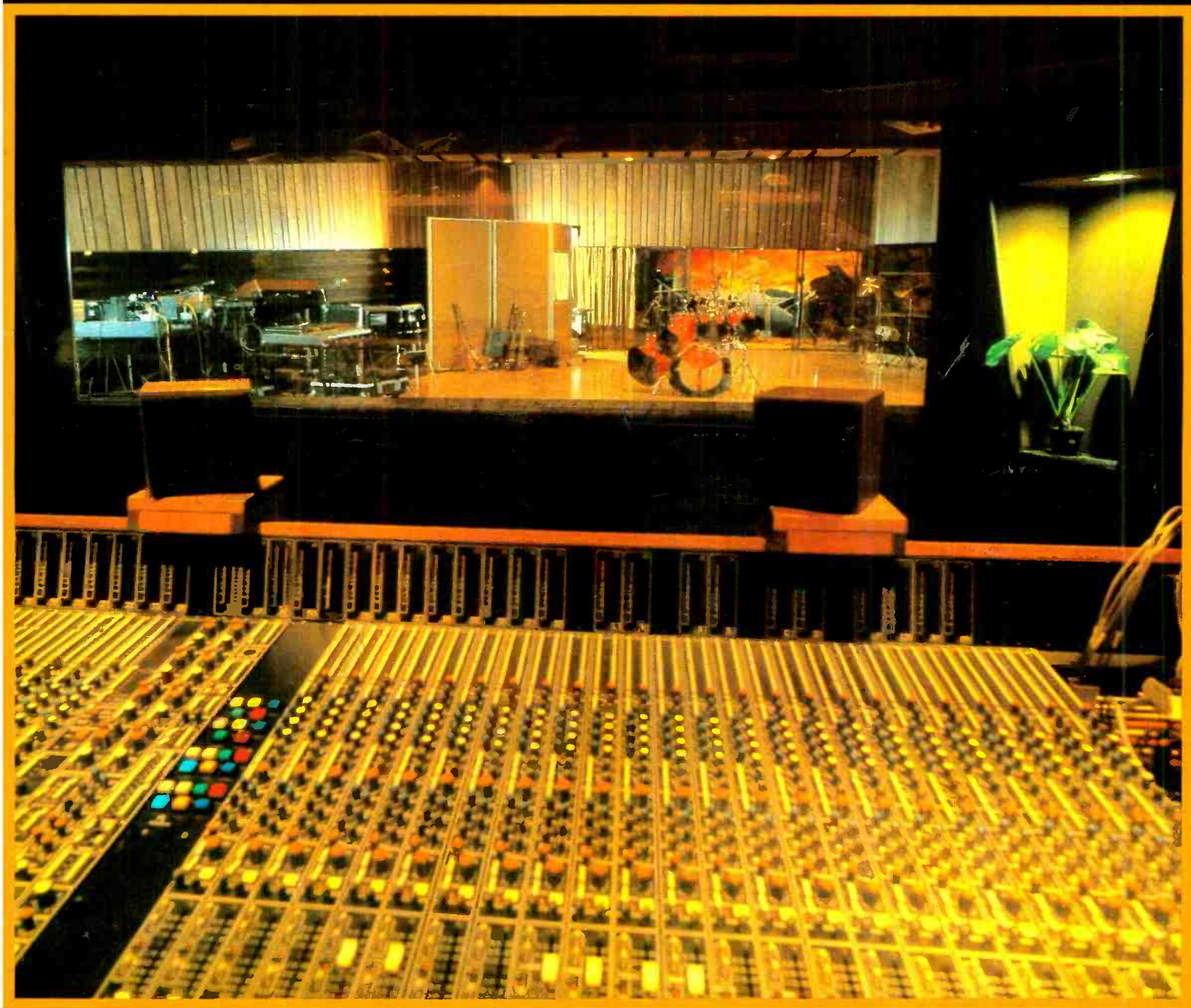


studio sound

April 1981 £1

AND BROADCAST ENGINEERING



**Tape
Furnishings
Interior design**

IMPECCABLE AUDIO • INCOMPARABLE CONTROL • UNRIVALLED INNOVATION



Solid State Logic
Master Studio Systems

UK & Europe
SOLID STATE LOGIC
Stonesfield
Oxford, England
099 389 324
Tlx: 837400

The Americas
WASHINGTON MUSICWORKS
2352 Wisconsin Avenue N.W.
Washington, D.C. 20007
East: (202) 333-1500
West: (213) 464-8064
Tlx: 440519

Japan
KAWAMURA LABORATORY
#34 Yari-Cho
Shinjuku-Ku
Tokyo 162, Japan
03 260 0401
Tlx: J-22748

EDITORIAL

EDITOR: RICHARD ELEN
 ASSISTANT EDITOR: NOEL BELL
 PRODUCTION: ANN HORAN
 CONSULTANT: HUGH FORD
 SECRETARY: WENDY MARSHALL

ADVERTISEMENT

MANAGER: PHIL GUY
 SECRETARY: AUDREY SLATFORD
 PRODUCTION: JACKIE McGRATH

PUBLISHER TONY ELLIS

Editorial and Advertising Offices:

LINK HOUSE, DINGWALL AVENUE,
 CROYDON CR9 2TA, GREAT BRITAIN
 Phone: 01-686 2599
 International: + 44 1 686 2599
 Telex: 947709
 Telegrams: Aviculture Croydon

© Link House Publications Ltd 1981

All rights reserved

STUDIO SOUND is published on the second Friday of the preceding month.

SUBSCRIPTIONS

STUDIO SOUND is available on a rigidly controlled requested basis only to qualified personnel (see back page for terms of control), or for an annual cost of £16.00 to non-qualifying readers or where more than two copies are required in a studio or small organisation.

UK Subscription cost £16.00.

UNITED STATES Surface mail subscription \$40, airmail subscription \$75.

OVERSEAS Surface mail subscription £17.50, airmail subscription £32.50.

Change of address

All changes of address must be notified to our Poole address in writing, preferably including an old address label or at least the seven digit number on the address label together with the old address. We are unable to accept verbal changes of address.

All subscription and circulation enquiries to: Subscription Dept, Link House Publications Ltd, Robert Rogers House, New Orchard, Poole, Dorset BH15 1LL, Great Britain. Phone: 02013 71171. Telex: 417109.

US mailing agents: Expeditors of the Printed Word Ltd, 527 Madison Avenue, Suite 1217, New York, NY 10022.

CONTROLLED CIRCULATION POSTAGE PAID AT NEW YORK, NY

BACK COPIES

A limited number of back copies are available, at cover prices.

Total average net circulation of 13,412 per issue during 1979. UK: 6,056. Overseas: 7,356.

Printed in England

 A LINK HOUSE PUBLICATION



studio sound

AND BROADCAST ENGINEERING

NEWS	28
STUDIO DIARY including Super Bear, France; Mandrill, New Zealand; Octopus, Suffolk	34
NATURALNESS AND ARTIFICIALITY	
Prof P B Fellgett	40
AES 68th CONVENTION — Exhibition Preview	42
INTERIOR DESIGN — Part One — Norman Bone	48
SURVEYS: Studio furnishings	54
Studio designers update	58
Acoustic materials	60
Engineers	62
BUSINESS	67
DESIGNING A MIXING CONSOLE	
Part Seven — Steve Dove	68
REVIEWS: MXR Dual Limiter — Hugh Ford	74
Audio Tapes — Hugh Ford	80

Looking behind the hardware

It's been said before, but it's almost certainly true: state of the art hardware doesn't necessarily mean a good studio—although it can help make a good studio better. Certainly equally important is the appearance and general 'feel' of the studio, from reception to washrooms to control room and the studio itself. Not only does a studio have to be together technically—good, reliable gear, efficient maintenance, good engineers, and so on—it also has to present an atmosphere to the client (and staff) which is conducive to creative work—typically, the creation of a music recording. It is easy to underestimate the importance of a good working atmosphere—and, no doubt, easy to *overestimate* it. It is as bad, in my view, to create beautiful plush surroundings at the expense of acoustic requirements, as it is to neglect appearances altogether, and I wonder sometimes if some of the current approaches to studio design make the recording of music any better. There seems to be a vicious circle involved, in which modern 'dead' studios enforce close-miking, which requires more mics, which need more channels, which means bigger and more expensive desks and recorders, which means more decisions during mixdown, which means expensive automation; all of which may ultimately detract from the original musical aim (and train engineers to develop ways of working which require dead rooms . . .). We'll be looking closely at this aspect of studio design and operating practice in a future issue, and it is one motivation for our current series exploring the basis of stereo and the reproduction of music. Indeed, it would be interesting to hear from sound engineers who worked in studios before the current multitrack wagon began to roll. How was it done in, say, the Thirties? Is there anything we can learn from those techniques which we can apply to modern recording requirements and facilities? No doubt there is: let's have some feedback on the subject.

In the meantime, it is interesting to consider how interlinked the arts of studio acoustic design and interior design have become, and Norman Bone's article in this issue makes interesting points on the subject. I must say that in some ways I would like to see a return to the days when you could choose a studio for its character, its sound, which went with the project on which you were engaged. I suspect that the argument that a modern studio, by its very lack of 'character', should enable the good engineer to impose *any* desired character, is fallacious (or maybe I'm just not a good enough engineer!). I would have thought that starting with a studio with the right 'kind' of sound for the job would require less tweaking at the desk (or in mic placement) to get a suitable sound than starting with no 'kind' of sound at all . . . or am I just old-fashioned? But then, of course, the current economic climate would no doubt spell disaster to any 'over-specialised' studio.

However, a colleague and I recently designed an 8-track studio for a composer friend of ours, and we aimed for a somewhat 'live' room. The studio is mainly used for synthesisers and other D/I'd instruments, so the desk and the recording area are in the same room, and if you want to record piano, drums or brass, you need to wear cans for monitoring. Yet the range of drum sounds, for example, is remarkable, from a really 'live' sound with no more than a crossed-pair of 451's, to a very good 'present' sound with three closer mics—both methods being particularly applicable to the limitations of 8-track (although I seldom use more than three drum tracks anyway). It's already my favourite studio, soundwise. But then, having had a hand in the design, it ought to be—and I'm just old-fashioned anyway.

Richard Elen

Cover photograph of Marcus Music UK by Roger Phillips

ISSN 0144-5944
 APRIL 1981 VOLUME 23 NUMBER 4

fact: this condenser microphone sets a new standard of technical excellence.

The Shure SM81 cardioid condenser is a new breed of microphone. It is a truly high-performance studio instrument exceptionally well-suited to the critical requirements of professional recording, broadcast, motion picture recording, and highest quality sound reinforcement—and, in addition, is highly reliable for field use.

Shure engineers sought—and found—ingenious new solutions to common

problems which, up to now, have restricted the use of condenser microphones. Years of operational tests were conducted in an exceptionally broad range of studio applications and under a wide variety of field conditions.

As the following specifications indicate, the new SM81 offers unprecedented performance capability—making it a new standard in high quality professional condenser microphones.



SM81 puts it all together!

- WIDE RANGE, 20 Hz to 20 kHz FLAT FREQUENCY RESPONSE.
- PRECISE CARDIOID polar pattern, uniform with frequency and symmetrical about axis, to provide maximum rejection and minimum colouration of off-axis sounds.
- EXCEPTIONALLY LOW (16 dBA) NOISE LEVEL.
- 120 dB DYNAMIC RANGE.
- ULTRA-LOW DISTORTION (right up to the clipping point!) over the entire audio spectrum for a wide range of load impedances. MAXIMUM SPL BEFORE CLIPPING: 135 dB; 145 dB with attenuator.
- WIDE RANGE SIMPLEX POWERING includes DIN 45 596 voltages of 12 and 48 Vdc.
- EXTREMELY LOW RF SUSCEPTIBILITY.
- SELECTABLE LOW FREQUENCY RESPONSE: Flat, 6 or 18 dB/octave rolloff.
- 10 dB CAPACITIVE ATTENUATOR accessible without disassembly and lockable.

Outstanding Ruggedness

Conventional condenser microphones have gained the reputation of being high quality, but often at the expense of mechanical and environmental ruggedness. This no longer need be the case. The SM81 transducer and electronics housing is of heavy-wall steel construction, and all internal components are rigidly supported. (Production line SM81's must be capable of withstanding at least six random drops from six feet onto a hardwood floor without significant performance degradation or structural damage.) It is reliable over a temperature range of -20° F to 165° F at relative humidities of 0 to 95%!

Send for a complete brochure on this remarkable new condenser microphone!

SM81 Cardioid Condenser Microphone



Shure Electronics Limited, Eccleston Road, Maidstone ME15 6AU—Telephone: Maidstone (0622) 59881

Get your priorities right.



**A stereo
Compressor
Limiter
for only £450
(excl. VAT)**

Now that your studio is bought and the desk is commissioned your next step will be to evaluate auxiliary signal processors.

The choice is wide and in these days of hard competition and tight budgets your first decision must be the right one—consult the experts. ADR are the experts, our Complex Limiter, Vocal Stresser and Scamp systems are industry standards and our signal processors are working in studios the world over.

The Gemini Easyrider is the latest in our range of stereo compressor limiters. Designed for budget operation without technical compromise it is ideal for new studios breaking into the professional recording market. In addition you don't need any sound engineering experience to operate it.

The Gemini Easyrider is available for evaluation at a dealer near you, call us now for full details, we're as near as your telephone.

Audio & Design (Recording) Ltd.,
North Street, Reading, Berks. RG1 4DA.
Telephone: Reading (0734) 53411.
Telex: 848722 a b ADR UK.
Cable: Scamp Reading.



Audio & Design Recording Inc.
PO Box 786, Bremerton, WA 98310 USA
Telephone: (206) 275 5009. Telex: 152426 a b ADR USA



Technical Specification	
Frequency response	± 1 dB, 20 Hz – 25k Hz
Sig-noise	Better than –80 dB.
Distortion	0.15% Ref + 12 dB.
Input	+ 18 dBm.
Output	– 10 dBm – + 12 dBm
Ratios (Slopes)	Variable 1.5 – 20:1 or out.
Threshold	Automatic.
Attack	500µS – 5 ms, auto dynamic.
Release	15 ms – 4 secs + auto.
Size	1 1/4" x 19" x 7 1/2"
	(44.45 mm x 482.6 mm x 190.5 mm)
Export packed with illustrated instruction manual.	



Pretty, Perfect.

SYSTEM 1&2 MIXERS

By Rank Strand Sound

We know aesthetic design in a mixer is necessary, but not at the cost of buying facilities you may never use, or finding that there are vital controls missing.

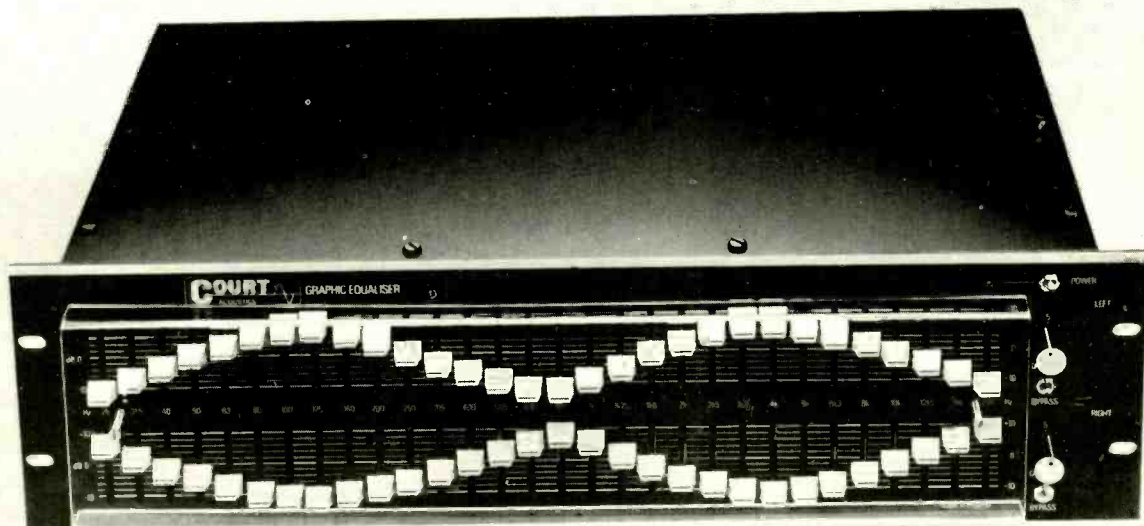
Systems 1 & 2 mixers are modular in design, offering a variety of input and output combinations economically achieved by the selection of modules and mainframe.

That way you save money, and the beautiful styling comes free.



Rank Strand Sound, P.O. Box 54, Gt. West Road, Brentford, Middx. TW8 9HR. Tel: 01 568 9222.
Telex: 27976. Cables: Rankaudio, Brentford.

The Ultimate Equaliser



- 2 Stereo bands of 30 faders with centre click stops giving 20db of control
- Entire audio spectrum from 21hz to 21khz in 1/3 octaves
- Up to 20db of gain
- High and Low pass filter on end faders for subsonic and supersonic rejection
- ± 10db of boost and cut, or 20db 'all cut' and 'all boost' with flat response

- Plug in balancing transformers
- 60 Precision inductors with minimally flat response for maximum curve performance
- Passive bypass for accurate pre & post eq. comparison
- Perspex 'Tamper-Proof' cover
- 100-240 volt operation in 5 1/4" rack space

COURT ACOUSTICS LTD

35 Britannia Row, London N18OH 01-359 0956 Telex 268279 Attn. BRITRO G

Penny-pinching Packages from ITA

	List	Package
4 track package. Teac A3440, Revox HS77, Model 2A Mixer	£1668	£1350
4 track package. Teac A3440, Revox HS77, Itam 10-4 Mixer	£2535	£2090
8 track 1/2 inch package. Itam 806, 10-4 Mixer, Revox HS77	£3917	£3220
8 track 1 inch package. Otari MX7800, Allen & Heath 16x8 Mixer	£7185	£6395
16 track 1 inch package. Itam 1610, Allen & Heath 16x8, Revox HS77	£9045	£8185
16 track 2 inch packages	from	£13800
24 track 2 inch packages	from	£23000



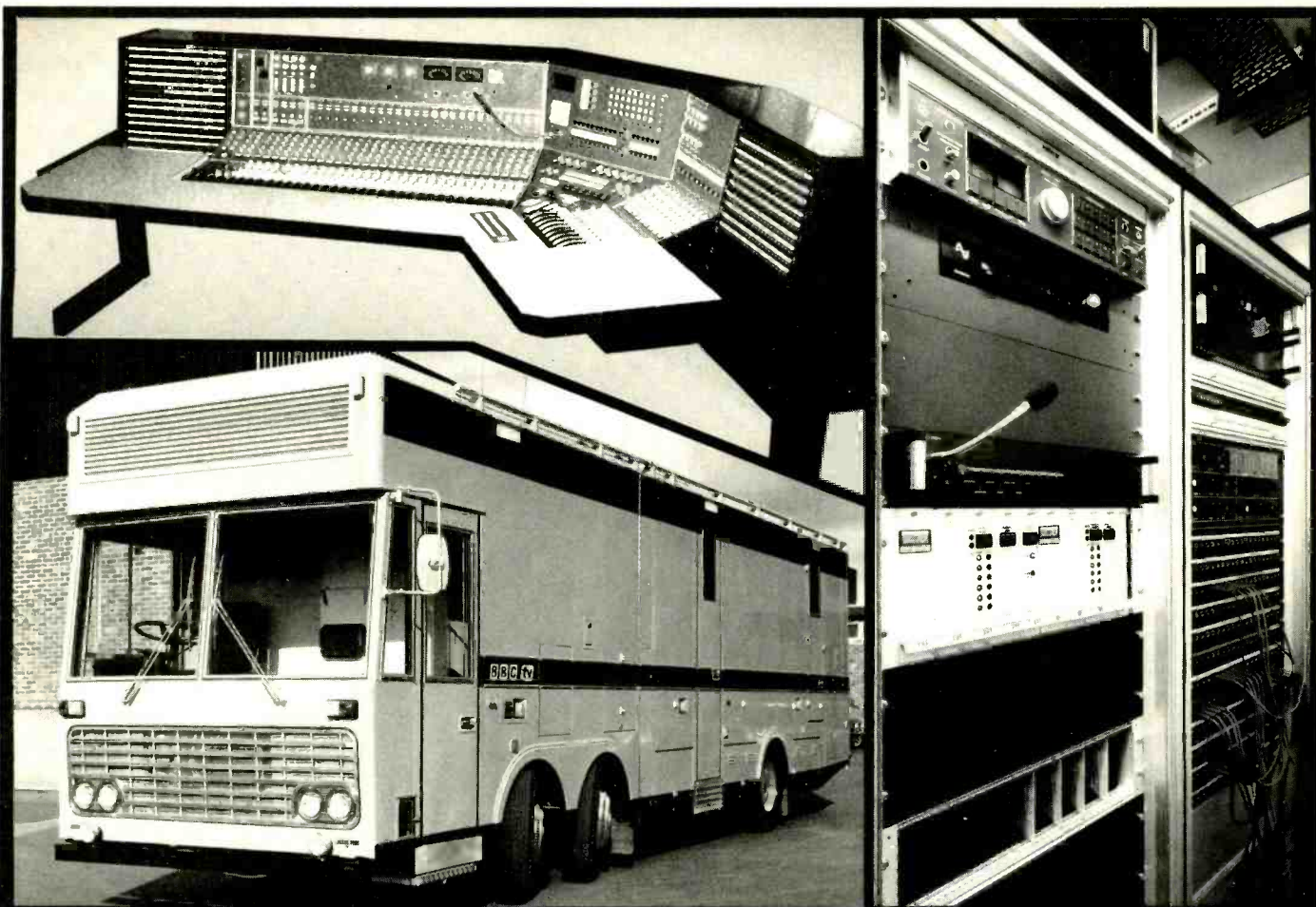
AHB OTARO itam
REVOX SOUNDCRAFT ELECTRONICS LIMITED **TEAC**

Full range of ancillary
equipment available.

Finance facility.

Full after sales service back up.

**ITA, 1-7 Harewood Ave., Marylebone Road, London
NW1. Tel: 01-724 2497. Telex: 21879.**



Jacks & Jackfields for Recording and Broadcasting

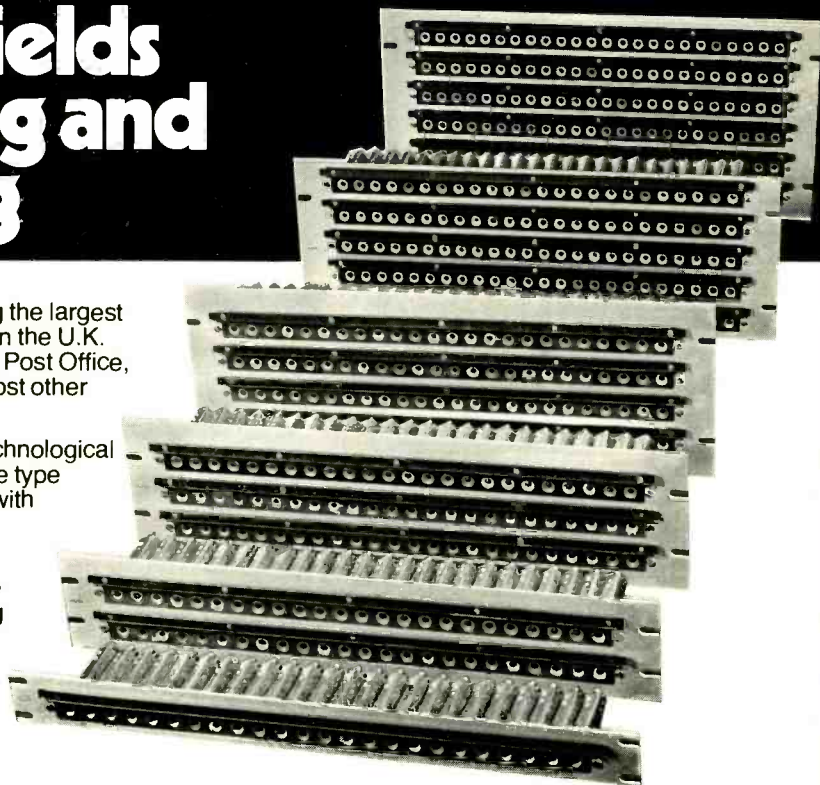
Mosses and Mitchell are recognised as being the largest manufacturer of Audio Jacks and Jackfields in the U.K. We are approved suppliers to the B.B.C., the Post Office, Pye T.V.T., Pye Telecommunications and most other major users.

We have a policy of continued design and technological innovation and are now able to offer miniature type Jacks and Jackfields which can be supplied with wire wrap terminals as an alternative to the traditional solder terminals.

At our modern factory in Farnham, Surrey we are equipped to offer a flexible manufacturing service geared to meet your individual specification and delivery requirements.



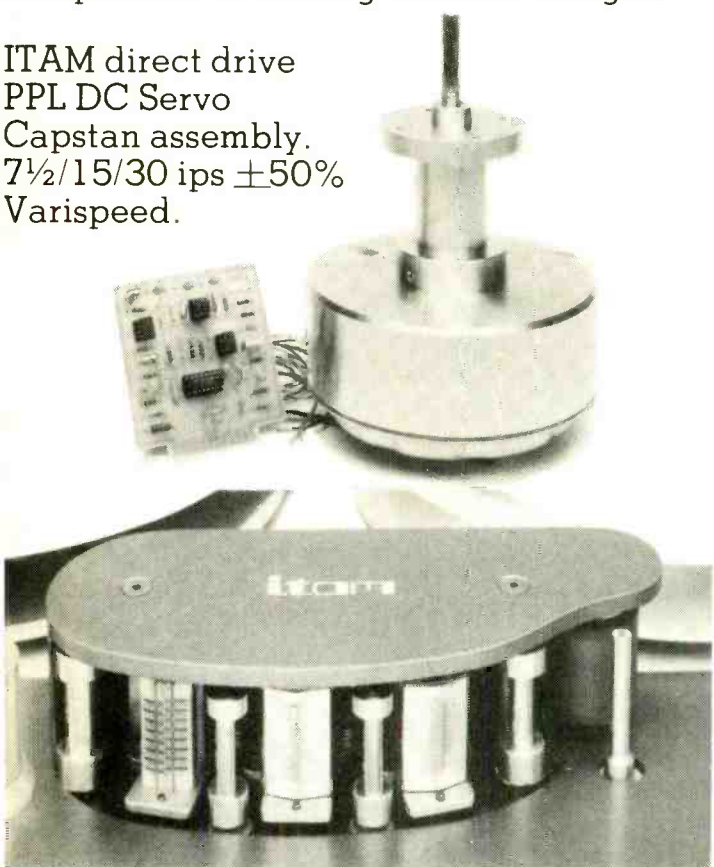
Mosses & Mitchell Limited, Weydon Lane, Farnham, Surrey GU9 8QL
Telephone: Farnham 721236 (STD 0252) Telex: 858820



For a better spec than the one inch 1610, a two inch deck offers a poor alternative.

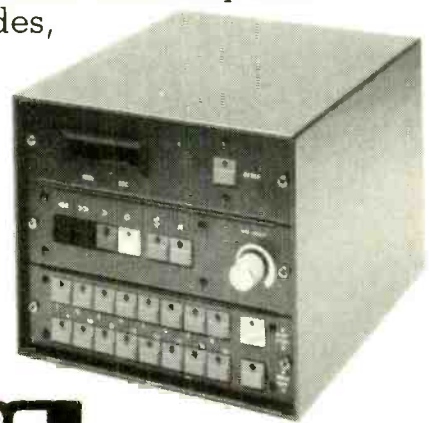
The ITAM 1610 features identical major components to leading two inch designs.

ITAM direct drive
PPL DC Servo
Capstan assembly.
7½/15/30 ips ±50%
Varispeed.



Precision plug-in head assembly with rotating tape guides, 8 or 16 track capability.

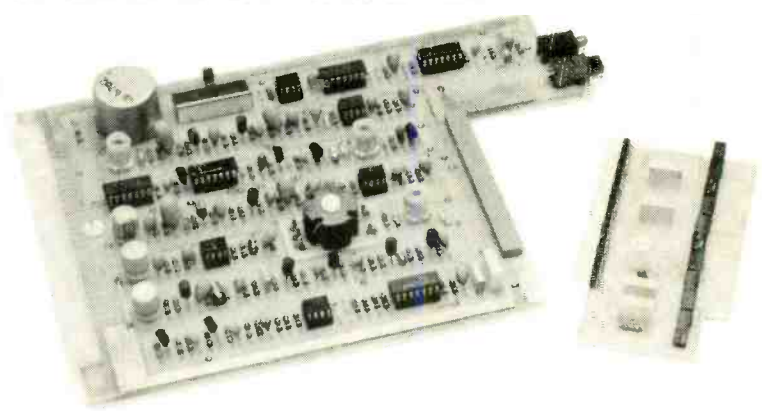
Full function remote with varispeed and digital tape counter.



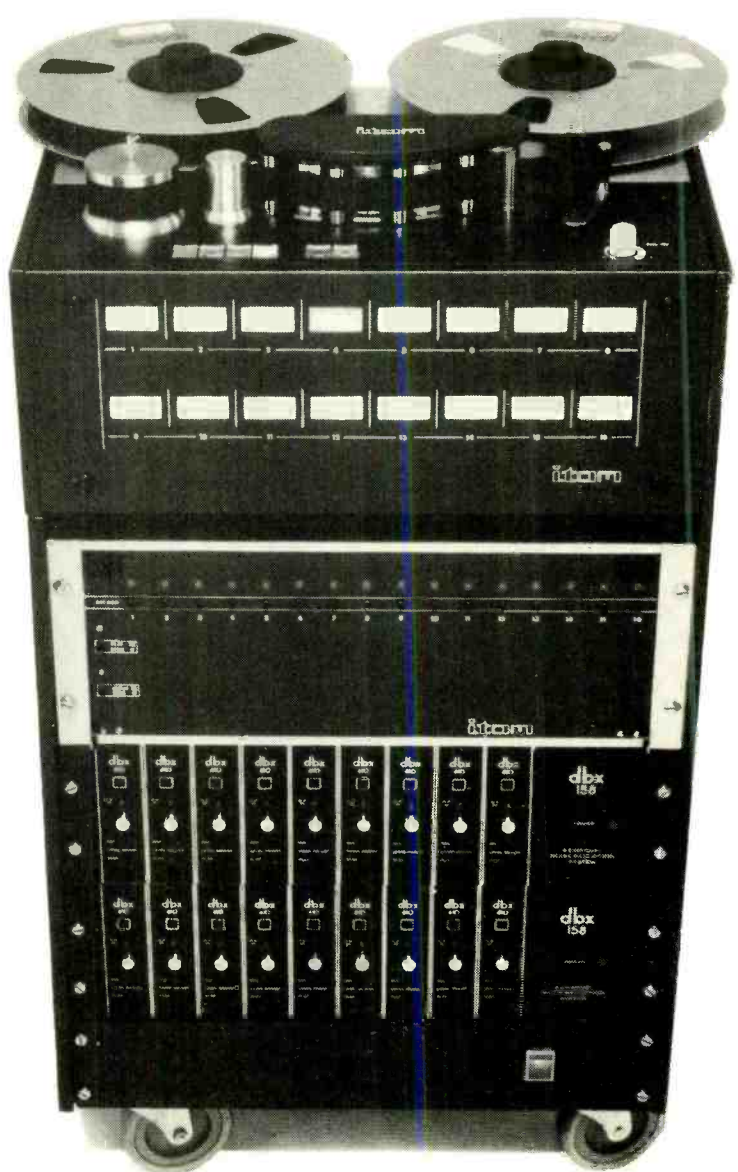
itam

Model 1610 1 inch 16 track. UK £5750 excl VAT. Model 810 1 inch 8 track (export only).

DBX and remote control are optional extras. Finance facility.



Sophisticated modular electronics with plug-in EQ card. All electronic switching via FETs for click free operation. +4dBm output level.



ITAM, 1-7 Harewood Avenue, Marylebone Road, London NW1. Tel: 01-724 2497. Telex: 21879.

COMPLIMENTARY PAIR



The 828, a high quality stereo output mixer with 8 or 12 mono mic/line inputs, HF, MF, LF, Equalisation, Echo and foldback sends, PFL on headphones, Limiters on outputs, PPMs, Phantom power optional.

The 828-S, a broadcast quality stereo output mixer with 3 mono mic/line inputs and 5 stereo RIAA (phono) or line inputs. Comprehensive monitoring facilities include stereo 'B' check input with gain control, phase reverse, Mono and Dim, PFL on meters, VU's or PPMs to order. 48v Phantom power standard. LS mute by fader micro switch available.

Alice (Stancoil Ltd.)

Alexander Road, Windsor, England. Tel: (075-35) 51056/7 Telex: 849323 Aegis G.

We've Smashed it!

IEC 468-2 SPEC,
SIZE AND PRICE

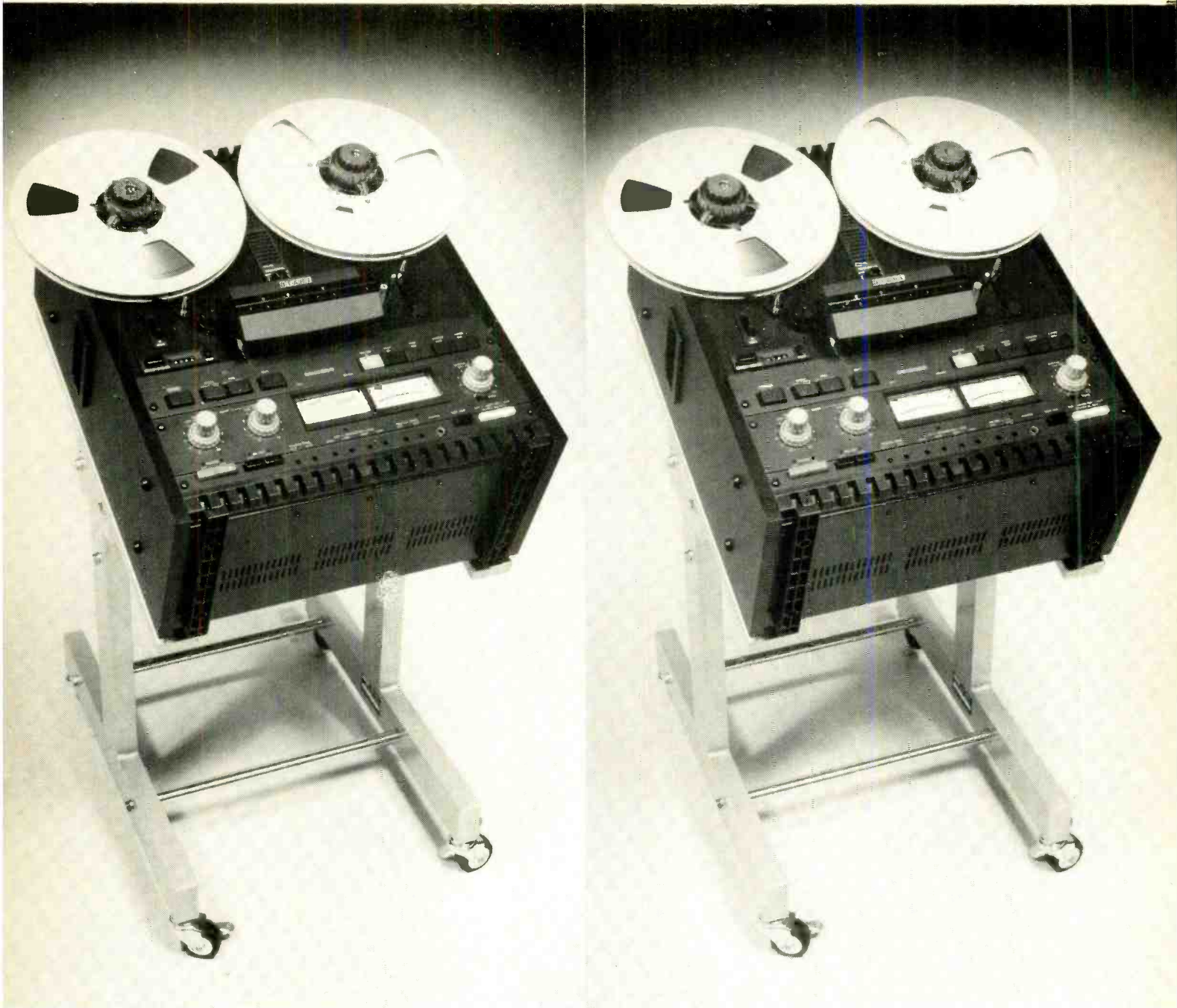
Soundex AMM 200

Noise Meter is the only instrument of its size and price which meets IEC 468-2 in every detail. It features a vital overload warning indicator, measurement down to -100 dB and is only $175 \times 67 \times 120$ mm. The single unit price is an equally surprising £350.

Would you like to see it?
Telephone Hoddesdon 64455

Bulgin Electronics
One of the Bulgin Group of Companies

Park Lane, Broxbourne,
Hertfordshire, EN10 7NQ.



Doubly effective

Embodying the facilities and ruggedness of tape machines costing double, or more, the new OTARI MX5050B is the recorder to meet the challenge of this decade, when economic restraints plus performance requirements will place greater demands on

manufacturers than ever before. The MX5050B is the answer.

- * DC Capstan Servo
- * Varispeed
- * TTL IC Logic
- * Switchable NAC/IEC EQ
- * Additional 4 track replay head

- * 3 calibrated record levels
- * + 28dBm 600 ohm balanced output
- * Optional balanced input
- * Good editing
- * Built-in 1kHz oscillator

As chosen by CARDIFF BROADCASTING

OTARI

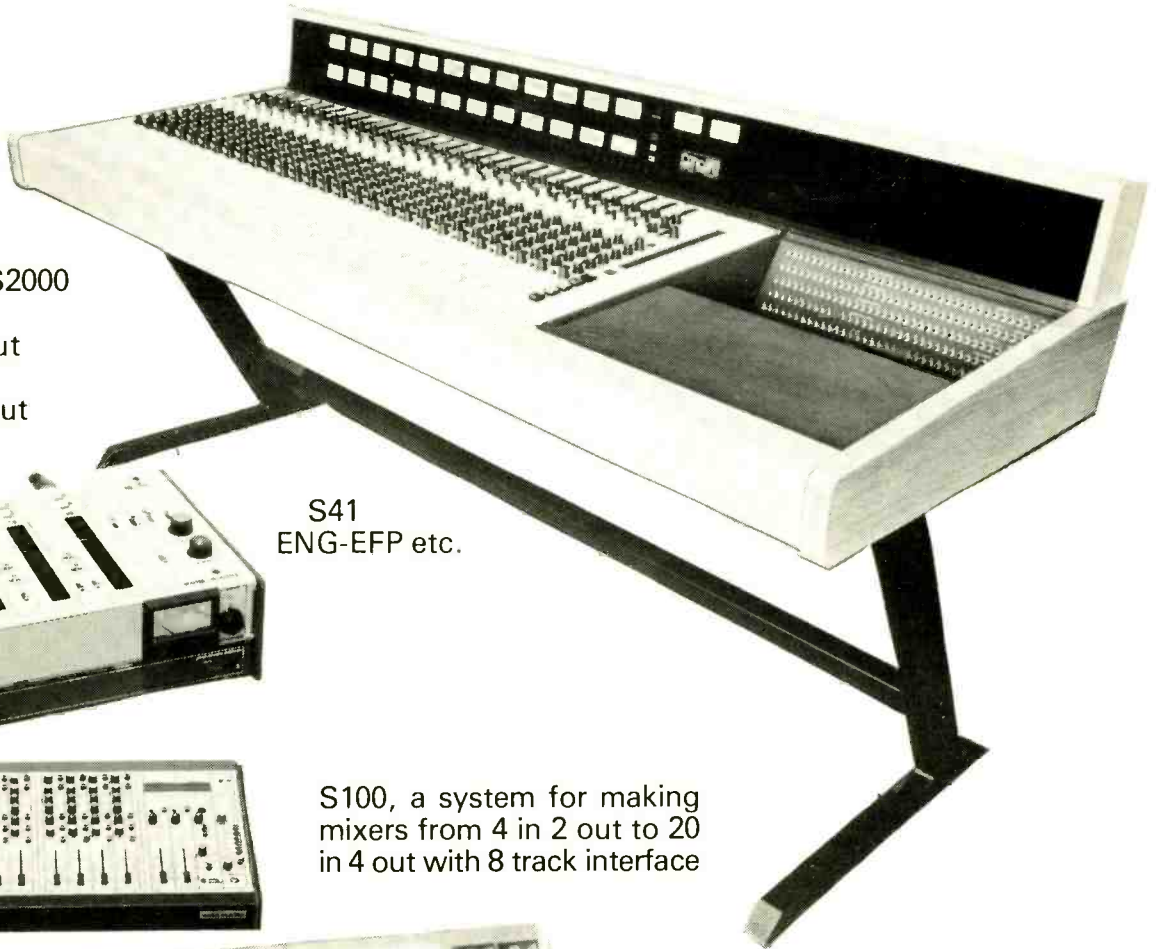
Sole UK Distributors: ITA, 1-7 Harewood Avenue, Marylebone Road, London NW1.
Tel: 01-724 2497.



EELA AUDIO INDUSTRIES MIXERS FOR MOST APPLICATIONS

MUSIC STUDIOS, SELF-OP, PRODUCTION, A.V., ENG/EFP, EDITING SUITES, etc.

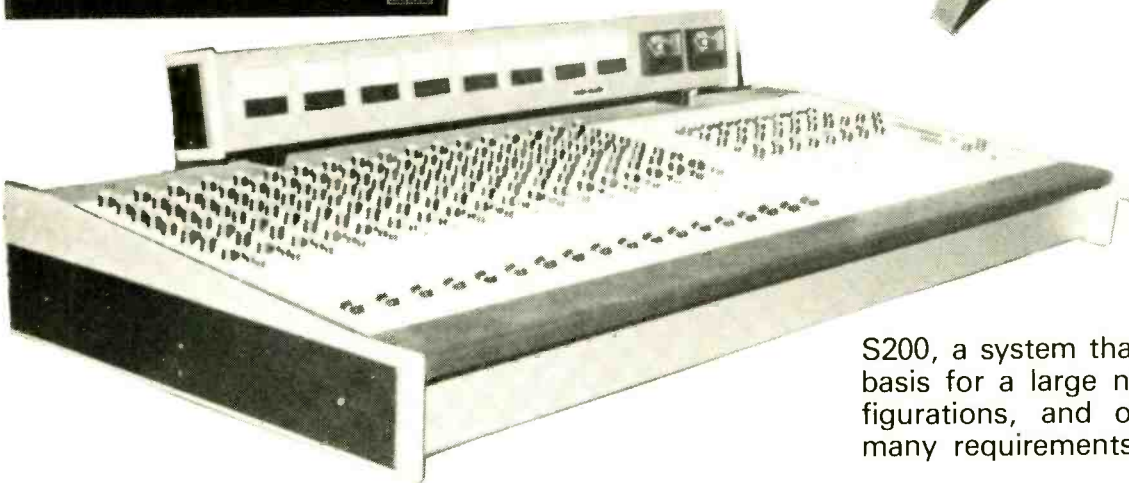
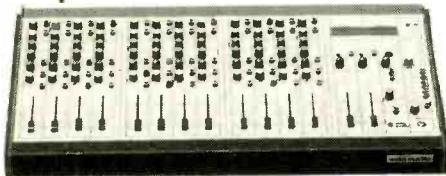
CONCORD S2000
from
12 in - 8 out
to
28 in - 24 out



S41
ENG-EFP etc.



S100, a system for making
mixers from 4 in 2 out to 20
in 4 out with 8 track interface

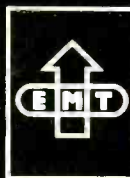


S200, a system that can form the
basis for a large number of con-
figurations, and options to suit
many requirements

UK and World Sales: **BILL DYER, EELA AUDIO INDUSTRIES, 13 Molesworth, Hoddesdon, Herts. Tel. Hoddesdon (61) 68674. STD 099 24 68674. Telex 893657.**
 UK: **RAINDIRK LIMITED: Tel. 03663 2165. AUDIO REINFORCEMENT SERVICES LTD. Tel. 01-341 1506. DON LARKING AUDIO SALES. Tel. 0582 26693. GERMANY: BARTH KG. Tel. 40-2298883. BELGIUM: T.E.M. Tel. 32-35691823. FRANCE: REDITEC. Tel. 300930. SPAIN: SINGLETON PRODUCTIONS. Tel. 228 3800. ITALY: Roje TELECOMUNICAZIONE. Tel. 413441/2/3. USA: AUDIOCON, NASHVILLE, USA. Tel. (615) 256-6900. EIRE: EUROTEK, DUBLIN 782343.**
PIETER BOLLEN geluidstechniek bv. HONDSRUGLAAN 83 A, 5628 DB EINDHOVEN. Tel. 040-424455. TLX: 59281 BOLLE NL.

STUDIO TECHNOLOGY

of world wide fame



EMT-FRANZ GmbH
Postfach 15 20, D-7630 Lahr
Tel.: 07825-1011, Telex: 754319
Federal Republic
of Germany

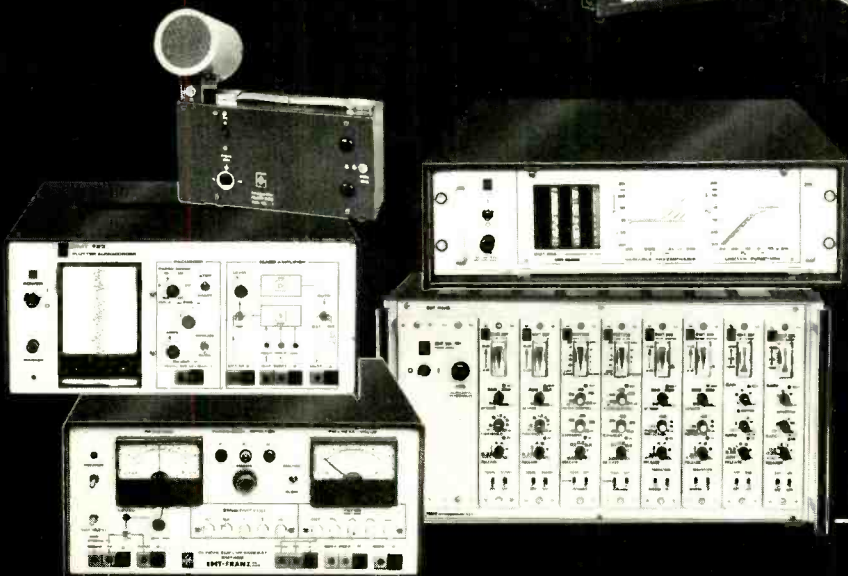
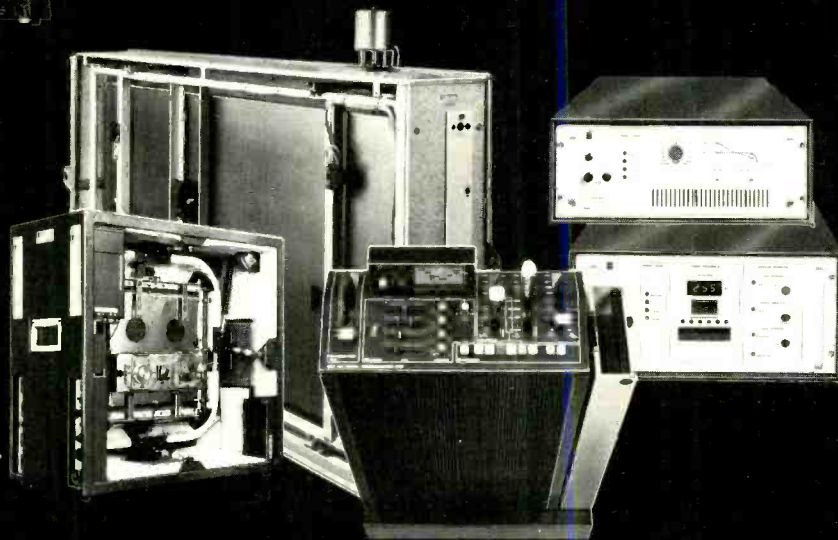


PROFESSIONAL RECORD TURNTABLES

Studio turntables for decades of continuous duty in radio stations. Cueing and instant-start features. Groove illumination. Balanced outputs at line level.

REVERBERATION AND AUDIO-DELAY UNITS

Advanced technology for music productions. Reverberation plate. Gold foil. Electronically produced reverberation with high reflection density and exponential decay. Digital signal delay for public-address applications and special effects.



TEST EQUIPMENT AND CONTROL AMPLIFIERS

Wow and flutter meters with the longest tradition and the most advanced static-data indicating system. Recorder and monitor provisions. Compact control amplifiers for limiting dynamic range, noise, and sybillants. Transient limiter for transmitter protection.

in Great Britain:

F.W.O. Bauch Limited

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

Now! A World Class Reverb . . .

**SEE US AT A.E.S.
HAMBURG**

**at a
budget price!**



ECOPLATE™ II

Often the weakest link in a recording chain is the reverb device. Ecoplate II offers the clean, bright, musical reverb heard on many hit records . . . and at a price affordable by most studios.

With a sound comparable to the world famous Ecoplate, but with greatly reduced size, weight and cost, Ecoplate II is certainly the "best buy" in a reverb unit today.

Partial Users List

- Dawn Recording-N.Y.
- Unique Recording-N.Y.
- Skyline Recording-Calif.
- Spectrum-Michigan
- 80's Recording-N.Y.
- Cherokee-Hollywood

Exclusive UK distributors

TURNKEY

**8 East Barnet Road
New Barnet, Herts. 01-440 9221**

**CANFORD
AUDIO**

UK & EXPORT SALES (Ex USA)
CANFORD AUDIO LTD
STARGATE WORKS
RYTON
TYNE & WEAR
NW40 3EX
TELEPHONE: RYTON (089422) 4515
(3 LINES)
TELEX: 537792

USA SALES
CANFORD AUDIO (NORTH
AMERICA) INC
652 GLENBROOK ROAD
STANFORD
CT. 06900
TELEPHONE: (203) 324-2889
TELEX: 643678



ILLUMINATED SIGNS
"ON AIR" "RECORDING"
"REHEARSAL"

ACOUSTIC
TABLES - HEXAGONAL &
RECTANGULAR



DJ "INDESTRUCTIBLE"
CHAIRS

Full details of these products, together with the rest of our extensive range of studio ancillary items are in our new catalogue - Ring for your copy now.



"The original A77 had set a standard by which I have judged other domestic and semi-professional recorders for many years. It is now clear that the new B77 sets a new standard not easily surpassed at its price"

Angus McKenzie (March 1978)

REVOX

For the full story contact F.W.O. Bauch Ltd., 49 Theobald St., Boreham Wood, Herts. WD6 4RZ



Audioscope

F 462

RANGE OF MASTER TAPE RECORDERS

A range of tape recorders designed for demanding users (typical wow and flutter .03% CCIR at 15 i.p.s.), who can upgrade their equipment as their needs evolve through a wide range of accessories and options such as: remote control panel, varispeed unit with ± 13 semi-tone range, tape marker, scissors, NAB hub adaptors, monitoring loud-speaker...

When ordering your recorder, you may select: 2 of the 4 capstan speeds, the tape deck height, your usual equalization standard (CCIR/NAB), the head assembly corresponding to your type of

operation (mono / stereo / two-track, with full or separate overlapping track erasure), etc.

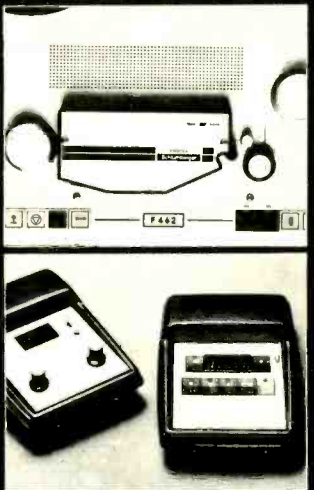
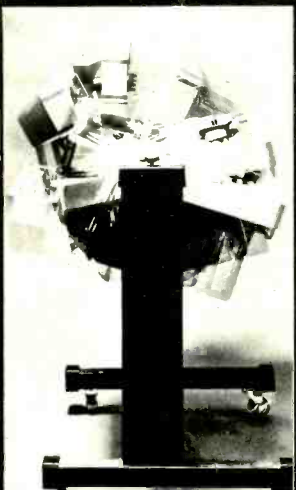
...And you can change your mind later by upgrading your configuration at your convenience for a minimum cost.

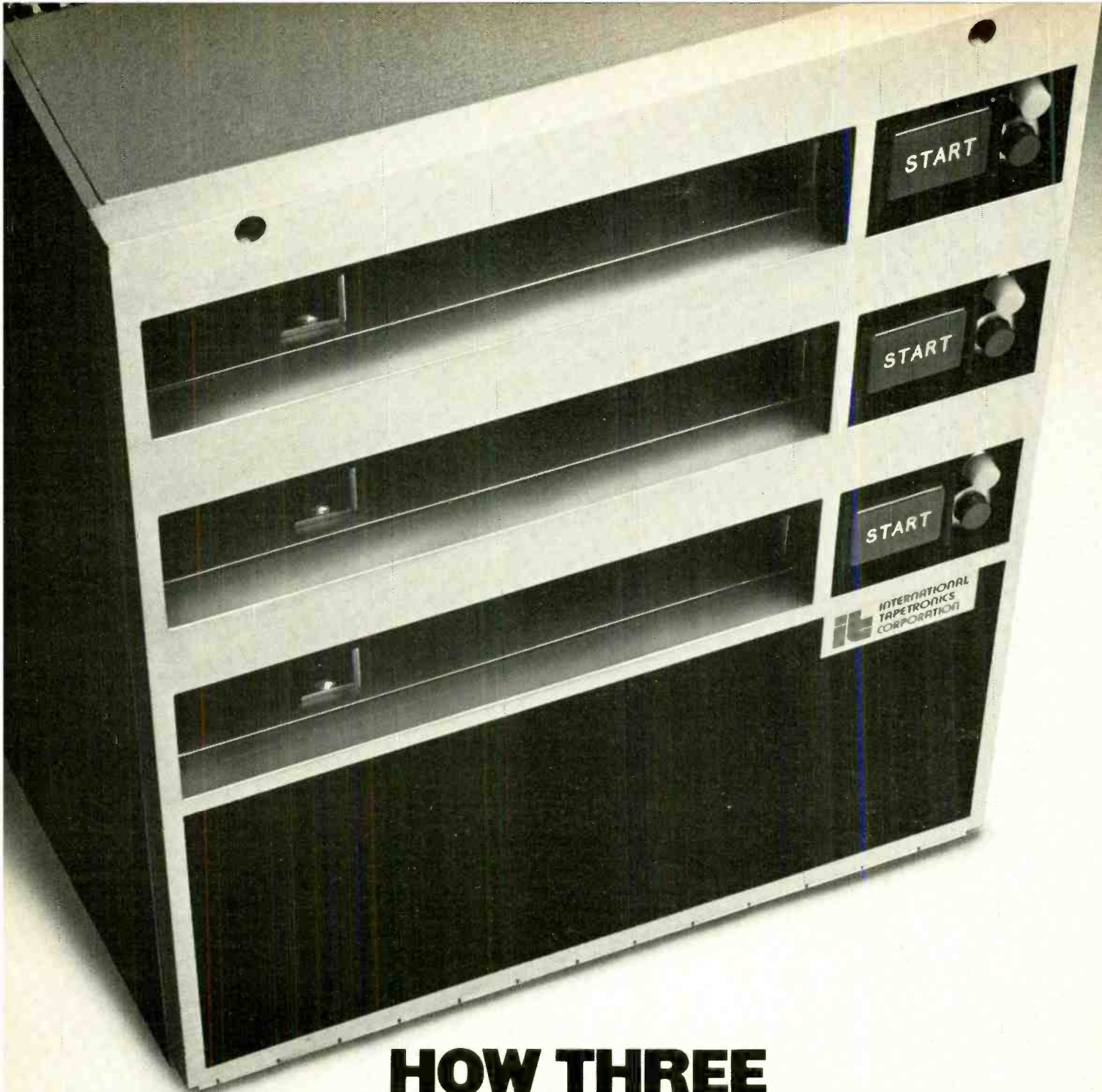
F 462: an outstanding and flexible range of master recorders.

Give us a call. We'll let you know how and where you can try this product (Why not in your own studio?).

ENERTEC
Schlumberger

ENERTEC. DEPARTEMENT AUDIO-PROFESSIONNEL
296, AVENUE NAPOLEON-BONAPARTE
95505 RUEIL-MALMAISON.
TEL. (1) 732 92 23. TELEX 203404 F.





HOW THREE INTO TWO CAN GO.

We started the ITC 3D Series by listening.

Not to our machines - we know they sound great - but to the people who use them.

And it came over, loud and clear, that what they want is 'greater compactness'. So we thought about it, worked on it and

came up with the answer.

Three cartridge reproducers in the space that two would normally occupy, and with record/playback facility on the bottom slot. A one-fingertip control. And all at a price less than three single machines.

If you want to know more

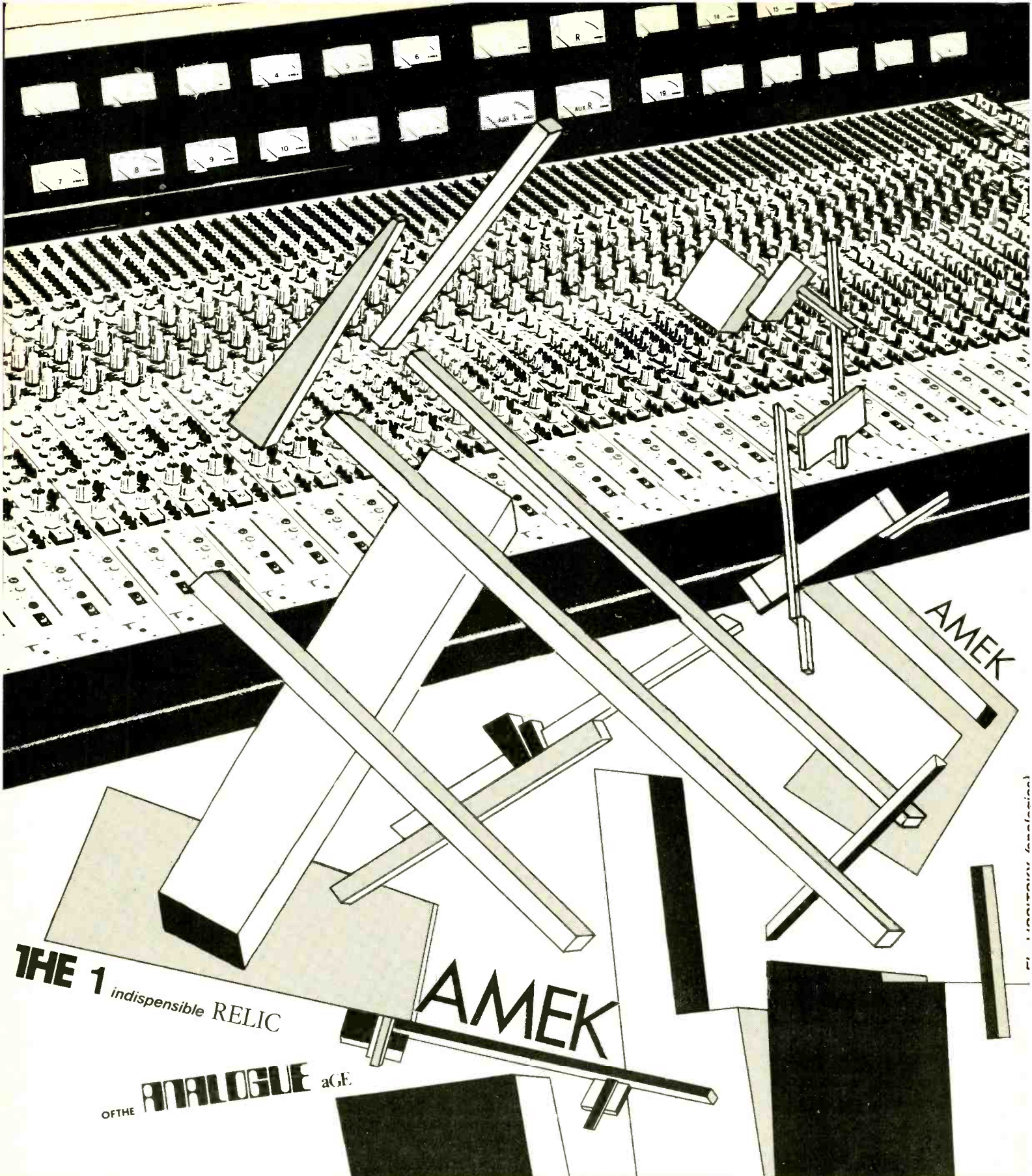
about ITC's way of turning odd arithmetic into sound recording sense, write now for details of the 3D Series to F.W.O. Bauch Limited.

International Tapetronics Corporation
Bloomington, Illinois 61701, USA.



F.W.O. Bauch Limited

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



THE 1 *indispensable* RELIC

OF THE **ANALOGUE** AGE.

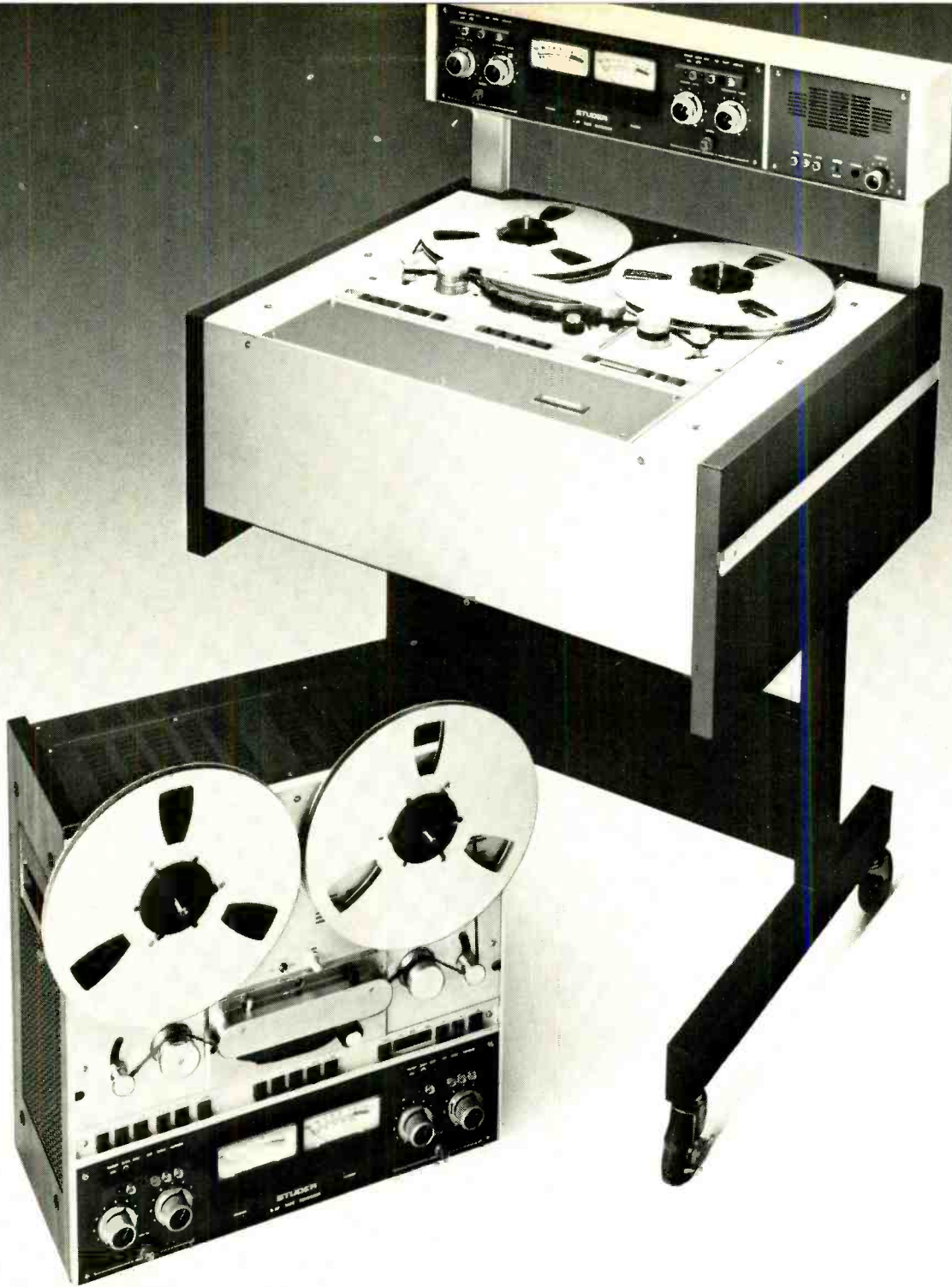
AMEK



UK SALES: SCENIC SOUNDS, 97-99 DEAN ST, LONDON W1V 5RA (01) 734 2812

- AUSTRALIA: AUDIO CONTROLS, SYDNEY (2) 922 1777 FRANCE: CYBORG, PARIS (1) 845 9448
- GERMANY: JEFF NIECKAU, B F E, MAINZ (06131) 46811 ITALY: AUDIO PRODUCTS INTERNATIONAL, MILAN (2) 236 6628
- SOUTH AFRICA: ELTRON, JOHANNESBURG (11) 23 0018
- USA: BRIAN CORNFELD, EVERYTHING AUDIO, LA (213) 995 4175 MARTIN AUDIO, NEW YORK (212) 541 5900
- WESTBROOK AUDIO, DALLAS, TEXAS FLANNER'S PRO AUDIO, MILWAUKEE
- JAPAN: CONTINENTAL FAR EAST INC, TOKYO (03) 583 8451

AMEK SYSTEMS AND CONTROLS LIMITED/TOTAL AUDIO CONCEPTS LTD, ISLINGTON MILL, JAMES ST, SALFORD M3 5HW, ENGLAND (061) 834 6747 TELEX 668127 NICK FRANKS/GRAHAM LANGLEY



The Robust Movers.

When a Studer machine is needed as a rugged, reliable work-horse in the studio or mobile unit, the B67 is the natural choice.

The value-for-money B67 offers proven reliability and performance to justify its acceptance as the direct replacement to the renowned B62.

For more information contact F.W.O. Bauch Limited.

STUDER
INTERNATIONAL AG
CH-8105 Regensdorf Telephone (01) 840 29 60

F.W.O. Bauch Limited

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

STUDER REVOX AMERICA INC Nashville
Telephone (615) 329-9576

STUDER FRANCE S A R L Paris
Telephone 533 5858

STUDER REVOX CANADA LTD Toronto
Telephone (416) 423-2831

A STATE OF THE ART CARTRIDGE MACHINE



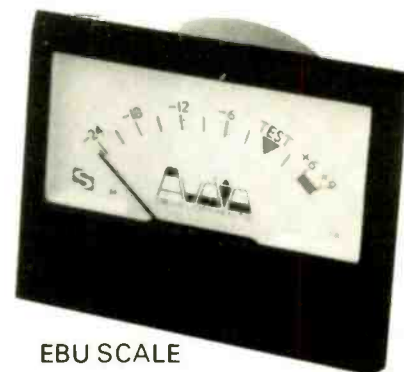
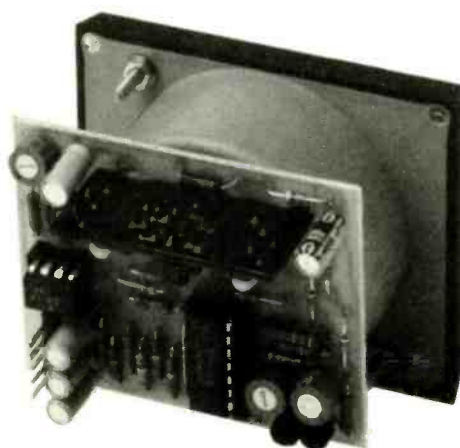
NAB cartridges can only be as good as the equipment used to record them. After you've seen our beautifully flat frequency response and superb distortion figures (less than 1.5% at 405nWb/m peak level), the next thing is to listen, as recordings sound cleaner too, because of the Phase Linear record electronics and the sort of headroom you'd be impressed with on a 24tk recorder. In fact Cartridge Technology is the closest you can get to reel to reel performance.

For the whole spec. contact - JOHN A. STEVEN Professional Recording Equipment
 24 CRESCENT DRIVE SHENFIELD ESSEX CM15 8DS Tel: BRENTWOOD (0277) 215485 Telex: 995701 INTCOM G REF 197

A BROADCAST STANDARD PPM DRIVER



BBC SCALE



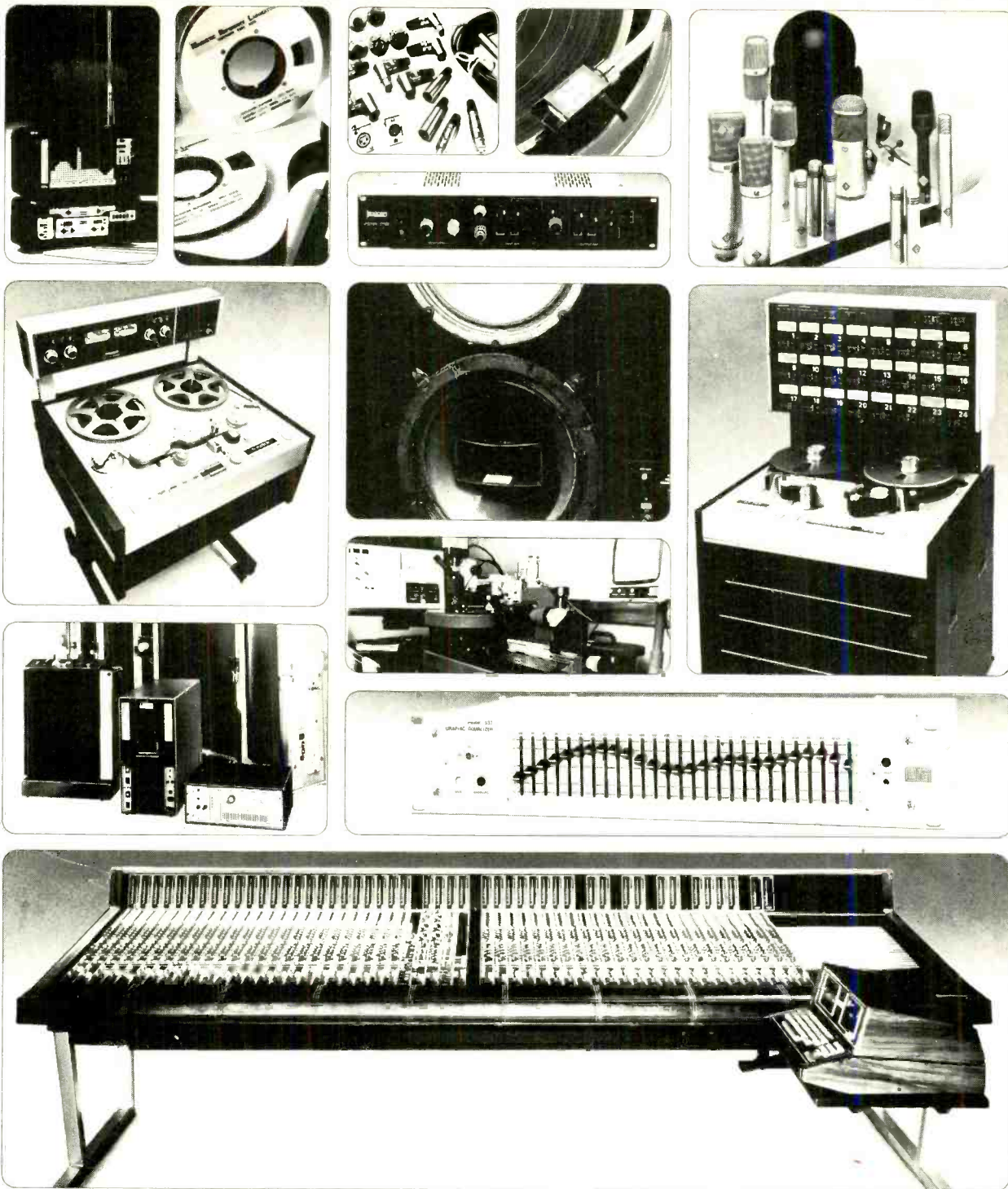
EBU SCALE

Available with or without meter. Write or phone for O.E.M. prices.

A high performance computer-aided design PPM driver which draws only 5mA and works between 15v and 36v. The P.C.B. is only 60mm x 48mm and the stand off curve generator can be either to BBC or EBU spec.

Audio

Developments
 Hall Lane, Walsall Wood
 WALSALL, W. Midlands, WS9 9AU
 Telephone: Brownhills 5351/2/3 (STD Code 05433)
 Telex: 338212 Audio



The Complete Studio.

Studer, Neumann, EMT, Albrecht, Klein+Hummel, Harrison, Urei, Lexicon, ITC, Ivie, Valley People, MRL, Transco, Switchcraft, Gotham, Europa Film and Revox.
 We represent all the major names in the audio field and can supply the best equipment for any studio requirement.

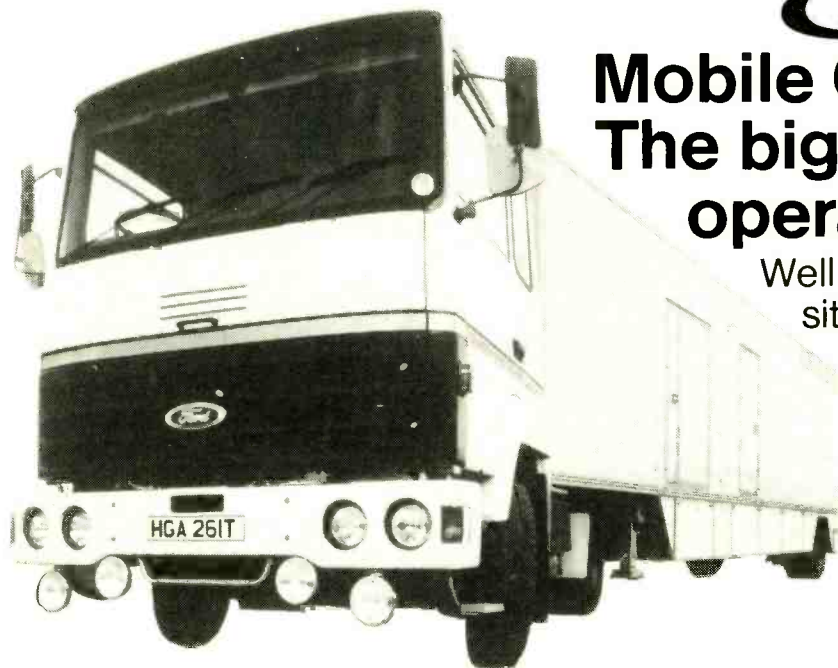
F.W.O. Bauch Limited

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

MOBILE ONE

29-30 Windmill Street,
Tottenham Court Road, London W1.
Tel: 01-580 3744. Telex: 298531.

The Bigger



Mobile One.
**The biggest Mobile in
operation in Europe.**

Well suited to any recording
situation anywhere in the world.

From concerts to films and
long term album work.
Completely self-contained
needing only a power
supply for it to become
a fully operational
46 track studio,
on the spot - instantly.

The Better

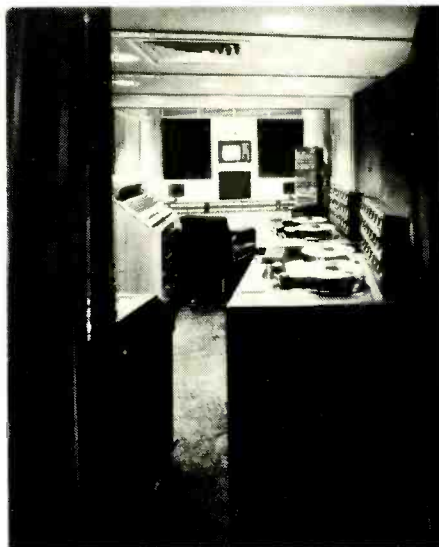
Special features include

- 46 Track recording
- Eastlake acoustic construction
- 52 Audio input channels
- Overdub booth (space for full drum kit)
- Full air conditioning
- Custom built chassis and body
- Radio telephone

Equipment includes

- Two MCI 24 track tape recorders
(each with full remote control)
- MCI 36 in 36 out mixing console
- Triad 16 by 4 auxillary console
- EMT Digital Echo
- Eventide Harmoniser
- Eastlake monitoring with JBL,
Amcron, and Whites' equalisers

**Bigger, Better,
But No More
Expensive**



Ferber Studios,
56, Rue Capitaine Ferber,
Paris 75020.
Tel: 361-3101. Telex: 670379

Studio Hamburg,
Atelier GmbH,
Tonndorfer Hauptstrasse 90
2000 Hamburg 70
Tel: Hamburg 66882246

Dolby

Plug Better Sound Into Your Picture

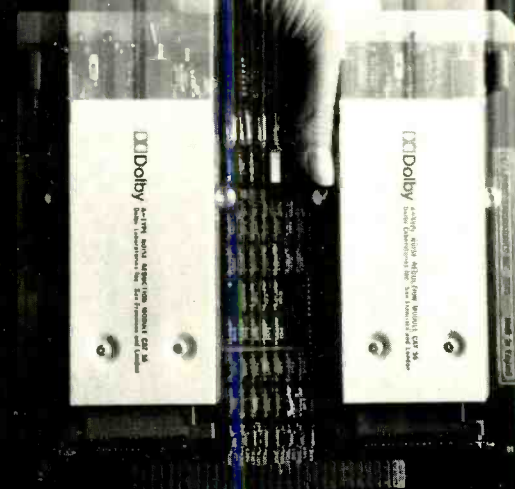
The Dolby® Cat. No. 155 or 255 module allows you to plug the benefits of a Dolby A-type noise reduction directly into your Sony® BVH-1000/1100 or Ampex® VPR-2 1" VTR.* Operation is fully automatic. And at long last the audio performance of your VTR will rival that of professional audio tape recorders.

Dolby A-type noise reduction has been accepted for years throughout the world for high-quality tape recording and other audio transmission and storage media. It provides 10 dB of noise reduction from 30 Hz upwards, increasing to 15 dB at 9 kHz and above, without the audible side effects (such as noise modulation and overshoot distortion) associated

with more conventional techniques. Dolby noise reduction can also lead to lower distortion, as it permits more conservative recording levels to reduce the risk of tape saturation.

Today wide audio bandwidth and low noise are becoming commonplace in many parts of the television origination/transmission chain. Contact us to find out how Dolby noise reduction can prevent the VTR audio track from being one of the weak links.

*Outboard Dolby noise reduction units are available for use with virtually any other video or audio recorder.



Dolby®

Dolby Laboratories Inc.

731 Sansome St.
San Francisco,
California 94111
415 392-0300
TELEX 34409

346 Clapham Road
London SW9 9AP
England
01-720-1111
TELEX 919101

SAM82

(ac and dc operated)



SAM 82 and SAM 42

- Stable design
- Handy size
- Acceptable weight to carry and to lift
- Clearly arranged and easily operated controls
- Broadcast quality

Made in Sweden by

SATT
Electronics

P.O. Box 32006
S-126 11 Stockholm/Sweden
Phone: +46 (8) 810100 Telex: 10884 SATTEL S

SAM 82/SAM 42
will be shown at

68th
CONVENTION
1981 MARCH 17-20



SAM 42

- Stereo line output
- Talk-back line output
- Built-in talk-back microphone
- Two PPM instruments
- Phantom powering 48 V
- T-feed (optional)

Worldwide marketed by:
Cine Madeco S.A.
2, Faubourg du Lac
CH-2000 NEUCHÂTEL
Switzerland

Distributed in
Italy by:
Roje Telecomunicazioni S.A.
Via Sant' Anatalone 15
I-20147 MILANO

Distributed in
West Germany by:
BFE (css)
Postfach 230080
D-6500 MAINZ 1

Distributed in
Japan by:
Hoei Sangyo Co. Ltd.
Kobunacho 12-15
Nihonbashi, Chuo-ku
TOKYO 103

I am interested in SAM 82/SAM 42

Company _____

Name _____

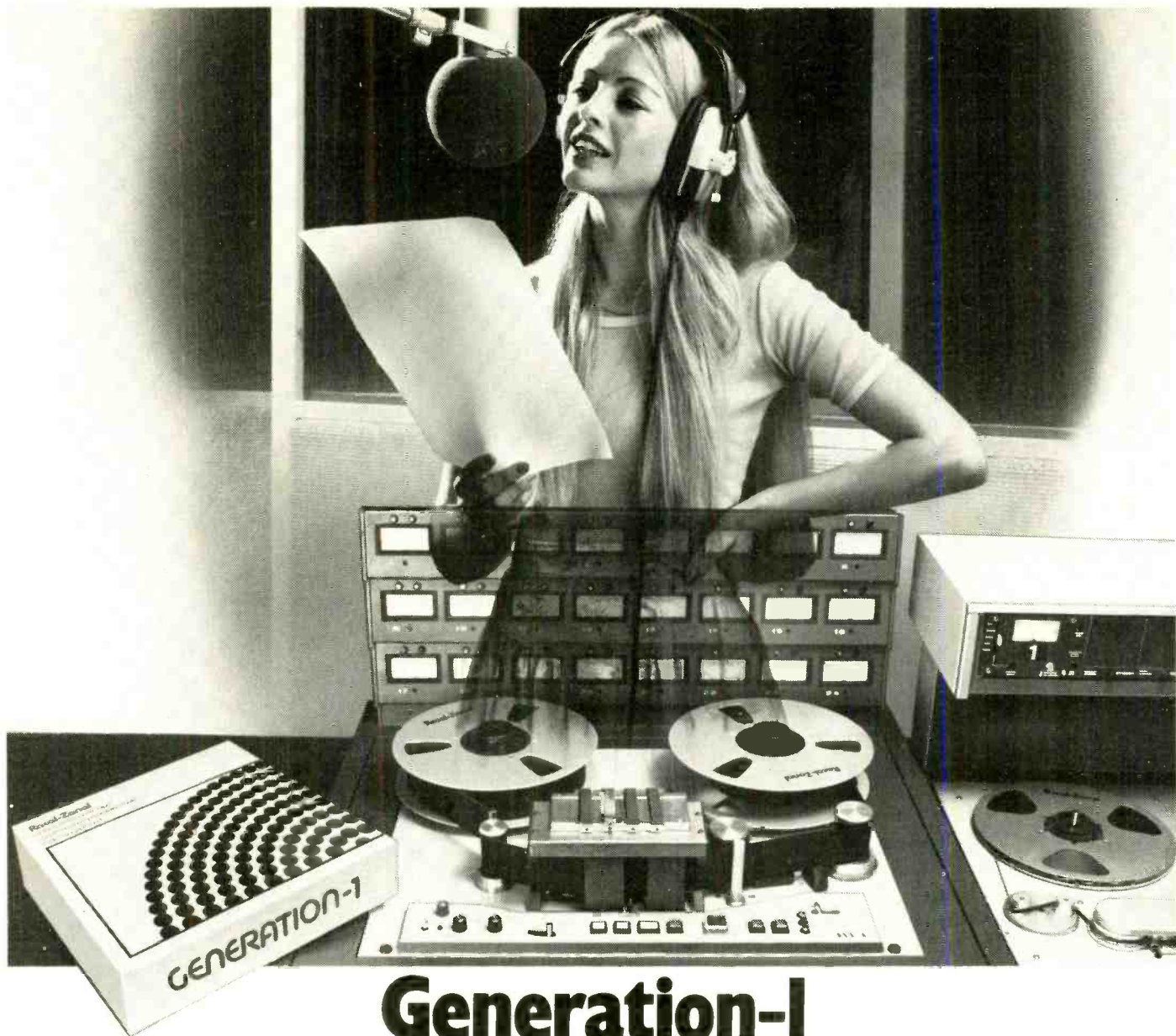
Address _____

Postal code _____

Country _____

Telephone _____

SS 481



Generation-1

The nearest you can get to live sound.

Generation-1

A brand new name. A brand new range of tapes — and a brand new standard of high quality reproduction for the professional sound engineer.

Generation-1

Everything from 1/4" to 2", from a solo voice to a symphony orchestra — whatever your application. Generation-1 offers the most faithful and realistic sound reproduction you can get.

Generation-1

High output, low noise — and an exceptional print characteristic.

Generation-1

Backed up by fast delivery and customer support second to none — and the technology for which Racal is famous.

For full details of the new Generation-1 range, send back the coupon today — and find out about the tape that's made for professionals by professionals.

Please send me full details of Generation-1

Name _____

Position _____

Company _____

Address _____

Telephone _____

Racal-Zonal Limited, Holmethorpe Avenue, Redhill, Surrey RH1 2NX.
England Tel (0737) 67171

SS4/81



GENERATION-1

Racal-Zonal Limited, Holmethorpe Avenue, Redhill,
Surrey RH1 2NX, England Tel (0737) 67171, Telex 946520

RACAL

SYNTOVOX

tomorrow's effects, today



vocoders
by



synton[®]
HOLLAND

P.O.B. 83 • 3620 AB BREUKELEN • HOLLAND

☎ 03462 3499

TELEX 40541 SYNTO NL

TEAC

UPDATE

turnkey

85-16

Now there's no excuse for buying a used machine. This precision engineered 16-track offers integral dBx, the economy of one-inch tape and, of course, TEAC reliability. Someone in Japan really worked this one out, it's TASCAM's finest hour.



Better service

Bigger workshops and more staff enable us to offer fast turnaround on all pro-audio service.

8 Track record

The 80-8 is the world's best selling 8 track machine, producing hits in thousands of studios. Working systems available at package prices.

One for the road



Custom Portastudio systems, road-cased or racked, with speakers, amps and effects, can be tailored to your requirements. Call for details, and remember that the 144 is available now at lower prices.

Baby 15

The other half of TEAC's 16-track package is the massive Model 15 mixer. Specs and facilities outshine anything they have made before. Our mini performance comparator is available on free loan to anyone seriously interested.

Specs & prices

All the TASCAM range is covered in the new, 30 page, full colour booklet, available on request. As this ad is written two months before you read it, please call or write for the latest prices and offers.

If you would like to learn more about multitrack, we can supply copies of TEAC's "Are you ready for Multitrack?" and "Multitrack Primer" at 60p and £3.30 respectively, incl.

Free with four

We have helped many multitrackers on their way with our offer of the 1478 mixer with every 3440 that we sell. It features treble, bass pan and fader on each of four channels, ideal for bouncing or mixdown.



32-2B Immediate Release

The latest version of TEAC's remarkable, low priced, 2-track mastering machine now features separate left and right record switches extending its already versatile performance. In stock now.



turnkey

8 East Barnet Road,
New Barnet, Herts EN4 8RW
Tel: 01-440 9221 Telex: 25769

Nakamichi new products

Japanese manufacturer Nakamichi has introduced several new cassette decks, a noise reduction unit, and an audio analyser. The cassette decks comprise six models in three series. Top of the line is the *1000ZXL* 3-head deck featuring microprocessor auto calibration of azimuth, bias, level and equalisation; 15-program random access music memory; three mic inputs plus mic/line mixing facility; and a host of other useful facilities. Next off are the *680ZX*, *670ZX* and *660ZX* decks these again being 3-head decks with auto azimuth alignment and 18-program random access music memory. The decks feature similar facilities with the *680ZX* also being capable of half speed operation. All the above models are 19in rack mount units.

Nakamichi has also produced the *581* and *582* 3-head metal tape capable cassette decks with the only difference between the units being the provision of a monitoring capability on the *582*.

To accompany the *1000ZXL* deck which has facilities to accept external noise reduction, Nakamichi have introduced a *High-Com II* noise reduction unit. This is a 2-band unit in a 19in rack format and



Nakamichi 1000ZXL

offers 20 to 25dB noise reduction via a 1:2 encoding and 2:1 decoding system manufactured under licence from AEG-Telefunken. The final new unit is the *T-100* audio analyser featuring facilities for level, wow and flutter, distortion and noise level measurement. Facilities include 21 frequency oscillator plus pink noise; switchable VU/DIN peak reading level meter; DIN weighted or unweighted peak reading wow and flutter meter; automatic THD

measurement at 400Hz; IHF-A weighted noise level measurement; and bargraph plasma display; plus oscilloscope output.

Nakamichi Corp, 1-153 Suzukicho, Kodaira, Tokyo, Japan. Phone: 0423 42-1111.

USA: Nakamichi USA Corp, 220 Westbury Avenue, Carle Place, NY 11514. Phone: (516) 333-5440.

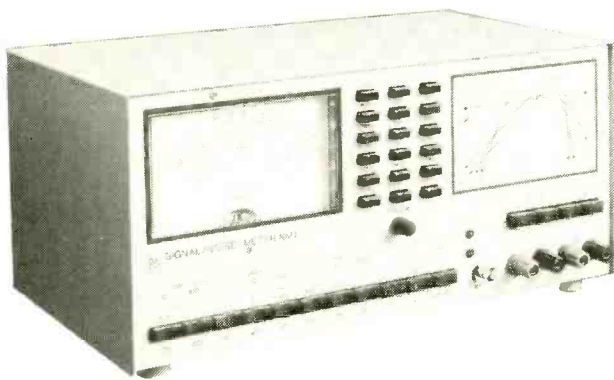
UK: Natural Sound Systems, 10 Byron Road, Wealdstone, Harrow HA3 7TL. Phone: 01-863 8622.

Multi-coloured meters

Eureka Electronics Ltd has introduced an innovative range of digital panel meters designed to give clear and quick indication of read-outs which are below or in excess of critical limits. Utilising standard digit colours of green, yellow and red to give a multi-coloured display, the meters provide an analogue display which changes colour at desired input levels. Other colours are available to order while the colour change sequence can be specified to order. Life of the meters is a minimum 50,000hrs and the meters are based on MOS/LSI circuits for reliability and minimal power consumption.

Features include high accuracy input signal measurement and colour switching, use of a dual-slope conversion method, and a reading rate of three per second. An additional feature is that each colour change gives a logic '1' signal output at the meter's rear terminals to actuate a warning device. Binary output codes are provided for each colour, and the multi-coloured digital panel meters provide all the features of conventional DPM's.

Eureka Electronics Ltd, Castle House, 27 Castle Street, Brighton, BN1 2HD, UK. Phone: 0273 28451.



Bang & Olufsen NM1

Bang & Olufsen has introduced the *NM1* signal/noise meter suitable for measuring S/N ratios to most standards including DIN, IEC, CCIR, IHF, JIS and ANSI. The meter has detectors for true rms values, quasi-peak and mean value measurements. Built-in filters include linear, unweighted, weighted and pilot tone, plus the facility to hook-up external filters.

An additional facility is the provision of a practical reference chart to facilitate selection of filter and detector type as per the standards used. The chart lists all the necessary data for each measurement relative to the standard required, with automatic visual indication of filter type or filter combination selected.

Further functions of the *NM1* include use as an AF voltmeter covering the range 20 μ V to 370V; use as a stereo wattmeter for output levels from 0.4nW to 40W (to 1kW when connected to an Audio Load *ALI*); and use as a measuring amplifier with calibrated amplification from -50dB to +70dB in 10dB steps. Monitoring is via a built-in loudspeaker with provision for connection of an external loudspeaker. Other outputs are analogue ac output, analogue dc output, and L/R output connected with the input via an L/R switch.

Bang & Olufsen a/s, DK-7600 Struer, Denmark. Phone: 07 85.11.22.

UK: Bang & Olufsen UK Ltd, Eastbrook Road, Gloucester GL4 7DE. Phone: 0452 21591.

Scamp power supply

Audio & Design Recording has notified us of a potential problem with its Mk I *Scamp* power supply unit. The following letter details the potential problem, and details solutions offered by ADR including a *Scamp* power supply update and exchange scheme:

'The Mk I *Scamp* power supply was originally designed on the basis of the power consumption requirement of the first module made available in 1976. Since then the range of modules on offer has expanded considerably, now numbering 15, many with much greater current consumption. This has led ADR to develop and introduce the Mk II rack-mounting supply which is designed to ensure that any combination of modules available today can be satisfactorily powered when the rack is full.

'Experience has shown that occasionally, prolonged usage of the existing Mk I supply, with a high complement of modules in high ambient temperature conditions (ie worst case), can lead to the breakdown and destruction of the main smoothing capacitor. We therefore advise users to restrict the Mk I supply to a maximum of 8-10 modules to be on the safe side, unless modified with the update board offered below.

'In order to facilitate user update at reasonable cost ADR offers the

following options:

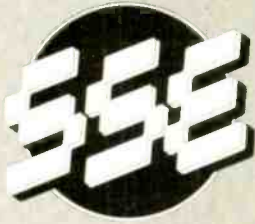
1. supply of a complete, assembled and tested replacement board for the Mk I supply which is directly and simply interchangeable with the existing pcb. This will solve the potential capacitor breakdown problem, but still cannot be guaranteed to run a full rack of today's modules in 'worst case' conditions. Price: £25.
2. supply of a reconditioned Mk I supply (with the new board fitted) to work in conjunction with an existing Mk I supply to power a full rack of units (ie the power rail is divided into two sections of 10 and seven modules respectively). This unit will be subject to availability. Price: £65.
3. as a further alternative ADR will provide a new Mk II rack mounting power supply, capable of handling any combination of existing modules, taking any Mk I supply in part-exchange. Price: £120. (All prices exclude VAT but include delivery in the UK).

'As you can see, we have devised a range of options one of which should suit any particular application. If this is not the case please contact ADR.' Audio & Design (Recording) Ltd, North Street, Reading RG1 4DA, UK. Phone: 0734 53411. Telex: 847822.

DESIGNED BY AMEK

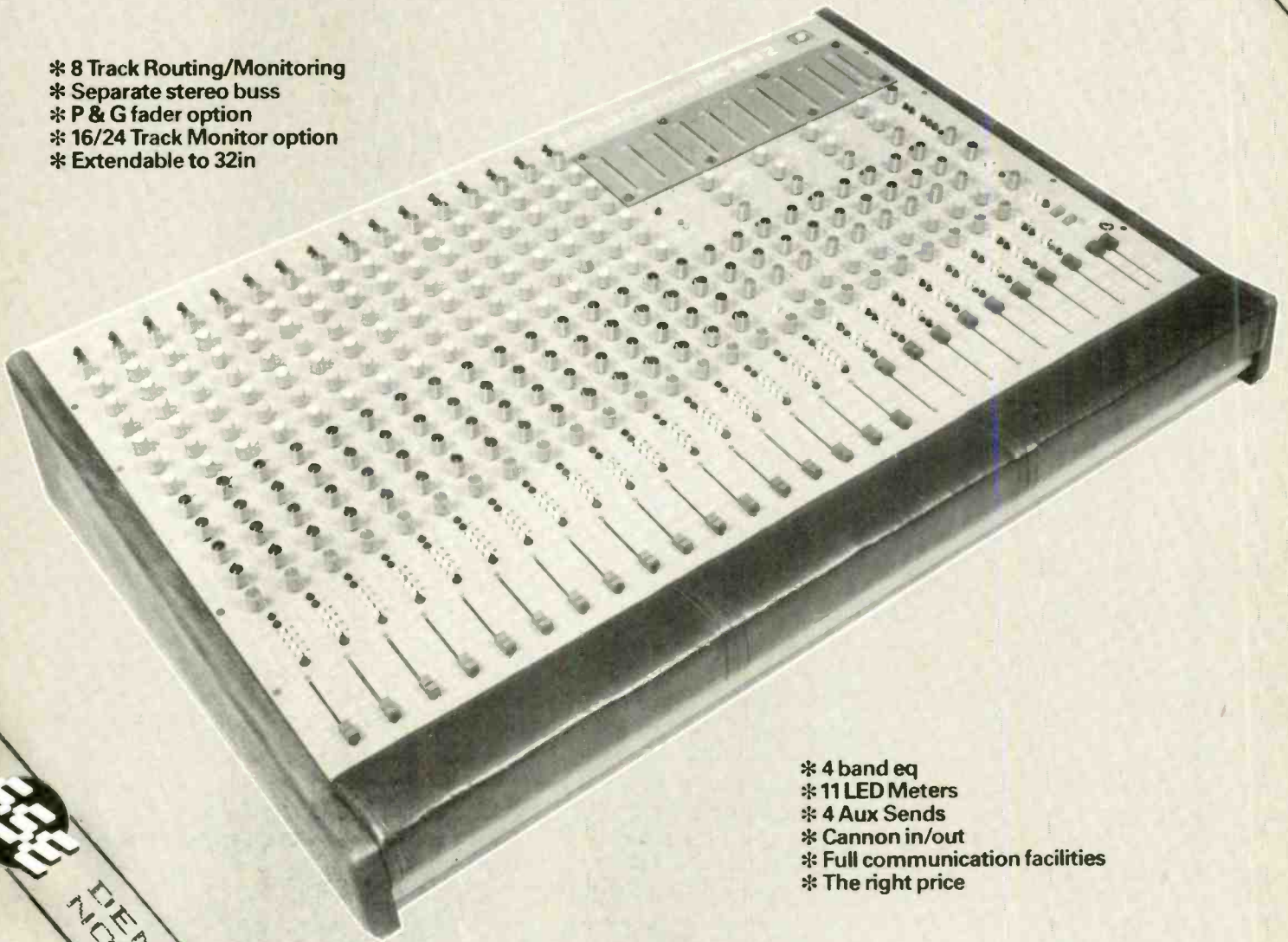
T.A.C. 1682.

TOTAL AUDIO CONCEPTS LTD.



NOW ON DEMONSTRATION IN LONDON AT:
UK AMEK DISTRIBUTORS;
SCENIC SOUNDS, 97-99 DEAN ST, LONDON W1V 5RA
TEL (01) 734 2812 TLX 27939

- * 8 Track Routing/Monitoring
- * Separate stereo buss
- * P & G fader option
- * 16/24 Track Monitor option
- * Extendable to 32in



- * 4 band eq
- * 11 LED Meters
- * 4 Aux Sends
- * Cannon in/out
- * Full communication facilities
- * The right price

AUSTRALIA: AUDIO CONTROLS, SYDNEY (2) 922 1777 FRANCE: CYBORG, PARIS (1) 845 9448
GERMANY: JEFF NIECKAL, B F E, MAINZ (06131) 46811 ITALY: AUDIO PRODUCTS INTERNATIONAL MILAN (2) 236 6628
SOUTH AFRICA: ELTRON, JOHANNESBURG (11) 23 0018
USA: BRIAN CORNFELD, EVERYTHING AUDIO, LA (213) 995 4175 MARTIN AUDIO, NEW YORK (212) 541 5900
WESTBROOK AUDIO, DALLAS, TEXAS FLANNER'S PRO AUDIO, MILWAUKEE
JAPAN: CONTINENTAL FAR EAST INC, TOKYO (03) 583 8451

AMEK SYSTEMS AND CONTROLS LIMITED/TOTAL AUDIO CONCEPTS LTD, ISLINGTON MILL, JAMES ST,
SALFORD M3 5HW, ENGLAND (061) 834 6747 TELEX 668127 NICK FRANKS/GRAHAM LANGLEY

Envelope controlled filter

Beigel Sound Lab has introduced an envelope controlled filter which combines a parametric envelope follower, a versatile parametric voltage-controlled filter, and an external effects loop, to provide envelope-controlled musical sound modification. Separate control switches are included for the voltage-controlled filter and external effects, and the envelope follower has independent onset, decay, and sensitivity controls. Specifications include maximum signal gain, 24dB; minimum 0dB; sensitivity, variable between 1.8V and 75mV; frequency response (bypass mode) 20Hz to 20kHz ± 0.5 dB; dynamic range 105dB; filter frequency range, low 150Hz to 5kHz, high 350Hz to 12kHz; envelope attack time 5ms to 2.5s; envelope decay time 10ms to 5s; and envelope output voltage 0-10V.

Beigel Sound Lab, 24 Main Street, Warwick, NY 10990, USA. Phone: (914) 986-1699.

Bach-Simpson catalogue

Bach-Simpson (UK) Ltd has produced a new illustrated catalogue covering its range of panel meters, multimeters and test instruments. This comprehensive catalogue covers the full range of panel meters including Wilbac, Excalibur, Century, Designer, Wide Vue, Edgewise, Digital, and 250° movements, with information on styling, construction and performance. Test equipment covered includes digital and analogue multimeters, microwave leakage detectors, frequency counters, electronic counters, clamp-on testers, and sound level meters.

Bach-Simpson (UK) Ltd, Trenant Estate, Wadebridge, Cornwall PL27 6HD, UK. Phone: 020-881 2031. Telex: 45451.

Wireworks Bandits

First shown at AES New York was a new cable marking system from Wireworks called *Bandits*. The marking system consists of flexible, irradiated polyolefin tubes, hot-stamped with a studio's name, positioned and heat shrunk onto a Wireworks mic cable 6in from the male connector. Up to 40 characters on two lines can be accommodated on the tubing and the system provides not only a useful means of identification of cable ownership, but also a means of publicity. *Bandits* are available in five colours each indicating a specific cable length.

Wireworks Corp, 380 Hillside Avenue, Hillside, New Jersey 07205, USA. Phone: (201) 686-7400.

Melkuist GT800 automation system

A new company to arrive on the professional audio scene is Melkuist Ltd which has recently introduced its *GT800* console automation system using dual floppy disks. Suitable for use with mixing consoles having up to 64 elements capable of producing and accepting voltage replicas of control functions, the *GT800* memorises the settings and movements of the controls and reproduces these in synchronism with the time signature.

In its standard version, timecode is generated in software by a dedicated processor, the format and speed of code being changeable. Standard code is European SMPTE running at 25ft/s (crystal controlled) from which a 50Hz timing marker is generated. The central processor is a 19in rack mount unit which contains the timecode generator/decoder processor, the disk store processor and its buffer memory, the central processor itself and the reset management logic. This processor acts primarily as a supervisory and communications centre; checking the various serial lines, keeping a register of timecode and arranging serial data into memory for the disk. Errors or faults are reported by the central

processor and if a fatal error occurs, the unit will stop the tape machine and display an error number.

The dual floppy disk stores are also housed in a 19in rack unit, this being a positive pressure enclosure with filtered air to obviate dust contamination of the floppy disks. This unit is equipped with a bank of six status indicators to help track down any malfunctions in either disk store.

A further 19in rack houses the system's digital filtering and contains all the hardware for A/D conversion, data processing, communications, and D/A conversion. Control of the system is via a small control box offering a 'menu' of functions with VDU display of selections. The functions available include display of mix from each of eight storage areas; protection of these stores; instruction of the processor to use data from a selected mix; copying of mixes onto fresh disks; renumbering of mixes; and selection of various options. The control box contains a 0-9 keyboard, a clear button, and an enter button. An optional printer interface from the control box is also available.

When used in conjunction with the

Melkuist digital transfer fader system the standard *GT800* system is designed to work with faders in a 'transparent' fashion. Functions available being Isolate, Write, Read, and Update. In addition the system is capable of dc grouping allowing any number of VCAs to be controlled by one of the separate group faders in all the various modes. A further feature being the ability of the group faders to be controlled by other groups so that any group fader can be termed Master. Other features of the digital transfer fader system include an LED null indicator with a nominal 2dB window; Ready and Enable functions (the latter also available as a footswitch function); and a Cut function. The Melkuist fader central control module features buttons for the following facilities: Isolate, Write, Read, Update, New Mix, Kill, Ready Changeover, and No, the latter function aborting commands.

The Melkuist automation system is suitable for use with any automation-ready console and may be interfaced with consoles equipped for analogue transfer only, such as those using the *Fadex* module.

Melkuist Ltd, 35A Guildford Street, Luton LU1 2NQ, UK. Phone: 0582 416028.

Klark-Teknik DN27A

Klark-Teknik has introduced the *DN27A* $\frac{1}{3}$ -octave graphic equaliser, successor to the respected *DN27*. Although basically similar to the earlier model, the new unit has several new features. Among these are a rear mounted earth lift switch allowing easy separation of 0V from mains earth should a ground loop occur; plug in card balancing allowing custom requirements such as electronic balancing, highpass/lowpass filters, subsonic filters, etc to be simply met; increased clipping level of +23dBm achieved by raising the power rails to +20V; and a dynamic range of >115dB.

A further feature is that with the *DN27A* switched off, the input and output sockets are connected together by a relay. When switched on, a delay circuit allows the power rails to stabilise before bringing the equaliser into circuit, thus eliminating any switch on transients being transmitted to other equipment. The delay circuit is such that if either or both power rails or mains go down the relay immediately turns off, joining the input and output sockets, a useful feature for live usage.

Klark-Teknik Research Ltd, Walter Nash Road West, Kidderminster, Worcs, UK. Phone: 0562 741515. Telex: 339821.

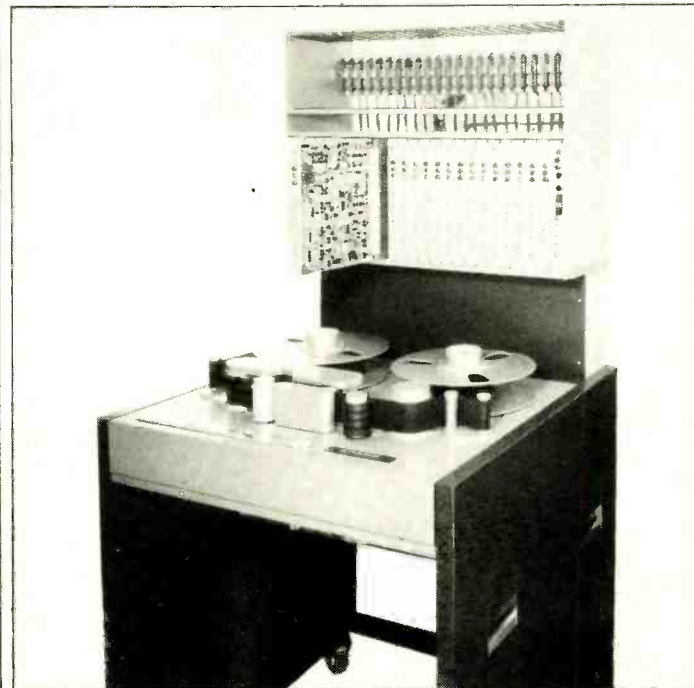
USA: Klark-Teknik Electronics Inc, 262A Eastern Parkway, Farmingdale, NY 11735. Phone: (516) 249-3660.

CB multitrack

CB Electronics Ltd has recently come to an agreement with Studer, whereby the company can supply complete multitrack tape recorders consisting of a Studer *A80* transport combined with the CB Electronics *400 Series* tape electronics. CB Electronics are offering complete multitracks with remote controls from £11,000 for a 16-track and £13,000

for a 24-track. The machines feature the following facilities: three equalisations; phase correction; Dolby/dbx Telecom noise reduction mounting facility; master bias adjustment; gapless drop-in; and a noise gate on every channel.

CB Electronics Ltd, 10 Fitzroy Crescent, Woodley, Berks RG5 4EU, UK. Phone: 0734 694512.





Within your grasp: new 3³/₄, 7¹/₂, 15 servo.

We've built a closed-loop, direct drive, servo capstan into the successful SP7 and called it the SP7S.

Giving it external varispeed in record and replay, improved wow and flutter, improved reliability, quiet running, and longer operating life...without letting the

refinement add to the price. 3-speed: 3³/₄, 7¹/₂, and 15 IPS.

It makes this custom-built machine more attractive than ever. Ferrograph quality with top

performance and flexibility at the same budget price. Full details are within your grasp too. Just get in touch.

NEAL FERROGRAPH



Simonside Works, South Shields, Tyne & Wear NE34 9NX. Telephone: 0632 566321

Main Dealers: Studio Equipment Services, London · Photo Acoustics Ltd., Watford · Medway Electronics, Chatham · Audio Bristol, Bristol.

www.americanradiohistory.com

Obituary

John Saul, president and founder of Micmix Audio Products Inc died on January 2, 1981 at the early age of 49. A graduate of the University of Notre Dame in mechanical engineering, John worked as a senior project engineer for LTV Corp until 1972, when after 20 years service he left to form Micmix. As president of Micmix John was responsible for a wide range of research into reverberation technology with particular emphasis upon spring reverb technology. As our readers will know this research resulted in the production of the *Master Room XL*

Series of reverb units found in many recording studios these days.

John's death was particularly untimely as the company is currently involved in a substantial growth, with manufacturing facilities having been increased recently, and with additional employees having been taken on. John's death must be mourned for what further expertise and direction he would have given this expansion.

In tribute to John we applaud his mind which will be deeply missed by the entire audio industry, and extend our deepest sympathy to his wife Babs and his daughter Teresa.

ILR stations

1980 was an eventful year for ILR broadcasting in the UK with seven new ILR radio stations becoming operational. These were (in order of opening): CBC (Cardiff Broadcasting Co) covering the Welsh capital (April 1980); Mercia Sound, Coventry (May 1980); Hereward Radio, Peterborough (July 1980); Two Counties Radio, Bournemouth (September 1980); Severn Sound covering the Gloucester and Cheltenham area (October 1980); Radio Tay covering Dundee and

Perth (October/November 1980); and the first ILR twinned station, Devonair Radio covering Exeter and Torbay (November/December 1980).

These seven stations bring the total number of operational ILR stations to 26 — 19 stations having gone on air in the period 1973 to 1976. The seven stations opened in 1980 are the first in a total of 25 further stations authorised by the Home Office in 1978/9. ILR stations due to become operational in 1981 include stations covering Ayr, Wrexham/Deeside, and Swindon/West Wiltshire.

Tri Tec modular console

A new American modular console utilising an unusual design concept has been produced by US manufacturer Tri Tec Systems. Using a totally modular concept the new console series allows customisation of all phases of manufacture from component subassemblies to console shells. This approach incorporates the use of a unitised front-to-back section assembly eight modules wide as the basic 'building block' of the console shell. The section assembly containing all the mother boards, interconnect jumpers, and structural hardware to support eight channels of faders, input modules, gain select modules, preselect/assign switch modules, etc.

A wide selection of input modules are available from two basic configurations: the 6100 mic/line mono module, and the 6200 stereo line module. Gain trim, mic/line, 20dB pad, and phase reverse switching being dc controlled from a separate switch module per input channel. This module being suitable for remote control or additionally it may be eliminated in favour of dedicated gain and mode functions. All buss assignments within the input module are accomplished with dc controlled FET switching. The Channel On switch is a momentary

switch with LED illumination driven by relay logic and is suitable for external control of peripheral audio or logic systems. Equalisation switching is via multiple modes depending upon module and system requirements allowing eq insertion and transfer of eq assignment. Various combining/booster amplifier modules in mono and stereo versions are available.

Other modules include talkback, monitor and plug-in fader modules. Further features include VU meter display (optionally vertical electronic bargraph display) and an optional wired jackfield supplied either within the console shell or remote fed via a pendant interconnection cable. Because of its concept the console is eminently suitable for customisation, an example being that the area immediately adjacent to the input module may be used for several applications, such as additional mix buss assign modules, input preselect modules, eq or comp/limiter modules, or can be left as blank space to be utilised for any custom control functions required such as a module with a combination of mix buss assign and input preselect.

Tri Tec Systems Inc, 1324 Motor Parkway, Hauppauge, NY 11787, USA. Phone: (516) 234-6090.

Forthcoming Exhibitions**March 17 to 20**

AES 68th Convention, Hamburg ((212) 661-2355).

April 10 to 13

Pro Sound Exhibition, Sydney (Sydney (02) 699 7931).

April 12 to 15

NAB Convention, Las Vegas (Washington (202) 293-3500).

May 12 to 15

AES 69th Convention, Los Angeles ((212) 661-2355).

May 30 to June 4

Montreux 12th Exhibition (Montreux 021 61.33.84).

Early June

CES Chicago ((312) 861-1040).

June 10 to 12

APRS, London (09237 72907).

June 29 to July 3

Film 81, London (01-242 8400).

August 14 to 18

British Music Fair, Birmingham (Birmingham 021-780 4141).

September 29

Sound Broadcasting Equipment Show, Birmingham (0734 53411).

October 30 to November 2

AES 70th Convention, New York ((212) 661-2355).

November 25 to 27

Prosound '81, London (01-340 3291).

November 25 to 28

Tonmeistertagung Convention and Exhibition, Munich (Berlin 030 308 2234).

Agencies

● Amplifier manufacturer FM Acoustics Ltd has appointed Harman Deutschland, Hunderstrasse 1, D-7100, Heilbronn, West Germany as its German agents.

● Klark-Teknik Electronics Inc, 262A Eastern Parkway, Farmingdale, NY 11735, USA (Phone: (516) 249-3660) have been appointed American agents for the Rebis range of signal processing equipment.

Contracts

● Neve are to supply AIR Studios, London with a third 56 + 6 channel, 24 group, 32-track custom console. The console is for AIR's Studio One.

● The National Theatre has ordered 15 μ HS broadcast cartridge machines from Sonifex.

● Micks Electronic Workshop has recently installed a large PA recording system (supplied by Audix) in the Jordanian Parliament, Amman.

● Aphex have supplied *Aural Exciter* units for audio sweetening purposes to Compact Video, Burbank; Rodel Audio, Washington DC; and ITV Ltd, Edmonton, Canada.

● Neve has received a turnkey installation contract for a new studio complex being built by Decca West

Africa in Lagos, Nigeria. In addition to the turnkey contract Neve will be supplying an 8108 32 channel, 24-track console with *Necam* automation.

● Neve is to supply a complete turnkey automated post-production dubbing system for ITN's new London dubbing suite. Equipment to be supplied includes a *Necam II* automated 8066 24-channel customised console, Sondor film machine, Ampex 1in VTR, and Sony *U-matic* machine. A similar contract for Neve is the supply of a custom 36-channel console with *Necam II* for the West German film production company Bavaria Atelier. A special feature of this system is its capability to work directly with film projection equipment under computer control. Further Neve contracts include a 48-input channel 8108 for the new National Concert Hall ordered by Radio Telefis Eireann, and a 56-input channel 8108 for the new EMI Abbey Road Penthouse Suite.

● Harris is to supply three 100kW short wave transmitters to Radio Republik Indonesia.

Financial

● Readers interested in financial matters will probably know that Ampex have recently been involved

in on/off merger negotiations with American company, Signal Companies Inc. Effective from January 15, 1981, however, the merger agreement was finally approved and Ampex has accordingly become a wholly-owned subsidiary of Signal. The primary advantage of the merger to Ampex is the infusion of capital into the company—an especially important factor for Ampex in its current research and development work into digital technology.

Address changes

● Precision realtime cassette duplicators Gemini Sound have moved to Church Path, Hook, Nr Basingstoke, Hants RG27 9LZ, UK. Phone: 025 672 2605.

● Hayden Laboratories the UK agents for Telefunken, Dual, Empire, Nagra, Sennheiser, and Sondor have moved to Hayden House, Chiltern Hill, Chalfont St Peter, Gerrards Cross, Bucks SL9 9UG. Phone: 02813 88447/89221. Telex: 8494969.

● Lindsay Electronics Ltd has moved to Unit 5, Salome Works, Prospect Place, Trowbridge, Wiltshire BA14 8QA. Phone: 02214 64282.

SCHOEPS

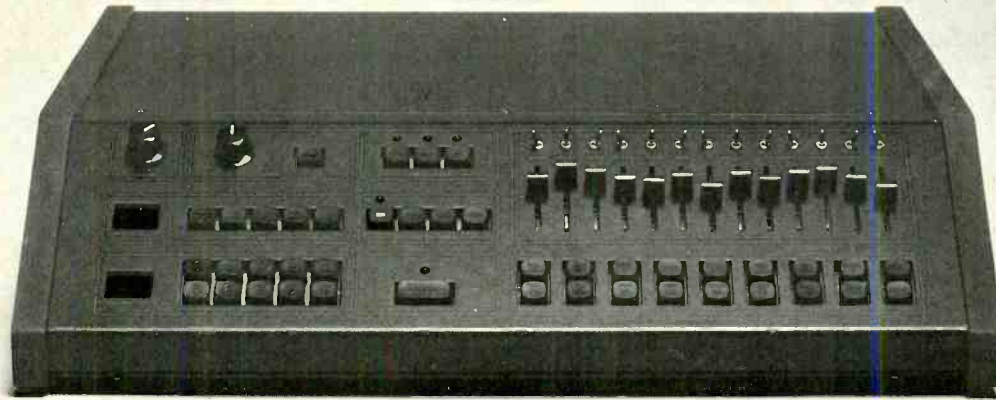
THE SUPREME CAPACITOR MICROPHONES

- The Colette Range a modular system with a wide range of capsules and mountings
- The MTS 501 coincident stereo microphone
- Special Purpose Microphones for specific applications

for full details contact:
Scenic Sounds Equipment
 97-99 Dean Street, London W1V 5RA.
 Telephone 01-734 2812/3/4/5



REAL DRUMS



The LM-1 Drum Computer— a new breed of rhythm machine.

- ★ Real Drum Sounds—digital recordings stored in computer memory
- ★ 100 Drumbeats—all programmable in *real time*
- ★ Easy to understand and operate, requires no technical knowledge
- ★ 12 Drums: bass, snare, hi hat, cabasa, tambourine, two toms, two congas, cowbell, clave, and hand claps!
- ★ All drums tunable in pitch
- ★ 13 input Stereo Mixer
- ★ Separate Outputs
- ★ Automatic error correction in programming
- ★ "Human" Rhythm Feel made possible by special timing circuitry.
- ★ Able to program flams, rolls, build-ups, open and closed hi hat, etc.
- ★ Programmable dynamics
- ★ Any time signature possible.
- ★ Plays Entire Song (intro, verse, chorus, fills, ending, etc.)
- ★ All programmed parts remain in memory when power is off.
- ★ Readout of speed in beats-per-minute
- ★ Versatile editing
- ★ Programmed data may be stored on cassette tape to be loaded back in later
- ★ May be synced to tape

Linn
 LINN ELECTRONICS, INC.

Available from:
 Scenic Sounds Equipment Ltd.
 97-99 Dean Street
 London W1 (01) 734-2812

studio diary

Super Bear, France

This is it! The getaway studio that really *does* get you away from it all, with an airy and relaxed atmosphere conducive to hard productive work. These are not the opening lines to the studio brochure but my impressions after spending the best part of an afternoon and evening at Super Bear studio in the south of France—a response apparently confirmed by the majority of the studio's clients. While recognising a need for getaway studios, when you come down to it, a studio is a place of work (and not exactly a cheap one, either, unless you have the pennies to indulge an expensive ego) and some studios may be so 'get-away-from-it-all' that clients even get away from the work (or vice versa?). This may make for a nice holiday and perhaps some good jamming, but nothing really productive. Apart from being a well designed studio, Super Bear gains from its homely atmosphere where the feeling is more of being at Auntie's in the country than at a high gloss jet-set establishment.

The studio is situated in the Alpes Maritimes near the little village of Berre-Les-Alpes and in the private villa section known as Super Berre (which was anglicised to become Super Bear). The actual building is a former restaurant of some repute and even now the studio still gets people calling up to reserve a table! Vestiges of its former glories are the swimming pool and sun terraces, together with enclosed grounds kept in immaculate condition by the gardener. Walking round into the living room/video show room, I was met by another British ex-patriate, Dave Burgess. Dave keeps the studio running smoothly and is also available as second engineer. A person who has his priorities right, his first words were, "Hello, what would you like first? to see the studio or have a cup of tea?" Five seconds for the answer—he does make a good cuppa, too. This reception also provided a good opportunity to get some background on the studio. At the time of my visit, Graeme Perkins, the studio manager, was in London and Dave himself was off next day for the APRS exhibition.

Though situated in France, the studio is entirely British-owned and staffed. Open for just over three years, the studio has also had an all-British clientele though they have lately had some enquiries from French artists and may be going international! Among the list of satisfied customers can be found David Gilmour and Richard Wright, Kate Bush, Elton John, Sham '69, Van Morrison, City Boy and Pink



Relaxation area!

Floyd, who did all the tracklaying for *The Wall*. Dave commented that he found such a variety of clients very interesting and compared the different recording techniques of, say, Pink Floyd and their meticulous tracklaying with someone like Van Morrison, who likes to get everyone around him in the studio and record virtually live, including vocals!

Super Bear is perched in the foothills necessitating quite a climb by car with hairpin bends which definitely discourage riotous behaviour. Though Nice is almost on the doorstep, it still means a 40-minute drive which tends to discourage all but the most determined. Not that the studio is lacking in amusements, having a selection of video films to suit all tastes—even football fans—plus games of all kinds, *Scalextric*, etc. There are also instruments available in the relaxation room if you just want to jam or mess around. The house also boasts a Cordon Bleu chef when you want your palate tickled!

Tea over so into the studio, or more precisely, the control room. This is an Eastlake quad capable room with a touch of the exotic in the lava rock from Hawaii! However,

Control room



this fits in very well with the generally low key décor, though the chequer board ceiling is rather striking. Desk and tape machines are all MCI and consist of *JH500 36/36* console with *Plasma* display and *Spectra-Vue*, one 24-track, one 4-track (with interchangeable 2-track headblock) and two stereo machines. Automation for the console is the MCI system. Ancillary equipment is split between a rack cabinet and the console with an Eventide *Harmonizer*, Rebis parametric, two Marshall *Time Modulators*, two dbx *160s* and UREI *1176s* mounted into the right end of the console. Gracing the rack are an Eventide *ddl*, Ursa Major *Space Station*, *Gain Brains*, *Kepexes*, Meyer noise gates, and Orban sibilance controller. For noise reduction there are 28 channels of dbx and Dolby. At the time of my visit Dave was in the process of making up his shopping list so the studio was in line to be more 'effective'. For the perfectionists there is also an Inovonics spectrum analyser and reverberation is courtesy of two EMT *140* stereo plates.

Loosely described as 'capable of holding 10-15 persons without

cramping', the 28 × 23ft (approx. 9 × 7.5m) studio offers a completely adequate working area. In fact the studio itself occupies the former restaurant area, complete with solid marble floor that is covered by a removable carpet. The main entrance doors have been preserved giving direct access for load-in. The Eastlake-designed studio features the main area with drum cage and two isolation rooms—one live, one dead—placed either side of the entrance. The outside windows also remain which means that during the day, wait for it, daylight is usually sufficient to light the studio. The outside world is also in direct line of vision from the control room so the engineers can benefit from it, too.

Instruments available include a rather battered Hammond *C3* and *Leslie* (which I am assured has a great sound), Yamaha *CS80* synthesiser, Steinway *B* grand piano, Ludwig drum kit and various guitars, basses and amplifiers. Microphones are the normal selection of Neumann, AKG, Beyer and Shure. The only modifications in the studio have been to the spacious drum cage where the front roller panels have been fitted with detachable perspex windows in a wooden frame should extra isolation be required. This has been done not so much to keep other instruments out of the drum mix as the cymbals out of the instruments, for times when the drummer is, as an engineering friend would put it, 'not a drummer but a cymbal basher!'.

Later on in the evening we had a listen to a good selection of tapes that had been recently made and the clarity of the sound was exceptional. Though Super Bear is most often used for tracklaying, mixdowns are also on the increase after the sessions and hence a projected stocking up of effects. Although, having listened to a rough mix of Elton John's *Little Jeannie* without the horns and strings, I know which version I prefer! Simpler is often so much more effective. Dave has spent quite a bit of time getting the monitoring correctly aligned and has replaced the bass units in the *TM3s* with Gauss drivers and, listening to the system, his efforts would certainly appear to be justified.

Super Bear have a lot to offer—comfort, efficiency and unpretentiousness. Thanks are in order to Dave Burgess for his cordial welcome and an excellent dinner! And don't we all like to stay at Auntie's in the country from time to time?

Terry Nelson

Super Bear Studio, Quartier Les Gerps, F-06390 Berre Les Alpes, France. Phone: (93) 91.81.20. 36 ▶

EXPRESSION



Atlantex Music, Ltd., 34 Bancroft Hitchin, Herts., SG5 1LA, Phone 0462 31511, Tlx 826967

Mandrill, Auckland

Reflecting a sharp upsurge in recording activity in New Zealand, Mandrill's new Studio Two was recently completed in Parnell, Auckland. This is the third studio Mandrill has built and is the culmination of six years' activity, resulting in a modern 24-track facility.

Founding directors Glyn Tucker Jnr, and Dave Hurley can well remember their experimental studio which was built in the basement of a Custom Street building in downtown Auckland. It was 1974 and although they were on a shoestring budget, they filled the growing need for demo work. Egg-cartons glued to the walls were a poor excuse for acoustic design and the Teac 4-track (only the second one of its kind in New Zealand) was a far cry from Studio Two's present 24-track MCI tape recorder. However, Mandrill was in business albeit on a part-time basis, with Glyn and Dave holding down regular daytime jobs and Glyn playing bass in a pub band.

"I walked into the studio late one Saturday morning to find Dave in the middle of a demo with a new band," says Glyn. "I was amazed by the sounds I was hearing and began straining to see into the studio through the tiny windows. The musicians were Split Enz and New Zealand rock music history was being made. We were very excited."

"After about nine months," Dave takes up the story, "we got kicked out of the building because it was to be demolished. That was our first big crisis; whether to look for new premises and build a new studio, or to pack it in altogether. We had hoped for about 18 months in the original studio, by which time we would have been in a better financial position to set up a new place. Business had been encouraging so we decided to continue."

Despite these early setbacks, Glyn and Dave began searching and after wearing out a lot of shoe leather found a semi-basement in Vacation House, Parnell. "It was obvious," continues Glyn, "that we needed radio and TV commercial work to stay in business and since many advertising agencies are situated in Parnell, we decided to give it a go. It wasn't until several days after signing the lease we found out that one of the big agencies was situated in the same building! We couldn't believe our first piece of good luck."

Glyn was now working the studio full time and Dave could be found there most evenings and weekends. Soon after establishing themselves in Parnell, they managed to raise extra capital for a 16/8 Allen & Heath mixing console and Glyn sold his family home to buy a \$28,000 Ampex MM1100 16-track tape recorder. "My wife, Carole, and our

kids were terrific," says Glyn. "We lived in a tiny flat for almost a year after that but nobody complained. Without their support I doubt if Mandrill Studios would exist today."

Having organised the finances, they faced a 12-month battle to gain an import licence. Eventually Glyn persuaded the authorities that there was sufficient work to warrant the expense of overseas funds and Mandrill went 16-track in 1976.

For a time it appeared to the Mandrill owners that they were getting nowhere. They had great plans but insufficient money to implement them. Glyn spent months checking further finance possibilities but it was not until he met Bruce Lynch that real possibilities began to emerge. Bruce had been playing bass for Cat Stevens for several years and had become a sought-after session musician and producer in London. He expressed an interest in returning home and investing in a studio so within a few months the search began again for new premises.

Bruce introduced Graeme Myhre to Mandrill. Graeme, a New Zealander, had been working in London as an engineer for Tony Visconti and at Rock City Studios. Since he had also constructed Tony Visconti's studio and installed Trident TSM consoles both there and at Rock City, Graeme agreed to build the new Mandrill studio and install equipment, but he seems to like it enough to stay indefinitely.

During the third search for new premises, Glyn drew up five variations of basic studio plan to fit into different types of building. "We had to go through the exercise for each building we considered," says Glyn, "which meant checking foundations, neighbours, sound proofing problems, council restrictions, future motorway routes, access, parking, potential radio inter-

ference and the aesthetics of each place. The main hassle was finding a clean building with a high ceiling.

Finally they signed a new lease on the building in York Street and began work on new plans again. Extensive sound proofing was necessary since there are offices on floors above the studio. Access is good, with plenty of car parking adjacent to the studio and facilities in Parnell are excellent and lively. Since Studio One is still operating only 300 yards away in Vacation House, logistics represent no problems between the two studios.

The front door of Studio Two leads into a tastefully furnished reception area with comfortable seating, and paintings and plants create a homely feeling. A long carpeted corridor leads to the studios and this, being on the outside wall, acts as part of the sound insulation. Walking on past the studio and control room doors, takes you to the comfortably furnished recreation room which contains hot and cold drinks facilities, pool table, dart board, TV set, etc. Also in the rear is a compact but beautifully appointed conference/playback lounge. This can be assigned as a producers' room when required.

First impression on stepping into the control room is of spaciousness and warmth. The shape is a unique 9-sided wedge with no parallel walls. The Trident TSM 32-channel, 24-group console stands in the acoustic centre between the UREI 813 monitors flush-mounted into the front walls at ear level. The inevitable small Auratones are mounted on movable cradles on the front of the console. The main studio is offset to the right of the console eliminating any glass in the front of the control room. Along with an acoustically 'dead' front wall finished in dark brown suedette, and attractive wood

panelling in the rear half of the room, the new LEDE design is apparent. A bronzed antique mirror on the left wall acoustically completes stereo imaging in relation to the double glazed window to the studio on the right. The whole room is built at a clever angle in relation to the studio so that eye contact with the whole studio is possible. The control room floor is built up 6in floating on neoprene rubber pads and the cavities filled with sand. All walls and ceilings are floating and up to 18in thick with layers of gib-board and insulation. At the rear of the control room is a small booth for vocals or acoustic guitar isolation which maintains visual contact with the main studio and drum cage. It is most handy for quick overdubs.

Tape machines include MCI JH116 24-track with autolocator and two JH110 2-tracks, with extra Revoxes available when required from Studio One. Outboard equipment includes UREI 1176 limiter, Rebis stereo comp/limiter, ADR Vocal Stresser, Harmonizer, Lexicon Prime Time DDL, MXR Flanger/Doubler, Marshall Time Modulator, stereo reverberation plate, Lexicon 224 digital reverb unit with computer memory and cassette and record decks. All power amps and power supplies to the desk are located in a separate amp room. Air conditioning is effective and quiet, with separate systems for each studio. The front and rear of the control room has extensive built-in bass trapping which accounts for the tight low end. The imaging and overall clarity is superb at all frequencies.

The main studio is also spacious incorporating three booths housing piano, bass and drums in a wrap-around configuration giving good vision between musicians. Extensive bass trapping is again featured with floating floors for bass and drums and a 7ft 4in Yamaha graces the piano booth. The natural pine finishes against the brown suedette cloth look superb and create a nice bright but controlled sound. The floor is carpeted, which is removable in the drum booth, and the far wall is a glass ranch slider which opens to reveal a large echo room which doubles as a string room. Drapes can be drawn in front of the glass to alter room acoustics. Stereo foldback is available to musicians from the TSM with up to six different mixes available if required. The main studio is 616 sq ft and can accommodate up to 20 musicians, while the echo room is big enough for 20 more.

The future of the New Zealand recording industry and Mandrill's Studio Two is indeed looking rosy.

Mandrill Recording Studios, Vacation House, 60 Parnell Road, PO Box 3924, Auckland 1, New Zealand. Phone: 09 793222.

Ken Bray
38 ▶



Console and studio beyond

MY REASON FOR NOT USING AMCRON POWER AMPLIFIERS IS

Name

Address

Occupation



Send to: HHB Hire and Sales (sole UK distributors), Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. (Telephone: 01-961 3295, Telex: 923393).

To be honest, we're not expecting a deluge of replies to this advertisement.

There are few applications in the world of professional sound where an Amcron power amplifier won't effortlessly outstrip anything else on the market.

Over the years, the name of Amcron has become synonymous with reliability and peerless performance. The DC300A, D150A and D75 power amplifiers, as well as the revolutionary self-protecting PSA-2, have variously set new standards in the fields of studio monitoring, live music, broadcasting and domestic hi-fi.

So if you really do have a bone to pick with Amcron, you'll be challenging the professional opinions of sound specialists all over the world.

There is however, one reason why you might look elsewhere for a power amplifier. And that involves the delicate subject of money.

Nevertheless, you'll find that in most cases an Amcron amplifier will cost you only marginally more than an indifferent alternative.

And that, in the long run, the matchless reliability of Amcron engineering will actually save you money on servicing and repairs.



AMCRON

studio diary

Octopus, Suffolk

Octopus Studio was formed in the first week of January 1980 by 'the lads', being Dave Hoser, his wife Jenny, and Tony Phillips. The studio follows on from Dave's 4-track mobile which he operated from home in Bishop's Stortford. The mobile did a master for Gypp which went down particularly well in Germany, although UK-wise work was mostly live gigs, sound effects for local drama groups and hundreds of demos as the staple diet. It was to break out of that rut that Dave decided to go 8-track and started looking for a suitable property to settle down in. It wasn't long before a friend had found a 200-year-old blacksmith's shop near Stowupland in Suffolk which Dave bought on spec without even seeing the place. Two months later he came and saw what it was really like and (after his wife had revived him) set to work.

That was the beginning of six months' hard labour during which time they had to gut the original blacksmith's barn, putting a new front on and building an annexe at the back for a control room. Acoustically, an inner shell was built inside the original barn using breeze block, plasterboard and fibreglass. A recording studio in this part of the world must have been quite an event as it seems that just about everybody on the local council came to vet and generally approve the new venture. Essentially what Dave managed to do was take what had been a local eyesore and restore it to its original condition, and on those grounds planning permission was not really too much of a problem.

Administratively, Jenny Hoser holds the fort doing all the typing, bookwork and other necessary bits including cooking meals on long sessions. She had even gone to the trouble of putting together a little menu so that bands can pick and choose.

Other plus points in the way of amenities are that Dave plans to put a 30ft caravan on the land next to the house where they will be able to offer free accommodation which will beat dossing down in the spare room.

Access to the studio couldn't be better: the main A45 Bury St Edmunds to Ipswich road runs within

two miles of the house which lies to the North of the A1120 turn off. In front of the studio is a lay-by which can accommodate almost any size of truck or up to half a dozen cars, with entrance through a large door directly into the studio. Certainly they have never experienced any trouble getting equipment in.

Staff-wise, Dave handles the engineering himself with help from Tony the other resident engineer who is also involved in half a dozen bands in which he plays various instruments.

The 20x6ft control room contains a Soundcraft Series 2, 16/8 mixer with stereo remix coupled with a Soundcraft SCM 381/16 multitrack, recently replacing the original 8-track machine which Dave really liked. The Soundcraft 8-track, which came complete with its own remote, particularly endeared itself to Dave who raved about the facility for dropping in and out of record, varispeed and 'cue zero'. When all's said and done Dave was still convinced, having owned the 8-track for some eight months, that the quality was unmatched for the price, especially when there was a lot of track bouncing going on — hence the choice of 16-track recorder.

Monitoring is through a couple of Tannoy Devons driven by a Quad 303 off the monitor output of the desk. Architecture in the room was all down to Dave's imagination, making use of cloth-covered walls and acoustic tiles on the ceiling just to flatten the bottom end and plenty of hardwood surfaces to brighten up the top end. Best little quirk yet to be seen in any studio is 'ego corner', a section of the wall in the control room which is reserved for all acts which have used the studio to pin up their own particular piece. Needless to say the scrawlings on the wall kept me occupied for at least half an hour before we could get the story started. Also for decoration are copies of 'standard' reject letters from major record companies so that the budding stars can get some idea of the kind of people they are going to have to deal

with when they start trying to spread their demos around. Photographs can be provided by Colin Jenkins who offers an 'in-studio' photography service, to accompany demos that are sent off to the record companies, or for record sleeves, publicity, etc.

The studio itself is 16x32ft with separate drum booth and acoustic screens of various sizes. The studio is completely wired into the control room through well-placed XLR jack and multiway boxes and is fully air-conditioned. The accent in construction tends to be on cloth walls with peg board ceiling for brightness, and a carpeted floor. Equipment laying around on offer is an upright piano, a variety of amplifiers and cabinets, 6-piece Hayman/Ludwig/Premier combination kit and a Polymoog. Foldback is through a Sony offering a selection of two foldtrack mixes.

Cans in use in the studio are mostly Beyer and Koss, plus Hoseidon DH61s. Mic stands, courtesy of Keith Monks, hold the usual variety of mics mostly AKG 202, 224, D12, Shure 57 and 58, PML condensers and Neumann U87s. Mastering is by way of a Revox B77 and the ubiquitous A77 with a Teac A106 stereo cassette deck and Aiwa AD6350. Dave can also provide musicians, producers and the odd juggler or two. Auxiliary equipment currently on Dave's 'shopping list' includes a Deltalab DL4 delay system and a dbx 160 compressor limiter, and Audio & Design SCAMP system currently vying for rack space. (May the best man win.) Not one to stand still too long Dave plans to add on a new, larger control room to expand the 16-track facilities probably using a Studer 2in 16-track machine and, probably another Soundcraft desk. It is also planned to put in a Proline 2000 for mastering, as well as JBL monitoring. Reverb is using the GB Spring from Turnkey which Dave rates excellent value for money.

The 'Philosophy' of the studio? You can't get far talking about Octopus without getting Dave's own particular brand of 'music

socialism'. He maintains that the studio is first and foremost a hobby born of a love of music and is a service to young, up-and-coming bands in addition to semi-pro and professionals since, to quote Dave "this is a bloody hard business to be in".

Strangely enough, Dave figures that only about 20% of his work comes from local bands, the other 80% coming from all over the country. Bandaxis, Bulk Erasers and the Stray Trolleys plus Nodding Dogs and Rich Gypsy all managed to get recording contracts on the strength of the demos they did at Octopus.

Naming no names, Dave's store of experience down at Octopus includes the band that turned up for its first session at 9.00 on a Sunday morning without the singer — nobody knew where he was. They cut six tracks, dead tight with no guide vocal, then the bass player and drummer went off to look for the singer and found him 35 miles away visiting his grandmother and dragged him back at 5.00 in the afternoon to overdub the vocals. Dave was quite surprised to see that they actually treated him quite nicely. However, when he'd finished the tracks around one in the morning they gave him a poke in the ear and made him walk home.

Octopus also do a variety of mix'n'match self-productions using a lot of the local talent for their own company Squid Marks Time. A couple of their recent ventures have been the release of cassette albums by the Dead Students and the Outpatients, and a compilation album scheduled for release early this year, featuring the 12 bands that have recorded at Octopus. Squid Marks Time also has some pretty nifty work by the Bulk Erasers, a pretty strange sort of band from all points east of London, who seem to specialise in walking into the studio, writing a number, laying it down and finishing it within three hours, during which time it has never been known for them to talk to the engineers! Good results though.

Any budding band would do well to go down to Octopus just to listen to some of the quite amazing masters which Dave has lying around.

Harry Mangle

Octopus Studio, Blacksmith's Cottage, Saxham Street, Stowupland, Suffolk.
Phone: 044 92 76842.



Studio in use

Colin Jenkins

Control room

Colin Jenkins



Neve Custom Design Consoles—turn dreams into reality.

Photograph courtesy of AIR Studios, London. Whatever your budget, contact us now with your requirements.

Neve Electronics International Ltd., Cambridge House, Melbourn, Royston, Herts, SG8 6AU, England. Tel: (0763) 60776. Telex: 81381.

Rupert Neve Incorporated, Berkshire Industrial Park, Bethel, Connecticut 06801. Tel: (203) 744-6230. Telex: 969638.

Rupert Neve Incorporated, 7533 Sunset Boulevard, Hollywood, California 90046. Tel: (213) 874-8124. Telex: 194942.

Rupert Neve of Canada Limited, 2721 Rena Road, Malton, Ontario L4T 3K1, Canada. Tel: (416) 677-6611. Telex: 983502.



The sound of Neve is worldwide.

DAL 9237

Naturalness and artificiality in recording

Prof P B Fellgett

An academic, writing about industry, begins at a disadvantage. How, it may be asked, can anyone have valid opinions unless he has earned his living in the industry for many years? In the present instance there are fortunately two circumstances which immediately help meet this objection. First, a leading practitioner of the audio industry expounding on just what is, or is not, 'commercial' in records, may sound convincing when these commercial records are justifying their name by selling well, but becomes less credible when there is a recession in sales. Second, I was brought up in the rag trade, and to this day the whiff of hot ironing and a rail of garments being wheeled along the Commercial Road will bring back nostalgic memories. The relevance of this is that, like recording, it is a fashion industry. So I know from early experience that fashion can afford only so much froth of artistic temperament at the interface with the public, and depends on hard detailed technical routine underneath the surface appearances. Moreover a fashion industry may 'decree' what the public shall like, but the public has a habit of thumbing its nose and following the dictates of its own preferences.

There is also a deeper reason why someone from outside the mainstream can sometimes make a

Getting back to basics need not be a retrograde step. A fresh approach to problems helps put them in perspective and can often provide a solution.

suggestion that the industry can take up with profit. Everyday operations compel a practitioner to think mainly about what is necessary for tomorrow or next week, and amid these pressures it is almost impossible to give enough attention to what is best for next year or the next decade. A researcher, however, has the duty and privilege of going back to fundamentals, and so has a proper basis for thinking about long-term optimisation. Nor should this be thought of as 'mere theory'; research requires theory and experiment to be harnessed in a single yoke, and my department now has almost a decade of experience of ambisonic recording using a soundfield microphone, beginning at a very experimental level and progressing to state-of-the-art innovation.

The writer A A Milne, as I recall, was once asked to contribute to an anthology under the title 'My naughtiest story', and offered a tale about a princess and a frog, the whole point of which was that all the characters in it knew the original story of the princess and the frog, and acted accordingly. Probably most of us have known at one time or another a colleague who would have

listened solemnly to A A Milne's version of the story, and then tried (as he thought, having missed the central point) to cap it by telling the original and well-known version! A rather similar misunderstanding seems to be triggered by any article which attempts to question the current fashion in audio. A 'reply' is published which merely reiterates the well-known arguments to which the article in question has already addressed itself. There have been several examples of this happening already, and it seems unnecessary to increase their number.

The past fifteen years or so have seen a rapid trend towards artificiality in recording. Use of a multiplicity of microphones is now common, indeed it may be thought of as the norm, in all kinds of music, while popular music is almost always built up from many separately recorded tracks. This has been in fashion for sufficiently long for a generation of studio personnel to grow up never knowing any other method of working. It is salutary therefore to recall that this is indeed a recent phenomenon which is not typical of the history of the industry. During the first half of this century

the normal method of recording was direct-cut using a single microphone (or what served as a microphone at the time); magnetic tape had yet to be invented.

Let us remember also that history has many examples of enthusiasm for change going into reverse, with a concomitant alteration in the emotional implications of the words used. The Victorians and Edwardians referred to as 'improvements' what we now call 'property development' and regard this as, if not quite a dirty word, at least ambivalent. So when alteration of the raw audio signals is called 'enhancement' let us remember that it would be at least as accurate, but just with the emotional implication reversed, to call it 'distortion'.

It is beyond the scope of the present article to argue the relative merits of naturalness and artificiality in various circumstances. It aims only at raising some questions, and recalling some facts, which may help some people to begin thinking critically about assumptions that they have previously taken for granted.

A sound starting point (yes, both senses) is to enumerate the characteristics we hear when we listen to the natural sound of a musical performance. These include:

(a) the direction from which each sound comes;

- (b) a sense of the distance of the instrument or other source;
- (c) knowing whether the instrument is being played loudly or softly;
- (d) a sense of the size of the instrument;
- (e) a feeling that the performance is taking place in some recognisable place;
- (f) continuation of the sound after its source finishes due to reverberation;
- (g) a sense of cleanness, and fine discrimination;
- (h) loudness which when measured on a meter is less than we might expect subjectively;
- (i) frequency weighting (we can hardly call it response) which except in extreme cases, our ears accept as correct;
- (j) a sense of excitement from fine performance whether the sound is loud or quiet.

Comparing this list with a typical multimic recording, shows that the industry has concentrated on items (a) and (f), realised by panpots and echo devices. Items (c) and (d) are falsified by the use of faders; frequency response (i) is often deliberately modified by filtering; items (b) and (e) are hardly represented at all in the recording; and if everything is made as loud as possible, it is an admission of failure with respect to (j). There is enough subjective judgement involved in (g) to admit differences of opinion, but there does seem to be a general consensus that direct sound does in this respect surpass anything heard on a monitor. Surprisingly, reports of this observation (some in *Studio Sound*) have tended to ascribe it to low background noise although this is not of course an inevitable property of natural sound, and indeed is not crucial to the observation (yet the industry devotes much effort to noise-reduction). It is generally accepted that (h) is because our ears interpret a distorted sound as louder than it really is physically. Actually (i) is quite surprising in view of the interference effects that can result from multipath transmission in any but an anechoic room, and this is discussed further, later on.

To approach the general question from another point of view, in the early days of commercial stereo when records were released in separate mono and stereo versions, it was sometimes assumed that it would be pointless to have other than the mono version of a recording of a solo instrument. Of course that naive idea did not last long; or did it? For what are panpot input signals but mono?

The early mistake of thinking that mono was all that is required for a solo instrument was made because it was treated as a point-source of sound, without either size or the ability to evoke reflected sounds having directions of their own; and

of course a spot or solo microphone treats it in precisely this mono manner.

Natural sound in fact has two properties which imply all the characteristics which we have listed. First, it is naturally free from any artificial non-linear distortion. Second, it is rich in information about the relationship between the direct sound and the sounds reflected from floor, walls, ceiling and other objects. This information can in principle be made available in reproduction if a stereo-pair 'main balance' is used, but it is absent from panpotted signals and falsified in artificial reverberation.

In the long course of evolution, our ears have acquired exquisitely refined powers of discrimination and interpretation. We use these all the time in everyday life, usually without being consciously aware of what we are doing. In particular, the ear is very good at relating the direct sound of an instrument or voice to the whole pattern of delays, directions and intensities in the indirect reflected sound. One illustration of this is that it is almost hopeless to attempt, using normal quasi-steady-state methods, to measure the frequency response of loudspeakers or mics in an ordinary room, but our ears are not put off by the interfering reflections and can react to an error of as little as 1dB in equalisation. As mentioned earlier, it is only when the reverberation time (more precisely, the room constant) varies badly with frequency that we feel disturbed by room-colouration.

This analytical ability of the ear enables us to derive a lot of information about the origin of the sound. Early reflections, particularly from the floor and any surface immediately behind the performers, seem to be particularly associated with the sense of depth and distance. Later reflections seem to tell us mostly about the general size, shape and character of the room, studio or hall. Together, these impressions add up to a labelling of the sound characteristic of the place and where within that place the sound originated. This ambience labelling is one of the very important clues we use to unravel the complexities of a musical structure, to hear each instrument, voice or section separately, and to distinguish inner lines in the music.

Ambience labelling is found to have a powerful stabilising effect on stereo images. Particularly when the classical Blumlein technique is used (as discussed later on), satisfactory images may be obtained over a wide area in front of the loudspeakers, whereas panpotted images tend to disappear into one loudspeaker or the other with small movements of the listener from the central position. Even when binaural clues are suppressed, either in reproduced sound or live by suitably masking the ears,

ambience clues can enable us to gain an impression of the true direction of the sound.

Multimic recordings need to make up, in various ways, for their lack of this kind of information present in live sound. With nothing more than sonority and panpotted directionality to rely on, it is much more difficult to hear separate instruments or other components, so that in practice it is necessary to make all of them (or at least the important ones) of nearly equal loudness. This requirement has resulted in the current preoccupation with balance, even to the extent of recordists being called 'balance engineers' which is a poor reflection of the wide knowledge and diverse skills they actually need to deploy. The result often falls down through being over-balanced and not reflecting the musical intentions of the composer.

Other stratagems include 'presence' filtering, and the use of close-miking to pick up a 'dry' sound. It is then necessary to add a controlled amount of artificial reverberation to improve blend, and this practice has led to a misunderstanding. Since ambience clues are absent from artificial reverberation it can contribute only to blend, and it is easily forgotten that natural ambience can contribute both to blend and to discrimination by the mechanism of ambience labelling. This misunderstanding can become self-reinforcing if it leads to natural ambience being treated only as a contribution to blend, as for example when signals are mixed-in from one or more microphones placed towards the back of the hall.

A more truly balanced approach would be to direct due attention to other properties than loudness, for example the correct representation of depth, scale and perspective, in general allowing the eventual listener to hear the same acoustic as that to which the musicians instinctively adapted themselves in the very act of performance.

When the aim is to preserve natural-sound information, the choice of microphone technique is clearly crucial. Here there is something of a national dichotomy; British recordists usually follow the pioneering work of A D Blumlein by using a pseudo-coincident directional pair, while American and some continental European colleagues tend to follow a tradition of spaced omnidirectional mics which seems to go back to the famous Philadelphia-Washington DC relay of 1933. For reasons that are now beginning to be understood theoretically, the British tradition is on the whole the better subjectively, but two qualifications are necessary. First, the classical Blumlein arrangement of figure-of-eights crossed at 90° is notably better-sounding than any of its modifications; in particular,

cardioids at 120° (despite some practical conveniences of this configuration) sound sufficiently inferior to make the phrase 'cardioid colouration' spring to mind. Second, and again there is now some theoretical understanding of the reasons for this, omnidirectional mics seem to be specially well able to give a good sense of depth, and indeed American recordists do seem to prize this quality more than we tend to in Britain. (Interestingly, if the attempt is made to find a stereo format that combines the virtues of Blumlein and omni techniques, the ambisonic UHJ 2-channel specification seems to be quite a good choice, even apart from its surround-decoding capability.)

Of course, even the best mic can only respond to the information that reaches it, and careful attention needs to be given to the acoustic environment, particularly the optimisation of the important early reflections. This is best done by direct listening on site, as has been described by M A Gerzon.

High mic positions may make it easier to obtain approximately equal loudness from all the performers, but they produce a distorted perspective which is very disturbing. This is often noticeable in BBC concert broadcasts where the mic has to be high to avoid audience sight-lines; the ear cannot make sense of the perspective until the listener forces himself to imagine he is looking steeply down on the stage, when everything clicks into place. But in any case, if one climbs up and listens directly from above the performers, the sound is distinctly less pleasant than from a normal listening position.

Meticulous attention to detail is indeed necessary at every stage. No part of the chain is ideal; even the best modern mics, electronics and loudspeakers all have imperfections and distortions which can adversely affect what we hear in recordings. The recording medium itself presents special problems which it is hoped to discuss in the future.

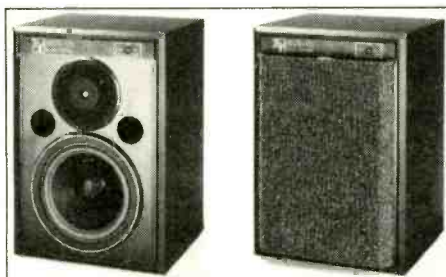
It is conventional business wisdom that in a depression the survivors are those who adopt well-chosen innovations. Progress is not always along a straight line, but may involve spiralling back to reconsider old ideas in new forms appropriate to changed circumstances and new technological resources, and so remembering things that have become overlaid and forgotten in the enthusiasm for current fashions. The present may be an especially appropriate time for the audio industry to take a new critical look at its fundamental technical assumptions. ■

Further references can be found in *Studio Sound* as follows: 'The Echo of Fashion', P B Fellgett, January 1977; 'Why Coincident Microphones?', M A Gerzon, March 1971; 'Stabilising Stereo Images', M A Gerzon, December 1974.

AES 68th Convention, Hamburg - a preview

The 68th Convention of the Audio Engineering Society will be held from Tuesday, March 17 to Friday, March 20 at the Congress Centrum, Hamburg. Over 110 exhibitors will be showing their products and as usual a comprehensive convention programme of technical papers will be presented.

- **ABE:** MTR Series of 8, 16, 24 and 32-track tape machines.
- **AEG-Telefunken:** MTS 15A timecode system; MTS 15A-2 audio editing system; M15A 2-track and multitrack recorders; M12A portable recorder; plus autolocates and vari-speed units.
- **Agfa-Gavaert:** range of tapes including PEM-568, PEM-468 and PEM-368 mastering tapes; PEMS26 bin tape; PE-611, PE-811 and PE-1211 bulk cassette tapes; and PE-36 duplicating tape.
- **AKG:** wide range of mics and reverb units including the recently introduced D-300 series of vocalists mics, the BX22 reverb unit; and the TDU 7000 modular time delay unit.
- **Altec Lansing:** range of monitor loudspeakers.
- **Amcron:** range of amplifiers including the PSA-2 self-analysing power amplifier. Also the PZM range of pressure zone mics, plus the Badap 1 programmable audio measurement system.
- **Amek:** range of consoles from Amek and TAC including an Amek M2000A/2500 multitrack console, and the expandable TAC 1682 console.
- **Ampex:** ATR-116 and ATR-124 16-track and 24-track recorders. Also ATR-100 and ATR-700 tape recorders; the ECCO MQS-100 synchroniser; and the ADD-1 disc mastering system. Additionally, Ampex tapes and cassettes.
- **Amptown:** range of intercom systems from American manufacturer Clear-Com.
- **AMS:** new DMX15R digital reverb system for use with the DMX15-80 programmable DDL. Also DM-DDS digital disc mastering delay line and the DM2-20 phaser/flanger.
- **Audio & Design (Recording):** new Panscan pan effects unit, and new Transdynamic tri-band processor primarily for broadcast use. Also comprehensive range of signal processing equipment including Scamp units; the Ex-press limiter; and the Gemini Easyrider rack-mount comp/limiter.
- **Audio Export:** wide range of products from UREI, Lexicon, Amber, Valley People, Inovonics, TTM and Switchcraft.
- **Audio Kinetics:** QLOCK 310 and QLOCK 210 synchronisers, plus the XT-24 Intelocator, and details of the company's acoustic absorption panels and screens.
- **Audiomatic:** Electro Sound tape duplication equipment including the System 8000 and System 5000 tape duplicators; the QCV quality control reproducer; and Apex on-cassette printer.
- **Augereau-Neve:** Neve consoles and automation systems, plus details of the company's consultancy services.
- **Auvis Asona:** range of tape duplicating



Electro-Voice Sentry 100

equipment and turnkey cassette production facilities.

- **Barth:** Param computer assisted programmable equaliser; Dynaset U311, Audios, and W308 signal processing equipment; and Musicoder vocoder.
- **BASF:** range of professional tapes, cassettes and magnetic film including calibration and test tapes.
- **Beyer:** range of condenser and dynamic mics plus headphones.
- **BFE:** no information received.
- **Peter Bollen Geluidsteekniek:** Concord expandable multitrack console, plus the S200 and S100 compact consoles.
- **WH Brady:** range of splicing and sensing tapes for audio and video applications.
- **Bruel & Kjaer:** comprehensive range of audio test instruments.

- **Calrec:** range of professional condenser mics including the ambisonic Soundfield mic. Also broadcast consoles and a programmable OB switching unit.
- **Cetec:** Gauge tape duplication system and the company's range of loudspeakers and drive units. Also Vega radio mics.
- **Consilium Industri:** range of audio test units.
- **Cross Music:** CT-1800 automatic cassette labelling machine.

- **D & D Engineering:** no information

- **Dolby Laboratories:** full range of professional Dolby-A noise reduction units, plus details of the Dolby FM system, and HX and Dolby-C systems.

- **Eastlake Audio:** details of the company's consultancy services and studio monitor loudspeakers.
- **Electro-Voice:** Sentry 100 studio monitor loudspeaker, and new Panjo mini-mixers from sister company Tapco. Also full range of professional mics and loudspeakers, plus mixers and amplifiers from Tapco.
- **Elektroimpex:** FIT-IC modular automation ready console; STM-610 tape machine; SL-101 direct drive professional turntable; and PCP-101 commentator's desk.
- **EMI:** full range of EMI professional tapes.
- **EMT:** new EMT 450 Digiphon digital recorder utilising a commercial digital disc store; new EMT 245 digital reverb; and new EMT 423 flutter audicorder. Also the company's established range of turntables and reverb units.
- **Enertec:** UPS-4000 24-track automation ready console; UPS-5000 and UPS-5100 consoles; F-462 tape recorders; GCE-4000 solid state switching grids; and a cassette broadcasting system.
- **Estemac:** no information received.

- **Future Film Developments:** comprehensive range of cables, cords, connectors, jackfields, wiring aids and associated components, plus a wide range of audio accessories. Also products from Soundex including the new AMN200 noise meter; Milab (Pearl) condenser mics; and Stella-vox portable tape machines.
- **FM Acoustics:** FM600A and FM800A power amps, plus the FM212 moving coil phono step-up preamp.

- **Genelec:** range of monitor loudspeakers comprising the 1019A bi-amplified mini monitor;

44 ►



EMT 450 Digiphon

APRS 81

INTERNATIONAL EXHIBITION PROFESSIONAL RECORDING EQUIPMENT

10 11 12 JUNE 1981

NEW VENUE

NEUER SCHAUPLATZ

NEUVO LUGAR DE REUNIÓN

NUOVO LUOGO D'INCONTRO

NOUVEAU LIEU DE RENCONTRE

KENSINGTON EXHIBITION CENTRE DERRY STREET KENSINGTON LONDON U.K.

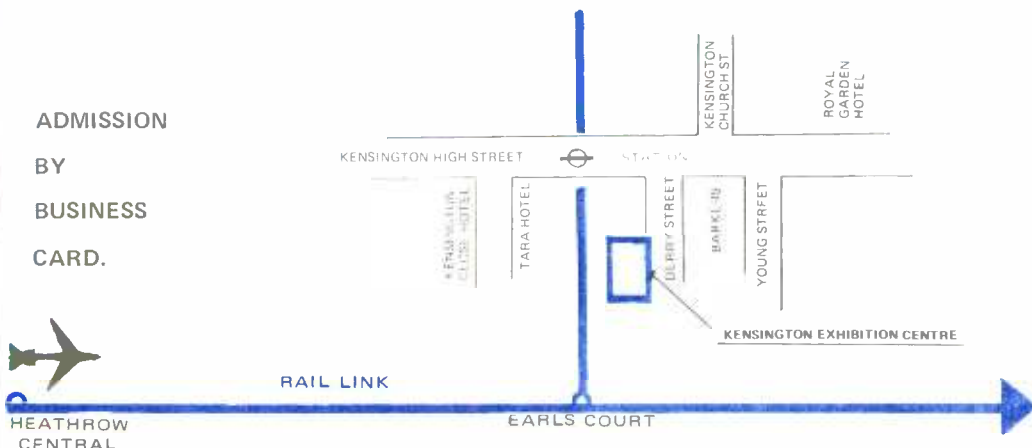
THE WORLDS LEADING MANUFACTURERS WILL DISPLAY
LATEST PROFESSIONAL RECORDING EQUIPMENT

ADMISSION

BY

BUSINESS

CARD.



EXHIBITORS OF PROFESSIONAL SOUND RECORDING EQUIPMENT

APRS 81

10 11 12 JUNE 1981

Audio Plus	FM Acoustics	Otari Electric Co.
Ampex GB Ltd	Fitch Tape Mechanisms	Penny & Giles Conductive
Alice (Stancoil) Ltd	Fraser-Peacock Associates	Plastics
AKG Acoustics	Feldon Audic	Philip Drake Electronics
Audio & Design	Formula Sound	Progressive Electronic
(Recording)	Future Film Developments	Products
Audio Developments Ltd	(Allotrope)	Publison Audio Professional
Audix Ltd	Gulton Europe Electro-	REW Professional Audio
Audio Kinetics (UK) Ltd	Voice	Racal-Zonal
Atlantex Music	HHB Hire & Sales	Raindirk Ltd
Agfa-Gevaert Ltd	Harman Audio UK	Rebis Audio Ltd
Allen & Heath Brenell	Hayden Laboratories	Soundcraft Electronics
Avcom Systems	H/H Electronic	Surrey Electronics
Audiomatic Corporation	ITA	Shure Electronics
Advanced Music Systems	ICM Cassettes	Sony (UK) Ltd
Audio Magnetic Products	"International Musician"	"Studio Sound"
Bulgin Soundex	James Yorke	Scenic Sounds Equipment
BASF United Kingdom Ltd	Jackson Rec. Studios	Studio Equipment Services
Bruel & Kjaer (UK)	Clark-Teknik Research	Solid State Logic
F.W.O. Bauch	Keith Monks (Audio)	Sifam Ltd
Beyer Dynamic	Lyrec Mfg. A/S	Sonifex Sound Equipment
Cetec International	Lee Engineering	Swisstone Electronics
Clive Green & Co. Ltd	Lennard Developments	Tannoy Products
CB Electronics	Leavers-Rich Equipment	Trident Audio
Canford Audio	Lake Audio	Developments
Calrec Audio	3M (UK) Ltd	Tweed Audio Ltd
Covemain	Music Laboratory	Trad Electronic Services
Court Acoustics	Mosses & Mitchell	Turner Electrical
Capital Components	Maglink Audio Products	Instruments
Clyde Electronics Ltd	MCI Professional Studio	Turnkey
Cetronic Ltd	Equipment	Vitavox Ltd
Clavitune Ltd	Magnetic Tapes Ltd	WKR (Wayne Kerr)
Communication Accessories	Midas Audio Systems	
Dolby Laboratories Inc	NEAL-Ferrograph	
EMI Tape Ltd	Neve Electronics International	
Ernest Turner Instruments		
Eardley Electronics		



WE DEMAND
PERFECTION.
THAT'S WHY
WE DEMAND
MCI.

Whether they're recording another hit for themselves or masterminding production work for other artists, the Bee Gees are perfectionists. That's why their studio in South Florida is totally MCI equipped with a JH-556-LM Automated Console, two JH-24 Multitrack Recorders with a JH-45 Autolock Synchronizer and JH-110B stereo recorders.

MCI. Not always the most expensive, but always the best.

MCI

1400 W. Commercial Boulevard, Fort Lauderdale, Florida 33309 USA. Telephone: (305) 491-0825. Telex: 514362 MCI FTL.



the *S30* tri-amplified broadcast monitor; and the *1024A* tri-amplified music monitor. ● **Gotham Audio:** wide range of products from Amber, TTM, Inovonics, Lexicon, UREI, Switchcraft, Valley People, and MRL. Also Gotham audio cables. ● **Greencorp Magnetics:** no information received.

● **Harrison:** recently introduced *MR-2* automated console and bargraph VDU monitor; plus the *Autoser* automation system. Also other consoles including the *32 Series* and an *Alive* console. ● **Heino Ilsemann:** *KZM3* automatic cassette loader and *ETK-1* and *ETK-1S* cassette labelling machines.

● **ICM:** *C-Zero* cassettes; *DO-2000* dropout checker; *ICM 7804* automatic wind tester; and the *C-Box* cassette packing and storage system.

● **Infonics:** *200 Series* tape duplicators including a high speed metal tape cassette duplicator.

● **ITC:** range of cartridge machines primarily for broadcasting use including the *Series 99* featuring microprocessor control and modular electronics.

● **Ivie Electronics:** new *Gold Standard* range of calibration mic capsules, preamps and power supplies. Also the *IE-17A* microprocessor controlled acoustics analyser and *IE-30A* spectrum analyser.

● **JBL:** new loudspeaker drive units for PA and studio monitoring applications. Also the company's complete range of monitor loudspeakers and the *7510* automatic mic mixer.

● **Kajaani:** *10 EA Series* compact mixing consoles and *KAJAC* multitrack broadcast consoles. ● **Keith Monks:** comprehensive range of audio equipment including mic stands, cable drums, *LS-19* self powered monitor loudspeaker, and record cleaning machines. Also EDC radio mics. ● **Klark-Teknik:** new *DN72* memory bank

Otari MX5050



to accompany the *DN70* digital time processor and a new dual 30-band graphic equaliser. Also the company's established range of graphic equalisers and effects units, plus the *DN80* 16-bit realtime audio computer. ● **Klein & Hummel:** range of monitor loudspeakers and parametric equalisers. ● **Klipsch:** range of monitor loudspeakers.

● **Leavers Rich:** *Proline 2000TC* and *Proline 1000* ¼in professional tape machines, plus bulk erasers and a tape head demagnetiser.

● **Leonhard:** no information received. ● **Lyrec:** *TR532* 24-track tape recorder and *ATC* remote controller. Also the company's high speed cassette duplicating system and a new ¼in recorder.

● **Magna Instant Tone:** no information received. ● **MCI:** *JH600* console; *JH500* console; *JH50* automation; *JH45* synchroniser; *JH24* multitrack tape machine; and the *JH110* Series recorders in various configurations. Also the *Autolock III* and *RTZ III* locating devices.

● **Midas:** *PR Systems* PA and sound reinforcement consoles and the *TR System* modular theatre sound consoles. ● **Mondial Electronique:** no information received. ● **Mosses & Mitchell:** range of jacks and jackfields including miniature versions.

● **MTI:** range of tape duplicating systems and accessories. ● **MXR:** wide range of ancillary equipment including the recently introduced dual limiter. Units include 31-band and dual 15-band graphic equalisers; flanger/doubler; digital delay; pitch transposer; and linear preamp.

● **3M:** 32-track digital mastering system; 4-track digital recorder; digital delay disc cutting preview unit; and digital editor. Also the *M79* analogue 24-track and *Scotch* audio tapes.

● **Nagra Kudelski:** range of portable tape recorders in a number of configurations. ● **NEAL Ferrograph:** new *SP7S* tape recorder designed to replace the *SP7*. Also the *Logic 7* and *Studio 8* recorders; the *RTS/2* and *ATU/1* test instruments; and the NEAL range of cassette recorders.

● **Neumann:** *VMS 80* automated disc mastering lathe and associated units; complete range of condenser mics; and a 40/32 multitrack recording console. ● **Neutrik:** comprehensive range of *XLR*-type connectors including rear-mounting direct to pcb types; *K-Check* cable tester; and new additions to the company's audio instrumentation range comprising the *3204* constant sound pressure source with integrated compressor amplifier and the *3282* artificial ear.

● **Neve:** *Model 8108* microprocessor controlled multitrack console, plus the *Necam* automation system.

● **NTP:** comprehensive range of PPMs, equalisers, phasemeters, limiters, and compressor/expander. Several new products including a 4-channel programmable disc cutting equaliser with each channel containing a 14-band graphic eq.

● **Otari:** *MTR-90* multitrack tape recorder;

● **Otari:** *MTR-90* multitrack tape recorder;

46 ►

THE SOLUTION TO YOUR MONITORING PROBLEM



The TRIAMP S30 speaker system has been designed to satisfy the requirements found in broadcasting, monitoring in small and medium-sized music and speech studios and control rooms where the maximum SPL needed is roughly 100 dB. The TRIAMP S30 is a three-way system with three integrated power amplifiers and an active crossover network.

Features

- ± 3 dB from 40 Hz to 20 kHz
- symmetric input, + 6 dBm
- 105 dB SPL at 1 m
- separate power amplifiers for each driver
- level controls in each amplifier
- low level active crossover
- reliability
- solid construction with no frills or gimmicks
- compact size, 45 litres
- low cost

GENELEC OY

SATAMAKATU 7
SF-74100 IISALMI
FINLAND
Phone -35877-24 942
Tltx 4404 ismi sf

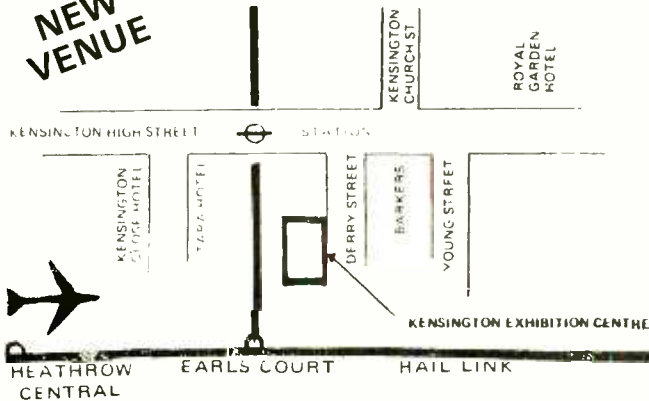
APRS 81

JUNE 10, 11, 12

EXHIBITION OF PROFESSIONAL
RECORDING EQUIPMENT

KENSINGTON EXHIBITION CENTRE
LONDON

**NEW
VENUE**



APRS, 23 CHESTNUT AVENUE, CHORLEYWOOD,
HERTS, ENGLAND

**IN CASE YOU MISSED HUGH
FORD'S REVIEW OF CONNECT-
ORS AND CONNECTING LEADS
IN NOVEMBER'S STUDIO SOUND,
WE THOUGHT WE WOULD
REPEAT PART OF IT FOR YOU :**

TECHNICORD AUDIO ACCESSORIES

Type PC801 audio patch cord

Patch cords, which are available in any length, terminated at each end with a tip, ring and sleeve brass $\frac{1}{4}$ in jack plug to British Post Office No 316. Inspection of the terminations showed that first-class workmanship was used in the three 2ft long samples supplied. Each conductor had an eye crimped to its end, the eye being screwed to the connections within the jack sockets. The actual length of free cable was exactly 2ft.

Type PC901 audio patch cord

Except for the use of Switchcraft type TT-253 0.175in miniature jack plugs, these patch cords are identical to the type PC801. Again the standard of construction was excellent with the screen and earth wires being crimped to the jack plugs and crimped eyes being used for the audio lines. The leads were exactly to their nominal length and the standard of workmanship was beyond reproach.

SAY NO MORE, Nudge, Nudge.

TECHNICORD LIMITED

Melbourn House, 2 Black Bank Road, Lt. Downham, Ely,
Cambs CB6 2TZ, England Telephone (0353) 87721.



Our lightweight heavyweight.

The major characteristic of the Neumann KMR82 is its superior off-axis frequency response. This, coupled with an extremely low self noise level, makes it the ideal alternative.

Its compact, lightweight construction makes it easy to handle and a full range of accessories adapts the KMR82 to every application.

For more information contact
F.W.O. Bauch Limited.

Audio Export Georg Neumann & Co. GmbH

D · 7100 Heilbronn Fleinerstrasse 29 West Germany

F.W.O. Bauch Limited

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



AES preview

recently introduced *MTR-10* 2- and 4-channel master recorders; *MX5050-BQII* ¼in 4-channel recorder; *MX7800* 1in 8-channel recorder; and the *DP4050* cassette duplication system.

● **Penny & Giles:** comprehensive range of faders including a digital fader with an 8-bit digital output. ● **Philips:** wide range of equipment including motion feedback loudspeakers. ● **Pioneers:** 16-bit audio laser disc system; digital compact disc systems; and ribbon sendust tape heads. ● **Publison:** range of audio processing equipment. ● **Pyral:** wide range of open reel and cassette tapes including the new *CJ 90* professional mastering tape. Also magnetic soundtrack film; master lacquer discs; and a spectrum analyser.

● **Racal Zonal:** range of audio tapes and cassettes including the new *Generation 1* mastering tape, plus magnetic soundtrack film.

● **Raindirk:** *Britannia* range of in-line consoles, plus the *Status 500* MOSFET power amp and *Status 20* modular stereo control unit. ● **Red Acoustics:** *Red Professional* monitor loudspeaker. ● **RTW:** no information received.

● **SAJE:** recently introduced *Odyssey* multitrack recording console and *Auxy* PA and theatre console. Also *CSM6* theatre console and *PE5* 4-band stereo parametric eq. ● **SATT Elektronik:** *SAM82* 8/2 portable mixer; the *SS Series*; and the *SAM42* 4/2 mixer. ● **Scenic Sounds Equipment:** wide range of ancillary equipment including products from Rebis Audio and Lindsay Electronics. ● **Schoeps:** comprehensive range of studio condenser mics and accessories. ● **SEN Laboratories:** no information received. ● **Sennheiser:** radio mic transmitter/receiver equipment, plus the company's range of mics and headphones.

● **Sescom:** wide range of audio modules and transformers; plus splitter boxes, direct boxes, 3-band parametric equaliser, 10-band graphic equaliser, and 4-channel mic-mixer. ● **Siemens:** *C4* and *C8* modular mixing system, plus the *Sitral C* console system offering up to 48 input channels.

● **Solid State Logic:** *SL-4000E* Series automated console; *SSL* studio computer system; and *Total Recall* studio computer. ● **Sony:** *DAE-1100* digital editor to accompany the *PCM-1600* or *PCM-1610* digital recorders; a digital compact disc system; and a wide range of professional mics and radio mics. ● **Soundcraft:** first European showing of the *Series 800* multitrack console and *SCM 382-24* 24-track recorder. New products include a new automation system for the *Series 3B* console and the new *Series 2400* automation-ready console. Also the *Series 1624* and *Series 1S* consoles, plus the *SCM 381* range of multitrack recorders. ● **Soundstream:** digital audio recording system. ● **Sound Technology:** *Model 1500* 4 microprocessor based automatic tape recorder test instrument. Also *Model 1710A*, *Model 1700B* and *Model 1701A* distortion measurement systems. ● **Stanton:** *980LZS* low impedance phone cartridge; *BA-26* pre-preamp; new cartridge series based on the *881S* Series; and the *Model 310* phono preamp/equaliser. ● **Statik Acoustic:** range of ancillary equipment comprising the *SA30* electronic crossover; *SA10* octave equaliser; *SA100* dynamic delay/flanger; and *SA20* dual reverb system. ● **Stellavox:** *TD88* ¼in, ½in and 16mm magnetic tape recorder; *AMI 48* mini mixer; and *SM8*, *SQ7* and *SP8* tape recorders. ● **STR:** new microprocessor controlled semi-automatic broadcast console. ● **STK:** no information received. ● **Peter**

A meeting of the Digital Working Party chaired by Hugh Ford will be held on Monday, March 16 between 12pm and 7pm at AES Hamburg. Venue for the meeting is Room 17 on the third floor of the Congress Centrum. All interested parties are urged to attend this meeting.

Struven: *Stramp* signal processing equipment.

● **Studer:** new *900 Series* mixing consoles; new version of the *A80/VU Mk3* with narrow head-block; new *Mk2* version of the *B67*; first European showing of the *Revox PR99* recorders; demonstration of the *A800* multitrack as a complete post-production system; and a 32-input version of the *369* console. Also the established range of Studer and Revox products. ● **Synton:** *Syntovox 222* vocoder; *Syntovox 221* effects vocoder; *Syntovox 202* vocoder for guitar players; and *Syntovox 232* 16-channel vocoder with voltage-controlled filter bank.

● **TAB:** no information received. ● **Tandberg:** *TD20A* tape recorder; *TCD 320* and *TCD 340A* cassette decks; and the recently introduced *TCD 440A* metal tape compatible cassette deck.

● **Tannoy:** *Buckingham* 3-way monitor loudspeaker; *Classic Dual Monitor* and *Super Red* monitors; *Little Red* and *SRM Series* monitors; *Dreadnought* monitor; and the company's hybrid passive/active crossover unit. ● **Tapematic:** no information received. ● **Tapetric:** no information received.



Ursa Major digital reverb system

● **Teac:** *Model 85-16* 1in, 16-track tape recorder; plus a comprehensive range of units from the *Tascam Series* including consoles, tape machines and accessories.

● **Televic:** *Astatic* range of mics. ● **Theatre Projects:** range of intercoms and small mixers, plus radio mics from HM Electronics. ● **Toa:** comprehensive range of communications and PA equipment including 6, 8 and 16-channel mixers and monitor loudspeakers. ● **Thum & Mahr:** no information received. ● **Tore Seem:** *SEESAM* broadcast/recording console; a wrap-around broadcast console, and a mini-mixer. ● **Trident:** *TSR Series* multitrack recorder with autolocate and compact remote control unit; *TSM Series* multitrack console; and dual channel stereo limiter/compressor. New products include a new 8 group *Trimix* console, and a new 2-channel parametric equaliser. ● **Turnkey Two:** details of the company's studio design and consultancy service.

● **Ursa Major:** *8 X 32* digital reverb system, and *SST-282* *Space Station* digital delay line and reverb system synthesiser.

● **Woelke:** new *ME 302L* and *ME 302D* wave analysers and new *POLA* floppy disc magnetic head system. Also full range of professional record, playback and erase heads; wow and flutter meters; wave analysers; and bias/distortion meters.

● **Zoot Horn:** range of modular recording and PA mixing consoles.

● **Studio Sound:** editor Richard Elen and assistant editor Noel Bell will be attending the Convention together with advertisement manager Phil Guy. Copies of the magazine will be available from our stand. ■

DOUBLE PRECISION EQUALIZATION ONE-SIXTH OCTAVE



SERIES 4301
ACTIVE EQUALIZERS

- 1/6 Octave** offers TWICE as much TUNING RESOLUTION as 1/3 Octave.
- Our **1/6 Octave** Equalizers are COST-EFFECTIVE HYBRIDS of **1/6 Octave** and broader bandwidth filters, typically 1/3 Octave. The **DOUBLE RESOLUTION** is concentrated where you need it the most for your tuning application.
- Recording Studio Control Rooms and other Small Volume Rooms tend to have more acoustic problems below 1000 Hz than above. Models 4301 and 4303 offer 28, **1/6 Octave** bands from 40 Hz through 900 Hz plus 13, 1/3 Octave bands from 1000 Hz through 16 kHz.
- As the volume of rooms increase to Auditorium or Gymnasium sizes, the acoustic

problems tend to rise in frequency. Models 4310 and 4311 offer 29, **1/6 Octave** Bands from 180 Hz through 4.5 kHz plus 12, 1/3 Octave bands from 31.5 Hz through 160 Hz and 5000 Hz through 10 kHz.

- We have a **1/6 Octave** equalizer **OPTIMIZED FOR SPEECH**. The Model 4240 concentrates **DOUBLE RESOLUTION** in the **SPEECH INTELLIGIBILITY** band with broader bandwidth filters to trim either side.
- Quick and efficient installation of these new equalizers is made possible by the **MODEL 200 SIGNAL ANALYZER** which features inexpensive, field plug-in, **INTERCHANGABLE FILTER SETS**.
- Call or write us for all the details.

ONE SIXTH OCTAVE REALTIME ANALYZERS AVAILABLE

White instruments, incorporated
P.O. Box 698 AUSTIN TEXAS 78767
PHONE AREA 512/892-0752

Distribution in U.K. & Western Europe
SCENIC SOUNDS EQUIPMENT
97-99 Dean St., London W1 Tel: 734-2812

At last you can put sounds on tape exactly as they happen. Because 3M's sensational new Multi-Track Digital Mastering System has arrived in Europe.

The 3M Digital System isn't just better than any form of analogue recording. It's an entirely new concept. And what a concept!

Tape-generated noise disappears. Wow and flutter drop to zero. Signal-to-noise goes up beyond 90 Db (without additional noise-reduction equipment). Print-through becomes impossible. Copy degeneration is nil.



Uriah Heep (above) and The Beat. Just two of the top groups attracted to 3M's New 32-Track Digital Recorder at The Roundhouse

No wonder top recording studios like The Roundhouse and The Town House are already turning to the 3M Digital System. No wonder top groups are insisting on recording the digital way.

You've got to hear it to believe it. Phone Derek Stoddart at 3M (0344-58398) to arrange a demonstration, and give your ears the surprise of their life.

Mincom Products
3M United Kingdom Limited
P.O. Box 1
Bracknell, Berkshire, RG12 1JU

IT'S HERE!

THE FIRST AND ONLY 32-TRACK DIGITAL MASTERING SYSTEM



3M and Mincom are Trade Marks



Interior design

Part one

RUPERT Neve stated the case very succinctly in the first four lines of his article: "A studio has to be an ideal environment enabling creative work to be carried out with a minimum of frustration or disturbance."

This is undeniably correct and it only remains to add: "but this environment will differ very considerably according to the programme requirements."

Facilities that will satisfy a pop group will be unsuitable for a symphony orchestra or a drama presentation, or more recently, a video production, and since one cannot please all of the people all of the time, the poor interior designer is often forced to accept a certain degree of compromise in the hope that he will please the majority most of the time. It would be ideal if he were able to design for a specific purpose, albeit radio, television or recording, but space and more often financial restrictions make it necessary for him to design in some degree for multi-purpose use, and this is not always as difficult as might first be imagined.

This article is basically a follow on from Mr Neve's and attempts to provide sufficient information for the successful achievement of suitable environments for most situations. It is intended to be more practical than theoretical and where applicable, will point out the many myths and pitfalls which still abound even in the most modern studios.

Any studio, from the smallest talks studio to the largest orchestral studio or dubbing theatre, must be considered in its entirety. It must be made suitable for its purpose both technically and aesthetically, provide comfortable and acceptable working conditions for those using it and, most important of all, provide that environment which will enable the artistes, cast or orchestra to give their best.

The very first question one should consider, is 'For what purpose is the studio to be used?' and then 'Will its use be confined to radio, recording, television or video, or will it be a combination of any of these uses?'. If a harmonious and successful result is to be achieved, no design can even be considered until the answers are firmly established.

These basics resolved, it follows that the ambient noise levels and acoustics, ventilation, lighting, decor, furnishings, technical facilities (other than the actual apparatus—which does not form part of this

Rupert Neve in his article Basic Studio Acoustics and Design (Studio Sound, October 1980) considered the structural aspects of recording and broadcast studios. Here Norman Bone offers equivalent thought on the no less important questions of interior design, furnishings and fitments.

article) down to the chairs on which the performers sit, should be eminently suitable for their purpose. The best course to pursue in dealing with these many and diverse requirements is to divide them into sections in order of priority, as follows:

1. Structural items

This refers to those items which should be built into the structure rather than applied to it.

2. Structural fittings

These are items applied to the structure.

3. Ancillary fittings

These may be constructed or purchased externally and placed in the studio after completion of sections 1 and 2.

Truly a comprehensive list and capable of many interpretations but all items are important to the user and, if dealt with methodically and practically, by no means insurmountable as we shall see.

Assuming that we have a building 'shell' which, if the architect has done his homework, has an acceptable ambient noise level, the interior design can now commence.

Structural items

Ventilation/air-conditioning

This is really the province of the architect in conjunction with the air-conditioning contractor, but these systems are the major source of background noise if the studio has been designed with a satisfactory ambient noise level, and the comfort of users is primarily dependent on the installation of a satisfactory system.

These two factors are of paramount importance to the success of any studio so here is food for thought on a subject which is often overlooked or thought to be of little consequence.

Two recent experiences highlight the lack of thought given to the provision of a suitable system. In the first case the system produced high velocity jets of air accompanied by enough noise to do justice to a steam locomotive standing in a main line railway station and in the second the

studio was almost completed when it was realised that no provision at all had been made for any air-conditioning. The omission was 'rectified' by the installation of long lengths of snake-like convoluted tubing suspended from the studio ceiling, with ghastly results to the final appearance.

Surprisingly, it is still not generally realised that a good sound insulated studio is virtually airtight, and to make it workable in any sense, regular changes of air must take place. Since one cannot extract air from such an airtight cell without suffocating the occupants, an equal amount of air must be fed in.

In all cases therefore, be it studio, control room or recording room, there has to be a separate intake and extract system.

Dealing firstly with the noise problem, this would seem an appropriate point to define satisfactory ambient noise levels. A chart similar to Fig 1 is used by most experienced studio designers and sets out the various types of studio, and their maximum permissible noise levels. These curves include any ventilation noise and vary from approximately NR15 to NR25 and here lies our first problem. Commercially designed air-conditioning systems used in open-plan office areas, theatres, etc, frequently have a noise rating of about NR40, which is not apparent and quite acceptable in those environments since it is generally masked by the higher ambient noise level of the area concerned—quite frequently NR60 in a busy office area.

Such a system in a studio would be useless, and it cannot be stressed too strongly that the maximum permissible noise rating of any studio system should not exceed NR20 when fully operational as in mid-summer conditions.

In small areas such as interview studios this is readily achieved. Relatively small fans installed on external walls of the building and connected to suitable trunking of sufficient length will usually provide sufficient air changes in the studio provided that a separate (and silent) heating system is available in the studio.

Larger studios, or groups of

several studios with ancillary working areas will require the installation of a properly designed plant system and the services of an experienced air-conditioning contractor. This may involve the use of mixing and recirculating chambers, heating and refrigeration units, condensers, attenuators, dampers, thermostatic controls, etc. Since these are beyond the scope of this article the advice of the architect and contractor should be sought, but certain necessities remain constant.

If possible, the plant room should be in a separate enclosure to the studio structure, or at least as far from the studios as financial considerations will allow. Intake and distribution of fresh air should be by large centrifugal fans avoiding types of compressor as these nearly always produce vibration and rumble. All machinery with moving parts should be mounted on anti-vibration mountings, preferably on an isolated concrete base.

Between separate parts of the system, ie fans, ducting, etc, flexible couplings will minimise the transmission of noise from one section to the next. Large area ducting is preferable—what is required is a large slow moving mass of air, not a high velocity jet.

All ducting should be internally insulated, particularly intake ducts, to further reduce the air flow noise. This is usually achieved by gluing scrim-faced mineral wool about 1in thick weighing 5 to 8lb/cu ft to the inside of the duct with the scrim facing outwards. External lagging of ductwork is also necessary. A similar material which is foil-coated on the outside is usually used. These two laggings will reduce duct resonance and 'ringing' and should effectively reduce 'crosstalk' between ducts, and noise pick-up where the ducts pass through working areas such as workshops, test rooms and maintenance rooms.

All duct hangers should be suspended by anti-vibration mountings and ductwork isolated from the hangers by the use of felt strips.

Each area should be supplied with individual intake and extract ducts and both taken back as far as possible to the main plant before being joined to their respective terminal points. It is useless to allow the same duct to serve both studio and control room as the programme or conversation in one would be immediately transmitted to the other. Sharp bends in the duct runs should also be avoided as

Norman Bone (Shone Sound Ltd)

they cause turbulence and therefore noise and where ducts bridge cavity walls flexible connections or canvas bellows should be inserted across the air gaps.

Spreading the studio's air intake and extract over a number of grilles (ideally six to 12) evenly spaced round the studio walls or at least over the full length of one wall, will lower the velocity at any one grille and ensure the dispersal of the air flow over a large area. The intake grilles should be near the ceiling (even in the ceiling if possible) and the extract grilles near the floor to provide good air circulation and prevent interaction between intake and extract. If the ceiling of the studio is to be a cast concrete slab, the holes for the ducting will need to be cast into the slab as it is virtually impossible to cut them out once the slab is completed. The air flow at the face of any intake grille should not exceed 250cu ft/minute to minimise air flow noise.

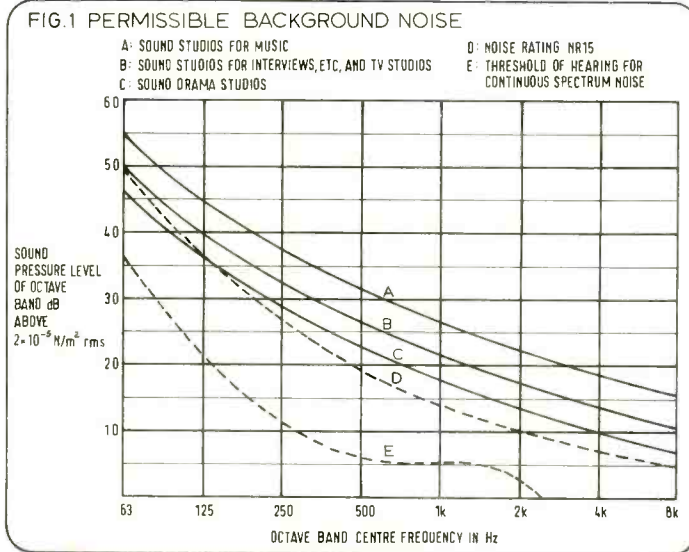
If it is at all possible to provide a plenum (expansion) chamber say over the top of a drum booth or vocal booth, this has the advantage of assisting an even flow of air over a large area of the studio and reducing air flow noise to a minimum. Any such chamber should be acoustically treated internally.

The comfort of the studio's users is also important and the system's capacity can be calculated bearing in mind a number of factors.

Estimate the maximum number of persons using the studio at any one time, and calculate the heat dissipation at 0.25kW/person/hour, ie 20 persons would be $20 \times 0.25 = 5\text{kW/hour}$. Add the total heat dissipation of lighting and equipment, say 40kW/hour. For economic reasons, since the studio will seldom be working at its maximum capacity for a maximum continuous period, calculate the plant capacity at 80% of this value, ie $45\text{kW} \times 0.8 = 36\text{kW}$. The plant should therefore be capable of dissipating 36 to 40kW continuously while maintaining a thermostatically controlled temperature of 69°F (21°C) $\pm 4^\circ$ whatever the outside temperature.

Heating batteries and refrigeration plant will obviously be necessary in nearly all cases other than the smallest studios, but it is normal to recirculate some of the warm air extract to assist with winter conditions.

Extremely dry air can not only cause sore throats but also be responsible for severe damage to some musical instruments in orchestral



studios. Double basses and violins have been known to split when left in dry air conditions so some form of humidity control should be installed which will maintain a relative humidity of 55% ($\pm 5\%$) when the outside conditions do not exceed 85°FDB or 70°FWB .

The system should be capable of providing no less than 15 complete air changes per hour for comfortable working conditions. Perhaps it is not generally realised but a large scale TV production would have to shut down within 15 to 20 minutes if the air-conditioning should fail, as working conditions would become unbearable.

Most of these facts and figures will be known to any experienced air-conditioning contractor and therefore dealt with in the general design. They are included here primarily to show that there is no cheap and easy way of overcoming ventilation noise problems and providing comfortable working conditions, and sufficient financial allowance must be made in the costing of any studio design. It is useless having an otherwise perfect control room or studio if the users cannot work in it.

Electrical wiring

The electrical requirements for any studio or control room area, should have been discussed and agreed long before building commenced and the electrical contractor should have designed the system accordingly. The provision of the mains supply, switchgear, distribution and installation are outside the scope of this article but the necessity of separate

circuits for both lighting and power requirements and the positions at which they appear on the inside of the studio walls are of paramount importance and are detailed below. The terminations of these various circuits and the fittings will be discussed later under Structural Fittings.

All studios will require certain, if not all, of the following separate circuits: (a) lighting—for TV, video or film purposes, general and domestic; and (b) power—technical and domestic.

The capacity of lighting circuits for TV, video or films will depend on the size of the studio and the nature and complexity of the productions envisaged, but in all cases they must comprise a separate supply direct from the mains intake distribution board and should enter the studio through the walls at high level, normally some 3 to 4ft below ceiling level for reasons described later. The capacity of these circuits is likely to be some 50kW upwards.

General lighting circuits are totally independent from the previous item and relate either to the lighting required at times other than when production is taking place or, in the case of sound or recording studios, will provide the main studio lighting for production purposes. These circuits should also enter the studio at a high level.

A third separate circuit is also necessary to provide low-level general lighting for cleaning and tidying purposes and where the use of the main lighting would be a waste of energy and create unwanted heat.

Technical power refers to the main

studio circuits. In TV and video studios two independent supplies will be necessary—one to supply the power required for the cameras, and the other to supply power for electrical instruments, mic power, cue lights, signal lights, etc. As in the case of lighting, these circuits should enter the studio at high level.

A few outlets will be required inside the studio for the use of vacuum cleaners, soldering irons, etc, and these should be separate from the technical supply so that any fault developing on these will not affect the technical power and shut down the studio.

Stress has been laid on the position of entry into the studio of all the above circuits for a very good reason.

Every engineer will know only too well that one of the worst problems to cure in any studio or technical installation is that of hum. This occurs only too frequently where mains cabling runs adjacent to technical cabling, particularly mic runs, and in some of the circuits mentioned we are talking in thousands of watts not just a few.

One method of avoiding this, which has been adopted with great success, is to bring all the electrical circuits into the studio as near to the ceiling as possible, bringing them vertically down the walls to their terminating or switching points, and to run all the technical circuits (mic cables, etc) in suitable ducts at floor level and take them vertically up the walls to their respective terminations.

If sufficient thought is given to this method hum will be reduced to an absolute minimum as mains and technical cables are separated by a maximum distance and approach their termination points diametrically opposed. Descriptions of suitable termination fittings will also be detailed later under Structural Fittings.

If at any point mains and technical cables do have to cross they should do so at right angles.

Fig 2 shows a typical layout for power and lighting distribution.

Doors

This item refers, of course, only to access doors to the studio(s) and ancillary technical areas. All other areas, such as maintenance rooms, storage areas, test rooms, etc, can have normal domestic doors fitted.

Commonly called 'sound-proof' or 'acoustic' doors, the more correct term, particularly in view of the

50 ▶

Trades Descriptions Act, would be 'sound resisting'. Together with the observation windows, they normally form the two weakest links in the sound isolation of the studio and care must be taken in their design and installation.

A multitude of designs have been tried over the years with varying degrees of success. Some 10 years ago, it was quite usual to construct a form of door slab with a hollow core which, when completed was filled with dry sand. More or less successful, the disadvantage revealed itself when it became necessary to drill holes, for door handles or other fittings. Quite often too, the door would bulge at the bottom when the sand settled. Similarly, other hollow-core slabs were filled with a concrete mixture, which gave great mass, but

these also tended to bulge, and providing any door furniture such as door closers, push plates, kicking plates and handles became a major operation. Ironically, the great mass, and consequently weight, became a disadvantage due to the effort required to push them open. Not all our lady artistes are Amazons.

Latterly it has been found that a more standard but satisfactory form of construction can be utilised which will provide a sound isolation value of 35dB upwards over most of the frequency range, without any of the previous disadvantages, and the majority of the doors now being installed adopt this form of design. Basically, they consist of a solid core construction formed by using layers of high density inert material to prevent twisting and warping,

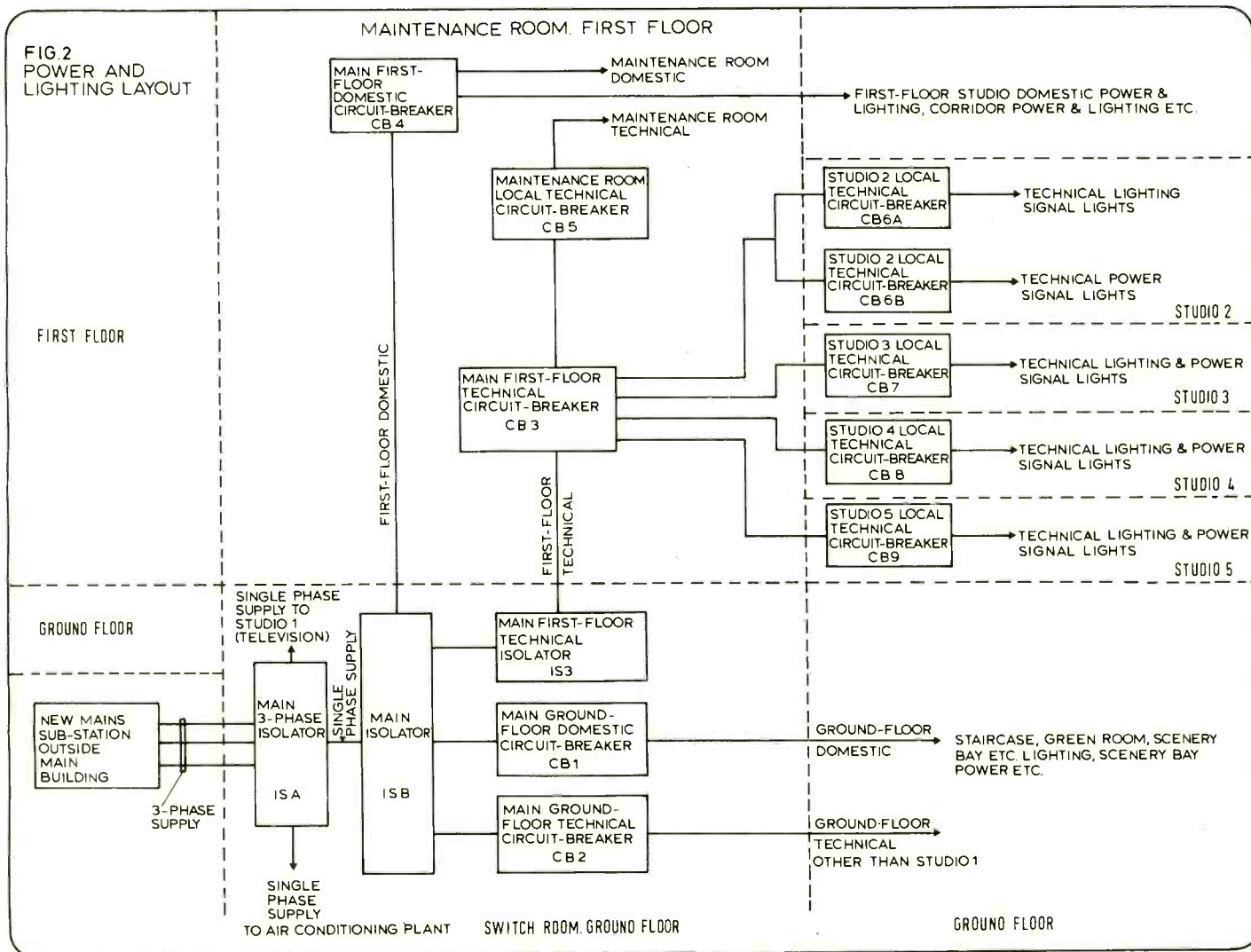
between which is sandwiched a complete layer of at least 4lb/sq ft lead. These are glued together under pressure and additionally screwed when pressed. This composite slab is then faced on both sides with the required finish, and finally hardwood lipped for resistance to wear. Asbestos sheets have been used as part of the inert core, but these have now been discarded due to the health hazard. Such a door slab of 2¼in or 2½in thickness will weigh about 2cwt, and provide sufficient mass and sound isolation if properly hinged into a suitable frame with an appropriate seal.

In a high-class door of this type, the door slab would be constructed first, and then fitted and hinged into a solid hardwood frame specifically made to fit each individual slab with

a maximum gap of 2mm between door and frame. At least three 4in solid-drawn brass hinges, steel-bushed for long service, would be used and handles would be bolted through and not screwed, with the nuts being covered on the other side by a push-plate.

Even this form of construction demands the addition of some form of sealing, and many types have been tried, from foam-rubber to phosphor-bronze strip, all of which appear to deteriorate with use. Without doubt the most satisfactory is the concertina-type continuous magnetic strip which, when correctly rebated into the door frame and mated with a mild steel strip similarly rebated into the appropriate door edges and threshold, provides what is virtually

52 ▶



Series 800. Designed to leave the final design to you.

A completely new console system, designed to give the creative engineer the sound he desires in the professional 8- and 16-track studio or, as an advanced specification concert, theatre or stage monitor mixing console.

The Soundcraft Series 800 is enriched with all of the technological developments that enhance the Series 1624 studio console, whilst providing total flexibility to the discriminating engineer in any situation demanding a high quality 8 buss mixing console.

This total flexibility means that the engineer's exacting demands can be fully realised, with a series of module options built into one unit.

With two sizes of mainframe to accommodate 18- or 32-channels, you can obtain the console custom-built with the choice of input and output modules for your particular creative application.

You can use the Standard Input Modules and four Double Recording Output Modules to achieve a superb 8- or 16-track studio console with 16-track monitoring.

Or, choose the Standard Input Modules with four Double PA Output Modules each containing two full-function effects return channels, for a highly versatile front-of-house PA Console. The Series 800 on-stage Monitor Input Modules provide up to ten independent mixes which is also ideal for

theatre sound.

And, of course, the console is enriched with all those thoughtful Soundcraft touches which are typical of the complete range of Soundcraft products.

Series 800 is the flexible system that gives you all the creative options without compromising your demands. Tough, compact and beautifully finished, the Series 800 mixing console is designed especially for professionals by Soundcraft – Masters of Quality.

Send the coupon for further details and full technical specifications or telephone your nearest dealer as listed below.




The new Series 800 mixer system from Soundcraft.

- Australia: Klarion Enterprises Pty. Ltd. Melbourne (31) 613801
- Austria: Kapla Vienna 02 2292 97
- Canada: McKeen Productions Ltd. Ottawa (613) 236 0393
- Denmark: SLT Copenhagen 01-341284
- England: Turnkey London (01) 440 9221
- Finland: Studiotec Helsinki 90 520604
- Germany: Hausmann Concert Electronic Berlin (030) 433 6097
GTC Studiotechnik München (089) 2971 71
Klever Studiotechnik Hamburg (040) 690 1044
Thum and Mahr Audio Leverkusen (Köln) (021 734) 1600
- Holland: Selectronic B.V. Uithoorn 02975 60 600
- Italy: AEG Telefunken Milan (02) 6266
- Japan: Hibino Electro Sound Inc. Tokyo (03) 8644961
- Norway: Tal and Ton Oslo (02) 20 97 05
- Sweden: Tal and Ton Gothenburg (031) 80 36 20
- Switzerland: Professional Audio Systems Basle (061) 504151
- USA: Soundcraft Inc. (616) 382 6300

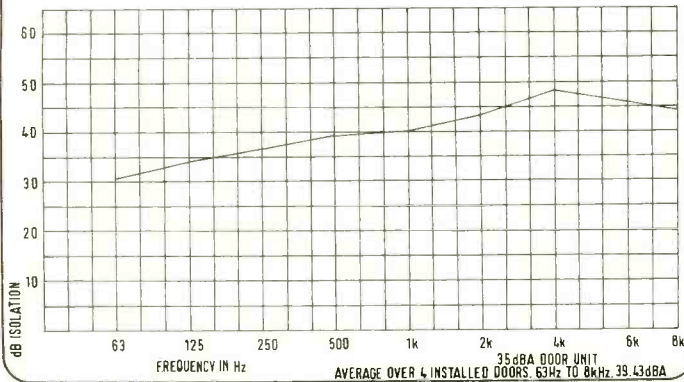
Please send me further details of the Series 800 mixer console and full technical specifications.

Name _____ Position _____
 Studio/Company _____
 Address _____
 Tel: _____

Soundcraft.
Masters of Quality. 

Soundcraft Electronics Ltd., 5-8 Great Sutton Street,
 London EC1V 0BX. Telephone: 01-251 3631. Telex: 21198.

FIG. 3
ACOUSTIC DOOR UNIT ISOLATION VALUES



an airtight seal around the complete door periphery when the door is closed, and what is airtight is good for sound isolation. Furthermore, this type of seal holds the door gently but firmly closed against draughts and air pressure, while still leaving it easy to open, and no locks, catches or bolts are necessary, unless for security reasons. The main reason this type of seal has been so successful is that there is no rubbing action whatever, and the life of the seal can be estimated at 10 to 15 years without deterioration.

This type of complete door unit is now in commercial production, and can be fitted by two competent carpenters in about four hours with the secure knowledge that a guaranteed isolation value will be achieved, provided always that any gaps between door frame and structure and/or the builder's subframe are fully sealed with mastic and finally covered by an architrave. Experience has shown that any sound leakage occurs at these points, and under the threshold rather than through the door itself. Fig 3 shows an isolation curve for a standard commercially produced door of this type.

The size of the door, or more importantly, the actual clear door opening space is very important and, regrettably, many cases are found where this opening is too small. Normal domestic doors are usually 2ft 6in wide and 6ft 6in high, and even in the smallest studio the clear opening width should be at least 2ft 10in and the height could well be 6ft 8in with advantage. In metric figures this becomes about 870 x 2,000mm and Fig 4 shows a typical example. These sizes ensure that such items as trolley, electric organs and even pianos can be wheeled in and out without damage to either instrument or door surfaces.

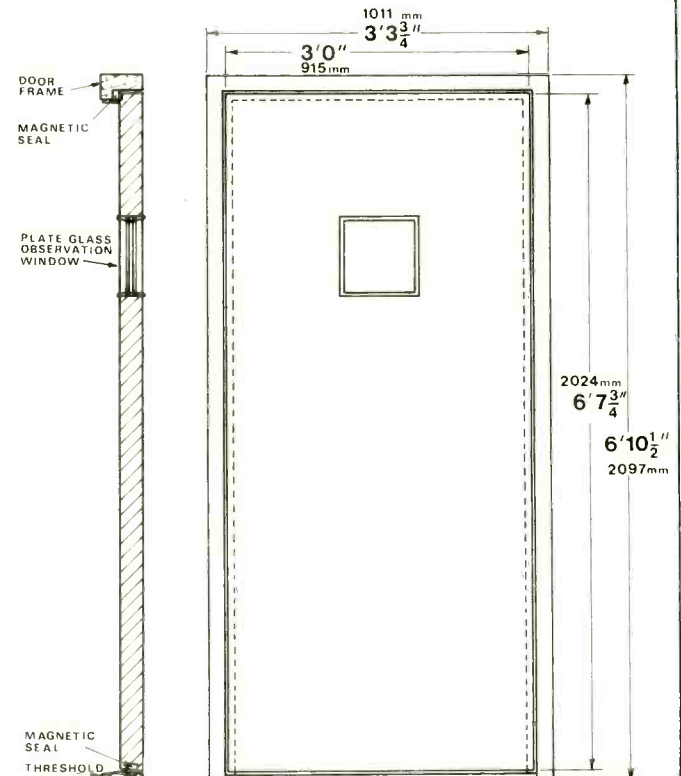
It is quite usual to have a small (9in

square) double-glazed observation panel inserted in the door so that, without entering, it can be seen whether the studio is in use, but primarily to ensure that nobody is coming out at the same time as someone wishes to enter. Being hit in the face by a 2cwt door is not the most pleasant experience.

In larger studios where large musical instruments such as grand pianos are employed, double doors are usually installed. These consist of two leaves in one frame and sizes up to 8ft square are frequently used and present no difficulty in manufacture. In these cases a magnetic seal is provided where the two leaves meet, thus maintaining the sound isolation.

Door surfaces can be in plywood for subsequent painting, veneered plywood (or hand-veneered in most timbers to match the studio woodwork), many of the excellent laminates available, steel for fire protection and latterly, with great success, carpet recessed into the hardwood lipping, providing further sound-absorption and quite remarkable resistance to wear and tear.

FIG. 4
SOUND RESISTING STUDIO DOORS



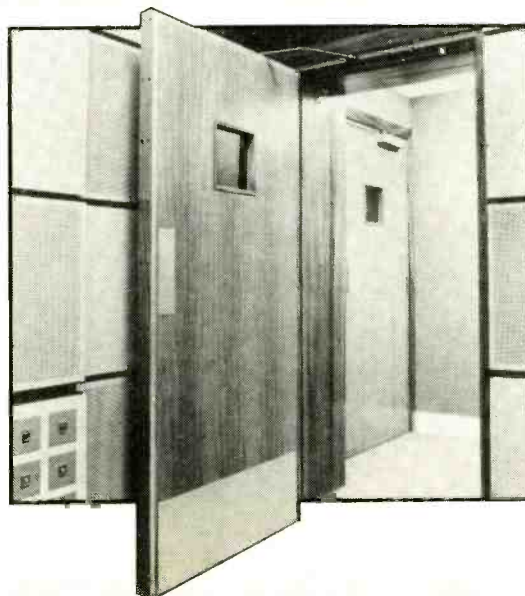
Two such doors should always be fitted between adjacent working areas, preferably with a small sound lobby between. Fig 5 gives a typical example. With such a sound lobby acoustically treated in a simple manner, sound isolation of 55 to 60dB between areas is easily obtainable.

For television studios, doors up to 12ft high and 10ft wide are available, if somewhat costly and these are normally used where studios are adjacent to television scenery storage areas, or even external areas such as car parks or where drive-in facilities exist. Such doors usually have two layers of lead and increased thickness up to 4in but are still capable of being hinged with special hinges.

The older continental method of a plain rubber seal compressed by a form of cold storage lever type handle is now obsolete in the UK and is indeed frowned upon by the authorities particularly because of the fire risk.

Handles, push-plates, kicking-plates should be fitted to the completed door in a finish to match the studio decor, and finally a heavy duty spring closer. This latter item should be adjusted to close the door gently and not to slam it shut as in practice the magnetic seal takes over during the last 1/2 in of door travel and holds the door closed.

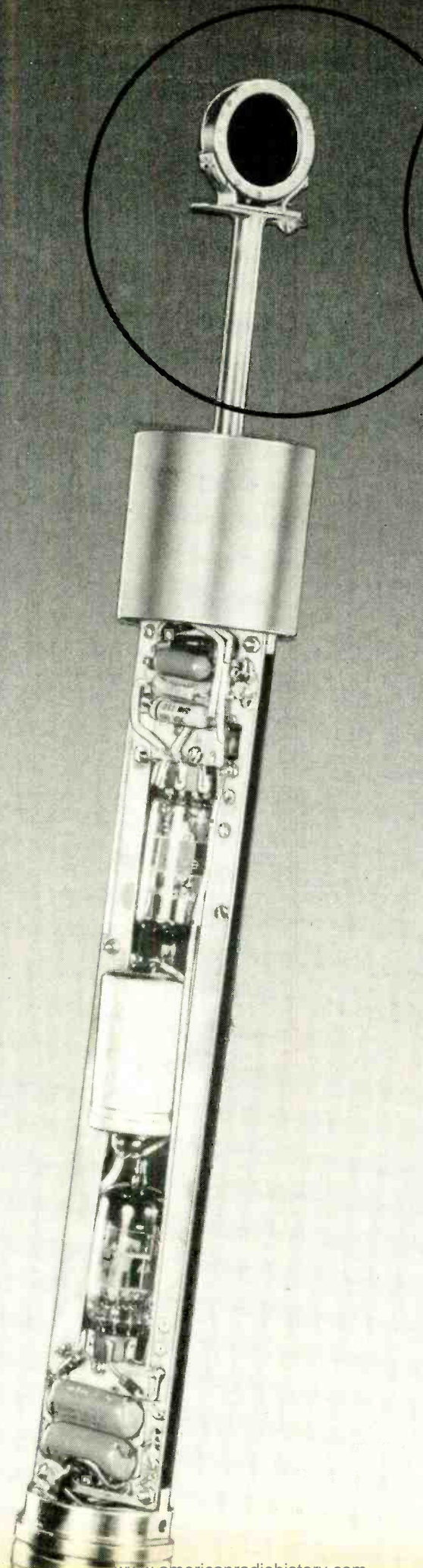
FIG 5



To be continued

AKG

ACOUSTICS



AKG – the ideal partner for professionals

AKG is an Austrian company engaged in basic research, development, manufacture and marketing of sophisticated and mostly professional audio products.

Sheffield Lab is an American company engaged in direct disc recording and acquired an excellent reputation in this field. Consequently, Mr. Doug Sax, the President of Sheffield Lab, made the following statement:

“For the demanding standards of our custom microphone electronics, Sheffield Lab uses microphone capsules manufactured by AKG. On many of our recordings, the professional microphone of choice is also AKG”.



AKG Acoustics Limited
191 The Vale, London W3 7OS.
TF: 01-749 2042 (5 lines) TX: 289 38 (akgmic g)

AKG Akustische u. Kino-Geräte Ges. m.b.H.
Brunhildengasse 1, A-1150 Wien, Austria
TF: (43 222) 92 16 47, TX: 131839 akgac a

AKG Acoustics Inc.
77 Selleck St., Stamford
Connecticut 06902 U.S.A.
TF: (203) 348 2121 TX: 84451121

Survey: furnishings

AUDIO KINETICS (UK)

Audio Kinetics (UK) Ltd, Verulam Road, St Albans, Herts AL3 4DH.
Phone: 0727 32191. Telex: 299951.

Acoustic screens

Range of three acoustic screens for improving separation between musicians etc. Available in half screen size of 41 x 39in and full screen sizes of 41 x 90½in with Model O having an observation window. Construction is within welded metal frames with supporting legs/castors at staggered heights to enable use of screens at right angles. Ground clearance of ¾in with castors 1¼in wide so they will not crush cables. Both faces are treated with a layer of Rockwool and this is then covered in a choice of coloured durable sisal fabrics.

Prices: Model S half size £190, Model A full size £265, Model O with window £265, Model R acoustic roof version £90.

AUTOCUE (UK)

Autocue Products Ltd, 265 Merton Road, London SW18 5JS.
Phone: 01-870 0104.

809 signal system

Portable cue system with two slave signal screens each with three separate messages that can be altered by the user. Mains powered. Complete system fits into suitcase for transport.

BE (USA)

Broadcast Electronics Inc, 4100 North 24 Street, PO Box 3606, Quincy, Illinois 62301.
Phone: (217) 224-9600.

UK: Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP.
Phone: 09322 43124. Telex: 928475.

Control room furniture

Range of broadcast studio furniture comprising single and double turntable cabinets and desk top table. Dimensions of single turntable cabinet 22in wide by 22in deep and 29in high. Double cabinet is twice the width. Area below turntable contains two 17½in panel openings for 19in rack mounting equipment. All equipment finished in 'Summer Pecan' wood grain Formica on vertical surfaces with 'French Blue' Formica tops. The desk top mounts on single or double cabinets or can stand on own metal legs.

BRABURY (UK)

Brabury Electronics Ltd, 119A Loverock Road, Reading RG3 1NS.
Phone: 0734 52434. Telex: 848760.

Type T802 tally light unit

Tally light panel for 19in rack mounting. Capable of holding up to five separate lamp assemblies. With models using less than five lamps, the spare space is used as a ventilation grille. Choice of lens colours, panel colour with symbols engraved to order and 12 or 24V dc operation.

T702 status light unit

Light unit carried on wall mounting fitting. 12/24 dc or ac mains operation available. Choice of lens colours with status symbols to order.

Type 115 script light unit

Script light available in two length sizes, 28 or 40in. with adjustable light beam control allowing light to be directed and minimise scatter on video monitors etc. Power 200/250V ac 50/60Hz. Fluorescent tube lighting element.

CANFORD AUDIO (UK)

Canford Audio, Stargate Works, Ryton, Tyne & Wear NE40 3EX.

Phone: 089422 4515. Telex: 537792.

USA: Canford Audio (USA) Inc, 652 Glenbrook Road, Stamford, Connecticut 06906.
Phone: (203) 348-4969. Telex: 643678.

Studio acoustic tables

Range of tables for use in broadcasting studios with a hexagonal shape as standard with sizes of 42 and 48in across flats. Also rectangular shape 60 x 30in. Acoustically absorbent top surface. Constructed from polished solid mahogany with detachable legs, circular hole in table centre of hexagonal type for cables etc. Several options available including choice of fabric colours and fitting of jack sockets on each face.

Price: £235 to £251.

Acoustic script lecterns

Designed to match acoustic tables. Constructed from polished mahogany with absorbent material on both sides of script panel. Height and angle of panel set by brass stay. Folds flat for transit. Custom versions available with extra facilities.

Price: £84.

Illuminated signs

Range of illuminated signs, rectangular with screen printed legend. Standard colour red with standard legends, other choices to special order. Uses 40/60W bulbs.

Price: £27.50.

DJ and control room chairs

Range of chairs manufactured in Italy by Vertebra, available in various colours with or without arm rests. Chairs are fabric finished and mounted on castors and feature unique bracing mechanisms to allow the seats and backs to adjust to posture.

Price: £136 without arms; £155.50 with arm rests.

Custom joinery

Canford offer a custom joinery service and can quote for all types of console, cabinet, rack, screens, etc, construction to customer requirements.

CUSTOM AUDIO (USA)

Custom Audio Electronics, 2828 Stommel Road, Ypsilanti, Michigan 48107.
Phone: (313) 482-6568.

Littlite

Gooseneck lamp for lighting control panels, turntables and work areas. Available in two versions; Littlite 1 with 360° swivel base, dimmer and quick release connector for removal of lamp; Littlite 2 as 1 but non-swivel action, permanent base mounting and high/low/off switch. Gooseneck sizes of 6, 12 and 18in. with range of accessories. 12V operation from WXF wall plug power supply for up to 4 Littlites.

Prices: L-1 kit with power supply \$44.95 L-2 kit with power supply \$34.95.

ELRACK (UK)

OK Machine & Tool (UK) Ltd, Dutton Lane, Eastleigh, Hants SO5 4AA.
Phone: 0703 610944.

Elrack enclosures

Range of 19in DIN rack systems and accessories. Units include cabinets, chassis units, cooling systems, module kits, extrusions, desks and consoles.

FUTURE FILM DEVELOPMENTS (UK)

Future Film Developments, 36/38 Lexington Street, London W1R 3HR.
Phone: 01-437 1892. Telex: 21624.

Racks and cabinets

Range of instrument cases, racks and cabinets constructed from mild steel and with a wide range of accessories. Numerous heights and depths of cabinet are available all to the standard 19in instrument housing width. Fittings available include chassis runners, vertical mounting angles, castor or static plinths, blank panels, and rear or side doors.

LEXOR (UK)

Lab-Aids Ltd, New Lodge, Ashorne, Warwick CV33 9QN.
Phone: 092-685 209.

Quiet-Chamber MkIII

Totally enclosed sound-insulated booth which is transportable, fitted with lighting, power points and 2-speed ventilation all ready to use. Can be erected by two people with only a spanner in 20 minutes claim the manufacturers. Interior fittings include desk and carpet. All the individual panels of the chamber fit through standard door widths. The Mk III model features double glazed windows with 50mm separation. Claimed sound attenuation from 20dB to 40dB at 2kHz. Several options and accessories available.

MICRO-TRAK (USA)

Micro-Trak Corporation, 620 Race Street, Holyoke, Massachusetts 01040.
Phone: (413) 536-3551. Telex: 955497.

UK: Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP.
Phone: 09322 43124. Telex: 928475.

Series L broadcast furniture

Complete system of furniture for broadcast studio applications allowing assembly into wide variety of formats. All furniture finished in Formica laminates in standard colours of Summer Pecan with Adobe Gold. Other colours and replacement panels available. Range includes single and double bay turntable cabinets, console table surfaces, and tables, corner console table and a wide range of accessories.

Tape cartridge racks

Range of three racks; 'Lazy Susan' L-72 holds 72 carts in a rotary format for use at a console, L-90

To the audio professional, when a compressor or limiter is needed to tame the potentially disastrous consequences of uncontrolled level or to create special effects, one name stands out as the best: UREI.

Studio Standards for more than a decade, the compressors and limiters from UREI have earned their way into thousands of recording, mastering, and broadcast installations around the world.

Because we built our reputation for unparalleled professional performance and quality with our compressors and limiters, we have continuously advanced their engineering and technology to offer more reliability, features and performance. When you need the fastest, quietest and most flexible gain control instruments available, you can be totally assured that these products will prove to you why they've earned the title — Studio Standard:

The Model LA-4

A single channel, half-rack unit with patented electro-optical attenuator. Featuring smooth, natural sounding RMS action, it offers selectable compression ratios, a large VU meter, adjustable output and threshold levels and stereo coupling.

The Model 1176LN

A peak limiter which features adjustable input and output levels; individual attack and release time controls; selectable compression ratios; switchable metering; and

stereo coupling. The 1176LN is the most widely used limiter in the world.

The Model 1178

A two channel version of the 1176LN in a compact (3-1/2") rack mounting design. Featuring perfect tracking in the selectable stereo mode, it additionally offers selectable VU or Peak reading meter ballistics.

From One Pro To Another — trust all your toughest signal processing needs to UREI.

The UREI Compressor/Limiters



F.W.O. Bauch Limited

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

UREI From One Pro To Another

United Recording Electronics Industries
8460 San Fernando Road, Sun Valley, California 91352 (213) 767-1000 Telex: 65-1389 UREI SNVY
Worldwide: Gotham Export Corporation, New York 10014 (212) 741-7411 Telex: 12-9269 GOTHAM NYK

See your professional audio products dealer for full technical information.

Survey

for wall or free standing holding 90 carts, L-18 wall or console mounted with space for 18 carts. All three models match the Series L furniture.

QRK (USA)

Broadcast Electronics Inc, 4100 N 24th Street, Quincy, Illinois 62301.
Phone: (217) 224-9600. Telex: 250142.
UK: Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP.
Phone: 09322 43124. Telex: 928475.

Broadcast furniture

Range of furniture for broadcast applications. Constructed from 3/4in composition board and finished with walnut grain sides and white tops in plastic laminate. Other finishes and colours to order. Range includes heavy duty desk, single turntable bay FP-1, double turntable bay FP-2, turntable plinth for desk top operation SB-7, semi-portable console with room for double turntables and mixer SP-1, portable console similar to SP-1 without storage space; light weight portable version of P-7 known as P-2; matching tape carousels with 72 or 200 cart capacity TC72 and TC200.

RAT (UK)

RAT Manufacturing, 17/18 Great Sutton Street, London EC1.
Phone: 01-251 2437.

Music stands

Versatile range of music stands constructed from black nylon covered steel. Various configurations can be produced from the basic stand and a number of interchangeable accessory parts. Basic stand has a 3-point solid base, adjustable height, and hooks to eliminate trailing wires and provide convenient wiring storage. Accessories includes music and instrument trays, demountable single or double bulb lamps (double insulated), and a fully adjustable mic boom.

RUSLANG (USA)

Ruslang Corp, 247 Ash Street, Bridgeport, Connecticut 06605.
Phone: (203) 384-1266.

RL300 tape transport console

Table-top tape transport console of wooden construction. Unit will accept any 19x15 3/4in tape transport including Scully, Ampex, MCI and Otari transports. Deck of console is canted at a 12° angle and is tiltable for access to the electronics. A 19in wide instrument overbridge with variable height setting is also available. An accompanying unit is the RL350 rack base mounted on castors. The units may be used in tandem as a roll around console.

SHONE (UK)

Shone Sounds Ltd, 16 Bentley Way, Whitehall Road, Woodford Wells, Essex IG8 0SE.
Phone 01-504 9796.

Table cue light TLW/1

Solid polished hardwood base with totally enclosed lamp fitting. Plated lens holder and choice of five differing lens colours. Used with standard 15W pigmy lamp. Model TLW/2 is similar but contains two cue lamps and can be fitted with switches for reverse cueing.

Floor cue light FLW/1

Stove-enamelled cast iron tripod base, anodised aluminium stem, hardwood cone and plated lamp fitting with coloured lens. Total height is 44in and comes with 6m of 3-core or screened cable. Twin light version known as FLW/2 can be fitted with switches for reverse cueing.

Wall signal lights

Available in flush WLF or surface WLS mounting versions with single, double or triple cue lights. Box is constructed from steel and welded at all angles. Front panel stove-enamelled in silver-grey hammer finish. Chrome or nickel plated lens holder and glass lens in choice of colours. All bulbs 230V 15W pigmy but low voltage versions available, 24V or 50V. Additionally the box can be fitted with low voltage relays to switch 230V lamps.

Wall signal lights TWLS

Very similar to WLS surface mounting signal lights

but with a larger lens for use in areas where the ambient light is of a higher intensity such as TV studios. Lens is 3 1/4in compared to 2in on the standard unit. Available in single, double or triple light versions.

Illuminated signs

Illuminated cue signs matching the cue signal lights but with wording to customers requirements. Information panel constructed from perspex and lit by 30W tubular lamp. Multiple units available.

Table microphone stand TMS/W

Uses solid polished hardwood base identical to that of the table cue lamp TLW/1 but with a metal plate and threaded boss instead of lamp holder. The boss is machined to 3/8in diameter and 27 turns/in and will accept most mic fittings. Alternatives can be supplied if requested.

Acoustic talks table AT/1

Hexagonal acoustic table with four layer top surface to absorb incident sound while remaining acoustically transparent. Three legs positioned to allow the use of the table by one to six people without interference. Table width of 48in across any two flats and 30in high. Centre hole for mic stand or cables. Headphone jacks may be fitted under table rim. Legs removable for transport.

Another style of table is also made, known as AT/2, rectangular with the long length being 48in with no centre hole. Intended to accommodate one or two people.

Custom joinery

Shone can provide a wide range of custom furniture and fittings to order.

TURNKEY TWO (UK)

Turnkey Two, 8 East Barnet Road, New Barnet, Herts EN4 8RW.
Phone: 01-440 9221. Telex: 25769.

Acoustics absorbers, fittings, etc

Turnkey Two are suppliers of panel, cavity, slat and porous acoustic absorbers, including full range panels for concert halls. A wide range of door and window furniture is also available. The company can also supply custom designed studio and equipment furniture. Other facilities include the provision of ventilation and lighting equipment.

ULTIMATE SUPPORT SYSTEMS (USA)

Ultimate Support Systems Inc, 1808 E Lincoln, Fort Collins, Colorado 80524.
Phone: (303) 493-4488.

Versa-Table

Lightweight portable table for mixing consoles, projectors, sound equipment etc. Each leg is independently adjustable with seven height settings, no long braces and tiltable surface. Can be used to straddle row of auditorium seats or uneven surfaces. Top size 22 x 44in with maximum load of 260lb. Table weight 131lb.

Portable loudspeaker stand

Lightweight portable loudspeaker stand of foldable design. Capable of supporting narrow column or wide bass enclosure loudspeakers weighing up to 300lb. Two height settings and tilt facility. Stand weight 12lb.

WADSWORTH ELECTRONICS (UK)

Leonard Wadsworth & Co (Electronics) Ltd, Unit F, Imber Court Trading Estate, Orchard Lane, East Molesey, Surrey KT8 0DA.
Phone: 01-398 4288. Telex: 892335.

Cable trunking

Range of PVC cable trunking available in 12 sizes and featuring a double locking cover. Special fixing kit required.

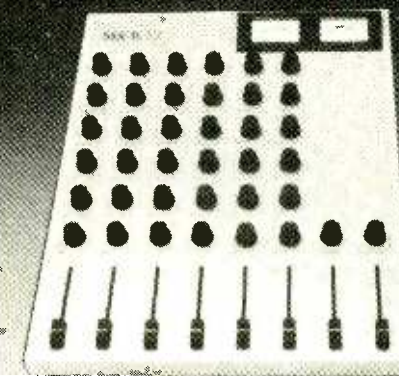
WHARTON (UK)

Wharton Electronics, 42 High Street, Princes Risborough, Bucks.
Phone: 08444 3849.

401 display clock

Large display clock suitable for wall or console mounting. Uses 2in high 6-digit LED display and has a quartz crystal time base. Accuracy claimed to be better than 2s per week. Features rechargeable batteries to overcome mains failure; an automatic brightness control for various ambient light conditions; and can be provided with a security lock to prevent tampering.

THE 8 HOUR 6 IN 2 OUT



Faster IC's, lower noise and a new meter pod are featured in the latest version of our classic mixer. Each input has wide range gain, treble, bass, foldback, echo and pan controls, with echo return and VU type meters on the outputs.

SECK 62 comes built and tested or in kit form. Construction takes about eight hours with the minimum of tools, following the comprehensive 32 page assembly and fault finding manual. (You can purchase the manual separately at £3.00, refundable against purchase of the mixer). A ten in, four out version, SECK 104, featuring pre-wired mixdown and monitor mix is also available. SECK mixers are used extensively for recording, PA, radio, AV and keyboards.

SECK 104 Ass'd £325.00
62 Ass'd £130.89
62 Kit £92.60

All prices + VAT

For full information on specs. and accessories contact:

BANDIVE Ltd, 8 East Barnet Road, NEW BARNET, Herts., EN4 8RW
Phone 01-440 9221

Available from:

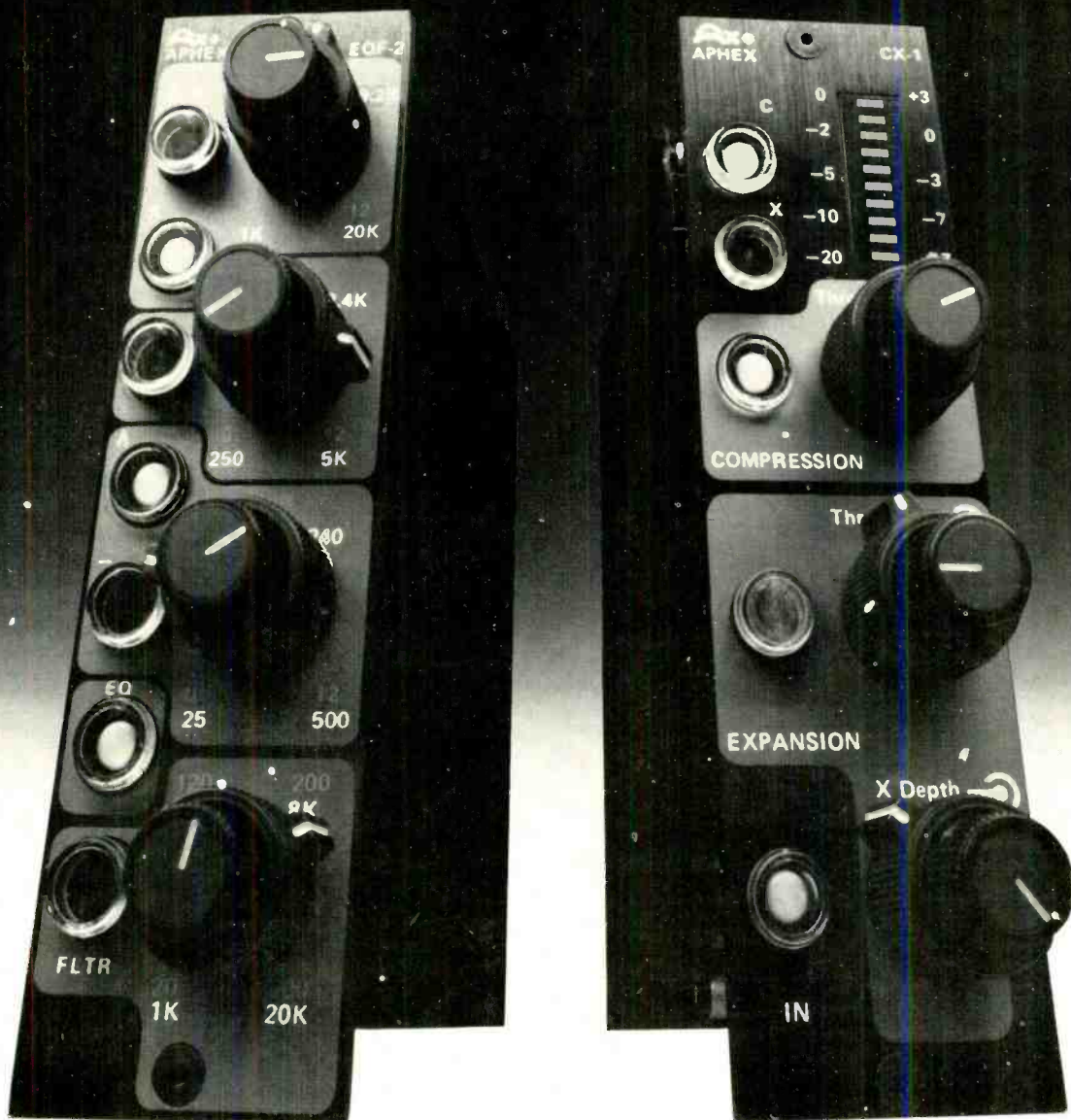
REW: 01-836 2372

SES: 01-458 9133

Turnkey: 01-440 9221

Music Lab: 01-388 5392

Buzz Music: 0432 52016



TOOLS...NOT TOYS

Already well known for its musicality and ultra low noise, the EQF-2 Equalizer/Filter packs 3 bands of sweep EQ with peak/shelf and 12 dB of reciprocal boost or cut as well as an independent sweep hi and lo pass filter section in an A.P.I. sized module. With +30dBm output capability, the EQF-2 can fix that impossible part without adding any coloration of its own.

The CX-1 Compressor/Expander offers performance beyond any similar device previously available. Total transparency, headroom to spare, up to 100 dB of expansion/gating without clicks, smooth acting "soft knee" compression and unique multi-function LED metering. It is simple to use, compact, powerful and effective.



ApheX Systems Ltd. 7801 Melrose Ave., Los Angeles, Ca. 90046
(213) 655-1411 TWX 910-321-5762 or: ApheX offices worldwide

Also available through: AKG Acoustics (U.K., Germany, Austria) Sound Genesis (San Francisco) Cramer Video/Audio (Boston) International Equipment Reps (La Jolla)

Survey: designers update

ALANGROVE BUILDERS LTD

9 Lancaster Mews, Hyde Park, London W2 3QQ UK.
Phone: 01-402 7071. Telex: 261705.

Facilities: Services range through acoustic design, building, air-conditioning, electrical installation and one-off control room furniture. Alangrove will construct from either supplied plans, or from notes on the back of an envelope. Complete construction crews can be supplied worldwide, or just a foreman with local labour being recruited. Recent projects have included Mobile One; Molinare Studios, London (including caretakers flat!); Red Bus, London; Trafalgar Studios, Rome; Utopia Studios, London and supervision for CBS/Sony in Tokyo.

AUDICON CONSULTANTS INC

1200 Beechwood Avenue, Nashville, Tennessee 37212, USA.

Phone: (615) 256-6900. Telex: 554494.

Principal staff: Claude Hill (Pres).

Consultancy: not the company's principal source of income.

Facilities and personnel: provide recording studio consultancy.

AUDIO DATA LAB

Katarinavagen 18, S-11645 Stockholm, Sweden.

Phone: 08 44.58.65/23.34.35.

Principal staff: Ingemar Ohlsson.

Consultancy: the company's principal source of income.

Facilities and personnel: include drawing office, acoustic measurement facilities, wiremen, electrical and electronic engineers with associates for carpentry. Recent projects have included control room for EMS Stockholm; Club Privee Disco Stockholm; Folkparkernas Centralorganisation Theatre and Auditorium. Other areas of involvement include PA systems, noise control and interfacing recording studios. Equipment supplied only if not available from a regular supplier. Electro-acoustic research laboratory.

Fees: Fees are based on time.

AURAL DESIGNS INC

PO Box 81067, Pittsburgh, Penn 15217, USA.

Phone: (518) 521-1104.

Principal staff: Robert Kerr (Pres).

Consultancy: the company's principal source of income.

Facilities and personnel: include drawing office, acoustic measurement facilities, wiremen, with associates for architects, electrical and electronic engineers. Recent projects include Studio for College of St Rose; WAMC radio Albany NY; WTEN (TV) Albany NY; Alliance Church, Balston. Manufacture low frequency and broadband panel absorbers, reverberation chambers and reverberation enhancement systems. Services can vary from provision of designs to turnkey installation.

Fees: usually based on time.

BERATUNGSBURO FUR BAU—UND RAUMAKUSTIK GmbH

Niendorfer Hohe 36, D-2000 Hamburg 61, West Germany.

Phone: 040 551 5355.

Principal staff: Wolfgang Jensen.

Consultancy: the company's principal source of income.

Facilities and personnel: provide 'consulting,

calculation, supervision and measurements'. Projects have included numerous studios in West Germany including Studio Maschen; Sunrise Studio; Tonstudio N; Sinus, Berlin; Olympia Studio; Studio Craamer, Netherlands; Studio Lewis, Paris.

CLYDE ELECTRONICS LTD

Ranken House, Blythwood Court, Anderston Cross Centre, Glasgow G2 7LB, UK.

Phone: 041-221 5906/041-248 3001.

Principal staff: John Lumsden, Phil Collins.

Consultancy: not the company's principal source of income.

Facilities: provide a design, supply, installation and commissioning service for the broadcast industry. Projects have included Radio Tay, Dundee; Radio Clyde, Glasgow; and Mobile Two mobile recording studio. Manufacture an expanding range of sound broadcast equipment. Also offer a broadcast equipment consultancy service.

DYMA ENGINEERING

PO Box 1697, 213 Pueblo Del Sur, Taos, New Mexico 87571, USA.

Phone: (505) 758-8686.

Principal staff: Carroll Cunningham, Michael Ziomko.

Consultancy: not the company's principal source of income.

Facilities and personnel: includes drawing office, carpenters, mechanical, electrical and electronic engineers. Recent projects include Sound Studio, KANW radio, KOKH TV, Plaza Theatre, TCA auditorium. Manufacture specialised disco cabinetry.

Fees: based on time and project value.

LAKESIDE ASSOCIATES

306 West Third Street, Suite 300, Los Angeles, Cal 90013, USA.

Phone: (213) 843-6916.

Principal staff: Carl Yanchar (Pres), Steve Fouce (Ex-VPres).

Consultancy: the company's principal source of income.

Facilities and personnel: provide acoustic design services from selection of site past completion to fine tuning. Provide experienced construction supervision or an entire crew. Design and installation of complete electronic and electrical systems.

MBM ASSOCIATES INTERNATIONAL

Triumph House, 1096 Uxbridge Road, Hayes, Middx UB8 8QH, UK.

Phone: 01-573 8333. Telex: 934271.

Consultancy: the company's principal source of income.

Facilities and personnel: carry out a complete independent consultancy service, covering facilities, financial budgets and project plans, and also provide staff for a project.

LESLIE F MOORE ASSOCIATES

22 Devonshire Avenue, Dartford, Kent DA1 3DW, UK.

Phone: 0322 21527.

Principal staff: Leslie Moore.

Consultancy: the company's principal source of income.

Facilities and personnel: drawing office, acoustic measurement, mechanical and electrical

engineering services. Associates for architecture and surveying. Specialise in noise and vibration control.

Fees: based on time.

NEVE ELECTRONICS INTERNATIONAL LTD

Cambridge House, Melbourn, Royston, Herts SG8 6AU, UK.

Phone: 0763 60776. Telex: 81381.

USA: Rupert Neve Inc, Berkshire Industrial Park, Bethel, Connecticut 06801.

Phone: (203) 744-6230. Telex: 969638.

Consultancy: not the company's principal source of income.

Facilities: Neve's Turnkey System division offers a design, supply, installation and commissioning service for almost any requirement. Projects have included national broadcasting, local radio, outside broadcast, and music recording. The service is available worldwide.

RECORDING STUDIO SERVICES

156 Chambers Street, New York, NY 10007, USA.

Phone: (212) 964-4097.

Principal staff: Jim Jordan.

Consultancy: the company's principal source of income.

Facilities and personnel: offer audio systems design, installation and maintenance, also providing custom items such as monitor switchers. 'Great attention paid to interfacing the chosen hardware'.

THEATRE PROJECTS GROUP

10 Long Acre, London WC2E 9LN, UK.

Phone: 01-240 5411.

Principal staff: Brett, Collison, Wise.

Consultancy: the company's principal source of income.

Facilities and personnel: includes drawing office, architects and mechanical, electrical, electronic engineers, associates for acoustic measurement facilities, wiremen and surveyors. Other facilities include project management and television system design. Recent projects include Barbican Theatre, Nottingham Concert Hall, Toronto O'Keefe Centre, Rainbow Rooms, teaching studios for Emirates University. Many other services in connection with theatre systems offered.

Fees: Based on time and project value with some fees always included in project cost.

JOHN A WEBB

3 Holly Road, Hampton Hill, Middx TW12 1QF, UK.

Phone: 01-979 8828.

Principal: John Webb.

Consultancy: the company's principal source of income.

Facilities and personnel: able to give advice on all aspects of the design, construction or modifications of buildings, and depending upon a clients requirements includes, site/premises appraisal, feasibility studies, outline and detailed designs, obtaining statutory approvals etc, obtaining competitive tenders or negotiating a contract from suitable contractors, inspection during constructions etc. Recent projects include Angell Sound Studios, Riverside Recordings, Wharf Music and Blackwing Studio.

Fees: normally the RIBA percentage, or part thereof, or hourly basis.



TSM- Mixing with Style

Trident Audio Developments Limited
 Post No 38, Studios Road, Shepperton, Middlesex, England.
 Telephone: Chertsey (09328) 60241 Telex: 8813982

Agents Worldwide:
America Studio Maintenance Services, California. Tel: 213-877-3311 Empirical Audio, New York. Tel: 914 762-3089 Phil Reddish Stereo Inc., Ohio. Tel: 216-885-1222 Wilson Audio Sales, Tennessee. Tel: 615 794-0155 Harris Audio Systems Inc. Florida. Tel: 305 944 4448 **Australia** John Barry Group, Sydney. Tel: 61-2-439-6955 **Belgium** Navies, Brussels. Tel: 32-2-734 31 38 **Canada** Radio Services Inc., Montreal. Tel: 514-342-2511 **Finland** Into OY, Helsinki. Tel: 90-742-133 **France** Lazare Electronics, Paris. Tel: 33 1 878 62 10 **Italy** Audio Products International, Milan. Tel: 392 27 29 51 **Japan** Nissho Electronics Corporation, Tokyo. Tel: 03-544-8400 **New Zealand** Mandrill Recording Studios, Auckland. Tel: 793222 **Norway** Protechnic AS, Oslo. Tel: 02-45 05 54 **South Africa** Leepty (Pty) Ltd., Johannesburg. Tel: 27 11 48 3821 **Spain** Neotechnica SAE, Madrid. Tel: 34 1 242 09 00 **Sweden** Stage 8 Studio KB, Kungälv. Tel: 0303-503-48 **Taiwan** Linfair Eng. Ltd., Taipei. Tel: 321-4454/7



Survey: acoustic materials

AUDIO KINETICS (UK)

Audio Kinetics (UK) Ltd, Verulam Road, St Albans, Herts AL3 4DH.
Phone: 0727 32191. Telex: 299951.

Sonapanel Acoustic System

System of modular absorbers for wall and ceiling mounting. Supplied as complete system comprising absorbers tuned for peak absorption at 45, 70 and 112Hz with a fourth module acting on the frequencies above 250Hz. It is claimed that the application of a complete system will lead to a linear absorption curve across the frequency spectrum. To achieve this, three modules of the 45Hz and the 250Hz type have to be used with one of each of the other types. Audio Kinetics supply formulae for the calculation of the required number of complete systems for any control room, overdub booth and studio area, with a choice of two reverberation times. Each panel is 34 x 16in with thickness varying from 3½ to 9½in dependent on module type.

Price: panel of eight absorbers £275, separate absorber panels 45Hz £40, 70Hz £35, 112Hz £33, 250Hz £30.

AURAL DESIGNS INC

PO Box 81067, Pittsburgh, Penn 15217, USA.
Phone: (518) 521-1104.

Manufacture low frequency and broadband panel absorbers, reverberation chambers and reverberation enhancement systems. Details on application.

DUNLOP (UK)

Dunlopillo Division, Dunlop Ltd, Coronation Road, Cressex Industrial Estate, High Wycombe, Bucks HP12 3SB.
Phone: 0494 26210.

Dunlop produce a wide range of polyurethane foams for sound absorption purposes. Thicknesses and formats can be supplied for almost any application ranging from acoustic panels, and loudspeaker linings to foam wedges for anechoic chambers.

PRITEX (UK)

Pritex (Plastics) Ltd, Wellington, Somerset TA21 8NN.
Phone: 082347 4271.

Audiprene acoustic foam

Range of acoustic foams specially formulated to give specific absorption characteristics over a wide range of applications including anechoic wedges, loudspeaker cabinet linings, etc. The foam is available in sheet, pad, roll or pressed shape formats.

Auditex acoustic laminates

Range of laminates incorporating *Audiprene* foam with different facings. Available in roll, sheet or pad formats, the laminates may be in either flexible or decorative forms. Thicknesses and finishes depend upon the intended application.

ROCKWOOL (Denmark)

Rockwool A/S, DK-2640, Hedehusene, Denmark.
Phone: 03 16.16.16. Telex: 58157.
UK: Rockwool Co (UK) Ltd, Wern Tarw, Pencoed, Nr Bridgend, South Wales.
Phone: 0656 862621. Telex: 497346.

Range of products made from mineral wool with the principal advantage of being non-combustible. Acoustic uses are only a small part of total applications of Rockwool and so there are a wide variety of products and the ones detailed here are the items with specific acoustic uses.

Rockwool Slabs

Resin bonded Rockwool in flexible and rigid slabs. Standard size of 23½ x 35½in with range of densities and thickness. The lighter density slabs are flexible and the heavier are rigid, making the flexible slabs suitable for insulation of ceilings and partition walls while the rigid slabs are used for impact isolation of floating floors.

Rockwool Firebatts

Semi-rigid Rockwool fire insulation slabs for continuous use at temperatures up to 825°C. Standard slab size of 23½ x 35½in in a choice of four thicknesses. Acoustic uses for sound absorption in high temperature areas.

Rockwool Rocklit Board

High density rigid and self-supporting board in sizes of 35½ x 47¼in. Acoustic uses include insulation of ceilings, walls and ductwork.

Rockwool Rollbatts

Resin bonded insulation in rolls of 118 and 157in lengths, three widths and three thicknesses. For acoustic insulation of ceilings and partitions.

Rockwool Wingmats

Resin bonded Rockwool mat insulation faced on one side with windproof paper and on the other with plastic coated paper vapour barrier. Sound insulation of partitions.

Rockwool Noise Absorbers

Semi-rigid Rockwool slab enclosed in white plastic sheeting or in galvanised framework with mineral tissue facing. Acoustic application is noise reduction in industrial premises by suspending vertically from ceiling.

Rockwool Rockfon Acoustic Ceilings

Sound absorbent panels and tiles in a range of facings. Intended for mounting in suspended ceilings.

SHONE (UK)

Shone Sound Ltd, 16 Bentley Way, Whitehall Road, Woodford Wells, Essex IG8 0SE.
Phone: 01-504 9796.

Modular Acoustic Boxes

Modular sound absorbers of three different types. Designed by the BBC and made under licence. Type B is a bass absorber with maximum absorption between 70 and 250Hz while type WB has a wider absorption band of 90Hz to 3kHz. The

third is type W and is seldom required, having an absorption band of 90Hz to 8kHz. Dimensions of the three types are identical but they can all be supplied in metric versions of 580mm square by 183mm deep or linear of 23¼in square and 7¼in deep. Also can be produced in 600mm or 24in square or shallower formats. Weight for each module is 15lbs approx. The module is secured to wall or buttons by four brass picture fixings mounted on the back. The front panel may be sprayed to the customers required colour.

Acoustic Door Unit AD/1

Door and frame unit in single or double sizes with each door adapted to customers requirements. Designed with as great a mass as is financially economic, the door construction consists of a complete lead sheet in a 5-layer laminated dense material with hardwood lips and an overall thickness of 2¼in. The door alone weighs over 200lbs and the frame is made from solid, kiln-dried hardwood with a threshold. Frame is built around the door to ensure fit to 2mm precision. Finish to order. Magnetic seal. Can be supplied with 9in observation window, double glazed. Sound insulation of 35dB and greater than 55dB for two doors with separating lobby.

SONEX (USA)

Illbruck USA, 3800 Washington Avenue North, Minneapolis, MN 55412.
Phone: (612) 521-3555.
USA: Alpha Audio, 2049 West Broad Street, Richmond, Virginia 23220.
Phone: (804) 358-3852.
UK: Canford Audio, Stargate Works, Ryton, Tyne & Wear NE40 3EX.
Phone: 089422 4515. Telex: 537792

Sonex Acoustic Foam

Open-cell urethane plastic foam available in four foot square panels with standard thicknesses of 2, 3 and 4in. The exposed surface is contoured with an anechoic wedge pattern to increase the effective absorption. Available in a range of colours with one major advantage being that it does not require covering as the finish is attractive to look at. It is fixed to walls and ceilings etc by staples or mastic. The manufacturers claim a uniform absorption curve over the frequency range. An alternative form of Sonex is known as Audiotiles and comes in 15in square panels of 2in thickness.

VARITONE (UK)

Industrial Acoustics Co Ltd, Walton House, Central Trading Estate, Staines, Middlesex.
Phone: 0784 56251.

Varitone absorption system

System of rectangular sound absorption panels suitable for wall or ceiling mounting. Available in lengths up to 12ft and in thicknesses of 2 or 4in, the panels are manufactured from vinyl coated 0.76mm steel front and rear faces with an infill sandwich of acoustic material. The panels have noise reduction coefficients of 0.95 and higher and feature a high degree of sound absorption in the range 63Hz to 125Hz.

EVENTIDE CLOCKWORKS

Sets the standard for Signal Processing



H 949 HARMONIZER

Pitch change: one octave up, two down. Delay: two outputs each 393.75 ms. Micro pitch change. Time reversal. Repeat. Randomized delay. Flanging. High and low feedback E/Q. Two selectable algorithms. Frequency response: 15 khz. Dynamic range 96 dB.



H 910 HARMONIZER

Pitch change: one octave up, one down. Delay: output one, 112.5 ms output two, 82.5 ms. Frequency response 12 kHz. Dynamic range: 90 dB. Feedback control.



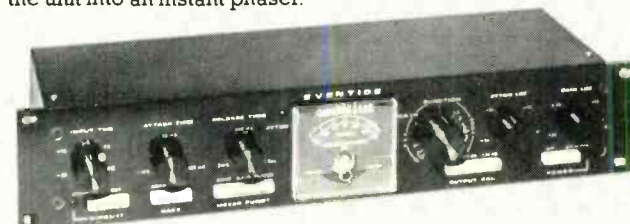
FL 201 INSTANT FLANGER

Simulates true tape flanging, initiated by an internal oscillator, manual control, remote control or envelope triggering. Now available with the interchangeable B.P.C. 101 card which turns the unit into an instant phaser.



BD 955 BROADCAST DELAY LINE

Designed specifically for the broadcast industry and is primarily intended for the policing of live transmissions. There are three maximum delay times available 1.6, 3.2 or 6.4 seconds plus a unique program dump and catch up facility.



2830 OMNIPRESSOR

The Omnipressor combines the characteristics of a compressor, expander, noise gate and limiter in one package.



JJ 193 DELAY LINE

Four outputs, each with up to 510 ms of delay, independently switchable in 2 ms steps. Extra delay is optional to a maximum of 1.022 or 2.046 secs. Frequency response: 12 kHz. Dynamic range: 90 dB.



R.D. 770 MONSTERMAT

Mono/Stereo Matrix unit. The Monstermat solves the problem of tape phasing and noise on cartridge machines.



1745M DELAY LINE

Up to five outputs, each with a maximum of 320 ms of delay (640 ms in the double mode) selectable in 20 μ steps. Optional modules available include a pitch changer, and a remote control module which controls the delay line with a micro-computer. Frequency response: 16 kHz (8 kHz in 'double' mode). Dynamic range: 90 dB.



U.K. Distributors

Feldon Audio Ltd.,

126 Great Portland Street. London WIN 5PH Tel: 01-580 4314. Telex: London 28668.

Harmonizer, Instant Flanger, Monstermat and Omnipressor are trademarks of EVENTIDE CLOCKWORKS Inc.

Survey: engineers

ABADON/SUN INC.

PO Box 6520, San Antonio, Texas 78209, USA.

Phone: (512) 824-8781.

Principal staff: Galen Carol (pres), Woody Smith (V pres).

Principal sources of income: equipment supply and studio design services.

Areas of activity: studio installation service, Indian Creek Recording.

ACOUSTILOG INC.

19 Mercer Street, New York, NY 10013, USA.

Phone: (212) 925-1365.

Principal staff: Alan Fierstein (Pres).

Principal source of income: services.

Areas of activity: complete electro-acoustic calibration facility including Time Delay Spectrometry equipment. Mechanical workshop for drilling, milling and engraving for sheet metal work. Studio maintenance service by contract or on demand available 24 hours, Transformation Studios. Installation service Hudson Sound, Zeami Studios, La Tierra Sound Studios. Design of test equipment for own and other consultancy uses.

AUDIO GRAPHIC SERVICES

1516 Ferris Avenue, Royal Oak, Michigan 48067, USA.

Phone: (313) 544-1793.

Principal staff: Edward J. Wolfrum, Scott Randall.

Principal source of income: services.

Areas of activity: well equipped electronic workshop including spectrum analyser, XY plotter, acoustic computer. Mechanical workshop with drill, press and lathe. Studio maintenance service on contract or on demand, K&R Recording Southfield; National TV News Detroit, Filmcraft Laboratories Detroit. Available 10-7pm daily with other times at O/T. Emergency service any time to established clients. Studio installation service, equipment design and evaluation.

AUDIO INTERNATIONAL

424 Grant Avenue, Scotch Plains, New Jersey 07076, USA.

Phone: (201) 322-4466.

Principal staff: Warren C Slaten, Sybil V White, Eric M Slaten.

Principal source of income: equipment and services are supplied equally.

Areas of activity: electronic workshop with full test bench, mechanical workshop for light custom fabrication, studio maintenance service by contract and on demand with a 24-hour service offered, studio installation service and equipment evaluation. These services are part of a wider studio service offered including initial studio preparations and consultations, to training operational staff if required.

AUDIO LABORATORIES (LEEDS)

3 Kildare Terrace, Leeds LS12 1DB, UK.

Phone: 0532 440378.

Principal staff: Phil Pimblott.

Principal source of income: not stated.

Areas of activity: fully equipped electronic workshop Gould-Advance, Farnell, Sound-Technology, Woelke, Philips, test tapes. Mechanical workshop used only for assisting in general overhauls and manufacture of unavailable parts. Studio maintenance service by contract and on demand with 'panic service' available Ric-Rac Leeds, Mark's Studio Wetherby, Harvestime Bradford. Principal business is the repair and recalibration of professional audio equipment.

AUDIO VISUAL SYSTEMS.

Unit 2, West Parade Industrial Estate, Halifax, West Yorkshire HX1 2TF, UK.

Phone: 0422 58600.

Principal staff: Richard Lockyer.

Principal source of income: services and supply.

Areas of activity: electronic and mechanical workshop. Full service facilities, project design and small assembly work with all test equipment including chart recorders and acoustic analysis. Studio maintenance service available 24 hours with answering machine for out of hours use which is attended hourly. Equipment design, evaluation and modification including turnkey audio installations for Mecca Ltd throughout UK.

THE AUDIO WORKSHOP

7 The Grove, Harrogate, N Yorks HG1 5NN, UK.

Phone: 0423 57653/57751.

Principal staff: N J Stockdale, P Meakes.

Principal source of income: services.

Areas of activity: electronic workshop with complete repair, prototype, test and measurement facilities. Mechanical workshop. Studio maintenance by contract or 24 hours on demand Crammer Studio and Celdon Jingle Studios. Studio installation service Crammer and Celdon, PA maintenance Magna Carta, Wally. Equipment design and evaluation. Claim to design, repair and maintain any electronic product.

BAY AREA STUDIO ENGINEERING

54 Ney Street, San Francisco, California 94112, USA.

Phone: (415) 469-0136.

Principal staff: Michael Gore.

Principal source of income: services. No equipment sales.

Areas of activity: electronic workshop with full range of test equipment including real time 1/2-octave analysers. Mechanical workshop with basic metal working requirement. Studio maintenance service on demand, Fantasy Records, Aurora Studios, Music Annexe, Funky Features etc. Studio installation service, Aurora Studios. Equipment design and evaluation service.

BROADCAST ENGINEERING SERVICES

The Old Chapel, Chantry, Nr Frome, Somerset BA11 3LJ, UK.

Phone: 0373 84562.

Principal staff: Jeff Gibson, John Cole.

Principal source of income: services.

Areas of activity: studio installation service, design and implementation of television and audio, static or mobile systems. Capital Radio, Transkei.

CLYDE ELECTRONICS LTD.

Ranken House, Blythwood Court, Anderston Cross Centre, Glasgow G2 7LB, UK.

Phone: 041-221 5906/041-248 3001.

Principal staff: John Lumsden, Phil Collins.

Principal source of income: manufacture of sound broadcast equipment.

Areas of activity: supply, installation and commissioning of equipment primarily in the broadcast field. Installation of Radio Tay, Dundee. Broadcast maintenance service Radio Clyde, Glasgow. Also design and consultancy service for broadcast equipment, and supply of mobile recording and OB vehicles.

COURT ACOUSTICS

35/39 Britannia Row, London N1, UK.

Phone: 01-359 0956.

Principal staff: Stephen Court.

Principal source of income: services and equipment supply.

Areas of activity: test and research workshop, acoustically treated listening and measurement room, installation of studio monitoring systems, the Music Centre Wembley, The Sol Studios,

Majestic Studios London; PA design, Pink Floyd, Roxy Music, Hot Chocolate, equipment design. Specialists in electro-acoustics, measurement and correction for stage monitoring, broadcast and TV monitoring, theatres, concert halls and clubs.

ELECTRONIC SERVICES

35 Vicarage Road, Wednesfield, West Midlands WV11 1SE, UK.

Phone: 0902 726846.

Principal staff: T F Billau (Prop).

Principal source of income: services.

Areas of activity: electronic workshop for maintenance, repair, design and construction. Mechanical workshop equipped for basic metal work. Studio maintenance service on demand at any time subject to other commitments. Equipment design, mixer for use with Nagra recorder, microphone battery packs, PA mixers. Operates mainly in the field of PA and sound reinforcement with additional services to freelance recording engineers, equipment hire and supply companies.

ELLIOTT BROS (AUDIO SYSTEMS) LTD

9 Warren Street, London W1, UK.

Phone: 01-360 0511.

Principal staff: Bruce Elliott.

Principal source of income: services.

Areas of activity: electronic workshop with equipment including 1/2-octave analyser, B&K equipment and test tapes. Mechanical workshop for minor metalwork and speaker reconing. Studio maintenance on demand with 24-hour service. Studio installation service Sain Studio, Roundhouse Studios, Radio Mercia Coventry, Devonair Exeter.

HF ENGINEERING

24a Trinity Road, Richmond, Surrey TW9 2LD, UK.

Phone: 01-948 5669.

Principal staff: Hugh Ford.

Principal source of income: consultancy services.

Areas of activity: extensively equipped electronic workshop for audio and general electronic measurements including acoustic measurements. Equipment includes B&K, Tektronix, Hewlett Packard, Radiometer. Facilities for automated measurements. Mechanical workshop for construction of prototype equipment. Equipment design, magnetic tape coating monitors, B/H loop tracers, magnetic tape evaluation systems, equipment evaluation for *Studio Sound* and various manufacturers and importers of audio equipment and recording materials. Construction of prototype electronics.

MIKE JONES AUDIO CONSULTANT ENGINEER

31 Parkfield Avenue, Eastbourne, Sussex BN22 9SE, UK.

Phone: 0323 52300.

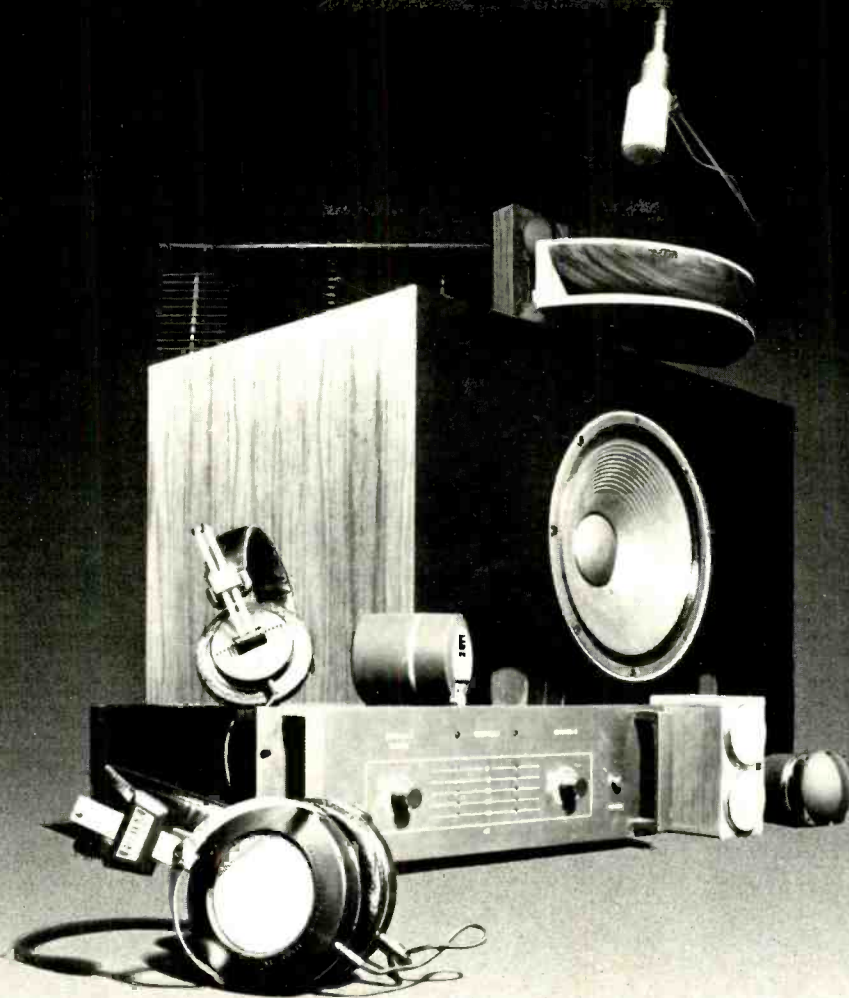
Principal staff: Mike Jones.

Principal source of income: services.

Areas of activity: electronic workshop with full facilities, B&K test equipment, for repair and maintenance. All mechanical work by associates. Studio maintenance service by arrangement with client, equipment evaluation for various manufacturers and magazines. Main aim of company is to provide full evaluation service with additional services of noise and acoustic measurement, electronic servicing, installation of all professional sound equipment.

GORDON J KING (ENTERPRISES) LTD

7 North Boundary Road, Brixham, TQ5 8LH, UK.



FOSTEX.

Our business is precision sound.

We manufacture studio monitors and components, microphones, amplifiers and stereo headphones. Our equipment does not intrude upon either clarity or character; our purpose is to obtain and preserve the integrity of your sound so you can make it become whatever you want it to be.

We combine imaginative design, exacting technology and materials of unquestioned quality into professional-use equipment that is able to surpass the best efforts of others, and yet also compete effectively on the basis of cost.

For more than thirty years we specialized entirely as quality manufacturers.

Our products have been perfected through continued improvements introduced from our research laboratories, and by the constant refinement of our manufacturing techniques. But our products were labelled and marketed by others.

Now, we're proudly putting our own name on our own products; the Laboratory Series of Fostex studio monitors and components, microphones, amplifiers and stereo headphones.

To be fully appreciated they demand demonstration and comparison. We'd like to have them earn your appreciation. For further details, please contact our nearest representative.

FOSTEX

precision sound...by design

ARGENTINA, Buenos Aires 40-1595 • BELGIUM/LUXEMBOURG, Brussels 2163140 • CANADA/USA, Winnipeg 204-775-8513 (TLX 07-55725) • DENMARK, Kobenhavn 01-351110 • FRANCE, Gennevilliers 7936512 (TLX 630504) • GREECE, Thessaloniki 031-221212 • INDONESIA, Jakarta 632215 • ITALY, Rome 06-5911543 • JAPAN, Tokyo 425-45-6111 (TLX 2842203) • LUXEMBOURG/BELGIUM, Brussels 2163140 • NETHERLANDS, Veldhoven 040 533500 • NIGERIA, Lagos 8-43470 • PHILIPPINES, Rizal 866696 • SOUTH AFRICA, Johannesburg 2000 • SPAIN, Barcelona 93-2101051 • SWEDEN, Linköping 013-140090 • SWITZERLAND, Zurich 01-421222 • TAIWAN, Taipei 341-9137 • USA/CANADA, Winnipeg 204-775-8513 (TLX 07-55725).

Survey

Phone: 08045 2304.

Principal source of income: services.

Areas of activity: electronic workshop for audio, video and general electronics evaluation and research for magazines, manufacturers and distributors. Consultancy including equipment design.

MALDWYN BOWDEN INTERNATIONAL

PO Box 112, Brighton BN2 2RS, UK.

Phone: 0273 607384.

Principal staff: Maldwyn Bowden, Michael Fabricant, Christopher Humphrey.

Principal source of income: not stated.

Areas of activity: electronic and mechanical workshop, studio maintenance service, installation service and equipment design. Sound systems for theatres, studios, clubs, discotheques and conference centres. Specialise in broadcasting requirements.

ANGUS MCKENZIE FACILITIES LTD

57 Fitzalan Road, Finchley, London N3 3PG, UK.

Phone: 01-349 0511.

Principal staff: Angus McKenzie, Roy Brooker.

Areas of activity: extensive testing laboratory used chiefly in the company's role as consultants in general audio, RF and sound recording, prototype assessment of tape, cassettes, professional and domestic hi-fi equipment. Specialists in legal matters concerning audio recordings. Equipment evaluation for magazines and associations.

MICROWORKS CORP

95 Cooper Drive, Great Neck, NY 11023, USA.

Phone: (516) 487-6172.

Principal staff: Edward Jaffe (Pres), Rex Mathanson (Exec VP).

Principal source of income: services.

Areas of activity: product development for audio and related fields. Fully equipped electronic workshop with equipment by Hewlett Packard, Tektronix, Marconi, etc. Digital audio is a speciality.

MODULAR PERFECTION

18917 NE 5th Avenue, North Miami Beach, Florida 33179, USA.

Phone: (305) 945-9774

Principal staff: Seth Snyder, Peter Maletta, Ken Realand, Bruce Butcher, Henry Littles.

Principal source of income: equipment supply.

Areas of activity: electronic workshop, studio maintenance service by contract TK Productions, Coconuts Recording, Quadradial Cinema Corp. Studio installation service Bee Gees studio, International Sound, Triid, Compass Point Nassau, Climax Recording. PA maintenance service KC & Sunshine Band. Specialise in prefabricated modular sections for recording studio construction.

SHE AUDIO

114 Tottenham Court Road, London W1, UK.

Phone: 01-388 1833.

Principal staff: Dave Smith.

Principal source of income: installation services.

Areas of activity: full audio measuring facilities including test tapes. Studio maintenance contracts Kingsway Recorders London, maintenance on demand generally 24-hour Rampport, Southern Music. Studio installation service Polar Music Sweden, BMS and SAV studios London.

CHRISTOPHER J SHERMAN

291 Lower Morden Lane, Morden, Surrey SM4 4NX UK.

Phone: 01-337 8451.

Principal source of income: provides services and supplies equipment.

Areas of activity: electronic workshop with audio test gear, test tapes, specialised tools for 35mm film equipment, mechanical workshop for finishing work only with larger projects being sub-contracted to regular metalworker. Carries range of Studer and Neve spares. Operates both studio maintenance contracts and on demand with a 24-hour service. Studio installation service, R. Cherrill Ltd. original dubbing theatre, Olympic Studio One desk, PeeJay Music 16-track installation. Equipment design and evaluation. Can undertake work with both film recording equipment and professional sound equipment.

SOUND CONTROL

1 Thirlmere Gardens, Belfast BT15 5EF, Northern Ireland.

Phone: 0232 772491.

Principal staff: John Connolly.

Principal source of income: services.

Areas of activity: electronic workshop equipped with full range of test equipment including spectrum analyser. Studio maintenance service on demand 24-hour service in N Ireland and the Irish Republic. PA maintenance service Eric Clapton, Thin Lizzy and Janis Ian. Can provide equipment for hire to studios and associated company can provide sound reinforcement and stage lighting systems.

S & P AUDIO LTD

41 Dorking Road, Tunbridge Wells, Kent TN1 2LN, UK.

Phone: 0892 38893.

Principal staff: Peter J. Smith.

Principal source of income: services.

Areas of activity: electronic workshop with full range of test equipment for all areas of electronic measurement including digital equipment. Partially equipped mechanical workshop for studio modifications with associated facilities available. Studio maintenance service by contract or demand with 24-hour service for all types of studio equipment. Installation service, Berwick Street Studios London. Equipment evaluation.

KEITH SPENCER-ALLEN

13 Bessels Way, Bessels Green, Sevenoaks, Kent

TN13 2QG, UK.

Phone: 0732 53537.

Principal source of income: services.

Areas of activity: electronic and mechanical workshop for repair and maintenance work. Maintenance service by contract. Systems design for studios and installation. Equipment evaluation for various magazines.

STEELAND SYSTEMS

37 Bellevue Road, London N11, UK.

Phone: 01-368 4601.

Principal staff: Steve Hoyland.

Principal source of income: mainly services with small amount of equipment supply.

Areas of activity: electronic workshop including test tapes; mechanical workshop with drills, grinder, buffer, etc. More sophisticated metalwork is sub-contracted. Studio maintenance on a contract basis with emergency cover offered on a 24-hour availability. Clients include a large number of musicians' home studios. Studio installation service, PA maintenance, (Led Zeppelin), equipment design and evaluation. Past work includes installation work on five local radio stations and Polar Music studios.

STUDIOSOUND & MUSIC GmbH

Schone Aussicht 16, D-6000 Frankfurt am Main, West Germany.

Phone: (611) 284928.

Principal source of income: equipment supply.

Areas of activity: electronic and mechanical workshops, studio maintenance service by contract or on demand three days a week, MW studios Leonberg, Biton studio Frankfurt, Frank Farion Studios Braufels. Studio installation service Europasound. PA maintenance service Boney M, Eruption, Chris Barber Band.

TRANSMISSION DEVELOPMENTS

49 Mildmay Park, London N1 4NB, UK.

Phone: 01-226 2526.

Principal staff: J L White, D M Thompson, S D Ainger.

Principal source of income: services.

Areas of activity: electronic workshop for design, development, servicing and manufacturing. Partially equipped mechanical workshop with light machining and benchwork facilities. Studio maintenance service on demand. Installation service, studio for University Radio Nottingham. Equipment design, induction loop broadcasting systems, consoles and systems for radio applications.

TRANSOUND (BRADBURY ELECTRONICS LTD)

PO Box 148, Welwyn Garden City, Herts, UK.

Phone: 043879 262.

Principal staff: Michael Bradbury (Tech Dir), Ruth Hibbs (Tech Purch Dir), Simon Bradbury, Russell Bradbury.

Principal source of income: supplies equipment and services dependent on demand.

Areas of activity: electronic workshop with test equipment for all audio and film requirements including an acoustic measurement facility. Mechanical workshop with lathes, shaping and piercing metal equipment, pillar drills and panel engraving. Studio maintenance on demand with ten hours being available a week and emergency cover offered within the London area in approx four hours. Studio installation service, CKS London, Tecnicolour Lab Peking, Tiuna Film Venezuela, State TV Broadcasting Singapore, Nigeria, and Libya. Equipment design and evaluation. Company active worldwide. Accredited supplier/installer for Dolby optical stereo systems.

VALLEY PEOPLE INC

2820 Erica Place, PO Box 40306, Nashville, Tennessee 37204, USA.

Phone: (615) 383-4737.

Principal source of income: both equipment supply and services.

Areas of activity: fully equipped electronic workshop, mechanical workshop, studio maintenance service by contract and 24 hours on demand to regular clients, Ground Star Laboratory, Creative Workshop Inc. Studio installation service WGUC, Ground Star Labs, Bee Jay Recording. Equipment design and evaluation.

10 OUTLET DISTRIBUTION AMPLIFIER 2



One floating input, 10 floating outputs at 600 Ohms for general studio work or feeding multiple slave pa amplifiers. They are used extensively during press conferences and state occasions to provide sound feeds to radio and television networks, with Stabilizers also used in the public address to reduce howl-round.

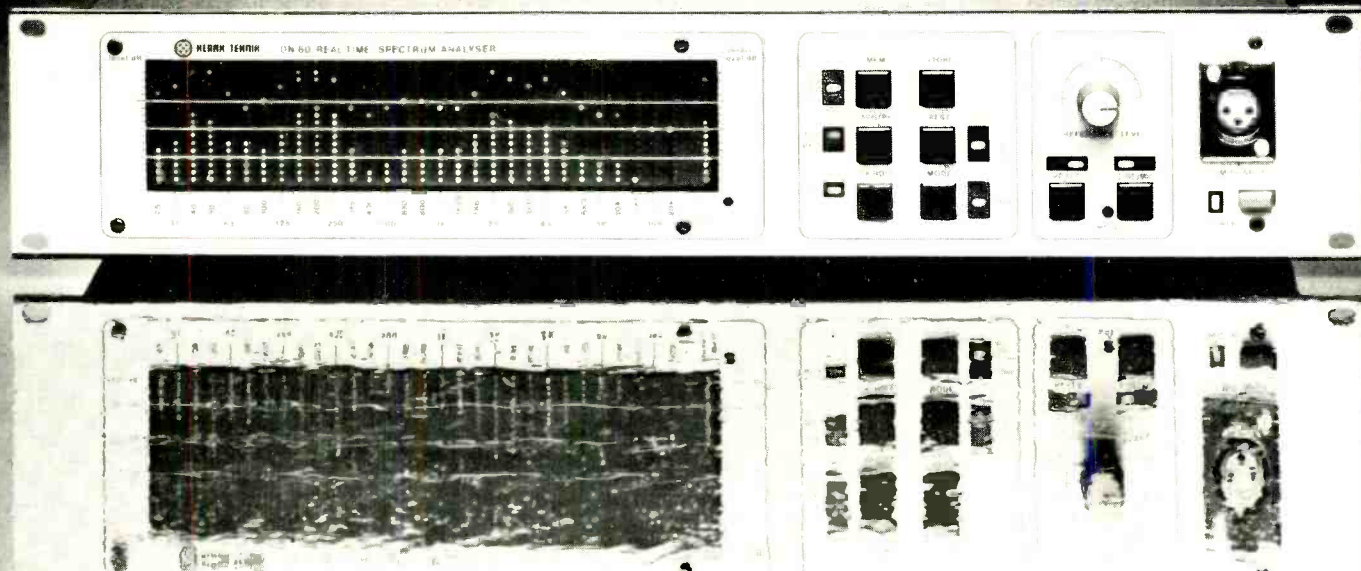
The unit meets the IBA 'signal path' specifications and is available as a complete unit or as a set of all parts excluding the case and XLR connectors.

Stereo Disc Amplifier 2 and 3 * Moving Coil Preamplifier * Peak Programme Meter Drive Circuits 2 and 3 and Ernest Turner Movements * Stabilizer * Frequency Shift Circuit Boards * Chart Recorders * Peak Deviation Meters

ILLUMINATED PPM BOXES: Coaxial TWIN movement with sum and difference selection. Also mono version, circuit boards and kits for building into equipment.

SURREY ELECTRONICS

The Forge, Lucks Green, Cranleigh, Surrey GU6 7BG
Telephone 04866 5997



"REFLECTIONS OF YOUR SOUND JUDGEMENT"

The "DN60 REAL TIME ANALYSER" is the heart of a new audio measurement system from the engineers at KLARK-TEKNIK and is the perfect compliment to the new DN27A Equaliser shown below. Using Micro-Processor based circuitry, the DN60 is capable of performance checks on virtually any audio equipment, and is especially well suited for aligning audio tape recorders. On-site performance verification, whether of a 10,000 seat arena, or a studio control room, is easily facilitated with the DN60; and is an excellent method of building your customer's confidence.

If you're a recording or broadcast studio, include the RT60 Option and provide quick and accurate alignment for your reverberation systems (plates, springs, digital). The DN60 incorporates a pink noise source internally, and occupies only 3 3/4" (2U) in a standard 19" rack.

If you take your sound on the road, the DN60 can help make that 5 p.m. sound check go easy, leaving enough time for a quick dinner before showtime. With the inclusion of Three Memories, and a Peak-Hold function, you can expand the scope of your sound check, and provide that extra edge of excellence.

The DN60 is Micro-Processor technology at a price you will like.

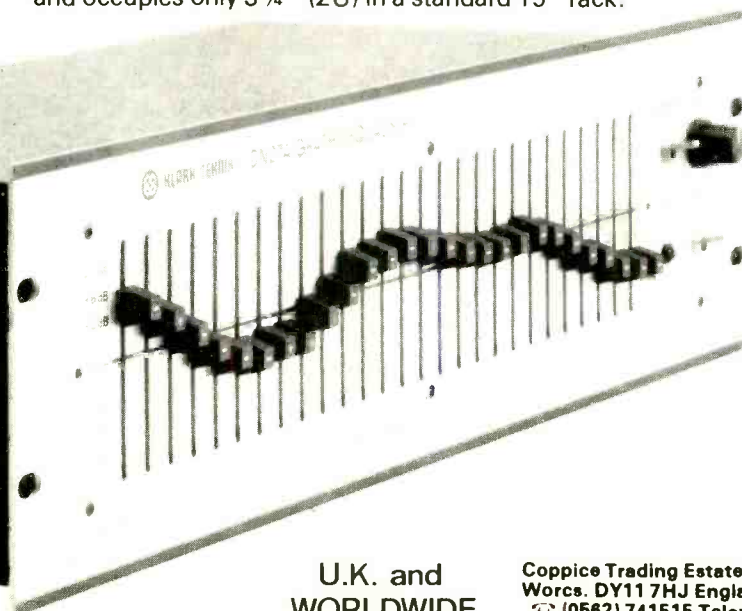
Other useful features include:- "A" Weighting, Average or Peak Reading and Selectable Response Time.

DN60 Options:- • Calibrated microphone
• RT60 (Reverberation time) package • X/Y Plotter and oscilloscope interface • Dot matrix printer interface.

Now complete your system with the new DN27A 1/3rd OCTAVE EQUALISER and quickly adjust your sound to perfection.

The new DN27A is the successor to the DN27, acclaimed world-wide as the industry standard in graphic equalisation. New features include improved headroom, earth lift facility and fail-safe system bypass plus the legendary reliability and performance of its predecessor.

Please contact us and get our DN60 and DN27A data sheets and related literature.



KLARK-TEKNIK
a touch of class

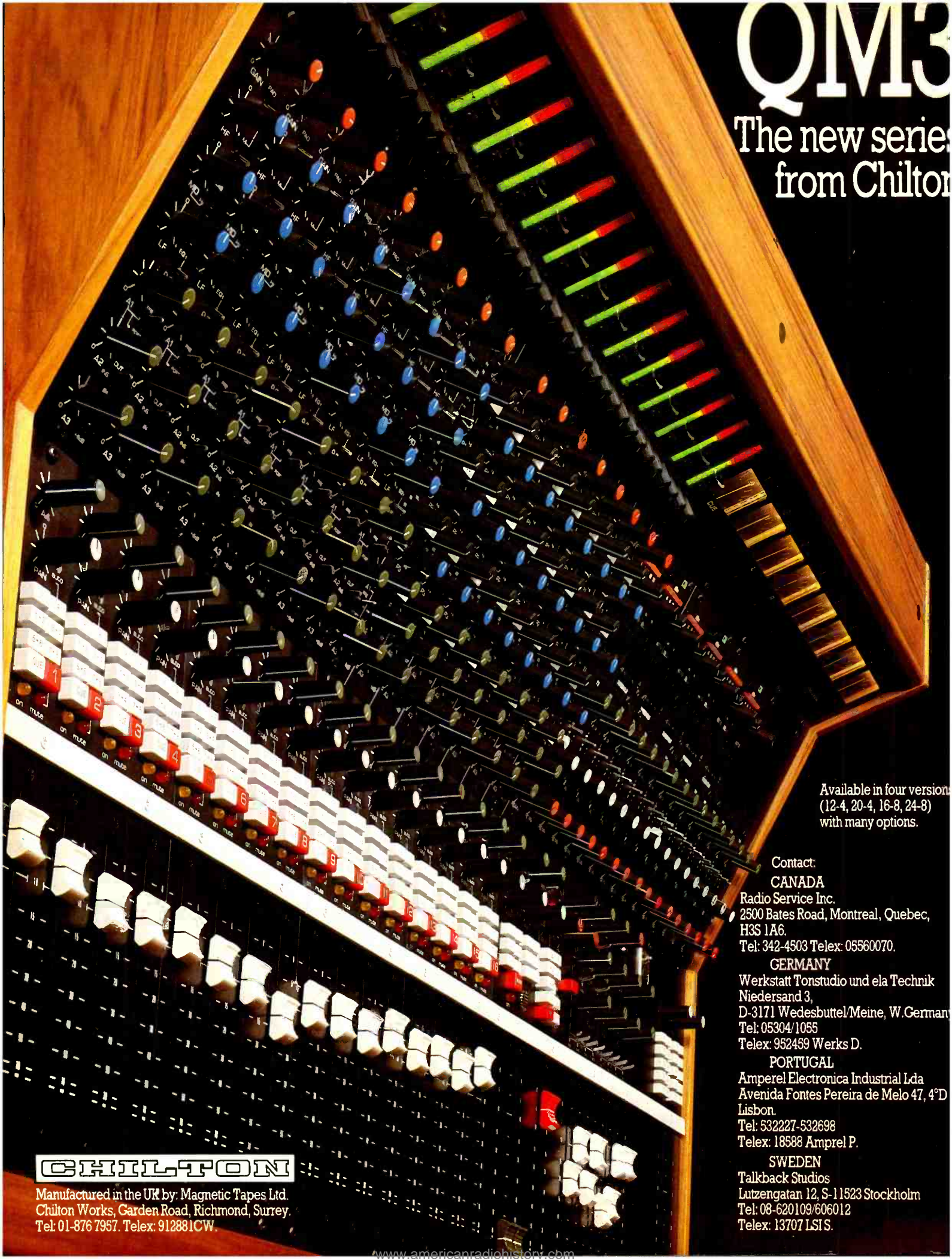
U.K. and
WORLDWIDE

Coppice Trading Estate, Kidderminster,
Worcs. DY11 7HJ England.
☎ (0562) 741515 Telex: 339821

U.S.A. 262a Eastern Parkway, Farmingdale,
N.Y. 11735.
☎ (516) 249-3660.

QM3

The new series
from Chilton



Available in four versions
(12-4, 20-4, 16-8, 24-8)
with many options.

Contact:

CANADA

Radio Service Inc.
2500 Bates Road, Montreal, Quebec,
H3S 1A6.
Tel: 342-4503 Telex: 05560070.

GERMANY

Werkstatt Tonstudio und elä Technik
Niedersand 3,
D-3171 Wedesbüttele/Meine, W. Germany
Tel: 05304/1055
Telex: 952459 Werks D.

PORTUGAL

Amperel Electronica Industrial Lda
Avenida Fontes Pereira de Melo 47, 4º D
Lisbon.
Tel: 532227-532698
Telex: 18588 Amprel P.

SWEDEN

Talkback Studios
Lutzengatan 12, S-11523 Stockholm
Tel: 08-620109/606012
Telex: 13707 LSIS.

CHILTON

Manufactured in the UK by: Magnetic Tapes Ltd.
Chilton Works, Garden Road, Richmond, Surrey.
Tel: 01-876 7957. Telex: 912881CW.

Surround sound

Recently the Federal Communications Commission in Washington met to debate the future of surround sound broadcasting. They couldn't decide whether to impose a standard single system on US broadcasters or to let radio stations use systems of their own. The public would then choose the best and generate natural market pressures to create a force majeure standard.

The FCC has unhappy memories of its recent decision to select the Magnavox AM stereo system as a standard. This decision produced such an outcry that it will probably never be implemented. Partly because of the AM stereo debacle the FCC decided to duck the surround sound issue and simply ask the US public to help them decide on the future of surround sound (or 'quadraphonics' as the FCC will still insist on calling it).

Fortunately for us some sharp witted lady or gentleman present at the FCC meeting happened to have a tape recorder running while the FCC debated 'quadraphonics' and the tape makes decidedly sobering listening.

In a nutshell, hardly anyone present seems to have any grasp of the subject on which they were supposedly taking such an important decision. Almost no one seemed to have a grip on the various techniques now available for transmitting and reproducing mono and stereo compatible surround sound.

Ten years after surround sound and quadraphonics first started to make news the FCC pundits were still making feeble jokes about needing four ears to hear four loudspeakers. Apparently it came as a surprise to several of the FCC committee members to learn that FM radio broadcasts are transmitted in countries other than the USA.

The most sensible comments of the meeting came from a lady member who at one stage succinctly summed up her understanding of what her blustering male companions were patently failing to grasp. On the strength of the FCC's performance on surround sound it's small wonder that they made such a pig's ear of the AM stereo issue.

Here, we think, is the news

What's happened at LBC and IRN? Four times I've heard networked IRN news bulletins fall apart at the seams when the wrong taped interviews have been played after the announcer's introduction. You know the sort of thing. "The Prime Minister today warned of lean times ahead," says the announcer and then up comes an eye witness report of some awful disaster in a far-off land. As I am by no means a regular listener to IRN newscasts heaven knows how many more cock-ups Gough Square have recently originated. At this rate Kermit Schafer could well put together a whole new album of Bloopers based entirely on the output of LBC/IRN.

It's as if the station has been going back to its own roots. Seven years ago LBC was the first British independent local radio station to go on-air. From the start it was an open secret

that LBC was in dire financial straits and in the manner of a vicious circle, advertising revenue was pitiful because the standard of news broadcasting was so appallingly amateur. Any awkwardly named place or person would almost certainly be mispronounced. There was also some hilariously sloppy mistiming.

"There's a minute to go before the news is due, but the news reader seems to be ready, so shall we go over to him?" I heard one LBC broadcaster say in the early days. "Oh," said the news reader, somewhat taken aback, "that puts the ball fairly and squarely in my court, but I am more or less ready, so I'll read the news now." This casual attitude over timing was only possible because in those early days Capital had refused to take IRN and started its own internal news service. But this was almost as bad. On one occasion I 'caught' the Capital news service rebroadcasting an off-air dub of an interview with Harold Wilson on the steps of 10 Downing Street. The giveaway was an abrupt edit on the TV soundtrack.

Partly because IRN was improving and partly because Capital was losing cash heavily during the station's first year or so, Capital closed down its own news service and started taking for instance, IRN. But LBC/IRN was still putting on a pretty poor show. On Wednesday July 17, 1974, a bomb exploded at the Tower of London, only a mile from LBC's door step. At the time the station was transmitting a chat programme centering around such scintillating subjects as 'caring for hair' and 'cooking mushrooms'. Although every now and then the hair and mushroom trivia were interrupted by a news flash, it took LBC nearly an hour and a half to get off its rear and come up with some proper on the spot reportage.

Over recent years both LBC and IRN have improved beyond recognition and the AM programme with Bob Holness and Douglas Cameron must surely be one of the best news radio shows anywhere in the world. So can someone in Gough Square get a firm hand on whoever it is who has been jeopardising the station credibility by cocking-up so many IRN bulletins.

German levy

It is pretty widely known that in Germany there has been a levy on all domestic recording equipment sold since 1965. It is less widely known that this levy is now producing a very healthy income. The rate of 5% on the manufacturer's price last year produced around £5m. What is less well known is that none of this money has ever reached the UK, even though some of it certainly should have done. Why? Well a main concern of the British Government over the plans for a levy on British tape sales is how much of the collected money will immediately leave these shores as payment due to foreign record companies and artists. Plenty of discs taped in the UK have foreign origin of one kind or another, but by the same token plenty of discs taped in Germany have British origin.

So I tried to find out what money UK artists had received from Germany. The German authorities fudged the issue but couldn't cite any instances of German levy money reaching the UK. The British Government's Department of Trade, however, thought that some money was being received by the Mechanical Copyright Protection Society from Germany. But the MCPS knew nothing of any such money. Neither did the BPI.

In other words for 15 years Germany has been running a levy scheme and the UK record industry hasn't received a penny of it. Has any other country?

You'd think that a record industry which claimed to be in such dire straits and kept pointing to the German levy scheme as justification for something comparable at home would have thought to check that some of that foreign money was due to the UK.

Editorial comment: What still surprises us is that the UK record industry in particular still complains so bitterly about home taping. The general standard of pressings in this country is undeniably appalling, yet we are still charged outrageous prices for generally duff albums. Apart from the disgust this generates within the record-buying public, what about the artists who see their records in the shops and later discover they bear only a pale resemblance to the tapes they made in the studio or heard on the test-pressings (if they were lucky enough). And what of the poor recording and cutting engineers who see their many hours of precision workmanship ruined in a moment, simply because someone couldn't aim straight at the factory? We also know very well that secret studies done a couple of years ago by some of Britain's largest record retailers revealed the fact that very often a record returned to the store goes back on to the van—not to be returned to the factory, but to be dropped off at the next record store.

High prices, along with poor quality, have produced the present problem. It is all very well for the industry to moan about home taping, and produce grossly inaccurate guesses about the amount of money lost, but what really goes on? Simply, what really happens is that the individual cannot afford to buy as many albums because they're too damned expensive. So groups of friends get together and buy, say, one album each, and copy them for the others in the group. Without the home taping, they wouldn't have been so likely to buy *any* records at all: in other words, without home taping, sales might well be *even less* than they are now! In truth, home taping is a red herring: the real solution to the companies' doldrums is threefold: Better quality pressings; lower album prices; and more investment in new acts.

The record-buying public deserves better quality product (even if it has to pay for it—look at the vast sales of Japanese imports which have been produced properly), and most important of all to those of us actually in the creative end of the industry, we engineers and artists deserve our hard work to be better looked after, after it leaves our hands. This really isn't too much to ask—is it? **Richard Elen**

Designing a professional mixing console

Steve Dove

Part Seven ~ Equalisers 1

THE TERM 'equalisation' is, strictly, a misnomer—it was originally utilised to describe flattening and generally putting to rights the response of systems in which by a matter of course or by design it had got a bit bent out of shape, eg telephone lines and tape machines. (In the latter case, the equalisation refers to the adjustment tweaks to the pre-emphasis and de-emphasis curves—not necessarily the curves themselves.)

In search of a name for the deliberate modification of amplitude and phase versus frequency response for 'the sound, man' and for the occasional genuine creative effect, the contraction 'eq' is well understood as both a noun and verb.

There is precious little in a modern studio that needs response modification to render it 'flat'—if there is, it needs mending or retiring, quick.

This sonic mutilation uses response curves, shapes and limits that have grown through an uneasy mixture of operator needs and technical expedience/feasibility—one of today's multi-parametric channel eqs would have needed nigh on a rack full of valves 20 years ago. Funny, they never seemed to need them . . .

The delight (and maybe curse) of IC op-amp design is that active filter (hence eq) implementation and techniques have blown wide open, limited only by the largeness of the pcb and the smallness of the user's fingers.

Eq curves can be roughly lumped into three user categories: garbage disposal; trend and area. Highpass and lowpass filters that eliminate air-conditioning/mic stand rumble/breathing and excessive noise are obviously enough in the business of *garbage disposal*. Gentle 'hi-fi' type 'treble and bass' slopes and shelving establish response *trends*, whilst resonance-like 'bell' shaped lift and cut filters manipulate given *areas* of the overall response.

As the curves differ, so do the design techniques required.

Single order networks

You can't build a house 'til you've

Purists call it Deliberate Frequency Selective Amplitude and Phase Distortion, studio operators call it Equalisation, textbooks and designers, a Royal Pain.

got the bricks, so they say. Fig 37 has the bricks, in the form of combinations of basic passive components with a rough guide to their input/output voltage transfer functions, with the assumption that V_i source impedance is zero and V_o termination infinite impedance.

Capacitive reactance decreases with increasing frequency, hence reacting against the resistance in a potentiometer-like fashion to increasingly 'short' the output to ground with increasing frequency in Fig 37a whilst steadily isolating the output from the input with reducing frequency (rising reactance) in Fig 37b.

Inductors have entirely the opposite reactive characteristics—inductive reactance is directionally proportional to frequency, so the curves in Fig 37c and d will be of no surprise at all.

"What about combinations of inductance and capacitance?" cry the anxious millions.

Shut up, sit down and wait a bit.

More useful curves are derived when the passive R, C and L elements are wrapped around an op-amp in the classic inverting and non-inverting amplifier modes—these are shown in Fig 37e to l. All the curves in Fig 37 are normalised to unity gain and the same centre frequency, that being the frequency at which the curve departs significantly from flat. Standard arithmetic formulae normally consider or obtain a frequency at which the curve has departed 3dB from flat—the 3dB down point—and it is usually also where the phase has been shifted 45°.

To move the frequency at which the filter 'bites', any of the elements may be varied. Making them bigger makes the frequency lower, smaller-higher. An important point to remember is that whilst increasing inductance increases reactance at a given frequency, the inverse is true of capacitors. Bigger capacitor, smaller reactance.

There are an infinite number of

combinations of element values to create the same curve at the same frequency. Say, in Fig 37a the value of the capacitor was reduced (increase in reactance) the filter curve would shift up in frequency. A corresponding increase in the series resistor value would result in the turnover frequency being restored to its original point. Identical filter, differing resistor/reactor combination. What *does* remain the same is the ratio or relationship between the two elements—it is only the filter *impedance* (the combination of resistance and reactance) that varies.

With the exception of a devious and evil few, any active filter's operation can eventually be sussed referring to these basic single order filter characteristics.

Resonance

There is one particular combination of the two reactive elements (capacitance and inductance) that is of prime relevance to the construction of eqs. Shown in Fig 38 it is a series connection of inductive and capacitive reactances.

In, for example, the context of a simple resistor/reactor filter (Fig 37a) the reactance not only causes an amplitude shift with frequency, but a related phase shift also. A fundamental difference between the two types of reactance is the direction of the output voltage (V_o) phase shift with respect to the source (V_i). More specifically, the capacitor in Fig 37a causes the output voltage phase to lag further behind the input as the rolloff progressively bites, to a limit of -90° at the dregs of the curve, whilst the inductor of Fig 37b imposes an increasing voltage phase *lead* as the $1f$ roll-off descends with a limit of $+90^\circ$ at maximum attenuation.

The two reactances therefore, in their pure unadulterated form effect phase shifts of $+90^\circ$ to -90° , in other words 180° apart, or in yet more words they are in *exact opposition* to each other. So?

So, referring again to Fig 38 a slightly different light shines—the two reactances are working in direct opposition to each other, the inductive reactance is trying to cancel the capacitive reactance and vice versa. Arithmetically, it is (surprisingly enough) that simple—two reactance values may be directly subtracted from each other and the whole network treated as a single reactance of the same reactive character as the one predominant in the network.

As an example, if for a given frequency the inductive reactance is $(+1,200$ (the + indicating the phase shift character of inductance) and the capacitive reactance is $(-1,500\Omega$, then the effective reactance of the entire network is that of a capacitor $(-)$ of 300Ω reactance. With a change of frequency, the two reactances will shift, one up, one down giving another network reactance resultant. (As a by-the-way, because there are two reactive effects operating simultaneously in this network, it is said to have *second-order* characteristics.)

For any pair of inductor/capacitors at any frequency their two reactances will still be equal. Think! If you subtract two equal numbers the answer is nothing.

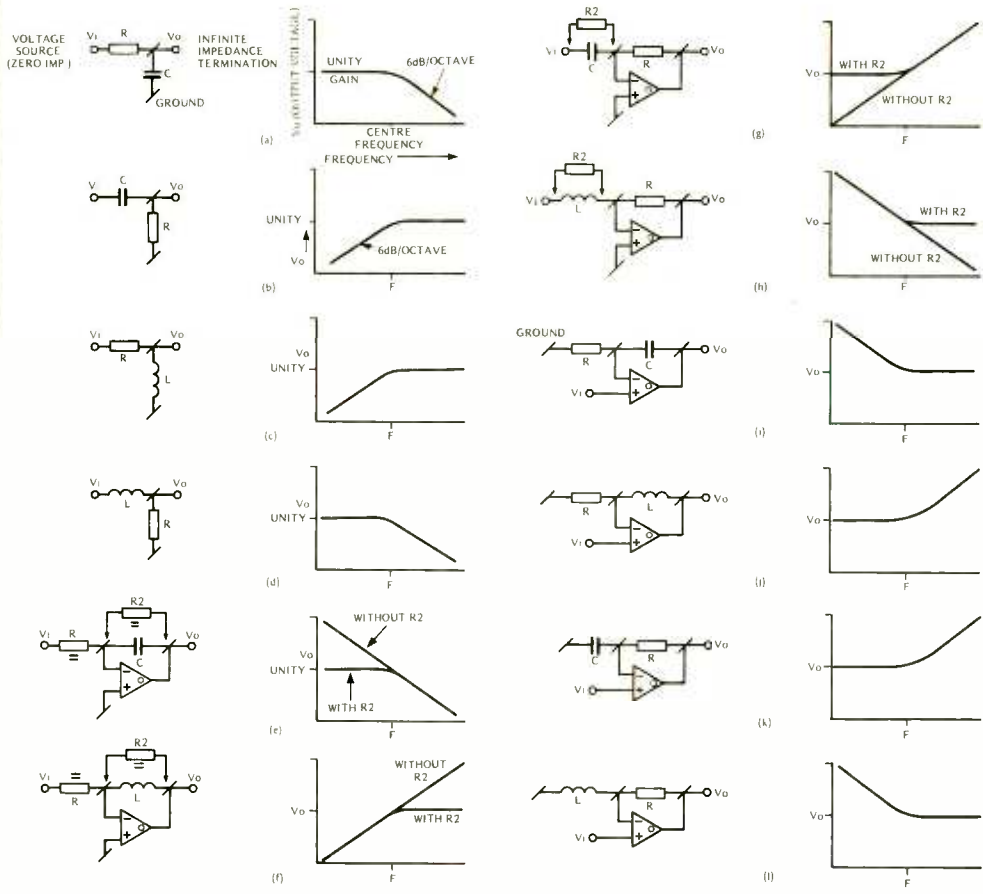
Uh?

At that frequency, the two reactances cancel completely resulting in a short circuit across the network terminals, no reactance, nothing (disallowing component losses).

A frequency-selective short circuit. Either side of that frequency of course one or other of the reactances become predominant again.

Like the single order networks, there's an infinite number of combinations of C and L that will have resonance (the two reactances will equal) at any given frequency and the relative values and rate of change in reactance either side of resonance hinges on the chosen combination. Say a given L/C ratio gives a reactance of $10k\Omega$ detuned 10% from resonance. Changing the L and C (maintaining the same resonant frequency) to make their reactances

FIG. 37 SINGLE ORDER FILTERS



cause a detune slope 10 times more steep with the higher reactance network than with the $1k\Omega$ one—in other words the higher reactance network has a sharper notch filter effect, less bandwidth and a higher Q than the $1k\Omega$ network. By a factor of 10, surprise, surprise.

There exists a direct relationship between the network reactance, series resistance, the bandwidth and Q. Q is numerically equal to the ratio of elemental reactance to the resistance in a series tuned circuit, whilst the bandwidth (between the two '3dB down' points where the phase has been shifted $\pm 45^\circ$) is the ratio of filter centre frequency to Q.

The greater the Q, the smaller the bandwidth. Filter resonant frequency may be altered by changing either the L or C, whilst Q is subject to variation of the resistor or juggling the reactance of the L/C network.

Creating inductance

It's most efficient (electrically and financially) in the majority of console-type circuitry for inductance to be simulated or generated artificially by circuits that are the practical implementation of a mathematical conjuring trick—known generically as 'gyrators'.

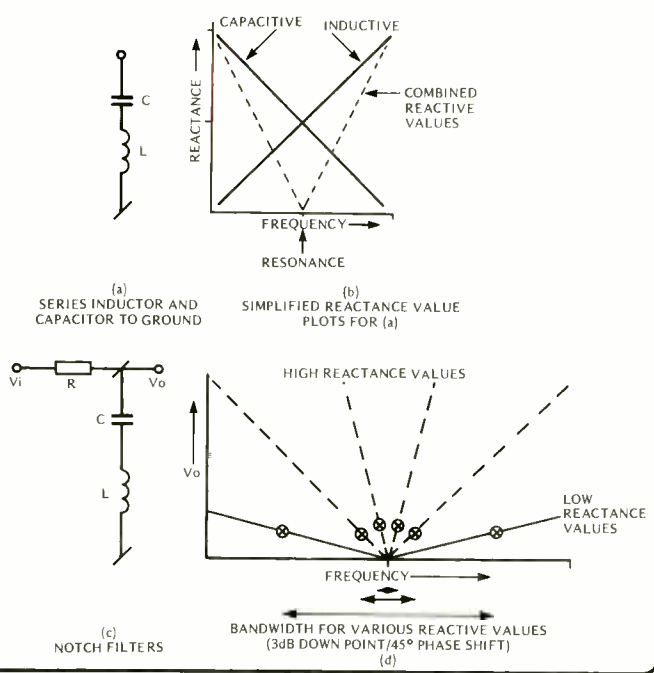
A true gyrator is a 4-terminal device that transmutes any reactance or impedance presented to one port into a mirror image form at the other port (Fig 39).

Hence a capacitor (with falling reactance vs frequency) is magically translated into a reactance of rising characteristic vs frequency at the output port, *voila!* inductance! The scale of inductive reactance generated may be easily and continuously varied by altering the internal gain-balance structure of the gyrator (in Fig 39b by changing the trans-conductance of the back-to-back amps).

A continuously variable inductor! Real inductors—the things with miles of wire knotted around odd-shaped bits of ferrite or some such—have a justifiably bad name for audio design. They are big, heavy, they saturate easily, their core hysteresis causes distortion, they are subject to pick-up of nearby (and not so nearby) magnetic fields principally

70 ▶

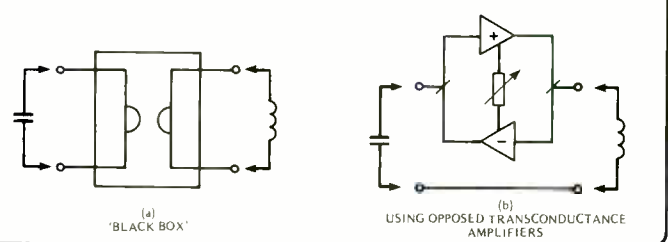
FIG. 38 RESONANT CIRCUITS



a tenth of their previous value (making the L 10 times smaller and the C 10 times bigger) makes the 10% detune reactances only $1k\Omega$.

The relevance of this is rapidly seen looking at the notch filter circuit in Fig 38c. At any frequency, the series resistor forms a classic 'L' attenuator against whatever reactance the L/C network is 'pretending' to be, total attenuation occurring at the network's resonant frequency. The rate of reactance change upon detune is directly related to the reactances of the network's constituent L and C. A fixed value of series resistor looking into our two earlier mythical $10k\Omega$ and $1k\Omega$ reactance value networks will

FIG. 39 GYRATORS



Mixing console

cially mains ac hum and rf unless well screened (which makes them even bigger and heavier) the windings are prone to break and they are e.x.p.e.n.s.i.v.e.

It is therefore quite easy to see why a means of avoiding them is popular! Naturally, the simulated inductive reactance is only as good (the inductor Q) as the quality of the capacitive reactance (the capacitor Q—determined by its leakage resistance) and the loading effect of the 'gyrator' circuit itself. Fortunately, for the purposes of normal equalisers very large Qs are not necessary so selecting capacitor types to this particular end is not really necessary.

An obvious extension of the continuously variable inductor is the continuously variable bandpass filter formed by adding a capacitor either in series or parallel with the gyrated inductor, forming series and parallel tuned circuits respectively making notch and peak filters. Whilst ideal for fixed frequency

filters with the network's Q or sharpness defined by a resistor in series with the gyrator resonator, the idea falls down when the resonance frequency is moved.

If the frequency is moved up, the reactances of the elements at resonance become lower, consequently the ratio of the reactances to the fixed series resistor (this is the ratio that determines the Q) becomes smaller and the Q of the filter becomes broader, in response relatively. In order to maintain the same Q over the projected frequency variation the series resistor has to be ganged with the frequency control—boring. Should it be necessary to make the Q a variable function also, as in a parametric-type eq section, it would mean devising a variable-variable resistor—brain-strangely boring. For this reason, parametric-type equaliser sections are ordinarily constructed around second-order active-filter networks, typically of the State-Variable variety.

Let's not write off gyration for function variable filters straight away—as we'll see they form in one way

or another the second reactance in many active filters anyway.

True gyrators of the back-to-back transconductance amp type are, let it be said, an unmitigated drag to make, set up and use. Fortunately there are simpler ways of simulating variable reactances, if not pure reactance at least a predictable effect of a reactive/resistive network.

The bootstrap

The simplest of the lot is shown in Fig 40a, with typical values shown for argument's sake. It relies on a wonderful trick called 'bootstrapping'. The principals behind this trick are shown in Fig 41. A 1kΩ resistor with a volt across it will pass 1mA, so says Mr Ohm in his well known law. Without changing the source potential of 1V, the bottom end of the resistor is tied to 0.8V. There is 0.2V across the resistor and so a current of 0.2mA flows through the resistor. Aha! The clever bit! The source (still at 1V) sees 0.2mA flowing away from it, the amount of current it would expect to see going to a resistor of $1V/0.2mA = 5kΩ$. It 'thinks' it's looking at a 5kΩ resistor!

Continuing this, stuffing a potential of 1V (not the same source) at the bottom end of the resistor means there is no voltage across the resistor, therefore no current flow and our original source 'thinks' it's seeing an open circuit (infinite resistance) despite the fact that there is still a 1kΩ resistor hanging on it.

This phenomenon holds true with any source voltage, ac or dc, provided the instantaneous 'bootstrap' voltage is the same as the source. This implies in ac (eg audio) the bootstrapping is exactly in phase with the source—any phase difference creates an instantaneous potential difference across the resistor, current flows, etc. etc.

The 'fake inductor' works on frequency dependent bootstrapping, the terminal being almost totally bootstrapped to high impedance via the 150Ω resistor at high frequencies and the bootstrap voltage reducing (together with its phase being shifted) with falling frequency. At very low frequencies, no bootstrap exists, so the terminal is tied to ground via the 150Ω resistor and the effective zero output impedance of the voltage follower. The circuit emulates an inductor reasonably well—very low impedance value at low frequencies, increasing with frequency to quite a high, virtually open circuit, impedance.

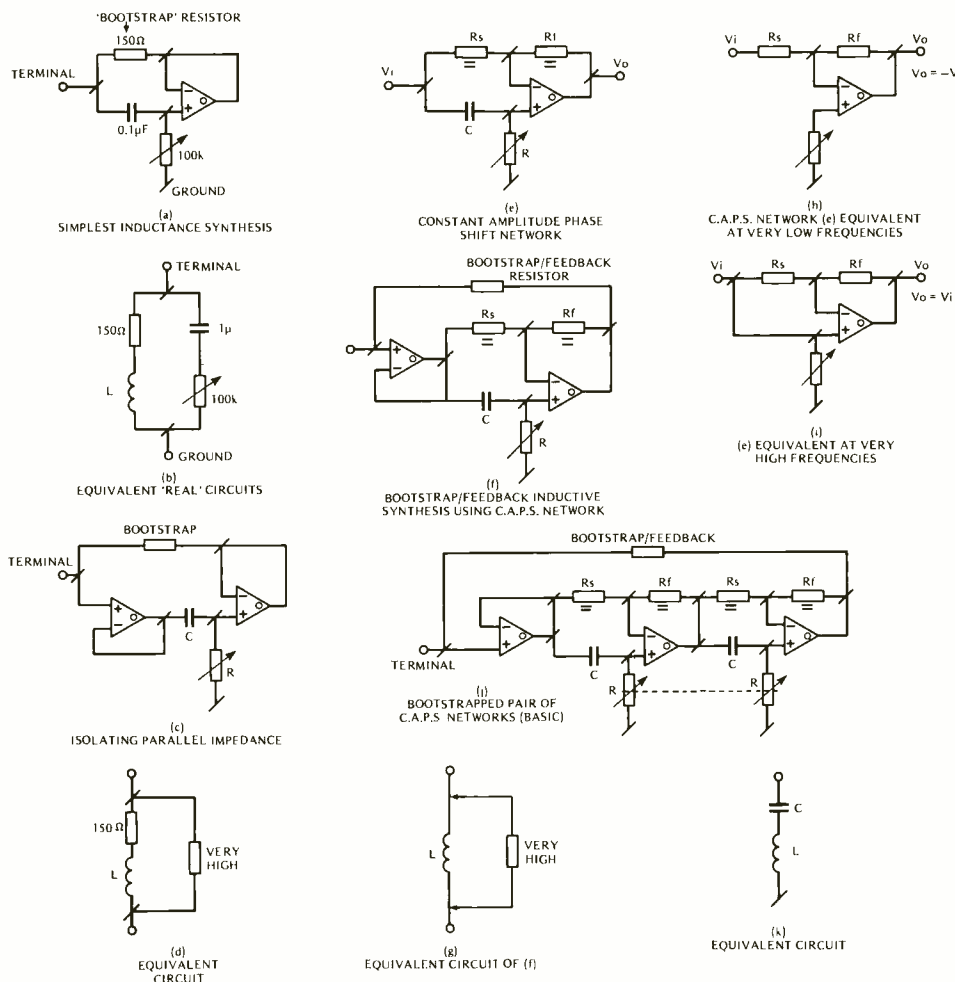
Problem No 1 with this simple circuit is that at high frequencies a parallel impedance (consisting of the variable resistor/capacitor chain) hangs directly from the terminal to ground. Buffering the chain from the terminal by a follower eliminates that one (Fig 40c).

Fig 40a creates an analogue of an inductor with losses as shown in Fig 40b. The series resistor is the 150Ω bootstrap resistor—after all a 'proper' inductive reactance tends to zero at low frequencies, not 150Ω, therefore the resistor is effectively in series. The R/C network across the lot represents, again, the highpass filter impedance which upon the addition of the follower disappears to be replaced in Fig 40d by the follower's input impedance—a lot higher and enough to be ignored.

Losing the effective series impedance of the bootstrap resistor is hassle No 2. A fascinating circuit of wondrous properties but previously of little real worth smiles at us in Fig 40e. Bearing more than a little resemblance to a differential amp, this circuit can rotate the output phase through 180° with respect to the input around the frequency primarily determined by the highpass filter, $R_1 C_1$. Not only but also, the amplitude remains constant throughout.

How? This is dealt with in Fig 40g and h where the simplistic assumptions that a capacitor is open circuit at low frequencies and a short at

FIG. 40 INDUCTIVE REACTANCE SYNTHESIS





**It's not only in love
that the french show
great taste...**

**3M
FRANCE**
Bld de l'Oise
95000 CERGY
Tél. : (01) 031.61.61

**3M
DEUTSCHLAND GmbH**
4040 Neuss 1, Postfach 643
Carl-Schurz-Strabe 1
Telefon (02101) 141

**3M
ITALIA Spa**
20090 Milano
S. Felice-Segrate
Tel. : 02.75451

**3M
NEDERLAND bv**
Rooseveltsstraat 55
Postbus 193, 2300 AD Leiden
Telefoon : (071) 76.93.30

**3M
ESPANA, S.A.**
Josefa Valcarcel, 31
MADRID 27
Telf. (91) 742.00.12

PLUS 30
37, rue des Annelets - 75019 Paris
Tél. : 202.21.02 - 202.58.69

Mixing console

high frequencies show that at lf the circuit operates as a straightforward unity-gain inverting amp (-180°) whilst at hf it operates as a gain-of-two non-inverting amp minus a gain of -1 due to the inverting amp chain R_f/R_s —in other words a unity gain non-inverting amp (0°).

At high frequencies bootstrapping back to the input is cool (Fig 40f) providing the expected lovely high impedance. The nice bit occurs at lf where the phase rotates around to -180°. The output amp generates an equal and opposite current along the 'bootstrap' to any which are supplied to the input terminal. Translated that means that the circuit has turned into an inverting amp and is treating the terminal as a virtual earth point via the 'bootstrap' (now 'feedback') resistor. Virtual earth means virtually zero impedance. Neat.

As a short footnote to this gyrator epic, consider what happens to either Fig 40c or Fig 40f if the highpass filter C/R is replaced by a lowpass filter by transposing R_1 with C_1 and vice versa. It may seem a bit dumb to use circuitry to imitate a capacitor—but a continuously variable capacitor...?

Simulated resonance

We now possess all the variable-everythings we need to create single and second order filters. Tracking variable capacitors and inductors allow us to manufacture constant Q bandpass filters irrespective of frequency—this realisation itself brings a dawning of understanding in how the much-touted loop filters such as the state-variable actually operate. The clue lies with the 180° phase shift circuit (Fig 40e). Connecting two such filters (with the variable resistor elements ganged) in series produces a remarkable circuit. At any frequency within the design swing it is possible for the circuit output to be 180° out of phase with the input—and only at that frequency. Combining the input voltage and the output voltage in a separate amp results in direct cancellation at that frequency and at no other—in short a notch filter with a nice resonant characteristic. Alternatively, bootstrapping the input from the output actually turns that input port into something that behaves exactly like a series tuned circuit to ground (Fig 40j). Continuously variable in frequency with a constant Q to boot by virtue of the simultaneously tracking simulated inductor and capacitor maintaining exactly the same elemental reactances at whatever the resonant frequency is adjusted to. Same source resistance, same reactance, same Q.

Same Q definitely does not imply

same bandwidth—as the resonant frequency changes, the bandwidth changes proportionally. Bandwidth is after all the ratio of frequency to Q.

Some active filters, such as the 'multi-feedback' variety (of which more anon, but not here) exhibit a constant bandwidth vs resonant frequency characteristic—meaning if it has say a 400Hz 3dB down point bandwidth at 5kHz, it will also show a 400Hz bandwidth when the resonant frequency is changed to 500Hz. A 10:1 variation of Q.

This, on the surface at least, appalling characteristic has been deliberately and usefully used in a mid-sweep eq providing the user with a broad low-end to 'fatten things up' automatically changing to a sharper filter higher up to pull out 'rings', sibilance and assorted screeches, which benefit from the high Q attenuation not molesting too much of the surrounding.

It has in fact received more praise than criticism, despite the obvious limitations.

Mechanical filters

Achieving prominence in TV, radio and communication-type signal processing is the Surface Acoustic Wave type filter which has in the last few years almost totally displaced conventional multi-element inductor/capacitor resonant and bandpass arrays. Distantly related to the quartz crystal effect—resonance in a piece of solid material at a precisely consistent frequency, SAW filters establish precise acoustic transference and interference patterns across a piece of solid material. The filter is excited at one end and sensed at the other—a bit like a reverb plate, only the plate's characteristics would have to be precisely trimmed to transfer energy along only between very sharply defined frequency limits, say 1kHz to 1.2kHz only and to reject all others. An SAW block can be arranged to have an almost perfect rectangular response with a

desperately plummeting fall-off either side of the bandpass.

Current technology places practical such filters at 10MHz and above, commonly being used for receiver intermediate-frequency band-shaping.

The extremely sharp fall-off shape still looks appealing when applied to audio thinking—90dB attenuation within 1kHz is typical for a narrow-band filter (25kHz) at 10.7MHz.

A practical technique for utilising these properties is sketched in Fig 42a. It is essentially a loop modulation/demodulation system, the double balanced modulators being constructed of transformer-matched hot-carrier diodes fed by identical amplitude and phase of the oscillator to minimise mod/demod discontinuity distortion.

The oscillator is centred on 10.6875MHz, the lower frequency limit of the bandpass filter. This, in its 'resting' mode, disposes of the modulated signal's lower sideband over the filter's 'cliff edge'. Now consider what happens as the oscillator frequency moves up 50Hz—yes, everything below 50Hz is pushed over the precipice. Increasing the frequency to 10.6885MHz (1kHz up) acts as an astonishingly sharp 1kHz highpass filter. Softening the roll-off characteristic is achieved by a really cunning trick; the oscillator

is frequency modulated ultrasonically (so as not to be audible) backwards and forwards over the part of the bandwidth that needs shallowing out—say from 1kHz down to 250Hz. Fig 42c shows the effect of an Equal Frequency Domain Duration (EFDD) ultrasonic waveform (such as a triangle wave) on the demodulated audio output.

A variation on the FDD technique is used to overcome a basic hang-up of the system—a fixed roll-off filter such as the SAW results in a wide range of effective roll-off rates when applied to the logarithmic-based audio band. The answer is to add a 'biasing' logarithmically asymmetric component to the ultrasonic FM. This ensures that at higher filter frequencies, the 'softening' FDD waveform is modulated wider so closely approximating at 1kHz roll-off the same number of dB/octave attenuation as down at 50Hz.

The fundamental problem with SAW filtering is in-band attenuation—the element itself has at best 18dB loss, there is 6dB loss due to one sideband being removed and each of the balanced modulators incurs -7dB conversion gain—a grand total of 38dB to re-establish in the make-up amp.

For the present, this technique is a bit noisy. ■

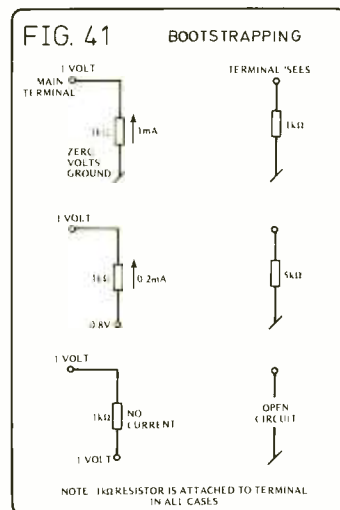
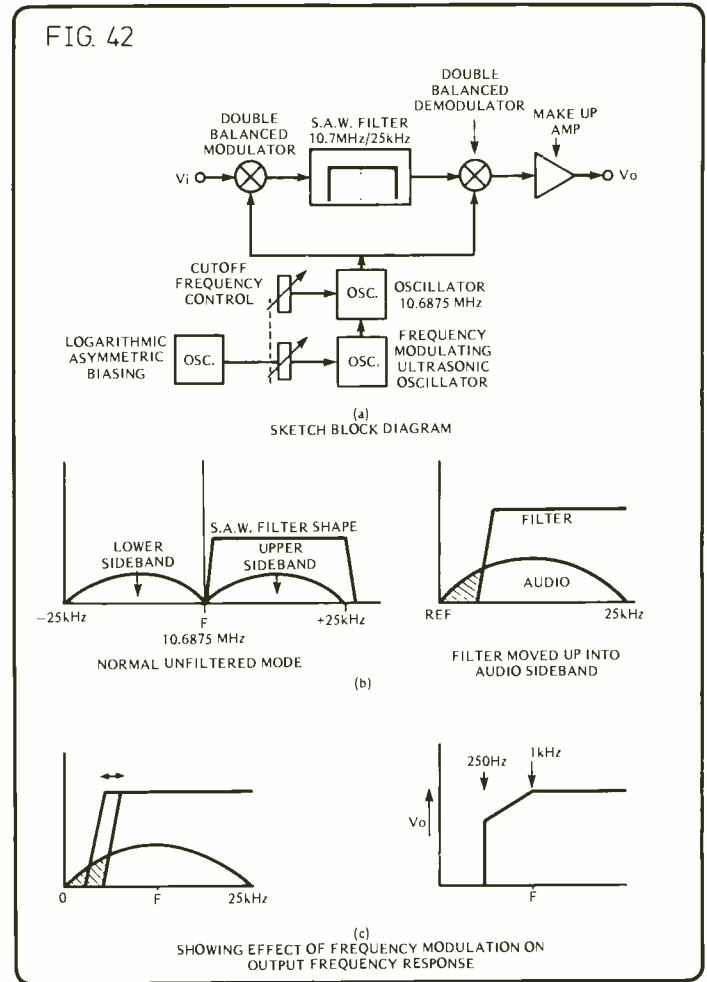
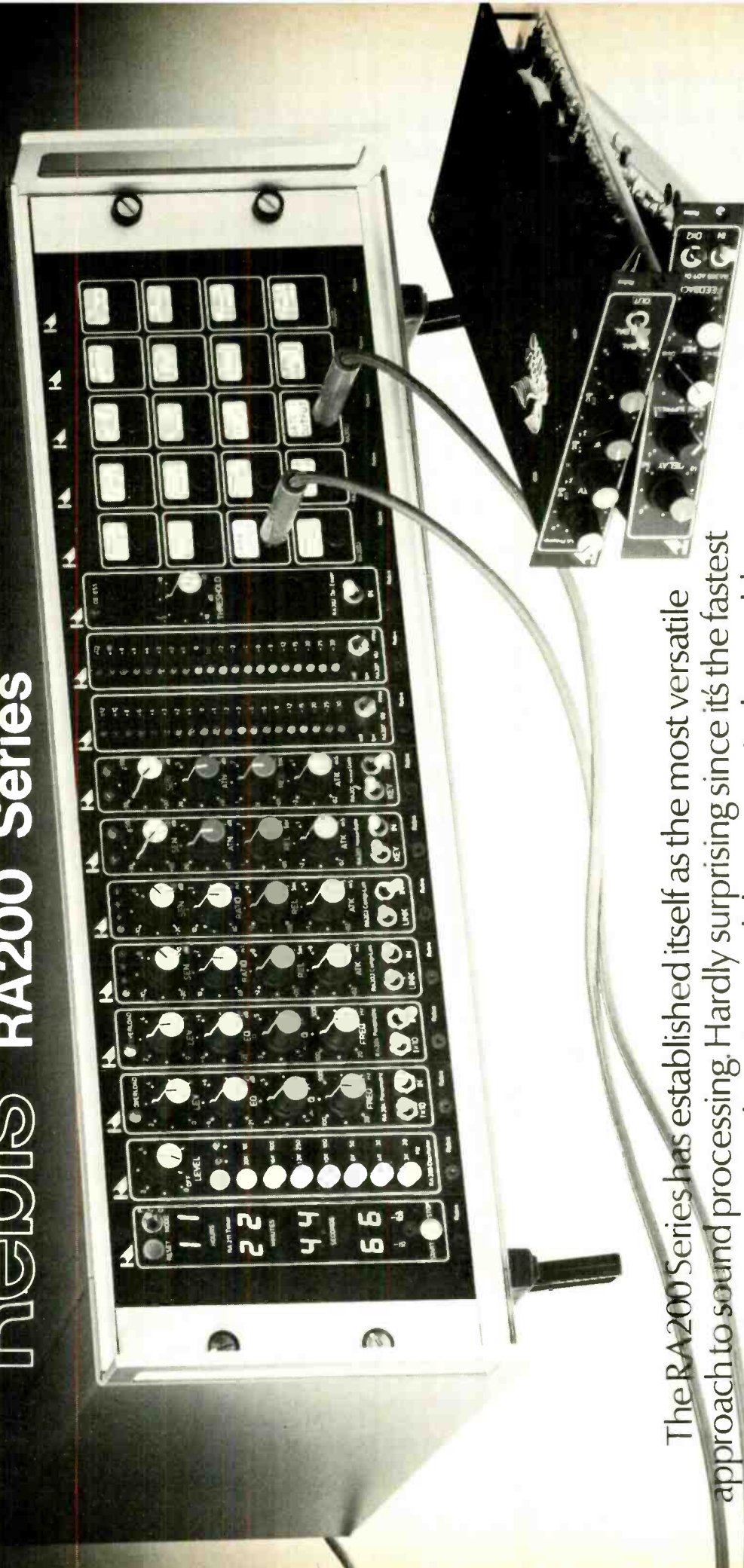


FIG. 42



Rebis RA200 Series



The RA200 Series has established itself as the most versatile approach to sound processing. Hardly surprising since it's the fastest growing and most comprehensive modular system in the world.

Modules to date include:

- | | | | | |
|--------------------------|----------------------------|-----------------|---------------------|-------------------|
| RA201 Noise Gate | RA204 Parametric Equaliser | RA207 LED Meter | RA210 RIAA Preamp. | RA213 Mono MDA. |
| RA202 De-esser | RA205 ADT/Delay | RA208 Modulator | RA211 Timer | RA214 Stereo MDA. |
| RA203 Compressor-Limiter | RA206 Oscillator | RA209 Mixer | RA212 Mic/Line Amp. | RA200J Connector |



For further information contact: Rebis Audio Ltd., Kinver Street, Stourbridge, West Midlands DY8 5AB. Tel: 0384 71865. Telex: 335494

Belgium: S.E.D., Brussels 522 7064. **Netherlands:** SAP, Amsterdam 797055. **Japan:** Continental Far East, Tokyo, Tlx. 72 22498. **Spain:** Mike Llewellyn Jones, Madrid 637 0752. **U.S.A.:** Klark-Teknik Electronics Inc., Farmingdale, N.Y. 249 3660. **Sweden:** Tal & Ton, Gothenberg 130216. **France:** Lazare Electronic, Paris 8786210. **Finland:** Studiolec, Espoo 520 604.



MXR dual/limiter

MANUFACTURER'S PROVISIONAL SPECIFICATION

Max input level: +19dB ref 0.775V.
Max output level: +19dB ref 0.775V.
Max continuous level: +10dB reference 0.775V.
Input impedance: 20k Ω balanced.
Output impedance: 200 Ω unbalanced.
Equivalent input noise: -110dBm.
Output noise: 90dB below max continuous output.
Slew rate: 70V/ μ s.
THD: \leq 0.02% below threshold. \leq 0.05% at 10dB limiting. 20Hz to 20kHz.
IM: 0.5% (60Hz to 7kHz, 4:1) below threshold. 0.1% at 10dB limiting.
Max limiting: 27dB.
Frequency response: 20Hz to 20kHz +0, -1dB.
Attack time: 0.5 to 50ms.
Release time: 100ms to 5s.
Slope: 4:1 or ∞ :1 with smooth transition through threshold.
Detector loop input: impedance 6.2k Ω , max level +19dBm.
Detector loop output: impedance 100 Ω , max level +19dBm.
Dimensions: (whd) 19 x 1 $\frac{3}{4}$ x 6in.
Price: £309.98.
Manufacturer: MXR Innovations Inc, 740 Driving Park Avenue, Rochester, NY 14613, USA.
UK: Atlantex Music Ltd, 34 Bancroft, Hitchin, Hertfordshire SG5 1LA.

THE MXR model 136 dual limiter is a new product offering ganged stereo operation or two separated independent channels. The unit is very compact, being designed for mounting into a 19in rack and only occupying 1 $\frac{3}{4}$ in of rack space.

The mechanical construction is particularly solid with the rack 'ears' being part of the cast alloy sides into which the extruded front and rear panels are secured with screws. The top and bottom panels interlock with the rear panel and are screwed to the front panel.

Within the unit all the electronics except the power transformer and the rear panel connectors, are supported on a single pcb. All connections to the pcb are by means of harmonica connectors, however the wiring to these from the rear panel audio inputs and outputs is rather untidy. Being a new product no proper instruction or main-

tenance manual was available at the time of the review. Also the pcb which was generally tidy in layout, lacked any component identifications.

Turning to the front panel the two sections of the limiter have identical layouts with a stereo/dual locking pushbutton switch at the centre of the panel and the power on/off switch and indicator to the right of the panel.

Each limiter section has two locking pushbuttons to the left, one to switch the limiter in or out and the other to set the compression ratio to either 4:1 or ∞ :1. The front panel legends do not make it clear which positions of the switches relate to which setting, this is also true of the stereo/dual switch.

Proceeding to the right from the pushbuttons each channel has an input and an output level pot, these having calibrations of 10 and -30 at their extremes and dots around their periphery to permit re-setting to quite well defined positions. Each channel has two further pots which control the attack and release times, these again having dots around their peripheries. The attack time pot has calibrations at 0.5ms and 50ms and the release time at 0.1s and 5s.

The remaining front panel feature for each channel is a gain reduction indicator consisting of a row of five red LED indicators mounted behind windows in the front panel. The right hand LED, identified as 'T', illuminates at the threshold of limiting with the remaining four LEDs indicating 3dB, 6dB, 12dB and 18dB gain reduction.

To the rear of the unit the audio inputs and outputs take the form of XLR-type connectors in parallel with $\frac{1}{4}$ in 3-pole jack connectors, the inputs being electronically balanced and the outputs unbalanced. A further four $\frac{1}{4}$ in jack sockets give access to the gain reduction detector loops of the two channels, forming inputs and outputs. There remains a fixed power lead having the correct UK colour coding.

It is strongly felt that the manufacturer should improve the switch position identifications on the

front panel and provide component identifications on the pcb (maybe this is already in hand for future production) but in other respects this is a neat and well constructed unit.

Inputs and outputs

The balanced audio inputs were found to have an impedance of 19.2k Ω in the balanced mode or 9.6k Ω when used single ended with the unbalanced outputs having an impedance of 204 Ω , the former being satisfactory but the latter on the high side for modern interfacing arrangements.

The maximum input level before the onset of serious distortion was found to be +22dBm at minimum input gain, the input impedance remaining constant with gain control setting. The input level for the onset of limiting could be varied from +9dBm to -30dBm with the overall maximum gain from input to output being 39.4dB for one channel and 38.6dB for the other.

At the output the maximum output level was found to be +22dB reference 0.775V or +21dBm loaded into 600 Ω with the output at the onset of limiting being variable from +11dB reference 0.775V to -29dB.

The common mode rejection at both inputs was virtually identical and as shown in Fig 1 was not very good, but was constant with frequency.

At the threshold of limiting the level at the detector loop inputs was found to be -5dBm with the output impedance being 53 Ω and the associated input impedance 9.8k Ω — all satisfactory here.

Metering

The gain reduction metering was found to have 'ballistic' characteristics with a similar timing to a VU meter, requiring about 300ms to reach the steady state indication. The accuracy of the gain reduction was good, being within 0.5dB for the three lower indications and within 1dB at the 18dB indication.

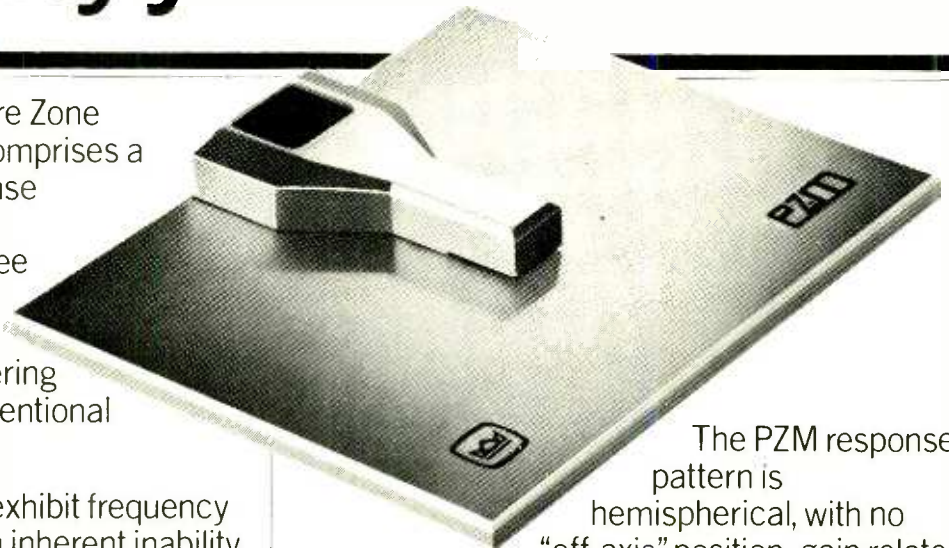
Can you afford to ignore the most significant development in microphone technology of the last fifty years?

The revolutionary Pressure Zone Microphone (PZM™) family comprises a range of hemispherical response microphones which give a transparently natural sound, free from non-linear characteristics – such as proximity effect and comb filtering – that are exhibited by all conventional microphones.

Traditional microphones exhibit frequency response anomalies, due to an inherent inability to satisfactorily combine direct and reflected signals, thus leading to phase-induced amplitude cancellations and reinforcements, or comb filtering.

Amcron PZMicrophones™ eliminate this effect because they detect sound by means of a new process. This takes advantage of the fact that, as a sound wave approaches a boundary (such as a wall, table or floor), there is formed at this boundary a pressure field four or five mm. deep, within which the direct signal and its reflection from the boundary remain in phase and add coherently.

The Amcron PZM places a small pressure transducer inside the primary boundary pressure zone, facing the boundary. This prevents any direct signal reaching the microphone, thus eliminating the possibility of phase-induced interference and providing a significant improvement in signal quality.



The PZM response pattern is hemispherical, with no "off-axis" position: gain related to distance will change, but not tonal quality. The PZM responds accurately to up to 150 db spl, yet hears a whispered conversation in an ordinary room at ten metres.

Engineers are finding that the PZM continually suggests new miking techniques. And that in many applications fewer PZM's are required than traditional microphones. In fact, the PZM is changing ideas about how a microphone should look, sound, and be used. Don't you think that it's time you got in on the act, and gave the PZM a listen?

Details of available models, prices, and suggestions for applications are obtainable from the sole UK importers and distributors, HHB Hire and Sales, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. Tel: 01-961 3295. Telex: 923393.



AMCRON

PZM and PZMicrophone are registered trade marks of Crown International

reviews

Frequency response and noise

The overall frequency response without limiting and with 10dB compression is shown in Fig 2 from which it can be seen that the response is within 0.5dB from 20Hz to 20kHz in either condition. However, when compressing by 10dB there is a rise in response at very low frequencies — a matter not thought to be of any significance.

Noise was measured at the output with the input and output gains set to maximum it being found that the two channels showed a slightly different noise performance which reflects the slight difference in gain noted previously.

Table 1 shows the average output noise in dBm. This may be referred to the maximum output of +22dB to arrive at the dynamic range or have 39dB added to arrive at the equivalent input noise — all figures being satisfactory.

TABLE 1

Measurement method	Noise
Band limited 20Hz to 20kHz rms	-67.7dBm
A-weighted rms	-69.7dBm
CCIR weighted rms reference 1kHz	-59.7dBm
CCIR weighted quasi-peak ref 1kHz	-55.7dBm

Main frequency components and their harmonics were at negligible levels and no other undesirable noise components were noted in the outputs.

Distortion

Measurement of the second and third harmonic distortion products at frequencies from 20Hz to 20kHz at levels below limiting showed that the performance was excellent with both distortion products being less than 0.01% (-80dB).

Also measurement of intermodulation distortion

78 ▶

FIG.1 MXR DUAL/LIMITER CMR

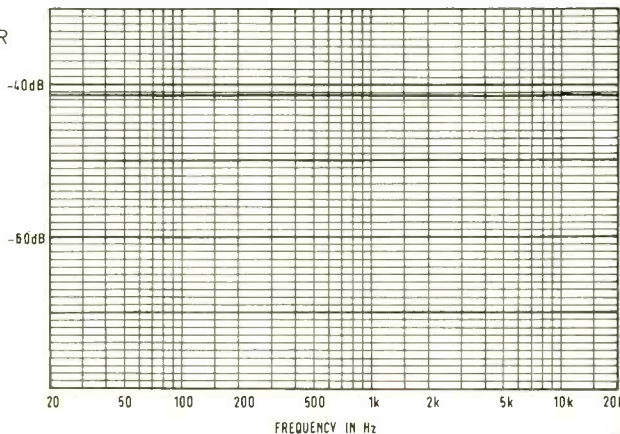


FIG.2 MXR DUAL/LIMITER FREQUENCY RESPONSE

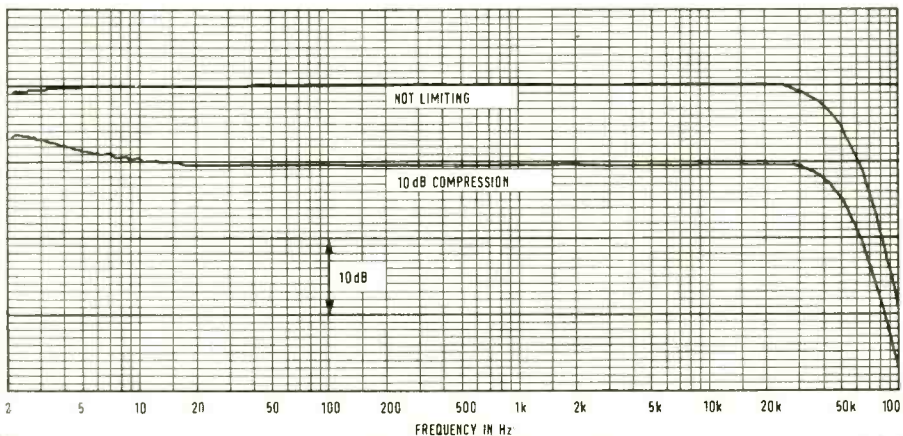
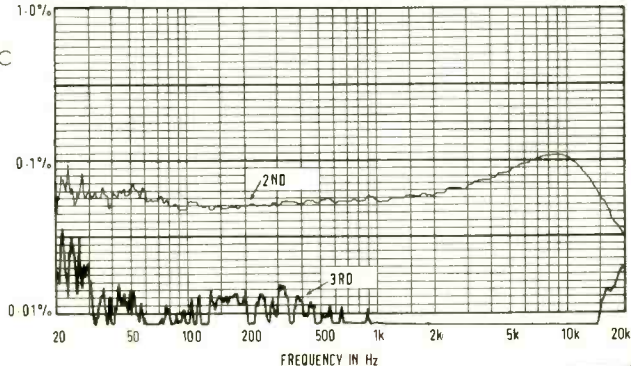


FIG.3 MXR DUAL/LIMITER 2ND AND 3RD HARMONIC DISTORTION



AUDIO COMPONENTS



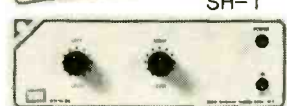
PM-1
Three Band Parametric Equalizer




TE-1
Three Band Tone Equalizer



AC-1
Adjustable Active Crossover



SH-1
Stereo Headphone Box



SHB-1
Companion To SH-1
Holds Up To Six Headphones




ADA-1
Four Channel Active Audio DA



SC-1
Stereo Combiner



LS-1
Line Level Splitter



SB-1
Stereo Balance Box

Send For Your Free Copy Of Our Catalog
 OPENINGS FOR EXCLUSIVE DISTRIBUTORS IN MANY FOREIGN COUNTRIES



SESCOM, INC.
 Professional Sound Division
 1111 Las Vegas Blvd. North
 Las Vegas, NV 89101 U.S.A.
 (702) 384-0993
 (800) 634-3457
 1WX 910-397-6996

Like Father...

How many times have you listened to playback in the main control room (or mobile), then moved to a re-mix suite and heard a totally different sound because the monitors in each location possessed totally different sound characteristics?



At Tannoy we set out to solve your problem by creating a Family of Monitors that retained the same sound characteristics, even though their physical size may be different to suit each location and purpose.

You can now be certain that by choosing Tannoy Dual Concentrics for all your monitoring the sound you hear will always be the same—whether you are listening to the Daddy of The Family, the Super Red M1000; or his young son Little Red 12B.

Let The Family make you an offer you just can't refuse.

...like Son

TANNOY®

The Name for Loudspeakers

Tannoy Products Ltd.

77/79 High Street, Watford, Herts WD1 2DT
Telephone: Watford (0923) 48868

tion to the CCIF twin tone method using two equal amplitude tones separated by 70Hz showed that under non-limiting conditions this form of distortion was below 0.01%.

With the attack and release times set to their longest, the harmonic distortion whilst compressing by 10dB is shown in Fig 3 which demonstrates an excellent third harmonic performance with the less offensive second harmonic remaining at a reasonable level. As with all types of limiter the 1f distortion will of course increase at short release time settings.

As with harmonic distortion, the intermodulation distortion when compressing by 10dB was excellent as shown in Fig 4.

Limiters

Fig 5 illustrates the I/O relation for the 4:1 and ∞:1 compression ratios, and shows that the onset of compression is 'soft' and that the correct laws hold up to 20dB compression or above.

Measurement of the attack and release times for the two extreme control settings and for the mid-point setting gave the results shown in Table 2 which are in line with the manufacturer's specification.

TABLE 2

	Fast	Medium	Slow
Attack time	1ms	10ms	50ms
Release time	100ms	1s	6s

The output of the limiter with the attack time set to fast with a toneburst resulting in 10dB compression is shown in Fig 6 which demonstrates an approximately 500µs overshoot of considerable amplitude. Whilst this does not matter in many limiter applications it means that this limiter is not suitable for limiting transmitter modulation and in some circumstances not suitable for disc cutting.

Tracking between the two channels in the stereo mode was very good at both compression ratios provided that one remembered to set the two compression ratios to the same value. It is felt that the limiter should have some form of warning to indicate invalid compression ratio settings when in the stereo mode.

Other matters

As demonstrated by Fig 7 the isolation between the two channels was excellent at all audio frequencies.

The controls were found to be quiet in operation and provided that the normal precautions were taken in the setting of the attack and release times the operation of the unit was smooth and effective.

Summary

In most respects this is a very good limiter for normal recording and sound 'treatment'

applications, but not for limiting in broadcasting and disc cutting.

Distortion was at unusually low levels and the noise performance good, as were other parameters.

The main shortcoming I found during use of the limiter was poor identification of the pushbutton control settings. It is also felt that it should be possible to isolate the signal earth from the chassis in view of the single ended outputs.

These matters and others raised in this review can be easily put right in production — this will then be an excellent inexpensive and small size unit.

Hugh Ford

Editor's note: Our review sample of the MXR dual limiter was an early production model supplied without an instruction manual. MXR have informed us that current models of the unit feature improved switch legends. Also a comprehensive instruction manual is supplied with the unit which provides full user instructions, pcb layout and component identifications, and gives details of how to isolate the signal earth from the chassis.

FIG. 4
MXR DUAL/LIMITER
IM DISTORTION AT 10dB
GAIN REDUCTION

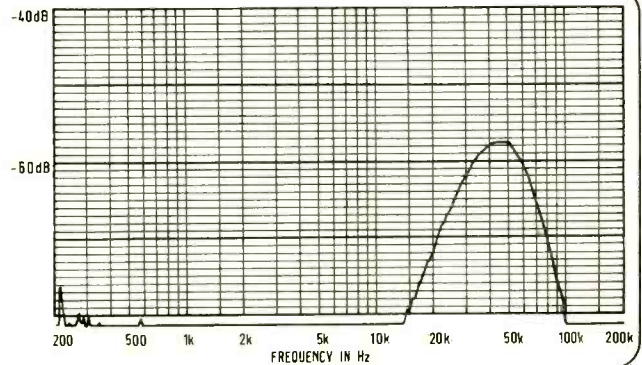


FIG. 5
MXR DUAL/LIMITER I/O RELATION 4:1 AND ∞:1

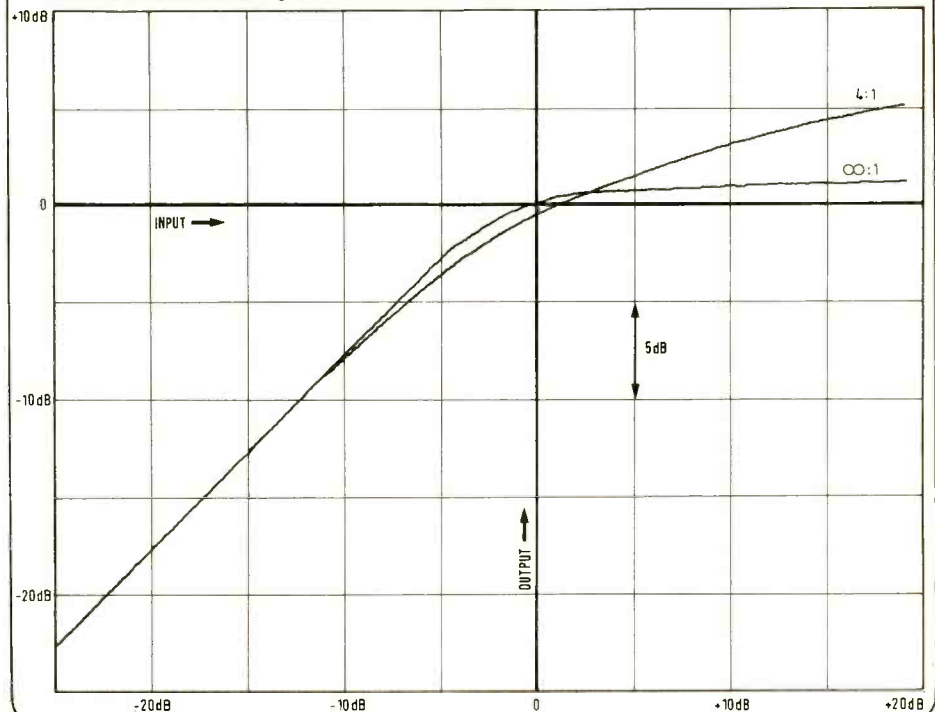
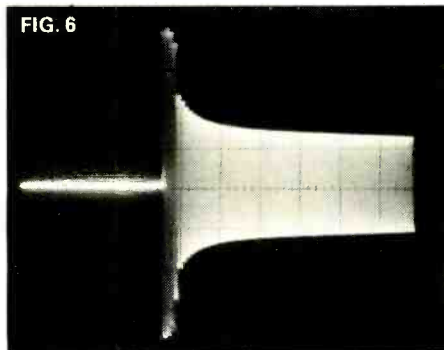
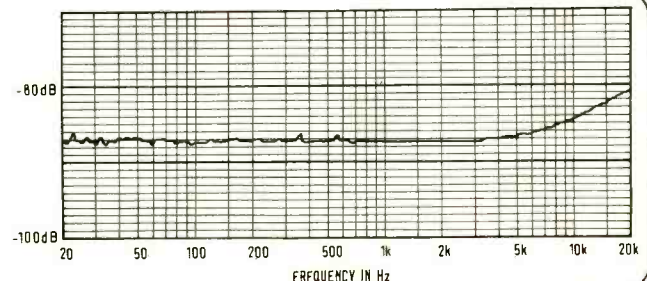



FIG. 7
MXR DUAL/LIMITER
CROSSTALK



GAIN BRAIN II

Now...a limiter/compressor and *ducker* that understands MUSIC



lin
log

release (sec)

0 2 4 6 8 10 12 14 16 18 20 30 50

attack (ms)

range/gain (dB)

1:50 duck ratio (x:1)

in out ext mode

threshold

GAIN BRAIN II

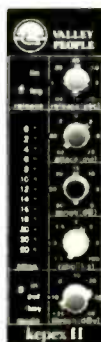
Strong words? We're prepared to back them up. Just listen to **GAIN BRAIN II** and you'll agree it's the only real advancement in dynamics control in nearly a decade.

GAIN BRAIN II is fundamentally different from any other limiter/compressor device, including our own Allison **GAIN BRAIN I**. The others struggle along with Peak and RMS detection methods that squash and flatten the life out of music, as if it were a laboratory test signal. **GAIN BRAIN II** treats music waveforms with greater respect and understanding. It does this by means of exclusive circuitry: Linear Integration Detection, Log Domain Processing, Peak Reversion Detector Correction, and the most transparent VCA ever created by man—namely our own EGC 101.

Sure, these are new words; we invented them. Just like we invented the technology that goes with them. Audibly effective technology that allows **GAIN BRAIN II** to solve the great limiter paradox: tight control vs. musical integrity.

GAIN BRAIN II can give you the *flattest VU meter output of any limiter/compressor device in existence*, while maintaining an *unheard of degree of integrity to the subtle dynamics of music and speech*. And it's a ducker, too.

And the **GAIN BRAIN II** phenomenon is just the beginning. Get your copy of our **GAIN BRAIN II** literature package. Once you've read it, you'll understand the full implications of our new technology. Better yet, get yourself a **GAIN BRAIN II**. Your ears will tell you all you need to know.



KEPEX II Our original KEPEX® is credited as the most successful signal processing device of the 70's. We're flattered by the imitators who widely advertise claims that they have "improved" on our design.

One fact remains: More studios buy KEPEX than *all* of the imitations combined, yet we seldom advertise the equipment. Does that tell you anything?

There does, however, exist a genuine "improved KEPEX". It's not a copy though, it's an original in its own right. We call it KEPEX II®. New technology from the ground up. New capabilities for the 80's: new controls, new functions, and best of all, dramatic new levels of audio transparency thanks to our EGC 101 VCA.

Today, more people buy KEPEX II than all of the others. Find out why this is true.

F.W.O. Bauch Limited

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



VALLEY PEOPLE, INC.

a merger of ALLISON RESEARCH & VALLEY AUDIO

P.O. Box 40306/2820 Erica Place
Nashville, Tennessee 37204
615-383-4737
TELEX 558610 VAL PEOPLE NAS

Audio tapes

ABOUT every two years the time comes to review analogue audio recording tapes—maybe in two years time we will be including digital audio tape? As in the past, tape manufacturers were invited to submit two NAB reels of each type of standard play tape from different batches and two samples of long play tape if its performance differed significantly from the standard play version.

Somehow such a request is beyond most organisations with only EMI complying with the simple request. Agfa, Ampex, BASF, Racal Zonal and TDK all provided two samples, but from similar batches. 3M, Maxell and Sony only provided single samples and again Pyral failed to provide any material.

As in the past, Japanese manufacturers only provided long play tapes, but, TDK have advertised standard play versions of their *GX35B* and *LX35B* with the type numbers *GX50B* and *LX50B* with these products having identical magnetic and electroacoustic properties to the long play versions.

All tape samples were initially subjected to a physical inspection to see if the spools were in good condition and also if the quality of winding was up to standard. With the exception of two Ampex samples which arrived with severely bent spools and were promptly replaced, all spools were found to be in good condition.

As can be seen from **Table 1** the quality of wind tended to be better with tapes from European manufacturers, however, there appears to be an overall improvement in the condition of tapes imported from the USA and Japan compared with earlier reviews.

Throughout the tables 'leafing' refers to the condition where individual tape turns protrude from the wind, 'blocking' refers to the condition where groups of tape turns form an uneven wind. If leafing occurs it is very easy to damage the tape edge and thus cause signal losses. Similarly blocking can lead to the tape rubbing on the spool's flanges and thus being damaged when winding.

Only the Japanese manufacturers provided an outer wrapping, thus indicating that a tape is unused. With the exception of Agfa and BASF who use rather fiddly envelope type boxes all containers were hinged boxes of adequate strength and relatively uniform size with the Ampex and Sony boxes being larger than the others. Only the 3M type 250 lacked a dust-excluding inner protection.

After the initial inspection samples of each tape

type were run at fast winding speeds to ascertain their winding properties. A fully professional machine in the form of an Ampex *ATR-100* was considered as a kind tape handler both when running at full winding speed and also at a constant 120in/s. Typical of semi professional machines we used a Teac *3340* for checking the winding properties at lower tape tensions and high speed, the Ampex running at a constant tension of 80 gm at both winding speeds.

As can be seen from **Table 2** the standard play back-coated tapes gave a better overall performance with the Agfa *PEM468* and 3M *256* being exceptionally good. The performance of the long play tapes left much to be desired. This confirms my experience that Japanese tapes have a poor mechanical winding performance irrespective of the coating and back coating resistivity.

It is interesting to note that the large measured variations in the resistivity of the coating and back coatings does not relate directly to the winding qualities, it often being assumed that a low resistivity leads to better winding.

The overall tape thickness is shown in **Table 1** and as can be seen there are significant differences such that the length on a full spool can vary by about 10%. It is also noticeable that the base film thickness for standard play and for long play is far from constant. Reference to the coating thicknesses, maximum output level and retentivity can provide some interesting information for readers prepared to do some sums on the magnetic performance of the coating.

Finally, on the physical front, the length of each tape was checked with all being found to be reasonably accurate and the weight of a packed tape was noted—there's some postage that can be saved here!

Measurement of electroacoustic properties

All measurements were done on an Ampex *ATR-100* recorder equipped with a European stereo headblock having a track width of 2.79mm as opposed to the common twin track format as used in the USA with a 1.91mm track width. In view of the enormous number of measurements needed the tapes were only measured at a speed of 15 in/s using the IEC 35µs equalisation as determined from a BASF DIN38 calibration tape.

It should therefore be remembered that the use of alternative equalisations will affect the noise performance and also distortion. It should also be noted that the nominal record head gap was 12.5µm and the replay head gap 2.5µm. Whilst these are typical of many professional recorders

the use of alternative gaps will have fairly unpredictable effects upon the measured performance.

In order to provide detailed performance data the relation between bias current and maximum output level at 1kHz for 3% third harmonic distortion, sensitivity (efficiency) at 1kHz, 10kHz, 15kHz and 18kHz, third harmonic distortion at a fluxivity of 320nWb/m at 1kHz and saturation output level at 10kHz was plotted at constant record current.

This daunting task for 17 tape types and the unrecorded section of the DIN calibration tape was largely done automatically using a Tektronix programmable calculator interfaced to an X/Y plotter, three digital voltmeters, a voltage controlled amplifier and a motorised drive to vary bias current.

The optimum bias for each tape type was considered to be that bias current at which the third harmonic distortion at a fluxivity of 320nWb/m at 1kHz was at a minimum and the tables refer this bias current for each tape to the same condition for the DIN calibration tape. This bias condition will normally correspond to minimum modulation noise and as can be seen from the diagrams it corresponds to a satisfactory maximum output level and usually 2dB to 3dB over bias at 10kHz for standard play tapes.

Reference to **Table 2** shows the minimum third harmonic distortion at 320nWb/m to vary widely from one tape type to another and it will be seen that the tapes exhibiting a very low distortion require an accurate bias setting to achieve the optimum performance in this respect.

All the remaining tabulated results were determined at this bias setting which showed a 3.5dB variation in bias current, it being possible that some older recorders may not be capable of using such tapes as 3M 250.

The sensitivity (or efficiency) was related to the unrecorded section of the DIN38 calibration tape with relatively small overall variation occurring at 1kHz. However, at high frequencies some of the long play tapes were significantly more sensitive and some recorders have inadequate record equalisation controls to cope with the measured variations.

Reference to the maximum output level shows that all the tapes reviewed are what used to be regarded as 'high output' tapes with five types having maximum output levels in excess of +10dB reference 320nWb/m. However the saturation output level at high frequencies is equally

82 ▶

EXPANDABILITY

Continuing our Policy of ever increasing the versatility of the DMX Series of Delay/Pitch changes, AMS are pleased to announce the DIGITAL LOOP EDITING SYSTEM. L.E.S. is the friend of every engineer who has wasted hours splicing and editing tapes together to make vocal instrument/drum loops. Now the job is simplicity itself and once information is stored in the memory of the DMX unit, editing may be carried out simply by means of the delay keypad. The pitch changer can be used to 'varispeed' the pitch of the information stored and the loop can be run continuously or triggered instantaneously for drop-ins.

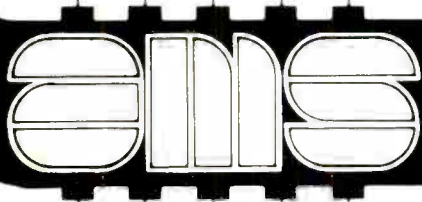
This facility is available as an update to both DMX 15-80 and DMX 15-80S systems.

Keep up with AMS - see us at the AES in Hamburg & Los Angeles and at the NAB in Las Vegas.

SWITZERLAND: ABQ, Zurich.
NORWAY: PRO Technic A/S Oslo.
CANADA: Octopus Audio, Toronto.
JAPAN: Continental Far East Inc., Tokyo.
SPAIN: Singleton Productions, Barcelona.
HONG KONG: Audio Consultants, Kowloon.

WORLDWIDE DISTRIBUTORS

HOLLAND: Delcon, The Hague.
FRANCE: Studio Equipment, Paris.
W.GERMANY: Elmus GmbH, Berlin.
BELGIUM: T.E.M. / A.S.C., Brussels.
SINGAPORE: Auvi Private, Singapore.
DENMARK: Sweet Silence, Copenhagen.



ENGLAND
Advanced Music Systems,
Worsthorne Village,
Burnley, England.
Telephone: [0282] 36943
Telex 63108

U.S.A.
Quintek Distribution Inc.,
4721 Laurel Canyon Boulevard,
Suite 209, North Hollywood,
California 91607.
Telephone: [213] 980-5717

shone

SPECIALISTS IN STUDIO DESIGN AND THE PROVISION OF ALL FORMS OF ACOUSTIC TREATMENT, SOUND-RESISTING DOORS AND OBSERVATION WINDOWS, ACOUSTIC TALKS TABLES, SCREENS, SIGNAL LIGHTS, ILLUMINATED SIGNS, AND ALL STUDIO FITTINGS.

THERE MUST BE A REASON WHY OVER 20 INDEPENDENT LOCAL RADIO STATIONS, 5 MAJOR BROADCASTING CONCERNS AND A MULTITUDE OF PRIVATE RECORDING STUDIOS HAVE UTILISED OUR SERVICES AND INSTALLED OUR PRODUCTS. WE LIKE TO THINK IT IS BECAUSE WE PRODUCE HIGH-QUALITY ITEMS AT COMPETITIVE AND REALISTIC PRICES, DELIVER ON TIME, AND OFFER PERSONAL SERVICE.

PERHAPS WE COULD DO THE SAME FOR YOU?

SHONE SOUND LIMITED

16 Bentley Way, Whitehall Road, Woodford Green, Essex IG8 0SE. Tel. 01-504 9796 (contact: Mr. P. N. Bone)
64 Joiners Lane, Chalfont St. Peter, Bucks. Tel. Gerrards Cross 86536 (contact: Mr. H. Bishop)

important if a clean 'open' sound is to be recorded and not all tapes are equally well balanced from this point of view. Furthermore, very high output tapes tend to have a poor print-through performance.

A further test of the output capabilities is the intermodulation distortion performance. Table 2 refers to IM distortion as measured by the CCIF twin tone method at the specified frequencies. Two equal amplitude tones at frequencies f_1 and f_2 were recorded and the record level increased until the difference frequency [$f_2 + (f_2 - f_1)$] reached the specified percentage of f_1 or f_2 with the tabulated level referring a single tone (f_1 or f_2) to 320 nWb/m.

There are clear differences between tapes in this respect. If we look at tapes with a 10% IM of +11dB at 1kHz and then look at their performance at 10% IM at 10kHz this varies from +3.5dB to +8dB—not all high output tapes are equal! Due to the extra high frequency record boost when using NAB equalisation this equalisation is less tolerant to hf saturation and IM performance.

Turning to the bias noise performance each tape was recorded with bias in the absence of an audio signal and the resulting noise referred to 320nWb/m using the CCIR recommendation 468 weighting network with unity gain at 1kHz and both a true rms meter and a meter complying with the CCIR recommendation 468 peak indicating requirements. In addition the noise was measured using a true rms meter with the IEC A weighting network. In all cases the recorder noise was at least 10dB below tape noise, so there was no need to correct the figures for machine noise.

Generally the variations in noise performance were smaller than the variations in other parameters with all tapes having a good performance.

The next test, that for modulation noise, showed a 5dB variation between tape types. In the past I have been accused of not putting enough emphasis upon modulation noise performance, so that shall now be put right.

Modulation noise is a form of tape noise that is only present when an audio signal is being recorded, thus it cannot be either heard or measured when recording hf bias alone. However modulation noise is present if one records direct current in the presence of hf bias and this is the traditional way of measuring modulation noise, but, this method does not give good correlation with the audible effects of modulation noise. The latter, which may be severe, are particularly noticeable when recording the piano or wind instruments like the flute and take the form of a gravelly unclear sound.

This defect is one of the most serious shortcomings of analogue tape recording and largely accounts for the very clean sound associated with digital audio recording.

The method of measuring modulation noise for this and previous tape reviews was to record a 1kHz sinusoidal tone at a fluxivity of 320nWb/m. The resulting recording was replayed through a 500Hz to 1.5kHz 24dB/octave bandpass filter to remove any harmonics whilst measuring the noise generated ± 500 Hz around the 'carrier'. The resulting signal was then passed through a very sharp 1kHz notch filter to remove the 'carrier' and the remaining noise measured with a true rms meter and related to 320nWb/m.

From Table 2 it can be readily seen that there

are significant (6dB) differences between tapes with the Ampex products and some 3M products being outstandingly good.

In order to ascertain the uniformity of reproduction from the tapes two types of test were done. Firstly tones at 100Hz, 1kHz and 10kHz were recorded for one minute each on the same length of tape and replayed to a level recorder with a pen speed of 200dB/s. The results shown in the diagrams provided show for 100Hz the effects of coating thickness variations, for 1kHz the overall coating uniformity and for 10kHz surface related defects. Overall it appears that during the past two years the general standard of performance has improved considerably.

The second test related to uniformity was to record a 7kHz tone and replay this to a SMPTE type intermodulation distortion meter. Normally this type of meter uses an lf (50Hz or 60Hz) tone mixed with the hf (7kHz) tone and looks for modulation of the high frequency by the low frequency. This is done by excluding the low frequency, rectifying the remaining high frequency and measuring variations in the rectified result. Doing this to the 7kHz tone from tape measures non-uniformities in the replayed 7kHz tone and gives a measured degree of quality.

As with the plotted uniformity these results have improved over the years, but large differences remain between tape types.

The final electroacoustic measurement was that of print-through, the tapes being recorded with bursts of 1kHz tone before being rewound and stored for 24 hours at a temperature of 68°F (20°C).

As is conventional the first pre-echo was measured and related to the original recorded fluxivity of 320nWb/m to produce the tabulated results. Normally it would be expected for the long play tapes to exhibit a worse print performance but this was not necessarily the case with some high output tapes giving a print performance which would be quite intolerable for classical recording without noise reduction.

The final tabulated results relate to the magnetic properties with the coercivity relating to the bias requirements—the higher the coercivity the higher the bias requirement and the more difficulty in erasure. The squareness gives an indication of the efficiency of the coating, the figure relating the residual flux density to the saturation flux density—the higher the squareness the more of the capability of the coating is used.

Finally the remanence is quoted, this being the maximum residual flux which relates to the maximum long wavelength recording capability when using wide record head gaps.

Conclusions

Clearly there is no ideal tape giving a high output at short and long wavelengths, low noise and modulation noise, low print-through and good uniformity.

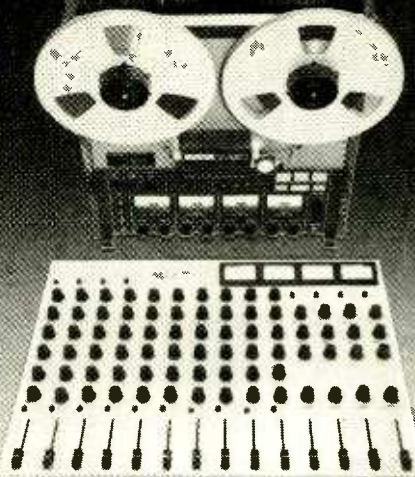
Whilst high output tapes are attractive, many suffer from lack of output at high frequencies or poor print-through or both. Often there is also a high price to pay for the better tapes.

Whilst writing this review I learnt that Ampex are producing a new tape, probably the long awaited low print version of the type 456 *Grand Master* but we must wait for this and also the new Pyral material type C/90.

Hugh Ford

Tables and diagrams follow

MADE FOR EACH OTHER



The **Seck 104** is designed specifically to work with budget multitrack recorders.

The mixer has prewired mixdown facility, a four way stereo monitor mix that is switchable between line and tape, and a comprehensive musicians cue mix system. All levels are -10^0 and 0dBm compatible.

A six channel stereo version **Seck 62** is also available. This is based on the original Prokit design and features new panel graphics, meter pod and upgraded IC's.

SECK 104 Ass'd £328.00
62 Ass'd £130.89
62 Kit £92.60
All prices + VAT

For full details of the **SECK** range of mixers and accessories contact

REW, 114 Channing Cross Rd,
London WC2 Tel. 01-836 2372

SES Ltd, 100 Hamilton Road,
London NW11 Tel. 01-458 9133

TURNKEY, 8 East Barnet Rd
New Barnet, Herts. EN4 8RW
Tel. 01-440 9321



SURVIVAL PROJECTS AUTOPANNER



- * Stereo Autopanning
- * Control Voltage For Synchronous Effects
- * Compresses, Expands, Vibratos And Ducks

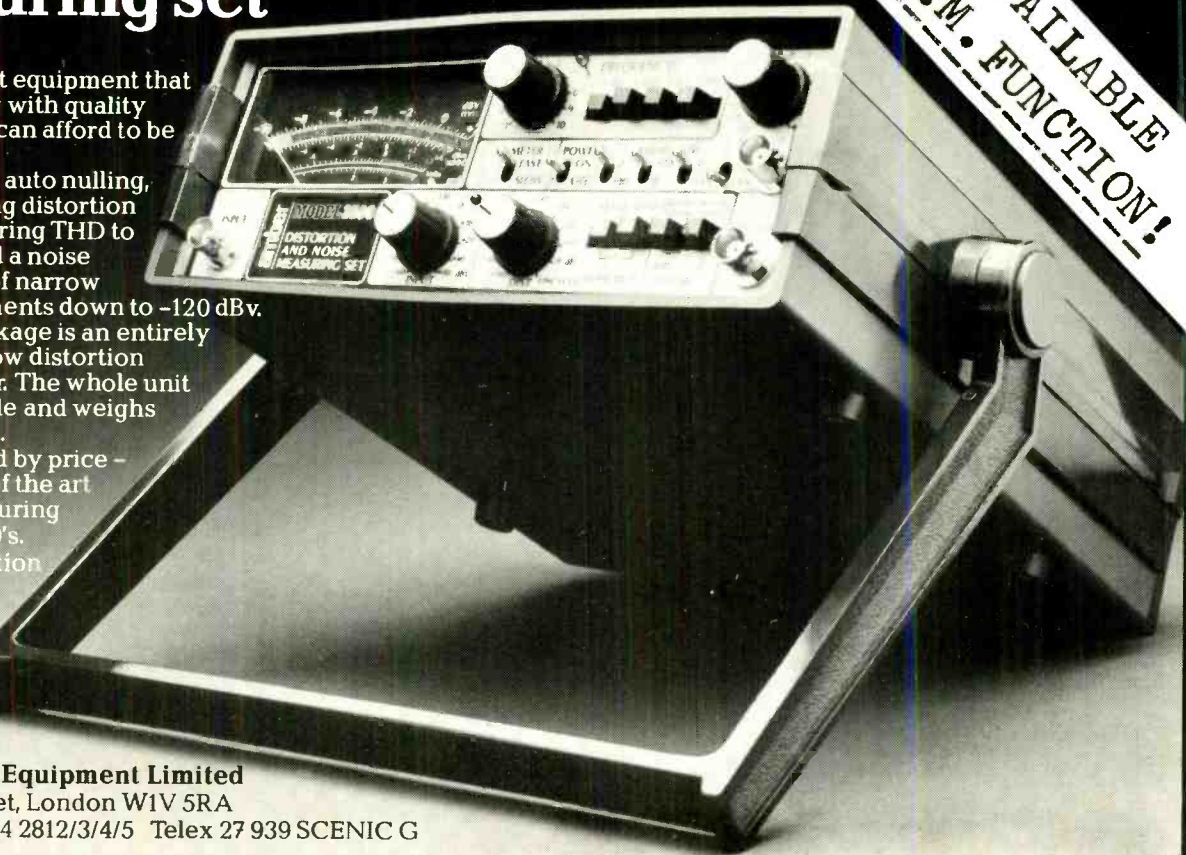
sole distributors:- Scenic Sounds Equipment 97-99 Dean Street London W1V 5RA Telephone: 01-734 2812/3/4/5

Amber 3500 distortion measuring set

The piece of test equipment that no-one working with quality audio products can afford to be without. £950.00 buys an auto nulling, auto level setting distortion analyser measuring THD to below .002% and a noise meter capable of narrow band measurements down to -120 dBv. In the same package is an entirely new design of low distortion signal generator. The whole unit is highly portable and weighs less than 3.5 kgs. Do not be misled by price - this is the state of the art distortion measuring system of the 80's. For full information contact:



Scenic Sounds Equipment Limited
97-99 Dean Street, London W1V 5RA
Telephone 01-734 2812/3/4/5 Telex 27 939 SCENIC G



**NOW AVAILABLE
WITH I.M. FUNCTION!**

TABLE 1 TECHNICAL DATA

	Agfa PEM468	Ampex 406	Ampex 456	BASF SPR 50LH	EMI 851	EMI 862	3M 206	3M 250	3M 256	Racal Zonal 888	Racal Zonal 675	Maxell UD35 180	Maxell UDXL35 180	Sony ULH	TDK LX35 180M	TDK GX35 180B
Outer wrapping	None	None	None	None	None	None	None	None	None	None	None	Yes	Yes	Yes	Yes	Yes
Box type	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Envelope Hinged	Hinged	Hinged	Hinged	Hinged	Hinged
Box size (mm square)	275	285	285	275	275	275	275	277	275	275	275	275	275	275	275	275
Inner wrapping	Polybag Sealed	Sealed	Sealed	Polybag	Polybag	Polybag	Polybag	None	Polybag	Sealed	Sealed	Polybag	Polybag	Polybag	Polybag	Polybag
Spool type (NAB aperture)	Small	Small	Small	Large	Medium	Medium	Large	Medium	Medium	Small	Small	Medium	Medium	Medium	Medium	Medium
Leader colour	None	None	None	Green	White	None	None	None	None	None	None	Silver	Silver	Black Print	Silver	Silver
Trailer colour	None	None	None	Red	Red	None	None	None	None	None	None	Silver/Red	Silver/Red	Red Print	Red	Red
CONDITION OF WIND	V. Good #1	Good/V. Good	Good/V. Good	Good/V. Good	Medium	Medium	Good	Medium	Medium	V. Good	V. Good	Medium	Medium	Good	Medium	Medium
Leafing	None	None	None	None	None	None	None	None	None	None	None	No	No	No	No	Some
Blocking	None	Yes	None	Yes	Yes	Yes	Yes	Yes	Yes	None	None	Some	Some	Some	Some	Some
On spool flange	No	No	No	No	Yes	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
Other	—	—	—	—	—	—	—	—	—	1 Rough	—	—	—	Distorted	—	Loose
Winding (ATR100 120in/s)	V. Good	Good	V. Good	V. Good	Leaving V. Poor	V. Good	Good	Good	V. Good	V. Good	V. Good	V. Poor	Leaving V. Poor	Leaving V. Poor	Leaving V. Poor	Leaving V. Poor
Winding (ATR100 fast)	V. Good	Leaf	Leaf	Leaf	Leaving V. Poor	Good	V. Poor	V. Good	V. Good	Good	Good	Poor	Leaving V. Poor	Leaving V. Poor	Leaving V. Poor	Leaving V. Poor
Winding (Teac 3340)	V. Good	Poor	Medium	V. Good	Leaving V. Poor	Medium	Medium	Poor	V. Good	Good	Good	Poor	Leaving V. Poor	Leaving V. Poor	Leaving V. Poor	Leaving V. Poor
Back coating	Yes	Yes	Yes	Yes	None	Yes	Yes	Yes	Yes	Yes	Yes	None	Yes	Yes	None	Yes
Back coating colour	Black	Black	Black	Black	—	Rust	Black	Black	Grey	Black	Black	Black	Black	Black	Black	Black
Overall thickness (µm)	50.5	50.3	50.8	51.7	47.4	55.1	52.6	53.4	52.3	53.0	53.0	33.5	35.1	34.0	34.7	35.8
Base film thickness (µm)	31.0	32.5	33.7	33.8	33.8	33.8	37.5	30.0	30.2	33.5	34.4	21.3	21.7	20.7	22.5	20.6
Back coating thickness	3.4	2.8	2.7	3.7	—	5.1	4.1	4.5	4.1	4.7	5.7	—	2.1	2.6	—	2.1
Coating thickness (µm)	15.6	15.0	14.4	14.2	13.7	16.2	11.0	18.9	18.0	14.8	15.5	12.2	11.3	4.6 *2	10.7	12.2
Coating resistivity Ω/□	10 ⁹	>10 ¹²	10 ⁹	5x10 ⁹	10 ⁹	1.5x10 ⁷	10 ⁹	2x10 ⁸	>10 ¹²	10 ¹	>10 ⁹	1.3x10 ⁸	10 ⁸	10 ⁸	10 ¹¹	5x10 ⁸
Back coating resistivity	200kΩ	26kΩ	70kΩ	70kΩ	—	>10GΩ	11kΩ	70kΩ	50kΩ	6kΩ	10GΩ	—	4x10 ⁶	600kΩ	10 ⁷	4x10 ⁶
Weight packed (g)	950	1,025	1,050	900	860	900	800	920	920	900	940	920	980	990	850	1,050
Nominal length (m)	730	762	762	730	732	762	762	762	760	730	730	1,100	1,100	1,100	1,100	1,100
Actual length (m)	726	763	763	733	734	759	758	762	760	738	738	1,108	1,098	1,106	1,104	1,112

LONG PLAY

STANDARD PLAY

*1 Both initial samples had bent spools and damaged tape. Replacements had medium quality wind.
*2 Due to difficulty in removing coatings this figure may not be accurate.

Reguvolt- the sound performer!

In a business where sound quality is critical, your biggest problem could be a 'dirty' mains supply.

Electrical equipment in the vicinity of your studio (from domestic to industrial loads) can cause voltage transients which will badly affect the performance of your sound-sensitive recording equipment.

Audible interference, such as 'clicks' and other unwanted noises are the result of these transients, which often only become apparent during playback, after a lot of time and effort has been expended.

Reguvolt Constant Voltage Transformers look after your equipment, by not only suppressing transients and fast 'spikes', but also maintaining a



continuous output over supply breaks of up to 1 cycle. They also handle mains voltage drift of up to 30%, with 1% variation in output.



Cetronic Limited

Hoddesdon Road, Stanstead Abbots,
Ware, Herts SG12 8EJ, England
Tel: Ware (0920) 871077 Telex: 817293

For a sound performance from your equipment, get the details on our 'sound performers'. Send the coupon off today, or call if you prefer.

Please send me further information on your range of Reguvolt Constant Voltage Transformers.

Name

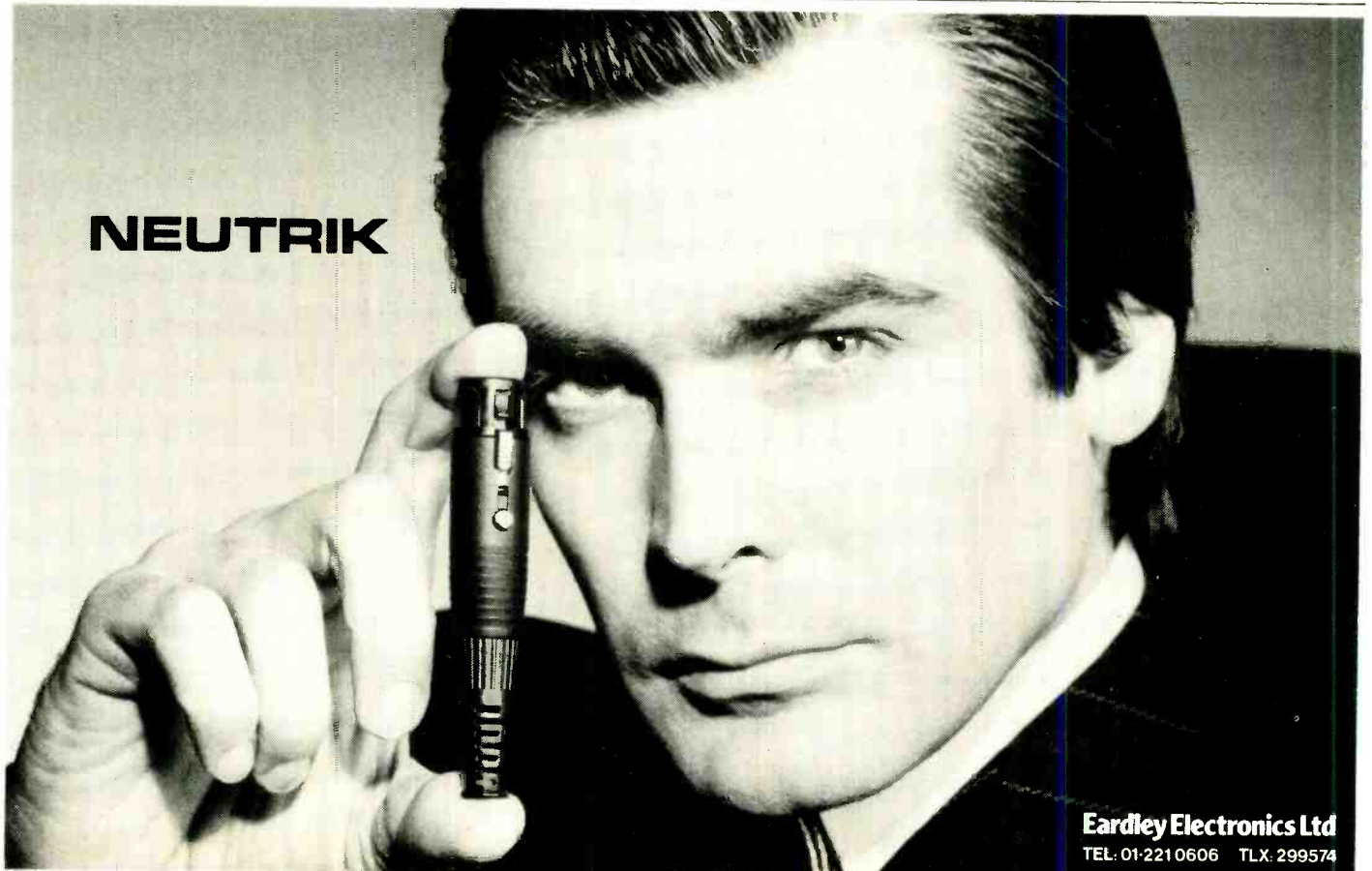
Company

Address

Telephone

SS2

NEUTRIK



Eardley Electronics Ltd

TEL: 01-221 0606 TLX: 299574

TABLE 2 PERFORMANCE	STANDARD PLAY										LONG PLAY									
	Agfa PEM468	Ampex 406	Ampex 456	BASF SPR 50LH	EMI 851	EMI 862	3M 206	3M 250	3M 256	Racal 675	Racal 888	Maxell UD35 180	Maxell UDXL35 180	Sony FeCr	Sony ULH	TDK LX35 180M	TDK GX35 180B			
Bias (dB)	+1.9	0	+0.8	+1.0	0	+0.6	0	+2.8	+1.9	+1.9	+1.0	0	+0.2	+0.4	-0.9	-0.4	-0.7			
Sensitivity at 1kHz (dB)	+0.5	+1.5	+2.0	0	+0.5	+1.5	+0.5	+1.0	-0.5	0	+0.5	0	+1.0	+2.0	+0.5	+0.5	+1.0			
Sensitivity at 10kHz (dB)	+2.5	+3.0	+4.0	+1.5	+2.0	+1.5	+2.0	+1.5	+0.5	+1.0	+1.0	+3.5	+4.5	+4.5	+4.0	+4.0	+5.0			
Sensitivity at 15kHz (dB)	+3.5	+4.5	+5.5	+2.5	+3.0	+2.0	+3.0	+2.0	+1.5	+1.5	+1.5	+5.0	+7.5	+6.0	+7.5	+6.0	+7.5			
Sensitivity at 18kHz (dB)	+2.0	+4.0	+5.5	+2.5	+3.5	+1.5	+3.0	+1.5	+3.0	+1.5	+1.5	+5.5	+10.0	+10.5	+7.0	+6.5	+7.5			
Maximum output level at 1kHz for 3% third harmonic distortion (dB)	+10.5	+8.0	+12.5	+9.0	+7.5	+11.0	+7.5	+11.0	+8.5	+9.0	+9.0	+7.0	+10.5	+9.0	+7.0	+8.5	+9.5			
Saturation output at 10kHz (dB)	+9.0	+9.5	+9.0	+8.0	+7.5	+7.0	+6.5	+7.5	+7.5	+8.5	+7.0	+9.0	+10.0	+9.0	+9.5	+9.5	+10.0			
Third harmonic distortion (%) at 1kHz and 320mWb/m	0.3	0.5	0.1	0.35	0.56	0.28	0.56	0.3	0.45	0.35	0.5	0.5	0.1	0.3	0.45	0.3	0.13			
1% IM (1kHz + 1.1kHz) (dB)	-50	-48	-60	-49	-45	-51	-45	-50	-47	-49	-46	-46	-60	-50	-47	-50	-58			
1% IM (10kHz + 10.1kHz) (dB)	+2.0	-1.0	+5.0	0	-2.0	+0.5	-2.0	+1.0	-1.0	0	-0.5	-2.0	+3.0	+1.0	-1.0	-0.5	+3.5			
10% IM (1kHz + 1.1kHz) (dB)	-6.0	-6.0	-4.0	-8.5	-7.0	-9.0	-9.0	-8.0	-8.0	-6.5	-9.0	-6.0	-4.5	-5.0	-4.5	-5.5	-4.5			
10% IM (10kHz + 10.1kHz) (dB)	+12.0	+9.5	+13.0	+10.0	+8.5	+11.0	+9.0	+11.5	+10.0	+11.0	+11.0	+8.0	+11.0	+10.0	+7.5	+9.0	+11.0			
CCIR-weighted noise rms (dB)	+6.0	+5.0	+6.5	+4.5	+4.0	+3.5	+3.0	+4.0	+4.0	+5.5	+3.5	+5.0	+7.0	+5.5	+6.0	+6.0	+8.0			
CCIR-weighted noise quasi-peak (dB)	-56.0	-54.5	-56.0	-56.5	-55.5	-55.5	-57.0	-58.5	-56.5	-54.5	-55.0	-56.5	-56.5	-57.0	-56.5	-57.5	-57.0			
A-weighted noise rms (dB)	-51.5	-50.5	-52.0	-52.0	-51.5	-51.0	-53.0	-54.0	-52.5	-50.0	-51.0	-52.0	-52.5	-52.5	-52.0	-53.0	-53.0			
Modulation noise ref 320mWb/m (dB)	-66.0	-65.0	-66.5	-66.5	-66.0	-65.0	-67.5	-68.5	-66.5	-65.0	-66.5	-66.5	-66.5	-67.0	-66.5	-67.0	-67.0			
Apparent SMPTE intermodulation (%)	-58.5	-62	-62	-57	-57	-56	-62.5	-62	-58	-58	-58	-59.5	-58.5	-58.5	-60.5	-58.5	-59.5			
Print through at 1kHz—24hrs	0.7	1.0	0.4	0.8	1.0	0.9	0.3	0.2	0.7	0.8	0.8	0.5	1.5	0.6	0.4	1.3	0.8			
Coercivity (Oe)	-58.5	-55.0	-50.5	-56.0	-58.5	-57.5	-52.5	-51.5	-58.5	-60.0	-49.0	-55.5	-53.0	-52.0	-58.5	-55.0	-52.5			
Coercivity (A/m)	343	299	308	326	309	295	301	345	365	365	299	332	343	306	330	342	336			
Remanence (mT)	27,300	23,800	24,500	26,000	24,600	23,500	24,000	27,500	29,100	29,100	23,800	26,400	27,300	24,400	26,300	27,200	26,800			
Squareness ratio	142	88	146	112	98	126	105	143	119	129	129	88	116	111	82	99	119			
	0.83	0.80	0.87	0.83	0.82	0.82	0.78	0.78	0.81	0.79	0.81	0.80	0.86	0.84	0.82	0.81	0.84			

SHURE · Gloss · Speakers · TEA
EMO · VOX · Wiring Conve
SEE US AT A.E.S.
HAMBURG

NOISE reference
320mWb/m
CCIR-weighted noise rms (dB)
CCIR-weighted noise quasi-peak (dB)
A-weighted noise rms (dB)
Modulation noise ref 320mWb/m (dB)
Apparent SMPTE intermodulation (%)
Print through at 1kHz—24hrs
Coercivity (Oe)
Coercivity (A/m)
Remanence (mT)
Squareness ratio

Key

Please send me a free copy of your 32-page catalogue.

Name _____

Address _____

turnkey

8 East Barnet Road, New Barnet, Herts. EN4 8RW Tel: 01-440 9221



package



Satisfies all your recording needs

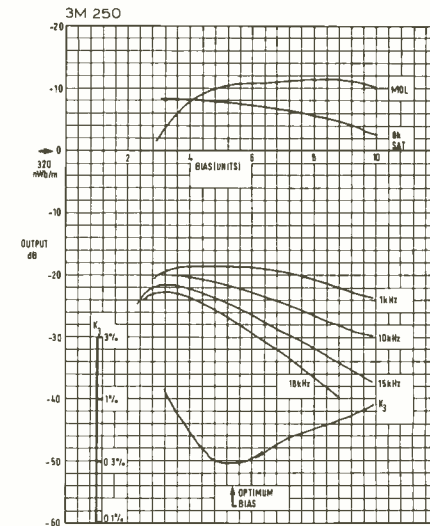
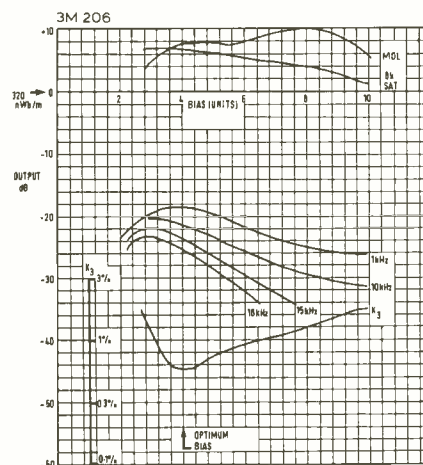
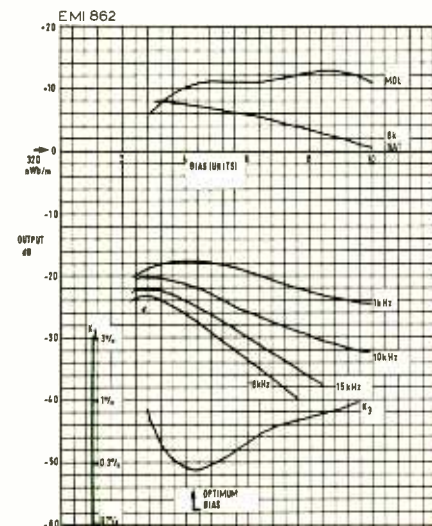
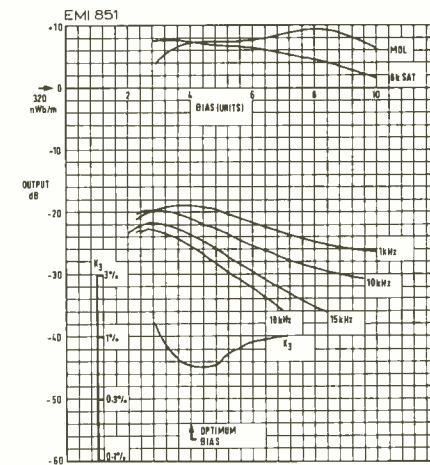
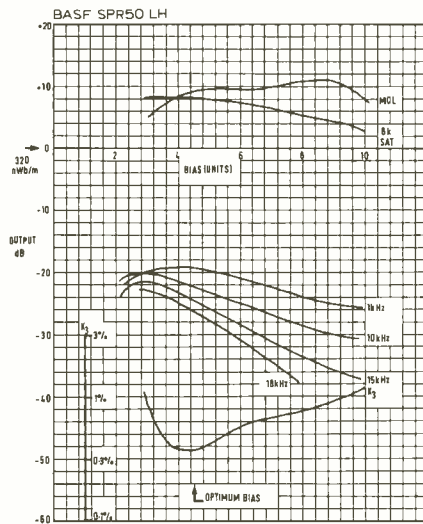
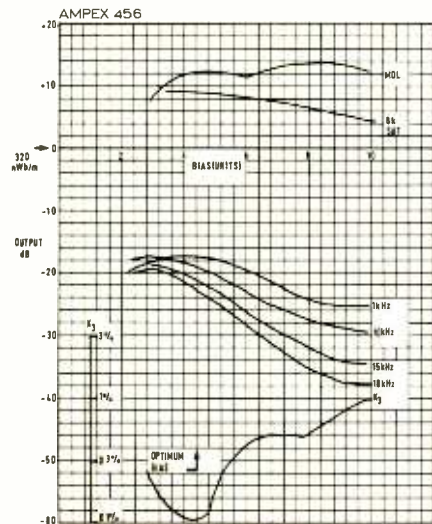
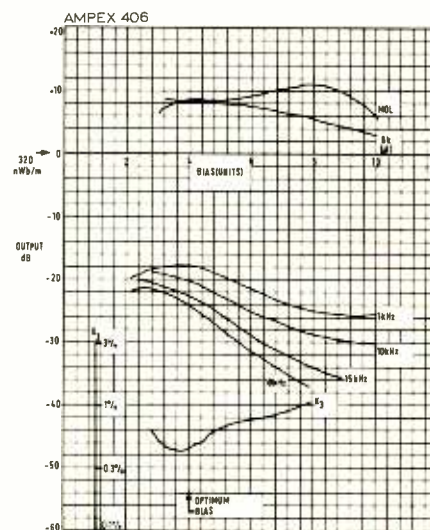
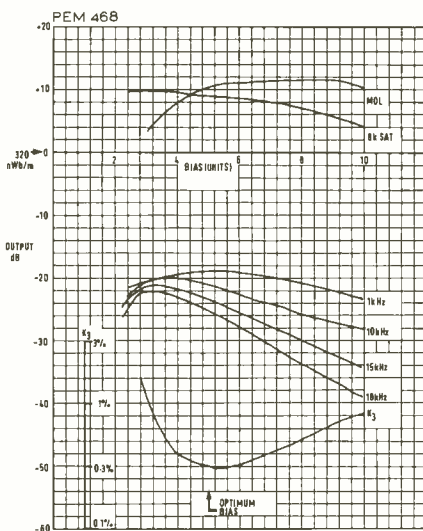
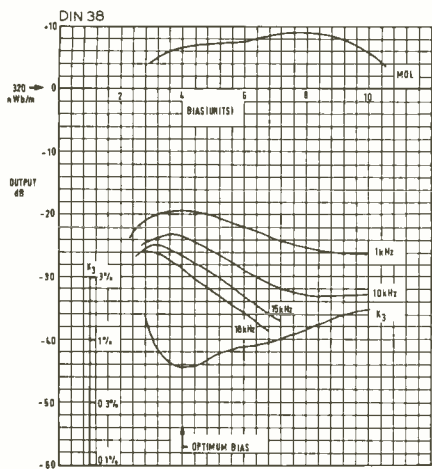
Proline 1000 and 2000 Tape Machines • Garner Erasers
Tomcat Cartridge Recording Systems • Tape Tension Gauges
Slow Speed Logging Systems • Han-D-Mag Demagnetisers

319 Trinity Road Wandsworth
London SW18 3SL
Telephone 01 874 9054
Cables Leemag London SW18
Telex 923455 Wembley



BIAS/SENSITIVITY

STANDARD PLAY



Four sound reasons why you shouldn't call this just a crossover.

The MCS Series 200 Crossover. Modular. Expandable. Professional. With four outstanding features that set it apart from all other crossovers. Mid-filter limiters for each frequency band. Output level meters for each frequency band. 24, 18 or 12 dB per octave filter slopes. Subsonic and high frequency filters. Compact, reliable and versatile. The MCS Series 200 has established its own standard. Complete with two innovative accessories. The **AR105** lead tester and the **AR116** high performance direct injection box.



Brooke Siren Systems, 92 Colney Hatch Lane, London N10. Tel: 01-444 7892. Telex: 912881 BSSAUDIO.

Also available through:— Gerr Electro-Acoustics, 363 Adelaide Street East, Toronto M5A 1N3, Canada. Tel: 416-868 0588.

Regiscene, 21 Rue de L'Alouette, 94160 Paris, France. Tel: 374 58 36.

Accessory range products available additionally from Turnkey and Audio Reinforcement Services.

Sound quality. Quality controlled.



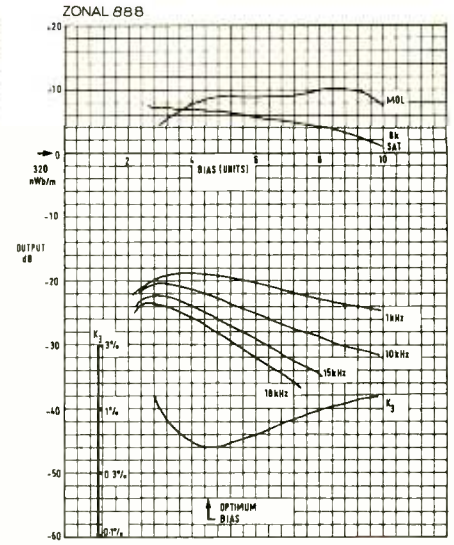
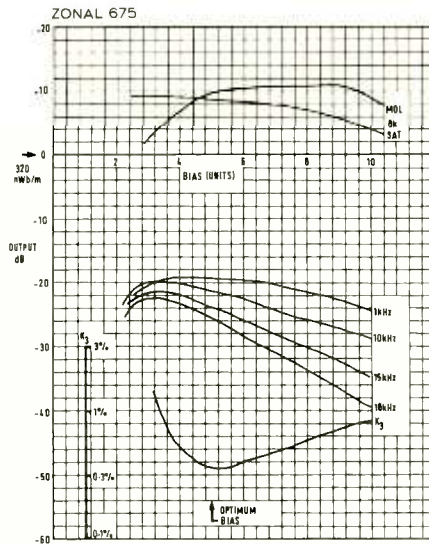
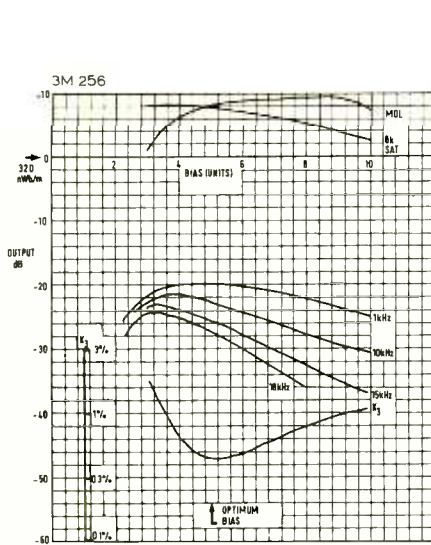
Are you mixing with the right people?

Progressive Electronic Products Ltd
83 Leonard Street London EC2A 4RB Telephone 01-729 5411

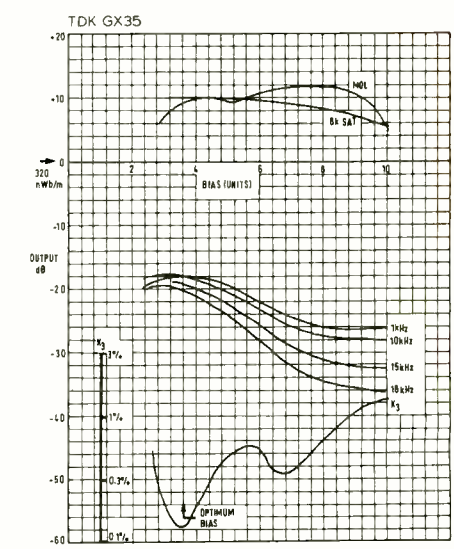
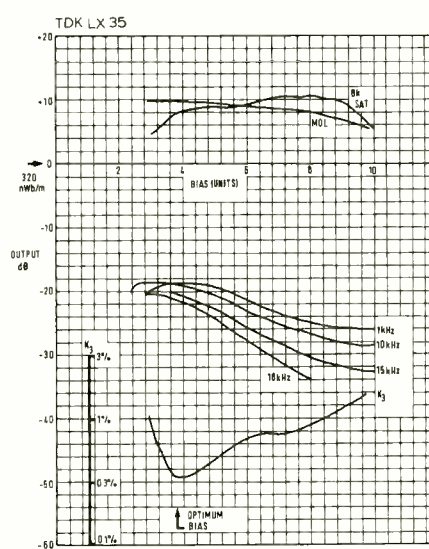
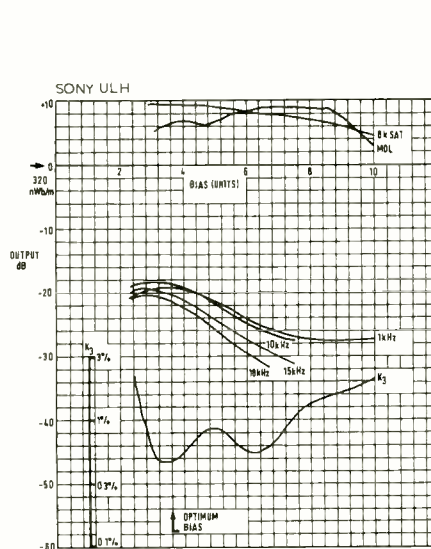
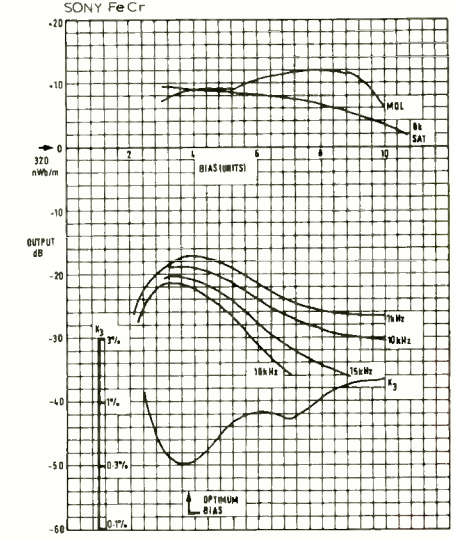
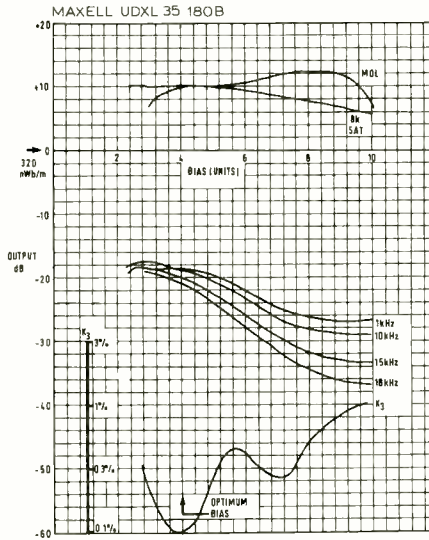
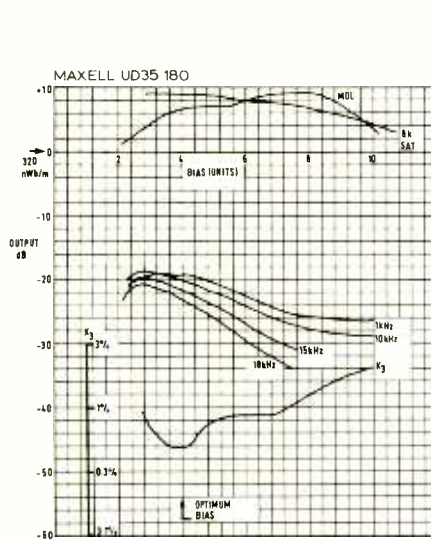
MANUFACTURERS OF PROFESSIONAL STUDIO EQUIPMENT AND DESIGNERS OF CUSTOM BUILT MIXING CONSOLES. PRICE RANGE FROM £18,000. TO £350.00.

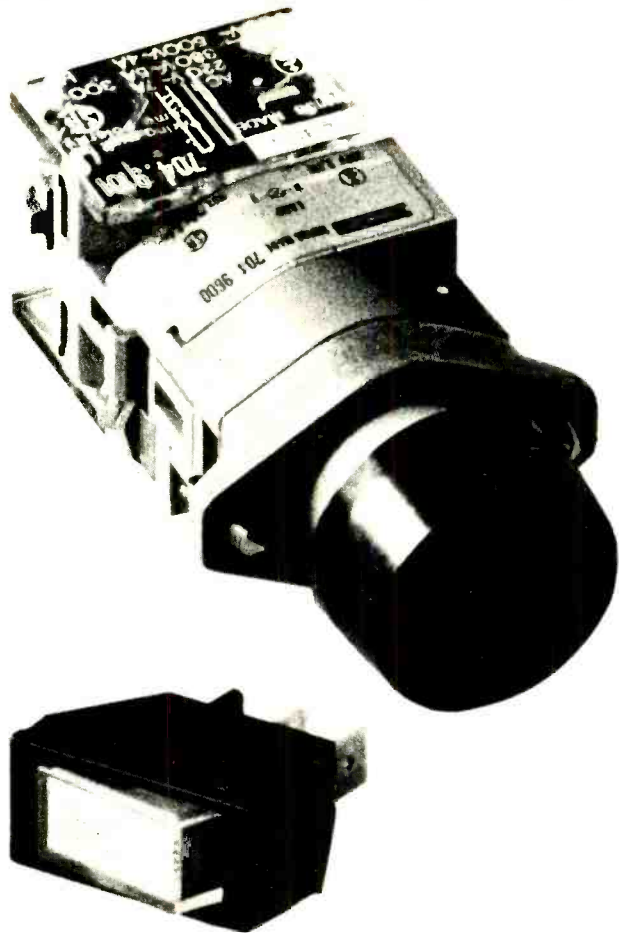
BIAS/SENSITIVITY

STANDARD PLAY



LONG PLAY





Two power switches. Both are rated at 16A/250V. The one on the left is specified for a minimum of 10000 operations. The one on the right is specified for 100 000 operations. The one on the left is a good general purpose power switch. The one on the right is without doubt the best power switch at this rating. The one on the left is widely used in household applications, consumer and communication electronics and in well-known power amplifiers. The one on the right is widely used in air- and spacecraft, heavy-duty industrial applications and in the FM ACOUSTICS power amplifiers. In quantities of 100 pieces the one on the left costs about 30 Pence each, the one on the right about 3½ Pounds each. Just one of the reasons why the power amplifiers made by FM ACOUSTICS are more expensive and more reliable than all others.

Unnecessary overdesign? Maybe that this kind of quality is not necessary for standard applications but it is a must in true professional installations where long-term reliability is more important than initial price.

FM ACOUSTICS. There is no alternative.

Distributors:

ASEAN:	LULLA MOTION SINGAPORE, 2528030
AUSTRALIA:	DURATONE PHILLIP ACT, 821388
BELGIUM:	CD TRONICS EDEGEM, 031/402299
DENMARK:	SC SOUND TAASTRUP, 02/998877
FRANCE:	SYMPHONIE DIFFUSION PARIS, 3360434
GREECE:	LYRIC ATHENS, 01/3606787
HONG KONG:	JOLLY SOUND LTD, 5-752246
ITALY:	ROJE MILAN, 02/4154141
NETHERLANDS:	AUDICOM WADDINXVEEN, 01828/6931
NORWAY:	PRO-TECHNIC OSLO, 02/460554
SWEDEN:	LEAB STOCKHOLM, 08/506039
U.K.:	FM ACOUSTICS WEYMOUTH, 0305/784049

All other countries:

FM ACOUSTICS LTD
TIEFENHOFSTRASSE 17
CH-8820 WÄDENSWIL / SWITZERLAND
PHONE: 01/7806444, TELEX: 56058 telag/fma

Progressive Electronic Products Limited

Price List as at 1st January, 1981

MBC	- 1	Meter Buffer Card	£3.68
MIC	- 1	Microphone Pre-Amplifier	£8.50
BAX	- 1	Bass & Treble Tone Control	£7.40
MID	- 1	Mid Range Tone Control	£6.85
UGB	- 1	Unity Gain Buffer Amplifier	£4.40
VEM	- 1	Virtual Earth Amplifier	£4.95
LHD	- 1	Line Headphone Driver	£6.30
GPA	- 1	General Purpose Amplifier	£5.48
SFR	- 1	Scratch Filter	£7.55
SUB	- 1	Subsonic Filter	£6.20
MAG	- 1	Disc Pre-Amplifier (Moving Magnet)	£8.70
CM	- 1	Complete Channel Module	££75.26*
CM	- 2	Complete Channel Module (with EQ defeat switch and additional features)	£85.24*
CM	- 4b	Complete Channel Module. Parametric Mid Range 300 Hz to 6.5 KHz Q switchable	£98.50*
GM	- 1	Complete Group Module	£62.46*
GM	- 1b	Complete Group Module + LED Display	£83.52*
TM	- 1	Talkback / Monitor Module	£80.26*
CUE	- 1	Cues 1 - 2 + PFL Master Module	£58.00*
CUE	- 2	Cues 3 - 4 Master Module	£56.00*
LHD	- 1 + 10dB	Line Headphone Driver +10dB Gain	£7.15
IPM	- 1M	Input Module Microphone with front panel	£39.00*
IPM	- 1L	Input Module Line with front panel	£28.00*
PPM	- 1	PPM Driver Card	£26.50
PPM	- 1	PPM Meter Movement	£36.00*
LDM	- 1	LED Display Module	£26.23
MC	- 1	Moving Coil Pre-Amplifier	£26.00*
MT	- 1	Microphone Transformer	£14.50 net
LT	- 1	Line Transformer	£14.50 net
PSU	- 1	Power Supply 24V DC @ 1A	£18.00*
PSU	- 3	Power Supply 24V DC @ 100 mA	£12.00*
PAC	- 1	50 watt Power Amplifier	£34.00*
104mm		Conductive Plastic Fader	£26.00
60mm		Carbon Fader (no panel)	£1.10
60mm		Carbon Fader (no panel - Stereo)	£1.65
BUS	- 1	Bus System 12 way	£15.00
BUS	- 2	Monitor Bus 8 way	£5.00
VU	- 1	Sifam Full Spec. VU meter R22AF	£25 net
VU	- 2	Low cost VU meter SU 45 or AL 22 F	£10.50 net

CUSTOM BUILT MIXERS

Frame Work for use with CM and GM series

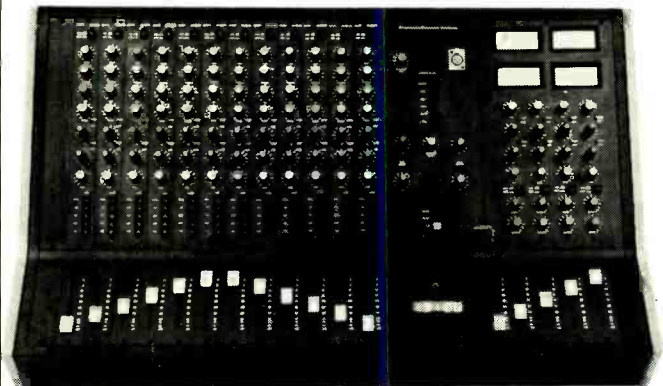
P.O.A.
P.O.A.

TERMS:

Cash with order, except approved accounts.

All prices subject to 15% VAT.

75p postage and packing per order, except on items marked with *, which will be charged at £2.00 per order.

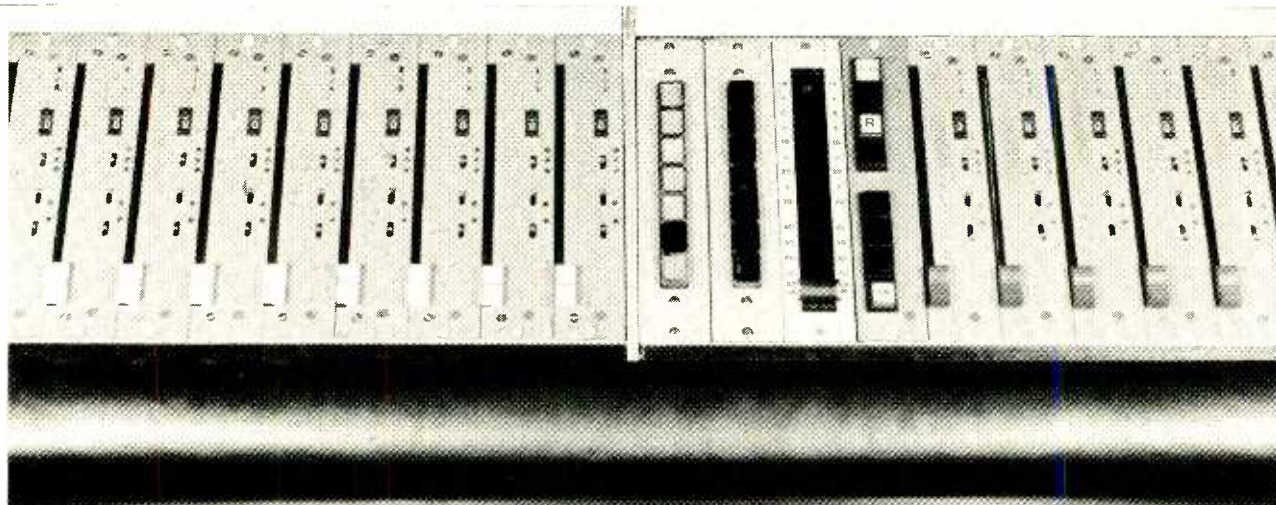


83 Leonard Street, London EC2A 4RB

Tel: 01-729 5411



Melkuist GT800 Automation System



MELKUIST GT800 AUTOMATION SYSTEM

IT IS BY FAR AND AWAY THE EASIEST TO USE AND ECONOMICAL DISK BASED AUTOMATION SYSTEM CURRENTLY AVAILABLE.

UP TO 64 CHANNELS AND 64 SEPARATE CUT FUNCTIONS PER FRONT END MODULE CAN BE AUTOMATED.

IT USES SMPTE/EBU TIMECODE AS ITS TIME SIGNATURE AND ACHIEVES DOUBLE EBU SCAN RATE.

THE VOLTAGE INPUT-OUTPUT SCALE CAN BE ADAPTED FOR ALMOST ANY DC CONTROLLED APPLICATION.

FRONT END ADAPTOR PACKAGES ARE AVAILABLE AS STANDARD FOR TRIDENT, HARRISON AND ALLISON EQUIPPED AUTO-READY CONSOLES.

RETROFIT MELKUIST FADER MODULES ARE ALSO AVAILABLE FOR NEVE 35 MM & 40 MM WIDE CHANNELS, CADAC LONG THROW FADERS AND ALSO AS A STAND ALONE FADER-ONLY CONSOLE FOR INSERTION INTO JACKFIELDS.

ANY CURRENT, AUTO-READY CONSOLE CAN INTERFACE WITH GT800 AND VIRTUALLY ALL SEPARATE FADER CONSOLES CAN BE UPDATED TO USE IT.

AS A THIRD GENERATION SYSTEM, GT800 IS UNIQUE IN THAT THE LEVEL OF AUTOMATION HAS BEEN EXTENDED TO COVER ALL THE FILE HANDLING ETC., THAT PREVIOUSLY HAD TO BE DONE MANUALLY BY THE ENGINEER.

IN ASSOCIATION WITH THE AUDIO KINETICS Q-LOCK SYNCHRONISER, SPECIAL INTERFACE PACKAGES ARE AVAILABLE TO RUN VIDEO-SWEETENING IN A TOTALLY TRANSPARENT MANNER, GT800 FUNCTIONING AS AN EXTRA SLAVE MACHINE WITHOUT TYING UP ANY OF THE MANY FACILITIES Q-LOCK PROVIDES.

THE DISK MEMORY IS SPECIALLY SILENCED TO OPERATE IN THE CONTROL ROOM TO AVOID THE NEED FOR SPECIAL COOLING SYSTEMS ETC.

'BUSY' 10 MINUTE TAKES OCCUPY ABOUT 15% OF ONE OF THE EIGHT STORAGE AREAS AND FACILITIES ARE EVEN AVAILABLE TO DOUBLE THE AREA IF REQUIRED.

INSTALLATION DOES NOT REQUIRE SPECIAL TRUNKING SINCE ALL MAJOR DATA HIGHWAYS RUN IN STANDARD SINGLE SCREENED CABLES.

THE CPU CAN BE OPTIONALLY PROVIDED IN AN 18U GLASS FRONT CABINET OR AS SEPARATE 6U SUBPACKS FOR MOUNTING IN THE STUDIO'S PERIPHERAL RACKS.

CUSTOMISING OF INSTALLATIONS IS SIMPLE SINCE SPECIAL SOFTWARE PACKAGES CAN BE SUPPLIED AS OPTIONS TO THE STANDARD AUTOMATION OPERATING SYSTEM. THUS IF SYSTEM USE ALLOWS AND TERMINAL / PRINTER OPTIONS ARE INSTALLED, BUSINESS AND WORD PROCESSOR PACKAGES CAN BE RUN.

COMPREHENSIVE SELF TESTING SOFTWARE IS INCLUDED AS STANDARD.

CONTACT SID PRICE FOR MORE INFORMATION.



Melkuist Ltd.
AUTOMATION SYSTEMS

35A Guildford Street, Luton LU1 2NQ, Bedfordshire, England.
Telephone 0582 416028



Ambisonics is a comprehensive technology for surround sound recording, broadcasting and reproduction. Sponsored by the National Research Development Corporation and developed by international collaboration between scientists, mathematicians and engineers, Ambisonics frees reproduced sound from the restrictions of stereo. Equipment featuring the Ambisonic symbol is designed in accordance with this technology to give greater realism and listening pleasure.

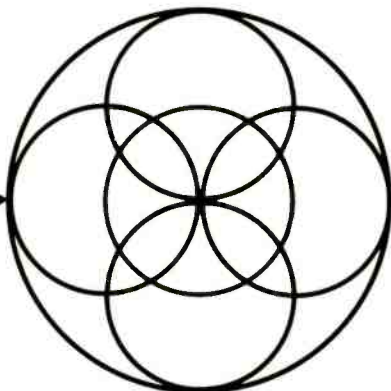
The UHJ symbol shows that programme material conforms to optimal specifications for playback as stereo, mono or with Ambisonic decoding. Ambisonic surround sound decoders also provide enhanced results from conventional stereo, but the highest fidelity of directional sound is obtained from recordings and broadcasts conforming to UHJ.

NRDC seeks licensees for applications of Ambisonic technology in professional audio. For information on which aspects of this technology are applicable to your area of activity, contact the

NRDC AMBISONIC ADVISORY SERVICE

PO Box 98, High Wycombe, Bucks,
HP11 1PJ

Telephone: High Wycombe (0494) 445951



LOOKING FOR STUDIO EQUIPMENT

We have a wide range of new and used recording equipment. Call and ask for our latest list.

Cadac F type, new, 32 in/out, P.O.A.	
Trident 24 input, 16 groups/monitors	£8,000
Amek 20 input, 16 groups/monitors	£6,000
Raindirk 26 input, 16 outputs, 24 monitors, 8 echo returns, 8 A & D complex limiters	£7,000
Helios 36 x 24 x 24	£10,000
Soundcraft 1624 with 24 monitors, 1 year old	£9,500
Alice 32 x 24	£5,500
Tweed 10 into 4	£1,800
Calrec broadcast desk, 10 into 4	£800
Neve, 24 x 16 x 24, 6 echo returns	£12,000
Alice 16 into 8, full patch bay, 2 comp/lims	£3,000
Studer A80 Mark 1, 24 track	£12,000
M.C.I., 24 track + spare 16 track H/block and auto-locate	£11,000
Studer A80 Mark 1, 16 track	£8,000
Ampex MM1000, 8 track with B.E.L. noise reduction	£3,200
Scully 280, 8 track, 7 1/2 / 15	£2,500
Scully 280, 8 track, 15/30	£3,000
Leavers-Rich 8 track	£2,200
Soundcraft 8 track, 1" with B.E.L. noise reduction, 9 months old	£4,400
Teac 80.8	£1,750
Brenell Mini 8, 6 months old, V/speed	£3,800
Ampex, Studer, Philips, Ferrograph and Teac stereo machines.	
Audio & Design F760X complex limiter, per pair	£500
Pye compressor limiters, new, per pair	£350
Monitors by Lockwood, Tannoy, J.B.L., Cadac.	
And much more	

Don Larking
Audio Sales

50 CHEAPSIDE, LUTON, BEDS.

Tel: 0582 27195/26693

Telex No. 825488

THE PROFESSIONALS SHOP

MEET THE PENTAGON FAMILY...

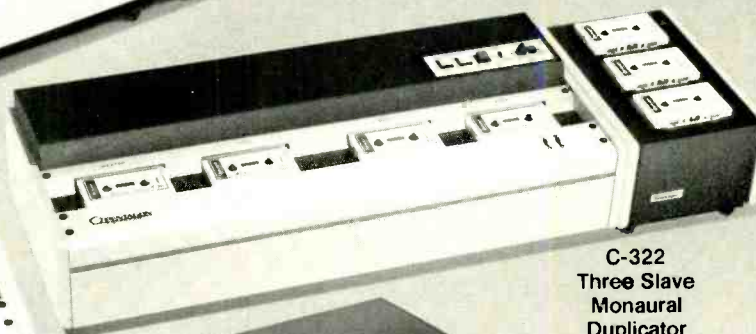
Precision Duplicators to meet Your Exact Requirements



PRO SERIES
Combination Master
Reel/Cassette



C-400
Automatic Stereo Copier



C-322
Three Slave
Monaural
Duplicator



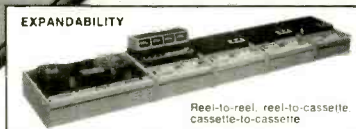
C-10
Economy
Monaural
Copier

PENTAGON'S

1100

Reel/
Cassette
Duplicating
System

No system can touch it
for Speed, Versatility or Price



Reel-to-reel, reel-to-cassette
cassette-to-cassette

PENTAGON'S HIGH SPEED DUPLICATION TECHNOLOGY LEADS THE WAY!

Now for the first time, Pentagon offers the largest selection of Reel to Reel (not pictured), Reel to Cassette, Cassette to Cassette duplicators and copiers in the world. No matter how small or large your production requirements may be, there is a Pentagon system to fit your exact requirements. From high quality reproduction of professional audio masters to just a few copies of a classroom lecture or training program, Pentagon can fill your needs with rugged precision engineered duplicating systems that are unequaled in performance and simplicity of operation anywhere.

This last year alone... we have obtained a patent covering our unique electro-dynamic braking system for the System 1100 open reel decks (the fastest open reel to in-cassette system on the market)...we've incorporated our exclusive Stabilign die-cast headmount in all cassette master and copy positions to all but eliminate alignment problems...we've introduced the Model C-10—a high quality, high speed, rugged duplicator at an extremely low price.

Pentagon tape duplication equipment is in use in virtually every country in the world. Should you need more information regarding product or distribution please contact our Sales office in Chicago.

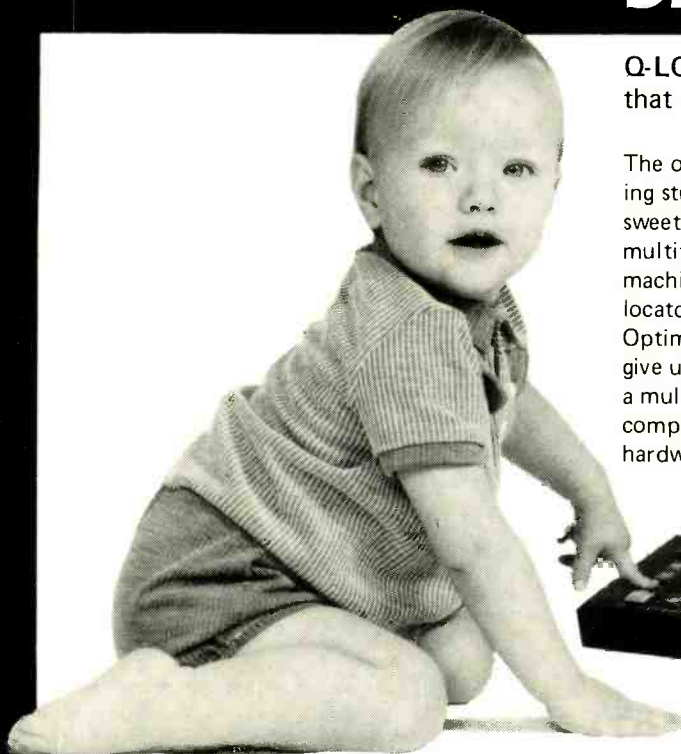


World Headquarters

4751 NORTH OLCOTT CHICAGO, ILL., U.S.A. 60656

(312) 867-9200
TLX-25-3058

SIMPLE AS THAT



Q-LOCK: An SMPTE/EBU time-code Synchroniser that makes the transition to Video childs play

The operator orientated Q-LOCK system offers the recording studio access to the world of Video post production audio sweetening, increasing the earning potential of existing multitrack facilities. The control panel commands 2 or 3 machines as if they were one, with a 10 memory cycling locator that can be operated with or without time code. Optimised software interfaces to audio and video machines give uncompromised performance. Q-LOCK, incorporating a multi-standard SMPTE/EBU time code generator, is a complete self contained system requiring no additional hardware.

Don't get left behind investigate Q-LOCK today.



Europe: **AUDIO KINETICS (UK) LTD.**, Kinetic House, Verulam Road, St. Albans, Herts. AL3 4DH England. Tel: 0727 32191 Telex: 299951
America: **QUINTEK**, 4721 Laurel Canyon Blvd., Suite 209, North Hollywood, CA 91607 Tel: (213) 980-5717 Telex: 194781

British Engineers demand the world's best. We supply it.



Ursa Major SPACE STATION SST-282

URSA MAJOR'S new SPACE STATION is a true breakthrough in audio technology. A complete processing centre providing comprehensive REVERBERATION, MULTI TAP DELAY, REPEAT ECHO, plus a multitude of other effects. The SPACE STATION uses the latest digital memory circuitry and is offered at a fraction of the price of many single function devices available at present. For further details contact:



UK Distributors

Feldon Audio Ltd.,

126 Great Portland Street, London W.1 Tel: 01-580 4314. Telex: London 28668.

Custom built studio? Call the professionals.



BRENNELL MINI 8

A truly professional machine within the reach of anyone seriously considering 8 track. I.C. logic transport control, sync facilities, silent drop in/drop out record functions, and everything that makes this 1 inch machine probably the best value for money on the market.



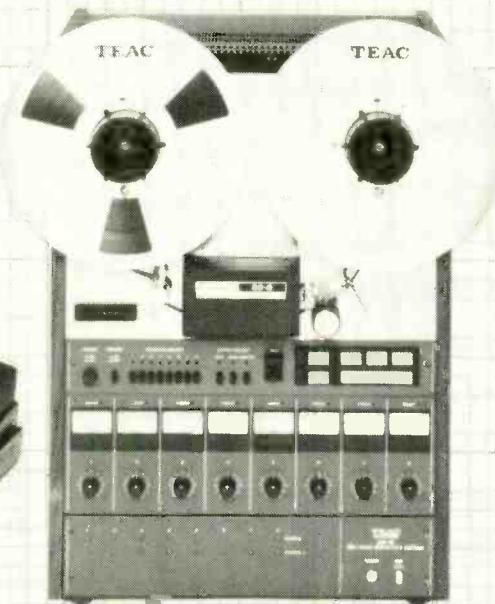
REVOX B77

The ideal mastering machine for the small studio giving really excellent results at a reasonable price. And for those who want to go even better we also stock the Revox A700.



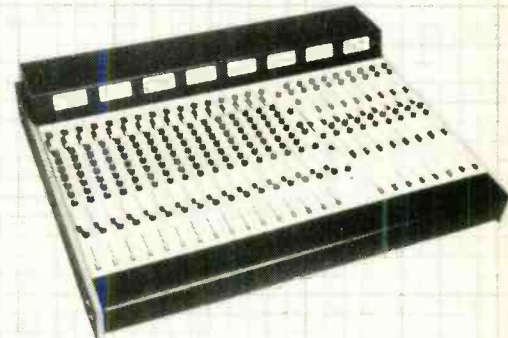
TEAC A3440

The new four channel machine replacing the famous A3340S. Now with even more facilities: — I.C. logic control, built-in pitch control, improved function select layout with auto sync for silent drop ins/drop outs, and a new monitor select system for easy monitoring in any mode direct from the tape machine.



TEAC 80-8

The ½ inch 8 track for the budget conscious studio. Giving high quality at a very reasonable price. The 80-8 has all the facilities normally associated with a machine of this calibre. And with the optional DBX unit gives excellent results.



A&H MODEL III

The high quality modular mixer for the quality 4, 8 or 16 track studio. Available in virtually any configuration up to a maximum frame size of 24/8. This mixer is available together with the Brenell Mini 8 at a special package price.



ALICE 12-48

The quality mixer for the 4 or 8 track studio. 12 inputs (16 input version also available) 4 outputs but wired for 8 track recording and monitoring. The standard model includes line up oscillator, talk-back and 48V phantom powering. Long throw conductive plastic faders available to special order. All in all a high quality mixer with all the facilities needed at a very reasonable price.



JBL MONITORS

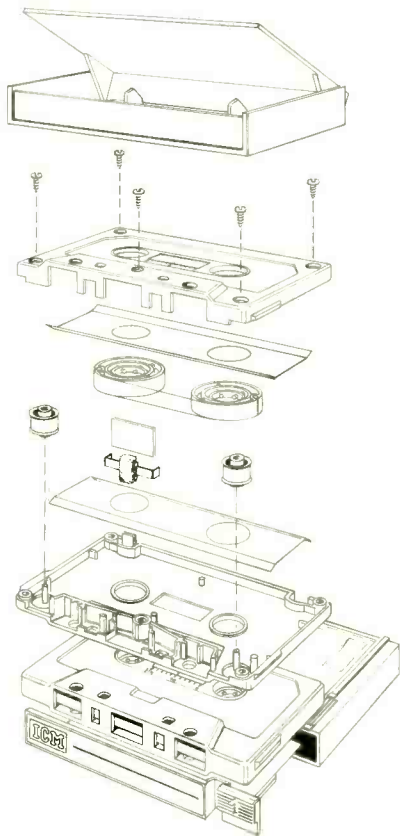
We can supply the full range of JBL Monitor speakers from the small 4301 broadcast monitor; the 4311, popular with the smaller studio, through to the 4343 for more critical monitoring purposes.

REW

**REW Professional Audio 114/116 Charing Cross Road
London WC2. Tel:01-836 2372/7851**

Full range of : AKG · Alice · AHB · Ampex · Beyer Dynamic · Calrec · dbx · JBL · Neumann · Shure · MXR · Quad · Revox · Teac · Soundcraftsmen · JPS · Roland · Auratone · Tannoy · Wollensak

...they say we are the best...



Manufacturer and supplier of:

cassette parts

C-O cassettes
top performance
4 or 5 screws or sonic welded
special liner
soft or hard window
with plastic or steel pin
tabs in or out
standard or Cro 2 type
colors

Norelco style box
in different colors

C-Box storage system
standard or with transparent
cover

Testequipment
Drop-Out tester DO 2000
Play + wind tester 7804

C-O Production:
over 60 million per year

**Your partner for quality and
reliability**

ICM Ltd.
Mühlebachstr. 27,
CH-8800 Thalwil
Switzerland
Tel. 01/720 29 42, Telex 53759

ICM
SWITZERLAND

The Total Package

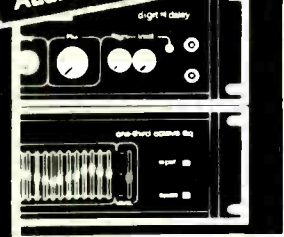
If you are considering a complete multitrack installation, Lake Audio can offer you 8, 16 and 24 track at very competitive prices, for further details, call our sales office 8 track from around £3,500 24 track from around £28,000

Mixers



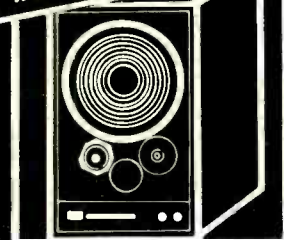
Our range includes, Alice, AHB, Amek, APSI, HH, RSD, Studiomaster, Soundcraft, Trident & MCI.

Audio Processing



ADR, Allison, Aphex, AMS, dbx, Dolby, EMT, Furman, Klark Teknik, Kepex, Lexicon, Loft, MXR, Rebis, Roland, Statik & Tresham Audio.

Monitoring



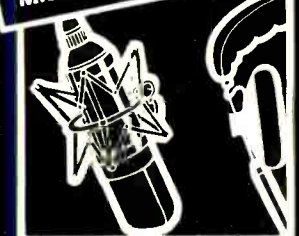
Tannoy (unquestionably), JBL and of course Auratone, Beyer Sennheiser, Quad, HH, Tresham Audio & Turner

Tape Machines



Mastering: Revox, TEAC & ASC. Multitracking: TEAC/TASCAM, Brenell, Soundcraft, Studer, Lyrec, and MCI. N.R. Dolby and dbx.

Mics & Things

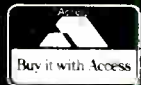


Mics by AKG, Beyer, Calrec Neuman, Shura & Sennheiser. Ampex tape (bulk purchase discount), leader tape - all colours, editing blocks, blades, splicing tape, demagnetisers, cleaning kits etc

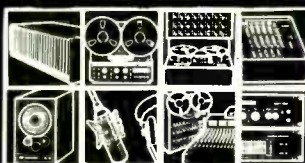
Mail Order



Our mail order dept. will process your order quickly and efficiently by computer.



Call now for your copy of "The Total Package" the Lake Audio guide to multitrack.



Studio design, consultancy, equipment, installation, service and excellent prices.

Lake Audio

Lake Audio (Components) Ltd.
33 Church Street,
Rickmansworth
Hertfordshire WD3 1DH

Telephone: (092 37) 70488

Now-highest quality copying at low cost

OTARI DP4050 C2 cassette duplicator

The first low cost copier to give you reliability and performance to professional standards. No other copier can match its precision engineering, and it is the only budget copier suitable for music programmes.

- * One master, 2 slaves.
 - * Add on units available up to 11 slaves.
 - * Automatic rewind.
 - * Ferrite heads.
 - * 16:1 duplicating ratio.
 - * Modular slave decks with DC servo motors.
- Also available: Reel to cassette version with 6 slaves.



OTARI from ITA

1-7 Harewood Avenue, Marylebone Road, London NW1. Tel: 01-724 2497. Telex: 21879.



ELECTRO-VOICE RE 20. THE MICROPHONE MOST HIGHLY PRAISED IN RECORDING STUDIOS.

The studio-microphone RE 20 is a cardioid microphone of the variable-D-series, i. e. incorporating the patented system that avoids proximity effect and reproduces the true sound. It was especially developed for broadcasting, recording studios and sound reinforcement applications and therefore features an essentially flat frequency response, a very wide frequency range, an excellent transient response and numerous further sophisticated qualities appreciated in recording studios. It is, therefore, not surprising that more and more recording studios so highly praise the various Electro-Voice microphones. Why not ask for further particulars from Gulton Europe Ltd., Electro-Voice Division, Maple Works, Old Shoreham Road, HOVE BN3 7EY.

EV **Electro-Voice®**
a gulton company S.A.

Telephone: Brighton (0273) 23329
Telex: 87680 Gulton G

Affordable Technology

SYNCON series A

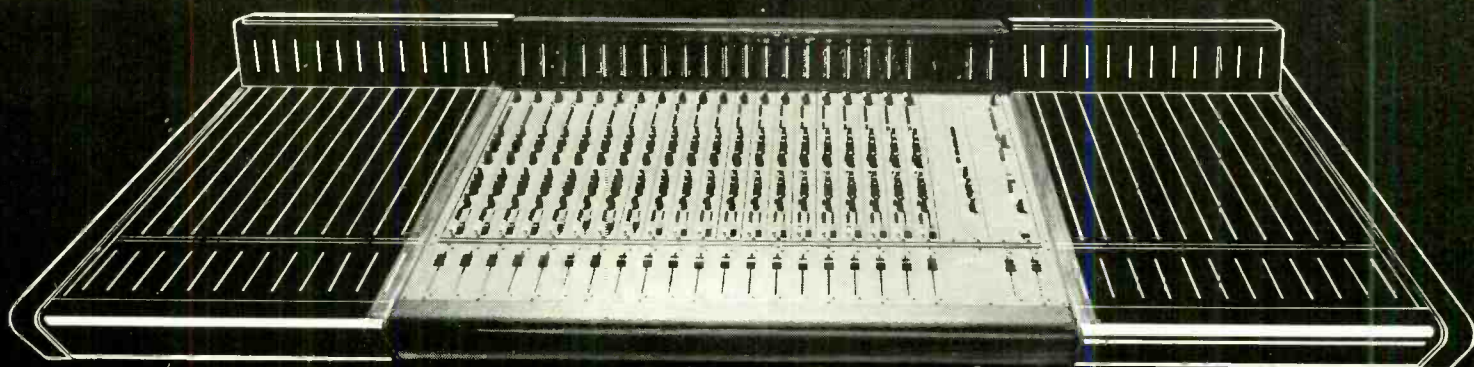


Syncon Series A has all the creative features of consoles twice its price.

Series A has been designed to give maximum flexibility within a standard frame format. Sophisticated PCB design has virtually eliminated hardwiring making Series A an incredibly reliable and serviceable console; an important factor for studios without resident

electronic 'Whiz Kids'. Add to this full parametric Eq and a superb status routing and grouping system, which enables 28 tracks or effects to be mixed through 14 stereo subgroups. The result is one of the most flexible and cost effective consoles to have ever been produced.

SYNCON series B



*AHB explodes the myth that 'state of the art' technology cannot be designed into a low price mixing console—
The Series B proves it can.*

Now through our philosophy of 'affordable technology' we have brought out a console that is both exceptionally advanced and adaptable within the reach of studios of all sizes. In its most basic format Series B is ideal for small

8 and 16 track studios and yet with no factory modification it can be expanded to a 44/24 fully automated console with full function patchbay. The Series B is the most important new audio product this decade. Check it out!

Made in England by:

AHB

ALLEN AND HEATH BRENNELL LTD.

Pembroke House, Campsbourne Road, London N.8.

Tel: 01-340 3291 Telex: BATGRP G 267727

EAST COAST:

AUDIOMARKETING LTD

652 Glenbrook Road

Stamford

Connecticut 06906

Tel: Tollfree (800) 243-2598

WEST COAST:

ACI/FILMWAYS Pro Audio Sales

7138 Santa Monica Boulevard

Hollywood

California 90046

Tel: (213) 851-7172

CANADA:

WHITE ELECTRONIC

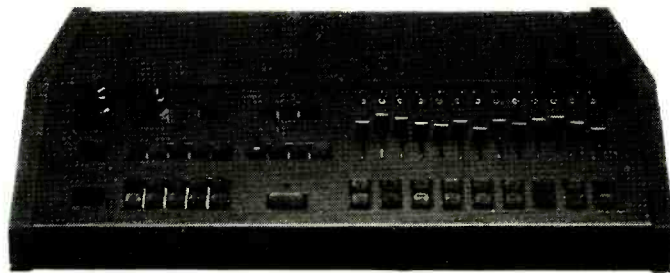
DEVELOPMENT CORPORATION

6300 Northam Dr. Malton

Ontario L4V 1H7

Tel: (415) 676-9090

REAL DRUMS AT YOUR FINGERTIPS



Here's the most amazing rhythm machine *ever*—the new LM-1 Drum Computer from Linn Electronics. Amazing because it has real drum sounds—not synthesized noises, but *real* drums, digitally recorded and stored in memory.

And it's programmable

You put in your own drumbeats in *real time*. Odd

time signatures? No problem. Your timing's a little off? No problem. The LM-1 understands and corrects the error. But music isn't just drumbeats. The LM-1 can be programmed to play all parts of a song—intro, verses, lead-ins, fills, endings, etc . . . And it can overdub to tape.

Surprisingly easy to operate

The LM-1 was created for musicians, not technicians. Take it out of the box, hook it up, and it's ready to play. You'll be laying down top-notch rhythm tracks in a matter of minutes. But it doesn't have to end there. The more you work with it, the more it can do. The possibilities are endless.

20/21 Conduit Place
London W2

Tel. (01) 723 3844 and 3829

SYCO SYSTEMS 

10 Rue Jean-le-Febvre
La Frette-sur-Seine
PARIS 95530
Tel; (3) 978 5161



The Shop - for Service

**STUDIO
EQUIPMENT
SERVICES LTD**

The Shop,
100 Hamilton Road,
London NW11 9DY.

Telephone: 01-458 9133
Telex: 87515 WISCO G

NEAL AKG Technics **BEYER**

AHB UHER TEAC **TASCAM**

Alice **MXR** **Revox** **TANNOY**

Soundcraft introduce a 24 track without an optional autolocator.

MOVE up to 24 track and you won't find the time to let anything get in the way of the music. The latest technology should be at hand to free you for creative work.

That's why the new Soundcraft SCM382-24 comes complete. We don't believe that essentials should be options.

Your full control is in the remote. This powerful device selects record and monitor status for all tracks in manual or auto modes, and contains the varispeed and tape motion controls. The integral autolocator was developed in conjunction with Audio Kinetics, pioneers of intelligent tape movement control. This microprocessor based system will search to any one of nine memory locations or to a keypad entered position. As you use it, you will find more ways to speed your sessions. Like the programmable sub-grouping for complex record punch-ins, and the cycle function that enables you to repeat mixes,

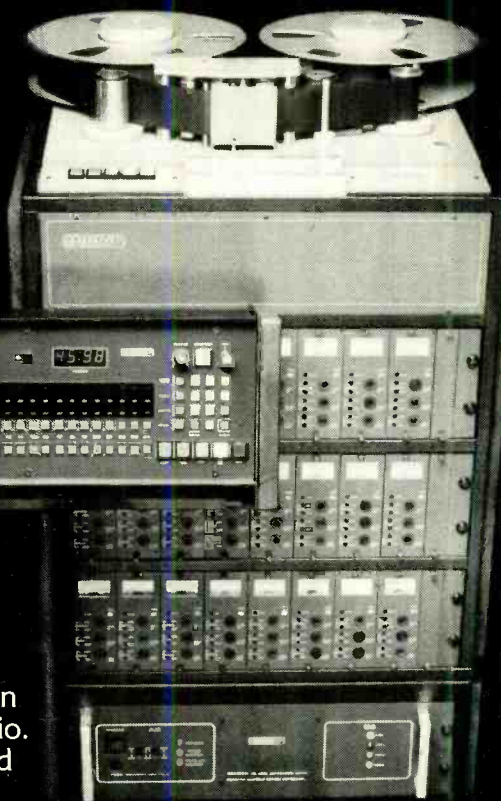
effortlessly, between any two tape locations.

The transport is the latest version of the proven design employed in our eight and sixteen track machines. Mechanical simplicity and careful, precise tape handling were prime objectives from both cost and maintenance standpoints.

Design of the modular electronics reflects the same degree of integrity that has been associated with Soundcraft for almost a decade. Quiet, fast amplifiers, with extended headroom are used throughout. The tape medium becomes your only limitation. Local metering simplifies all alignment procedures.

In every way this rugged recorder has been designed for efficient work in the modern studio.

Before you take the 24 track decision, find out more about our new machine. Arrange for a demonstration, and see and hear it for yourself. Then, take a closer look at your alternatives and see if you wouldn't be paying more, for less.



Australia: Klarion Enterprises Pty. Ltd. Melbourne (31) 613801
Austria: Kapla Vienna (02) 252 7459
Belgium: TEM Dilbeek (02) 569 1823
Canada: McKeen Productions Ltd. Ottawa (613) 236 0393 Denmark: SLT Copenhagen 01-341284
England: Turnkey London (01) 440 9221 Finland: Studiotec Helsinki (90) 520604 France: Publison Paris 1-357 6408
Germany: Hausmann Concert Electronic Ber in (030) 433 6097
GTC Studioteknik München (089) 2971 71 Klever Studioteknik Hamburg (040) 690 1044
Thum and Maier Audio Leverkusen (Köln) (02173) 41600
Holland: Selectronic B.V. Uithoorn (02975 60 600 Italy: AEG Telefunken Milan (02) 242 7812
Japan: Hibino Electro Sound Inc. Tokyo (03) 864961 Norway: Tal and Ton Oslo (02) 20 97 05
Sweden: Tal and Ton Gothenburg (031) 80 36 20 Switzerland: Professional Audio Systems Basle (061) 504151 USA: Soundcraft Inc. (616) 382 6300

**Soundcraft
Masters of Quality**

Soundcraft Magnetics Ltd.,
5-8 Great Sutton Street,
London EC1V 0BX.
Telephone: 01-251 3631
Telex: 21198

Not only but also!

Not only do we manufacture
and sell our own products...
but also we now stock the
best in audio equipment!

Manufacturing:

The **S19G** and the unique **S19GA**
1/2 octave graphic equaliser/analiser, for
ultimate control.
The **PM-80** compact modular production
mixing system, of studio quality.
Complete high quality P.A. systems for
all applications.
Custom built loudspeaker enclosures
suitable for all types of JBL drivers, in a
variety of finishes.
Special projects — custom consoles,
capacity for one-off or short
production runs.

Stockists:

Large range of JBL loudspeakers,
studio monitors, pro-series components.
New E range of musical instrument
chassis.
Replacement diaphragms and cones.
Tape recorders, cassette decks and

mixers by **Revox, Teac, Tascam**.
H/H mos-fet range of power amps.
Beyer microphones, stands,
headphones, accessories, XLRs, Jacks,
Gaffer tape, cable etc.

Demonstration lounge.

Service Dept.

JBL recones. Most types of pro-audio
equipment serviced.
As a professional audio company with
many years of experience in systems
design and manufacture we can offer
you the best possible advice and
service there is.

Formula Sound Ltd.

3 Waterloo Road,
Stockport, Cheshire, SK1 3BD.
Telephone: 061-480 3781
Telex: 669249



BRABURY ...

Specialists in the Design and Manufacture of
Communication Systems and Equipment for Studio
and O.B. use.



T402 Mains Distribution Unit

Also available: Video and Audio Jackfields, Status
Light Units, Cable Reels, Script Light Units, Tally
Light Units, Automatic Voltage Stabilisers, etc.

BRABURY ELECTRONICS LTD.

Smitham Bridge, Hungerford, Berkshire RG17
0QU, U.K.

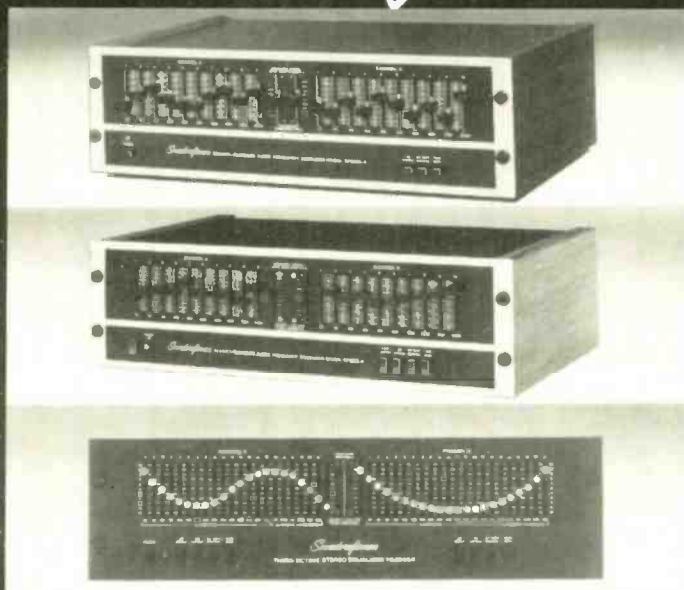
Tel. Hungerford (04886) 3511 Telex: 848760 Brabry

You need an
equalizer for:

- * Equalizing for
room change.
- * Equalization of
records.
- * Equalizing tapes.
- * Changing
overall balance.
- * Hearing
deficiencies.
- * Sound
reinforcement.
- * Changing the
'colour' of
speaker systems.
- * Special effects.
- * P.A. feedback
elimination.

Audition a
Soundcraftsmen
today!

Soundcraftsmen



RP 2201-R

Dual 10-band graphic utilizing I.C.
equalizing technology. Only through this
innovative circuitry may a true $\pm 12\text{dB}$
cut or boost be obtained with an
incredible 105dB signal to noise ratio.
Zero gain controls and 19 rack
mounting are featured on this model for
the cost conscious audiophile.
£150.00 + VAT

RP 2215-R

The Soundcraftsmen RP2215-R is one of
the finest graphic equalizers available
today providing superb performance at
low cost. 114dB signal to noise — 0.01%
distortion $\pm 15\text{dB}$ cut or lift, LED intensity
display for accurate line up — 19 rack
mount. A unit for the perfectionist.
£185.00 + VAT

TG 3044

One third octave equalization has
always been acclaimed by professional
sound engineers as being the absolute
method of achieving balanced
frequency conditions in problem
listening areas. Up until now, the one
third octave units were either too
expensive and/or overly complicated.
The TG 3044 is divided into one third and
alternate one third segments. The
advantage of this frequency division is
two fold, firstly, by eliminating the less
often used controls in the high end the
unit becomes less complicated to use
yet precise and quick set up is possible.
Second and most important, this
equalizer offers facilities and
specifications not available from other
manufacturers at any price.
£275.00 + VAT

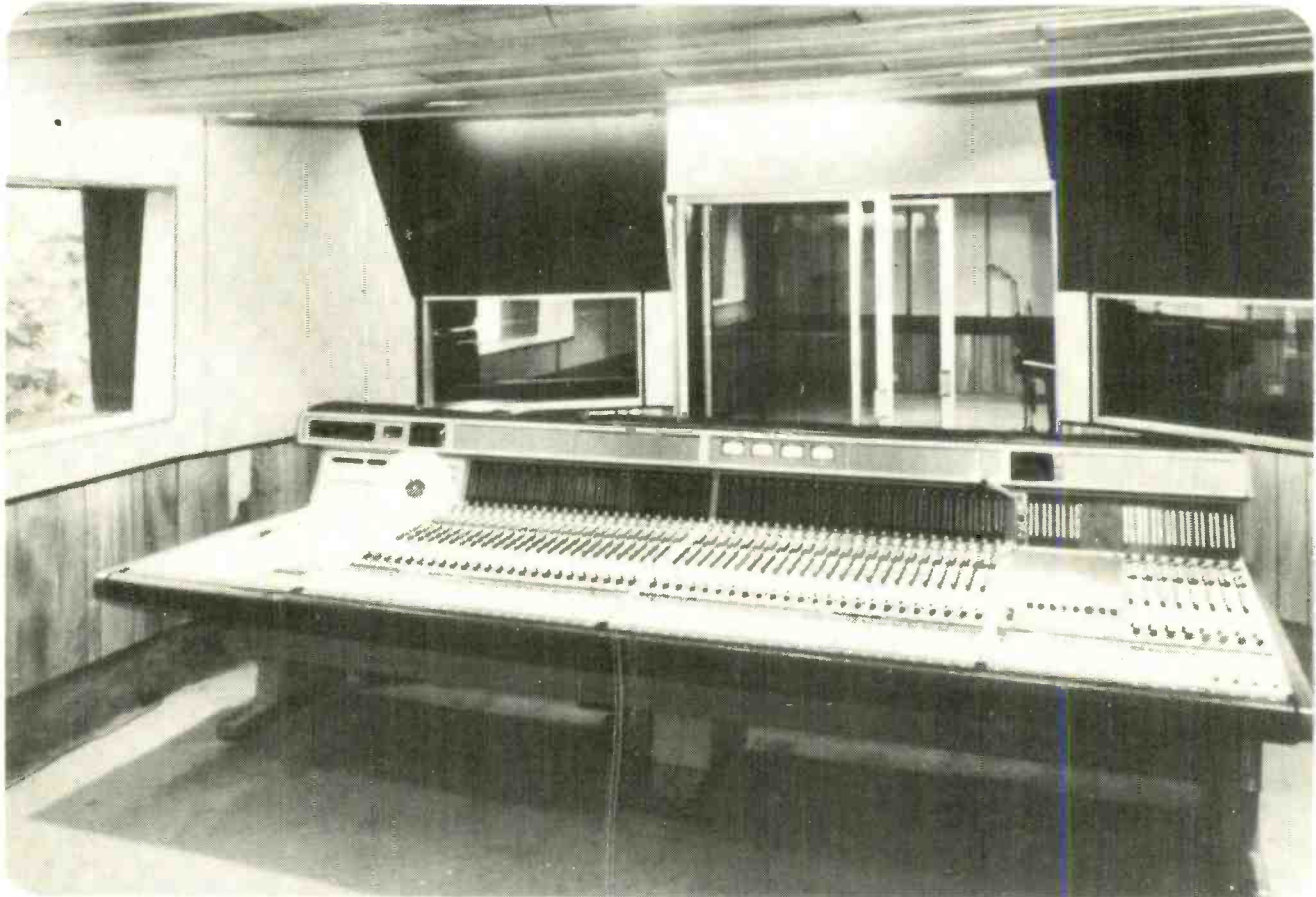
REW PROFESSIONAL AUDIO

Sole UK Distributor:

REW Professional Audio, 114-116 Charing Cross Road, London WC2. Tel: 01-836 2372/7851

Agents: Buzz Music, Widemarsh Street, Hereford. Tel: Hereford (0432) 51831.

Another Alan Grove Studio



E.M.I. Abbey Road, London

Alan Grove construct and design fully integrated recording studios, complete with audio, air-conditioning and audio visual with their unique personal attention to detail and service.

Listed below are some of the past projects we have been connected with:-

- | | | | | |
|--|--|--|---|--|
| Belgium
Kritz | Star Music
Super Bear | Trafalgar | Ibiza Sound | Red Bus |
| Canada
Thunder Road | Germany
Arco
Union Studios | Japan
CBS/Sony | UK
Atlas Photography
Brittania Row
D.J.M.
E.M.I.
Maison Rouge | Riverside
Strawberry North
& South
Town House
Utopia
Venue |
| Denmark
Tocano | Holland
Philips | Norway
Arnoff
Artic
S.E.S. | Marquee | U.S.A.
Artisan
Soundmixers
... and many more |
| Finland
Finnlevy | Italy
C.G.D.
Il Mulino
Phonogram
R.C.A.
Stone Castle | South America
Estudio | Molinare
Palladium
Phongram
Pye
Radio Clyde Mobile One | Agents in most countries listed.
Brochure available. |
| France
Barclay
Davout
Grande Armee | | Spain
Eurosonic
Hispavox | | |



Recording
Studio
Design &
Construction

9 Lancaster Mews, Hyde Park, London W2 3QQ
Tel: 01-402 7071/262 8157 Telex: 261705

Alan Grove Construction Inc.
947 Suite L North La Cienega Blvd, Los Angeles, 90069 Calif
Telex: BVH 194728

Bob Gross, 99 Antrim, New Hants, 03440, USA.

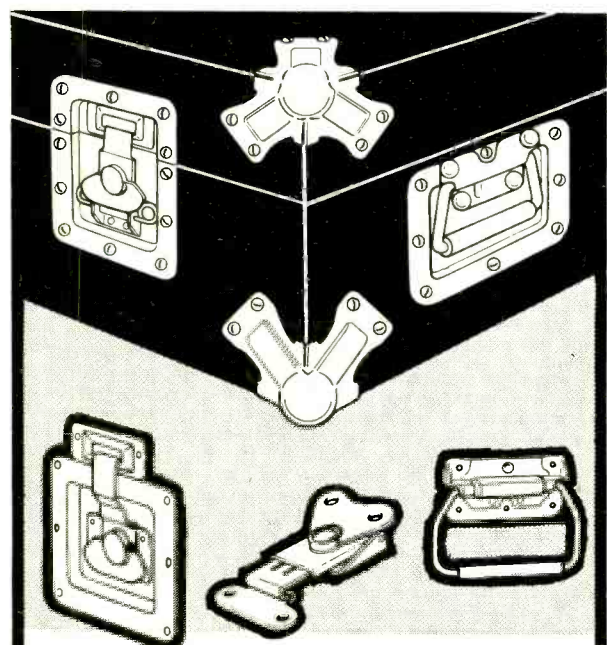
Radio Studio Projects

Radio Studio Projects -
We system design,
manufacture and
install

TV studio sound
systems too!



Audix Limited, Station Road, Wenden, Saffron Walden, Essex CB11 4LG
Telephone Saffron Walden (0799) 40888 Telex 817444



Protex quick-release latches, handles, corner pieces and fasteners are used by some of the world's leading manufacturers because they are just right for the job.

protex FASTENERS LTD.

Arrow Road, Redditch, Worcs. Tel: Redditch 63231



200 & 320
SERIES

REPRODUCE
ALIGNMENT TAPES

Audio Test Tape, Ipswich, England

Webber Test Tapes are produced by studio engineers for studio engineers. They are manufactured in England on Europe's finest studio tape machines.

Each Test Tape is a master individually calibrated during its manufacture, the results being constantly monitored for uniformity and slitting accuracy.

The format and tone durations are of convenient length for speedy, day to day machine alignment.

Tape Width (INS)	Tape Speed (MM)	Tape Speed (IN/S) (MM/S)	EQ NAB	Fluxivity (Nwb/M)	EQ CCIR	Fluxivity (Nwb/M)
¼	6.3	7½	190	200	200	200 or 320
		15	380	200	200	200 or 320
½	12.5	7½	190	200	200	200 or 320
		15	380	200	200	200 or 320
		7½	190	200	200	200 or 320
1	25	15	380	200	200	200 or 320
		30	760	AES	200	-----
		15	380	NAB	200	200 or 320
2	50	30	760	AES	200	-----

Other tape configurations are available by request. All Webber Test Tapes are recorded across the full width of the tape and each Test Tape is supplied with a Specification Chart and a line up procedure leaflet.

WORLD WIDE DISTRIBUTORS:

50 Cheapside, Luton, Beds
Tel: 0582 27195 - 26693
Telex: 825488 DONLAR

Don Larking
Audio Sales

SEE US AT A.E.S.
HAMBURG

THE GREAT BRITISH SPRING

Spring Reverbs are notorious for the odd sounds that they tend to produce. Many manufacturers have tried to remedy this with limiters, equalisers and the like. In the design of 'The Great British Spring' we took a different approach. We started out with a custom spring unit that sounds good without any fancy electronics. The unit simply has a variable line input and a stereo output.

The six spring paths produce a natural sounding reverberation that is full at the low end and sparkling on the highs. But don't take our word for it. Fifty pence brings you our demo cassette, or drop in and hear it live.



DEMO RECORD
NOW
AVAILABLE

Exclusively from:

TURNKEY, 8 East Barnet Road, New Barnet, Herts
01-440 9221

REW, 114 Charing Cross Road, London WC2
01-836 2372

STUDIO EQUIPMENT SERVICES, 100 Hamilton Road,
London NW11
01-458 9133

DON LARKING AUDIO, 50 Cheapside, Luton, Beds
0582 26693

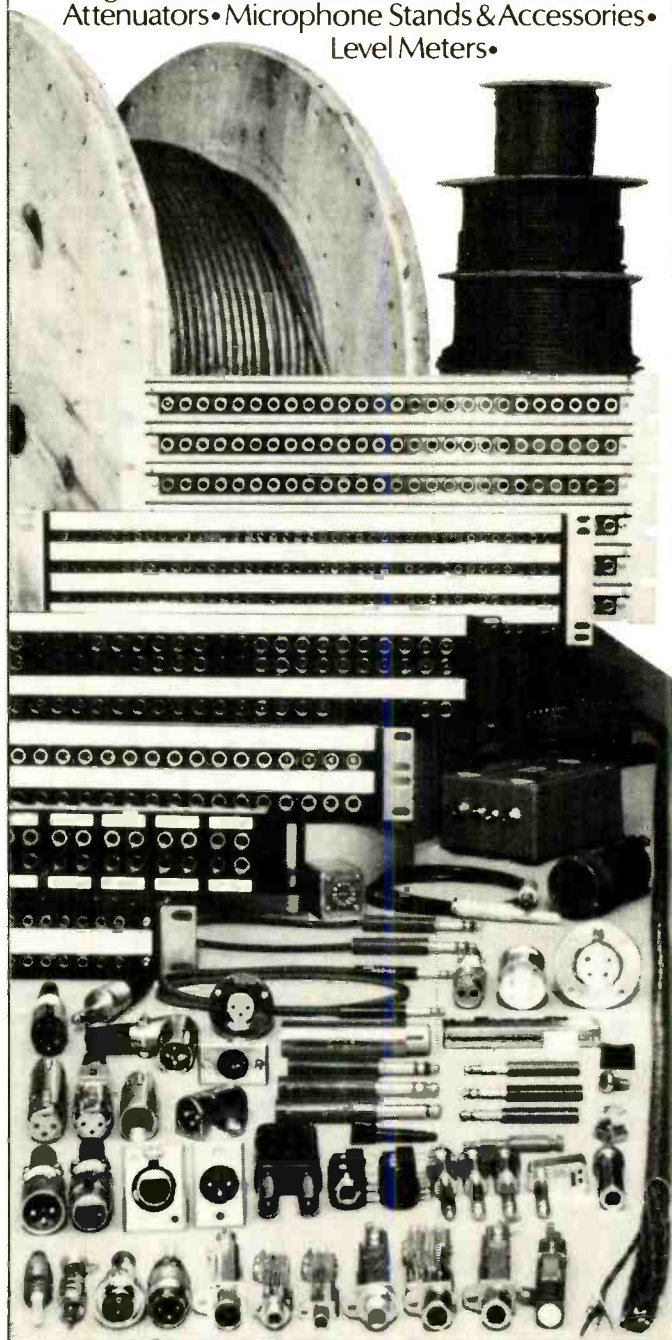
BUZZ MUSIC, 65 Widemarsh Street, Hereford
0432 55961

FUTURE FILM DEVELOPMENTS

36/38 Lexington Street, London W1R 3HR, England.
Telephone: 01-437 1892. Telex: 21624 ALOFFD G.
Cables: Allotrope-London W1.

STOCKISTS OF:

Studio Microphones • Monitoring Loudspeakers •
Intercoms & Headsets • Noise-Reduction Units •
Audio Jackfields, Patchcords, Cables & Connectors •
Splitter Boxes • Multi-Pair Cables • Video Jackfields,
Cables & Connectors • Cable Drums & Winders •
Wiring Aids • Racks & Cabinets • Switches, Faders &
Attenuators • Microphone Stands & Accessories •
Level Meters •



AFFORDABLE TECHNOLOGY

with the SM 24/16/2

To complete an already successful range of Multitrack consoles we invite you to compare quality, specification and price of our new 24 input 16 track recording console with the competition.



**£3000
Plus VAT**

- * Transformer balanced inputs
- * 5 band EQ (switchable mid freqs)
- * 3 aux sends
- * Up to 16 aux returns (2 as STD) AS
- * Push button routing
- * Numerical channel displays
- * Full communication and line up OSC.
- * Extremely low noise circuitry
- * Fully modular construction
- * P & G fader option
- * Led column input level indication
- * Insert jacks on all I/P and O/P channels
- * Large padded armrest
- * Separate power supply



A.C. ELECTRONIC SERVICES
BROADOAK,
ALBRIGHTON,
NR. SHREWSBURY,
SHROPSHIRE.
TEL: (0939) 290 574

AGENTS IN: W.GERMANY, DENMARK, SWEDEN, BELGIUM, NETHERLANDS.

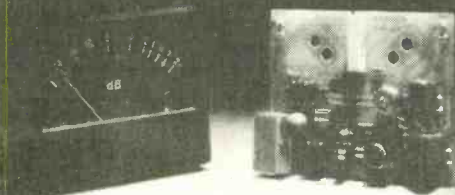
Our business is getting you into business—

MEW **MICKS ELECTRONIC WORKSHOP**

P.C.B. BUILDING, PROD, PROTOTYPE
PROTOTYPE WIRING SERVICE
PRODUCTION WIRING
INSTALLATIONS UK, OVERSEAS

Phone **MICK ENEVER** on
Heckfield 450 or Telex 87515 WISCO. G.
Reading (0734) 473042 Telex 87515 WISCO. G.

Award yourself the P.P.M!



Soundex

Bulgin Electronics Park Lane, Broxbourne, Herts.
Telephone: Hoddesdon 64455

Are you legal, decent, honest and truthful?

Advertisers have to be.

The Advertising Standards Authority.
Write to The Advertising Standards Authority
15/17 Ridgmount Street, London WC1E 7AW



CLASSIFIED ADVERTISEMENTS ORDER FORM

Please use this coupon for your private sales and wants. Rates 30p per word. Minimum £6. Box Nos. £1 extra. To: *Studio Sound*, Classified Advertisements Dept., Link House, Dingwall Avenue, Croydon CR9 2TA. Please publish the advertisement indicated below for insertion/s under the heading

Name

Address

.....

Cheque/P.O. enclosed £

Is a Box No. required Yes/No. If no, please include remittance to cover name and address and/or Tel. No.

Please write in block capitals.

Cuemaster
THE RELIABLE
CARTRIDGE MACHINE



Granet

Communications Ltd.
39 Beechcroft Manor, Oatlands Drive,
Weybridge, Surrey KT13 9NZ
Weybridge (0932) 47785

POWER AMPLIFICATION BY MUSTANG



Our SS.100 and SS.50 are economical amplifiers with outputs of up to 175 and 100 Watts RMS into 4-16 ohms, typical THD figures being 0.1%, slewing rate > 10v/μs, noise > 90dB down, zero level input, and full electronic protection. Considering these points with their proven reliability and robust construction, plug-in output transistors and driver board, optional balanced input and 100V line output, and virtually ex stock despatches we reckon we take some beating! Contact us now for the full technical specifications.

Manufacturers of mixers, integrated mixer amplifiers and slave amplifiers, studio power amplifiers, transformers, lighting control equipment and cabinets for the home and export markets. Contact us for full illustrated technical brochures.

MUSTANG COMMUNICATIONS

Eastfield Industrial Estate,
Cayton Low Road, Scarborough,
North Yorkshire YO11 3UT
Telephone (0723) 582555



Classified Advertisements

Advertisements for this section must be pre-paid. The rate is **30p** per word, minimum **£6.00**. Box Nos. **£1.00** extra. Semi-display rates on application. Copy and remittance for advertisements in **JUNE** issue must reach these offices by **6th APRIL** addressed to: The Advertisement Manager, **Studio Sound**, Link House, Dingwall Avenue, Croydon CR9 2TA.

Note: Advertisement copy must be clearly printed in block capitals or typewritten.

Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975:** No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder or (2) it is in a business employing less than six persons or (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

The attention of advertisers is drawn to "The Business Advertisements (Disclosure) Order 1977", which requires that, from 1st January 1978, all advertisements by persons who seek to sell goods in the course of business must make that fact clear. From the above date, consumers therefore should know whether an advertisement relates to a sale by a trader or a private seller.

SERVICES

GRAMPIAN cutter heads repaired, new coils, new armatures, etc. Cutting styli supplied for MSS, Grampian, Neumann, Ortofon, Haeco. Stereo cutter heads made to order. County Recording Service, London Road, Binfield, Bracknell, Berkshire. Telephone Bracknell (0344) 54935. X

K.M. Studios. Fast, efficient cassette copying service, competitive prices. Small runs welcome. Phone Leicester 392270. D

Don't get side tracked...

Cassette and open reel copying in large and small runs. Blank cassettes supplied between C-3 and C120. Dolby A and B facilities available. Studio facilities available for voice-overs. Design, artwork and print service. Established suppliers to most of the major publishing houses and Examining Bodies.

...come to the professionals

Sound Communication

Field House, Wellington Road, Dewsbury, West Yorkshire WF13 1HF. Telephone 0924 451717

PRESSINGS of classical quality (colour also), promptly manufactured from your master tapes. Sleeve printing, mailing service. Studio or mobile units for master recording. Specify requirements to Mike Bull, Sound News Studios, 18 Blenheim Road, London W4 1ES. Tel. 01-995 1661. F

Gemini Sound

SUPERB QUALITY CASSETTE COPYING SERVICE

PRECISION ONE-TO-ONE COPIES WITH PHASE-EQUALISATION

Ring David Wright now on (025 672) 2605 for further details, or write to our NEW ADDRESS: Gemini Sound, Church Path, Hook, Near Basingstoke, Hants RG27 9LZ

SPEECH RECORDING
(VOICE-OVERS; LANGUAGES; AUDIO-VISUALS)

HIGH-SPEED CASSETTE COPYING

SPR

OPEN-REEL COPYING

(ANY SPEED - ALSO TO BROADCAST SPEC)

HIGH QUALITY BLANK CASSETTES
(C1-C120)

LABEL & CARD PRINTING

SPEECH-PLUS RECORDINGS LTD

UNIT 32, NO 19, PAGES WALK, LONDON, SE1 4SB.

01-231 0961

Wollensak Cassette Copiers
SALE & HIRE • SERVICING • CASSETTE COPYING RECORDING • P.A. EQUIPMENT
SUPERSCOPE CASSETTE PLAYERS BY MARANTZ
Christian Sound Services
AUTHORISED WOLLENSAK DISTRIBUTOR
43 Linden Gardens, Enfield, Middx
01-363 2337

RING US...

FOR BLANK CASSETTES CASSETTE DUPLICATING
EMPTY SPOOLS WHITE TAPE BOXES
LEADER TAPE 1/2" TAPE IN ALL LENGTHS
BT CARTRIDGE BODIES SPLICING TAPE
1/2" NAB REFILLING SER. RAZOR BLADES

RING 01-399 2476/7

MEDIATAPE LIMITED

29A TOLWORTH PARK ROAD, SURBITON, SURREY

AMPEX MAGNETIC TAPE STOCKISTS
WHY NOT PHONE US NOW FOR A QUOTE!

CAN YOU AFFORD NOT TO

Quantity	CASSETTE DUPLICATING inc L/cass.					Label and inlay card printing.						
	C1-10	C11-20	C21-30	C31-40	C41-50	C51-60	C61-70	C71-80	C81-90	C91-100	C101-110	C111-120
10-49	61p	63p	65p	69p	73p	77p	82p	90p	97p	107p	117p	127p
50-99	58p	60p	62p	65p	68p	71p	78p	86p	94p	104p	114p	124p
100-149	57p	59p	61p	62p	64p	66p	73p	82p	89p	99p	109p	119p
150-249	53p	55p	57p	58p	60p	62p	70p	79p	84p	94p	104p	114p
250-499	51p	53p	55p	56p	57p	58p	66p	74p	80p	90p	100p	110p
500-999	49p	50p	51p	52p	53p	54p	61p	69p	77p	87p	97p	107p
1000+	43p	45p	47p	48p	50p	52p	58p	64p	74p	84p	94p	104p
10,000+	42p	44p	46p	47p	49p	51p	57p	63p	73p	83p	93p	103p

R.F.W. RECORDING SUPPLIES, 83 Herewood Road, Isleworth, Middlesex. Tel. 01-560 6000

TANNOY SERVICE

We have an extensive stock of Tannoy spares and exchange units and offer a prompt, efficient service including delivery and collection. We perform B & K analysis on all units to factory set specifications.

For all repairs, contact the factory accredited service agents: Elliott Bros. Ltd.

ELLIOTT BROS. (Audio Systems) Ltd.
9 Warren Street, London W1. Tel. 380-0511

HIGH SPEED CASSETTE COPYING IN MONO OR STEREO AT COMPETITIVE PRICES

Long or short runs.
Blank cassettes supplied in bulk.
A growing reputation for reliability.

MORARD SOUND PRODUCTIONS
THORNTON HEATH, SURREY
Telephone 01-689 7424

CASSETTE COPYING IN THE MIDLANDS

Specialists in short run productions. Prices from 1p per minute, inc. cassette and library case. Label and inlay card printing, plus services and supplies for film, disc and AV productions.

Write or phone for rate card to:

AUDICORD RECORDS
59 Mayfield Way, Barwell, Leics LE9 8BL
Tel. 0455-47298 (24 hr answering service)

COUNTY RECORDING SERVICE

For super quality Master Discs, Demo Discs and Pressings. Scully lathe with our latest MKW 80 Stereo Cutting System.

Also half speed cutting for that very special disc.
Dolby 'A', Dolby 'B' and DBX noise reduction.

London Rd., Binfield, Bracknell, Berks
RG12 5BS
Tel. BRACKNELL (0344) 54935

A QUALITY pressing and duplication service provided to studios, etc. Complete with cutting, processing, labels, sleeves, art work, inlays, etc. Minimum order for LPS—250, singles—500 cassettes—250. Example price for complete 46 minutes cassette to include mastering, printed label and library case, on Agfa tape—80p each plus VAT. For further details: SRT Record and Tapes Ltd., 01-446 3218. X

100C-60 cassettes beautifully copied in stereo
Just £59.50 (plus VAT)

We can copy from 100 to 5,000 high quality cassettes on our high speed loop-bin system, load them precisely into top-class shells. Price includes library case and all production work from your in edited master. Any length C-5 to C-90. NOW ALSO cassettes in SILVER or GOLD effect finish! Ring for price check.

STUDIO REPUBLIC
High Street, Pinner 01-868 5555

YOU WOULDN'T BELIEVE WHAT WE CAN GET ON TAPE

We do work for some of the biggest companies as well as the smallest. Give us a call, you'll find we're very helpful. Whatever your problem.

CASSETTE DUPLICATING SPECIALISTS
To or from cass. 1/4", 1/2" or 1"

OUR BIGGEST ASSET IS WE CARE

We have fantastic references, can other companies say the same?

WELL, WE'RE WAITING!

20-20 SOUND FACILITIES LTD.
13 Bethnal Green Road, London E1 6LH
Tel. 01-739 5550 or 01-739 5558

ZIPPER MOBILE RECORDING STUDIO

Get Taped Where You Play

16 TRACK Acoustically Designed

Control Room £9.50 per hr

JBL Monitors/Phasing/Flanging

Comp/Lim's/Noise Gates/A.D.T.

Dolby A's For Mastering.

Contact Jeffrey on

01-435 3076 or

01-637 9977



Cassette Duplication from 45p incl: Master/demo copies (1-1/Hi-speed); Audio Visual and computer programme cassette duplication. Printed inlays and direct cassette printing. Fast turn-around. No minimum. Dolby 'A' and Dolby 'B' facilities.

SIMON STABLE PROMOTIONS
Inglenook, West End, Launton, Oxon.
08692 - 2831

FOR SALE—TRADE

3M Wollensak Cassette Copies, Also endless loop cassettes, single edged razor blades. Sound Marketing & Services. Tel. Norwich (0603) 45338 X

DISC CUTTING

COMPLETE SYSTEM FOR SALE

Comprising of: Scully lathe, Ampex tape playback, Westrex/Haeco heads and amplifiers, Ortofon CPS Control Unit, Pultec equalisers, Dolbys, etc. In full use and may be seen working.

Ring: Dublin 766104/763522

TANDBERG UHER, REVOX NEAL-FERROGRAPH

For the best prices and Service

PHOTO ACOUSTICS LTD.,
255a St. Albans Road,
WATFORD.

Tel: 0923 32006

and at

58 High St., Newport Pagnell
Tel: 0908 610625

NEW Wollensak cassette copiers directly imported by C.A.V.S. Ltd., cost less and have full service/spares back up. E.g. Wollensak 2770 still costs £999 plus VAT. Also available Telex Copuette at £299 plus VAT and all other Wollensak, Telex, Pentagon similar units. Contact Yates, C.A.V.S. Ltd. 01-363 6125. X

BOSE 802 speakers with equalisation, £499 per pair or £473 without equalisation. Amcron DC 300 £530 and D150A at £335. All prices plus VAT. Contact Geoff Yates, C.A.V.S. Ltd. 01-363 6125. X

YORKSHIRE Erricks of Bradford. Tascam, JBL, Bose, AKG, Beyer, Calrec, Revox, Ferrograph, Spondor. Sales, servicing, exchanges, leasing. Bradford (0274) 22972 (Paul). X

TAPE DUPLICATING
ENDLESS CASSETTES
INDUSTRY SUPPLIES
EXACT LENGTH
CASSETTES

SELECTA SOUND
FREEPOST
ROMFORD RM2 1BR
Tel. 040-24 53424

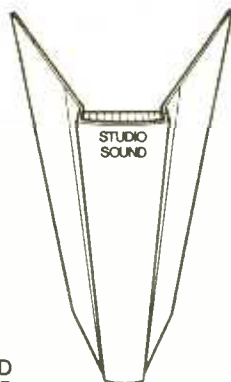


John Smailes

Get binding!

Keep your copies of **STUDIO SOUND** in smart black binders (each holds 12 copies) with title in golden block letters on the spine. Price: £3.00 each which includes inland and overseas postage. Send your order with cheque or postal order to: Modern Book Binders Ltd. Chadwick Street, Blackburn, Lancs. (state clearly your name and address and the relevant magazine title).

OVERSEAS READERS MUST SEND INTERNATIONAL MONEY ORDER



LINK HOUSE GROUP

FOR SALE—PRIVATE

SOUNDCRAFT SCM16 16-track on 2in with remote panel. Virtually unused, still under warranty. £8,000. Tel. 096033 2487 to arrange viewing. D

WOOLENSAK 2772 high speed cassette duplicator, less than 2 years old, recently serviced, less than 1,000 copies made, £800 o.n.o. Box No 851 c/o *Studio Sound*. D

YAMAHA CR1000 £250, Nakamichi 1000 £600, DBX 122 £100, Electro-sound cassette-winder with spare parts £450. Tel. Dave, Hornchurch 59909. D

SONY TC D5, domestic model, 2 pole jacks, perfect condition, hardly used. Forced to sell. Mike, tel. evenings 0462/56553, collect Central London. D

FULLY operative 16-track studio with adjoining 3-bedroom semi-detached farm cottage and 6 acres of grazing land on Kent and Sussex border. £75,000 (willing to split). Enquiries Staplecross (058083) 635. D

MY 16-track 2in custom-built recorder has given 2 years excellent service, but as I'm changing to 24, it's for sale for around £2,000. Details from Phil Dawson, Ginger Recordings, Portland Road, Aldridge, Staffs. 24-hour answering on Aldridge 56546. D

E.M.I. TR52 Stereo recorder, 3¼/7½ ips. Mint condition, almost unused. £200. Ampex 15 ips NAB test tapes, as new, 2in £100, 1in £50, ½in £20. AKG D224 mic, as new, £65. Phone after 7 p.m. 01-561 0293. D

TWO T.R.D. series 600 ½-track machines. 622/s/15 (full facilities) and 622/VR/15 (replay only). Offers and information please phone 01-653 0419. D

ZOOT Horn 10/2+2+2 modular mixer, PFL/TB, VU's on all channels, output inserts, tape returns, framespace for extra 6 input, 2 output modules. CP cases, stagebox, 50m Belden cable drum £1,500. 4 Bose 800 speakers, equaliser, stands, £550. 041-339 8932. D

SALE of new Uher accessories. Z214 Nicad Battery £25, M517 remote control mike £23. M634 pair of stereo mikes for cassette machines £35. AKG D109 neck mike £25. AKG D190CS mike £45. AKG D140C mike £49. AKG D170E mike £55. BASF LP35LH 900ft tape on 5in reels £2.95. All equipment is fully guaranteed. All mikes are fully wired. All prices are subject to VAT. Wycombe Cameras, 45 King Edward Court, Windsor, Berks. Tel. Windsor 67774. D

D.I. Box, passive, 20dB insertion, ground lift. Suit guitar, keyboards, etc. Ideal for Stage or Studio use. Only £19.50. Sound Advice (SS), 396 Godstone Road, Whyteleafe, Surrey. H

FOR SALE

Neve Desk, 24 into 8.
EMT Mono Plate
2in and 1in Sound Recording Tape
(used)

Sensible Offers Please
Tel. Denham (0895) 833522

NAGRA SNN-3 with SMR and CK1. Also 20dB attenuator. 18 months old and with under 20 hours use, £1,075. EMS SYNTHI-AKS portable synthesiser with KS touch keyboard/sequencer and additional DK2 keyboard. Current list price £1,800 (see *Studio Sound* February). £780. Godstone (0883) 843221. E

SOWTER TRANSFORMERS

WITH OVER 40 YEARS' EXPERIENCE
we have the expertise to design and manufacture
ANY TYPE OF AUDIO TRANSFORMER
AT THE RIGHT PRICE

WE SUPPLY ALL TYPES OF MICROPHONE TRANSFORMERS, BRIDGING TRANSFORMERS, INPUT TRANSFORMERS FOR RECORDING, BROADCASTING AND PUBLIC ADDRESS APPLICATION.

We call your attention to our very successful
MICROPHONE
SPLITTER/COMBINER TRANSFORMER
type 4079

with a high impedance 200ohm primary and two 200ohm secondaries. It will handle up to 2.3 volts rms at 30Hz and has a frequency response of plus/minus ½dB from 20Hz to 20kHz. It is contained in a Mumetal Can 33mm diameter x 37mm high and **WORKING DETAILS OF THE CONSTRUCTION OF A SPLITTER ARE AVAILABLE ON REQUEST.**

WE HAVE AVAILABLE STANDARD DESIGNS OF OUTPUT TRANSFORMERS WITH EXCEPTIONAL PERFORMANCE FOR ALL TYPES OF VALVE AND TRANSISTOR AMPLIFIERS

E. A. SOWTER LTD.

Manufacturers and Designers
P.O. Box 36, Ipswich IP1 2EG, England
Tel. Ipswich (0473) 62794 and 219390

EQUIPMENT FOR SALE

Nagra IV-S immaculate £2,300
Tascam 80-8 with DBX £2000
Klark Teknik DN34 £625
Rebis Stereo comp-limiter £300
Rebis Stereo Parametric £300
Hill 12-8 mixer £750
Scopex 4D 10 dual trace scope £150; CCTV £100
5 x 20 Jackfield E80; 2 multicores £125 & £100
10 channel 1/8 amp E60; 5 straight mic stands £75
New tape: 20 reels Scotch ¼" £150; 5 reels Agfa ¼" £40

Ring SMR Records Ltd, Bristol (0272) 47264 or
Weston-s-Mare 515634

SALE OF STUDIO EQUIPMENT

by order of **APPLE CORPS Ltd**
sound recording and record cutting equipment.

Particulars from:

Edward J. Veale Assoc Ltd, 16, North Rd, Stevenage, Herts.
Tel: 0438.50023. Telex: 825211.

LYREC 24 track + 16 track head block, 3 years old, £11,000. Box No. 848 c/o *Studio Sound*. C 24-8/8 Alice A.C.M. Mixer. PPM metering, P & G faders, in all-wood console. Especially suitable for Broadcast Production. Offers around £3,900. Telephone Studio on 01-734 5572. D

FOR SALE

Amek 20 into 16 mixing desk (24-16 frame) V.U. Meters. Completely overhauled and installed in new case by the Manufacturers. This desk is in perfect condition.

£5,000 + V.A.T.

Phone (0875) 340143 or
061 834 6747

WANTED

RADIOMICROPHONE wanted, any condition. Transmitter/Receiver or incomplete system. Please telephone 02013 81987 after 8 p.m. D

STUDIO FACILITIES

FANFARE Records. Tape-disc pressings, demo's masters, any quantity. Studio/mobile Neumann disc cutter. S.A.E. brochure. 1 Broomfield Close, Rydes Hill, Guildford, Tel. 0483 61684. X

DISC Cutting master and demos, pressings, cassettes, mobile recording studio. Free brochure. TAM Studio, 13a Hamilton Way, London N.3. Tel. 01-346 0033. X

For Further
INFORMATION

on

**STUDIO
SOUND**

contact

PHIL GUY

on 01-686 2599

SITUATIONS WANTED

RECORDING Engineer, experienced in all types of multi-track recording, seeks permanent or freelance work. Box 852 c/o *Studio Sound*. D

SITUATIONS VACANT

STUDIO PERSON

required by 24-track London studio. The successful applicant will be experienced in studio maintenance and also responsible for studio bookings. Salary negotiable. Apply in writing only to:

**Sound Suite Recording Studios Ltd., 92
Camden Mews, London NW1**

M.W.M. Company, manufacturers of **TRACK TECHNOLOGY**, require an engineer for the testing and finishing of their studio mixing consoles and ancillary products. Opportunities exist for advancement, design work and travel in a rapidly expanding company. Please contact: M.W.M. Company, 159 Park Road, Kingston-upon-Thames, Surrey KT2 6BX giving details of qualifications, experience, etc. D

MAJOR 48-tracks recording studio on the continent requires excellent and experienced maintenance engineer. High level of salary and incentive if proven capability. Detailed application in writing to Box No 856 c/o *Studio Sound*. D

POLYTECHNIC OF CENTRAL LONDON SCHOOL OF COMMUNICATION

Senior Sound Engineer

The Media Unit of the School requires an audio engineer to work in its Broadcast quality radio studios. The post will involve demonstrations to students of current radio practice. Salary on Technical Officer 3 scale: £8115-8709 p.a. inclusive of London Allowance.

Application form and job description from: **Establishment Office, PCL,
309 Regent Street, London W1R 8AL, tel. 01-580 2020 ext. 212.**

INDEPENDENT LOCAL RADIO IN ABERDEEN

North Sound require a Chief Engineer. Applicant must have experience in radio broadcasting, preferably I.L.R. Salary negotiable.

Phone or write to:

**MR. J. LUMSDEN,
Managing Director,
CLYDE ELECTRONICS LTD.,
P.O. Box 261,
Glasgow
G2 7LB.**

Telephone: 041-248 3001

THE REVOX B77 EDITING CONVERSION



If you purchase your B77 from us it is available in our **OPEN PLAN EDITING** version at an **EXTRA COST of £35.**

No interference with the Revox specification.

Still covered by manufacturer's guarantee.

A factory approved modification. Existing machines converted.

From the originators of the Open Plan A77 Kit—Which is still available at £88.

Tape and Cassette copying also available. Please call for further details.

SOUND ASSOCIATES LIMITED, 23 REDAN PLACE, LONDON W2 01-229 0101

INDEX TO DISPLAY ADVERTISERS

A	AC Electronic Services 108	G	Genelec 44	P	P.A.C.E. Musical Equipment 98
Association Professional Recording Studios 45	Granet Communications 109	Pentagon Industries Inc. 95			
Advanced Music Systems 81	Groves, Alan 105	Plus 30 71			
AKG 53	H	Progressive Electronic Products 89, 91			
Alice Stancoil 10	Harrison <i>OBC</i>	Protex Fasteners Ltd. 106			
Allen & Heath/Brenell 101	HHB Hire and Sales 37, 75	R			
Alpha Wire Ltd. 98	I	Racal-Zonal 25			
Amek 18	ICM Ltd. 99	Rank Strand Sound 6			
Aphex Systems Ltd. 57	I.T.A. 7, 9, 11, 100	Rebis Audio 73			
Audio & Design recording 5	ITC 17	Revox 15			
Audio Development 20	Interlake Audio 63	REW 97, 104			
Audio Kinetics 96	J	S			
Audix Ltd. 106	John A. Steven 20	Satt Elektronik AB 24			
B	K	Scenic Sounds 29, 33, 83			
Bauch, F. W. O., Ltd. 13, 15, 17, 19, 21, 45, 55, <i>OBC</i>	Klark-Teknik 65	Sescom Inc. 76			
Bradbury Electronics Ltd. 104	L	Shone Sound 81			
Brooke Siren Systems 89	Lake Audio Components Ltd. 99	Shure Electronics 4			
Bulgin Electronics Soundex Ltd. 10, 108	Larking, Don, Audio 94, 106	Simmon Sound & Vision 98			
C	Leevers Rich Ltd. 87	Solid State Logic <i>IFC</i>			
Canford Audio 14	M	Sound Associates Ltd. 114			
Cetronic 85	Magnetic Tapes Ltd. 66	Soundcraft 51, 103			
Court Acoustics Ltd. 6	MCI Inc. 43	Studer 19			
D	Melkuijst Ltd. 93	Studio Equipment Services 102			
Dolby Laboratories Inc. 23	Micks Electronic Workshop 108	Surrey Electronics 64			
E	Mobile One (Radio Clyde) 22	Syco Systems Ltd. 102			
Eardley Electronics 85	Mosses & Mitchell 8	Synton Electronics BV 26			
Eela Audio 12	Mustang Communications 109	T			
Electrovoice 100	MXR Innovations 35	Tannoy Products 77			
EMT 13	N	Technicord Ltd. 45			
Entertec 16	National Research Develop. Corp. 94	Trident Audio Developments Ltd. 59			
F	Neal Ferrograph 31	3M UK Ltd. 47			
Feldon Audio 61, 96	Neumann 45	Turnkey 14, 27, 56, 82, 86, 107			
Formula Sound Ltd. 104	Neve International Ltd. 39	U			
FM Acoustics 91	O	Urei 55			
Future Film Developments Ltd. 107	Otari Electric Co. Ltd. <i>IBC</i>	V			
		Valley People Inc. 79			
		W			
		White Instruments Ltd. 46			

Studio Sound is available without charge to qualified readers: these are directors, managers, executives and key personnel actively engaged in sound recording, broadcasting and cinematograph industries in any part of the world. The Publisher reserves the right to refuse applications considered inappropriate and restrict the number of free copies sent to any one company or organisation. Non-qualifying readers can buy *Studio Sound* at an annual subscription of £16.00. All enquiries to: Subscription Department, Link House Publications Ltd., Robert Rogers House, New Orchard, Poole, Dorset BH15 1LU. Tel. Poole (02013) 71171. Published by Link House Magazines (Croydon) Limited on behalf of the proprietors, Link House Publications Limited, Robert Rogers House, New Orchard, Poole, Dorset BH15 1LU and printed by Arthurs Press Ltd., Woodchester, Stroud, Glos. GL5 5PB.

It's a reliable recorder with foresighted features. A new constant-tension transport has a full symmetric tape path, the most advanced electronic servo and a large diameter capstan without pinch roller. The latest electronics includes single-card-per-channel modules, full-fledged remote

controller, auto-locator and interface access for external synchronizers.

Otari MTR-90 — the masterly multitrack with engineering expertise available in 16, 16 prewired for 24 and 24 track formats. Write to us for further details of the new-generation machine.

OTARI

Industrial Tape Applications
1-7 Harewood Avenue, Marylebone Road,
London NW1 Phone: 01-724 2497, Telex: 21879

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

Otari MTR-90. True progress in multitrack engineering.



MR-2

F.W.O. Bauch Limited
49 Theobald Street, Boreham Wood, Hertfordshire WD6 4RZ
Telephone 01-953 0091 Telex 27502

MR-2 delivers more usable console for the money. Efficient design has reduced the labor and material content, while improving features, signal handling, and reliability.

MR-2 offers a full range of options and features, allowing you to specialize your console to your functional and budgeting needs.

MR-2 expansion frames and module update kits continue to keep your console matched to your future needs.

Resale prices of Harrison-designed-and-built consoles demonstrate that MR-2 will continue to protect you even at trade-in.

More Usable Console for the Money?

Somehow that sounds like cheating—as though you could get something for nothing. NOT SO!!

The secret is to eliminate things that cost money but do not add any function or "quality" to the console.

The console designers at Harrison Systems have identified many traditional inefficiencies and have eliminated these in the design of MR-2.

Printed-circuit boards have been made smaller (thus, less expensive) through the use of double-sided artwork and a more meticulous, time-consuming design process.

Almost all hand-wiring in the frame has been eliminated. Mother-board-mounted multi-pin connectors are used for inputs and outputs.

Seldom-used features (like Quad) have been eliminated and replaced with more desirable and useful features.

Module width has been reduced to 40.6 mm (1.6"), thus reducing metal-work cost for a given console size.

In other words, every small detail of the MR-2 design has been critically optimized for efficiency. This efficiency does not mean, however, a reduction in signal-handling quality or reliability. In fact, just the opposite is true.

A radical new multiple-ground system is at work to even further reduce induced noise.

Modern "dielectrically isolated" switches are used for all logically controlled switch functions.

Patch points now operate full line level (+4 dBu or +6 dBu) and are isolated and balanced.

These are only a few of the reasons that allow us to confidently say that MR-2 is the most efficient, cost-effective console ever offered by anyone to the industry.

We think you will agree and make it your choice as well.

 **Harrison**
NOW MORE THAN EVER

