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75
YEARS

The graphic features the numbers '75' and the word 'YEARS' in a bold, three-dimensional, sans-serif font. The letters are filled with a vibrant landscape scene of rolling hills under a blue sky with white clouds. The entire graphic is set against a background of yellowed, torn paper.

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25
YEARS

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FEATURES

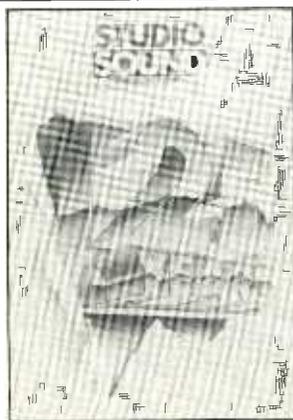
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EDITORIAL

EDITORIAL

This month's comments, observations and opinions from Richard Elen

Sound for picture

Every so often I am reminded of the expectant feelings that were around a few years ago about the combining of the audio and visual media... that before long, there would just be an 'audio/visual' field and very little that was out on its own. I seem to recall that those pundits had us believe that those days would by now be upon us. If this is the case, then the 'unified medium' must be very well hidden. I keep looking for it, because it's such a good idea, but I have so far found only a few enclaves of experimentation which are exciting, but logical, developments of previous work with both sound and pictures. And despite Dolby Stereo, there are plenty of pictures (of one kind or another) with decidedly suspect sound, and even more sound recordings with no pictures at all. What are the possibilities, what is being done, and what does it mean to the studio?

Let us first look at where we might expect the most profitable developments of the successful marriage between high quality sound and high quality pictures. In the process, we come across a number of attempts which seem well and truly doomed. The videodisc seems to have been dogged with problems, perhaps because the consumer is used to video being a record/replay medium (as opposed to being used to 'read-only' sound recordings). It obviously has its uses, however, in training and other interactive applications. Some years ago I saw an interactive *Laservision* disc containing a service manual for the *Apple II* computer, and very nice it was too. And now there are some remarkable interactive arcade games using laser videodiscs. Here I wonder how a capacitance-type videodisc is going to survive the experience—indeed, why has the format survived at all?—and whatever the disc medium, I really can't see much scope for high-quality audio in those areas. The (NTSC version) laser videodisc can hold high-quality digital audio, but the sales of the system appear to be so shaky that I wonder if there will ever be production machines with the facility. And while we're on the subject, can someone *please* come up with a unified international video system next time?

Then we have video cassettes. There are now some ingenious methods of getting FM audio on to domestic video formats, and we stand every chance of getting home videos that produce better sound than they do pictures, which is definitely a little unusual to say the least. With the high sales of each new generation of video recorder, I imagine we will soon have, if not digital video in the home, then at least digitally-enhanced video, perhaps with digital audio. Unfortunately I see no real sign of these machines at the moment. But certainly the format offers plenty of possibilities for artistic combinations of sound and vision which will sell.

Beyond these areas there are still more possibilities. If cable survives its birth pangs in the UK (something I regard as by no means certain, especially with more than one franchise-holder thinking about pulling out. I wrote to my local franchise-holders and asked them a few questions about what they were going to do in my area, and they have not even acknowledged that they received my letter!) then there may well be some exciting possibilities. Then besides *video* pictures, there is the

straight audio-visual medium. Curiously enough, this field has never really suffered from the same problems with sound quality as everyone else. All the A/V sound people I know are at least as inventive and quality-conscious—if not more so—as the average recording studio engineer. I think there is a philosophical reason for this, and it is that because A/V uses still pictures (despite rapid changes and dissolves, they are largely slide-based), the sound and picture elements balance each other: they have equal weight, where moving pictures instantly 'take over' and demand more concentration from the viewer and the producer alike. A/V people are doing marvellous things with sound and vision, and some of the most moving audio-visual experiences I have witnessed have been of this type. Productions like those by White Oak Design in Boston spring immediately to mind in this connection, where transparencies and illuminated tableaux combine with surround-sound to produce environments of incredible power. Indeed, it is interesting to note that it is the A/V producers—notably Sarnar Audio-Visual—who have picked up on Ambisonics, where it produces exactly the effects they require, often with less difficulty than using discrete tape channels which offer more limited results. As with the medium itself, A/V production houses have kept sound and picture techniques in balance, using all the latest technologies on both sides, to an astonishing degree.

One area on which I have waxed most sceptical in recent months is that of the promotional video, where I see there being great problems if organisations like MTV are charged for their clips, which looks somewhat inevitable. It may also, as some have suggested, represent merely a passing fad, and the demand may not last however successful this area is today. But in *nearly* the same direction, there are some interesting things going on. The Visual Music Alliance, based in California, is a group of artists in both the sound and picture camps who are trying very hard indeed to integrate the visual and audible media into a coherent and artistically valid whole. With any luck, there is money to be made here too. And, like the A/V people, they are combining state-of-the-art techniques in both fields, be they computer graphics or digital sound synthesis. The results I have seen are both encouraging and exciting, and they deserve every success. There have also been some interesting experiments in the visual music field in the UK, notably *TV Fetish* which was probably the first truly artistic visual music programme to be broadcast on British TV. The production contained hints both of some parts of the VMA's work, and of the original British experimental TV group TVX. Although some of the work was a little primitive by VMA standards, it contained all the excitement of an artistic experiment performed for the first time, and all credit must go to the team that realised it.

I have not yet considered the hardware required for linking sound and visual techniques, mainly because we are aware of it already. It is not a difficult link to make, technically—not half as difficult as it is economically and artistically. Technology, it seems to me, is not the problem in this area. But to be successful it requires that both sides combine their talents somewhere near equally, which is still not true today.

Richard Elen

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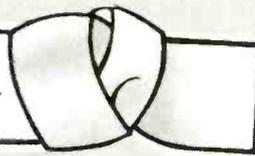
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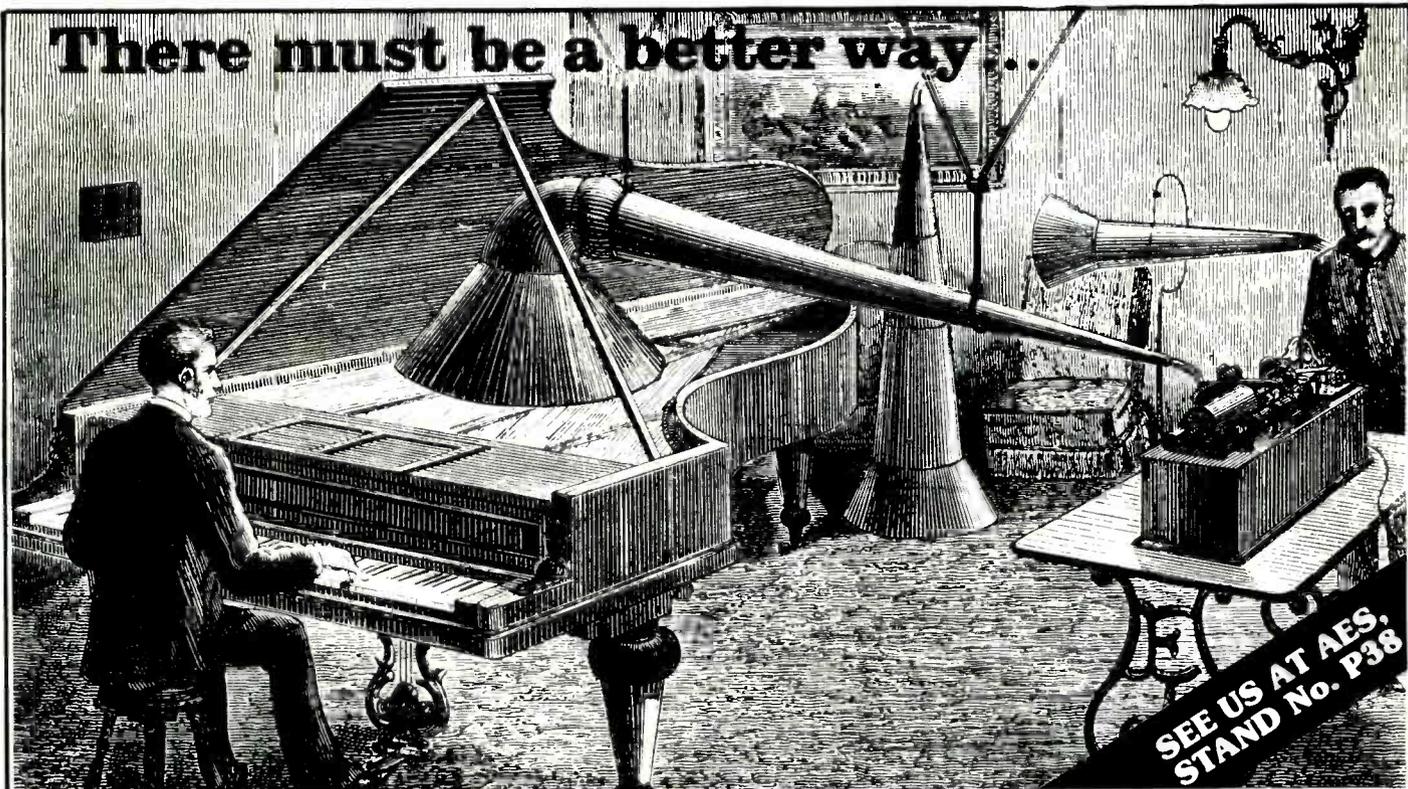
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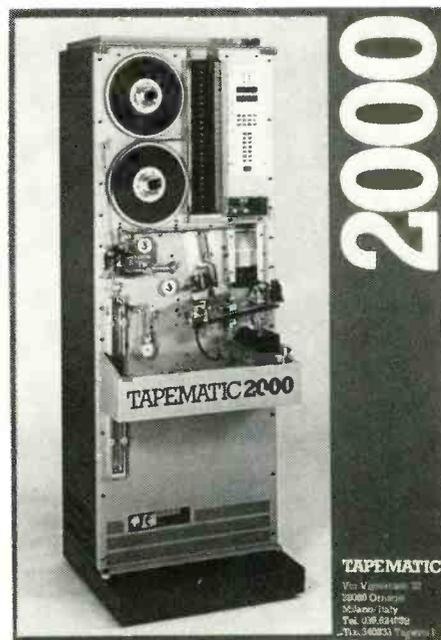
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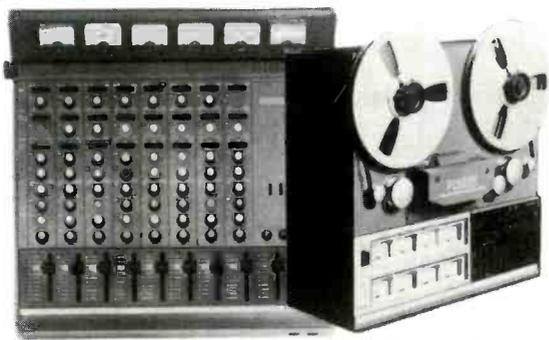


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- 3 Tape dump
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- 5 sync/input switching
- 6 Balanced line inputs and outputs
- 6 Calibrated or uncalibrated level adjustments
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The Revox PR99 is available in several versions: mono or stereo 3 3/4 / 7 1/2 ips NAB or 7 1/2 / 15 ips NAB or

IEC. And being built to Studer precision, the PR99 achieves exceptional performance and reliability but now at an easily affordable price.

For more information on the PR99 phone or write for a catalogue.

STUDER REVOX

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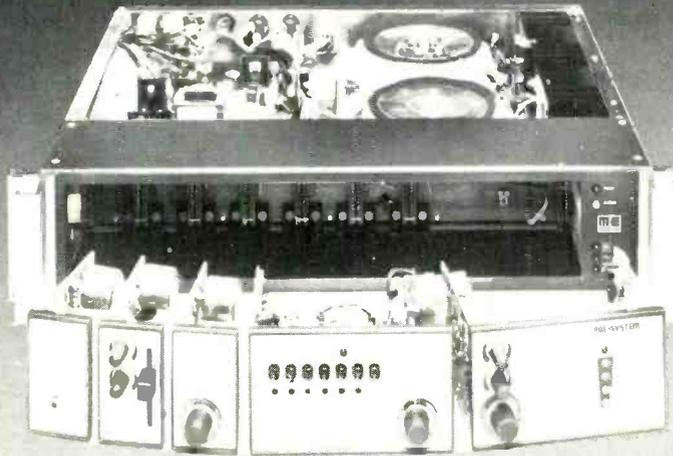
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turnkey mix

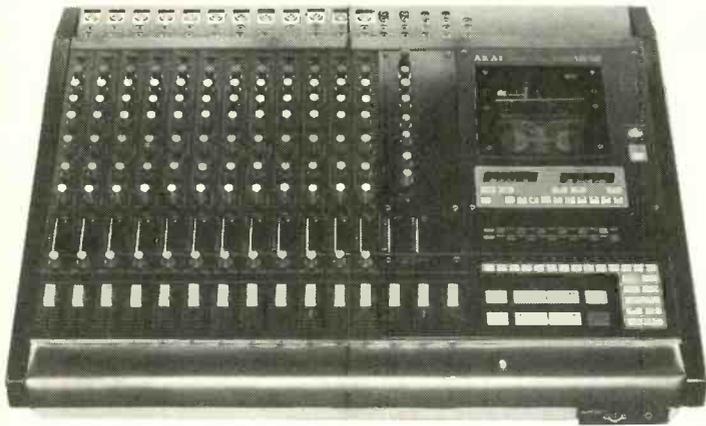
March 1984

The Turnkey Mix has appeared in various forms over the past six years. It's the most effective way we know to keep our friends and clients in touch with what we are doing.

For the next few months, we'll be binding monthly issues in with each copy of Studio Sound.

We also publish regular price lists, and you should be getting your copy through the mail. If not, call and let us put you on our mailing list.

Hope you enjoy this new format!



AKAI announces 12 track at Frankfurt

At Europe's biggest Music Fair another major Japanese audio manufacturer bravely joined the ranks of creative recording.

AKAI introduced a system of synthesizers, computers, and interfaces. They call it the 'Micro Studio System'. It includes all a musician needs for creating and recording music. But our main interest is in their cassette based 12 track all-in-one studio.

Using a custom cassette (looks like Beta video format) their 'lambda' loading feeds half inch tape past a conventional open reel head/capstan arrangement. We counted fourteen tracks, the extra two being used for control. Very clever transport controls, including locate and auto mute functions add up to a well thought out new concept. Use of dBx suggests that specs will be good, though none are yet published.

The other half of this portable

studio is a fairly conventional twelve way mixer. Construction is good with XLR's, individual modules, etc. It all reflects in a projected price of around £6000.

The total concept of a music system for the musician is a new approach that has yet to be proven. Not yet in the country, but we'll keep you in touch.

The other news from Frankfurt

... low cost mixers for recording from new British companies RAM and Promark. Everyone after a slice of the action ... Midi madness. The interface from music to computers is becoming an essential feature on many of the latest synchronisers

... Digisound introduce a pedal that can be custom made with any digitised sound ... MXR introduce a digital reverb for around £1500 (in soon) ... Fostex show the squash.

Trident Studios decide on Otari from Turnkey. Twice

Trident studios are expanding. Not long ago they took over the old Strawberry disc cutting rooms in Victoria, London, to establish Trident Two. A state of the art recording suite built to carry on the tradition of quality recording that they have become famous for.

An SSL console was first choice to achieve the most advanced and comprehensive control of audio. To satisfy the needs of their most demanding clients, they had to match the consoles performance and versatility with a multitrack recorder of equal standing.

The final choice was a 24 track Otari MTR 90, from Turnkey.

That was in October last year. As the engineers settled in with the new equipment, the potential of the MTR 90 was very quickly realised. All the many features that identify the machine as a fast, reliable production tool were studio proven.

Just a month later, manager Stephen Stewart Short decided to upgrade the original St Anne's Court Studio. To cater for the ever tougher demands of this famous studio's clientele, their Studer A80 twenty hour track, was replaced by a further, second Otari MTR 90

We congratulate Trident on their growth and on choosing Otari from Turnkey.

More studios are now turning to Otari to upgrade their facilities.

The reputation for reliability and performance grows steadily.

Our extensive experience in major studio projects, through design, installation and backup, adds up to the comprehensive service that uniquely backs every Otari which we supply.

Whether you are considering an upgrade or your first purchase of a major multitrack call us and find out more about Otari from Turnkey. We are the experts.

PZM Price Crash

Frankly speaking, we took a bit of a gamble when we first offered our matt black PZM alternative for just £19.95. But they have been selling like hot cakes.

It's sold under an unusual brand name, yet licensed by Crown International who hold the registered trademark to the PZM name. Tests show that this lookalike is very much a sound-alike too. The differences? Dry battery not phantom powering and jack instead of XLR out.

Limited stocks at the moment, so please place your order soon.



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Turnkey Two builds a no-compromise studio in the Bavarian mountains

Horst Hartmann's ambition was to build the best quality sound studio in the world.

As a result of a meeting with Andy Munro, our acoustic expert during an AES show, Turnkey Two was awarded the contract for design and the full product specification.

The project rapidly gained momentum with the choice of a suitable site - a disused electric pumping station in a peaceful mountain setting, that offered a basic shell and room to expand.

Andy Munro produced a LEDE design to provide the ideal acoustic environment to benefit from state of the art recording techniques.

To achieve no-compromise audio quality, a digital audio

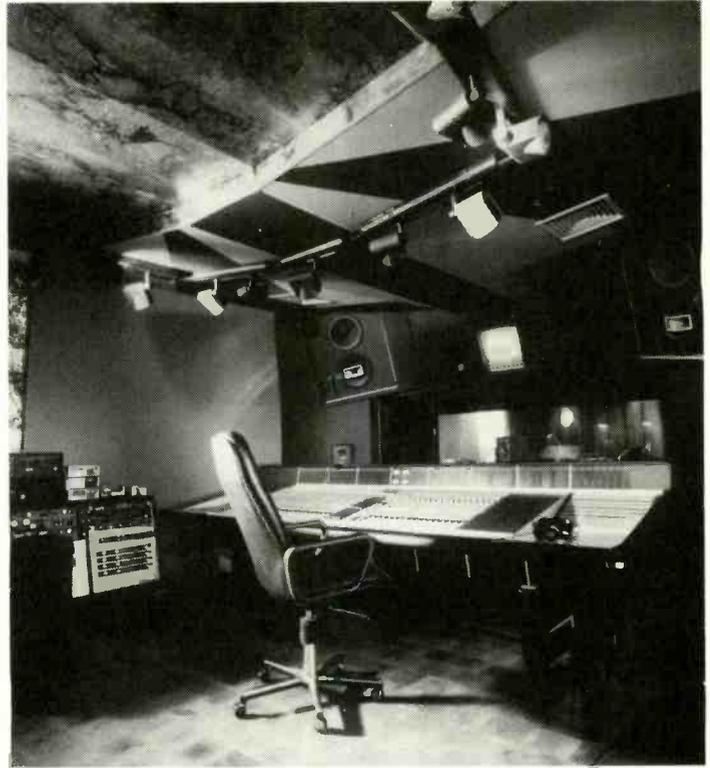
system was recommended.

A forty input SSL Series 6000 console was commissioned and the SONY 24 track PCM Digital multitrack with 1610 stereo mastering recorder were chosen.

Just over a year of work later the Hartmann Digital facility was completed. Today it is first choice for many of the artists in the local Berlin Music scene.

Turnkey Two is involved in other major studio projects at the moment, such as Big M and Sound Developments. There is also a considerable track record of previous achievements.

To find out more about all our successful projects and how our studio design services can help with your project, call and speak to Andy Munro at Turnkey Two.



EXR Projector. For disbelieving ears

Sceptics still abound. We know that not everybody is convinced about psychoacoustic enhancement. Yet our sales results show that it is working for those willing to give it a chance.

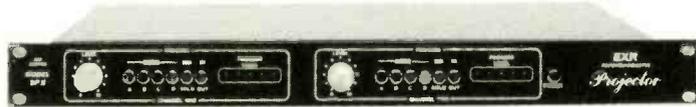
The latest product from EXR is a little less mysterious. Called the 'Projector', it breaks up the total processing into four switchable sections.

The first three functions create an interference signal, which when added back to the original signal, reverse the fundamental build ups and losses caused by multiplier effects and distortion

in the audio chain. Notching out these build-ups, the ears limiters are relaxed, causing apparent (to the ear) but not measurable increase in SPL.

The fourth function is a patented EXR process that appears to fill the holes left by the notching. Information from one part of the spectrum is processed, then used to sonically replace another part.

If it all sounds a little far fetched but we've caught your interest, then please call us and arrange for SOR trial to discover success of EXR for yourself.



The fully loaded, big time sale

How much delay do you need? Whilst many processors are now offering more time for your money, take a close look before you decide. There's a fixed relationship between time and frequency response, and many brands seem to offer long delays only to customers with burnt out ears. MXR System II offers a full, 16kHz bandwidth right up to 800ms. This results in very clean signal and presence during flanging, chorus and doubling.

Beyond these effects there are further possibilities with longer delays up to 3.2 Seconds. Repeat hold is a front panel feature allowing entire musical choruses to be captured and replayed

indefinitely - eliminating troublesome tape loops. When combined with regeneration, this allows the construction of quite complex melodic structures with several delay parts.

In true MXR style, the delay is robustly made for the rack, with balanced connections and an accurate, larger LED display of time.

As a result of a confidential purchase, we are offering MXR delay system II at less than half price. Only £599 plus VAT etc. We only have five units left and the offer is strictly on a first come, first served basis.

Call Garry Robson or John Ridell for full specifications.



Soundcraft knuckle under

When it comes to the design of mixers, there has always been a conflict of opinion between the UK and the US.

Originally the question was - where was the first multitrack console built? More recently, British preference has been for logically laid out, split mixing and monitoring sections, whilst our neighbours have preferred the in-line approach to mixing and monitoring.

Soundcraft have always been a major supporter of this British institution. But no longer. Their latest TS24 console takes an innovative step beyond the usual in-line approach.

Normally, an in-line channel contains two signal paths - one sends to the multitrack, the other is used for monitoring. When you mix, the monitoring is usually unused and you re-use the signal paths that went to the multitrack -

they connect to the mix buss. You reconfigure the console when you change from record to mix.

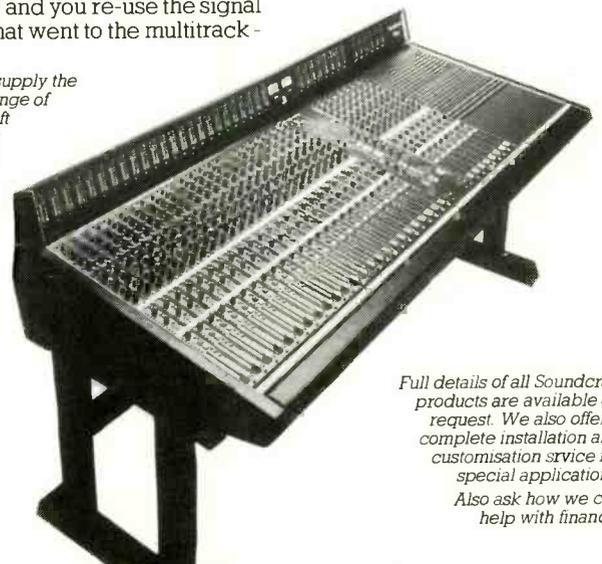
The TS24 dispels all of this confusion. The signal path which is designated 'channel' always goes to the multitrack, and the 'mix' path is always connected to the mix buss. So your monitor becomes your mix, and you can mix as you go.

Thus the British tradition to maintain order is upheld.

Soundcraft's new TS24 is a departure from their usual split console approach, yet it offers very logical, fast operation in a compact way.

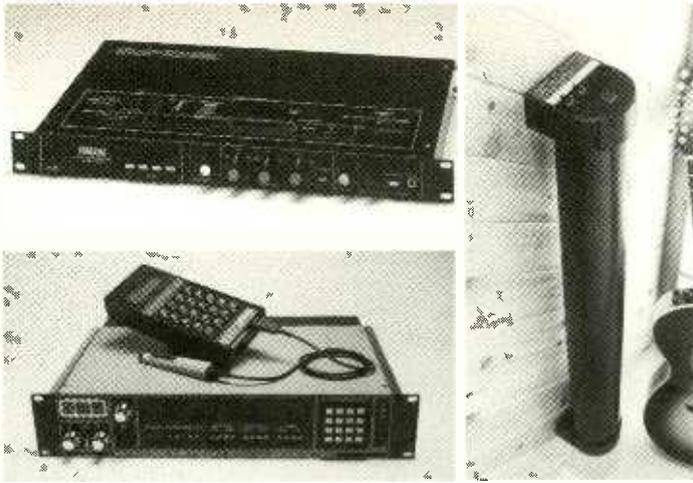
The many innovative features and facilities are described in a new, eight page brochure. Call us for a copy. Nobody knows Soundcraft better.

We also supply the full range of Soundcraft Magnetic products.



Full details of all Soundcraft products are available on request. We also offer a complete installation and customisation service for special applications. Also ask how we can help with finance.

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Plates, Springs and Chips our reverberation review

Whilst digital is slowly creeping in, the classic electromechanical systems still hold their own in both quality and price. At Turnkey, we offer the widest range of reverberation devices in the country.

AMS RMX16 - It's controlled by computer and you can determine the parameters of nine reverb programmes.

A hand held remote offers full control and includes memory.

Altogether, this must be the most advanced reverberation system available in the world today. We are the exclusive, South of England distributors.

Ecoplate III - Plate reverb is the industry standard. It has a crisp, bright appeal, all of its own. Since the patent expired, several manufacturers have tried to come up with a good sounding plate at a competitive price - Ecoplate have had success for some time now. Their latest is more compact than ever. Fully compatible, excellent specs and affordable.

Yamaha RV1000 - The price breakthrough had to come. Not in the league of the AMS, but providing a basic mono reverb with none of the quirks



associated with mechanical devices. Four preset delay times, with mixing and three band sweep EQ.

G.B.S Mk III - This is the latest version of Britain's classic stereo reverb. Frills free operation using custom transducers and high speed op-amps. A fully balanced version, approved for broadcast is also available. Warm, bright sound with strong stereo imaging. Use as a main, or secondary reverb system, or for live applications. Unbeatable in the value it offers.

There's more to come. MXR are about to launch their own digital reverb system and Yamaha has some advanced devices on the horizon.

For more information or to arrange a demonstration, call Turnkey, the Reverb experts.

Now, rapid line-up and audio checks

The Imagine the ideal hand held test set. It has the minimum of controls. Starting with an audio oscillator that covers the entire spectrum in a single sweep. Then a digital reading level meter that measures directly in dB's over a range of 74dB's. And finally a frequency counter that displays the oscillator or meter input in large LED digits.

A test set that's small enough to operate anywhere, yet precise



enough for any professional application.

The Loft TSI is manufactured by the Phoenix Audio Labs and distributed exclusively by Turnkey. Now only £216.52.

Call for full specifications.

How a computer is the future of music

Synclavier is causing a storm. Composing, arranging, editing and laying rhythms and even the art of multitrack are all changing as a result.

Imagine a familiar scenario. The musician sits at a piano arranging a composition. A pencil clamped in his teeth, playing chords and scribbling the dots. Building a mental picture of how they will sound together as brass or strings in the final performance. He may even make a basic demo recording.

Enter Synclavier. An idea can be played on the keyboard in any conceivable voice, recorded digitally and edited or retimed. And each development or orchestration can be added and manipulated and recorded separately on the sixteen track recorder. There's final mixdown, playback and music printing.

That's just a fraction of what can be done. Whole verses of real sounds can be captured and minutely manipulated.

Users such as Martin Rushent and Daniel Miller are discovering the potential of Synclavier as a production tool. Songwriter



Sting and film music writer Alan Parker are developing their ideas in a way which was not possible before. We have also supplied institutions here and abroad that not only use Synclavier for music but varied applications like phonetic analysis too.

There's a great deal of exciting progress being made with this computerised music system. All pointing to the future of music - and recording.

For full details on Synclavier, and the latest software and hardware updates, call David Whittaker at Turnkey.

Behind the success of System Sixteen



one inch format with dBx, is both proven and approved for music mastering and broadcasting.

The mating mixer, Model 15 is built in the same tradition. It's balanced, metered, modular, and ergonomic. Independent monitoring sections and a range of access points to the auxiliary busses offer the flexibility to repatch to any requirement. And again, performance challenges familiar high priced products.

System Sixteen from TASCAM offers remarkable versatility and carries an equally surprising price tag for such wide range of facilities and features.

If you know TEAC then you we urge you to find out more about System Sixteen for your studio upgrade. The system is quick to install and you can begin working with confidence in a matter of hours. Call Garry Robson.

If your first multitrack was TEAC or Tascam then you know of all that this manufacturer has done to provide affordable recording technology. You should also know that since their first multitrack product, more than ten years ago, they have continued to provide music and production people with more and more advanced technology. Their philosophy has always been to provide easy to use technology, that's also easy to own.

The System Sixteen is no exception. The 85-16B recorder is built to work hard. The way it's built challenges the likes of Otari and Studer. And the quality achieved using the economic

Dynamix Special

We have one only, frustrated order in our stock room.

It's a twenty four input, Dynamix 3000 Series, sixteen track mixer. It was ordered with high quality P&G faders, but the buyer had a sudden change of heart. Brand new, but it's our policy to sell-off specials. Hence the unrepeatable price of only £2995. Details on application.

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Welcome to Spring AES, Paris 1984

This year's European AES looks like being full of surprises from several major manufacturers.

Our overseas interests will be represented as follows.

Stand T63 - Turnkey Two

Andy Munro will be pleased to discuss all aspects of acoustics and studio design. His innovative approach, incorporating LEDE theory has resulted in many major contracts over the past year. This is a chance to take a closer look at some of these large installations, both home and abroad, that have been recently completed.

Andrew Stirling, Turnkey

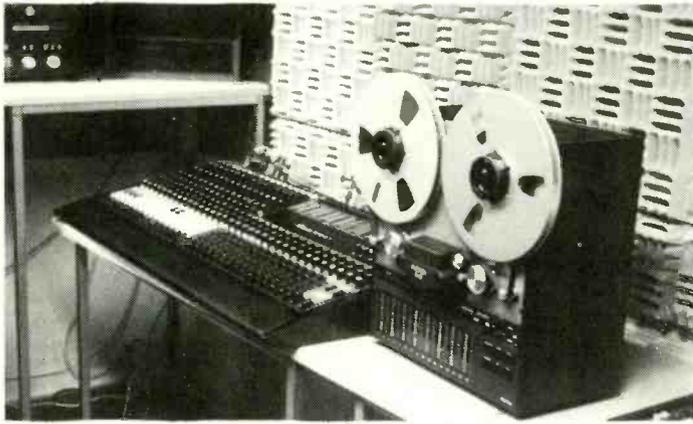
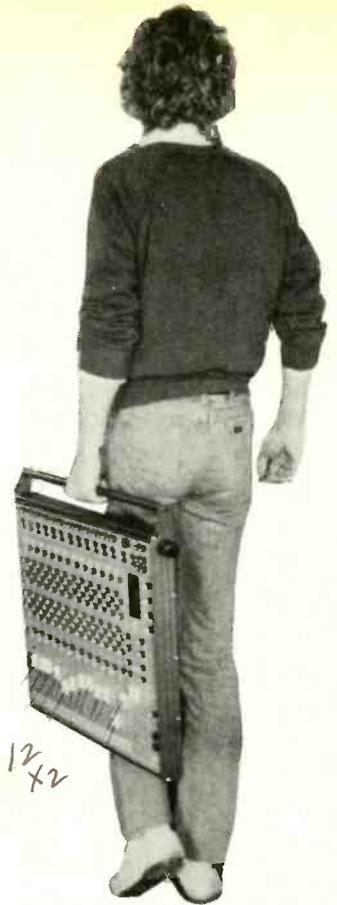
Sales Director, will also attend to discuss major studio packages.

Stand T64 - Synclavier

Following our quite recent appointment as the European representatives for this remarkable product, our resident expert, David Whittaker will attend.

A complete, working Synclavier II system will be demonstrated. Full information on the latest software and hardware updates, plus news on applications will be available.

The Paris AES is at the Palais de Congres, March 27th to 30th. We look forward to meeting you there.



SECK announces two new mixers

These brand new consoles from SECK include many recording features, packaged in the most compact, portable console we have seen.

Construction technology is very advanced. An extruded aluminium shell holds a double sided printed circuit board.

The inputs feature balanced mike and line connections, long faders, four auxiliaries, and a very good sounding three band (centre sweep) equaliser.

There's auto solo on all outputs and peak/average switchable LED bargraph metering. Plus performance that challenges consoles costing twice the price. And not just on paper.

Remarkably, these consoles

12 x 2

are just 48 millimeters thick, and the twelve in version weighs just 8 kilogram. The built in handle makes them truly portable, and folds back to provide convenient angled operation. An external power supply ensures that there are no hum or hear problems.

Feature by feature these new SECKs offer more value in basic stereo mixing facilities than any other product we know in the marketplace. Call or write for further details and full technical specifications.

Fostex plus RSD system now on demo

A couple of months ago we offered the choice of Soundtracs, SECK or Allen & Heath, budget sixteen track mixers to work with the new Fostex B16 recorder.

Our fourth variation, is the new sixteen - sixteen - two mixer from RSD. Wide facilities at low cost.

At Turnkey you get the widest range of choice in multitrack.

Do you have a copy of our Fact File yet?

Based on our wide experience of private and commercial studio projects, we have prepared a unique file of information.

It contains facts, figures and comment, covering all aspects of establishing a successful 16/24 track operation.

In short, it is essential reading for anyone considering a major multitrack venture.

For your free copy, apply directly to Garry Robson.



Marilyn Studio in operation

Another design success for the LEDE approach taken by Andy Munro of Turnkey Two. The Marilyn studio in Munich is 3M and API equipped, providing full twenty four track facilities.

Ilsonic panels are used for precise, local control of sound reflections. Note that signal processing is mounted above the mixing console, cockpit style.

The studio has full video lock facility to meet the exacting needs of many post production clients.

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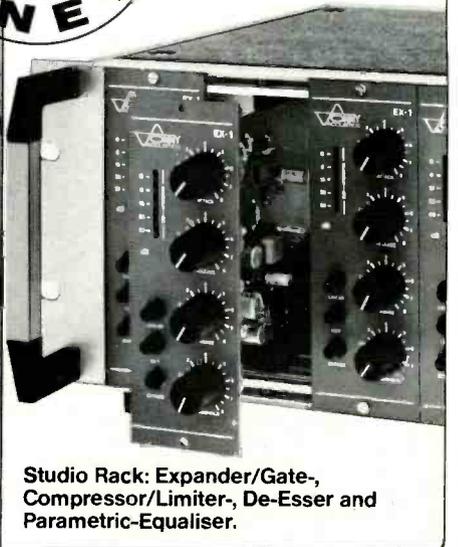
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BFE announces new studio concept: Sonny Acoustics Studio Line! Finally, after a long silence, a domestic audio mixing console designer came up with a professional quality product with the seal

"Made in Germany" which is cost effective with detail finish and state of art design. Sonny Acoustics Studio Line : Naturally available exclusively through BFE. For further information please contact :

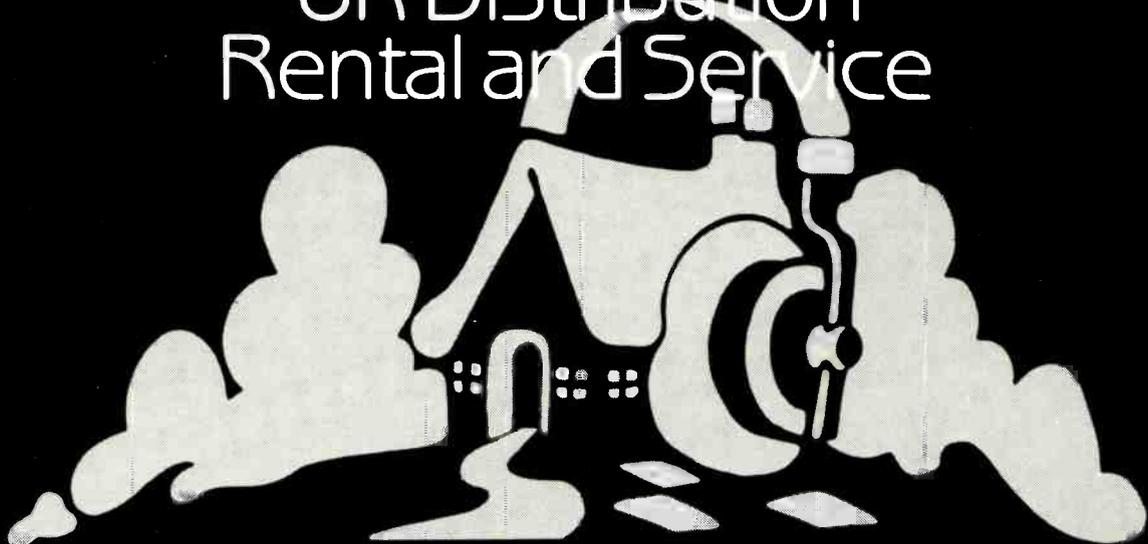
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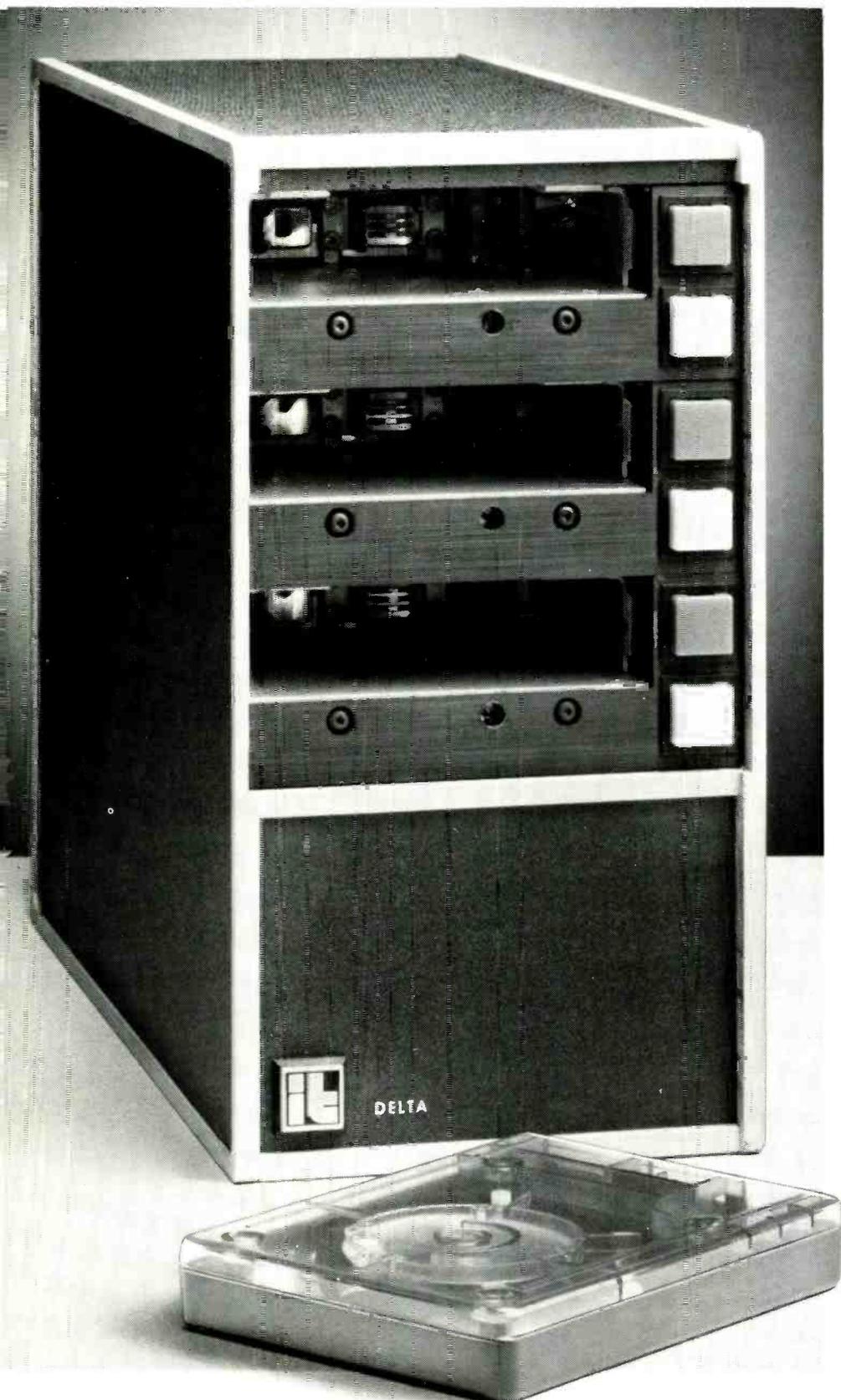
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MAJOR BREAKTHROUGHS DON'T HAPPEN OVERNIGHT.



The new Delta three triple-deck cartridge machine from ITC gives you even more rugged reliability than its well-proven predecessors in the Premium Series, it provides improved performance, is more compact and includes a host of new operating features.

All this has been made possible by major technological advances in the ITC research and development lab. Advances which have created an electronically and mechanically superior unit. A machine that will take all the inevitable day-to-day knocks yet keep on functioning at the high standard you – and your listeners – expect.

The Delta Three has three independently-removable decks and modular construction makes alignment and servicing simple and convenient. It is clean and smooth in operation, with minimal flutter and optimum frequency response, in mono or stereo. Insertion and removal of cartridges is positive, and there's a microprocessor-controlled digital cue tone detector. A newly designed capstan motor with its own integral "gallows" greatly reduces bearing noise and ensures stability of shaft along its entire length. Record facility on lower deck is made possible by the addition of Delta Four.

Rigorously tried-and-tested in the field, the Delta Three represents a significant breakthrough in practical technology for the studio.

ITC. Sound quality.



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The FDS300 and MCS200 series frequency dividing systems have created new standards in sound control. Between them, they meet every requirement in the sound reinforcement field, with each unit offering four outstanding features to set them apart from other crossovers. Mid filter limiters for each section; subsonic and ultrasonic input filters; output level indicators; and a choice of programmable frequencies on 12, 18, or 24dB per octave slopes.

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NEUMANN CONDENSER MICROPHONES



It is essential that microphones used for digital recording be capable of covering a dynamic range of at least 96 dB, since this is the range between the quantizing noise of a 16-bit system and its clipping level. Neumann condenser microphones have always provided 110 dB – some as high as 129 dB (r.e. IEC 179) – but this is only one of their many advantages. There is no doubt that your digital recordings will continue to have their best chance at success if they are made using Neumann microphones. We'll be glad to send you our catalog 120.

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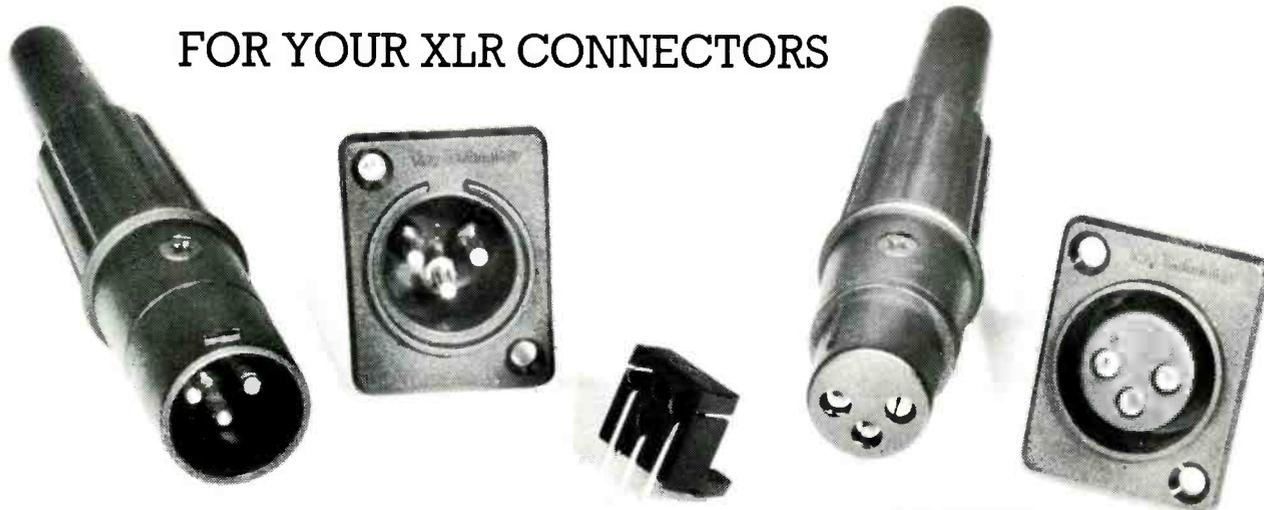
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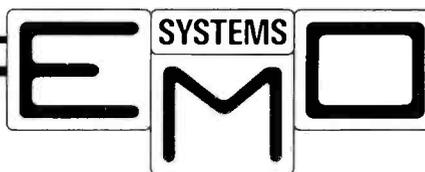
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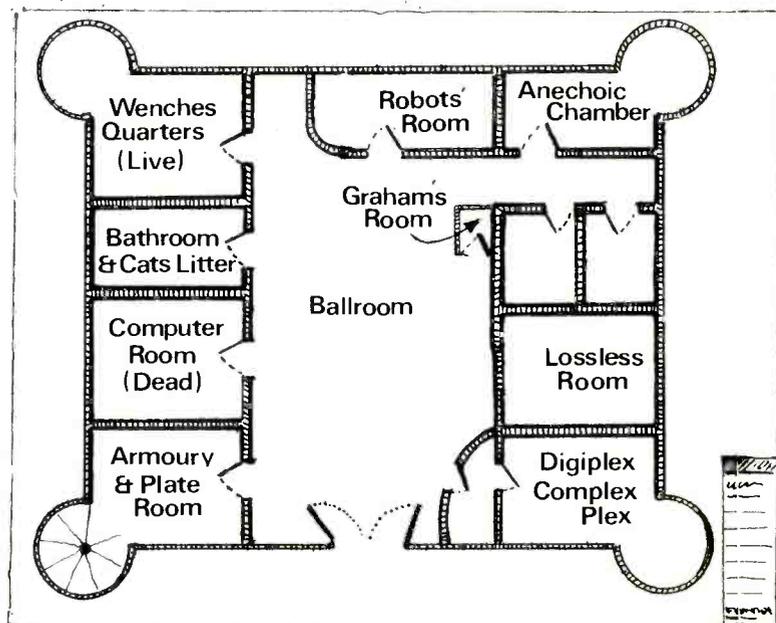
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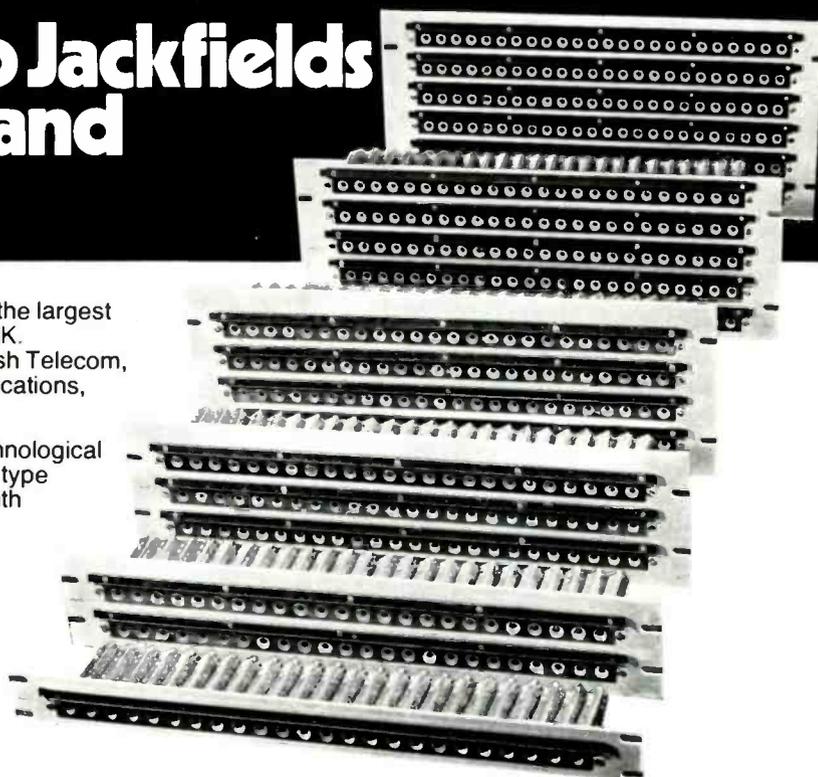


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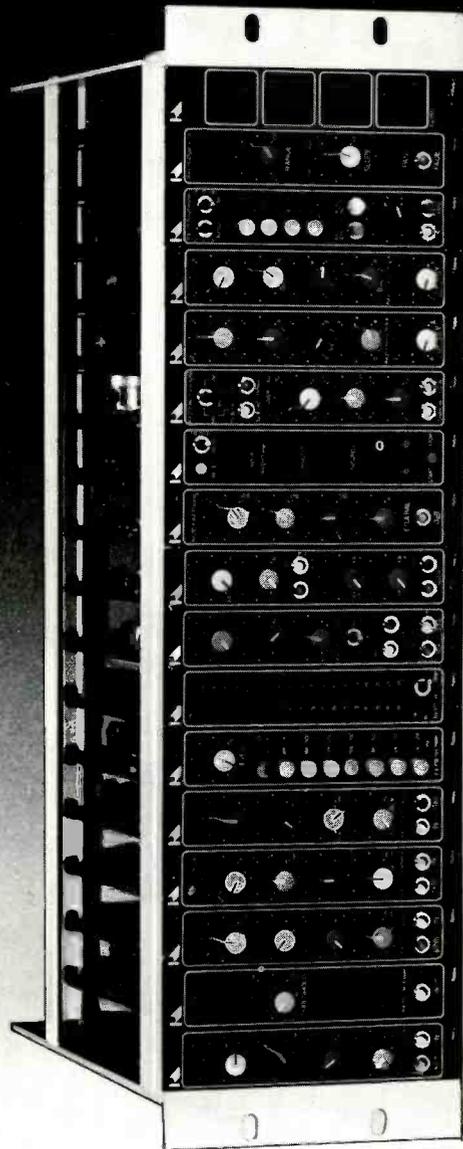
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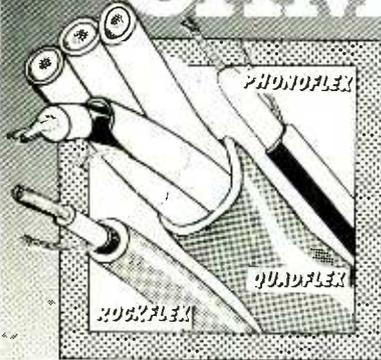
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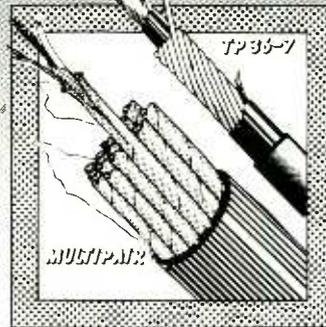
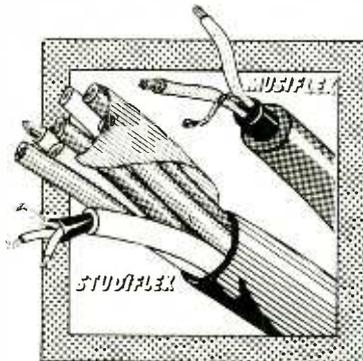
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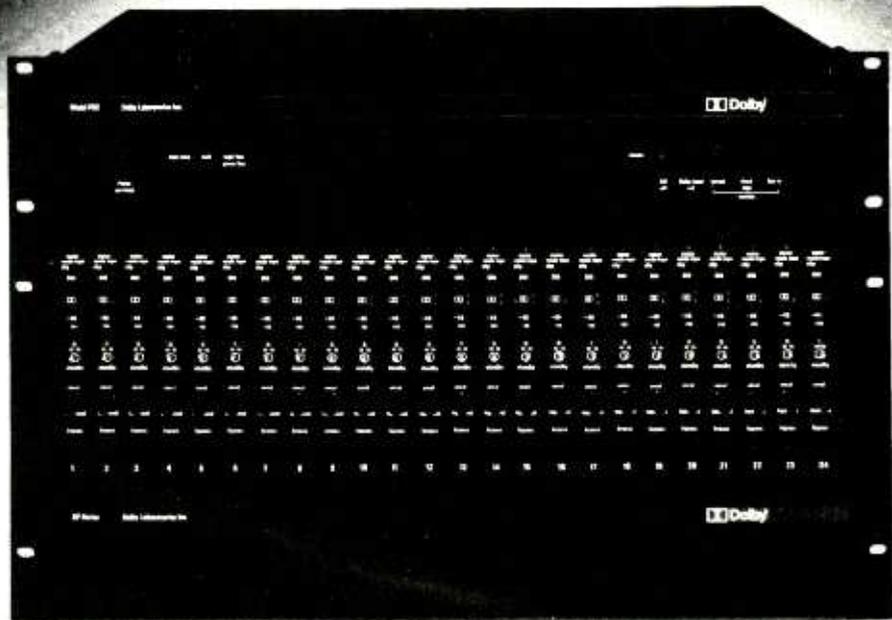
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Dolby



The Dolby SP Series Multi-track noise reduction unit

Dolby noise reduction is an integral part of professional multi-track recording practice in music, radio and TV broadcasting, and film studios throughout the world. A new noise reduction unit, the Dolby SP Series, has been developed for these and other applications, and provides up to 24 tracks of Dolby A-type noise reduction in only 12¼" of rack space. The SP Series' combination of compact size, ease of operation, and new features makes it ideal for equipping new recording facilities and upgrading existing ones.

For further information on the SP Series and other professional noise reduction equipment, contact Dolby Laboratories.

Highlights of the Dolby SP Series:

- Up to 24 tracks in only 12¼" of rack space, including power supply.
- Dolby A-type noise reduction characteristics utilizing standard Dolby Cat. No. 22 modules.
- Separate regulated power supply unit with electronically-controlled output protection.
- Low-noise fan cooling.
- LED display for each track permits accurate Dolby level calibration (within ±0.1 dB if desired) by matching intensity of LED pairs; further LEDs

indicate the presence of signals and clipping, and assist alignment with high-level reference tapes.

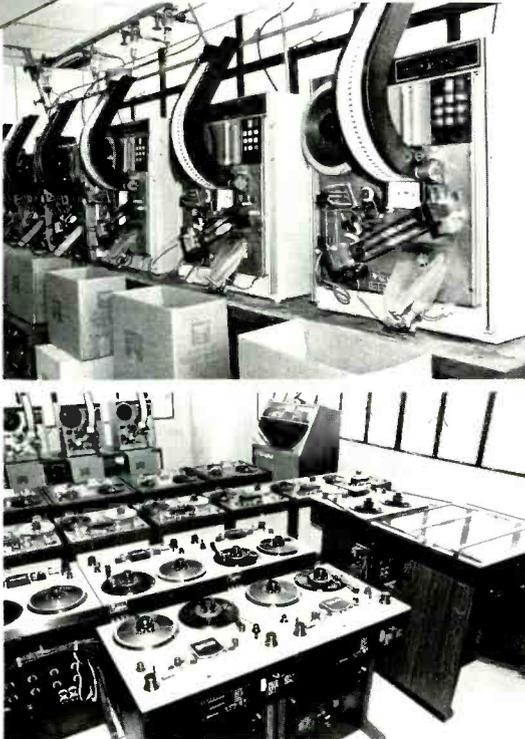
- Front-panel "UNCAL" control for each track permits rapid resetting of Dolby level for playback and punch-in on nonstandard-level tapes, then instant restoration of preferred preset studio Dolby level without recalibration.
- User-selectable option of "hard" or electronically-buffered bypass of individual tracks and of all tracks simultaneously.
- Snap-fit connectors on rear panel for rapid disconnection and reconnection.
- Balanced and floating input stages.
- Output stages drive either single-ended or balanced 600-ohm loads at levels up to +28 dB (19.5 V) before clipping.
- Ultra-low-distortion input and output amplifiers.
- Remote ground-sensing output configuration minimizes hum pickup when driving single-ended loads.
- Discrete FET switching for reliable, noise-free routing of audio signals.

Dolby Laboratories, 731 Sansome Street, San Francisco, California 94111, Telephone 415-392-0300, Telex 34409. 346 Clapham Road, London SW9, Telephone 01-720-1111, Telex 919109. "Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation. S81/3621

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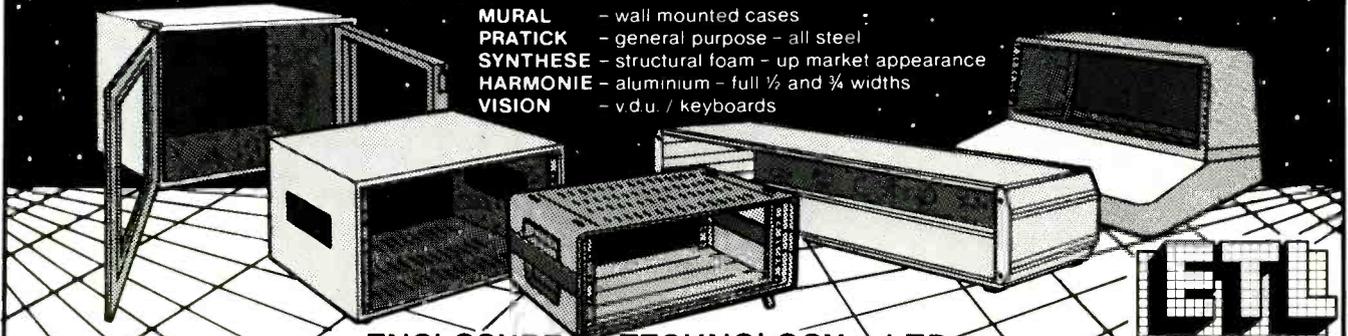
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"There's no doubt-Apollo Master Discs give the quietest cut available through conventional techniques."

"The Apollo has all the pluses mastering engineers look for."

We designed into the Apollo lacquer all the features the mastering engineers have been asking for: better flatness, less noise, clean cutting, longer stylus life, better uniformity and consistency. Ultimately, the Apollo results in better records.

"Absolutely flat."

All aluminium blanks used for the Apollo are micropolished using a process originally developed for magnetic computer disks. This multi-step process resurfaces the aluminium blanks and creates a fine finish, free from defects and with an improved flatness.

"Free of ticks and pops."

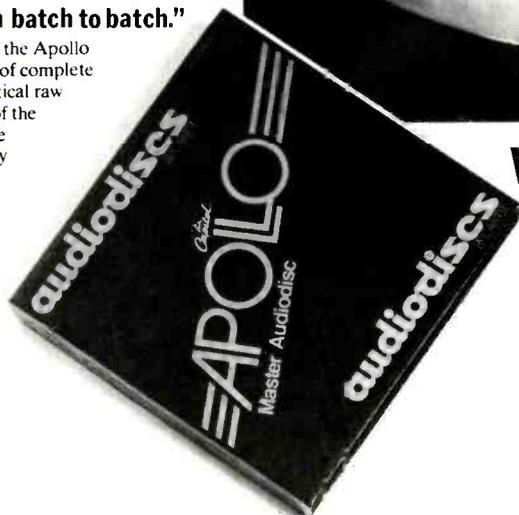
Our elaborate lacquer manufacturing process insures that all particles and gels which could cause cutting problems are removed. Moreover, the new formulation resists lacquer buildup on the stylus, thus reducing groove wall scoring and loose debris in the groove, which contribute to ticks and pops.

"Least abrasion."

The unique Apollo formulation reduces the cutting friction when contacted by the heated stylus. This results in lower abrasion, thus extending the stylus life. And, of course, the formulation does not use any abrasive ingredients in the first place.

"Very consistent from batch to batch."

The excellent consistency of the Apollo lacquer masters is the result of complete control we have over the critical raw materials and the blending of the formulation. In addition, the extensive process and quality control methods assure the maintenance of tight manufacturing tolerances.



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DIARY DIARY

Exhibitions; conventions; developments; contracts; agencies

De Lane Lea change of ownership

De Lane Lea Studios has been acquired by a consortium of freelance film people. The deal was completed on January 5, 1984 and involves a total capital injection of nearly £½ million. By June 1984, two of the Sound Centre's studios will be completely re-equipped. Hugh Strain will be running Studio 3 with a new 40 channel desk, Dolby Stereo and 6-track recording. Peter Maxwell will be moving to Studio 2 with a new 24 channel stereo desk. Both theatres will run 16 or 35 mm at high speed. Studio 1 will continue to provide dual gauge film facilities while the recently re-equipped Studio 4 has added video dubbing with a *Q-Lock*. Additional transfer capabilities will be available following the transformation of the Dean Street premises over the next five months. Also planned is the refurbishment of the complex's 15 cutting rooms which will be available for hire to all aspects of the film and TV industries.

Contracts

- Advanced Music Systems (AMS) has announced the following contracts—10 *DMX 15-80S* stereo digital delay pitch changers to ORF, the Austrian Broadcast Corporation; 10 *DMX-80S* and *RMX 16* digital reverbs to Showco, the US tour company following road trials; 2 reverb systems and 2 stereo delay line pitch changers to Limehouse Studios, London and one of each to Complete Video, London. Steve Levine, producer of Culture Club, has taken delivery of an *RMX 16* reverb system and a 16 second stereo DDL pitch changer which was upgraded to 25 s maximum delay; and producer Peter Collins (Musical Youth, Tracy Ullman) now has a stereo pitch change unit with 16 s maximum delay.
- Allen & Heath Brenell Ltd have announced that in conjunction with their Spanish distributor Fading SA, they have won a contract to supply the Spanish Broadcasting Corporation with 10 *Syncon B24* mixing consoles.
- Elliott Brothers have supplied a *DDA D Series* console to Metro Radio for their commercial production studio; Tannoy *Super*

Red monitors to Harlech Television; Tannoy *Little Red* monitors to Central Television for on-air studios; the stage management desk for the RSC production of *Poppo*; and have been awarded the contract to install the new SSVC studio complex in London. SSVC has replaced the old BFBS network.

Agencies

- PAWS Sound Service has been appointed the distributor for Sunn in The Netherlands. PAWS Sound Service, Weteringstraat 46, 1017 SP Amsterdam, The Netherlands. Tel: 020-239501.
- Trident USA and Wilson Audio Sales have appointed Trackside Engineering of Atlanta as their exclusive dealer for the Georgia area. Trackside are currently installing a Trident console in their own mixdown room and will continue providing full service and sales support in the South East area. Trackside Engineering, 2670 South Cobs Drive, Smyrna, GA 30080. Tel: (404) 436-3024.
- Kapla have announced that they are the exclusive Austrian agents for Amber, Amek, Bogen, Fabec,

Gotham products, Keith Monks, Lexicon, MRL, Stellavox, Switchcraft, TAC, UREI and Valley People. Kapla, Sooss, Vöslauerstrasse 38-40, Postfach 49, A-2540 Bad Vösau, Austria. Tel: 02252-7459.

- The professional audio products division of the Sony Corporation has appointed Audiotechniques, the New York and Stamford, Connecticut dealer, under a sales representation agreement for the full line of Sony digital equipment including the *PCM-3324* digital multitrack.

Forthcoming events

- March 27 to 30
AES 75th Convention, Paris, France
- April 29 to May 2
NAB Convention, Las Vegas, USA
- May 12 to 15
AES 76th Convention, Anaheim, USA
- June 13 to 15
APRS Exhibition, London, UK
- September 21 to 25
International Broadcasting Convention, Brighton, UK

Electronic mail links the industry

What is likely to be the next step in communications technology—electronic mail (simply 'E-MAIL' for short) is beginning to link together all sections of the music and recording industry.

Dialcom is an international electronic mail and information system based on Prime mainframe computers in a number of the world's major cities. The software was written in the seventies for the US Government, and was released for commercial applications through ITT Dialcom, who own the system in the States and have set up joint companies with the major telecommunications organisations in several countries: so, for example, the British Dialcom system, Telecom Gold (which has three separate but interlinked systems) is a company jointly owned by British Telecom and ITT Dialcom.

The system was originally designed for the major national and multinational corporations, to allow them to send inter-departmental memos and the like anywhere in the world, but more recently groups have been set up to serve smaller organisations. Each 'closed user group' is independent of other groups,

having its own directory of users and a wide range of facilities which can be developed exclusively for the group.

One such group is administered by International Management Communications, and exists to serve the entertainment industry with communications and 'office automation' facilities, be they recording, music business, video, TV or broadcasting companies. IMC has exclusive deals with Dialcom to serve this industry internationally; there are now well over 300 users of the system in places as far apart as Los Angeles, Tokyo, Sydney and London. Besides communications facilities, IMC offers an exclusive electronic publishing service, Music Industry News Services (MINS), which supplies up-to-the-minute information on international record charts, industry news, and a wide variety of other topics; a custom database-management program design and installation service, which enables, for example, a touring band to handle all the administration required for a major tour (Elton John is using the system for all data and message handling on his current tour) or a studio equipment manufacturer to

keep track of spares and stock levels on an international basis; a comprehensive text processing system which includes automatic generation and mailing of forms, say for enquiries about studio time or exhibition enquiries; and a growing set of specialised international information databases, which will cover such subjects as music venue information, studios, pro-audio manufacturers, and hire companies.

The system is accessed from virtually any computer or terminal which has serial communications facilities, via a modem on to telephone company lines. In each major centre there are direct lines into the computers; for longer distance calls the system may be accessed via almost any of the national and international data networks—this means that the system is a local phone call away from most major centres in the 'civilised world'.

To allow your computer to access the system is very simple: almost any computer system with a serial RS232 port will do, and the system can be accessed at 300/300, 75/1200 or 1200/1200 baud, CCITT or Bell tones

depending on the access location. Asynchronous communications software is available for, or sold with, the majority of serious computers, and after that all you need is a modem to link your computer to the system.

Electronic Mail is the centrepiece of the system, and this is simply imagined as each user having a secure, password-protected 'Mailbox' ID which allows access to all the facilities on the system. The ID can be set up to scan incoming mail automatically on sign-on, check telexes (telex and telegrams can be sent and received) or perform many other functions available. For the mail service, the main charge is for the time connected to the computer (plus the local call) although there are reasonable rates for storing files on the system or sending mail internationally between systems. In addition, IMC charges a subscription to enable it to give instant technical and operational support almost anywhere in the world, and to provide the wide range of 'value-added' services which are exclusive to IMC, like the databases.



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The MXR Drum Computer. With a full complement of features and functions, it rivals the performance of a high-cost system—at an affordable price. And it's simple to use.

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- Individual level controls and outputs for all voices
- Capacity: 100 patterns of up to 99 beats each, 100 songs
- 2000 drum beat memory
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SS 4/84

DIARY

DIARY

In perspective

Introducing an occasional column from Martin Polon

What the world doesn't need is another column about audio. There may not be as many audio magazines as there are computer magazines, but it certainly seems like it (especially to this writer who has birthed several). That there is need for intelligent commentary on the state of the world of audio seems to be a fact (but that too may be a vanity from having commented on audio in the pages of other publications for the last ten years.

The purpose of this column will be to cut across lines; to measure the differences between professional audio as it is practised in the UK and Europe with the USA, to show the future direction of audio as a synthesis that merges audio, video and computing, to see the impact of electronic home entertainment as the creator of the marketplace for professional audio equipment and services, and to view technology and the politics of marketing wherever they come into conflict. The dual linkages of technology and culture bind Japan, England and

the United States in intimate relationship with Europe and the rest of the technology-consuming world with new products, consumer reactions and the demand for professional audio services. The outcome of the marketing effort for the Compact Disc will be a success or failure because of its impact on numerous world market places, and the interactions of these markets. The recent rejection of the Beta format in Europe may not have influenced the several American and Japanese manufacturers who rejected Beta for future US distribution, but it seems likely that it did. The result of this marketing migration to the VHS format in video will influence the emergence of a suitable stereo-video system for release worldwide in much the same way that the announcement of a stereo-video standard from Dolby Laboratories will impact the hundreds of films produced in Dolby stereo and now available for release in some enhanced audio format on video-

cassette. In short, the future of audio is intimately involved with the direction of such diverse entities as the split-up American Telephone and Telegraph (AT&T), the failure of professional organisations to come together and enhance the educational process in audio and the activities of direct broadcast satellite (DBS) in the United States and the United Kingdom.

These and other activities of interest will be chronicled in these pages from time to time. I say time to time because the idea is not to make this column a repetitive or boring thing, but rather an exercise in stimulating the magazine audience to the same things that excite me.

Who is this Martin Polon? Is he of value or is he just another self-impressed observer of the audio scene (there seem to be more than a few)? He has spent the last 10 years working at the business of the Audio Engineering Society. From the perspective of the Education Committee, presenting papers, running sessions, chairing

conventions and working as a Governor of the Society, he has learned to listen to the needs of those who inhabit the world of audio. As a consultant in developing a broad range of audio, video and computing products, he has helped to give direction to features that make the user want to buy something. He has sold his fair share of high-technology refrigerators to Eskimos, but has at least learned there is a price to that. As an academic, he has taught the emergence of the needs of people as a basis for establishing high technology marketplaces. He believes in facts; in the research that produces those facts and most of all in the people/consumers who are the ultimate arbiters of the success or failure of any new technology or the continued success of what is established.

This column will be hopefully enjoyed as much by the reader as it is by the writer. It will be a vehicle for both to communicate their views with the rest of the audio world. **Martin Polon**

Electronic mail links the industry cont'd

Sending an E-Mail is very easy; you just dial the local data network node, key a set of characters to access the system, and enter your personal ID and password. Then a simple set of commands enables you to 'address' a letter to another subscriber and upload a word-processor file or type the message on-line. You can easily set up a personal file which contains 'short-form' names linked to the destination ID number of people you often mail. So, for example, to mail *Studio Sound*, you could type: 'MAIL SEND TO S SOUND SUBJECT EDITORIAL LETTER' instead of having to remember that our ID is 81:DGS1071. With suitable software on your computer, it is a simple matter to sign on, download your unread mail, exit, prepare replies as WP files off-line, sign-on again and send them, in the space of a few minutes, if you want to save money. There are also commands which enable you to see who else is on the system, and 'chat' to them, terminal-to-terminal, live. An additional facility enables you to send 'Express' E-MAIL messages, which always appear as the first item when your recipient reads his

or her mailbox. The system 'flags' you if an Express E-MAIL arrives while you are on-line, and it can even call your radiopaging 'bleeper' to warn you that an Express message has arrived, if you wish!

One benefit of the system is that you can send full upper- and lower-case characters in an E-MAIL (although you can't send graphics unless both sender and recipient have similar character sets) which is impossible with a telex. Plus you can send E-MAIL or telex messages yourself—useful if you use a bureau currently, or have highly technical messages to send—without having to transcribe them and hand them to the appropriate person in your company, or dictate them slowly and laboriously over the phone. In addition, there is no machine to leave on overnight to catch messages from other time-zones; you simply sign on when you wish and your messages will be there waiting for you. And as the ID relates to you, and not your location, you can send and receive messages and information from anywhere in the world: from home, from a hotel room, or from the office. The system is perfectly compatible with portables like the

Osborne or the NEC or TRS-80 briefcase portables—indeed the latter is one of the commonest machines used by bands and technical staff on the road.

Studio Sound has been on 'The System' since last September, and as the number of pro-audio users in the IMC group grows, we are receiving more and more letters, articles, press releases and comments via the system. A fair proportion of the contents of each issue is being received by this means, and the proportion is growing all the time. Several of our international contributors are on the system, and we are thus able to receive an article, correct it and check it with the author in a day or so, or even an afternoon, where before we had to wait for a week or so each way to get an article together via normal airmail, for example from the USA.

A growing number of pro-audio companies, such as Eventide, Sound Workshop, Marshall Electronics, Soundcraft, and Alice are on the system, and more are joining all the time, especially where there are international distributors or offices which need to be in touch with each other a great deal. The British APRS is also considering the system with a

view to linking member studios and international studio organisations. Indeed, it would be perfectly possible to arrange studio bookings on the system, and many existing users are bands, management, and record companies with whom a studio will normally deal.

With UK connect time running at 10.5p/min during the day, and 3.5p/min outside office hours, it makes a lot of sense for both E-MAIL and Telex, apart from the other facilities, and compares very favourably with international phone calls.

If you're interested in joining the IMC group, contact the following people in the first instance: Don Singleton, IMC, 96a Portland Road, London W11. Tel: 01-221 2749 or Chris Coffin, Technigroup, 16 Green Acre Lane, Northport, NY11768. Tel: (516) 261-5541, and you will be introduced to the system and placed in contact with your local IMC representative. (By all means mention *Studio Sound* when you get in touch!) Training on the system is free and IMC can also offer assistance in advising on suitable communications software and hardware for your computer system.

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The 200 is the first economical general-purpose digital reverberator designed for recording studios, musicians, film/video production houses, and broadcasters. Its versatility and high quality are matched only by its low price.

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60 Turner Street
 Waltham, MA 02154 USA
 (617) 891-6790
 Telex 923468

Export:
Gotham Export Corporation,
 New York, NY 10014

NEW PRODUCTS

NEW PRODUCTS

Ursa Major StarGate

Following on from the *8X32* and the *Space Station*, Ursa Major have announced their third product, the *StarGate 323* which is available from mid February. The *StarGate* is a stereo digital reverb at what Ursa Major refer to as 'an attractive price'. It has eight room simulations including tiny chambers, fast diffusing plates, concert halls and huge echoing spaces. The rooms can be modified by front panel controls to adjust decay time, pre-delay, and separate high and low frequency decay curves.

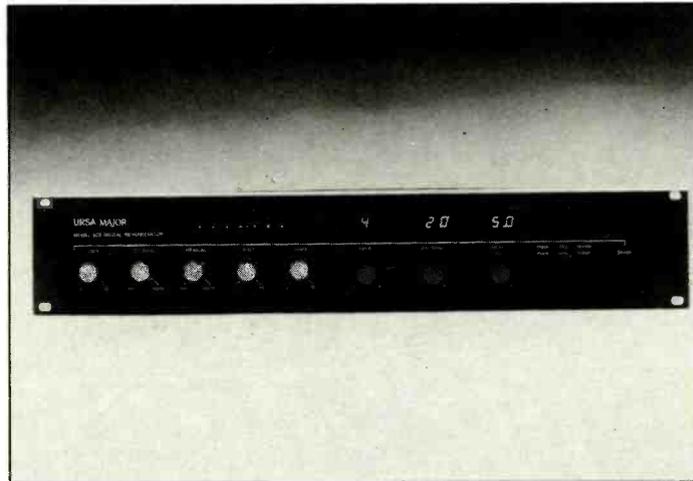
The unit has a 15 kHz bandwidth for all rooms and delay times and has a dynamic range of 80 dB. Operation is straightforward, claim Ursa

Major, with digital readouts of decay time, pre-delay and room. Pre-delay is available in 16 settings from 0 to 320 ms with eight choices of decay time from 0 to 10 s. Signal level is displayed by an 8-LED peak indicator.

Input mute, dry only and reverb clear may be remotely operated and the *StarGate* is fitted with balanced inputs and outputs. It is standard 19 in rack mounting and 3½ in high.

Ursa Major Inc, Box 18, Belmont, MA 02178, USA. Tel: (617) 489-0303. Telex: 921405.

UK: Feldon Audio Ltd, 126 Great Portland Street, London W1N 5PH. Tel: 01-580 4314. Telex: 28668.



Oberheim DMX updates

Oberheim Electronics have updated some of the features of the *DMX Programmable Digital Drum Machine*. This includes a new software release that allows for over 45 new features including 5000+ event internal programming capacity, 200 sequence patterns, 100 songs, programmable tempo displayed in frames per beat, song and sequence length displayed in real time, and a selective cassette interface for loading single sequences or songs from tape. There is also available a memory expansion update that is retrofittable.

All the voice cards in the *DMX* are changeable with any of the other *DMX* cards available. New optional percussion recordings include congas, timbales, cowbell/claves, a complete set of electronic drums as well as special sound effects.

The price of the *DMX* remains currently unchanged with the addition of the new software although the memory expansion is extra when retrofitted.

Oberheim Electronics Inc, 2250 S Barrington Avenue, Los Angeles, CA 90064, USA. Tel: (213) 473-6574.

Spectrum DELTA-G

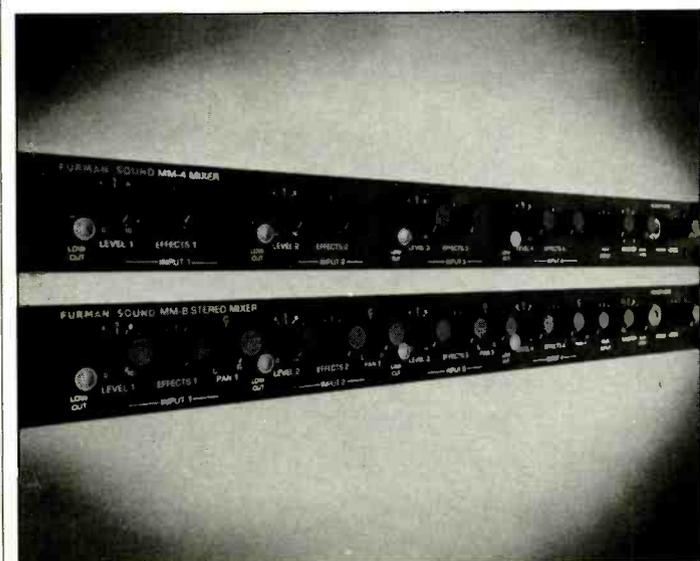
Spectrum Audio have announced details of a multichannel, radio controlled, software driven attenuator for use in live sound systems. Operation of the system can be either from a local keyboard or a remote controller enabling the sound engineer to balance a system from the optimum position and save the setting in the central processor's memory. The software allows the operator to select a variety of operational modes and make stored adjustments to the system settings.

A VDU displays current system status and operational

prompt information.

Included in the modes of operation are control of single channel; selected groups; total system; gain to preset level; minimum and maximum attenuation, etc. Suitable for permanent and temporary installation, *DELTA-G* is available in modules of eight channels to a maximum of 128 channels and there is a high degree of operational security with system access by code.

Spectrum Audio Ltd, Leeside Industrial Estate, Garman Road, London N17 0QP, UK. Tel: 01-801 7461/2.



Furman Sound MM-Series mixers

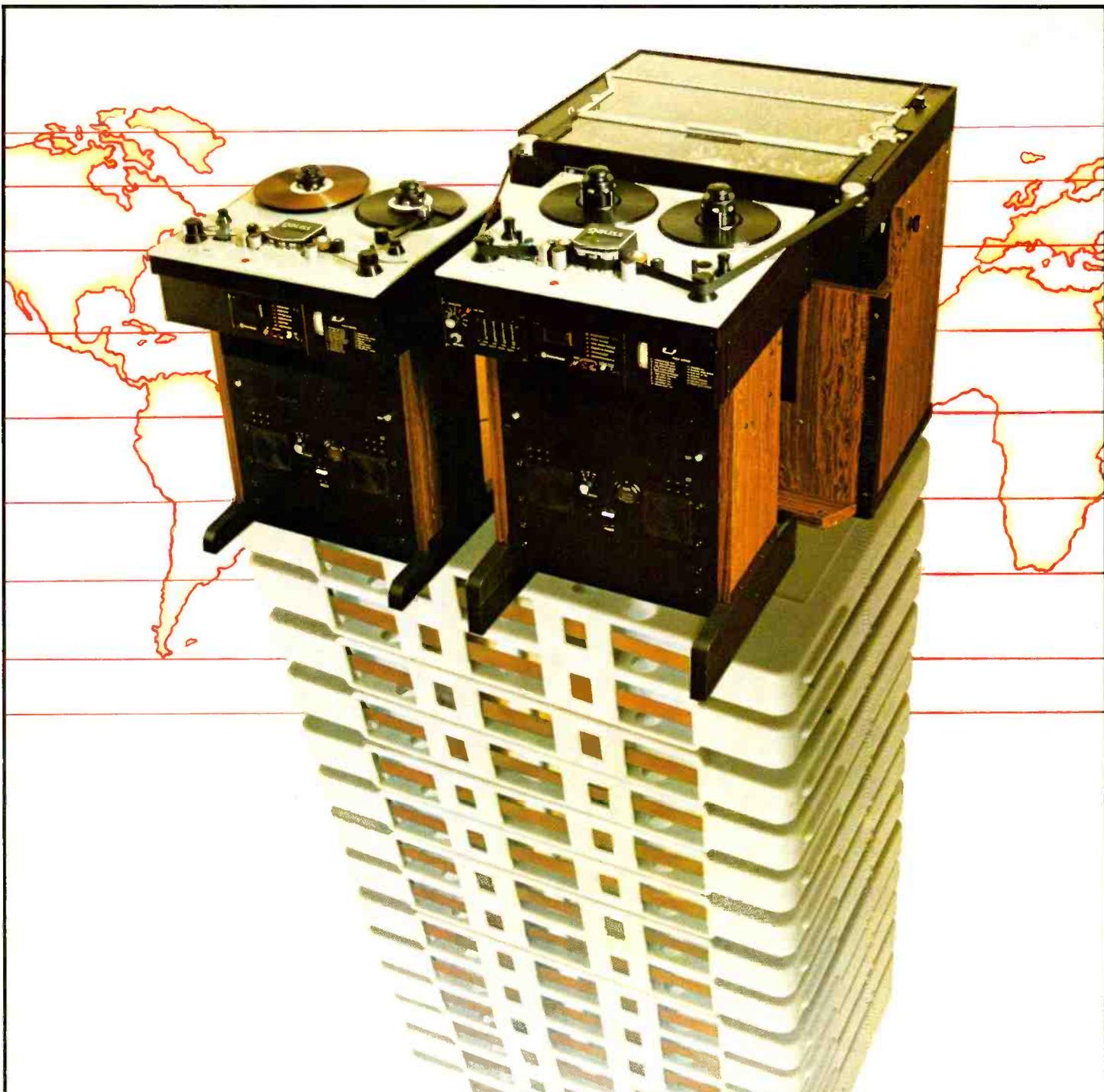
Furman have introduced the *MM-Series* of compact rack mount mixers, of which there are four versions currently available. These are the *MM-4* 4-input, mono output, high impedance inputs; *MM-4B* as the *MM-4* but with high and low balanced inputs; *MM-8* stereo version of the *MM-4*; and the *MM-8B* stereo version of *MM-4B*.

All models are single U high and 19 in rack width. Level controls are rotary and the input is capable of handling a wide range of input levels. Each channel also has an effects send and return loop which could also be used for deriving a secondary mix. Switchable low cut filters are fitted on each channel

giving 6 dB/octave below 100 Hz. All the models are equipped with headphone monitoring with a level control, a master output level control with overload LED, and an aux input with front panel level control. Other features include balanced and unbalanced outputs as standard, stereo models with pan pots on each input, phantom power option, and ground lift switch.

Furman have also recently added the *TX-5* stereo 4-way crossover system to their product range.

Furman Sound Inc, 30 Rich Street, Greenbae, CA 94904, USA. Tel: (415) 927-1225.



Gauss stands alone.

Among all the available high speed tape duplicating systems, one towers above the rest: the Gauss 2400. No other system in the world integrates the technological advancements, reliability and craftsmanship epitomized by the name Gauss.

The Series 2400 is quite simply the best Gauss ever built. Two on board micro-processors perform vital control functions and diagnostic capabilities. Three independently selectable equalizations allow duplication onto ferric, chromium, and metal particle tapes. Advanced state-of-the-art Dolby[®] HX Pro is available for further high-end enhancement.

Being a Gauss, the Series 2400 incorporates all the advanced features that set Gauss apart from the others. Our low noise electronics and extended frequency response are industry legend. The ultra-stable 10MHz bias that Gauss pioneered is still unmatched for improving high frequency quality. Three speed phase locked dual capstan servo system, true position sensing reel servo system, automatic tape packer arm—all are undeniably Gauss.

The Series 2400 is ruggedly constructed for years of dependable operation. Reliability is integral to Gauss design. That is

why many Gauss systems have over fifteen years of service to their credit, and are still in daily use, quietly duplicating miles of recorded programs.

Innovation. Reliability. Performance. This is Gauss. And this is why when the only choice is the best, the choice is the Series 2400. Built by Gauss.

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NEW PRODUCTS

NEW PRODUCTS

Capitol Apollo lacquer masters

Capitol Magnetic Products have recently introduced the *Apollo* lacquer master which they claim to be one of the most significant breakthroughs in the manufacture of masters. This has been achieved by research into the two most important components of the lacquer disc—the substrate and the lacquer formulation.

Aluminium substrates of a sufficiently high quality to be used for lacquer masters have apparently been in short supply in recent years. Aluminium blanks, although available from several sources, are usually not suitable for masters due to imperfections, rough surfaces and lack of flatness. Capitol decided to try to improve these less than perfect blanks. They used a micro-polishing process initially developed for computer hard discs which totally removes the top surfaces of the disc on both sides, eliminating all imperfections and apparently producing a substrate superior to those previously available.

Capitol R & D department also developed proprietary nitrocellulose lacquer formulations and set tight tolerances for the ingredients and the lacquer preparation. A great deal of care

and attention is then taken over cleaning of the substrate, coating, drying and visual inspection of every master. Samples from batches are tested in three separate laboratories using several different types of cutting equipment and when proved satisfactory, that batch is then released to inventory.

The benefits of the *Apollo* are claimed to be a reduction in the basic noise level of an unmodulated groove by up to 6 dB; virtual elimination of impulse noise; heavily modulated grooves are clean and well burnished with the lacquer being more resistant to groove greying, scoring or streaking; lacquer production control makes adjustment of stylus heating current unnecessary from lacquer to lacquer; lacquer formulation leads to improved silvering, smoother stampers with longer life and better pressings.

Capitol Magnetic Products, A Division of Capitol Records Inc, 6902 Sunset Boulevard, Los Angeles, CA 90028, USA. Tel: (213) 461-2701. Telex: 4720854.

UK: Thorn EMI Tape Ltd, Alma Road, Windsor, Berks SL4 3JA.



New version of Orban Stereo Synthesizer

Orban Associates have announced the availability of a new version of their established *245E Stereo Synthesizer*.

Designated the *245F*, the major areas of change are the addition of a balanced input, an output transformer option, RF filtering on audio inputs and outputs, and AC line filtering.

The price of the new model will remain the same.

Orban Associates Inc, 645 Bryant Street, San Francisco, CA 94107, USA. Tel: (415) 957-1067. Telex: 171480.

UK: Scenic Sounds Equipment Ltd, 97-99 Dean Street, London W1V 5RA. Tel: 01-734 2812. Telex: 27939.

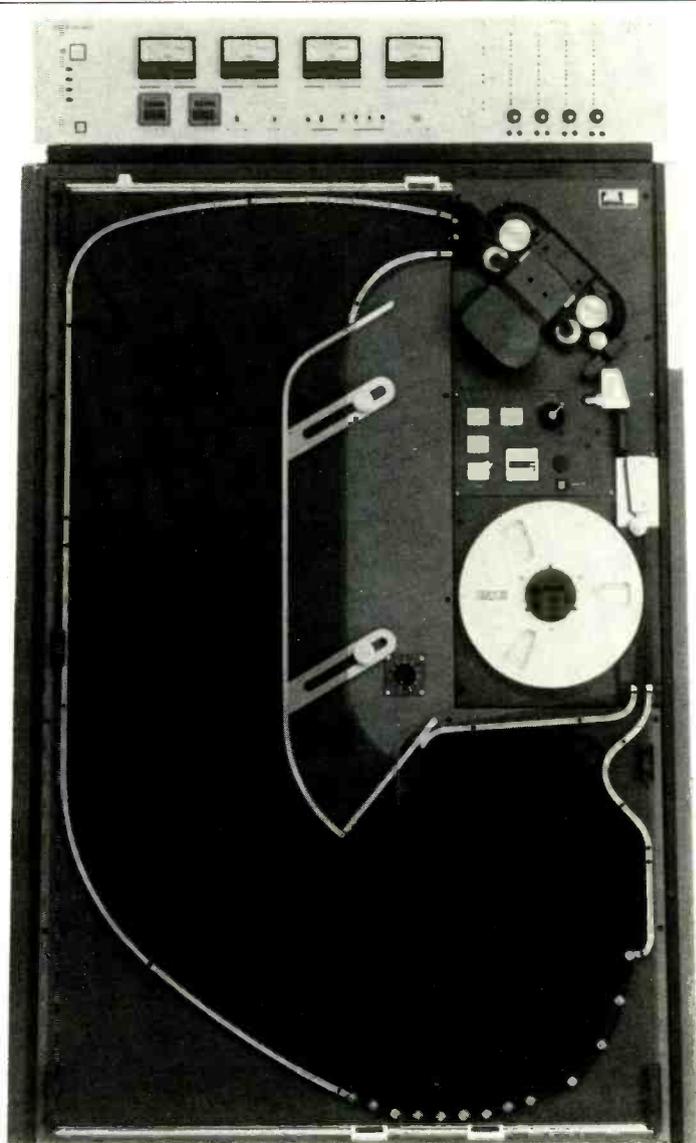
Options for BGW power amplifiers

The BGW Model *150* broadcast power amplifier is now available with electronic balanced inputs. This is a factory installed option incorporating an active electronic input assembly with *XLR* input connectors, RFI filter and active low noise differential input circuitry. The CMRR is > 75 dB at 100 Hz and > 65 dB at 20 kHz. The *150* with this option is known as the *150-01*.

The broadcast Model *75* is also now available with built-in bridging transformers and is referred to as the Model *75-01*.

BGW Systems Inc, 13130 South Yukon Avenue, Hawthorne, CA 90250, USA. Tel: (213) 973-8090.

UK: Court Acoustics (Sales) Ltd, 10-16 Mercer Street, London WC2. Tel: 01-240 3648.



New Otari high speed duplication

Otari have introduced a new high speed audio duplication system, the Model *DP80*. The major advance is that the system can accept 7½ in/s masters and operate at a duplication ratio of 64:1. This involves running at a staggering 480 in/s. Otari claim that this will be a major step forward in upgrading the quality of mass produced, pre-recorded music cassettes. The *DP80* system consists of a master reproducer and up to 20 slave recorders and features normal and chrome capability, dual capstan servo drive for reduced tape skew and wear, sendust ferrite heads and status monitoring. The systems were scheduled to be available from January 1984.

Also in the duplication line,

Otari have introduced the *MTR-10-4 LX*, a version of the *MTR-10* series designed for the low speed mastering of duplication masters. The *LX* uses a ½ in transport with speeds of 3¾, 7½, 15 in/s (a 30 in/s model to be available in the future) and three optional remote controls. It can also be equipped with Dolby *HX Pro* cards.

Otari Electric Co, Otari Building, 4-29-18 Minami, Ogikubo, Suginamiku, Tokyo.

UK: Otari Electric (UK) Ltd, Herschel Industrial Centre, 22 Church Street, Slough SL1 1TP. Tel: 0753 38261.

USA: Otari Corporation, 2 Davis Drive, Belmont, CA 94002. Tel: (415) 592-4890. □

AMEK M4000 film post-production console demonstrates our capability for one-off customer-specified design and manufacture. The version shown here, installed at Motionpicture Recording in Hollywood, U.S.A., is for 3-man operation and has advanced facilities. Some of the more notable of these include 2- and 3-channel stereo panning, with divergence, on every input; 4 band parametric equalization throughout; automated graphics; VCA-fader and mute automation with computer-controllable transfer keys; Foley capability; multi-format film sound monitoring for mono optical, 3- and 4-stripe, Dolby stereo, and other formats, as well as standard 24-track operation for video post production.

AMEK M4000 employs the same high standard of circuit design and mechanical construction used in our production consoles for multitrack recording, broadcasting and sound reinforcement. Few console manufacturers in the world have both the product range and in-depth custom experience we possess.

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U.S.A. sales and distribution:
AMEK CONSOLES Inc.,
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CA 91604, U.S.A.
Tel: (213) 508-9788
Telex: 662526

ADVANCES IN DIGITAL MICROPHONE TECHNOLOGY

The basic theory concerning the sensing of modulated space was conceived over a short period during studies in Paris on existentialism and effects of music on missing audiences.

Existing types of microphones, besides being analogue devices, all suffer from the insurmountable problem of requiring a medium transfer—a conversion of either pressure or velocity into physical movement of a finite substance. However light or small this diaphragm or ribbon may be, it still presents an impedance to the air movement, and therefore distorts the resultant electrical output.

Existentialism, besides being a philosophy dedicated to the non-meaning of life itself, offers insight into this type of infinitesimal thinking: if a basic problem exists that is caused by a specific physical requirement, then consider the total removal of that requirement.

When applied to microphones (as they used to be called), the subsequent development direction becomes obvious and, because of the advanced techniques necessary for the realisation of the project, the application of digital technology was a formality, and obvious.

The D-REC

The archaic term 'microphone' infers the aforementioned medium conversion and has about as much relevance to this device as the 'Phonograph' to the laser disc. The term 'D-REC' is an abbreviated form of Digital Receptor which is a more accurate description of the system.

The operation of the D-REC is based upon a little known property of the high intensity hologram; the property being that when a hologram is created in

Dr Stuart Arrowsmith describes an approach to digital microphone design using digitally sensed space modulation techniques

space, given certain rules concerning the spectra of the colours used, the visual density is proportional to velocity of sound passing through it.

This property, not surprisingly, has been overlooked as a useful function in the past, partly because of the velocity aspect (as opposed to pressure), and partly because of the extreme difficulty involved in making use of it at all.

The technology required to produce the necessary holograms has been with us for some years, as has the ability to create stable lasers of low dispersion. The realisation of the project demanded the combination of the two disciplines, together with the design of an ultra high speed analogue to digital converter operated directly by light.

The practical result is equipment capable of producing a multicoloured holographic sphere of 5 cm diameter, in free air in front of the sound source. Some distance from the hologram (the distance is not critical) a low power laser is fired at the hologram and penetrates through it and on to the digital receptor. A novel design of photo-receptor produces a voltage proportional to the laser intensity (which, in turn, is proportional to sound velocity), and this is digitised directly into a conventional 16 bit (24 bit overflow) code.

Highpass filtering takes place in the

receptor to avoid distortions created by low velocity air movement. Lowpass filters are conventional within the encoding process.

Performance

The system provides the first ever direct conversion of wide dynamic range sound into a digital form and as such, its performance is limited only by physical restraints of the medium (air), so the lower noise limit is a summation of Brownian movement within the laser path.

The dynamic performance is limited by the digital code which, practically, is approx 190 dB range (allowing for loss in the encoder).

Limitations

Although the sound source (performer) is no longer encumbered by any physical presence in the form of a microphone, practical problems can arise when an artist moves into the space occupied by the hologram. As well as a total loss of signal, there is some physical danger to the performer.

The control equipment necessary to maintain the stability of the system is somewhat cumbersome and requires a separate stabilised power supply of some 12.6 kW.

Developments

Research has been continuing into an integrated stereo and surround sound version of the system, however, the Government department from whom the development was being funded, are somewhat reticent to continue with it due to a recent reappraisal when it was realised that the system showed little promise as a practical defence system against ballistic missiles. □

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There are clever DDLs & clever pitch changers but none has survived and remained as popular as the DMX system. The completely modular nature has allowed optional hardware & software updating of these units for over 5 years now. Currently the DMX 15-80S, a programmable true stereo unit offering 18kHz bandwidth and 90dB dynamic range, can support up to 33 seconds of delay, two pitch changers and de-glitch module complete with the new digital sampling/editing LES software. And there is more to come. Box clever with clever A.M.S. Boxes.



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EXHIBITION PREVIEW

AES 75th CONVENTION PARIS

A

● **AEG-Telefunken:** the full range of products including the Telefunken analogue tape machines and the Mitsubishi digital systems marketed under the Telefunken name. ● **Agfa-Gevaert:** tape from their audio and video ranges. Featured will be the new *PEM 469* professional studio tape intended to meet multitrack requirements having high output at high and low frequencies and a low background noise level. ● **AKG:** full range of products including *The Tube* valve microphone. New items will include the *Ultra Linear Series* of microphones and a new shotgun microphone. ● **Allen & Heath Brenell:** wide range of consoles from compact transportable to full *Syncon* automatable systems. Also details of their multitrack tape machines. ● **Altec Lansing:** wide range of entertainment and studio speaker systems in addition to individual drivers and a range of other components. ● **Amcron/Crown:** full Amcron product line with featured item being the new *Delta Omega 2000* power amplifier that has been designed to help overcome problems caused by the interaction between the voice coil and power amplifier; and new additions to the PZM line together with accessories. ● **Amek Systems:** full range of Amek/TAC products including *M2500* console with DC subgrouping, VCA faders and Amek *Multimix* computer; Amek *Angela* console now available with add on automation; and the TAC *1682* system of PA and recording consoles. Featured will be the new TAC *Matchless*, a multi-purpose console with 24 buses and an in-line monitor section. The dual sub-group module also features a monitor enabling the console to also be configured in a split console format. ● **Ampex:** the full range of Ampex mastering tapes for audio and video applications. ● **ANT Nachrichtentechnik:** *telcom c4* systems, multiplex systems, telecommunications and radio link systems. ● **Advanced Music Systems (AMS):** full range including *DMX 15-80S* stereo digital delay line/pitch changer with de-glitch module and triggerable loop editing software, the *RMX 16* digital reverb with bar code reader and details of new reverb programs and *A/V SYNC* 3-channel digital delay for use with video synchronisers. There will also be

The 75th AES Convention will be held March 27 to 30 at the Palais des Congres (CIP), Place de la Porte de Maillot, Paris. As usual we present our preview of the exhibition and exhibitors with emphasis on the new products to be shown. This preview is based on information received at the time of going to press and so may be subject to change.

As usual, Studio Sound (and Broadcast Sound) will be exhibiting and our stand will be dedicated to celebrating the 25th Anniversary of Studio Sound. Editorial and advertising staff will be in attendance on the stand and around the convention.

information of latest software releases including the new long delays for the delay lines. ● **Appel:** no information received. ● **Applied Microsystems:** *Spin Time* real time tape timer, *CM50* autolocator and a new development in basic synchronisers. ● **APS:** no information received. ● **Asbel:** no information received. ● **Audio & Design:** full range of signal processing products including new additions to *Scamp* rack, *ProPak* and *AmPak* units, and the full Ambisonic Mastering System for Ambisonic mixing. ● **Audio Developments:** full range of products including the *AD049*, *AD160*, *AD145* and *AD062* small mixers. ● **Audio Kinetics:** the first operational showing of *MasterMix* console automation system and an automated post-production demonstration of the *Q-Lock 3.10C* time code synchroniser. The system will incorporate recent software additions including *Q.SOFT ADR* automatic dialogue replacement, *Q.SOFT SFX* sound effects assembly programs, a new control software option and the *Q.SOFT CONFORM* package. ● **Audiomatic/Electrosound:** the full Electrosound range of cassette duplication systems including the *Series 8000* and the *Series 2400*. Particular emphasis will be on the application of Dolby *HX-Pro* to the

duplication systems. ● **Auditronics:** a selection from their range of consoles and the programmable equaliser. ● **Auvis Asona:** wide range of cassette duplication equipment including master machines, loop bins, slaves, loaders and labellers.

B

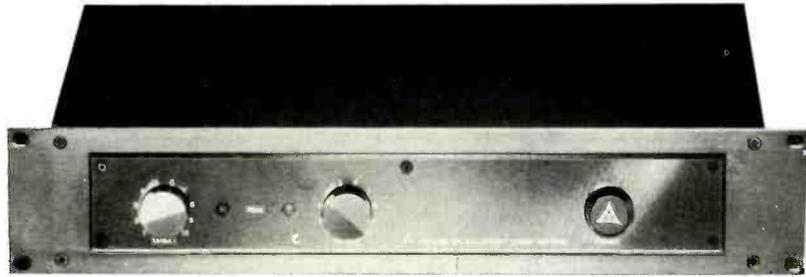
● **BASF:** full range of professional audio and video tapes, cassettes, magnetic film including calibration and test tapes. Also celebration of their 50th anniversary. ● **Bel Marketing:** complete range of Bel products including mixing console, noise reduction, flanger/decay lines and new *BD60* digital delay. ● **BES:** no information received. ● **Beyer:** full range of dynamic and condenser mics, headphones and large selection of accessories. ● **Bose:** full range of Bose products including the monitors, active equalisers, power amplifiers and accessories. ● **WH Brady:** range of splicing and sensing tapes for audio and video applications. ● **Brooke Siren Systems:** full range of crossover systems, DI boxes, hand held cable/phase checking equipment. ● **Bruel & Kjaer:** comprehensive range of audio test equipment and the more recent recording range of microphones. ● **Bryston:** range of power amplifiers including the addition of the *70 Series*—versions of the standard range being mono and 70 V line output. ● **BTX:** new *Softouch* synchronising system.

C

● **Cabasse:** no information received. ● **Calrec:** full range of microphones including the new *Soundfield IV*, broadcast production console and the new *M Series* mini mixer for rack mounting. ● **Cetec-Gauss:** range of studio monitors, individual drive units and tape duplication systems. ● **Clearcom:** intercom systems. ● **Collins (CAT):** automatic tape editing products in the form of the *CAT* and showing models with the most recent refinements to cutting angle/edge etc. ● **Comel:** disco/sound reinforcement equipment. ● **C-Tape Developments:** full range of flexible *C-ducer* strip contact transducers. Featured will be new *CX* system electronics and a wide range of specialist models.

EXHIBITION PREVIEW

FM 300A SE Thermo-module power amp



SSE HB3 enclosure

D

● **dbx**: full product line including noise reduction systems. *Series 700* digital processor, signal processor rack systems, compressor/limiters and details of a CPDM transcoder system allowing the *700 Series* to be standards converted to 16-bit PCM.

● **Dolby**: full range of noise reduction products for mastering, duplication use, multitrack applications, portable 2 channel system, cards for installation in VT machines.

● **D&R Elektronic**: range of consoles from small portable to large consoles including very wide range of signal processors, reverb units, noise reduction, rack effects system.

E

● **Eela**: full range of mixing consoles

including *S300* broadcast console, *S50* portable 4-channel stereo mixer, *S20* Reportophone and the *S3000* recording console. ● **Electro-Voice**: full range of microphones, studio and broadcast monitors and sound reinforcement products.

● **Elektroimpex**: *FIT-1C* modular automation ready console, *STM-610* tape machine, *SL-101* direct drive turntable and *PCP-101* commentator's desk. ● **EMT Franz**: full range of products including test equipment, signal processors, turntables, digital reverb units, reverb plates, and the *Digiphon EMT 450* digital disc recorder.

● **Enertec**: will be presenting full details on their current R&D work, namely digital consoles. On display will be certain elements of the system developed so far together with information about the basic design concepts such as the maximum flexibility for the user.

Also on show will be the ranges of *F462* and *F500* tape machines; *UPS 5000* and *UPS 6000* consoles; *Euro Standard* amplifiers; and *5000 Series* intercommunications system.

● **E2A**: no information received.

● **Eventide**: wide range of signal processing equipment including *SP2016* programmable effects processor, *H949 Harmonizer* and a range of delay lines including two broadcast models. ● **EXR**: range of psychoacoustic signal processors. Latest addition is the *Model IV* which has additional processing capability.

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EXHIBITION PREVIEW

F

- **Fairlight:** the *CFI* synthesiser system with latest software in demonstration room.
- **Ferrotronics:** no information received.
- **FM Acoustics:** the full range of power amplifiers for professional use. Including the new *FM 1000* amplifier capable of delivering a power output in excess of 1,000 W RMS, working into 1 Ω , discrete class A operation and full protection systems. Also on show will be the *FM 236* linear-phase electronic crossover.
- **Fostex:** full range of products from the personal multitrack systems, the *B16 1/2* in 16-track and a selection from the sound reinforcement and microphone products together with the ranges on ancilliary signal processors.
- **Freevox:** no information received.
- **Future Film Developments:** comprehensive variety of cables, cords, connectors, jackfields, wiring aids and associated components plus a wide range of audio accessories.

G

- **Genelec:** studio monitoring systems from compact units to large high powered studio monitors. On demonstration.
- **Giese:** no information received.
- **Girardin:** no information received.
- **Gotham Export:** wide range of products from Amber, Fabec, Lexicon, Switchcraft, Valley People, MRL and Quantum Audio. All equipment on display in a demonstration room.



Tandberg TD50

H

- **Harrison:** selection from their range of mixing consoles for recording, TV production, broadcast and live sound applications.
- **Heino Ilsemann:** *KZM3* automatic cassette loader, *ETK-1* and *ETK-1S* cassette labelling machines.
- **Heyna:** no information received.

I

- **ICM:** range of C-O cassettes, *DO-2000* dropout checker, *ICM 7804* automatic wind tester and cassette packaging and storage systems.
- **Illbruck:** acoustic foam tiles for sound absorption control.
- **ITC:** range of broadcast cartridge machines.

J

- **JBL:** selection from wide range of sound reinforcement products and studio monitor systems.
- **JVC:** the *Series 90* digital mastering and editing system with a selection of video equipment on demonstration.

K

- **King Instruments:** self-feed cassette loaders and various video tape loaders.
- **Klark Teknik:** the full range of *DN 300* series graphic equalisers, the *DN 700* low cost digital delays for sound reinforcement and broadcasting applications, the *DN50* dual spring reverb, *DN60* spectrum analyser, with *RT60* reverb analyser. This will also be the first showing of the *Digital Reverberation Room Simulator* with remote control, the *DN780*.
- **Klein + Hummel:** compact monitor systems.

L

- **Linn Products:** demonstrations of Linn products from disc mastering to turntables.
- **LPS:** no information received.
- **LTM:** no information received.
- **Lyrec:** *TR55 1/4* in tape machine, *TR532* multitrack with *ATC* control and high speed cassette duplication systems.

M

- **Martin Audio:** speaker systems for stage use.
- **Meyer Sound Labs:** full range of sound reinforcement systems and the *833* studio monitor.
- **Midas:** *PR System* of consoles for sound reinforcement applications, *TR Systems* modular theatre consoles, *Auditorium* console system.
- **Milab:** wide range of microphones from boundary types to multi pattern condensers.
- **Mondial Electronics:** range of broadcasting equipment for local radio applications.
- **Mosses & Mitchell:** range of high quality audio jacks and jackfields meeting BBC specifications. Audio products are now supplemented by video jackfields and to suit specific requirements, combined audio/video jackfields can be provided.
- **Musicbox:** no information received. ▷

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FOSTEX

EXHIBITION PREVIEW



Soundcraft Series 20

N

- **Nagra:** range of portable tape machines in a variety of configurations including the T-Audio twin capstan multi-format recorder.
- **Neumann:** selections from the very wide range of Neumann products including microphones, signal processors, disc cutting equipment, mixing consoles etc. Featured will be the automated EQ system.
- **Neve/3M:** Neve will be working with 3M France in a joint presentation featuring a working studio dedicated to recording and post production. The featured console will be the 8128 with *Formant Spectrum EQ* and *Necam*. In addition there will also be a 5322 broadcast console.
- **New England Digital:** the *Synclavier* digital synthesiser system with the most recent software releases and accessories.
- **Nexo:** no information received.
- **NTP:** comprehensive range of PPMs, equalisers phase meters, limiters and a compressor expander.

O

- **Optimix:** console automation system.
- **Ortiplas-Gema:** no information received.
- **Otari:** full range of products including *MTR-10*, *MTR12* and *MTR-90* ranges of tape machines, *MX5050* series of two, four and eight track recorders, new cassette mastering machines and new bulk high speed cassette duplication system *DP8000* using *Dolby HX* and 64:1 duplication ratio but with 7½ in/s master.

P

- **Penny & Giles:** wide range of faders and pots for audio applications.
- **Philips:** demonstration room display based around professional versions of the Compact Disc player together with related professional units.
- **Professional Recording Equipment:** the *Leevers-Rich* range of tape machines.
- **Publison:** range of signal processing equipment including the new

Infernal Machine 90 with its wide range of possible functions and a potential maximum delay time of five minutes.

- **Pyral:** range of audio tape products and disc lacquers.

Q

- **Quad/Eight:** range of modular mixing consoles, automation systems, digital reverbs and following their acquisition of Westrex, details of that company's products.
- **Quantec:** the *Quantec QRS* digital reverberation and sound processing system on demonstration.

R

- **Raindirk:** models from the large range of Raindirk consoles including ancillary units. Also details of the custom building services available.
- **Rebis:** full range of signal processing units, racking systems and details on the *Omega* console system.
- **Reditec/Neutrik:** wide range of audio products and the Neutrik range of audio connectors.
- **Regiscene:** no information received.
- **RTS:** full range of products including intercom systems, preamplifiers, IFB systems, phono pre-amps, monitor amplifiers, distribution amplifiers and mini mixers.
- **RTW:** wide range of bargraph meters and interface unit to allow interface of *PCM-F1* digital processor with full 16-bit *PCM-1610* Sony digital equipment.

S

- **SAJE:** range of recording consoles with a wide variety of application.
- **Saki Magnetics:** range of hot pressed glass bonded ferrite tape heads.
- **Sanyo:** no information received.
- **SATT:** *SAM82 8/2* portable mixer and *SAM42 4/2* compact mixer.
- **Schoeps:** the full range of Schoeps microphones and accessories.
- **SCV Audio:** wide range of signal processing products including noise gates, compressors and

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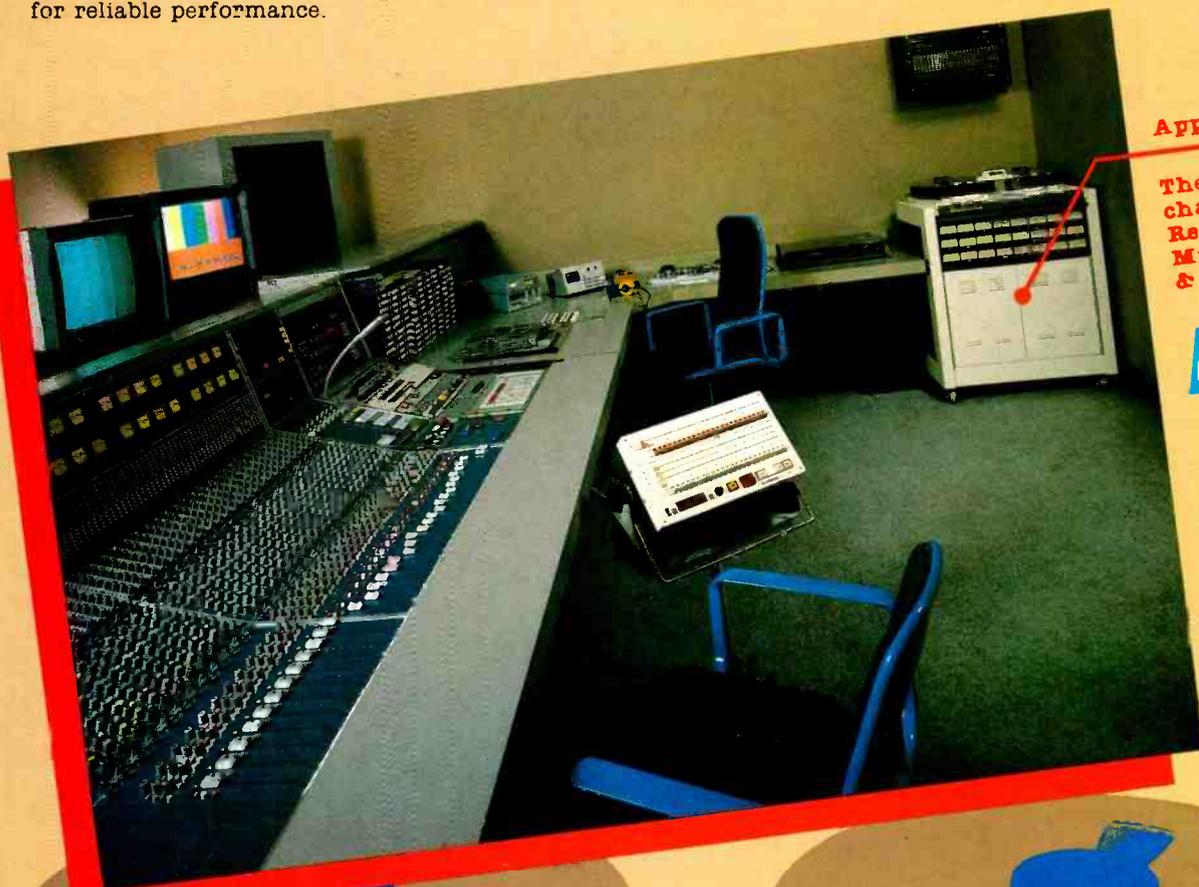
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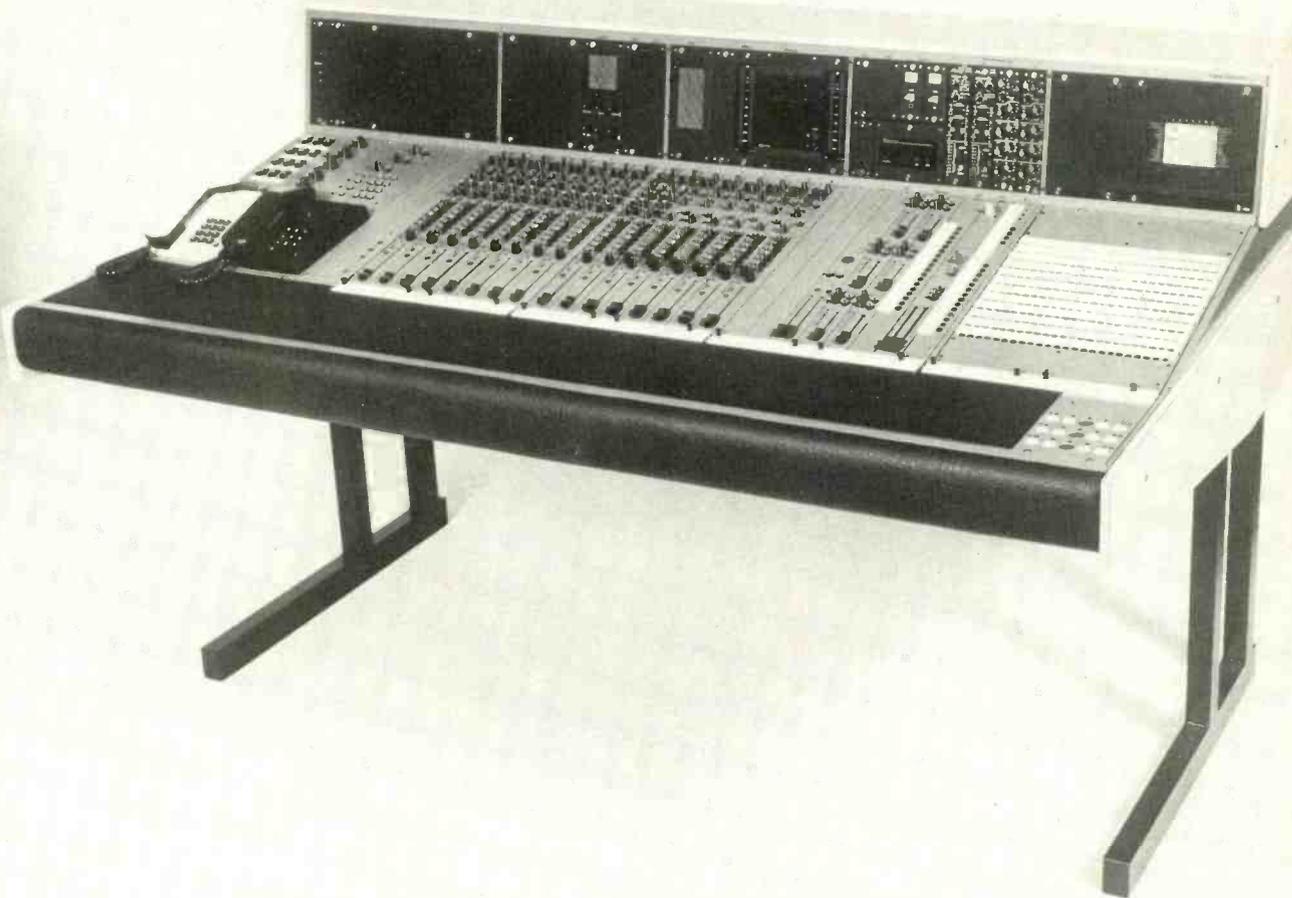
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EXHIBITION PREVIEW



Tore Seem SEECON broadcast orientated console

crossover units. ● **S Seidel:** no information received. ● **Sennheiser:** the full range of dynamic and condenser mics, radio mic systems, headphones and a wide range of accessories. ● **Shure:** the range of dynamic and condenser mics, phono cartridges, sound reinforcement products and accessories.

● **Sierra Hidley Design:** acoustic consultancy service. ● **Sigma Sound:** exhibiting for the first time at an AES. Offers turnkey service for design and construction of sound reinforcement systems. On demonstration will be latest enclosure system the compact *HB3*, bi-amplified full range enclosure. Designed to allow suspension simply use in multiples. Comes with a phase tracking crossover and response filter to correct system response. ● **Solid State Logic:** examples from the *SL-4000E* and *SL-6000E* console ranges with *Total Recall*, *Real Time* and *Events Controller*. ● **Sonosax:** the *SX-S* modular portable mixer will be demonstrated in its final version after its introduction last year. Also on show will be the *SX-B* small broadcast A/V type with VCA circuitry, and the *SX-A* light compact VCA mixer for fixed or mobile studio use, VPP, live sound etc. Shown for the first time will be a communications system developed for Swiss TV for internal control and intercommunication between studios.

● **Sony/MCI:** the MCI range of analogue consoles and tape machines, the Sony digital mastering system—*1610* and *DAE1100* editor, *PCM-3324* digital multitrack with new remote control unit, professional compact disc products and the full range of Sony mics, radio mics and accessory products.

● **Soundcraft:** an exhibition booth and a shared demonstration room. The full range of console and tape machine products will be on display with featured items being the new stereo mastering recorder *Series 20* with microprocessor control and preset adjustments possible in seconds; a new high speed cassette duplication system based on a modular expandable format; the new range of power amplifiers comprising four models from 450 W/channel to 75 W/channel, the new *TS 24* in-line console designed for easy in-line operation; the *Producer* packages of *Series 1600* console and *Series 760* multitrack and the full range of other consoles including the *Series 4*, *2400*, *800B*, *400B* and *200*.

● **Soundtracs:** full range of mixing consoles for multitrack, theatre, broadcast and video production use. Featured will be the *CM4400* capable of being expanded to 32/24/2 with 24 track monitoring. Uses digital routing system with system allowing the storage of up to 30 patches. An *RS232* port provides an interface with an external computer enabling information such as track sheets etc to be displayed. ● **Stanton Magnetics:** wide range of phono cartridges. ● **Stellavox:** range of portable tape machines and the multi-standard *TD88* tape machine.

● **Studer:** full range of tape machines, consoles and ancillary equipment including the *A810* range of mastering machines, the *900 Series* broadcast consoles, the new *TLS 4000* synchroniser etc. ● **Synton:** Syntovox *222* vocoder, Syntovox *221* effects vocoder, the *202* vocoder, Syntovox *232* 16-channel vocoder with voltage controlled filter bank, and flexible compact synthesiser.

T

● **Tandberg:** featured will be the new *TD 50 1/4* in 2-channel mastering recorders available in 3 main models—the *Studiomaster*, *Broadcast* machine and *Editing* machine. They feature microprocessor controlled transport, 3 speed, faderstart, RTZ and RTS and an *RS232* interface. Also on show will be a new series of professional cassette decks *TCD 900* series based on two versions—record and playback. ● **Tannoy:** full range of professional monitors for studio and broadcast applications. Tannoy are based in a demonstration room. Additionally there will be amplification from the Tresham division. ● **Tape Automation:** cassette duplication products. ● **Tapematic:** *TMD470/630* automatic cassette winder, *TMD 470* semi automatic winder; *TMD 530* cassette labelling machine and *TMD 670* cassette boxing machine. ● **TEAC/Tascam:** full range of Teac products including the *58* and *52* series of multitrack and stereo tape machines, the range of signal processor units, the *M50* console etc. ● **Technical Projects:** redesigned *MJS401D* test set, *Series 5000* stereo production console, *Multi-Pan* programmable multichannel memory panner, ancillary broadcast items. ● **Tekpa:** no information received. ● **Tektronics:** range of test equipment. ● **Thorn-EMI:** range of audio tape products and the new Appollo master lacquers. ● **TOA:** wide range of equipment largely intended for the live sound market including consoles, speaker systems, power amplifiers, microphones etc. ▷

EXHIBITION PREVIEW



Electronic analogue VU meters from Ernest Turner Instruments

- **Tonographie AB:** no information received.
- **Tore Seem:** featured will be the *SEEMIX* computer controlled console with system sizes up to 48 channels with digital faders. DC subgrouping is available and the console is prepared for automated mixdown. Also on show will be the *SEECON* for general broadcast applications based on the larger *SEEMIX* but without the automation. Finally the 3-channel *Pluto* mixer will also be shown.
- **Trident:** in addition to the established *Series 80*, *Series 70* and *Trimix* consoles, a completely new range is being shown. This is a range of simple to operate in-line consoles providing a wide range of facilities and the flexibility for 24-track operation. Features will include 8 aux sends, 4-band EQ with swept high pass filter, fader reverse and EQ assignable to monitor.
- **TTL:** no information received.
- **Turbo Sound:** full range of sound reinforcement products.
- **Ernest Turner:** examples from the wide range of VU and PPM meters and standard panel mounting electrical indication meters. Featured will be the recently launched range of twin PPM and single VU meters using CMOS circuitry and based on a gas plasma display to give clear flicker-free operation particularly under low lighting conditions.
- **Turnkey Two:** details of the company's consultancy, studio design and construction services.

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	1000W into 2, per channel
	600W into 4, per channel
	300W into 8, per channel
dx3000	3000W into 4, mono
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U

- **UREI:** wide range of signal processing units, sound reinforcement products, broadcast consoles, power amplifiers, studio monitor systems.
- **Ursa Major:** established products, the *Space Station* and the *8X32* digital reverb and featuring the new low cost *Star Gate* digital reverb.

V

- **VCL-Audio:** no information received.
- **Vitavox:** sound reinforcement systems and drive units with accessories.

W

- **Wandel & Goltermann:** no information received.
- **Woelke Magnetics:** range of multitrack record, play and erase heads, and cue track heads for 1/4in use. Also a range of test equipment.

X

- **Xedit:** range of tape editing blocks and test equipment.

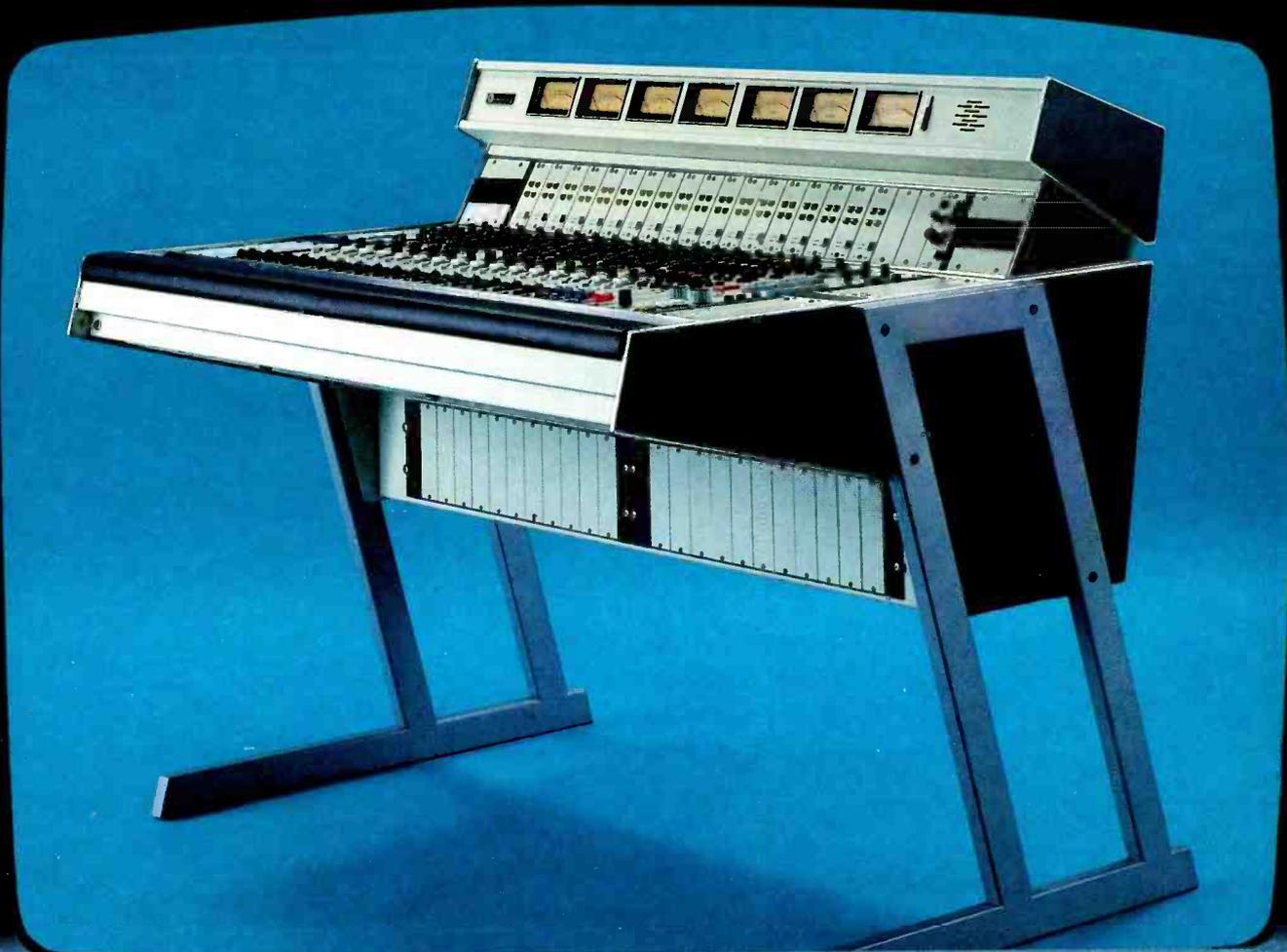
Y

- **Yamaha:** full range of Yamaha professional sound products.

Z

- **Zonal:** range of analogue tapes for analogue applications including *610* standard play and *611* long play, a new tape to add to the existing *675* and *676*. Tapes, cassette tape and magnetic film stock. □

CONRAC



High Definition Audio

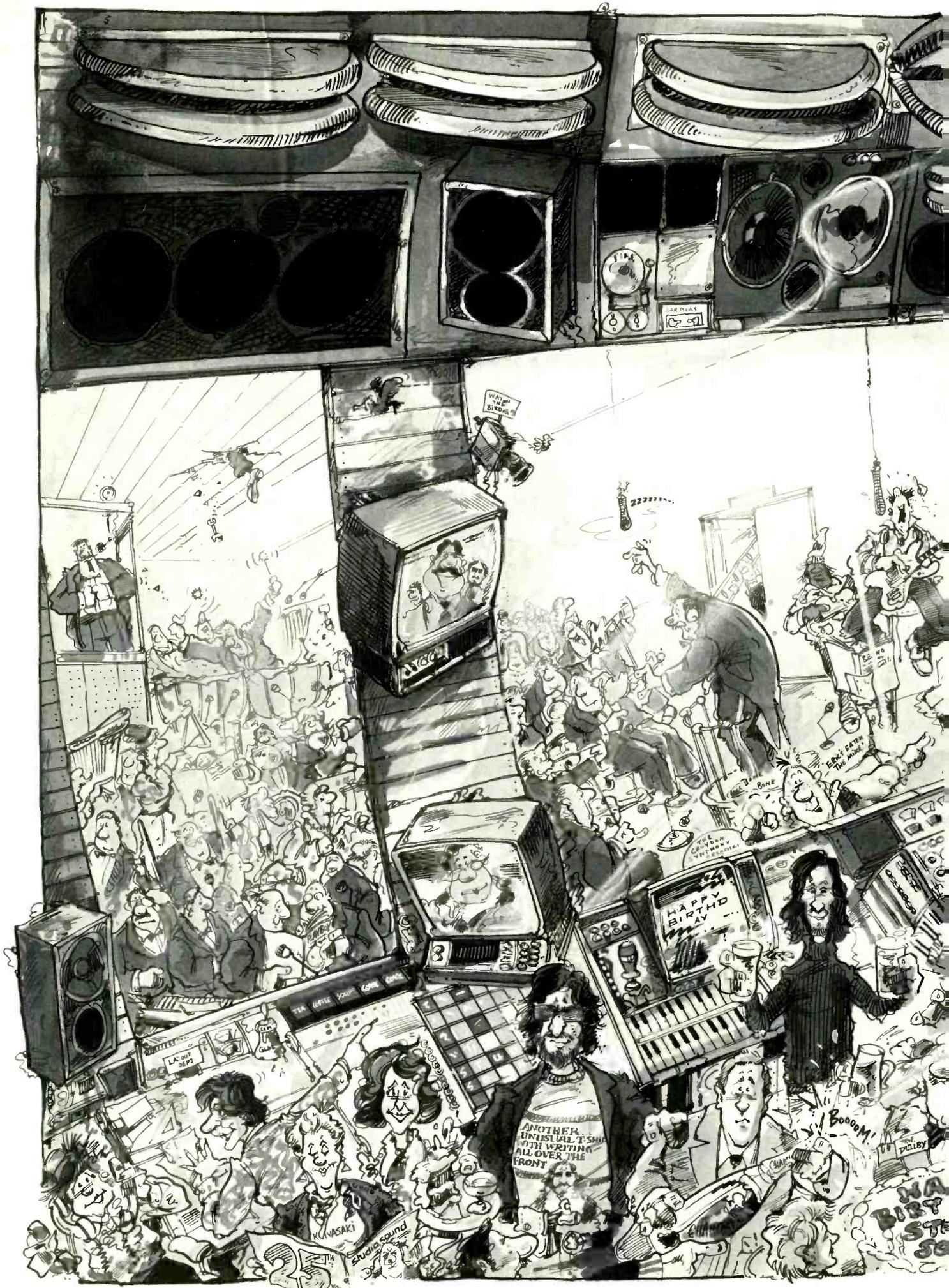
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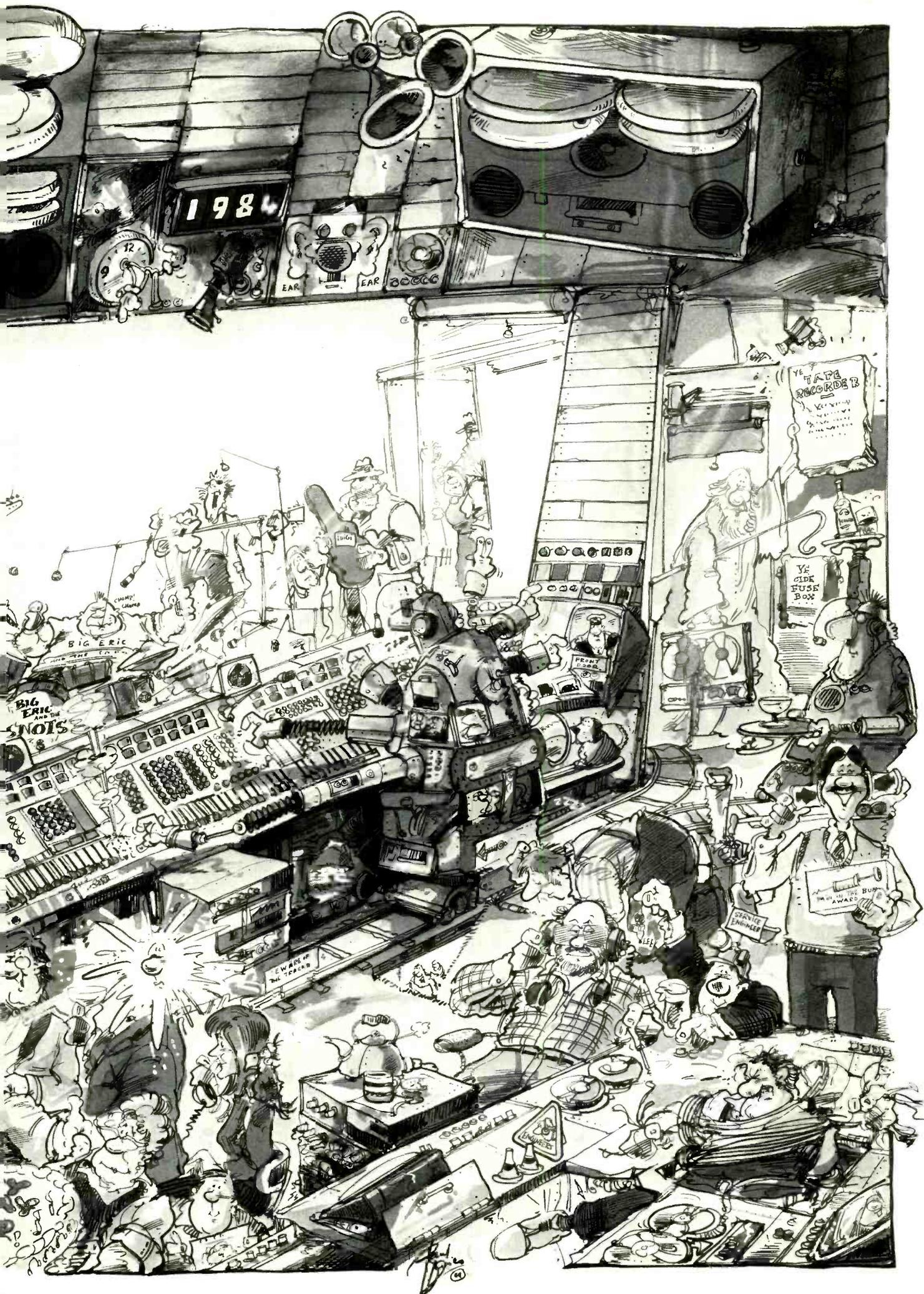
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TRILION

SOUND AND VISION

Trilion Sound Studios? Surely there's a contradiction in terms. We all know that Trilion was originally developed as the video leg of the Trident empire. So what's all the talk about sound studios?

Television sound is, and always has been, diabolical, to quote Trilion's studio manager Sheila Cane. The audio side of television broadcasting has always been sadly neglected, and indeed to this day, the only programmes which go out in stereo are music ones. Channel 4 managed a temporary breakout when they showed *Nicholas Nickleby*—the very first drama to be broadcast (simulcast) in stereo. Trilion was the company chosen to 'do the sound' and thus, having spent many months on location recording, they are now probably the UK's most 'stereo-experienced' television sound studio.

It is astonishing that the medium which reaches the largest capacity audience on the most regular basis can have been acting as if stereo was only invented yesterday. High quality sound should be important on television and it is with little surprise that you'll learn what is causing a great deal of the recent pressure for improvement in this area—bands and artists becoming increasingly involved in video production finding that the audio aspect is not taken seriously enough. Poor sound quality is all too obvious with

Janet Angus

musical material. Because of the video industry's bad sound reputation, bands have tended in recent years to take their video track back into the studio where they recorded their album, hire in the necessary equipment to mix audio to video and to do this as though they were mixing for their album. What is often overlooked, however, is that mixing to video, especially for broadcast is sometimes quite a different matter. And so what usually happens next is that the tapes then have to go into a video studio to be mixed again.

Having woken up to this fact there is now a new generation of video people coming round to the idea of putting a lot more time and effort into the sound themselves, thus cutting out the need for the sound mix to go elsewhere. This is what Trilion had in mind when they opened their 48-track capable studio last summer. It is very unusual for the video industry in many ways—its size, its facilities, its capabilities and most important, its attitude.

The studio to all intents and purposes is a fully professional audio studio with the added benefit of camera facilities, direct links to the Post Office Tower (enabling satellite transmissions to anywhere in the world) as well as tie lines to

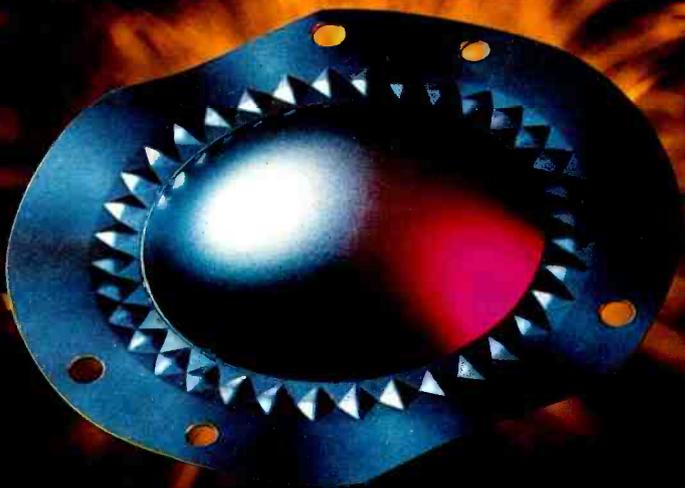
Trilion's editing suites and video studios. Built by Eastlake, with modifications stipulated by studio engineer David Woolley, it is equally capable of recording an album as remixing a live video. The studio personnel can also offer a very wide understanding of the whole audio/video industry—with David having previously been an engineer at Air London (and a Tonmeister graduate) and Sheila having been with Trilion for many years. Between them they have seen everything from both sides.

The three main criteria when making a live concert video are (a) is it exciting? (b) is it a true representation of what happened? and (c) is it fun to watch? These are the ultimate goals but getting there is not necessarily that simple. The most obvious thing to take into consideration is that when for example a person watches a band on stage, as his eyes come to rest on a particular player, his ears will automatically 'bring that particular instrument out in the mix' of sounds that he can hear. In this way a video must be mixed to match what the viewer's eyes are telling his ears to expect. Another very important aspect of live concert video is the reproduction of the atmosphere. It is all very well to get down some excellent tracks,

but the audience's excitement has also to be captured. This is usually done simply by adding applause and screams, etc, to the mix.

Where broadcast quality tapes are required there are more basic parameters to be observed. The sound has to be kept within strictly defined limits with no high peaks and conversely no too low dips in level, maintaining a more or less dynamically flat sound and yet *still* retaining the excitement of the live performance. These requirements are much tighter than those for disc cutting and only experience can teach you where exactly they lie. This is another reason why tapes out of a music studio usually need a bit of reworking.

Everybody knows that there is seldom a *true* live recording of anything. For a start, most live concerts will be edited simply to leave out the odd song which didn't happen to work that night, and an edited concert by definition cannot be a straight live recording. But the idea that most bands will go into the studio to mix the audio to a live performance recording, overdub practically everything apart from the audience, Trilion seems to put down to popular myth. There are naturally going to be bits and pieces where the musicians will say 'Oh I must do that again, that's terrible' but it apparently doesn't happen that much. The only other thing that



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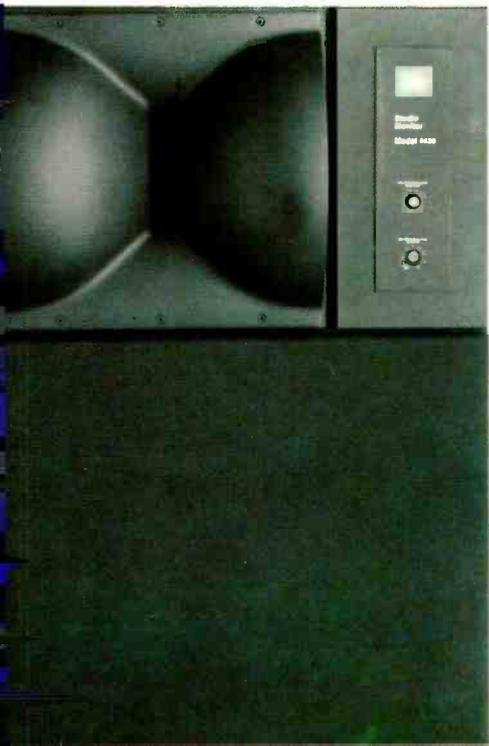
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TRILION



tends to happen to these tapes is simply a balancing of the tracks—if the vocals were drowned out at one point by the audience there is no need for this to happen on the final mixed track—there is no need to replicate live ‘excitement’ that closely.

The fact that the UK’s broadcasting companies have been so unprogressive in their attitude to broadcast TV sound has meant that the video companies with their broadcast-trained staff have also become very complacent in their own attitudes and years have continued to roll by without anybody really bothering to do anything about it. So what has brought about this new awareness?

Apart from the fact that bands and artists themselves are naturally very particular about their sound output, the imminent rebirth of cable television in this country and the birth of MTV in the United States has revolutionised (or is beginning to) the attitude of the video industry. The fact that some of the cable television channels in the US broadcast in stereo, as will some of our own, has made the BBC and the independents suddenly sit up and actually discuss the idea that maybe even they could consider it. Amazing. To this end, at the time of writing there are great debates

going on as to ‘should we or shouldn’t we?’. But how can they avoid it? It has to happen, and this is the time that companies like Trilion are preparing for. As it is, the vast majority of their work goes out to MTV and cable programmes abroad.

There is another aspect of video sound that is currently being examined. Whereas film soundtracks are nearly always recorded on separate machines, video soundtracks are often recorded with the picture and so the sound quality is often not that brilliant even by the time it arrives at the studio to be worked on. It would be much better if it was an original recording and now at long last the industry is moving towards the idea of recording a separate soundtrack.

What Trilion do is utilise a Studer *A810* ¼ in. with the centre track for the time-code. This means that you can take the sound off and work with it and then put it back on again. It also means that although by the time the film has been edited it may well be fifth or sixth generation tape, the soundtrack will still be first or second.

There can be no doubt that Trilion are taking this very seriously. The studio is a fair size and is equipped with what, even in the recording industry is considered to be fully professional gear. The desk is,

perhaps inevitably, a Trident *Series 80 32/24/24* with a producer’s table built on the end. They have two Studer *A80VU MkII* 24 track machines, 1 Studer *A810* ¼ in already mentioned and 2 Studer *B67* 2-track ¼ in machines all connected to a *Q-Lock 3.10* synchroniser.

The only obvious concession to video in the room are the three television monitors mounted above the separating studio glass doors. The monitor speakers were installed by Eastlake but received almost immediate treatment in that the White graphics were extracted and replaced with UREI crossovers, and JBL 15 in drivers and bullet tweeters were installed. David’s reasons were that he found the Eastlake sound to be “very tunnelled and it sort of came out and nearly knocked you over. What I think we’ve got now is a much sweeter, more open sound. We’re very pleased with it.” And if that doesn’t indicate where his heart is nothing will!

The control room itself is pretty standard Eastlake fare except that there was a good deal of discussion about the amount of space to be sacrificed to sound treatment and in fact a lot of it was snatched back, as it were. To the left of the desk was originally intended to be an alcove for the *A810* and *B67*s and they managed to extend this

to create a small isolation room for overdubs. They also managed to claim several sections of the metre thick back wall as rack space and cupboard space. “We’ve even got a sort of cloakroom there, not many studios have got that, have they?” Too true. There is a wooden plinth behind the desk and the area in front of it is wooden also, and so the room is quite a bit livelier than a ‘typical’ Eastlake control room.

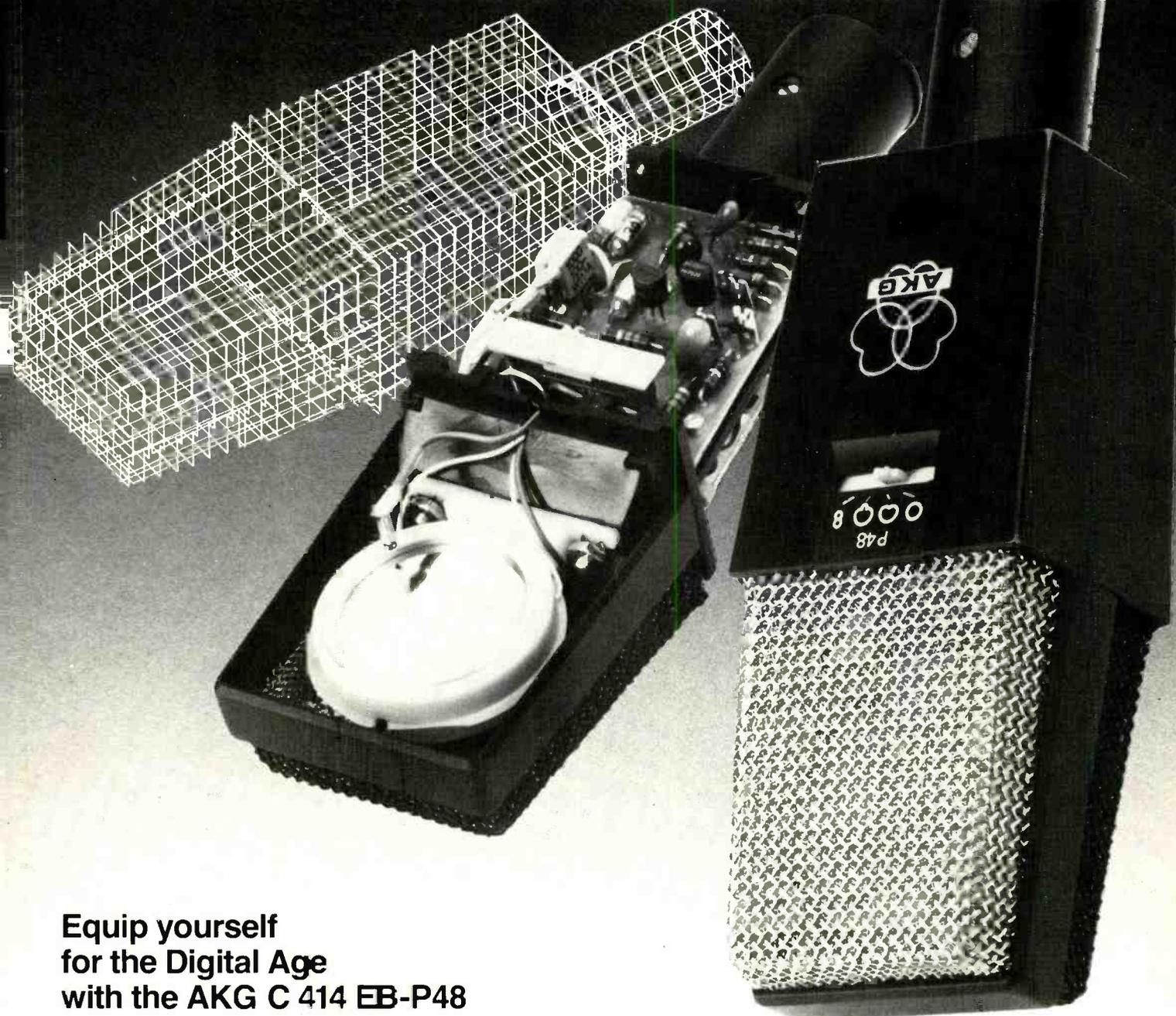
The ancillary equipment is quite extensive and provides them with the full capability of executing top quality original masters, be it for record or film. It consists of an *AMS RMX 16* digital reverb and *DMX* stereo digital delay line with loop editing and two pitch changers, a *Dyna-mite* stereo limiter/expander, two *Kepex II* noise gates, two UREI *1176LN* limiters, an Audio Developments *AD055* compressor/limiter, a *Bel BF20* stereo flanger, an *Eventide H949 Harmonizer*, two Trident stereo compressor/limiters and a Survival Projects stereo panner. There is a full complement of Dolbies—the first 24 being *SP* rack and the second 24 *TTM*. There is additionally a *Revox B791* record deck for utilising Trilion’s extensive sound effects library, three ITC cartridge machines and a JVC low band U-matic machine.

The recording area is L

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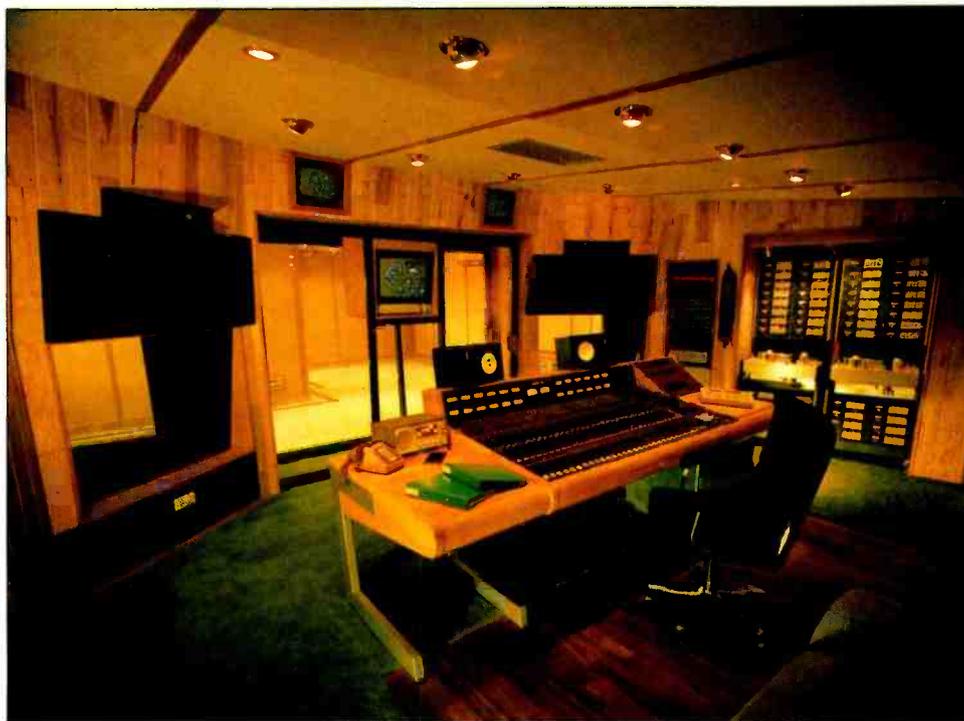
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TRILION



shaped—a fact that could not be avoided because the stairwell causing this shape could not very well be moved! Another enormous problem was the fact that the studio is directly below Trilion's car park, and before the rebuild, it was not unknown for the beautiful sounds of an articulated lorry revving up to come wafting through on to the tape! This meant that the ceiling had to come down considerably to accommodate the sound insulating treatment.

This room has two features which indicate its video potential: as well as the mic lines, there are also camera lines; and the concrete floor is covered in a linoleum paint which makes it absolutely smooth for cameras to roll about on in comfort. The room is thus inevitably quite live but there are pieces of carpeting which may be laid down to create the required ambience, or lack of it. Now the fact that cameras are very likely going to be shooting around the place means that ideally you don't really want people strewn all over the room trailing microphone leads in their wake. To this end the mic line wall boxes have been placed so that wherever you are standing you shouldn't be more than 6 ft away from one of them.

At the moment Trilion's work is fairly restricted, simply because there are not that many

outlets for it. On the other hand, nobody could deny that it is varied. On the day of my visit an Omani prince was doing a voiceover on a film being prepared for the Omani government! They have covered nearly all the recent major rock concerts; they have sent live interviews all over the world; they send Marquee Club gigs out live every Friday night to Swindon(?) cable; they cover the American Football for Channel 4 every week, not to mention all the commercials which come and go.

Just as a measure of the revolution's progress it is perhaps worth mentioning that the Big Country gig in Edinburgh on New Year's Eve was covered and two days were spent working on the film and three on the sound.

There is a more obvious, though just as important, consideration to be looked at when comparing this facility with the more usual video/audio studio. Since in a normal situation not a lot of time or trouble is taken over the sound, (a) the facilities need not be too extravagant, (b) you don't need a lot of room because you haven't got much gear and you won't be staying there more than a few hours anyway, and (c) because of the brevity of your stay it doesn't matter if you're not too comfortable and the atmosphere

isn't that great!

Atmosphere is a difficult thing, although being comfortable is a lot of it, but Sheila said something about the fact that the rest of the company "tends to indicate suits and ties, whereas down here in the basement we've tried to make it feel that you can do what you want and it's alright. It's much more relaxed and friendly down here."

"We wanted to make the studio feel just like a normal music studio so that bands coming here would actually turn round and say 'hey, we like it here, can we come back and do our album?'"

Anticipating an even greater workload than that already achieved, a second studio is under construction and by the time you read this it could well be in operation. Although Eastlake have again had a lot to do with it, this second studio will not be on quite such a grand scale. It is intended to offload the smaller bits and pieces of work that principally don't require so much room, into this 16-track facility. It will have a smaller control room and a slightly smaller overdubbing studio with facilities comparable to those in the main studio, although final decisions on the equipment had not been made.

Trilion are anticipating an enormous boom in the video and TV industries when cable

television proper comes to Britain later this year. There is great excitement at the prospect of feeding material into our own version of MTV. Not only will it have a great impact on video, but I suspect it will be a tremendous shock to the music industry as a whole. MTV in America has been breaking British bands like there is no tomorrow—giving them the kind of exposure they would never have dreamed possible. Says Sheila Cane "*The Tube* of course has been a great help here, but until our own version of MTV starts things won't really get moving." The BBC and ITV companies are rethinking their whole attitude towards their medium. It's a great time and one that will eventually affect every television owner in the country. And I suppose it is fair to say that we are going to need all the expertise we can get from companies like Trilion who have already gained valuable experience in high quality video audio.

The question now is really whether there are going to be more and more video/TV companies hurriedly upgrading their sound knowledge and equipment, or is it going to be the music recording industry which leaps in to approach it from their side. We won't have to wait long to see. □

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STUDIOFILE

STUDIOFILE

Some studios have the knack of being the image of their name and Toy Box Recording Studio, due to be renamed Chelsea, falls right into that category. Toy Box just seems to conjure up the image of something small and cosy and that is just what the studio is. However, for those familiar with London, and Chelsea flats, the new name carries on the studio's image to a 'T'.

Toy Box was first put together by country artist, Tom T Hall, with David Hieronymus and Chuck Haines in charge of engineering and running the place. Having less time for an active interest in the studio, Mr Hall has now leased the studio to Messrs Hieronymus and Haines, who are now fully responsible for its running. In order to clarify the change in direction, it was felt that a change of name was in order, hence Toy Box has now become Chelsea Recording Studio. Why Chelsea? "It just sounded like a nice name!" commented David.

The studio is situated in Brentwood, a quiet suburb of Nashville, on the first floor of a house with the imposing name of the Hallnote Music Building. Parking is the least of anyone's worries and access is by a straight flight of stairs up to a wide corridor. Not too bad for bringing equipment in though humping a B3 will cause you to sweat a little! The lounge has the usual drinks machine, coffee machine and cooking facilities should you wish to drum up a meal *in situ*.

No doubt certain readers will cringe when I say that the control room is nice and cosy, but if it is, how else do you want me to describe it? The layout is such that even though the room is fairly small, there is room to move about without falling over people or equipment and feeling cramped. Acoustic treatment is a mixture of rough wood panelling, moquette and hessian (fabric) covered absorption materials, with the surfaces arranged so that they oppose each other, ie: moquette opposite wood, cutting down on the risk of having the sound bounce around too much. The monitor bridge has also been 'fine-tuned' with a large piece of Fibreglass fixed over the wood between the speakers! A bit 'belt-and-braces', but if it works it can always be refined when time permits.

Work revolves around a Harrison MR3 console, 36 frame with 30 I/O channels, and a Studer A80 24-track machine. Two-track recorders are in no shortage, either, with the room possessing a Studer A80/RC master recorder,

Toy Box/Chelsea Recording Studio, Tennessee



David Hieronymus at Console (top) and studio (below)

Revox PR99, 3M master recorder and a Scully. Tape echo is no problem here! Cassette copies are available from a Sony deck.

Monitoring is provided by bi-amplified JBL 4331s installed in a monitor bridge with near-field monitors in the form of JBL 4411s and a pair of Auratones. Power amplifiers for studio and control room are Crown (Amcron) with the exception of McIntosh's for the bass end. Room equalisation is by White.

Whereas the amount of outboard equipment is not impressive at the moment (a shopping list is in the process of being prepared) there is enough to get most sounds that are required without racks cluttering the place up. Processors currently available are UREI 1176 and LA-3A compressors, Eventide Instant Flanger, Orban parametric EQ and a Rebis module rack with compressors, ADT and de-esser units. Reverberation and echo effects are taken care of with a Lexicon 224, Lawson plate and AKG BX20. The latter really has

that genuine 'bathroom sound'—that's where it is installed!

The song that was being worked on at the time of my visit was for one of the local colleges, with rock rhythm section, reeds and brass. The sound was very clear and punchy—enough wallop in it to make it come over but retaining some air so that no one was fighting to get through.

Access to the studio is just a couple of paces down the corridor and there again we find the same basic acoustic as in the control room, viz: wood panelling and hessian-covered absorbent areas. Apart from a rectangle of parquet in front of the control room windows, the floor is carpeted. The feel of the studio is quite subdued, rather like a drawing room or salon, making for good separation without everyone being 'boxed in'. However, mobile screens are around for those occasions when leakage is a problem.

Instruments in the studio include

a Yamaha grand piano, which is pushed against a wall and surrounded on two sides by waist high screens, Hammond M3 organ with Leslie, Wurliitzer electric piano, Clavinet and vibes. Amplifiers include that old favourite for bass, the Ampeg B15, with Fender Twins for guitars, etc.

In addition to the main studio there are two isolation booths, one mainly for vocal or single instrument use and fairly dead, and a drum booth that houses a Premier kit with a Rogers metal snare drum. The drum booth has a lively response which can be damped down if necessary with carpets and drapes. For those times when a more lively sound is required in the studio, no need to tweak the EQ, or echo send; just place the source (human or otherwise) on the parquet floor in front of the windows. There is a definite presence rise there that gives just that bit of extra 'sparkle'.

Monitoring in the studio is by headphones fed through cue-boxes, giving the musicians a degree of control over their mix and level—after all, if your neighbour wants to deafen himself that's his problem, it shouldn't be yours! Additional cueing can be given by inset JBL 4331s over the control room windows.

Incidentally, visual contact between the two rooms is very good, always a bonus to keep things running smoothly.

Lighting in the studio consists of spots mounted on rails so that they can be positioned to suit. The appropriate atmosphere can be created by means of a dimmer panel that is also in the room. This way there is no need to bother the engineer and you can regulate it just how you like it.

Microphones available are mainly from Neumann, Shure and Sennheiser, though David did say that they are planning to widen the selection.

As well as Tom T Hall, the studio also records Tom Gribbin and the Saltwater band plus a whole host of local bands and groups. In order to get a good professional recording it is not always necessary to go to megabuck studios—Chelsea will give you just that without it costing an arm and a leg.

Thanks are due to David Hieronymus—and his clients—for having me in during his session and still finding time to have a chat!

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STUDIOFILE

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There's a unique combination of factors that make Vancouver, British Columbia, a very special city—and that help to promote a thriving audio and video scene there. First, it is snuggled precariously between breathtaking mountains and the sea, giving it an uncommon beauty, and some mighty nice weather. Second, it is Canadian, and reflects that country's predilection for cleanliness and order, and its concern for its urban citizenry. And it is an important city to Canadians—the next largest city in the country, Toronto, is 2,900 miles away. It is a major Pacific seaport, and so its population and economy show a diversity only equalled in the Western hemisphere, perhaps, by New York. Finally, it is most decidedly West Coast—and reflects many of the attitudes that characterize the neighbouring states to the south.

In a way, all of this contributes to the success of the Little Mountain Sound Studios, a four-room audio complex located five minutes from downtown Vancouver. The name itself is a bit ironic: the Mountain referred to, at the base of which the studio stands, is but a minor lump on the landscape—even if it is the highest point within Vancouver proper.

But there's nothing puny about the studio. In a city whose music, film and video scenes have been growing rapidly for the past seven years or so, Little Mountain is one of the premier audio facilities, with two world-class 24-track music rooms, an 8-track production studio, and a dubbing suite, all of which turn out records for major labels (CBS, A&M, Solid Gold, and Warner Bros. to name a few) and tracks for audio/visual shows, industrial and feature films, and advertising work.

The studio's activities are international in scope. Many clients are attracted from Toronto and Los Angeles (only a two-hour plane ride away), and they come to enjoy the scenery, or to take advantage of the 20% premium on US dollars, but most of all, according to chief engineer and operations manager Roger Monk, "Because we do good work."

Monk came to Little Mountain from Buckinghamshire, England, by way of Toronto, in 1976. "The studio's been here about 10 years," he says. "It was originally built by Griffiths Gibson, a jingle house. They started with just half of the building, what is now Studio A, as a 16-track, and the rest was a warehouse. After a time, they started getting very busy, and built Studio B, another 16-track room, and Studio C, and 8-track production facility."

With all the money this

Little Mountain Sound Studios, Vancouver



8-track Production Studio and (below) Control Room A

expansion required, the agency found it necessary to bring in a partner, and so a half interest was sold to Western Broadcasting, one of the province's largest media conglomerates. In 1979, Western took over the rest of the shares, and then in March, 1983, general manager Bob Brooks, who came on staff at the same time as Monk, bought the place himself.

"Griffiths Gibson is still in the offices upstairs, and they are still our biggest client on a ongoing basis," says Monk. "They won't use any other studio in town—I can think of only two occasions where they went somewhere else, and those were when you couldn't get time here for begging. We give them a lot of work too—they have arrangers and composers on staff, and when we have a project that needs orchestration or whatever, we get them in. Although we are distinct companies, there's a lot of holding hands. Some of the people who were involved in Little Mountain

at the beginning are still there."

Today the two music studios sport Studer *A80 Mk III* 24-track tape decks and Neve 24-input mixing consoles—although this is about to change, as I'll explain in a moment. There are Scully *280* and Studer *A80* stereo decks, including a half-inch Studer. In the production studio is an MCI 8-track hooked into a 16-input Neve, and in the dubbing room are Scully and Revox tape decks and Hitachi and Pioneer cassette machines.

The two main studios have individual lobby entrances as well as their own lounge areas, which are situated between the control rooms for added isolation. The two control rooms are virtually identical. "A client might come in and record basics in B and do horn overdubs in A, but control room-wise he feels comfortable in both," says Monk.

Monitors are UREI *813s*, changed a few years back from JBL *4350s*, powered by Studer

amps. Except for the equipment updates, the rooms are essentially the same as when they were first built. "There's no mysterious magic behind the concept," says Monk.

The studios themselves, however, do differ. Monk explains, "We didn't want to build two studios with the same feeling." Although both boast 22-foot ceilings, Studio A is larger: it measures 55 × 38 ft and Monk claims that sessions have used as many as 88 musicians. The front of the room is carpeted, while the rear has harder surfaces, and a curtain can be drawn to divide the space in half. Studio B, 37 × 38 ft, is more live—"It's designed for the contemporary rock sound," says Monk. Both rooms have separate 11 × 17 ft isolation rooms with 12 ft ceilings, which have different acoustics—the B iso room is all rock and mirrors.

An extensive network of tie lines connects the rooms, which are used on those rare occasions when two 24-track tape decks are hooked together. "We don't advertise that we can do that," says Monk, "but we can as a last resort if a client really wants it."

There is a large collection of outboard equipment, gathered over the years, which floats between rooms. And that can sometimes be a problem—a point brought home as Monk takes a phone call during our visit, and discusses where to find a second pair of Trident equalisers, because it seems two clients want to use the single in-house set at the same time. "If we want to buy an \$8,000 digital delay, we have to buy two," he says.

Fortunately, there are two EMT *140* plates and two *240* gold-foil reverbs in house, as well as an AKG *BX-20* and a Lexicon *224X*. There are 44 channels of Dolby altogether, as well as dynamic processors by UREI, Altec, RCA, Orban, and Valley People; delays and phasers by Marshall, Loft, UREI, Countryman, and Eventide; both the *H910* and *1745M/3 Harmonizers* from Eventide; and equalisers by Trident and Orban, as well as some new models from GML that Monk is particularly enthusiastic about. No room EQ is used.

Instruments include Baldwin 9 ft and Howard 6 ft grand pianos; Rhodes, Hammond, Hohner, Moog and Solina electric keyboards; and a large assortment of guitars, basses, amplifiers and drums.

"Being a relatively new studio, old tube mics are basically unavailable to us," says Monk, and yet the microphone closet boasts a vintage Neumann *U47*, as well as *U87s*, *KM86s* and *KM84s*.

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STUDIO FILE

STUDIO FILE

Little Mountain, cont'd

video at Little Mountain, one which started a bit unexpectedly. "Video came along to us a little earlier than we had planned to put it in," says Monk. "It was a client request—we got a big gig in and had to put the necessary equipment together. Since then we've learned a lot from it, and modified its usage quite a lot." Already on hand is a JVC 8300 U-Matic deck, with Sony monitors, a SMPTE reader/generator and a BTX Shadow controller.

But things are about to change at the studio. The biggest changes will involve the Neve consoles, which have been in place since the 16-track days—although, as Monk says, "they have such an incredible sound, we have to think twice before throwing them out." As I write, the board in Studio A

is being chopped up and several of its input modules attached to the board in Studio B. Studio A is getting a brand-new Solid State Logic system. Only the second SSL in Canada—and the first on the west coast—it should be installed by the time you read this. Says Monk, "Until relatively recently, we didn't feel that automation had got up to the point where we wanted to put those sort of dollars in. But the SSL is the state of the art. Some of our engineers have worked on them, and we feel that's the way to go."

At the same time, the video equipment is being dramatically upgraded. After the SSL is installed, the 3/4 in video gear will go into production Studio C, while Studio A will get a new Q-Lock interlock system and a 1 in video deck, as well as multitrack 35 mm mag dubbers. "We'll be able to do

a lot of pre-laying and pre-organisation in Studio C, with our 'off-line' system," says Monk. "The rate in studio A is going up to \$200 an hour for the whole kit and kaboodle, and that's a fairly expensive way of doing it. So we'll only use the big room for master assembling and mixing.

"We're interested strictly in audio sweetening—we're not getting into video production *per se*—but we want to be able to go direct-to-1 in layback. We'll be able to take sync sound that the client provides, lay it on to multitrack for sweetening, and lay it back onto 35 mm. We're planning to get more versatile and flexible. We're going after the total post-audio process. As far as I know we're the only people in Vancouver doing audio for video at this level."

Fancy new equipment isn't all

that keeps Little Mountain Sound running at a high level. There's a full kitchen on the premises, and "meals are thrown in the deals." There are video games, pinball machines, and few VCRs with a well stocked film library. Most importantly, amidst the chaos that is inevitable in a four-room complex that divides its time about equally between record and advertising work, there's a sense of professionalism that comes from Monk and the rest of the 16 staff members—which promises to help Little Mountain Sound, and all of Vancouver, become an even more important force in the world of audio recording. **Paul D Lehrman**

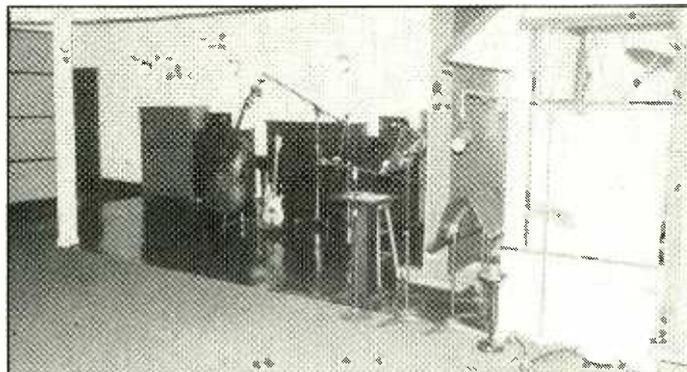
The Little Mountain Sound Studios, 201 West 7th Avenue, Vancouver, BC, Canada. Tel: (604) 873-4711.

OK rock'n'roll fans, what three things do Buddy Holly, Ritchie Valens and the Big Bopper have in common? All three were rock stars in the '50s? Correct. They were all killed in the same plane crash on February 3rd, 1959? Right! Uuuuummm? The same year a 'tribute' record was released called *The Three Stars* by Tommy Donaldson, which was also quite a success. "So what?" I hear you ask. Well, Tommy Donaldson is alive and well in Nashville and is also the boss of Roxy Recording Theatre and Studio. Formerly used for in-house productions, the studios are now officially open to the musical fraternity at large and if you are looking for something slightly different, this may be the place to come to.

Roxy is situated in a quiet residential area just out of downtown Nashville in a building complex that once housed a cinema (or movie theatre), shops and stores and warehouse space. In fact, space is the one thing that Roxy is not short of and a long-term development programme is in hand to build an integrated audio-visual facility. For the present, Roxy consists of control room A with the old theatre being used as studio A and studio AA, which is the more conventional control room/studio layout.

For many engineers, walking into control room A would probably cause an instant, heavy whiff of nostalgia as they see a whole collection of Ampex 350 series tape machines. In fact there are seven of them, two mono, two 2-track, one 3-track and one 8-track. As if this is not enough, there are two large Neumann consoles, a selection of fairly early JBL 4331 monitors and a whole rack of McIntosh valve (tube)

Roxy Recording Theatre and Studio, Nashville



Studio AA and (below) Control Room AA

power amps. And what is more, it all works perfectly!

Once you have dried your eyes, the other side of the glass reveals the theatre where one can really record in a 'live' situation. Even the seats are in place and waiting for an audience of about 160 people. The stage, with a lower front stage and main stage, has enough room for about four or five

musicians, depending on the amount of equipment being used. There is quite a sizeable floor area each side of the stage which is at present occupied by two rostrums carrying an upright piano and Wurlitzer (what else in a theatre?) organ and no doubt these could be moved if the need arose. The sound is as one might expect, that of a small hall but nice and bright

and, more importantly, free from slap or flutter echoes. The high ceiling adds to the airy feel of the theatre and it does mean that one can go for a good 'onstage' sound with lots of ambience without acoustic nasties messing things up. Because of this, the theatre has already become a favourite among some rock bands because of the sound they can get here.

Moving back into the control room, the two Neumann 24/8 consoles are basically identical except for the fact that one has been modified to be also 24-out so that it can be patched through to studio AA for 24-track recording. The two desks feature built-in compressor limiters and extra equaliser modules that can be patched in for further flexibility and the overall sound quality is first class, more than making up for the slight inconvenience of their size. Tommy Donaldson gives us the reason behind working with rather elderly equipment.

"It works fine and sounds good: customers like it. Also, we are one of the few studios here that can play back the old tapes properly, especially the mono and 3-track tapes. This is important for the constitution of archives and transfers, especially with the long established artists."

He also told me that they had a lot of vintage recording equipment locked away in the basement and that a future plan is to make a recording museum, much along the lines of the Country Music Hall of Fame, that will outline the recording history of country music. To this end, the equipment is very carefully maintained to be always in peak operating condition.

Control room A is scheduled to be upgraded to 24-track in the

Hi Tech — Today's issues

Spring 1984

For high technology the honeymoon is over. No longer does the equipment user automatically assume that a microprocessor controlled widget must automatically be a better and more useful widget simply because of its technology. Technical innovation is our servant and cannot call the tune itself, though the wrong product design can leave the user wondering just whether it is man or machine who is in charge.

It is when technical invention is combined with full awareness of user needs that the very best products are created. In this "High Technology" edition of *Neve Today* we have included key examples of Neve Technology specifically designed to make the user's job quicker, easier and more effective.

The Audio Balance Engineer has a highly demanding task. Whether in recording, radio or television, he is in charge of the main information flow. One mistake on a live broadcast can frustrate millions of listeners, whilst a blunder in recording means an exasperated producer and angry superstars.

Today, Digital Control Technology is available to remove many of the routine stresses from the sound operator's job. A key note is perfect memory, looking after those parts which the operator has already perfected, leaving freedom to concentrate only on the most difficult bits. Creativity thus thrives better.

The applications of Neve technology shown here range from the time-saving

assignable memorised signal routing in the 8128 console through to the world-beating all-digital DSP.

Did you know that in the 3000 system, Neve offers the most advanced programmable intercom talkback system?

Of all demanding studio tasks, post-production and multitrack mixdown must rate as the one immediately benefitting most from microcomputer assistance. Following in the established reputation of Necam II, Necam 96 now employs all-microprocessor technology with a totally new advanced software program to provide a host of brand-new features in a system easier and faster to use than ever.

NEW

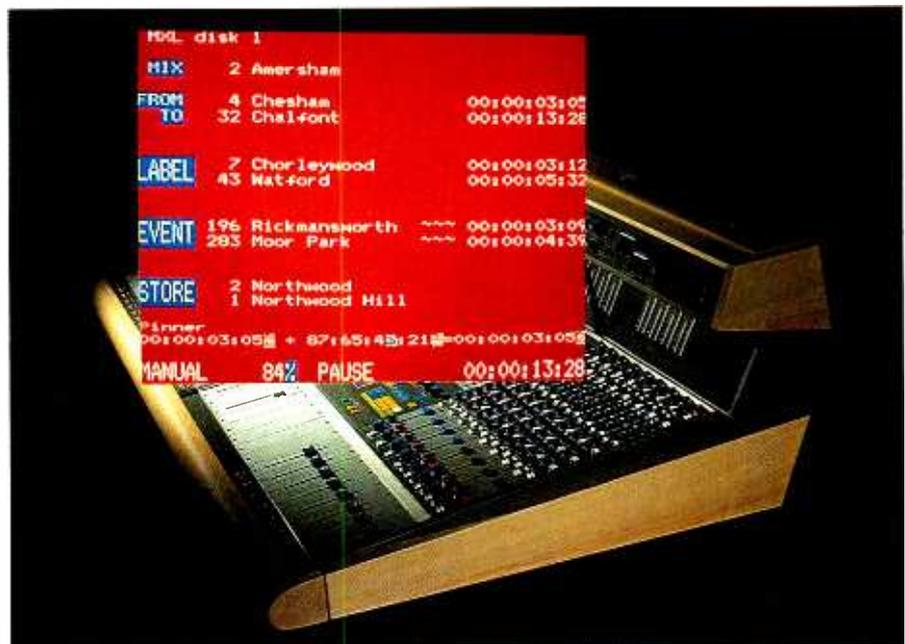
Necam 96: Future Technology for Today's Post Production

Necam has long been recognised as the industry standard in computer assisted mix-down and post-production systems. System software and hardware performance has proved itself in thousands of hours of operation in leading studios throughout the world and today many hundreds of users will readily testify that Necam is the most cost-effective investment for audio post-production, music, television and film studios worldwide.

1984 sees the completion of major development work to produce:-

Necam 96

This totally new mix-down and post-production system provides the operator with an unparalleled level of control, freedom of operation and flexibility, whilst retaining the much acclaimed features of Necam I and Necam II. Necam 96, with its all-microprocessor technology, together with its advanced real-time software operating system, offers a host of new enhancements and



facilities geared to the mix-down and post-production requirements of today and tomorrow.

Incorporating new high-speed "feather touch" precision motor driven faders, this is the fastest post-production system for music, film and video ever produced. The intelligent roll-back feature with super instinctive update brings computer assistance right to the very heart of the post-production process with an ease and speed which were previously just operator's dreams.

The full colour VDU display keeps the operator fully informed throughout the mix. The working display includes

last and next Label in addition to the usual complete status information, whilst lists of mixes, labels, mutes, stores and events are available at the touch of a button. Text pages provide for track lists, title lists, special memoranda, etc. Necam 96 does not expect the operator to be a computer programmer; commands and screen prompts in clear friendly English reassure the operator, whilst special security functions and a new high integrity disc handling system ensure smooth progress throughout the mix or dub.

Continued page 3

Digital — The Dream Console

★ Direct interface to digital tape eliminates degradation of multiple analogue/digital and digital/analogue conversions.

★ Full memory of all control settings with instant reset and recall of multiple "snapshots" saves valuable time.

★ Laboratory instrument precision and repeatability of all controls.

★ Full flexibility of processing and routing gives every operator his preferred system configuration.

★ Variable signal time delay on every channel brings phase coherence to multi-MIC mixes.

★ Time code synchronized mix-down and dubbing automation of all controls.

★ Assignable controls give powerful ergonomic advantages and smaller control console.

★ Optical fibre signal transmission simplifies installation and avoids signal degradation in studio system.

★ High signal handling capacity eliminates internal overload and improves transient handling.

★ Self-diagnostic software simplifies maintenance.



controls, faders, equalisers and compressors work by operating on the actual digital audio signals. The DSP console connects directly to digital tape machines and PCM links without intervening D/A and A/D conversions, thereby preserving every detail of signal quality.

The Neve DSP combines digital audio techniques with computer-controlled signal routing, enabling the entire console to be configured for individual applications. 'Assignability' means that many control functions need not be duplicated for every channel as in the conventional console — for example, a single EQ control 'set' can be 'assigned' to desired channels in turn, adjusted and stored before moving to the next. The result is a compact and totally flexible console, offering far more sophisticated facilities in the same space as the conventional console.



Rapid access to programmable controls

Yet the DSP console is distinguished not only by its technical virtuosity, but also by the new creative horizons it opens up to sound engineer and producer alike. The console is not only easy to understand and operate, but allows for the rearrangement of the whole system at will, offering total memory and instant restoration on all controls, as well as a number of special effects based on time delay.

The future of broadcast is also digital, with established digital terrestrial links expanding to DBS satellite systems bringing digital stereo direct to the home listener. The DSP completes the digital audio chain.

Digital audio, established for more than a decade as the top-quality transmission technique for broadcast links, has now become the standard medium for high-grade recording.

The advent of Compact Disc (CD) has created new standards of awareness of audio quality in the critical home listener, and this has resulted in new challenges to existing technical production techniques in the recording, broadcasting, film and video industries.

These new pressures on audio facilities have created an atmosphere of exciting technical change, and it is these conditions that have spurred the development of the Neve DSP.

The DSP (Digital Signal Processor) is the last link in the digital audio chain from microphone to master-tape, and in the case of CD, to the listener's home. Yet, in order that digital audio may fulfil its real potential, it must be handled appropriately in the studio.

Once audio has been encoded into digital form, the signal is very robust, but only as long as it remains digital.

However, most processes in the sound studio involve transfers from one tape to another, whether for track-bouncing, mixdown, post-production editing or changes of level, equalisation, echo or dynamics. Without a digital mixing console, the signal must be reconverted to analogue form for such processes, and, since they occur many times in the production of the average recording, there will inevitably be a loss of audio information.

To avoid degradation of the signal in the audio chain, the extra stages of analogue-digital and digital-analogue conversion must be cut out. Once the signal is in digital form, the ideal solution is to process all aspects of the recording chain in digital form. This digital signal processing (DSP) involves level control, mixing, equalisation, compression and panning, which is carried out by arithmetic on the sequence of numbers which constitutes the digital signal.

The DSP mixing console carries out all its operation in digital form. All

Yesterday - Today - Tomorrow

Neve's high technology brings not only the advanced digital mixer but is already bringing benefits to the range of analogue consoles.

The 8128 multi-track music and post-production range of consoles uses microprocessor assignable routing with memory and operator interrogation for rapid session set-ups. This unique centralised microprocessor controlled routing system replaces up to 2688 assignment push buttons providing exceptional reliability. The system also provides output assignment memories which can produce four different assignment configurations at the touch of a button. The sophisticated FET switcher driven by the micro uses a specially developed ribbon cable technology to interconnect with the input channels. These are just a few of the high tech systems that support the advanced 8128 range of consoles.

A rapidly accessed interrogation system provides the engineer with an instant overview of the routing configuration and instantly accesses the central assignment switcher for re-configuration.

The proven design and pure sound quality make this range the choice of such superstars as Stevie Wonder and Kenny Rogers. The easy to operate and easily understood layout will always make it a favourite with the balance engineer.

Featuring the formant spectrum equaliser and sweep high pass, low pass filters, tracks and mix downs are produced with the highest possible performance. The EQ and filters are independently switched into the track or mix-down section with clear LED status indicators.

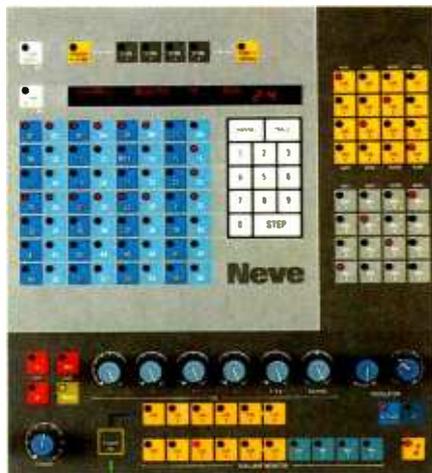
Master and individual control of MIC/line, overdub/sync. and mix provides rapid control for those complex sessions. The comprehensive auxiliary sends can be supplemented by up to 48 additional effects mix sends (for a 56 input console) again at the push of a button if required. This makes those complex mix-down sessions so much easier.

Very high resolution bargraph metering with both VU and PPM characteristics is provided on all multi-track reverberation and 4 track out, and

can be switched between either VU, PPM or both.

External devices can be easily patched into any portion of the console system and be inserted when required by insert switches with associated LED indicators.

All features on the 8128 system are designed to provide maximum operator convenience and the highest reliability. In summary, high technology brings not only the world-acknowledged best sound but super operational benefits.



Continued from page one

Up to 999 snap-shot static stores of faders and mutes, auto/manual crossfading, real-time Necam fader and mute grouping and up to 128 separate event switches make this system the most powerful in real-time as well as in post-production operation.

Seeing is believing — the outstanding features and enhancements of Necam 96 are too many to fit into this issue. However, some Necam 96 buzz words will instantly identify their advantages and benefits to those involved with mix-down in the multitrack recording studio

and effects mixing and dubbing in film and video post-production or sweetening. SMPTE or feet/frames operation, fast locate using tacho pulses, adjustable pre-roll on master machine and events, programmable soft keys for multiple operations from single keystroke, drop-in merge, moveable mutes, latched or momentary events, offline mix creation.

Designed for expansion to cater for future special requirements, Necam 96 is also of course compatible with Necam I and Necam II: Necam 96 is Neve's commitment to provide a future-proof installation for today's and tomorrow's post-production studio.

International Show Guide 1984

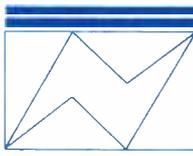
In 1984, Neve's strong presence will again be felt at the major International events:

March 27 - 30:	AES Paris
March 29 - April 2:	NAB Las Vegas
May 11 - 14:	AES Los Angeles
June 13 - 15:	APRS London
September 21 - 25:	IBC Brighton
October 7 - 11:	AES New York
October 23 - 25:	Interbee Tokyo

Neve and its international agents look forward to welcoming you to the Neve stand.

★ Newsflash ★

At the time of going to press, Neve booked its fourth digital order. At this stage, the customer's name cannot be disclosed. However, the professional and national press will soon be announcing full details and the next *Neve Today* issue will be reporting on the latest status of DSP installations and applications.



Neve TODAY

Backtalk

Neve is not just the leading manufacturer of audio consoles, it is also one of the leading suppliers of a sophisticated and comprehensive professional communications systems, the Neve 3000 Series Intercom and Talkback System.

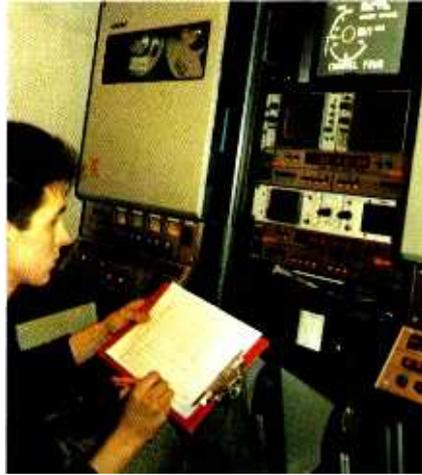
Used by recent big names in broadcast studios, the 3000 Series is an expandable and programmable communications network which meets those applications where top-quality professional intercom or talkback is needed.

The system configuration can be programmed when installed or afterwards by the user, by means of the keyboard and VDU display held in the central rack units. The user can store up to 10 different system configurations in a floppy disk unit.

The Central Switching Matrix is the heart of the system; a rack houses the electronics for systems ranging from 8 to 32 stations. The intercoms themselves vary from simple panels with pre-programmed keys and LED displays, to sophisticated assignable panels with alphanumeric displays and keypads for programming. Calls are identified by an alphanumeric readout which can be customised for individual terminology.

Series 3000 uses micro-processor control and solid-state audio switching

techniques to achieve a flexibility which is unrivalled by other conventional systems.



It was this flexibility which recommended the Series 3000 to the newest of Britain's television networks, Channel 4. Equipping a new station from scratch meant an opportunity to select the very best in available technology. Mike Sage, Engineering Projects Manager for Channel 4, takes up the story.

"In equipping the station, we were in a position to choose the latest and most sophisticated equipment on the market. The emphasis was on maximum automation in our studio equipment,

since our energies are mainly devoted to the commissioning and transmission of programmes rather than the production of them. With Neve's Series 3000 Intercom and Talkback System, the micro-processor control enabled us to reconfigure the system almost instantly, according to requirement. For instance, configurations for standard operation and for transmission of sports programmes can be stored on a floppy disk and called up as required.

"With the previous generation of hard wired systems, this was not possible, and this particularly influenced our choice of Neve. The conventional systems required a precise foreknowledge of what you would be doing with them. As a completely new station, we didn't have this knowledge, but the Series 3000 was able to offer us such a high degree of flexibility in reconfiguration that we were confident that it would meet our requirements as they developed.

"Really, Neve was the safest bet we could find; the modern technology and digital control promised us complete adaptability and there was no other system that was so highly modifiable."

Channel 4 is fitted with a 32-station system which is used for intercommunication in the studios, control rooms and remote locations. The system was installed in the summer of 1982 to take up its place alongside the console and other equipment from Neve.

CAN WE HELP?

Neve and their international agents would be pleased to deal with any enquiries directly. Please contact:

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Melbourn, Royston, Herts SG8 6AU, England. Tel. Royston (0763) 60776. Telex: 81381. Cables: Neve Cambridge.

Rupert Neve Inc.

Berkshire Industrial Park, Bethel, Connecticut 06801, USA. Tel: (203) 744 6230. Telex: 969638.



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Tel No.:.....

I am interested in further information about:

- DSP Necam 96 Music Recording Consoles
 Broadcast Mixing Consoles Neve Intercom Systems
 Please send me the relevant brochures Please arrange for a call/visit

STUDIO FILE

STUDIO FILE

Roxy Recording Theatre, cont'd

fairly near future though the career of the consoles will be a subject of discussion. Their performance is such that they will probably be modernised rather than replaced by something newer. After all, when it sounds right, why tamper with it?

On the other side of the spacious entrance hall, which also serves as a lounge, is studio AA. Here I met engineer Clark Smith who was going to show me around a bit more fully and who explained that the studio was called AA as they did not want any B studios in the place! Reason enough. Clark is also one of those, shall we say, younger generation engineers who does not believe that studios have to be equipped with the very latest technology in order to make good records—certainly as far as rock and country are concerned. In fact, he feels that the technology can often come between the music and the recording and that at times people tend to lose sight of the fact that studios mainly exist to record music and not to indulge in hi-tech exercises.

The actual studio is large and features a fairly dead area for guitars, etc or for where separation is an important factor; and a live area for strings and brass. There is enough room for 20 musicians or more without anyone feeling crowded and visual contact is very good. There is also a drum booth built on to a rostrum in order to give a clear view of the studio, with the added bonus of cutting down on spillage. Should the need arise, the booth can be totally enclosed with soundproof panels that fold down over the upper Perspex windows.

A novelty in the studio is the vocal booth. What could be loosely described as being like a telephone box on wheels, this is a self-contained booth, complete with patch panel for microphones and foldback, that can be rolled to anywhere in the studio to suit space requirements or vocalists' whims and plugged in without further ado.

The basic walls being thick and solid, the acoustic treatment of the studio is fairly simple but effective, consisting of moquette, acoustic tiles and panel absorbers spaced away from the walls. The frequency response is even over a wide range with a short reverberation time so that while the area is reasonably dead, it is not muffled. There is also a selection of acoustic screens should further separation be necessary. The live area is just that! This is due to a combination

of polished wood floor and painted walls. A small partition in the ceiling along the live/dead dividing line helps to keep the ceiling reflections in and due to the irregular shape of the live area, there is a lack of any sharp resonances or flutter echoes. However, should problems arise, or groups of instruments need to be separated, there are some high acoustic screens.

There is a 5-way cue or foldback mix to the studio and as well as headphones, Altec *Voice of the Theatre* monitors, Electro-Voice *Sentry 500* AND *Patricia* cabinets and there are also some JBL speakers hiding somewhere!

Instruments in the studio include Yamaha baby grand piano, CP 30 electric and SK 30 polyphonic synthesiser, Hammond M3 organ

100As and Auratones, with power being provided by custom-made amplifiers that have been built by one of the local electronics wizards. Clark told me that they have a very fast response time with a lot of reserve power. In short, he likes them!

Reverberation is provided by two EMT 140 plates and the rest of the outboard equipment is a mixture of the old and the new, with Klein and Hummel *UE-100* universal equalisers, two Universal Audio 175 compressors, Altec 436C compressor and 67-A filter, two Fairchild 675 de-essers and two 663 limiters, a Langevin 7-band graphic, and a Neptune 2710 1/3-octave graphic, four dbx 160 compressors and a Deltalab ADM 1024 delay line and DL-4 *Acousticcomputer* with memory



Control Room A

with Leslie, Rhodes suitcase 73 piano, and Traynor and Fender amplifiers (all valve, of course!)

The control room is in an irregularly shaped booth situated in the far left corner of the studio from the entrance door—access being only via the studio. However, Clark told me that this was a temporary measure as the room is scheduled to be a keyboard isolation room with a proper control room to be built in an area adjoining the live area of the studio. Vision into the studio is very good and the room has a bright, airy feel to it. Equipment consists of an MCI 428 console with 28 channels and 24-track routing going to an MCI JH-114 24-track recorder. A 16-track headblock is also available. Other recorders are Ampex 2- and 4-track machines plus a Scully 2-track. A Technics M222 double cassette recorder is available for cassettes.

Monitoring is a selection of speakers, these being UREI 811s, JBL 4311s, Electro-Voice *Sentry*

module. Custom-made equipment includes three filter modules that are variously 3- or 4-band sweep and parametric equalisers. Clark was very enthusiastic about the filter modules and would be interested in getting them on to the market, so, any takers out there? However, he did also have some harsh words to say about the after-sales service on new equipment from certain manufacturers, which I found rather surprising. Bad reputations are easily come by in a tightly knit world such as studios so it looks as if a bit more attention to quality control and PR would not come amiss with some people.

The gripes out of the way I was able to listen to a couple of tapes that had been recorded recently. The sound was clear and driving, with just that touch of rawness that always benefits rock'n'roll bringing it to life. It also showed that no matter the age of the equipment, if the music and the band are good, a good engineer can get first class results.

Roxy are very proud of their selection of microphones, this being in the order of over 150 and from makes such as Neumann, Telefunken, Sennheiser, Electro-Voice, AKG, Shure, Sony (including some valve/tube models), Beyer and RCA. The latter including 77-DX and 44 models. The selection includes a fair number of valve/tube microphones as well as ribbons. Widely used by Pink Floyd as a vocal microphone for some time, Clark uses a Sennheiser 409 with considerable success on bass drum; he says he finds it has lots of 'snap'. By the way, he has also found a good use for spare wheel covers — as a bass drum 'muffler' to cut down on leakage. It works and it's cheap!

Before going public, the main work at Roxy was with its in-house artists, in particular country star, Bobby Helms. As may be surmised, the studio is fairly heavily country orientated though rock and rock-a-billy have their places as well. Tommy told me that their policy has always been one of finding new artists and developing them up to the point of having minor successes, from where they can move on to the bigger companies who can do more in the way of national promotion. This is a good way of bringing new talent into the music industry and it is encouraging to find there are still some people who want to go out and find the talent of tomorrow and not just stay with established successes.

Although some of Roxy's equipment by be of a certain vintage, this does not imply in any way that they are living in the past. Far from it and their development programme shows an awareness of future trends. There are plans to start work on a large video studio that will be next to the theatre and this will also coincide with the updates in the rest of the complex. The idea is to move towards a fully integrated audio-visual complex and thus offer a complete service. The theatre will also be equipped for promo video filming and small live shows.

Thanks are in order to Tommy Donaldson and Clark Smith for showing me around, as well as taking time for some very interesting conversations. Slow but sure seem to be the keywords at Roxy and they plan to be up there with the best of them. It will be a story to follow up on.

Terry Nelson
Roxy Recording Theatre,
827 Meridian Street,
Nashville, TN 37207, USA.
Tel: (615) 227-0920.

PRODUCTION BY NUMBERS

Timecode originated from the need to edit video tape recordings precisely and repeatably. On the introduction of video tape in 1956 it was soon discovered that the time-honoured cut and splice methods used by film-editors were inaccurate, cumbersome, time consuming and sometimes disastrous when applied to the video medium. Film images were visible, video images were not, making the splice point difficult to locate.

Despite the introduction of a standardised frame pulse on a separate track indicating each frame start, and electronic splicing systems, video tape editing remained a slow, tedious job. What was really needed was an electronic equivalent to the edge numbers used on film so that each video frame could be located quickly and accurately.

Several manufacturers developed time-based electronic code systems, all incompatible with each other. In 1969 therefore, the Society of Motion Picture and Television Engineers (SMPTE) established a committee which proposed a standard code that would offer interchangeability. This standard was also adopted by the European Broadcasting Union (EBU), and the International SMPTE/EBU standard timecode is the basis for all of today's sophisticated video and audio tape editing and synchronisation systems.

Advantages of timecode

Timecode is normally recorded on a separate track to audio or video, and is coincident with it. Each frame or section of programme is uniquely identified by a time value in hours, minutes, seconds

With the pure audio and video worlds merging more and more, the audio engineer has had to become more aware of the uses of timecode. This article, by David Neal of Audio Kinetics, sets out to explain its reasons, uses and problems

and frames. USA standard is 30 frames per second, whilst Europe uses 25. Standard film rate is 24 frames per second, for 35 mm film. The advantages of such a system are accuracy, repeatability, and interchangeability. *Accuracy*—because each frame can be precisely located electronically; *Repeatability* because unlike mechanically linked systems the code reference always stays with its particular part of the tape—there is no slippage inaccuracy, which is normally introduced on 'tape counters'; and *Interchangeability*—because tapes can be moved between different editing or synchronisation systems. In addition, durations of programmes or programme

segments can be defined precisely, and machines can be synchronised easily.

Construction of timecode

We stated earlier that timecode is normally recorded on a separate audio track of the video or audio tape—this is termed Longitudinal timecode. Another, but very similar construction of code, may be recorded on video tape in the video tracks, interlaced with the video signals, and is called Vertical Interval Timecode or VITC. As the make-up of the two types is so similar, we will describe only the longitudinal variety, additionally because it is the only code which may be recorded on audio tape for synchronisation or editing purposes.

Each second of timecode is split into frames (30 for the USA, 25 for Europe) and each frame, or timecode Word, is made up of 80 bits of information ('bit' being a binary digit). The total timecode value makes up a 24-hour clock, so values from 0 to 23 hours 59 minutes 59 seconds 23/24/29 frames can be used. Obviously the next step will take the clock through zero again, and onwards.

Each frame is constituted in binary sections to identify the segment: units and tens of Frames, units and tens of Seconds, and so on in Minutes and Hours. Together with other information, User Bits and Housekeeping Information (which will be covered later), they make up the 80 bit timecode word. These bits have the value one or zero.

Electronically, bits are created by fluctuations or shifts in the voltage of the timecode signal using a technique named Bi-Phase Modulation.

In Bi-Phase Modulation, a new bit,



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PRODUCTION BY NUMBERS

equal to a zero is created whenever the signal shifts from one state to the other. Fig 1 shows a string of zeros.

To create a one, there is a second voltage shift half way through the bit period. Fig 2 then, shows a pattern of 0's and 1's.

This method of encoding data allows the code to be read in forward or reverse, at fast or slow speeds. However, there are inherent problems in reading code at fast or slow speeds.

If the example of a timecode word is studied, one can see the pattern of zeros and words all through the 80 bit word. Each '1' makes a portion of a binary number, which when all are added together gives the timecode value (Fig 3).

The 'User Bits' are made available for any data the user may require (reel numbers, take numbers etc), and the 'Synchronising Word' defines the end of each frame and allows detection of whether reverse or forward reading is in operation.

Other information is found within the timecode word, such as the 'Drop Frame Flag'. Drop Frame Timecode is another frame standard which was introduced mainly to allow old monochrome TVs in the USA to receive the audio from colour broadcasts, because of the difference in the monochrome and colour TV signals in the USA.

Simply described, the National Television Standards Committee (NTSC) set the colour frame rate to correspond to approximately 29.97 frames per second. So a colour programme clocked at 30 frames per second picks up an extra 0.03 frames per second—108 timecode frames per hour (3.6 seconds worth). The problem is how to lose 108 timecode frames per hour and still run the timecode at consistent speed. Thus the counting is altered so that whenever the timecode ends a minute, it drops the first two frames of the next minute. For example, 16:36:59:29 moves to 16:37:00:02. However, if this happened every minute, 120 timecode frames would be lost, so it was agreed that no frames would be dropped at every tenth minute. Simple, isn't it?

Fortunately, as long as numbers are logged during the session, the equipment used is now normally capable of handling drop-frame timecode.

VITC vs longitudinal

Each version has its advantages over the other, mainly; VITC can be read even when the programme tape is stationary, and frees an audio track. Longitudinal can be recorded on audio or video media, and tapes can be pre-stripped with timecode, and is thus more commonly used for synchronising.

The disadvantage of VITC is that the code must be recorded simultaneously with the video material as they are part of the same signal. Any editing of the

video subsequently edits the timecode, so jam-sync timecode regeneration on the electronically edited master tape becomes mandatory.

In a typical video-audio post production set-up both types of code may be present. Longitudinal on audio tapes, and longitudinal or VITC on the video tapes.

Uses of timecode

As we stated earlier, the main uses of timecode are: programme section identification, synchronisation and editing.

In synchronisation, two or more machines are played 'in sync', with the synchronising system continually comparing the timecode values and adjusting the tape speed to keep all machines locked together as accurately as possible. Most synchronisers today offer a minimum sync accuracy of $\pm 1/2$ frame, with some, such as the Audio Kinetics *Q.Lock* system, specifying a typical $\pm 50 \mu s$ ($\pm 1/2$ bit) synchronisation accuracy.

Synchronisers have a multitude of uses, from simple linking of multitrack recorders to offer more tracks, to a complex arrangement of video, audio, and film machines for dubbing, audio editing and post-production work. The demand for better audio with video has led to such work. Indeed, specialist application programs to streamline routines such as sound effects assembly and looping (for dubbing) have been provided for the *Q.Lock* system to enable operators to handle these tasks more efficiently.

Editing, of course, is the original reason for the development of timecode, and with the sophisticated computer technology available today, video editing

systems are simple to use, quick, and accurate.

Timecode is also used as the basis for data synchronisation on console automation systems.

Hints on the use of timecode

There are several guidelines to be observed when recording and using timecode.

- Record timecode from a timecode generator and avoid dubbing if possible. Drop-outs and wow and flutter are then not transferred.
- Stripe the whole tape with continuous timecode. Hence each point on the tape is unique and tape position cannot be misinterpreted.
- Avoid placing bass-heavy audio, drum or brass tracks adjacent to timecode. Inherent crosstalk from tracks on the replay head can modulate the code and impair synchronisation.
- It is good practice to avoid recording code and audio on adjacent tracks at the same time. Spillage from the timecode track is then wiped when programme is recorded.
- Watch the record levels—avoid crosstalk—timecode lies in the frequency range 1 to 2.5 kHz (depending on frame rate) and of course tends to get in everywhere if you encourage it.
- Keep the heads clean—the usual reasons. Timecode readers are very critical about missing information.

We hope this short article has helped you to understand a little more about timecode. With due care, it's a good although not perfect medium, but it is a standard. Until somebody perfects a better, universally acceptable method, we must continue to use it. □

FIG.1 A STRING OF ZEROS

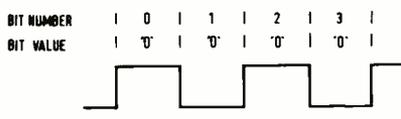


FIG.2 PATTERN OF ZEROS AND ONES

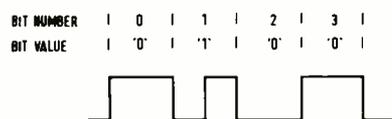
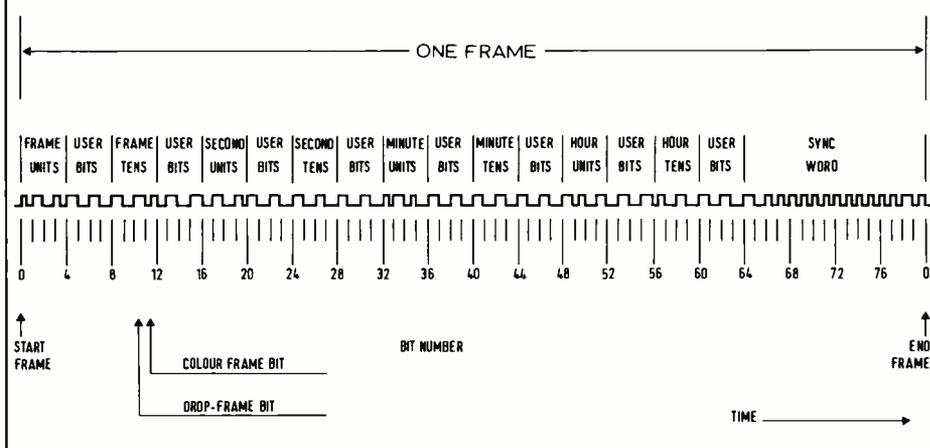


FIG.3 TIMECODE WORD





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The trouble with ordinary consoles don't work half the



It's a situation that every studio manager recognises. A client has been in, done some work, and departed to return some time later. Expecting to find the desk as it was left.

Of course, the engineer could always note down all the settings and then reset the desk. But that's extremely time consuming and not entirely reliable.

So, usually, the studio has to stand idle between sessions. Keeping the customer happy, but not keeping the money coming in.

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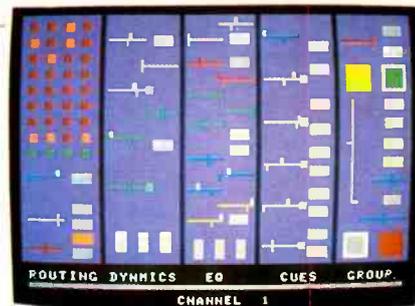
So, at the next session it takes only minutes to reload this information, check it on the colour video monitor and return the console to its original settings.

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VIDEO FOR AUDIO

If a picture paints a thousand words... then why can I follow the plot of *Coronation Street* when my neighbour has his set turned up too loud? The debate about the relative importance of sound and vision in the communication of information can keep a conversation going for several beers. Let's just say they are different. You can angle a camera to keep a building site out of shot but you can't stop the noise getting into the microphone. On the other hand, audio post-production can transport the viewer from 'next to a building site' to 'a desert island'.

There is one major difference between sound and television as Chris Blake discovered when he joined Limehouse television studios last year after three years at the Town House and two years running the Manor Mobile: "The first thing you have to get used to is the idea that you're part of a larger process. The scale of the operation and the amount of money involved is the thing that hits you as soon as you start working in television." Television involves more people, more technology, more money. You can find an audible crowd in any sound effects collection but a visible crowd requires extras, transport, catering, even wardrobe and make-up.

The developments of the last ten years have brought sound and vision closer together. Improved technology has broadened the scope of sound recording and simplified television, making it more accessible. It is often the same technology, as in the case of the portable VCR which doubles as a digital sound recorder. All the latest television studios and video facilities are wired for two channel sound. The broadcast standard 1-inch C-format VT machine includes at least two sound tracks, frequently with Dolby A. Videograms with stereo sound have made an impact on the domestic scene. We can now have television sets with two horrible little elliptical speakers.

Satellite Television began broadcasting from London to Europe on April 26, 1982

Tim Leigh Smith covers aspects of the audio studio looking towards video

with just two hours of programmes each evening. The beginning of 1984 has seen a massive expansion in coverage and hours of broadcasting. By April *Sky Channel* will be on the satellite for eight hours every evening and four hours of that will be Thorn-EMI's *Music Box* pop video show. Satellite Television is looking at the possibility of stereo sound by the end of this year.

The market for high quality stereo sound is growing and for some reason it grows faster if you add pictures. Fortunately one of the developments in the last ten years was the timecode synchroniser which can lock audio and video recorders together to within 50 micro seconds. Some studios are already doing quite a lot of work recording music for commercials, films and television.

In the film industry there are three main areas of sound work. The sound recordist is responsible for lip-sync recording in the studio and on location. The music balancer probably records the music. The dubbing mixer brings dialogue, music and effects together for the completed soundtrack. In television there is less specialisation but it is true to say that a good music balancer is not necessarily a good dubbing mixer or sound recordist.

Want to get involved?

What should you do if you have a studio and you want to get involved in the video revolution? Basically get a video monitor, a VT machine and a synchroniser to link the VT to the rest of the studio. Assuming you are planning to work on British standard 625 line 25 frames per second PAL, the video monitor can be anything you fancy so long as it works with the VT. Film work copies are often tatty black-and-white prints but people seem to expect something more up

market from video. Low-band U-matic VCR is the generally accepted standard for video work copies. The exact type of machine depends on the type of synchroniser used. Some synchronisers simply follow anything that is connected as a master machine and leave you to operate the master using its own controls. Others offer full remote control of the master from the synchroniser keyboard. We'll look at synchronisers in detail later in this article. Right now let's look at timecode.

Twenty-five years ago video tape editing was done by the traditional audio method of cutting and joining the tape. It wasn't easy; the machines had no slow-motion or still frame/search ability and the sound was recorded nine inches ahead of the vision. Multi-generation electronic editing became possible with the first high-band quadruplex machines in 1964. Machines could be locked together while they were running but to rehearse an edit and roll back was to risk sync slip. There was no absolute lock.

A committee of North American manufacturers in 1971 agreed on a standard video editing code. It was an 80 bit binary code which could be generated and recorded as an audio signal. Each 80 bit word related to one frame of picture and uniquely identified it within a 24 hour period in terms of hours, minutes, seconds and frame number. 16 bits are used to indicate the start of each code 'word' and the direction of reading. 32 bits are used for the eight digit timecode and 32 'user' bits are available for another eight hexadecimal characters to indicate the date, shot number, whatever. The Society of Motion Picture and Television Engineers (SMPTE) of America adopted the timecode and so did the EBU (EBU Technical Document 3097-E). In its 25 f/s European form the audible timecode consists of a combination of 1 kHz and 2 kHz square wave. For that reason it is usually recorded at between -10 and -20 dBm. On multi-track audio tapes it is usual to put the timecode on the bottom track

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VIDEO

and leave the next track blank as a guard band to prevent cross talk from or to the timecode.

The other forms of SMPTE timecode include 24 f/s for film, 30 f/s and drop frame for NTSC. For some inscrutable reason the frame rate of NTSC pictures is not exactly 30 f/s but 29.97 f/s so that 30 f/s timecode would have 18 frames left over at the end of ten minutes. To get rid of these surplus frames and allow the timecode to keep up with the pictures, two frame numbers are omitted from the first nine minutes out of every ten. The frame count is then correct at the end of the tenth minute because 18 frames have been dropped.

Once an international standard had been agreed, the electronics industry set about creating timecode generators, timecode readers, timecode displays and timecode inserters. Who needs 'em? If you are required to relate your recording to existing lip-sync sound, your client should bring a video copy and a multi-track tape with the lip-sync on one or two tracks. These two recordings should have been produced at the same time from the master video tape and should have the same timecode recorded on the appropriate track. If you are creating a complete soundtrack from scratch, you will need a timecode generator to lay down your own timecode track which can be related to the timecode on the video copy. Another point is that timecode doesn't take kindly to being copied and often becomes unreadable by the third generation. A timecode generator can be used to re-generate timecode. They have an external reference input to enable them to synchronise with other video equipment (genlock) and a burst of timecode jammed into it will reset the timecode generator to produce identical timecode. This method of slaving a timecode generator is called 'jam sync'. Some synchronisers include an integral timecode generator.

Synchronisers use timecode readers to

do their job but you're not likely to need an external one. Synchronisers usually include a timecode display or two so that you know where you are. Timecode inserters read the timecode from the VT machine and 'burn in' a timecode display on the video monitor. You can usually arrange for timecode to be inserted in picture by the video house when the U-matic copy is made.

Sync your teeth into this

The basic purpose of a synchroniser is to keep one or more slave machines running at the correct speed relative to a master machine by overriding the slave capstan servos. If a VT machine is involved it will usually be designated as the master because speed variations tend to cause picture break up and, in a video environment, VT machines are usually slaved to house sync pulses. A synchroniser using a phase-locked loop can lock machines so tightly that any wow and flutter from the master is reproduced by the slave. This is not a good thing if the master is a U-matic VCR with claimed wow and flutter of about 0.25%. Various ways have been found to avoid this problem, such as locking all transports to a crystal locked reference once sync has been achieved or using a microprocessor which can recognise unwanted minor speed variations.

A timecode synchroniser can compare the relative position of the transports in terms of timecode address. Ideally the timecode will be the same on every transport but this rarely occurs. As the video master is assembled the various different timecodes on the insert tapes are replaced by a continuous Edited Master timecode. The difference between the original timecode on the audio tapes and the video master timecode is called the offset. A friendly synchroniser will calculate the offset for you if you tell it the start point timecode readings from the master and the slave. Otherwise it's pencil and paper or pocket calculator. Once the offset has been entered in the appropriate memory, the synchroniser will maintain that distance.

The synchroniser can usually be set to update the offset if it suddenly encounters a change in the timecode because of an edit. If the offset is slightly incorrect for any reason it should be possible to nudge the slave back into sync without noticeable pitch variation. Most manufacturers offer fast and slow rates to re-synchronise. The fast rate is often $\pm 50\%$ of normal transport speed and is referred to as fast, smart, narrow or hard lock. The slow rate would be about 1% of normal speed and is called slow, wide or soft lock.

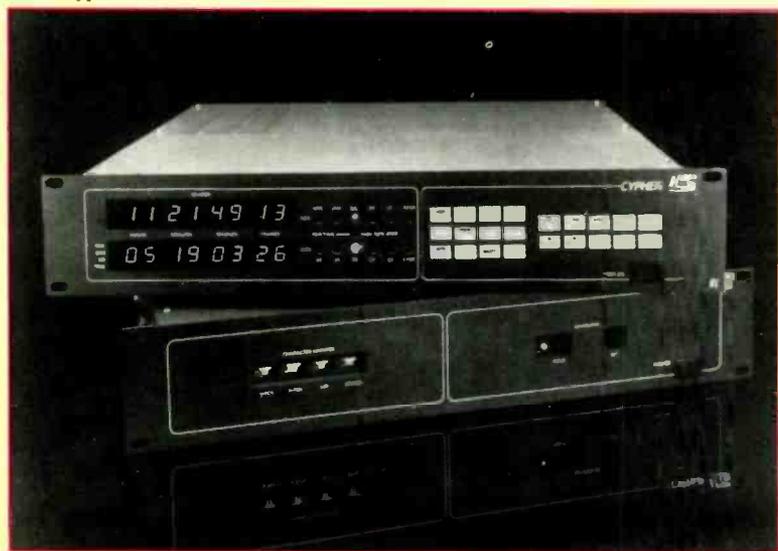
There is usually a facility for the operator to capture cue points 'on the fly' by freezing the timecode on the display so that it can be transferred to a memory. Certain synchronisers will automatically subtract a predetermined preroll time from any given start point timecode so that the transports will park several seconds ahead of the required point. When they are started they will achieve sync before reaching the start point. This means that timecode must start well before the beginning of any programme material. Other common features are roll back for instant replay which causes the transports to repeat the previous few seconds and cycle or loop which defines a start point and a stop point for the transports to shuttle between.

It is usually possible to program a slave to drop into and out of record at selected timecode points within a loop.

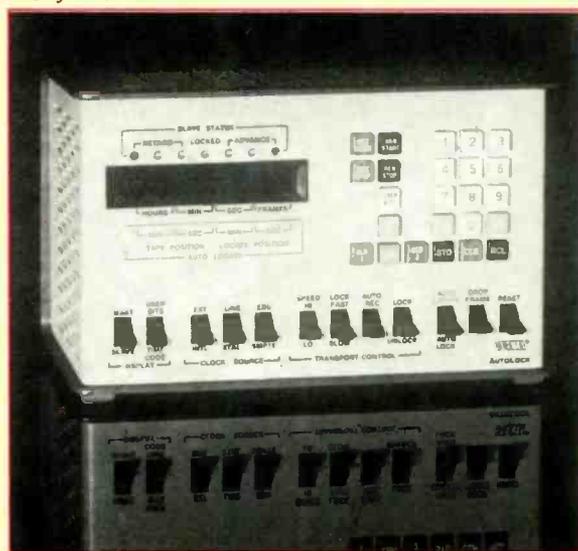
What's on offer?

Synchronisers come in a variety of shapes and prices. Several manufacturers offer modular systems which can be built up over the years as work expands to fill the facilities available. The cost of a complete modular system soon mounts up so there could be a long term saving on an integrated system if expansion is certain. The most basic form of synchroniser is a single slave controller which compares slave timecode with master timecode, allows for any offset and overrides the slave capstan servo to achieve sync. It could use just three connections: master timecode input,

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VIDEO

slave timecode input and slave capstan control. The master transport controls are used in the normal way. This type of synchroniser operates at play speed only and could not follow the master in fast wind. It requires the operator to locate both transports close to the start point. It is perfectly satisfactory for long uninterrupted runs but not suitable for roll back or loops (rock 'n' roll). It could handle the layback of a completed mixed track but would be useless laying tracks for a 30 second commercial. None of the synchronisers that I've looked at have really been that basic although a single unit from some of the modular systems would come close to it.

A more advanced synchroniser has full control of the slave transport and can follow the master anywhere so long as it can receive some form of direction and location information from the master. It may need a burst of timecode at normal play speed from the master at the cue point in order to locate the slave to the correct point. To read timecode from a fast winding transport requires that the tape is wound on the heads with special wide band timecode heads and amplifiers, and a high speed timecode reader. Video folk are quite used to their heads banging about at ridiculous speeds but from an audio point of view there is head wear and the risk of hearing damage to be considered. Maglink Audio Products of Forest Row, East Sussex, devised a form of timecode with a low frequency component that could be read with the tape just off the heads. It also reduced the risk of crosstalk as it was a sine wave. Unfortunately for this noble British enterprise SMPTE/EBU timecode has turned out to be surprisingly popular despite its drawbacks.

Alternative methods exist to enable a slave to follow a rapidly moving master. Audible longitudinal timecode becomes inaudible at very low tape speeds so that video editors would lose track of their position if they were inching slowly to

locate an edit point. The solution to this problem was Vertical Interval Time Code (VITC) which is a 90-bit code similar to longitudinal timecode. It is recorded in vision in the vertical blanking interval between each video field, like teletext. Special VITC readers are claimed to recover this code at up to 100 times play speed as well as down to still frame. A more practical alternative is to use the low frequency control track pulses or tachometer pulses from the timer/footage counter on the master transport to update the timecode information if it becomes unreadable. Accurate sync can be regained when the machines play to park.

Most of the available timecode synchronisers are in the broad category which can be called 'chase and lock' because the slaves chase the master when it is spooling and lock with it when it plays. A few of the units go a bit further and offer full remote control of each transport or any combination of transports.

Names and pack-drill

The MCI *JH-45* Autolock, Studer *TLS 2000* and Telefunken *MTS 15A-1* were designed to synchronise two, or three in the case of the Telefunken unit, audio tape machines of the appropriate brand but they can also be used with certain VT machines as master. The Studer *TLS 2000* offers four programmable timecode triggered events which can be used for starting and stopping additional machines, switching equalisation in and out, etc. The new *TLS 4000* was designed for use with the Studer *A810* and is available as two modules. The basic synchroniser is a black box which hasn't even got an on/off switch. It uses high speed timecode readers to enable the slave to chase the master at speed and it accepts a variety of auxiliary references. Other synchroniser functions can be accessed by a separate Local Control unit or by an external system using an *RS232C* serial data port. The Local Control unit provides all the usual facilities including ten memories to store cue points, offsets and event triggers.

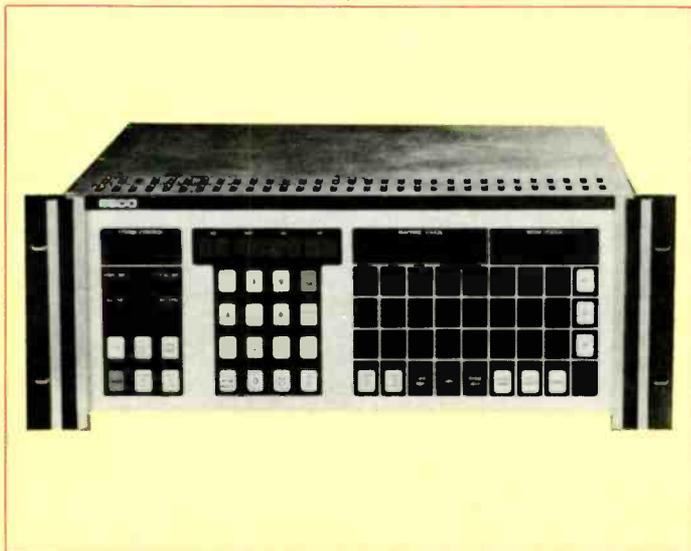
Several slaves can be locked to one master using one synchroniser per slave.

The Studer *A810* is an interesting machine as it can offer standard 'two track' (2 mm guard band) audio with a 0.38 mm timecode track down the middle. To avoid magnetic crosstalk the timecode is physically offset to be recorded by a fourth head ahead of the audio and a delay line is used to correct the offset. On replay the timecode is recovered at the erase head position and again delayed to correct the offset. The separation between audio and timecode is claimed to be better than 90 dB. Trillion, who opened their new multi-track video dubbing suite a few months ago, are considering the possibility of using several Studer *A810* timecode machines in the way that film dubbing suites use several magnetic film transports with the possibility of altering sync on selected tracks.

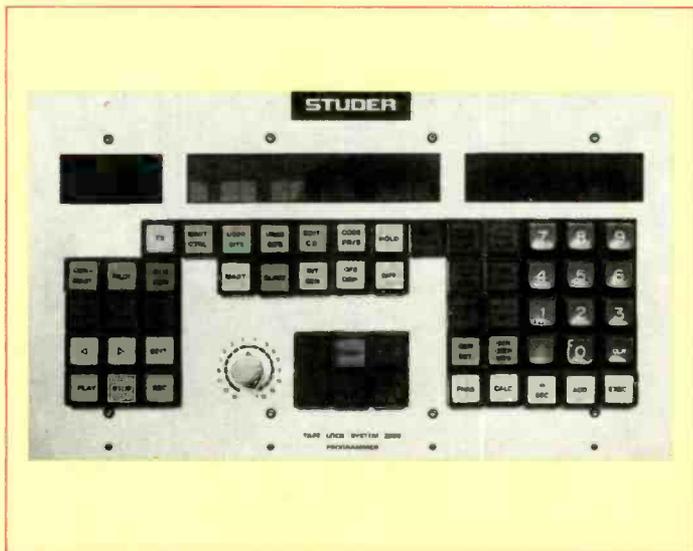
The EECO *MQS-100A* series synchroniser can be used to lock two or three transports. The unit uses high speed timecode readers to recover timecode from 1/16 to 60 times play speed. Three of the ten memories on the keyboard are available as scratchpad, two are dedicated to event triggers which can be used to drop into and out of record, two more allow event offsets to be stored to accommodate erase delay for 'gapless' recording. The other three memories are used to store pre-roll, roll back and a third event trigger dedicated to starting the second slave machine from a timecode point. The keyboard will perform offset calculations. Interfaces are available for various Ampex, RCA and Sony video machines and for audio machines by Ampex, MCI, Scully and Studer. The *MQS-100A* series has an *RS232C* serial data port for interface to external systems. EECO also offer a PAL/SECAM/NTSC video character generator which can read and burn in timecode or VITC, a multistandard timecode generator and also a high speed timecode reader which can use tach pulses to update timecode.

The Adams-Smith model *605* tape synchroniser is used by several of the ITV companies. One or two slaves will

EECO *MQS-100A* Series multi-cue synchroniser



Studer *TLS 2000*



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VIDEO

follow the master in any mode. Each transport is provided with a dedicated microprocessor which can be preset to suit the type of transport and will then learn the particular machine's characteristics. The model 605 is now being superseded by the Adams-Smith modular *System 2600*. The basic synchroniser module, *2600 SY*, will lock two transports to timecode or various other references at play speed only. One control track/tach pulse reader is included in the basic module but a *2600 LR* high speed timecode reader is required to enable tach pulses from both machines to be read at up to 100 times play speed for full chase and lock operation. The control panel (operator data transfer interface?) in more complex systems offers full remote control of the master transport. The roll back and replay facility is arranged for a standard roll back of five seconds but repeated operation of the replay button adds five second increments to the roll back time.

Other modules in the Adams-Smith *System 2600* include timecode restorer, timecode generator, VITC reader, VITC generator, character inserter, sync pulse generator, VITC to longitudinal timecode translator, *RS232C/RS422A* serial data interface, and parallel Binary Coded Decimal data interface. Each module is a microcomputer in itself and communicates with the rest of the system via a 34 conductor data bus. Adams-Smith suggest that with VITC recoverable from still frame up to 100 times play speed there is no need for longitudinal timecode to occupy one sound track on the VT machine.

The BTX *Shadow* can be used as a chase and lock synchroniser or with its own Command Console or with an external system via an *RS232C* serial data port. The universal interface can be preset for the type of transport and will

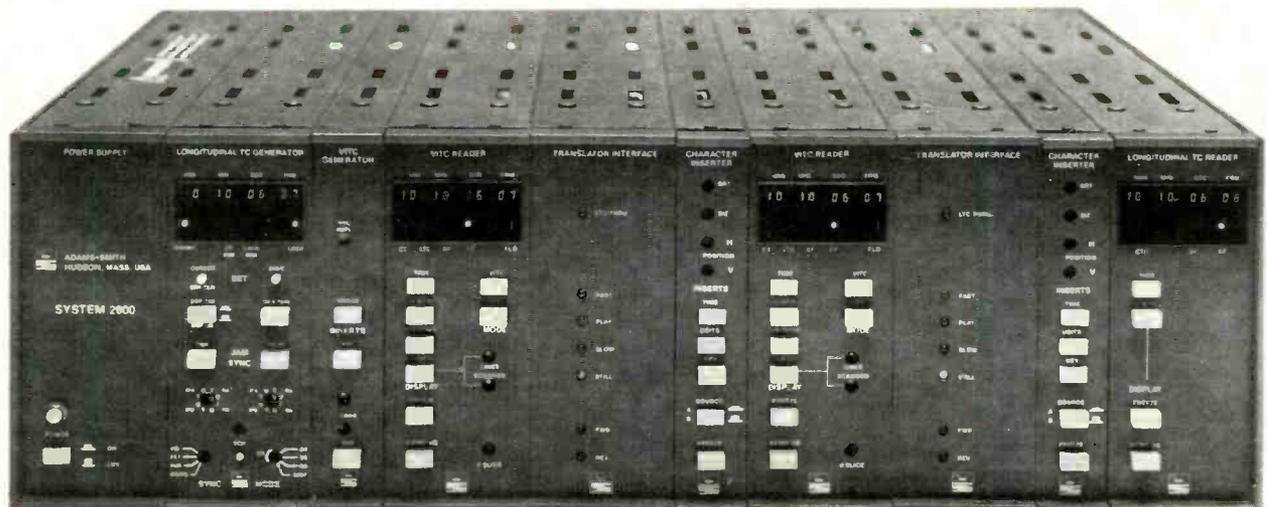
learn the particular machine characteristics. The slave may be put into record manually or programmed to drop in and drop out at timecode points. Nine memories are available for storing offsets and cue points. The *Shadow* can recover timecode from 1/50 to 25 times play speed and uses tach pulses to update timecode when it becomes unreadable. A separate BTX *Cypher* timecode unit can read timecode up to 80 times play speed and VITC up to 20 times. The *Cypher* unit is also a multistandard timecode generator, VITC generator and PAL/SECAM/NTSC video character inserter. An extra *Shadow* synchroniser is required for each additional slave transport and several units can be paralleled by looping between master transport connectors. Up to four transports can be commanded by a BTX *Softouch* controller linked to three *Shadow* units and a *Cypher* timecode unit via *RS232C* serial data interface. Additional transports using *Shadow* units in chase and lock mode can be connected into the system. The *Softouch* keyboard includes 16 programmable keys for repetitive routines as well as timecode event triggers and the ability to store start point/rec in/rec out/stop point for up to 100 loops.

The Audio Kinetics *Q-Lock* is in danger of becoming a generic term like 'vacuum cleaner'. "*Q-Lock* is the best system in the world," according to John Page of TVA who used to work for a rival synchroniser company and has some experience of designing the beasts. Each of the two or three transports connected to the *Q-Lock 3.10C* can be designated as master, slave 1 or slave 2. In addition, slave 1 automatically becomes the master transport if the master is deselected. *Q-Lock* uses dedicated intelligent machine interfaces which are designed for specific types of transport and learn the characteristics of the individual machine. Audio Kinetics can provide interfaces for about 15 film transports, 20 VT machines and 30 audio

tape recorders. The timecode readers accept timecode from 1/50 to 1½ times play speed and update timecode from control track/tach pulses at higher speeds. A high speed timecode reader is available to recover timecode from 1/50 to 70 times play speed. *Q-Lock* includes an integral multistandard timecode generator which is capable of producing timecode with a less than square wave (slew limited) thus reducing crosstalk. The co-ordinating microcomputer will calculate offsets and automatically update them if required. It will also store start and stop for points for loops; five timecode events including rec in and rec out points for loops with offset for 'gapless' recording; ten cue points in scratchpad memory. An *RS232C/RS422A* serial data port is available for linking *Q-Lock* to external systems or to another *Q-Lock* unit in order to control up to four slaves from one master using the Cascade facility. Special versions of the *Q-Lock 3.10C* for sound effects assembly and automatic dialogue replacement (looping) are also produced.

Given the range of equipment available—and a desire to get in on the music video boom—what should you do? Some years ago Mike Connaris of Sounds Aquarian in Kingly Court, London, did some soundtrack recordings without any sort of picture monitor—just a stopwatch. The results were so successful that he invested in a Sony *VO-2630* low-band U-matic and *CVM-1850 18* in colour monitor and set about recording music for film, television and commercials to picture without a synchroniser. In the last few months he completed the recording of Mike Storey's music for the film *Another Country*. The 24-track master tape included a 50 Hz film pilotone pulse on one track so that it could be taken to Olympic and run at the correct speed for mixdown and synchronisation. Mike did have one problem and that was finding someone who could transfer the film to video at 24 f/s. He succeeded. □

Adams-Smith *System 2600*



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STUDIO SOUND

AND BROADCAST ENGINEERING



ANNIVERSARY SECTION

A P P R O P R I A T E



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25
YEARS

THANKS FOR 25 YEARS

Studio Sound has grown tremendously over the years, since it took its present name after having been started as a consumer magazine called *The Tape Recorder* in 1959. That growth has paralleled the growth and increasing sophistication of the industry that the magazine serves. During the past 25 years the field of professional recording has expanded so much that we have had to start two new magazines as 'spinoffs' from this, the original: first there was *Video and Audio-Visual Review* (now known simply as *Professional Video*); and then in September 1982, we began *Broadcast Sound*, the first magazine devoted centrally to sound in the broadcast and related fields. Thus, *Studio Sound* has perhaps become more specialist over the years. We tend to concentrate on what is new, and what is interesting—not an unreasonable thing for a magazine to do—and we concentrate more today than ever before on the professional multitrack recording environment, a field which is still changing rapidly. But we have widened our coverage too, over the years, as the field with which we concern ourselves has changed and expanded. There are more techniques, pieces of equipment, and subjects to cover, as befits an art which has highly technological equipment as its tools of the trade.

But the magazine has not merely expanded its coverage of the subject: it has also dramatically increased geographically in both coverage and readership. We cover activities all over the world of professional studios, and almost 16,000 copies go out, every month, to over 100 countries. And it is a magazine that is continually expanding in size (and weight!). The fact that we are

by Richard Elen

able to send the vast majority of these copies out free every month to those who need to read it is a tribute to our advertisers who effectively pay the subscriptions that you do not, by means of their advertising support.

On this 25th anniversary of the launch of *The Tape Recorder*, it is therefore appropriate for us to thank all those manufacturers who have supported the magazine through its life to date, and have made it possible for the magazine to be sent out all over the world. In addition, those same manufacturers have given us the information and help we need to bring you a good deal of the magazine's editorial content: in the form of press releases, photographs, review equipment, and time to talk to each other to find out more. On many occasions their top research teams have somehow found the time to write us detailed articles on their latest projects, enabling us to bring you the information with a degree of detail and accuracy we believe is unparalleled in the industry. For despite the valuable support of the manufacturers, we draw a firm line between editorial and advertising in the magazine. We do not agree to write about something because a manufacturer is advertising, nor do we modify none-too-pleasant results to please an advertiser. This has sometimes made it more difficult for our advertising department to sell to companies that were used to a somewhat different approach, but in the end it has paid off: we have gained respect in the industry and among the manufacturers for our unbiased approach, and have proved that, after all

honesty does indeed pay for itself!

But we would also like to extend our thanks to you, the readers, for making the magazine what it is today. We have always tried to cover the subject in the best possible way, and you have been quick to prompt us when we have made mistakes. Your feedback and interest has helped to formulate our approach to the magazine, enabling us to do our best to try to give you the information you want, in the way you want it. With your help, and the continuing help of the manufacturers, we will continue to do our best!

I am therefore very pleased to see the number of congratulatory advertisements and the letters from well-known industry figures which appear in this 25th anniversary edition of *Studio Sound*. All of you who are reading this have contributed to the magazine you are looking at now, whether you have been on our lists from the beginning, or merely a month or so. You, manufacturers and users alike, have by your support made *Studio Sound* the Number One international sound recording magazine. We on the magazine would like to respond by nominating you Number One—because it is the communication between the different parts of this industry which holds it together and maintains its direction and success. We are only one part of that essential dialogue—a link between both sides of the professional audio industry. We like to think we're an important part... but, after all, without you we'd have nothing to do!

Thanks again, therefore, for your help over the last quarter of a century. We hope we'll still be working together another 25 years from now.

25 YEARS

When this magazine was started, 25 years ago, it was not conceived as the magazine it is today. It was at the time when home tape-recording was at its height; and, being in the days before the Compact Cassette, the main subject of discussion was the reel-to-reel tape recorder and how to make the best use of it. Thus *The Tape Recorder* was, perhaps, a natural name for the magazine.

What did people do with their tape recorders in those days? Probably not the same things as they do today. Today, the primary use of the home hi-fi cassette recorder (a development which was featured in an early issue) is to copy one's records on to cassette so as to play them on the car cassette player or the personal hi-fi. In those days

there were hundreds of other things that 'tape recording enthusiasts' got up to. They recorded birdsong; they produced taped 'programmes' for their local tape recording club; they entered competitions with their own recordings of all manner of subjects. Thanks to organisations like the Federation of British Tape Recording Clubs, such activities still continue, but perhaps they have a lower profile than they did then. Seldom do we hear today of the taped magazines put together by clubs in many places and circulated around the world, although no doubt such activities continue. Were *Studio Sound* the same magazine it was 25 years ago, we would no doubt revel in such things today... but today there is no magazine that covers the same ground, as such activities are just one small section of the vast and still fast-expanding field of 'Hi-Fi'.

And as Hi-Fi as a hobby and leisure interest began to overshadow that area of

activity—tape recording—that it had spawned, and the other tape recording magazines began to disappear, the magazine *Tape Recorder* began to change. It had always taken an interest in the 'professional' side of recording, and as the art of recording original material on tape disappeared from the consumer market, so it became rapidly more important in the professional field where, of course, it had largely begun some 25 years previously when BASF developed the first magnetic paper-backed recording tape, and AEG came up with the *Magnetophon*. It is, of course, the fiftieth anniversary of tape recording this year as well as our 25th.

As professional tape recording became more important and sophisticated, the magazine took a greater interest in professional audio, and it was a logical step, in the early 1970's, to rename the magazine *Studio Sound*. The original title remained for a time, eventually to fall away as so

many titles absorbed by one publisher from another tend to do. For at the same time, the control of the magazine had passed from its founders to Link House (where, of course, it is today). Shortly after the change of name came a change of style, and the traditional *Studio Sound* logo, which remained there until this very issue, began to head the cover and the contents page.

Since then we may not have seen much dramatic changes, but changes there have been nonetheless. The magazine has responded, perhaps gently and subtly, to the changing needs of its changing readership. The early issues concerned themselves with many things that we still consider: new products, for example, and reviews... but the style has changed to meet the new requirements. Seldom today do we discuss how to modify tape recorders, perhaps because today's machines are not that easy to modify—and hopefully less in need of such

25 YEARS OF \$



30 Jan 1984

Dear RICHARD

Studio Sound of the fifties was simple - Mono ruled OK. Stereo was merely for classical ears. Re-makes did not exist. Overdubs were via tape to tape. No over saturation of "wireless" airplay. To hear the hits you had to pop a sixpence into a jukebox or fade-in to Radio Luxembourg. Tape was one width and the speed was 15 ips. Monitors were loudspeakers, PA was Tannoy. The only "gimmicks" were echo chambers, tape echo, home-made limiters and tone controls. Equipment was made in-house and filled with valves. Session men rushed from studio to studio - Kenny Clair was always there. Four titles in three hours. Record on Tuesday, cut on Wednesday, press on Thursday, sell on Friday. Producers were A & R representatives. Engineers carried screwdrivers and only artists received royalties. Norrie, Wally, Norman and George were the "hit" men. Beetles were still insects in the garden. The Drifters became The Shadows and Cliff was No. 1 with "Livin Doll". Those were the days my friend.

Studio Sound of the early sixties was interesting - America went for 3 track, Europe for 4 track. A new era was upon us. Four to four, mix to two. Overdubs or superimposition became the order of the day. Sessions became open-ended. The Mersey Sound was with us - boom boom. New suppliers of equipment emerged. The transistor replaced the valve. Beatle mania was upon us. Cliff was No. 1 with "The Young Ones". Those were the days my friend.



Studio Sound of the mid sixties saw more outboard gear, more groups, ADT, phasing, flanging, fuzz boxes, direct injection, compressors, de-essers and bigger speakers. Cliff was No. 1 with "The Minute You're Gone". Those were the days my friend.

Studio Sound of the late sixties saw - 8 track takeover from 4 track. The beetles got back under The Stones. More and more studios offering more facilities for the same price. Cliff was at No. 1 with "Congratulations". Those were the days my friend.

Studio Sound of the seventies saw - 16 track takeover from 8, only to be superseded by 24. Computer mixing, Necam, synthesisers, Sex Pistols, punk and the emergence of digital. At the end of the decade Cliff was still No. 1 with "We Don't Talk Anymore".

Studio Sound of the eighties is a technological mess - standardisation has evaporated. Analogue and digital side by side. Three products, records, cassettes and compact discs. Straight 24 track is a thing of the past. Machines locked together for 48 track, sometimes Dolby, sometimes not. Sometimes 30, sometimes 15. Sometimes NAB, sometimes IEC. This tape, that tape. Digital delays, AMS, harmonisers, Scamp, special limiters, noise gates, the latest this the latest that. Mix to digital PCM1610, JVC or Sony F1. Mix to analogue 1" or 1/2". SSL total recall, computer mix. Record

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25 YEARS

modifications, for the manufacturers above all have not stood still—but we will still allow ourselves to examine the inner workings and possible alterations to equipment when it is feasible to do so. Neither do we often produce articles of the 'build-it-yourself' variety, although we will often offer technical articles to give an insight into the workings of some new machine or system. Today it is less feasible to make something economically at home, as the price of components to the hobbyist is so much higher than that to a manufacturer that it is often a false economy to build something if you can buy it for less. And our present reader is seldom a hobbyist—instead he or she is more likely to be the owner of a studio, where time, staff and money are precious. The role of serving the home constructor has passed to other magazines long since. These and other changes have marked the move from being a home recordist's magazine to

becoming a regular information and reference work for the professional in the audio business.

But even since we have been serving the recording engineer, producer and studio owner, we have seen a great deal of changes. The simple reason for this is that these people have changed in themselves. The studio of the late Fifties was a quite different place from the studio of today. Often it was owned by a record company, for although there had been independent studios in the mid-Thirties, their time was really yet to come in 1959. The recording engineer was still very much a technician, whose main job was to keep the needle from going into the red on the big machine in the back room. He was, perhaps, truly an 'engineer' in those days, and the major studios were characterised by their white-coated technical staff, fluorescent lights and cold grey walls. The studio was a place in which a technical operation was

carried out—that of transferring what was 'out there' in the studio on to tape—and the majority of the 'art' of recording was concentrated in the musical forces in the studio itself, for there was no multitrack recording in commercial studios. Indeed, there was hardly stereo—the first commercial stereo LP had emerged only the previous year.

In 1959 the studio owner might have been a record company accountant, a business man, or perhaps an engineer of whatever persuasion who had turned to recording music in his own facility. If he was not a technical man, he had technical staff on whom he could rely to point out the technical requirements for the studio.

But a change was already in the air. Some independent studios had been involved in broadcasting originally—IBC Studios in London had originally been set up to produce recordings for Radio Normandy (the first commercial radio

station to serve the UK, set up in the Thirties) and had turned its hand in a number of directions, for example—and a number of other studios were waiting in the wings. Perhaps they concentrated on records, perhaps on broadcasts, perhaps on film music recording. But they were to play an increasing role in the development of professional sound recording in the Sixties.

The first major innovation came with the introduction of 3-track recorders and then, rapidly, the 4-track. The new techniques opened up new possibilities, and more sophisticated consoles came in along with the new recorders. The 'engineers' came out from the back room into the same room as the producer, and began

STUDIO SOUND



straight to digital, 2 track, 24 or 32. No tapes are interchangeable between any systems. Edit via computer or just cut and splice. Transfer onto lacquer or DMM. 12" singles. Lock to video, lock to picture. Big screen, small screen. Time code generators, drop frame code. With Pre-emphasis or without. Bin masters for high speed cassette duplication direct from digital. XDR, chrome, ferric, cobalt, metal, Dolby A, B, C and now HX. PQ editing for CD. Tape-lock, Q-lock, Bow-locks. Months to record an album, weeks for a single. These are the days my friend. Cliff with "Daddy's Home" didn't quite make it, had to stay next door in No. 2 for several weeks. Good old George with "Pipes of Peace" - well done Paul.

Good songs still sell, despite the technology. Throughout 25 years Cliff and Studio Sound shine through. Great professionals and a credit to the industry - thank you both.

Regards.

Yours sincerely,

Ken Townsend
General Manager

Richard Elen
Editor
Studio Sound
Link House
Dingwall Ave
Croydon CR9 2TA

KTV 4133

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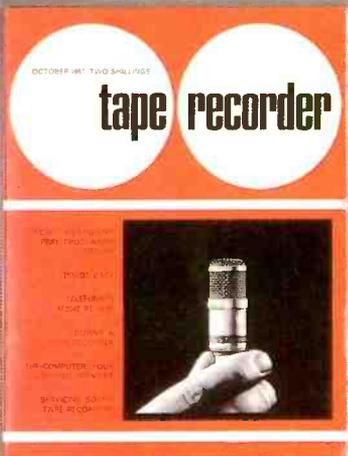
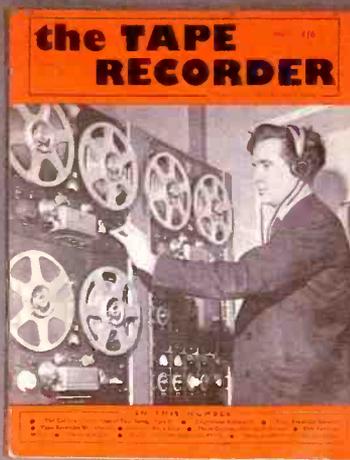
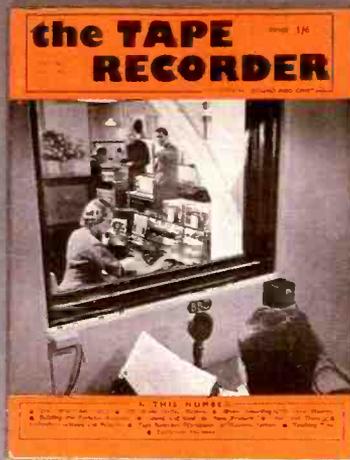
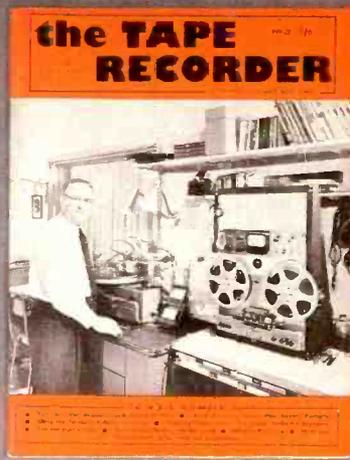
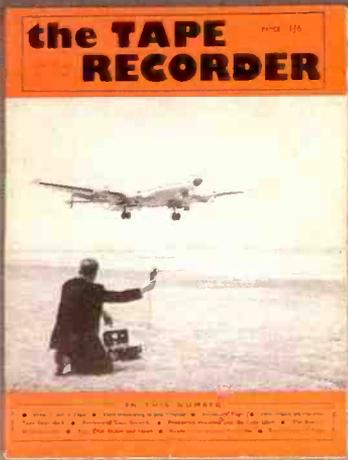
Dear Studio Sound

A professional in the world of professional audio celebrates its silver jubilee. Being a professional myself, I can't tell you, how much I appreciate the good and competent work you are doing month after month. I realize, that it is one thing to influence the market from the manufacturers side, but without the assistance of an industry like yours, it would be hard to market anything at all. On the other hand I think that due to your critical attitude many a manufacturer has been forced to improve his product. This no doubt has helped the audio industry in reaching the standards, it has reached today.

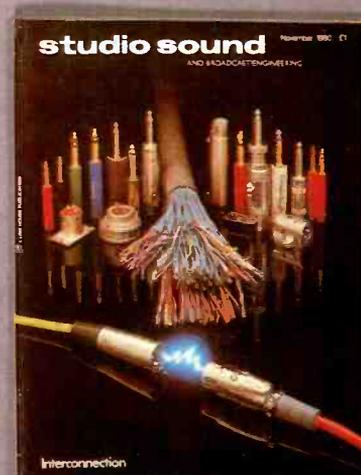
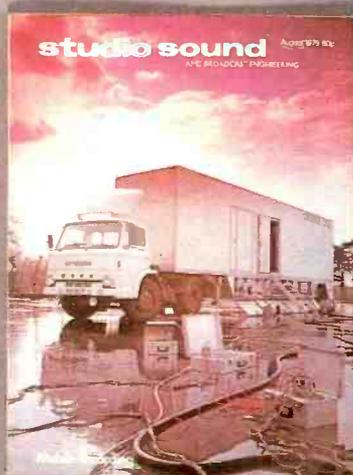
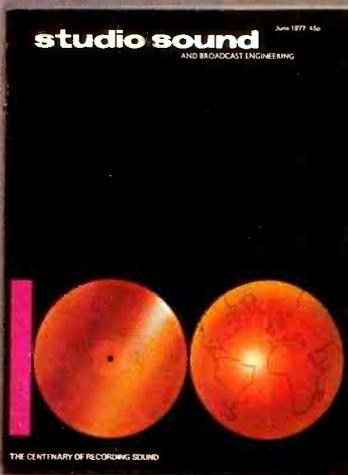
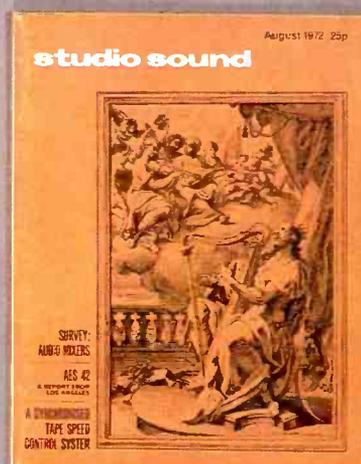
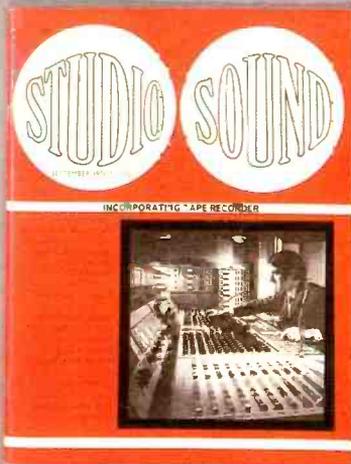
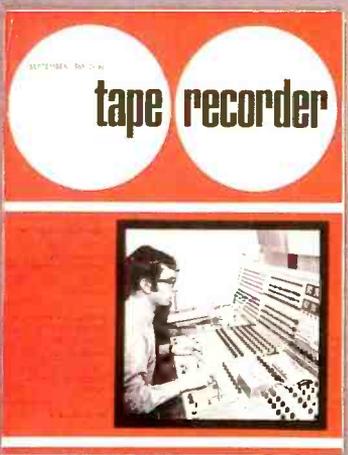
Many happy returns and keep up the good work.

With best wishes

Dr. h.c. Willi Studer



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the TAPE RECORDER



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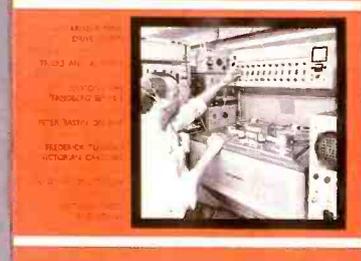
► THE 1975 TAPE RECORDER MARKET ► THE TAPE RECORDER MARKET ► THE TAPE RECORDER MARKET

tape recorder



STUDIO SOUND

tape recorder

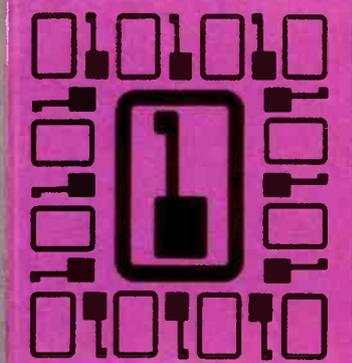


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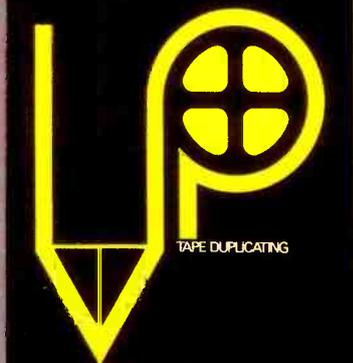
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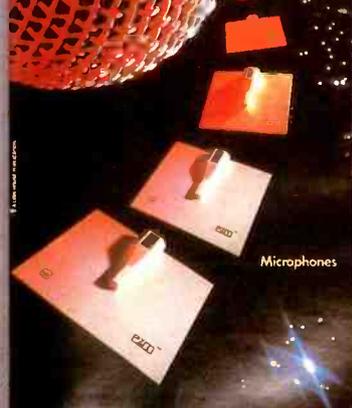
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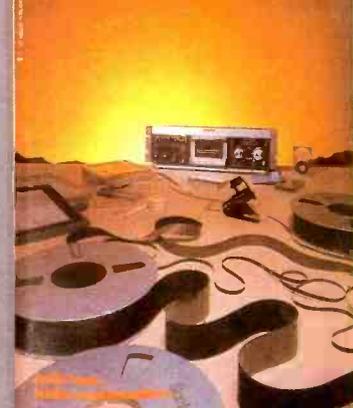
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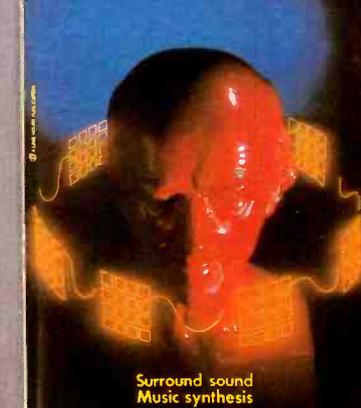


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25 YEARS

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January 20, 1984

To the Readers of Studio Sound:

We speak for everyone at JBL when we wish Studio Sound a Happy 25th Birthday! Our knowledge of the magazine extends back perhaps 15 years, and we can assume that the first ten were as glorious as the ones we have known.

We have come to expect of Studio Sound a degree of thoroughness in equipment testing and review rarely encountered elsewhere, particularly in Hugh Ford's exhaustive and penetrating analyses. Additionally, Studio Sound's commentary on trends in the industry is enlightening, amusing, and sometimes depressing -- witness Barry Fox's shining spotlights into some of the murkier corners of our business, and Richard Elen's literate, witty and cogent editorials. All of this, of course, is presented in a style which is as pleasurable to read as it is accurate.

Over the years, there have been significant high points. Studio Sound's coverage of quadrophonic sound has been perceptive, focussing early on the aesthetic flaws which were eventually to do quack in. In particular, his Michael Gerzon have made for very interesting reading. The many articles by exposition of the Soundfield microphone has been significant for the recording industry. In recent times, digital technology is receiving sensible and balanced coverage.

Nor have there been any sacred cows. When the recording industry has given us puffery or committed a technical gaffe, it has been duly noted. We can think of many places where such things would go unnoticed -- or, if noticed, remain unreported. The editorial independence of Studio Sound and its willingness to bite the hand that feeds it, when deserved, have gained the respect and admiration of the entire industry, except, perhaps, for some of those whose activities were exposed to public view.

It has been our privilege and pleasure over the years to know personally the staff of Studio Sound. They are a dedicated bunch, and we look forward to their next quarter century!

JBL INCORPORATED
John Eargle
John Eargle
Senior Director of Product
Development and Application

Garry Margolis
Garry Margolis
International Marketing and
Sales Director
Professional Division

APRS ASSOCIATION OF PROFESSIONAL RECORDING STUDIOS LTD.

The Editor,
Studio Sound Magazine,
Link House Magazines (Croydon) Ltd.,
Link House,
Dingwell Avenue,
Croydon, CR9 2TA

Dear Studio Sound,

The APRS was happy to welcome the arrival of a new magazine, *Tape Recorder*, 25 years ago, and has watched with interest and appreciation as it has developed into the readable, but authoritative, professional audio publication that Studio Sound is today.

During the past quarter century the Association has grown in size and in prestige, and, in particular, through the efforts of its executive committee, kept pace with the increasingly complex business side of professional recording -- offering its members access to contracts, credit control and legal advice; and keeping in touch, through them and for them, with the speech and music recording, broadcast, film and now video industries which members both serve and help to advance.

The APRS has encouraged the raising and maintaining of professional standards in member studios -- and in the industry as a whole. The worldwide respect earned by UK studios, and the engineers and producers who work in them must in good measure be due to the APRS.

The same level of respect is accorded to the professional audio equipment manufactured or marketed by APRS members and the Association has set up -- and continues to organise with increasing success, the annual exhibition which shows exhibits then was the 1983 show. A measure of the show's international metropolace, is the fact that the June 84 show is already full, and one which is a real with new products continue to be added to the exhibitors' list.

Always interested in education, the APRS has established its own engineers' refresher course as another important event in the recording industry calendar. And being the scenes the Executive and the APRS secretary daily deal with enquiries, requests for help in the field of training, education and the development of careers in the industry. As a direct result of advice and encouragement from the APRS Executive and practical help from several members, the new engineers course at Salford College of Technology has just started.

Cont'd 2...

44 Chorleywood Hill W3 4HA Telephone: Rickmansworth (070 0923) 77207
The R. Cameron, C. Green, D. Hartley, R. Hine, R. Jones, L. Lewis, D. Pickett
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The APRS will continue its interest in this -- and of course in the University of Surrey Tomlinson course for which the Association has set up the annual Jacques Levy Memorial Awards. In offering anniversary greetings to Studio Sound, the APRS recognises that a fully professional recording business with high standards -- and a readiness to investigate and adopt new ideas in order to improve itself -- needs a publication which has the same attitudes and expertise. In Studio Sound it has one.

Yours sincerely,

E. L. Masch

a remarkably rapid transition which was to make them artists rather than technicians. The new ideas began to be exploited, and such well-remembered techniques as the synchronisation of two 4-tracks, controlled tape phasing or flanging, and ADT appeared on the scene. Old things began to take on new roles, and, like the 'engineer', their names began to become inappropriate. The old 'equaliser', for example, had been a device to 'equalise' the sound in the control room to become like that in the studio--it had been a correction device to allow for the various changes the signal had to go through to get to tape. Now it became a device for creative application--it became a sound *changer* rather than a sound *corrector*. Completely new operations came into the recording process: the recording of the basic rhythm section on its own became much more common, and with it came the overdub, and tracks were bounced across from one track to another, or, later, from one machine to another in addition. And then there was the mix. Now at last the entire recording team could be brought together to apply their respective talents--be they musicians, producers or engineers--in the same room to making those multitrack tapes into mono or stereo masters.

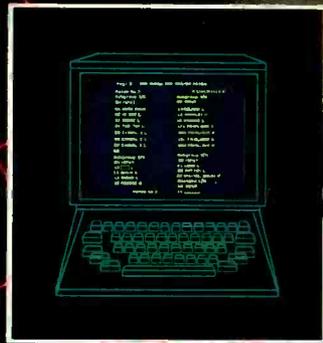
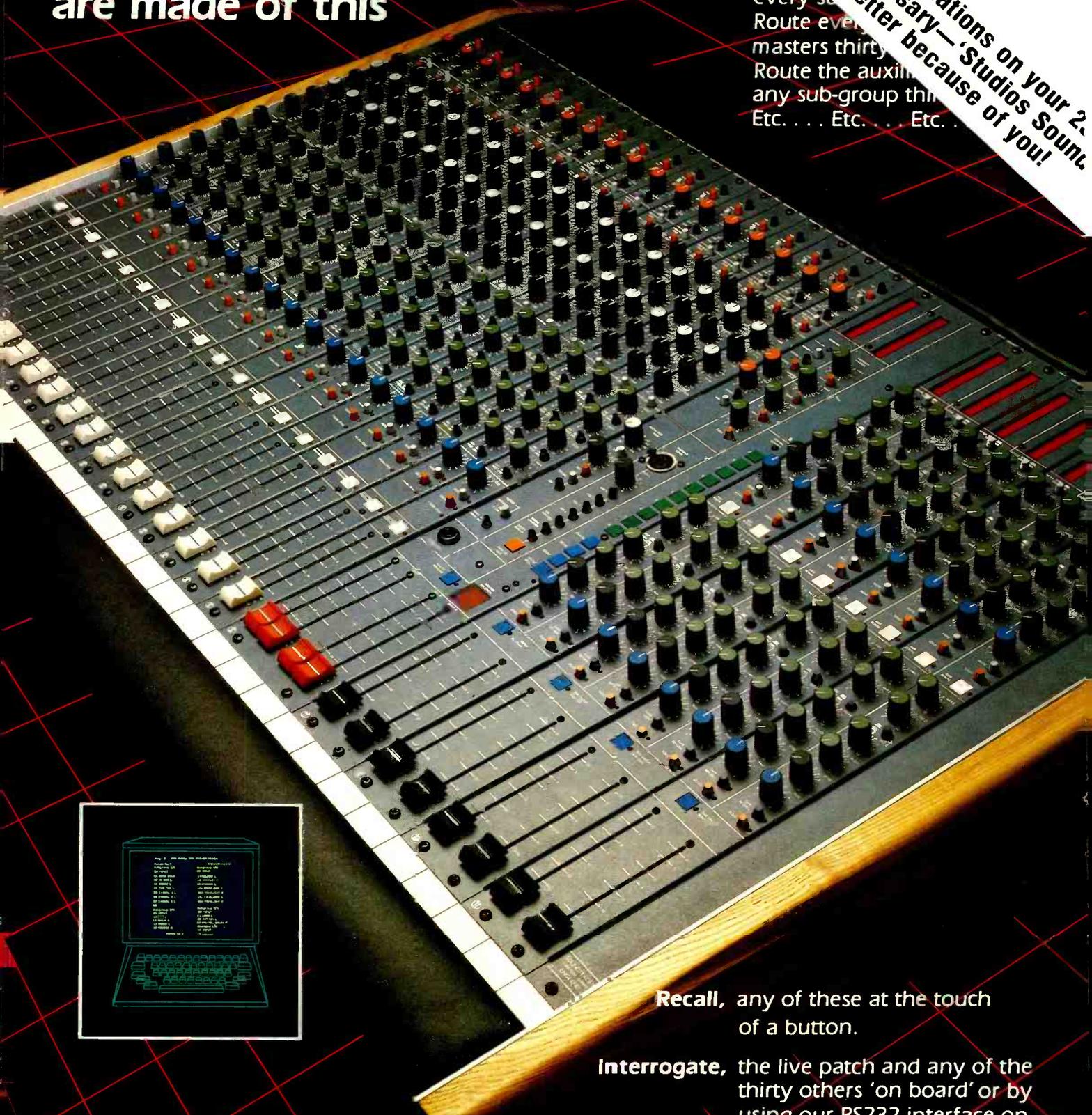
A distinction began to arise between the 'recording engineer' and the 'maintenance engineer', and with that distinction of personnel came a distinction of concern with the technology. To the recordist, the equipment was the 'tools of the trade'--it was something that it was necessary to know how to use--while to the maintenance engineer the gear was something to know inside out, to install, repair, modify or even build in the workshop.

Almost in a moment, it seemed, we had upgraded from 4-track, to 8-track, to 16-track and almost ultimately to 24-track. At about the time that *Tape Recorder* became *Studio Sound*, the first 24-track machines began to come into the studios. 4-track consoles had been expanded, expanded again, and expanded still further, but now they often had to be replaced by new consoles more sophisticated still. I was a tape-op in a major London studio at the time: typical of the period in many ways, it had started in the late Sixties as a 16-track facility. Now, just half a handful of years later, the 16-track in the corner

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Mr. Richard Elen, Editor in Chief
"STUDIO SOUND" Magazine
Link House, Dingwall Avenue
Croydon

20 January 1984

RE: Your Silver Anniversary (A "Letter to the Editor")

Dear Richard:

The great STUDIO SOUND is only a year younger than GOTHAM AUDIO. Having just last year gone through the agony and the ecstasy of our 25th, I can appreciate what you'll be going through all the rest of this year, if you do it right. I wish you only the joys from it, and as little agony as possible.

Our audio world is a better world for the existence of your fine magazine. I have searched both my bookshelves and my soul to find another in this field which addresses itself so eloquently to the main stream of our hodge podge industry. It would appear that the Journal of the AES has great difficulties serving its diverse membership. It addresses itself to an audience of members which wishes it had, but alas the number who would qualify under those rules would be vanishingly small and certainly not able to support as lavishly a Journal as that. You accomplish, in my view, what they attempt.

And so it falls on STUDIO SOUND's shoulders to do the job; and you do it so well. Your no-nonsense approach to reporting, apparently without trying to curry favor with advertisers; your Hugh Ford reviews: honest, well documented, consistent, reliable; your excellent cover pictures which have happily featured our products on numerous occasions; all this contributes to a consistently excellent journal. Now if you could do something about those "messy" looking ad pages which rather remind a U.S. reader of the porn mags, you'd improve even more. Mercifully you have relegated these into their own section, so one may readily skip them.

Happy Birthday STUDIO SOUND! No other magazine can hold a candle to yours -- except, perhaps, on your birthday?

Sincerely yours,
GOTHAM AUDIO CORPORATION

Stephen F. Kemmer
President

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Fax: (212) 941-1111

27th January, 1984



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Our Ref: REC/MAM

Mr. P. Guy,
Studio Sound,
Link House,
Dingwall Avenue,
Croydon,
Surrey, CR9 2TA.

Dear Mr. Guy,

The development of sound recording and broadcasting has been marked by a few inventions of tremendous significance. In earlier times the most notable were the introduction of electrical recording processes in 1925 and the advent of magnetic tape recording immediately following World War II. Both developments revolutionised recording studio technique and had the effect of liberating performing artists from the unaesthetic constraints imposed by former methods. But neither of these profound developments required any changes in equipment used by the consumer.

At the time that Studio Sound was born in 1959 solid state amplifying devices were just beginning to influence the design of consumer electronics equipment and in the ensuing 25 years their impact has again been revolutionary. The nature of the radical influence of solid state devices is not widely understood. Their enormous impact has resulted from a significant reduction in the amount of heat generated in amplifiers and power supplies. This very considerable reduction in heat dissipation has led to a decrease in the size and weight of all electronic equipment rendering it more readily acceptable in the home and quite portable. A valuable side benefit has been a big improvement in reliability, the importance of which increases as products become more varied and complex.

The impact of miniaturization on the industry has been immense. Since 1959 there has been an enormous upsurge in demand for portable radio and cassette players culminating in the quite recent innovation of personal portable stereo cassette and radio devices. All of these developments were undreamed of in the valve era because they were completely out of consideration for size, weight and running cost. In specific high fidelity sound reproducing equipment miniaturization through the application of solid state devices has provided the ordinary user with many useful features which otherwise would have been technically impossible or too expensive.

Like the two previous revolutions to which I have already referred, transistorization has had a generally beneficial effect on the quality of sound reproduction. Greater user convenience always leads to increased demand which, in turn, pays for further development. Where these bounties have been intelligently applied, important gains in refinement have resulted. A good example of this is the application of digital computer techniques - another product of transistorization - to the design and production of consumer electronic equipment and transducers such as loudspeakers.

Within the development span of sound recording, which now covers 107 years since Edison invented the phonograph in 1877, the last 25 years have certainly been the most exciting technically and the most important commercially. A great industry has evolved from what was only a hobby in 1959.

With kind regards,

Yours sincerely
KEF ELECTRONICS LIMITED

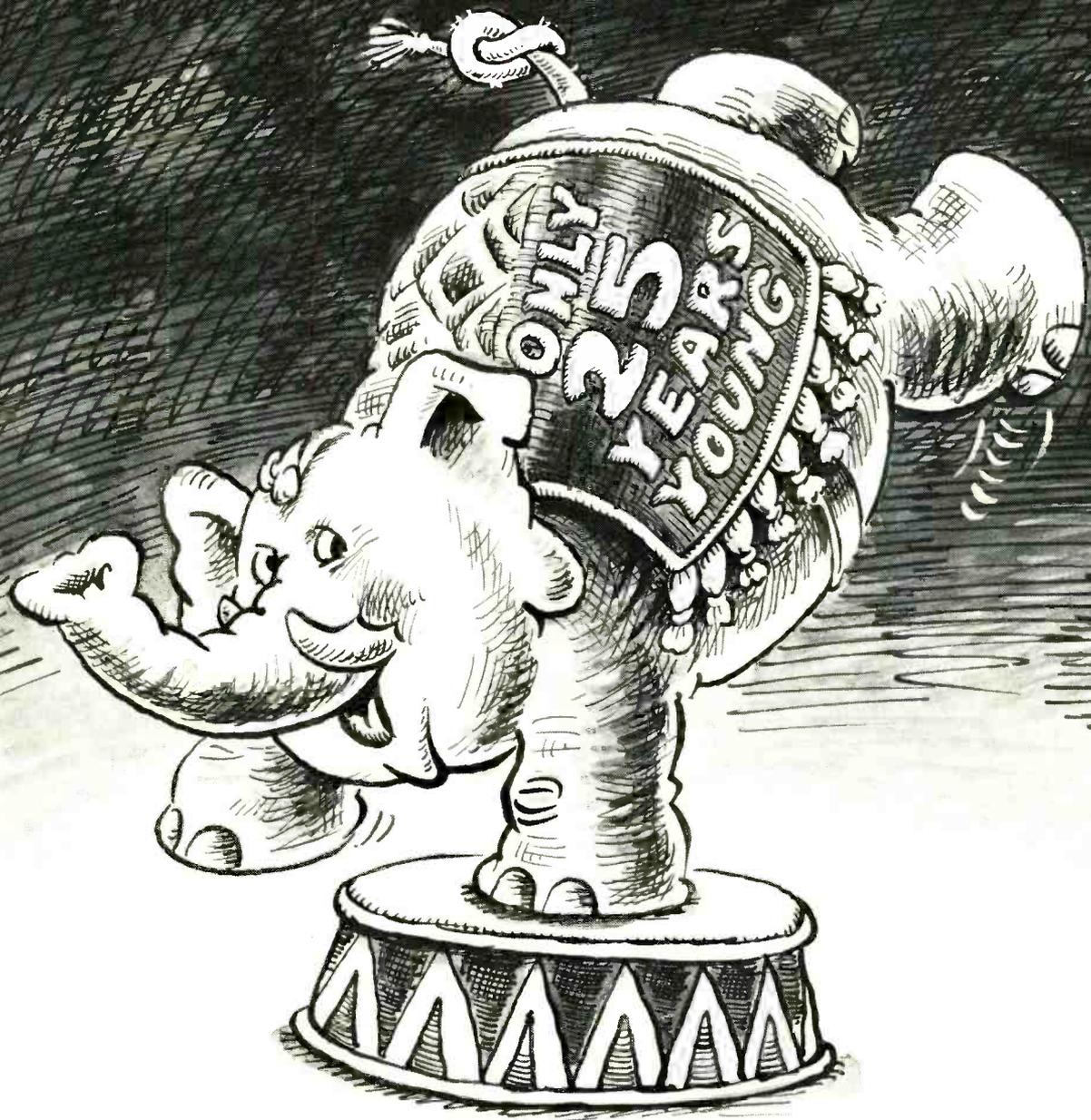
Raymond E. Cooke
RAYMOND E. COOKE, O.B.E.
MANAGING DIRECTOR

was joined by the gleaming new 24-track which, not so long later, replaced it entirely. The well-loved black console was replaced by a new, brighter machine which somehow managed to take up little more space. And for the first time the new tape machine had a knob on it that varied the speed—no longer did one have to hook up a Levell oscillator to an old cutting amp to drive the capstan when such facilities were required.

The technical facilities were to remain similar for some time. But movement was happening on other fronts. The greater number of tracks had opened up new and occasionally unwelcome possibilities—for example the ability to pop eight or ten lead vocals on the tape instead of just two to choose between on the mix. More tracks, more mics, meant more control was needed. More separation was wanted for the musicians and their instruments, now festooned with microphones. The day of the studio designed by common sense and rudimentary acoustics was drawing to a close, as specialist studio designers appeared with answers to such questions as separation, room EQ and the like. Their efforts often seemed to turn the problem in on itself, as separation led to more microphones, closer still to the instruments. Some rooms seemed so dead that you could hardly hear someone speaking just a few feet away...

Then the vinyl crisis of 1973 seemed to combine with a number of other factors to produce a gentle stalling of this seemingly inevitable process. Budgets dropped; belts began to be drawn in, bit by bit. Studio rates stabilised at a level they have hardly exceeded today. And on top of that there was a new musical fashion in Britain on the horizon. Some say it was as inevitable as the change from the big band sound to rock'n'roll had been in the Fifties; that the recording scene of the mid-Seventies had stagnated, centring around high-technology facilities and superstar acts who spent several months in the studio per album; that music and the recording studios that produced it had lost touch with the requirements of the time, and of the young person in the street.

Such an argument is easily countered, but whatever the reasons, the results were plain. Between the major studios and the cassette demo tape sprang



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27th January 1984

Studio Sound
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Dear Studio Sound

Congratulations on your 25th anniversary.

At Dolby Laboratories we have followed your development over the years with great interest, especially as the "new" Studio Sound was introduced in 1965, only a few weeks before our company was founded in London.

Since then, our industry has seen some developments, which have strongly influenced the music industry. Multi-track recording led to computer assisted mix-down, and together they expanded due to the convenience and flexibility they offered. Electronic music production and processing have introduced changes in production techniques and in the sound spectrum. The pre-recorded cassette has very substantially increased its share of the market, because of its ease of use and its portability.

At the same time, the technical quality of professional and consumer equipment improved substantially. Even film and television sound, which has been the poor relation for many years is now attracting much more attention and interest. Dolby Laboratories is proud to be closely involved with the trend towards better quality: 1966 first Dolby A-type recording; 1970 first B-type encoded pre-recorded cassettes; 1975 first Dolby Stereo film; 1980 Dolby C-type.

Studio Sound, with its objective technical presentation, has achieved an authoritative world-wide position in a highly subjective industry. As to the future, I am sure that the magazine will again have many opportunities to play its part, as we approach the choice of new formats for recording, distributing and transmitting sound. It remains to be seen which will become stimulating new media, opening up new outlets for the music produced in our industry, and which will turn out to be just expensive marketing exercises. I don't envy the journalists who have to state publicly which of the new formats will become standards for the next 25 years. For some time we shall see many formats side by side. This is not necessarily bad, because it will show what difference the format makes to the final music product, and what difference a good engineer makes.

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-2-

One lesson we have probably all learned over the last few years is that despite the tremendous speed at which component technology develops, new formats take a long time to be refined and optimized and to mature. New standards have to stand up to the critical tests of many good ears, and real everyday operating conditions. Finally, the consumer has to have, or find, a real use for them.

An interesting time lies ahead of us, during which many engineers will be looking to Studio Sound to present well-founded information. Thanks again for the last 25 years and good luck for the next!

Yours sincerely

Elmar Stetter
International Marketing Director

up whole new strata of recording facilities, reacting to a popular demand for 'basic', low-cost recording that catered for new bands to whom the whole structure of the major record company and the major studio was an anathema. Hit records were made in back rooms on 4-track recorders which offered, at a fraction of the costs of a 4-track of the late Sixties, comparable—if not better—quality.

Small independent labels sprang up to distribute this new music to the punters, as it appeared that the majors had drawn their belts in so tightly that few, if any, new acts were being signed—instead the majors appeared to be happier to survive on established acts and *Greatest Hits Vol 96* compilations. Cheap studios offering 4, 8 or 16-track facilities seemed to appear in a basement on every other street.

For the major studios, the whole established structure disappeared overnight. Whole fields of music seemed to be wiped out as the college circuit became saturated with subsidised tours which a sophisticated band could not afford to match economically. All the established techniques, which had been developed around precision, care, and expertise—for musician, engineer and producer alike—were thrown out by what I called at the time the 'Blunderbuss principle' of music, in which raw energy, carelessly directed, appeared to be a sufficient replacement for expertise, talent and ability. Almost overnight, British music disappeared from the prime position in the international charts that it had held since the Beatles. And with it went much of the freelance recording work. The old progression through a studio from tea boy, to tape-op, to engineer, to freelance, vanished. Engineers and producers left for the States, went into advertising, film or other recording fields where their expertise was still recognised, or left the industry altogether, talking with them years of accumulated ability. Some engineers stayed with their studios to become studio managers instead of risking the harsh and nearly non-existent world of freelance recording. The country became flooded with new studios, but it took some several years to realise that all that expertise and operational knowledge did not come in the new tape machine's

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25 YEARS

in broadcasting, and have set up *Broadcast Sound* to serve that need, both to enable us to cover that field to the depth it deserves, and to give us more room in *Studio Sound* to cover an increasingly widespread and sophisticated field, that of sound recording.

We feel that over the past few years we have moved from a position of overseeing the industry from the outside to being a part of it, advising and giving ideas where we can, and that too is a process we intend to continue. We have seen an increasing degree of support from manufacturers, not only in the obvious areas of advertising support, but also in the important field of telling us what exactly they are up to, so we can tell you. Increasing sophistication, be it in console automation, digital recording or whatever, means that feedback between manufacturer and user is more important than ever, and here we feel that we have a steadily greater role to play in assisting that two-way traffic.

We have, I hope, been outspoken at times sufficient to cause you to pause for a moment and think about what the industry is doing, and whether things are going the right way—again, something we have no intention of shying away from in the future. Because above all our talk about the hardware, and even the ways to use the hardware, we are trying, as you are, to remember that all that sophistication is not an end in itself but a tool—a tool which will hopefully help us to perform better as artists, whether our particular art is music or one of the many other fields in which sound recording and reproduction has a part to play.

We are pleased to have served the industry for 25 years, and hope that with your help we will be able to continue to do so, even better and more usefully than we try to do today. We therefore extend our thanks to you all: whether you use the gear or make it. We especially thank all those who have sent letters of support to the magazine for this issue, many of which appear in this section; we hope to be even more worthy of that support in the years to come, as the industry moves into what may be the most exciting phase in its existence since Edison turned a handle on a machine over a hundred years ago and heard his voice reciting the words 'Mary had a little lamb...'.
Richard Elen

LANSLOWNE

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Registered Office
Lansdowne House, Lansdowne Road, London W11 3LP.

STUDIO SOUND
Link House,
Dingwall Avenue,
Croydon CR9 2TA

Attention: Richard Elen, Esq.,
Editor

31st January, 1984

AK/PM

Dear Studio Sound,

As this year we are both twenty five years of age I thought it appropriate to comment and reflect on the dramatic changes we have seen in our industry during the past twenty five years.

From Valves to Solid State Electronics, from all acoustic instruments and the well tried Hammond Organ through to synthesizers and drum machines, Et Al. From Mono recording to Stereo to Four track, to Eight track, to Twenty Four and Forty Eight track, each step of the way enhancing our ability as engineers to have more freedom of sound and more artistic licence for writers and performers. May I also mention here a young but informative pioneer Tape Recorder!

For me personally, the most exciting times of development during this period were the early sixties and the tremendous impact that period had on the musicality of our industry as it is now.

People say the excitement of these times will never be recaptured but I believe even today we are still capturing with the new generation of instruments that same excitement.

In those early days outside of the major record company studios, there were only to my knowledge, two independents, IBC being one and Lansdowne founded by Denis Preston the other, and Lansdowne gained a reputation for being the most modern up to date studio in Europe at that time.

.../...

Adrian Kerridge / Johnny Pearson

.../ Page 2.

LANSLOWNE

On checking our records and, each of us likes to feel we contribute towards the industry, Lansdowne has been no mean contributor from Liverpool to London with the Dave Clark Five who created and recorded their highly individual answer to the Mersey Sound, Adam Faith, Tommy Steele, The Animals, Spencer Davis, Eric Burdon, Nina & Frederick, Millie Small, Acker Bilk, Roger Whittaker, Johnny Pearson, Joe Brown, Gene Pitney, to name but a few of the highly innovative artists with whom we were very proud to be associated with in these early years, creating forty four major hits in the UK charts alone and earning for many artists who passed through our doors something in excess of three hundred silver, gold and platinum discs, and sales exceeding 200 million worldwide. No mean feat.

I also like to feel we contributed technically by being a major advocator in the sixties, to name but two examples, transformerless equipment and minimum signal path electronics; to the present day where the studio has forged ahead with acquiring the best in sound to video technology and computerised and audio recording facilities with digital effects. But we must never lose sight of the fact that we are here to serve our clients and artists and to do the best for them for the final product. Let us hope that the digits we now find ourselves processing will not detract us from taking the art of recording into a too clinical sphere.

Yours sincerely,



Adrian Kerridge

Managing Director

Success breeds success

Klark-Teknik congratulate Studio Sound on 25 successful years.

With many thanks for your help in our success.



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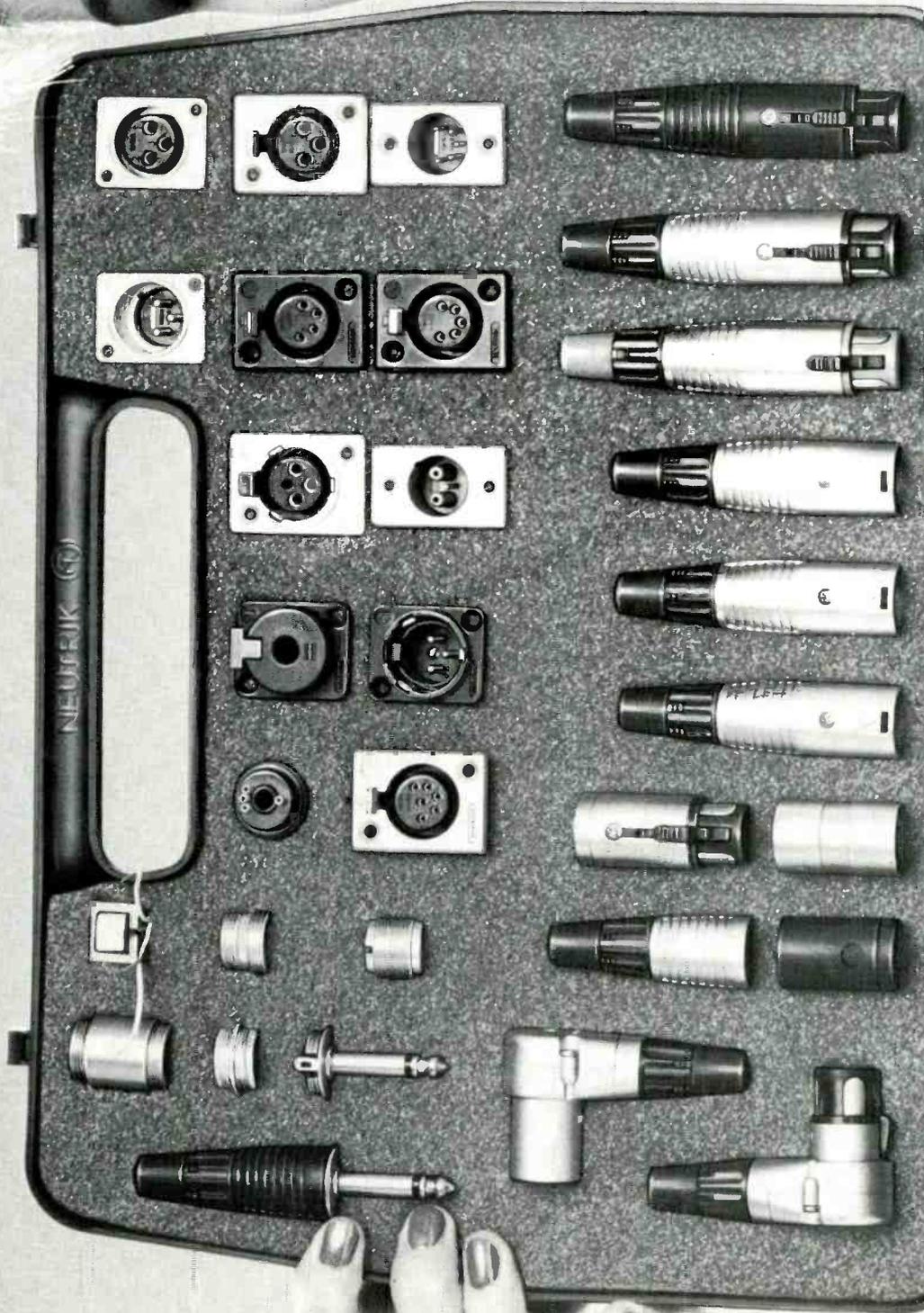
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YEARS

MUSINGS ON PAST AND FUTURE

More than 20 years have passed since my first contribution to this magazine's forerunner *The Tape Recorder*, a piece about the 1962 Audio Fair which detailed what seemed like a deluge of domestic tape equipment from over 20 firms, more than half of them British. But that report also included respectful mentions of studio machines from EMI, Leever-Rich and Ampex, and semi-pro models from Brenell, Ferrograph and Vortexion, so that even in those days of optimistic amateurism there were pointers to a professional future for these pages. But more immediately to the point, just five months after that article appeared I found myself installed as Technical Editor of the same magazine, under the owner/editor/publisher regime of the Dalmatian-loving, tough, but ever-charming Miles Henslow, who foisted this additional (but unwanted) task upon me as a condition of my holding the same (and eagerly sought) position on *Hi-Fi News*.

David Kirk's letter in this issue relays most of what needs to be said about those Henslow days, and also the subsequent transition to Link House, but there are just a few extra points

In the beginning John Crabbe

worth noting. They mainly concern the contrasts between who did what, and who was called what—as much for fun as anything, but possibly also of some interest to future historians of magazine journalism.

Miles Henslow was named as Editor of both *Tape Recorder* and *Hi-Fi News* until March 1965, nearly a year after the Link takeover. But apart from writing the monthly Leader columns until June 1964, for which he always had to be badgered and bullied right up against the printer's deadline, Miles never did any real editing work on either magazine after I joined his staff at the end of 1962—and I sometimes wondered how much he had done before. During that last 18 months of the Henslow epoch, day-to-day editorial management of both magazines fell to Alan Lovell (who now runs his own publishing business) and myself, with David Kirk increasingly involved towards the end. Then, when David and I were 'sold' to Link House with the two magazines in

1964 we had the curious situation that during our first nine months at Croydon Miles Henslow was listed as Editor of *Tape Recorder*, myself as Technical Editor, and David Kirk as News Editor, whereas in fact Miles played no part at all, I was treated as Editor by the management but devoted 90% of my energies to *Hi-Fi News*, David was Editor for most practical purposes, and there wasn't a separate News Editor.

I wrote a few of the early Leader columns and kept a fatherly eye on the way things were going, giving the odd bit of technical advice, but by the time 'Crabbe' had replaced 'Henslow' as nominal Editor on the Contents page I had faded very much into the background, leaving the whole task except signing the monthly paysheets to the 18-year-old David Kirk, who on top of everything else was then commuting daily between Southend and Croydon. Thus it is very appropriate that David should have written more than I about those days before the

emergence of *Studio Sound*, for he was the real driving force on *Tape Recorder* while I was a mere figurehead.

A driving force which proved to be rather less effective was the chimera of 'creative tape recording', an amateur pastime to which we all paid lip-service in the 1960s. Indeed, in the Editorial I wrote in July 1964 for the issue which inaugurated the Link House regime, *Tape Recorder* was pledged to campaign in favour of 'the expansion of tape recording into the major national hobby it deserves to be'. Well, deserving or not, that sonic equivalent of domestic photography somehow never materialised, and in the event it was just as well that I stood to one side and let David steer the journal in an increasingly professional direction. After all, the two other magazines devoted to the 'hobby' ethos in tape recording finally went down the commercial drain, whereas *Studio Sound* still goes from strength to strength.

Now D.K. is concerned with video, I'm writing about art history, and Miles has joined his Dalmatians in heaven or hell. Where will Richard Elen end up?

The Tape Recorder alias *Tape Recorder* alias *Studio Sound* was born above a violin shop in Mortimer Street, W1, within shouting distance of Broadcasting House. The shop is still there if you need a new string. *The Tape Recorder's* father was a Bentley-driving gent named Miles Henslow. The Bentley doubled as a status symbol and office van, being used for local magazine deliveries. Henslow himself was a former hack on *The Draper's Record* or something of the kind and made himself a healthy income by creating Britain's first monthly magazine for audio enthusiasts—*Hi-Fi News*—in June 1956.

Two renegades from the *News Chronicle* now enter the picture. One Robert Douglas Brown and a colleague set up elsewhere in London a monthly titled *Tape Recording and Hi-Fi*. Henslow was incensed at what he saw as invasion of his territory and reacted by launching *The Tape Recorder*. *Hi-Fi News* became

From scissors to razor blades David Kirk

gradually fatter as the years passed but neither of its semi-competitors enjoyed much advertising support. With hindsight, Brown must regret that he did not pitch in with a direct rival to *Hi-Fi News* as subsequent competitors (*Hi-Fi Sound*, *Popular Hi-Fi* etcetera) earn considerable profits.

Enter myself, the wonder ingredient. Leaving the South East Essex County Technical High School with a miserable three O-levels in July 1963, I joined the editorial staff of *The Tape Recorder* as Reader of Proofs, Maker of Coffee and Carrier of Litho Plates to Waterloo Station. The coffee function was dropped almost immediately when my skills in that area were found to be less than ideal. One year later, the two titles were sold to Link House Publications. Henslow's

ruling that *Hi-Fi News* should never carry more than 100 pages of advertisements in any one issue was abandoned and very soon the head-on competition he had feared began to appear. There seemed to be as many audio magazines then as there are computer titles now and both *Tape Recording* and *Hi-Fi* and *Tape Recorder* waxed decreasingly thick, I came back from holiday one day to find myself elevated from deputy editor to editor. What did I think I could do to increase the profitability of *Tape Recorder*? (We had snipped *The* off some years before.) Push it up-market, said I. We were already moving in that direction anyway, playing down Grundig and Philips rubber-banditry in favour of anything we could find running faster than 7½ in/s.

In my own mind, I always

consider the true father of *Studio Sound* to be John Alcock (sales manager with Leever-Rich and subsequently with the ill-fated Unitrack). I had gone to see him in Wandsworth to check the details of a feature describing the Leever-Rich factory. The trouble is, said he, that there is nothing for a sound engineer to read beyond *Melody Maker* and the *Daily Mirror*. Why didn't we start a journal purely for studios? I agreed it was a good idea. My advertisement manager, the aggressive but highly capable Tony Newman (now selling fluorescent lighting in the States) agreed. The management of Link House agreed. A polite period of corporate inactivity was permitted to elapse and then a title was chosen and a cover format designed. We had been running a series titled *The Sound Studio* and this seemed appropriate to the magazine itself. John Mendes, then the company's managing editor, at some stage proposed *Studio Sound*. There was no snap

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25 YEARS

'That's it!' It didn't mean anything... it was back-to-front. But *Studio Sound* it became, with a slow transition of title and cover design to avoid frightening *Tape Recorder's* readers and advertisers before the new format became established.

I remained editor of *Studio Sound* for about 20 years; at least, it felt that long. Then a column entitled *Video*,

contributed initially by Richard Golding and later by Roderick Snell, blossomed into a magazine in its own right. Ten years on, it too has changed name and moved up-market as *Professional Video*. . . essential reading for any audio or television studio engineer who can see further than the Compact Disc.

Why did I leave *Studio Sound*?
(a) Because digital audio was

scarcely yet on the horizon and we seemed to be writing round in circles; (b) I never warmed much to the multi-miking, multi-channel, multitrack end of the business from a final-product viewpoint even if it led to impressive and expensive equipment; and (c) £300 extra salary to edit *two* monthly titles rather than one was not encouraging. *Studio Sound*

survived the loss of yours truly and sustained its climb into increasing respectability and profitability.
Happy birthday fatty.

I think every editor of *Studio Sound* has, at some time or another, commented on the financial situation and related studio survival within the recording industry. True enough, at times it's not a pretty sight, and particularly over the last few years the 'general depression' must have taken quite a lot of studios close to breaking point. But thankfully, most seem to survive in some way, even though the added complication of competition is probably fiercer than in most industries.

My years with *Studio Sound* gave me the definite impression that it's the people in recording studios that make them, not only survive against the odds, but keep them moving towards that 'better sound'. Vocational

Middle man Ray Carter

dedication appears to be assisted by the competitive aspect of the industry to provide an attitude that cannot help but make things work.

Technological advances have obviously added fuel to the fire of competition, but the equipment that these advances create is only of any use in the hands of skilled people. Like computers, you can only get out what you put in, but in the ultimately analogue world of sound reproduction you hope it will come out a bit better than before. It will be a great pity if the level of investment in

expensive machinery finally becomes the major factor on which the success of a recording studio depends. Of course it plays an important role, because in the light of a good producer, greater horizons are offered to recording skill, technique and hence experience; and the improved results will hopefully show in the finished product (but we'll leave record pressing out of this).

Provided the commitment and dedication, together with the skills and techniques in a recording studio are fully maintained and suitably

developed, along with the equipment of course, then the recipe at least is right for success. I suppose, not being the owner of a recording studio bank account, it's all very easy for me to sit and write philosophical-sounding letters. However, I feel that my position with *Studio Sound* allowed me to be sufficiently involved in the business to experience and interpret situations that justify my comments—I hope I'm right.

Anyway, during my time with *Studio Sound* I thoroughly enjoyed being part of an exceptionally friendly industry. To those of you that I met, "Hello again" and to those I didn't, "Hello".

Best wishes for a prosperous and rewarding future.

The most significant development since I joined the magazine in September 1980 must be the introduction of digital recording. I remember hearing some early digital recordings on vinyl at the time; I had no problems with the theory—*Studio Sound* had kindly run a series of introductory articles on the subject a remarkably long time before. It all made sense... it was just unfortunate that it sounded so *nasty!* I was forced to conclude that as the *theory* looked right, there must be something wrong with the practice. How could the top end sound so harsh, and the echo drop away so unnaturally at the end? I remember writing at the time that perhaps we needed to look at higher sampling rates and longer digital word lengths, as forty-something kilohertz was obviously too low (hence the top end), while there must be more than 14 or 16 bits because the least-significant bit still seemed to represent something a little *too* significant.

As time went by, I discovered why those effects were occurring, and how they were avoided: that the echo died away curiously because it needed dithering—something which sounded like an audio equivalent of Heisenberg's Uncertainty Principle, and was certainly something someone called 'unnecessary, but it doesn't half sound awful without it!'—and that the top end, while partially due to phase shifts in the anti-

Yesterday and today Richard Elen

imaging filter (or was it the anti-aliasing one...?) was largely due to cutter-head resonances, to which the real answer was obvious, and with which came the sudden realisation that another vinyl crises might not matter quite so much as before.

There were digital systems in studios in those days, once in a while: Sony stereo units with their attendant weak-link video recorders, and perhaps the odd 3M digital system, about which, no doubt, a great many legends tell.

One thing I noticed, though, was that there were signs that the industry might start moving again. I had spent the previous two years editing the now-sadly-defunct magazine *Sound International*, having been the first and penultimate editor of the title, and had watched the British musical instrument industry largely collapse as Government weirdness strove for an unusual kind of efficiency in which large companies were made smaller and small companies ceased to exist. We got the efficiency at the end, of course: the British MI industry is now dominated by highly efficient Japanese companies. I would like to think that perhaps this was accidental, and that no-one could really be that loony deliberately, but, alas, they could

be.

I had come on to *SI* by answering an ad in *Studio Sound*, of course, as we had received it at the cosy, intimate little 16-track studio I ran for EMI Music Publishing in a Denmark Street basement following my return from the USA in 1976. We had not really heard more than a murmur about digital then, as we were in a rather unusual world recording library music and commercials, a haven of excellence compared with the pop world of the time, but not one noted for large capital expenditure budgets. It seemed in those days that the studio scene had ground to a halt, and that nothing very new was happening. Everyone who had a good excuse had had 24-track for several years, and there really wasn't much more than that to aim for. Maybe some curious little company in Oxfordshire was thinking about an automated console in those days?

But digital techniques *really* existed by the time I came to *Studio Sound*. Not just digital audio, but digital almost everything. Rumours of an EMI digital console... a new synthesiser from Fairlight was the subject of an article I wrote before I joined the magazine, and it was published in the

February 1981 issue. Modern Times were on their way, although they hadn't *quite* arrived. Funnily enough, they still haven't, quite. And even more funnily, some people still don't quite believe the stuff works, although it seems to work to me. Maybe I'm not listening properly (to what I hear or to what I'm told I hear?) or carefully enough. Perhaps it is carelessness and imagination that makes this CD of the Equale Brass sound so good as I listen to it while tapping gently at the keyboard and gazing at the screen on which these words appear...

Enough of this stream of (un)consciousness... from where I'm sitting, the industry looks pretty good, *if* there is enough money coming into the studios to help them stay at the sharp end; *if* producers learn again to choose studios and consoles because they sound good and are right for the project and not because they're fashionable (even if the favourite console *is* excellent); *if* studios can find a way of continuing to employ maintenance staff and assistant engineers, so gear can be fixed fast and new engineers can be trained the only way that works... There will no doubt be a recording industry around in 25 years' time, and no doubt it will be as much fun, and as satisfying to be in, as it is today. And no doubt *Studio Sound* will be around too. Happy birthday, *Studio Sound!*

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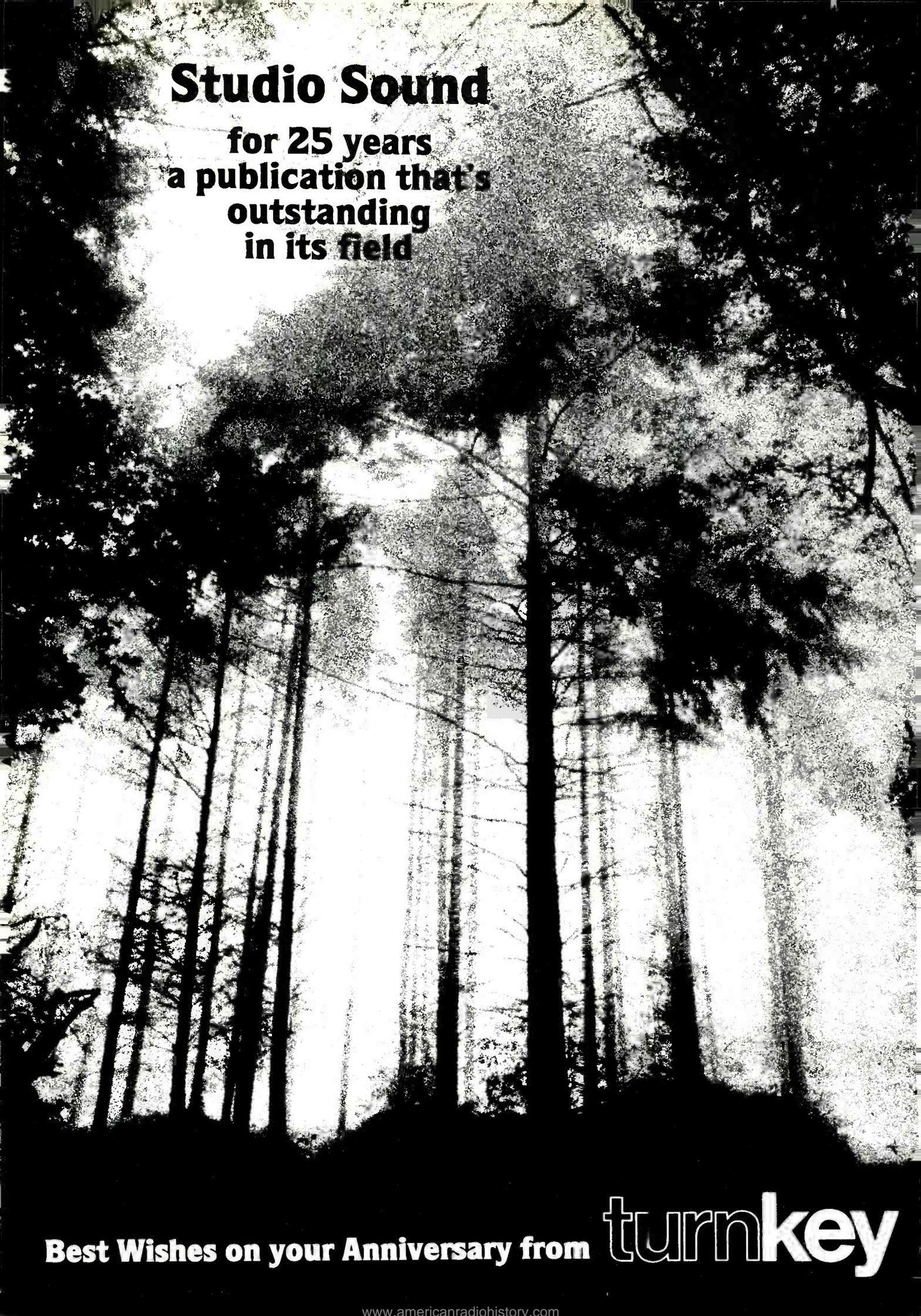
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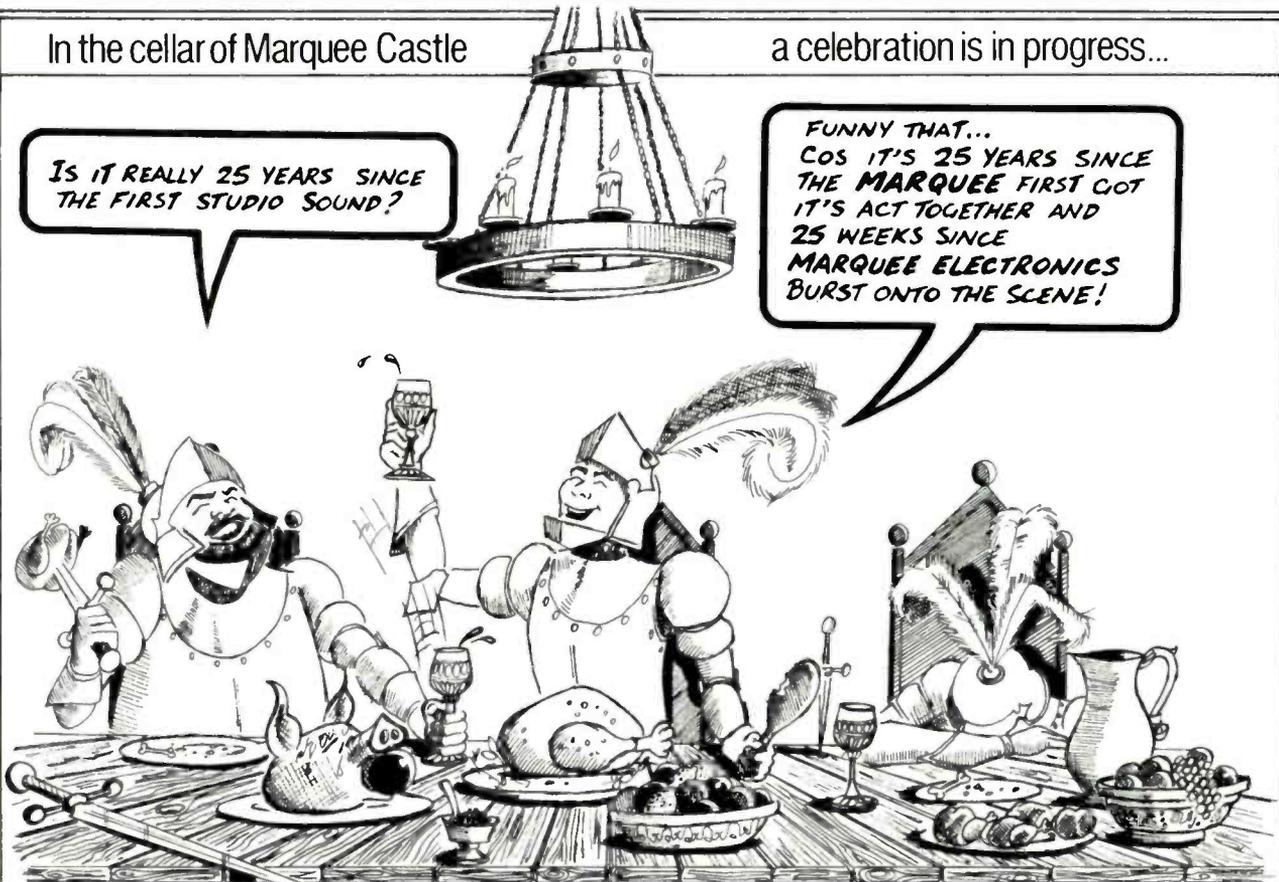
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IS IT REALLY 25 YEARS SINCE
THE FIRST STUDIO SOUND?

FUNNY THAT...
COS IT'S 25 YEARS SINCE
THE MARQUEE FIRST GOT
IT'S ACT TOGETHER AND
25 WEEKS SINCE
MARQUEE ELECTRONICS
BURST ONTO THE SCENE!



Marquee Electronics

Sales, Servicing and Rentals till 11pm
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We'd like to congratulate Studio Sound on their twenty-fifth birthday.

A quarter of a century at the top in a business like theirs is no mean achievement, especially considering the ever-increasing range of equipment to be tested, reviewed and discussed.

Although we're somewhat younger than Studio Sound, we can still claim over 12 years experience in the recording industry.

We've supplied major recording studios and broadcasting organisations all over the world with a wide range of sound equipment.

For further details about ITA, check out our ads in this edition of Studio Sound or contact Mick Boggis at ITA, 1, Felgate Mews, Studland Street, London W6 9JT. Telephone: 01-748 9009.

INDUSTRIAL TAPE APPLICATIONS
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□ GREAT BRITISH SPRING □ H H □
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□ MXR □ NEUMANN □ N.S.F. □
OTARI □ P.E.P. □ PENTAGON □
QUAD □ REBIS □ REVOX □ ROLAND
□ R.S.D. □ SECK □ SHURE □
SOUNDCRAFT □ SPENDOR □
STATRAK □ TANNOY □ TASCAM □
T.C. ELECTRONICS □ TDK □
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STUDIO SOUND'S TWENTY FIFTH.

Happy Birthday!
from **Audio + Design**
The Hit Sound in Audio Science

RAPER & WAYMAN
PROFESSIONAL AUDIO

	25	S	25	
		E		
S		R		
A		V		H
L		I		I
E		C		R
S	0	E	0	E

Congratulations on +25
May you continue to maintain
this high level

34 Danbury Street, London N1 Telephone 01-359 9342/3030

Advanced Music Systems
congratulate Studio Sound
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now that

*Sounds
like
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Advanced Music Systems
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Worsthorne Village, Burnley, Lancashire
Tel: (0282) 36943

25 years of studio sound



**Many
Congratulations.**



U.K.: **AUDIO KINETICS (U.K.) LIMITED**, Kinetic Centre, Theobald Street, Borehamwood, Hertfordshire WD6 4PJ England. Tel. 01-953 8118 Telex 299951 (Kintek G)

U.S.A.: **AUDIO KINETICS INC.**, 4721 Laurel Canyon Boulevard, Suite 209, North Hollywood, California 91607, U.S.A. Tel. 980 5717 Telex 230 194 781

AUDIO KINETICS

1970-72

COMMAND

DAVID KURR VISITS COMMAND RECORDING STUDIOS

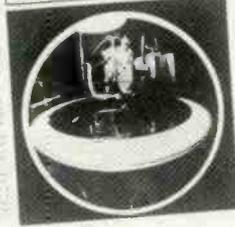


Command Recording Studios, located in the heart of the music business in New York City, is a state-of-the-art facility that has become a mecca for recording artists and producers alike. The studio's reputation for high-quality sound and professional service has made it a sought-after destination for a wide range of musical genres.

David Kurr, a prominent figure in the industry, recently visited the studios to explore the latest in recording technology and techniques. His insights provide a valuable look into the inner workings of one of the most successful recording environments in the world.



Photo by [Name]



THE WONDERFUL SOUND OF RADIO

Keith Wicks begins a two-part examination of commercial radio and its prospects.

Commercial radio has long been a dominant force in the entertainment industry, providing a constant stream of music, news, and information to millions of listeners. However, in recent years, the industry has faced significant challenges, including the rise of digital streaming services and the fragmentation of the audience.

Keith Wicks, a seasoned industry analyst, examines the current state of commercial radio and offers his perspective on its future prospects. He discusses the impact of new technologies and the changing listening habits of consumers, while also highlighting the unique strengths and opportunities of the radio medium.

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Experimental Tetrahedral Recording

PART ONE BY MICHAEL GERZON

This article explores the concept of tetrahedral recording, a technique that uses four microphones arranged in a tetrahedron to capture sound from multiple perspectives. Michael Gerzon discusses the theoretical benefits of this approach, such as improved spatial imaging and a more natural sound field. He also provides practical advice on how to implement this technique in a studio setting, including microphone placement and signal processing techniques.

ABBEY ROAD

Keith Wicks visits EMI studios

Keith Wicks provides an in-depth look at the iconic Abbey Road recording studios in London. He details the studio's history, its legendary sound, and the various recording techniques used by the Beatles and other famous acts. Wicks also interviews studio engineers and producers, offering valuable insights into the creative process and the technical challenges of recording in this historic space.

STUDIO SOUND & tape recorder

FEBRUARY 1970 26 44 (12p)

This advertisement features a detailed photograph of a vintage tape recorder, highlighting its sleek design and advanced features. The text describes the recorder's performance capabilities, including its frequency response and tape quality. It also mentions the inclusion of a manual and a carrying case, making it a portable and reliable choice for studio and field recording.

STUDIO SOUND

JULY 1970 36 (15p)

INCORPORATING TAPE RECORDER

This advertisement promotes a recording studio setup that includes a tape recorder. It emphasizes the studio's professional-grade equipment and the expertise of its staff. The text lists various services offered, such as recording, mixing, and mastering, and provides contact information for inquiries. A photograph shows a person working at a recording console, illustrating the studio's capabilities.

LEVEL TONE CM

This advertisement features a photograph of the Level Tone CM audio device, which is used for leveling and tone control in recording studios. The text describes the device's adjustable settings and its ability to provide precise control over the audio signal. It also mentions the device's compact size and ease of use, making it a valuable addition to any studio's equipment rack.

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INELCO Belgium
Avenue des Croix Noires, 9
B-1120 BRUSSELS

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SC SOUND SYSTEMS
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DK-2630 TAASTRUP

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D-8000 MÜNCHEN 60

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NORES OY
Väinämöisenkatu 19
P. O. Box 889
SF-00101 HELSINKI 10

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F-93330 NEUILLY-SUR-MARNE

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AKG Acoustics Ltd.
191, The Vale,
LONDON W3 7QS

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Via Venezia 6-8
L. 10100 Granarolo
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I-46057 BOLOGNA

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2-12-1 Kita Otsuka, TOSHIMA-KU
170 TOKYO

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PHILIPS Electronic Ltd.
AKG Sales Division
601 Milner Avenue, Scarborough
ONTARIO M1B 1M8

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BEAULIEU LUXEMBOURG, sàrl
2, rue de Luxembourg
P. O. Box 29
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Postbus 82
NL-1230 AB LOOSDRECHT

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SIVILINGENIÖR NJÅL HANSSON A/S.
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Postboks 6031 Etterstad
OSLO 6

NORWEGEN
FEIRING Elektronikk A/S
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AKG Sales Department
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Apartado 1331
P-1009 LISBOA

PORTUGAL
BEPALIZ Lda.
R. Capitão Leitão, 47-1. Dto.
P-2800 ALAMDA

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Sorterargatan 2
S-162 26 VÄLLINGBY

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CH-5430 WETTINGEN

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Stamford
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ARAB INDUSTRIAL BUREAU
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CAIRO

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TECHNICAL SERVICES
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Doha
BAHRAIN

ISLAND
DUNN & CO. A.
Solomon Street
REYKJAVIK

GRIECHENLAND
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54 Tsimiski Street
P. O. Box 500
THESSALONIKI 111

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SOCIEDADE INTERNACIONAL F. INDUSTRIAL
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150, Rua da Liberdade
BISSAU

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INDIA TRADING COMPANY
Market above Williams Market
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BANGALUR

IRAN
ELECTROVISION Co. Ltd.
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South Sohevardi
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TEL AVIV 61-214

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Hartenaugasse 15
8010 GRAZ

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INTERNATIONAL AERADIO (E. A.) Ltd
Newfield House, 2nd Floor
St. Mark's Street
Nairobi

KUWAIT
JUPITER TRADING COMPANY
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KUWAIT

LIBANON
PROJECTIONS SA
Bechara El Khoury Str
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ET INDUSTRIEL Département BOSCH
Lalana Ravoninahitrinarivo
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Boîte Postale 2569 E
C. T. 1015 CASABLANCA 05

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IKEJA

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STUDER REVOX (South Africa) Pty. Ltd.
Concor House
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2091, JOHANNESBURG

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INDIA TRADING &
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P. O. Box 3515
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TANZANIA
AERADIO (Tanzania) Ltd.
Tancot House
City Drive
P. O. Box 861
DAR-ES-SALAAM

TUNESIEN
SOGOR Electronics
32, Rue Garibaldi
TUNIS

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TEKNIKEL Elektrik ve Sanayi A. S.
Nispetiye Caddesi No 1
SARAYBURNU

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P. O. Box 2577
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INTERNATIONAL AERADIO (Zambia) Ltd.
Maunda Road
P. O. Box 31253
LUSAKA

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RADIO FREQUENCY COMMUNICATIONS
(Pvt) Ltd.
Suite 219-220, 2nd Floor, Colonial Mutual Bldg.
Gordon Avenue, Salisbury
P. O. Box 8357
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ZYPERN
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P. O. Box 291
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INTERNATIONAL AERADIO (E. A.) Ltd.
P. O. Box 2577
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Amalgamated Wireless (Australasia) Ltd.
Newfield Division
P. O. Box 100
GREENSBORO

BARBADOS
A. & B. Music Supplies
Prince Alfred Street, Bridgetown

BOLIVIA
Sociedad de Industrias S.A.
Casilla 1274
LA PAZ

BRAZIL
Importechnica S. A.
P. O. B. 6134
Av. Dr. Albuquerque Ribeiro 740
CEP 01133 São Paulo - BRASIL

CHILE
Sociedad Importadora Providencia Ltda.
Casilla 91, Las Condes
Santiago de Chile

CHINA (PEOPLE'S REPUBLIC)
China National Light Industrial Products
Import & Export Corp.
82 Tung An Men Street, Peking

COLOMBIA
Orbex de Columbia Ltda.
Calle 37 No. 14-35, P. O. Box 10953,
Bogota

COSTA RICA
Electronic Corporation
Apartado 10304 San José
Juan Bausbach Instrumentos Musicales Ltda.
Apartado 10237, Calle 11, Ave. 1 A, San José

CUBA
Consumimport
Apartado 8427, Calle 23 no 55
Mediada La Habana

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AWA New Zealand Limited
P. O. Box 858 Suva
47 Foster Road, Walu Bay

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Almacen Magno Mercantil S. A.
9a. Ave. 8-26, Zona 1, Guatemala City

GUYANA
Mohamed's Radio & Electronics Ltd.
70 Robb Street
P. O. B. 10229, Lacytown, Georgetown

HAIITI
Aux Ondes Sonores
41 Rue Macaoula
PORT-AU-PRINCE

INDIA
Phillips India
Peico Electronics & Electricals Ltd.
Shivsagar Estate Block "A"
Dr Annie Besant Road
P. O. Box 6598
Bombay 400018

INDONESIA
Shure Electronics
Glodok Baru Blok C-118 (Harco Building)
Jakarta-Kota

ISLE OF CABO VERDE
M. Ribeiro de Almeida
P. O. Box 15
Vicente de Cabo Verde

JAMAICA
Stanley Motta Ltd.
2-4 Geffrard Place
P. O. Box 341, Kingston

KOREA
Young Nak So Ri Sa
182 Jangsa-Dong, Jongro-ku, Seoul

**DEMOCRATIC PEOPLE'S
REPUBLIC OF KOREA**
Korea Machinery Import Corporation
Central District, Pyongyang

MALAYSIA
Asia Sound Equipment (M) PTE Ltd.
35 Jalan Yew Pudu, Kuala Lumpur 0613
West Malaysia

MEXICO
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Apartado Postal M-851,
Mexico 1 D. F.

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Casilla 1274
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P. O. Box 50-248, Porirua

NEW ZEALAND
AWA New Zealand Ltd.
276 Richmond Road
P. O. Box 1363
AUCKLAND, NEW ZEALAND

PAKISTAN
Pakwestrex Co. Ltd.
Room 55 Fourth Floor, Chafoor Chamber
Abdullah Haroon Road, Karachi

PANAMA
Tropelco S. A.
Apartado 8465, Panama 7

PARAGUAY
Electronicas Sri
Casilla de Correo 66, Asunción

PERU
Tel. 411 200
R. Rivera Nayarate No 797, Lima-27

EL SALVADOR
Radio Parts. S. A.
P. O. Box (06) 1262, 4A Av. Sur 125
San Salvador

SINGAPORE
Asia sound equipment (S) PTE. Ltd.
100 Beach Road
No. 02-13/14 Shaw Tower
Singapore 0718
Republic of Singapore

SOLOMON ISLANDS
Solomon Islands Information
and Broadcasting Services
Honiara

SRI LANKA
Hi-Fi Centre
35 Rosmead Place, Colombo 7

TAHITI
Oceanic Garage
P. O. Box 39, Papeete

TAIWAN
Yang's Audio-Visual Laboratories
58 Min-Chuan West Road, Taipei 104

THAILAND
Vichai Trading Co.
P. O. Box 1512, 133/2 Asoke Rd.
Bangkok 10110

URUGUAY
Swissau
P. O. Box 100
Montevideo

VENEZUELA
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Asia Disquies
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Congratulations for 25 Year's Excellent Work in Professional Journalism



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191, The Vale, London W3 7QS
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TX: 851/28938 akgmnc g

AKG of Japan Service Co. Ltd.
401-3, Daichi-Kanoh-Bldg.
2-12-1 Kita Otsuka, TOSHIMA-KU
170 TOKYO, JAPAN
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25 YEARS

1972-75

LITTLE HENRY™

Chadacre Wins The Day

TAKE A TIP FROM HENRY—SOLVE ALL YOUR PROBLEMS AND INVEST IN A CUSTOM BUILT CHADACRE MIXING CONSOLE—OR BUILD ONE YOURSELF!

Chadacre's mixing console is a masterpiece of audio engineering, designed for professional studios and serious hobbyists alike. It features a wide range of controls, including volume, tone, and equalization, all housed in a sleek, durable cabinet. The console is built to last and is capable of handling the most demanding audio signals.

Command Studios RIP

JOHN DUNN

DIARY

Since I wrote the column here in 1972, I have had a lot of fun with the Editor. You can't go much without to mention a few things that I have done that you may have heard of. I have had a lot of fun with the Editor. You can't go much without to mention a few things that I have done that you may have heard of.

There is a lot of fun to be had with the Editor. You can't go much without to mention a few things that I have done that you may have heard of.

TOTAL RECALL

If you are thinking about music automation and you are looking for a system that will give you the most of your money, you should consider the TOTAL RECALL system. This system is designed to give you the most of your money, and it is the only system that can do this.

Automated Processes Inc.
11000 1st Street, Northridge, CA 91324

Command Studios RIP

JOHN DUNN

This is a detailed article about the history of Command Studios and the impact of RIP on the industry. It discusses the challenges faced by the studio and the solutions implemented to overcome them.

Ex Feldon, now designer

AFTER NEARLY four years as JBI sales manager, Stephen Court has left Feldon Audio to do consultancy and design work. He said that, in live performance and studio monitoring work, it was becoming virtually impossible to satisfy every engineer environment with 'one omnipotent off the shelf system'.

Each situation must be treated as highly individual in order to maintain some sort of consistency in the final product. His company, Dennington Acoustics, hope to provide a service to both these fields including equipment manufacturer with system design and construction as well as offering top quality components. When asked if customers wouldn't rather go direct to the suppliers of this equipment he said that, unless he was physically building the system, they would do that anyway. His service on that side would be to recommend the right units for the job without being biased toward any particular manufacturer. The address of Dennington Acoustics is 50 Dennington Park Road, Hampstead, London NW6. Phone 435 0532 or 734 2571.

future proof

With a digital synthesizer and plug-in pre-amplified head blocks your Stellavox recorder may never be obsolete.

Any current hi-fi tape manufacturer can be serviced.

Stellavox 3M Digitalmaster music mastering recorder.

STELLAVOX

Video

THIS AUTUMN, Link House Publications are to launch a new monthly magazine called Video. This is to be edited by David Kirk, along with Studio Sound, and its aim will be to detail the continuing development of audio-visual media with particular emphasis on television and video tape. Video will be a professional journal with a controlled circulation, aimed at users of audio-visual communication techniques.

NEWS

Automated Advertisements... The latest in audio technology... A new generation of speakers... The future of music production...

Within 2 years, 4-channel sound will be the rule. Sansui QS system puts you 2 years ahead.

Now your listeners can enjoy the extra depth of 4-channel sound with the Sansui QS system. Now available for the first time in the United Kingdom.

Keep your equipment

The Sansui QS 4-channel system is used with all current stereo transmitters, receivers, cutting equipment and hardware. So there's no need to upgrade. The listener only requires 4-channel receivers and 4 speakers to obtain outstanding quadraphonic effects.

Excellent separation

Both encoding and decoding matters are symmetrical. Together with the new 120 Volt-Mains in the decoder, an inter-channel separation of 30dB or more is no problem.

Maintains present hi-fi standards

High standards are maintained because of a unique phase shift technique, the quality is well as the quantity of input information is preserved. In fact a great better stereo perspective than conventional 2-channel sources.

Proven performance

In both Japan and the United States where 4-channel sound is becoming the rule, rather than the exception, QS type recording is standard.

Listen to the recorded equipment at the London exhibition of Sansui. It's right next to the I.R.C. stand. Our technical experts are ready and willing to give advice on specifications and prices. Or send us in coupon for full information.

NEW FROM TEKNIK

MASTER RECORDERS:
4 Track £2,890, 2 Track £1,950, 16 Track £2,950, 24 Track £2,900.
Stereo £1,500 Q.C. REPRODUCERS: Cassette £2,250, Cartridge £2,500.

All Teknik equipment is manufactured in Britain and gives unequalled performance, backed by full Teknik service.

TEKNIK



WHICH WAY DO YOU RENT EQUIPMENT ?

8:30pm...
A SINGING PRINCESS IN DISTRESS!
MORE REVERB AND SOME HARMONIZING
REQUIRED STRAIGHT AWAY.

THIS WAY?

ZIPPO ANSWERING SERVICE

ON CALLING HER
REGULAR COMPANY,
AN ANSWERING-
SERVICE RESPONDS...

THEN THEY CALL THE CONTACT
NUMBERS THEY'VE BEEN GIVEN,
LEAVING MESSAGES.
BUT ALAS... NO ANSWER...

OR MESSAGES ANSWERED
AFTER MUCH DELAY.

A very happy
25th
anniversary
STUDIO SOUND

BUT WAIT!
THERE'S A RADIO-
TELEPHONE IN THE
CAR...

CAR 57
WHERE ARE
YOU?!

OR
THIS WAY?

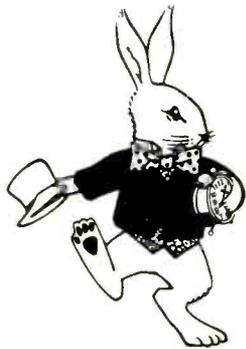
8:31 P.M. ...
ON THE OTHER HAND...
A CALL TO **MARQUEE ELECTRONICS**,
AND OUR KNIGHTS IN SHINING
ARMOUR ARE ACTUALLY THERE!
HELP IS AT HAND.

Start Again!

Marquee Electronics Rentals

OUR OFFICES, WORKSHOP AND SHOWROOM ARE OPEN FROM 8.30 A.M.
UNTIL 11.00 P.M. AND DURING THE DAY ON SATURDAY
SHOWROOM AT 10 RICHMOND MEWS TELEPHONE (01) 439-8421

*Alice was
100
in 1959*



*hoppy
birthday
from
Alice*

Many congratulations to Studio Sound, the best studio mag by far. The multicoloured responses to our advertisements bears witness to the many parts other don't reach.

STEVE BROWN

APPLIED MICROSYSTEMS
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TEL: CHOBHAM (09905) 6267
TELEX 8952022 CTYTEL
SEE MAIN ADVERT ON PAGE 171

Everyone at Studio Sound would like to take this opportunity of thanking all our readers and advertisers, past and present, for their support in enabling us to produce this special 25th anniversary edition and making it the largest issue ever.

1971-73

APRIL 1973 VOLUME 13 NUMBER 4

WHEEDER'S FUTURE You can't enter the sound recording industry. Probably not since present working conditions make a case of the fact that you can't enter it unless you're already in it.

The first serious step towards improving the status of recording engineers took place at Ladbroke Studios on January 17th. The first meeting of the Engineers Guild was held by the members of the Association of Professional Recording Engineers (APRE) and the Guild's first act was to vote for their own union by electing a committee to represent them in trade union policy, conditions of work, etc. It was a historic day. As Larry Gorman, vice-president of the APRE, said: "The engineers have finally recognized their status. The one trade union work area exists in this industry, the APRE, is recognized by only a few of the larger studios and virtually none of the many small ones. For our studios we receive any formal training, we are allocated reasonable working hours, four receive more than others, and we enjoy the security of a well-run situation. The majority work in conditions which are far from desirable."

Why do engineers subscribe to these limitations? Attracted by what they consider an attractive, if not a particularly good, rate of pay, they have accepted the fact that they are not being treated as a separate profession. They are being treated as a part of other men's work, not as a profession in its own right. It is time to change this and to demand a higher status for the profession.

The Guild does not see sound recording as a profession, a fairly defined term, but as a craft, a trade, or a technical skill, and as such it is subject to the same rules as other crafts or trades. What objectives the Guild should set for itself are to be determined by the members of the Guild. The Guild's concept has not exactly been welcomed in this country. Despite considerable interest in the Guild, it is not yet a recognized trade union, and its members are not yet recognized as a profession. Some of the reasons for this are: (1) The Guild does not have a large membership. (2) The Guild does not have a large membership. (3) The Guild does not have a large membership.

Ergonomic bliss!

Only one set of hands are needed to operate the 3440 console on the 32 track, 24 group TRIAID 16 Series console. It's the only console with a fully functional console, made in the USA, and a fully functional console.

The number of buttons which are needed to operate the most advanced of consoles is a major factor in the design of a console. The TRIAID 16 Series console has 100 buttons, each with a unique function. It is the only console with a fully functional console, made in the USA, and a fully functional console.

TRIAID 16 SERIES
 THE ONLY CONSOLE WITH A FULLY FUNCTIONAL CONSOLE, MADE IN THE USA, AND A FULLY FUNCTIONAL CONSOLE.

EVERY PICNIC NEEDS A SYNTHI

EMS

The Synthi Range by EMS

THE SYNTHI RANGE BY EMS

Automated Mixing is NOW!

Functional, added automation, whether for music, news or commercial, means that the mixing console is no longer a simple device for adjusting levels. It is now a complex, multi-functional device, capable of handling a wide range of tasks. The Model 254 Program-Mixing Unit is the only console with a fully functional console, made in the USA, and a fully functional console.

MODEL 254 PROGRAM-MIXING UNIT
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INTO THE FUTURE

by Richard Elen

We have been waiting in the reception area for only a few minutes when our guide emerges from Studio 2 to show us around. We take with us our hand-held display pads on which we will take notes for the article we expect to write as a result of this visit. On the way to the studio I sign off from the information system I was using to check the appearance of the menu page for the April 2009 issue of *Studio*—a regularly-updated on-line database on all aspects of recording. We are ushered into a spacious, comfortable room. There are a number of chairs around the room, which has a deep pile carpet and an obvious degree of acoustic treatment.

The front of the room is dominated by a large screen which stretches across from one wall to the other. A frozen image is on the screen, showing a number of musicians, some seated in front of display screens and others standing, holding various forms of devices, some flat and touch-sensitive, others more like soprano saxophones, and still others with a number of long, touch-sensitive strips along them. To one side is a four-piece brass section. Not a microphone is to be seen. Inset into the main screen are a number of displays: on the left, two status displays indicate data on a selection of audio channels in a number of colours, while on the other side a display pair shows musical notation of a complex sort plus a number of multi-voice instrument displays.

Eight planar loudspeakers are in the corners of the roughly rectangular room, but they are presently silent. Indeed, the silence in the room is only broken by a barely perceptible whirr of air-conditioning, and the sound of tapping on a keypad.

To one side is a recording

booth, with a window looking into the room. It is a good deal smaller than the control room.

Two of the chairs—placed seemingly at random in the room—are occupied, one by the producer, who has a flat, wide control surface across between the arms of his chair, and the other by a musician who is intently keying instructions into a similar control surface, this one handling the control of a synthesiser. A third chair, obviously previously occupied by our guide, has its own control surface which appears identical to the one the producer is using, but with the addition of a number of other controls including a track ball. It is presently hinged up to allow the engineer to sit down. There appears to be no other equipment in the room.

As we enter, the producer and the musician turn round and welcome us. Our guide introduces us to them, and we learn that they are in the final stages of overdubs for an album by one of the top bands of the day. It is notable for the fact that although it will be released in the *Lasercard* and CD formats, the multi-channel data is being stored on a new device which uses a complex crystal lattice for storage—it is this that we are particularly interested in, as it is the first studio in the country to have a production model—not that we can see any evidence of the device!

The engineer indicates a couple of chairs to us and we sit down, pulling the chairs forward so that I am next to the engineer and producer, and my colleague—our music system specialist—is next to the musician.

"I doubt if you'll notice

anything particularly unusual about the setup in here", says our guide, "the DSC system is in the other room with all the rest of the stuff. We'll be having a break in a few minutes, then I'll show it to you. In the meantime, have a look at what we're doing". He turns back to the screen and clips his keypad into position across the arms of the chairs. He moves a stylus in a swirling motion on the control surface and the image begins to move, at high speed, in rewind. It rapidly stops at a start cue point which is indicated in a timecode format on one of the status displays. He moves the stylus again and I notice a cursor on the status screen inset follow his movement as he calls up a cue point from the memory and its timecode value and title appear on the screen. He looks towards the musician. "We'll play from the top and drop in, OK?" The musician nods and the engineer puts the cursor over the 'play' label on-screen. The image begins to move, and a couple of coloured markers come up on the engineer's display indicating the selected track for the drop-in. Then the display dissolves, to be replaced by a set of level indicators. At the same moment, the room is filled with a virtually solid sound-image, in all three dimensions as the track begins with a pulsating bass line which is rapidly joined by drums, guitar-like sounds and some heavy synthesised chords. A horizontal bar along the base of the main screen begins to move along a scale representing the duration of the song, inching its way towards a red marker indicating the drop-in. What is obviously a guide vocal comes in briefly, rather too loud, and the engineer rapidly drops its level

to a more suitable setting, and its bar-graph drops accordingly.

Meanwhile the musician is awaiting the entry point. Since all the systems in the room are slaved to the same timecode, the data representing the synthesiser signal has already been activated, and his previously-stored data track is being read out, producing sounds we cannot presently hear. The drop-in itself will take place automatically at the solo section—a point which the musician labelled before we came in—so he is free to gear himself up for the entry. He makes some minor adjustments in a slightly nervous fashion as the solo approaches. A count-in display appears, the track display bar turns red, and he's in, both hands moving rapidly across the control surface and producing a wild solo of swooping portamento, note-bending and vibrato. He is rapidly switching the auto-correct sensing in and out so as to improvise on the stored line, which incorporates some of his previous attempts as well as pre-programmed straighter passages. With a descending swoop of sound, he drops out at the correct spot. The track plays on to the vocal entry and freezes. My colleague is most impressed by the capabilities of this particular synth—it too is a new model, from Fairlight Instruments. Using a standard control surface and hardware, the software was only received on-line from the factory the previous week. Everyone looks at each other, impressed. "That was it, I think... wasn't it?" queries the engineer, and we all nod our heads. "Very impressive", says my colleague. "A suitable point for a break?" suggests the engineer as we get up from our chairs. "I'll show you the DSC now, if you'd like to come through to the

equipment room. . .” My notes will have to wait until later. The screen goes dark except for the synth displays. My colleague is obviously going to get a demonstration of the machine over lunch, while I have a look at the DSC.

I follow the engineer through the door and into another, small room. The walls are lined with various racks of equipment, and in the centre of the room is a terminal sitting next to a squat box on a table. The VDU shows a bar display identical to that we saw in the other room. “Well, here it is. . . our new toy”, says the engineer. “I think it’s only the second in the country, and the first to be installed. We’ll be putting it into the rack when we’re sure that it’s all behaving itself. And here”, he says, opening a door on the front of the box, “is the heart of the thing, the crystal storage module.” He carefully slides out a clear block about 2 in square.

Inside is a faintly blue multifaceted crystal, with a fine web of barely-visible wires leading from it to the edges of the cube where contacts are noticeable as small golden points in grooves along four sides of the block. “Not much to look at, really. . . but a good deal more expensive than it looks! I suppose it doesn’t have the same obvious storage quality as a normal data disk!” He points towards the Sony/KDD *Optidisk* recorder and the rack of blank 12 in laser-cut read/write silver disks beside it. “I mean, it is rather easier to relate to *that* sort of technology—it’s just a clever CD, really. But things are moving very fast these days—that machine is only two or three years old, after all.” We talk briefly about the impact that crystal storage is likely to have on the consumer market. “Well, the only thing I’d say about that is the price at the moment. I don’t see it as a consumer

format. And we’ve only just had a new format introduced. Who’s going to want to go out and get a crystal system in the next few years, when they’ve got all those CDs and now *Lasercards*, at the price they’ll have to be to cover the development cost? I mean, we’re still wondering if this thing is really worth the money. It’s obviously the way to go, but I was very tempted to let a few other people get them in first and see if the price comes down. But at least, as you can use exactly the same system for video, not to mention other data storage applications, the market should be big enough for the price to drop pretty sharpish. And you can still transfer from one system to the other; they’re both AES standard, 32-bit 64 kHz, so there’ll be no problems there, thank goodness. But as far as consumers are concerned, I still wonder if we won’t be seeing on-line access to video music instead of another

discrete system. It’s been possible for years, it’s just that the cable crash in the Eighties made everyone very wary of using that kind of system for access to entertainment channels. But even there, they could use normal broadcast dataplex for it—there’s plenty of room. You only need to send the four audio channels and the pictures after all. Unless, of course, that Russian holographic projection system gets off the ground: that’ll need much more bandwidth.”

CD, of course, has had a very good run. And it isn’t going to disappear overnight. It could well co-exist with the new systems for some time, like vinyl records did. I suggest that it will take some time for on-line access to videomusic to take off, even though virtually everything interactive uses that kind of system. He agrees. It will take time, but a lot will happen in the next 25 years. . .



Illustration by Stuart Briers

EULOGY

As a recording engineer of some years experience, the author Dan Andlast is dedicated to raising the status of the recording engineer. He feels that many aspects of his work are still taken for granted and all the skills that a good engineer possesses are seldom recognised. To bring this matter to a wider audience he has prepared a multi-point eulogy in

praise of the engineer's role in the form of pleas to those he has to mix with (no pun intended) every day of his working life. The author further claims that every case history quoted is completely true which is probably more than can be said for his own pen name. To protect the innocent, all studios, manufacturers and people mentioned must remain anonymous.

To clients of the studio

Famous (and infamous) producers should respect the tools of the engineer

The Very Famous Producer with more hit records to his name than I've had hot dinners (actually at dinner time) should have known better. He arrived at the studio promptly, as he is known to do, for what was ostensibly a demo session with a girl singer and her then unknown band. Grateful that the Very Famous Producer should attend the session in person, the band gave him a very large can of beer which he stood on the producer's desk at one end of the console. The designers of the custom console had placed the power supplies under this section of the desk which used to keep desk top comfortably warm. About four hours into the session the producer, not exactly noted for excess within the studio, decided to open the can. The violent explosion of frothy beer soaked the acoustic treatment in the ceiling (which dripped for days), took out two thirds of the input channels and routed everything to everything. I stared open mouthed at the damage done by this single can of beer while the Very Famous Producer turned and said, 'Don't worry. I've done this sort of thing before and I find it gives the desk soul!' If that was the case why didn't he use the studio again until a new desk was installed? With most of the desk out of action, we finished the session by laying mixed stereo pairs on to the multitrack using a complex patching system using the monitor mixer.

The monitor mixer was dealt a blow by another producer who dropped MY mug of hot sweet tea on the thirty adjacent faders. Surprisingly they continued to work fine for the rest of the session. The following morning however all the faders were stuck fast as the sweet tea had dried. The only remedy available was to pour hot water in the same way the tea had gone much to the angst of the waiting client. That mixer never worked that well again.

Between the two of them, these producers had written off the finer points of this console. Producer Two had offered to pay for a 'new one' which was considered very generous until he added that he was referring to the hot tea.

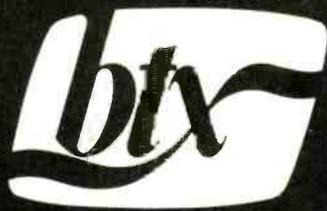
Respect the engineer's judgment—if he thinks the takes are getting worse, maybe they are

Certainly not an unknown case for many engineers. The

band were laying backing tracks for a single. Recent lack of chart success made them feel an increasing pressure to make this session count. Things were however far from happening. After managing to get one reasonable take of the first song down, the band began to acquire a little more enthusiasm. Unfortunately the producer disappeared into the studio with his 'herbal kit' and the room filled with distinctive aromas. Take two was about the same as take one so the producer disappeared again, more smoke, and reappeared. Take three was definitely not as good as two, and four was even worse. The producer disappeared again looking slightly worried into the studio. The band were however beginning to get VERY enthusiastic and this worried the producer even more. He gave his herbal kit a real hammering and emerged from the studio an apparently happier man. Take five was rather sad and by eight and nine it was quite appalling. The band and producer were convinced that the next take would be the one while the engineer and tape-op just patiently waited for the post-dope stupor to set in having already tried to communicate with the producer and band to suggest that their judgement might not, perhaps, be quite sound, no matter how laidback they felt. These suggestions were simply met with mystification and suspicion. The band never had a hit record with that producer.

Use your engineer's diplomatic talents

There are probably no other jobs where the client and representative of a service company etc work so closely for such long periods and often under pressure of work and excellence. Most engineers wish to do a good job no matter how difficult their relationship with the client might be. With so much of the talents of a good engineer being based on his PR abilities, it would be worthwhile if producers took more notice of the engineer's diplomatic suggestions. For example, if the session is running over the prescribed finishing time for unavoidable reasons and the next session is beginning to arrive, it would be worthwhile if the producer consults with the engineer about how to approach the incoming client about having that extra half an hour. Most incoming clients are quite happy to delay their start by 30 minutes if the need is real and they also don't have time problems or session musicians booked. A polite approach from the producer together with an offer to stand a round of drinks or a meal will win around most people. The fling open control room



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door, storm into reception, 'Why don't you go home, I'm trying to do serious work here' approach most certainly will not. While working for a studio with a back to back session policy this used to happen occasionally despite advice from the engineers who often would know the incoming client. The producer should also listen to valuable advice on musicianship from the experienced engineer. This maybe from experience of similar situations occurring previously or simply keen observation—'You know that is almost certainly the best diction you will get today. When he arrived about an hour before you did, that bottle of whisky behind the screen was full.'

Have enough respect not to use the studio for rehearsals

The studio is not the place for composing or making arrangements as a general rule. The days of the band booking in six months to write, arrange and record their album have thankfully almost disappeared. The engineer is a conscientious beast and will quite placidly do a good job. Should you have the courage, then throw down a challenge and stand back while the real creative engineering instincts exercise. Sitting around for two weeks for something to happen is the exact opposite to the conditions required for creative engineering. In these cases money is the sole motivator; or a conscientious tape-op with your home phone number.

Producers with bad vibes should stay away

The general manager of the British branch of the big American record company used to like to produce a couple of acts on their roster. He would bring in this band that specialised in good simple blues-based rock that was a pleasure to record, some of the band having been around for many years. The general manager was a very amiable person and the sessions were always looked forward to. Unfortunately, every one was a disaster. The very moment he walked into the room equipment that had been functioning perfectly 10 minutes previously, simply refused to work properly. Equalisers would distort, mic amps would overload even on low level signals, signals would disappear from the foldback and random tracks on the multitrack would not record, eg the snare drum on the best take. The worst was when the switching logic arrangement between the noise reduction system (not in circuit), the tape machine monitor logic and desk auto line in/out select simply changed its mode of operation so that it was impossible to monitor tracks in sync play.

This happened three times over a period of two months and each session was less successful. The members of the band came individually on other sessions with no problems at all but never again with that producer. After the second disastrous session, I decided to ask the general manager why after such a bad first session he came back to the studio. 'Oh, you've got the most amazing bass drum sound,' he replied.

It must have been pretty good to have come back after what that unfortunate man went through.

Protect us from producers who believe that it is not possible to record a signal on tape under '0 VU'

This is one of those problems that doesn't seem to be so prevalent as it was till about 5 AD (After Dolby). The minute your back's turned the fingers creep across the faders pushing anything that doesn't frequently hammer the end stops. Explanations about why this is not the best of practices falls on deaf (literally?) ears and so the answer used to be to recalibrate your meters for the session so that the desk meters read somewhere between 5 and 10 dB higher than the true VU reading. The only way to defeat this problem is to install PPM type meters and this will almost guarantee that they will try to find another topic to worry about. This is, I suppose, a quite understandable worry of those producers who were working before noise reduction and current high

output tapes but using your ears should tell you that tape saturation is only useful to certain sounds and that high recording levels can have very nasty effects on the accuracy of noise reduction decoding and 'gutsyness' of bass instruments.

Never ask for a rough mix as refusal often offends

Well not quite the truth but surely a sentiment felt. How many times have you spent hours trying to recreate the flat-balance 7½ in/s tape run off at the end of the previous session. Something magic happens to rough mixes and they acquire characteristics just not present when the multitrack tape is pulled out for the remix sessions. I find that the answer is to make sure your rough mix really is rough so that no one would wish to replicate it. This also makes sound business sense as it then becomes difficult to make any commercial use of the mix without remixing and paying for the sessions in full. However even this is not a foolproof technique. I once ran off flat mixes with a dab of echo on the voice for a major international record company following a phone request.

The studio was paid for the sessions but nothing more was heard on the mixing of what were quite commercially promising tracks. About six months later the producer reappeared with a different project. When questioned why he hadn't returned to mix the tracks, pulled out a copy of a trade music paper and pointed to the top five places in half a dozen European countries with my unbelievably rough mix selling in vast quantities. It appeared that the mix had fallen into the hands of the top record company management who got so used to hearing it as it stood, vetoed any funds for remixing. Producers please just try and understand that there seems to be little reason why the rough mix should have anything in common with the contents of the multitrack once the rough mix has left the studio walls.

Don't try to convert the engineer to your religion

It must have been the insecurity of the studio manager or some dark secret that he was hiding from the staff but for some reason he decided to let this bizarre 'religious' sect have studio time to make a single. The movement in this country was led by a very smooth young Californian who had more in common with the 'ad execs' we normally saw. The followers were in general earnest, youngish and mostly acid casualties. Some of them had been pro musicians and they were quite a good band in their way. My instructions from the studio were to keep them happy; try and absolve the studio from any further commitment to them; and get them out within three hours. As one of the songs was 15 minutes long there was little hope of that last point so we prepared for a long night.

Little did we realise quite how long. The session had been tacked on the end of a long day anyway. There was little problem with sounds from the band but the followers numbered about 30 and they were there to reinforce the collective consciousness. This meant that the area around the drum booth was turned into a sacred area, a sort of altar. The studio area was redecorated with posters of their improbably guru and these were known as prayer points. Due to prayer breaks, ritual chants and the total disregard to mic positions by the musicians, it was about six hours before we had anything to show for our work. With the first backing track down, the second title was not going so well. I think somewhere this was interpreted as being negative karma from my tape-op and I. In any case the attention was turned on us and there then followed what was the nearest I have ever come to brain washing. We were already very tired and the undivided attention of about 30 people forcefully explaining how in five years this sect would be the sole owner of all sources of material wealth and this was to be achieved by business means and solid door-to-door conversion groundwork. If I wanted to be saved I should commit my soul now, etc. Although it seems quite ridiculous now, they were very persuasive and their enthusiasm did put a slight query at the back of your mind that maybe they are right? It was about three in the morning. I panicked slightly and made an excuse to phone the chief engineer. We agreed that the session had to be finished that night and that if I could make sure that they never needed to come back, there was a large

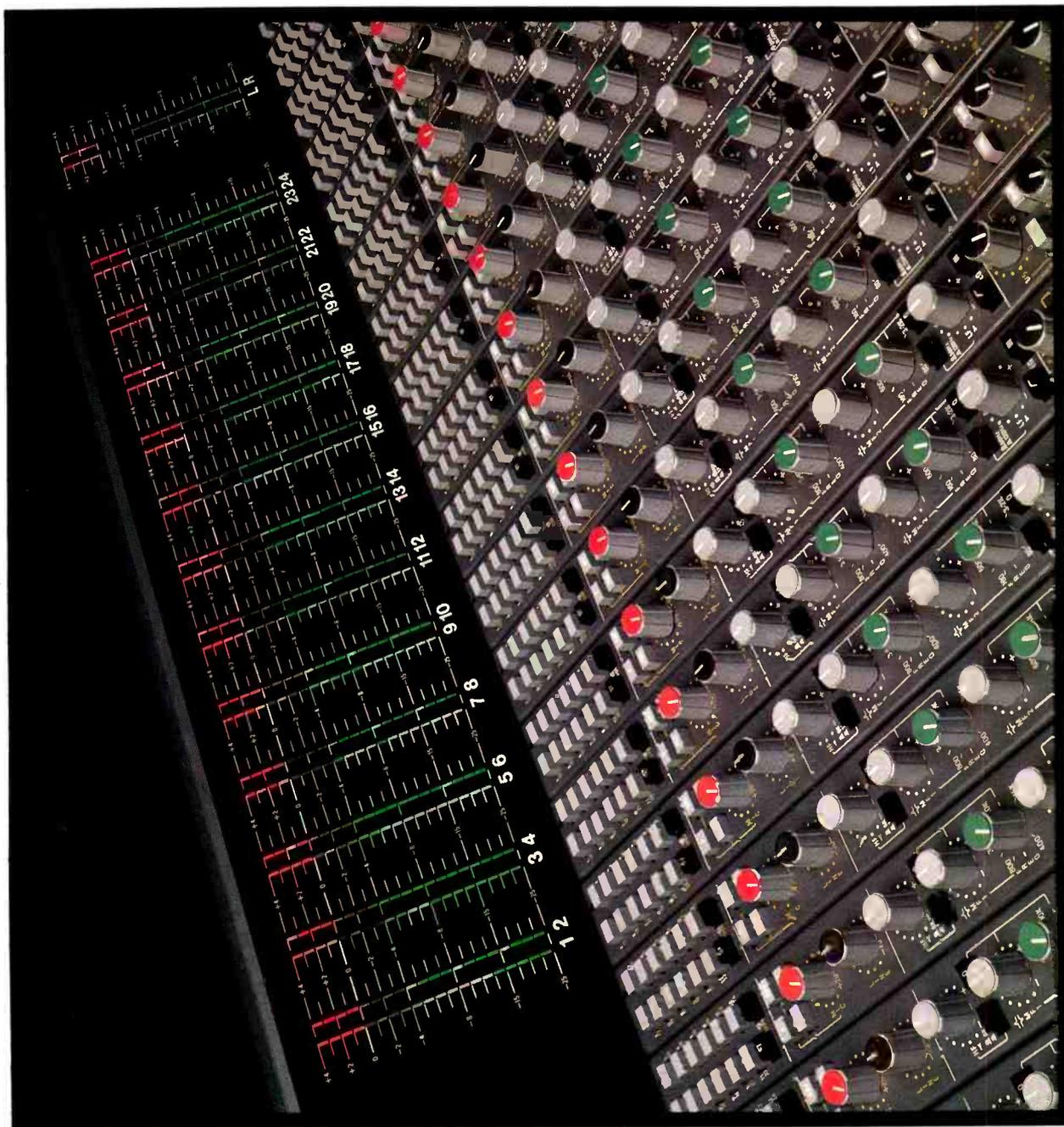
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Our definitive statement...

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bonus for me. Armed with this financial courage I went down to reception (which looked more like a church with a further 20 followers praying vigorously) and phoned the tape-op in the control room. I had decided it was best if he went home and there was just me to worry about. On entering the control room, my rehearsed lines were unnecessary as only the band were there and they were talking about the music. Could I make the guitar sound like Stephen Stills was playing (yeah—easy answer!), could the bass be a little fuller? I then had an apology from the smooth young American and I began to warm to them slightly. Was this just part of their technique? Actually no. They had appeared to have given up that side of their work and the followers had all bedded down leaving just me, the band and the smooth young American.

We finished and mixed three slightly magical tracks at about 10 the following morning and they left happy. They left and were never seen again but I'm still waiting for that copy of the single they promised.

Protect us from . . .

Over zealous traffic wardens VS the mobile truck

The gig was a single day event in a large open air stadium just outside central London. There were about eight bands on and each would have been capable of drawing crowds individually but the UK bands had nobly agreed to step down and allow the two US bands to headline, both of whom had had several hit records in the UK but never played here before. We were very excited to have been asked to record the two US bands sets as it would be only the second outing for the mobile. The mobile had to be parked in the road and so we took great care in applying for parking permits and following all the regulations. Details concerning the height, etc, of cables passing over walk ways, etc, were measured and kept generous to prevent any queries. All mics were rigged and all worked. The road managers of the bands came to the truck and gave us the song schedule with timings and we worked out where the reel changes would be (only one multitrack in the truck)—everything looked good. The producer looked confident and seemed well pleased that they had chosen the mobile for the recording. By chance, about half an hour before the recording was due to start, a visitor to the truck mentioned the hostility of the local residents and police to the event. This was the first we had heard of anything like this. Apparently a group of local citizens had tried to get the event cancelled and also had the backing of the police but they were not able to present any firm reasons and so the gig proceeded although with an 8pm finish time. The police however proceeded to be as unsubtle as they could in their approach to crowd control. The first band played and the recording was very successful. There was then a break of 45 minutes before the final band went on and this left them only 25 minutes to play before the official end. In this break however, a certain element of the audience had become slightly bored and vocalised it. The police panicked a little and told the organisers that they were moving men into the ground and 8pm was *still* the finish.

The band came on and the place went wild. Immediately mics began to go down so the maintenance engineers and tape-ops were sent to find out what was going on leaving just the engineer and producer. They signalled back that there were so many people and big star guests back stage that there was going to be little they could do. We decided to live with the situation until the lead guitar just disappeared. While frantically searching for another mic picking up the guitar, there was a loud hammering on the mobile door. We did nothing—it was a crucial moment—where was that guitar? More hammering. The engineer rushed to the door and opened it. There stood a traffic warden—no time for them—'We've got a permit and we've also got problems'—rushed back to the desk. The traffic warden

stepped into the truck and homed in on the producer who looked physically less busy. The traffic warden shouted in his ear but due to the monitoring level he heard very little but indicated that it was the engineers problem not his. The engineer is still going through his mics trying to find one with more lead guitar and the traffic warden is ignored.

Not sure what to do next, the traffic warden decides to take some action and moves towards the multitrack tape machine. As quick as a flash, the producer slides his chair between the warden and the tape machine but in so doing bruises the warden's leg. After shouting something inaudible over the monitors, the warden stormed off. This was the cue for the producer, who was now very worried over the loss of the guitar, to turn on the engineer who was still alone in the truck. As luck would have it, the main guitar mic came up again but when the mobile engineer breathed a sigh of relief, he realised that the mobile now contained two traffic wardens and three police who looked like trouble. Before turning down the monitors, the engineer called the stage and screamed at all the tape-ops, etc, to rush back and drag as many people as they could with them. He then turned off the monitors and turned to the police. They explained that as they were expecting trouble when the concert finished, they had cancelled all parking permits and we had to move! *Now!*

Trying to explain was useless. The tape-ops had now arrived back at the truck with about 20 people who positioned themselves behind the engineer and in front of the console. While pleading for reason the engineer moved back into the gathered throng and someone else took up the argument. So the throng rotated all denying who was responsible, the police began to lose patience. As they were young police and looked fairly fresh, they were not quite sure what to do next. It was obvious that we had to string them along—short of physical violence—until the band finished. So for 10 minutes while the tapes turned unmonitored, every trick was used to prevent the mobile being moved—temporarily locking the doors, moving people in and out of the truck and blocking the entrances, asking to speak to their superiors, etc. Every minute counted—a quick prayer that there was to be no encore and the hope that the gig organisers were under as much pressure as we were to finish on time. With only five minutes to go, we said that we would do as they said now and figured that if we went through the motions of breaking down the gear and cables they would go away or keep a distance. For some reason they did but they were most likely called to the stadium exits. On the stroke of 8pm, the power was pulled and the band tried to play acoustically but eventually had to admit defeat.

As you would expect after an effort like this, the tapes of the second band were not used as the performance was said to be not up to standard. Surprisingly there were no obstruction charges brought against us but the producer never used us again.

Telephone mad producers

The busy record producer surely is very dependent on the telephone but why do they often choose the most difficult moments in an overdub session to shout at the transatlantic branch of a certain record company from the control room. Many artists have become ultra disorientated as they wait for the producers approval of a skillfully executed overdub while everytime you push the talkback to speak, all the artists hears is a stream of abuse from the producer at the unfortunate on the other side of the world. The engineer is not really sure what is going on either as every time he attempts to turn up the monitors to hear the artist, the telephone-bound producer turns it down again.

Time to go to the pub.

Drummers who . . .

And nervous producers who would beat out tempo on the top of our valve (tube) mic amped console. It's alright for some of the time BUT with that number of valves there always seems to be at least one that's microphonic or slightly dodgy in its contact. We have forgotten these problems today generally but I still feel uncomfortable at the desk being tapped hard.



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Sycro and the Simple



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Congratulations

Dear Richard, On the occasion of your 25th anniversary I, on behalf of the staff at Lexicon, would like to commend you for the continuing excellence of your magazine.

Since the inception of Lexicon 13 years ago, our professional staff have come to rely on Studio Sound as the definitive publication for the high-end professional audio industry in Europe and the US.

Studio Sound's journalistic standards and editorial content has uniquely met the needs of the technically sophisticated community in our industry.

We also appreciate the fact that the objectivity and depth of your equipment reviews has been in keeping with the high level of standards set by your editorial policy.

We wish you the best for your next 25.

Yours sincerely, Ronald P. Noonan, President, Lexicon Inc, 60 Turner Street, Waltham, MA 02154, USA.

Mic reviews

Dear Sir, We were alarmed to read Hugh Ford's boundary microphone reviews (December issue) on two counts. Firstly, the microphones have been measured free-field, when their only legitimate use (if flat, uncoloured response is desired) is on a large, rigid boundary, contrary to the suggestions made by some boundary microphone manufacturers themselves. Secondly, the reviews seem to imply that the frequency response and polar response measurements shown (forward hemisphere) are applicable when these microphones are used on a large boundary. This is absolutely not so. Both the frequency and polar responses of such a microphone are significantly altered (degraded) when it is taken off a large boundary. We have discussed some aspects of boundary microphone design and use in an available Audio Engineering Society preprint¹, to which we refer interested readers.

If a flat pressure-responding microphone is flush-mounted in a large boundary two things happen: (a) the output doubles (+6 dB) at all frequencies due to the acoustic pressure doubling at the boundary, and (b) the response remains flat and does not show the on-axis rise which such a pressure-responding microphone would exhibit if used free-field. If the diaphragm size is sufficiently small (of the order of 8 mm diameter or less) this flat response will be maintained within 3 dB up to 20 kHz even at angles up to 90° off axis. If an obstruction is placed between the diaphragm and the sound source (for example, by inverting the diaphragm mounting as is done in some commercially-available designs) or if the mounting is not

adequately flush, the frequency and polar responses are more or less severely degraded, with no beneficial effects whatsoever¹. And, most importantly, if the microphone is taken off the large boundary (if used, for example, on a small baffle, or on no baffle other than its mounting plate) two very significant degradations occur due to:

(1) the loss of pressure doubling for frequencies below that at which the boundary size is comparable to the acoustic wavelength (change from 2π to 4π steradian loading). This causes a downward shelving of the response by 6 dB below this frequency (or, wired alternatively, a 6 dB upward shelving of the response above this frequency).
(2) sound diffraction from the edge of the small baffle or mounting plate back to the diaphragm. This results in periodic peaks and dips in the response, and irregularities in the polar pattern. The smaller the baffle the worse the effect. In this regard, even a 1×1 m baffle introduces significant aberrations¹. These effects occur in the 2π steradian frequency region.

The measured curves in Hugh Ford's reviews display all these effects. It is not possible, on the basis of these measurements, to assess the relative merits of the different microphones when used in the proper manner. Indeed, the measurements serve mainly to demonstrate the poor performance of such microphones when used improperly, whereas some of these microphones actually perform well under the intended conditions. The measurements are not fair to the good boundary microphones in the bunch. In just the same way, it would clearly not be fair to assess free-field microphones by measuring them when placed on a boundary. The measurements really must be repeated with proper boundary mounting. This will probably require either dual-channel FFT or TDS techniques to be used.

Yours faithfully, Stanley P Lipshitz, John Vanderkooy, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1.

¹S P Lipshitz and J Vanderkooy, *The Acoustical Behavior of Pressure-Responding Microphones Positioned on Rigid Boundaries—A Review and Critique*, presented at 69th Audio Engineering Society Convention, Los Angeles, May 12-15, 1981 (preprint No 1796).

Hugh Ford replies:

I entirely agree with Messrs Lipshitz & Vanderkooy and the sting of their comment is in the tail: 'This will PROBABLY require either dual-channel FFT or TDS techniques to be used.' Whilst I now realise that I should have made more comment on the shortcomings of anechoic measurements

on boundary microphones, I should welcome suggestions how to measure such microphones.

Provided that free field conditions are met, measurements on conventional microphones are relatively straightforward but this is far from the case with boundary microphones.

Firstly there is the problem of the size and shape of the baffle (boundary) that should be employed and its construction both of which affect the frequency response and polar response.

Secondly there's the problem of producing a suitable reference sound field for frequency response measurement as the presence of the central boundary makes conventional techniques useless. Whilst TDS techniques can be used at a suitable distance (depending upon frequency) from the boundary, measurement at the boundary is another story.

Soundfield mic

Dear Sir, 'It's the quality that counts—don't get paranoid about the direction.'

Above all one must try to be open minded in anything as subjective as recording music. So I stopped to ponder some points raised by John Whiting in his article about the Soundfield microphone.

Yes, he has a logical argument, we do only have 2-channel digital recording available and most people listen in stereo. But then I walk in while one of my colleagues is listening in surround to the orchestral recording we have just completed with the Hanover Band in *All Saints, Tooting*, and my reaction is: to hell with stereo—this is better, a lot better than stereo, and even if only a few hundred people can hear it in surround that is important. More important than hearing exactly where the piccolo is, to the nearest six inches, because you can't at a live concert anyway.

What is more I can't stand stereo, and ultimately we must all be guided by what we believe in, not what others tell us. Surround gives a better approximation to the live experience and is more satisfying. It is also far more involving.

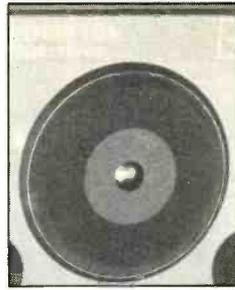
I have to stop and ask what the pure stereo soundfielders are after. Well, they are after clarity. Unfortunately they do not seem to realise that when listening to music live we are less concerned with clarity than with quality—mainly tonal quality and impact—and whilst the two are not mutually exclusive we do need to get our priorities right.

Good concert halls have evolved to blend sounds together, not to separate them. If you want every instrument separated, arrange a concert in a large flat field. They do not build anechoic chambers big enough,

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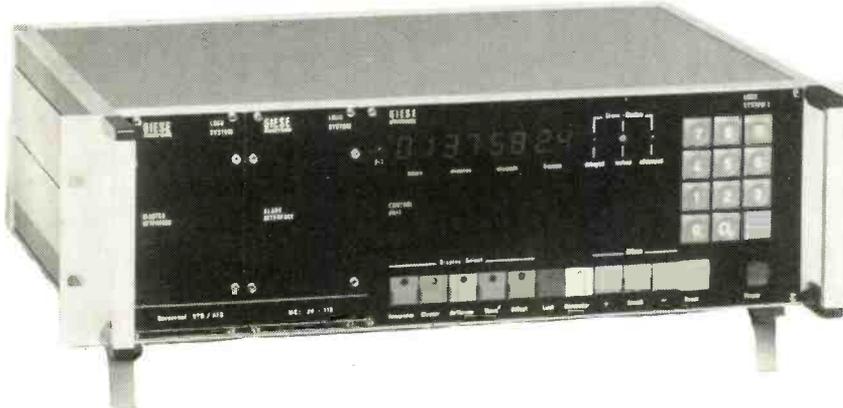
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LETTERS

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although some recent concert halls make a fair try.

It can be shown (Michael Gerzon and others have done so) that to achieve an accurate re-creation of a live sound including its tonal qualities the response of the entire recording and reproducing chain needs to be uniform in all directions around the listener. So stereo via two loudspeakers will always be a compromise. The only way stereo really works is through headphones where the above requirement is more nearly met, but four loudspeakers using Ambisonic surround is better than stereo.

We are not the only ones to find UHJ an excellent 2-channel medium. Listeners have not noticed anything horrible about music broadcast in UHJ when it was not labelled as such. They become more agitated about good or bad recordings than the system used. Even eminent 'golden eared' critics who proclaim that UHJ is phasey like many of our recordings whilst becoming enraged by others—in both cases UHJ. Their choice tells us more about their musical prejudices than about their technical judgement.

An important practical point about recording in surround is that you must monitor in surround, otherwise it won't work properly. It is like trying to set up the microphone for a stereo recording by listening exclusively in mono. Setting up the microphone for surround using stereo monitoring will produce ill-defined stereo and compromised surround. So take courage and monitor in surround next time.

I would reverse Mr Whiting's advice: next time you have an SFM available, borrow a UHJ encoder and decoder and try it in surround. You'll be surprised how much more like the real thing it sounds.

Please, oh please remember that clarity is only one quality of a recording and a secondary one at that, tonal accuracy is far more important.

Yours faithfully, Gerald Reynolds,
technical director, Nimbus
Records Ltd, Wyastone Leys,
Monmouth NP5 3SR, UK.

Digital misconceptions

Dear Sir, I found Keith Armstrong's article in the January issue very interesting; it was welcome, too, for its pleasant tone. Obviously Mr Armstrong knows a lot about digits and after reading the article, I am not at all surprised that most digital processors sound so bad.

My problem is that I have never heard one stand up to a direct comparison with microphone feed in a way that was even acceptable, let alone good, and I have gone to considerable trouble to hear a number of

the commercial machines in a fair way.

This has even extended to my organising a very careful double-blind listening test at California Institute of Technology, where I teach the 'Projects in Music & Science' course.

For those who have not yet heard satisfactory digital sound, the crucial question is whether the problems are inherent in the 16-bit 44 kHz format, or whether they are merely due to the sort of problems so well decried by Mr Armstrong. The existence of even one satisfactory digital processor would be enough for me so the question I have for Mr Armstrong is: Can he tell me which one I should listen to? Or, if he knows of no commercially-available processors which go A/D and D/A successfully, can he name any existing unit at all which does so, even though it may not be an off-the-shelf item.

Yours faithfully, James Boyk,
President, Performance
Recordings, 2135 Holmby Avenue,
Los Angeles, CA 90025, USA.

Us and them

Dear Sir, Thank you for a most sensible editorial 'Us and Them' (November 1983). I have a pet theory about some of the more extreme Golden Ear expositions. Is it possible that listening too hard causes blood to mass in the auditory centres of the brain,

resulting in temporary shortages elsewhere? This might explain diminished motor function (inability to whistle along or bench press your weight while bombarded with digital sound). Insufficient blood flow in the reasoning centres could explain some of the logical lapses noticed.

I'm sorry that I can't cite any research on this but why muddy up the issues with science, nobody else is?

Yours faithfully, John H Roberts,
Phoenix Systems Inc, 91 Elm
Street, Manchester, CT 06040,
USA.

Royalties

Dear Sir, Thank you for the mention of PRS in the Business column of your October edition. However, the statement, 'When a band or orchestra wants to perform music live it pays royalties to the composer through PRS' is incorrect.

I am sorry that I failed, when your correspondent visited PRS, to impress the fact that PRS issues licences, in the majority of areas where copyright music is performed, not to the performers.

I would be grateful if you could correct this point as it could cause unnecessary worry to performers.

Yours faithfully, Miss Lesley Bray,
PRS, 29/33 Berners Street,
London W1P 4AA.

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THE MANIPULATED MAN

PART 2

Graham Paul Wayne

In my previous article I expressed the opinion that industrial psychology cannot be applied to the study of industrial processes that never produce the same thing twice and in which the quality of the product is always an abstract, or subjective value. Further, that selection and training may not be formalised when criteria for such are based on the equally subjective values of creativity and motivation — requisites for people who would be good at their jobs in this volatile and unpredictable business.

This article deals with the other aspect of Mr Hodgkinson's dissertation: ergonomics. Since I feel my previous comments dealt quite adequately with both GPH and industrial psychology in application, suffice it to say those methods are similarly inappropriate when considering the ergonomics of studio design and use. For these reasons I do not propose to dwell on GPH's article further but utilise instead my imagination, tempered by a dollop of common sense, to peer into a future and see what might, *just might*, be happening in the control-room of a typical state-of-the-art recording studio a few years hence and in doing so, map the route by which I get there.

A writer must learn, if he wishes to write well, that the business of clear and powerful descriptions is his main aim; the business of naming things and naming them accurately enough to invoke the *essence* of the thing described to the reader. So when I came to consider this article I started, as is my preference, with the people rather than the equipment, and the name we give them—the job title. And I wondered, in light of the demands of this particular craft, why we call them engineers. Is that how they think of themselves? Does the name invoke the essence of the job?

Like the way a middle class of managers emerged from the working classes in post-industrial revolution society, sound recording has produced a middle class of its own in the hierarchy of production. The pioneers who designed and built recording equipment also operated it—after all, who else knew how? These men were, quite literally, *electrical engineers*. Not very happy ones either when, as time passed by, they found themselves immersed in production problems rather than engineering. No doubt many of them longed for the solitude and quiet of the back room and the work-bench. Others,

however, discovered a career in the office. Engineering became of secondary interest in light of the ever evolving challenges of production and the new creative conquests demanding both mechanical and humanistic skills combined. Thus, a new breed of craftsman has risen from the ranks of the electrical engineers, unfortunately saddled with the anachronistic title of their forebears. Taking this title at face value, some *engineers* regard the word as a self-fulfilling prophesy; immersed in technology and technique, they seek to validate their existence by living up to the name. Others, the Glyn Johns of this world, fear the evident corruption of aesthetic judgement that seems to be a concomitant of such scientific orientation, and decry technical knowledge. Of the two groups, the latter is more likely to achieve creative results but it is sad to find so few people feel able to reconcile the two major elements of our culture: Art and Science.

'We now turn to the other side of industrial psychology, namely that of fitting the job to the man'

Gerard Paul Hodgkinson, Industrial Psychology, *Studio Sound*, September 1983

Yet we must look to science for the materials with which to build a bridge across this yawning chasm. It is this august body that has dispatched a reborn Lone Ranger carrying the plans for our rescue. If we listen closely we can hear the thunder of distant hooves as he gallops towards us packing Winchester slung low on each hip where they nestle in their disc drives, loaded with deadly silver bytes. (Avoids obvious pun!) In his hand, the reins of his trusty steed 'Chip'; trailing behind, his trusty new side-kick, 'Two-bit'. (Tonto was too busy writing diagnostic programs for his medicine man.) If you oppose him he'll rope you in with the fibre-optic lasso hung from his saddle horn and you'll get your just desserts: only the bad guys cross the Lone Ranger, ending up in jail—aka the assembly line of a Coventry car plant.

Or not. Car manufacture is being increasingly automated, made possible by the fixed nature of the product and the task assigned the machine. New technology is the scientific contribution that enables these processes, giving instructions to semi-intelligent

automatons and providing the means by which we can *communicate* with machines. Yes communication is a key area in new technology application and the growth of this technology will, I believe, be the predominant force guiding future recording studio design. Most interestingly, the self-same technology is also forcing another change, for people soon discover that you still don't get something for nothing, not even out of computers. Obvious examples are the young musicians *forced* by their drum boxes to play in time (a big relief, that) and the would-be sequencer programmers who discover that without some music theory ie note value, rest value and beats per bar, no sequencer will replay a given musical sequence. The benefits of new technology await us all but the price must be paid and frankly, the payment really consists of something we should all be glad to give—our resistance to learning and growth. The winds of change blow powerfully through the foundations of our society. No wonder so many people are shivering.

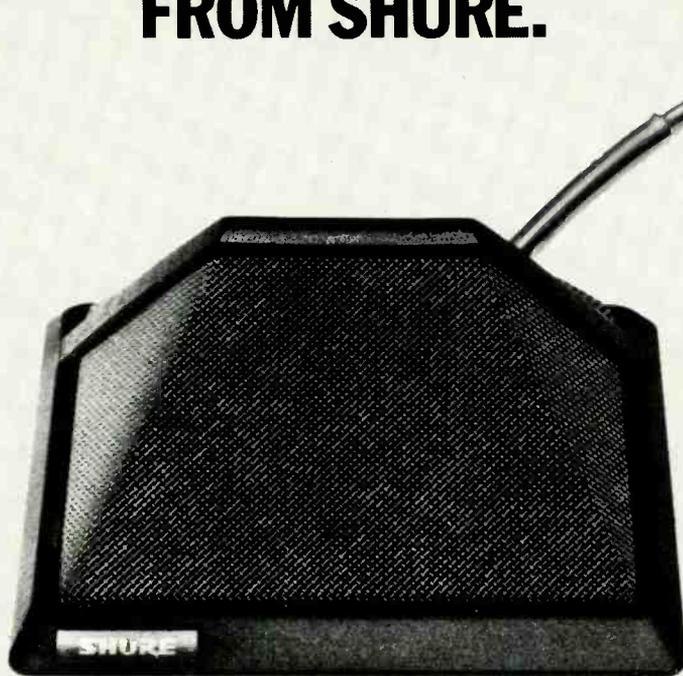
How can the studio engineer escape the rigid definitions of his job and utilise new technology to bridge for himself the Art/Science paradox? I suggest it will be by embracing the concept of being a *translator*, a communications interface with the tools of his trade. No longer an operator, for the machines operate themselves, but a multi-lingual expert in converting the Abstract into the Defined. (A/D conversion?) Future sound engineering will be incorporated with the inter-disciplines of production, the primary function that of bridging the gap for others between the idea and the technical realisation.

So what environment and tools will such a role demand? Firstly, a nice place to sit and listen to music. Since that constitutes the main part of the job. No painter would seek to add colour to his landscape whilst working in a laboratory. Why then should we attempt to evaluate the quality of music in an environment like Mission Control, Houston? Lets put all that complex looking, almost *deliberately* confusing equipment in another room (incidentally protecting the gear from atmospheric damage to which the machines of today are becoming more and more susceptible), with glass doors and air conditioning at a temperature guaranteed to out-cool anybody except the Fonz.

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THE MANIPULATED MAN

and interface everything to everything else. An A/D conversion of the mic and line inputs renders all signals down to digital information and from then on, all signal processing is controlled numerically. From the comfort of your executive chair you will be able to call up programs for the parametrics, companders, acoustic enhancers etc, not forgetting a whole new range of Meximegalon Multiflangers and the satellite link to a transducer/receiver installation in the Grand Canyon. ("My Wem Copycat sounds better than that, mate!") There will no doubt be some analogue-type controls, probably a couple of channels-worth of EQ and some assignable rotary pots, and I would expect to see a small fader panel that fits across the arms of your chair with say 16 mini-faders selectable to your choice of function, such as monitor mixes or riding the numerous vocal takes. (Make that 30 faders, will you.) And all this will come in a nice little unit mounted with the VDU, qwerty keyboard and numerical keypad on a freestanding trolley which will sit by your side, awaiting your command.

Sounds far-fetched? I recently edited some video material at a £200 per hour facility in Soho which to all intents and purposes looked pretty much like the one I have described. Having few traditions to overcome, the designers of video systems incorporate the latest information-handling techniques, somewhat offsetting the fearsome complexity found elsewhere in the medium. The logic of digital signal control developed for video is gradually finding its way into the recording studio as digital systems replace the *traditional* analogue methodologies. Video engineers may be breaking ground for us all.

Sound recording, as Keith Spencer-Allen wrote in his June, 1983 editorial, is covering so much more technical ground these days that "... advanced equipment will create extreme pressures to learn," and that the changes in recording practice "... will undoubtedly increase the demands on the engineer." Almost contradicting him however, Richard Elen wrote in the following month's editorial that "... the operational knowledge required for a piece of equipment—even very advanced gear, like a console automation system—is quite straightforward." (My italics.)

But despite a difference in emphasis, both writers demonstrate an honourable concern over the virtual impasse which new entrants to the field and the industry itself find themselves in—that of training. Like the trainee, the 'education resistant' industry despairs of an educational

system that, caught as it is in the snares of its own traditions, fails almost completely to recognise the needs of a growth industry which paradoxically could benefit from a better choice of applicants and alleviate at least a small part of the unemployment pressures facing school-leavers. In the present climate, *no* training may be more advantageous than bundles of certificates demonstrating only an ability to win certificates. Perhaps this assertion may appear redundant in light of the diminishing number of jobs available at present with the encroachment of the ubiquitous autolocator units, etc, and yet new technology offers its own solutions to these problems.

As Mr Elen stated in his editorial, complex function coupled with ease of operation is not enough. He calls for more creative applications of these new tools, and rightly so. The fiendish aspects of new gear lie in the sudden, exponential rise in possibilities for creative uses such devices offer.

Certainly, the design and maintenance of these new technical wonders is a growing discipline, but not one with which the studio engineer need *necessarily* be concerned. We are becoming more specialised; others may well prefer the smell of solder. And within that *creative* specialisation we find new technology's answer to unemployment for the trend towards one man 'self-op' configurations, I predict, will be reversed as a new breed of craftsman takes his place in the control room, part of a team pooling their knowledge of the rising number of creative possibilities that no one person can reasonably be expected to master.

The time for warnings is past. The writing is on the wall. Pessimistic outbursts about complexity and demanding technology without a clear understanding of what the issues really are may open a flood-gate of Luddite hysteria in a crazy parody of the technical imbroglio that seems ready to overwhelm us. Claims that exacerbate the problem must be avoided, especially when couched in a doom-laden caveat. (Quote: "Overall, the future looks rather grim." RE's July editorial.) Not from where I'm writing, it doesn't.

Those innocuous little dominoes that have changed their spots for tiny golden legs bring liberation to all that use them. They liberate time; time better spent on the constructive tasks of our daily lives, if we can grasp the opportunity. Studio engineers have this choice. I believe it is an opportunity that will eventually force itself on us for reasons beyond our control or even our comprehension. Who

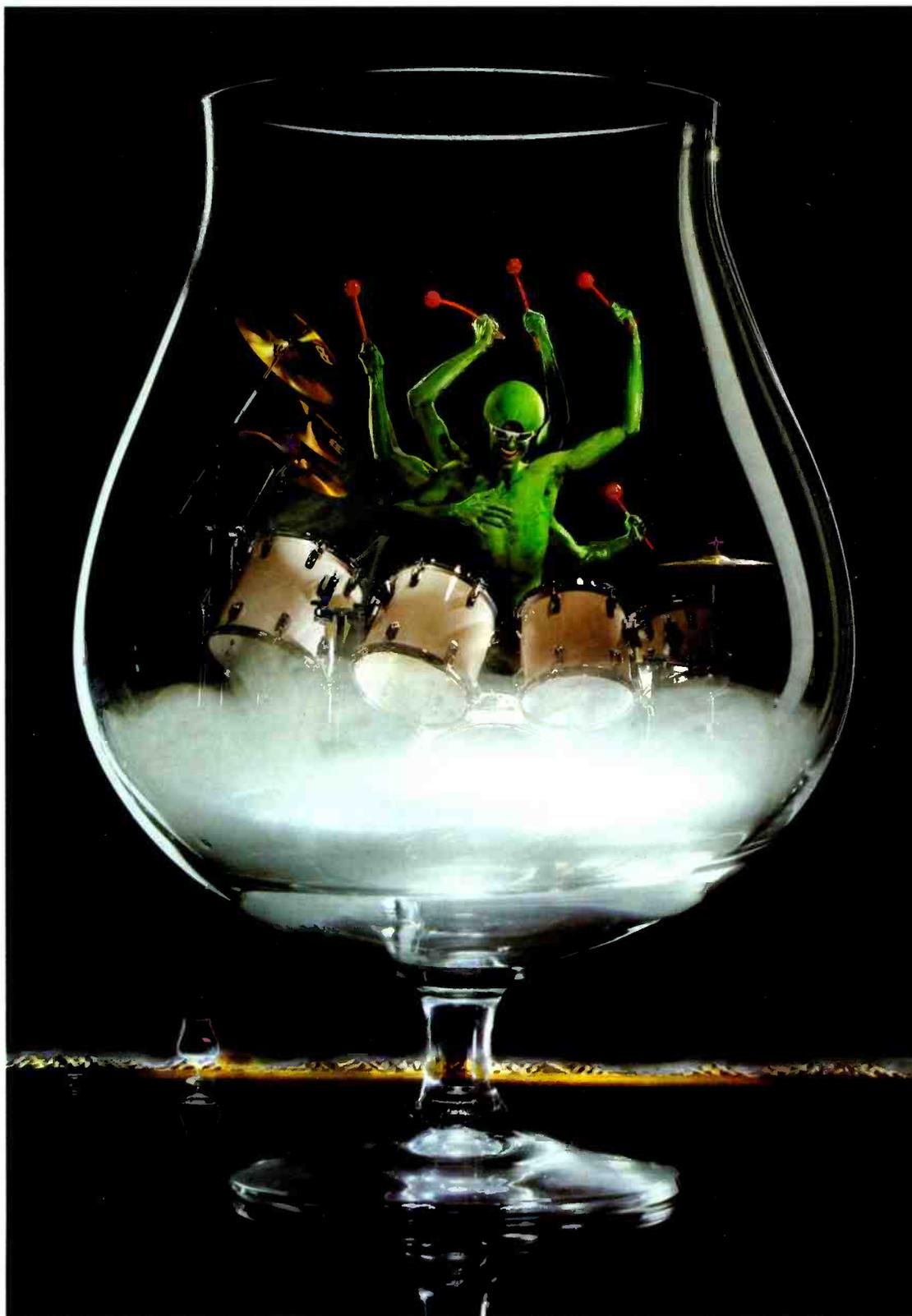
would wish to oppose these changes? If they bring new challenges and new descriptions of the jobs we do, let us welcome, not fear them. Perhaps we will see more people in the control room now we've made a bit of space by getting rid of all that un-ergonomic gear; how about an echo programmer or a harmonic mathematician (a bionic Meximegalon Multiflanger?), or an equalisation expert complete with flight-case full of floppies? Here again I draw on the labour-intensive world of TV and film production in which the *team* cover between them the myriad possibilities of their craft. Labour intensity should be shunned if man can be freed from the terrible demands of the assembly line. Labour intensity should be welcomed in those situations where man will never be replaced by machine; those capacities where creativity and subjective evaluation are of fundamental importance to the task at hand. More machines do not equal more creativity. Creativity is the exclusive domain of human beings. Only more people equal more creativity, *if they can work together.*

It would seem our future, individually and perhaps even as a species, hangs on the historically tenuous thread of our ability to communicate. Not only with each other, but now with everything around us.

Finally, a word on behalf of a chap who is, in fact, the most important person to, and beneficiary of, all our efforts. His name is Joe Public. He supports our businesses and our expenditure on the new technology, the R + D that develops it, our wages, rent, food and leisure. (At which point we become this Mr Public ourselves.) For him, then, it is that new technology should rightly offer the most benefit. He buys our products, not with any concern for the techniques involved but to avail himself of the material to which those techniques are applied. For all of the history of sound recording, engineers have struggled to overcome the interference with the material that analogue systems induce. New technology now offers the artist and his audience a most beautiful synthesis of art and science, both literal and philosophical: Music to Mathematics to Music. Untouched by human hand or device, the abstractions of art encoded in the abstract science of digital code, and back again. We are coming to the real nub of sound recording, which if I may allow myself a little scholarly erudition here may be stated in the Latin as *Arx est celare artem*—The art is to conceal the Art. Only now is it becoming possible for the musician to communicate Direct to his Audience. D/A conversion. □

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BUSINESS BUSINESS

Barry Fox investigates the facts behind the industry news



CD sampling standard

When you next use a Compact Disc player, try listening in MONO. What you hear could help explain why some hi-fi purists don't like the sound of Compact Disc.

First principles first. When the Sony 1610 PCM processor converts an analogue stereo pair into digital code, it samples the left and right channels simultaneously. The left and right channel bits are then interleaved into a single serial stream for recording. On playback the serial stream is fed into a buffer which allows the left and right channels to be played back simultaneously. So the system is self-consistent. Signals come out coincident or coherent in time.

The Sony F1 PCM processor is also self consistent but in a different way. It samples the channels alternately and plays them back alternately with self-compensating delays. This is fine, unless you mix systems, by taking a digital output from the F1 to the 1610. The digital stream from the F1 will be incorrectly reconstituted by the 1610, because the F1 digits have come from alternate channel sampling and the 1610 plays them back as if they had come from simultaneous channel sampling. So the left and right channels end up staggered by half the sampling frequency, ie 11.34 μ s. This creates a slight phase shift, mainly at high frequencies, which may pass unnoticed. But in mono there is HF cancellation. It is particularly noticeable if the process goes through two generations. Although few people listen to digital tapes in mono, the BBC soon found out about the problem because of the need for mono radio compatibility. Reading firm Audio & Design has come to the rescue with a matched pair of delay lines, one goes in one channel of the F1 record circuits and the other goes in the other channel on playback. So the F1 remains self-consistent but its output is also consistent with the 1610 standard. It's a clever idea, which A & D have patented.

But there is a similar problem on some Compact Disc players now being sold. The Compact Disc recording standard, agreed by Philips and Sony, calls for simultaneous sampling of the left and right channels, as on the 1610. The player output should have a buffer to put the serial stream samples back into step. The Philips and Marantz players (which use Philips and Mullard chips) do this. But other players from Japan, don't. Some use a separate D/A converter for each channel but rapidly switch the output signal between converters. So

there is an 11.34 μ s lag between left and right channels at the player output with consequent phase shift and mono roll off. Some players, for instance the Sony CDP 101, use a single A/D converter that is rapidly switched between left and right operation. So it too has the same 11.34 μ s lag between channels.

You can hear the effect if you listen to the Sony, especially on headphones, and switch your amplifier to mono. Don't be fooled by the test disc, it has tones only on one channel at a time! The BBC soon found out when using the player with music for Radio 1 on the medium wave. The BBC is now starting to use Audio & Design delay lines for Compact Disc as well as the F1. Sony UK are well informed and aware of the situation but believe the problem isn't audible. Most Japanese firms in Britain don't know what a buffer is, let alone whether their players have them. Another Sony player, the CDP 701 uses separate converter chips for each channel. Sony says there is still a lag between channels but it's inaudible.

High speed tape

I wrote some articles recently about how the Germans had used tape during the war. It wasn't just to pre-record Hitler's broadcasts so that he could appear to be in one place while actually in another. The German navy used them for transmitting coded signals at high speed, like a modern tape duplication plant. Radio pioneer Joel Tall of Washington (he invented the Editall block) came up with some lovely extra information. He was working with CBS Radio during WWII and in 1947, when Ed Murrow got back from England, CBS was switching from wire recorders to tape recorders. They used the Brush BK 402 machine, invented by Dr Semi Begun, with paper tape that broke if you looked at it.

"The Brush was far from a complete success," recalls Tall. "The AC power pack transformer was tightly coupled to the reproduce head, resulting in a hum level of around minus 40 dB. I rewired one machine with a 7 ft extension cable, reducing hum to about minus 55 dB. I used it to edit Fred Friendly's opus album *I Can Hear It Now*. Fred came in one day, couldn't find a chair and sat on the power pack. It gave him a burn that reduced him to tears.

"At around that time a German inventor came in to see me, with an old *Tonschreiber*, the machine which the Germans used during the war to record sound at normal speed and play it back at any desired speed. The receiving point just had to know at what speed to play it back. A very high speed transmission

could sound like a momentary, almost inaudible, squeak or not be audible at all. Anyway, the *Tonschreiber* unit was made with a four part rotating head. The rotation speed of this head could be increased or decreased at will. Also while the tape was going in one direction the rotating head could be turned in the opposite direction. This way you could compress speech but maintain the same pitch. The man called the thing an expander or contractor of sound and it could also change pitch on demand. I did once use the machine for a broadcast. Ed Murrow wrote his usual think piece exactly twice the normal length. I then played back that section on the *Tonschreiber* at double speed while retaining the same pitch."

Time base errors and CD

How long before the audio industry starts talking about time base errors in digital audio equipment? The video industry is already well familiar with the problem and professional equipment users correctors. But do all Compact Disc players use full buffering to ensure that the data stream off disc is never corrupted by time base errors caused by minor variations in speed of the low mass turntable?

It is not generally known that the military has been working on the problem for at least 10 years. Although details are classified, the Navy uses digital recording and playback equipment to disguise its submarines which carry a disc or tape player to reproduce the sound of a quite different kind of ship, through loudspeakers strapped to the hull. The sub carries a library of digital recordings—trawlers and cruisers etc. When these recordings are replayed under water it fools the enemy's sonar equipment. Digital recordings are used because any wow and flutter from analogue playback and any analogue tape hiss, is an immediate give away. But rival navies found they could recognise recordings by analysing the signal received and spotting the characteristic phase distortion caused by time base errors.

The military has spent millions of pounds and dollars on developing digital and audio equipment that is free from time base errors. Most, if not all, of the domestic players boast crystal-locked oscillators to control disc speed. This enables the makers to boast wow and flutter figures that are unmeasurably low. But what about the effect of time base errors in the digital bit stream that are unmeasurably low? Do they exist; are they audible?

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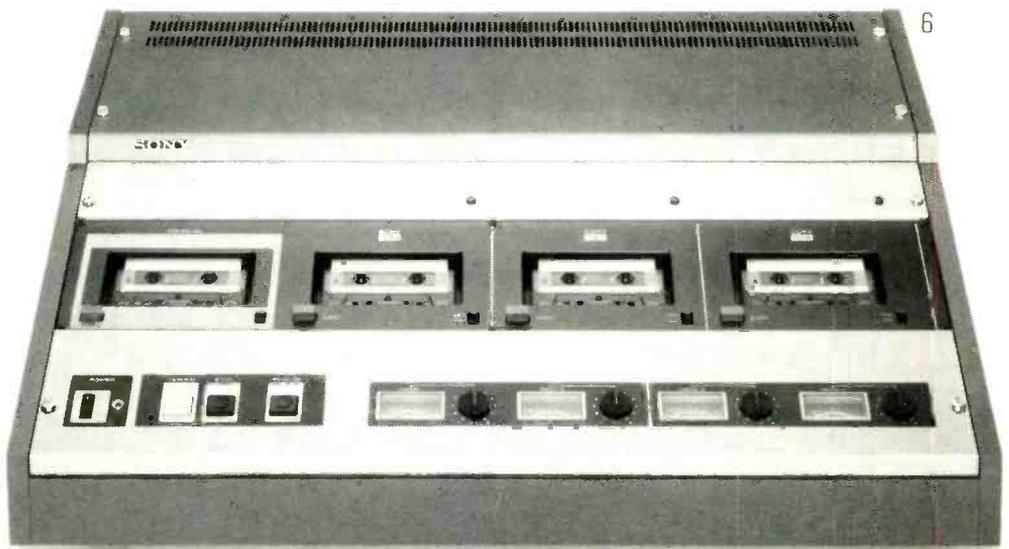
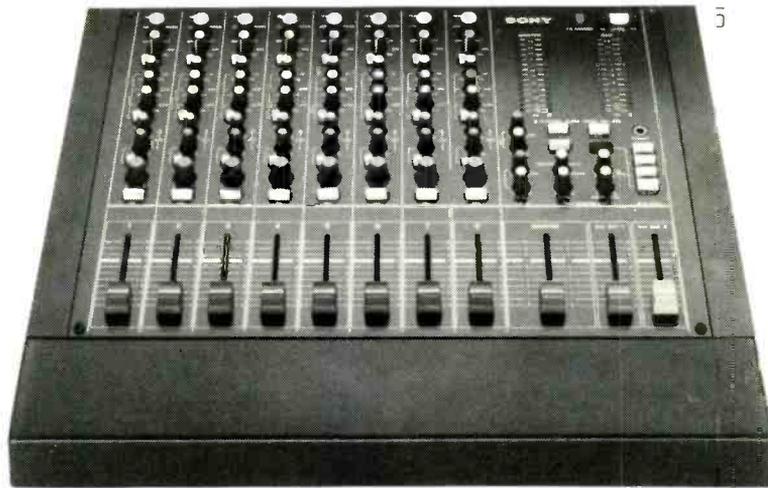
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NASHVILLE

Terry Nelson investigates the current Nashville Scene.

Nashville—otherwise known as Music City, USA—is alive and well and keeping up with its reputation. Though many think that Nashville = country, this is not longer the case.

Sure, country music is probably the backbone of Nashville but there are a lot of bones on the skeleton. I was recently in Nashville for about a week and was able to get an idea of the atmosphere there, hence this overview. As the town does seem to conjure up the image of stetsons and high-heeled boots, we might as well look at the country scene first.

That country music sells is without discussion. However, there are certain trends worth looking into. One of the aspects that worries people closely involved with the production of country

music is the way that it is now 'crossing over' too much. The opinion of Tommy Donaldson of Roxy Studios, a country composer himself, is that a lot of music being played as country is really 'MOR': "The fact that a pop or MOR artist does a country influenced song does not make him a country singer! What Kenny Rogers and Dolly Parton are doing now may be good, may be selling, but it ain't country!"

A bit of fusion never really hurt anyone and fresh blood is often a good thing but it does raise the point 'at what moment does one style cross over into another?'

Another problem is that of airplay and the system of reporting stations. Here the difficulties are twofold and can be headed as 'playlists' and 'hit parade charts'. As far as country music is

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NASHVILLE



Bullet Recording 'A' with SSL

concerned, there are about 360 reporting stations and in many ways they rule the roost in airplay and record exposure. Basically, it is the reporting stations that make up the hit-parade by reporting in to the centres where the hit-parade is compiled. They are often on a very restricted playlist, say 40 at the most but often around 20, so this means that only well established artists will be played and that for the few remaining places it is an open market for all kinds of 'persuasion'.

Recently there has been a trend for owners to take stations off the reporting circle—even some of the very important ones—in order to be free-er in their programming. This drop has been in the order of about 10%, there being until quite recently roughly 400 stations reporting in. On the one hand it is a good sign to see stations being more independent but on the other it still does not solve the problem of the hit parades as published in the musical press, and the record buying public getting to hear about new releases or artists.

Coming back to the 'cross over' styles, there is the added fact that MOR country will find itself being played on both pop and MOR orientated stations as well as the country ones, nibbling away further at the restricted exposure available for lesser known performers. As far as Tommy Donaldson is concerned: "They have got to start making country records again and leave the MOR where it belongs." Why don't they leave it in the road, perhaps?

Be that as it may, good country does still exist, as a listen to many of the country radio stations will confirm (though on several occasions I must admit that I was wondering what that

record was doing there!) and even the 'rebels' such as Waylon Jennings or Willie Nelson are firmly rooted in the country music tradition. And no one could accuse Nashville's own WSM of 'going city'!

Despite the problems, and they are real, a healthy recording scene does exist and an example of this was a session at LSI studios where country singer Gary Stewart was laying down a new album with a pick-of-the-crop session band. The refreshing change here was that everything was going down at once, vocals and all, and that very little retouching or over-dubbing would be needed. This, of course, is the way the traditional Nashville sound evolved. An already good sound was further enhanced by the togetherness you can only get with a group of musicians playing together at the same time as a band.

However, as mentioned earlier, Nashville is not all country and there would appear to be an increase in rock and pop sessions. This trend is typified by new studios such as Treasure Isle. The first top class studio to be built from the ground up in Nashville for some time, Treasure Isle are definitely out for the national market and the first results have been very encouraging. The studio has been built and designed with an eye to the rock market and in fact the sound is often quite British sounding!

Another studio aiming for a similar market is Bullet, part of Bullet Creative Group, Inc. As well as being music recording studios, Bullet are moving into the realm of video and audio-visual productions. Their large studio A can be used as a recording room or as a video soundstage

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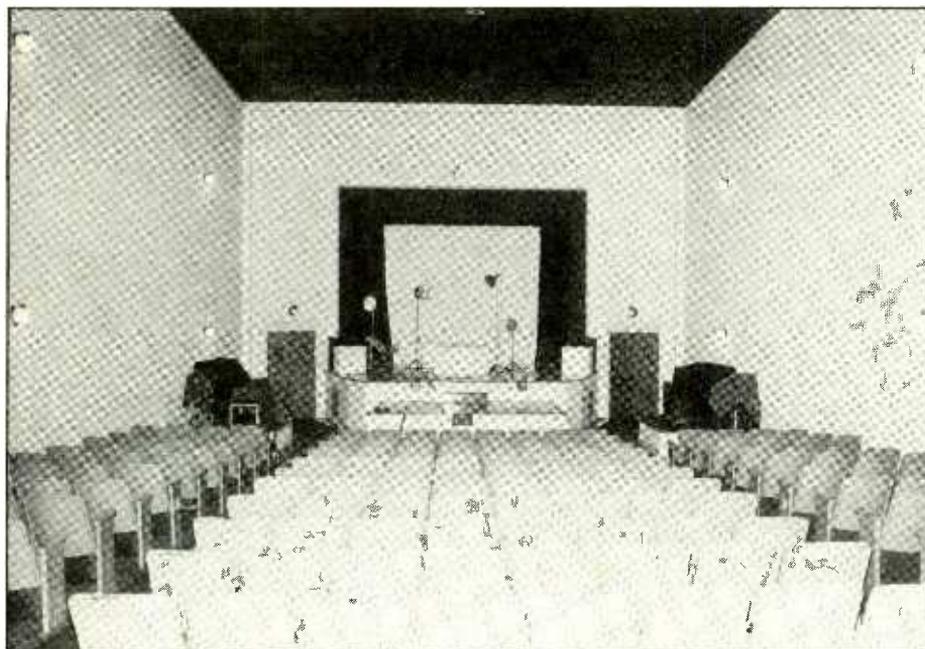
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NASHVILLE



The theatre, Roxy Recording

and they are in the process of installing the control rooms for full video production. Although full operation was not planned until the end of 1983, some TV specials had already been taped at Bullet and gone on air.

For those who like to record in the peace and quiet and be out of town, there are studios such as the Bennett House or Castle Recording Studio.

The former is in the little town of Franklin (also an historic site from the Civil War, by the way), just outside Nashville, while Castle are close by but in the open countryside.

The two studios are similar in that they offer top flight equipment and have both entered the digital era with the installation of 3M digital multitrack machines.

The Bennett House is a classified building from the 1880's with the studios adjoining in what appears to be a barn and stables to the outside world. There is a large main studio that I was unfortunately unable to visit owing to a last minute closed session and a new remix/overdub studio in the 'stables' that were in the process of being installed. The new studio also features a 3M digital with a slightly 'hot-rodged' Trident Series 80 desk, and should, by now, be operational. The large house offers accommodation and rehearsal space with beautiful surroundings and has a very noticeable 'at home' atmosphere to get you away from the stress of the studio.

Castle Recording Studio offers much the same atmosphere with the studio being part of the house itself. There are, of course, the added joys of the countryside. As with most of the studios mentioned in this overview, Castle will be reviewed fully in Studiofile.

It would be strange for a town like Nashville not to have a lively music scene and there is always live music in a variety of places every night. The large percentage is country and rock but there are musicians in Nashville who are anxious to make the city known for other types of music besides and watering holes such as the Bluebird feature jazz and fusion groups to a large audience. In fact, I found it quite amusing the way some studio engineers went to great pains to explain that Nashville was 'more than just country.' There's really no need to sound apologetic, guys!

Nashville also means the audio industry, with firms such as Harrison Systems, Valley People and the main office of Studer/Revox, America being in residence. Most of the people in these and other firms have a close involvement with the local recording industry, making for a continual feedback of ideas and an awareness of what is going on—and what is needed—in the market place.

Whereas the slump in the music industry has hit some places pretty hard, Nashville does appear to have been fairly unaffected by it all.

Indeed, it would be truer to say that it is in expansion with studios turning to embrace video and the audio/visual media, together with a more aggressive marketing policy towards the national and international markets. Expansion in convention facilities, now in progress, is also going to put Nashville more firmly on the map and it must be only a matter of time before we see the AES convention coming to Tennessee. (Some people might be tempted to say, the sooner the better!)

It looks like Music City is just going to keep on growing! □

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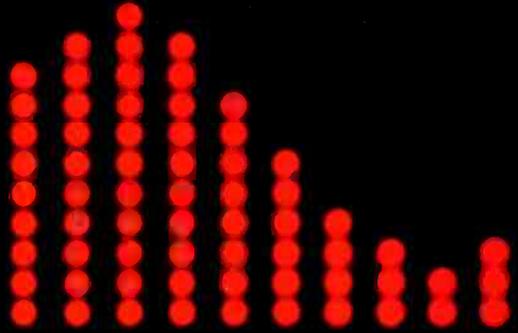
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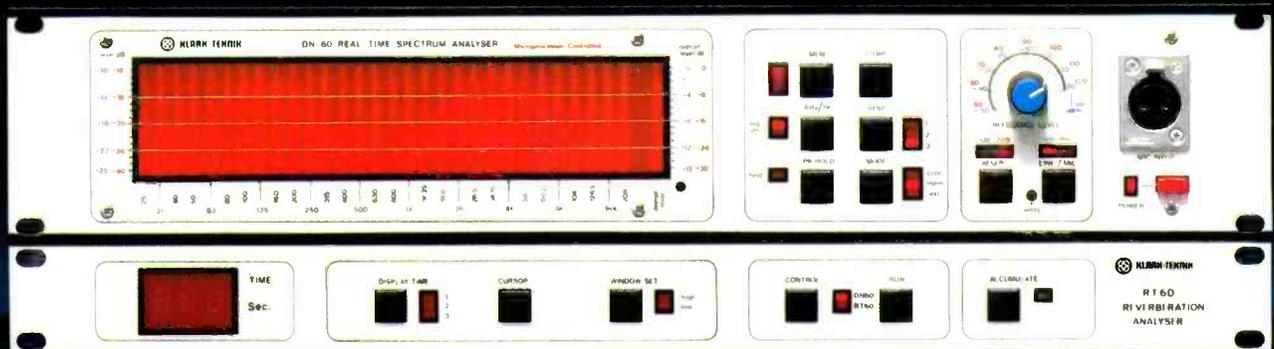


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Introducing the DN60 25Hz-20kHz microprocessor-controlled audio spectrum analyser — with its optional add-on RT60 Reverberation Analyser — and all the accuracy you'll ever need.



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sound science



Dedication is the soul of good design. Klark-Teknik are dedicated to making every product a classic.

Terry Clarke

Seeing is believing

If you've ever spent too much money on a precision audio analyser — or too much time trying to figure out the results from a low cost model — you'll see why professionals prefer Klark-Teknik's DN60. It has all the accuracy you'll ever need — at a price that's equally realistic.

The DN60 has controls that make instant sense to eye and finger, for easy use in a busy session, or just before a 'take'. Its clearly readable graphic display gives you precise information at a glance.

Put it in a rack or any convenient position and you will have 30 frequencies displayed — to match the 30 faders on the Klark-Teknik series 300 equalisers. Connect a

Klark-Teknik AT1 measurement microphone or the line output of any other equipment for the most accurate analysis. Or simply plug in the RT60 to make an accurate reverberation analysis. Together these options make a complete and fully integrated professional sound analysing system based on the DN60 Audio Analyser.

Don't take our word for it. Take a searching look at the front panels of these superb instruments. You've seen other skilfully styled panels, but if your fingers have tripped over switches before, you'll soon recognise that this is more than a pretty interface. It's a practical solution to your need for information when you're in the dark — figuratively or literally.

More than a pretty interface!

The ACTUAL SIZE photograph shows the DN60 in the peak hold display.

DN60 Analyser A microchip breakthrough

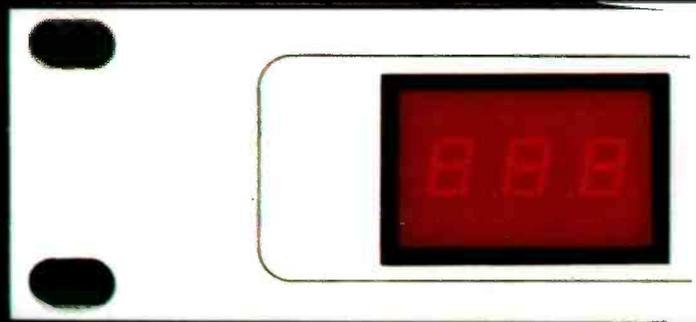
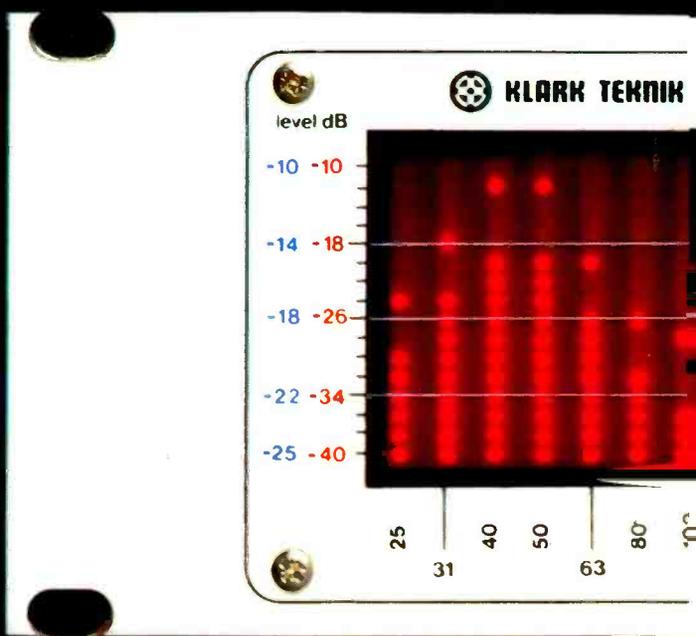
The new microchip technology has made it possible for Klark-Teknik to improve on their previously high design standards at lower cost. Skillful design techniques and the computing power of one of the new generation of microprocessors have both contributed to give the DN60 Analyser unbelievable value — combining unequalled ease of use with the high levels of accuracy and reliability for which Klark-Teknik are known and respected in the industry.

RT60 Reverberation analyser Add-on at little added cost

Linking the add-on RT60 unit to the DN60 through our multi-purpose interface circuit card creates a remarkably inexpensive microprocessor reverberation analyser. Special programming of the microprocessor in the DN60 allows the reverberation decay levels to be shown on the DN60 display just as graphically as on a dedicated reverberation analyser costing very much more. The 'pink noise' source built into the DN60 makes it easy to use the system noise method of reverberation measurement as well as the clapperboard.

BUILT-IN RELIABILITY

Both instruments are produced to proven Klark-Teknik quality control standards, consistent with their advanced technology. Only top quality components are used, and every unit is bench-tested and aligned before a burn-in period and final performance test.



RT60 memory is separate from the DN60 analyser memory, although controlled by the same front panel switches. Storage of reverberation curves will not erase previously stored analyser curves.



RT60 display

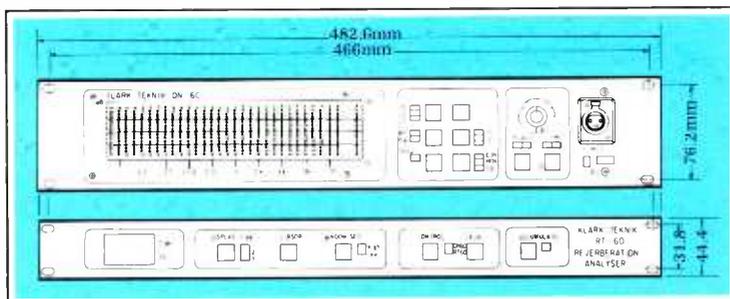
Specification DN60/RT60

Frequency response	15Hz to 22kHz	
Microphone input	Differential .25mV/μBar to 1mV/μBar	
Sensitivity	120dB spl — 50dB spl	
Powering	14 V dc. phantom power (nominal)	
Connector	D3F-XLR	
Line input	Differential — balanced or unbalanced	
Sensitivity	+ 20dBm to - 50dBm in 10dB steps	
Impedance	47k ohm	
Connector	D3F-XLR on rear panel	
Attenuation accuracy	± 0.2dB	
'A' weighting	Selectable to IEC 651 type 1 requirement	
Pink noise output	Digital pseudo random white noise generator with pink noise filter.	
Frequency distribution	- 3dB/octave 20Hz — 20kHz ± 1.0dB	
Level	+ 4dBm (adjustable)	
Impedance	1k ohm (unbalanced)	
Connector	D3M-XLR on rear panel	
Data output	Via interface* and multipin connector on rear panel. (*Interface optional.)	
Power requirements		
Voltage	110/120/220/240V 50/60Hz	
Watts	Less than 30VA.	
Dimensions	<i>DN60</i>	<i>RT60</i>
Width	482.6mm (19 inch)	482.6mm (19 inch)
Height	89mm (3.5 inch)	44.4mm (1.75 inch)
Depth	254mm (10 inch)	40mm (1.6 inch)
Weight		
Nett	5kg (11.03 lb)	
Shipping	8kg (17.64 lb)	

Specification AT.1 MICROPHONE

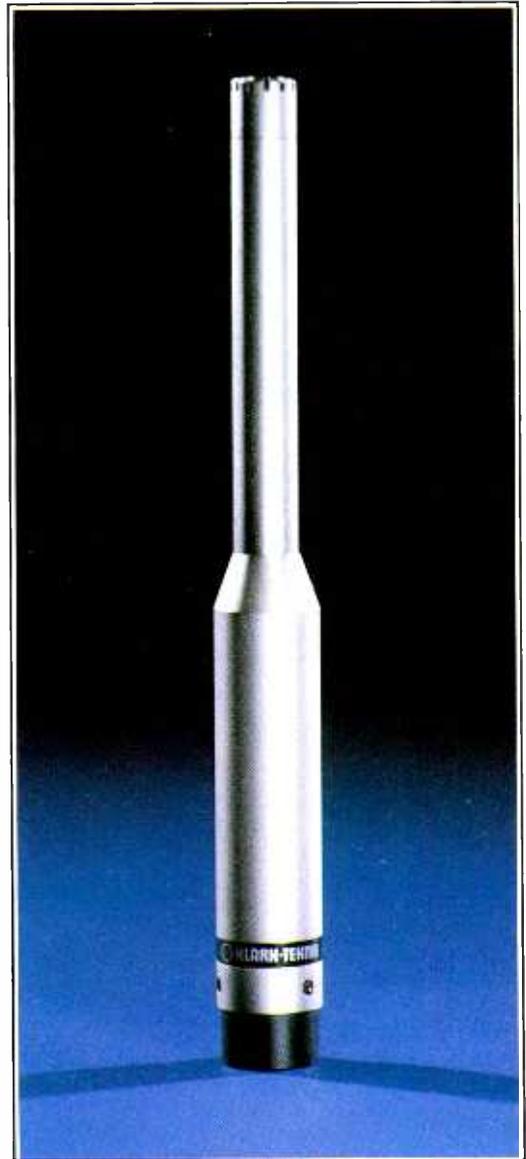
Frequency response	Flat to 10kHz
Sensitivity	0.5mV per μBar nominal @ 1kHz
Dynamic range	20-130dB spl
Capsule	¼ inch electret condenser
Type	Pressure
Power required	14V phantom powered

As part of a policy of continual improvement, Klark-Teknik reserve the right to alter specifications without notice.



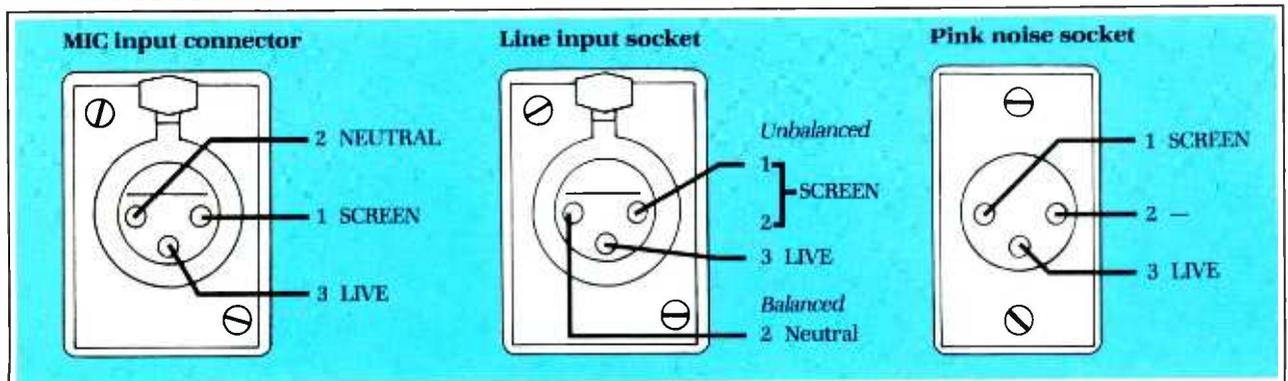
Options

Klark-Teknik AT1 Measurement Microphone has been specially designed as a precision transducer for measuring random directional sound with instruments such as the DN60. This makes it particularly suitable for reverberation measurement. It shows little difference in frequency response between sound directly along the axis and that arising 90 deg. off.



The DN60 with incorporated interface card will interconnect the DN60 to the RT60 — or to other external equipment such as an X-Y plotter or your computer. (*Please contact the factory for interfacing information and feasibility.)

PIN CONFIGURATIONS



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AND ROOM RESPONSE**



Known for its roadability. Ask around, you'll find that Klark-Teknik equipment is known for its ability to take the hard knocks of the road while continuing with its smooth studio-quality performance.



It's nice to know you're right. The consistently high accuracy of the DN60, and its versatility with the RT60 Reverberation Analyser add-on, can give added confidence to those responsible for the acoustic performance of public buildings and auditoriums. Specified as part of the final installation, the same instrument can provide proof at commissioning and continuous quality control for many years after.



Visible excellence. Under the demanding conditions of production testing — of equipment or of recordings — the simplicity of the DN60 controls and the clarity of the display make it possible to maintain the highest standards of performance quality.

Klark-Teknik Research Limited,
Coppice Trading Estate, Kidderminster,
Worcestershire DY11 7HJ, England.
Telephone: (0562) 741515 Telex: 339821

Klark-Teknik Electronics Inc.
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and fumes. To minimize unwanted noise, breath and pop filters are provided on all models, and the mics are all adaptable either for hand-held use or use on a mic stand. And behind all this is Toa's assurance of quality - the guarantee of crystal clear sound, wherever you are.



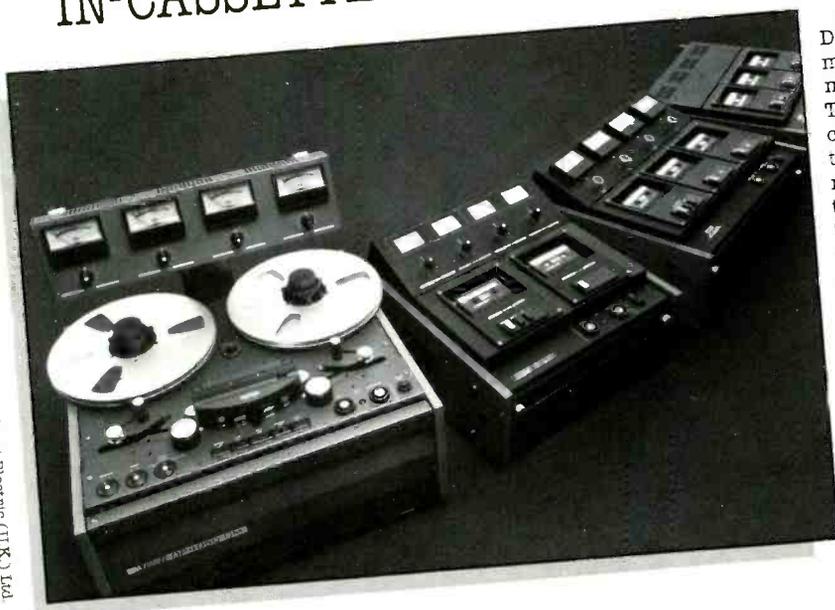
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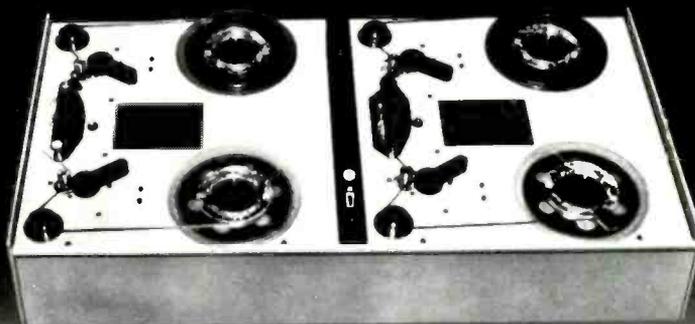
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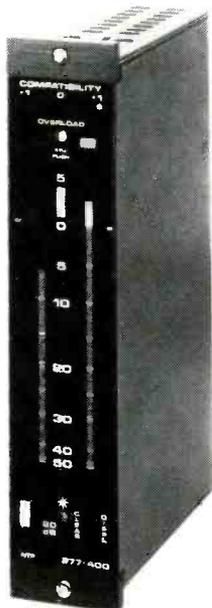
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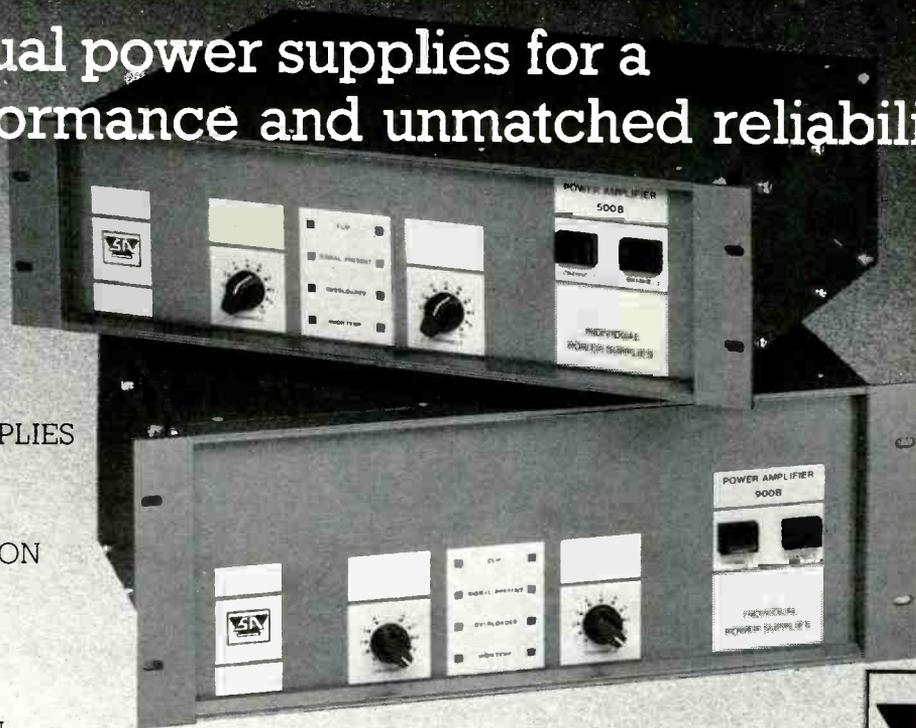


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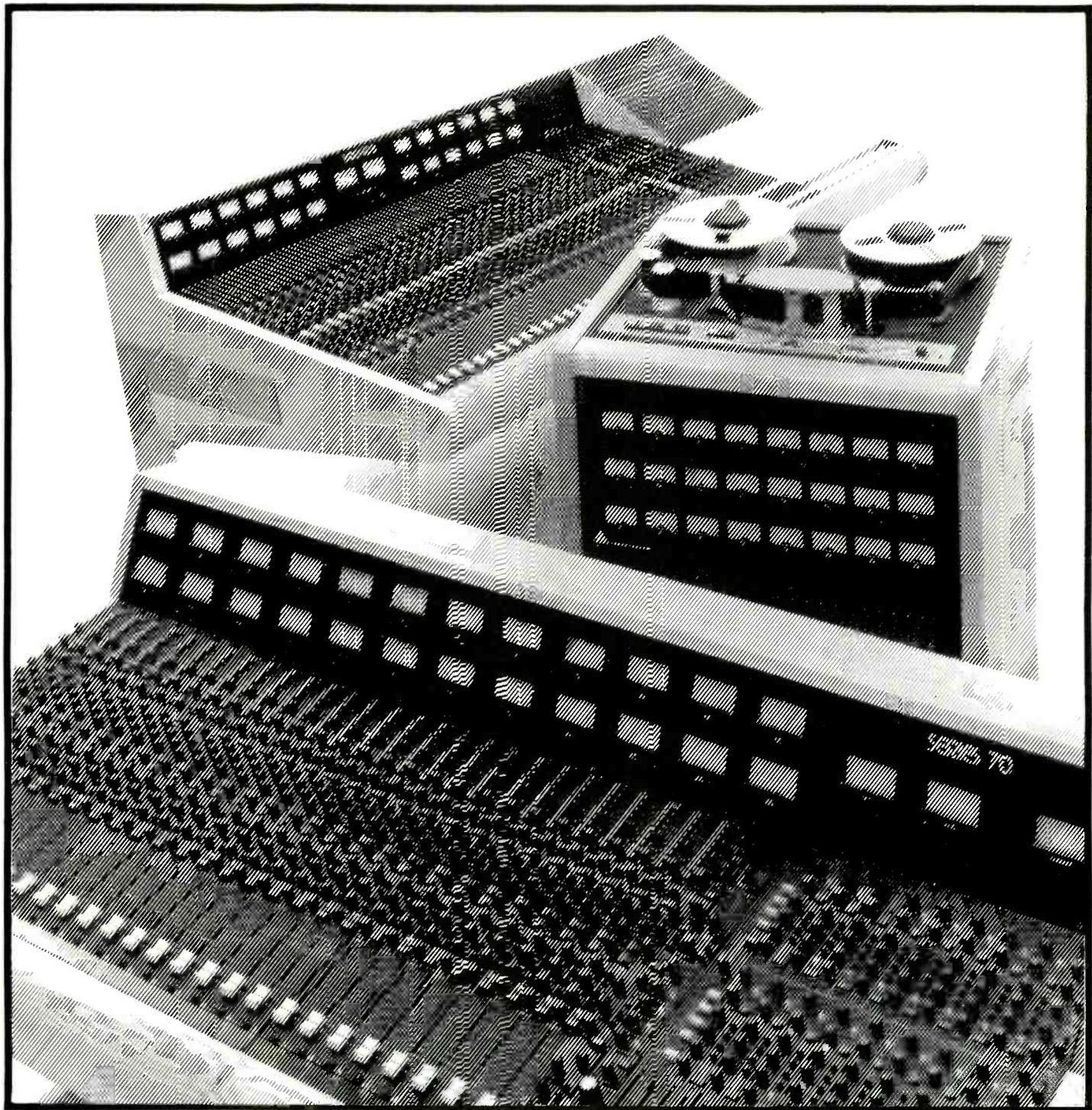
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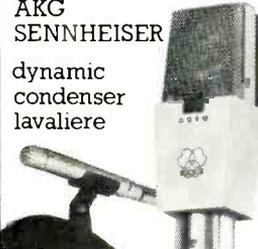
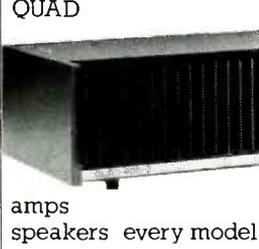
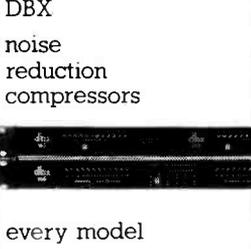
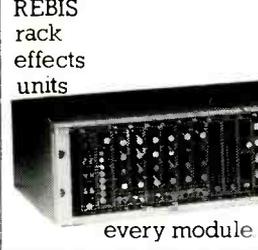
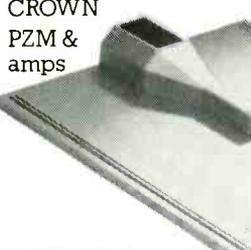
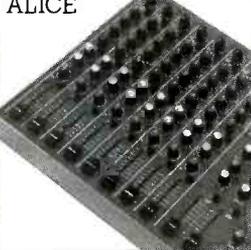
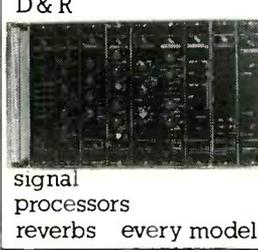
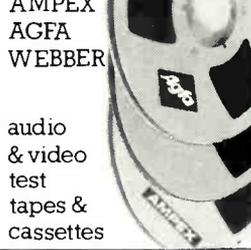
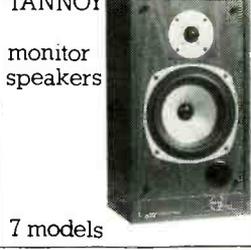
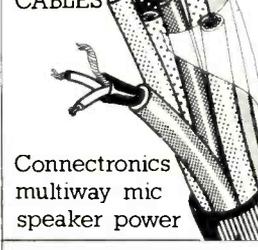
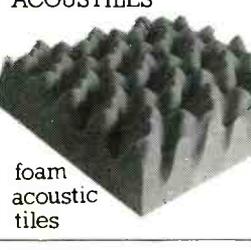
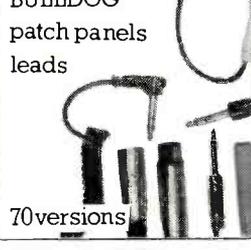
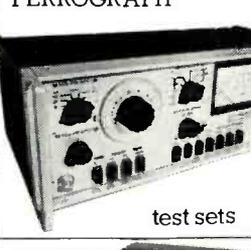
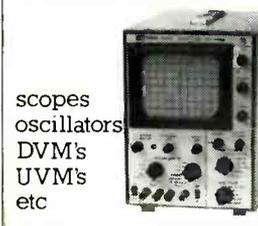
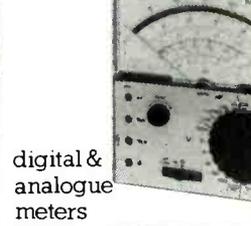
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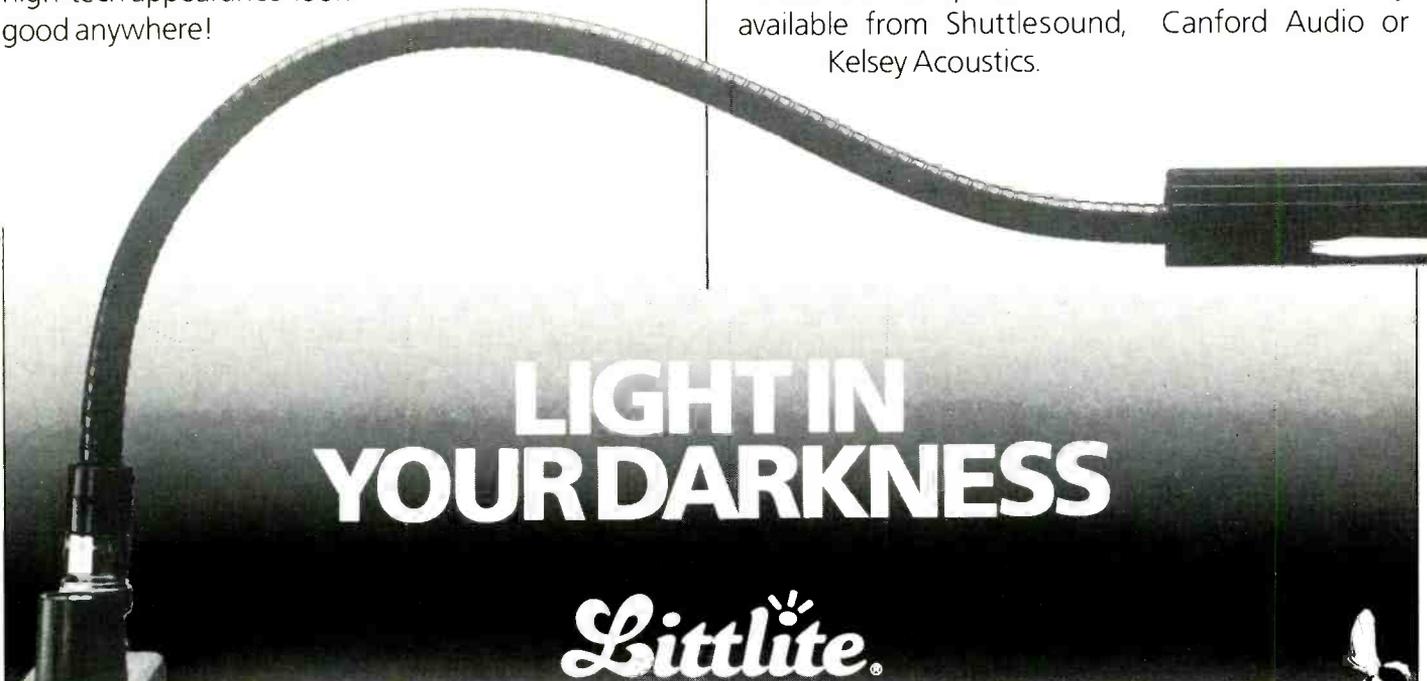
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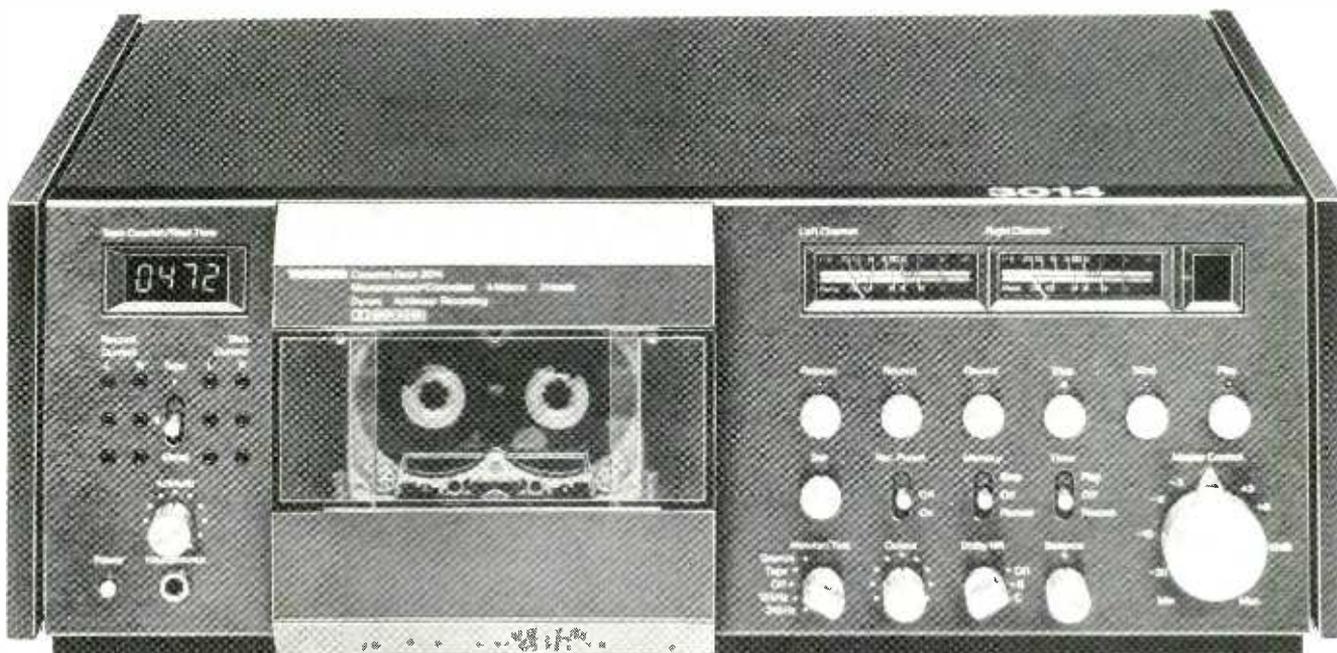
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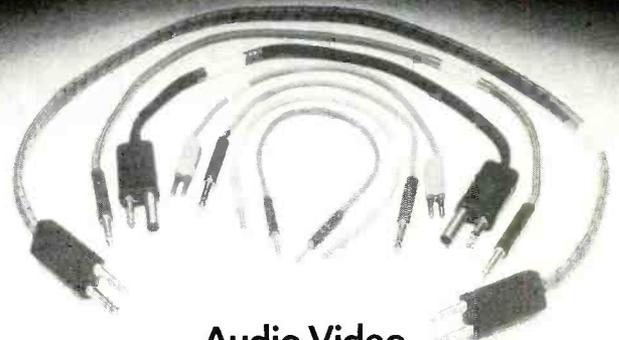
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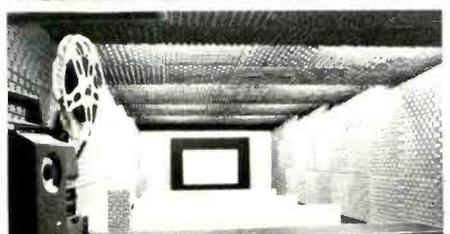
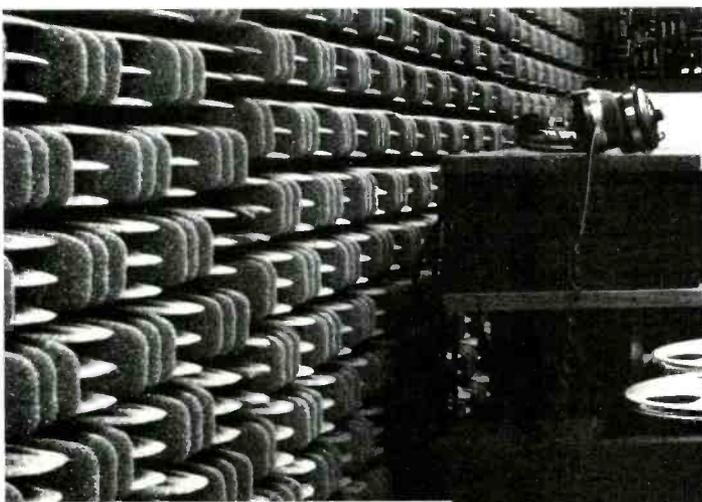
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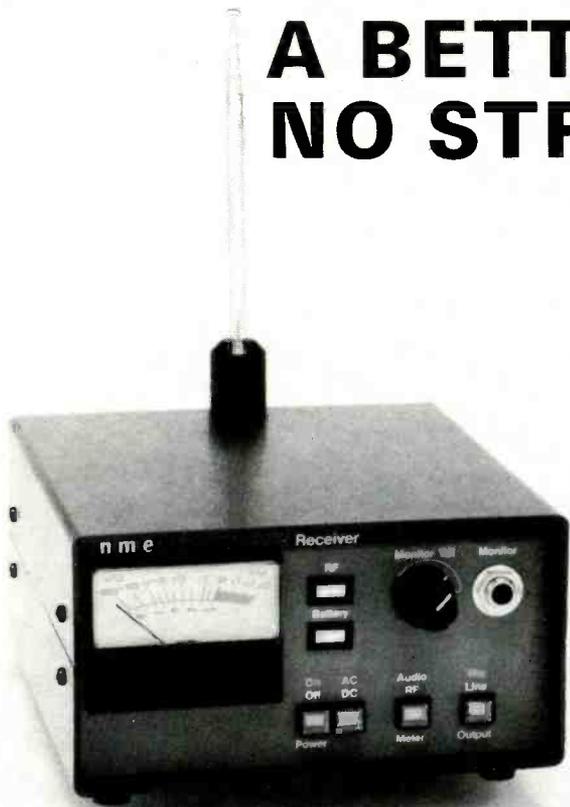
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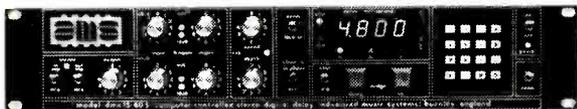
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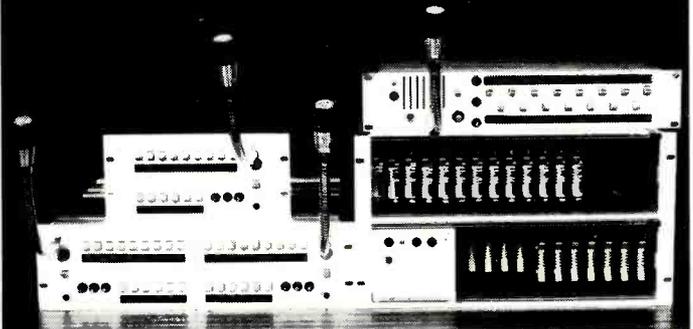
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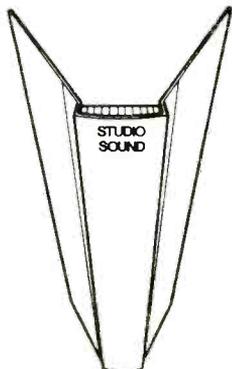
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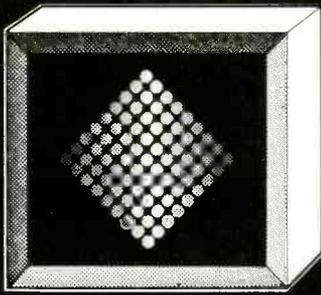
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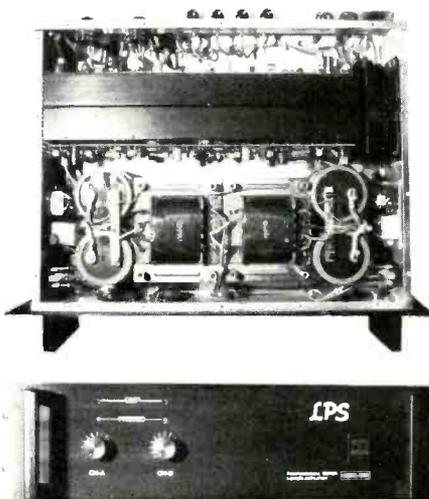
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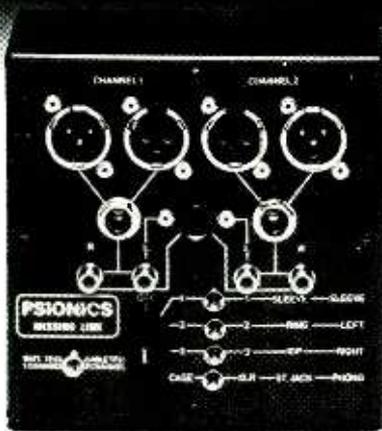
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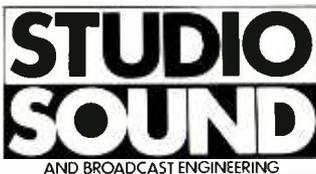
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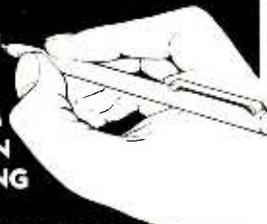
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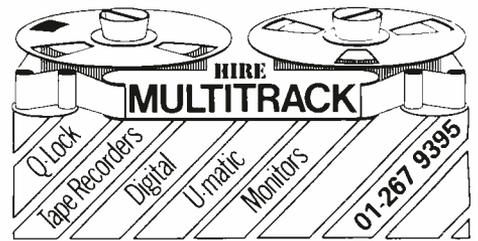
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