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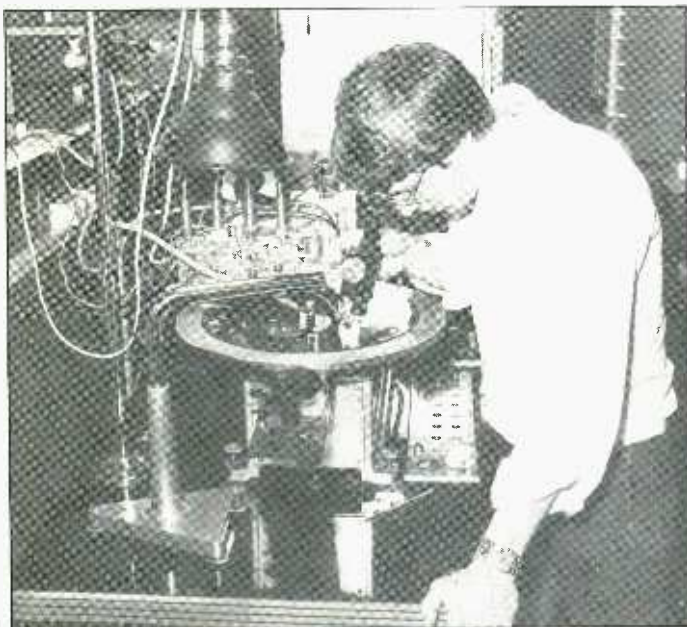
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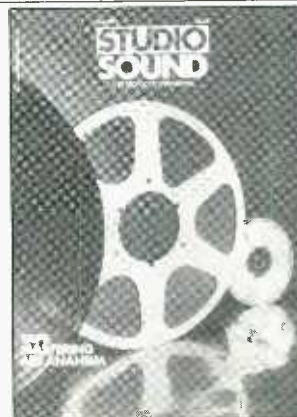
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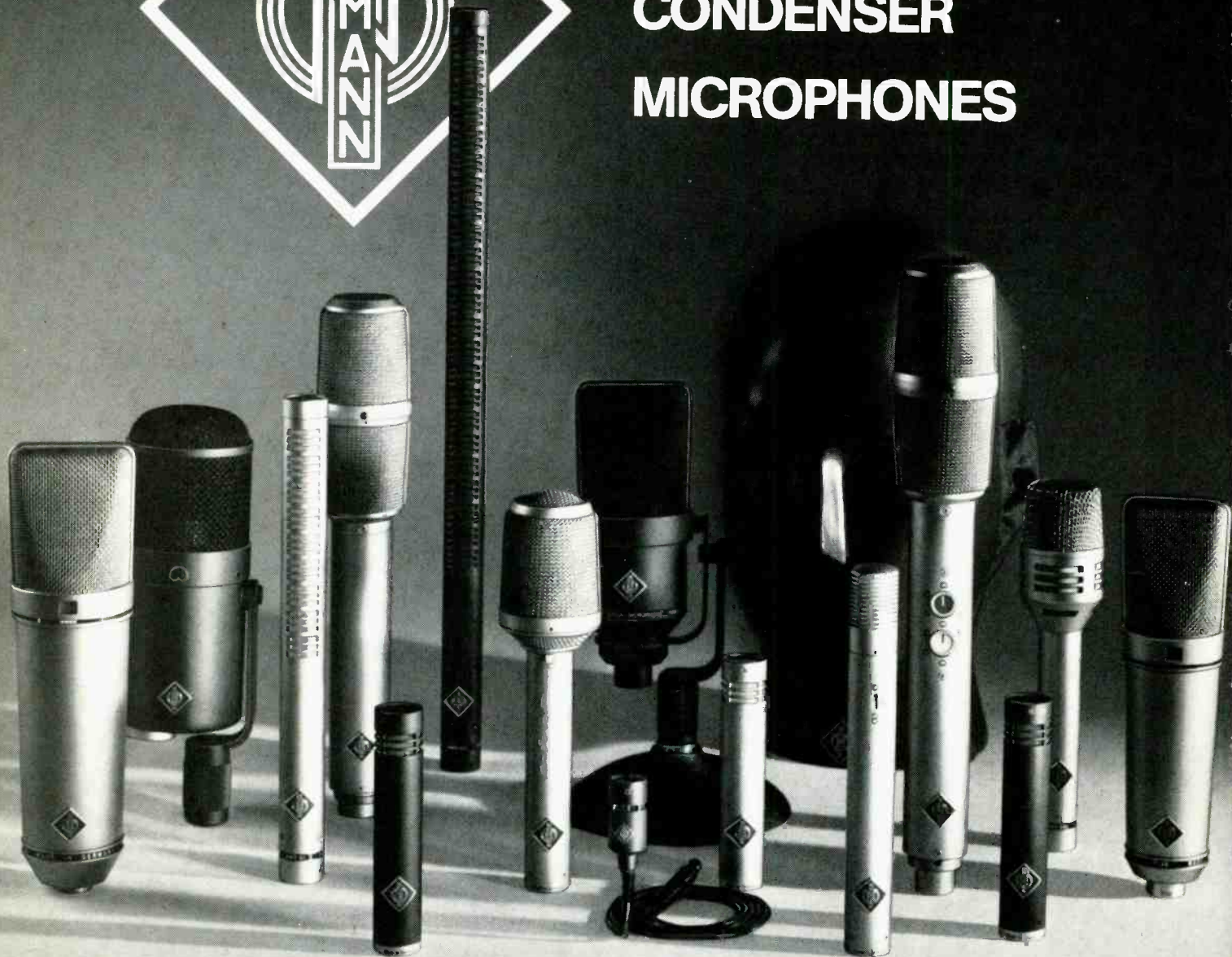
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EDITORIAL

EDITORIAL

This month's comment from Keith Spencer-Allen

Mastery

We all have those days where little goes right. Some people I know have that kind of life. For me this has been one of those months. Although this is the May issue, the *now* of writing this is February in a heavily snowbound Europe and very little is running normally either inside or outside this office. The weather and the frailness of human bodies have together conspired to produce an issue with a different angle on the cover topics.

Planning an issue such as this with clearly defined cover topics such as Tape and Mastering is theoretically very straightforward. Our hopes of that 'leading edge' (or cutting edge?) technology story from Western Europe rest on a man whose car has a tank of frozen diesel and a voice at the end of the telephone adds that if the temperature drops another 2°, his tyres will freeze to the road. Meanwhile our round-up of attitudes and techniques is as unwell as most of the contributors to the piece—although while their affliction is reputedly extra-terrestrial in origin, our article is rapidly 6 ft underground. The tapes for review are anywhere other than where they should be and so on and on.

These enforced changes to our preliminary plans are not unusual and in this case may prove to be somewhat fortuitous. Having fewer technically orientated features on the cover topics than planned has left room for the opinions to flow. Aside from a few notable exceptions, the cutting engineer or his equivalent in the other mastering disciplines is a low profile position although not one to be dismissed by any means.

Why is it that certain cutting engineers, for example, are much in demand and/or command enormous amounts of respect when there is so little variety of equipment available that most mastering rooms start at least with the same basics and then tweak? The opinions expressed throughout this issue particularly on the topic of disc cutting are always just the visible areas of a cutting or other discipline that makes that individual result different from the next similarly equipped room.

The world is also full of mediocre mastering engineers who practise on the same equipment that is used by the in-demand practitioners although don't achieve the results. The difference between the two groups has to be something that is difficult to explain and quantify—an art. We can only hope to learn by listening, both to product and attitudes.

There is really not enough to write about in the art end of

disc cutting but approaches and quantifiable techniques will give clues to what this art really is. I don't think that this is necessarily anything that most engineers try to foster unduly. In several places in this issue you will find quotes that almost express utter joy at being able to transfer a master tape to disc with no electronic assistance (flat) which would almost suggest that disc cutting is a negative art in that it is more important to know what not to do or not to touch rather than what to treat.

Further if you get a tape that needs something doing to it to complete the transfer, then the good cutting engineer is the one who treats the signals although your attention is not drawn to it. Again this negative aspect appears, as success means that you can't hear that anything has been done. There are of course the other disc cutters who specialise in further processing to enhance the finished master although I feel that this is more an extension of the recording process rather than the more specific aspect of disc cutting.

Undoubtedly there is an art to successful disc cutting and whatever that really comprises we should celebrate all forms of successful mastering.

This rather neatly brings me to CD mastering. I get the impression that the average CD is now a much better item than a year ago and someone in the production chain is learning their craft (although it may be more pressure on record companies). At present, certainly in Europe, the CD is being heavily marketed to those lapsed record buyers who may have become disillusioned with vinyl discs, as well as some of the more hi-fi orientated markets. Quality of sound is very much the selling point at present although certain personalities are far from happy about even that.

So far so good. I hope the quality continues to rise and the minor bugs within the CD process disappear. The time I feel we may have to worry is when the record companies feel they have saturated the current market and have a surplus capacity for CD production. To meet the mass audience the CD will have to be marketed as a system of convenience, simplicity and versatility rather than of sound quality. It would be an everlasting shame if such a change in marketing should lead to a scale down in quality requirements to meet mass market commitments as seen by the record company. Unlike with vinyl discs, there are few producers of CDs and it would be easy for such a situation to happen. □

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

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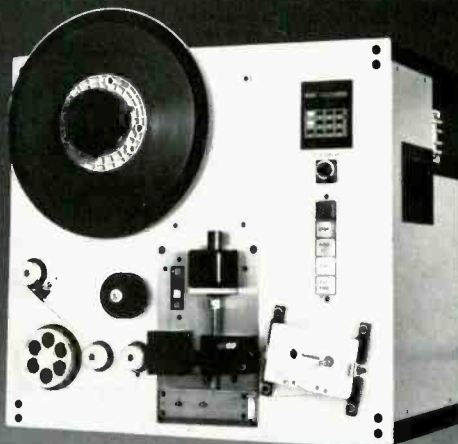
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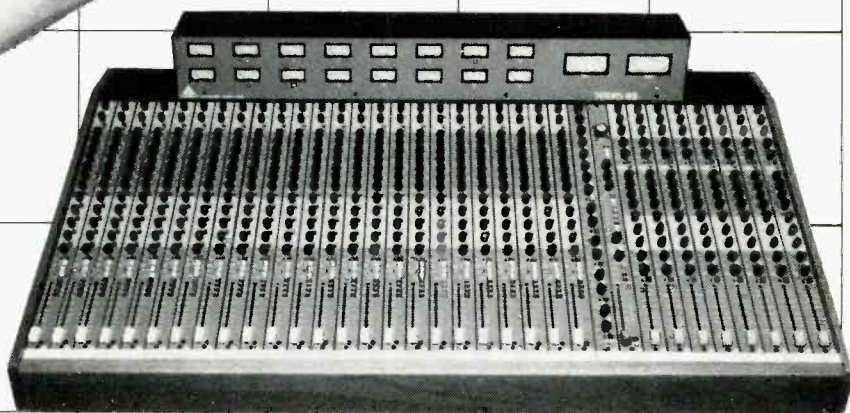
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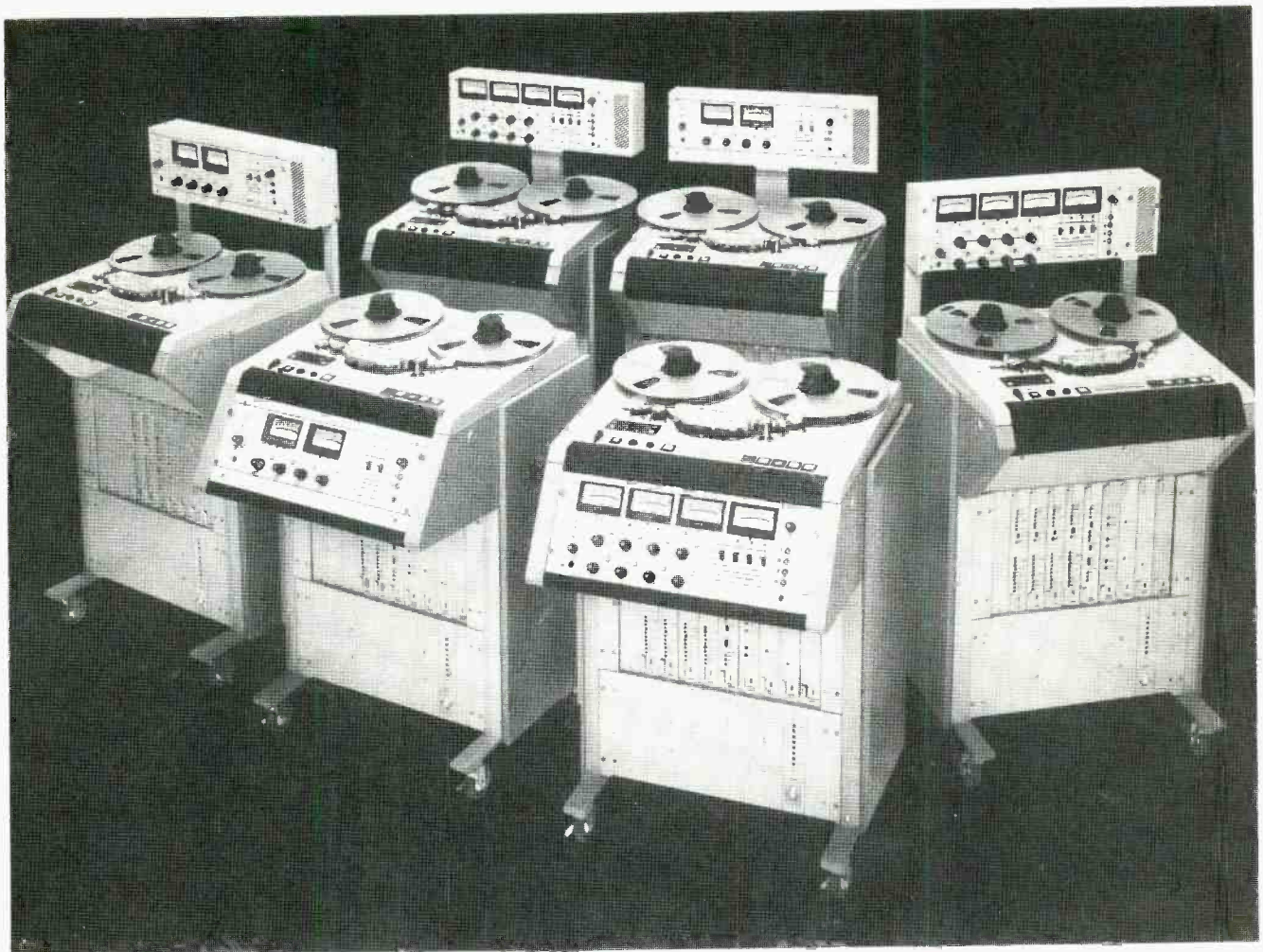
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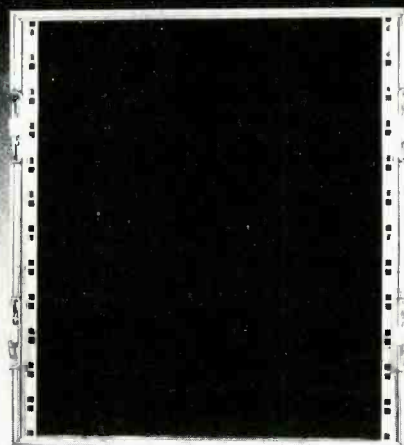
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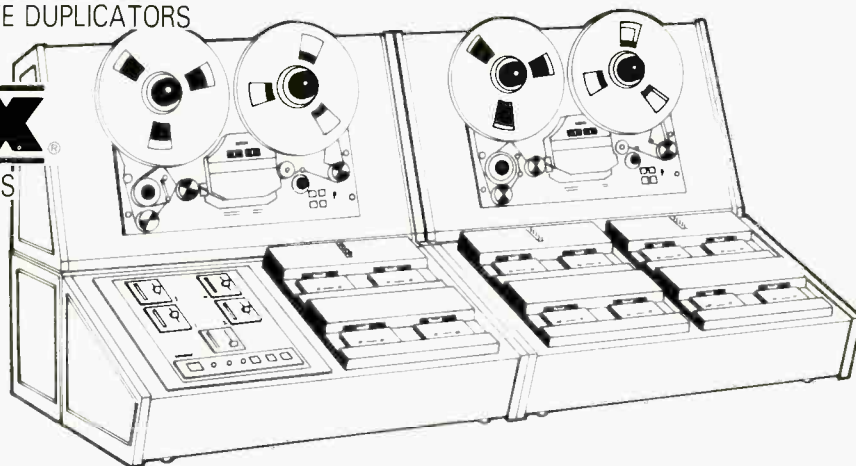
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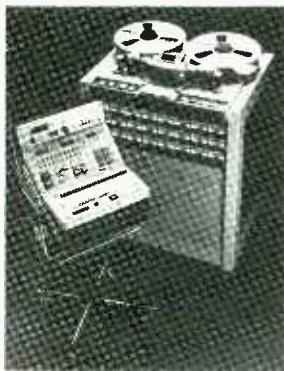
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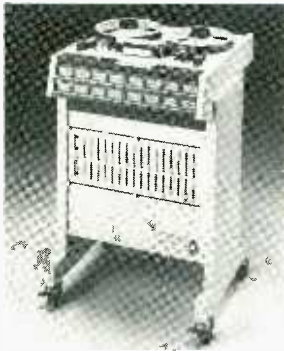
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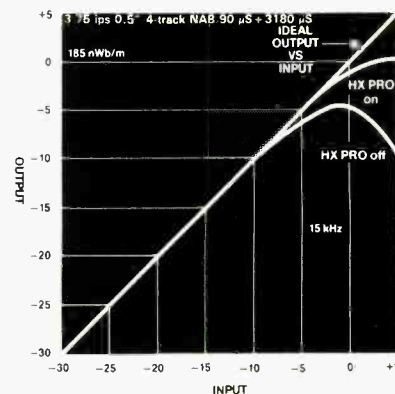
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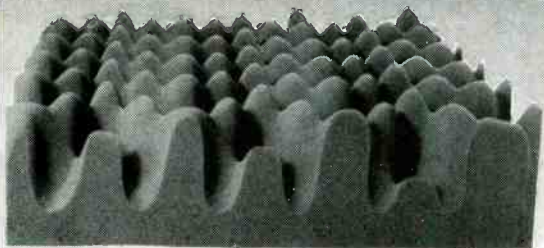
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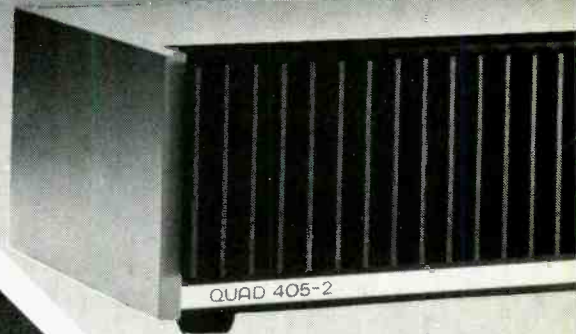
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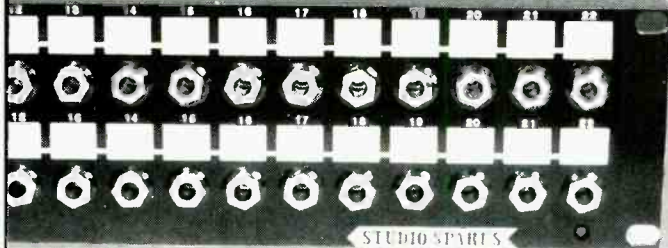
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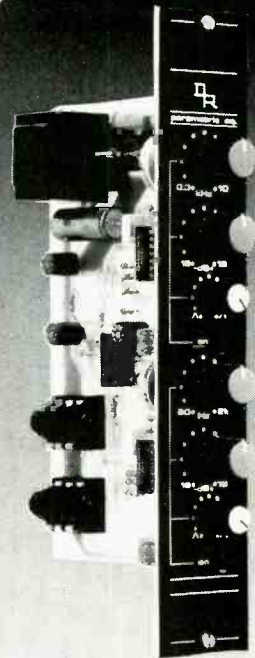
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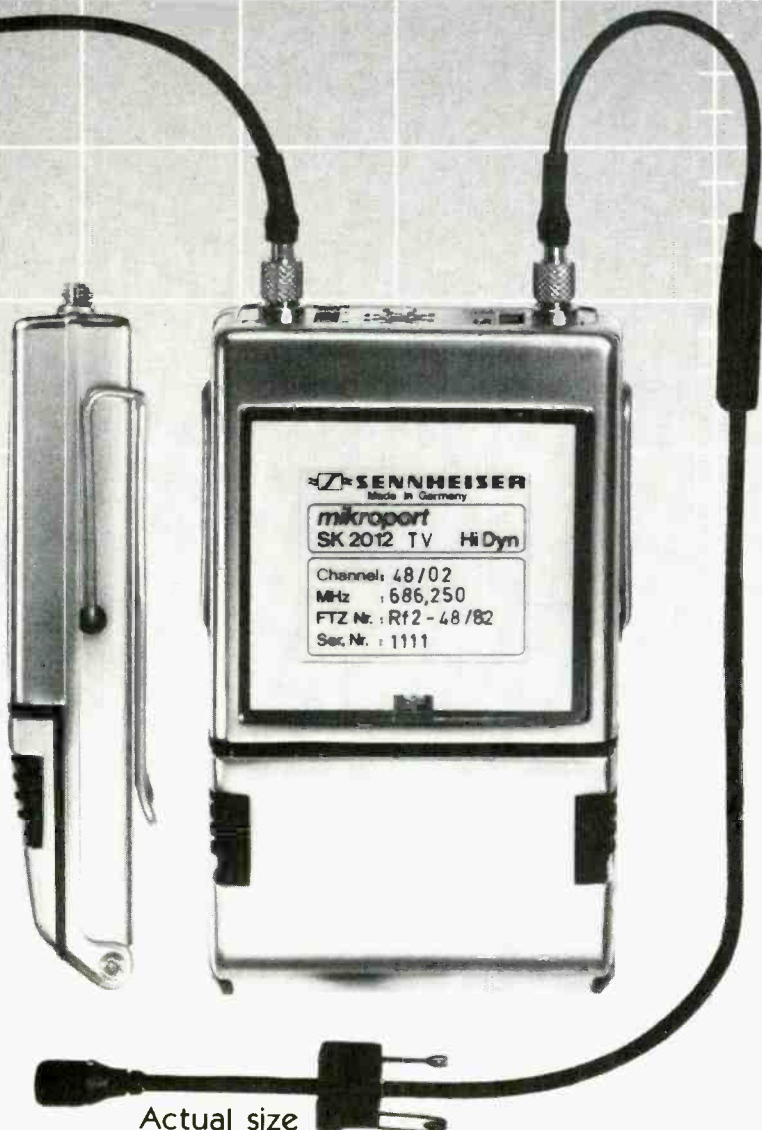
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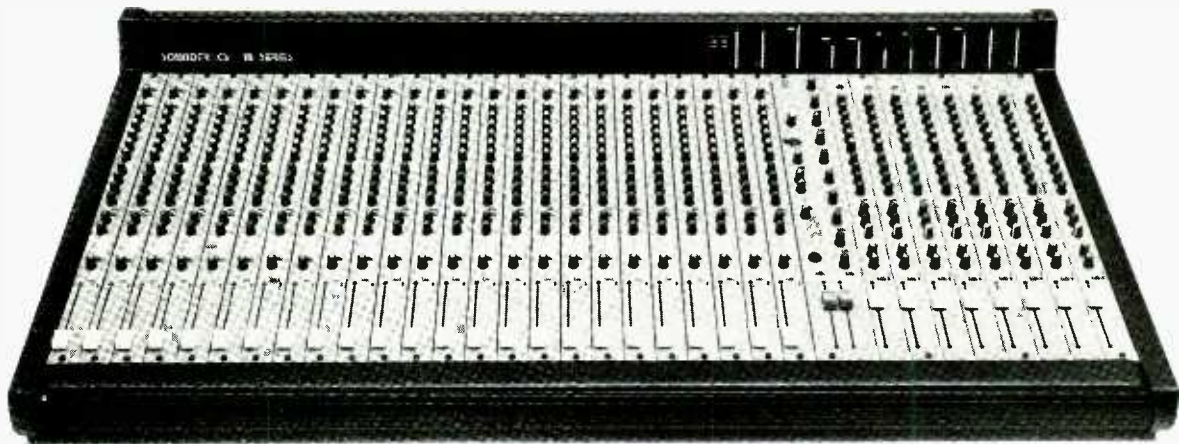
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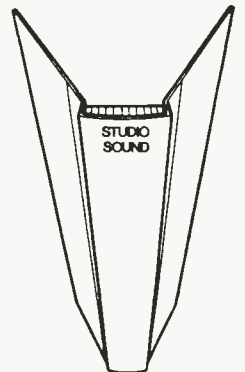
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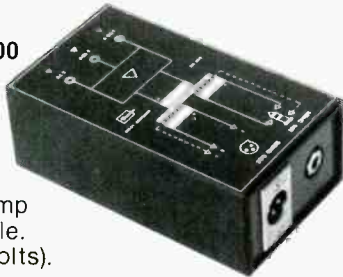
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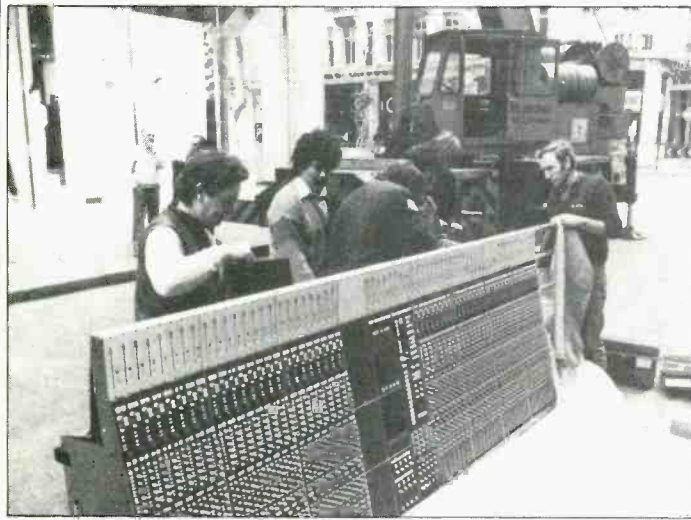
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DIARY DIARY

Delivery, mastering



AIRborne

A nail-biting moment as a second 56-channel SSL 4000E console with *Total Recall* is hoisted into AIR studios via a fourth floor window while

bringing a section of central London to a standstill. The SSL landed safely and will shortly be in operation in Studio 2.

Over the last 10 years we have carried quite a few articles on tapes, mastering and cutting and we thought you might find this mini index useful. When some of these articles were written, particularly in the early days of CD, knowledge of the subject was limited and readers may wish to recap in the light of experience.

Tapes

Feb 75 Recording tape/Test tapes: Surveys and comparisons by Angus McKenzie
Aug 77 Magnetic tapes: Reviews by Hugh Ford
Apr 79 Audio tape: Reviews by Hugh Ford
Apr 79 From rust to tape: Steve Billige of Racial-Zonal examines how different formulations and preparations can mean different recording and handling characteristics
Apr 81 Audio tapes: Hugh Ford reviews

Mastering index

Jun 82 Calibration tapes: Reviews by Hugh Ford
Dec 84 Handling and storage of tape: Hugh Ford gives advice on how to look after your tapes
Compact disc
Feb 78 Cutting sound with light: Paul Messenger discusses the development of a PCM-encoded disc which is cut and read by laser light
Nov 81 The compact disc: Sony's Alan Kilkenny describes the Compact Digital Audio Disc system and outlines how it will change the way engineers work
Jul 83 Inside the compact disc: The basic structure of discs and players described by Rod Duggan of Sony Broadcast
Jul 83 Compact disc mastering: Hints and tips on preparing digital and analogue masters for CD manufacture from Chris Hollebhone of Sony

Broadcast

Aug 83 A technical introduction to compact disc: by Hugh Ford
Dec 83 Letters: CD questions and CD mastering
Apr/Jul 84 Business: Barry Fox on CD sampling standard, Time base errors and CD, and Laservision v CD
Oct 84 CD mastering—how it should happen: Basic rules for success outlined by Bill Foster of Tape One
Oct 84 CD mastering—how it happened: Richard Elen reports his findings after completing his first CD tape master
Feb 85 Business: CD mono—Barry Fox on the problems of replaying stereo CDs in mono

Disc mastering

Jul 15 Disc cutting in theory: Technical theory from Hugh Fennimore
Jul 75 Disc cutting in

practice: Tony Bridge of the Master Room discusses changing criteria in the wake of adventurous recording techniques

Sep 78 Direct cut myths and problems: Adrian Hope visits the Teldec plant in West Germany
Nov 79 Into the groove: John Valvo of Cybersonics introduces a new disc mastering lathe
Aug 82 Making tapes for disc: Ted Fletcher with advice on stereo phase and disc cutting
Aug 84 The modern lacquer disc: Hugh Ford visits Capitol's US manufacturing plant
Aug/Oct 84 The cut and after: A two-part article from Mike Jones on keeping up standards

Cassette mastering

Nov 83 Advances in cassette duplication: an in-depth look at the whole process from mastering onwards, by Mike Jones.

Lyrec's Secret Army



When we were talking to Lyrec about distributing their products in the UK we were surprised and impressed by what we heard.

Did you know:- That Lyrec are a Danish company who have been manufacturing tape machines for over 30 years? That Lyrec are Europe's largest maker of high speed loop-bin duplicators? That there are over 300 Lyrec multitrack machines in use in Europe?

That over 60 of those are in the UK? That Lyrec machines are in use with broadcasting organisations all over the world and the BBC alone have 30 of the newly introduced 'FRED' two track editing machines?



In short, we think that Lyrec have been hiding their light under a bushel and that it's high time for us to bring their secret success into the open. Remember, unlike Swiss or Japanese products, Lyrec machines are made in the EEC and therefore, carry no import duty.

So if you are looking for impeccably engineered tape machines at a very reasonable price talk to us about Lyrec.

Distributed in the UK by:



Scenic Sounds Equipment Limited,

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

Lyrec Manufacturing A/S, Hollandsvej 12, DK-2800 Lyngby, Danmark. Tel: 02-87 63 22. Telex: 37568 Lyrec dk.

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DIARY DIARY

Developments, cable sound

Tam cutting system

Tam has released preliminary details of a new cutting system for analogue records. The system will comprise a new design of Phonotech cutting head, together with a set of re-designed TAM electronics to complement the head.

Standard facilities will

include half-speed cutting for both LP and Disco-single high level cutting, feed-forward high frequency head protection, add-on kit for preview tape machines running at half speed (to correct EQ) and improved head safety circuits.

Andy Munro goes solo

From March 1st studio design consultant Andy Munro began trading as Munro Associates from new premises in London's Docklands. He is now totally

independent and may be reached at Warehouse D, Metropolitan Wharf, Wapping Wall, Docklands, London E1 9SS. Tel: 01-480 7121.

New DSP order

Neve Electronics has achieved a first with an order for the first all-digital sound mixing system outside the UK for the German radio network WDR (Westdeutscher Rundfunk). Specified by WDR for

installation in the 2200-seat concert hall section of Cologne's new 200 m DM cultural centre, the mixer is due for delivery during the Spring of 1986, with the hall due to open in mid '86.

Worldwide cabling from Kelsey

Kelsey Cabling, the custom cabling department of Kelsey Acoustics which has manufactured tape interface systems, mixer/microphone stage-box systems and home recording looms for various manufacturers and distributors including Soundcraft, Studiomaster, HHB, Trident

and Court Acoustics, has announced that these facilities are now being offered on a worldwide basis to both trade and end users.

Further details from Kelsey Acoustics Ltd, 28 Powis Terrace, London W11 1JH. Tel: 01-727 1046.

For nearly a decade, observations that connecting cables can affect sound quality have steadily been gaining credence, although there was no apparent objective rationale to support or refute subjective claims. As long as cable sound remained substantially inexplicable, it could only be approached on an empirical 'suck-it-and-see' basis, which has been a source of great frustration to engineers.

However, take enough empirical observations in relation to the appropriate construction techniques, and certain patterns seem to emerge. Martin Colloms recently conducted a mammoth survey for *Hi-Fi News & Record Review*, which examined a great many parameters. Subjectively the most important factors proved to be the length of the conductor and its purity, assuming minimum standards were achieved for construction and resistance.

Although there has been plenty of myth and mumbo jumbo with which to contend, there is one hypothesis which offers some support for these observations, based on the metallurgy of the conductor. Metals can never be 100% pure, and are composed of comparatively small crystal domains. It is therefore logical that the impurities will congregate at the crystal boundaries, forming molecules with insulating and semi-conducting properties such as oxides and sulphides, and these may act as some sort of impediment to the signal.

Cable sound— a rationale at last?

This hypothesis does at least offer a possible explanation for high purity being advantageous, and further indicates how the number of crystal boundaries within the conductor (which will be proportional to length, given the same basic metallurgy), may also be a factor.

Working from this hypothesis, researchers like Dutchman A J van den Hul have suggested that significant improvements might be achieved by increasing the size of the crystals formed during refining, in an ideal case so that the wire is drawn from a single 'monocrystal'.

Researchers at Hitachi Cable in Japan (a large autonomous subsidiary of Hitachi, unrelated to audio or video products) have applied a refining technique similar to that used for silicon in semiconductor manufacture, where local zone heating increases the crystal size. When drawn, the LC (long crystal) wire crystal domains become extended some 1,000 times compared to those in conventional wire, with a corresponding reduction in the number of boundaries along a length. Martin Colloms' initial reports indicate that it sounds extremely short for a given length compared to conventional cable, and this negates the disadvantages of long runs to a significant degree.

The application of this cable

to 'high end' analogue high fidelity interconnections is obvious, inevitable, and will probably be beneficial. Perhaps more important, however, will be the substitution by LC wire of the vital, necessary generator coils in analogue machinery, such as those in tape heads, pickup cartridges, microphones and loudspeakers. Comparison of two cassette recorders, one of whose heads had been rewired with LC, is reported to give very impressive results indeed.

There is little, if any, proof for the crystal domain hypothesis as yet, though LC-refined copper does show certain characteristics different from conventional forms, such as a 20% reduction in self-capacitance. The empirical results of subjective observations will have to serve as arbitrator at present, though early indications are that these may be sufficiently positive to convince many sceptics.

If the hypothesis is valid, the implications for analogue audio could prove dramatic, both in professional and consumer circles. For the first time there may be a real vindication for the hitherto heretical 'more means less' claims applied to audio circuitry. More disturbing perhaps is that PCBs have inherently poor-sounding conductors according to the crystal structure theory, due to the manufacturing techniques

currently employed. The Hitachi Cable engineers have apparently come up with an experimental rolling process for LC copper, which should enable foils to be fabricated for future specialist PCB applications.

Certainly there could be an opportunity for significant qualitative improvements in recording studio sound, particularly at the microphone end where long leads can be difficult to avoid but probably also in critical components like tape heads. Whether there will be further applications in mixing desks, signal processors or the other paraphernalia which are themselves inherently highly complicated, only time will tell.

By their very nature, digitally encoded signals are unlikely to benefit in any way from LC technology; though fast, their binary nature should ensure that they are entirely immune from subtle degradations.

It could well be that conductor technology has been a limiting factor in high quality analogue audio for some years and may indeed have held back its capabilities *vis-a-vis* digital. Until much more experience has been gained in a wide variety of applications, it would be dangerous to predict the effect of long- or mono-crystal technology. But it could just possibly provide a sufficiently large shot in the arm for analogue audio to make digital life just a little bit harder.

Paul Messenger ▶

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DIARY DIARY

Agencies, options, people, contracts

Agencies

● Scenic Sounds Equipment have announced acquisition of the Lyrec agency in the UK. The appointment took effect in December 1984, and their first contract was ¼ and ½ in machines to London's Music Works, along with a newly installed Amek M2500 console.

● ITA has been appointed UK distributor for Ursa Major products. Details of the full product range, including the *StarGate* and *8X32* digital reverbs and the *MSP126* Multitap stereo processor from ITA, 1 Felgate Mews, Studland Street, Hammersmith, London W6 9JT. Tel: 01-748 9009.

● Audio Kinetics, seeking to improve sales and service backup in the USA have

appointed a network of dealers to cover San Francisco, New York, Chicago, Boston, Seattle, Minneapolis, Nashville, Salt Lake City, and Florida.

Audio Kinetics Inc, 4721 Laurel Canyon Boulevard, Suite 209, North Hollywood, California 91607, USA. Tel: (818) 980 5717.

● Brooke Siren Systems Ltd have appointed a new agent for Italy: Audio Link, Via Tartini 13, 43100 Parma. Tel: 0521 772009. Audio Link also have an office in Milan: Via Dei Transiti, 20127 Milan. Tel: 02 2850334.

● Professional Recording Equipment Company in south west London have been appointed sole UK and Eire agents for Perfectone SA. PRECO, 319 Trinity Road, London SW18 3SL.

Audio Kinetics interfacing

The list of consoles to which Audio Kinetics' *MasterMix Automation System* can be added now includes Amek M2500 and *Angela*; Calrec UA8000; Harrison MR2, MR3, MR4, TV4 and the *Raven*; Soundcraft TS24; and Studer 900.

Non-automation ready consoles can be equipped with *MasterMix* by the addition of the Audio Kinetics VCA fader which is available in various styles to suit different consoles such as Neve and Trident.

News from *Q.Lock* is that several new machines have been interfaced including the Mitsubishi X-800 digital multitrack, Mitsubishi X-80 and Telefunken MX-80 digital machines and the Studer A80 video layback transport. Audio Kinetics have also interfaced the older Otari MX7800 in response to customer demand.

The *Q.Lock* now also has a battery backup enabling memory retention in the event of power failure and overnight powerdown.

Contracts

● CTS Studios, London, have taken delivery of three Studer A800 24-track 2 in machines.

● Feldon Audio have recently purchased a second PCM-3324 24-channel digital recorder.

● Plantinum Studios of Victoria, Australia, have installed a 40-channel SSL console with primary computer and *Total Recall*, a Studer A80 2-track ½ in and AMS DDL.

● Harrison of Nashville have recently fulfilled a number of contracts including the first Harrison console into Denmark: an MR-4 52/36 automated console expandable to 48 inputs to Medley Records of Copenhagen. Norwegian Theatre (DNT) in Oslo, due to open this Spring, has taken five consoles—three HM-5s and one ALIVE for live sound

reinforcement, and one 40-position *Raven* mainframe for the theatre's electronic music and recording studio.

Five consoles have also been supplied to Australia: two TV-3s and one Pro-7 went to TCN-9, an independent TV station in Sydney and a specialised MR-4 delivered to Soundfirm TV and film post-production facility Melbourne.

● Bearsville Studios, New York recently took delivery of a Neve 8088, originally custom built for the Who at Rampart Studios, London.

● Canada's first digital recorder has been installed at Toronto's Amber Studios. The Mitsubishi X-800 32-track and X-80 digital 2-track package contract was placed with GERR Electro Acoustics.

People

● Greg Badger has been appointed director of engineering for Aphex Sound Field Systems, a new division of Aphex Systems which will specialise in surround stereo products for the film and audio/video industries. Aphex Systems have also announced the appointment of Paula Lintz as director of sales and marketing. She has been with Aphex for over six years, her previous position being sales manager.

● Cherry Lane Technologies, a division of Cherry Lane Music Co Inc, has announced that Roger Powell has joined as director of product development. Roger is well known as musician, composer, synthesist and instrument designer, perhaps best known as a member of Todd Rundgren's Utopia.

● The AES has announced the appointment of Mr. Milton 'Bill' Putnam as convention chairman for the May convention in Anaheim.

● Crown International has appointed four new engineering speciality managers: Tom Lininger goes from microphone engineer to manager; Tom Szerencse is engineering group manager; John Bachman also moves to engineering group manager and Jim Marks is appointed sustaining engineering manager.

● Four engineers have been appointed at JBL Inc. Drew Daniels, a former JBL man comes from CBS Fender as applications engineer for JBL and UREI; Roy Cizek, formerly a design engineer with Altec Lansing, joins JBL as senior engineer; Henry Martin is a new senior engineer and engineering manager for JBL; and Paul Apollonia has joined as an acoustical engineer.

● Gordon Parker, head of BBC's engineering designs department has retired and is succeeded by Ian Miller, previously head of studio group.

● Otari Germany have appointed Harald Viering as sales manager. He has extensive experience of the professional audio, video and broadcast business.

● Alan Archer has joined

Soundcraft Electronics as product manager, following eight years with Neve Electronics as technical services manager. He is based at the Great Sutton Street head office and takes responsibility for the entire range of Soundcraft Electronics products as well as the tape machines from Soundcraft Magnetics.

● Dave Cottam, formerly with Feldon Audio, has joined ITA's sales team where he will be involved in promoting the professional recording products to the larger studios and video facilities. Stephen Knight comes to ITA as sales consultant for the Republic of Ireland. He may be contacted on Dublin 896026.

● Telex Communications in Minnesota has reorganised its international department, and Michael Olinger, formerly international sales manager has been appointed vice-president, embracing responsibility for management of the international department and several special assignments related to off-shore technology transfers.

● David Amey has joined Monitor Systems Technology from Tannoy where he was UK sales manager. MST are worldwide distributors of Rauch Precision power audio products and UK distributors of Turbosound loudspeaker enclosures, and David becomes head of sales.

● Nick Ryan has joined Edward J Veale and Associates. He was previously technical director of Sarm Studios West and East in London.

● In New York, Bearsville Studios' owner Albert Grossman has announced the appointment of Steven Bramburg as studio manager, who was previously vice-president and general manager of Boogie Hotel Studios.

● Houston, Texas—Richard Avery has joined Midcom Inc as vice-president/sales manager. Before Midcom he was responsible for design and production control at Interface Electronics, and has a background of audio engineering as well as design and manufacture of mixing consoles. □

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NEW PRODUCTS

NEW PRODUCTS

Equipment, modifications, options, software

Shure's low profile SM91

The *SM91* is a unidirectional condenser microphone just introduced by Shure. The company claims the *SM91* is the first unidirectional boundary effect surface mounting microphone, with, at its heart, a new Shure cartridge giving high output and wide frequency response with excellent off-axis performance.

A small, sturdy, low distortion preamplifier with good headroom is supplied with the mic. Powered by a standard phantom supply or two 9 V batteries, the preamplifier includes a 12 dB/octave LF cut switch, battery on/off switch and LED condition indicator. A 25 ft small diameter twin screened cable with two 3-pole Switchcraft connectors is also

provided.

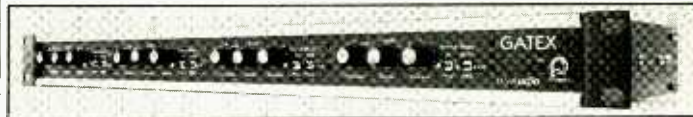
The housing takes the form of a shallow, elongated pyramid of perforated steel in matt black on an aluminium base. The housing is lined with a replaceable fine steel mesh screen and foam pad wind/dirt barrier.

Designed to operate on virtually any flat surface, the *SM91* will exhibit a half cardioid with as much as 6 dB increased sensitivity.

Shure Brothers Inc, 222 Hartrey Avenue, Evanston, IL 60204, USA. Tel: (312) 866-2200.

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

Late news: Shure has just introduced an omnidirectional version—the *SM92*.



Gatex from US Audio

The *Gatex* is a 1 U 19 in rack mounting noise gate/expander which has four channels with separate front panel controls for adjustment of threshold levels, range and release times. Two 3-position switches are labelled 'source' selecting in-out-keying by external signal, and 'mode' for noise gate operation and a choice of two expander slopes, 1:2, or 2:3. Three LEDs complete the front panel facilities: green indicates full on or unity gain; yellow ongoing expansion; and red maximum attenuation as determined by the range control.

The heart of the system is a new Valley People *TA-104* VCA which promises low distortion and wide dynamic

range.

Features of the *Gatex* include: feed-forward circuitry ensures accurate gain control; DC control of all functions eliminates noisy potentiometer problems; threshold control range from -40 dB to +20 dB with a complementary range control enabling attenuation adjustment from subtle noise reduction to an 80 dB 'cut-off'; programme controlled sustain automatically alters release time according to programme content. US Audio see a wide range of applications in the recording, performance, film, PA and conference markets for the unit.

US Audio Inc, PO Box 40878, Nashville, TN 37204, USA. Tel: (615) 297-1098.



Crown PCC 160 boundary mic

In addition to their range of *PZM* microphones, Crown have introduced a new boundary effect microphone known as the *PCC 160* phase coherent cardioid. This differs from previous *PZM* models as it uses a sub-miniature supercardioid electret element which, together with the self-contained electronics, is mounted in a slim, heavy gauge steel case. The *PCC 160* is designed to give a 'half supercardioid' pattern when used on relatively large surfaces such as a stage floor, table, news desk or lectern top. In contrast to previous models, Crown emphasise that this microphone should not be operated any closer than 8 in to any other boundary perpendicular to the primary boundary surface. In other words, if the *PCC 160* is placed on the floor it must be a minimum of 8 in away from any walls to avoid compromising the pronounced

directional properties.

A smooth response from 50 Hz to 18 kHz, uniform off-axis response with 25 dB rear rejection and the ability to withstand inputs of up to 120 dB SPL without distorting are claimed.

The *PCC 160* can be phantom powered from 12 to 48 V or battery operated and has a side-mounted connector to facilitate unobtrusive placing of the low profile charcoal grey unit and is supplied with a 15 ft cable and *XLR*-type connector.

The high sensitivity is quoted as -52 dB ref 1 V/ μ bar and low internal noise <22 dBA. Output impedance is 150 Ω balanced.

Crown International, 1718 West Mishawaka Road, Elkhart, IN 46517, USA. Tel: (219) 294-5571.

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

Alphaton safety DI box

German based manufacturers Alphaton have introduced a new direct injection box, the *SM-500*, particularly aimed at the safety conscious performer or engineer.

The *SM-500* has three inputs for levels up to 1 V, 10 V and 50 V. These are intended for instrument electromagnetic pick-ups, line level outputs from instrument amplifiers and speaker output from power amplifiers respectively. Two outputs are provided, one isolated high impedance (2 k Ω) on a 1/4 in phone jack and one balanced low impedance (200 Ω) on an *XLR* socket.

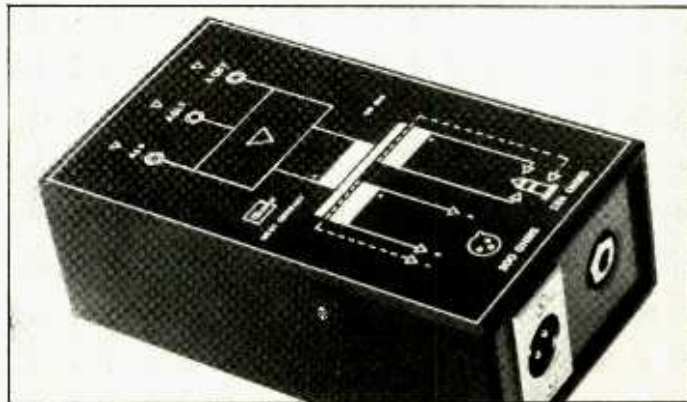
The box isolates electric instruments from their amplifiers or from recording consoles. The primary to

secondary windings of the isolation transformer included in the circuit are claimed to withstand a test voltage of 2,500 and the device has been certified safe by the official West German Safety Board.

Screens are not routed through the box and separate Faraday shields are provided for each winding to minimise hum. Low distortion and flat frequency response (40 Hz to 15 kHz \pm 0.5 dB) are quoted.

Alphaton Electroakustik, Siemensstrasse 19, D-6233 Kelheim, West Germany. Tel: (06195) 74032.

USA: Alphaton Elektroakustik, 506 Indian Creek Drive, Roanoke, Dallas, TX 76262. Tel: (817) 430-3351.



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NEW PRODUCTS

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Equipment, modifications, options, software

Stellavox Star TD9 multi-standard recorder

The *TD9* is a versatile modular tape recorder. The *TD 9-BASE* provides the basic machine framework and deck into which opto-electrical tensiometers, tape guides, headblocks and electronics units are plugged to suit a chosen format.

All tape transport functions are microprocessor controlled which allows some diagnostic feedback and offers some extension facilities such as various synchronisers, locator, varispeed, remote control, computer interface RS 422 etc.

The *TD9* recorder offers a choice of ¼ in and ½ in magnetic tape or 16 mm perfortape (PE-film) operation and headblocks are available in no less than 12 different track configurations from mono to 4-track with or without sync tracks of any type. There is even provision for using 0.15 in cassette tape!

The servo capstan system gives six tape speeds with internal adjustment of 25% or control by external signals, and the bi-directional flat reel motors give fast spooling times.

Headblocks contain not only the heads arranged in the desired format but also the requisite plug in 'audio cards' for each track including transformerless record and playback electronics with

accessible EQ. A plug-in sync card is also available for multitrack heads.

The short signal path of this design ensures good transient response and contributes to the high performance of this machine, claim Stellavox.

Up to four audio 'line-in' modules may be plugged into the rear of the machine to provide balanced and floating inputs and outputs. There is also a plug-in synchroniser module with pilot 50/60 Hz for neo pilot, synchroton and FM-sync and a supply control module incorporating a small stereo monitor amplifier.

Other features include 14 in reel capacity, mains or 24 V DC operation, easily replaceable plug-in cards for capstan and deck function control, a pre-listen accessory for use with cutting systems and rugged construction to cope with inimical field conditions.

Stellavox, CH-2068
Hauterive/NE, Switzerland.
Tel: 038 33.42.33.

Telex: 952783.
UK: Future Film Developments, 114 Wardour Street, London W1V 3LP. Tel: 01-434 3344 & 01-437 1892. Tel: 21624.

USA: Zellan Enterprises Ltd, 250 West 57th Street, New York, NY 10019. Tel: (212) 245-1598. Telex: 125122.



Shure amps

Shure have introduced two new items in their range of compact, portable field-production products aimed at the Electronic News Gathering (ENG), Electronic Field Production (EFP) and on-location film production markets.

The *FP11* is a mic to line amplifier designed to provide 84 dB of gain adjustable in 6 dB increments by means of a precision rotary switch mounted on the front panel. Also included on the front panel are a slide switch to select the integral peak limiter in or out, an LED indicator, a battery on-off slide switch and an aux-level mini phone jack input. The LED indicates the onset of limiting, when the limiter is in, or the 6 dB below clipping point, when it is out.

The second item is the *FP12* headphone bridging amplifier, designed to bridge across either microphone or line level signals and to produce

sufficient output to drive headphones at high levels. Shure claim that bridging is achieved without degrading the source signal so several *FP12*s may be used together. Other features are switchable mic and line level inputs, balanced loop-through *XLR* locking connectors, headphone jack sockets and a slide switch to select high or low output impedance. A gain control knob is also provided on the front panel.

The *FP11* and the *FP12* are each powered by a single 9 V alkaline battery and test sockets are provided for battery checking. Both units are built into rugged metal boxes with silk screen printed front panels and circuit diagrams on the side panels.

Shure Brothers Inc, 222 Hartrey Avenue, Evanston, IL 60204, USA. Tel: (312) 866-2200.

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

Dynamic dbx 166

First announced at the New York AES in October 1984, the model 166 dynamics processor from dbx is a three-in-one 2-channel device incorporating a noise gate, compressor/limiter and peak clipper in a single unit 19 in rack mounting format.

Front panel controls for each channel include expander/gate threshold, compressor/limiter threshold, peak stop level, ratio, output gain, channel bypass, side chain monitor and a stereo link button for independent or master/slave operation. The model 166 allows simultaneous use of all three functions and the compressor incorporates dbx's familiar 'over easy' action which operates on a rather more gentle curve than the usual 'hard-knee' curves found in some compressors. There is provision for side chain insertion of EQ, etc. The side

chain monitor button lets the user listen directly to the side chain signal post EQ.

The 'peak-stop' was borrowed from dbx's 'intelligent clipper', featured in the model 165A compressor; this is claimed to set an absolute limit on peak output level where reliable overmodulation protection is required.

Attack time for the noise gate is said to be tailored to allow the unaffected passage of initial transients. A horizontal row of eight LEDs indicate the amount of gain reduction and compression taking place.

dbx Inc, 71 Chapel Street, Box 100C, Newton, MA 02195, USA. Tel: (617) 964-3210. Telex: 922522.

UK: Scenic Sounds Equipment, Unit 2, Comtech, William Road, London NW1 3EN. Tel: 01-387 1262. Telex: 27939. □

UB40 CHOOSE AMEK



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

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

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EXHIBITION PREVIEW

AES 78TH CONVENTION ANAHEIM

A

● **AB Systems:** Power amplifiers from single-channel to multi-channel units with integral crossovers, also monitor speakers and sound reinforcement speakers. ● **Accurate Sound:** High speed tape duplication equipment and tape machines. ● **ACO Pacific:** Microphone systems for measurement and music recording use. ● **Adams-Smith:** Synchronising systems featuring the 2600 modular system. ● **Advanced Music Systems:** The complete range of digital audio processing systems. New products include the latest versions of Nonlin, Reverse, Chorus and Echo programs for the *RMX16* together with new bar code programs; a volt/octave interface for *DMX15-80S* allowing control of sampled material; a remote control for the *A/V Sync*; a modified, specialised version of the *DMX15-80S* known as *Timeflex* for time compression and expansion; and the *DMX15P* profanity delay. ● **AEG-Telefunken:** Full range of professional analogue tape machines. ● **Agfa-Gevaert:** Audio and video tapes including *PEM 297D*, digital ¼ in tape and *PEM 469* professional studio tape. ● **AKG Acoustics:** Microphones, headphones, reverb systems and accessories. Featured new products include range of 'ultra-linear' capsules *CK61-ULS* and *CK62-ULS* design for *C460* preamp, also new version of *TDU 8000* delay line. ● **Alpha Audio:** Sonex acoustic foam and a studio automation system. ● **Amek Consoles:** Selection from the Amek/TAC range of mixers including the *BC101 series 2*, the *TAC Matchless* and the *Scorpion*. It is also likely that exhibits will include the GML

For the first time in several years the AES Convention finds itself on the West Coast at Anaheim, California or more precisely, the Disneyland Hotel. The convention will be held between May 3 to 6 and will comprise the normal wide range of technical papers and associated activities together with a products exhibition. This preview has been compiled using the lists of exhibitors and information available at the time of writing

moving fader automation system.

● **Ampex:** Full range of Ampex audio and video tapes. Part of display dedicated to 10th birthday of 456.

● **Anchor Music:** Speaker systems including compact portable active models. ● **ANT:** Selection of products

from their range of noise reduction systems, *telcom C4* available in multitrack and single-channel formats also including versions for more specialised use. ● **Aphex:** Full range of Aphex units including the *Aural Exciters* and the *Compellor* dynamics unit. New units include a modular *Aural Exciter* for rack systems and a single-channel version of the *Compellor*. ● **Applied Research & Technology:** Products selected from original MXR range including the *O1A* digital reverb, the pitch transposer, etc, now available from the re-structured company under new ownership and trading as ART.

● **Audico:** Cassette production equipment also including tape loaders, timer/rewinder/exerciser and basic rewinders. ● **Audio+Design (Calrec):** Full range of products including Ambisonics mastering package, new *Compex 2* comp/limiter, digital fader, modified Sony *PCM* processors and details of Calrec *UA8000* console.

● **Audio/Digital:** Range of digitally related equipment. ● **Audio Engineering Associates:** Selection of distributed products including Coles and Schoeps microphones, and new version of the Studio Technology's stereo simulator known as the *AN2*; and auto switching stereo simulator for broadcasters and from AEA a new version of the *MS30 MS/XY* box. ● **Audio Intervisual Design Systems Facilitators:** No details known. ● **Audio Kinetics:** Full range of products including *MasterMix* console automation system and the *TimeLink*. The *Q.Lock* system will feature new enhancements including battery back-up memory. ● **Audio Precision:** New range of audio test equipment.

● **Audio-Technica:** Wide range of microphones, phono cartridges and headphones. ● **Audio Video Consultants:** Magnetic tape duplication systems, audio and video loaders, labelling and insertion equipment. ● **AXE:** Diverse products including the *KT-1000* programmable digital metronome/synchroniser with the ability to store 50 different user programmable tempos.

B

● **Kenneth A Bacon Associates:** No details known. ● **Barcus-Berry Electronics:** Wide range of contact transducer microphones. ● **BASF**

The dbx model 166 dynamics processor



STEREO IMAGING

DISPERSION

PHASE ALIGNED

PORTABLE

EXPENSIVE

ACCURACY – NOT FLATTERY

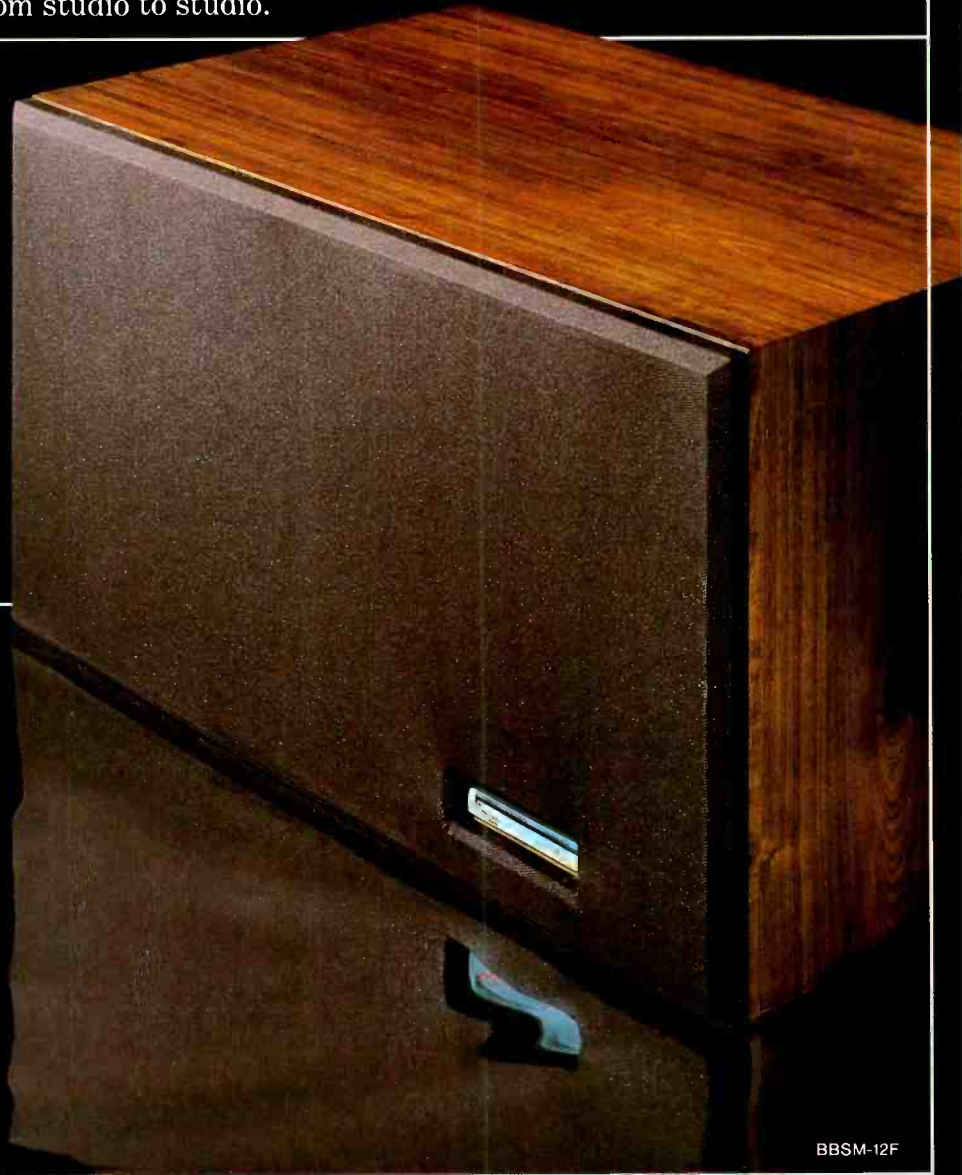
Knowing exactly "what's on the tape" is of paramount importance to the professional recording engineer and producer. Unfortunately, many recording, mixing, mastering and listening rooms are less than ideal, making truly accurate monitoring difficult.

For over a decade, permanently installed Westlake Audio studio monitors have been the worldwide choice of professionals who demand accurate reference monitors. Now, that same precision is available in the Westlake Audio BBSM series of Portable Reference Monitors.

The BBSM's pinpoint stereo imaging, wide bandwidth, totally symmetrical polar pattern and coherent wave front, even when monitoring as close as 18 inches, are a result of a unique combination of drivers, crossover and mounting configuration. Best of all, this has been achieved in a size that makes these Reference Monitors easy to carry with you from studio to studio.



BBSM-6F



BBSM-12F



BBSM6

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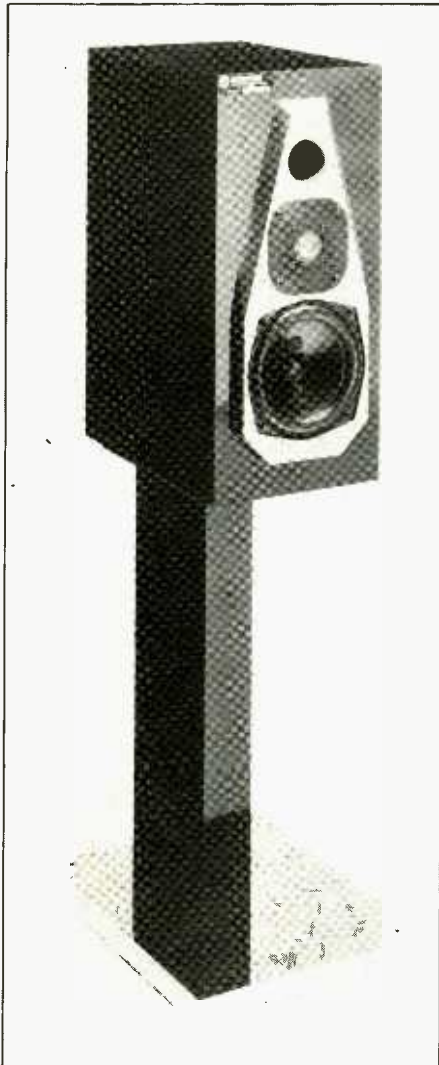
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EXHIBITION PREVIEW

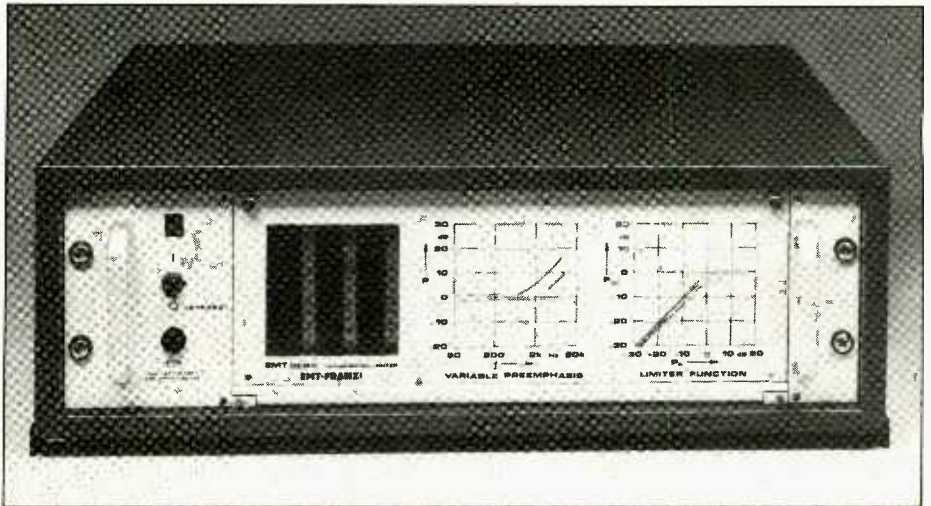


Klark Teknik USA active monitor

Systems: Professional audio and video tapes, cassettes, magnetic film and calibration test tapes. • **BGW Systems:** Full range of power amplifiers and accessory products. • **Biamp Systems:** Small mixing consoles and signal processors. • **Broadcast Electronics:** Broadcast mixing consoles. • **Bruel & Kjaer Instruments:** Comprehensive range of test and calibration products and music recording microphones.

C

• **California Switch & Signal:** No details known. • **Cerwin Vega:** Live sound speaker systems and monitor speaker systems. • **Cetec Gauss:** Studio monitors, individual drive units and tape duplication systems. • **Cetec Ivie:** Wide range of products including audio-analysis systems, pink and white noise generators, microphones, preamps and amplifier systems. • **Cetec Vega:** Wireless microphones and wireless intercom systems. • **Community Light & Sound:** Sound reinforcement systems. • **Compusonics:** The *DSP-2000* series of digital audio mixer/recorders from 4/4 to 24/8 and incorporating hard and *SuperFloppy* disk drive. • **Connectronics Corporation:** Cables and connectors for audio applications.



EMT 266X transient limiter

• **Crest Audio:** Power amplifiers including models *2501A*, *1501A*, *2001A* and *1001A*. • **Crown International:** Full range of products with featured power amplifiers being the *MicroTech* and *Delta Omega* series and the new *PCC160* boundary microphone. Also on show will be the full range of *PZM* microphones and the *TEF* audio measurement system.

D

• **The David Hafler Co:** Power amplifiers and preamps. Featured will be the *P220* and *P505* amplifiers. • **dbx Inc:** Full range of dbx products including noise reduction systems, rack mount signal processing systems and the *700* series digital processing system. Featured item will be the model *166* dynamic processor. • **Digital Entertainment Corporation:** The Mitsubishi range of digital recorders including the *X-800* 32-track and *X-80* 2-tracks. Featured will be special versions of *X-80* and range of ancillary/interface products. • **DOD Electronics:** Graphic equalisers, delay lines, parametric equalisers and other rack mount signal processors. • **Dolby Laboratories:** Full range of noise reduction products for mastering, duplication use and multitrack applications, portable 2-channel units and cards for VTR installation. Also featured will be *DP85* digital system.

E

• **Electro Sound:** High speed tape duplication systems including units incorporating Dolby *HX*. • **Electro-Voice:** Selection from wide range of products including new items, *DH2012* HF compression driver, the *ELX-1* portable mic/line mixer and the *Sentry 100EL* studio monitor with integral power amplifier. • **Emilar Corporation:** Wide range of loudspeaker drive units. • **Eventide:** Sound processing equipment including *SP2016* digital reverb/effects processor with new software; the *Harmonizer* range with new model; the *Timesqueeze* system, and the *Specsystem* software package for spectrum analysis with personal computer systems. • **Everything Audio:** No details known.

F

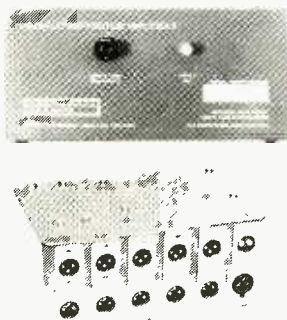
• **Fostex:** Full range of Fostex products including tape machines, signal processing units, microphones, speaker systems and mini reference monitors.

G

• **GML:** George Massenburg Labs products including the moving fader automation system and a range of equalisers. • **Gotham Audio Corporation:** Wide range of products from a number of manufacturers including Neumann and EMT. Also

10 OUTLET DISTRIBUTION AMPLIFIER 3

APRS STAND No. 163



A compact mains powered unit with one balanced input and ten AC and DC isolated floating line outputs.

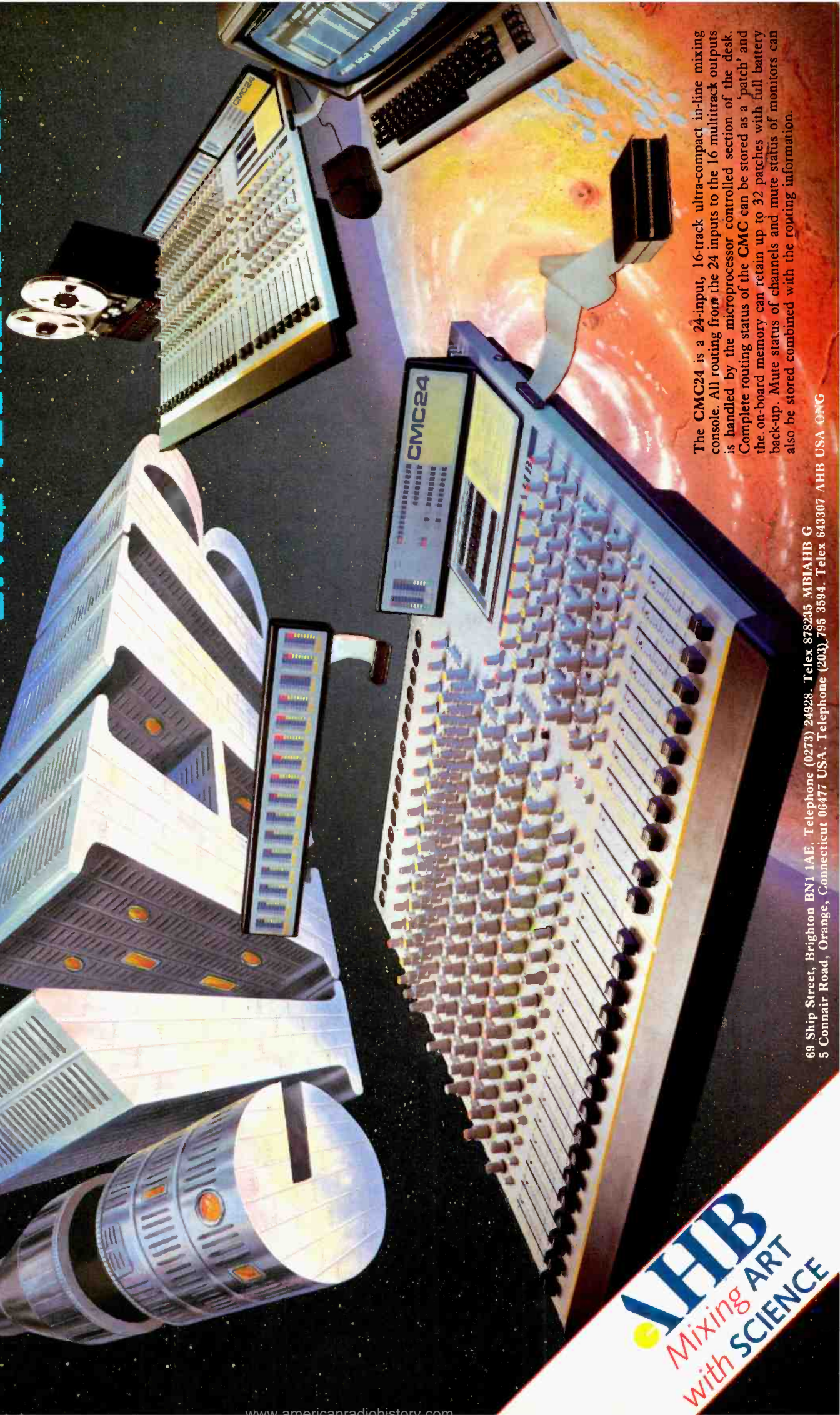
- Exemplary R.F. breakthrough specifications giving trouble free operation in close proximity to radio telephones and links
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- Any desired number of outlets may be provided at microphone level to suit certain video and audio recorders used at press conferences.
- Meets IEC65-2, BS415 safety and 1 B A signal path requirements

Also available as a kit of parts less the case and all XLR connectors for one or ten outlets

Broadcast Monitor Receiver 150kHz 30MHz • Stereo Disc Amplifier 3 and 4 • Moving Coil Preamplifier • Illuminated PPM Boxes • PPM Drive Boards and Ernest Turner Movements • Stabilizer and Frequency Shifter Boards • Peak Deviation Meter • Programme and Deviation Chart Recorders • Stereo Microphone Amplifiers • Advanced Active Aerial
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THE CMC24 MIXER

WITH COMPUTER AIDED ROUTING SYSTEM
GIVES YOU MORE SPACE



The CMC24 is a 24-input, 16-track ultra-compact in-line mixing console. All routing from the 24 inputs to the 16 multitrack outputs is handled by the microprocessor controlled section of the desk. Complete routing status of the CMC can be stored as a 'patch' and the on-board memory can retain up to 32 patches with full battery back-up. Mute status of channels and mute status of monitors can also be stored combined with the routing information.

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5 Connair Road, Orange, Connecticut 06477 USA. Telephone (203) 795 3594. Telex 643307 AHB USA ONG

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EXHIBITION PREVIEW

details on the Gotham/EMT *Systex* digital recording/editing system based on a hard disk.

H

● **Harrison Systems:** Wide range of consoles including the new *HM4* front-of-house live system and the *MX-8* rack mounting stand-alone unit or premix expander. ● **Heino Ilsemann:** Automation cassette loading and labelling systems. ● **Hill Audio:** Range of Hill products including high power amplifiers, mixing consoles for sound reinforcement, monitoring and multitrack use, a compact rack mount mixer and stage speaker systems.

I

● **ICM:** Wide selection of C-0 cassette shells and library cases. ● **Innovative Electronic Design:** No details known. ● **Inovonics:** Audio processing, recording and instrumentation products including audio analyser, average/peak limiter, octave-band compressor and the *MAP II* broadcast audio processor. ● **Integrated Media Systems:** No details known. ● **International Music Corporation:** No details known.

J

● **JBL/UREI:** Sound reinforcement speakers and systems, signal processors, studio monitors, power amplifiers and

associated products. ● **JRF Magnetic Sciences:** Magnetic head sales and service. ● **JVC Corp of America:** Digitally related equipment, equipment for PA applications and signal processing systems.

K

● **King Instrument Corporation:** Fully automatic audio cassette loader with automatic pancake/hub changeover and tape threading, alternator/feeder and display for machine monitoring. ● **Klark-Teknik Electronics:** The *DN780* digital reverb/processor along with the *USA* active monitor loudspeaker system. Also the rest of the Klark Teknik range of graphic EQs and DDLs will be exhibited.

L

● **Lexicon:** The full range of Lexicon products and latest software updates on the *200*, *PCM60* and *224X* digital reverb systems and the other digital signal processing products.

M

● **Magnafax International:** Magnetic tape duplication systems and auto tape degaussers. ● **Marshall Electronics/Mogami:** The full range of Marshall signal processing devices and also Mogami cable products. ● **Meyer**

Sound Labs: Selection of products including the *833* studio monitor and sound reinforcement speaker systems. ● **Monster Cable Products:** Wide range of cable products.

N

● **Nady Systems:** *Nady Cordless* and *Nasty Cordless* radio transmission systems and various transmitter/receiver units. ● **Nagra Magnetic Recorders:** Professional tape recorders including *T-Audio* twin capstan multiformat recorder and the *IV-S* stereo machine with built-in SMPTE/EBU timecode generator record/playback circuit. ● **Neotek Corporation:** Mixing consoles for multitrack applications. ● **Neutrik Products:** Connectors and sockets including the new *X* series of *XLR*-type units. Also featured will be the *Audiograph* modular measuring system. ● **Network Music:** No details known. ● **New England Digital:** On show will be the latest developments of the *Synclavier* music system including a new velocity pressure sensing keyboard, advanced synthesiser software and music printing enhancements. There will also be full details of the new 16-bit polyphonic sampling system which features sample rates of up to 100 kHz.

O

● **Orban Associates:** Range of signal processors including the *424A* and the *422A* compressor limiters in addition to broadcast compression systems and de-essers. ● **Otari Corporation:** Audio and industrial products including the *MTR-90/II*, *MTR-12/II*, *MX-5050* series, *MX-70*, *BTR-5* and *MTR-20* machines along with the *DP-80* and *DP-4040* series cassette duplicating machines.

P

● **Philips Television Systems:** Professional CD systems. ● **PPS Electronics:** No details known. ● **Pristine Systems:** No details known. ● **Professional Audio Services & Supply Co:** No details known. ● **Publison Audio Professional:** Signal processing products including the *Infernal Machine 90* digital effects generator which offers internal delay of up to 5 min, and the *Nature Boy* 6-octave polyphonic keyboard.

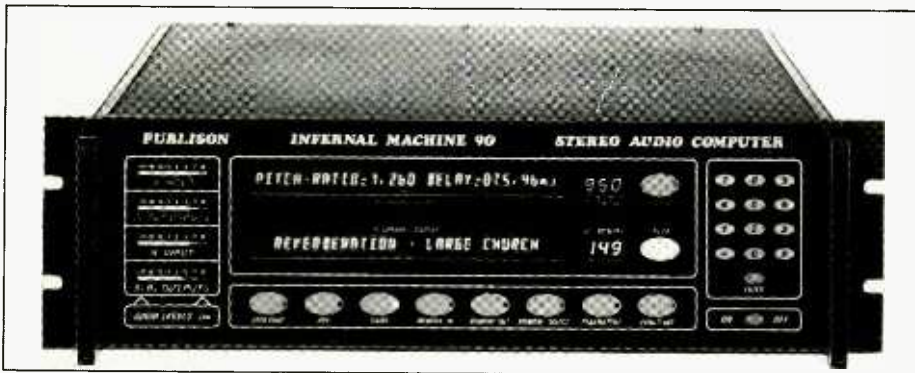
Q

● **QSC Audio Products:** Range of power amplifiers. ● **Quantec:** Demonstration room for the *Room Simulator QRS*, the infra-red remote control option, and the new *QRS/L* simplified version of the *QRS* which has the same features but only a single input and two outputs.

R

● **Recortec:** No details known. ● **Renkus Heinz:** Range of loudspeaker drivers, horns and passive crossover networks. ● **Rhone-Poulenc systems:** Tape and mastering products. ● **RPG Diffusor Systems:** Acoustical design diffusing panels. ● **Rupert Neve:**

Publison Infernal Machine 90 digital effects generator



Nagra T-Audio twin capstan multiformat recorder



BASF Studio Master Series. The new Tape Generation.

BASF Studio Master 910

This sophisticated recording tape of high dynamic was designed especially for the high professional demands of modern multi-track technology.

The wear resistance of the magnetic layer ensures reliable operation even after hundreds of passes.

In spite of its considerable high MOL (+ 11.6 dB over reference level 320 n Wb/m), BASF Studio Master 910 has an unusually good print ratio of 57 dB and is therefore also suitable for long-term archiving. The BASF typical constancy of the electroacoustic properties and the excellent winding characteristics also ensure easy hub operation.

BASF Loop Master 920

The chromium dioxide master tape for high-speed duplication systems. At 64-times duplicating rate, the master is usually recorded at 9.53 cm/s. It is only the typical chromium dioxide properties featured by Loop Master 920 which offer that extra quality needed to allow exploitation of all the advantages of a high-class cassette tape (eg. BASF chromdioxid II). In spite of the mechanical stress to which it is subjected in the "loop bin", the durable magnetic layer means that the recording level remains extremely constant, particularly in the high frequencies, even after running thousands of times.

BASF Digital Master 930

This professional chromium dioxide tape is especially tailored to the requirements of digital sound recording (PCM), where the high storage density makes exceptionally high demands on the evenness of the coating. The typical chromium properties are brought out excellently in this latest form of sound storage. The antistatic magnetic layer and the black, conductive matt back protect the recording against dust-induced dropouts and ensure smooth, steady winding without damage to the tape edges.

Coupon: Please send me further information on the BASF Studio Master Series.

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Gottlieb-Daimler-Str. 10
D-6800 Mannheim 1
Tel: 06 21/40 08-1
Telex: 4 62 621 basf d



BASF

EXHIBITION PREVIEW

Precise details not available at time of publication but will include analogue and digital console products and information.

S

Saki Magnetics: Range of hot-pressed glass-bonded ferrite tape heads.

● **Samson Music Products:** Range of phase reflex hi-band hand-held wireless microphone systems, Wy frequency booster and range of accessories.

● **Sanken Microphones/Pan Communications:** Range of high quality microphones.

● **Schoeps/Posthorn**

Recordings: Full range of Schoeps microphones and accessories.

● **Shure Brothers:** Dynamic and condenser mics, phono cartridges, sound reinforcement products and accessories.

● **Sierra Audio Acoustics/Tom Hidley Design:**



Sony's DTA-2000 digital tape analyser

Displays of new phase-coherent studio designs recently completed and discussions on the use of their variable acoustics system. ● **Solid State Logic:** *SL 4000* music recording console; *SL 6000* video production console and featuring the new *SL 5000* broadcast



Sanken CU-41 twin capsule cardioid mic

'000' series power amplifiers

*3000 watts in 5 1/4 inches

- **HIGH EFFICIENCY** dual power supplies from **TOROIDAL** transformer and computer grade capacitors.
- **FULLY PROTECTED** against damage to either load or amplifier.
- **SPACE SAVING** occupies only 3 units (5 1/4") of 19" rack space.
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dx1000	1000W	into 8, mono
	600W	into 4, per channel
	300W	into 8, per channel
dx1000A	1500W	into 8, mono
	800W	into 4, per channel
	450W	into 8, per channel
dx2000	2000W	into 4, mono
	1200W	into 8, mono
	1000W	into 2, per channel
	600W	into 4, per channel
	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



*dx3000 bridged mono



Hill Audio, Inc., 231 Marquis Court, Lilburn, GA 30247 USA (404) 923-3193 TLX 293827 HLAD
 Headwater Industries, 635 Caron Ave., Windsor, Ontario N9E 5B8, Canada (519) 256-2454
 Hill Audio, Ltd., Hollingbourne House, Hollingbourne, Kent ME17 1QJ, England (062 780) 555 TLX 966641 HILL

console system, together with the Master Synchroniser Controller, Events Controller options and programmable EQ system. ● **Sony Corporation:** Selection from the company's wide range of products including the *AV-500/AVS-500 Sync Master*; the *RM-3310* remote for the *PCM 3324* multitrack; the professional CD system *CDP-3000/CDS-3000*; the *K-1105* digital console, the *PCM-3102* digital mastering recorder; the 12-channel compact analogue console *MX-P61*; the range of studio mics and digital equipment; and a selection of tape machines and consoles from MCI.

● **Soundcraft:** Examples of the full range of Soundcraft products including the *TS24* in-line console, the new *500* and *600* series consoles, the series *20* mastering tape machines and the new range of power amplifiers.

● **Soundcraftsmen:** Power amplifiers, equalisers and other signal processors.

● **Sound Ideas:** Sound effects library recordings.

● **Sound Technology:** Test equipment including distortion measurement equipment and microprocessor controlled automatic tape recorder test set. ● **Sound Workshop:** Several ranges of multitrack consoles and the *Diskmix* automation system.

● **Sprague Magnetics:** Tape machine heads including multitrack. ● **Studer Revox:** Wide range of products including the *900* series consoles, the new digital *D-820 DASH* format recorder and the analogue equivalent *A820*, the new

EXHIBITION PREVIEW

Mark IV versions of the A80VU mastering machines, the Mk II PR99 recorders, the A725 professional CD player; the Mk II versions of the A80MR and S80QC duplication mastering recorders.

T

- **Tandberg:** Full range of professional products including TD 50 ¼ in reel-to-reel 2-channel tape recorders.
- **Tannoy:** Selection of studio monitor loudspeakers, the Wildcat high level PA series and the SR840 professional power amp.
- **Tascam:** Aside from the normal range of Teac/Tascam products, there will be three new products launched: the MS-16 16-track tape machine; the M-300 series mixing consoles; and the T-2600 series high speed cassette duplication system.
- **Tektronix:** Test equipment including the SG5010 and AA5001 programmable instruments for carrying out a variety of measurements.
- **3M:** Full range of the company's magnetic tape products including magnetic tape and cassettes.
- **TOA Electronics:** Complete line of professional sound systems from microphones to speaker systems, largely intended for the live sound market.
- **Transco Products:** Master recording blanks.
- **TTL:** High speed automatic cassette loader.
- **Turbosound:** Range of live sound systems.

U

- **Ursa Major:** Demonstrating the Space Station; the StarGate 323 digital reverb and the Mark II version of the 8X32 which features four new programs—Cask, Percussion plate, Chamber and Reverse reverb, and a lower price than the original version. Featured will be the MSP126 stereo processor.

V

- **Valley People:** Full product range including new level interface unit.
- **Versadyne International:** No details known.

W

- **Westlake Audio:** Studio monitors including near-field types in addition to full product range.
- **Whirlwind Music:** Cables and connectors assembled into patch cables, stage boxes, multiway systems, etc.

Y

- **Yamaha International:** Professional sound products including digital reverb, digital delay, mixer and power amps. Featured item will be the new REV-7 digital reverb.

● **Studio Sound:** We will be exhibiting the latest issue together with copies of our new sister publication *Broadcast Systems Engineering*, in addition to our other reference publications. Both editorial and advertising staff will be in attendance at the stand or around the convention and we look forward to meeting anyone who wishes to drop by for a chat. □



Tascam M-308 mixing console from Teac

If your favourite London studio's full up - we'll show you the easy way to Switzerland.

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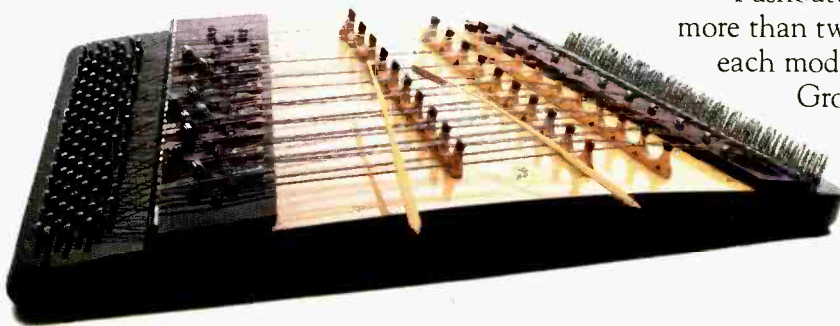
Why do the world's leading studios turn to Solid State Logic?

Every day, music of all kinds is being made on this planet. And every week, another studio somewhere in the world switches on their new SL 4000 E to record it. When so many different people agree, there has to be a reason.

Perhaps it's that Solid State Logic lets them hear the sounds and the silences that were missing before. Through short, clean signal paths that add nothing to the source unless the engineer or producer so desire.

Yet when the desire strikes, the SL 4000 E responds with musical precision and a tremendous range of creative power. Only SSL provides the easy flexibility that invites each engineer to shape the console to suit their personal style. And the natural transparency that allows each instrument to speak its distinctive voice.

From the studios of China Records in Beijing to the famed broadcast concert halls of the BBC Symphony Orchestras, Solid State Logic sets the standard for audio integrity. Study the charts. Ask the producers. You'll find SSL at the top in rock and pop, country and western, rhythm and blues, jazz and dance. The world of music turns to SSL. Because, purely and simply, SSL delivers the musicians' intent.



The Art of Technology

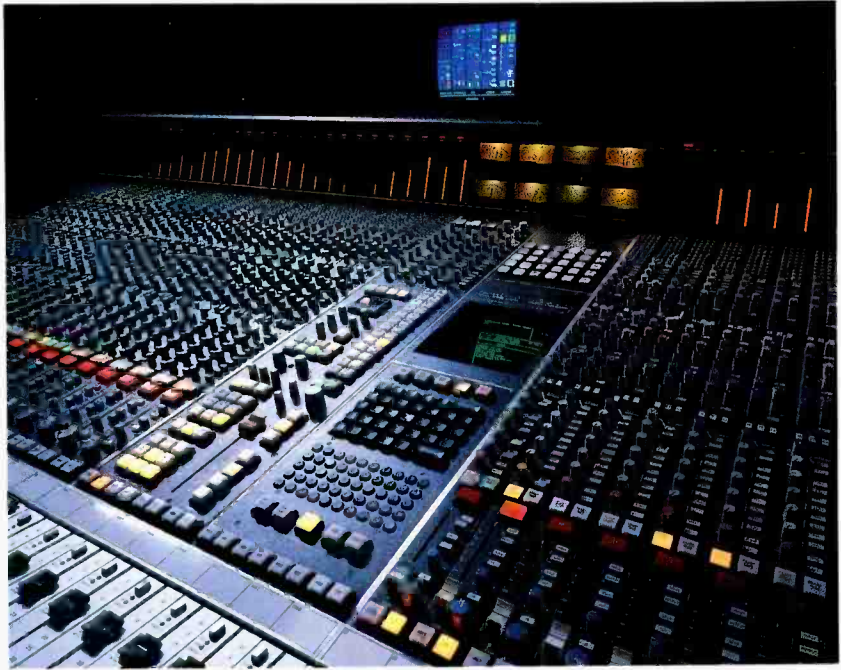
It's one thing to build a collection of audio electronics into a big box. It is quite another to create high technology for the recording musician. In every detail, the SL 4000 E Series supports your artistry with the experience and awareness of the world's leading console design group.

In every channel, SSL presents the tools required to perfect your sound. Superb four band parametric equalisation and filters. Versatile compressor/limiters. Noise gates, Expanders. And virtually unlimited possibilities. Because the SL 4000 E Series not only helps you shape the sound, it lets you structure the signal flow itself.

Pushbutton signal processor routing provides more than two dozen useful variations within each module. Six master statuses, 32 Output Groups and SSL's unique patchfree audio subgrouping direct the audio paths throughout the desk to serve your individual requirements and preferences.

Making Life Easier

To give the artist and engineer complete freedom to explore these new potentials, SSL invented Total Recall™. At the end of each session, Total Recall scans every knob and button on all Input/Output modules. Then, in less time than most people take to find a pen that works, it creates a permanent and portable record of these settings on floppy disk. Which means that you can stroll into any SSL Total Recall control room anywhere in the world and recreate last week's monitor and cue mix, or last year's incredibly complicated but not quite final version.



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HAZEL YARWOOD ABBNEY ROAD DISC CUTTER

After 35 years of disc cutting at Abbey Road, Hazel Yarwood talks to Tim Leigh Smith on her retirement

Hazel Yarwood is not famous in the record business and she would not wish to be, but in the field of classical disc cutting her name commands considerable respect. EMI's Abbey Road Studios last summer reluctantly allowed Hazel to retire from full time work—her career at the studios began 35 years ago in the last days of the 78 rpm record.

Hazel Yarwood says she has been in love with the Arts all her life. At school she studied music (the piano) and the theatre (speech and drama). After successfully completing the relevant exams she decided to concentrate on acting. She studied with Elsie Fogerty whose students, at one time or another, included such subsequently ennobled thespians as Peggy Ashcroft, Edith Evans and Laurence Olivier.

The second world war was in full flight when Hazel joined the Pilgrim Players to tour the British Isles, appearing in theatres, hospitals, cathedrals, church halls and huts. As the war came to an end she got a part in a play called *Pink String and Sealing Wax* which took her on tour across Europe to Germany and then on to the Middle East. Returning to Britain Hazel found the commercial theatre far less attractive than the Arts Council-sponsored 'art for art's sake'. She decided to return to music and joined the staff at Abbey Road in 1950.

"In those days we all did a bit of everything—now people tend to specialise—but I was taken on primarily for tape preparation and to cut

microgroove which was just beginning then. I think that was the greatest advance that has been made in the gramophone business: from 78s to Long Playing records with the extended frequency range and the extended dynamic possibilities. The microgroove after the 78s really was sensational in my opinion, it was marvellous. But we had a chairman in those days who thought the Long Playing record was just a gimmick. So we didn't record anything for Long Play, we simply stuck the 78s together and put those on to microgroove. And that's how I started, transferring 78s and putting them on to extended range microgroove."

At the time EMI had transatlantic links with CBS, which had developed the microgroove LP, and RCA, which had responded with the 45 and suitable autochangers (complete with a little dog peering into the speaker). It was hardly likely that *both* standards would be successful. In the meantime EMI microgroove releases were selected performances from the 78 catalogue transferred to tape with crossfades or edits to create a long playing master. That was Hazel's first job.

"Then of course it was realised that Long Playing records were here to stay so we began recording specifically for that. I had a spell in the studios, virtually doing the same thing. Not balancing, just looking after the tape. We did the playback to the artists

afterwards and we did the editing. There wasn't a separate editing department in those days; we did the whole preparation, generally with the artist there.

"Of course we didn't record everything in tiny little bits like they do nowadays—it was decent sized takes. The music really had a chance to breathe. An odd horn fluff or that sort of thing would be removed but that's all. The players resented being stopped, they wanted to go on. I remember working with Solomon on the *Hammerklavier* Sonata which has a huge double fugue. He was playing wonderfully but always somewhere in the fugue there was a little slip—maybe a split note, just nothing—and I said to him, 'Mr Solomon, we can edit that.' 'No, I can play it!' he said, 'I can't take you on my concerts, can I?' So we all went and had some supper, then we came back and he did play it. And that is one of the records that people are still buying, it is still one of the performances.

"As the place got bigger we began to specialise and about 1960 I asked to go on the cutting because it appealed to me. The cutter has the final say; you are in fact making something. If you have a sense of responsibility towards the music, then you are going to maintain the dynamics that the artist has given you.

"I would hate anyone to think that we 'interfere' or 'improve'. It's not that at all. It's a very crude system, despite the sophistication nowadays. Imagine scratching the groove out. Pick-ups are still difficult things, they've got to be considered, dynamics have to be taken care of. You've got to know what will play and what won't play. So each job is considered individually. When accountants pressure us to hurry and do 'so many per day' then we fight this, and always have, because if you want the standard then the work has to go into the record.

"A record is a miniature, if you like, of the real performance—it's got to be diminished in some way—but we try to grade the dynamics to keep them consistent with the performance in the studio. And this is one of the things that makes the job fascinating from our point of view because, in terms of the artists, it really sorts the men out from the boys. You really listen to what they're doing and, as it were, you see the music through their eyes.

"We all know there are machines that could knock the peaks down and make the record safe. You could possibly make the record without even listening to it. But you wouldn't have an artistic product at the end. It's not just the peaks, sometimes the tape is too quiet. You have to find a place where the conductor's making a *diminuendo* or *crescendo*, whatever you want, and just 'aid and abet' it a little bit. And you have to do that artistically in my opinion. You can't sit there reading a book and just let the automation do everything, you've got to keep alert as to what's happening. So telephones are unanswered; in fact nobody can contact me at the studios because the bell is switched off and I put the telephone behind me so I can't see the light."

The best compromise between signal-to-noise and distortion inevitably means far more than just keeping the level within

set limits.

"There are known limits—the BSRA have certain tolerances—but there are times when you can exceed those and there are other times when you cannot attain them. A piano for example is a very difficult instrument to get on to a disc. You have to be very, very careful with levels, you can't let them just bang away at will. A lot depends on the style of the original recording. If the engineer has used my favourite technique—the crossed mic for stereo—you get a good, clean, natural sound, and I think you get a purer waveform on the tape. It is much easier to pile the level on when you're cutting from a tape like that than these multitrack efforts where everything's confused.

"Also, if the engineer is recording in a strange hall, the conductor may be perfectly happy with the sound he's hearing but when we get the tape it may be that some of the low tympani notes can't be heard so we feed in a little bass. It's much easier to do this titivation working from a clean sound. If the engineer's been raising a solo clarinet for a little bit, for example, he raises the spill from everything else along with that fader so you get a muddy sound."

Naturally this sort of tweaking is regarded as a last resort. If something needs to be done then the rule Hazel applies is: "How little can I do to make this an acceptable disc?" She certainly does not want the listeners to be aware of the process. In fact she is quite reluctant to talk about it.

"I don't think these things should be talked about much outside the business. We've lost the mystique really but let's just keep a little bit of it. It's only comparatively recently that critics have talked about pre- and post-echo. We had pre- and post-echo in the 78 days but it was never talked about because they didn't hear it, they weren't aware of it. But now, in a sense, everybody's an expert; they've got their hi-fi and their tape recorders.

"It's a pity to shatter too many illusions. I wish artists sat there and played from start to finish without any editing. I wish they did, we would get better records if they did. If people start hearing edits they won't listen to the music any more. It's hard enough anyway now because some of the performances are so cold. Instead of using the technology, I think we've let the technology use us. We work to the possibilities: 'It's now possible, so let's do it'.

"In the 78 days Schnabel, bless him, didn't have editing and he had to stop every four minutes, or whatever it was, at the end of each side. How he got a performance under those conditions I don't know but he did. He recorded the whole Beethoven piano repertoire and it's still unequalled in my opinion. I go home and listen to it, clicks and bangs and all, because he's playing, the music is coming from his mind, into his fingers, by some miracle on to the disc, and there it stays.

"It's always a miracle to me how, if you have been moved in the studio, you are still moved when you listen to the

recording. There's something about the communication that is still there for you. And that is what music is, what all art is, communication; if you don't have that you have nothing. So I wonder what we're playing at sometimes.

"In the days when I was working in the studios, the experienced recording artists would ask how loud they could play, to be safe—or how softly they could play—and they would do it. But life has changed, we don't have that sort of co-operation now. There's not so much need to have the music. Everything's been done several times. We had a sense of pioneering then. The *St Matthew Passion*

The microgroove after the 78s was sensational in my opinion, it was marvellous

for example had never been put on to disc, just sections of it, and here we were, enabled to record this wonderful music. So we did have a sense of pioneering and adventure; breaking new ground.

"And we didn't talk about what we were recording either, because the microgroove catalogue was very small. There were all these marvellous operas and oratorios and symphonies waiting to be put on to microgroove. Naturally we wanted to be ahead of Decca and Philips and the other companies, so it was all very secretive. Outsiders weren't allowed in. We used to wonder if the firemen would be allowed in if we had a fire."

Direct Metal Mastering has been a major step forward in disc cutting. As Abbey Road had the first DMM lathe in Britain, general manager Ken Townsend remarked that Hazel Yarwood had become the first lady of Direct Metal Mastering.

"I wasn't looking forward to it, and

If you have a sense of responsibility toward the music then you are going to maintain the dynamics that the artist has given you

that's strange because I like change. Now I don't want to be unkind, but we didn't care very much for the first discs that we'd heard coming from Germany. They had parameters and they worked to them. We never had with the other

system. We knew pretty well how to cope with the lacquers and the amplifiers that we were using. Here was a whole new monster and we didn't know what to expect. In point of fact we fell into it, if that's the word, very quickly. I think we were so appreciative of the advantages that it was a pleasure to start working on it.

"I wish we'd had DMM in the great days of music making. I mean the 1950s and the 1960s when London was the centre of music making. The orchestras were marvellous and any artist who was anybody, wanted to come, and *did* come, to these studios. We weren't pressured as we are now by the accountants. I think I'm right in saying that the pop side did so well that it financed quite a bit of the classical recording. Perhaps we were allowed to be a little bit extravagant and get what we wanted.

"It's always a fight on a disc because it's a crude system. We've got distortion towards the middle, pre- and post-echo, and so on. DMM has done away with some of those difficulties. It's added others but I think we've gained much more than we've lost. In a perfect world I suppose it would be a simpler system but there are so many ifs and buts. At the moment the fight to get the copper blanks right is as great as any fight we ever had with lacquers.

"So many people have to do their bit of the job correctly. You're not working in isolation. Somebody's got to make those coppers. This is why I hate to lose one. If I make a mistake I get mad at myself. There's a lovely blank copper, good noise figures on it, flat as a flounder, and because I've just lost a moment's concentration and done something damned silly, that's gone to waste. It disturbs me. It's the same when the factory loses something that we've struggled with, we've perhaps spent a whole morning trying to get it right and then a little bit of paper comes in saying, 'Sorry—copper damaged,' and we have to start again."

Hazel obviously feels a considerable personal investment in each disc she cuts but without intruding on the original performance.

"I was talking about this very thing with Tony Faulkner. He's an independent balance engineer and he said he regards his microphone placing as 'eavesdropping on the performance'. I thought that was a lovely way of describing it. He's not going to interfere; he's going to put his mics in the best possible position and then let the performance take place. This is how I feel about the disc. If there's something a little bit rough and there is a possibility of smoothing it over then one does that, but again that's not interfering that's just making the most of what is there."

According to Chris Buchanan, manager of transfer operations, when Hazel's lacquer-cutting lathe was finally taken out of service it was in better condition than new because she set aside a few minutes every day to clean it. Hazel says this is simply showing respect for the equipment.

"The locomotive drivers on the old

HAZEL YARWOOD ABBAY ROAD DISC CUTTER

steam trains always kept their engines immaculate. It's a form of selfishness in a way. If you look after it, it looks after you. And lacquers have to be kept pristine don't they? You couldn't have dust flying around the room—and Heaven help anybody who came in smoking a fag, they were immediately chased out.

"And remember, the company made its own equipment when I started. We made our own microphones, tape machines, everything. In fact we started cutting microgroove on machines designed for amateurs to cut 78s on at home. We've always been a bit like that, we'd start on some old clobber and then go ahead and develop. And we certainly did have a respect for the apparatus."

The DMM lathes were developed in Germany but Abbey Road contributed the concept of the pre-cutting run-through. The necessary modifications were suggested soon after the first lathe was installed in Britain and subsequently implemented by the designers. The run-through is a standard part of the cutting process and certain cuts would be very difficult without it.

"For example the fourth act of *Otello* runs for approximately 35 minutes. It's late Verdi with a lot of heavy stuff in there, and we were asked if it was a possibility. We said it was a possibility but it was not advisable because we would lose certain dynamics. Before laying the law down I insist upon hearing the tape, because it depends on how much stereo spread there is, how 'forward' the voices are in relation to the orchestra, what the dynamics are—if you've got a conductor who really plays Verdi as per the score—and all kinds of things like that.

"Then I do what we call a 'dry run', a run-through without a disc. You put the automation on so that it's opening and closing the threads and you make any scroll that has to be made; I tend to be mean with them so as not to lose space. Then you can see where you are along the radius of the disc at any given moment. That's important if you've got an enormous bass drum for example. If it comes towards the centre of the disc you can't let it be as wild as you could were it on the outside. Similarly sopranos are rather difficult in terms of frequency, so they can shriek a little bit on the outside of a disc but certainly not towards the middle.

"Of course that was another enormous battle in the early days; we had distortion on the tape. We adored Maria Callas and loved working from her recordings but in a sense we dreaded it because her top notes would be harsh. It wasn't her fault, it was just the kind of voice and the kind of recording that was possible in those days. A lot of that has gone with the digits."

Both digital and analogue are being cut to copper. For one thing EMI is re-issuing some of its classical catalogue in DMM cuts. From Hazel's point of view there is not a great deal of difference

between analogue and digital masters. Her concern is the music rather than the technology.

"I know very little about the technology actually. This isn't false modesty. I'm surrounded by technical engineers—'my boys' as I call them—and they are all delightful. I just say I need some help and in they come and attend

We had pre- and post-echo in the 78 days but it was never talked about; they didn't hear it, they weren't aware of it

to things. If you're a cutter you've got to be surrounded by marvellous engineers because they prepare everything for you. It's nice if they understand what it is you want.

"Naturally you want to use the apparatus to the very best advantage, and you really have to have somebody who can explain how you should be operating certain things. This is not a thing that we've always had here. For instance we never really liked the Dolbys. The engineers set them up so that they operate as accurately as possible but I hate the quick die away that you get from Dolbys. You get the same thing from the digits as well. That's progress—you win a few and you lose a few."

The final stage of disc cutting is checking the pressings before they go

It was all very secretive. We used to wonder if the firemen would be allowed in if we had a fire

into production. In addition to formal Quality Control the cutters listen to their own discs.

"We are in a position to reject them, should we wish to do so, before the artist's manager hears them. It's very important because things can go wrong at the factory; or we may have overstepped the mark somewhere, perhaps been a little ambitious with the dynamic range so it graunches a little bit. Then we'll say, 'We can improve that,' and always somebody says, 'Go ahead and take care of it.'

"The person listening to the records really has to understand the cutting. He's got to know whether it's something we can do something about, whether it's a factory problem, whether it's purely processing, whether it's to do with the original recording. He really has to be able to pin-point it."

For many years at Abbey Road the disc cutter was the balance engineer with a simple mixer feeding the lathe in the studio control room. The jobs are still very closely related and two experienced balance engineers are employed full-time preparing CD masters. There are those who think of disc cutting as the first stage of a mechanical production process rather than the final stage of the artistic recording process. Naturally Hazel is on the side of the Recording Angels.

"Ever since we started, and long may it last, it has been the end of the studio process here; co-operating with all concerned, let me say. The balance engineers can help or hinder what we do just as much as we can complement or destroy their work. We used to have a rather cynical joke in the old days, we didn't mean it at all because sometimes we were over-praised, but we used to say if a record was good people would ask, 'Who made the tape?' but if it was bad, 'Who cut this?' It still tends to remain: if there was something wrong they would say, 'You should have done something,' but if you did something and that wasn't right, 'Why did you touch it?'"

When everyone has approved the white label test pressings the record is released. Although it may lack the rainbow hues of the compact disc, a well cut and properly processed LP is still a joy to behold. Hazel believes in the microgroove disc and she believes in music.

In John Wyndham's classic *The Midwich Cuckoos* there is a scene in which a visitor is asked to wait silently until a gramophone record ends. When the music has 'tied itself into a neat bow, and ceased', the host explains: 'One feels that once Bach has started his pattern he should be allowed to finish it,' and asks, 'Is the art of the musician less worthy of respect simply because he is not present in person?' It is no surprise that Hazel whole-heartedly agrees with this attitude. She has an ardent dislike of the technology that encourages people to treat music as mental chewing gum.

"You make a contribution, as the listener, if you've got a disc. You've got to be careful taking it out of the cover otherwise you can damage it. You put it on your turntable, you clean the disc and then you've got to find the beginning of it. You are, in my opinion, contributing something. You're involved! You've got to make some effort. This business of sitting back, pressing a button, and having the thing start up... I hate it when I hear people say they've got a marvellous new player you can put in your car so you can listen to your symphonies on the way home. What are we coming to? Wallpaper music!"

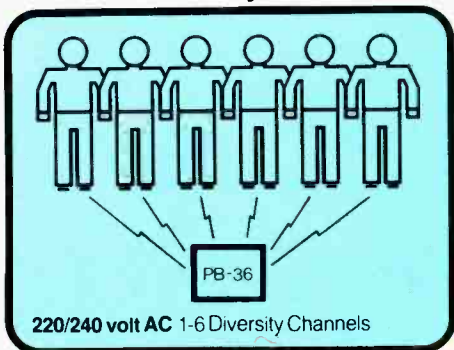
Hazel Yarwood's contribution to the quality of microgroove disc has been enormous. Long may she be able to continue. □

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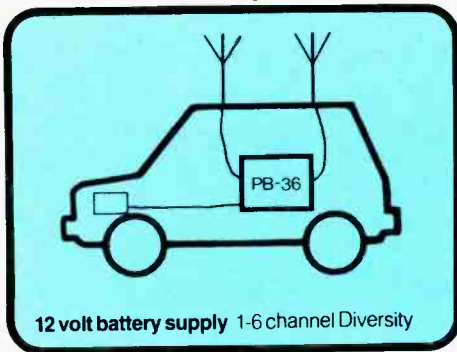
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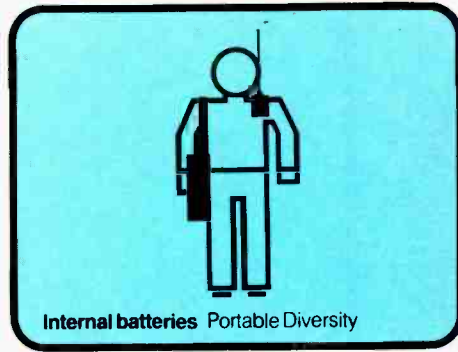
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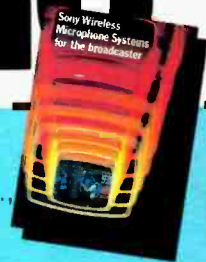
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CUTTING AT MASTER ROOM

The Master Room is situated in London's West End, and is owned and run by one Arun Chakraverty, ably assisted by Kim Randall. Arun is a quiet, unassuming character who, once he gets talking exudes a surprising confidence which, presented in print could be misconstrued as swollen-headedness, but somehow you don't question anything he tells you. His confidence must come from somewhere—the most likely source being his hugely successful career to date.

The Master Room is very peaceful and pleasant to work in and we talked on for hours without realising how fast the time was flying by. Arun is an extremely ambitious man, his driving force being a desire to acquire millionaire, if not

Janet Angus talks to Arun Chakraverty who runs this West London cutting facility

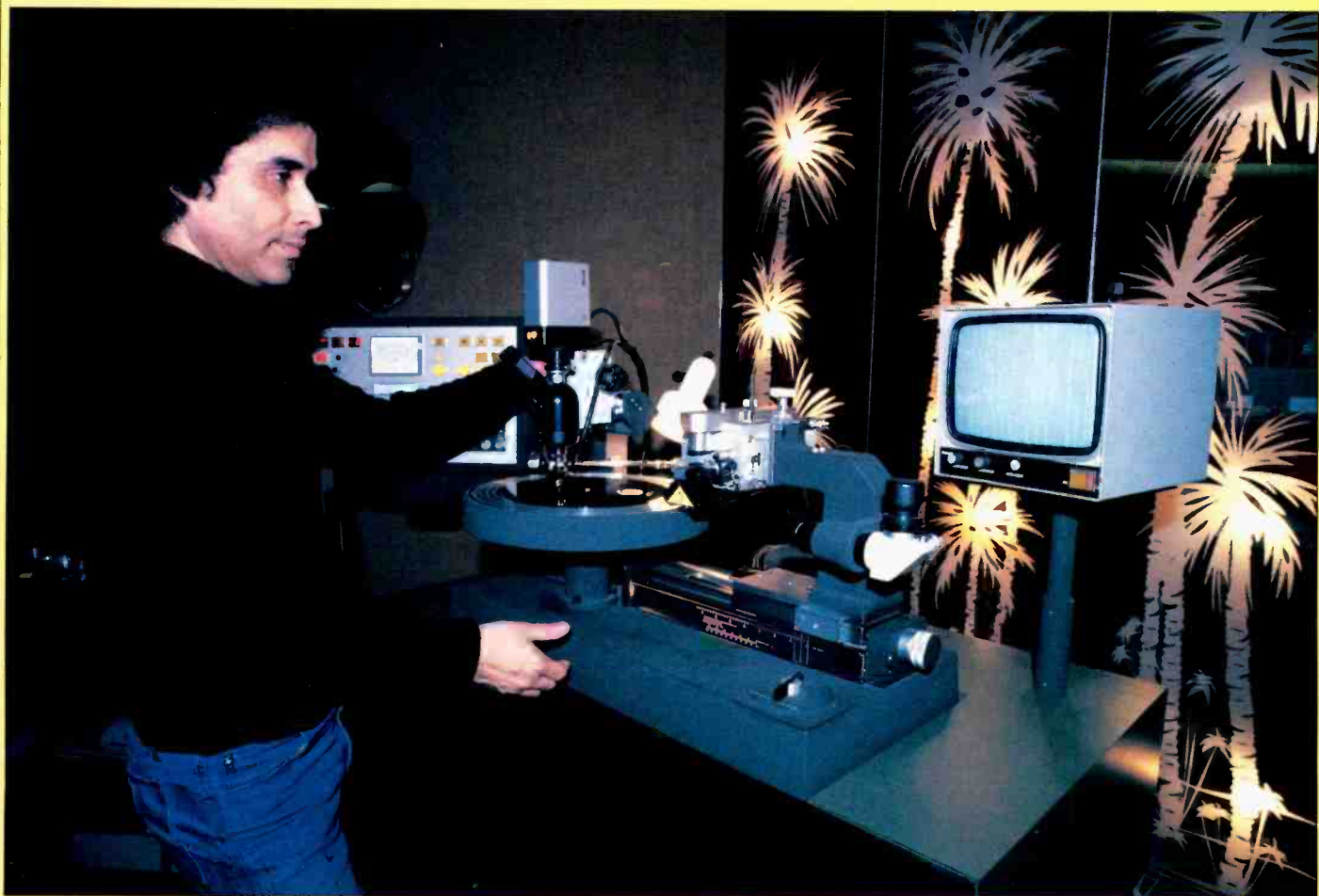
multi-millionaire status.

He first came to London to study at the University for an electronics degree. On graduating in 1967 he went to work at the Telecommunications Research Centre. With this sound technical background (as opposed to technical sound background) he went to RCA as maintenance engineer. Having maintained the cutting rooms for two years and finding the equipment extremely simple in its make up and

application, he started doing cuts at night for extra money. These 'extras' included David Bowie's *Ziggy Stardust* album, Lou Reed's *Transformer* and some work for Robert Fripp amongst others! Why did he move into cutting? Simply because he felt there were more prospects in that than in maintenance.

In 1974 Arun went to CBS as cutting engineer working with artists of the Rod Stewart, Elton John, ELO, Abba, Neil Diamond and Eagles ilk. But alas even this was not sufficient to make the man happy, and frustrated by large company politics, he accepted a post as studio manager at Stone Castle studios in Milan. Whilst out there, Rod Stewart requested that he come over to England to cut his records—it was no good hiding in Italy. One and half years later Arun

Arun Chakraverty at his Neumann VMS80 lathe—groove quality is monitored on screen





Kim Randall at Master Room's custom-built console

was very depressed in Milan "I didn't like the Italian music!" and he eventually jacked it all in and came back to the UK. The big problem then was that there were no jobs vacant. Except at the Master Room that is.

"It was horrible here. There was just very basic equipment and it was all old and broken: they had a very primitive Ortofon console with no proper facilities, an old—one—Studer A80 which needed attention, and a Neumann lathe. It was the sort of place that everybody went to once and never came back."

This was when Arun took his big gamble. Realising that the facility could not survive long in the state it was in he decided to stay and eventually buy them out. This he duly did in 1981—so sure was he of the strength of his position, he actually had the new console built to his own design, bought a new Studer machine and a new cutting head all with his own money and moved them in before the sale was executed. Kim and the lathe were all that stayed!

They quickly modernised the place and gradually built up the equipment, culminating in the purchase of a brand new Neumann VMS80 lathe six months ago.

The console was actually put together by Clive Green to Arun's design: it has four sets of Court equalisers—two graphic and two parametric—and NTP and Valley People compressor/limiters. All the machine remotes are built in to the console. "It is very similar to a studio console in its appearance so that an engineer or producer coming in here will feel immediately comfortable with it.

I have used all faders instead of the normal rotary controls. Most cutting room consoles use rotary controls—they must have a reason but I don't know what it is. I prefer the faders, they are easier to use and get precise settings." Dolby A360s and the Studer DD16 digital delay line are also mounted in the console.

The tape machines are all Studer A80s—two ½ in and four ¼ in. For digital mastering there is the Sony PCM 1610 with two 5850 U-Matics, the second being for production masters or compact disc production masters. "We've also got the Sony F1 system which is very good for domestic use but no good really for this type of work. We only recently got it because people would say 'oh we could take a copy home to listen to if you had one of those.' Music on F1 sounds a bit weak and bit tinny like the difference between a clean cassette and a clean ¼ in master."

The UREI Time Aligned monitors dominate the back of the room, but it is the Yamaha NS10Ms which are predominantly used. "The NS10Ms came from the Power Station—Rhett Davies brought them when he came in '82 to cut Roxy Music's *Avalon*, and I asked him to leave them behind. They sounded amazing. These days I only go by the Yamahas. There is no EQ on the monitors. We use BGW power amps on both sets of monitors: 750B on the UREIs and 150A on the Yamahas. A lot of people make the mistake of using cheap amps on the Yamahas and don't get a good sound. We tried Crown and Studer as well but the BGWs were the

best." The record deck is a Technics SL10.

"The digital delay is extremely important for the digital work, because there is no preview head on those machines so you have to delay the sound to the cutting head. Therefore all the music going on to the disc has to pass through the delay and the Studer is really 99% close to the original sound. You have got to have the best, and you have to keep a spare because without it you can't do anything."

The lathe is a VMS80 with Neumann SX74 cutting head and PG74B cutting head drive amplifiers. Installed by the machine's designer, brought over from Berlin, astonishingly enough certain of the Master Room's clients haven't even noticed the change!

Any regular cutting room visitor will know that the above equipment list is pretty standard fare—the console has a few extras, the monitors may be different, but really there is not a lot of scope for variety. Even the lacquers are all much of a muchness: "There isn't much choice—there are only two or three types and they are basically more or less the same. They all have their ups and downs. The standard of lacquers hasn't changed over the last 10 years. They are not easy to manufacture; there are a lot of things that could go wrong. We use Capitol Apollos at the moment and they are 90% OK, which is OK.

"It's the same with the cutting stylus: you might use it for five hours or 30 hours it's up to you. If something needs all the precision you don't look at how long it has been on, you just change it."

So what makes Master Room so special? What makes any cutting room different to another, assuming the engineer knows what he's doing? "In the end it is really business. I think we are the most expensive cutting room in the country. Most of our work is for major record companies: very quality conscientious people. Anything we do here costs money. I make myself available at any time—the Thompson Twins came in at 3 am. Duran Duran recorded and mixed in Australia, delivered the tapes here and wanted a cut and 12 production copies for EMI in two days—it was hard work but we did it.

"I spend around four or five hours with a client; you can't have a whole day, even if you are prepared to pay for it. There might be an emergency like something going wrong at the factory and new lacquers are required, you can't tie yourself up with one client like that. You can have any service here but you have to pay for it." And not even a trace of a twinkle in his eye.

Is any of the work in the classical music field? Not here it seems, although while at RCA he was cutting 40-50 sides a week. "But on classical music you don't have to be creative, you just have to reproduce exactly what is on the tape. With rock music you often have to add the spice which has been left out."

And then suddenly apropos of nothing in particular: "It would be impossible for anyone to hire me because they couldn't afford it." Arun is obviously, and

justifiably very proud of what he has achieved. Having the owner working the studio himself he feels is the key to everything. The profits so far have not been lining his own pockets either.

Why cutting, if it isn't too obvious a question? The main motive would appear to be the money. "I would pack it up if I had two million," he said, dead pan. Wouldn't we all? "I would have liked to work in A&R but the problem is who is going to give me that much money?"

For some time he has had a studio project in mind which he intends to move into in around five years time. He sees the cutting room's life as it is now, being very short lived. "Things are going to change, they have to and we won't be talking all this equipment anymore.

"The reason we are so successful is because it is just Kim and me, although we have recently brought in a couple of other people to assist from time to time. But I can do all my own maintenance—that's my background, and half an hour each morning and evening takes care of most of that.

"But for recording and cutting engineers, mostly it's a dead end job. Most university graduates don't waste their education in this field—they go into industry. Cutting is so easy you are just transferring sound from one thing to another: you can't progress or advance at all, you can either do it or you can't.

"In a good cutting room, the main thing is to have the ability to make the disc sound identical to the tape. To do that is very easy, but there are so many areas along the electronic chain on the way to the mechanical head where it could go wrong. And then when you have used a stylus for 10 hours you lose some of the high frequencies. You must be able to cut records flat and record the sound exactly like the tape. If you can't do that then forget it.

"We do get tapes which are absolutely wonderful and then I will cut them normally absolutely flat. You A/B the tape and the disc, and because of the mechanical process all sorts of things start to happen and you can't get it 100% identical but you can get 95%. If your tape is really good: no distortion, good tone, good frequency response, then even if the cutting room is not very good and only gets it 80% it will still sound good. If a tape has been to two or three rooms and they can't get a good sound then I know the tape is no good.

"If a tape is rotten you can never make it sound brilliant."

A problem which faces many artists is record companies who pay for good cutting in the UK, but have their production master copies put out to cheap facilities who deliver bad copies which are then sent abroad for re-cutting and overseas distribution. This is a false economy which all too often the artist will be totally unaware of. By saving maybe £10 on the copying fee they are signing that record's death warrant in the destination country. Most American, Japanese and German copies which arrive in England are of a very high standard, and it seems to be a peculiarly

CUTTING AT MASTER ROOM

British problem. "The Americans are very strict about it. If you talk to an A&R director he doesn't know how it happened. That's the area that has to change: they are so busy they don't have time to know what happens to the masters; and often the original master is just sitting here doing nothing."

Cheap factories also seem to be culprits, but how do you know which are good and which to avoid? "All the major record companies have their own factories and they are all brilliant" seems to be the answer to that. Another stage that can go wrong is if a factory damages a lacquer it will have to be re-cut, and maybe the record company will unthinkingly send it somewhere else. Sometimes the result is depressing. "Virgin, EMI, CBS, Polydor and Phonogram are all very good about it, they always send it back to the original room where, after all, you have gone through it with the artist or producer. We used to cut *Tubular Bells* 10 years after the initial release. But the companies that don't do it—they think because the artist has passed the initial cut and pressing, he will never know."

Which brought us on to the subject of the compact disc, leading to a certain amount of good humoured scorn: "Everybody thinks compact disc is going to sound amazing, but it all depends on the tape supplied to the manufacturer. Nobody knows anything about it, but it is all down to the tape I make. I could send a terrible tape, but nobody cares because they've been told that all CDs sound brilliant. Transferring on to CD will not improve very bad source sounds. With *Avalon*, Sony in Tokyo kept the CD for demonstration, but even that has been processed to get it on to CD and therefore I still think the original ½ in sounds better."

As for the room's acoustics: "I don't believe in cutting room acoustics. People who say they will design those for you are just trying to sell something. I don't think anyone can design good cutting room acoustics—it is basically just good decoration, fresh air and cleanness." The only aural matter is the monitoring.

Attempting to explain what it is about Master Room that justifies a price tag 20% higher than any other in the country, Arun touched on the subject of equipment. And although most rooms have the same basic facilities, they do tend to be sparser. "The cutting engineer should be able to get anything he wants instead of waiting two years to buy anything. If you are the owner you can sign cheques and buy it straight away."

The atmosphere and appearance of the studio is kept up by enforcement of a rule stuck on the console: no smoking, eating, drinking or feet on the console! "I can only impose restrictions like that

because I am the owner. When Status Quo first came here they couldn't believe they weren't allowed to smoke, but now they like it.

"Things like keeping duplicate sets of equipment you can't do in most places. Because I am working here I know what equipment I need to keep all my clients happy. The working owner must be dedicated and ambitious. I could be happy with £10,000 a year but I want millions and you have to earn it.

"I can come in any time, and I can do anything I want. If a client is important enough I could send the tape to New York on Concorde—it might cost me £1,200, but it might be worth it."

The ingredient for success is seemingly unidentifiable, the driving ambition, the dedication, the musical and technical background combine in some way to create something special. It certainly isn't an ability to smooth talk the clientele. "I have built up a list of clients which have a mutual respect for me. I don't get on with people who consistently bring me bad work. There are a lot of producers and engineers who won't come to me because they know I might say something unpleasant. I don't care; I'm going to tell them the truth and if he doesn't like it I will never see him again. We gain and we lose, but I think we gain more than we lose. We all make mistakes, but we must be able to admit that—all the time I am learning so many things from different people.

"All the good engineers are still doing good work and all the bad engineers are still doing bad work. There are very few good producers—everybody is busy but they are not all good. 70% of the tapes we get are good and 30% you have to spend time on to make it reasonable.

"Because I know my equipment inside out I can guarantee that if you ask for a disc exactly the same as the tape I can provide it. If we couldn't we would pay for everything and any damage that had been done. The rest is down to the tape. People who say it's a great cut: it's all nonsense, it's all down to the tape. There are very few engineers and producers who can provide a tape that can be cut flat. I would be delighted if they always did—it's cheaper, takes less time, involves less hassles and everybody is happy. Then you could have a robot to do it!"

I hope to have done Arun justice in this article because there is a danger in presenting his ideas of making him sound extremely arrogant. But this could not be further from the truth, he is charming and almost unassuming in his manner. It is simply that he is very confident of his own competence and does not see his skill as being in any way remarkable. And he certainly knows how to make a business pay!

Kim Randall takes care of all the administration and accounts and is very much an integral part of the facility. The three years in which the two of them have built the business up have been very strenuous.

What of the future? "I would like to set up a cutting room in New York. If we're talking about me becoming a millionaire, that's the way to do it." □

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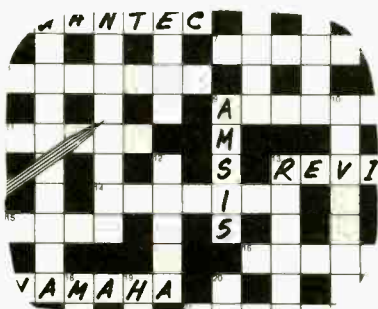
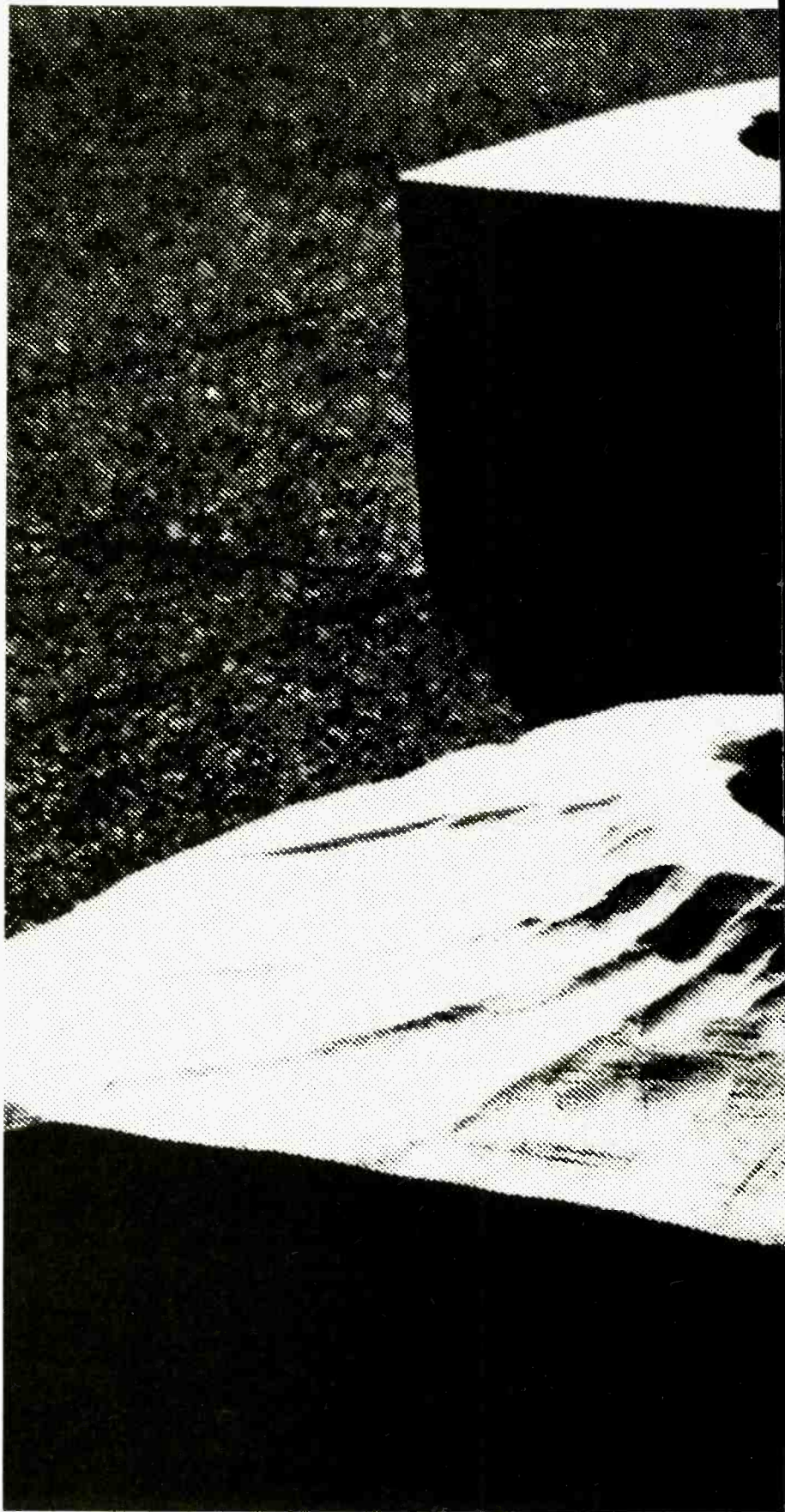
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Linn Products of Glasgow have spent the last decade or so revitalising the UK hi-fi industry, along the way becoming one of the largest specialist firms operating in this market. The secret of their success has been based upon the *LP12* turntable, and the discovery that the turntable was a significant factor in determining sound quality.

Prior to this the turntable had been regarded as an essentially passive component, which merely had to satisfy simple steady state measurements for speed consistency and noise but this is not the place to go into the whys and wherefores of turntable design. The best justification for Linn's new perception of the turntable must simply be the healthy growth of the company.

Becoming increasingly depressed by the declining standards of LPs generally, disenchanted by the supposed extra quality available on the 'audiophile' discs which were appearing (particularly the trend to half-speed mastering), and appalled by what they regard as the abysmal sound of digital recordings, some five years ago the people at Linn started to involve themselves in the LP production process.

They now have a successful, if small, record label, Aloi Records, and have worked extensively with Calum Malcolm at Castle Sound near Edinburgh. But the really interesting part technically has been the development of a cutting facility at the Glasgow factory, which they and others use, not to mention all their other investigations into the other processes of record production.

The first step was to examine critically the records which were available. It appeared that they expressed a preference for LPs cut at Compass Point, which used a Scully lathe rather than the more widespread Neumann.

Linn purchased a couple of secondhand Scullys, which they combined, and were generally pleased with much of the design, having a natural affinity to belt drive systems from their extensive knowledge of the *LP12*. However, the Scullys had not been well treated in their earlier homes; the bearings were well worn with too large tolerances, and early results were a little disappointing.

The first priority was to get the speed constant and correct, so an extensive rebuilding was undertaken, retaining the Scully castings but replacing bearings with ones based on the *LP12* for starters. Technical manager Martin Dagleish described how he and his assistant had to sneak into the factory during the three week summer break to get their hands on the precision tools necessary to make the components, as these were normally too busy on production work.

Having reduced the mechanical noise, wow and flutter in the bearings, motor noise became apparent, and this was solved in part by mounting appropriate motors on the concrete wall and floor of the lab. The cotton belts supplied for the Scully proved problematic, so the ground neoprene belt used in the *LP12* was adapted, and a more powerful version of the 24-pole Philips synchronous motor was adopted, driven from a Hewlett-Packard signal generator via a small 90 V power amplifier to provide speed variations.

LINN SET UP

Well known for top end hi-fi equipment and disenchanted with reproduction quality of discs, Linn have entered the field of disc cutting. Paul Messenger investigates

The cross-slide drive to the cutting head itself is normally via an infinitely variable gearbox, and this also contributed to the noise problems, so the drive shaft is now belt driven from a wall-mounted motor, with preset and variable speeds.

The precise position of the head, determined by a shaft encoder, is stored in a computer. This recommends varipitch settings, in accordance with required playing time, etc, but the actual control remains deliberately manual, via a potentiometer. Linn dislike the 'constant correction' digitally controlled varipitch system used with Neumann/Studer setups, and are deeply suspicious of the desirability of applying a DC correction signal several times per revolution.

Though they are very pleased with the basic mechanics of the stripped-down Ampex *ATR100* which they use, there is no room for the necessary extra varipitch head on this machine, and they are unhappy with the Ampex digital delay system, whereby the off-tape signal controls the pitch, and the cut is made via a digital delay line. Most of the electronics of the Ampex have been replaced by custom Linn electronics to suit the particular application and avoid unnecessary circuitry.

The cutting head itself is the latest Ortofon *821* series. As usual, Linn took this apart, and flew to Denmark to discuss certain points. The only significant modification they made was to remove the case and fix the magnet structure itself firmly to the carriage. Ortofon use a plastic case to electrically isolate the innards, as their experience shows that most cutting rooms manage to get at least one earth loop going without this precaution. The mechanical isolation effect of this case is sufficient to affect quality above 10 kHz, but very few studios seriously seem to attempt to cut anything accurately at these frequencies.

Once again the virtues of simplicity are championed in the cutter drive electronics. Linn built their own feedback circuitry to control the complex cutter head characteristics themselves, and have mounted this as close to the head as possible. To get the high voltages at high frequencies which are required to produce the inverse RIAA curve, two bridged Naim *NAP250* amplifiers are used, one for each channel; current demands are comparatively light, but clipping needs to be avoided at all costs to keep high frequency information.

In their early investigations, Linn established that the inner groove 'pinch effect' or high frequency scanning loss, due to the difference in profile between a brand new cutting stylus and replay via a top quality Vital hi-fi stylus, amounted to nearly 3 dB. Accordingly an appropriately increasing amount of treble boost is automatically applied at the cutting head to compensate.

They also looked at, but abandoned, the possibility of 'pre-distorting' the cut to allow for pivoted tone arm geometrical tracking errors in the lateral plane. Besides accepting the fact that two wrongs don't make a right (and that maybe someday someone might manage to make a radial tracking tone arm that works properly) the extra pivoting required between head and carriage was bound to provide its own set of difficulties.

Some outside users find difficulty in coming to terms with the fact that no processing or equalisation is applied to the signal from the Ampex. Theoretically the cutting master should be pre-equalised as required, and Linn see no reason to provide yet another series of equalisers to further degenerate quality. They have however, bent to the extent of considering installing custom compressor/limiters based on Amek designs, which they have found vastly superior to many others. Tapes which they have not originated, and particularly those from

live recordings with strong resonances related to mic positions, have sometimes given problems which they hope this will overcome.

The research programme has so far resulted in a rather remarkable cutting facility, but Linn are not blind to the other problems which can afflict album quality. On the pressing side they have finally resorted to importing Teldec vinyl, having despaired of getting adequate quality with even the top grades supplied from the UK.

They have also studied metalworking in some detail, going to the edge of the precipice involved in the £200,000 investment necessary to install their own operation, but baulking at the difficulty of getting enough people to use a Glaswegian facility to make it worthwhile.

They remain concerned at the quality variations they find outside, both sample to sample and company to company. Martin Dalgleish described in glowing terms the 'sensational' metalwork shown him by American Rick Goldman, who visited Glasgow. Sadly, said electroplating genius is now working as a waiter, unable to find a commercial operation in which he can use his talents without unacceptable compromise.

Martin described metalworking as still very much a black art, success being as much a matter of instinctive experience and great care as the equipment itself.

Cleanliness and great purity in the water, the electrolyte, and the nickel are vital; the chemicals need to be exactly right; clean filters are also essential. If the tank is run too hard for too long periods, problems of purity start to appear quite quickly.

The precise timing and rates of the different stages of the plating also play a vital part, though cause and effect remain nebulous enough to make generalisations difficult. Pressed, Martin said there was some indication that plating too fast tended to give low frequency noise, too slow increased high frequency noise.

Having heard the results of the lathe on Aloi and other discs, it is a little sad they have decided, for the moment in any case, to stop short of the metalwork stage. Compared to the investment going into CD mastering, the sum required to advance the state of the LP art seems trifling.

As a company, Linn display a Glaswegian earthiness that is unafraid to call a spade a spade, yet will invariably critically re-examine its suitability to the task of removing earth. Favourite adjectives can be accepted as engaging frankness, or rejected as downright rudeness when used to describe the fruits of another's labours.

Yet this attitude has been an essential ingredient in their remarkable success in analogue turntables, and more latterly loudspeakers. The disc mastering work has already borne valuable fruit, and there is a new Behemoth of a monitoring loudspeaker. As they continue to turn some of their attention towards professional audio, Linn Products will merit more than a passing glance. □



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STUDIO FILE

STUDIO FILE

Bullet certainly have the right address for a studio in Nashville, situated in Music Square West. Nevertheless, the traditional image of the Nashville studio ends at the building and studio complex itself. Bullet are housed in a very modern looking tower block where you would expect to find corporation offices, not recording studios. Access is by lift with a separate service lift for heavy equipment.

The studios were in slight turmoil when I arrived as various changes in the building layout were in progress and sessions were being set up. However, Merissa Ide, who is in charge of publicity was able to take me under her wing and give me a guided tour of the facility.

Bullet Creative Group Inc can be regarded in some ways as the prototype for a new kind of studio for the '80s and after: the complete audio/visual studio where both the A and V have capital letters. The main Studio A is fully capable of providing first class audio and video facilities—anything from a single to a live television show can be produced there.

The studio itself is a 40x46 ft sound stage that can hold a large orchestra in comfort or give a group enough room to spread out and play 'live'. No walls are parallel and the basic interior design consists of wood panelling with a parquet floor. There is considerable trapping installed behind the exterior surfaces with various fabric covered ports around the room. As may be surmised, the acoustic is fairly lively with small concert hall characteristics but a controlled bass response. The room can also be damped if necessary by pulling floor to ceiling drapes in front of some of the wall surfaces. Various acoustic screens were also in evidence for separation purposes. A striking aspect of the studio is the high ceiling (about 30 ft) and the lighting grids. The ceiling itself is absorbent in order to avoid floor to ceiling reflections and is criss-crossed by a television studio lighting grid. The sound stage is fully capable of taped or live TV shows.

A staircase along one wall

Bullet Creative Group, Nashville



Control room A and through to the machine room

leads to a balcony that overlooks the studio and fronts the video control rooms, the latter being situated over the audio control room and isolation room. As well as providing access, the balcony serves as a camera platform and lighting gallery.

At the time of my visit the video studios were undergoing some final transformations so I was not able to see the facility in its final state. The two main control rooms are situated over Control Room A and consist of a video production control room in Studio A and a production studio for on-line editing and post-production. These could be likened to the on-air and production studios in a small television station.

Equipment, either projected or already installed, for studio video production included three 180° Cyncs, Sony BVP 330A camera with pedestal, Sony BVH 1100A C-format VTR, 16-input audio console and lighting with Kleigl dimmer control. Similar equipment would be available for location video production.

It was planned that the editing suite be equipped with a Grass Valley 1600 switcher, Laird Telemedia character generator, CMX 340X editor, Studer A80 2-track recorder, graphics camera, insert stage, three VTRs and NEC E-Flex DVE with perspective.

Off-line editing was also available with a Panasonic NV-A960 editing system and Bullet also have a video tape duplication service with

copying from and to 1 in C-format, ¾ in and ½ in formats.

Back to the control room for Studio A. This is in keeping with the studio in that it is large and spacious. The decor is reserved without being Spartan and the lighting can be regulated from office brightness to low and moody. The atmosphere is fairly bright with parquet floor and wooden panels each side and to the front of the room. Windows are also in abundance with vision into the main studio, machine room and separation room. The control room is set at 90° to the studio with symmetrical windows overlooking the studio on the left and the machine room on the right. Two windows at the front look into the isolation room and are separated by an attractive panelled pillar (though what this may be doing with reflections is another story).

The ceiling consists of a large open trap which extends down and over the side windows, thus effectively cleaning up floor to ceiling reflections and any other loose 'mud' that may be around. The rear wall consists of a mixture of hard and absorptive surfaces and is also set well back from the console area. Part of the reason for this is that the main access to the studio is through the control room and this rear space acts as an 'open corridor' to it and thus keeps people away from the console and its operators. The floor at the rear is carpeted as well.

Centrepiece of the room is a 48-channel SSL 4000E console fitted with 40 channels (thus allowing room for expansion), together with *Total Recall*. This allows for "greater rentability of the studio" when clients have mixdowns to do over a period of time.

Monitoring is on UREI 815 speakers mounted in a bridge over the front windows and isolated away from the structure in order to minimise transmission interference. Two large video monitors are also installed in the bridge for the console computer display and video tapes. Secondary monitoring consists of two 'hi-fi' style speakers attached to the console meter bridge with a solitary Auratone for glorious mono.

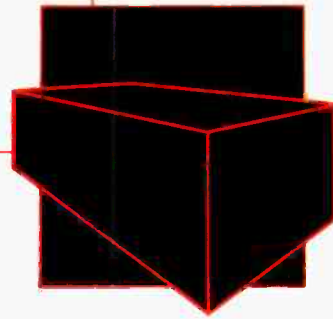
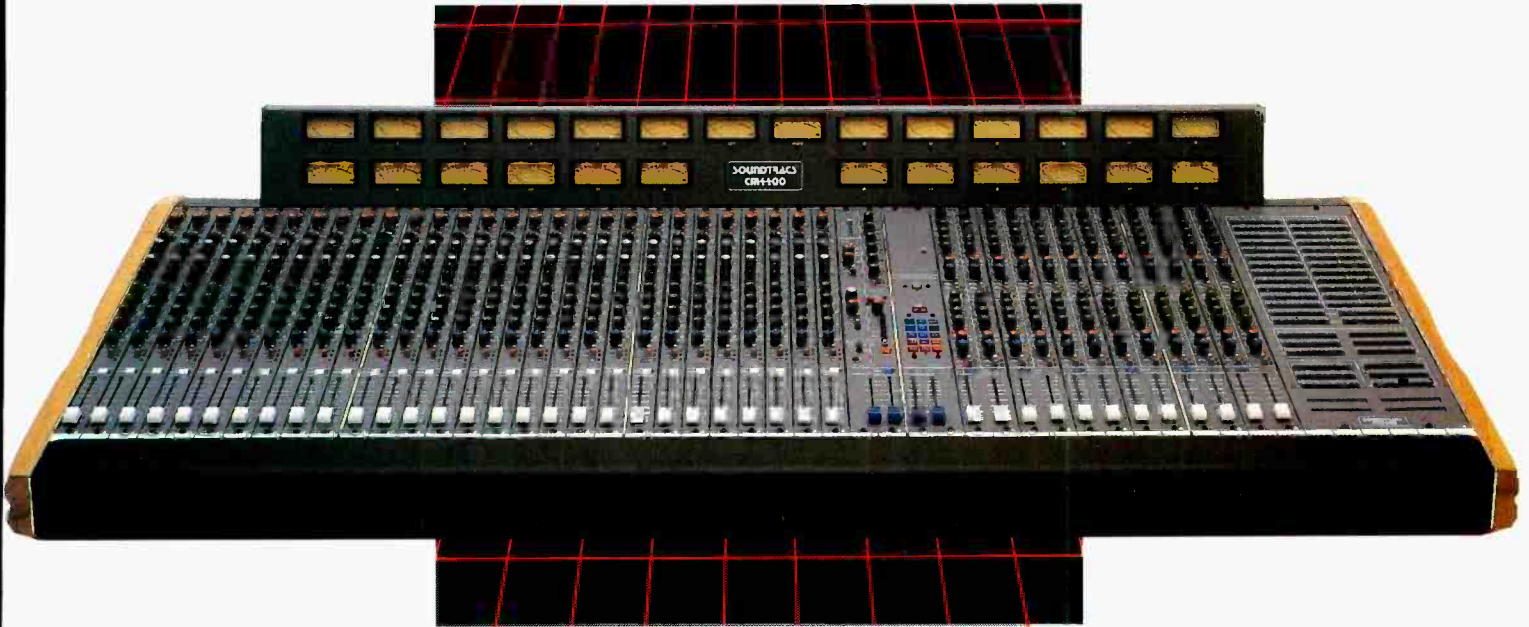
The outboard effects are housed in a twin wooden rack which also serves as a handy tabletop for manuals and a record player. Rather than have fixed effects setups, Bullet tend to have a pool of equipment that can be installed into each studio's racks depending on the needs of the session and this includes: EMT 251 digital reverb and 240 stereo plate, Lawson plate, Lexicon 224 and *Prime Time*, AMS DMX-16 reverb and DMX-15 processor, several live echo chambers (these, of course, are fixed!), Eventide H949 *Harmonizer*, Roland *Dimension D* and Aphex II, UREI LA-4 and dbx 161 compressors, Loft flanger and an Audioarts stereo parametric EQ.

Studio A has a separate machine room and this offers several advantages not the least being the fact that it gets the recorders out of the control room (and provides a job for a tape-op). Normal working consists of a Studer A800 24-track machine with a high speed ½ in A80 master recorder. However, 48-track recording—or should I say 46—is available and usually means pinching the A800 from Studio B and wheeling it in. Dolby is also available throughout for those clients that require it.

Access to the isolation room is through sliding glass doors in the studio and in fact, the room could house a whole rhythm section if required. Megalomaniac drummers will have more than enough room



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for the largest kits as well as space to thrash around in. The acoustics can be adjusted from bright to fairly subdued, as can the lighting, and thus the room can be used for a variety of purposes, one of these being a keyboard studio. An obvious advantage of this 'small studio' is that where a large orchestra has to be recorded with electric instruments, the latter can be isolated from the acoustic instruments on the main studio floor.

As well as straight music recording, Studio A provides scoring and mixing facilities for film—or at least its video copy—via a Sony *BVH 1100A* 1 in C-format VTR with an Audio Kinetics *Q.Lock* sync.

Across the other side of the building is Studio B. This is set up mainly for track laying and sessions requiring a fast turnaround, such as jingles. The studio is fairly small and holds a group of say up to seven or eight musicians with comfort. The acoustics of the studio enable a good ensemble sound to be obtained easily and

Bullet continued

quickly. The treatment in the room consists principally of parquet floor and panelled walls that are trapped behind, the port for the traps running along the lower edge of the walls. The ceiling is also absorbent and the overall conception similar to that of Studio A.

One striking aspect of Studio B is the enclosed Baldwin grand piano. This is housed in its own trap with just the keyboard being in the studio. This means that an open lid sound can be used in a group situation with the pianist still being very much a part of the band. It also means that the piano remains in a fixed place and can be miked up for an optimum sound. In fact, a selection of microphones are installed, including *PZMs*, and these can be run into the console as required—pick a mic and pick a sound!

Control Room B features a Neotek series *111* console with 28 inputs, master logic control

and 4-band parametric EQ, running into the previously mentioned *A800* 24-track. Monitoring is by UREI *813* speakers with 'typical dime store hi-fi speakers' on the console for secondary monitoring. The use of UREI monitors in both Studios provides a certain continuity between the two rooms, especially where tracks are laid in B and mixed in A.

Outboard gear can be drawn from the list given earlier, though I did notice an Audio+Design *Vocal Stressor* perched on top of the console; these seem to be very popular units in the US.

Although Studio B is primarily used for track-laying with mixdown in Studio A, there are Studer *A80* master machines available so each studio can function as an independent operation.

In addition to the main room, Studio B also has an isolation booth separate to the studio and on the other side of

the control room door. The window is at 90° to the console and thus near to it for good visual communication. The booth is mainly used for vocals and speech, or overdubs with instruments such as flute or acoustic guitar.

As their name implies, Bullet Creative Group Inc also offer 'creative services'. These can range from advice on a first recording session to the planning and realisation of a complete audio-visual production, such as a video clip or television special. The aim of Bullet is to be able to provide a complete service to clients under one roof thus relieving groups of the necessity of going to different studios for recording and a post-production for the video clip. It is this integrated audio-visual aspect that sets Bullet apart from the more traditional Nashville studios.

Terry Nelson
Bullet Creative Group Inc,
49 Music Square West,
Nashville, TN 37203, USA.
Tel: (615) 327-4621.

Opposite Liverpool Street station does not, perhaps, sound like the most romantic setting for a music/recording venue. Once inside the Bishopsgate Hall, however, you turn your thoughts to the wealth of opportunities which the institute offers.

The Bishopsgate Institute warrants some explanation here as its main hall has been the scene of many a fine recording and indeed concert for many years. The Institute is a charitable and educational trust which was opened in 1894 with funds from the Bishopsgate charities and grants from the City Parochial Foundation.

It comprises the main hall and associated back rooms, reference and lending libraries, and various smaller halls fulfilling a number of functions. Here we are primarily concerned with the main hall which has audio and video tielines running out to the mobile which parks at the side of the building. The mobile uses this venue as its base, and its prolific output has received wide critical acclaim, eg 'Nor has a wide range of the lovely sounds the guitar can produce been more faithfully caught in a

Sutton Sound Mobile Studio, London

recording', *Gramophone* June 1982.

The principle thing about the hall is its acoustic. At the time of my visit, they were just about to redecorate and the result will be breathtaking. At the moment much of the ornate detail has been lost under fading paintwork: intricate patterns on the ceiling, grand pillars around the walls. The lower half of the walls are wood panelled which, at the moment are painted but will be stripped and polished. With parquet floor and decorative leaded windows the room is comfortable to play in.

Approximate dimensions are 80×48×42 ft with a good sized stage at one end. The full size Steinway concert grand piano, reputed to have belonged to Myra Hess, sits on the platform and is used for recording. For rehearsal purposes there is a lesser Bechstein baby grand sitting in the hall. The stage has a piano lift, and once lowered the piano may be moved into a special store room at the back.

Managing director Mark Sutton explained that they have not always been a mobile unit. In 1968 they were located in Soho Square at which time they were recording a mixed bag including Jethro Tull, T Rex, Emmerson Lake and Palmer, and Derek Nimmo.

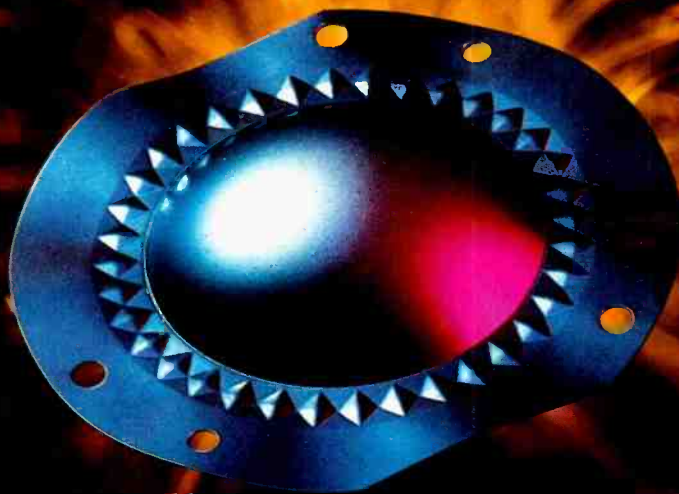
Already, Sutton's work was ingratiating him with the major record companies. His recordings of John Williams for CBS led to Sutton Sound's own productions with musicians of the David Munrow and John Ogdon ilk. One can see immediately a strong contrast in the two types of work they were now involved in. It was in 1974 that Mark realised really he wanted to concentrate on serious, ie classical, music and therefore mobile work. Trying to find suitable halls proved to be an unrewarding task, and with a mobile, there isn't that much gear humping to be done. Thus the Sutton Sound mobile was born.

It is built into a Bedford Luton van, which is the

largest you can drive before you need to start producing HGV licences. Kenneth Shearer (of the Albert Hall flying saucers fame) carried out the acoustic treatment, which consists of alternating hard (heavy duty vinyl) and soft (high frequency absorbers—acoustic foam) panelling. None of the surfaces is even and therefore standing waves have been eradicated. The walls and ceiling vary in thickness from 2.5 to 4 in, and are covered with a thick hessian cloth.

The main feature of the van is obviously the desk which is 20/8/2 and was custom built by Mark Sutton's then partner Michael Hall. They went for this option because they required facilities on the desk which were not readily available at the time. Although it is essentially 20/8/2 it is possible to have outputs from all 20 channels if necessary. "It has a very wide dynamic range and low noise for its date," explains Mark. "It's a vintage desk! After all it's 16 years old now."

The monitors built into the wall behind the desk are Tannoy *Lancasters*: "They are driven by a Quad 303 amplifier. I find Tannoy



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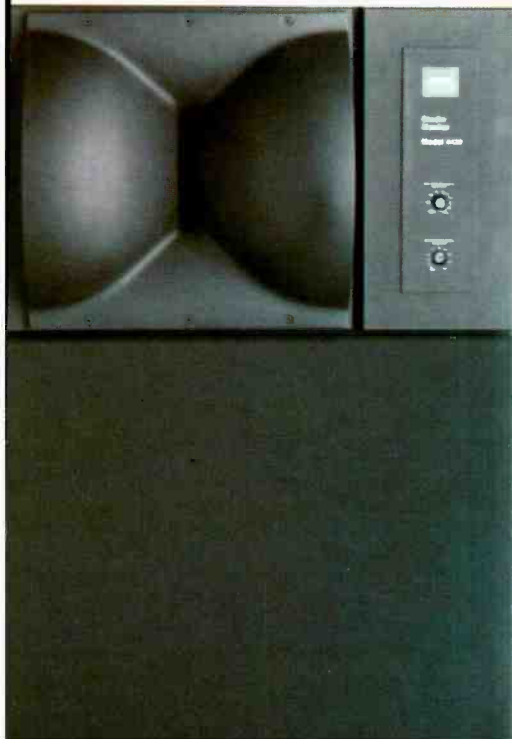
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STUDIO FILE

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speakers are very sensitive."

The tape recorders are Philips *Pro 20s*, of which he is the proud owner of eight. Noise reduction is with Dolby *A301s* and other equipment in the mobile includes GBC TV monitor and camera ("This is absolutely essential") for visual communication with your recording musician, and a 260-way patchbay underneath the desk. There is a home made talkback speaker, and a telephone link to the main Bishopsgate switchboard.

In addition to the permanent equipment in the mobile, there are various other set ups which for reasons of theft nervosa as well as ergonomics, are stored either in Mark's Westbourne Grove office or his home. These include a Sony *PCM 1610* digital processor with *DAE1100* editor, and he has also ordered the new Studer *D820*, hoping to get the first one that arrives in the UK.

He also has a portable rig which he will use without the van, consisting of the Sony *F1* and a 6/2 Central Recording Services desk. This will be for smaller scale budget work. Bayswater is also the home of a further pair of Dolby *A301s*, five Akai cassette machines with Dolby *B* and *C* ("I'm getting another five"), four Lockwood monitors and Quad electrostatics for comparison listening.

Getting nearer the source of the music, Mark talked a bit about the microphones he uses and the techniques he employs. "I definitely like Neumanns—I use lots of *U87s* and *KM84s*, and I will be getting the new *KM83* omni version; *AKG 451s* and *D202s*. I have used the Calrec *Soundfield* microphone occasionally, but I'm not that wild about its surround effect in stereo.

"I get very worried by the two extremes of thought that exist," expanded Mark, on

Sutton Sound continued



Mark Sutton at the mobile's custom-built console

the subject of miking orchestral works. "It's usually a stereo pair versus microphone on everything. In between there is a stereo pair with some fill mics. For example I will always mic up a harp. It's a funny thing but you can always hear a harp at a concert simply because you can see it, but it's not necessarily so in a recording. My miking techniques are probably best explained with the following analogy: it is like painting a picture. You start with the basic colours and then you touch in subtleties on top. Thus you give presence and clarity to the sound.

"In the Bishopsgate Hall I use the room as a tool. It has a very generous acoustic—the reverb goes from 2.5 to 4.5/5 s; so you can move the mics nearer and get reverb and clarity in one go. It's a very good room to work in.

"I enjoy the different disciplines of engineering and producing—on small things I will do both. With larger projects I will either get an assistant or have someone sitting next to me with the score."

The majority of the mobile's work is London based although it has travelled extensively in the UK and

abroad, working for almost all the major record companies, many smaller ones too as well as Sutton Sound productions. Records and cassettes can be manufactured in any quantity at very competitive prices.

There are great plans afoot in the hall itself. There is a room backstage which was laid out as if for meetings and which Sutton sometimes sets up as a control room. By knocking a window through the wall it would be possible to command a very good view of both hall and stage. So the idea is to build a fully professional (and permanent) control room in here. It is 22x13 ft, and Kenneth Shearer has already put some thought into its possibilities.

The aim, apart from anything else, is to attract more recording work to the building which Mark would manage on behalf of the foundation. "It seems so ideal. There is even a little recess outside the room where the U-matics could go—I find them very noisy and distracting with all their clicking and whirring when you're trying to listen to something else."

Sutton Sound operate various advisory services for young performers not fully conversant with the ways of

the recording world. Mark also lectures at the Guildhall School of Music and Drama one day a week as Professor of Recording Techniques (ie techniques from the performer's point of view). He started this work in 1978 with responsibility for buying equipment. As in the new city Barbican Arts Centre, of which the school is a physical wing, the sound side of the new school, it seems, was totally miscalculated. "They had put one audio line in to all the music rooms, which made stereo a trifle difficult! And they had allowed £50 in the budget for microphones!" Happily, the organisation is much better now.

His association with students is continued in a special scheme which he launched in 1975. He invited the principles of all the music colleges to send along their best students (approximately 10 each) who would be given 1½ hr recording time to make a 20 min tape.

The demo tape is a well known phenomenon in the rock and pop world, but it has really come into its own in the classical field too. You can audition for jobs in orchestras all over the world by sending in a demo, and so the equality of that demo becomes very important indeed.

Sutton Sound's working days are thus tremendously varied, from analogue to digital; from large-scale concert hall to small-scale demonstration tape, and all seem to be thoroughly enjoyed.

The Sutton Sound literature states that they will willingly discuss and advise on the feasibility of recording requirements without obligation, and it is certain that you will find Mark a thoroughly agreeable advisor.

Janet Angus

Sutton Sound Mobile, 80 Queensway, London W2 3RL, UK. Tel: 01-262 9066.

The basement of a four-storey terraced house in a residential street is the location for one of West London's small but comfortable 24-track studios. Owner Nick Sykes conducted my tour which began at the bottom of a steep flight of stairs.

Nick realised his ambition to build his own studio in 1981

Rooster Studio, London

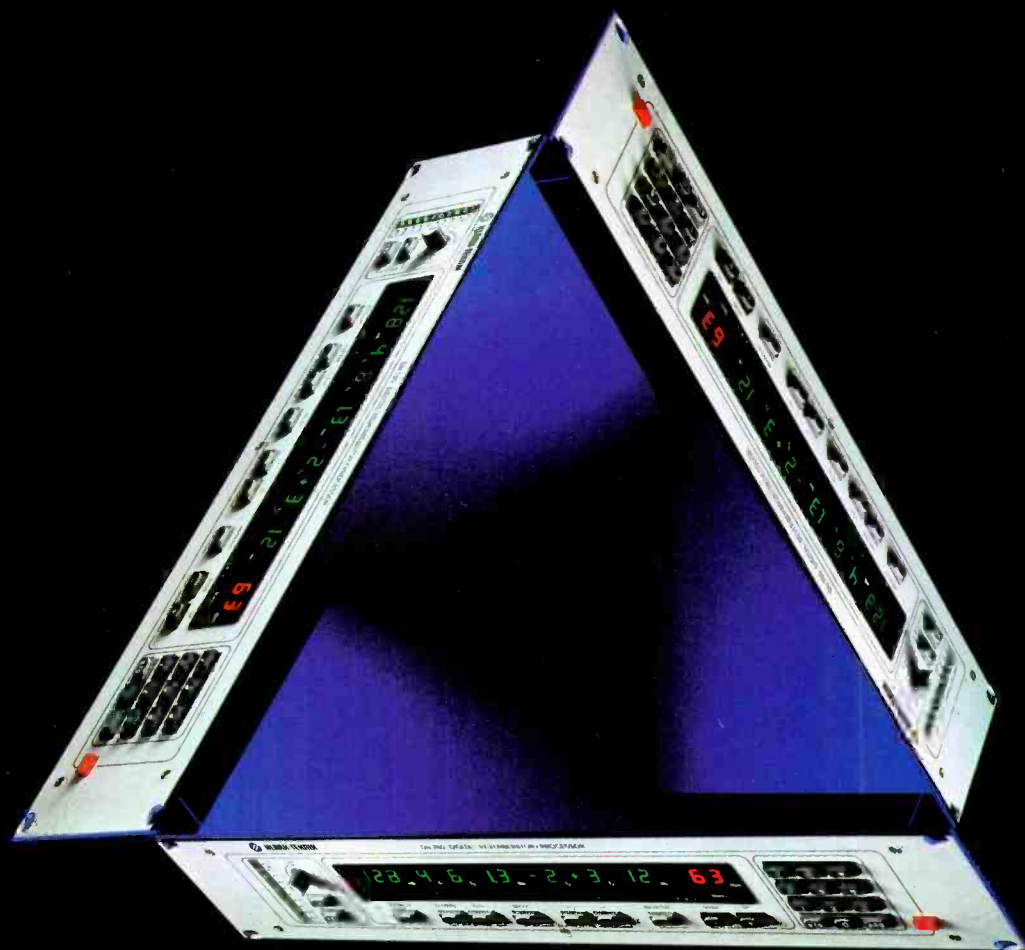
together with friend and consultant Vaughan Maybury. The idea was to make the acoustics as dry as possible to aid separation in such a small studio area. Vaughan has since returned to his home in New Zealand leaving Nick to run his studio alone.

Isolation from adjoining buildings was of course essential and achieved on one party wall by lining it with lead before commencing the Rockwool/cavity/blockboard construction. The other party wall is separated by the stairs and corridor.

They built the ceiling in sections and lifted it on to the walls. They then climbed up above this having left one block out so they could get up between the new and the original ceilings and bolted the sections together. Sheets of plaster board were then nailed to this and a skim of plaster floated over the top. They then ▶

A small universe

325
154



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raised it above the studio walls on acro props and dropped the whole lot on to a fresh mortar bed so it squeezed out between the ceiling and the walls like toothpaste thus sealing itself.

Acoustic panels following the BBC design were built by Nick and Vaughan and assembled round the walls in the studio and control room. These consisted of tuned Helmholtz resonators and Rockwool of varying thicknesses, within an 18 in square board construction all covered with hessian.

"We built all these boxes ourselves, there were thousands of the things. They are bass absorbers with a layer of Rockwool on the front to absorb the top end so the whole room really is one giant bass absorber. There are panel absorbers of different types in the ceiling so the whole room is tuned," says Nick.

Although the control room has since been refurbished, decor and treatment in the studio area remains and the sound is very flat and comfortable. According to Nick the room is very popular with vocalists.

"In fact most of the work gets done in the control room now, we only do the odd vocal and guitar overdub in the studio and maybe some live drums. People bring in whatever drum machine, etc, is flavour of the week and plug it in and that's it. I'm wondering what's going to happen in 10 years time when there'll be no-one around who's actually recorded real strings; the average engineer will be puzzled by what to do with a real bass drum because he'll be so used to having his sounds sampled with digital boxes."

A small drum booth lies to the right of the studio, under the stairs to the ground floor, with visual contact to the studio, a floated concrete floor and the same acoustic panels.

A good selection of mics is available including Crown/Amcron PZMs and Nick has recently been trying out a Schoeps boundary mic as well.

The studio and control room are similar in size measuring approximately 17x10x8 ft.

The control room was refurbished and re-equipped at the beginning of 1984 under

Rooster continued

the watchful eye of Eastlake. Tongue and groove wood panelling lines the walls with a little tree bark between the wall-mounted monitors.

"We had no air conditioning in the original control room and it was horrendous so I set aside as much money as possible when we re-did it to get a decent air conditioning system," says Nick.

Original equipment consisted of a Soundcraft Series 2 desk and 3M 56 16-track tape machine. These were replaced in the redesign by an Amek *Angela* and Otari *MTR-90 MkI* 24-track. In March 1984, however, Nick couldn't resist the temptation to buy a second hand Harrison *MR3 36/24* desk from Park Gates Studios who were upgrading with an SSL. He also now has an Otari *MkII* multitrack, and *MTR-10*, *MTR-12* and MCI 2-tracks, and Sony *PCMF1* and *PCM701*.

Nick: "I personally think that for recording you can't beat a Harrison desk. It's designed for the engineer—it's got a fair number of functions that would fox the average non-technical person. The size is ideal for this size of studio as they pack in what other manufacturers would need another 3 or 4 ft for."

The desk is wired for automation and Nick is considering *MasterMix* as and when the coffers will allow.

Monitoring is by Quested. Nick feels that the soft dome mid-range unit used in these speakers gives a smoother sound than the usual horn and goes so far as to say that this system has played a large part in the popularity of the studio.

Power is rack mounted in a room to the left of the

console—actually it's the front bay window area. HH *V200* and *V800* take care of the mid-range and top, and Yamaha the bottom end. The rack also contains ATC crossover network, *V200* MOSFET for foldback, etc, and desk power supply.

"The Quested has some rather nice facilities where you can mute each part of the system. It's got mute buttons on each channel so you can cut out and check things are working. The wonderful thing about this system is that you don't have to touch it. This crossover was set up with a pink noise generator and then just left and it's been running for a year without any problems."

Desk monitors have tended to change from time to time but at the moment are Yamaha *NS10M* which Nick is very happy with.

Dbx noise reduction is available if required and there is a pair of *telcom* cards on the mixdown machine.

"When I'm recording here and I know I'm not going to have to send the tapes out anywhere else I tend to use the dbx system on certain tracks. Things like drums I don't treat but one can keep the noise floor on the tapes quite low with that particular combination."

Effects include Lexicon *224X* with *LARC* and *224* with upgraded software. Rooster is well equipped for its size; as there are no ambient rooms, the design philosophy behind the studio was to work round digital reverberation. This with the many other effects units available can simulate any environment that may be required.

Nick has two synths available—an Emu *Drumulator*, which he uses on his own productions, and a Roland *Juno 106*. There is also an upright reconditioned piano in the studio which still gets used from time to time.

Five Nakamichi *ZX7* cassette recorders enable artists to take away copies of their day's work, one is wired in for copying straight from the desk.

Investment in digital equipment may be on the cards for the future and Nick will be looking at 32-track in order to increase his capacity at the same time. This, of course, will mean a change of desk but as the necessary models just aren't readily available in the UK yet discussion on this topic is slightly academic.

Although Nick is an engineer he usually leaves this job to a number of young freelancers whom he does his best to encourage. Nick began engineering in the theatre and toured with the major musical production *Hair* during the '60s. He has also toured with diverse live shows abroad. After eight years of this he settled down to studio life working mostly at R G Jones, London.

He has also recently toured to South America to record material for an album by Incantation. All experienced and classically trained musicians, this band specialises in Andean music and their instruments present a new set of problems for the engineer. It's difficult to get the sound of the pan pipes, for instance, without distortion from the musician's blowing.

Other recent projects include studio sessions for the Cocteau Twins, Go West and jazz duo Morrissey Mullen.

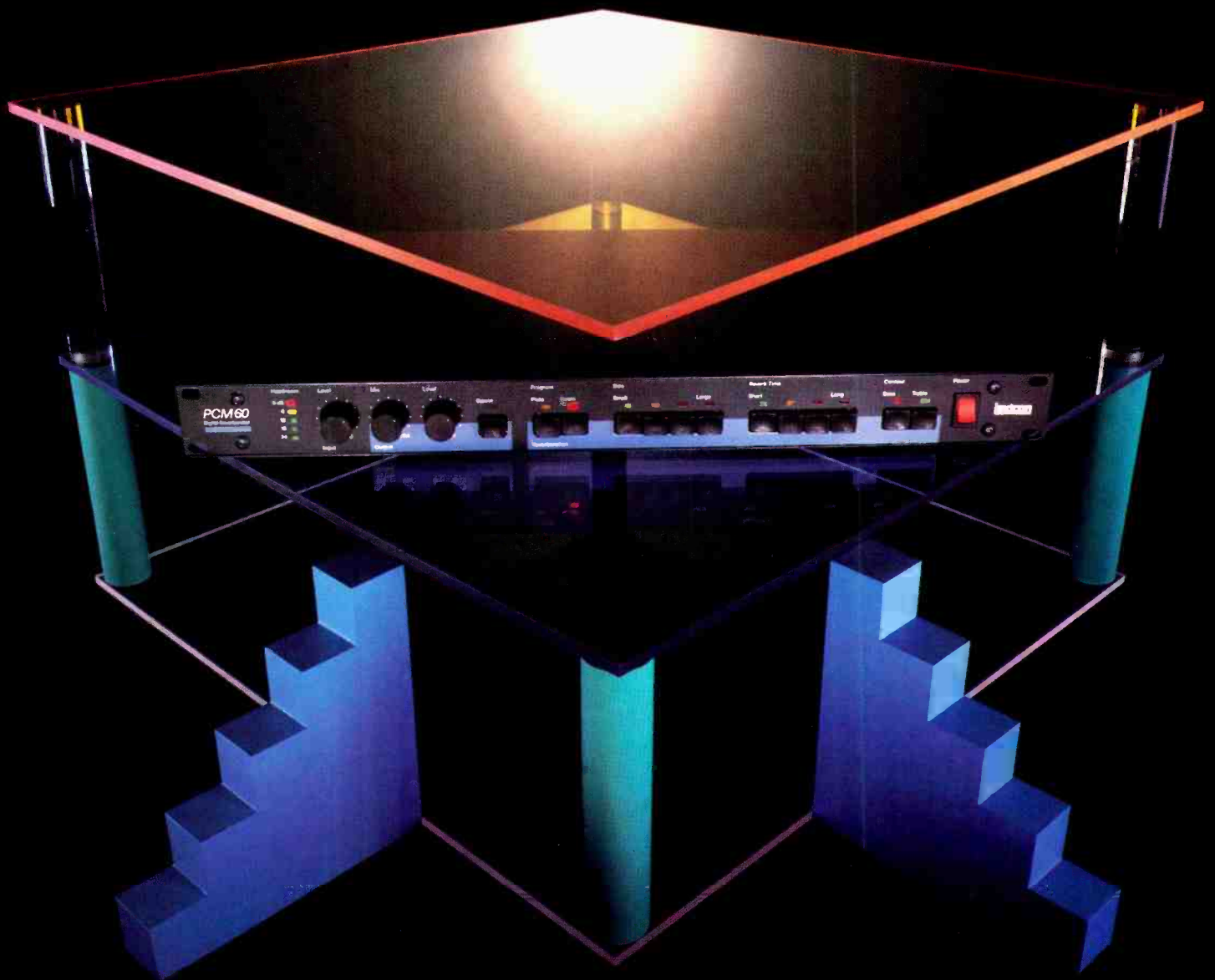
The last word to Nick: "The carrot for me now is to get involved in the production side. Engineers put a huge amount into what they do and financially get very little out of this business—unless you do something like this which requires a great deal of courage. It's more than investment—it's investment of your whole life."

Ann Horan
Rooster Studio, 117 Sinclair
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Rooster's control room; the studio is on the right



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GUIDE TO AUDIO TAPE

This listing only includes tapes suitable for professional analogue or digital mastering purposes. Audio tapes for cassette duplication, audio cartridges and hi-fi applications are excluded

Manufacturers and agents	Type	Tape widths (up to 10½ in reels)				Larger reels		Additional information
		¼ in	½ in	1 in	2 in	12½ in	14 in	
AGFA-GEVAERT (West Germany) Agfa-Gevaert AG, Kaiser-Wilhelm-Allee, D-5090, Leverkusen-Bayerwerk. UK: Agfa-Gevaert Ltd, 27 Great West Road, Brentford, Middlesex TW8 9AX. Tel: 01-560 2131. Telex: 28154. USA: Agfa-Gevaert Inc, 275 North Street, Teterboro, NJ 07608. Tel: (201) 288-4100. Telex: 0134410.	PEM 468	●	●	●	●	½ in	2 in	2,500 ft length Long play version of PEM 468 Long play on 5 or 7 in reels for portable recorders Digital tapes expected
	PEM 469	●	●		●			
	PEM 428						2 in	
	PER 368	●						
AMPEX (USA) Ampex Corp, 401 Broadway, Redwood City, CA 94063. Tel: (415) 367-3809. Telex: 348464. UK: Ampex Corp Magnetic Tape, International Division, Acre Road, Reading RG2 0QR. Tel: 0734 875200. Telex: 847611.	406	●	●	●	●	¼, ½, 1 & 2 in	¼, ½, 1 & 2 in	Long play equivalent of 406 'Grand Master' Long play (for Fostex) High energy for digital reel-to-reel
	407	●	●	●	●			
	456	●	●	●	●	¼, ½, 1 & 2 in	¼, ½, 1 & 2 in	
	457	●						
	466	●	●	●				
BASF (West Germany) BASF AG, Gottlieb-Daimler-Strasse 10, D-6800, Mannheim 1. UK: BASF UK Ltd, 4 Fitzroy Square, London W1P 6ER. Tel: 01-388 4200. Telex: 28649. USA: BASF Systems Inc, Crosby Drive, Bedford, MA 01730. Tel: (617) 271-4000. Telex: 951856.	SP 54	●	●	●	●	2 in	2 in	Mainly for broadcast studios 'Studio Master' 'Digital Master' for DASH format, 4,800 ft on 10½ in 'Digital Mixdown' for Betamax format PCM
	910	●	●	●	●			
	930	●	●	●				
	HG L250/ L500							
MAXELL (Japan) UK: Maxell UK Ltd, 3a High Street, Rickmansworth, Herts WD3 1HR. Tel: 0923 777171. USA: Maxell Corp of America, 60 Oxford Drive, Moonachie, NJ 07074. Tel: (201) 440-8020.	UD 50-120B	●						2,500 ft length Long play version of UD 50 2,500 ft length Long play version of XLI 50
	UD 35-180B	●						
	XLI 50-120B	●						
	XLI 35-180B	●						
SONY (Japan) UK: Sony Broadcast Ltd, Pro-Audio Dept, City Wall House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 0256 55011. Telex: 858424. USA: Sony Corp of America, Sony Broadcast Prods, 677 River Oak, Parkways, San Jose, CA 95134, USA. Tel: (408) 946-9090.	D-½-1460/ 2920		●			½ in		4,800 ft (digital for DASH) 9,600 ft (format PCM-3324) ¼ in version expected BRK formulation for U-matic format PCM, various lengths
	D-¾-75							
TDK (Japan) UK: TDK Tape Distributors UK Ltd, Pembroke House, Wellesley Road, Croydon CR0 9XW. Tel: 01-680 0023. Telex: 946727. USA: TDK Electronics Corp, 12 Harbour Park Drive, Port Washington, NY 11050. Tel: (516) 625-0100.	LX 50-120M	●						Suffix M for metal reel Suffix B for back treated Long play version of LX 50, suffixes as above Only available back treated Long play version of GX 50
	LX 50-120BM	●						
	LX 35-180M	●						
	LX 35-180BM	●						
	GX 50-120BM	●						
	GX 35-180BM	●						
3M (USA) 3M Audio/Video Products Division 3M Center, St Paul, MN 55144. Tel: (612) 736-2549. UK: 3M UK Ltd, PO Box 1, 3M House, Bracknell, Berks RG12 1JU. Tel: 0344 426726. Telex: 849371.	226	●	●	●	●	½ & 1 in	2 in	2,500/5,000 ft length Digital for 3M DMS, 7,200 ft on 12½ in reel
	265		●	●				
ZONAL (UK) Zonal Ltd, Holmethorpe Avenue, Redhill, Surrey RH1 2NX. Tel: 0737 67171. Telex: 946520.	610	●						Mainly for broadcast studios Long play version of 610 Back treated Long play version of 675
	611	●						
	675	●						
	676	●						

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MARTIN RUSHENT

From the Stranglers to Fats Domino, Martin Rushent's style is to let the individuality of the artists shine through. Ralph Denyer managed to catch him between takes

Martin Rushent has come to regard magazine interviews with a certain amount of trepidation, but at the same time, was the most helpful producer I've interviewed, arranging for copies of past interviews and albums to be sent to me. He's been feted by the media and when *Dare* catapulted the Human League to major act status, as co-producer of the record with the group Martin found himself eagerly sought after by the media, hungry to learn his 'secrets' and keen for him to explain how to harness emerging computer-synthesiser technology. He was called 'Techno-wizard behind the new synth-pop age' and 'The personification of the ultra modern record producer'.

During the 80s he certainly did embrace the emerging technology. *Dare* credits him with programming the Roland MSQ 700. The album was followed by the electronic dub version, *Love And Dancing* which enhanced the hi-tech image even further.

His work with the League was preceded by a far more intriguing album which he made with Pete Shelley called *Homosapien*. An image was being built up of a man who was nothing short of a studio alchemist. In the media, Altered Images were tagged as Rushent's creation.

Listen to albums he has produced and it is immediately clear that his aim to achieve 'transparent production' is successful. Altered Images records are pure adolescence on vinyl, whereas Pete Shelley's *Homosapien* is an adventurous album of considerable depth and Human League's *Dare* heavily atmospheric danceable pop music.

His work allows the individuality of the act he is working with to shine through untarnished. This is born out by the evidence on vinyl. He feels he represents the antithesis of the type of producer he was portrayed as being two or three years ago. He talks very openly and seems to treat interviews as being somewhat therapeutic even though he feels he has been misrepresented in the past. He had obviously made up his mind he wasn't going to be drawn into discussion that would allow technicalities to be blown out of proportion. I was left with the feeling Martin finds interviews quite

good for getting something off his chest and to a degree rationalising his thoughts. Once over his interest passes, and the focus of his attention reverts 100% to making records. As photographs were taken in the studio half-an-hour or so after the second interview he asked, "What magazine did you say this was for, again?"

He says he doesn't make a habit of reading his own press. He does *discuss* things and as a result it is easy to see how he could be quoted out of context. At the time of our first meeting, he was going through a period of critical self-examination. By the time we met during February this year, he was obviously in a much more relaxed frame of mind.

Starting as an Advision tape-op at the age of 19, he became an engineer and worked with Yes, Led Zeppelin and

countless others. In 1973 he produced Curved Air and found success in the singles charts as a producer during the mid '70s with the Stretch record *Why Do You Do It?* He has produced the Stranglers, Generation X, Ian Gomm, 999, Danny Kirwan, Altered Images, Buzzcocks, Pete Shelley, JJ Burnel, Fats Domino (with Tim Read) and the Human League. He co-produced Rachel Sweet, Telephone, Trickster and Yachts with Alan Winstanley. During the last year or so he has worked with Hazel O'Connor and a number of new acts.

At the beginning of the '80s he reached the point where he was able to set up Genetic Sound studios with the help of his partner, record producer Alan Winstanley. A few acres of Berkshire countryside accommodates Martin and Alan's studios, administrative

offices and Martin's home, where they have managed to build up what many creative people would regard as the ideal working and living environment.

The music of a given period can seem radically individual, yet with the passage of time, that individuality can appear to become far less marked. For example, the Stranglers' records—which Martin produced way back during the punk new wave era—do not now sound so outrageous.

"It wasn't, really. Well I don't know. (Laughs.) We're getting into a very touchy area for me, which is about how I perceive music sitting within an industry. We're talking about fashion now."

Would Martin agree there are certain fundamentals involved in music making and record production that remain fairly constant?

After a pause he continued, "I'm just trying to find the right words to explain. There is not a lot of music around at the moment—nor has there been for some time really—which is of true quality. It's all very *fashion* linked."

Martin feels the way in which most people currently perceive the music they hear has a lot more to do with promotional visual imagery than the music.

"Sometimes I despair of the pop business. There are those days when I just go: *phew!*"

"At the moment I am very depressed to see young kids being made to jump through hoops. That's the way I perceive it: that here you are, kids will do *anything* to get a record deal. It's just *not* a healthy situation right now where the amount of money spent on promotional items—I mean the video and all the things that go with it—are really more important than the actual music itself. I find it very difficult to have a discussion about music at the moment, within the context of pop because it seems there isn't any really.

"To me, music should be a reasonably clean outpouring from a soul. It's impossible to have that, it always gets tainted along the way—and artists have to eat too, but there are degrees and degrees. I think Wham's single *Wake Me Up Before You Go Go* for example, has nothing to do with anything. It's a piece of



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candy floss, which is fine. I don't object to people selling pieces of candy floss. But I don't want to get into heavy raps about music, because there isn't any to talk about right now. There's no cultural movement happening. There's no real street thing happening.

"Those things that outwardly appear to be for real, have actually been very carefully conceived, packaged and put together and sold very well. I think *Two Tribes* is a perfect example. You have a little band from Liverpool who come in and sing a few lines here and there. Everything else is producer. The whole image of the band has been created by a media person who works for ZTT. It doesn't ring true to me. I can't see Frankie Goes To Hollywood and all that. I can see Trevor's excellent work but that's all I see. But to me—and you can dig back and you'll find the quotes—I feel that a producer's work should be transparent. I've always felt that and I've always tried to make my work transparent. So that it's the band that comes through, the artist that comes through, and what I do you shouldn't be able to see. When I get round to making my album, then you'll see me. I may or may never do that. But that's what I'll say: This is what I do.

"But where," he said, accentuating key words by thumping on a desktop, "are all the new talents? Where are the people that can actually stand there, without any fancy frills or wonder studio technology, and can sing a great song that makes your hair stand on end? I don't know. How do you get it played?"

"I think that *Time After Time* by Cindy Lauper (No 1 in America at the time of interview) is a fantastic record. Great song, it's got atmosphere, everything, right? She can't get arrested on British Radio because it's a song. It's not a piece of production and it's not little fag boys in shorts either. You know?"

Isn't that typical of record marketing today?

"Well yeah, I mean, it's that genre.

"I'm always against what's happening now. I say that as a general thing. I never like what's happening today. Either yesterday's today, or today's today. I always think there's something better. When the records that I've made come out, I hate them

because they're today now and they were tomorrow when I was making them. So maybe I'm being a bit unfair on today because I always hate what's happening today, I'm always more excited by what may happen tomorrow."

Conversation drifted towards dealing with the pressures of the music business and how they can be de-humanising.

"I'll tell you what is de-humanising: ultra-success in the music business. It can de-humanise you as an individual. It sort of partially did it to me, I think, from when the League broke really big. It's really weird when people come up to you in the street and go: 'I think your work's great.'

"After a while you start to believe all this, you really do and that's what starts to de-humanise you. Before that, OK, I was a mildly successful producer and I used to have to argue my points with bands about the way things should be done. And they would argue back with me and somehow, we'd get a rapport going."

Now they come in bowing down?

"Exactly. Now they come in and it's like: 'Just tell us what to do. You've got all the answers, man.'

"And of course, I haven't. Because I'm just an ordinary Herbert like them. And I can be right, wrong and mediocre. Before it was fairly easy. Now it's sort of—sometimes it gets a bit strange."

When it was suggested to Martin that we might do some simple schematic diagrams to help convey how he worked during the *Dare* and *Homosapien* period and then perhaps another for the obviously more sophisticated set-up he uses now, *Synclavier* and all, Martin was not having any of it. He felt that wasn't the way to talk about making records. He felt that miking diagrams were definitely not appropriate.

"I outlined my technique a way back and that applies throughout. If I hear a good idea, I record it as quickly as possible in any fashion I can get together and that is the whole technique. In a nutshell, that's it. I'll plug it in and if it sounds really good, that's it, isn't it? I might do a tweak later on to make it blend but I don't follow any rules and to give you anything that would

imply that I did would not be the truth. I don't record drums the same way every time and I don't mic up the bass the same way every time. One of the difficulties that assistants have in working with me is they don't know what I'm going to do next. They think: 'I'll set up a 202 because that's what he used yesterday.'

"And I'll go: 'No, no, no! I want a C451.'

"I don't know why. I just felt like it at the time and sometimes it works. Sometimes I might be really overloading the head but it's giving me a really good sound so, go with that."

As Martin says, in his case he aims for transparent production. He feels that even with the best intentions, say when technical explanations or diagrams are presented only to give an example, this is more than likely to encourage the wrong attitude. He considers that it is wrong to try to gain information by noting a recording technique set out in an interview and then listening to the record.

Hugh Padgham had expressed similar views when interviewed for *Studio Sound*. Martin mentioned that Hugh worked as his assistant at one time and continued:

"Hugh, I know is a well sensible lad and he'd be the first to admit that you can't make a Phil Collins record without Phil Collins. That's it in a nutshell. You can sit and pour over details what mics to use on what and all the rest of it and it doesn't help. All I ever did was copy the blokes in front of me in the studio where I worked, that's all.

"From that point on, it was experimentation to make it better. And I was constantly fooling about with microphone positionings and all that, and then I found the moment I stopped worrying about it, I did it twice as good. The moment I stopped trying to make it better and adopted a relaxed pose and just said to myself: 'That's the way it is going to be.'

"You listen to a drum kit. A drum kit is a really good example because they're always a bloody problem. They're everyone's biggest nightmare because everyone knows how important a drum sound is and they are hideously difficult to record if you let them be difficult. Make

a few assumptions. You've got a well made kit that is well maintained, has good quality heads and the drummer knows how to tune his kit. You've got a room that has a reasonably normal acoustic. You've got a drummer who can play. That kit—when you stand in front of it—is going to sound good. All you have to do is put two or three mics on it—record it—don't stick any gaffer tape on the drums—none of that. Just put it on tape and it will sound great. If you start to worry about little tom-tom rings, or the odd bit of snare rattle, or a slight sizzle on one of the cymbals—and you start getting into that trip—you'll go on forever and you'll end up with a shitty sound. Because you get too involved in trying to glue it up and make it perfect. You can't, a drum kit is not a perfect instrument. Therefore you'd better accept its imperfections because if you don't, you'll just run around in circles. If you want perfection, use a machine.

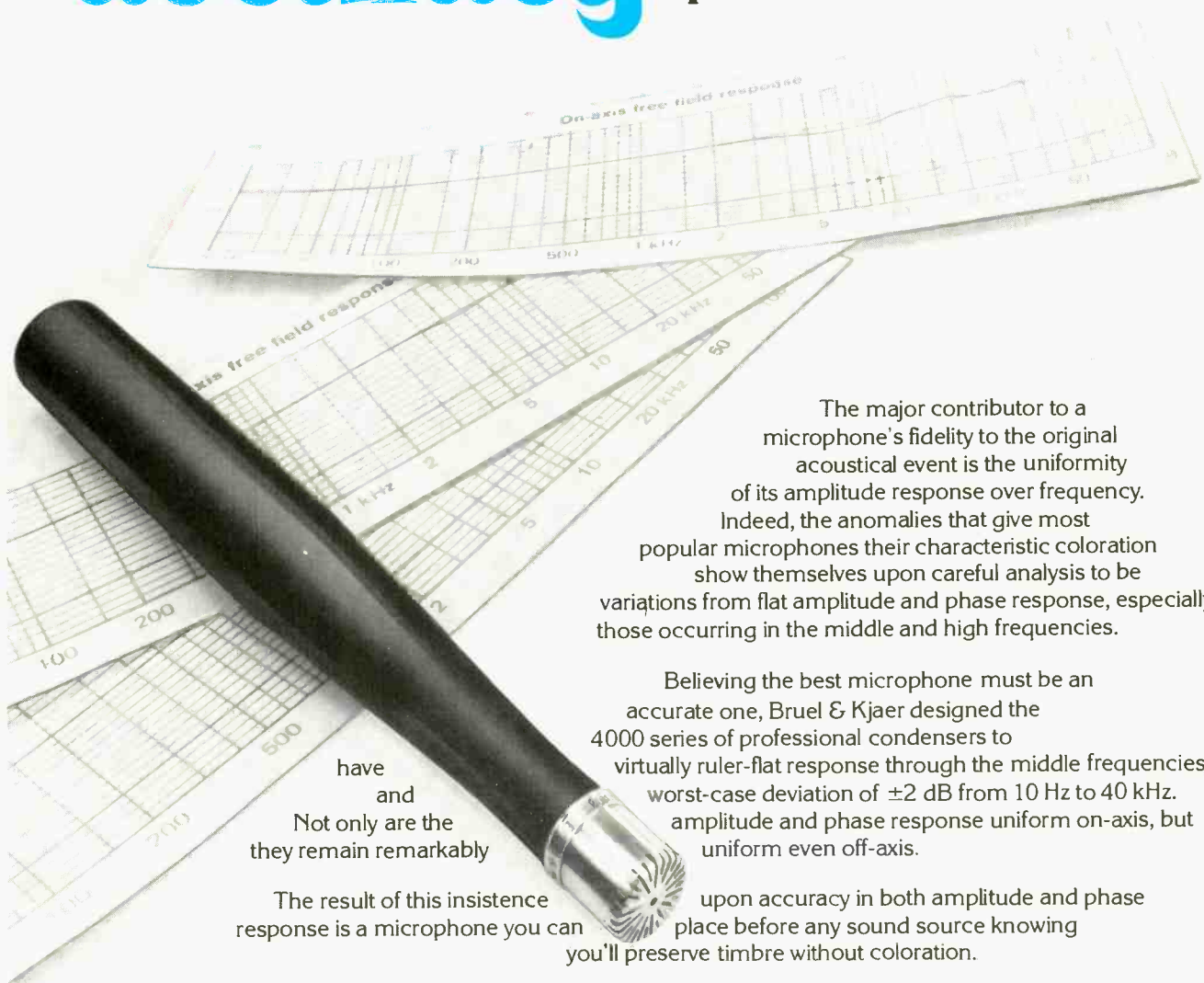
"That's the answer these days. But that's the thing about drums. I mean, I remember doing it myself. I remember as a young engineer, using piles of gaffer tape and trying to stop each tom ringing and all that.

"I'm amazed sometimes by the quality of some of the demo-tapes that turn up, recorded by someone who has just been doing it as a semi-pro in their home. If this guy could be put in front of the gear and knew where the knobs were, he'd make a great record because he's got the ability. You know what it's like, you get all this complicated gear and it's like a shield between you and the ordinary person. I'm sure that studios, some producers and a lot of engineers, use this outwardly complicated looking technology to baffle people into submission, in the same way that civil servants use all those documents and stuff, to baffle you into submission. You go into any bureaucratic type government organisation to get anything done and it's hopeless. Because you get hit up with all these documents, forms and stuff.

"Making a record is really quite simple. You have a good song, and good idea and you approach it in a relaxed fashion and you make something that really appeals to people. The only difference between some demos and some records is that the records

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were made on gear that doesn't distort so much. I think there is a lot of what I call 'Techno-snobbery'. I have occasionally read some interviews that give the impression that I advocate that but I don't. I'm very anti it actually. I think things should be kept as simple as possible. At least that's how I feel now. Maybe five years ago I felt differently, I can't remember. But certainly now, I think the simpler everything is, the better. That's why some of the records being made at the moment—they're too big, too complicated and too involved. I call them 'dirty records'. Too much noise and not enough substance. Now, I'm not saying that I'm making the records that should be made now, because I'm not. They're the ones I'd like to make. I listen to Quincy Jones and I think he's stunning, right? He'll have four sounds going and it will sound *enormous*. Everything is tailored and it fits, and it works, and it just blows me out of the door. Now *that*, I'm impressed by, as far as producers go.

"Quincy is drawing from 40 years of musical influence? Well, by the time I hit 54, so will I. And I hope that I will sound as modern and current as he does. Now there's a real record producer. He's in a class of his own. Because it is experience and knowing what works instinctively. And that instinct is built up from years of doing it wrong."

Martin went on to make the point that an advantage of being free and open to experimentation with recording technique and making mistakes, is that you can sometimes end up with an unexpected bonus on tape.

"To record a snare, really distorted, is technically wrong and not something that somebody would do out of choice. To destroy all the front end transient and stuff by over-modding by about 20 dB on tape? Lunacy. But because I misaligned one of the tape tracks on that Stretch record the snare went on to tape at 22 or 23 dB over the top. Now, not many people can remember that record (laughs) but those who can always say what a great snare sound it was. That's the *one thing* they remember. So you make a few mistakes like that, that people pick up on and that some of them actually like—and you realise it doesn't matter anyway. It's down to the way

that the dice fall on those sort of things.

"I never worry if something's distorted. I mean, there are things on *Dare* that are hideously distorted but no one ever notices because they sound good where they are. That's really what it's about. Recording is about being free in your technique and it's a lot of hard work too.

"You develop new ideas, you use them once and then throw them away. It's a constantly changing process—or it should be. I think the moment I ever reached a point where I could actually sit down and write the technique out, then it's all over. Because if I can write out the technique that applies to the last three years of work that I've done, then I've gone stale, haven't I? I would be repeating myself."

Turning to Genetic Sound, what was important to Martin in terms of the design? What did he tell designer Eddie Veale he wanted?

"Well, I wanted a control room that has got the sort of acoustic that my front room's got. I didn't want a 'control room' control room.

"I've got concrete ceilings, brick walls and stuff, and it really is a bright room. And when you sit in there, your mouth doesn't drop out at the corners. People can relax in a room like that. It's big; I didn't want one of those telephone boxes. Acoustically, the environment is fairly normal so that people don't

feel claustrophobic in there.

"You see, I've always been producer-artist orientated rather than studio owner-engineer orientated. Studios are for the artist and they should be designed and run with the artist in mind, not with the engineer in mind—which is what goes wrong a lot of the time.

"The way people listen to records is not the way that producers and engineers listen to records. You'll go into a record company office, and you'll play something you've done and you'll notice that the speakers are out of phase. There's *no* bottom end—it's disappeared down a hole in the middle and you'll say: 'Do you know your speakers are out of phase in here?'

"He says: 'Well, this isn't my office, it's the company's listening room.'

"And you say: 'But your speakers are out of phase!'

"He says: 'Oh, is that bad?'

"You say: 'Well, yes. Hang on a minute.'

"You flip the wires over and he asks you: 'Is it alright now?'

"Because they're not listening to what you're listening to. They're listening to the songs and the performances and either it's working or it's not. They're listening for enthusiasm and *people* coming through the speakers.

"Sometimes I think the standards that we set ourselves are too high and we allow it to get in the way of what we're doing. You see, I'm not supposed to be making bits of hi-fi. Do you know what I

mean? I'm supposed to be making nursery rhymes for adults and sometimes people forget that."

For *Dare* (a huge commercial success and an influential album) Phil Oakey recorded several of his vocals singing in the toilet at Genetic Sound thus underlining what Martin says about too much emphasis being placed on technicalities.

"I'd rather that he sang it in the studio from the technical point of view. But he wasn't going to sing very well in the studio. He actually thought that he was going to sound good in the toilet. And I would say that four or five cuts on *Dare* were done in the toilet. And it was good fun too because he was standing in the toilet and I nipped to the outside of the building, leant in through the window and flushed the toilet, which freaked him out completely because he was standing with headphones on so he didn't hear me. He took the headphones off and the toilet was flushing for no reason. That was good fun: that broke the ice."

By the time of the second of our interviews, Martin was obviously in a much happier frame of mind. He was working with a new electronic band called Hard Core, was about to start work with another new band called Jericho and was talking to such diverse talents as PP Arnold and Feargal Sharkey.

"I don't want to get locked into one sort of thing again because for a while I did and it gets boring. So I want to work with some electronic bands, some guitar bands and solo singers. Spread it around a bit. It's more fun. If I do the same thing over and over again, I just get fed up with it all."

Martin had previously expressed disappointment that Cindy Lauper's *Time After Time* wasn't getting anywhere in the UK charts and that was a sad reflection of the charts. But a couple of weeks later, it started to do well.

"Yes it did. Well, it's nice to know I can pick the hits. I thought that was a hit right from the beginning. That record made me think. The lyrics were really good, it was well produced and it had something special. I just couldn't see why it was having such a tough time.

"I suppose that we people in



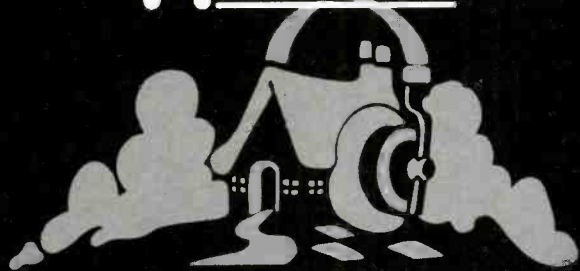
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the business that make the stuff—or are involved in the making process—have this feeling that anything good should sell automatically and of course it doesn't happen because the main reason for the way that records sell is the way they're promoted. You can actually sell vast quantities of pap if you've got a really good marketing campaign going and all the rest of it. And if you don't get behind a really good record, well, sometimes it just doesn't do it on its own. It gets buried if no-one hears it. Sometimes I make a record and I think: I'm really proud of that.

"The record company and everybody thinks it's great and the marketing man screws up and doesn't put his campaign together. You put everything you've got into something and because some guy's going on holiday that week or whatever and doesn't get his act together, it's gone."

As readers may have gathered, Martin is not a producer who feels he can adopt a chameleon role in terms of constantly producing records solely to meet current market demands.

"I think that when a producer feels that music is going up a blind alley, you can either follow it for the bucks or say: 'Wait a minute, I'm not sure that I want to go up this alley, there's another road.'"

Martin feels that for those in the recording industry who wish to take the purely commercial path, things have never been better. Studio and advanced instrument technology provides the facilities to add impact and dynamics to music. Videos can add remarkable power to a sales campaign which can be combined with marketing expertise to provide a tour de force.

"We've got all the marketing stuff. We can hit them right up and just flog 'em whatever we're churning out and they'll buy it. That sometimes works but it's not what it's really about and it's not what I came into the record business for. I came into the record business for two reasons: one, to make good records; two, to make a lot of money. At the moment I can go up the blind alley—the whole business can if it wants to—and we can all make a lot of money, which satisfies one of my desires, right? But it

leaves the other one totally unsatisfied and I can't live and work in the music business only having part of my desires satisfied.

"I couldn't exist making great music all the time and no money. I couldn't survive like that because my lifestyle is such that I need the money. But again, I think you can make good music and loads of money. I could have run off to America and produced those mega-bands but it's not for me, it's not what I wanted to do. I nearly did in '84 but I backed off at the last minute."

Martin has acquired a fairly impressive array of computer and synthesiser-based equipment. He absorbed the new technology and became conversant with how to operate it. Does he consider that this creates something of a barrier between himself and new young bands coming into the studio? Martin was quite amused by reference to him as a Technology Baron.

"No, I don't think there is a barrier. A lot of the new bands take to the technology like ducks to water. Most of them have got quite complicated

to do the whole thing but to be part of the process with a live band. And that's something that is starting to develop quite rapidly now. Those sort of techniques where you can use the computer's ability to enhance the live stuff that you've recorded. Although it's early days because there are complexities of timing and feel to be dealt with, you can, for example, beef up a drum kit quite easily now and there are other areas that we are looking at where you can start to improve things. So that's quite an interesting technique."

Martin was reminded that at our previous meeting he had been in the middle of a period of self-assessment. In spite of platinum records, awards and all his success, he was able to take quite a scathingly objective look at what he was doing and to consider the validity of his work.

"I think you have to really. You go through these periods in your life when you have to examine and re-examine your motives for doing things, the quality of what you are doing and evaluate where you are.

essentially to make sounds based on those of existing instruments as opposed to creating new sounds.

"Yes, I think it will come. I don't know whereabouts in the transitory stage we are; the end of the beginning, the beginning of the end or the middle or whatever, I don't know. But there must be a point where electronic music matures away from its roots, if you like.

"We need to use these things to create sounds that bear no relationship to the sounds you hear in everyday life and that's the exciting part of it. The real problem is getting the money to do that. You see, for a bunch of artists to sit around for two or three years being totally creative—with no influences about earning a living or anything—that costs a lot of money. They need the gear, they need the studio and they need to eat. It's been the problem with pure art all through history. It was great in the old days because artists would have patrons.

"You could say that the record companies are the patrons of the music business but it isn't like that because they're only patrons as long as you do what they tell you to do. The moment you do something they don't want you to do, they say: 'Thankyou and goodnight.'

"So they could hire a bunch of electronics musicians on contract—like Hard Core—for example. They've heard what Hard Core can do and they like it. They think they can sell it and make a lot of money out of it. Fine. Supposing Hard Core—having signed the contract—decide: 'Look, we don't want to do this anymore? What we want to do is push the barriers of electronic music on.' And they come in with a record that doesn't sound as if it is going to get played on the radio at all because it's too adventurous and all the rest of it. Now it could be a great record for pushing the barriers of electronic music on but it might not get released, you know? Then how are people going to eat and continue to work? They're not. So whilst everybody who is involved in electronic music is saying—yeah, let's go for it—it is moving very slowly because we all have to eat to varying degrees. Some of us have got used to eating very well—right?—and we're a bit reluctant to give it up. Do you know what I'm saying?" □

I came into the record business for two reasons: one, to make good records; two, to make a lot of money

synthesiser equipment of their own so it's not like they're coming in to a world they don't understand at all. And usually, by the end of a record, they're quite conversant with some areas that they didn't know about before. Part of the responsibility of the producer is not only to make the record but also to educate or help the educational process. So I never object to people asking me questions what's going on and *why* it's happening and *why* we are doing something in a particular way. It's all part of the role. No, I don't think so. I think if a young band of 18-year-olds from 1964 walked into a studio today, they wouldn't know where to start. But that's not true of young bands coming in off the street now. I mean, Hard Core do their own 'Micro-composing' and everything. They're well into it. There's nothing here that intimidates them at all.

"The transition that is being made now is to making good records using computers, not

And I suppose you caught me at a period when I was doing that. OK, I've done that, I've gone through that mental exercise which sometimes lasts several months before you realise: Yeah, what I'm doing is alright.

"OK, I could be something more useful to the world, like a doctor. But doctors need their music otherwise they can't function. If you ask a doctor to imagine a world without records, a lot of doctors would say: 'What am I going to listen to at night when I've finished treating all these dying people?'

"So you start to think: 'Oh well maybe what I do is important.'

"You go through periods when you think: 'All I do is sit around all day making pop records. I mean, what good is that? And are they any good, these pop records?'

Martin had also previously mentioned the paradox that despite quantum leaps in computer-based equipment, the technology was still being used

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BUSINESS BUSINESS



Barry Fox investigates the facts behind the industry news

Information block

The engineers who made ex-Genesis Steve Hackett's album *Till We Have Faces* for Lamborghini Records in Ambisonic surround-sound, may wonder why it hasn't scored any publicity with the surround-sound-hungry hi-fi press. Here's why, with some extra background.

Until recently UHJ recordings had been made with a single surround-sound microphone which gave artists no chance to overdub and post-mix. Now, thanks to the work of Reading firm Audio+Design, it is possible to mix multitrack recordings into UHJ format. The Hackett album (LMG LP 4000) was a newsworthy example of what can be done.

I heard about the Hackett release only through an audio engineer working on Ambisonic technology who took the initiative and telephoned me. Soon afterwards I saw the pop music press carry news items about the new album. An obviously puzzled reporter, wrote "Ambisonics is a system of surround-sound which is supposed to create a live effect."

I heard nothing from Lamborghini Records. I heard nothing from the British Technology Group, that infamous quango which has spent over £½m of taxpayers' money on backing Ambisonics, and has often got hot under the collar when I've criticised its handling of British technology. I checked with colleagues in the hi-fi and audio press and couldn't find anyone who had heard anything from BTG or Lamborghini. What I did find was a BTG newsletter, aimed mainly at the recording industry trade, which had been issued over a month prior to the Hackett release. It embargoed any mention of the LP to the press!

Almost without exception the record companies deal only with the pop and music press. They would not know a hi-fi journalist if he bit them on the leg. As far as the record industry is concerned hi-fi people are those damned nuisance people, who moan about faulty pressings. How curious, then, that the Lamborghini press release, which I got from an engineer and not from Lamborghini, quotes passages from the hi-fi press describing Ambisonic technology. How even more curious, that BTG didn't send out press releases, or tell Lamborghini who to contact. All in all it's not surprising that the Hackett record was released with a dull wet thud.

I had planned to raise this at the annual press conference held by BTG. But I wasn't invited and heard about it only afterwards. So I wrote to the Chairman of BTG, Colin Barker. A minion replied with waffle which further helps explain why Ambisonics is so handicapped by BTG.

"It is BTG's policy to send press releases and invitations for press conferences to all appropriate newspapers

and magazines," wrote a Mr Tony Christmas of the Marketing Division. "We then leave it for those journals to decide who they wish to cover the story or attend the press conference on their behalf."

To the best of my knowledge no magazine dealing with audio was invited to BTG's meet. More to the point, only a quango underwritten by taxpayers' money could continue in business without realising that most of the words written in specialist magazines are written by outside contributors and columnists. A magazine editor would have to be psychic to know which contributors are researching what stories, and then appropriately forward incoming invites. In any case, when I get invites forwarded from a magazine, postal delays often mean the event is over by the time I receive it.

The sting in the tail is that BTG know my home address and interest in Ambisonics only too well. Recently BTG commissioned a market research group, at considerable expense, to produce a report on the best way to market Ambisonics to the audio industry. I know because BTG gave the research group my home address and phone number, telling them that they should try picking my brains.

Balance codes

An interesting idea was thrown out recently by engineers at the BBC after Angus McKenzie shook them with a wonderful demonstration of how no-one can actually use the full dynamic range offered by compact disc. He set the gain of a CD replay system at a reasonable level for crescendo peaks. Even in a cottage in the deep country you won't then be able to hear pp strings. This set some BBC minds ticking. Why not use the PQ codes, which are on all compact discs, to record control codes representing several alternative sound balances? The compact disc as sold would play with a dynamic range wide enough to satisfy even the most unrealistic hi-fi buff. But the PQ codes would contain, along with beginning and end of track marker flags, control data to represent more realistic manual balance. Radio 3 nominally runs on 26 dB range but in practice pushes to 35 dB. Pop music on Radio 1 is far narrower, nearer to on and off. So why not a compact disc with a Radio 3 and Radio 1 balance option built into the PQ codes?

Bear in mind that this is *not* a proposal for automatic gain control. It's a real-time encoding of a real live human balance engineer's work. There's an old adage about even the best automatic compressors sounding like an incompetent, unfeeling engineer with very fast reaction time. A good engineer moves smoothly and slowly ahead of the

performance. So only a low data rate would be needed to encode the control information.

The problem is that there is some confusion over the spare space available in the data stream. My information is that the sub coding frames run at 75 blocks/s which is equivalent to a user data rate of 150 kbyte/s. Obviously this would be more than enough to record a string of alternative mixdown options. But how much of this data stream is spare and available for tasks like optional mixes?

I have asked Philips for information. But on the company's past track record I certainly won't hold up publication of this item until I get a reply.

DSP facts

The *DSP* launch produced some interesting background facts. Like Tape One, who showed early faith in the Neve *DSP* mastering desk, CTS got a very good price deal on its *DSP* console by committing themselves back in March 1982. When CTS signed, the price was £310,000. If you want one now you will pay nearer £½ million. Also CTS took advantage of the Government's scheme for encouraging British companies to buy British technology. CTS got £¼ million on a 1 yr interest-free loan. Fortunately for CTS, the clock on this loan did not start ticking until the official unveiling. So interest and repayments don't start falling due until early 1986.

In a previous column we touched on the *DSP* vital statistics; 150 circuit boards, each with 250 chips, making a total of 3 million solder joints. You can compare the *DSP* either with one of the fifth generation computers which the Japanese are threatening or a *System X* all-digital telephone exchange of the type which British Telecom is trying rather unsuccessfully to sell abroad.

Volatile data is stored in ½ Mbyte of on-board RAM. Set up codes are stored on 5 in floppy disks, which load and reset the desk in around 11 s. So what happens if there's a power cut between saves on to disk? There is 64 K of battery-powered CMOS RAM which will hold the data overnight, or if the mains goes down.

CTS has its own emergency generators but they do not kick in automatically. If the power goes off while tape is winding, it will spool off and tangle. The last thing you want is for the power then to come back on again without warning.

What fascinated me was the way the £½ million, fifth generation super brain, with all that sophistication under the bonnet, relies on just one £100 cheap and cheerful floppy disk drive tucked away in the corner. For that kind of money I would expect a hard disk Winchester as well. □

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LEXICON PCM60 Digital Reverb: Brings famed Lexicon 224X quality at a realistic price. Plate or Room simulation, each with 4 decay and 4 size presets. Hi- and lo-filters. Stereo. £1475.00.

BEL BD80 DDL: Amazing value with full bandwidth, 2 sec delay as standard, up to 8 secs available. Digital sampling with loop editing facility. Internal or external trigger of sample. Modulation and phase controls. £695.00 (2 secs) + £200.00 per extra 2 secs.

DRAWMER DS201: This sophisticated low-cost dual noise gate, offers attack, hold and decay controls, frequency-conscious keying gate or duck function, 80dB attenuation and stereo link. £275.00.



KLARK-TEKNIK DN780: Flexible new digital reverb from KT, offering choice of Plate, Hall, Chamber, or Room simulation, as well as delay, ADT, SOS, and multi-tap echo. Up to 990ms pre-delay, 99 sec decay; also reflection pattern and intensity controls, filters. 39 presets + 50 user stores. Stereo. £3580.00.

YAMAHA'S R1000: The lowest cost, high quality digital reverb. It features 4 presets and a nifty 3 band parametric EQ for flexibility of effect. Digital quality at the price of a spring. £449.00.

DELTA-LAB ADM 1024: We are glad the Effectron II range is once again available here, because of all the many 1 sec DDLs now on the market, we think this one is the best. Features one second delay at full bandwidth, fine time control, modulation etc. £399.00.

DRAWMER DL221 Compressor/limiter: Linear performance and flexible control, plus a separate limiter and side-chain functions make this a steal at £325.00.

All these units (and more) are permanently on demonstration at HHB if you need to try before you buy. If not, why not take advantage of our mail-order service for best possible prices and free delivery. Call now on 01-961 3295.

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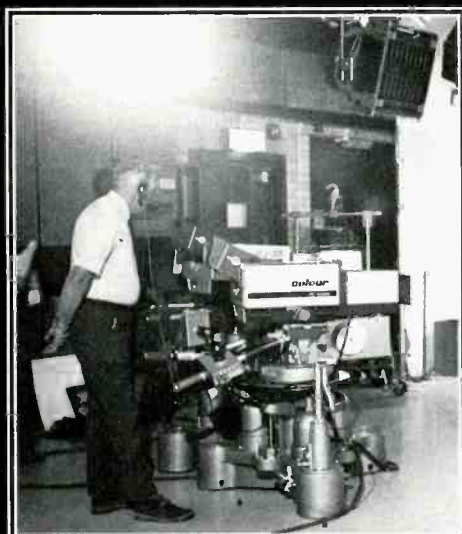
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REVIEW REVIEW

A user report by Richard Elen

URSA MAJOR 8X32 MK II IN OPERATION

I reviewed the original 8X32 in *Studio Sound* in August 1983 and remember being impressed by it. Always willing to have a listen to a digital reverberation unit I was pleased to look at the 8X32 *Mk II*.

The *Mk II* looks exactly like the old one, which is hardly surprising. The 8X32 is a software-based machine, and quite dramatic enhancements can be made to the operation of the unit simply by replacing the firmware PROMs (Programmable Read-Only Memories) inside the unit. If you are an 8X32 owner, you get such updates free of charge.

There has been one (internal) hardware modification since I reviewed the original unit: when the remote control unit—which duplicates the front panel controls—was released, so was a new CPU board to cope with it. People who bought a remote unit and had the old CPU card could swap it free of charge for a new one, and all subsequent machines had the new card fitted.

The new program release is *Edition E8-0*, which replaces *E4-1*, which was the first revision of the original 8X32 programs. A major change is that there are eight of them, rather than four. As a result, you have to change the CPU PROMs as well as the two program PROMs, because the front-panel protocol has been changed to allow access to eight programs instead of the original four.

The technique is simple: they have revised the button-pressing sensing system so that it treats the 'reverb clear' button as a shift key when pressed in conjunction with one of the program buttons. So pressing the first program button alone will activate Plate I, while pressing the same button with the 'reverb clear' button will activate Cask, one of the new programs. When you call up one of the 'shifted' programs, the program LED flashes rather than remaining steady.

It should be noted at this point that the first four programs are identical to those found in the previous release: Plate I, Plate II, Hall and Space—all Revision 1. The four new ones are Cask, Perc, Chamb, and R rev—all Revision 0. The content of this 'mini-review', then, is

largely a discussion of these four new programs.

Cask

As its name suggests, Cask is intended to simulate a very small enclosed space so it is based around a great many closely spaced early reflections and has a very high echo density. Ursa Major says that it has the highest density of any of their programs to date.

This program has a very fast build-up indeed, reaching full density in under 25 ms. In addition, you can't hear any discrete reflections at all, and you don't get a set of rapid clicks if you put percussive instruments through it. Meanwhile the decay is smooth, and may be set in 15 steps from 0 to 2.0 s. The delay on early reflections is a short 8 ms left, 3 ms right, and there is about 4 ms between that and the onset of initial reverberation.

It sounds quite remarkable, and is reminiscent of the kind of reverberation I remember hearing as a child while shouting in the passages of Underground subway stations, but without the multiple reflections: a 'tunnel echo', but quite short. Cask is quite a good name for it as it does indeed sound like lowering the audio source into an oil drum or a large-diameter pipe as you turn up the reverb level.

My only complaint with this program is that it is rather bright in its natural form; it becomes somewhat more usable when the HF decay is dropped. Its smoothness and freedom from clicks make it feasible for use on drums and percussion without too much trouble, although it must be remembered that this sound is very highly coloured. Flanging the returns is also quite an experience, as is the effect of adding Cask to Simmons drums. I like the sound, and I'm sure I'll find a use for it.

Perc

Percussion Plate also has a very high, rapid build-up. According to the manual's description, Perc has a level of density second only to Cask, and an explosive build-up starting in under 1 ms

and peaking by 25 to 40 ms. The decay is again very smooth and uniform, and there is no clicking on transient inputs. The decay can be set to a maximum of 4 s, and the early reflection delay is 9 ms left, 5 ms right, with the initial reverberation delay at 8 ms.

The effect is very modern and dramatic. It is explosive and gives a fashionable noise on snare drum, which can be exaggerated effectively by gating the returns, where it becomes a bit like an AMS Non-Lin setting but sufficiently different to be interesting. I like sounds like this: the only trouble is that so does everyone else.

It is also interesting when used to add to tuned percussive sounds from an instrument like a Fairlight, where the relatively mildly-coloured reverberation picks out and enhances the 'quasi-pitch' of the sound, giving a series of tuned crashes which are very exciting especially when used as part of a Page R sequence. It does start to become a bit messy on longer decay times, however, as the density is so high that it gets in the way. Gating it or using short reverb decay settings is the secret here.

Chamber

The third of the new programs features a gradual build-up, achieving peak density in about 65 to 130 ms. The decay is quite uniform and smooth, and Ursa Major describe the program as having 'moderate density', which I suppose is about right. It is only slightly coloured, and has a low echo density in the first 100 ms. The decay time can be set up to 8 s, and the early reflection delay is 31 ms left, 13 ms right base delay, with an initial reverb delay of 44 ms (approximate base delay to cluster midpoint).

This is obviously an attempt to model an echo chamber whose size is somewhere between those used in the Plate and Hall programs. It's very nice on chamber music (honest... no puns) because of the smoothness and clarity of the reverb.

It suits strings very well where you need to retain the sound of the instruments rather than just get a wash of string-like sound. It also suits vocals, flutes and a number of synthesiser sounds, particularly those without too much in the way of an initial attack as transients can 'ping' a little with this program. Otherwise, the reverberation decay sounds particularly pleasant on this program. I would like to have used it more on female vocals, where it was giving every indication it would sound particularly useful.

R rev

The final program in this set is Reverse Reverb. It is most definitely an effect and one could imagine it as the Space

REVIEW REVIEW

program run backwards. What does it do? Well, it is supposed to sound like what happens when you turn the tape over, put echo on something, record it, and turn the tape over again. Backwards echo, I always called it.

I think it does sound rather like backwards echo. The book says that it has a very slow, open and uneven build-up over the first 100 to 250 ms, and that the decay has a low echo density, similar to the Space program. Transient material does produce discrete reflections. There is little coloration here, and the early echo density is low but very even. The decay time may be set up to 20 s (phew), and the early reflection base delays and initial reflection base delay are 168 ms left, 186 ms right, and 75 ms respectively.

The description is largely a paraphrase of the manual because I would describe it like this: the initial reverberation is heard first, as an increasingly loud series of reflections. Then the two early reflections—which are set to 168 and 186 ms whatever it says on the front panel—come along. Meanwhile, the reverberation has been building up, and it comes to a peak shortly after the 'initial' reflections have whizzed past.

Ursa Major recommend that you set the early reflection delay time and level to zero, and the initial reverb delay to zero, level 8 for the most pronounced effect. Then increase the decay time slightly to help smooth the sound. It certainly works, although I don't think you would generally want to use this a great deal. It's useful and interesting to have around. What you do need to watch is where the most noticeable part of the sound is, especially if the effect is running on a longish timebase, because if you are using the effect on a rhythmic source, the location of the sound with regard to the beat of the music might be a bit disturbing.

There are a vast number of possibilities here, too, like delaying the reverb by a beat or so, delaying the original sound and reinserting it at the end of the effect, and so on. I didn't really have the time to pursue this sound to its ultimate destination, but I think it has a goodly number of possibilities.

Conclusions

The new *Edition E8-0* for the Ursa Major 8X32—making it the 8X32 *Mk II*—adds significantly to the possibilities of what was already an excellent digital reverberation unit. Each of the new programs has its application and all the programs are well-designed for their purposes. Usefully, they tend to minimise percussive repeating clicks on transients, which were a problem on some of the original sounds with certain instruments.

The complete 8X32 system is an

excellent choice for many studios looking for a remoteable, versatile digital reverberation unit. In addition, the unit is disconcertingly lightweight and is probably resilient enough to take on the road.

The service manual for the unit contains 41 pages of highly detailed service instructions and illustrations, plus 10 field service bulletins and running design changes, parts lists and full circuit diagrams. It is well put together and appears to cover all the areas one needs to know. The 8X32 *Mk II* owner's manual is basically the same as the original—which is quite

sufficiently detailed—with the addition of an extra six sides of yellow paper describing the new program set.

The only question for UK users will be the cost-effectiveness of the device against other systems at the present time, bearing in mind the strength of the US dollar. Very few US-manufactured units are cost-effective in the UK today, or even in some parts of Europe, and with such a lively range of British pro-audio gear, it will pay the UK purchaser to examine home-grown products first.

The quality of the equipment is very high, and subject to exchange rates, is good value for money. □

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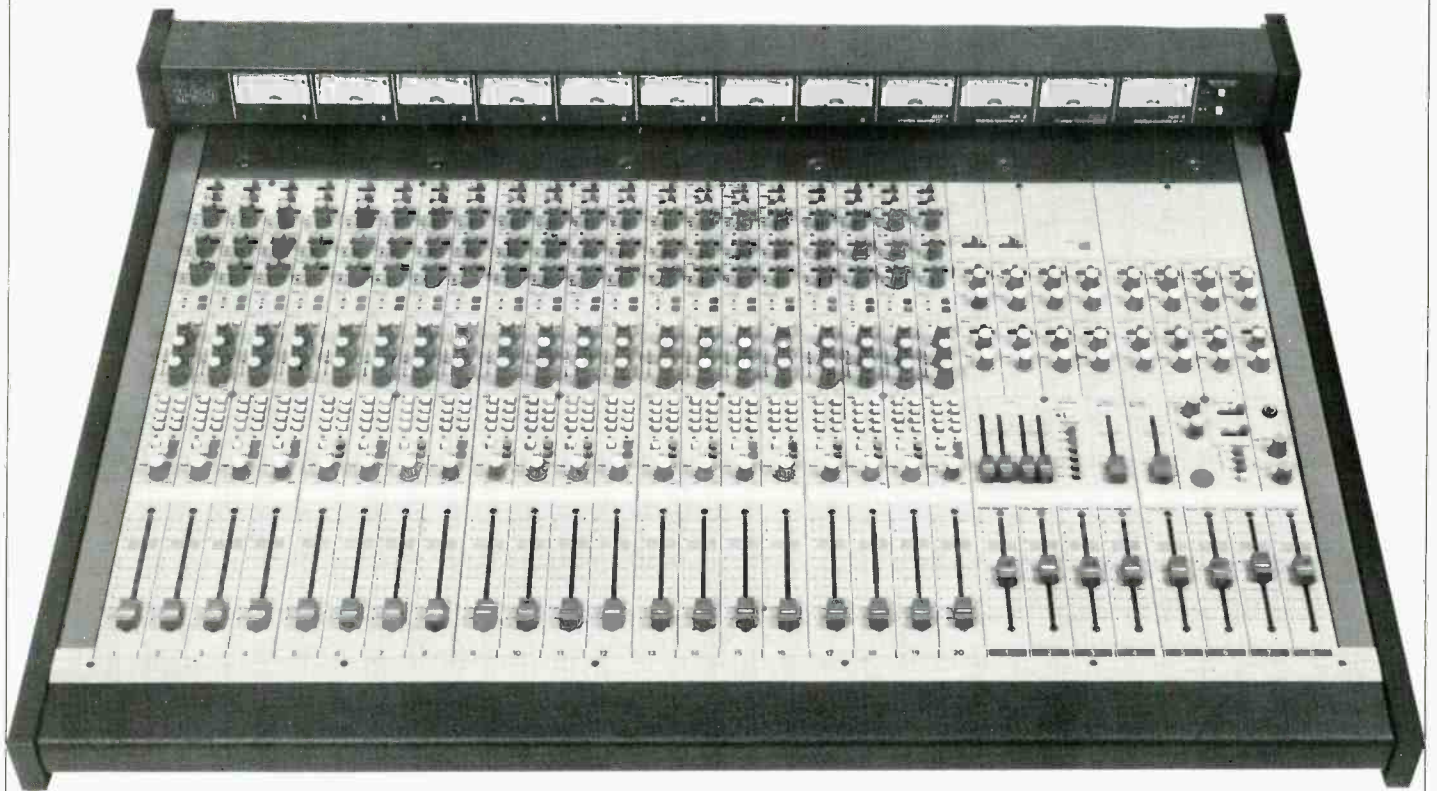
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REVIEW REVIEW

Hugh Ford reviews a small recording mixer

TASCAM M-520 MIXING CONSOLE



MANUFACTURER'S SPECIFICATION

General

20-input; 8-PGM output; 2-monitor output (x2); 4-AUX output; 16-tape monitor; 8-balanced amp.
Mic input (low impedance) (channels 1-20)
Mic impedance: 200 to 600 Ω nominal (matched for mics of 600 Ω or less).
Input impedance: 2 k Ω , balanced, XLR-type equivalent.
Nominal input level: -60 dBV (1 mV).
Minimum input level: -70 dBV (0.3 mV) MIC TRIM to maximum.
Maximum input level: +18 dBV (8 V), MIC ATT to 30 dB; MIC TRIM to minimum.
Instrument input (channels 1, 2)
Input impedance: 100 k Ω .
Nominal input level: -50 dBV (3 mV).
Maximum input level: +10 dBV (3.15 V); TAPE TRIM to minimum.
Minimum input level: -58 dBV (1.3 mV); TAPE TRIM to maximum.
Tape input (Tape—channels 1-16, 2TR A/B—channels 17-20).
Input impedance: 47 k Ω .
Nominal input level: -10 dBV (0.3 V).
Maximum input level: +18 dBV (8 V).
Phono input (channels 3, 4)
Input impedance: 47 k Ω .

Nominal input level: -54 dBV (2 mV) at 1 kHz.
Minimum input level: -62 dBV (0.8 mV) at 1 kHz; TAPE TRIM to maximum.
Maximum input level: -25 dBV (56 mV) at 1 kHz; TAPE TRIM to minimum.

Line input (channels 5-20 plus spare sub input)

Input impedance: 100 k Ω .
Nominal input level: -10 dBV (0.3 V).
Maximum input level: +18 dBV (8 V).

PGM/AUX 1, 2, 3, 4 OUTPUT plus stereo master A/B output, direct output and access send output (input 1-12/Bus 1-8)

Output impedance: 100 Ω .
Minimum load impedance: 2 k Ω .
Nominal load impedance: 10 k Ω .
Maximum output level: +18 dBV (8 V).

Balanced amp input (separate type)

Input impedance: 22 k Ω .
Nominal input level: -10 dBV (0.3 V).
Maximum input level: +15 dBV (5.6 V).

Balanced amp output (separate type)

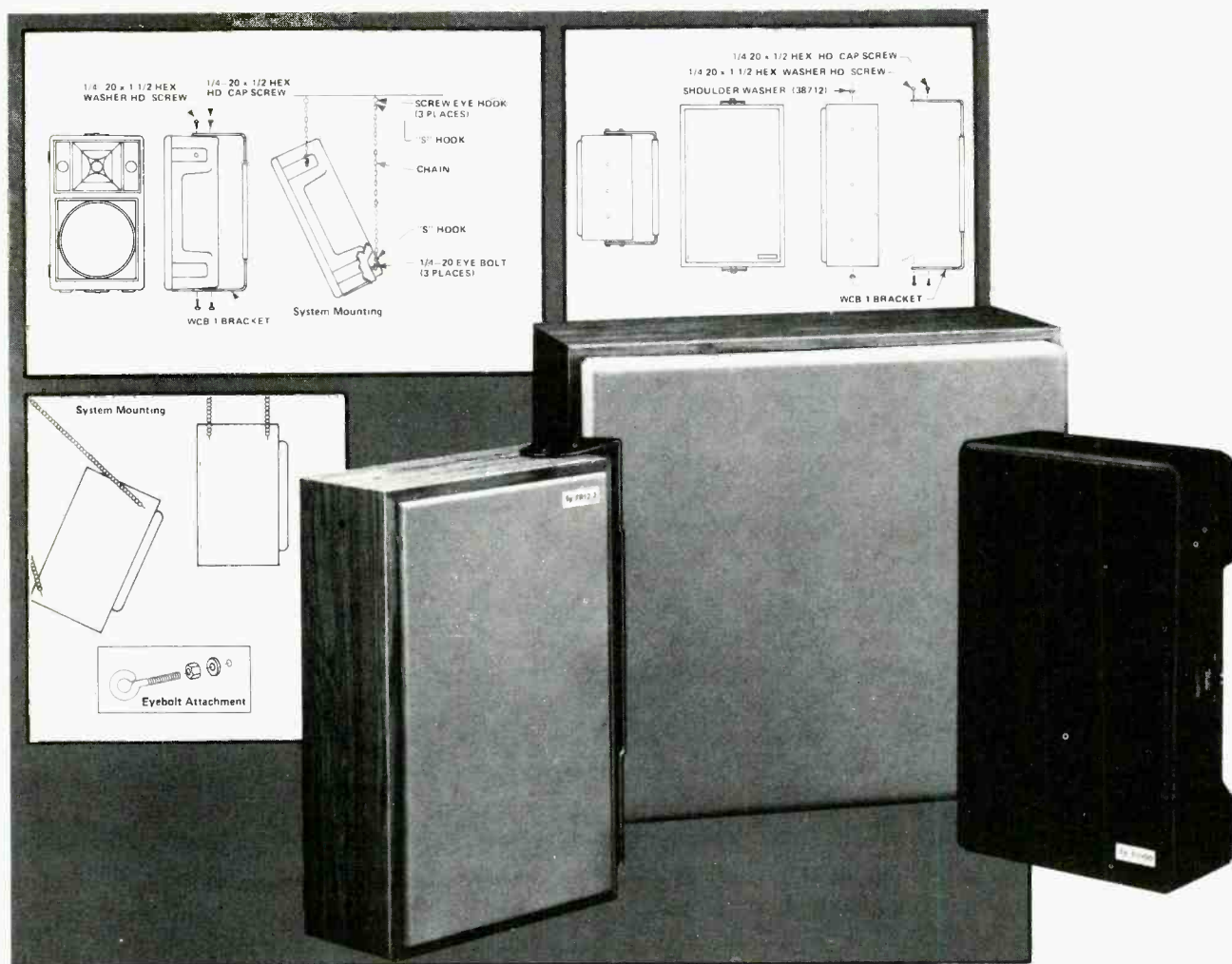
Nominal load impedance: 600 Ω balanced.
Nominal output level: +4 dBm (1.23 V) +8 dBm (1.95 V) switchable.

The Tascam model M-520 is the big brother of the Tascam M-512, the former having 20 inputs with 16-track monitoring and the latter 12 inputs with 8-track monitoring. In both cases four auxiliary sends are available.

The lightweight frame of the desk is formed from a combination of alloy and steel and is remarkably strong for its weight with a separate rack mounting power supply feeding the desk via a multiway locking connector. The power unit which is 3U high has a power on/off switch and LED indicator at the front and the output connector with a fixed 2 m long power lead at the rear.

Within the power unit the line voltage selection is by means of soldered connections with protection being provided by six properly identified fuses. There were no problems with mains safety and the unit was tidily

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We went into the field to find what you wanted most: a wide-angle speaker system that works like a component array, but installs with ease and looks great anywhere. Then we designed our new FR15-2, FR12-2 and PI100 speaker systems to make your job easier.

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The FR15-2 and FR12-2 have oak-grained, vinyl-covered enclosures, for use indoors.

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Telephone: 01-871 0966 Telex: 27670 Shutso G

REVIEW REVIEW

MANUFACTURER'S SPECIFICATION

Maximum output level: +28 dBm (19.5 V).

Access receive input (input 1-20)
Input impedance: 22 k Ω .
Nominal input level: -10 dBV (0.3 V).
Maximum input level: +18 dBV (8 V).

Access receive input (Bus 1-8) plus program sub input, aux sub input and monitor sub input
Input impedance: 22 k Ω .
Nominal input level: -10 dBV (0.3 V).
Maximum input level: +18 dBV (8 V).

Oscillator output
Frequency: 40 Hz/1 kHz/10 kHz switchable.
Output impedance: 470 Ω .
Nominal output level: -10 dBV (0.3 V).

Headphones output
Nominal load impedance: 8 Ω .
Maximum output power: >100 mW, 8 Ω .

Frequency response
Line input to PGM output, Aux output and Mon output: 20 Hz to 20 kHz \pm 1 dB (reference 30 kHz +1 dB/-2 dB).
Headphones output: 50 Hz to 20 kHz \pm 2 dB (reference 30 kHz \pm 3 dB).

Equaliser
Type: sweep.
Level: boost/cut \pm 15 dB.
Frequency (low): 50 Hz to 500 Hz.
Frequency (mid): 100 Hz to 5 kHz.
Frequency (high): 2.5 kHz to 15 kHz.

Signal to noise ratio (at nominal input levels, EQ out, UNWTD/A-WTD)
1 line to 1 PGM output and 1 tape to 1 PGM output: 86 dB/87 dB.
16 lines to 1 PGM output and 16 tape to 1 PGM output: 73 dB/75 dB.
1 line to access send and 1 tape to access send: 90 dB/92 dB.
1 line to direct output and 1 tape to direct output: 88 dB/90 dB.
1 mic to 1 PGM output: 68 dB/70 dB (150 Ω source).
1 mic to access send and 1 mic to direct output: 68 dB/70 dB (150 Ω source).
1 inst to 1 PGM output: 72 dB/74 dB.
1 phono to 1 PGM output: 65 dB/68 dB.
Balanced output: 90 dB/95 dB.

Crosstalk
 Better than 70 dB (1 kHz, nominal input level);
 better than 60 dB (15 kHz, nominal input level).

Total harmonic distortion
1 mic input to 1 PGM output: 0.025% (at 1 kHz, EQ OUT, nominal input level above 50 dB and MIC ATT 30 dB on, with 30 kHz LPF and 400 Hz HPF connected).
1 line input to 1 PGM output: 0.02% (at 1 kHz, EQ OUT, nominal input level, with 30 kHz LPF and 400 Hz HPF connected).

Intermodulation distortion (SMPTE method)
1 mic input to 1 PGM output: 0.06% (EQ OUT, nominal input level above 50 dB and MIC ATT 30 dB on).
1 line input to 1 PGM output: 0.045% (EQ OUT, nominal input level).
Fader attenuation: 80 dB or more.
Overload indicator: 25 dB above nominal input level.
Peak indicator: 10 dB above nominal output level.
Dimensions: (whd) 1082 \times 240 \times 798 mm/
 42 $\frac{1}{8}$ \times 9 $\frac{3}{8}$ \times 31 $\frac{1}{8}$ in.
Weight: 47 kg/103 lb.
Power requirements: 100/120/220/240 VAC,
 50/60 Hz, 90 W.

Manufacturer: Teac Corporation, 3-7-3 Naka-Cho, Musashino, Tokyo 180, Japan.
UK: Harman (Audio) UK Ltd, Mill Street, Slough SL2 5DD, Berks.
USA: Teac Corporation of America, 7733 Telegraph Road, Montebello, CA 90640.

constructed with domestic quality printed circuit boards.

Quality of the mixer section is similar with all components being well identified. Module interconnection is by means of harmonica connectors.

The VU meter bridge with 12 illuminated VU meters is an integral part of the rear connector panel, the complete assembly hinging at the back for access to the rear of the connectors and their subsidiary printed circuit boards which also connect to the modules via harmonica connectors. With the exception of the XLR mic connectors, two ¼ in jacks for instrument connections on channels 1 and 2, and XLRs for the eight assignable balanced outputs, all connections are by RCA phono connectors.

Each module is of the equivalent width of four channels. With the exception of the input configurations, which are unusual, all 20 input channels have identical facilities. All channels have an electronically balanced mic input with 48 V phantom powering switched by a slide switch adjacent to the input connector. Similarly all inputs can be switched to tape inputs with channels 17 and 18 being assigned to 2-track unit 'A' and channels 19 and 20 being assigned to 2-track unit 'B'.

The third switched input is dedicated to instrument inputs at jacks and phono sockets on channels 1 and 2, an RIAA equalised 'phono' input in channels 3 and 4 and line level inputs in the remaining 16 channels. At the top of each input module is a -30 dB mic pad switch and a mic phase reverse switch below which a paddle switch selects one of the three input sources. Each input source is buffered and the mic/line input has co-axial gain trims. The output from the input selector switch has an overload indicator before being fed to the insert point in the form of a link at the rear of the modules; a second output is provided at this point.

The next section feeds the four auxiliary buses which may be derived from the tape input or the selected input either pre- or post-fade and equalisation. Twin gang co-axial potentiometers control the levels to auxiliary buses 1/2 and 3/4 with each pair having a mute switch with a warning LED.

The three section equaliser has its in/out pushbutton with warning LED. The three variable frequency sections overlap and have a detented cut/boost potentiometer co-axial with the frequency control.

Below the equaliser sections are the assigns with bus selection having eight pushbuttons in the conventional odd/even layout. At the bottom of the section a non-detented panpot pans between even and odd buses.

Also within the assign sections are the channel on/off buttons with green warning LEDs, and the solo buttons with

red warning LEDs plus the locking pre-fade listen buttons. The 100 mm channel fader at the bottom of each channel has arbitrary calibrations from zero to 10 and a shaded section where the normal -10 dB point would be placed.

From the summing points the eight group buses are fed to an insert point which is linked at phono sockets at the rear of the desk. The feed then goes to the eight 100 mm group faders and on to the eight programme outputs at the rear in the form of duplicated and paralleled phono sockets.

The four auxiliary buses are similarly routed to the rear without insert points and with rather stiff 60 mm faders. Similar faders are used for the stereo master outputs A and B which have duplicated phono connectors.

Six locking pushbuttons select the monitoring source from the monitoring section, aux 1/2, aux 3/4, 2-track A and 2-track B plus a spare input with a further button allowing monitoring in mono.

Stereo output A has its feed also sent via a level control to the headphone jack with a separate level control being used for the solo level to output A and the headphones. Both are muted by talkback which is fed to output B.

Each of the 16 monitoring sections have a paddle switch to select tape input, bus input in a 1/9, 2/10, etc, format and an off position. Each section then has a level potentiometer and a panpot feed to the monitor select switching.

On the meter bridge, the first eight VU meters with peak LEDs may be switched in groups of four (1 to 4 and 5 to 8) between the eight programme buses and duplicated external connections at the back of the meter bridge. The remaining four meters are associated with two 3-position paddle switches in the monitoring section such that meters 9 and 10 can be off or monitor stereo outputs A (L/R) or auxiliary buses 1 and 2. Meters 11 and 12 deal similarly with stereo outputs B and auxiliary buses 3 and 4.

The final user feature is the oscillator and talkback section of the desk at the far right. Oscillator frequency can be switched to 40 Hz, 1 kHz or 10 kHz with a second switch selecting slate, off or test tone. The latter is fed via momentary pushbuttons to the eight programme buses, auxiliary buses 1 and 2 or 3 and 4 in the test tone setting.

The inbuilt recessed talkback microphone is fed via a slate level control to the bus selection switches in the slate setting and via a talkback level control and the talkback switch to stereo output B whilst muting stereo output A.

Inputs and outputs

The balanced microphone inputs had a sensible impedance of approximately

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

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

The Model 1500: Performance You Can't Hear

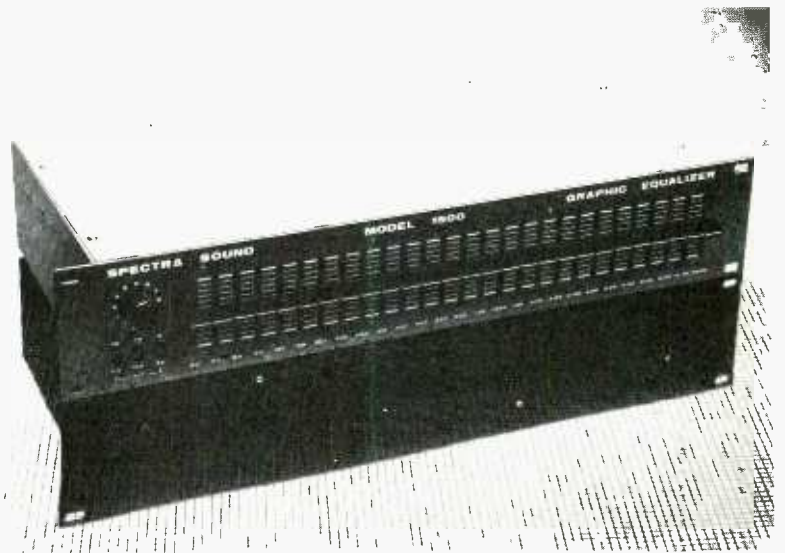
The measured performance of the Spectra Sound 1500 is second to none. Unmeasurable distortion, (I.M. and T.H.D), and extremely low noise, (104dB, +4dBv, unweighted), represents a significant, performance improvement over any other professional twenty seven band graphic equalizer.

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

The 1500 is also affordable

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

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



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REVIEW REVIEW

1.8 k Ω constant with gain setting and the presence or absence of the nominal 30 dB pad which had an actual attenuation within 0.05 dB of nominal. Phantom powering provided 47 VDC from the correct source resistors.

Common mode rejection varied from channel to channel but the performance of three channels as shown in Fig 1 was quite good. Maximum gain to the insert point was 61.6 dB for three channels with the gain trim having an average 41 dB range allowing maximum inputs between 0.82 V and 7.5 mV without the pad—a quite adequate range.

Examination of the other unbalanced inputs gave consistent results for each type of input with the tape inputs and line inputs having a maximum gain of 8 dB to the insert points with a gain trim range of 36 dB. The input handling capability was 9.6 V at minimum gain or 3.8 V at maximum gain—suitable for semi-professional equipment, but, possibly restricted in professional applications.

In both cases the input impedances were high, being 47 k Ω for the tape inputs and 100 k Ω for the line inputs, both in parallel with approximately 70 pF.

The third type of input available on channels 1 and 2, is the instrument input with an impedance of 218 k Ω in parallel with 40 pF. These inputs could handle 3.8 V at minimum gain or 40 mV at the maximum gain of 47 dB with a gain trim range of 40 dB. The insert return had a similar impedance with a signal handling capability of 8.9 V.

Available on channels 2 and 3, the equalised phono inputs had an impedance of 47 k Ω in parallel with 20 pF well suited to magnetic pickups. Similarly the maximum gain of 52 dB with a trim range of 36 dB associated with input overload limits of 60/25 mV was satisfactory.

Gain from the insert points to the channel outputs had a maximum of 8 dB with the gain being unity at the shaded section of the channel fader located at 80% travel.

In general the unbalanced outputs had a source impedance of 100 Ω with a drive capability of 9.7 V—satisfactory for most purposes—however, the unassigned balanced output amplifiers with the input impedance of 22 k Ω and gain of 11.7 dB offered a high level balanced output of 24 V from a low source impedance of 22 Ω suitable for driving professional equipment.

Frequency response

Fig 2 shows the frequency response from the microphone and line inputs to the channel outputs at maximum gain with 1 V output. Clearly the response is very flat within the audio band with a sensible roll-off at high frequencies

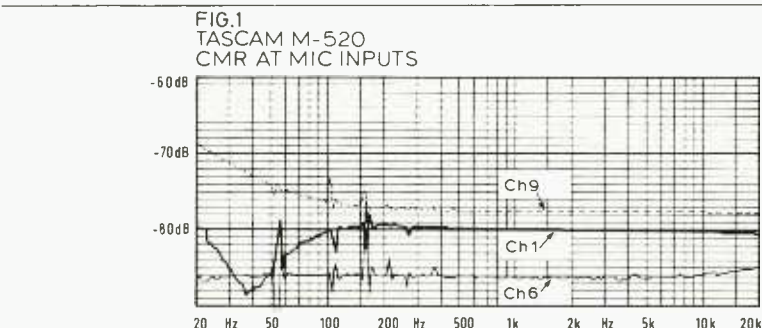


FIG. 2 TASCAM M-520 FREQUENCY RESPONSE TO CHANNEL OUTPUTS

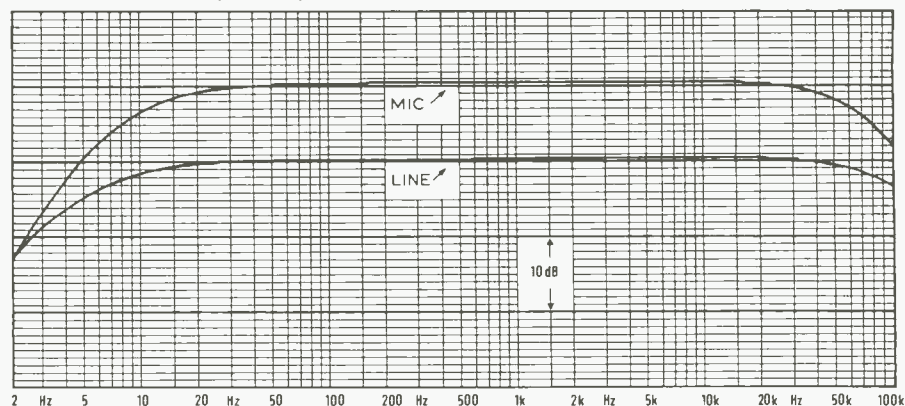
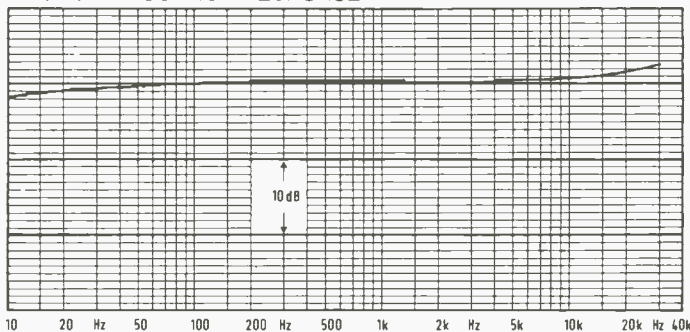


FIG. 3 TASCAM M-520 PHONO FREQUENCY RESPONSE



which remained reasonably constant with gain and level.

The response from the phono input measured via an inverse RIAA network is shown in Fig 3 and shows a slight unwanted boost at high frequencies. In addition, the extended low frequency response is undesirable, particularly in view of the lack of any highpass filter in the mixer.

Reference to Fig 4 shows the characteristics of the low, mid and high frequency equalisers. All three are shown at their maximum cut/boost settings and at the extreme and mid point frequency settings, the performance being very close to the nominal performance. While the nominal cut/boost is ± 15 dB, however, the actual performance varied slightly with the frequency setting. This is of little practical consequence and the control

laws allowed accurate setting.

Particularly in view of the provision of phono inputs the absence of high- and lowpass filters could be a nuisance.

Overall the frequency response from the line inputs to any output irrespective of routing was within ± 0.7 dB reference 1 kHz from 20 Hz to 20 kHz falling to -3 dB at 10 Hz and 39 kHz—an entirely satisfactory performance.

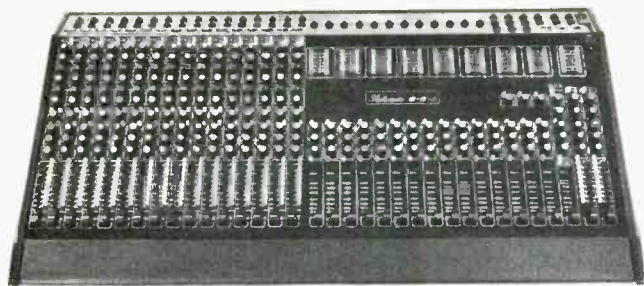
Noise

Noise at the insert point in the channel modules was measured under various conditions with all modules giving closely similar results. First considering the microphone inputs terminated in 200 Ω the noise performance was very good as shown in Table 1.

Measurements at the channel outputs showed that insertion of the equalisers

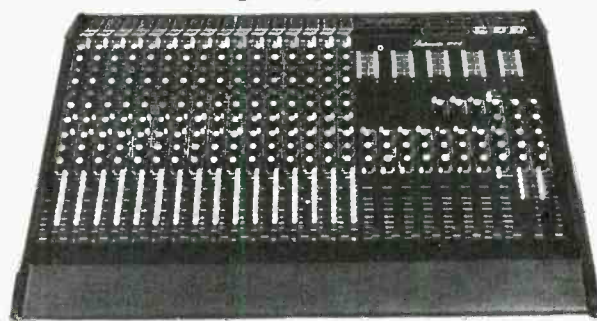
STUDIOMASTER

16-16-2



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

16-8-2



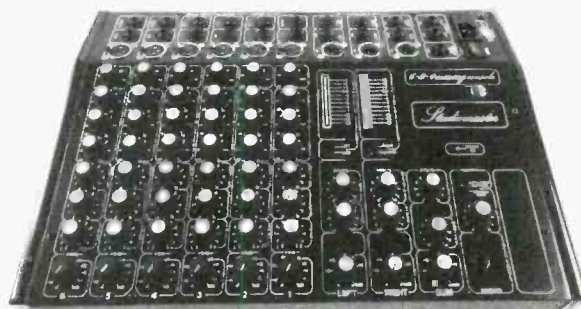
The 16/8/2 is compatible with 8-track recorders and has all the versatility of the 16/16/2, like optional expander modules for the mic. channels (an extra 16 mic. channels may be fitted without altering the unit's P.S.U.) and a double patch bay. Mic. channels feature 48V Phantom Power, parametric E.Q.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

16-4-2



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

6-2-1



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

Mosfet 500



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

Mosfet 1000



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

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We would welcome you at the Frankfurt Fair (February 9th - 13th 1985).
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REVIEW REVIEW

TABLE 1

Measurement methods
22 Hz to 22 kHz RMS
A-weighted RMS
CCIR-weighted RMS
CCIR-weighted quasi-peak
CCIR/ARM ref 2 kHz
A-weighted noise referred to input

Min gain
-88.8 dBm
-90.7 dBm
-83.0 dBm
-79.5 dBm
-90.0 dBm
-111.7 dBm

Max gain
-66.4 dBm
-68.3 dBm
-59.5 dBm
-55.5 dBm
-66.5 dBm
-129.9 dBm

TABLE 2

Measurement methods
22 Hz to 22 kHz RMS
A-weighted RMS
CCIR-weighted RMS
CCIR-weighted quasi-peak
CCIR/ARM ref 2 kHz
A-weighted noise referred to input

Instrument
-73.5 dBm
-76.5 dBm
-68.0 dBm
-64.0 dBm
-74.5 dBm
-123.5 dBm

Tape/line
-99.0 dBm
-102.5 dBm
-92.5 dBm
-89.5 dBm
>-100.0 dBm
-110.5 dBm

Phono
-55.5 dBm
-62.5 dBm
-59.7 dBm
-56.0 dBm
-66.5 dBm
-114.5 dBm

FIG. 4A
TASCAM M-520
LF EQUALISER

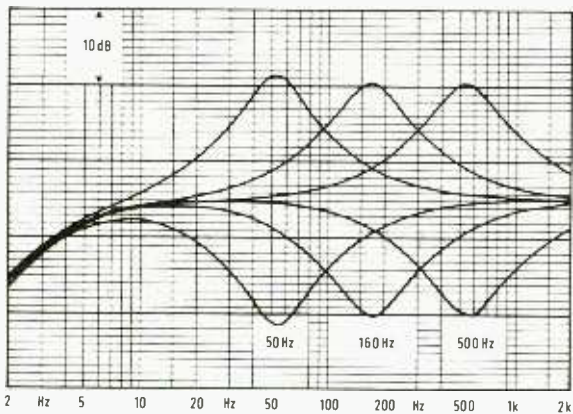


FIG. 4B
TASCAM M-520
MF EQUALISER

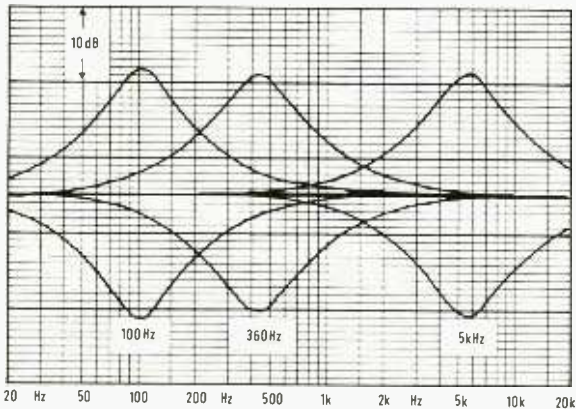


FIG. 4C
TASCAM M-520
HF EQUALISER

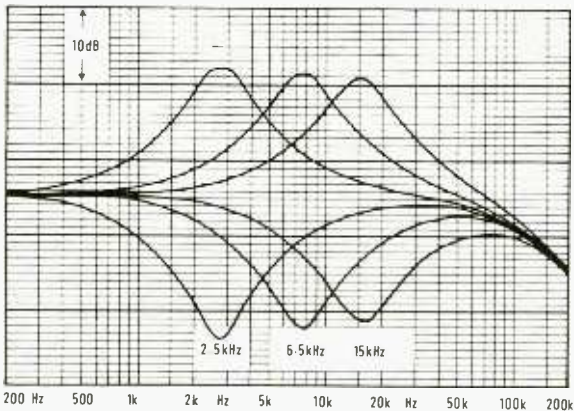


FIG. 5
TASCAM M-520
HARMONIC DISTORTION, MIC INPUT TO CHANNEL OUTPUT

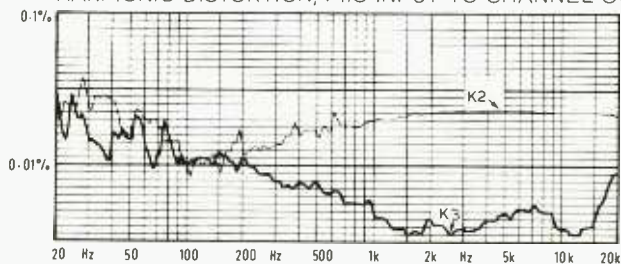


FIG. 6
TASCAM M-520
IM DISTORTION LINE INPUT TO CHANNEL OUTPUT

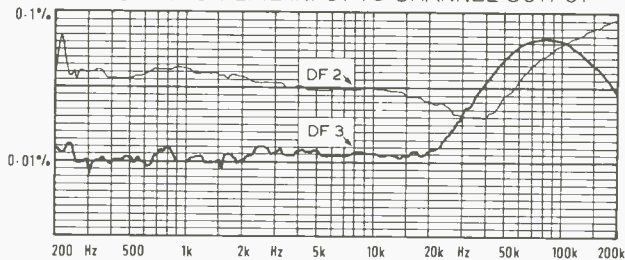


FIG. 7
TASCAM M-520
HARMONIC DISTORTION, TAPE INPUT TO STEREO OUTPUT

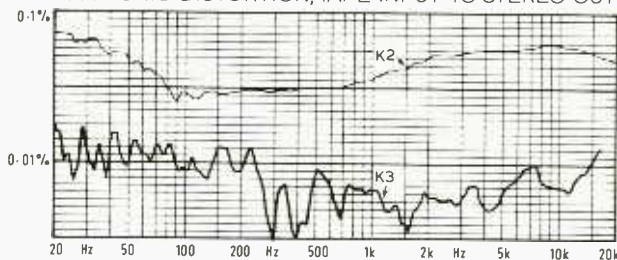
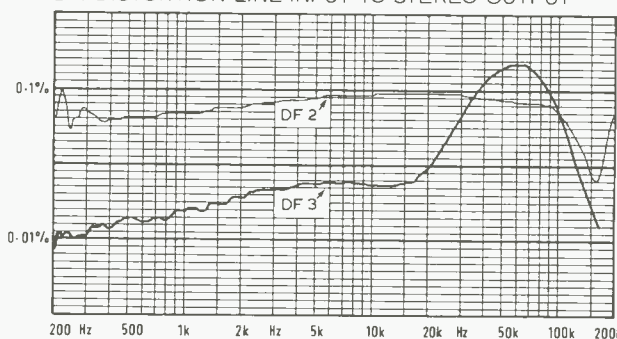


FIG. 8
TASCAM M-520
IM DISTORTION LINE INPUT TO STEREO OUTPUT



REVIEW REVIEW

in their flat positions degraded the noise by 7 dB irrespective of the measurement method used, however, the use of equalisation had the expected results.

Noise for the high level inputs was measured with them shorted, and for the phono inputs with a dummy cartridge of 625 Ω in series with 700 mH impedance. **Table 2** refers to noise at the channel insert point for various inputs at maximum gain.

Noise in the stereo outputs at maximum gain (ie 20 dB gain from the channel insert points) with no channels allocated was -75 dBm band limited or -77.5 dBm A-weighted increasing to -70/-73 dBm with six input channels routed. In operational use the gain would be at least 10 dB less resulting in a good noise performance at least 10 dB better than the preceding figures.

Distortion

Before dealing with harmonic and intermodulation distortion it should be mentioned that the squarewave performance from any input to any output can only be described as perfect, with a complete absence of ringing or droop.

Distortion between the microphone or line inputs and the channel outputs was almost identical with typical results for harmonic distortion being shown in **Fig 5** and those for CCIF twin tone intermodulation distortion in **Fig 6**. Both these figures were plotted at +20 dBm equivalent peak sinewave output and at maximum gain. Reducing levels slowly reduced the harmonic distortion and rapidly reduced the high frequency intermodulation distortion. In both cases the gain setting made little difference.

Measurements of distortion from the line inputs to the stereo outputs, embracing most of the mixer, showed some increase as anticipated. **Fig 7** shows the individual second and third harmonic distortion with the far less objectionable second harmonic predominating. Reducing levels and altering gains could reduce the distortion levels without any dramatic effects.

CCIF intermodulation distortion is shown in **Fig 8**—the third order intermodulation products fell rapidly with level.

Crosstalk

Crosstalk was measured between 20 Hz and 20 kHz under a number of conditions, and with the exception of 'leakage' across the tape input selectors at 60 dB, was good. Across the channel faders, channel mutes, between input channels and across the solo function it was less than 90 dB up to 3 kHz increasing at 20 kHz to <75 dB.

Left/right crosstalk in the complete system was better than 75 dB up to

7 kHz increasing to better than 65 dB at 20 kHz.

Metering and overload indication

The peak indicators in the input modules operated 5 dB below clipping from the microphone or high level inputs with their response time for a clear indication 1 dB below clipping being 1.5 ms—perhaps a little on the slow side.

At VU meter bridge, 0 VU corresponded to -8 dBm at the programme outputs (normally +4 dBm in professional systems) with the rise and fall time of the meters being on the fast side at 200 ms. However the average rectifier characteristics were correct.

Within the VU meters the red clip indicators operated at 0 dBm giving a clear warning on 300 μ s bursts at clipping and down to 10 dB below clipping. This level may be adjusted within the mixer by means of pre-set controls.

Other matters

The output from the internal test oscillator was found to be -8.42 dBm at 1 kHz (0.42 dB below 0 VU) with the

flatness being -0.2 dB at 40 Hz and -0.78 dB at 10 kHz—room for improvement here.

The nominal frequencies were reasonably accurate with 40 Hz being 39.64 Hz, 1 kHz being 1.0318 kHz and 10 kHz being 10.336 kHz. Second harmonic distortion was 0.6% at the lower frequencies and 0.3% at 10 kHz with the third harmonic approximating 0.4% at all three frequencies with the higher harmonics at least 10 dB lower.

Summary

Within the limitations of its design this is a lightweight unit suitable for the small studio and general live sound mixing. Not much in excess of the minimum of facilities are provided for multitrack recording.

In terms of performance the unit does what the manufacturer says and in some respects (such as input noise) the performance is very good. No severe defects were found and the unit is suitable for its intended use.

The standard and form of construction are semi-professional but this is inevitable in a mixer of this type. The layout is clean and all controls can be readily identified and their settings reasonably easily assimilated.



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DS:3

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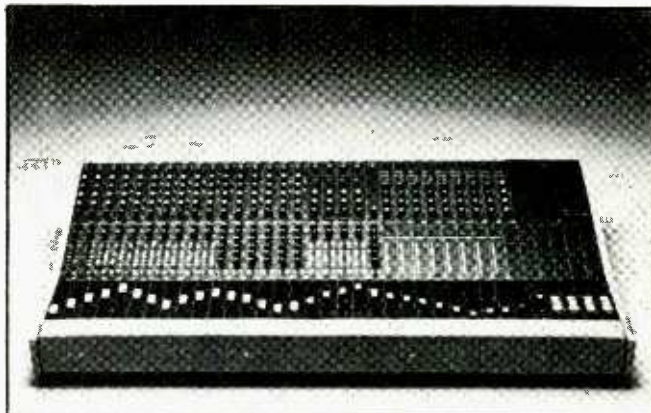
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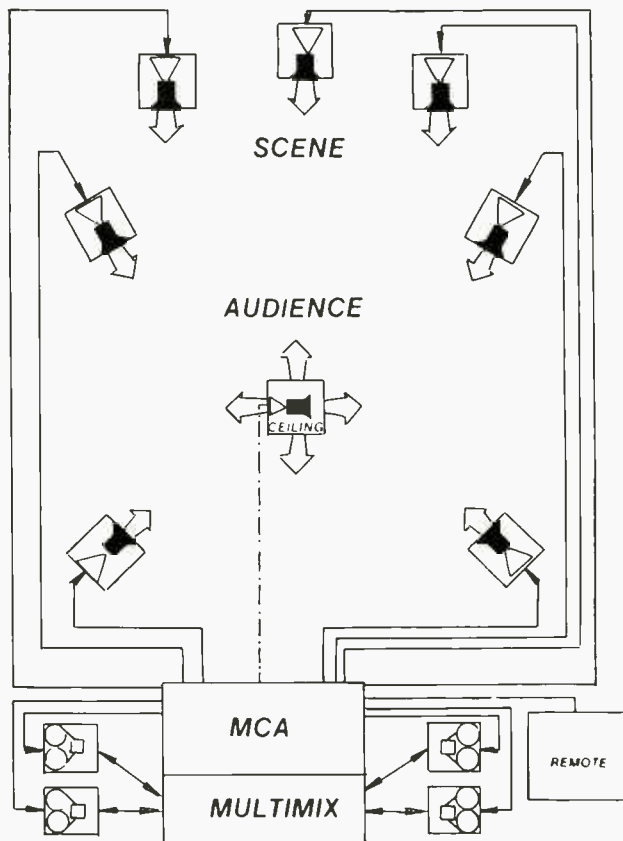
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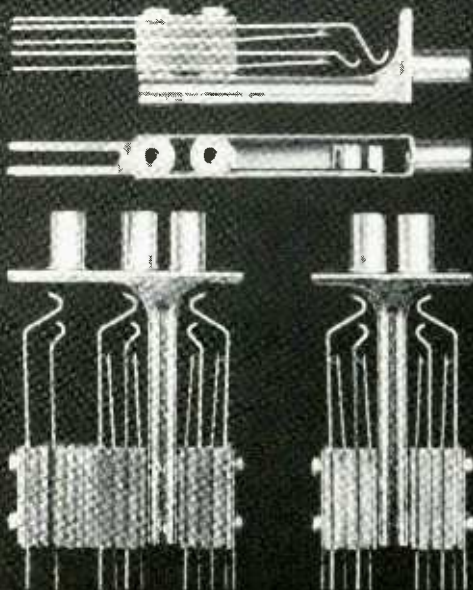


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CLASSIFIEDS

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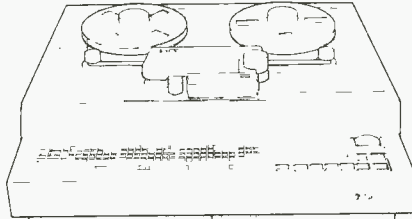
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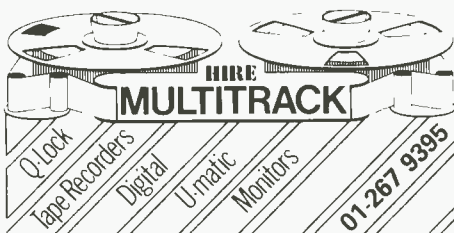
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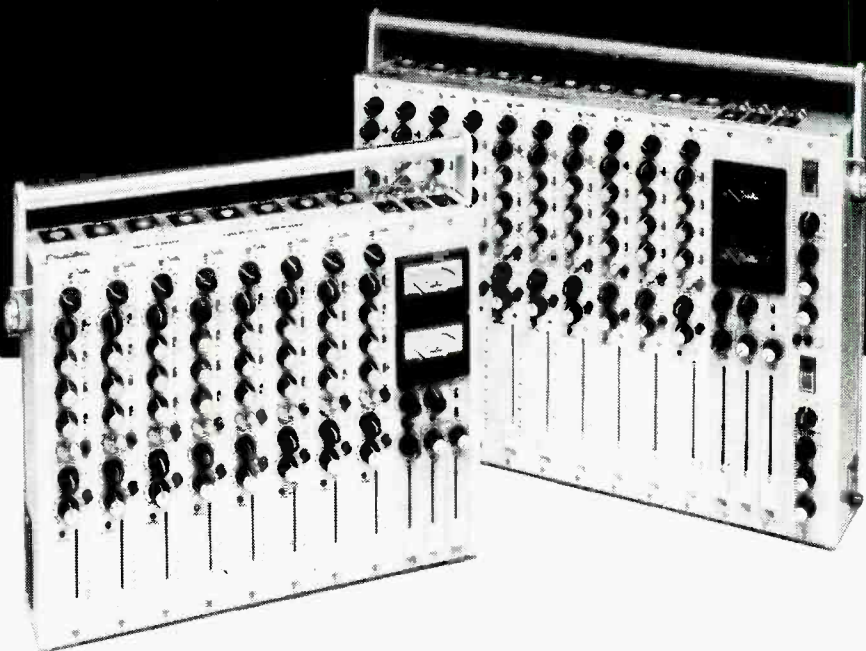
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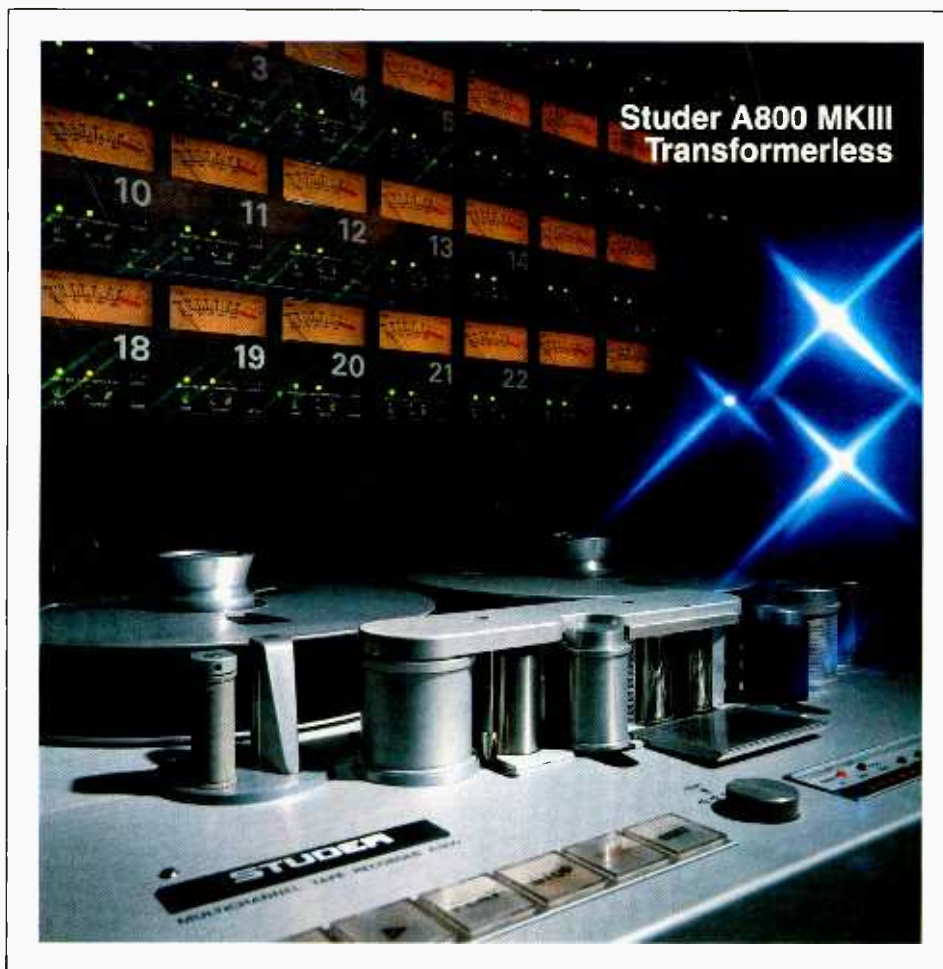
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