

July 1988

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PREVIEW
APRS LONDON



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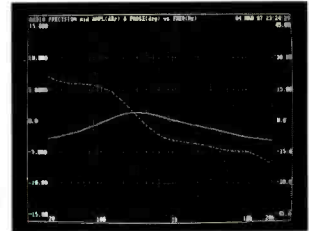
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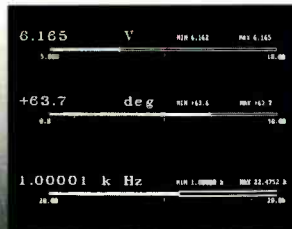
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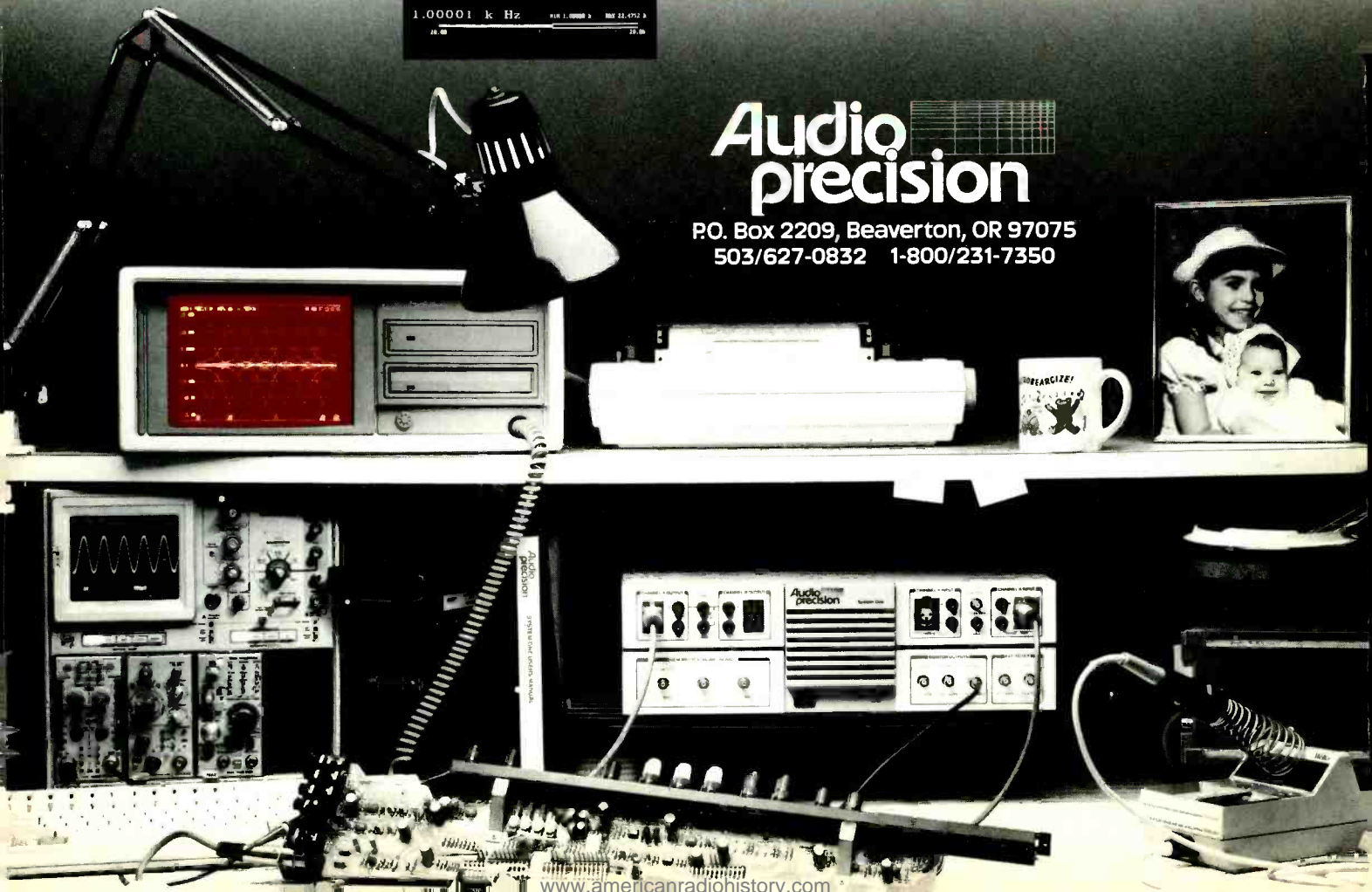


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EDITORIAL

The APRS exhibition, which this issue features heavily, is the first in a particularly intense international pro-audio exhibition calendar filling the second half of this year at the rate of over one a month. There will be many new products launched during these coming months and within the literature describing the new developments will be liberally sprinkled such terms as 'familiar user interface' and 'user friendly'—you are 'user familiar' with the terms I am referring to but do you really know what they mean?

They seem to make several assumptions—the first of which is that you wish to be familiar and friendly with a piece of electronic hardware! But facetiousness aside, terms such as this do suggest that the designer has a model for the potential user. It is with the general background and experience of the user that there may be discrepancies. So what is the experience of the end user and what is the point of this editorial?

When we talk of something being user friendly or having a good user interface it really means that you do not have to adapt your way of working too far to achieve the desired results. The equipment that the user interfaces with most are the mixing console and the processing gear. The mixing console is the main problem and there are far more similarities between consoles than differences between makes.

To this end almost all consoles have rotary controls, faders, rotary switches (even some toggle switches still), and a wide variety of similar hardware. In recent years we have seen the addition of QWERTY keyboards, nudge buttons, numeric keypads and alphanumeric readouts, etc. The first console, as far as I am aware, with QWERTY keyboard and VDU was the console that became the SSL 4000 when it was first shown about 10 years ago. I well remember the reaction—'If I wanted to watch TV I'd have stayed at home' and 'My accountant does all my sums'. Those commentators had even less idea about what to make of the computer. Of course, we know better now!

Many changes have occurred in studio equipment with interface design experimented with as the hardware became available. The studio equipment industry is rarely in a position where it can develop its own hardware components and has had to take the results of developments for the military, computer or consumer industries where unit volume and money are more closely allied. So we currently have equipment interfaces that are governed by the existing availability of the hardware and the degree of acceptance by the end user. We must add to this the gradual incorporation of a computer into just about every item of pro equipment around and the expressed needs of users for highly versatile software. And the stage is now set.

While pro-audio equipment manufacturers are required to tread slowly, everything else changes. Walk round any electrical store and see how many rotary knobs you can find on video recorders, CD players, microwaves, TVs, alarm clock/radios, electric cookers and so on. The idea that a rotary knob or display is somehow an instinctive indication seems to have been rejected in consumer circles. On a more basic level children are far more familiar with a numerical display of the time rather than an analogue display (with hands). They seem to feel quite comfortable with just numbers and find the traditional clockface largely redundant. At school computing subjects are an integral part of study and there is an almost instinctive acceptance of monitor screens, keyboards and control actions that are far more removed from the actual event itself than I feel happy with.

Video games also play a major role in training attitudes to computers and unusual control interfaces—joysticks, trackballs, multidirectional rocker controls, etc. So my argument is that user friendliness and the attractiveness depends on the experience of the user. We appear to have a rising new generation of users with quite different experiences and so what price our 'traditional interfaces' now?

What price indeed? If the pro-audio industry tries to hold out against these developments it may find it has to pay for it in financial terms when large scale users pull out of such components. Attempts to keep equipment costs down to a level that recording studios stand a chance of affording may mean that the knobs and switches will have to go due to the large part they play in overall costs. It looks very much as if equipment designed as we know it today and relate to will soon be under pressure for what looks like a formidable array of reasons: cost of the components, versatility of operation not possible from existing interfaces, redundancy of knobs in the increasing role of computerisation and perhaps more immediately the post-production industry.

At the recent NAB Convention there was a proliferation of audio control equipment from video manufacturers—multichannel digital mixers with 3-band parametric EQ, etc, that function in a way familiar to video people, ie screens and a joystick, and we have also seen the SSL/Quantel *HarrySound*. The film and video post people have far more money than the studio world and are therefore in a better position to influence future equipment than us.

From the manufacturers' point of view they have every incentive to stop trying to develop expensive hybrid control surfaces if their most monied customers are happier with full assignability or joysticks or whatever. Also they may see that in the near future there will be a new generation of studio engineers who are fully at home with this new interface approach and with none of our 'problems'. There is every indication that if it happens this way it will happen quickly once it starts. Look how musicians went from playing instruments to programming computers—in about four years!

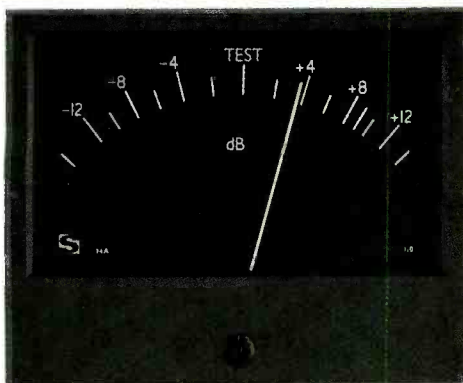
Of course I may be wrong. I could have misread the signs. Whatever you feel, it would be wise to consider the possibility and hope that you can learn to become 'user friendly' yourself to a new control interface—if you see yourself still working in 10 years time. Thank you and goodnight.

Keith Spencer-Allen

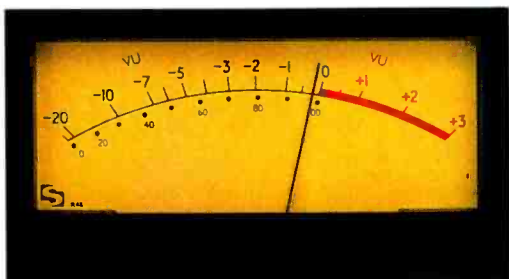
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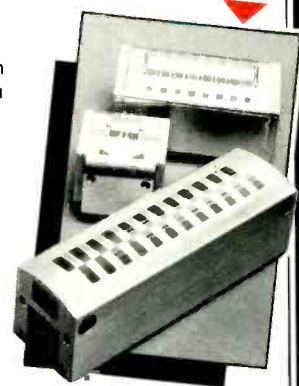


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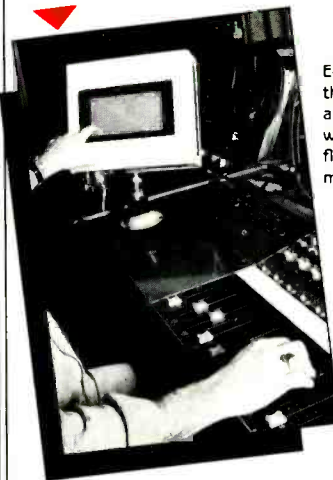


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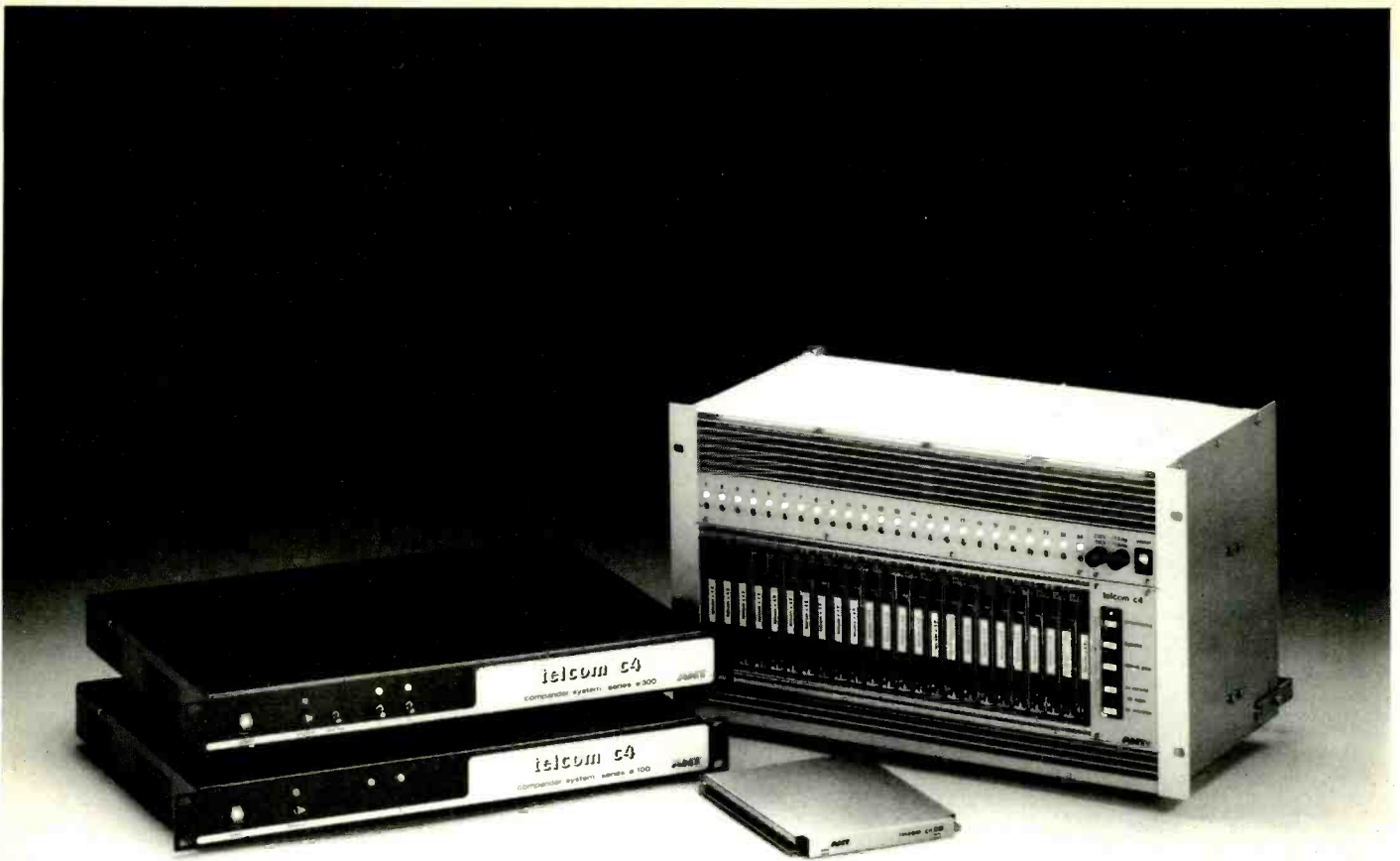


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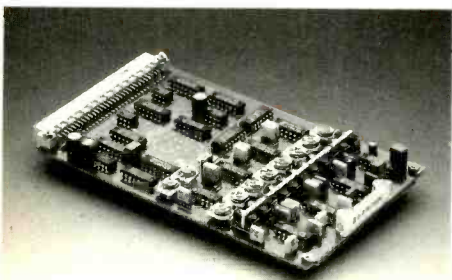
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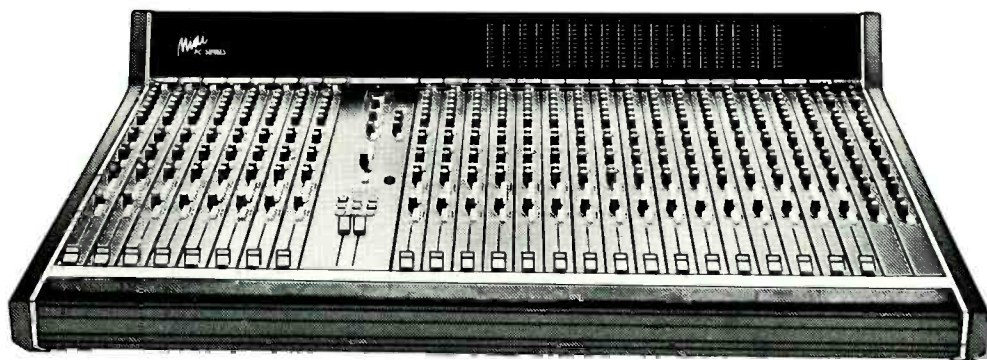
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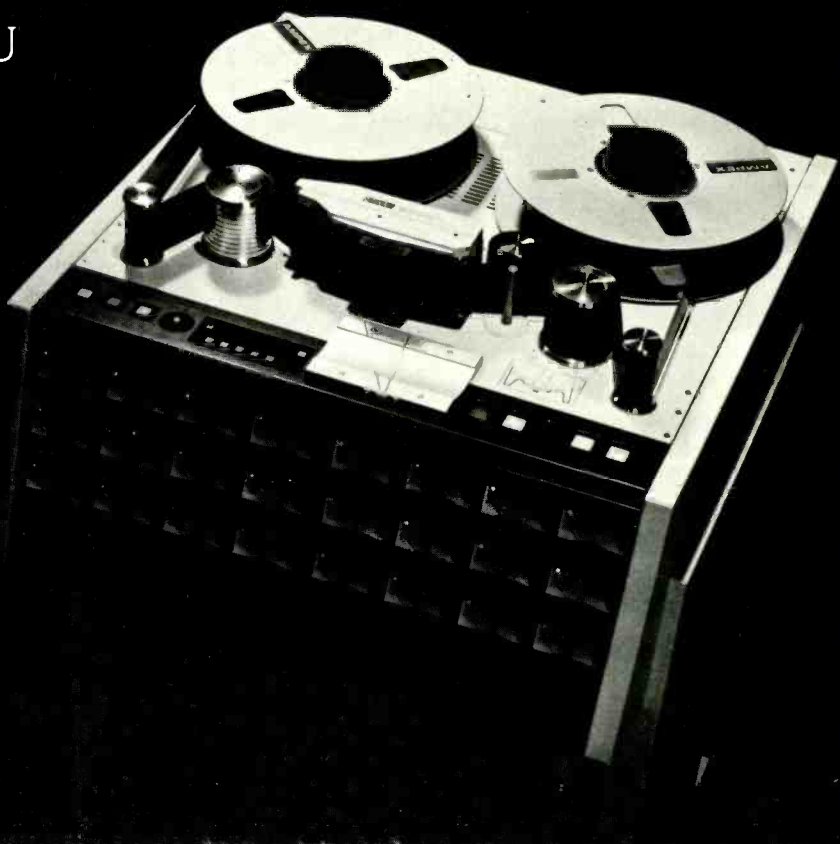
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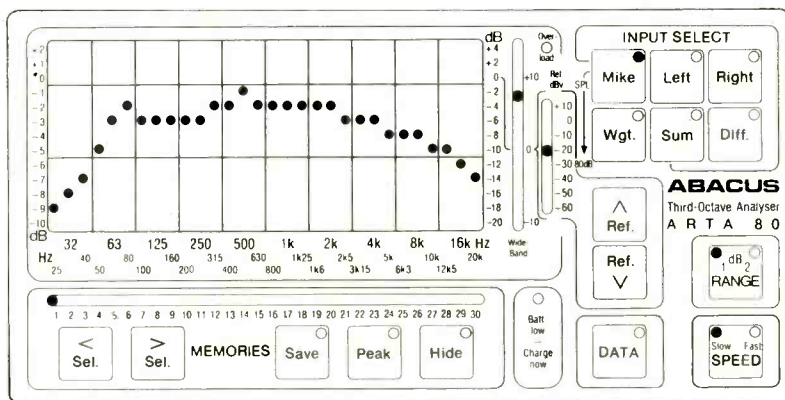
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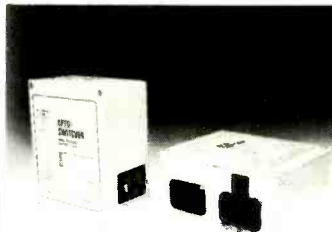
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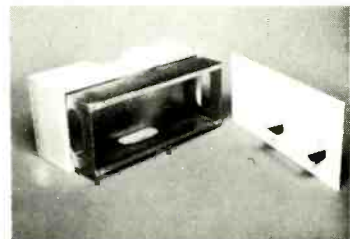


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NEWS

Address changes

- Acoustic design company **Lakeside Associates** have moved to 1540 East First Street, Suite 243, Santa Ana, CA 92701, USA. The new telephone number is (714) 836-6496.
- **Neve** have opened two new facilities in the USA. New York: 260 W 52nd Street, Suite 25E, New York, NY 10019. Tel: (212) 956-6464. Nashville: 1221 16th Avenue South, Nashville, TN 37212. Tel: (615) 329-9584.
- **Master Blaster**, loudspeaker

enclosure designers and manufacturers, have moved their production facilities to a new 2,000 m² factory. Master Blaster Europe, Nijverheidswig 13, PO Box 275, 3760 AG Soest, The Netherlands. Tel: 2155 20101. Fax: 2155 22806.

- **Canadian Instruments and Electronics** have opened new head office and warehouse premises at Blenheim Industrial Estate, Bulwell, Nottingham, UK.

Exhibitions and conventions

June 22nd to 24th APRS '88, Olympia 2, London, UK.
June 24th to 26th NAMM Expo, Georgia World Congress Center, Atlanta, GA, USA.
August 16th to 18th 3rd Regional AES Convention, Melbourne Hilton Hotel, Melbourne, Australia, Convention Chairman: Brian Horman. Tel: 03-329-0162. Fax: 03-328-1424.
September 8th to 12th 22nd SIM-HIFI-IVES, Milan Fair Pavilions, Milan, Italy.
September 23rd to 27th International Broadcasting Convention '88, Metropole Conference and Exhibition Centre, Brighton, UK.
September 29th to October 3rd International Broadcasting and Telecommunications Show, South Pavilion, Milan Trade Fair, Italy.
September 29th to October 3rd MITAS '88 Show of Technology, Equipment and Services for Entertainment (including discotheques, ballrooms, theatres, cinemas, congress centres and organisations), South Pavilion of the Milan Trade Fair, Italy.
September 29th to October 3rd MeM—Mediterranean Market (International Market of Audio/Video programmes and Services), South

Pavilion of the Milan Trade Fair, Italy.
September 30th to October 9th BBC Radio Show, Earls Court, London, UK.
October 11th to 13th Sound Broadcasting Equipment Show, Albany Hotel, Birmingham, UK. Admission by invitation. Contact: Point Promotions. Tel: 0734 583086.
November 3rd to 6th 85th AES Convention, Los Angeles Convention Center and Los Angeles Hilton, Los Angeles, CA, USA.

1989

February 21st to 22nd Sound '89, Heathrow Penta Hotel, London, UK. Contact: Sound & Communications Industries Federation, Slough, Berks. Tel: 06286 67633. Fax: 06286 65882.
March 7th to 10th 86th AES Convention, Congress Centre Hamburg (CCH), AM Dammtor, D-2000 Hamburg, West Germany.
April 28th to May 2nd NAB, Las Vegas, USA.
June 17th to 23rd ITS Montreux, Switzerland.

1990

March 30th to April 3rd NAB, Atlanta, USA.

Gateway re-opens

Following their move to Kingston Polytechnic, Gateway have now opened their new studio complex. Acoustically designed by Sandy Brown, the studio is octagonal with 50 ft diameter and is intended to accommodate large numbers of musicians.

The control room is equipped with Soundcraft *Saturn* 24-track recorder and *TS12* mixing console, a full

range of outboard gear, and microphones from Bruel & Kjaer and Electro-Voice.

Originally, the hall was intended for the use of musicians and staff from the School of Music at Kingston Polytechnic but the nature of the joint venture has freed the facility for commercial lettings. Gateway will also be continuing and expanding their range of courses.

Apogee filters incorporated

Sony Corporation have given approval for Apogee's 944 series filters to be retrofitted to the *PCM-3324*. The anti-aliasing/anti-imaging, lowpass filters eliminate the 'harsh clinical' sound usually associated with digitally recorded music. Sony say many customers have requested that the filters be

fitted to their *PCM-3324s* and have been working closely with Apogee to this end.

Fairlight have designed 944s into their new AES/EBU sampling card. The card is an upgrade for the existing sample input of the *Series III*.

APRS engineers course

The UK Association of Professional Recording Studios is to modify the format of its annual training course for studio engineers. The next course, during September, will comprise separate one-day modules with optional accommodation instead of a residential one-week programme. The content will also be changed to 'respond more accurately to what the APRS believe are the real current needs of the recording industry'.

Clive Green, chairman of the training and education committee, announcing the 'new look' said, "In recent years, studios found it increasingly hard to release staff for the full week of our course; also, the

need for training in just one or two specialisations seems to be more in demand—hence we are introducing more flexibility."

Modules available include: equipment synchronisation and MIDI; noise reduction systems; acoustics—studio, control room and instruments; video post-production; test equipment and its application in studio maintenance; recording techniques—classical and pop; final mastering for vinyl, cassette and CD.

For more information contact The Secretariat, APRS, 163A High Street, Rickmansworth WD3 1AY. Tel: 0923 772907. Fax: 0923 773079.

Rooftop at CBS

London studios CBS have recently opened their new Rooftop studio. The mixing console is an SSL *SL 6000 E* with *G* series options, MCI 24- and 2-track tape machines, *Boxer 4* and

JBL *4311* monitors, plus outboard equipment. The studio also houses a Yamaha *G3* grand piano. The facility was designed by Neil Grant of Discrete Research.

Courses and seminars

June 23rd to 24th Syn-Aud-Con, Toronto, Canada.
June 27th Institute of Acoustics one-day meeting 'More About Noise Control in Factory Buildings', University of Salford, Salford M5 4WT, UK.
June 28th to 29th Syn-Aud-Con, Syracuse, USA.
September 3rd to 9th APRS Engineers' Training Course,

University of Surrey, Guildford, UK. Contact: APRS Secretariat, Rickmansworth, Herts. Tel: 0923 772907. Fax: 0923 773079.
September 20th to 22nd Digital Processing of Signals in Communications, Institution of Electronic and Radio Engineers, Loughborough University of Technology, UK.

THE ADVANTAGES OF A STUDIO CONDENSER WITHOUT A SOUND OF ITS OWN



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For all of its virtues, the typical studio condenser imparts a definite character to any recording. These impositions are often considered inevitable technical imperfections: accepted, ignored or tolerated by audio engineers.

Characteristic anomalies of condenser performance such as exaggerated high end response or distortion have even been rationalized as compensation for the high frequency losses inherent in typical analog formats. Nowadays, however, they are increasingly viewed as unnecessary intrusions in critical analog and digital recording situations.

A Condenser For The Digital Era: The Difference is Nothing. The increased dynamic range of digital recording is perfectly complemented by the self-effacing nature of the MC 740. The microphone is virtually inaudible. No coloration, no self-noise — no sonic footprint, not even a fingerprint. All

five of its pickup patterns are equally uniform, identically transparent. We feel your prior experience with large diaphragm condensers will confirm this as a unique achievement.

An Atypical Approach To Condenser Sound. Beyer has never relied on conventional technical solutions. A manifestation of this kind of thinking, the MC 740 eliminates the icy, strident quality typical of most condensers to reproduce voices and instruments with warmth and intimacy. It's no coincidence that these are characteristics often ascribed to our ribbon microphones.

The MC 740's freedom from exaggerated sibilance or graininess and its greatly reduced distortion are immediately apparent to critical listeners. European and American engineers have already commented on the startling accuracy of the 740, and the way it reveals the subtle differences between instru-

ments and ambient environments.

Accuracy And Versatility Without Compromise. Uniform (< 2 dB: from actual machine specs, not just published specs) frequency response curves for all five polar patterns may seem a remarkable breakthrough. To Beyer, this is simply a design criterion for the microphone. Similarly, there is no contradiction in the fact that the 740 is exceptionally sensitive, yet also withstands extreme SPLs (up to 144 dB with the 10 dB attenuator in circuit).

Hear What You Could Be Missing. The MC 740's unconventional design offers a clear alternative. The best way to evaluate the difference the MC 740 can make is to work with it in your studio. To arrange a hands-on audition of this remarkable new audio instrument, contact your Beyer dealer or write us: beyerdynamic, Ltd., Unit 14, Cliffe Industrial Estate Lewes, Sussex BN86JL

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NEWS

Music companies call for better cassettes

Major European music companies—members of the Music Cassette Quality Committee of the German Phonographic Industry—have announced that they will be intensifying industry efforts to improve the quality of the audio cassette. The MCQC will seek the active involvement of leading hardware manufacturers and testing institutes to develop standards of evaluation and tolerances.

Research has already revealed the influence that the housing construction has on final sound quality and many customers underestimate the part construction

plays in the playback quality. According to the committee, the degree of azimuth deviation can also cause diminished sound quality and this can be reduced by using a welded housing instead of a screwed-type cassette.

“Improving the sound quality of the music cassette is important to the growth of the industry,” says Hanns-Diether Sommer of Polygram.

“Recorded cassette sales initially suffered in comparison to LPs because of cassette sound quality problems but have, after quality improvements in recent years, shown much growth.”

Queen's Awards

Mixing console manufacturers DDA have won the Queen's Award for Export Achievement for the second successive year. The company say increased US sales have contributed greatly to the growth and further potential is seen over the next 12 months.

The last year has seen expansion at DDA with a new factory and increased staffing levels with several key appointments. The product range continues to grow and expansion into new market areas is planned for the next year. Two new products are scheduled for launch at this year's APRS and healthy sales are reported for the DCM 232 launched at last year's exhibition.

Says managing director Gareth

Davies, “The last year has been a real milestone in DDA's history. The benefits of joining the Klark-Teknik group have really started to pay off. Access to KT's expertise and resources as well as the overall synergy of the liaison have helped us enormously in sustaining DDA's tremendous rate of growth.”

An Award for Export Achievement has also been won by Soundwave who manufacture the Trace Elliot line of bass guitar amplification. Soundwave began exporting in 1982 and since then increased business activities in Europe, the US and the Far East have seen export sales, which represented 30% of turnover in 1985, increase to 80% of all output in 1988.

IFPI news

EEC harmonisation of VAT: a joint declaration has been made by representative bodies of authors, composers, performers and the recording industry on the proposal to enforce the standard rate of VAT on sound recordings, currently between 14 and 20%. The BIEM, FIA, FIM and IFPI believe the reduced rate of

4 to 9% should be applied as sound recordings have the same cultural importance as books, newspapers and periodicals. A statement issued by the IFPI says, “Clearly, this discriminates against recorded music in material form and represents a considerable barrier to the circulation of cultural goods.”

AES news

• News this month of a future Lecture and a Technical Visit with a difference. On **Tuesday July 12th** Laurie Fincham, technical director, KEF Electronics Ltd will discuss the **Design of a Miniature Wideband Coincident-Source Loudspeaker for Psychoacoustic Investigations.**

A major psychoacoustic project to simulate the response of a loudspeaker in a room requires a number of loudspeakers of small size with very flat response over a wide bandwidth and symmetrical polar response.

KEF have designed a loudspeaker system to meet these requirements using new technology in a spherical enclosure of 280 mm diameter. A new coincident source is used in which the drive units are effectively both coaxial and coplanar.

Each system is driven by a 2-channel amplifier incorporating low-level active crossover network and drive-unit equalisation.

The lecture will present the background to the psychoacoustic simulation project, the design criteria for the new source, its construction, and measurements of its performance. This project has a bearing on future studio and

domestic loudspeaker designs.

The meeting will start at 7.00pm (coffee at 6.30) and will be held at the IBA, 70 Brompton Road, London SW3 1EY.

• Our next Technical Visit in **September** will be to **Solid State Logic** at their factory near Oxford. There will be a lecture on their new digital console and a tour of their facilities. More details next month.

• The AES publishes many books on audio related topics as well as Convention preprints, standards, etc. Two of our members have just written books: John Borwick *Loudspeaker and Headphone Handbook* and John Watkinson *The Art Of Digital Audio.*

• All the above will be available from the **AES stand** at the **APRS Exhibition**, June 22-24th, 1988.

There will also be information on future meetings, conferences and conventions and someone to talk to about membership. Come and see us.

• For details on any of the above or information on joining the AES, please contact: **Heather Lane, AES British Section, Lent Rise Road, Burnham, Slough SL1 7NY, UK. Tel: 06286 63725.**

Agencies

• The new range of **Klotz** pre-made microphone and loudspeaker cables is to be distributed in the UK by Beyer Dynamic.

• Live sound contractor **Master Blaster** of The Netherlands, have appointed v d Linden Audio as a theatre sound contractor for Holland. Also Klangfarbe Wien and Wim Verbiest Flitecar will represent Master Blaster's full range in Austria and Belgium respectively.

• **ADA** of Oakland, California, have appointed Kelsey Acoustics as UK agents for their range of signal processors.

• **Fairlight Instruments** of Australia have appointed Stirling Audio Systems as their sole UK distributor. A *Series III* will be on permanent demonstration at Stirling's London showroom and specialists will be on hand to answer customers' queries.

• **John Hornby Skewes** have re-introduced **Synsonics** drums to the UK. The drum is added to an acoustic drum kit to provide electronic drum sounds.

• **Selecta Sound** are now sole UK agents for **Seikisui Evercel No 28** polyester splicing tape. Selecta Sound, 5 Margaret Road, Romford, Essex RM2 5SH. Tel: 04024 53424.

• **Gexco**, New Jersey, USA, have been appointed worldwide distributors for **Audio/Digital Inc** digital signal processing equipment and for **Cipher Digital Inc**, manufacturer of timecode, audio

editing and synchronisation products.

• Following a deal concluded at the Paris AES show, **Rebis** are to be represented in Japan by Soundcraft.

• **Focusrite US** have been appointed exclusive North American representatives by **Quested Monitoring Systems.**

• **Apogee** of California have appointed a number of overseas distributors: Audio Equipment, Monza, Italy; Lydrommet AS, Oslo, Norway; Hilton Sound, Paris, France; Selectronic, Amstelveen, The Netherlands; AV-Craft and SCI, Tokyo, Japan; and Klotz, Munich, West Germany.

• New European distributors have been announced by US company **WaveFrame**: Syco Systems, UK; Spye Srl, Italy; Music-Land, France; Amptown Electroacoustic, West Germany; Synton, The Netherlands; and New Musik, Denmark.

• **Fairlight**, Australia, have announced the following distributorships: Naniwa Gakki and Studer Revox, Japan; Maser Broadcast, New Zealand; and Hong Kong-based Jenston International will distribute the *CVI* and represent Fairlight in China.

• **Digidesign** of California have appointed Evenlode Soundworks as their UK agents. Evenlode will also handle Turtle Beach Software's *SampleVision*, which is represented by Digidesign in the US.

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L88/043

NEWS

Digital audio, its past and its future

One of the invited papers at the AES Convention in Paris was given by Tom Stockham. He has been one of the pioneers of digital recording and is known for the invention of the *Soundstream* digital recording system (which some people still think has yet to be surpassed). Dr Stockham gave a brief history of his involvement with digital audio and gave the audience a few points to ponder, especially regarding the future of digital recording.

"With the development of the *Soundstream* in 1975/76, there were two main objectives—sound quality and archive permanence. Denon paved the way with their in-house productions of PCM classical recordings and the first *Soundstream* recordings were mainly operatic."

The problem of digital mixing was also addressed with an experimental mix of a Beach Boys stereo recording into mono. This caused the *Soundstream* to be developed into a 4-track machine with 50 kHz sampling rate/16 bit and over 500 albums were recorded between 1977 and 1983.

A feature of the *Soundstream* system was powerful error correction and tapeless editing that used 1M buffer RAM packs (which Dr Stockham called 'L-DAT'). From this, edit decision lists could be made and the final product produced.

Tom Stockham touched on the problem of archiving: "There is not too much going on in this area to ensure perfect digital archive masters and we have yet to see control systems that indicate error conditions. This is all the more surprising since the archive stock is the record company's most important asset.

"We still have a problem with digital copies: in fact this is a misnomer as in digital there should be no copies—they should all be the same. However, we now have the situation where after 14 passes there is noticeable degradation, which means that they are digitally different! The question now is—how?

"Looking into the situation with a piece of editing equipment that had automatic crossfade, we found that in

the neutral position the resolution was 255 for one side and 256 for the other (or 255 divided by 256). In digital 0=0 and even a very small gain can cause problems such as quantising differences. In working with digital we have to live with the amplitudes of the recording and not try to tamper with it once it has been recorded. Another problem area is in CD production where sampling rate conversion has to be used."

Looking to the future, Tom Stockham felt that digital recording standards should be upgraded to 18 bit or more using very high quality A/D converters. In the field of post-production the copying should be to the Hewlett-Packard format (big words) with all processing being done in this mode before returning to 18 bit for the final master.

"Playback conditions in the home should also not be ignored and hi-fi 'effects equipment' such as reverb, equalisation, etc, should be 16-bit with extended precision bits for processing. However, this is probably being too idealistic."

Looking further ahead, digital storage was considered: "How big a digital memory do we need for one hour of video?" One possible avenue may be the tunnelling electron microscope: this would be used to record the master with very high quality copies being duplicated from it. Data compression is also another possible area of investigation.

The lecture emphasised the fact that digital is still very much in the early stages of development and that there is still very much more to come.

Terry Nelson

Contracts

- UK architects and acoustic consultants **Sandy Brown Associates** and **David Whittle Associates**, the broadcast consultants, have announced their involvement in two projects in the Far East. They will advise the Ministry of Education in Thailand on the design and equipping of a new £8.8m educational TV and radio station in Bangkok and the Overseas Development Administration have appointed them consultants to advise Radio Republic Indonesia on the rebuilding of their studios in Jakarta.
- **Syigma Television**, Paris, France, have equipped their new post-production facility with the **Alpha Audio BOSS** automated audio editor. The computerised workstation was installed by DM2J and will be used for audio post-production of Syigma's video programme material.
- **HBO Studio Productions**, New York City, have ordered an **SSL SL 6000 E** series mixing console for a new audio post room currently under construction at the cable network's post-production centre in Manhattan. The 48-input frame is fitted with 32 I/O modules and is equipped with a **G series** fader automation system, **Total Recall**, programmable equaliser, bargraph metering and a multimachine timecode synchronisation system.
- **Genetic Studios** have re-entered the studio market following an extensive programme of re-equipping and upgrading. They have recently installed a **Mitsubishi X-850** 32-track digital recorder.
- **Mark Knopfler** and **Alan Clark** of **Dire Straits** have both purchased **Soundtracs PC24** consoles for their home studios.
- **Elliott Bros** are to rewire the Sound Control Room for the BBC at the All England Lawn Tennis and Croquet Club, Wimbledon. Upgraded cable and a new Krone distribution system will replace the old GPO tag blocks. The contract will be completed in time for the Wimbledon Open Tennis Championships in June.
- **Amek** are to supply a 48-input

Classic broadcast console with custom-designed remote patchbay to RPS (Recording Production Services), Nottingham, UK. The console will be installed in a new multi-camera OB vehicle.

Lynx Video have replaced their 8-channel mixing console with a 12-channel **Amek** as part of its continuing policy of redevelopment. The console joins a new **Questech Charisma 3D** effects machine and new **Sony BCE 9000** edit controller.

● **Rockfield Studios** in Monmouth, South Wales, have taken delivery of a **Neve 60-channel V series** mixing console as part of a major refurbishment programme.

● **Molinare** have ordered five **Studer A820** 8-track machines from UK agent **FWO Bauch** to add to their two 24-tracks recently delivered. Orders have also been received by **Bauch** from **Rockmasters**, **BBC**, **Aztek Productions**, **Trident Studios** and **Rockfield**.

● The **Music Works** have taken delivery of a second **Mitsubishi Westar** mixing console fitted with **PC** automation. The new 48-channel console is in operation in **Studio Two**. A 52-channel **Westar** was installed in the main studio last September.

● A 48-input **Neve 8108** console with **GML** moving fader automation has been installed at **Music Grinder** recording studio in Los Angeles. The studio has also recently acquired an **Eventide H3000 Super Harmonizer** and **tc Electronics 2290** sampler delay with sampling #2 and full memory.

● Seven **Soundcraft 200B** consoles have been supplied by **JBL** in the US: **The Arizona Nuclear Power Project**; **Syngam Productions**, **Pacific Palisades, CA**; **Future Media Corp**, **O'Kemos, MI**; **Backstreet Edit**, **New York City**; **The Christian Faith Centre**, **Seattle, WA**; the **First Presbyterian Church**, **Michigan City, IN**; and **Oregon State University**.

● **Scandinavian Soundcraft** installations include a sixth **TS24** console to **NRK**, the **Norwegian Broadcasting Corporation**, with **Audio Kinetics MasterMix** automation; and a 24-input, 24-frame



A Neve V series arrives at Rockfield in South Wales

TS12 to SEP Production, Sweden. The latter is a joint venture with Marian Music who have ordered a *Saturn* 24-track for their main studio.

- Three **Mitsubishi** mixing consoles have been ordered by Sounds Interchange, the Toronto-based post-production and music studios for TV and radio. A *Superstar* with 50 moving faders will go into Studio One, and custom *Westars* with *Compumix PC* automation will be installed in two of the remaining four rooms.

Also *X-850s* have been installed at McClear Place and Evolution Studios of Toronto, Canada.

- **ASC Tube Traps** have been fitted to the Effanel Music mobile, a 50 ft semi-trailer. This is the first major installation of *Tube Traps*.

- Cassette duplication plant Sonortape Nederland has taken delivery of a third **Lyrec Loopmaster P2509**. This is an expansion of their existing Lyrec duplicating line, which comprises two master and 15 twin slave units.

- **Wolverhampton-based Cable & Instruments** have won a 2-year contract from the BBC for the nationwide supply of test instruments.

- Recent **Otari** sales in the US include: Sunset Sound (*DTR-900*); Pantera Productions (*MTR-90/24* and two *MTR-12H*); Shrimp Boat Sound (*MX-80/24*); Broadcast Video (*MX-80/24*); Mirror Image Studios (*MX-80/32* with additional 24-track headstack); songwriter Paul David (*MTR-90/24*); radio station WSM (*MX70-8/16* and *MTR-10C*); MTM Music Group (*MX-70*); Manhattan Center Studios (*DTR-900* and *MX-80/24*); The Apollo Theater (*MTR-90 II* 24-track with autolocator, *MTR-12 II 1/2* inch 4-channel recorder, three *CTM-10* stereo cart machines, *MX5050B-II* and *MTR-20-T*); Sound One (six *MTR-90s*).

- The **Audio & Design SoundMaestro** digital recording and

editing system has been installed in October's End Studio in Reading and tam studio, London.

Initially tam will have software for recording, playback, sequencing and hard-editing, and later in the year packages will be supplied for soft-editing, CD preparation and 4-channel recording. The hardware will include an Ad-Mix and interfaces for *1610*, AES/EBU, *701* and R-DAT.

- **Soundcraft** has just installed the 100th *TS12* in-line recording console at Scotty's Sound Studio near Glasgow, Scotland, UK. This was supplied as a package with the *Saturn* multitrack.

- The Ministry of Culture of France (FEMIS) has acquired an automated **Harrison SeriesTen** for their Paris facilities. The console will be used for audio training in the cinema, video and music sound recording fields. The sale was conducted by 3M France.

- Danish **Amek** dealer AB Musik have won a contract to supply TV2 with two *Classic* broadcast production consoles and 10 *BCII* console systems. These will be put to use in the television company's new production and transmission centres in Copenhagen and Odense.

- Pacific Studios in London have taken delivery of a **Soundcraft Saturn** 24-track recorder to replace their Soundcraft 762. And a 24-track *Saturn* has been installed by Audio Equipment in Italian studio Al Capone to join their *TS12* consoles with FAME automation.

- **Acoustic Engineering Services** have recently completed a turnkey project at Twickenham Film Studios for their new Sound Centre. This comprises a dubbing theatre, ADR theatre and 31 cutting rooms.

Acoustic Engineering Services were responsible for the air conditioning and ventilation, electrics, noise and vibration control, plus the specialist fabrics, furnishings and carpets to the critical areas.



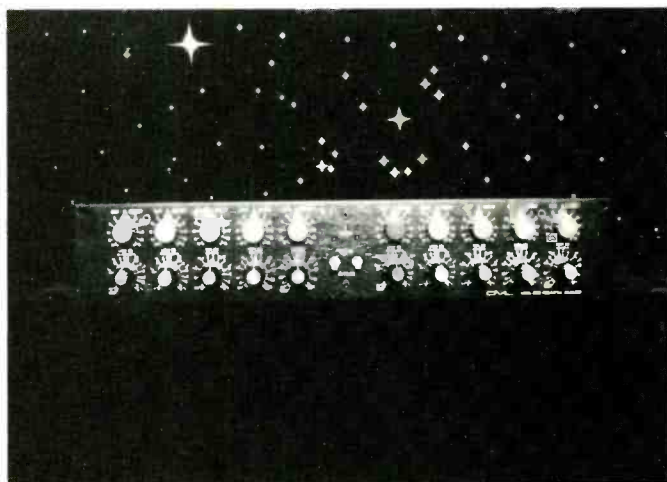
The Mitsubishi Westar at The Music Works, London

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GML

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B & K

Bruel and Kjaer's range of 4000 microphones now comprises four omni's and the new 4011 cardioid. The careful attention paid to optimising both on- and off-axis response results in a sound which is clean, transparent and well-balanced.

API

Renowned during previous decades for their "proportional Q" equalisers and mixing consoles, API has launched a new range of products built to the same specifications as the originals. Amongst the range is the 3124 mic/line pre-amp, 3124M mic/line mixer and 5502 two channel, 4 band equaliser as well as the famous 550A parametric and 560A 10 band graphic.

EAR

Esoteric Audio Research manufacture a range of valve products which includes the 822Q programme and 822MQ mid equalisers, based on Pultec's EQPIA and EQP3, and the 660 Limiting Amplifier based on the Fairchild 660. EAR's models benefit from transformer enhancements and improved signal-to-noise ratios without altering the character of the sound.

Syco: Conduit Pl. London W2 Tel: 01 724 2451 Tlx: 22278 Fax: 01-262 6081

NEWS

Needletime royalties referred to MMC

Royalties charged by the UK record industry for the broadcasting of records are too high, according to independent local radio stations, and their complaints have led to the matter being referred to the Monopolies and Mergers Commission. It is claimed that as well as the royalties being too high, the industry's power to limit needletime is restrictive and will hamper the growth of independent radio.

The MMC has been asked to report on royalties being assigned to a collective licensing body, ie PPL, and that body controlling the royalty rates, how they are calculated and the number or proportion of broadcasting hours during which the recordings may be broadcast.

A report is expected from the Monopolies and Mergers Commission by the middle of October.

In brief

- Ampex Golden Reel Awards have been given to country and western artist Reba McEntire for *What Am I Gonna Do About You?* and *Whoever's In New England*. Plaques were also awarded to co-producer Jimmy Bowen, engineer Ron Treat and mastering engineer Glenn Meadows.
- Livingston Studios in London has opened a dedicated 24-track copying room. The facility can handle all 2 inch formats, copy SSL floppy disks and digital to digital 24/32-track copies can be made at 24 hours notice. Tel: 01-889 6558.
- BASF is to become a supplier of duplicating tape to TapeTech who have just announced a £4 million

expansion into high speed video duplication technology.

- Video duplicator Fraser Peacock is to build a tape-winding cleanroom at their Wimbledon, south London, plant. The company plan to have 15 winders operating by early autumn.
- MBI, specialists in the design, installation and commissioning of radio stations throughout the world, have formed a new company. MBI Consulting & Commissioning will widen MBI's scope and enable them to offer operational as well as technical advice and to act as brokers for the supply of other forms of technical equipment and expertise to broadcasters and radio stations.

Outside broadcast vehicle for ZDF

West Germany's largest outside broadcast vehicle has recently been delivered to ZDF in Mainz by BTS, a joint company between Bosch and Philips. BTS was responsible for the planning, construction and equipment of the vehicle, which was designed principally for sports broadcast and large scale live events such as the Soccer European Cup Championship in June.

The vehicle is 15x2.5x4 metres high and weighs 32 tons—five of which are accounted for by the audio and video equipment fitted.

Audio equipment includes a 30-input mixing console installed by ANT Nachrichtentechnik, two tape machines with timecode-controlled synchronisation with the VTR systems, two cassette recorders, a car telephone system and a comprehensive internal and external intercom.

Video equipment comprises five ½ inch VTRs allowing simultaneous recording, slow motion and editing, two digital framestores and digital video effects.

Music video agreement

A music video agreement between the BPI and the Musician's Union replaced the Promotional Films Agreement, signed in September 1983, effective May 1st.

The old system whereby BPI members purchased rights to a number of UK national and regional showings has been abolished. In its place is a buyout allowing UK TV exploitation for two years, followed by further exploitation on payment of a further fee.

Artists will now be paid direct by record companies rather than via the

union if sufficient information is provided to satisfy the union that artists are in fact the subject of recording or similar agreements.

All-video programmes will be outside the agreement and subject to separate negotiations as will night time use of videos either through original or bought-in programmes.

The agreement also provides for the setting up of a Working Practices Committee that will be able to review disputes and take a practical look at the way this and other agreements are working.

Rental right in Copyright Bill

The British Phonographic Industry (BPI) have proposed an amendment to the Copyright Bill giving the right to authorise the rental of recorded music on all formats. "It is essential that the UK record industry is given an unrestricted rental right in the Copyright Reform Bill. The question of rental poses a straightforward legal problem with a potentially significant commercial impact. The

only way in which record rental can be tested is in a properly regulated legal environment," says the BPI's legal adviser.

The Japanese record industry is cited where in the early '80s they suffered a 30% loss in earnings due to an uncontrolled rental system. There is now a licensing arrangement with the record industry.

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Contracts

- **The Home Service** are to fully equip Fleetwood Mobile's second mobile recording studio. Equipment to be fitted includes an in-line Raindirk *Symphony* mixing console with 42 inputs, Genelec monitors, dbx compressors and Yamaha reverb units.
- A **Mitsubishi X-850** 32-track digital recorder has been ordered by Brook House Studio, Suffolk, UK.
- Don Larking report a number of UK orders for the new **Soundtracs In-Line** console and the North East Media Training Centre have ordered a 32-channel **CP6800** as has DJ Tony Prince for his new three-studio complex in Slough, Berks. A 40-input **CP6800** will be installed in the Cairo studio of London-based Americana Publishing.
- Park Lane Studios have recently installed a **DDA DCM 232** in-line mixing console with 56 channels. The console was supplied by Stirling Audio Systems along with an **Otari MTR12** ½ inch mastering machine, **Westlake BBSM15** monitors and **BGW** amplifiers.
- US company **Altec Lansing** have supplied PA equipment to the Soviet Union to be installed in the Press Center where journalists from all round the world will be briefed during the Reagan/Gorbachev summit meeting.
- **DDA**, Middlesex, UK, have announced a number of worldwide contracts through their local agencies. *S* series PA console to the Guildhall Theatre, Preston, UK; *S* series monitor consoles to Italian distributor Audio Link; PA consoles to Finland and West Germany; *D* series to the Royal College of Music, London, UK; *D* series to the Royal Dramatic Theatre, Sweden; 28-input console to Swedish Television for location digital recording; **AMR 24** to Bavaria Music Studios, West Germany; a specially shortened **AMR 24** with 28 inputs to Shadows drummer Brian Bennett for his private studio in Herts, UK; **AMR 24** 36-input frame console to the People's Republic of China. Recent rental contracts for *D* series mixing consoles have included: a 42-channel desk for the *Winnie* stage play, and 28-channel desks to *The Little Shop of Horrors* and *Seven Brides For Seven Brothers*; a 16-channel desk has been supplied to Interactive Television for sound control of their Vidiwall in Brisbane for the British Exhibit at EXPO '88.
- **Sandy Brown Associates** have announced a number of major projects worldwide. In Australia projects include ABC's new Sydney broadcasting studios—6,000 ft² orchestral recording and rehearsal studio, 800 ft² drama studio, two music studios with dedicated technical rooms plus 120 other

broadcast studios with control rooms. Radio Jordan in Amman—design of six new studios including 2,700 ft² music studio with variable acoustics. In Glasgow, Scotland, a new 2,850-seat Concert Hall. NBC, USA—a 45,000 ft² complex for coverage of the Seoul Olympics. USSR—a television studio with control suite and video editing for Novosti Press.

- **Kelsey Acoustics** have supplied connectors, jackfields and bulk cable to a number of major UK recording and TV studios. Also Belden cables have been supplied to a number of sound reinforcement companies.

Literature received

- The third edition of the *International Certification and Approval Schemes* is now available from **BSI** Technical Help to Exporters priced at £40. This edition contains revised dates on the CB scheme for the safety of electrical equipment, the CENELEC Certification Agreement, the CEN Certification System, the CENELEC HAR Agreement, the CECC Harmonised system, the IECQ system, the ECE Harmonisation and Conformity scheme, EEC schemes under 'Article 100' Directives and schemes co-ordinated by EFTA. Also

included is information on the participation organisations; a summary of the membership and addresses of those based in the UK. Copies can be obtained from BSI Sales, Linford Wood, Milton Keynes MK14 6LE, UK, quoting reference TH 020334.

- The 1988 short-form catalogue from **BICC-Citec** gives updated information on their range of over 40 potentiometers. Brief specifications are accompanied by illustrations. BICC-Citec Ltd, Westmead, Swindon, Wilts SN5 7YT, UK. Tel: 0793 487301. Fax: 0793 610217.

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NEWS

Contracts

- BBE signal processors have been installed in the PA system of The Pacific Amphitheatre in Costa Mesa, CA.
- Two further SSL SL 5000 M consoles have been ordered by Todd/AO/Glen Glenn, Hollywood, CA,

to be installed at Todd-AO East, a new facility currently under development at their New York City premises. One console will be configured for video and film sound post-production and the other for ADR sessions.

- Music Factory Studios in Cardiff, UK, has taken delivery of a Mitsubishi X-850 32-track digital recorder and an X-86 digital mastering machine, following the refurbishment and re-equipment of the 2-studio complex. The new machines will join a Calrec UA8000 48-channel console with TASC automation.
- Lavskymusic, New York, USA, have purchased their second Synclavier digital audio system and a Direct-To-Disk digital multitrack recorder from New England Digital. The system features 96 voices, 64 Mbytes of RAM, an optical disc system capable of storing 2 billion bytes of on-line sound files. NED say this is the largest Synclavier system ever installed. Also Alpha Audio, Richmond, Virginia, have taken delivery of a Synclavier digital audio system and two Direct-To-Disk digital multitrack recorders, as part of a facilities expansion programme.
- Three Lyrec TR-533 24-track 2-inch machines have been delivered to BBC Scotland. One is to be used in

the large classical music studio, the second in the pop and light music studio, and the third in the audio/video dubbing studio in conjunction with an Audio Kinetics Q.Lock and Eclipse synchroniser

- Recent Soundtracs sales include: Canada—CM4400s 32/34 to the Columbia School of Radio, TV and Recording Arts in Vancouver, and Wellesley Studios in Toronto (with CMS2 automation); a CM4400 with CMS2 to Winfield Studio, Toronto. Sweden—CP6800 to songwriter/performer John Ballard for his home studio in Gothenburg; a CP6800 32/34 to Nordic Sound Lab/CMM Records, a new studio/record label owned by songwriters Torgny Soderberg and Ladoc Holm; a CP6800 to LMS Studio, Skane, for recording of Swedish dance music and production of jingles. Denmark—a CP6800 to Dreamland Studio, Aalborg. Norway—a CP6800 to West Audio, Stavanger, for commercial recording and video post.

Sound reinforcement trends at AES Paris

Sound reinforcement continues to advance in its interrelated fields and though of less interest to some than the latest developments in audio recording technology, systems for the reproduction of sound in public venues are an important link with studio product.

A quick look round the Paris AES show confirmed that integrated—or compact—speaker systems are the major trend today though the component—or modular—system is by no means dead.

The main reasons behind the development of the compact system have been easy trucking and loading plus fast setup and, of course economics, but the performance of compact systems when used in arrays has often been questionable with serious problems relating to phase and dispersion characteristics. It would appear, however, that there is now a greater awareness of this and arrayability is now a major sales argument.

Another interesting trend is that after a period of preference for direct radiator systems over horn-loading, we are now starting to see more new enclosures using horns, either throughout the full frequency range or for the higher frequencies, which tends to indicate that it was not the idea of a horn that was bad but the designs. The use of horn technology is also producing speaker systems with reasonably defined coverage patterns over the whole frequency range allowing the configuration of arrays that provide more even coverage and greater efficiency with less cabinets.

Also on the upswing are systems with electronic processing. This seemed to be endorsed by the fact

that the sound reinforcement workshop was on loudspeaker systems using dedicated processors and it will be worthwhile to look at some of the main points raised during this workshop.

On the panel were representatives from manufacturers of systems using processing. Each panellist described the philosophy behind his particular system and questions and comments were invited from the audience. (JBL were an exception here as they do not currently produce systems with processors.)

A significant sub-heading to this workshop was 'what degree of control should the sound system manufacturer give to the engineer?'—or, to put it another way 'how competent or incompetent do we assume the engineer to be?'

Already a wide variety of processors is in use but most will include a mixture of the following functions: speaker protection, phase alignment and/or correction, crossovers, equalisation to compensate for bumps in the system's response and to extend 'flat'

frequency response at both ends of the audio spectrum, gain control of the power amplifiers such as limiting and compression.

Some manufacturers have adopted the policy of neutral processing, ie not to colour the sound to any great extent, by providing facilities such as speaker protection at critical levels, crossover characteristics to suit the driver/enclosure combination and maybe also some frequency tailoring.

Others provide such features as floating crossover points, which shift with power input and comprehensive EQ and gain reduction in various forms, which can affect the overall response of the system when driven hard by limiting some frequency bands more than others.

The subject of gain reduction seemed popular with opinions falling into two main streams: reducing overall amplifier gain to saner levels or compressing/limiting to reduce peaks at the expense of the dynamics (and maybe the sound character with multiband limiting).

Of course there are engineers out there who know how to spec out, rig and use sound reinforcement systems but the introduction of off-the-shelf systems is a response to complaints of bad sound due to poorly designed/rigged systems and poor engineering. However, many studio engineers are not acoustic

consultants and the role of the latter is to provide a proper environment for sound creation, similarly why shouldn't manufacturers do the same for live sound engineers?

On the component side, an important introduction was compression drivers from Electro-Voice and JBL using neodymium magnet structures. Though still expensive, these new drivers feature improved performance over their heavier counterparts, smaller physical size and considerably less weight making them ideal for use in clusters where weight and packing are of vital importance.

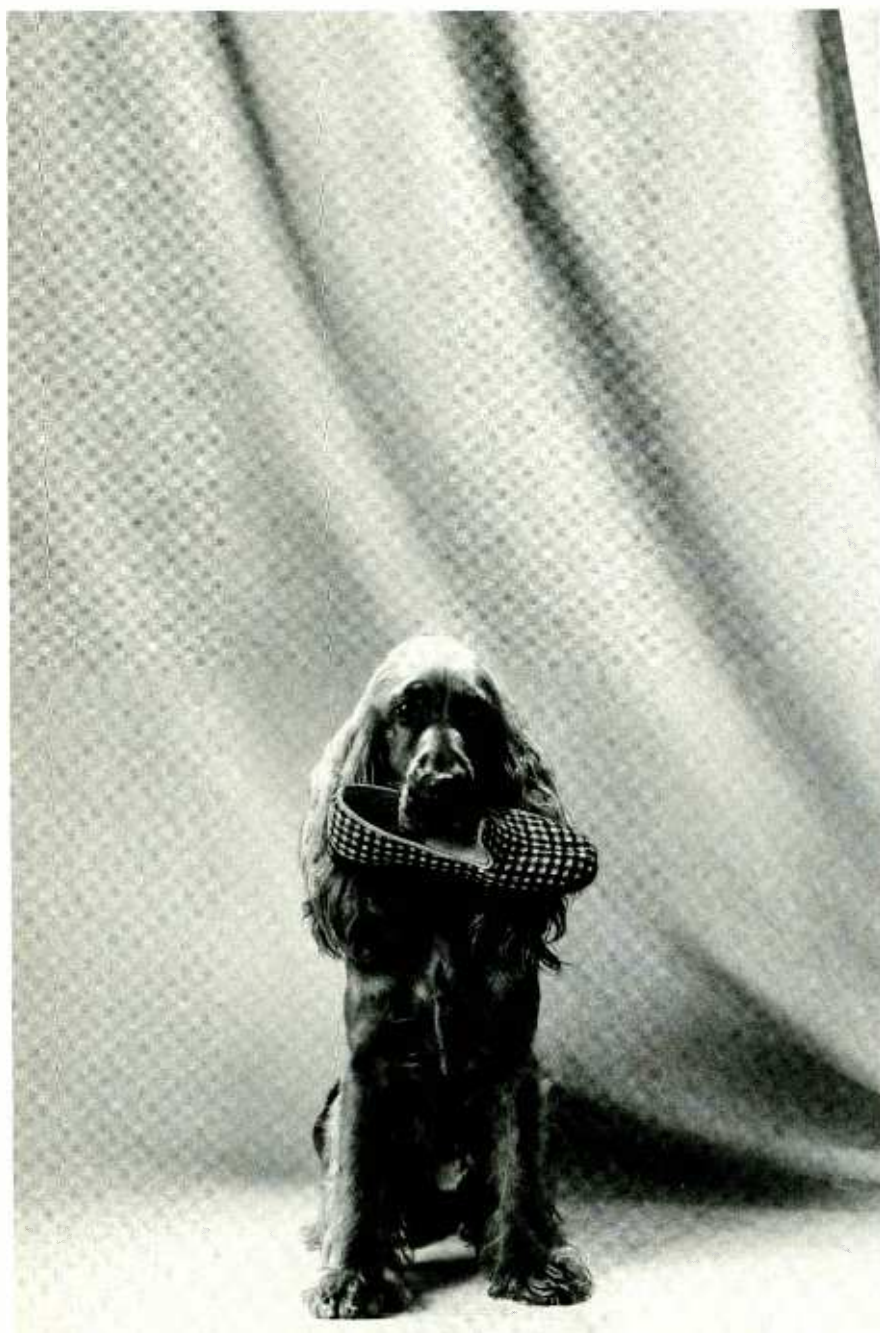
Stage monitors are now making a general appearance among manufacturers and are evidence of many user's comments. Most sound companies have been driven to designing and building their own monitor wedges in order to satisfy their clients' requirements and there is now a positive reaction to off-the-shelf models that will provide good frequency response and power handling and be usable in the real world of live performance.

In the field of crossovers, most new models now feature Linkwitz-Riley fourth order filters. It is surprising to see, however, that while there is an ever-increasing level of sophistication in crossovers (filters, limiters, etc), most manufacturers still appear to ignore the fact that constant directivity horns are now very widely used and that they need equalisation for a constant power output response. You can compromise with graphics but it is most certainly not the best solution and as far as I know, no one is offering a dedicated CD horn equaliser as a standalone unit at present.

As far as amplifiers are concerned,



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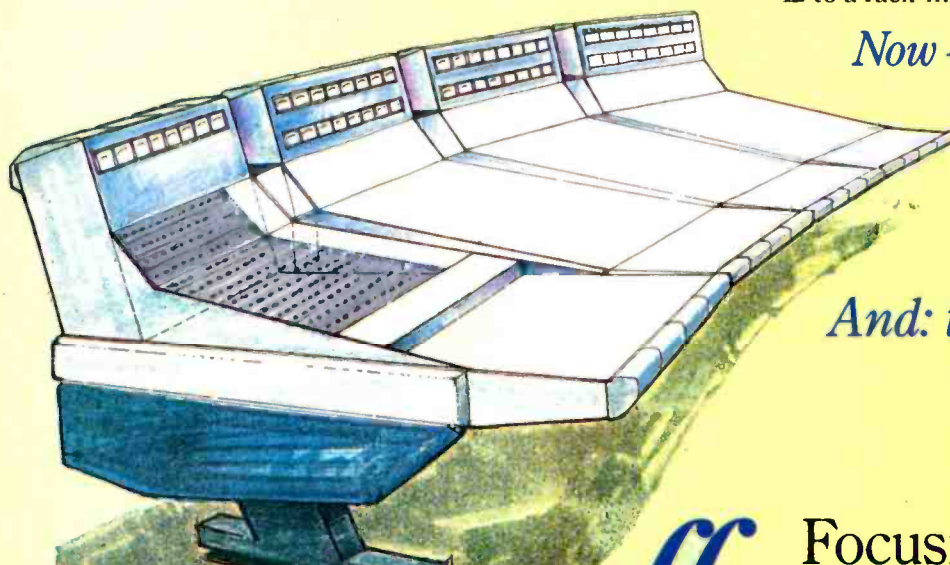


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NEWS

People

● Jeff Meadows, managing director of Sony Broadcast UK, and Carlos Kennedy of Ampex, who is also president of SMPTE, have been awarded Fellowships of the Royal Television Society.

● Janice Larking has joined Allen &

Heath to handle the UK distribution of their range of mixing consoles. Larking has been selling the Allen & Heath range for another company since leaving Don Larking Audio Sales. She will be based centrally within the UK at Luton and not at

Sound reinforcement

bigger and better would appear to be the main trend. Whereas not so long ago 500 W RMS into 4 Ω was considered to be 'large calibre', we now seem to be settling on 1 to 1.25 kW into 2 Ω as the norm. We are also seeing amplifiers fitted with VCAs for gain control, which can be used for protection or for remote control purposes, thus offering greater flexibility of control over a system during performance—either manually or automatically—from a computer.

The mighty micro is also making further inroads in the field of equalisation with programmable graphic equalisers (not to mention parametrics) that also include a spectrum analyser and 'smart' technology to set the equaliser to the appropriate curve for the environment. These software-controlled units allow tried and tested curves to be stored in memory and recalled at will, as well as saving system-align time when fast setup is required. A particularly useful aspect is that a preferred system response curve can be memorised, eg at the beginning of a tour, and the analyser/equaliser will do its best to tune the system response to that curve at each venue, thus providing continuity.

Live sound mixing requires more and more channels, which means that mixers are getting bigger. Eight aux sends are now the norm for any serious live sound console and 16 sends are no longer uncommon.

With consoles getting larger and more complicated, there is a surprising lack of automation being proposed and what there is, is largely

aimed at theatre situations. It is interesting to note that the spearhead of development for live sound consoles is coming from France with companies such as Ateis, Saje and Abac-Rustin.

Saje have been showing their *Memory* console in prototype form for some time now but the Paris AES marked the debut of a working pre-production version that will be going into a Paris theatre for extensive field trials. The *Memory* is an assignable—or virtual console—and offers complete microprocessor control over parameters and configuration, which can be saved in memory and recalled as required.

Abac-Rustin have developed an assignable console for live sound and multi-media applications, which can be expanded as requirements grow. Part of the concept is an ergonomic control surface suitable for applications other than sound

Abac-Rustin modular assignable console



the company's Brighton, Sussex, headquarters.

● Amek have appointed Gerard Green as broadcast sales engineer. This is a new position created within Amek's expanding broadcast sales division. Green was previously a freelance sales engineer selling principally to government departments.

● Alan Protheroe, a former BBC assistant director-general, has taken over as managing director of The Services Sound and Vision Corp (SSVC). The company provides worldwide training for welfare support for the Ministry of Defence and the armed forces.

● Bose UK has recruited two new sales representatives to handle increasing demand. Graham Walton will cover the north of England and Scotland, and Gareth Collyer will operate in the south and south-west of England. John Dodson has been appointed sales manager of the professional products division.

● Adrian Weidmann, Bruel & Kjaer's international manager, has

moved to the US, provisionally for one year. Initially he will concentrate on rationalising B&K's US dealer network, he will then co-ordinate a series of seminars aimed at producers, engineers and musicians. Weidmann will still oversee the European operation and will make regular trips to the Danish headquarters.

● Brian Engel has become membership representative within the management team of The Performing Right Society Ltd, London. His brief is 'to encourage and assist qualifying persons to apply for membership of the society and to maintain and increase the society's contacts with its existing members'. He will be assisted by Christian Ulf-Hansen who was previously with the overseas documentation department.

● SECA/Studio Magnetics have appointed Kevin Bower sales manager. Initially responsible for the UK, Bower will eventually become responsible for the company's total output. He was previously with the Carlsboro group.

mixing—such as lighting control and video—providing integrated control of a presentation from one console.

Cinema sound engineering also figured on the agenda and Lucasfilm held a special seminar on modern film sound production and presentation of their *THX* system.

Good sound reproduction is at last being recognised as an integral part of film presentation and the *THX* system (developed out of frustration with existing techniques) extends and smooths out the frequency range by an octave at each end of the range of 'normal' cinema sound, as well as laying down acoustical specifications for the cinema, in order for the audience to hear the soundtrack as it was originally recorded. Though such a presentation may appear to be a bit superfluous to most professionals from the audio world, the questions asked by many present from the cinema business indicated the necessity of the workshop.

The lack of connection standards is perhaps no better illustrated than by

that of speaker connectors—the bane of many PA engineers' lives. Neutrik introduced their *Speakon* loudspeaker connector at the end of the sound reinforcement workshop and invited comment from the audience as to whether it could find universal acceptance.

The connector uses four contacts for bi-amp or stereo capability and an 8-pole version is also being proposed. All contacts are touchproof to IEC65/IEC348 and terminations are solderless for easy field assembly. The connectors are robust with chassis assemblies being airtight and to *XLR* and *EP13/14*-compatible dimensions for easy retrofit. The contact lugs will accept wires up to AWG 10 and will each handle 30 A RMS.

Neutrik propose a cable and chassis version of the connector with the cable version being male and this is where the main objections were rooted.

The system means that cable runs cannot be extended by simply plugging one cable into another. An in-line coupler is available for linking cables but this was universally felt to be cumbersome and inefficient—especially if you have to start looking for a coupler in an already fraught situation.

The Neutrik proposition does, however, have a lot going for it and a concerted effort coupled with a little goodwill might just make the idea of a universal speaker connector reality.

Live sound is still a most exciting medium and even though technology keeps pushing on, we should never lose sight of the fact that most venues are still acoustical nightmares and that the pressure should be kept up for the acoustics to do credit to the equipment.

Terry Nelson

NEWS

The US news section

This page is the start of a section within *Studio Sound* that will carry news and information that is just for the US. It is our intention to let this section grow so that it reflects all the areas of interest of our US readership and eventually the copies distributed to North America will have the international *Studio Sound* as it is now but with this additional local news section. We welcome news, stories and information for this section and these should be sent to our US office located at 2 Park Avenue, 18th Floor, New York, NY 10016. US news that has worldwide implications will still be used within the main news pages so that the rest of the world knows what is happening within North America.

Events

• Synergetic Audio Concepts have now announced their schedule for the rest of the year. Two day engineering seminars in Toronto (June 23-24), Syracuse (June 28-29), Chicago (September 22-23), Minneapolis (September 27-28), St Louis (October 6-7) and Anaheim (November 1-2); three day workshops will be Sound Reproduction, Syn-Aud-Con Farm, IN (July 15-17 and August 18-20), Grounding & Shielding, Los Angeles

Area (November 17-19) and Concert Sound Reinforcement, Los Angeles Area (January 17-19, 1989). For more information contact Syn-Aud-Con at RR #1, Box 267, Norman, IN 47264. Tel: (812) 995-8212.

• **Music Expo '89**, May 12-14 1989 at The Pasadena Center, Pasadena, CA. Information from Musex Inc, 723 1/2 N La Cienega Boulevard, Los Angeles, CA 90060. Tel: (213) 659-0701.

People

• The **WaveFrame Corporation** of Colorado have announced an extensive list of new appointments. Craig Hunter and Gary Rosen become Los Angeles and New York branch office managers. Hunter comes from Everything Audio and Rosen from TimeLine. Gus Skinkas joins as product manager coming from the Sony Professional Audio Division. Doug Wood becomes an applications engineer at the main office in Boulder.

Other branch appointments include sales representative Jon Eganhouse, sales co-ordinator Susan Sloatman, and applications engineer Andy West in Los Angeles; and sales co-ordinator Liz Lockhart and applications engineer Steve Rossi in New York.

• **Sony** have announced new executive appointments of William G Connolly as president of a new Advanced System division with responsibility for technologies such as

HDTV, and Richard K Wheeler as president of Sony Communications Products Company and will be responsible for the sales and marketing of products in the Professional Audio, Broadcast and Professional Video divisions.

• The **Manta Electronics Group**, Toronto, Canada, have announced the appointment of Steve Rawlinson as sales manager. Rawlinson joined MEG in 1983.

• Fred Elkins has been appointed to the position of manager of R&D at **RAM Broadcast Systems**. Elkins was previously senior design technician at the Sony Pro-Audio facility at Fort Lauderdale, TX.

• **Audiotechniques**, New York, have appointed William Dexter as sales manager. After 13 years sales experience at Martin Audio, Dexter joined Unique Recording as studio manager. He has been with Audiotechniques since May 1987.

Contracts

• **Crest Audio** have announced a couple of significant sales of the 8001 power amplifier. Shubert Systems of Hollywood, CA, have taken delivery of 48 units to power their Steradian touring system. The amps are packaged four to a rack each driving four 2x18 inch sub bass and eight full range boxes. They are currently touring with Toto and the Reggae Sunsplash Tour. Burns Audio of Sun Valley, California have taken delivery of 30 4001/8001 power amplifiers to power a large Apogee speaker system comprising 3X3 full range enclosures augmented by A12 subwoofers. The system makes its debut at the Democratic National Convention in Atlanta, GA, during July.

• **RCA Studios** in New York City have installed a **Sony MXP-3000** console with **ADS-3000** automation system in the recently refurbished Studio C.

• **Manta Electronics** have announced sales of their **MS 1.10** monitor system to Studio Secret in Montreal and David Fleury Music in Toronto.

• **Soundcraft** have announced the installation of the following consoles: a 32-channel **200B** to the Temple Baptist Church, Talahassee, FL for broadcast production; a 24-channel **200B SEQ** and 24-channel **200B** to Sound One Corporation, New York, NY for film post-production and **Synclavier**-based sound effects editing; a series **600** console to Taylor Video Communications Inc in Wauwatosa, WI for multipurpose use; a **TS-12** to Vital Sounds Recording Inc, Hoboken, NJ for recording/mixdown and video post; a **200B** to Westrak Recording Studios, New York for master recording and MIDI recording work; and a **500B** to the Whisky A Go-Go, Hollywood, CA, for the club's sound system.

New Music Seminar

The ninth New Music Seminar will be held at the Marriott Marquis Hotel in New York, July 16-20. The Seminar has become a major music industry convention offering record labels, producers, recording studios and related services a forum for communicating and making new business connections. Last year's seminar drew over 7,000 attendees that included 1,534 producers/artists,

950 recording studio personnel, 1,026 A&R personnel, etc. The exhibits and workshops will highlight developments such as MIDI and DAT. Equipment manufacturers will be sponsoring product demonstrations within the hotel and at nearby locations. For more information contact New Music Seminar, 632 Broadway, New York, NY 10012. Tel: (212) 473-4343. Fax: (212) 353-3162.



New studio for university

A 24-track studio has been opened at the University of Miami in the Gusman Concert Hall. Built by students on the School of Music's programme in Music Engineering, the new room features an automated Sony **MXP 3036** recording console donated by Sony. The control room

contains a **Synclavier** and is equipped for digital recording.

The studio is in use round the clock by music engineering students for recording university concerts and in-house productions as well as for maintenance training.



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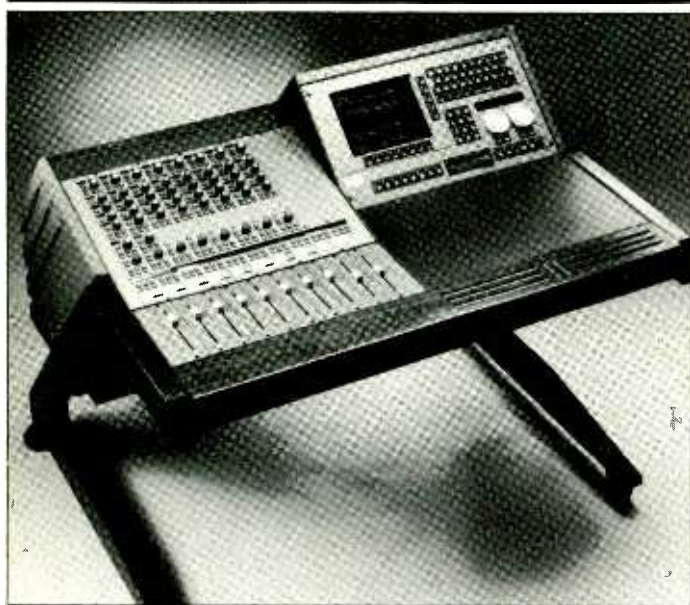
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NEWS



AMS Calrec Logic 1

The NAB saw the first showing of the *Logic 1*, a fully digital audio mixing console, resulting from the combined R&D abilities of AMS and Calrec following their merger two years ago. Initially the system has been configured to work with *AudioFile* in a high level of integration while offering complete dynamic automation of all functions and a control surface of conventional layout and appearance.

Initial information describes the *Logic 1* as using internal 32 bit floating point architecture with transputer control that AMS claim guarantees an internal dynamic range of 1500 dB. The automation will control all desk functions with realtime updating (not snapshot). The automation has 130 Mbytes of Winchester disk storage.

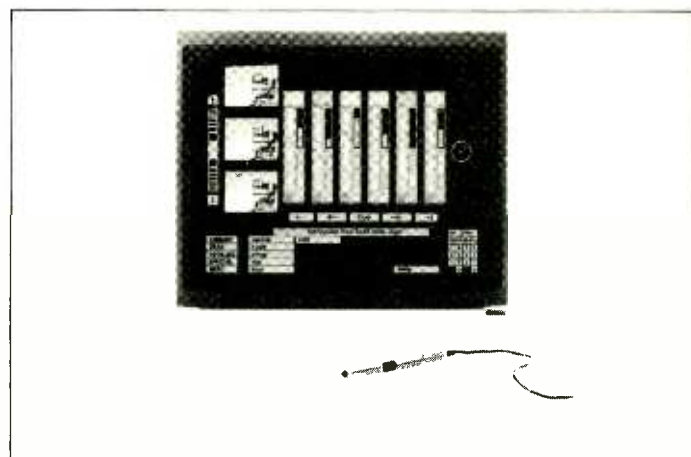
Other features of the console include linear motorised faders that work in conjunction with the automation system. They feature an armature which is driven up and down the length of a bright steel bar. This reduces the number of parts needed within the fader and

apparently delivers a more natural feel for the user. Another feature is the use of *Logicator* controls. These are displays that transmit positional information from a ring of LEDs mounted behind the knob giving a movable cursor on the top of the knob itself. This can show positional information for the knob, ie level, pan, gain, etc. This is important for continuously rotating knobs and also being on top of the knob, the information is not so easily obscured in adjustment.

AMS Calrec describe the *Logic 1* as the first in a series of digital consoles to be produced for a wide range of applications. Due to the modular approach to design the series is expandable with the maximum design configuration being 256 channels of which any or all may be stereo.

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

USA: AMS Industries Inc, 3827 Stone Way North, Seattle, WA 98103. Tel: (206) 633-1956.



SSL HarrySound

SSL launched their second digital product, *HarrySound*, at the recent NAB Convention. *HarrySound* is a digital audio editing system for video post-production and has been specially developed by SSL to extend the abilities of *Harry*, the video editing system of SSL's sister company Quantel, both part of the UEI group. The concept is to enable video soundtracks to be placed in the digital format as early in the production process as possible and then handled alongside the *Harry* digital video system. To this end *HarrySound* uses the same pen and tablet control surface as the standard Quantel *Harry*. Menus and displays follow standard *Harry* presentation and can be overlaid on the *Harry* screen. The operation of the system is by moving the pen on the tablet to access sound files from the library, position edits, crossfades, offsets and

control mixes. A cursor on the screen relates to the pen position on the tablet.

HarrySound has AES/EBU digital interface for receiving digital audio or analogue audio through SSL designed A/D converters. It has six tracks of audio (or reels in production terms) and these can be mixed, altered in level, edited, time offset or slipped against each other. Edit points can be defined as can crossfade points and together with the other functions, dynamic level changes and mutes can be programmed.

Solid State Logic, Begbroke, Oxford OX5 1RU, UK. Tel: 08675 4353.

USA: Solid State Logic, 320 West 46th Street, New York, NY 10036. Tel: (212) 315-1111; 6255 Sunset Boulevard, Los Angeles, CA 90028. Tel: (213) 463-4444.

Leonardo Software Professional Librarian

Leonardo Software have introduced a Professional Librarian program for co-ordinating, previewing and assembling effects from sound effects libraries. Essentially it allows a studio to catalogue its sound effects library and search for groups of effects using plain English words; words may be linked together in the form of a thesaurus so that, for instance, a search for 'cars' would also show all effects catalogued as 'automobiles'. Timings, sources and copyright details can all be filed for reference and printed for client invoices or copyright returns as required.

Most importantly, the software interfaces directly with the Sony *CDK-006* compact disc 'jukebox' so that a properly catalogued CD effects library may be loaded into the player and accessed directly from the controlling computer (an IBM *PC-AT* or compatible) allowing library searches to be immediately

auditioned and sequenced as appropriate.

Leonardo plan to make catalogues for popular effects libraries available on disc ready to use complete with cross references; the Sound Ideas library is already available in this form.

The software appears to be aimed at the non-technical user and provides every possible assistance for the assembly of a logical catalogue, prompting when, for instance, previously unused words are entered as descriptions. The procedures for gradually narrowing search terms are well defined and will be familiar to anyone who has used large-scale library cataloguing software, and its linkages and synonym translations are user-definable.

Leonardo Software, 693 Washington Street, Venice, CA 90292-5418, USA. Tel: (213) 305-1521.



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www.americanradiohistory.com

AMB measurement tools

AMB have introduced a new line of measurement tools; an active remote cable tester, a phase checker and a headphone distribution system/line monitor.

The AMB cable tester can be used for testing either long or short cable lengths in both balanced and unbalanced configurations. A colour-coded three LED display provides fast identification of all possible wiring schemes and faults and has a handy fault table printed on the unit itself for quick operation. A remote XLR plug is used to test installed cables and the unit is fitted with XLRs and jacks. A MIDI adapter also allows MIDI cables to be checked. The unit employs two 9 V batteries with an operational life of about 25 hours with alkalines. All circuitry is shock-proof encapsulated and high-grade components are used throughout.

The AMB phase checker consists of a pulse generator and a detector. The generator features both an acoustical and electrical output, detented output level pot, floating low-Z output, and an integrated high-efficiency loudspeaker as well as loudspeaker direct drive capability. The detector features an integrated microphone

plus both acoustical (external microphone) and electrical inputs, two colour LED display and switchable balanced or unbalanced operation. Both units feature on/off switches, switchable pin 2/3 hot and rugged construction. Battery life is rated at 50 hours with alkalines.

The AMB headphone distribution system/line monitor allows the use of a power amplifier for headphone listening, either for foldback/monitoring or checking power amplifier performance, eg PA. The unit consists of a rugged die-cast box with loophrough XLR connectors and Neutrik locking phone jack. The left and right channel levels are controlled by two MIL grade conductive plastic pots and a switch allows stereo or left-mono or right-mono operation. The unit will handle voltage swings of ± 40 V, ie 200 W/8 Ω .

AMB, Hustadring 63, D-4630 Bochum 1, West Germany.

International distribution:
UK: Executive Audio Ltd, 159 Park Road, Kingston-upon-Thames, Surrey KT2 6BX. Tel: 01-541 0180. Fax: 01-549 2858.

NEWS

Custom pushbutton service

Sifam, the UK meter and panel accessories company, can now offer instrument pushbuttons printed with any combination of letters, numbers or symbols.

The service is expected to be of interest to manufacturers of specialised keypads where non-standard key-cap style, shape or size

and variations in the printed designations are required. It is aimed at the high-volume market for two-shot mouldings such as for typewriters, computers and telephone keypads.

Sifam Ltd, Woodland Road, Torquay, Devon TQ2 7AY, UK. Tel: 0803 63822.

gtc CARL

gtc now have a dedicated computer for the Quantec QRS/XL digital reverberation unit, the CARL (Computer Assisted Remote Link). The unit consists of a 1U mainframe and a remote control unit.

The CARL provides interactive control for up to seven XLS using standard video monitors with data insertion and gives fast and easy access to the XL for the creation of custom programs. The mainframe also has a dump-to-disk facility using

3.5 inch floppies for extending the user-defined memory space in the XL.

The CARL is now available to existing XL owners and gtc will be offering XL-CARL packages at advantageous terms.

gtc Studiotronic GmbH, Nordendstrasse 3, D-8000 Munchen 40, West Germany. Tel: 089/278 0404. Fax: 089/272 4478.

UK: gtc Ltd, Malley House, 5 Fulmer Drive, Gerrards Cross, Bucks SL9 7HH. Tel: 0753 884319.

Neotek Essence mixing console

The Neotek *Essence* console has been designed expressly for tracklaying on 16-24-32-track recorders for video and film work for effects layering, ADR, Foley, as well as in the building up of music tracks with synthesisers, samplers, etc.

The *Essence* consists of four to eight mic/line input modules and 16 to 32 tape monitor modules, for one multitrack or several machines. The input modules pan to four mixing buses, a main stereo bus and a second stereo bus (designated Ready Bus) that routes to all odd and even tracks of the multitrack recorder. Also included are comprehensive monitoring facilities and space for scripts, cue sheets and a synchroniser remote keyboard. An optional SMPTE/MIDI computer card allows for the automation of mute functions and communication with external devices.

Each input module features independent mic and line inputs, 4-band sweep EQ section with switchable bell and shelf characteristics for the high and low bands and switchable normal and narrow band Q on the mid frequencies. Also included are sweep high- and lowpass filters, two

auxiliary sends switchable pre/post and very comprehensive solo facilities with three solo group buses.

The monitor modules feature linear fader, two auxiliary sends, signal present LEDs (with -40 dB threshold for ambience tracks), muting via the input modules, comprehensive solo facilities including channel auxiliary solo and record ready switch for the corresponding recorder channel. The record ready is used in conjunction with the ready bus on the input modules and any input routed to this bus is automatically routed to any tracks in record ready.

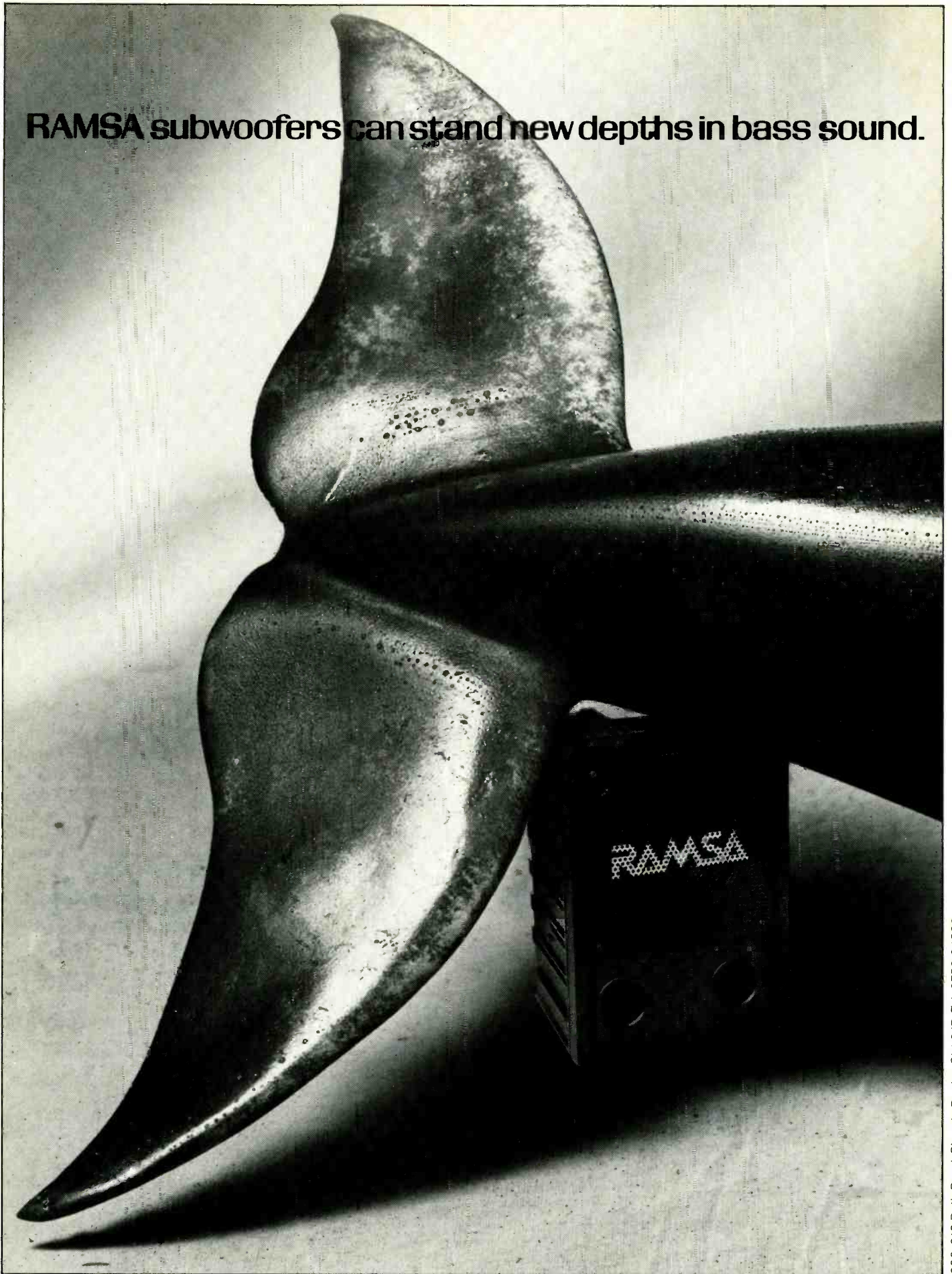
Other facilities include a comprehensive patchbay, eight vu/peak bargraph meters for input channels/output buses plus direct outputs, stereo meter for mix bus/auxiliaries, etc, stereo meter for the ready bus and two mechanical vu meters for the mix bus. An audition speaker is also included in the meter bridge.

Neotek Corporation, 1154 West Belmont Avenue, Chicago, IL 60657, USA. Tel: (312) 929-6699. Fax: (312) 975-1700.

UK: Music Lab Sales Ltd, 72-74 Eversholt Street, London NW1 1BY. Tel: 01-388 5392.



RAMSA subwoofers can stand new depths in bass sound.



300-318 Bath Road, Slough, Bucks. SL1 6JB. Tel: 0753 34522.

RAMSA
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See the full range of amps, microphones, speakers and mixers on stand 154 at A.P.R.S.

NEWS

Sony sound reinforcement

Sony have now entered into the sound reinforcement field with a range of portable mixers, loudspeaker systems, amplifiers and effects units.

The effects units are all in 1U rack packages and include the *MU-R201* stereo digital effects processor, *MU-E311* 31-band graphic equaliser with sweep high- and lowpass filters, 4-band parametric EQ, stereo compressor/limiter/gate and stereo 2-way crossover.

The *MU-S8/MU-S381* speaker systems are designed for small to medium sized venues with the

MU-S7/MU-S6/MU-S3 being suitable for restricted space applications. A range of fixing hardware such as stands, clamps, belts, etc, is also available.

Sony Corporation, PO Box 10, Tokyo AP, Tokyo, Japan. Tel: 03 448-2111.

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

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

Audiomatica mixing system

Audiomatica of Italy have introduced a retrofitable automated mixing system for consoles, the *Evamix AM 04*. This is a software-based system in order to accommodate updates and consists of a control unit housing the main computer, floppy disk drive, digital section controller, SMPTE/EBU reader/generator and power supply. An A/D converter is installed in the console together with fader interface cards and VCAs (dbx 2150) for each channel. Each channel interface contains two user control buttons, SELECT and ACTIVE, with the former isolating the channel from the automation and the latter putting it under control.

At present the software allows the automation of levels and mutes, mix

merge, mix compare and mix link as well as general management such as titling, channel identification and overall mix information (aux send and EQ settings, etc).

Channel capacity is 32 channels with 64 on option, together with 16 VCA groups that are freely selectable, and operation is said to be 'transparent'. A/D conversion is 12 bit with 8 bit D/A conversion for 0.4 dB resolution. VCA specifications are THD <80 dB over 20 Hz to 20 kHz at +10 dBm, S/N better than 90 dB and maximum attenuation of 100 dB.

Audiomatica, Via Faentina 250, 50133 Florence, Italy. Tel: 55 575 221.

Stage Accompany Leader monitors

Stage Accompany have introduced the *Leader* range of floor monitors for stage sound reinforcement use.

The 4629 and 4627 employ two and one SA 1502 15 inch (38 cm) loudspeakers respectively, an SA 8525 *Compact* driver coupled to an SA 2327 horn and an internal crossover network. Power handling is 300 W RMS and 150 W RMS respectively.

The 4626 and 4624 use the same high frequency elements but

incorporate two or one SA 1202 12 inch (30 cm) loudspeakers and have a lower profile.

Stage Accompany BV, Anodeweg 4, 1627 LJ Hoorn, The Netherlands. Tel: (0) 2290-12542. Fax: (0) 2290-11192.

Stage Accompany, Vennweg 5, 446 Nordhorn, West Germany. Tel: (0) 5921-16196.

UK: Stage Accompany (UK) Ltd, 14-16 Deacons Lane, Ely, Cambs CB7 4PS. Tel: 0353 2278.

JBL 2450J and 7110

JBL have introduced the *2450J* compression driver and the *7110* limiter/compressor.

The *2450J* features a Neodymium high energy magnet assembly and combines improved performance with smaller size and less weight. Another feature of the driver is a newly designed coherent wave phasing plug, which has annular apertures of constant path length to provide in-phase combining of sound waves through to the highest frequencies, thus providing smooth response and higher definition to the signal.

The *2450J* is available with a nominal impedance of 16 Ω and production was scheduled for early Spring.

The *7110* is a single-channel compressor/limiter in a 1U package and provides user controls for threshold, attack, release, output level and variable soft-knee

compression from 1.5:1 to ∞ :1. Other features include an automatic preset button that engages a programme-dependant variable attack and release circuit while fixing the compression ratio and peak/average controls to critically accepted settings. A link function enables units to be cascaded for stereo or multichannel applications. The unit has high resolution LED displays for gain reduction levels and a switchable input/output level meter. The input is active balanced with the output being unbalanced (+22 dBm into 600 Ω) and optional output transformer is available as an accessory.

JBL Professional, PO Box 2200, 8500 Balboa Blvd, Northridge, CA 91329, USA. Tel: (818) 893-8411.

UK: Harman (Audio) UK Ltd, Mill Street, Slough, Bucks SL2 5DD. Tel: 0753 76911.



NTP 277-500 phase meter

The NTP 277-500 is a 7 cm CRT unit that monitors the stereo image and phase relationship of a stereo signal. The oscilloscope display will show the width of the stereo signal as well as indicating mono compatibility.

A phase correlation indicator is also included in the display scaled from 0° to 180°.

The input amplifiers are transformer coupled and an AGC function allows weak signals to appear at full strength on the screen for easy monitoring. Front panel

controls allow the light intensity of the oscilloscope and correlation meter to be adjusted.

The 277-500 can be mounted into a square cut-out and matches the design of the NTP 8-channel bargraph meter.

NTP Elektronik A/S, Theklavej 44, DK-2400 Copenhagen NV, Denmark. Tel: (1) 10 12 22.

UK: Elliott Bros (Audio Systems) Ltd, Osney Mead, Oxford OX2 0ER. Tel: 0865 249259.

FAST, FUNCTIONAL FIDELITY



INTRODUCING SOUNDSTATION II THE SECOND GENERATION DIGITAL AUDIO RECORDER AND PRODUCTION CENTRE

Recording and editing with SOUNDSTATION II is quick, simple and accurate. Multi-channel digital recording, combined with comprehensive edit control and signal processing extends the abilities of the audio engineer with boundless creative latitude. Direct access of recorded elements from magnetic disks or removable optical media results in productions completed ahead of schedule with unmatched sonic accuracy.

Dedicated controls together with the flexibility of the Touch Screen provide intuitive operation to accomplish both conventional and advanced audio production functions. Tasks normally requiring multiple recorders or external processors, such as track slipping or time compression, are achieved immediately and effortlessly by SOUNDSTATION II.

High resolution 18 bit conversion, direct access editing and the preservation of original multi-channel recorded sound fidelity distinguish SOUNDSTATION II as the practical solution to demanding audio production requirements.

Contact Digital Audio Research for a demonstration of the unsurpassed flexibility and performance of SOUNDSTATION II, the second generation digital audio recorder and production centre.

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The best studio pa have a spare room,

On the face of it, a spare bedroom in Pimlico and the biggest studio development to take place in Britain this decade may not have a lot in common. But they do.

Each was meticulously planned, from the drawing board to the final dab of paint. Each was designed to allow people to do their jobs, not only with efficiency, but creative brilliance. That's why our Martin Westwood looks exhausted, but pleased, in Willy M's 'home' studio. That's why Ian Davidson and Alan Douglas can afford to relax in the control room at Olympic Studio Two. All three completed their complex projects, brilliantly.

Making music demands the right kind of atmosphere. You can't build an environment that stimulates creativity and musical inspiration with bricks and mortar alone. So, when Willy wanted to utilise the convenience and reassurance of his own home as a composing and demo studio for his 'Londonbeat' band, we understood. When the Virgin Group chose a building

already steeped in recording legend as the springboard for further chart success, we knew it made perfect sense.

Willy chose HHB to help him design and plan his whole studio. Virgin Studios turned to HHB to supply the bulk of their equipment needs at Olympic. Both knew we had the skill, experience and expertise to make it happen on time.

But whether you are planning the outboard and digital recording gear for a spare room or an 18,000 sq ft complex like Olympic, the same rules should always apply. At HHB they always do.

Qualified, considered advice, based on over a decade of practical experience in studio and live recording. The largest and most reliable selection of equipment from the best manufacturers in the world. An ability to supply, implement and commission on time with little fuss. The professional skills to complete a project against tight budgetary constraints. And of course, the guarantee of service back-up, long after the gear

is up and running.

When we realised that Willy and 'Londonbeat' had less than 80 sq ft to play with – you can bet some serious planning was required. This led us to design a complex central patchbay linking twenty midi keyboards with a range of signal processors from Lexicon, Drawmer, Yamaha and Amek. It also led to a decision to standardise on Sony DAT for two-track digital mastering.

Getting one studio up and running on schedule is difficult enough, to attempt three at once was precisely what Alan, Ian and their team had to do with the Olympic complex. With the facility booked up with major recording projects from its scheduled opening in February, the last thing they wanted to worry about was coping with shifting delivery dates from dozens of different manufacturers. HHB took the strain and made it happen – bang on schedule.

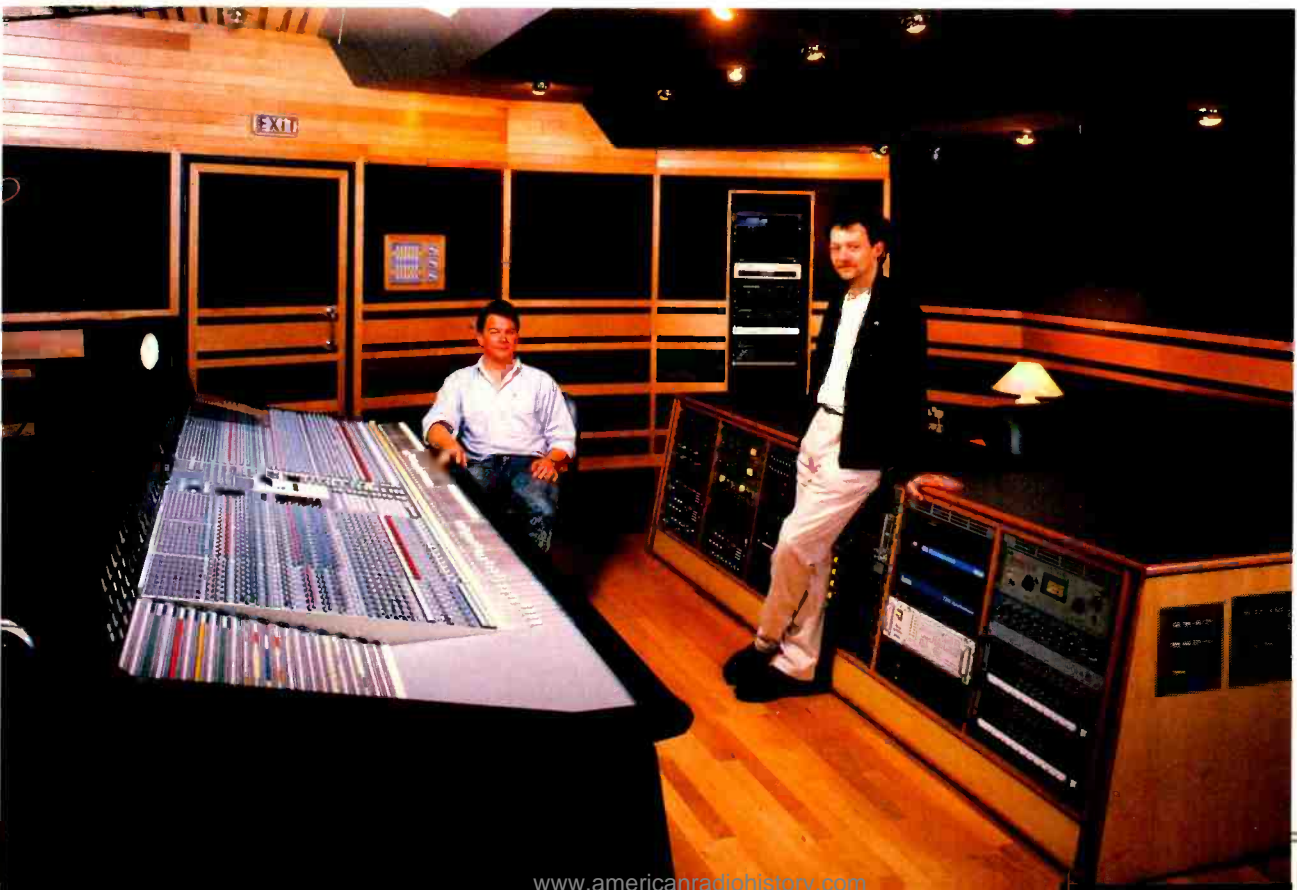
Equipment supplied by the company included several

professional Sony DAT mastering recorders; a Sony CD mastering system; stacks of Dolby SR; Westlake studio monitoring in each control room; extensive Amcron amplification and a vast array of outboard gear from AMS, Bel, BSS, dbx, Lexicon, Urei and Yamaha. Headphones, microphones and near field monitors from every manufacturer you might expect and even Chinagraph pencils.

So as you can see, at HHB, there's nothing we don't know about devising relevant studio packages for professionals. As well as being Sony Pro-Audio's leading independent distributor, we are now the exclusive UK outlet for the superb range of Amek mixing desks, including the stunning G2520. Yet, for the cost-conscious, we also carry the same console manufacturer's big value TAC line. Whatever your budget, we really can provide all the options.

So, if you feel a package coming on, whether its 16 tracks of analogue or 48 tracks of digital, HHB is the only name to call.

ckage, whether you or room to spare.



Electro-Voice DeltaMax and N/DYM 1

Electro-Voice have introduced two new products, the *DeltaMax* loudspeaker system and the *N/DYM 1* compression driver.

The *DeltaMax* series consists of two 2-way systems—*DML 1122* and *DML 1152*—equipped with *DLX 12* inch (30 cm) and 15 inch (38 cm) bass drivers respectively and a *DH-1A* compression driver and *HP64* high frequency constant directivity horn. The cabinet is trapezoid in shape and forms a 30° wedge, thus allowing easy configuration of arrays. Flying hardware is also available as an option.

Each speaker system has its own dedicated electronic controller, the *DMC-1122* and *DMC-1152* although enclosures may be connected in series if the power amplifier used has sufficient power output into a low impedance load. The controllers incorporate a 2-way electronic crossover using fourth order Linkwitz-Riley 24 dB/octave slopes, time delay for the bass driver, equalisation for both frequency sections and protection circuits.

A special feature of the *DeltaMax* is the protection circuitry, which monitors the excursion and temperature of both the bass and high frequency drivers as well as amplifier clipping. If the electronics sense an overload situation at the

amplifier terminals, the input signal is lowered thus leaving the spectral balance intact. The controller also includes a compressor with a 'soft-knee' design and variable ratio from 1:1 to 20:1 should a more compressed or limited sound be desired.

The *N/DYM 1* compression driver uses Neodymium, a high magnetic strength material, to provide increased performance and smaller size and weight dimensions compared to conventional drivers. The *N/DYM 1* is roughly a quarter the weight and $\frac{2}{3}$ the size of the equivalent *DH-1A* and has a flux density in the gap of 2.25 Tesla.

As well as improved performance, the *N/DYM* offers considerable weight-saving for cluster assemblies and allows tighter packing enabling more accurate point-source arrays.

The driver is available in both nominal 8 and 16 Ω versions and has a long-term acoustic power output (24 hours) of 14 W.

Electro-Voice Inc, 600 Cecil Street, Buchanan, MI 49107, USA. Tel: (616) 695-6831.

Europe: Electro-Voice SA, Mark IV Industries, Keltenstrasse 5, CH-2563 Ipsach, Switzerland. Tel: (0) 32 51 68 33. Fax (0) 32 51 12 21.

UK: Shuttlesound Ltd, Unit 15, Osiers Estate, Osiers Road, London SW18 1EJ. Tel: 01-871 0966.

NEWS

Summit Audio EQP-200 equaliser

The Summit Audio *EQP-200* dual programme equaliser provides two channels of equalisation in a 2U rack package. The circuitry is a vacuum tube and solid state hybrid, with valves being used only in the audio circuitry for sonic reasons.

Inputs are electronically balanced while outputs are unbalanced using 990 output stages. Transformer balancing on the outputs is available as an option.

The unit features separate boost and cut controls and switchable

frequencies for high and low frequency attenuate points and high frequency peak boost and low frequency shelf boost turnover frequencies.

Other features include silent in/out switching per channel and handbuilt construction.

Summit Audio Inc, PO Box 1678, Los Gatos, CA 95031, USA. Tel: (408) 395-2448. Fax: (408) 395-1403.

UK: Autograph Sales Ltd., 2 Spring Place, London NW5 3BA. Tel: 01-267 6677/01-485 3749.

Aphex 612 and 124

Aphex have introduced the model *612* expander/gate and model *124* audio level interface.

The *612* is a stereo 1U rackmount unit and uses the latest Aphex VCA, the *1001*. A high degree of control is achieved by using variable downward expansion ratios (1:1 to 20:1) with gate operation being achieved at the highest ratio. Other controls include variable high- and lowpass key filters with in/out switch from the audio and control paths, external key switch and key listen function; three LED function display; adjustable threshold from -50 to +20 dBm; variable attack time from 2 μ s (click-free) to 10 ms; release hold function of 10 ms to 4 s with release variable from 40 ms to 4 s; variable expansion range from 0 to 100 dB; in/out switches for both channels and master/slave switch for stereo operation. Inputs and outputs are servo-balanced and can be used instantly either single-ended or balanced. Both key inputs and

outputs are provided for flexibility and the *612* can also be used as a ducker.

The *124* audio line interface provides high quality matching between professional (+4/+8 dBm) sources and -10 dBm inputs and -10 dBm sources and +4 inputs (also variable ± 6 dBm). Inputs and outputs are RCA jacks and XLR-type connectors and the unit can be mounted in a 1U rack adaptor for two units. Features include low distortion and noise, active buffering on all inputs and outputs, full RF protection, servo-balanced high level inputs and outputs, low output impedances and selectable 600 Ω input termination.

Aphex Systems Ltd, 13380 Satcoy Street, North Hollywood, CA 91605, USA. Tel: (818) 765-2212.

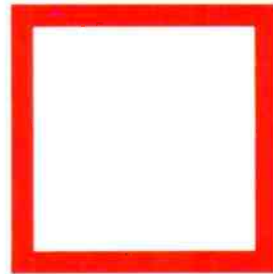
UK: Sound Technology (UK) plc, 6 Letchworth Business Centre, Avenue One, Letchworth, Herts SG6 2HR. Tel: 0462 480000. Fax: 0462 480800.



 **Stirling**

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GRAPE



THE STIRLING NEWSLETTER

VINE

SUMMER '88



THIS SEAT IS YOURS IN OUR DEMO ROOM

NEW STIRLING AUDIO CENTRE OPENS

The New Stirling Audio Centre opened its doors in April. The newly refurbished building has been designed to provide a comfortable and workmanlike environment in which to select professional audio equipment.

Within the building are 1000 sq. ft. of demonstration area, including an entirely separate demonstrator room based around DDA consoles, which is fully equipped to 48 track control room standards.

In addition there is the Stirling service lab., equipped with all the necessary test equipment, and complete spares back-up, to ensure that turn-round times on service and maintenance are kept to the absolute minimum.

With comfortable surroundings in which to relax and negotiate for that extra special deal(!), the Stirling Audio Centre has to be the place to visit when you're looking for anything from a 72 channel automated console to a reel of quarter inch.

We even have our own car park reserved for visitors, so you can come by car with no fear of being ticketed, clamped or towed away.

Continued inside

FAIRLIGHT COMES TO STIRLING

The Australian designed and manufactured Fairlight is now being distributed in the UK by Stirling. *Details inside*



FAIRLIGHT COMES TO STIRLING

Continued from front page

We have added Fairlight to our portfolio in order to provide you with a wider choice of creative studio equipment. And we are going to be living and breathing Fairlight – so maybe you should call us before we call you!

Roger Bolton and Greg Jones from Fairlight are based in the new Stirling Audio Centre, so we have the knowledge and experience on hand to help you with any queries you may have on the Fairlight.

We can provide you with a full sales and service back-up for all Fairlight products including the latest Series III and software updates.

There is a Fairlight Series III on permanent demonstration at Kimberley Road, and we also have the new MFX panel which provides QWERTY keyboard control of the Fairlight system – especially useful for post-production applications. Call us for the latest information on the Fairlight system.

01 624 6000



Greg Jones, our resident Fairlight expert from Australia

THE ULTIMATE ANALOGUE MULTITRACK

The new multitrack recorder from Otari, the MTR100A, represents the state-of-the-art in analogue recording technology, and features built-in, switchable Dolby A and SR.



The **MTR100A**, which is definitely *not* a replacement for the MTR90 Mk.2 – the world's best selling multitrack recorder – uses some of the existing MTR90 features but adds a lot more new technology.

While retaining basically the same tape transport as the MTR90, for instance, the MTR100A is radically different in circuit design.

There is **fully automatic line-up**, both in record and playback, which are completely automatic procedures not just sets of stored parameters.

Many basic **Auto-locator** functions, such as shuttle, search zero, search cue points, etc. are built in.

The **Head Amplifiers** are mounted under the head assembly to give a cleaner sounding signal.

There is **Pulse Width Modulation** control of the reel motors for improved heat dissipation, giving more reliable and quieter operation, while **thermostatically controlled cooling fans**

help on the noise front as well.

Perhaps the most interesting feature of the MTR100A is the optional built-in **Dolby** noise reduction.

The MTR100A is unique in that **Dolby A** and **Dolby SR** can be built-in, with the ability to switch between both systems. This is the **only** tape machine to offer switchable Dolby noise reduction.

Should you not require both noise reduction systems, the MTR100A is also available with either Dolby A or Dolby SR only.

The MTR100A can be specified in three basic formats: With no noise reduction: Pre-wired to accept the Dolby Noise reduction cards: Fully fitted with noise reduction.

The MTR100A will initially be available in 2" 24 track format only. Alternative formats, including 2" 16 track, 1" 8 track and manual alignment versions will be available in due course.

A wide range of optional accessories is available for the MTR100A, including Auto-locator, plus serial and parallel interfaces to suit your particular installation.

Contact **Mick Boggis** for the latest information on prices and delivery on **01 624 6000**.

PARK LANE GO FOR BIG DDA CONSOLE

Glasgow's Park Lane Studios have re-equipped with a 56 channel DDA DCM232 console, together with a number of other items, all supplied and installed by Stirling.

We've been supplying Robert Andrews of Park Lane for a number of years now, and when the time came to refurbish the Studio Robert came to us again, "I have been impressed with the service I received in the past and wanted to use Stirling Audio to help us re-equip," he says.

Robert had been looking at a number of different consoles for the new control room, but it was no surprise to us that in the end he chose the DCM232 in-line computerised console from DDA. The performance of the desk is so good that we knew he couldn't fail to be impressed.

"We weren't too happy with the EQ on our previous desk," Robert explains, "and the EQ on the DCM232 is really superb, but the whole console is also so very easy to use. In fact, since having the desk installed we've discovered there's a lot more things that can be done with the computer than we realised."

Apart from the DDA, Robert has also taken this time an Otari MTR12 1/2" machine, a pair of Westlake BBSM15 monitors plus the BGW amps to drive them and a lot more outboard gear, all supplied and installed ahead of schedule.



Robert Andrews of Park Lane Studios and Mick Boggis of Stirling Audio, with the DDA DCM232

BUDGET LEXICON REVERB AND REMOTE



Lexicon have introduced a new budget priced digital reverb – the LXPI.

With 16 basic programmes such as, **Hall, Rooms, Gate, Reverse** and **Chorus** for around **£399 (incl. VAT)** the LXPI represents remarkably good value for money.

A stereo output machine, the LXPI provides selectable pre-delay and decay time parameters.

A further 6 parameters are available with the optional **MRC** MIDI remote controller, which uses a MIDI bus to allow

the operation of up to 4 LXPI reverbs.

Kevin Walker has been trying out the new LXPI and is very impressed. Call him on **01 624 6000** and you too can be impressed.

NEW 1/4" FROM OTARI

The MX55 is a new 1/4" tape recorder from Otari intended primarily for use in broadcast and audio post-production applications.

A development from the MX5050 series, the **MX55** features a re-designed constant tension transport mechanism and will be available in six versions; full track, twin track NAB or DIN stereo, twin track with centre track timecode, 4 track and a 2 track desk-top overbridge design. All versions bar the center track timecode machines are available now, with the timecode models following shortly.

The MX55 will take 12" reels and features a built-in 4-memory mini autolocator, $\pm 20\%$ vari-speed and a cue control with built-in monitor loudspeaker.

VSC is an option which



uses a harmoniser module to allow the tape to be run at double speed with a 50% pitch reduction on playback. A useful function in broadcast applications where it allows tapes to be searched at high speed while retaining full comprehension of voice recordings.

Other options available for the MX55 include editing scissors, fader start, remote control and 19" rack mount.

Call us for the full details on **01 624 6000**

 **Stirling Hire**

**Recording Equipment Hire
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You won't find a more reliable service, anywhere

SA&W HIT FACTORY GO FOR DDA

PWL, the studio owned by Pete Waterman of Stock, Aitken and Waterman, chose a DDA console for the new room at the hit making complex.

Pete Waterman said, "The new room at PWL is for the exclusive use of S,A&W and we wanted the best sounding console available."

With the choice of any console on the market open to them, PWL picked a 36/24 **DDA AMR24**.

Mike Picking of PWL explains why they chose DDA, "The new room will provide direct to digital recording with Sony 3324 machines and we therefore wanted a console with the shortest, cleanest signal path. After listening to all the consoles available, we decided the **DDA AMR24** was the most audibly transparent.

"The willingness of Stirling and DDA to make minor modifications to the patchbay and switching to fit in with our established working practices was another plus point."



Pete Waterman (centre), Garry Robson of Stirling Audio (left) and David Neal of DDA with the AMR24.



PANNING IN CIRCLES

When we saw this product we thought it was really good fun and for those of you with such a specialised requirement it could prove an invaluable production tool.

To say that the **Cyclosonics FS1** is a panner would not be sufficient to explain its unique function.

The FS1 provides you with the ability to move the signal not just in a left-to-right panning mode; but also in a circular 'round-sound' format.

Three different modes are available in both panning and 'round' formats, with the ability to reverse the stereo output in either format.

The FS1 provides sophisticated signal adjustments and

keeps you informed with a visual display of LEDs in 2 circular arrangements.

The FS1 can be operated manually or triggered from outside sources.

For the full details on this unique 'circular' panner, call us on

01 624 6000

CABLE CATALOGUE

Mogami studio cable continues to be received enthusiastically and we have now produced a full catalogue, showing the available range.

The response to the sound advantages of **Mogami** cable, with its oxygen-free copper core and uniquely flexible construction, has been such that it is selling almost as fast as we can bring it into the country.

We are also using Mogami exclusively on our own installations and among the customers to benefit recently have been Park Lane, Glasgow and the PWL studio complex.



MOGAMI
BY STIRLING

Mogami patch cords are now available in a choice of four colours - Red, Green, Blue or Black to make channel identification easier. Full details are in the new catalogue. Phone for your copy - **01 624 6000**.

NEW VALLEY EFFECTS

Valley International have launched a brand new range of effects which are of especial interest to musicians/composers working within budgetary constraints.

The Micro FX range offers many of the features of the established Valley effects at a

lower price level.

The range includes a Compressor, a Noise Gate, a De-Esser offering single ended, single channel noise reduction, a Level Booster and a Level Attenuator.

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NEWS

People

● **CMX** have appointed Richard Sirinsky vice-president and director of marketing and sales, and Lawrence Weiland has been elected president and chief operating officer. Weiland joined the company in 1984 after 12 years with TriData and Sirinsky was previously with AF Associates.

● **Soundtracs** have appointed Phil Guy marketing manager. He will be responsible for increasing the company profile and day-to-day running of the marketing department. Guy was previously deputy publisher for *Studio Sound* and other associated publications.

● Graham Stephenson has joined DDA's R&D department to work with David Dearden on new product development. Stephenson comes from Neve where he was a project leader.

● R V (Rob) Castle has joined Neve, UK, as marketing manager.

Reporting to John Andrews, he will be responsible for promotion, publicity and advertising including liaison with Neve's subsidiary in the US. Castle was previously marketing manager with Rose Morris Ltd.

● **Fane Acoustics** have appointed Michael Wood to oversee sales and marketing.

● Simon Bohannon has recently been appointed CSD manager at Audio Kinetics with overall responsibility for the service and training department.

Tim Harrison has also joined AK as technical sales engineer. He was previously a studio maintenance engineer with Wessex and Battery Studios.

● Julian Young has joined Executive Audio to take the newly created position of international sales and marketing manager. Wood was with Vitavox for four years.

Tap-code automatic tape identification

High Speed Video's tape duplicating plant in Philadelphia is now recognising Tap-code, which was launched by Tape Automation recently. Tap-code is an encoding system that enables HSV to offer their clients accuracy in labelling and checking authenticity.

As well as title and catalogue number, each cassette is encoded

with information on date and time of duplication, programme length, country code, duplicating house and the machinery involved in producing it. The code enables a high level of automation in post-duplication sorting, labelling and packaging as well as reducing the time spent on quality control.

Playback confusion

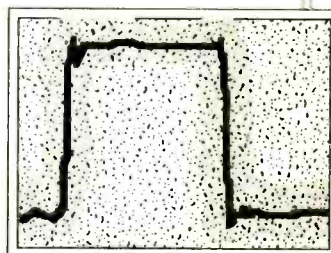
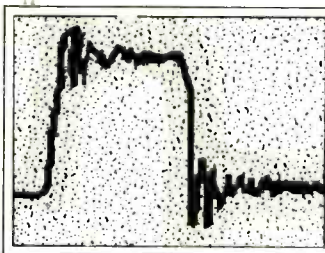
Digital audio and pro-tape specialist Playback has received an undertaking from Playback Digital Recording plc not to trade using any name containing the word 'Playback'.

Playback Digital Recording plc's prospectus outlined their intended business to supply record companies with master tapes of classical recordings whereas Playback's

existing business covers the sale of digital mastering tape to recording studios and record companies so confusion could occur between the two companies.

'Playback' is the registered trading name of Playback Studio Ltd, Playback Studio (Retail) Ltd, Playback Hire Ltd and Playback Communications Ltd.

*If you think they
look the same,
you need your
ears tested.*



It's a frustrating fact of life. When we sit down and listen critically, a domestic compact disc player frequently sounds better than even the best professional digital recording hardware. Until now, that is.

The waveform on the left reveals how a popular professional digital system handles a 1 kHz square wave. On the right the same waveform through an Apogee filter. The difference sounds as remarkable as it looks. It also confirms the suspicion that the people who buy compact discs might just be able to hear it too.

Unless your digital system includes Apogee anti-aliasing filters. Our low dispersion, linear phase filters simply smooth away that unwanted 'edge' from professional digital recordings. Apogee filters can be retrofitted to CD Mastering systems or to any digital multi-track recorder. They even breathe new soul into the good old F1.

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APRS PREVIEW

This year's annual exhibition of the Association of Professional Recording Studios will be held at Olympia 2, Olympia, London from June 22nd to 24th. As usual we have compiled a preview of the exhibits from information available to us at the time of writing. Studio Sound will be exhibiting in conjunction with sister publication One to One. Both editorial and advertising staff will be in attendance at the stand and around the show. We look forward to meeting you

A

● **ABAC-Rustin:** the ABAC digitally-controlled *Command* console with its latest updates.
● **ACES:** the latest update to the SECA AR2400 24-track machine with redesigned transport, new autolocator, revised metering. The machine is also available as a 16-track, the AR1600. Products being launched include the low cost AX22 and AX32 active crossovers with switchable crossover points for sound reinforcement systems, and SL30, SL57 and SL96 power amplifiers for medium to high power applications. From Studio Magnetics, the full range of tape machines will be shown including the SML1216II ½ inch 16-track and the Omega 24/32-track. ● **Acoustics Design Group:** details of their acoustic design services and consultancy together with examples of recently completed projects. ● **Adams-Smith:** a new remote for the Zeta-Three audio/video/MIDI synchroniser. The Zeta-Remote is a fully-equipped editor/controller with 100-address autolocate capability. In addition to all the control functions of Zeta-Three it provides additional programmable function keys, numeric keypad, transport control keys, dedicated display keys, an UNDO key and non-volatile memory. New for the 2600 is an automatic dialogue replacement system and the 2600A/V editor has new MIDI triggers allowing integration of samplers and other MIDI-controlled

outboard equipment. It also has C-Sound digital sound envelope display providing the equivalent in audio terms of slow motion and still picture edit decision making with any existing analogue or digital audio recorders. ● **Audio Digital Technology:** featured products will include the retrofit board for the Sony 701 enabling a digital output conforming to AES/EBU standard. This will allow digital transfer to the Sony PCM 2500 and other RDAT machines. Also on show will be the Real Time Logic MTI, Mac Timecode Interface (for use with Apple Macintosh), which will read and generate all formats of timecode, convert timecode to MIDI timecode and direct time lock, and has two MIDI input ports and four MIDI outputs with comprehensive routing. ● **Audio Systems Components:** wide range of broadcast orientated products including the Mix 3/1 ENG mixer, modified PR99 tape machine. ASC modified Technics SL-P1200 CD player for pro users. Also on show will be products from Applied MicroSystems and CB Electronics. ● **Audio Vertrieb:** CB-1 mixdown automation. This computer-based system controls level and mute/demute functions on up to 64 channels. There is also provision for the automation of virtually any audio source and the provision of the CPI-RC remote control for fader rather than computer keyboard control. ● **Audix:** examples from their range of broadcast audio products. ● **AES (Audio Engineering Society):** will have

full details on forthcoming AES events, AES publications and membership details. ● **Akai:** DR-1200 digital multitrack recorder and S-1000 stereo digital 16-bit sampler for the first time in the UK. Up to three DR-1200s can be synchronised to give 36-track capability and using standard 8 mm tape format. The S-1000 has a 2 Mbyte internal memory, 44.1 kHz sampling frequency and S-900 sound disk compatibility. The Akai Digital Matrix Patchbay will also be shown but with several software changes from the original system launched a year ago. ● **AKG:** will introduce several new microphones including the MicroMic series of miniature lightweight condensers for close miking. The series includes the C401/B9 contact mic designed to handle mid and upper frequencies while its partner, the C402 is designed for the bottom end. C408/B9 and C409/B9 are miniature clip-ons for close miking. The C410/B9 is an update of the existing C410 headset mic. New generation software for the ADR 68K digital reverb and effects unit will be shown for the first time with new split programmes and MIDI features, enhanced sampling facilities and further presets. The full range of dynamic and condenser mics will be shown with headsets, the new self powered LSM 75 75 W studio monitor, the TDU 8000, and the range of Dynamax cartridge machines. ● **Agfa Gevaert:** the complete range of Agfa magnetic products including digital audio tapes, analogue audio tapes, loopbin duplication tapes and cassette tapes. ● **Alice Soundtech:** the Series A range of portable recording mixers with input channels from 4 to 24 into 2. ● **Allen & Heath:** featured will be the new Phantom console of which two of the three frame sizes will be on display—36, 44 and 56 modules all of which may be fitted with integral patchbays. Standard feature is the Mute Processor System, which gives 32 patch memories of input and group muting with MIDI control possibilities. Channel features include four-band EQ with sweepable mids, six aux sends and 16 bus routing. Also on show will be a Sigma 24 with integral patchbay. ● **Amek:** in addition to their ground floor exhibit, there is a demonstration room in which there is a full working model of the APC1000 Assignable Production Console fitted with GML moving fader automation. On the stand there will be a full audio demonstration of G2520 Master Recording Console also fitted with GML automation although Audio Kinetics MasterMix and Digital Creations Disk Mix are offered as options. Also on show will be the Angela, the BCII Multipurpose Broadcast Console and the Classic Advanced Broadcast Post-production Console. ● **Ampex:** full range of magnetic tape products for professional digital and analogue applications. ● **AMS:** featured will be the Logic 1, a dynamically automated digital audio mixing console that integrates with AudioFile. It has initially been



SECA console from ACES

Hundreds of Matchless consoles in use around the world testify to three years of continuous success in the 24 track studio market. A continual programme of innovative research and development has ensured that the console remains ahead of its competition.

The latest updates mean that it is now available with a range of VCA fader and mute automation systems. Disk-based on standard PCs and SMPTE/MIDI converters that you buy off the shelf, rather than expensive dedicated computer systems, they offer unrivalled facilities at an unbeatable price.



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configured to work with *AudioFile* but will function as a standalone system presenting the operator with a mixing surface of conventional layout and appearance. Other products on display will include the *AudioFile* in standalone version and the full range of AMS digital signal processors; and examples from the Calrec range of products including the *UA8000* analogue audio console in 48-channel version, the Calrec *Minimixer* plus the full range of standard microphones and the *Soundfield*. ● **ANT**: will display and demonstrate the full range of *telcom* *c4* noise reduction systems including the new *E413* 24-track unit. ● **Atlantex**: will feature Seck consoles, SED stands and Fostex recorders. Demonstrated will be the Fostex *E16* with the stereo *CTTC E22* and the stereo *E2*. Also on show will be the Model *20* and *80* machines for budget applications. From SED there will be a range of stands, consoles and trolleys for 19 inch rack, shelf or surface mounting of equipment; while Seck will have desks from 6/2 to 18/8. ● **Audilec Distribution**: full range of products from Audio Technica including launch of *AT 40* series microphones—modular capsules offering true condenser designs in shotgun, lobed, omnidirectional, cardioid and hypercardioid types—and the new *900* series headphones. Also recording equipment from TOA and sound reinforcement equipment from RCF. ● **Audio Design**: demonstrations of two variants of the *SoundMaestro* digital hard disk recording system. *Studio-Maestro* is designed for creative audio compilation, singles editing, sequencing and spin-in against timecode. *CD-Maestro* is a specialist digital mastering system complete with CD subcode listing facilities. The *ADMIX* digital fader will be demonstrated coupled to *SoundMaestro* and Audio Design will be able to discuss a broadcast *SoundMaestro* machine. The *DIGI-4* 4-channel PCM processor will be shown

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working with U-matic format. Completely new will be the *PRODAT*, a professional version of the Sony *DTC1000* DAT machine, rebuilt into a 3U rackmount unit with balanced *XLR* inputs, standard AES/EBU interface and record capability at 44.1 kHz. This conversion is also being offered as a retrofit service. Finally there will be the full range of analogue dynamic control products together with RTW light meters. ● **Audio Developments**: will introduce the *AD066-11* 2-channel microphone amplifier—most recent addition to the *Port-a-Flex* range developed to meet the interest in MS recording techniques providing inputs for two powered stereo mics with monitoring facilities. Also exhibited will be the *AD145-E* edit mixer and the *AD062-M* multimixer, the *AD110* computerised mixing system, and the *AD160/260* ENG mixers that have now been enhanced with a talkback feature, plus the range of distribution amplifiers and portable mixers. ● **Audio FX**: details of their audio equipment hire services. They will also show the *Voyetra* range of MIDI software and hardware for IBM PC and compatibles. ● **Audio Kinetics**: new products will include the *ES 1.11* synchroniser and the *ES Eclipse* controller being shown as part of an EBus system. *Reflex* automation will be shown. This is a centrally-controlled fader, muting and aux switching system that can be fitted to any console providing both off and on line facilities. Also new is *Wiper*, a video wipe or countdown inserter that provides a visual cue facility for artists, producers and anyone involved in the post-production process. Existing products being shown include the *Pacer*, *Pacer Pad 2*, *Striper*, *Gearbox*, *VTL*, *MasterMix* and *Q.Lock*. ● **Autograph Sales**: established range of Meyer Sound loudspeakers and

associated products for the sound reinforcement and recording industries; two new ASL racking packages, the *RS22* and the *RS23* featuring speaker output multiway connectors and multiple amplifier sensing, designed to reduce the size and cost of larger Meyer concert systems whilst increasing flexibility; a representative selection of modules for the Cadac *E*-type console specifically designed for live sound applications (Autograph are European distributors); and the full range of Summit Audio valve signal processors including the *TLA 100A* compressor limiter, the *TPA-200* mic preamp, and the *EQP-100/EQP-200* single and dual channel compressors. ● **Avcom Systems**: cassette duplication equipment. New for the show is the Telex *6120XLP Pro Series* system. The CD series of duplicators now has improved heads. The Telex *Copvette Series II* will also be shown. This is a redesign of the *Copvette 1&1* offering higher quality copies and increased reliability.

B

● **BASF**: full range of magnetic tape products including digital audio tape, analogue audio tape, loopbin mastering tape, duplication tapes, and the range of calibration tapes and cassettes. ● **Beyer Dynamic**: first showing of the new *MCE86* electret gun mic and the extra small pocket transmitter for the Beyer radio mic. The *DT100* headphones will be shown in an alternative all-black finish alongside the new styled *DT108* and *DT109* communication headsets. The *MC740* large diaphragm studio condenser mic will be demonstrated with a new range of accessories. The full range of other Beyer products will also be on show. ● **Branch & Appleby**: full range of replacement audio tape heads plus NAB cartridge, video sound and duplicator types. Electronic products include the B&A looping video/film/sound post-production controller, Skotel and B&A timecode products, audio test and maintenance products. ● **Bruel & Kjaer**: featuring their newly launched *4011* cardioid microphone. The series *4000* omnidirectional mics will also be shown, alongside the Grid *UA0777* black nose cone for the *4003* and *4006* omni pattern mics to provide a true omni response at all frequencies. There are to be further product announcements at the show. ● **BSS**: featuring the *DPR-502* noise gate and the *MSR-602* microphone distribution system. The *DPR-502* incorporates Auto Dynamic Enhancement technology (ADE) to reduce the loss of leading edge audio information common in noise gates. Also on display will be the *FDS-360* frequency dividing system and the *DPR-402* compressor/limiter/de-esser.

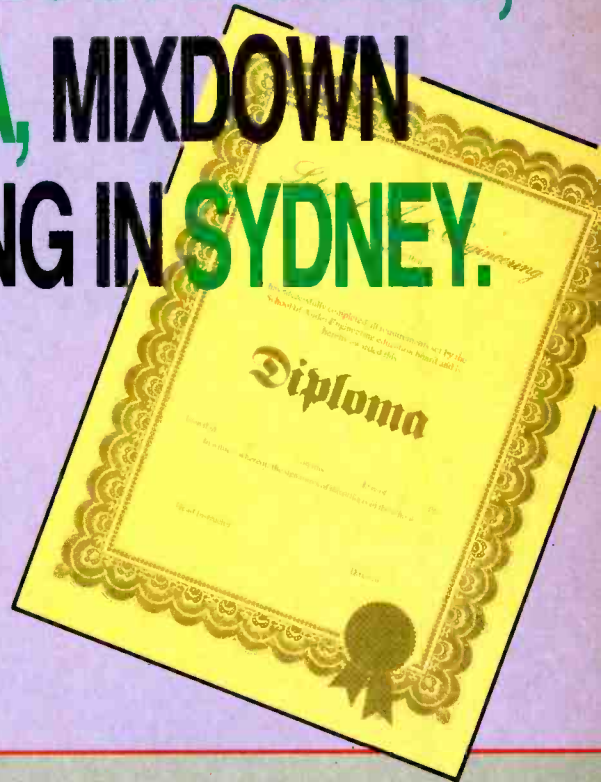
C

● **Cadac**: will feature modules from the *CD1000* multitrack mixing console as well as other console products including the model *E* theatre console, and models *B* and *A*. ● **Canadian Instruments & Electronics**: wide range of cables, connectors and accessories. ● **Canford Audio**: a selection from their wide range of studio interfacing, interconnection, fitting and furnishing products. New for APRS are a phase correlation meter and an 'utterly splendid' razor blade holder. ● **Cetec International**: examples from the range of duplicating systems and loudspeaker drive units. ● **Citronics**: examples of the range of power amplifiers, processing and mixing products.



Amek APC1000 assignable production console

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● **Connectronics:** the CR75 modular cable reels and range of patchbays, stagelink systems and assemblies. Also the complete range of cables and ancillary hardware for pro audio, music and broadcast applications. ● **Court Acoustics Sales:** Court products including the SA-30 realtime spectrum analyser, the Sharnfield PA mixing console, the EC7 electronic crossover system and the Black Box and C3 systems. Also on display will be microphone products from Milab. ● **Cue Systems:** sound reinforcement loudspeaker systems comprising cabinets and control electronics. ● **Cunnings Recording Associates:** examples from their ranges of professional tape machines and accessory products. These include the Studio 8 professional tape machine; the Marantz pro portable cassette recorders—the CP230 2-head and the new CP340 3-head recorders; further examples from the Marantz range of audio equipment; tape recorder products from Revox and Tascam; and details of the company's duplication and supply services.

D

● **DDA:** the full line of mixing products will be demonstrated including the AMR24 split recording console, the D series consoles, the S series consoles, and the DD 500 and DD 1000 electronic crossovers. Featured will be the DCM 232 in-line console that now has updated control software and VCA fader automation. ● **Digital Audio Research:** will be showing SoundStation II for the first time at a UK exhibition. Described as a second generation system, SoundStation II is a digital audio disk-based recorder and production centre providing multichannel audio recording and signal processing combined with instant access audio editing. Features include reel rocking, varispeed with sample rate conversion and timecode lock to picture. The control console has a touch sensitive screen for manipulation of many commands. Applications include CD mastering, music and dialogue editing, film and video post-production. ● **Digital Creations Corp:** second generation version of their moving fader console automation system for the first time in Europe. ● **Diless International:** introducing a new full duplex intercom system by the name of ProCom. ProCom features pushbutton dialling with each station able to make wide variety of connections even several stations connected on the same line. Also available is remote station with PA outputs. ● **Dolby Laboratories:** the Dolby SR system will be the featured theme of the stand. Dolby say that more than 12,000 tracks have been installed—including over 300 multitrack installations (as of early April). The whole range of Dolby products for music recording, film and TV post-production, cassette duplication and transmission systems will be shown. The new SDU4 Surround decoder will be shown in the UK, for the first time. This unit has been designed to enable monitoring of TV or video Dolby Stereo soundtracks. ● **D&R:** completely operational Dayner console with 32 channels of C-Mix automation linking an E-16 to a U-matic to demonstrate post-sync applications. Also on show will be the Stylx split type console and the Airtec broadcast console, both of which are available with various options. The complete range of signal processors will also be exhibited including the new Multigate and De-esser. ● **Drawmer Distribution:** first showing of DF320 universal noise filter single-ended noise reduction system,

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which combines programme dependent noise filter with auto-attack expander and can operate at -10 or +4 dB; and E101 passive coil equaliser 4-stage single-channel passive equaliser, which uses precision wound coils in order to reproduce the EQ sound of the '50s and '60s. Other products on show include the recently introduced M500 2-channel dynamics processor, the DS 201 dual noise gate, the DL 221 compressor/limiter, the DL 231 expander/compressor, the 1960 valve compressor, the LX 20 compressor/limiter, the M401 Midiman and the T102 gate interface.

E

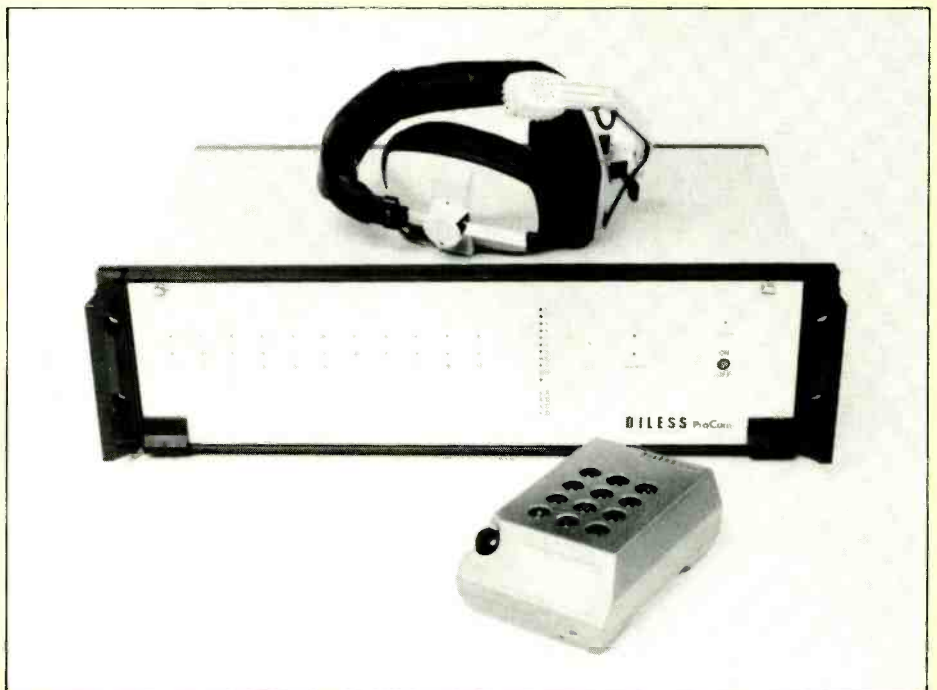
● **Eardley Electronics:** TT402 audio transmission test set, which is an enhanced version of the TP401, the Audiograph 3300 modular measuring system for audio and electroacoustic applications, plus the entire range of Neutrik pro-audio connectors including the Speakon amp to speaker connector system. ● **Eastlake Audio:** photographs of projects both underway and recently completed. Eastlake personnel will be on hand to discuss new projects. ● **Electromusic:** featured will be the Scanalyser, a handheld continuously sweepable combined frequency analyser and sound pressure level meter. It offers detailed analysis of all frequencies from 20 Hz to 20 kHz using an internal 1/3-octave filter and a 24x1 dB LED display. It is not limited to ISO centres and can locate differences in between these reference points. The unit will

also function as an SPL meter. Also featured will be the Crest range of power amplifiers, for which Electromusic are now UK agents, and includes the 8001, which provides 1200 W/channel into 4 Ω load and the new 6001, which includes a plug-in internally adjustable crossover module.

● **Embermen:** will launch the Otis Power Station compact 125 W monoblock power amplifier, the first of a range of products from Otis Communications. The amp is 1U high and half rack width and features switchable input sensitivities. Applications include near and midfield monitoring, foldback, communications, and location playback. ● **EMO Systems:** range of stage and studio ancillaries including the EMO Direct Injection Box, the range of cable testers and the systems range including The Switcher. Also details of the company's contract design and production facilities. ● **Evenlode Soundworks:** products from Steinberg, JL Cooper, Clavia, Passac, and Digidesign. ● **Executive Audio:** SAJE mixing consoles, the full range of C-Audio power amplifiers, Gauss loudspeakers, Samson radio mics, AMB measuring tools, EAA power amplifiers and EAW loudspeaker systems. Also on show will be the Anchor range of portable sound systems.

F

● **Ferrograph:** featured exhibit will be the Series 9 digital audio recorders with the Model 9000 Optical Recorder/Editor and the Model 9500 Magnetic Digital Workstation being demonstrated. The 9000 incorporates a removable



Diless Pro-com intercom system



Drawmer M500 dynamics processor

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Kingsley Ward
Owner Rockfield Studios

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 **Neve**
A Siemens Company

5¼ inch 466 Mbyte WORM disk. On display for the first time will be a dedicated digital remote edit controller to extend the editing capabilities of the 9000. It is possible to record up to 12,000 edit instructions without reducing available audio recording capacity. The 9000 also now incorporates a digital audio interface compatible with Sony 1610/30 format. The 9500 Digital Workstation comprises the 9500 Digital Cartridge Recorder, a Macintosh computer with dedicated editing software and EXD hard disk storage expanders. The removable magnetic cartridges store the final cuts and the edit commands. Completing the Ferrograph display will be the AVM 77 range of analogue tape machines, the RTS2 and ATU1 audio test measuring system and the Ferrograph range of defluxers. ● **Film-tech Electronics:** a selection from their ranges of portable equipment for video and film sound recording, including the Compact range of 3- and 4-channel mixers, and the new PAM 42 4/2 shown in prototype last year, featuring microphone powering, attenuators, PPMs, compressor and headphone monitoring, panpots, group select switches, slate mic, M+S decoder and 12 V battery pack. Also on show will be the VTM800 8-channel mixer for use in video edit suites and a collection of 'little black boxes' including a camera battery charger, a battery charger, mains PSU and a new MS headphone amplifier/decoder. ● **Focusrite:** making their first UK appearance will be a range of dynamics units featuring compressor/limiter, noise gate/expander and de-esser, all with full access to the sidechains. All inputs and outputs are balanced and floating and initially the units will be available as 7U high modules to complement the existing range of ISA channel amplifiers using the same racks and PSU. Shown for the first time anywhere will be the channel strips for the newly launched range of consoles. Consoles may be ordered with a full choice of internal or remote controlled mic amps and a full dynamics section. A new version of the ISA 110 7U rack mounting frame will be shown featuring a new modular power supply allowing reduced dimensions and improved access and servicing. Also on show will be the existing range of ISA channel amplifiers and remote controlled mic amps. ● **For.A:** featured will be the Sirius-100 hard disk-based digital audio memory system providing up to 1,000 minutes of recording time. Sirius is a multichannel system enabling up to eight remote units and can address the same memory simultaneously. For.A will introduce the multichannel system at the APRS showing three remotes with the one memory. Additionally one

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fully computer-controlled system will also be shown. ● **Formula Sound:** demonstrating modules for their PM-80 modular production mixer and will show the QUE-4 and QUE-8 studio headphone foldback systems. ● **Future Film Developments:** wide range of cables, connectors and accessories for the professional audio, broadcast and video industries. Also range of products from Neumann, Tannoy, Philip Drake, Stallavox, RTS, Soundex and Canare. ● **FWO Bauch:** products from Studer, Revox, Harmonia Mundi, Lexicon, EMT, Harrison, Neumann, ITC, Gotham and Tannoy. New products will include the first UK showings of the Studer DE4003 DASH format digital editor, the A730 professional compact disc player (first true product of the joint Philips/Studer venture) and the A807 ½ inch 4-track budget recorder. New from Revox will be the C270 2-track, C274 4-track, C278 8-track and the PR99 III tape machines. From Lexicon there will be the first UK showing of the now fully-operational Opus digital post-production system. EMT will have the first UK showings of the EMT 448 E Spot Recorder, the EMT 442 Digital PA Processor and the EMT 448 Unimatic digital audio spot recorder. Harrison Systems will be launching a new computer system with many enhancements for the SeriesTen.

G

● **Gautam:** range of live sound consoles and rackmounted mixers. ● **Graff Electronic Machines:** new Crystal high speed copier available in stereo or mono versions with 8x or 16x speed options. Also on show will be the Diamond and Sapphire copier systems and a new heavy duty bulk eraser. ● **gtc:** the new off-line/on-line video editing system is being shown in the UK for the first time. Other exhibits include the Edimark, electronic equivalent of the film editor's grease pencil with LTC or VITC operation, JVC or Sony remote machine control and a 3½ inch disk storage for edit information; the Edilog, which enables the definition of edit points on video tape; the Edisync, which is a 1U 19 inch rack version of the Editon synchroniser; the Editon MSE universal machine control system; and CARL, the Computer Assisted Remote Link designed specifically as a remote link for the Quantec QRS/XL.

H

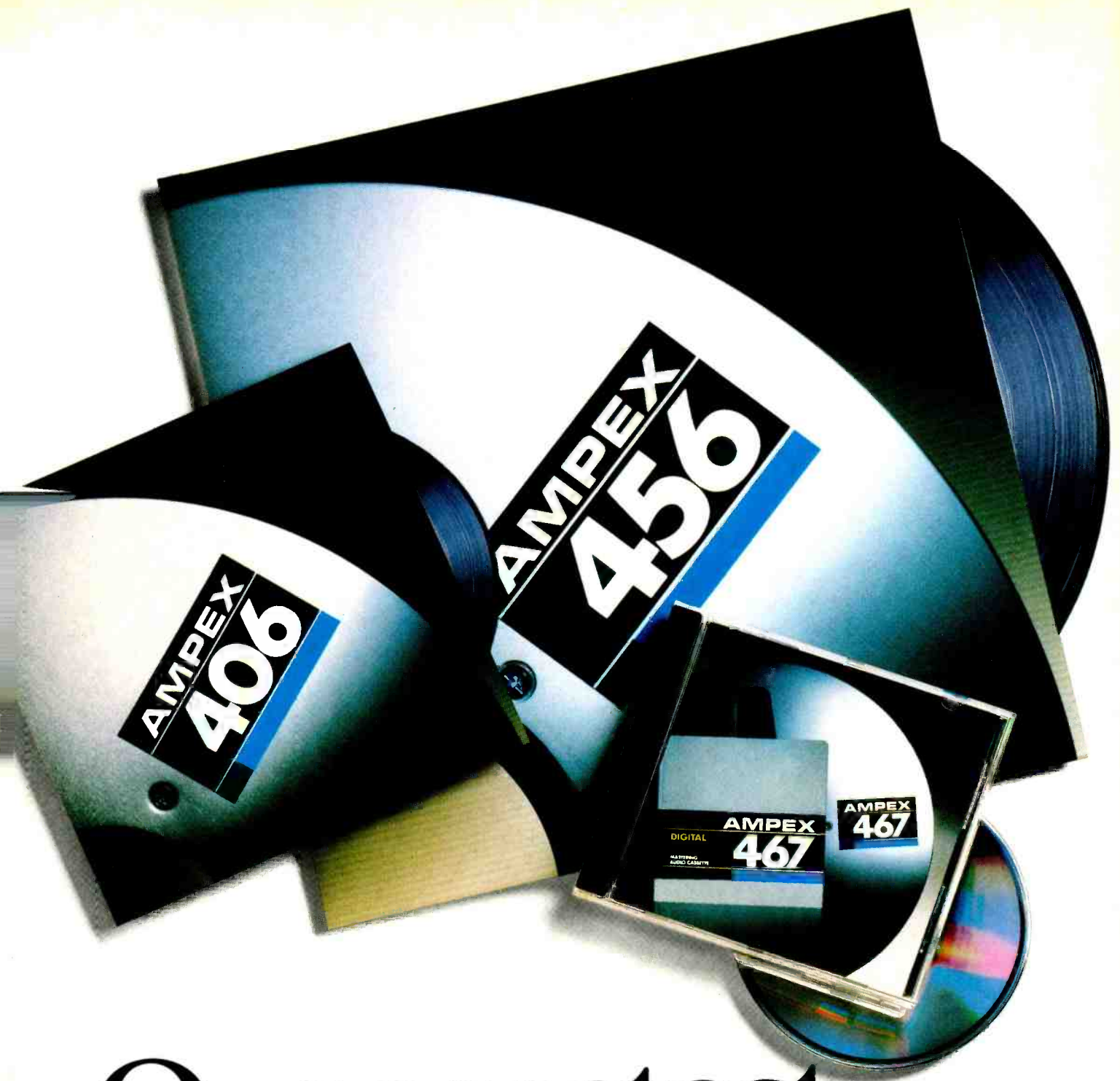
● **Harman Audio:** under the heading of Harman Studio Systems, Harman will be showing several new products. The featured item is an own-developed console, REIMS, which is a 24-track equipped console for recording and production applications with fully integrated automation. The Fostex synchroniser system will be demonstrated with the full Series 3 software implemented and running with a range of recorders. From ART will be the MultiVerb reverb and effects unit and the IEQ intelligent equaliser system with full RS232/MIDI control. From Rauch will be the new compact DVT300 1.6 kW 2U high amplifier. There will also be a wide selection of products from JBL, UREI, B&K mics and Focusrite.

● **Harrison Information Technology:** the DSA series of amplifiers that range from 150 W/channel to 600 W/channel with built in limiters; the X1 series of MOSFET amps ranging from 75 W/channel to 1000 W/channel; the GP series of equalisers and the AC series of active crossovers with built in limiters, subsonic filters and selectable crossover frequencies. ● **Hayden Laboratories:** products from Kudelski, Sennheiser and Denon. From Nagra-Kudelski there will be the first UK showing of the T-Audio/3, which is fitted with an improved control panel offering easier and more flexible operation, and improved self sync replay with improvements to the amplifiers and leads. This machine will be demonstrated in conjunction with a small video edit suite. From Sennheiser will be a selection from their wide range with emphasis on the low noise studio microphone range and the radio mic range. The Denon exhibit will include the 950F professional CD player and the full range of Denon products. ● **HHB Hire and Sales:** featuring the Sony family of DAT recorders. These include the DTC1000ES consumer machine, the new portable TCD-10D machine, the PCM2500 professional DAT recorder and the new professional PCM2000 portable. HHB will also be demonstrating the new Sony DAE3000 digital audio editor in conjunction with the PCM1630 CD master system and the PCM3324 multitrack. Also on show will be the Akai DR1200 12-track digital recorder and the Yamaha DMP7D, which now includes digital inputs and outputs with accessories including a format converter. Signal processor on display include the Drawmer M500 dynamics processor, the Roland R880 digital reverb and the Sony MUR201 low cost reverb. Other products include items from Lexicon, AMS, Dolby, Amcron, AKG, B&K, E-V, Neumann, Sennheiser and Shure.

● **HH Electronics:** launching the TA series of speaker cabinets consisting of the TA2 and TA3 full frequency systems, the TA-1 sub bass system and the C-1 controller. The TA2 and TA3 are 2-way and 4-way systems respectively and the sub bass unit extends response below 40 Hz. The C-1 controller sets frequency response alignment, crossover and limiter functions. Also to be launched are two 2-channel 15-band graphic equalisers, available in either preset or slider form. Also on display will be the full range of power amplifiers. ● **Hill Audio:** complete range of mixing consoles and power amplifiers to include the recently launched Remix 24/8/16/2 semi-modular console for recording and sound reinforcement plus the Concept series of five consoles with new patchbays and stands plus a new small frame size. The latest updates to the 00 and 000 amplifier ranges will be shown plus the mix series consoles. ● **Hilton Sound:** will be



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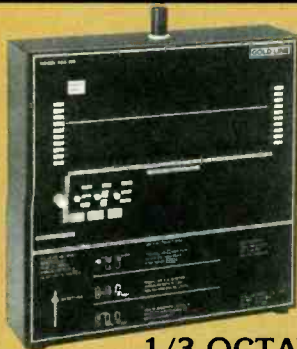
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APRS PREVIEW

making their APRS debut with their *PDASH* and *PDASH-2* digital transfer boxes. These are digital conversion units that allow direct transfer of digital audio between the *DASH* and *PD* digital audio formats and this will be fully demonstrated on the stand. Also on display will be details of the new equipment hire charges that allow for more economic hire use. • **HW International:** will be showing a new hand-held radio mic that is described as sounding as good as a cabled *SM58*, and with the ability to interchange the head with an *SM87*. A budget hand-held radio mic based on the *SM58* capsule will also be launched together with a low cost lavalier system. The full range of Shure mics will also be shown together with the mixers and troubleshooting equipment. HW will also show the Carver range of power amplifiers that they now distribute in the UK.

J

- **J. Butcher:** no information available.
- **Jackson Music Group:** details of second hand equipment for sale including complete facilities.
- **John Hornby Skewes:** full range of packaged accessories for studio and stage use including leads, plugs and other small accessories. Also under the *JHS* name there will be a range of rackmounted effects units and microphones. Also on display will be the full range of Audio-Technica microphones in the *Artist* and *Pro-series*. *JHS* will also have examples from their wide range of other products including Gorilla amplification, Rocktek effects, Seiko metronomes, Steven Music graphic equalisers and digital reverb, Synsonics drums and the Kahler *Human Clock*.

K

- **Keith Monks:** will feature their new range of powered monitor speakers for broadcast and studio use including a wide response 18 W mini monitor and a full range studio monitor. Also on show will be the *MkII* series of Keith Monks stands, booms and accessories, the new *IMP 2000* digital impedance meter, cable drums, the record cleaning machine and a selection of public address

products. Distributed products on display will include Toa and Shure products and the range of Lectrosonics range of radio mics. • **Kelsey Acoustics:** showing for the first time will be the products of US company ADA. The *MP-1* is a MIDI programmable valve preamp with two valve stages and a solid state stage for compression, 4-band EQ, stereo chorus and delay. Contains 128 user memories MIDI addressable. EQ designed to replicate sound of well known guitar amplifiers. The *MQ-1* is a $\frac{1}{3}$ -octave programmable graphic with a constant Q filter design and 14 bands/channel, 99 stereo memories and MIDI control. The *Pitchtraq* is a pitch transposer. The complete range of Carver power amplifiers will be shown including the optional *PMX* plug-in crossover for the *PM350* and *PM175*. Kelsey products on display include the *NG4* 4-channel noise gate and the *EQ4 MkII* four full-band EQ channel unit. Other products include the *Isotrack* range of patchbays including MIDI, BNC, *XLR* panels and MIDI Thru boxes. Finally samples from the ranges of cables and connectors carried. • **King Instrument Corporation:** introducing the new R-DAT cassette loader as well as the new 2797 dual supply audio cassette loader which features a two pancake supply system that provides uninterrupted production. Established product, the 2500 dual supply VHS video cassette loader will also be shown. • **Klark-Teknik:** the series 300 range of graphic equalisers, the *DN60* realtime spectrum analyser; the *DN716* multiple output digital delay; *DN780* digital reverb with latest software; and the Klark Acoustic active monitor speaker, the *Jade Mk II*. New will be the Series 400 range of parametric equalisers, which includes the *DN410*, a dual-channel 5-band design with switchable stereo mono operation, and the *DN405* 5-band single-channel design. The latest modules for the *Midas XL* range of consoles will also be shown. • **Klotz:** samples and catalogues of their 58 different types of cable for audio and video applications. Also on show will be the *Audio-Line* range of patchbays available in TT phone or PO 316 formats, cable drums, active and passive DI boxes including a new battery and phantom-powered model. • **Korg:** will be showing examples of their range of synthesisers and signal processing equipment. • **KW Electronics:** specialise in manufacturing equipment to customer requirements. Equipment designs include self-op broadcast consoles, film dubbing consoles, switching matrices, talkback systems, etc. Featured will be a self-op console designed for Mercia Sound and a prototype digital switching matrix. The latest version of the *KW Reporter* cassette machine will also be shown.



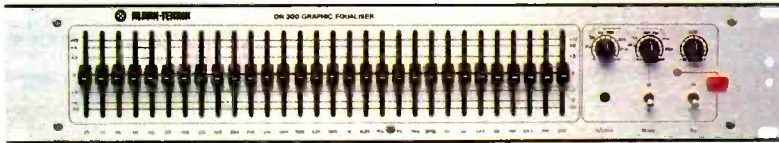
Hill Audio Remix

30 band 1/2 octave graphic equaliser – Frequency response $\pm 0.5\text{dB}$ (20Hz – 20kHz). Distortion (+4dBm) $<0.01\%$ at 1kHz, Equivalent input noise $<-90\text{dBm}$. Auto-bypass failsafe, Low and High pass variable filters, Balanced XLR input and output.

Also available for stereo applications DN360 Dual Channel 30 band 1/2 octave graphic equaliser.

DN300

GRAPHIC EQUALISER



Dual channel 5 band parametric equaliser – Frequency response $\pm 0.5\text{dB}$ (20Hz – 20kHz), Distortion (+4dBm) $<0.01\%$ at 1kHz, Equivalent input noise $<-90\text{dBm}$, 100% Frequency overlap for each filter + variable bandwidth, Bypass, XLR inputs and outputs.

Also available DN405 Single Channel 5 band parametric equaliser.

DN410

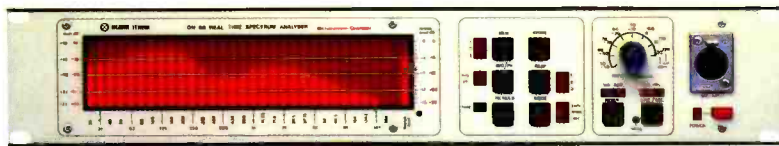
PARAMETRIC EQUALISER



Real time audio spectrum analyser – 30 band 1/2 octave + overall level, LED display, Pink noise source, Mic/line XLR input, AT1 measuring microphone, X-Y plotter output, Add-on reverbation analyser available.

DN60

SPECTRUM ANALYSER



One input-three outputs digital delay line – Frequency response $\pm 1\text{dB}$ (20Hz-20kHz), Distortion $<0.01\%$ at 1kHz, Dynamic range $>90\text{dB}$, Minimum increment 20 micro sec, Delay range 0-1.311 sec, Digital conversion 16 Bit Linear, XLR terminated input and outputs.

Also available DN773 Stereo 10 sec. digital delay line.

DN716

DIGITAL DELAY LINE



Digital reverbation system – Bandwidth (reverb model) 20Hz-12kHz, Distortion $<0.003\%$ at 1kHz, Dynamic range 85dB, Digital conversion 16 Bit Linear, Arithmetic processor 32 Bit, Stereo processing, Balanced XLR input and outputs, 7 parameter control, 28 programme library, 50 user memories, Midi interface, Updatable programming, Remote control.

DN780

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Yamaha TX16W supersampler, 16 voices, full stereo, astounding memory. We are one of a strictly limited Yamaha dealer network capable of demonstrating this product. For more details give us a ring!

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Mike Howlett	(OMD, Joan Armatrading)
JJ	(Art of Noise)
Mike Pela	(Sade/Fine Young Cannibals)
Wally Badarou	(Level 42/Talking Heads)

For anyone interested in producing, these classes will present a unique opportunity. Tickets are £50.00 plus VAT each, details of dates & timetables are available from Paul Tingen on 01 249 1876. Book early to avoid disappointment.

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APRS PREVIEW

L

● **Lindos:** are demonstrating their LA100 audio analyser comprising LA101 synthesised oscillator and LA102 measuring set. Sequence testing is key feature of the unit's design and 10 ready-made test sequences are stored for transmission when required. Recent enhancements include fast repeating frequency sweeps and tolerance testing of sequence results with immediate Pass/Fail display. ● **Lyrec:** latest 16-/24-track 2 inch analogue multitrack recorder TR533 designed for easier audio video synchronising, now featuring a new tape deck and transport. Now available with Dolby HX Pro incorporated into record electronics. Other products include the duplication systems with the new 80:1 option and the FRED editing tape deck with new tape dump mode.

M

● **Marquee Electronics:** featured new products include the Eventide H3000 Ultra Harmonizer, which offers true musical harmonising and fully mono/stereo compatible stereo output; the Adams-Smith 2600AV audio for video editor with C:Sound, which gives the audio editor a visual representation of the waveform for fast accurate editing; and the GoldLine GL60 Reverberation Time Meter and the GoldLine ASA30B handheld ½-octave spectrum analyser. There will also be the first UK appearance of the Adams-Smith Zeta-Three remote control unit and an automatic dialogue replacement package for the 2600 System. ● **Martin Audio:** examples of their loudspeaker systems and processing electronics. ● **Mayron UK:** no information available. ● **MBI Broadcast Systems:** launching a new broadcast mixer to be known as the Series 16. It will have many of the features of the larger Series 24B but at a much lower cost. It will be fully modular with mono and stereo inputs with all the metering, monitoring, routing systems, muting and remotes that would be expected from a much more expensive console. There will also be fader options that will enable further cost reduction.

Other products will include the Series 12 console, which may be rackmounted, and a wide range of ancillary equipment including metering and monitoring panels, matrix switchers, distribution amps and intercoms, etc. ● **Michael Stevens & Partners:** details of their studio design and installation services. Products on display will include the KEF Professional and Reference series monitor speakers together with the new Professional Kube equaliser. This unit has plug-in cards to suit any of the reference series as well as the passive version of the P60 compact monitor. From Audioscope, the complete range of audio analysers will be shown including the new software-based Model 9000 all-purpose analyser and multichannel level display unit. The range of theatre and PA speaker systems from d&b audiotechnik will be shown including representative from d&b present on the stand. Also on show will be the established range of Rogers monitor speakers. ● **Minim Electronics:** range of presenters' clocks, studio clock systems and Ambisonic decoding equipment. ● **Mitsubishi Pro Audio Group:** established products include the X-850 32-track, X-400 16-track and the X-86 2-track digital recorders. On the mixing console

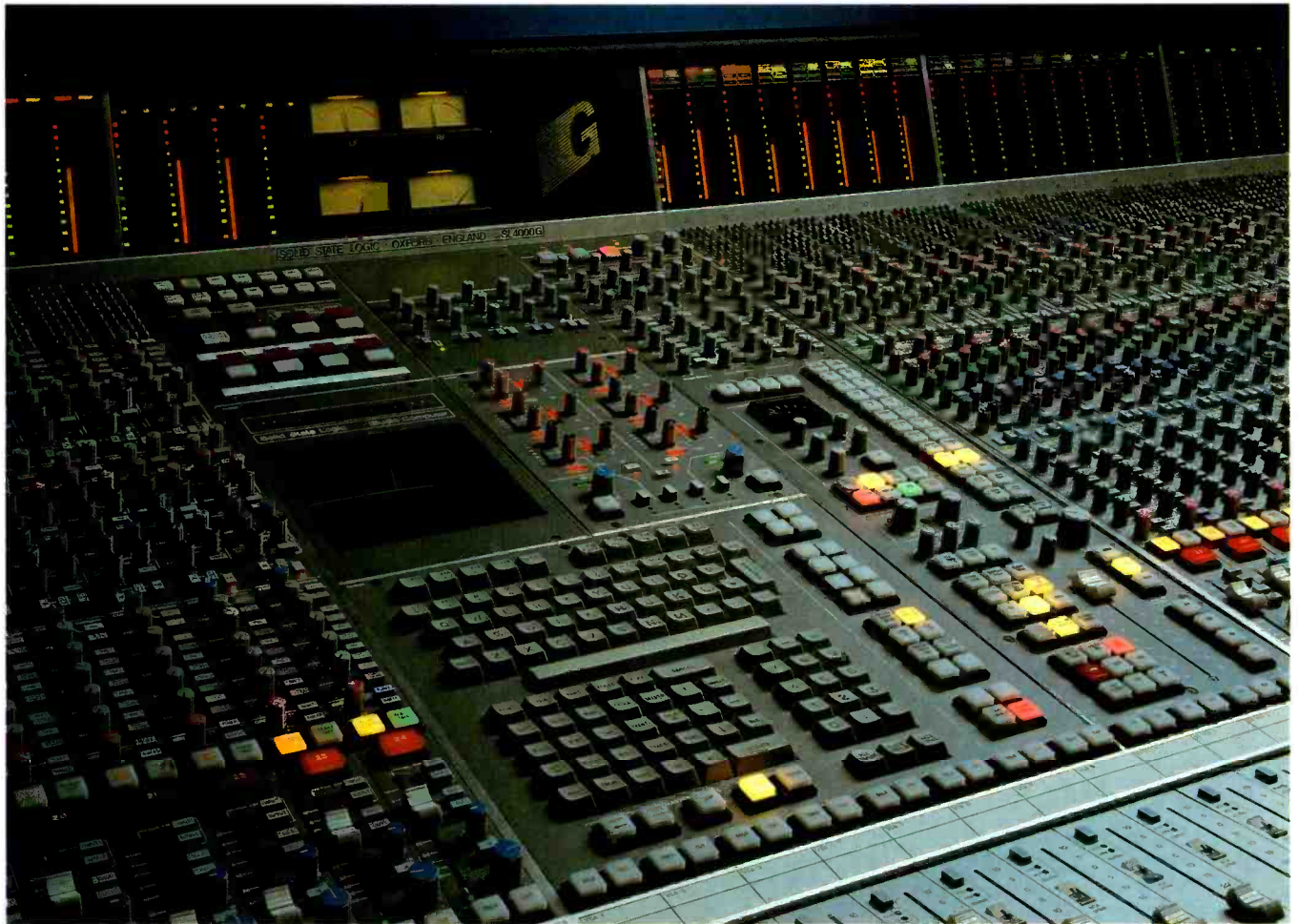
side the Westar and Superstar will be shown as will the ACS series High Performance Audio Crossbar Routing/Mixing Switcher. Three new products will be getting their first UK showing including the X-86C and X-86HS 2-track digital recorders and the XE-2 digital audio editor. The X-86C provides the same recording and playback facilities as the X-86 but has further playback compatibility with the X-80 format. The X-86HS is also compatible with the X-86 but offers the ability to record and replay at 96/88.2 kHz sampling rate resulting in a greater frequency bandwidth. The XE-2 editor is an editor that will control two X-86s for assembly or insert editing.

● **Mix Magazine:** US recording magazine. ● **Mosses & Mitchell:** as manufacturers of audio jacks and jackfields for professional recording and broadcast applications they will be showing examples from their wide range of products. New products include prewired jackfields typically with Edac 516/Varelco 8106 90-way connectors terminated to individual full screened twin conductor cables. All versions of normaling can be provided. Also new are 1U high panels containing two rows of 26x¼ inch jacks or as three rows in 2U panels. ● **MTR:** MTR series III range of consoles led by the ME 16, which is an 18-channel 16-track model. Derived from this console are 12- and 16-channel 8-track versions. These three consoles feature a Line 2 input on each channel for MIDI/sequencer signals feeding the in-line monitor controls. Other products on display include a dual noise gate, two MOSFET power amplifiers rated at 200 and 400 W-channel, a stereo 10-band graphic equaliser, a 40-way stereo jackbay, an active DI box, and Statik Raks enclosed 19 inch racks. Additional products will include the Cutec range of stereo mixers; the Rush 15249 2-channel equaliser; the Madrack D7 analogue delay line and Celestion SR series speakers and active controller. ● **Music Lab Sales:** full range of Rane equalisers and sound processors including the new AD13 audio delay and HM42 headphone mixer. Other new products include compact single- and multichannel interfaces and Kwik Fixers—attenuators, polarity reverse or ground lift in XLR form, from Pro Co Sound. The hire division will also be represented with details of the new hire rate structure.

N

● **Neal:** models from the wide range of recording and broadcast studio cassette machines will be shown. ● **NED/Harman UK:** are running demonstrations throughout the show for Direct-To-Disk, Synclavier and the Tapeless Studio. The aim of the demo is to show the speed and flexibility of Direct-To-Disk and the use of the optical disk WORM with 5½ hours of recording space per disk. The Music Printing Station, which can produce engraving standard music manuscripts from any form of music in the Synclavier memory will be on demonstration. ● **Neve Electronics:** featuring the most recent V series design including improved Formant Spectrum Equaliser with variable Q on the two mid bands, switchable Q on upper and lower bands. In-channel dynamics give separate release times on the combined noise gate/expander and compressor/limiter and further threshold controls allow precise fine tuning. DTC1 digital transfer console will also be shown along with the new Prism range of audio processors developed from the V series.

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APRS PREVIEW

O

● **Otari Electric:** a selection from their wide range of audio tape machines and duplicators. Featured will be the *MTR 100A* making its UK debut. This is a 24-track machine offering full auto-alignment for both record and playback. Pre-wiring for noise reduction is available as an option with a Dolby 'Cat 300' card being available offering both Dolby A type and SR on a single card. Also being introduced is the *MX50* a low cost twin-track machine. Centre-track timecode is now an option on the recently introduced *MX55*, which has also an optional console and overbridge added.

P

● **Paul Farrah Sound:** products from their hire stock plus equipment from Nexo, Soundcraft, Martin, Yamaha, C-Audio, Metro and Anchor.

● **Penny & Giles:** comprehensive range of studio faders and other audio/video controls. Featured will be the Motorised Studio Fader, which P&G describe as cost effective. Other products on display will include the multi-axis joystick controllers and the video control T-bars.

● **Phase Audio:** *Dynamic Precision* range of power amplifiers from Norway and the Strommer Audio range of loudspeakers.

● **Playback:** display will be devoted to all digital products including Casio DAT, Sony TCD-10D and PCM2000 portable DAT recorders and the Kenwood DAT car player. On the tape side Ampex 467 in multitrack and mastering widths will be shown together with DAT stock from TDK, Maxell and That's.

● **PRECO:** products from Digitec, Garmer Industries, Leavers-Rich, Pacific Recorders, Perfectone, Sound Technology, The Sanix Corporation and STL.

● **Presence Audio:** products from Jecklin, Opus 3, SAE, Spica, Vecteur and YBA. New products to the UK include Opus 3 monitors (featuring crushed marble cabinet material to eliminate resonances); Spica *Angelus* floor standing loudspeakers with the small *TC-50* models which have been improved; and YBA 3 preamp power amplifiers. Improved Jecklin *Float* electrostatic headphones, OSS Mic mounting disc and *Transdym 2* signal processors are also being shown along with SAE CD player, cassette deck and pre-amp.

● **Pro-Britro:** products from Westlake Audio, Lyrec, Sonosax, Aquarius Electronics, BGW Systems, SJ Court Associates, Unisound, Trident Audio, and Renkus-Heinz.

● **Pro Sound News:** European pro-audio news magazine.

Q

● **Quad Electroacoustics:** wide range of power amplifiers including the *520F*, *510*, *306*, *606*, and



Rane AD13 audio delay

405, together with the professionalised version of their electrostatic monitor, the *ESL-63 PRO*.

● **Quested Monitoring:** will be devoting more of their stand space to studio design this year. Photographs, drawings and specifications of studios in Switzerland, Luxembourg, Singapore and the UK will be displayed. On the monitor side, the *Q012* series on monitors has been updated and new parts will be shown. New products include the *Q210* and the *H210* with the former replacing the *Q209* and the latter is a 3-way passive monitor for the smaller studio. The *HM 415* 4-way active monitor has been revised and will be the centrepiece of the stand.

R

● **Radford Laboratories:** a selection from their ranges of power amplifiers and test equipment.

● **Raindirk Audio:** their new 32-track *Symphony* in-line console. Available in frame sizes of 40 to 60 channels with an integrated patchbay. Various automation and VCA packages are available. Also on display will be a 10-way distribution amplifier in a 1U rackmount box.

● **Ramsa:** the *WRS-840* mixing console for the first time in the UK, the recently launched *WR-X01E* pro micro mixer low cost system for A/V post-production, broadcast and simple recording applications. Also on show will be the full range of established power amplifiers, speaker systems and microphones.

● **Re'an:** introducing a new development in control knob design for many years with a range of collet and slider knobs featuring computer-controlled 2-colour manufacturing technology with indicator lines moulded into the body of any component. Samples and information are available on the stand.

● **Rebis Audio:** first UK showing of the *RA702 Multigate*, which features four frequency-conscious gates in a 1U rack. A sync facility has been added that links envelopes to shortest decay removing ragged tails from multipart lines. Also on show will be the *CompLimEx*, which features a variable knee compressor with independent expander/gate; the *MIDigate* and the *RA402* dual parametric equaliser.

● **Recording Engineer & Producer:** US recording magazine.

● **Roland:** featured will be the two new rackmount digital signal processors—the *R-880* digital reverb, which provides four separate and interactive reverb processors in one unit; and the *E-660* 2-channel 4-band or single-channel 8-band digital parametric equaliser. Both use 16 and 28 bit processing with MIDI capability. On the synthesis side, the *D-10*, *D-20*, *D-110*, *D-50* and *D-550* will be shown alongside the digital sampling modules *S-330* and *S-550* with the latter being demo'ed with the *SYS-553* sequencer software and the *HD-5/80* hard disk interface. Also on display will be the *MC-500 MkII* sequencer with *Turbo 500* software, the *TR-626* rhythm composer, the *SBX-80 SMPTE* sync box, the new *M-160* and *M-240* line mixers and the range of Boss *Micro Studio* modules.

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TASCAM

THE ATR80-24



**Don't just note
check out**

**the good looks,
the features!**

The ATR80-24 is more than just a pretty face.

Yet with all the features you would expect of a Professional 24 track recorder/reproducer, it is easy to overlook one of the most essential: the quality of the heads.

The fact is that we don't trust anyone else to make them for us. So for the last 30 years, we have designed and manufactured our own record/sync, reproduce and erase heads.

This resulted in TASCAM being the first multitrack manufacturer to achieve full playback frequency response in sync mode.

SYNC EQUALS REPRO - means no quality loss during track bouncing or overdubbing.

- * High density permalloy record/sync and repro heads with contourless configuration for hard wearing heads and optimum tape to head contact.
- * Erase head with overlapping tracks and glassbonded gaps for erasure precision.
- * Non magnetic ceramic capstan with high torque motor.
- * Smooth transport, controlled by three 8 bit D to A converters, even in varispeed.

- * 14 inch reel capacity and a wind speed of 375 ips.
- * Interface for external noise reduction system.
- * Optional serial interface for external control.
- * Sophisticated remote includes rotary shuttle, rehearsal and "sync lock" function enabling simple use of reference codes, such as timecode.

Run in to the '90s with an ATR80!

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Tel: 0923 225235. Fax: 0923 36290.
Contact: Martin Cann - Sales Manager

● **Scenic Sounds Equipment:** products on show will include the dbx RTA with RT60 software, the long awaited dbx 18-bit A/D converter, the Orban mic processor in production form; the *Editron* editing suite in its latest form; the Audio Precision *System One* test set with auto alignment and test programs for Studer tape machines, and three new interfaces; Shoeps MK21 subcardioid capsule; speaker systems from Genelec and products from the other lines represented.

● **Sellmark Electronics:** the Out Board Electronics MF-100 motorised fader. The design has a low inertia feel and is designed to retrofit most audio and lighting control systems. ● **Shep Associates:** specialists in restoration and customisation of Neve consoles. Also own products and consultancy services. ● **Shuttlesound:** new products include new Electro-voice Delta Max, ND 1 compression driver, RE45 and a new series of professional audio components; new Amcron MA2400 amplifier; new Samson broadcast series of wireless microphones; BBE 401 Unimax processor; Micro Audio PC280 POD programmer; the full range of Furman signal processing products and Greystone Industries' full production



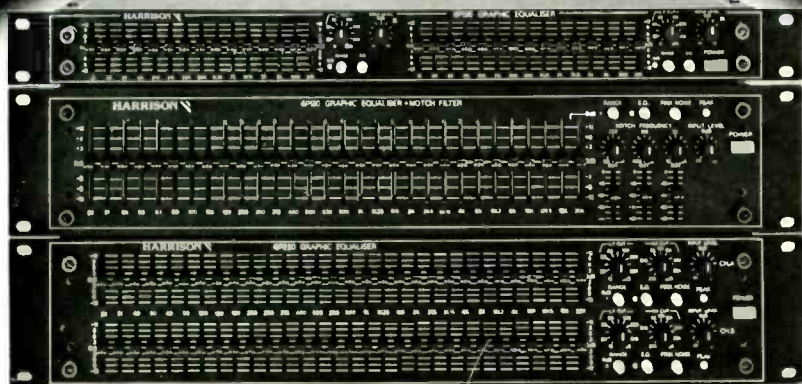
Pro range from Sifam

version of the *Inflexor*. ● **Sifram:** examples from their full range of vu meters and ppm indicators as well as low cost audio level meters and panel accessories. Further a representative selection of collet, push-on, pushbuttons and slider knobs will be shown together with fuseholders, miniature

switches, diodes and LEDs. ● **Solid State Logic:** featured will be the new *O1* Digital Production Centre, an integrated audio recording, processing and editing system which includes 8-channel mixing, EQ and dynamics control, and hard disk storage of one hour of stereo audio (expandable to two). Also new will be the *SL 4000 G* series music recording console being shown in the UK for the first time. The *G* series studio computer will be shown, which forms an integral part of the *4000 G* but may also be retrofitted to *4000 E* series consoles as may the *G* series EQ modules. Also on show will be the *SL 5000 M* series Audio Production consoles for broadcast applications and the *SL 5000 M* series Film Production series designed for film post-production work. ● **Sonifex:** will feature their *HS X* series cartridge recorders with enhanced specification including digital timer, noise reduction, headphone monitoring and revised operational logic. Established products on show include a *HS200* broadcast cartridge machine, *CQ* and *CQ-R* series NAB cartridge recorders. *HSE* autosplice/finder eraser for cartridge recordings and the *HY01* telephone hybrid telephone balance unit. ● **Sony Broadcast:** digital product will be heavily featured. One featured item will be the *PCM-3324* multitrack with two under the control of the new *DAE 3000* editor, the replacement for the *DAE 1100*. It will also give edit control of the *PCM-3402* 'twin DASH' machines and the *PCM 1630* to form the heart of a CD mastering system. Within this display, other mastering products will be shown including the *DMR-4000* U-matics, the *PCM 1630* processor and the *DTA-2000* analyser. On the DAT side, the *PCM-2500* will be shown as will the new portable *PCM-2000* model, which also has an AES/EBU interface and timecode capabilities. There will also be a display of Sony real-time DAT duplication equipment using five *DRD-100* slave machines with a *DTM-100* monitoring unit. Finally, the *MXP-3000* analogue console will also be shown in the UK for the first time.

● **Soundcraft:** the new series *6000* recording console will be shown in the UK for the first time. Features include a patented microphone preamp and active panpot design available in 16- or 24-bus split formats. The show model will be fitted with Twister PAC automation. Other products include the *TS12* in-line console with *FAME* automation interfaced to a *Saturn* multitrack; the *SAC 200* modular broadcast console and the series *200 BVE* 'audio-follow-video' editing console developed for the video post-production market. ● **Sound Engineer:** UK recording magazine. ● **Sound on Sound:** musician orientated recording magazine. ● **Sound Technology:** products on display will include the Alesis range of 16-bit digital reverb and effects processors, the *HR16* drum machine, *MMT8* MIDI sequencer and the *Micro* series of signal processors; from Aphex will be the *Compellor* and *Dominator* processors, the *Aural Exciters* and the expander/gate and 10/4 box for interfacing levels; all the Ashly processors for PA installation; the *Creator* and *Notator* 64-track MIDI recording software and the *X-lyzer* and *Explorer* editing packages for Atari computers; the Oberheim range of synthesisers, sample players and keyboards; Stack wireless mics using AKG capsules; and the Symetrix range of signal processors with three new half rack units. ● **Soundtracs:** featured will be a production model of *ERIC*, which has undergone extensive field trials since showing its prototype last year. It is a 24-bus split console with up to 48 inputs, and features include digital control of auxiliary

HARRISON GRAPHIC EQUALISERS-PLUS



Superior Sound Control

Utilising the most advanced Microchip technology HARRISON are proud to introduce the GP-SERIES. Graphic Equalisers which not only have more user features than previous designs but which also outperform existing models. The GP-SERIES are precision units which incorporate extra facilities to match the requirements of today's sophisticated sound systems.

Precision Model Range

The GP215 is a 2x

15 band 1/3rd octave

instrument in a compact 1U high 19" rack mount unit.

The GP130 offers real precision 30 band 1/3rd octave control plus a three band Notch Filter set in one neat package. Last but not least the GP230 combines two channels each covering the full 1/3rd octave 30 band 150 centre frequencies from 20Hz to 20kHz.

Plus Extra Features.

Each model is more than a precision Graphic Equaliser - it also includes extra features that are essential to today's sophisticated sound systems. Tuneable low and high pass filters, e.g. Range Switches, On/Off Switches, Peak LEDs and Switchable Inputs and Output Levels are all provided. Electronic balanced Inputs and Outputs with sockets for balancing transformers are also key features, and built-in Pink Noise generators are included, as well as silent switching and a fail-safe bypass circuit and much more.



Security Cover Included

At no extra cost each model comes with a tinted Perspex Security Cover which prevents unauthorised tampering with your control settings once the GP-Series have been set up to give you the sound you want.

Notch Filters

The GP130 Model also includes a 3 band tuneable sweeping Notch Filter set which is a really cost effective means of getting up to +10dB more system gain from your sound system. This means that at last annoying feedback can be "notched out" and you can get more sound level without sacrificing quality.



Feature protective rear carrying handles

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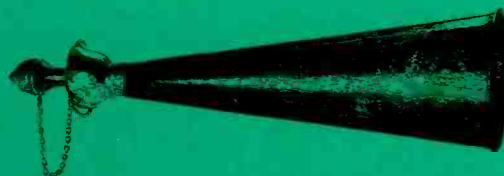
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Soundcraft 6000

and channel muting, 100 external events, switching to interface with two 24-track machines, and automation to SMPTE/EBU/MIDI. The *In-Line* console series makes its UK debut with analogue specification exceeding that of the *ERIC* console but without digital control. Available initially with 36 and 48 input frames, options include stereo inputs and effects returns modules. The broadcast console from the *FM* series (*FMB*) is also now in production and will be on demonstration. Designed for local and community radio applications it may also be configured for programme editing. Also new is the *Tracmix* Automation System using switchable VCA circuitry and offers control of up to 64 channels with 1/4-frame accuracy. Retrofittable to existing Soundtracs consoles it operates against SMPTE or MIDI. The full range of established consoles will be shown. ● **Stirling/ITA:** as UK distributor, Stirling will be showing products from Fairlight, Otari, Sanken, Lexicon, Lynx and Valley International, DDA, Westlake and Alpha. New products to be launched are the Fairlight *CMI-III* with *MFx* controller for post-production editing, the Otari *MTR100A* 24-track 2 inch machine and *MX55* 2-track; new *CMS 9* portable stereo and the *CU44X* transformerless microphones from Sanken; *LXPI* digital reverb and *MRC* MIDI controller from Lexicon; the Timeline *Lynx Controller* and *Micro FX* range of signal processors from Valley International. ● **Studiomaster:** four new products. The *IDPI* dynamics processor with full MIDI control first shown last year in prototype form is now in production. The next product is the *Studiofex* integrated effects system, which comprises a 4U high mother board and space for 11 modules with the current range including stereo gate, stereo compressor, stereo dynamic noise filter, parametric EQ, fader-panner, modulation source, enhancer, dual delay flanger, and de-esser. Two new mixing consoles are to be shown in the form of the *Session Mix* and the *Mixdown*. The *Session Mix* is available as 8/2 and 16/2 both expandable. The *Mixdown* console is available as 16/4/8 and 16/8/16 both expandable to 32 inputs. Other products to be shown include the series *II* with its MIDI upgrade, the series *III* and the series *V*. ● **Studiospares:** wide range of studio equipment, spare parts and ancillary supplies for the professional user. ● **Studio Week:** monthly studio news magazine. ● **Surrey Electronics:** launching

the *Stereo Variable Emphasis Limiter 3*, a protective limiter for live recording and broadcasting as well as dynamic range reduction for pro/semi-pro format transfer. Also first showing is the *Twin Twin PPM* rack *AM20/5* microprocessor-controlled ppm system made under licence from the BBC, the illuminated *Twin PPM* box with microprocessor-controlled drive board providing A/B, MS and S+20 dB monitoring, and a stereo and Ambisonics Coder with full broadcast spec and capable of handling RDS, SCA and Ambisonics Q and T. The full range of other products will also be on display. ● **Sycos Systems:** first UK showing of *Waveframe AudioFrame* digital audio workstation designed to integrate synthesis, recording and editing, signal processing, mixing and mastering; the Technos *Axcel* re-synthesiser, which analyses and resynthesises an acoustic waveform enabling the modification of that sound in realtime; *EMU EIII* digital sound production system; *IMS Dyaxis* hard disk-based recorder for mastering and audio post-production, sound effects and dialogue replacement; *ATC SCM* series self powered active 3-way monitors; the *Kurzweil 1000* series synthesiser modules (including professional



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expander, horn expander, string expander, guitar expander and keyboard version of the professional expander). These will all be shown alongside Bruel & Kjaer, API, Esoteric Audio Research and George Massenburg Lab products. ● **Syndromic Music:** wide range of products based around the Atari ST. The Hybrid Arts ADAP project will be demonstrated with the ADAP1 stereo sampling system, which may be triggered via MIDI, SMPTE or an external audio or MIDI trigger. The latest addition to the system is ADAP2, which is a direct to hard disk recording system with the capability of 45 minutes of stereo audio at 44.1 kHz with full editing features. Controlled from the ST, the ADAP2 has full SMPTE triggering and AES/EBU interface. Other Hybrid Arts products on demonstration include the SMPTE Track 60 track MIDI sequencer, SYNC Track, MIDIPlexer and GenPatch. Other software products include EZ Score Plus scoring and printing, MIDI Score and MIDI Score Plus, Drumware sample waveform editors in the

APRS PREVIEW

SoundFiler series, GenWave 12 bit sampler editors and translators, and the range of Atari ST computers, hard disks and printers.

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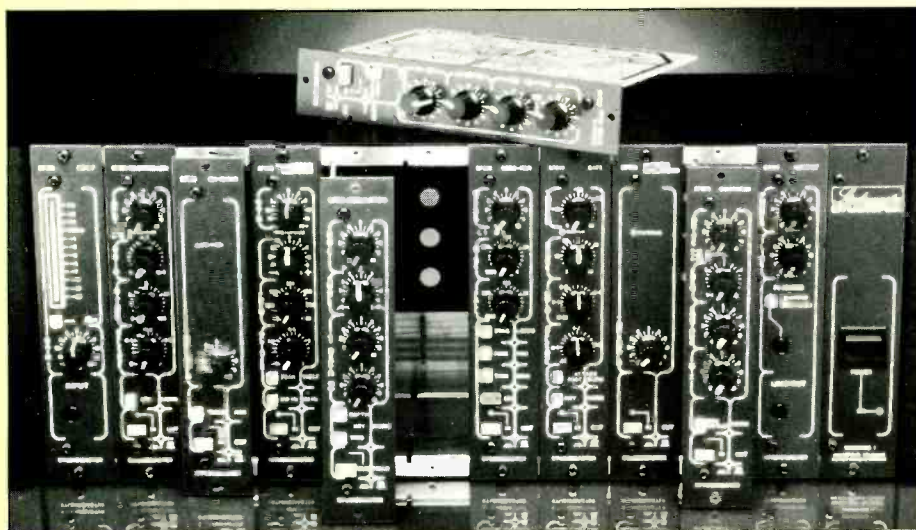
● **Tam/England:** complete range of disc cutting supplies including Micro-point recording blanks and styli plus information on new and secondhand disc cutting equipment and systems. Special test records such as mirror blanks for accurate pick-up arm setting will be shown. There will also be some historic equipment on show. There will be full information on their disc cutting and duplication services. ● **Tannoy:** introducing the Eclipse compact nearfield monitor with a rated power handling of 90 W. Also on show will be the



Tannoy Eclipse



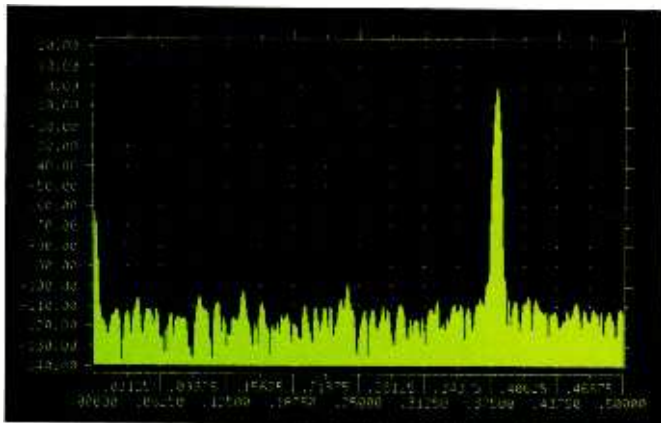
TAC Matchless with automation



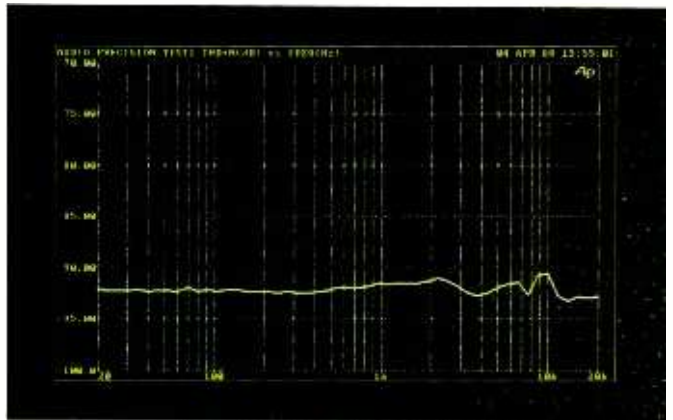
Studiomaster Studiofex modular effects system

DTM-8 small desk top monitor, which uses the 8 inch dual concentric, the FSM-U studio monitor, which uses a 15 inch dual concentric with an additional 15 inch bass unit, and the SR840 power amplifier. ● **Tape Automation:** featuring two products: the KSD-48/96 is a digital audio mixer based around a computer offering all standard analogue desk features. It can operate up to 96 channels with EQ, gate, reverb, delay and compression with the possibility of memorising all settings with sync to SMPTE and MIDI. Also possible processing includes digital synthesis and sampling, data compression, infinite subgrouping possibilities and two simultaneous stereo mixes. On the tape duplication side there will be the X-L Minor automatic audio loader—a high output fully automatic, blank or cue-tone loading with digital control and inbuilt self diagnostic maintenance routines. ● **Tape One Studios:** full details of their mastering and copying facilities. Answers will be available to questions about analogue or digital mastering for CD, vinyl and cassette. ● **Tascam:** showing in the UK for the first time the M-700 custom in-line mixing console with 40 inputs/outputs, 32-group bus, 12 auxiliaries with bargraph meters and 4-band EQ. Also on show will be the DA-50 professional DAT recorder/reproducer, which features twin A/D and D/A converters, oversampling digital filter and separate power supplies for digital and analogue sections; and the ATR-60-16 16-track recorder with built-in dbx. A full selection of established Tascam products can also be seen including the ATR-80-24 24-track, the ES50/51 synchroniser, the CD-501 professional CD player, ATR-60 series tape machines, the pro cassette machines and the 300, 500, and 600 series of mixing consoles. ● **tc electronic:** showing at APRS for the first time in their own right with their complete range of signal processing equipment including the 1128 28-band graphic equaliser and spectrum analyser, 2290 sampler/delay/effects processor and 8201 AES/EBU digital audio interface test generator and analyser. ● **Theatre Sound & Lighting:** no information available. ● **The Sound Advice Company:** details of their extensive database for production co-ordination. ● **The Synthesizer Co:** the AE-1 and AE-2 monitors from Acoustic Energy, the Casio portable DAT machine, a new product from Simmons as well as the SDX, products from Ensoniq, wide range of software for

Stop, look, listen.



FFT Detailed distribution of noise and harmonic distortion vs. input signal. Measurement of sample and hold and ZAD2716 A/D converter only. Computer analysis receives digital information from A/D converter (to avoid DAC reconstruction distortion).



Using an Audio Precision system, a sine wave is digitized by the ZAD-2716, then reconstructed by the ZDA-1801, and filtered by Apogee's 944S linear phase filter. Graph shows combined total harmonic distortion and noise vs. frequency.

Introducing the world's finest professional 16-bit stereo digitizing subsystem and 18-bit deglitched reconstruction DAC.

Want to position yourself at the leading edge of digital audio? Then hear this.

Analog Solutions gives you a new family of professional audio products with confirmed "Golden Ear" performance using the industry's two most powerful test criteria. The eye. And the ear.

If seeing is believing, you'll be impressed by the harmonic distortion and noise plots of our ZAD2716/ZSH202 digitizing subsystem (left) and ZDA1801 deglitched reconstruction DAC (right). Nobody's ever seen plots like those before.

But there's more to the story than a good plot.

The ZAD2716-2 coupled with the ZSH202 Dual Sample-Hold can provide stereo digitizing at a 50 kHz sampling rate per channel. The ZSH202 allows simultaneous sampling of both channels within ± 2 nsec with guaranteed -96 db/channel separation. And there's no sacrifice of phase linearity or $\sin x/x$. In fact, we guarantee $\sin x/x$ performance of 0.01dB and phase linearity of 0.1 (degree) over 0 to 20 kHz. (Performance that brings a smile to any Golden Ear.) Cost savings are significant on a per channel basis, because you only need one converter for two channels.

Our ADC is also available in a ZAD2716-1 model with integral sample and hold amplifier and 100 kHz sampling speed for 2X oversampling applications.

Your needs extend over the entire audio spectrum. And that's how our products are tested. We test the way they're used. So we can guarantee signal-to-noise plus harmonic distortion of 92 dB over the entire 0-20 kHz audio range.

We maintain the same outstanding performance at the back end of your system with the ZDA1801. This 18-bit DAC, with a built-in deglitcher operating up to 200 kHz for up to 4X oversampling, offers guaranteed signal-to-noise plus harmonic distortion of 94 dB over the full audio range.

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the Apple *Macintosh* including systems from Blank, Performer and Passport, as well as products for the Atari computer including *Dr T*, *Passport* and *Intelligent Music*. ● **3M**: full range of magnetic tape products for broadcast, music and video applications. ● **TOA Electronics**: will launch the 19 inch rackmounting *MR-8T* 8-track cassette multichannel recording system, which uses two separate 4-track heads to give eight tracks. The system features built-in monitor mixer with insert point, drop in/out facility and dbx noise reduction. Tape speed is 3¾ in/s with the unit designed for use with type II cassettes. ● **Total Audio Concepts**: new for this show are the automation options for the *Scorpion* and *Matchless*. A number of interfaces have been developed allowing a choice of systems. One such system is the Jellinghaus Music System, which allows a mix to be stored to disk and replayed with editing and copying possibilities. Now a standard option for the *Matchless* this combination will be demonstrated during the show. Also on demo will be an *SR9000* console for comprehensive live sound applications in a 42-input version. Additionally there will be various configurations of the *Scorpion* range on

APRS PREVIEW



Toa MR-8T recording system

show from the wide range of available standard formats and customer options. The recently introduced TAC *S1200* stereo module will be shown that offers broadcast applications for the available consoles. ● **TRAD**: details of used equipment, products and professional services will be available. ● **Trident Audio Developments**: is showing brand new stereo input module for the Series 65 16- and 24-track mixers. Making its UK debut is the Series 24, competitively priced 24-track recording console featuring 24 discrete

group outputs and 24 monitor/effects returns (each with 2-band EQ) and incorporating fader reverse giving 24 additional equalised inputs in mixdown. In-place solo and automote bus are provided as is optional TT patchbay. Series *80C* and *80B*, Series 65 and the *Di-An* digitally-controlled analogue recording consoles are also being shown.

● **Turbosound**: launching a new range of loudspeaker enclosures to be known as the *TXD* series. These have been designed for use where wide dispersion characteristics are desirable and where space is at a premium. The recently introduced *TFM-2* personal stage monitor will also be featured using the new *TurboConcentric* midrange loading device, which gives a controlled dispersion full range sound pattern allowing higher levels without the need for filtering against feedback. Also on show will be the *TMS* and *TSE* series of loudspeakers and representative samples from the complete Turbosound range.

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- **Wellard Research**: nearfield monitor speaker systems including the active *Middle Monitor*.
- **Windmill Munro Design**: full details of their studio design and acoustic consultancy services together with details of recently finished projects.

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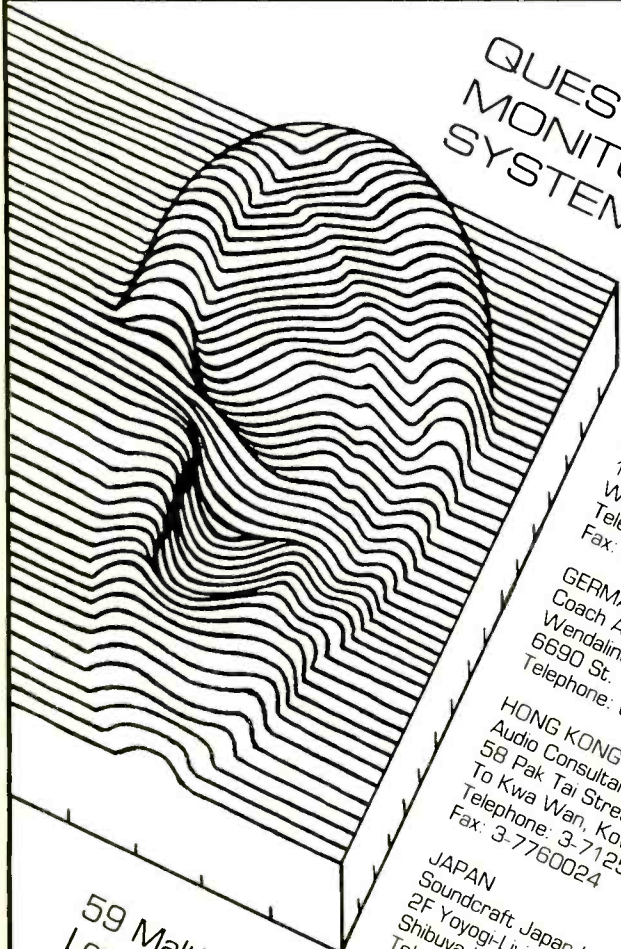
- **Yamaha-Kemble Music**: first UK showing of the *DMP7D*, a further development of the *DMP7* digital mixing processor. It contains interfaces enabling its use with external accessories such as the Type 2, 3, 4 and 6 optional interfaces boxes that will allow connection digitally to the DASH format or Mitsubishi *X850*, etc. Also launched is the *DA202* D/A converter designed to convert digital audio signals in AES/EBU or CD format to analogue; the A/D converter that converts eight channels of analogue to digital format for direct feed into the *DMP7D*; and the *FMC1* format converter interface that converts *DMP7* digital signals to DASH, AES/EBU, CD or DAT formats. An all-digital direct-to-DAT mixdown will be demonstrated. Also on display will be the new range of PC power amplifiers, the *NS40M* monitors and the studio version of the *NS10M*. Software designed by Steinberg in co-operation with Yamaha Europe will also be shown allowing extensive automation and management of up to four *DMP7*s. Other products will include the *PLS1* MIDI programmable line selector, the *SPX50D* digital multi-effect processor, and the *R100* reverb processor.

Z

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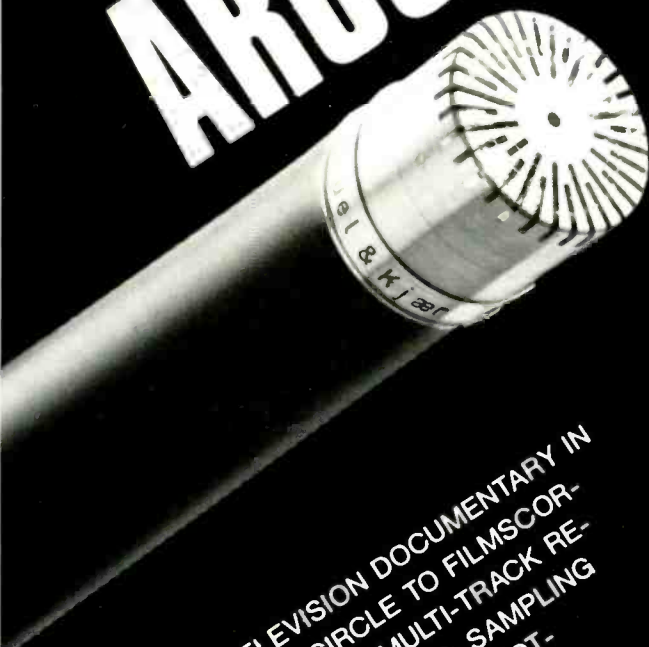
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D/D/DENON

Carl A Snape reviews the development of Nippon Columbia/Denon's professional PCM recording systems and highlights their classical recording techniques with reference to the 1985/86 recordings of Mahler's ten symphonies

For many people the evolution of any new technology is mainly perceived via the announcement or arrival of commercially available products. Asked to provide a brief history of digital recording, the average person would invariably produce a list of highlights based entirely on well known products. Pressed for more information about which companies were involved in the very early days of digitally recorded music and memories usually start to get a little hazy. One name you may not have expected to see is Denon.

Denon is a trading name for the Nippon Columbia Co Ltd, which was originally founded in 1910 as the Japan Gramophone Co Ltd. Initially the company started by selling hand wound gramophones and single-sided discs. In 1939 they manufactured Japan's first disc cutting lathe and by 1953 had developed a professional tape recorder for broadcast use. In addition to their record company and professional recording activities they were (and still are) actively involved in the design and manufacture of a wide variety of domestic sound reproduction equipment.

Today not only does Nippon Columbia produce original recordings (both in their central Tokyo studios and on location around the world) but under the name Denon they design and make recording equipment, manufacture domestic replay equipment and even have their own pressing plants for manufacturing vinyl and compact discs. They also make broadcast equipment and this is the link that originally sparked their interest in digital recording.

Early digital work

Some of the early work on pulse code modulation (PCM) was done by the British Broadcasting



Denon's first PCM release (1972)

Corporation in the mid to late '60s. Similarly in Japan, the Technical Research Center of the national broadcasting network, NHK, had recognised the potential of PCM and had produced an experimental digital PCM recorder towards the end of the '60s.

Due to the close links between Denon and the NHK it wasn't long before the Denon recording engineers got to hear about the successful prototype and immediately started their own development programme. During 1970, with assistance from the Technical Research Center, they embarked on a large number of experimental digital recordings and in 1971 released the world's first PCM digital record (*Something* by Steve Marcus, Jiro Inagaki and the Soul Media, Denon NCB-7003).

The limitations of a purely record/playback device (with no editing facilities) was resolved in



Above: the digital time coherent console. Below: Frankfurt Alte Oper

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D/D/DENON

1972 when Denon produced the 13-bit *DN-023R*. Developed totally by the recording engineers it had many of the functions common to analogue machines of the period. Despite being large and cumbersome it permitted manual editing, had a half speed playback facility, provided eight record and playback channels and was equipped with a preview feature for disc mastering.

The *DN-023R* was first used in March 1972 and in the following month it was taken to the Aoyama Tower Hall in Tokyo for the recording of the two Mozart String Quartets. This recording was released in October 1972 making it the world's first commercially available PCM recording (Smetana Quartet, *Mozart—The Two String Quartets*, Nippon Columbia NCC-8501-N).

Overseas expansion

During the first couple of years, PCM recording at Nippon Columbia was restricted to the main studios and local Japanese venues, however, in 1974 the company decided to broaden its classical recording base and looked towards Europe for suitable concert halls for digital recording. A new compact PCM recorder—the *DN-023RA*—was specifically designed for this purpose. Towards the end of 1974 the first European PCM recording was made in Paris at the Notre-Dame de Liban church (Paillard Chamber Orchestra, *Mozart—Concertante Symphony*, Denon OX-7022).

Engineered by Peter Willemoes, the session also included engineers from other major record companies interested to see what could be achieved with PCM techniques. After this initial European recording Denon returned to Europe every year with the *DN-023RA* quickly building up a large repertoire of digital recordings. During this period Nippon Columbia/Denon released over 250 different PCM recordings, the majority of

which, were recorded back in Japan.

In 1977 Denon finally recorded in the US. A new digital recorder—the *DN-034R*—which had been developed earlier in the year (Jan) was used to record a number of jazz sessions at Sound Ideas Studios in New York during November and December. Interestingly, although only an 8-track machine, the recording was effectively 16-track, made possible by storing a further eight tracks on a second VTR. The new equipment was contained in two heavy flight cases and featured 14-bit coding; pre-emphasis for improved dynamic range (81 dB without, 89 dB with); 47.25 kHz sampling and storage on 2 inch video tape running at 38.1 cm/s.

The following year Denon engineers continued their European classical sessions and returned to the US late in the year to make a second series of jazz recordings at Sound Ideas.

Fourth generation PCM

In June 1979 Denon had progressed to their fourth generation PCM system. The *DN-035R* was a 16-bit, 4-channel machine using U-matic tape storage. This was to become the basis for the recording system Denon adopted throughout the '80s.

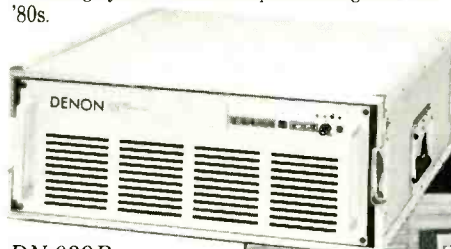
In 1980 the new PCM recording system won the *Diplome d'Honneur Technique* award at the 13th Montreux International Record Grand Prix (having already received *Billboard's* 'Trendsetter Award' for their PCM recording techniques in 1978). The company offices in Tokyo were already starting to fill up with technical and recording awards—and there were more to follow.

Up to this point the recording engineers had been editing the 2 inch digital tape manually, using splicing tape. Even with the introduction of U-matic, tape masters would still be copied to 2 inch for manual editing. In 1982 all that was to change with the introduction of the *DN-036ED* random access editing system. Once the engineers had become familiar with the system as many as 100 edits a day could be rehearsed and completed—about five times better than with the 2 inch system.

This vast increase was due to the fact that Denon had used a hard disk system (635 Mbyte) with a dedicated microprocessor-based controller. Once again having been developed by the recording team the new system was easy to use and featured electronic 'rock and roll' edit point location mimicking the conventional analogue technique. The system provided up to 42 minutes of stereo or 27 minutes of 4-channel sound and used 16-bit (expandable to 20-bit) digital I/Os with a sampling frequency up to 54 kHz.

1982 proved to be a significant year. Nippon Columbia/Denon had already recorded something like 600 PCM sessions and by August the sale of compact discs had been announced. In October Denon introduced an improved, more portable, digital recorder (*DN-035 MiniII*) and also, along with Philips and Sony, began selling compact discs. It was exactly 10 years to the day between Nippon Columbia's first commercial PCM recording and the release of their first compact disc.

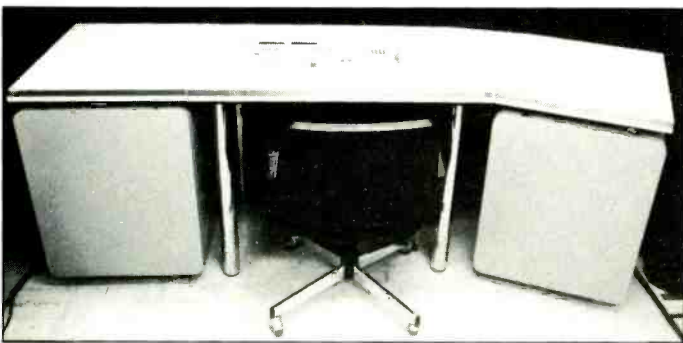
Throughout the '80s further advances and



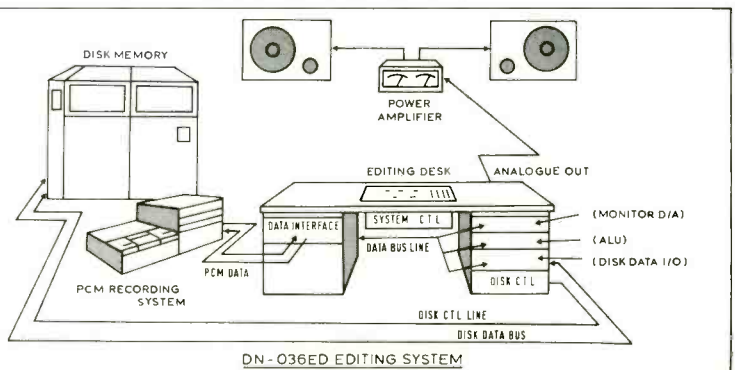
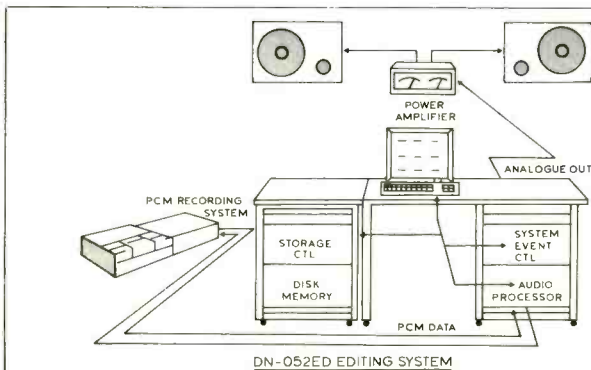
DN-039R



DN-050MD mixing mastering console



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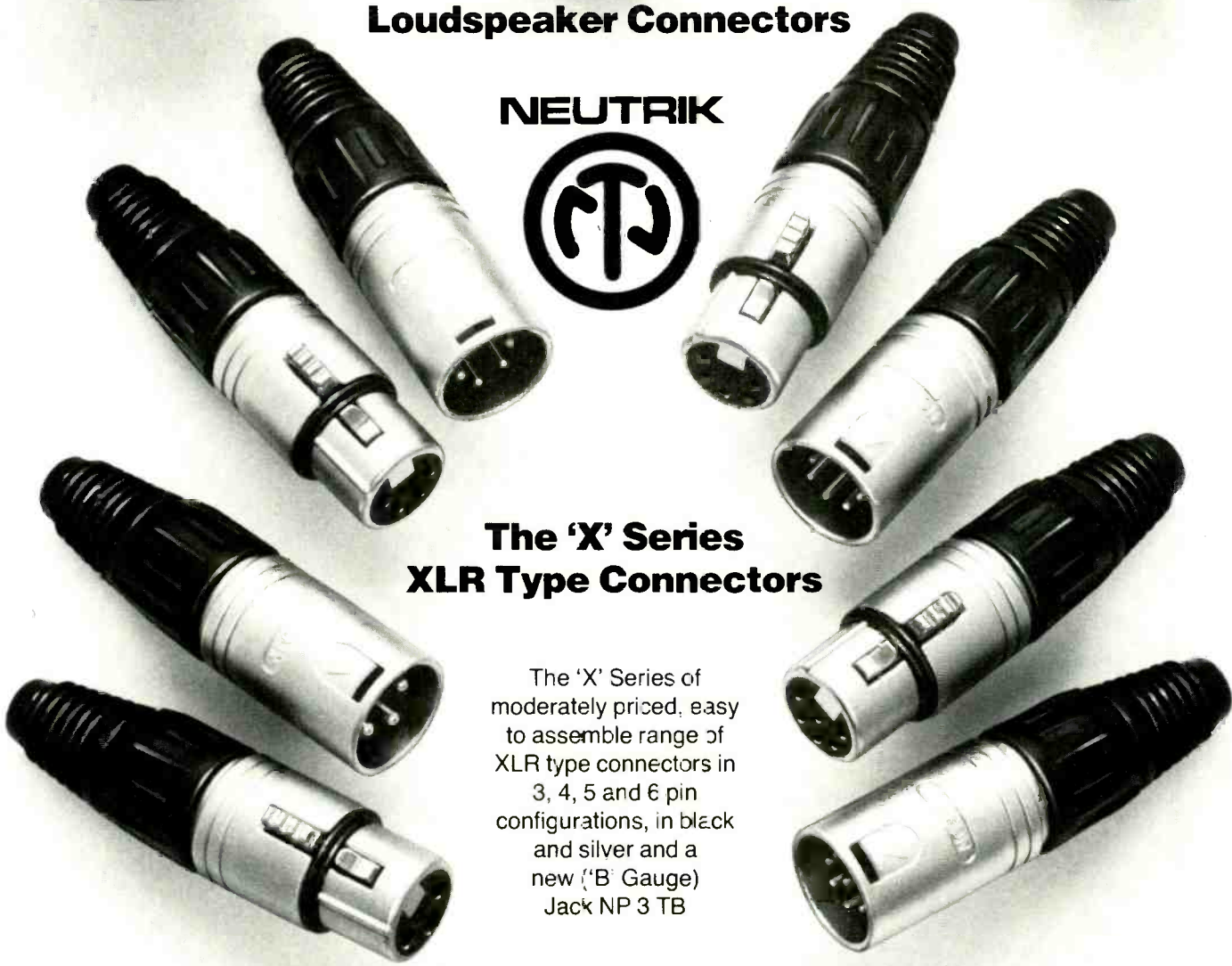
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D/D/DENON

refinements were made. In 1984 the company produced the *DN-039R*—a completely new recording system, both internally and specification-wise. Tape storage could be U-matic (providing either 2- or 4-channel capability) or ½ inch VHS or Beta (2-channel only).

The new design provided a number of advantages for example, the inclusion of a subcode recording channel (for text and graphics information) and synchronisation of colour television signals with audio. Virtually all the handling procedures on the *DN-039R* were software-driven, which gave the system enormous flexibility over previous designs. The development of the machine enabled Denon to demonstrate CD Graphics at the 1984 Japan Audio Fair.

During the development of CD-ROM, CD-I and CD-G (graphics) the Denon engineers didn't slow down on their digital audio recording projects. Since 1982 top priority had been given to the development of a completely digital mastering console. In October, two years later, the *DN-050MD* digital mastering/mixing console was a reality. It provided six inputs and outputs and

included digital equalisers, stereo, stereo limiter, compressor and gate thus making it unnecessary to return to the analogue domain during editing or mastering. All parameters could be memorised (512 events, expandable with additional floppy disk drives) and the desk featured a 32-channel, bi-directional digital data bus easy interface to all the digital studio equipment throughout Columbia Studios. Given the size of the studios and all the various applications this latter facility was an important and extremely useful facility.

At the headquarters of Nippon Columbia/Denon in Tokyo there are eight separate studios. Four are used for regular recording sessions and the others are used for editing and making radio programmes. Studios One and Two are the main recording areas and are used for classical as well as popular music. Studio Three is primarily used for vocal overdubs and Studio Four is used for location recording in Japan and has a permanent recording team based in Germany, mainly for recording classical repertoire throughout Europe. In addition Columbia Studios also have all the

facilities for analogue and CD pre-mastering, video editing and CD-ROM and CD-G mastering.

Mahler recordings

In addition to Nippon Columbia and its associated record labels, Denon also has its own label. Most of the repertoire is classical—there are some jazz, popular and folk recordings—and it is this area in particular where the search for better and better quality has been most intensely concentrated.

By an interesting coincidence, having refined much of their recording and digital techniques, the opportunity to record (as part of Denon's European recording commitment) the complete Mahler symphonies became a distinct possibility in the early part of 1984. The Frankfurt Radio Symphony Orchestra under conductor, Eliahu Inbal, had already performed all Mahler's symphonies earlier in the '80s and it was their second series of concerts that Denon recorded.

Work on the project started in May 1984 at Frankfurt's Alte Oper (The Old Opera House). The Alte Oper had been built in 1880 but the interior was totally destroyed during the Second World War. In 1981 the building, including a completely new interior, was restored not as an opera house (the city had already built a new one after the war) but as a concert hall, to which it appears ideally suited with an internal volume of 30,000 m³ and seating for 2,423.

The recording of the first symphony took place in February 1985. The sessions were interesting not only because of the digital aspects but by virtue of the fact that there were actually two separate recording teams. In total there were two Japanese engineers, three Germans and one Dane. The project was a co-production with Hessischer Rundfunk (Hessen Radio). They owned the orchestra and were going to transmit live broadcasts of each concert.

The Dane on the session was Peter Willemoes, a famous freelance recording engineer in his own right and chief engineer of the Denon team. It was his advice and considerable help that had established and guided Denon's European classical recording projects from the very beginning in 1972. At 60 years of age he is now a music producer at Danish Radio.

During my visit to Nippon Columbia I asked recording engineer Yukio Takahashi if the Mahler recordings were caught quickly or if they involved numerous takes.

"Many takes! That was a very special recording, normally it would take three or four days for one symphony. We began our recording sessions at 10



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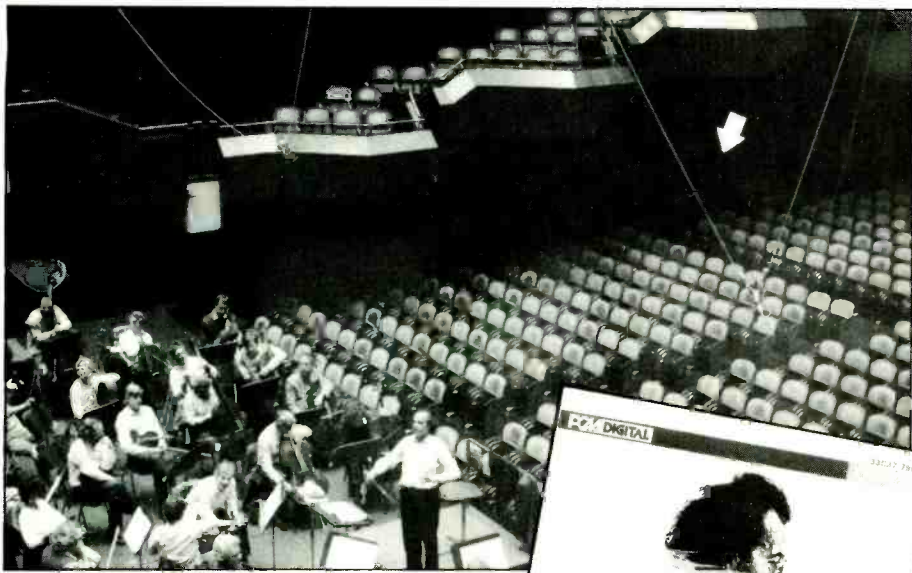
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One-point recording (AB) technique, 50 cm spacing

o'clock in the morning and the first session lasted until half past one. We would record every morning for three or four days and in the evening there would be the concert using the same orchestra but of course there would be an audience. We would record the live performance then when we got a very inspired performance during the live performance we cut that part from the live performance and inserted it into the previous recording."

What about the change of ambience?

"That's a problem. When we mix these two acoustics fortunately we had a very good auditorium for the recording sessions. The hall has a very big volume. The capacity audience is I think 2,300, which is not a small audience but in relation to the large size of the hall the sound doesn't change too much between the two concerts."

What happens when you bring the spot microphones in, surely there must be a subtle change in the ambience? Do you correct for this say during editing?

"Yes that's right. Our policy is that the less microphones the better the sound so we like to use the least number of microphones possible. During the recording of all Mahler's symphonies we used two channels of our recorder for the main microphones and we used our other two channels for mixed spot microphones. Where necessary we mixed the spot microphones here in Tokyo because we know the acoustics of the Tokyo studio."

"The No 4 symphony—which is the smallest, in terms of orchestration, of all the Mahler's symphonies—was not so complicated and we could realise that recording using only two microphones. Because we used only two microphones, it wasn't necessary to use a recording console. We connected the two microphones directly to the recorder with no equalisation during the pre-mastering stage. We did remove some very low frequencies to cut low frequency noise."

"On Mahler's No 5 Symphony we used 12 spot microphones and two main microphones. Our

main microphones are always omnidirectional and are always B&K microphones, usually 4006 or 4003. For the Mahler recordings we used the 4006 microphones."

The primary object of the recording sessions was to avoid any artificial balance and to aim for a good natural balance and dynamic range, rich resonance and full orchestral perspective. Apart from the ceiling, most of the reflective surfaces in the Alte Oper are mahogany, which gives a warm, relaxed sound and a full two second reverberation time with a capacity audience.

Recording equipment throughout the sessions included Denon transformerless mic preamps, Bowers and Wilkins 801 monitor loudspeakers, Schoeps and of course B&K microphones. Denon had already made secret experimental recordings with B&K prototypes as early as 1981 and have used B&K mics on most of their classical PCM recordings.

Between the period May 1984 to February 1985 various experimental recordings were undertaken to decide suitable locations for the microphones and assess the general acoustics of the recording venue.

During the recording of the first three symphonies (with the exception of Symphony No 8, which was the last to be recorded, all the others were recorded in the order they had been written, ie numerical order) the main pair of B&Ks were set slightly closer to the orchestra. Symphony No 1 has some delicate woodwind passages and these required assistance, microphone-wise, so a number of Schoeps CMC-54s were located within the orchestra. Throughout the sessions much more use of these microphones was made by Radio Hessen who naturally had to tailor their recording technique in order to meet the needs of the radio broadcast.

The 2nd symphony required solo soprano and alto, a chorus and organ and was recorded almost exclusively using Denon's preferred one-point recording technique. The Denon engineers paid particular attention to the dynamic range, which they wanted to capture as 'true to life' as possible without resorting to compression—out of the question unfortunately for the radio team. Much the same technique was used during Symphony No 3, which includes a female and children's chorus and off-stage horn solo. Symphonies No 1, No 2 and No 3 were recorded in February, March and April/June respectively.

The 4th Symphony (*Symphony No 4 in G Major*) was recorded in October 1985 and represents something of a milestone for Denon. The final recording won the Japanese Record Academy Award in 1986. Because the fourth uses a smaller orchestra, Denon felt confident that they might be able to capture the whole sound using just a single pair of 4006s and the one-point technique. It was the natural depth and clarity of this technique that excited them and so they started to search for just one precise point in the hall that would capture the very best balance of orchestra and acoustics and where the B&K microphones could be used to their best advantage.

They found such a location just 2.5 metres from the front of the stage and about 4.5 metres above the floor. This provided the required sonority to the lower strings, placed the vocal parts to the front of the soundstage and captured the pure, natural and detailed sound of the string section. Interestingly the violins had been tuned half a tone higher (as written in the original score) so an accurate recording of the musical balance was vital if the performance was going to sound convincing.

Having located the correct position for the one-point technique the rest—as they say—is history. The 4th was the only Mahler symphony small enough (in orchestral terms) to capture the whole sound with just the one-point recording technique. Those before, and those that followed, all required some assistance from secondary pick-up points. In general these additional microphones were used very, very sparingly and only when absolutely necessary. For most of the time only the main pair are heard on the recordings.

In January 1986, Symphony No 5 was recorded (using a greatly expanded orchestra) and in April/May (using an even larger orchestra) Symphonies No 6 and No 7 were recorded. The 5th won yet another award in Japan, this time Best Recording of the Year 1986.

Editing and Time Delay Alignment

During these sessions and of course during all the various PCM recording sessions going on back in Japan the recording engineers were still hoping to improve various aspects of their digital recording equipment. During the recording of Symphony No 6, Time Delay Alignment mixing was introduced.

Two months earlier, in March 1986, a new improved random access digital editing system (DN-052ED) received its first public demonstration. To the best of my knowledge this was the first—and as far as I'm aware, the only—professional Denon PCM product that has ever been made commercially available.

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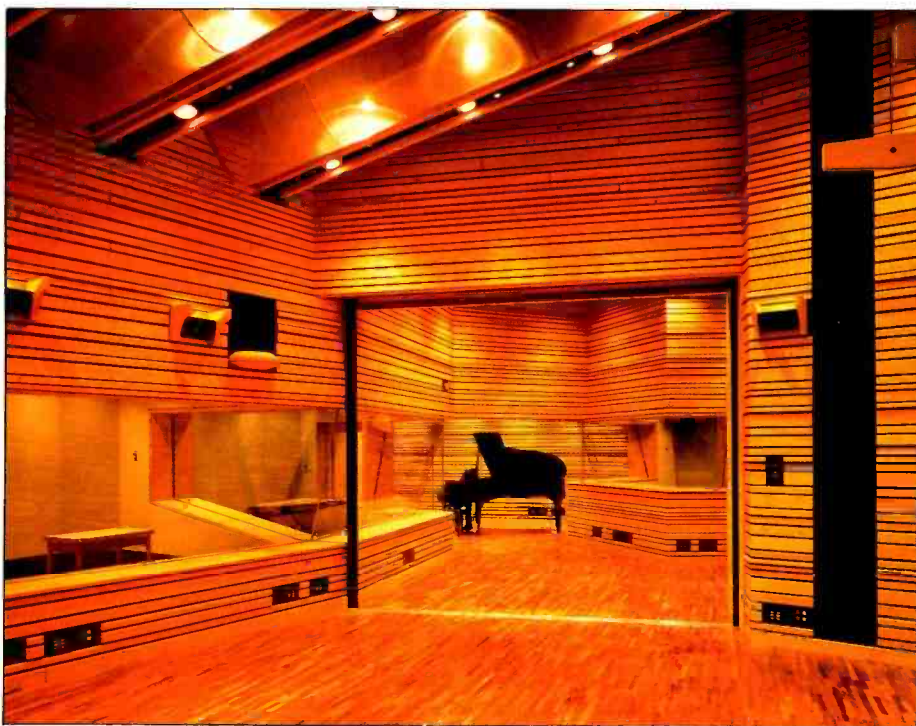
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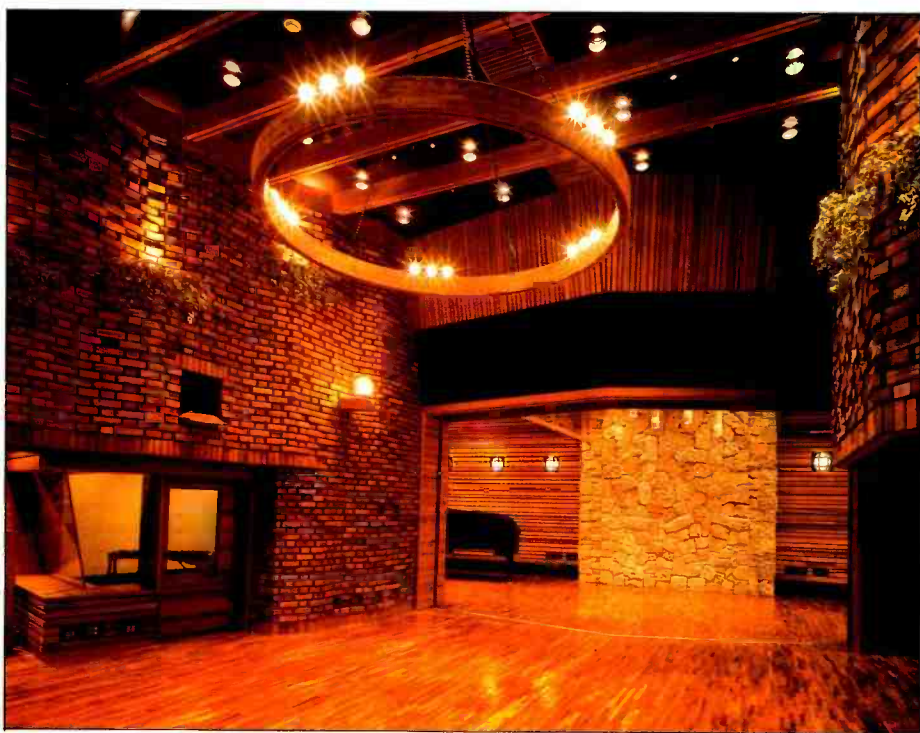
capacity, 5¼ inch hard disks (expandable to 4 Gbyte with 32 drives), which, using 44.1 kHz sampling, is equivalent to roughly 94 minutes of 2-channel programme (standard version) and up to six hours with all 32 drives (half this with the 4-channel option). Up to 1,000 edit locations can be stored with the expandable option and of course it provides all the advantages of the earlier system but in a far more convenient package.

When the overseas masters are returned to Japan after each recording session, at Columbia

Studios the 4-channel masters are edited and mixed to stereo using the *DN-036ED* or *DN-052ED* editing systems. Connected via an internal data bus that runs between all the studios, the final master can be fed directly, in digital form, to the digital transfer console in the cutting room then on to either the disc cutting lathe or the CD pre-mastering equipment. In this way the original masters are kept in pristine condition never having been subjected to shuttling back and forth during the editing process.



Studio Two at Columbia Tokyo



Studio One is the larger of the two

Because Denon record two identical masters during the recording sessions (using two U-matics) in theory it could be quite possible that a unique or rare recording only gets played once (during transfer to hard disk) before it is filed safely in the library.

From the 6th Symphony onwards Denon used their new time-aligned digital console during the recording sessions. This technique allowed small time adjustments to be introduced to each mic line in order to compensate for the variation in distance between any of the spot microphones and the main stereo pair. After the delay has been introduced signals are routed through the console as normal.

The 9th and 10th symphonies were recorded in September 1986 and the final recording, the 8th (*Symphony of A Thousand*), was recorded the following month. If you are a recording engineer and unfamiliar with Mahler the enormity of the situation has to be seen to be believed. The work requires a very large orchestra. Surrounding the orchestra and above the stage on three sides are two male, and two female choruses, and a children's chorus and a soloist (soprano). In front of the orchestra are four female soloists (to the left of the conductor) and three male soloists (to the right). A tall order for just two microphones. But that's not all. There is also a second orchestra consisting of four trumpets and three trombones in each of the rear corners of the hall.

True to their philosophy of using the minimum number of microphones, the Denon team retained the B&K 4006s as their one point source but were able to use, for the very first time, the then new B&K 4011 cardioid microphones. These were used (configured as one point source) as spot mics throughout the hall.

After completion of the Mahler symphonies Denon continued to widen their digital recording repertoire in Europe, the US and Japan. Earlier this year (March) a new product was available to the engineers—the *DN-061 MC* digital 16 bit mixing console. Equipped with 16 inputs (12 normal and four auxiliaries) the console has four outputs and two sends. Each input features digital delay for time alignment when required but there are no EQ circuits. The new equipment is designed to be portable and therefore most of the electronics A/D and D/A units; analogue mic amplifiers; level display; CRT and processing unit are packaged separately in flight cases.

Naturally PCM recordings didn't stop with the Mahler recordings. By 1986 Nippon Columbia/Denon had already recorded over 1,000 PCM masters and of course have gone on to record many more. The Mahler symphonies, however, proved to be quite unique in many ways both in terms of performance and from the recording point of view. Not only do they illustrate Denon's commitment to quality but in a fascinating way, they document the refinement of Denon's microphone and digital recording technique.

Over a period of 18 months the same recording team had the rare opportunity to use the same conductor, orchestra, venue, etc, for a series of closely related musical works, in addition to witnessing those exact same performances under identical 'live' conditions. Even the air-conditioning was new—evening out yet another variable that plagues both concert hall and performer—temperature and humidity.

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INNOVATIONS IN VIDEO
and AUDIO TECHNOLOGY

Pyramide Studios look very much like a new concern—new buildings for a new studio team located in a new luxury residential development on the outskirts of Brussels. But appearances can be deceptive. Pyramide has been in operation for over five years, the acoustics have all the years of design experience of the German Jensen organisation behind them, and both Luc Tytgat and Oliver Debay were involved with production and publishing in the recording industry for many years before deciding that they could, and should, do the whole job themselves. “One day,” says Oliver Debay, “we said, now we make our own studio.”

They called in Jensen for expert advice and planning. “It is important for us to hear correctly so we had to have very good acoustics from the start.”

Block by breeze block, however, they put the place together with their own hands. The tab still came to more than a million

present facility will convert to a performance area.

A corridor off to the right leads to the main studio unit and the administration wing. This is a large office with a picture window looking out over open fields. It holds a variety of instruments plus a couple of desks and still has room for a work bench. Here, Luc Tytgat usually has the guts of some music maker or sound processor on display for he is a freelance engineer and acts as Yamaha agent for Belgium as well as sharing the studio workload with manager-cum-engineer Debay and fellow freelance Yves Feyaerts.

The main control room and the studio get equal billing when it comes to floor space but then with Pyramide's handsome array of electronic music makers and its customer specialisation in 'variety song' artists this is hardly surprising.

This specialisation has given the company “four big hits in France in the last year” and saw them process Sandra Kimm's *I Like Life*, which won the Eurovision Song Contest for Belgium in 1986. They have also worked with Shirley Bassey, Al Corey of Dynasty fame, the Platters on a nostalgia LP out now in Germany, and Frederick Francois. This particular chanteur is “very popular in France” and has been for 20 years with sales of some 25 million records to prove it. “One day he listened to one of our records,” explains Debay. “He said: ‘What a nice synthesiser sound,’ and so he came to see us.”

Debay is proud of his electronic music setup. He needs little persuasion to demonstrate some of the computerised credentials of his *Emulator II*. “We have 10 synthesisers,” he says. “They all have their own colour. That Yamaha (*DX7 HFD*), gives one type of sound. So, I've got 10 different colours which merge.”

He picks out the various instruments, a Roland *JX10*, a *Prophet 5*, a Hohner *Clavinet 7*, a *Mini-Moog* for rich bass sounds, an Oberheim *Xpander*, yet another *DX7* of an earlier variety and a couple of drum machines, an *Octopad* and a Yamaha *RX5*. Acoustic music production comes from a Steinway for “a clear sound.”

“It is better to be a musician in the studio now,” Debay believes. “The music is so technical.”

Effects come from a rack containing an equal variety of production names—Yamaha (*D1500* delay), reverb units from Ursa Major and AMS, a UREI compressor, a Roland phase shifter (*SPH323*), an Aphex *Type B Aural Exciter*, with a couple of Roland *MSQ 700* sequencers and Lexicon *200* and *PCM 70* processors.

The control room, dominated as it is by the Soundcraft *2400* has one or two interesting curiosities. The BGW amplifier that feeds the JBL *4343* monitors is high in the wall above the studio viewing panel. “It means you can see it from behind the desk,” Luc Tytgat points out.

PYRAMIDE

Bill Melville reports from Brussels

francs. “We had had a big hit in publishing with a French record. It sold 10 million in one year,” said Debay, to explain away the obvious budgeting problem.

Pyramide is located in a garden suburb of the Belgian capital called Beersel. There is a small town feel to it—quiet, full of character and close to the countryside. “I think it is better for creative people,” says Debay. At the same time, on the city's south side, it is within five minutes of the E10, the 6-lane carriageway that connects with Paris, Holland and the Brussels ring road. Necessities such as easy transport for customers have not been forgotten.

Atmosphere has been an important ingredient. A lantern hangs outside the door and a cane ceiling effect welcomes visitors to the reception lounge with its hot and soft drinks bar, easy chairs and TV with video.

The main 30x8 m block is divided into three parts. A door from the lounge takes you into a small demo-studio. At the time of visiting, this was about to expand into a new control room with a Soundcraft series *600* and a Fostex *B-16* while the



Photo: J. P. Naitan

"And it is out of the way of idle fingers," adds Debay, "the setting cannot be changed easily."

At one side they have a Sony VO-5800 PS video unit working on a Q Lock system, and a computerised link to the recording unit. "For about a year," explains Debay, "we have had a division for post-production work on advertising videos."

Debay likes Japanese electronics and this explains Pyramide's dependence on Otari as far

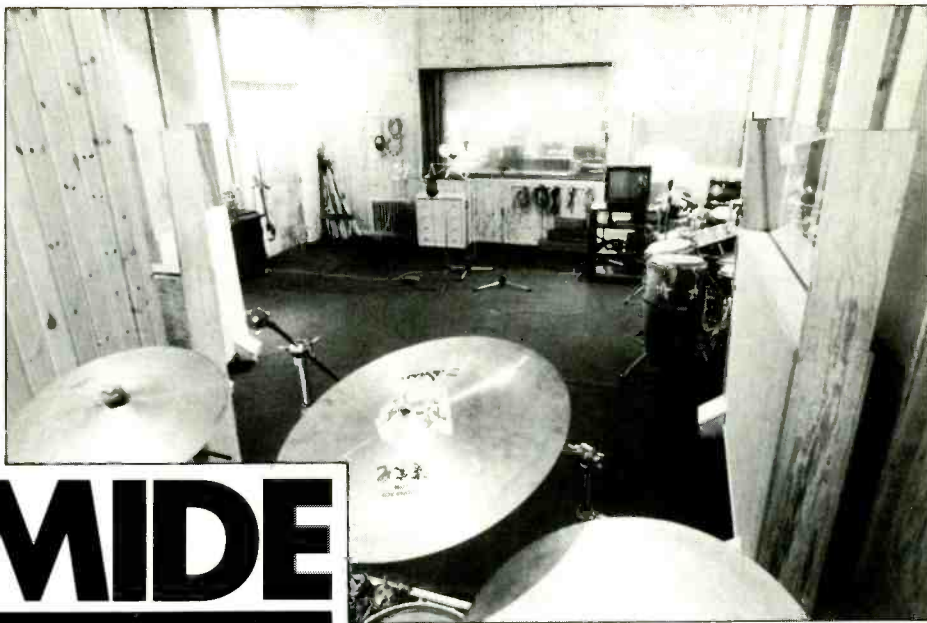


Photo: J. P. Nouton

PYRAMIDE

as tape machines are concerned. They use an MTR-90 centrally, plus MTR mastering and copying units.

Eighty per cent of their work is concerned with music recording for discs even with a BFr 2200* per hour studio hire fee. They point out that current French prices are two or three times higher even in studios without an equivalent investment in synthesisers. They maintain a 24-hour schedule by offering a night price rate of BFr 1800. The tail end of the night shift, from say 7 am to 10 am each morning is hard to sell so that is when they get around to completing the advertising soundtracks and jingles.

Their clientele includes the rich and famous for whom they might even find themselves hiring the necessary digital equipment. "We price it in our catalogue," says Debay, "but

customers don't usually want it." It also includes the occasional new rock group in search of a good demo and willing to pay the BFr 800 asking price for the small studio. For all but well tried and regular customers their accounting policy is one of pay-before-you-leave. It is a policy that, with few exceptions, means all their problems are of the everyday variety that come with just making sure theirs is a job well done.

Debay and Tytgat opened their studio so that they could keep the whole process of production in their own hands. Such has been their success, however, that they are specialists once again. Pyramide Studios, 27 Dworpstraat, Beersel, Brussels, Belgium. Tel: 2 377 55 82.

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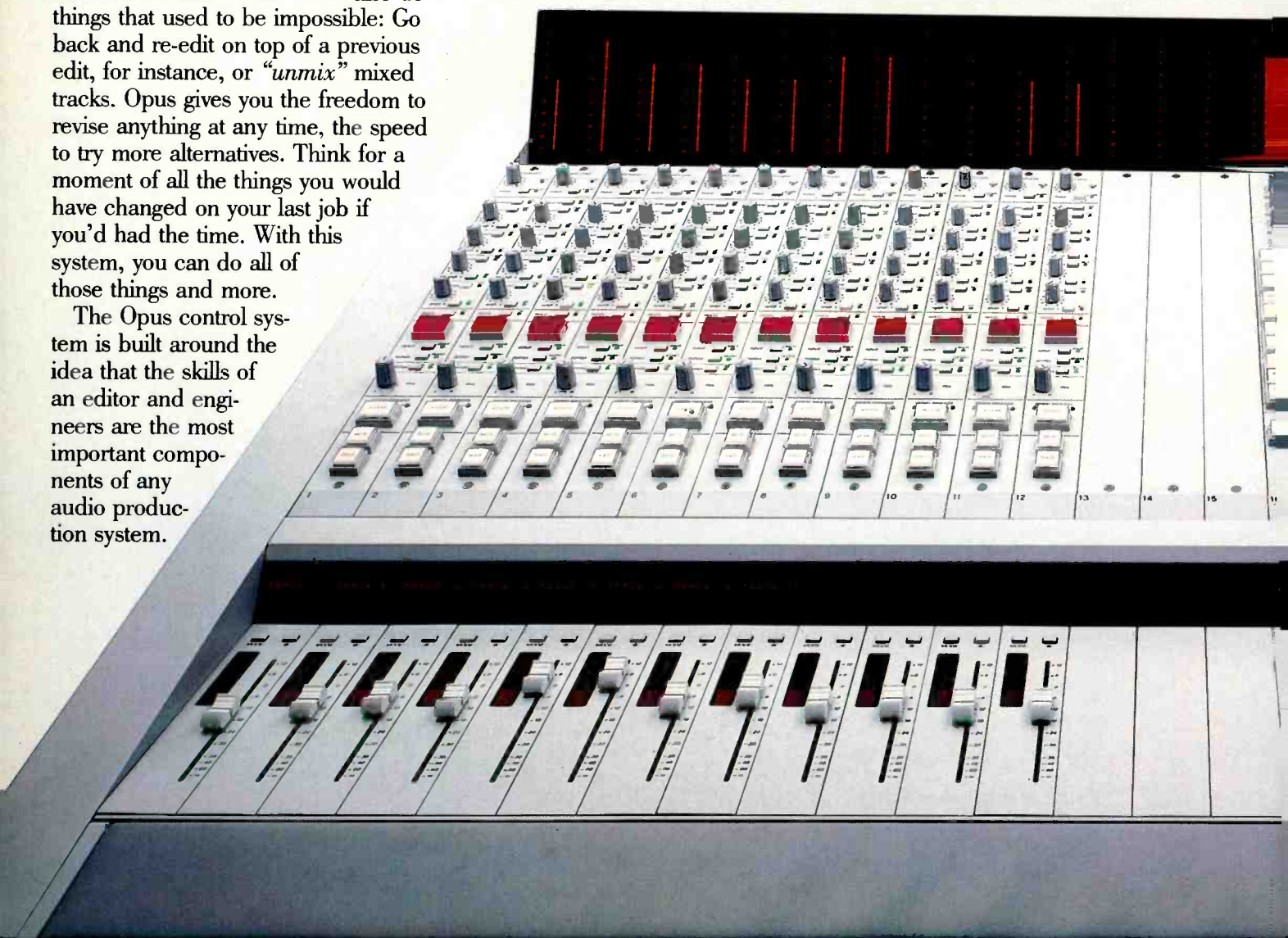
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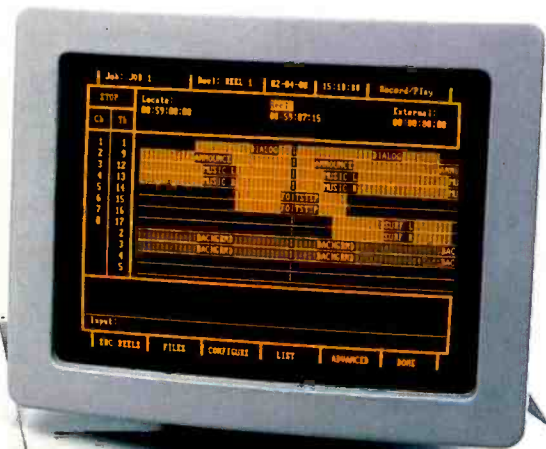
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flow to call up a special "mix" screen on the monitor, because real-time digital mixing is integral to the system's design.

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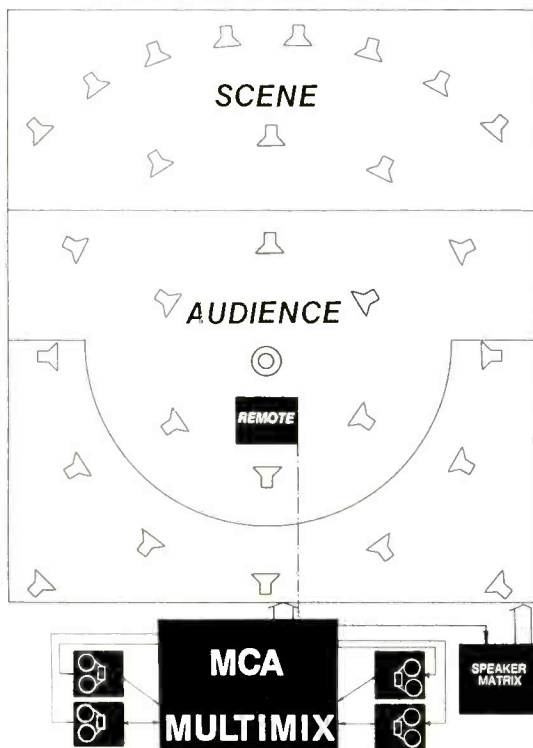
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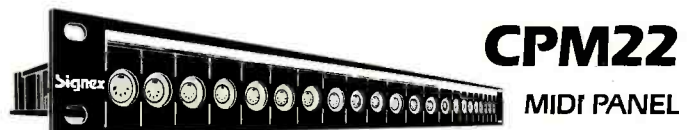
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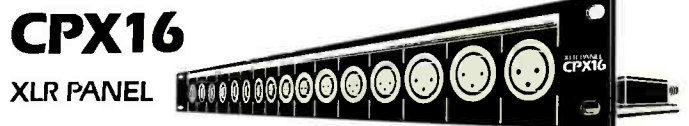
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5 SM87 Condenser

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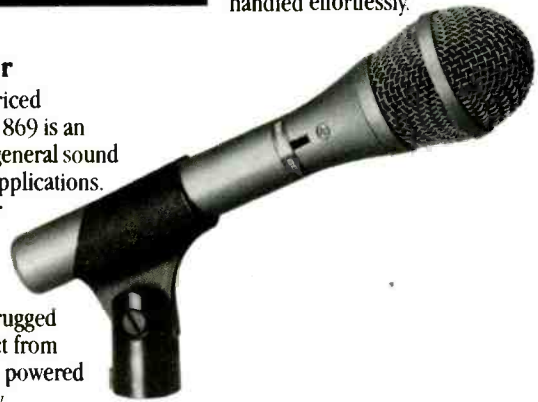
3 SM96 Condenser

This vocalist's microphone has features usually found in much more expensive condenser units. Smooth response has a controlled low-end roll-off to correct for proximity effect, and a slight presence rise to enhance vocals. Efficient 3-leg capsule suspension system minimizes handling noise. Optimized output level to control overloading. Steel-shielded against hum and RF pickup. Operates off phantom power, plus the convenience of automatic battery switchover.



6 869 Condenser

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In the world of Electric Phoenix, a contemporary vocal quartet plus electronics, small is beautiful. We are apostles of minimalist technology, which we define as (a) affordable and, (b) transportable. There are only five of us, including the engineer, and on the road we're all roadies. But it's not just our backs we have to worry about. Travelling by air as we do to concert halls and college campuses all over Europe and America, we must weigh and measure every new piece of equipment even before we price it; a few flights with a bulky item can cost as much as the original purchase. For instance, the deciding factor between Soundcraft 200 and 200B mixers (both 16/4/2) was the fact that a 200 (without its power supply) would fit in a flight case small enough for an American airline not to count it as two pieces of luggage!

The weight problem is compounded by travelling with a complete surround sound system including amps and speakers. We have learnt that when you arrive a few hours before a concert in an unfamiliar venue you'd better not spend your time cursing the house PA or chasing hum loops in a hastily cobbled interface: better by far if all you need is a wall socket. The quad principle was with us from the beginning 10 years ago but the rationale and the hardware have steadily evolved. One of our first commissions went to the great Belgian composer Henri Pousseur who asked for complex, precise spatial distribution by assigning each of four microphones to two faders, one pannable between the front speakers and the other the rear. Imagine the logistics of rotating all four voices around a hall! Joysticks were subsequently investigated and found to be expensive, cumbersome and unreliable; levels in different positions could vary by several decibels.

The big breakthrough came a couple of years ago with the Ambisonic Pan Rotate system from Audio+Design/Calrec, a spin-off from Soundfield microphone technology. Designed as a studio production tool, this provides continuous 360° peripheral panning for each of eight separate inputs, plus through-the-centre diameter control by a second row of pots. The peripheral controls are so sensitive that with practice they can be played with eight fingers like a sort of rotary keyboard; there is also a master control that allows a complex sound field to be rotated around its epicentre.

Ambisonic purists had always maintained that the system, which relies on phase as well as amplitude, would not function properly in a large hall. Image integrity would disintegrate, they claimed, with more than about 20 feet between the speakers. But the concept was so attractive that we decided to try it anyway. One option was a system with extra speakers 'plugging the holes' between the corners but we rejected the idea as too cumbersome for our resources—it had to work, if at all, with four speakers.

My first chance to experiment came with a Glyndebourne Opera production of Oliver Knussen's *Where the Wild Things Are* ('Glyndebourne Panned', *Studio Sound*, February 1986). The monsters' amplified, reverberated voices went whizzing about the opera house in a very satisfying fashion. Subsequent experience has shown that, even when it is not possible to distance the rear speakers sufficiently from the audience, spatial effects work much more satisfactorily than with conventional quad, which is entirely dependent on relative amplitude. Even outside the rectangle of speakers one perceives a sonic hologram of considerable detail and

LIVE SURROUND SOUND

Electric Phoenix is a contemporary electro-acoustic and vocal quartet frequently performing around the world using surround sound. John Whiting is their engineer and here he discusses some of the practicalities of equipment selection

complexity.

Possession of the Pan Rotate unit led us immediately to the solution of another problem. Much of our repertoire includes pre-recorded tapes, sometimes 4-channel, with a click track for the singers. Five separate tracks require an 8-track deck, which is wasteful overkill. But

another Ambisonic by-product came to the rescue. UHJ encoding reduces Ambisonics to stereo in a format from which it can be retrieved by a small decoder (custom-built for us by Roger Furness of Minim Electronics), thus permitting the production of 701 digital Ambisonic masters with the click on the audio track of a Beta VCR. Using



a Beta hi-fi keeps the click clean and hiss-free.

For a while we toured with digital performance tapes but there were serious drawbacks: the system, with up to 18 cassettes, was bulky and heavy; it is impossible to cue the VCRs for instant, glitch-free starts, particularly if the tape starts and stops frequently in a single piece; over a long period, 701/Beta technology is not reliably robust, and in the rough-and-tumble of live performance drop-outs became a growing problem.

The solution of the moment is a custom-built, double-speed Neal 340 4-track cassette recorder with external dbx (the UHJ-encoded programme goes on tracks 1 and 2 and the click on track 4). It is equipped with foil-sensing double contacts located between the playback head and the capstan, which automatically stop the tape at the beginning of each successive cue. A foot pedal on stage, its signal transmitted down a mic line, connects to the remote socket and permits one of the singers to start the tape for perfect sync. Thus the engineer need only change tapes between compositions and give his full attention to balance, panning and treatment.

Another problem was dealt with by yet another of our back-up crew of specialists. The Neal's massive flywheel is driven by a heavy-duty AC motor, which derives its speed and stability from 50 cycle mains. In America, of course, the norm is 60 cycles; and so Mike Solomons of London Sound designed and installed a crystal-controlled 50 cycle power source that is independent of mains variation. All this may be rendered obsolete by R-DAT or solid state but so far none of the available hardware meets all our requirements.

Since we are essentially an electro-acoustic ensemble who commission our repertoire from some of the world's greatest composers (the likes of Luciano Berio and John Cage) we have to think very carefully about our technical parameters. If we were rigid in our restrictions it would stifle creativity but if we were to give composers *carte blanche* to use any equipment they liked, we would be travelling with a whole showroom of state-of-the-art signal processors. In practice our purchases tend to be both composer-accelerated and budget-braked, which so far hasn't stripped our transmission.

For instance, Henri Pousseur requested that we have individual vocal synthesizers constructed for the four singers that they could control themselves, allowing much more flexibility than central control by a single operator. Designed and built by Ian Macintosh of Anchor Assemblies, they included a ring modulator, a resonating bandpass filter, and a simple digital delay, patchable to treat each other in any order. These are now virtually museum pieces of analogue technology but they are still in service, providing vocal sounds as yet not available from compact, affordable digital technology.

A recent godsend has been the Yamaha SPX-90, of which we have two, remotely footpedal-controlled by the singers. They are particularly useful because their cheapness and versatility have made them common all over the world. Thus a composer in any country is likely to have one available for experiment and can specify treatments with precisely noted settings and know that he will get exactly what he wants. We have found that, like so many of the newer generation of signal processors, they are capable of interesting and unrecognisable effects never discovered by those who don't bother to alter the presets.

But still our biggest problem wasn't solved. Even with all this distributing and processing hardware; when we went into a hall we were

at the mercy of its acoustics. Dry, unresponsive spaces are particularly cruel to singers; it's no accident that western vocal music evolved side-by-side with western architecture. Artificial reverb was a possibility but stereo reverb inside an Ambisonic system sounded unconvincingly flat and one-dimensional, and the Quantec Room Simulator was so far beyond our means that we didn't even want to tempt ourselves with a demonstration.

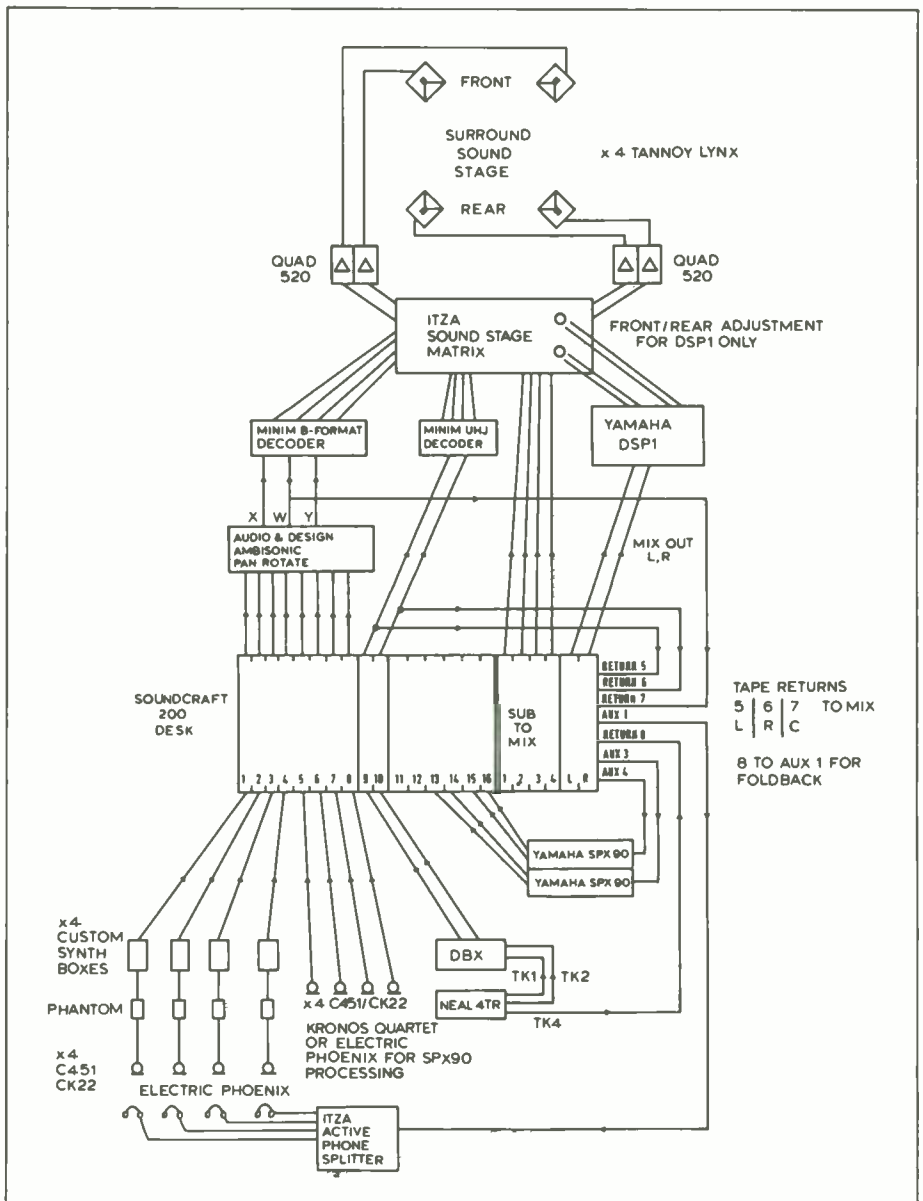
Then I heard the Yamaha DSP-1 Digital Soundfield Processor. After spending half-an-hour with it in Yamaha's R&D studio I went straight next door to their showrooms and had one within 24 hours. It was a gamble whether or not it would work in a large space like a concert hall, but I knew I wanted it anyway for my own Ambisonic listening area. Anything else would be a welcome bonus.

At this point Electric Phoenix had to make a quick decision. We were about to set out on another five-week tour of the US and this time we had decided to expand our repertoire to include brief examples of the great vocal traditions of the past, from the middle ages onward, some of them supplemented by overdubbed pre-recorded tape. With these older works, written to be performed in churches or banqueting halls, it was now

essential that, in addition to everything else, we carry a 'portable cathedral'. The DSP-1 had better be the answer.

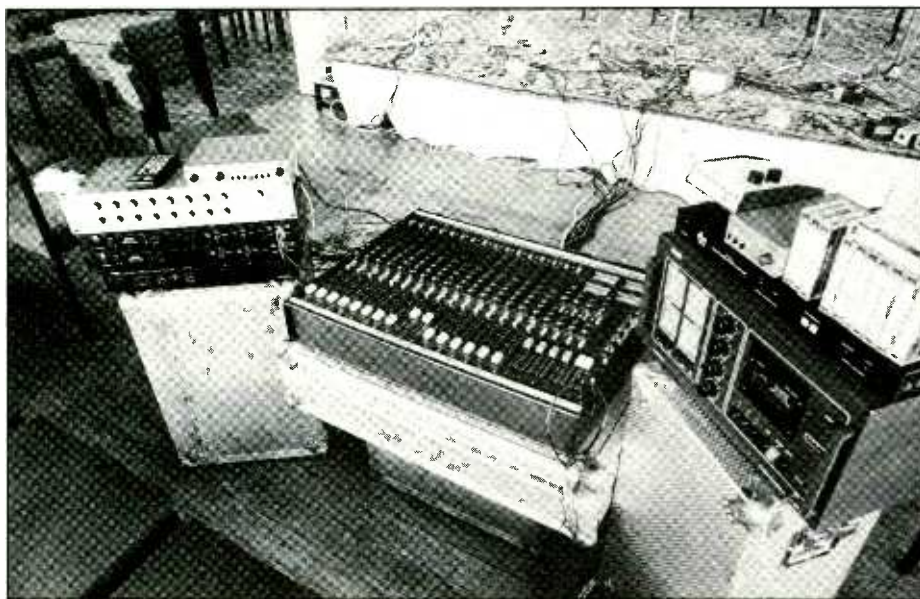
But wait, we're now talking about eight channels (Pan Rotate) feeding four outputs through a decoder, another two channels (UHJ tape) feeding four outputs through another decoder, a further four to six channels (SPX-90s) feeding yet another four outputs, and finally the DSP-1, which must be flexibly fed by everything else, going to a final four outputs. And all four of these four-output groups must be superimposed symmetrically to feed four channels of PA. At a quick estimate, a 28/26/4 mixer ought to do the trick. What price Minimalism?

The final solution is shown in Fig 1. It became obvious that we needed a mini-mixer, which would superimpose four sets of groups at unity gain (except the DSP-1 output, which should be adjustable for optimum S/N ratio). The job was entrusted to Mike Skeet, who produced a gerbil's coffin with four 5-pin XLR and DIN inputs (one with stereo front and rear pots) and one 5-pin XLR output. The two Ambisonic decoders and the DSP-1 were retrofitted with 5-pin DINs (no room for XLRs) so that interconnection is by stock cables; mixer-out and amp-in required 4/1 octopus cables. The box is powered by a ± 15 V Time



Electric Phoenix touring surround sound projection

LIVE SURROUND SOUND



Machine' and bears the cryptic label 'ITZA Sound Stage Matrix'.

It had become evident that the Soundcraft 200 must function as three separate mixers plus a reverb send unit. So Mike altered the break jacks on the first 10 channels to post-fade (tip out, ring in). This allows the first eight channels, fader-controlled, to go discretely to the eight channels of the Pan Rotate system. Similarly, channels 9 and 10 feed the UHJ decoder, leaving the last six channels in conventional configuration. Aux 3 and 4 sends on channels 1 to 10 were made pre-fade to match aux 1 and 2; otherwise they would no longer function at all.

The really elegant touch is the reverb send facility. The *DSP-1* has a genuine stereo input, so I make use of the Soundcraft's panpotted multitrack return sockets, formerly superfluous, to bring back split signals from the Pan Rotate and tape outputs to feed the stereo mixdown faders; the groups are similarly fed by the sub switches. This allows me to feed the *DSP-1* selectively from the mixdown faders, with constant easy gain ride on reverb levels via input rather than output.

The final piece in the jigsaw puzzle is the click track to the singers, which now comes into the mixer on a tape return socket and is fed out

through aux 1 to a multicore line to stage and into another Mike Skeet box, a powered headphone splitter with four separately gain-controlled outputs. (It can also feed four separate click tracks to the four outputs, as is required by one *bravura* piece of unimaginable rhythmic complexity.) Since the signal is going via aux 1, foldback of tape or live signal can be added if required, although the singers are so used to performing with classical ensembles, that foldback is rarely called for.

The bottom line, as always, is, 'Does it work?' The short answer is, 'Beyond our wildest dreams.' We were already familiar with every aspect of the system except the ITZA sound stage matrix and the *DSP-1*. The former was so efficient and trouble-free that we quickly forgot it and concentrated our attention on the *DSP-1*, which was like a sensational companion at a party. From one end of America to the other, local musicians and technicians commented on how their dreary, all-purpose halls were transformed into environments of sonic luxuriance. In one of our frequent joint concerts with the Kronos String Quartet, they asked for amplification in a normally acoustic part of their programme just to take advantage of the improved ambience. One of the most remarkable results was a brand-new

2000-seat, virtually anechoic chamber in Illinois—a real sound-sucker, which our four Tannoy *Lynx* speakers and two Quad 520 amps (minimalism, remember?) transformed into Münster Cathedral. And at MIT, one of America's high-tech Meccas, the campus mag's critic said it all:

'For the Phoenix concert, loudspeakers were placed on the walkway above, and a special Ambisonic sound projection system insured that the listener got the full intended effect wherever seated. The result was far better than is achieved by the Media Lab's usual set-up, and investment in a permanent set-up of this sort would be a good investment for The Cube'.

Within this context, the *DSP-1*'s success is especially remarkable in that it was obviously intended for the rich domestic market, complete with Dolby *Surround* decoder for videos and remote control for self-induced paraplegics. Some of the more promising Concert Hall settings consist only of early reflections and there are a number of environments not useful for our purposes, from Disco to Stadium to Warehouse Loft. The only settings we used were Chamber, Church, and Münster but they were quite enough.

There is also a range of remarkable surround sound special effects, analogous to, but more sophisticated than, those of the *SPX-90*, and of full CD quality and bandwidth. These are obviously aimed beyond the barriers of the domestic market within which the unit was officially conceived and launched. We are perhaps witnessing another manifestation of the *F-1* syndrome, in which the clever lads in the hi-fi section show the old pros a thing or two. The unit certainly deserves a serious write-up as a production tool.

I've one ironic footnote to this happy ending. The word 'Soundfield' (which Yamaha carefully splits in two) is part of a concept and a technology pioneered almost 20 years ago by funds from the National Research Development Corporation, culminating in Ambisonics and the *Soundfield* microphone. In those far-off days governments of all parties considered it their responsibility to encourage and support primary research but never, alas, to promote its products. Other countries see fit to support their native technologies with legal sanctions even when they are inferior whereas in Britain, Ambisonics has remained the plaything of a few aficionados. Even Nimbus, who have always recorded everything Ambisonically with the tenacity of the British bulldog, now tell you so only on the disc, in small print, as if it were a government health warning. (The *Soundfield* is admittedly a respected tool of some recordists, but principally as a clever fabricator of coincident pairs.)

Private companies under contract—Calrec (now part of AMS) later joined by Audio+Design—did their best to launch Ambisonics in the wake of the quad debacle with its rival standards, each worse than all the others. But now, perhaps, the market is finally ready for 'surround sound'. Everyone who has heard Ambisonics recognises that it produces a more complex and precise sound stage than the various 'Brand Xs', quite apart from its infinite 3-dimensional capabilities. But there's no really important money behind it, so when the time comes, the great buying public, with one stereo speaker on top of the liquor cabinet and the other behind the sofa, will never know what they missed.

In the meantime, Electric Phoenix travels around the world, bypassing the marketing infrastructure by taking surround sound technology straight to thousands in the concert hall. It's a great life if you don't get a hernia. □

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Bexleyheath via Chislehurst Caves seems an unlikely beginning for the owner of one of the hottest studios of the moment in New York but: "It's hardly a shattering story: I was a musician back in those times when it was all happening and followed the time-honoured route of the South London groups—including Chislehurst Caves! I always had itchy feet and came over to New York in the '70s when Englishmen were still something of a rarity over here," says Simon Andrews.

"My interest has always been producing and I felt that coming over to the States would give a fresh angle on things.

"My actual beginnings were fairly modest and in order to have time to experiment without running up very expensive studio bills, I started my own studio and gradually worked my

RIGHT TRACK

Terry Nelson visits Right Track in the heart of the New York music industry

way up through the various track formats. Somewhere along the line, the studio started getting popular for itself—due in no small part to the engineers that I have been able to find—and after various locations the final Right Track has come to rest here in 48th Street."

The studios are situated from the first floor up at 168 West 48th Street, which is right over Manny's, Sam Ash and other music stores.

The entrance is an inconspicuous door at street level with a security system. A CCTV camera follows you down the passageway and into the lift, which arrives directly in the reception area.

"It does all seem a bit strange to people who are not from New York," explained Simon, "but people are very security conscious here and you have to know who wants to come into the studio before you let them in, for a variety of reasons."

The two studios are both on the same floor. Studio B is directly behind the reception area and Studio A further down the hallway. The floor below has space for storage and also houses the administrative offices and the maintenance workshop, tape store, etc. The main difference between the two studios is size "... and preference. Some clients like to work in a large studio area—others prefer a more intimate atmosphere" though the smaller room, Studio B can hardly be considered tiny at 28×40×15 ft.

A liberal use of wood has ensured a very live acoustic, but the atmosphere is definitely 'workplace'. "We find that clients who come here are not so concerned with what it looks like but what it sounds like. There is no point in having an expensive parquet floor when you know perfectly well that equipment cases and the like are going to be dragged in and out of the studio. It is far better to have solid plywood panels with hardwood facing, which give the same effect acoustically and last longer!"

The floor does look a little used but the walls do not fall into the same category. These are faced with pine planking—either set vertically or in inverted 'V's. The two end corners of the studio feature slat absorber walls in order to take out excess bass while diffusing the mids and highs and the two main walls are not flat but feature angled sections to aid dispersion and cut down standing waves.

To gain height, the ceiling has been stripped back to the support beams of the floor above and the necessary isolation installed over the studio ceiling rather than in the room. An acoustic advantage is that the beams tend to catch and disperse the sound so floor to ceiling reflections are dealt with very effectively.

Both studios and control rooms are, of course, fully floated away from the main structure of the building.

"Studio B is very popular for vocals and rhythm tracks, due to its live character. Musicians such as David Sanborn like it a lot for the fullness that it lends to their instruments—it really makes them want to get in there and play."

As often with simple-looking rooms, the conception was definitely not simple and is the work of Right Track chief engineer Frank Filipetti.

"Frank had the basic idea in mind and then supervised every step of the construction tuning up the room as he went along."

Control Room B juts into a corner of the studio and visual contact between the two is good. As well as the usual headphone



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foldback, a pair of Altec 604 *Big Red* monitors are mounted into the studio wall over the control room window.

Control Room B measures 16×18 ft with all tape machines and most of the equipment racks out of the way in soffits. The acoustics lean toward the absorbent side with a lot of open trapping covered with fabric—restful dark blue for the room and light grey for the soffits. Wooden framing covers joins or external construction, providing contrast and defining the lines of the room.

The sound is “tight and precise while being able to breathe”.

The UREI 813 speakers have since been replaced by Tannoy FSMs. “UREI’s are really considered as being dated here in New York. They were a good speaker when they came out but with the demands of today’s music, the frequency and power response are a little lacking. The Tannoys are a direct retrofit

RIGHT TRACK

so installing them will be no problem and they are already getting to be a popular speaker here.

“Though we do not get things in just because they are the ‘flavour-of-the-month’, we still have to take notice of what the client says and as far as the monitoring in B is concerned, it is time for a change now and the FSM’s appear to fit the bill. Besides, I always did like Tannoy, anyway!”

Secondary monitoring is *NS-10M* and *Auratone* with other speakers available upon request.

Recording centres around a large SSL *SL 4064 E* console with *Total Recall* and a pair of Studer *A800 MkIII* multitracks with mastering on Studer *A80RC* ½ inch and ¼ inch machines. Noise reduction is available via TTM transformerless mainframes, which can be equipped with Dolby and dbx cards as required. Additional machines are an Ampex *ATR-104* ½ inch 4-track, Nakamichi *MR-1* analogue cassette and *F-1* digital with Sony Beta deck.

Whereas most studios set up keyboard stacks behind the console, the tendency at Right Track is different: “Depending on the session, the player can either face the engineer or look into the studio and watch the other musicians without peering over the console—either way, the contact is better. It also leaves the space behind the production team clear and generally stops people from tripping over each other.”

For sessions requiring more space, Studio A’s main area is 40×40 ft and there are three isolation areas—A, B and C.

Construction is similar to Studio B with the same flooring and ceiling, however, the extra space allows the use of some

polycylindrical diffusers on the far wall facing the control room. The right wall features wood-faced slat absorbers and the left wall is entirely brick and trapped behind.

As might be expected, the sound is very live though there are no objectionable resonances or flutter echoes and the overall reverberation time is surprisingly short for the size of room and type of treatment so the sound is kept well under control.

Iso B is 20×12×13 ft and is open to the studio floor; screens can be wheeled across if further separation is necessary. The sound is very damped for dry acoustic conditions and there is a marked difference when stepping over the line that separates studio and iso room.

Iso A (12×10×10 ft) forms an access lock between the control room and studio and is mainly glass sided with trapping in the ceiling. It is used for instrumental and vocal dubs where a certain amount of presence is required.

Iso C (6×6×10 ft) is primarily a vocal booth with a very dry acoustic and more limited vision.

An interesting feature of Studio A is the drum riser at the far left of the studio. This is a raised platform floated away from the floor providing a view of the whole studio. The rise has a hardwood floor, upon which carpet can be laid if required, and wooden panelling on the two wall surfaces. The platform is surmounted by an inclined hood with wood panel finish on the exterior and absorbent panels on the inside, together with a trapped ceiling. There is also a trap opening at the side of the platform to capture excess bass energy and lose it behind the brick wall.

“The drum iso works very well, even though we have a piano on it at the moment! It enables a good, solid sound without much spill into the room and we can always put half-screens around if we want even more separation.

“Though it is large enough for most drum kits, we do find that drummers like to set up in the middle of the studio if they can. We often get the comment that they can get a sound that has a lot of space around it and this is especially popular with rock drummers.”

Monitors in Studio A are JBL 4435s.

Control Room A measures 21×20 ft and again features soffits for the tape machines and racks. “You’ll always get some racks being used up by the console but we try and keep the bulk of the outboard gear out of the way in the soffits.”

The construction is very similar to Control Room B with extensive trapping, a slight compression ceiling with open traps and the fabric and wood frame decor. The room is larger, though, and features a wider window system.

Tape machines are as per Studio B with recording centring around an SSL *SL 6056 E* with *Total Recall*. “It was a conscious decision to buy a 4000 and 6000 series SSL. Although the bulk

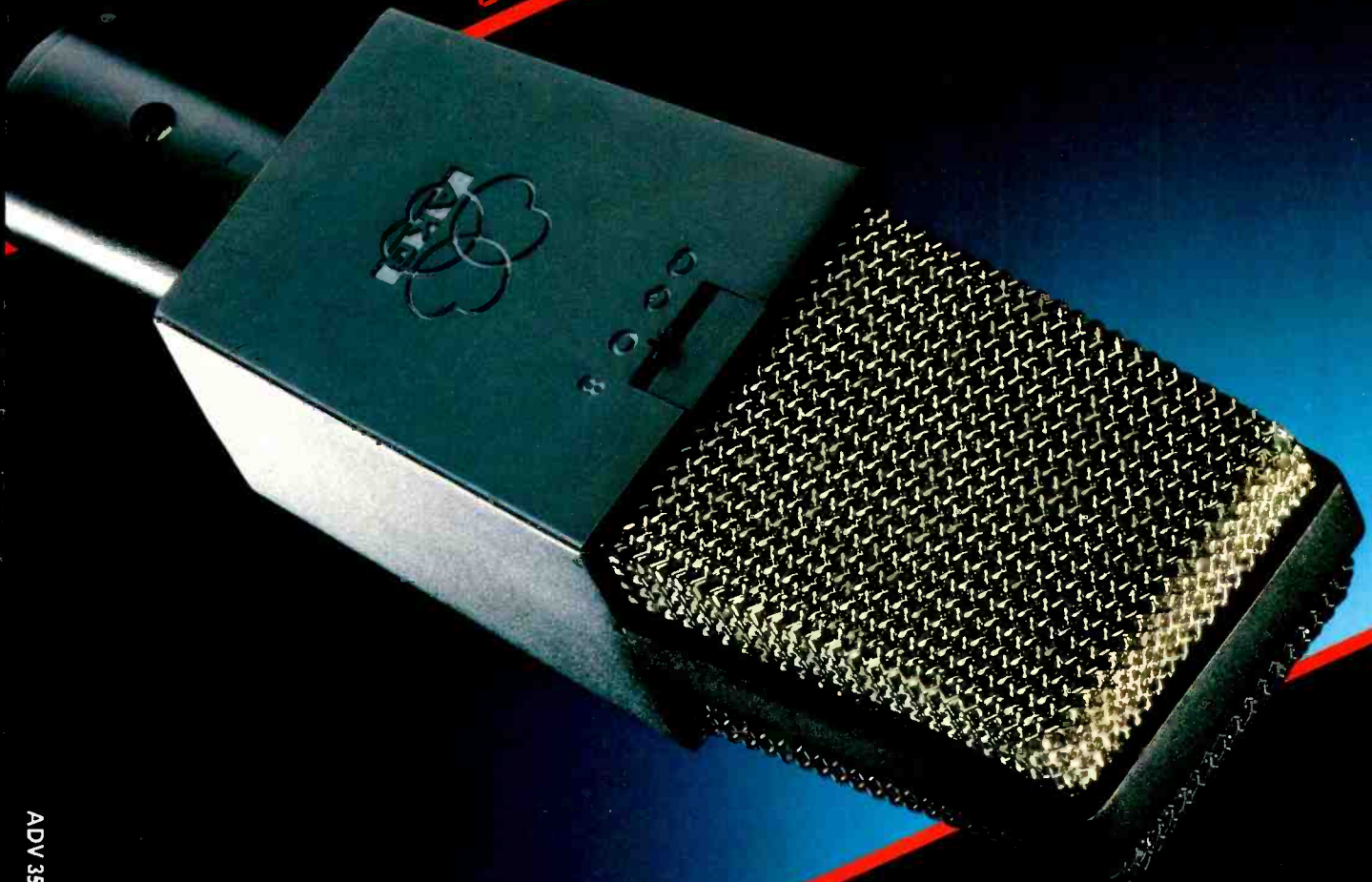


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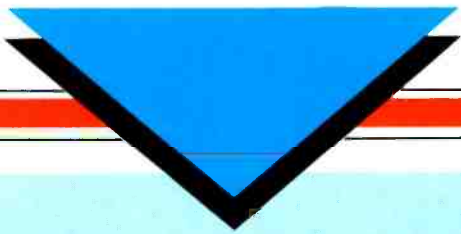
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of our work is records, there is a certain amount of post-production work and we wanted to be able to offer our clients all the facilities they needed, hence the two types of console."

Monitoring is also more powerful with a Westlake *HRI* 4-way phase coherent system plus the usual secondary monitoring.

The comprehensive equipment list is standard for both studios: "We wanted to have the rooms as identical as possible for compatibility reasons—and to avoid engineers raiding the other studio for that piece of gear that they didn't have! We also have what we call our floating outboard stock that can be installed where and when required. Most of the effects equipment is included in the studio rental fee though there are certain items that we do make an additional charge for—the Focusrite racks, for example.

"If you are going to stay ahead, you have to provide the best

RIGHT TRACK

service possible to the client and I think this is fairly common sense, however, service costs money and studios are a business like everything else, which means that things have to be paid for.

"Right now one of the hottest pieces of outboard gear is the Focusrite *ISA 110* equaliser and we have a rack of eight channels in each studio. People want them so we get them—and they pay for the service.

"There is always talk of a price war between New York studios but we have never lowered prices nor do we intend to. Our standard rate is around \$220 an hour with the rates being

adjusted accordingly for long bookings—but not by much!

"I think if you set out to provide the best service possible—and this means an efficient office, proper maintenance of the equipment, clean premises, etc—then clients appreciate it as such and are prepared to pay a reasonable rate in order to have it."

Right Track also have a healthy collection of microphones and musical instruments, the former including such gems from the past as the RCA *D-77* and the latter ranging from a Hammond *B-3* to an Emu *Emulator III*.

As regards digital: "We offer Sony and Mitsubishi multitrack and master machines with the appropriate charge and the client can choose whichever system he wants to work with.

"A lot of our work here is with rock bands such as Foreigner and frankly, I feel that for this sort of music analogue sounds better! However, this is only my point of view and not studio policy. It all comes down to what we were discussing earlier—service to the client. If they want digital, they get digital; if they want analogue, or a mixture of the two, then they get that also.

"The fact that there is not one digital standard but two has put studios in a very difficult situation. You can be sure that if you buy one system you will have clients who want the other and so on. Even though there are preferences for analogue multitracks, they are still all to the same standard and perform to a professional level.

"The digital systems are still very expensive and you cannot afford to have equipment like that lying around idle. The day there is a unified standard and tapes can be interchanged between studios, without problems, I think we will see things change quite considerably but until then it seems to me the most flexible way to work is to supply the equipment as and when it is needed."

Another feature of the service offered to clients by Right Track is the private lounge. Each studio has an adjoining lounge equipped with fridge, video, hi-fi and private telephone.

"Each lounge can be accessed either from the control room or the hall and can be used as a relaxation room or as a private office. We have separate telephone lines installed in each room and it is often useful for clients to be able to have their own office in order to conduct business, have production meetings or what have you, rather than share our reception area.

"The lounges also provide a peaceful corner where the musicians can go when they are not in session."

Layout is something that has really been thought about at Right Track and each studio and control room can be accessed directly from the main hall, thus avoiding any unnecessary tramping through rooms. There is, of course, direct access between the studios and control rooms.

Apart from the ground floor, Right Track have the whole building to themselves and there is more than enough space to build a third studio or large remix room.

"With the amount of work that we are doing, a third room is becoming a very strong possibility, however, I am not going to rush into things and if we do a new room, it will be because the time is right."

The kind of clients that have been keeping Right Track busy recently include the likes of Foreigner (an entire album), David Sanborn, Roberta Flack, Survivor, Mick Jagger, Michael Boulton, Whitney Houston, La Toya Jackson, Anthrax, Ace Freehly, Loins and Ghosts. Present projects include Steve Stevens (guitarist with Billy Idol) and Dave van Roos.

"As you can see, we do get a wide variety of artists in here but I would say that we are basically a rock and roll studio!"

But does Right Track have a secret for success?

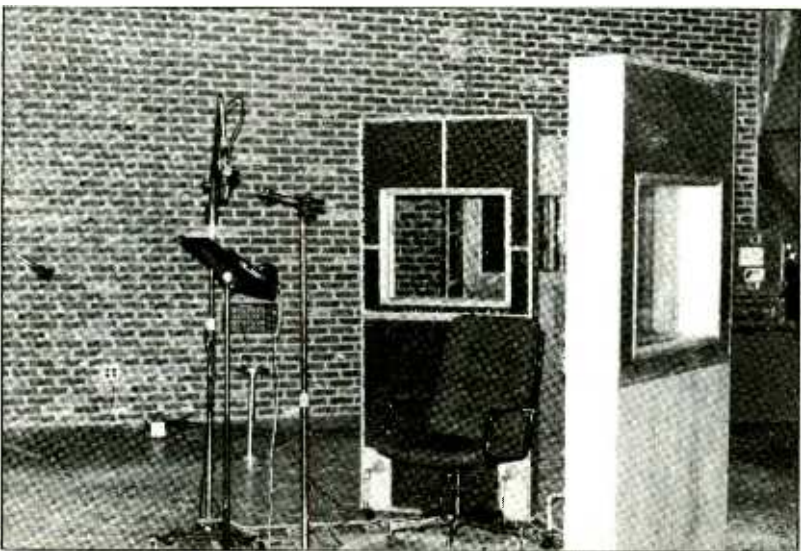
"It all comes back to service for the client—and having good engineers! I have to say that most of the credit for Right Track's success is down to Frank, our chief engineer, and his colleagues. You can have the best equipment in the world, luxury decor, all the facilities such as jacuzzi, sauna, etc, but if you haven't got the engineering staff you may as well forget it—unless you are just into the glamour of making records.

"We are very much a working studio and I am still amazed by the amount of actual work that the majority of our clients put into their sessions—which is perhaps the reason why they have a lot of hits!" □

Right Track Recording, 168 West 48th Street, New York, NY 10036, USA. Tel: (212) 944-5770.



Control Room A



Studio A

MARTIN POLON'S PERSPECTIVE

The time is somewhere in the future. On the third moon of Algon, in the Polaris quadrant, a small Galaxy Council cruiser is moored for some minor repairs. On board the Scimitar, the crew busily works to repair the damage to the main navigation computer power supply system caused by a collision with space debris. In the hold, the valuable cargo of polyvinylite from the surface of Algon itself will finally allow the production of compact discs to begin again back on Earth. One of the undesirable results of the 'Digital' wars 350 years previous was the destruction of the last deposits of petroleum that could be used to make records. Oil had long since been replaced but the need for plastics had increased and not diminished.

Record production had been one of the first things to go as the earth's record companies destroyed the sources of compact discs rather than allow them to be digitally copied. Now, with the hold full of the naturally plasticised rock, Captain Slade knew their homecoming would be a welcome one.

First Officer Gorgon was the first to notice the presence of the Baltoon vessel. Ostensibly a tramp freighter furthering the Baltoon's arbitrary mission as the traders of space, the vessel continued to grow in size on the Scimitar's monitor screen.

Captain Slade decided to wait until the vessel was within hailing range before making any decisions about the Baltoon presence. He had suspected for several days that someone was shadowing the Scimitar; now he felt sure that it was the Baltoons. He had not come across the race of traders before. Their activities seemed to be limited to this quadrant of space. He remembered from the Galaxy Academy their reputation for business with a generous dose of violence and deceit if necessary to 'close' the deal.

"Halloo, Galaxy Council vessel," came the hailing from the Baltoon ship.

"Heelo yourself," responded Slade. "Please identify."

"We are but poor businessmen," signalled the freighter. "We seek only water to drink, which we are without now to a point of extreme jeopardy."

Slade acknowledged their transmission. "What do you want, specifically?"

"We would like to send a party to receive water. In return, we shall leave you with a gift."

Slade replied, "We will give you water. Our solar converter produces water in whatever quadrant we find a sun. Acts of help are part of our duties under Galaxy Council rules. Gifts are not necessary."

"Oh, but we insist," signalled the Baltoon commander. "I would be dishonoured if you refused."

From that point, the two ships continued to close until the Baltoonian vessel had also docked, just abeam of the Scimitar. The Baltoon party was piped aboard and the transfer of water via energy beam began. The Baltoon captain faced Slade and pulled a large plastic disc from a plush

purple bag. "A complete stock of popular music from your planet. I believe when connected to your computer it provides what you people call a junkbox?"

Slade corrected his opposite, "You mean jukebox. That is very thoughtful. As you know there is a shortage of music on Earth. We shall enjoy this very much." The disc was given to the science officer who scanned it internally and externally. It was then placed into one of the data ports of the ship's main computer. The sound of music was heard around the ship.

"Was not that one of your artists who had been an important figure of religious worship before becoming a music maker?" The Baltoon second officer asked with a drool. (Baltoonians had the unfortunate habit of drooling as they talked.) A significant puddle had already formed beneath the Baltoon captain.

Slade laughed, "No. The Madonna you are listening to had nothing to do with events several thousand years previous."

The pleasantries over, the Baltoon contingent returned to their vessel. Repairs were completed on board the Scimitar. A course was set back to Space Station 90, where the cargo would be transloaded into a Galaxy Council freighter for passage to Earth. "Look back for that Baltoon ship," Slade ordered Gorgon. Suddenly, the various computer consoles on the flight deck began to flash red warning lights. The cacophony of emergency horns filled the air. Only the hailing computer seemed to work. The Baltoon captain filled the monitor screen.

"Your computers are frozen. We hid a special program in the music which has crippled your computers and your ship. We work for the world's record companies. If they cannot control digital recording of music; nobody will. You have two

systems had further complemented the operation. Jack Werth, his chief engineer had devised a complete common connection scheme, so that each studio or major system could communicate with each other's system via computer buses. Special software was written for each of the Apple Macintosh II computers that were part and parcel of each recording studio, post room or editing suite. Other software was created for the various tapeless recording systems, digital consoles and a myriad of MIDI equipment. All of the business functions including studio traffic assignments and analysis, accounts receivable and payable, payroll accounting, fiscal management and inventory control were handled by dedicated computer systems with interface to the technical computers.

With the entire operation on computer, the electronic recording community made Hercules their home away from home. It became a normal occurrence for a studio user to show up with his or her own software written specifically for their application, or to sit late at night prior to a session creating automation software. Everything was coming up digital and binary roses for Hercules Studios until one day. A disgruntled former employee went to a friend with significant computer software skills. He had the programmer create a machine language subset that would start on one machine in the facility and implant a 'bug' that would spread from system to system within the studio through innocent interconnection and use. This bug would wait until all the machines in the facility were 'infected' and then shut everything down, destroying software and losing data in the process.

The former employee passed the lethal floppy disk on to an acquaintance who was going to record at Hercules. He told the gullible mixer that the disk held 'the greatest mixing software ever written'. On the day of the appointed session, the mixer inserted the disk and the bug moved on to the hard disk of that particular computer. It did nothing to enhance mixing or computing and the mixer assumed it was just not working. That part was true. Five days later, the 'bug' hit. It shut down every computer in the facility. It destroyed all data that was stored and it rendered all system software non-functional. It also made it impossible to reboot standard operating software

Is the first story really part of a script for a new TV series. . . Is the moral never to accept gift junkboxes from drooling Baltoonians?

choices. You can drift through space for eternity or you can transfer your cargo to us. We will give you a new computer program to cancel the one that has crippled your ship's systems."

What would you do if you were Captain Slade? Think about that while reading this next story.

At Hercules Recording, the investment in digital equipment had really paid off. Nothing in the house had analogue control, thought Steve Brightoff. Brightoff had parlayed a small investment in one of the most successful and sought after studios in the city. Every room had computer control or computer consoles. The investment in direct to disk systems and in MIDI

since it now controlled the architecture of each computer. Groups that had placed their entire electronic music mix on to MIDI cues had their work wiped out. The direct to disk facility was without its vital operating software. All data records of bills that needed to be paid and of monies due to the studio were destroyed as was the entire calendar of future traffic and rentals. In short, the facility was devastated.

Now, fellow professional audio practitioners striving to embrace both digital audio and computer automation, which story is truth and which is fiction? Is this the *Studio Sound* version of *Tales From The Darkside*? Heaven knows,

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MARTIN POLON'S PERSPECTIVE

many readers have suggested that of this column every month. Is the first story really a part of a script for a new television series called 'StarTrack Meets The Record Industry'? Is the moral of the first story really to never accept gift junkboxes from drooling Baltoonians?

The reality here is that both stories are fiction but are an amalgam of true stories to the same point. In the first story, the ending would have been clear. Slade's goose was cooked because if he chose to survive, Galaxy Council Command would have assigned him to walk a beat on the fifth moon of Saturn. By that time, computer 'bugs'

would have been old hat and even the newest reader of science fiction knows that you never ever let anyone place strange software into your main computer.

The second story hasn't happened in the audio or recording industry—yet! But it will, because computer viruses, which is what the bugs are called when they spread from computer to computer—are the greatest threat to the computerised interaction of digital technology

today. 'Viruses' began when playful hacker-programmers with sufficient skills to operate at the machine code level in various systems began to devise ways to place a hidden program within the confines of 'visible' software.

These computerised engines of apocalyptic destruction generally are 'time bombs.' They hook into the clock that is a part of every computer and either count time or transactions before unleashing their damage. This accomplishes two things for the diabolical hacker. It allows the hacker to insert the software directly on disk or indirectly via modem and phone line at a time different from that of the actual virus function. That makes it very difficult to track the culprit. Secondly, the ability to use time or transactions allows the virus to be 'set off' at exactly the time when it will do the most damage. Viruses in a studio at 11pm on a Sunday night might do absolutely nothing. The same viruses at 3.45pm on a Friday could cripple an entire studio or an entire industry.

The level of sophistication shown by the errant hacker-programmers is truly amazing. Some have guided their 'virus' offspring to search for specific programmer's initials on other software. Some have only attacked software from a selected vendor. Others have devised bugs that create a false display while the bug feasts away on data or instruction sets. The problem caused by tele-reporting viruses is even more significant. Consider the case of electronic music computer networks, where public access bulletin boards and data libraries are used by owners of personal computers and MIDI equipment to exchange information and programming. Imagine a set of programming cues that is offered for free and downloaded by hundreds if not thousands of users. The cues themselves might be perfectly good while the virus is installed subcutaneously in each user's hardware. The program would pass to every piece of software that came in or out of an infected unit's floppy disks. When the pre-programmed time arrived, the bug could crash the system hard disk or wipe out stored music and programming or perhaps do more subtle levels of damage like taking down MIDI cues but scrambling them to make recovery or playback impossible.

The question, 'Why?' immediately comes to mind. There are several reasons: anger of the less successful musician and jealousy from professional compatriots rises rapidly to the top of any list. Disgruntled former employees have the best of excuses, don't they? After all, it is the ideal crime from the perpetrator's viewpoint. The time delay before execution, no physical violence against human beings—just a chance to get even against some big studio... record company... manufacturer... former friend... etc. And then there is the question of greed.

Numerous computer experts and an equal number of behavioural psychologists are trying to suggest that while the possibility of someone creating a virus is real, the likelihood of someone actually using such a tool is remote. On the other hand, there is a virtual hue and cry being raised about viruses in the computer press, by security experts and by computing managers for large companies in the US and the European Common Market. The middle ground is best described by a manager of information services at a large company whose product line includes professional audio products: "Look, it's on the same par as finding a poisoned 'banger' (sausage) in your

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'mash' (potatoes) down at the 'local' (pub). The odds are a million to one against it but can you afford to take the risk? Who would do it? All the classic villains known to Scotland Yard. The disgruntled employee, the jealous wife, the owner of another pub, the competitor of the sausage provider.

"A Japanese manager that I know said, yes, he takes risks on a personal level because there is a challenge in bucking the odds when he dines at his favourite restaurant serving fugu—blowfish in Tokyo. But he said he could not take risk on a corporate level because it could devastate his operation."

The information manager continued. "The problem we face here is the potential for a total shutdown. First, most large companies today have linked their various computers and terminals via local area networks. Many even use telephone lines to extend that capability from plant to plant, city to city, country to country. Second, the increasing dependence upon CAD/CAM (Computer Assisted Design/Computer Assisted Manufacturing) extends the vulnerability beyond data, accounting, scheduling and payroll. It brings the catastrophe of the virus to the work floor and shuts down a plant or all the plants of a company for a day, a week or longer. The danger extends even further because production machinery like hard disk drives can be damaged or even destroyed during such a crash. As to who would do it, the list is just the same as it is for the pub serving the odd piece of sausage. It could be an ex-employee, a relative, a competitor or even a supplier's competitor. And size of a business has no relationship with the potential of the threat. Think of a computerised recording studio that has only one competitor in a town. That competitor has a real inducement to think about planting bugs."

For the audio industry, and for any other industry at that, the question of computer viruses must be answered with methodology for suppressing the threat of the 'virus' program. As with the analogised human illness, the best way to deal with computer viruses is to use the proverbial ounce of prevention before the pound of cure is needed.

It is interesting to note that in surveying methods to eliminate or significantly reduce the threat of binary viruses, the same precautions for viruses are recommended and have been recommended for some time to prevent hacking, data theft, computer fraud, etc. The best advice is to isolate access to a company's computers. As difficult as that may seem on first thought, it simply requires some simple security measures to control access from outsiders. As to the use of telephone access with a computer system or systems, the most reliable way to prevent hacking or catching a computer cold is the use of adequate passwords. Passwords also help to control unauthorised usage from inside any business as well.

The trouble with most passwords is human nature. Ask a manager to come up with a password and he will most frequently come up with SARAH-ANN. Now it is easier to remember the name of your wife and daughter than to remember 3TFGH9LKJ, but most successful hackers simply move through a list of first names to gain entry to corporate or government computers. It is also helpful to use entry counters that will disconnect, identify and isolate a repetitive entry effort using erroneous codes. After three tries, the system blocks further access. Hacking requires virtually unlimited access to break down the passwords.

Several layers of passwords are also helpful. Telephone callback systems respond to a correct usage of a password by disconnecting the caller and then instituting a reconnection to the phone number that is stored with that particular user's password. In other words, even with a purloined password, the hacker/viral poisoner cannot gain access via the telephone line and modem since the computer will only call back the authorised number to make the connection. If a virus cannot gain direct access to a computer system, no infection is possible.

Operating software should be purchased from legitimate sources with the physical seals intact. It is like buying a bottle of aspirin at the chemist's shop with the protective seal broken. Would you take that aspirin? Probably not because it might have been tampered with. The same holds true with computer software. Discount

software from legitimate sources will still have intact seals. Audio control and electronic music software from small vendors should be ordered only in sealed versions. Of course, a virus could be inserted at the premises but that seems unlikely since a small company's credibility and, in fact, very survival is on the line. For the studio operation that makes use of computers to accept user software, the isolation of these PCs from the rest of the computing equipment is vital. What if a virus actually strikes? There is not much to do except to force a complete shutdown of all systems to kill the virus and then to restore all operating software from known 'clean' sources.

The likelihood of viral 'medical' problems in the audio community is just as high as it is in other industries where the computer has become an indispensable commodity. The supposition that 'it's just another silly thing to worry about' is probably not a good one because one catastrophic 'viral' infection can signal the demise of an audio business. □

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BARRY FOX'S BUSINESS

The Musicians' Union is calling for laws to clarify the situation on sampling. I don't envy

the copyright bodies trying to explain to politicians how the word sampling is used to describe two quite different techniques.

And the MU's call looks suspiciously like a pointless and fruitless knee-jerk reaction against new technology.

Readers of this magazine will surely need no-one to tell them about digital sampling—the technique of digitally recording a snatch of sound played by a musical instrument, storing it in solid state memory and using a keyboard to trigger the release of notes modified in pitch and tone.

But readers may be less familiar with the other kind of sampling, DJ disco mixing. Did you know for instance that there is now a world championship, with finals held at the Albert Hall in London? The sponsors are Technics—Japanese purveyors of the hi-fi turntable disco DJs have blessed—with participation by Stanton—who make one of the few cartridges in the world able to stand up to the appalling abuse thrown at it by the disco jocks.

They build a performance by mixing together short segments of commercially available recordings, often while rapping over the top. It started as a live act but mixes are of course now being re-recorded and issued on disc.

John Morton, General Secretary of the Musicians' Union, says digital sampling is the MU's main concern: "A musician may spend many years developing an instrumental sound. That sound is an essential part of the professional service that he or she offers to the public".

But when I phoned Morton, saying I was following through on his proposal and would need some specific examples of abuse to quote, not a single one was available and not a single one was subsequently forthcoming.

And when I phoned Stock, Aitken and Waterman, prime complainant about rap sampling, no-one had time to talk—either then or later.

The record companies' trade body, the British Phonographic Industry, has been talking about drafting an industry code, "... but I blanch when I hear talk of industry codes", says Patrick Isherwood, the BPI's legal adviser. "It is better left to the individual, because the worst offenders will just ignore a gentlemen's agreement."

Like it or not some people now regard disco rap mixing as a new art form. At the Albert Hall championships, a string of contenders all used pairs of Technics *SL 1200* turntables. These have a quartz-locked electronic control that can vary the speed of the motor by 16%, which lets the DJ match both the tempo and pitch of successive records.

The *SL 1200* motor has high torque and remains constant under load. Replace the rubber mat with a felt pad and you have the ideal fast start slip and scratch pad.

When scratching and mixing is done live in a nightclub, there is little chance of legal redress. The trouble starts when DJs release their own records made up from snatches of other people's recordings.

Lawyers look all set to make fat fees from noisily threatening each other because there are no legal precedents on this new kind of copyright plagiarism.

Pete Waterman of SAW recently claimed that the hit mix song *Pump up the Volume* contained snatches of his own recording *Roadblock*. Another performer, Jimmy Castor, has accused the Beastie Boys of using snatches from an old recording. Many mix records include snatches of the voice, or backing instruments, taken from old James Brown gospel and soul records. Squeaky clean Swedish pop group Abba, complained that excerpts of their music had been used on vulgar recordings. *Pump up the Volume* is itself being plagiarised by later recordings. To sound different, artists are now 'borrowing' from old radio programmes, and film soundtracks. *Beat Dis*, by Bomb the Bass, recently topped the charts with snatches from the *Thunderbirds* TV series, an old Decca stereophonic test record and the music soundtrack of the spaghetti Western film *The Good, the Bad and the Ugly*.

Patrick Isherwood says there are "no helpful legal decisions yet on sampling"—most music plagiarism cases have involved the theft of whole songs—"but the principles are well established", he says. "The courts tend to judge on quality rather than quantity. Taking just one exceptional phrase, for instance the key idea for a song, could be infringement, while taking several lines of unexceptional music might not matter."

The disco, mix sampling craze is likely to die a natural death. Electronic sampling is here to stay. Does it matter?

Bands swap samples. Few musicians or engineers use manufacturer's samples without altering them. They sound too samey.

"Take my samples but don't steal my music" is the new code of ethic. Which makes more sense than talking vaguely about changing the law or making lawyers richer than they already are.

Ken Dibble will be writing separately about the new limits on sound level due to become UK law on January 1st, 1990—remember that's only 18 months off.

It does seem extraordinary that no-one has seen the implications of this for recording studios. But full marks to the British Entertainment and

Dancing Association for smelling trouble and commissioning Dibble's firm of consultants in noise control and acoustics, to tour Britain and measure sound levels in public places where music is played.

Although Dibble's brief does not include studios, he predicts what will happen if the regulations are imposed: "I just don't see how anyone will be able to work in a recording studio any more," he says.

But so far there is no money from recording studios to sponsor a similar survey and plead for engineers to be made special exceptions and exempt from the proposed regulations. After spending six years drafting them, you can be sure that the Common Market eurocrats are not going to change them.

The snag is that the consultative document, published by the Health and Safety Commission, is a pretty inscrutable tract. But, be warned, it could put studios out of business. So do be sure to read whatever Dibble writes.

At the risk of being repetitive, be warned that the proposed limit is an LEQ or equivalent continuous sound level of 90 dB. LEQ is an averaging technique that compensates for the fact that sound levels seldom remain constant over a working day. An LEQ of 90 dB is equivalent to a continuous exposure of 90 dB spread over an eight hour day, or 93 dB for four hours, 96 dB for two hours and so on. At 105 dB, the kind of sound level in a studio control room, near a disco amplifier or alongside a drum kit in an orchestra pit, the legal limit is exceeded after just 15 minutes.

In a factory, anyone subjected to excessive noise level will be compelled to wear ear muffs. Clearly this cannot be done in a studio where the engineer can only do his job by listening to the sound against which the law insists on protection.

A straw poll suggests that studios will be up in arms as soon as they realise what they will face. Says Barry Ainsworth, of Tape One:

"A studio is a private place. Artists should be able to do what they want. If they are stupid enough to listen at dangerous levels, that is their own prerogative. But I would be very annoyed if an inspector were able to come in and tell me to stop work."

But that is exactly what *will* happen if the industry does not convince the HSC that people making and recording music are a special case.

You might like to know that Liu Zhongdu of Beijing in China, is filing patent applications round Europe on what he calls a Dancing-Musical Instrument for a new art form, to be called 'instrument boxing'.

As he says, most countries have traditional dancing, and most countries have traditional music. Instrument boxing uses modern electronics to integrate the two.

An electronic organ or synthesiser, amplifier and loudspeakers are connected to a giant keyboard. This is spread over the ground like a gymnast's mat, alongside a similarly large size replica of a musical instrument containing the electronic organ. The keys of the mat keyboard are touch-sensitive, and connected by cable to the electronics. So as dancers prance over the keyboard touching keys under foot, they produce matching sound through the loudspeakers. At the same time the keys trigger coloured lamps which light up in the huge replica.

Alternatively some dancers can work the keys with their hands, or with hammers.

Anyone who loves radio, should try to see Woody Allen's film *Radio Days*, now available on video cassette. Allen narrates, telling a string of anecdotes about the '30s and '40s, when radio was what TV is today.

The music is all from the period—Dorsey, Shaw, Miller and Crosby—and there are sound clips from the most famous radio series. The feel of sound studios 40 years ago has been lovingly recreated at the Kaufman-Astoria film studios in New York.

Some of it is very funny. There's the ventriloquist on radio, an on-air quiz show where burglars answer the phone in the home they have broken into and win first prize for the owners, and a cameo on the night when Orson Welles brought America to a halt with his *War of the Worlds* broadcast.

Woody Allen shows only one glimpse of what happened when the 'WoW' broadcast went out 50 years ago this October. The H G Wells novel was adapted for radio by Howard Koch. Koch hit on the brilliant idea of pretending to broadcast music from a hotel ballroom, and then interrupting it with an emergency announcement about Martians landing in New Jersey. Listeners casually switching over from the Charlie McCarthy ventriloquist show, thought the emergency was for real.

Families in Newark, NJ, fled their homes with towels over their faces; in Harlem crowds sought sanctuary in the churches; and in Pittsburg a woman swallowed poison rather than face the little green men from Mars. It was estimated that 12% of the US radio audience heard the broadcast and more than half took it seriously.

The FCC threatened to punish the CBS network and CBS threatened to punish Welles and his Mercury Theatre Group. But Mercury found a small print clause in their contract absolving them from 'all legal liability' and the threats came to nothing. But the Hallowe'en broadcast changed the face of radio forever. Never again has any station dared to transmit anything that could trigger national panic by so convincingly dressing up fiction as fact.

The *Radio Days* video release, from RCA/Columbia, is interesting for another reason. RCA has always looked for new ways of boosting revenue and sales. It began when RCA stuck a Pepsi or Coca-Cola advert on the beginning of their *Ghostbusters* cassette. (I deliberately can't remember which drink it was.) Not surprisingly the video trade and public rebelled—saying that they hired videos to avoid the commercials thrown at them in a cinema or on TV.

Radio Days has something even odder on the front. It is a collection of trailers for other videos in the RCA catalogue. Nothing odd in that, a lot of firms do it. But the *Radio Days* trailer is an extraordinary free-form mish-mash of different films intercut, apparently at random. You end up not knowing which scene is from what film being trailed; the video equivalent of a disco DJ mix.

What would happen, I wonder, if a record company played a similar—but more sensibly edited—game? As often as not there is plenty of spare running time on a CD. Why not put some extra sampler tracks on the end that trail other releases from the same record label, by offering short excerpts from other artists?

Whereas the video companies stick their trailers on the front of the tape, to trap viewers into watching them, hopefully the record industry would put excerpt trailers at the end of a disc where they will not irritate and alienate the listener.

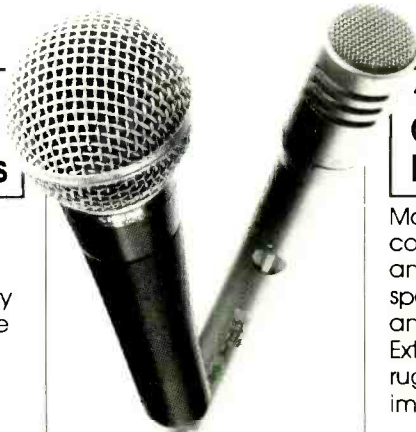
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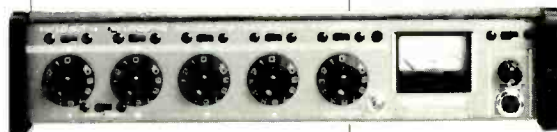
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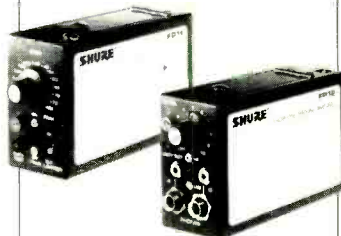
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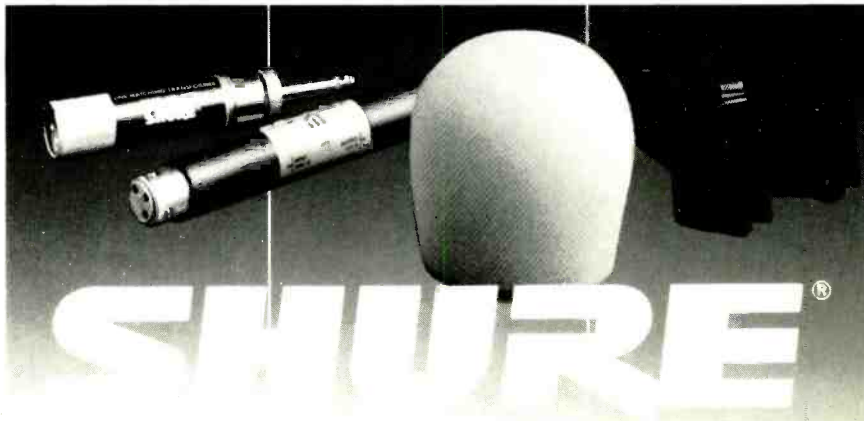
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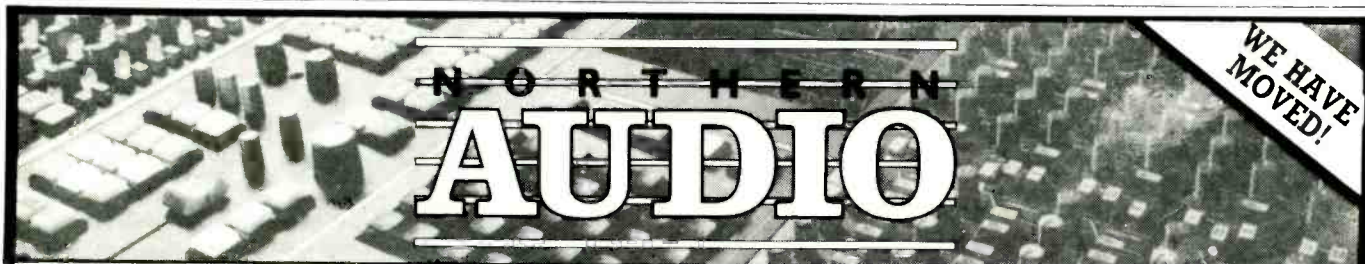
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There is no denying that the *Opus* appears to have been a long time coming. From early technology previews of the *RDI* R&D project to the current time it has taken nearly three years. Meanwhile this area of technology is one of the fastest developing and it's possible that the *Opus* could have been considered obsolete before it was even fully operational. Well it is now in production, it works and there are several already paying their way in US facilities.

There are as many different ways of dealing with digital audio once it is off a hard disk as there are manufacturers. There are the same number of audio storage structures within the systems. If you couple this with the physical editing hardware, the controlling software and the actual physical process that the editor (the user) has to pass through to complete his task, you understand the character of the system and what type of work it will be most suited for. Some manufacturers have designed systems to be capable of doing every type of work once the relevant software has been called up. Others have seen more specific uses for their product. Lexicon have said quite firmly for the last 18 months that they see *Opus* as being a tool for video, film and music post-production—not necessarily to the exclusion of other work but that is its prime function.

Hardware

The *Opus* comprises a workstation and a main processing rack. The workstation is purely a control surface with all audio remaining within the racks. The two are interconnected by a single cable carrying an RS422 bus and can be up to 1,000 m apart. Both draw their power from standard mains power points.

The workstation comprises 12 digital mixing channels with faders, a master section with faders, a QWERTY keyboard and numeric keypad, screen, soft keys and an edit jog wheel (plus room for future additions to the system).

In the main rack, the demonstrated system had eight digital interfaces (Sony SDIF-2, 1610/1630 and 3324 currently available, AES/EBU soon), 12 A/D 16-bit converters and 12 D/A 16-bit converters in a rack that could hold up to 28. This rack is fibre optic linked to the processing rack to prevent noise entering. Operating sampling rates for the system are 48, 44.1 or 44,0559 kHz with the ability to slave between 41.8 and 50.4 kHz. Moving the converters around is achieved using the I/O Configure screen display, which allows the converters to be assigned to in and outs, patch inserts, all other external connection as well as setting the level for interconnection to external machines. The system can interface directly to the Lexicon 480L effects processor in the digital domain.

The hard disk abilities are based around a sealed 14 inch head/disk assembly with a

OPUS

The first Lexicon Opus Digital Audio Production Systems are now up and running in commercial facilities. Keith Spencer-Allen takes a brief look at the system itself

Channel strip

This part of the *Opus* is really quite self explanatory and so I will be brief. At the top of the channel is an input level and this digitally controls the analogue audio input to the A/D converter. Below this we have a phase invert button and overload LED. There are four pre/post sends and it is possible to use them coupled for stereo.

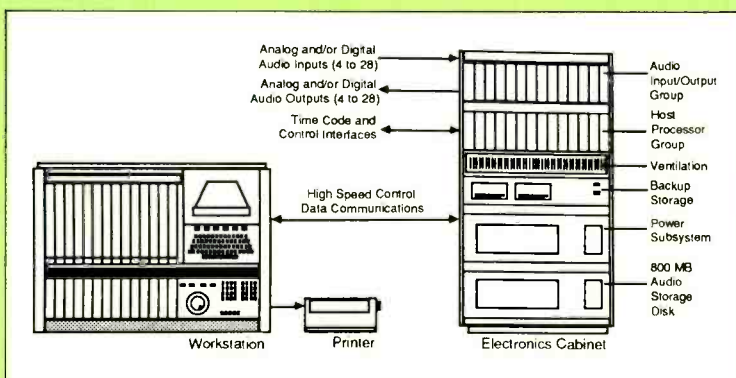
This is followed by an insert point, a large record enable key for the channel, a channel input/repro/on-off selection, a pan control for the main mix outputs, an access key that assigns processing hardware to that channel, mute and solo buttons, a scribble strip and an 8-character alphanumeric display for labelling the channel. All channel switches are momentary to allow for future automation control.

The faders are fairly traditional although there is an * key that identifies you wish to do some editing on that channel. The master section contains the master controls for the channel functions plus space for some future functions.

To the right of the fader panel is the editing section with jog wheel for rock and roll editing, numeric keypad (for timecode and other numeric entries), another keypad with dedicated function keys for editing and screen cursor movements, and the audio transport controls. Above this panel is the QWERTY keyboard whose function is really just for labelling, the VDU and set of six soft keys whose function is displayed on the monitor and changes with the selected mode. Metering across the top of the console is bargraph type.



Inset: record/play screen with edit window



formatted capacity of 800 Mbytes providing 120 track minutes of audio storage at 48 kHz sampling. Up to four disks may be used extending maximum recording time to 480 track minutes. Back-up is on 240 Mbyte tape streaming cartridges. WORM disks are talked about for the future.

Working

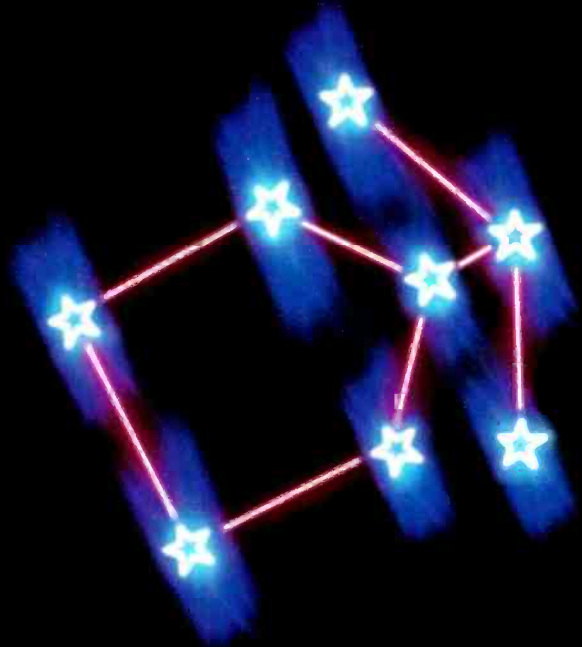
The operation of the record aspects of the *Opus* are similar to a multitrack tape machine. It is possible to record or play one or a combination of up to eight 'tracks' at any one time.

Overdubbing is similar with the user selecting which tracks to play back and which are to record. Bouncing down tracks is similarly straightforward with the levels of the mix set on the channel faders. *Opus* also has the ability to synchronise with timecode, digital audio word clock, and tach/pilot tone information, or to generate timecode and word clock information to control external equipment. Switching between these modes is just a simple single screen change.

The software screen displays are easy to use with access to most screens being only a touch of the relevant soft key below the screen

away. Lexicon have tried to restrict the number of software levels. The only screen in fairly common usage and needing more than two keystrokes is the System Parameters display for access to sample rate, timecode sync and status, default names, edit parameters, timing reference, etc. Access to this screen would generally only be

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needed once a session as all the selected parameters are stored as data on the reels for automatic reload with the reel selection.

Audio

The audio hierarchy within the *Opus* is arranged as Jobs, Reels, Tracks and Segments and these relate to their name quite accurately. A job is literally that; all the work for a particular project can be grouped under such a heading. Within that group all the audio is divided into Reels, which are quite simply continuous sections of timecode and can be of any length (up to the limit of available storage). Although a reel that had been worked on would have a beginning and end timecode value as well as a duration there is nothing to prevent you recording beyond the end of the reel.

Within the reel, audio is arranged as if it were a multitrack machine with sequentially recorded audio laid on up to 99 tracks, any eight of which can be recorded and/or replayed at any one time. The selection of which tracks are in use is made on the record/play menu. It is not possible to change tracks during record or replay.

Each new reel created needs a timecode value and this may be either a timecode generated by

OPUS

Opus or the code supplied with the incoming audio material. Internal timecode can be displayed as h/m/s, SMPTE/EBU/film or film feet/frames with a range of display resolution from a frame to 1/100th frame or second. Audio on the tracks in the reel are made up of segments and these are the smallest audio unit within the system. It is possible to edit segments (also tracks and reels) and the record play page displays tracks and segments quite clearly. A segment on the display is a continuous block along the 'tape' tracks and is labelled with a segment number (automatically generated) that can be replaced by a proper user-given name. A full breakdown of segments, their duration and position is given on the file screen, which also gives a full breakdown of use of the *Opus's* audio storage capacity.

When audio is recorded on a reel, a copy is automatically loaded into the Source Reel area. This is an area on a reel that is away from the work area and material in this area cannot be altered and provides 'safe segments' for reference

should copies be needed for editing or assembly of work.

Should we wish to select a particular job or reel we would turn to the File screen display, move the on-screen cursor to the required item and hit enter and the item appears. Opening a new job or reel is done by selection of the labelled soft key below the screen. Editing is obviously the heart of a system such as *Opus* and its abilities are comprehensive although the actual mechanics of editing have been kept quite simple. Most editing actions centre around the jog wheel and the soft keys above it. The pair to the left are normally labelled Mark 1 and 2. General editing procedures begin with locating the edit point using the jog wheel that gives a very good likeness of reel rocking, or by entering a timecode value. Which tracks are to be edited is controlled by selection of the * key on the corresponding mix channel, therefore to edit on track 5, press the * key on channel 5. The start point of the edit is marked by selecting Mark 1 and the out point is selected in the same way and Mark 2 selected. The buttons to the right indicate other editing aspects such as insert and delete. For coarser location of audio edit points there is a shuttle mode for the jog wheel where the audio is replayed faster forwards or backwards the more the wheel is turned.

There are five principle edit functions on the *Opus*, each of which has a number of variations but greater detail is beyond the scope of this article. These five are Cut, Copy, Replace, Align and Loop. These may all be performed at segment, track or reel level.

Cut: this is an edit that removes material from the source location such as removing an unwanted section.

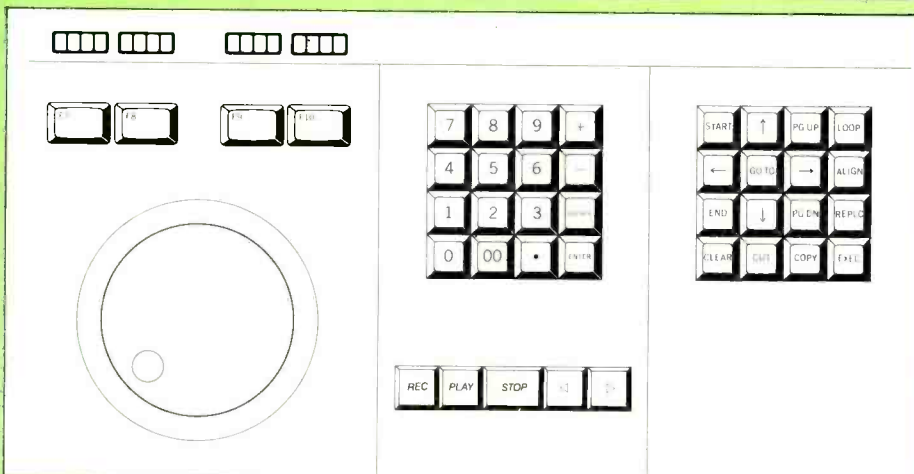
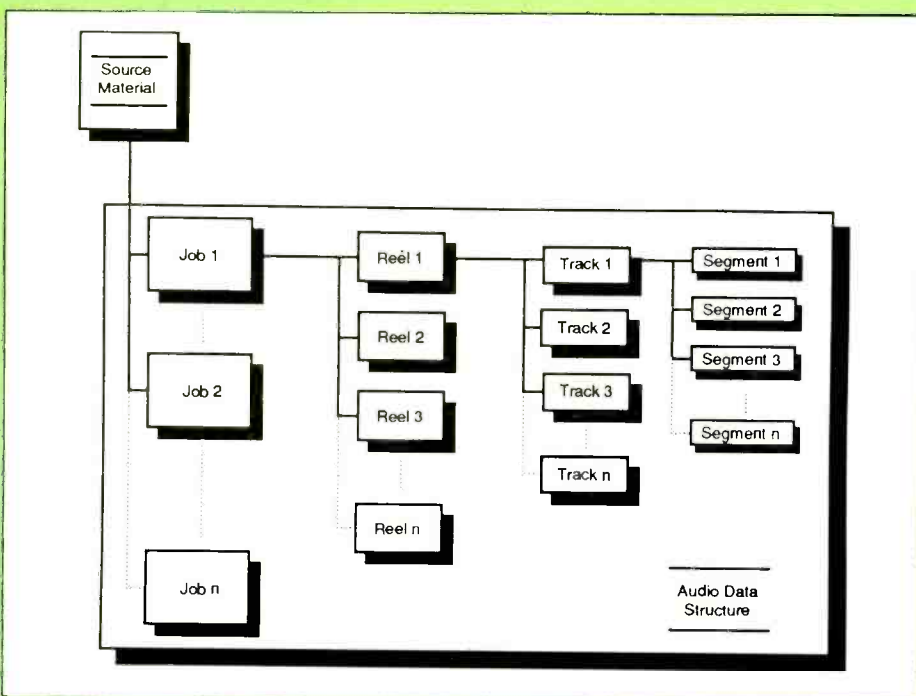
Copy: this is similar to cut edit but leaves the source material untouched and simply copies the edit section for use elsewhere.

Replace: this exchanges a marked section in the wanted material for a new similarly marked replacement section. These will normally be of identical length. If not the replacement edit is trimmed to fit the allotted space.

Align: used for slipping segments against timecode, to slave segments against timecode or for specifying offsets.

Loop: for making an audio loop of a segment.

Most edits would be completed when working in the Record/Play screen and it is possible to open a Segment Cut window within this screen to display all edit data and give full access to all variable edit functions such as crossfade duration, location of mark within crossfade, level trim, etc. There is also the ability to build up a selection of 10 alternative edits and preview each to find the most suited should you be that unsure.

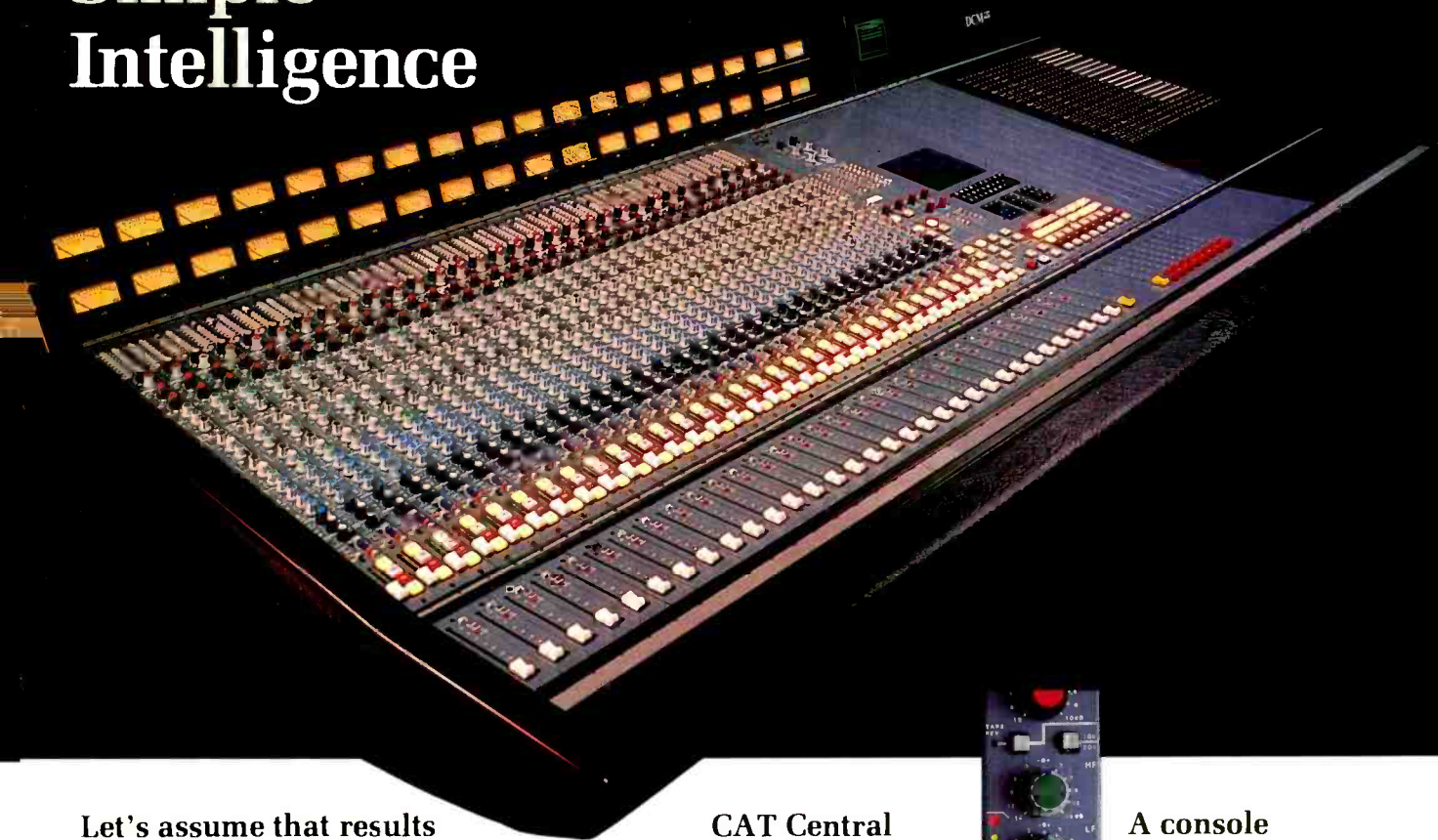


Editing section with jog wheel and soft keys

Conclusion

We do not have the space to go into the editing functions with the detail that they deserve but my impression was that they seem versatile enough and straightforward to use and perhaps more important, quick. The *Opus* seems to have hit a relevant combination of flexibility in audio production work without requiring too much of a user unfamiliar with disk-based editing systems and digital audio. I think that it is a system that needs another look at a time when there is more practical experience of running not just the editing/record side but also the integrated mixing abilities. When Lexicon deliver the equaliser and the automation package (scheduled late summer '88) this will be a very serious contender. □

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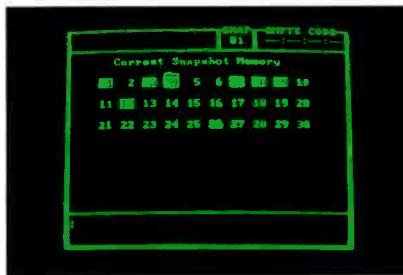
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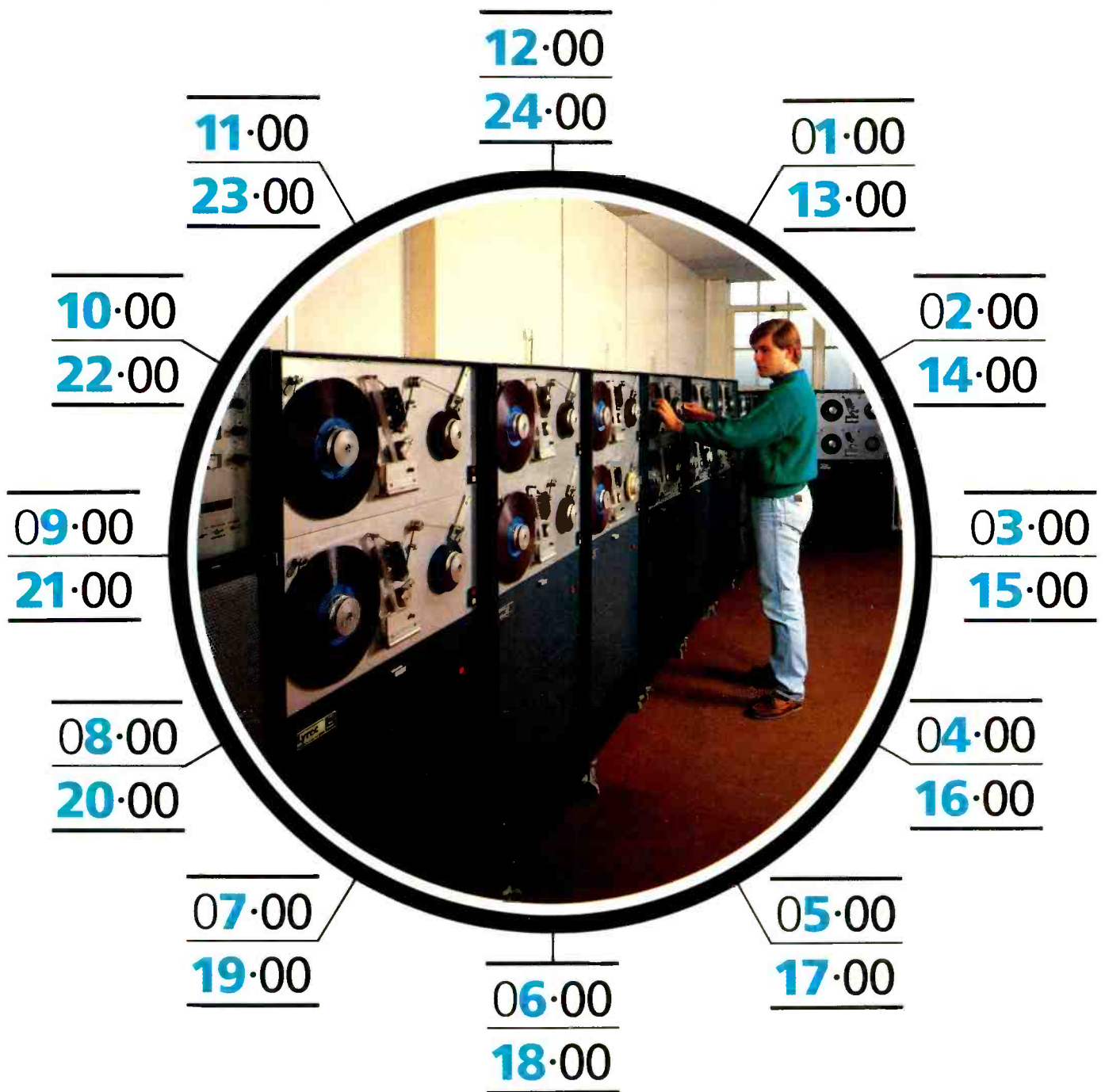
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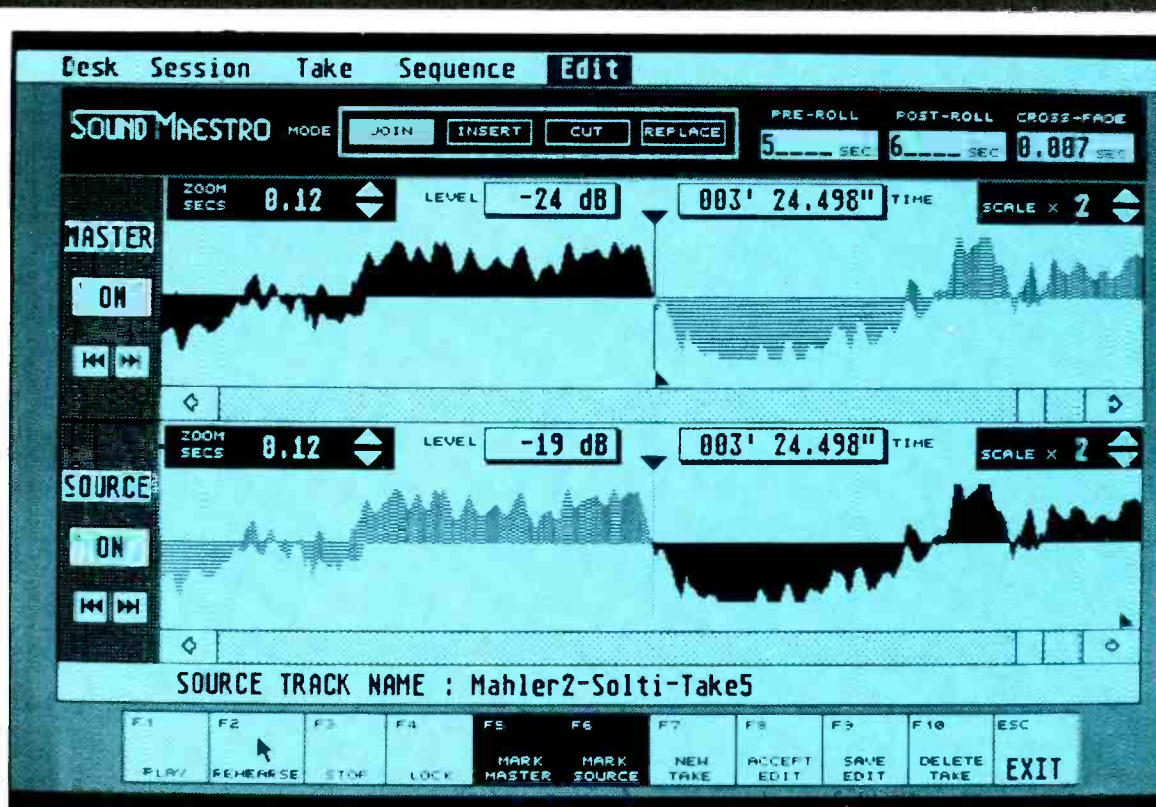


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PRACTICAL SERIESTEN

*Following our design article on
the SeriesTen in March
Patrick Stapley looks at its operation*

At first glance the *SeriesTen* could pass for a conventional analogue desk, with its standard-looking modular arrangement and central control areas. However, when one takes a closer look and notices that each channel module has only five rotary controls and that nearly half that module is taken up with LEDs, one begins to appreciate that this is something radically new.

To view the desk, I was invited to Advision Studios where Jamie Gray (the UK's expert on the console from FWO Bauch) patiently ran me through the system. I think the easiest way to describe the console is to divide it up into its four distinct operational areas and explain their functions separately.

Input module and fader

Each input module is capable of handling two separate signal paths, and depending on how the desk is being used, these could be a mic/line input feed to the multitrack and a monitor return, or two mic/line inputs either in split mono or stereo—there are a number of permutations. Whatever the arrangement, each input (left and right) has full access to EQ, dynamics, auxiliaries, panning, etc. The interesting point here is that there is only one set of these controls per module and—perhaps even more mind

boggling—only one fader. The key to this puzzling arrangement lies in the two access buttons situated directly above the fader, and marked with a left and a right arrow. They are responsible for selecting which input will be controlled by the module and the fader; so in the case of the Advision desk (in a track laying situation), the left arrow accesses a mic/line input and the right accesses a monitor return. As the inputs are selected, so the motorised fader and all the other functions reset to display appropriate values. There are two indicators showing which input has been accessed and if they are both lit, then the input is stereo. To make identification even easier Harrison have included an electronic slating system consisting of a four-character display above each fader.

The success of the *SeriesTen* relies very much on the DCA (Digitally Controlled Attenuator). Each module contains 14 of these devices, which essentially do the job of the VCA. The DCA works directly from the control areas without the need of voltage conversion, as with a VCA. So the *SeriesTen* is providing a digital control surface that acts directly on analogue audio.

As I mentioned earlier, there are very few rotary controls on each module. The reason for this is that each pot carries out a number of different functions. For example, the bottom three pots (known collectively as the 'low panel controls') are responsible for controlling EQ, dynamics and panning. To assign them to a particular function, one of the yellow function buttons must first be pressed, which will split the pots into different controls for that function. If I had selected one of the four bands of EQ, the three pots would arrange themselves as a \pm control, a frequency selector and a bandwidth selector. When any of these controls are being used an appropriate readout will appear on the slate display, and once value exists for a function an associated LED will light up.

The other two rotary controls deal with the four pairs of auxiliary sends, either acting as separate gain controls or as a pan and a gain control in stereo. Each aux pair has a button called Last, which allows previous settings to be reinstated and these can behave like mute buttons if the previous value were zero. The other functions also have Last buttons and I will come on to these in the next section.

The rest of the module is largely taken up with LEDs giving information on Main (32) and Mix (eight pairs) routing as well as the Set Up details. The Set Up section gives a clear picture of the derivation, changes and destination of the signal. The combination of routing, set up and individual function LEDs

makes it quick to identify how the module has been configured.

Above each module and below the metering, is a transformerless mic preamp. This, together with the eight auxiliary output masters, is not controlled by automation. This is considered unnecessary by Harrison and is also difficult to engineer without detrimentally affecting the incoming signal. The mic preamp includes a 20 dB pad, phantom power on/off, ground lift, selection between two mic lines, a 4-LED output meter and a gain control.

The EQ, as mentioned, is split into four parametric bands: Lo (40 Hz to 800 Hz); Mid 1+2 (400 Hz to 8 kHz); Hi (800 Hz to 16 kHz) all are ± 15 dB in $\frac{1}{2}$ dB steps. The bandwidth is either Narrow or Wide and has a scale of 0 to 7. The sound of the EQ is good, based around the Harrison *MR2*, which in turn owes a lot to the original API consoles. In addition to the four bands of EQ there are high and low pass filters.

The compressor and gate have the same fixed attack time of 1.04 ms. The compressor has a release time of 25 ms to 250 ms, a threshold of -7 dB to +7 dB and a ratio of 1:1 to 1:20. The gate, which also offers keying and ducking facilities has a release time of 23 ms to 2.4 s, a threshold of 40 dB to -9 dB and a slope of 0 dB to -30 dB (thereafter it shuts off). There is shared metering of six LEDs showing total gain reduction for gate and compressor and I found this a little confusing when both functions were operating. The gate seemed to work well, but it's possible that it could be improved by being faster. The compressor I found harder to get on with; whereas it did successfully reduce level, it did little to add any 'body'.

Mute and Listen buttons are situated above the fader and both these can perform different roles. The mute button, apart from its normal function, can act as an in/out button for EQ, dynamics and the insert point. The Listen button can operate as PFL, pre-EQ listen, pre-insert listen, after pan listen or wet (where all modules mute except for those selected and those designated as FX returns; produces an in place solo with effect). All these choices are accessed via the Global Facilities Unit, which I will talk about later.

The module can take on three different identities—Input, Group, or Program, depending on how the desk has originally been organised—ie all modules can perform as input modules but Group and Program modules must be specially assigned to act as such. Group modules are not normally included as this is more of a broadcast requirement. For general use, there are usually enough grouping facilities provided by the 16 mix bus outputs supplying the eight stereo program modules. Program modules can route to the main bus or back to another program module via the mix bus; there is a built-in inhibitor to prevent them routing back on themselves.

Shared Facilities unit

The Shared Facilities unit is situated in the top-centre half of the desk, and is split into 10 sub-areas. A logical way to think

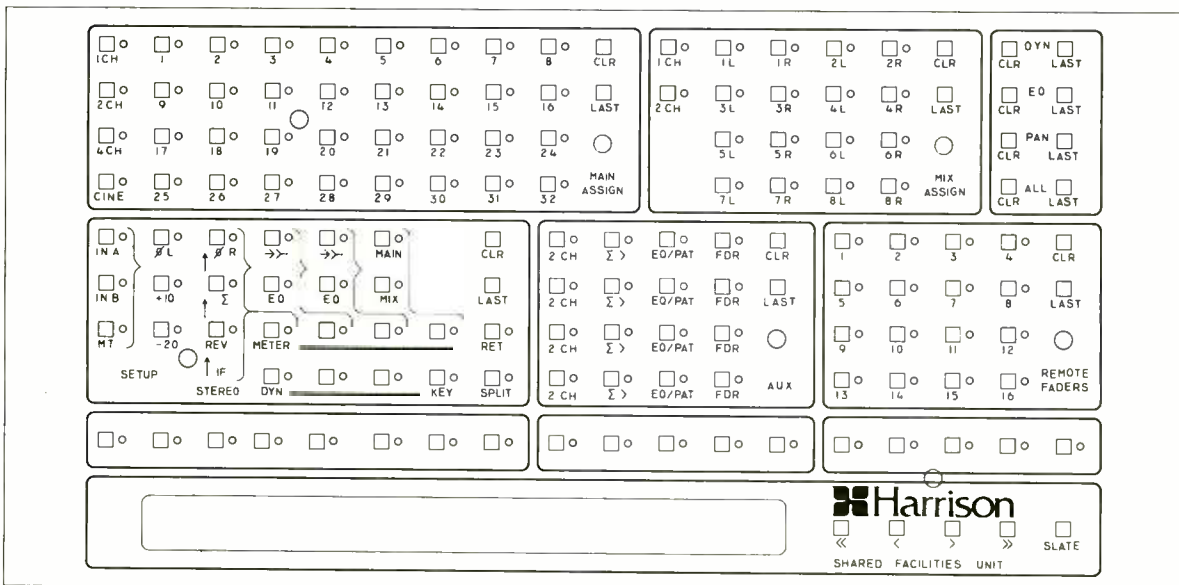
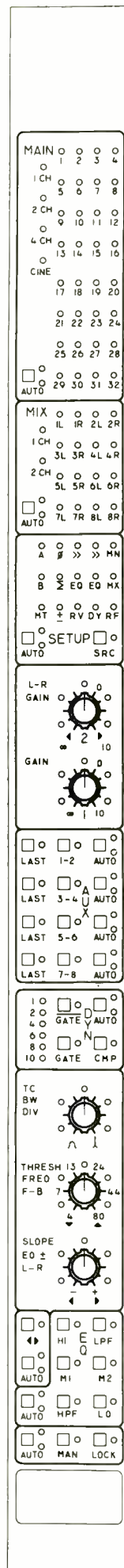
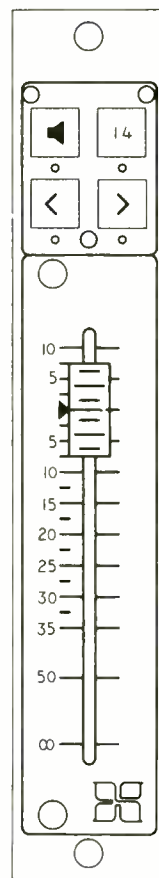
of this section is as an extension of the module itself, providing all the extra controls needed to complete its operation. In fact, if the controls from Shared Facilities were physically incorporated in the module, each module would end up being twice its present size. This arrangement, along with the dual nature of the input is how the module manages to offer so many facilities in such a compact space.

Shared Facilities can only be attached to one module at a time and it does this either by following the access buttons on each module, or by using a step selector on the Shared Facilities panel. When a module has been attached to Shared Facilities, the display at the bottom of the unit will show the module number, its type (input, group or program), the side that has been selected or if it's in stereo, and the slate ID (if one has been entered).

It is from here that the inputs to the desk are selected between A, B and MT (stands for bus rather than multitrack, and in the case of an input fader, would input the main bus output corresponding to the channel number). Inputs A+B have a left and a right side, which can, for example, be normaled to provide a mic input on one side of input A, and a monitor return on the other side of input B. The way to visualise it is as A+B offering four separate inputs. The module can be switched to operate in split mode or stereo. In stereo, the equaliser, dynamics, auxiliaries, insert points and fader will all adopt a stereo mode of working. Phase reversal, stereo reversal and gain control are provided, and there is also the facility to sum the left and right inputs in stereo mode. The positioning of EQ, insert, dynamics and metering can all be juggled around in the module using a simple arrangement of buttons. So, for example, without using patchcords, I can move my insert point pre- or post-EQ, pre- or post-dynamics, and check the metering at any point in the chain.

All main and mix routing assignment is controlled from Shared Facilities, as is the type of panning requirement: mono (off), stereo, quad or full cinema panning.

The *SeriesTen* provides 16 remote faders, which do the job of the familiar VCA group fader but using DCA technology. The thumbwheel selector switch, normally associated with this function, has been replaced by a set of 16 assignment buttons on the Shared Facilities panel. This means that there is no restriction on the number of remote faders that can control a channel fader and consequently groups can exist within groups and overlap each other. Each remote fader is a controller for two



independent groups; so the first of the eight remote faders will access control between groups 1 and 9.

To save the user the extremely tedious task of zeroing functions control by control, Harrison have added Clear buttons for each control area. Also available are Last buttons, which will return the previous setting with a quick push, and duplicate the last module's setting with a sustained push. This makes setting up identical parameters on different channels a very easy exercise. The ability to input different commands from the same button (single push, double push and sustained push) is used extensively in the *SeriesTen*.

There are a couple of cost options worth thinking about when ordering the desk. The first involves auxiliaries. As the system stands, the auxiliaries are shared between the two sides of the module, so in split mode they are divided into combinations of pairs providing, say, four sends on each side, two on one side and six on the other, or all eight on one side but what can't be achieved is eight discrete sends from both sides. The option available will allow this to take place, keeping the stereo working of the auxiliaries the same. Whilst on this subject, the main output buses can be utilised as additional aux sends with a trim control included on the first 16. The second option, is the graphic display system. This gives a complete picture, in full colour, of the channel that is currently attached to Shared Facilities, and by using a mouse or trackball, it can be externally controlled. One feature of the display I particularly liked was the EQ section where a graph is plotted showing the curve; I found this added a greater understanding of how the

equaliser worked while providing an instant picture of what has been set up.

Global Facilities unit

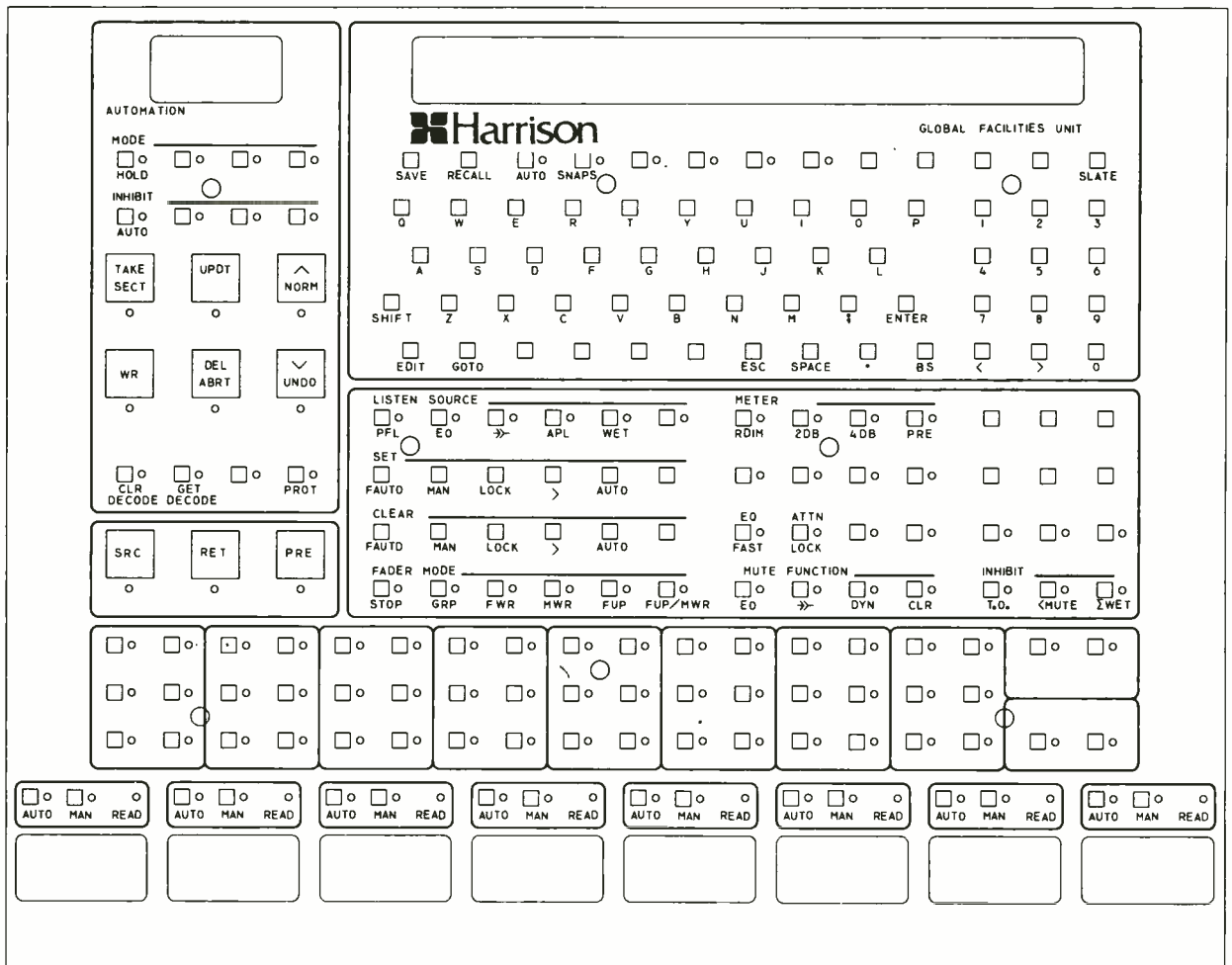
The Global Facilities unit is placed below Shared Facilities in the centre of the console, and is split into three areas—the terminal, audio functions and automation (which I will deal with later on). It is called Global because it controls the console as a whole rather than acting on individual modules like Shared Facilities.

The terminal consists of a QWERTY keyboard, numerical keypad, display, and various dedicated automation buttons. The keyboard is mainly used to name automation files and to type in slate information (which is then entered via Shared Facilities either directly to the module or into one of eight soft buttons, where it can be recalled and used whenever necessary).

The audio function controls are arranged in rows of buttons beneath the terminal. They offer control over solo source and mute button functions (which I covered earlier), overall selection of left and right sides of modules and changes to some of the metering functions. Fader motors can be disabled and you can see which faders are attached to which remote fader. The follow muting of prefade auxiliaries can be toggled on or off to suit the requirement, and the rate at which EQ changes are implemented can be switched between fast and slow. The reason for this last facility is that some users have felt that they can hear the equaliser 'stepping' through different values if it is operated too fast; this control slows the rate at which the equaliser works, causing it to ramp to a new value thus avoiding the problem.

All the remaining controls are concerned with automation except for the three large buttons marked Source, Return and Previous. These provide master switching for those channels connected with the multitrack, and will switch between line in and line out. Previous switches all channels to their last settings and can be useful when bouncing tracks, where some channels will be in Source and some in Return. Alternatively,

PRACTICAL SERIESTEN



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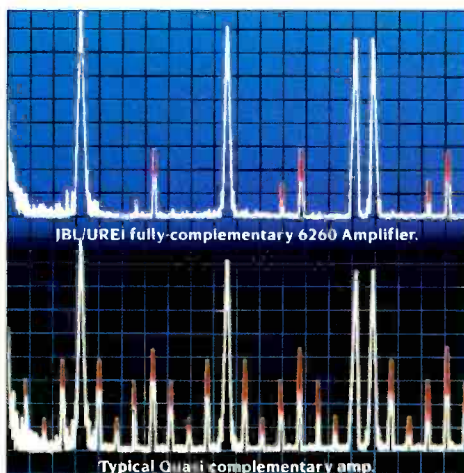
When it comes to evaluating amplified sound, seeing is believing.

In fact, when engineers judge the sound quality of an amplifier, they often rely on *two* precision instruments: the human ear, and the industry-standard Transient Intermodulation Distortion Test, because when measuring sound with T.I.M. what you see is what you get.

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Many manufacturers deal with distortion by using massive amounts of feedback through a single overall feedback loop, placing greater demands on the amplifier and producing an inferior sound.

When we built our new JBL/UREI Amplifiers, we committed ourselves to designing the industry's purest-



Red spikes in the TIM Spectrum reveal the dramatic differences in distortion output.

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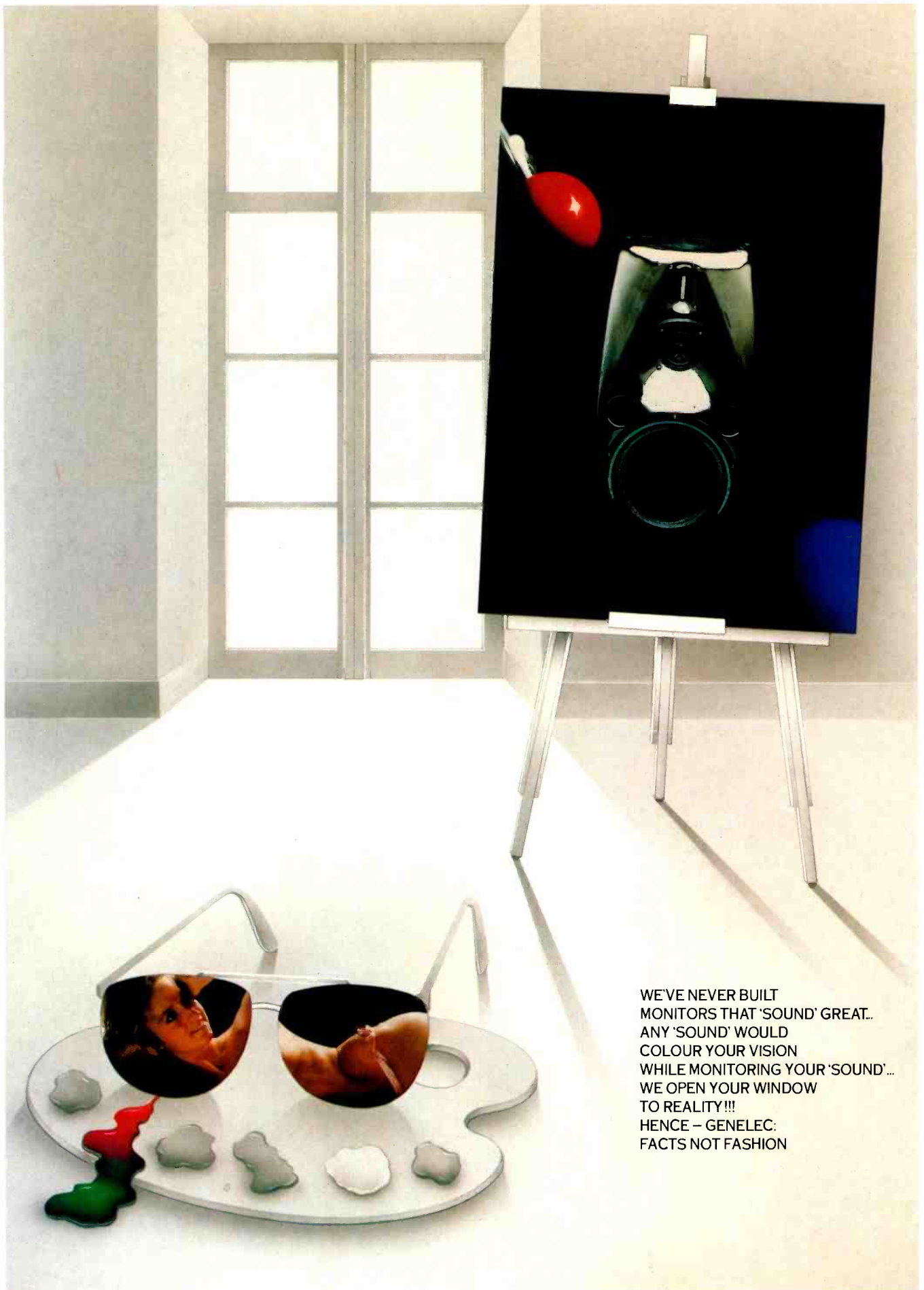
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and perhaps more normally, the multitrack will be used to control switching.

At the bottom of Global Facilities are eight groups of buttons that deal with the Events system. This is an option.

Monitor Facilities unit

This unit, placed to the left of the remote faders, acts as a controller for the switching of 64 inputs and 32 outputs. It also houses oscillator, metering and talkback controls. There is one motorised fader that inputs and displays level for the current selection.

The 64 inputs are the eight stereo mix outputs, eight auxiliaries, eight 2-track machines, four 4-track machines and eight outputs connected with the oscillator, talkback and slating signals. These all appear on the section called Source where there is a button for each type of input plus selector buttons 1-8.

The outputs provided are: three stereo foldback circuits, studio loudspeakers, mono control room cue speaker, alternative (nearfield) speakers, two separate selections for the main control room speakers (providing up to 5-channel monitoring) and eight stereo record buses designed to feed external machines for mastering, copying, etc. All these outputs or 'destinations' have a yellow button to distinguish them, so to join inputs to outputs it is simply a case of choosing the destination, say foldback 1, then deciding on a source, aux 1+2, and pressing the buttons in that order. It is quick, patchcord-free and extremely versatile

inhibits any level changes to the studio circuits (Foldback and SLS), unless the appropriate yellow Destination button is held down, while level changes are being made. This prevents accidental movement, which could lead to a studio full of irate, if not deaf, musicians. When it comes to the eight Record buses, the fader has no effect as these operate at fixed unity gain (designed for machine-to-machine connection, etc).

Other functions include the ability to mute either side of a stereo input and to sum the remaining side to the output. The solo bus can be included in the source selection allowing, for example, the cans to hear PFL selection. There is a Follow button that links the control room monitoring with the current setup, so if I had selected Foldback 1, this button would bring that circuit up on the control room monitors for me to check, and if I hit Quick at the same time, normal monitoring would be reinstated after six seconds.

The monitoring mode is also selected from this area, whether it be mono or 5-channel cine. There are individual mutes for all five outputs and a left to right reverse button, which affects both front and rear speakers. If I want to hear all the control room speakers (large, small and cue) working at the same time, I select All.

The oscillator provides sweep control from 20 Hz to 20 kHz and contains a pink noise generator. The metering can be switched between vu and ppm, has a threshold control to set the peak indicator and has an overall dimmer control.

The Monitor Facilities unit crams an enormous amount of control into a very small area and it does this without jeopardising operation or relying on highly miniaturised controls.

PRACTICAL SERIESTEN

giving a clear LED display of how things are linked.

The motorised fader will automatically reset the level between different setups, so if I'm switching between large and small speakers it will reset to the last listening level for that set of monitors. There is a safety feature built into this system that

Automation

Before the automation system can be used, it is necessary for the user first to identify himself and then to enter his password, which can be letters or numbers. This will allow him access to one of 28 user storage areas on the 80 Mbyte hard disk.

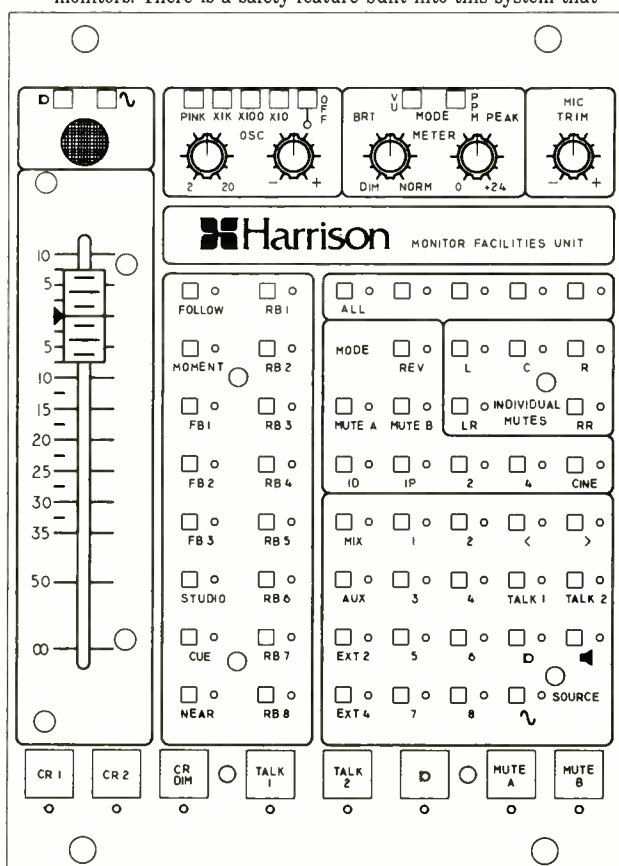
The automation computer works on three different levels—Save/Recall, Snapshots and Automation. Each of these modes is capable of storing settings for the entire console, except for mic preamps and master aux outputs. The central controls for the system are found in Global Facilities.

The Save/Recall function is used to store settings for console status (ie 32-track overdub, 48-track mix, etc) and to recall different monitor mix setups between titles when tracklaying. Operationally, it is a simple process of using the Save and Recall buttons and entering a name to identify the store in the Save/Recall file.

Snapshots are similar to Save/Recall stores in that they are static but they are designed more for pre-setting information into a mix. Snapshots do not contain information from the Monitor Facilities unit like Save/Recall files, and they can be selective in what they store. Each functional area of a module has associated with it a button called Auto and it is this button that decides whether a function will be snapped or not. So a snapshot could consist of a single function or the whole console. They are numbered 1 to 255 and can be named, and are stored in the Snaps file. The two displays on Global Facilities are used in the Snaps function. The left display shows the snapshot currently set to the desk and the right shows the snap that is next in line to be set. They exist in a stack, which can be scrolled through or selectively entered using the Go To button. Snaps can be updated, have their name changed or be deleted but they can also be put in a Protect condition where they remain safe from any changes.

To enter into dynamic automation mode, timecode from the tape machine must be present. This does not necessarily have to match the 30-frame rate of the desk as there is an internal code reader that automatically recognises external code and slaves the desk accordingly.

As with Snapshots, the Auto buttons act as safe/ready switches for the different areas of the module. To aid the user in activating these buttons, there are various master buttons on the Global panel that will switch complete sections on or off. With the Auto buttons selected and the tape running, I can now hit the Write button and begin mixing. As soon as timecode is absent the computer will store the mix information in an Auto



file and I can play it back. When I do so, yellow LEDs will light up on all the areas where the computer has control. I can rewrite sections of my mix by selecting the appropriate Auto buttons and drop them in and out using the Write button. Alternatively, I can go into an Update mode.

Fader Update mode puts the fader into a read status until it is touched—at which point it switches into write. There is also a Fixed Update mode whereby a fader can be moved to implement a trim during existing movement without losing those moves. When in an Update mode the slate display will give a null indication for the fader. This consists of an arrow pointing in the direction the fader must move to become nulled and a bar when the null is achieved. In Auto drop mode, the fader will automatically drop back into read status when it passes through the null point.

The write status of the computer can be changed between write faders and cuts: write faders only, write cuts only, fader update and fader update with mute write. Whatever the status, it applies globally and it is not possible to split channels into different status.

If, during a pass I decide I don't like what I've done, I can delete it and return to the previous mix by pressing the Abort button. Normally (without pressing Abort), when the tape has stopped, the new data will be merged with the previous mix data to form the current mix. However, I can still retrieve the previous mix at this stage by pressing Undo and, if required, I can run the tape and A/B between the previous and current mixes.

Mixes, as such, are not kept as separate entities; rather there is a continuous supersession of previous and current mix files. However, these files can be copied on to floppy disk for safety or archiving purposes, as too can the Recall and Snapshot files.

When a new mix is made, it involves all the previous data being merged, even if only a single update were performed. This process, depending on the volume of data, can be quite slow (averaging 20 to 30 seconds). To address the problem and to meet plans for future expansion, Harrison have decided to change over to an Apple *Macintosh II*. This will be a direct retrofit with the least possible cost to existing users and should be available in the summer.

This gives a broad outline of how the automation works. Suffice to say that I have not mentioned every detail, as to do this would require a separate article. The basic operation is straightforward and the possibilities opened up by having all the desk functions automated is very exciting. There is also provision made for future automative interfacing with outboard equipment.

At present, the *SeriesTen* does not offer any machine control facilities and consequently, there are no cue or locate points available to the user. There is also no provision made for automatically executing computer functions at a predetermined timecode position, for example: At (timecode) Put Snap 1.

SeriesTen and the user

I think it will have become apparent by now, that the *SeriesTen* is an extremely complex system. Although the operational side of it is very logical, it is not the kind of desk one can sit down at and feel at home with in a short period. Indeed, most of the engineers I spoke to admit they are still learning things about it and, as Advision's studio manager put it, "there is a gradual learning curve". However, users who have had considerable experience with the system are claiming that they sorely miss its capabilities when working on other desks.

A thought that occurs to me is that the *SeriesTen* is going to produce a breed of experts and most probably these will be the people working full time in studios where the desk is installed—staff engineers. I have always felt that an in-house engineer who knows his studio inside out is a valuable asset and I think this is even more pertinent with a desk of this calibre. What I'm wondering—and here's a controversial point—is how Mr Flash Freelancer will cope when he's thrown in at the deep end.

I talked to producer Mike Hedges, who had at the time of writing this, spent a month behind a *SeriesTen* at London's Marquee Studios. He endorsed the fact that it took a long time to become familiar with the console, although he found the straightforward aspects quick to learn and easy to perform. He told me that they were continually finding new capabilities in the system, some of which even Harrison were unaware of. A facility that particularly impressed him was the resettability of the console: one can be midway through a mix and suddenly someone decides they want to do an overdub (not an uncommon occurrence). Using the Recall function, the song can immediately assume its last overdub setup with all the correct foldback, etc, and when the overdub is completed, the mix can be returned to just as easily. Another feature Mike liked was the automated EQ. If one has recorded a number of different things on a single track, it is simple to switch between different EQ settings, avoiding the traditional solution of paralleling the track on to separate faders.

Conclusion

From my brief involvement, I would say that this is not a desk for the faint-hearted. It requires a great deal of understanding before the full benefits are realised but I think time taken to discover its potential will be very worthwhile.

The system looks set for plenty of expansion in the future and due to the nature of its software control, upgradability is easily achieved.

I will leave the last words to an experienced London-based user: "We are at present only in the first chapter of what I'm convinced will be a long and fascinating story." □

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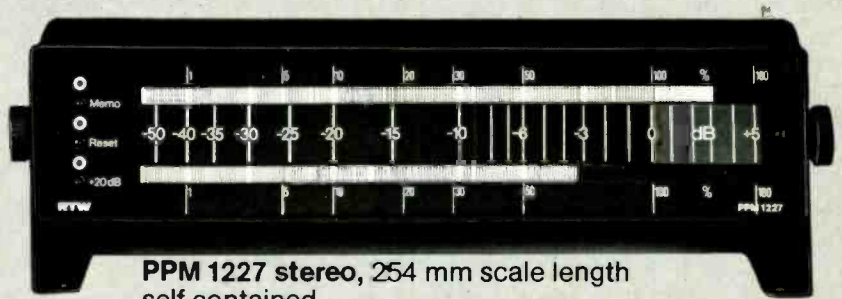


A SeriesTen at Advision, London

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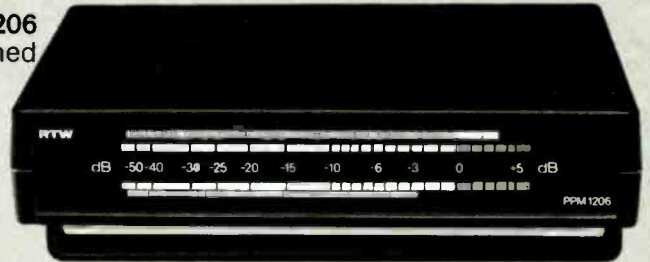


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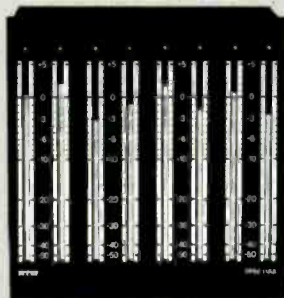
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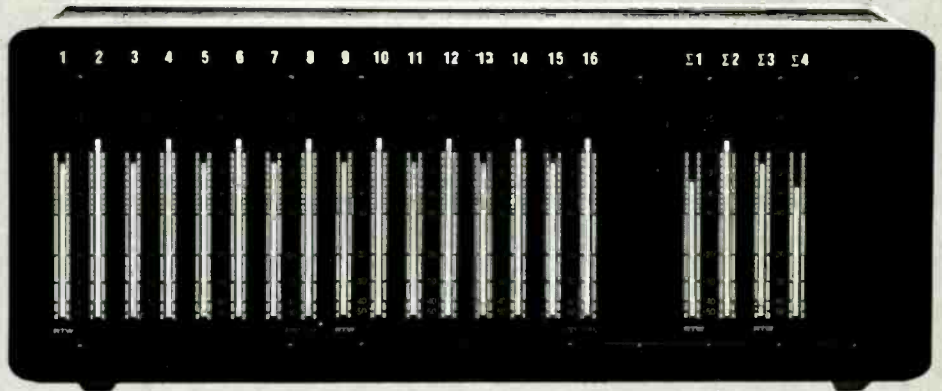
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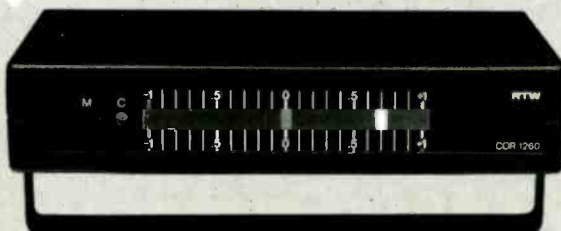
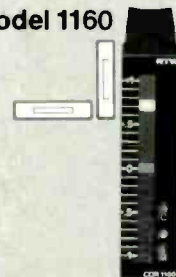
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D A T A B A S E

FILE

SYSTEM: 1024B



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STATEMENT: TAPE ONE



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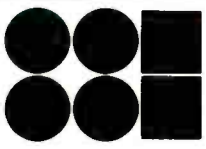
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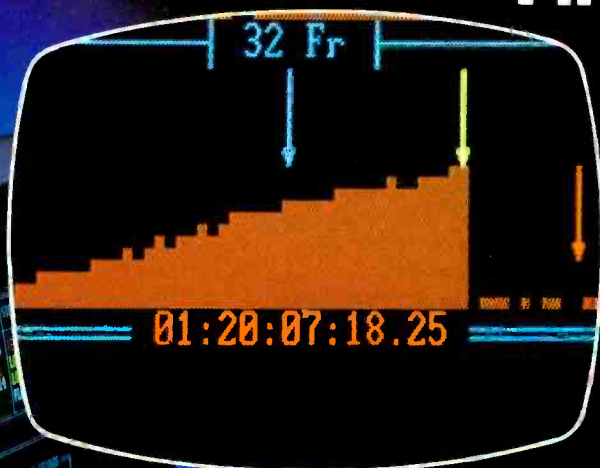
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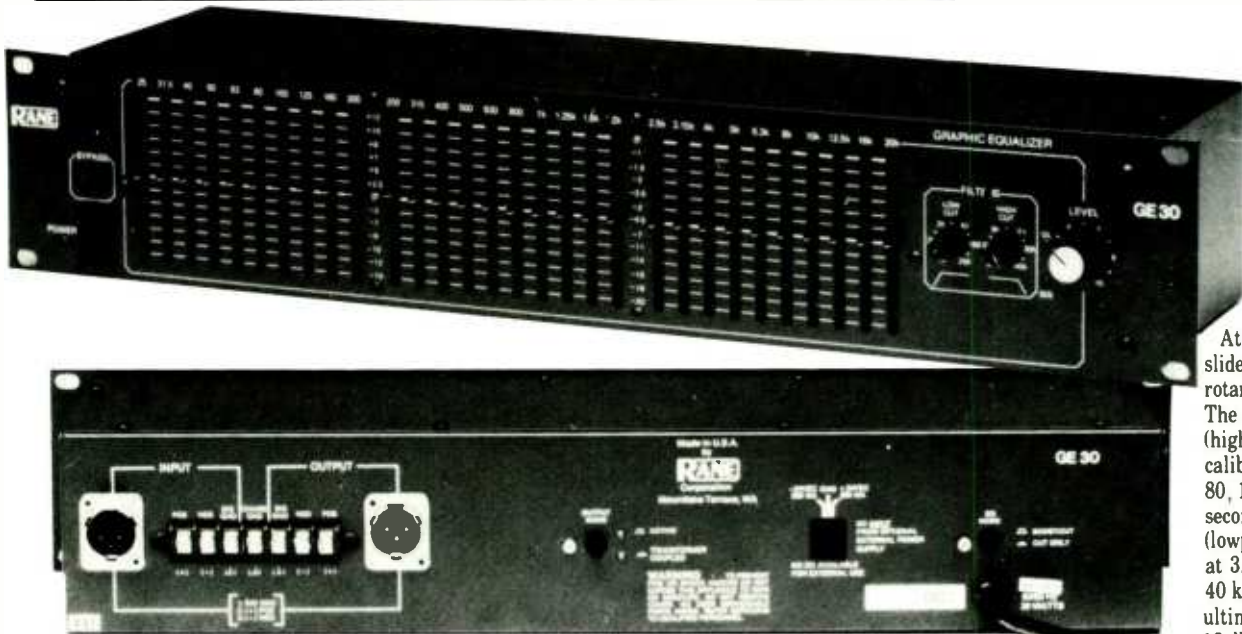


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REVIEW

Sam Wise completes a technical report on the GE30 graphic equaliser from Rane Corporation



of the front panel is taken up with 30 slider controls spaced on ISO standard centre frequencies from 25 Hz to 20 kHz. The controls are detented and have a set of calibrations for each of the two operating modes. The boost/cut scale is located between the 200 Hz and 250 Hz sliders and is indicated by a yellow LED at the centre detent (0 dB) point. Calibrated markings are provided at 12 points from +12 to -15 dB. While the increments are physically evenly spaced on the panel, their electrical range varies from 1 to 3 dB.

The cut only scale is located between the 2 kHz and 2.5 kHz sliders and is indicated by a yellow LED at the top 0 dB position. In this mode the operating range is 0 to -20 dB with increments varying from 0.5 dB to 4 dB between markings. The finest degree of control is provided near the 0 point.

At the left of the front panel is a by-pass switch with an associated red LED, which is illuminated when BY-PASS is depressed. By-pass is automatically activated if external or internal power fails, routing the input signal directly to the output in a balanced condition. The by-pass relay is also used to temporarily by-pass the unit on switch-on, thus preventing an audible thump.

Below this is a power on/off rocker switch that switches the secondary of the mains transformer. The primary remains permanently connected to the incoming power via an internally mounted fuse.

At the right end of the sliders, there are two rotary filter controls. The first is a low cut (highpass) filter calibrated at 10, 20, 35, 80, 180 and 250 Hz. The second is a high cut (lowpass) filter calibrated at 3.1, 5, 8, 18, 30 and 40 kHz. Both provide an ultimate slope rate of 12 dB/octave. Next to

these is a red overload LED that illuminates when the input signal is nominally -4 dB below clipping. Below this is a green 'signal present' LED, which indicates when a signal greater than -20 dBu is present at the input.

The last control at the far right is a level control, calibrated with markings from 0 to 10. This operates in a gain control stage just after the differential input amplifier. The unit was supplied for test with a steel security cover plus fixing hardware, which can be mounted to the front panel. All controls have a good feel, although the centre detent is rather subtle, making resetting to 0 tedious at times.

Rear panel facilities

The rear of the unit contains male and female Neutrik XLR-3 compatible connectors wired to IEC and ANSI standards (pin 2 hot). (Thankfully good sense is finally prevailing over this matter.) The input signal is then fed directly into an

The Rane GE30 graphic equaliser is a constant Q, 30-band, 1/2 octave unit that forms part of a complete range of equalisers, analysers and simple mixers. It has the unusual feature of being

switchable to allow use in CUT ONLY, or in BOOST/CUT mode, thus fulfilling all the roles required of a graphic equaliser.

It is finished in a charcoal grey colour with a clear off-white screen-printed legend and is housed in an all-steel enclosure two rack units high. Most

Manufacturer's specification

Frequency response: 10 Hz to 40 kHz, +0/-3 dB

S/N ratios, uwtd, 20 kHz bandwidth:

Boost/cut mode:

Filters at 0 dB, unity gain: 110 dB below +20 dBm (-90 dBm)

Filters at 0 dB, max gain: 109 dB below +20 dBm (-89 dBm)

Filters max boost, unity gain: 86 dB below +20 dBm (-66 dBm)

Filters max boost, max gain: 86 dB below +20 dBm (-66 dBm)

Cut only mode:

Filters at 0 dB, unity gain: 110 dB below +20 dBm (-90 dBm)

Filters at 0 dB, max gain: 100 dB below +20 dBm (-80 dBm)

Gain control range: Off to +6 dB (minimum boost/cut mode), +20 dBm cut only mode

THD+noise: <0.01%, 20 Hz to 20 kHz @ +4 dBm

SMPTE IMD: <0.002% @ +4 dBm

Low cut filter range: 10 Hz to 250 Hz

High cut filter range: 3.1 kHz to 40 kHz

Input impedance: 10 kΩ

Output impedance: 100 Ω each leg to earth

Maximum input level: +22 dBu

Maximum output level: +27 dBu into >2000 Ω

+24 dBm into 600 Ω

Signal present indicator threshold: -20 dBu input level

Overload threshold: 4 dB below clipping

Dimensions: (whd) 19×3.5×5.5 in/

485×88.9×140 mm

Weight: 7.5 lb/3.4 kg net

Rane Corp, 6510 215th SW, Mountlake

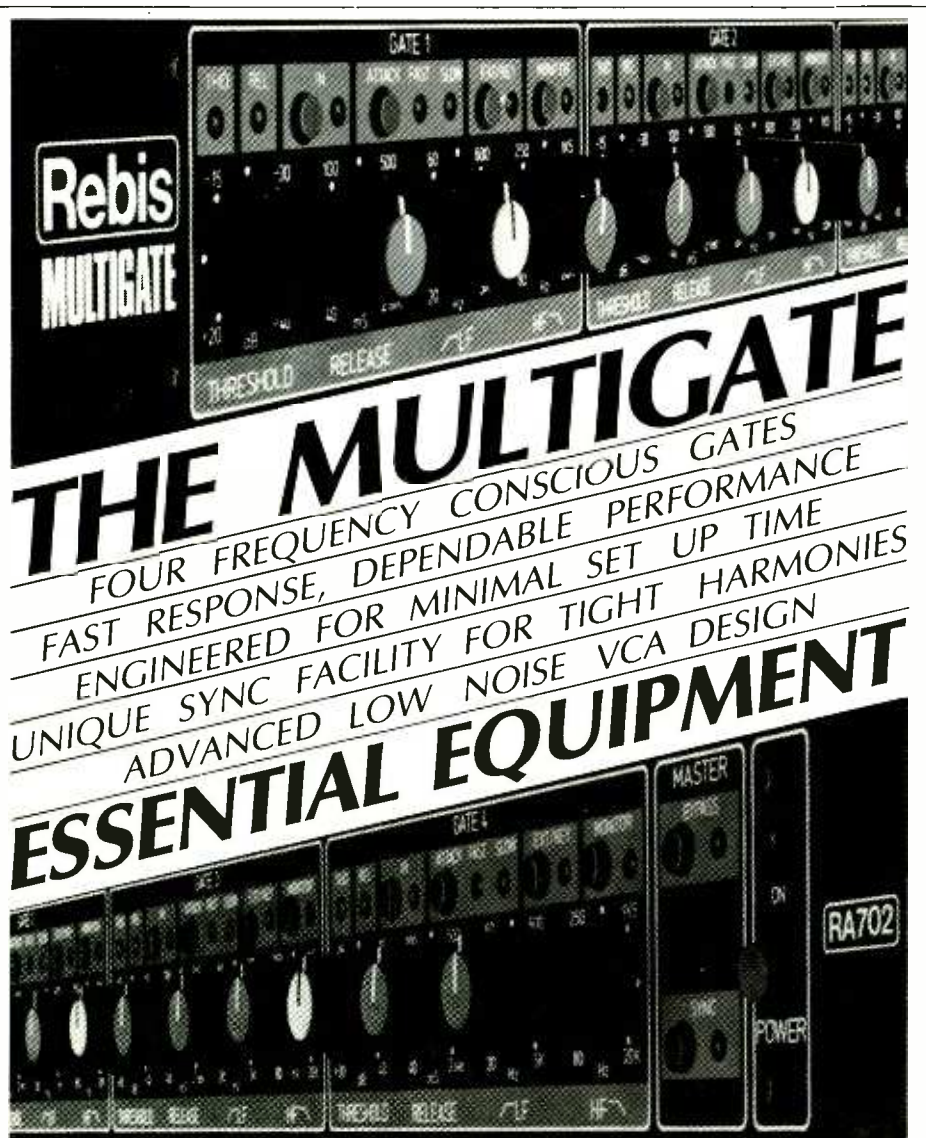
Terrace, WA 98043, USA.

UK: Music Lab Sales, 72-74 Eversholt Street, London NW1 1BY.

REVIEW

active differential (balanced) input stage. Between the two XLRs, the audio input and output connections are duplicated on a screw terminal block.

A pushbutton near the centre of the unit is used to switch from active balanced to transformer floating output modes. The switch setting is further indicated by an adjacent pair of LEDs.



For full information/demonstration contact:

Rebis Audio Ltd. Kinver Street, Stourbridge West Midlands DY8 5AB. ENGLAND. Telephone: (0384) 71865. Telex: 335494. Fax: (0384) 265907

Australia: John Barry Group, Artamon N.S.W. 02 439 6955. **Austria:** Bauer Sound, Himberg 02235-89298. **Belgium:** S.E.D., Bruxelles 522 70 64. **Canada:** Heint Electronics Inc., Ontario 727-1951. **Denmark:** Kinovox A/S, Lyngø 02 18 76 17. **Finland:** Studiotec, Espoo 592055. **France:** High Fidelity Services, Paris 285 0040. **Germany:** Thum & Mahr Audio, Langenfeld 2173-7806-0. **Hong Kong & China:** Audio Consultants Co. Ltd., Kowloon 3-7125251. **Japan:** Soundcraft Japan Ltd., Tokyo 3416201. **Netherlands:** Special Audio Products B.V., Amsterdam 140035. **New Zealand:** Maser Broadcast Systems Ltd., Auckland 4797889. **Singapore, Malaysia & Indonesia:** Bell & Order, Singapore 7438081. **South Africa:** Tru-Fi Electronics, Johannesburg 786 7177. **Sweden:** Tal & Ton, Gothenburg 803620. **Switzerland:** E.M.M. Studio, Basel. 061 54 20 45. **U.S.A.:** Rebis U.S. Atlanta, Georgia 404 633 6626.

The unit can be used unbalanced in active mode by connecting both the input and output wiring between the positive terminals and ground. In this case the maximum output amplitude decreases by 6 dB. To the right of the switch is an external DC power supply input connector of the telephone connector type. Last is an EQ mode (boost/cut or cut only) pushbutton switch, with a fixed power cord directly below. Clear safety warning and power supply rating information is printed on the rear in accordance with BS 415 regulations.

Internal construction

Top and bottom covers are each held in place by six Philips self-tapping screws and two Allen machine screws. Removing these reveals an internal construction almost entirely on two permanently interconnected printed circuit boards. All the sliders are mounted on a front vertically mounted PCB, with the remaining electronics, controls and indicators mounted on a board fixed at right angles to this. There appears to be little risk of damage to this unit due to shock or vibration.

The assembly is of a good professional standard. All ICs are mounted in sockets and the PCBs are securely fixed to the chassis with brackets and screws. The main printed circuit board has a printed legend giving component values but not the corresponding reference numbers. These are given in the user's manual on a clear assembly drawing. Full circuit diagrams are also provided. The only hand wiring is to the power transformer and front panel power switch and these are terminated with 6.35 mm blade terminal connectors.

Neither the output transformer nor the power transformer are shielded. The noise measurements indicated a degree of power line harmonic noise pickup, which was found to be affected by rather critical positioning of the power transformer wiring. The power supply fuse is located internally and power line voltages are present on the main PCB even when the unit is switched off, so open with care.

Input and output performance

Input impedance was found to be within 1% of 5 k Ω unbalanced and 10 k Ω balanced, conforming to the manufacturer's specifications and just adequate for professional use. Input common mode rejection is acceptable, ranging from 86 dB at low frequencies to 50 dB at 30 kHz, as shown in Fig 1. In balanced mode, the input THD+N measurement reaches 0.7% at +21.96 dB, conforming to specification. This input overload point remains constant with the setting of the gain control.

In boost/cut mode with filters at 0 and a balanced output configuration, gain ranges from a maximum of +13.3 dB, to 0 at level control position 6, down to a minimum below noise. With the unit in cut only mode, the maximum gain increases to +26.6 dB. These gains are all about 6 dB above the published specification, but match the specs when the output is unbalanced. If the gain control is turned down much below unity, overload occurs first in the input amplifier and is not indicated by the overload LED.

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above that it cannot be depended upon to indicate overload under all conditions.

Frequency response

Fig 2 shows the flat frequency response and the action of the low cut and high cut filters.

Frequency response is $+0/-0.1$ dB from 40 Hz to 6 kHz, dropping to -0.6 at 20 Hz and -0.8 at 20 kHz. The filters provide a useful range of control while not being particularly accurate in their calibration. Frequency response was little different at any level with or without the transformer in circuit.

Fig 3 shows the response of individual $\frac{1}{3}$ -octave bands in cut only mode. All are creditably accurate in their frequency centres and their consistent amplitude responses. The difference in

REVIEW

FIG.1 COMMON MODE REJECTION OF AN EQUALISER

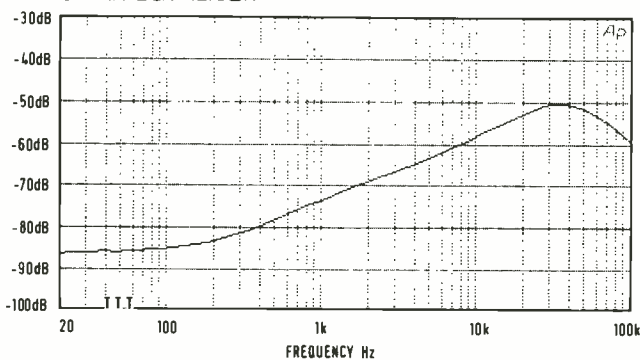


FIG.2 HF AND LF FILTER RESPONSE CURVES

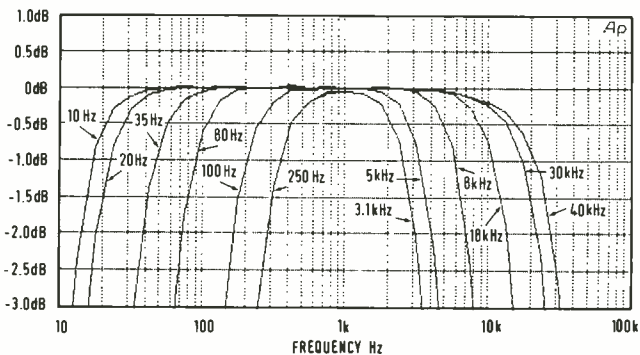


FIG.3 INDIVIDUAL FILTER RESPONSES ONE AT A TIME - FULL CUT

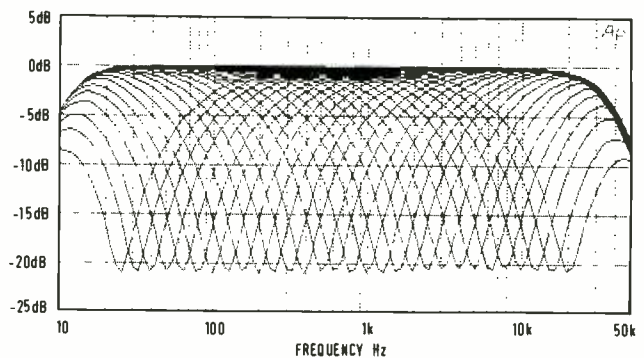
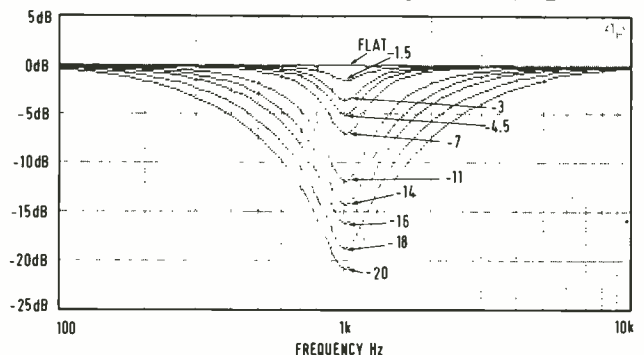


FIG.4 FREQUENCY RESPONSE OF 1kHz FILTER



Output impedance measures within 1% of the rated 200Ω in active mode but with the transformer in circuit rises to approximately 650Ω . Output overload occurs at $+27.0$ dBu in the active balanced mode with a load of $10 \text{ k}\Omega$ or greater, with the overload LED coming on at $+23.5$ dBu. When the output is loaded with 600Ω , this decreases to $+19.0$ dBm and at this point the

overload LED does not illuminate. Switching the unit into transformer balanced mode with a 600Ω load, further reduces the maximum output before clipping to $+17.0$ dBm.

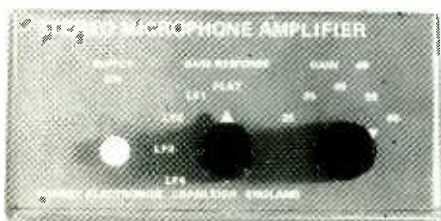
The signal-present LED comes on at an input signal level of -20.5 dB, with the overload indicator operating at 3.5 dB below the internal overload point, however, note from the comments

amplitudes between bands reaches a maximum of ± 0.5 dB. The results in boost/cut mode were similarly good.

In Fig 4, the calibration of the slider for the 1 kHz band can be seen. It is typically within 0.5 dB of the marked setting, reaching a worst case 1 dB error at -20 dB. On the front panel there are additional calibrations at -1 , -2 and -2.5 dB, which are also similarly accurate. The wide gap between -7 and -11 is the most difficult area of adjustment in practice, as just one front panel graduation covers 4 dB of adjustment. The constant Q nature of the filter response is also clear in Fig 4, where it can be seen that the filter shape remains approximately constant for all except the smallest amounts of cut. Q is approximately 3.5 .

Filter interaction effects are shown in Fig 5. In these curves the 630 Hz and 1 kHz bands are set for a boost of $+7.0$ dB, while the 800 Hz band in between is adjusted from 0 to $+7.0$ dB. The dip in the lowest curve discloses the relatively small interaction between the first two bands with the band between set to 0 and shows that their boost setting remains at about $+7$ dB at the selected frequencies. By the time 800 Hz has been raised

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CONSEQUENCES: When pushed hard, most tweeters simply fail. Transient detail blurs, and the material itself deforms and breaks down. Other materials can't take the stress, and crack under pressure.

TRUTH: The Frequency Dividing Network in each 4400 Series monitor allows optimum transitions between drivers in both amplitude and phase. The precisely calibrated reference controls let you adjust for personal preferences, room variations, and specific equalization.

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When MasterMix of Nashville decided to spend whatever it took to offer their clients the very best automated mix facility in America, they commissioned a survey and did some tests. On these results they sent their studio manager and chief engineer to spend some time at EMI Abbey Road. It didn't take them long to know they had found what they were looking for - and the competition didn't come close.

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REVIEW

to +5 dB the dip has disappeared but the gain has increased to +10 at 630 Hz and 1 kHz. Meanwhile, the slopes of the curve remain constant.

Fig 6 shows a more complex equaliser setting. The slider shapes show the front panel settings while the curve shows the measured response. This is a good result, where the typical error is about 3 dB, with a worst case of 9 dB at 800 Hz.

Noise and distortion

Table 1 shows the noise performance of the unit under various operating conditions. In general these results are 8 to 10 dB worse than the published specification. All measurements were

made balanced, whereas the manufacturer specifies the noise from one leg to ground,

resulting in figures 6 dB better. These measurements were taken following adjustments to the internal power supply wiring. On arrival, there were significantly higher levels of power line harmonics evident in the noise measurements. The effect of these was most visible in the boost/cut mode with all the filter bands set to full boost, where the unweighted, audio band limited noise readings were 7 dB worse than those shown in the table.

Fig 7, taken after the wiring was re-dressed, shows that these harmonics are still much in evidence. When single equalisers are in use this will be inaudible but the connection of several units to mixing console channels, which are then summed, will be likely to become evident. This is because hum, unlike noise, is usually in phase in similar devices. Thus, though noise increases by only 3 dB every doubling of channels, hum increases 6 dB, rapidly becoming audible. The unit was also found to be susceptible to external

TABLE 1 Noise performance

Boost/cut mode Slider settings	All full cut		All flat		All full boost	
	Gain (dB)	Resulting system gain (dB)	Gain (dB)	Resulting system gain (dB)	Gain (dB)	Resulting system gain (dB)
Gain (dB)	0.0	13.3	0.0	13.3	0.0	13.3
Resulting system gain (dB)	-28.4	-15.1	0.0	13.3	22.7	36.0
RMS 22 Hz to 22 kHz	-75.0	-75.0	-82.0	-81.0	-55.0	-55.0
RMS 100 Hz to 22 kHz	-76.0	-76.5	-84.0	-82.5	-55.0	-55.0
RMS A-weighted	-77.0	-77.0	-87.0	-85.0	-56.0	-56.0
CCIR 468-3 weighted	-65.0	-65.0	-73.5	-72.0	-44.0	-43.5

Cut only mode Slider settings	All full cut		All flat	
	Gain (dB)	Resulting system gain (dB)	Gain (dB)	Resulting system gain (dB)
Gain (dB)	0.0	26.6	0.0	26.6
Resulting system gain (dB)	-41.0	-14.4	0.0	26.6
RMS 22 Hz to 22 kHz	-74.5	-75.0	-79.0	-73.0
RMS 100 Hz to 22 kHz	-76.0	-76.0	-82.5	-74.0
RMS A-weighted	-76.5	-76.5	-85.5	-76.5
CCIR 468-3 weighted	-64.0	-64.5	-72.0	-63.0

FIG.5 BOOST/CUT MODE 630 AND 1kHz AT +7, 800 AT 0, +2.5, +5, +7 COMBINED RESPONSES

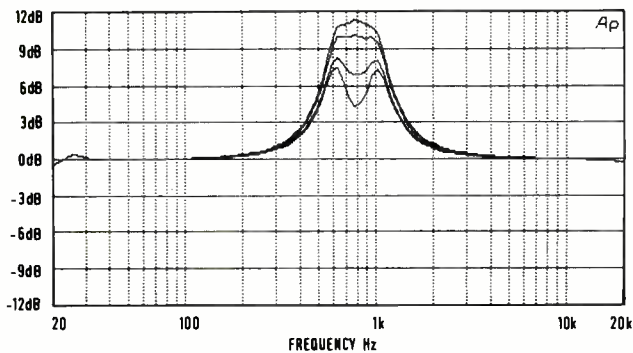


FIG.6 BOOST-CUT MODE FILTER INTERACTION

□ = SLIDERS

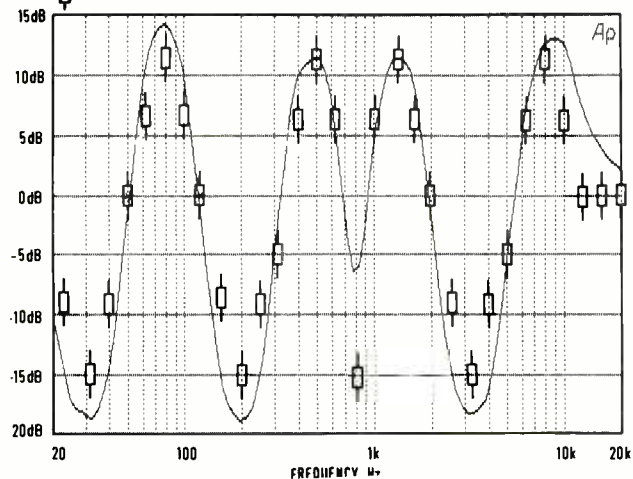


FIG.7 SWEPT, 1/3-OCTAVE NOISE SPECTRUM

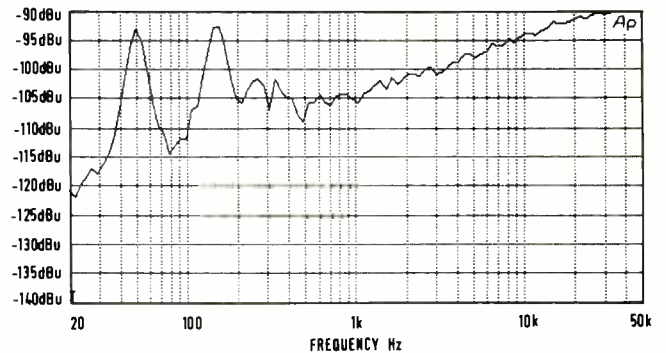
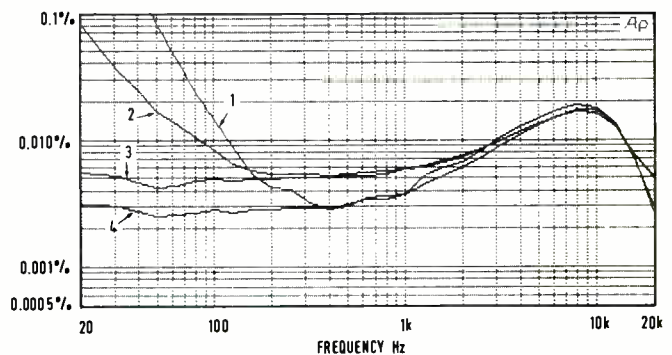


FIG.8 THD+NOISE vs FREQUENCY

1+20 dBu, BALANCED MODE, VIA TRANSFORMER
 2+4 dBu, BALANCED MODE, VIA TRANSFORMER
 3+4 dBu, BALANCED MODE, ACTIVE OUTPUT
 4+4 dBu, UNBALANCED, PIN 2 (LIVE) TO PIN 1 (GROUND), ACTIVE OUTPUT



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REVIEW

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hum fields, so site it away from other high power devices whenever possible.

Total harmonic distortion plus noise measurements are dominated by noise at the lower frequencies when the active output is in use as shown in Fig 8. As the frequency rises so does distortion, surpassing the specified level at 3 kHz. When the transformer is in circuit, however, it becomes the limiting factor as shown in the two upper curves.

Fig 9, which shows the change in distortion with signal amplitude into a high impedance load, reveals that while the transformer has an effect at low frequencies and high levels, it has little effect at middle and upper frequencies. At lower load impedances the useful level is limited due to the transformer output impedance and output amplifier current capability, making distortion less of a consideration as shown in Fig 10. SMPTE intermodulation distortion was measured

using 400 Hz and 7 kHz as 0.005% at +4 dBm, with or without the transformer.

Conclusion

The Rane GE30 is a robust, well-made piece of equipment that should be at home in the studio, permanent installation, or on the road. It has some minor deficiencies that the manufacturer could easily improve and others that are probably more due to optimistic spec writing than any real weakness in the design. The relatively accurate, constant Q, 1/3-octave filters with low interaction make it of particular interest for permanent sound reinforcement installations, where resetting or exchange of units may take place. The ability to switch the unit to operate in boost/cut or cut only modes will benefit many users who use graphic equalisers for a variety of applications. □

FIG.9 THD + NOISE vs OUTPUT LEVEL INTO 100 kΩ LOAD
3-50Hz ACTIVE OUTPUT
1-50 Hz, TRANSFORMER OUTPUT
2-BOTH CURVES AT 1kHz ACTIVE OR TRANSFORMER

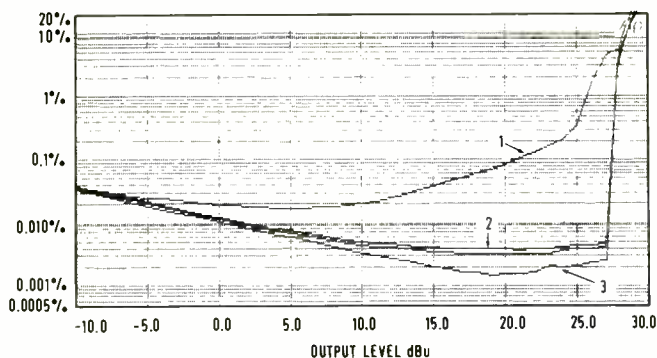
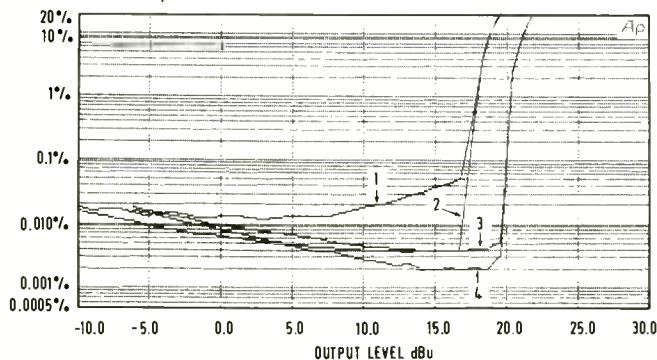


FIG.10 THD + NOISE vs OUTPUT LEVEL INTO 600 Ω LOAD
1-50 Hz, TRANSFORMER OUTPUT
2-1kHz, TRANSFORMER OUTPUT
3-1kHz, ACTIVE OUTPUT
4-50Hz, ACTIVE OUTPUT



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Editor's note: Unfortunately it was not possible to include the manufacturer's comment in this issue—this will be published next month.

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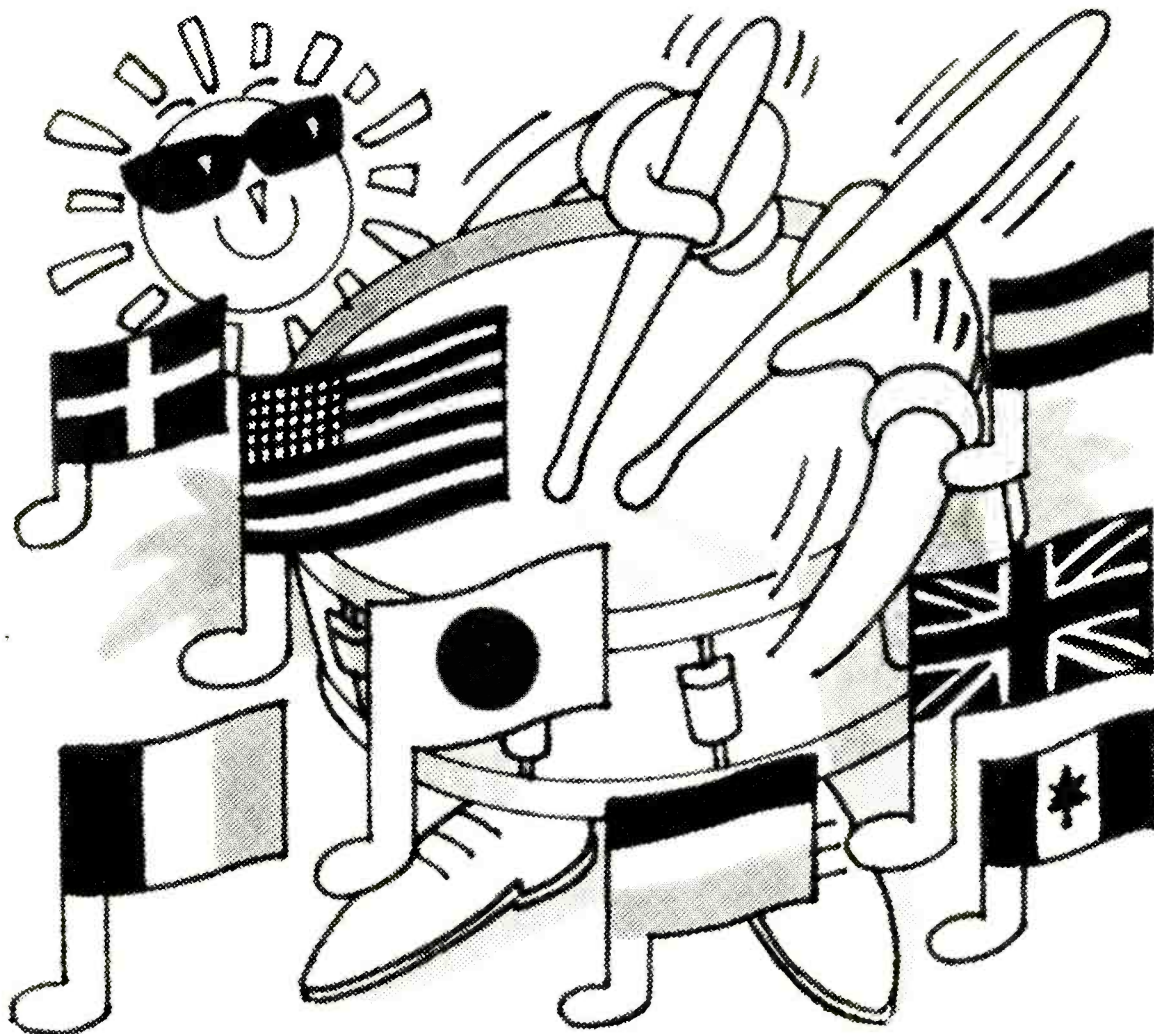
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REVIEW

A user report by Dave Foister on J L Cooper's Midimation

JL Cooper's *Midimation* system is a versatile modular VCA control and data storage system designed to meet most control requirements—from simple VCA subgrouping to full SMPTE-driven fader and mute automation—with various combinations of modules. The system can be fitted to virtually any desk since it has its own fader control panels (dimensioned to stand over a desk's

existing faders) and its VCAs plug into the desk's channel insert points.

The control system is quaintly called *MAGI* (Mixer Automation Gain Interface) and its heart is the *MAGI* controller, capable of handling up to 56 VCAs. This is a fairly substantial rackmount unit, reading fader and mute moves on any one of the various remote fader console units and normally controlling the *MAGI* VCA modules, each providing either eight or 16 VCAs, which

themselves may be based round either of two dbx VCA chips.

The control data format used is straightforward MIDI note-on commands (hence the system name) where the note-number byte represents a VCA channel and the velocity byte represents its level. This stems from the fact that the system was originally designed so that full automation could be achieved with a separate off-the-shelf MIDI sequencer package, which would easily be able to record, store and transmit VCA control data in realtime sync'd to a recorded track. However, the whole process is made considerably simpler and more powerful by the addition of the *SAM* (SMPTE Automation Manager) module and its associated *SAM* disk storage unit, although neither of these is necessary for straightforward VCA control, they simply add the automation. The use of MIDI velocity information for VCA levels means of course that there are only 128 discrete levels available but the difference between them in dBs varies up and down the fader track so that the critical middle area around 0 dB works in 0.4 dB steps.

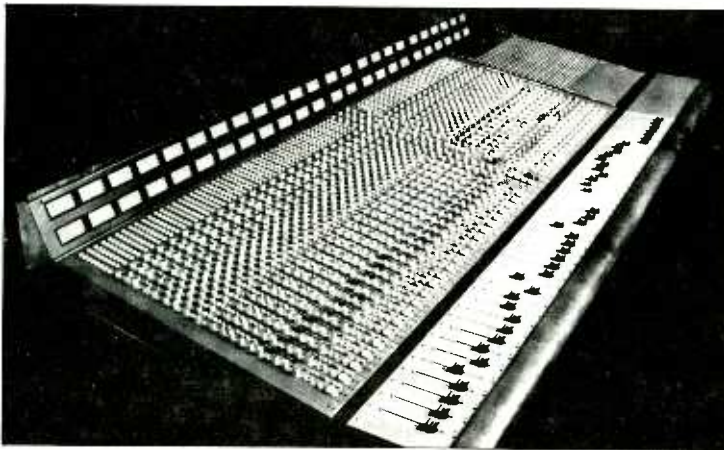
The most immediate part of the system to the user is of course the remote fader panel, of which there are several types available. The one with the widest application (and the most popular) is the 16-channel *RM2*; this comprises 16 VCA control faders with associated mute switches, together with four VCA subgroup master faders and four mute subgroups, all easily assignable from the fader panel. The panel and its operation could hardly be simpler. The only initially confusing aspect is that the single row of pushbuttons and LEDs has two functions depending on the panel mode, which is selectable with one red switch. In fader mode, each switch enables its fader, placing the associated VCA at the level corresponding to the actual fader position; in order to eliminate level jumps when enabling a fader (assuming the automation is in use and therefore the fader position and the stored setting may be different), a null LED is fitted to each channel, which comes on when the fader position matches the stored level. Once a channel is nulled and enabled, the fader has control of the VCA and details of its moves are passed to *SAM* for storage.

The alternative mode is Mute mode, in which the buttons become mute switches and the LEDs show the mute status. Assignment of channels to the mute and VCA subgroups (which are quite independent of each other) is very simple, involving holding down the relevant subgroup button and selecting its slave channels by pressing their associated switches, with the LEDs showing current assignments. Obviously individual faders and mutes are still operative even when subgrouped.

The operating system seems to have been designed to combine a small number of controls (and hence a small physical size) with the minimum number of keystrokes for any task, and as such it should soon become intuitive in use—it certainly didn't take me long to feel at home with the system. If there is a drawback in operation it is that in the interests of space, and presumably economy, the faders are rather shorter than the desk faders they will probably replace. They feel smooth enough but P&Gs they're not; on the other hand, the whole point of automation is that you don't have to continually adjust critical levels so long ultra-smooth faders may not be such an important requirement.

For engineers who prefer it, *MAGI* can be used with the faders in 'relative' mode; with this option selected (via an internal switch in the

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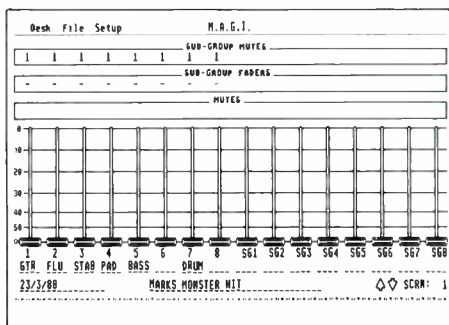
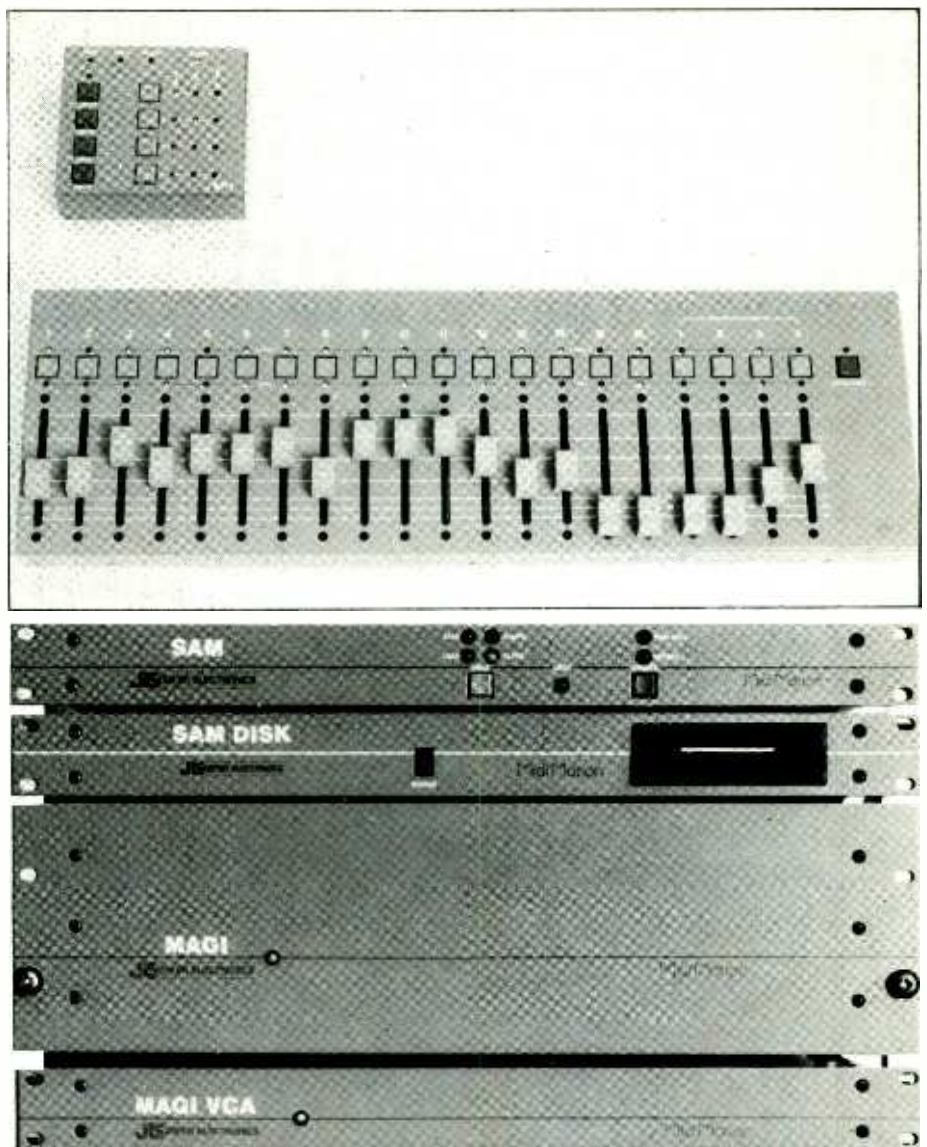
MAGI controller) the faders are normally live and any move will immediately add the appropriate offset to the VCA's current level. The main disadvantage of this over 'absolute' mode is, of course, that a fader that is only half-way up cannot fully fade out a wide-open VCA but with this in mind faders can be disabled, moved and re-enabled at their new positions without having to be nulled.

Apart from larger configurations of this RM2 remote panel with 24 and 32 channels, there is also the RM1 8-channel bank switching unit, which incorporates the same features in an 8-fader package and can be switched to control any of seven banks of VCAs, or to act as eight subgroup masters. All the remotes link to the MAGI controller via small, flexible and inconspicuous data cables, not the unwieldy ribbon cables one might have expected. Most importantly, the MAGI controller has sufficient interface ports and configuration options to drive virtually any VCAs and to read DC control signals from suitable faders, so can be used with almost any desk already fitted with VCA subgroups or automation-ready faders.

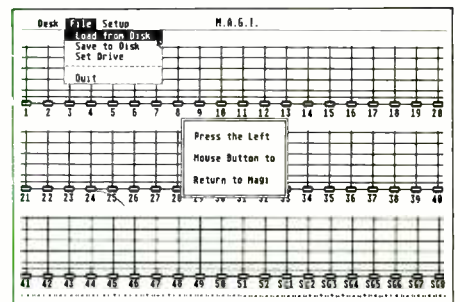
As already mentioned, full automation is added to the system by the SAM module, which stores and updates mix data in realtime locked to SMPTE. A SMPTE generator is built in, and all four SMPTE standards can be accommodated. The process used to store data is quite ingenious. SAM's memory consists of a large RAM playback buffer and a smaller input recording buffer, enabling read-while-write operation; at each tape pass, the main buffer is read and its data sent to MAGI, and at the same time any fader or mute moves sent from MAGI are time-stamped and stored in the recording buffer. As soon as SAM loses SMPTE—when the tape stops—the new data is merged with the existing data and the whole memory is automatically saved to disk (if SAM disk is fitted). Because the new data and the old remain separate until the tape stops, it is possible to abort the final merging and saving processes with a switch on the SAM disk remote if you make a mistake you don't want to keep. This remote also handles the clever disk sectoring process that automatically archives mixes; the disk is divided into four areas, each of which can store a whole bufferful of data (about 11,000 moves), and SAM cycles through these with each successive save operation, so that at any time you have the previous four mixes available on the disk. The major advantage of all this is that you can happily forget the disk backup is even there—it does everything you would normally want to do automatically, and very quickly.

With the remote, you can read any of the four mixes, or if you want to keep one mix for reference but go on to try more, any disk sectors can be write-protected, and SAM will cycle round the remaining ones. Lock-up to SMPTE is extremely fast, event timing accuracy is to within $\pm 1/2$ frame, and the system can quickly set up to any point in the song. Unlike some systems, it doesn't use snapshots to continually update the VCA status but if the tape is started in the middle it rapidly calculates all the moves that would have been made from the top of the song to the current SMPTE position and sets everything to the resulting levels.

It is hardly surprising to learn that the Midimation system will hook up to a computer (either an ST or a Mac via the MIDI ports) although it works quite happily without it. The computer simply provides a graphic display on screen of current fader and mute status of anything up to 60 channels, complete with



Main page from graphics package



Master page for viewing up to 52 tracks and 8 subgroups

definable labels for individual channels and groups. SMPTE appears in the corner. The screen shows moves in realtime and even shows a 'phantom' fader at the actual fader position as well as a solid fader at the VCA level, which could be used as an alternative nulling method. The selection of channels shown at any one time is completely user-definable and up to 12 separate screens may be set up. These screen configurations may be saved to the computer's own disk for future use and this also saves the subgroup and mute group assignments from MAGI, which unfortunately are not stored on the system's own disk.

The performance of the system seems to be everything one could wish from such a system. Audio behaviour is virtually transparent,

resolution and accuracy are easily sufficient to enable the system to reproduce anything you could do manually, and the whole thing is very simple to learn and operate. For most purposes, all the user need be aware of is the fader panel and the screen display, if fitted—the brains of the system can be out of sight and out of mind.

Midimation seems to be finding its way into the smaller more budget-conscious 24-track studios and while it doesn't pretend to be competition for SSL, Neve or GML this is reflected in its price, which should make it accessible to many facilities who thought they couldn't afford automation. **JL Cooper Electronics, 1931 Pontius Avenue, West Los Angeles, CA 90025, USA.** **UK: Evenlode Soundworks, The Studio, Church Street, Stonesfield, Oxford OX7 2PS.**

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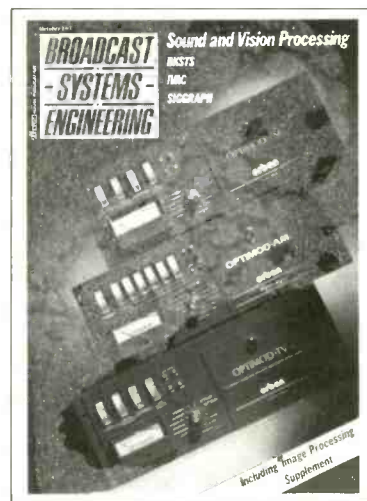
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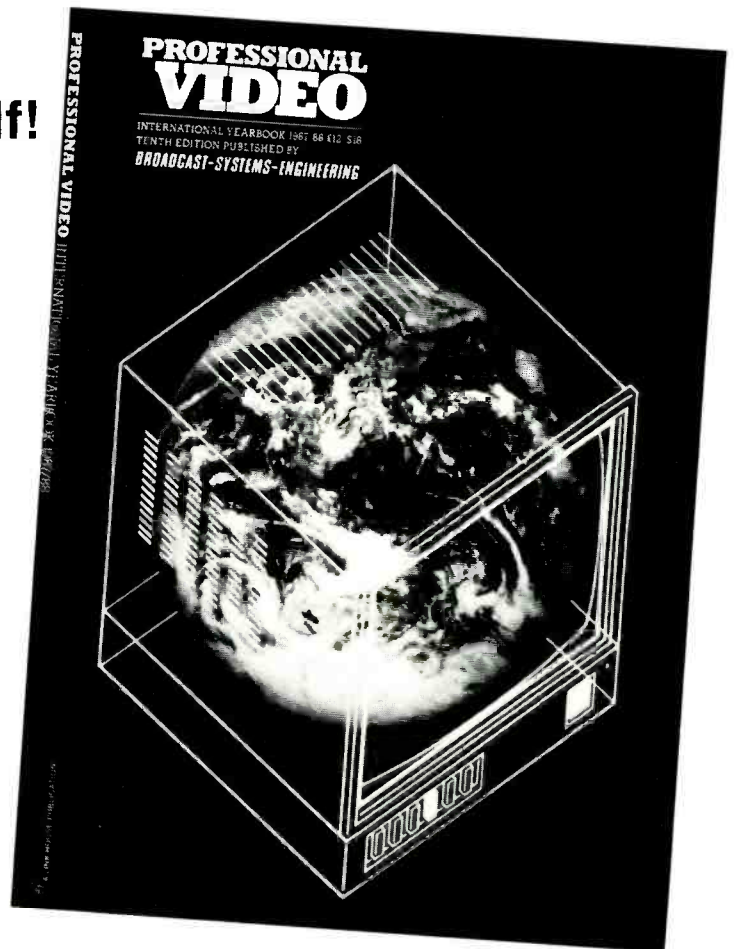
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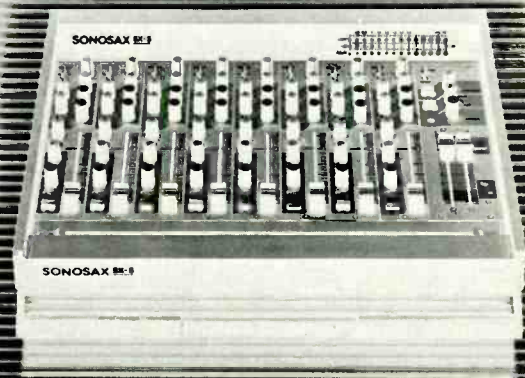
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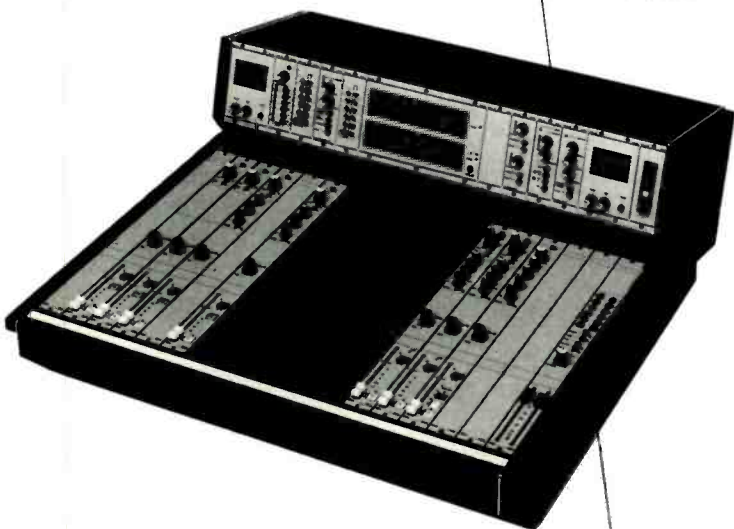
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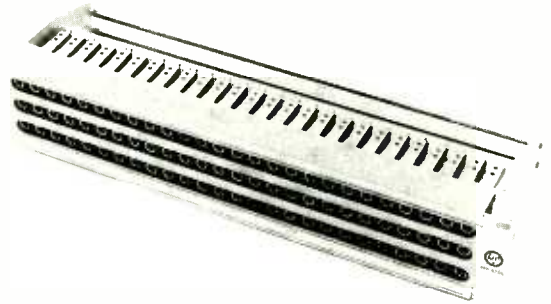
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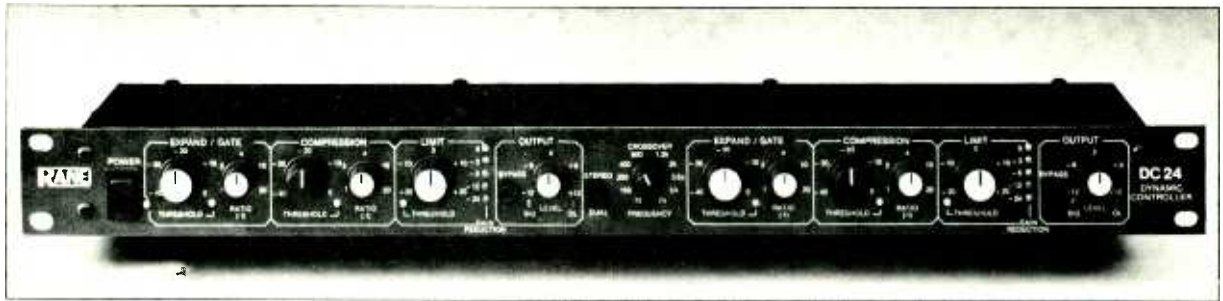


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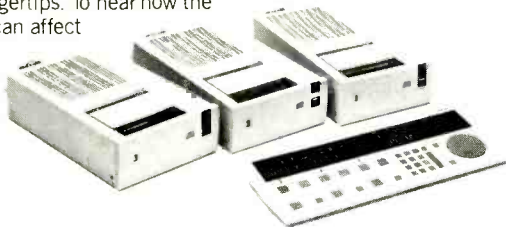
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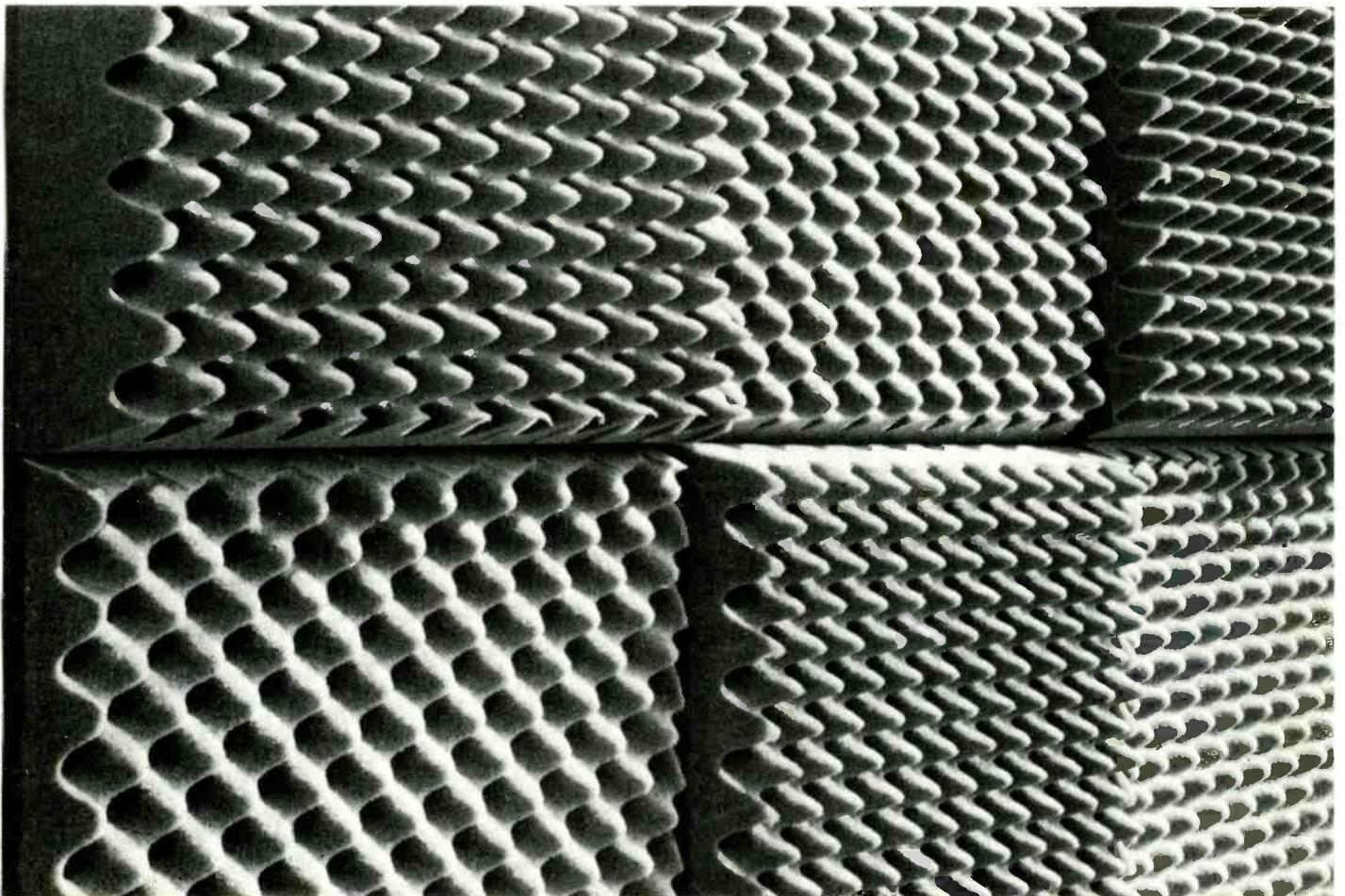
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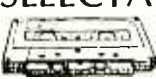
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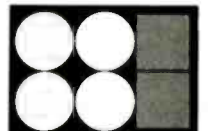
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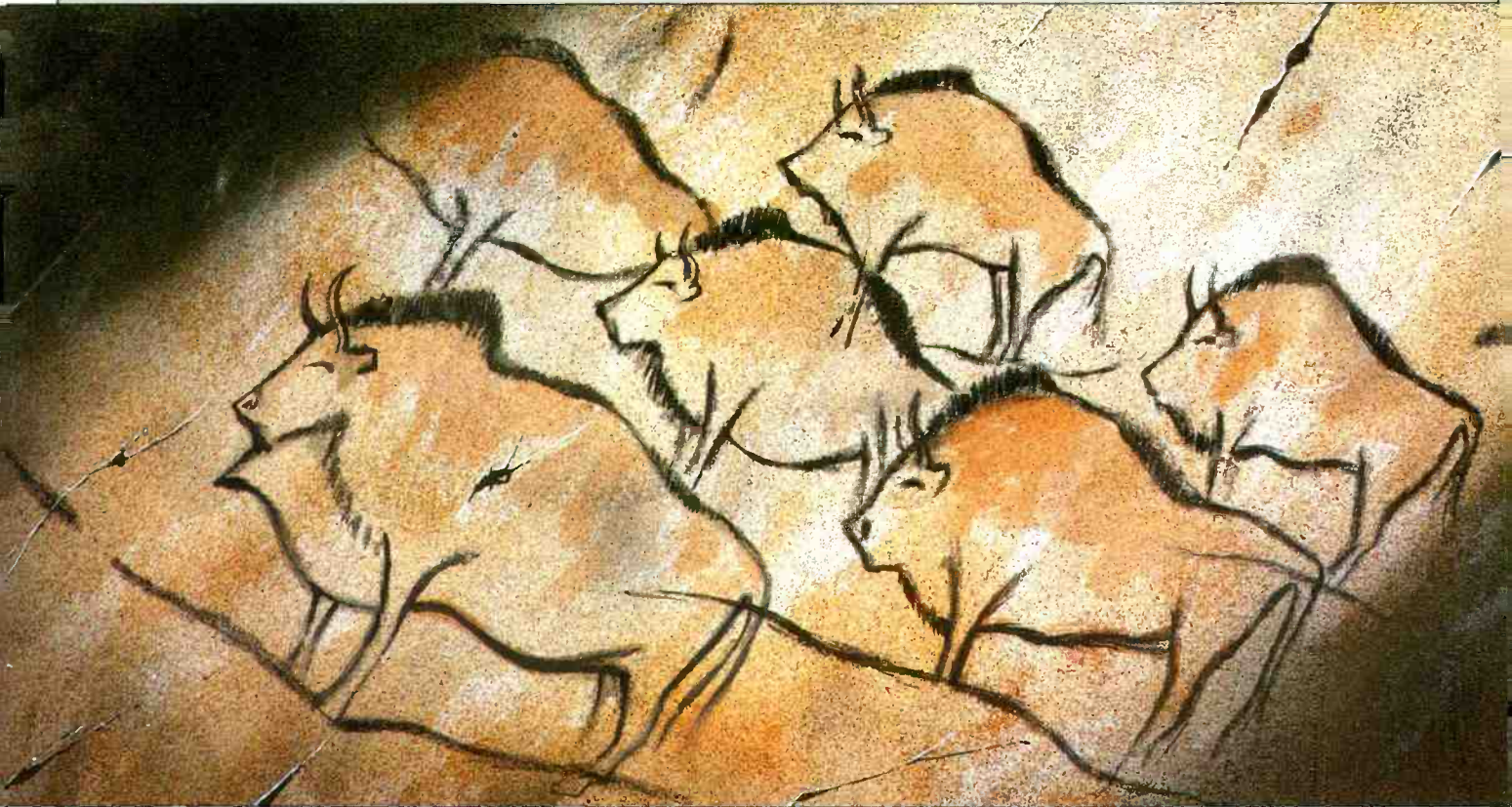
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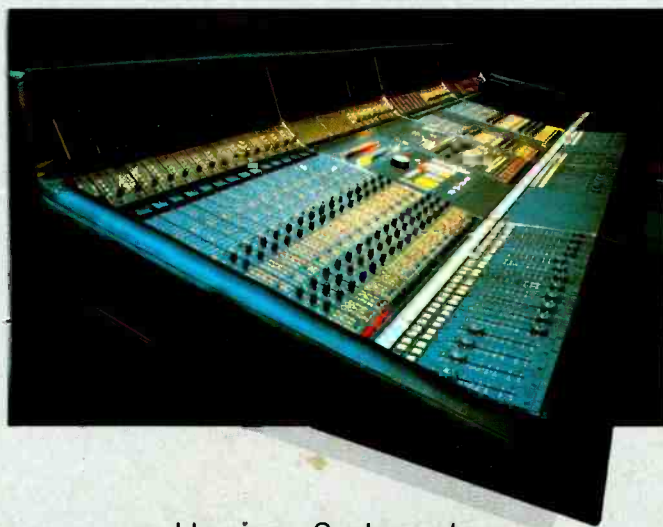
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