

STUDIO SOUND

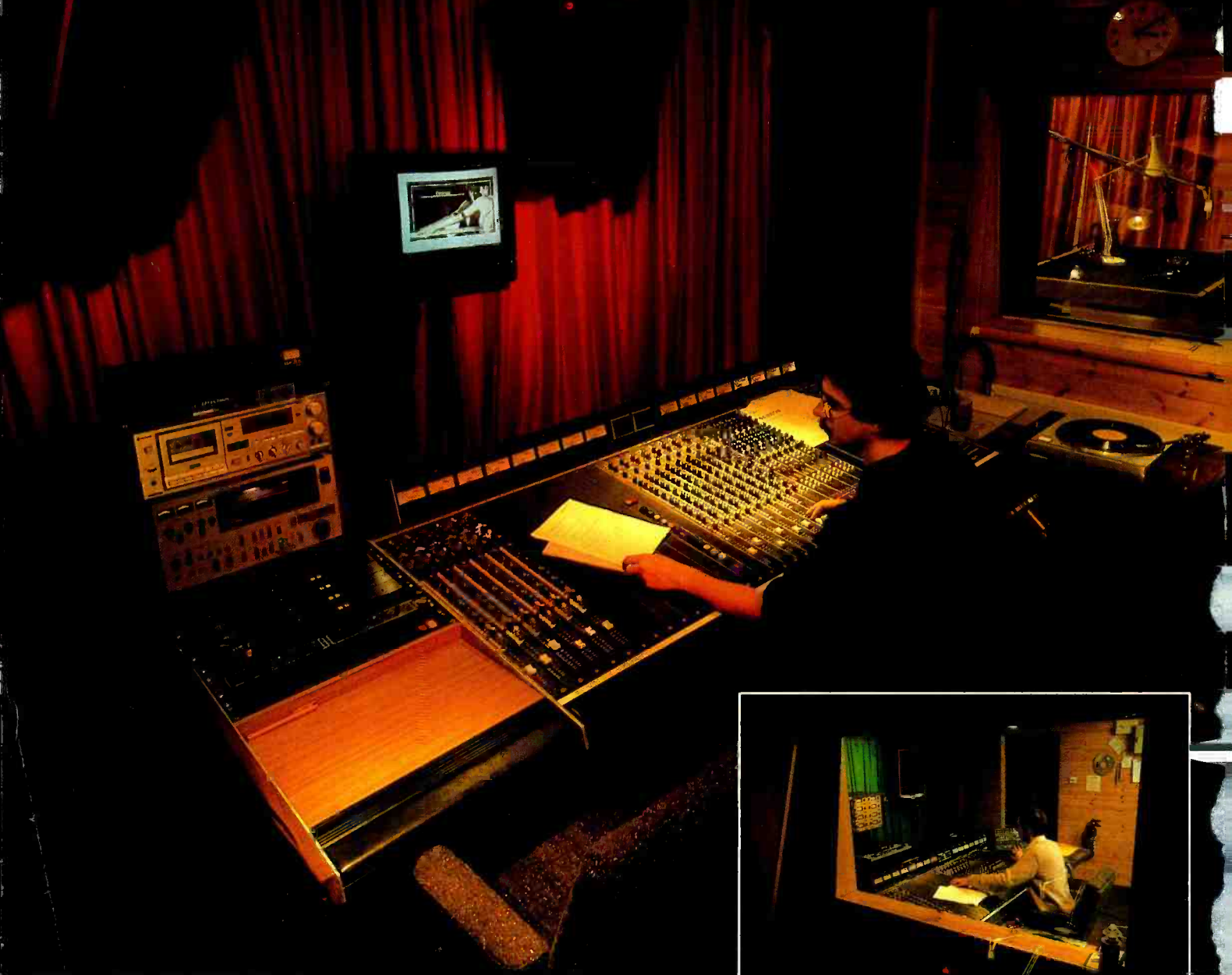
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STUDIO DESIGN & MANAGEMENT

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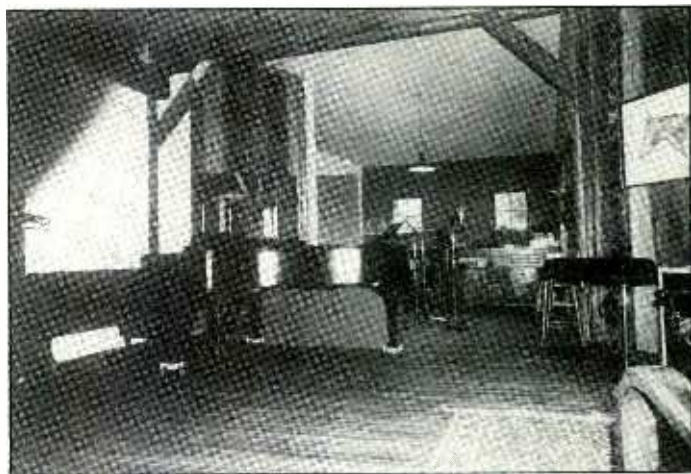
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A LINK HOUSE
PUBLICATION

May 1984
Volume 26
Number 5
ISSN 0133-5944

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EDITORIAL

EDITORIAL

This month's comments, observations and opinions from Keith Spencer-Allen

The science of the art

Once upon a time, it never mattered what acoustics you chose to record in. The end consumer of your recordings was unlikely to hear the results with enough fidelity to deduce the acoustic environment used. The recording situation would have been a hall, or later on a studio, that would have been chosen to suit the musicians and create a pleasing situation for them to play in. The most important instrument was as close to the recording horn, later a microphone, as a balanced sound would permit and the other instruments would take their chances behind. The end listener couldn't hear the recording acoustic as the predominant instrument or voice was the equivalent of close miked. In addition the ambience or reverb time of the recording room fell far below the effective noise floor of the recording medium. It made a balanced system—the recording techniques available were of a parallel development with the consumer replay system and any shortcomings on either side were complimentary to the deficiencies of the other. All the listener had available to consider was the musical performance and, to some degree, the subtleties of musicianship. End result: listener happy with the sound of contented musicians.

One of the areas of improvement waiting to be made was the choice of recording environment which had become increasingly more audible as equipment improved. Up until this point, the applications of an imprecise science of acoustics was largely geared to theatres and concert halls. In many cases this did not matter as a lot of the popular types of recorded music were quite at home in this type of acoustic and again we had a balanced system. Result: musician happy and the listener fairly happy.

With the development of differing musical types, changing tastes, a familiarity with recorded music and the appearance of electric instruments, things again had to change. Studio owners (the few that there initially were) turned to experimenting and taking from concert hall design what ideas seemed appropriate. This of course led to wildly differing acoustics and recording environments. Some were a creation of instinct, some the result of trial and error and others by doing virtually nothing to a by chance good sounding room. This further led to specialisation—this studio being good for acoustic instruments and that one being great for rock'n'roll although awful for string sections etc. Studios acquired reputations and it was obvious why. The constructor of the acoustics had an empathy with the specific type of music he wished to record which in turn was what the studio did best—the circle reinforced itself. There were many great records made in this era and I think it was fair to say that this might be the last time that musicians and listeners were both quite happy.

To upset this order, multitrack arrived but it was not until the early 70s and the halt at 24-track in the track race that acoustics became a 'problem'. The cry was that the studio should be used as a musical instrument, a tool for the producer to play. This led to acoustic separation becoming almost the sole goal in acoustic terms. For the first time the playing environment of the musician was disposed of and the recorded sound became the only viable parameter. Musicians were screened, boxed, separated by glass and brick walls. The most

extreme application was probably the Rock-Box concept of each musician quite physically separate from each other thereby giving good acoustic separation but removing a lot of the musical cues for the players leaving the music to be made by musicians playing at the same time rather than together. Sometimes this placed extreme demands on musicians and there was a back-lash feeling from players of acoustic instruments that forced a change. Musicians very unhappy while listeners were fairly happy.

About this time appeared a relatively scientific approach to studio design that attracted studio owners to design companies at either end of the 'Lake'. They were able to offer guarantees about how a room will sound, perform or separate. Musicians were allowed to stand in the same room usually without separating walls and screens and still be acoustically separated. The attraction to studio owners was that the risk of design had gone or was reduced; they could have a studio that was flexible enough to record most types of music—with limits—and any discomfort caused to musicians by their still only marginally improved playing conditions could be made up by making them feel at home—the comfy environment, the carpets and curtains; they were functional in more ways than just acoustic. I think in retrospect, little can be easily criticised about this approach other than that it was accepted perhaps too readily by many studios. It will always be a shame that more studio owners did not try to make a designed studio more reflect themselves and the character of their studio rather than accept the stock item. Result: musician a little happier and listener response split.

In recent years there has been a return to the character environment, the return to a liver acoustic, the search for more accuracy in the control room and the use of time as an acoustic separator rather than glass. For the first time since the earlier days of recording, we are getting closer to a suitable environment for musicians to give their best. Unfortunately with the introduction of a consumer medium that will relay studio shortcomings very faithfully, there is now increased pressure to get that control room right and generally raise monitoring standards all round. Without delving too deeply into the exact reasons I believe it to be fair to state that at present the score is musicians happy and listener (CD owner) often unhappy when CDs replay those studio 'errors.'

The major emphasis of design work must be in the control room in preparation for the next generation of monitors that will hopefully manage to combine power handling and a fidelity beyond the current generation. But please do not let us *all* follow in the same direction in control room design philosophy. No one has it completely right and the truth as you would like to hear it probably lies somewhere between the various design stances becoming current.

Studio design has always sat somewhat uneasily between a black art and a science. Without a doubt the art side is becoming less black as measurement technology improves although we must always look for that slightly 'magic' ingredient to create a great studio. The approach to the musician's recording area is very nearly right. Let us hope that we can make the same progress in control room design by not closing our ears and over polarising our approaches to the detriment of the end result—the music.

**STUDIO
SOUND**
AND BROADCAST ENGINEERING

STUDIO SOUND is published on the second Friday of the preceding month. The magazine is available on a rigidly controlled requested basis only to qualified personnel (see back page for terms) or for an annual cost of **£14.00 UK, \$40 US surface mail, \$75 US airmail, £20.25 overseas surface mail or £32.50 overseas airmail** to non-qualifying readers or where more than two copies are required in a studio or small organisation. *All* subscription

enquiries, including changes of address (which should be *in writing* and preferably including an old address label or at least the 7-digit label code) should be made to the **Subscription Department, Link House, Dingwall Avenue, Croydon CR9 2TA, Great Britain.**
US mailing agents: Expeditors of the Printed Word Ltd, 527 Madison Avenue, Suite 1217, New York, NY 10022. Second class postage paid at

New York, NY.
Total average net circulation of 13,925 per issue during 1983. UK: 5,821. Overseas: 8,104. (ABC audited)
Studio Sound and Broadcast Engineering incorporates Sound International and Beat Instrumental. Printed in England

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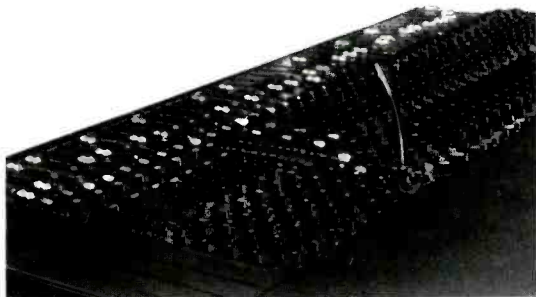
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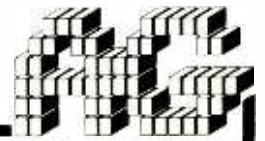
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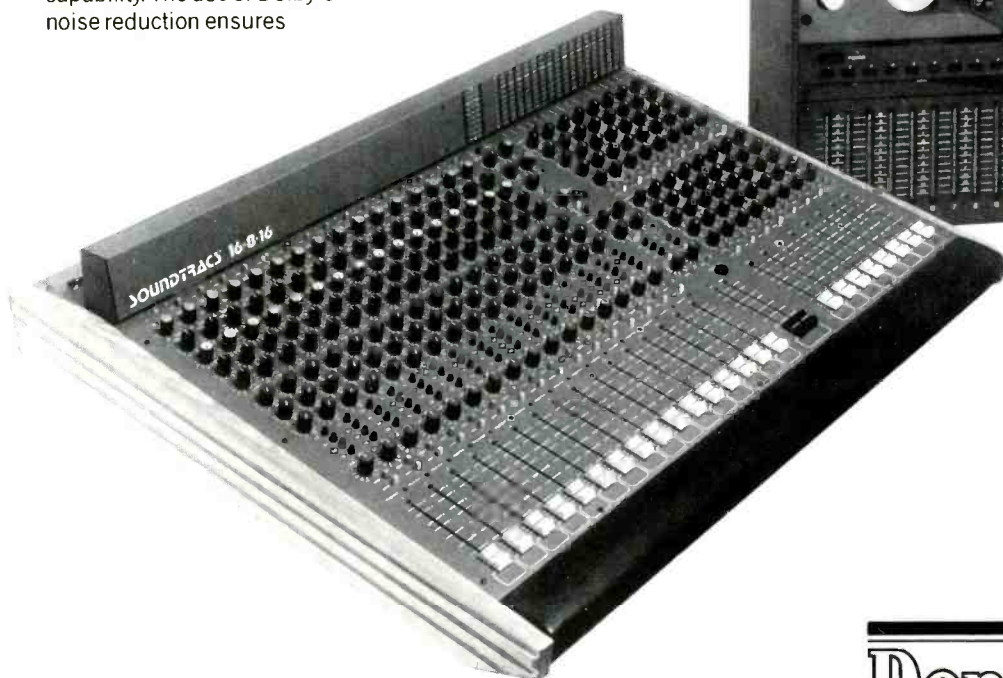
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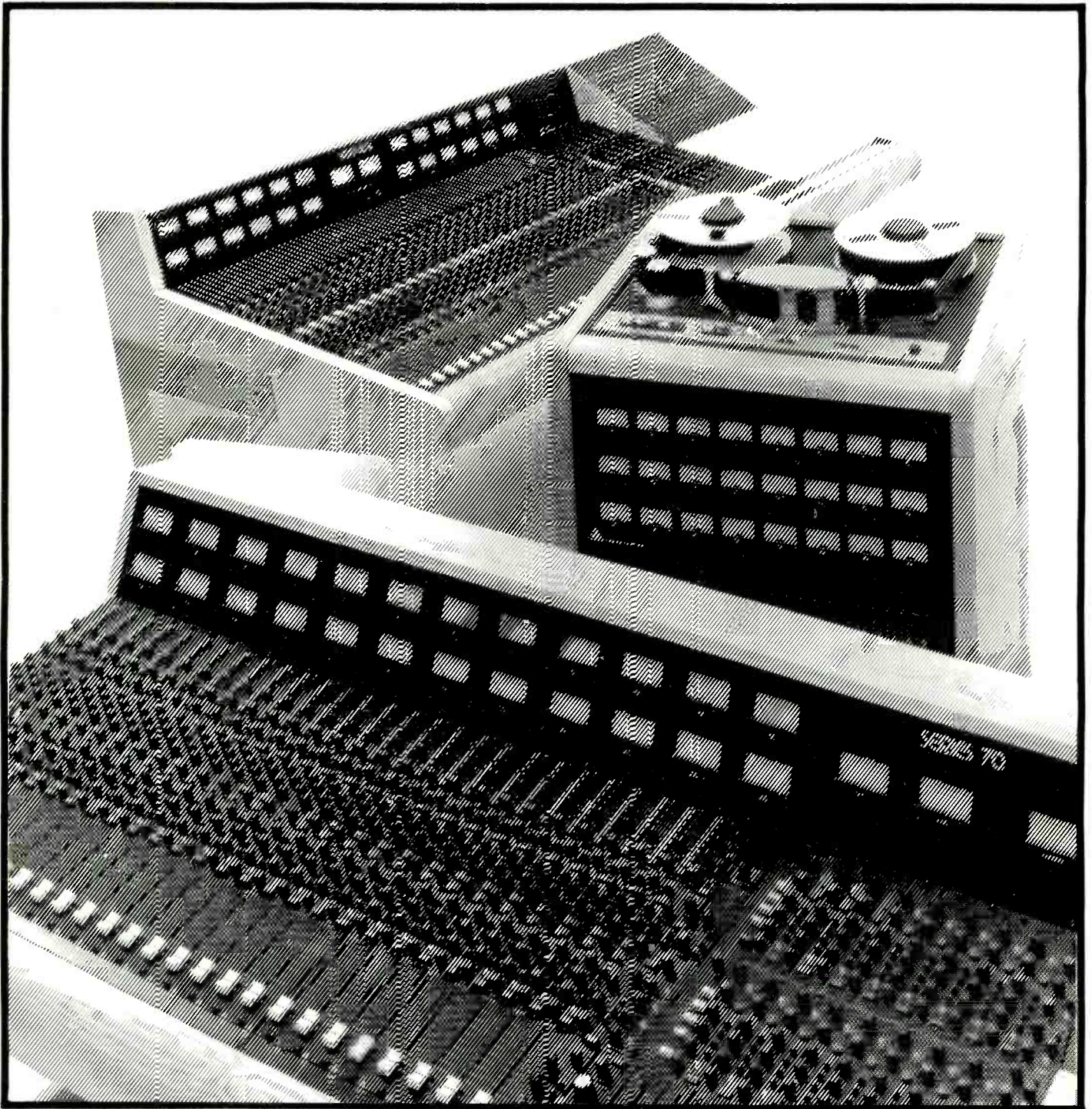


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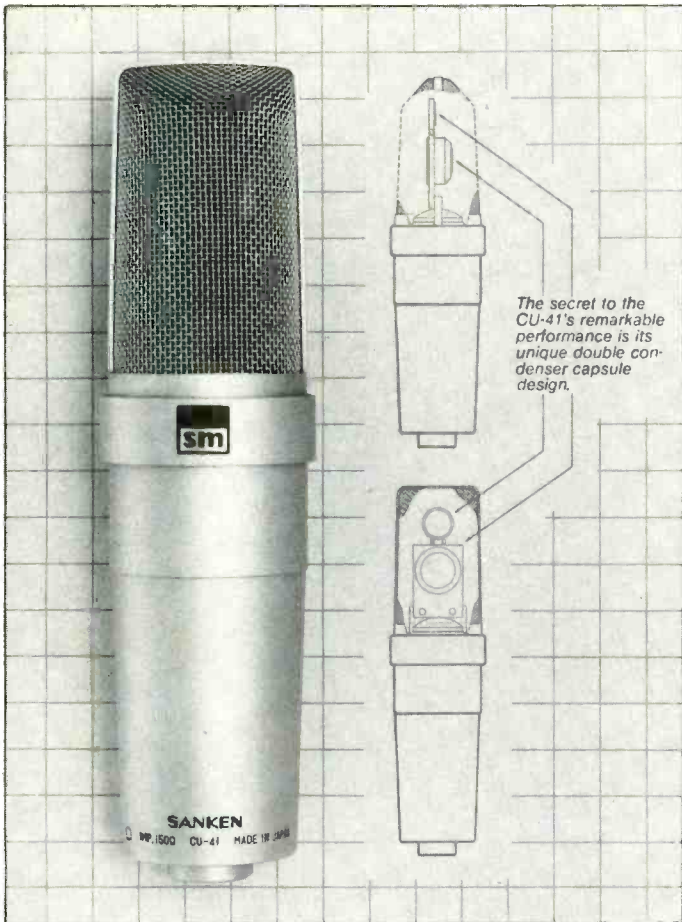
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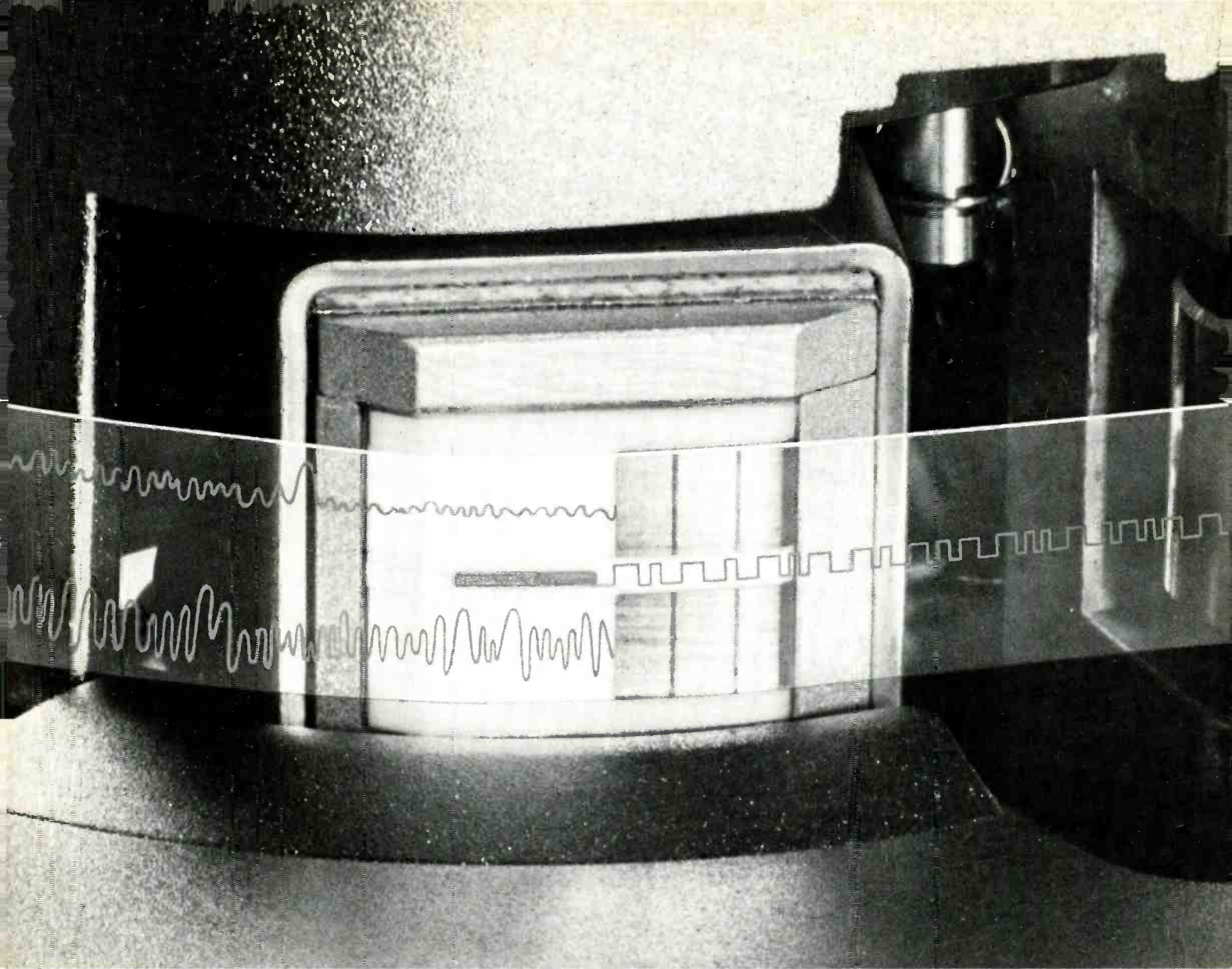
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TOTAL SEPARATION AND PERFECT TIMING.

These are the innovative features that place the microprocessor-controlled Studer A810 way ahead in the science and art of analogue recording.

The A810 incorporates a specially-developed time code system, utilizing a new combination head arrangement to input SMPTE code data on a 0.35mm wide central track between the audio channels on a 1/4" tape. Two 'combi-heads' are employed, on either side of the audio record and reproduce heads. One head contains the time code reproduce gap and the audio erase gap; the other has the time code erase gap and time code record gap. Because the heads are totally separate, audio/code crosstalk rejection is better than 90dB.

An integral digital delay automatically compensates for the problem of audio/code time offset – at all speeds. During recording and playback, this delay holds the time signal until it is in exact synchronization with the audio output. Tapes can be spliced in the normal way without fear of removing SMPTE data.

Not only does this novel A810 time code system eliminate the need for a multi-track recorder when

synchronizing stereo audio programs with video tape recorders, but it is also ideal for a variety of other applications: film audio editing, TV-simulcast, broadcast automation systems, A/V system control, and slow-speed logging.

And the A810 offers a host of other advanced features including: fully-programmable functions; a revolutionary memory system for electronic alignment parameters and different tape formulations; quartz-referenced capstan speed control with +/- readout; and many other monitoring and control options.

Just write or phone for full technical details.

Studer A810. A quantum leap.

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April 1984

'We thoroughly recommend, Otari from Turnkey'

**Jerry Boys
Studio Manager**



Livingston update to Otari from Turnkey

More than ever before there's a move away from mega-studios and towards more specialist, more cost effective installations.

That's the kind of studio we specialise in building.

From cashflows, through planning, acoustic design, supply, installation and commissioning.

We are building the next generation of studios.

Nobody knows the business better.

The original Livingston studios were housed in a converted chapel in Barnet, a few hundred yards from where we had our first offices. Three years ago they decided to move on to bigger premises, and so a church in Wood Green seemed the natural progression.

Nick Kinsey, one of the talented owners of Livingston, modelled the design of the new facility on studios he had visited on the West Coast of America.

Studio one, has a capacious control room and tandem studio arrangement - at the back is a large live brass/string area, leading to a smaller room and vocal booth. Originally, the

equipment complement was MCI/Lyrec, but the need to satisfy, ever more demanding clients meant that a replacement multitrack was called for.

Livingston's policy is one of continuing upgrade. Their wide experience enables them to choose the most advanced equipment. So the Otari MTR90 proved to be the obvious choice.

State of the art technology, built for hard working studios.

But choosing Otari from Turnkey goes far beyond our neighbourly connections.

Livingston recognise that we have unique expertise in supply, installation and backup of major recording equipment.

Otari from Turnkey is backed by a sales and engineering team that provides a complete service to the recording industry.

Studio Two, a more intimate music studio, features one of the largest AMEK consoles ever built for music. Their other Lyrec is still in service but that too is now ready for replacement with a Second Otari MTR90 that they have on order with us.

We congratulate Livingston on their update and on choosing Otari from Turnkey.

You can find out more about the remarkable Otari MTR90 range and the unique packages and services we offer. Call Garry Robson on 01-202 4366

CALL TURNKEY FOR FULL INFORMATION AND PRICES ON ALL PROFESSIONAL AUDIO PRODUCTS. COMPLETE 44 PAGE CATALOGUE IS AVAILABLE ON REQUEST. WE CAN HELP YOU TO FIND AND ARRANGE FINANCE. INSTANT CREDIT OF UP TO £1000 IS AVAILABLE TO PERSONAL CALLERS ONLY IF YOU HAVE A VALID CREDIT CARD.



MXR Reverb. All the latest facts.

No photos yet, just an artist's impression - but by the time you read this we should have our first unit in for evaluation.

Hearing it at Frankfurt was impressive. It's everything you would expect from devices costing several times the price.

Housed in an all steel chassis, the Ø1 Digital reverb has input level LED indicators, mono input, stereo out, infinite reverb and decay kill features. The front panel settings can be stored in 7 different memory locations. These are;

1. Nine different, preset simulations of reverberation type.
2. Predelay separates original sound from reverberation, thus leaving the original sound

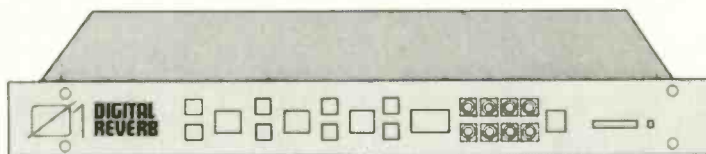
uncluttered and distinctive.

3. High frequencies are more readily absorbed by dampened environments, (eg curtains vs hard walls). You have full control.
4. Decay time is the taken for the sound to fall to one thousandth of its original intensity.
5. The blend of pre-delay and reverb may be set.

There are also seven factory programmes stored up in the software, these may be called up as required.

The cost of buying synthesised stereo reverb has dropped by a factor. The final price is well under two thousand pounds.

Arrange to hear the effect of MXR's Ø1 reverb in Turnkey demonstration studio soon.



Why Otari's 'fifty-fifty' series is really one hundred percent on the button

Spec comparison is only part of choosing a two track. Consider these features that distinguish Otari's 5050 from the overrated domestic machines.

No phonos or jacks Signals are balanced and on XLR's, both in and out. A rear panel switch lets you select +4dBm or -10dBm reference level for signals.

Balanced microphones (on XLR's) also include a 20dB pad switch for

compatibility with pre-amps and high output mikes. Line and microphone inputs can be mixed with the front panel controls.

Flux choice Rear panel switches let you choose between three flux level references, and either NAB or IEC equalisation. The status is displayed by front panel LED's, next to the meters.

Reference tone at the start of each new tape, or for convenient and

rapid line up, there's a built in 1k/10k reference oscillator. It switches directly on the front panel to both left and right.

Trimmers for bias, equalisation and level are all available directly on the front panel. And further presets inside set all the playback parameters, including LF EQ trim. You set to perfection for any tape.

Output level is variable, and a switch below the master control

selects SRL (standard reference level) output at the rear.

The reputation as the world's best selling professional two track precedes every Otari 5050 III. Every feature you expect from a mastering two track plus many specialised, proven features.

Available now in 2, 4 and 8 track formats. Call Garry Robson or Jon Ridel, and find out more about the new Otaris from Turnkey.

Turnkey Two, complete Madness

This is a studio that perfectly proves how Turnkey is building the next generation of studios.

The project undertaken was to design, build and equip a fully working music studio in converted London wine cellars.

The equipment package is based on a Soundcraft twenty four track system - a 2400 console and 24 track two inch machine. A true text book package.

The studio design is based on a minimal floor area of only five metres by thirteen. The room is divided by a double door sound lock, permitting easy access and visibility between studio and control room.

A live acoustic was attained in the studio in keeping with the style of music to be produced there. It boasts a custom made Bosendorfer piano. The studio

design enhances the subtle tonalities of the instrument.

Whilst the control room is also small in terms of the usual twenty four track installation, accurate, high level monitoring is made possible by new developments from Turnkey Two.

Acoustically, the basic room is modified with custom tuned bass absorbers, neatly disguised by wall panels. The monitoring system features the new Hafler power amplifier, a new product exclusively from Turnkey Two. JBL 4435 speakers are used for listening via a phase corrected crossover, again, custom made for Turnkey Two by BSS.

The studio is already up and running, primarily for in-house sessions. We wish Madness every success in their own studio venture.



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24 TRACK RECORDING SYSTEMS

ML24/24 Features:

- ★ Audiofad Plastic Faders
- ★ Switchable 48v
- ★ Integral Patch Bay
- ★ Input Led PPMs
- ★ 5 Band EQ (Switchable Mids)
- ★ Fully Modular
- ★ Remote PSU



With today's music becoming more competitive it is more important than ever to have the right recording equipment in order to maintain standards whilst remaining flexible, and financially competitive. Our policy has always been to produce professional quality equipment at realistic prices, achieved by manufacturing every possible part in-house whilst keeping overheads down to a minimum.

When you buy a multitrack system from us, you will have delivery and commissioning taken care of by skilled engineers. In addition the 2-year warranty covers major fault repair on-site by the factory or dealer completely free of charge.

Interested! Write for full brochures and price list to:

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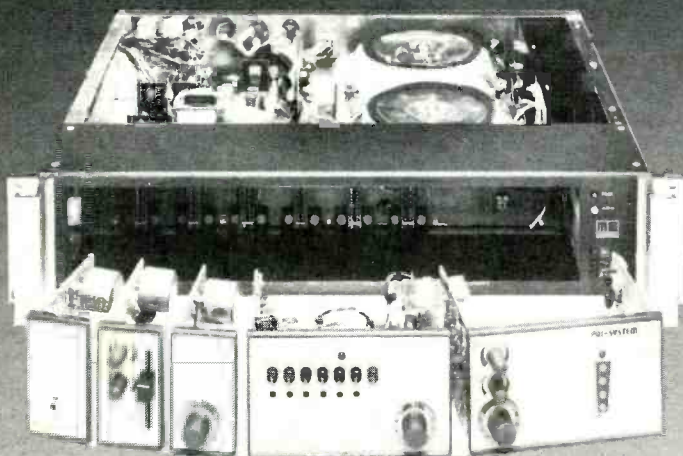
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Most mainframes accept a large variety of input and control options, enabling precise system requirements to be achieved and this concept allows re-configuration and system expansion at minimum cost.

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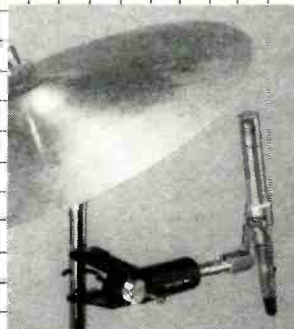
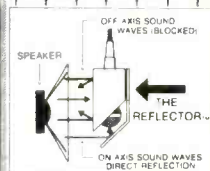
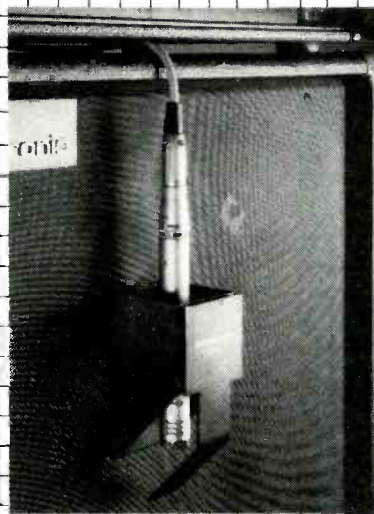
MICROPHONE SHOCK MOUNT SYSTEM

Offering significant advantages in studio miking, the STAND OFF range is now available in the U.K.

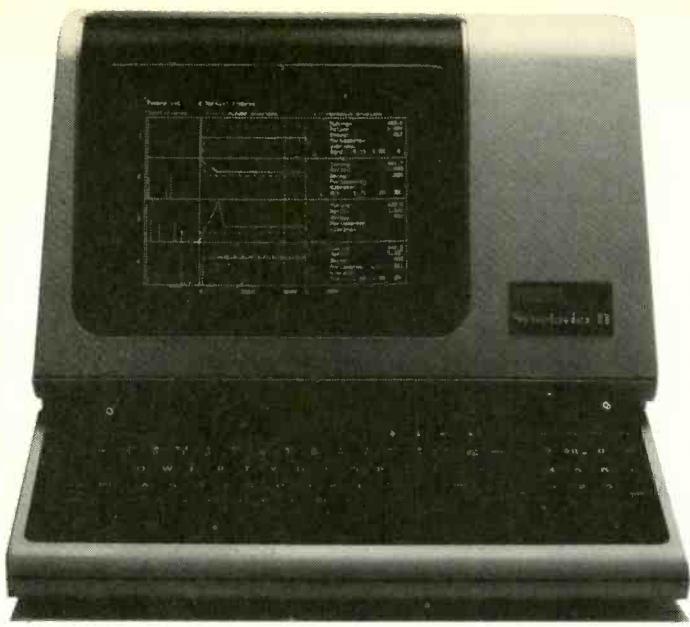
The shock-isolated units attach directly to drums, cymbal stands, amplifiers and microphone stands and give precise positioning for close-miking techniques.

Most models require no conventional stands, so there is a valuable gain in floor-space and instrument accessibility.

Lightweight and robust, the units are available now from selected stockists.



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The sound manipulators art and the future of music

Throughout the music recording industry, Synclavier is providing skilled producers with ever increasing new techniques for production.

Most recently Trevor Horn, of Dollar, Yes and ABC fame has acquired a Synclavier to expand his musical expertise.

The effect of this remarkable product cannot be overstated.

The music industry is demanding more refined and more polished productions. Where every millisecond of music is preened for maximum

effect. Multitrack provided the ability to break down the music into individual instruments, now Synclavier provides the ability to dissect each instrument further.

Never before was possible to manipulate a recorded piece so minutely.

A track or phrase is captured on tape during a session. Later, it is sampled by Synclavier and stored in its digital memory.

Now the powerful software can be applied to edit, loop, pitch shift and manipulate the stored information in hundreds of different ways. Finally the processed sound is added back to the multitrack

One of the major uses is the building of complex rhythm tracks. Again with up to 16 track recording capability, complex sounds can be created by manipulating few original sources.

Applications of this computer controlled synthesiser go far beyond the simple playing of music.

Leading musicians and music producers, including owners of sophisticated equipment such as Fairlight are moving on to the greater capabilities of Synclavier.

Call David Whittaker at Turnkey and find out why for yourself.

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.



Rack Shop Sale

All the products in the stack in the picture are either samples, demo stock or second hand.

All available on a first come, first served basis at the back of our demonstration studio sales area. These offers are available to callers only.



The Fostex Compressor, why it is quieter and more musical

Squashing the top twenty dBs into one will produce a tight sound, but if the original dynamic range is limited, pumping noise is likely to be a problem.

The solution is to incorporate an expander/noise gate, to reduce noise below a preset level.

By including this feature, the Fostex 3070 compressor is easier to set for tight performance.

It has a sound which can only be termed more 'musical' than others. In particular it can squeeze bass signals with little distortion. The reason lies in the type of VCA. Most conventional compressors, use an attenuator such as an FET or Multiplier. With fast attack times, the speed

is often faster than a cycle of bass note, so, distortion is apparent.

The Fostex compressor, uses a switching circuit which literally cuts energy from the signal, so attenuating the level.

There's a wide ranging control for every application. Variable attack, release, threshold, expansion and compression ratio (from 1:1 to 1:∞). Linking permits stereo operation, LED's display gain reduction.

The Fostex gated compressor offers surprising quality and facilities at its modest price.

Call for more information or contact Garry Robson or Jon Ridell to evaluate a unit using our SOR scheme, at no obligation.



Full service facilities now available

Our workshop experience with leading brands of mixers and recorders has grown from the humblest of four tracks to the most advanced microprocessor controlled twenty four tracks.

We hold extensive documentation on all the leading makes

We are pleased to perform a routine line-up on portable equipment or arrange to call out an engineer for any major work.

And of course, our studio installation team is also ready to undertake projects of any size.

As our engineers specialise in different products, it is important to specify the product that needs attention to our receptionist.

We can arrange local London delivery and collection for a small charge. Urgent matters can often be settled very quickly. Service on any professional audio product is just a phone call away.

Now you can call Turnkey for all of your service requirements.



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Prices shown are exclusive of VAT and delivery charges. Please call us for a firm and final price. Prices on any pro-audio product or a copy of our 44 page catalogue are available on your request Turnkey. Brent View Road, LONDON NW9 7EL Telephone: 01 202 4366 Telex 25769, TKBANG



The classic, the German and the powered our latest micro monitor review

Get up close to a pair of speakers and an uncanny psychoacoustic effect occurs. Suddenly room acoustics play much less of a role in what you are listening to. Stereo separation improves and you are closer to the sound. You hear subtleties you may have missed earlier. It's just like sitting in a large set of headphones.

Auratone

Originating in California in the 70's, Auratones emerged as the midrange reference.

Their popularity is legendary. Inside there's a massive 26oz magnet assembly contributing towards an efficient, sensitive design. Just 20 Watts will provide ample monitoring levels. In fact, they're rated at 30W RMS, but will handle up to 60 Watts peak at low frequencies for extended bass response. An aluminium former allows heat dissipation.

A switching box is available to enable comparison between main and near field monitoring. There's also a handy pair of mounting flanges or that allow you mount them on a mic stand.

Fostex 6301

Everything that Fostex comes up with, smacks of innovation. Their 'personal monitor' includes a power amplifier within the compact, diecast speaker enclosure. You simply connect to a mains supply and apply a line level input. Whilst not as loud as the Visoniks or Auratones, they do provide a handy and useful reference in many studio applications. We hear that a major British Broadcasting Corporation has ordered over one hundred pieces.

JBL 4401

Top of the range where small speakers are concerned - these capture the famous JBL sound in miniature. Used extensively in broadcast, and they offer a legend on a budget.

VISONIK Davids

The Visoniks were intended as a hi-fi speaker, but, as is the case with many products, found their way into European recording studios as a local alternative to the Auratone. They handle 40 watts with such accuracy that you would swear that you were listening to bigger cabinets. So imagine what their big brothers sound like. The range is on demo

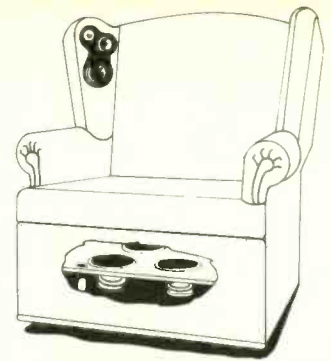
These micro speakers do not replace main monitoring, though they are ideal for a compact setup. They are designed to supplement large multi driver tuned cabinets. Hear them all in our demonstration studio.

Our newly arranged studio features a barrage of studio monitors for evaluation and direct comparison.

The standard range of Tannoy and JBL is also available from Turnkey. Right from the budget Stratfords from just over one hundred pounds a pair through to the largest JBLs. Many are on demo. You are welcome to come along and listen.

Monitor Chair

Recently announced breakthrough in studio monitoring from Stephen Court. Designed to produce intense near field sound levels with just 8 Watts input. Woofers mounted in the base produce a tight, bottom end effect. More info as we get it.



Mod of the month, Sony PCM upgrade

The one drawback with the Sony PCM F1 system is that the standard output level is set at -10dBm and must be boosted before it can be interfaced with professional studio equipment.

Our solution is an internal modification to the processor unit. It provides line compatible, 0dBm output. We can provide this modification with new sales or as a retrofit to your existing equipment.

The Sony F1 system offers digital mastering affordably for every studio. We are continuing our offer of free demoloan of the processor to anyone wishing to prove the outstanding quality for themselves.

Simply call Turnkey and speak to Garry Robson about this trial offer.



The continuing success of the Soundcraft 1600 console

No other studio console has been placed in so many different music applications as this best selling multitrack desk.

Turnkey are the specialists in Soundcraft supply. Here are some of our most recent studio installations;

☆ Alan Zipper is a musician songwriter and we've mated a 1600 with with a Fostex B16. At the moment it's a true bedroom operation but soon to be moved to a true loft conversion by T2.

☆ The music Workshop at Poplar Baths community centre recently took on a 1600 with a Tascam 85-16B. The part we played included design by Andy Munro at Turnkey Two and

installation and commissioning by our own team. The studio is to be used for local music recording, and training in the subtle art of mixing music.

☆ Over in Ireland, ballad singer Dennis Allen has installed a full sixteen track Soundcraft system at his home in Limerick.

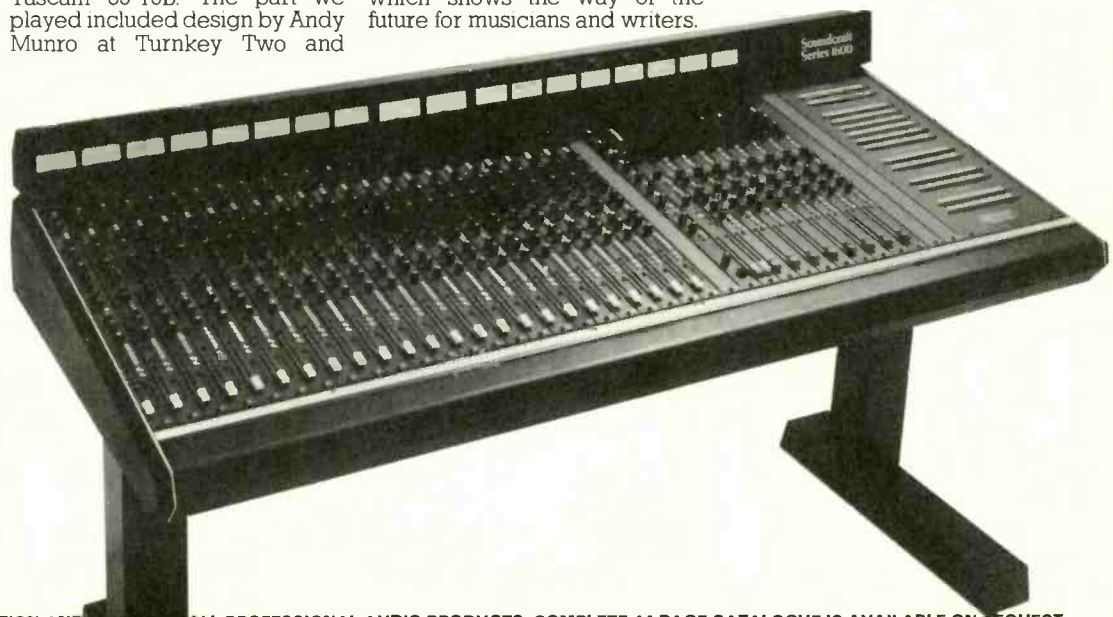
There's also a wide range of range of effects to achieve the results he had to visit major studios for till now.

☆ Another electro-musician, Colin Thurston has just taken a Soundcraft 1600 plus Fostex B16 package. A popular choice which shows the way of the future for musicians and writers.

☆ Martak South a leader in AV production has just received delivery of a 1600 console for post production work. The sophistication of multi-image work demands the very latest facilities and the most flexibility. The system includes Soundcraft one inch eight track workhorses.

The Soundcraft 1600 continues its success. Alone or in complete working package it offers unequaled facilities.

For more information or to discuss tailored packages call Garry Robson or Andrew Stirling at Turnkey. Nobody knows Soundcraft better.

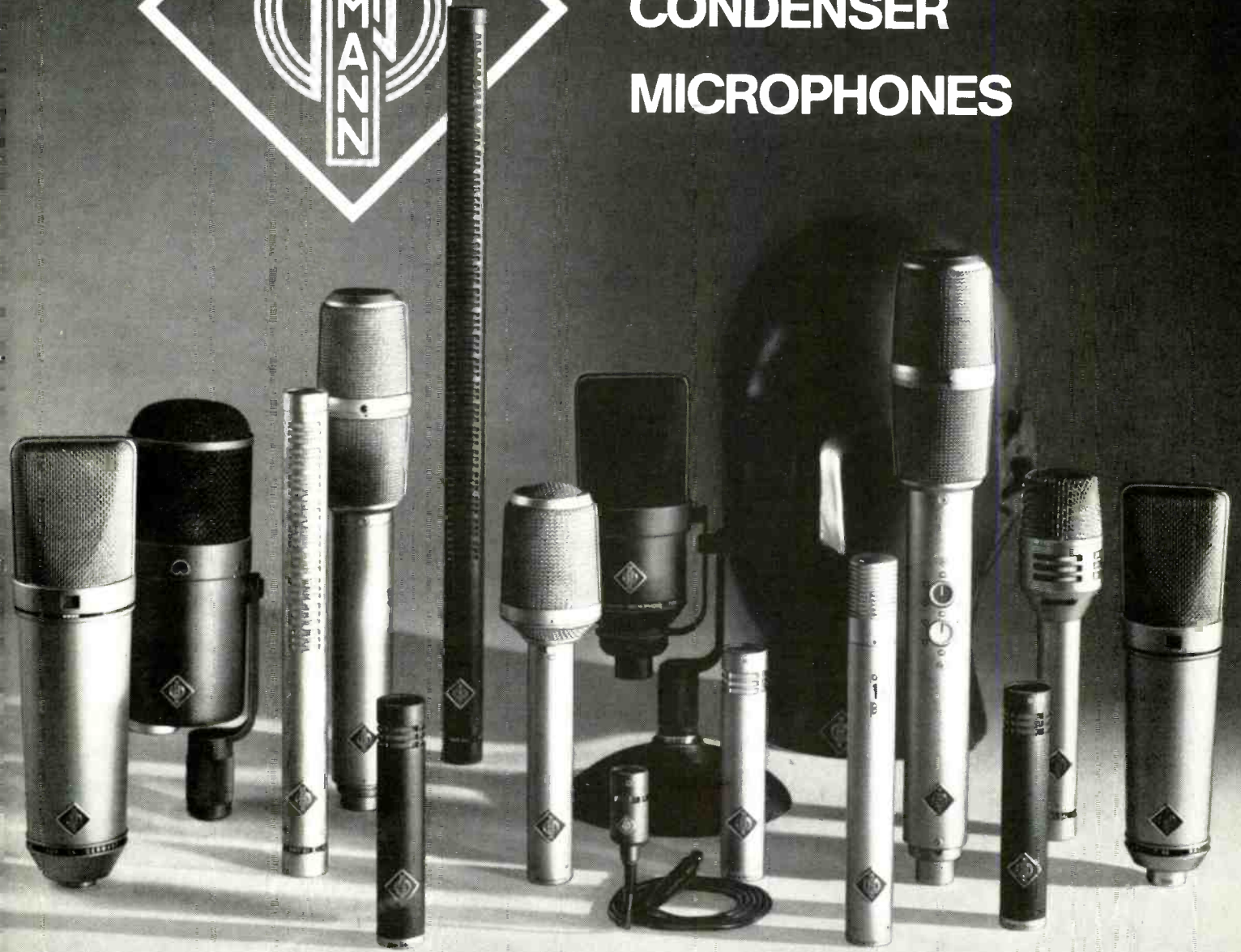


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It is essential that microphones used for digital recording be capable of covering a dynamic range of at least 96dB, since this is the range between the quantizing noise of a 16-bit system and its clipping level. Neumann condenser microphones have always provided 110dB – some as high as 129dB (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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Sole importers and retailers of the **Alpha Syntauri** computer music system and the ever expanding **Voyetra 8 IBM** computer synthesiser system are pleased to announce two new dealerships to take them into the pro-audio market. Firstly with MXR, the full range of MXR pro rack mount, signal processors, along with the MXR drum computer and the incredible new **MXR fully programmable digital reverb system** at £1,500, and now in stock and on full demo, along with the new **Series 16 recording desks from RSD**.

All our demos are by appointment only in our fully equipped 8 track demo studio, which has been built entirely around the equipment we retail. This gives customers the opportunity to hear and try equipment in a full working environment with no hassle or hurry at times to suit your own schedule.

For more information contact Computer Music Studios on 221 0192 or write for details to 62 Blenheim Crescent, London, W11.

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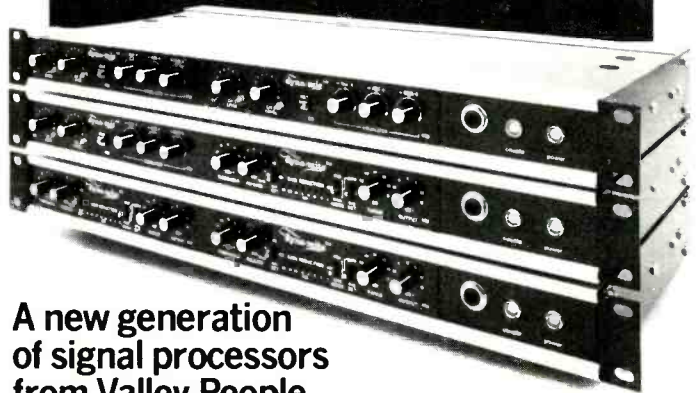
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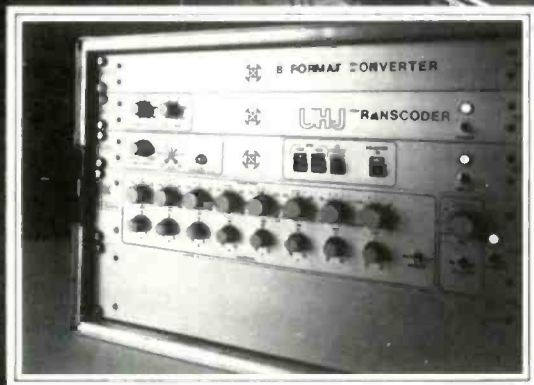
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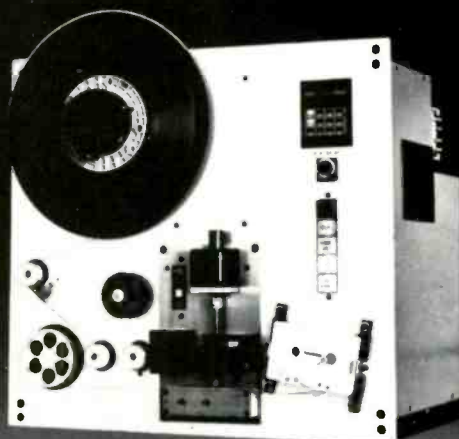
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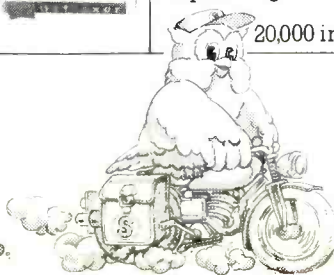
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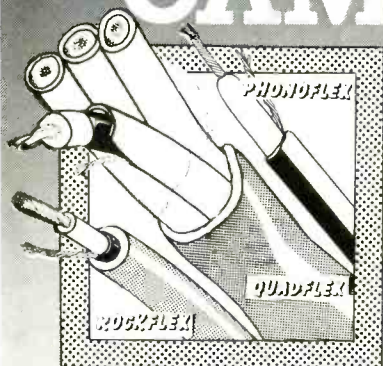
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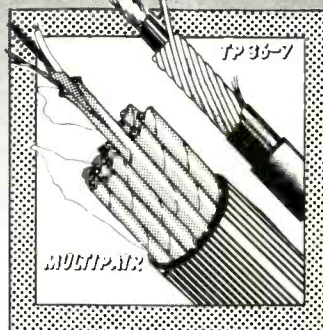
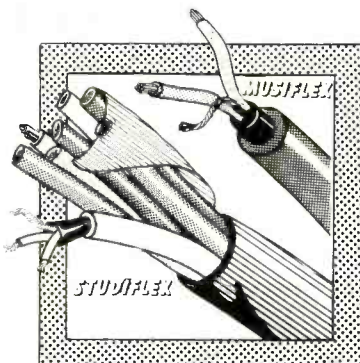
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TP 35-7

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MULTIPAR

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One thing that always leads to another.

PSIONICS — MISSING LINK

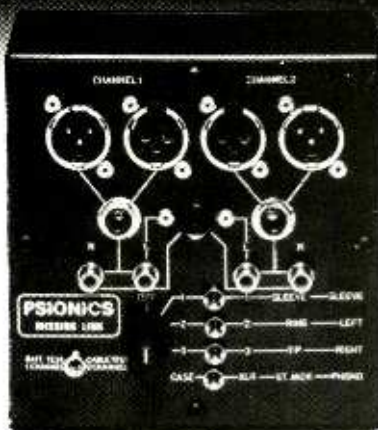
The Missing Link could be described as very, very useful.

It could also be described as a dual channel switchable patching system with cable test facility and compatibility between XLR, Stereo Jack, Phono (RCA) and DIN connectors — in either one or two channel modes.

The first description, however, is just as accurate.

The very, very useful Psionics Missing Link is now available from sole distributors Kelsey Acoustics Ltd.

For further details, please contact Richard Vickers on 01-727 1046/01-727 0780.



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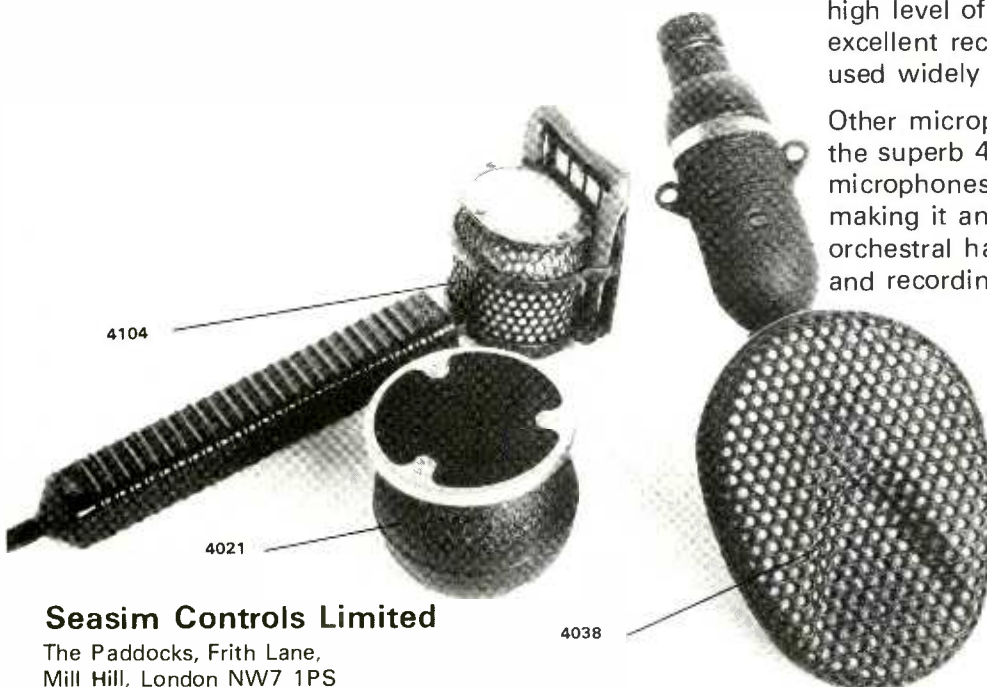
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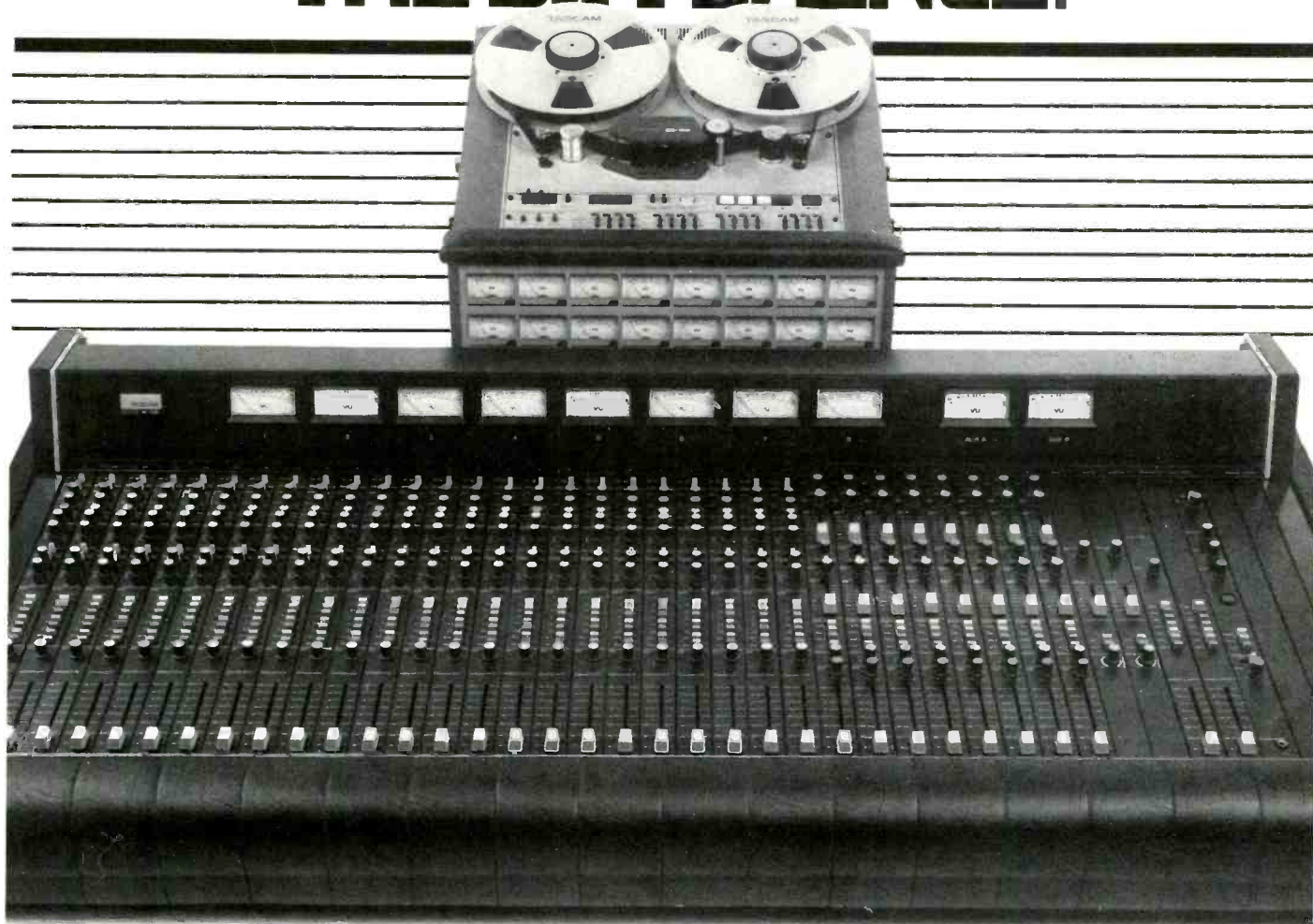
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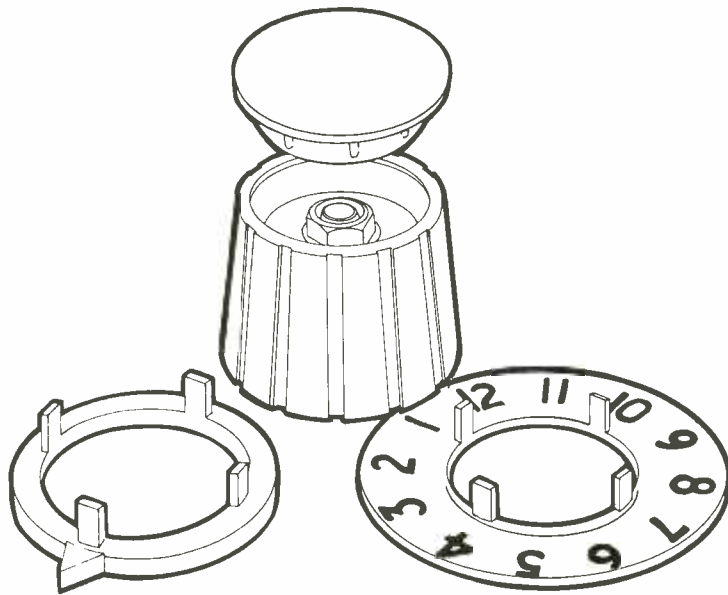
TASCAM

Turnkey, Brentview Road, London NW9. Tel: 01 202 4366

Michael Stevens and Partners, Homesdale Centre, 216 Homesdale Road, Bromley. Tel: 01 464 4157.

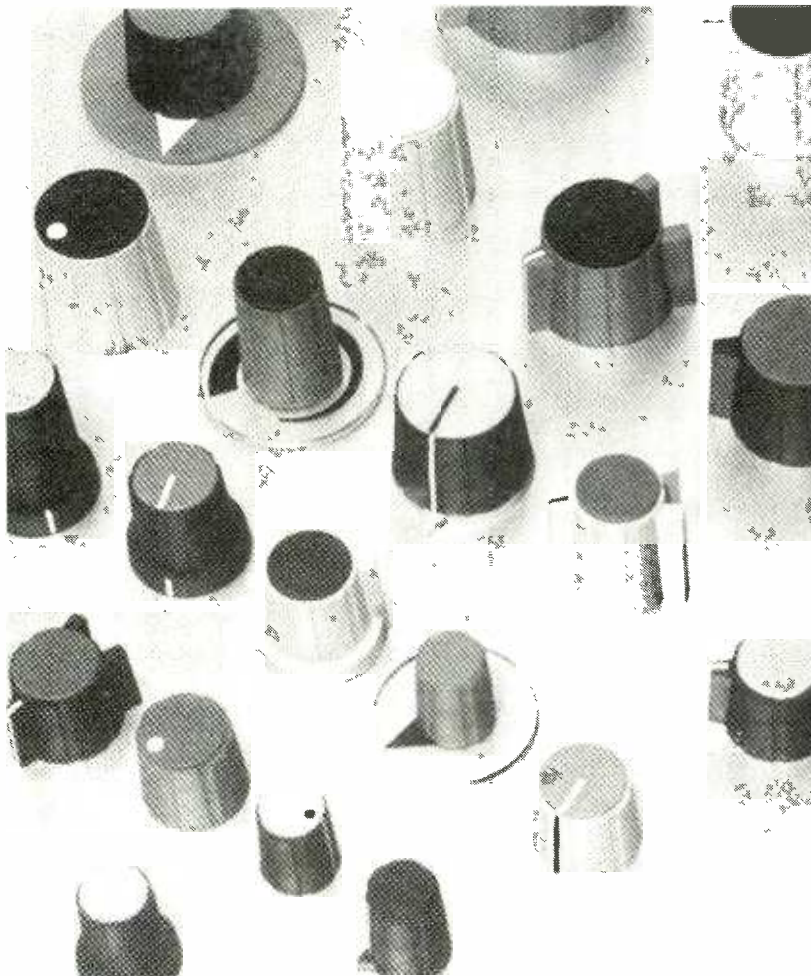
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CANADA NorPam Electronics Inc. 877 Alness Street, Unit 16, Downsview, Ontario M3J 2X4. Tel: 416 736 0469 Telex: 28143

DIARY DIARY

Developments, controls, agencies, address changes

Recent Eastlake projects

Eastlake Audio have recently completed projects on three continents. These include a large 24-track music studio designed and constructed for the Instituto Ninos Cantores Del Zulia in Maracaibo, Venezuela. The studio was designed to record a wide variety of contemporary and classical music; a 20 ft recording vehicle designed and completed for NRK, the Norwegian State broadcasting organisation; twin 24-track studios for Powerplay Studios in Zurich; a 24-track recording, disc cutting and record pressing plant known as the Society Congolaise du Disque situated in Brazzaville, the Congolese Republic with the further addition of a preview theatre; the re-design of Hollywood Studios, London; a

24-track studio for Roger's All-Stars, an independent label in Anambra State Eastern Nigeria; a 24-track studio in Nawfia also situated in Eastern Nigeria. Projects currently in hand include a recording complex in French Polynesia, the rebuilding of the large studio area at CTS London prior to the installation of their Neve digital console; private recording studios for Alan Tarney and Jona Lewie; and they are in the process of designing a large audio/video complex in Covent Garden, London for Imagination.

US Sony digital sales

Sony Professional Audio Products has recently announced the results of the first year of sales of the PCM-3324 digital multitrack which they described as significant. Orders for 14 machines have so far been

received with the following sales having been made—two machines to Atlantic Studios, New York; two machines to Digital Recording Services, Houston; three machines to Oasis Studios (Giorgio Moroder), Los Angeles; one machine to Wonderland Studios, Los Angeles; and one machine to Frank Zappa, Los Angeles. A further four machines have been ordered for installation in New York and one more machine is destined for Los Angeles—the identity of these studios will be announced at a later date.

Agencies

- Citec Ltd, manufacturers of professional studio faders, have appointed Canford Audio Ltd as their distributor for the UK. Canford Audio Ltd, Stargate Works, Ryton, Tyne & Wear NE40 3EX.
- Products from Allington Audio Developments, manufacturers of crossovers, graphic equalisers,

distribution amplifiers, etc, are now being distributed within the UK by Sigma Sound Enterprises Sales Ltd, Unit 12, Bar Lane Industrial Estate, Bar Lane, Basford, Nottingham. Tel: 0602 783306.

● Hill Audio Ltd have appointed Springtide Sounds as their London representatives for the complete range of Hill audio equipment including full demonstration and servicing facilities. Springtide Sounds, Mezzanine Suite, 1 Central Buildings, Westminster, London SE1. Tel: 01-222 8841.

Contract

- Clyde Electronics have delivered a mobile recording/ outside broadcasting vehicle to the Central Peoples Radio Broadcasting Organisation in Peking, China. As part of the installation of Radio Clyde's new broadcast complex they have commissioned an 8-track and two 24-track studios.

Salford College course established

The long talked about course at Salford College of Technology has finally been set up. Ex-APRS chairman Peter Harris has described the new Advanced Certificate in Recording Technology and Techniques at Salford College of Technology as a much-needed educational scheme which will provide the music recording industry with new entrants 'educated to a far higher standard than is at present available, who will be of considerable benefit to the UK industry'.

The creation of the course, and the Advanced Certificate towards which it leads, was a long uphill task—and the APRS executive committee has been involved every step of the way. As long ago as early 1980 committee member Peter Tattersall, of Strawberry Studios, Stockport, was approached by Salford College. The proposal was to set up an Advanced College Diploma in Music Technology by September that year. It was to qualify for a major student award, and would cover three main areas of study: developing musical ability and interpretation across a wide range of commercial music; teaching the relevant principles of electronics and acoustics; covering techniques in a largely practical section of the course.

The College considered audio engineering a 'relatively new and possibly rapidly developing

occupational area' and intended the course to offer primary training for those wanting to go into the studio profession as it stood, as well as giving a basic training capable of meeting the needs of the future.

Salford asked for APRS support of the application to the Department of Education and Science for permission to start the course; and for the Association's official recognition of the qualification. The APRS readily expressed 'sympathy with the College's aims' but suggested some important modifications of the proposed way of trying to attain them.

Firstly, the need for maintenance engineers rather than balance engineers was stressed; secondly, the stark truth about how many jobs were likely to be available each year was gently spelled out; thirdly, the admirable qualities of the Surrey University Tommeister course as a source of musically trained studio industry entrants was pointed out, and it was suggested that technically rather than musically trained personnel were now needed more.

The APRS also suggested a course aimed at a lower (post O-level rather than post A-level) age group, to allow the diploma holders to enter their chosen profession at the salary level suitable for educated juniors/in-house trainees. A six-figure sum would be needed to equip a studio

for students—and later the committee provided a detailed breakdown of essential items.

Predictably rather aghast at the capital outlay suggested, Salford went ahead and revised its plans along the lines suggested by the Association; the modified course had its emphasis divided in a 50% electronics/30% recording techniques/20% understanding music pattern. The planning had by that point taken until November 1981—a full year beyond the point when it was hoped the Salford diploma course would have started.

By March 1982 a detailed description of the course was ready. The APRS was asked to consider setting up three to five £500 bursaries for students. The project proceeded, with regular contact between the Association and the college. Then the local education authority suddenly halted it: the reason was money.

The college battled on but by February this year was still only able to report that an appeal to the Department of Industry for funding had failed. The silver lining to the cloud included an offer of a Soundcraft console at factory price, and a £40,000 grant for capital outlay, wrung from the LEA.

Progress was made, with a few hitches and revisions along the way, until by May of last year the college had arrived at the point where it could show its most

steadfast supporters and helpers—the APRS committee—final details of the course.

It is for students aged 16-plus, with at least five O-levels; the bias is towards producing maintenance engineers and factory production/design engineers, with a sufficiently general electronic background to allow students to work in other-than-audio electronics. The course comprises 25 theoretical units, plus about 500 hours' practical work. An advanced two-year course will be offered to the successful candidates at the end of the three-year Diploma course—to offer a Higher Technician's Diploma.

At the APRS 1983 show, the Salford course heads had a table at the committee's invitation, and during three days of meeting and talking to studio owners and exhibiting manufacturers, were offered many useful components and redundant pieces of equipment for the students' use.

At the beginning of October, APRS secretary Edward Masek was able to tell the association that the new diploma course was off and running, with an initial intake of 32 students, which will rise to about 90 by the third year of intake. The course studio now has its Soundcraft 28/24 console (cut down to 16 for the moment) and has just celebrated its achievement in getting started by winning a further capital grant of £60,000.

DIARY DIARY

Address changes

- Eventide has moved and is now located at 1 Alsan Way, Little Ferry, NJ 07643, USA. Tel: (201) 641-1200. They have also modified their name and are now simply known as Eventide Inc.
- Richard Swettenham Associates (Helios Custom Audio) are in the process of relocating and for the moment all correspondence should be sent to BCM, Box 3721, London WC1N 3XX. There is no new telephone number at present.
- Joiner-Pelton-Rose Inc, the Dallas-based acoustical consulting firm has moved to a new larger office facility. The firm maintains a full-time staff of over 20 individuals whose only concern is acoustics-related items. Their new address is 4125 Centurion Way, Dallas, TX 75234, USA. Tel: (214) 392-7800.
- The west coast office of the Gotham Audio Corporation has modified its telephone number. Due to changing area code, the number will now be (818) 841-1111.
- Solid State Logic USA have announced that all telex traffic for their DC office should now be directed to their Michigan telex number 230 504 SSLMAN. All other telephone numbers and telex numbers remain as before.
- Clyde Electronics moved as from February 1 and their full address is now Clyde Electronics Ltd, Units 44 and 45, 3 North Avenue, Clydebank Business Park, Clydebank G81 2LA, UK. Tel: 041-952 7950. Telex: 779537.

Literature received

- Nortronic Associates have issued their 1983/84 colour catalogue providing over 170 pages of information on capacitors, connectors and resistors stocked. Copies are available from Nortronics Associates Ltd, Gateway, Crew Gates Industrial Estate, Crewe

CW1 1YY, UK.

- Hellerman Electric have produced a shortform catalogue of their cable accessory and heatshrink products, covering the complete range. It is intended that this catalogue be used to point the way to the company's main catalogues. Copies are available from Hellerman Electric, Pennycross Close, Plymouth PL2 3NX, UK.
- Audix Ltd have just issued a new brochure detailing the company's product range, areas of operation and general company information. Copies are available from Audix Ltd, Wendon, Saffron Walden, Essex CB11 4LG. Tel: 0799 40888.
- Fane Acoustics have produced a booklet entitled *Towards perfection* containing over 20 designs for cabinets using their speaker products in live sound and musical instrument applications. These range from quite simple systems to multiway systems and basic design drawing details are given together with the results that can be expected from the completed enclosure. Further details from Fane Acoustics Ltd, 286 Bradford Road, Batley, West Yorkshire WF17 5PW, UK. Tel: 0924 476431.

In brief

Bearsville Studios is installing a custom Neve 8088 in Studio A. This console incorporates features from the 8078 and 8068 series with 40 inputs and in-line monitoring additionally fitted with *Necam II*. . . Livingstone Studios, North London has installed a 42-channel automated Amek 2500 console in Studio 2 together with AMS delay line and reverb, and an Otari *MTR-12* stereo machine. Studio 1 has a new Otari *MTR-90* 24 track. . . Kajem Recording of Gladwyne, Philadelphia have undertaken a major update including the installation of Studer A80 24-track and 1/2 in 2-track; EMT 251 digital reverb and API 550A equalisers. Acoustic redesign is being undertaken by Acoustilog Inc. . .

Aphex Compellor

Further to the set of evaluative articles on the *Compellor* which we carried in the March issue, modifications to the unit have lowered the noise floor.

Unfortunately we received the new figures too late for inclusion so amendments to Barry Victor's Table 1 are as follows:

Noise floor:	700 Hz tone at reference silence gate engaged
	-74.0 dB -70.0 dBV
Absolute noise floor:	Output control full clockwise input shorted
	-78.5 dB -74.5 dBV



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NEW PRODUCTS

NEW PRODUCTS

Equipment, modifications, options, software



Harrison Systems The Raven

Harrison have designed a new music recording console which they claim is 'competitively priced, yet highly responsive' while retaining the signal handling performance found in their more expensive consoles. *The Raven* is offered in a single configuration consisting of a 40-position mainframe which will hold 36 input modules. All consoles are supplied with 28 input modules and three master modules. Customers requiring 32 or 36 input versions can have a console expansion kit that takes about an hour to install into the mainframe.

Much like the *MR-4* in function, features and component design, *The Raven* has a different 'look' from the standard Harrison console. It is supplied in standard Harrison dark grey with a light grey silk screen, the console being

trimmed in gloss black ebony-type wood finish. The standard meter system is 28 illuminated Sifam analogue VUs, in a metering penthouse.

No internal patchbay is supplied but there is provision for the addition of an external patchbay by the user such as the optional patchbay/producers desk unit. The interconnection system of all signal lines is 12-pole molex series connectors and Harrison supply the mating connectors as they do on their other consoles.

Harrison Systems Inc, PO Box 22964, Nashville, TN 37202, USA. Tel: (615) 834-1184. Telex: 555133.

UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ. Tel: 01-953 0091. Telex: 27502.

Ariel real-time spectrum analyser

The Ariel *RTA 331* is an add on $\frac{1}{3}$ -octave analyser board that uses the processing and display capabilities of the IBM *Personal Computer*. It consists of 31 2-pole filters from 20 Hz to 20 kHz on ISO band centres with a package of assembly language routines called from BASIC. It features instantaneous RTA display; variable decay rate and averaging period; peak hold and weighting functions; dual display of two independent bar graphs; pink

noise generator under software control; programmable input gain; and 8-bit, 20 kHz sampling, data acquisition. (It can store up to 22 s in 128 kbytes of memory.)

Ariel Corporation, 600 West 116th Street, Ste 84, New York, NY 10027. Tel: (212) 662-7324.

UK: Marquee Electronics Ltd, 90 Wardour Street, London W1V 3CE. Tel: 01-439 8421. Telex: 894278.



Compact Bryston amplifier

Bryston has recently announced the model *2B-LP*, a low profile single U, 19 in rack mount, 50 W/channel power amplifier designed to save space in recording studio and broadcast monitor applications. It is claimed to be especially suitable where difficult loads, high average levels and musical accuracy are required.

Among the standard features of the *2B-LP* are balanced inputs with *XLR* connectors, dual colour pilot/clipping LEDs, high current

delivery capability of 24 A peak per channel, and front removable channels cards for ease of servicing. The *2B-LP* can be considered the functional equivalent of the original Bryston *2B* in half the space.

Bryston Marketing Ltd, 57 Westmore Drive, Rexdale, Ontario M9V 3Y6, Canada. Tel: (416) 746-1800.

USA: Brystonvermont Ltd, RFD No 4, Berlin, Montpelier, VT 05602. Tel: (800) 451-4160.

MXR Drum Computer updates

MXR have announced the addition of two new packages to their library of sounds for their Digital Drum Computer. These are the *Model 185G* timbali and the *Model 185H* ride cymbal. The timbali package consists of two timbali sounds that can be substituted for any of the existing three tom sounds.

The ride cymbal is one voice consisting of six 32 K ROM and can be substituted for the crash cymbal. These packages as well as others available are easily replaced inside the Drum Computer by the user.

MXR also have a new line in musical instrument accessories that is certain to appear in studios. The junior *Model 210* is a portable mix modelled on the *Series 2000* pedals having a user changeable ROM package that will replay on triggering. There are currently

library packages that include - *Model 211-A*—claps, shaker, drum, and laser blast; *Model 211-B*—maraccas, clave, low and high cow bells; *Model 211-C*—claps, castanets, tambourine and shaker. The *210* will accept internal or external powering with the internal battery being auto rechargeable if a ni-cad. The unit is controlled by a tactile feedback footswitch and when the voice is activated the red run LED gives a visual synchronisation of the status.

MXR Innovations Inc, 740 Driving Park Avenue, Rochester, NY 14613, USA. Tel: (716) 254-2910. Telex: 978451.

UK: Atlantex Music, Ltd, 1 Wallace Way, Hitchin, Herts SG4 0SE. Tel: 0462 31511. Telex: 826967.

Gaines Audio active DI box

Gaines Audio have introduced a new active DI box known as the *AD-1* which is available either in unassembled kit form or fully tested and complete. The *AD-1* will accept inputs from instrument to speaker level and is also equipped with ground lift switch, protection against input overload and output short circuit. It is compatible with 48 V phantom powered lines while powered by an internal 9 V battery. For those building the unit, the majority of the components are PC board mounted with a minimum of hand wiring.

Gaines Audio, PO Box 14099, Federal Station, Rochester, NY 14614, USA.





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SS 5/84

NEW PRODUCTS

NEW PRODUCTS

Equipment, modifications, options, software

Fairlight Series X

Fairlight Instruments have announced the release of the *Series X* system for the Fairlight *CFI*. This incorporates a dual 6809 processor configuration, 256 K of processor RAM, 2 Mbyte floppy disc storage and new graphics circuitry. The first software release for *Series X* will take advantage of the new memory capacity and will give the user the facility to run OS9 software ie off the shelf accounting, spreadsheet and games packages, as well as high level languages.

Additional features available for the *CFI* will include *STAVEWRITER*, a high quality music notation printer; Fourier analysis; wave table voice synthesis; back and forth looping

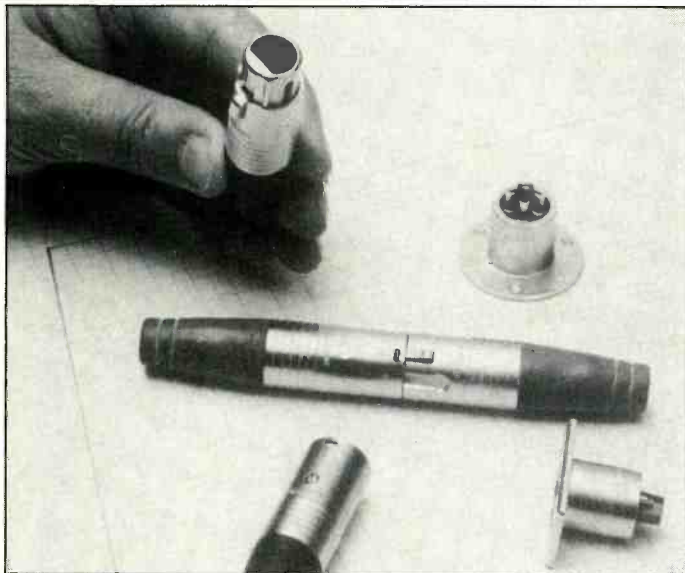
in mode 1; pitchbend added to Page 7; waveform justification for pitch correction of sampled sounds; and film music processor.

April saw the release of the *MIDI* input/output, expanded Music Compositional Language (MCL) memory and an increased number of real-time controls.

Fairlight Instruments Pty Ltd, 15 Boundary Street, Rushcutters Bay, NSW 2011, Australia.

UK: Syco Systems Ltd, 20 Conduit Place, London W2. Tel: 01-724 2451.

USA: Fairlight Instruments Inc, 2945 Westwood Boulevard, Los Angeles, CA 90064. Tel: (213) 478 8221.



New connectors from Cannon

New, streamlined audio, mains and general purpose connectors for professional applications with improved RFI protection are now available from ITT Cannon. The connectors are available in two ranges, the *AXR* Series and the *AXR-LNE* Series. The designs are claimed to offer high reliability, ruggedness, fast simple assembly and improved cable retention.

Rated at 133 V, the *AXR* Series has black insert and strain relief bushing with versions available in 3-, 4-, 5-, 6- and 7-contact types. Features include anti-vibration ribs; grub screw cable clamping; a latch-lock and a leading contact which makes in advance of signal contacts. The connectors have a steel barrel with zinc alloy hardware and a satin nickel finish.

The *AXR-LNE* Series is rated at 250 V, has a red insert and bushing and is available as a

3-way contact version. The connectors have quick action lock coupling, ground to shell earth contact in the receptacle and a plug with earth contact making in advance of power contacts, which are fully shrouded. UL94V-0 approved insulating materials are used and the metal shells have a satin nickel finish.

For safety reasons, the two new series of connectors are not intermateable, although they are fully compatible with their equivalent in the standard *XLR* range.

ITT Cannon Electric, 666 East Dyer Road, Santa Ana, CA 92702. Tel: (714) 557-4700.

UK: Cannon Electric (GB) Ltd, Jays Close, Viabes Industrial Estate, Basingstoke, Hants RG22 4BW. Tel: 0256 3171. Telex: 858105.

Crown PZM-180

Crown International have introduced a relatively low cost *PZM*, the *PZM-180*. It uses the same principles as the standard *PZM* range but has an integral handle allowing hand held use. It may be phantom or battery powered and requires no external power supply interface. The handle contains a battery which is disconnected when the unit is phantom powered. The output is

an integral *XLR*-type connector. The *PZM-180* is supplied with a wind shield.

Crown International, 1718 West Mishawaka Road, Elkhart, IN 46514, USA. Tel: (219) 294-5571.

UK: (As Amcron) HHB Hire and Sales, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. Tel: 01-961 3295.

Milab VIP-50

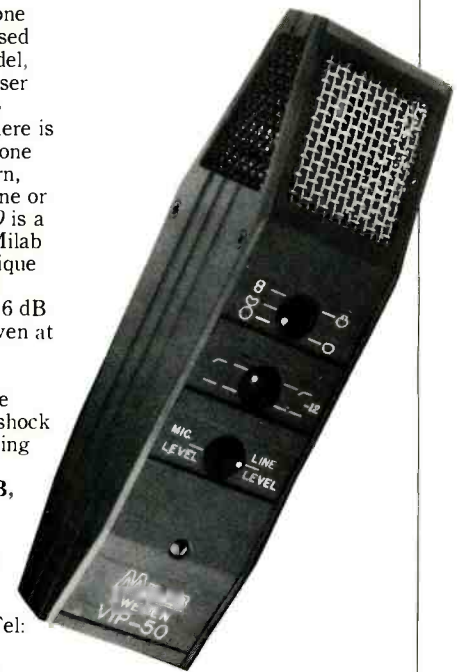
Milab, the Swedish microphone manufacturer have just released advance details of a new model, the *VIP-50*. This is a condenser type with the standard Milab rectangular capsule style. There is full provision on the microphone for control of the polar pattern, roll-off and the selection of line or mic level output. The *VIP-50* is a transformerless design and Milab claim that performance is unique giving advance specifications details such as self noise of 16 dB and a max SPL of 145 dB, even at low frequencies.

The microphone will be available by itself or complete with accessories including a shock mount, windscreen and carrying case.

Creative Trade CTAB AB, Knutsgatan 6, S-265 00 Astorp, Sweden.

UK: Audio Video Marketing Ltd, Unit 20/21, Royal Industrial Estate, Jarrow, Tyne & Wear, NE32 3HR. Tel: 091 4893092.

USA: Camera Mart Inc, 245 West 54th Street, New York, NY 10019. Tel: (212) 757-6977.



dbx offer CPDM cards on OEM basis

dbx have announced that they will be offering *Companded Predictive Delta Modulation* (CPDM) digital recording technology to manufacturers of professional tape machines on an OEM basis. This system forms the basis of the *dbx Model 700* digital audio processor. dbx is currently designing circuit cards to be interfaced with tape transports to produce open reel fixed head CPDM digital recorders. To ensure compatibility of all recorders using CPDM, dbx have also specified a track format to be used and they claim that a number of manufacturers have responded enthusiastically to dbx. They further claim that the manufacturers will be able to produce 2-track and multitrack

machines that are cost comparable with analogue tape machines of the same track formats.

dbx have further announced the development of a CPDM to PCM transcoder that will allow the *dbx 700* series and other CPDM equipped units to have their outputs transcoded in the digital domain to PCM compatible format suitable for Compact Disc mastering.

dbx Inc, 71 Chapel Street, Newton, MA 02195, USA. Tel: (617) 964-3210. Telex: 922522.

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

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THE VIEW FROM THE TOP

The term 'studio management' is open to interpretation. There are as many approaches as there are studios and the only criteria for successful management is continued success. Tim Leigh Smith talked to a cross section of London studios about their methods of management.

Agreement on rates?

Steve Hall is the owner and operator of Hallmark, a very neat little 1 in 16-track studio in a basement in Foubert's Place between Carnaby Street and Oxford Circus. "In the music business you can't charge much more than the kind of rent you'd be paying. You can't really make a profit and you can't really employ outside engineers. You're always at the bottom end of everything. I'm slightly higher priced than most small studios and that's a joke really because I'm lucky if I can get £20 an hour. Normally it's £16. You're never able to charge more because there's always someone round the corner that's being sponsored by someone that can go out at a

lower rate. You can get a 24-track studio, unofficially, for £10 or £12 an hour. I really wouldn't recommend anyone to start a recording studio if they want to make money. You can only keep a studio going if it's for some other purpose like you happen to be a musician and that'll take you through bad times."

Andrew Bell and his partners took over Tin Pan Alley Studios, which really is at the heart of the music business in Denmark Street, about 18 months ago. It was a state of the art 2 in 16-track some 10 years back with a 40 sq m studio and a cosy control room but this is no longer flavour of the month. "Now it's all synthesisers, it's everybody in the control room. The good thing about it is that it's usually only a few people working.

Being a 16-track studio, almost everything we do is demo work. The majority is worked by signed artists who come down here at fairly cheap rates to get a listen to what they're doing. They probably do at least 50% of the arrangement work here which saves them an awful lot of money when they go into a more expensive studio to master it. They get the parts together here and some of the sounds and then they go into a big studio and build them all up into megasounds. The rates are really fixed by the market. The 16-track 2 in market goes at £16 per hour down to about £10. Our rates are £14 an hour and we get enough work at that. The main problem in the studio market at this level is that people undercut because they get desperate for work."

Audio International, in what must have been an attractive mews near Baker Street before one side was demolished to make way for Marks and Spencer's offices, offers 24-track recording in its 103 sq m Sandy Brown-designed Studio 1. Managing director Richard Millard: "We're all undercharging. It's ridiculous to think that you can get this studio today at a basic rate of £60 an hour and when we opened the basic rate was £32. That was 12 years ago. It just does not make sense. What we do find as well is that producers don't want to work the kind of hours they used to;

many seem to want to get home. Quite often they book the studio for a week or two weeks open ended and then finish at nine o'clock in the evening. It does make it difficult for a studio to maintain its income sometimes."

Piers Ford-Crush, Mike Gardner and Philip Love came from Kingston-upon-Thames some 10 years ago to establish Eden in West London's charming Chiswick. The 87 sq m 24-track studio is kept busy by the record industry. Piers Ford-Crush: "If the studio world was an eight-hour-a-day, five-days-a-week operation, studio time would be astronomically expensive. It's the success of the busy studios that actually subsidises the rate. To a layman it seems astonishing to pay £65 an hour but if it were not like a Jumbo jet, flying all the time and earning its keep, you wouldn't get into a studio for under £120 an hour. That's why it's uneconomic for somebody to buy that sales potential for 24 hours when they only need part of it. We are often asked to do lock outs but, because we've got a lot of people who might pop up after an absence of six months or a year and want to do something, we always try to organise it so there is some time available. Having the SSL desk and *Total Recall* does mean you can fit people in to do re-mixes and things like that because the desk can be set up quite quickly." Lansdowne was set up over 25

years ago in the basement of a late-Victorian artists' colony in tasteful Holland Park. Four years ago it was bought by the then studio manager Adrian Kerridge and his partner, composer Johnny Pearson. They invested in VAPP equipment which was linked into their Melkuist automation. The studio works on TV and film scores and jingles as well as records. Multitrack recording in the 77 sq m studio is currently charged at £65 per hour and music to picture or VAPP is £75 an hour. Managing director Adrian Kerridge: "We spent a lot of money on investment and I have to actually work out my sums and recoup that investment. I feel that the rate we have for our video and motion picture work is about right. I do get attacked by other studios saying that we're under but all I can say is that it keeps us busy. Work keeps coming in. We feel that it's a price that is realistic for the company. It is slightly under but you still get the situation of producers ringing round. Everybody's looking for a deal."

Marquee Studios are tucked away in Richmond Mews behind the Marquee Club in Wardour Street, Soho. The 90 sq m studio with MCI automated console and 24- and 16-track machines is £67 an hour. The similarly equipped remix suite with overdub studio is £58 per hour. Studio manager Larry Bartlett came to Marquee five years ago after 10 years at Pye Studios: "Obviously the record industry being the way it is hates studios putting their rates up even if they've put in new equipment. When you get a client ringing up, the first thing they ask is, 'What's the discount?' They don't seem to realise that we have to update. They don't want to pay any more for sound but they'll willingly spend thousands and thousands on a video to promote a record. Where are their priorities? Are we making music or are we making films? If they want us to be film people we'll charge film rates."

Advison began 30 years ago in New Bond Street and moved to Gosfield Street near Broadcasting House 15 years ago. Doug Hopkins had been thinking of buying the Island studios at Basing Street when they went to Sarm in 1982. Instead, he and accountant Jeff Trendell formed a partnership with Roger Cameron of Advison and they bought the former Island mobile, now called Pumacrest, and the Advison studios. Studio 1 is 140 sq m with a 32-channel Quad Eight desk and Studio 2 is 13 sq m with a 32-channel SSL desk. Both studios are equipped for recording music to film or video. Multitrack recording in either studio is £75 per hour with a video surcharge of £15 per hour or film surcharge of £25 per hour. There is also a film dubbing theatre with Magna-Tech rock-and-roll dubbing equipment. Sony *PCM-F1* and *PCM-1610* 2-channel and *PCM-3324* 24-channel digital recorders and digital editing are available. The

music studios do work for records, film, TV and jingles.

Doug Hopkins: "The Americans have quadrupled their rates over the last 10 years. Unless we have a particularly valued client who has used the studio for a long time, we don't get involved in doing discounts. From a studio manager's point of view, the rate for the job is well under what it realistically should be. A C-format video tape machine, suitable for us to do lay off and lay back of video soundtrack, costs between £30,000 and £50,000. One can charge £70 an hour for the rental of that as a facility; whereas a recording studio costing no less than £250,000 plus bricks and mortar is £70 an hour."

Musician and songwriter Phil Wainman produced a series of hits in the 70s including number ones by Sweet, The Bay City Rollers and The Boomtown Rats (*I Don't Like Mondays*). Finding himself able to choose where to live, he considered moving to the US, but his family decided they preferred



Britain. His next plan was to build a home studio but consideration for the neighbours led to this project being re-sited in Spencer Court, Primrose Hill, close to London Zoo. The first studio in 1976 was the beginning of Utopia Studios which had expanded by 1978 to include an overdub/remix room, a smaller studio, and a disc cutting room. When the landlords came to review the rent for Utopia Studios, Phil Wainman bought Spencer's Court from them and it is now called Utopia Village.

Studio 1 was equipped with an SSL desk last year and the remix room has *Necam* automation; they are charged at £70 an hour and Studio 2 is £35 per hour. Phil Wainman believes that these rates help to keep the studios busy with a range of pop, middle-of-the-road and jingle work: "We can either have people sitting around looking at one another or we can work them and develop their careers as well. I'd rather let the studio go at a competitive rate, I'd rather give good value for money, and have the client come back than charge them that little bit extra and lose them. It also helps us move our staff up the ladder."

CTS began offering record industry technology for film music recording in Bayswater in the early 60s. In 1972 they moved to Wembley to join De Lane Lea Music who had recently opened The Music Centre on the site of an ornamental lake just a stone's throw from Wembley Stadium. Studio 1 (360 sq m) has just been completely rebuilt while the control room was being equipped with Neve's first *Digital Signal Processing* desk. Studio 2 (120 sq m) with 34-input Neve desk is charged at £72 per hour. Studio 3 (80 sq m) has *Necam 2* automation and *Q-Lock* for VAPP at £70 per hour with a video surcharge of £15 per hour. Studio 4 with 26-input Neve is £46 per hour. Studio 1 has projection facilities and all the studios have teletext/video feeds. The film surcharge is £25 per hour. Other facilities include disc cutting, a small video studio and Sony *PCM-F1*, *PCM-1610* and *PCM-3324* digital recorders and digital editing. The digital recording

industry."

Abbey Road Studios in sophisticated St John's Wood near Lord's Cricket Ground are probably the most famous recording studios in the world. Studio 1 (475 sq m), soon to be equipped with a complete new control room and an SSL desk, is at present £105 per hour for orchestral work. Studio 2 (200 sq m), recently equipped with an SSL desk, is £80 per hour and Studio 3 (105 sq m) with *Necam* automation is £75 per hour. There is also the cosy carpet-walled luxury of the Penthouse (40 sq m) with 56-input Neve desk and triple glazed views over the neighbouring gardens, at £65 per hour. Studio 1 and Studio 2 have projection facilities and all the studios have video feeds. Other facilities include mixdown rooms, four disc cutting rooms, three editing suites, two sets of mobile equipment, a video production control room, Sony and JVC 2-channel digital recorders and digital editing. The studios cover the full range of recording work, classical and pop, from operatic and orchestral to small groups and solo performance for record, film, TV and jingles.

Abbey Road general manager Ken Townsend: "I think studios generally were having a reasonable time until the recession came along. The recession caused a lot of price cutting. People couldn't raise their rates, otherwise they had no work. It became easy for people to offer studios at a lower rate than they would like, otherwise they would be empty. In the long run this is a vicious circle that kills everybody off. With the improved facilities we're now offering, we're very, very underpriced—all of us. Studios, generally, have got to be firmer in getting better rates and I think we are beginning to see this happen in 1984. Some of us have probably made a mistake in giving daily rates. Although it guarantees you work for a long time, a daily rate does of course lower your actual rates and, Abbey Road included, these daily rates have often been too low.

"People say they can get 24-track for £12 an hour but they have to pay £70 somewhere else. There is a very great difference between what comes for £12 and what comes for £70. The professional service that goes with it, the actual quality of the equipment, the maintenance of the equipment, the size of the studio, the types of microphone available, the in-house facilities possibly. The actual quality of service is completely different. In America they provide a basic facility and they charge so much per hour. Anything above that, they charge a rate for—so much for Dolbys, so much for a Lexicon... I've seen some of these American bills and they're quite horrendous. In Britain there's a common philosophy that if somebody says, 'You haven't got 15 Lexicons in each studio. I want to go somewhere else,' you have to

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throw all these things in for nothing. These are very high cost items and somewhere down the line studios have got to actually have a charter that will say that 24-track means a 24-track console, 24-track tape machine and Dolbys, plus maybe two or three items of outboard gear, and the rest has to be charged extra. I'm hoping that APRS will be doing this and if we don't do this there's no chance for anybody being highly successful. In the long run we have to get more money for what we do."

There was general agreement that the rates are far too low although some studios felt that this was alright so long as you kept busy and your staff enjoyed working like Trojans (building wooden horses, digging tunnels, etc). I have actually encountered a studio where the rates were so low that the owners could only afford to pay the studio rent and had to live in the studio until worked picked up. More than one studio said that the days of the pencil booking were over and in future they would require a deposit to confirm a booking. Many people invoked the name 'Chris Stone of The Record Plant Los Angeles' and endorsed his views on studio rates (*Studio Sound* February 1984).

The amazing divergence between video and audio facility rates may be explained by the fact that video facilities grew out of the administration-intensive broadcasting institutions with their 'hours of work and conditions of service' whereas the music recording business is closely related to the music business. Whatever the reasons for the problem, the solution will require concerted action. Co-operation rather than competition.

Buddy, can you spare a dime?

"My advice to anyone who wants to start a studio is: Don't."—Jill Sinclair of Sarm. Sarm is a family business which began in London's mysterious East End when David Sinclair and his son John took over the City of London Recording Studios in Whitechapel 11 years ago. As Sarm developed, John's sister Jill Sinclair was, she says, "dragged into it" and she kept it in the family by involving her husband, ace producer, ex-Bugle and father of two, Trevor Horn in a production company, music publishing company and the ZTT record label. Some 18 months ago Sarm took over the former Island studios at Basing Street, near Ladbroke Grove in West London. They re-equipped them and painted them blue. As Sarm's managing director, Jill Sinclair is

now the proud owner of one (80 sq m) studio in the east and two (245 sq m and 55 sq m) in the west with a third on the way.

"One of the worst things is that no sooner have you equipped and re-equipped than you have to re-equip again. Now everybody's talking about digital and you're still going to have to keep analogue. On a pure business basis a studio is not a good return for your investment and it is a high gamble. We have very tight control on everything. Every cab that is ordered has to have a job sheet, has to have an order number. We don't lose cabs, we don't lose dinners, we don't lose anything because that's the hole in the bucket. The amount you have to plough back into a studio is very high. You have to keep putting it back and I think it only really works when you do as we do—you have your related record label and your related publishing companies. In management terms that's the only way it really works. We can spread costs across several companies."



When Eden moved from Kingston to Chiswick they had a curious experience with investors. Piers Ford-Crush: "When we opened here we sold 25% of the equity to a merchant bank to help finance the thing, but the merchant bank was obliged to close. Fortunately the people we were dealing with at the bank said we should have the chance to have our equity back. In fact we were able to buy our equity back at what they had paid for it which was very lucky. When they paid for it there *was* no company. Two years later it had a very sizeable value. It was very fortunate they didn't just sell our equity off to anybody. That has taught me that if you want to start a business, borrow money by all means but try not to have have people involved in the equity of the company unless they are working in the company or very close to the business. If they're not day-to-day involved they don't have that gut feeling about what's the right thing to do. When it's your own company you're prepared to say in the early years 'no money for us

this year, let's spend it on equipment.' Investors want to see a profit."

Peter Harris has increased the rates for CTS Studio 1 now that the Neve DSP desk is installed. Will this cover the cost of the investment? "We expect to increase our working hours with that equipment. One reason is that it has *Total Reset*—not recall but reset—so that previously dumped information on a floppy disk will allow one to reset all the routing, all the equalisation, all the settings on the console. One can then start on a mixing session in an evening after doing a day's work on a film score with a big orchestra. Normally we wouldn't disturb a console if it's set up for something like that but now we can dump everything on to the floppy disk at the end of the day session and then start the mixing session in the evening. Turnround between sessions is going to be easier because of that and if it's a digital recording we don't have to spend the time setting up an analogue machine. It is not necessary to re-

align a digital machine every time you use it, as we do with our analogue machines. Factors such as this will mean that we can increase utilisation so that the whole cost of the new equipment is *not* being passed on to the clients."

A final thought on investment from Ken Townsend of Abbey Road: "If you hire a piece of equipment off, one of the guidelines is that you should charge 1½% per day of the original capital cost. We get nothing like 1½% for actually hiring equipment in the studio to the artist who wants all our engineers and everything thrown in as well."

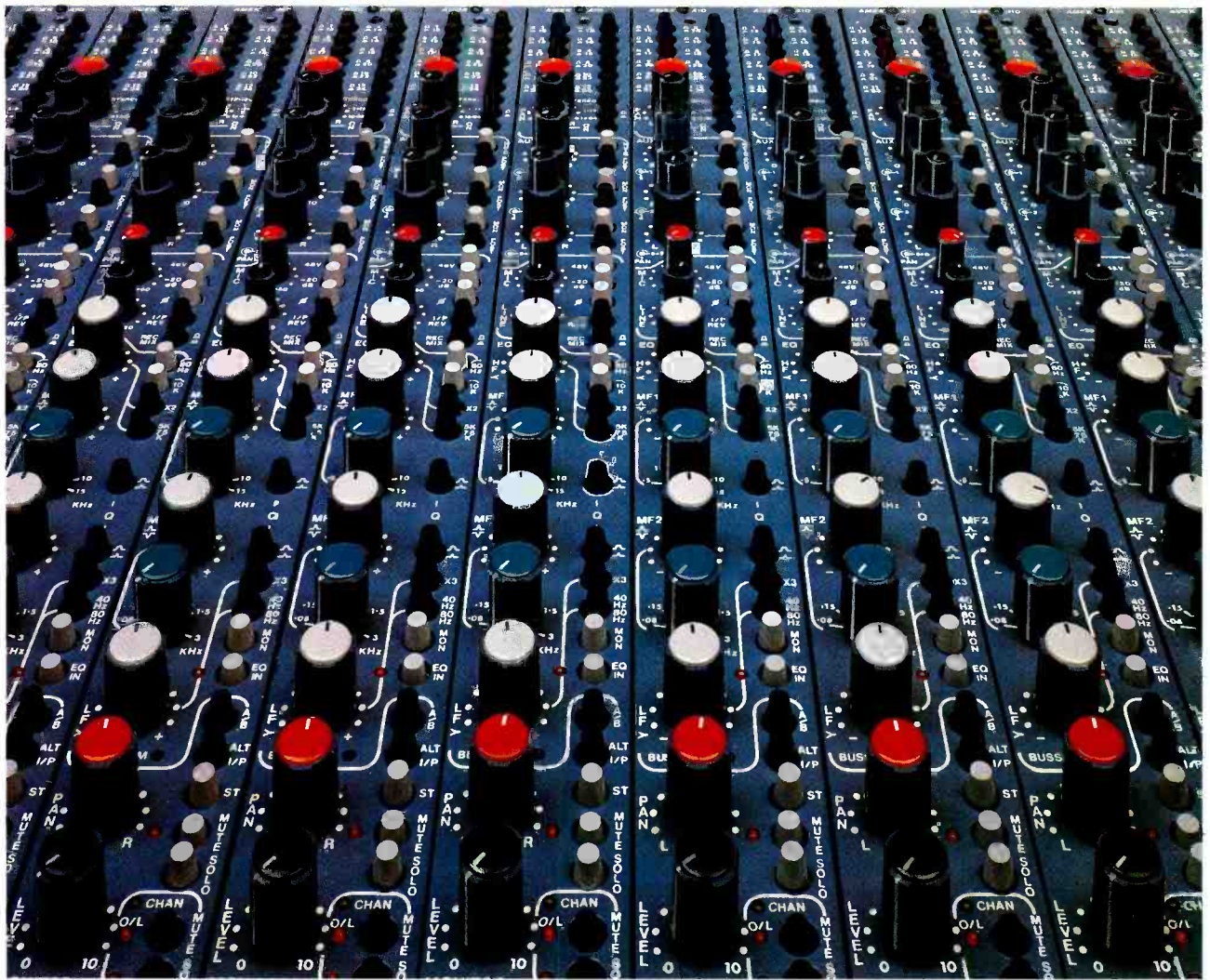
Alright for some?

Several of the studios are part of a larger group of companies. This provides more of a short term financial safety net than the long term security blanket some people imagine. CBS Recording Studios were built 11 years ago on the site of a bomb damaged car park (where would we have parked our

cars but for the blitz?) in Whitfield Street just off Tottenham Court Road in the centre of London. The studios and mastering facilities are available to third parties. Studio 1 (275 sq m) and Studio 2 (70 sq m) are equipped with MCI automated desks and are charged at £75 per hour and £65 per hour respectively. Studio 3 (50 sq m) with a Neve desk is £50 per hour. Other facilities include two disc cutting suites and two cassette mastering rooms for the preparation of 1 in cassette duplication masters. Sony *PCM-1610* 2-channel digital recording and editing and audio for video synchronisation are each available at a surcharge of £25 per hour. The studios cover the full range of musical styles from classical to pop and jingles.

Some studios are rather reticent about their friends in high places but studio manager Rodger Bain openly admits that the CBS studios are part of the CBS group: "We couldn't exactly hide that, could we? We are a profit centre within the group. We operate totally independently and we have the same commercial constraints placed upon us as any other studio. CBS Records is just another customer for us; we're cousins but that doesn't mean that one subsidises the other. If we find we're making a loss then we're in trouble. The CBS tag works to our advantage because it is a major corporation but it probably scares off some new artists because they feel intimidated by that."

The PRO Workshop at the Polygram building in St George Street between New Bond Street and Oxford Circus is a most unusual studio. It is listed in the APRS guide as being available at £50 a hour but only the three related record companies, Phonogram, Polydor and London/Decca, which have adjoining offices are permitted to use the 65 sq m studio. It was built two years ago to record demos and masters by new or established pop artists. Polygram designed it with the idea of video production in the future so there is a lighting grid and the studio walls are grey. There is a platform at the back of the control room with a row of aircraft seats so that artists and visitors can sit in comfort and out of the way to survey the scene. The most interesting thing about the studio is that it has a basically functional appearance and large selection of valve outboard equipment. I suggested to Polygram's Manager of Technology Carlos Olms that only an in-house studio could afford not to *look* fancy: "It has to be a relaxing atmosphere but our place is non-fancy. I've kept the standard of the old equipment very high. As you know, many people believe that valve equipment sounds better, and there is a lot of truth in this. When you use the old Fairchild, or the old Pultec, or the old Universal Audio (UREI) limiters they are absolutely superb. A



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AMEK *ANGELA*

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record company in-house studio has a different duty from a free studio. Our aim is to help our artists with our product. We take care of our artists in other studios as well."

Diversify or die?

Almost all the studios said they had some experience in production, music publishing and/or a record label at one time or another because successful ventures allow them to spread their costs. Piers Ford-Crush of Eden: "I think any studio really should have some involvement in that side of things—and I think they all do—it gives you an insight into things."

Another area that many studios have looked at is film and video. Abbey Road, Advision, CTS and Lansdowne all have magnetic film sound recorders and timecode synchronisers for video audio synchronisation. Several recent Brent Walker television products have involved Abbey Road engineers pre-recording the musical items, attending the video recording to provide playback and record the 'live' sound in conjunction with the video sound crew, and finally mixing the complete soundtrack to picture. CBS, Sarm and Utopia have synchronisers which they use to lock multi-track machines together but they have all used them with VCRs for video sound work. CBS has just invested in a Sony VO-5850 low band U-matic with timecode reader and monitor to develop this line of work. Sarm included video cables in the rebuilding of Basing Street and Utopia has just built a low band video editing suite for industrial video production. Both Abbey Road and CTS have low band video production facilities.

Who pays to advertise?

Most studios said that they occasionally advertise to announce new developments or 'just to keep the flag flying'. Peter Harris of CTS: "For many years it has been a contention in this industry that word of mouth is the best way of advertising and that is an important factor but, however well known you think you are, you'll find people who'll say 'Who?'. They don't know you and don't know what services you offer so I think it is worth some advertising to get the message across to those who might not know, especially when you've got some new facilities to offer. Because of the launch of our digital equipment, we are in fact thinking of utilising an outside company to actually get the contacts for us and get the

message across rather than relying solely on a mail shot. It's a more personal approach. It's on the basis of 'We'll catch the lion and throw it in the tent—it's up to you to skin it when it's in there'."

Richard Millard of Audio International also uses a direct approach: "If we have spare time we phone around to producers and say we have got available dates. We keep a list of people who've used the studio in the past two or three years." Adrian Kerridge of Lansdowne has tried targeted advertising: "We have begun to take space in *Television Weekly* primarily because we do quite a bit of video audio post production and that goes to producers and directors in that area. We have had enquiries from it."

TPA has also had some success with advertising. Andrew Bell: "We advertise in *Melody Maker* every week. We have tried other forms of advertisement but nothing has actually been any use except the ad in *Melody Maker*. That gets us a certain amount of



street level work with non-signed bands looking for deals. That would constitute probably 25% of our work but 50% of our work is record companies and that's nothing to do with advertising; that's purely personal contact." Steve Hall of Hallmark said that he used to be either overworking or worrying about where the next job was coming from: "I tried advertising when I had a rather quiet summer and I found it just didn't make a spot of difference. You've either got to be the cheapest or the biggest or preferably both. I'm just learning that work does seem to keep coming in but it's all I can do to stop myself from worrying when things are quiet."

Piers Ford-Crush of Eden hasn't got the advert habit: "I usually have to be embarrassed into advertising—when I think it's so long since we did it that really perhaps we ought to—just for the sake of appearances. I don't think advertising sells any studio time whatsoever. If you took any studio and analysed its clientele over a six-month period you would find it

was very small, probably four or five main clients. An album might take between a month and two months, so a project running in the studio, even if it's not solidly locked out, doesn't leave a lot of room. No amount of advertising is going to find those five people that happen to be bringing you all the work at that time."

Rodger Bain of CBS sums it all up: "It's the chicken and egg question, advertising. You never know what benefit you actually get from advertising. If we hadn't advertised would we have got that work? You can never quantify it."

What brings you here?

The precise location of a studio in the London area does not seem to have much effect on the sort of work it gets. Several central studios felt that being within walking distance of music publishers, record companies and advertising agencies more than

compensates for any parking problems. In fact CBS in central London, Abbey Road in suburban St John's Wood and CTS way out in Wembley are used for every type of session, from major symphony orchestras with their vans full of instruments and their cars full of players to carefully costed and tightly timed jingle recordings with their account managers and clients.

It seems that the reputedly high budgets of television commercials rarely stretch as far as the music recording studio although, as Andrew Bell of TPA says: "You have to have superb décor because the clients come down and they want to see leather chairs and shag pile carpet."

Apart from the décor, what determines the work that each studio gets? Rodger Bain of CBS: "It's usually the producer that makes the choice. He's going to work somewhere he's had success, somewhere he feels comfortable, somewhere that he likes the coffee. There could be no logic behind the reason but they have their favourites and that's where

they will choose to go." One studio asked a new client why he had booked them for two months and he replied, "I booked you because you laughed at my jokes when I came to see you".

Can you manage?

It was generally agreed that the personnel side of studio management is a matter of ensuring that everyone knows what is expected of them and letting them get away with it. Continuous monitoring of the operation with maximum accessibility and minimum interference. The nature of the business does bring certain problems. Piers Ford-Crush of Eden: "I think that people in their twenties have a difficult emotional time and most of the people one is employing in the studios are in their twenties. It's a great period of transition, of coming to terms with life and the fact that it isn't quite as you always hoped it would be. Even engineers can find themselves suddenly thinking, 'I wanted to do this so badly for so long and now I've got it, do I want it? Where do I go from here?' I think that anybody who becomes an engineer should really have the potential to, in some way, become involved in record production because otherwise the choices are fairly limited. It's very hard to be sitting there, receptive to other people's demands and ready to do them, plus trying to make sure that the job's done the right way. It's so much easier to tell other people what to do."

Seeing records that the studio has been involved in getting into the charts is always a great morale booster. A successful studio will practically run itself. Phil Wainman of Utopia: "We don't have a manager. We did have a manager for almost a year but it really wasn't working. I do that job myself now. My first stop is normally reception to find out what's been happening. Then I go into maintenance because I want to know if there have been any technical problems. I spend about half an hour with maintenance, just generally what needs doing and what needs ordering because we are forever updating bits of machinery. Then I take a wander into accounts to find out what's doing there. We've just gone computerised and it's nice to see it coughing up invoices. Then I'll stop off in the cutting room to see if everything's OK there. I'm not cracking the whip. I take a wander round, talk to everybody, find out what their needs are and let them get on with their jobs. I like them to be self-motivating. They have their own responsibility and I like to let them get on with it. We have studio meetings every month or six weeks when we tend to wash our dirty laundry together. Anyone can come under fire and I've got the whole lot to answer to. I enjoy every minute."

Doug Hopkins of Advision: "I have always maintained that the people who work in the

studio—the staff—are actually more important than the clients. The facilities have to be on a par with what is required at the moment but if the staff are good the clients will come in to work with those staff.” Richard Millard of Audio International: “I think the day of the house engineer is coming back again. I like having the outside engineers in because most of them have worked here and we have a good relationship with them but I would much rather have my own engineers. I think it creates more loyalty.”

Don't call us, we'll call you

None of the studios relies very heavily on freelance engineers although they often have freelances coming in with particular producers. Steve Hall is active as a musician and composer as well as being the owner and operator of Hallmark: “In the last six months or so I've had to get outside help because I've had to be doing two jobs at once—engineering and writing—so it was sheer necessity. I could justify that because I was earning two sources of income but when a studio's charging £16 or £20 an hour there's no way you can pay someone even £8 an hour—it's embarrassing really. When things are cut-throat you can get engineers quite cheaply because there isn't much work going.”

Most of the studios said they used freelances to cover holidays, sickness and peak workloads but only people they knew personally, often former staff engineers. Piers Ford-Crush of Eden: “We use one a great deal and a couple of others. I would say there are perhaps three other freelance engineers that I'd be happy to use, that I know will do a really good job because they know our room. I think a studio is running better from the point of view of the management when you know that you've got an engineer down there who's basically on your side. There are freelance engineers from certain countries who want everything changed because they are building up their part. They've been paid a lot of money to come in and engineer so they want to make an impression. ‘Remove those monitors. Haven't you got 83 Tube microphones?’”

Several studios said they almost never use freelance engineers. Rodger Bain of CBS: “We have sufficient staff to cover all our requirements and if our engineers are not actually on sessions they're doing editing or copying. There's always work to be done. I've heard of studios where they have only a skeleton staff and just hire freelances for particular sessions. Obviously the idea is to keep your overheads as low as possible but you've got to do a lot of juggling to put sessions together.”

Several people spoke of such *Marie Celeste* operations. One example of this system is

Polygram's Wisseloord Studios in Holland. Bert Baars in charge of Audio and Visual Productions explained that, although they have three music studios and a video dubbing suite, there are only five people on the staff—the managing director, bookings, admin, maintenance and himself. All the balance engineers are freelance. The studio guarantees them a certain number of hours work per year but they are free to do as many or as few as they choose.

Most of the London studios I visited have one more balance engineer than the number of control rooms to be manned; and a similar number of tape operators or assistant engineers (peripheral technical facility operatives). Studios also said they preferred to rely on staff or former staff for maintenance because equipment has often been modified in some way that is unique to that studio. The smaller studios tend to work round a technical fault until they get a chance to repair it themselves. Steve Hall: “You've just got to be ahead of servicing equipment. I'm always hearing about studios that are constantly breaking down but since I've always run my own place that doesn't happen. If a channel goes I know about it and my bad conscience will keep me up until three o'clock in the morning to fix it.” TPA use a change over service which replaces faulty cards and modules for a standard fee regardless of the fault. The larger studios usually have maintenance staff on duty or on call while the studios are operating. Typically they have one less maintenance engineer than the number of main technical areas. Doug Hopkins of Advision: “It's better to have maintenance staff than down time.”

The line forms on the right

Nothing seems to stem the flood of young hopefuls who write to, call or visit recording studios wanting just the slightest chance to get into the business. Larry Bartlett of Marquee recalls the letter he sent when he started: “It was the usual thing. ‘I'll pay you if I can work in a studio’ you get 10 letters like that a week. When I interview them I just make sure they know all the pitfalls. The money's dreadful, you can fall by the wayside, you could get to the age of 30 and be married with two kids and suddenly finished. There's no guarantee that after four years of being a tape op you're going to make it as an engineer. If you can put them off by saying that, they're not right.”

Peter Harris of CTS: “So many of the applicants we get offer to make tea for us but we have a restaurant which makes nice tea. What we're looking for is some form of musical appreciation or talent. It's nice if they can read a score, it's nice if they can play an instrument so they're in sympathy with what goes on—although this

has not always proved to be the necessary requisite for a very successful engineer. We're looking for people who will as quickly as possible learn the necessary skills and will become a responsible member of the team.”

Studios agreed that there is very little time for any formal training. Jill Sinclair of Sarm: “We do expect the engineers to spend time with the tape ops and show them things, not during a session, normally not after, but certainly before. We've just recruited an experienced engineer, Nick Ryan, to take over some of the management of our studios. One of his jobs will be to make sure that standards are kept up so that tape ops aren't ignored. I find that it's more necessary now than ever before because we are getting a lot of people bringing in their own engineer and so the tape ops in many ways have more responsibility than they used to.”

What about the formal courses that are available? Piers Ford-Crush of Eden: “I don't think formal training courses really are anything other than useful background. Applicants that I've had from those courses do have a lot of knowledge but it's not like combat experience. They're at a disadvantage if they're now 22 because if they're almost the same age as the engineer they may feel that perhaps they've got something to contribute to the session, which is probably not true. Nobody's going to treat a new assistant badly but they aren't expected to make a major contribution; they're expected just to be useful, to be a pair of arms and legs going in the right direction at the right time.”

Larry Bartlett of Marquee is very concerned about the development of future engineers: “What worries me, now that everything is becoming more computer assisted and if you want to you can run a tape machine from the desk, is that the tape op is just making the tea and getting the sandwiches. They're not getting that involved in sessions. How are they going to learn? They're not doing things that I did when I started; I'd be totally in charge of the tape machine, running it. Drop-ins were a lot harder so you had to pay attention. Now they don't have to pay that much attention. What we try to do is get the senior tape op to do his own work, get his band into the studio and record them just so he gets the grounding.”

I put this point to other studio managers. Rodger Bain of CBS: “I don't think the tape operator just runs the machines. He does all sorts of other things as well—putting up a microphone and plugging it into a certain channel, moving a screen, anything that the engineer wants done ‘out there’ while he's listening to the effect in the control room.” I suggested that a major part of a balance engineer's training is learning to hear: “Yes, and to anticipate, not only on the technical level but to anticipate what the producer is

likely to want next. Having been in a producer's chair myself, I know you really do appreciate it when you don't have to spell it out, when something is done for you. It makes all the difference when the guy's really on the ball.”

Most people said that personality and attitude were major considerations in the selection of potential future balance engineers. Piers Ford-Crush: “I get reaction from customers because he may only be the tea boy but if he's been standing in the corner yawning, *everybody's noticed*; if he came back from McDonald's with the wrong milkshakes, they all know who did it. In any job, if a bloke can't get the petty cash right, if he can't get the right milkshakes—what *is* he going to get right? If he can't be good at that, is he really going to be able to apply himself to the rest of it? An assistant needs to know how to handle people. Having good ears, knowing a bit about music and all the rest of it is just not enough. That's why it takes four years before they know much about being an engineer in the full professional sense of the word.”

With my sheltered upbringing, I was slightly surprised to learn that so many people still believe in the traditional ‘it's tough at the bottom’ approach—but it does seem to produce the results. Phil Wainman of Utopia: “I do believe in getting them straight out of school or college and putting them in the rough end of it first. I put them through the gruelling bit so that I know whether they're going to last the course. We get them helping the builders, carrying materials, clearing up, making the tea and doing the really terrible jobs. If they're still keen after all that lot, they're for us. We took on Tim Palmer 2½ years ago. He was tea boy for four months, then he worked in the copy room for a couple of months and he tape op'd from then on. He engineered for a year and he's got himself top 10 records now as a producer. That's how quickly things like that can move. We won't take on a tea boy to be a tea boy for the rest of his career. It's part of our job to get those guys there as quickly as possible. I make it a point that they must play a musical instrument when they come here. They've got to be musical. I encourage them to write and to put their own material on tape. We've got a nice atmosphere here and I think that really comes from the people. It's a question of picking people who are going to work *with* us. Nobody actually works for Utopia: they all work for their clients.”

Phil Wainman described the atmosphere at Utopia as a buzz and I certainly noticed something of the sort, an expectation of great things, there and at other studios I visited. We know that the recording industry has got itself into problems but, on my travels, I became aware of a firm belief that something can be done and a determination that it should be done now. □

LETTERS LETTERS

Ambisonics

Dear Sir, I think your readers are entitled to a different point of view on Ambisonics from the privileged one presented in your February issue by Barry Fox.

'You still can't find a decoder in any shop'. Maybe not but there are ample precedents to demonstrate that mail order is a very effective way of selling things whilst demand for them is being created. Shops may well wait to move in on a product once the demand has been created.

'I wonder if the Government and BTG have any inkling of how fortunate they are (in that you, Sir, are an Ambisonics supporter). It might be news to Barry Fox that NRDC paid for the development and manufacture of the equipment to which he refers in this context. That of course is what we're here for: if people in the industry had not wanted to use the equipment there would not have been any point in our sponsoring it. In other words, the efforts of NRDC and of the Ambisonics fraternity were complementary in that instance.

'The man at BTG in charge of the Ambisonics project . . . is also in charge of dozens of other things from, for example, optical fibres to large computer aided design packages for various purposes. Shame on him—he hasn't personally tried to set up all of these things either, but we do in fact have a demonstration Ambisonics system here at BTG.

'Only the most devoted convert knows how to buy a decoder by mail order'. Here Barry Fox seems to lose confidence. Does he believe that nobody reads the audio press?

'I am sorry that I ever had the ideas that led to the Ambisonics project'. Here Professor Fellgett, as quoted by Barry Fox, claims too much. He is only one of a number of people who had similar ideas at about the same time. One of the problems which NRDC has faced during the last 10 years has been the task of bringing all of this work into one pool. Discussions along these lines started in about 1974 and have resulted in pooling of ideas from the BBC, Professor Duane Cooper of the University of Illinois, Michael Gerzon, the staff of Nippon Columbia Company, Japan, and others. With so many people involved, no-one can expect to have everything his own way.

'Despair at the way BTG and NRDC have handled their project'. Despair is at least mutual. Here at NRDC we are accustomed to dealing with difficult people but some of the Ambisonics people are just impossible. Professor Fellgett is quoted as saying that the promise of the invention (sic) has been dissipated: we view such statements as tending to dissipate the

promise of more than 12 years' careful work and investment. Again, he refers in critical terms to the treatment of British inventors and British innovation—but what light do his comments shed on the behaviour of some British inventors?

Ambisonics is great technology, with an international base, but we don't expect its general introduction to happen overnight. We suggest that Barry Fox should ask himself whether his outbursts are really likely to help.

Yours faithfully, D R Easson,
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London SE1 6BU.

Digital misconceptions

Dear Sir, Mr Boyk's letter in the April issue strikes right to the heart of the Digital V Analogue debate: Is it possible for 16 bits at 44 or 48 kHz to sound good enough? The only A/D or D/A converters that I know of that realise their full potential are the ones Neve have designed. (This is not to say that there may not be others). A/B analogue/digital tests show that the only audible difference is that the digital adds some noise. This noise sounds fairly white and is 90 dB below maximum level when there is no modulation and somewhat worse when there is.

Of course, 90 dB is not an adequate dynamic range for a microphone feed¹ and Neve get around this by setting their 90 dB as a 'window' on their microphone amplifiers output according to the setting of the channel fader². Whether the net result would be considered satisfactory by Mr Boyk is not for me to say.

Unfortunately, there is so much hype and so many bandwagons that some expensive lessons will be learnt, one way or the other. It will be some time before subjectively relevant tests are common in digital audio, so in the meantime beware specmanship and beware golden-ears.

Keith Armstrong, Audix Ltd,
Station Road, Wendon, Saffron
Walden, Essex CB11 4LG.

¹ 'Digital misconceptions', M K Armstrong, *Studio Sound*, January 1984.

² 'Processing systems for the digital audio studio', Dr M H Jones, AES New York paper, 1982. ▽

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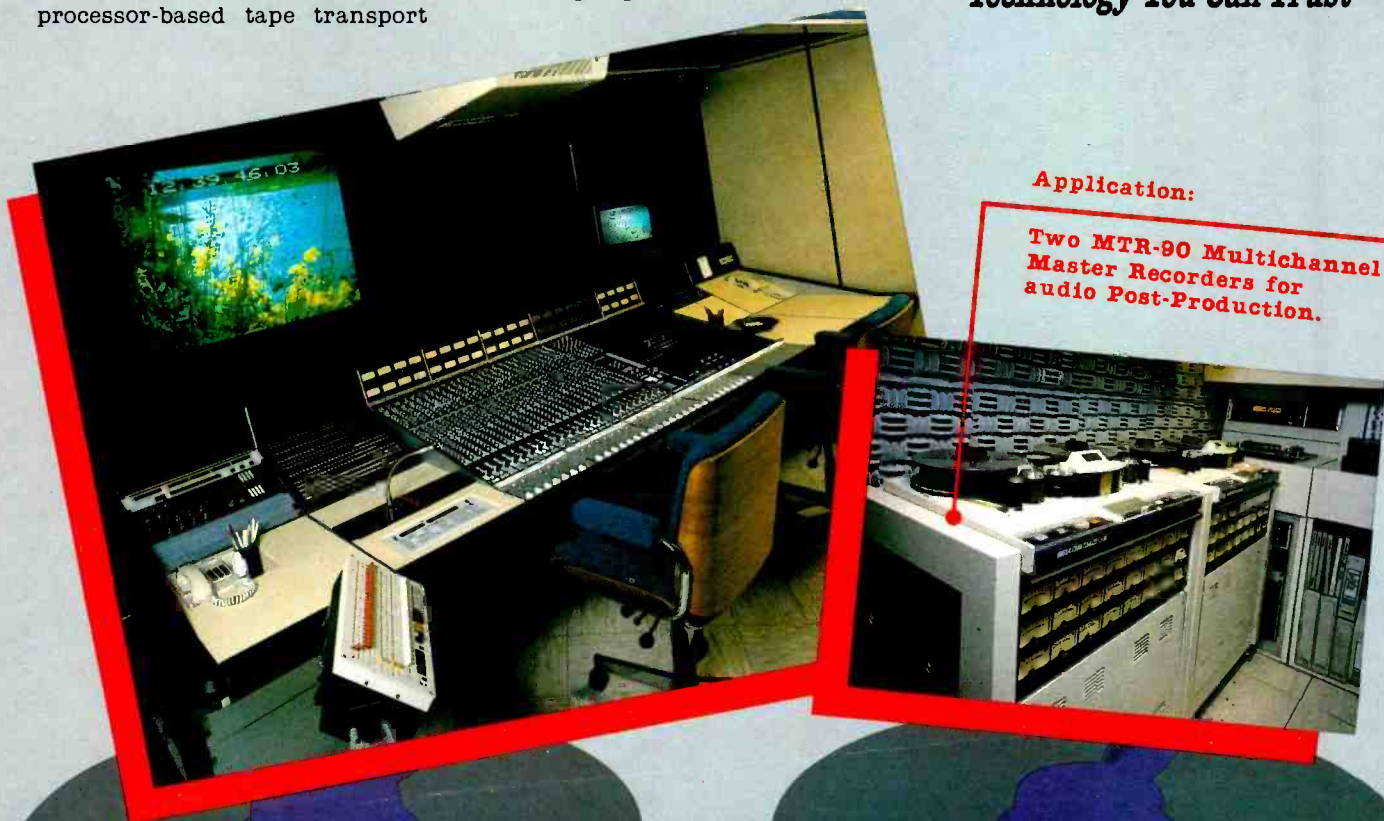
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LETTERS

LETTERS

Letters should be marked 'For Publication' and sent to the Editor at the Croydon address on page 3

APRS standards

Dear Sir, The change in APRS membership requirements came as a bit of a surprise. The Association has not lobbied interested parties within its own ranks so your editorial in March was the first I'd heard of any change.

A professional studio should be defined as one that makes a full time business from recording. Each studio makes its own commercial decision to which format they will use, whether to buy new or second hand and so on.

Of course, I applaud the aim to improve the overall technical standards, but the quality limitations are not in the format but rather in the level of care in production and the overall standard of equipment maintenance.

For the 'standards' myth, each studio uses its own combination of tape width, speed, noise reduction, EQ and level. Therefore there are no absolute 'standards', just different formats. As long as these formats are well documented and understood, there are no problems when interchanging tapes between studios.

It would be more productive of the Association to prepare a document along the lines of the IBA engineering code than to exercise flacid muscles in a display of elitism. By this arbitrary requirement on tape formats, the APRS neglects its responsibility to all commercial studios, since it can no longer be considered representative.

It does a great deal more harm to the Association than to the studios it wishes to exclude and that is a great pity.

Yours faithfully, T Frost, Harman (Audio) UK Ltd, Mill Street, Slough, Berks SL2 5DD.

Sbelling lesson

Dear Sir, Your December issue has just arrived here in the colonies and I note with interest two references to db magazine. Although I have recently resigned as its editor, perhaps you will allow me to make a few comments anyway, at risk of further debasements of the English language.

Please let Mr Andrews know that db's logo is not wrong (December letters). Perhaps he has it confused with dB, which is (even here in this cultural backwater) the abbreviation for decibel. To the best of my knowledge, db has never been known as Decibel (deciBel?) magazine. About the closest it ever came to that was in 1967, when its founders designed the db logo. At the time, decibel was abbreviated with lowercase letters (see almost any magazine or journal of the period). In the early '70s, db (the decibel) evolved to dB, while db (the magazine) didn't. Even here, we have our traditions.

As for 'buss', db has been getting that one right for years (see 'bus', in the Recording Studio Handbook Glossary, 1976 edition). For Mr Andrews' OED, here are some hyphens (---); he might like to put one of them between Hewlett and Packard, to avoid being charged with debasing the American language.

Moving on to the December editorial, I'm delighted at the kind mention of Ken Pohlmann's db feature on the SPARS digital certification programme. And you're quite right—the complete pictogram series on the front cover is indeed overcomplex. However, they reinforce Pohlmann's conclusion: 'What started out as a 'simple' project has turned out to be a rather-complex issue.'

Some of the concepts presented in the pictograms may not be totally unrealistic though. A border that alternates between sine- and square-wave conveys information on several levels. It may be passed off as decoration by those who are uninterested in matters digital. However, a casual scrutiny will quickly reveal the relative proportion of analogue and digital content. A careful bit-by-bit (sorry!) study will let the knowledgeable listener know just which steps in the multi-link production chain are digital. Such a scheme might allow a lot of information to be made available to the customer, without having that information get in the way of those who don't need or want it.

Yours faithfully, John M Woram, (SPARS Technical Consultant), 45 Lakeside Drive, Rockville Centre, New York, NY 11570, USA.

Training...

Dear Sir, I find it very interesting to read that Mr Steenhuis (Letters, February) should feel as he does about the Music Industry Arts Programme at Fanshawe College in London. His claim that the students could not be properly educated in the College environment comes as a real surprise since he was a staunch supporter when he taught here. He is also aware that

the Industry supports and promotes our efforts at Fanshawe, and that our graduates are well respected and sought after across the land.

On the topic of budgets, if it were not for our involvement with his own organisation through the rental of his facilities, his own budget would be down by a healthy amount.

I am disappointed that Mr Steenhuis finds it necessary to promote his business at the expense of another. I hope Mr Steenhuis doesn't teach the course on Business Ethics at his school himself. Yours faithfully, Fred Steinmetz, Chairman Communication Arts Division, Fanshawe College, PO Box 4005, London, Ontario N5W 5H1, Canada.

...a clarification

Dear Sir, On September 15, 1983 I wrote you a letter in response to your editorial published June 1983. I learned last week that my letter had found its way into print and had unfortunately quite disturbed the Chairman of the Communications Division at Fanshawe College in London, Canada.

I would like to take this opportunity to clarify the intent of my comments as I now recognise that they might easily have been misinterpreted.

When I wrote that I did not feel that the student could be properly educated in the college environment I was not singling out Fanshawe but meant ANY college, further, a college is not permitted to use its facilities commercially as it is funded by tax payers. This inhibition prevents the administration from setting up a 'real world' situation for their students where they would be working on professional and paying sessions and working with professional clients.

I in no way intended my comments to be disparaging and apologise for having left them open to that interpretation.

Yours faithfully, Paul Steenhuis, Ontario Institute of Audio Recording Technology, 500 Newbold Street, London, Ontario N6E 1K6, Canada. □

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HARTMANN DIGITAL DESIGNED

Set in a remote part of Southern Germany, Hartmann Digital is a recently completed studio that stands every chance of being an international name in the near future. Designer Andy Munro

Andy Munro: "The whole thing started at the AES Convention in Montreaux, Switzerland during March 1982. It was the first AES that we exhibited at as Turnkey 2 and basically we were there to wave our flag. Who should turn up but Horst Hartmann who I did not know from Adam but at least he spoke reasonable English. He had read an article I had written and was sufficiently intrigued to find out more about it. He told me that he wanted to build the best studio in the world and so on. I think that I just showed a polite interest and after he left, it all seemed rather improbable; I didn't think any more about it.

"About three or four months later he teleaxed us in London to say that he would be arriving at Gatwick airport at 11 o'clock. I thought 'Fine. Eleven in the morning he'll be at the office at lunchtime'. But he unfortunately arrived at 11 at night, and somehow managed to make his way to our Barnet office which is a feat in itself. But of course our offices were locked and empty. He promptly went to the police station where they treated him with utmost suspicion. He ended up in some God forsaken hotel in Enfield from where we dug him out the next morning. That is literally how it started.

"As he recovered from his ordeal, we spent a few hours just chatting about his ideas and it transpired that he was really very serious and definitely wanted to build this ultimate studio in the middle of this mountain area in Northern Bavaria. He wanted to do whatever was necessary to achieve this end. So I simply had to ask him the obvious question 'How on earth are you going to pay for it?' as he was only in his early 20s. He said 'Oh money is no problem!' and it turned out that he wasn't far wrong."

The beginning of the beginning

It was during this initial meeting that they ran through the aims of the studio and did some rough budgeting. At this point in time, the idea was for a completely analogue studio. However as digital multitracks were becoming more of a reality, the concept was extended to include digital recording as a major part of the design brief in addition to the analogue machines. The console had not been decided on at this point. Andy suggested to Horst that he might consider looking at a Solid State Logic console for the studio as it seemed to fit his outline requirements. Horst was not very familiar with the SSL consoles and so it took a further trip to England slightly later to the Stonesfield SSL factory with detailed instruction in the ways of the SSL 4000E

of Turnkey 2 was happy to talk to Keith Spencer-Allen about all aspects of this project from the very beginning to completion six months ago, and other topics from the designers point of view.

before the console was confirmed. It was about this time that the actual rough drawings and a start to the design were made. It had been essential for Andy to know exactly what major pieces of equipment were to be used within the studio as they have a philosophy of taking responsibility for every facet of the studio construction that might affect studio performance.

"When we design a studio, we design everything—in fact we insist on it. What we don't like is handing over certain areas needed for the successful functioning of the studio to other people. If something is wrong, then we take the responsibility. We still use specialists but we lay the ground rules."

The location

Before work could start seriously on the design aspects, Andy had to visit the intended location. They had, prior to that, decided on certain aspects of the approach to the design with rough sketches but it was still vague.

"When you see a building it gives you a clue as to the way to go, and the approach that is best to take. This is not always true although with Hartmann it certainly was.

"The building was an old power station that had once formed part of a hydro-electric scheme to supply electricity to the valley it is in. It wasn't very old—about 1935 I would think and was the most solid building that I have ever come across. It was built to withstand avalanches and it is in an area that is very much snowed-in during winter. They keep the roads open obviously but it is in a skiing centre. The walls were so thick that you virtually didn't need any inner shells or isolated shells. All you had to worry about was the internal acoustic. The walls were something like 12 in of solid concrete and we were doing such tests as banging two bricks together outside and measuring sound transmission inside. Apart from the windows which were not very good, on the walls we couldn't measure any vibration at all. It was really that solid."

Its actual location is about 100 miles from Frankfurt and Munich and a look at the map will show only mountains there. The nearest town of any consequence is Nuenburg. It was very much the German equivalent of Rockfield. It must be said that it doesn't look at all like the picture that the title 'power station' conjures up, witness the photograph. You have seen the building and have acquired a feel of its possibilities. What next?

"If you have a building that has some form of architectural merit, then I am a great believer in using the bits that I can. For

instance a lot of country studios are in old barns with exposed timbers and plaster and as much as possible I like to keep the character intact. It is usually very difficult. In this case however it was easy as there was virtually nothing of any architectural merit at all."

There then follows what must be one of the most difficult aspects of studio design, that of translating the client's requirements into a form that can be built. And only then can the project be properly costed.

"In this case, particularly with Horst's aim to build the perfect studio, I had to spend some time over this aspect. Aside from his ultimate aim, he was not hampered by any preconceived ideas about what it should look like but had very definite ideas on what it should sound like. We spent a lot of time listening to records and he would pick out the sounds that he wanted to be able to achieve. I have learnt how to work backwards from the recorded sound and it is not too difficult to figure out if a vocal has been recorded in a live room or with a digital reverb hanging on it. As it transpired what he really liked was the same as the current vogue of studio in London. Most of the records that he preferred came from studios such as The Townhouse and Playground. From this we were able to construct a design brief for the studio area—more or less a Bavarian 'Townhouse' with a very big, very live main studio area; a big very isolated room and somewhere a very dead trapped area that gives a very dry tight sound."

Time spent at this stage is valuable but the translation of musical requirements into something viable seems to be an area fraught with problems for the designer. Surely people must change their minds with their musical taste and make life difficult.

"You can't let them change their mind. You have to take a certain stand. You are basically being used as a designer because they trust you—it is all trust. If someone buys a piece of equipment, they will buy it on the basis that if it doesn't work it can be taken back or fixed. If however you are having a studio built and it doesn't work out the way that you want it, you are fairly stuck. So once you have defined your parameters you have to stick to them or really you can get into a terrible mess. Certainly you can change colour schemes and decor but not make fundamental constructional changes without costing an enormous amount of time and money. It is very important to set completion dates and time schedules and do everything to a set pattern when building a studio, otherwise costs can escalate. You can start out with a studio construction costed at £50,000 and if you go off course a little bit and start

changing things, it can easily double in cost. You must, as designer, keep a control on that. Designing studios is really just good architectural practice and when it comes down to it, the acoustics is 25% of the project and the other 75% is the getting it done and the logistics of doing it."

What are the problems of working away from your normal construction crews and sources of supply?

"One of the prime reasons for making a pre contract site visit is to meet people who would potentially be involved in the building. One point worth mentioning on this project is that I worked closely with Dieter Börner who is the SSL maintenance man in Europe and between us we worked out all the wiring installations and the interface with the SSL gear. With regard to materials we certainly have our problems.

One thing is that I am not a great believer in using materials just out of habit. I always look at what is available locally and use what is possible. The idea of buying your studio out of a catalogue is anathema to me. A studio should be a personal statement of what the client actually wants. If you're spending a great deal of money on something, you don't expect the same as the guy down the street has got."

The design starting point

The design of a studio is a multi-layer process. With the basic requirements known, the next problem is where to place it within the chosen site. In some cases of course there is very little choice but with Hartmann, there was a complete building to choose from.

"What I do normally is start off with a basic floor plan of the building and then divide it up to gradually work in a control room shell, studios and everything. In the case of Hartmann there were certain constraints with regard to positioning of the rooms. There is a main structural wall running right through the building along the centre and it would have cost a small fortune to remove as most of the building was resting on it. It was really no problem to leave this but it determined where the control room should be. The ground floor had been set aside for the studio and this meant that there was the full floor space of the building to use—approximately 20 m long by 13 m wide. I knew the geometry I was looking for in the control room area to give a finished size of 8 m by an average of 6 m to 7 m. The actual isolation of the existing building was so good, as I said earlier, that I did not have to worry about isolating shells, just the acoustic shell. The nearby road gets about two cars a week."

Apparently people who commission studios fall into two categories—those that are practically minded and can see the logic in everything and those that don't. It is not uncommon for the instincts of the first set of people with regard to studio location within a building and the relative sizes of rooms, to get it almost right in line with the designer. In the case of Hartmann, Horst had a good idea of what he wanted and it was not very far out from the final positioning.

"He started off with the control room too small which is what most people do, and the studio area far bigger than it needed to be. The first thing I had to do was push the control room down the building to get the geometric ratios to their optimum level. There are very clearly defined criteria for the ratios of width, length, and height of a control room which if you get right make the job of getting the sound right within the room much easier."

The rest of the building had plans for it such as offices, workshop, etc. Immediately above the ground floor was another potential asset to the studio—a completely open space

of about 17×12 m and part of the original idea had been to turn that into a studio as well but as there was a slight problem with isolation between floors the idea was deferred. During the project it was decided to reintroduce this and steps were taken to improve the isolation between floors. It had also been decided that it should be treated acoustically but following some measurements and listening tests using a drum kit, the sound was thought to be so good it was decided to leave it exactly as it was. This room is equipped with a stage and makes a very good live room available in addition to the main facilities. Mic lines and video lines have been run up there and if you want that very ambient sound—apparently it has a reverb time of about 2 s. Having this space available meant that the main studio area could be made a little smaller to allow for a better sized control room.

The control room

Part of the design brief for this studio had been to minimise the amount of equipment in the control room. It had been decided that all there should be was the console and the effects rack. There were to be no tape machines or noisy items of any kind in there. This would keep the digital tape machines in a clean environment and also improve the monitoring capabilities within the control room—something that was thought vital for digital work. There is at present no visual contact with the tape machines at all and you have to rely on the machines behaving themselves. Video lines were put in though and Andy said that on his last visit to the studio after it had been operational for a few months there were still no cameras in the room and so it can be assumed to have worked in practice.

As it was known that digital recording was going to be a main aim of the studio certain requirements had to be different from those normally accepted with an analogue system. This really amounted to an all round improvement in design standards. At the time of this design, there were very few digital tape machines in operation and it was impossible for the studio designer to know to what extent this was going to effect his work.

"At the time of designing the studio, I had not actually heard any digitally originated product. That is not quite true as I had heard a Decca classical recording and although I was very aware of the fact that it sounded superb, I would not say that I had had any experience of listening to digitally recorded music. I had assumed that you would need vast headroom capabilities in your monitoring system and that your signal-to-noise ratios in the room would have to be up with the 90 dB available on the medium but we hadn't actually heard it. So we got to the point where we were designing a studio for something we hadn't heard—certainly not as a finished commercial product."

There has to be a design philosophy that is taken as a starting point for a control room. Andy Munro has found his ideas aligning with *Live End Dead End* type ideas. He takes great pains to point out that he could not actually build an *LEDE* control room and call it that as the term is trade marked and the studio would require licences to use the term. His approach is however easiest to refer to as *LEDE* type

"There are degrees of treatment between a conventional type control room and an *LEDE* room. If you look at an *LEDE* room or any control room from the mixing position and you make a Time Energy curve, first you will see the direct sound, then you will see a series of discrete reflections and then you will get a mush that is the decay of the room. Take out any or all of those early reflections and you



will start to immediately hear the difference. One or two funny things can happen though. If you go totally away from the *LEDE* room and produce a mass of early reflections, as long as they actually merge significantly, giving a mass of smooth reflections, the room can sound very good. A lot of early listening rooms were done like that—such as some of the rooms at the BBC which are very cluttered and can sound quite good. So I feel that control design is not one way or the other but degrees of compromise. *LEDE*-type design is an approach that I tend to take without people realising it. I approach the design of any control room from the point of view of optimising the direct to reflected sound and as far as I'm concerned the optimum ratio between direct and reflected energy, you usually define in terms of time and not level but I wouldn't call it *LEDE*."

Returning to the reasons for the original choice of control room position, size was mentioned. With an increasing amount of recording taking place within the control room—a change of emphasis if you like—what tended to be the general size requirements in maximum and minimum terms with regard to acoustic properties?

"I think that the crunch comes at low frequencies. There are certain geometric ratios that work for a control room and you can scale them up or down. In other words, a small room can work just as well as a big one within those ratios but there is a low frequency cut-off point below which the room will not work. The room acoustically locks up at certain frequencies and some small control rooms have horrendous problems as a result of that. A standing wave effect may cause something like a 10 to 12 dB peak or trough in the response at the console.

With large rooms the situation is different. As the size of a room increases the sound from the monitors has more space to fill and therefore you need more energy. You eventually reach a point where the room is so big that you need a PA system to achieve rock'n'roll monitoring levels. A control room doesn't need to be any larger than 11 m in its longest dimension which is the length needed to develop the longest useful wavelength. It would be equally acceptable to have 5½ m maximum dimension as you can work in half wavelengths just as much as wavelengths."

In the case of Hartmann it had been possible to achieve the correct geometric constants within the intended control room area and the maximum dimension of 8 m fell into the area that was a good compromise between floor area and the power that would be needed to create realistic monitoring levels. The brief however was for the ultimate control room in terms of good listening conditions.

"Obviously this is a subjective matter and other people may disagree with what the

HARTMANN



ultimate room is. It is essential though in this case to get the room knowledgeably working down to the 31 Hz $\frac{1}{3}$ -octave band as a lower limit. Below this the speaker dies and cannot really reproduce anything other than rumble and outside vibration. The 25 Hz band, if it is there in a monitoring system means that there is something funny going on and you should use a highpass filter."

So a room was designed that would geometrically work down to about 31 Hz bandwidth. This determined the approximate shape of the acoustic shell although there were several other points that had a substantial influence. The first of these was ceiling height.

"This was the only limitation of the intended control space and we had to work within the constraint of that. There was no temptation to raise it—the building was just too solid and completely unalterable. We ended up creating a shell scheme that was almost impossible to draw and actually looked very strange but it does work. The only way that we could get the monitors where we wanted them and to construct the ceiling in the way that we wanted was to... well normally you have the monitors angled downwards but here we angled downwards and inclined so that they look as if they are overhanging. From my point of view there was only one position that they would go into that was right and to get into that position they had to tilt. There is of course no reason why this should effect the performance at all, although it does produce some very interesting geometrical shapes around the front of the room and the sound focuses very well."

The monitoring

In a control room design where the acoustics are precisely controlled, the choice of monitors forms an integral part of the design. This means that the type of monitor to be used must be known before serious design and adjustments of the acoustics can be made.

"It was decided that we were going to use UREI 813 monitors—something I was quite happy about. There are three or four monitors that I am happy about using and several that I would not like to use at all. UREI monitors figure about as highly as any of my other favourites if you weigh up all the pros and cons. When it comes down to it all big studio monitors are PA systems in disguise. They all have their varying degrees of infidelity. When 15 in bass drivers were invented, they were never intended to go up to 1 kHz crossovers which is what UREI, JBL and Eastlake now all ask of their bass units. I would far prefer to see them crossover at 300 or 400 Hz. If you are mixing rock'n'roll, what you want out

of a studio monitor is a punchy, tight bottom end and that should take over from all other considerations. I have done a lot of measurements on various speaker systems and we went along the road towards the soft dome monitor for a while. I still believe that to be a good idea but it needs more elaborate crossovers and improved power handling capabilities. It lacked a rock'n'roll bottom end which is what you are usually going to produce on it."

There are many ways of positioning the UREI monitors as a pair. Andy chose to mount them upside down with the familiar blue horn at the lower side. The precise positioning of the speakers was determined by the standard focusing requirements with regard to the listening position while the angle that the monitors lean forward was adjusted so that the axis of direct radiation of the monitor horn and the console surface were as parallel as they could be and still focus at the intended position. In the case of Hartmann this was very nearly achieved and this has minimalised the splash-up reflection off the console surface to the listening position. In general terms the console itself looks like being one of the major problems in control room acoustics as the other parameters of design are increasingly controlled.

"You can actually prove that consoles have quite a nasty effect on the sound if you lay a lot of absorbent acoustic tiles along the surface. There will be an image shift taking it slightly back towards the monitors as again you are getting more direct information than you were. If there was some way of getting rid of the console, so much the better. I always insist on having an absorbent surface above the console which helps a lot."

Is there EQ on the monitors?

"No."

Do you ever?

"Yes I do but no there isn't."

Andy had made up his mind that on this project there would be no equalisation on the monitoring no matter what had to be done. He has no basic objection to it but he felt that it would be introducing a resonant phase shift in information into a situation where there must be an acoustic resonance somewhere for there to be something wrong.

"Generally speaking most speakers do need equalising. The UREI monitor for instance is only flat to about $\pm 2\frac{1}{2}$ dB and that is a 5 dB envelope and even that is enough to warrant EQ. In this case however I was determined to have nothing nasty in the chain."

The digital monitoring aspect

As mentioned earlier, the results of a fully

digital chain ending in a commercial end product had not been heard during the earlier stages of construction of Hartmann, this being before CD. With it known that the chosen monitor had to be capable of a very high standard of performance, there was little that could be done other than try to aim for the highest analogue monitoring standards. Choice was of course restricted as Hartmann was a rock'n'roll studio.

"Although many studios are using digital equipment and recording rock'n'roll, if you want to stay in line fully with digital performance you can't use a monitor of the generation currently used for monitoring rock. I am convinced that soon we will have to use dome monitors—hard or soft, and this will be the way that monitoring will develop.

"The UREI monitor produces quite a high level of distortion as most compression drivers do—and it is progressive distortion—the louder it gets, the more distortion. In some monitors the distortion is more pleasant and that is how I think I would define a good monitor—the distortion is more pleasant. What I can say is that by the time we finished the studio we had digital recorders, and I had been using an *F1* and CD player to listen to all sorts of monitors for about six months. From the time the monitors were chosen and they were installed, there would have been time to have changed our mind but having listened to digital source material of all types, the UREI did sound far easier on the ear than the equivalent horn loaded monitors.

"I think that ultimately you need a big monitoring system as it is the only way that you can actually feel certain aspects of rock music. There is a certain physical element in the music and you have to be sure that that certain element is in the recording, the only way of being sure is with a large monitoring system. You have to learn how to use large monitors but a trained engineer and producer will have spent several years doing that. In those terms it is far more of an art than a science. If we rely on the skills of the engineer there is not so much to worry about as some people have recently suggested."

Beyond the basic starting point

"Having constructed the basic shell of the control room, we then started to dampen it down and introduce X units of absorption at low frequencies. Then you gradually introduce control of the mids and highs. I always do it in this way because the mids and highs mostly take care of themselves as long as you have the geometry, time delays and reflections right. This done, all you need are the decorative finishes and final adjustment of the acoustics to achieve the right combination of liveness and deadness."

The slight constraint placed by the ceiling height, which was a little less than would have been the optimum, was mentioned earlier and a look at the photographs of the control room show some very unusual ceiling geometry beyond that which must be attributed to the monitor angles.

"The ceiling had to allow enough variation in the geometry of the room to actually avoid any predominant standing waves. There are ways that you can approach a control room ceiling. Some designers like to make the ceiling very deep and trappy to get rid of the vertical dimension relying on the horizontal dimension to give you the necessary ambience. I don't particularly agree with that as I feel it gives an emptiness to the room and removes a dimension that people expect to hear. You are robbing the ear of one of its

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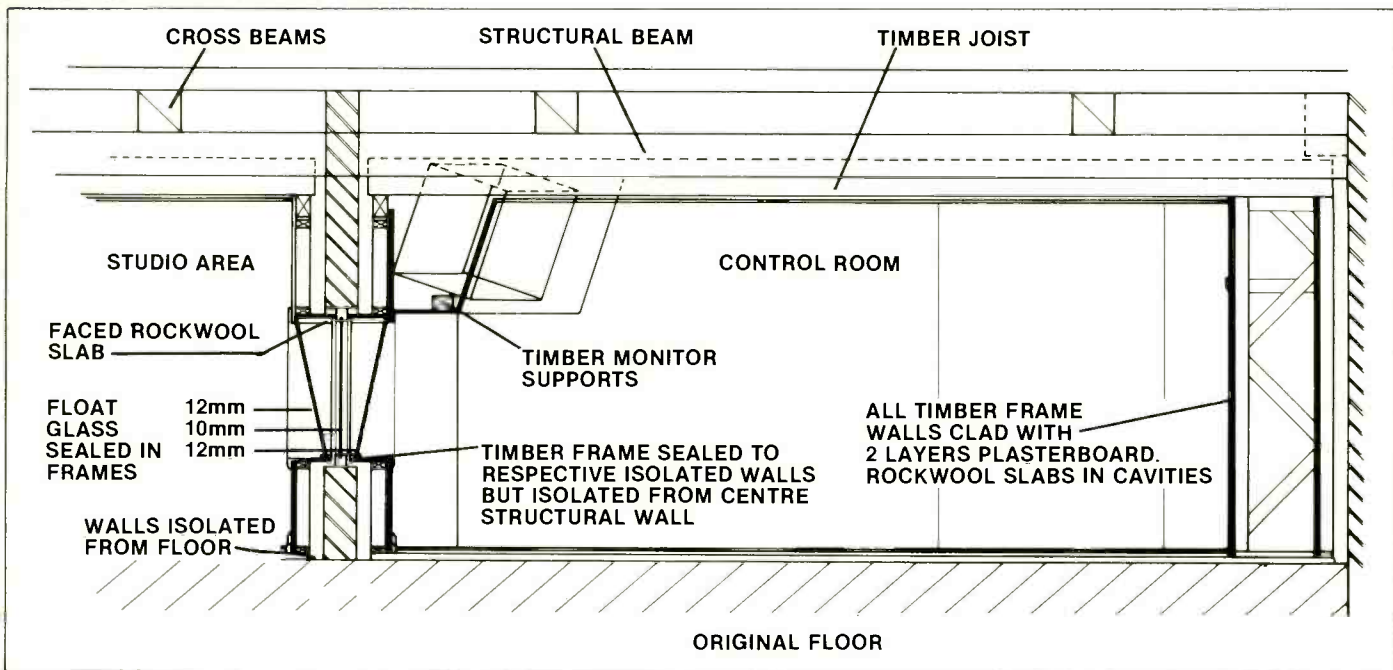
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HARTMANN



references. There is too little account taken of psychoacoustics. It is an obscure field and I don't profess to being an expert in it but I do find that in talking to engineers, etc, about the way the ear responds to set conditions, they all emphasise how strange the ear feels if you remove one of these conditions.

"The first reaction that people have to LEDE-type control rooms is that it must feel very strange with all that deadness in front of you and all the liveness behind—you must feel like you are standing in the doorway between two rooms. In fact it is exactly the opposite. All you are aware of is the fact that you are hearing the monitors with a clarity that is disconcerting and the room sounds live. You are not aware that the liveness is behind you because the time delay is such that the ear doesn't respond to it in a directional way."

It is considerations like this which play a major role in the positioning of the console within the room, its relation to the reflective surfaces, hence where the monitors should be. To achieve the effect of the rear reflections to the listening position being sufficiently delayed that they don't interfere with the brain's perception of the direct radiated path, there are critical path lengths and distances from the rear of the control room surfaces to the listening position. Once this has been determined to satisfy all the requirements, you then have to turn your attention to the line between the live and dead areas. This must be a gentle transition—not instant at all.

One of the ways that this smooth transition was accomplished at Hartmann was the staggering of the line and the use of carpet at the sides of the floor.

There was one further reason for the unusual ceiling shape and that was a main structural beam in the building ran through that area.

"This is where the theory stops and the practicalities begin. We couldn't get rid of the beam and so it was incorporated symmetrically within the control design. It runs directly on the centre line of the room and the ceiling was made to angle on either side which is exactly the opposite of the normal state of affairs which is to have a lateral low point across the room. How much difference this makes depends on how you go about it. The normal reason for the low point design is to introduce a compression effect around the

console so that you have a perceived increase in loudness. If however you angle the ceiling and the walls you can achieve a greater increase in apparent loudness. It was therefore possible to compensate for the ceiling shape in this respect.

"There were other requirements as well. We wanted the back end of the control room ceiling to be live but you have to diffuse the sound. To achieve the density of reflections and increase path lengths the ceiling geometry was tied in with the rest of the room. At the front of the control room, the ceiling is of course very absorbent and because of this it doesn't matter if the angles are present or not but it was decided to keep the same ceiling profile just to give some sort of geometric sense."

The absorbent material used was mainly Ilsonic (Sonex) foam as a facing for fairly large quantities of Rockwool and other usual materials. There is fairly deep low frequency absorption at the front of the room particularly in the form of some fairly massive bass traps under the control room window. There is also a lot of absorption on the side walls but this is not all bass. The fine adjustment of the placement of this material is determined by measurement and by ear.

"The measurements are fairly straightforward. At the time I was doing Hartmann I was using the Ivie analyser which has a gated time snare pulse which is fairly predictable—it sounds like a snare. You can trigger the analyser on and off within fairly short time limits so you can actually get a fairly accurate picture of the direct response of the monitors and then you can compare the results with and without the room. Because it is a snare pulse, the speaker doesn't behave in a flat way. If you look at the direct response of the monitors, it is anything but flat. This doesn't matter as what you are looking for is deviations between the spectrum of the monitors and that of the room. The normal process is to measure the response of the monitors at about 1 m to give a good idea of the direct radiation, and then put the microphone at the mixing position to measure again using the gating system so that you are effectively measuring mostly direct radiated energy again. You then start measuring the room introducing it bit by bit so that you can see distortions appearing in the sound

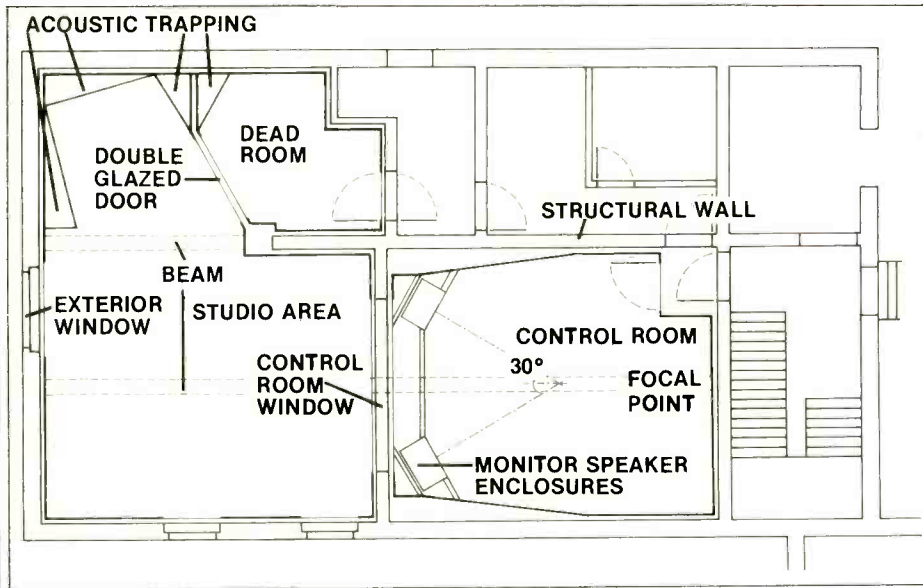
perspective. Because you know what time delay they are occurring on, say up to 15 ms the sound looks reasonably unchanged and then about 18 ms you see something nasty creep in, you can work that backwards by integrating and find out roughly where the problem is."

This process is continued until the room sounds and measures as near perfect as possible. It may also be carried out at different times within the construction to verify the original design was correct. Apparently quite meaningful measurements can be made even in the shell to prove that the geometry is correct. Ideally having built the shell it should measure flat without any acoustic treatment in place at all although it is never like that. If you are getting the perfect combination of standing waves within that shell the room should be flat.

"The rear of the control room is in fact a slatted trap which reflects most things and is intended to break up the sound and damp down the low end. Again it can be a misleading impression to call a room LEDE-type. At low frequencies the back of the room doesn't want to be totally live and you must control things a bit. You must prevent standing waves building up along the longitudinal wall. The facing is slatted but it is very close together so it is like a tuned Helmholtz resonator.

"The finish of the control room and studio area was the work of a German lady interior designer and so it differs quite considerably from the style we would otherwise have used. She suggested some very unusual materials. The floor of the control room under the console to the rear of the room is a wood blocking machined from mature solid Oak-type timbers. It is so hard and so perfect in appearance that it looks like a glazed tile.

"The material on the rear ceiling and the rear side walls is etched rolled metal but it is almost like wallpaper, being very thin. I was a little worried when they first started to describe the material they wanted to use in a broken English. I just said—"Send me some". I checked it out and gave them instructions about where to place it. When I walked into the studio after it had been put up, I was amazed. It has some very deep chemical etching that reflects light and appears to change colour from different angles."



The window

There are always elements that are unforeseen when trying to complete a control room. As the measurements were being made in one of the later stages of construction, there were signs of a quite noticeable overhang in the sound of the control room. If you put a transient into the room, the room itself appeared to decay as you expected but there was something else hanging on—almost like an echo plate lurking in the room somewhere but it wasn't possible to say exactly where.

"In an ordinary room you probably would not have noticed it but because the room was so tuned up to eliminate early reflections and the problem was actually in this time area (you actually began to hear it very early and the ear took great note of it) we had to eliminate it. You get to this point where very small things tend to stand out more.

"We eventually tied it down to the control room window which was set into a recess in the wall. This is fairly deep and of sufficient volume to produce a room sound all of its own; a standing wave in the recess. The bass trapping below it was front loaded and there was no porting of the recess. This was cured by cutting slots in the side and bottom walls of the recess, allowing the energy to escape into the trap. This removed all the problems."

The window was recessed deeply at Hartmann so that there was no possibility whatsoever of there being any reflections off the glass. The only way that anything could reflect off the glass would be by bouncing off about 10 other surfaces because the rear wall of the control room is angled in such a way that there is no direct reflected path to the window. As the path is so complex, the glass would be acting like an open space at high frequencies while at lower frequencies it acts as an ordinary boundary surface. At low frequencies you are still trying to get the basically hemispherical radiation of a flat baffle and the indentation of the window in that respect doesn't matter very much. An indentation of 2½ ft is not very significant when you are talking about overall wavelengths of 20 to 30 ft. As long as everything is done correctly, the fact that there is a lot of glass there doesn't matter.

"Personally I have always liked large control room windows. I see it as an extension of the any-means-to-better-music ideals. If you make the studio area a better environment for the musician to play in, then you also ought to make the best possible communication

facilities available between both sides of the glass."

The studio area

The studio and control room were not decoupled in the sense of totally isolated floating slabs. That was simply just not necessary with a building such as this. This factor was tested with an accelerometer and it was found quite satisfactory. If you were to bang on the floor with a hammer, it might be audible the other side but you don't get energy levels like that in a studio environment. There were three isolated walls forming the divide between the control room and studio and the separation Andy describes as enormous.

As mentioned at the very beginning of this article, the design brief for the studio area was very much similar to what is currently in vogue in London—an overall emphasis on brightness with a live sounding main area, a very bright, tight sound in the drum separation area and a trapped area for a much drier, deader sound. Throughout the studio bass trapping and absorption was used to tighten up the sound—not to eliminate decay.

"If you leave a room to its own devices, the reverb times at low frequencies will be much longer than those at high frequencies. What you have to do is to equalise that out a bit by removing some of the lows without affecting all the mids or highs. A tightening effect. Not the sort of sound you would want at all for a concert hall but then you don't record rock'n'roll in a concert hall."

The studio area was designed purely for pop or rock as the chances of recording string sections or orchestras in that part of the world are like the location—fairly remote. There was very little design around specific instruments such as a grand piano. The room is big enough to move the piano into the live or dead areas as wanted. There was a conscious effort to make at least three or four acoustically different areas and they are big enough to easily take the piano as is the isolation room. This area is much drier in comparison to the main room but is still very bright—that tingly HF type of sound.

"Before any treatment, this room was very live—no extremely live! There are very few rooms that I would have compared it with. We actually did very little in the way of trapping, just some large ones in each corner. The dead area has a quite elaborate slatted bamboo screening effect which again produced a very dry tight sort of sound but it

still kept that little bit of brightness at the top end as opposed to the main area which was just generally live, full stop. The studio area also incorporates a window to the outside world to provide natural light. The floor and ceiling is made of the same woodblock as used for the control room floor and although the ceiling looks flat if you study the photographs very closely you will realise that this is not the case.

"I think that within the studio area it is more down to character of sound rather than any more scientific approach. You need a sound that has some sort of character and the days when you wanted to record completely dry are over. If you want to do that you can still achieve it with close miking and screens. It is however virtually impossible to turn a very dry studio into a bright ambient room. And in the case of Hartmann they have this room above that is almost like a concert hall in itself. It is very high, something like 4½ m and is fully linked to the control room."

The finished studio

From the final approach to Turnkey 2 in March 1982, the conceptual stage and planning took most of 1982. By mid '82 all the negotiating side was completed and building started in September. From the start of building to final commissioning of the console and acceptance was one year. As designer, Andy had two pre-contract meetings at the site, three visits during the building work and a final visit for tweaking. There were few problems at all from the location as it was quite possible to find all or most of the materials needed fairly locally. It did however take a long time.

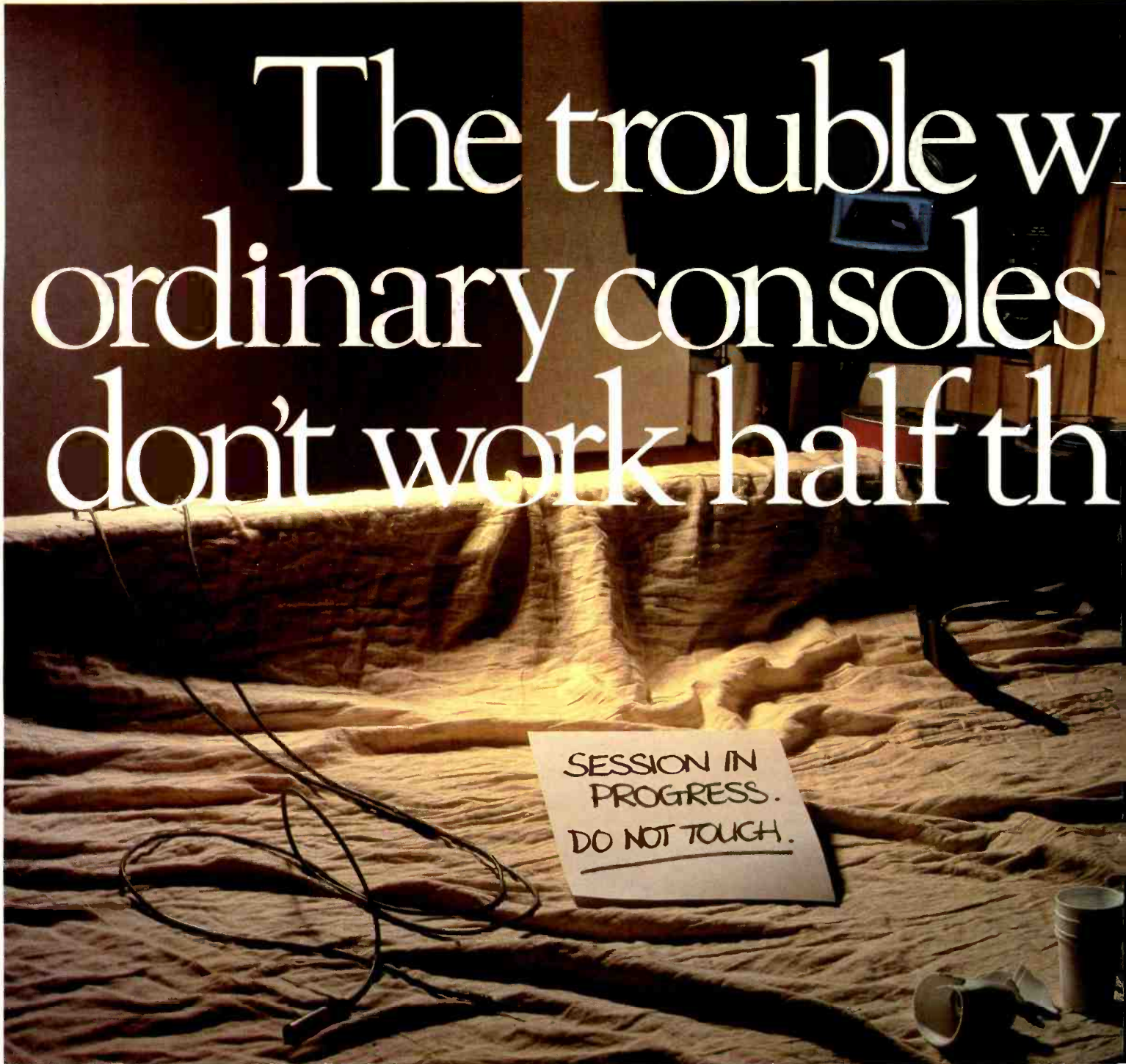
"Not for any other reason than that the people out there building were doing it very slowly and very carefully. There were several reasons but it was mainly Germanic attention to detail—if they weren't sure of something they wouldn't do it, but come back to me and talk about it. It might have been more cost effective for them to have had me out there for three months with a full team and got the thing built. The way they did it was a lot more economical but it took far longer. They were happy to do it in that way.

"Final listening tests were made with an *F1* and a CD player with enough discs to really check it out. We always do musical tests because you can't define what it is about a sound that is right in technical terms. I could measure a room and hazard a guess as to whether that room will sound good or not but what makes the difference between a room that is just OK and one that is really something, is a musical appreciation. Some rooms don't measure at all flat and sound wonderful and some flat rooms sound awful which might be down to some psychoacoustic property—there is no other explanation."

During our conversation, we were interrupted by a well known producer ringing up Andy to ask questions about Hartmann Digital as he had heard some rumours. Andy had also had a couple of calls from producers who had used the studio just to say how good they found the rooms. This is the kind of response that makes the designer's efforts worthwhile as without a doubt, the ultimate room must be a subjective matter, but if you receive unsolicited feedback on a project, it must mean that you were more than half way to your aim.

"All they have to do now at Hartmann Digital is to find enough people to actually go out there and use it but that has not been a problem so far. They have been almost constantly busy since they opened. That room really does sound good!" □

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.

At Solid State Logic, however, we've developed a rather more practical solution to this dilemma. We call it the Total Recall System.

Total Recall is completely independent of all audio paths and allows the console settings to be permanently stored on floppy discs within a few seconds.

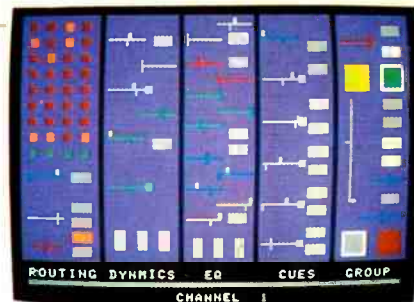
So, at the next session it takes only minutes to reload this information, check it on the colour video monitor and return the console to its original settings.

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to save time at a later re-mix. And engineers can even store their personal EQ and dynamics settings and create their own libraries on floppy disc.

Total Recall is just one of the functions of the SL 4000 E's on-board computer. The computer will record all the details of a session – title entries, track lists, cue points, dynamic mixes, synchroniser information and so on – and store them on a floppy disc.

These unique facilities give the Solid State Logic Master Studio System several important advantages.

It allows the manager to keep his studio working, and earning, for the full 24 hours a day. Because even the most complex set-up can be precisely reproduced in about 20 minutes before the start of a session.

It saves the engineer wasting precious time and lets him concentrate on the creative process, from track laying to over-dubbing through to mixing. Because the studio computer speeds up everyday tasks like autolocation, drop-ins, mixing and synchronisation.

STUDIO FILE

STUDIO FILE

Woodinville, Washington, is an unprepossessing little town about 20 miles from downtown Seattle. To the hi-fi set, it's known as the headquarters of Bob Carver's amplifier company. To the hot-rod fan, it's known for the two gigantic Fitz's Auto Salvage Yards that surround Highway 522.

But to the music and film community of greater Seattle, Woodinville is where you can go to get low-key, informal, but highly professional audio production work done, thanks to a 24-track studio-on-a-farm known as Bear Creek.

Joe Hadlock, a Seattle-based composer and producer, bought the 8.6 acre farm in 1975, as a retreat from the hustle of the downtown studios where he worked. Two years later, feeling the need for a "relaxed, creative atmosphere" he decided to build his own studio on the property. The first task was to rebuild the old barn, a project that was accomplished entirely by Hadlock and his friends and family—in about five months and at an initial budget of less than \$20,000.

His wife Manny, now business manager of the company, was pregnant at the time. "She harnessed her nesting instincts to deal with the material suppliers," he recalls. He likes to dig out a photo album showing in minute detail every step of the renovation. "We lowered the floor, poured a concrete slab, and pulled out the walls. The only thing left intact was the roof. We were hippies tearing down a barn. We had a lot of parties. Actually," he admits, "it probably would have been cheaper to start from scratch.

"I didn't go into it blind like some other producers who have built their own studios," says Hadlock. "I knew that it could support itself." And he was right: "By the time we opened, we were booked for a year."

There was no overriding philosophy in the design of the studio. "I wanted to create a situation and sound that I like," he says simply, and so there was a certain amount of trial and error involved. Originally the studio was 16-track, centred around a Quad/Eight board and an MCI tape deck. Soon the building itself underwent significant expansion and structural improvement, and within two years, 24-track equipment was installed, including an MCI JH-114 with Dolby MH24 and a Trident TSM. Today there are also two Ampex ATR-102 stereo decks, a Lexicon 224 digital reverb and Prime Time, an Eventide Harmonizer and the company's spectrum-analysis package that interfaces with an

Bear Creek Studio, Washington



Joe Hadlock at the board

Apple computer, MXR flanger and DDL, *Gain Brains*, *Kepexes*, an old tube LA-2, a UREI 545 equaliser, an Orban de-esser, a Trident stereo comp/limiter, and a full *Scamp* rack. A Proton 500M video monitor is permanently installed, and the studio rents 3/4 in video and SMPTE equipment when necessary.

Each of the custom audio monitors contains two Altec 515 drivers, one of which is used as a subwoofer (thanks to a custom 80 Hz active crossover), an Altec horn, and an E-V supertweeter, all arranged in a phase-coherent array. There are power amps—Phase Linear, Crown, McIntosh, and customised tube Eicos(!)—for each driver. The system was designed by Steve Haselton, who has also worked for Sheffield Labs and the Mastering Lab in California, and, according to Hadlock, is "... the type of guy who spends six months listening to connectors." Haselton also helped to straighten out the way the Trident console was installed ("We had so many hums and buzzes when we first hooked it up that we were ready to fly in people from England to help," says Hadlock) and assisted greatly in securing the collection of rare and custom tube mics that resides at the studio.

Bear Creek's ventilation system is somewhat unique—the studio windows and the door from the control room to the outside are kept open almost all the time. "The only problem is in the Spring when the frogs start croaking," says Hadlock.

The studio room itself is roughly

L-shaped, with a wide range of acoustic environments, thanks to non-parallel walls, a variety of textures, and movable surfaces. A kitchen in the back of the barn is used as an iso booth at almost every session and office space upstairs is often used for recording as well. Instruments on hand include a 1919 Steinway B 7 ft grand, Wurlitzer and Rhodes electric pianos, *Prophet 5* and *alphaSynthauri* synthesisers, a *Clavinet*, an Oberheim DMX drum computer, and a custom drum set that was milled out of solid mahogany.

There is also one of those 'Make Your Own Record For 25 Cents' booths that used to draw crowds at amusement parks and county fairs. Hadlock calls it their direct-to-disc machine, and explains, "You gotta stay competitive." Its coloured fluorescent lights add a festive, if cheap, touch to the studio, but it's been a long time since anyone's been able to make a record on it.

Considering the laid-back atmosphere, Bear Creek's continuing success is impressive. The client mix is about 40% each records and commercials, and about 20% films. The studio charges are quite high compared to other automated consultant-designed rooms in the region but: "It keeps us from getting swamped and turning into a jingle mill," says Hadlock.

All of the music for the commercials is written and produced in-house, and much of it is synthesiser based ("The alphaSynthauri has already paid for itself," he notes). Hadlock

collaborates with a small stable of local musicians, engineers and producers to turn out a wide range of product. Clients have included Boeing, Weyerhaeuser, Bic, Ralston-Purina and the children's television show *Sesame Street*. "Roman Meal (a national bakery) will be doing stuff here for the spots they've bought on the Olympics this summer," says Hadlock. "They tell us they'll be seen over a billion times.

"*Chariots of Fire* has been good for us," he notes. "It's opened up a new demand for commercial electronic music. We've done 'Chariots of Whole Grain Bread', 'Chariots of Skyscrapers', 'Chariots of Tennis Shoes', 'Chariots of Dairy Products', and of course 'Chariots of Beer'."

For a time, business was too good. "One year we decided to make a lot of money and we hired a lot of people and tripled our business," he recalls. "At the end of the year, I was doing nothing but administration, which was not what I wanted, the equipment was breaking down all the time, and our two kids hated us. So we pulled back. And as it turned out we weren't making any more money anyway."

There is also the usual complement of local bands doing mostly demos, 45s, and EPs; the occasional LP for a national act; and Hadlock and his crew do their own albums as well. "It's 'recreation' from the other work," he explains. "Two or three days of commercials covers the studio nut for a month, so we can enjoy ourselves.

"I love the variety. I do my best jingle work after I've done a week of screaming punk Marshalls."

Hadlock also loves working at home but realises it can't last forever. "When we first moved here, the place was considered small but now the suburbs and the subdivisions are moving in and we're considered land barons.

We're looking for other places—Manny has six horses, so we need more room. If we go to live somewhere else, we may turn it into a resort studio. As it is now, we sometimes let clients stay upstairs and we've been considering renting out the whole thing to people—if they're respectable—for a month at a time." So if you go for a visit, act respectable. And don't forget to ask about the Burlington & Maine Railroad caboose sitting in the front yard.

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STUDIO FILE

STUDIO FILE

Konk, London

Konk Studios, situated in Hornsey, North London, is one of those places that have tended to keep out of the limelight whilst pouring out a stream of top albums and singles. This can probably be put down to the fact that it belongs to those mainstays of rock music, The Kinks, and for many years the studio was primarily for their own use. In recent years however it has become popular for its large rooms, equipment and facilities, and now, having received the 'refurbishing treatment' the doors have been thrown open and the welcome mat put out.

The studio was first built in the mid Seventies, in a large rambling old house in Tottenham Lane which was originally, would you believe a chocolate factory or warehouse (we're not quite sure!). At that time there was also the Konk Club which occupied the rear part of the ground floor. In fact the club area hasn't changed much even now. There is a large commercial kitchen, a dining area, a small bar and a large games room with a *full size* snooker table (one of only two in English studios), television and a darts board etc. These are all part of the studio package. Bands have free range in the kitchen and, if required, a cook may be brought in. This seems to work quite well because so many people nowadays have funny eating habits it's generally better to let them do their own thing.

Anyway, back to the studio. The studio manager Pete Smith has been involved with The Kinks for many years, having originally come in on the record side of their empire, as well as the general organisation of Kinks affairs in England. Since all of these things are run from Tottenham Lane it was inevitable that he would eventually get involved in the studio.

The Konk Club ran for only six months before someone had to decide to either go with the studio, or go with the club. The studio won, and has now been running as a commercial 24 track facility for six years.

I said the building was 'rambling', well so is the studio, and it is therefore rather difficult to describe. There's no harm in trying!

The control room is probably one of the largest in the UK; you could almost set up home in the area between the desk and the back of the room! It therefore has two windows along the side wall, to the left of the desk. The rear



Studio manager Pete Smith (standing) and Damian Korner in the control room

one looks into one isolation booth; while the front one looks through a corridor, into the main recording area and then up into the piano/isolation booth situated at the back of the studio and up a short flight of stairs. So let's start here. This room, apart from housing the Yamaha grand piano, was the original control room in the 8-track days, but it now makes a very comfortable recording area and, in fact, on the day of our visit it was full of mics and chairs because the band had been recording some guitar work in there. This room is simply covered in acoustic tiles.

Back in the main area which is approximately 50ft by intermittently, 14 ft the major changes have taken place. There is a smallish area next to the control room window which is carpeted and acoustically trapped creating a very effective dead area. The main part of the room, originally covered in orange carpet (it sounds awful but it really wasn't that bad) has all been stripped down to the bare walls and the acoustic treatment

completely reworked. The walls consist of layers of panel board, Rockwool, plaster board, breeze blocks, and more Rockwool covered with very attractive wood panelling made up of Canadian Maple and African Cedar, both of which are very dense woods. Finished off with three layers of yacht varnish and combined with a ceiling of acoustic sound board with a bit of Rockwool behind it, a very good live sound has been achieved. Incidentally, the wood panels come down to approximately 1 1/2 ft above the floor to avoid transmitting sound.

The vocal booth is a sort of irregular triangle and is again simply covered in hessian tiles. This will be receiving a facelift while remaining essentially the same. "The trouble is once you refurbish one room, everywhere else starts to look a bit shabby where it didn't before!" quoth Pete. The same applies to the control room. There have never been complaints about the sound, so why mess around with it now.

The control room is again simple in its design with acoustic

tiles and blocks all over the walls.

The JBL 4350 monitors are mounted in concrete in front of the desk. There are also a pair of Tannoy *Super Reds* above these, although concealed from view, but according to chief engineer Damian Korner, these are seldom used. Other monitors include Yamaha *NSM10s*, and Auratones mounted on the desk.

The desk is a Neve 40/32/32 with *Necam* and it came from Utopia about 3 years ago. At the time Damian was working at Utopia and he says nobody could understand why they let it go because it was such a lovely desk to work with.

The tape machine corner of the control room looks like a Studer showroom! These include an *A80 MkII* 24-track, a recently acquired *A80 MkIII* 24-track (which together with the *Q-Lock 3.10* synchroniser now provide 48-track facilities); there is also an *A80* 4-track, an *A80* stereo 1/2 in machine and a *B67* stereo machine.

The equipment list continues to impress as we move into the

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GAINES 84

STUDIO FILE

STUDIO FILE

Konk cont'd

outboard gear: There is a full set of Dolbys; a full *Scamp* rack including *F300* noise gates, auto-pan controllers, dynamic noise filters, ADT module and parametric EQ; Audio & Design *Complex* limiters, three UREI and one dbx compressor; Klein & Hummel parametric EQ; Eventide *Harmonizer*, two *Lexicon Delta-T* digital delays and one *Prime Time* DDL; AMS, MXR and Eventide flangers; an Orban de-esser and a *Lexicon 224* reverb. And as if this wasn't enough, if you start to snoop around the various corridors there is loads of gear just lying around, homeless and rejected. Maybe there's some sort of charity—the RSPCRE? Anyway, something which is definitely not neglected is the pair of EMT stereo plates, and if you have a craving for natural echo (and Pete Smith is looking the other way) you can sneak down into the 'dungeons' and have a whale of a time paddling around (yes, literally) in the many little basement rooms and set up a mic. It works a treat.

Talking of microphones there is a regular mountain of Neumanns, AKGs, Sennheisers, Shures, Electro-Voice—you name it, it's probably there. And of course, should you desire any additional equipment, the studio is so near central London your wish can easily be fulfilled.

In addition to the piano there is also a Hammond *C3* organ with Leslie cabinet and a Fender Rhodes electric piano.

Still on the ground floor, between the studio and the 'club' there are two sets of double doors. These open to reveal two lock-up garages. The building has roads running both sides of it, and these garages open out onto a parking area next to the road at the rear. They also provide direct access into the studio. There are, however, great plans afoot for these rooms. At the moment they provide storage for whomsoever it pleases, but quite possibly they will soon become a secondary studio providing video facilities as well as audio. It was stressed that anything that happens now will be to complement the existing studio, and the plans which have reached the drawing board stage include a small recording/video studio with a second control room—the whole of which will be tie-lined to the main room, and any gear in the new room will be 'mobile' so that it may be easily taken into control room 1.

And since the garages are at the



The studio, Konk

back of the control room, it will be a simple exercise to put another window in the back wall, and thus operate the whole thing from there. Incidentally, the *Q-Lock* has facility for synching three machines, so mixing for video will not be a problem.

Because the building is so large it is very easy to get away from everybody—go and cook yourself a meal, watch the TV, have a drink and relax in a completely different atmosphere without having to actually leave the building. And if you sneak upstairs to the office you can also watch a few videos or use the hi-fi, or make yourself a cup of coffee in the *other* kitchen (talk about keeping up with the Joneses!)

The various other rooms about the place are Kinks offices, maintenance workshops and storage rooms.

The staff is a small happy team headed up by Pete Smith. Damian Korner (son of the sadly departed Alexis, whose untimely death was announced as this piece was being written) is a very experienced young man whose recording

career has taken him from CBS, all over the United States, through freelancing all over England, coming to rest at Konk where he seems to have settled with a vengeance, travelling up from Brighton every day.

He played a very large part in the redesign (including a lot of hard graft) and obviously feels very much at home. His opinion of the new room: "It's *very* live now, and *very* good to work in", but then it was his idea! He is also very proud of the fact that the studio did not close down for the rebuild, he just carried on mixing in the control room, when he wasn't trying to balance bits of Rockwool and wood on the walls.

Another new addition to the studio comes in the form of Steve Hoiland; a quiet, expert man whose reputation as a skilled freelance maintenance engineer travels before him. In the office you will find Sarah who has been with the studio almost since it began. At this point Pete Smith beams at me proudly "Did you know we'd got an accountant now? His name's Larry Morgan. But

he's not here today, he's gone to the races". Rather amusing we thought.

They are also very proud of their clientele, and I was handed as list as long as my arm (and that's long) of clients from the previous four months. There follows a short extract: *Pride of place* of course goes to the Kinks' 'Come Dancing' single; The Boomtown Rats (producer Peter Walsh); Wang Chung (producers Chris Hughes and Ross Cullum); Twisted Sister (with Bill Hurley); Matt Bianco (produced by Damian); Tears For Fears (with Chris Hughes and Ross Cullum); and what, alas, must be Alexis Korner's last recording which he did with John Alcock and son Damian. This album was in fact the trial recording in the new acoustic.

With work coming in from practically every major record company, things are looking good at Konk.

Janet Angus
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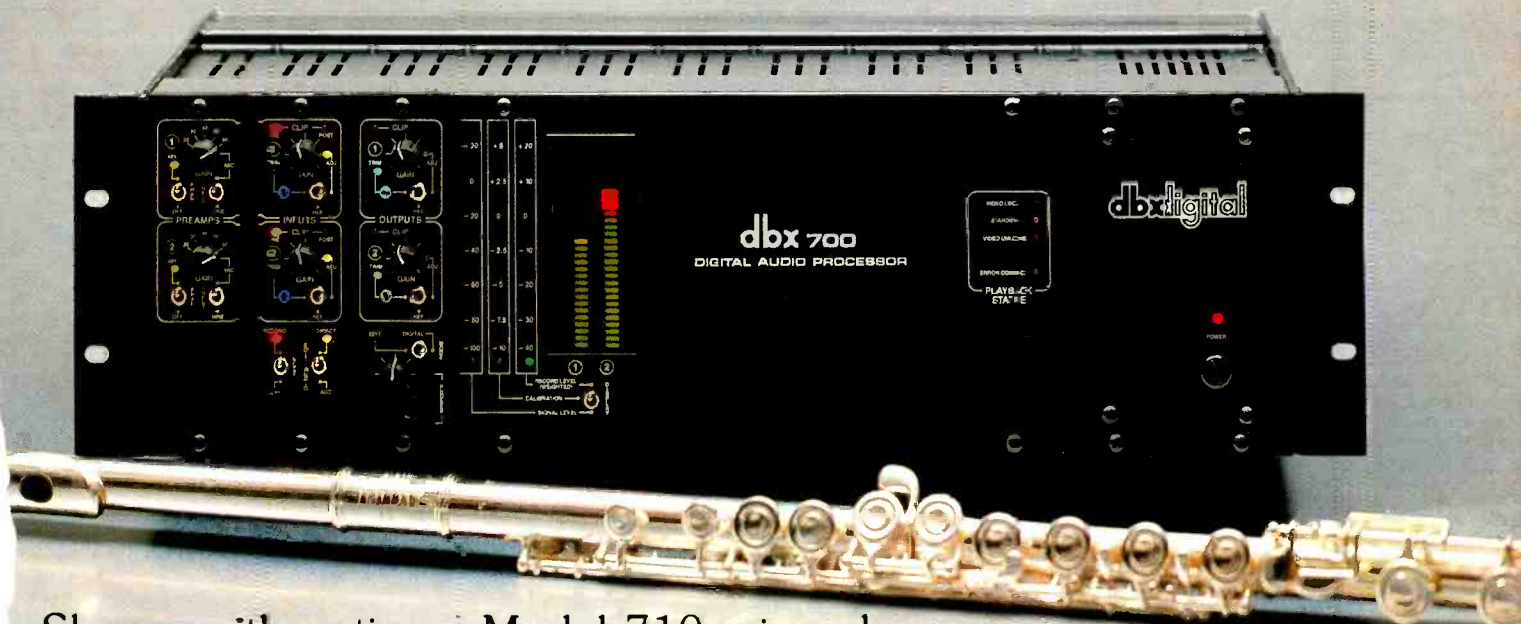
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AES

2ND INTERNATIONAL CONFERENCE ANAHEIM



The Art & Technology of Recording is the title given to a four day conference to be held from May 11 through to May 14 at the Disneyland Hotel, Anaheim, California. This 2nd AES Conference will consist of a fairly intensive study of the art of recording with particular emphasis on the aesthetical aspects. Apparently recent surveys of AES membership have shown that recording is the primary interest of a large proportion of the AES membership. The chairman for the conference is John Eargle.

Each of the 11 sessions will concentrate on one aspect of recording and each will be guided by an expert in that field.

The conference will also have an exhibition by manufacturers whose products come under the heading of the art and technology of recording. Unlike the comparable situation at an AES Convention, this appears to be a very much more informal affair and at the time of writing (early March) there were no firm details about exhibitors at this part of the conference and it is therefore impossible for us to prepare any form of preview details as is our normal practice for the Conventions.

Instead we have included a list of the conference sessions with all the details that are available at this time.

May 11 Friday morning

A Microphone Tutorial
How the devices work; basic rules for usage; stereo techniques
Ron Streicher, Pacific Audio-Visual Enterprises

May 11 Friday afternoon

Audio Transmission Systems
Audio systems technology; interfacing audio equipment
Albert B Grundy, Institute of Audio Research

May 11 Friday evening

Signal Processing
A survey of time domain, frequency, and gain manipulation
John Hodge, JBL Incorporated

May 12 Saturday morning

State of the Art: Digital
A survey of digital recording and signal processing
Curtis Chan, Sony Corporation of America

May 12 Saturday afternoon

State of the Art: Analogue
A survey of advanced analogue recording and transmission technologies
David Clark, DLC Design

May 12 Saturday evening

Psychoacoustical Factors
How we hear and how we perceive various kinds of distortion
Floyd Toole, National Research Council of Canada

May 13 Sunday morning

Sound Recording for Motion Pictures
A survey of problems and techniques in creating sound for the motion picture
Tomlinson Holman, Lucasfilm Ltd

May 13 Sunday afternoon

Popular Recording Techniques
Creative techniques in the studio: current technology; musical options
Richard Rosmini, Consultant

May 13 Sunday evening

Classical Recording Techniques
Methods for large and small musical ensembles; environmental and technical problems
Jerry Bruck, Posthorn Recording

May 14 Monday morning

Historical Perspectives in Recording
A glimpse at our colourful past to aid in defining future directions
John Mullin (retired)

May 14 Monday afternoon

Educational and Economic Factors
A study of how the industry has fared in a less-than-perfect economy
Martin Polon, Consultant

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I REMEMBER

As a postscript to Studio Sound's 25 years, loudspeaker designer and consultant Stephen Court muses over monitoring and other matters

Twenty-five years. What a daunting thought! Actually it doesn't really seem that long ago, until you see a film made in 1959 with undercranked police cars with bells on the bumpers, and recording engineers wearing trilbys and smoking Woodbines. When Lonnie Donegan was in the hit parade and Paul Anka's *Diana* was issued on a Columbia 78 RPM.

Although I was building recording equipment, I was of course *much* too young to be earning a living in the recording industry. Actually I was in my final years at school, and we were allowed to choose our own project in woodworking. Most of the boys put down their choice of the usual obscure items of furniture like a chest of drawers or a three legged piano stool. Having succeeded in making a short wave radio that actually picked up stations, and an amplifier with *KT88*s that glowed sufficiently to read a book by, I was bitten by the loudspeaker bug even at that early stage, and that was my chosen project.

"You stupid boy," came back the answer, and when I argued that a loudspeaker was in fact a serious project, I was promptly awarded with 300 lines of 'I must take my lessons seriously'.

Before I attempted to join six biros together with lollipop sticks, I returned undaunted with Gilbert Briggs's book on loudspeaker design, and an engineering drawing of a folded horn loudspeaker by somebody called James B Lansing of Fletcher Avenue USA dated 1957.

Having seen the incredible complexity of loudspeaker construction, he begrudgingly conceded to my request on the condition that it showed examples of no less than 14 different carpentry joints. Amidst howls of laughter from the rest of the form, and before I had chance to enjoy the fruits of that particular battle, he reminded me that I still owed him 300 lines. He was a particularly nasty woodwork master, and if you don't believe me, ask another of his students—George Martin.

That particular loudspeaker—the only one in the world with a dovetailed terminal panel—used an EMI 13½ × 8 in woofer and an Elac tweeter, and as far as I know you can still buy both of those drivers today.

It was used in a small studio I had built at home, using an enormous ex-naval Ferrograph tape recorder. Still having some of those tapes today one

often wonders just how far we have come over the last 25 years. I won't ramble on about valves vs transistors, but the old *EL34* is still going strong in some studios and its contemporaries still have a lot of qualities. (Do you remember the 'magic eye' valve with its PPM characteristics?)

Having been caught up in the great rock and roll revolution of the late '50s, I too had purchased an electric guitar, and with a 15 W amplifier that could fill a concert hall with noise—those were the days.

I visited a recording studio for the first time, and apart from the masses of gear including an 8-channel desk that was used to record Cliff Richard and the Drifters, what really impressed me was how they placed the musicians. The poor old drummer was totally isolated at the far end of the studio, not just because that was the only way they could balance him with the rest of the band, but if you did try to mic up the drum kit, you would usually end up with a pile of speaker cones flying across the control room.

The years went by and mainly because recording studios were far and few between I ended up in the Merchant Navy as a ship's radio officer. One of the duties then was to record music and send it round the ship's loudspeaker system. Having visited studios in America, Japan and Australia during the great music boom in the early '60s and finding a proliferation of British equipment—things haven't changed that much. One of the most popular requests on the ship's system was for *House of the Rising Sun* by the Animals. I would never have thought then that a few years later I would be sitting in the actual control room where that record was made. That was Advision Studios when it was in a basement in Bond Street. I said sitting in the control room, but invariably I would be lying under the desk during a session, under Roger Cameron's legs, trying to find out why the monitor amp kept catching fire.

Monitoring was strictly mono in those days, and the most prevalent system was the proverbial 9 cu ft reflex enclosure, and do you know despite £¼m digital consoles in today's studios, you still can't beat the performance of a *big* loudspeaker.

If you've managed to get this far, you may have come to the conclusion that we

haven't really said a lot about monitoring over the past 25 years. Well to be truthful, there hasn't really been a lot you can say in the way of changes. The parameters that apply to good loudspeaker design, have hardly changed over the last 40 years. They still stubbornly refuse to deviate from the laws of physics, and of course they never change.

I recall working with the late and much loved Stanley Timms at his Lockwood loudspeaker works, and even though Tannoy had changed the design and parameters of their dual concentric speaker goodness knows how many times, Stanley's monitors still had the acoustic filter and tuning recommended by Harwood in the days before commercial television had been invented.

An attempt to drastically reform studio monitoring was the introduction of 'a totally new concept in speaker design' by a Swedish company in the mid '60s. One of those present at the listening tests was the late Spencer Hues, at that time working for the BBC research establishment. Yours truly sat there with a vast pile of reference tapes ranging from Pink Noise to Pink Floyd and Spencer Hues had what sounded like a badly recorded tape of a man's voice. I stood there incredulous when he turned the speaker down flat before any music had been played, and said, "I've known the fellow on that tape for 20 years. If it can't reproduce his voice, why bother playing music."

What a great teacher Spencer Hues was.

Paradoxically that particular speaker re-emerged some months later in cosmetic form, as 'a revolutionary concept in hi-fi design'.

Having been involved in many of the major studios over the years sorting out monitoring problems, little has changed despite the coming and going of numerous 'revolutionary' designs. The basic concept of paper cones and wooden boxes remains. The problems have remained also. Poor installation like suspending monitors from ceiling brackets and under-powered amplifiers et al, still top the charts in monitoring design.

I suppose I shouldn't complain because it has paid for my bowl of rice over the years and it is just as satisfying when you do sort out the problems even though they don't seem to change.

Who knows what will happen in the next 25 years? A full range electrostatic that actually works is still the obvious answer since it is the converse of a condenser microphone, or even a modulated air loudspeaker. Heaven knows they've had long enough with a fast approaching Golden Jubilee. □

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BUSINESS BUSINESS



Barry Fox investigates the facts behind the industry news

Good business tips

Never lose sight of the basics. A big firm spends a fortune on a grand new building, advertises its wares in all the best places and promises the best service in the history of humanity. But the switchboard is manned (more accurately personned) by nine-to-five 'don't-cares' who can't even recommend the right extension. Unless someone in the company happens to phone in, they never find out why they are losing customers.

The same thing happens with smaller companies who employ PR firms. Recently I got a call from a PR person wanting to tell me all about a new studio toy. Because I can't afford the time for boozy PR lunches that waste the best part of a day, I fixed an appointment at their office for 6pm on a cold winter's night. Unfortunately PR person in warm cozy office several floors up hadn't thought to check whether there would still be a receptionist on duty at 6 o'clock. There wasn't. So I stayed out in the cold, fuming.

One London studio, with massive investment in high technology toys, and a well stocked bar for its clients, couldn't understand why it was losing long-standing customers. The crunch came when a well known film director took his work elsewhere. The studio finally woke up to the fact that the man behind the bar was a slow server and rude to customers. Now they have a new barman and business is picking up again. That's a true story. It came from an MD who grew not to like working there. As a story it's worth its weight in gold to any studio or supplier. All you have to do is try looking in from the outside.

Ambisonics

Recently I wrote about the circumstances surrounding Ambisonics surround sound. The technology deserves to succeed but is hampered by political intrigue, bumbling incompetence and bureaucratic inertia. The reaction to what I wrote was very revealing. Most, and perhaps all, the people who have developed the system took the criticism of them in fair part and hoped that published criticism of the British Technology Group (the quasi-Government body that is funding Ambisonics) would shame and stir it into action. Well certainly the published criticism stirred BTG into action. I have now seen several huffy letters from BTG people which dismiss the criticism as pique and petulance, try desperately to re-write historical fact and paint a picture in whitewash of an efficient organisation beavering away with knowledge and

enthusiasm to make Ambisonics a success.

In the meantime, several of the Ambisonics team have said the same thing to me; it was reassuring for the team to see an outsider meeting for the first time with the upper echelons of BTG which are responsible for Ambisonics and coming away with the same feeling of hopelessness that they have had to quietly suffer and tactfully harbour for years. The righteous indignation from the BTG people, with assured conviction that they are beyond criticism, does not bode well for the future of a British technology that could, if it had a chance, be a world beater.

Barbican reverb

After literally four months of negotiation, I did finally get to talk to the Barbican Centre in London about their efforts to improve the hall acoustics. The sticking point, as mentioned in a previous article, was that the Barbican managers wanted me to talk to the acoustic consultants and the acoustic consultants wouldn't talk unless they were guaranteed a sight of what I wrote ahead of publication. As this is tantamount to censorship, I held out for a no-strings interview. In the event it turned out productive and constructive. It also explained a comment made to me by a recording engineer: "The Barbican acoustic is more like a recording studio than a concert hall. I have never known a place with so little atmosphere, it's so dry. Soloists at the Barbican find they have to work hard to reach the audience. It's like singing into a blanket."

The Barbican knew, even before the hall was opened by the Queen in March 1982, that it had a problem. Although reverberation time isn't the only criterion on which to judge a concert hall, it is the only measurable parameter. But reverb time still can't be accurately predicted in advance, just as you can't predict how a car will behave in a skid. There are far too many variables.

The original idea for the Barbican complex was to include a small concert hall for the Guildhall School of Music and Drama. But the Guildhall decided it didn't want to share its hall with the public, so plans were drawn up for a much larger public hall. Unfortunately, by the time construction began in 1972, there was only a small awkwardly shaped space left over. This space was also limited in height by adjoining buildings. That's why the hall is relatively small and low. After acoustic tests in an eighth-scale model, built at Cambridge, the architects predicted a reverberation time of 1.6 or 1.7 s. This is

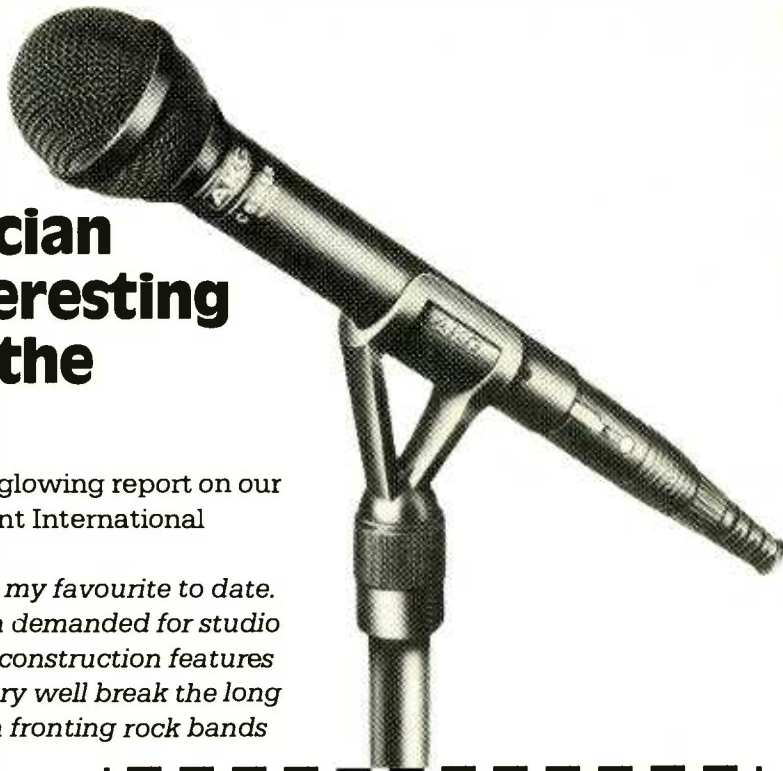
low by traditional standards, which suggest between 1.5 s for chamber music and 2.5 s for a large orchestra. The Barbican hall holds over 2,000 people which is a large venue for chamber group acoustics. In the event the predictions were out of whack anyway. When finished the Barbican measured at only 1.4 s. Since 1980, two years before official opening, architects and acousticians have been tinkering with the acoustics and trying to increase the reverberation time. Their brief was to do this without electronic sound reinforcement or 'assisted resonance' as used in the Festival Hall or the new Limehouse TV recording studios. The RFH uses 172 separate amplification channels, each tightly tuned to a different frequency band. Limehouse uses the Philips system of 80 channels each handling the same full frequency band but running at very low gain.

The first Barbican move was to start taking down the 1700 perspex balls which had been hung in the roof to disguise the beams and scatter sound. After 400 balls had gone the hall sounded marginally brighter. But taking out the rest made no difference. They tried putting hard-cladding under some of the padded seats and that too brightened it a bit. But treating the rest made no difference. Then they tinkered with the panels on the walls to kill resonances that suck out energy. As things stand, the Barbican now measures 1.76 s at 125 Hz, but is still only 1.63 s, on average, between 500 Hz and 1 kHz.

If you sit at the front, near the stage, the Barbican now sounds pretty good. This is because you are hearing mainly direct field sound. The lack of ambient sound off the walls and ceiling isn't noticeable. But move back, halfway up the hall, and the lack of ambience creates the effect of a bass-light orchestra playing in mono on a proscenium stage. This is exactly the opposite of the designer's intended effect, a single room experience.

So what happens next? Will the Barbican settle for what it has achieved, try for further natural improvement or throw in the towel and install assisted resonance? At the start of my long-awaited interview with the Barbican folk, they defended their baby by saying that there had been few complaints from the public. By the end of the interview they were telling me that unfortunately there was unlikely to be any more money for more acoustic research, because there had not been many complaints!

The project has cost the City of London £153 million already. So if you have been to the Barbican and don't like what you hear, you are doing no-one any favours by keeping quiet about it. □



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SHUTTLESOUND



THE MYSTIQUE OF DIGITAL RECORDINGS

In what now seems like all too many years ago, when 4-track recording superseded 3-track, the engineering and producing community welcomed the advancing technology which made it possible to make a recording and then end up with a choice of final mixes. It made it possible for us, who were in the business of recording and producing records, to proceed with a session even if the lead vocalist was indisposed at the time. And while the technology improved tape machines to hold ever more tracks, multitrack recording became more and more of a crutch for inept musicians, indecisive producers, experimental arrangements, and unsure recording engineers who once were rightfully and justifiably called 'sound mixers' because they could actually mix a session directly to its final form; stereo, or that legendary format where all of the sound comes out of only one speaker.

In due fairness, I must acknowledge those few of our industry who have taken advantage of the multichannel technique for constructive creativity, and have done some absolutely extraordinary work of great musical complexity and clarity aiming for special and effective use of the medium. I must make this point, lest some readers get the mistaken impression that I am opposed to innovation. Nothing could be further from the truth. I have experimented, examined, used and pioneered many a technique, and maintain a most open and analytical mind to any new development. Why? Because basically I shall never be satisfied with the status quo. Somewhere there must be a better way of doing things and if there is, let me at it! Tell me about it! Let me try it! Let me learn it.

Now, for the first time in 35 years, since the introduction and commercial development of analogue magnetic tape recording (a sound storage medium), we have an entirely new storage medium for recording and playback.

A personal point of view from Leo de Gar Kulka, Sonic Arts Corporation

And for the first time in 104 years, since the invention of the record groove on a cylinder (Edison) or disc (Berliner) for the mass distribution of recorded material to the general public (with acknowledgement of the tape cassette, which falls into the first category mentioned in the previous paragraph) we have an entirely new storage medium for playback. This is truly a most exciting time in our lives, and the changes taking place now are heralding a new era of sound enjoyment and sound experiences. The digital sound era is upon us, and a pleasure it is... or is it?

I like to divide our industry into groups: the professionals, the amateurs, the opportunists... all taking aim with their rifles and shotguns at the gullibility and ignorance of the consumer, taking full advantage of the advertising urging that 'new is better' and that one must embrace the new and discard the old. Not only the record buying consumer, but also the studio user consumer. And if the charlatans and opportunists are not wiped out by educating the consumer, I can foresee the delay of the long-overdue sound revolution in our industry!

When multitrack recording became possible, there were those who fervently believed that the mere use of a multitrack recording session would guarantee not only better sound, but also a sure-fire hit. I am certain that many of my professional colleagues had the same experiences I had as a studio owner, arguing with some intense 'artist' who insisted that recording a solo piano, or guitar and voice on

16 channels would sound infinitely better than it would directly recorded on two or four tracks! Sometimes we were able to convince the artist, many other times he went to some other multitrack studio who was delighted to charge for all of the time and tape wasted on the 16- or 24-track recording, the many hours dubbing down to 2-track, where inexperience or the improper use of another 'invention', the panpot, combined with the improper use of multiple microphones to produce a near monaural final mix. (Just listen to your records... all too many are practically mono!) So, mirroring grandma's old logic that 'if one is good, more is better', much too much has been recorded on multichannel equipment with every house microphone turned on and mixed in for the sake of charlatanism and the continuation of the multichannel myth.

The myth has been updated as well. It now reads: 'Digital is guaranteed to give you better sound and is also a sure-fire guarantee for a hit.' (If that phrase sounds familiar, please refer to the previous paragraph.)

Variations to that theme have been heard before as well, and sounded like this, 'Stereo (quad, discrete or encoded/35mm Sound/Dolby/dbx—put in your own default expression) is guaranteed to give you... yata, yata ad nauseam...'

When stereophonic recording finally caught on, many record companies went through their catalogue of turkeys (read 'record masters') and re-issued them after some fancy equalisation and possible phasing as *New and Improved Stereo*. Truth in advertising and labelling finally insisted that these phony stereo records be marked that the original masters were in fact NOT recorded and/or mixed in stereo. The result were phrases such as 'Electronically Enhanced for Stereo' or 'Electronically Synthesised Stereophonic Record'. Just enough to be within the letter of

the law, but sufficiently obfuscated in technically fancy buzz-language so that the average record buyer was not fully aware that the wool was being pulled over his eyes. There is no question that technically obfuscated buzz-words sell everything—and records are no exception. 'Half-Speed Mastered' worked well for quite a while, when 'Carefully Equalised and Mastered, Pressed on Quality Vinyl' should have been sufficient... but wasn't. 'Half-Speed' could be logically explained... but what was not explained was, that it has not been necessary to master at half-speed since cutting heads were improved in 1962, or since the JVC discrete quad records required a carrier frequency 'way up there in the high end' that their records had to be mastered at half speed and quite a few dB down to be able to put the information on the disc and then retrieve it from the disc without destroying the groove in the process.

And now we have new buzz-words: 'Digital' and 'Compact Disc' which may now be entered into the same myth category as all the ones mentioned above.

I think that digital is not only good, I think that it is outstanding and I am personally tickled pink with it! If there is anything that is wrong with it, it is that it is too good. But digital is the word which sells records, and as a consequence I see catalogues of new compact digital discs with some recordings that were made shortly after the 78 RPM record hit the dust! I just came across a standard LP which proclaimed most prominently: 'A digitally processed analogue recording' of some Big Band that had not recorded since 1950! Come on, give us a break! All that happened here was that this company took some old tapes, copied them to a digital format, and then cut a disc... most likely from the analogue tape. I very strongly

'... I am personally tickled pink with it!'

urge that we insist analogue or compact digital discs be allowed to use the word 'Digital' only if the entire storage process of recording from mic to master disc was digital!

The trade papers are full of controversy over which is better, analogue or digital. How can one compare a finely and carefully produced, engineered and mastered analogue record, carefully pressed on the finest materials, with a mediocre, or even good or better digital disc? One would, in all honesty, need to be able to compare the same performance from the same microphones, the same mix recorded on the different storage mediums, and then one could compare, as the only variable would be the disc—analogue LP vs CD. Only a few of us have been privileged (or plagued) by being able to make such a comparison, as there are so many redeeming factors to both!

There is no question that an analogue disc is difficult to make well—without warpage and clicks and scratches as well as sound aberrations through improper mastering compounded by bad vinyl. It is annoying to have the tranquility of a soft, tender musical passage destroyed by a semi-explosion caused

by a minute speck of dust which static attracted like a magnet to the disc. Who does not have a favourite musical composition or performance which is marred by record scratch and pops and clicks, which some careless record company sold to the public? We all do. And I would certainly not mind having these recordings of historically sentimental value on the CD, where I can play it in less than perfect, but consistent fidelity, devoid of the pops and clicks. That's OK with me, but please don't pass these old analogue recordings off to the public as the latest technical breakthrough digital recording. Tell us that this is an old recording, re-issued to be preserved on the new digital medium, the CD. There are enough redeeming reasons for the record to be re-issued and for the consumer to purchase and play it.

As a record producer, engineer and studio owner with his own digital and mastering equipment, I consider myself very fortunate in being able to have so many constants. I know the sound of the studio, the control room, my speakers and mastering equipment and playback equipment. When I make my recordings, I am privileged to compare the sound of the live instruments in my room, walk a few steps and adjust the monitor level to match that of the live sound—thus eliminating one variable. I position myself until my ears are pleased with the perspective of the live sound, and then proceed to replace my ears with the electronic ones—my mic or mics. I go to the control room and see if it sounds the same. If not, I move the mics or change the kind of microphone I am using until I have a match, or as close to one as is possible. I can now set my levels at a comfortable point. I do not use equalisation, but rather move the mic(s) an inch or so, or a foot or more, until it is right. I find close-miking annoying, as violating my personal

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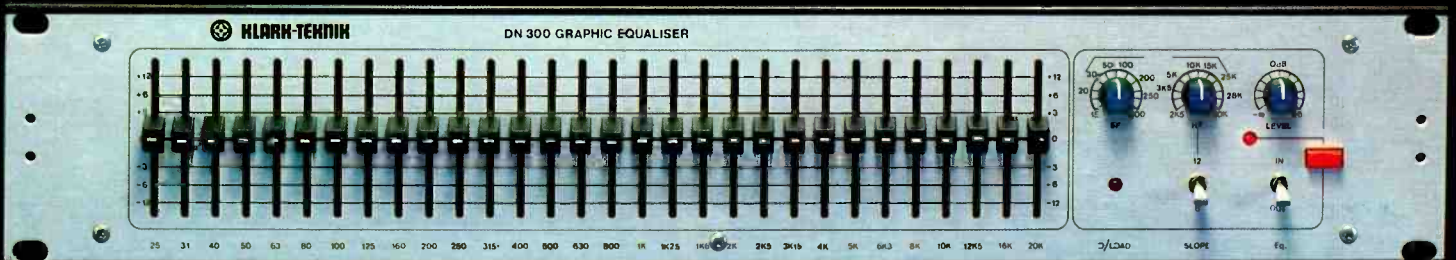


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MYSTIQUE

space—I feel about the same as I would if someone moved within inches of my nose to have a conversation with me. (We all know at least one such character and cringe when we see him/her coming.)

The output of the console is split to go to our analogue tape machine, finely tuned and aligned and loaded with Agfa mastering tape, which I have used longer than any other engineer in the US—since 1955, when I had to import it myself! The other goes to a digital recorder; often a *PCM-1*, a *PCM-10* and now the *PCM-F1* as well. Basically I use the analogue tape for playback to check performance only. The digital tapes are checked for safety. In playback analysis, I and everyone involved can hear the difference. And there is a difference. The digital is devoid of side-noises (hiss). The digital has more clarity, definition. In little things that

'I no longer need to compensate for would be "losses" in playback'

are difficult to describe, my ears are taking the subtle changes from monitoring the live performance to the playback from the tape machine for granted. But I know that I am listening to a playback. When Ken Lee, my assistant engineer, plays the digital back I do not know for the moment if I am experiencing the artists playing in the studio or the digital tape. I also note that I no longer need to compensate for whatever I knew would be 'losses' in playback on the analogue.

So there you have the constants with only one variable. Do I hear a difference between the PCM units? Yes. Which one do I like better? I am not going to answer that question now—we have enough in this can of worms!

There are great problems in transferring the digital tape to the master LP disc. When one goes from ordinary tape to disc, the tape is sampled about one second prior to the playback head which feeds the cutter. This preview system feeds the computer in our lathe and nests the grooves as close together as possible without overcutting in order to preserve the land area, thus allowing maximum utilisation of level and time on one side of the disc. It does a few other very important things which are not pertinent in this particular discussion. In mastering from the digital format it is not possible to 'preview' the tape, since there is only one head. Consequently the mastering engineer now has a choice to either make all of the adjustments normally made by the computer by hand, or use a delay circuit (usually digital delay device) to delay the programme signal, and send the pure, unaltered sound to the computer. Since I started disc cutting well before computer assists, and learned to speed memorise performances and levels, and to anticipate the music before it happens, I just naturally adapted the first option—also because I

happen to believe that sound should go through as much straight wire as possible and as little as possible through electronic devices; ie any device not needed should be bypassed. Thus the purity of the recording is preserved—hence the slogan of our company: '*Direkt-to-Digital-Direkt-to-Disc*'. (I know how to spell, thank you. By spelling it this way I was able to copyright and register the phrase.)

Many years ago, in 1957, when I opened my first studio in Hollywood on Sunset Blvd, John Stephens (of Stephens Electronics) built my first solid state recording console. Twelve channels in, four out with four echo chambers. It was a great console and I wish I had it back. I listen to the tapes I did then and am amazed at the clarity. But the industry looked with suspicion upon it. One 'expert' told me that I made a big mistake going solid state to transistors. "Why?" I asked. "They sound tinny," he said. When I challenged him to give me a reason for his statement he shrugged his shoulders and replied. "Sure they do! Haven't you ever listened to a transistor radio?" Another expert took me aside and confided that I was making a mistake having multichannel outputs, because: "Don't you know that stereo is just a passing fancy?"

The two prominent men in the industry who made these statements shall remain unidentified. . . but they taught me a strong lesson: to look at the pros and cons of 'newfangled' things and not to make snap judgements. Too many people feel unsafe when their status quo is being challenged; when, in a lifetime of doing things one way and finally learning to do it right they are comfortable in their rut, and now see their way of doing things going out of style. Instead of fighting new developments, we should examine our experience and developed skills and see if they could not be applied to make the new development better. I do not wholeheartedly embrace something new just because it is new. But I try very hard to see what is good about it, and if it could help me make truer and better sound. Because I can use the skills I acquired long ago and be selective and distant enough to become objective, I have been and hopefully will continue to be able to apply them in taking advantage of new developments in technology. Technology is a tool. Skill is an asset. Knowledge is the raw material. Reason and intelligence is what allows us to make choices in a dispassionate manner. Enthusiasm is what gives us the drive to accomplish what cannot be accomplished.

'Too many people feel unsafe when their status quo is being challenged'

A genius is a person who sees what no one else can see, and makes it happen. I think that we should carefully examine every opportunity to make our product better—for the enjoyment of the music, the language of love and of the soul and of the gods. . .

Analogue tape formats and analogue records have advantages over the digital format in many ways for us, the engineers, as well as for the listener. Digital has many advantages over analogue. No one thing has ever been the panacea for everything.

And in our eagerness to 'protect' our close interest we forget that it would be in our best interest to examine the new and allow the future to happen to us as well. And you my friend, whom I deeply respect, and I know you know who you are, do not defend a position which you can no longer defend 'just because' you once made a premature and all-inclusive categorical statement. Unless you keep bringing it up, the rest of us will not, and would have forgotten it a long time ago. You yourself told me that my digital records do not sound like digital—whatever you meant by it—like the only digital records that sound like music: come on in, the water's fine. Add your skills and talents to make digital CDs better, just as I shall do, and maybe together we might be able to show the younger engineers, who did not have the privilege of the tutors we did during our apprenticeship, that

'Technology is a tool. Skill is an asset. Enthusiasm . . . gives us the drive to accomplish'

consciousness for quality—discrimination for excellence—must begin in the discipline of the planning stages and must be meticulously followed throughout the processes to the end product. Only this absolute discipline will improve the quality of the CD. . . or for that matter, anything.

In my personal judgement, based on what I know today I do not think the CD will have a long life. As long as we use Polyvinylchloride there will be some problems, and I see technology moving rapidly to better, less vulnerable mass data storage devices, which, in the not too distant future will provide a much more stable and accurate storage for the retrieval of sound. And if we, the buying public, learn to judge better by acquiring an education, and become less apt to follow advertising slogans sheepishly, we will not Byte the Bait of the Charlatan, and make 'his Legerdemain' ineffective and thereby drive him either into legitimate channels—or into ruin and oblivion.

Within 45 days from the day I am writing this, I should have tests of a couple of my digitally recorded masters in the CD format to compare directly with my carefully mastered and pressed LPs, and reserve my final judgement of this process under present manufacturing technology until then. In the meantime I shall do what I have done before—the best I can and keep a positive attitude towards life, myself and others.

How do you like the CDs you bought? There are some really good ones and then there are some not so good, and some outright lousy. . . just like the run of the mill LPs. Oh, but when the digital recording is good, gad, it's great! And what does that prove? A good recording is a good recording, is a good recording.

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Pictured is a Roland G3 guitar. Roland Corp., Japan.
See and hear Pat Metheny Pat Metheny Group ECM Records.

A PERSONAL STUDIO

Barbara Thompson fans would have noticed it—but her neighbours wouldn't. The *Mother Earth* album was a landmark for all of them. Released last spring, it was the first album recorded by Barbara Thompson's Paraphernalia in the new studio built by Barbara and husband Jon Hiseman beside their home in Sutton, Surrey.

So why build a studio at home, when most performers with a beautiful house in Surrey's leafy lanes are only too glad to leave the long hours of recording behind in the city and retreat homewards for a bit of peace? Hiseman takes up the story.

"The idea started because Barbara and I were recording two or three albums a year, doing other television and film work, and spending a lot of money in studios. I felt that if we designed a studio that would be used only by us, and not hired out on the open market, we could do it a lot more cheaply than the current cost of an all-facility venue. I also knew from my interest in recording equipment, and the fact that I had been producing records for many years that it was now possible to obtain a mixing desk that would have cost about £70,000 eight years ago, for under £20,000. The audio chain was much cheaper to deliver cleanly and with the same quality finish. It was therefore technically possible to create our own studio. All I had to do was find a place to put it."

Being acoustic musicians (Jon plays drums and Barbara the saxophone) they found themselves restricted to using certain studios that could cater for their particular sound. This meant that to achieve the standard of production they wanted, they had to build a sizeable unit with a separate control room—rather than the type of converted bedroom that a

Nick Wood-Dow

keyboards player might find satisfactory. This standard set certain criteria, which in turn would influence the cost and feasibility of the project. The first was height: "I don't believe it's possible to achieve the sound that I like to create as a drummer from a ceiling height of less than 12 ft. In a normal home environment, ceilings just aren't that high."

The second was space:

"I wanted enough room for seven or eight musicians to rehearse in comfort. Also a large control room to take care of keyboard overdubbing, and the long involved mixing sessions that we tend to find commonplace in modern music."

"If you put all that together, there was no way I was going to take two rooms of our house and put a studio in—to say nothing of the sound problem of a 12-piece drum set, which I wasn't going to inflict on the family or our next door neighbours!"

So Hiseman's original objectives were a combination of business sense and artistic need. The latter was the more important: musicians for whom commercial success is not the highest priority are restricted by the cost of hiring studio time levied by owners for whom commercial success is vital.

"Being continually up against fictitious deadlines means that you compromise your musical integrity. After 15 years of that, I wanted the facility to put a mix up on the table and leave it there for a week if I wasn't happy with it—and then play about with it until I was happy," Jon continued.

Jon and Barbara finally made their decision in January 1981 to go ahead and build their own studio. They had to fulfil two immediate objectives: to raise the money; and to plan and build it using their own instincts. They

had also discovered by this time that there was enough room in the garden to build a separate structure alongside the house, with a 50 × 30 ft space inside, which would suit their needs admirably. So the problem of where to build was solved.

Planning started in earnest.

Another obstacle was transmission loss. Hiseman bought every book he could find from all the technical publishing houses on acoustics and recording studio design, and read the lot but even after weeks of research he couldn't solve the problem.

"I knew that at 9 o'clock at night, in the suburbs of London, you can hear a pin drop. It's absolutely pointless if once the wind has died down on a summer's evening and everyone's windows are open, I've got to stop work because the noise is escaping. I had to have total transmission loss by 5 m away from the building—or there was no point in carrying on." Eventually Jon designed a structure based on the mass principle: two solid concrete walls with a massive roof area, and the basis for the acoustic treatment in the shapes of the walls, using very simple ideas about non-parallel surfaces and ceiling heights, and length and breadth, which Hiseman calculated with the use of a computer program.

"I thought that if I engaged somebody to do it completely, then went away and left him to it, I was taking a big risk. If I didn't like it, I would have spent the money, and although I couldn't blame the builder, I couldn't do anything about it. Whereas if I did it myself, and it was wrong, I only had myself to blame, and I would rather be in that situation."

But having dealt with transmission loss, an even bigger,

more basic snag reappeared: cost. The building estimates had trebled, and although he had raised the money, he was worried that the closer he came to design and acoustic perfection, the dearer the final bill would be.

Up till this point, he had been working with a local builder, but he began to realise that building houses and building recording studios were two very different matters. It was time to call in a specialist who could make a judgement on the preparations Hiseman had already made, and put a total budget figure and time estimate on the entire operation. Through an ad Jon chose AlanGrove and by chance his builder was also put in contact with them. AlanGrove are a London-based company who have built a number of studios in the London area and around the world. It seemed to make sense to seek their advice, and an estimate to compare against the other building quotes he had already obtained.

Shortly Alan Stewart of AlanGrove was in Sutton, studying a complete set of Jon's plans. These were the result of a year's work and based on simple, conventional building techniques, as Hiseman knew that specialist techniques attempted by people who had never done them before were going to become more and more expensive. The local builder was not even prepared to guarantee the final building cost, as he had never done this kind of job before, and did not know what kind of snags he was going to encounter.

It was late March 1982 when the initial contact was made. Alan Stewart, managing director of AlanGrove, takes up the story. "Having built studios next door to each other, and sometimes three high on top of each other, we'd had to deal with the problem of sound isolation in different

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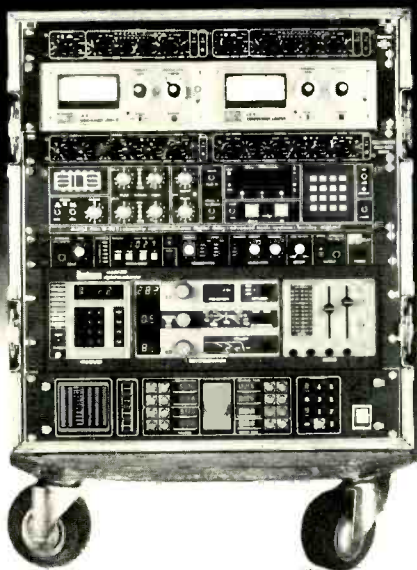
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A PERSONAL STUDIO



1: The intended site for the studio following the demolition of a rear entrance to the house; 2: A detail showing the construction of the monitor housing with space for the UREI monitor (upper) and side mounted Spondor BC1 (lower); 3: Initial construction of the isolation booth; 4: The studio under construction showing the only way to get materials on site

environments. We knew the different methods of achieving the isolation and how to do it in the most economic fashion."

They had to apply that experience to building a studio in a London suburb, where the sound of a bass drum floating through a lounge window means that studio no longer becomes viable 24-hours a day right through the year.

"Although Jon had done an enormous amount of research and planning, he had been using only the mass concept to cure all the leakage problems. What needed to be done was to prevent the energy from getting into the structure, which was where we trimmed down a lot both in the amount of building work, and in the cost estimate. We created a structure which was waterproof on the outside, with a certain amount of mass in it—about half of Jon's original plan—and we built within that structure a completely isolated box within a box. This box prevented 75% of the energy from reaching the outside structure, thus leaving the outer shell of the building to absorb the other 25% using a 6 in dense concrete block."

AlanGrove had recently completed a rehearsal room for drummer Bill Bruford who wanted to be able to practice without disturbing the rest of the family. Sound isolation was vital but he did not need the kind of full-scale studio that Jon Hiseman wanted. The experience was valuable, though, in terms of creating the right atmosphere for a professional drummer, and enabled Stewart to understand Hiseman's requirements very quickly.

"The main challenge for us," said Stewart, "was that the site available measured 50 x 30 ft, but there was no margin for flexibility. In a commercial studio measuring thousands of square feet, if

isolation is not achieved first time and another air separation is needed, we can use up another 6 in. That is not usually a problem. In Jon's case we were governed at one end by the boundary of his land, and at the other side by the boundary of his existing house that he did not want to break into. So it wasn't possible to lose much space inside in order to achieve total isolation and retain the required size of studio."

AlanGrove were able to give Hiseman a price for the job in the form of a total cost estimate.

"I had to know if what I wanted could be built for the money," said Jon, "on the clear understanding that the given price was all the money there was. The key to the success of the whole project was that AlanGrove gave me a price that I could just manage—and be secure, by giving me a guarantee, that they could deliver the goods. Remember that I still had to buy all the equipment to go inside the studio. Leave one important item out and you have nothing; the building and all the other equipment are useless. The whole chain has to be complete before it even starts to pay for itself: it's a big capital investment."

Once he had his price, and his guarantee that there would be no transmission loss, Hiseman felt it wise to get a few 'second opinions' about AlanGrove.

"They had done a lot of work at the Town House, whose head of maintenance was going to do all my audio work. So I was able to visit the Town House and see what AlanGrove had done there."

AlanGrove started work on April 20, 1982. Hiseman had already obtained planning permission for his original plans but AlanGrove had to amend these so that the new outside structure would meet the planning requirements, and

deal with the local authority over building regulations. They also downgraded some of the structural steelwork, and the new calculations took two weeks to complete. Next came the job of clearing the land of gooseberry bushes and the ornamental pond, and then excavation of the foundations.

By the third week in May, all the outside walls were up, and by the second week in June, the roof was on. At first the sunshine helped, and warm weather meant fast progress. But once the sand had been laid on the roof, as part of the isolation process, two nights of heavy rain washed it all out, so the team had to start again and re-lay it.

While the external structure was being built, Hiseman the client, was still working out what he wanted to put inside it.

"It was rather like building a completely open barn," he said, "for there were no internal walls or divisions. I had a ground floor plan for the interior, which almost completely changed as a result of AlanGrove's advice and ideas.

"It was their idea to have double doors between the studio and the control room. This gave us a lot more space and removed the necessity of having a passageway which would have been a completely wasted space.

"At one point I was going to have my echo devices within the building but at AlanGrove's suggestion, that moved out to the garage. While the building was under way, it was my responsibility to do all the mains and audio electrical work. Geoff Atter from the Town House did all the audio wiring and I acted as mate; we ran all the cables underneath the house to the garage on the other side where we sited the echo plates."

AlanGrove had recommended

that the floors of the studio and the control room were to be floating, the walls would float on those floors, and the internal ceilings would float on those walls. There was to be no mechanical connection between the outside and the internal walls, nor between the control room and the studio; wherever the walls and floor met, there was an air space of at least 1/4 in, or the joint between them was layered with rubber. The concrete floor was laid on a sandwich of materials, consisting of chipboard insulation board, Fibreglass, and isolated around the perimeter by using polystyrene which was then removed once the concrete had set. In fact everything on the inside was totally discontinuous from the outside weatherproof structure.

During the summer of 1982, Barbara Thompson's Paraphernalia were on the road. This meant that Jon Hiseman's mind was on two things at once: rehearsing and performing as a drummer with a band; and supervising the building of his new studio.

Flexibility was paramount, because once Hiseman saw a further stage completed, he and Stewart would make minor changes in their ideas as opportunities for improvement became evident.

"The programme would run in fortnightly cycles," said Stewart. "Jon would give us the go ahead on a particular part, and say he'd be back in two weeks to see how it looked. Then he'd be off again in the knowledge that it was progressing the way he wanted, and we'd meet again at the end of the next section of his tour to review things, and plan the next stage."

"We couldn't have done it any other way," reacted Hiseman. "No

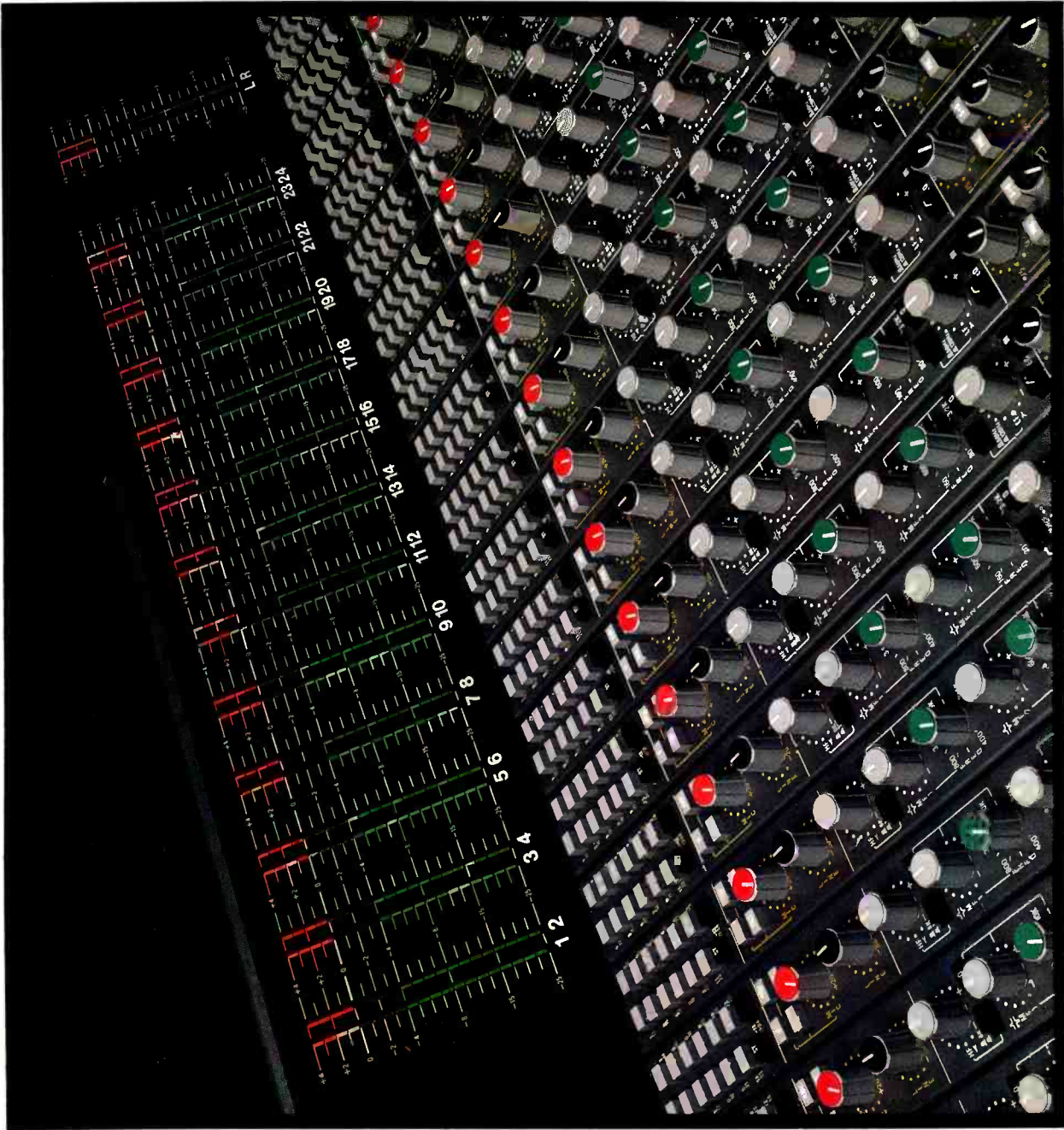
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Our definitive statement...

A PERSONAL STUDIO



Paraphernalia with Jon Hiseman (2nd left) and Barbara Thompson (2nd right) in control room

decision which was made turned out in the end to be wrong, and many things turned out much better than I could have dared hope. But I never felt that I was pushed into a corner: the options were always discussed, tested and eliminated. It really did work. The worst thing on the acoustic front would have been to have had a cut and dried plan and been unable to change it. We achieved success because of this flexibility." The AlanGrove building crew were very experienced: the foreman had been involved in the construction of more than 30 studios over the last 11 years; the other two men had worked on 15 and 10 studios respectively during the previous three years. This enabled Hiseman to make modifications as he went along. He had around him a crew who could turn his theories into practical solutions. The ceilings were an example.

"AlanGrove were totally responsible for the ceiling shapes," added Hiseman. "I didn't have much knowledge in this field, and Alan's suggestions on the studio ceiling, and on the sloping back ceiling in the control room worked extremely well."

Hiseman stopped touring on July 1, and from then on worked all day every day. He did all the wiring and plumbing himself while the interior was finished off around him. AlanGrove handed over the studio in the first week of August; taking into account two short gaps where the crew worked on another job to enable Hiseman to catch up on his part of the project, they had completed the task in just over three months.

Hiseman was particularly pleased with his control room and its rather experimental nature. He explains why: "There are as many theories about control rooms as

there are engineers. The control room is the place where decisions are made about the music being created and the sounds being put on to tape. I believe that if music is to be enjoyed in a comfortable home environment, then the control room has to be a very good imitation of that.

"AlanGrove and I designed the control room on the basis that most of the acoustic treatment would be front to back, so that the sound would come out of the speakers, pass over my head, but not wash back to me. Certain very low frequencies that may wash back would be trapped on the second pass. We used bass traps underneath the monitors at the front. A false wall behind the mixer desk chair created a dead rear to the room; it contained a patchwork quilt of different densities of Rockwool. Behind the false wall was an airspace, and then a simple treatment on the extreme back wall.

"The flexibility was still there in that I could play about with the panels in the false wall until I found the exact sound I wanted. Nothing acoustically was permanent. All I had to worry about, in design terms, was the basic shape of the room and the siting of the monitors. The side to side walls remained live, as in the domestic living room situation."

Guest engineers who have visited Hiseman's studio have been impressed, especially with the stereo imaging and the transparency of the sound whilst not being too dead.

"To make the sound clear and critically audible, engineers have to work at the mixing desk. Many control rooms have an apparent cleanliness about them, because of their acoustic environment, so engineers don't bother to work to

make things separate and clear and audible," is Hiseman's view. The result is often mushy and undefined, more so with his style of music than with heavy rock, for example.

He described his control room's technical layout. "We have a three level monitoring system, using UREI 813 monitors as the basic system; as a high quality domestic monitor we have Spondor BCIs, and of course Auratones as well. We can switch between all three. The mixer is a 28-channel in-line Raindirk Concord 2000 which is compact yet well equipped. We've got all the usual gear such as limiters, noise gates and DDLs.

There's a Soundcraft 24-track tape machine, an MCI 2-track machine, a Revox A77 for additional tape echo, a Sony 701 ES/SLFI digital stereo record system, three cassette machines for simultaneous tape copies, a radio tuner with an aerial on the roof.

The studio is equipped with a Yamaha C7 grand piano, a Fender electric piano, guitar amplifiers and lots of drums and percussion equipment."

The 'Mother Earth' album should have been completed a year earlier but Jon and Barbara delayed it so it could be the first to be recorded and mixed in their new studio. Jon felt the first album should be with a band he knew well, to give him a good indication of how the studio was performing. Martin Levan, who had been the engineer on the previous Paraphernalia album, did the basic track engineering; then Hiseman handled the overdubbing and the mixing. The album took two months to produce. Mother Earth was one of the first albums to be Direct Metal Mastered which was a gratifying reward for the Hisemans.

Alan Stewart believes the studio notched up one notable first: Barbara Thompson is probably the only saxophone player in the country to have her own booth designed specifically for her. She can play in the booth, which stands right beside Jon's drum set, but isolation from the drums inside the booth is very good. Its ceiling is 12 ft high, and the top 5 ft of that has a lot of acoustic treatment in it. She has a bright acoustic around her, so she can produce a good saxophone sound in the booth. As Barbara does most of her solos live—she does not like overdubbing—they achieve excellent results all round.

Following the release of *Mother Earth*, Jon and Barbara recorded the music for the two versions of the Britannic films about the America's Cup Challenge—*Prelude to Victory* and *The Challenge*. They saw the final cuts on video and created the music to fit the pictures. They have written and recorded the music for three children's drama series for Thames Television and are currently working on the signature tune for a new BBC Radio 4 show.

They recorded *Shadowshow*, the follow-up to the Ghosts album, with Clem Clempson from Colosseum and Rod Argent, which was released last October.

The sales of *Mother Earth* have been encouraging, at home and abroad. Its follow-up *Pure Fantasy* was digitally recorded in the studio and was due for release on April 7th. When they are not writing, rehearsing, producing or recording, Jon and Barbara have enough tour dates lined up with Paraphernalia to keep them out of mischief. All Jon Hiseman wants for Christmas this year is to know how to create the twenty-five hour day. □

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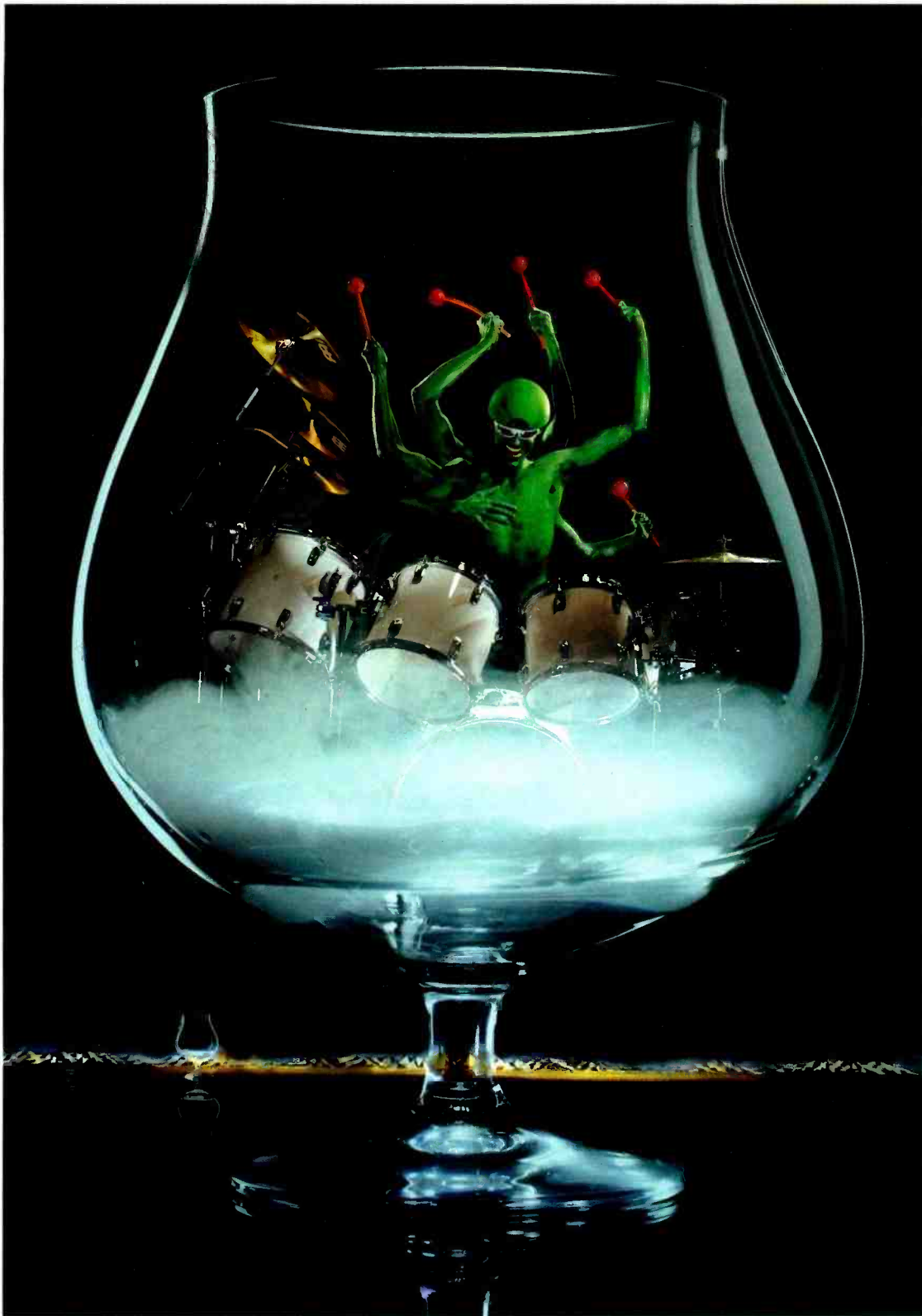
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ELECTRONIC INSTRUMENTS AND THE STUDIO

ELECTRONIC INSTRUMENTS AND THE STUDIO

US notes from Paul D Lehrman

Notebender—The ultimate keyboard?

Ever since the first Moog modular synthesiser hit the market, one of the great debates in the world of electronic music has been 'keyboard or not keyboard?' Using a piano-type keyboard, many say, keeps synthesisers locked into an 'electronic-organ syndrome' and severely limits their expressive abilities. Defenders of the concept maintain that the alternatives—guitar, woodwind or ribbon controllers, or Theremin-like devices—are worse.

In light of this controversy, a lot of synth manufacturers are now looking at new ways for musicians to play their products. Most of them, like Bob Moog's *Big Briar*, are basing their research on various types of touch pads that can be interfaced with music-making computers. But a small group of instrument designers and electrical and mechanical engineers working out of a warehouse in an industrial section of Boston, Massachusetts, who call themselves Key Concepts, are working in a different direction: a piano keyboard that operates in several dimensions, thereby greatly increasing the creative options open to the player.

The idea behind the *Notebender* was hatched in 1965, during the 'pre-synthesiser' era. What originally came out was a harpsichord that could bend notes like a guitar, over a range of about three semitones, by moving the key back and forth. It took about 16 years to build and was obsolete by the time it was done. As Key Concepts' president Jeff Tripp admits, "It's too easy to accidentally displace the key." The key surfaces are not flat—in order to facilitate control in the horizontal plane, they are wavy and ridged. It's an interesting idea, but it's a 'Rube Goldberg device'—and the complex mechanics involved make it rather impractical for production.

But now the computer age is upon us, Tripp and his partners more recently have been working on a version of the keyboard that can interface with a synthesiser. Revealed at a small party towards the end of 1983, the electronic *Notebender* is a 5-octave keyboard that allows the player to move any of the keys back and forth, together or individually, about



an inch. The motion of the keys is tracked by an onboard 68000 microprocessor. In the prototype, the interpretation of the information is handled by an external computer, but Tripp says that production models will contain the program on built-in PROMs.

Besides the horizontal motion, the keyboard offers several other useful new functions. It is touch-sensitive—not velocity-sensitive but force-sensitive, using a type of accelerometer.

At the bottom of the keystroke, another detector measures pressure, so the sound of a note can be changed after it's struck.

The keys themselves are spring-loaded, so they automatically return to their original horizontal position, and they are mechanically centre-detented, so the player can easily feel where the 'normal' point is located. The waves and ridges are gone, and instead the keys are covered with a synthetic rubber that provides a high coefficient of friction in the horizontal plane, to prevent slipping, and almost no friction vertically, so the player's fingers don't stick to the keys.

Because the keyboard's output is completely under computer control, its mechanical functions can be set up to manipulate any synthesiser parameter. For the demonstration, the horizontal key motion was set to bend the pitch over a range of between one and four semitones, either smoothly or in chromatic steps, while the vertical key motion controlled volume, and the bottom-pressure sensitivity adjusted vibrato depth. But there is no reason why the parameters couldn't be switched around, or any other parameters addressed, such as volume, duration, timbre or repeat attack, by any of the keyboard functions.

The demonstration used a Rhodes *Chroma*, an instrument that Tripp says he likes, but is not exclusively tied to. When it goes into production, he says, each *Notebender* will be specially designed for the particular

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ELECTRONIC INSTRUMENTS

ELECTRONIC INSTRUMENTS

US notes from Paul D Lehrman

instrument the customer wants to interface, and Tripp says he is already talking with owners of *Synclaviers*, *Fairlight CMIs*, *Prophet T8s*, and *Korgs*. He is also planning on implementing a MIDI interface. "MIDI is a little slow," he says, "but I'm hoping they'll soon upgrade it." But don't hold your breath for Key Concepts to offer a model for your Casiotone or even your alphaSyntauri—the price of the *Notebender* keyboard will be about \$25,000.

Manufacturer's comment

Several new functions have been added to the *Notebender* since Mr Lehrman visited us.

- (a) Soft-frets™, an auto-quantising function: electronic notches are created giving semi-tone jumps as the key is displaced in-and-out. The number of jumps and their spacing is adjustable.
- (b) Pressure Re-trigger™: notes can be re-initiated while being 'bent' without letting up on the key. The signal is made through an adjustable change in pressure sensitivity.
- (c) Cost: Economies generated through our increased production level has allowed us to offer a basic (61) key unit for close to \$15,000.

Digital recording for \$239!

Ridiculous, you say? Not at all—although there are a couple of things you should be warned about. You're going to need an *Apple II*-type computer to start with, and keep in mind that you will only be able to record about 30 seconds of sound at a time, maximum—and those 30 seconds will sound terrible. But a nifty little hardware/software package called the *DX-1*, made by a tiny California company that calls itself Decillionix, can provide even the most seasoned recording engineer with an awful lot of fun—recording, playing back and just fooling around with sound in the digital domain. And it shouldn't be long before someone comes up with some serious applications for this wonderful toy.

The *DX-1* consists of a circuit card that plugs into an I/O slot on the *Apple*. The heart of the circuitry is an 8-bit analogue-to-digital convertor and two digital-to-analogue convertors. There's an unbalanced audio input, a switchable input pad (to match mic or line-level signals) and a sensitivity pot, and a single high-level RCA jack for output.

There's also a floppy disk, with software to run the thing. When you boot the disk, between one and eight pre-recorded sounds are loaded into a 24 kbyte section of the *Apple*'s memory. The first 'Soundbase' on the disk consists of eight surprisingly high-quality percussion sounds: snare drum, bass drum, wood block, cowbell, two tom-toms and two cymbals.

The program allows you to do all sorts of tricks with the sounds: you can play them in real time using the *Apple* keyboard, changing

their playback sampling rate (ergo, their pitch) and volume, or reversing them in time, or you can design sequences to play them automatically. Already written for you are some great abstract patterns, as well as some rather unimaginative 'drum machine' sequences.

Best of all, you can record your own sounds, specifying the sampling rate (from 780 Hz to 23.2 kHz) and the amount of memory dedicated to each (from a single byte to 24 kbytes)—the combination of sampling rate and memory space determines the length of the sound. Groups of recorded sounds can be saved in their own 'Soundbase' on disk; three 'Soundbases' fit on each floppy.

Sounds you have recorded yourself can be manipulated as well and that's where the fun is—using the sequencer, you can compose a piece, if you go for that sort of thing, out of the sounds of your own bodily functions.

Given the limitations of the hardware, of course, the sound quality ranges from respectable to downright awful—and at the highest sampling rate, the system's on-line recording capacity is barely 1 second. The 8-bit resolution of the *Apple* limits the dynamic range to a maximum of 48 dB. But the software is so cleverly designed (and the instruction manual is about the simplest and clearest you'll find with any *Apple* program) and so delightful to use, that it's easy to forget the drawbacks.

Another major advantage of the system is that writing software for it is not particularly difficult. Already one enterprising programmer has come up with something called 'Echo', which Decillionix is selling for \$149. It takes incoming analogue sounds, loops them through the *Apple*'s memory and spits them out again. The huge variety of algorithms in the software range from straight repeat to triple-looped increasing-pitch-and-speed forwards-and-backwards space effects. Many of the program's variables, including delay time, repeat speed, sound length, pitch, feedback, and the processing algorithm itself (there are even a couple of random routines available) can be adjusted using the *Apple* keyboard, game paddles or joysticks, or a separate 'feedback control' that plugs into the *DX-1* circuit board.

Just for the fun of it, the designer has added subroutines to the program that generate colour graphics—text, low-res, or high-res—that follow along with the sound. The documentation is rather sketchy, which makes it a little tough to get started on the program, but once you do, 'Echo' can be a long-term source of entertainment.

But there's no reason why audio professionals could not write more serious applications for the hardware. For instance, this writer has been working on a program that graphically displays the recorded waveforms, zooms, splices and filters them, and can even convert them into a form that can be used by an alphaSyntauri synthesiser. Possibilities for other programs are endless—time and frequency analysers, digital equalisers, delays, phasers, flangers, reverberators and even instructional programs dealing with the nature of sound and sound synthesis. The quality may not be the same as an Ursa Major 8X32 but it's a whole lot cheaper, and it's infinitely more flexible. □

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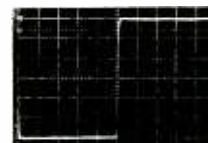
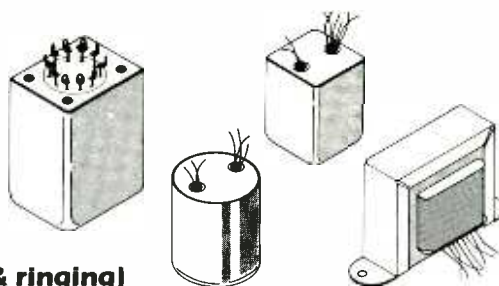
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INPUT TRANSFORMERS AND SPECIAL TYPES

Model	Application	Impedance Ratio Pri:Sec	Turns Ratio Pri:Sec	20 Hz Max Input Level ¹ (dBu)	Typical THD Below Saturation (%) 20Hz/1kHz	Frequency Response (dB ref. 1kHz) 20Hz/20kHz	Band-Width ² -3dB @ (kHz)	20 kHz Phase Response (degrees)	Over-Shoot (%)	Noise Figure (dB)	Magnetic Shield ⁴ (dB)	Number of Faraday ⁴ Shields	Package ⁵	PRICES		
														T-19	100-249	1000

MICROPHONE INPUT

JE-16-A	Mic in for 990 opamp	150-600	1:2	+8	0.036/0.003	-0.08/-0.05	170	-10	<1.75	1.7	-30	1	A=1 B=2	63.61 68.25	42.49 45.60	29.32 31.46
JE-13K7-A JE-13K7-B	Mic in for 990 or I.C.	150-3750	1:5	+8	0.036/0.003	-0.10/-0.22	85	-20	<3	2.3	-30	1	A=1 B=2	63.61 68.25	42.49 45.60	29.32 31.46
JE-115K-E	Mic in for I.C. opamp	150-15K	1:10	-6	0.170/0.010	-0.50/+0.10	115	-5	<7	1.5	-30	1	3	41.48	27.72	21.65

LINE INPUT

JE-11P-9	Line in	15K-15K	1:1	+26	0.025/0.003	-0.03/-0.30	52	-28	<3		-30	1	1	102.86	68.72	47.42
JE-11P-1	Line in	15K-15K	1:1	+17	0.045/0.003	-0.03/-0.25	85	-23	<1		-30	1	3	39.53	26.41	20.62
JE-6110K-B JE-6110K-BB	Line in bridging	30K-1800 (10K-600)	4:1	+24	0.005/0.002	-0.10/-0.30	75	-15	<1		-30	1	B=1 BB=2	62.31 70.95	41.63 47.38	30.56 32.70
JE-10KB-C	Line in bridging	30K-1800 (10K-600)	4:1	+19	0.033/0.003	-0.11/-0.08	160	-9	<2		-30	1	3	40.98	27.37	18.89
JE-11SSP-8M	Line in / repeat coil	600/150-600/150	1:1 split	+22	0.035/0.003	-0.03/-0.00	120	-9	<3.5		-30	1	4	151.90	101.47	70.01
JE-11SSP-6M	Line in / repeat coil	600/150-600/150	1:1 split	+17	0.035/0.003	-0.25/-0.00	160	-5	<3		-30	1	5	78.62	52.52	36.24

SPECIAL TYPES

JE-MB-C	2-way ³ mic split	150-150	1:1	-2	0.180/0.005	-0.25/-0.20	88	-15	<1		-30	2	3	34.08	22.78	17.78
JE-MB-D	3-way ³ mic split	150-150-150	1:1:1	-2	0.180/0.005	-0.25/-0.16	100	-12	<1		-30	3	3	59.57	39.80	31.08
JE-MB-E	4-way ³ mic split	150-150-150-150	1:1:1:1	+10	0.050/0.002	-0.10/-1.00	40	-18	<1		-30	4	1	96.29	64.32	44.38
JE-DB-E	Direct box for guitar	20K-150	12:1	+19	0.096/0.005	-0.20/-0.20	80	-18	<1		-30	2	6	43.04	28.76	22.46

1. Max input level = 1% THD; dBu = dBv ref. 0.775 V
2. With recommended secondary termination
3. Specifications shown are for max. number of secondaries terminated in 1000 ohm (typical mic preamp)
4. Separate lead supplied for case and for each faraday shield
5. Except as noted, above transformers are cased in 80% nickel mu-metal cans with wire leads.

PACKAGE DIMENSIONS:

	W	L	H
1 =	1 5/16" Diam.		1 9/16"
2 =	1 3/16" x 1 3/16"		1 9/8"
3 =	1 1/8" Diam.		1 1/16"
4 =	1 1/2" x 1 3/4"		2 1/2" w/solder terminals
5 =	1 5/8" Diam.		1 3/4"
6 =	1 1/8" Diam.		1 5/16"

NICKEL CORE OUTPUT TRANSFORMERS⁶

Model	Construction	Nominal Impedance Ratio Pri:Sec	Turns Ratio Pri:Sec	20Hz Max Output Level ¹ (dBu)	600Ω Termination across (n) windings	DC Resistance per Winding (Ohm)	Typical THD Below Saturation (%) 20Hz/1kHz	Frequency Response (dB ref. 1kHz) 20Hz/20kHz	Band-Width ² -3dB @ (kHz)	20 kHz Phase Response (degrees)	Over-Shoot ³ (%)	Package ⁵	PRICES		
													T-19	100-249	1000
JE-123-BMCF	Quadfilair 80% nickel	600-600 150-600	1:1 1:2	+28	2	-1.1	20	0.002/0.002	>450 158	-2.1 -4.1	<1	7	87.41	44.17	30.47
JE-123-DMCF	Quadfilair 80% nickel	600-600 150-600	1:1 1:2	+21	2	-1.0	19	0.004/0.002	>450 230	-1.2 -2.5	<1	8	50.71	33.88	23.38
JE-123-BLCF	Quadfilair	600-600 150-600	1:1 1:2	+32	2	-1.1	20	0.041/0.003	>450 168	-1.9 -4.0	<1	7	61.30	35.79	24.70
JE-123-DLCF	Quadfilair	600-600 150-600	1:1 1:2	+27	2	-1.0	19	0.065/0.003	>450 245	-1.2 -2.5	<1	8	39.61	26.45	19.42
JE-123-SLCF	Quadfilair	600-600 150-600	1:1 1:2	+23.5	2	-1.1	20	0.088/0.003	>450 245	-1.2 -2.8	<1	9	33.48	22.35	15.43
JE-112-LCF	Quadfilair	600-600 150-600	1:1 1:2	+20.4	2	-1.6	29	0.114/0.003	>450 205	-1.2 -3.2	<1	10	25.48	17.01	12.49
JE-123-ALCF	Quadfilair	66.7-600	1:3	+26.5	3	-1.3	8	0.125/0.003	190	-4.6	<6	8	42.14	28.15	19.42
JE-11S-LCF	Bifilar w/ split pri.	600-600 150-600	1:1 1:2	+30	1 (sec)	-1.7	63	0.058/0.002	>10MHz 155	+1.1 -4.1	<1	8	42.14	28.15	19.42

6. Multifilar construction has no faraday shield.
- All specifications are for 0Ω source, 600Ω load.
7. Max output level = 1% THD; dBu = dBv ref. 0.775 V
8. Source amplifier -3dB @ 100kHz
9. Output transformers are horizontal channel frame type with wire leads, vertical channel frames available.

PACKAGE DIMENSIONS:

	W	L	H	Mounting Centers
7 =	1 1/2" x 2 5/16"		1 15/16"	2 13/16"
8 =	1 5/16" x 1 15/16"		1 5/8"	2 3/8"
9 =	1 1/8" x 1 11/16"		1 3/8"	2"
10 =	1 1/16" x 1 7/16"		1 3/4"	1 3/4"

These charts include the most popular types which are usually available from stock. Many other types are available from stock or custom designs for OEM orders of 100 pieces or more can be made to order. Certified computer testing is available for OEM orders. Call or write for applications assistance and/or detailed data sheets on individual models.

Prices shown are effective 2/1/84 and are subject to change without notice.

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FRANKFURT '84

KEYBOARDS AND COMPUTER MUSIC

There was a new optimism at this year's Frankfurt Music Fair, coupled with an awareness from the keyboard side of the importance of utilising micro control, not just internally, but as an 'all-singing, all dancing' update to the more restricted analogue CV/gate interfacing. The unprecedented implementation of MIDI to allow connection between one make (and type) of musical instrument and another has eagerly been taken up by the established electronic keyboard manufacturers and there's almost a feeling of 'We must have MIDI to survive'.

Already, the list of MIDI instruments grows rapidly, with such names as SCI, Roland, Yamaha, Moog, Oberheim, Seiko, Korg, Akai, Seil, Fairlight, PPG, CBS Rhodes, Kawai, 360 Systems, Octave Plateau, Crumar and Wersi either incorporating the now familiar 5-pin DIN sockets for in/out (and thru on some) in new machines or doing (or planning) a retrofit job on existing instruments to keep them up to date.

The huge potential of not just linking instruments but of setting up dynamic note playing, program sounds and individual parameters on keyboards, guitar controlled synth drum machines, reverb/echo units, processors, and mixing desk/tape functions all down the same cable does make you wonder how long it will be before the 'studio' becomes a MIDI communication concept.

Some people have disputed the serial MIDI interface's ability to transfer data fast enough, but in a logically organised environment it is quite adequate, provided your 'performance' is structured to only be note playing (with dynamics and expression of course) and channel/voice changes. I will be writing about the specific access/operation times of MIDI instruments in future articles.

There will be a great deal of

The Frankfurt Music Fair is the most important trade show in the European calendar. In line with related developments, this year's show has seen electronic instruments featured far more strongly and Mike Beecher gives us the first part of his report. Part two will appear next month.

software available soon for Commodore 64, Spectrum and BBC B, some of which is inevitably limited in its usefulness and not always compatible with a particular version of a micro or instrument. When purchasing a MIDI instrument, always make sure you have the latest 'operating system'—usually one or more EPROM chips inside the keyboard that are exchangeable for the newest version. In fact, EMR tell me that they've wasted a lot of time ironing out bugs that simply existed because of using instruments with out-of-date EPROMs. Typical indications are notes holding on indefinitely, programs resetting to the first program, and MIDI error indications on displays.

Although I may be preaching to the converted, I would like to mention that so-called 'all-MIDI-instrument' software packages can be a problem too, as no two instruments are alike and it cannot be assumed that irrelevant data can be ignored—some instruments, particularly the early DXs, try very hard to process everything that comes down the line!

Most of the software on display at Frankfurt was from just a few major sources and these will soon be available in the UK, with a significant number of packages

finding their way into the large chain stores as well as music shops. Most packages are for recording and playback or real-time or manual 'step' input notes in various 'track' and polyphony configurations, with the exceptions being program dump for SCI and Seil and screen editors and music printout for Yamaha DXs. You'll also be able to set SMPTE compatible interfaces with sync to tape, external triggering, analogue-to-digital converters and graphic interpreters for visual enhancement in the studio. Printout of music and panel parameters will all become part of the library files in the MIDI studio.

Roland are well known for approaching a new concept in a different way and have once again produced several 'firsts' by putting MIDI control on to their HP-300/400 contemporary keyboards—including the PB-300 Rhythm Plus and PR-800 Digital Piano Recorder through MIDI to complete the home user package. Of more interest to studios are their self-contained MIDI control units with the JSQ-60 DCB Digital Keyboard Recorder for manual or real time input of 2,000 notes, plus track overdub.

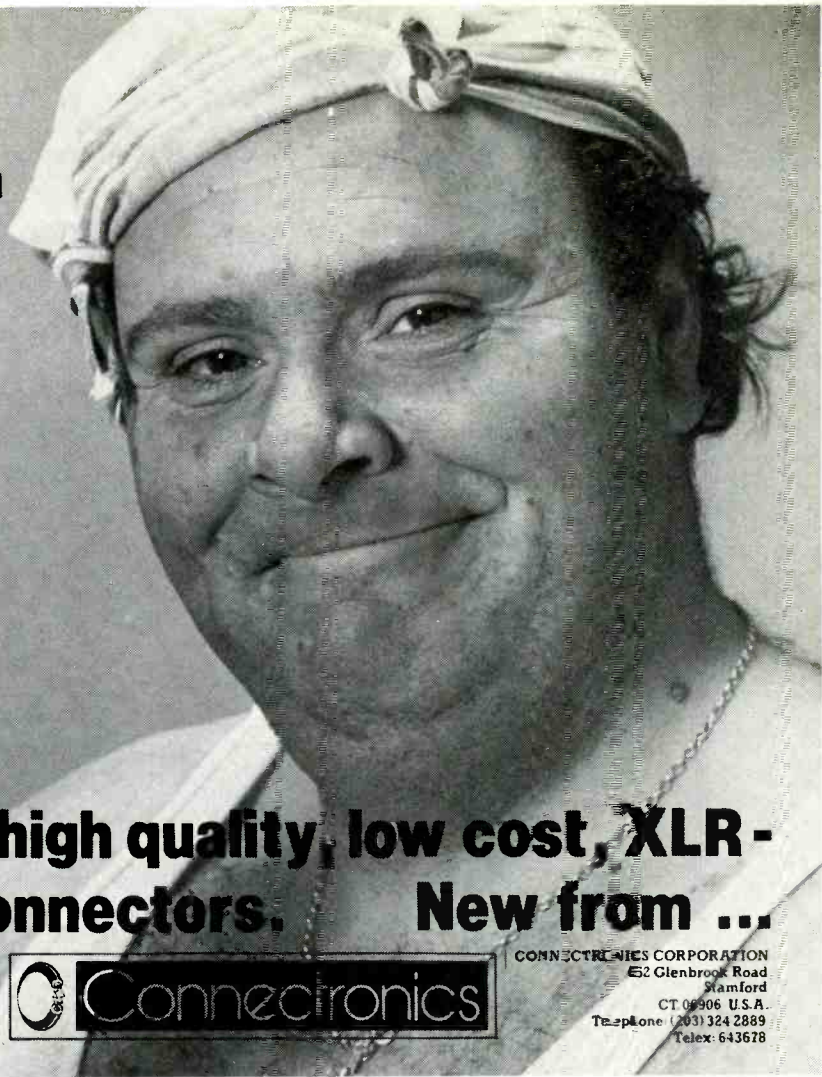
Another problem in the past has been to link Roland DCB

instruments, the Juno 60 and the Jupiter 8, to other machines, and this has been solved by Roland's MIDI-8 unit which converts DCB to MIDI and vice versa, assigning information to any of the 16 communication channels on MIDI for selective playing of instruments. So it should be possible to link other MIDI instruments to the JSQ-60 via the MIDI-8—for Roland that means the Jupiter 6, JX-3P, HP300/400 and the new Juno 106.

Roland also released the first MIDI drum machine, the TR-909, to take over from the TR-808 as a studio instrument. Ninety-six rhythm patterns can be memorised on two banks of four continuous tracks for storing programmed rhythm chains of up to 896 measures in all in each bank. The sound sources are analogue or sampled for bass drum, snare, three toms, rim shot, hand clap, hi-hat open/closed, and crash and ride cymbals. As with the TR-808, some can be tuned and levels can be adjusted, but 'shuffle' (eight types of syncopation) and variable flam effect are added. Complete rhythm tracks can be saved on cassette and an optional RAM cartridge (M-64C) extends internal memory to give 96 x 1792 bars. It's sensibly provided with two MIDI outs to allow other instruments to be sync'd. The standard Roland sync code completes the link to Roland MicroComposers and the new MSQ-700 recorder, but only one instrument trigger is available from the Rim Shot. A lot of musicians will enjoy playing a dynamic drum solo from a velocity sensitive keyboard with the TR-909 and it shouldn't be long before the MIDI makes sense for the drummer by means of live drum pads.

If you're only interested in note (event) playing and program changes, Roland's JSQ-60 recorder is ideal and makes a good

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ELECTRONIC INSTRUMENTS AND THE STUDIO

alternative (at around £200) to using a home micro in the MIDI set-up. Their *MM-4* MIDI *Thru* box (at around £49) will also be a popular add-on to the majority of instruments that only have in/out, but their top line contribution as a sort of MIDI equivalent to the *MicroComposer* is the *MSQ-700 Digital Keyboard Recorder*. Claimed to be the first MIDI compatible sequencer, it can handle 16-voice polyphonics through MIDI or *DCB* link (and will sync to anything else with a Roland sync in/out socket to keep your existing drum machines and sequences in the system).

Whereas the *JSQ-60* only processes note (with velocity and pressure ignored) and program changes using straightforward 'whole track again' editing, the *MSQ-700* accepts the lot—pitch, velocity, MIDI channels, program changes, hold and bender modulation. Capacity is 6,500 notes in 8-track memory to be chained, merged, overdubbed or multitracked. This number of real-time or step events compares favourably with what you would get from a home micro like a Commodore 64 and editing allows time value changes located via displayed bar information. Cassette tape and battery backup sort out memory storage and there's also a 'Tape Sync' function for layering on your studio multitrack.

New for Frankfurt was the *Juno 106 (JP-106)*, a low cost MIDI synth with 128 programmable memories, polyphonic portamento and chorus. MIDI control is limited to LFO modulation, Bender, program changes (but not individual parameters) and key note info only.

The centre of attraction for many guitarists was the new *GR-707* guitar controller plus *GR-700* synth and is the first guitar MIDI system. Operation of the programmable synth unit is made easy by means of 11 footswitch pads and a sizeable LED display. The *GR-707* guitar is the same as a *G Series* guitar except for a special stabilising arm parallel to the fretboard and is there to reduce unwanted resonances that may obscure a string's fundamental tone. It can be used with the *GR-300* and *GR-500* and has a new tremolo unit and front pickup for anything from warm *Les Paul* to heavy rock.

The *GR-700* synth unit is really like a *JP-6* with 6-voice poly and two oscillators per note, 64 program memories, plus tape interface or cartridge memory expansion to 128 sounds. Cross modulation makes bell-like sounds and dual osc phase sync brings a *Moog Prodigy* flavour—but leaving the details aside, here's an opportunity for the guitarist to show off his technique without resorting to learning the keyboard to get a Hammond organ sound, backed by guitar strums, rippling

surf and string orchestra!

It is likely that Roland will reveal their modular synth concept in a few months that will let you buy the synth modules that you want and control them from a MIDI 'mother keyboard', the *MK-1000*, which has heavy weighted wooden keys and touch sensitivity, and programmable floating split in mono or poly modes. The modules will be 19 in rack mounting and therefore lend themselves well to studio use.

Moog were not present at the Fair but we'll keep you informed on their new MIDI-equipped *SL-8* polysynth and some software programs under development that can be used with a *MemoryMoog* retrofitted with MIDI for 5250 event sequencing and program changes, albeit rather expensive

(£575). The sequencer also suffers from the same drawback as the *JSQ-60*, in that if you make an error in a track recording you have to do the whole thing again.

A newcomer to the self-contained *Apple*-based music system idea is *Musipack 1.0* from the Italian Jen company. It's a less expensive alternative (at under £1,000 minus micro equipment) to Passport Design's *Soundchaser* and the Syntauri Corporation's *alphaSyntauri*. All three use the same dual 8-voice sound generation and additive harmonic synthesis and waveform drawing, as well as on-board multitracking up to 16 tracks (currently four for Jen). Sync to tape, external drum triggering and music printout is also offered. The important considerations for us are adequate

memory and sync'ing that's continuously accurate, good enough sound quality and upper bandwidth, and multitrack options that don't simply provide a limited alternative due to restricted mixdown. It's possible to improve all systems by replacing the stereo output filters with 96 dB slope filters and they're MIDI as far as timing is concerned through the Roland sync code output if you use an interface with Roland sync as well. Jen even make their own *Lemon II* lookalike to the *Apple II* with extra numeric keypad and rear slide-out microboard for quick access to cards.

The Fairlight *CMI* has received a face-lift in the form of a new processor unit with 8-voice cards and 500K RAM expansion to enable not only longer

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	300W into 8, per channel
dx3000	3000W into 4, mono
	1600W into 8, mono
	1500W into 2, per channel
	800W into 4, per channel
	450W into 8, per channel



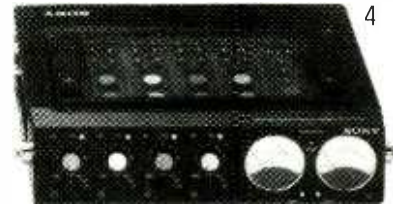
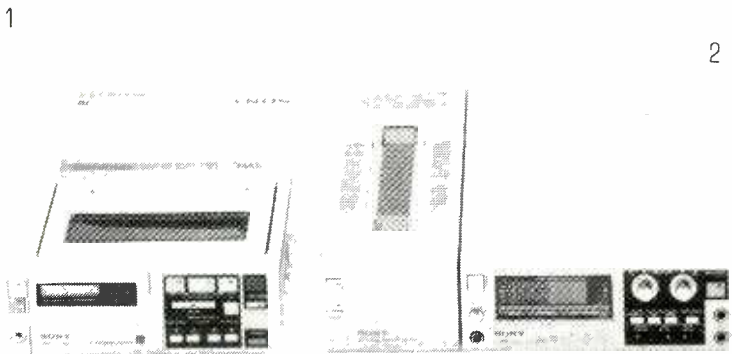
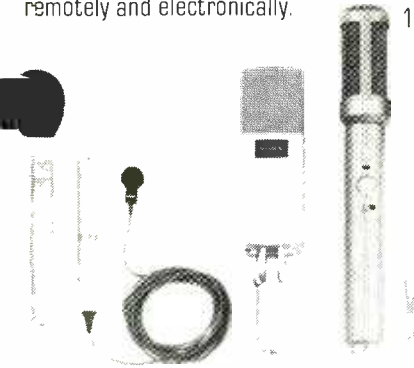
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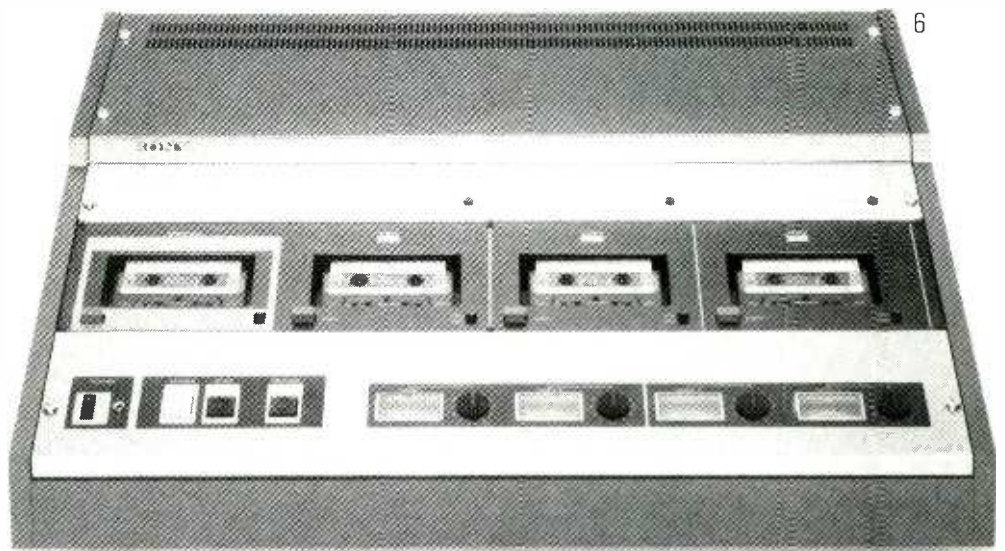
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ELECTRONIC INSTRUMENTS AND THE STUDIO

compositions but also a sophisticated music printout option that will soon be completed. Fourier analysis of sampled sounds is now possible and there are new features on Page 7 that includes pitch bend, delayed vibrato, and patchable filter for keyboard or pedal. Waveform justification now corrects tuning for Page 6 operation and further control features appear on Page D. Page H has a wavetable where you can create new sounds by drawing a waveform envelope instead of a harmonic series so that 32 segments of a waveform can be created and merged together.

PPG introduced the *Wave 2.3*, a self-contained polyphonic synth that stores basic waves, two natural sounds and 1,800 other waveforms. It has a built-in sequencer for 8-channel mixing of different voice sounds and can be integrated into the full PPG system. PPG are heavily into ensuring that anything you get from them can be updated as new hardware and software become available, so you could bring your 2.2 in line with *Version 4, 1984* software. However, the 2.3 is an instrument in its own right and without PPG's *Waveterm* it can still load 12-bit sampled sounds and modulate them fully. The built-in sequencer has real time recording and playback from eight different sounds in any one sequence plus multi-parameter mixing. Adding the *Waveterm* lets you create your own 8-bit samples or harmonic waveforms and manual input composition using the screen displays. The PPG *EVU* unit expands sequencing to 16 voices and the *PRK* keyboard contains its own sound bank plus variable tone and pressure.

One of the surprises at the pro end was Oberheim's new *Xpander*, a 6-voice individually programmable synth that offers all three synthesis alternatives—analogue, digital or FM—with 90 VCAs, 30 LFOs, 30 EGs, 12 oscillators, six 15-mode filters, six lag processors (portamento) and six FM generators!

The *Xpander* will operate with any keyboard, guitar or computer with MIDI or analogue CV/gate control and can be a source for six separate voices, controlled by a MIDI channel or CV input, so its use extends far beyond using it with the current Oberheim music system. The front panel has an interactive diagrammatic layout (on the same lines as the *DX-1*) and employs three 40-character fluorescent alphanumeric displays for creating complex programs and routing 'algorithms' easily. The control knobs can be continuously rotated to provide very accurate stepped encoding of parameters and '*Xpanded autotune*' can instantly set up filters and VCAs as well as oscillators.

Besides having storage for 100 programmed sounds, an additional

100 'multipatches' set up performance combinations of sound patches in full detail. Incidentally, if you want some new or custom sounds for your *DMX*, you'll find more details from R&H Studiosound, 7808 Waldkirch, West Germany.

Some manufacturers have been quicker than others to get into MIDI and large-scale systems like the Fairlight and PPG are both expected to implement it, while 360 Systems appears to have taken the plunge already (at least the sockets were there!). And, as discussed in February *Studio Sound*, there were a number of sound sampling machines at the exhibition.

A West German company, Klangwerk, have a large instrument called the *Audio Operator* that samples natural acoustic or recorded sounds via mic or line and stores them on disk. It claims studio quality response, complete structural manipulation of the sampled sound and can store and play from its keyboard up to 16 voices with full recording and parameter control. Recording can be done in three modes: manual, auto (on variable threshold level), and assembling (storing last heard sound). Sixteen memory blocks give a full 1 min recording time and one memory block can hold eight parts of 500 ms length each, although these can be used in varying combinations.

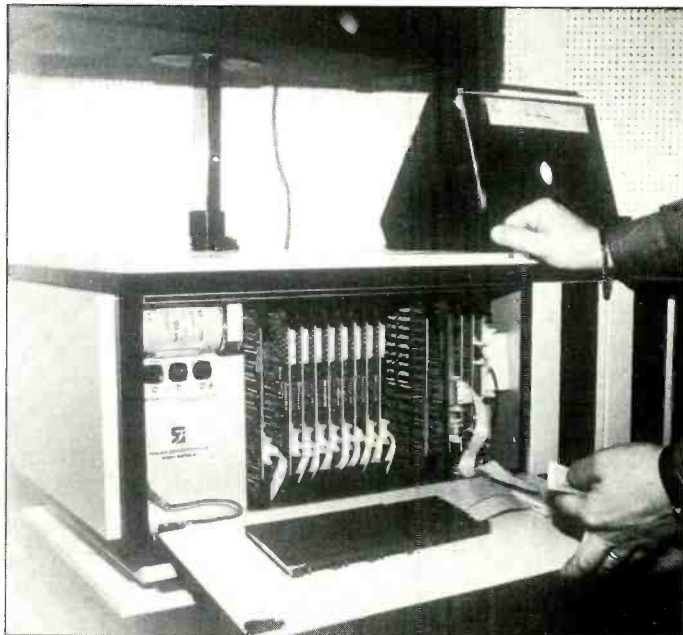
Sixteen-voice playing can be configured to play 1-16 voices, mono or poly and there are eight assignable keyboard splitpoints for accessing eight tracks. Up to 50 programs can be stored that contain full performance data—parameter values, part names, memory blocks, arpeggiator select, and performance parameters. The latter includes fast 'play' locating and manipulation of sound data, waveform analysis, real time recording and playback, delay line setting and the possibility of using your own software to create new menus, etc. The keyboard has five octaves and can be dynamic, wood and dual if required. The 5 in disk system holds 1 Mbyte data and a built-in LCD monitor can be supplemented by an optional 12 in VDU.

The interesting sampling details are that start attack/release, start/stop loop and release are addressable in memory, plus delay, phasing and panning as well as standard LFO, ADSR, VCA level setting. The polyphonic arpeggiator is definable and the 16-voice sequencer holds some 200,000 notes(!), with SMPTE code sync. External micro access is to a Z80 system with printer and monitor.

The second German sound sampler comes from Musikelektronik in Munchen, with a range of stored instruments, choirs, percussion and other sounds allowing Fourier, FM and



Yamaha software being explored



New Fairlight CMI unit

wavetable synthesis from its 8-bit, 32 K RAM system at 12 kHz bandwidth. But if you're looking for a cheap answer to sampling, I believe that Movement Audio are still proceeding with their EDP-style mono instrument—or there's a third German company, Dr Bohm, who showed a prototype of their updated *Sound Lab*, that could be the first kit mono sampling instrument in modular form that is built into a carrying case. Samples can be played from its own keyboard or any 1 V/octave source or MIDI. The patching system is mainly for the built-in analogue synth which is based on the well known Curtis chips found in many pro synths.

The 'single sample' sound box is bound to catch on with effects manufacturers as the next step to take, because a sample can be anything from drums to a natural

sound effect that's triggered from a pushbutton, transducer or pulse—as in the new Ted *Digisound* range of modules. They make useful studio accessories for direct line connection and each unit's 'pitch' can be tuned. Of course, a lot of drum synthesisers are employing sound samples too, following the path of the LinnDrum, with the latest coming from Allen & Heath Branell, the *Impulse One*. Most studio delays will do the job just as well—the Publison *Infernal Machine 90* is a new stereo or quadra 16-bit audio computer that will be of particular interest, with maximum delay up to 5 min, SMPTE, digital or MIDI-controlled automation, pitch shifting, variable delay through algorithm selection and an informative alphanumeric display. Dynamic range is 96 dB for 16 bits or 114 dB for optional 19-bit

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ELECTRONIC INSTRUMENTS AND THE STUDIO

operation over a 20 Hz to 20 kHz response. Take a look at the new Dynacord delays as well if you're looking for alternatives.

E-mu Systems are about to introduce their *Emulator II* digital sampling keyboard. It's likely to be cheaper than the original system, yet still retaining dynamic polyphonic playback, plus increased frequency response and reduced distortion (from a new data encoding technique) on a maximum 17 s sample with 1 Mbyte disk storage.

Its 5-octave keyboard has velocity sensing and each of its eight channels can be treated by filters, VCAs, EGs and independent delayed LFOs. A variety of keyboard algorithms provide voice assignment selection and any number of voices can be used on the keyboard at once if you've not run out of memory. The sampled sounds can be given their own particular part of the keyboard or be overlapped or simply stacked with other sounds—up to eight on any one key. The built-in digital sequencer has auto-correct and plenty of editing features. Connection to the external world is via RS-232, MIDI and SMPTE code reader/generator.

The printing of a music score is relatively easy to do as separate staves of monophonic music say, from a digital multitrack system like Syntauri's *Metatrack*. But it becomes a complex operation when taking a polyphonic input. Synclavier have produced a big lead in this area with very good reproduction down to the tidying up of demi-semiquaver errors that eventually creep in with real time playing. I'm impressed with the Fairlight printout as it stands and also discovered that Kurt Maas from Munich has been doing computerised music printing for some time, although he's really offering a 'music engraving' system that's used by a 'programmer/secretary' to code in a copy of a handwritten manuscript.

A Canadian company, Syntronics, have jumped into the limelight at Frankfurt with a large computer-based music system called the 'McLeyvier'. No specific details are available at present except that music can be composed and printed out at high quality. Meanwhile, home computer programs on *Spectrums*, *Apples* and the like do a good job with single stave printout and even manage to combine parts into piano staves if required (alphaSyntauri's *Composer* software).

Another important feature that could well be on a lot of moderately priced synths before long is the provision of a built-in sequencer that plays different sounds together in unison or as separate instrument lines. Sequential Circuits' new *Six Trak* MIDI synth must take the praise

for this new feature and offers this facility for six voices. A further sound program can be played live from the keyboard during sequencer playback. Although the sequencer is limited to 800 notes, it can tidy up your note input and remember playback speed and volume changes. Already available is SCI's cartridge pack for the Commodore 64 that makes 6,000-note sequences on the Prophet 600, T8, or retrofitted 5s and 10s.

The Italian Siel instruments are likely to become better known in the next few months due to the new UK distribution and have some products aimed up-market, notably the *Opera 6* programmable synth and its companion *Expander 6* unit. The *Opera 6* benefits from Siel's development of velocity

sensitive keyboards like the *Piano Quattro*, a stage piano with weighted dynamic keys. With some 95 factory or user programs available, the *Opera 6* is a reasonably sophisticated digital instrument featuring analogue-style controls, six voices each with two DCOs, 24 dB LP VCFs, six EGs, key split, program dump to cassette, and MIDI control. Siel must certainly be credited for keeping up with the Joneses, for they've brought out no less than seven versions (on internal EPROM) of MIDI control this year already! The latest info on this shows note playing (plus velocity), program changes, keysplit and parameter dumps should all be possible.

The *Expander 6* is a useful stand-alone 6-voice unit that is

really an *Opera 6* without the keyboard. It could provide the source for polyphonic sounds through MIDI controllers and can direct load new programs and individual parameters from the *Opera 6* or a micro using Poly mode to allow data transfer to specific MIDI instruments on channels 1 to 16. Using the split facility, it is possible to assign one section of the master keyboard to play a particular *Expander* module. Their MIDI interface box is a standard MIDI in/thru/three out with external clock in, initially for Commodore 64 and *Spectrum*. □

Within the UK, for general information on MIDI you can contact Electromusic Research on 03744 67221.

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16:2:1 12:4:2:1 16:4:2:1

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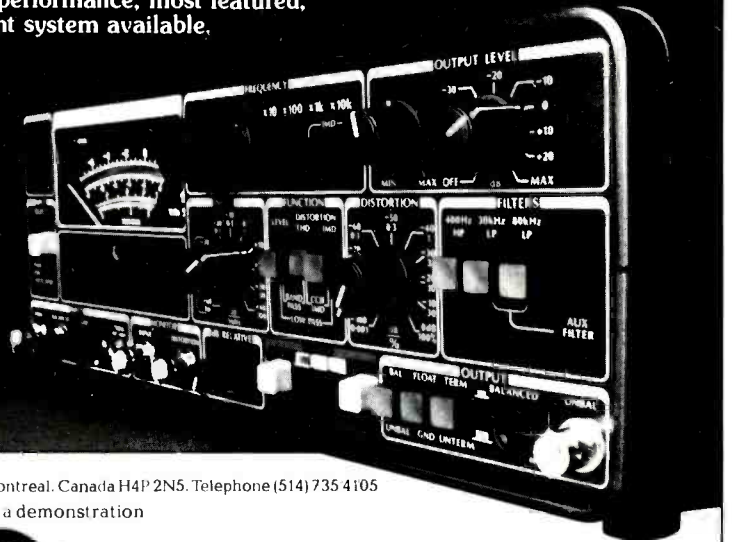
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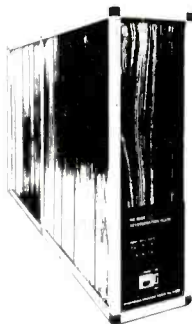
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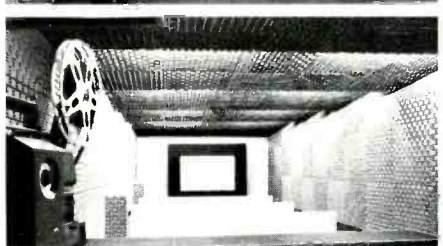
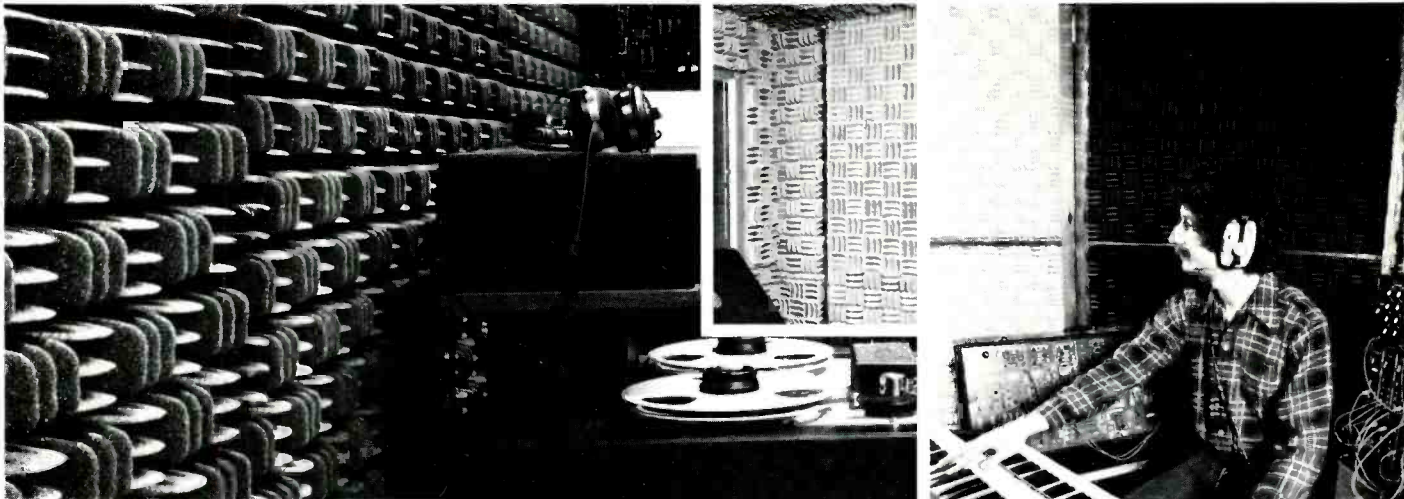
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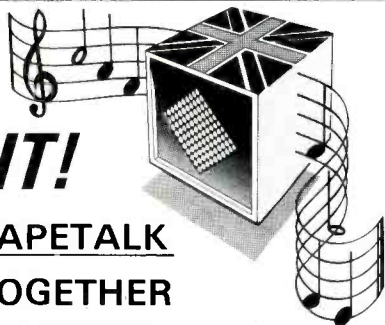
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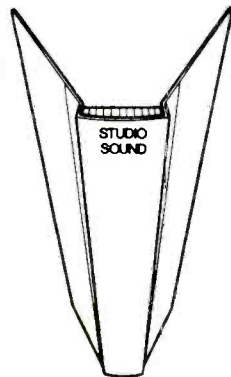
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FOSTEX A8 1/2" 8track, Dolby C	60	40	20
TASCAM 1/4" 4track	50	30	20
TASCAM 244 Portastudio	35	20	10
FOSTEX 250 Multitracker	35	20	10
REVOX B77 7.5/15ips	45	25	15
OTARI MX5050B Stereo	60	40	20
REVOX PR99 7.5/15ips	50	30	20
OTARI MTR90 24track	600	400	150
ITAM 1610 1" 16track	250	140	75
TASCAM 122 Cassette	30	20	10

Mixers:

	Week	3 Days	Day
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ITAM 12x4x8	100	60	35
TASCAM Model 30 8x4	50	30	20
FOSTEX 350 8x4	35	20	10
TASCAM Model 2A 6x4	20	10	5
CUTEC MX1210 12x2	25	15	10
LOCATION MIXER 8x2	70	45	25
PORTAMIX 6x2	40	20	15

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OTARI DP4050 C2	150	80	40
OTARI DP4050 OCF Reel-to-reel copier	300	200	80
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QUAD 405 Amp	20	10	5
TASCAM DX4D 4ch. DBX	20	10	5
FOSTEX 3050 Digital Delay	20	10	5
FOSTEX 3070 Compressor Limiter	20	10	5
KORG SDD 3000 Prog. DDL	60	40	20
MXR Digital Drum Computer	100	60	35
ITAM dB30 8 channel noise reduction	30	20	10
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DRAWMER DL221 Dual Compressor Limiter	30	20	10
MXR Dual Limiter	25	15	10
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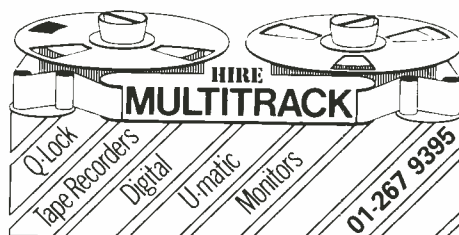
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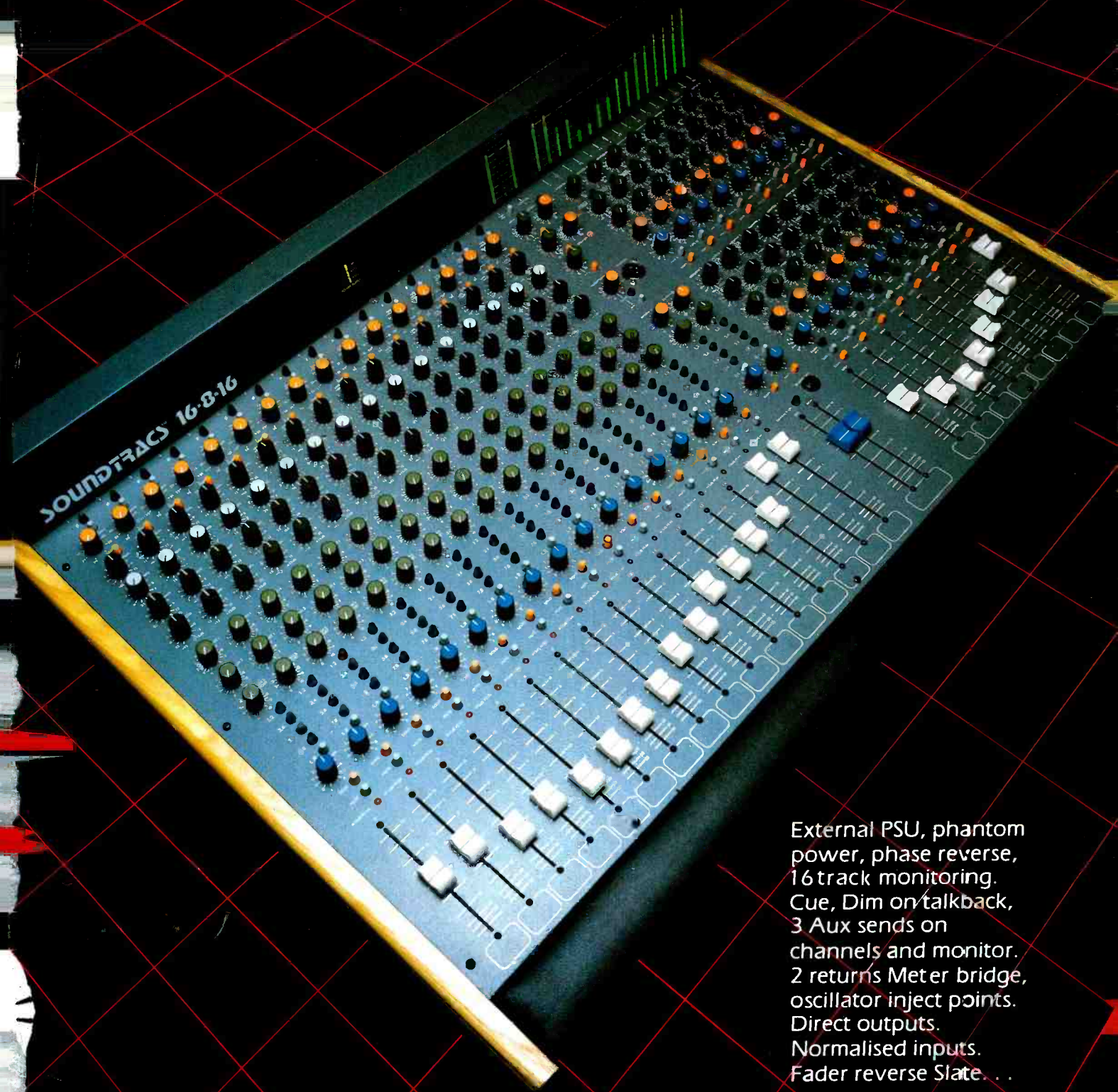
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