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THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE
FOR RECORDING, POSTPRODUCTION AND B

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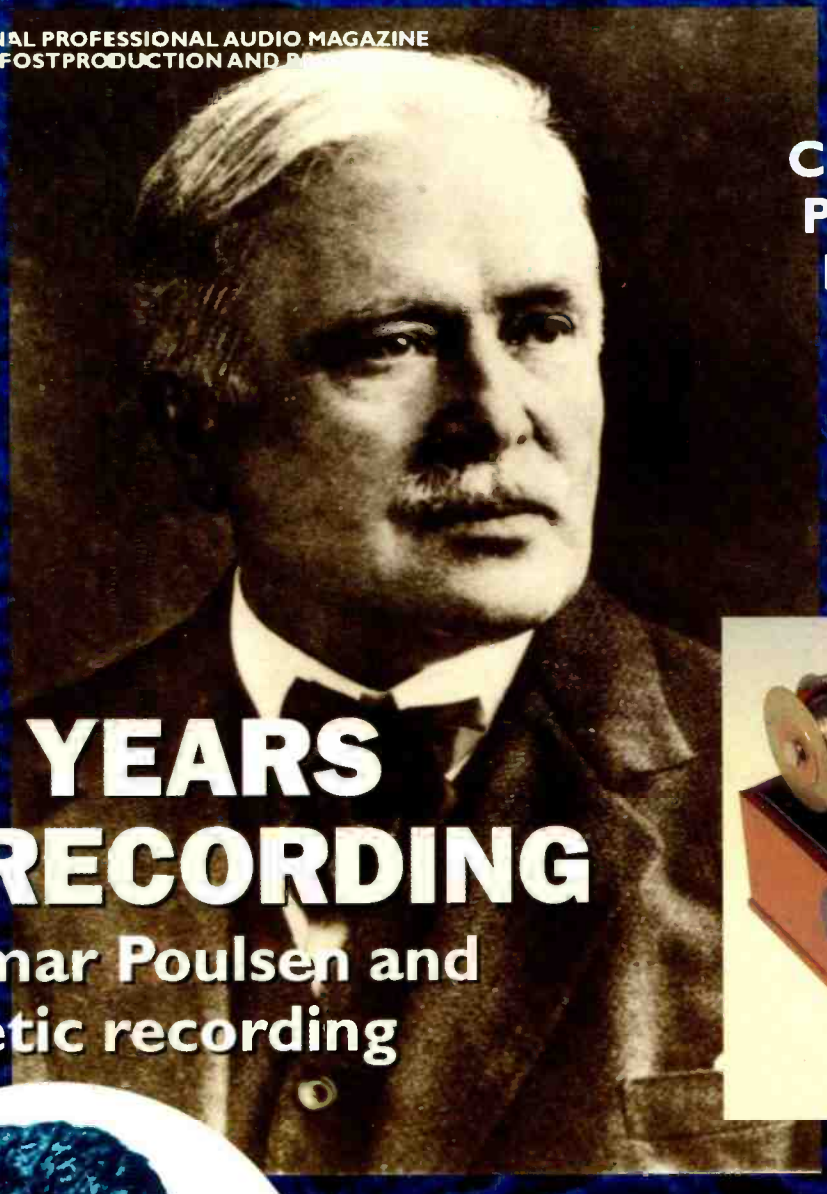

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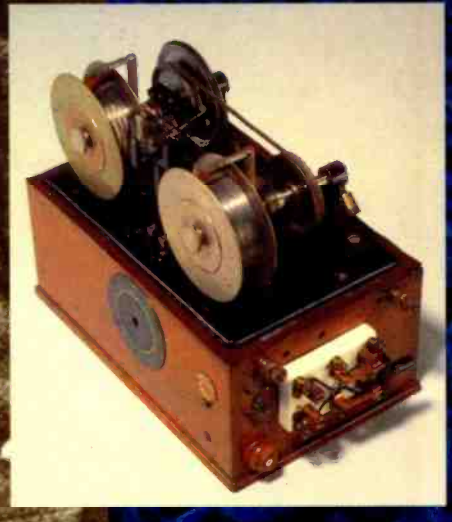

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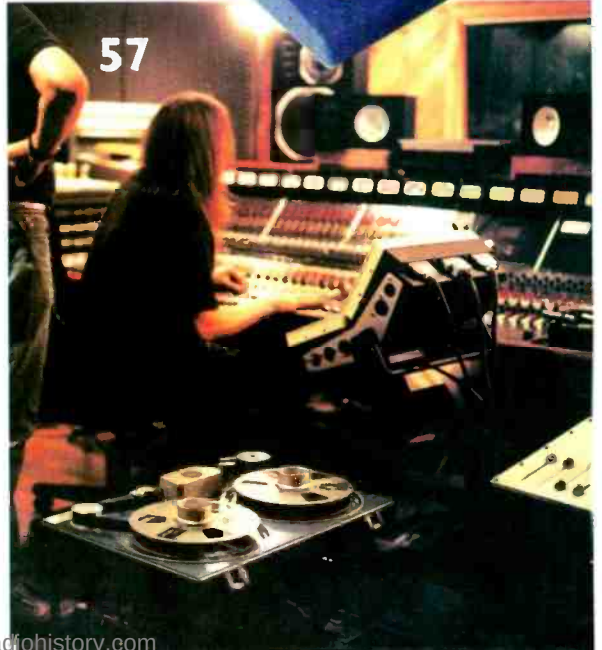
Ringing the changes

Readers and advertisers please note that all our telephone numbers and fax number will change from 1st January 1999. Our masthead on page 6 has been revised and in the January 1999 issue direct lines to all staff will be included. Happy New Year!

www.prostudio.com/studiosound



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The keeper of quality

A SENSE OF PERSPECTIVE should be preserved before we rush off the cliff of programming nirvana afforded by the promise of the multichannel orgy of DTV.

While it could be judged as good for the viewer, just how good depends largely on how good you judge any previous and existing attempts to expand programme channels via such means as satellite and cable. My own experiences of this so-called 'improved' viewing experience, gleaned from many years studying the varied output in hotel rooms throughout the world, is that a core of quality programming is supported by a majority of dross.

If we really distil the analysis down to the fine powder of origin, it is dross because the money is simply not available to make quality programming in the sort of quantities required to fill the number of channels available. The programme makers are further bound in some territories by a Governmental directive that dictates a minimum quota of locally produced programming, subdivided in some cases by a breakdown of programming category and type. This is never cheap to do properly, and, in many cases, short-circuits the natural temptation to buy-in American or even Australian soaps, dramas and documentaries and simply repackage them for local consumption by redubbing.

The last decade has seen the worldwide erosion of local broadcasters' abilities to plan, originate, shoot, postproduce and disseminate quality programming, predominantly in the name of cost-cutting and increased efficiency. Many have now been neutered to the point where they can muster the energy and resources to produce only a handful of programmes in the recognised categories per year often with the accompanying leap in viewing figures underlying the fact that the population clearly appreciate the effort.

However, with the explosion in the number of channels you have got to wonder who the keeper of the quality will be. I cannot think of a reason why there should be any enormous leap in the quality of programming just because we have more channels to choose from. Correct me if I am wrong, but is this just not the road to more dross?

Zenon Schoepe, executive editor

Crying wolf?

WE'RE FULL OF IT. The media, that is, full of tales of woe regarding the Millennium Bug. You know the one—the computer problem that would have you withdrawing all you savings from the bank and investing heavily in tinned food and a shotgun. And not, under any circumstances, travelling in an aircraft, riding in a lift or even sending an email.

Whether you are reading the specialist computer press, the daily broadsheets or passively watching the television, you cannot be unaware of the problem facing computers and equipment using 'imbedded' processors concerning the year 2000. The use of the '00' year abbreviation that confuses the year 2000 with 1900 threatens to disrupt your video recorder and plunge the world deep into economic recession.

And the story does not end there. For while armies of IT experts consign non-compliant hardware to the skip, implement alternative software systems and chase out countless lines of code, subsequent 'millennium bugs' are waiting in the wings.

Once the Millennium Event is over—with all that it may entail—a procession of similar problems will follow, all with their roots in date systems. The OS on older Macintoshes, for example, is only good until February 2040 (the current Mac's OS should still be serviceable until 29,940). The Rhapsody cross-platform OS that is intended to run on next-generation Apple machines is up in 2038, meanwhile, and Aladdin's DOS and Mac software expires in 2036 and 2040 respectively. Microsoft's XL v5 is good until 2078, Word 6 until 2411 and Filemaker Pro until 3000... I believe there is also a leap year problem in the offing. You get the picture.

My tinned food shopping list is nearing completion as I write, but I am considering exchanging a few cans of canned custard for some form of entertainment. Given that Internet porn is off the menu, I reckon a new copy of *Genji Monogatari* is in order.

Tim Goodyer, editor

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Great Studios Of The World

PRODUCTION NOTES

Following the unparalleled success experienced with their first Solid State Logic SL 9000 J Series console in Studio 3, premier recording facility the Hit Factory now owns a second J Series console in Studio 1, one of the largest scoring stages in the U.S. The 80-input console features the SL 9591 Eight-Channel Monitoring Section, which addresses 5.1 and 7.1 surround sound mixing options. Three-time Grammy Award producer/engineer Humberto Gatica mixed, recorded and/or produced several tracks from Celine Dion's 'Let's Talk About Love' CD on the 550 label, including the hit single 'My Heart Will Go On' from the film 'Titanic', at the Hit Factory on an SL 9000. "The versatility of the 9k allows you to do anything you want. The console's definition, clarity and musicality are all very important to me. The 9000 J made Celine sound very real, which is what she's all about. It's my favorite console."

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Tonmeistertagung

Germany: The Tonmeistertagung exhibition and conference in November was further proof, after the French SATIS event, that the health of well organised and planned national shows has never been better. However, qualification is needed as both the aforementioned are single language rather than single country get togethers.

The Karlsruhe event managed to combine a typically restrained collection of unmistakably high-ranking audio folk in the show area with a papers and workshops programme that are bettered only by the AES. On the exhibition floor there were previews of a new highly portable hand-held card-based recorder from CCS, valve-based outboard from a division of Hughes & Kettner, mics from Schoeps.

The biennial event will move at its next gathering to Dusseldorf, which benefits from, among other things, an airport with the same name. The Karlsruhe venue while popular is difficult to reach for international visitors and requires the exhibition to be split over floors and down corridors in an inefficient and confusing manner. The lack of space also limits expansion which the new venue will presumably solve. Worth the trip.

Zenon Schoepe

▲ **UK:** 'Younger, more aggressive and more hungry,' is how Scott Jackson describes the new management team at Soho's Magmasters. 'We're running it as a business not a hobby.' Demonstrating its intent with the refurbishment of Studio 1 and 2 of the 9-room facility, the team has replaced its DDA DMR24s with new 6-screen, 56+56 input Soundtracs DPC II consoles. 'When a company like Magmasters is looking to spend money everybody rings you up,' continues Jackson. 'We looked at whatever else is out there and, for the money, nothing else came close —both for price and ease of use.' The 5.1-capable studios have also had new Dolby systems installed and have recently received acclaim for work on *Lock, Stock and Two Smoking Barrels*.

'Godzilla eating Manhattan was a bit too loud so we've put new soundproofing in,' says Jackson of other aspects of the refurbishment. Right now he's looking forward to working on the new *Star Wars* First Chapter movie and a new version of *Captain Pugwash*. Magmasters, tel: +44 171 437 8273.

Broadcast firsts

US-UK: Broadcasting history has been made on both sides of the Atlantic when NTL provided the world's first digital terrestrial television network for the new FilmFour channel and CBS affiliate WBNS-TV in Columbus, Ohio made the first live HDTV broadcast of a college football game.

In addition to Channel 4's digital film channel, NTL's £100+m Digital 3&4 multiplex is also carrying digital versions of ITV and Channel 4 and will handle the new ITV 2 service imminently. NTL claim the networking and transmission arrangements to be the most complex of the 2 UK digital terrestrial multiplexes due to regional programming and advertising. WBNS-TV's broadcast, meanwhile, used the US standard of Dolby Digital to deliver 5.1-channel surround coverage of the game between Ohio State and West Virginia University via satellite.

Tim Goodyer

▲ **US:** Aiming to establish itself as the leading training centre for audio and visual media in Western America, the Ex'pression Centre for New Media will open its doors in San Francisco in January next year. Founded by Gary Platt and Eckart Wintzen (pictured), the centre offers audio, video, graphics, editing and post facilities in its Walters-Storyk-designed facility. The three post suites house SSL and AMS Neve systems. Training is intended to be personal and comprehensive, including surround and ISDN working. Net: www.xnewmedia.com

▼ **US:** Svetlana Electron Devices, the Alabama-based distributor of Eastern European valves has released a new catalogue, claiming that trouble in Europe has not hindered its ability to deliver. Established in 1928, Svetlana is a familiar name to many manufacturers of audio, hi-fi and musical equipment. Svetlana, tel: +1 256 882 1344.

▼ **Greece:** Recently updated with v2.81 software, the Capricorn console at the Athens Concert Hall has been busy at the centre of the facility's first 5.1-channel music production. The forthcoming DVD release, Epiros of Pentationia, has been 11 years in the making, involving 11 studios and 19 engineers, and will feature the duet between Shaliff Keita and Elenei Dimou, mixed at the Concert Hall. The Athens Concert Hall, tel: +30 728 2000.

▲ US: The jazz-dance fusion of British band Portishead has been caught on a live album, PNYC. Recorded in New York and coproduced by the band's writer-guitarist, Adrian Utley, the album marks the completion of a 10-month world tour and has benefited from the use of TL Audio Classic C-1, EQ-2 and Ivory 5051 units.

Business matters

World: A consortium of investors led by London-based Legal & General Ventures has completed its takeover of Emtec from the Korean KOHAP group who had owned the German media manufacturer for around two years. The sale was prompted by the Far Eastern economic crisis, transferring control to a subsidiary of one of the biggest and oldest investment groups in Britain (Legal & General, founded in 1836) that intends to take Emtec public within the next three years. Turnover for 1997 and 1998 were consistent at around DM1.5bn, with pretax profits of DM39m. President and CEO of Emtec, Dr Jurgen Langeheine, predicts a turnover of DM2.2bn for 2001.

British-based DAR has recently come into the ownership of the American Harman Pro group for an undisclosed sum. While the potential benefits of Harman's investment and structure are implicit and it has been announced that there are to be no changes to the DAR management structure, little further information is available.

Computer control

UK: A new UK-based company called Ingenium proposes to take the pain out of applying computer systems and IT in European pro-audio operations. Set up by Nick Price, ex-technical and projects manager for the likes of The Strongroom, The Church and Harris Grant Associates, Ingenium reckons to consult on custom computing systems as a direct response to the increased relevance of computing to music and AV studios. Services include design and specification of computer, software and network solutions, installation, training and support with an aim to 'revolutionise the day-to-day running of studio facilities'. Net: www.ingenium-ltd.co.uk

▼ France: Belgian loudspeaker manufacturer FAR has completed acoustic design and building on a number of prestigious post rooms in Paris including Elude and Digimage at the Boulogne Studios complex. Elude's installation includes the combination of Foley recording and mixing duties in the one area (pictured) fitted with D&R Octagon desk while the two near-identical rooms at Digimage sport multichannel FAR AV10 monitoring for their role in video postproduction.

At Tele Europe, which works almost exclusively for national channels France 2 and France 3, FAR has worked on two identical film mixing rooms also equipped with D&R desks. Multichannel monitoring is handled by three DBW200s at the front, four CR 20s at the rear and a LBE 46 subwoofer. Amplification consists of 2 TWIN 450s, 3 TWIN 150s and 1 LC 1200. FAR, tel: +32 4 259 7412.

■ London's De Lane Lea Soho post facility has ordered two Harrison Series Twelve consoles, bringing its total to three. Slated for Theatres Two and Three, the new 220-input desks will have 80 predub channels, 8-channel monitoring, 256x256 routeing, and be optimised for either one or two-operator use. Meanwhile, London's Angell Sound has opened a new 5-studio Soho post house using 24-fader, 72-input Amek DMS consoles and Augan OMX RC24 workstations throughout. Taking over from Angell's 19-year-old operation, the new Convent Garden facility will serve advertising, TV and film postproduction and the record industry. Across Soho, Saunders & Gordon is set to buy a 96-channel SSL Avant digital desk, and to upgrade its existing Scenaria and Omnimix. The investment is part of its move to multichannel working for TV and radio commercials.
De Lane Lea, UK.
Tel: +44 171 439 1721.
Angell Sound.
Tel: +44 171 478 7777.
Saunders & Gordon, UK.
Tel: +44 171 580 7315.
Harrison, UK.
Tel: +44 1442 875900.
Amek, UK.
Tel: +44 161 834 6747.
Augan, The Netherlands.
Tel: +31 85 648966.

■ French national broadcaster FR3 is to equip its new mobile with a the 24-fader, 48-channel SSL Aysis Air digital console with a custom control panel for the video router matrix and SSL's RIO remote fibre-optic interface system. To be based at Grand Est, the station's eastern production centre in Alsace, the mobile represents the stations first move into digital on-air working. It is due for January commissioning when it will be used assignments ranging from classical concerts to sporting events.
FR3, France.
Tel: +33 3 88 56 6724.
SSL, UK.
Tel: +44 1865 842300.

■ Kansas City has a new 2-room recording facility, an annex of Chapman Recording. Established in areas ranging from talking books through dialogue replacement to music recording, the new facility boasts identical control rooms equipped with 40-channel Yamaha 02R consoles and Studer Dyaxis II DAWs, with pride of place going to the EMT plates acquired from A&R recording in NYC.
Chapman Recording, US.
Tel: +1 816 842 6854.

■ Leipzig-based German public broadcaster MDR has bought an Orban Audicy workstation for its flagship commercial contemporary music station, MDR Life. The purchase brings MDR's use of Audicys to four, and will be used for on-air promos, station idents, and programme editing. The station serves the former East German states of Thuringen, Saxony and Saxon-Anhalt, and targets a 23–39 age group.
MDR Horfunk.
Tel: +49 341 300 5320.
Orban, US.
Tel: +1 510 351 3500.

■ Nashville's Finalstage has invested in a Crookwood Mastering Brick console as the central element in the refurbishment of its mastering operation. The console uses both off-the-shelf elements and a custom analogue transfer path with 4 stereo inserts.
Finalstage, US.
Tel: +1 615 256 2676.
Crookwood, UK.
Tel: +44 1628 528026.

■ New Zealand national broadcaster, Radio New Zealand, has bought 25 SADiE 24-96 digital audio workstations for use on documentary production and classical music recording, and an SA&V Octavia multichannel system for drama production.
Radio New Zealand.
Tel: +64 4 474 1999.
SA&V, UK.
Tel: +44 1353 648888.

■ Swiss-based Ben's Audio Support and Engineering has purchased a pair of Aucos Q-2b studio monitors. The loudspeakers are to be used for mastering and engineering applications.
Stoll Audio, Switzerland.
Tel: +41 61 691 8388.

■ The Turkish Republic's 75th anniversary was celebrated with a concert at the 1,800-year-old Aspendos amphitheatre involving the Istanbul Symphony, a 40-piece choir, pop ethnic and solo artists and 20 Mehter drummers. The event was captured by the Sound with Vision multimedia production company's Istvan Leelossy on six Tascam DA88s using Quantegy DA8 MP-113 tape. Audio was handled by Midas XL250 and A&H GL4000 desks, with Focusrite and Tube Tech mic preamps splits from the stage to the DA88s.
Quantegy, US.
Tel: +1 770 486 2800.

■ Hire companies' recent acquisitions include Europe Audio Rent's Otari Radar II in The Netherlands; Stockholm Audio's 12 DPA 4011 mics; Dreamhire's Sony PCM-3348HR DASH multitrack machine; The Sound Company's set of Crown CM31 suspended mics (for choirs of up to 200) extra Neumanns, AKGs, DPAs and Accusounds; FX Rentals' Digidesign Pro Tools 24; and Wigwam's Soundcraft Series Five console in the UK.

■ London's Cinevideo post facility has ordered the first six Trantec IEM500 programmable in-ear monitoring systems for use by television presenters. The order follows a period of evaluation of such systems and coincides with the launch of the IEM500.
Cinevideo, UK.
Tel: +44 181 743 3839.
Trantec, UK.
Tel: +44 181 330 3111.

■ Switzerland's first privately-owned television station, Tele 24, has recently gone on-air. Regarded by its owner, Roger Schawinski, as a victory over over the state monopoly, Tele 24 has adopted Soundcraft's Venue Theatre, Delta AVE, B100 (for its OB vehicle) and 9 Spirit Folio desks (for its editing suites).
Soundcraft, UK.
Tel: +44 1707 665000.

December 98

9-10
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Contact: Mr Bhavuk Kaul, Exhibitions India
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Email: exhibind@nda.vsnl.net.in
Net: www.exhibitionsindia.com

9-11
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Email: chuilan.chia@reedexpo.com.sg

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Email: Jane_garton@midem-paris.ccmail.compuserve.com

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Email: confdesk@firstconf.com
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25–27
33rd SMPTE Advanced Motion Imaging Conference
Omni Rosen Hotel. Orlando. Florida, USA.
Contact: Linda Alexander.
Tel: +1 914 761 1100.
Net: www.smpte.org

March

3–7
MusikMesse Prolight & Sound
Frankfurt, GermanyContact: Messe Frankfurt.
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Fax: +49 69 7575 6613
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6-9
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Bahrain International Exhibition Centre
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April

10–12
16th International AES Conference 'Spacial Sound Reproduction'
Arktikum. Rovaniemi, Finland.
Contact: Juha Backman. Nokia.
Tel: +358 10505 9140.
Fax: +358 10505 5738.
Email: aes16@acoustics.hut.fi
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13–15
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Fax: +44 171 378 6170.
Email: office@avtt.org.uk

May

8–11
106th AES Convention
MOC Centre. Munich Germany
Contact: Martin Woehr. Bayerischer Rundfunk Studioproduktion.
Tel: +49 89 59002434.
Email: 106th–chairman@aes.org
Net: www.aes.org

10–15
21st Montreux International Television Symposium and Technical Exhibition
Montreux. Switzerland.
Contact: Patricia Savioz.
Tel: +41 21 963 32 20.
Fax: +41 21 963 88 51.
Net:wwwmontreux.ch /symposia

25–30
Expo Light & Sound 99
Romexpo Exhibtions Centre. Bucharest. Romania.
Contact: Romexpo.
Tel: +40 1 222 43 56.
Fax: +40 1 224 04 00.
Email: romexpo@ccir.ro
Net: www.ccir.ro/romexpo

June

1–3
Showtech 99
Berlin. Germany.
Contact: OTSA.
Tel: +44 171 886 3106.
Fax: +44 171 886 3101.

10–15
Montreux International Television Symposium and Exhibition
Montreux. Switzerland.
Contact: WHD PR.
Tel: +44 171 799 3100.
Fax: +44 171 976 0922.
Email: news@whdpr.com
Net: www.montreux.ch /symposia

July

8–10
11th PALA 99
Singapore International Convention and Exhibition Centre (SICEC).
Contact: Ann Tan.
IIR Exhibitons.
Tel: +65 227 0688.
Fax: +65 227 0913.
Email: ann@iirx.com.sg

26–28
Conference: Advanced A–D and D–A Conversion Techniques and their Applications
University of Strathclyde. Glasgow. UK.
Contact: ADDA99 Secretariat.
Tel: +44 171 344 5472.
Fax: +44 171 240 8830.
Email: adda99@iee.org.uk
Net: www.iee.org.uk/Conf/

September

10–14
IBC 99
Bolkesjø Mountain Hotel. Amsterdam. Netherlands.
Contact: Gina Christison
Tel: +44 171 240 3839.
Fax: +44 171 240 3724.
Email: show@ibc.org.uk
Net: www.ibc.org.uk/ibc/

23–26
Nordic Sound Symposium
Bolkesjø Mountain Hotel. Bolkesjø. Norway.
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Calrec X-Series

Largely overlooked in the digital desk onslaught, radio is now beginning to see its own consoles. **Zenon Schoepe** reports on one of the earliest available offerings

NAB THIS YEAR was something of a turning point for digital radio desks as a congregation of hitherto unseen numbers gathered in the halls of Las Vegas.

Large scale digital production consoles have been made, and postproduction has to a great extent served as the test-bed for the technology, yet so far radio has been largely overlooked. Part of the reason for this has to do with the fact that the radio desk market, for those manufacturers steeped in the required technology, is not seen as particularly big money, and outside the realms of the national broadcasters, and each country's top five commercial endeavours it can all become too 'shoestring' far too quickly. However, shoestring is always linked to the need to work more efficiently and this really is the spot at which the great promise of digital rears its cost-effective head.

Radio wants digital desks because they can be integrated with other parts of the radio chain that are already digital, and there is a distinct move towards more operator-driven programming. The control that digital affords does hit these buttons.

The swathes of simple digital radio desks at NAB, not all of which are near shippable status it has to be said, proved that attention was being paid. What is most refreshing is the great differences between manufacturers' interpretations of what is required to do the job. There is a diversity in digital radio-desk ergonomics and structure that is enormous given the relatively rudimentary tasks being asked of the technology.

At NAB, Calrec debuted its all-digital T-Series production desk, yet reminded everyone that its technology had been proven and tested in its X-Series digital radio desk, itself previewed at the Munich AES the year before. A number of X-Series have now shipped in the UK with more following. Calrec's approach is distinctly different to that adopted by a number of other manufacturers' efforts primarily because the work surface, and, indeed, the remote rack electronics are modular. Work-surface panels can be mounted in any piece of furniture you could like.

Internally the X-Series is based on the core that is scaled up significantly in the Digital T-Series. Sonically it is said to be no slouch as would be expected with Calrec's pedigree in these matters, but the inside word is that performance is close to that of the DCA T-Series.

The X-Series is deliberately limited with regard to its DSP processing to a maximum of 24 faders in blocks of 6, and to achieve this maximum you need to employ 2 processing racks. One rack on its own can accommodate two 6-fader panels, and the way to approach it is to get enough DSP to run the number of faders you want. Processing is arranged on a per-channel basis, not a per function or pooled basis.

Input options are a mono mic card linkable for stereo, analogue line-input card for 8 analogue line-inputs and 2 stereo outputs, and a digital card that gives 2 AES3 inputs, and 2 SPDIFs. Conversion rate is fixed on the AES, but SRCs are on the SPDIFs.

On the output side cards are available for digital with 3 AES3 outputs with an SPDIF copy and monitoring tap-off point, and an analogue output card that gives 3 stereo line levels. An additional path through the output card is required for such things as PFL.

Aside from the main rack a smaller unit houses the crosspoints for the monitoring system with analogue or digital inputs plus the control processor for the worksurface.

Significantly there are no fans and no hard drives, so the rack can be located in the control room.

On the control surface side there are three main panel types and this is the area that is likely to make the difference as far as the potential purchaser is concerned. On the one hand it must be clever and deep enough to allow comprehensive access to the desk's specific innards for techie interest, on the other it must be able to be made obvious and simple enough for someone who talks continuously for a living to operate. The chunks to play with are a fader panel with 6 faders on it, a monitor panel, and a talkback panel which connect to the rack via SCSI cables (not SCSI data).

Because the console is designed to be self-operated the intention has been to make it very easy to use. Consequently the usual self-op analogue clutter such as EQ and auxes have been put on screen. Within each fader strip there is a fader, STOP and START buttons, PFL, an ASSIGN button that

calls the main screen to the selected channel and an assignable rotary controller (a Wild control in Calrec parlance). This can be programmed individually by pressing the shaft encoder, while an adjacent button is linked to this function, be it pre-post switching of an aux or for a bypass when used with a pan control.

The idea is that once the desk is configured for the user it can be left plain and simple, and to prove the point early X-Series installs have actually had playout systems screens installed in front of the operator with the desk screen to the side.

The panel display continually shows what the fader source is, what the assignable control is doing, and the position or value of the continuous shaft encoder pot. A useful touch is the fact that the display expands when an encoder is moved for better visualisation.

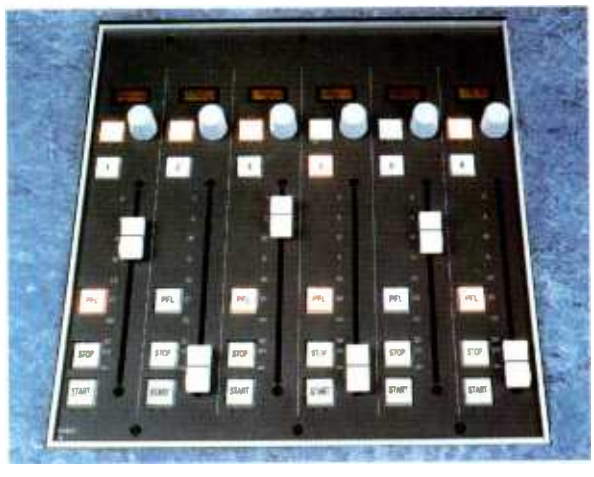
The Monitor panel handles 16 monitor sources all effectively as external inputs. These can be analogue or digital in blocks of 4 and can feed control room loudspeakers, operator's headphones (fed with reverse talkback, PFL, and with split working), a separate selector for a studio with loudspeaker control and 3 guest headphones.

The talkback panel allows you to address 6 clean feed destinations with a variety of key tap latching-momentary functions. There's talkback to the studio, the three headphones, some spares and condition switching at the top. External bar-graph metering is an option.

The main display is run from a PC which is not responsible for driving any of the audio, and the X-Series reboots from cold or hard resets in around 5s to the settings just prior to power down by continually saving desk settings to FlashROM.

Desk settings can be transferred between desks on diskette or by networking the PC elements; although this must not be confused with the networking of multiple controller surfaces to one elaborate rack. The X-Series can run one work-surface system with one rack system.

I will touch on some of the setup routines to illustrate what sort of other features are available. Starting from scratch you are presented with an on-screen setup page that recognises the cards that are present, and then you enter into a process in which you assign sources and destinations using icons and names. This setup page predictably permits the creation of consoles specific to operators or to programmes. Channel routeing is to 4 main stereo outputs, and 2 stereo auxes.



Coarse gain is accessed on the setup page with fine gain available on the surface controls, along with aux sends, and pan. Channel functions can be switched globally, for the purposes of setup, to the Wild controls for across-the-desk adjustment of single parameters. In a so-called Auto-Wild mode, every time you touch a control on-screen it is sent down to the Wild controls for adjustment with a timeout switching back to their previous statuses. This amounts to a highly tactile and fast means of adjustment on what is a rather frugally populated worksurface.

EQ is 3-band with 2-frequency shelving LF and HF and fully parametric mid plus fixed high-pass and low-pass filters. EQ and filters can be bypassed individually and the former can also be flattened.

Compressor-limiters are available on each channel with limiters on the main outputs in addition to absolute brick wall limiters thresholded at the top of the desk output headroom.

Worthy of note is a RECORD button on the channel page which serves as a quick way of making, say, a telephone interview recording on air while playing something else out to the network. Pressing this button on the relevant phone channel routes this and the presenter's on-air mic to the record bus and takes a clean feed off that mic and routes it back to the telephone caller. Very clever. You could, of course, direct this reconfiguration process manually, but this is a feature that is intended to make life easier. Customisable features include the programming of the work-surface switches to light according to your own preferences.

Snapshots are used to configure the desk and allow specific tailoring and reconfigurations of a radio show, for example, to handle a live phone-in section of the show. Additionally the desk can be serially controlled from a PC for integration with automation systems and a Diagnostic mode charts all desk activity for print out purposes.

The use of screens is interesting in that although it is Windows-driven it is stripped of a top menu bar and dropdown menus, using instead a tab system that allows the labels for all the different desk functions to be seen at all times.

There is really not that much more to say about the X-Series. The goals of combining extended internal power with a fool-proof user-interface have undoubtedly been met. It is not as 'analogue' in presentation as some of the offerings from other manufacturers, but that is not a bad thing because it looks unintimidating and quite frankly it also looks modern just like all the other stuff that is appearing in the racks of radio studios. Prices for a 12-fader desk weigh in at around £25,000 (UK) depending on the precise nature of the I-O cards selected, but this will be eclipsed in cost terms by the sort of investment required to digitise other, and it has to be said, now seemingly more important sections of a radio station's operation.

The X-Series is small, powerful, and intensely configurable for all eventualities, and you can buy it right now. ■

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CB Electronics SR-3

Topical yet unglamorous, 'glue' systems are an essential aspect of audio and video. **Rob James** takes a look at the CB Electronics range with the release of its SR-3 serial remote-synchroniser

FOR YEARS, the film and broadcast community has relied on Colin Broad's expertise to solve a range of problems in the area of machine and system control. In fact, you would have to search hard to find a UK film dubbing theatre without at least one of his products, known to all and sundry as Broad Boxes—or more properly as CB Electronics units.

Because big film-dubbing theatre requirements are so complex, most of CB's output has tended to involve a degree of customisation to suit individual requirements. The SR series of Serial Remote controller-synchronisers is CB's first real off-the-shelf line.

The SR-2X, SR-3 and SR-4 numbers refer to the number of machines each will control. In practice the price differences are small and most purchasers will opt for the SR-3 or 4. The SR-3 under review will also act as a slave synchroniser-controller, locking up to three 9-pin machines to a master 9-pin input.

The first thing that strikes you about the SR-3 controller is its small size. There is no separate rack unit, and all the electronics are in the control surface. With panel space at a premium in sound-for-picture studios, this is highly desirable. Power is taken care of with an in-line 'brick'; alternatively, the unit may be powered via the 25-pin D-connector that also handles time code I-O and GPIs. A further four 9-pin D-connectors join the machines to be controlled. The only other connector is a BNC for video syncs, which the unit requires as an absolute reference.

The gently sloping metal box, with its dark purple hammer finish, may be used on a desktop or panel mounted, the latter option being facilitated by four tapped holes in the case. The display is a 2- line, 80-character pale green backlit item with a small degree of up-tilt to aid viewing from odd angles. I would have preferred more tilt, but what there is most welcome. All the keys are chunky, square and internally illuminated. A neat and slim jog-shuttle wheel with excellent feel accompanies the transport controls. The other keys are arranged in three groups, numeric with store and recall, a row of eight keys with a bank switch key below the display that will frequently be used for record selects and the largest group which contains, well, the rest.

Anyone who has had any dealings with 9-pin controlled machines will realise that there is no such thing as a standard set of commands. One significant achievement of this synchroniser-controller is that it does exactly this. My Tascam DA-60 Mk.II DAT machine has defeated a number of other devices but the SR-3 recognised it immediately and controlled it better than any other device to date. The SR contains a library of machine specific protocols that should suit the majority of users requirements. If, however, you wish to use a machine for which the SR has no profile, it is possible to experiment with a variety of parameters in the hope of achieving the desired results. On the evidence of previous experience, if you do have such a machine the chances are it will be supported in a subsequent software update.

In any multiple machine serial system it is customary to designate one machine as master. It will also operate as a 'perfect machine'—the unit is used as a 'virtual machine' master. The performance of the system is largely governed by the dynamics of the master machine. With the SR-3, given a suitably quick master, or in 'perfect machine' mode, synchronisation is quick and accurate, and control is tight with little of the 'rubber band' feel of some others.

A total of 20 keys invoke Macros including the nine below the display. These are user programmable from a library of functions currently comprising around 160 options. If this unit has a fault it is that you can make life impossibly complicated and loose yourself in a maze of nested menus. On the other hand, if you need a weird function the chances are it is already available. In practice, most users will set the SR up for specific purposes and leave it alone. To this end, the key legends and colours can be easily customised to reflect the functions for which they are programmed. Needless to say, the time displays can be switched to read in film feet (units of 16 frames) or time.

Without going through all the possible options, there are groups of com-

mands designed to make light work of ADR operation, DAT IDs and programme numbers, record control of multitrack machines and locator smarts such as Again and Loop.

In addition to the direct 9-pin machine control capabilities, the unit offers a time-code reader-generator. There are 6 GPIs and GPOs which can be used to remote the transport controls to existing keys on the user's panel and provide tallies, 'red light' control, and so on. The SR-3 can also interface with Audio Kinetics ES.BUS protocols, Studer TLS 4000, Ampex and Timeline Lynx. This gives access to non 9-pin machines and can aid integration with existing installations.

If all this sounds too good to be true, it is not. There is one area that could stand considerable improvement. The unit comes with the manual from hell Most of the information you need is in there somewhere if you can find it, but there are factual inaccuracies and most people will tear their hair out and wring their hands or reach for the phone. I have even watched well respected facility engineers in a state of bafflement when confronted with this manual.

Syence tells me it is discussing a rewrite with CB electronics. I hope this happens soon. Apart from anything else it would reduce the cost of support.

If you are looking for an incredibly versatile, neat compact and comprehensive multimachine control system and synchroniser, for any number of applications then this is the only game in town at any where near this price point. Machine control is finally showing signs of growing up.

Broad Boxes roundup

CB Electronics also manufactures a range of boxes that help glue complex systems and production routes together. These are some examples—the MR is the heavyweight controller for major installations.

The MR series of multiformat remote control systems are found in many film dubbing theatres. It handles 9-pin, biphase and parallel remote control and synchronisation. There are also recorder control panel options for dubbing or ADR operation, and a PC can be used to prepare loop timings which are downloaded into the controller. The system also interfaces with console automation systems from the major manufacturers.

The MC-1 Master Motion Controller functions as a virtual master with four biphase outputs, (biphase standards from one pulse per frame to 100ppf), time-code output and 9-pin output. A 9-pin input is also provided. Gear-boxing allows mixed frame rates and there is an additional biphase output fixed at 25fps. Parallel remote facilities allow the unit to interface with existing transport control keys and recorder functions.

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Email: sales@syence.co.uk

The GD-1 Giant Display is an 8-character time counter that takes a time-code input in any format or, when used with other CB Electronics products, will show film feet.

The VS-1 Video Streamer offers a variety of functions designed to make life easier in mixing for picture and ADR applications. The VS-1 can hold up to 500 events in its cue list which are used to trigger electronically generated cue wipes which may be inserted into a composite video signal. The events can be entered and edited on the VS-1 or prepared 'off-line' on a PC and downloaded to the unit. As well as the wipes, the VS-1 has beep or click outputs. The beeps are used to help talent hit cues and to get the pace of the loop. The unit also has a multistandard time-code reader-generator and display or the numbers can be inserted into video. Options are available to add relay outputs and Opto-Audio Trigger inputs and VITC reader-VITC to LTC conversion.

The TC-1 is an LTC multistandard, multireference time-code reader-generator. The TC-2 adds video inserts and the SS-1 is a TC-1 with a 9-pin synchroniser. Options for the TCs are VITC reader-VITC to LTC convertor and a multistandard VITC generator.

The FC-1, FC-2 and BS-1 Film Coders deal with converting to and from biphase. The FC units convert a biphase input to LTC and also gear-box between frame rates. Biphase standards from 1ppf to 100ppf are catered for. The FC-2 adds video insertion.

The BS-1 does the opposite and generates biphase from a time-code or 9-pin input. This allows a DAW or VTR to control a film chain. This device also includes a gearbox.

The ED-1 ED-2 units are used to generate an EDL from discontinuous time code. The unit works with a PC to generate EDLs in CMX format. Reel numbers can be taken from user bits or time-code hours. A second time-code reader is included to enable listing against existing code. The units also regenerate time-code with new user data if required. The ED-2 adds video insertion. There are options for VITC. CB Electronics won an Academy Award for technical innovation with these units.

The IS-1, when used with a suitable ISDN audio unit (like Dolby or CCS), enables an ISDN audio connection to be used to synchronise machines. The unit includes a 9-pin synchroniser with a programmable offset to suit the encode-decode delay.

The TC-4 is a portable, light (100g) and compact battery-powered multistandard LTC reader-generator for location work. The temperature-controlled crystal gives a claimed accuracy of around one frame in 12 hours. A real-time clock is included and the unit can be jam synced. User-bit assignments are in either AMPS or Aaton for Date, Month, Unit and reel. A video output is optional. ■

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Quantegy GP9

A new high output analogue tape for these digital random access times. **Zenon Schoepe** reports on formulation, **Caroline Moss** asks for early feedback

IT SEEMS APPROPRIATE that on the Poulsen anniversary related elsewhere in this issue (see page 61) that we should also be recounting on a significant analogue tape formulation from Quantegy, itself celebrating 40 years of tape manufacture next year through its Ampex connection.

Much has been reported concerning the company's acquisition of 3M's tape business and the rebranding of its tape from the established Ampex name to that of Quantegy that officially takes effect at the beginning of next year, yet clarification is still required.

3M's original and highly popular high output 996 analogue tape will not be manufactured by Quantegy and any that is left in dealer stocks truly is the last that there will ever be. This is despite the fact that Quantegy bought 3M's tape division and with it all the elements required to manufacture this formulation.

The reason has been explained with the use of an entertaining analogy —take all the exact ingredients to make a cake and hand them over to someone else in the same kitchen and the result will be different enough to make a difference. Quantegy, through its acquisition of 3M's tape operation, had all the ingredients and the production line kitchen to make 996, but by its own admission and despite its own considerable experience was unable to make it taste and perform like the 996 that 3M prepared.

This was clearly a source of considerable concern for Quantegy as it had bought into 3M's tape technology in order to take advantage of 996's excellent reputation, but the chef's were different. It had to rethink, and the result is GP9, a formulation that could be described as something of a 'best of' 3M 996 technology and Quantegy's own 499, which remains current, as it combines aspects of both.

It combines chemical components from the two formulations, which incidentally shared a surprising amount anyway, and it employs a new urethane-base film that draws on modern developments in this substance that amount to increased durability and improved longevity.

A new crosslinking binding system is claimed to make the tape more robust, but, perhaps most significantly, claims to get some 8% more oxide onto the tape than its competitors.

The company is claiming an improved noise floor, lower distortion and virtually shed-free runability. The metal reels for the ½-inch, ¼-inch and 2-inch versions that are available have thicker flanges, a solid back flange and are coloured red and the product is available in standard Tyvek and 3M's TapeCare boxes.

In terms of alignment, GP9 is close enough to 996 and 499 to allow direct replacement; although the window is large enough to permit additional or custom tweaking for the realisation of particular results. In terms of cost, GP9 weighs in at slightly more than 499.

Quantegy does not expect 100% market dominance as it clearly

< identifies the importance of freedom of choice as a means of policing performance. From the user's point of view, and in the face of the increasing onslaught of digital, it is interesting to note that we now have more choice in high-output analogue tape than ever before as GP9 is accompanied by Quantegy's 499, Emtec's 900 Maxima and Zonal's 999.

All Quantegy's other tape lines, including 456, will continue to be manufactured.

As with all media any true appraisal must be tempered with the observation of consistency over the course of years as it is only here that the true worth of a formulation can be judged honestly. What follows are the comments of several early users of GP9 and Quantegy is likely to be amenable to approaches from those interested in their own trials with the product on significant projects.

There is only one way for you to find out if GP9 works for you and that is to try it. No one should doubt Quantegy's commitment to professional analogue tape and the company has stated categorically that if the day should ever come when the last roll of tape should ever be produced, then that reel will bear the Quantegy name. ■

Joe Foster, Creation Records

'I was using the GP9 at Straylight Studios in Willesden on a variety of old 3M machines, which overheated during the session. The maintenance guy popped along and was so interested in what we were doing he stayed to tweak different bits, so we did a real hot test on the tape, we cut everything really hot and it all cut in fantastically loud with no distortion whatsoever. The recording had all the clarity of digital with the warmth of analogue.

'Straylight was a great studio for our test purposes because it's a big old BBC-type studio with souped up Hammond organs and old echo plates, but is also linked up to digital, so we were able to give the GP9 a really good run through.

'Normally when I'm given test graphs of tape they mean nothing to me and I find it difficult to hear the difference. When I first heard the GP9 demo at Town House I immediately heard a difference, but was sceptical. However, after my sessions I'm convinced it is really excellent; the tape was saturated and it outperformed itself. Several friends have used it in different applications including live recordings and they all report a similar success.'

Foster was working on sessions for American label Rhino Records and for recordings of new Creation signing One Lady Owner. He also tested the GP9 with Glen Matlock, Steve New and Tony Barber.

Jon Dee, chief engineer, Orinocco

'I was given a couple of test reels of GP9 to evaluate in a short time, so I used it on sessions I was working on as much as I could, right across the board. I would have liked to try it out some more, preferably on drums which would have given it a good test, but time constraints didn't allow this. I did use it quite extensively on vocals though, and also was able to record onto digital to do an AB comparison. There was a very small amount of noise on the GP9 recording, which you'd expect from an analogue recording, but

The modern media family —GP9 pictured at its birth with relatives close and distant

if it had been a blind test I'd have to say the two were identical. It is not the sort of thing you'd expect from analogue. GP9 is an excellent tape which has restored my faith in analogue, performing like a digital tape while giving all the benefits of analogue. I was definitely impressed and look forward to using it more extensively in the future.'

Tim Vine-Lott, chief engineer, Air Studios

'I thought that this time, when evaluating some new tape, I'd run proper tests on it, so I spent two weeks running it on a Studer A800 Mk I machine using an Audio Precision test set. All the tests I normally use seemed pretty meaningless so I read a book about how tape actually works and got together some new tests to run. One was a frequency response test, seeing how the tape performed at different fluxivities, and for the other I lined up tracks at different levels and tested the GP9 together with some 499, 900 and 996.

'On the maximum output level test at +3% distortion, I got much better results from the GP9 than from the others; I was able to put a lot more on the tape before it distorted by 3%. However Emtec pointed out that the batch of tape I used was old so I retested. On the old batch the GP9 was beating the 900 by 1½dBs; on the new batch it still beat it by a dB, so although the new 900 is better than the old I could still get more out of the GP9 in the course of the tests I ran, in terms of maximum output level and saturation output level.

'In general the noise floor on the GP9 is audibly lower than the other tapes, there's a lot less tape hiss and you can put more on it before it falls over. I was running it on the A800 at +10dB, whereas I wouldn't have lined up any of the others at above +7dB. So you can run it much hotter, and get a useable frequency response on tape.'

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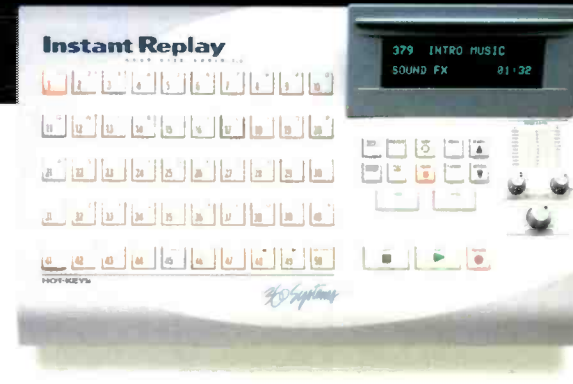

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PROFESSIONAL DIGITAL AUDIO

Panasonic-Ramsa WR-DA7

An 8-bus digital desk sporting the Panasonic name and priced to compete with the Yamaha 02R is certain to command attention. **Rob James** finds an interesting mix

THE FIRST IMPRESSION after wrestling the WR-DA7 out of its box is of clean, appealing functionality. Closer inspection of the console shows the wrist rest to be sculpted for serious use; the dark blue-black colour scheme confirms its professional styling. The fader strips start on the left and are positively minimalist until you arrive at the area above the Bus and LR masters. All the other controls are grouped on the right much as you would expect. Transport controls and parameter wheel are located bottom right, with EQ, Dynamics and Aux sections immediately below the screen. Monitoring control sits in the channel.

Each of the 16 identical channel strips has a fader and 4 illuminated small square keys for CUE, SELECT, FLIP and SOLO. FLIP in this case refers to the layering not as in an in-line console switching signal paths between monitor and main.

Four keys switch the fader modes between Inputs 1–16, Inputs 17–32, aux sends and returns with bus masters, and a custom-MIDI control layer. Flip keys allow individual channels to be brought to the surface and changes from green to red to show what is going on. Channels selected to Flip toggle with the global switching. Unfortunately there is no way of keeping specific channels on the surface in both global conditions.

Without adding option cards the WR-DA7 has 16 balanced analogue inputs accepting signals from -60dB to +10dB using 24-bit convertors. Two digital XLR inputs are provided as an alternative for Channels 15&16, and for Aux Returns 1&2. The first 16 channels also have unbalanced analogue inserts using the usual single TRS jacks.

Audio interfacing is accompanied by wordclock input and combined output through on BNCs, MIDI on DINs, a mini-DIN for connection to a Mac (labelled 'to PC') and a 9-pin D-connector RS422-485. The last connection is for a foot switch to be used for punching in and out of automation recording.

The optional meterbridge allows monitoring of Channels 1–16 or 17–32 or the auxes in the same way as the fader layers with bus outs and LR always displayed. On the rear of the WR-DA7 are 4 option slots. One of these is dedicated to a video sync and SMPTE time-code board. The other three accommodate various permutations of ADAT, TDIF, AES-EBU/SPDIF or A–D D–A cards. A further option, also using one of these slots is a TANDEM card to connect two WR-DA7s together.

The screen is fundamental to the operation of this type of console and this one is identical in resolution (320 x 240) to the one fitted to the 02R.

The EQ section is equipped with shaft encoders for Gain, Frequency and Q. Four keys select which of the 4 frequency bands the knobs affect and a further key turns the EQ on for the selected channel. The knobs also function as buttons, which is neat and intuitive. Curiously the frequency bands are slightly restricted, depending on the type of filter in use. For example the high band operates over 50Hz–20kHz in 1/12 octave steps in parametric mode but over 1kHz–20kHz in shelf or low-pass modes. More important than the numbers, the EQ sounds good—very clean. I also found it difficult to overcook it into distortion. The Q goes high enough for surgical clean up work, but the EQ still manages to be smooth and musical at wider settings.

The Dynamics section operates in a similar way to the EQ except that there are 2 rotary encoders. Thus, Threshold and Ratio may be adjusted or Attack and Release or Delay and Gain Make-up. Toggling through the selections also takes you to the Expander with Threshold control. Delay is activated with a dedicated key and is adjustable in millisecond increments or samples up to 11,400 samples. I am less impressed with the desk's dynamics. They are effective in controlling levels, but they are neither virtually inaudible when working hard, like the better digital types, nor are they full of musical character. Annoyingly there is no option to place the dynamics post fader. Competent enough, but could be better sums it up.

The Aux section uses one rotary encoder which, if pressed will bring up the Channel screen for the selected channel. It also switches sends on and off. Six keys select between the 6 aux sends and a further key switches the send on. The Channel screen is used to determine whether the feed is pre or post fader.

Things get more complex with Pan and Bus assignation. Again there is a rotary shaft encoder with associated ON key. This is partnered by 8 BUS keys and LR and DIRECT ASSIGN keys. Pressing the knob brings up the Pan-Surround screen which is where you decide if the channel is to be panned and bused in surround mode. The ON key only affects whether panning is active between odd and even adjacent buses. Selecting Surround Enable has a number of effects: The first 6 bus selection keys light and the surround panner outputs are routed to these buses. Depending on the chosen panning mode, the rotary shaft encoders on the EQ, Pan-Bus Assign and Dynamics sections will now function as send level controls. Other surround panning possibilities include using the LR master fader and parameter wheel as back-front left-right controls and a number of vector based options including timed pans, return and repeat.

Don't let anybody kid you, the learning curve for this console is steep. The reference for this mixer is the Channel screen, accessed by a dedicated key. Associated with this is the METER key which activates the metering screen. There are libraries for EQ, Dynamics and Channel settings each with 50 memories. Once the relevant library has been selected the dedicated STORE and RECALL

keys can be used or the on-screen fields. Copying parameters between channels is assisted by the MULTICHANNEL VIEW key and screen. Comprehensive linking and grouping functions allow adjacent pairs of channels to be linked as a stereo pair with balance or as twin monos with individual settings retained. Four fader and mute groups can be set up allowing control of multiple channels from any fader or mute key in the group.

Navigating around the vast range of options is accomplished using a combination of keys on the console surface, soft keys on screens with the ENTER key and cursor control in combination with the parameter wheel. In many cases there is more than one way of achieving the same end. The cursor keys do double duty as MMC transport keys via a CURSOR-MMC key. This can be rather inconvenient if not downright dangerous given that the CURSOR MODE key doubles as MMC RECORD. When not in MMC mode the CURSOR MODE key toggles the function of the parameter wheel >

Ronald Prent

on BASF tape

"If the choice is left to me, I use **BASF Studio Master 900 *maxima*.** It is such a high-class analogue tape that I could not find a better one even after comparing several tapes with it. You get a super performance from **BASF Studio Master 900 *maxima*** even when you push up the level. The clarity is phenomenal. I don't use anything else now."

Ronald Prent has had success as a recording engineer working with such artists as **David Bowie, Police, Elton John, Def Leppard, Iron Maiden, Peter Maffay, Jule Neigel, Rammstein, Guano Apes** and **Fury in the Slaughterhouse.**

SM 900 maxima is a high-output analogue tape designed specifically for multi-track recording and mastering, with extra wide dynamic range, low noise and low print through.

EMTEC Magnetics

For more information contact
☎ 01295-227838 or visit EMTEC Magnetics' web site at http://www.emtec-magnetics.com

BASF

< between fast navigation and selection of parameters in fields.

In addition to 50 scene memories for snapshots with variable crossfade times, the WR-DA7 boasts comprehensive dynamic automation. The LED field above the faders shows which parameters have been selected for automated control. A nice touch is when replaying an automated mix the relevant LED flashes green to indicate automation control. The automation has two screens, Setup and Execute. Automation can be engaged from the surface using the AUTOMATION-AUX key. Offline editing of parameters is possible; although I think it is rarely worth the bother. The memory supplied for automated mixes is less than generous; although you can use a MIDI data filer or computer to record automation data in real time or to bulk dump data.

It was when I first started to play with the automation that I hit the first real snag. Try as I might, I could not figure out from the manual how to persuade the thing to read MTC. I could see it was receiving MIDI data and I could read MTC running on a device connected downstream from the WR-DA7, but its counter remained on zero. Since it was a weekend and I was impatient, I had a quick trawl around the Internet. If Panasonic-Ramsa has an official site my search engine couldn't locate it, but I did find the 'unofficial DA7 user group'. My reservations about the MIDI and sync implementation appear to be shared by a number of owners. I did however, find the answer. The timebase reference can be changed, but only when there is no automation data in memory. The manual is positively opaque on this point and I am by no means the first person to notice.

A mere three years ago, this class of mixer did not exist. It is a measure of Yamaha's achievement with the seminal 02R and its siblings that all digital mixers in this price range cannot be considered except in this context. To pretend otherwise would be unrealistic. Much the same applies with 'big gun' consoles. The AMS-Neve Logic and Capricorn consoles effectively define expectations. This sets the agenda for the rest—however much they may protest this is not the case.

The WR-DA7 looks the part. It is clearly designed in the 02R mould and is none the worse for that. I had expected to find significant improvements over the much older 02R but was somewhat disappointed. Less a quantum leap, more a hop, skip and a jump, just like the faders—128 steps are not enough and there is still no real 'touch sense'. Sure, you can put a fader into Record by moving it, but it's still a shadow of the real thing. I had also hoped for advances in ease of use.

Another golden opportunity missed is in the surround area. Although the WR-DA7 tries to be surround friendly there is no ready way of comparing 6 channel sends with 6 channel returns. The same applies to the automation memory. It is all very well providing hooks to a PC or data filer, but less elegant than a few greenbacks' worth of onboard memory.

While I concede built-in effects do not suit everybody, the advantage of full integration with the automation system should not be underestimated. The absence of effects would be forgivable if the console offered a serious advance in other areas. Subjectively the EQ may be better than others and the 'look and feel' is good. I particularly liked the use of bicolour LEDs, and the knobs-as-buttons (like the StageTec consoles and Junger outboard), but there need to be better reasons to go with a new console.

I am assured the firmware is due for an update along with remote software for PC and Mac, which may address some of my disappointments. But it remains to be seen whether Panasonic can capitalise on a promising, if 'me too', start before other manufacturers come up with something which genuinely advances the category. ■

Contact

US: Panasonic-Ramsa, 3330 Cahuenga Boulevard West, Los Angeles, CA 90068. **Tel:** +1 213 436 3624.

FAR DbW-80

For methodology see Studio Sound, April 1998, page 14.
See it on the Internet website:
www.prostudio.com/studiosound/apr198/r_tannoy.html

Studio Sound's 'bench test' loudspeaker reviews continue with the DbW-80. **Keith Holland** reports

THE FAR DbW-80 is a 3-way passive loudspeaker comprising two 7-inch (178mm) plastic-coned bass drive-units, a 3-inch (76mm) soft-dome mid-range, and a 1-inch (25mm) soft-dome tweeter housed in a cabinet of external dimensions: 300mm high by 560mm wide by 320mm deep. The tweeter is mounted close to, and directly beneath, the mid-range driver with the bass drivers either side. The loudspeaker is specified as having an internal volume of 39 litres and a weight of 19.5kg; it is a bass reflex design with two front-mounted ports. A switch on the front panel

gives the choice of 'flat' response or a 3dB increase at 1.5kHz (the supplied specification sheets do not state the reasons for the inclusion of this switch); the measurements were taken with the switch in the 'flat' position. The crossover frequencies are specified as 600Hz and 4kHz, and the power handling is specified to be 200W rms and 450W peak (pink noise 10ms) giving a claimed maximum pressure level of 122dB SPL (peak) with a pair of loudspeakers driven.

Fig.1 shows the on-axis frequency response and harmonic distortion for the DbW-80. Average sensitivity is seen to be approximately 90dB SPL for 1W at 1m distance, and the low-frequency roll-off is 4th order with -10dB at 37Hz. The response is maintained within ±2dB from 50Hz to 5kHz except for a peak at 600Hz that corresponds with the crossover frequency between the low-frequency and mid-frequency drivers; the response above 5kHz is dominated by an unexplained dip to -5dB between 5kHz and 12kHz. Harmonic distortion performance is good with second and third harmonic distortion lying below -40dB (1%) from 45Hz upwards and below -50dB (0.3%) from 200Hz upwards. Fig.5 shows the horizontal off-axis response to be disappointing, with distinct lobing around 3kHz and a strong interference dip at 700Hz due to the spacing of the bass drivers. The vertical off-axis response (Fig.6) is dominated by a dip at 30° off-axis at 3kHz that is close to the crossover frequency between the mid-frequency and high-frequency drivers (specified as 4kHz). The time-domain performance of the DbW-80 is presented in the step response (Fig.3), acoustic centre (Fig.2), waterfall plot (Fig.7) and the power cepstrum (Fig.4). The step response has a rapid rise and steady decay showing good driver time-alignment, and the acoustic centre is seen to shift to a maximum of just over 2m behind the loudspeaker at very low frequencies, a typical result for a loudspeaker with a 4th order low-frequency roll-off. A slight shift in acoustic centre at around 600Hz corresponds with the peak in response at the crossover frequency; the consequence of this can be seen in the waterfall plot which shows evidence of ringing at this frequency. Also visible in the waterfall plot is a ringing at about 130Hz, and a fairly rapid and well-controlled decay at low frequencies. The power cepstrum shows an echo after about 100µs that is responsible for (or as a consequence?) the uneven high frequency response. Overall, the FAR DbW-80 performs reasonably well. The on-axis and off-axis frequency response and some aspects of the time-domain performance are let down by a problem at the crossover between the low-frequency and mid-frequency drivers, and a peculiar response at high frequencies, but the distortion performance and step response are impressive. The measurements demonstrate the compromises inherent in the use of twin drivers: harmonic distortion is reduced and maximum power output increased as each driver only has to cope with about a quarter of the electrical drive compared to a single driver, while directivity is compromised by the necessary physical spacing of the drivers. ■

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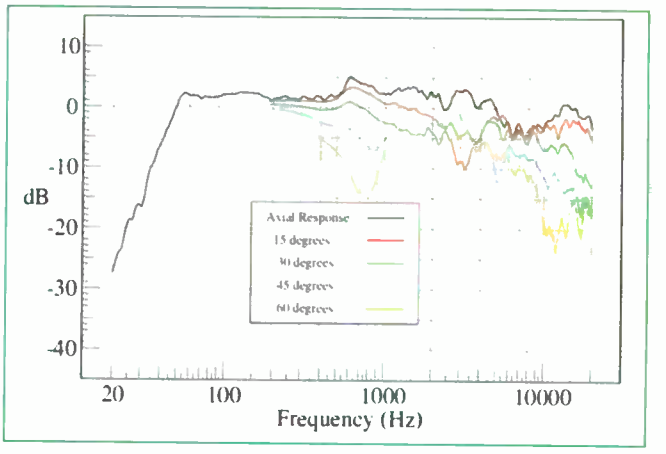

Fig.5: Horizontal directivity

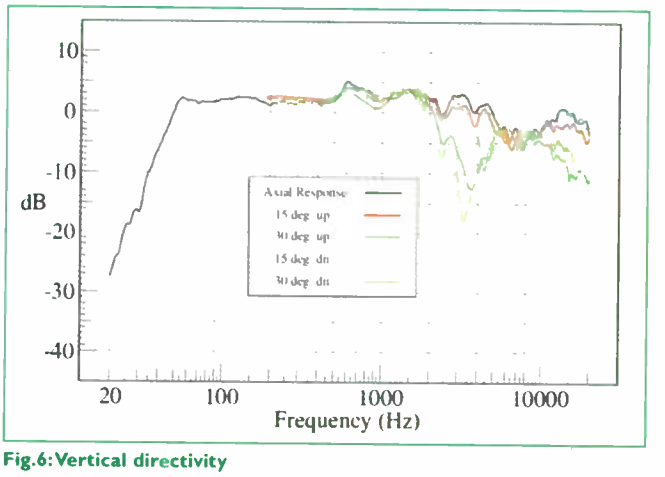

Fig.6: Vertical directivity

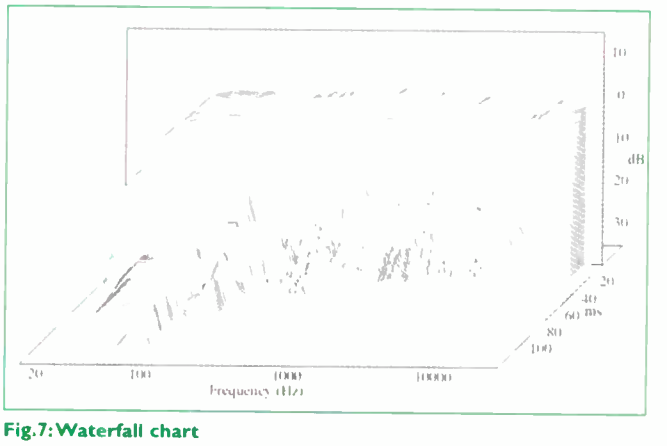

Fig.7: Waterfall chart

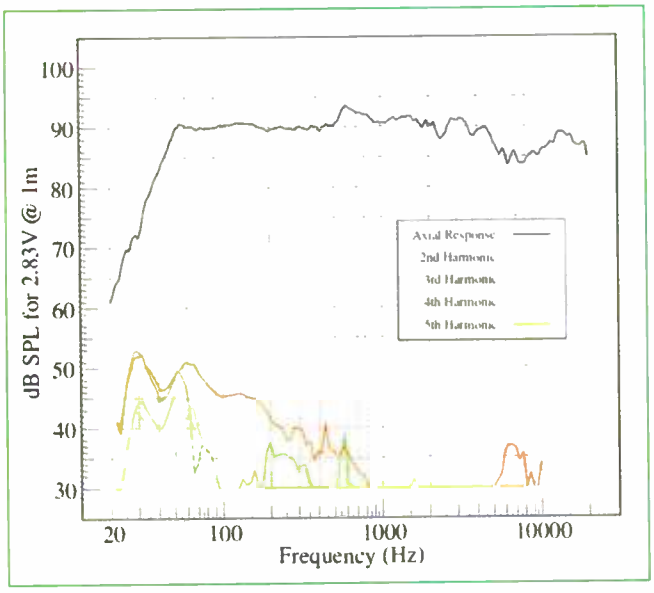

Fig. 1: On-axis response and distortion

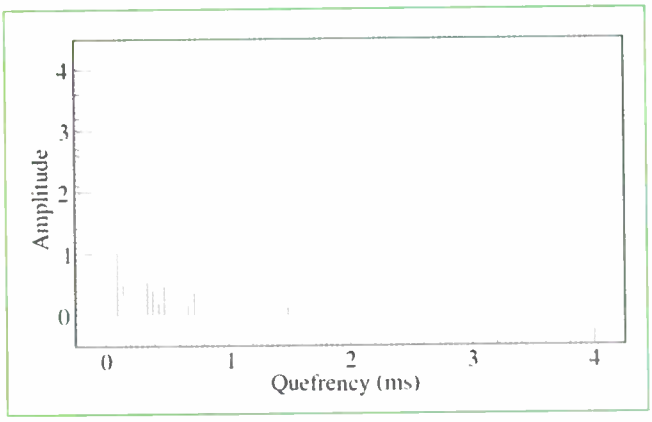

Fig 2: Acoustic centre

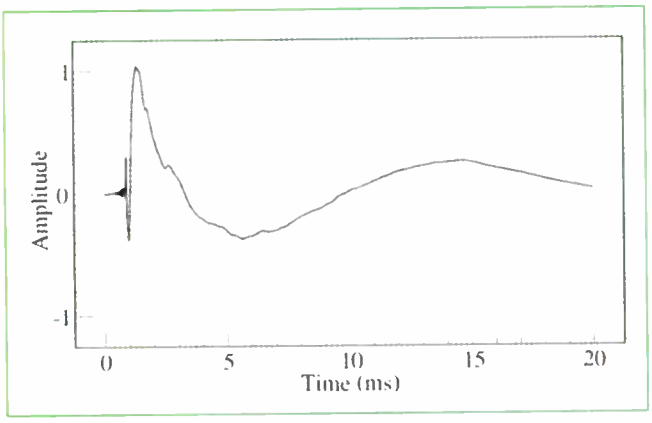

Fig.3: Step response

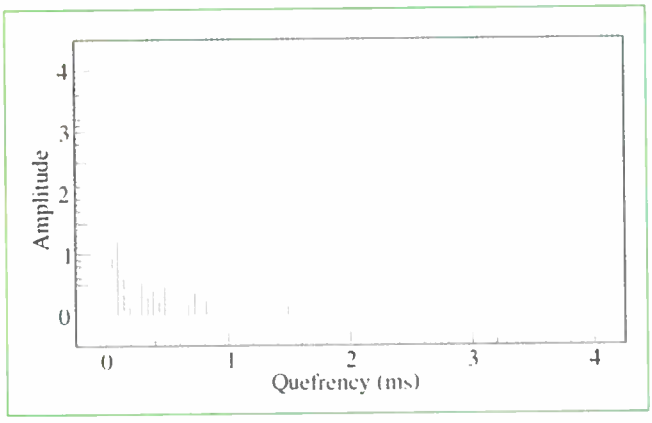

Fig.4: Power cepstrum

Tripping with Glyph

Storage and networking specialist Glyph Technologies has launched a customisable rackmount data-storage system known as Trip. The 3 U-high box can accommodate a wide variety of storage devices for applications across the board, and while there are three off-the-shelf configurations the actual selection is up to the user. The three are good examples of the possibilities: the QuadraBurn Trip contains four 4x write/8x read CD writers, an Adaptec SCSI card, and Prassi CD Rep recording software for PC compatibles; Trip for Pro Tools provides two hot-swappable Kingston drives or up to 46Gb hard drives, a tape backup unit, and a CD Recorder configured for Pro Tools; and Trip for Paris is populated with appropriate drives for the Ensoniq Paris.

Glyph Technologies, US.
Tel: +1 607 275 0345.

CAD sends in cleaners

CAD has shown the first fruits of its new clean room capsule facility, headed up by the new VSM-1 tube condenser microphone. It uses the new Optema Series 1.1-inch diaphragm capsule with a servo valve, combining elements of the VX2's valve technology and the servo technology from the Equitek Series. This is claimed to deliver extraordinary bandwidth, frequency, and transients with exceptional gain and low noise. Shared tooling with the VX2 allows aggressive pricing. The same capsule appears in the new Equitek E-350, giving an extended LF response down to 10Hz and a high SPL capability. The microphone shares the Equitek concept of battery-power supply support using a Nickel Metal Hydride battery, and will also operate from internal batteries without phantom power.

CAD, US. Tel: +1 440 943 0110.

Community gets WET

Community has introduced its WET series of loudspeakers, designed to withstand extreme environmental conditions over the long term while delivering the kind of sound quality expected from indoor enclosures. >

Audix CX-111

Audix has raised its professional profile with a new studio condenser microphone. **Dave Foister** finds new mileage in old styling

THERE IS NO STOPPING some people. Fresh from bursting forth with two acclaimed ranges of dynamic microphones—I still rate the D4 bass mic as one of the finds of the year—Audix has moved up a gear into the condenser market. In comes a big bold studio model, joining the ranks of those who seek to emulate a certain familiar classic without charging the familiar price. If imitation is the sincerest form of flattery then a certain German company should have been feeling almost embarrassingly flattered now for several years. Not all imitation works, however, and even on the cosmetic level some succeed better than others, with variations on the theme from awkward and ungainly to smooth and classy.

The CX-111 is particularly sleek in appearance. Its matt black body flares smoothly into an unusual grille that dispenses with the normal woven mesh and instead is made of perforated black metal. This looks at first sight to present less of an opportunity for the sound to get through, but on reflection there may actually be less solid material in the way; certainly the capsule, a 1-inch conventional-looking design, is clearly visible through it. Within the grille is an integral wind-shield, and the microphone is not supplied with any further external protection. It comes with the increasingly-standard bulldog-clip-style suspension mount as used by Rode and BPM, a proven design that grips the body securely, supports it well and provides good shock isolation. Unfortunately the one Audix supplied broke; one of the elastic bands snapped as I tried to straighten it out on unpacking it, so the fact that it was a common design was a bonus as I could mount the microphone as intended by obtaining one from elsewhere.

There is no mistaking the allusion in the overall shape, and the similarity extends to the position of the switches, mounted in the ring below the grille. There are only two controls, as the CX-111 is a fixed cardioid-only model: the options are a 10dB pad and a high-pass filter, both accessible on the front of the microphone. The slide switches are the same colour as the body, and it is not always easy to tell which way they are set just by looking, particularly as the engraved markings are hard to read from any distance.

There is undoubtedly a broad character of sound that one expects to hear from a microphone of this size and shape, and the various competitors achieve that character with varying degrees of success. Audix has done remarkably well with the first offering in the field. Not only is the microphone quiet and difficult to overload, but it also has the big full sound that goes with its image without the shortcomings that can accompany such imitators.

The CX-111 is not entirely without character, but neither does it have the degree of coloration that often attends attempts to emulate the classics. All too frequently the edge is overdone, or the warmth overplayed to the extent that the top suffers; here neither is the case, as the clarity and breadth at both ends of the spectrum are commendable and combine to give a sense of slightly enhanced realism. Two particular extremes, paradoxically related, showed the range of capabilities well.

Stuck in front of a loud guitar amplifier is sometimes not a very comfortable place for a condenser microphone, but the Audix with its pad in had no complaints. There was edge when needed, and also fullness, when it was available, but never any suggestion of strain. By contrast, an acoustic guitar can test the more delicate capabilities of any microphone, and again the Audix passed with flying colours, with a smooth extended bottom end and plenty of detail on the finger noises when required. The polar pattern appeared to be pretty uniform, with spill pickup relatively uncoloured and good control when moved those critical few inches in front of the guitar.

This combination of attributes should make the CX-111 a strong contender for the quality all-rounder market, much more so than some of its kind that place character before versatility and thereby rule themselves out of some applications before they begin. It is remarkable that a company should do quite such a good job of its first high-profile foray into the area.

Audix has achieved much in the last couple of years. Its distinctive range of dynamic microphone capsules has found homes in studio and stage microphones, and this was capped recently with the announcement of a tie-up with an interesting new radio microphone system. Xwire's UHF system is claimed to be the first digital radio microphone, with ADCs in the transmitters and DACs in the receivers. Xwire not surprisingly sets much store by the sheer sonic quality of its transmission, and has recently chosen the Audix OM6 capsule for its handheld model, a move that says much for Audix's standards. The CX-111 looks set to build substantially on this base and get itself noticed in a crowded marketplace. ■

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Audient ASP 231

Long in service and long in the tooth, the humble graphic equaliser gets a timely update in the ASP 231. **Terry Nelson** welcomes it

THE NAME AUDIENT may be new to many on the pro-audio scene, but the principals of the company, Gareth Davies and David Dearden, are most likely not. Audient is the latest venture from the duo after their involvement with DDA, and the ASP 231 graphic equaliser is the company's first offering.

You would have thought that graphics are plentiful on the market, but a little investigation quickly narrows down the serious choices to a handful of units, and discussions with users indicates that whereas the concept is still valid, most designs could do with bringing up to date. This same research led Davies and Dearden to consider all aspects of the graphic EQ in the light of modern technology—from true balanced inputs and outputs to filter design and minimal signal path. The result is the ASP 231 dual-graphic and the ASP 131 single-channel version.

The unit features a rugged 3U-high steel chassis and also has rear support mounting points for installing in road racks. This saves on rack rails and is a nice touch. The rear panel contains input-output XLRs (Pin 2 hot) for the electronically balanced connections plus parallel Klippon-Phoenix-type connectors. There is a rocker mains switch next to the IEC mains connector and a red push-button to isolate chassis earth for earth loops. Bringing a modern touch to the front panel is a back-lit central strip to identify the frequencies of the 31 ISO bands (20Hz–20kHz), plus back-lit icons for the various functions, facilitating easy operation under low-light conditions. The layout is neat and uncluttered, and touches such as knobs recessed into the front panel further demonstrate its practicality.

Each of the 31 bands has ±10dB of cut and boost, and the sliders have a centre detent marking 0. The right-hand side of the panel carries identical controls for each channel: MODE switch with two icons, TILT switch with LED and rotary control, HI-PASS filter switch with LED and rotary control, GAIN control with back-lit icon and a large illuminated IN switch.

The gain and high-pass facilities are fairly standard, and the high-pass filter provides a smooth cut response from 15Hz–250Hz, while the gain control provides ±10dB of trim variation. The 0dB point features a detent that is again positive to the touch. What starts to set the Audient graphic apart from others are the Mode and Tilt facilities. The MODE switch changes the third-octave filter response from Constant Q to Constant Q for boost ,and a narrow sixth-octave response for cut. In terms of system EQ applications, this is extremely useful as it means that you can deal with the troublesome frequencies without taking large chunks out of the surrounding audio spectrum.

The Tilt function uses a centre-detented knob to 'tilt' the frequency balance by ±3dB around 1kHz—boosting the high end lowers the low end by the same amount and vice versa. Inspired by the Tilt control on Quad preamplifiers, this allows the overall frequency response to be fine tuned to meet changing conditions or taste without having to touch the graphic settings.

As is normal, the equaliser was tested with a variety of programme material and the response characteristics were found to be smooth and not harsh. The constant-Q filters combine very pleasantly, and, though boosting or cutting adjacent bands by large amounts will affect the neighbouring band, there is no dip in the curve between bands (the 'broken tooth' syndrome) as on some units. The Narrow mode gets a thumbs up, and switching between Normal and Narrow demonstrates just how effective this is when you want to knock out specific frequencies without detriment to the others.

Interfacing the Audient was both trouble free, and noise free. My only regret was that we did not have a PA gig where I could have tested the line drive capacity of the outputs as the unit has been designed to handle long cable runs and is specified at +22dBu into a 600Ω load or less.

The Audient ASP 231 offers a new approach to one of the established workhorses of audio, the graphic equaliser, and try as I could, I cannot fault it. Merits your attention. ■

Contact

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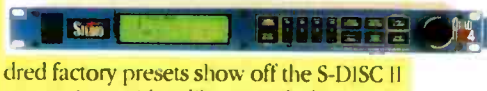
Worldwide Distributor: Expotus, 95 Grays Inn Road, London WC1X 8TX.
Tel: +44 171 405 9665.
Fax: +44 171 831 6017.

NEW TECHNOLOGIES

< The vital element is a heavy-duty one-piece, hand-laminated, all-fibreglass enclosure that is said to be completely impervious to weather and the effects of UV radiation. Community says this far outstrips laminated wood, roto-moulded and injection-moulded enclosures for strength, rigidity and long-term durability. Three-layer Weather-Stop grilles prevent water intrusion, and a one-piece fibreglass baffle secured with stainless-steel fittings and a rubber gasket completes the picture. Drivers have diaphragms made of advanced carbon fibre, mylar and polyimide materials, and Ferrofluid is used not just for the usual purposes but also to prevent corrosion in the voice-coil gap. The first model is the WET228, with two 8-inch carbon-fibre cone LF drivers, and a new 1-inch compression driver coaxially mounted with the upper LF driver and fitted with a rotatable horn.
Community, US. Tel: +1 610 876 3400.

DigiTech powerhouse

DigiTech, an early enthusiast for multi-effects processors, has added the Quad 4 to the Studio range. Effectively four processors in one, it has four inputs, four outputs and flexible internal patching arrangements to suit a variety of applications. One hundred factory presets show off the S-DISC II processing, with a library including compression, rotary speaker simulation, spring reverb, delay up to 5.5s, vocoder, sampling, time warp, envelope filter and many more.
DigiTech, US. Tel: +1 801 566 8800.



More power, less noise

Furman's specialist range of power conditioning and distribution equipment has acquired two new additions to its series of balanced AC power isolation transformers. The existing 20A IT-1220 is joined by 10A and 30A versions, not surprisingly designated the IT-1210 and IT-1230 respectively.

These specially wound and shielded rack-mount toroidal transformers, provide balanced AC power, bringing similar benefits to system noise as those provided by balanced line audio operation. Hum and buzz from ground currents, and from radiation into adjacent audio equipment, are claimed to be drastically reduced. The US-standard boxes carry multiple Edison outlets and deliver 60V at opposite polarity on the two main conductors referenced to the common safety ground attached to the centre tap of the transformer.
Furman, US. Tel: +1 707 763 1010. >

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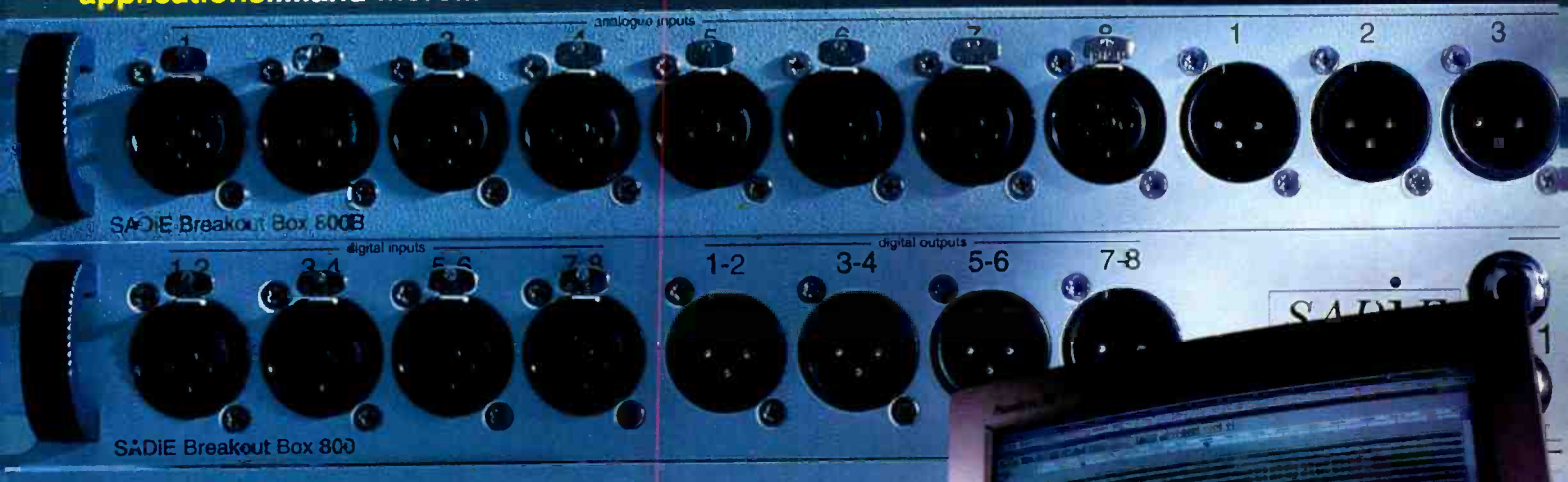

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BSS Opal FCS-966

Adding a graphic EQ to the Opal range, BSS presents another element of up-market signal processing. **Terry Nelson** checks its appeal

THE OPAL RANGE has been designed to make BSS's equipment available to the more budget-conscious members of the audio community. And, considering the success of the BSS FCS-960 dual graphic, it is hardly surprising that the Opal range be joined by the FCS-966 dual graphic equaliser. While it would appear to be targeted more towards the live sound market, the 966 will no doubt end up in a variety of situations.

Featuring the distinctive Opal green front plate, the FCS-966 lives on a solid 3U-high chassis. The slider and potentiometer knobs are of a pleasing rubbery material that gives both a pleasant feel and non-slip operation, and all legending is clear and easy to read. The unit offers two independent third-octave EQs with 30 ISO frequencies ranging from 25Hz to 20kHz. The filter characteristics are Constant Q with ±15dB of gain and a Q of 4. Hooking up the unit is easy and trouble-free—providing you follow the guidelines in the manual. BSS has very kindly provided a selection of input-connectors in the form of balanced XLRs and jacks, plus a new one to me, the Combi-Con terminal block. I used the equaliser in a variety of situations—including unbalanced source to balanced destination and *vice versa*—and the unit worked fine. However, (to simulate real-life situations) in one instance I used a mono jack-adaptor for phono leads and found most of the signal disappeared in Bypass mode. You do need to use 3-pole (stereo) jacks for the jack connectors and connect the shield of the cable to the ring. In the same way, Pin 3 of the XLRs needs to be linked to Pin 1 for unbalanced operation. This is all carefully explained in the manual and merits full marks.

BSS has also chosen a broadcast convention for the mains supply and fitted an IEC mains socket, fuse holder and mains voltage selector at the back—there is no mains on-off switch to be turned off inadvertently. A delayed power-up is featured in order to avoid disturbing bangs or thumps in a system and idle noise is unnoticeable.

Each channel features centre-detented

NEW TECHNOLOGIES

JBL hits bottom

The need for a low-frequency monitor for surround work has a new contender in the form of the JBL LSR12P. The powered subwoofer uses JBL's Differential Drive technology, which has two voice-coils in each driver wired 180° out of phase to double the power handling. This is combined with a direct radiator approach rather than the band-pass approach used by other systems, and lightweight Neodymium transducer technology with JBL's Linear Dynamic Aperture design. The result is said to be exceptionally well-defined bass and unusually high power levels with very low distortion. A special feature is the multi-input capability, allowing subchannel frequencies to be derived from either the LCR channels or a completely discrete source. This is to help accommodate the changing needs between matrixed and discrete surround mixing, and there is an auto patching mode allowing remote switching of the input source.

JBL, US. Tel: +1 818 894 8856.

TDK DVD

TDK is ready for the introduction of recordable DVD with three recordable discs. DVD-R is a WORM disc with a potential capacity of 3.95Gb, functioning much like a conventional CD-R, but with a much finer tracking groove and more accurate laser mechanism requirements. The minimum pit size is reduced to 0.44μm with a track

width of 0.8μm, both 50 to 60% smaller than on a standard CD. DVD-RAM is the rewritable equivalent for high-capacity data storage, with two versions offering single-sided 2.6Gb and double-sided 5.2Gb capacities. These use the 'land-and-groove' method of recording, where data is recorded on both the troughs and the ridges of the tracking groove. At this stage DVD-RAM discs will be housed in a cartridge similar to that of a conventional M-O disc as a protective measure; although both types are eventually expected to operate bare like current CD-Rs.

TDK, Europe. Tel: +352 50 50 11. >

sliders, a sweepable high-pass filter (Out to 250Hz), LF and HF CONTOUR controls, GAIN control (off to +10dB), 8-segment LED meter that reads output with the EQ in and input with the EQ out, red clip LED and large illuminated half oval EQ IN switch. The EQ In lamps also function as the mains indicators and you could be forgiven for thinking that the unit is turned off if powered up in Bypass mode, unless it is already passing signal, in which case the LED meters will be operation. A very slight click is audible when switching the EQ in and out when passing programme material, but it is doubtful that an operator would do this once the show was running or mixing had started.

We all know that EQs are highly subjective, but I quickly found myself warming to the unit. With all settings at zero, switching the EQ in adds a subtle but discernible 'body' to the sound that. While not neutral, is certainly a plus for live work—live sound engineers are often expected to do the impossible with meagre source signals and anything that helps here is welcomed.

Before getting into the graphic, a good deal of flexibility is provided by the sweep high-pass filter and the Contour controls. The HP filter does a good job of cleaning up LF wooliness and provides a short cut to tidying up some signals. The Contour controls could be considered as bass and treble trims and provide ±6dB of 6dB/8 octave shelving characteristics at 50Hz and 14kHz respectively. These controls are effective—both when used by themselves or tweaking up a graphic setting—and are a useful addition to the graphic section.

The merits of constant-Q filters are well known and the filter sections of the Opal prove positive. Good sound system engineering says that if excessive cut or boost needs to be used, then the problem is in the system somewhere and needs to be addressed before doing the fine tuning. If you need to cut or boost a frequency by 10dB before you can hear any difference, something is wrong somewhere... It was therefore a pleasure to find that the Opal is capable of subtle, yet effective, work using ±1dB to 3dB adjustments, though if you do need to hit the nut with a sledgehammer, the 966 does it well, too.

The Opal was tested in a variety of situations, including stage monitoring, working studio and home studio, and performed well in all cases. A quick look with an RTA revealed that settings at flat were within 1dB of each other and that all filter slopes are very smooth. However, a -3dB LED in the metering would be a useful addition as the 0dB LED literally is that—at -0.5dB it does not illuminate. The jump from -6dB to 0dB seems a little large and I would much prefer an intermediate indicator, even at the expense of the -24dB LED. It would also be useful to have zero detents on the GAIN and CONTOUR controls. But you cannot have everything and so the FCS-966 comes recommended. ■

Contact

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Tascam TM-D1000

Amid applications for large scale digital desk technology, a need exists for something smaller. **Zenon Schoepe** finds hope in an unlikely guise

I MAKE ABSOLUTELY NO EXCUSES for raving about this little console, despite the fact that I fully expected to dismiss it as a project studio orientated plaything. While its ambitions in the TM-D1000 are not enormous, Tascam has managed to cram an unnerving level of functionality into this tiny little console which takes up about as much room as the opened up magazine that you're reading. What you are presented with is a row of 21 short-throw unmotorised faders handling the 16 input-channels, 4 group/aux masters and the main stereo output. It will handle incoming 16, 20 or 24-bit lengths and if I describe what it has you'll get the picture. There are eight analogue line inputs, four of which also offer mic XLRs with phantom power and inserts. Eight digital I-Os on TDIF come up at faders 9 to 16, while there is one stereo digital input and two stereo digital outputs on paralleled AES-EBU and SPDIFs. There are four group outputs which can also act as aux sends; external stereo inputs; stereo outputs; a monitor output; and a headphones circuit complete with switch- operated monitor- source selection. There are 2 inbuilt stereo effects and 4 dynamics devices.

Options include the fitting of an additional TDIF interface card with extra AES-EBU and SPDIF I-Os, and sample-rate convertor, and an additional effects board that doubles the onboard effects processing.

Hard channel control is sparse as would be expected. The channel faders are complemented by dedicated and detented pan controls (nothing multichannel here), channel mutes and SELECT keys, the last assigning control to the small LCD that works in conjunction with four soft rotaries to access the 3-band EQ (sweepable shelving HF and LF and fully parametric mid) and the afore-mentioned effects. It is not an elegant means of control and requires a lot of scrolling through and along menus with a data-entry knob.

The real letdown is the LCD which is restricted to alphanumerics and it is out of keeping with the spirit of the rest of the product. Given its meagre panel surface, the TM-D8000 is absolutely peppered with controls and switches, even down to the number of soft controllers which greatly exceed the number on the Yamaha 01v, for example. However, the display is limited in the density of information it can show at any one time in comparison to the 01v, for example. This puts a stick in the spokes of any rapid progress and while I am not saying that the desk would be clearer to operate if the screen was larger and more elaborate, it is just that it may have felt as if it was.

Routeing and EQ bypass are handled on keys which also double as MMC transport controls complete with track-record arming via the MUTE keys. Onboard automation is restricted to snapshots, but dynamic automation can be realised by capturing the MIDI generated from channel parameters.

The fact that most functions are hidden away and require a fairly intimate knowledge of this consolette to truly master does not detract in anyway from its usefulness. In fact the degree of complexity, and I was surprised and encouraged at just how unobvious a lot of the operating system and configuration is, aligns this box far more with an experienced digital user than with the novice. I am not sure if this is necessarily what is intended, but I reckon it would blow the brains out of a cold-start bedroom recordist hoping to get creative in a hurry. They would never get passed the manual.

It is almost too well loaded with features and the configuration routine, particularly with regard to organising I-Os, is very involved and matters are complicated by a curious imposition of Record and Mixing modes that seems inappropriate.

But if you are not intimidated by these sorts of things and have a good idea of what you would use this desk's abilities for then at around £900 (UK) it is among the finds of this millennium. Yes, you can mix on the thing, but running it to the extremes of its capabilities is probably missing the point, this is a device that you can sort small little jobs on. The fact that Tascam now has in its IF-TAD (US$349) a box that will translate between its own TDIF and ADAT optical bidirectionally further extends the realms of connectivity.

You could use this desk for rough mastering, premixing, getting signals into the digital domain for output to somewhere else, purely as a digital monitor mixer with a DAW, or simply as a spare digital mixing resource for simple tasks if the bigger stuff is otherwise occupied or deemed too grand.

It is interesting to note that following the first trial generation of digital desks, the next wave concentrated almost exclusively on the big-buck monsters. Many of us looked on pathetically longing only for something simple that would allow us to interface with all the bits of gear that we had assembled with digital ports on . It has been a very long time coming, but the requirement still exists and the TM-D1000 is the sort of digital toolbox that everybody could afford to have in their personal setups or facility back rooms. I love it to death. ■

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Fax: +44 1923 236 290.

D/ESAM from memory

The 870 4-channel RAM recorder is a plug-in option for the Graham-Patten Systems D/ESAM 820 digital edit suite audio mixer, providing up to 10 minutes of audio storage under full edit system control. It eliminates the need for a dedicated rolling audio source by fitting a module within the mixer itself, and four versions are available with varying amounts of memory from 32Mb up to the maximum 256Mb for 640s of 2-channel or 320s of 4-channel audio. Recording is 48kHz, 24-bit, and full Sony control is provided including shuttle and jog.
GPS, US. Tel: +1 530 273 8412.

MediaFORM dupes

MediaFORM has covered both ends of the small-run CD duplication market by simultaneously reducing the price of its CD-2701, a spindle-based 50-capacity automated device, and launching a new 3-CD duplicator, the CD2CD. In its basic form this is a stand-alone copier capable of producing 3 CDs simultaneously without the need for a PC, and a 4-bay cabinet can be added to increase the slave capacity to seven. PC connectivity also allows control from mastering software, and the Easi-DAT and Easi-Audio options allow external audio to be imported. A unique feature is Track Extraction, which allows tracks from various discs to be mixed and recorded.
MediaFORM, US. Tel: +1 610 458 9200.

Bias Peak climbs higher

In a comprehensive revision, Bias has introduced Peak v2.0, the latest version of its Mac editing software. DAE support is added, along with the ability to use Adobe Premiere audio plug-ins and full SMPTE synchronisation. RealAudio 5.0 can be encoded directly for internet authoring, and CDs can be burnt directly from the playlist to most popular burners. The user-interface has been improved to take advantage of Mac OS8, and a QuickTime movie window has been added, compatible with Peak's scrubbing capabilities. New support for third-party hardware includes the Yamaha A3000 and Ensoniq ASR-X samplers and file interchange with Ensoniq's Paris file format. Several of these updates are also incorporated in version 2.0 of the entry level Peak LE.
Bias, US. Tel: +1 707 782 1866. >

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

Alesis Q20

Appealing first effects units combined with professional expertise gives Alesis a new take on outboard. **Dave Foister** patches in

WHEN ALESIS REVOLUTIONISED the digital-effects box with the Midiverb, few could have guessed where it would lead. Now, with the ADAT format firmly established as a standard, and its associated lightpipe multichannel digital interface rapidly following suit, Alesis reminds us of how it all started with a new effects processor.

The Midiverb was very cheap and made a lot of people very cheerful, and was followed by many variations on the theme with different degrees of sophistication and inexpensiveness. Always there was the feeling that in catering for the broadest market, including the live musician's effects rack, the studio suitability was perhaps compromised a little, but the boxes offered such good value for money and high effects quality that allowances could be made. The Q20, while coming full circle in one sense, also shows the direction Alesis has taken since then by putting in place all the features needed for full integration with the professional studio.

For a start it is a 20-bit unit, and comes complete with SPDIF and Alesis optical digital I-O and BNC wordclock input. Balanced pro-level analogue ins and outs are also provided, completing a very respectable interface line-up. This is all reflected in the overall quality of the effects, with a smoothness and clarity that takes Alesis up a notch. Many will be pleased by the onboard power supply; although the common aversion to wall-warts, and the other external supplies used by Alesis and others, has always puzzled me as the removal of the mains transformer from a box of sensitive electronics would seem to be eminently sensible.

One of the Q20's facilities is subtle but very important: the ability to globally mute the direct signal to the outputs. Older Alesis effects had the direct signal present in the mix of all the effects, so that for aux send-return use the mix had to be changed for every one. The mix control is still there in the presets, but a global function removes the direct signal from all of them.

NEW TECHNOLOGIES

SADiE surrounded by Dolby

Studio Audio & Video has taken the surround capabilities of the new 24-96 workstation a stage further by showing its integration with Dolby's DP569 Dolby Digital encoder for DVD preparation. 24-96's mixer now has full mouse-controlled automated surround panning, and the resulting buses can be fed out to the Dolby encoder and back to the disk within SADiE, all under the control of the SADiE PC. These files can then be sent to a DVD authoring workstation via network or removable medium.

SAV, UK. Tel: +44 1353 648 888.

Phonic range grows

Aimed among other things at close-field monitoring applications, the MAR1 Reference Amplifier is the fourth model in the MAR Series of power amplifiers from Phonic. It delivers 100W per channel into 8Ω, with comprehensive protection and enough heat sinking to avoid the need for a fan. Calibrated gain controls, front panel LED indicators, power-on muting, Neutrik Combo input connectors and a ground floating switch complete the picture.

HW International, UK.
Tel: +44 181 808 222.

Electrospeed: mil-spec

Electrospeed's new TMN range offers low-cost waterproof connectors providing an all-metal equivalent to ITT Cannon's

Trident Neptune range. The die-cast zinc-alloy bodies have the additional advantage of full shielding, providing military spec performance at much lower cost. When fitted with a shielding end bell they provide full EMC screening over 360° as well as a waterproof rating to IP67 when mated. Existing standard Trident contacts are used, removing the need for new tooling, and they are fully pin-for-pin compatible with Trident Ringloc connectors.
Electrospeed, UK. Tel: +44 1703 644555.

Sescom mic transformers

In response to an idea from Shure Applications Engineering, Sescom has released an in-line audio transformer for microphone signals. The IL-29 Ground Isolator is designed for use with phantom- >

Perhaps the area that has seen the most change over the years is the means of controlling the unit. The Q20 is driven from a large graphic screen, a set of dedicated buttons and a data wheel with integral push-button, and the combination makes it one of the most accessible effects boxes I have used. Where some units can leave you feeling snowed under with possibilities, wading aimlessly through a sea of parameters trying to find the reverb time, Alesis has always been good at choosing a core of important parameters to adjust and presenting them clearly. The Q20 is the best example yet, with a block diagram of each effect always on screen and a clear list of adjustable functions. These are organised into simple one-line pages, stepped through with dedicated buttons, and each preset shows how many pages there are on screen. Getting round them with the dial-button is an extremely fast alternative, inspiring confidence to start tinkering with the presets immediately.

Up to eight effects blocks can be used simultaneously, each being configured as one of several types from reverb to EQ, chorus, overdrive and delay —the usual stuff and plenty of it. There are certain limitations on how much you can do at once, but you have to try hard to exceed them, and unusually there is a big chart in the manual telling you exactly how much of the unit's resources each algorithm requires. Not surprisingly the reverbs are the most demanding, and the number of bands in an equaliser is important, but some effects use surprisingly little DSP and memory. Another clearly-explained limit is the number of modulation LFOs that can be used within a patch; these are in fact much more than LFOs, having peak followers, envelope generators and ramp generators available. There is no restriction on the order of an effects chain, and the same type of block can be used several times in a patch with complex feeds between them. Patching between blocks is simple, and it is very easy to set up dual effects—two mono ins, two stereo outs—as well as true stereo reverbs and delays.

The memory capacity is impressive, with 100 factory presets in ROM and 200 user memories, all filled at the factory with further programs. The range on show is very and varied, with a better than average proportion of them being of real practical use rather than just to show the Q20 off. The choice of reverbs is especially attractive, and it is so easy to follow what's going on and bend it to your particular requirements that even the most complex patches are just asking for experiment and adaptation.

Alesis has a knack for getting it right, and it looks as though the designers have done it again with the Q20. It sounds good, it will hook up to almost anything and it's hard to imagine how it could have been any easier to use. It manages to be powerful and fun at the same time, a feat few such boxes can achieve. ■

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Tascam DA-45HR

Bringing benefits of 24-bit working to the DAT domain, Tascam offers an upgrade to Pioneer's 96kHz machine. **Dave Foister** reports

THE TROUBLE with high-resolution digital recording is that it makes so much stuff redundant. Equipment and technologies that have served us well for years are threatened with being left behind in the rush towards ever-higher sampling rates and longer words. DAT in particular would appear to be a likely casualty: never intended (as we are constantly reminded) for professional use, and restricted in its specification to 16 bits and 48kHz/44.1kHz. The first attempt to overcome the limitations was Pioneer's high sampling DAT system, capable of 96kHz at double the tape speed, and now comes Tascam's development, using the increased speed to offer 24 bits on tape.

The DA-45HR looks and works much like any other DAT recorder, and clearly belongs to the Tascam family; although its sculptured front panel and comprehensive display are new. The display, and the printing on the tape drawer, are the only things that give away the 24-bit feature; otherwise it could be just another Tascam DAT, and it should be noted that it works quite happily at 16 bits in Normal mode, with potential benefits from the 24-bit trappings.

The most significant of these is, of course, the A–D conversion. 24-bit Burr Brown convertors are used to deliver the required word length, and full 24-bit incoming AES-EBU can also be recorded. The same convertors are used, rounded down, for conventional 16-bit recording from the analogue inputs. The D–A conversion is not quite so straightforward, as the machine cannot fully convert the recorded resolution on board: 20-bit 8x oversampling convertors are fitted for the analogue outputs, and there are three options as to how the missing bits are allowed for. By default the system rounds to 20 bits (whether this is any more sophisticated than simple truncation is not clear) but it also provides either triangular or rectangular dither to be selected as appropriate to the material.

Whichever is operative, the digital output will remain at the full 24 bits, and perhaps this marks the machine down as primarily an acquisition machine for transfer into a 24-bit editing system. For use with further digital systems that can only handle 16 bits, the digital output can also be reduced to this word length, and in this case the analogue output is derived from this shortened data.

The selection of these parameters, along with a host of others, is carried out from the comprehensive menu system controlled by the shuttle wheel. Also hidden here is a choice of time display modes, accounted for by the double speed of the transport in 24-bit mode. The Tascam records conventional A-time or ABS in both modes, and therefore shows A-time at double speed when running 24-bit, but it also has an option to translate this into real time if required.

It did not take long, recording a string quartet with a crossed pair via good mic preamps, to appreciate the benefits of the extra bit width. Direct comparison with a conventional (although pretty good) 16-bit machine immediately showed where the definition was being lost between the source signal and the normal DAT returns. The Tascam was unquestionably delivering a more open, defined sound, with frighteningly low noise, and that all-important resolution of the low-level details—the ends of notes, the reverberant tails, the sounds of the players' movements. By comparison my normal machine sounded a little closed in and restricted. Piano recording demonstrated all of this at least as well, as long-held notes tailed off into studio background noise instead of that slight mush that generally accompanies them.

Operationally the Tascam matches up quite well to any of the competition. I struggled to find a convenient way of end searching—a standard feature on most of my machines and something I regard as absolutely vital for straight stereo session work if confusion is not to reign when stringing the bits together afterwards. Everything else appears to be in place, however, with easy access on the big informative menu screens. Some unusual features include a report of block errors with the facility to locate to their positions, titling of tracks, and the sending of an end tally via the control I-O port when the tape is at or near the end. In conjunction with a full set of sub-code editing facilities, programming and nice touches like calibrated and uncalibrated analogue input levels, this adds up to a fully professional machine at a reasonable price even without the 24 bits.

Whether the DA-45HR and similar developments will save DAT from professional oblivion as 24-96 becomes more and more the norm remains to be seen. Presumably combining the longer words with the higher sampling rate would require the transport to run at 4x normal speed, and the resulting abbreviated running times might well rule that out. In the mean time, for those who already have digital mixers and editors capable of handling 24 bits, but no means of acquiring them or mastering them, the Tascam is a very attractive and competitive machine that can quite happily earn its keep in mundane 16-bit mode as well. ■

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powered microphones and is intended to solve the problems of RFI and EMI noise.
Sescom, US. Tel:+1 702 565 3400.

Yamaha monitors

Yamaha's new biamped powered monitor, the MSP5, is designed for a wide range of applications from home studios to post-production. A custom 5-inch woofer and a 1-inch titanium tweeter are powered from separate amplifiers delivering a total of 67W, and full magnetic shielding allows use near video monitors.
Yamaha, UK. Tel: +44 1908 366 700.

Devlin graphic switches

New switches from Devlin aim to clarify panel layouts by incorporating LCD graphic panels in the buttons. Multicoloured LCD combinations are available in two sizes, with matrix layouts of 16x32 and 24x36 pixels. Each switch's graphics are controlled by a newly developed ASIC, and the controller and driver are built into the switch. Control is via a single serial pin and

the panel can be used to display alpha-numeric data, moving pictograms and simple graphics.
Devlin, UK. Tel:+44 1256 467 367.

Equi=Tech balances power

Responding to customer comments about weight, size and price, Equi=Tech has produced newly redesigned versions of its rackmount balanced power products. This means the 15-Amp ET1.5R and the 20A ET2R are now 2 U-high chassis in line with the 10A ET1R, and weigh 15lbs less than their predecessors. Any thoughts that ruggedness might be compromised are countered by Equi=Tech's warranty, now extended to three years on parts and labour for all rack systems with a lifetime replacement warranty on the power transformer.
Equi=Tech, US. Tel: +1 541 597 4448.

CEDAR refines the refiners

Two recently introduced CEDAR restoration products are already the subjects of upgrades. The DHX is the Series X dehisser, launched last year; and the new v1.02 improves the algorithm's ability to deal with certain types of dance and rock music, and has been found to achieve better results with most types of material. The software Debuzz processor for the CEDAR for Windows system is even more recent, but has also been upgraded to v2, which not only improves the efficacy of the process, but also simplifies its operation by reducing the number of controls.
CEDAR Audio, UK. Tel: +44 1223 464 117.

5.1 Surround Sound...

It's a jungle out there

Mixing six or more discrete channels of audio for film is already well established but the scope afforded by 5.1 surround for music and broadcasting has yet to be realised. There are no rules. There are challenges, there are opportunities - but there's only one certainty - it's on the way.

Before venturing into the unknown, be comforted to learn that Solid State Logic consoles are already equipped to tackle the surround sound future - in all current and envisaged formats, including DVD. And, come the 5.1 revolution, the enormous advantages of proven SSL technology such as snapshot and dynamic automation, instant reset and unparalleled audio quality will be even more apparent.

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Aysis Air - The digital broadcast console for studios and mobiles, designed for a painless transition to the era of DTV.

Avant - The digital film and post production console which mixes in all formats from stereo to 7.1 surround.

Solid State Logic

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Surrounded!

From its establishment as a high-end studio service with large control rooms, recording and mixing surround sound has made its way into ever smaller rooms. **Rob James** examines the essential surround requirements

IN RECENT YEARS, equipment capable of producing 'broadcast quality' sound has become more accessible due to rapidly falling costs. In particular, advances in digital recording, mixing and processing equipment has caused a massive increase in the number of small studios. More recently, it has become feasible to attempt complex surround mixing, including sound for picture, in modest rooms. This is good for the industry but there are pitfalls.

I believe good mixing practise begins with establishing as many fixed points of reference as possible. To old hands all of this will be obvious, but I am becoming painfully aware a whole generation or two has grown up without sufficient understanding of the value of consistency—I recently witnessed people who should know better taking console and machine alignment as read without even rudimentary checks.

One of the advantages of being brought up in a broadcast environment is an appreciation for the importance of monitoring. We all know that speakers, amplifiers, meters (and acoustics) have a vital role in any mixing room, but this is by no means the end of the story. The way in which these are interfaced and controlled is crucial if proper monitoring is to be possible. The monitoring controls on most standard consoles are barely adequate for stereo, let alone surround—particularly outside the high-end console market.

What is needed is a reliable and consistent means of conveniently controlling monitoring. Fortunately, a number of specialist manufacturers are addressing the omission. Here, we can attempt to identify what features to look for and why they are desirable.

For openers, any monitoring unit should attempt to minimise the effects of Heisenberg's principle—that the act of monitoring should not affect the signals monitored. Level, phase or frequency response should not be altered in any significant way. A discrete 5.1-surround mix requires left, centre and right front speakers (LCR), left and right surrounds (LS, RS), and a subwoofer. These may be active or passive with separate amplification. The frequency response should, ideally, be as flat as possible, but above all the responses should all match, with the exception of the subwoofer. Cinema reproduction systems from Dolby and others use equalisers to tailor the response to suit the speakers and the room, but for the type of studio under discussion this is likely to be seen as undesirable or overkill.

A means of fine trimming the level of each speaker is desirable. Ideally, this should be accomplished with multiturn pots operating over a small range (say, ±2dB). The first essential is Muting—each speaker output should have an individual muting switch and there must be a master mute that kills everything. A DIM key should attenuate the monitoring level by a preset amount—the amount required depending on the chosen reference level and therefore the amount of attenuation needs to be variable. The Dim function should also be tied in with the talkback system where microphone recording is envisaged, to avoid unpleasant and potentially dangerous feedback. Individual mutes should allow swift identification of mix elements without changing the condition of the console. One desirable, though not essential feature, is to have Solo switching in addition to the individual mutes.

The ideal Level control is a calibrated, stepped attenuator. This allows the monitoring level to be set accurately and repeatably. The next best thing is a calibrated rotary pot with detented stops. An alternative approach is to provide a Reference Level key or keys in addition to the level control. In this case there must be a means of calibrating the reference level(s), either by preset pots or in software controlling VCAs. The importance of using a consistent mixing level cannot be overestimated. In cinema mixing, where the reproduction level is specified, this is obviously essential. But there are benefits even where there is no control over what level the mix will be heard (as in broadcast and music). With experience, a consistent monitoring level leads to decreasing reliance on meters and >

< increased trust in your ears. The perception of a mix changes according to the reproduction level and the listening environment. With surround, the perceived front-to-back balance changes markedly. If sound mixers make a point of listening to their final mixes in various conditions this will enable recursive adjustments to be made to balance technique to achieve a predictable result in varied listening environments.

The luxury approach to loudspeaker sources is to have a matrix that allows any source to be assigned to any speaker. Source, in this context, means the outputs of the Monitor Source selector. Alternatively, assignment could be achieved with patch cords or be fixed, which would normally be the case.

Monitor Source selection is the complex part. Here buses, monitor only inputs and returns to monitor must be managed. The important thing to grasp is that this is to all intents and purposes a pair (or more) of summing matrixes with the ability to compare the matrix outputs. At the simplest level the requirement is for a pair of surround mixes to be compared. For example, console LCR, LS, RS and Sub mix bus outputs with corresponding recorder returns. It is essential to your sanity that the comparison switching be silent in operation. Switching clicks will quickly drive you up the wall.

Otari Picmix

Operationally, switching between these mixes may be accomplished with a single toggling key or a pair of keys. They will be designated PFC and Direct if the manufacturer has a film background or Direct and Tape if not. There are many other possible terms. Comparison Check will be familiar to some. Certain manufacturers do not differentiate between Direct and Tape but >

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< provide a number of switchable sources, leaving it up to the operator-installer to decide which gets used for what. The next level of complexity is where multiple concurrent mixes need to be monitored. This can arise where one set of console buses is being used for dialogue, another for music, and another for effects with each feeding a different set of record tracks. In this instance the monitoring unit is required to sum the three sets of Direct inputs and also to sum the corresponding Tape return inputs (for monitoring purposes only). Another version of this occurs when you wish to record a new premix while listening to an existing premix without recording it. This will require summing of a set, or sets, of console output buses plus monitor only inputs on the Direct side, but only one set of recorder returns is needed on the Tape side.

It is also common to provide for stereo and 4-track Direct and Tape sources in addition to 5.1.

Although now a little long in the tooth, Dolby Surround is still alive and well and, with the current declared intentions of the UK digital TV service providers, is likely to be around for some time to come. If your work is likely to include Dolby Surround mixing there are other useful additions to look for.

As a quick reminder, Dolby Surround is a matrix-encoded system with LCR front and band-limited mono surround channels. Because of the nature of the matrixing employed it is essential to monitor after encoding and decoding. It has always been important to at least consider what happens to a stereo mix summed to mono. It is now essential to consider what will happen to your pristine 5.1-channel mix when it is downmixed to stereo and mono.

Some manufacturers of monitoring solutions make the process of inserting the matrix encoder-decoder into the monitor chain a matter of hitting a key and some don't do this. It depends how important this is to you. Some take the concept further and allow for instant switching between 7.1, 5.1, discrete LCRS, matrix, stereo and mono. Where this is an option look for options and adjustments in the way the down mixing is performed.

In addition to the console metering I would suggest, as a minimum, that there are meter outputs from the monitoring controller which look at the inputs to the speaker controls—the meters should follow the Monitor Source Selector. In an ideal world, you would have the same options for metering as for speakers, but separate, and also some means of determining the phase relationship between the various metered sources. There are numerous options to achieve this such as M-S PPMs, vectorscopes and phase correlation meters, but these are outside the scope of this article.

In a purpose-designed film console, the monitoring controls will be logically placed along with record control and motion control. This is not always possible in small studios. Some thought should be given as to how convenient the controls will be in context, and how easily the monitoring setup can be altered to accommodate various tasks. If the unit is fitted with GPIs it may be possible to use existing switches on the console or to add switches to taste to control the monitor functions.

All this presupposes the console you intend to use for surround is equipped with true surround panning. If it is not then you will also need a panning unit to enable a mono source to be panned, at least across the front LCR speakers and, ideally, the rear LR pair, without changing perceived level. Some means of controlling 'divergence', the spreading of a centre mono signal left and right, is also desirable. ■

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Cold War

Applying the successful formula of his seventies *World at War* series, Jeremy Isaacs has documented the Cold War for BBC Television. **Kevin Hilton** joins the fray

HISTORY, it is said, repeats itself. If so, then Jeremy Isaacs must be hoping that the telling of history can also be repeated. Isaacs, founding chief executive of the UK's Channel 4 (1981-87) and general director of the Royal Opera House (1988-97), produced what is generally considered one of the finest achievements in television, *The World at War*. First screened in the early 1970s, this 26-part documentary series is still spoken of with reverence by viewers and TV people alike. Now the formula that made *The World at War* so compelling has been applied to the period that followed, examining the mistrust between East and West that divided countries and their people until 1990 and gave rise to a still evocative phrase. The Cold War.

This is the title of a 24-part series that starts with the roots of the political and doctrinal divide between the Soviet Union and the United States, and continues with the metaphorical and then physical erection of the Iron Curtain (a phrase coined by Churchill), the spectre of nuclear war, the space race, the Berlin Airlift, the McCarthy witch-hunt, Korea, Vietnam and the Cuban missile crisis, through to *detente* in early 1970s, Star Wars and the eventual fall of Berlin Wall and the Soviet empire. During a 3 year period, the production team carried out over 500 interviews, shot in excess of 1,000 hours of original footage and viewed 1,500 hours of archive material.

As with its predecessor, *Cold War* attempted to speak to people who were in the midst of this situation; not just the politicians and generals, but the citizens who saw events unfold and felt the chill between East and West. Among the key figures interviewed were Henry Kissinger, Nixon's security advisor; former US Presidents Jimmy Carter and George Bush; ousted Soviet President Mikhail Gorbachev; and, perhaps the series' greatest coup, Cuban leader Fidel Castro. These are linked by the commentary of Belfast-born actor Kenneth Branagh. Once labelled the new Laurence Olivier, and Olivier's narration of *The World at War* is as remembered as much as the historical impact of the series, Branagh has again faced comparisons with the lord of the stage.

Any television production is about how the material is put together, but on *Cold War*, this process was all the more vital. Postproduction supervisor Andrew Denny, who had responsibility for the end product, worked on this part of the project for 15 months up to May this year. Overseeing all stages of postproduction, Denny supervised both picture editing and the creation of the final soundtrack—recording the commentary and voice-overs for interviews where translations were necessary, and track-laying the music, the bulk of which specially composed by Carl Davis.

Cold War is a history, but it is one that relies on relevant archive footage and the testimony of those who were there. Some of these were difficult to track down, which meant that Denny found himself having to deal with changes to material that had already been picture locked. 'The programme started to be edited almost a year and a half before I came on board,' he explains, 'and several were already locked. But everything was archived onto digital linear tape, so I was able to put that back onto an Avid MediaComposer and work with that again. In some cases we were updating or changing sequences where archive material had become available for some reason.'

Interviewees also proved difficult, particularly when they were of the stature of Fidel Castro, who kept the

crew waiting before finally granting an interview. 'We got Castro at the third attempt,' Denny confirms. 'Martin Smith [series producer] has tried, unfortunately unsuccessfully, on two occasions to get an interview with Fidel, even going to the extent of being in a hotel in Havana waiting for the call, which was promised but never came.'

Help came from an influential source. The US media mogul and founder of CNN, Ted Turner, knows Castro and made sure that the interview was finally arranged. Turner's motivation in using the old pal's act was that he conceived the concept of the series and wanted the best possible material for his baby. 'So we finally got the interview,' says Denny, 'albeit at a very late hour when several programmes had been completed. It was too good not to go ahead with and was used in four programmes, not just the programme about Cuba. There were major decisions to be made as what to drop and what to re-edit to make things flow. Obviously the programmes are very carefully constructed and to introduce new elements at such a late stage was somewhat difficult in some cases but I think we managed to achieve good results in the end.'

In drama productions, sound effects often fight with the music for precedence, as both are considered crucial to the telling of the story. For a documentary, the words are all-important; in the case of *Cold War*, the secondary emphasis was given to the music over effects. 'We decided early on to keep effects to a minimum,' explains Denny.

'Carl Davis wrote a score for all the programmes and we decided that, in most cases, where there was music, we wouldn't add effects underneath because the music was so good.' The music was recorded over a 2½-year period, with the sessions split between CTS Studios' Studio 1 at Wembley for the title theme and sister facility Lansdowne Recording Studios in West London, some months later, for the incidental tracks.

The sessions were engineered by Lansdowne's Chris Dibble, who had to turn the recordings around quickly as the music was typically recorded at the rate of two episodes per day over a 2-year period. Only two or so hours were allowed for recording each episode's worth of music (plus mixing time), something further complicated by recording programmes out of order, which was another side-effect of material becoming available during the late stages of production. Davis conducted the incidental score to picture, rather than the orchestra working to a click track. This technique was achieved using Lansdowne's streamer technology, inserting the wipes and timings on the video replay in the control room and on the studio floor.

While the main theme was recorded digitally, the incidental score was laid onto 24-track analogue with Dolby SR processing; both were mixed to stereo DAT and later loaded into Avid Media-Composer for the final dub. Andrew Denny admires Carl Davis' skill in hitting the visual cues, but explains that as the score was recorded ahead of the dub, late re-editing meant that library music was used when there was no original music for new edit points. Mood discs were also used for specific sequences; for example, a recording of traditional Russian funeral music accompanies footage of Stalin's burial ceremony. When the story reaches the peace movement of the 1960s in Programme 13, *Make Love, Not War*, the appropriate hippie anthems of the time—including the ubiquitous *For What It's Worth* by Buffalo Springfield—illustrate newsreels of anti-Vietnam protests.

Effects do play their part: pictures may tell a story, but there is something eerie and disconcerting about mute footage. 'What I did concentrate on more than anything else with effects was spot effects,' says Denny, 'because the programme is heavily covered with >

Producer of *Cold War* Sir Jeremy Isaacs with narrator Kenneth Branagh

< dialogue, either sync dialogue or commentary, so to involve too many effects underneath some critical areas of commentary or dialogue would have confused people, so we decided to keep things as low as possible. But at the same time we allowed certain sounds to come through so that they would give the feeling that it wasn't just mute archive material.'

Footage used in the earlier programmes was either without sound because it was shot by a lone camera in the midst of the action or any effects were mixed in with the stentorian newsreel voice-overs by such as Bob Danvers-Walker (who, like others of the time, would narrate 'live' straight onto the optical track of the film stock, with music and effects mixed in at the same time), which were stripped off in postproduction if not considered applicable. 'I tried as hard as possible to get sounds that were close to the originals,' comments Denny. 'We were very aware of fact checking all quotes that went into the commentary and we took the same approach with the sound, that we had the right sounds for cars or guns of the period.'

Denny adds that this extended to ensuring that aircraft engine noises for the Berlin Airlift edition matched the planes. Luckily the producer of this particular programme, James Barker, counts this past-time as one of his hobbies, helping to guarantee authenticity, as did making sure that any background chatter in crowd scenes was in the correct language. The thoroughness of this approach resulted in an overkill of effects for Programme 8, 'Sputnik'. Producer Richard Melman, now head of production for Jeremy Isaacs Productions, had, through the Internet, tracked down an American ham radio operator who had a recording of the bleeps of the Sputnik as it orbited the earth. An hour of it, recorded onto 1/4-inch tape. This was dubbed onto DAT, but only a snippet was used.

Location audio was recorded onto the FM audio tracks of DigiBeta machines and later transferred to Beta SP and then onto Avid. A sound recordist was part of the crew, and made simultaneous back-ups onto DAT, but Denny says that as the quality of the DigitBeta audio tracks is good, and it was already in sync with picture, it was easier to transfer digital sound and vision straight into the non linear editor. The other main task of the sound recordist was to record any simultaneous translation onto a separate track; the translator would be sitting where they would not be picked up on mic, with interviewer and interviewee wearing ear pieces so that they could understand each other.

The location recordings and sound effects were track-laid on MediaComposer and then taken to Soho postproduction house Tele-Cine, where archive

Dubbing mixer Michael Narduzzo

footage transfer and on-line picture editing was also carried out. The prepared audio was imported into Avid AudioVision in the facility's AMS Neve Logic 2 dubbing suite. The material was mixed on the Logic, with the AudioVision acting as what dubbing mixer Michael Narduzzo (who dubbed the majority of the series, with some mixes by Richard Lee) describes as 'chase tool', mixing onto Tascam DA-88.

Narduzzo says that when dubbing began it was not certain whether Kenneth Branagh was going to narrate, so it was decided to work on the international M&E (Music and Effects) mix first, and then add the commentary and other voice-overs later.

The voice-overs are of the translations of interviews, with the interviewee still audible in their own languages underneath the new dialogue. Six actors were used, five of whom voiced different 'characters' in different episodes, with one who was exclusively the voice of Castro. 'Martin [Smith] decided on who he wanted to do each character,' recalls Narduzzo, 'but he didn't want them to act the part, he just wanted them to tell us what they were saying. You could hear the emotion in the original, so there was no need to hear to it coming back from the translation.' These, and Branagh's narration, were also recorded at Tele-Cine.

The dub was on a 16-track mono AudioVision (occasionally AudioFile), which Narduzzo says was mostly full up all the time. 'With some of the archive sequences, there would be guns and battle noises, voice-over and stereo music, so in some cases we had to do pre-mixes because there was such a lot going on.' The sound effects for old footage was kept in mono as Narduzzo is of the opinion that 'lovely whizzy sound effects look completely wrong over archive material. I also filtered it and limited the frequency response >

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< so that it sounds old as well and not to draw attention to the sound effects, so they look as though they are happening there.'

Dubbing time was limited and Narduzzo estimates that tracking up the M&E and sync track for each programme (everything barring commentary and voice-overs) took approximately eight hours on average. 'The final mixes took quite a long time,' he says, 'because Martin [Smith] has a great feel for rhythm and he wanted the voice-overs to work against the picture and with each other and the effects and music. To get all that is quite critical and we spent a lot of time moving the commentary by half a second each way, for example, or splitting paragraphs to let a picture cut go through before the next sentence. It's quite a time consuming business but it ended up with quite a polished result.' Narduzzo mixed on the suite's main Genelec monitors but also had two small JBLs on the desk and a TV to reassure the production team how things would sound to the viewer.

Overseas sales are a prime concern for any production company; *Cold War* was guaranteed air-time in the UK (on BBC2) and in the US and now, after great success at the MIPCOM television market show, will sell around the world. This makes preparation of different versions, with each country able to add its own language commentary and translation voice-overs, a crucial part of the postproduction process.

'The requirements of Ted Turner at Turner International Productions were quite strict and they differ from those in the UK,' explains Andrew Denny. 'Whereas an M&E here would include sync dialogue, the US requires those laid off on separate tracks. So it was an involved post-production process, making sure that all the tracks were laid off separately for the various versions, as opposed to just a straight M&E and a final mix.'

> 'I tried as hard as possible to get sounds that were close to the originals,' comments Denny. 'We were very aware of fact checking all quotes that went into the commentary and we took the same approach with the sound, that we had the right sounds for cars or guns of the period'

Michael Narduzzo expands on this by saying that by using a digital, automated mixing console, the mixing of each element is only in the desk's memory, enabling material to be run out as balanced components on different tracks, plus a combined mix onto one track. In this way, archive sound, dialogue, specially recorded effects, specially recorded music, commentary and voice-overs were recorded onto discrete tracks of two DA88 tapes, in addition to mono mixes, mono M&E, stereo mixes and stereo M&E. 'In the old days, you would have had to have had a separate pass in real time for each element,' says Narduzzo, 'which would have meant eight hours running time for each programme, whereas we can do it in one pass today and everything comes out completely balanced as it was in on the final mix.'

Such processes have helped tell a compelling story as it happened and through the testimony of those who lived through it. It has also improved on people's memories; a recording of Churchill warning of the threat posed by Stalin was re-assembled from different sources to give the longest and best version currently available.

And, like all good history, *Cold War* has dispelled popular myths. In reality, Nikita Khrushchev did not bang his shoe on the table during an UN debate, it was his fist. And in this production, his pique has a nice new sound effect to accompany it. ■

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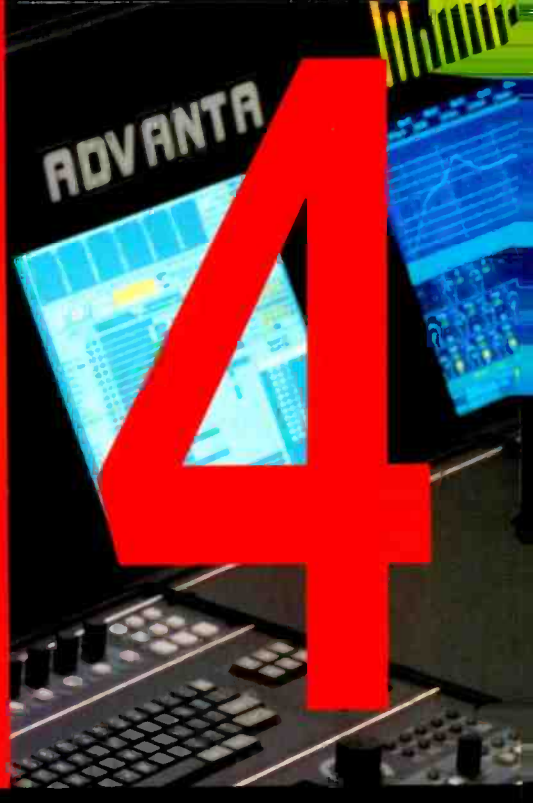

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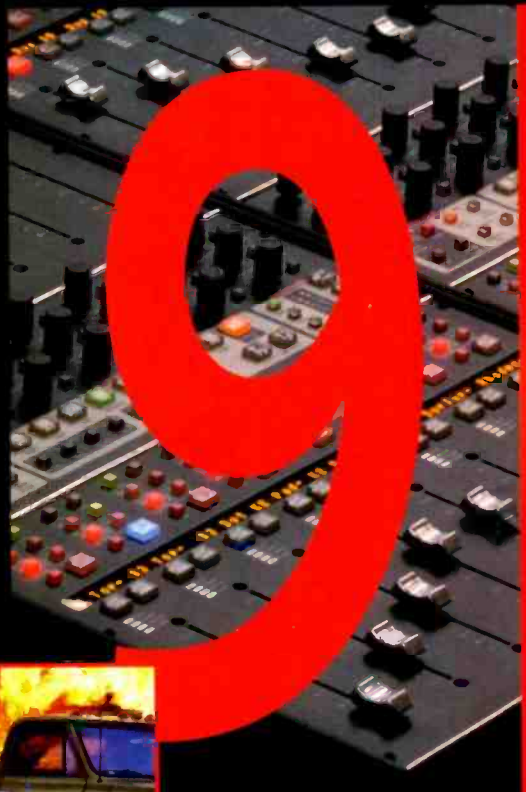

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Up until his death in 1996, Bob Thiele helped steer the course of popular music recording. **Richard Buskin** presents a previously unpublished interview with the past master.

'I could always see myself in the studio recording Louis Armstrong and Duke Ellington some day. Even as a kid I would go and see Louis and Duke play, and I was probably a little pushy at getting to meet them, introducing myself and saying how great I thought they were. I got to meet Duke backstage at Carnegie Hall in 1938, and the relationship blossomed.'

So said Bob Thiele in 1988, reminiscing about his 50 years as a major player in the American music industry. One of the giants in the world of jazz, Thiele was an amateur clarinetist before working as a radio DJ and then, in 1938, editing and publishing the widely respected *Jazz Magazine*. After forming Signature Records in 1939, he produced then-unknowns such as Errol Garner and Lester Young, while his interest in the blues and R&B also led to him forming Bluesway and Bluestime Records, and recording anyone from John Lee Hooker and BB King to Junior Parker, T-Bone Walker, Big Joe Turner and Gatemouth Brown.

During the fifties Thiele worked as the Head of A&R at Decca subsidiary, Coral Records, where he broadened his field of interest by signing and producing pop artists like Buddy Holly, Jackie Wilson, The McGuire Sisters and singer Teresa Brewer, whom he would later marry. However, it was during his tenure at both ABC-Impulse! and Flying Dutchman from the early sixties through to the late seventies that he made some of his most memorable achievements. These embodied albums by Duke Ellington, Louis Armstrong, Count Basie, Coleman Hawkins, Charlie Mingus, Earl Hines and Archie Shepp, as well as the key recordings of John Coltrane, including *A Love Supreme*.

During the eighties and nineties, Bob Thiele supervised reissues for Impulse!, CBS and RCA-Bluebird, and continued to record musicians on his final label, Red Baron. Born in Brooklyn, New York on 27th July, 1922 he died in New York City on 30th January, 1996. Here is my previously unpublished interview with him.

'From the standpoint of pop—as opposed to rock 'n' roll—my most successful years were when I was Head of A&R at Coral,' he recalled of his 1953 appointment. 'We made the first records with Steve Lawrence and Eydie Gorme, we signed The McGuire Sisters, we had Lawrence Welk, and I remember a manager named Al Green taking me up to the Apollo theatre to hear a black vocal group [The Dominoes] that Jackie Wilson was in. He wanted me to sign the group, and I said, "Nah, but I'd love to just sign that one guy. He knocks me out!" Al didn't care, so we agreed to sign Jackie Wilson and then later, when I went to the Taft Hotel to pick up the contract, I was told that Al had died during the night. However, a kid named Nat Tarnapole—who would become Jackie's manager—brought me the signed contract, so the deal went through.

'The first record we made was 'Lonely Teardrops'. It was unique in a way, because it was R&B, but we did it with a big band; not a tight little rhythm and blues band but a big orchestra, and of course, that became a big hit and so I continued to work with Jackie. In the beginning he was a great guy, but then he went downhill through drugs.'

Meanwhile, at around the same time as Thiele was recording Jackie Wilson, a nerdy-looking white guy with curly hair and unfashionable specs came into his orbit. The kid's name was Buddy Holly and just about every record company had passed on his home recording of 'That'll be the Day', as produced by Norman Petty in the hick town of Clovis, New Mexico.

'I was probably last on the list,' Thiele admitted, 'but when I heard it I said, "Hey, this is great! I want to put it out." We bought it for, like, $2500, but beforehand I remember going to the President of the company, Milton Rackmil, and saying, "Look, I want to buy this and we ought to put it out". Well, Rack played it at a meeting to a few people, including a PR guy and a sales guy, and they all said, "You can't put that out on Coral, it'll destroy the image of this classy pop label".

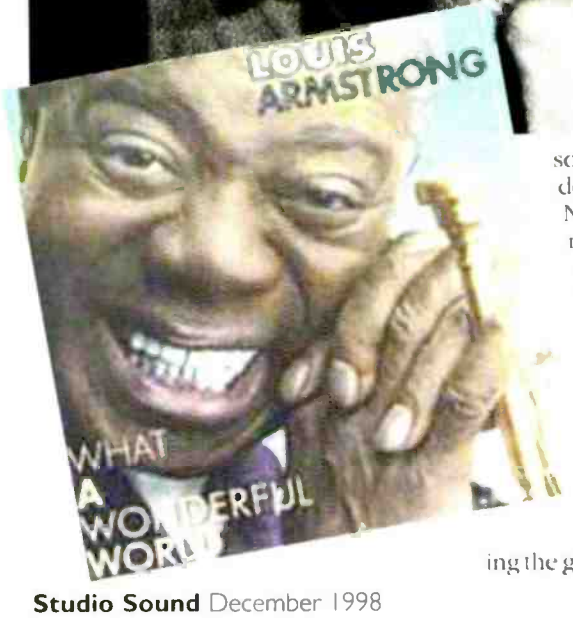
'Fortunately I remembered that Coral's parent company, Decca, also owned the Brunswick label which was really not being used, so I said, "Okay, let's put it on the Brunswick label". They finally agreed to that, we put the record out and, my God, it just took off. It was a tremendous hit. So, we signed The Crickets —Buddy was a member—and we continued to make more records with Norman Petty who would send us the tapes from Clovis, New Mexico. Then I got the idea of putting Buddy Holly on Coral while leaving The Crickets' sound on Brunswick. That way we could develop Buddy as a solo artist, and as things turned out he became very big.

'Buddy happened to be a very nice, appreciative kid. He was always thanking me and he said that he'd love to record in New York City, so I said, "Well, look, when you come up we'll do it". Eventually he did make the trip and Norman wasn't around, and I therefore took charge of the session at Bell Sound when we recorded 'Rave On' and 'That's My Desire'. In fact, Buddy knew that I'd already written some songs and he asked me to compose one for him, so I and a girl named Ruth Roberts wrote 'Mailman, Bring Me No More Blues'—I used the pseudonym of Stanley Clayton, as in those days it would never do for the A&R guy to have his name on a

Bob Thiele with Johnny Hart

PHOTOGRAPHS OF BOB THIELE FROM THE MICHAEL OCH ARCHIVES. © REDFERNS

Bob Thiele



song—and we sent it to him down in Clovis. Buddy then told Norman that he wanted to record it and that was his way of paying me back for releasing 'That'll Be The Day'."

It was during a short stay at Norman Petty's house in Clovis that Bob Thiele stumbled upon another discovery: this time not an artist, but a hit song.

"We were on [Petty's] porch and this guy was sitting on the front steps, playing the guitar and singing a number that he'd written called 'Sugartime'. Thiele remembered. "I told him it sounded good and he said 'Boy, I'd love to record it'. I said, "I'll tell you what, don't play it for anybody else because when I get back to New York I want to do it with The McGuire Sisters". He agreed, and that's what we did, and, of course, 'Sugartime' became a giant hit.

"It was because of my success doing pop records that I was also able to make jazz recordings. The heads of the major companies were not jazz enthusiasts but they would say, "Hey, let's keep Bob happy by allowing him to go do his jazz records. They're not too >

< expensive and let's just hope that he keeps producing these great pop hits by The McGuire Sisters, Lawrence Welk, Teresa Brewer and whoever." After that my discovery of people like Jackie Wilson and Buddy Holly only helped to solidify my position with Decca, and as a result I was able to produce a lot of jazz records.'

Still, none of this appeared to help Thiele's cause during his 1958–59 stint as Head of A&R at Dot Records. An album that he had produced with Jack Kerouac, featuring the beat poet reading some of his most famous work, was branded as 'obscene' by the Dot execs and refused distribution. Thiele therefore left the company and released the record himself on the Hanover-Signature label which he formed with TV personality and jazz enthusiast Steve Allen. Thereafter he joined Roulette for a short time, and then, in 1961, took over at Impulse!, where for him the highlights included producing a record by Duke Ellington and Coleman Hawkins, as well as an album that contrived to merge the conventional with the avant-garde by way of uniting Ellington with John Coltrane.

'It was really a major feat to get those two artists together,' Thiele told me. 'The funny thing is that Duke was the kind of guy who usually tried to get everything in one take. Even if there was some slight problem with the balance or one of the musicians hitting a sour note he would say, "Look, if the overall feel is there, that's great, let's keep that one." Coltrane, on the other hand, was such a stickler for perfection that he would record the same song over and over again. I mean, he could make 10 to 15 takes on the same tune. Yet, I'll never forget how beautiful it was when these two guys worked on their first tune together, 'In A Sentimental Mood'. At the end of the first take I looked out of the control room window and I knew that Duke was satisfied, and I just felt that Coltrane was gonna say, "Well, we'd better do it again". So, I quickly ran out into the studio and said, "What do you think, Duke?" and he said, "That's it". I said, "Come on, let's go tell Coltrane", and so before John could open his mouth Ellington said, "John, that's it. There's no reason to do it again". That settled that issue.'

Not even Bob Thiele's best efforts could placate another of his idols when he had his fits of artistic temperament. Louis Armstrong, the legendary trumpeter with the head-patting handkerchief, may have forged a reputation among his many fans as one of the industry's nicer guys, but, as Thiele was to find out, behind the scenes he could display a somewhat harder side to his character. And to think: things had been so pleasant to a point...

'George David Weiss and I had written this song, 'What a Wonderful World', for Louis,' he recalled. 'That was during a rough period; it was the late sixties and there was Vietnam, protests and everything else, and George and I decided to have Louis sing about how good things really could be.

'I went down to Washington to see Louis while he was working there and he liked the song, so we went ahead and booked studio time for him together with a 16-string rhythm section. I was with ABC [Records] at the time, and the President of the company, Larry Newton, showed up at the session. I was in the control room and he came in and said, "What the hell are you doing? You're crazy!". You see, Louis Armstrong had just had a big hit with 'Hello Dolly', which was a Dixieland-type arrangement, and now here we were, recording a ballad with strings. He said, "This record isn't going to mean anything", and finally he became so upset that he threatened to cancel the date and throw everyone out. I said, "Well, you're going to go down in history, Larry, as the only man who ever threw Louis Armstrong out of a recording studio". He got really mad, and a couple of friends of mine who were at the session had to restrain him out in the hallway because he was just going berserk. He shouted, "You're fired", and by that time I was a nervous wreck. Still, we finished the date and things cooled down as the days went by. One of the vice presidents called me and said, "Come on back to work; this is >

digital

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< ridiculous", so I did.'

Nevertheless, Larry Newton still had not finished airing his point of view. When 'What a Wonderful World' was played at a subsequent sales meeting, he described it as "a piece of shit that isn't going to sell at all". This, of course, led to another argument, yet Newton appeared to be vindicated when the record hardly sold after its US release. Then it was released by EMI in England, sold about 650,000 copies and topped the singles chart. The result: EMI wanted to rush release an album entitled *What a Wonderful World*. The only problem was, there was not enough material in the can.

'Louis had made this record because we were good friends, and I'd paid him union scale which was $250,' Thiele recalled. 'All we had were four sides, so Newton called me and said, "Bob, get your friend Louis to do eight more sides and let's work the same deal". I said, "Well, I'll see what I can do". During this whole sequence of events, Louis' manager, Joe Glazier, had heard about what was going on, and so when I called him and told him we'd like to get Pops [Armstrong] in the studio again to do eight more sides he said, "You tell that bastard at your company that he can have eight sides for $25,000". I passed this on to Newton and Newton said, "Tell him to get lost". I said, "What about EMI?", and he said "To hell with EMI. It doesn't matter. Forget it". After that we received a telex from South Africa, a telex from France, a telex from... Everybody wanted a *What a Wonderful World* album. Not too surprisingly, after a couple of weeks Newton finally agreed to the $25,000 payment.

'You know how Louis Armstrong was always considered such a friendly, jovial, happy-go-lucky sort of guy, with that big smile of his? Well, we wanted to rush out this project, and, because of his work schedule, the only place where he could record at the time was in Las Vegas. So, I sent Louis the songs that we wanted to do and then about a week later I flew out. I went up to his hotel room and he was in there with his wife, together with a band boy named Bobby. I asked him how he was doing, "Everything's going well". I said, "You got the songs, didn't you? Because we've got studio time booked in a day or two". He said, "I don't have any songs". I said, "Well, I mailed them to you..." So he said, "Bobby, if the songs came in where did you put them?", and Bobby said, "I think they're in that suitcase over there on the table." Louis' wife stood up to go over to the suitcase, but Louis shouted, "Sit down; I didn't tell you to go get them. I want Bobby to get them". He was coming on as a real mean guy and I started to get a little shaky.

'We got to the session and I believe we planned to record all of the songs in one day. Well, when we got to the last song Louis undoubtedly didn't like it and he hadn't even attempted to learn it. I was in the control room, he was out in the studio and all of a sudden I could hear him say, "Bobby, let's get the fuck out of here.". For a second I thought he was talking to me, but actually he was speaking to his band boy. Every other word was fuck, and he was saying, "Get my fucking horn; we're getting outta here". As he walked through the studio he said, "Fuck everybody!", and as he walked past the string section he said, "Fuck all you guys!". I finally opened the door as he was walking past the control room and I asked him, "Pops, what is it?", and he screamed, "Fuck you, you white motherfucker!" It was real horrible, you know. I'd known Louis for 15 years and he'd always come across as Mr Showbusiness, a nice guy, but I certainly discovered that he could really go off the deep end.

'I learned more about the record business as an A&R man in the 1950s than at any other time. Even though we did things quickly, the thing about being Head of A&R was that you made the decisions with respect to the songs, to the sound and the arrangements, to what records came out and when they came out. Today, everything is done by committee—nine guys have to get together before they can even put out a record.' ■

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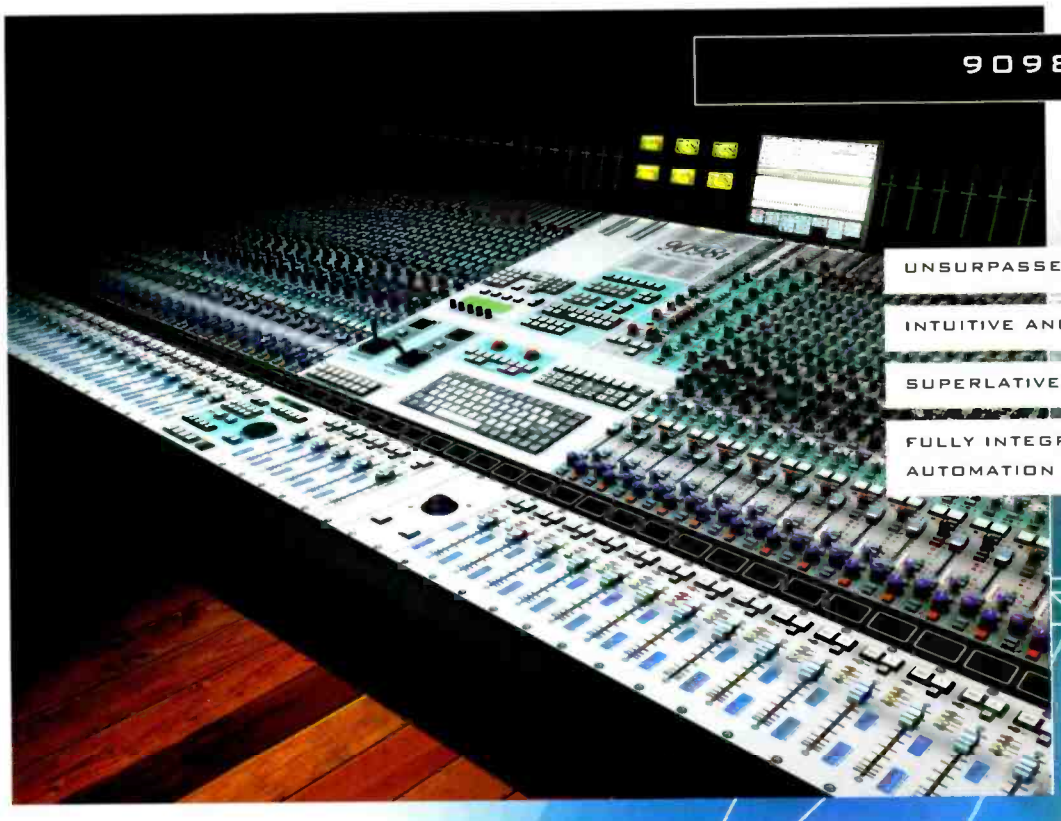

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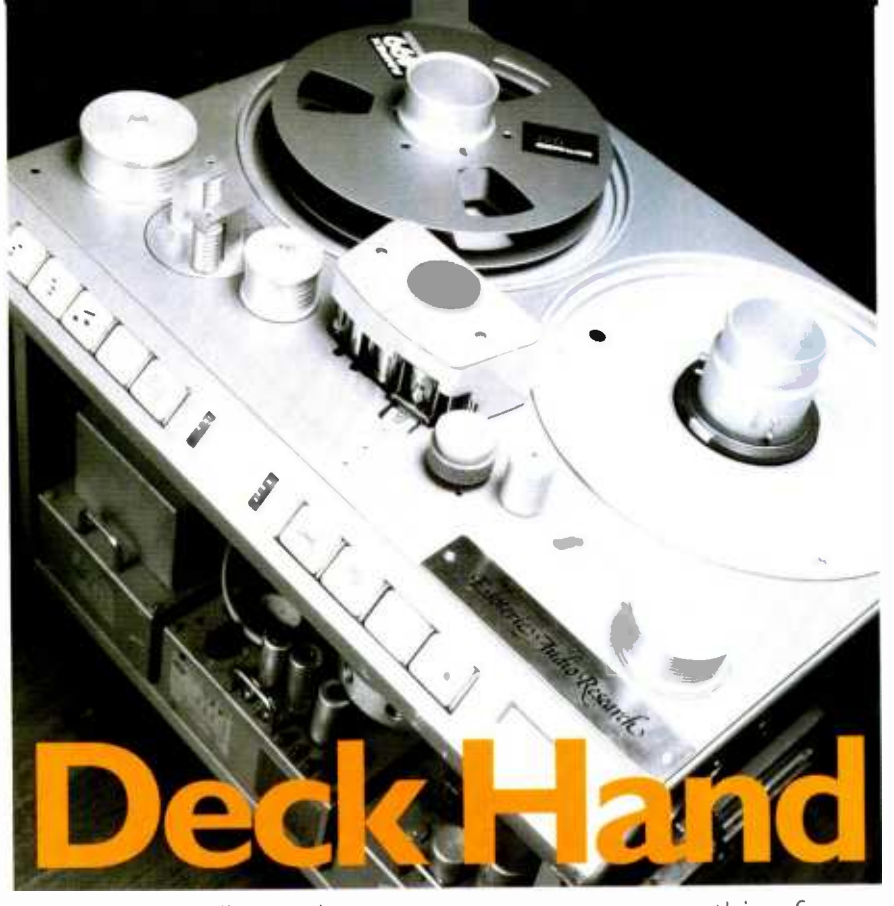

Deck Hand

Ambitious audio equipment encompasses everything from the incredible to the impractical. **George Shilling** asks Tim de Paravicini where his 1-inch stereo recorder fits

IN THE MUSIC INDUSTRY, there are two types of people: those who eagerly await every new software update and aspire to own every piece cutting edge technology; and those who prefer the tried and trusted, only accepting 'new' when it has proved itself 'better'. Tim de Paravicini falls into the latter group. He is no Luddite, however, and believes in the steady improvement of recording and playback technologies.

'With an analogue system, you can go on and on improving, just like the motor car industry. Cars today are better in most respects than their fifties and sixties counterparts. New models are a logical development of their predecessors.'

This, he believes, is not the case with digital music technology. He blames virulent marketing: 'because music is such a continuous event, it is difficult to do with digital, because the brain is sensitive to glitches and minute errors in the high frequency range. If you scratch CDs they won't play—unlike vinyl. When they demonstrated the robustness of CD on BBC's *Tomorrow's World* in 1981 they wiped strawberry jam on a disc, but it was a con—they put it on the opposite side to the data. The major CD promoters destroyed heaps of vinyl in order to advance the CD with its larger profit margin. Vinyl discs has the instant access of hard-disk recording, and I've got vinyl pressed in the fifties that is still acceptably quiet. What's more, a modern cassette machine nearly gives a DAT machine a good run for its money. Standards should be carefully thought about and implemented'.

Tim de Paravicini is also well-known for his valve technology: 'In the early days of recording, valves were expensive, therefore designs tended to feature less of them. This discipline led to cleaner signal paths. When cheap transistor technology came along, this simplicity went out of the window.'

Following the introduction of the new Zonal 999 tape (*Studio Sound*, August 1998) and approving comments from Paravicini, a demonstration of his 1-inch analogue stereo recorder using the new tape was arranged. Present were Adam Francis, consultant for professional audio to Zonal, and Sam Hann, Zonal's sales director. The setting was Dave Gilmour's Astoria Studio (courtesy of studio manager Phil Taylor), appropriate not only for its wonderfully accurate monitoring, but also the huge amount of EAR-Paravicini equipment, including eight compressors and a modified mix bus on the Neve VR Legend desk.

The 1-inch mastering machine is built using a Studer C37 as donor. This workhorse was popular with broadcasters in earlier years, and redundant machines are readily available to be rebuilt to Paravicini's demanding specifications. This is not just a transport modification: all electronics are rebuilt to the highest standards. Paravicini has also rebuilt C37s as ½-inch machines due to customer demand, but since 1986, his entire 1-inch machine output comprises a mere eight machines. This looks likely to change, with three mastering houses in the US acquiring machines within a year, giving more people confidence to use the format. Famous users include Bill Bottrell (for work with Sheryl Crow and Michael Jackson). More recently Aerosmith mastered their double-live album to 1-inch. (Producer Jack Douglas, on auditioning the format, reportedly exclaimed, 'It sounds huge, man!') Perhaps unsurprisingly, competitors have sprung up in the US pinching the format idea. Paravicini dismisses the electronics of their machines as inferior to his; although their use of alternative 'donor' machines interests him.

'If starting from scratch now I would use a more modern transport', he says. Indeed, there is a possibility of a future collaboration with these 'upstart' competitors who will rebuild Ampex ATR transports while Paravicini takes care of the electronics.

Paravicini sets his own standards when it comes to line-up. Despite using high-level tape, he sets 0vu at 200NWb m. 'I use 999 for the cohesive sound, because with the low noise floor of the 1-inch, the headroom is relatively irrelevant. It gives a safety margin during live recording and reduces print-through.'

Paravicini typically recommends over-biasing by nearly 1dB less than is conventionally recommended, giving improved HF distortion figures.

We listened to a range of source material, switching between input and off-tape monitoring. The sound was undeniably huge and vibrant. One all-digital recording seemed subtly enhanced off the 1-inch tape, and superb dynamics and frequency definition were witnessed by all present.

The machine costs around £9,000, but 'if you spent a gazillion dollars on it I could do better still,' its designer claims. 'The only thing that will equal this sonically would be a 24-bit 400kHz true linear digital system; both systems will then satisfy the hearing mechanism.'

Paravicini points out that he wrote in 1982 of the need for 24 bits at 400kHz, and yet today the big players are still discussing 96kHz and 192kHz as possible formats. He adds that with the rapidly falling prices of digital storage media, moving to a 384kHz sampling rate is not unreasonable and absolutely ideal. Until that happens, however, there may well be a market for machines such as these. Current Paravicini C37s run at 15ips and 30ips. However, one future improvement he is considering is the seemingly oddball change to 18ips, which he is proposing in an AES white paper. 'I have agreement with all the owners of my 1-inch machines,' he says. Apart from possibly frightening potential purchasers, this has yet to be implemented due to the notional compatibility with other 1-inch formats >

< for emergency editing or playback. Presently, Paravicini recommends 15ips with bass response down to 7Hz within 3dB for minimum phase distortion in 40Hz–100Hz region, important, he says, for rhythmic elements. Paravicini is a great believer in the importance of frequencies above and below the conventional 20Hz–20kHz range. He points out that one can sense the standing wave of a large cathedral, which is below 5Hz. The brain knows this as our body senses sound through other parts of the body than the ears.

'This notion of the hearing stopping below 20Hz is absolutely rubbish,' he asserts. We detect sound down to the resonant frequency of the body, and deaf people certainly seem to "hear" through the body.

'Likewise, the high frequency notion of 20kHz is rubbish. In essence, we detect audio up to about 45kHz. We can't say we hear it as a tone, but we are certain that something is going on. My method of demonstrating this was several years doing work on ultrasonic bath cleaners. Everybody in the room suffered the after-effects of tinnitus. You are aware of this excruciating feeling. My speakers go up to 40kHz. If I put a 20kHz tone from an oscillator through them, most people in the room are in discomfort. With a 24kHz tone the younger people in the room are in discomfort and discerning it quite obviously. So traditional myths have to be thrown out the window. I wanted a tape machine that roughly embodies what the hearing mechanism is about: 15ips enables a range of 7Hz to roughly 40kHz within 3dB with a good running time. At 30ips it goes from 14Hz up to 80kHz theoretical, 60kHz in practice, but performance at 15ips is already better than most digital systems and perfectly adequate for human hearing.'

The proposed 18ips standard degrades the bass by a negligible amount, yet gives 45kHz–50kHz top end and is arguably the best compromise. I asked about the improvement over ½-inch, he explains the difference in terminology more commonly related to digital equipment: 'The number of magnetic particles on the tape with ½-inch is roughly equivalent to 23-bit or 24-bit while 1-inch is 24-bit to 25-bit. This is necessary as the ear can discern distortions as much as 80dB down. Also, modulation noise is lower than ½-inch, with better bottom end solidity.'

Although emphasising the importance of large playback heads for extended bass response, Paravicini accuses major multitrack manufacturers of the crime of 'cost-unbalanced engineering'. He maintains that corners are often cut with playback electronics. 'Many 1950s recordings have response up to 40kHz—recording these frequencies is relatively easy compared to playing them back.' Paravicini has designed playback equipment for Mobile Fidelity to enable remastering to the highest standards. Poor playback electronics overload the high frequencies and cause what he refers to (onomatopoeically) as 'spitching', with LF and HF artefacts.

Paravicini is particularly impressed with Zonal 999's packing, which improves HF phase and quality with no deposit on the heads visible during our tests. He points to historic shedding problems of other tape manufacturers. Rather alarmingly, Paravicini suddenly grasped and crumpled a foot or so of tape with his hands, to demonstrate another advantage of the 1-inch format—that it is twice as difficult to stretch compared to ½-inch. And if you even touch DAT tape you're in trouble...

As to the future, Paravicini is working on a 35mm audio format with advantages of easy mechanical lock to film, and space alongside the sprocket holes for time code. Featuring a roughly similar track-width to 1-inch he claims the quality of reproduction will be equal. He also has ideas for a multitrack format with increased track width. ■

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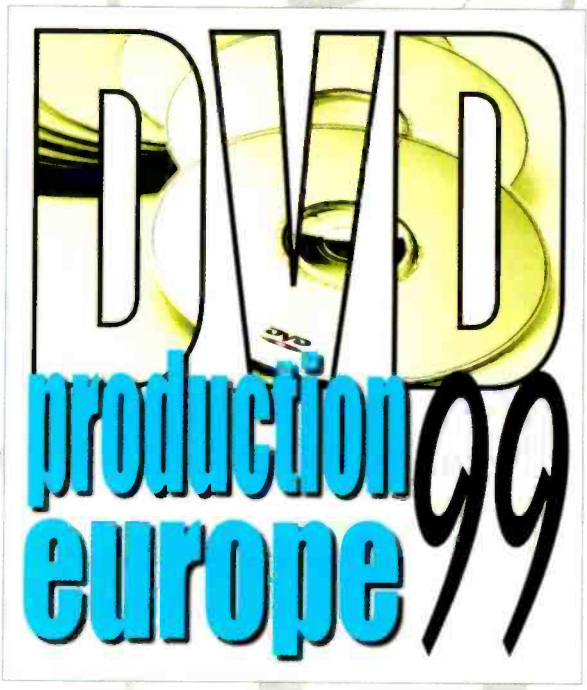

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Wandering in Magnetic Fields

December 1st marks the centenary of the invention of magnetic recording. **Bernard Pike** and **Ken Talbot** trace its history and the fortunes of its Danish inventor, Valdemar Poulsen

LOOKING BACK over 100 years of magnetic recording offers an interesting study of how an invention develops. The years to the death of inventor Valdemar Poulsen in 1942 saw limited progress. From his wire-based Telegraphone, the Blattnerphone and the Marconi Stille steel tape recorders do not fit in well with the development pattern of magnetic recorders. The key events took place in the thirties and forties and were followed by exponential growth up to the present day. It was after the war that magnetic recording started to make itself felt in the recording studio, and displaced the shellac disk as the standard medium. Today magnetic tape is threatened on two fronts by optical and solid-state technologies. What does the future hold for magnetic storage?

Poulsen was working for the Copenhagen Telephone Company when he first started experimenting with recording. The first recording is reputed to have been made on a screwdriver, using a telephone earphone without the diaphragm as the record and playback head. Once the basic principle was established, he went on to record on a piano wire stretched across his laboratory. He operated it by running alongside the recording apparatus, which was perched on a trolley, with the record head (earphone) in contact with the wire. The final patented version had the wire coiled around a drum with the head driven by a screw thread at the top of the machine.

In 1900 at the Exposition Universelle in Paris, he exhibited his invention. It was well received and he was awarded the Grand Prix of Paris. One of his visitors was the Austrian Emperor who made a recording at the exposition that is believed to be the earliest magnetic recording still in existence today.

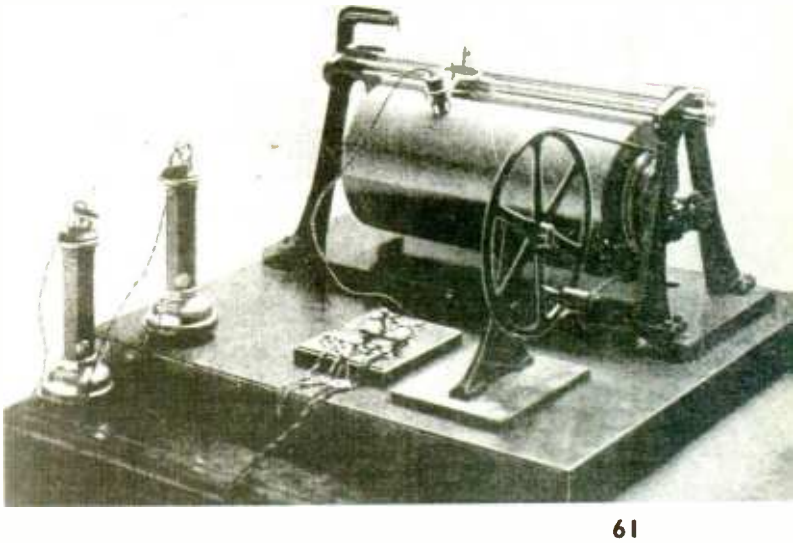
As Poulsen was unable to find backers in Europe, in 1903 he formed the American Telegraphone Company with an American associate in Washington DC. The duo started to produce wire recorders where the wire ran from one spool to another. The first machines had a wire speed of 84ips and could record for 30 minutes. By 1910 the company was in trouble due to bad management and by 1918, after only selling a few hundred machines, it went into receivership. Amazingly it remained in existence until 1944; although whether Poulsen was still involved is not clear and not much more seems to be known about Poulsen until his death. He did, however, receive many awards.

In 1907, Poulsen was awarded the Gold Medal of the Royal Danish Society for Science. In 1909, the University of Leipzig conferred upon him the honourary degree, Doctor of Philosophy. He received from the Danish Government the Medal of Merit and at his death, Dr Poulsen was a fellow of the Danish Academy of Technical Science and the Swedish Institute for Engineering Research.

There are a number of reasons why Poulsen's invention did not immediately succeed commercially—the Edison Phonograph had been invented 20 years before Poulsen's Telegraphone and had already gained a foothold in the market. And where the Telegraphone needed to be listened to on a headphone, the Phonograph used an acoustic horn. If amplifiers, had been around Poulsen would have had a better chance. An additional handicap derives from the fact that AC bias had not been invented, so the Telegraphone's signal was distorted and had >

'Poulsen's first recording is reputed to have been made on a screwdriver, using a telephone earphone as the record and playback head'

Illustration of Poulsen's Telegraphone published in *The Electrician*, 1901



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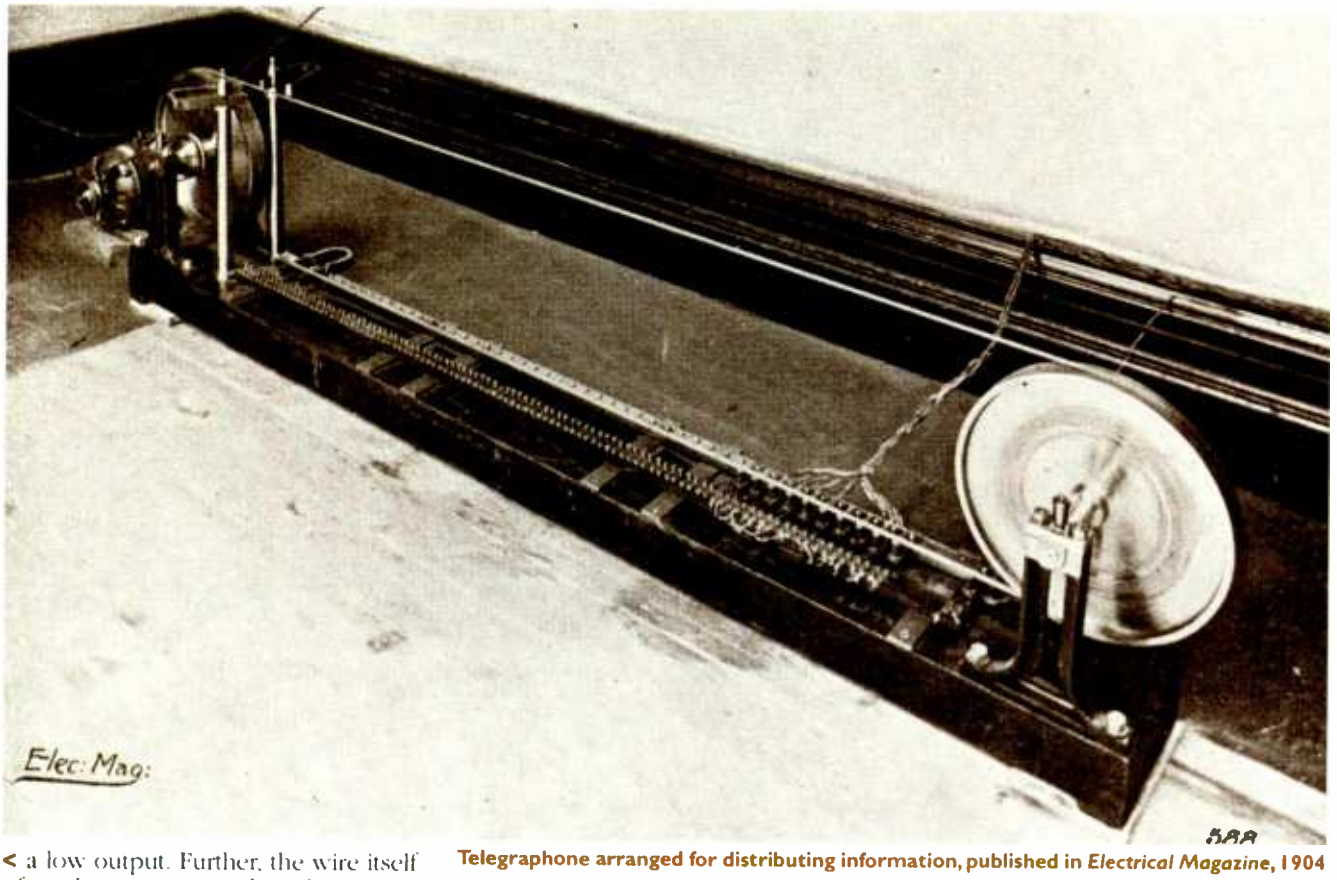


Telegraphone arranged for distributing information, published in *Electrical Magazine*, 1904

< a low output. Further, the wire itself often became twisted and tangled. Finally, Poulsen was also busy with his other invention, the Continuous Radio Wave Arc Transmitter, which dates from 1902. This must have diverted his attention away from running his company.

Despite Poulsen's lack of success with these machines, other companies had moderate success with wire recorders, and they were manufactured right up to the late forties. One of the more famous and more successful machines was the Webcor wire recorder whose head rose and fell as the wire passed. The head had a groove in it so it also acted as a guide that made sure the wire was evenly wound onto the take up-spool; although here, too, the wire often broke and acquired kinks that caused severe dropouts. It also caught under other layers of wire and would release with a jerk.

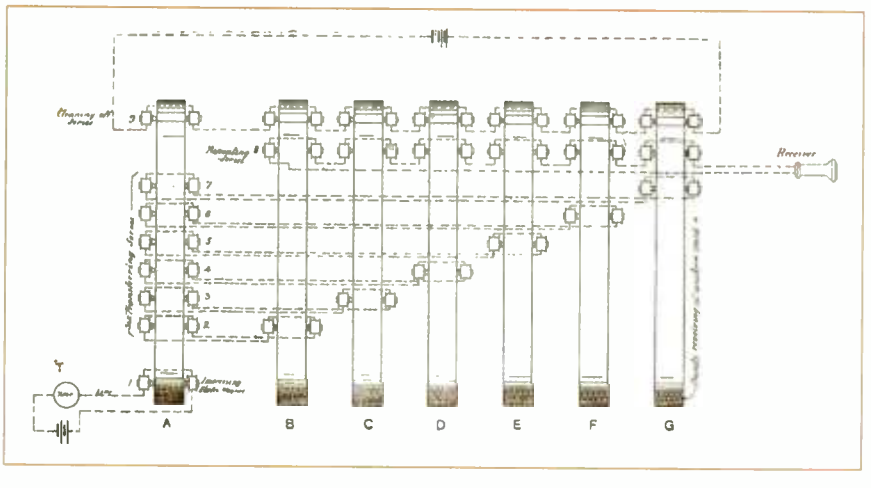
Among the other wire recorders that were made, were the Brush which was developed by SJ Begun (the Brush Development Company also developed a number of recorders which used a variety of tapes, disks and wires); the Stille wire recorder from Curt Stille and Karl Bauer, which was called the Dailygraph and was manufactured by the Vox company as a telephone answering or dictation machine; and the Textophon developed by the Echophon company, which was used as a dictation machine. Several thousand wire recorders were sold to the American Army and Navy, many being built or licensed by the Armour Research Foundation of the Armour Institute of Technology. In 1949, there were still wire recorders being built and one of these, the Wirex Recorder has a home in the Science Museum in London.

'Wire recorders had little use and there appears to be no reference to them being used in the recording studio'

Apart from as dictation machines, telephone answering machines and home recorders, wire recorders had little use and there appears to be no reference to them being used in the recording studio. Their success was very limited when compared to the commercial success of the tape recorder.

Steel tape machines made their appearance from time to time, only to vanish again as quickly as they came. There are two machines, which stand apart—The Marconi Stille machine and the Blattnerphone. These machines had a short but interesting appearance in the professional broadcast section of the market. The Blattnerphone sounds like something out of comic opera, but there really was a recorder by this name. Blattner, the designer, sold machines to the BBC and went bankrupt in the same year. The machine was a rather unwieldy giant with enormous reels to hold the steel tape. The story goes that it was necessary to keep the machine in a room of its own as when the steel >

Illustration for a proposed telephone repeater using Poulsen's Telegraphone, published in *The Electrician*, 1901



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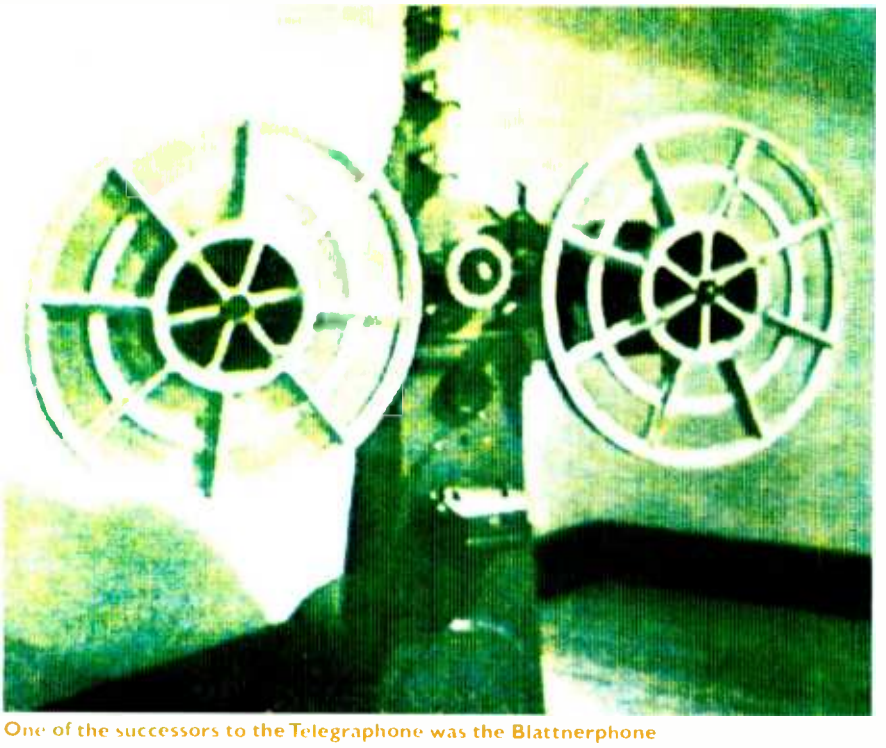


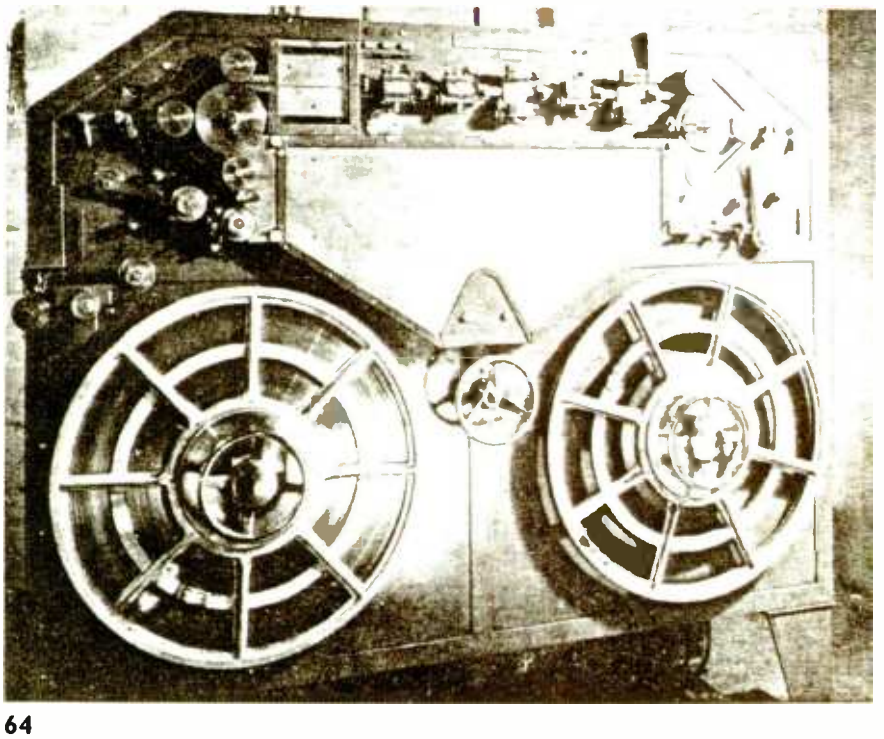
One of the successors to the Telegraphone was the Blattnerphone seen here. It was used by the BBC at an operator's peril.

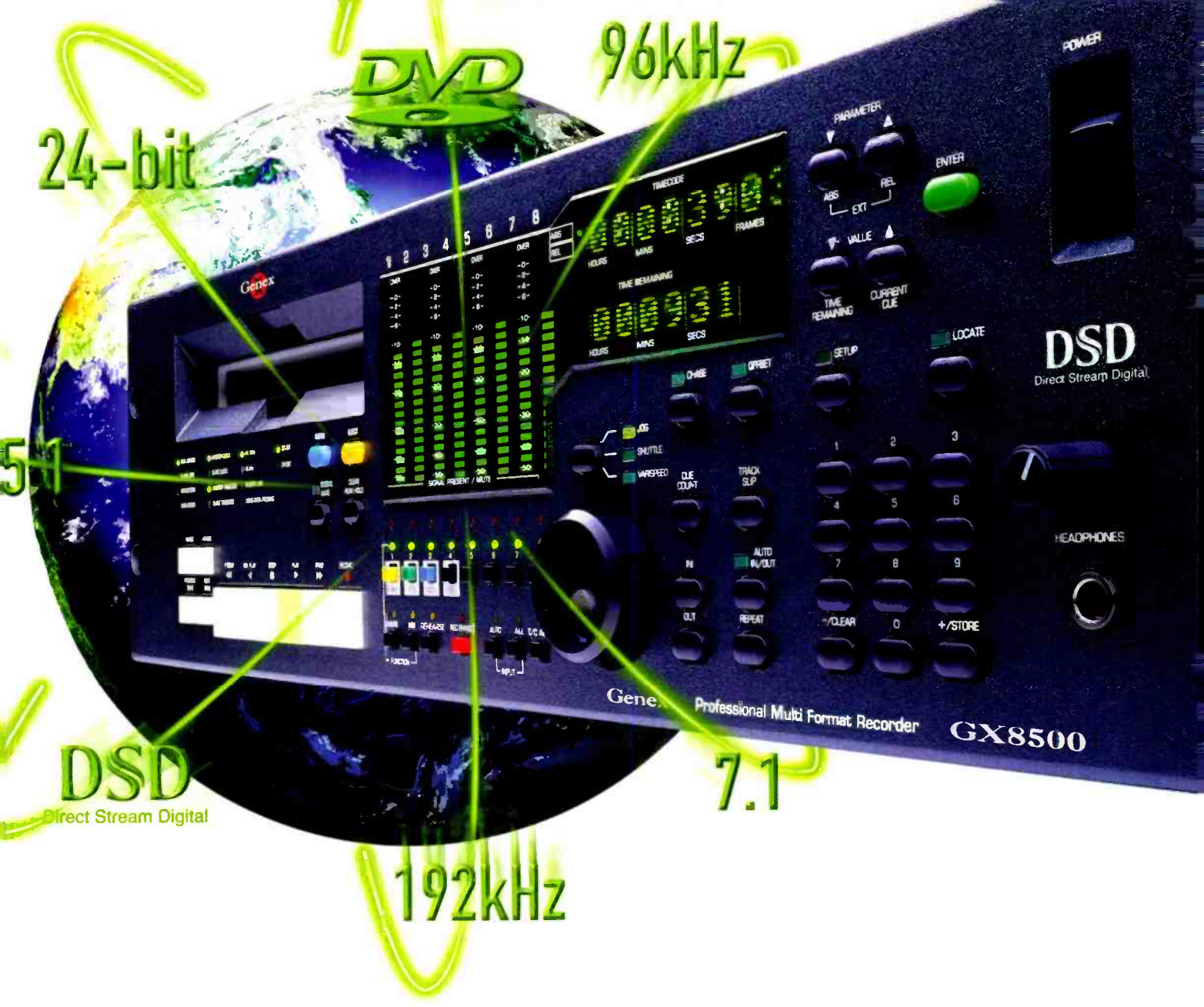
< tape snapped the loose ends would whip around with dangerous effects. Dr Bates, of Verbatim, tells the story, that one day during a live recorded broadcast from the Blattnerphone, the steel tape broke. Being the junior engineer at the time, he was required to grab the broken end of tape and run down the corridor with the tape trailing behind him to keep the tape from becoming snarled. He said he was the first person to break the tape and then run 100m... The famous speech made by British prime minister Neville Chamberlain's when he declared war on Germany, was recorded on a Blattnerphone.

Later, steel tape was used on the Marconi Stille machine and these machines were used extensively in the years leading up to the Second World War. Steel tape had the advantage that it did not twist, but it was no rival for the German Magnetophon. This machine together with tape would change the course of recording.

It was Fritz Pfleumer who made the breakthrough that would change the direction of magnetic recording and move it in the recording studio, when he patented a coated paper-backed tape. Pfleumer was working on a metalised cigarette end for a cigarette company; >

Another pretender to the Telegraphone's crown was the Marconi-Stille steel tape recording machine





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Clockwork disc-type Telegraphone for early recording and replay —as a Dictaphone, for example

his hobby however was recording, and one day when his wire recorder's wire became all tangled up, he hit on the idea of using a metalised tape. In 1928 he patented the idea and sold it to AEG, a large German manufacturer, in 1932. While AEG made the recording hardware, it needed a chemical company to make the tape—the job fell to IG Faben. At first the tape was coated with pure iron particles as Pfleumer had originally conceived. This was not very successful as the fine crystal shapes became unstable and oxidise. Strangely, iron oxide (rust) is not magnetic, but IG Faben with its knowledge of chemistry was able to develop a propriety process which resulted in a carbonyl iron powder that was magnetic, stable, and you could produce fine needle-shaped (acicula) particles to coat the tape.

In 1934, 36 years after its invention, magnetic recording became a serious competitor to its arch rival, the disk. Until this time, disk had been the main storage medium in the sound studio but it could not be edited—all recordings were instantaneous, and after the engineer had dropped the cutter head onto the disk and spiralled it in, the band had to play, and play without making a mistake. The count-in had to be silent as well. Paper, or plastic-backed tape could be cut up, the best parts of the recording selected and edited precisely to produce a faultless performance. Editing had arrived.

By 1939, 5,000,000 meters of magnetic tape were being produced for broadcast stations. In the UK, EMI and the BBC were dominant forces in recording and it appears from our research that magnetic tape was virtually unknown here.

It was Hitler who was to aid recording over the war years. Hitler supported magnetic recording as it was useful in his propaganda campaign. British intelligence used to monitor Hitler's broadcasts in order to know where he was. Not knowing about the developments of magnetic recording inside Germany, they would listen for the familiar clicks or surface noise of the gramophone record. If there were no clicks it was assumed that Hitler would be present. It soon became apparent that this could not be the case as Hitler would make addresses at two distant places within too short a period for him to travel the distance.

Once the war was over, American GIs captured a number of the Magnetophon machines and shipped them to America where they were taken apart and analysed. The British brought them back and EMI developed the famous BTR1 machine, which was based on the Magnetophon design and by 1945, Bing Crosby, working with sound engineer

John Mullin, used the Magnetophon for radio broadcasts on ABC Radio.

The early tapes ran at 30ips and shed oxide with each pass. In America 3M developed Type 111, a plastic-based tape, that quickly became the industry standard. Slowly research on tape delivered an improved medium, and from coercivities of less than 100 Oersteads, it was possible to achieve coercivities of as much as 350 Oersteads by the late fifties.

It was during this period that tape machines quickly displaced disk recording in the studio, both in recording studios and broadcast studios. With improvements in head design, the very limited frequency response of the early machines was increased and by the sixties they were able to produce a flat frequency response from 20Hz–15kHz.

During the sixties tape speed was standardised to 15ips in the studio and with all the modern developments, hi-fi was born. In Germany the Telefunken machine was mainly used, in the UK it was the EMI BTR1 and BTR2 and TR90, and in America the Ampex model 200 was the studio workhorse. In Japan, after a devastating war, Sony was busy developing its own tapes and tape machines. To show the level of enterprise, TDK was producing tape which had the oxide painted on using a pig's hair brush, and the slitting was achieved by pulling the coated film over razor blades. It was in the sixties that the Japanese started to compete in the West with their high performance tapes.

Fritz Pfleumer who made the breakthrough that would change the direction of magnetic recording and move it in to the recording studio, when he patented a coated paper-backed tape

The chemical giant Dupont, in America, had developed a new Chromium Dioxide particle. This increased the tape coercivity values to over 500 Oersteads and gave a flat frequency response all the way up to 20kHz at even lower tape speeds than were commonly being used. Consequently, many studios using the famous Revox machines were able to record at 7.5ips; although for editing 15ips was still preferred. Dupont issued a licence exclusively to Sony in Japan to produce chromium dioxide tape. Not to be outdone, TDK developed a cobalt-doped tape called Super Avilyn. New tape machines also appeared on the market, such as those from Studer and Nagra. These machines were in a class of their own with a frequency response of ±0.5dB over the full 20Hz–20kHz spectrum.

The use of tape became far more widespread over the coming years, being used for Video recording, Data and with the introduction in 1962-64 of the compact cassette, home recording.

With the advent of multitrack machines the whole process of recording changed—the ground-breaking *Sergeant Pepper's Lonely Hearts Club Band* was recorded on a Studer 4-track machine and later *Abbey Road* was recorded on one of the first 8-track machines. By 1970 multitrack recording had once more transformed the way recordings were being made. Now with far more options open to the producer, engineer, and musicians, recordings were taking years to be made. The disk could not compete.

Poulsen saw his invention mainly as a telephone answering machine. Using wire, it was only suitable for speech, as claimed in his original patent (dated 1.12.1898). Today, telephone answering machines are solid state with no moving parts, no tangled wire, no wow, no waiting to rewind the tape for the next take.

Tape was able to challenge the disk only once it was improved in quality, was suitable for editing and finally it was multitracking which cemented its superiority in the studio. We may have almost forgotten Poulsen today—ask the man in the street who Poulsen is and you can be sure to get a blank look—but his invention was a brilliant breakthrough and deserves recognition. Without his pioneering efforts, where would the modern recording industry be? ■

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Three to get ready

The launch of TV3 gave Ireland four television stations and new-found self respect in broadcasting. **Kevin Hilton** traces the history of the isle and its air waves

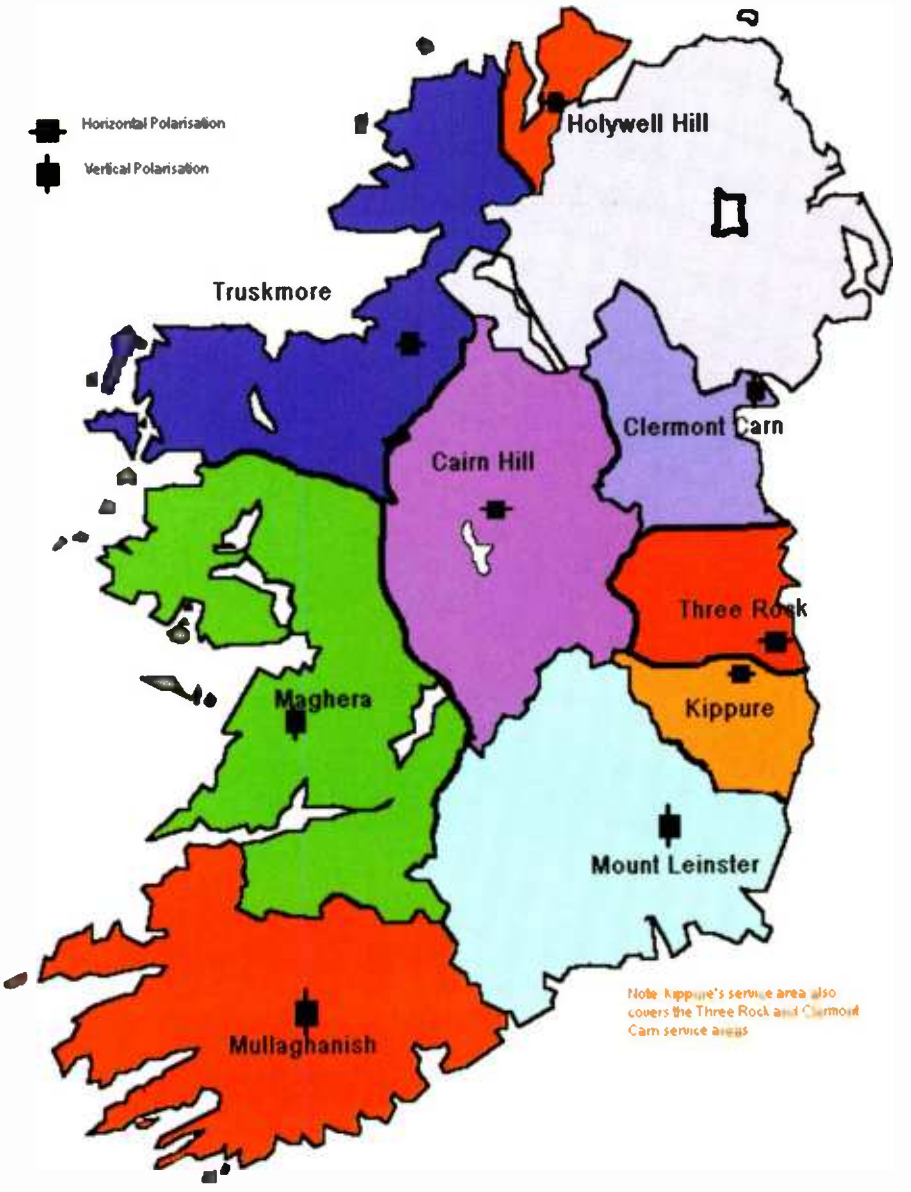
IN THE YEARS FOLLOWING THE establishment of firstly the Irish Free State and then the Republic of Ireland, efforts were made to re-affirm the country's cultural identity.

Broadcasting can be a way of doing this, so it is odd to consider that the Irish public service TV broadcaster is only 37 years old. Now with four domestic stations, including the recently opened TV3, the country's first commercial service, Ireland is confident that it can truly provide for its own viewing needs.

Television from the UK had been picked up in the east and north of the country from the fifties but there were demands for Ireland to have its own channels. Legislation was put before the Dail, the lower house of the Irish Parliament, in 1960 and Radio Eireann was given the responsibility of founding Ireland's public service TV broadcaster. Under its first chairman, the well-known presenter Eamon Andrews, Radio Telefis Eireann (RTE) went on air on New Year's Eve 1961, opening with a broadcast from President Eamon de Valera warning of both the good and bad that television could bring.

So Ireland's sole home-grown channel pumped out a mixture of news, entertainment, soaps and chat. Vague memories of RTE come back to me from when we used to visit my grandfather on the West Coast; in particular Garda Patrol, where an uncomfortable-looking police officer would appeal for public help in solving crime. It was around this time that pressure for a second channel became stronger, particularly in regions that could not receive UK signals, known disparagingly as One Channel Land.

A second station, RTE2, was launched in 1978 but cut-backs led to the service being rethought and relaunched as Network 2 towards the end of the eighties, getting another rejig in 1997 to become N2. The growing penetration of UK services into the once cosseted Gaelic-speaking areas prompted the launch of an Irish-language service, Teilifis na Gaeilge (TnaG), in October 1996. Although there are government plans to establish TnaG independently, it is 100% owned by RTE, which itself is cofinanced by a licence fee and advertising revenue. Unsurprisingly, there have long been demands for a true commercial channel in the Republic and pirate TV stations forced the issue through the 1980s.



In 1988 a revised Broadcasting Act was passed, setting up the Independent Radio and Television Commission (IRTC) and making provision for a third, completely commercial channel. The franchise was advertised and won in 1989 by the TV3 consortium, led by Windmill Lane Pictures. Original plans stated that the new service would only be available through cable and MMDS, the so-called wireless cable system.

The Broadcasting Act was amended in 1990 to provide a UHF network, something that required the TV3 consortium to submit a revised business plan —which is where the problems began.

In 1992, the IRTC withdrew the franchise from the consortium, saying that the group had not been forthcoming about its investors. The immediate effect was to render Windmill Lane Pictures insolvent, as it had carried most of >

< the development costs.

Shareholders lost huge amounts of money; the consortium banded together and appealed to the High Court against the IRTC, on the grounds that the regulator had made the decision without giving TV3 a hearing. They won, as they did when the matter went to the Supreme Court. The franchise was restored in early 1996 and the consortium, which still included Windmill Lane and U2's manager Paul McGuinness, decided to get the station on air rather than pursue damages.

A new shareholder was found in Ulster TV but its involvement ended after it could not get agreement from the IRTC regarding cross-shareholding and management arrangements. Once again it looked as though the venture had been killed off. But Canadian media group CanWest Global took a 45% stake, committing money, resources and expertise. In late January this year a disused pharmaceutical warehouse in Dublin was bought; gutted and re-built inside, costing in the region of Ir£4m, the broadcast centre was finished in July.

CanWest started recruiting a team at the end of last year, with Peter Ennis, who oversaw the technical installation as director of operations, joining in February 1998.

This was something of a return for Ennis, who was chief engineer at Windmill Lane from 1986 to 1991, after which

Peter Ennis at TV3's play-out area

he ran Leinster House Television, a subsidiary set up to televise Parliament. He had been involved in some of the planning for TV3, but at that stage no technological decisions had been made. After leaving Windmill Lane in 1993, Ennis worked variously at Avid and Snell & Wilcox, from where he was lured to TV3.

Ennis says he looked long and hard at the proposals to see if he came to the same technological conclusions, which he did. 'The first decision, of course, was "Do you or don't you compress?",' he explains. 'In terms of storage, I felt that there were significant advantages to be had from compressing. It's particularly true for server-based applications and MPEG is an inherently superior compression format to Motion JPEG.'

The decision to go MPEG made the choice of tape format relatively simple; the original concept had been to use DigiBeta for transmission and Betacam SX for acquisition and news editing. Two servers are used: one with 3 hour capacity for on-air, the other an 18 hour back up library unit that includes a 3 hour mirror of the main unit. 'Betacam SP is pretty much the standard for bought-in programmes, and so we needed machines that could playback tapes that we'd produced ourselves and Betacam SP,' says Ennis. 'I decided that DigiBeta wasn't going to give us that much extra. We're not doing any significant multi-generation postproduction on tape, therefore the benefits of DigiBeta, in terms of multi generation, were not going to be realised. So we went Betacam SX throughout the station.'

TV3 was, and still is, the first station in the world to go completely SX, which Ennis agrees was something of a bold move, but considers the decision to have been vindicated because of the application. This is largely TV3's status as a publisher-broadcaster, where the bulk of its output is bought-in – SP tapes are either played from the compatible SX machines or dubbed to SX for reconfiguring (inserting or removing ad breaks) – with news, sport and current affairs being self produced, providing just under two hours of news a day and between half an hour and a hour of sport each day.

TV3's pictures may be digitally originated but the audio is strictly analogue. 'We could have gone AES-EBU,' says Ennis, 'but it would have meant expense and the benefits wouldn't have justified the cost. Looking into the future, most audio is going to be embedded in the serial digital video stream and that's the direction I'm heading in.'

However, he says that sound isn't an afterthought. 'The audio on our news stories tends to be a little more elaborate than RTE's,' he says, 'bringing in music or doing the dialogue slightly differently. Because we're NICAM stereo we try to set the stereo sound stage as much as we can. As far as audio production values are concerned, we're probably ahead of our competition because we've done it from day one.'

This funkier approach is designed to fit in with TV3's target demographic of the 15 to 49 age group. 'We recognise that we're not going to take RTE's audience away from them.' Ennis comments, 'and they've got a 37 year head start on us. There's a lot of viewer loyalty there. Where we see our audience coming from is a small amount of RTE1's viewers, a slightly larger number from N2 but we also saw ourselves repatriating a lot of viewers, those who are currently watching the British channels or Sky. And this has largely been borne out.'

The service is currently available to 88% of the population using the UHF network, and, already, figures show that average audience share is just over 7%, one point above its target for the first year. TV3 is also a must-carry for cable and MMDS systems, making for a total availability of over 90% of homes. The 12% of the country that is unable to receive TV3 is predominately around the mountainous Western and Northern seaboards. Work is currently underway to install booster stations to extend coverage to these regions.

TV3's digital system places it comfortably for the coming of digital terrestrial in Ireland, which may begin by the start of the millennium. Under current proposals, TV3 will share a multiplex with TnaG and while Ennis says that the station is ready for DTT, there is concern that too much dominance is being given to the state broadcasting sector under the government's plans.

The channel's early success is only among the public, however. Ennis admits that critics are lambasting the station, which is criticised for broadcasting too much foreign programming and not enough home-produced material. One journalist was moved to call TV3 'The bastard son of Sky', a quote that is now blown up and proudly displayed in the news room. At the minute there is no place for an updated Garda Patrol but given the popularity of true-life crime programmes today, it might not be too long a wait. ■

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Audio Over ISDN

Having addressed the technological basis, common applications and use of digital audio codecs, in part three **Jeff Cohen** concludes this series on ISDN with a look at some application specifics

ONCE ISDN IS ESTABLISHED in a broadcast centre or individual studio and its operation has been mastered, its management can frequently be improved. Many radio stations with long-standing methods for sending and receiving audio traffic found that ISDN did not easily fit into their existing setup. One common problem experienced by small local radio stations is where an outside studio once linked via a local analogue line was wired so its output could be monitored or recorded at the main centre in several studio areas plus newsroom and offices. If the remote studio is then converted so it is linked via ISDN it may only be possible for staff in the one studio which has dialled it up to monitor the line and others who were used to listening or using the feed will lose that facility. However, the economic benefits of ISDN over other kinds of audio communications generally encourage re-equipping of studios and newsrooms to retain well-established facilities.

A number of other improvements are desirable once ISDN is in use. These include remote control of audio codecs from the studio desk, sharing of codecs and ISDN lines among various studio and recording areas, the ability to transfer calls around different codecs or different studios, and integrating ISDN calling into existing audio routers, switchers and source-selection systems.

A number of devices now on the market can help in the management of ISDN. Codec manufacturers provide remote control software for a single codec that allows a PC to display the names and numbers you wish to dial, codec encoding parameters, and call status.

More sophisticated systems such as Nicral's ARC allow various ways of networking and control of codecs and audio source selection—for instance, several studios may gain access to various codecs. This saves on the cost of equipping each area with lines and codecs, and can provide for much flexibility. Canford Audio sells an ISDN Terminal adaptor that will interface with any kind of audio switcher and will dial up a particular number when a contact closure is made by the switch. In this way it is possible to integrate ISDN calling into an existing source selection system that was built for analogue lines.

Many codecs give users access to Ancillary Data (spare digits that not needed for audio coding). This is presented in RS232 format via a 9-pin D-connector at the back of the unit and a wide variety of applications have been found by users for this data stream. Time code is one such use, as is data from a studio desk showing information about the mix. Another example is feeding sports results in text form from the studio to a remote commentator who needs to report on the scores at other events.

An audio codec manufactured by the Dutch firm Youcom allows control from the studio of the audio levels of the sports commentator and the crowd noise microphones, so the commentator is freed from worrying about the balance. One broadcaster with some small self-operated contribution studios is using ancillary data to switch its lighting off and on. It is even possible to use this data channel to provide a low-grade talkback channel by feeding it into a 3kHz voice codec operating at 9,600 bits per second.

Early digital-audio codecs were not designed for portability, and were not built to be very rugged. But as a lot of equipment is constantly on-the-road manufacturers responded by producing units such as the Zephyr Express from Telos Systems, MPAC from AEQ, and Roadrunner from CCS-Musicam. These are built to take the rigours of being constantly transported yet support much the same comprehensive facilities as the rack-mounted models. The GSGC series from Glensound >

PHOTO: JOHN MAHER AT THE STOCKMARKET

< has also optimised battery power for sports commentators seated in stadiums without main power (three D-size batteries last nearly 6 hours).

Several manufacturers are now producing combined portable audio codecs and hard-disk recorders. Similar electronics are required for both these functions so it was fairly inevitable that they would come together. Equipment from Sonifex, Dialog4, Maycom and Youcom allow either live transmission via ISDN, or the ability to record and edit then send as a data file via ISDN, telephone modem or even email. Via ISDN the transmission might even, if required, be faster than real time by, for instance, recording at 64kb/s and sending at 128kb/s. Sending via a telephone line can be at real time with the sort of data rates now available from modems. In addition to these combined recorders and codecs, several manufacturers now produce stand-alone 'analogue' codecs dedicated and optimised for sending digitally-encoded audio via standard phone lines. This, Comrex, CCS-Musicam, and AETA responded to broadcasters' needs by manufacturing audio codecs that could be used on the plain old telephone system (POTS) from locations without ISDN lines and their performance has been constantly improving due to both modem and encoding developments. The latest model, Vector, from Comrex can provide up to 15kHz audio on a good connection, but POTS line quality can be unpredictable, unlike ISDN where bandwidth is guaranteed. If the modem is unable to achieve the required bandwidth or the line quality deteriorates during the call the audio may fall to just 5kHz.

Several manufacturers are now producing combined portable audio codecs and hard-disk recorders. Similar electronics are required for both these functions so it was fairly inevitable that they would come together

In contrast using analogue lines for high-quality audio, some newly released equipment uses ISDN lines to convey standard 3kHz telephone calls. Broadcasters put on-air quite a number of phone calls and ISDN provides some advantages over conventional telephone interface equipment, such as low noise, clarity, and complete separation between incoming and outgoing audio. A new box from Telos Systems exploits all these advantages in a sophisticated 'phone-in' system capable of handling a large number of lines along with additional facilities that programme makers need such as screens of data showing callers' details. An ISDN call dials up rapidly (in a fraction of a second) and one interesting recent new application is for long distance studio-to-studio talk that connects the moment the key is pressed and thus you only pay when you talk.

Maya Send—a software-only audio codec running on a PC—has recently appeared on the market and permits connection via ISDN with a hardware codec. It will be interesting to see if this idea catches on. Many studios already feel they have enough PC screens but where budgets are tight the cost advantages can be tempting.

Broadcasters often wish to provide reporters with a fully-equipped remote office and studio on location. Digital circuits (such as both ISDN and permanent point-to-point lines) can support connection from a centre to a remote office with the sharing of the bandwidth by many devices using a piece of equipment known as a multiplexer. This may be used in effect to divide up a data stream and feed it into such things as an audio codec, PCs, telephones and other items of digital equipment. Thus for example it is possible to supply journalists with a connection to a newsroom

computer system, narrow-band intercom line and high-quality audio for filing reports. This can all be accommodated on a line with a bandwidth as low as 64kb/s.

It is now becoming less expensive to lease a permanent circuit at 2Mbit/s (known in telecoms parlance as an E1) and these have now replaced the analogue sound lines previously offered to broadcasters by BT. ISDN is ideal for ad hoc links but it is often necessary to connect sites on a permanent basis such as for studio to transmitter or satellite uplinking. Even if connection is required for more than about four hours per day, it can be more economical to have a permanent circuit than to dial up on ISDN. A service known as MusicLine 2000 is offered by BT and uses a 2b/s line and multiplexer to support up to four audio lines in each direction plus narrow-band talkback lines and RS232 data. For a distance between sites of about 2 or 3 miles this will cost nearly £7000 for installation and £7000 per annum rental. However, many broadcasters are choosing to do it themselves and buy their own 2Mb/s multiplexer such as that made by Intraplex. This is a sub-rack with 18 slots that can be filled with a variety of different cards for wideband audio, RS232 data, talkback, remote telephone extensions or computer LAN connection. The audio cards available cover a range of bandwidths from 1Mb/s down to 32kb/s using linear, J.41, apt and MPEG (Layers 2 and 3) and both analogue and AES-EBU inputs and outputs. KISS FM is using a pair to link its radio stations in Manchester and Leeds such that it provides not only several channels of audio in each audio but also links the computers controlling the advertisements and central audio storage system. You can make a good financial case for buying your own multiplex equipment and digital circuits. In some instances the newer telecommunications operators such as local cable companies are offering very good tariffs for 2Mb/s circuits.

ISDN is useful as a backup to point-to-point circuits for those occasions when they fail and automated equipment for this purpose is on the market from KW Electronics.

For many years a service known as a Fractional Digital Circuit has been available in the US. FDC allows a customer to use one circuit (normally what is known as a T1 operating at 1.54Mb/s) for communications with many sites. This is achieved by effectively splitting the circuit into different channels and the telecommunications operator routing the individual channels to different sites as nominated by the customer. By contrast, in the UK it was always necessary to lease a separate 2Mb/s line between each site and this could be prohibitively expensive. However such a 'fractional' service has recently become available here from the newer telecommunications operators and is used by the Scottish Radio Holdings and Capital Radio Groups to link between various stations.

The deregulation in the UK has allowed many new telecommunications developments to take place. A recent innovation is the freeing up of some radio frequencies for what is known as Spread Spectrum communication. This uses very small amounts of power spread across many frequencies and no licensing is required for transmission equipment that can operate over a range some half dozen miles. So rather than eternally paying rental for a digital line if you have the opportunity of clear line of sight and the motivation to install an antenna on the roof, in a short time this equipment will pay for itself. It could be linked to a multiplexer such as the Intraplex unit or with an appropriate interface AES-EBU equipment could be directly connected.

Telecommunications is one of the world's fastest growing industries and new equipment and services are constantly being launched. In its trail, the audio industry has been providing us with equipment to connect to them and which can solve our problems and reduce costs. The down side is that we all have to get to grips with the complexities of a lot of new technology. ■

Louis Studio

Moving up from the middle market gave Louis Studio the opportunity to reinvent itself. **Tim Goodyer** visits a Belgian facility with its eye on the international stage

Studio manager Luc van Acker in front of André Waterkeyn's Atomium in Brussels

SINCE THE PROJECT STUDIO decimated the middle order of the recording market during the 1980s, there have been few options open to those wanting to run a viable professional facility. Coupled with the record companies' prioritisation of back catalogue CD releases over new recordings, the rise of project studios ensured that simply cutting back on wages and investment would not ensure a studio's survival. The majority of high-end recording facilities quickly identified classical recording and then expansion into audio-for-video postproduction as the means to keep the books balanced. For many this has worked, and in doing so has helped create an alternative opportunity for those wishing to remain focused on sound recording.

While many artists enjoyed the novelty and freedom afforded by a personal facility, their opportunities to book time in a properly equipped, maintained and managed studio were diminishing. And when they emerged from their own rooms in need of live rooms, large consoles, quantities of outboard, high-quality monitoring environments, and purposefully creative environments there were few. Now, they are quietly coming back, fuelled by the need for all of the above as well as technical and creative input from engineers with a full microphone cupboard and diverse experience of the recording process.

One such facility is Louis Studio, a single-room residential studio in Tienen, 50km east of Brussels. Recently reopened after extensive refurbishment and having an upper (residential) story added, the studio owes its history to Louis Jans' passion for recording. Beginning with 4-track and 8-track studios, Jans opened Studio 20 some seven years ago with a Soundcraft 3200 desk and a pile of outboard ('We used to bypass the console except for the faders') on the site that is now Louis Studios. Having redesigned and rebuilt almost every aspect of it, he now operates a first division SL9000j room with a Pro Tools v4-Apogee hard-disk system and Genelec monitoring, and an even longer outboard list that includes AMS Neve reissue 1081 EQs and Purple Audio M76 compressors. To date the new facility has hosted five album sessions by artists from Belgium and Holland, with an eye to extend its international clientele.

Luc van Acker and Louis Jans

'It was another class of studio,' Jans says of Studio 20, 'but it was fun. The name change is because it isn't Studio 20 any more, it's something totally different.'

Moving out of the fading middle market brings the studio into competition with other Belgian facilities such as ICP, Synsound, Jet (itself currently being refurbished), Caraibes, Moliere, La Chapelle and Galaxy. Accordingly, Jans has increased the studio rates by 100% and has been pleasantly surprised that he's attracted not only new clients but also retained old ones. 'Some were clients before the refurbishment,' confirms studio manager Luc van Acker, recently recruited from Galaxy. 'We didn't expect everyone to want to pay more, but it hasn't been a problem.'

'Belgium is rather small to support a studio in this price class,' Jans continues. 'If you want to get people over here you need to have rooms and offer a service.'

If the move up-market seems to have been all but inevitable, the intended profile of the studio seems to have been similarly fated. Running more than a single room was never on Jans' agenda before Van Acker arrived, and he would have opposed it if it had.

'To be able to say "I have a studio with four clients in it" is a bit of a circus act to me,' states the studio manager. 'I did that circus act for three years and I'd had enough of it. I had to deal with so many problems that I couldn't give any of the artists enough attention. This afternoon we got a guitar for one of the guys here because he asked for it... That's a personal service we can give to our clients because there's time to take care of it. To offer that same service in a four- or five-studio complex you need so many personnel that it's not profitable any more. If we wanted another room it would be a better idea to leave this as it is and open another studio at another location.'

With the equipment and the gameplan in place, the missing element is service. 'We rent the studio with Louis as an engineer and with two assistants,' says Van Acker. 'It depends on the project and if they have their own engineer,' adds Jans, who also serves as the studio's chef. 'On a yearly basis, I'd say I work on 70% of what comes in but you never know, I might have half a year when I'm not an engineer. In August we had Terranova and I was a cook. In September we had Super Sub and I was a cook. We think the service is the thing that's going to count in the end—it's like why you go to one restaurant and not another. The studio has now been open for seven months, and everybody has been smiling when they left and talking about coming back. That's a great sign.'

Taking the extensive outboard of Studio 20 as a starting point, Jans set the benchmark for Louis Studio with the

PHOTOGRAPHS ON THIS PAGE BY TIM GOODYER

SL9000j console. Again the choice seems to have been straightforward: 'We looked at the Euphonix and briefly at Neve, but it became SSL and we are very, very, very happy,' says Jans of its performance.

'You need to convince people to come into a new studio and when the learning curve is lower, the threshold is lower for them to come,' Van Acker adds. 'But it's not only the learning curve, it's being assured that you can get the sounds that you want. With Neve and SSL desks it's like plugging a Les Paul guitar into a Marshall amp and getting a certain sound from the beginning. With digital consoles there isn't a sound to start with, you have to create your own space within the digital domain, and that's a very difficult thing. I think there are enough engineers who, after a couple of weeks, can operate a digital console, but I don't know many who can create a whole album and say they know exactly what they're doing and how it's gonna sound.'

As well as music recording, Studio 20 hosted film recording and mixing but lacked surround monitoring, Jans notes his dissatisfaction with the subsequent transfer to surround production when specifying the monitors for Louis Studio. 'To install surround monitoring is obvious when you see what is happening in the market,' he confirms. 'I've taken music from the new studio and, you have the coloration of the film mixing room, but it is exactly the same. We are also able to check that anything mixed in stereo transfers well to Dolby Surround.

'I've always had Genelecs, I'm a Genelec freak,' he says of the new 1039A-1037A 5.1-channel system. In fact, the studio reckons to have every Genelec speaker currently in production. 'Working with them is like sculpting with a chisel. I tried other speakers—we have Westlakes here, NS10s, we've tried Mackies, big Questeds—but I don't like working on anything else.

'We can patch whatever you want,' Jans continues. 'You can do plain old Dolby mixes, you can do 5.1, you can do 5 without the .1, or you can shut off the surrounds and use the three front channels...'

Apart from the outboard and microphone lists, one of the few equipment legacies of Studio 20 is the Pro Tools v4-Apogee AD8000 system that sits alongside the Otari MTR100.

'When I saw the AD8000 I knew a Pro Tools system with all the plug-ins and a high-end conversion system was a winner,' Jans enthuses. 'The Apogees have the Soft Limit feature that emulates analogue tape —I switched from analogue to the Apogees and I had no problem, no problem at all. Our analogue machine hasn't been used for three months now.

'I have to stress also that we have a kind of custom-built Pro Tools system —it's an ordinary Mac but everything is very well installed on the hard disk to run very quickly and smoothly—you should never use automatic installers on the program disk, you need to get into the programs at a low level and install them carefully. The system is also very well maintained; just like you maintain and recalibrate an analogue machine; you need to maintain Pro Tools. We also have a mirror system that follows everything the main system is doing, so that if the system breaks down we can have it back up in five minutes.'

'These days a studio must be very flexible because people can walk in with an Otari disk, a Logic system, Pro Tools, ADATs, DA-88s...' Van Acker comments. 'Instead of pretending all those didn't exist and going with a 48-track machine, we chose the flexibility of offering all those systems - and all the sync problems that go with them. I think Louis could write a book on what syncs and what doesn't and why, and how to synchronise everything. And we've found that the Pro Tools is the most steady and reliable thing in the studio.'

But while Van Acker endorses computer-based audio, the philosophy of many of the people behind it greatly offends him: 'I find it criminal the way some things are sold these days,' he asserts. 'People are selling you boxes and if there's a problem the only thing you hear is "it was the other guy's box that made it crash", or they blame the studio for not hooking it up properly. If the manufacturers would form support groups to solve these problems, they would be providing a service we need but they would rather put their money into R&D so they can sell you another box.

'Fifteen years ago every studio had a maintenance engineer who knew all there was to know about the 2-inch machine and the console... If something went wrong, he would walk in and go "oh, it's that". He would know immediately what to do. These days we have digital equipment and sync problems and no service engineers to support them.' Which brings us back to the studio's emphasis on service and individuality...

Sitting in the lounge upstairs discussing audio involves a view of a flat roof beyond which lies a fitness centre and sauna. The roof will soon be a garden for the barbecues Jans wants the studio to host while the fitness centre offers all the indulgences it lacks. Inside, the décor is enhanced by light fittings that look like the work of an Art Deco Heath Robinson.

'It's not only the SSL,' claims Jans, 'often that just opens the door and it's the rest of the facility that wins people over—it's the lights, everything.'

'Weyers & Borms made all the lights,' Van Acker reveals. 'We saw some pictures of lights they had made on a Belgian CD. Their concept is to work with associations. The more you look at their work the more you see in it, so it's very inspiring to have around. We hope to have enough money to do more things like that.'

'The acoustics come first but the lights are kind of a trademark for the studio,' Jans continues. 'Everybody who comes here goes, "look at the lamps" and we're going "SSL 9k anyone?".' ■

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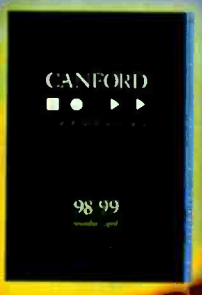

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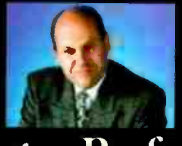

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US: Formats, formats, formats

Whether spoilt for choice or just spoilt, Americans are running out of time to choose its future delivery formats writes **Dan Daley**

AMERICANS LIKE to like options. 'Should we have Italian or Middle Eastern tonight? Would you prefer Planet Hollywood or Hard Rock Café? Want to rent *Goodfellas* or *Pulp Fiction*?' Of course, these choices are not really choices at all, just slight variations on one another. Which is to say, Americans prefer to have many of their decisions made for them, so long as they retain the illusion of choice. That is what is happening with regard to audio formats—but it is going to be easier to decide what we are having for dinner, where we are going for drinks, and what movie we are renting than it will be to know what format we will be listening to.

The effects of the passionate first encounter with multichannel sound are wearing off. In their place is the unpleasant reality that, as much fun as it is in the studio, surround audio is not going to go much further than the facility until an awful lot of people sit down and figure a few things out. One sign of the times is the fledgling formation of a guild of mastering engineers which, as of this writing, was little more than a series of phone calls, mainly between Denny Purcell (Georgetown Masters in Nashville) and Bob Ludwig (Gateway Mastering in Portland, Maine). But considering how busy the elite of this group have managed to keep themselves despite slowdowns in the rest of the business, when they begin to get flustered you know you have reached a problematic stage.

'There's too damn many formats out there, and not enough people in this business know enough about all of them, much less asking consumers to understand what's going on,' says Purcell, one of the founding members of the aptly named MEGA (Mastering Engineers Guild of the Americas).

'You've got DVD-Audio and now we have the Sony-Philips Super Audio format coming around before consumers really know what DVD-Video itself is. We're getting inundated with competing formats, many of which are incompatible. The result is that it sounds poor and it's hard to know what to tell people. DVD has been around [in the US] for over two years now and they still haven't figured it out.'

The last time this bunch got fed up, it led to a quiet but significant revolution in how replication facilities do their premastering and disc manufacturing. BMG in Nashville and New York hosted conferences which vented the mastering engineers' feelings about how digital sounded,

The effects of the passionate first encounter with multichannel sound are wearing off. In their place is the unpleasant reality that, surround audio is not going to go much further than the facility until a lot of people figure a few things out. One sign of the times is the fledgling formation of a guild of mastering engineers which, as of this writing, was little more than a series of phone calls

while replicators came like penitent pilgrims to the bar to apologise, inspired by recognition of the errors of their ways and by falling unit prices. And just as mastering engineers are perplexed by the proliferation of formats on the professional side, the record labels are now becoming warier of multichannel recordings' potential to inspire sales among the public. What once looked like it might spark a replay of the

Europe: Formats, A never-ending story

Far from learning from past events, manufacturers of delivery formats seem determined to repeat their follies writes **Barry Fox**

IN EARLY NOVEMBER, TDK gathered some European press near London to visit the private studio used to make Genesis and Phil Collins recordings. The object of the exercise was to let us hear the difference between TDK's ordinary MD blanks and the new MD-RXG Pro discs at twice the price.

RXG uses a higher quality disc material and shell, which supposedly reduce errors and lighten the load on the servo mechanism, to improve sound. The studio, owned by Mike Rutherford, made parallel dubs from a 48-track DASH digital master onto MD. These were played back in sync on two Kenwood DM 9090 decks, through a Quad 520 amplifier and ProAc Studio 1 monitors. Both Rutherford and his engineer Nick Davis seemed convinced there was 'something different' about the recordings, and pointed to fuller, less woody, bass, a longer tail on the vocal reverb and cleaner top end. I think there probably was a slight difference, but it was very subtle.

Judge for yourselves, but do not mistake new MD Pro for the new second-generation, high-density MD that is already under development. Fujitsu has been working with Sony on GigaMO, which exploits lab research on Thermal Eclipse Recording made by Sony in the early nineties. The leaked news confirms fears that the next few years will see a new recording format war. In addition to HD-MD we can expect three different and incompatible 8cm versions of erasable DVD.

MiniDisc currently has a capacity of only 200Mb so must use 5:1 data compression in order to squeeze 74 minutes of stereo on the 64mm disc—GigaMo increases this capacity six-fold. MDs are coated with a terbium ferrite cobalt mix. Heat from a laser makes the coating temporarily lose all magnetism. As the coating cools it picks up magnetism from a surrounding field which is switched to create a magnetic pattern of spots which change the polarisation of read-out light. The GigaMO disc is coated with material sensitive only to the hot central core of the laser. Consequently, the relatively wide beam records small spots. To allow equally precise read-out, the disc has a passive top coat, that covers a lower layer that stores the magnetism. The central core of the read-out beam heats fine spots in the top layer that then 'sucks' magnetic information from the lower layer. So the beam 'sees' only very fine spots of magnetism, effectively focusing more tightly than the long wavelength of the infrared laser normally allows.

A pressed 12cm DVD holds at least 4.7Gb, which is enough for a full-length movie. There are now three different varieties of DVD, which can make erasable recordings. Hitachi, Toshiba and Panasonic back DVD-RAM, while Philips, Sony, Yamaha and Hewlett Packard have developed DVD+RW (plus RW), and Pioneer proposes DVD-RW (minus RW). All three discs rely on phase-change technology; the disc is coated with material, which switches between amorphous and crystalline state, and thus different reflectivity, when heated by a laser beam. All three disc types are embossed with a groove, which guides the laser over the blank during recording. They vary in the way they record data in and alongside this groove, and are largely incompatible. All three formats either can or will match the 4.7Gb capacity of a pressed disc.

At a recent meeting in Barcelona, the DVD Forum set the standard for 8cm versions of DVD. The small disc will record at least 1.4Gb, and as much as 5.3Gb if it is double-sided and each side has two

1980s, when everyone replaced their album collections with CDs, now looks like a potential economic quagmire with a long wait for a return on investment.

A litany of failed formats from the past indicates that the public will ultimately make up its mind and a winner will be chosen. But before the public ever gets to make a decision, other forces will have to duke it out. The result of this less democratic process is that, once the public gets to make its decision, it's generally Hobson's choice—any horse you want as long as it is the one closest to the door.

But if the public is to be presented with a *fait accompli*, those in professional audio get at least a ringside seat to watch the circus that leads up to it. What they are now asserting, via MEGA and other interface forums with the bigger players in this game, is a voice to do something to affect the outcome. Mastering engineers are in an excellent position to take the lead—for every album a major producer or mixer works on a year, someone like Purcell, Ludwig or any of their brethren works on ten. This would be a good time to speak up; DVD Audio v1.0 is just shy an encryption agreement as this is written, and three or four other disc formats are lined up ready to hit the streets, as is the Internet-based MP3 format, to be followed within a few years by flash memory devices. Someone had better impose a little order on this situation. Who better than the people who record the stuff? Then we can all get back to important matters, like figuring out what and where we are going to eat tonight.

recording layers. Panasonic has already developed dual-layer RAM.

At the Comdex computer show in Las Vegas in November, the +RW group hosted a briefing at which Michael Matson, Hewlett Packard's Vice President 'unfolded the +RW road map'. The assembled crowd was hoping for a clear pointer to the future and the chances of avoiding a destructive standards battle. But Matson said nothing of any discernible consequence; he made no reference to the rival systems, gave no overview or perspective, no explanation of why +RW might be better for the consumer or whether there is any hope of bridging the rival systems, as happened when Philips and Sony compromised with Toshiba on their rival DVD systems. 'Why no mention of DVD-RAM or DVD-RW?', I asked him afterwards. 'This is a DVD+RW briefing,' was the reply.

This kind of blinkered nonsense can only come from a computer executive, who has made a living out of making peripherals for formats which others have fought to establish. It shows no understanding whatsoever of professional or consumer electronics.

DVD+RW may or may not be the best system, but it is a sure-fire loser unless the group hands the reigns to someone with real-world battle scars, like Jan Oosterveldt of Philips who brokered the previous DVD standards deal.

Booming or busting?

The arrival of digital broadcasting and the Far-eastern recession are sending mixed messages to broadcasters writes **Kevin Hilton**

BOOM AND BUST is a common enough economic expression. The 1980s were a classic time of boom, followed by the inevitable bust in the early 1990s (although nobody in charge of the economy appeared to realise that this would happen). Boom and bust, cause and effect, the one following the other —but as economics is not a precise science, it can be said that this does not always hold true. At present there are doomy predictions of bust but some aspects of the broadcasting business are booming. Or appear to be.

Amid talk of a coming global recession, broadcasting, largely through the digital revolution (as we are now forced to call it), is expanding rapidly. New channels are coming on air around the world every month—at present—and manufacturers are excitedly issuing press releases detailing the big orders for everything from digital video format cameras, recorders and editors to servers and play-out controllers. Both of these indicators are, however, deeply misleading. They may give the impression that much is happening at an incredibly fast rate, but it has to be remembered that broadcasting today is itself a fast moving medium and industry, meaning that by the time one realises something is happening, it does not necessarily mean all that much.

This phenomenon was neatly summed up by the tag-line for a satirical comedy series (screened on the UK's Channel 4) set in a fictional news channel: 'To them, news is already history'. Gone are the days when there would be no news bulletins because there was no news to fill them; everything must be constantly changed and updated; lesser stories being bumped when something else—anything else—comes along. The trouble is, the broadcasters themselves are more circumspect when the news concerns them.

Last year, technology journalists were disgusted when Independent Television News tried to get them to sign non-disclosure agreements in relation to the organisation's on-going technological update. This was a definite attempt to control coverage, as is issuing information long after the event. At the beginning of November, I received a press release from Telex informing me that German production company Sono Studiotechnick used a Midas XL4 console for its coverage of the Wimbledon Tennis Championships. To save you checking the calendar, Wimbledon takes place during July.

So, by the time people hear about things—if the manufacturers have their way—it is already out-of-date, if not irrelevant. Of course, it puts the onus on the journalists covering this area to get the story by their own means and not rely on being told about it by somebody else. This is one misleading element in the current situation. The other is that the majority of new channels are not new channels at all. This is in the sense that many are plundering existing libraries of movies or TV programmes and that such new services only need a transmission suite and a machine room to get things on the air.

Publisher-broadcasters, stations that produce little if any of their own output and rely on buying in material, are nothing new: BSkyB is a classic example (although it commissioned its own soap last year), Channel 4 is a highly respected one, and Channel 5 is not. The proliferation of new stations has seen an increase of publisher-broadcasters, which depend on a high degree of automation; the initial outlay may be expensive, but ultimately this keeps down the staffing and operational costs in the long term.

At present manufacturers of such equipment are signing important orders and systems houses are inundated with work to install and commission these suites in quick time. Once installed, however, these will be expected to run for a number of years quite happily and although there will be a need to upgrade in the future, the big sales blips seen recently will not be repeated next year.

If you consider that too gloomy a prognosis, it is just how business, any business, works. And it is born out by the Asian experience. Up to June 1997, the Asia-Pacific region in general was the envy of the West; broadcasting in particular was a bullish market, with Rupert Murdoch's Star TV doing everything it could, including sucking up to the Chinese government, to establish itself in there. Western manufacturers saw orders increase from this area as even the smallest countries experienced a boom in channels; Sri Lanka (with a 1993 estimated population of 17,800,000) has in the region of eight TV stations and five radio stations.

The financial crisis in Japan and elsewhere in South-east Asia has slowed this considerably; broadcasters have been forced to cut back their development plans; the Singapore Broadcast Asia 98 exhibition reflected this, with a fall in attendance from previously strong areas like Indonesia. Whether this kind of collapse will be repeated in the West is uncertain but it is a reminder that things can go horribly wrong even when they look as though they are going horribly right.

A matter of quality

With producers, engineers and manufacturers looking to surround sound for their futures, the merits of stereo may have been overlooked. **Phil Newell** takes in the surroundings

JUDGING BY STATEMENTS made in the recording press, music-only surround DVD is the best thing yet for recorded music. The implication is that surround is a kind of 'super stereo', but relatively little discussion concerns the fidelity of surround systems as compared to good stereo systems. Can surround systems supply an extra dimension which stereo cannot, without compromising the quality we've come to expect from good stereo systems? And it is reasonable to expect consumers to find three or four times more money for their music reproduction systems in future? If not, we may be trading quality for quantity.

In most cases, those prepared to pay for and accommodate home theatre systems will be unlikely to have either the money or the space for a separate, dedicated, music-only stereo system. And it is this realisation that is forcing the music industry to regard the arrival of home cinema as sufficient competition to want to embrace rather than fight it. It follows that much recorded music will have to be made to fit a home-theatre format, to which it may often not be suited. Ultimately, the quest for quality does not seem to be being given its due attention.

Hi-fidelity stereo is not dead, however. It is not even unwell; it's alive and kicking. It survived the onslaught of quadrophonics in the 1970s, and it will, no doubt, survive the surround craze, at least where true high fidelity is concerned. The reality is that stereo works extremely well, and is relatively convenient to employ in a domestic environment. Discrete surround functions best with at least ten sources, which is impractical for domestic use.

Perhaps it is also true that surround is best suited to be an adjunct to film or video, and is not inherently well suited to music only. The question therefore must be asked, what are we being sold, and do we need it?

Stereo, despite is limitations, gives a fairly good representation of the way in which we usually hear music when performed live; that is, on a stage, and in front of us. The Pink Floyd are one of the few bands who have consistently put on quadrophonic or surround performances. The very fact that this has been something largely associated with them is due to its rarity. That rarity is, however, probably not due to technical or financial restrictions, but to its unsuitability to most musical performances. Mahler wrote parts for an offstage, distant brass band in his Second Symphony. This was to create an ethereal sensation: it was his 'Resurrection' Symphony. In Berlioz' Requiem, he called for brass 'choirs' from each corner of the hall. In fact, such 'surround' presentations go back to around 1600, and the work of Gabrieli, but the intervening 400 years have only seen sporadic use of surround presentations, and these have usually only been for special effect. It should be remembered, though, that any special effect which is over-used soon ceases to be special, and this will perhaps be what will happen with some applications of surround.

There can be many pitfalls for surround mixes. The impact of two electric guitars playing together, for example, can be completely lost if they are spatially, and even marginally temporally, separated. The lost impact which may occur with surround may well not be compensated for by the extra spatial effect. It should seem obvious that if such guitars were better in a frontal spread, then that is where they should be put, but what will be the pressure on mixing personnel to separate them if the record company is blindly calling for a surround mix? What options are left open to the mixing team in the studio when one only has bass, drums, two guitars and a vocal to work with? Will the impact of the mix be watered down, merely to fulfil the requirements of surround, or will unnecessary instrumentation or effects be invented to fill the space, which may possibly only serve to create distraction?

The recording press is currently awash with producers telling us about their wonderful plans for surround, but to many of us who passed through the quadrophonic era and have the scars to prove it, it all seems like *déjà vu*. We are still confronted with the same laws of acoustics that faced quadrophony. Human perception and psychoacoustics have also not changed. While it is true that the delivery systems were severely lacking in their capability in the quadrophonic era and that those problems are now largely past us, the fact remains that for a great number of engineers, producers and musicians, the disappointment of quadrophony was first encountered during the actual mixing. That dissatisfaction came from the positional instability of the mixes, the artistic inappropriateness of spatially splitting many musical groups, and the serious room to room compatibility problems. After between six and ten years of trying, many quadrophonic mixing personnel decided on the use of a frontal sound stage with ambience at the rear. Ambisonics also began to develop a following, but just as sanity was beginning to win the day, the quadrophonic bubble burst, and CDs brought new life to stereo.

HOWEVER, with current technology, there is an option that offers many benefits of surround, with few of the drawbacks: 3-channel stereo, with ambient surround. In such use, 5-channel surround systems can really deliver a sensational improvement over 2-channel stereo. Nevertheless, the commercial question which this raises is whether enough people will be prepared to buy 5-channel equipment to make such mixes worthwhile, or whether discrete surround will be the only idea promoted. The other big advantage which such a concept has over discrete surround mixing is that it is relatively straightforward to design control rooms which are absolutely optimised for conventional 2-channel stereo, or 3-channel plus ambient surround mixing. On the other hand, the optimisation of rooms for 2-channel stereo and discrete 5-channel or 5.1-channel mixing can be a very demanding task, and will not suit many spaces.

Tomlinson Holman recently wrote, with regard to 5-channel surround, 'rooms should have a diffuse sound field, so far as practical. This means scattering absorptive and diffusive elements among all the surfaces—not half-live, half-dead'. At a stroke, that rules out a large proportion of the world's most well-known and successful stereo mixing rooms, be they Live End, Dead End, Non-Environment[1], or variations on those themes. There are also many other widely used bi-directional stereo control rooms of good repute, such as those by Jensen, Toyashima[2], Walker[3], Voelker[4], and others.

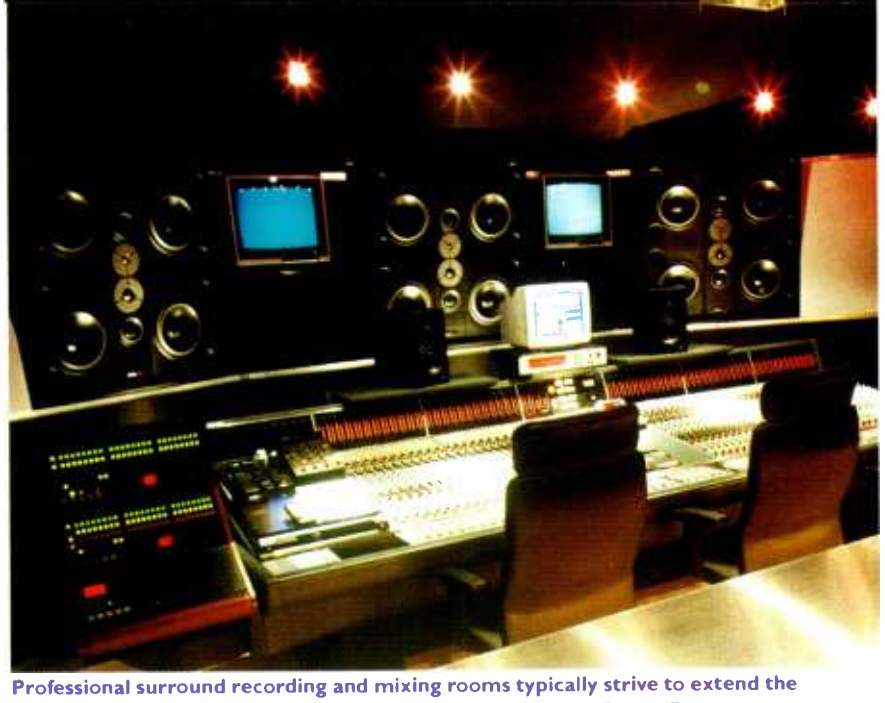
It is not possible to build practical rooms in which the front and rear walls serve equally well as projectors and receptors of sound. Mixing in anechoic chambers, which would be the only rooms which could accommodate all formats, is so unrepresentative of any realistic listening rooms that it is not worth considering. Furthermore, such acoustics are quite unpleasant to work in. Nonetheless, it is perhaps the only way to hear audiophile quality discrete surround in any repeatable form.

A paper in the 1997 Institute of Acoustics, Reproduced Sound Conference[5] dealt with the mutual coupling

problems with surround images in anechoic and non-anechoic situations, between the loudspeakers themselves, and between the loudspeakers and their reflections. Compared with surround, the corresponding problems in 2-channel stereo pale into insignificance and lead directly to variability of reproduction, which is the antithesis of fidelity. The fact is that all advanced forms of stereo control room design have bidirectional acoustics, and even many listening rooms employ such techniques. For that matter, the same can be said for most concert halls. An orchestra performing in the stalls with the audience on stage would be unlikely to satisfy either party. Whether live or recorded, sound production and reception acoustics tend to be different. Whilst the previously mentioned comments of Tom Holman are a well grounded logical conclusion for surround listening rooms, they clearly do not meet the optimum demands for stereo. Many people trying to adapt stereo rooms to surround use, have discovered that each time the rooms are improved for surround use, those adaptations tend to detract from the optimal stereo performance requirements.

We simply cannot make symmetrical surround monitoring, because we do not have symmetrical front-back perception. A result of this is that the nature of the front wall in surround equipped rooms is critical in terms of the characteristics of the rear monitor sound. The reflective, diffusive or absorbent nature of the front wall surface will dramatically affect the perceived character of the rear loudspeakers, unless the side-facing rear loudspeaker format is used, but this, until now, does not appear to be making too much headway in music-only mixing. The subjective loudness of the balance between the front and rear channels is strongly affected by the strength and frequency content of the front-wall reflections. In fact, with highly reflective front walls, some sounds emanating from the rear loudspeakers may actually appear to be coming from the front though a little delayed due to the extra distance travelled. This is especially true with high frequency sounds, where the directivity of the ear can render the front wall reflection to be perceived more strongly than the direct sound from the rear.

Five-channel surround, especially in the case of the discrete concept of mixing, is simply so room dependent that finding an arbitrary compromise may, in practice, be so unrepresentative as to render it useless. If a common concept of control room design were agreed, it would provide a reference point for serious listening, but surround mixes will largely be carried out under conditions even less standardised than is the case with stereo. The situation with stereo compatibility is already diverse enough, but it seems that we are heading for an era with surround (which is an inherently more room-sensitive format) being mixed in rooms with even less in common between them than between those in use for stereo mixing.



Professional surround recording and mixing rooms typically strive to extend the monitoring principles of stereo monitoring—as at London's Pierce Rooms

It seems ludicrous to let go of what we already have whilst grasping for something that we cannot reach. The answer seems to be to keep our excellent stereo control rooms, which can handle the addition of a centre-channel without acoustic compromise, and to add ambient surround loudspeakers without damaging their stereo performance. Considering the extreme sensitivity of surround mixes to the listening environments, the mixes which such rooms produce should not be noticeably inferior to those done in purpose designed surround rooms in terms of their compatibility with domestic reproduction. Such rooms would meet the needs for audiophile quality stereo mixing, audiophile quality ambient surround, and typical Ambisonic-type mixing. They would not be ideal, however, for fully discrete surround mixing, with lead instruments coming from rear loudspeakers.

Conversely, the majority of rooms specifically designed for discrete surround mixing are less likely to support audiophile quality stereo mixing. In fact due to the gross variation in domestic surround electro-acoustics, they may set a standard which will tend to be rather meaningless in the final application of their work: domestic reproduction.

If these things really reflect the situation that we are faced with, then surround is not an audiophile format, and cannot be marketed as such. There is, of course, no reason why this fact should deny surround the right to exist, but if it is the case, then the fact should be openly publicised. For those people for whom the spaciousness of surround is a great pleasure, then they can chose to buy surround systems if they so wish. However, for the people who enjoy highest quality stereo, it would be an outrage to lead them into spending large amounts of money on surround systems, in the belief that they are about to experience sensations which will be entirely in addition to what the best stereo can offer. In many ways, audiophile stereo and fully discrete surround exist as alternatives, and it is certainly not the case that the latter supersedes the former. The option of 3-channel stereo with ambient surround is a compromise which, in reality, is probably in most respects superior to either option alone. The big question is whether or not it is sparkling enough for the business people to feel it to be worth a big marketing push.

If not, then, discrete surround will be marketed for all it is worth, and in five years time there will be a lot of disused equipment, with the majority of people listening to stereo, once again. Should this situation come to pass, then a huge opportunity to take a great step forwards will have been lost. ■

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DR JOHN

Inductors

Continuing his discreet approach to the operation of electronic components, **John Watkinson** finds himself in the compelling company of inductors

INDUCTORS ARE UBIQUITOUS components. They are found in, for example, equalisers, crossovers, delay lines, power supplies, and EMC control, but they seem to suffer from what can only be described as bad press. Many designers don't like to use them, but they are missing out.

Even a straight piece of wire has a small inductance. This can be increased by winding the wire in a coil and increased further by placing a magnetically permeable material in the coil.

Essentially the inductor is the dual of the capacitor. Both store energy, one in a magnetic field, one in an electric field. This difference is what makes the inductor useful. Fig.1 shows a mechanical analogy. At Fig.1a, energy is stored in a compressed spring. The applied force balances the reaction from the spring and so there is force but no movement. This is like a charged capacitor holding voltage but no current. At Fig.1b, energy is stored in a revolving flywheel. If the shaft turns at the same speed as the flywheel, we have movement with no force. This is the condition with a charged inductor where there is no voltage if the current remains constant.

Whereas a capacitor tries to keep the voltage across itself constant, the main characteristic of an inductor is that it tends to keep current flowing. If any agency tries to alter the current, the inductor will respond by developing a voltage whose polarity tries to maintain the flow. Thus the inductor can be used for decoupling.

If the current in an inductor is interrupted, a large voltage can result. The automotive ignition coil is a good example. A current is established in a large inductance, then the contact breaker points open and we get a spark. The EHT in a CRT is obtained in much the same way.

Fig.2a shows that when we drive an inductive load such as a relay with a transistor, the inductive effect will zap the transistor when it turns off. The solution is to put a diode (Fig.2b) across the coil so that the current has somewhere to go when the transistor turns off. The energy stored in the coil will be safely dissipated in the coil resistance. This effect also has to be considered in power amplifiers driving moving-coil loudspeakers, particularly if the amplifier is driven into clipping.

Inductive storage is also useful in deriving additional power rails. Fig.2c shows that a transistor switches on allowing current to build up in an inductor. When the transistor is switched off, the flywheel effect raises the voltage across the coil to allow the current to continue to flow. This raised voltage makes the flywheel diode conduct into a smoothing capacitor, producing a second power supply rail higher than the first.

The amount of energy stored in the inductor is controlled by the 'on' time of the transistor and so the voltage of the second rail can be made variable without the heat build up of a linear regulator. This is the main advantage of the switched-mode power supply. The active devices are either fully on or fully off and so don't dissipate much heat.

The ideal inductor has only inductance, but real components will have finite resistance, stray capacitance and losses, especially in inductors having permeable cores. The advantage of the core is that it dramatically increases the amount of energy that can be stored. However, the core can also saturate magnetically when a certain current is reached and this causes the inductance to become nonlinear.

If the energy is limited by saturation, transferring energy more often can raise the power. This leads naturally to the use of high switching frequencies in power supplies. The higher the frequency, the easier it is to smooth or decouple the output, again using inductors. In practice the frequency used is a compromise because losses in the inductors and switching losses in the active devices will increase with frequency.

Fig.3 shows a switched-mode regulator. The input is raw DC from a bridge rectifier. A series transistor or chopper will be either on or off. When it is on, current ramps up in the inductor, which stores energy and the output voltage rises. When the correct output voltage is reached, the transistor will turn off. The flywheel action of the inductor means that current continues to flow into the load via the flywheel diode. The output voltage now falls as the energy in the inductor is used up. The control system simply switches the transistor on and off at high speed so that the amplitude of the output voltage variation is made small. A suitable Pi-filter will reduce it further.

If the inductor is replaced with a transformer to obtain isolation, the input can be obtained by rectifying the AC line and the mains transformer is eliminated. The switching transformer is much lighter and smaller than a mains transformer of the same power. Voltage stabilisation by feedback means that no voltage selector is needed. The feedback also means that much larger ripple is allowable on the raw supply. The conduction angle of the bridge rectifier can be increased and the distortion of the AC waveform reduced.

If the reference of a switching regulator is changed, the output voltage will change. This is the principle of the switched-mode amplifier. This is effectively a bipolar power supply with a modulated reference. Switched mode amplifiers have an huge efficiency

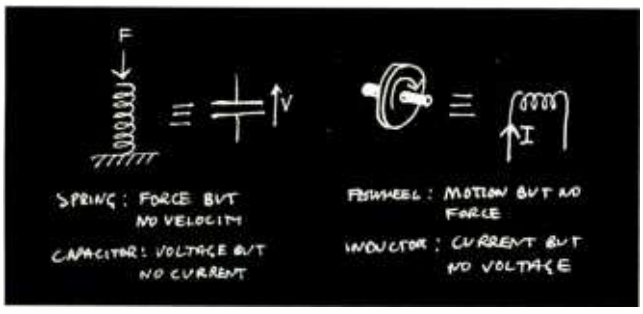

Fig.1: Mechanical analogy of capacitor

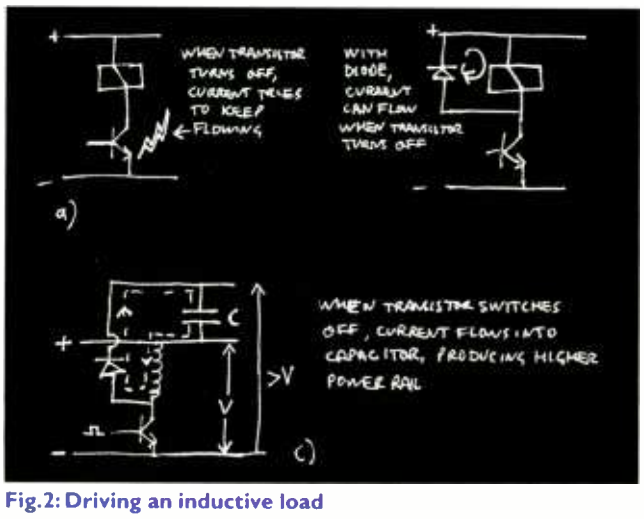

Fig.2: Driving an inductive load

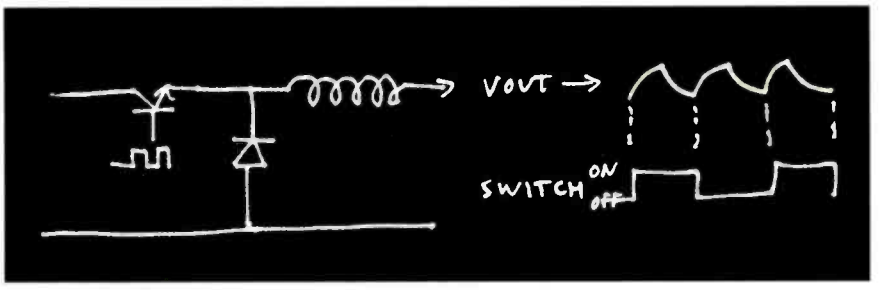

Fig. 3: Switching regulator

advantage over class-B audio amplifiers because the active devices are either on or off. In portable applications this extends battery life and in high power applications there are economies to be made in the area of power supplies and heat sinks.

While it is difficult to obtain the lowest distortion figures at the top end of the audio spectrum using a switched mode amplifier, in active speakers the amplifiers for the woofer are not required to have wide bandwidth and a switched-mode amplifier then becomes ideal.

The audio industry seems to resist developments such as switched-mode supplies and amplifiers, but the reasons given do not stand scrutiny. Most switchers are intended for the computer industry where the loads are constant and much more tolerant to ripple, so these are not going to be adequate for audio. That does not mean that a switcher cannot be built to audio standards; it is just a question of setting the appropriate criteria and meeting them.

With heavy pulsed currents flowing, circuit-board layout is critical in switchers to avoid common impedance effects, just as it is in class-B amplifiers. Remember that the main advantage of the printed circuit board is economy of construction. From the standpoint of optimal layout and the avoidance of common impedances, the printed circuit is actually suboptimal, especially when designed by CAD systems intended for logic circuits.

Whereas the capacitor has an impedance, which falls with frequency, the inductor has one, which rises with frequency. Consequently, the inductor figures prominently in the crossover networks of the traditional passive loudspeaker. Fig.4 shows a simple 2-way system where an inductor is placed in series with the woofer and a capacitor in series with the tweeter. From an audio performance standpoint it is quite awful, but it is cheap and easy to understand.

The transformer is the result of making two inductors share a common core. Now the performance is determined by the mutual inductance, defined as the voltage on the secondary for a given rate of current change on the primary. Transformers are primarily impedance convertors, changing between high-current-low-voltage and low-current, high-voltage domains. In this respect the transformer is analogous to the mechanical gearbox.

The tight coupling between the primary and secondary windings of the transformer gives it a certain transparency to AC signals. The characteristics of a complex load are reflected into the primary by a ratio, which is the square of the turns ratio. For example, seen through a 10:1 transformer, 10Ω in series with 1000μF looks like 1000Ω in series with 10μF.

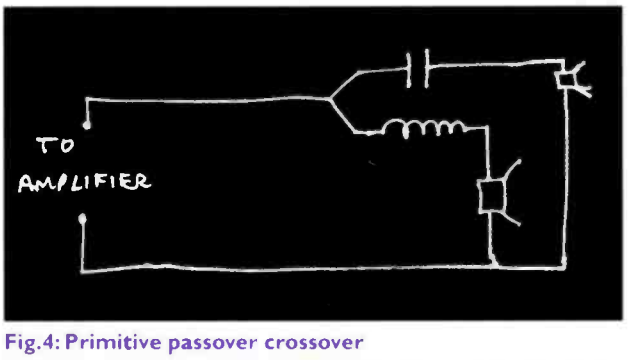

Fig.4: Primitive passover crossover

Transformers are ideal for interfacing very low impedance transducers such as ribbons and very high impedance transducers such as electrostatic speakers to the impedances more usual in electronic circuits. Vacuum tube amplifiers work at relatively high impedances and an output transformer is essential to interface to loudspeakers. Splitting the primary makes differential or push-pull operation easy.

Transformers come with free isolation between primary and secondary, so the voltages on each side can have different references. This makes the transformer ideal for converting from balanced to unbalanced signals with extremely good common mode rejection. Making a winding centre-tapped produces a phase splitter.

Finally the inductor is useful for suppressing interference. The humble ferrite bead threaded over audio input wires introduces a loss mechanism at radio frequencies. A set of wound inductors in the AC line socket prevents rectifier switching noise going back down the power line. ■

Advertisers Index

20-20 foresight

While audio aficionados debate the quality of forthcoming delivery formats, big business is lining up the big picture. **Tim Frost** offers an retrospective overview

IN YEARS TO COME, when albums have moved entirely over to one of the new formats, we'll look back on the shenanigans of the DVD Forum and SACD and wonder what the fuss was all about. We'll also then know that the new format's extra audio quality pleased artists, engineers and player manufacturers, but proved largely irrelevant to the huge majority of its users.

Let me explain. When CD arrived it was like a gift from the future. It wouldn't wear out, it didn't suffer from pops and clicks, a scratch wouldn't make it unplayable, you could jump from one track to another at a touch of a button and finally it had the promise of 'digital sound'—whatever that was. The point is that while CD's sound quality was a bonus, it was not the key to its success. Instead, it was the convenience and attractiveness of CD to the general album-buying public that made it what it is today — and of course the fact that a CD player now costs so little to manufacture that it can be virtually given away in a midi system or ghetto blaster.

Moving music from CD onto a new medium, whether it is supplied by DVD-Audio or SACD, offers none of the additional convenience factors that differentiated LP and CD; in operational terms CD and DVD are interchangeable. There are extra features like text read-out and the ability to display images, but if these were truly in demand, then Enhanced-CD would be much bigger than it is today. DVD and SACD offer only two things that can't be supplied by CD.

The first is higher sound quality, as represented by higher sampling and bit rates. I declare from the outset that I am, or at least was, a card-carrying audiophile and believe that irrational and non-scientific audiophile 'magic' can and does work. There's no argument in my mind that larger digital words and higher sampling rates give better sounding recordings. But I'm in the minority—the bulk of the music-buying populace doesn't have systems that can expose the differences and largely don't care.

DVD's other card is surround sound. Having convinced all the family that having several speakers in the living room for a home entertainment system is a good idea, inevitably movie enthusiasts are going to want their music in more than 2-channel stereo. That will spur the demand for surround albums. But even this doesn't further the aims of audiophile sound, as surround and super-fi performance

There's no argument in my mind that larger digital words and higher sampling rates give better sounding recordings. But I'm in the minority—the bulk of the music-buying populace doesn't have systems that can expose the differences and largely doesn't care

are not inextricably linked. The majority of the surround-sound experience comes via Dolby Pro Logic and Dolby Digital, in the cinema and from VHS, LD, TV and DVD. Even Dolby will admit that these formats are hardly the bee's knees when it comes to leading-edge audiophile reproduction. Yet these sources are generally accepted as producing fantastic sound—just read the reviews of the better DVD releases to see how well Dolby Digital has been received.

In reality, this marks a reverse shift in the audio quality demanded by the general consumer. They have moved from uncompressed PCM, upwards and onwards to data-reduced digital audio running at moderate bit-rates. If Dolby Pro Logic and Dolby Digital—or MPEG audio on digital TV and more recently MP3—satisfies the mainstream expectation, where is the need for PCM at CD quality, let alone 24 bits?

It is easy to get waylaid by the standards arguments surrounding audio on DVD—and lets admit it, audio on DVD is in a serious mess. Even without SACD, there are three different routes for musicians to put their music on DVD. But the natural progress of market forces will sort this out, and sooner or later there will be a winning format. The real question is not which variety of the format should win, but does the concept itself offer anything that people want to buy in the first place? There is an obvious parallel with the quadrophonic wars of the early 19"0s, when Sony, Sansui and JVC were so busy fighting each other's variations on the theme, that they failed to notice that nobody actually wanted quadraphonic.

So then why do I still maintain that one of the new formats will replace CD? Primarily because the manufacturers will inevitably move to production of DVD drives and drop CD; a process driven initially by the computer market. By the end of next year DVD-ROM drives will have replaced CD-ROM in the majority of new PCs. The huge demand this creates—25 million drives at least next year—will decimate the production cost of DVD. Within a few more years, DVD and SACD drives, which of course will play CDs as well, will be so cheap to manufacturer that they will replace CD-only drives in most new audio systems with little additional cost.

This means that the music industry will have to gear up for producing in surround and 24-bit/96kHz, and the sooner the better. But whilst the aim must be to satisfy the most demanding users, lets not kid ourselves that audio on DVD marks the renaissance of interest in hi-fi in the huge mass of the album-buying public. ■

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