in mixers, outboard equipment and especially recorders, but the music business was still an expensive pastime and the home studio was only for the rich and successful. Quadraphonic and Tetrahedral experiments and systems were well established thanks to superlative work at the BBC and at Crawley Court (the IBA) and the ghastly Philips compact cassette sounded bad.

I remember clearly a 1970 demo session in my London studio with a small band of session musicians. I went into the control room and switched on the valve 12-channel 2-group mixer and the two 50W power amplifiers. I was fortunate to possess a couple of Neumann microphones so I switched them on to warm up.

The mixer had simple channel equalisers, pan pots and auxiliary outputs but not much else; the recorders were 1/4-inch 2-track machines with home-built sync switching on one of them for mono overdubbing.>

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'Now you can use professional tape, even if you're not in the business'
Akai Professional is the future of sampling. We established the standard for professional digital sampling in 1986 with the S900 and every important advance in the years since then has had our big red logo on its box, now with the launch of the radical S5000 and S6000, the cutting edge of progress has got even sharper. Our pedigree speaks for itself.
error. Backing vocals and anything else were synced on. The final 'master' was a further processed (heavily compressed) mix of the second 2-track.

The resulting recording was vaguely reminiscent of 50's Holloway Road and I listened to it with the usual disappointments and regrets that the studio owners didn't yet want to invest in an Ampex 4-track machine.

Today, when I go into my Newton Abbot studio for the start of a session with a small hand, I fire up the desk, the rack of outboard and the computer. My two sets of monitor speakers are driven by experimental power amplifiers, and some of the microphones are decidedly 'prototype'. The desk is 40-input digital joll with everything.

The outboard is a selection of both valve and solid-state mic amps, compressors and even a couple 'equalisers'(!). There's a stack of MIDI gear with keyboards and a experimental computer.

The computer has just been upgraded with a 17GB hard drive, but the processor is still only a Pentium 2 266MHz. It is running Cubase VST while another machine runs Creamware TripleHat for CD mastering.

The sound sounds a bit tricky on the first run through so I decide to revert to a little-used ADAT machine for the foundation backing track (to save storage space). I make a dummy Cubase song and lock the clock to the ADAT. Forty minutes of 8-track running-time later, and using a wall of gear, we have a backing that is good enough to work on so I dump the ADAT backing across to the computer may be reducing (mixing) it to 5 tracks to save time. Limited only by the musicians and singers I can record, cut, paste, copy, cheat, stretch and fix anything (it says in the instruction book).

At the end of the session—or more likely several sessions—I'm left with a screenful of pretty coloured rectangles and it is mixed down in time. I try not to think about the frustrations in the hours of assembling: organising the subgroups out of the computer into the desk because it sounds better that way, trying to make the plug-ins work; and then trying even harder to make them sound musical.

After an eternity of programming runs, it is sweet and acceptable and we can press the buttons on the two computers for the automation to produce a master CD—through an analogue compressor of course.

So what's changed? Everything and nothing. No-one forecast such a fantastic drop in cost of good electronics—all because of the computer. Computer technology and thinking has rearranged all our brains and we've got to learn to love them (if we don't already).

Given us the freedom in recording technology, together with extreme excellence in fidelity.

All these functions I had in 1970 have been improved out of all recognition except...

There are still huge acres of the sound recording business where blind application of even the finest digital techniques is arguably counterproductive to 'quality'. These are areas that directly affect the human ear and are mainly on the creative side of recording or sound reproduction. I mean loudspeakers, equalisers, compressors, preamplifiers and microphones. These are the subjects of my work nowadays, and the more things improve, the more work there is to do, new (revolutionary?) ideas jump up and the list of researches and developments rolls on, never ending.

I predict that in another 30 years our technology will be just as unrecognisable to us now as the DVD would have been to Joe Meek. But it is equally evident that musos will still be the same and it will take just as long to overrule the guitar.

Each day really does bring new and exciting challenges; I can't wait for tomorrow.

Ted Fletcher keeps a word processor to hand for the odd moments when he is not tainting the recording industry with Joemekk outboard.

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We Should Stay So Young

The Olden Days were fun, even when you were there, and even if you can remember them now. Steam trains were in the scrapyard, but the economics of an £18 ( $36) per-hour studio in London's West End - On The Lane Tea Music, underneath the Midland Bank at the corner of High Holborn and Kingsway - meant that a party was an accepted part of music-making routine rather than sliding in as an off-the-books celebration. At the time, this was one of the most expensive studios. Three days after starting my first studio job as a tape op/tea-boy, I was playing har football with Fleetwood Mac at 2am. That was in 1970. A few years ago, I was doing the same, with Blur, but even averaging their daily studio rate over 24 hours you won't come close to £18. No one can now overlook the pressures of the expensive business that top-shelf recording has become. Conveniently, Blur recorded quickly and confidently, dealing with pub sports the same way.

Economics were unavoidable in my first 1979 New York City productions. Since real estate was so expensive, Media Sound would charge $175 (£110) an hour for the tracking room, and rely on turning over at least two sessions per room per day. For a Brit bullied by meal breaks and nice cups of tea, the discipline of streamlining music-making to fit session time constraints was invigorating. However, as equipment finance payments began to surpass the rent, studios worldwide would lose their innocence.

Thirty years ago, innocence was endemic to recording. Thanks to the revolution of the early sixties, where artists cast off the old business chains of Tin Pan Alley and took control (at least of their working environments), studios were decidedly unintellectual and even anti-intellectual places. You were under suspicion if you thought outside the factory and made remarks.

For me, editing Studio Sound (1974 and 1976) was a no-brainer; get your mates to write their first-ever article and stage a raiding party on the American AES shows to establish yourself as the first international studio publication. Studio Sound now serves a business fundamental.

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Courting Controversy

After forty years, I found myself coughing over a box file of dusty clippings to see when I started contributing to Studio Sound. It seems to have been in 1972 when I was keeping a watch on new patents for inventions that might be of interest to studio engineers. Decca was still patenting the Teldec video disc, a flimsy grooved recording that was tracked by a stylus. Leonard Kahn was patenting AM stereo. The industry was stumbling into the absurd battle of the stereo sound levels above 90dB, and it seemed to me that the idea of a regular column came up just as Philips was demonstrating the first prototypes of an optical digital audio disc that later became CD. Our idea was, and as far as I am concerned, still remains, to try and bridge the gap between professional and consumer life.

As demonstrated by Philips in 1978, CD was a 14-bit system with a smaller disc and limited playing time. I wrote many articles saying it was not good enough. Everyone seemed happy with CD except Barry Fox, sneered one ex-BBC magazine editor at a press conference. Fortunately Sony, who upped to 16 bits, had more sense.

I have never worked in a studio, but I know that those who do are far too busy to keep up on consumer innovation. And studio fortunes rest on what the consumer buys, not what some naive marketing manager wants people to buy. You just can't separate the professional and consumer worlds. Botanists would call it cross-pollination. The Fatal turntable played LP records with a CD laser, thereby causing no wear. But the asking price was so high (tens of thousands of dollars) that nobody could afford it, and the designers had overlooked a fatal flaw: A stylus shoves dirt from the groove; a laser beam just tracks it as noise.

We have seen the failure of FMX, a CBS system to improve FM radio cover, and before the failure of Dolby's FM system. Another CBS system, CX, was supposed to let LPs compete with CD. The biggest nonsense of all was CopyCode, the CBS system that was supposed to stop home copying. It took a US Government enquiry to persuade CBS, the IFPI, BPI and RIAA that journalists were not just inventing the problem that CopyCode was fatally flawed.

I still treasure the compliment unintentionally paid me by an IFPI lawyer—Everyone was quite happy with CopyCode until you started trampling it around, she told me.

We have tracked the scandal of analogue recording tape, mainly Ampex and Agfa, that goes sticky in storage. The culprits said nothing until we exposed the issue in Studio Sound. The PRS tore itself apart and wasted millions on the dopey PROMS computer system. And some people got really hot under the collar when I researched the story that Whistle the Protractor Normal Sheldy had made some of the Winston Churchill recordings that are still on sale under his name.

I learned long ago the simple rule that for a quiet life in the audio business you don't rock the boat. My rule remains equally simple. Stuff the quiet life.

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Building For The Future

I must confess to having forgotten about the series on building an audio mixer that I wrote for Studio Sound in 1991, though apparently others have not.

If I were writing the series today, however, it would be very different because of the advances in technology that have taken place since. I would begin by stating what I believe to be a fundamental difference between now and then—in those days, creative engineers, whether amateur or professional, got their satisfaction from making the equipment and today they get their kicks from using it. I think that the reason for this is that nowadays, even very basic equipment is so much better and cheaper than it was, that it is simply not worth even trying to compete. For example, you can now buy a complete, good performance, digital multirange meter for under £1.00—50 years ago, you couldn't buy a decent moving-coil movement for sixpence money and as for close-tolerance resistors, they were simply not available except at very high prices. I well remember buying carbon composition resistors up to value—not because we were rugged traditionalists but because there was no other way of getting what we wanted.

In another area of life, I find it both amusing and irritating when I hear someone say that music is going to the dogs because of all these synthesizers. I am willing to bet that if they had been available to JS Bach, he would have used them. Great composers have always been pushing at the boundaries of technology and it is well-known that Beethoven was quite capable of breaking the strings of a piano while attempting to get more volume out of it.

I had lost the original typescripts and diagrams of my mixer series and had only a hazy memory of what they contained. What surprised me when I reread them was the amount of technical detail that I had put into it—must have done this because I thought readers would be interested in how and why things worked. And I must have been right, to judge from the response at the time and this drew me to look at the readership of that time.

The amateur magazines of the time illustrate the practical nature of the readership at the time—Practical Wireless and Radio Constructor were both circuit designs, complete with drawings of how to drill the metal chassis and how to wire the parts together. These magazines had been around for many years but about this time, a new breed began to appear of which I did not reflect the DIY tendencies of the readership, their appeal being broader. Nevertheless, there was still a readership who expected to build what they needed from a bag of bits and both the newcomers catered for it. The only publication that continues to keep this tradition of technical discussion with the opportunity for DIY assembly is, as far as I know, Electronics World (previously Wireless World). The wonderful thing is that heated discussion about the merits or otherwise of this or that power amplifier circuit continues today. All the old fire is there, the only difference being that a few extra zeros have appeared after the decimal point when distortion figures are presented, and I suspect that this is because the combatants have access to much better distortion analysers than we did, I wonder how many of today's readers will remember the Peake Point One amplifier. Imagine—an amplifier with a distortion of 0.1% was thought remarkable enough to announce it in the name and it was pretty good, using valves and an output transformer. There are still those around today who claim that valves give a better sound than transistors do, often described as "warmer".

What about using it though? Power amplifiers are destined to be connected to loudspeakers for the purpose of reproducing sound, and, although I am not an acoustics expert, I believe it is true to say that loudspeakers and the rooms they are used in, can make a nonsense of the most impressive amplifier measured performance. Today, you would need to be something of a genius to make an amplifier that sounded so bad that you could not enjoy your favourite recordings which is the whole purpose of the exercise—isn't it?

There may be an identifiable disease called Hi-fi Syndrome which shows itself as an insatiable appetite for better and better sound reproduction without much attendant interest in the programme material and I freely confess to having suffered from a mild form, but I used to work for a man who would demonstrate the prodigious fidelity and power of his Westrex sound system by playing a recording of Bela Bartok's Music for Strings, Percussion and Celesta, which he disliked but, because I was forced to listen to it so often, much to his surprise, I grew to love; he even gave me his copy later and I still have it. We owe a debt of gratitude to those pioneers who have brought the sound reproduction industry to where it is today and with digital recording, I think we really have got close enough to the original sound, so why not sit back and enjoy it.

Peter Levesley remains true to constructors' ideals as an audio consultant.

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CONGRATULATIONS

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The Technology Of Change

IT ALL STARTED at the APRS Engineers Course closing party in 1976, when I was approached by a trendy looking gentlemen in a fur coat. You must be the chap from Switzerland, he said as I speculated that the previous owner of the coat was a grizzly bear. 'Fancy doing some writing for Studio Sound.' The gentlemen was, of course, Mike Thorne, editor of Studio Sound.

My first article appeared in early 1977: a Studio File on Mountain Studios in Montreux. Twenty-two years and five editors later, I am glad still to be part of what is probably the most respected pro-audio magazine in the world (at least, that's what people tell me when I meet them). Quite a reputation to live up to.

I first came across Studio Sound in the waiting room of the Shure distributors in London. After it ceased to be Tape Recorder, and have been a reader ever since. To say that things have changed would be to put it mildly, though in many ways, not as much that you might think.

Technology has always been an integral part of working with sound, there is just more of it now, and once the initial love affair cools down, people get back to the serious business of making records or whatever. But it is interesting to note an alternative application of Newton's First Law: for every action, there is an equal and opposite reaction.

Not so long ago, the number of stand-alone preamps at a trade show could be counted on one hand. Now, with the plethora of digital multi-effects processors et al., you could virtually fill an exhibition hall with the stacks of valve (tube) and class-

A discrete equipment, all designed to look less, yet to do it superbly well. Surely this means that people must still be using their cars or there would be no such market.

One of the most marked changes is that Studio Sound has outgrown has to be the inven-

to several or all. The mighty micro (processor) is naturally at the bottom of all this.

It will be nice to be writing a similar piece in another 32 years and have the luxury of knowing where technology has taken us in the meantime. Regardless of whether I'm here.

of sound reinforcement continues apace, while Neve go with the grain. Meanwhile, much is happening in the digital front. APRS Chairman Mike Bevile comments. The impact of the CD has opened a new chapter in studio recording techniques: The second Digital Information Exchange takes place in London at the end of 1986. 1987 is notable for new techniques and formats. The record industry gets up a bit of steam, the supposed threat of DAT recorders, and then the inclusion of the CBS Copy Code chip, Neve, Mitsubishi, SSL and Sony announce their digital standards initiative, while a

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1986—1990

More raids—BASF launches Studio Master 9 Hi Turbo Tape, DDA debuts the D-series desk, Dolby unveils SR (Spectral recording), the Midas XL range

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READER RESPONSE No. 029

SUBWOOFERS 1094A & 1092A ARE PART OF THE COMPLETE COLLECTION OF OUR ACTIVE MONITORS
A Different Future

A S THE EDITOR of this august organ on its 25th Anniversary edition, I am very pleased to have been asked to contribute to the 40th. My first thought was to dive into the archives and locate what I wrote back in April 1984 (along with the other editors to date) to see how right or wrong I had been in my predictions. I know I wrote a piece set 25 years into the future (2009) with crystal recording media, enormous flat-screen displays, and control surfaces reminiscent of a slimmed-down HUI, but when I went to look in the appropriate box it was nowhere to be found. So much for that idea. And everyone on Earth has by now written about all that stuff anyway.

I do recall what was happening in 1984, though. I clearly remember Apple’s Macintosh launch advertisement during the Superbowl, and later playing with a 128k Mac in a computer store in Cambridge, MA, until they threw me out. Arguably that machine and its descendants have had more impact on the work of creative professionals—from graphics to audio to video—than any single device. The pundits even then insisted that the company would fail.

I also remember 1984 as the year that saw the launch of the compact disc—in Europe, at least. We were treated to demonstrations of a little player on top of a table and a lot of machinery behind the drapes underneath. Commercial digital audio was probably ten years old or so at the time and it still sounded quite horrible sometimes, thanks to such problems as jitter and brick-wall analogue filters. I remember there being two main camps: those who told us that they had taken away all the problems of analogue and replaced them with pure, perfect sound forever, and those who told us it was cold, hard and unnatural and would never catch on. Thankfully, a small third group—believing that we had replaced a set of known problems with a set of unknown ones, so we’d better work out how to fix them—won the day.

I don’t know about you, but along with Arthur C. Clarke, I find 2001: A Space Odyssey—though it has never been the box office hit—completely ahead of its time: I know it today than we were then.

And once again, we have not learned the lesson of the past. Arguably there would today be an open-reel digital recorder in every major studio, were it not for the battle between DASH and Pro-Digi. Now we are about to have a consumer format war between DVD-Audio and Super Audio CD, both of which require expensive, incompatible systems in the studio. Making sure that all players play both types of disc would at least ensure that the consumer is not left in the lurch, but that’s not enough. We need a single studio standard too, or at least one that is large enough to encompass both systems. That’s what I hate about audio standards: there are just too many to choose from. The more things change, the more they remain the same...

Richard Elen has forsaken the rain of London for the sunshine of California at the pleasure of Apogee Electronics.
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Establishing Expertise

NINETEEN-EIGHTY-FOUR was a long time ago, and it is only as I write, that I realise what a truly long time ago it was. If you’re of the opinion the eighties were a musically dull period, the excuses are all here—blame it on the extraordinary changes in technology that we crawled through.

And crawl we did. In the spring of my first year as editor (1984-1991) of Studio Sound, we were still carrying articles about vinyl disc-cutting and improved lacquer formulations—and so we should. CD had been launched the previous year, but the availability of discs was so awful that there were serious doubts about it being the future.

Digital recording was with us—multitrack for the very few and Sony F1 for the masses. We argued as to it, and the CD, sounding better or worse.

It seems odd now, but I still had to justify including creative-artistic stories even though my predecessor had started this some years before. Although we were all creative people, a publication like Studio Sound was not seen as the place for it. It was, however, changing as equipment costs fell to enable the more successful artists to buy their own and bring a different motivation to the market. The militant wing of the creative division, in the form of the digital.

Acoustic design was turned on its head by the use of computers. The Corporates fought over digital recorders. DAF was a lucky find. An increasingly international business suffered recessions, globally. DSP began to do things we always wished for. We had to learn about software—which ‘it’s only software really meant and how products could evolve, for better or worse and still look the same. We were wary of new media (HD, CD-R, MD...) but when our old tapes got sticky we realised that the future did not look so bad.

Home studios became a threat till we understood about Mischwirtschafts. We tried it, and still the industry changed, fuelled by

Nineteen-Eighty-Four

Great Gear at Low-Low Prices

Sixteen bits was never enough and we’d made it to 20 in my time. We understood what made digital sound bad and a little of what made it good. At last could talk about technology from a creative standpoint. And a previ-
Choosing the right audio Codec.

The Dialog4 MusicTAXI range is one of the most comprehensive audio packages on the market today. It contains all the standard ISO/MPEG audio coding algorithms in common use today such as Layer 2 and Layer 3, as well as CCITT G.722 for high grade voice bandwidth connections, and G.711 so it can talk to a plain old analogue telephone line, too. Connectivity features include up to three ISDN termina adapters and X.21 port, for operation up to 384kbps. Dialing is quick and easy using the 96 entry directory.

The range of network protocols included means that it can be taken virtually any part of the world. In the studio the audio i/o can be analogue or digital (AES/EBU & S/PDIF interfaces are both provided). The aux data channel enables embedded control data to be sent alongside the audio, and the unit can be controlled remotely from a PC or the external Remote Panel if desired. Most importantly, automatic sensing of the codec at the other end of the call means that it sets itself up to communicate with the most commonly used systems in use today, i.e. Telos Zephyr, CDQPRIMA, Glennsound and others without complicated manual programming. Operationally the buttons are large and straightforward to use, while the illuminated LCD display gives a clear indication of what is going on at all times.

No noisy internal cooling fan to worry about in quiet studio conditions. The Remote Panel can control a MusicTAXI from over 500m away via the RS422 interface. The online menu indicates online time, send-level, receive-level, adjusted headroom, Rx and Tx audio configuration SYNC flag and the Transmission Codec.

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Life Begins At Forty

D O YOU THINK there's a place for it any more? I was asked of Studio Sound by a former colleague. I'd spent plenty of time thinking about it, and my accepting the position of Studio Sound editor really should have spoken for itself. But this technological advance, questioning its inventors and users, and sharing its findings with readers all around the world. The emergence of new technologies, the prospect of new "delivery" media and broadcast formats, the requirement for new technical standards, and an increasing need for information, discussion and education ensured that there remained an important role for a worthy magazine.

I am not certain that he was convinced by my argument, and the magazine's 40th anniversary is an appropriate opportunity to make a couple of observations. The first lies in the steady succession of important events that have kept Studio Sound busy since 1992. Questions raised by the professional use of modular digital multitrack machines and DAT recorders prompted Studio Sound to run tests, inaugural explorations of 96kHz and 192kHz recording technology, attracted exclusive invitations to attend, and breaking the story of the Beatles Anthology sessions brought the studio to the attention of the rest of the world. Record Europe's Festival of the Fifty invited us to make the cover of its upmarket magazine. Europe's guide to the recording scene, the Voice, spent two pages on the studio in its April number.

The second observation is that now, as the second longest-serving editor of Studio Sound, I'm cursing the millennial way the music recording industry is coming to terms with the project studio — and will gain significant ground over it through the take-up of surround formats. Audio-for-video postproduction, while having taken great strides in sophistication, is still on a fairly steep learning curve. And the ramifications of the changes in broadcasting are still to be properly felt. Throughout all of this, of course, the history of professional audio will continue to grow.

In occupying the historical and technical high ground over the project studio, we seem ready to sustain one major misconception, however. The professional aspects of audio evolved through the enthusiasm and efforts of talented people, they were not handed down complete like some facet of Plato's Theory of Ideas. There is no intellectual model we can use to determine what's professional and what's not, and we should be careful how we make our judgments. It is not about cost, heritage or aesthetics, it is about performance, facility and functionality. Ultimately, if it does the job to a suitable standard, then it is professional.

Looking back over 40 years, it is evident that Studio Sound contains many lessons, not the least of which is that change is our way of life and a closed mind is a disability.

Tim Goodyer manages his insomnia by correlating his 41 years with Studio Sound's 40.
DVD Production Europe 99 is the only European DVD conference to offer a concentrated two-day presentation schedule for decision-makers and technical personnel. DVD Production Europe 99 deals effectively with both the business and production issues surrounding European DVD. The programme is tailored exactly to meet the needs of video, music and games content owners and those working within the DVD, CD and video production chains.

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Forty Years and What Have We Done?

Well, quite a lot really. We have seen the birth and development of an industry that has gone from the most incredibly humble roots to one that has extended out to touch every single aspect of modern life.

So you think home recording is a modern phenomenon? Well, witness instead the birth of the magazine that served the now seemingly incongruous function of informing the public on the how and why of operating, choosing and getting, the best out of a plain old red-open tape machine. Houses the world over were being invaded by futuristic looking slabs of hi-tech machinery with names that few had ever heard of and from prices that few had ever seen.

You see a pattern developing.

When it became apparent that a requirement existed to serve an altogether more select hand of recordists, which happily coincided with a grass roots movement away from record company recording facilities to those of independent exhibits, exhibiting visionary far-sightedness the magazine was retargeted at a new breed of user. Because of this, the world was afforded the vehicle by which progress could be traced and documented.

Mind you, the editors in those earlier years of Studio Sound had the best of it. They were not arguing the toss on 20, 24-bit or 96/192kHz, their hearts were locked into far more fundamental and palpable concepts such as increasing the meaning of ‘multi’ in multitrack.

They were sitting in on the genesis of pro-audio, the original steps of true pioneers, names that would become familiar and perhaps even famous. It is most remarkable.

When you buy a house, you never really own it. You are simply a custodian until someone else takes charge of it because the house was there before you came along and will still be there when you’re gone. So it is with Studio Sound. We are only ever caretakers for what is the most singularly important title in this industry, the magazine has a heart of its own.

Zeno Schoepf is presently Studio Sound’s executive editor

Celebrating forty years of Studio Sound March 1999
The pro-audio industry joins Studio Sound in a celebration of the last 40 years' events and achievements

The long and winding Abbey Road

It's 68 years this year since we opened our doors for recording with Sir Edward Elgar conducting his own Pomp and Circumstance. The good news is we're still in business and still evolving. We've always used the best gear for the job (originally made by EMI of course) and worked with some of the best people in the business. I suppose one of the keys to our success has been our diversity, recording artists from the Manics to Mumuhin, also our large postproduction department, and most recently the formation of Abbey Road Interactive who get involved with all the new media stuff such as Web-site design, enhanced CDs, and DVD.

We're always a bit torn between serving the needs of our professional clients and the distraction of the thousands of tourists that appear at the front of the building to visit the 'shine' and leave their marks on the wall. Of course every year, there seems to be an anniversary of something to do with the lads from Liverpool and this year is no exception being 30 years since the release of the Abbey Road album.

These days it's not just the technical side of things that have to be right but also the complete service. You're only as good as the weakest link in the chain, so when we recruit we're looking for that rare all round mix of technical, musical and personal skills. So, we look forward to the next Millennium with anticipation of surround (again), high-resolution recording and DVD-Audio. After that, who knows? But we'll be there.

Chris Buchanan, Abbey Road.

Historical precendents

Studio Sound's first year: In 1959, AKG launches the world's first super-aural, open-back, lightweight headphones (K50); designs and manufactures for Telefunken the ELA M250 and ELA M251; and reads the new UK magazine The Tape Recorder...

The 1st Decade: The rapid spreading of TV kills many movie theatres. AKG responds by discontinuing optical equipment and concentrating exclusively on designing and manufacturing audio transducers. AKG establishes a British subsidiary, AKG London. The C26 and C30 capacitor microphones are developed further into the C60 with Nuivistor miniature tube (the name is derived from 'nueva vista' a new vision); the C12A Nuivistor condenser microphone is developed as a predecessor to today's C414. AKG delivers the world's first 2-way cardiod microphone, the D202. The 'CMS' modular capacitor microphone system becomes famous all over the world. After initial problems have been solved, it strengthens AKG's mono- sound with both BBC, AKG is a faithful subscriber to Studio Sound...

The 2nd Decade: Studio Sound reviews AKG's BX20, the world's first truly portable studio reverbator.A special stamp issued by the British Post Office commemorating the 50th anniversary of the BBC shows historical microphones along with models from the AKG catalogue. The first AKG dummy head microphone is used for binaural recording. The first AKG endorsement contracts are con- cluded with Frank Zappa, Henry Hsieman, Roger Whittaker, and other artists. AKG steps into the lion's den by founding a subsidiary in Japan. World firsts include the AKG TDU7000 modular digital mixer.

The 3rd Decade: Studio Sound reviews the AKG Tube. Black market prices for C12 microphones sky- rocket. Responding to the market situation, AKG makes the first run of a large-scale production tube microphone. A Golden Microphone (AKG C535) is presented to Frank Sinatra. AKG Acquires Boston-based Ursa Major, which is transformed into the Digital Products Division of AKG Acoustics. The first fruit is the AD68K. The DSP 610 Delta Processor for the 'Delta Stereo- phone' sound systems is launched by AKG along with the Micromie Series miniature clip-on microphones. AKG's DSE7000 Digital Sound Editing/Control System is bought by Acoustic Research with the Diaphragm tube microphone. AKG Neve is widely regarded as the leader in digital mixing technology, its flagship DFC (Digital Film Console) is the world's largest digital mixing console, capable of providing over 500 audio tracks.

Colin Pringle, AMS Neve

Extending the family

Congratulations for being a part of the history of studio coverage in your 40th anniversary. Although I looked back 40 years (because I was not even a sperm 40 years ago), I feel very much related to the audio industry of the time because everybody was working with tube equipment of extraordinary high quality. Companies spent their effort on developing gear with the best possible performance and robustness, rather than making it ever cheaper in order to compete in overcrowded mar- kets as is too often the case today. I fear that we are in danger of losing parts of our engineering heritage as well as our musical culture when we move on like this. So few companies, so few idealists hang on to their ideals without compromise, cre- atively combining the valuable results of the achievements of the past with today's possibilities and without loss in quality. Today, when the cost of tape and production time are the main issues in a commercial studio’s survival, the ability to deliver a high quality production environ- ment has become a niche market

for a few high-end studios. On the other hand, there is the mass market with its cheap and fast production facilities mainly based around cost- effective digital production environ- ments for sound, that these environments—with their previous- ly unimaginable possibilities to control audio material—also offer new musical opportunities. But again, who will take time to explore these possibilities and who can afford to do it?

Here's hoping that the next 40 years will see audio culture rise to new heights.

Dirk Brauner, Brauner Microphones

The information station

When I started reading Studio Sound it was 1973. I remem- ber being mainly interested in Studio Sound because of all the schematics and technical information on electronic parts they were printing in those years. The alternative I had in those days was Wireless World. I remember that Studio Sound slowly moved away from the technical side of products towards the user’s side of equip- ment, and was pretty independent. But, up to today Studio Sound has always been the main source of information for us at D&M. Today I am glad we are getting more copies than in the early days when I regularly read it to keep up to date with all the issues because of the popularity of the magazine in the company.

I hope that Studio Sound will continue to give us manufacturers all the information we need from the market and from our com- petition of course. I know I will not be present for the whole next 40 years but I hope that Studio Sound will continue to be the leading international magazine to present our products our company and I hope it will continue to be a well respected platform for new ideas. Congratulations for providing us with 40 years of serious information.

Duco de Rijk, D&R Electronics

Setting standards

Genelec may not have been around as long as Studio Sound, though we, too, celebrated a key anniversary very recently—our 20th. Since Genelec came into being, way back in 1978, we have focused on the design and manufacture of active monitors at a time when the dominant format was passive.

However, the dedication, devotion and commitment Genelec has put into its belief in active monitoring through the years has paid off because there has been a huge growth in the pro-audio gold standard. We are very proud to have contributed to that as we see the acceptance of active monitoring as the most important development in monitoring in the last 40 years. If it did not happen overnight,
We probably have the widest range of products across our chosen industries than any other manufacturer, and pride ourselves on excellent after sales service provided by our sales teams. We were here for the first 40, and will be here for the next 40 years.

Peter Goldsmith, Quanytec

Small but mighty... Not a reference to the vagaries in people’s tastes in studio monitors, but an aside on the changes in manufacturing companies within the Audio Business over the last 40 years. From many small beginnings in the 1960s and 1970s some of the most famous analogue companies evolved. Companies whose founders were often as interesting, entertaining and memorable as the products that bore their names.

The Clondyke gave way to the corporate high-life of the late seventies and eighties. Old hippies cashed in their chips to follow the country good-life or became consultants to the civil servants who were now running their companies. The mid to late nineties saw some new and interesting products and companies, often created by disenchanted eighties staff.

One hopes for a period which will be as creative as the last 40 years and where the cost of a product is not more important than what it sounds like. Where people listen to things and not just measure them. Finally there is a rumour that Studio Sound is thinking about giving free space to advertisers who have still got all their copies from the last 40 years. Has anybody got the April 1961 article entitled: ‘Will 4 tracks make a difference’?

Steve Revill, Quested Monitoring Systems

Fifty years together

There'll not be many companies who can claim to share Studio Sound's 40-year history, but Solid State Logic comes close, as we're celebrating our 30th birthday this year — so Happy Birthday to both of us! In 1969, the company began by making control systems for pipe organs; the first audio console, the SL4000, appeared in 1977. An early photograph shows an SL4000 on booth 56-57 of the APRS Show in 1979, at the Connaught Rooms in London.

In 1978, SSL received the Queen's Award for Export Achievement. At the end of a decade of analogue expansion, which saw the SL4000 series become the world's most widely used multitrack console, SSL entered the digital era in 1989 with ScreenSound, which pioneered nonlinear audio for video.

The success of the 'ultimate analogue console' — the SL9000, introduced in 1994 — showed that analogue technology still had a lot of life in it, while SSL's expanding digital product range provided additional pioneering choices.

Studio Sound has always been one of Solid State Logic's first choices for advertising, and in 1998 a fruitful collaboration between SSL and the Studio Sound advertising department resulted in the highly successful 'Cat in the Bag' launch at AES 98 in Amsterdam of the company's latest digital product, the MT digital multitrack console. Here's to the next 40 years!

John L Andrews, Solid State Logic

Past 25 years

Over these past 25 years much has changed in an industry which not so long ago could not agree on how to wire an XLR. Since 1973, Soundtracs has been actively designing and manufacturing audio mixing consoles in one form or another. The function of a console being very much dictated by the equipment with which it is to be interfaced and the technology available to be encompassed, we at Soundtracs simply strive to anticipate these extraneous developments.

The earliest and most significant of these was for us in the early-eighties with the advent of multitrack recorders and then the broad acceptance of MIDI, both of which increased demands for line level inputs and hence the introduction of 'in-line' configurations. By the mid eighties we pioneered MIDI-based digital routing and muting with the natural progression to SMPTE-based fader automation utilizing the then cost-effective PC. As the nineties witnessed high-speed audio processing becoming more readily accessible we added assignable 'onboard' signal processing, then in 1996 we introduced the first fully digital SHARC-based console.

Few, if any, of these developments would have occurred without the liaison of others not directly involved in the mixing console business, neither would the now accepted format standards have been universally adopted without the appraisal and support, of trade journals, most specifically Studio Sound. So as we reflect on the past 25 years we would like to thank all the talented individuals who have enabled Soundtracs to remain innovative, independent and most importantly, in audio.

John Carroll, Soundtracs

Celebrating forty years of Studio Sound March 1995

Lars-Olof Janfod, Genelec

The oldest new company in the business

This year Quantegy celebrates its 40th anniversary in the magnetic media manufacturing industry. Through the years, we have seen there has been one constant factor — our enthusiasm and commitment to the industry.

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Even at this time when more established analogue formats are being challenged by smaller digital formats, we are well aware that there is still significant investment by the recording studios in 2-inch and half-inch analogue formats. For this reason we are still willing to commit R&D money into supporting this requirement with the recent introduction of GSM— a high output analogue tape designed to give virtual shield-free durability and vastly improved archival stability.

During our 40 years in the business our state-of-the-art factory in Opelika, Alabama has evolved but retained one consistent factor — many of the employees have over 20 years experience in the manufacturing of recording media and all are dedicated to output of the highest quality of product.

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Spirit is the UK market leader in creative low cost mixing with an unrivalled record for innovation and technology development. Part of the Soundcraft Group, Spirit is now looking for a committed, self motivated sales manager who is keen to develop their career as part of one of the foremost audio companies in the world.

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If you are looking for a challenging role where you can fulfil your career ambitions and combine your enthusiasm for audio with a natural flair for sales, then please write immediately, enclosing your CV to:

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A cautionary tale from the old country...

'I had toyed with the idea of going digital for a decade, more or less, so when the world stopped still for the Festival of Impeachment, it seemed a good way to fill the endless treadmill of life, the universe and everything. AND SO... out when my faithful, outdated and obsolete analogue recording equipment, and in came a truck-load of cardboard boxes; computers, converters, hardware, software, overwear, underwear, cables, tables and vegetables (or at least a fruity Apple or two). Beam me up Spock, it didn't look like the Starship Enterprise about to enter warp drive.

So I turned on, tuned in and... crashed. After a day or two on the software helpline, I got through to a very helpful voicemail message guiding me to a website of adverts and a starting point of a learning curve that has been moving in a gradual downwards direction ever since. So now I'm three months in, Clinton's still there, and I'm still here; desperately fiddling with digits, powering-up, backing-up and cracking up. I've learned more than I ever wanted to know about computers, and forgotten most of what I ever knew about music (and certainly about soul - ) BUT I do have two full minutes recorded (if I cut, paste and loop that should fill my first CD). AND I have a room full of digital equipment worth fully 10% of what it cost three months ago. SO - if you want to be a REAL COOL DUDE, follow me into the digital domain. If you want to be an analogue square, then call those sad, sad limeys at Funky Junk and they'll take care of you. They even offer SERVICE and ADVICE, - that's how old fashioned and out of date they are! Mr. D. Git. Hipsville USA.
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Rewriting the geography of business is at the cost of the most enduring aspects of musical development writes Dan Daley

ACK IN 1991, I did a sort of reverse Beverly Billlilues, loading up the truck with brie and headly and taking up a residence in Nashville. Okay, so I maintained a residence in Manhattan (I couldn't carry that much) but Nashville appeared to be the next major centre of music recording in the U.S. It was not just that country music was hot again —Nashville's studio base, along with its assorted community of musicians and other music entities, was shaping up into what could have been a powerful force for not just recording music but changing it, as well.

In addition to being close to the news, I felt a palpable excitement, one that had not seemed so real in this industry in a long, long time. And the studios gave Nashville a sense of permanence that eluded such previous pretenders to the title as Minneapolis and Seattle. Nashville did indeed have its moment, and to its credit it did change music to a degree (though the city itself was also changed in the process). But in this fluid, global culture, everything is momentary, and now that entertainment is inextricably emmeshed with corporate culture, it is as vulnerable to the changes of big business as the technology of music has become sensitive to changes in the computer industry.

As a result there was the sense that the focus would shift elsewhere, that the peripheral centre of the American recording industry would move on to another physical place as it had before, accompanied by the usual retinue of paparazzi, disorderly conduct arrests and discours du moment. At first, I thought it would be Atlanta, where several new studios had recently opened with more on the way. Having Elton John living there was a plus in several ways. I thought, not only musically but as an eccentric whose plumage would destabilise the crust that had grown around the music business there. Alas, as happens to us all in middle age, Sir Reginald's headgear and music have grown conservative.

My head was spun next by Miami. Here the certainties of that pastel-coloured city's pre-eminence as the global centre of Latino music was shattered by the acquisition of recorded TV broadcasting by the Miami-based group, S.O.X. (www.americanradiohistory.com).

As a result there was the sense that the focus would shift, that the centre of American recording would move on to another place, others, and it was beginning to get some serious studio construction that could provide an infrastructure.

It was in the middle of this geographical head twirling that I realised that, where no longer matters. The days of music having a physical residence are likely over. From New York's Brill Building to the Beach Boys' hallowed homes in Southern California to Jerry Walker's inexcusable Luchenshaut, Texas, to the two sides of the down-home Deep South in presented by John Denver.

Europe: Digital dupes

Digital television is rekindling copyright concerns as well as proving that hi-tech operations do not necessarily use high-tech operators writes Barry Fox

SINCETHE DAYS of the Beatles, Apple and Magic Alex's LP spoiler system (a high-pitched tone on an LP that was supposed to be heard with a tape recorder's bias signal) the audio industry has been dreaming of a system to put a stop to home copying. The best it has produced to date is SCMS—the Serial Copy Management System that stops a digital recorder making a digital copy of a digital copy.

But Philips' new 765 CD recorder confirms that SCMS was always a broken reed. If someone wants to make multiple digital copies of a CD, they simply make a series of first-generation copies from a single original. The 765 makes this easy because it is a dual-well deck with double-speed dubbing. And when SCMS blocks digital copying, if the user wants to copy a CD-RW compilation disc onto CD-R for playback on an ordinary CD player, the 765 switches to hardwired analogue dubbing with negligible loss of quality. A home audio recorder with tighter copy control than SCMS would be unsaleable —no-one buys a CD-R deck to record bird-song or dictation.

Video recorders are different. Their primary purpose is to time-shift TV broadcasts, or play pre-recorded tapes. Consumers accept that the movie studios use Macrovision on their prerecorded tapes to stop people copying them.

Few people yet realise how the coming of digital TV has changed the rules of the game. We are moving into a new age where VCRs will no longer be able to do the job for which their owners bought them.

We are moving into a new age when VCRs will no longer be able to do the job for which their owners bought them. The Macrovision system relies on sporadic pulses inserted near the picture sync pulses when a prerecorded tape is made. A television set ignores the extra pulses, but they fool the AGC in a VCR into making too-weak a recording. The same system will not work with digital video, so the digital TV receiver (or DVD player) has a built-in encoder. This adds anti-copy pulses to the analogue output. The TV displays the pictures normally, but a VCR makes an unplayable copy. The encoder is switched on by trigger signals that the broadcasters transmit along with programmes that are not to be taped. The broadcasters pay a royalty to Macrovision for transmitting triggers.

Macrovision says the 'majority' of digital TV receivers now being sold in North America, South America, Europe and Asia, incorporate encoders. Over 15 million homes around the world are now equipped with dormant circuitry that can be remotely switched to stop home taping.

Hollywood studios are already insisting on analogue copy protection on all pay-per-view movies broadcast on Sky's digital satellite Box Office. The UK is pioneering digital terrestrial TV, and so far there is no PPV and no use of copy protection—but the encoder chips are in the receivers. Who knows what happens tomorrow, next year or the next?
DVT: fortune or failure

With enthusiasm for digital television floundering in the UK, what are the prospects for DVD asks Kevin Hilton

MAYBE IT'S JUST ME but doesn't DVD seem at once both high tech of this moment, and just that little bit out of date? Perhaps it is because, as people are fond of saying about me, I'm a cynic. But as our spiritual leader, Ambrose Bierce, said, 'a cynic is simply a blackguard whose faulty vision sees things as they are, not as they ought to be.'

There is a very good case for saying that DVD is the ultimate in cut-and-paste technology: the CD family has made us familiar with the small silver disc from which we could enjoy digital audio and even images (for all the people who did not blink while CDi was around), while LaserDisc offered the added value bits that the serious home movie-collector craves (extra scenes, a commentary by the director explaining why a particular sequence was shot from a pigeon's point of view).

Sure, it is digital, with all the promises of better quality that digits bring with them. But there is the feeling that we have all been here before; a sense that has not been eased by the fact that manufacturers and technology magazines had been talking about DVD long before it appeared on the market. Of course, the strength of DVD is not the fact that it is a new format but that it can do more than its similar forebear. Its problem is how it is marketed; more specifically, there is a degree of education attached to emerging technologies that it appears was not associated with what went before.

This means that consumers and professionals alike. Each new development offers something for both groups as technology is developed that can be used as much in the home as in broadcast centres. Which is why there are nearly as many seminars about DVD as there are jokes about Bill Clinton, cigars and deposits made at the dress shop. During January, the BKSTS Moving Image Society staged what was claimed to be the first conference to look at the subject from the film and television industry angle. In his introduction to DVD—Assess for the Future', Ben Keen, editor of Screen Digest, called the versatile disc the 'ultimate convergence device—the packaged format for the future.'

Which it is. But how far DVD will take all markets to a converged future depends on its acceptance and rate of take-up. The format has, as a universal standard, the strength of DVD-Audio. And lots of seminars. Prepare for Summit 2 in Dublin from 29th March to 1st April and DVD Production Europe 99 from 24th to 25th May in London. Let's hope that they do not live up to the definition of another cynic, a favourite of Fred Allen, that conferences are gatherings of important people who can do nothing but together decide that nothing can be done.

Europe is nowhere near the 20% of the sell-through market, the 'one million homes with DVD players' situation in America. It is also lagging in terms of professional authoring and replication.

When I finally got round to trying mine, I found that there were no instructions on how to use its software. Being reasonably computer-literate, I searched the disc for an .EXE file to 'Install'. I looked for HTML pages for Internet-style access with a Web Browser. I looked for plain ordinary text files. There were none. The BBC thought the PC would need to be loaded with Quark Illustrator or Adobe Photoshop.

The disc, a write-once CD-R, was full of data but had no ISO Primary Volume Descriptor. Presumably whoever did the work had not heard that the disc had burned the disc without fixing it for standard CD-ROM access. I tried another of the same discs, given to me at a different time. It, too, was full but useless. I've crashed my PC several times when trying to check the contents with Windows Explorer—and you know how much time that wastes, because Windows insists on running Scandisk before it will start again. And Scandisk will only run if the PC is first run in Safe mode.

Each year the BBC gets £2bn in public funds, from the license fees which all TV viewers must pay. A hefty chunk of this money is being spent on taking Britain into the digital age, with digital TV, DAB and an Internet service. Head man John Birt likes to employ consultants who tell him how to do it right. Perhaps the consultants could now tell Birt to try a BBC Digital CD-ROM on his PC and see what happens.
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Mark Thom, Engineering Manager, Classic FM on the CD-RW5000s purchased for Classic FM's new digital broadcast studios.

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www.americanradiohistory.com
This month's study of the operational amplifier exposes John Watkinson contrasting the feedback and feedforward techniques used to optimise them.

FEEDBACK AND FEEDFORWARD have been around for a long time, but they are still not widely understood in audio circles. One of the great myths is that you have to choose which one to use, whereas in reality the best results are obtained by combining them.

In an ideal world neither would be necessary, if we could get ideal components we would be able to make, for example, ideal distortionless amplifiers with fixed, frequency independent gain. Unfortunately these ideal parts elude us. Some components like resistors and capacitors can be extremely linear, whereas others such as transformers and amplifying devices including valves, bipolar and field effect transistors are not linear. Their transfer function is not straight and so the result is harmonic distortion.

Feedback and feedforward are both techniques, which have been developed to reduce the effect of deficiencies in real components. These can include linear and non-linear distortion and non-ideal frequency response. In a Class A valve amplifier the main sources of distortion will be the output tubes and the transformers; in a Class B transistor amplifier the main problem will be crossover distortion.

Fig 1 contrasts them in the simple application of a power amplifier. Feedback shown at Fig. 1a is a system where a model of the deficiencies of the amplifier proper is used to create a feedforward processor, having the same deficiencies, but in the opposite sense. The effect of the two devices in series is that when the model is accurate the deficiencies cancel out. In theory if the model is precise, the cancellation is perfect and the result is ideal.

Fig. 1b shows that if the deficiency is in frequency response, the feedforward processor may contain an opposite response: in effect an equaliser. Fig. 1c shows that if the transfer function is distorted, the feedforward processor may have an opposing transfer function. This technique can be used with loudspeakers as well as amplifiers.

Feedforward only works well if the deficiencies to be corrected are stable and repeatable so that the correct degree of opposition is always applied. Where the deficiencies are not stable, for example if they change with temperature or supply voltage, a simple feedforward process will not produce such accurate results.

Fig. 1d shows feedback. Here the output is measured and compared with the input. If the output is not simply a larger version of the input, the comparison will reveal the error. The error is used to drive the amplifier proper in such a way that the error is reduced. From a simplistic standpoint, the actual mechanism responsible for the error is not important. If the output voltage is not high enough, it does not matter why, it just needs to be increased.

Clearly there is almost always going to be an error in a feedback system, because of course there is no drive to the load. The degree of improvement achieved with feedback is a function of the open-loop gain available. The more gain that can be used, the smaller the residual error will be. The natural conclusion is that the ideal gain is infinite, as in the operational amplifier.

When the loop gain is high the output is determined primarily by the feedback and so it is not so important if the transfer characteristics change. In other words feedback has an advantage over feedforward in the case where the deficiency in the forward path varies.
Unfortunately this ideal feedback system with infinite gain can not be implemented in practice because real gain stages have a sub-optimal phase response. Negative feedback will fill in the presence of phase shifts within the loop, because these can result in positive feedback if the loop gain is above unity when 180° of shift has occurred. The amplifier has become unstable and turns into an oscillator. Now feedforward has the advantage because a feedforward system can never become unstable.

The way to deal with frequency dependent phase shifts in the forward amplifier path is to introduce opposing phase shifts in the feedback path so that the phase response around the loop remains constant enough for stability. This is called compensating the loop. The more accurately the feedback path models the inverse of the phase characteristics of the forward path, the more gain that can be used. As we have seen this accurate model can only exist if the forward characteristics are constant.

In this sense, feedback and feedforward are similar in that they both depend upon being able to model the problem in order to compensate for it. The main difference is that feedforward models the problem in order to oppose it whereas feedback models the problem in order to allow high loop gain while retaining stability.

It may seem obvious, but the benefits of negative feedback are only obtained when the feedback determines what happens. This is defined as the error being negligibly small. In fact this is a general truth that applies to all uses of negative feedback including autopilots, servos and not just audio amplifiers. If the system never gets into a state where the error is large, then the feedback has lost control and the system is said to be working open loop.

One of the greatest myths about the use of negative feedback is that it increases the bandwidth of a system. Fig. 2a shows the full power frequency response of a real amplifier.

Fig. 2b shows the same system after the application of some ideal negative feedback which, of course, reduces the gain. Note that, although bandwidth has been increased, this has been done by reducing the power output over the whole band down to the highest level, which was possible at the band edge without feedback. Thus, although the small signal bandwidth has increased, the power bandwidth has not increased at all.

Negative feedback only increases bandwidth at the expense of output power. If we have the naive view that feedback just increases bandwidth, we might simply add a gain stage to counteract the gain loss due to the feedback. The result is in Fig. 2c: in the shaded area the system goes 'open loop' and the output is heavily distorted. This is the origin of the hi-fi pseudoscience
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that negative feedback is a bad thing. The truth is that the full-power frequency response of a feedback system can never be better than the open loop response. It does not matter how accurately the error signal has been derived, or how much gain has been applied to it if the power source delivered through a saturated transistor simply cannot slew the load fast enough.

Before World War 1, the designers of steam-powered gun turrets had discovered the phenomenon of the slew rate limit. It took another 50 odd years for audio amplifier designers to reinvent the same wheel under a new title of Transient InterModulation distortion (TIM).

What feedback can do, when properly applied, is to reduce distortion. However, distortion is the process of creating harmonics. If the open-loop response of a system is not good enough, the system cannot respond fast enough to cancel the distortion products. In order to apply negative feedback well, we need lots of loop gain and a wide bandwidth to avoid phase shifts.

A pure feedback system can only reduce the error by increasing the gain. If the gain, that can be used, is limited by stability requirements, the error can only be reduced so far. However, Fig.3 shows that using feedforward inside the feedback loop may reduce the error further. The feedforward processor combined with the forward path is more accurate than the forward path alone, so the error will be smaller. The available feedback can then make the error smaller still. Thus the best results will be obtained when feedback and feedforward are combined.

A moment's consideration of Fig.3 will reveal that if the feedforward processor is ideal, the error will be zero. The worse the accuracy of the feedforward, the larger the error. This can be used to advantage in adaptive systems. In an adaptive system, the error in the feedback system is monitored as the parameters in the feedforward processor are varied. Any variation, that results in a smaller error, will be adopted, whereas any variation, that increases the error, will be rejected. In this way the feedforward system can learn the characteristics of the forward path and can track them to compensate for changes.

For a simple analogy, consider a rally car. The driver uses feedback to stay on the road. He compares the position of the car on the road with what it ought to be and cancels the error by operating the controls. The navigator uses feedforward. He has recorded every detail of the course during practice and constantly tells the driver how fast each bend can be taken. With the driver and navigator working together, the car goes faster than with the driver alone.

![Fig. 3: Feedforward can minimise the error in feedback loop, improving performance](image)

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**Studio Sound** March 1999
High frequency confusion ahead

If you had been claimed by developments following the initial flurry of high sample rate systems, prepare to be challenged again writes Ben Duncan

Among other apparently solid benefits, it has been regularly reported that new media such as DVD offer an HF response to 96kHz and beyond. But no-one seems to have thought through the situations when such a capability will be of benefit, and if so, whether it will be useable.

Since the beginning, audio textbooks have taught that human hearing ceases to perceive sound above between about 1kHz and 20kHz. This is easy for audio engineers (more than anyone else) to test. But take heed—the limit may depend as much on the signal used, and crucially on which speaker system, as well as the level. Equally, tests by Drew Daniels1 have demonstrated the wide variability of the aural canal sensitivities among 100 audio colleagues, with some ears having ‘gains’ of more than 10dB above 18kHz. Yet, the adjective ‘ultrasonic’ unambiguously indicates sounds ‘higher in frequency than the audible’. As with the onset of infrasonic sound, it may be better to see the ‘edge’ of audible sound not as where sensitivity stops dead, but where the nature of perception of the vibrational energy changes rapidly.

That humans are sensitive to stuff above the 16kHz–20kHz area at which most listeners’ conscious perception stops (with steady test signals), has been individually established in disparate studies by respected authorities. For example, they have been carried out by Philip Newell, Rupert Neve and by Japanese researchers who used ECG equipment to demonstrate that music with its infrasonic content intact, gave rise to brain patterns that were the same ones seen exclusively when people were very happy or ecstatic. The keynote is that for this to happen, it was necessary to have conscious awareness of the infrasonic content. As a measure of the commercial reality, at least to oriental ears, Japanese speaker makers have been making ‘super tweeter’ drivers for many years, some with responses that start above 20kHz.

In the West, meanwhile, the rare presence of frequencies above 20kHz on a recording is recognised by both professional and domestic listeners. Other than offering pleasure, the ultrasonic parts are frequently described as adding to music’s air, texture, edges, timbre, and ‘palpably live’ sense of presence.

The ability of audio engineers to learn about frequencies above 20kHz has been held back by an 80-year-old industry feedback loop. In the beginnings, 5kHz was the limit. Each 1kHz above that has had to be hard-won over years, at an affordable cost, right through the record-replay chain—particularly from microphones, tape heads, record cutters, cartridges and speakers. Also, in an analogue system, extra bandwidth above 20kHz lets in extra noise; while in most of mainstream audio, the simplest possible engineering and hence maximised profitability inevitably precede any sensitivity to such ethereal subtlety as raising the hairs on the back of a billion necks.

The outcome is that much audio equipment—while made for an analogue path, and is potentially capable of extending far beyond the 16kHz–20kHz wall imposed by 1980 digital standards, is organised to progressively remove—in varying degrees—all life above 20kHz. In the best audio-phonile and complementary monitoring setups, the bandwidth for handling 48kHz or 96kHz already exists between the D–A converter and the speaker end. Even down to the low inductance speaker cables and ultrasonic drivers. But in the remainder of the audio recording path, getting signal extending out to 96kHz from the booth, and ultimately to the DVD mastering suite (when appropriate) will take some equipment revisions or changes.

For a start, most of the mature audio industry’s power amplifiers and speakers will be damaged or shut down if full level ultrasonic signals are applied to them. Since redesign for ultrasonic handling may not be solvable on existing designs, some form of optionally flagged, level-envelope-limitation will need specifying—‘Response above 20kHz to be sloped off at -6dB octave, and compressed to keep rms levels to a maximum of -12dB’. Meanwhile, the prognosis for much analogue audio is frankly, ‘not at all DVD-ready’.

Although there are some skeletons in the cupboard, at least low noise, clean analogue electronics with a bandwidth comfortably above 20kHz is established technology. A more crucial step—capturing higher frequency stuff at the front of the chain, has been taken by David Blackmer, whose Earthworks nics are some of the first to have a flat response to 40kHz. A start has been made.

1 Daniels, A See Black Box, HFNNRR, Mar 1998
3 Blackmer, D. ‘20kHz and beyond’, Studio Sound, January 1999

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[Image of the recording technology exhibition flyer]
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