THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE FOR RECORDING, POSTPRODUCTION AND PRODUCTION

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CB Electronics SR-3
Panasonic WR-DA7
BSS Opal FCS-966
Tascam DA-45HR
Audient ASP-231
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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 repack 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 program that would have you withdrawing all your 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 ‘embedded’ processors concerning the year 2000. The use of the ‘00’ abbreviation that confines 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—well, with all that 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 2088, meanwhile, and Aladdin’s DOS and Mac software expires in 2036 and 2040 respectively. Microsoft’s XL v5 is good until 20?8, 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 Genjii Monogatari is in order.

Tim Goodyer, editor
Great Studios Of The World

The Hit Factory
RECORDING STUDIOS

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E-mail: sales@solid-state-logic.com
http://www.solid-state-logic.com

PRODUCTION NOTES
Following the unparalleled success experienced with their first Solid State Logic SL 9000 Series console at Studio 3, pioneer recording facility the Hit Factory now owns a second SL Series console in Studio 1, one of the largest recording stages in the U.S. The 84-mix console features the SL 9096 Eight-Channel Monitoring Section, which addresses 2.1 and 7.1 surround sound mixing options. Three-time Grammy Award-winning producer Humberto Galicia moved, recorded and/or produced several tracks from Celine Dion's 'Let's Talk About Love' CD on the SSO 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 9000I made Celine sound very real, which is what she's all about. It's my favorite console.")
Tonmeistertagung
Germany: The Tonmeistertagung exhibition and conference in November was further proof that the health of well organized 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 Karlruhe event managed to constitute a typically restrained collection of mistrustably 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 pre-views of a new highly portable hand-held card-based recorder and a digital to deliver to the Atlantic when NTL provided the world’s first digital terrestrial television network for the new FilmFour channel and CBS affiliate WHNS-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 & HDTV multiplex is also carrying digital versions of ITV and Channel 4 and will handle the new TV2 service immediately. 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. For example: TV1’s broadcast, meanwhile, used the US standard of Dolby Digital to deliver 5.1-channel surround sound coverage of the game between Ohio State and West Virginia University via satellite.

**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 WHNS-TV in Columbus, Ohio made the first live HDTV broadcast of a college football game.

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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 1887, 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 DM389m. President and CEO of Emtec, Dr Jurgen Lange, predicts a turnover of DM2.3bn for 2001.

British-based DAR has recently come into the ownership of the American Hamron Pro group for an undisclosed sum. While the potential benefits of Hamron Pro’s status 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.

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 DB220WS 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.

A US The jazz dance fusion of British bobs 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 Ivox 5051 units.

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 Straygroom, The Church and Harris Grant Associates, Ingenium reckons to consult on custom computer 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.

TEL: www.ingenium.co.uk

London’s De Lane Lea Sound post facility has ordered two Harrison Series Twelve consoles, bringing its total to three. Sated for Theatres Two and Three, the new 220-element desks will have 80 preduo channels, 8-channel monitoring, 256x256 routing, and be optimised for either one or two-operator use. Meanwhile, London’s Angel Sound has opened a new 5-studio Soho post house using 24-fader, 72-input Amek, DMS consoles and Augen OP/MS RC24 workstations. Taking over from Angel’s 19-year-old operation, the new Covent 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. Avid digital desk, and to upgrade its existing Scenara and Omnis. The investment is part of its move to multichannel working for TV and radio commercials.

De Lane Lea, UK.
Tel: +44 171 439 1721.
Angel 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 6489866.

French national broadcaster FR3 has to equip its new mobile with a 24-fader 48-channel SSL Avys Air digital console with a custom control panel. 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 annexe of Chapman Recording. Established in areas ranging from taping books through dialogue recording the new facility boasts digital control rooms equipped with 48-channel Yamaha O2R consoles and Studer D24 DAW’s, 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 Audicity workstation for its flagship commercial contemporary music station, MDR Live. The purchase brings MDR’s use of Audicy, and will be used on-air for promotions, station ideas, and programme editing. The station serves the former East German states of Thuringen, Saxony and Saxony-Anhalt, and targets a 23 year age group.

MDR Halle.
Tel: +49 341 300 5320.
Orban, US.
Tel: +1 510 351 3500.

Nashville’s Finalstage has invested in a Cockwood 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: +1 615 356 2676.
Cockwood, UK.
Tel: +44 1628 528026.

New Zealand national broadcaster, Radio New Zealand, has bought 25 SADE 24 96 digital audio workstations for use on documentary production and classical music recording, and an SAVI Omnicon multichannel system for drama production.

Radio New Zealand.
Tel: +64 4 474 1999.
SAVI, UK.
Tel: +44 1353 648888.

Swiss-based Ben’s Audio Support and Engineering has purchased a pair of Avox Q-24 studio monitors. The loudspeakers are to be used for mastering and engineering applications.

Stoog Audio, Switzerland.
Tel: +41 61 691 8388.

The Turkish Republic’s 75th anniversary celebration was celebrated with a concert at the 1,800-year-old Aspendos amphitheatre involving the Istanbul Sympho- ny’s 40-piece choir, pop and solo artists and 20 Mehter drummers. The event was captured by the Sound with Vision multimedia production company’s six Isivan Leetoo on six Tascam DABs and then by Quantegy DAP MP 113 Tape Audio was handled by Midas XL-250 and A&H GL4000 desks with Fourtune and Tube Tech mic preamps from the stage to the DAB8s.

Quantegy, US.
Tel: +1 770 481 2800.

Here companies’ recent acquisitions include Europe Audio’s Rèm’s Oud & Raku from Stockholm Audio’s 12 DPA 4011 mics, Dreamliner’s Sony PCM CS-3348-IR DASH multitrack recorder, The Sound Company’s ion of Crown CV3 and suspended mics (for choirs of up to 200) extra Neumann AKG 490s. DAPs and Accusignal’s FX Rental’s Digidesign Pro Tools 24, and Wigmore’s Soundcraft Series five console in the UK.

London’s Cinevideo post facility has ordered the first six Trantec (EM500) programmable auto-monitoring systems for use by television presenters. The order follows a period of evaluation of such systems and coincides with the launch of the EM500.

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 as its owner, Roger Schamsik as a victory over the Swiss monopoly, Tele 24 has adopted Soundcraft’s Venue Theatre. Delta Ave. E1000 (for its OB vehicle) and three St-Point desks (for its editing suites).

Soundcraft, UK.
Tel: +44 1707 665000.
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When we launched the world's first affordable pro quality CD recorder, we thought we might have a hit on our hands. But even we've been amazed at the popularity of the CDR800. Thousands of machines are now in daily use around the world in every conceivable application (and some we could never have conceived of!). You're kind enough to tell us how you love the way it sounds, that superior build quality makes the CDR800 exceptionally reliable, and that pro-features like balanced analogue inputs, an AES/EBU digital in and 5 simple record modes with built-in sample rate conversion are essential for the ways you work. So we'd like to say thanks for making the HHB CDR800 No. 1 in CD recording.
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

NLAB 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 swaths of simple digital radio desks at NAB, not all of which are near shipable 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 worksurface, 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 inwards for technical 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 SCIF 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-operate 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 layout 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 sources 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 PLC 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 system.

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 to add 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 unassuming and quite intimidating and quite straightforward.

There is the 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 1-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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Studio Sound December 1998

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www.americanradiohistory.com
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 GPs. A further four 9-pin D-connectors join the machines to be controlled. The only other connector is a BNC for video sync, 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 back-lit 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 supp-
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 tally, 'red light' control, and so on. The SR-A can also interface with Audio Kinetics ES.BUS protocols, Studer TLS 1000, 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.

Syenex 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 look no further. 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 modified 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.

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 VTC reader-VTC 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 VTC reader-VTC to LTC converter and a multistandard VTC 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 unit also regenerates time-code with new user data if required. The ED-2 adds video insertion. There are options for VTC. CB Electronics won an Academy Award for technical innovation with these units.

The BS-1, when used with a suitable ISDN audio unit (like Dolby or CSS), enables 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. Zeron 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 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 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 1/2-inch, 1/4-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

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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, Orinoco

‘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...”
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 frequencies, 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 reran. On the old batch the GP9 was beating the 900 by 1/4dB, on the new batch it 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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THE FIRST IMPRESSION after wrestling the WR-DA™ 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 illuminated small square keys for CUT, SOLO, TIP and SPLIT. 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-DA™ has 16 balanced analogue inputs accepting signals from +4dBu to +14dBu using 2-bit converters. Two digital XLR inputs are provided as an alternative for Channels 15 & 16, and for Aux Returns 1-16. The first 16 channels also have unbalanced analogue inserts using the usual single TRS jacks.

Audio interfacing is accompanied by wondrous input and combined output through 16 BCS, MIDION DINS, a mini-DIN for connection to a Mac (labelled to PC) and a 9-pin D connector RS 232-C. 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 bus masters in the same way as the fader layers with bus outs and LR always displayed. On the rear of the WR-DA™ are option slots. One of these is dedicated to a video sync and SMPTE time-code board. The other three accommodate various permutations of ADAT, TAPE, AES/EBU SPDIF or A-D D-A cards.

A further option, also as one of these slots is a TANDEM card to connect two WR-DA™s together.

The screen is fundamental to the operation of this type of console and the mix is identical in resolution (320 x 240) to the one referred to the O2R. The EQ section is equipped with shaft encoders for Gain, Frequency and Q. Four keys select which of the four 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. Carefully the frequency bands are slightly restricted, depending on the type of filter in use. For example the high band operates over 50Hz-20kHz in 12 octaves 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 Made-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 milliseconds increments or samples up to 1400 samples. I am not 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. Annovously 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 assignment. Again there is a rotary shaft encoder with associated own key. This is partnered by 8+8 keys and UL and MR bus assign keys. Pressing the knobs brings up the Pan-Surround screen which is where you decide if the channel is to be panned and based in surround mode. The key only affects whether panning is active between loud 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 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 soft and hard keys can be used for the on-screen fields. Copying parameters between channels is assisted by the via button. Via key and screen. Comprehensive linking and grouping functions allow adjacent pairs of channels to be linked as a stereo pair with balance or twin monos with individual settings retained. Four fader and mute groups can be set allowing some 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 via 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-soft key. This can be rather inconvenient if not downright dangerous, given that there is no key doubling as MMC button. When not in MMC mode the cursor-soft key toggles the function of the parameter wheel.

Panasonic-Ramsa WR-DA™

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 of features.
"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.

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

In addition to 50 scene memories for snapshots with variable crossfade times, the WR-DAD7 boasts comprehensive dynamic automation. The 152 field above the faders shows which parameters have been selected for automated control. A nice touch is when replaying an automated mix the relevant 152 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 file or computer to record automation data in real time or to bulk dump data.

I was the first to start playing 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 MTG running on a device connected downstream from the WR-DAD7 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 is not the case.

The WR-DAD7 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-DAD7 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 file, 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 LCDs 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.
FAR DbW-80

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 4-inch (103mm) soft-dome midrange, and a 1-inch (25mm) soft-dome tweeter housed in a cabinet of external dimensions: 300mm high by 500mm wide by 520mm 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 a 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 800Hz and 4kHz, and the power handling is specified to be 200W rms and 750W 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 rolloff 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 3kHz and 12kHz. Harmonic distortion performance is good with second and third harmonic distortion lying below 0.01% from 51Hz upwards and below 0.06% 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 7kHz due to the spacing of the bass drivers. The vertical off-axis response (Fig.6) is dominated by a dip at 80° off-axis at 5kHz that is close to the crossover frequency between the mid-frequency and high-frequency drivers (specified at 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.1). 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 2mm behind the loudspeaker at very low frequencies; a typical result for a loudspeaker with a 4th order low-frequency rolloff. 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 1kHz, and a fairly rapid and well-controlled decay at low frequencies. The power cepstrum shows an echo after about 100μs that is responsible for 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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NEW TECHNOLOGIES

Tripping with Glyph

Storage and networking specialist Glyph Technologies has launched a customizable rackmount data-storage system known as Trip. The 3U-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 QuadBurn 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 Eonisong 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 Openna 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-590, 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 with 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.

Studio Sound December 1998

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 D-3 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 changing the price tag. It is imitation is the sincerest form of flattery, because a certain German company should have been feel almost embarrassedly 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 being awkward and unignantly smooth and classy.

The CX-111 is particularly sleek in appearance thanks to the black finish of the body, the black finish of the grille that dispenses with the normal woven mesh and is instead made of perforated black metal. This looks as 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 Bode 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, 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 10kHz 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 they are so 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 shortcomings, however, does it have the degree of colouration 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-siflers are either not as the clarinet and bass 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. In 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-noses 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-ranger market, much more so than some of its kind that place 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 entry 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 sees much store by the sheer sonic quality of its transmitters and receivers, and has recently chosen the Audix OX6 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.
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 in 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 251 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 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 231 single-channel version.

The unit features a rugged 3U-high steel chassis and also has rear support mounting points for installing in rack rails. The unit sits on rack rails with a nice touch. The front panel contains input/output XLRs (Pin 2 hot) for the electronically balanced connections plus parallel Knippon-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. Bouncing 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 hands has ±10dB of cut and boost, and the sliders have a centre detent marking it. The right-hand side of the panel carries identical controls for each channel: mode switch with two options, low-pass filter switch with ±22dB cut-off (set by an illuminated switch) and rotary control, gain control with built-in lever and a large illuminated 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 I/O 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 equipment 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 (if a broken tooth syndrome). 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 ±22dB cut-off (±6dB per channel) by a low-end limiter that is set by +2dB 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.

NEW TECHNOLOGIES

The vital element is a heavy-duty one-piece, hand-laminated, all-fibre glass enclosure, encasing the driver and a pair of drivers, and a microcontroller. The driver and a pair of drivers, and a microcontroller, are claimed to be completely impervious to weather, and the effects of UV radiation. Community says this far outstrips laminated wood, coroplast and injection-moulded enclosures for strength, rigidity and long-term durability. Three-layer Weather-Stop grilles prevent water intrusion, and a one-piece fibre glass bottle secured with stainless-steel fittings and a rubber gasket. Unlike the Audient unit, these drivers have diaphragms made of advanced carbon fibre, mylar and polyimide materials, and the drive unit is stable and not just for the usual purposes but also to prevent the casing from being damaged.

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 removable horn.

Community, U.S. 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 and five factory presets show off the S-DBC II processing, with a library including compression, rotary speaker simulation, spring reverb, delay up to 5s, vocoder, sampling, time warp, envelope filter and many more.

DigiTech, U.S. Tel: +1 801 566 8000.

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-1230 is joined by 30A and 40A versions, not surprisingly designated the IT-1230 and IT-1230 respectively.

These specially wound and shielded rack-mount toroidal transformers, provide balanced AC power, bringing similar benefits to systems 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 60Vac 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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8 to 32 inputs and outputs 30 to 120 simultaneous replay tracks up to 192kHz 24bit audio full surround sound mixing & editing DVD compatible real time architecture professional plugins segment based automation free software upgrades & support comprehensive PQ editor direct exchange with Lightworks/Genex/BWF 4 9-pin ports region editing bars & beats timeline display to 768 PPQN project management background autoconform/recording/archiving Exabyte DDP 50 levels of undo sample accurate waveform display/editing integrated random access video rack mount system hardware control surfaces with jog/shuttle, edit and moving fader mixing all timecode formats supported for all post production & CD premastering applications.....and more...
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 front plate, the FCS-966 lives on a solid 40-lb 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 20 ISO frequencies ranging from 25Hz to 20kHz. The filter characteristics are Constant Q with ±15dB of gain and a Q of 1. 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 jack plugs a new one to me, the Conbi-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-adapter for phone leads and found most of the signal disappeared in bypass mode. You do need to use 5-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...
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 250kHz). LF and HF contour controls, gain control (off to +10dB). 8-segment LED meter that reads output with the EQ off and input with the EQ on, red clip led and large illuminated half oval eq is 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. While not neutral, it 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 clearing up LF wooliness and provides a short cut to tidying up some signals. The Contour controls could be considered as husks and treble trims and provide ±6dB of 6dB/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 vs. bad 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 then you can try different sorts of things to do. If you need to hit in a little of something, or even a subtle but effective work using ±1dB or 3dB adjustments, then do not you need to hit the nut with a sledgehammer, the 968 does it well, too.

The Opal was tested in a variety of situations, including studio monitoring, working studio and home studio, and performed well in all cases. A quick look with an RIA revealed that settings at flat were within 1dB of each other and that all filter slopes are very smooth. However, ±3dB in the metering would be a useful addition as the 0dB level literally is that—at ±0.5dB, it does not illuminate. The jump from 0dB to 0dB seems a little large and I would much prefer an intermediate indicator, even at the expense of the ±2dB level. It would also be useful to have zero decibels on The Gain and Contour controls. But you cannot have all that and so the PCB-966 comes recommended.
Tascam TM-D1000

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

I make absolutely no excuse 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 unerring level of functionality into this tiny little console which takes up as much room as the opened up magazine that you are reading. What you are presented with is a row of 21 short-throw unmotorised faders handling the 16 input-channels, a 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-0s on TDFI come up at faders 9 to 16. While there is one stereo digital input and two stereo digital outputs paralleled AES/EBU and SPDIF's. 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 TDFI interface card with extra AES/EBU and SPDIF I-0s and sample-rate converter, and an additional effects board that doubles the outboard 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 box that works in conjunction with four soft masters to access the 3-hand EQ (swappable shielding HF and LF and fully parametric mid) and the mentioned effects. It is not an elegant means of control and requires a lot of scrolling through and among menus with a data-entry knob.

The real letdown is the LCD which is restricted to alphanumeric 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 easier to operate if the screen was larger and more elaborate, it is just that it may have felt as if it was.

Routing 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 console 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. 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 past the manual.

It is almost too well loaded with features and the configuration routine. particularly with regard to organising I-0s, is very convoluted and matters are complicated by a curious imposition of board 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 £5000 (UK) it is among the finds of this millennium. Yes, you can mix on the thing, but running in the extremes of its capabilities is probably missing the point; this is a device that you can sort small jobs on.

The fact that Tascam now has in its IF-TAD (US$49) a box that will translate between its own TDFI and ADAT optical bidirectionally further extends the realm 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 for something simple that would allow us to interface with all the bits of gear that we had assembled with digital ports on it. 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 faculty back rooms. I love it to death.

Tascam America, UK. Tel: +1 213 726 0303. Fax: +1 213 727 7641.
UK: Tascam. Tel:+44 (923) 819630. Fax: +44 923 236 290.

D/E/ESAM from memory

The 870 4-channel RAM recorder is a plug-in option for the Graham-Iten 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 32nb up to the maximum 256nb for 46's of 2-channel or 32's of 4-channel stereo. Recordings is 48kHz, 24-bit, and full Sony control is provided including shuttle and jog.

GPS, US. Tel: +1 530 723 8412.

MediaFORM dupes

MediaFORM has covered both ends of the small-run CD duplication market by simultaneously reducing the price of its CD-270i, 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-day 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 OS9, and a QuickTime movie window has been added, compatible with Peak's scrubbing capabilities. New support for third-party hardware includes the Yamaha A900 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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www.americanradiohistory.com
Alesis Q20

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

For a start it is a 20-bit unit and comes complete with S/PDIF 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-wars, 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 entirely 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.

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 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.
Trident Neptune range. The die-cast zinc-alloy bodies have the additional advantage of full shielding, providing military specification 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-power.->

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, loading is assisted through a set 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 organized 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 reverb is the most demanding, and the number of bands in an equalizer 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 200 factory presets in ROM and 200 user memories, all filled at the factory with further programs. The range on show is very 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.
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 word lengths. 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/34kHz. 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-451HR 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 cassettes, are the 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 workings.

The most significant of these is, of course, the A-D conversion. 24-bit Burr Brown converters are used to deliver the required word length, and full 24-bit incoming AES/EBU can also be recorded. The same converters 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 8ks oversampling converters are fitted for the analogue outputs, and there are three options as to how the 24 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 filtering to be selected as appropriate to the material.

Whichever is operative, the digital output will remain at the full 24 bits, and 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 20 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 AFS 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 reverberant tails, the sounds of the players' movements. By comparison my normal machine sounded a little closer in and restricted. Piano recording demonstrated all of this at least as well, as long-held notes tallied 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 studio 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 them on the transports, tilting of tracks, and the sending of an end tally via the control 1-0 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 uncomplicated 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 3x 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 who are lacking them, the Tascam is a very attractive and competitive machine that can quite happily earn its spurs in mundane 16-bit mode as well.
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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 practice 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 Mutting—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 needed 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 an 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 underestimated. 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 >

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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 matrices 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.

Operationally, switching between these mixes may be accomplished with a single toggling key or a pair of keys. They will be designated PE 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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<p>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 LCFS, 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 into 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 GPs 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 23-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 détente 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 voice-over 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 testimonies 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 a Avid Media Composer and work with that again. In some cases we were updating or changing sequences that 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 [whose production 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; 'albeit not all that helpful',] came from an influential source. The US media mogul and founder of CNN, Ted Turner, knew 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, because the music was so good. 'The music was recorded over a 2½-year period, with the sessions split between GTS 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

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Denny adds that this extended to
ensuring that aircraft engine noises for the
Berlin Airift edition matched the planes.
Luckily the producer of this particu-
lar programme, James Baker, counted this part-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 Pro-
ducer 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 beeps 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 DigitBeta 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 separ-
ate track; the translator would be sit-
ing where they would not be picked
up on mic, with interviewer and inter-
viewer wearing ear pieces so that they
could understand each other.

The location recordings and sound
effects were: track-led on MediaCom-
pounder and then taken to Soho postpro-
duction house Tele-Cine, where archive
footage transfer and on-line picture
editing was also carried out. The pre-
pared audio was imported into Avid AudioVision in the facility’s Avid Neve
Logic 2 dubbing suite. The material was
mixed on the Logic, with the AudioVi-
sion acting as what dubbing mixer
Michael Narduzzo (who dubbed
the majority of the series, with some mixes
by Richard Lee) describes as ‘chase

Narduzzo says that when dubbing
began it was not certain whether Ken-
neth Branagh was going to narrate, so
he was decided to work on the interna-
tional 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 mixes 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 dub 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
ever hear the emotion in the original, so
there was no need to hear 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.

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 Khrouchev did not hang his shoe on the table during an UN debate, it was his fist. And in this production, his piqûre has a new sound effect to accompany it.
The ADVANTA Series

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Novastar Studios, Los Angeles, CA
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 on some day. Even as a kid I would grand 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 1948, 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 1948, 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 Blueblues 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 sixties and seventies, 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 2nd 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 1954 appointment. 'I 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 Dominos] that Jackie Wilson was in. He wanted me to sign the group, and I said, "No, 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 we went to the Taf Hotel to pick up the contract, I was told that Al had died during the night. However, a kid named Nat Taranto—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 didn't have 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 Thiele was recording Jackie Wilson, a nearly-looking white guy with curly hair and unexceptional 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, $250, but beforehand I remember going to the President of the company, Milton Rucknill, and saying, "Look, I want to buy this and we ought to put it out". Well, Ruck 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 Norm 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.' It 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 December 1998 Studio Sound
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 I 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: “Hey, 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...
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December 1998 Studio Sound

< 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 best 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-pounding handkerchief, may have forged a reputation among his many fans as one of the industry’s micer 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 couldn’t wait 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 bit of a 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 >
"At this price, and in these times of digital mixing revolution, the Spirit 328 has got to be a winner."

Paul Mac, Spirit 328 Preview, The Mix, April 1998

"A brilliant desk, I use it all the time. The 328's sound is superb, for writing at home or in the studio as an automated sub mixer for the computer. Loads of professional features and sound to match. From high quality Mic-amps, the clever E-Strip, proper size faders to analogue sounding EQ it has worked on many sessions for me. A brilliant product!"

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"Interfacing the console digitally to tape or disk recorders is pretty flexible - in fact I would suggest that the 328 is the present market leader in this respect."

Paul White, Sound on Sound Magazine, December 1998

"Spirit 328 does have a series of optional extras, although many features which would be an expensive option with other manufacturers are standard here."

Frank Wells, Audio Media, March 1998

"I must say that the board sounds fabulous. Just taking the digital out from a CD player into the 328 gave the CD much greater depth and clarity than the CD's regular audio outs."

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Christopher Ash, Recording Magazine, USA, August 1998

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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. Thiel 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 Glazer, 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 telegram from South Africa, a telegram from France, a telegram 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 horrid, 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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THE AMEK DIFFERENCE

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www.americanradiohistory.com
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 of 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 1984 they wiped strawberry jam on a disc but it was a coin—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 disc 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: '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 Zonol 999 tape **Studio Sound**, August 1999 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 Zonol, and Sam Hann, Zonol'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 Xerox 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. They are not just a transport modification: all electronics are rebuilt to the highest standards. Paravicini has also rebuilt C37s as 1.5-inch machines due to customer demand, but since 1986, his one 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 is also leaning into the format, reporting enthusiastically: '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 out 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-pressing 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 £10,000, but 'if you spent a gazillion dollars on it I could do better still,' his designer claims. 'The only thing that will equal this sonically would be a 24-bit word for true linear digital system, but then you will then satisfy the hearing mechanism.'

Paravicini points out that he wrote in 1982 of the need for 24 bits at 100kHz, 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, which is 288kHz 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.

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Presently, Paravicini recommends 1ipsis with bass response down to 7Hz within 3dB for minimum phase distortion in 40Hz-100Hz region. For higher frequencies, he recommends the after-effects of several years are certain that deaf people only can sense the standing wave of a large cathedral, which is roughly 51Hz. 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 20kHz 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 aware that something is going on. My method of demonstrating this was to use a 1.000Hz tone. Everybody in the room heard the effects of itinuus. You are aware of this excruciating feeling. My speakers go up to 40kHz. If I put a 20kHz tone on 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 really embodies what the hearing mechanism is about. It 19ips enables a range of 17 to 20kHz with 3dB with a good running time. At 5ips it goes from 1kHz up to 40kHz within 3dB with a good running time. At 10ips it is already better than the standard 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 1/4-inch, he explains the difference in terminology more commonly related to digital equipment. The number of magnetic particles on the tape with 1/4-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 1/4-inch, with better bottom end solidity.

Although emphasizing the importance of large playback heads for extended bass response, Paravicini accuses most 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 as "phase and frequency." Better, however, is a phase distortion.
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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 recording machines do not fit in 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 8 inches 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 honorary 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 Telegrapophone needed to be listened to on a headphones 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 Telegrapophone's signal was distorted and had...
<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 in 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 1919, there were still wire recorders being built and one of these, the Wirex Recorder has a home in the Science Museum in London.

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...>
C-1 stereo valve compressor with mic pre-amps £1299 ex vat £1152.40

TL Audio products have been part of some of the most important records of recent years, and none more so than the C-1 stereo valve compressor. So when Portishead - who are without doubt one of the most influential and ground breaking acts of the 90's - came to choose some high end valve outboard to use on their latest 'PNYC' album, the decision was easy:

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Adrian Utley - Portishead (Guitarist, Writer, Co-Producer)

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Adrian Utley - Portishead (Guitarist, Writer, Co-Producer)

So if you've always wanted to own a Classic, speak to your nearest TL Audio dealer today!
Another pretender to the Telegraphone’s crown was the Marconi-Stille steel tape recording machine.

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.

tape snapped the loose ends would whip around with dangerous effects. Dr Bates, of Verbitini, 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 when he declared war on Germany, was recorded on a Blattnerphone.

One of the successors to the Telegraphone was the Blattnerphone shown here. It was used by the BBC at an operator’s peril.
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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 Pfeunzer 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 proprietary process which resulted in a carbonyl iron powder that was magnetic, stable, and you could produce fine needle-shaped (acicular) particles to coat the tape.

In 1944, 36 years after its invention, magnetic recording became a serious competitor to its arch rival, the disc. Until this time, disc 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 cut-in had to be silent as well. Paper, or plastic-backed tape could be cut up, the best parts of the recordings selected and edited precisely to produce a faultless performance. Editing had arrived.

By 1949, 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 Oer- steads, it was possible to achieve coer-

vencies 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 recor-
dring studios and broadcast studios. With
improvements in head design, the very
limited frequency response of the early
machines was increased and by the six-
ties 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 enter-
prise, 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.

The chemical giant DuPont, in Amer-
ica, had developed a new Chromium
Dioxide particle. This increased the tape
coeercivity 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 Avlyn. 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 record-
ing 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 record-
ing had once more transformed the
way recordings were being made. Now
with far more options open to the pro-
ducer, engineer, and musicians, record-
ings were taking years to be made. The
disk could not compete.

Fritz Pfeumer
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

Poulussen 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 answer-
ing machines are solid state with no
moving parts, no tangled wire, no
wow, no waiting to rewind the wire
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 multitrack which cemented its
superiority in the studio. We may have
almost forgotten Poulussen today—ask
the man in the street who Poulussen is
and you can be sure to get a blank
look—but his invention was a brilliant
breakthrough and deserves recogni-
tion. 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.
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 €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 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 play back 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 ALS-BIU,' 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, 'brought in.'

This 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 RTE'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 80% 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-have 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 RTÉ 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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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.

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, switches 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 (frame digits that are 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 score 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 smaller 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 AFQ and Roadrunner from CGS-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...
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, Dialog, Marscom and Yuncum 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, Sonifex, CSS-Musicam, and MPEA 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 Sonifex 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.

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 boy 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.

Mario 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 new room...
It is now becoming less expensive to lease a permanent circuit at 2Mb/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 a host of 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 may be more economical to have a permanent circuit than to dial up on ISDN. A service known as Musi-cline 2000 is offered by BT and uses a 2Mb/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 £700 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 2kb/s using linear, J-14, 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 so 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 multiplexer 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 using the telecommunication operators 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 of some half a 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 downside 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.

Since the project studio dominated 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 studio-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 9-Apollge hard-disc system and Genelec monitoring, and an even longer outboard list that includes AMS Neve pre-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.

‘It was another class of studio,’ Jans says of Studio 20, ‘but it was flat. 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, Synosound, Jet itself currently being refurbished), Carabes, Molicure, 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 suited. 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. ‘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. That 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 Terra Nova and I was a cook. In September we had Super Pub 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...
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 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 knows that's why they needed 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.

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

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US: Formats, formats, formats

Whether spelt for choice or just spelt, 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 Cafe? 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 encounters with multichannel sound are being worn off. In their place is the unpleasant reality that, as much fun as it is in the studio, today's audio is going to 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 Mike 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 slow downs 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 MiGA (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 mastering and disc manufacturing. BNG in Nashville and New York hosted conferences which invited the mastering engineers' feelings about how digital sounded.

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 reduces errors and lightens 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-9000 decks, through a Quad 520 amplifier and Acoustic 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 the RXG Pro for the new second-generation, high-density MD that is already under development. Fujitsu has been working with Sony and IBM (and almost) to exploit a 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 4mm disc—GigaMo increases this capacity six-fold. MDs are coated with a terbium ferrite colloid 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 polarization 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 and there are 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, where 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 and alongside this groove, and are largely incompatible. All three formats either cannot 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 version of DVD. The small disc will record at least 1.4Gb and as much as 5.2Gb if it is double-sided and each side has two
1980s, when everyone replaced their album collections with CDs, now looks like a potential era of 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 do it for 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.

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. Marketing engineers are in an excellent position to take the lead—for every album a major producer or major act releases a year, some 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 High-Definition MP4 format, to be followed within a few years by flash memory devices. Someone had better impose a little order on this situation. Who then can help the people who record the stuff? When 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, Halland 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 Oosterveld 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 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 realize 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 (if we are now forced to call it), is expanding rapidly. New channels are coming on 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 editers to serving up new new 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 realizes something is happening, it does not necessarily mean all that much.

This phenomenon was neatly summed up by the tug-line for a satirical comedy series (screened on the UK's Channel 4) set in a fictional news channel: 'To them we are the enemy's history'. Gone are the days when there would be no news bulletins because there was no news to fill them, everything must have to be 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 Studioechnik used a Midsa 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 mainly, are nothing more than a class 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 have been expensive, but ultimately this keeps 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 experienced the enemy of the West, broadcasting in particular was a bullish market, with Rupert Murdoch's Sky TV doing everything it could, including sucking up to the Chinese government, to establish itself 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.

December 1998
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 unmanned; it is 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 its 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 quadraphonic 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 off-stage, 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 blindly called to fill the space, which may possibly only serve to create distortion?

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 quadraphony. 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 quadraphony 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: 5-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 configuration for 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-five, 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-Environment1, or variations on those themes. There are also many more widely used bi-directional stereo control rooms of good repute, such as those by Jensen, Toyoshima2, Walker3, Voelker4, 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 Conference5 dealt with the mutual coupling of...
problems with surround images in ana-
choic and non-anaechoic situations, be-
tween the loudspeakers themselves, and
between the loudspeakers and their
reflection. Compared with surround, the
corresponding problems in 2-channel
directional stereo pale into insignificance
and lead directly to variability of reproduc-
tion, which is the antithesis of fidelity.
The fact is that all advanced forms of
stereo control room design have bi-
directional acoustics, and even many
listening rooms employ such tech-
niques. For that matter, the same can
be said for most concert halls. An or-
chestra performing in the stalls with the
audience on stage would be unlikely
to satisfy either party. Whether live or
recorded, sound production and recep-
tion acoustics tend to be different.

Whilst the previously mentioned com-
ments of Tom Holman are a well
grounded logical conclusion for sur-
round listening rooms, they clearly do
not meet the optimum demands for
stereo. Many people trying to adapt
stereo rooms to surround use, have dis-
covered that each time the rooms are
improved surround sound constraints tend
to detract from the optimal stereo
performance requirements.

We simply cannot make symmetrical
surround monitoring, because we do
not have symmetrical front-back per-
ception. A result of this is that the nature
of the front wall in surround equipped
rooms is critical in terms of the char-
acteristics of the rear monitor sound.
The reflective, diffuse or absorbing nature
of the front wall surface will dramati-
cally 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 loud-

speakers may actually appear to be
coming from the front though a little
delayed due to the extra distance trav-
elled. This is especially true with high
frequency sounds, where the direct-
ivity 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 mix-
ing, is simply so room dependent that
finding an arbitrary compromise may,
in practice, be so unrepresentative as
to render it useless. If a common con-
cept of control room design were
agreed, it would provide a reference
point for serious listening, but surround
mixes will largely be carried out under
circumstances even less standardised
than is the case with stereo. The situa-
tion 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.

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 excel-
ent stereo control rooms, which can
handle the addition of a centre-chan-
nel without acoustic compromise, and
to add ambient surround loudspeakers
without damaging their stereo
performance. Considering the extreme
sensitivity of surround mixes to the listen-
ing environments, the mixes which
such rooms produce should not be
noticeably inferior to those done in pur-
pose designed surround rooms in terms
of their compatibility with domestic
reproduction. Such rooms would need
the needs for audiophile quality stereo
mixing, audiophile quality ambient sur-
round, and typical Ambisonic-type mix-
ing. 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 sur-
round 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 situa-
tion that we are faced with, then sur-
round 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 these people
for whom the spaciousness of surround
is a great pleasure, then they can choose
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 sys-
tems, 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, audi-
ophile 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 sound is a com-
promise 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 for-
wards will have been lost.

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

Studio Sound December 1998
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 FM 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 EIT 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/off 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 a 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 rams 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 effective for a bipolar power supply with a modulated reference. Switched-mode amplifiers have a huge efficiency.
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 economics to be made in the area of power supplies and heat sinks.

While it is difficult to obtain the lowest distortion figures at the high end of the audio spectrum using a switched mode amplifier, in active speakers the amplifier for the woofer is 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 converters, changing between high-current-low-voltage and low-current, high-voltage domains. In this respect the transformer is analogous to the mechanical gearbox.

The high 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 the series with 1000Ω looks like 100Ω in series with 100Ω.

Transformers are ideal for interchanging 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 ferite bead threaded over audio input wires introduces a loss mechanism at audio frequencies. A set of wound inductors in the AC line socket prevents rectifier switching noise going back down the power line.

![Fig. 3: Switching regulator](image)

![Fig. 4: Primitive passover crossover](image)
While audio aficionados debate the quality of forthcoming delivery formats, big business is lining up the big picture. Tim Frost offers a 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 it finally 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 mid-size system or ghetto blaster.

Moving music from CD onto a new medium, whatever 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 doesn’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 superb audio performance 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 reversal in the sound 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 bit?

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 progression 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 1970s, 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 quadrophonic.

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 creates—25 million drives at least next year—will drive production cost down. Within a few more years, DVD and SACD drives, which of course will play CDs as well, will be so cheap to manufacture 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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