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	SOUND AND BROADCAST ENGINEERING
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## 8000 Series III Beyond Comparison.





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# DIO EDITORIAL

his month there are two points that I would like to raise on this page—yes and there is even a vague element to connect them both. Firstly I would like to sound off about exhibitions, shows

and conventions—quite simply the fact that there are now just far too many of them. This has often been moaned about over a number of years and the fact is that this is now undeniably true.

It is probable that my concerns do not really bother the vast majority of our readership who like to attend shows that are held near them and welcome the proliferation of events. But no matter how much this may be the case, this proliferation does affect us all to a degree. Few companies have the manpower to cope with a show every other week and this is rapidly becoming the case at certain times of the year. The major drawbacks for frequent exhibitors, apart from the sheer cost of the operation, is the way that these events can totally disrupt product development when the only prototype is wheeled off to be shown every few weeks. Often, members of the R&D department are also required in attendance at the shows and even in moderate sized companies there can be severe disruption of the normal trading and servicing patterns of business during show-time.

Also, the abundance of regional shows, all gaining in importance, hits quite hard at the very small company exhibiting for the first time. Quite simply they may find their financial outlay for exhibition space does not bring them the breadth of attention that small companies need.

When it comes to the crunch, however, it is difficult for manufacturers to say they will definitely not exhibit at a specific show. It is easy to say this about a show 18 months away but it is less easy to be sure six weeks before and it is a very brave man who can stand by his decision not to exhibit and still be happy during the event. Are they still in business? we cry.

For what it is worth I would like to suggest that some enterprising company start an exhibition representation service that would quite simply have an exhibition booth, the logos and a few photos on the walls, of the companies they are representing (and perhaps a copy of the company's accounts— reference my earlier remark) just to show that they are still in business but are at this show in spirit only. Oh yes, they could give out literature and company info but the whole exercise would be really just to disprove rumours of the company's ill-health while maintaining a high degree of absence from the exhibition round, or at least those shows that were not considered so vital. Even the pro-audio journalists are becoming victims of this situation. In post mortems on shows they are frequently to be heard complaining that there was 'nothing really new on show' and 'oh how disappointing it was'. What they tend to forget is that we are now seeing a dilution of new products at the larger number of shows. Without doubt, it is an expanding sales market that boosts an industry, not an expanding exhibition business, and I see very little evidence in the current situation that they are at all related.

A last point on the subject, which has prompted this feeling that events have truly come to a head, is the number of shows that we have had in the last six weeks of June/July and how they overlap in timing. What is it that stops exhibition organisers talking to each other on dates rather than ignoring each other's existence?



hile on the subject of talking to each other it seems a shame that the studio industry and the record companies cannot do a little more talking to each other. The Copycode issue just appears to

have polarised along industry lines and the smears and innuendo emitting from the mouths of certain record company executives is little short of libellous. Those associations in a position to talk actively to record companies have so far been very quiet on this issue, perhaps wary of biting the hand that feeds, but I would like to see at least an effort made to explain to certain record companies that just because a certain opposing viewpoint is held, it does not mean we have been the recipients of expenses-paid Caribbean holidays, courtesy of the DAT hardware manufacturers, and neither do we need the suggested course of counselling.

Self interest on a personal level is natural and within reason quite acceptable. However, when self interest goes beyond the limits of simple business and extends to larger organisations, be they exhibition organisers or record companies and their trade organisations, it becomes extremely distasteful, and abundantly more so when they try to dress this up as a philanthropic attitude.

. Keith Spencer-Allen

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Exclusive Components catalogue contact: Sole Agent U.K.

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the right and producer desk left side commissioned July 1984 in good order available July 87 \$87,500.00	Lyrec TSR 24 track/spare 16 track headblock Autolocater 11 4.000 hours £11,500.00
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## Change of address

 Interama, the International Audio and Music Association, have moved from their Strand, London address to: Premier House, 10 Greycoat Place, London SW1P 1SB. Tel: 01-222 8866. • Valley People have officially changed their name to Valley International Inc. • RLS Acoustics have expanded their

## Gateway to Kingston

Kingston Polytechnic have announced a major co-operation that will start in the latter months of 1987, and which will involve Gateway moving their entire studio and training operations on to the Kingston campus. Gateway director Dave Ward said: "By sharing facilities and combining our teaching talents, we will be able to bring about the 'wedding' of traditional and technological music production which has long been overdue.<sup>3</sup>

Mr Bob Godfrey, Dean of the



operations and moved to: 300 Brannan Street, Suite 610, San Francisco, CA 94197, USA. Tel: (415) 541-0818.

• Carlsbro Sales Ltd and Carlsbro Sound Equipment have been incorporated into Carlsbro Electronics Ltd

## The Gateway School of Recording and Faculty of Education at Kingston

said: "We have long wanted to bring recording and music technology training into our curriculum and combining the talents of the Gateway teaching staff with our existing structures seems the most logical approach.'

Kingston Poly have a purpose-built orchestral rehearsal and recording complex that was acoustically designed by Sandy Brown Associates. Gateway and Kingston Polytechnic are now examining ways of jointly administering these facilities.



## Terminal problems

When Terminal 24 studio placed an order for an Amek G2520 through Stirling ITA, they thought their problems were over. The narrow staircase to the top floor of the South London office block precluded delivery via that route, so Stirling's Mick Boggis had ordered a crane to lift the console through the back window. But the frame wouldn't budge, so Boggis et al subtly smashed

the pane. From there it was all downhill-or rather up as the crane successfully maneouvred the Amek through the window. Terminal 24's Tony McGrail said after the installation: "The G2520 is an extremely clever desk, it does everything you'd expect it to do-plus more." Except, of course, find its own way through the window.

## Stolen equipment

On June 23rd, 1987, at the Philadelphia Academy of Music, the following list of equipment was stolen from the Effanel Recording truck:

- Two Bruel & Kjaer 4007
- microphones, serial nos 973232 and 1040002 in KEO215 wooden boxes with clips.
- One Beyer M500 ribbon microphone, serial no 21465 in box with clip.
- Two Sennheiser MD 421 microphones, serial nos 19817 and 19825 in one box, initials JA inscribed on bottom, one exterior repaired.

Two Sony ECM 50 microphones, serial nos 22458 and 22459 in individual boxes with complete clips, initials JA on preamps.

One Neumann KMR 82 shotgun, grey with black leather sheath and

#### CorrectionIn the News section of the July issue

we gave the fax number for Scopus UK Ltd (distributors of the Media

windscreen with notch cut-out for Rycote mounting.

Four Radio Shack PZMs, two with XLRs on cable end, two new in boxes.

Six AKG stereo bars.

One Shure A27M stereo bar.

One Rowi microphone clamp.

- Six windscreens MD421s, Shure SM 81s and KM 84s.
- One C-ducer transducer pickup in case, mono with power supply.

All equipment was in a mediumsized suitcase size case with silver metal exterior and light blue felt interior.

There is a reward for information leading to the return of the equipment. Please call either (212) 807-1100 (Effanel Recording) or (718) 643-1675 (James Anderson Audio).

Recovery Shockwatch) and not the telephone number. The correct number is 01-739 3344.

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#### Agencies

• Professional Audio Ltd have recently appointed R G Jones as Southern UK dealer for Renkus-Heinz PA systems, and MAC as Northern UK dealer.

• Renkus-Heinz in California have appointed Bi-State Marketers as their representative for New York City, Long Island and northern New Jersey.

• Lyrec have appointed Professional Audio Ltd UK studio dealer for their range of tape machines.

 McKenzie Acoustics have appointed two new European distributors. Pe-el Sound will handle sales in Holland while Finn Musik Oy will act similarly in Finland.

• Alpha Audio have appointed Gexco International as exclusive exporter of the BOSS audio editing system.

• Beyer Dynamic have been appointed sole UK distributor for ASL intercom systems.

• Clyde Electronics have appointed Philip Drake Electronics as sole distributor for their entire range of consoles and other audio equipment.

Fairlight and Syco have jointly announced the appointment of HHB as the UK's second Fairlight dealer.
TAC have appointed Music Lab as main dealers for the entire range of TAC live and multitrack consoles. Music Lab have also been appointed London distributor for Ampex goods.
Danish company NTP have appointed Elliott Brothers (Audio Systems) Ltd as the UK distributor for the full line of NTP audio products.

• Elliott Brothers (Audio Systems) Ltd have been appointed UK distributors for the Chromatec TVD20 PPM/VU audio meter and the TVD24 multichannel meter.

• Bruel & Kjaer have appointed

Syco as UK distributors of their series 4000 studio microphones. • Stirling ITA have been appointed exclusive UK dealer for DDA's existing range of AMR consoles as well as their new in-line console. Stirling have also been appointed as a full UK distributor/dealer for Lexicon's entire range of products, with effect from July 31st, 1987.

• DDA have appointed Savana Comunicacoes as agents for all DDA products in Brazil, while in Italy, the product range is split between Professional Equipment of Milan (AMR24) and Audio Link of Parma (D, S, S series PA and S series monitor consoles).

Savana Comunicacoes Ltda, Rua Visconde de Piraja 547, GR 1120, CEP 22410, Rio de Janeiro, Brazil. Tel: (021) 274 5009. Professional Equipment Srl, 20142

Milano, Via le Famagosta 37, Italy. Tel: (02) 817839.

Audio Link Srl, Via Monte Prinzera 17a, Alberi Di Vigatto 43010, Parma, Italy. Tel: (0521) 598723.

• Soundcraft have announced the appointment of TSC as their central London dealership for all their studio products. TSC, 9 Hatton Street, London NW8, UK. Tel: 01-258 3454.

• Lyrec have appointed Martin Persson Creative Audio, Stockholm, as sole Swedish distributor for Lyrec studio recorders. Martin Persson Creative Audio AB, Box 235, S-182 52 Djursholm, Sweden.

• Bruel & Kjaer have announced several new European distributors, including Audio Control Lease in Belgium, BFE Fernmeldertechnik and Electronik AG in West Germany, High Fidelity Services SA in France, Fading SA in Spain and Sciental Audio Srl in Italy.

#### Ampex sale agreed

Allied-Signal Inc. owners of Ampex Corporation, have sold Ampex to the Lanesborough Corporation for \$479 million plus certain liabilities. Lanesborough intends to finance the transaction through a combination of its own equity and an offering of debt or equity securities. In the meantime, a major New York commercial bank has put up credit of up to \$475 million.

Under the agreement, Ampex will be acquired by a newly formed subsidiary of Lanesborough that plans to operate Ampex with the present management and organisational structure.

Âllied-Signal announced last December that they were selling Ampex along with six other units in their Electronics & Instrumentations division. Ampex were originally bought by The Signals Companies in 1981, which then merged with the Allied Corporation in 1985, as an advanced technology company focusing on aerospace, automotive products and engineered materials. Lanesborough, which are privately held, manufacture a variety of speciality chemical products that are sold in the US and abroad.

1986 and the first quarter of 1987 were record sales periods for Ampex, and everyone concerned with the sale expects the success to continue. Chairman of Ampex, Charles A Steinberg, is "especially excited that Ampex will again be operated as a stand-alone corporation."

• Lanesborough Corporation have subsequently changed their name to Sherborne Group.

## **NEWS IFPI attacks Copycode misrepresentation** The IFPI recently issued the authentic, nor are the demonstrated

applications valid or equivalent to

'Our industry is accused of

consumer access to improvements.

beneficial technological change but

music industry is to proceed with

Copycode and continue to seek

implementing legislation. We

Bureau of Standards.

welcome objective and impartial

"The intent of IFPI and the world

technical appraisal, such as that soon

to be undertaken by the US National

'Although our confidence in the

reaffirmed, we remain open to other

incomprehensible, for example, that

industry that conceived DAT cannot

or will not produce technology that

can protect the intellectual property

and talent of the music constituencies on whose creativity they depend.

"Instead, the Japanese hardware

industry declines even to address our

concerns, masking its self-interest

where DAT is concerned? Press

articles already report that one

necessarily compatible or interchangeable with other

with a spurious 'consumer interest'.

But where is that 'consumer interest'

manufacturer's DAT cassettes are not

companies' DAT cassettes. Until this

problem is solved, why are the DAT

makers so intent on the equipment's

early introduction and marketing, to

"In summary, IFPI and the world

recording industry will welcome DAT

creators and our producers. Copycode

the total disregard of 'consumer

if its conceivers will reasonably

is an achievable solution to

musical compromises.'

protect our copyrighted works, our

accomplish this ojective-with no

interest'?

viability of Copycode is staunchly

alternatives that will protect our

intellectual property. It seems

the genius of Japan's electronic

thwarting new technology and

Wrong again! We prosper from

not when we find it suicidal.

any recording company.

the intended Copycode applications of

following statement from its meeting in Hamburg.

"The master-quality copying of our copyrighted sound recordings by Digital Audio Tape (DAT) recorders threatens the future ability of our industry to create and produce recorded music. To defend the rights, careers, and incentives of all artists, composers, music publishers and record producers against the encroachments of DAT, the 'Copycode' system was developed as an impediment to unauthorised DAT copying.

"Despite the fact that eminent scientists have developed the system, the makers of DAT equipment have launched a multi-million dollar world campaign of lobbying and advertising that misrepresents Copycode and its effects on recorded music.

"By false statements and contrived demonstrations the DAT industry maintains that Copycode will distort recorded music and thus will cheat consumers who buy it. Wrong! The Copycode encoding of a given recording is a totally controllable process. Yes, certain musical notes and forms could be hurt by careless encoding, but the skilled encoding engineer can specifically avoid such sensitive passages and readily encode other non-vulnerable portions of a recording. DAT spokespersons avoid communicating those facts and avoid acknowledging that Copycode can guarantee uncompromised sound quality.

"Our business is to make fine recordings that faithfully reflect the intents and talents of our musicians and vocalists. We have not and would not jeopardize that mandate or trifle with the trust of our consumers. Yet, the DAT makers claim otherwise in pursuit of their own commercial objectives. In the United States, they have even undertaken demonstrations using a system which is claimed to be the equivalent of Copycode technology. It is not

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# NEV

In brief

• Amek have introduced a 16-channel version of their APC 1000 console, following problems arising from the installation of the first delivery of the full-sized version to Green Street Studios. The mini version is hoped to help potential customers evaluate the APC while Amek sort out the construction problems that plagued Green Street. • The Association of Professional Entertainment Hire Companies have designed an insurance policy for members, providing all necessary cover, including an 'inter-hiring' bonus between member companies without added premiums.

• Audio Fidelity have purchased Fanfare Group plc for over £2 million. They intend to inject management expertise and new business opportunities and especially to expand operations of Fane Acoustics Ltd.

• Syndromic Music have set up a digital service centre in their North London premises. Called SynService, it aims to service a wide range of

products including Atari ST computers, disk drives, synths and keyboards, and to provide retrofits, general servicing and major overhauls.

SynService, Syndromic Music, 24/26 Avenue Mews, London N10 3NP. Tel: 01-444 9126.

• Former Syco sales director Jonathan Cole has formed The Synthesiser Company, based at 9 Hatton Street in London. Already TSC have built a demonstration centre and have been appointed central London distributors for the Soundcraft TS12. Further news is the development with Do Not Erase Ltd of a 25-disk sample library for the Casio FZ1, and the partnership with Totalsystems, the studio installation company. TSC have also installed a complete recording studio for Jon Moss of Culture Club, and have delivered a pair of B&W DM1400 monitors to record producer Derek Bramble

TSC Ltd, 9 Hatton Street, London NW8, UK. Tel: 01-258 3454.

October 6th to 7th, Kansas City,

October 14th to 15th, New York,

#### Syn Aud Con schedule

Synergetic Audio Concepts have announced their autumn schedule of 2-day engineering seminars: August 26th to 27th, Lansing, Michigan. September 15th to 16th, Chicago, Illinois.

September 29th to 30th, Denver,

New York. October 27th to 28th, Washington

Colorado.

Missouri

## Forthcoming events

September 3rd to 7th SIM-HI.FI.IVES, Milan, Italy. September 17th 'Magnetism, Commercial Applications of Current Research', University of Salford, UK. September 24th 12th Sound Broadcasting Equipment Show Albany Hotel, Birmingham, UK. September 24th to 28th 2nd International Broadcasting and

Telecommunications Show (ITBS), Milan, Italy. October 2nd to 4th Sound & Vision '87, The Last Drop Village, Bolton,

UK. October 14th to 17th Broadcast '87, Frankfurt, West Germany October 16th to 19th AES 83rd Convention, New York, USA.

#### Contracts

 New England Digital have announced a number of second-time Synclavier buyers, including Shelton Leigh Palmer, Universal Recording Corp, Todd AO/Glen Glenn, Elias Associates, Motown, Modern Sound, Producers 1 and 2, and Mark Snow. Professional Audio have recently

supplied complete studio packages to Great Linford Manor, Livingstone Studios Three and Four, and Snake Ranch Studios, and were responsible for redesigning and rebuilding the control room at West 3. They have also supplied Court Signature series monitors to Rivertown Records, Eden Studios, West 3, The Sol Studios, Marquee, Chris Hufford's new studios and Pat Willis.

• Master Mix Studios in Nashville have recently taken delivery of a new Calrec UA 8000 console, the first of its type to find its way to the US.

• Ampex Electronics Ltd (UK) have recently taken delivery of two Radan 300 series computer-aided draughting systems, for use in designing outside broadcast vehicles and editing suites.

• The BBC have announced that Dolby SR was used in a multitrack session with Ladysmith Black Mambazo, who was then appearing with Paul Simon during the Graceland tour.

• UK distributor for For.A products, Cameron Video Systems, have announced that Channel 4 has become the first UK broadcaster to go on-air with the Sirius 100 digital audio memory system.

• Battery Studios in London and Stockport's Strawberry Studios have both ordered Mitsubishi equipment. Battery have ordered a 36-channel Westar console for its new Studio Five, which will feature an X-850 and Fairlight III. Strawberry have ordered a 52-channel Westar as well as an X-850.

• Britannia Row have recently purchased a 10-channel MSR-604 active mic signal distribution system, while Pink Floyd have invested in 72 channels of the MSR-604 for their forthcoming world tour.

• Sony have announced three more sales of the PCM-3324 'double package'. Solid Bond have taken delivery of two machines for their London facility, as have Harold Faltermeier's new Red Deer studio near Munich. Finally, Queen

guitarist Brian May has bought a pair of 3324s.

 Ampex Electronics have placed an order for a Drake 6000 series intercom/talkback system, and for two of the Compact series talkback systems. Drake have also delivered a 6000 series system to Radio Television Hong Kong.

· George Martin's London-based Air Studios went digital during the APRS with the order, worth over £1/2 million, of four X-850s and two X-86 2-tracks. This follows last year's purchase of two X-850s and two X-86s for Air's Montserrat studios.

• Air have also purchased Europe's first Massenburg moving fader system-it has been fitted to their Neve V series console.

 Danish manufacturer NTP Elektronik A/S have won a contract to expand the central audio switching system at the BBC's Broadcasting House in London. The contract worth some £900,000 includes a 3-level programme matrix of  $288{\times}96$  and a digital reverse music line router of 448×256 in addition to revision and expansion of the existing control system.

• London recording studio complex Mayfair have bought a second Sony 1630/DAE 1100 editing package. • The first Amek G2520 to be sold in the UK went to The Strongroom Studio in London, during their recent refit.

 Neotek have announced a series of recent purchases. Peter Gabriel has bought a 40-input Elite system with MIDI Direct for his home studio, while The Post Group, a Los Angeles video post-production facility, have purchased their second Elite. New England Digital Corporation, who make the Synclavier, have recently bought three Elan console systems, each with MIDI Direct, for their Chicago demonstration facilities and corporate headquarters in Vermont. Other purchases include: a 48-input Elite for Dino Elephante's West Coast Studio; a similar *Elite*, this one with Massenburg automation, for Merle Haggard's California studio; a 36-input Elite for Bose's recording studio and manufacturing facility in Massachussetts; and a 36-input Elan for the Bregman Electronic Music Studio at Dartmouth College in Vermont.

## Acoustics Design Group

Acousticians Sam Toyoshima and Bike Suzuki, along with UK architect John Flynn and producer Hugh Padgham, have set up the Acoustics Design Group consultancy, incorporating design, construction and installation of audio and video recording studios. Gas Electronic Systems are also involved as specialists in multi-media

electronics. The test and research facilities of JVC's audio engineering research centre will be made freely available to ADG, who are based in Guildford, Surrey. Current projects are underway in Japan, Europe, USA and the UK. For further information, contact John Flynn on: 0483 583681.

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## People

• Toa have appointed their first ever customer liaison manager. Tony Stote will be responsible for training and customer liaison for all their products.

• Ampex have appointed Charles Steinberg chairman of the board, succeeding Arthur Hausman. Succeeding Steinberg as president is Max Mitchell, who was executive vice-president.

• New England Digital have appointed Franklin Sullivan to the newly created position of vice-

president of marketing and sales.
Bill Arnold, one of the founders and Chairman of Tele-Stage Associates, has rejoined as a director.
Oliver Masciarotte has been appointed production manager of Neotek, where he will co-ordinate the work of some 40 manufacturing personnel.

• The BBC have appointed Peter Jefferson as the new liaison engineer in the design and equipment department to supervise the licensing of BBC-designed equipment to outside manufacturers.

 Professional Audio Ltd have appointed Varnavas Tsioupra as service manager.

 Electro Sound have announced the retirement of Richard Meixner as senior vice-president. ESG's board of directors are expecting to appoint Robert Barone, currently president of ElectroSound Inc, in the near future.
 David L Prentice has been

appointed sales engineer for the New England Digital Corporation's New York sales and service centre, with responsibility for sales throughout the Northeast area. He was previously with New York pro-audio dealer Martin Audio.

 Stirling ITA have appointed Tim Cuthbertson to the newly created post of general manager. Tim was previously with Audio Rents and has also worked for Air Studios and Genetic Sound.

• Sony Broadcast have appointed Rob Summers as sales engineer within their console product group. Summers comes from Molinare where for the past five years he worked as an audio engineer.

• Keith Grant (ex-Olympic Studio, London) is now at Twickenham Music Studio, Twickenham Film Studios, Twickenham and can be contacted on 01-892 4477. This is a new 48-track, fully Dolby'ed, mixdown facility, which is tied into the Twickenham Film Studios complex.

• Focusrite have appointed Stan Spiegal as general manager, whose first priority will be to improve production capability along with general administration. Kim Templeman-Holmes joins the company as international sales manager, coming most recently from Turnkey as sales manager for studio systems, and before that from Neve International where he was involved in UK and European sales.

• Tannoy have appointed Janet Lee as European sales manager

as Dataspeak stress manager responsible for all loudspeaker sales, succeeding Derek West who left the company in May. The company have also appointed Barry Carter as marketing manager for their systems division at High Wycombe. Carter will be co-ordinating the High Wycombe and Scottish operations of Tannoy's specialist systems design service.

• Digital Audio Disc Corporation, the compact disc manufacturing subsidiary of Sony Corporation of America, have appointed Scott N Bartlett as director of sales and marketing, who will direct DADC's sales activities and oversee all advertising, promotion and customer relations.

• Bruel & Kjaer (UK) have appointed Ralph Dunlop as sales manager for the Pro-Audio group, whose main areas of responsibility will include the studio range of B&K products.

• Ampex Magnetic Tape division have announced the promotions of Chuck Pope to product manager, instrumentation tape, and Jerry Campbell to product manager, ¾ in video tape. • The Mitsubishi Pro-Audio Group in the UK have appointed two new specialist engineers for digital recorders. Dave Ward joins as technical operations manager, running the technical services and providing support, while Toshio Fujisawa, from the PCM factory in Osaka, will provide first-hand technical experience to Mitsubishi servicing operations.

• API Audio Products of Vermont have appointed Jim Wallace as their new vice-president of finance and director of marketing. Kevin Raynor has been promoted to director of manufacturing and quality assurance manager.

Both of these excellent Tube-Tech units are modern reproductions of classic valve technology, offering an unparalleled warmth and natural quality to your recordings, without maintenance or reliability problems.

**PE-1A Equalizer** – The Tube-Tech valve equalizer has been built to emulate the 'PULTEC' equalizer of the 1950's and 60's. The PE-1A not only looks like its classic predecessor it also gives the same superb quality of sound (like PULTEC, Tube-Tech even wind their own chokes!)

ME-1A Mid-Equalizer - also available

**CL-1A Compressor** – Like the PE-1A, the CL-1A Compressor has been built to accurately reproduce the sound of a classic from the 1950's and 60's, 'The Fairchild'. Now the Tube-Tech CL-1A offers the same superb dynamic range control, and maintains the natural warmth and feel for which its classic forerunner was so revered.

Please contact us for further details or a demonstration.



CL-1A COMPRESSOR



## ANT multitrack NR system

introduced a new multitrack noise reduction system based on the c4 line of telcom NR systems. The 24-channel E413 uses the more energy efficient c4 E card, allowing noise reduction in the control room. Reliability has been increased with the use of gas-filled bypass relays. Channel mode can be controlled by the application of a positive or negative voltage from the multitrack to the differential input stage. All inputs and outputs are electronically balanced with the outputs floating and short-circuit proof for 600  $\Omega$  load. The unit has built-in memory to retain existing function settings in the event of power loss.

ANT are claiming over 14,000 channels in use in the world and that it has become the European broadcasting standard. On the record front they are currently rather pleased that the U2 album *The Joshua Tree* was recorded using *telcom c4*.

#### ANT Nachrichtentechnik GmbH, Lindener Strasse 15, D-3340 Wolfenbuttel, West Germany. Tel: 05331 830.

UK: Audio+Design Ltd, Unit 3, Horseshoe Park, Pangbourne, Berks RG8 7JW. Tel: 07357 4545. USA: ANT Telecommunications, Avenel Business Park, 211 Perry Parkway, Gaithersburg, MD 20877. Tel: (301) 670-9777.

## **NEWS** DDA DCM 232 in-line console

DDA has recently launched a new console, the DCM232. This shows the first results of the association with Klark-Teknik, as the automation system is by John Austin and Terry Clark of K-T. Console philosophy is to provide a high number of input channels in the same sized console. Channel switching functions including aux muting, pre/post switching, EQ in/out, insert, phase reverse and mute bus selection have been removed from the channel and an 8-channel subgrouping function is available. All switching functions can be stored in a snapshot mode on floppy disk and recalled. Snapshots can be set up as an events list, manually or triggered by timecode

Each channel uses a split architecture allowing the use of both sections on mixdown. The EQ can be switched in sections between the two paths as can the insert point. DDA also claim the use of the same minimum signal path approach that they use in their other consoles.

Frame sizes currently available include 40- and 56-channel with length dimensions of 96 and 120½ in respectively. Both versions have 32-bus outputs.

DDA Ltd, Unit 1, Inwood Business Park, Whitton Road, Hounslow, Middx TW3 2EB, UK. USA: DDA/Klark-Teknik, 30B Banfi

Plaza N, Farmingdale, NY 11735. Tel: (516) 249-3660.







We AMS Industries pic, Burnley, Lancs. BB11 5ES, England Tel: (0282) 57011. Telex: 63108 AMS-G. Fax: (0282) 39542 Harris Sound Inc. 6640 Sunset Blvd., Suite 110. Hollywood, CA 900028. U.S.A. Tel: (213) 469-3500

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Like your tape machine, the MSM 2000 has three buttons: Fast Forward, Rewind and Record. The first two allow you to step or scroll through 64 banks of 32 sounds each. Pressing Fast Forward or Rewind will move you through the banks of sounds, one bank at a time. You then access individual sounds through your keyboard or drum machine. In a hurry? Hold either button down and quickly scan through the banks. A single MSM 2000, by simply swaping RAM cartridge interfaces, will operate with your Yamaha DX-7, RX-11 or Roland keyboard. Your favorite sounds are on line all the time.

To save a sound, just push the Record button. Once activated, the Record light comes on telling you that

"Memory Protect" is off. Now you may save to or format the bank currently shown in the display window. Once formating or saving is complete, the light will automatically go off and "Memory Protect" is enabled. You may cancel the record function by simply pushing Fast Forward or Rewind.

To insure that all your precious work won't get lost, the MSM 2000 comes standard with automatic memory self protection. This is provided through maintenance free rechargeable batteries. Every time you plug in the MSM 2000, the batteries are automatically recharged.

Only the MSM 2000 can give you the freedom, speed and flexibility you need, on the road or in the studio. To experience the remarkable MSM 2000, contact your favorite professional music dealer or call Forat for the authorized dealer near you.

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## Neve Prism series

With a break from established policy have electronically balanced line Neve have made a range of rackmount units available derived from the V series consoles. Called the Prism series, they comprise a 4U 19 in rack with capacity for 10 modules that may be powered from the client's existing console or by a 1U power supply if required. The two modules are the Formant Spectrum Equaliser and the mic amp/dynamics unit which comprises compressor/ limiter/gate/expander. Both modules

level inputs and outputs with the mic amp/dynamics module also having a transformer balanced mic input and variable high and low pass filters in the audio chain.

**Neve Electronics International** Ltd, Cambridge House, Melbourn, Royston, Herts SG8 6AU, UK. Tel: 0763 61886.

USA: Rupert Neve Inc, Berkshire Industrial Park, Bethel, CT 06801. Tel: (203) 744-6230.



## Bel The Editor

Bel Electronics have introduced a new digital delay processor designated the BDE-2600S and also known as The Editor. Specification is similar to the BDE-2400 and 3200 but the main difference is its ability to operate in stereo. The BDE-2600 has 26 s of memory at 20 kHz single channel and 13 s in stereo. Unlike the other BDE models the optional floppy disk interface with dual disk drive and the remote control, are now

standard rather than optional. Other features include pitch now being adjustable in semitones or  $\frac{1}{50}$  of a semitone; and that the MIDI specification now includes assignable channels.

UK: SED, 29 Guildford Street, Luton, Beds LU1 2NQ. Tel: 0582 452495. Export: Musimex, 46A Marlborough Road, London N22 4NN, UK. Tel: 01.881 6060





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## Sony digital limiter

The Sony DAL-1000 is a digital limiter designed for dynamics control of the final 2-channel master. It consists of a 1U rack mount case and a separate remote control unit that is supplied as standard. The DAL-1000 can handle sampling rates of 44.056, 44.1 and 48 kHz and it will select the correct rate automatically.

Basically the unit offers two types of limiting curve. Type A offers a gentle top end roll-off and allows the rest of the signal to be level shifted. Type B allows gentle compression over the entire dynamic range of the signal. Input attenuation and balance can be adjusted in 129 steps, which can be changed while a signal is being processed with no spurious noises. Up to five different settings can be pre-selected into the DAL- 1000's memory.

Sony are quite keen to emphasise that they see the limiter as a way of actually expanding the dynamic range available on digital recordings. They feel that 'fear' of level clipping actually causes unnecessary undermodulation which does not allow maximum use of the available dynamic range. The limiter will also allow low level signals to be shifted up from the digital noise floor which is itself desirable.

UK: Sony Broadcast Ltd, Belgrave House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 0256 55011. USA: Sony Corporation of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656. Tel: (201) 930-1000.

#### Clear-Com Series 500 beltpacks

Clear-Com have released preliminary information on the series 500beltpack-type headset intercom stations. There are three models: the RS-501 single-channel standard unit; the RS-502 dual-channel unit selectable to either one of two channels; and the RS-522, which is a 2-channel dual-listen design providing facilities for simultaneous listening and talking to any combination on two intercom channels. All operating controls are recessed as are indicators and connectors for protection against damage.

Clear-Com, 1111 17th Street, San Francisco, CA 94107, USA. Tel: (415) 861-6666. UK: Theatre Sound & Lighting

(Services) Ltd, 67 Drury Lane, London WC2B 5SP. Tel: 01-836 7877/8.

## New Yamaha products

Yamaha introduced a number of new products at the APRS about which there is only brief information currently available. The *REX50* is a Digital Multi Effector—a desk-top free-standing design with effects capability including reverb, delay, modulation, pan and pitch change with the ability to combine effects. The unit has 30 preset memories and 60 user memories with program selection by footswitch, MIDI or front panel. It has 16 bit processing with 12 kHz bandwidth.

The *REV5* is a reverb and multi effects unit with similar operation to the *REV7*. It has the possibility of creating layered effects, combined effects programs and includes programmable parametric EQ. Contains 30 preset and 60 user memories and a bulk dump capability via MIDI. Sampling frequency is 44.1 kHz for 20 kHz bandwidth.

## Sony DAT launch

Sony have announced their intention to market professional DAT equipment throughout Europe from Autumn of this year. The first pro-DAT machine to become available will be the PCM-2500, a 2U 19 in rack mounting unit. The basis of the transport has been derived from a domestic machine already available in Japan (DTC-1000ES) but will contain different features and interfaces. The PCM-2500 has sampling rates of 44.1 and 48 kHz on the analogue inputs and 44.1, 48 and 32 kHz digital sampling rates. All digital inputs and outputs correspond with a variety of formats including AES/EBU and SDIF-2. The system also has its own error rate indicator in playback mode and can add a copy

#### Soundcraft FAME automation

Soundcraft have recently introduced an automation system for the TS12console to be known as FAME: Faders; Auxiliaries; Mutes; Equalisers. Based around a 68000 microprocessor, the system can control faders, switching of three aux send on/off, channel cut and EQ in/out. There is also provision for up to nine automated subgroups. SMPTE/EBU timecode-based, the system locks to the code from a tape track and maintains frame accuracy. Ten complete mixes can be stored on a 3½ in disk while 'working mix' data is stored in 512 kbyte of RAM. The program and colour graphics have separate memory.

The system hardware consists of a VCA switchcard for each channel, a

The MSS-1 is a MIDI position synchroniser containing a SMPTE/EBU generator and reader, SMPTE/MIDI interface with song position pointers and the ability to send MIDI program and control change data. It will store 10 songs with cartridge save and a memory capacity of 7,178 beats in the sync mode and 1,795 steps in the MIDI event model.

There have also been four new additions to the mic range: the *MZ106S* dynamic vocal mic with mute switch; *MZ204* and *MZ205Be* dynamic drum/instrument mics; and the *MZ203Be* dynamic vocal mic. **UK:** Yamaha Kemble Music (UK) Ltd, Mount Avenue, Bletchley, Milton Keynes, Bucks MK1 1JE. Tel: 0908 71771. **USA:** Yamaha International Corp, PO Box 6600, Buena Park, CA 90620. Tel: (714) 522-9105.

prohibit code when recording. Other features include emphasis on/off, master 'safe' button, voltage selector, wireless and wired remote facilities.

Sony plan to launch a portable pro-DAT machine at the beginning of 1988. This is the portable *PCM-2000* first shown in prototype at the London AES. This machine will include a larger selection of professional interfaces including a timecode capability. Provisional prices for Europe are £3,500 for the *PCM-2500* and £5,200 for the *PCM-2500* and \$5,200 for the *PCM-2500* and \$8,300 respectively). **UK:** Sony Broadcast Ltd, Belgrave House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 0256 55011.

central keypad and a 2U 19 in rack unit for disk drive and processor. Retrofitting is possible to existing *TS12* consoles and Soundcraft say that the design of the system will allow software upgrades without hardware changes. Additionally there is an optional colour monitor to display EQ, aux and mute positions with fader level and automation mode for each channel strip. Soundcraft Electronics Ltd, Unit 2, Borehamwood Industrial Park, Rowley Lane, Borehamwood, Herts WD6 5PZ, UK. Tel: 01-207 5050.

USA: Soundcraft USA, PO Box 2200, 8500 Balboa Boulevard, Northridge, CA 91329. Tel: (818) 893-4351.

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# NEWS

#### Klark-Teknik EQ, delay line and monitors

Klark-Teknik have introduced two new equalisers in the form of the 400 series parametric EQ primarily designed for room tuning although other uses are quite possible. The DN405 is a 1U unit with 5 band parametric EQ with separate variable high and low pass filters. Other features include input gain control and individual band in/out. Each band covers 20 Hz to 20 kHz in three switched ranges allowing 100% overlap. Bandwidth variable  $1/_{12}$  to 2 octaves with gain of -25 to +15 dB. Model DN410 is dual-channel unit similar to DN405 in 2U rack and with possibility of 10-band operation.

The DN780 digital reverb has had new features added in the form of a MIDI serial board allowing any memory store in the unit to be recalled by the MIDI voice select command with the addition of tape save and load. With MIDI, an RS232 board is also available allowing external control of the unit. Both these boards may be retrofitted to existing units. The remote unit has also been improved allowing fuller control.

The *DN773* is a compact 16 bit delay line with 50 kHz sampling rate allowing  $2\frac{1}{2}$ , 5,  $7\frac{1}{2}$  and 10 s of stereo delay in the standard models with

double the delay running in the mono mode. All delay adjustments are internal making the unit tamperproof.

Lastly, the electro-acoustic division, known as Klark Acoustic, have launched the first of the Jade series of monitors developed in collaboration with Munro Associates. The Jade One MkII is a 2-way bass reflex speaker system with integral power amplification. The drive units are a 1<sup>1</sup>/<sub>4</sub> in HF soft dome type with an 8 in LF driver. An active crossover is used with 2.5 kHz crossover frequency and a user controllable placement compensation EQ. The amplification is rated at 100 W into  $6 \Omega$  with acoustic output rated at 113 dB SPL peak at 1 m or 107 dB continuous. Frequency response is quoted as 55 Hz to 17 kHz. A high powered system known as Jade Two has also just been launched although details are not available at time of writing.

Klark-Teknik plc, Klark Industrial Estate, Walter Nash Road, Kidderminster, Worcs DY11 7HJ, UK. Tel: 0562 745371.

USA: Klark-Teknik Electronics Inc, 30B Banfi Plaza North, Farmingdale, NY 11735. Tel: (516) 249-3660.



#### EQuator automation

*EQuator* is a self-contained automation system that can be connected to any console through its insert points and allows fully automated EQ, level and muting. The system has no control over the host console and therefore this remains fully active.

The hardware comprises a QWERTY keyboard, colour monitor and a master module, EQuator 2+8, which contains the system computer, disk drive, two master channels and eight input channels. The system is expandable up to 40 channels and two master channels by the addition of further modules.

Memory capacity allows the storage and resetting of up to 100 EQ and fader levels for each channel with mix data stored on diskette. The EQ is 10-band,  $\pm 12$  dB in 1 dB steps with 14-band EQ on master channels. Fader range is 0 dB to mute with a ½ dB resolution. It is possible to work on one channel while the rest are running under automation and it is possible to define the fade rate from one fader level to another. It is also possible to solo channels at their true mix levels.

The system runs against SMPTE/timecode. Software is diskbased allowing for future updates. The manufacturers point out that the system is not limited to use on desk channels and could quite easily be used for aux, etc. Audio Control Systems Ltd, Commerce House, 658b

Chatsworth Road, Chesterfield S40 3JZ, UK. Tel: 0246 566801. UK: HHB Hire & Sales, 73-75 Scrubs Lane, London NW10 6QU. Tel: 01-960 2144.



## In brief

• 3M have recently launched three new tape product ranges: 3M AUD is a U-matic cassette for PCM audio applications; 3M 806/7 is a music mastering tape for use in field recording, music and broadcast mastering applications; 3M 808/9 is described as an audio mastering tape for use in voice narration, archiving, animation and other voice/effect recording applications.

• TAM/England have just introduced two special purpose vinyl discs for test purposes. *Type One* is a 12 in double-sided mirror pressing, ie one with no grooves at all for bias setting on pick-up arms; and *Type Two*, which is a 12 in double-sided silent groove pressing intended for play at 78 RPM running for about 3½ mins. Intended uses for *Type Two* are for theatrical, film and TV where the visual appearance of an acoustic gramophone being played may be required leaving the real control of the sound balance to the production team. TAM/England, 13a Hamilton Way, London N3 1AN. Tel: 01-346 0033.

• Danish company SC Audio have introduced two new units in their Tube-Tech series of valve (tube) products. Following the *PE1A* equaliser there has now been added the *ME1A* mid-range equaliser and the *CL1A* compressor.

• Ampex audio tape division has announced that in future all ¼ in 467 digital audio tape will be supplied on precision reels similar to the wider tape formats. Precision reels will also be available in ¼ in format, 10½ and 14 in size as accessories.

• Sony Broadcast have announced that the *MXP-3000* multitrack console is now available in Europe following launches in Japan and the US over a year ago with in excess of 40 consoles sold to date.

## **OUR NEW EQ SOUNDED GOOD HERE...**

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> It's just one example of the way we continue to enhance the sound of the SL 4000 E Series Master Studio System to keep ahead in the technology race. And if you already have an SL 4000 E Series you can stay ahead too, as the new EQ is easily retrofitted to all existing consoles.

> There is also a new SSL Studio Computer, the G Series. which with its fast processors and vast data storage capacity enables processes that used to take minutes, to be carried out in seconds. The G Series too is fully retrofitable.

With these improvements, and more to come, shouldn't you be using the only totally integrated audio mixing system in the world?

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# NEV





The DX300, DX800 and DX1500

DX300 output power: 200 watts into 8Ω (per channel, both channels driven, 20Hz-20kHz, 0.5dB) 400 watts into 8Ω, 450 watts into 4Ω (burst power') distortion (250mW to rated power at 8Ω): (MD SMPTE; <0.01%, THD (1kHz): Ω0.01%, THD (20kHz DIN): <0.02% size: 2 rack spaces, 8%" behind front panel weight: 7Kgs, 16 lbs. cooling: 2 passive heatsinks. atts into

DX800 output power: 250 watts into  $8\Omega$ , 400 watts into  $4\Omega$  (per (bridged mono), 800 watts into 4 $\Omega$  900 watts into 2 $\Omega$  (burst power\*) distortion (250mW to rated power at 8Ω): IMD SMPTE: <0.01%. THD (1kHz): <0.01%. THD (20Hz-20kHz DIN): <0.02% size; 2 rack spaces, 13" behind front panel weight: 13Kgs, 29 lbs. cooling: 1 servo controlled DC fan.

**DX1500** output power: 300 watts into 8Ω, 500 watts into 4Ω, 750 watts into 2Ω (per channel, both channels driven, 20Hz-20kHZ, -0.5dB), 1000 watts into 8Ω, 1500 watts into 4Ω (bridged mono) 1500 watts into 2Ω, 1600 watts into 1Ω (burst power\*) distortion (250mW to rated power at 8Ω): NID SMPTE: <0.01%. THD (TkH2): <0.01%. THD (20Hz-20kHz DIN): <0.02% size: 2 rack spaces, 13" behind front panel weight: 15Kgs, 34 lbs. cooling: 2 servo controlled DC fans.

\*Burst power is a 1kHz tone for 10ms every 100ms, single channel (an indication of the amplifiers ability to handle music transients and tolerate deviations in nominal speaker impedance)

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U.S. Sales Office: Hill Audio Inc., 5002B N. Royal Atlanta Dr., Tucker, GA 30084 USA Tel: (404) 934-1851 Tlx: 293827 HLAD



## In brief

• More contracts for SSL: a 40-channel SL4064 E with Total Recall to Livingston Studios in London; a 56-channel SL4064 E with Total Recall for Skyline Studios in New York; a 40-channel SL4056 E with Total Recall for Carriage House in Stamford, Connecticut; a 64-channel SLA056 E (their seventh SSL) for JVC 7, and a 32-channel SL4048 E for Wonder Station, both in Tokyo; a 40-channel SLA056 E with Total Recall for Studio du Chesnay in Versailles, France; a 32-mono channel SL5540 M audio production system for Supraphon in Czechoslovakia; and a 36-channel SL5548 audio production system for ABC MVC2 in New York.

• The new studio complex at Great Linford Manor is the world's first recipient of the Studer A820 multitrack. British distributors FWO Bauch have already received more than 25 orders for the new machine, including those from Silk Sound, Marquee, Abbey Road, BBC, Maison Rouge, Lansdowne, RAK Records, Farmyard, Britannia Row, Peter Gabriel's Real World Studios and Rockfield Studios.

• The second Calrec digitally assignable mixing system has gone into service with the BBC's latest master sound control vehicle. The 112-input system was christened at the 1987 International Country Music Festival at Wembley.

 Hibino Electrosound, Amek Distributors for Japan, have ordered a 64-input APC1000 with GML automation, which they will supply to Studio Jive in Tokyo. Ace Management of Hong Kong will provide seven consoles for the Great Hall of the People in Beijing, comprising two custom-built Amek Classics, three BCII broadcast consoles and two TAC Scorpions. Protech GmbH of West Germany are supplying an Amek Angela with 36 inputs and MasterMix automation to the University Games in Zagreb, Yugoslavia (it was bought by the people of Mainz and presented as a gift to their twin city Zagreb). And Amek G2520s with MasterMix have been ordered by: Ca Va Studios in Glasgow (56-input), Square 1 in Bury (40-input) and Mainos TV in Finland (40-input).

• Siemens, Austria, Neve's parent company, have recently received an order from Austrian Broadcast & Television (ORF) for a large DSP system for their radio drama studio.

• TDS Tecniche del Suono Srl of Italy have been awarded a contract to supply Fono Video Sync of Milan with a complete audio studio for music and A/V synchronisation. Equipment includes a 32-channel Westec console and 24-track MCI/Sony. • DDA have announced a number of recent sales. Two 24/8 S series monitor consoles have gone to the Nomis complex, while Abbey Road has taken on their fourth D series console for mobile stereo recording. Fountain Television have received a customised D series for their TV studio control room. AMR24 installations include a 28/24 to FRJ Studios and a customised 36/32 console with remote patchbay to Orinoco Studios

• The MBI/AHB group have announced the installations of a Sigma 24 mixing system in Tonstudio Wagner near Vienna and another in Tonstudio St Blasien in Grafenhof.

• Mal Holmes and Graham Weir of OMD have each purchased a home studio system from Audio Services in Stockport, comprising the computerassisted CMC24 mixers and multitrack equipment.

• Sigma Sound Studios have recently upgraded their Philadelphia-based Studio One with a 52-input Neve 8078, a George Massenburg Labs automation system, and Mitsubishi 2- and 32-track digital recorders.

# Neve V Series – when only the best is good enough



console and the ease of operation of the Necam system during mixing.

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Tim Leigh Smith looks at disk-based recording at The Bridge studios in London

> he Bridge is a recently opened two-room facility specialising in work ranging from radio and

TV commercials to full scale radio drama and documentary film soundtrack work. The central London facility is run by Robbie Weston. The two studios have the same facilities: a Studer stereo A812 with centre-rack timecode, an



SSL 6032E 32-channel console with a professional CD player and an AMS AudioFile set into the desk (SSL painted the surrounding panels to match AudioFile), with stereo monitoring on KEF KM1s. A pair of 3-speed 24-track Studer A820s, the first two production models, live in The Engine Room between the two control rooms, which are normally assigned one each.

The Engine Room also houses Studer A810 centre-track timecode machines, Beta, VHS and U-matic machines for both video and digital audio, and an Ampex VPR-80 1 in C-format VT machine. Both studios have tables facing colour monitors, putting the emphasis firmly on audio for video.

AudioFile appeared on the horizon about a year ago when The Bridge was being planned, so there was a visit to AMS in Burnley (Robbie Weston says "a sort of long weekend") to see and poke the prototype. "Right from the beginning in the conception of The Bridge we had the idea of eliminating cart machines and control rooms full of reel-to-reel machines. It just seemed obvious that was the way things would go and it was very firmly in our minds that the AudioFile would be the way to do it."

In terms of technical quality, cart machines are still the weakest link in the chain despite considerable improvements. "Also a cart's not very good in a video sense because you can't synchronise it. You can tell it when to start but you can't do anything about the speed while it's running. Because of the lubricated tape and slippage you can't guarantee that it's going to be the same if you play it 10 times; it certainly won't be frame accurate 10 times.

He is swift to point out that carts are still being used very successfully at Silk Sound but for the new facility they wanted something better. Following the visit to AMS an AudioFile was introduced at Silk Sound and quietly put to work. AMS had made it clear that the software was still being developed and feedback from early users would contribute to that development. The system kept getting faster and better so it proved a worthwhile experience, hence the two AudioFiles at The Bridge. "Costwise it balances up very well with all the



Why is it always such a struggle to link audio and video tape transports through most synchronizers? Because each machine speaks a different control language. Translating reel and capstan commands for one type of transport is complicated enough. Factor in a multitude of machine-specific commands and transport design philosophies, and you have a real nightmare.

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# PRACTICAL DISK RECORDING I

other equipment that we would have had. If you'd got a fully equipped studio with six cart machines, three ¼ inch machines and two turntables, then on top of all that you looked at buying an *AudioFile*, it's not really going to offer very much you can't already do except for digital

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#### For full information/demonstration contact: **Rebis Audio Ltd.** Kinver Street, Stourbridge West Midlands DY8 5AB. ENGLAND. Telephone: (0384) 71865. Telex: 335494. Fax: (0384) 397105

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quality.

"If you're starting from scratch you could buy six cart machines, six sets of dbx, a cart recorder, dbx for that, three centre-track timecode machines, synchroniser interfaces for those, a way of event-starting all the carts of the synchroniser, lots of patching and a matrix of switchers to enable it all to work. Build it into a console so that the engineer can get at it all without obscuring his view of the TV monitor or the studio. Or you could get an AudioFile with a 19 in rackmounted unit in the desk and the mainframe in The Engine Room out of the way. Costwise there's absolutely nothing in it."

The latest software provides up to eight simultaneous mono outputs, each of which can carry a continuous stream of different cues related to timecode, all capable of independent adjustment. Carts, tape machines and grams may add up to more outputs but they need time to recue or attention to reload.

Video productions that just require 30 min of background music and narration are handled on 24-track tape. *AudioFile* comes in to action where there are complex sound effects to be arranged.

"We see it as working in conjunction with a multitrack. It's not an 8-track digital recorder that replaces the need for tape. It's a cart machine that's editable."

One of the most useful features is its ability to mark a cue point within a sound effect that relates to a visual cue. For example, the squeal of an airliner's tyres on touchdown can be related to timecode when the puff of smoke appears. Having marked the cue point the accuracy of sync can be checked simply by running back a few seconds and playing the cue. It is not necessary to run right back to the start of the sound effect as it is with an event-triggered tape machine or cart. In the same way, if background music is to be faded up after speech, a particular phrase of music can be marked to come at the end of speech. Again this can be checked almost instantly.

"Things like that really speed up an operation," says Weston. "An engineer can look very impressive in front of his client. Of course you can do that sort of thing using timecoded tape but you're not losing any quality by doing it through the AudioFile. You can take a compact disc of library music, put it into the AudioFile, synchronise it, edit it, and it's exactly the same as if it was coming straight off that compact disc."

Editing changes the sequence of sounds reproduced without actually cutting anything. So when the producer decides it was better the first way the bits are still in the system, not scattered about the control room floor. At the end of a session the events list can be saved to  $3\frac{1}{2}$  in micro floppydisk and the digital audio from the hard disk can be saved to PCM tape for future use on the same AudioFile or another elsewhere. Robbie Weston reckons that this ability to interchange material between studios will help to build clients' confidence in the system.

It may not have escaped your notice that we have covered only the AMS AudioFile system in practical use—this was not our intention. Two other systems scheduled for inclusion were quite simply not in an operational state and reference to them as practical systems would have been an exaggeration. We hope to report on these at a later date. It should be pointed out that the Synclavier Direct-to-Disk system was not among these units and a full appraisal of this will appear in the near future.

#### How to deliver all the mixes they want, with all the sound quality you need.

Monitor mixing could be the world's most thankless job. Juggling levels to keep a group of demanding and critical musicians happy is tough enough without a console that ties your hands.

#### Maximum flexibility

It's essential for effective control of levels and balances on stage. So the S Series Monitor includes eight Monitor sends on each input channel, as well as a feed to the master L-R outputs via the pan pot and 100mm channel fader. Monitor sends can be assigned pre- or post-fader as needed. For even more routing options, each of the eight Monitor groups can feed the four Aux Sends. Both Aux and Monitor outputs have 3 bands of EQ (with sweepable midrange). There's even a Mono output with its own level control. Altogether, you have seventeen usable outputs to work with.

Building this level of flexibility into a cost-effective console isn't easy. But DDA engineering has never been about settling for the easy solution: it's about finding the **right** one. It's an attitude we share with Klark-Teknik, our parent company.

#### Outstanding audio performance

Hum, hiss and noise are especially annoying and distracting on stage. They're too high a price to pay, what ever the console costs. Meticulous attention to every detail of S Series



More control Aux sends have three band EQ with sweepable midrange. More outputs Eight monitor sends on each input channel.

circuitry meets the high standards set by our world-class D Series sound reinforcement consoles. Input channel crosstalk is typically better than – 80dBv, line level noise is – 84dBv. Other specs are equally impeccable. Balanced inputs and outputs preserve signal integrity, even through the network of audio, power and lighting cables on stage. Finally everyone can hear the music without distracting hum, hiss and noise.

#### Status in a snapshot

Successful designs have to perform in the real world, not just on a test bench. The S Series includes status LEDs for Solo, Cut, EQ In/Out and other key functions, so you can see what's going on even in the dark. And the removable meter bridge lets the console fit into low-profile flight cases, making the most efficient use of your truck space.

#### **Roadworth** reliability

DDA's stringent quality control includes a complete "burn-in" of each console. We won't ship an S Series console until we're satisfied that it will deliver clean, accurate, precisely controllable mixes night after night.

#### Improve your performance

Discover the difference DDA sound quality, precise control and ergonomic design make. Who knows, one of these nights someone may even thank you. For the name of the DDA S Series

dealer near you, contact:

DDA Limited, Unit #1, Inwood Business Park, Whitton Road, Hounslow, Middlesex TW3 2EB. Tel: 01 570 7161 Telex: 932905 Fax: 01 577 3677



In the USA write to: Klark-Teknik Electronics Inc., 30B Banfi Plaza Nor Famingdale, NY 11735 Tel: (516) 249 3660 Fax: (516) 420 1863.





# PRACTICAL DISK RECORDING II

The BBC has many production centres around the UK, of widely differing sizes. BBC Wales' Stacey Road is a unique facility within the Corporation that has evolved into a specialist post-production operation. Tim Leigh Smith, in conversation with Des Bennett of Stacey Road, traces the development from basic beginnings to the present, now with several years of disk-based recording experience under their belt

> s a film sound recordist for BBC Wales I was very interested in music recording using film audio equipment, which was very limited. You had to think about what you were doing because you didn't have the resources of acoustically

> controlled surroundings and a large mixing desk with foldback, and all the things you would expect to have if you're going to record music. And on top of that you didn't have multitrack. So what you got is what you got.

"The outcome was that I took a great deal of interest in recording music in whatever form, whether it be a single voice and a guitar or a piano up to any forces they could command. It ended up with me doing a programme which involved an 18-piece band with eight vocalists and backing vocalists for four films which were going to be put out on BBC network television."

This project was obviously a bit big for the standard film recordist kit so the necessary gear was hired in and set up in a radio studio to prerecord the music. (In those days most BBC studios were equipped with mono desks designed for speech rather than multimic music.) The mix was recorded on stereo Nagras with vocals on one track and backing on the other, allowing adjustments to suit the balance to the images. When the films were edited a first generation sepmag soundtrack was produced to ensure the finest quality for transmission.

As a result of this successful venture it was suggested that any similar projects in the near future could make use of a former TV news and current affairs studio in Stacey Road away from the main BBC premises, which was surplus to requirements then. In 1975 Des Bennett set up his four Audio Developments portable mixers linked with flying leads to provide 24 channels into two stereo Nagras. A number of demonstration recordings from the  $10 \text{ m}^2$  Stacey Road studio helped to convince producers that this 'temporary' facility was worth investigating. Then came the first television rock opera in Welsh: *Melltith ar y Nyth*, based on a traditional tale. "The producer asked me if we could do it multitrack, and I said 'Yes' because the first answer to every question is 'Yes', and then you find out how you're going to do it."

On this occasion it meant hiring in a 3M 8-track M79 with a set of Dolbys and a suitable synchroniser. The machine came from ex-BBC Ealing film sound recordist John Page who was connected with the firm making Maglink portable timecode equipment, so he supplied a Maglink synchroniser system along with an IVC 1 in VT machine. The soundtrack of this production was issued as the first BBC Wales album, a measure of its success.

In 1974 the first Sypher video dubbing suite had been set up at BBC Television Centre in London but video people generally were not then familiar with the idea of separate audio and video recorders linked by a synchroniser. For Des Bennett and his colleague at Stacey Road, Tony Heasman (now assistant manager film, BBC Wales), the synchronisation of Nagra or Stellavox with film camera and sepmag recorder was the norm and they were able to establish Stacey Road as the first video post-syncing facility outside London.

Twelve years ago there wasn't a great deal of video synchronisation work around, so to keep the 8-track machine busy it was arranged that the studio could be hired out through BBC Enterprises. It was one of the first to offer multitrack studio and location facilities for Welsh language pop/rock recordings, which had not been well served previously. The 8-track earned itself a permanent place and was later joined by a 16-track M79, a 20/8/2 Midas desk, a couple of Studer B67s and a Nagra IV-S with NAB spool capability and varispeed.

In the early days the 8-track was taken to the TV studios to pre-record material and provide 'live' multitrack playback for several series of a Welsh language pop music show which saw the introduction of Shure SM58 pop-shielded mics to BBC Wales. Eight-track and synchroniser did the first television drama dub in Wales and the first stereo simulcast of a pre-recorded work in Wales. For the simulcast, landlines carried timecode some five miles between videotape and audio machine. The stereo pilotone Nagra with varispeed was run as a backup in case of sync problems. There were none.

The first simulcast on the continent of Europe involved the Stacey Road crew and their gear in a trip to the Netherlands at the request of NOS, who provide technical facilities for the various Dutch broadcast production companies. The portable Maglink system and two M79s were taken over to handle audio recording, editing and transmission of a 90 min performance of Verdi's *Requiem.* On this occasion the mono TV sound was derived from the stereo radio feed rather than coming off the VT soundtrack.

After a few years multitracks became available in television studios and Des Bennett, now officially a dubbing mixer, settled more permanently at Stacey Road recording title music, backing tracks, and even music to picture, as well as handling video dubbing for BBC Wales and occasional jobs for other BBC regions. BBC London facilities were usually fully committed so if video and audio synchronisation needed special attention, for whatever reason, Stacey Road tended to be where it got sorted out. The next development came in 1979 when BBC Wales' Children's Department wanted to dub an American series of 25 fast moving 6 min cartoons into Welsh. This would apparently involve rapid rocking and rolling of U-matic and 8-track by deft manual operation of the synchroniser controls. When asked if it would be possible Des as usual said 'Yes': "And I hadn't got the faintest idea how I could do it."

Timecode in picture might obscure vital lip-sync cues so a separate 35 mm footage/frame display (1% ft=1 s) fed from the Maglink was fitted below the video monitor for the actors. In film areas they would also see written dialogue timed to match lip movements, projected across the bottom of the screen, passing a cue mark. This was not then possible in video, so scripts carried footage cues and the actors were persuaded to wear headphones and listen to the original soundtrack. At first they were reluctant, now they wouldn't do it any other way.

During recording the original and studio sound were monitored on separate speakers to assess accuracy of sync. Then each take was played back clean to assess performance. Some cartoon characters had sped-up or slowed-down voices and the only way to match them was to use varispeed on the multitrack. The video machine could not run in sync so only the audio tape was used for cues. This proved so successful that the picture was not used at all during post-syncing.

A routine developed: play the original track twice for rehearsal then record and finally play the take. In the next five years this system handled several cartoon series and two major live action film series, which required much more accurate lip-sync to picture than the cartoons. There was a constant search for simple means to correct slightly inaccurate sync by slipping the speech into place.

If speech was ahead of picture a delay line provided the simple solution. But if it was already delayed the speech had to be taken off the multitrack and laid back in sync at a cost of two tape generations. Des Bennett had an idea: suppose the required bit of audio was stored on a suitable delay line device that allowed the stored audio to be edited and then triggered by timecode at the correct point. That device was a modified AMS DMX 15-80s stereo digital delay line.

"It had the longest delay in broadcasting, 4½ seconds, when we got it in January 1982. I had asked AMS if they could modify the normal AMS delay line so it could store a piece of information and fire it off as a complete piece of information. When they asked me how long a delay I wanted, I said, 'Enough for a sentence'. I took my stopwatch and went: 'Mary had a little lamb, it's fleece was white as snow,' and at the time I made that 4½ seconds. So I said, 'I want 4½ seconds delay, how much will that be?'"

Des was able to offer several good reasons for the necessary investment: as well as delay and repeat effects there were strange voices for cartoon characters using harmonisation and pitch change. An actor could play several parts with different voices or a complex crowd effect could be built up from one voice and, best of all, mistimed lines could be stored and repositioned using the timecode trigger.

About this time Stacey Road effectively doubled its post-syncing output by the installation of a second control room with two M79 multitracks, two Studer B67 ¼ in, AMS delay line and digital reverb, and a 24/4 Midas desk linked to the same studio. This was to be operated by Des Bennett's new colleague Peter Jeffreys. One of them could be recording from the studio while the other was editing a previous session. Solo operation was possible provided the established play, play, record, play pattern was automated.

This was done using a BBC *Micro* computer in each control room with interfaces and software created by David Williams, a BBC Wales maintenance engineer, for Stacey Road's requirements. One decision was that at no time would there be more than one actor in the studio. "Now most people say you can't get performance if you do that, but when needs must the devil drives and the fact remains you can get performance." The actor recording the first voice can use the original soundtrack as a guide to performance, provided it is properly performed and synchronous. Following actors can perform to voices that are pre-recorded, just like overdubbing.

In the computer controlled post-syncing system every timecode cue point for one actor would be listed on the BBC *Micro*. At the session each of that actor's cues could be located, rehearsed, recorded and checked in turn. For rehearsals the system would run only the video machine from the required pre-roll point (reducing multitrack wear) and would feed the original soundtrack to the actor. A set of cue bleeps at about one second intervals would be injected just before cue point.

This allowed the actor to concentrate on performance without the need to watch for timecode cues and lip movements. A good performance tends to make the accuracy seem less important. "If you feel that the voice matches the character then you enjoy the programme and you ignore the sync." When things were working well the system could be set to skip one or both rehearsals and go for a take. The computer system also freed the operators from the endless manual shuttling of tape machines so they could concentrate on sound quality and sync accuracy.

The success of the delay line for slipping things into sync led to enquiries about longer delays at lower cost. AMS was already thinking about a digital recording and editing system. For three or four years there was discrete dialogue with potential users. Des Bennett was requesting that the device should have an RS422 port providing control facilities similar to a tape machine. He also had specific ideas for video dubbing, postsyncing and music recording applications. AMS managed to take many of these into consideration.

In due course an AudioFile arrived at Stacey Road on the understanding that its software was still in development. There followed three software updates within a year, each an improvement on the preceding version and each requiring changes in the BBC Micro controlling software. Inevitably there were crashes: "It was like driving down the motorway in the wrong direction sometimes." But anyone who has spent years rocking and rolling tape machines manually all day, hitting the right button at the right moment time after time, has got to be fairly persistent ("or a bit loony") and eventually it all settled down.

A mobile control panel allows the device to be operated from either control room. It is used on three main types of work: video dubbing, basically adding music and effects; video post-syncing, dialogue replacement, usually from one language to another; and stereo music editing.

One of the first productions to use AudioFile for dubbing at Stacey Road was the drama series District Nurse with 12 episodes of 50 minutes duration. The routine here was to get a printout of the edit decision list from the VT edit computer. This enabled in and out timecode points for every scene to be entered on the BBC Micro. Then the system could locate any scene, rock and roll across any scene, and trigger frame-accurate event starts within any scene.

Events can be cued from the start of an effect or from a chosen mark point within an effect that must coincide with a visual cue. Effects can be dropped in on the fly and later slipped into perfect sync, if necessary. Des Bennett reckons each 50 min episode of *District Nurse* required between 150 and 200 effects to be tracklaid, mainly from wildtrack tapes provided by the programme's sound supervisor.

Where conditions had prevented clean lip-sync sound there was either a studio post-sync dialogue replacement session or sometimes a wildtrack 'sound only' take done on location to be slipped into sync. This last could be a very fiddly job of cutting and joining bits of tape or mag track but it is much easier on AudioFile with the DMX 15-80s available to expand or contract the sound as required. (There are plans to include time compression/expansion facilities on AudioFile itself.)

With all the tracks prepared the mixdown canbegin. The BBC *Micro* commands the U-matic video machine and audio recorder to go to their starting points. When *AudioFile* receives timecode from the video tape it prepares to present the appropriate cues at their designated outputs and timecode event points. A VDU in front of the operator shows cues on the 8-output channels moving across the screen past the 'replay head' in the manner of an animated dubbing chart.

One major advantage is the ability to assign any cue to any timecode point and any output. For example, in *District Nurse* there were many cues that occurred more than once in an episode. Several scenes set in one particular location would usually require the same basic atmosphere. Once an effect is stored in *AudioFile* it can be called up repeatedly throughout the programme. For certain continuous effects there is no need to record several minutes of the sound.

"If you have a three minute scene that requires a ticking clock, you can record one minute of a ticking clock suitable for the scene and then ask for it three times. You could have a minute on output one, moving to output two for the second minute and then back to output one. So you're using two outputs but you have your three minutes of ticking clock for the price of one minute of disk time. The only criterion when it's a ticking clock is that it must go 'tick-tock' on every edit and not 'tick-tick', but that can easily be achieved on an *AudioFile*."

A neat point is that if it is necessary to drop into record in mid-scene the 'ticks' and 'tocks' will still be in sync. Try doing that using a tape loop for the background effects.

The editing technique can be used to deal with an abrupt change of level on the video soundtrack. For example where a VT edit has brought together the end of a quiet scene and the beginning of a loud scene, the director may decide to smooth this out at the sound dub. It is simple to lay off a few seconds either side of the level change on to AudioFile and then split it to two separate outputs, one taking the sound up to the level change and the other from there on, with everything held in sync by timecode.

A slight catch in the present system for mixdown arises because AudioFile only locate to the required point when it receives timecode from the U-matic VT. It locates the point instantly but then has to sort an event list for all the cues that follow. If there are 150 events to sort this can take longer than the 5 s pre-roll on the VT machine. (The latest software release from AMS speeded up event list sorting by a factor of at least four.) If a VT machine is controlled from AudioFile it is not put into play mode until the events have been sorted.

One solution is to divide long dubbing sessions into sections of about 50 events, enough for 15 to 20 mins of mixdown. When timecode in/out points and output channels have been entered for the first 50 events this data is downloaded to a  $3\frac{1}{2}$  in micro floppydisk, the event list is then cleared ready for the next section. It is even possible to



overlap sections so that the last few events on the first section are duplicated as the first events on the next section. "It sounds complex. It isn't," Des Bennett assures us.

For the first few episodes of *District Nurse* the original VT soundtrack was laid off to 16-track tape so there were plenty of spare tracks available for anything *AudioFile* could not accommodate. These spare tracks were never used so after three episodes the lay off was done to 8-track. In fact for this sort of dubbing session a Nagra *T-Audio* twin-track with centre track timecode could take original VT sound on one track and final mix on the other audio track.

The next development will be a facility to download material from AudioFile via a PCM-701 encoder to video cassette. (AMS say this facility was released last March.) This will provide inexpensive, compact, long term digital storage of all the music and effects needed to create M&E tracks (without dialogue) for programmes to be sold overseas. It will also be handy for those occasions when a completed programme has to be shortened for scheduling reasons. On AudioFile it is a simple matter to edit out unwanted material and offset all subsequent events so they still come up at the right moment in the mixdown.

Another application of AudioFile is the postsyncing (re-voicing) of purchased programmes. The aim is to get all of one actor's lines recorded on AudioFile as close to perfect lip-sync as possible. Only the U-matic VT, AudioFile and a back-up ¼ in recorder are run for the voice recording. At the end of the session the accuracy of sync is checked and usually less than 10% of the cues need to be moved. After any adjustment each actor's lines are dumped to one track of the multitrack master tape.

There are several advantages: reduced wear and tear on the tape machines and the multitrack master tape, instant access to any cue without having to spool tape about, the ability to adjust lines by as little as  $V_{10}$  of a frame in either direction for more accurate sync, and digital quality in stereo or mono.

The system will become even more flexible with the digital download to video cassette. It will be possible to download an actor's lines without first trimming sync, and at a later date upload to make the adjustments without any loss of quality. An ideal arrangement would be to hold all the dialogue and even mixdown on AudioFile, but that would require much more disk space and expense.

AudioFile also gets called on for rescue work. For instance, a recent BBC Wales production involved a choir and a band performing on location at Cardiff Castle. In this sort of situation the music is often pre-recorded on ¼ in so the performers can mime without mics obstructing the view while the playback goes on to the VT soundtrack. On this occasion something went wrong with the VT audio chain. The result was a good video recording accompanied by very poor sound and only 24 hours to get it put right.

The producer still had the ¼ in master but that had no timecode on it to synchronise to the video tape. Could Stacey Road sync the ¼ in? 'Yes,' of course. The video was copied to U-matic and VT sound was laid off to 8-track. The ¼ in master went on a Studer *B67* which was started as a timecode event so it hit the beginning of mod in sync with the 8-track.

The outputs of the two audio machines were fed to separate speakers and then held 'in phase' and in sync by tweaking the *B67* varispeed. The music was recorded on *AudioFile* so that outdoor atmosphere could be added as it had been on location. This included faint helicopter effects for some aerial shots. The helicopter track was quickly slipped into the required position so the approaching and receding sound matched the images.

On another occasion AudioFile was able to help a chorister who had not quite pitched correctly a couple of times. Fortunately the organ accompaniment had been pre-recorded on one track and the voice was recorded clean on another track. With AudioFile it was possible to edit the wrongly pitched notes to another output to go via the DMX 15-80s which simply corrected the pitch.

Multimic music pre-recording sessions for TV pop shows still require multitrack tape machines rather than AudioFile, which has eight outputs but only two inputs. Bands come in to get two numbers recorded and mixed in just five hours. That needs 16- or 24-track tape. Less frenetic sessions such as piano and vocalist have been mixed straight to stereo on AudioFile.

Recent stereo simulcasts produced by BBC Wales have had the benefit of stereo music editing on *AudioFile*. Verdi's *Otello* broadcast in May this year was a major production using five cameras working to five separate VT machines to be brought together by post-production in the VT editing suite. Sound was mixed to stereo and recorded digitally on *PCM-F1*. After VT editing the sound was conformed at Stacey Road.

The FI audio was synchronised to video pulses but did not carry timecode, so the first requirement was to transfer it to a digital Umatic format with timecode. Then the U-matic audio was brought into sync with the VT soundtrack by adjusting the timecode offset and listening for phasing between them. Once the offset was known any sections that needed editing could be laid off to AudioFile against timecode.

One of the tricky bits was a trumpet fanfare that included a cracked note. A retake was provided but the instruction was that only that one note was to be used from the retake.

'What we did was transfer the section of audio with the cracked note and the retake of the trumpet fanfare on to the AudioFile in stereo. Then we edited the retake down until all we were left with was the one note and we edited the original so we had up to the start of the cracked note on one stereo track and continuing after the cracked note on another. Now we wanted them to be in sync, so by offsetting the timecode we moved the replacement note to meet the last  $1_{10}$  of a frame before the cracked note started and made sure that the 1/10 of a frame of the new note met the beginning of the original after the cracked note. We checked that the sound on both sides of the cracked note was in sync with the VT soundtrack and then allowed the AudioFile to do the edit for us.




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# David Hastilow visits a studio with

David Hastilow visits a studio with an unconventional approach to effects and a slice of history lurking in the live room

> "Some people set up studios by buying lots of equipment and plugging it in, and think they've got a studio. The pivot of our company, our reason for existence, is the fact that in everything we've gone into, we've never taken the attitude that we'll adopt the 'traditional' studio or production way of doing it." Ian Dent, owner/engineer of Daylight Studios, is the sort of person who, if spring-line reverberation hadn't been around, would probably have invented it.

"We had a singer in the other day who wanted a short reverb



Control room

on his voice with a natural 'phasing' effect in true stereo. Not two performances panned left and right or one performance put through an effects device and panned left and right. So, I got him to sing into an electric radiator I'd mic'ed up with two *TLM 170s*, which are very sensitive. And we got this lovely reverberant sound off the springs inside. Once the casing had been 'notched' out with a touch of 700 Hz it sounded wonderful, like an early reflections mode off a *REV7*. The quest for sounds doesn't have to rely on £1,000 worth of gear. (Anybody want to buy a bedstead...time-aligned?) Sound recording has its own rewards and some really nice work can be achieved by just listening to something and then creatively placing the mic."

Having said this, the Daylight control room is equipped with a good measure of outboard equipment and enough keyboards to start a music shop. But before explaining, Ian lets me into a secret: "Guess what we've got lurking in our live room." In a centuries-old building in ye olde part of deepest Devon, the imagination was inclined to roam.

"Not what you're thinking," he continued, "but a slice of pop music history. I'll show you later."

In the control room is a Tascam 85-16-B, Soundtracs desk and an Emulator: "The Emulator is very useful, we do a lot of orchestral stuff on it using theirs and our own samples that we get by trading 'time' for samples with musicians. We've got some great string sounds recorded with our mobile setup. Actually, a trick to compensate for the loss of high frequencies caused by the digitising process is to feed a sidechain through a pitch changer, we use SPX-90, one octave above and then mix it back with the original signal. It stimulates a lot of the lost presence. Great for bass and brass. But the Emulator is old technology now compared to the Akai or Prophet 2000. We hung on to it because it's so manual and easy to use, you don't have to spend hours fiddling with knobs and cross referencing. A couple of knobs, a slider and that's it-finished. We've also got KX88 with digital harpsichord and grand piano module, TX7 with 1200 sounds, JMS 12-track recording studio package with scorewriter, Dureth MIDI recorder and Roland Space Echo, which some guitarists still prefer to digital sounds.

"Oh yeah, and last week I was recording a kit in the live room and just couldn't get a really nice fat, rounded, enveloped thump from the bass drum. So I stuck my ear to the ventilation shaft and could hear a resonance in the plastic pipe making a boom boom sound. A Sony C48 down the shaft recorded it beautifully; the pipe, being quite long, was filtering off the high frequencies. That's our philosophy, being totally open minded. Actually, I've spoken to many engineers who'd like to work that way. Why just close-mic everything or use the same old techniques. Everyone does it. If they're recording an overdriven guitar or drums for instance, up goes the mic at the other end of the room. It's a recording cliché now."

Ian's 'adhocist philosophy' doesn't just apply to the manipulation of mics, it also extends into equipment. "We're really into transients here, we want to get reality on tape. Actually, nearly all the equipment in here has been modified to a greater or lesser extent. We've actually changed a number of components quite drastically to get a better sound.

"My brother, John Dent, is a well known cutting engineer. He was at Island for 10 years in the Sound Clinic. Having access to the Island cutting room, where our tapes could be compared with others, and meeting Tim de Paravicini, who has a company called Esoteric Audio Research in Cambridgeshire, made us very aware of many of the finer aspects of equipment technology and how it all comes together finally in the sound of the place. Did you know that some op-amps colour the sound? You put them in line and the sound changes-the difference can be heard. The ones we got from the States don't but in fairness to the larger manufacturers these particular chips have only been around for a couple of years; we discovered them by chance when we were looking for something else. It's all to do with the speed of the sound through the desk and we're trying to achieve the sort of sound in the studio that you'd get on location with a Nagra, reality on tape, not that boxed in noise-reduced mush. Noise reduction is used here as an effect. A lot of people think you're crazy if you work without it. Why? We've gone into everything here, even the cable. The blue stuff is data transmission cable and the grey stuff 56 pF/m. And we've had transformers rewound, and special circuitry made."

Much of Ian's attitude towards the sound of his studio stems

<sup>38</sup> Studio Sound, September 1987



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# **DAYLIGHT**

from the early days when Daylight was just the name of a production company operating from a small office in Honiton.

'We were producing bands-well anything, really-in studios all over the country. Cassette dupes to complete album packages. And that included graphics and photography. In a way it's a pity we have to call ourselves a recording studio because we were doing everything. If a shop opened up in town and was looking for an image that was different, they'd come to us because they knew we were a bit quirky. We helped the local schools and charities and lots of businesses. For three years we were registered as an advertising agency but stopped it after being in here for a few months because we were continually getting calls from magazines trying to sell us space. We're still in the Chamber of Commerce, though, because we bring a lot of business into the town. The graphics and photography side are still thriving and when a band comes in we can offer them a whole deal ready when their sessions are finished. Artwork, pics, ads, etc.

"It was frustration that brought about the setting up of our own recording studio. On arriving at a studio somewhere they'd have changed the monitoring or sold the previous desk and



Recording area two

installed something totally different. Trying to maintain consistency became a problem and we were lucky to have the Island cutting room as a reference, otherwise it was a case of 'stick your finger in the air and guess whether it's correct'.

"Casually looking around for premises this place came up. Totally gutted, it meant we could do what we wanted and also that we'd be in the centre of town with our own car park. People did say we should be in nearby Exeter because it's larger and more appropriate, being the principal city, but Honiton is just as accessible by train and motorway and the rural peace meant more to us than the trappings of city life. The building is quite a peculiar shape because originally it was wedged in between two cottages to form a terrace but they've since been removed. So many of the acoustical problems associated with parallel walls have been taken care of. Having to put all new floors in meant that we could 'isolate' studio and control room. We've only been here since 1984 and have had to expand already because we diary our work on lots of different levels so one area is always busy. Be it the studio, graphics, the mobile, editing, duping or whatever.

"The first four records we did were gospel music, which has a very distinctive style, and for someone trying to cut their teeth it's a less aggressive way of doing it. We did some jingles work but there are so many studios around after that sort of work we never really pushed it, although our biggest success most recently with radio stations has been through tape syndication. We record programmes of authors talking about their books. Then edit them all together and they are sent to radio stations on a syndication basis. At the moment we hold the highest record in the UK for a syndicated tape to be played on the air, which is 51 out of 60 stations, mainly BBC.

"We recorded the BBC Young Musician of the Year in Exeter Cathedral. The orchestra had been set up badly because the soloist, Emma Johnson, was placed on a plinth right out by the conductor so we had to bring the stereo pair further out than the ideal. But, because the cathedral interior is so cavernous, the brass sounded distant, so a second pair of Neumann *TLM* 170s was used to bring the top end in a bit. It didn't affect the feel of the sound or create phase problems. When the tympani went you could still hear the sound go down the length of the cathedral and come back again.

"We've recorded orchestras in some strange ways though. We were booked to record one in a church but the vicar refused to have the pews taken out or even shunted around. So all the musicians were up the aisle. Instead of double basses, cellos, violas and violins being in the normal place, everyone was all mixed up. It was a baroque orchestra—which wasn't so bad, about 28 musicians plus a harpsichord—but there was also a choir, which ended up down the other end of the church, and the poor soloist had to stand in the pulpit. I just multimic'ed everything for a dry sound and then added digital reverb to the final mix. It sounded really good, actually, but purists would have a fit if they knew how it was recorded."

Daylight hope to become 24-track soon, and although they've yet to acquire a multitrack machine, a desk has been found. This is no ordinary mixing console, however, and any recording engineer who look's back to the '60s and '70s with an 'elephant's eye' would probably love to get his hands on it. That slice of pop music history is the old Helios from the original Island studios, through which many of the greatest sounds of British rock music were pioneered; the 'bedrock' of the business we know today.

"What we intend to do with it," says Ian, "is not change the character in terms of performance and sound but just make slight mods for today's requirements. Having got hold of it we've been literally inundated with people wanting to help us do it up because it's got some nostalgia value to it. The modules have all gone off to be cleaned up and the frame is being mod'ed, and when it's finished it'll replace the Soundtracs desk. It's quite a scoop. Three Genesis albums were done on it as well as a Led Zeppelin—well, just all those really famous sounds of the '60s. And if there is one desk in the country that could suit the kind of atmosphere that we feel is here in this studio, this is it. We get people coming to work here from all over the world and there's no logic why they come here, they just enjoy working here I guess." Daylight Recording Studio, Kerslake's Court, King Street,

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Marketing Services, Sony Broadcast Ltd., Belgrave House Basing View, Basingstoke, Hampshire RG21 2LA. Tel. (0256) 55011 pened over 20 years ago and now owned by Warner Communications, Atlantic Studios are one of the few

remaining recording studios still owned by a large record company. The studios, however, are by no means exclusive to Atlantic and work as much for outside labels as they do for WEA artists.

Atlantic also do all the duplicating work for Warner Communications and its affiliates as well as quality control for all Warner and Elektra products. Other activities take in all of the production (including much of the mastering and cutting)

ATLANTIC

#### Terry Nelson visits this well established studio in New York



Control Room A

and tape archival for Atlantic Records and its sub-labels such as Elektra, Atco and Cotillion. CD has been recognised as a much more durable storage medium and at present a large transfer programme is underway to copy the tape archives on to compact disc.

Atlantic Studios are situated in New York's theatreland in a corner building on Broadway and spread over the second and third floors. The studios are on the second floor and the third provides accommodation for the cutting, transfer and *Synclavier* rooms.

Studio A features a Hidley/Sierra design. In fact Atlantic were the first US studio to update with the new Hidley modifications, in December 1984. The modifications basically improve the phase performance of the room and give greater control over the bass frequencies. Engineer Stephen Benben commented that Studio A was "our California room" due to the cherrywood that had been used for the hardwood finishes, giving a very warm feel to the place.

Centrepiece of the control room is the Neve custom console that was acquired from Air Studios (one of two made to the specifications of George Martin and Geoff Emerick) and is probably the only console to have the distinction of wearing a Rolls-Royce insignia! The console is a 48/24 in a 'European' (or split mix) configuration with 32-track monitor section and features an extremely large patchbay for extra flexibility. Automation for the console is in the pipeline and should be installed by the time of publication.

Paul Sloman (then studio manager): "You just don't let a console like that go! When we heard that Air in London were going to sell the Neve we jumped right in to secure it. Some of our engineers had been to Air and all commented on the sound of the console. It may be considered old technology but that console has a lot of innovations and technical excellence, such as all gold connectors. And having the microphone preamplifiers out in the studio does make a big difference in the basic quality of the sound, which means that you start off on the right foot straight away. Many engineers find that the Neve has a more musical, softer sound than other consoles, which tends to enhance the signal. As you can tell, I'm a fan!"

Monitoring comprises an upgraded Hidley/Sierra 2-way system with secondary monitoring depending on clients' wishes. Amplification is provided by Bryston 4Bs and Studer A68s.

Engineer Bill Dooley (the guide for the day) commented that Yamaha NS-10s were "pretty popular though it does seem silly when you think about it that the final sound of over \$1 million worth of audio gear depends on what brand of toilet paper you



Studio A



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The control room has a good amount of rack space built into the rear walls in order to avoid too much clutter, though "sessions can tend to get a bit out of hand when people start bringing in mountains of extra gear in portable racks". General policy at Atlantic is to have all studios fitted out with the same outboard gear with a central stock of effects that can be moved around as required. The list of equipment available is more than comprehensive and includes such gems as Fairchild stereo compressors, MagnaTech de-essers, Pultec EQPs/EQH-2s, Teletronix LA-2As and API modules through to the latest in



digital processing.

Recording is both digital and analogue with Sony 3324s for the former and Studer A800s for the latter. "We find that the DASH format works very well for us and the after-sales service is very good here in New York.

"As far as digital and analogue are concerned as mediums, I think it is very much a question of what works best for a



Control Room B with engineer Bill Dooley

particular session. In fact, we often end up by using both machines together, either in parallel or synced up separately. For instance, some people like rhythm on analogue and the dubs and vocals on digital."

Mastering is digital and/or analogue with a choice of machines from Sony, Mitsubishi, MCI, Otari and Studer.

The studio can be accessed from either the control room via sliding glass doors between the monitors, or the corridor/lounge area, meaning that musicians do not have to tramp unnecessarily through the control room. Dimensions are  $36 \times 47 \times 12$  ft and acoustic treatment is fairly basic with a varnished concrete floor, wood panelled walls and a fair smattering of mirrors. The overall sound is that of a small hall and the irregular shape of the room avoids problems such as flutter echo.

"The studio has remained almost the same since the studios were built," explained Bill, "and though we have gone through extensive re-building in the complex over the last few years we were virtually under pain of death by clients not to change this room—it just sounds good so why argue with that? We can always lay down carpets and hang drapes if it needs to be damped down but most people like it the way it is. It gives a big live sound and separation has never really been a problem."

In addition there is an isolation booth  $(12 \times 16 \times 9 \text{ ft})$  that is mainly used for vocals and tight instrumental dubs.

A feature of the studio is the extensive microphone patchbay (equipped with Neutrik gold pin XLRs). This is a master patch containing the mic lines going to the console and sub-patchbays known as satellites. The satellite is in fact a duplicate of microphone points around the studio and also has XLR connectors for foldback, etc. Though at first sight this seems a little excessive, the system is in fact extremely flexible and proves to be a good timesaver.

Patching flexibility is almost a hallmark at Atlantic as all machine send/returns can be routed between any studio as well as microphone lines.

A useful accessory to Studio A is a good sized lounge behind the control room. Naturally 'wired for sound' it can double as an excellent isolation booth. The lounge enables production meetings to be held in private on the premises.

Studio B features a design by Paul Sloman—and also has an 'escape lounge'. The treatment consists of spaced slat absorbers and carpeted surfaces and according to Paul, "sounds like my living room".

Recording centres around a Neve B108 (48/32) fitted with Necam 96 and Studer A800 and/or Sony 3324 according to choice. Equipment racks are recessed into the rear side walls and hold the 'standard' complement of Valley and Scamp racks,



Studio B



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Giovannelli

Pultecs, Teletronix, 1176, etc.

The control room measures  $17 \times 21$  ft and gives plenty of room for the production team to work without visitors or musicians breathing down their necks. Visual contact with the studio is excellent via a window almost floor to ceiling.

The studio  $(33 \times 17 \times 10 \text{ ft})$  features the same acoustic treatment as the control room with cylindrical slat absorbers, some panelling and absorbent surfaces. The floor is parquet. The general shape of the room is a long rectangle that sounds like "a garage" smiles Bill Dooley. "However, that's where bands start so they feel right at home here!"

The studio has two isolation booths at the far end of the room



and features a microphone patching system identical to that in A. Studio B provided the opportunity for a talk with Paul Sloman.

"Part of our philosophy is to have a lot of effects available for the client. We don't have one piece of gear that never gets used though I must say that the AMS stuff is very popular right now."

How does the studio absorb the cost of all the equipment?

"By keeping the studios booked! The competition out there is fierce and the technical level is staggering. We have a basic complement of outboard equipment for each studio that we consider necessary to be able to do a good job and that is included in the studio rates. On top of that we have a central pool of equipment that can be hired out as required, such as the AMSs, Lexicons, etc.

"One of the problems facing studios here, and I am sure it's the same everywhere else, is that studio rates haven't matched inflation. In 1976 a standard rate was \$150 to \$160 an hour and it hasn't changed much from that today.

"I often feel that it's a crazy business—there's equipment sitting here that's 25 years old and its still terrific yet people are in love with hi-tech. At one end of the scale you have the super-SSL type of technology and then you have people lining up to use Pultecs and *LA-2As*.

"Kids often call me up and ask what they need to know to get into the recording business. I tend to recommend computer science, technology programmes, that kind of thing. Education is much more important now than it was, say, 20 years ago, especially as the manufacturers have realised what is going on and are using new technology more and more."

Did Paul Sloman think there might be a backlash against all the technology?

"It's not impossible. New kids to the business often know about the technology but they don't know basic acoustic principles, what sound is and how it originates and is affected by different environments.



Cutting room

46 Studio Sound, September 1987

"For example, I would much prefer electro-mechanical control of studio acoustics than use EQ on a console but I doubt whether many other people would be interested! However, I maintain that to be good in the studio business you have to have good ears and more—not just be able to manipulate dials.

"As a studio manager I obviously cannot reject new technology, nor do I want to! If I did then it's time I looked elsewhere for a job! Our third 3324 came in this morning and I doubt if we will stop there. This said, we still have to recognise that besides the cost of the equipment today, the creative process very often suffers, in spite of the fact that all this new gear is supposed to aid creativity. This is because pressures demand results or effects at the touch of a button rather than leaving time to experiment and to actually use some of the potential that a piece of equipment may offer. Like I said, it's a crazy business but I still love it!"

The latest major innovation at Atlantic has been the rebuilding of their mixdown suite (which has been such an enormous success that they are already considering building a second). Dimensions are  $25 \times 23$  ft with the design being an inhouse effort. All walls are fully isolated and floated off the main structure together with a suspended ceiling.

The treatment consists of walls that are effectively absorbent with the rear of the room being reflective. There is also heavy

trapping behind the monitor wall to control the low end energy. Monitoring is by UREI 813Bs together with any secondary monitoring that may be required.

Mixing centres around an SSL 6000E console with all the computer options and fitted with 56 input channels and eight stereo line inputs that provide automated returns.

Multitrack machines are again Studer and Sony though sometimes an MCI JH-24 is called into service. Mastering is on Studer A820 or Sony 1610.

In order to keep flexibility and cater for last-minute surprises, the mix room also has an adjoining overdub room for vocals, brass sections, etc. The surface treatment of the walls is  $1 \times 1$  ft squares with one side reflective and the other absorbent. Depending on the dub, the response of the room can be changed quickly to suit.

Reaction to the new mix room has been very positive with quotes such as 'the gear is topnotch, like the console', 'with all the synths in here it's like a live gig in the control room', 'like a second home', being heard from different engineers and producers.

Other facilities at Atlantic include a digital editing suite with a Sony *DAE 1100* editor and Hafler speakers, two identical cutting rooms each equipped with a Neumann VMS70 lathe, SX-74 head, SAL-74 amplifiers and Zuma computer, and various copying and duplicating rooms.

Video has not been forgotten either and there is a postproduction room equipped with an MCI JH-500 console and JH-24 multitrack. However, the room often becomes a budget studio for small productions. (Maybe the daylight and interesting view of the street has something to do with its popularity.)

Heralding the era of the 'tapeless studio' is Atlantic's newly built *Synclavier* room. Though the instrument can be installed in any of the studios for a session if required, the studio recognised the potential of the *Synclavier* some time ago and realised that nine times out of ten it did not need to be in a control room—it was quite happy functioning as a complete system by itself. This way composers can work in peace and the studios can welcome other clients.

Also part of the *Synclavier* room is a (yet another) MIDI room where systems can be tried out and programmed before moving into the studio or fed down tielines to the final destination.

A facility the size of Atlantic relies heavily on efficient maintenance and five to six people are on permanent staff to keep things running smoothly. There are also, on average, six house engineers who either do sessions or look after freelancers.

Since Atlantic was first visited, Paul Sloman has gone on to pastures new and studio manager, Pamela Johnston, has taken over after having managed the Power Station for two years. Her comment on Atlantic was: "That the engineers are taking over! With all the expansion that has been going on I literally have to fight to keep some administrative space!"

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# AUDIO RECORDING TODAY

e have divided audio information storage into four distinct product areas. This was done, not to separate them but to show the relative strengths in the different product areas. This said, it is quite clear that the largest range of products still lies in the analogue domain.

It appears there have been more analogue machines introduced in the last 12 months than at any other time. In the area of multitracks alone we have had the Studer A820 the Soundcraft Saturn, the Otari MX-80, the Tascam ATR-80, the Aces Omega and significant modifications on the Lyrec TR533. Analogue does not seem about to die just yet, at least in the multitrack area. With these machines two more analogue 32-track recorders have been introduced in which there has certainly been interest shown, although it would seem that an effective noise reduction system would be a necessity.

Much of the regained interest in analogue multitrack has to be due to the continuing split format among the digital systems, although perhaps more importantly, the emergence of Dolby SR and the *telcom c4* system have significantly narrowed the operational results between digital and analogue recording systems.

The story is rather different-on mastering machines. Without a doubt there have been fewer top end analogue mastering machines introduced as digital mastering has made inroads. The various *F1* type systems at the lower end of the market have been complemented by the full blown *1630* video format PCM processors. As the JVC DMS system now includes a number of flexible interfaces, together with a product range parallel to that made by Sony, there has been an increasing amount of interest in it. With CD mastering houses and pressing plants becoming more prepared to accept masters other than 1610/30 we may see a rise in the variety of practical mastering formats.

Reel-to-reel digital mastering machines have also become a reality with the DASH 2-channel machines from Sony and Studer and the new X-86 series from Mitsubishi. The 2-speed PCM-3402 with its RAM memory and electronic editing capability offers some significant steps forward in mastering technique, and deserves a closer look. The Mitsubishi X-86 series will also need close scrutiny in two different areas. When the standards for professional digital audio were being set a few years ago, there were a number of voices raised that claimed the specification was just not high enough, that 16 bit and 44.1 and 48 kHz sampling rates were just not high enough and that professional standards ought to be significantly higher than the consumer products. Well, two machines in the X-86 series will allow us to see if these feelings were true. The standard version of the X-86 has to be designed so that 18and 20-bit operation can be retrofitted to the 16-bit current performance level when the chips are available. Another version of the X-86 will allow a sampling rate of 96 kHz giving a possible HF extension in the frequency response to 30 kHz.

There have been a number of suggestions that all these formats are unnecessary as we will all be using DAT within a few years anyway. So far

there has been so little practical experience with the system that a large number of problems still have to be solved before it could be accepted as a fully pro format; care should be exercised in forward planning with DAT. The feedback we have had so far from those consumer-type DAT machines that would have found their way into pro hands, is that the performance is impressive. Sony have been showing a portable DAT machine at recent exhibitions (*PCM-2000*) but there is not yet a firm date on availability. However, during the recent London APRS show Sony were showing a DAT system based upon their domestic machine but professionalised. This had a 44.1 kHz record sampling rate and consisted of two quite separate boxes and was known as the PCM-2500. Orders were being taken for delivery sometime in October.

On the digital multitrack front there are only three manufacturers at present. Sales of both DASH and PD format machines still appear to be gaining significantly. The choice between the two systems is becoming more obvious and seems to depend largely on the way you see yourself working. While it is difficult to generalise, there are a lot of Sony 3324s being used in pairs as there are advantages in flexibility of working. The 32-channel Mitsubishi and Otari machines are going to those who like the idea of 32 channels to play with and there is an increasing number about. 32-channel machines are also being used in pairs but by this stage things are beginning to get a little out of hand without careful discipline in the recording process. We have no figures for the numbers of each format in the field but they have both reached sizeable proportions (as many as 500 in total?). Sony probably have some more machines (24-channel) in the field although I would not be sure about the leading sales format if looked at in total numbers of digital channels.

If we look at disk-based recording we have all learnt at lot in the 18 months that systems have been fully commercially available. The shortcomings and benefits of disk-based recording have become much clearer and a current role working in parallel with tape-based systems seems the most logical step for the moment. Diskbased systems can vary enormously from the very ambitious Lexicon Opus and NED Direct-to-Disk systems, through the more applications-directed systems such as For.A's Sirius and the AMS AudioFile, down to the low cost systems which are not that easy to find and are short term audio stores for sampling rather than serious recording media.

One particularly interesting product that has appeared in the last few days is the Soundcraft *Digitor*—a stereo audio editor based around a custom keyboard, monitor screen and central processor system. The processor contains up to 3.5 Mbyte of dynamic RAM that will store up to 6 min of stereo 16-bit audio at 44.1 or 48 kHz sampling. This is obviously not intended for use as a long term recording medium at present but more for the manipulation of short pieces or editing of complete mixes. Edit data is stored on disk but the audio signal goes to DRAM and therefore this may be an important new development.

By this time next year we will undoubtedly see more of two specific directions: the increasing use of optical disk recording with its large storage capacity; and a breakthrough in low cost solid state storage. Whatever happens there is a fairly safe bet that all the formats covered in the following guides will still be readily available. Things don't change that fast-yet.





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#### AEG

M21: 2-track master on ¼ and ½ in. M20: 2-track on ¼ in; four speeds, digitally adjustable functions.

M15A: 8-track on 1 in, 16-, 24- and 32-track on

2 in with autolocate. AEG Aktiengesellschaft, Professional Tape Recorder Branch, Bucklestrasse 1-5, D-7750 Konstanz, West Germany. Tel: 07531 862370. UK: Hayden Labs, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 888447. USA: Quad-Eight Westrex, 225 Parkside Drive, San Fernando, CA 91340. Tel: (818) 898-2341.

#### ASC

AS 6000: 2-track transportable 3-speed machine on ¼ in with high and low speed versions. Provision for extra replay head and other options. Audio System Componenten GmbH & Co, Seibelstrasse 4, D-8759 Hoesbach, West Germany. Tel: (0 60 21) 5 30 21. UK: RJ Education Supplies Co Ltd, Unit 2, Westerham Trade Centre, London Road, Westerham, Kent TN16 3BR. Tel: 0959 62255.

#### Digitec

F 500: Mono, stereo and 2-track versions on ¼ in; variety of timecode options. Societe Anonyme des Techniques Digitales, 57 bd de la Republique BP 51, 78401 Chatou, Cedex France. Tel: (1) 30 71 16 95. UK: The Professional Recording Equipment Company Ltd, 21 Summerstown, London SW17 0BQ. Tel: 01-946 8774.

#### Ferrograph

Series 77: 2-track mono and stereo versions on 1/4 in; Revox transport and electronics. AVM-Ferrograph, Unit 20/21, Royal Industrial Estate, Jarrow, Tyne & Wear NE32 3HR, UK. Tel: 091-489 3092.

56 Studio Sound, September 1987



AS 6000 from ASC

#### Fostex

E Series: 8- and 16-tracks on ¼ in and ½ in respectively with Dolby C; also  $\frac{1}{4}$  in and  $\frac{1}{2}$  in 2-track master recorders with centre-track timecode.

Model 80: 8-track on ¼ in; 7 in reels; Dolby C incorporated.

Model 20: 2-track master based on Model 80, with centre-track timecode.

Fostex Corporation, 560-3 Miyazawacho, Akishima, Tokyo, Japan. UK: Harman (Audio) UK Ltd, Mill Street, Slough, Berks SL2 5DD. Tel: 0753 79611. USA: Fostex Corporation of America, 15431 Blackburn Ave, Norwalk, CA 90650. Tel: (213) 921-1112.



Otari's MX-70

#### Lyrec

TR533 Mk II: improved TR533 with slightly altered tape path and optional Dolby HX Pro; 16and 24-track versions on 2 in tape; 14 in max reel size.

TR55: 2-track master recorder on <sup>1</sup>/<sub>4</sub> in tape; 14 in max reel size.

Lyrec Manufacturing A/S, Box 199, Hollandsvej 12, DK-2800 Lyngby, Denmark. Tel: 02-86 63 22.

UK: Professional Audio Ltd, Professional Audio House, 53 Corsica Street, London N5 1JT. Tel: 01-226 1226.

### Nagra

T-Audio: Stereo, 2-track and 2-track plus timecode versions on ¼ in tape; four speeds with max spool diameter of 11.8 in.

Nagra 4.2: Full-track mono portable on ¼ in tape; choice of sync or timecode.

Nagra E: Updated version of 4.2.

Nagra IV-S: 2-track stereo plus Nagrasync; ¼ in portable.

Nagra IV-SJ: Instrumentation version of IV-S, but sync track replaced by FM track.

Nagra IV-S TC: Timecode version of the IV-S. Nagra SN: Full- and 1/2-track mono versions on 1/8 in tape; very small.

Nagra SNST: Stereo version of SN, using 0.15 in tape; with expander and compressor. Kudelski SA, CH-1033 Chesaux/Lausanne,

Switzerland. Tel: (021) 91.21.21.

UK: Hayden Labs, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 888447. USA: Nagra Magnetic Recording Inc, 19 West

44th St, Room 715, NY 10036, New York. Tel: (212) 840-0999. USA: Nagra Magnetic Recording Inc CA, 1147

North Vine Street, Hollywood, CA 90038. Tel: (213) 469-6391.

#### Otari

MTR-90-II: 1 in 8-track, and 2 in 16- and 24-track machines

MTR-20: Mastering recorder in five versions ¼ in 2-track, ¼ in 2-track with centre-track timecode, ¼ in stereo, ½ in 2-track and ½ in 4-track; 14 in max reel size, plus automated audio calibration. MTR-12-II: ¼ in 2-track, ¼ in 2-track with centretrack timecode, ½ in 2-track and ½ in 4-track versions; 121/2 in max reel size.

MX-55: ¼ in compact in full-track, 2-track stereo, 2-track with centre-track timecode, 4-track and 2-track desktop overbridge design.

MX-70: 8- and 16-track versions on 1 in; 101/2 in

NAB reels.

MX-80: 16-, 24-, 24/32 and 32-track versions on 2 in; 101/2 in max reel size; Dolby HX-Pro incorporated.

MX-5050 tabletop series: Mk III/2 2-track on ¼ in; Mk III/4 4-track on ½ in; Mk III/8 8-track on 1/2 in tape; B-II 2-track on 1/4 in.

Otari Electric Co Ltd, 4-29-18 Minami-

Ogikubo, Suginami-ku, Tokyo 167, Japan. Tel: (03) 333-9631.

UK: Otari Electric (UK) Ltd, 22 Church Street, Slough, Berks SL1 1PT. Tel: 0753 822381.

USA: Otari Corporation, 2 Davis Drive, Belmont,

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### LOGUE RECORDI NA

CA 94002. Tel: (415) 591-3377.

#### Scully

280B: Full-, 1/2-track mono, stereo, 1/4-track stereo and 4-track, all on ¼ in tape, plus a 4-track ½ in version.

284B-8: 8-track on 1 in, up to 14 in reels. 285B: Full-track mono and 2- or ¼-track stereo on ¼ in

250: Full- or 1/2-track mono, and 2- or 1/4-track stereo on ¼ in.

Ampro/Scully, 2360 Industrial Lane, Broomfield Lane, Broomfield, CO 80020, USA. Tel: (303) 464-4141.

UK: Lee Engineering Ltd, Napier House, Bridge

Street, Walton-on-Thames, Surrey KT12 1AP. Tel: 0932 243124.

#### Solidyne

GMS-200: 2-track on ¼ in, convertible to 4-, 8and 16-track on 1/2 and 1 in tape; full digital control of editing and synchronisation. Solidyne, Tres de Febrero 3254, 1429 Buenos Aires, Argentina.

#### Sony

JH-24 series: 8-track on 1 in, 16-track on 2 in, 24-track on 2 in.



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It is magical the way the dynamic BBE process will restore the harmonic balance, increase intelligibility, and give the total sound image a fresh, sparkling clarity. The BBE 402 and 802 Processors are ready to perform their aural "sleight of hand" the moment you insert them into your recording studio, live sound, or broadcast audio chain. Both units will dramatically improve the overall reproduction of program transients in any audio system.

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5500 Bolsa Ave., Suite 245, Huntington Beach, California 92649

APR-5000: Range of mono, stereo and 2-track mastering machines on ¼ in with stereo ½ in version and centre-track timecode options. Sony Corporation, PO Box 10, Tokyo Airport, Tokyo 149, Japan. Tel: (03) 448-2111. UK: Sony Broadcast Ltd, Belgrave House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 0256 55011

USA: Sony Corporation of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656. Tel: (201) 930-1000.

#### Soundcraft

Saturn: 24-track on 2 in, with Total Remote and interface for timecode reading, noise reduction, sync. Automated equalisation system for tape set-up.



1/2 in format recorder

of a 24-tra: mastering studio and a a pre-production programming room, known as The BRIDGE.

E 1 00

The BRIDGE cfers both MAC NTOSH and ATARI hardware and an extensive range of the latest music software, which along with a wide range of keyboards, compilters and interfaces for guitarists and drummers gives many options for tapeless recording. The BRIDGE has been designed and constructed to allow complete interface of all equipment via the many MIDI and audio inputs. SMPTE generators control all standards of audic and visual machines. Furthermore, STRONGROOM i tied to the BRIDGE allowing transfer of information between the two studios. In the Bridge molt sound scurces are digitally-generated and as it is essential to keepnoise levels to a minimum, we chose the TAC SCORPION PB because it is very quiet, logical to operate, well-constructed, and scunds superb...

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Richard Boote and Dave Formula, The Strongroom



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Head Office, Factory and Sales: AMEX Systems and Controls Ltd. Islington Mill, St. Jame- Street, Salford M3 5HW, Englanc, Tel: 061-834 6747. Telex: 668127 AMEH G.E-MAIL: AMEK-UK Faz: 661-834 0593. TAC Factory and Sales: Total Audio Concepts, Unit 17, Bar Lare Industrial Park, Bar Lane, Basford, Nottingham NG5 0HU. Tel: 0602-78310 64 lines. Telex: 37329 AMEKNT G. Fax: 0602-7851 ° E. Mail: DCS 1347. In the USA: AMBK Consoles Inc. 19815 Eurbank Blvd, North Hol Javaod, CA 91601. Tel: 8184508 978E. Telex: 662526 AVEK USA E-MAIL: AMEK US, Fax: 818/508 8519.

# ANALOGUE RECORDING



Soundcraft's Saturn analogue multitrack with Total Remote

760 MK3: 16- and 24-track on 2 in; NR interface. Soundcraft Electronics Ltd, Unit 2, Borehamwood Industrial Park, Borehamwood, Herts WD6 5PZ, UK. Tel: 01-207 5050.

USA: Soundcraft USA, PO Box 2200, 8500 Balboa Blvd, Northridge, CA 91329. Tel: (818) 893-4351.

#### Stellavox

TD-9: Twelve ¼ in versions include mono, stereo, stereo with timecode, stereo mastering and 4-track instrumentation; ¼ in versions are stereo and 4-track mastering; will also handle 16 mm film in mono, stereo and 4-track; exchangeable heads and plug-in sync module; full microprocessor control.

SP 8: Battery-operated portable, plug-in headblocks for full- and 2-track mono or ¼- or ½-track stereo; sync for TV, film and instrumentation.

Stellavox, 2068 Hauterive/NE, Switzerland. Tel: 038 33 42 33.

UK: Future Film Developments, PO Box 3DG, 114 Wardour Street, London W1A 3DG. Tel: 01-437 1892.

#### Studer-Revox

A820: 8-, 16- and 24-track versions on 1 or 2 in; Dolby *HX-Pro* fitted as standard; optional





Achieves the very best from analogue discs and includes the unique Response Variable Filter. A single control knob provides click free CANCEL and then a 13 to 4 kHz filter with appropriate phase and amplitude characteristics altering gradually between Chebyshev and Bessel.

SURREY ELECTRONICS LTD The Forge, Lucks Green, Cranleigh Surrey GU6 7BG Telephone: 0483 275997 interface for Dolby A, SR or telcom NR; autoalignment, 40 assignable functions in memory. A800: 24-track on 2 in, 16/24 on 2 in and eight on 1 in.

**A80:** Wide range of versions from 2 in 24/16/8-track machines to cassette tape QC designs.

A807: 2-track, mono and stereo on ¼ in, with centre-track timecode imminent.

A810: Similar to above with CTTC, FM and neopilot code.

A812: Centre-track timecode version of A807 predominantly for broadcasting.

Revox-B77: Transportable mono, stereo and 2-track on ¼ in.

**Revox PR99:** 2-channel general purpose recorder. 2-speed with two high/low options.

Studer International AG, Althardstrasse 10, Regensdorf, CH-8105, Switzerland. Tel: 018 40 29 60.

UK: FWO Bauch, 49 Theobald Street, Borehamwood, Herts. Tel: 01-953 0091. USA: Studer Revox America Inc, 1425 Elm Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651.

#### Studio Magnetics

SML12: 16-track and 2-track master, both on ½ in tape.

Omega: 24- and 32-track machines on 2 in. Studio Magnetics Ltd, PO Box 111, Shrewsbury, Shrops SY1 4NJ, UK. Tel: 0743 236672.

#### Tascam

ATR-80-24: 24-track on 2 in; optional computer interface.

ATR-60: Available as 2-track and 2-track with centre-track timecode on ¼ in; 2-, 4- and 8-track on ½ in; SMPTE/EBU, timecode and sync code lock on 8-track version.

40 series: 2- and 4-track on ¼ in, and 8-track on ½ in; SMPTE timecode.

Teac Corporation, 3-7-3 Naka-cho, Musashino, Tokyo, Japan. Tel: 0422 53-1111.

UK: Teac UK Ltd, Victoria House, 28-38 Desborough Street, High Wycombe, Bucks HP11

2NF. Tel: 0494 26211. USA: Teac Corporation of America, 7733

Telegraph Road, Montebello, CA 90640. Tel: (213) 726-0303.

#### Uher

4000 series: 4-speed portables, battery or mains powered; 4000 is ½-track mono with pulse track, stereo version can record mono on one channel with sync on the other; 4200 is ½-track stereo, 4400 is ¼-track stereo, both accommodating sync like 4000; all have 5 in reels using ¼ in tape. Uher Werke Munchen GmbH, Industriestrasse 5, Bad Homburg 1, D-6380, West Germany. Tel: (6172) 106350.

**UK:** Telecommunications Information Systems Ltd, 223 Twickenham Road, Isleworth, Middlesex TW7 6TG. Tel: 01-847 3033.

USA: Mineroff Electronics Inc, 946 Downing Road, Valley Stream, NY 11580.

USA: Uher of America, 7067 Vineland Avenue, North Hollywood, CA 91605.

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reproducers have been the backbone of private and many professional studios running up to 16 tracks. Superb sound, smooth operation and extraordinary dependability have made them a standard in the field. Now TASCAM takes on a new dimension with the ATR-80-24 24-track Recorder/Reproducer. Years of accumulated experience and the lates technology have come together to create a 24-track machine that gives you what you need to compete.

For years TASCAM multitrack recorder/

If you're going 24-track, now is the time to go TASCAM.

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TEAC UK Limited. Victoria House. 28-38 Desborough Street, High Wycombe. Bucks. HP11 2NF. Tel: (0494) 26211 Tix: 83389 Fax: (0494) 461201 Contact: Martin Capo www.americanradiobistory.com

## **DIGITAL REEL-TO-REEL RECORDING**

#### **M**itsubishi

**X-850:** 32-channel PD format multitrack plus two analogue tracks, timecode track and two aux digital tracks for user data. 30 in/s tape speed with 1 in tape and 14 in reel capacity. Switchable 48/44 1 kHz sampling at 16 bit

48/44.1 kHz sampling at 16 bit. X-400: 16-channel PD format multitrack plus two analogue tracks, timecode track and one aux digital track for user data. 30 in/s tape speed with ½ in tape and 14 in reel capacity. 16 bit at 48/44.1 kHz switchable sampling.

**X-86:** 2-channel PD format mastering machine plus two analogue tracks, timecode and aux digital track. Standard version 15 in/s tape speed with 14 in reel capacity, switchable 48/44.1 kHz sampling rate and future upgradable from 16 bit to 18 or 20 bit. Version X-86LT as standard but with 7½ in/s tape speed. Version X-86HS as standard but with sampling rate of 96 kHz. There will also be a special version available with an X-80 head to replay X-80 tapes.

#### Mitsubishi Electric Corporation, Mitsubishi Denki Building, Marunouchi, Tokyo 100, Japan.

**UK:** Mitsubishi Pro Audio Group, Unit 13, Alban Park, Hatfield Road, St Albans, Herts. Tel: 0727 40584.

USA: Mitsubishi Pro Audio Group, 225 Parkside Drive, San Fernando, CA 91340. Tel: (818) 898-2341.



#### Otari

**DTR-900:** PD format multitrack available as 32-channel or 24-/32-channel plus two analogue tracks, timecode and two aux digital tracks for user data. Tape speed 30 in/s on 1 in tape with 14 in reel capacity. 16 bit with 48/44.1 kHz switchable sampling rate.

#### switchable sampling rate. Otari Electric Co Ltd, 4-29-18 Minami-Ogikubo, Suginami-ku, Tokyo 167, Japan. Phone (03) 331-5802.

UK: Otari Electric (UK) Ltd, 22 Church Street, Slough, Berks SL1 1PT, UK. Tel: 0753 822381. USA: Otari Corporation, 2 Davis Drive, Belmont, CA 94002, USA. Tel: (415) 592-8311.

#### Sony

PCM-3324: 24-channel DASH format plus two analogue tracks, control track and one user data track. Tape speed 30 in/s for 48 kHz sampling rate on ½ in tape with 14 in reel capacity. 16-bit with switchable 44.1/48 kHz sampling rate. PCM-3102: 2-channel DASH format mastering machine plus two analogue tracks, control track and timecode. Tape speed 7½ in/s at 48 kHz sampling rate on ¼ in tape. 16 bit with switchable 44.1/48 kHz sampling.

PCM-3202: As *PCM-3102* with higher tape speed of 15 in/s at 48 kHz sampling rate. PCM-3402: 2-channel DASH format mastering machine. Will operate at 7½ in/s (DASH-S) and 15 in/s (DASH-M) using Twin DASH format. Switchable sampling 44.1/48 kHz with 16 bit operation. Full electronic editing capabilities with pair of machines.

Sony Corporation, PO Box 10, Tokyo Airport, 149, Japan.

UK: Sony Broadcast Ltd, Belgrave House, Basing View, Basingstoke, Hampshire RG21 2LA. Tel: 0256 55011.

**USA:** Sony Corporation of America, Sony Professional Audio Division, Sony Drive, Park Ridge, NJ 07656. Tel: (201) 930-1000.

### Studer

D820X: 2-channel DASH format mastering machine with timecode, reference data and two audio cue tracks. Uses Twin DASH format running 15 in/s at 48 kHz sampling 16 bit switchable to 44.1 kHz. ¼ in tape width with 14 in reel capacity.

Studer International AG, Althardstrasse 10, CH-8105 Regensdorf, Switzerland. Tel. (01) 840 29 60.

UK: FWO Bauch, 49 Theobald Street, Borehamwood, Herts WD6 4RZ. Tel: 01-953 0091. USA: Studer Revox America Inc, 1425 Elm Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651.

#### AEG-Telefunken

Telefunken have the rights to market the Mitsubishi range of digital tape machines under their own name in Germany, Austria and Switzerland until April 1988. Model numbers are similar and specifications are the same. Telefunken have expressed their intention to introduce a PD format 2-channel machine of their own design at some point.



### -"...probably the best analogue recorder in the world!"



Confact: Richard Kelly, Professional Audio Ltd., 53, Corsica St., London N5 1 JT. Tel: (01) 266 1226 Lyrec (U.K.) Ltd., 'Ardhaven House', Old London Road, Milton Common, Oxford OX9 2JR. Tel: (08446) 8866 Fax; (08446) 8810 Tix: 838725 LYREC G Lyrec Manufacturing A/S Hollandsvej 12, DK-2800 Lyngby, Denmark. Tel: +45 2 876322 Tix: 37568 LYREC

www.americanradiohistory.com

## PCM VIDEO BASED RECORDING SYSTEMS

#### Audio+Design

Digi-4: Two modified Sony 701 processors with video encoding equipment enabling 4-channel phase coherent recording/playback. Audio+Design (Recording) Ltd, Unit 3, Horseshoe Park, Pangbourne, Berks RG8 7JW, UK. Tel: 073 57 4545. USA: Audio+Design/SWA, 4611 Columbia Pike, Arlington, VA 22204. Tel: (703) 979-1990.

### By The Numbers

**Collossus:** 4-channel PCM processor 16 bit with 50 kHz sampling rate. NTSC standard TV output. Portable. Digital standards conversion option allows full compatibility with Sony *1610/1630* format.

By The Numbers, PO Box 8359, Incline Village, NV 89450, USA. Tel: (702) 831-4459.





#### Denon

DN-039R: 2- and 4-channel PCM processor with NTSC standard outputs. 16 bit with switchable 48/44.1 kHz sampling rate (also 44.056 kHz under certain conditions). Can be edited using Denon editing system or to 1/30 s accuracy with two recorders.

Denon/Nippon Columbia Co Ltd, 14-14 Akasaka 4-Chome, Minatu-ku, Tokyo 107, Japan. Tel: (03) 584-8111.

UK: Hayden Laboratories Ltd, Chiltern Hill. Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 88019.

USA: Denon Digital Industries Inc, 1380 Monticello Road, Madison, GA 30650. Tel: (404) 342-0637.

JVC

**VP-900**: 2-channel PCM processor 16 bit with switchable sampling rate 44.1/44.056 kHz. Output conforms to NTSC TV signal. Uses JVC Bi-Parity recording format. Forms part of the JVC *DMS 900* mastering system, which comprises digital editing and mixing components.

Victor Company of Japan Ltd, Tokyo, Japan. UK: Bell+Howell Ltd, Alperton House,

Bridgewater Road. Wembley, Middlesex HA0 1EG. Tel: 01-902 8812.

USA: JVC Corporation, 41 Slater Drive, Elmwood Park, NJ 07407. Tel: (201) 794-3900.

#### Sony

**PCM-1630**: 2-channel PCM processor 16 bit with switchable 44.1/44.056 kHz sampling frequency. Fully compatible with *1610* format. Optional read after write board and digital I/Os. NTSC standard TV output. Full editing and mixing possible with additional Sony components.

PCM-F1: 2-channel PCM processor switchable 14/16 bit with 44.1 kHz sampling frequency. Format EIAJ with versions having outputs of PAL/SECAM or NTSC TV format. Has mic inputs and is portable. Not widely available except through a couple of specialist suppliers.

**PCM-701ES:** 2-channel PCM processor similar to *F1* but not portable and has no mic inputs. Sony also manufacture a *PCM-501* and *601*.

compatible with *F1* format but for less demanding application.

Sony Corporation, PO Box 10, Tokyo Airport, Tokyo 149, Japan.

UK: Sony Broadcast Ltd, Belgrave House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 0256 55011.

USA: Sony Corporation of America. Sony Professional Audio Division. Sony Drive, Park Ridge. NJ 07656. Tel: (201) 930-1000.



Mitsubishi X850 32 track digital audio recorder

The "Mitsubishi" machines have proved to be faultless. When using them in the Studio you can forget that they are there. What more can you say about a Tape-Recorder!

#### HARRY MALONEY - DIRECTOR, GREAT LINFORD

At Great Linford Manor it is the rule to buy the finest possible. From the 200 year-old French Refectory Table in the kitchen to the Munro Associates Acoustics. The Mitsubishi X850 32 track and X852 track digital audio recorders are of the finest quality and complement the policy of this Studio in their quest for Excellence.





DIGITAL ENTERTAINMENT CORPORATION LTD. Unit 13, Alban Park, Hatfield Road, St. Albans, Hertfordshire AL4 0JJ, England Fax UK: 0727 67684 Telex No: 268972 MPAGUK G Telephone:0727 40584

## **DISK RECORDING**

Disk-based recording systems are, by their very nature, totally under software control, so features contained within the system are dependent upon the software in use. This review is therefore rather brief in content but still a useful guide.

Because the nature of disk-based recording is just the technique of recording a different form of data on what is normally a computer data format, there are many products coming from companies who are not traditionally within the audio field. Because of this, and a lack of specific data, this section may not be as complete as we would normally hope.

#### AMS

AudioFile: Hard disk-based 16 bit record, edit and playback system. Can be configured mono, stereo or multitrack

AMS Industries plc, AMS Industries Park, Burnley, Lancs BB11 5ES, UK. Tel: 0282 57011.

USA: Harris Sound Inc, 6640 Sunset Blvd, Suite 110, Hollywood, CA 90028. Tel: (800) 233-1580.

#### Audio+Design

SoundMaestro: Hard disk-based audio recording editing system designed around the Atari Mega ST computer with 16 Gbyte storage capability 2-channel 16 bit with 44.1 and 25.5 kHz sampling rate. Plans for multichannel versions. Audio+Design (Recording) Ltd, Unit 3, Horseshoe Park, Pangbourne, Berks RG8 7JW, UK. Tel: 073 57 4545.

USA: Audio+Design/SWA, 4611 Columbia Pike,

Arlington, VA 22204. Tel: (703) 979-1990.

#### *Compusonics*

DSP-1000: WORM-based 5¼ in optical disk format giving 72 min of 44.1 kHz sampling rate, 16 bit stereo of up to 512 min mono speech type material using CSX process.

DSP-1500: Magnetic disk in cartridge format digital recording giving 7½ min stereo music at 32 kHz with possible external computer control. DSP-1200: Replay only version of DSP-1500. Compusonics, 2345 Vale Street, Palo Alto, CA 94306, USA. Tel: (415) 494-1184.

#### Denon

DN-052ED: Hard disk-based 16 bit recording system operating 2 or 4 channels. Part of comprehensive editing system intended mainly for music editing.

Nippon Columbia Co Ltd, 14-14, 4 Chome Akasaka, Minato-Ku, Tokyo 107, Japan. Tel: (03) 584-8111.

UK: Hayden Laboratories Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 888447.

USA: Denon Digital Industries Inc, 1380 Monticello Road, Madison, GA 30650. Tel: (404) 342-0637

#### Fairlight

Series III: An optional part of the series III is a disk recording system recording 16 bit at



sampling frequencies up to 96 kHz. Fairlight Instruments Pty Ltd, 15-19 Boundary Street, Rushcutters Bay, NSW 2011, Sydney, Australia. Tel: (02) 331 6333. UK: Syco Systems, 20 Conduit Place, London W2. Tel: 01.724 2451. UK: HHB Hire & Sales, 73-75 Scrubs Lane,

London NW10 6QU. Tel: 01-960 2144. USA: Fairlight Instruments Inc, 2945 Westwood Blvd, Los Angeles, CA 90064. Tel: (213) 470-6280. USA: Fairlight, Instruments Inc, 110 Greene Street, New York, NY 10012. Tel: (212) 219-2656.

#### Ferrograph

Initially they will be marketing Compusonics products under the Ferrograph name in Europe. Later will manufacture own versions. Model 9000: Compusonics DSP-1500-write once, read many (WORM) 51/4 in optical disk format. Model 9500: Compusonics DSP-1500-magnetic disk in cartridge format intended for broadcast use

Model 9200: Compusonics DSP-1200-playbackonly version of DSP-1500.

Ferrograph, Unit 21, Royal Industrial Estate, Jarrow, Tyne & Wear NE32 3HR, UK. Tel: 091-489 3092.

#### For.A

Sirius-100: Hard disk-based record/replay system with up to eight channels of audio available. Capability to handle a number of control panels simultaneously on the same system. For.A Company Ltd, 3-2-5 Nishi-Shinjuku, Sinjuku-ku, Tokyo 160, Japan. Tel: (03) 346-0591.

UK: Cameron Broadcast Systems, Burnfield Road, Giffnock, Glasgow G46 7TH. Tel: 041-633 0077. USA: For A Corporation of America, Nonantum Office Park, 320 Nevada Street, Newton, MA 02160. Tel: (617) 244-3223.

#### Image Video

AES-2000: Hard disk-based digital recording/editing system operating at 16 bit 48 kHz sampling rate.

Image Video Ltd, 705 Progress Avenue, Unit 46, Scarborough, Ontario, Canada M1H 2X1. Tel: (416) 438-3940.

#### Lexicon

Opus: Digital audio production system with hard disk record/replay capability. Full sound mixing, equalisation, etc, with expandable recording capability

#### Lexicon Inc, 100 Beaver Street, Waltham, MA 02154, USA. Tel: (617) 891-6790. UK: FWO Bauch Ltd, 49 Theobald Street,

Borehamwood, Herts WD6 4RZ. Tel: 01-953 0091.

#### New England Digital

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## MARTIN POLON'S PERSPECTIVE

 want to begin by thanking all of my loyal readers for the support
 you have shown me in

this, my time of real crisis. The cards and letters have been a real morale booster. So have been the flowers and candies. However, for those several of you who have been sending the Venus Fly Traps, I must report that the nursing staff tends to frown on such things. The same could be said for the Chocolate-Covered Ants.

At any rate, the doctors here at the Shady Rest tell me that I am getting better and better each day—in every way. They have let me out of my room with the lovely quilted walls and I do not even have to wear my special jacket with the extra long sleeves that strap around me all of the time. The doctors felt it would be good for me to return to writing my *Studio Sound* column—after all, they said many of you frequently consider my writings to be crazed normally.

The editors at *Studio Sound*, aside from wishing that the doctors had found some other therapy for me, felt strongly that my story had to be told. Our industry needs to be protected from the series of events that turned me from a normal functioning individual into a mere shadow of my former self.

My story begins several months ago. I was working on a lazy spring afternoon in Boston when the phone rang. It was a good friend of mine who had purchased a used recording console of fairly recent vintage. He wanted to tie its builtin recorder switching panel to several of his analogue tape recorders of familiar manufacture, albeit a little long in the tooth. Knowing my perceived pleasure at a good challenge, he thought I could solve the problem he was having. I was to be within driving range of his home studio the following week. In the interim, I called the manufacturer of both the tape recorders and of the console to obtain the manuals. I assumed these epics of technological literature would provide the solutions to a multitude of sins.

Oh ye of little faith out there in my audience is that snickering I hear? I did find out that replacement manuals for equipment no longer made are not always given, but I was able to lever out a copy of the manual for each of the units (except that the borrowed manual for the tape recorder had to be copied page by page—all 377 of them). Armed with these most important collations of Xerox, I sallied into the project.

I discovered from the manuals that my friend had wired the various connectors according to standard convention. The manuals quickly identified that the control connector wiring could vary from application to application and from country to country, to conform to electrical codes and for user preference of functions in order of display. A cursory examination of the manual for the tape recorders produced no initial information as to wiring. I delicately enquired of my friend as to the ethnic origin of his tape recorders. He returned the favour by enquiring as to my own ethnicity. Seeing as this was getting us nowhere and as the units had multi-voltage taps allowing universal power but offering no clues as to the intended country of use, I decided to "punt".

I opened up the tape recorders and discovered that they were 'Hecho En Mexico'. This immediately made me thirsty for a Marguerita but did encourage a sense of confidence in the US as ultimate destination for the product. After wiring the connectors to the console, I was rewarded by a successful clatter of relays. Unfortunately, the clatter of relays did not stop and they seemed to be playing a version of Spike Jones's *Tea For Two* scored by R2D2. I thought about calling Mexico and asking to speak to 'Hecho' but decided against it.

After disconnecting, trying every possible pin combination and reading the manual over and over, I discovered that I could not get the assigned functions to work from the console keyboard. The manual kept referring to a level of control logic performance that we could not establish in real life. That led to a new adventure. I would call the factory for telephone assistance. This I did, only to discover two very pertinent facts. One was that nobody employed in the customer assistance area had been out of kindergarten when these machines had been first designed. Two was that some great mind at the factory (undoubtedly a Harvard MBA earning yearly what the console had cost new) had dictated that support should be provided by the dealers-not the factory. Fourteen phone calls later discovered that no dealer within 500 miles would support a unit at any price that they had not sold. Most suggested calling the factory for support. Further calls to the factory kept referring us back to the dealers who...

Several weeks passed (or should I say impassed). I decided this was all really my contribution to making America great by helping ATT turn a profit on my numerous long distance phone calls. The factory was called again. Forceful behaviour finally achieved some acknowledgement of our problem by the factory. They connected us to a young engineer who said he had heard of the machine but had never actually seen one although he did have a manual. After some additional yelling, an engineer was found who knew what the machine I had was all about.

He told me that my problem was that the machine needed a Mod B logic assembly. He helpfully pointed out that the Mod A assembly had ROM software bugs which could not be fixed. He also pointed out that I obviously needed the correct manual after the 'Fix'. The needed assemblies would cost my friends several thousand dollars, so I suggested that assemblies with bugs should be replaced at no cost to the customer. He replied that if the tape recorder was still in production, that might be possible. However, since the model was discontinued, we would have to have it fixed at our cost.

My friend agreed reluctantly that this was sensible and we shipped the units to a factory repair centre with a detailed record of all problems, telephone conversations, etc. Two days later, my friend received a phone call from the service technician assigned to the machine asking if we wanted to keep the 'A' modules or were we interested in the 'B' modules. I called back to explain that if he read the attached letter, all of the necessary information would be his. He said the office usually kept such correspondence in a file so it would 'be safe' rather than give it to the technicians. Two weeks later the machines were returned efficiently by Federal Express. The change to B Mod had been made. Now I knew we could not fail. I opened the cartons eagerly but began to flail wildly about the packaging looking for the manuals after the units themselves had been freed from their plastic and cardboard cocoon.

I leapt for the phone and lambasted the factory for information as to the whereabouts of the manual. I was told superciliously that since the repair was done at the factory, the technician just ordered the necessary parts assembly. After all, he already had the manual. If we had ordered the Mod B assemblies ourselves, then we would have been shipped the manuals. There was no price difference between the two options. That prompted me to ask. in an uncharacteristic kindly voice, if it would be possible to purchase the manual having instructions for the Mod B. I was told no-that we had to order the entire Mod B assembly.

At this point, I bravely volunteered that I could fix it with just the old manual and my good common sense. It is important to note here that I obviously did not have any good common sense. I would not have been spending 100 man hours doing this while my business went unattended, my children unloved and my garden unweeded. But, vou remember that I like a challenge...

Several sleepless nights later, I was back on the phone to the factory where I learnt (at about \$1 per minute) that the Mod B logic assembly has an internal logic wiring board. By strapping certain connections, I could configure the remote control switching to do anything we could possibly want in any country we could possibly be in.

When I asked how to strap the board, I was told that the information I needed was too complex to do over the phone but that it all was in the manual. I explained again the entire story, complete with summaries of all previous telephone calls, anecdotes and other compelling innuendos. I also explained that there was some minor incongruity here as I had machines with Mod A logic and had them upgraded to Mod B logic. My manuals would be Mod A. After the upgrade, my machines would be Mod B. But my manuals would still be Mod A. And since the factory did the work because we were not up to

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### POLON'S POLON'S PERSPECTIVE

performing the tape recorder's equivalent of openheart surgery, we still had no Mod B manuals and no one would sell them to us. We were told that the entire matter had been turned over to a supervisor and that we would be contacted.

Two weeks passed and no word was received. I finally called back, only to be told that no decision had been made. At that point, I asked for the Vice-President of Operations. Upon reaching this good gentleman, I beseeched him to release a manual to us. He said he would. Two more weeks passed and nothing came. I called yet again to find that the manual in question was "now out of print". I was assured that it was being reprinted and that I was at the very top of the list for a copy. I asked why I couldn't be sent a Xerox copy. I was told that the only good copy extant was the one at the printers being used to generate the new copies.

Having reached the limits of my patience, I began to probe inside the B logic module in search of a solution. I felt after some considerable amount of work that I was indeed getting close. The manual would confirm my findings and I would be triumphant. Finally, the fateful day arrived. The manual came via the US Post Office's Express Mail system. The service guarantees overnight delivery; it just doesn't say which night it will be over. I tore the package open to discover the Mod B manual. I was ecstatic. The solution was at hand. I thumbed through the revised manual looking for the section on strapping the Mod B logic. All I found was a single page with the admonition to "please call factory customer service for assistance in strapping the B module".

It was about that time that I began to walk in my sleep talking of Mod B manuals and I was sent away to see the nice Doctors.

he story above is, needless to say, an amalgam of experiences that have all happened to me and that have been known to befall many others. I cannot but doubt that anyone who needs service on complex high technology electronic equipment today escapes the various technical information syndromes described above. To aid Studio Sound readers attempting to gain technical and service information for various kinds of studio/audio hardware and software, I shall delineate other such problems with technical and service documentation. Further reference may be found in Murphy's Law-see section 21-4, paragraphs A-G.

The Manual Versus The Service Handbook' In this particular variation on a theme, the product in question is supplied with a manual. The manual has a very complex block diagram of the device. There is a great deal of how-to information present in the manual but there is precious little service information of note. For accurate service information (necessary if one actually intends to repair the device in question), a service manual must be purchased from the manufacturer. This is frequently priced in the \$25 to \$40 price range and can take up to several months to obtain. One would almost think that this was sometimes a ploy to force the user to obtain service from the manufacturer directly or at least boost accessory sales profitability but we all know that no one would ever attempt to do such a thing in our industry.

'Asia Speak' In this version, the manual has been carefully written by the company's skilled engineering staff who have developed their . product as if it were one of their children and who have complete familiarity with the product. This can be a big advantage over having some 'hired gun' write the manual (a procedure that sometimes works well and sometimes does not). The only fly in this ointment is that all the engineers live in the country of origin and between them do not possess enough English to catch a bus in Piccadilly Circus. This leaves us with a manual written in either Jap-Lish, Chi-Nglish or New Del-Lish. This produces a manual that is not the most desirable object in the world. It is incapable of being deciphered in either the Asian language or in English. When one considers that the Japanese have four sub-sets of language to deal with-the Chinese character set of Kanji, the mixed language set of Katakana, the pure Japanese set of Hiragana and the Anglicised Romanji-it is a miracle that anyone ever learns English properly. Unfortunately, many do not but that does not stop them from writing manuals.

'English Majors Writing Technical Manuals' This is the 'hired gun' school of manual writing. There are some audio professionals working in places like Los Angeles and Tokyo who specialise in writing manuals. Their work is excellent and they are usually on retainer or under contract to one specific company. In many cases, however, a company will choose a person who is a good writer to produce a manual.

This writer is qualified to ghost write the biography of Fawn Hall but knows absolutely nothing about audio. The result is usually worse than useless, especially if some engineer who can speak only 'Lish' is assigned to aid the writer. 'See Other Manuals' In this syndrome to increase somebody's bottom line, and you can guess it is not that of the equipment user, the manufacturer spins out needed information to create a set of handbooks for the system you have purchased. For example, there will be a 'Broadcast Operations Handbook', a 'Sound Reinforcement Usage Handbook', a 'Sound Reinforcement Usage Handbook', telectronic Music Recording Handbook' and so forth, and so on, ad infinitum, or until the cash registers jamwhichever comes first. Needless to say, there is a separate service manual as well (see above).

'Manuals In Foreign Languages' Although this was once strictly a grey-market phenomenon, the practice of shipping foreign-intentioned product has become more common as demand frequently exceeds supply. What all this means is that dealers and distributors sometimes purchase products from the local subsidiary of a worldwide electronics manufacturer in a distant geographical setting or it may even be the electronics giant redistributing product to equalise demand.

At any rate, the customer is shipped equipment with the manual in some other language. In many cases this will be Japanese but it is just as likely to be French or Spanish. This is a no-win situation if the dealer or distributor is going around the American or English subsidiary of the parent company. The subsidiary will frequently not make good on this problem. If the cause is short supply on the part of the parent, they would have shipped the product with the correct manual if they had it in stock. The best solution is to meander over to your local college or university and find a bright senior student in the language in question. Pay the student to translate and order the correct language manual for future use. A corollary of this is the mutlilingual or universal symbol manuals that have the unique honour of actually achieving the task of being all things to all people. Confusing! These multilingual manuals are burdened by trying to say a little to a lot of people in 12 languages and not having enough space per language to do anything right.

The manuals with symbols are great fun! It is like trying to play 'Pantomime Quiz' with your career. People are yelling at you to get the new recorder hooked up 'so we can start the session' and you are trying to decipher why there is a picture of what seems to be a toilet bowl with the international 'Do Not' symbol superimposed over it. Perhaps it means do not go to the toilet while the tape recorder is running?

'See Figure 11A' Last but by no means least, is the manual with a missing or illegible illustration. 'See Figure 11A for terminal block wiring diagram', is what the manual says. But figure 11A (and several other illustrations for good measure) is missing/reduced so much it can only be read through a magnifying glass blurred so badly in printing that half of it is unreadable in any way. No easy answer here except to call the factory.

The bottom line with all this is to hope that the numerous manufacturers who read this column will decide to be a bit more careful about getting the necessary user data to the user. It is probably true that whatever extra revenue some makers achieve by segmenting manuals, selling service manuals separately, saving money on manual preparation or other similar schemes is a poor investment indeed. In the long run, these tricks will cost more in terms of user goodwill and return purchases than any possible offset of extra revenue could compensate for. A good manual is part of the purchase price of the product and valued customers deserve no less.
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audio test problems

# BARRY BUSINES

visited Pete Townshend's Eel Pie Studios on the banks of the River Thames near Richmond Lock, to see a sales pitch dem of the Synclavier Direct-to-Disk multitrack system. A lovely hot day but the studio is afflicted with the American disease: the air conditioning is turned up full blast so that many people inside are shivering from the cold. Townshend demonstrates the system by playing piano, guitar and singing. He apologises for his voice, blaming "air conditioning sinus". We are not surprised.

Two interesting technical points emerge from the Synclavier dem. The Synclavier is ideal for editing pop videos and film scoring, because the system can very easily be run in sync with several video tape clips at the same time, eg several concert performances or a mute sequence to be scored. Townshend also plays the neat trick of filming himself conducting along with the click track. So the musicians get exactly the same conductor guide each time through.

And now, hey presto, we have a ridiculous situation. The Synclavier system, costing at least £100,000, gives instant access, without time wasted on tape rewind. But only for the audio. With the video on tape, there is still the same agonising delay as the tape rewinds, searches out the SMPTE start point and locks into sync.

The next step has to be video on disc to give matching access times. It's already possible to record video on magnetic disk-Quantel's Harry system does it-but the cost per second screen time is prohibitive because data rates for digital video can be as high as 200 Mbit/s. Optical recording is the cheaper answer.

There have been optical videodisc recorders (compatible with conventional Laservision) for many years, but so far they all work on the WORM (write once read many times) principle. Once the recording is made it cannot be erased. This is not necessarily a problem because the guide video, of picture sequence and conductor visuals, can be recorded on to video tape and dumped on to disk only when they are in final form. But an erasable disc would obviously be far more convenient.

All the major electronics companies have been working on this. Prototype recorders have been developed, which temporarily change the magnetic state of a metal-coated disc and thereby affect the optical reflection of a laser beam. But magneto-optical recording is still too expensive for commercial exploitation. Now Philips believe they have found some new materials that change the rules of the game.

A blank disc is coated with a mix of gallium antimonide and indium antimonide, doped with minor impurities, the same materials that are used in the manufacture of integrated circuit

chips. When the coated disc is scanned by a high power laser, spots on the surface get hot, cool rapidly and convert to amorphous 'supercooled' state. Surrounding areas of the material remain crystalline. The amorphous dots reflect light differently so define a pit pattern. This is sufficiently crisp to reproduce either digital audio or analogue video signals. To erase the recording, it is heated again to just below the melting point, and allowed to cool slowly back to natural crystalline state.

The new material can be erased and re-recorded 1,000 times and disks recorded in this way will play back on existing compact disc audio or video players, with only slight modifications. The system, if it can be developed for commercial sale, would be ideal to run with the Synclavier.

The Synclavier 8-track Direct-to-Disk system has 600 Mbytes (4.8 Gbits) of Winchester magnetic disk storage. This gives 13 minutes per track at 50 kHz sampling and 16 bit coding. As anyone who has ever used a hard disk computer well knows, they can crash and lose data. The system has tape back-up. But it's not audio tape, it's computer back-up using data 'streamer' cartridges. There are four cartridges running in parallel and each storing 150 Mbytes. With the four streamers running together the Synclavier can back up a 3 min 8-track recording (equivalent to 24 min total linear time) in under 5 min. The tape back-up is bit-perfect because the system is recording the data as corrected and checked chunks, not a conventional audio stream.

This raises an interesting possibility. Would it be possible to send the recording over a telephone line? That way a recording made in one studio and one country could be couriered to another studio or cutting room in another country without a courier.

Systems already exist to transmit text data by telephone line, like electronic mail. The Synclavier streamer data could be sent in the same way. Phone transmission relies on modems, to convert digital data into analogue audio modulation. Transmission speed is limited by telephone line quality. But very recently there have been some interesting new ideas on this.

British firm Dowty, of Newbury, is selling a modem which allows computers to exchange information over an ordinary telephone line at speeds previously considered impossible. The new modem, called Trialblazer and costing under £2,000, uses the Packetised Ensemble Protocol, or PEP, developed by Telebit of Cupertino in California. PEP deliberately does not adhere to any of the current modem standards, because these were formulated before engineers saw the need to send large files, like high quality graphic images, by conventional telephone line, and before airlines and industrial companies routinely exchanged vast quantities of data by telephone.

Existing modems handle data at a maximum speed of 9600 bits/s, by sending rapid streams of data on two carrier tones widely spaced in the 4 kHz bandwidth available from a telephone line. They compensate for noise on the telephone line by continually checking for reception errors, and then re-sending large chunks of data until they get through safely. In practice this can be agonisingly slow. If the line is very noisy, the modem 'falls back' or drops its speed in large half steps, from 9,600 to 4,800 to 2,400 to 1,200 bits/s, making transfer even slower.

Telebit re-thought the problem from scratch, and a PEP modem sends a large number of slow data streams on narrowly spaced carrier tones. The 4 kHz bandwidth is divided into 512 discrete carrier bands, at 8 Hz intervals.

Each carrier conveys a stream of digital bits which varies in speed depending on the line quality at that specific frequency. Matching PEP modems at each end of the line continually monitor the line quality and tailor the data rate at each tone frequency to match line quality at that frequency. If, for instance, there is a drop in line quality in the middle of the 4 kHz band, the PEP modems reduce their transmission speed only on the affected mid-range tones

Conventional modems waste data capacity by operating symmetrically; they send and receive data at the same speed. PEP modems can send and receive at completely different speeds. When a personal computer has to send several Mbytes of text or graphics into a mainframe, all the line capacity is used in one direction. When the mainframe sends data to a PC, all the line capacity is used in the opposite direction. The PEP modem could use all its capacity to send a Synclavier audio file.

The only snag with PEP is that it is nonstandard proprietary technology and matching PEP modems must be used at each end of the telephone connection. But at under £4,000 a pair it's not a high price to pay.

With ordinary domestic phone lines a pair of Trailblazers can carry data at up to 18,000 bits/s, which is equivalent to around 1 Mbit/min. So a 3 min stereo mix would take 4 or 5 hours to transmit. That's still cheaper and quicker than flying the Atlantic.

> irebrand drummer Buddy Rich had the last laugh. After a series of

heart attacks, and threatening his audiences that he would die on stage as a grand finale, he finally succombed to a brain tumour.

The obits were all a bit sickly. I prefer the eye witness account of what happened when Buddy went into the TV studios in Britain to record a last interview with Michael Parkinson. His band only played a couple of numbers. All the rest was chat. One of the TV directors told Buddy he must do a run-through with the band at 6.30pm.

"6.30?" queried BR. "Yes," said the studio God. So Buddy called the band at 6.25pm and sat down at his kit, dead on the dot of 6.30pm.

The director and his cronies were nowhere to be seen. They were still in the bar. Rich counted in the band, played his two numbers and told the musicians they could go.

With nice timing, the director and a crew of posers appeared from the bar. "Are you ready, Buddy?" they asked.

"We've finished," said BR and left the studio. Wouldn't it be nice if recording engineers could do that with pop stars!

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visited The Bridge, a new 24-track studio in Great Marlborough Street, London, mainly

for film, TV and radio voiceover commercials. And yes, you can easily soak up 24 tracks with spot effects, music and alternate voice takes.

Being slow on the uptake, I waffled on about how much the whole complex looked like the Starship Enterprise before registering the name. Of course, it's meant to look like the Enterprise. That's why they call it The Bridge.

Having once been on the Hollywood set that is kept permanently ready for the next Star Trek sequel, I can vouch for authenticity. One thing I recall about the Hollywood set that isn't in The Bridge, is the wonderful effect they got from an aerial map of Los Angeles. With a few thousand pin pricks in the surface and a flickering back light it creates the startling illusion of a city at night as seen from space.

The Bridge uses an AMS AudioFile instead of carts and they have two of the first production models of the new Studer A-820. This is the first 24-track system with Dolby HX Pro. There is an interesting but tangled story behind the origins of HX Pro. It all began with the domestic cassette market.

In June 1979, at the Chicago Consumer Electronics Show, Ray Dolby-in person-unveiled Dolby HX, a headroom extension system for domestic recorders. HX automatically and continuously varied both the recorder's bias and its record equalisation, to optimise them in response to the changing high frequency content of the music being recorded. The variable circuitry was controlled by a signal derived from the conventional B-type noise reduction circuit. This is already sensing the level and high frequency content of the music for control of the Bsystem sliding band filter. The object was to minimise the HF erasure caused by excessive bias, by varying the bias with signal content and varying the equalisation to track the bias changes and so keep tape sensitivity stable.

The result of dynamic bias and EQ, claimed Dolby, was around 10 dB better performance at 10 kHz. It worked, but ganging vari bias and vari-EQ to B noise reduction proved tricky in practice. A few firms used HX on upmarket cassette recorders but commercially the system flopped.

Meanwhile, in Norway, Tandberg was working on Dyneq, dynamic equalisation, as another answer to the same problem. The system was unveiled in August 1979. Dyneq put pre-emphasis on a sliding scale, reducing the amount of HF boost when the original sound contained too much high frequency for the tape to handle. The idea

was to avoid the overload you get on slow moving cassette tape, when a meaty HF signal is subjected to a fixed amount of HF pre-emphasis.

*Dyneq* followed a year after another Tandberg system called Actilinear which was intended to avoid amplifier saturation. Instead of using a passive resistor to isolate the record head from the amplifier, Tandberg used an active boost circuit. The Norwegians claimed patent rights on what sounded like a pretty obvious design step. A grand squabble promptly ensued when, in November 1978, FWO Bauch sent the press circuit diagrams for the 1962 Revox F36, 1964 Studer C37, 1965 Studer A62 and Revox A77 and B77 machines. All these machines, said Bauch, used the Actilinear circuit which Tandberg was now patenting and advertising as novel. Like all audio squabbles, it was soon forgotten. So were Dyneq and Actilinear, although some Tandberg cassette decks used them both.

The next move came from Denmark. There must be something in the air up there. Bang and Olufsen engineers were checking the performance of their hi-fi cassette recorders in the lab and found that they got odd results when testing with mixed tones. This was because a high frequency tone acts as additional bias on lower frequency tones. So the preset bias signal is no longer optimised, and mid range sensitivity changes. The recorder goes non-linear.

B&O built a circuit, which they called HX Pro. It monitors the HF content of the music signal and automatically reduces the bias level as the HF signal level goes up. So total bias effect remains constant and mid and low range behaviour is stabilised. In other words B&O's HX Pro is Dolby's original HX, but without dynamic equalisation.

Wisely, Dolby recognised that HX Pro was the practical answer to headroom expansion. B&O wisely recognised that it has no licensing expertise whereas for Dolby Labs it is bread and butter. In August 1982 B&O and Dolby signed a deal. B&O gave Dolby an exclusive licence on HX Pro so that Dolby can sub-licence it to any firm already using Dolby noise reduction.

In September 1982 Electro Sound took a licence to use HX Pro, by now called Dolby HX Pro, for the high speed duplication of cassettes. Others in the field have followed. It's no mean feat because duplication at 32 or 64 times real speed, hikes the bias to around 5 MHz and it must be modulated in microseconds. Now HX Pro is being used for professional real time recording, in the Studer A820 decks.

Under the circumstances it seems fitting that the Studer's first outing should be on the Bridge of the good ship Enterprise.



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and this down a fack at our expense we will provide all engineer. Wong class outboard plus coffee for as long as at takes! If you feel that 24-track total recall for under £9,000 will help bring business into your studio why not contact Dave Simpson and arrange a demonstration (accommodation available).

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ounding director (with Robert Woods) of Telarc International Corporation, Jack Renner has had a distinguished career in

the field of classical music recording. He has received seven Grammy nominations and the 1985 Grammy award for Best Classical Engineering (Robert Shaw/Atlanta Symphony Orchestra and Chorus, Berlioz Requiem).

His practice of simple microphone technique has brought worldwide acclaim initially establishing Telarc as an 'audiophile' label. His pioneering use of digital recording processes saw early digital classical recordings including the first US symphonic digital and the first US orchestral digital recordings in 1978. That year also saw the first digital recording in the world with a world class orchestra: The Cleveland, conducted by Lorin Maazel, playing *Pictures at an Exhibition*.

His recording career started 25 years ago when Jack Renner, music teacher, was taken over by a more ambitious creature altogether. A pressing plant in California advertised for people interested in setting up their own businesses to operate in a prescribed territory, recording school bands, church choirs and community groups. This kept Renner occupied for several years, providing him with valuable experience and time to develop his own recording technique.

As a self-taught engineer he could only go by what he heard on disc himself, and ended up with a preference for the type of sound provided by the Mercury Series.

"I wanted to model my approach after the Mercury Series because they sounded the most musical and real of any recordings on the market. I realised later it was because of the particular approach to engineering: the mono records were made with one microphone, the stereo records were made with three microphones. At that time most of the companies were using a small number of microphones, it was only in the late '60s/early '70s that this explosion of going to more and more microphones and more tracks to record symphony orchestras started to take place. Even then I wasn't aware of that; I was off in my own little world.



### American Jack Renner has been making a name for himself and Telarc with a specific approach to classical music recording

"When I started making recordings I started with two microphones and for a number of years I could not understand why anybody would want any more to record orchestra or a chorus or wind band, whatever."

Renner firmly believes that his training as a musician led to his approach to microphone technique and recording in general: "Classical recording is the business of recreating what has actually happened in that concert hall. Very early on I learned how to do this with a minimal number of microphones. It was only later on that I realised there were other techniques at work out there and that a lot of the major companies were using a lot of microphones and microphones with very tipped up high frequencies that tended to create a whole different sound.

"It never occurred to me that you do it any other way. And anyway, I quite literally couldn't afford more than two Sony C37A condenser microphones when I first started my business. These were supplemented with a pair of Telefunken M251s. So at one point I had four microphones and I could do a band or orchestra and chorus and put microphones on each of them."

His first tape recorder was an Ampex PR10, superseded by a 354. From there he went on to a Scully 180, to Studer B62, B67 until finally "..., digital caught up with me".

When the bottom fell out of the schools business Renner decided to go commercial and his lack of business acumen resulted in the loss of a lot of money and the accumulation of rather too many records in his basement. It was then that he met Bob Woods, now a partner in Telarc, and together they formed a vanity label (ie recording for artists who paid them, rather than paying artists for the privilege). Over the next few years a number of recordings with principals of the Cleveland Orchestra and singers from the Metropolitan Opera were received with critical acclaim—particularly regarding the sonic quality of the recordings. The company by this stage was called Advent Recording Corp. Renner was still recording with only two or three microphones, religiously following Bob Fine's technique at Mercury Records.

"Late '76 Bob Woods and I decided we had gone as far as we could as a vanity label and we were ready to do something really wild."

The 'in audiophile thing' at the time was recording direct todisc and Advent had the madcap idea of persuading conductor Lorin Maazel and the Cleveland Orchestra that they should have a go at doing this with an orchestra. The event took place in January '77 and turned out to be a case of too many chefs spoiling the broth: input came from the cutting engineer; the Disc Washer company, who were at the time importing Denon product; and then Teldec in Germany when the disc cutter suddenly became bankrupt a week after the recording.

In the midst of all this confusion the Advent speaker manufacturing company had demanded that Renner's Advent change its name, so they became Telarc.

"It was at best a mixed success. The people that liked it absolutely liked it and those that didn't thought it was the worst thing they had ever heard but it put Telarc's name on the map.

"This is going to be very contradictory to all I have said about minimal microphone technique but we sort of decided by committee how we would record it because there were three companies involved, and it wound up being a multimic project."

Not only was all this totally unnecessary as far as Renner was concerned but unknown to anyone, the cutting engineer, in order to protect his cutter heads, was severely limiting the signal and rolling off the low end of the signal he was feeding to the cutter head.

"So it came out sounding very compressed with much less extended frequency response than any of us would have liked. But we got nice clean cuts and no problems."

Another direct-to-disc recording was made later that year with organist Michael Murray. Then an acquaintance introduced Telarc to the digital concept and the Soundstream system.

"Listening to the Denon digitals we were concerned with the lack of extended HF response (at that time the Denon system rolled off beyond 17 kHz). We had a much more favourable reaction to the Soundstream except the high end still wasn't there (it was rolling off beyond 17.5 kHz)."

A suggestion to Soundstream's Dr Tom Stockham that the HF response needed to be extended to beyond 21 kHz was duly taken up, and Telarc were obliged to come up with a project.

"This had all led to the great debate about why do you need anything beyond 16 or 17 kHz because you really can't hear things up there; most people can't, most microphones don't respond that high, but I am absolutely convinced that although you can't hear what's up there, there is information there. If you take away the information in your recording above 17 or 18 kHz that sound will change because there are overtones, and what we call in the business 'a sense of air' around the sound. It affects the total colour and characteristic timbre of any instrument that has a response that high."

So, this was to be the first commercial digital recording in the US of classical music. Should it be spectacular musically, sonically or both? They decided in the end on Holst suites for military band, Handel *Royal Fireworks* and Bach *Fantasia*. The event took place in April '78 with heavy press presence from all over the States.

"There was something about those two days that will never happen again. The Soundstream turned out ultimately to be the finest digital recording system in the world. It's a shame they couldn't compete with the combine of Sony and Philips in terms of standardisation and they ultimately went out of business."

October that year saw the completion, with Lorin Maazel, of the first digital recording of a world class orchestra, beating Decca by three months, although they didn't realise it then.

Very quickly Telarc became established as an 'audiophile'

label in the US, one which has expanded dramatically over the subsequent years to become a mainstream classical label with worldwide appeal for both its sonic quality and repertoire. They were also among the first to make CDs.

Their reputation has led to strong links with various manufacturers of recording hardware, particularly of microphones: "I had considerable influence in Schoeps' last two new models, the *MK2* and linear *MK2S*—both of which are phenomenal capsules and work wonderfully in different acoustics. I work very closely with Bruel & Kjaer in the US and field tested their studio mics first in classical recording. We recently became the first US company to use the excellent new Sennheiser model *MKH 20* omni microphones and now use them regularly."

When recording in the States, Telarc use a Sony 1610 system modified by recording engineer Tony Faulkner. Faulkner is also responsible for supplying the recording equipment for Telarc's European sessions. The console is a Neotek, specified by Telarc and used by them in all territories.

"Neotek because first of all it is transformerless. We started out with a Studer 169, which is a very good little desk but it is loaded with transformers. We decided early on, if we were going to be really hi-tec, that our entire chain was going to be transformerless. The thing that really convinced me about Neotek was when Tom Stockham, who used to come on sessions with the Soundstream, hooked the entire recording chain up and with his distortion analyser, ran a check on every piece of gear. He would check the S/N, frequency response and distortion on whatever mixing desk was feeding the Soundstream (and he has done these measurements on every brand of mixing desk in existence). When Tom measured the Neotek he found the cleanest, lowest distortion he had ever come across. In addition to which it sounded great. So we got one.

"We have just taken delivery in the States of a Neotek which is wired with Monster cable, which is phenomenal."

Not so long ago Renner was a firm 'atheist' as far as high performance cable was concerned—all you needed was clean contacts and good quality cable. A meeting in the UK with A J van den Hul and his oxygen-free cable left him a changed man.

"We had two matched B&K studio mics which we put side by side, put on the best cable we had on one mic and the oxygenfree stuff on the other and opened the faders. I tell you it was unbelievable; it was like two different microphones. The one with van den Hul had much more open top, tighter bass, more detail and everything about it was better."

Back home in the States he met Monster Cable and the conversion was complete: "I have absolutely become convinced that the cable is a valuable additional component in that signal chain. We are Monster Cable from the microphones to the video recorder. I don't know whether in a video signal high performance cable is going to make a difference but it's now available and I'm going to use it: microphone cables, interconnects in the control room. You could have talked to me for years and if I hadn't made the comparison I would still be saying it was just somebody's gimmick to make a lot of money. I'm hooked so much now that I can tell the difference between Monster, van den Hul and Hitachi; it's gotten real bad! I'm just terrible. I know it doesn't sound like it but I don't think I could ever actually be an 'audiophile', too much tinkering around goes on."

Monitoring is currently under review; discussions are in progress with Boston speaker manufacturer ADS who are developing a new speaker for them. "In the States we use an older model of theirs. In the UK we use B&Ws and have had several meetings with John Bowers about his speaker line. He knows what I'd like to see and I think they're headed in that direction with the Matrix models, although they don't have a wide enough range speaker available in that line yet. I dare say the 801 that we are using is a bit loaded for what we do because we use microphones that have very extended frequency response, especially on the low end, and the 801s roll-off pretty drastically below 40. There's stuff going on down there, especially outside noise, that we'd like to hear, so we need a speaker system with a wide frequency response which is accurate musically, and which doesn't screech at you constantly while you listen to it.

"It is hard to get something that is detailed enough in the mid range and high end that you can hear noise problems, and you hear enough detail and yet you have a nice sense of musical balance as well: low enough, deep enough, tight enough, great power handling capability.

"I learnt early on that when we started making recordings with extremely wide dynamic range and LF response, I absolutely had to have a monitor system that told me everything about what was on that tape. You can't get halfway through a session and have the orchestra playing full out with percussion and everything and start hearing distortion and overload and wonder whether it's your monitor system that's breaking up or your tape recorder, or microphone. I had to eliminate the monitor system and just started working toward the system we use in the States, which has a very, very wide range. The 801 is OK but you can turn it off; you can push it too hard and it's automatic shutoff. It comes close and I think the Matrix line may ultimately make it but there just isn't a big enough monitor there at the moment. For amps, we have been sold for years on the Thresholds. I think they are the most musically accurate solid state amps made."

Renner overcomes some of the problems of having to set up control room environments in odd rooms at the various church and concert halls by carting acoustical materials around with him. These include *Sonex* foam, *Soundex* panels and *Tube Traps*-tall cylinders that kill standing waves.

"Everywhere I go, even if I have worked there before, I measure and record exactly what I use, where it was placed and how, so that I at least have a basis and you begin to see a common thread through all this. Even if something has changed in the room or the hall when you come back you can start where you left off and save a lot of time.

"I spend quite a lot of time setting up the control room. I take to every location a CD of the *Firebird* recording we did in Atlanta. It has everything I need to know that'll tell me how a room is reacting to a system. The *Firebird* has certain passages where I can tell immediately if I've got LF boost because there are bassoon solos, horn solos, and if they take on a big plummy spread I know immediately that I've got to start moving speakers around.

"Even if you can't get that system placed in the room so that it's totally ideal, I have at least listened to enough music in there of recordings I am familiar with to know whether there are still problems."

Renner emphasises the fact that Telarc sessions produce a 2-track stereo master: "There's no mixing, balancing, equalising or anything. The only thing that'll happen to that tape once it goes back to Cleveland is that it will go through the editor. It's the time and the care that we take in getting ready and preparing for sessions that really makes the difference."

A typical microphone setup will consist of three spaced omnis which, according to Renner,

has met with mixed critical review in the UK: "In the UK they seem to be very much in favour of



a Blumlein or crossed fig-of-eight coincident approach for classical recording. I don't happen to like that. I like three spaced omnis—small diaphragm, single diaphragm omnidirectionals—because they have much wider frequency response, much better dynamic range and they tend to be quieter for some reason. Those microphones will take a lot of signal level before they collapse and there is no way, with a coincident system, that you get the sense of space and bigness of the listening experience that you do with spaced omnis.

"There is no way that you get the extended low frequency response without actually putting it in artificially; you have to EQ that bottom in if you use a coincident system, expecially figeights, or some people like these hypercardioids.

"To me a coincident recording, whereas it is perfectly in phase, has everything right from a purely technical standpoint but everything is too pinpointed and located in the sound picture. With spaced omnis the way I use them I feel I've worked out a technique whereby the imaging of what we're recording is pretty well locked in."

Microphone placement is basically in front of the orchestra: "It's very important to have that centre microphone. In the vinyl LP days it was extremely important to control the LF phase situation, because one thing you get with spaced omnis is a hole in the middle. Most of the percussion is placed pretty much dead centre, especially the bass drum—right dead centre facing toward the front rather than side to side where you get wave fronts going in both directions and having a lot of cancellation and problems like that. The centre mic allows you to control that phase and, especially when we were cutting LPs, it allowed you to keep that bass drum absolutely locked in the centre so you had little or no chance of head lift when you were cutting.

"It's important to pull that wide, what would be an exaggerated sense of stereo together. The centre mic would run 4 to 6 dB down below the other two and the others, depending on the width of the group, are spaced accordingly, depending on the acoustic: anything from 6 to 10 ft back, 3 to 3.5 m in the air.



"For our first seven years of digital recordings we used the older Schoeps MK2s. Then I bought some MK3 capsules, which have an extremely rising high end; I tended to use that in a diffused soundfield. But I still hadn't found my ideal mic and started a dialogue with the designer at Schoeps."

Out of these conversations came the new MK2 and MK2S. "The B&K mics have been very useful but they are a totally different microphone than Schoeps, being almost a pure omni. The last two Beethoven concertos that we did in Boston I did with just two B&K microphones—people mostly put up more mics for a piano and full orchestra than that but it worked phenomenally.

"But as with any mic, these mics don't work beautifully in every hall. It seems the more reverberant and bright sounding the hall the less successful they are. It's probably because they are the closest to being a true omni and you can put them in any position. They are slightly directional, that's another reason I insist on a small diaphragm omni. Most of them become directional above 3 kHz so they're not a pure omni. B&Ks have a specially tiny capsule with very little directionality at all. There is some but it starts around 10 k.

"I did *Messiah* with just two B&K microphones placed slightly into the string section rather than out of the group so that I could reach the chorus that was behind the orchestra as well. It turned out beautifully and you would never know that some of the string players were behind the microphone because of the polar pattern of the mics.

"What happens in a very bright reverberant hall, because they are so omni, you will tend to get a lot of the room coming back into the microphone, which you wouldn't get even with the Schoeps or the Sennheisers.

"Now the new Sennheisers have come along, a sort of cross between the Schoeps and B&Ks. Pretty much the polar pattern characteristics of the Schoeps but tending to have slightly more detail like the B&Ks. But even they aren't perfect in every situation. There is no ideal mic. If I had to go to a desert island with only one kind of mic it would probably be the Schoeps linear capsule. You can do an awful lot with those and they will never let you down, You'll always come out with a recording that is perfectly acceptable."

On the topic of digital recording systems, although using the Sony 1610/30 systems, Renner is still in search of his ultimate dream and in this respect has recently taken delivery of the new *Colossus* system from By The Numbers. Brad Miller of that company contracted Lou Dorren, a designer in Silicon Valley, to design a 4-channel digital processor that could be battery powered to facilitate his hobby of recording steam railway engines! Telarc field tested it for live music rather than babbling brooks and crashing oceans, steam engines and aeroplanes.

"We were absolutely stunned by the quality. Dorren hasn't done anything radically different; he's got some proprietary circuits and approaches to encoding the information, and yet it mates up with a VCR or a professional video machine—anything you want to plug into, it will be happy with. It is slightly larger than an F1 and its deck together, but the quality is phenomenal. It has such amazing resolution to the sound. The tone centre of the instruments is unlike anything I have ever heard—very much like the Soundstream, except better.

"In order for us to accept it, it absolutely had to have a standards converter that would allow it to be converted to the 1610/30 format because we have to deliver CD masters in that format; if we had had to copy it to analogue to the Sony system why bother? He discovered that Harmonia Mundi's converter for F1s, etc, to talk to the 1610s and 30s and back, had everything he needed, just had to change one chip."

Experience with Soundstream had shown that even though a recording is transferred to the Sony format for mastering it retains the basic character of the sound of the system on which it was originally recorded.

"The whole secret is first of all what the A/D sounds like; this is where your sound is being tailored initially, that's the first circuit the signal goes through; if that's not right, what comes out the other side is going to be bad."

What next? Whether the *Colossus* is here to stay or not, whether R-DAT takes over from CD or not, Telarc intends to stay at the forefront of our advancing digital technology and its application.  $\Box$ 

80 Studio Sound, September 1987



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mastering facility in New York

so goes the slogan of the New York mastering facility, Masterdisk, and with often as much as 42% of the *Billboard* charts being their customers' which would seem to be an acceptable criterion. Indeed, at one stage the list read like a gathering of the *Who's Who* of the rock world with the likes of Roger Daltrey, Dire Straits, Rush, ZZ Top, Sting, Huey Lewis and the News and Simple Minds.

Accounting for 40% of the 42% is Masterdisk chief engineer/vice-president Bob Ludwig, who exudes the qualities needed in a mastering engineer—be cool, calm and collected!

Bob comes from a musical background and has a Masters degree in musical literature from the Eastman School of Music. He has also played lead trumpet in various bands and orchestras.

"I remember Phil Ramone coming to do a lecture in 1968 and that really decided me to go into the world of recording. Since then you could almost say that Phil has been my mentor."

The first foray into the world of professional audio was as a staff announcer for a classical FM station "which also enabled me to do a bit of composing on the side". However, the contract with Phil Ramone bore fruit and Bob Ludwig went on to join him at A&R Records "and for the next one and a half years I learned disc cutting". This also had the effect of expanding A&R's cutting business and the studio was one of the first to have a Neumann VMS 66 ("The first computer-controlled lathe") with an SX-15 cutter head.

"Around 1969 Neumann introduced the SX-68, which was the first stereo cutter head that you could call flat with sufficient level. However, the management of A&R did not think that this would be a worthwhile investment and, needless to say, caused a serious difference of opinion!

"As things worked out, Sterling Sound were just opening up the same year and they were implementing the new Neumann equipment—they also had a vacancy for a cutting engineer!"

During the next seven years Bob worked his way up to become vice-president of Sterling Sound as well as working with Sly and the Family Stone and The Band among others.

In 1976 Mercury Records sold their cutting room to Sterling Sound. The facility was given an injection of capital and renamed Masterdisk with Bob Ludwig at the helm. Though pretty much his own boss, business reasons made Ludwig leave Sterling Sound and Masterdisk became a separate entity with himself as vice-president and chief engineer. At the time of our interview, however, he was "working on becoming an owner".



Bob Ludwig in his mastering suite

Masterdisk are situated on the fifth floor of a building between Broadway and 9th and thus enjoy quite a central position in New York. The premises themselves are open and airy with more than ample lounge areas for seating clients who are waiting for either their turn or the results, while the numerous platinum, gold and silver records on the walls attest to the success of the studios.

Masterdisk feature three cutting rooms together with a fourth room that houses the DMM lathe installed last year. The DMM can be fed from any of the three rooms via tie lines as well as be remotely controlled.

Each room 'belongs' to each of the engineers at Masterdisk (and is suitably furnished according to individual taste) with Bob's room being shared with Alan Moy, "who does the night shift", and hails from Canada. The other two engineers at Masterdisk are also Canadian: Howie Weinberg who counts The Clash, Aerosmith, Tom Waits, David Lee Roth and The Power Station among his clients; and Bill Kipper who specialises in classical work. With three Canadians in-house, it is of no surprise to learn that many releases for the home country are cut at Masterdisk.

Other staff include Scott Hill for transfer and computer work and mastering engineer Tony Dawsey.

All three cutting rooms are similarly equipped, the only real differences being in the outward cosmetics and the fact that Bob's room has two lathes to the other's one, so the description of the 'boss's' premises will give a good overall indication of the others.

The two lathes are Neumann VMS 70s, driven by a Zumaudio computer with the latest software. "John Bittner did the design for the Zuma and I was able to give him a lot of input as to the facilities we required. It has all worked out very well and we are very pleased with the results. It gives us very precise—as well as optimum—control over depth and groove distance when cutting." The cutting heads are driven by Neumann SAL-74B amplifiers.

Recorders are two Studer A80 ( $\frac{1}{2}$  in and  $\frac{1}{4}$  in) mastering machines, one in preview version so the computer always knows what is coming up a second in advance (these have had several inhouse modifications including replaced transformers); a Mitsubishi X-80 digital 2-track; Sony 1630; Audio+Design 701 professional version; plus Sony U-matic and Tascam 122 cassette recorder.

The mastering console has been custom built and features two Sontec *MES 430B* stereo parametric equalisers, four Neumann equalisers that have been modified to have controls in 1 dB steps "for repeatability", two Neumann high pass/low pass filter modules, two *RV 75* stereo attenuator modules calibrated in ½ dB steps ("again for precise repeatability"), four NTP *179-20* compressor/limiters and NTP phasescope. The main metering consists of Neumann *J645V* plasma displays and *U479* phase meters.

The console features a large patchbay for fast setup of the configuration of equipment required and gives access to such outboard equipment as Dolby, Aphex Compellor and Type II Exciter, Pultecs, Lexicon PCM 60 and whatever else may have been brought in. The outboard rack also features its own effects mixer rather than returns on the console.

At first glance the acoustic treatment of the room looks deceptively simple—acoustic tiles on the ceiling, moquette, etc—but in fact a lot of thought and experimentation has gone into making the room sound right.

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# MASTERING AT MASTERDISK

"I feel that mastering rooms should resemble living room conditions," said Bob Ludwig. "After all, that's where music is listened to most of the time. This is why we have gone for what I call a 'living room feel'—no dropped ceiling or anything like that.

"As far as the actual acoustics are concerned, I took a leaf out of Phil Ramone's book and had them designed around the speakers so that the monitors would not be fighting the room. Though things may look haphazard, everything has been put in its place after much trial and error—for instance, it took us half an hour to locate the right place on the wall for that picture!"

Monitoring consists of a choice of six types of speaker. The main system is 3-way comprising modified Altec A19s with corner reflectors behind the enclosures. These feature Mark Levinson crossovers, Sequera Pyramid ribbon tweeters crossing over at 8 kHz (and extending up into the stratosphere!) and a Hartley 24 in subwoofer with an 11 cps resonance. "The ribbon tweeter gives a very open sound for the highs with no colouration—they let the sound breathe." Power is provided by HH M900 MOSFET power amplifiers ( $2\times400$  W). Also on hand are Canadian-made Times 1 power amplifiers that feature an impressive slew rate of 160 V/ $\mu$ s.

"You need to spend a lot of time in choosing speaker systems. A/B tests are all very well but you have to bear in mind that different speakers can influence an amplifier in different ways, and this has to be taken into account."

Secondary monitoring consists of NS-10s ("Not my favourites, but we have them for producers so they can re-hear the sound they think they had"), AR-18s, Auratones, Visonik David 9000s and "the new range" Fourier B 2-way speakers.

Bob Ludwig also had a word of warning for those who have lots of speakers in the same room. "Passive cones should not face into the room as they can act as traps. The rule is: when the speakers are not in use, turn the amp off."

The transfer room features a Studer A80 4-track recorder ("we often use this for music videos") with all the variations, an A80 master recorder, B67 recorders for editing, a rack of Tascam 122 cassette recorders ("they do a good job and are reasonably priced"), Sony digital editor, the Mitsubishi X-80 when it is required, Sony 501 processor (specially modified) and a Harmonia Mundi BW102 digital audio signal processor and interface. "The Harmonia Mundi has proved an invaluable tool in preparing CD masters on 1610/1630 from F1 recordings, though it is an allround tool as well. We are very pleased with it."

A new addition to Masterdisk was the installation in 1986 of a *DMM* lathe. Previously Bob Ludwig was not enthused by *DMM*: "I felt the sound was too hard and the bass very inaccurate. However, feedback from other users in the field brought about some modifications to the system and I can wholeheartedly recommend it now. Certainly if I was a producer, I would have all my records cut on *DMM*."

Briefly, the *Direct Metal Mastering* process stems from the research done on the Teldec videodisc in the late '60s. Though some of the suspension bearings for the cutter head come out of NASA! The Neumann lathe uses a diamond stylus to cut the copper plates, enabling negative stampers to be made directly, thus bypassing several stages used in the normal mastering process and improving audio quality. In fact, each disc has to be measured for noise performance before the *DMM* logo can be used.

Other advantages stem from storage possibilities. Whereas uncut lacquers can be kept for a long period of time, once they have been cut they have to be sent through the spraying process



Transfer room

fast before groove echo and other nasties start setting in (good news for express postal services). The copper plates, on the other hand, have to be stored at  $-10^{\circ}$  F to avoid crystallisation (and going green), however, once cut they are treated in a passivation unit and this keeps the disc in pristine condition.

Bob Ludwig gave some thoughts on the various aspects of mastering.

"I feel very fortunate to be able to do this jobto come in at the end of a project and put the final touch. Especially as I am able to pick and choose a bit now and just work with the cream of the crop!

"Mastering is the last creative step in the recording chain. The point is to get as much musically out of the performance as possible and sometimes this requires a lot of what I call 'executive engineering'. However, I must say that I am delighted when I can just cut flat! I feel that I know what it is to produce a record and you have to be involved in the project. After all, people have spent a lot of time and money on doing a recording and they are usually looking to you to make that recording a reality.

"We are lucky that we often get artists who come here to get involved in the final stages and this helps creativity all round.

"With classical music the master tapes are usually very good and hardly ever need much attention. With jazz more work is usually required as the recordings in the majority are pretty low budget and have to be done quickly. Rock and pop varies from the very little to a great deal: the fact that it's often totally fabricated in the studio and overdubbed into infinity means that there can be a lot to do."

Bob touched on some of the problems raised by the practice of freelance engineering.

"House engineers usually know their studios—or they should do—and are accustomed to getting the right sound. With the widespread use of freelance engineers now, I find that we get many tapes that need a lot of work on equalisation, balance and general cleaning up over the frequency range, due to the fact that they have been working in rooms that they are not completely familiar with and that may have their own set of problems. For instance, I have noted that productions mixed in control rooms with dropped ceilings are often lacking in reverberation.

"In these cases it is a question of working with the producer to select the best mixes and agreeing on the best way to process the masters for cutting. On average you could say that 95% of the modifications are artistic and 5% for the benefit of the final medium, ie: record, CD, cassette, etc." Did Bob often find himself in situations where

opinions differed?

"There are times when tastes clash but these are rare. What can happen is that you can find yourself caught between the record company and the producer—then it can be interesting—although brick wall situations are very few and far between.

"I think people are far more aware today of the importance of the mastering process and that people like us are there to help and not to ruin the artist's work! We had Malcolm Young (of AC/DC) literally come over on a day trip with Concorde at one time just to ask my opinion on a tape! There's flattery for you.

"One problem that does subsist is that record company executives are not always aware of the technical side of things and we have had cases where a group has spent six months in the studio and is ready with the final masters and the record company want it cut by 8 o'clock that

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## MASTERING A F R

night and not a minute later. It's as if someone has looked at his desk diary and seen 'album due today' and started chasing it up!" (In fact this interview was being conducted while one side of an album was being cut and a final remix being done for a number on the other side with the courier waiting at the studio.)

We talked about some more of the technical

aspects of mastering.

"One thing that people still can't see seem to get right is level, be it analogue or digital. We did a Rush album recently that had been mixed at Sarm and for some reason had to be edited elsewhere. The studio promptly raised the level by 4 dB, which caused far too much clipping (and this is by no means an isolated situation) and thus a lack of definition. Geddy Lee is a friend of ours and when he called us to ask if we could



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"With analogue you do have a bit more leeway and using tape saturation for rock can be artistic, however, this does not mean oversaturation! We had to re-master some of the early Journey albums and the needle was literally glued to the endstop. Another negative point is that the tapes appear to self-erase after a time above 10 kHz, meaning that you lose all the sparkle.

'We get tapes coming in in every possible format, from cassette to digital, though I don't really recommend the former as a mastering source! Classical music is now nearly all digital with pop being a mixed bag of analogue/digital. We still get some 1/2 in 30 ips stuff which is nice because you can get more apparent level, especially if there is just a touch of tape saturation."

Does Bob have any personal preferences concerning digital vs analogue?

"There is really no hard and fast rule on digital versus analogue. As a general rule one could say that things sound better in digital while analogue retains what I would call a better musicality overall. However, this can sometimes be the other way around. We often get masters in both formats and it's up to us and the producer to choose whichever we think sounds best. Some things, such as rock and roll, often sound better dirty.'

On cutting: "I like it clean from beginning to end. Some cutters in New York have it loud at the start of the record and soft at the end. The final decision is up to the producer, of course, but when I can, I maintain a constant reference level.

Though the technology has advanced a lot, there are still basic practices that have to be observed, such as careful inspection of the discs. After the Zuma was installed we still had to measure the resonance of the cutterhead suspension and take it into account-the computer can't! Even if everything looks OK, you still can't totally trust it.

"I consider four hours the minimum to master a record-under perfect circumstances-and the more you do to ensure that everything runs smoothly the better. At the end of the day, the equipment is still only a tool doing a job and it's how you use it that defines what the end result will he.'

On processing: "As you can see, there are two sets of processing modules: one for the current track and one for the next. This way I can prepare each track individually and not make compromises. Everything is very closely calibrated, which means I can repeat settings with confidence.

In order to aid flexibility, Bob has built up a file card system with settings for gain control, EQ, etc, which enables him to get a base reference very quickly: "For instance, if I have a tape in from John Doe productions the chances are that it will need a certain basic setting and then we can get into the artistic considerations!"

Recent trends at Masterdisk (see One to One, February 1987) show that ½ in mastering at 30 in/s and no noise reduction is by far the front runner with 1610/1630 trailing quite a way back in second place. This would indicate that digital now has its place, especially for classical, but is still a long way from becoming king. However, one significant change is that the production copies are now nearly always on 1630 cassettes, thus taking advantage of the superior storage qualities of digital.

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# EUROPE'S NUMBER ONE DIGITAL HIRE C?

erard Hali, former studio manager of EMI Studios in the Netherlands, is a well known man in the Dutch recording industry. When talking about the Bovema Studio, as the studios were called before, Hali is the man to talk to. For the AES Netherlands section he is the wild card, to be used whenever there is a shortage of subjects for meetings. He can talk for hours on subjects of the past-over 30 years of experience, from the 2-track vacuum-tubes to 24-track, guarantees that.

"A studio is there to serve the artist," he says, "and not the other way around. The musicians, on the other hand, must realise that even the best technician cannot make bad music sound like good music. That part really has to come from the other side of the glass. And that is a good thing too; running the

## **EMI STUDIOS** Hans Beekhuyzen visits a two-

## studio facility in the Netherlands

studio takes up enough of our time and energy. It really takes a lot of working hours to keep the equipment as reliable as possible. Every morning at 8.00 the maintenance crew enter the studio and switch on all equipment. After the machines are warmed up, each one is checked so that when the recording engineer comes in, the equipment is ready to go. Of course there is a malfunction report system and at least one engineer is available on short notice at all times. Another important matter concerns levels. A good studio should have uniform levels throughout the system. This prevents problems with noise and overload conditions when working under pressure."

Hali, on the new breed of low budget studios that pop up like tulips in spring: "It is stunning to see how these people work, and I am not referring to the equipment alone. A good engineer is able to make a fair recording on low budget equipment. But then the equipment has to be maintained properly. Most low budget studios have no maintenance engineer, nor a maintenance contract with the equipment supplier. The equipment is only checked when it breaks down—a large risk for the musician and the studio owner. Not only does it give agony when the machine really breaks down, it also increases the chance that equipment will not perform to standard. The same goes for the levels; more often than not the equipment is hooked up 'with cables that fit'. No concern is given to level matching or even grounding. It is amazing to see these people work around the clock in such an environment to make a living."

About recording engineers, Hali has some definite ideas: firstly, he has to have 'good ears' and must be interested in all kinds of music, especially in the sound of the different kinds of music. Furthermore, he must be willing to work at inconvenient times and must be healthy to withstand irregular working times. He must be a good host, a police officer and administrator. Last but not least, he must have consideration for his colleagues. When he has been working until 3am he still has to make sure that his colleagues will find nothing but a clean studio the next day. Hali realises that there are few of these around and jokes about another quality: a sound engineer might better be unmarried, which saves divorce costs.

EMI Studios recently replaced the vintage EMI Neve console in Studio One with an SSL 4000. Jacques Delemarre, studio manager: "The old EMI console was extremely large. We had rented a huge truck to move it. When it was only just loaded, a tiny lorry came in and the driver announced that he had the new console in his car. We were all looking at the tiny car, unable to understand how our new console could have fitted in."

The 'small' SSL was chosen for a number of reasons. One is SSL's perfect marketing job—many producers nowadays insist on SSL. But this should not be over-emphasised, according to Hali, the other reasons really are more important. For a large organisation like EMI, it is important to have similar facilities in all locations. Consoles vary from brand to brand so EMI had to decide on a more or less standard console. At first they had chosen Neve but problems with servicing and parts supply forced the decision. Another important feature was the *Total Recall* function. Hali: "Some people comment on the manual adjustment one has to make with *Total Recall*. They think it



Studio One front piano trap and guitar booth, the drum booth is on the other side



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takes hours but in reality it only takes 10 minutes to re-adjust all controls. Most of the time it is not necessary to re-adjust them all. That is where the new scanning function becomes very handy, it scans for controls that need adjustment." The EMI sound engineers like the console for its open sound and absence of noise.

There are two studios in the EMI facility. Studio One is the largest, measuring  $15\times8\times5$  m. The control room houses the new SSL 4000E, a Studer A-80 24-track, a Sony/RTW PCM processor with U-matic tape machine, Lexicon 224X and Yamaha REV7 reverbs, AMS and Eventide pitch shifters and delays, a Roland SBX-80 sync box, Drawmer gates, Orban de-essers, Klark-Teknik analyser and equalisers, and UREI compressors. The monitor system comprises Eastlake, Yamaha NS-10 and NS-100 and Auratone 5C loudspeakers, powered by JK Acoustics power

# EMI STUDIOS

amps. The studio itself was rather large in the old days but it has been divided into two rooms and two booths. The remote room is rather live and is designed for strings, 'British' drum sound, etc. The room, close to the control room, is less live and more like an average studio room. The rooms are separated by two booths and a glass door.

The drum booth is very dry; the other booth is used for vocals, etc. The windows are covered with Laxan, a special plastic normally used as burglar protection. Laxan renders the glass virtually indestructible, acoustically almost dead, which is good for isolation.

Studio Two is smaller measuring  $4.5 \times 8 \times 3$  m. The recording equipment, with the exception of the Barth/Telefunken console, is similar to that in Studio One but the ancillary equipment is more basic: Orban equalisers, Kepex gates, *Gain Brain* compressor/limiters and EMT filter limiters.

Studio Two is very popular because of the atmosphere—it is a perfect working environment. Studio One is more clinical because of its size. Hali: "That indeed is a very important feature of Studio Two. I always say: we should record the music in a way that every consumer thinks it is recorded specially for him. Of course, this is far more difficult when you commit yourself to multitrack production work. A good, intimate studio atmosphere can improve a lot there, just like good equipment and even catering."

EMI Studios also have an in-house cutting room, an important feature according to the EMI people: "The wishes in the studio and the restrictions of the cutting techniques can conflict from time to time. In classical music the basses are usually placed on the right side but when cutting records we prefer to have the low end in the middle. Menuhin has agreed to that but most conductors don't. With pop music nowadays worse things can happen, and it proves handy if the cutting engineer is available to be consulted." The cutting room houses a Neumann VMS 70 lathe with Neumann SX 74 cutting head, a Neumann SAL 74 amplifier, a custom built EMI console and JBL 4310 monitoring. DMM cutting (EMI is licensee) is not done in Heemstede but in the German plant.

Gerard Hali retired on January 15th. Jacques Delemarre has now taken over and will continue to bring EMI Studios back to the leading position they had some years ago. Bovema Studio was the first real studio in the Netherlands, up till then all recording was done on location. They were the first to have 4-track, 8-track and 16-track and the first with 24-track machines. When there was a turnround in the industry, however, EMI Studios declined somewhat although now they are recovering, the SSL being the proof of it. Furthermore, they claim to fulfil any needs. Digital multitrack machines are available to order, as is all necessary ancillary equipment and musical instruments. Human needs are regarded important too. Delemarre: "The only thing the artist and producer should take care of is the music, all other things can be taken care of by our staff. The beach is only 10 minutes away, Amsterdam and Schiphol Airport only 15 minutes. Even if they would like to have a Chinese meal in Japan..." But then again, Holland is famous for its Chinese restaurants.

EMI Studios, Bronsteeweg 49, Postbus 139, 2100 AC Heemstede, The Netherlands. Tel: 023-231500.

(Since this article was written EMI have closed the studio although it is hoped it will re-open shortly under new ownership.)



Studio One live area







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