



# YOU HAVE TEN SECONDS TO MEMORISE THIS AD.



Storing this much information in ten seconds is an impossible task for anyone.

But the ability to store and recall complex settings in a matter of seconds, is just one of the special features of the Series 20 master recorder.

The Series 20 has a built in micro-processor which provides you with a concise series of status messages via a fluorescent display. All audio settings can be adjusted by push button controls. Information such as tape speed, position and time can be selected as desired.

Within seconds each pre-set can be stored for three different tape speeds, three eq standards and five tape types; amounting up to 588 different audio parameters.

Through changes of speed or tape types, a

whole library of alignments can be built up and recalled at the press of a button.

The Series 20 will handle  $\frac{1}{2}$ " and  $\frac{1}{4}$ " formats. And changing formats is a simple operation that only involves one button and three screws. The process takes less than a minute.

Add to its amazing micro-processor capacity a practical modular construction (which makes the Series 20 one of the most serviceable recorders on the market) and you have on your hands the ultimate master recorder.

So, to get a head start write to Soundcraft now for further information on the remarkable Series 20.

Don't forget.

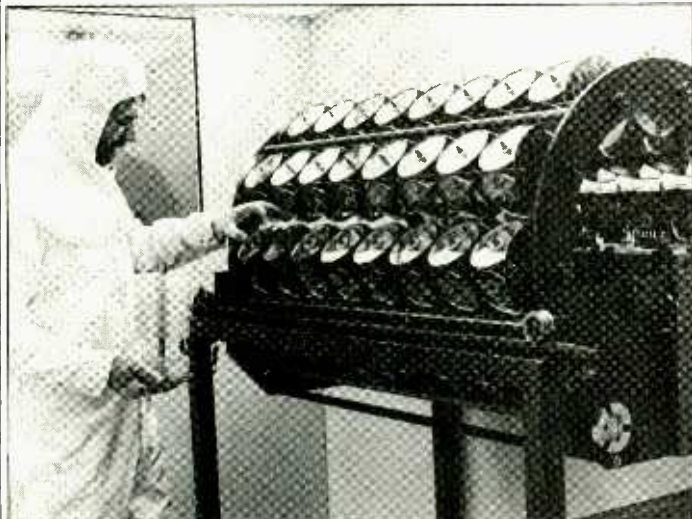
## Soundcraft Series 20

Soundcraft Electronics Ltd., 5-8 Great Sutton St, London EC1V 0BX, Tel: 01-253 6988, Telex: 21198 SGRAFT G. Soundcraft Electronics USA, 1517 20th St, Santa Monica, California 90404, Tel: (213) 453 4591, Telex: 664923. Soundcraft Canada Inc., 14-14 Hymus Blvd., Dorval, Quebec, Canada H9P 1J6, Tel: (514) 685 1611, Telex: 05 822582.

# STUDIO SOUND

AND BROADCAST ENGINEERING

## FEATURES



- 44** **Nimbus CD manufacture:** Richard Lamont relates why and how a specialist record manufacturing plant moved into compact disc production
- 62** **In perspective:** US columnist Martin Polon says it's not all CD's fault
- 64** **Theme park sound at Disney:** The sound set ups at the Magic Kingdom and EPCOT Center are examined by Terry Nelson
- 72** **A personal view of psychoacoustics:** How to check if it sounds good without actually listening by Ted Fletcher
- 76** **A Blow by Blow account:** Following George Martin's discussion on the making of Jeff Beck's *Blow by Blow*, engineer on the sessions Denny Bridges gives Janet Angus some more inside information

## SPECIAL FEATURE

- 38** **Effects, reverb and equalisers:** A rundown of new equipment and modifications since we last covered the subject

## REGULARS

- 5** **Editorial:** Keith Spencer-Allen with a warning to beware of infiltration
- 28** **Diary:** Address changes—Literature—People—Cipher acquires btx—APRS column—Agencies—APRS membership and categories—SIM training—Up and coming topics—Benchmark design—Contracts



- 32** **New products:** Genelec control room monitor—SPL effects—Philips BPE condenser microphones—Budget Shure—In brief—Synchroniser and editor from Audio Kinetics—Synton replaces vocoders—ADA programmable delay—Alesis reverb—Imhof blower units—Yamaha REV-7 digital reverb—Harris pro gate—Audioarts stage monitor console—LOLA audio from Yugoslavia

- 52** **Studiofile:** Hollywood Studios, London—Battery Studios, London
- 58** **Business:** Spoiler boiler—Advice for drop-outs—Don't be an expert. By Barry Fox

## REVIEWS

- 78** **Klark-Teknik DN780:** Keith Spencer-Allen's user report on KT's new digital reverb device
- 83** **Electrospace Spanner SP2:** A user report by Ian Gilby on this automatic stereo panner
- 86** **Ursa Major MSP-126:** A user report by Keith Spencer-Allen on this multi-tap stereo processor

### EDITORIAL

**Editor:**  
Keith Spencer-Allen  
**Production Editor:**  
Ann Horan  
**Production Assistant:**  
Beverley Hudec  
**Consultant:**  
Hugh Ford  
**Contributing Editor:**  
Richard Elen  
**Secretary:**  
Carrie Love

### ADVERTISEMENTS

**Advertisement Manager:**  
Kerr Duffy  
**Sales:**  
Collette Ramsay  
**Secretary:**  
Mandy Paul  
**Production Manager:**  
Jacky Thompson  
**Japan and Far East Agent:**  
Media Sales Japan Inc, Tamuracho  
Bldg 3 3 14, Shimbashi Minato-Ku  
Tokyo, Japan  
**US West Coast Agent:**  
Herb Schiff, 1408 Santa Monica Mall  
Suite 200, Santa Monica  
CA 90401 USA  
**COMMERCIAL MANAGER**  
Phil Guy



Editorial and advertising offices:  
LINK HOUSE, DINGWALL  
AVENUE, CROYDON CR9 2TA,  
GREAT BRITAIN  
Phone: 01-686 2599  
International: +44 1 686 2599  
Telex: 947709  
© Link House Publications  
PLC 1985. All rights reserved.



A LINK HOUSE  
PUBLICATION

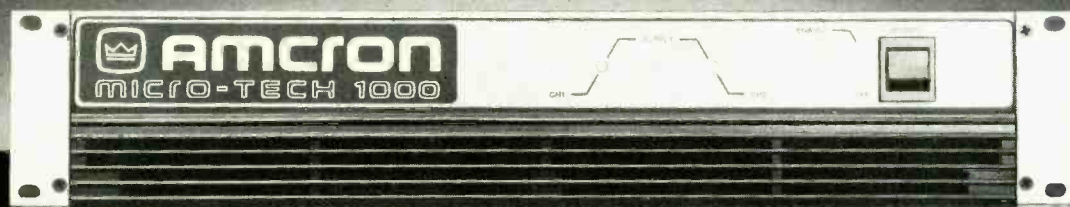
Publisher and consultant to  
APRS for Studio Sound's  
Producer's Guide to APRS  
Members 1984/85

June 1985 Number 6  
Volume 27 ISSN 0133-5944

Cover: Photography by Roger Phillips



# This much power in this much amp.



The Amcron tradition of peerless performance was established with the introduction of the legendary DC300 series in 1967. Now, in 1985, on the back of modern technology and two decades of experience, Amcron bring you the Micro-Tech 1000 amplifier.

The Micro-Tech 1000 is the amp we've all been waiting for - lightweight, compact, and with more than enough punch to suit the increased power requirements of the digital age. These are the facts:

- 400 watts RMS per channel into 4 ohms.
- 500 watts RMS per channel into 2 ohms.
- 1000 watts RMS into 4 ohms - bridged mono.
- Safe operation at high power to 1 ohm.

- Reversible forced-air cooling.
- Amcron performance in 3½" rack space.

We believe that these facts, coupled with Amcron's reputation speak for themselves. But if you wish to know more about the Micro-Tech 1000 and how it can solve your headroom problems, call HHB Hire & Sales at: Unit F, New Crescent Works, Nicoll Rd, London NW10 9AX. Tel: 01-961 3295. Telex: 923393.



# EDITORIAL

# EDITORIAL

This month's comment from Keith Spencer-Allen

## We are vulnerable to aliens

The professional audio industry is small fry. It is bigger, much bigger than it used to be but still very small. I recall a conversation with Martin Polon, our US columnist, in the reception area outside the AES Convention in New York last October. I commented that the exhibition looked healthy—the biggest ever, attendance looked good and that perhaps there really was a recovery in industry fortunes. I don't quite recall how this developed into a discussion on the total size of the business but Martin said that he found most audio people just don't realise a company such as IBM or AT&T could buy the complete industry with petty cash should they have the need of it. Now I don't know if Martin has access to precise figures but I am sure that he is close enough. We *are* small fry.

Well, so what? Why should this matter, and why am I bothering to devote this space to talking about it? That is slightly tricky to answer. I think it is because we have grown sufficiently large as an industry that we are now attracting aliens. These are people and companies which 10 years ago would have been profitably engaged in selling encyclopedias and arguably still should be. They have appeared within the pro audio industry at all levels and are often quite incapable of understanding how the recording process works even at basic levels. They also seem very alien to those of us who entered recording studios because we liked the idea of being creative at some level—either technically or artistically and had a genuine feel for the advancement of the process. Sometimes it seems that these aliens may have been sent to sabotage our collective efforts.

These aliens appear to have infiltrated many levels—at lower levels they are just a tiresome nuisance but when they are present in large companies, the small pro audio industry is most under threat—not from extinction as this isn't their aim—but from confusion and misinformation at a time of change when clarity of decision and beneficial industry objectiveness are most needed.

The question you are probably burning to ask is, 'Who are they?' although I should say that it is more important that we learn to recognise them than identify specific aliens. They do appear to need our help as they are more related to *ET* than *The Alien* and are lost far from home.

So, some examples. One area close to us is the PR company who believes that the newsworthiness of an event, product or piece of news increases with the amount of releases and telephone calls they bombard us with often on unsuitable topics; don't understand the word *no* and are so lost in their field that they cannot answer a simple question about one of their clients. Not all PR companies have aliens but many seem to adopt them quite happily.

Record companies seem refreshingly free of aliens at most

levels (they have other infestations) although occasionally they find safe houses as studio time bookers for major labels. For example studio X may have completed very satisfactory work for the label for many years until the alien arrived. The alien then finds out that this very satisfactory work was not recorded on an ABC console and promptly cancels all future work. If I could be sure that the alien knew the difference between an ABC console and a chocolate chip cookie I could be more charitable. The manufacturer of ABC consoles employs no aliens at all—something they are very strict about and I think that they would be rather disturbed at the fondness that this alien seems to have for their devices.

As I said earlier, it is possible to find these aliens at all levels and in operations of all sizes. I recently saw an alien working for a major internationally known manufacturer and expound the virtues of a newly proposed development. Excited members of the audience then asked when this new development could also be applied to the company's existing products in the field as this would solve a lot of the problems they had been experiencing. The alien then replied that there were no plans to implement the new development in the existing machines as they were working completely well without it—there was *no* problem. This came as a severe surprise to the excited members of the audience who just happened to be some of the most experienced studio owner/operators you will find anywhere. As a small industry we find it very hard to cope with a corporate *no* which can have far reaching financial effects for many of our industry members who become victims of the alien influence.

My final example (limited by space not examples) concerns a PR release from a foreign subsidiary of an increasingly important manufacturer from a different country. The release concerns the decidedly non-alien activities of what seems like the majority of US rock artists in producing a recording to sell to aid famine relief—in a similar manner to the UK Band Aid record. Altruism is rife in the project and there has been no commercial advantage or gain made to my knowledge by any of the involved parties. Who but an alien would break ranks to tell us that their equipment had been used in recording it. A clear case of the displaced alien blundering lost when remarkable industry example of co-operation was taking place. It quite obviously didn't matter what type of machines were used to record this track any more than the colour of the studio carpet and the use of such a notable occasion for commercial gain is in poor (alien) taste.

Unfortunately, aliens will not go away now. We have to learn to recognise them and live with them. I have no further observations—look to the skies.

**STUDIO  
SOUND**  
AND BROADCAST ENGINEERING

STUDIO SOUND is published on the second Friday of the preceding month. The magazine is available on a rigidly controlled requested basis only to qualified personnel (see back page for terms) or for an annual cost of £18.00 UK, \$40 US surface mail, \$75 US airmail, £24.50 overseas surface mail or £46.50 overseas airmail to non-qualifying readers or where more than two copies are required in a studio or small organisation. All

subscription enquiries, including changes of address (which should be *in writing* and preferably including an old address label or at least the 7-digit label code) should be made to the **Subscription Department, Link House, Dingwall Avenue, Croydon CR9 2TA, Great Britain.** US mailing agents: Postmaster please send address corrections to Studio Sound, c/o Expeditors of the Printed Word Ltd, 515 Madison

Avenue, New York, NY 10022. Total average net circulation of 13,981 per issue during 1984. UK: 5,735. Overseas: 8,246. (ABC audited). Studio Sound and Broadcast Engineering incorporates Sound International and Beat Instrumental. Printed in England.

**ABC**

MEMBER OF THE AUC  
BUREAU OF PUBLICATIONS

# X = SERIES

## LEAVING OTHER POWER AMPLIFIERS IN THE DARK AGES

Harrison Information Technology meets the accelerating demands of contemporary Sound Professionals with even more sophisticated technical specifications – incredible SECOND GENERATION MOS-FET amplifiers. A range of power amplifiers which are exceptional in every way, smaller size, lighter weight, and total reliability.

Performance quality is optimum, so Harrison gives you superb sound handling capabilities, stunning bass outputs, crystal clear high frequency response and ultra low distortion – all for a remarkably modest price.

- **X150** 75+75 Watts stereo 150 Watts mono (1U)
- **X300** 150+150 Watts stereo 300 Watts mono (2U)
- **X600** 300+300 Watts stereo 600 Watts mono (3U)
- **X1000** 500+500 Watts stereo 1000 Watts mono (3U)
- **X1200** 600+600 Watts stereo 1200 Watts mono (4U)
- **X1600** 800+800 Watts stereo 1600 Watts mono (4U)
- **P900** 450+450 Watts stereo (3U)

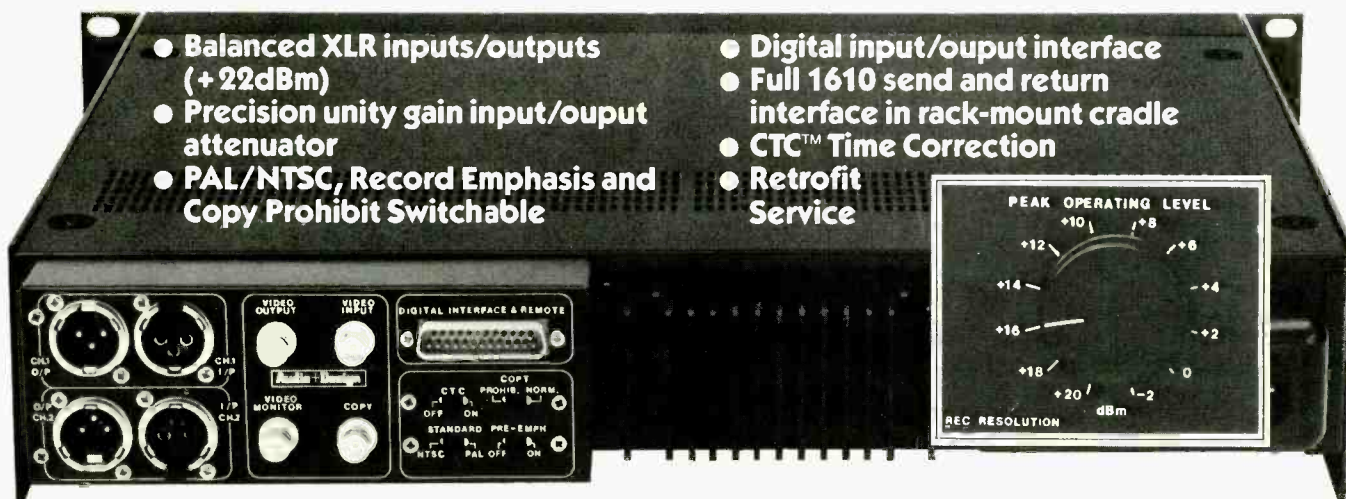


LET YOUR PROFESSIONALISM  
SOUND THROUGH.

**HARRISON**  
INFORMATION TECHNOLOGY LTD  
Unit 3, Button End, Harston,  
Cambridge CB2 5NX  
Telephone 0223 871711, Telex 81687 HITCAM G

## Audio + Design

## Digital PCM 701 ES Professional



- **Balanced XLR inputs/outputs (+22dBm)**
- **Precision unity gain input/output attenuator**
- **PAL/NTSC, Record Emphasis and Copy Prohibit Switchable**

- **Digital input/output interface**
- **Full 1610 send and return interface in rack-mount cradle**
- **CTC™ Time Correction**
- **Retrofit Service**

Audio+Design's enhancement programme for Sony domestic digital processors, expands the scope of low-cost digital for the professional user. The PRO-701 ES has a full professional analogue interface with improved cross-talk

performance. The digital interface provides a low-cost high quality A/D converter for use with computer hardware. When coupled with the A+D Add-mix™ Digital Fader the system provides inexpensive digital mixing for the first time.

A complete Sony 1610 interface is available as a plug-in option fitted in a rack-mount cradle that holds the PRO-701 ES. This interface not only offers 'send' facilities to 1610 from F11701 format, but also digital 'return' from 1610 tapes to F11701.

**Audio + Design**  
The Hit Sound in Audio Science

Audio Design Calrec Ltd.,  
P.O. Box 182,  
Reading, Berks.  
RG2 9BA England  
Tel: Reading (0734) 861088  
Telex: 848722 ADR UK

Audio Design Calrec Inc.,  
P.O. Box 786,  
Bremerton,  
WA98310, USA  
Tel: (206) 275 5009  
Telex: 152426 ADR USA

# Once a month, we sit down to have a serious talk with Otari.

Otari products are a serious investment by anyone in this industry. Our success with their recorders is largely due to the extent of technical expertise that Turnkey provides.

Our investment in support of Otari goes far beyond the tens of thousands of pounds in backup stock parts.

Our engineers are 'factory trained' and we maintain very close contact with Otari engineering staff. In fact, we run monthly, tech meetings during which the finer points of operation and backup are clarified

Every machine that we deliver undergoes a thorough eight to fourteen hour checkout of both transport and electronics. Commissioning involves a final line-up that brings the machine tight in on specification. It is our experience that these machines will perform well inside their quoted tolerances.

And of course, for a full year or more thereafter, we make sure that the machine runs true.

Our technical expertise with the Otari product has resulted in Turnkey becoming the recommended service agent for all their machines in Britain.

And of course, we have our monthly sales meetings too. An opportunity for everyone to learn more about the remarkable range.

For example, we've discovered that the latest 5050 MkIII

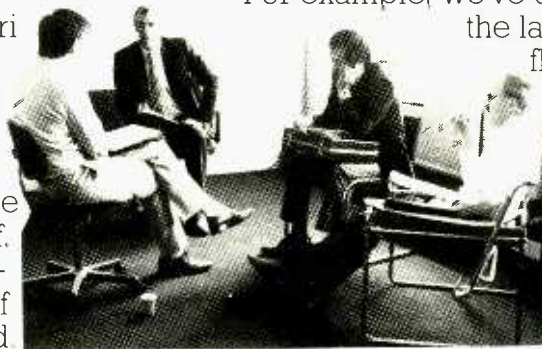
flatbed, is the stereo mastering choice for many studios - in particular where editing is of import.

Similarly, the new MX70 six-track on inch

is the logical choice for many quality yet budget concious production houses.

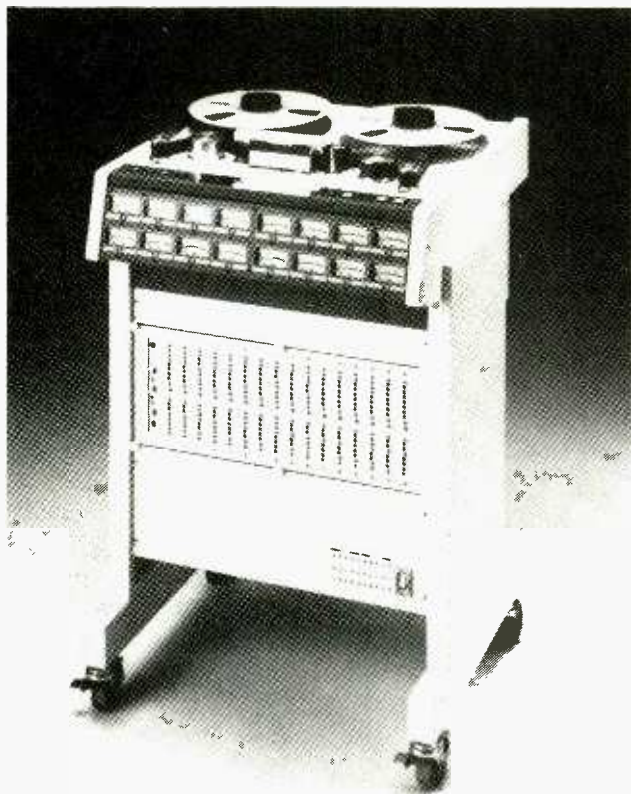
In fact, wherever you look, Otari product are satisfying every need in professional sound recording.

Call Garry Robson or John Ridell for more information on Otari from two to twenty four track. No one offers a more complete service of supply, installation and backup.



## turnkey studio systems

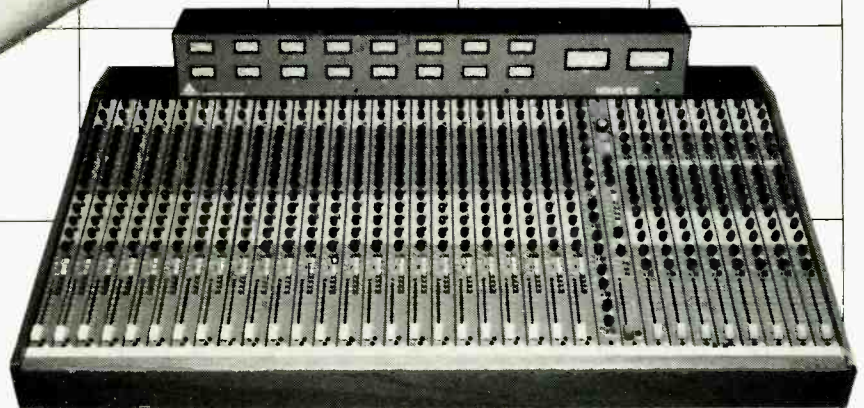
Brent View Road. London NW9 7EL. Tel;01-202 4366



# ..... tried, trusted, TRIDENT



**ti!**  
SERIES



SERIES  
65



SERIES  
80B

## Quality that speaks for itself!



**Trident Audio Developments Ltd.**  
Shepperton Studio Centre Shepperton Middx. TW17 0QD, U.K.  
Tel: Chertsey (09328)60241. Telex: 88139282 TRIMIX G  
Trident U.S.A. Inc. 280 Mill Street, Ext, Lancaster, Mass 01523 U.S.A.  
Tel: 617-365-2130/617-368-0508 Telex: 951546 294105





# Packages from Soundcraft, Systems from Turnkey

Sounds just the same, but there's a subtle difference. One comes as two large crates, the other is hands on from the word go.

When we turn a package into a system, more of our expert staff become involved with your needs than any manufacturer could dream of sparing.

There are finance, design, acoustic and building considerations. The ancillaries, the installation, the commissioning and the long term backup.

And of course the deal.

Because as well as offering the same price as buying the package direct, we'll put together the best deal we can for anything else you need to get your system up and running. Total savings, buying this way are often dramatic.

Our experience with Soundcraft products is unequalled. Our knowledge of their products and our long relationship means that any problems are solved with speed.

The Producer System shown below offers the most cost effective, two inch format sixteen track in the market today.

Their TS24 in-line console and twenty four track recorder offer even more advanced facilities for upgrading studios.

Call Garry Robson for full information on our complete studio systems. Nobody knows Soundcraft better.

**turnkey studio systems**

Brent View Road. London NW9 7EL. Tel: 01-202 4366



**electrospace developments ltd**



**The Family:**

The **Time Matrix**, a versatile multitap digital delay system. 1.637 secs on each tap. 80 memories, LF and HF controls. Output level and delay display of each tap, on-board two output mixer. Optional eight outputs are available. Electronically balanced XLR's.



The **Spanner**, the first digitally controlled stereo panning system. Auto-pans from once every 12 seconds to 6 times per second. External/internal trigger pulse count up to 8 beats. Asymmetrical panning and modulated stereo imaging.



**And next ...**

Available From:

UK DISTRIBUTOR:  
**BRITANNIA ROW LTD**  
35 BRITANNIA ROW  
LONDON N1 8QH  
TEL 01-226 3377 TLX 268279 BRITROG

AGENT  
**TURNKEY**  
BRENT VIEW ROAD  
LONDON NW9 7EL  
TEL. 01-202 4366 OR 01-637 1701

AGENT  
**DON LARKING AUDIO SALES**  
29 GUILDFORD STREET  
LUTON  
BEDFORDSHIRE LU1 2NQ  
TEL 0582 450066 OR 0782 24257

AGENT  
**CARLSBRO SOUND CENTRE**  
11-13 HOCKLEY  
NOTTINGHAM NG1 1FH  
TEL 0602 581888

AUDIO · VIDEO · DATA

A superb range of innovative loading  
and duplicating technology  
· Worldwide ·



**the leaders**

Tape Automation Ltd, Unit 2, River Way, Harlow, Essex CM20 2DN.  
Telephone (0279) 442946, Telex 265871 MONREF G quoting Ref: 84: AUL001.

EUROPE · USA · JAPAN · UK · INDIA

# Psychoacoustic effects to fool your ears, exclusively, from Turnkey Direct.

On the one hand, there's the traditional signal processing. Limiters, equalisers, delays and their derivatives.

On the other, there's a variety of devices which affect the sound in a way which 'tricks' the brain to believe that it's hearing something else. The domain is that of psychoacoustics, and the products we offer are from leading American manufacturers.

**Symetrix** offers the 511 single ended noise reduction system. Improvements of up to 30dB from previously recorded, objectionably noisy tapes. Combining the techniques of expansion and dynamic noise filtering, the 511 is an important tool in any control room.

Downward expansion reduces noise by attenuating low level signals. The dynamic filter works on the principle that music is capable of masking noise within the same bandwidth. The Symetrix 511 helps achieve the dynamic range of digital from existing analog machinery.

**Studio Technologies** have announced improvements in their AN2 stereo simulator.

If two channels are perfectly coherent the sound is heard as mono. If one signal begins to vary from the other, the channels become incoherent and the spaciousness of the sound increases. This difference in the channels is achieved by delay and comb filtering techniques. Control over the modulation and

stereo width permit the unit to be tuned to any programme material. Used with care, the effect is subtle. It literally opens up a mono track into glorious stereo.

The Studio Technologies Simulator is the effect you're least likely to give back once you've tried it.

**Aphex** began with a black box and an enhancement effect. Once their products were only rented, now you may buy them outright. Their Model B is well within any studio's budget and utilises established techniques to restore clarity and presence to recordings.

The Compellor is their highly successful, intelligent compressor. You set the input level and that's it. The Compellor provides smooth, inaudible compression, increased loudness, freedom from gain riding and the desired density, - all automatically.

These unique signal processors are available only from Turnkey Direct.

To audition any one of them, call Tony Williams, and arrange for a free demoloan.

Discover the latest psychoacoustic effects in your own studio - the only way to choose.

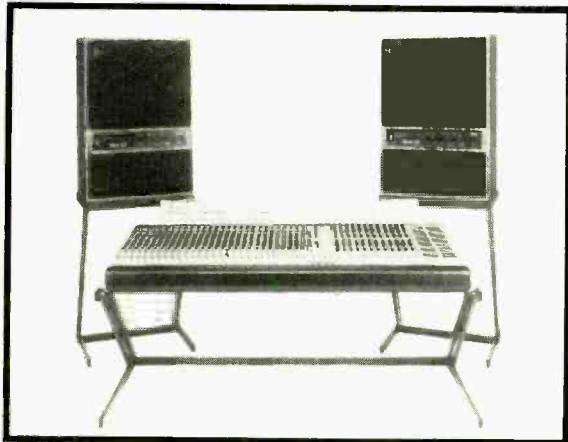
**turnkey studio systems**

Brent View Road. London NW9 7EL. Tel:01-202 4366



# STAND EASY STANDS

MANUFACTURERS OF STANDS, RACKS AND SCREENS FOR THE AUDIO INDUSTRY

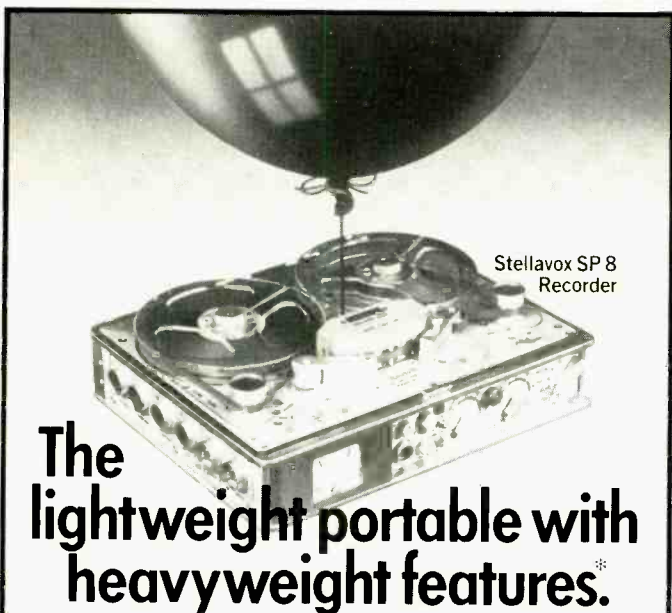


Stands for all makes of consoles.

We can rack anything for less than you would think.

**Don Larking**  
audio sales

Luton: 29 Guildford Street, Luton, Beds.  
Telephone: Luton (0582) 450066  
Telex: 825488 DONLAR G  
Stoke-on-Trent: Stafford House,  
Clough Street, Hanley, Stoke-on-Trent  
Telephone: Stoke-on-Trent (0782) 24257



Stellavox SP 8 Recorder

## The lightweight portable with heavyweight features.\*

- \* 4.9 kg Total operational weight.
- \* EBU SMPTE Time-code generator version available.
- \* Universal option includes mono/neo-pilot compatible, mono/synchro and stereo/synchro.
- \* Optional plug-in 50/60 Hz synchronizer.
- \* Very low power consumption (90-110 mA).
- \* 6 Simultaneous inputs: 2x mike; 2x variable line; 2x fixed line.
- \* Passive big reel adaptor allows up to 12" spools to be used, including NAB.

**STELLAVOX** SWITZERLAND © 2068 Hauterive-Ne, Switzerland. Tel: 038 33 42 33. Telex: 35 380.

UK Distributors: FUTURE FILM DEVELOPMENTS, 114 Wardour Street, London W1V 3LP, England. Tel: 01-434 3344 & 01-437 1892. Telex: 21624 ALOFFDG. Cables: Allotrope-London W1.

# AUDIO SERVICES

**ULTRA HI-TECH DEALER**

**NEW LUXURY MIDI COMPUTER KEYBOARD SHOWROOM**  
The only place in Great Britain where you can experience the full production potential of all the HI-TECH digital equipment shown on this advertisement.

**Roland**

MKB-1000 MOTHER KEY BOARD  
GR-700  
G-707  
ROLAND JX-8P  
PG-800 PROGRAMMER  
MIDI  
PLANET-P  
PLANET-S  
SUPER JUPITER  
JUNO 106  
TR-707  
Digital Midi Keyboard Recorder MSQ-100  
Digital Programmable PCM Drum Machines with Midi.

**YAMAHA**

Digital programmable algorithm synthesizer  
DX-7  
R-1000  
D-1500  
Digital Reverb  
Digital Delay with Midi.  
RX-11  
RX-15

**OBERHEIM**

DMX  
DSX  
OB-8  
DX  
Now with latest 3-4 Software.  
2 osc's per voice-15 VCA's-5 LFO's-4 RAMP converters-LAG processor-15 MODE filter-FM on every single voice.

*30 Systems*

**HIRE OR BUY ...**

**MIDI**

**KORG**

KORG DW-6000  
MIDI THRU  
F.M. Synthesizer, easy programming  
MIDI IN  
EX-800  
POLY 61-M  
MIDI OUT

DDM110  
DDM220  
Digital Drum Percussion machines  
Very Low Price!  
Now in Stock!

**SEQUENTIAL CIRCUITS**

MULTI-TRAK  
SIX-TRAK  
DRUMTRAKS  
MAX-MIDI EXPANDER

EMR Software/Hardware Packages from stock.

**NEW**

**AMS**

DMX-1580S Programmable digital delay and harmonizer. Now with Keyboard Interface.  
RMX-16 Programmable digital reverberator.

All this hooked up and working in our new showroom through 3,000 watts of JBL/RSD. A 'KNEE-TREMBLING' EXPERIENCE.

(6 LINES) Studio House, High Lane Village, Nr Stockport SK6 8AA. Telex 665721 SOTA.

**06632 4244**

Barry Blue is a successful singer turned producer.

Some six months ago, he acquired and set about refurbishing Aosis Studios in Chalk Farm, London.

*You wouldn't employ a carpenter without his own tools. After fifteen years of other people's studios, I decided to have my own. There are too many variables between the sound you get*

*I've worked in every major studio in Britain, and many overseas. There's always something you wish they'd done to help the artiste or producer. In refurbishing Aosis we've channelled out the bad points and channelled in the good. We don't profess to be a mega studio in terms of size, but we do offer all the facilities of the giants, and achieve the same quality for considerably lower rates.*

Turnkey Two was commissioned to redesign and rebuild the main studio and control room. Barry's long experience influenced many aspects.

*Working as writer, artist and producer, I've come across many studios where you simply don't feel like performing. It's important to have a live room where you can hear yourself singing and pitching. We've achieved a studio environment live enough to hear the brain working. Artistes like it because there's a closeness when they perform, they both hear and feel what they're doing - and naturally give their best.*

*The final design achieves variable acoustics. A drummer gets bounce-back if he wants it or we can mike up for a dry, close sound. And the foldback system's the clearest you've heard!*

The control room follows Turnkey Two's principles of accurate monitoring. The main speaker system is custom designed, using the soft-dome approach.

*We've been quite brave about the monitors. The safe choice would have been one of the classics like JBL, UREI or Tannoy.*

*We spent a long time discussing and listening. I've always found studio monitors too hard or too flattering. When you take the mix home it sounds different. We wanted something that added nothing to the sound. These Turnkey soft dome monitors are accurate. Scarily true. You get the mix right, first time around.*

Control room acoustics proved true to the design. During final checks it was found that no EQ'ing was necessary.

Equipment choice further reflects a no-compromise attitude.

*We had to upgrade the ageing tape machines. I'm not one to follow trends, but Otari has arrived. It's rapidly built up a reputation as a workhorse. A really brilliant transport, brilliant ideas. We bought three of them. An MTR90 Series II 24 track, and two stereo mastering machines.*



## At what point does a producer invest in his own studio?

Turnkey supplied, installed and commissioned the tape recorders - even helped to arrange the finance.

*I called Garry Robson on Tuesday with my decision to buy. Wednesday, Prime Leasing called me and we struck a deal. I took delivery the following week.*

The mixer was a unique personal choice.

*Ever since I worked at Abba's Polar studios I've had my eye on their mixer. I like American desks, and I think that the Harrison is the best sounding one around. When it came up for sale I grabbed the opportunity. The Otari with the Harrison means Aosis can offer the best facilities in its price bracket.*

Much of the outboard gear came from Turnkey as well. It's an aspect of the facilities which Barry Blue is particular about.

*Even before I took over, Aosis always had a high outboard count. With many new clients, one of the first things they ask is what's in the racks. You can never give them enough.*

*I asked myself the basic question, what do I use to make a top twenty hit, and what's good to work with? We've got a hundred 'U's of rack gear now. AMS, dbx, Aphex, Drawmer. You name it and we've probably got it.*

Aosis runs a sixteen track studio too, equipped with a Soundtracs desk and the Fostex B16 from Turnkey.

*One studio gets the clients, the other keeps them. The sixteen track room is a boon. Clients can work out*

*their music then transfer straight up to twenty four track. It's a great room to work in. Not the highest tech but all the right outboard gear.*

Considering the standard of equipment, acoustics, and not least the able personnel, Aosis hourly rates seem to offer incredible value for money. Can a studio like this really make commercial sense?

*As a stand-alone business the answer would be no. Most studio rates are undervalued. The Aosis operation makes financial sense because it gives me more freedom over producers who don't own a studio.*

*As a writer I can always find a free hour or so to capture an idea. As a producer there's more time to develop ideas and work with artists.*

*Aosis is a commercial studio first and foremost. And as with all viable and successful studios today, there's a degree of speciality.*

Aosis has tagged the words Audio Visual onto its name. As the business grows and changes, will this be an important area of development?

*It seems record companies talk as much about the video budget as they do about the music. Linking sound and vision will be paramount. With the advent of digital 32 track keyboards, and compact sixteen track systems the studio business will change. More and more of the music on record is coming out of front*

rooms. The major studios will have to think video to survive.

Aosis is busy developing its client base with a reputation for accurate, quality mastering. What kind of clients are they attracting?

*There's a buzz about Aosis. The facility was rebuilt to provide the kind of studio that a performer feels instantly at home in. There's a team spirit here. I often get asked to listen to songs or join in on sessions. And Will Mowat our studio manager is an expert synth programmer.*

*Aosis is more of a studio for making music rather than just recording.*

Turnkey worked closely with Barry Blue and his team for six months to rebuild and re-equip Aosis.

If you would like to see or hear the results for yourself, call Aosis on 01-267 4680. Or if you would like to discuss your studio project with us, call Turnkey Studio Systems on 01-202 4366 and ask for Garry Robson. No one knows the business better.



**turnkey studio systems**

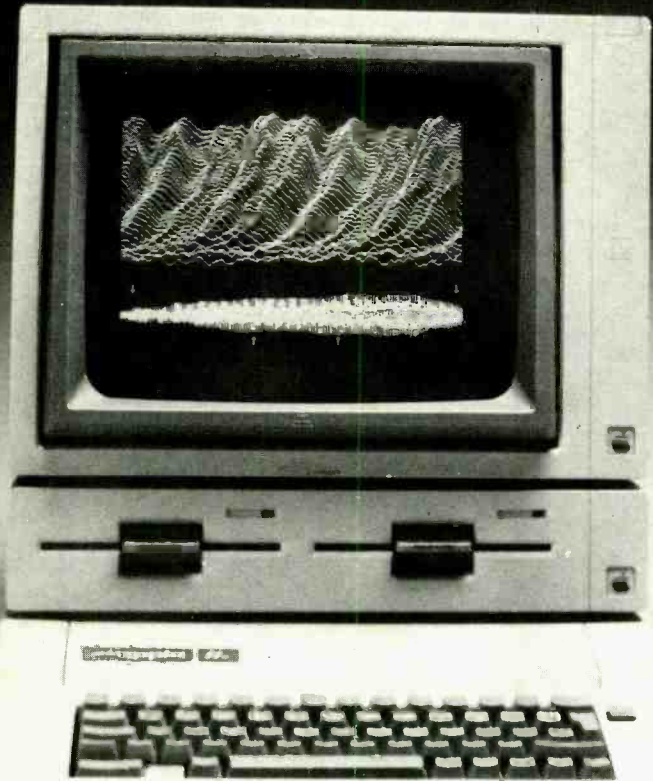
Brent View Road, LONDON NW9 7EL. Telephone 01-202 4366

# GREENGATE LTD

productions



The Greengate DS:3 is the definitive sound sampling system for the working musician/composer/producer/engineer. There are bigger names and bigger prices but *none* compete on a price/performance basis with this 4-voice polyphonic, 15kHz, 2.8s system.



"They're talking about adding looping... Frankly, I don't see how that's going to be possible given the Apple's rather slow processor" (David Ellis, Electronics & Musicmaker, October 1984)

On the Ides of March we were pleased to prove him wrong...

Looping is implemented on the DS:3. On time. On spec. And with graphics groomed to let you see your loop points and hear the results as you create them.

Or you can let the APPLE find a good loop if you want the DS:3 to do it.

But then there are a lot of things about the DS:3 that ol' DE doesn't know. Like the fact that all you lucky Simmons/Linn/Oberheim/Drumulator/Etc., owners can blow your own PROM's on a DS:3. With any sampled sound you like. And with the super sound quality obtainable only with a powerful visual/aural editor...

Set your Simmons free...! Give your Linn a break...! Drop us a line and we'll tell you how its done. For a song!

# DS:3

Ask your local record store for the "Noise of Art" or "Close to the Ground (The C5 Edit)" 12" 45rpm classics (YYY001 & 002 on Polydor Records) which show just what the DS:3 can do...

Greengate Productions Ltd.,  
24 Missden Drive, Hemel Hempstead,  
Hertfordshire, England. HP3 8QR.  
Telephone: (0442) 3495

Greengate Productions,  
2041 Pioneer Court (Suite 15), San Mateo,  
California 94403, United States of America.  
Telephone: (415) 345 3064



---

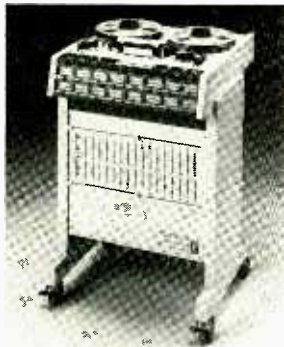
# 4 reasons for choosing an OTARI.

1.



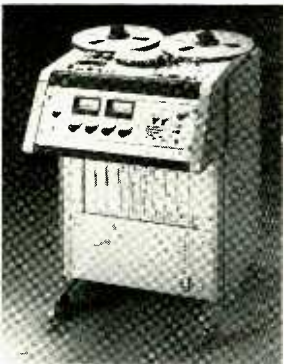
The MTR90 Mk. II is now the world's best-selling multitrack. It offers an audibly superior performance, simplicity in operation and maintenance and superb tape handling combined with extreme reliability and excellent characteristics when locked to video. It is also several thousand pounds less than its only serious competitor.

2.



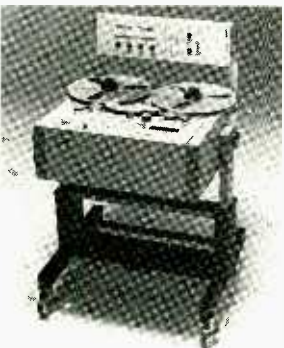
The MX70. The MTR90's new baby brother. This completely new, state-of-the-art multitrack draws on the wealth of design experience gained with the MTR90 over 6 years, and offers smaller studios, broadcasters and video facilities Otari performance and reliability at lower cost.

3.



The MTR12 is now available in a huge range of formats – 1/4" mono, 1/4" and 1/2" 2tk., 1/4" DIN stereo, and 1/2" 4tk., plus centre-track timecode and self-resolving Nagrasync and Monopilot versions. A choice of speeds (30/15/7.5 or 15/7.5/3.75 ips) and cabinets (console or overbridge) is also available.

4.



The MTR20 is the ultimate analogue recorder. Incorporating the most advanced computer control and line-up system on any studio recorder in the world, this truly remarkable new machine will become the mastering recorder that clients and producers insist upon.



---

# 4 reasons for choosing it from ITA.

1.

We have 12 years experience with Otari. We offer you a PERSONAL service, and our sales staff really do understand the product.

---

2.

The BBC, Limehouse Studios, Riverside Studios, Swan Yard, Anglia TV, Jacob's Studio and Windmill Lane are just a few clients who bought their Otaris from ITA. Full client list available.

---

3.

ITA offers TOTAL SYSTEMS CAPABILITY. Our range of services go from simply supplying your Otari to designing and building your studio and specifying and installing everything in it.

---

4.

Our Otari back-up is second-to-none. Years of experience coupled with a huge spares stock gives you security of mind.

INDUSTRIAL TAPE APPLICATIONS  
PROFESSIONAL PRODUCTS DIVISION



---

1 Felgate Mews, Studland Street, London W6 9JT. Telephone: 01-748 9009. Telex: 21897.

# SOUNDTRACS CM4400

*The best studios are not always 24 track  
It's the quality that counts*

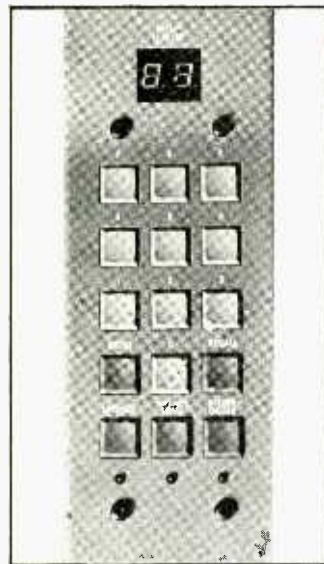


**The Soundtracs CM4400  
computerised console.  
Computerisation at no  
extra cost.  
As a studio console it is great  
value for money. As the price  
includes internal computer,  
it is outrageous.**

## Don Larking audio sales

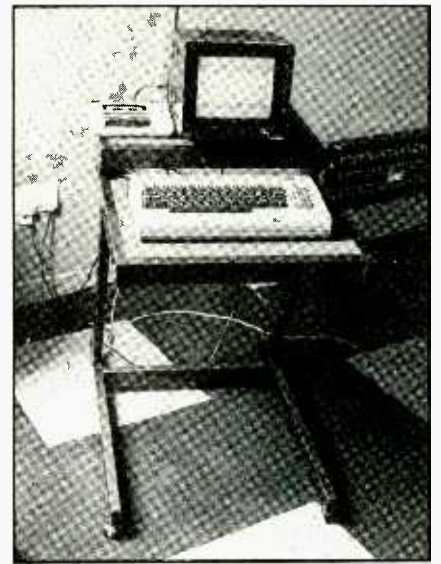
**Luton:** 29 Guildford Street, Luton, Beds.  
Telephone: Luton (0582) 450066  
Telex: 825488 DONLAR G

**Stoke-on-Trent:** Stafford House,  
Clough Street, Hanley, Stoke-on-Trent.  
Telephone: Stoke-on-Trent (0782) 24257



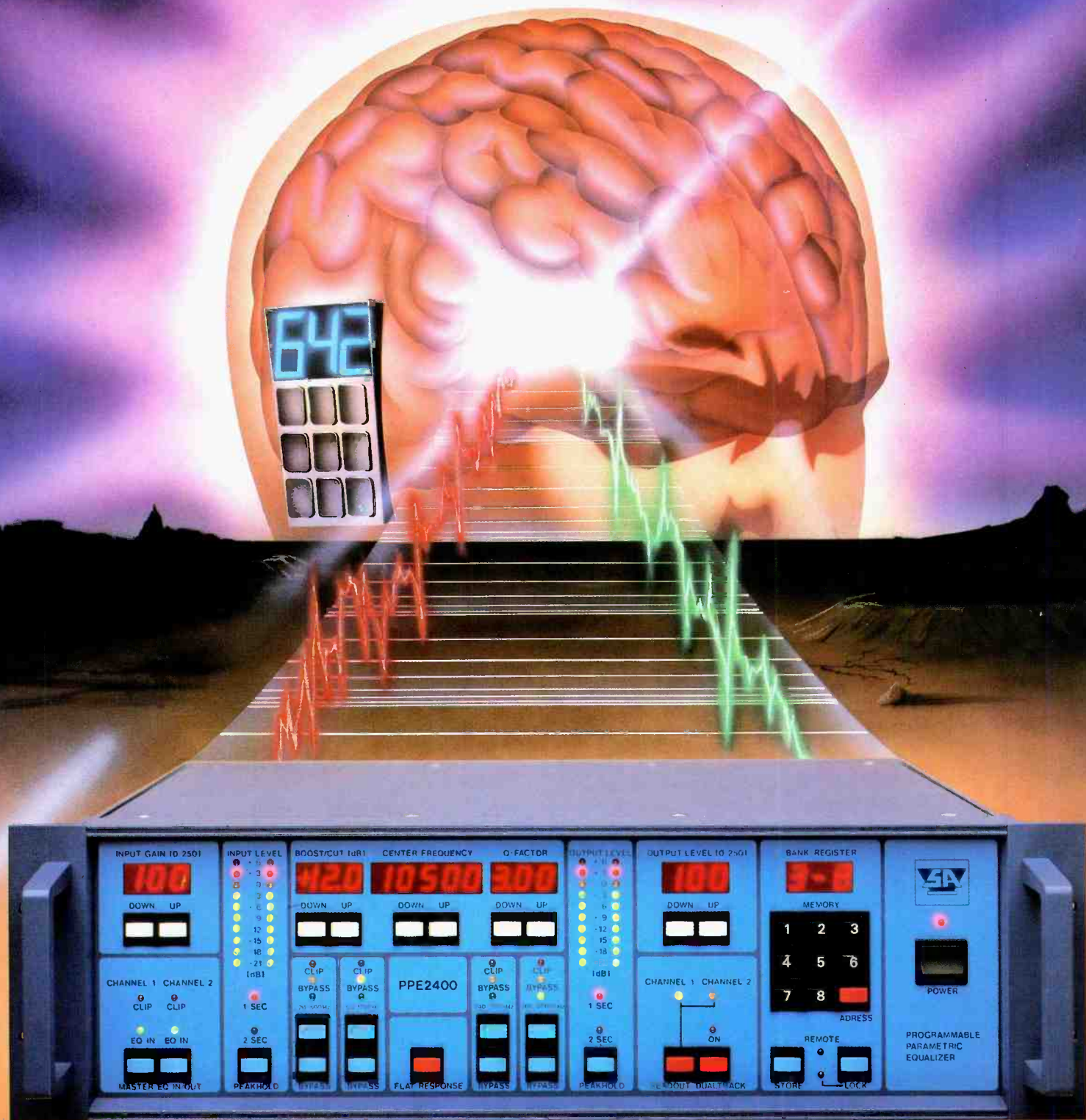
The CM4400 internal computer enables 30 routing/muting combinations to be pre-set and changed at the push of a single button.

Throw away your razor blades for that difficult mix; this computer does it all.



Interface via the RS232 port enables a personal computer to be used as a track sheet, to display patches and for desk routing. New software will enable routing and over 1,000 mutes to be triggered by SMPTE/EBU timecode track. Conventional automation does not permit tracks to be switched into and out of effects. You can do it with the CM4400.

*Leap into the future  
with the SA PPE-2400  
the equaliser with Brains...*



- FULL PARAMETRIC EQUALISER  
stereo 4-band; dual tracking possible
- ALL FUNCTIONS PROGRAMMABLE  
ultimate versatility through full programmable functions
- 64-REGISTER MEMORY BANK  
preserve and recall your favourite settings
- AUTOMATION READY  
with serial bus for computer link-up
- STUDIO QUALITY  
extreme low distortion
- ROAD-PROOF  
very solid construction



stage accompany

# SA PPE-2400: the ultimate equaliser for now and the future!

The SA PPE-2400 is a sophisticated, programmable, two-channel four-band parametric equaliser with **total** digital control of **all** variable settings. The memory offers storage, recall and comparison of up to 64 different settings. Once you've programmed an optimum EQ for a certain instrument or set of speakers, you can retrieve it in an instant with a push of your fingertip.

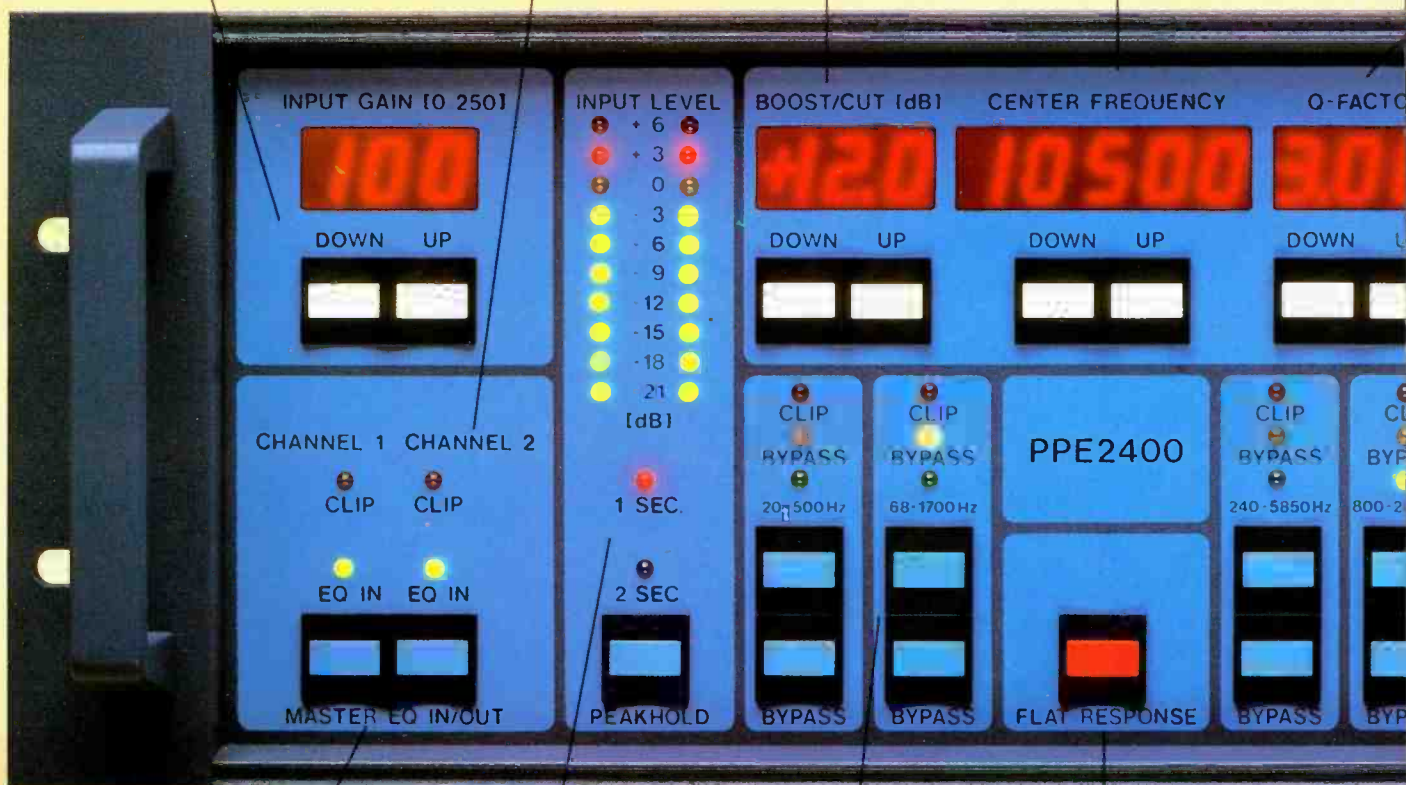
Centre-frequencies are visible on highly accurate led displays. By "sweeping" a narrow boosted peak you can easily detect resonances and identify the frequencies at which they occur. Led displays are also provided for

Input gain can be adjusted by UP/DOWN push-buttons in 250 steps and is indicated on an led display. All UP/DOWN push-buttons have "accelerating control speed": the longer you keep it pressed, the faster the respective parameter changes.

Adjusted by UP/DOWN push-buttons, the BOOST/CUT level is indicated on an led display in dB.

Input overload is indicated by a red led, one for each of the two channels.

Adjusted by UP/DOWN push-buttons, the CENTRE-FREQUENCY is indicated on an led display in Hz.



For comparison of original and processed signal, two MASTER EQ IN/OUT switches are provided, one for each channel. A yellow led indicates when the equaliser is switched in the signal path.

Input levels are displayed by led bars with simultaneous VU and peak level indication. Peak-hold time can be switched to 1 or 2 seconds.

Electronically balanced (or unbalanced) inputs and outputs are accessible on the rear of the unit by XLR sockets. They accept, respectively deliver levels up to + 20 dBV.

The FLAT RESPONSE push-button affects the cut/boost levels of all four bands of both channels and enables you to "erase" all equalising in an instant and start all over again.

Each of the four bands has an individual red clip led, a bypass switch with led indication, and a BAND SELECT push-button. When pushed, this button over-rides any previous selection and assigns the three EQ parameter UP/ DOWN push-buttons with their corresponding displays to the selected band.

input gain, cut/boost level, Q-factor, output gain and for memory banks and registers. Input and output levels are displayed on led bars with simultaneous VU level and peak indication.

A serial data bus and interfaces, facilitating computer link-up and studio automation, are optional. A further option, the remote control unit with memory, allows you to carry your EQ programs and link-up to any PPE-2400. You can then recall your own settings within seconds!

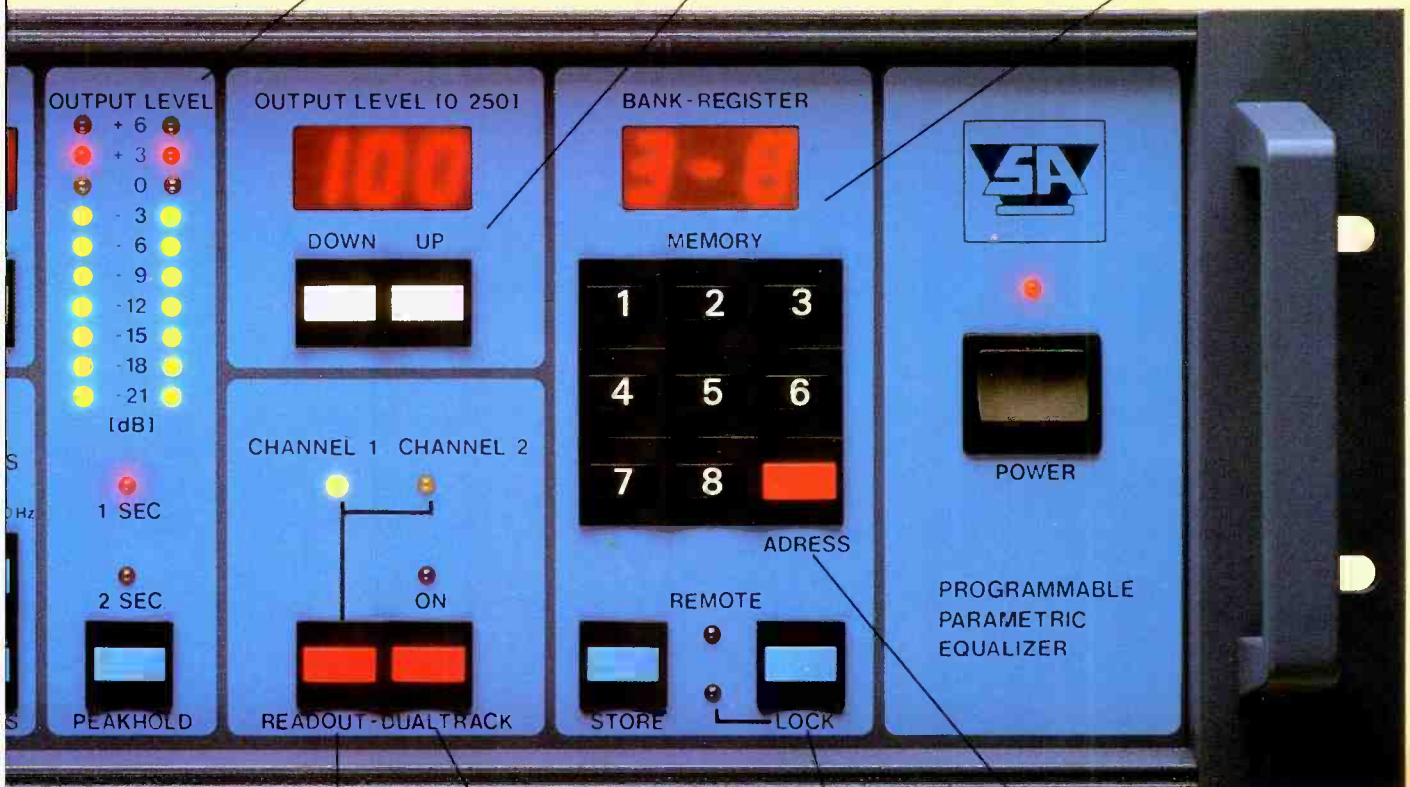
The PPE-2400 analog, digital controlled equaliser amply matches the performance and capabilities of the all-digital competitors at only one tenth of the cost. By combining top-quality components with an unequalled solid construction this equaliser is also ideally suited to the heavy handling in "on the road" situations.

The variable Q-FACTOR is also adjusted by UP/DOWN push-buttons and indicated on an led display.

Output gain can be adjusted by UP/DOWN push-buttons in 250 steps and is indicated on an led display.

Output levels are displayed by led bars with simultaneous VU and peak level indication. Peak-hold time can be switched to 1 or 2 seconds.

The MEMORY is accessible by an 8-digit keyboard and enables you, together with the STORE button, to store and recall combinations of settings of **all** front panel control functions. 8 banks of 8 registers each, provide storage of up to 64 different pre-sets.



The DUAL TRACK switch links all UP/DOWN control functions of channel 1 and 2 for stereo operation. This feature also affects centre-frequency and Q-factor.

The red ADDRESS button on the keyboard bypasses the internal memory and assigns the digital control functions to the databus for computer controlled operation.

The READ OUT push-button assigns the three EQ parameter UP/DOWN push-buttons with their corresponding displays to the selected band of either channel 1 or channel 2. An illuminated led shows which channel is chosen.

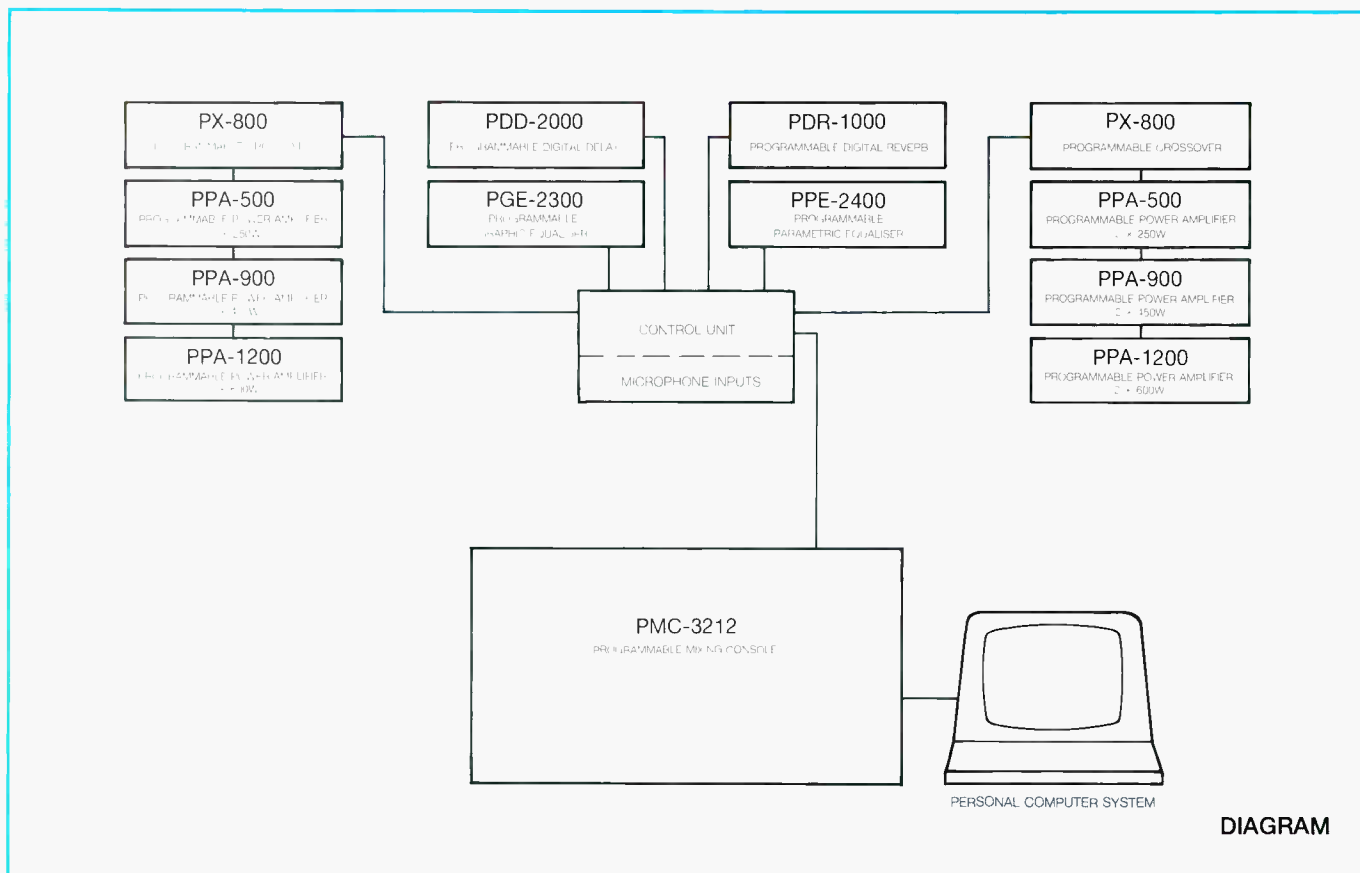
The LOCK push-button disables all front panel control functions to prevent unauthorized alterations of any setting. This feature does not affect the actual operation of the equaliser: any setting will remain unchanged. A special code, chosen by the user and typed-in on the keyboard, unlocks the "lock" function.

## POSSIBLE SYSTEM LINK-UP FOR THE FUTURE

As a result of the demands in today's fast developing sound systems, Stage Accompany is designing a comprehensive computer controlled sound system. Unlimited possibilities are created when you link-up a complete digital controlled sound system, including mixing consoles, equalisers, reverb units, delays, electronic crossovers and power amplifiers, to a personal computer. Ultimate control of each unit is achieved from an easy-to-use keyboard, while the status is displayed on a screen.

Other major advantages are:

- ★ Very complex, pre-programmed alterations of all function settings on all units are possible, whether in studio mix-down sessions or at live-concerts, by just pushing a few buttons.
- ★ This information can be stored, then transported and used to program identical systems anywhere in the world.
- ★ In live situations, sound-checks for fixed set-ups are reduced to merely adjusting to the particular acoustic environment.
- ★ Notably improved sound quality, especially in live-sound reinforcement, as a result of dramatically shortened signal paths. Remote control allows the signals to remain on stage, avoiding the use of multicables.



### Specifications:

Max. input level:	+ 20 dBV
Max. output level:	+ 20 dBV
Frequency response:	20 Hz - 20 kHz, $\pm 1$ dB
Max. gain (input to output):	+ 16 dBm
Slew-rate:	13 v/ $\mu$ sec
T.H.D.:	0,02% max.
I.M.D.:	0,008% max.
S/N ratio:	better than 85 dB
Max. cut/boost level:	$\pm 16$ dB (per band)
Q-factor:	min. 0.3; max. 30
Input impedance:	66 k $\Omega$
Output impedance:	100 $\Omega$
Input and output connectors:	3-pins XLR, with earth lift

Centre frequency range:	band 1: 20 Hz - 600 Hz band 2: 60 Hz - 2 kHz band 3: 200 Hz - 8 kHz band 4: 800 Hz - 20 kHz
Data bus: (optional)	serial bus, IEEE-488
Power consumption:	120 W
Power supply:	220 - 240 V ac
Housing:	19" rackmounting, 3 HU high

Stage Accompany reserves the right to change specifications without notice. As a result of constant research, SA products may differ from published description but will always equal or exceed the specifications stated above.

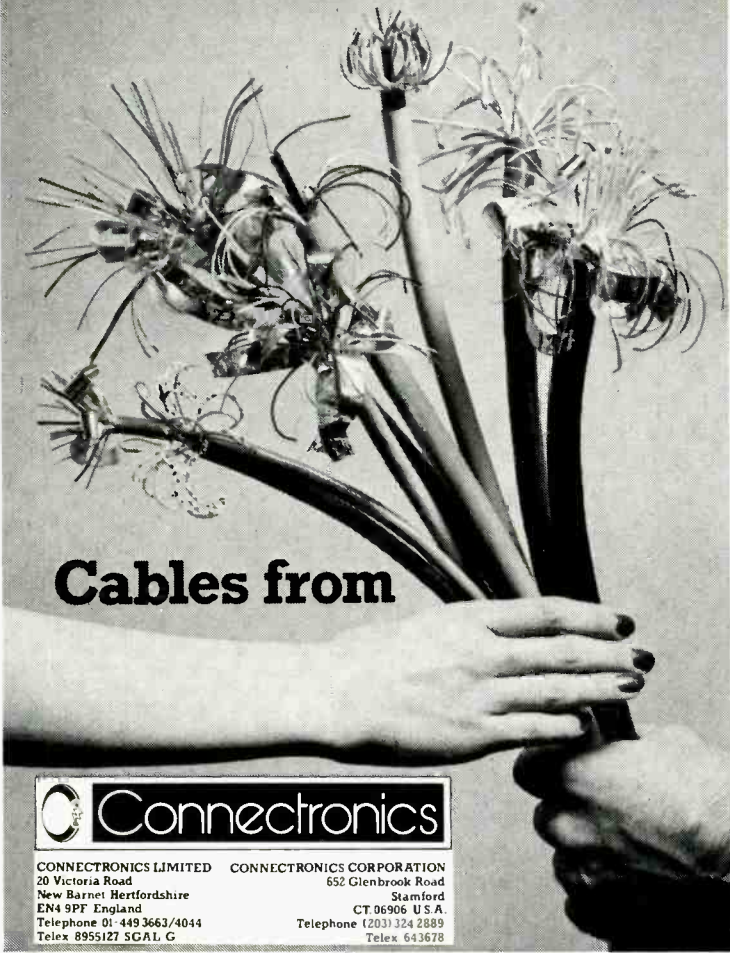
### STAGE ACCOMPANY

Anodeweg 4, 1627 LJ Hoor, Holland, phone (0)2290-12542 telex 37989 Stage nl  
 Marienburger Straße 29, 4460 Nordhorn, Germany, phone (0)59211-6196  
 Spiseeggstraße 30, 9030 St. Josef, Switzerland, phone (0)71-281696  
 Kennell s.n.c., 324 Corso Unione Sovietica, 10135 Torino, Italy, phone (0)11-612148  
 Caw Sonoss, 3 Rue Vieille, 59160 Lomme, France, phone (0)20-925091  
 Kühnl & Wurzer, Waldeggstraße 68, 4020 Linz, Austria, phone (0)732-668125



stage accompany

# For every occasion



## Cables from

 **Connectronics**

CONNECTRONICS LIMITED    CONNECTRONICS CORPORATION  
20 Victoria Road                      652 Glenbrook Road  
New Barnet, Hertfordshire                      Stamford  
EN4 9PF England                      CT 06906 U.S.A.  
Telephone 01-449 3663/4044                      Telephone (203) 324 2889  
Telex 8955127 SGAL G                      Telex 643678

## Success is Good Timing

Timing is our speciality,  
so it won't take a second to tell  
you about our unique range of tape timing products:

**The SPIN TIME**, a real time counter for the A77, PR99, 5050 and AG440.

**The CM50**, an autolocator currently available for 20 different multitrack machines with all the features you would expect to find in a top-line autolocator and at a reasonable price. Popular interfaces for the CM50 are the A80, MM1100 and M79. The older the machines, the greater the transformation in deck control.

**The I-CON**, incorporating all the features of the CM50 with the addition of channel select keys and now our EBU compatible synchroniser for locking audio to video or even audio to audio. Check with us for machines available or call us or any of our dealers for information on all our products.

**Applied Microsystems Limited**  
Bagshot Road, Chobham, Woking, Surrey GU24 8BZ.  
Telephone: (09905) 6267. Telex: 8952022 CTYTEL G.

AUSTRALIA: Klanton Enterprises, (03) 61 354 1. CANADA: Gen Electro Acoustics, (416) 868-0528. DENMARK: ABI Music, (06) 198733. FRANCE: Studio Du Hibou, (76) 880158. GERMANY: S.C.S., (7159) 7222. HOLLAND: P.A.C., (040) 424455. ITALY: Startek, (051) 321063. NORWAY: Audiotron, (02) 3520 96. NEW ZEALAND: Maser Communications, (444) 3583. SOUTH AFRICA: Eltron, (011) 293066. SWEDEN: Stage & Studio, (031) 2240 90. SWITZERLAND: EMM Studio, (061) 728972. U.K.: Don Larking Audio Sales, (0582) 450066. In the USA, call: (213) 854-5098.

# ams AUDIOFILE

## MUCH MORE THAN DIGITAL AUDIO RECORD/PLAYBACK



• **ADVANCED MUSIC SYSTEMS** •

Wallstreams Lane, Worsthorpe Village, Burnley, Lancs,  
BB10 3PP, England.

Tel: (0282) 57011 Telex 63108 AMS-G.

# APRS 85

WED THURS FRI  
**JUNE 12 13 & 14**

10.00 to 18.00 hours

10.00 to 18.00

## INTERNATIONAL PROFESSIONAL RECORDING EQUIPMENT

# EXHIBITION

KENSINGTON EXHIBITION CENTRE, KENSINGTON, LONDON

Alpha Audio  
Audio Services  
Autograph Sales  
Audio-Music Marketing  
Applied Microsystems  
Audio Systems Components  
Ablex Audio Video  
Audio Video Marketing  
ACES (UK) Ltd  
Advanced Music Systems  
Avcom Systems  
Audio Kinetics  
Ampex  
Audio & Design/Calrec  
Audio Developments  
Agfa-Gevaert  
Alice (Stancoil)  
Arny's Shack (Tools)  
Amek Systems  
Allen & Heath Brenell  
Allotrope  
AKG Acoustics  
Bell & Howell  
Britannia Row  
Beyer Dynamic  
Briel & Kjaer  
BASF United Kingdom  
F.W.O. Bauch  
Branch & Appleby  
Brooke Siren Systems  
Clear-Com Intercom  
Cadac Electronics  
Cetec International  
Canford Audio  
Cunnings Recording Assoc.  
Connectronics  
DDA  
Dolby Laboratories  
Drawmer Marketing & Sales  
Ernest Turner

Elliott Bros.  
Eardley Electronics  
Electromusic  
E.M.O. Systems  
Film-Tech Electronics  
Formula Sound  
Future Film Developments  
HHB Hire & Sales  
Harrison Information  
Hidley Design  
Harman (Audio)  
H.W. International  
Hayden Laboratories  
Hill Audio  
HH Electronics  
I.T.A.  
ICM  
"International Musician"  
Industrial Acoustics  
KEF Electronics  
Kelsey Acoustics  
Klark Teknik  
Keith Monks  
Lindos Electronics  
Lennard Developments  
Mosses & Mitchell  
Minim Electronics  
Magnetic Tapes  
Michael Stevens  
Musimex  
Modutec  
Music Lab  
Marquee Electronics  
Midas Audio  
Neve Electronics  
NEAL  
Otari  
Professional Recording  
Peavey Electronics  
Pangbourne Musical Dist.

Penny & Giles  
Philip Drake Electronics  
Playback Studio  
Quad Electro  
Quested Monitoring  
Recording Studio Design  
Rebis Audio  
Roland (UK) Limited  
Sifam  
Studio Innovations  
Sonifex  
Shuttlesound  
John Hornby Skewes  
Sony Broadcast  
Solid State Logic  
Studio Sound  
Swisstone Electronics  
Surrey Electronics  
Sound Engineer  
Scenic Sounds  
Soundcraft  
Soundtracs  
Space Logic  
Sellmark Electronic  
Studio Equipment Distribution  
TAM/England  
Tannoy  
Tweed Audio Electronics  
TRAD  
Turnkey  
Tandberg  
Trident Audio Developments  
Technical Projects  
Uher Sales & Service  
Wellard  
Yamaha-Kemble Music  
Zonal  
  
Exhibitors at  
12.4.1985

**Tickets: APRS, 23 CHESTNUT AVENUE, CHORLEYWOOD WD3 4HA, ENGLAND**



# OVER THE ROAD SHOW HAS MOVED

**JUNE 12, 13, 14 1985**

**THE TARA HOTEL Scarsdale Place, Kensington, LONDON W8 5SR**

The Don Larking Audio Sales Over The Road Show has **MOVED**. Round the corner at the **TARA HOTEL, KENSINGTON** the Over The Road Show is even bigger and better than last year. Come and **SEE** and **HEAR** and **TRY** equipment from an incredible

selection of top quality manufacturers including: Aiwa, Aphex, Applied Microsystems, Bel, Fostex, Lexicon, MXR, Quad, Rauch, Rebis, Soundcraft, Soundtracs, Standeasy, Studer/Revox, Tannoy, TC Electronics, Trident, Teac/Tascam, Westlake and Yamaha.

## Applied Microsystems Icon Autolocator

Developed out of the CM50 autolocator, the Icon is designed specifically for the Fostex B16. It is, however, perfectly possible to supply units for other makes. Like the CM50, it is a 9 memory autolocator plus record select. It simply plugs into the remote socket on the B16. Most exciting of all, if you buy a Sync Unit you can link two B16s - instant 32 track at its most revolutionary cost yet. You too can drop-in Over The Road.



## Bel BD80/320 32 Secs Delay/Sound Sampling

Yes the amazing new digital delay processor from Bel is available up to 32 seconds delay @ 15kHz bandwidth. Sampled sounds can now be played on your synthesiser/ keyboard.



## SOUNDTRACS 16/18/16 Mixer

Now a firm favourite in both home and professional studios alike, the Soundtracs 16/18/16 continues to enjoy a sound reputation for quality, coupled with its extremely competitive pricing this mixer is a must!

Features now include ALPS faders (standard), dual level inputs and outputs via stereo jack sockets (compatible with Japanese and European equipment), 3 band EQ, 3 Aux Sends channels and monitors, plus EQ and fader reverse on 8 monitors allows use of the monitor channels as further inputs on mixdown.

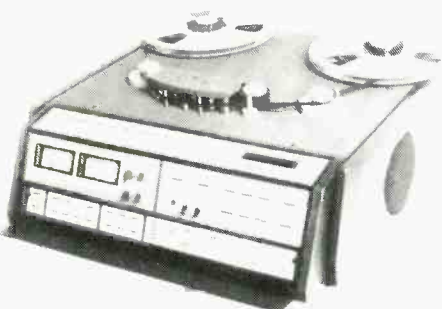


## Fostex Collection

Everybody knows about Fostex and Teac and all the rest, but it's not every day that you can try it all out with an extremely patient and knowledgeable recording engineer. You can do it Over The Road.

## Soundcraft Machines

The Soundcraft Series 20 Stereo Mastering Machine takes the concept of conventional analogue tape machines into a new era. The Series 20 meets the highest professional standards at a very competitive price. The end result of this revolutionary design is a very impressive product indeed.



## Trident for the Professional

Range of consoles and multitrack machines from Trident for which D.L.A.S. are sole UK agents. The Series 70 mixer is the ideal instrument for the producer/engineer and comes in many different configurations. The Series 80B is for the fully professional studio. Come and fix a mix Over The Road.



## Neumann Professional Microphones

Recently appointed UK main dealer for the complete range.

**Don Larking  
audio sales**

Luton: 29 Guildford Street, Luton, Beds.  
Telephone Luton (0582) 450066  
Telex 825488 DONLAR G

Stoke-on-Trent: Stafford House,  
Clough Street, Hanley, Stoke-on-Trent  
Telephone Stoke-on-Trent (0782) 24257

# A better vocal microphone



The New SM87 by

# SHURE

HW International  
3-5 Eden Grove London N7 8EQ Tel 01-607 2717

## TRAD

FOR SALE	£	FOR SALE	£
Lyrec TR532, 24-track, current grey model, 5000-hrs. 32-memory autolocate	13,000.00	Electrospace time matrix, new	P.O.A.
3M M79, 24-track, recent head replacements	10,000.00	Webber test tapes	P.O.A.
Studer A80, 16-track, Mk 1, 15/30 ips	8,500.00	Marshall time modulator	500.00
Studer A80, 24-track, Mk 2, 15/30 ips	14,500.00	Eventide digital delay 1745A	400.00
Telefunken 24-track, new	19,000.00	Eventide omnipressor	175.00
Ampex MM1200, 24-track autolocate, etc.	11,500.00	Audio and Design E500RS selective processor	500.00
3M M79, 16-track	6,500.00	Fairchild 600 Conex	350.00
3M M56, 16-track, selectake-varispeed	4,750.00	H.H. S500D amp	350.00
Studer 810 with time code, new	5,200.00	H.H. V800 MOS fet amp	475.00
Studer A80 stereo	3,200.00	MXR digital delay	350.00
Studer A80R stereo	3,000.00	Scamp modules, large stock	P.O.A.
Proline 2000 stereo	1,200.00	Roland DC10	110.00
Lyrec TR55 stereo	2,300.00	Beyer microphone stands s/h	15.00
Studer C37 stereo, valve	750.00	Tascam 32-2B, as new	425.00
Soundcraft 1624 with 24 monitoring	8,000.00	A.K.G. BX20 reverb	1,300.00
Neve Kelso 10-2	5,000.00	Bel DDL 4 sec	P.O.A.
Neve B.C.M. 10-2	5,500.00	KEF LS5/1 loudspeakers	per pair 150.00
Quad 8, 32-16-24	10,000.00	KEF LS5/1 loudspeakers	per pair 225.00
Trident Series 80, 32 in	14,000.00	Helios P.S. desk 16-8-16	3,000.00
EMT 240 gold foil	2,500.00	Helios 36-16-24	4,500.00
Master Room MR3, reverb with DC2 control	950.00	Dolby M24 noise reduction	8,000
Klark Teknik DN34	350.00	Sennheiser MD421 microphones	65.00
Drawmer Multitracker	350.00	Shure SM58	75.00
Crown DC300A	450.00	Quad 405/2 amps, new	195.00
Crown D60	120.00	Quad 303 amps, new	127.00
Beyer DT100 headphones, new	34.00	A.K.G. C451 with CK1 capsule	85.00

The above prices do not include V.A.T.

## TRAD

### ELECTRONICS SALES LTD

149b. St. Albans Road, Watford, Herts, WD2 5BB, England

Tel: Watford (0923) 47988/9

Telex: 262741



# NEUMANN

Manufacturer of sophisticated Disk Cutting Equipment of worldwide reputation.

Direct Metal  
**DMM**  
Mastering

TELDEC DMM-Technology, accepted worldwide and realised by the Neumann system, has established a new Quality Standard for the Long Playing Record.

Cutting into copper for direct production of the mother eliminates three stages of the previous processing sequence.

The Technology: TELDEC DMM

The Equipment: NEUMANN VMS 82 Cutting Lathe  
SX 82 Cutterhead  
SAL 82 Cutter Drive Logic

For DMM Licence Agreement, please contact  
Teldec Schallplatten GmbH, Heussweg 25, D-2000 Hamburg 19



**AUDIO EXPORT GEORG NEUMANN & CO GMBH**  
Badstraße 14 · Postfach 1180 · D-7100 Heilbronn · Tel. (0 71 31) 8 22 75  
Telex 7-28 558 audex d · Cables Audioexport

**GOTHAM**  
AUDIO CORPORATION

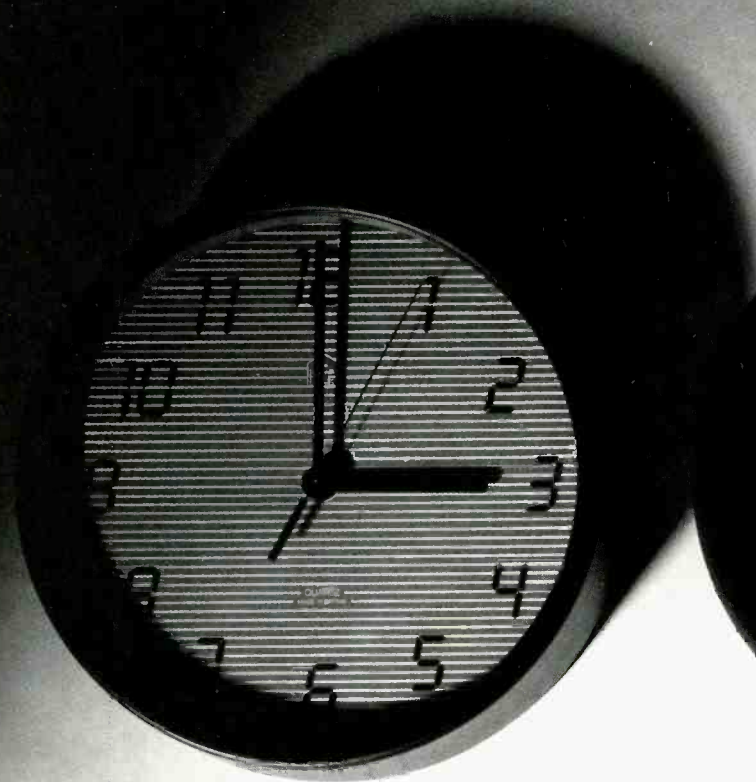
741 Washington St., New York, NY 10014  
(212) 741-7411  
West Coast Sales Office  
(213) 841-1111

**F.W.O. Bauch Limited**

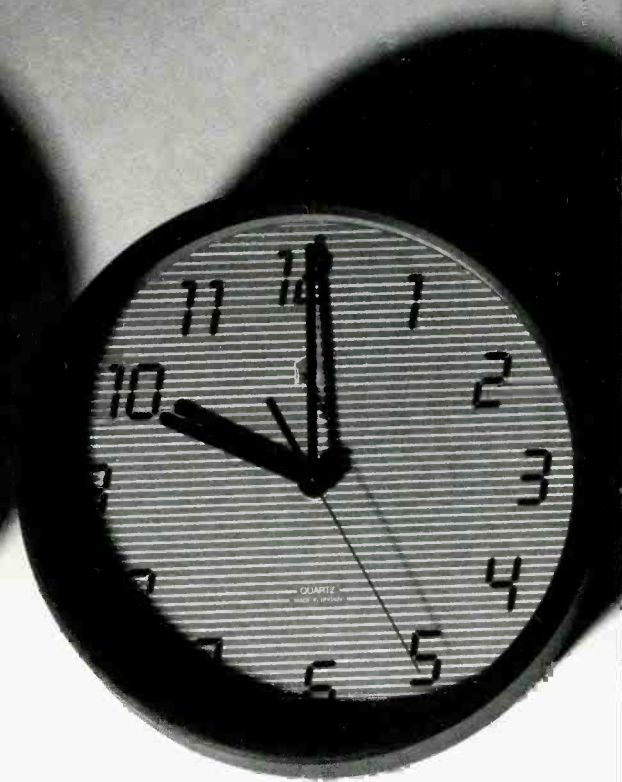
49 Theobald Street, Boreham Wood, Hertfordshire WD6 4RZ  
Telephone 01-953 0091, Telex 27502

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# LOCK AROUND

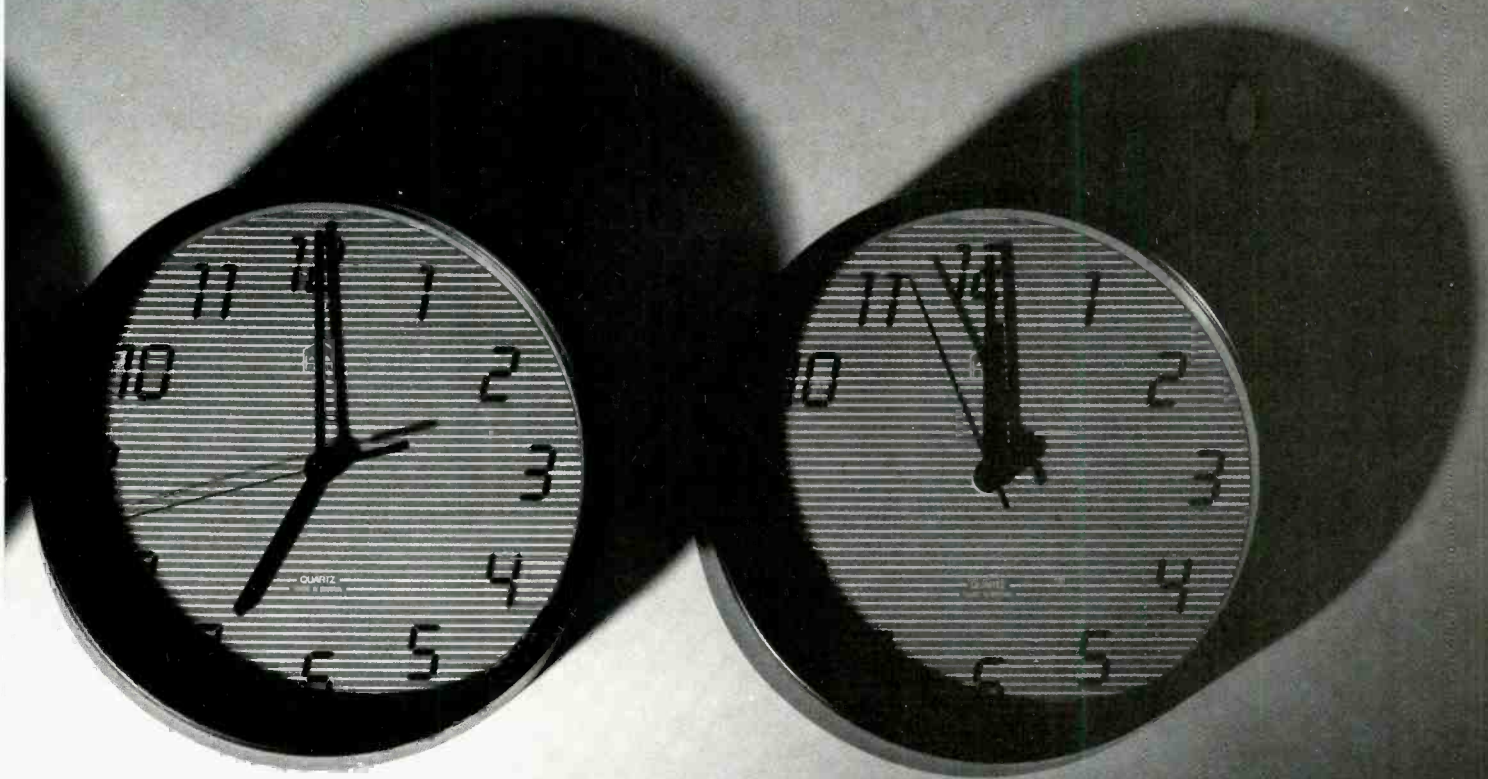


**LONDON**



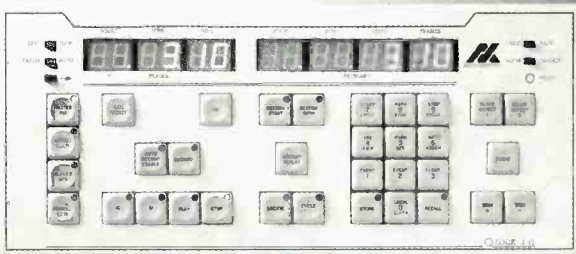
**NEW YORK**

# D THE CLOCK.



**LOS ANGELES**

**TOKYO**



The ability to synchronise video and audio recorders is an increasingly vital facility required in studios all over the world. As much as three-quarters of today's audio recordings involve a visual aspect, and recording is more international than ever before. Basic tracks in New York, string and brass overdubs in London, dubbing in Los Angeles... modern international productions need an international standard for machine synchronisation, and there's really only

one: Q-Lock by Audio Kinetics.

It's the same all over the world. The simple, uncluttered controls. The custom interfaces that suit your machines. The remarkable software capability. The integrated system with built-in expansion possibilities. It all adds up to accuracy and ease of use, and that means speed and creative flexibility. It means Q-Lock. If you're looking for an international standard, you've found it.

Now, more than ever, you need to keep in sync with the times. Lock around the clock - with Q-Lock.

Audio Kinetics Limited,  
Kinetic Centre, Theobald Street,  
Boreham Wood, Hertfordshire,  
WD6 4PJ England,  
Tel: 01-953 8118 Telex 299951 AUDIO KINETICS  
Audio Kinetics Inc., 4721 Laurel Canyon Boulevard,  
Suite 209, North Hollywood, California 91607, USA  
Tel: (818) 980 5717 Telex 230 194 781.





## SONEX kills background noise beautifully.

Tom Hannaford, Dixieland Productions, Atlanta, GA

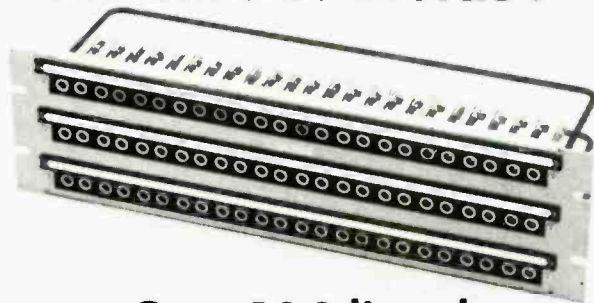
SONEX is a special acoustic foam that absorbs noise four times better than acoustic tile or carpeting. It makes you sound like a pro — inexpensively — because your voice comes across clear, clean, and intelligible. Use SONEX for video, remote conferencing, voice-overs, radio communications, audio production, or anywhere else you need to sound crystal clear. Kill background noise beautifully — and save the true sound — with SONEX. Send for all the facts.

**Alpha Audio**

SONEX is manufactured by Illbruck and distributed exclusively to the pro sound market by Alpha Audio.

2049 West Broad Street · Richmond, Virginia 23220 · (804) 358-3852  
Acoustic Products for the Audio Industry

## Audio Jackfields?



Over 100 listed in our Catalogue.



Write or call for your free copy.

**FFD FUTURE FILM DEVELOPMENTS**

114 Wardour Street, London W1V 3LP Telephone: 01-434 3344.  
Telex: 21624 ALOFFD G. Cables: Allotrope-London W1.

## After 57 years of research, Sanken offers a microphone that you cannot hear.

Reputation is the most powerful salesman of microphones. A studio's locker will contain a wide selection of flavours. Bright ones, mellow ones and punchy ones. A selection of coloured sound for every application. Even reference to the leaders in the microphone stakes turns to words like warm, or tight.

While there's room for all these, there's also need for a microphone that comes as close to the truth as possible - offering transparency and adding nothing to the sound.

### SANKEN'S FIRST EXPORT

Sanken have been in the microphone business for over half a century, much of the time working in close cooperation with NHK, Japan's state broadcaster.

Over the past four years they have developed a microphone for use with digital audio systems.

The unique design employs a dual capacitor capsule, permitting no

compromise in dimensional design. Where the response of one capsule falls off, the second takes over. Diaphragms are made from micron thick titanium, assuring stability under all conditions. The housing is nickel plated solid brass.

### ENTHUSIASTIC USERS

As well as its extensive applications by NHK, the Sanken has been highly acclaimed in the West.

In America, Mix Magazine said 'transparency that cuts through the track.'

When Hugh Ford reviewed the CU41 for Studio Sound he discovered 'textbook performance' polar response.

The first owner/users of these precision devices are equally enthusiastic.

Tony Faulkner, the classical music recordist uses them extensively. He states that the medium of digital audio exposes colouration that was acceptable on analogue recording. The

quality of the Sanken is of paramount importance in his work.

They are Steve Levine's favourites for piano and vocals at Red Bus.

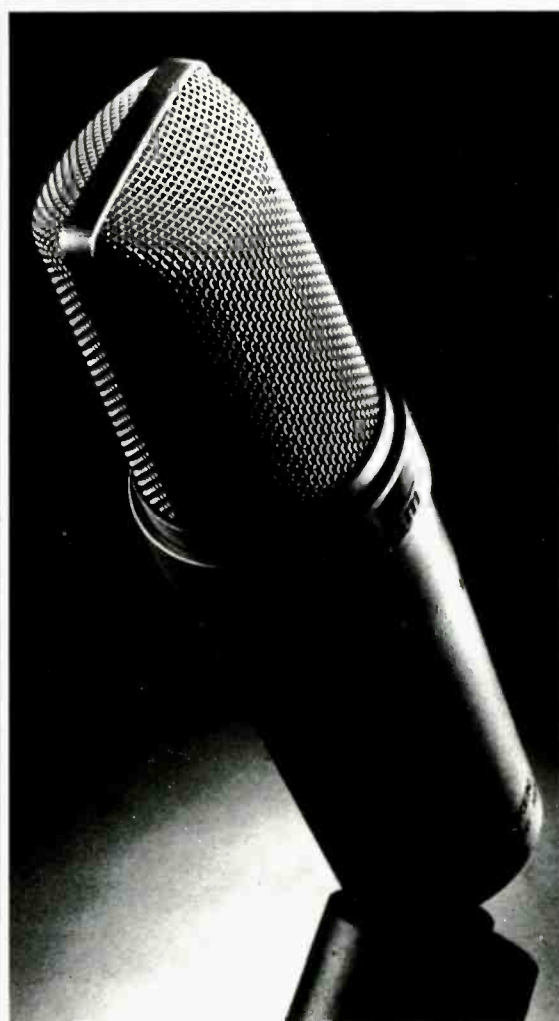
The Sanken captures sound without adding colour, it is the most accurate microphone you can own.

### THE CASE TO TEST

Endorsement is not enough. Audition the Sanken for yourself by asking your local distributor for a demo loan of a pair of these remarkable microphones.



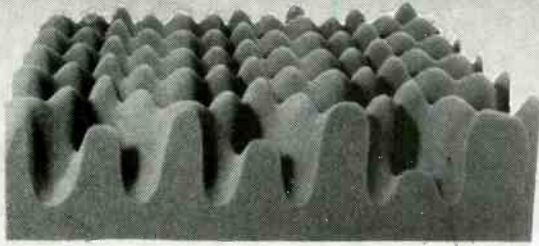
The Sanken CU41 is the acclaimed state of the art in microphone technology.



Sole Export Agent, **Pan Communications Inc.** 5-72-6 Asakusa, Taito-ku, Tokyo 111, Japan Telephone: (03) 871-1370  
Distributors, **Turnkey**, Brent View Rd, London NW9 7EL, England. **Radeco** Italele, 179, B-2000 Antwerpen, Belgium  
Telephone: (03) 233 7935 **3M France** 1 Rue Francois Malherbe, 8540 Vernouillet, France. Telephone: (03) 031-6423

# THE 1985 STUDIO SPARES CATALOGUE IS OUT NOW

If YOU have not yet received your copy -  
Phone 01 482 1692



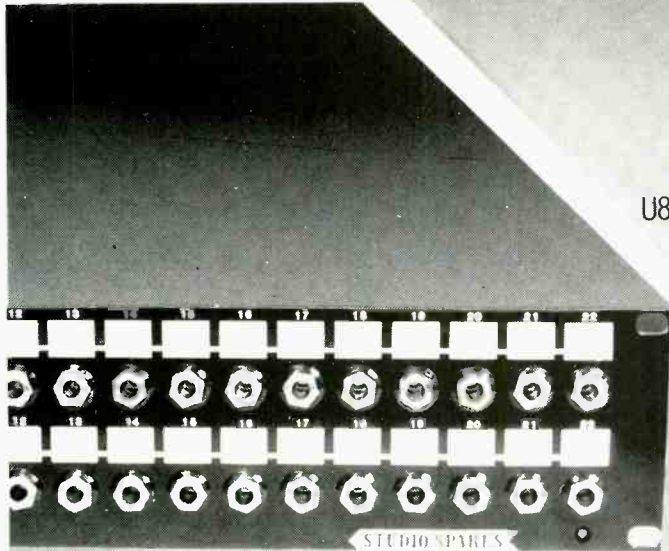
Acoustitile & Acoustisheet  
in stock



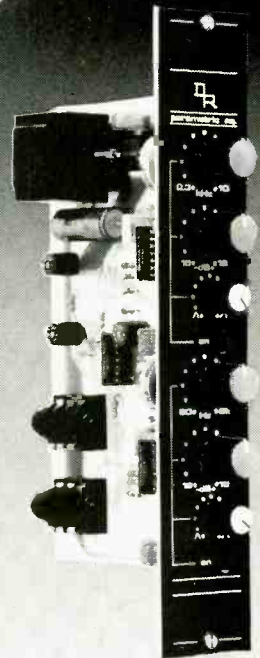
405-303-34-44-FM4  
all in stock



U87 - U89 - KM84 - U47  
& Accessories  
in stock



Patch Panels 17 versions & Patch Cords  
SWITCHCRAFT - ISOTRACK - STUDIO SPARES BANTAM



All Effects and Reverb -  
DI Boxes in stock



Trade counter now opens 8am to 5.30pm  
Phone for free 50 page fully illustrated catalogue  
Camden Town Station 1 minute's walk  
Orders 01 482 1692 Administration 01 485 4908



# STUDIO SPARES

16 Stucley Place Hawley Crescent Camden Town London NW1 6NS

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# DIARY DIARY

Addresses, Literature, APRS

## Address changes

● The Hudsons Group of Companies is moving its base to Slough in Berkshire, England. The four companies involved in the initial move were MVC Hudsons (predominantly involved in the construction and equipping of outside broadcast vehicles); Hudsons Freight Services; Hudsons Airfreight Ltd and Crow of Reading, the television systems engineers.

Hudsons will retain its

London head office, the move to Slough being part of overall future plans. The new premises are on the Bath Road International Trading Estate, Slough, Berkshire.

● The British company of AKG Acoustics has moved from its home of many years in West London to Godalming in Surrey: Vienna Court, Catteshall Wharf, Catteshall Lane, Godalming, Surrey GU7 1JG. Tel: (04868) 25702. Telex: 859013.

## Literature

● Gerr Electro Acoustics Ltd of Toronto, distributors of Sound Workshop, Audio Kinetics, Mitsubishi digital recorders, the Synclavier and more, has published the first issue of a quarterly newsletter. Containing features, product information, technological developments and news from around the world the company's aim is to keep their customers informed.

Gerr Electro Acoustics Ltd, 363 Adelaide Street East, Toronto, Ontario M5A 1N3. Tel: (416) 868-0582.

● Imhof-Bedco Standard Products have brought out a 60-page catalogue giving details of the company's extensive range of standard cases and boxes designed to meet the requirements of a wide variety of applications. Imhof, Ashley Works, Ashley Road, Uxbridge, Middx UB8 2SQ.

● From Marquee Electronics, a series of applications reports on the use of timecode in audio and video systems. Titles available include Video Tape Editing with Vertical Interval Timecode; Basic Tape

Synchronising for Television Audio Production and Post-production; Keyboard control for Basic Chase Synchronising; Automating Master Transport Operations for Television Audio Post-production; Manipulating Numerical Data in (Adams-Smith) System 2600 Controllers and Controller Displays.

More titles will follow and they are available free from Marquee Electronics Ltd, 90 Wardour Street, London W1E 3LE.

● 1985 208-page catalogue from Nortronic Associates with information on wide range of capacitors, connectors, mains filters and resistors. Technical articles cover specific areas, and the technical spec is accompanied by line diagrams and photographs. Available from Nortronic at Gateway, Crewe Gates Industrial Estate, Crewe, Cheshire CW1 1YY.

● Instrument trolley brochure from Tele-Production Tools Ltd with a new range of equipment trolleys all of which include two shelves which can be adjusted for angular positioning and/or height.

## People

● Signetics Corp, a subsidiary of US Philips Corp has announced the resignation of their executive vice-president Charles Harwood. Mr Harwood joins Quality Improvement Inc.

● Audiosales, Mödling, Austria, have appointed Thomas Ruisz product manager for Klark-Teknik and Drawmer. He was previously with For Music PA-Hire.

## Cipher acquires btx

Video and timecode equipment company Cipher Digital has acquired the btx Corp's product, product rights, trade names and development rights. Cipher feel they have the

financial strength necessary to develop the former btx range further.

Cipher Digital, 10 Kearney Road, Needham, MA 02194. Tel: 617-449 7546.

## APRS COLUMN

It was only after careful consideration of how best it could be used, and how best to avoid misuse, that the new interactive viewdata service for APRS member studios on Prestel was launched. The Studio Link Up service was endorsed at the April meeting of the APRS Executive, when the terms under which it would be operated were finalised in order to protect the interests of the Association's members who use it to show their availability for bookings.

Studio Link Up is being operated by Gwynn Williams Viewdata Ltd, the company which has for some time operated similar services called Theatre Link Up (for venue availability and bookings) and Conference Link Up.

Studios can use the service to show what time they have free in a three month period, and subscribers can dial up the pages to check on this, and then make bookings by telephone. GWV has undertaken to provide an update service seven days a week, and to update any information in any of the Studio Link Up pages within half an hour of being called and informed about it.

The company has also undertaken to operate a system of checks, intended to ensure firstly that the studios who buy pages do keep their information up to date all the time; and secondly that no subscriber misuses the Link Up to tie up studio time with spurious bookings in different studios at the same time.

Studio Link Up can be received on any TV which accepts Prestel but only members of a closed user group will be validated to access the relevant pages. The APRS has decided that this will be confined to members of the BPI. GWV will be given a

list of BPI member companies, and this will be updated frequently. Annual subscription to the user group costs £250.

Similarly, the use of the system for posting studio availability is confined to APRS members. They are able to buy pages at £100 each per year (including cost of unlimited necessary updates) but do not need to have Prestel receiving TVs themselves because they can make all arrangements for displaying and updating via telephone to GWV.

Studio Link Up is a service endorsed by the APRS but run entirely by GWV. Subscribers can check on an APRS noticeboard page (and can place notices on it), they can check a list of studios on the system area by area and can then call up specific studio pages to check on available time.

GWV will be running demonstrations of Studio Link Up on the APRS stand at the show (Kensington Exhibition Centre, June 12, 13 and 14).

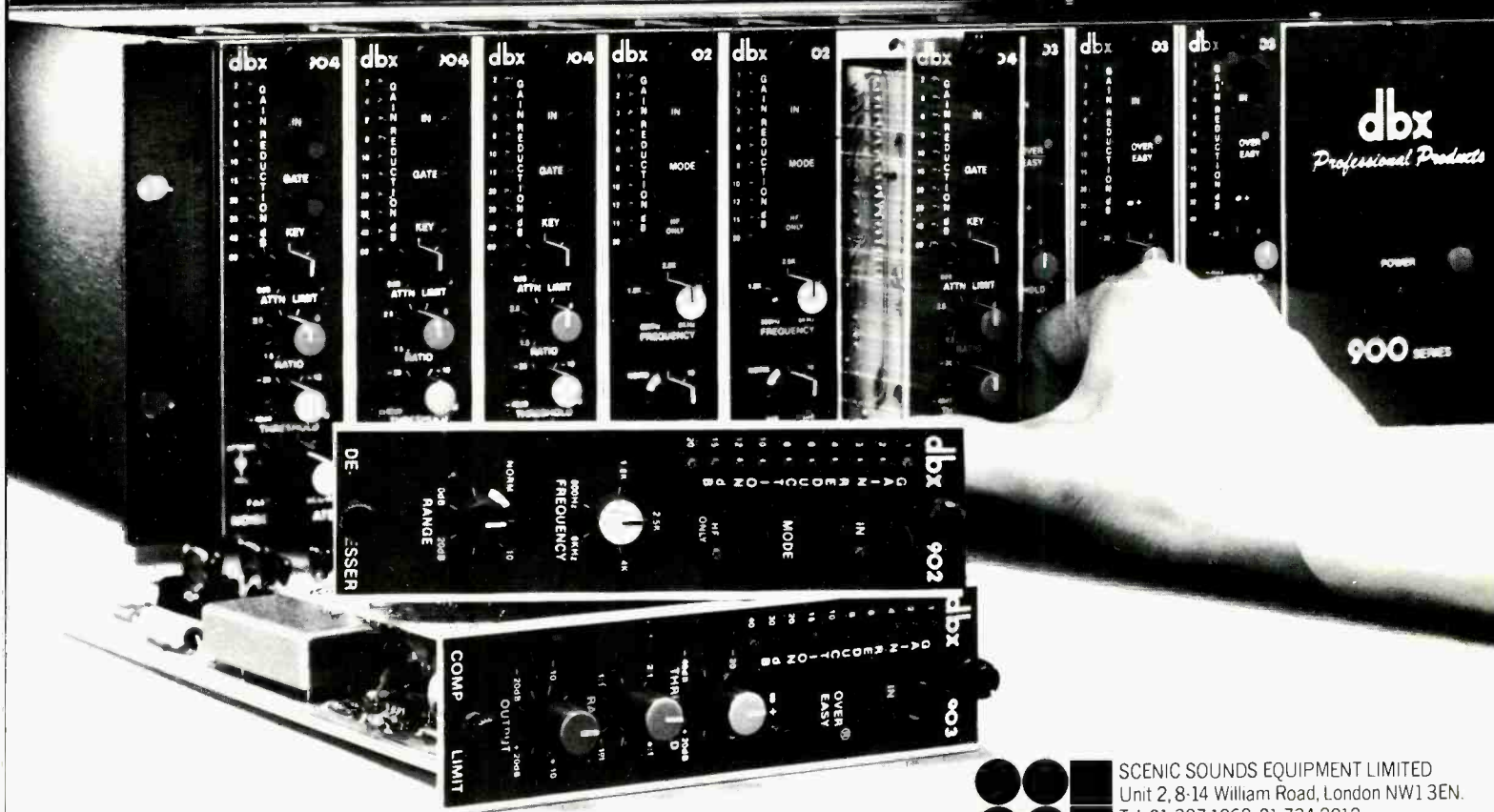
With all the 192 stand units for APRS 85 booked—by a total of 120 companies—it is clear that the near-clash with ITS in Montreux made no impact on the bookings for the UK annual show.

The APRS is expecting the usual high, and ever-improving, numbers of visitors to what is undoubtedly one of the world's premier pro-audio exhibitions now. However, there is considerable concern at the prospect of an AES show being held in London in 1987. That concern is made greater by indications that the dates of AES in that year will be put back to as late as the end of March or April. Such proximity to the APRS show is expected to be anything but welcome to would-be APRS exhibitors who would also wish to take stands at the AES Convention. It is felt that the need for an AES Convention in the UK—the one European capital which holds its own first league professional audio exhibition annually—no longer exists, and it would probably be acceptable to manufacturers and potential buyers for the European AES convention to rotate around Continental capital cities only.



# dbx

The world's  
smartest  
noise gate/expander  
fits into the same rack as  
the world's smoothest compressor which  
fits into the same rack as  
the world's cleverest de-esser which  
fits into the same rack as the  
world's most versatile parametric equaliser  
which fits into the same rack as the world's...



SCENIC SOUNDS EQUIPMENT LIMITED  
Unit 2, 8-14 William Road, London NW1 3EN.  
Tel: 01-387 1262, 01-734 2812  
Telex: 27939 SCENIC G

dbx PO Box 100C, 71 Chapel Street, Newton, Mass. 02195 USA.

Austria KAIN GES MBH & COMPANY Salzburg Vienna Australia KLARION ENTERPRISES PTY LTD South Melbourne Belgium TRANS EUROPEAN MUSIC SA Dilbeek Denmark SLT Kopenhagen Finland STUDIOTEC KY Espoo France S C V AUDIO Paris Great Britain SCENIC SOUNDS EQUIPMENT LTD London Greece ANTALEX O E Athens Hong Kong STUDER REVOX LTD Indonesia PT KIRANA YUDHA TEKNIK Jakarta Italy SCIENTEL AUDIO SRL Modena Japan BSR LIMITED Tokyo The Netherlands SPECIAL AUDIO PRODUCTS B V Amsterdam New Zealand VICOMM SYSTEMS LIMITED Auckland Norway LYDROMMET Oslo Singapore LINGTEC PTE LTD South Africa PRO SOUND Johannesburg Spain AUDIO PROFESSIONAL SA Barcelona Sweden TAL & TON ELEKTRONIK AB Gothenburg Switzerland AUDIO BAUER AG Zurich Taiwan YANG'S AUDIO VISUAL LABS Taipei Turkey OMER TRADE EXPORT AND REPRESENTATION Ankara West Germany AUDIO VERTRIEB

# DIARY DIARY

Agencies, contracts

## Agencies

● Beard Audio has appointed Presence Audio as UK marketing agent, the two companies having been closely allied in recent months and with the Presence *Audiostatic* speakers complementing the Beard amps. Beard Audio, Unit B1, Askew Crescent Works, Askew Crescent, London W12 9DP. Tel: 01-749 4528. Presence Audio are at Eastland House, Plummers Plain, Horsham, West Sussex. Tel: 044485 333. ● Turnkey has been appointed UK distributor for the new Westec *LT3000* multitrack recording and post-production audio mixing console, and PPG. They will be stocking the complete PPG range and contacting all existing owners

for backup service. Turnkey, Brent View Road, London NW9 7EL. Tel: 01-202 4366. ● Amek Systems and Controls has appointed two new European agents: Audio Bauer in Switzerland and Trans-European Music for Holland. Amek Systems and Controls Ltd, Islington Mill, James Street, Salford M3 5HW. Tel: 061-834 6747. ● The London office of Capitol Magnetic Products has appointed the first of its European network of *Audiopak* distributors: Studiotec KY in Finland, Eurotronica SA in Spain, Tal Ton in Sweden, Dr W A Guenther in Switzerland and the Professional Recording Equipment Company Ltd and Canford Audio Ltd in the UK.

## APRS membership and categories

Recent moves within the APRS to expand and embrace those companies and individuals involved in the recording industry without actually owning a studio have led to the introduction of the Facilities membership category. This embraces mastering and cutting facilities, video and film post production houses where audio is laid on, audio and audio-video mobiles.

The APRS is also working to set up a producer's guild with

members of the executive, notably Phil Wainman of Utopia and Bob Hine of BASF are directly involved.

Ten new membership applications have been approved by the membership sub-committee: Aosis Studio, Amazon, The Barge, Hollywood Studios, Terminal 24 Studios, Griffiths Hanson (Facilities), Music Labs and Qusted Monitors (Manufacturers/Agents) and Chapel Lane and Right Track Studios (affiliates).

## SIM Training

Meyer Sound held the first of a series of training seminars on the *Source Independent Measurement (SIM)* technique in their factory back in February. The principles and practice of SIM were introduced to dealers, to

demonstrate that with the correct instruments and technique it is possible to effectively eliminate acoustic resonance (and the consequent unwanted frequency response modification) caused by acoustically 'bad' performance environments.

## Up and coming topics

As you know, every month we have specific special feature topics and it is always appreciated if you are aware of these and send in any relevant product information which your company may have.

Topics for August: test equipment, metering and interconnection, copydate 24 May; September: microphones,

copydate 21 June; and October: AES preview and exhibition, tape machines and synchronisers, copydate 26 July.

Press releases should be marked for the attention of Keith Spencer-Allen, Editor, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, UK.

## Benchmark design

Vin Gizzi and Francis Daniel have combined their backgrounds in architectural design, acoustics and engineering to form Benchmark Associates. Based in New York City, they provide consulting and design

services to recording studios, video facilities, broadcasters, production stages and corporate communications services. Benchmark Associates Inc, 425 East 63rd Street, New York, NY 10021. Tel: 212 688-6262.

## Contracts

● Turnkey have recently supplied an Otari *MTR12* master recorder to Worldwide Pictures in London's Wardour Street, specialists in multistandard film dubbing. ● Audiosales have supplied several Klark-Teknik *DN780* digital reverberator/processors. Customers include Power Sound factory, Achau; GP-Recording Studio, Fred Jakesch, and Seemann Mastersound, all in Vienna; Pop Group Opus, Styria; Harry Schörch PA-Rental and Berton Records in Vorarlberg, Austria.

● Two new Solid State Logic *SL6000E* series stereo video system consoles have been installed in London studios Mayfair and the Roundhouse. The Mayfair console is one of the first in London to be equipped with the SSL Integral Synchroniser and Master Transport Selector. Further recent SSL contracts include fully computer-assisted *SL4000E* Master Studio Systems with *Total Recall* into New York's Unique Recording Studios, and Skyline Studios. ● Solar Audio and Recording's new studio at 6065 Cunard Street, Halifax, Nova Scotia, has been designed by Claude Fortier of State of the Arts Electronics, Ontario. Equipment will include Claude Fortier *CF2000* monitors and Soundcraft *TS24* 40-input console with *MasterMix* automation.

● Jor-Dan studios has opened a new 24-track facility in Wheaton, just outside Chicago, with the first Studer *A80 VU MkIV* 24-track machine in the USA. The console is a 'vintage' all-discrete Neve *8058* console, modified and installed under the personal supervision of Rupert Neve and features Neve compressors, *31102* equalisers, 16 added sub-groups and four extra grouping faders accessible via the patchbay.

● Terry Medwedek of Group One Acoustics Inc, Toronto, has recently completed a new 24-track facility for Comfort Sound in Toronto and the redesigning of both 24-track control rooms at Ocean Sound, Vancouver. The rooms feature 'expansion' ceiling designs and a combination of techniques aimed to control early reflections and maintain a uniform soundfield.

● Theatre Technology Inc, New York has added Eastern Acoustic Works *JF-500* 3-way speaker systems bi-amped with *QSC 1700* amps and *JBL 5234A* crossovers to its list of rental equipment.

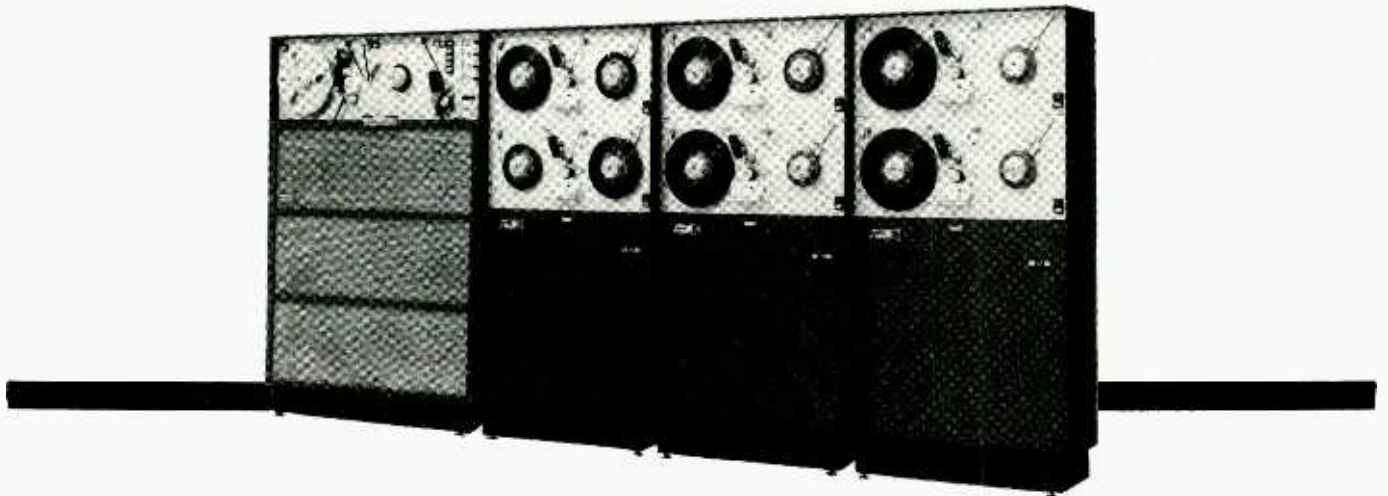
● Solid State Logic has supplied the first *SL4000E* computerised console to Philadelphia. Kajem Recorders have also redesigned their control room with the assistance of Al Fierstein of Acoustilog, making it brighter and expanding the effective listening area in terms of frequency response.

The *UREI Time Align* monitors have been modified in order to accommodate louder dB levels and transient peak information delivered by the SSL Gauss speakers interfaced with a custom-built Acoustilog crossover have been installed, biamped with Hafler *P500s* and *P225s*.

● Soundcraft Electronics has installed a *TS24* in-line console at Advision Studios, London where it will be used for 24- and 46-track digital recording in a wide variety of applications. The console features *MasterMix* automation and the studio's new equipment includes Sony PCM 3324 digital multitrack. The new digital facility is designed to complement that offered by Advision's other studio with its SSL *SL6000E* console, and their digital editing suite, the Pumacrest mobile and the latest project: refurbishing of Studio Three.

# LOOK AT LYREC

**P-2500 / 2000**  
**before you leap**



- Look at** 64 : 1 quantity at 32 : 1 quality, two speed switchable.
- Look at** Dolby HX-PRO fitted as standard (P-2500).
- Look at** The return of invested capital: Lyrec scores better than Japanese or American products.
- Look at** Staggered loading capability.
- Look at** The loop bin design: no compressed air, no static.
- Look at** Space requirements: Lyrec has the smallest foot print of all.
- Look at** Lyrec, which has more than 200 units operating around the world.
- Look at** No import duties or heavy freight charges to inflate the price.

*And if you are contemplating upgrading from in cassette copying to high speed, it may well be worth your while looking at Lyrec.*

And Now:  
Contact **Dag Fellner, LYREC (U.K.) Ltd**, 13 Hampden Hill, Beaconsfield, Bucks HP9 1BP  
Tel (04946) 4425 Tlx 838725 TTL G



DOLBY and the Double-D symbol and HX-PRO are trademarks of Dolby Laboratories Licensing Corporation

*The Lyrec range includes:*  
Multitrack Recorders  
1/4" Recorders  
Q-C Machines  
Cassette Mastering Recorders

I am .....  
of .....  
Address .....  
Tel. ....

**Lyrec**

OF DENMARK



# NEW PRODUCTS

# NEW PRODUCTS

Equipment, modifications, options, software

## Yamaha REV-7 digital reverb

Launched in preproduction form at the Hamburg AES, the *REV-7* digital reverb fits between the existing models. Specification and exact facilities may change slightly when the unit becomes available later this year. It is a 2 U 19 in rack unit. It can operate in a stereo or mono mode although in stereo the inputs are summed with the output being stereo reverb. Basically the unit has 30 preset ROM memories and 60 non-volatile RAM user memories which will store all information other than EQ and level input. At present it appears that there are only 10 presets in memory including Large Hall, Small Hall, Vocal Plate, Percussion Plate, Early Reflection Mode A and Mode B, Delay, Stereo Echo, Stereo Flanger A/B and Chorus A/B. Reverb time is between 0.3 to 9.9 s mid band with initial delay being adjustable up to 99.9 ms. There are up to 15 early reflections available.

Front panel features include

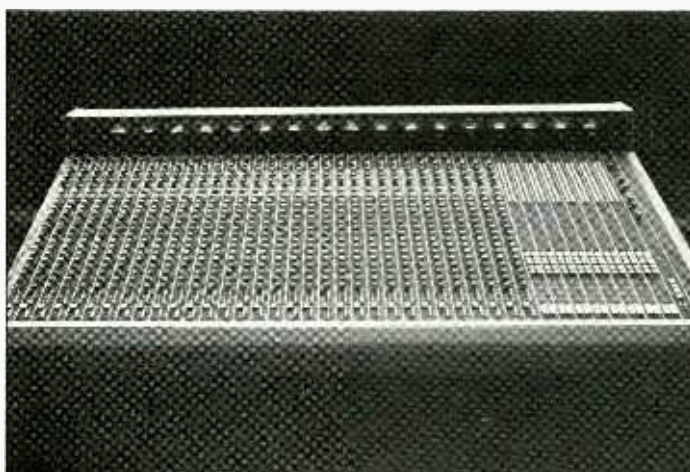


a numeric LED for memory indication, a 16 character two line LCD for program and selected parameter readout, a 3-band parametric EQ, selection buttons for presets, parameter adjustments, numeric keypad and memory functions and other general master functions. One interesting feature although it is not quite clear how it functions is the provision for MIDI control of program number (and other functions?). The price has yet to be confirmed although the price bands being mentioned were extremely competitive although not confirmed for publication.

**Yamaha, Nippon Gakki Co Ltd, Hamamatsu, Japan.**

**UK:** Yamaha-Kemble Music (UK) Ltd, Mount Avenue, Bletchley, Milton Keynes, MK1 1JE. Tel: 0908 71771.

**USA:** Yamaha International Corp, PO Box 6600, Buena Park, CA 90620. Tel: (714) 522-9105.



## Audioarts stage monitor console

Audioarts Engineering has added a stage monitor console, the *M16* to its line of stage and recording consoles. The *M16* is a 16-mix monitor console with features that include programmable mutes, optional bus switching matrix and full output VU metering. Standard mainframe size is 32 input although other frame sizes are available.

The input channels feature 4-band parametric EQ, sweepable highpass filter,

input phase reverse, channel dim, illuminated on/off, direct out and patch points. Outputs include talkback, output phase reverse, illuminated pre-fade PFL and on/off. The master module includes cue speaker level, master solo level and illuminated mix masters.

**Audioarts Engineering, A Division of the Wheatstone Corporation, 5 Collins Road, Bethany, CT 06525, USA. Tel: (203) 393-0887.**

## LOLA audio from Yugoslavia

Lola professional audio equipment is manufactured by Yugoslavian company Ivo Lola Ribar and includes the Series *LA1100* and *LA1300* mixing consoles. The *LA1100* is designed for broadcast, sound reinforcement and theatre applications as well as small production studios. Basic features include four group outputs, optional stereo or mono master output, two aux sends and P&G faders.

The *LA1300* series is for broadcast and large PA and multitrack studios with eight sub-group outputs and stereo/mono master, 3-band semi-parametric equaliser, phase reverse, VU or PPM metering and patchbay.

Other products include *LA3201* graphic equaliser and *LA2102* and *2111A* power amplifiers. The *LA3201* is a 27-band 1/2-octave graphic

equaliser featuring active or transformer balanced input, active LC filters-equalisers with high slew rate, low noise operational amplifiers and continual regulation of boost and cut, and *XLR*-type connectors.

The power amps, *LA2102* and *2111A* are rated 25 W and 200 W/channel into 8 Ω or 70 W and 600 W bridged mono mode with a quoted THD figure of 0.02% and 0.05% respectively.

The *2012* is designed for smaller studios and OB vans and the *2111A* for professional studios and sound reinforcement applications.

**Ivo Lola Ribar, Ro Lola, Fabrika Racunara, YU-11250 Beograd, Zeleznik, Yugoslavia. Tel: (011) 571-950. Telex: 11276; 12090 YU ILR.**

## Harris pro gate

This compact, battery-operated noise gate, the *P92*, is the first product from a brand new company, JJC-AV Research Limited of Cumbernauld, Glasgow.

At first glance one could be forgiven for assuming this to be just another musician's pedal. Closer inspection, however, suggests there is more to this unit than meets the eye.

In addition to the usual controls for adjusting the threshold level and hold time, the *P92* includes controls for adjusting attack and decay times; has an external key input; remote switching (logic or contact); an LED to indicate noise gate status and a footswitch for manual operation of the gating function.

The makers claim that in

addition to the usual gating functions, the complete control over the envelope shape provided offers a range of sound generation possibilities via the external key input when used in conjunction with, say, an electronic-drum pad or logic control from a synthesiser or sequencer via the Remote input.

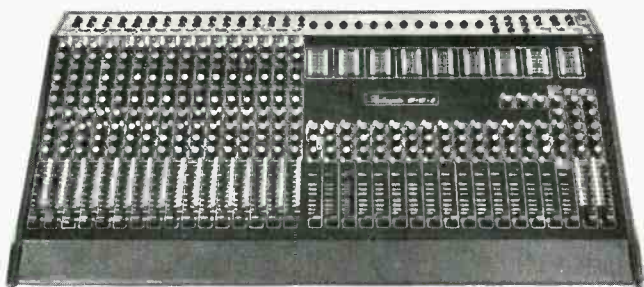
Specifications include a sensitivity of -65 dBu to -35 dBu; attack time from 1 ms to 100 ms; hold time 0.1 s to 2 s and decay time from 0.1 s to 2 s.

Measuring approx 96×127×52 mm, the unit is powered by a 9 V alkaline battery.

**JJC-AV Research Ltd, 17D Stuart House, Burns Road, Cumbernauld, Glasgow G67 2AP, UK. Tel: (02367) 25602.**

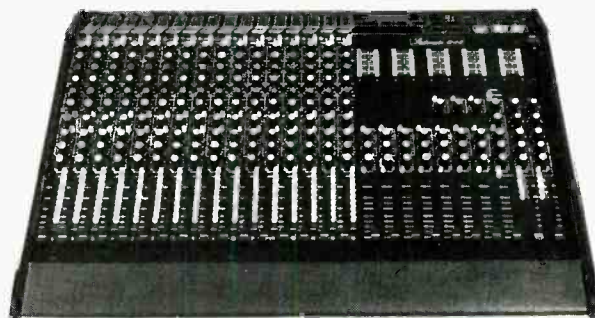
# STUDIOMASTER

## 16-16-2



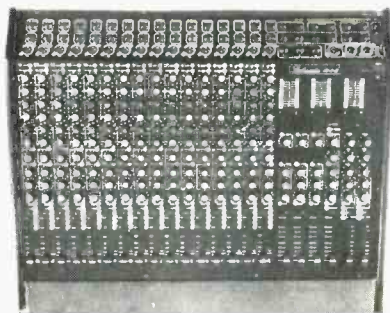
The 16/16/2 is designed to complement budget 16-track recorders. It features its own external P.S.U. which can supply even a fully expanded 16/16/2 (a 32/16/2!). All mic. channels have 48V Phantom Power, parametric E.Q. network, and 3 auxiliary sends. Full 16 channel monitoring is included in the 16/16/2 package. 12 segment 2 colour bargraphs are fitted to the 16 sub-mix stages and the master output which is also fitted with 3 band E.Q. As well as optional expander modules for the mic. channels, a double patch bay is available.

## 16-8-2



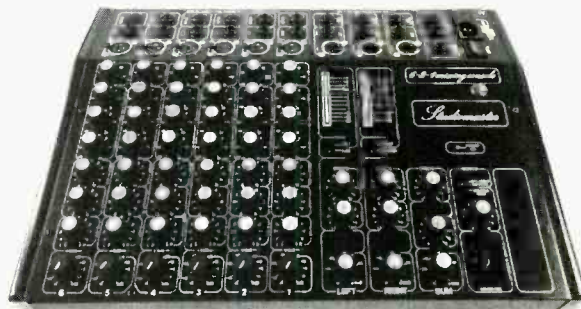
The 16/8/2 is compatible with 8-track recorders and has all the versatility of the 16/16/2, like optional expander modules for the mic. channels (an extra 16 mic. channels may be fitted without altering the unit's P.S.U.) and a double patch bay. Mic. channels feature 48V Phantom Power, parametric E.Q. network, 3 auxiliary sends and 90mm faders. Full monitor and foldback systems are included. Master outputs have 3-band E.Q. and 2 colour 12 segment bargraphs. These bargraphs are also fitted to the 8 sub-mix stages. Applications for the 16/8/2 include small 8-track studio mixing and live sound reinforcement.

## 16-4-2



The 16/4/2 is the mixer that the 16/8/2 and 16/16/2 developed from and consequently contains all their superb features. It is expandable to 32/4/2 on its existing P.S.U. and a patch bay is also available. Mic. channels have parametric E.Q. network, 48V Phantom Power, 3 auxiliary sends and 90mm faders. Full monitor and foldback systems, 3-band E.Q. on the master outputs and 2 colour 12 segment bargraphs are all supplied on the 16/4/2. Uses of this mixer include live sound reinforcement and for use with 4 track recorders in small studios.

## 6-2-1



The STUDIOMASTER 6-2-1 mixing console offers features and performance normally obtainable from mixers costing twice the price. Mic. channels feature three band e.q., effects and monitor sends as well as the usual gain and pan controls. 2 colour, 12 segment bargraphs allow monitoring of channels, auxiliaries and both stereo and mono sum outputs. This outstanding specification makes the 6-2-1 ideal for sub-mixing, P.A. and recording.

## Mosfet 500



With distortion not exceeding 0.005% (1kHz sinewave at 200 watts/4ohms) this amplifier provides reliable amplification of outstanding fidelity in all applications. The extensive protection circuitry ensures failsafe protection against D.C., thermal overload and short circuit conditions. The front panel carries LED indication allowing instant monitoring of the amplifier's operational status. The Mosfet 500 is ideally suited to all professional applications requiring medium power, accurate reproduction.

## Mosfet 1000



This high power amplifier delivers twice the power of the MOSFET 500 with the same 0.005% distortion (1kHz sinewave at 400 watts/4 ohms). This amplifier has already proved itself under the most stressful of applications and is fast becoming the standard against which all other amplifiers are measured. The Mosfet 1000 delivers high power with total fidelity in all applications.

StuDiomaster, Faircharm Industrial Estate, Chaul End Lane, Luton, Bedfordshire.  
Tel: (0525) 221331 Telex: 825612 STUDIO G



# NEW PRODUCTS

# NEW PRODUCTS

Equipment, modifications, options, software

## Genelec control room monitor

Genelec has introduced an addition to the *Triamp* range of active monitoring speakers: the *1022A* control room monitor which has been specially adapted to the needs of medium-sized music and drama studios.

Featuring frequency response from 37 Hz to 20 kHz  $\pm 2$  dB and 108 dB SPL, its three built-in amplifiers produce 150 W each for bass, midrange and treble. The rigid enclosure is designed for symmetric radiation, stable stereo imaging and minimum colouration.

**Genelec OY, Satamakatu 7, SF-74100 Lisalmi, Finland.**  
Tel: +35877-24942.  
Telex: 4452.



## Philips BPE condenser microphones

The *BPE* is a new concept in microphones and is based around a combination of both condenser and electret characteristics, resulting in a condenser microphone with permanently charged back-plate electret (*BPE*) inserts.

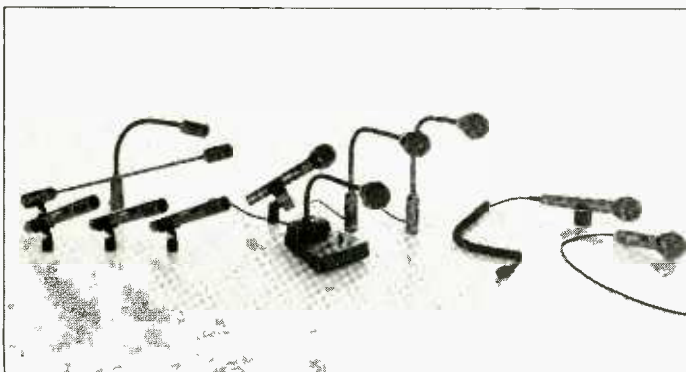
The series comes in three ranges: professional, standard and special purpose. The professional series *B43* comprises five models available in configurations to suit applications such as broadcasting and sound reinforcement which require precision. The range offers three hand-held mics: two hypercardioid and one omnidirectional. There are also

goose-necked and fixed stem hypercardioids.

All models are rated at 134 dB SPL with equivalent input noise level of 17 dB giving a dynamic range of more than 117 dB. Frequency response of the hypercardioid condensers is quoted at 60 Hz to 17 kHz, and for the omnidirectional 16 Hz to 20 kHz.

**Philips International BV, Electro-Acoustics Division, Building HCZ 1, 5600 MD Eindhoven, The Netherlands.** Tel: 040-757279.

**UK: Philips Business Systems, Cromwell Road, Cambridge CB1 3HE.** Tel: 0223 245191.



## Shure correction

In last month's issue we wrongly referred to the new Shure omnidirectional low

profile mic as the *SM92*. It should have been the *SM90*. Apologies for the confusion.

## SPL effects

Sound Performance Laboratory is a West German company manufacturing signal processors for both home recording and professional markets as well as musical instruments and MI amps.

Of particular interest for the professional studio are two *Exciters*: *EX 2* and *EX 3*, and their parametric equaliser *PQ3*. The *Exciters* may be used on high frequency producing instruments such as crash ride cymbal, strings, oboe, flute, etc. The basic unit features input, mix and brilliance pots for each channel; the *EX3* has additional functions output gain, +10 dB switch, LED bar and on/bypass switch for each channel. The units are also available with balanced in/outputs.

SPL has a *Scamp*-type rack and the exciters are also available in *Scamp* rack size.

The *PQ3* 3-band parametric equaliser has a frequency response of 20 to 20 kHz and each EQ band has separate output, LED bars and bypass switches. The unit features two gain range pots to calibrate input and output of the complete parametric equaliser. It is 1 U 19 in rack mounting. Balanced in/outputs are available as an option.

**Sound Performance Laboratory, PO Box 1227, 4055 Niederkruchten 1, West Germany.** Tel: 021 63-8 1200.

**USA: Europa Technology Inc, 1638 West Washington Blvd, Venice, CA 90291, USA.** Tel: 213-392 4985.



## Budget Shure

Shure has introduced a new line of microphones designated the *Prologue* range. It is designed and quality controlled in the US and manufactured in Japan with looks and feel and performance in Shure style.

Aimed at home recordists and 'beginners' vocalists, musicians and audio/video hobbyists, there are three models, all available in high

or low impedance versions. Each model features an all metal die-cast case, on/off switch and professional XLR connector.

**Shure Brothers Inc, 222 Hartrey Avenue, Evanston, IL 60204, USA.** Tel: (312) 866 2553.

**UK: H W International, 3-5 Eden Grove, London N7 8EQ.** Tel: 01-607 2717.

## In brief

- **Bruel & Kjaer:** has just released information on a new precision sound level meter with a modular construction. Known as type *2231*, the unit is designed for high accuracy enabling use as a precision integrating sound level meter and a statistical analyser and, if required, as a calibration standard. Three interchangeable modules are currently available with further modules being introduced shortly. A digital

interface for connection to printers is part of the system.

- **Symetrix:** has introduced a revised version of the *511* single ended noise reduction unit known as the *511A*. The unit now provides independent variable threshold controls for both the expander and filter circuits in addition to separate in/out switches for each circuit. The two signal channels may be run as dual mono or stereo linked. Other specifications are as before.



# The Future of sixteen track

More than ever before, there is demand for tightly produced and specialised music for the film, video, broadcast, advertising and music industries.

The Fostex B16 is engineered to bring all the potential of sixteen track within reach of both working musicians and studios.

It is the most compact, most affordable, sixteen channel multitrack ever made. Precision heads, developed for the unique half inch tape format achieve astonishing fidelity and minimal crosstalk. And Dolby C noise reduction results in remarkable signal to noise performance without side effects.

Every aspect of the machine is carefully thought out and built for fast operation. All motion and status modes can be entered from an optional paperback sized remote. It has advanced facilities that professionals need, yet it is simple to operate.

If you are producing music for the needs of today, then take a closer look at the Fostex B16. Call or write for the brochure and the name of your specialist dealer.

Sixteen track puts no limits on your creativity, and presents every opportunity to achieve more with your music.

Bandive Ltd. Brent View Road, London NW9 7EL. Telephone 01-202 4155

**Fostex**

# NEW PRODUCTS

# NEW PRODUCTS

Equipment, modifications, options, software

## Synchroniser and editor from Audio Kinetics

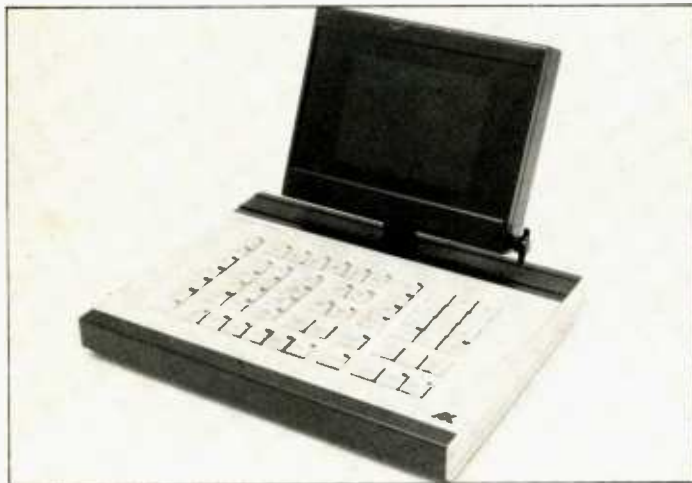
Audio Kinetics launched a re-modelled synchroniser range and a new editing system at the recent Hamburg AES. The *Q.Lock* computer frame has been redesigned to accept four complete machine interfaces. The standard *Q.Lock* controller will still only sync three machines although the operator will have the ability to access any of the four machines without new PCBs. Provision has also been made for an optional VITC reader with rear panel connections. Further provision has been made for additional spare cards such as the 16-event Relay Card option.

The completely new editing system is known as the *Eclipse*. It will operate in conjunction with the redesigned *Q.Lock 4.10* system and will offer full 4-machine capability. The unit itself has a high definition mini VDU that can display 20 lines of information such as machine status, timecodes, set-up menus and other text. Control features include access to any machine individually while the

machine group remains in the sync state and without affecting the status of these other machines. Also two types of machine groups may be set up, each with a different machine as master. Selection of which machine configuration to be used is a one-key operation. The operational parameters and general facilities may be set up from the keyboard such as code standard and facility options, etc, with the assistance of the display. The system has a number of assignable keys to allow operator programming of multi-key operations. There are also now 100 loop memories available for specialised use.

**Audio Kinetics Ltd, Kinetic Centre, Theobald Street, Boreham Wood, Herts WD6 4PJ, UK. Tel: 01-953 8118.**

**USA: Audio Kinetics Inc, 4721 Laurel Canyon Boulevard, Suite 209, North Hollywood, CA 91607. Tel: (818) 980-5717/(800) 423 3666 toll free.**



## Synton replaces vocoders

The introduction of a low cost, versatile stereo vocoder to the Synton product list makes the unit's predecessors, the 221 and 222 redundant. The *SPX216* is a 1 U 19 in rack mounting unit which features 14-channel analysis/synthesis, low frequency roll-off filter on mic input, LED level indication on speech and

carrier inputs, voice circuit, built-in noise generator, VCO with doubling circuit, bypass, multiconnector for external patching and formant shift facility up or down by push button or remote control. **Synton Electronics BV, Box 83, 3620 AB Breuklen, Holland. Tel: (03462) 63499. Telex: 40541.**

## ADA programmable delay

The *Digitizer 4* is a 16-program digital delay offering complete programmability and instant access to any program. On board computer allows programming of all effect settings including sweeps, regeneration, mix and delay time.

Sixteen shadow programs have been programmed into constant memory to be recalled at any time, and there

is an optional footswitch control. Frequency response is 17 kHz, delay time 1024 ms displayed by LED readout which also displays function. The unit has stereo outputs and a self-diagnostic program which runs a self check during power up.

**Analog Digital Associates, 2316 Fourth Street, Berkeley, CA 94710, USA. Tel: (415) 548 1311. Telex: 470 880.**



## Alesis reverb

The *XT* digital reverb is the first product of Los Angeles based Alesis, and was designed by Keith Barr, formerly president of MXR Innovations. The *XT* features 14 kHz frequency response, full stereo output and decay time variable from less than 1/4 s to 10 s. There are two separate reverb programs (stored in replaceable ROMs) with front panel option switches: pre-delay, slap back, diffusion, damping and high and low filters.

Front panel input, output and mix controls mean that the unit may be used with instruments and through sends and returns on a console. Rear panel 1/4 in jack connections include input, stereo outputs, loop and external defeat.

Future software updates will be made available to all *XT* owners as they are developed. **Alesis Corp, PO Box 3908, Los Angeles, CA 90078, USA. Tel: (213) 467-8000. Telex: 855310.**

## Imhof blower units

A space saving slimline blower unit from Imhof occupies 38 mm of space behind a 3 U 19 in panel, and can be fitted with fans for extraction or induction. The standard unit contains three fans wired for 220 V, 50/60 Hz and each rated at 94 cfm, although

other fans may be supplied.

The units may be fitted vertically or horizontally and each has a panel mounted neon indicator lamp. **Imhof-Bedeco Standard Products Ltd, Ashley Works, Ashley Road, Uxbridge, Middx. □**



# take a closer look at in-line mixing..

The new D&R Series 2000 is a new revolutionary design in the field of in-line mixing technology. The Series 2000 provides features in a price-class all of it's own. The desk has a floating subgroup system, called F.S.S. , which opens the opportunity to make sub-groups on every desired channel without the need of repatching.

It is also possible to process as many effect-returns as the desk has channels, whereby the original function of an input-channel holds good. The Series 2000 is designed so that every audio signal takes the shortest signal-path which insures transparency of sound and a signal to noise ratio on the microphone-input of more than -126 dB (A weighted)!

Because of the Series 2000 extensive facilities it is impossible to list all mixers features. Therefore contact your local dealer requesting a free brochure.

GREAT BRITAIN, Studio Spares London/FINLAND, Lahti Sound Lahti/France, Mettler Audio Paris/ITALY, CEM Elettronica Varallo/NORWAY, Jon Vedum Oslo/SWEDEN, Music Workshop Stockholm/SWITZERLAND, Jacques Isler Zürich/GERMANY, Sound Service Berlin/BELGIUM, ASE Mechelen.

**DR** THE ULTIMATE MIX  
electronica b.v.

rijnkade 15 b  
1382 gs weesp  
holland  
tel: 2940-18014\*  
tlx: 18503 dr nl



# EFFECTS, REVERB AND EQUALISERS

## Equalisers

**Ivo Lola Ribar:** This little known company is one of Yugoslavia's larger manufacturers and has been producing professional audio equipment for many years. The company exhibited at the Hamburg AES for the first time; one of their exhibits was the *LA 3201* 27-band  $\frac{1}{3}$ -octave single channel graphic equaliser using active LC filters.

**Knowles/Industrial Research:** Of particular interest is the newly introduced *Transversal Equaliser*. Information is brief at the moment although the unit is a single U with 16 bands controlled by rotary knobs. The design is claimed to minimise response ripples, frequency interaction and phase shift. There are no tuned filters in the design. The transient response is synthesised from a single fixed response circuit and uses a single tapped delay chain. We hope to bring more information about this unit in the near future.

**Meyer:** A 2-channel unit with five bands of parametric EQ per channel including high and low cut filters. Each band may be switched out independently and the circuitry is described as 'complementary phase' to ensure minimum phase distortion even at extreme settings.

**Psonics:** This is a range of products made by Kelsey Acoustics and they have introduced the *EQ4* which is a single U rack unit with four bands of parametric EQ, each having a range of 50 to 1200 Hz with a  $\times 10$  range switch. Cut and boost are variable over 15 dB with fully adjustable bandwidth. There are additional high- and lowpass filters. By switch selection it is possible for all five sections of the unit to function independently.

**Rane:** Two graphic equalisers, the *GE 27* and *GE 14*. The *GE 27* is a  $\frac{1}{3}$ -octave 27-band unit and the *GE 14* is a  $\frac{2}{3}$ -octave 2-band unit. The design criteria were to maintain constant bandwidth at all filter level settings and Rane claims that this reduces band interaction.

**SCV:** This French company is beginning to make a name for itself in the field of signal processing. It has recently launched two new equalisers, the model *209* and model *228*. The *209* is a 2-channel 9-band parametric graphic with a set of high- and lowpass filters together with a high and low quasi-parametric shelving network. The *228* is a 2-channel 28-band graphic using minimum phase LC and RC networks.

**Spectra Sound:** The model *1500* is a 27-band  $\frac{1}{3}$ -octave equaliser that has been designed to maximise distortion and noise performance, enable precise calibration of band centre and keep

**These update features contain details of new equipment and changes to existing models made since the last time we featured these topics (January 1984). Further details can be found in the new products sections of the magazine over the same period and those of the next few months for the newer items.**

output impedance very low. The price of the unit has also been kept competitive. **Stage Accompany:** Mainly known for large power amplifiers and crossover systems, this Dutch company has introduced a rack mount programmable parametric equaliser known as the *PPE-2400*. Basically a 2-channel, 4-band with digital control of all variable settings. Memory for up to 64 settings. **TOA:** Two new graphic equalisers, the *E-112* and the *E-131*. The *E-112* is a 2-channel, 10-band parametric graphic with octave spacing band centres with  $\pm 12$  dB cut or boost. The *E-131* is a single-channel,  $\frac{1}{3}$ -octave unit with 28 bands and  $\pm 12$  dB range. **Yamaha:** Yamaha is working in two areas at the moment. The first is a range

of graphic equalisers including the largest model, the *Q2031*, which has 31-bands of  $\frac{1}{3}$ -octave control with two channels in a single 2U high rack unit. The other end of the scale was a prototype system shown at the Hamburg AES—a digital equaliser that will eventually form part of the same range as the *REV-1* and *YDM-2600* units and will be completely programmable with multichannels (more than 10) of parametric control.

## Reverberation

Currently this is probably the fastest growing area of new products. There are something like 20 manufacturers involved in digital reverbs and the major advantage of such a situation is that there are now enough different types and approaches that finding a unit suitable for your needs has become simpler as has finding a unit to meet your finances. What has become more difficult, however, is that manufacturers vie with each other for unique software updates and new features such that studio clients expect far more in many cases in terms of reverb facilities than they are prepared to pay for—one of every type at their disposal or as near as they can squeeze. The advent of the low cost unit has freed the high cost devices to create the more exotic demands with recent examples offering only a simplified range of features rather than a real decline in quality. This has also helped to meet client demand and enabled many smaller facilities to offer a digital reverb without putting themselves in major debt.

We should not, of course, forget the mechanical reverb systems that are still with us and there have indeed been a number of devices in this area mainly in the area of low cost spring devices. This will certainly continue for some years until digital devices can be effectively

## PPM5

APRS Stand 163

### 20 PIN DUAL IN LINE HYBRID

- Vcc 8.5V-35V at 3mA
- Only signal level and meter tolerance presets required. Mother Board 1, MB1
- MB2: Bal input, MB3: Bal input, overload LED flasher to IBA specification
- Applications note and full specifications on request.



SURREY ELECTRONICS LTD.

The Forge, Lucks Green, Cranleigh, Surrey  
GU6 7BG.  
Tel. 0483 275 997



# “WOW!”

When the boys from the engineering department walked in with their newest creation, we said: “Nice looking box. What is it?”

“This,” they said proudly, “is our new MSP-126 Multi-Tap Stereo Processor. It’s a stereo-tapped digital delay line with a 20kHz bandwidth, eight pre-programmed processing modes, and . . .”

“Hold the engineering jargon,” we said. “Just tell us what this gizmo does.”

“Oh, no problem,” they said. “Basically, the MSP-126 is a signal processor that creates a whole range of interesting effects. To begin with, it produces really great balanced stereo with flat response from any kind of program material. And it also creates other kinds of effects—some of which are subtle, dramatic, or even bizarre. It’s easy to fine-tune the effects you get, too. For each of the eight effects modes, there are 16 delay parameter setups and 16 amplitude variations. Okay?”

We tried to look enthusiastic. “Well, maybe it would help if you could just give us a few *examples* of these effects,” we said.

“Good idea,” they said. “One of the neat things the unit does is produce forward

and backward discrete repetitions. Then there’s a traditional ‘comb filter’ stereo synthesis. And delay-based panning. And binaural image processing for Walkman applications. And delay clusters. And concert hall early reflections.”

“That’s better,” we said. “We’ve probably got enough to do a pretty good ad for you. Before we go, though, you probably ought to run us through a quick demo. That might help if we get stuck for the right word to describe what the effects sound like.”

“Sure,” they said. “Hope you like what you hear.”

So we listened. Then we walked over to the typewriter, rolled in a blank sheet of paper, and typed a headline that seemed to say it all:

“WOW!”

If you’d like to see why we’re so excited about the MSP-126, ask your nearest Ursa Major dealer for a hands-on demonstration. It’s an astonishing experience.

## **MSP-126 STEREO PROCESSOR**



**URSA MAJOR, Inc.**

Box 28, Boston, MA 02258 USA • Telephone (617) 924-7697  
Telex: 921405 URSAMAJOR BELM

## EFFECTS, REVERB AND EQUALISERS

manufactured at this kind of price. It may of course always be cheaper to use a spring device than try for a spring effect on a digital unit costing far more unless we are really fond of a mythical spring sound when the digital device is the only answer.

**Alesis:** The first product from this new company is a low cost digital reverb with a decay time of up to 10 s down to 0.1 s with a stereo output. The unit has two programs stored in ROM and there are seven selectable options for signal modification. The device is apparently designed for specific uses in complex mixing rather than general uses.

**AMS:** As well as providing software updates for the *RMX 16* digital reverb, AMS has introduced a system of barcode

reverb program updates. These are supplied as laminated cards that can be read by a remote terminal with barcode reader supplied by AMS. Any three programs may be stored at the same time and the first barcodes available include new programs not available on the current software in addition to previously available programs not on the current software.

**ART:** The demise of MXR resulted in a buy-out. Applied Research Technology, the company formed from ex-senior MXR employees, has seen an uplift in the fortunes of the better products that were selected to form its initial product lines. Former MXR model the *O1A* digital reverb, is one of these and it has seen a software update since its introduction.

**DOD:** Spring line units are getting more sophisticated and the *R-848* is fairly typical. It incorporates a 6-spring assembly with a variable predelay of 20 to 60 ms, a 4-preset EQ network and an additional parametric EQ for fine tuning.

**EMT:** The *EMT 251* and *252* units have been available for some time now although a recent update on both units allows them to be very simply modified with the correct initial installation, to produce the reverb algorithm of the older *EMT 250* digital reverb which has apparently remained quite popular. The feature is indicated solely by a single button on the *252 S* remote control unit.

**Eventide:** There have been substantial software changes to the *2016* unit in the form of the *Generation II* software and the *Signal Processor User Development* system (SPUD) for user origination of original program software.

**Clark Teknik:** The *DN780* was introduced just over a year ago. It is simple to use, is capable of a wide variety of reverb types and employs a non-dedicated software program system that allows a high degree of flexibility. It contains 20 starter programs together with five special effects memories. Recently introduced software updates have added another seven preset memories in the form of plate and gated reverb types and a system for giving increased protection to selected user memories.

**Lexicon:** A very influential new unit was the *PCM60*, a compact digital reverb that had plate and room programs that could be shaped by size and decay switches together with HF and LF contour controls. The practical limits of such a device are clearly visible but it has found wide acceptance as a basic reverb device when sophisticated reverb patterns are not needed. The model *200* has Version 1.3 software which increases the number of preset programs to eight. There has also been a new release for the *224X*.

**Quantec:** A simplified version of the standard *QRS* in the form of a single input and stereo output device known as the *QRS/L*. It is recognisable from the different front panel.

**Roland:** We have no details on this new digital reverb although we understand it to be a flexible low cost device that will probably be more widely known by the time you read this.

**Ursa Major:** A *Mark II* version of the *8X32* has been added to the range and this now offers eight preset programs: new software for the previous four—Plate I, Plate II, Hall and Space—plus four new ones: Cask, Perc, Chamber and R rev. There are apparently a number of changes to be made shortly to the *StarGate* low cost reverb although precise details are not available at the time of writing.

**Vesta Fire:** The *RV-3* replaces the *RV-1* and has a true stereo output and 3-band EQ on each channel. The channels can be fed from a common source or operate independently. There are limiters on the inputs and the output has a noise gate designed to remove mechanical and hum-induced components from the output.

**Yamaha:** The *REV-1* was first shown over 18 months ago and created quite a lot of comment with regard to the sophistication of the remote controller and in particular its displays. Further details are now becoming available about even higher levels of control using external computers although there is not the room to expand on this here. The *R1000* was also introduced. This is a



ANTWAK 1985E

**Most of today's 1" type B VTRs are equipped with telcom c4**



**Users already selected telcom c4 as the most suitable NR System for type C VTRs. The new telcom c4 units are now designed to improve the sound of type C VTRs. telcom c4 creates lower distortion from tape, better crosstalk attenuation, improved headroom plus a 25 dB gain in dynamic range. No line-up procedures. telcom c4 units for VTRs**

**are available for 1, 2 (stereo) and 3 channels, for simultaneous encode/decode and automatic switching. Furthermore, telcom c4 is used in connection with ATRs, line and satellite transmission. Don't you also need super sound for stereo or copying? Just contact us for further information.**



**ANT**  
Telecommunications

ANT Nachrichtentechnik GmbH  
Lindener Str. 15 D-3340 Wolfenbüttel  
Phone (05331) 83-0 Telex 95651 ant d

Contact: Audio & Design Calrec Ltd.  
Unit 3, Horseshoe Park, Pangbourne,  
Reading, RG 8 7 JW, England  
Phone 07 34 86 10 88, Telex 848 722 ADR UK

single-channel very low cost digital reverb that has inevitably found use in low cost applications where its shortcomings were not a hindrance. Introduced in preproduction prototype at the Hamburg AES was the *REV-7* that is closer in concept to the *REV-1* but has a price related to the *R1000*. It is based more around the ability to modify a preset number of programs in a very user-orientated format.

## Effects

**Akai:** Recording products are coming from Akai at a very great speed. There are two devices that would loosely come under the heading of effects—*MM-99 Sound Controller* is a unit combining pitch changer, octave doubler and digital delay; and the *S612 MIDI* digital sampler that creates a 6-voice polyphonic output from any sampled sound.

**AKG:** A completely redesigned version of the *TDU 8000* digital delay line.

**AMS:** A number of new items including an interface for the *DMX 15-80S* that allows V/octave control of digitally sampled material and the *Timeflex* which is a modified version of the *DMX 15-80S* designed for time compression and expansion.

**Analog Digital Associates:** Two units in the form of the *2FX* digital multi-effects box and the *Digitizer 4* have been introduced. The *2FX* can produce flanger and chorus functions which may be used simultaneously with delay or repeat hold. The unit has a bandwidth of 17 kHz at 1 s. The *Digitizer 4* is a 16-program delay line offering programming of all effects settings.

**Aphex:** A modular version of the *Aural Exciter* that is designed so that 10 units can be fitted in the standard Aphex *R-1* rack or nine in the standard dbx *F900* rack. This system makes the *Exciters* very much cheaper than the standard 19 in rack versions.

**Audio Engineering Associates:** A new version of the stereo simulator known as the *AN2* is about to be launched and hopefully will have been by the time you read this.

**Bel:** The *BD80*—a single channel of digital delay with an expandable memory (up to 8 s), a loop edit facility and synchronised record and playback facilities. A loop reset allowing the loop to be retriggered manually or by program has been added more recently along with keyboard 1 V per octave facility. Also the *BD320* (up to 32 s) with similar facilities to the *BD80*.

**DOD:** Two new units—the *R-938* digital delay offering 1.9 s of delay at 15 kHz bandwidth and up to 8 s with a decreased bandwidth; and the *R-944 Chain Reaction* which is a unit containing four independent effects units in the same box—compressor/distortion, digital delay, flanger/chorus and parametric EQ with a harmonic enhancer circuit provided on the output.

**ElectroSpace:** Following on from the *Time Matrix* multi-tap delay line, comes the *Spanner* stereo or mono automatic panning system that features a clamp arrangement that can count 'beats' and then pan the processed signal. There are a number of rumours about future products from this company that suggest some unique items.

**EMT:** Although they probably will not be used as effects units, EMT has introduced two new units that could be used as such. The *EMT 445* is a digital delay line in the form of a stereo 16-bit 48 kHz design with adjustable delays between 1 ms and 10.9 s; the *EMT 448 Unimatic* is a short duration audio storage unit using a Winchester disk drive.

**Eventide:** The new *H969 Harmonizer* also referred to as the *ProPitch*. It uses 16-bit linear PCM coding for the first time in a *Harmonizer*. Features include 12 preset pitch change presets, full bandwidth has increased to 1.5 s with 3 s at half bandwidth, memory for five settings of delay and the delay and pitch ratios can be displayed at the same time.

**Orban:** A new version of the *245F* stereo synthesiser, with the improvements being a balanced input, output transformer option, RF filtering and AC line filtering.

**Powertran:** A digital sampling unit that

is available ready built or in kit form. It can function as a straight delay line from 0.3 ms to 32 s or as a sampler with looping and pitch control facilities. This can be controlled externally and there are MIDI and V/octave interfaces. The unit can also be run in conjunction with a BBC *Micro* for permanent saving of samples to floppy or tape.

**Publison:** The *IM90 Infernal Machine* is now in production and widely distributed.

**Ursa Major:** The *MSP-126 Multi-Tap Stereo Processor* which is a device that can simulate stereo from a stereo signal in a number of ways, provide stereo panning effects using time delay, provide a number of delay type effects including delay, repeats and delay clusters, etc.

**Yamaha:** The *D1500* digital delay line with 16 memory positions, full modulation controls for time related effects, max delay of 1.023 s and a MIDI interface allowing external control of the memory selected. □

**multimax**  
16:2:1 12:4:2:1 16:4:2:1  
All from one 19" rack mount console

- 3 band Equalisation
- 2 auxiliary sends
- 90mm smooth action faders
- Mic and Line inputs
- Subgroup direct outputs
- RIAA equalised inputs
- Peak LED on inputs
- 12 way LED displays on masters
- Phantom power on every input
- 5532 Op-amps throughout

Hill Audio, Inc.  
231 Marquis Court  
Lilburn, GA 30247 USA  
(404) 923-3193  
TLX 293827 HLAD  
Headwater Industries  
635 Caron Avenue  
Windsor, Ontario N9E 5B8, Canada  
(519) 256-2454  
Hill Audio, Ltd.  
Hollingbourne House  
Hollingbourne, Kent ME17 1QJ, England  
(062 780) 555  
TLX 96641 HILL

**hill**  
Hill Audio

# We suggest you



**YDD-2600 - Professional Digital Delay**

The REV-1 digital reverb and YDD-2600 digital delay systems herald the arrival of an exciting era of professional studio processing equipment from Yamaha, designed without compromise to deliver absolute quality.

Both units utilise new technology centred around a series of uniquely powerful LSI chips specially developed by Yamaha's own R&D

team. And it is these circuits that give REV-1 and YDD-2600 their unprecedented levels of controllability and sophistication, putting them clearly ahead of what is currently considered state-of-the-art.

But what about the musician in all of this? As music and technology become synonymous with one another, the roles of artist and engineer become increasingly fused. The old idea of the recording studio gives

**RX11 - PCM Digital Rhythm Programmer**



# U make notes.



REV-1 - Professional Digital Reverb

way to the concept of the totally integrated production environment. Here the line between instrument and processor becomes indistinct, and to remain competitive a studio needs to offer an array of instruments as standard equipment.

Once again Yamaha lead the way with a range of unrivalled MIDI-based synthesizers, controllers, tone generators, drum machines and

sequencers capable of forming one of the most musically powerful systems in the world.

Music and machines from Yamaha. We suggest you make notes.

**APRS 85** See the range of Yamaha Professional Audio Equipment on stand No. 122A

KX88 - Virtuoso Master Controller Keyboard

TX816 - FM Tone Generation System (DX7 x 8)

QX1 - 8-track Digital Sequence Recorder



**YAMAHA**  
MUSICAL INSTRUMENTS

MOUNT AVENUE, BLETCHLEY MILTON KEYNES, BUCKS, MK1 1JE  
:0908) 640202 24hr Ansaphone (0908) 649222

# NIMBUS CD MANUFACTURE

**T**he decision to manufacture compact discs was a monumental one for a small company like Nimbus. It will yet prove to be monumental for the whole European record industry. But why did they take such an enormous gamble, and how on earth could they match the research and development resources of Philips and Sony? To find out we paid a visit to the company's base near Monmouth, Wales. The 'Brideshead' setting—an enchanting country estate called Weystone Leys—is hardly the stuff of lasers and binary digits.

Many of Nimbus' past achievements have been reported in this magazine before, but to understand how and why Nimbus arrived at CD in the first place it is necessary to know a little of the company's history. Gerald Reynolds, technical director, says that their involvement in digital audio started with their LP mastering business for outside clients.

"Digital recording was becoming a reality. We purchased a Sony 1610 system, initially to service those customers of ours who were making digital recordings. We did try it ourselves: we made comparison analogue and digital recordings.

"Initially, we were very disappointed with the quality of digital recording. At around that time, Dr Jonathan Halliday, who was head of the audio research department at the IBA, joined us. He was being wooed by NASA and people like that in America, but fortunately he decided to join us, and now heads our research team. He took our subjective objections to digital recording and examined the equipment and tested it. He developed special test equipment to observe what was going on, and found the objective reasons for the poor quality, and found ways of correcting faults that were causing that poor quality. The problem, essentially, was that most of the 16-bit equipment around was not working at 16

## Nimbus is the only CD manufacturer in the UK. Richard Lamont reports on how and why

bits. It was working at around 12½ or 13, and it was suffering from something very analogous to crossover distortion. Most A/D converters tend to drift, and at around 0 V all the bits change at once. That pretends to produce a glitch, or discontinuity, in the transfer characteristic of the converter. It is possible to adjust that out, if there is an adjustment on the converter, provided you have the right equipment to see it. Dr Halliday developed a black box which enables one to see this fault quite clearly on an oscilloscope, and actually look at the transfer characteristic. So you have a direct means of adjusting it and correcting it.

"We managed to make our own 1610 system work at 16 bits. We immediately got very satisfying results indeed. We recorded in parallel for a time, both analogue and digital, but very soon stopped using analogue. Digital was clearly superior when it was working properly. We were therefore completely convinced that the future in recording was digital recording."

They reached this stage about four years ago.

"We then were beginning to hear about Philips' development of compact disc. At that stage they were still trying to launch the 14-bit system, rather than the outcome of the joint work between Philips and Sony. We went to see Philips. It was quite clear that they were very serious about it; they had put many years and a tremendous amount of money into developing it. It was absolutely clear that a digital storage medium for home use was the future.

"The deficiencies of the analogue LP couldn't really be overcome. The analogue system is already 100 years old and has been refined and refined and refined beyond what is strictly practical. It still suffers with very severe

distortion, a thing which CD is completely free of.

"We decided that compact disc was the way we had to go. That was our future: we decided that it would replace LP in the long run. If we did not get into CD then our market would eventually disappear and our livelihood with it.

"That gave us an opportunity to capture a large percentage of the UK and European manufacturing capacity, which would never have been the case on LP. The number of people who wanted our quality of LPs is relatively limited. However much better we made our LPs, we wouldn't get a much bigger market share. CD gave us an opportunity to increase—dramatically—our market share of manufacturing business. It would enable us to get the quality of our recording to the end user at home.

"Some time later we went to see Sony in Japan and saw what they were doing. We were very impressed by their ingenuity and by what they had achieved with the resources they were using. We then went to see Philips in Eindhoven and saw their complete CD mastering operation. We were certainly impressed by the amount of money that they had spent, but were glad that we had seen what Sony had done first. Philips has spent very much more money than Sony to achieve the same result.

"We looked at the two mastering systems—the Philips one and the Sony one. We decided that we could make a system that was better than either of them.

"In order to have a full understanding of the process we had to control the mastering. The only way to fully understand it was to develop our own. We could make a better mastering system; we could do it for less money than the £2 million it

would cost to buy a system from Philips or Sony. So we started basic research on the mastering process and signed a licence with Philips. We were one of the first licensees of the system outside PolyGram."

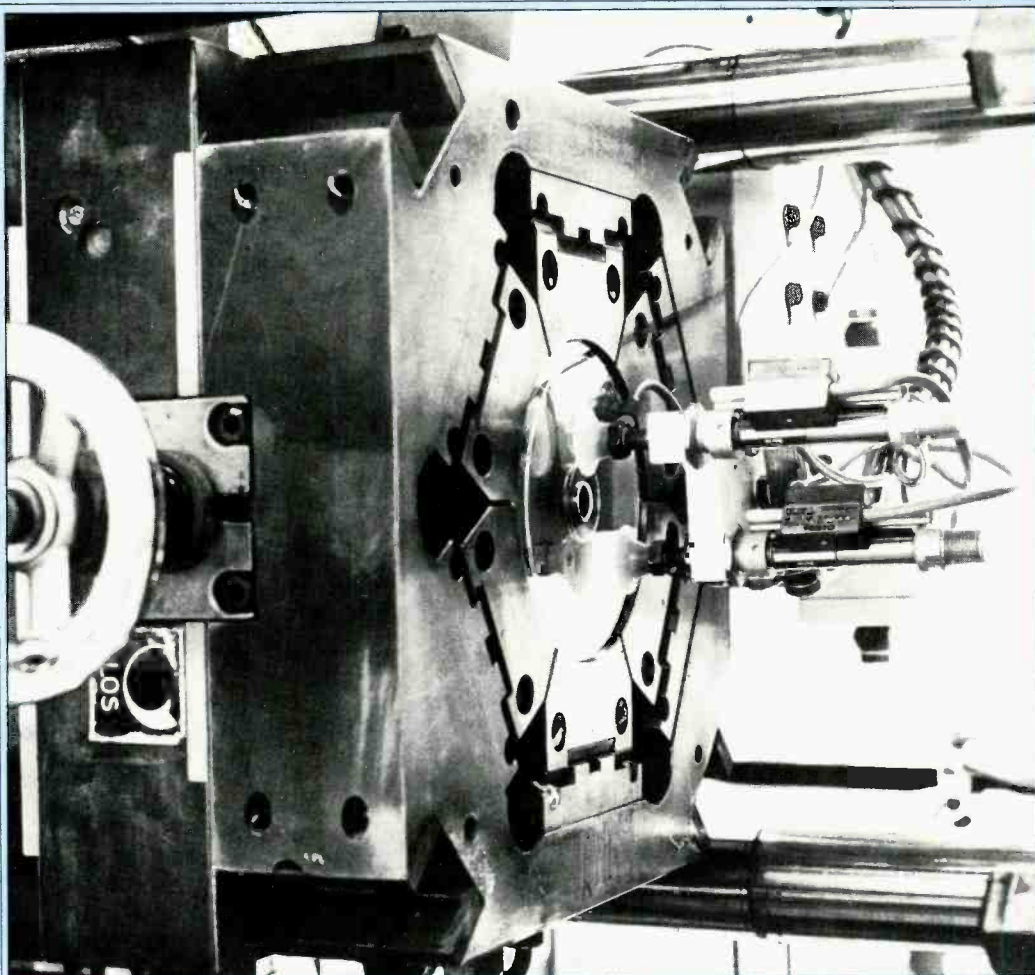
The licence from Philips simply gave Nimbus the right to manufacture the thing called 'Compact Disc'. It was not a recipe book on how to make one.

"All it tells you is precisely what a CD is. Even that sounds too easy: in fact it contains some very obscure mathematics on how the error correction system works and the actual encoding of the digital signal on to the disc. It tells you what output a standard player should see when you play a CD on it. That gives a certain amount of latitude in the physical geometry of the pits on the disc. If you compare Japanese discs and PolyGram discs and our discs, we achieve slightly different pit geometries but they all produce similar outputs from the player. There are different ways of achieving the same result."

Nimbus' pits are more like the Japanese than the German ones. Philips tend to use fairly large pits with sloping sides, the Japanese tend to use smaller pits with very much sharper edges. The shape has to produce the right output signal to meet the specification, but that can be achieved with different combinations of shape and size. Different shapes create different moulding problems.

"They differ, I think, for two reasons. One is that some shapes are easier than others to mould. The other is that it depends at what stage of the mastering process you control the shape of the pits. There are three things which govern the shape of the pits. In very broad terms, there is the thickness of the photo-resist layer, which has to be very accurately controlled. There is the amount of exposure—the amount of laser light that you expose each pit to. And there is the amount of development afterwards. It's analogous to photography. You can either





Robot arm takes a disc from the press

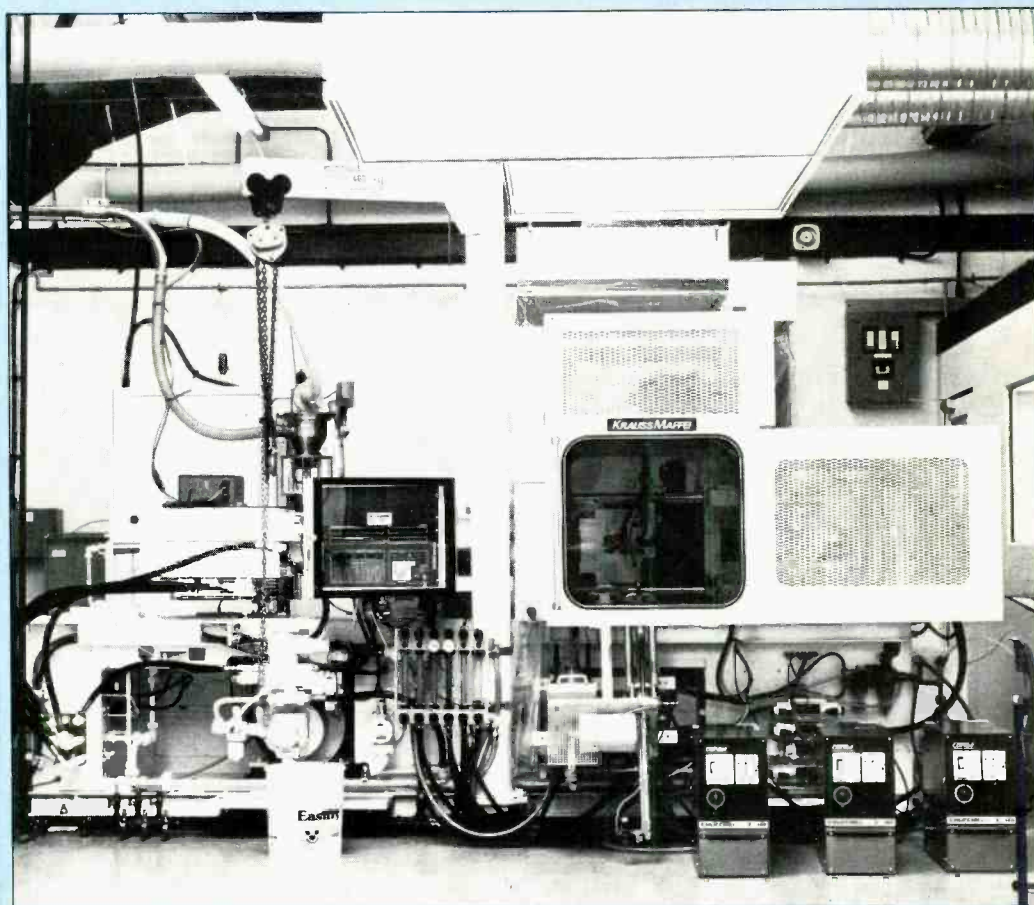
the nickel master that you have grown from the glass master—obviously problems can occur during those stages. It is a very much more refined plating process than for analogue records, but provided it's done properly there's no significant change in the shape of the pits. The most difficult parts are controlling the shape of the pits at the beginning of the process (the mastering) and controlling the injection moulding process to reproduce consistently what is on the stamper. It is only people who are doing it who know how to do that. There are several manufacturers of equipment for injection moulding who have tried to offer packages to mould CDs, but unless you have all the testing facilities that go with the mastering process you cannot actually say whether the disc you are making is a good one or not. You can mould the disc and put it on a player and say it plays alright, it plays all the way through without any muting or anything, but that unfortunately is not sufficient. You have to be able to monitor the shape of the pits and what the error rates throughout the disc are. Is the position of the errors varying from one disc to the next? What's causing them? All of these things require the kind

go for low exposure and very full development or high exposure and partial development. It produces different results. Philips decided in the early stages to use one method of controlling their process and we adopted a different one. It's a matter of which one you believe will give you the most consistency. Opinions do differ about it.

“The manufacturing process is a complete circle. This is one reason why we felt it absolutely essential to have our own mastering facilities. Until we were mass producing discs by injection moulding, we could only produce discs by a laboratory process akin to the one used for making video discs. This is the process that Philips and Sony and we use for making ‘test’ discs. The actual shape of the pits produced by that process is different from that produced by injection moulding. Unless you have feedback from the moulding process to the mastering process, you are working in the dark.”

Does the shape of the pits change as one moves through the chain from master through to stamper?

“The galvanic processes—that is making the nickel mother and the nickel stamper, from



Injection moulding press

of expertise which goes with the mastering process.

"We developed our mastering system over a period of about 15 months: the actual building of it took about eight months. We first used it in December '83, and it worked first time."

**H**ow much of a gamble was it for a small company to invest such a large amount of money? If there had been problems developing the mastering process what would have happened?

"It was an enormous gamble. You have to remember that when we told Philips we were going to develop our own mastering system, their view was, 'Don't be silly! It's far too much for you to take on. We don't think you're very wise to attempt it. You ought to buy ours!' The proof of the pudding is that we've done it. If we'd failed it would have been a very serious setback, mainly of confidence, because by the time we had largely developed the mastering system, we were seeking the finance for the mass production side. The development of the mastering was financed out of both our own resources—income from our analogue pressing—and out of a loan from NRDC (National Research Development Corporation). They had faith in our ability to do it and they provided a loan for the development of the CD mastering.

"Certainly, finding the finance for the mass production stage was a very, very time consuming and exhausting matter. The fact that we had got the mastering to work was a major contribution to getting that finance."

Was the laser mastering part of the whole production process—from tape to finished disc—technically the most tricky?

"The mastering is undoubtedly the most difficult, yes. The skills and the technology required to both develop the mastering, and to maintain the optimum result, are of a higher order altogether to that required to press the discs. But I wouldn't envy anybody trying to make discs without knowing about mastering. Because it's all part of the same chain.

"There's a firm in France which is attempting to do this who have made extravagant claims about their capacity—a ridiculous 30,000 discs per week on one machine. This would require 200 hours of perfect production. Highly

## NIMBUS CD MANUFACTURE

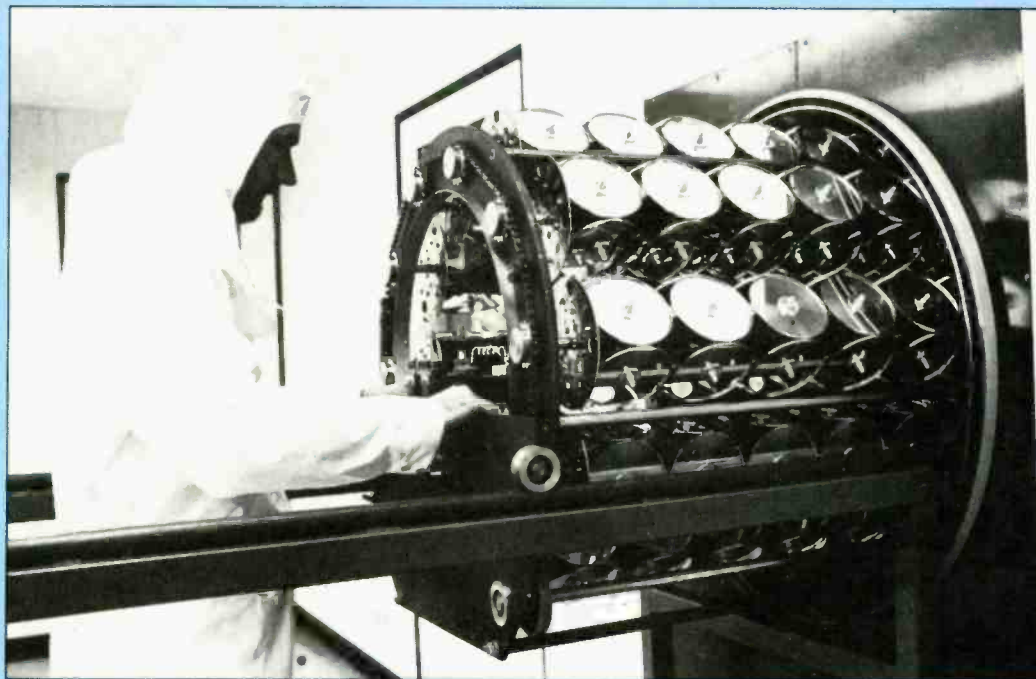
unlikely, simply not possible."

In the UK there were other licensees who have for one reason or another all fallen by the wayside. Most of them

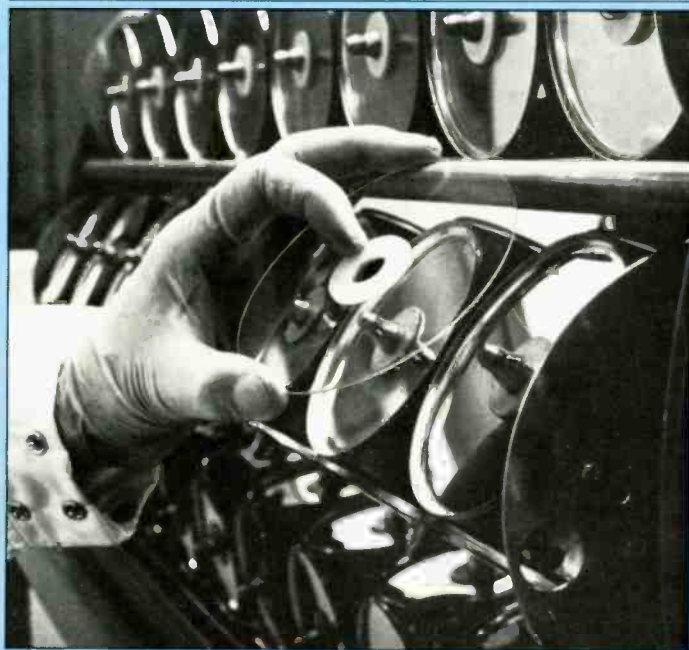
simply because of the technical problems but some of them didn't even get that far.

"We had the good fortune to be able to buy from General

Electric Plastics in Holland a pilot production set-up, which they had developed in order that they could prove a new material which they had developed for injection emerges from the press is mechanically complete. It already has a centre hole of the right size and the outer edge is complete. Apart from the fact that it's transparent and has no aluminium layer or anything else, it doesn't



Discs on rack entering the metallisation chamber



Disc before metallising

"Nimbus started to build their factory in about August 1983. It was complete and ready for equipment in early '84. Unfortunately the original supplier of injection moulding equipment was ultimately something like 15 months late in delivering.

moulding CDs. Up until that time, in Europe, CDs had only been made using the PolyGram system, which is injection compression moulding. The Japanese have always done it by pure injection moulding, which has the great virtue that what

have to go through further stages of mechanical finishing like putting a centre hole in or trimming the edge off, which PolyGram have to do with their process.

"We have been working in discussion with General Electric Plastics for some time. We were desperate, having not had delivery of the original machine, so we went to General Electric Plastics and said, 'can we beg, borrow or steal your machine?' Thirty-nine hours later they said we could buy it. So we did.

"We received that machine at the beginning of August '84, and started producing the first CD from it that actually went out of the door for sale on 22nd August."

**T**he CD is a deceptively simple object. It's flat and round. There are very basic problems in injection moulding a flat round disc. How do you get it to stay where you want it to be, when the mould parts? It's no trivial matter to ensure that the disc stays where you want it—whether it sticks on the stamper or the mirror face which forms the other side of

# Here's to the next 100 units sold around the world

Sony Pro-Audio has good reason to propose a toast. After all the PCM-3324 DASH recorder has outsold all its rivals by a considerable margin and is in use throughout Europe, North America, Australia and Japan.

Despite all the words about formats we believe that the PCM-3324 is the best Digital Audio Multi Track Recorder in the world.

We're biased, of course, but countless top artists and producers keep telling us the same story.

So, we raise our glasses to them "Good recording, great chart success and here's to the next one hundred."



**SONY**   
Broadcast

**Sony Broadcast Ltd.**

Belgrave House  
Basing View, Basingstoke  
Hampshire RG21 2LA  
United Kingdom

Telephone (0256) 55 0 11  
International +44 256 55 0 11  
Telex 85 84 24  
Fax G2/G3 (0256) 474585

the disc. It sounds a simple problem, but it was extremely difficult to solve.

"The other thing is that the optical requirements for compact disc are very much more stringent than, for instance, video disc. With video disc you have quite a large margin around the edge of the disc. A major optical problem with compact disc is strain. If there is any strain left in the plastic after you've moulded it, that produces a property called birefringence. It means that when the player tries to see the track, the track isn't where it thinks it is. So if there is too much strain in the disc, the player cannot follow the track. This is one reason why, up till now, the full potential playing time of CD hasn't been realised. The longest playing time so far—commercially available—is about 70 minutes.

Theoretically the CD can accommodate about 82 minutes, but that would mean going to within about 1 mm of the edge. Nobody has yet managed to mould discs which have a low enough strain that near the edge. We can get around 70 minutes, which is comparable to what is being achieved by PolyGram or in Japan.

"That's one moulding problem. The other is simply reproducing accurately those 6,000,000,000 bits of geometric information, which needs very, very low levels of contamination in the raw material and extreme cleanliness. Even small particles of dust can obliterate thousands of bits. Whilst the player has some tolerance for faults that are due to the manufacturing process, that tolerance is limited. There is an upper limit beyond which things go seriously wrong. The quality of discs has to be very, very good."

Towards the edge of the first CD that Nimbus manufactured (for the BBC), there appeared to be a round spot of plastic, about 2 mm in diameter.

"That was with our original development mould. That spot was due to a pressure transducer, which was giving us information about the pressure with which the plastic was being forced into the mould. It didn't affect the 'playability' of the disc, because that pressure transducer would have been out at the 75-minute radius, or over. We used that tool for about two months, by which time we had learned enough from it to be able to manage without it."

They were running at 75 to 80% reject rate when they first

## NIMBUS CD MANUFACTURE



started but it's now about 25% and going down.

"Those first discs were made at about 5 o'clock in the morning. Because of the late delivery of the equipment, we had to telescope our learning curve into a very short time. This meant many, many days of running the machine through the night."

At the moment Nimbus has just one pressing unit working. This consists of two injection moulding machines, each of which moulds one disc from the raw polycarbonate every 18 s. The moulded disc then passes to the cleanest part of the clean area, the metallisation room. Here the air is changed about 40 times an hour, and the pressure is deliberately kept higher than the outer area, so that there is a steady draught outwards, not in. Clean air is also blown over the moulding machines to keep less clean air away. The air is cleaned to the same standard, 'Class 100', as used by semiconductor manufacturers.

The discs are spread out on a rack which is put inside the metallisation chamber. This produces a very high vacuum. The discs are left in the vacuum for 20 to 30 min to 'suck out' any gaseous impurities. Then the aluminium is evaporated on to the surface of the disc by a tungsten wire heated by an electric current.

After metallisation, the disc emerges from the metallisation room on the opposite side to where it came in from the injection moulding machines. A protective lacquer is applied to the aluminium layer by a machine developed by Nimbus. This lacquer is then cured by ultra violet light. The disc,

which is by now carried in the grey plastic tray which forms part of the display case, is then ready to have the label screen printed on it. This is about the only conventional technology anywhere to be seen. Even this involved some tricky development to produce an ink that sticks to the discs well.

After that, the discs are ready to be tested.

"The finished discs go through three basic tests," says Gerald Reynolds. "Every disc goes through a very thorough visual examination. Discs are sampled regularly by computer, which tells us the error rates and gives us a map of where the errors are on the disc. About one in 100 discs are tested right the way through. We also do an audio check on each new job before we start manufacturing to make sure nothing has gone amiss during the mastering stage."

Experience shows that a fault which affects only an individual disc is likely to be visible. Invisible faults tend to affect the whole batch.

The current pressing unit is the first of three to go in the clean factory area: construction of the second started in February and should by now be well advanced. When all three units are going by the end of this year, they will have a combined capacity of about 3,000,000 discs per year.

A second factory with six more units should be ready to start production in mid or late 1986. This will bring the total capacity to 9,000,000 discs. Nimbus is aiming to capture 40% of the European manufacturing market, and

expects demand to exceed supply for at least two years. Some of the biggest record companies are facing a shortfall in the order of 3,000,000 discs in 1986.

"I have every respect for Barry Fox, but his figures are slightly misleading," says Gerald Reynolds. "I know he wants to argue that the price will come down, but in fact the capacity by the end of this year will not be as high as anticipated. The various plants that were hoping to be in production, like CBS in America, are behind schedule.

"PolyGram are working very conscientiously to fulfil the pressure on them, and so are we, but there is still going to be a shortfall."

**A** number of problems keep cropping up which are under the customer's control. One is the subcode data on 1610 tapes. Very few of the tapes have been PQ edited correctly. Some master discs have had to be scrapped because of drop-outs on master tapes.

A less hi-tech problem is the artwork or film supplied for the label. Many customers are unaware of the limitations of the screen printing process. Nimbus can only guarantee to reproduce lines at least 0.3 mm thick. Lines thinner than 0.1 mm may not come out at all. A simple typeface, without elaborate serifs, will reproduce best.

In a few months Nimbus will be able to offer 2-colour screen printing, and 4-colour at extra cost.

Nimbus also says it is unwise to order too small quantities: last minute requests to increase the run may have to be turned down to avoid delaying the next job.

Gerald Reynolds reckons that producers could sell more CDs by one simple move: "Many producers have missed the opportunity of really using the inlay card. When the disc is on display in the shop, the back of the case is a very good selling area. In many shops you can't open the case and look at the booklet. Nothing is more boring than just a black and white listing of the contents, which is about as far as most of the classical companies have got. Pop producers, in general, use it more imaginatively."

Finally, a small plea. Please leave a couple of seconds of silence at the beginning of the first track, to give those of us without remote control players a chance to sit down before the music starts. □

NOW WITH NEW SOFTWARE

# A small universe



Visitors can evaluate the new version 1.5 Software at the forthcoming APRS in a nearby recording facility.

Admission is by invitation only.

For further information please contact Stand 45 in the Rainbow Suite.

## Create space The DN780 – Reverberator/Processor

Klark-Teknik's ongoing investment in research leaps into the age of variable space with the new DN780 reverberation simulator. Its *Very Large Scale Integration* technology and a superfast *Digital Signal Processor* (DSP) allow the world's first practical application of specifically developed algorithms, creating "added density"™ reverberation: reflections with much smaller intervals between them.

The result is simply – greater realism.

From natural concert hall reverberation through remarkable small room and plate sounds to an impressive "infinite space" effects programme, the DN780 will uncannily place you in the musical environment of your choice.



**KLARK TEKNIK**



British designed, British made  
Trusted throughout the World

Manufactured by Klark-Teknik Research Limited  
Coppice Trading Estate, Kidderminster DY11 711J,  
England. Telephone: (0562) 741515 Telex: 339821

Klark-Teknik Electronics Inc.  
262a Eastern Parkway, Farmingdale,  
NY 11735, USA. Telephone: (516) 249-3660

Distributed in the UK by Autograph Sales Limited  
2 Spring Place, London NW5 3BA.  
Telephone: 01-267 6677

# THE BLACK & WHITE S

The concept of playing acoustic or 'sampled' sounds on a keyboard, first introduced by Fairlight with the CMI in 1979, has now become a requirement of today's synthesiser users.

Syco, the specialists in 'sampling' keyboards, have selected the 'state of the art' instruments, instruments which meet the varying demands of our clientele.

The choice of the best sampling keyboards. The Fairlight CMI, the Emulator II and the Kurzweil 250. The Black and White Collection.

Fairlight CMI is much more than a musical instrument. It is an integrated music production system, expandable to cope with the ever-changing needs of today's musician. Consistently upgraded since its introduction in 1979, the CMI has become legendary for its compositional software. Now the largest selling computer musical instrument in the UK, the options arriving in the next six months will increase its already fantastic potential tenfold.

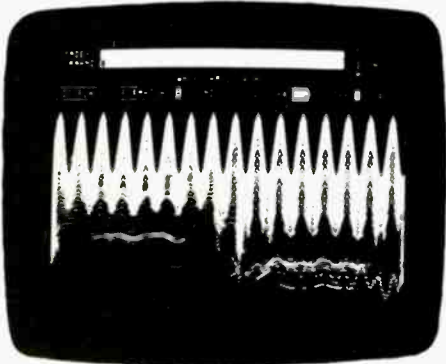
EII, successor to the popular Emulator, brings the power of high quality sampling within the reach of most professional musicians. Featuring a five octave dynamic keyboard with a variety of possible keyboard modes, the inclusion of filters, VCAs, envelope generators and independent LFOs allows you to extensively modify any sampled sound. An eight track sequencer with MIDI and SMPTE interfaces enables complex compositions to be recorded. These features, together with a dramatically increased sampling memory make the EII a powerful creative tool.

Kurzweil 250 features an 88 note piano-type keyboard. Utilising technology from the fields of artificial intelligence and pattern recognition it achieves extraordinary realism of sound with unprecedented expressive capabilities. It's supplied with thirty preset sounds, (expandable to 60), can accommodate up to 40 keyboards set-ups, and features a twelve track sequencer. Ideally suited to live performance and studio work, the Kurzweil 250 is the only viable alternative to an acoustic grand piano.

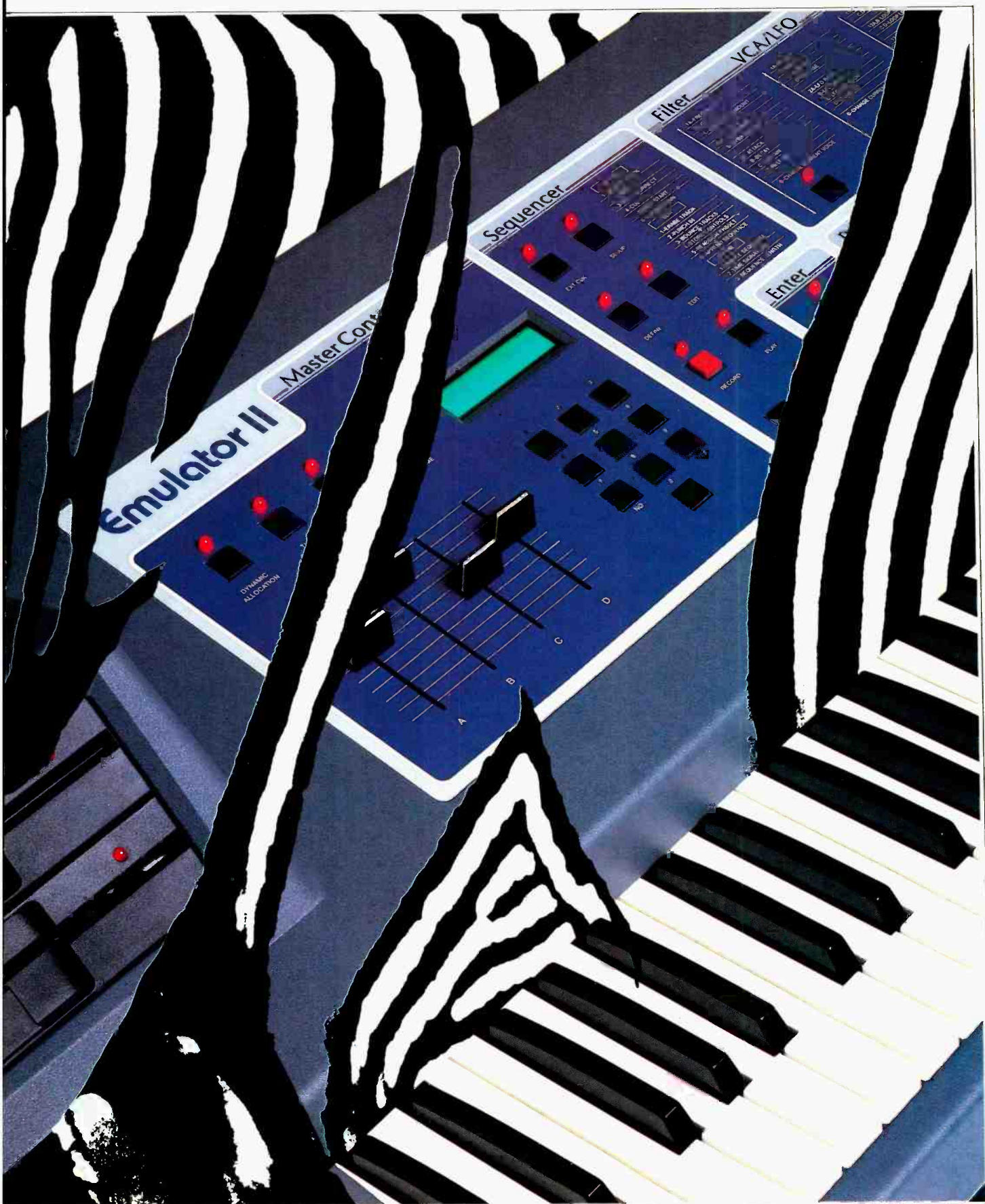
All of these instruments are available for you to see and hear at our demonstration suite in W2. So next time your looking for something very special, try the best sampling keyboards.

The Black and White Collection.

Syco, 20 Conduit Place, London W2.  
Telephone 01-724 2451 for an appointment.  
Telex 22278 Syco G.



# ELECTION FROM SYCO



**Syco.** We are

# STUDIO FILE

# STUDIO FILE

During 1984 Hollywood Studios opened their doors to the recording industry and began to take outside bookings. The studios are owned by John Edward who has been in the music business for some time, having played guitar with David Jones (later David Bowie) in the Manish Boys, been a booking agent, pirate radio DJ, rehearsal rooms proprietor, publisher and record producer. From the building that houses Hollywood Studios, John operates his group of mainly music related companies which include Hollywood Records and Hollywood Publishing.

During the early '80s various ventures began to pay off allowing him to realise his personal ambition of owning a professionally designed multitrack recording studio. Though initially he intended Hollywood as a private studio in which to work on his own projects, after a complete studio re-fitting in 1984, financial practicality led him to start hiring out. As he explained, he feels there are also other advantages.

"The idea of having studio clients is not a bad one. You get a chance to keep tabs on what other producers are up to. And at least people realise we're a record company as well and they can bear that in mind if they want to submit recordings."

In the mid '70s he had become aware of an acute shortage of rehearsal rooms with reasonable facilities in the London area. He found suitable premises in Upper Clapton Road in East London (now Hollywood Studios) a

## Hollywood Studios, London

long building with good straight-through ground floor access and ample parking facilities. The building had previously been a factory among other things and needed considerable sound insulation before it could be used for rehearsals.

He built up the rehearsal studios room-by-room over a period of time and was not averse to rolling up his sleeves to mix and lay concrete and the like. When he opened his first room, Dire Straits rehearsed their first album there and were followed by various well known and not so well known bands. With 1,000 W Orange PA systems, fitted carpets and various comforts, the four rehearsal rooms were soon well booked with clients that included Billy Idol, Adam Ant, Susie Quatro and Bucks Fizz.

After eight years, he called in a company of studio design consultants to give him a quote for the full treatment to make the transition to recording studio but on hearing a quote of £75,000 for a control room and studio he realised that he was going to need considerably more funding to finance the project than he had access to.

Towards the end of the '70s, John started to turn one of the rooms into a recording studio. Norman Bone—an ex-BBC man who had experience of studio design and acoustical treatments—advised John and became his partner for a

while.

"Norman told me how to put up the two-by-two timbers on the walls, the Rockwool in between, the plasterboard, marine ply and all the rest of it."

Alex Alexandros—an ex-Soundcraft employee—also became involved with John, bringing in a modified and reconstructed Soundcraft console.

After producing some 30 or so records that were released during the '70s, his efforts in that direction were finally rewarded two-fold. He devised Metal Micky, a radio controlled robot, to promote a single featuring a vocoder treated vocal. Metal Micky was more successful than the record and promotional appearances led to a London Weekend Television series as well as various commercial spin-offs.

John also had a recording project for a single that had been on the shelf gathering dust for seven years which had previously been turned down all over town. Originally conceived and put together as a joke, it was suggested that he record a slightly less tongue-in-cheek version which he did. The song was written by John and his wife Susanne, published by his own company and released on his own label. The record—*Save Your Love* by Renee and Renato—was a No 1 UK hit and an international hit with multiple cover versions. John's days of

concrete mixing were over.

As soon as *Save Your Love* started to move up the British charts John decided to get serious with regard to developing the recording studio. Some 30 rubbish skips later, the carpets, mock tudor beams and all the rest were gone and John had an Eastlake control room and studio.

The studio follows two popular trends in that the acoustics are quite reflective and live in the mid and high frequencies, and there is a complete synthesiser-sequencer-computer suite which can be patched into the control room. John says he wanted a friendly and comfortable environment and this has been achieved.

The four rooms adjoin one another in a straight line. The control room is at one end, then there is the main studio. Then there is a room currently used for John's video and television routining. At the opposite end to the control room is the synthesiser suite. The layout makes simultaneous use of the different rooms quite practical.

The increasingly popular wood-faced floor, ceiling and wall coverings dominate the Eastlake designed control room and main studio. Floors are African Walnut while the rest is American Red Oak.

The control room was kept to a comfortable and practical minimum size to allow the studio area to be as large and live as possible. The Soundcraft Series 2400 console faces sliding glass doors (with around a 2½ ft sound isolation gap) which allow good visual

The main studio room



The synth room





# STUDIO FILE

# STUDIO FILE

contact and access to the studio. The multitrack is an Otari 24-track *MTR90* which is complemented by an Otari ¼ in *MTR12* recorder and a Sony *PCM F1*. Studio monitors are by Eastlake, powered by HH amplification with White graphic equalisers. There are also Yamaha *NS10* speaker units as well as Auratone reference monitors. The signal processing rack—which is recessed into the wall—houses an AMS *RMX16* digital reverb, Audio+Design *Panscan* and various other units.

The main studio room measures 18×30 ft with a ceiling height of 18 ft. There is a Yamaha *Baby Grand* and a Fender *Rhodes* electric piano. Novel features include a couch and palm trees!

## Hollywood Studios, continued

Monitors are recessed into the ceiling.

A drum booth with variable acoustics is situated at the opposite end from the control room. There is also a small isolation booth of just under 59 ft<sup>2</sup> with mainly mirrored and glass surfaces with curtains for acoustic variation.

The room used mainly for John's own video and television work divides the synth room from the main studio. The synth room has basic sound insulation and quite acceptable acoustics for what is essentially all DI and sequencing work. Most of the instruments and ancillary

equipment are set up on a plinth making them convenient to use. Most are linked via the UMI *1B* (issue 3.12) combined sequencer and MIDI interface which is run on a BBC-B micro with the Aries 20K memory extension. This is used with the Garfield Electronics *Mini Doc* which triggers a *LinnDrum*. The equipment also includes a Yamaha *DX9*, Yamaha *DX7*, PPG *Wave 2.2*, and the Simmons *SD7* Digital/analogue drum system. This is all patched through a Soundcraft series 200 16-channel mixer to Tannoy *Super Red* monitors and/or Yamaha *NS10* speaker

units. There are 16 lines hard-wired through to the console in the control room.

Studio operatives include engineers' Stephen Warwick and Roger Wake as well as programmer/arranger Simon Sterling.

In summary, Hollywood is in touch with the currently favoured live and reflective acoustics, and well equipped to deal with the popular computer-sequencer oriented recording. The comfortable and light feel of the studio make it an easy and enjoyable place in which to work.

**Hollywood Studios, 38  
Upper Clapton Road,  
London E5. Telephone:  
01-806 0071/4.**

Ralph Denyer

LONDON BOROUGH OF ISLINGTON

**BRITANNIA  
ROW**

**N.I**

**COMPLETE SERVICE AUDIO HIRE**

**2-24 TRACK TAPE RECORDERS**

**BTX SYNCHRONISERS**

**DIGITAL TAPE RECORDERS**

**NOISE REDUCTION SYSTEMS**

**PROFESSIONAL VIDEO EQUIPMENT**



01-226 3377 TELEX: 268279 BRITRO G  
BRITANNIA ROW LTD 35 BRITANNIA ROW LONDON N1 8QH

# STUDIO FILE

# STUDIO FILE

## Battery Studios, London

Battery Studios in West London are located in three separate sprawling buildings where they have quite rapidly grown up and spread out, and continue to do so at an almost alarming rate. Part of the Zomba group of companies which include the record and management companies, the mobile, the four studios and Dreamhire studio equipment hire company, the Battery studios are equipped to a very high standard: Solid State Logic consoles with UREI *Time Align* monitoring in three of the rooms, a long list of outboard equipment as well as virtually any kind of synthesiser/keyboard you care to name.

All the buildings at one stage belonged to Morgan Studios, scene of many a '60s hit, and Battery bought them in the order of their numbering—so you can work it out as you read. The first was in Chaplin Road, which surprisingly seems to be directly opposite a primary school. Perhaps it has been a studio for so long that when planning permission was first granted they did not realise what a recording studio was, or they would surely have jumped to all the irrational conclusions planning authorities usually do these days.

Battery One (ex-Morgan Four) was taken over by Zomba in 1980. In July 1981 the studio was closed and completely gutted and refitted by Keith Slaughter, working with the studio's technical manager Derek Sticklen. The room is approximately 21x14 ft and was full of keyboards and synthesisers at the time of our visit. Beyond the keyboards is the first SSL *SLA000* 40-channel console with *Total Recall* acquired by Battery. Complemented by the UREI *813 Time Align* monitors powered by Studer *A68* power amps, this set-up formed the model for the subsequent studios.

The Keith Slaughter design incorporates a sloping ceiling made up of a combination of wood and hessian with bass traps towards the rear, the angle of the ceiling levelling off over the desk and going up again towards the monitors. The room is fairly bright and looks into a spacious recording

area, which is very live, having been designed for large orchestral work. This was redesigned in January 1984, as it was felt that the room was too dead, explained Derek. A certain amount of Bradstone stone wall tiles were introduced with drapes located all round the room so that you could deaden it up if required, and bass trapping took care of the booming bass problem they had previously experienced in the room. Derek wanted as flat a room as possible and that's what he reckons he got.

The 'Cotswold'-type stone is moulded tiles glued on to plaster board, and all the walls are slightly angled. Other wall surfaces consist of oak panelling and hessian. The floor is covered in Japanese wood.

The grand piano is a Yamaha *C3* which was quite recently acquired and lives here.

All the studios have a large range of effects units, although a lot of them are floating. As a basic guiding rule, they try to have one digital reverb and one digital delay line in every room as a permanent fixture, explained studio manager Chris Dunn. Studio One has a Pultec *EQP1A3* valve equaliser, Klark Teknik *DN22* graphic, UREI *1176* limiters, dbx compressor/limiter, two UREI *545* parametric equalisers, AMS *DMX15-80* mono delay, Eventide *H910 Harmonizer* and *FL201* flanger, Valley People *Kepex* noise gate and *Gain Brains* and AMS *DMX 15-80S* digital delay and *RMX16* digital

reverb.

The 2-track machines are situated at the front of the room between the monitors and are Studer *A80VU*, one of which is convertible to 1/2 in. Multitracks are two Studer *A800* 24-track machines, one of which is utilised by the company's hire service when not required at Battery. The cassette recorder is a Revox *B710 MkII*. Noise reduction consists of 24 Dolby *361s*, with a floating rack of the new Dolby *SP24s* for 48-track work. Reference monitors are Yamaha *NS10Ms*.

Between the monitors there are three television monitors: one CCTV for close ups of artists in the studio, one to view the front door and one for the SSL's *Total Recall*.

Behind the control room is what used to be a live room in the Morgan days. Redundant as such with the revamping of the main studio, this has now become a playroom with television, pool, snooker, table tennis, video games and a fridge.

The rest of Chaplin Road houses the studios' administration offices with Helen Tyler who takes care of bookings as well as working with Lou Landin on the Dreamhire side of things; the hire company store room; the tape store and Impulse Records, a promotion company which does not belong to Zomba although there is a working connection.

This sprawling building is probably destined to sprawl some more. Prior to the purchase of Battery's latest

studios, an adjacent plot of land became available and the company naturally snapped it up, with a view to expanding. Since they have subsequently purchased another building round the corner this project has temporarily been put on ice.

After Battery One, came Battery Two where Rod Stewart recorded *Maggie May* all those years ago. A few minutes' walk away on the corner of Maybury Gardens this facility was acquired from Morgan in December 1980. The recording area, which was very dead, was livened up, the console and monitors replaced and otherwise it is just the same. Derek Sticklen has it scheduled for a cosmetic facelift, but the acoustics will remain.

It was previously a very dead room with carpet on half the floor and wall areas. The floor is now all parquet. The layout is rather odd: to get to the control room you have to negotiate the recording area; commanding the best view of the studio is a small iso room which is no longer used for recording and the control room is to one side, unable to see about a third of the room where the Yamaha *C3* grand piano stands. The piano area has a lowered ceiling to house air conditioning ducts. The walls were livened up by means of introducing the stone tiles used in Battery One.

The control room has not changed acoustically or cosmetically since Morgan. The ceiling slopes downwards and walls come in towards the front of the room giving a strange impression of being in a cinema or some such place. The UREI *813 Time Align* monitors are mounted on plinths in front of the 32-channel SSL *SLA000E* this time without *Total Recall*.

"At the time the old Cadac desk was replaced it was felt unnecessary to provide the *Total Recall* in here, and all it means is that sessions requiring that facility go into one of the other studios," explained Chris.

What really dates the room is the thick carpeting on the rear wall and the rear section of the side walls. Moving towards the front of the room the walls become wooden slats over the hessian with trapping

Studio One's control room complete with CCTV monitors



# UB40 CHOOSE AMEK

Congratulations to UB40 on the success of their latest hit album, GEFERRY MORGAN. Recorded and mixed at their own studios in Birmingham on their AMEK ANGELA console. Yet another outstanding example of the ultimate sonic performance that only AMEK delivers.

GEFFERY MORGAN on DEP INTERNATIONAL produced by UB40 and HOWARD GRAY.

Head Office and Factory:  
**AMEK SYSTEMS AND CONTROLS LTD.**  
Islington Mill, James Street  
Salford M3 5HW, England  
tel: 061 834 6747  
telex: 668127

In the U.S.A.  
**AMEK CONSOLES INC.**  
10815 Burbank Blvd.  
North Hollywood, CA 91601  
tel: 818 508 9788  
telex: 662526 AMEK U.S.A.



# STUDIO FILE

# STUDIO FILE

behind.

Tape machines are one Studer A80 24-track machine and two 2-tracks, and the reference monitors are Teac LSX7s and Yamaha NS10Ms. Effects and outboard gear are of similar wide range and plentifulness as Studio One. These could not be inspected very thoroughly because engineer Peter Wooliscroft was trying to get on with a mix which he had had to start at 6 o'clock that morning in order to get studio time.

The rest of this building is Jive Records and Zomba music publishing and management.

A few yards further into Maybury Gardens is the newest Battery, which Morgan converted from factory premises. Next to the main building there is a small cottage which, when redecorated will be used as a store. The main house is vast and contains two more studios, a dance studio, and various recording, musical, resting and recreational facilities.

Battery Three is upstairs and was originally a 24-track studio built by Morgan. So far nothing has been changed and it was closed down at the time of our visit for air conditioning work. It has a Trident Series 80 console with UREI 815s and Studer A80 24- and 2-tracks. One of the applications being considered for this studio is digital. The recording area is fairly large and it would probably be very suitable.

Below this is the dance studio which is sometimes used as a live room by Battery Four down the corridor. The floor has some very curious, well, mounds I suppose which look for all the world like graves! Chris is still dying to find out who is under there. Seriously, he puts it down to bad workmanship on the part of Morgan's builders.

Mutt Lange has his studio in this building 'in transit' prior to moving it into his home. Mutt is one of the many producers which Zomba manages, including Martin Birch, Nick Tauber, Tim Friese Green, Tony Platt, Mike Howlett, Peter Henderson, Nigel Green (who started life as tape-op here), Peter Harris, Bryan 'Chuck' New and Phil Nicholas. Mutt's studio has no less than two

## Battery Studios continued



Control room, Studio Four—recently opened

consoles: a TAC and a Soundcraft with every keyboard, synth and drum machine you could wish for. This room will be available as additional studio space when Mutt moves.

Continuing on round the house there are several rooms tucked away which are variously kitchen facilities, recreation room, Jive meeting room, Derek Sticklen's workshop and the programming room. This is principally for the Fairlight and PPG with a Soundtracs 16/8/16 small console, Portastudio and various other bits and pieces to facilitate the programming of the numerous synths and drum machines, etc. Producer Peter Harris is the house Fairlight programmer and this room is principally for his benefit. Phil Nicholas who works primarily with Mutt Lange also does programming work for Battery.

On the ground floor, Battery Four is the company's latest pride and joy which has only been working since November 1984. Previously a Morgan rehearsal studio Keith Slaughter was brought in to completely rebuild with emphasis on a large control room to cater for lots of keyboards. Its size is increased by virtue of the fact that the multitrack machines can sit outside behind sliding glass doors if so desired.

Because of this the isolation room is not over large although quite adequate for their purposes. The walls are covered in angled wooden panels which are a new Keith Slaughter design for bass traps

which actually have wooden fronts. Derek has been very impressed by these and stresses that they work extremely well. They are also employed at the back of the control room. The rest of the wall surfaces are a mixture of hessian and wood.

The console in Battery Four is 48-channel SSL SLA000 in a 56-frame with Total Recall. Derek discussed the reasoning behind the company's decision to go SSL virtually throughout. Every studio they have refurbished has been fitted with an SSL console. It wasn't necessarily simply that the combination of SSL and UREI monitoring seems to equal bookings at the moment. It was more a case of having installed SSL in Battery One, they wanted to make the other facilities compatible with that enabling the studios themselves to be very flexible; if a producer recorded in Battery One, he could move to Four for mixing and find the same kind of atmosphere and facilities there. "I must say, however, that SSL is the finest desk I know of—for its facilities, reliability... almost everything. It is very expensive, but it is worth it," Derek concluded.

Battery Four's wiring obviously involved a fair degree of forethought. It may be accessed almost anywhere in the control room, so that should they wish to change things round ever it may be done so without completely destroying the decor. This was done by means of Budgie boxes "or at least that's what the builders kept calling them at any rate. I don't know why!"

The effects racks can be floated on an umbilical cord which plugs straight into the patchbay so you don't get masses of wires all over the place. The racks contain two Drawmer DS201 noise gates, three UREI 1176 limiters, four dbx 160X compressor/limiters, AMS DMX15-80S digital delay, Yamaha REV-1 digital reverb, three Kepex: two Gain Brains and one noise gate, Roland SBF325 stereo flanger, Klark Teknik graphic, Eventide H910 Harmoniser, Lexicon Prime Time, Sony PCM F1 system, and EMT 140 and 240 Gold Foil plate reverbs.

For the monitoring it is again UREI 813s with Yamaha NS10Ms for reference and the tape machines are two Studer A800 24-tracks and A80 2-tracks.

Self-appointed resident cynic Tony Platt was working on a Gary Moore video with assistant Andrew Warwick at the time, which represented the first time Battery had mixed to video. The necessary monitors and Q.Lock, etc, were hired in although they would of course buy them if demand grew.

The studios are just a small part of an altogether larger-scale whole as can be glimpsed here. There is a mobile which for the moment is living in South Africa where it records many black artists. The tapes are then sent back to London for mixing, etc. Zomba also has record companies in South Africa and America.

The nearby Power Plant have three studios in Maybury Gardens, but there is no real rivalry between the two companies, according to Chris. There is so much work around at the moment for them that they can all be friends and help each other out when needed.

Perhaps SSL plus UREI plus management of several top producers who all like the studios are the secrets of Battery's success. They must certainly contribute. At the end of the day, however, it's all down to the studio and equipment, and if that is good it will succeed.

Janet Angus

**Battery Studios,**  
14-16 Chaplin Road, London  
NW2 5PN. Tel: 01-451 3044. □

# Now an Aural Exciter™ for Every Audio Channel!

The new Modular Apex Aural Exciter is designed to fit in the popular Apex R-1 Rack System. Ten across! Or nine across in the dbx F900 Rack System. So you can now add the psychoacoustic excitement of an Aural Exciter to every audio channel without filling your entire rack with stereo Aural Exciters.

Like the famous Type II Aural Exciter, the new modular version restores natural brightness and



presence... improves intelligibility  
... increases perceived loudness  
... and generally improves acoustic performance. All without the unnatural distortion which can be caused with other signal processing.

See the Modular Aural Exciter at your sound professional's soon. And, while you're there, check out the modular Apex EQF-2 Equalizer/Filter and the CX-1 Compressor/Expander.



**Apex Systems Limited**  
Atlantex Music Ltd.,  
3 Cadwell Lane, Hitchin  
Hertfordshire SG4 0AG  
Telephone: (0462)31511  
Telex: 826967



Aural Exciter is a registered trademark of Apex Systems Ltd., North Hollywood, CA

© 1984 Apex Systems Ltd.

#### AUSTRALIA

East Coast Audio Sales,  
Melbourne

#### AUSTRIA

AKG, Vienna

#### BENELUX

Trans European Music,  
Dilbeek

#### CANADA

AKG Acoustics, Scarborough

#### DENMARK

SC Sound, Taastrup

#### FINLAND

Nores Oy, Helsinki

#### FRANCE

3M France  
Cergy Pontoise Cedex

#### GERMANY

AKG, Munich

#### GREECE

Omikron, Athens

#### HONG KONG

Audio Consultants,  
Kowloon

#### ITALY

M. Casale Bauer, Bologna

#### JAPAN

Matsuda Trading, Tokyo

#### NEW ZEALAND

Maser Comm., Auckland

#### SINGAPORE

Auvi Private Ltd.

#### SOUTH AFRICA

Tru-Fi Electronics,  
Wynberg, Sandton

#### SPAIN

Neotecnica, Madrid

#### SWEDEN

AB Betoma, Solna

#### SWITZERLAND

PAS, Basil

#### TAIWAN

Linfair Engineering, Taipei

# BUSINESS BUSINESS



Barry Fox investigates the facts behind the industry news

## Spoiler boiler

The BPI and record companies have now got themselves back into the position where they were at the end of the '70s, before a disastrous PR front and nonsensical sci-fi talk about spoilers to prevent home taping, pulled the rug from under their case for a levy or tax on blank tape.

The recent Government Green Paper approves, in principle, the idea of a small levy. Information Technology Minister Geoffrey Pattie says the Government changed its mind because the record industry has now stopped whining so loudly for compensation on lost sales. "No-one could know what sales should be," says Pattie.

A small levy, to be fixed by law at a maximum of 10% for audio tape and 5% for video tape, will effectively legalise what the record industry calls copyright theft and let people home tape with impunity. Pattie pledges that all the money, after administration fees have been deducted, will go to the copyright owners. None will go to the Treasury for bigger and better bombs.

The Green Paper is a discussion document and Pattie's ministry, the DTI, welcomes comments. But as usual, in its typical clumsy way, the DTI has set a deadline (April 30) too late for leaders of most monthly magazines to respond.

The Government obviously realises the risk of giving the profligate record companies a present of free cash. The money raised (around £5 million a year from audio and £5 million from video) will be collected by an independent society and then distributed by a hard-nosed industry group. One suggestion is the MCPS which already has long experience of dealing with the not-always-too-honest record companies.

Back in the mid '70s, the idea of a levy on tape to legitimise home taping made sense. But then someone, somewhere, talked the BPI into plucking figures from the sky to 'prove' lost sales of over £300 million a year. Government ministers and the Patent Office officials who advise on copyright are human. They buy records and tape for use in their cars. So they know the £300 million claim is just baloney.

By talking about spoilers, in the late '70s, the BPI gave the Government a Heaven-sent opportunity to duck the potentially unpopular solution of imposing a fresh tax on the public, while appearing to be helpful. The idea of a spoiler, which magically permits normal reproduction of a record but spoils any attempt at making a tape copy, was first proposed by the Beatles' electronic company Apple, in 1967. It has been repeatedly re-invented and discarded ever since.

Through 1978 and 1979 the BPI commissioned the Wolfson Unit of

Southampton University, at a cost of over £10,000, to carry out spoiler research. Over the following two years the BPI officials, including its chairman and members of the technical committee, publicly reassured the record companies that a working spoiler was not only possible but nearly ready. So it was no surprise that in the 1981 Green Paper the British Government neatly side-stepped the levy issue by promising to introduce legislation in support of any spoiler which the industry could develop.

By definition a spoiler signal would prevent home taping and thus make a levy redundant. It is hard to believe that an industry, which relies entirely on technology for its living, can have been so stupid. I am not surprised, however. Every time I have tried to talk technology to the trade bodies for the record industry, spokesmen who were only too happy to make nonsensical pronouncements in public, have prefaced their private remarks with those familiar words: "Of course I am, not technical."

I am only too happy to admit that I know nothing about brain surgery. That's why I steer clear of writing and talking about the subject.

## Advice for drop-outs

A record producer was complaining recently about the cost and practical problems of mastering for CD release. The prime gripe was the need to use U-Matic videocassettes for the digital master. Normally these have a maximum playing time of 1 hr. But 75 min U-Matic cassettes are available. Yes the machine tape tension has to be re-aligned to cope with the thinner base. But the re-alignment is usually a simple job (a couple of extra capacitors in the electronics) and new machines already contain them.

Also don't be surprised if PolyGram soon starts accepting Decca open reel tape as the master source. Incidentally the 75 min tapes actually run for 81 min, with 4 min set aside for the control code data.

More of a problem than running time, or at least apparently so, is the risk of drop-out from U-Matic tape, especially if it has run several times. This is even more likely if the tape is thin-based for longer than 1 hr playing time. Decca's open reel system is so heavily protected with error correction that drop-outs are virtually no risk. But a producer planning to send a U-Matic master to Hannover, or Japan, needs to listen to the cassettes for any drop-out crack or mute, and if there is one go back to square one, re-master and listen all over again. So the hours roll by. Actually there are some simple ways round this, which not everyone seems aware of.

The first rule is never to re-use tape. At £20 a U-Matic cassette, it just isn't a worthwhile economy. Second, note that most of the drop-outs heard (around 90%) are on replay only. They are not on the tape. If you run back to the offending spot on the tape, the chances are that the drop-out won't be there second time around. There's a simple safeguard in case it is. Use two machines, locked together for mastering. In other words make two master tapes at the same time. That halves the chances of ending up with a drop-out recorded on to tape.

Of course the real, long-term answer is a U-Matic recorder with reassurance head that monitors off tape, just like an ordinary analogue deck. Professional video machines have these, so why on earth not U-Matics? No reason. This is why it's a dead certainty that U-Matics with reassurance heads and off-tape monitoring will be available soon. Sony say January but it could be sooner. The extra heads will give read-after-read as well as read-after-write.

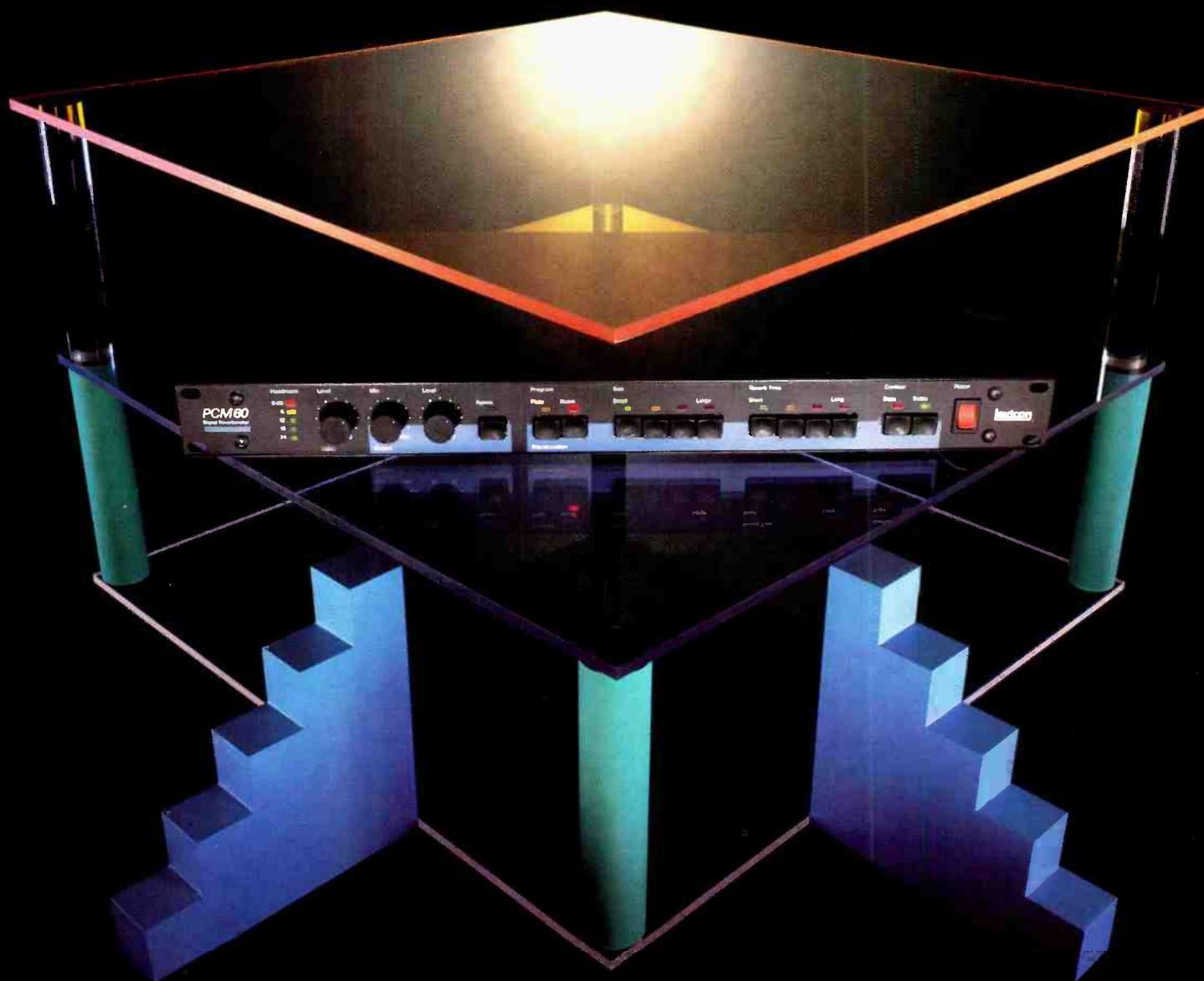
## Don't be an expert

I am not surprised lawyers find it so difficult to get people to come into a UK court and give evidence as 'expert' witnesses. If my experience is anything to go by, the best thing you can do when asked to give technical evidence is run a mile. I was approached by a firm of solicitors representing a retailer who had been accused of deliberately damaging gramophone records. They had got my name as someone who had been critical of the general standard of record pressings in Britain and would thus say that not all records supplied to the shops are perfect. I agreed.

Everything was a terrible rush. I spent many hours overnight hunting out old documentation and spent the best part of a full Saturday afternoon giving statements to the defence team. I was told I would get £50 for this research. In lost work it cost me far more but I agreed. I then had to go to a suburban court where I sat around for the best part of a day before being grilled under cross-examination. I lost a full day's work for which the court awarded £50 compensation.

Months later I was still waiting for payment on the drop-everything research work and weekend briefing. Finally, after heavy badgering, the solicitors explained that their client was on Legal Aid so they had to get the money out of court. Not in the best of grace, they paid me out of their own pockets. So, the total fee paid for searching through piles of old documents for material admissible as evidence, a weekend briefing for the defence team, a day in court and literally months of chasing for payment produced the princely total sum of £100. I am assured this is routine. Be warned. □

# Presenting Lexicon's *PCM 60*



## *Superior Digital Reverb Within Reach.*

Lexicon proudly announces the PCM 60, Digital Reverberator—the first reverb with the Lexicon sonic quality demanded by so many performing artists and studios at an amazingly low price.

Inside the PCM 60's refined package are the same realistic rooms and plates that have made Lexicon famous. And Lexicon engineers have carefully designed the PCM 60 for rugged use and easy operation: over 100 distinct and useful reverberation effects are only a few pushbuttons away.

Whether you're looking for a long, rich reverb for vocals; a warm spaciousness for instrumentals; a bright or sizzly plate for percussion; or a natural ambience for dialog or all forms of electronic music, the PCM 60 does the job with Lexicon style.

Don't invest in a reverb until you demo the PCM 60 at your Lexicon dealer. With the most demanding program sources, listen to the PCM 60 and compare it with the competition—you'll find no one else comes close. For the serious musician or small studio, the PCM 60 is worth your investment.

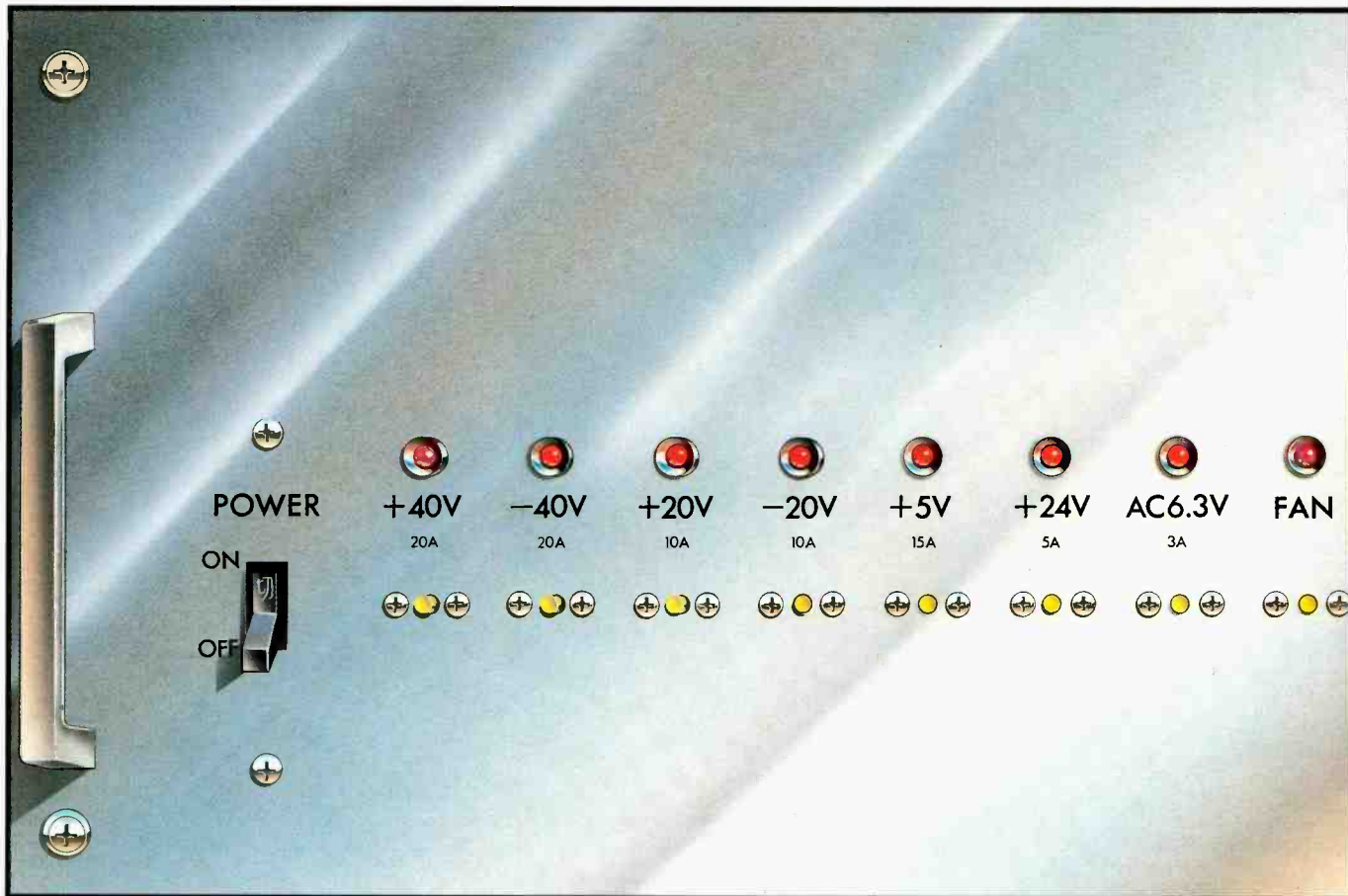
**lexicon**

Lexicon, Inc., 60 Turner Street  
Waltham, MA 02154  
617 891-6790 Telex 923468

Export: Gotham Export Corporation,  
741 Washington Street, New York, NY 10014



SCENIC SOUNDS EQUIPMENT LIMITED  
Unit 2, 10 William Road, London NW1 3EN  
Tel: 01-387 1262, 01-734 2812  
Telex: 27939 SCENIC G



# THE **///** FUTURE **///** OF **///** MULTITRACK IS **///** IN **///** YOUR **///** HANDS

Otari Corporation  
2 Davis Drive,  
Belmont, California 94002  
Telephone: (415) 592-8311  
Telefax: (415) 591-3377  
Telex: 910-376-4890 OTARICORP BLMT

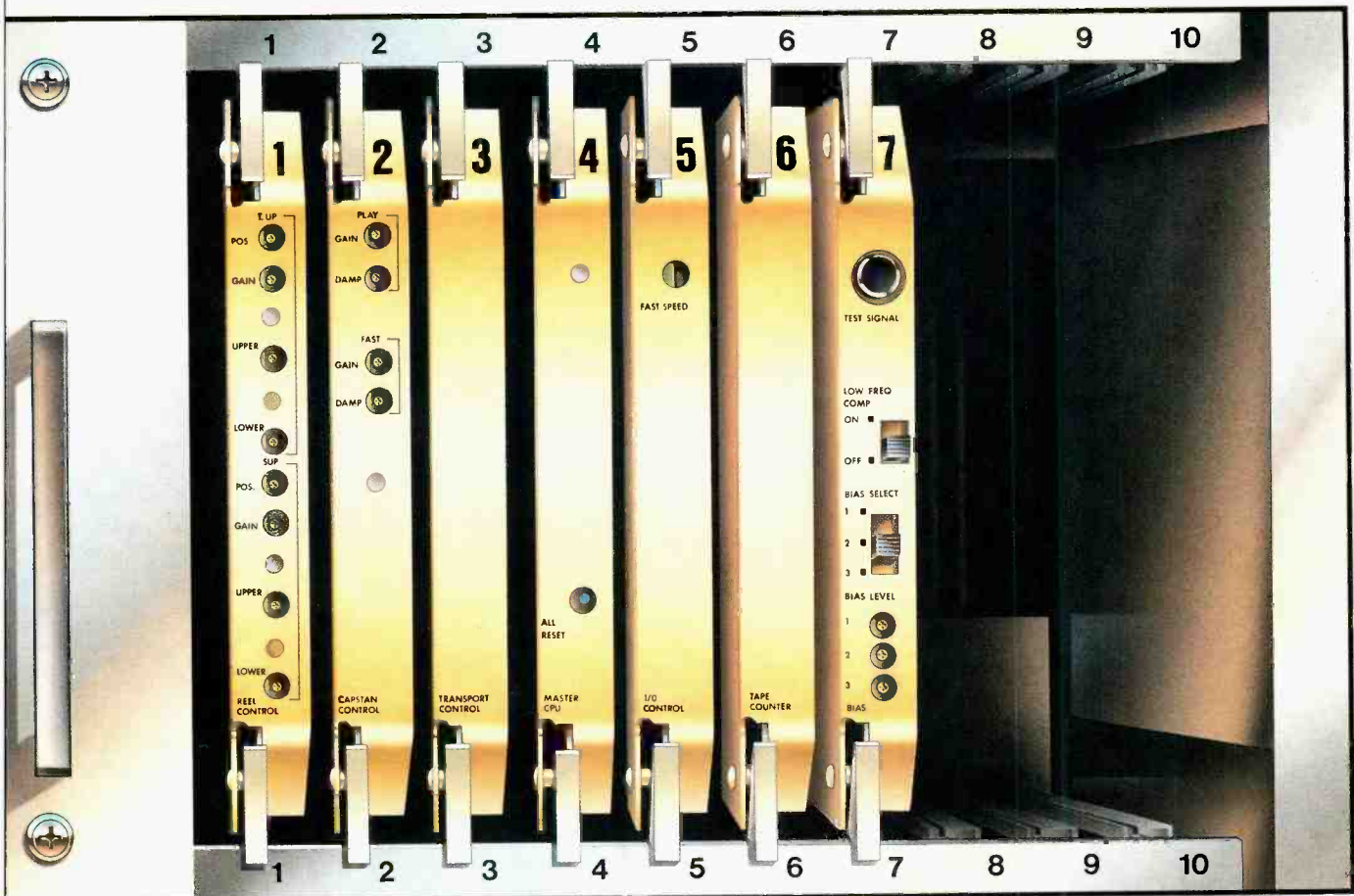
Otari Electric Co. Ltd.  
4-29-18 Minami-Ogikubo,  
Suginami-ku,  
Tokyo 167  
Telephone: (03) 333-9631  
Telefax: (03) 331-5802  
Telex: J26604 OTRDENKI

Otari Singapore Pte Ltd.,  
625 Aljunied Road,  
07-05 Aljunied Ind.,  
Complex Singapore 1438  
Telephone: 743-7711  
Telefax: (743) 6430  
Telex: RS36935 OTARI

Otari Electric Deutschland GmbH  
Gielen Strasse 9,  
4040 Neuss 1  
Telephone: 02101-274011  
Telefax: (02101) 222478  
Telex: 8517691 OTELD

Otari Electric (UK) Limited  
22 Church Street,  
Slough,  
SL1 1PT  
Berkshire  
Telephone: (0753) 822381  
Telefax: (0753) 823707  
Telex: 849453 OTARIG





You're holding a picture of the MTR90's most remarkable feature.

A hole.

To be precise, the hole is located in circuit board slots 8, 9 and 10 on the Otari MTR90 Mk.2's transport and CPU cardframe.

That's the part of the MTR90 that does all the thinking.

On a mere seven cards is contained all the information the MTR90 Mk.2 user needs

to create perfect master recordings, with microprocessor control to achieve ultra-fast, split second accuracy and total ease of operation.

But it says a great deal for Otari's vision that despite everything that seven cards can do, they've left space for ten.

What could the other three slots contain? An integral synchroniser? Something even more advanced?

The answer is that those slots will control the features that Otari users will be demanding from their MTR90s in 1986. Or 1987. Or 1990.

Those spare three cardframe slots may be empty now. But to Otari users, they're the future of multitrack.

Because the most important thing about that hole is the fact that Otari are looking into it.

**OTARI**®

For more information on the MTR90 Mk. 2 Series or other Otari products, contact Turnkey Studio Systems, Brent View Road, London NW9 7EL. Telephone: 01-202 4366  
Industrial Tape Applications, 1 Felgate Mews, Studland Street, London W6 9JT.  
Telephone: 01-748 9009



# IN PERSPECTIVE

# IN PERSPECTIVE

Comment from Martin Polon, our US columnist

It has become very fashionable to blame the compact disc for everything wrong that happens in audio in the Continental United States and in the rest of the world for that matter. Consumer and trade audio magazines are full of letters and articles from writers who are obviously digitally literate 'Men of the World' (women seem to have too much sense to get drawn into CDmania). However, it would be so simple to assume that these fellows are wearing sea green polyester slacks with a white dress shirt hanging out; the pocket stuffed with an assortment of pens kept fastidiously in a plastic pocket protector. One could also assume Florsheim shoes worn with white socks. A pocket calculator hanging from the belt, glasses broken at the bridge repaired with tape and a conspicuous disregard for underarm deodorant would complete the picture of our imaginary CD critic. That the hypothetical CD defiler fits the description of what is known in America as a 'Nerd' is clear. Unfortunately, there are several problems with identifying those protesting the power of Japan (and the Netherlands) in forcing compact disc down our collective throats (or ears as the case may be) as cranks.

The Japanese electronic companies have not been noticed for their dainty ways. One is currently swallowing American professional audio makers and has been lovingly identified as 'Namu of Tokyo' (as in killer whale) by several employees of these absorbed ventures. ('Namu of Tokyo'—not bad. It sounds like an exclusive Japanese couturier about to challenge Ralph Lauren).

On one side of the coin, there is less wrong with the CD and Japan than many people think. The Japanese have legitimised an industry that could only sell digital audio to people who really could clear an elevator in 1.2 s by raising their arms above their heads. The Japanese sell CD machines that work and fix them when they don't. They stay in business, by and large police their dealers so they support product as well as customers and have spawned profits for a broad range of second and third party vendors who have supplied software and hardware for digital audio. Yes, it is true that other companies have been hurt or destroyed as Japan changes its directions in professional and consumer audio, but it's a lot like sleeping in the same bed as an 800 lb gorilla. The gorilla does not necessarily intend to hurt you, but if it rolls over during the night—you got a problem. So if you do business with or because of digital audio or compact disc you make money but you don't sleep a

## Let's lay off the compact disc

lot. For those who view the compact disc and its Japanese and Dutch mentors as the earthbound equivalent of the evil empire led by Darth Vader (and how many articles have we all read with that analogy) ask yourself how much like 'Rebecca of Sunnybrook Farm' our old friends at RCA were with the development of the LP record?

Compact disc is subject to a particular kind of rumour at every audio trade show. 'The latest album from (name any pop group) was recorded digitally with a special black laser.' 'The record companies are run by zombies who worship cash and not record quality and are defiling the pressing of CDs the way they ruined the LP.' 'Japan only wants 75% of all digital audio business in the world.' The latest CD portable will have two meg of RAM with a solar powered gas plasma display for still video and data plus frequency response from DC to 100 K; all for \$300. 'Compact disc has bi-directional translateral dither at 17 kHz clearly audible if you have an R2D2 amplifier played at the levels found in Wembley stadium.' 'Martin Bormann is alive and well and running a compact disc pressing plant in Paraguay, that will come on-line third quarter 1985.' . . . hey, gimme a break will ya!

Despite numerous hypotheses to the contrary, the Dutch and the Japanese are not consciously planning to destroy all other forms of audio hardware or software. It is inevitable that many jobs and companies will change as the audio industry goes through various hills and valleys of conversion to digital. Consider US census figures and similar statistics from HM census and European authorities. Look at statistics on income and poverty. Look at the age and income distribution curves and demographics. See all the 'junk' audio systems and innovations that have been foisted on the consuming public in the past. (Remember Quad? No?—you'd be surprised how many consumers still do!) How many pieces of audio equipment can be found in people's closets or garages? Check discretionary income in consumer's homes and budgeted expenses for home entertainment systems. Look at each category of audio hardware and software or audio peripheral vendor and count the number of different companies in each category; all in competition with each other. Japan and compact disc didn't 'do' any of that.

However, it is now time to go back to

our supposed CD nerd and find out that in most cases these people make some sense. There is much about the way digital audio and digital disc was foisted on all of us that does not sit very well. It is as though the industrial giants simply made it happen despite some grey areas in the technology. A respected engineer recalled his first exposure to the compact disc: "I was at a meeting where one of the chief backers of the new system from a well known international company silenced his critics by saying it *was* going to happen no matter what!"

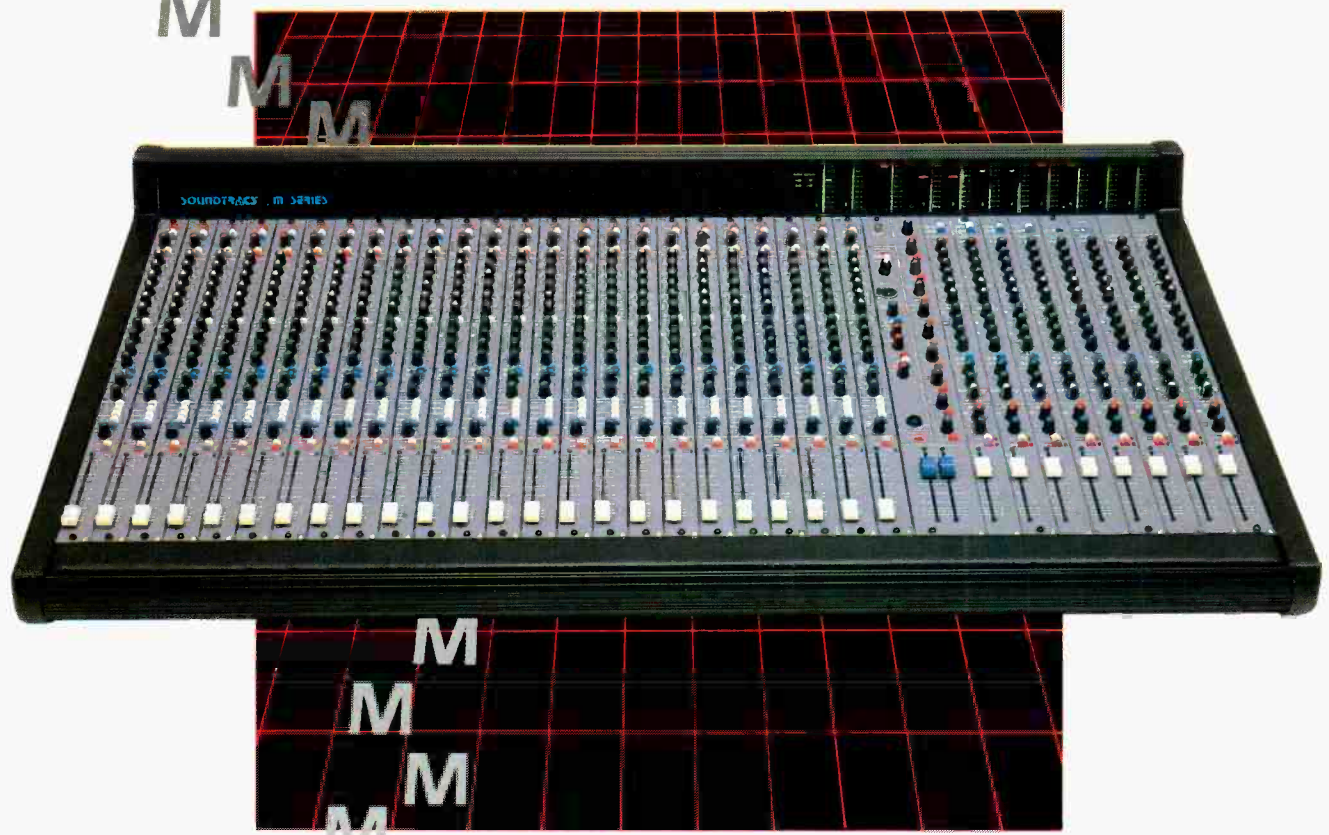
We really do need those who criticise. It keeps the audio industry honest and helps those less sophisticated to be aware of subtle shadings in things technical. It is important to remember too that those who developed the mathematical theory and did much of the basic research that made studio digital recording and the compact disc possible, were viewed as just as eccentric in the past as today's 'dithering' critics.

The solution at this point is to accept compact disc as a reality of the marketplace and move forwards. It is not going to 'go away,' no matter how much some of us resent its real or supposed inadequacies. Nobody in their right mind is going to pretend that compact disc is the new toy for 1985. Ten years have passed since it has evolved into the system we are now using. You can find problems with 14/16-bit technology, aliasing, with the kinds and quality of filters used by various manufacturers, with dither, with A/D conversion and so on. It is important that we do talk about these problems so we can move forwards. But, we are finally beginning to interest the owners of some 200 million-odd LP phonographs in the new system. I am actually looking at research that says middle class citizens in Framingham, Massachusetts and Slough, England and Blois, France are recognising and showing interest in compact disc. It represents a quantum jump for those who have audio equipment so crude that a stylus is changed every ten years. And bottom line; the audio industry needs digital and compact disc to provide momentum. It is, I suppose a compromise. But it is a very necessary one and if we look back at the Philips cassette tape format of the early '60s; we can find an analogy for trying to improve the digital disc in an evolving way. If we continue to dwell on all that is wrong with CD, we might just scare off the audio consuming public. And people would be saying, "That used car salesman—didn't he used to sell digital audio equipment—and personal computers before that." □

See us at the  
**APRS 85 Exhibition**  
 June 12-13-14. Stands 44 & 53  
 Kensington Exhibition Centre



M  
M  
M  
**M SERIES**  
**NO MORE SLEEPLESS NIGHTS!**



No nonsense eight buss mixing console designed for live sound reinforcement, theatre or eight track recording. Unique facilities such as +30db input headroom, 4 band equalisation, six auxilliary sends, switchable pre or post fade and settable using hand set jumpers to pre or post

equ. By four matrix on each sub group pre or post fade. Stereo return to masters. Fader reverse. Eq on group output, permanent access to all eight busses for effects returns with eq option. Full monitoring of groups. A total solution to an eight buss mixer that will not fail on you; So **NO MORE SLEEPLESS NIGHTS!**

THE **M** SERIES BY



affordable quality

Soundout Laboratories Limited  
 91 Ewell Road, Surbiton,  
 Surrey KT6 6AH Tel: 01-399 3392  
 Telex: 8951073/SNDOUT/G

U.K. Distributor

**Don Larking**  
 audio sales

Luton: 29 Guildford Street, Luton, Beds.  
 Telephone Luton (0582) 450066  
 Telex 825488 DONLAR

Stoke-on-Trent: Stafford House,  
 Clough Street, Hanley, Stoke-on-Trent.  
 Telephone Stoke-on-Trent (0782) 24257

America Soundtracs Inc., 745 One Hundred and Ninth Street, Arlington, Texas 76011. Tel: (817) 460 5519 (MI) MCI MUSIC Inc., 745 One Hundred and Ninth Street, Arlington, Texas, 76011. Tel: (817) 469 1600  
 Australia Klarion Pty., 63 Kingsway, South Melbourne, Victoria 3205. Tel: 0361 3541 Austria Kai Ges.m.b.H. & Co. KG, Hi-Fi Stereo Center, 1120 Wein, Steinbaurgasse 25. Tel: 0222-838235 Canada  
 Omnimedia Corporation Ltd., 9653 Côte de Liesse, Dorval, Quebec H9P 1A3. Tel: 514 636 9971 Denmark Kinovox AS, Industrivej 9, 3540 Lyngby. Tel: 02 187617 Finland MS Audiotron, Laitilantie 10, 00420  
 Helsinki 42. Tel: 90 5664644 France Phase Acoustic, 163-165 Bd Boisson, 13004 Marseilles. Tel: 91-4987 28 Germany Amptown, Hamburg. Tel: 040 6460040. Session Musik, Walldorf. Tel: 06 2272876. Sound &  
 Drumland, Berlin. Tel: 030 8827911. Musik Shop, Munich. Tel: 089 341111. Der Musikladen, Nurnberg. Tel: 0911 445454 R & H Studio Sound, Waldkirch-Kollnau. Tel: 07681 5043 Greece Sound Centre, 22 Tossitsa  
 Street, P.O. Box 148, Athens, Greece. Hong Kong Ace (International) Co., Block A, 10/F., AB Hong Kong Industrial Centre, 489/491 Castle Peak Road, Kowloon, Hong Kong. Italy Linear Italiana S.p.A., 20125  
 Milano, Via Arbe, 50. Tel: 02-6884741 Israel Barkai Ltd., 5 Krinzi St., Ramat Gan. Tel: 03-735178/732044 Korea Computech, Kwanghwamun, K P O Box 1706, Seoul Netherlands Pieter Bollen  
 geluidstechniek bv/PAC, Hondsruglaan 83 A 5628 DB Eindhoven. Tel: 040-424455 Norway BE siving Benum as, Boks 2493, Solli, 0203 Oslo. Tel: 02-442255 Portugal Amperel Electronica Industrial LDA, Av.  
 Fontes Pereira, De Melo, 47, 4º, D 1000 Lisboa. Tel: 532227/532698 Singapore Lingtec Pte. Ltd., 246 MacPherson Road 07-04, Betime Building, Singapore 1334. Tel: 07-471951/07-471952 South Africa Eltron  
 (Pty) Ltd., 2nd Floor Film Trust Building, 112 Polly Street, Johannesburg 2001. Tel: 11-29-3066 Sweden Septon Electronic A.B., Box 404B, S-42104 Vastra Frolunda. Tel: 31299400 Switzerland Studio M & M, Villa  
 Tannheim, CH5012 Schoenewerd, Tel: 64 4149 69 Thailand Kitchareon Machine Tool and Musical Ltd., 73 Asadang Road, Bangkok 2. Tel: 2224712 United Kingdom Don Larking Audio Sales Ltd., 29 Guildford  
 Street, Luton, Beds. Tel: 0582 450066

# THEME PARK SOUND AT DISNEY

**F**rom the very first Walt Disney cartoon, *Steamboat Willie* produced over 50 years ago, sound has always played an integral role in Disney productions, be they film or live entertainment, and this is strongly demonstrated in Walt Disney World. An area of 43 square miles near Orlando in Florida contains hotels, camping sites, etc. and two theme parks—Magic Kingdom and Epcot Center. To say that Disney is a world of sight and sound would seem to be an apt description: from the moment you board the monorail or ferry, sound becomes an important part of the environment, even down to the quality of the announcements.

The sound installations are very discreet and as far as possible built into the surrounding decor of each of the six 'lands' or theme areas—sound should be heard and not seen. Loudspeakers vary from 4 in *Hot Spot* single drivers up to multiple arrays using 12 in woofers and constant directivity horns for mids and trebles. Some attractions also use Altec A7s where space permits.

There are four main situations to cater for in the Magic Kingdom: general background music; open-air shows; sound for rides and attractions; and various audio/visual presentations. Rides such as carousels or flying Dumbos only require background music but for the attractions (stories presented in an audio/visual manner) it is much more important to create the right atmosphere and the sound is a vital ingredient toward creating the illusion desired.

Visuals are a mixture of decor, lighting, slides, film and animated figures, all carefully co-ordinated into the whole and placement of the loudspeakers varies a lot with the effect desired, even to the extent of having 'personal' speakers in the cars taking visitors through the attraction. However, the main philosophy appears to be put the sound source where the sound is supposed to be coming from.

The audio-animatronics (as the system is known) really come into their own in the Country Bear Jamboree. This is a parody of a wild west show in a saloon theatre where a cast of hillbilly bears perform songs complete with heckling and interjections from a trio of wall-mounted hunting trophies. The sounds emanate from each 'performer' and the spectator is left in no doubt as to which character he should be watching. At the same time, interruptions from the wall-mounted trio cause heads to turn and the whole show has a feeling of depth

## Walt Disney World's sound system is examined by Terry Nelson, in Florida



Cinderella's Castle

and realism that would not be possible with a normal sound system, even stereo.

Another area where great care has to be exercised with this type of presentation is levels. The reality cannot be maintained if a character who should be whispering seems to shout—the volume also must be as near as possible to real life. However, power is available when needed. In the earthquake section of Big Thunder Mountain Railroad a battery of 15 in woofers provides the necessary noise and vibration of a subterranean rockfall.

Live entertainment in the Magic Kingdom necessitates a combination of mobile and fixed installations. For parades audio comes directly off the floats and background music is fed through speakers along the route and faded up and down as the parade passes. Each float is linked to its own cart machine in the Audio Control Center and can fire off music and effects at will.

Stage shows are performed in three main areas: in front of Cinderella's Castle; in a fairground tent known as Fantasy Faire; and at an open air theatre called Tomorrowland Stage. The shows consist of song and dance routines, bands and appearances by Disney characters; the vocals are a mixture of live and pre-recorded tapes as it is

difficult to sing in a relaxed manner while dancing energetically around a stage.

Tomorrowland Stage has a fully equipped covered stage with 4-way speaker systems built into each side of the proscenium arch and hidden by decorative material. The band plays rearstage with the song and dance company at centre front. Monitoring is by E-V wedges and the front vocal monitors are sunk in at floor level to be unobtrusive; the band's drummer receives cues and click tracks through headphones. Front vocal mics are Shure SM85s and the collection includes Sennheiser MD441s and MD421s and AKG 451s. Although the engineers have a free rein in their choice of microphones, they have found that these provide a dependable general purpose combination for outdoor work.

There is a sound and a lighting booth at either side of the rear of the stage and though the sound booth does have small local monitors, the bulk of the monitoring is through the open window.

The sound is controlled from a Yamaha mixer and very few special effects are used—a bit of reverb or delay here and there with a compressor or two to smooth out any peaks. The coverage of the audience area is good with very little variation from front to back. Levels gave a decent 'punch' to the show but not enough to drive people out.

Fantasy Faire is a much smaller affair and the musicians rarely more than a trio. However, the intelligibility of the vocals is very good and the fun of live music is retained.

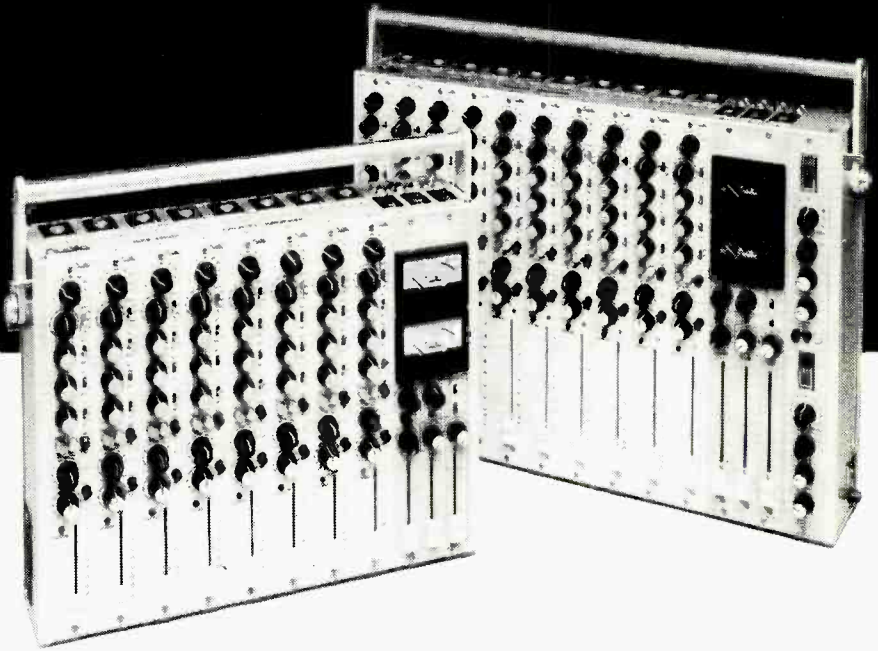
The stage area in front of Cinderella's Castle is completely exposed and situated between the double ramps leading to the castle gateway. Again the musicians play behind the company but on a slightly higher level. Floor monitors are sunk into the stage and the speaker systems are well concealed in tall cabinets looking to the outside world as though they are large supports for hanging banners that go with the castle decor. A Yamaha mixer is used on-stage there being no permanent mix position within the audience.

**A**fter a guided tour behind the scenes (very rare I understand) I was welcomed to the audio nerve centre by Bill Tomlinson, engineer in charge of audio. I was simultaneously confronted with the largest collection of NAB cartridge machines I've ever seen in one place, a few recorders and a

Worldwide List of Audio Developments Ltd., Agents

COUNTRY	AGENT
Australia	Rank Electronics Tel: 2 449 5666 Telex: 71289 Contact: Andrew Harrison
Austria	Peerrtronic Tel: 43 222 832224 Telex: 134072 Contact: Gunther Friedrich
Balkan States	Constantin Stavriniadis Tel: 4121 39 5015 Telex: 26297 Contact: C. Stavriniadis
Canada	Gerr Electro Acoustics Ltd. Tel: 416 868 0528 Telex: 065 24385 Contact: G. Eschweiler
China	Ace (Int'l) Co. Tel: 852 3 7452343 Telex: 40442 Contact: Michael Pang /Whyman Chan
Denmark	Kinovox Tel: 452 187617 Telex: 40394 Contact: Steen Peitersen
Finland	Studiotec KY Tel: 358 0 514133 Telex: 125284 Contact: Peter Stralman
France	Simplex Electronique Tel: 331 271 5330 Telex: 230045 Contact: J.C. Thobois
Germany	Nagra Kudelski GMBH Tel: 4989 656633 Telex: 529893 Contact: J. Weber
Greece	K. Stavriniadou Tel: 607 7782938 Telex: 210934 Contact: K. Stavriniadou
Hungary	Cinac Tel: 4124 711600 Telex: 451070 Contact: Henri Suter
India	Cinerama PVT Ltd. Tel: 293873 Telex: 1171198 Contact: S. Agarwal
Israel	Sontronics Electronic Equip. Ltd. Tel: 9723 442233 Telex: 361579-Ref SSK Contact: S. Shmueli
Italy	Audio International SRL Tel: 392 7384751 Telex: 322251 Contact: R. Beppato
Japan	General Traders Ltd. Tel: 813 2912761 Telex: 24754 Contact: H. Saitoh
Korea	Saetong Corp. Tel: 783 6551 5 Telex: 23596 Contact: J.B. Kim
Kuwait	Light & Sound Elec. Co. Tel: 965 434307 Telex: 4528 Contact: A. Al-Baghli
New Zealand	General Video Int. Ltd. Tel: 644 881 169 Telex: 30129 Contact: Gerry Smith
Norway	Siving Benum & Co. Tel: 472 44 2255 Telex: 17681 Contact: Bjorn Benum
Singapore	Rank O'Connors Sing. PVT Ltd. Tel: 65 637944 Telex: 21023 Contact: Patrick Ching
South Africa	Prosound (PTY) Ltd. Tel: 27 11 337 6556 Telex: 485712 Contact: D. Feldman
Spain	Telco Electronic S.L. Tel: 341 231 5601 Telex: 27348 Contact: J. Escrig
Sweden	Intersonic N.B. Tel: 468 744 5850 Telex: 11136 Contact: R. Isacson
Taiwan	Linfair Eng. & Trading Ltd. Tel: 886 23214454 Telex: 22563 Contact: Duncan Chang
Thailand	Ace (Thailand) Co. Ltd. Tel: 2812512 Telex: 72300 Contact: Bundhit Thongpen
Tunisia	Soger Electronique Tel: 2161254 230 Telex: 13447 Contact: C. Barouch
Turkey	Nefan Ltd. Tel: 465952 Telex: 26304 Contact: A. Fresco
Zimbabwe	Audex (PVT) Ltd. Tel: 26370 Contact: W. Mueller
U.S. Office	Audio Developments Inc. Tel: 818 843 7567 Contact: Ron Fuller

# TOTAL CONTROL AT YOUR FINGERTIPS



JUST TWO OF OUR WIDE RANGE OF PROFESSIONAL MIXERS FOR BROADCASTING, FILM SOUND AND POST PRODUCTION. CONSOLE MOUNTED, RACK MOUNTING AND PORTABLE VERSIONS AVAILABLE TO ORDER.

**Audio**  
DEVELOPMENTS LTD

Audio Developments Ltd, Hall Lane, Walsall Wood,  
Walsall, West Midlands, WS9 9AU  
Telephone: Brownhills (0543) 375351 Telex No: Audev G 338224

# THEME PARK SOUND AT DISNEY

sizable number of loop bins and 35 mm Maglink machines. A large number of patchbays enable signals to be patched in anywhere in the audio network in case of need. There is also a paging system that can be patched into any or all the areas for announcements.

Much of the audio equipment is designed and constructed in-house for maximum reliability and ease of maintenance, and the Mapo cart machines are no exception.

The various attractions and A/V presentations are served by the NAB cart machines, 14 Ampex 1 in 14-track loop bins (12 audio, 1 timecode, 1 guard) and 13 RCA 35 mm Maglink machines for soundtracks accompanying film projections.



Magic Kingdom cartridge machines

Because of the complexity of the various cues and multiplicity of sequences very little of the audio operation is manual. The central computer is located next door and the 35 mm and loop bin machines are linked to this by SMPTE timecode.

A comprehensive monitoring system is essential in this type of operation and Magic Kingdom's is both simple and extremely effective. The monitor unit consists of a rack mount chassis with alphanumeric pad to punch up designated source monitor reference numbers and VU meter to check levels. A rack mounting monitor speaker with amp completes the system. The versatility of the system is that any source can be monitored at any of the individual points along a particular audio chain from replay output to amplifier output, thus the source of a problem can be tracked down in seconds.

The Audio Control Center also houses Walt Disney World's own AM radio station which provides visitors with information on the day's events, parking and traffic conditions, etc. Audio distribution is quite simple and consists of two Shure M67 professional mixers in

series with an Altec compressor controlling the output. From the distribution studio a Yamaha PM2000 24/8 console sends the audio for the parades and other special events. Each bus is dedicated to one of the 'lands' plus outputs for overall background music and announcements. From here the audio following the parades is faded up and down as they pass each point and radio links between floats and their respective cart machines are maintained. A rack of Shure octave equalisers is on hand for shaping sound as required. Monitoring is again comprehensive and the audio supervisor can keep track of what is going out to the parade at any one time, and where.

Completing the Audio Control Center is Studio D. The bulk of recording work here consists of voiceovers and vocals with most of the music tracks being handled by the Walt Disney Studios at Burbank, California. However, Studio D produces all the tapes and carts for the Magic Kingdom as well as getting involved in EPCOT projects, some tracks for Disney commercials and TV and film work.

The studio consists of the control room, a small studio, machine room/lounge and dubbing room. The control room is not the symmetrical listening room found in most recording studios and is more of a control centre. At the time of my visit, the whole area was in the process of being redesigned and this will no doubt entail a certain amount of relocation.

The newest addition to the studio's equipment is a Neve 8128 console with 32 input channels and in-built Neve stereo compressor/limiter. At present the



Loop bins in the Magic Kingdom

monitors are Electro-Voice Sentry 100As, which are standard in all parts of the studio and control rooms. The previous control room monitors were Altecs fitted with UREI Time Align crossovers but although these performed well, it was found that they were too big for the room. However, with the plans for the new control room under preparation, various other monitors are also under consideration.

Special effects units include only Eventide H949 Harmonizer, Aphex II (fitted into one of the rack mount spaces in the console) and Lexicon 224 digital reverb unit. Bill Tomlinson points out that for the sort of work carried out, racks of signal processing equipment are

really unnecessary. The flexibility of the desk EQ plus these few effects is sufficient resource for the studio to produce the ambience flavoured tracks needed. Other accessories are UREI 964 digital metronome, especially useful for film work as the tempo range is based on 24 frames/s, and a Cypher SMPTE timecode generator.

Studio D is linked by send/return tie-lines to all parts of the Magic Kingdom and the hotel for recording and production of live events. Participation in live events could involve additional musicians playing in the studio and being patched through to the stage mix point. Mixing can be done from an outside mix point or in the studio or even a combination of both for simultaneous performance and recording—the idea of a Neve 8128 as a PA console is quite fun!

The machine room houses two Ampex ATR-124 24-track and two ATR-100 master recorders and Technics and Nakamichi cassette machines. Noise reduction, if used, is dbx. There is also an old MM series Ampex which is used for 16- and 8-track recording/playback. Film recording is looked after by 35 mm and 16 mm magnetic recorders and the digital age is represented by a 3M 1/2 in 4-track. Equipment layout is very open facilitating fast and easy operation and when things get hectic, tape-ops do not get in each other's way.

Equipment in the dubbing room includes two ATR-100 2-track recorders for copying, and two ATR-100 4-tracks for tapes needing cue tones (30 Hz for Magic Kingdom, 1 kHz for EPCOT). A batch of Nakamichis handle cassette copying.

Three miles away from where Cinderella's castle overlooks the Magic Kingdom, the multi-faceted globe of Spaceship Earth dominates EPCOT Center—two skyline symbols of the legends of yesteryear and the promise of tomorrow.

Divided into two sections, Future World is a collection of exhibitions and A/V presentations dealing with present knowledge and the foreseeable future for technology in communication, computers, energy, art forms, transport, farming, etc, plus a look at life in the 21st Century, while World Showcase is a series of pavilions from nine (soon to be 10) countries combining famous landmarks.

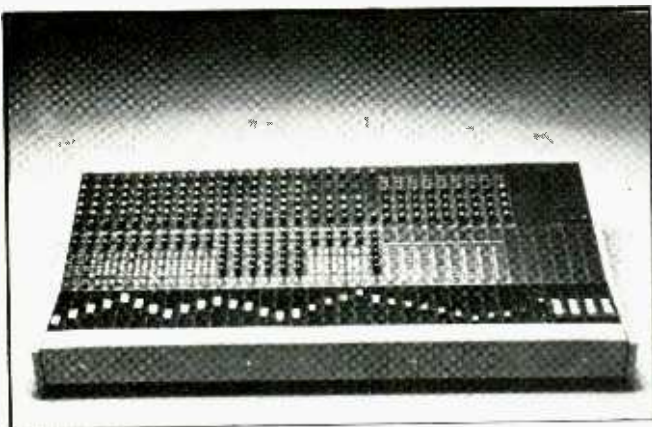
As with Magic Kingdom, the visitor is greeted with background music upon entering which changes appropriately with each different area.

The Universe of Energy starts out with a pre-show that alone makes the visit worthwhile. A Cinerama-size screen is composed of modules that revolve independently and can thus form a flat screen or a number of screens as each section can receive its own projection.

The animatronics set succeeds admirably in creating a general soundfield and localised sources giving a 3-D effect. I am convinced that the key to creating the right atmosphere with sound lies in clear and powerful rendition of the low mid and bass frequencies. This plays a large part in helping the visitor to enter more fully

# MS-MULTIMIX

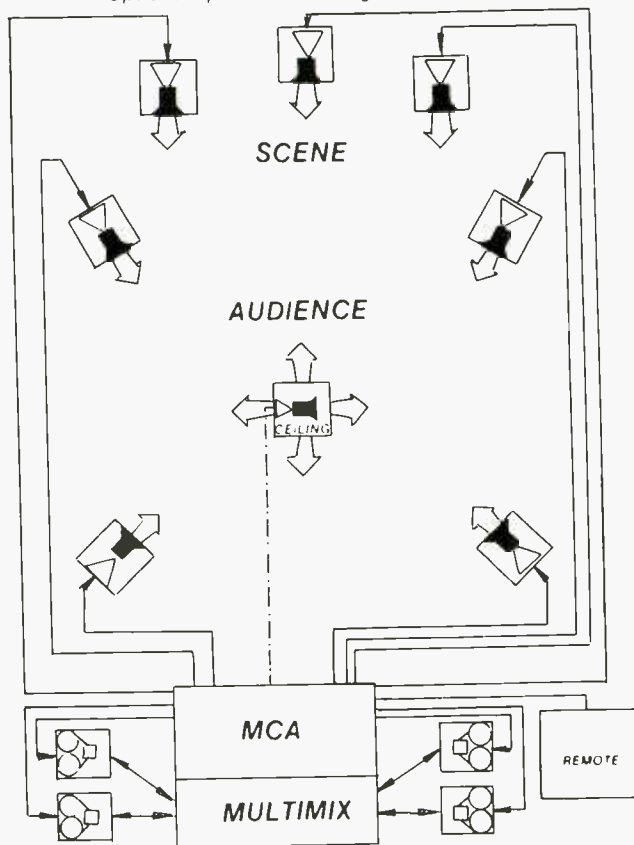
## TOTALLY MODULAR



- True modularity to really meet your requirements, in theater and multipurpose hall installations.
- A family of some 20 different input, grouping, fader, metering and output modules.
- Special modules for control room and headphone monitoring, test signals, talkback, remote control etc.
- Heavy duty steel chassis.
- Transformer balanced inputs and outputs.
- Wide range meters, 60dB display

### MCA; MICROCOMPUTER CONTROLLED AUDIO SYSTEM

- Stores up to 600 cues (scenes) on floppy disk
- Controls up to four tape recorders.
- Assignable digital fader and meter to set and control output levels.
- Eight output groups.
- System operation by single cue entry push button.
- Pocket terminal for remote control and cueing.
- Optional speaker switching matrix.



WE ARE LOOKING  
FOR INTERNATIONAL  
CONTACTS



**MS-AUDIOTRON**

Laitilantie 10 00420 HELSINKI 42  
FINLAND ☎ 90-5664644  
Telex: 125778 msa sf

# John Bowers active 1

"A few seconds' listening is enough to convince most people that Active 1 is something exceptional.

... Alert, commanding, perky, delicate, direct, realistic, raring to go, discerning, utterly natural, enthusiastic, awesome ...

... Certainly I know no neater, tidier and less obtrusive path to the full range of musical enjoyment ..."

GEOFFREY HORN  
OF GRAMOPHONE

## MUSIC LOVERS' SOUND SYSTEM

We have appointed a few exclusive dealers where you can hear a full demonstration. Please write or phone for details.

UK B&W Loudspeakers (UK Sales) Ltd Marlborough Road Lancing West Sussex BN15 8TR Tel. (0903) 750750

WORLDWIDE John Bowers Ltd Elm Grove Lane Steyning West Sussex BN4 3SA England Tel. (0903) 815666

# THEME PARK SOUND AT DISNEY

into the world being shown and dispels that 'its only coming out of a speaker' impression.

The presentation uses several different 'theatres' for the segments of the show and a noticeable feature was the uniformity of sound quality from hall to hall with a suitably low reverberation time keeping things nice and clear and never muddy or resonant.

Interesting A/V fun awaits the visitor to The Image Works in 'Journey into Imagination'. Here you can conduct, arrange and balance an audio-animatronics orchestra with your hands in front of light beam controllers (I wonder if there is an idea here for finger-controlled light beam subgroups) or do a little dance on a discotheque-style floor that lights up when your foot touches a square.

The Chinese and Canadian pavilions in World Showcase feature 360° circle vision shows which are travelogues exhibiting the scenic joys and history of the two countries. Modular screens can provide up to nine separate films or one wraparound projection so some audio prompting is necessary to keep the viewer looking in the right direction. To this end each screen also has its own audio channel and a 10th channel is largely used for off-screen narration. The sound quality is excellent helped by the facts that all tapes are first generation analogue from digital masters and sound is not mixed with the infamous Academy curve.

The American Adventure put on what amounts to a full scale theatre production with audio-animatronics actors. A potted history of America beginning with the Mayflower pilgrims is narrated and presented by Benjamin Franklin and Mark Twain who convincingly walk up and down stairs, write notes and even go up the Statue of Liberty.

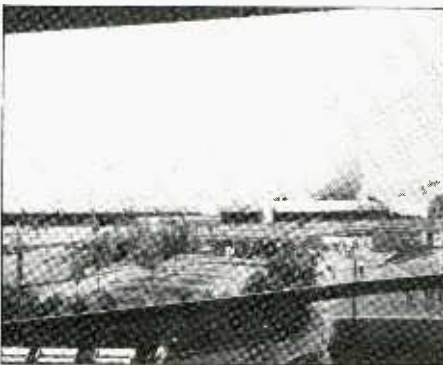
An outdoor amphitheatre, The American Gardens, contains a high quality sound system which is split into two levels. This means that sound levels can be adjusted separately for the front and rear seats and thus achieve even distribution. The nearfield speakers start at stage level and comprise two 18 in subwoofers, two 15 in low mids, one high mid horn with driver and two treble horns. The rear coverage system is similar but has two horns for high mids and three treble horns.

Parades and outdoor shows are also an important part of the presentations at World Showcase and the circumstances are much the same as those described at Magic Kingdom. The speakers are mostly 2-way with constant directivity horn/driver and 12 or 15 in woofer. Two reference levels are used: 75 dB SPL for background music and 95 dB SPL for reinforcement allowing for 10 dB peaks when dynamics are required. The centre of the promenade is taken as the reference point for these average levels

and this means that any one speaker system can find itself between 20 and 50 ft away. Human absorption permitting, great care has been taken to obtain an even coverage over all areas of the parade route so a 'route curve' was developed that would be pleasing to the ear while retaining a proper frequency balance. Each speaker system has a dedicated  $\frac{1}{3}$ -octave equaliser and careful adjustment of each area ensures smooth reproduction throughout the parade route.

Additional sound reinforcement comes from vehicles known as pageant audio units. These are multi-purpose vehicles providing 360° sound distribution which also serve as monitors for artists taking part in the pageant. They can also be decorated as floats and thus fully integrated into the procession. Link to the audio unit is by radio with all audio distribution coming from EPCOT Central.

**O**pened October 1, 1982, EPCOT Center represents a leap ahead in computer controlled entertainment systems. Apart from the complexities of the audio/visual—it would be truer to say multimedia—attractions of Future World, the attractions and live shows in



The Epcot Center

World Showcase have their own special set of requirements. In particular, the Promenade Route can be considered as being a stage 'in the round' that is 1.2 miles long and divided into 22 separate zones, each requiring audio and lighting control. To deal with the challenge the Entertainment Control System, or ECS, was evolved and housed within EPCOT Computer Central, the operational heart of the park.

The continuing complexity of parades and special events in the Disney parks led to the forerunner of the ECS being installed at Disneyland in 1979. This was an antenna system buried along the parade route and able to monitor float positions and radio the information back to the central computer.

As is often the case in systems design, the ECS evolved from its original role of audio and lighting controller to also being able to control maintenance and monitor all show elements, live or otherwise, throughout EPCOT. The central unit consists of two mini-computers installed in a console complete with four dedicated touchscreen terminals. The functions of the terminals are: 1 Real-time display of all stage areas with live shows, plus status of the

promenade route zones; 2 Maintenance terminal, with diagnostic programs for all audio and lighting systems—this permits troubleshooting in advance or during a fault, making for speedy rectification of the problem; 3 Audio monitor for all audio signals in the World Showcase pavilions—all signals can be monitored along the audio chain up to the output of the amplifiers permitting quick and easy troubleshooting should a fault occur; 4 Cue editing terminal allowing programming of new events or revision of existing programs.

As well as the terminals, the console also houses all the communications systems for the live events in the form of telephone and 2-way radio links with maintenance engineers, operations crew, security and entertainment divisions, each department having its own radio frequency. There is also a special show intercom switchboard for live events that links up all the pavilions, sound booths, lighting positions, equipment rooms and access gates. The master console can communicate with any station routed to the network as well as tie together any of the selected stations into an 8-channel assign system. This allows the intercom system to be tailored to suit the needs of individual productions.

The live shows in World Showcase requiring audio sources use an Ampex ATR 124 24-track machine and 30 stereo NAB cartridge players, whereas the Future World exhibits and presentations such as the American Adventure or the CircleVision shows are fed from 36 2 in loopbins, 5-stack NAB cartridge machines, 1 in VTRs and Sony U-matic shuttling VCRs, Sony interactive videodisc players and graphics control equipment. Racks of 14 in reel capacity Scully playback decks are also used for the general background music requirements for the different areas around EPCOT.

Much of the equipment is designed, if not built by, WED Enterprises. This is the technical projects and engineering side of the Disney organisation which often has a vital role in creating what is known as the 'Disney magic' and because existing equipment does not always meet the challenge, WED have often been innovators. One example of this was the 360° panners that were used for the audio production of *Fantasia* (here it was possible to go from left to right without looking through the centre). Among the WED innovations at EPCOT are the WED designed 2 in loopbins built by Pacific Recorders. The horizontal tape bin is able to vary its size and vacuum pressure depending on the loop length and a self-cleaning operation is carried out on the tape with each pass. Maximum loop time is 28 min at 15 in/s (I'll let you work out the length!).

With so much computer control the operators at the audience end often do no more than see that everyone is installed, make announcements and push the button that tells the central computer to run the show. The appropriate audio and video (if required) sources start up and a local computer dims lights, draws curtains, starts the cars, etc. in a carefully ordained sequence with everything being held in place by



# When no manufacturer will discuss equalizer performance, Spectra Sound still does.

*Have you ever noticed how few, if any, graphic equalizer manufacturers will discuss the measured performance of their product? At Spectra Sound, we believe that measured performance is an essential factor in the selection of an equalizer.*

## **The Model 1500: Performance You Can't Hear**

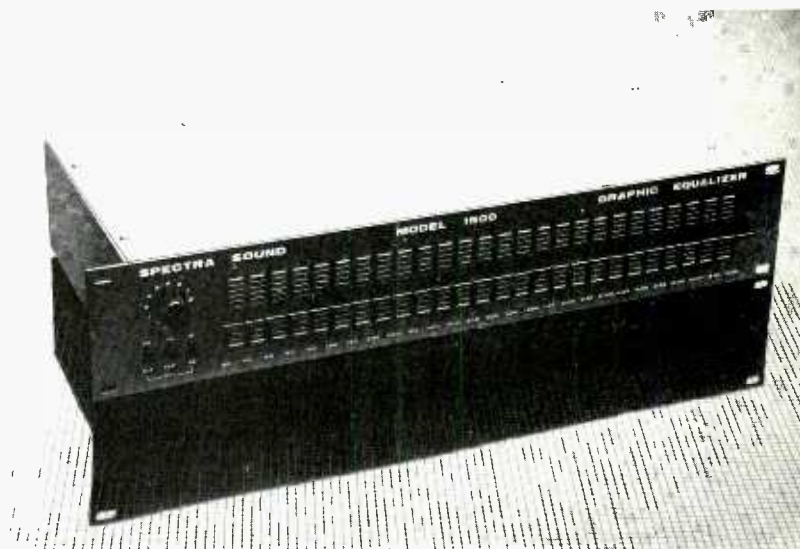
The measured performance of the Spectra Sound 1500 is second to none. Unmeasurable distortion, (I.M. and T.H.D), and extremely low noise, (104dB, +4dBv, unweighted), represents a significant, performance improvement over any other professional twenty seven band graphic equalizer.

In addition, band-centers are calibrated by hand to be within two percent, and an output impedance of below one ohm, (typically .3ohm), minimizes the disastrous effects of long cable runs.

## **The 1500 is also affordable**

Surprised? Well don't be. In fact, the 1500 is priced *well below* the majority of twenty seven band graphic equalizers on the market.

In a day where performance is often judged by price, the 1500 is truly a bargain.



3750 Airport Road  
Ogden, Utah 84405  
(801) 392-7531

Spectra Sound is a wholly owned subsidiary of Spectra Sonics

# THEME PARK SOUND AT DISNEY

SMPTE timecode.

Foreign visitors and the hard of hearing are not forgotten either. A Sennheiser infra-red FM transmitting system has been installed in most of the attractions, permitting the selection of one out of three languages presently available—German, Spanish and French. The system is 9-channel so presumably others will follow suit. The headphones, or 'Personal Audio Listening Systems' as they are grandly known, have a bandwidth of 12 kHz and are operational throughout the whole of EPCOT, ie you don't have to fiddle with changing the tuning for each attraction. In fact, the only fiddling you have to do is with the volume, the frequency for the language chosen being determined by the battery pack which is installed at the EPCOT entrance. As might be expected, the narrations are recorded on extra tracks of the loopbins, VCRs or on NAB cartridges.

The basis of the Entertainment Control System is that of a central computer with a distribution—or network—of intelligent controllers at key points around the show areas. This means that a local systems failure will not upset the others and the 'show can go on!'. The two Sperry-Univac V77-500 minicomputers control 10 microcomputer-based remote interface cabinets (RIC) via fibre-optic links. The RICs act as in-situ controllers for local lighting and audio cues as well as relaying commands to floats via the pageant float identification system (ID). The system can accept up to 20 RICs without any degradation, thus leaving the way open for future expansion.

Operation of the ECS depends on a pre-programmed show schedule that is fed in each day from the entertainment department. The central computer then 'organises' the show from its own data base and from information received from the RICs. Though two central computers are used, each one is capable of running the ECS on its own and to this end there is a continual transfer of data from one to the other so that each computer is able to take over control immediately should the other fail.

As mentioned previously, the ECS terminals use touchscreens instead of keyboards. This means that cue files can rapidly be built, modified or deleted at will by using a cue editor program that enables the running of a show to be planned by its director. Available commands include: Lights up; Lights down; Lights lift up and Lights lift down (where lifting hoists are involved for lights); Sound up; Sound down; Wait for; as well as logical commands that wait for certain conditions to be met before executing cues.

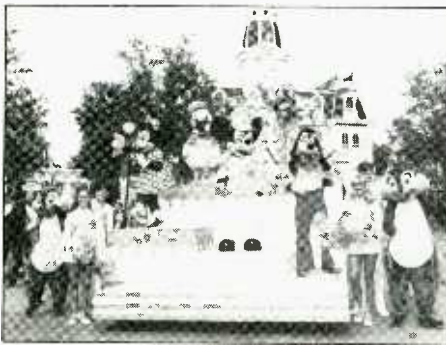
As we noted earlier, the ECS central computer terminal 1 displays the real-time status of each show area. In the case of a pageant—or procession—the display shows the relative positions of

the floats and the operating status of audio and lighting. The maintenance terminal permits troubleshooting as well as manual override of the inputs and outputs of an RIC.

The central computer also controls two computers that are independent from the ECS. One is for general lighting (streets, buildings, etc) and the other for audio (or, to be more precise, the Audio Router Switcher (ARS)). This handles the audio cues fed from the 24-track machine and the NAB cartridges and we will look at its functions more closely in a moment.

The remote interface cabinets, or RICs, report in to the ECS central computer every tenth of a second. The RICs monitor real-time status of lights, lighting positions (those on hoists or lifts), float positions (ID system) and any other information pertaining to the area of each one's responsibility. Should the sequence of events or event file be changed, for example, an RIC could be instructed by the central computer to take commands from another RIC; this information is then stored back at Computer Central for later reference.

Also interfacing with each RIC is the float ID system, or radio identification system. Each float has its own dedicated



Mickey Mouse leading the parade

code that is emitted by transmitters mounted in the float itself or from handheld sets with personnel manning the float. The ID code is picked up by the antennas that are buried along the promenade route and relayed to the RIC which in turn relays the information to the real-time status tables at Computer Central.

Another facet of the central computer control is that each event, be it live show or pageant, is put on to file. Thus a series of events can be analysed for breakdowns and equipment failures, running times versus scheduled time, and other performance related data. This enables improvements and/or changes to be made on the basis of the information collated. Maintenance organisation is also aided as problems can be identified before or while they occur, enabling the repair crew to be at the right place at the right time—and with the necessary tools and spare parts!

Audio distribution for the live events and pageants is a lot easier to say than do. The configuration used is 63 input channels going to 86 outputs. In console terms, this would mean a 63/86 desk! Large or complicated routing changes, such as multichannel crossfades, would require quite a few pairs of hands and be completely impracticable. This is where the Audio Router Switcher or ARS comes to the rescue. The ARS is a computer-

based switching system that operates in a similar manner to a matrix. Let us now take a closer look at the programme sources.

The source material for the 63 inputs comes from two areas: 22 channels come from the 24-track recorder (track 23 being a guard band with track 24 containing SMPTE timecode) while the remaining 41 come from NAB stereo cartridge machines. The source tracks from the cartridges are selected from a total of 60 available.

The ARS then routes the input channels to three main groups of outputs, viz: the pavilion zones, RICs for promenade route transmitters to the floats and monitoring. In addition, each of these output groups is divided into preselect groups A and B. This means we now have a total of 44 outputs for the 22 zones of the promenade route, 40 outputs for the 20 pageant audio units and two for monitoring. The latter enable the operator(s) at the ECS console to check up on any channel of programme without breaking into the signal flow. Both the pavilion zone and float signals pass through an RIC where all crossfading operations are done by means of VCAs (you had already guessed, no?).

In case anyone is thinking that human control is all but non-existent, take heart, it still needs a finger to operate the Showtime Switch! This is a facility that lets a performance area tell the ECS that a show is about to start and to relinquish control of the audio system to the local console (also human-operated!). The actual operations involved can vary in complexity from just fading out background music to routing backing tracks to the local console, fading out background music and setting levels for the audio feeds to the show. The system works on an 'Are you ready?—Yes, I am' basis. The ECS knows when a certain show should start and 5 min before 'curtain up' a pilot lamp flashes above the Showtime Switch. Once the stage manager and technician have verified that all is in order—and everyone is in place—the operator pushes the switch, the ECS fades down the background music and the local console takes over control of that particular audio system.

Not all live entertainment is theatre-based and is often in the form of strolling players requiring no audio support. In these cases it is a question of being backstage at the right time. The Showtime Switch flashes to let you know '5 minutes and you're on'; the performer acknowledges by pressing the switch and—fade out music, enter players.

If one word can sum up all the possibilities of the audio, video and lighting systems at EPCOT, it would be flexibility. Any live entertainment situation can be dealt with and the creative possibilities within a totally automated system that allows instant updating must be endless. EPCOT is only in its beginnings and is now just starting to get into its stride. New attractions, new pavilions, one thing is for sure, the place is not going to be static and there will always be plenty to see and do. □

**Acknowledgements:** additional information from Walt Disney World engineering staff Robb Resler, Jeff Smith, H. Lee Pharr, *Theatre Crafts* magazine and Paul D. Lehrman.

# TURN YOUR USED AUDIO EQUIPMENT INTO CASH.

Ocean Audio are specialist dealers in premium used studio equipment. Our worldwide clientele, especially U.S. studios, are eager to acquire your used equipment. Many are seeking the specific items you may have considered for sale.

We are more than brokers who simply "list" availabilities; Ocean Audio pays hard cash, the highest dollars. If we choose to purchase your gear, the many hassles you would encounter with a typical brokerage firm are eliminated because we'll handle all the transaction and transport details. We're interested in acquiring your studio equipment in all categories—from microphones to large console systems.

Turn your used audio equipment into cash. Let us help you beat the high cost of high tech. Contact us now for a fast response quotation on the specific items you wish to sell.

**Ocean Audio International**  
A World Class Source for Prestige Equipment

Tel: (213) 454-6043  
Telex: 316706 OCEANAUDIO



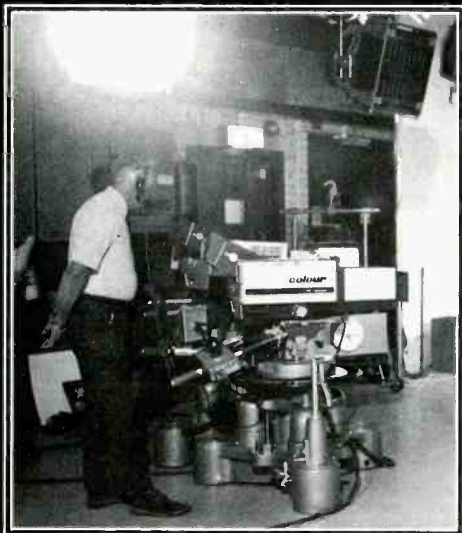
## "More Talkback, less argument.."

A good, easy to use Talkback System – smooth production, saving time and improving programme quality.

Contact TecPro for Talkback systems that are:

- Simple to install – using standard mic extension leads.
- Reliable – proven by over 5 years of use in the field.
- Inexpensive.
- Non-tiring – due to wide band width and low distortion.
- Easily added to almost any existing system. Radio links are also available.
- Available off the shelf.

**TecPro – Active in Talkback since 1975.**



**Technical Projects Ltd.**  
Unit 2, Samuel White's Industrial Estate,  
Medina Road, Cowes, Isle of Wight, PO31 7LP, England.  
Telephone: (0983) 291553 Telex: 869335 TECPRO G

**TecPro Inc.**  
PO Box 1069, Palatine, Illinois 60078, USA.  
Telephone: (800) 562-5872 From IL AK HI (312) 359-9240  
Telex: 280 502 (PROTON PALTN)



# HOW TO CHECK IF IT SOUNDS GOOD WITHOUT ACTUALLY LISTENING

In all areas of sound equipment, test routines are becoming more and more complicated, and less and less meaningful. Measurements of parameters such as frequency response and distortion reduce to the level of, 'What would you like to see, Guv?' While noise has become a simple arithmetic computation based on a bit of original work by Boltzmann and latterly... modesty forbids. The technology of mixers and sound processing equipment has become transparent and there are enough people who understand the disciplines to make the job of the 'customer' a matter of paying a defined amount of money, and getting equipment that will do as much of the job as he has paid for.

Over the last few years, there seems to have been a polarisation of attitudes when it comes to specifications of mixers. The manufacturers are tending to offer the same old parameters; stretching things where the customer can't possibly check for himself and being ultra conservative where bad results could end in litigation. The area where specifications become really meaningless is in the psychoacoustic domain; what does the equipment sound like?

## The squarewave

Running the risk of being ultimately boring and senile, in the pre-transistor era when the EF86 reigned supreme and all heaters were 5.5 V DC by selenium (under-run the heaters boy!) the squarewave was the ultimate test of any amplifier. We used to modify the anode currents and the biasing to produce the best transfer characteristics (slew rate and damping to the modern youth) watching it all on some dreadful ex-government Cossor 'scope and drawing inaccurate conclusions about starvation ratings and matching impedances. The standard waveform for these empiric meddlings was the 1 kHz squarewave, and for a very good reason: it is the only

## The interplay of psychoacoustics and test procedures with particular emphasis on the squarewave by Ted Fletcher

waveform that tells a host of stories at a single glance.

To return to the real world of integrated arrays and ultimate limits of performance, having grown up with electronic rectangles they form the basis of production testing today in the 'Arriss' factory. Recent excursions into the domains of the competition have shown that I am by no means alone—the rectangle is there on 'scope tubes up and down the country.

The simplest of all signals to produce is a repetitive change in potential. If this can be done by switching on and off at a regular rate, then we have it; a squarewave with a unity mark/space ratio. If the speed of the oscillations can be controlled to either 1 kHz or 10 kHz, and the 'offs and ons' are symmetrical about a reference voltage (or 'earth') then we have all that we need to 'listen' with our eyes to the performance of any piece of audio equipment.

The test signal is merely an instantaneous set of transitions from one voltage state to another, separated by a known time; both of these facts are of utmost importance to the conclusions that can be drawn from the results we get.

So let's plug our test squarewave into a hypothetical audio chain in a recording studio and look at the output on a 'scope.

## The flat state

Fig 1a shows a squarewave as it is meant to look before modification by some 'state-of-the-art' audio equipment.

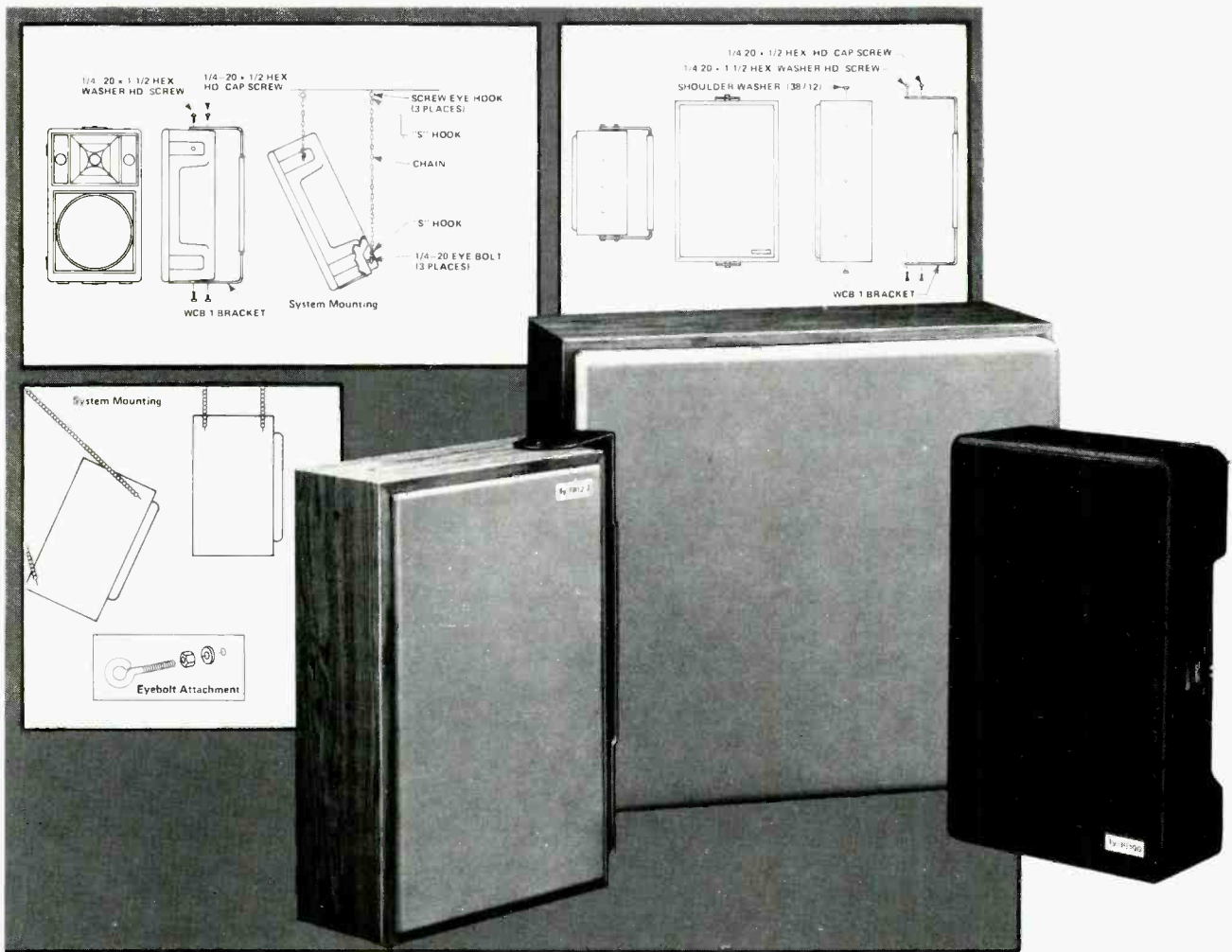
The vertical portions are really vertical, and the horizontals are absolutely parallel. Any little blips or pimples at the corners are decidedly out of order making the test signal worse than useless for our purposes. Fig 1b shows the mangled mess that appears at the output but don't be disheartened, all is not lost. Examine the results and what they mean in terms of *sound* rather than pretty pictures.

To start at the beginning, the first vertical line is not too bad, this means that the response of the amplifiers in the chain is quick enough to follow this rapid transition and the 'slew-rate' is good. The nasty little wiggly bit at the top of the first rise is a different matter, this shows that the system is not too happy about settling down after such a rapid change of state. But now is not the time to jettison the system, this minor ripple shows that there is an inductive element present—a piece of the circuitry that retains charge during transitions of voltage. It could be a transformer, or a filter circuit intended to remove supersonic components of the signal. The main thing is that the wiggle dies away very quickly; the oscillation is heavily damped and will have no effect on the perceived 'quality' of the signal (unless your ears are particularly sensitive to frequencies above 100 kHz).

The 'horizontal' part of the squarewave has suddenly lost its direction. It is falling downwards giving the appearance of drunkenness to the picture. This tells us one of two things; either the frequency response is falling off at the bass end (the electronic charge in the circuit is decaying noticeably), or there is significant phase shift in the bass end. Unfortunately, it is not possible to tell the difference without a quick look at the frequency response.

All analogue circuits that have bass-end roll-off suffer from both of these effects (suffer?—it's intended!) so some bending of the horizontal is quite normal and to be expected.

# EV SHUTTLESOUND



## Great Sound In Small Packages

We went into the field to find what you wanted most: a wide-angle speaker system that works like a component array, but installs with ease and looks great anywhere. Then we designed our new FR15-2, FR12-2 and P1100 speaker systems to make your job easier.

All systems are factory-fitted with threaded inserts to facilitate suspension. And, with an optional telescoping bracket, the FR12-2 and P1100 can also be wall or ceiling mounted in six versatile positions. For constant-voltage operation, an optional TK60 line



TK60 TRANSFORMER KIT

transformer kit replaces the normal direct input panel.

The FR15-2 and FR12-2 have oak-grained, vinyl-covered enclosures, for use indoors.

The P1100's one-piece molded polyethylene enclosure is tough enough to go outdoors.

All three new units are two-way, full-range systems featuring EV's own constant-directivity design which radiates sound over well-defined coverage zones: 90° x 40° for the FR15-2; 100° x 100° for the FR12-2 and P1100. They're all substantially more sensitive (96/97 dB, 1W/1m) and more rugged (100/200 watts long-term average power capacity) than most competing systems.

The FR15-2, FR12-2 and P1100 speaker systems from Electro-Voice. Outstanding performers that install with ease and look as great as they listen. Let us tell you more.

### Shuttlesound Limited

Unit 15 Osiers Estate, Osiers Road, London SW18 1EJ  
Telephone: 01-871 0966 Telex: 27670 Shutso G

# A PERSONAL VIEW OF PSYCHOACOUSTICS

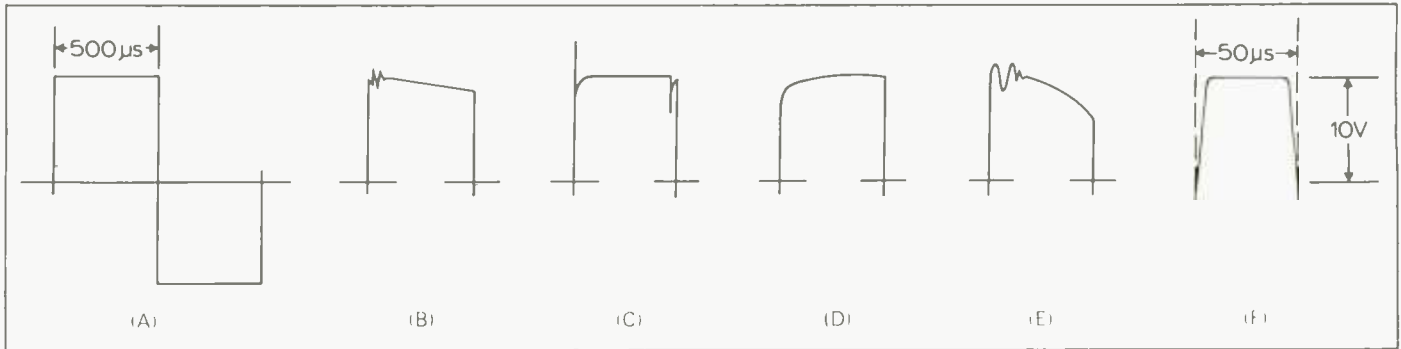


Fig 1: (a) The 'flat' squarewave with clean 90° angles—the starting point. (b) The squarewave through some reasonable equipment. A slight ring on the leading edge and an angle on the horizontal indicating bandwidth limiting. (c) The response of an amplifier suffering from transient instability. (d) The Sony F1 record/replay characteristic as shown by squarewave. (e) An analogue tape record replay characteristic—but it still sounds good. (f) Waveform showing severe rise-time restriction. Frequency 10 kHz.

The next point of interest is the transition from the horizontal to the vertical. An unstable system would show a nasty kink either upwards or downwards here; a sure sign of intermodulation distortion tendency and a 'rough' sound. Our waveform shows a normal near right-angle, with no twitches or kicks in either direction.

The conclusions that can be drawn immediately from the wave are:

- the frequency response has been limited to audio frequencies and is substantially flat within those limits;
- stability is good;
- intermodulation products are at a low level.

It's a good bet that the system that has a squarewave response like Fig 1b will sound good under all conditions and with all programme material.

Look at Fig 1e. At first glance it is close to a perfect squarewave, the only difference being the tweaks at the front and the back of the waveform. This one is unfortunately all too common in the middle range of audio equipment; a frequency response test using sinewaves will probably show absolute linearity. Distortion tests will be acceptable but in reality, it will sound *awful* because those insignificant-looking spikes show instability during fast transitions—the transients of music, the bits that give sound that indefinable 'quality'. The only other test that will show this is a high frequency intermod test requiring kilopounds worth of test equipment and a 3-year course in result interpretation. It's a sad fact that it is all too easy to produce equipment that looks like this, when for the sake of some intelligence and a squarewave, the problems could be eliminated quite early during the design stage.

## Getting it right

Making it very plain that I have no axe to grind in the digital domain, the engineers at 'Sunny' were faced with some horrific problems when developing the circuitry of the F1 system of digital recorders. The system demanded extremely steep filtering at the HF end; usually an instant recipe for disaster in transient response. Fig 1d shows the result of a record/replay squarewave on a standard F1. The front edge shows no signs of 'ringing' at all, there is just a little ramp demonstrating the HF response roll-off. The LF response is absolutely flat (fairly easy with digital!) and the collapsing charge is an exact right angle showing the excellent damping and control in the analogue stages. It is no wonder that the system sounds right (anyone wishing to argue can meet me after school and receive a fat nose to match his thick ears).

Having just become lyrical about the input/output performance of an inexpensive digital recorder, it is only fair to show the equivalent waveform via a good analogue recording chain. The result is shown in Fig 1e. Conventional testing would show good frequency response, reasonable distortion and filter roll-offs; why then is the squarewave so dreadful? The parameters that modify the trace most significantly are phase changes across the audio band and response over an extended bandwidth. The analogue recording path has to apply emphasis and de-emphasis, filter out bias frequencies, and generally get as good a result as possible from what is basically a non-linear medium. The result is that the inductive components in the record and replay amplifiers show as 'ringing' when hit with the first

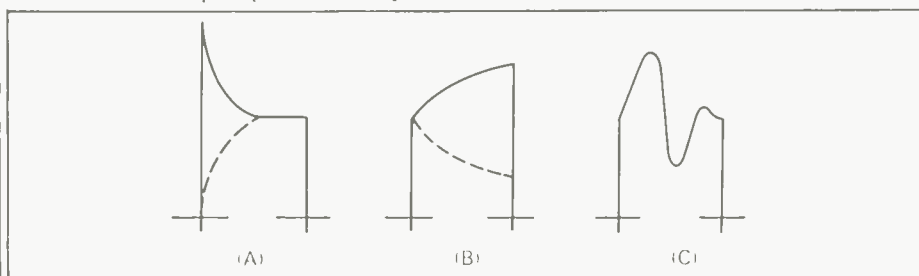
transient, and the response straightening circuitry introduces fairly severe phase shifting in the mid and lower bands which accounts for the wavy horizontal section. Why then does it still sound OK?

Back to psychoacoustics—the human ear is remarkably tolerant of aberrations in sound that occur naturally in everyday life. Specifically, reflections from large masses create odd delays that show as phase shifts. At high frequencies, these shifts are interpreted as directional information while at lower frequencies the brain cannot 'compute' direction and ignores the effect. The predominant distortions that are introduced in magnetic recording are '1st order'; a modification of waveform that is greater on one side than the other. (This was expounded upon in 'The Human Ear' August 1983.) This form of distortion is 'acceptable' to the ear as pleasing within moderation and so the analogue recorder 'improves' on many forms of programme material. The less-than-perfect transient handling of magnetic tape does affect the perceived performance, imparting a 'glassy' sound to the high frequencies; once again a useful effect (in both senses).

Another effect that is not strictly to do with the squarewave testing bit but is none the less interesting when considering analogue recorders, is the strange appearance of modulation noise. Record a simple bass line and do a direct A B comparison as it is going on to the tape. The increase in 'noise' is astonishing; but careful listening will show that the noise comes and goes with the modulation. This is just a little example of how specifications can be totally misleading when it comes to what you actually hear: the bottom end modulation noise is far worse than the noise measured (and specified) with clean tape running. Careful bias setting will minimise the effect but it's a fact of life that it is always there! Dr Ray Dolby proved practically that this sort of noise is effectively masked by the modulation itself, but in a controlled comparison test the brain is aware that there is 'something different' in the noise of analogue.

Having grown up with conventional tape recording, the sound of digital *is* different. It happens to be more 'correct' in that it faithfully reproduces the

Fig 2: (a) High frequency lift and cut (6 dB octave). Operating (shelf) frequency approx 10 kHz. (b) Low frequency lift and cut (6dB octave). Operating (shelf) frequency approx 100 Hz. (c) Mid frequency lift with a Q of 2 at 4 kHz.



# A PERSONAL VIEW OF PSYCHOACOUSTICS

signals that were thrown at it in the first place. The current generation of humanity have been inexorably indoctrinated to love the tiny 'modifications' that exist in analogue; and this is why analogue recorders still sound good; but some sound better than others.

A separate, but useful, use of the squarewave is to check the 'rise-time' or slew-rate of any equipment. To be useful in a professional audio environment, the slew-rate should allow near-perfect reproduction of transient signals approximating to a frequency of 20 kHz (being the limits of hearing). After much arithmetic, this equates to a slew-rate of about 5 V/ $\mu$ s (in the world of 30 V power supplies and 26 dB overload margins and assuming a transient THD of within 1%). With present-day devices, this figure is reasonably easy to achieve, and to check it, all one needs to do is apply a 10 kHz squarewave, and measure the slope of the rising and falling 'verticals'. Some simple sums will provide the answer.

Fig 1f demonstrates the effect of equipment that is deficient in this respect and shows a 1 V/ $\mu$ s response.

## Equalisers

Smartly pulling the article back to its original course, the squarewave is at its most useful as an instant high speed way to examine the performance (both specified and perceived) of that haven of subjective garbage—the equaliser\*.

When many, many small mixers are being produced each week by some little factory with narrow profit margins and restricted facilities for testing, engineers are desperate for a test procedure that can show at a glance all the parameters of a particular set of circuitry. The equaliser is ideally suited to squarewave testing because it affects phase, amplitude, and is time related. Fig 2 shows some pictures that are the real result of 1 kHz squares bounding through typical mixer channels.

Fig 2a shows the effect of single order (6 dB/octave) high frequency lift and cut. The amount of height above or below the original squarewave that the front edge goes is a good idea of the amount of lift or cut that the circuit is giving, the amount of the squarewave affected shows the frequency at which the control commences its effect. The 'curve' shown is a 'Baxendall' type of HF control shelving at about 10 kHz and with 6 dB lift (and cut) applied.

Fig 2b shows a similar state of affairs with a bass control. The front edge of the waveform remains unaffected, the modification becomes progressively greater along the 'horizontal' section.

Fig 2c has been intentionally overcooked to demonstrate that one cannot read too much into these waveforms; this one is a mid-frequency lift at about 4 kHz but with a high Q value (a sharp and peaky filter). The apparent oscillation is exactly that—it is a demonstration of the nasty wiggle that such filters create, but is more related to time and stability than to apparent lift and cut which were evident in the other examples. It is a graphic demonstration

of how the circuitry has difficulty in stabilising itself after a transient edge when such filters are in circuit, and gives a clue to why a low Q value produces a more pleasing and cleaner sound than a high one. (I hasten to add that this is an over simplification—my brain has not gone completely soft.)

Testing equalisers then can be simply a matter of watching a 1 kHz squarewave on a 'scope and swinging the controls—the gyrations of the waveform giving more than just an indication of the performance. In a production environment, once the 'correct' performance results are known and understood, the diagnostic capability of the squarewave is supreme, giving instant graphic indication of lifts and cuts, Q values, frequencies of operation, interaction, smoothness of control—in

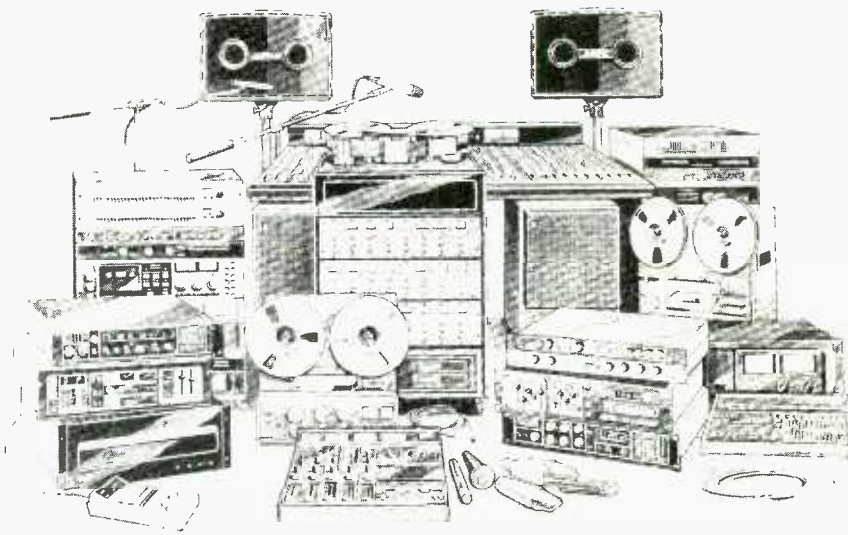
fact all the parameters that are important to the end user.

So look at squarewaves as a valuable interpretative tool; just the odd word of caution. By its very nature, the square uses very wide bandwidths in the rest of the test equipment—if the gear isn't linear out to about 250 kHz (even higher preferably), then the kinks on the 'scope won't necessarily be from the equipment under test. Similarly, at the LF end the equipment must be flat down to a very few Hz. All this is easily checked by looking directly at the signal source and making sure that the squarewave is really square.

Interpretation takes a little practice but the achieved Guru-like ability in fingering problems makes it very worthwhile. □

The best equaliser is no equaliser

## MUSIC LAB HIRE



Supplying the very latest pro audio equipment to the recording studio and broadcast industries, Music Lab Hire offers today's most flexible and professional hire service. Whatever your audio requirements may be, from the most advanced digital processor to the last minute accessory, we can deliver 24 hours a day.

Our experienced technical services staff will ensure that you get the correct interface cables, operators manuals and full technical backup with every rental. All equipment is fully maintained, subjected to a quality control programme and is protected in heavy duty flight cases. A fast and efficient delivery and collection service is also available if required day or night.

24 HOUR STUDIO EQUIPMENT RENTAL

75, VEEHOLT STREET, LONDON, NW11 1BY, TELEPHONE 01 367 2356

# A BLOW BY BLOW ACCOUNT

**J**eff Beck's first solo album *Blow by Blow* was recorded in the Autumn of 1974 at AIR London. Denny Bridges had been working there for three years,

engineering for about two of those, and anyone familiar with the training set-up at AIR will know that after three years Denny had not engineered very many full scale album projects. Because of this George Martin has said that Denny brought a freshness to the recording.

Denny admits that he was relatively inexperienced and agrees with George's surmise.

As for the working routine, although it was Jeff's album and George was the producer it did not seem to matter much if one or other of them went missing for a while: "George Martin would leave around midnight and then the band and I would routine and work through ideas. Recording would recommence around two in the afternoon the following day.

"The backing track of *She's a Woman* was done without Jeff being there. They ran through it and recorded it and it just happened to turn out to be the best. Jeff didn't mind that sort of thing at all, and he did the lead melody live on to the tape."

Working with George Martin worked very well for Denny and he is clearly very impressed by the man. "In those days producers produced, engineers engineered and artists performed. It was different then. George Martin let you get on with the engineering and he looked after the musicians, the music and the performance. He doesn't create a sound in the desk or the machine but with instruments and artists' performances. That's how he gets what he hears in his head—not by techno-wizardry.

"This is part of George's strength, that he is confident enough to delegate those areas. Of course he has the right to veto and change a component if it is going wrong and therefore he has control. For instance if I did everything wrong I would be the component that had to go.

**The making and producing of Jeff Beck's epic album *Blow by Blow* was one of the subjects discussed by George Martin in our recent interview. Denny Bridges was the engineer on those sessions and he talks to Janet Angus about the making of a musical milestone.**

"Hence George's relationship with Geoff Emerick—they have such a good relationship and a huge confidence that this enables George to let Geoff get on with twiddling the knobs."

**A**nother aspect of George Martin which left a lasting impression on Denny was his handling of the artist; the way he motivated Jeff to come up with the goods and fed his confidence time and time again. Jeff Beck put himself under a lot of pressure for *Blow by Blow*. Being his first solo album he was very worried that it would not be a success. He had also been out of circulation for a while which had helped to lose him a little of his confidence. Consequently George Martin's main task was simply to convince him that what he was doing was as brilliant as it really was, and Jeff by all accounts took a tremendous amount of convincing.

Recording started with Carmine Appice on drums. After only two days work the two musicians' managers fell out over the album concept and Appice was replaced with Richard Bailey. Denny had worked with Richard before on an album for John Williams so he knew the player and his kit very well. Recording in AIR One, which is a very big room, the area was divided in two with large screens—Richard stuck in the middle of a still fairly large space, and the drum sound was achieved by miking up Richard Bailey's ears. Using two Neumann U87s as close to the ears as they could get without being

intrusive and restrictive to his playing (approximately 12 in) the drums were put down. "It was not a very ambient sound, but it was open; the drums only spread a little. We close miked the kit as well."

On the bass drum they used an AKG D25, predecessor of the D12; on the snare a Neumann KM86; hi-hat was an AKG D22A and on the toms Neumann FET U47s.

"What we were aiming for in the overall sound of the recording was very simple. I didn't immediately dive on the EQ for 'creative equalisation' as they call it these days. It was all done with mic technique and working for a very clean sound. We used very little EQ even on the mix."

Other sounds were achieved in different ways. The bass was miked and DI'd, the FET U47 placed in front of the bass amp; no EQ at all. "We didn't mess around with the sound at all. It was about 10:1/mic:DI and it sounded very loud, although it wasn't."

"On the guitar we had three different ways: for the backing tracks it was in the studio with a Neumann U87; some of the work was DI'd in the control room and some with Jeff in the control room and the amp out in the studio.

"Of course Jeff had loads of effects pedals. Miking up the amps, depending on the volume, the mic was placed between 2 and 5 ft from the amp. No ambient mics were used—we went more for capturing exactly the right atmosphere rather than the ambience."

A lot of the mic placement experimenting went on during rehearsal but "There wasn't

any great fuss about placement of mics—none of the drama you sometimes get nowadays. We weren't going for anything in particular soundwise, it just unfolded as we went along. Things like the Clavinet, which was DI'd, might be too up front and things like that, so you would have to mic it a bit as well, because if you try to turn it down it doesn't fade as quickly as some of the other instruments."

The Bosendorfer grand piano, played by Max Middleton, was miked up with two Neumann U87s; the Fender Rhodes DI'd stereo.

"The Fender Rhodes has an ambience of its own. It was the only thing I immediately EQ'd—cut at 200 Hz and then compensated for level; cut rather than boosting of the frequencies. A thing I do quite often is give quite a massive boost (at whatever the top knob on the desk is) on the bass drum which would then be shelved off in the mix. So when you are recording there is a good clicky bass and then you can rectify it in the mix. It keeps the bass drum well up front and you can get rid of the hiss at the end."

The main reason Denny didn't EQ any of Jeff's guitar work is that he changes pickup and brings effects in and out so often during a solo, constantly changing settings in the middle of runs, and so it was partly caution and partly the fact that it sounded great anyway which made Denny back off.

"We used very little EQ generally. It was not necessary. All the instruments fitted together very nicely. Possibly the album turned out to be a bit top light to some people's ears because of that but it is all down to individual taste. There was a lot of warmth on that album. The combination of instruments: bass, bass drum and piano and Jeff's guitar, especially with his octave splitter taking it down an octave, there were lots of nice bass sounds. The overall atmosphere you get by miking up 3 or 4 ft of air around the sound gives it a sound all its own—a warm shell, a roundness."



**H**ardly any effects were used either. Eventide *Instant Flanger* and digital delay line were the only things. George wah wahed some of the strings on *Scatterbrain*, and there was "The obligatory 7½ in/s repeat echo on Jeff's guitar from time to time, especially on *Freeway Jam*."

"*Scatterbrain* is in two sections. It starts off in slow ½ or ¾ time and then it goes into a 7 rhythm, and then into the sort of funk solo guitar and all that was recorded at once. Then the middle bit was inserted afterwards. We did that by getting a bit of tape and mixing a long chord on to 2-track. Then we dropped it in so that it died away."

"The hi-hat that comes in that section we recorded in the middle of AIR Four which was in the process of conversion into a dubbing theatre and it had a fairly live acoustic. So we set the hi-hat up in the middle of the control room and in order to dry the hi-hat sound out and shield off the noise from the machines, everyone stood around with George's overcoat and whatever else they could find, forming a wigwam around Richard while he played. And then the final section was added on to that and Jeff did his bits on top."

"This illustrates another of George's strengths. He can work things like that out in his head; he knew exactly how long that section was going to be and the hi-hat and then Jeff coming in. George can keep that timing perfectly in his head and it always comes out exactly right. He has done that time and time again when I've worked with him. He also has perfect pitch."

The strings were all capacitor miked—between 20 and 24 players, Denny can't remember the exact number. The string recordings were done in two lots: one for *Scatterbrain* in AIR Two, which is a smaller studio and a bit dry "There isn't as much openness to the sound"; and the other was for *Andromeda*, which is now called *Diamond Dust*, in AIR One.

"It's a slower track anyway but you can hear the space; we used it to our advantage. George wah wahed those strings. The mics used were Neumann U87s, FET U47s and KM84s—all Neumann capacitor mics. At the time they were the best we had—we didn't have any valve microphones. I think it was before the days of the AKG 414."

While we are still with *Scatterbrain*, Denny illustrated the sheer musicianship which was present on that album with a tale about the 'five finger exercise' riff which is at the back of the track. Jeff and Max Middleton played this repetitive, fairly complicated riff based on a five-finger exercise *live* on the backing track.

"On the first track, just as Jeff is going into the second solo there is a really long note. The guitar was DI'd and he was sustaining it just with finger tension on the fretboard—pure finger technique on Jeff's part. It wasn't amplified so there was no ambience. Being a guitarist myself, I couldn't shut my mouth for about three hours afterwards, it was incredible!"

**A**s Denny said before they quite often got on with their own thing if one or other of the key people was busy.

George would go off to do some string arrangements leaving Denny and the band to record.

"Sometimes George would go off at 6pm and when he came back he would bring me bacon and egg sandwiches. He can always go into catering, because they were wonderful!"

It was unfortunate and disappointing at the time that when the album was released Jeff's nervous tension broke, with the result that he was very critical of the production, engineering and even players on the album for a while.

"That's all water under the bridge now. Jeff was so nervous about what sort of reception the album would get."

"It is an album made in heaven, and is the result of the musicians, the music. George and, overcoming my natural modesty, me. We had a totally undefined approach, and we didn't have any disagreements. The only difficult thing was George having to demonstrate to Jeff that what he was doing was brilliant."

"We lost quite a few amazing performances because Jeff couldn't be convinced of their value. I tried to keep them on track 24 or something, but as we ran out of tracks they had to go."

The whole project took around five weeks, which was quite standard fare in those days. "We didn't have the marathons you do now." □

Denny is now chief engineer and studio manager of Berwick Street Studios, 8 Berwick Street, London W1.



**DRAWMER · VACUUM TUBE  
COMPRESSOR AMPLIFIER · 1960**

**DRAWMER MARKETING AND SALES  
· 01 · 943 · 1368 ·**

# REVIEW REVIEW

A user report by Keith Spencer-Allen



## KLARK-TEKNIK DN780

One of the few advantages in the proliferation of reverberation systems is that there is an increasing amount of choice in the operational style and complexity available together with a wide variety of prices. We are currently seeing what you might term the second wave of manufacturers entering the market and they have had the advantages of being able to consider user requirements from a far more practical user basis than their first-wave manufacturer predecessors. Further, the range of users of digital reverb has increased to the point where there is no longer such an item as the universal-meet-all-requirements system and a degree of tailoring is necessary.

The DN780 is the first digital reverb device from Klark-Teknik although they have had the DN700 series of digital delay lines and a range of effects processors from their earliest days aside from the graphic equalisers with which they are more commonly associated. In fact the DN780 is instantly recognisable as a product of K-T with its silver brushed aluminium front panel with black trim and lettering.

The unit is a compact 3½ in high within the 19 in rack mount format. There is also a small remote unit that the manual describes as an option although I believe that it is now a standard item with the DN780. The front panel is dominated by a multi figure display with associated switches very simply laid out in such a way that makes the capabilities of the unit appear deceptively basic.

Before covering the front panel facilities, some explanation of the general philosophy behind the design criteria is necessary as it is not typical. The DN780 doesn't have dedicated software programs for the user to select from in the normal way and is therefore arguably more versatile. There is for example no dedicated Hall program that

you can dial up and then proceed to modify within certain limits as with most units. The K-T approach is to provide 89 internal memories, with the block from 1 to 39 being factory preset. In the current software release (1.4) the first 20 memory positions contain preset Hall, Plate, Chamber and Room settings—five of each—which can be instantly recalled. These memories are not programs but recordings of the front panel settings needed to make those reverb types. As I will describe in more detail later, there are seven user adjustable reverb parameters on the front panel and these preset selections were created using only these adjustments and the other 50 user memory locations can be filled with the user's own settings. I was slightly sceptical myself that there were no software aspects in the preset selections and set about taking a Room and a Plate preset and modifying the parameters of each until the displays read identically, entered them into a sequence and switched between the two with a variety of signals and I have to report that they were exactly the same.

These presets are really only for quick access to certain types of reverb pattern and also to familiarise the user with the type of parameter settings to achieve different types of reverb. To summarise this aspect, the DN780 should be viewed as a 'blank reverb slate' with the flexibility of controlling all the parameters needed to create a wide range of reverb settings with 20 settings stored for guidance or as good starting points. This having been said, there are also five special effects programs that do contain dedicated software although they are not part of the general reverb section; I will cover these in more detail later.

### Front panel

The easiest way to explain the DN780 is to describe the operating procedure but a

brief description of front panel controls is in order first. At the extreme left hand side of the front panel lie the basic master controls. The LED column is an input headroom indicator with the necessary peak reading movement and a red LED calibrated 0 dB that illuminates at 3 dB below the clipping point. The lowest of the 10 LEDs is calibrated as -27 dB. The 0 dB LED also indicates overload at the arithmetic processor which can only really occur if some of the special effects programs are used without care. The input level control has a usefully wide range with K-T recommending a setting such that loud passages cause the -3 dB LED to illuminate.

Remaining in this section are two momentary action pushbutton mutes labelled IN and REV. IN kills the input feed to the reverb section while the button is depressed and this allows the user to check the decay pattern on the reverb setting he is working on. The REV button has a similar effect but upon the reverb sound itself.

As mentioned earlier and can easily be seen from the front panel, half of the panel is a numerical readout with eight separate values displayed at the same time. Seven of these are the adjustable reverb parameters while the eighth at the far right is the number of the accessed memory. Below each of these displays is a momentary pushbutton that selects the parameter for adjustment and this is clearly indicated by a green arrow that appears under the numerical display for that parameter. At the right hand side under the memory store readout there are parameter up (+) and down (-) buttons. By tapping the appropriate up or down button the selected parameter can be stepped up or down through its available values. Holding down the parameter button will cause the selected parameter to automatically step slowly through its range. If rapid adjustment is needed then both + and - buttons

# Selected effects from HHB.

The staggering range of signal processors that has become available on the back of low-cost computer technology can be overwhelming.

To help you make the right choice, HHB has selected a few that we think are special, representing best quality and value for money.

**AMS RMX16 Digital Reverb:** Undoubtedly the state-of-the-art in digital reverb. 12 factory presets, 9 user stores for user-edited sounds plus loadable programs. Up to 800ms pre-delay, 9.9 sec decay. Hi- and lo- filters. DDL capability. Stereo. £4680.00.

**LEXICON PCM60 Digital Reverb:** Brings famed Lexicon 224X quality at a realistic price. Plate or Room simulation, each with 4 decay and 4 size presets. Hi- and lo- filters. Stereo. £1475.00.

**BEL BD80 DDL:** Amazing value with full bandwidth, 2 sec delay as standard, up to 8 secs available. Digital sampling with loop editing facility. Internal or external trigger of sample. Modulation and phase controls. £695.00 (2 secs) + £200.00 per extra 2 secs.

**DRAWMER DS201:** This sophisticated low-cost dual noise-gate, offers attack, hold and decay controls, frequency-conscious keying gate or duck function, 80dB attenuation and stereo link. £275.00.



**KLARK-TEKNIK DN780:** Flexible new digital reverb from KT, offering choice of Plate, Hall, Chamber, or Room simulation, as well as delay, ADT, SOS, and multi-tap echo. Up to 990ms pre-delay, 99 sec decay; also reflection pattern and intensity controls, filters. 39 presets + 50 user stores. Stereo. £3580.00.

**YAMAHA'S R1000:** The lowest cost, high quality digital reverb. It features 4 presets and a nifty 3 band parametric EQ for flexibility of effect. Digital quality at the price of a spring. £449.00.

**DELTA-LAB ADM 1024:** We are glad the Effectron II range is once again available here, because of all the many 1 sec DDLs now on the market, we think this one is the best. Features one second delay at full bandwidth, fine time control, modulation etc. £399.00.

**DRAWMER DL221 Compressor/limiter:** Linear performance and flexible control, plus a separate limiter and side-chain functions make this a steal at £325.00.

All these units (and more) are permanently on demonstration at HHB if you need to try before you buy. If not, why not take advantage of our mail-order service for best possible prices and free delivery. Call now on 01-961 3295.

Access, Barclaycard/Visa, American Express. Finance arranged. (All prices exclude VAT and are correct at time of going to press.)



HHB Hire and Sales, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. Tel: 01-961 3295.

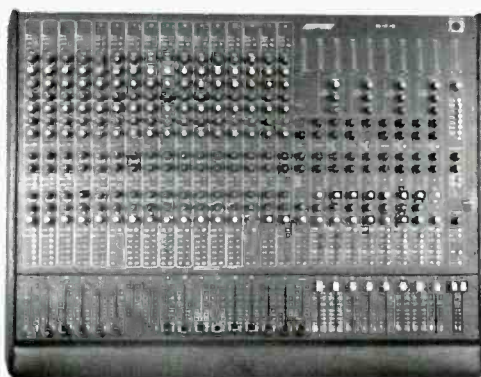
Over 5,000,000 man-hours of experience in the development, planning, manufacture, installation, and maintenance of radio, television, and communication equipment.



Group of companies in communication technologies  
An der Ochsenwiese 3-6 / P.O. Box 23 00 80  
D-6500 Mainz-Gonsenheim F. R. G.  
Telex: 4187300 bfe d; Telephone: (61 31) 46 30

## Productinformation No. 17 C301 Live/Studio Mixing Console

The C301 Live/Studio-Mixing Console meets the stringent demands of top audio engineers and provides truly professional performance. Its versatility, whether used for live performances or in the studio, results from its ease of operation and simple expansion through addition of standardized modules. All channels are accommodated on their own separate circuit boards accepting the plug-in bus line, and are thus easily interchangeable. The power supply is incorporated into an external 19" rack-mount housing. LED-indicators for supply voltages and internal voltage supplies are situated on the mixing panel.



Double potentiometers with two adjustment knobs on a single shaft are deliberately avoided in order to simplify operation; all push-

button switches are of a type which has gained acceptance in the broadcast industry.

A mixing-console-system based on a 16/8/2-Mixer, expandable up to 40 channels.

- Transformer ballanced inputs with phantom-power
- 4-band EQ with 2x param mids
- 4-Aux-Sends pre/post switchable
- 8 in 2 monitor-matrix
- external power supply 19" 2 U
- excellent technical dates are the best qualification for highclass P.A.-systems and studio work.



For further information use our telephone-service:  
Call West-Germany 61 31-4 63-0

- Audio-/Video-studioplaning
- Mixing-consoles and Studio-gear
- Professional audio equipment

- Rack-systems
- Acoustic-planing
- Room-measurements

**61 31  
463-0**



# REVIEW

# REVIEW

should be held down with the required direction button being pushed slightly ahead of the other.

The adjustable parameters are largely self explanatory although they do require some clarification—from left to right they are:

- **Predelay:** the time delay between the initial signal and the initial reverberation. Fully adjustable from 0 to 100 ms in 1 ms steps, to 200 ms in 2 ms steps, to 500 ms in 5 ms steps and to a maximum of 990 ms in 10 ms steps. If this is adjusted with programme running, small clicks may be heard.

- **Reflections—Pattern & Level:** these two parameters are paired and together they define the basic acoustic character simulated. Pattern adjusts the pattern of the early reflections, ie those that determine the character of the reverb. Settings 1 to 5 give a variety of values for number, spacing and density with the 1 position giving a very solid compact type pattern such as would be more suited to a percussive requirement, while increasing pattern numbers diffuse the early reflections creating a more spacious sound character. Level is a 9 increment control that sets the level of the initial reflections against the reverberant field with the higher value settings giving higher initial reflection levels.

The next three controls effect the reverberation type:

- **Decay:** the overall midband reverb decay time. Adjustable from 0.1 to 99 s although the complete range is not available in all settings—the extremes are also controlled by the room size parameters selected.

- **LF & HF:** separate control allowing boosting and attenuation of the decay time within their respective frequency areas.

- **Room Size:** adjustable control to simulate room size with a display stepping from 5 to 99 which is intended to represent a linear dimension in metres. Adjustment of this control will also cause the decay time to alter at the more extreme settings.

Above the up and down parameter controls is the memory display. This is a red readout as against the other parameter displays which are green. To the right of the displays is the key pad. To access a memory location you simply enter the two digit number, the audio mutes while changing and then returns with the displayed parameters and memory number which takes about 1.5 s. The STO and SEQ keys will be explained within the operational discussions. The only remaining front panel control is the power on/off button at the extreme right-hand side.

The rear panel layout contains a standard IEC mains socket with an integral fuse assembly, a cooling fan outlet, a 15-way socket for the connection of the remote, XLR-type input and output sockets and a pair of recessed

output level controls that are factory preset although adjustment procedures are detailed within the manual should they be needed. The fan is very quiet and produced no distraction within the control room. The XLRs are wired pin 3 hot as is standard K-T practice.

In prolonged use, the unit did not become any more than comfortably warm and aside from the sensible precaution of keeping it away from the other heat creating devices and allowing adequate ventilation at the rear of the installed rack, I can see no restrictions on installation.

## Remote

This is connected at the rear of the unit by approximately 25 ft of cable. Basically it gives the user remote control over predelay, level, HF and decay parameters on sliders. This means that rapid adjustment is very easy. The remote is enabled by hitting the remote button which then illuminates the LED next to it on the box. The only indication on the main unit itself is that an LED labelled 'a' under the memory display is illuminated. The parameter display shows the setting created by the remote. Should any of the front panel parameters be adjusted with the remote operative, the remote becomes switched off and has to be re-enabled which is a useful way of preventing two-ended operation.

The faders on the remote have LEDs above them and these show when the faders have taken control of that parameter on the main unit. To 'switch it in' you have to move the fader until the fader position corresponds with the current parameter setting and then the LED illuminates and you are in control—similar to finding automation null points although in this case it is just a sweep of the fader. It is also possible to step a sequence from the remote and this will be covered later. One point worth remembering though is that this control is separate from the remote on/off status.

## In use

The difficulty with the *DN780* is that the unit appears so simple you tend not to look at the manual till you run into problems. This is what I did and found that there were certain aspects I could not make work; it was then I found I didn't really understand the unit very well. So read the manual first or you will miss many of the unit's features.

When power is first applied, a self-diagnostic routine runs and if all is running correctly the unit resets itself 2 s later at the last used display. While running the diagnostics, the software series number is displayed within the memory readout. If this is the reverb pattern you want, then you can start modifying the parameters as described

earlier. If not, then simply enter the memory location of the desired pattern with two digits on the key pad and it will appear. Memory positions 1 to 20 are factory preset and if you are creating a new pattern, it would make most sense to enter one of these nearest to the type of reverb you are looking for. Then having modified it to your taste it would make sense to store it in one of the 50 user memories. This is done by pushing the STO button on the keypad then the number of the store that you wish to assign to it. This of course must be a user memory (over 39) and if it is empty, the display will scroll from left to right and then reappear with the store in the memory position fully entered. If the selected memory is full, then the memory position display selected will flash. Entering the memory number again will erase the previous memory and enter the new. I would support K-T's suggestion that a note should be kept on the pages at the back of the manual. You will need this anyway unless you can remember all 89 presets.

If the memory is getting full, patterns may be stored by hitting STO and 0,0 and the pattern will be entered in the numerically next highest empty memory position. Trying to access empty stores or store into factory presets leaves a broken dotted line across the displays and the word NO before it returns to previous status. The manual also details the method of erasing the complete user memory if required with a sequence of buttons that you are quite unlikely to make in operational use.

The *DN780* has the ability to store a sequence of up to 16 reverb patterns to allow rapid changes in live use or during mixdown, etc. This is set up by hitting STO and the SEQ buttons. The memory display will then read SE 1. You then hit the 2-digit number of the first reverb pattern and the display reads SE 2, you enter the next and so on until you reach 16 or the end of the sequence, push SEQ and the sequence is stored. This process can be set up while a reverb pattern is running programme material as normal. If you should inadvertently enter more than 16 memories the sequence is erased and you have to start again. The stored sequence can be recalled by simply pressing SEQ and stepped through by pushing the button again. A useful addition could be provision for the remote switching of sequences from other than the remote, eg from a real-time events controller or a console automation system. It is possible to alter the parameters of user memories within a sequence although this will of course change the memory itself.

You may have noticed that so far I have not commented on the sound quality of the *DN780*. This is largely because if you have a reverb device that creates a definite Plate program, you can comment on the sound of that program

# REVIEW REVIEW

within the control parameters that you have at your disposal. In the case of the *DN780*, however, there are no programs and so if you don't like the sound of the suggested presets you can alter them totally—do you see the problem? The presets are good examples of their type although I could not really imagine using any of the room or plate settings without some small modifications.

There are, however, some general observations that can be made about the reverb quality of this unit. Firstly, the decay of the reverb signals is very smooth and dense, even at the tail end of the reverb. The sound quality is very full and solid and the stereo image is wide while still remaining mostly natural. The unit is also very quiet in operation. I was able to find the reverb patterns that I needed for most uses—the percussive ambience, the expansive hall, the ringing plate and the explosive snare. They are all there but you need some operational experience to reach them easily. All digital reverbs sound different and in this aspect of reverb creation, the *DN780* is a match for any other. Where it may currently miss out is in the area of the very specific requirement or the special effect reverb that some of the top end units can provide.

I have not yet mentioned the five special effects memories. These are memories 31 to 35 and are: delay line (up to 2 s); ADT effect with variable predelay and selection of two to eight voices; multi-tap stereo echo with predelay, pattern, decay and HF decay control; sound-on-sound loop with a variable length of up to 2 s with level and decay control; and the infinite room which allows fresh input while the up parameter button is selected.

The manual provided with the *DN780* is very clear and comprehensive although aimed solely at the user—no user serviceable parts inside, etc! It does say that software updates are envisaged on a regular basis and that these will be provided free of charge to registered owners so there may be some interesting future developments.

## Conclusion

You have to become familiar with using the *DN780* to appreciate its ease of operation and indeed its complete mode of operation. For those of us reluctant to read manuals: it looks very simple, and it is, but not so simple that all is immediately clear. Because of this many people may be put off and not check it out fully. A fairly powerful inducement to look closely should be its price—which in the UK is about a third of some of the established US models and must still be considerably lower in most territories.

The *DN780* is a high-quality digital reverberation system that has a unique approach to the creation of reverb

patterns. Once you have understood the approach that Klark-Teknik have taken in the technical and operational design, manipulation of the reverb patterns is simple and quick as all parameters are adjustable at the front panel with easy operation and clear indication of the parameter settings. Simplicity in operation has not compromised reverb potential and the way that the system is configured suggests much future potential.

There is virtually nothing to criticise with the *DN780* and I would recommend a serious audition of this unit to anyone.

## Postscript


Since the completion of this review Klark-Teknik have informed us of a number of software changes that add to the abilities of the *DN780*. The new release, Edition 1.5, has added another seven preset memories in the form of plate and gated type reverbs and a user memory protection facility. One of the remote faders has now been made 'assignable' so that it can be used to control other functions than the fixed assignment of the review unit. □

# '000' series power amplifiers


**\*3000 watts in 5 1/4 inches**

- **HIGH EFFICIENCY** dual power supplies from **TOROIDAL** transformer and computer grade capacitors.
- **FULLY PROTECTED** against damage to either load or amplifier.
- **SPACE SAVING** occupies only 3 units (5 1/4") of 19" rack space.
- **RELIABLE** output devices can handle 6 times rated power.
- **UNIQUE** ultra linear transformer-coupled drive

<b>dx1000</b>	1000W into 8, mono
	600W into 4, per channel
	300W into 8, per channel
<b>dx1000A</b>	1500W into 8, mono
	800W into 4, per channel
	450W into 8, per channel
<b>dx2000</b>	2000W into 4, mono
	1200W into 8, mono
	1000W into 2, per channel
	600W into 4, per channel
	300W into 8, per channel
<b>dx3000</b>	3000W into 4, mono
	1600W into 8, mono
	1500W into 2, per channel
	800W into 4, per channel
	450W into 8, per channel

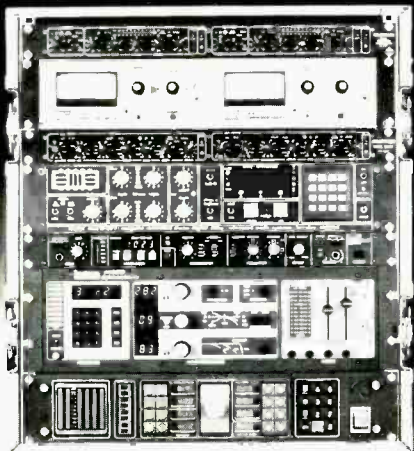


\*dx3000 bridged mono



Hill Audio, Inc., 231 Marquis Court, Lilburn, GA 30247 USA (404) 923-3193 TLX 293827 HILAD  
 Headwater Industries, 635 Caron Ave., Windsor, Ontario N9E 5B8, Canada (519) 256-2454  
 Hill Audio, Ltd., Hollingbourne House, Hollingbourne, Kent ME17 1QJ, England (062 780) 555 TLX 966641 HILL

# The Desired Effect



**01-708 0483 (24 hrs)**  
**The studio effects hire service**

# APRS

## COURSE FOR STUDIO ENGINEERS

THE 12th COURSE IN THE SERIES WILL BE HELD  
SEPTEMBER 13-20, 1985  
UNIVERSITY OF SURREY

This highly-successful series is designed for sound engineers, artist engineers, managers, directors and other personnel involved in the recording of sound for records, radio, television, theatre, video, film and educational purposes.

The Course includes lectures on each link in the chain of operations, Microphone to Finished Product, to record sound for:

Professional Recording Studios · Radio  
Television · Video

using a large range of modern equipment assembled especially for this Course + workshops.

*Prospectus from:*

**APRS**  
**23 Chestnut Avenue,**  
**Chorleywood, Herts., U.K.**  
Telephone: 0923 772907

## INVEST IN A SOUND FUTURE

YOUR CAREER IN THE  
**MUSIC RECORDING INDUSTRY**

**TREBAS INSTITUTE OF RECORDING ARTS**  
WILL PUT YOU ON THE RIGHT TRACK



in a 2 year professional training program in the

## RECORDING ARTS AND SCIENCES

80% of graduates placed

80 COURSES IN

- MUSIC VIDEO PRODUCTION
- RECORD PRODUCING
- SOUND ENGINEERING ● MANAGEMENT

LIMITED INTERNSHIPS AVAILABLE

For Day or Evening courses **APPLY NOW!**

For application and FREE brochure describing courses contact The Institute

**TREBAS INSTITUTE OF RECORDING ARTS**

34 West 8th Avenue, Vancouver, B.C., Canada V5Y 1M7  
410 Dundas St. East, Toronto, Ont., Canada M5A 2A8  
290 Nepean St., Ottawa, Ont., Canada K1R 5G3  
1435 Bleury St., Ste 301, Montreal, Que., Canada H3A 2H7  
1901 Ave. of the Stars, Suite 1774, Los Angeles, C.A., U.S.A. 90067

developing tomorrow's music industry leaders since 1979



**TREBAS INSTITUTE OF RECORDING ARTS**

WITH OVER 44 YEARS' EXPERIENCE IN THE DESIGN AND MANUFACTURE OF SEVERAL HUNDRED THOUSAND TRANSFORMERS WE CAN SUPPLY:

## AUDIO FREQUENCY TRANSFORMERS OF EVERY TYPE

**YOU NAME IT! WE MAKE IT!**

**OUR RANGE INCLUDES**

Microphone transformers (all types), Microphone Splitter/combiner transformers, Input and Output transformers, Direct Injection transformers for Guitars, Multi-Secondary output transformers, Bridging transformers, Line transformers, Line transformers to British Telecom Standard Isolating Test Specifications, Tapped impedance matching transformers, Gramophone pickup transformers, Audio Mixing Desk transformers (all types), Miniature transformers, Microminiature transformers for PCB mounting, Experimental transformers, Ultra low frequency transformers, Ultra linear and other transformers for Valve Amplifiers up to 500 watts, Inductive Loop transformers, Smoothing Chokes, Filter inductors, Amplifier to 100 volt line transformers (from a few watts up to 1000 watts), 100 volt line transformers to speakers, Speaker matching transformers (all powers), Column Loudspeaker transformers up to 300 watts or more.

We can design for RECORDING QUALITY, STUDIO QUALITY, HI-FI QUALITY OR P.A. QUALITY. OUR PRICES ARE HIGHLY COMPETITIVE AND WE SUPPLY LARGE OR SMALL QUANTITIES AND EVEN SINGLE TRANSFORMERS. Many standard types are in stock and normal dispatch times are short and sensible.

OUR CLIENTS COVER A LARGE NUMBER OF BROADCASTING AUTHORITIES, MIXING DESK MANUFACTURERS, RECORDING STUDIOS, HI-FI ENTHUSIASTS, BAND GROUPS AND PUBLIC ADDRESS FIRMS. Export is a speciality and we have overseas clients in the COMMONWEALTH, E.E.C., U.S.A., MIDDLE EAST, etc.

Send for our questionnaire which, when completed enables us to post quotation by return.

## SOWTER TRANSFORMERS

Manufacturers and Designers

E. A. SOWTER LTD. (Established 1941), Reg. No. England 303990

The Boat Yard, Cullingham Road, Ipswich IP1 2EG,  
Suffolk. P.O. Box 36, Ipswich IP1 2EL, England.

Phone: 0473 52794 & 0473 219390. Telex: 987703G

# REVIEW REVIEW

A user report by Ian Gilby

## ELECTROSPACE SPANNER SP2

**T**he popularisation of stereo in the '60s brought about those terrible, yet inevitable, stereo demonstration records that more often than not featured a full drum kit being whimsically panned across the stereo field and vocalists who not only sang 'moving' lyrics but walked across your living room as they did so.

When the novelty of moving sound pictures wore off and stereo became stationary, the panpot was quickly relegated to a passive role selecting a 'fixed' position within the stereo image for each particular sound source—a function it still performs today, of course.

The resurgence of interest in the 'sound for sound's sake' philosophy prevalent in many modern pop productions, has placed the emphasis once again on studio effects and their creative utilisation—automatic stereo panning being one effect destined to receive the attention of an on the ball equipment designer looking to develop a new product. ElectroSpace Developments is one such company and the device is the cleverly entitled *Spanner*.

### Function

In fundamental terms, the *Spanner* is an advanced and versatile stereo panning system that removes the need for panpot twiddling by engineers and offers automatic or externally triggered pan functions.

Housed in a sturdily constructed 1U 19 in rack-mounting steel case with matt black front and rear panels, the *Spanner* looks and feels as though it could well live up to the rigours of life on the road, so studio sessions should present no problems.

Two versions of the device are available: the *SP1* and *SP2* configured for mono input/stereo output and stereo input/stereo output respectively. The two models differ visibly only by the inclusion of a Right Input level control on the *SP2* front panel which is the version chosen for review.

Audio input and output connections on the *Spanner SP2* are made via female and male XLR-type sockets on the rear, these being the Neutrik latching variety,

electronically balanced with pin 3 hot. Since the *Spanner* is designed for unity gain operation, both left and right input controls provide level attenuation as opposed to amplification. As long as you patch into an auxiliary send/return circuit with a high enough drive level to prevent possible signal degradation, this won't cause any problem.

### Controls

At the front panel, attention is immediately drawn to the horizontal 9-segment image display which provides a good visual indication of the panning

low frequency oscillator (LFO) which controls the automatic panning feature. Three knobs—Auto Depth, Auto Frequency and Auto Symmetry—govern the operation of this LFO and thus the autopan effect. The width of the pan is set by the Auto Depth control whose range is sufficient to encompass extensive image shifts or no pan at all. The speed of the pan is then determined by the Auto Frequency Knob which, on maximum, can produce a very long pan that takes some 12 s to complete right down to eight pans every second. The latter setting produces a tremolo effect similar to that of a Leslie speaker



action. A central pan position is shown by the green LED illuminating in the centre of the display whilst wider image movement is indicated by three yellow LEDs per side and red LEDs for the extremities—clear and concise. It should be noted that this image display only ever illustrates the positioning of the left input signal, requiring any mono signal to be fed to this input if an image display is to be achieved.

The adjacent Offset control allows the user to select where exactly in the stereo field he wants the reference 'centre' of his stereo image to lie. Since the panning action of the *Spanner* is always centred around the position set by the Offset, at extreme left/right settings, the panned signal will appear to 'wait' at one side whilst it completes the out of range pan cycle.

An 8038C waveform generator chip is used in the *Spanner* to give the triangle wave output for the constantly running

cabinet, since fast panning is merely another form of amplitude modulation.

The triangle waveform is used by the LFO since it produces a perfectly symmetrical pan; think of it as a signal climbing steadily from left up to centre then back down to the right, effectively drawing a triangle shape. The provision of the Auto Symmetry control on the *Spanner* cleverly lets you modify this triangle wave to create a ramp wave, with the audible result that the signal pans gradually from left to centre, then quickly to the right (or vice versa). Operation of this autopan section is simplicity itself and the image display helps to promote a clear understanding of what's going on.

### Mod/clamp facility

Unique to the *Spanner* is a second, totally independent panning system which allows further modulation and

# REVIEW

# REVIEW

triggering of the stereo image. This section can operate in either Modulation or Clamp modes according to the setting of the small Mode toggle switch. A second switch labelled Mod/Trig selects whether the audio signal fed to the left input is used as the internal modulation source or whether an external signal applied to the rear panel Mod/Trig Input jack socket is employed.

In Modulation mode, the Mod/Clamp Depth and Damping controls function in a similar manner to the previously described Auto Depth and Auto Frequency features by varying the amount and speed of the modulation effect. What this means in practice is that you can set up an initial autopan effect and then simultaneously apply another 'overall' pan movement if so desired.

For example, a *Juno 60* polysynth was used to play a sustained organ chord and the Auto Depth control set to a 10 o'clock position with Auto Frequency near maximum to create a tremoloed Leslie effect on the organ sound which remained stationary in the centre of the stereo field. The Mod/Clamp Depth was then turned to full and Damping to below halfway which resulted in the tremoloed organ sound appearing to move slowly from left speaker to right and back again—a most impressive effect, the direction of the second pan movement being determined by the trigger system, more of which later.

In Clamp mode, internal and external modulation sources have no effect on the image position which is effectively frozen as far to one side of the stereo field as possible dependent upon the amount of Mod/Clamp Depth and the trigger system. Whenever the trigger changes polarity (left or right), the frozen or 'clamped' image will move to the opposite side at a rate set by the amount of damping (maximum 20 s) where it will again remain fixed until another polarity change is implemented by the trigger system.

## Triggering

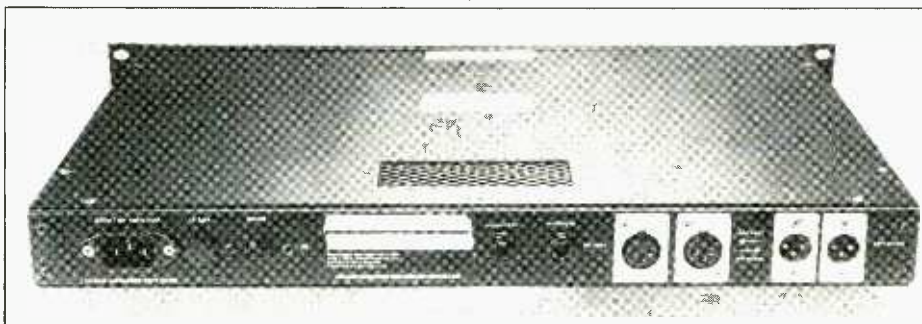
Associated with the Mod/Clamp section is a versatile triggering system which allows the panning action of the *Spanner* to be synchronised to any programme material, the benefits of which are pretty obvious.

Trigger pulses may be derived internally from the audio input itself or from an external source, making it possible to control the panned signal from a bass drum or a sequencer for example. The Trig Count and Threshold functions also allow you to preset how many triggers you wish to receive before the pan action changes direction. A small thumbwheel is used to set the required number (to a maximum of eight) and by momentarily pressing the Reset toggle switch, the total number of

triggers selected is shown by the 7-segment, green Trig Count display. As each trigger is received, the Trig Count readout continually decrements to 1 and automatically changes the direction of the pan as indicated by a green decimal point to the left or right of the number, and begins the countdown again.

The inclusion of a gate-type Trig Threshold which monitors the amplitude of the trigger signal provides precision setting of the desired trigger level. Only when the trigger signal is loud enough to cross this threshold, shown by a red square LED below the Count number, will the Count function be activated. Using the direct audio output of a snare sound on a *Drumtraks* rhythm machine as an example, it proved very easy to vary the threshold so that it was low enough to capture each individual stroke of a programmed snare roll or merely the first beat, and to use these to trigger the panning.

A further bonus of the Reset switch is that an engineer can clamp a sound to one side of the stereo field and prevent it from changing polarity by manually overriding the count before it reaches 1.



In addition, a +15 V pulse is generated whenever the pan polarity does change and this is available as an output from the rear panel Trig Count jack socket which may well be employed to trigger other external devices such as noise gates or even synthesiser arpeggiators. Very useful.

## Interior design

First impressions on opening up the *Spanner* are of neatness—always a good indicator of the thought put into any design. If the interior is badly laid out, it more than likely spells reliability problems in the long term. All front panel controls and displays mount directly on to the one-piece PCB which runs the full width of the case. ICs are all socketed for convenient servicing and the use of PCB connectors on audio cabling means downtime will be reduced to a minimum if any fault does occur. Component quality is high, the heart of the unit being the somewhat infamous Aphex VCA chip which is expensive but very quiet in operation; the claimed noise figure of -85 dBm concurred with the review findings. Finally, a ground

lift slider switch on the rear panel enables the mains earth to be isolated from the audio earth if hum becomes a problem in situ.

## Applications

Having stereo inputs, the *SP2* allows that rarely heard effect of cross-panning to be achieved. This is especially effective where a dry signal is left intact whilst its reverb is made to sweep gently from either side of the stereo field to the other—positively ethereal. Experimentation is the name of the game but where it proves to be an obvious benefit is in panning a mono tom-tom sound, again from a *Drumtraks*, to create the illusion of a drummer playing a roll around the kit. All you do is programme several beats on a tom-tom each with a subsequent drop in pitch, then feed the tom-tom direct output from the drum machine into the left input of the *SP2* and clamp the sound to the left. Then add sufficient Clamp Depth and Damping and the correct threshold so that with each trigger from the drum, the tom-tom sound moves gradually over

to the right dropping in pitch as it does so. The end result is very realistic and a superb way of humanising any rather flat and robotic drum machine.

## Conclusion

The *Spanner* is a fascinating device to use which also has many more applications than may be apparent on first encounter. Auto panning, like the majority of other effects, is best used with subtlety and always with the overall context in mind—though there are times when out of the ordinary pan effects are called for and here again the *Spanner* can provide the necessary goods, being considerably more sophisticated than any other panner on the market.

In terms of audio quality and construction too, there are no complaints, the *Spanner* being a classic example of a black box that does the job it's designed to do without creating a fuss. □

Electrospace Developments Ltd, Suite 3, 39/41 Newnham Street, Ely, Cambridgeshire CB7 4PG, UK.  
UK agent: Britannia Row Ltd, 35 Britannia Row, London N1 8QH.



# Lyrec's Secret Army



When we were talking to Lyrec about distributing their products in the UK we were surprised and impressed by what we heard.

Did you know: - That Lyrec are a Danish company who have been manufacturing tape machines for over 30 years? That Lyrec are Europe's largest maker of high speed loop-bin duplicators? That there are over 300 Lyrec multitrack machines in use in Europe?

That over 60 of those are in the UK? That Lyrec machines are in use with broadcasting organisations all over the world and the BBC alone have 30 of the newly introduced 'FRED' two track editing machines?



In short, we think that Lyrec have been hiding their light under a bushel and that it's high time for us to bring their secret success into the open. Remember, unlike Swiss or Japanese products, Lyrec machines are made in the EEC and therefore, carry no import duty.

So if you are looking for impeccably engineered tape machines at a very reasonable price talk to us about Lyrec.

Distributed in the UK by:



Scenic Sounds Equipment Limited,

Unit 2, 10 William Road, London NW1 3EN. Tel: 01-387 1262, 01-734 2812. Telex: 27939 SCENIC G

Lyrec Manufacturing A/S, Hollandsvej 12, DK-2800 Lyngby, Danmark. Tel: 02-87 63 22. Telex: 37568 Lyrec dk.

NEWS FLASH.....

MUSIC WORKS HAVE JUST TAKEN DELIVERY OF A LYREC/AMEK PACKAGE FROM SCENIC SOUNDS. THIS IS THEIR THIRD LYREC.

# REVIEW REVIEW

A user report by Keith Spencer-Allen

# URSA MAJOR MSP-126

**T**his is an unusual effects unit in that it doesn't fit into any of the neat accepted categories that we like to place equipment in. Yes it is a delay line but that is only a very small part of what it does—other features including basic Room simulation, Haas-type stereo panning, non-localised stereo images, repeat echoes, filtering in musical scales, etc. Ursa major have always had a different approach to signal processing devices right from the early days with the *Space Station* and this unit is no exception.

Although I have possibly made the unit seem an eclectic collection of effects this is not the case and designer Christopher Moore, in a statement at the beginning of the manual, explains the rationale by saying that although all listening experiences are stereo, more of the recorded sources are 'severely' mono and that he believes 'a richer, more natural kind of stereo ambience is vital in all media'. To achieve this the *MSP-126* converts sound into a digital format and enters it into memory which is then read from 12 different locations within the memory and from this creates a left and right output signal each

consisting of six delay taps. How these taps are arranged in time delay, phase and amplitude is determined by pre-programmed memory stored in EPROM. The front panel of the unit allows selection of any of the eight basic operating modes which may be further modified by Parameters 1 and 2 both of which modify the processing in ways dependent upon the selected mode.

As you can see from the photograph the *MSP-126* is a single U 19 in rack mount device. Front panel controls are very simple beginning with input and output level controls and a five LED indication of input level at the left side. Being a firm believer in reducing the fiddling possibilities from idle hands in all pieces of installed equipment I think I would have preferred to see slightly less accessible level controls for such a device. All interface levels are standard line level and for such a piece of equipment, I would imagine permanent installation is the order of the day, so ready access to levels on the unit is, I feel, not so necessary.

At the far right hand side of the panel are latching pushbuttons for power and the bypass mode which has an accompanying indicator LED. It is also

possible to switch this remotely. The application of the power illuminates the central display strip that gives bright red readout of the selected Mode and the precise settings of the Parameters 1 and 2 all at the same time. These values are altered by the three knobs to the right of the display which are unusual in that although indented they are continuously rotating and therefore the display is essential to see the setting of all three knobs.

The rear panel contains a standard IEC mains connector, rear pointing heat sink, the bypass remote socket, and pairs of male and female *XLR*-type sockets for inputs and outputs. Due to an obvious space restriction on the rear panel, all the socket labelling is on the top panel and this will of course not be visible once mounted within a rack. The *XLR*-type sockets follow pin convention in L & R and input/output and therefore will not be any real problem.

Although the *MSP-126* has a pair of inputs, it actually sums the channels internally and so there is small benefit in using a stereo input. There is a pushbutton switch on the back panel for switching between a mono input and a stereo input. The only advantage of



# AUDIO JACKFIELDS & JACK SOCKETS

Mosses & Mitchell  
are the largest  
manufacturer of Audio Jacks and  
Jackfields in the UK. We are approved  
suppliers to the BBC, British Telecom, Pye  
Telecommunications and many other major  
telecommunication companies throughout the world.  
We manufacture a complete range of Audio Jacks &  
Jackfields and offer a design and manufacturing  
service geared to meet your specific requirements.  
For further information and technical data on our  
products contact:

## MOSSSES & MITCHELL

Mosses & Mitchell Limited  
Weydon Lane, Farnham Surrey GU9 8QL  
Telephone: Farnham 721236 (STD 0252)  
Telex: 858820

## WHEN ALL IS SAID AND DONE.... IT'S THE MICROPHONE THAT COUNTS.

### AT THE LAST COUNT WE HAD OVER 100 TYPES TO CHOOSE FROM.

### HERE'S A FEW.

AKG D190E General Purpose	d	49.00	SENNHEISER MKE203U Omni-directional	b/p	72.00
AKG D202E1 Vocal/General Purpose	d	119.00	SENNHEISER MKE403U Uni-directional	b/p	83.00
AKG D222EB Vocal/General Purpose	d	101.00	SENNHEISER MKE803U Short Gun	b/p	98.00
AKG D12E Bass Mic	d	121.00	SENNHEISER MD421U Vocal/General Purpose	d	95.00
AKG D330EBT Vocal	d	113.50	SENNHEISER MD441U Super Cardoid	d	131.00
AKG C414EB General Purpose	p	347.00	SENNHEISER MKH416 Short Gun	p	236.00
AKG C451E + CKI	p	135.00	SENNHEISER MKH816 Long Gun	p	302.00
AKG C451EB + CKI	p	159.00	SHURE SM58 Stage Vocal	d	125.00
AKG C535EB Vocal	p	115.00	SHURE SM57 General Purpose	d	99.00
BEYER M201 General Purpose	d	78.00	ELECTRO VOICE RE20 Studio Mic	d	425.00
BEYER M550 Omni Interview	d	28.00	ELECTRO VOICE RE50 Omni-Directional	d	139.00
BEYER M88 General Purpose	d	123.00	ELECTRO VOICE PL5 Omni-Directional	d	74.00
BEYER HM560 Head Mic	d	109.00	SONY ECM30 Miniature Tie Clip	b	59.00
SONY ECM30 Miniature Tie Clip	b	59.00	SONY ECM50 PS/PB Miniature Tie Clip	p/b	113.00
SONY ECM50 PS/PB Miniature Tie Clip	p/b	113.00	SONY ECM969 Single Point Stereo	b	118.00
SONY ECM969 Single Point Stereo	b	118.00	AUDIO TECHNICA ATM41 Rugged Vocal	d	65.00
AUDIO TECHNICA ATM41 Rugged Vocal	d	65.00	AUDIO TECHNICA PRO4L Stage Vocal	d	39.00
AUDIO TECHNICA PRO4L Stage Vocal	d	39.00	AUDIO TECHNICA ATM83G Talk-Back Mic	44.00	
AUDIO TECHNICA ATM83G Talk-Back Mic	44.00		NEUMANN U47 FET1	p	613.00
NEUMANN U47 FET1	p	613.00	NEUMANN U871	p/b	633.00
NEUMANN U871	p/b	633.00	NEUMANN U391	p	633.00
NEUMANN U391	p	633.00			

ALL PRICES SUBJECT TO VAT CARRIAGE EXTRA.

*Michael Stevens & Partners*

The Homesdale Centre 216-218 Homesdale Road  
Bromley Kent England BR1 2QZ 01-460 7299

## BIRTHS

**TO PARADISE STUDIOS:** On 10th April 1985 at 329 Chiswick High Road, London W4, a daughter, Angela (full name Amek Angela). A big sister for Otari and a playmate for Fairlight and PPG. Studio and baby both doing well. 01-747 1687.

# REVIEW

# REVIEW

using a stereo signal would be that in the bypass mode the stereo signal would feed into the stereo outputs rather than a dual channel mono mode.

The *MSP-126* comes with a very good explanatory manual that goes into quite some depth on operation of the unit and the effects programs themselves. There is no service information. It would appear the Ursa Major are planning software updates on the system in the future.

## Modes

Some of the effects created are very difficult to describe in words but I'll do my best. This is further complicated by the fact that in some modes, the variable parameter controls modify the basic effect considerably and a full description of every possibility is totally beyond the scope of this user review.

I will work through the modes and then try to describe the parameter controls in roughly the order that the modes appear on the control, starting with Room.

● **Room:** This program adds early reflections of a hypothetical room to the dry signal—a sort of digital reverb without the reverb decay. The first parameter controls adjust the longest reflection time in different sized increments from 5 to 360 ms in 16 steps while the other adjusts the mix of dry signal and reflections in the output of the unit between 0 and 100%. The effect of small rooms on the voice and percussion is well known. This unit made it easy to experiment during mixdown in a number of ways that general availability of equipment may often preclude. Firstly, the stereo effect generated greatly enhances many instruments particularly during solo passages. By playing off the reflection time against wet/dry mix various tonal effects due to combing could be created. The individual repeats became too obvious on percussion when the

reflection time was above 80 ms although a very staccato rhythm guitar gained a very unusual percussive edge (in stereo) which I would not normally have been able to achieve so easily. The very long room settings are very extreme for common usage although if for instance you were after a massive sounding acoustic guitar solo, sending a 360 ms reflection time with 45% mix to another echo device such as a plate would be very effective. Also adding a 300 ms reflection at 15% mix across a complete mix is quite effective on the right track. Whatever setting, the stereo effect is very natural and cohesive—not two mono channels. Returning to an earlier point, one useful application for the *MSP-126* could be for working with a standard echo plate to increase the density of early reflections that just really are not present in those devices.

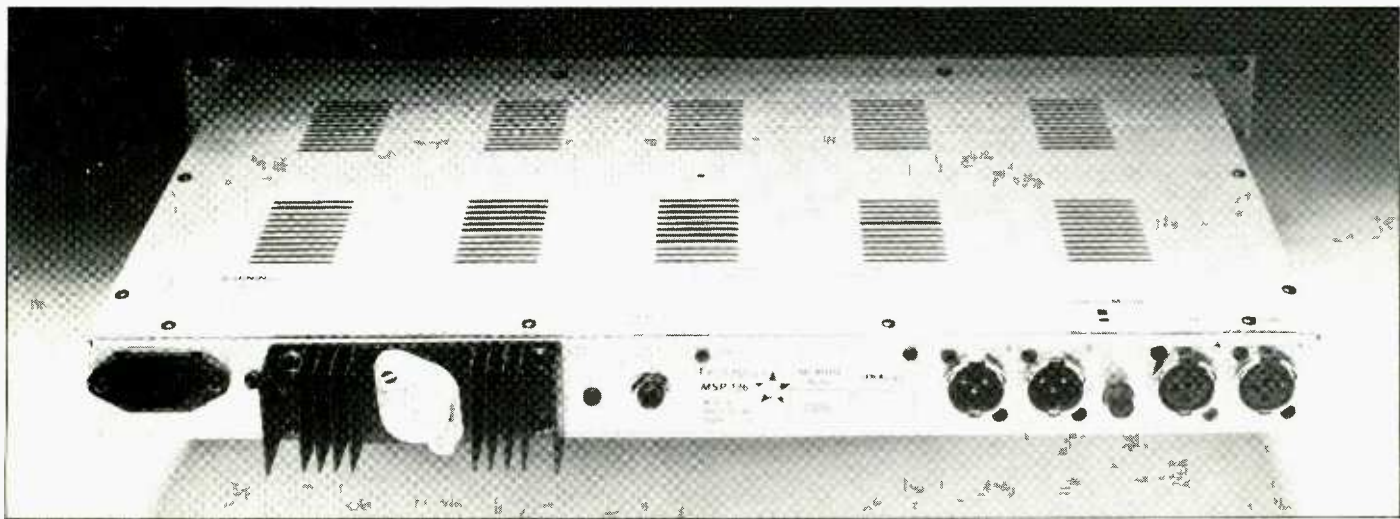
● **DLAY (Delay cluster):** This program gives a cluster of delays after an adjustable pre-delay. Parameter 1 adjusts the delay before the cluster in 20 ms steps from 20 ms to 320 ms while the second parameter control adjusts the wet/dry output mix in percent from 0 to 100%. The effect is similar to a single repeat although the repeat is a solid stereo signal that is thick in quality rather than the slightly thin character of a single delay. The ideal uses for this would be on exposed signals where the full quality of the repeat is audible.

● **DDL:** This one is where the *MSP-126* gets closest to being a standard delay line. The second parameter selects which channel will have the delay added to it—L, R or L&R and also the range of delays for that channel. Both left and right have a choice of 1, 2, 5, 10 and 20 ms while the combined L & R offers the same values with the addition of a 0.1 ms position. Parameter 1 is a delay multiplier and multiplies the selected parameter 2 delay by a factor between 1 and 16. This is of course quite an easy effect to create with standard equipment although the left/right aspects will quite

possibly save a number of channels on a console as well as saving the use of patching and routing.

● **RPTS (Repeats):** This is a program for spaced stereo repeats that are pre-delayed. Parameter 1 sets the delay of the last repeat in ms from 10 to 360 ms while the second parameter selects the number of repeats from 2 to 10 and the gain of the repeats—either equal, increasing or decreasing. Aside from the integrated stereo character of the repeats, this is similar to a tape type repeat although the increasing loudness repeats is of course impractical with tape. This gives an almost backwards quality to the repeats particularly on the very longest delays. Except on the very low repeat settings, this is really aimed at non-percussive type material.

● **Pan:** This is a program that uses Haas effect principles to pan signals left and right. It is possible to create such an effect with a basic delay line by adjusting the delay on one channel to be a few ms later in arriving than the other. The brain then hears the signal from the undelayed channel first and interprets the image as being in that direction—how much depending on the delay settings used. The levels of the signal within the channels make very little difference within almost 20 dB. In the *MSP-126* clusters of delays are used to simulate this effect rather than single delays and effect is subsequently rather more specific. The first parameter adjusts the angle of pan from 0° (centre) to 90° left or right. The second parameter adjusts the apparent image width and does this by adjusting the durations of the time delay clusters. The other aspects of this setting worth noting are that both channels are of equal level, and the channels are both flat response. The mono summed channel is only flat at the higher settings of parameter 2. It must be said that this effect is not blatant; it works best when the signal source is fairly exposed. The delay clusters also add a slight ADT type



# REVIEW REVIEW

quality to the signal even when panned centre. This is a very interesting effect to experiment with and there are no problems of mono compatibility. The idea of using these units for stereo panning in a live situation is also covered briefly as a suggested experiment in the manual. This would mean that the audience near to a left or right speaker would hear a proper balance even though the panned effect could be to the other side as levels within the left and right channels would still be equal.

- **Scale:** This program uses stereo comb filters to filter in musical scale steps. Parameter 1 sets the musical interval between the fixed A 440 filter in the left channels and the variable filter in the right channel. This scale ranges from A 440 to the minor 3rd above A 880. Parameter 2 sets the intensity of the filters from 0 to peaks on all harmonics or odd only. I have to say that this is truly only a special effect. I cannot think of any musical use for what is similar in quality to a stationary flange with loads of regeneration. In some cases though the audible pitch of the filters together with the displayed value will be mildly educational.

- **MSP11 (Multi-tap stereo processing):** A useful program for straight stereo simulation. Parameter 1 sets the depth while parameter 2 sets the width. Used in moderation this is a very natural sounding simulation although at depth settings over 50 the delay line nature of the processing becomes increasingly more noticeable particularly at the wider width settings. The summing of left and right signals was flat or as near flat as makes no difference at all settings and the individual channels also sounded flat. As a rule this setting sounds far better over speakers—with the delay aspects sounding rather more obvious over headphones. A useful effect to call upon particularly when simulating stereo on non-acoustic sounds.

- **CSP (Comb filter stereo processing):** This program creates stereo with complementary comb filters in the left and right channels. This means that the sound in the individual channels is very coloured although the sum is quite flat. Parameter 1 adjusts the frequency between 200 Hz and 14 kHz and parameter 2 adjusts width. In terms of the comb filters, 1 sets the frequency of the lowest comb peak and the null comb, while 2 sets the depth of the comb nulls. I would recommend that *adjustment* of the stereo image is not made on headphones as altering parameter 1 appears to give rise to phase type effects that move the illusion around in the stereo and make your brain never hear it in the centre at all. This just doesn't happen on speakers. Single items such as voice seem to prefer a stereo simulation using a HF value of parameter 1 while more musical and complex signals benefit from a very low setting such as

the 200 and 400 Hz values where the image sounds more natural and full. Between this setting and MSP11 there should be a means of stereo simulation for virtually all cases.

## Conclusion

For those expecting a unit that produces aural fireworks it should be noted that many of the effects created by the *MSP-126* are subtle and the quality of the stereo aspects needs appreciating. Unfortunately these qualities too often

seem decidedly uncommercial these days. Let's wise up!

As you can see, however, from this seemingly brief review, this 'simple' unit has a tremendous amount of potential for experimentation. With an increasing number of mono sources—particularly non-acoustic in origin, here is an excellent way of bringing stereo effect back to music in a very wide range of ways. The number of uses for this device are vast and the quality of design and construction are very good. Recommended for those serious about stereo. □

## ULTRAPARAMETRIC



## PE 15 PARAMETRIC EQUALIZER AND NOTCH FILTER

The PE 15 brings an unprecedented degree of performance capability to the single-space parametric equalizer format:

- Five complete bands with four-octave frequency sweeps
- Bandwidth range from 1.5 down to 0.03 (1/30) octave
- +15dB boost and -20dB cut for notch filter capability
- Bands 1 and 5 switchable to shelving mode
- ¼" and three-pin balanced/unbalanced inputs and outputs
- Up to 20dB input gain for low level EQ such as electric guitar or bass

Backed with low-noise/low distortion circuitry and reliable Rane construction, the PE 15 would be a studio, sound reinforcement or broadcast "must have" at any reasonable price. See, hear and covet a PE 15 at:

**MUSIC LAB SALES** 72-74 EVERS HOLT STREET, LONDON NW1 1BY. 01-388 5392

**RANE**  
CORPORATION

6510 216th SW,  
Mountlake Terrace, WA 98043  
(206) 774-7309

CANADA: Head-water Ind., 635 Caron Ave., Windsor, ONT. (519) 256-5665

# STUDIO SOUND

AND BROADCAST ENGINEERING

## PRO-AUDIO DIRECTORY 1984/85

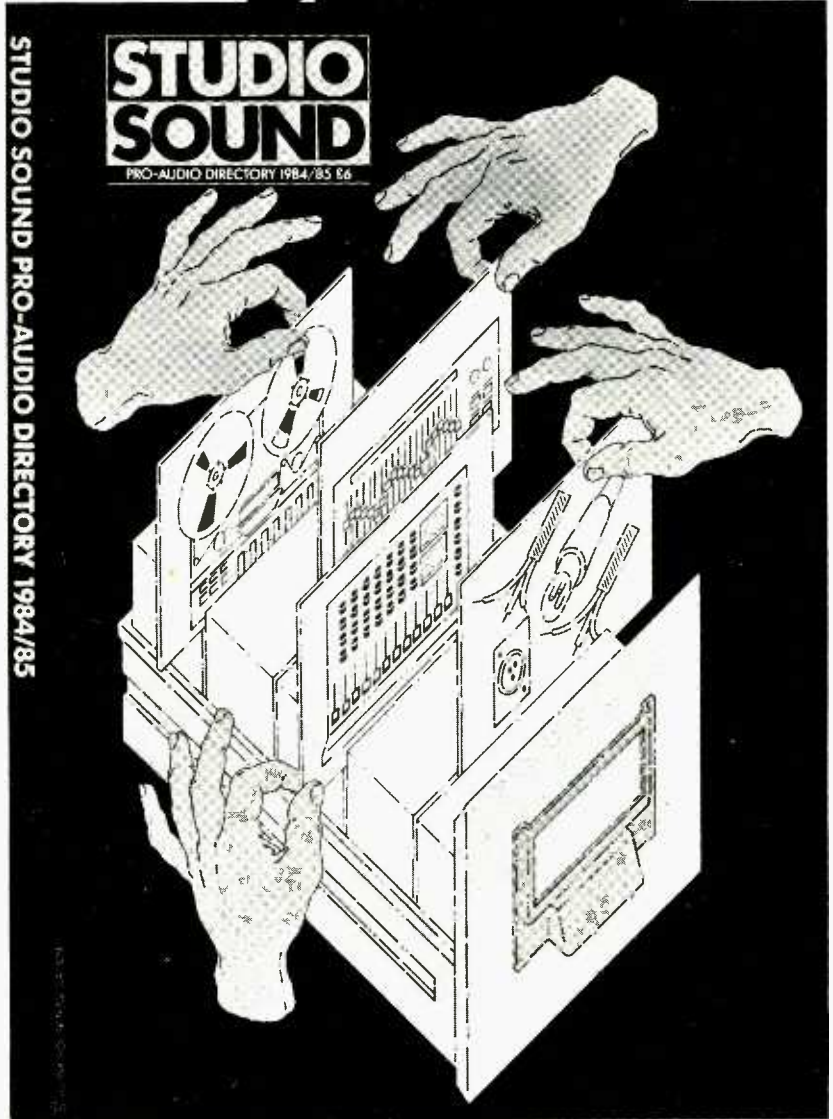
From the publishers of **Studio Sound** and **Broadcast Sound** magazines, the world's leading journals for recording and broadcast studios, comes the 1984/85 edition of the **Pro-Audio Directory**.

Just published, the new edition of this definitive guide to international audio products and services provides up-to-the-minute information on companies, products and services throughout the world.

- Thoroughly cross-referenced and indexed, the easy-to-use classified guide to industry services and products features everything from Connectors to Consoles.
- Extensive address files of distributors and manufacturers worldwide.
- Extensive illustrations.

Don't be without your copy of this important international reference work.

Size A4  
152 pages  
Soft cover  
ISBN 0-86296-020-7  
ISBN 0266-2248  
£6 / \$9 net



Professional Publications Group, Link House Magazines (Croydon) Ltd, Dingwall Avenue, Croydon CR9 2TA, United Kingdom.

Please send me ..... copies **Pro-Audio Directory 1984/85**.

£7 (UK). Overseas surface mail £8.50 USA surface mail \$15 Includes Postage and Packing  
Overseas airmail £10.50 USA airmail \$18

I enclose a cheque/postal order/International money order payable to **Link House Magazines** for the amount \_\_\_\_\_

Or debit my credit card



Credit card No.

Credit card holders can order by simply ringing 01-686 2599, ext 213, quoting credit card No.

Signed \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

(please print)

Please return the completed order form enclosing full remittance (including delivery) or giving your credit card number to **Professional Publications Group, Link House, Magazines PLC, Dingwall Avenue, Croydon, CR9 2TA, United Kingdom.**

Please allow 28 days delivery in Britain, extra overseas depending on country and delivery method.

# HH electronic SUPERIOR POWER AMPLIFIERS



At HH we know there is no substitute for quality. That's why when you buy an HH amplifier you automatically get a range of benefits and features not always available from our competitors. A point many of the most notable Studios, Installation and Broadcast Companies

have been quick to note and appreciate when installing our amplifiers – and amazingly it doesn't cost any extra!

HH design, manufacture and sell, thus cutting out one or more stages in the supply chain. The benefit – higher quality and additional features.



## M900 400W + 400W

The M900 has been designed for the installation or P.A. specialist who wants quality, reliability and limited features at a fiercely competitive price. Identical in performance and specification to the V800 it has the advantage of 'Lock Pot' Input Attenuators.



The V800 features stepped input attenuators

### Range of Connectors

Inputs: Jack and XLR together with XLR Link connectors

Outputs: Binding Posts and 4 × XLRs

### Rear Carrying Handles

Invaluable rear carrying handles help in transport and when installing in racks. Additionally they provide protection against accidental breakage of the binding posts.



Contact one of our distributors or HH direct for full details of our range of power amplifiers.

**H. H. ELECTRONICS LIMITED, VIKING WAY, BAR HILL, CAMBRIDGE CB3 8EL.  
TELEPHONE 0954 81140 TELEX 817515 HH Elec G**

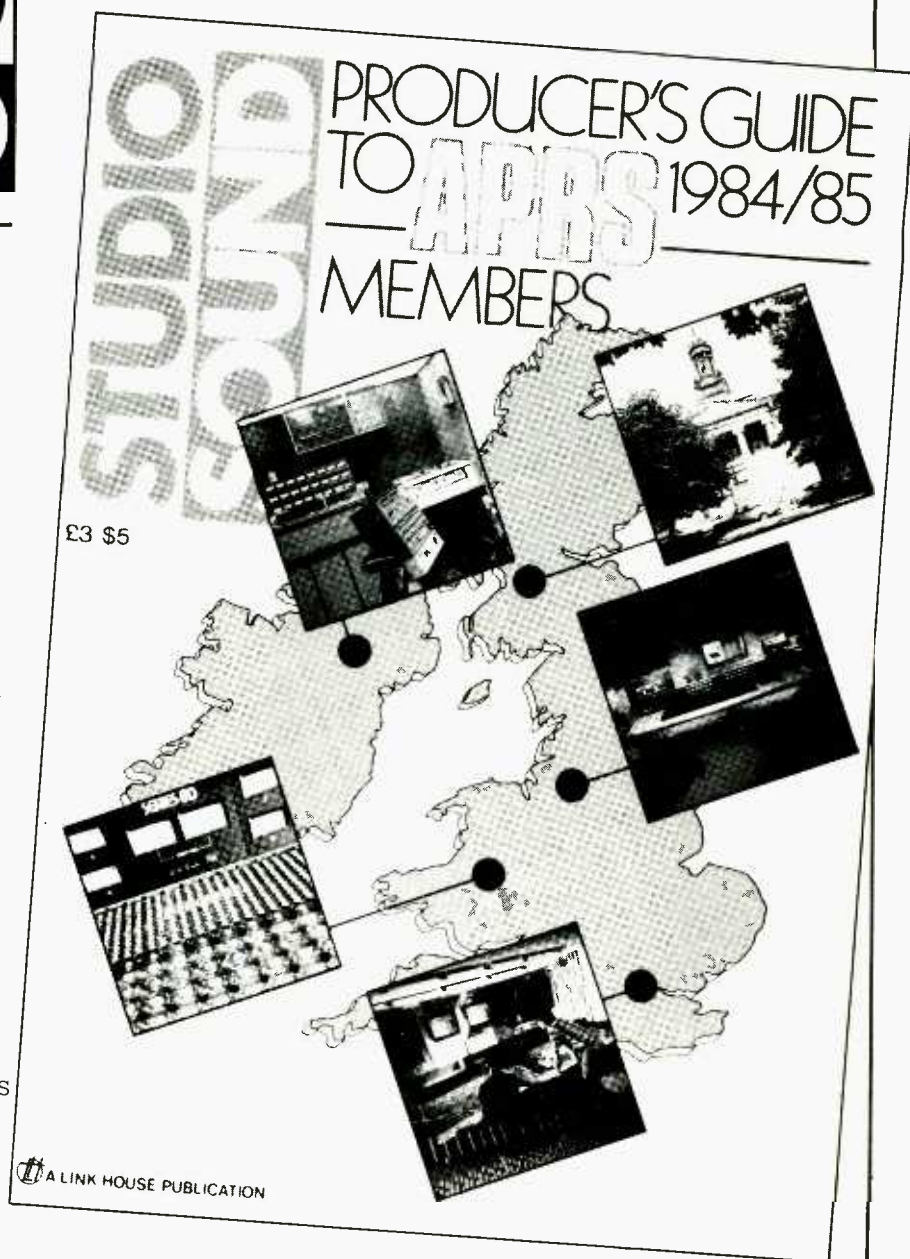
# STUDIO SOUND

AND BROADCAST ENGINEERING

## AVAILABLE NOW – the new official guide to APRS members.

Published by STUDIO SOUND, the number one sound recording magazine in the world, in partnership with the Association of Professional Recording Studios. This completely new guide is an essential reference source for professionals in sound recording throughout the world.

- \* Full facility listings to member studios UK and overseas.
- \* Main cross referenced sections to which studio has what, by consoles, primary monitoring and tape machines.
- \* Location maps divided into individual geographic areas where each studio is pinpointed by a reference number.
- \* Comprehensive cross reference sections.
- \* Master studio address file.
- \* Manufactures/Agents section to what they manufacture and or are agents for.
- \* Courses and facilities offered by UK and overseas educational members.
- \* Handy A5 size. 8½" x 5¾".



Size A5  
92 pages  
Soft cover

ISBN 0-86296-029-0  
£3 / \$5 net

Professional Publications Group, Link House Magazines (Croydon) Ltd, Dingwall Avenue, Croydon CR9 2TA, United Kingdom.

Please send me ..... copies **APRS Producers Guide 1984/85.**

£3.50 (UK). Overseas surface mail £4    USA surface mail \$6    Includes Postage  
Overseas airmail £6                      USA airmail \$10                      and Packing

I enclose a cheque/postal order/International money order payable to **Link House Magazines** for the amount \_\_\_\_\_

Or debit my credit card



Credit card No.

☑ Credit card holders can order by simply ringing 01-686 2599, ext 136, quoting credit card No.

Signed \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

(please print)

Please return the completed order form enclosing full remittance (including delivery) or giving your credit card number to **Professional Publications Group, Link House, Magazines PLC, Dingwall Avenue, Croydon, CR9 2TA, United Kingdom.**

Please allow 28 days delivery in Britain, extra overseas depending on country and delivery method



# CLASSIFIEDS

Advertisements for this section must be pre-paid. The rate is 50p per word, minimum £12.50. Box Nos. £3.00 extra. Semi-display rates on application. Copy and remittance for advertisements in **AUGUST** issue must reach these offices by **12th JUNE** addressed to: The Advertisement Manager, **Studio Sound**, Link House, Dingwall Avenue, Croydon CR9 2TA. Cheques made payable to Link House Publications Ltd. **Note:** Advertisement copy must be clearly printed in block capitals or typewritten.

Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975:** No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder or (2) it is in a business employing less than six persons or (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

The attention of advertisers is drawn to "The Business Advertisements (Disclosure) Order 1977", which requires that, from 1st January 1978, all advertisements by persons who seek to sell goods in the course of business must make that fact clear. From the above date consumers therefore should know whether an advertisement relates to a sale by a trader or a private seller.

## SERVICES

**THE COMPLETE SERVICE.** Disc cutting (masters and demos), pressings, sleeves, cassettes, labels. Fixed and mobile recording studios. Free brochure. **TAM STUDIO**, 13a Hamilton Way, London N3. Tel. 01-346 0033 (X)

**QUALITY HIGH-SPEED** and real-time audio and video cassette copying and processing. Any quantity. While you wait. 24-hour, 7-days-a-week service. Central London W2. **GWBB Audiovision**. Tel: 01-723 1583/5190. (X)

**CASSETTE DUPLICATING**, label and inlay cards printed or blank rate card from Audicord Records, 59 Mayfield Way, Barwell, Leicester. 0455 47298. (G)

**CASSETTE DUPLICATION.** High speed duplication with an emphasis on quality control. Full mastering/processing facilities available in our own 16 track studio including experienced producer/engineer plus a design and printing service for inlays and labels. Complete details of the excellent service we are able to offer from Brook Trickett on 0204 395412 (24 hour service) or Soundtree Productions, P.O. Box 81, Bolton BL1 2BP, Lancs.

**MUSIC SUITE**—Low cost real time cassette duplication. Labels, blank cassettes, boxes, etc.—Fast and efficient service. Phone for price list 0239 711032. (H)

### SELECTA SOUND

Real time or loop bin tape duplication.

Exact length cassettes.  
Maxell, Agfa and BASF cassette tape.

Ring John Smailes, 04024 53424  
5 Margaret Road, Romford, Essex

### SPEEDY REVOX SERVICE

Plus **TEAC, NAGRA, UHER**. Large spares stock held  
Approved **REVOX** modifications undertaken.  
A personal service by experienced engineers  
plus collection and delivery

34 Danbury Street, London N18JU  
Telephone 01-359 9342 (24 hours)

**RAPER & WAYMAN**



## Angel Talk Limited

FOR HIGH QUALITY. REAL TIME. AUDIO CASSETTE DUPLICATION. Small runs 30+ a speciality. Rapid service. stereo format, cassette or open reel masters

Ring 0344 425200 ANYTIME for details or write to:  
6 ABBEY CLOSE, HARMANS WATER, BRACKNELL RG12 3NX

*Check It Out...*

**DIRECT FROM OUR MODERN U.K. PRESSING PLANT**

- CUTTING · PRESSING
- TEST PRESSING
- LABELS · SLEEVES
- CASSETTES
- ARTWORK
- COMPETITIVE PRICES

**MARKET LEADERS**

**SRT**

**01-446 3218**

### WHY PAY LONDON RATES?

Professional Disc Mastering operation offering top quality with over 20 years experience. Contact Brian East, "Suncliffe", 43 Sandgate Hill, Folkestone, Kent

**SPECTRUM SOUND**

0303 38752

### 3M WOLLENSAK SERVICING

Tandberg cassette fast copiers produce excellent copies at 16 times normal speed—all day!  
Full Service facilities in London, Cambridge and Somerset. SCS cassettes in bulk. Fast copying service.

Tandberg Main Dealers

**Sound Cassette Services Ltd.**  
P.O. Box 2, South Chard, Somerset  
0460 20988

**TANDBERG FAST COPIERS**

## Fairview Services

BLANK CASSETTES — Any length AGFA FERRIC & BASF CHROME TAPE — ICM SHELLS.

HIGH SPEED & REAL TIME CASSETTE DUPLICATION

HEAD RELAPPING from £2.50 for CASSETTE HEADS to £16.50 for 24 TRACK HEADS

Contact FAIRVIEW STUDIOS, WILLERBY, HULL. 0482 653116

## Revox & Uher Sales & Service

16mm sound 35mm slide projectors, open reel and cassette recorders, amplifiers, etc., serviced and repaired.  
Bell & Howell, Elf, Ferrograph, Revox, Tandberg, Uher, approved service agents.

**PHOTO ACOUSTICS LTD.**, 255A St. Albans Road, Watford, Herts Tel: 0923 32006 Entrance in Judge Street, 58 High Street, Newport Pagnell. Tel: 0908 610625

**Photo Acoustics Ltd**

**CASSETTE DUPLICATING:**  
**GAUSS Loop-Bin / TELEX In-Cassette**  
**High Quality Blanks / Label Printing**  
**OPEN REEL DUPLICATING**  
(ANY SPEED - ALSO TO BROADCAST SPEC.)  
**SPEECH RECORDING**  
(VOICE-OVERS; LANGUAGES; AUDIO-VISUALS)  
**SPEECH-PLUS RECORDINGS LTD.**

UNIT 32, NO. 19, PAGES WALK, LONDON SE1 4SB. TEL: 01-231 0961

**CLASSIFIEDS**

**SERVICES**

**HIGH QUALITY CASSETTE DUPLICATION AND SPECIALISED LENGTH BLANK CASSETTES**

*Leeholme Audio*

Leeholme Audio Services Ltd., 350-4 Leabridge Road, Leyton, London, E10 Telephone 01-556 4748

100 C-60 cassettes beautifully copied in stereo  
Still only **£59.50** (plus VAT)  
We can copy from 100 to 5,000 high quality cassettes on our high speed loop-bin system, load them precisely into top-class shells. Price includes library case and all production work from your ¼ in edited master. Any length C-5 to C-90. Ring for price check.

**STUDIO REPUBLIC**

47 High Street, Pinner 01-868 5555 01-868 5555

**MAGNETIC TAPE/FILM HEADS**

\*We manufacture to order, ¼", ½", 1" and 2" tape heads and a wide variety of film heads at very competitive prices. Please specify machine type for an early quotation.  
\*We also offer a prompt RELAPPING service at standard prices.

**BRANCH & APPLEBY LTD.**

Stonefield Way, Ruislip, Middx. HA4 0YL  
Tel. 01-864 1577

**REAL TIME CASSETTE COPYING**

All work carried out on Nakamichi machines to the highest standard. Normal or chrome tape available.

We also supply blank cassettes wound to length. AGFA, BASF Chrome and Maxell XLII tape available.

• **GATEWAY CASSETTE SERVICES**  
1 GAUDEN ROAD, LONDON SW4 6LR  
TEL: 01-627 4758

**WEST 5 Tapes Ltd.**

Rapid supply of high quality blank bulk cassettes C1-C120

5-screw C-Zero — no minimum or maximum order.

Phone Dave West 01-502 2447  
West 5 Tapes Ltd, Unit 34, Oakwood Hill  
Industrial Estate, Loughton, Essex.

*Hanway*  
22 Hanway Street  
London W1  
Tel: 01-637 7554  
*Cassettes*

High speed cassette duplication. Open reel copying. Small quantities a speciality. 48 hour service (if not sooner).

**THE PLAYBACK STUDIO**  
15 Percy Street, London W1  
Tel 01-637 8392

**AUDIO & VIDEO TAPES**  
MAXELL • FUJI • T.D.K. • SONY • AMPEX

**FOR ALL YOUR RECORDING NEEDS**

AMPEX AUDIO AND VIDEO TAPE MAIN DISTRIBUTORS  
Spools, boxes, blades, splicing and leader tape. Blank precision wound cassettes C1-120, labels, library cases and cards, C-zeros, pancake, etc. Broadcast Cartridges.



103 Washway Road  
Sale, Cheshire M33 1TY  
Tel: 061-905 1127

**FOR QUALITY, PRICE AND SERVICE**

**VOICEPORT**

West London-based A/V company offering full audio/visual production, 8-track studio. Sony, low-band video edit suite. Equipment, hire and sales and cassette copying.

Voiceport Ltd, Windmill House,  
137A Windmill Road, Brentford,  
Middlesex TW8 9NH

Tele: 01-568 0462 (3405)

**YOU NEED IT . . . WE SUPPLY IT**

Precision wound cassettes, high speed duplication. Both using Ampex, Basf. Capital open reel copying. Full printing facilities (side labels & inlays) Major suppliers of Ampex open reel tape. Also razors, leader tape, splicing tape spools and boxes, etc., etc.

**Rainhill Tape Specialists**  
31 Eccleston Street  
Prescot, Merseyside L34 5QA  
051-430 9001

**SELF ADHESIVE CASSETTE LABELS**

We are specialists in self adhesive cassette labels and can supply them in a wide range of formats. Send or phone for our price list and samples.

(0795) 28425 — 24-hour service.  
**INDUSTRIAL PROCESS—Self-Adhesive Labels SUPERFAST**  
Unit A4, Smead-Dean Centre, Sittingbourne,  
Kent ME10 3RN

**MUSIC-SPEECH-COMPUTER**

REAL-TIME or (Slow) HIGH-SPEED Quality Cassette Duplication and Blanks from 1 to 1000+ Computer printed Cassette Labels. Studio speech and solo recording/editing etc. Fast Security Delivery service.

the records—a division of **FILTERBOND LTD.**  
19 Sadlers Way, Hertford SG14 2DZ, 0992-551188.

**CASSETTE DUPLICATION**

COMPREHENSIVE FACILITIES  
QUICK TURNROUND - LOW PRICES  
THE COMPLETE SERVICE

**N.R.A. RECORDING**  
37 WEST END, LAUNTON, OXON.  
08692 53986

**TO ALL USERS OF MAGNETIC TAPE HEADS IN EUROPE**

SAKI MAGNETICS INC, CALIFORNIA, MANUFACTURERS OF THE WORLD'S FINEST MAGNETIC TAPE HEADS, ARE PLEASED TO ANNOUNCE THAT THEY HAVE APPOINTED TAPETEK AND TAPE MARKETING TO HANDLE SERVICE AND SALES AS DISTRIBUTORS OF THEIR PRODUCTS.

**SERVICE:**

TAPETEK OFFER A REPAIR SERVICE TO MANUFACTURER'S SPECIFICATIONS AND GUARANTEED HIGH STANDARD. IT IS NO LONGER NECESSARY TO SEND HEADS TO CALIFORNIA FOR RECONTOURING. TAPETEK'S LABORATORY IS EQUIPPED TO DO THIS IN LONDON.

**CONTACT: DAVE HILL, TAPETEK, 44A BRIGHTON ROAD, LONDON N16**  
TEL: 01-254 5203 TELEX: 858623 OR 858393

**SALES:**

SUPPLIES OF NEW HEADS AT MANUFACTURER'S LIST PRICE CAN NOW BE MADE THROUGH:  
TAPE MARKETING, 13 ELM ROAD, FARINGDON, OXON  
ENGLAND SN7 7EJ

TEL: 0367 20262 TELEX: 858623 OR 858393

**THERE IS NOTHING BETTER THAN THE BEST**



**FOR SALE**

24 TRACK STUDIO

JACKSON MUSIC GROUP  
The Studios, Rickmansworth,  
Herts, England WD3 2XD

Telephone: 0923 772351 or Vodafone 0836 203557

**STUDIO PACKAGES**

**TANNOY MONITOR GOLDS, REDS, SILVERS, X/Os CONES, CABINETS ETC.**  
EMT 927, 928, 930 ST. Neumann U47. STC 4038. Valves PX4, PX25 KT66. Midland Radio Supplies, 021-430 7817. (J)

**PRIVATE BUYER SEEKS** to equip 24 track studio for cash. Package deal considered. Tel: 0232 225225 (daytime) 644632 (evenings).

**WANTED:** Multitrack machines wanted any make, age, condition or format also heads, spares, boards, and mastering machines etc. (0803) 25575.

**WANTED**

**SALES TECHNICAL SERVICES**

DIGITAL DELAY - HARMONISERS  
DIGITAL REVERB UNITS  
DIGITAL RECORDERS  
DIGITAL RHYTHM COMPUTERS  
VIDEO EQUIPMENT  
COMPRESSORS/NOISE GATES

PAVS offers a full studio equipment maintenance service and a comprehensive studio and studio equipment design service

**PAVS**  
**01-540 2164**

7 DAYS A WEEK 24 HOUR  
EXPRESS STUDIO EQUIPMENT  
HIRE SERVICE.

# AUDIO SERVICES

## SUPER DEALS IN RECORDING & P.A.

DOLBY 361's Pair as new in flight case	£1,195
DOLBY 360's	from £350
TRIDENT TRIMIX. "As new" 16 frame 10:8:2	£2,495
TASCAM 52 "New in box" (Second class stock)	£1,295
JBL 4430 Pair New(ish) used only in my own Hi-Fi	£1,895
TASCAM 58 "New" Ex-showroom	£2,995
FOSTEX 600 Power Amp "New"	£375
STUDER B67 Meterbridge "New"	£200
FOSTEX A8 "Nice"	£895
MB ELECTRONICS Stereo PZM mics	£195
TASCAM 38 "New" in box	£1,599
MILLBANK STEREO DISCO III Mixers "New in box"	£75
TEAC A3440 "New in box"	£795
MCI 500c 36 frame VU. inputs fitted, 4 extra returns, automated matching wrap around side cheeks	£25,000
<b>HILL POWER AMPS "Brand New"</b>	
100w (811) mono £75 2x275 (811)ST £395 LAST FEW	
FOSTEC 350 Mixer with 3060 MTR Bridge	£375
TEAC V350c Cassette Deck 1 only "New"	£89
TASCAM 34 "New"	£795
TASCAM 38 Ex-demo	£1,500
TASCAM 52 NAB/IEC Switchable on front panel "New"	£1,595
1 Roll New 2" Tape BASF	£49
DRAWMER DUAL GATES DS201 S/H	£225
DRAWMER COMP/LIM DL221 S/H	£229
QUAD 303 "Very good condition"	£95
JBL 4401 "Ex-demo"	£250
TEAC V330 Cassette Deck "New"	£75
TASCAM 225 Syncassette "New"	£195
REVOX PR95 "New in Box"	£925
TASCAM PORTA 1 inc power supply unit	£345
TASCAM 244 (mint)	£435
<b>MULTICORE Short Runs - Ideal for studios "Dead cheap"</b>	
JBL CHASSIS SPEAKERS "New" 4 off 2203A (8) 12"	
Bass	£90 each
1 only El30	£120
CHEAP JBL MONITORS (J216) Pair	£75
SOUNDTRACS 16:8:16 "As New"	£1,595
RAM RM10 Ex-demo	£495
TEAC 144 PORTASTUDIO "Immaculate"	£350
TASCAM 22-4 with DBX RX9	£450
BOSE 602 (pair) Good condition	£595
TANNOY BROADCAST MONITORS (BM8) "As New"	£325
KLARK TEKNIK DN34 (Pair with link) "As new"	£795
TASCAM RM8 (Pro dBx) "Bargain" for use with 122 or "C" series	£100
A & DR SCAMP Rack + PSU (MA) Containing S24 time shape + octave "Sparkling Condition"	£495
YAMAHA R1000's Pair "Special Price"	£695
Each £385 (Limited stocks)	
YAMAHA D1500 "Midi" Digital Delay Ex-demo	£450
TEAC LSX 7 Monitors (Pair)	£49
TEAC LSX 3 "mini" Monitors (Pair)	£20
OBERHEIM OB-8 Ex-demo slightly marked	£2,895
OBERHEIM DMX DRUM COMPUTER "No box"	£1,950
SEQUENTIAL CIRCUITS SIX-TRAKS "As new"	£599
360 SYSTEMS with 13 voices incl: Bosendorfer Grand	£4,100
REVOX PR99 S/H Literally as new	£795
MCI JH 110B 8T 1" "Corking Condition"	£3,500
AKG BX20E	£1,395
ADR COMPLEX LIMITER	£995
KLARK TEKNIK DN22 2x11 Band Graphic	£350
FOSTEX SP11's with Tripods (pair)	£195

Please add VAT to all prices.

## NEW MAIN DEALERSHIPS:

**KLARK-TEKNIK**



PART EXCHANGE WELCOME

WELCOME

CAN I BUY ANY OF YOUR SURPLUS EQUIPMENT  
CAN I SELL ANY EQUIPMENT FOR YOU ON COMMISSION



SINCERELY ALAN CHEETHAM

# STUDIO HOUSE

High Lane Village, Nr Stockport  
SK6 8AA. Telex 665721 SOTA.

**06632 4244**

## FOR SALE—TRADE

**SPRING CLEARANCE SALE. DBX RM160**  
compressors/limiters £250 each. Ibenes HD1000 £275, Lexicon PCM41 digital delay £425. Lexicon prime time £995 Audio and design FRX 760S £450. Deltalab ADM 64 £150. BSF FDS 320 stereo crossover £275. 1 Shure SR106 stereo crossover £70. Fostex 3050 digital delay £135. Accessit EQ £25. Accessit stereo amplifier £35. SCV dual noise gate £100. 3 PZM sound grabber microphones £35. 2 PZM 12 SP microphones £95. Fostex 250 4 track cassette recorder £425. 2 Nakamichi DT550 portable cassette recorders £100 each. 1 Sony watchman £150. 1 Sony KV6000 BE portable colour TV £295. All prices exclude VAT at 15%. H.H.B. Hire & Sales, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. Tel: 01-961 3295. Telex: 923393.(G)

**REORGANISATION ALLOWS THE SALE OF:**  
3M M79 24 track recorder £11,000 + VAT. 24 ch. dbx N/R + 2 spares £2,500 + VAT. Helios 32ch console £5,000 + VAT. Total package £17,500 + VAT. Much more studio equipment available. For complete list Tel: Bristol 426409.

**MONO-COMPATIBILITY,** stereo balance and width, soundstage position, correlation, transport defects and more... "THE BOX" by TAPE TALK gets it all together. For full details of this unique professional stereo display unit call Tape Talk on Milton Keynes (0908) 77710.

**DISC CUTTING EQUIPMENT** and systems bought, sold, installed and manufactured (under licence from ORTOFON). TAM/ENGLAND, 13a Hamilton Way, London, N3 1AN. Telephone 01-346 0033. (X)

**TEAC 244/34/38 discounts and HP and leasing.**  
Erricks Bradford 309266 (Julian). (X)

## K.G. MUSIC

Northern Stockists and Distributors for  
RSD-STUDIOMASTER Audio Consoles and Amplifiers.  
ALL DRAWMER PRODUCTS IN STOCK  
AND ON DEMONSTRATION

Large stocks of new and used Recording and Audio equipment—extensive range of connectors and accessories—Send large S.A.E. for lists.

18/42 Charlotte Street, Wakefield, W. Yorks WF1 1UH  
Tel: (0924) 371766

For Sale: 2 Studer A800 MKII  
\$48,500.00, each. 1 Q-Lock 3.10 (2  
A800 Cards, 1 JVC Card) \$10,000.00.  
Package price \$100,000.00.  
Call (615) 327 4621 for details.

## 2" MASTER TAPE

Once used by major studio. Guaranteed no joins.  
Ampex 406 £25.00; Scotch 226 £25.00; Scotch  
250 £25.00; Scotch 206 £20.00 + VAT. Some  
1" Tape available. Empty 2" spools £7.50.  
Quantity discounts.

**Action Sound** 01-734 0134  
01-434 4365

## IT'S FREE

Don Larking audio sales produce a free bi-monthly  
newsletter which is mailed direct and contains lists  
of new and used recording equipment for both the  
professional and home studio. Telephone now and  
get your name on our computer. (0582) 450066 or  
telex 825488.

# NORTHERN AUDIO

## Special Stock Offers

<b>Mixers</b>	
Dynamax 3000 16 8 2 inew	£1 475.00
Dynamax 3000 16 16 2 inew	£1 775.00
Trident 20 8 16 mon inew	£1 595.00
A H B System 8 16 8 2 inew	£1 295.00
A H B System 8 16 16 2 inew	Telephone
T A C Scorpion inow available	P O A
T A C Machiess	P O A
Trident 65	from £2,750.00
Pro Mark MX3	£380.00
M T R 6 4 2	£190.00
<b>Tape Machines</b>	
Tascam 4+ inew	£950.00
Tec 3440 var speed is hi	£425.00
Foster B 16 is	£2 450.00
Fostex A+ inew	£1,150.00
Tascam 38	£1,295.00
Tascam 2 2B stereo	£670.00
Revox B77	from £650.00
Studer B67 inew	£3,875.00
<b>Effects etc</b>	
Lexicon CM 60	£1 450.00
Dynacord Dg reverb	£495.00
Yamaha Dig reverb	£35.00
Vestlar RV2 stereo sprng	£230.00
Vestlar RV3 sprng 1m com	£170.00
Fostex 3180 stereo reverb	£299.00
GBS sprng	£195.00
Vestlar Dig 410 dig delay	£210.00
Ibamez DN2000 dig delay	£260.00
Yamaha D1500 dig delay	£425.00
M X R dg delay	£265.00
J H S dg delay	£210.00
A D A 25K dg effects	£450.00
A M S R M 16	P O A
M S 1580s	P O A
M X H 1 Reverb	£1 650.00
Quad 405 2 amp	£225.00
Quad 520	£339.00
Quad 510	£419.00
Yamaha P2050	£225.00
Yamaha P2100	£350.00
<b>Microphones</b>	
A K G D80	£28.00
A K G D190e	£50.00
A K G D12	£125.00
Shure SM57	£106.00
Shure SM58	£120.00
Shure SM81	£285.00
Neumann U87	£462.00
Neumann U89	£460.00
Neumann U47 fet	£102.90
Sennheiser MD421U 5	£75.80
Sennheiser MD419U	£425.00
Portastudio 244 is hi	£395.00
Portastudio 244 is h	£345.00
Yamaha MT44 cassette deck	
<b>Monitors</b>	
Bose 301	£207.82
Bose 205	£146.95
Bose 101	£121.69
Auratone 5C super cubes	£69.50
Visonic Davids 6001	£100.00
Visonic Davids 7001	£120.00
J B L 4401	teach: £155.00
J B L 4411	teach: £465.00

Also in stock full range of Meyer Sennheiser and  
Electro voice microphones. Phone for best prices  
Prices do not include VAT or P + P  
\* We also have a limited stock of  
equipment for hire

## HIRE AND SALES



**061-483 9563**  
**061-483 4299**

## WANTED URGENTLY

ALL TYPES OF USED STUDIO EQUIPMENT  
PLEASE PHONE FOR BEST PRICES

Look forward to hearing from you!

NORTHERN AUDIO, 4 CHEVIOT ROAD,  
HAZEL GROVE, STOCKPORT, CHESHIRE

★ This Company has no association with any  
other recording equipment supplier.

## CLASSIFIEDS

**FOR HIRE**

35 BRITANNIA ROW LONDON N1 8QH  
**BRITANNIA ROW** 01 226 3377

**DIGITAL AUDIO RENTALS**

**SONY DIGITAL**

PCM 1610 DIGITAL AUDIO PROCESSORS  
 5850D/A U-MATIC RECORDERS  
 DAE 1100 DIGITAL AUDIO EDITOR  
 PCM F1 DIGITAL AUDIO PROCESSORS  
 SLF1 BETAMAX RECORDERS

FULLY EQUIPPED AIR CONDITIONED  
 DIGITAL EDITING & TRANSFER FACILITY



HHB Hire & Sales, Unit F, New Crescent Works, Nicoll Road,  
 London NW10 9AX Telephone: 01-961 3295 Telex: 923393

**HIRE MULTITRACK**

Q-Link  
 Tape Recorders  
 Digital  
 U-matic  
 Monitors

01-267 9395

**THE P.A. COMPANY**

HIRE • SALES  
 INSTALLATIONS  
 01-607 0087

PROFESSIONAL SOUND SYSTEMS AND  
 CONTROL EQUIPMENT (TOYS)

**MIDI SYSTEMS** 01-995 4730  
 24 HOUR SERVICE

Super Jupiter	£30	Linn Drum Mk3	£25
Yamaha QX1/TX816	£60	Simmons SDS7	£25
SCI Multi Trak	£20	MXR01A dig reverb	£25
MSQ700 sequencer	£15	Bel BD80 delay	£15

Large range includes Juno 106, DX7 keyboards, RX11, TR707 drum machines, digital delay/reverb/harmoniser systems and Portastudio or 8-track home recording packages.

**JBL**

Late night sales & service.  
 8.30 am - 11pm

**Marquee Electronics**

10 RICHMOND MEWS, W1. 439 8421

**MUSIC LAB HIRE**

**24 HOUR RENTAL**

A comprehensive range of Digital and Analogue effects including AMS, Lexicon, Eventide and Roland. Plus Sony PCM systems, Tape machines, Noise reduction, units, Signal processors, Microphones, Drum computers and Keyboards.

Immediate delivery and collection service

**01-387 9356**

24 HOUR STUDIO EQUIPMENT RENTAL  
 76 EVERS HOLT STREET, LONDON NW1 1BY

**Studio Hire**



Full range of effects, keyboards and drum computers etc  
 Phone for a competitive quote.

Emulator II £100, Oberheim X-Pander £35. AMS from £75.  
 Phone Paul Tattersall on 01-640 8487  
 01-646 3137

**FOR HIRE**

Lexicon 224X Larc  
 AMS 15-80s 6.4s/1-6s 2pc De-Glitch  
 AMS RMX-16 Digital Reverb  
 Drum Computers, Keyboards, etc

**01-228 0984**

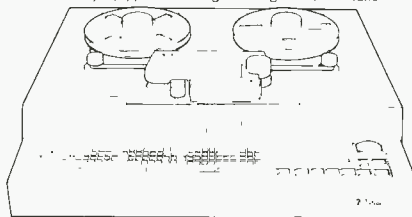
**The First Name in Sound Equipment Hire**

**FELDON AUDIO**

**580 4314**

126 Great Portland Street, London W1N 5PH Telex: 28668 AUDIO G.

- \* Sony PCM-3324 24-track digital recorders.
  - \* Sony PCM-1610 2-track digital recorders.
  - \* Sony F1 and 701 2-track digital recorders.
  - \* Plus the most comprehensive range of audio effects and ancillary equipment available.
- Electronic editing facilities for 24-track digital  
 New fully equipped 2-track digital editing and transfer suite



**24 HOUR SERVICE RING: 0860-313-990**

35 BRITANNIA ROW LONDON N1 8QH

**BRITANNIA ROW** 01 226 3377

**DIGITAL AUDIO HIRE**

**DIGITAL AUDIO HIRE**

E per day E per week

SONY PCM-F1 - SONY SL-F1 Portable Betamax Recorder	35.00	105.00
SONY PCM 701 - SONY SL-C9 Mains Betamax Recorder	8.00	24.00
PHILIPS Compact Disc Player c/w Remote	12.00	36.00
SONY Compact Disc Player c/w Remote		

Telephone: 01-549 1787  
 Telex: 945114 FARRAH G  
 Prices exclude VAT

**FOR SALE—PRIVATE**

**CHILTON 16/8/16 MIXER** to high spec including Parametric all channels, P & G faders, 4 auxiliaries, phantom power, PPM's etc. In good condition. For full details tel. 0904 58436.

**REVOX A77** with remote/varispeed. HS version in good condition/recent service. £350. Tel. 0904 58436.

**JBL L36 SPEAKERS** good condition, £350. Tel. 0904 58436.

**POTENTIOMETERS**—4,000 x 10K sliders. Offers to Jane. Tel: 01-897 1881 Ext. 50.

**KLARK-TEKNIK DN60** real-time spectrum analyser, calibrated mic, LGB3 long period integrator, little used. operators manual, complete packing, leads. £975. Tel. after 6pm 0684 72955.

**VIF INTERNATIONAL** will remanufacture your AMPEX or SCULLY (Ashland/Bodine) direct drive capstan motor for US \$250. Average turn around time 2-3 weeks. For details write to PO Box 1555, Mountain View, CA94042, USA. (D/F).

Private Studio has for sale the following items in good condition Will sell separately if required.

- Dolby A 361 x 8
- Ampex MM 1000 8-track
- Soundcraft series 2 16/8/2
- Otari MX 5050 2 track
- Quad 8 CPR/16 Digital reverb
- Scamp ADT module S24
- Teac 4-track A3340S
- 4 Shure mics 565
- Calrec CM 1050
- Master Room III BL Reverb
- 50 yards 8-way multicore
- 6 Boom Stands
- 4 Screens

Offers. Telephone 01-609 6001 anytime

**CLASSIFIEDS**

**SITUATIONS VACANT**

**ENGINEER/ASSOCIATE** to help run small ambitious company operating around its own 16 track (pre-wired 24) studios, designed by top specialist. Work includes music and speech recordings to professional standard, audio and possibly satellite TV installations and studio maintenance. Experience in above and enterprising, easy-going personality advantageous. Contact 22a Forest Road West, Nottingham N97 4EQ. Tel: (0602) 784714.

**AUDIO ENGINEER**

The applicant must have extensive experience in mixing live sound in a large arena environment in Europe and the USA. The applicant must also be familiar with the installation, repair and maintenance of large four-way and five-way PA systems on a touring basis. A familiarity with the on the road repair of Midas desks and Crown and BGW amplifiers is also necessary. Applicant must be able to organise other members in a team and assume responsibility for the financial running of the system including the preparation of tour accounts. The applicant must be physically fit and be prepared to travel at short notice. This position is offered on a contract basis which is renewable on a tour by tour basis. Salary is dependant on age and experience. Applications should be in writing, enclosing a full CV to Tasco 115 125 Lambeth Road, London SE1 7JL. For the attention of Mr. L. N. Blyth.

**STUDIO DESIGNERS AND CONSULTANTS**

**STUDIO CONSTRUCTION**

Studio environments built to the highest standards. Our services include: Fully engineered floating floors, suspended ceilings, high density doors, sound lock lobbies, concrete and brickwork, double glazing, low frequency absorbers, attenuated ventilation systems, insulating sealants, acoustic screens, electrical and electronic installation, equipment sales and commissioning. *U.K. and international projects undertaken.* Planning, design and materials export. Ring **RECORD CONSTRUCTION LTD** 01-985 7573 — London, England



SCENIC SOUNDS EQUIPMENT LIMITED  
Unit 2, 8-14 William Road, London NW1 3EN.  
Tel: 01-387 1262

**SERVICE ENGINEER**

At SSE we have been specialising in the distribution and technical support for sophisticated audio/digital products for over 10 years. We are looking for a fourth engineer to join our existing team of three.

The successful applicant will have several years' experience in fault finding down to component level. Will be familiar with digital and analogue products and be a self-motivated person who appreciates the freedom and demands of working in a small friendly team dedicated to excellence.

We are located in Euston, just behind Capital radio and look forward to hearing from you.

**KENNETH SHEARER AND ASSOCIATES**

Consultants in acoustics

30 years' experience in the custom design of all kinds of recording and TV studios, remix, dubbing and viewing suites — new and conversions. Down to 25 Hz.

Tel: 0442 54821

**BUSINESS FOR SALE**

**FOR SALE**

24-track professional studio with large house and grounds.

An excellent going concern with potential for expansion and improvement.

If you would like more details please write to Box number 923.

**CLASSIFIED ADVERTISEMENTS ORDER FORM**

Please use this coupon for all your sales and wants. Rates 50p per word. Minimum £12.50. Box Nos. £3.00 extra. To: **Studio Sound**, Classified Advertisements Dept., Link House, Dingwall Avenue, Croydon CR9 2TA. Please publish the advertisement below for.....insertion/s under the heading.....


Name .....

Address .....

Cheque/P.O. enclosed £.....made payable to Link House Publications (Croydon) Ltd.

Is a Box No. required Yes/No. If no, please include remittance to cover name and address and/or tel. no.

Please write in block capitals.

**CLASSIFIEDS**

# AUDIO SERVICES MIXERS & MACHINES



**TASCAM 480B**  
SMPTE Compatible  
Commercial quality.  
Small number at  
A SPECIAL PRICE

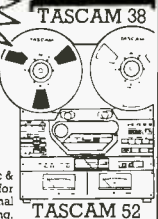


**TASCAM 22-2**

Pro mastering at budget price (P.O.A.)

**TASCAM 52**  
BRAND NEW  
FROM  
**£1,295**

NAB IEC rec & playback for professional mastering.



**TASCAM 38**

**TASCAM 52**

## Fostex



**FOSTEX B-16**



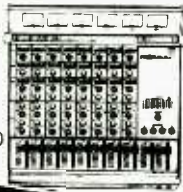
**FOSTEX A-8**

**SPECIAL PACKAGE DEAL**  
FOSTEX A8 with RAM RM10  
Also with FOSTEX 350  
**EXTRA SPECIAL PRICE P.O.A.**

A new standard in multitrack recording.

**SPECIAL PACKAGE DEAL**  
FOSTEX B16 with AHB 24:16  
**P.O.A.**

**FOSTEX 350**



Computer aided mixdown. Superb Partner for B-16

Now on demonstration with Commodore 64



**AHB SYSTEM 8 24:16:2**

## RAM



**RAM MEGA**

Modular design ideal for B-16.  
18 in. 6 aux. 4 band eq. hpf. lpf.

**RAM MICRO**



**STUDIOMASTER 16:8**

**REVOX B77 MkII**



**REVOX**



**SECK 12:2**

**SECK 18:8:2**  
Portable, low cost mixer for B-16 in-line, 4 band, 6 aux.



**TASCAM 225**



**TASCAM 244**



**FOSTEX X 15**

## TASCAM



**TASCAM 234**



**PROMARK MX3**

Two variations on the musical sketchpad theme.  
**PORTA-1 TASCAM**

Great comparisons

(6 LINES) Studio House  
High Lane Village, Nr Stockport  
SK6 8AA. Telex 665721 SOTA.

☎ **06632 4244**

# INDEX TO ADVERTISERS

APRS .....	20, 82
Advanced Music Systems .....	19
Alpha Audio .....	26
Amek Ltd. ....	55
ANT Nachrichtentechnik GmbH .....	40
Aphex Systems Ltd .....	57
Applied Microsystems Ltd .....	19
Audio & Design (Recording) Ltd .....	6
Audio Developments .....	65
Audio Kinetics .....	24, 25
Audic Service Co .....	12, 95, 98
B F E .....	79
Bandive .....	35
BASF AG .....	IBC
Britannia Row .....	10, 53
Connectronics Ltd .....	19
D & R Electronica B V .....	37
Don Larking Audio .....	12, 18, 21
DBX .....	29
Drawmer Marketing & Sales .....	77
Future Film Developments Ltd .....	12, 26
FWO Bauch Ltd .....	15, 23, OBC
Greengate Productions .....	14
H H Electronics Ltd .....	91
H W International (Shure) .....	22
Harrison Information Technology .....	6
HHB Hire & Sales .....	4, 79, 96
Hill Audio Ltd .....	41, 81
Hilton Sound .....	82
I T A .....	16, 17
John Bowers Ltd .....	67
Klark Teknik Research Ltd .....	49
Lexicon .....	59
Lyrec (UK) .....	31
Michael Stevens & Partners .....	87
Mosses & Mitchell Ltd .....	87
Music Labs Hire Ltd .....	75
MS Audiotron .....	67
Northern Audio .....	95
Neumann .....	23
Ocean Audio .....	71
Otari .....	60, 61
Paradise Studios Ltd .....	87
Rane Corporation .....	89
Sanken Microphone Co Ltd .....	26
Scenic Sounds .....	29, 59, 85
Shuttlesound .....	73
Sony Broadcast Ltd .....	47
Soundcraft Electronics Ltd .....	IFC
Soundout Labs .....	63
Sowter Ltd E.A. ....	82
Spectra Sonics Inc .....	69
Studiomaster .....	33
Studer .....	15
Studio Spares .....	27
Surrey Electronics .....	38
Sycos Systems Ltd .....	50, 51
Tannoy .....	OBC
Tape Automation .....	10
Technical Projects .....	71
Trad Sales & Services .....	22
Trebas .....	82
Trident Audio Developments .....	8
Turnkey .....	7, 9, 11, 13
Ursa Major .....	39
Yamaha/Kemble .....	42, 43

*Studio Sound* is available without charge to qualified readers: these are directors, managers, executives and key personnel actively engaged in sound recording in any part of the world. The Publisher reserves the right to refuse applications considered inappropriate and restrict the number of free copies sent to any one company or organisation. Non-qualifying readers can buy *Studio Sound* at an annual subscription of £18.00. All enquiries to: Subscription Department, Link House Magazines, Central House, 27 Park Street, Croydon CR0 1YD. Tel: 01-760 0054. Published by the proprietors Link House Magazines Limited, Link House, Dingwall Avenue, Croydon CR9 2TA and printed by Lawrence-Allen Ltd., Gloucester Street, Weston-super-Mare, Avon BS23 1TB.

# BASF Studio Master Series. The new Tape Generation.

## BASF Studio Master 910

*This sophisticated recording tape of high dynamic was designed especially for the high professional demands of modern multi-track technology.*

*The wear resistance of the magnetic layer ensures reliable operation even after hundreds of passes.*

*In spite of its considerable high MOL (+ 11.6 dB over reference level 320 n Wb/m), BASF Studio Master 910 has an unusually good print ratio of 57 dB and is therefore also suitable for long-term archiving. The BASF typical constancy of the electroacoustic properties and the excellent winding characteristics also ensure easy hub operation.*

## BASF Loop Master 920

*The chromium dioxide master tape for high-speed duplication systems. At 64-times duplicating rate, the master is usually recorded at 9.53 cm/s. It is only the typical chromium dioxide properties featured by Loop Master 920 which offer that extra quality needed to allow exploitation of all the advantages of a high-class cassette tape (eg. BASF chromdioxid II). In spite of the mechanical stress to which it is subjected in the "loop bin", the durable magnetic layer means that the recording level remains extremely constant, particularly in the high frequencies, even after running thousands of times.*

## BASF Digital Master 930

*This professional chromium dioxide tape is especially tailored to the requirements of digital sound recording (PCM), where the high storage density makes exceptionally high demands on the evenness of the coating. The typical chromium properties are brought out excellently in this latest form of sound storage. The antistatic magnetic layer and the black, conductive matt back protect the recording against dust-induced dropouts and ensure smooth, steady winding without damage to the tape edges.*

**Coupon:** Please send me further information on the BASF Studio Master Series.

Name/Company \_\_\_\_\_

Address \_\_\_\_\_



BASF United Kingdom Ltd.  
4 Fitzroy Square  
London W1P 6ER  
Tel: 01-388 4200  
Telex: 28649

BASF Aktiengesellschaft  
Gottlieb-Daimler-Str. 10  
D-6800 Mannheim 1  
Tel: 06 21/40 08-1  
Telex: 4 62 621 basf d

 **BASF**



# Family Resemblance.

All Tannoy professional monitors have a common heritage: a family resemblance which is born from a commitment to the ultimate in sound quality.

Each aspiring Tannoy monitor is carefully examined by the best-tutored ears, and by the most sophisticated measurement instrumentation available. When Tannoy give a monitor top marks, the family's reputation is assured.

Hugh Ford of *Studio Sound* commented recently that the Tannoy BM8 – the smallest speaker in the professional range – indicated "the similarity of overall tonal balance of all the Tannoy range of professional monitors"

This resemblance ensures that whenever a mix is monitored on one Tannoy speaker it will have the same sound continuity on another speaker from the Tannoy family. For full technical details, just 'phone or write.

**TANNOY**  
The Name for Loudspeakers



**F.W.O. Bauch Limited**

49 Theobald Street, Boreham Wood, Hertfordshire WD6 4RZ  
Telephone 01-953 0091, Telex 27502