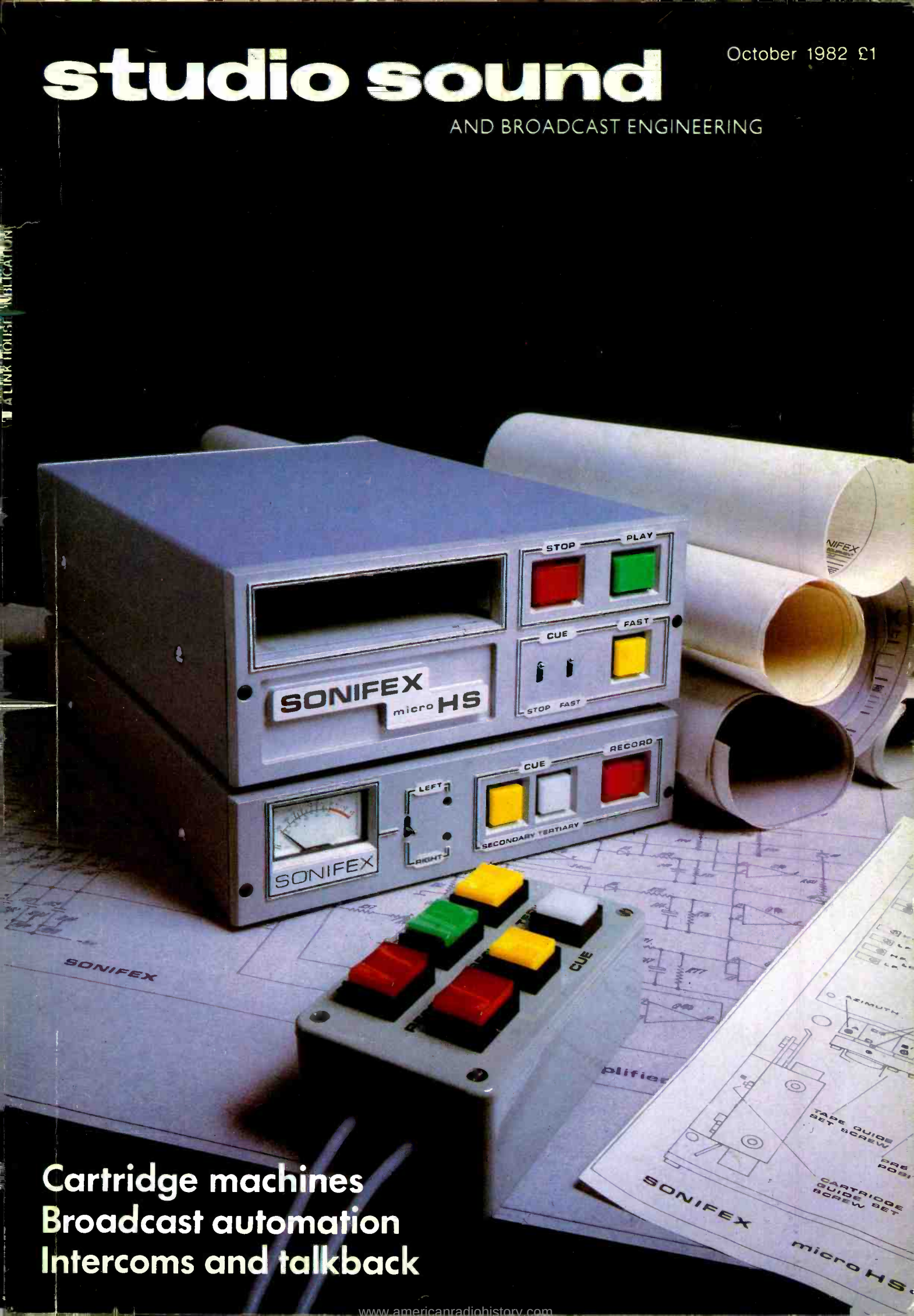
# studio sound

AND BROADCAST ENGINEERING

October 1982 £1

A LINK HOUSE PUBLICATION




## Cartridge machines
## Broadcast automation
## Intercoms and talkback

# The Producer Package

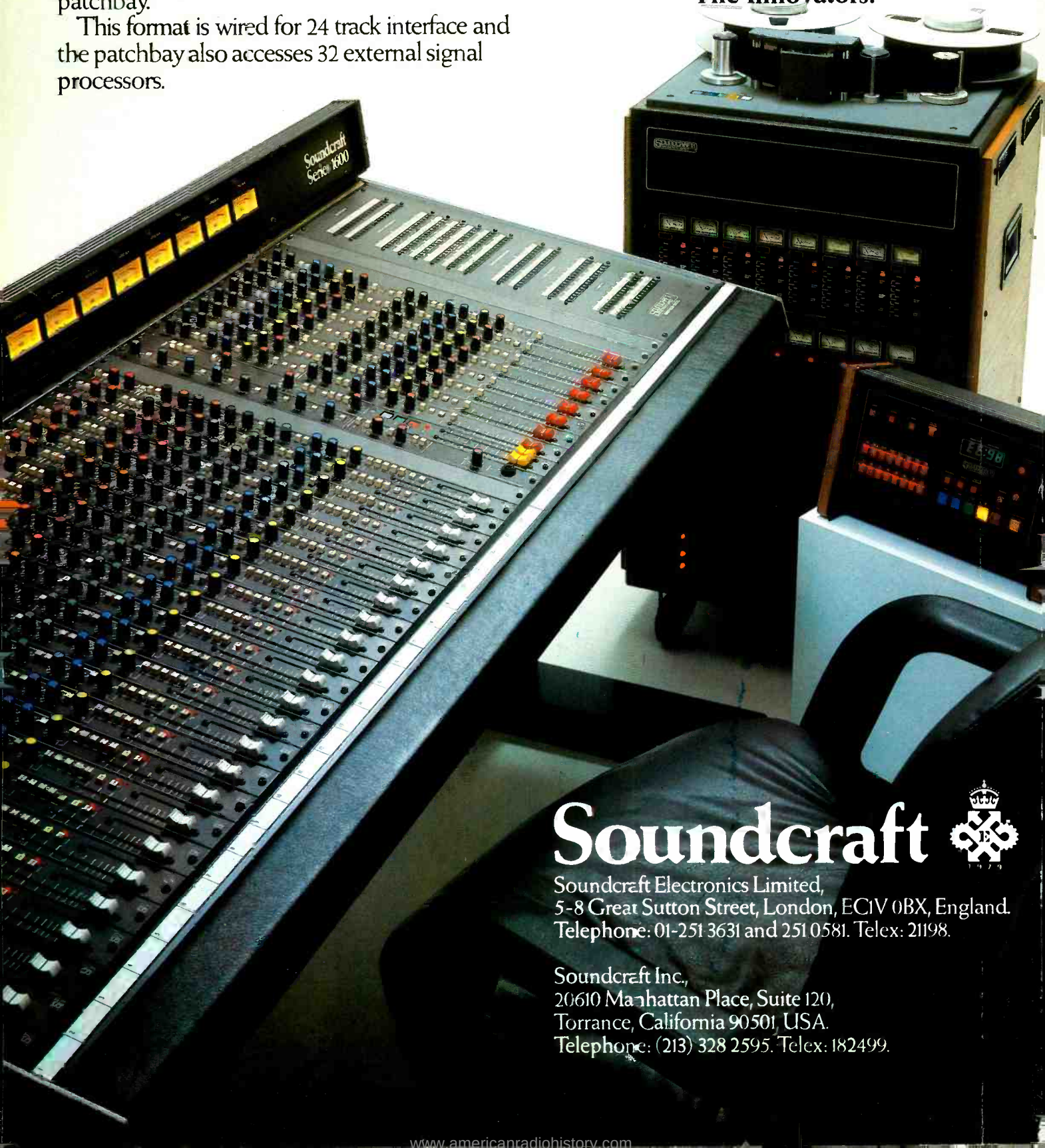
## The New Series 1600 + the SCM 762 Multi-Track.

The Series 1600 offers 4 mainframe configurations with 16 track monitoring: 16, 24, 32 channel and, as featured, 24 channel with patchbay.

This format is wired for 24 track interface and the patchbay also accesses 32 external signal processors.

The SCM 762 is a fully professional 2 inch recorder which may be ordered as a 16 track, 16 track prewired 24, or as a 24 track machine, each of which has the option of a nine memory autolocator.

**The Producer Package from Soundcraft – The Innovators.**




# Soundcraft

Soundcraft Electronics Limited,
5-8 Great Sutton Street, London, EC1V 0BX, England.
Telephone: 01-251 3631 and 251 0581. Telex: 21198.

Soundcraft Inc.,
20610 Manhattan Place, Suite 120,
Torrance, California 90501, USA.
Telephone: (213) 328 2595. Telex: 182499.

**EDITORIAL**
EDITOR: RICHARD ELEN
DEPUTY EDITOR: KEITH SPENCER-ALLEN
PRODUCTION: ANN HORAN
LINDA FIELDHOUSE
CONSULTANT: HUGH FORD
SECRETARY: ALISON DUNCKLEY

**ADVERTISEMENT**
GROUP EXEC MANAGER: PHIL GUY
SALES: MARTIN MILES
SECRETARY: AUDREY SLATFORD
PRODUCTION: JACKIE McGRATH

**PUBLISHER** PAUL MESSENGER

**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**

**STUDIO SOUND** is published on the second Friday of the preceding month. The magazine is available on a rigidly controlled requested basis only to qualified personnel (see back page for terms) or for an annual cost of £12.00 UK, $40 US surface mail, $75 US airmail, £17.50 overseas surface mail or £32.50 overseas airmail to non-qualifying readers or where more than two copies are required in a studio or small organisation. *All* subscription enquiries, including changes of address (which should be *in writing* and preferably including an old address label or at least the 7-digit label code) should be made to the **Subscription Department** at the above address.

Studio Sound and Broadcast Engineering incorporates Sound International and Beat Instrumental.

**US mailing agents.** Expediters of the Printed Word Ltd, 527 Madison Avenue Suite 1217, New York, NY 10022. Controlled Circulation postage paid at New York, NY.

Total average net circulation of 13,264 per issue during 1981. UK: 5,677. Overseas: 7,587.

Printed in England

# studio sound

## AND BROADCAST ENGINEERING

OCTOBER 1982
VOLUME 24 NUMBER 10
ISSN 0144-5944

A LINK HOUSE PUBLICATION

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

Cover photograph by Norman Hodson



## Reviews:



### What's What in broadcasting

Everybody, or almost everybody, thinks of us as *Studio Sound*—this is hardly surprising, as it says so in large letters on the front cover, and on this page (it also says it on every other page, but we do not supply the necessary microscope). There are some other words up there on the cover, and they indicate our subtitle: . . . *and Broadcast Engineering*. Broadcasting has always been an important field, and we would not neglect it.

On the contrary, we have consistently upped our coverage of broadcast audio topics, particularly over the last two years. This year, we've produced two special issues on *Sound in Broadcasting*: April and the one you have in your hand now. Broadcast audio has increased dramatically in importance—obviously in the UK but equally in other parts of the world. This year's NAB Convention, for instance, attracted a goodly number of previously studio-oriented manufacturers who are now adding their weight to the many companies already supplying gear to the industry. The recording side has gone through a flat period in the meantime.

Simultaneously with the growth of importance of broadcasting *per se*, there has been a growing realisation that broadcast audio is important too. Sound is no longer the poor relation, even in the video industry. This is all to the good.

With more and more products, techniques and ideas on both sides of the industry—broadcast and recording—than ever before, we've run into a problem: lack of space. Certainly, recording has always been *Studio Sound*'s main concern, but we also wanted to give broadcasting the increased coverage it deserves.

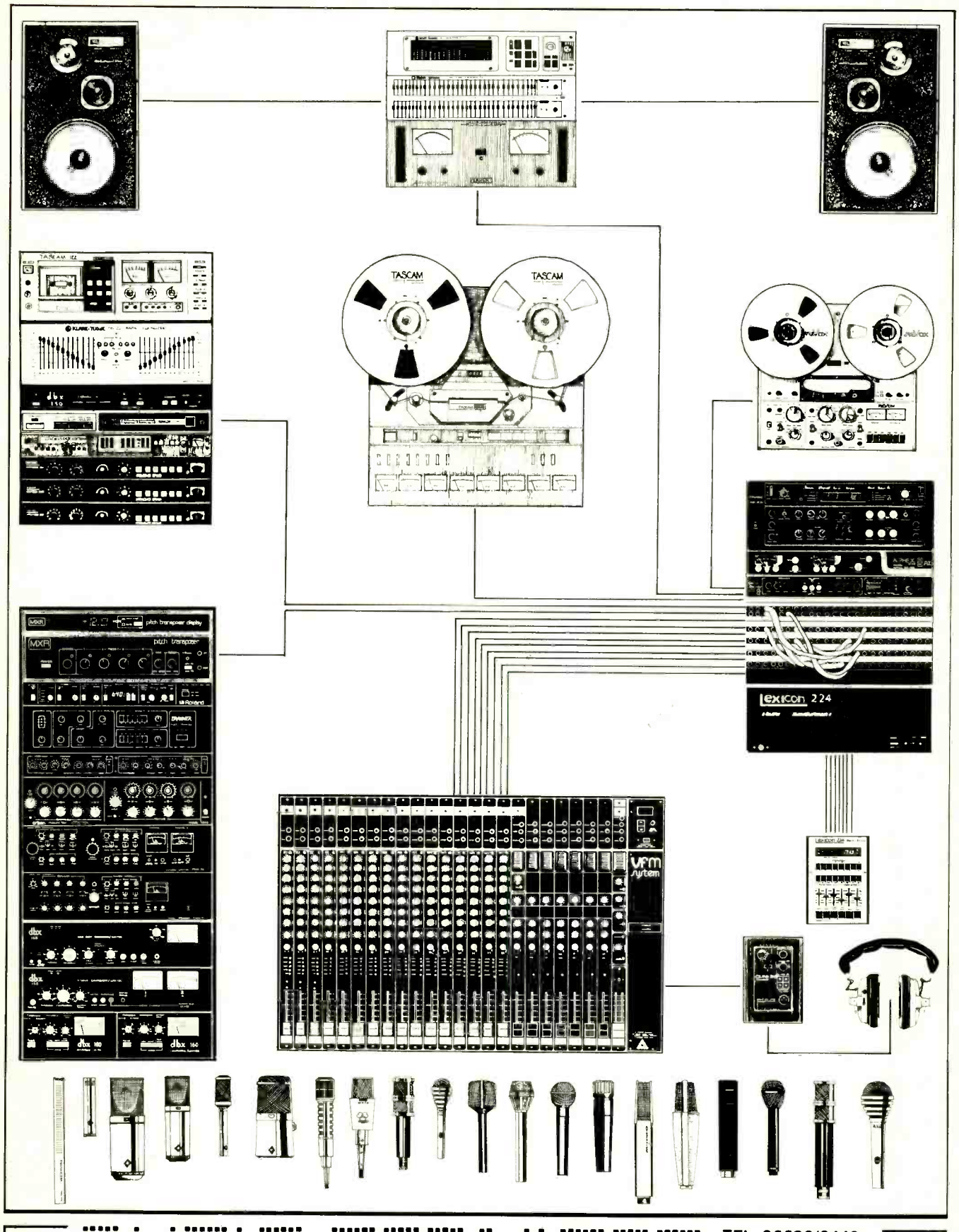
The solution is an obvious one, and as a result, we are pleased to announce the publication of a new magazine, specifically for all those involved in broadcast audio. Called *Broadcast Sound*, the first issue appeared on September 3rd and includes full coverage of the IBC and SBES broadcast equipment shows. The magazine will appear every two months and represents the first regular magazine to our knowledge that covers specifically *audio* in the broadcast and allied fields. Thus you will no longer have to hunt through pages of vision mixers and cameras to find a snippet on audio.

*Broadcast Sound* is available on the same basis as *Studio Sound*—details from our Subscription Department at the Croydon address—and enables us to cover broadcast audio topics in far greater detail than ever before.

There is a bonus for *Studio Sound* readers too: we will not be abruptly terminating our broadcast coverage in *Studio Sound*, as this issue demonstrates. We will be 'phasing it out' as the new magazine grows. Ultimately, this means that we will be able to give more coverage in *Studio Sound* to recording-related topics in the manner to which you have been accustomed. We will have more space for interesting features and the like. We also encourage broadcasting readers to write in for the new magazine: in time, this will enable us to offer *Studio Sound* to more recording studios throughout the world.

*Broadcast Sound* will be international in scope, coverage and circulation, just like *Studio Sound*. Indeed, *Broadcast Sound* will offer the same approach to professional audio as you are used to. The difference is in the field covered. The new title will enable us to cover both fields more effectively, and in greater detail, than ever before. You, the readers, benefit, and we'd be most interested in your comments.

**Richard Elen**




# AUDIO SERVICES

*AUDIO, VISUAL NEW TECHNOLOGY DISTRIBUTORS*

TEL. 06632/2442
STUDIO HOUSE
HIGH LANE VILLAGE
NR. STOCKPORT
SK6 8AA.

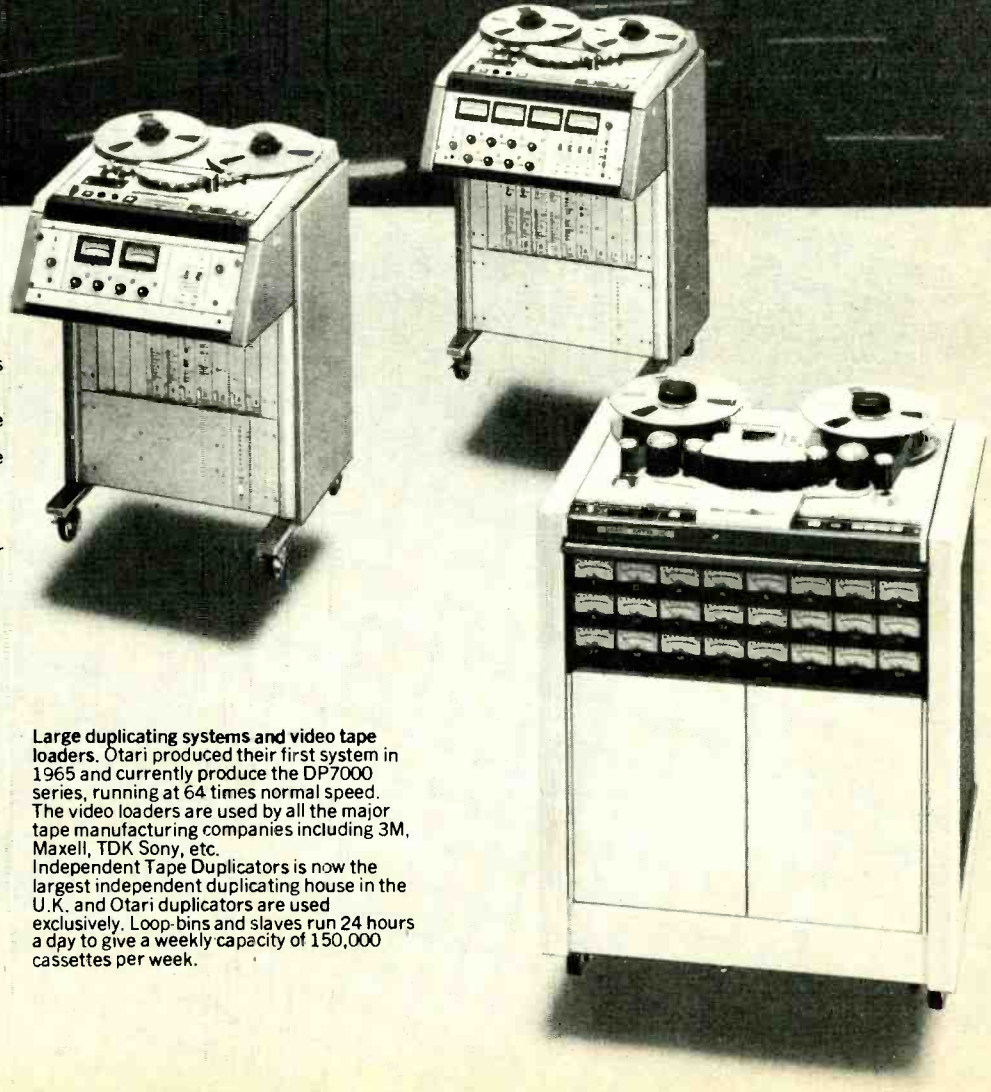
**COMPLETE PACKAGE PRO–AUDIO DEALERS – FROM STEREO TO 46 TRACK**

**FOR USED LISTINGS SEE OUR OTHER AD INSIDE BACK PAGE**

I.T.A.

10 YEARS

OTARI



## The Otari range.

**Compact recorders.** The MX5050 range of compact stereo and multitrack recorders is designed for the smaller studio, but still meets the demands of the professional recordist. Available in 2, 4, and 8 track format the inherent Otari hallmark of quality and long life is not compromised by their competitive pricing, as evidenced by their selection for use by video production companies, (8 track), audio-visual users (4 track), local radio stations and multitrack studios (2 track).

**Mastering Recorders.** The MTR Series includes a full range of recorders designed for major studios, broadcast and video production companies. The MTR10 range includes quarter and half inch stereo mastering machines, and 4 track half inch versions for video and other specialist applications.

The MTR90 multitrack range is available in one inch 8 track, 2 inch 16 track and 2 inch 24 track models. These are the most advanced recorders available today. (The MTR90 24 track is reviewed by Hugh Ford in Studio Sound, October 1982.)

**Small duplicating systems.** The DP4050 Series is aimed at the smaller user who requires minimum maintenance but still demands a high level of consistent performance. These in-cassette copiers will go on producing perfect copies for many years. Two basic models are available, one using a cassette master, and one with a reel master. Both versions are very easy to operate.

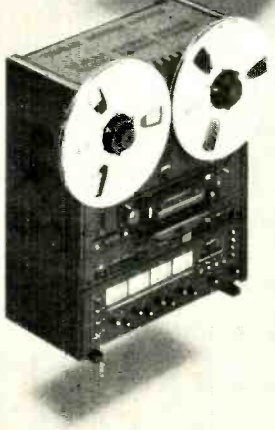
**Large duplicating systems and video tape loaders.** Otari produced their first system in 1965 and currently produce the DP7000 series, running at 64 times normal speed. The video loaders are used by all the major tape manufacturing companies including 3M, Maxell, TDK Sony, etc.

Independent Tape Duplicators is now the largest independent duplicating house in the U.K. and Otari duplicators are used exclusively. Loop-bins and slaves run 24 hours a day to give a weekly capacity of 150,000 cassettes per week.

# OTARI + ITA

## 10 YEAR ANNIVERSARY

1972-1982
I.T.A. celebrates 10 years of service to the recording industry. From a small office in Eton, opened in 1972, we have grown to become one of the UK's leading equipment suppliers with an ever-increasing product range from the world's leading manufacturers. Most important of these is OTARI — now the world's fastest growing manufacturer of tape decks and duplicators. I.T.A. started to import Otari equipment in 1973, recognizing the potential of their engineering expertise. This has developed into market leaders, like the new MTR range of stereo and multitrack master recorders. The highly advanced technology incorporated in them is backed by I.T.A.'s decade of servicing experience. We look forward to the next decade! OTARI + I.T.A. — your guarantee of satisfaction.



**RECENT INSTALLATIONS BY I.T.A.**

**Rediffusion Music** — is the largest producer of pre-recorded background music in the world. Six Otari MTR10 stereo and 4 channel recorders are used for the production of master tapes. **Solid State Logic** and **Audio Kinetics** both use the MTR10 series for demonstrating their own products at their premises.

**Windmill Lane Studios** — is the top sound and video dubbing studio in Ireland. They have just replaced their 24 track with the latest Otari MTR90-II.

**A New Service from I.T.A.**

If you are thinking of replacing your 16 or 24 track recorder, or of upgrading your studio, we are offering attractive part exchange facilities against your old machine. Ring our sales department for full details of allowances against the purchase of a new MTR90 16 or 24 track.

**ITA** 1-7 Harewood Avenue, Marylebone Road, London NW1 6LE.
Tel: 01-724 2497/8 & 01-724 3768. Telex: 21879.

# ITA NEWS

The brand new Tascam 38 is a sensation on its own. Now, coupled with ITAM DB30 noise reduction, this must be the greatest offer ever! 8 channels of simultaneous noise reduction increases sig/noise to 98dB (A wtd). Even more amazing — the price!

**£1666** (+ VAT)
for the complete package!!

## THE MOST SENSATIONAL 8 TRACK OFFER EVER!

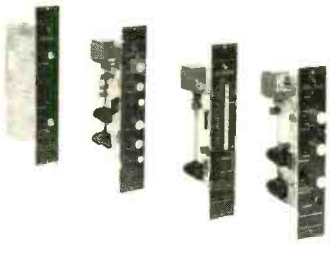
ITAM DB30 noise reduction is also available separately, and is the most realistically priced NR system giving 30dB improvement.
**4ch (simultaneous) £275**
**8ch (simultaneous) £450**
**16ch (simultaneous) £799**

## D & R MODULES • D & R MODULES • D & R MODULES • D

This excellent range of outboard effects modules is now available from ITA. This is the only rack system on the market that does not need an expensive separate power supply — all modules are self-powered! The range of modules includes:

- Noise Gate
- Compressor-Limiter
- Compander
- Parametric Equaliser
- RIAA pre-amp
- Stereo limiter

All modules priced under **£80.** A rack is available at **£35.**



## ITAM STEREO — 8

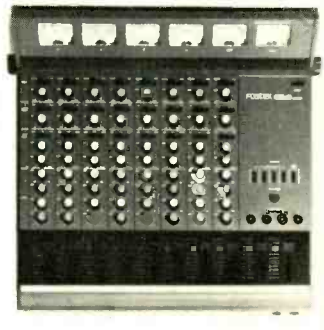
A very quiet low-cost 8/2 mixer. Performance figures meet IBA spec. Extremely flat frequency response, distortion < 0.08% at +20dBm output at ALL frequencies.
Simple to operate — NO GIMMICKS! **£550**

## THE LOCATION MIXER • THE LOCATIO

An extremely comprehensive 8/2 mixer in a flightcase, powered from mains or batteries (dry or NiCads). Almost every facility you're ever likely to need on location or in the small studio, and highly robust as well! Also in 16/2 format. Amazing value at **£995**

## FOSTEX • FOSTEX

Come and see the full range of FOSTEX — now on demonstration at our showrooms. All models in stock.
A-8 — the mini 8 track on ¼ inch tape; with Dolby C noise reduction.
350 — the 8×4 mixer that makes recording at home a doddle!
250 — 4 channel cassette deck with built-in mixer. The musical notebook!
3050 — an inexpensive digital delay. Variable delay plus a range of effects inc. phasing, flanging & doubling.

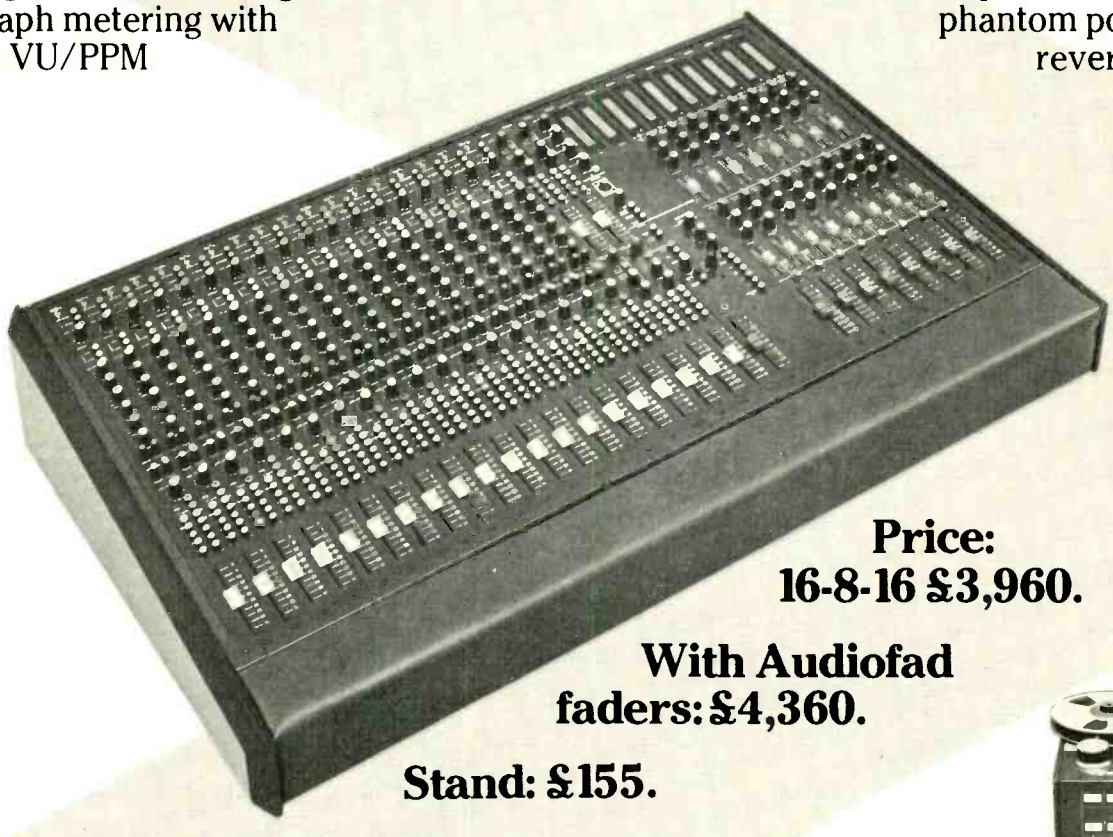


ITA, 1-7 Harewood Avenue, Marylebone Road, London NW1 6LE.

Tel: 01-724 2497 / 8 & 01-724 3768. Telex: 21879.

# ITAM Introduce SIGMA

SIGMA — the new multitrack console that outclasses the competition — in price, features and performance. Facilities include: Full modular construction, full 16 track monitoring, 8 busses + stereo buss + 4 aux busses, programmable muting, autosolo, LED bargraph metering with switchable VU/PPM characteristics, PFL on groups and cue sends, comprehensive line-up oscillator, dedicated FX returns, 4-band EQ mid-bands sweepable, hi and lo pass filters, flexible talk-back system, electronically balanced mic. inputs with switchable phantom power, phase reverse and pad.

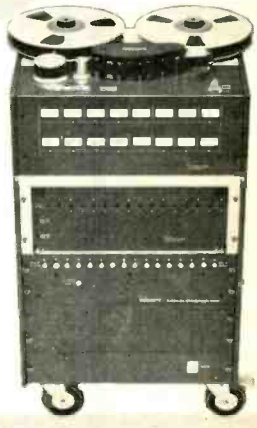


**Price:**
**16-8-16 £3,960.**

**With Audiofad faders: £4,360.**

**Stand: £155.**

(exc. VAT)



**16 TRACK PACKAGE.**
The new Sigma is available in a complete 16 track system, with the Itam 1610 recorder. Prices from under **£9,000** for a complete package.

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

Please send colour brochure on the new Sigma to:

Name .....

Address .....

.....


HI EVERYBODY! PROGRESSIVE ELECTRONIC PRODUCTS HAVE ASKED ME TO MAKE A SPECIAL ANNOUNCEMENT!


AND SO I PROUDLY PRESENT (TRA'LA) THE FABULOUS **LOCATION MIXER**

A TRULY PORTABLE 8x2 STEREO MIXER HOUSED IN A SUPER FLIGHT CASE. PACKED WITH FEATURES SUCH AS,

TRANSFORMER BALANCED INPUT ON MIC/LINE INPUT, HI PASS FILTER, 3 BAND EQ PLUS SWEEPABLE MIDDLE, 12-48V PHANTOM MIC POWER, PLUS TWO AUX SENDS,

SOLO ON EACH CHANNEL, PRE OR POST FADE AT THE TOUCH OF A SWITCH, INDEPENDENT CHANNEL ON, PHASE REVERSE ON MIC, INSERT- OR DIRECT OUTPUT ON EACH CHANNEL, GROUP OVERLOAD DETECTORS,

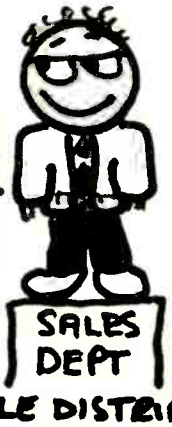
PROFESSIONAL BATTERY PACK, BUILT IN CHARGER FOR NICADS, STEREO TAPE REPLAY, BATTERY CHECK SWITCH, METERS TO AUX OUTPUTS, INDEPENDENT SOLO AND AUX SEND LEVELS, EQ IN OUT SELECTOR, STEREO ECHO RETURN ETC.


GASP, THERE'S MORE! SOLO INDICATOR, POWER LED, AND HIGH QUALITY CARBON 60MM FADERS ALL AS STANDARD!

ANYWAY, WHAT I AM TRYING TO SAY IS, THAT THE SUPER **LOCATION MIXER** IS PORTABLE, AFFORDABLE & COMPLETE. IT'S A FLIGHT CASE FULL OF FEATURES. JUST GRAB IT AND GO!


WAS THAT ALL RIGHT BOSS?

NO!




HE FORGOT TO MENTION THINGS LIKE, 48V/12V PHANTOM IS AVAILABLE FROM THE BATTERY PACK AND THE WHOLE PACKAGE ONLY WEIGHS ONLY 28 LBS

BUT THE MOST IMPORTANT FACTOR IS THE PRICE, ONLY £975.00 + VAT FOR A PROFESSIONAL MIXER THAT MEETS THE I.B.A. SPEC. THE ENTIRE UNIT IS HIGHLY RF SUPPRESSED AND THE SPLASHPROOF CASE IS BUILT TO LAST!

AS SOLE DISTRIBUTOR WE ARE HAPPY TO SEND YOU OUR FREE COLOUR BROCHURE AND YOUR NEAREST DEALER FOR AN INSTANT DEMONSTRATION. BY THE WAY, DON'T FORGET THAT P.E.P. HAS A SUPER RANGE OF MODULES AND OUR CUSTOM MIXERS ARE THE TOPS!.

**PROGRESSIVE ELECTRONIC PRODUCTS LTD**
83 LEONARD ST
LONDON EC2 A4RB
01-729-5411

DON'T BE SHY, WRITE OR PHONE FOR OUR LATEST INFORMATION.


# THE MORE-AFFORDABLE 948.

From the makers of the world's finest broadcast turntables comes the EMT 948, a direct drive unit that embodies the proven circuitry and reliability of the EMT 950 in a compact format.

Featuring almost instant start (0.02 secs), stop and reverse cue; motor-driven tone-arm lift and integral amplifiers, the EMT 948 has a new shock-absorbing system and pick-up illumination.

Available for use with a standard 47k-ohm cartridge, the EMT 948 is an integrated system ready to drop straight into a desk-top. The EMT 948 brings excellence within greater affordability.

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

EMT FRANZ GmbH
Postfach 1520, D-7630 Lahr, Tel. 07825-512, Telex. 754319. Franz D

**F.W.O. Bauch Limited**
49 Theobald Street, Boreham Wood, Hertfordshire WD6 4RZ
Telephone 01-953 0091 Telex 27502


# AF Transformers

## 10 ranges - 95 standard types

Used and specified throughout the world for the highest professional applications including broadcasting, public address systems, recording consoles, mixing and filtering.

Other users will find that these ranges provide the answer where impedance matching is essential for data transmission, accurate measurement and instrumentation.

Audio transformers in the high voltage proof range are approved by the Post Office (Technical Guide No. 26) as permitted attachments to Post Office lines.

The high quality specifications of these comprehensive ranges are set out in our brochure — send for them now.

# Gardners

Def. Stan. 05-21 approved
BS 9000 capability approval
(BS 9720) in progress

Gardners Transformers Limited,
Somerford Road,
Christchurch,
Dorset BH23 3PN, England.
Tel: Christchurch 482284
Telex: 41276

# A sound investment!

## Complete Sound Systems

Formula Sound have been designing and building sound systems for a great many years. Our reputation is based on our professional approach to all our installations. We use only the best equipment and each system is designed to suit each specific venue. All our loudspeaker enclosures are hand built and designed to suit the location and can, therefore, be an integral part of the interior decor if required.

**Equalisers** We manufacture our own unique S19G ⅓ octave stereo graphic equaliser for overall equalisation in any system. A version with a built-in analyser is also available.

**Loudspeakers** JBL speakers are used throughout our installations because quite simply JBL are the best speakers available, and with a complete range of components all aspects of sound reproduction can be catered for from one manufacturer. We have been the North's leading JBL dealer for the past 8 years and can offer a first class sales and repair service.

**Mixer** Because we could not find a mixer which came up to our exacting standards we developed and built our own. The technology and quality of components that go into the PM80 are of the same standard that are used when manufacturing custom built recording studio and PA mixing consoles. A compact MODULAR mixing system, the PM80 has provision for up to 8 input modules. These can be any combination of mic/tape/phono so the system can be extended as and when trends dictate. (Size 19" x 10¼" x 3").

*Whatever the requirement of your club or venue, be it disco, cabaret, a new club or up-grading an existing system we can offer you the best possible advice and service.*

**Formula Sound Ltd.**
3 Waterloo Road,
Stockport, Cheshire SK1 3BD.

**Before you invest your money make sure of a sound return - ring Tony Cockell 061-480 3781**

## SWITCHCRAFT INC. XLR CONNECTORS

| | | | |
|---|---|---|---|
| Line Female A3F | £1.59 | Chassis Female D3F | £2.04 |
| Line Male A3M | £1.36 | Chassis Male D3M | £1.19 |

4, 5, 6 & 7 pin versions, audio adaptors, Jackplugs & Sockets,
Tiny Telephone Jackfields and Patchcords in stock.

## NEUTRIK XLR CONNECTORS

| | | | |
|---|---|---|---|
| Line Female NC 3FC | £1.34 | Chassis Female NC 3FP | £1.65 |
| Line Male NC 3MC | £1.15 | Chassis Male NC 3MP | £0.87 |

P.C.B., Latchless, 4 & 5 pin, Black versions & Adaptors in stock.

## XLR LNE MAINS SERIES

| | | | |
|---|---|---|---|
| XLR LNE 11C | £3.87 | XLR LNE 12C | £3.76 |
| XLR LNE 32 | £2.89 | XLR LNE 31 | £4.14 |

## BELCLERE AUDIO TRANSFORMERS

| | |
|---|---|
| EN6422 Ratio 1 + 1:2 + 2 freq. 40Hz-35KHz Pri 150/600Ω sec 600/2.4K | £4.15 |
| EN6423 Ratio 1 + 1:6.45 + 6.45 freq. 40Hz-25KHz Pri 150/600Ω Sec. 6.25/25K | £4.15 |
| SKT723 MuMetal Screening Can 39dB reduction 50Hz ext. field | £1.30 |

## EDAC MULTIPIN CONNECTORS (Varelco Equiv.)

20, 38, 56, 90 & 120 pin versions, metal covers, crimp, solder or wirewrap pins.

## Electro-Voice MICROPHONES & SPEAKERS

## YAMAHA PROFESSIONAL RANGE

Multicore & mic cable, D.I. Boxes, Mic Splitters, Multicore systems,
mic stands, gaffa tape, cable glands, metalwork, tools etc.

Trade enquiries welcome; quantity discounts available. All prices subject to V.A.T. Min. order value £10 + £1.50 p&p. Access, American Express, Barclaycard accepted.

**KELSEY ACOUSTICS LTD**
**28 POWIS TERRACE, LONDON W11 1JH**
**01-727 1046/0780**


# The Undeniable Master.

The A80/RC is the machine that sets the standards. The one that most discerning professionals praise for its performance, trust for reliability and thank for its accessibility.

The A80/RC is **the** master recorder. For more information contact F.W.O. Bauch Limited.

**STUDER**
INTERNATIONAL AG
CH-8105 Regensdorf Switzerland

**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) 254-5651

STUDER FRANCE S A R L Paris
Telephone 533 5858

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

# EELA AUDIO STUDIO EQUIPMENT

## EA 800 SERIES

EA 850 STAGE BOX

EA 802 8 WAY BOOSTER

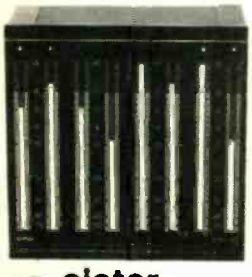
EA 803 TELEPHONE HYBRID

EA 804 STEREO DISC PREAMP

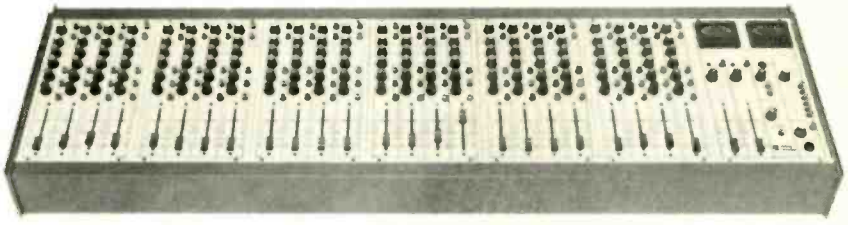
EA 806 PHANTOM SUPPLY

EA 809 PHASE METER

EA 823 TEST METER



RTW STEREO AND MULTI-TRACK BAR GRAPH METERS.



**S100** *Consists of a module system, the versatility of which lends itself to the assembly of mixers of multiple configurations, using a method of construction that makes for a simple, sturdy and attractive unit. These mixers have been designed specifically to satisfy the need for compact but high quality professional mixer for use in: mono, stereo and four track studios, broadcast stations, audio-visual units, film and video dubbing studios, hospital broadcast, theatres and other public address systems.*

**S200** *A system designed to construct mixers of advanced design for on-air self-op, multitrack operation, audiovisual, outside broadcast, grams and editing desks.*

**S191** *Particularly suited to audiovisual facilities.*

**S41** *A four input one output battery portable mixer for ENG, EFP and general portable use.*

Eela Audio Products and Broadcasting Cables distributed in the UK by

**Audio+Design Marketing**

Along with:

**RTW Bargraph PPM's**
**CALREC Microphones**
**TELCOM Noise Reduction**
**NRDC Ambisonic systems**

and of course

**AUDIO & DESIGN Signal processing equipment**

pieter bollen geluidstechniek bv
hondsruglaan 83a
5628 DB eindhoven
Tel: 040-424455
tlx: 59281 bolle nl

HOLLAND

UNITED KINGDOM

**Audio & Design Marketing, 16 North Street, Reading RG1 7DA Tel. (0734) 53411**


# The Professional Revox.

The PR99 has been developed from the highly successful B77 in order to meet the stringent demands of the recording and broadcasting industries. The PR99 offers the professional these important features:

1 Raised deck plate for easier editing
2 Improved tape start
3 Tape dump
4 Two-way self-sync with automatic sync/input switching
5 Balanced line inputs and outputs
6 Calibrated or uncalibrated level adjustments
7 Manual or remote control operation, with fader start

The Revox PR99 is available in several versions: mono or stereo 3¾/7½ ips NAB or 7½/15 ips NAB or IEC. And being built to Studer precision, the PR99 achieves exceptional performance and reliability but now at an easily affordable price.

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

STUDER REVOX

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

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

# The Complete Studio.

Since 1950 Bauch has supplied the finest products and an unrivalled service to the professional sound recording and broadcast industries.

Today, with the inclusion of broadcast video and semi-professional sound divisions, Bauch is actively satisfying the requirements of the entire spectrum of communications industries.

Bauch offers a complete service for the design and installation of professional audio and broadcast video systems: an all inclusive service combining up-to-the-minute technology and skills with individual and personal attention.

From the initial enquiry through installation and acceptance to comprehensive back-up and after-sales service, Bauch provides the assurance and stability needed to meet the ever increasing demands of today's professional audio and video markets.

## F.W.O. Bauch Limited

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

# Packages from Soundcraft.

Sounds the same, but one comes as two large boxes, the other's hands on from the word go.

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

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

And of course the deal.

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

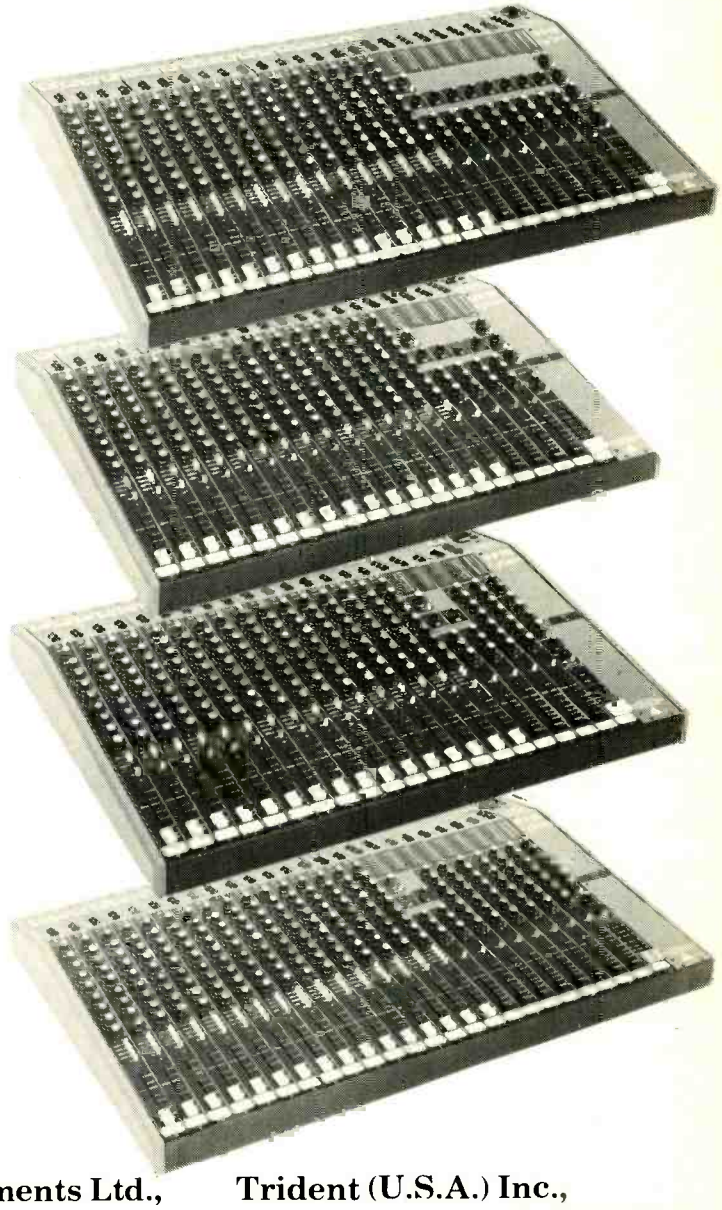
In fact, we're so eager for your business, that if you only want the boxes, with a little arm twisting, we'll throw in the chair.

# Systems from Turnkey

For more information on the Producer systems, call Andrew or Garry now on 440 9221.

# Introducing the New VFM

## An exciting new range of low cost fully modular mixers designed for both P.A. and recording studio applications.



- Totally modular construction.
- Four band EQ on each input.
- Three auxiliary sends (two echo, one foldback).
- Insert send and return on each input.
- Separate mic and line inputs.
- Full multi-track monitoring.
- Accurate 12 segment L.E.D. metering.
- Rugged welded steel frame construction.
- Self contained power supply.
- Long throw faders.

All at an unbelievable price:

**16-4-2 Studio or P.A.**
**£1,000 .00 plus VAT.**

**16-8-2 Studio or P.A.**
**£1,150 .00 plus VAT.**

TRIDENT

**Trident Audio Developments Ltd.,**
Shepperton Studio Centre,
Shepperton, Middx. TW17 0QD, U.K.
Tel: Chertsey (09328) 60241.
Telex: 8813982 (TRIMIX G.)

**Trident (U.S.A.) Inc.,**
652 Glenbrook Road, Stamford,
Connecticut 06906 U.S.A.
Tel: 203-348-4969


# The whole truth.

Bipolar transistor power amplifiers are obsolete.

Now there's HH MOS-FET technology; with no thermal runaway, no secondary breakdown, simpler circuits, fewer components and superior high-end performance for better sound quality when reproducing fast transients.

Naturally, we anticipate that most professional sound engineers will be eagerly switching over to MOS-FET at the first opportunity. So to make it easier, there are 4 models (all 19" rack mounting) with outputs from 150 to 800 Watts...and multiples thereof, using the X300 frequency dividing network.

And once installed, our cool MOS-FET amplifiers will perform with so little distortion, that i.m.d., d.f.d. and t.i.m.d. are almost immeasurable by contemporary standards.

So at last you can boost your input with total honesty—and nothing else.

## Graduate to the 80's. MOS-FET.

**UK**: HH Electronic
Viking Way,
Bar Hill, Cambridge, CB3 8EL.
Tel: Crafts Hill (0954) 81140
Telex: 817515 HH ELEC G

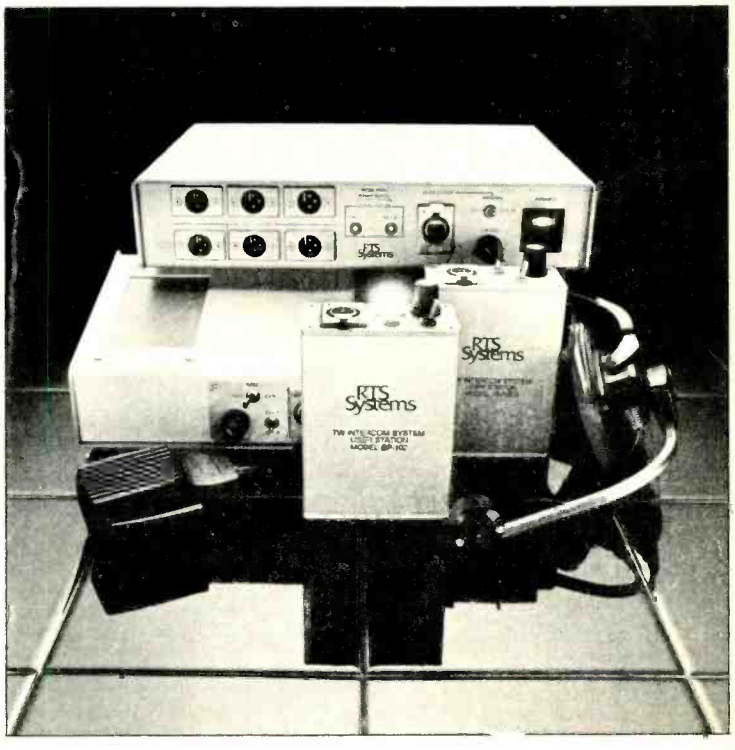
**USA**: HH Electronic Inc
2500 East Fender Avenue,
Unit 1,
Fullerton, California 92631.
Tel: (714) 680 4293

**FRANCE**: HH Electronic Son Professionnel
2 Rue de Tennerolles,
92210 Saint Cloud,
Paris.
Tel: (01) 602 6815

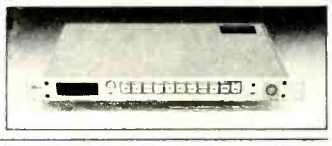
DAL 9036

# THE ADVANTAGE.

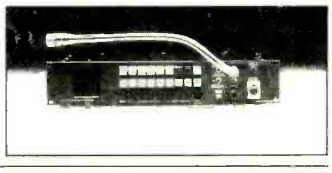
An intercommunications system so powerful, so flexible, so reliable, that it has become the standard for television production in the United States. The TW Intercom System has been serving the needs of teleproduction centers, broadcast stations and industrial users for over six years. The system represents a dedication to an unprecedented level of product capability. Please call or write for detailed literature.



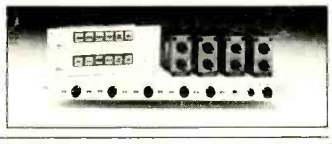

## Additional Product Lines



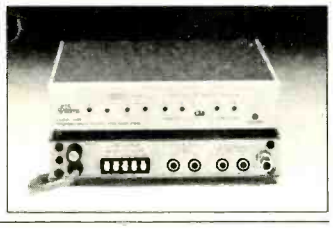
**Series 1000 Matrix System**
Dedicated-line matrix intercom/squawk system



**Model 801 Master Station**
Multi-channel communications center



**Series 4000 IFB System**
Self-contained program interrupt system



**Series 400 Pro-Audio**
High performance amplifiers

## International Distribution

**Otec Corporation**
Otari Building,
4-29-18, Minami Ogikubo
Suginamiku, Tokyo, 167 Japan
Telephone: (03) 333-3891
Telex: (781) J26604

**Intersonic AB**
P.O.B. 42133, S-12612 Stocknolm
Vretenborgsvägen 9
S-12630 Hägersten, Sweden
Telephone: 08-744 5850
Telex: (854) 11136

**SCV Audio**
Batiment 3418 C, Rue De La
Jeune Fille, Zone De Fret Sud,
B.P. 10314, 95705 Roissy C.D.G.
Cedex Fr., Telephone: 862.43.04
Telex: (842) 212802

**Future Film Developments**
36/38 Lexington Street
London, W1R 3HR
England
Telephone: 01-437 1892
Telex: (851) 21624

**ProSound**
P.O. Box 31405,
Braamfontein 2017,
South Africa
Telephone: (011) 37-6556/9
Telex: (960) 8-0712

**Harman Deutschland, mbH**
Hunderstrabe 1.7100
Heilbronn, W. Vermany
Telephone: (0 71 31)
48 01
Telex: (841) 728433

**Oceanic Trading Corporation**
P.O. Box 891
Taipei, Taiwan
Telephone: 7077111-4
Telex: (785) 11458

**Patrick Trading Corporation**
2004, Hang Chong Building
5, Queen's Road,
Central Hong Kong
Telephone: 5-220964
Telex: (780) HX75472

RTS Systems INC.

1100 WEST CHESTNUT STREET, BURBANK, CALIFORNIA 91506, U.S.A. 213/843-7022 TELEX: 194855 TWX: 910-498-4987 A SUBSIDIARY OF COMPACT VIDEO SYSTEMS INC.

Like speakers, microphones are a matter of choice.

Nothing is perfect, all are different and each has its prime application.

But a dynamic can be too rounded or too muddy.

And a condensor too harsh or too sharp. So they are used selectively.

Flatcoil technology is relatively new.

It's exclusive to the Fostex Laboratory Series Microphones.

What you'll hear is as transparent as a capacitor, and as smooth as a moving coil. Akin to the classic ribbon but neither fragile nor prone to wind noise. And the quality's a whole technological leap forward.

It's a new and different way to capture sound. An essential alternative in any professional selection.

If you'd like a copy of the six page brochure describing the technology and the range, or the opportunity to evaluate the Fostex flatcoil for yourself, call or write now to:

FOSTEX®

Bandive Ltd, 10 East Barnet Road, NEW BARNET, Herts. EN4 8RW. 01-441 1133

# BIRTH ANNOUNCEMENT

*We are pleased to announce*
*the birth of a new magazine*

# broadcast sound

*The new quality bi-monthly for professional audio engineers in broadcast and related fields.*

*If you would like to receive a regular copy RSVP*
*Subscriptions Dept, Link House, Dingwall Ave, Croydon CR9 2TA. Tel: 01-686 2599*
*full details below*

## To ensure you receive a copy of

# broadcast sound

## bi-monthly for one year,
## from the 1st issue onwards,
## send £6.00 (UK) or £8.75 (Overseas)
## United States $20 surface mail $38 airmail.

I enclose cheque/postal order/international money order payable to LINK HOUSE MAGAZINES, or debit my credit card account VISA ☐ DINERS CLUB INTERNATIONAL ☐ ☐ AMERICAN EXPRESS ☐

(please tick box)

Signature _____ Credit Card No. _____

Credit card holders can order simply by ringing 01-686-2599 Ext 432 quoting your credit card number.

Name _____

Address _____

_____

(Please print block capitals)

I understand that if, after receiving the first issue of BROADCAST SOUND, I am dissatisfied I can cancel my subscription and receive a full refund.

To: The Subscriptions Dept., Link House, Dingwall Avenue, Croydon CR9 2TA.
Tel: 01-686-2599. Registered in England and Wales No. 1341560

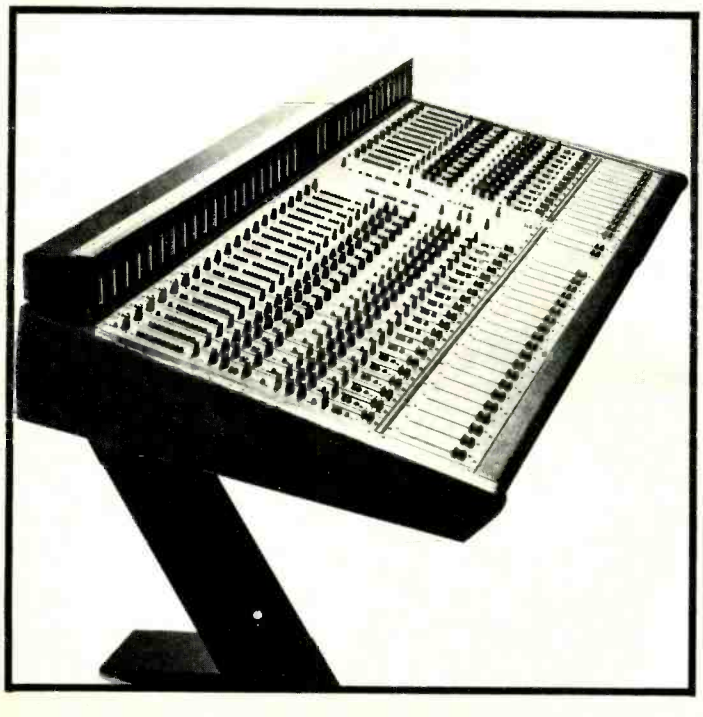
# Master Class

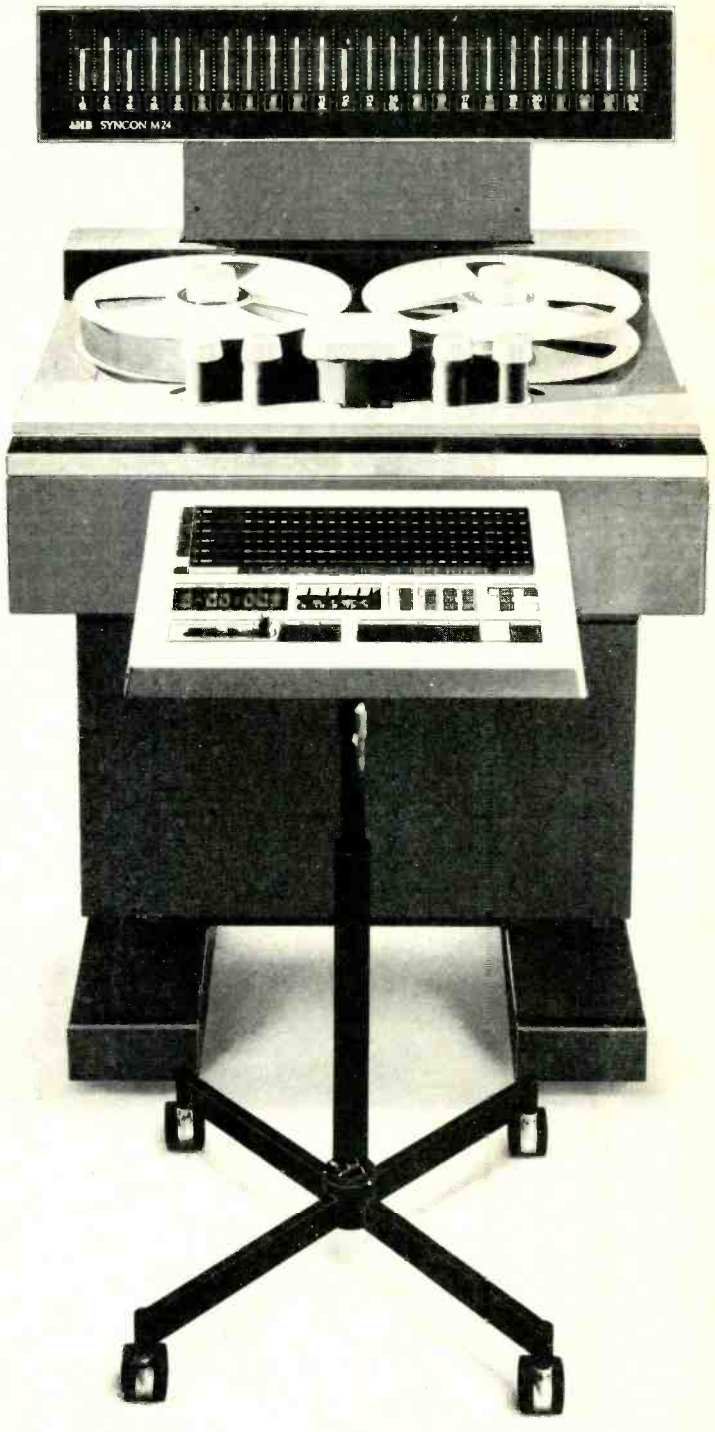
The new Syncon M24 2-inch Recorder – another AHB success story.

At its heart a microcomputer control system that makes it truly a recorder of the third generation.

Together, the M24 and the renowned Series B expandable Console are an unbeatable combination.

The Syncon range – a class of its own.





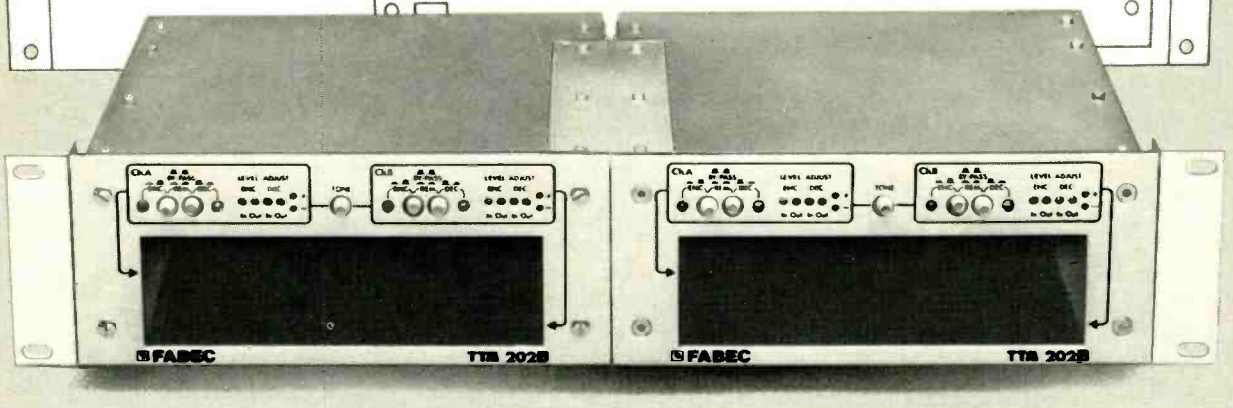

AHB
ALLEN AND HEATH BRENELL LTD.

Pembroke House
Campsbourne Road
Hornsey
London N8
Tel: 01-340 3291

USA: Allen & Heath Brenell (USA) Ltd, 652 Glenbrook Road, Stamford, Conn. 06906

# Announcing a size reduction in noise reduction.

# TTM 202B.




Your noise reduction frame is doing half the job it should—

In twice the space necessary!

But don't feel bad. Everybody had the same problem—until now.

Until the introduction of the TTM 202B.

For both the recording and broadcasting industries—where rack space is often a problem—this remarkable unit offers a happy solution:

The TTM 202B takes up no more than half the space of the system you're now using. Whichever system it is.

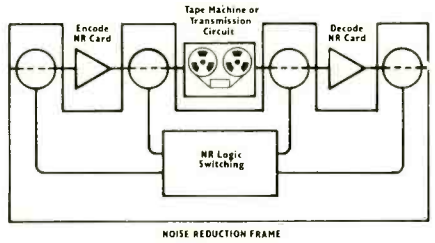
And regardless of your present system, it also lacks our unit's flexibility: TTM 202B—and *only* TTM 202B—takes all types of N.R. cards. Now you can switch or upgrade your noise reduction system anytime you wish—perhaps to Telefunken's fabulous telcom® system.

Other advantages? See the box on this page. And also check the diagram—a good reminder that your signal is actually processed four different times within the frame.

This means you *must* have a frame that performs faultlessly. With any kind of card.* And without using too much space.

Now you can have all this. In the TTM 202B.

Ask for the facts today—and we'll prove it.

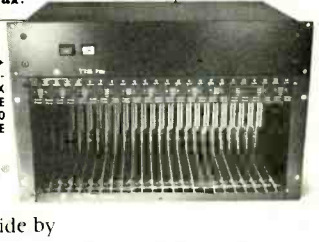



NOISE REDUCTION FRAME

Each signal is processed at four points within your frame—four times when it may be colored and distorted. The same signal passes through the tape only once and the noise reduction card twice — making your frame a crucial factor to your success!

| Ours | Theirs |
|---|---|
| • 4 Channels of noise reduction in 3½ inches of rack space. | • 2 Channels of noise reduction in 3½ inches of rack space. |
| • Active balanced line inputs and outputs. | • Transformer coupled line inputs and outputs. |
| • Separate calibration adjustments for input/output levels in both encode and decode modes. | • Common calibration adjustments for encode and decode. |
| • Led alignment indicators with ±¼ dB accuracy. | • Alignment meter with parallax. |
| • Timing circuits for thump and click suppression during mode switching. | |

*You can, of course, buy Dolby® or telcom® cards, alone, without their frames.



TTM► MULTI-TRACK FRAME ALSO AVAILABLE

Distributed world-wide by

**The Gotham Organization**

741 Washington Street, New York, NY 10014 • (212) 741-7411
International: +1 212 741 7411 • Telex 23-6779 GOTHM UR

**SEE US AT EIGHT INTERNATIONAL EXHIBITIONS**

Swedish Music Show, Gottenburg 12/15 Aug. OFO Elektronik AB
Firato, Amsterdam 26 August/5 September Mugro Nijmegen
SIM HiFi IVES, Milan 2/6 September ITAL C'DA
Sonimag, Barcelona 27 September/3 October Barna-music
Salon-de-Music, Paris 19/26 September Phase Acoustic
AES, Anaheim USA 23/27 October Soundtracs Inc.
Swiss Music Fair, Lausanne 21/25 October Studio M & M
BEEB/Japan Audio Fair, Tokyo 9/11 Nov. Soundtracs Ltd.


# The professional range of audio mixers that won't cost you the earth.

The trouble with most professional quality mixers is that their high quality is reflected in their price. So you either settle for poor sound or dig deeper into your pocket.

But now, with this extensive range of Soundtracs mixers, there is no longer a need to settle for a compromise. There's a format to suit every need, and all up to full professional standards. Write off for a colour brochure.

The results will bowl you over, but the price won't.

SOUNDTRACS from SOUNDOUT

**Soundout Laboratories Limited**
91 Ewell Road, Surbiton, Surrey KT6 6AH, England.
Telephone: 01-399 3392. Telex: 8951073/SNDOUT/G
Telegrams: Soundout, Surbiton.

WORLDWIDE DISTRIBUTION

**America** Soundtracs Inc, 262a Eastern Parkway, Farmingdale, N.Y. 11735. Tel: (516) 249 3669. **Australia** Klarion Pty, Regent House. 63 Kingsway South, Melbourne 3205. Tel: 0361 3801. **Austria** Bourke & Dissertori GmbH, Wels. Tel: 52242/7147. **Finland** Disco Laitteet, Helsinki. Tel: 90-534 134
**France** Phase Acoustic, 163-165 Bd Boisson, 13004 Marseilles. Tel: 91 49 87 28. **Germany** Audio Vertrieb, Peter Struven GmbH, Hamburg. Tel: 40 524 51 51.
**Greece** Bon Studio, Athens. Tel: 3249 305. **Holland** Magro Nijmen bv, Wolfskuilseweg 27, 6542 JB Nijmegen. Tel: 80-770910. **Italy** Ital Cida srl, Via Marmolada 17 BIS, Sorbolo, Parma. Tel: 0521-690158. **Israel** Barkai Ltd, 5 Krinizi St, Ramat Gan. Tel: 735178/732044. **Norway** Hagstrom Musikk AS, Oslo. Tel: 2 248090. **Sweden** OFO Elektronik AB, Linkoping. Tel: 13 110241. **Switzerland** Studio M&M, Schoenewerd. Tel: 64 4149 69

# The NEW Marshall Time Modulator MK II 5402

is the end result of three years of research and development and makes the 5402 many times more powerful and easier to operate than the original 5002A.

Features:

- 400 m/s delay, continuously adjustable.
- Comprehensive mixing facilities.
- 15 kHz response and 95 dB dynamic range at all delay settings.
- Exclusive seventy-two to one continuous sweep range.
- Programmable locked sweep delay ratios of the six internal delay lines makes possible many new harmonic and tonal effects.
- Contact us for a demonstration and for further information:

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

# PLUTO 3-1 ENG MINI MIXER

2 mono dyn/cond mic channels
1 dyn mic/line input channel
Return cue line input
Commentator cue line output
48V phantom powering
0dB test tone, cueing microphone
Limiter warning signal in phones
Runs from dry cells or eliminator
8 hours continuous operation
XLR connectors

TORE SEEM A/S
P.o.box 10, 1344 Haslum, Norway
Tel.: (02) 53 39 75. Telex: 19121 seem n

# Get Aligned
# Stay Aligned

**with STL precision magnetic test tapes**

**These dependable tapes are used by broadcasters, recording studios, equipment manufacturers, governments and educators throughout the world.**

STL offers the most accurate reference in the widest variety . . . Alignment, Sweep, Pink Noise, Level Set, Azimuth and Flutter/Speed. Available on reels, in broadcast carts, in home carts and in cassettes . . . 2" to 150 mil tape widths. Also available is the Standard Tape Manual and the Magnetic Tape Reproducer Calibrator.

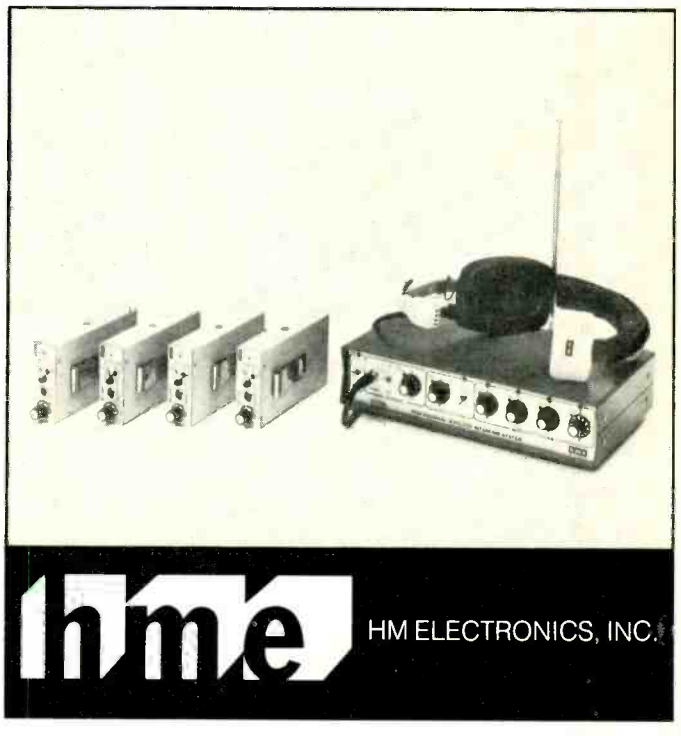
*Write or phone for fast delivery or free catalog.*

STL

**STANDARD TAPE LABORATORY, INC.**
26120 EDEN LANDING ROAD #5, HAYWARD, CALIFORNIA 94545 • (415) 786-3546

# Intercom Systems: Wired & Wireless

Technical Projects



hme HM ELECTRONICS, INC.

# An unbeatable combination

Technical Projects Command Communications System provides a complete solution for team communications where wires are acceptable. For the roving floor manager or film crew, HME's cordless system allows unencumbered communications. Combined, HME & Technical Projects provide an ideal mix of the low cost and reliability of a wired system with freedom from cables when required.

Come to Technical Projects for your communications system.

European distributors of HME wireless systems.

**Other products include:**
HME Wireless Microphones
The MJS range of Audio Test Equipment
Audio consoles for Film and Broadcast applications
DI, Balancing and Distribution Amplifier Systems
Kliegl Lighting Dimmers and Control Desks
Custom manufactured Audio and Lighting Equipment

**Technical Projects**
Electrosound House, 11 Marshalsea Road, London SE1 1EP Telephone: (01) 403 3838
Telex: 885659 Yodel G Contact: Sam Wise.

---

**Technical Projects Dealers:**

**Midlands & North of England** Mike Sweetland Lighting, Tel: 061-273 4003
**Denmark** Audilux APS, Tel: 451-46-57-77, Telex: 16777 Teatek.
**Holland** Theatre Projects BV, Tel: 31-2331-5300, Telex: 41744
**West Germany** GTC Studiotechnic, Tel: 089-297171, Telex: 528592
**South Africa** Eltron (Pty.) Ltd., Tel: 011-29 3066, Telex: 8 9416
**Norway** Audilux A/S, Tel: 472 677 449, Telex: 72614

# diary

## Gotham and Neumann—25 years

Exactly 25 years ago, on August 29th, 1957, Stephen F Temmer, President of the Gotham Audio Corporation, first visited Georg Neumann GmbH in Berlin. He was a guest of the US broadcasting organisation RIAS at the time.

1957 was an important year in audio, marking the start of stereophonic record production, and at that time Neumann produced the only cutter-head for the job, the *ZS 90/45*. Gotham began to market the device and thus began an arrangement which has been continuous from that time.

To celebrate this silver anniversary, Mr Temmer was the guest of honour at a banquet in Berlin given by The Neumann Company on August 29th.

Gotham's own 25th anniversary will be marked on June 11th, 1983. The Gotham Organization is today a company of 23 employees with offices in New York and Hollywood and is made up of the Gotham Audio Corporation, Gotham Export Corporation, and Telden Leasing.

## People

● Furman Sound has announced the appointment of Allan Sohl to the position of Chief Engineer.

● Alice (Stancoil Ltd) has appointed Keith Ritchie to the position of Technical Sales Representative.

## Broadcast Sound

For many years, *Studio Sound* has served the recording and broadcasting industries with regular coverage of equipment, ideas and techniques. Whilst we have always included the broadcasting aspects of professional audio, even more so over the last year, our main readership has been in recording studios. However, while there are great similarities between these two areas there are also important differences, and we have found it increasingly difficult to feature articles of such wide interest in the space available.

As a result, we have taken the obvious step, and are happy to announce the publication of *Broadcast Sound* which is a new bi-monthly magazine for professional broadcasters, and those in related areas. A companion to *Studio Sound*, the new magazine will carry authoritative coverage of technical and creative matters, but with an ear firmly on the specialist topics which will be of interest to broadcasters, audio/video post-production houses and others in this area.

There are, of course, several other broadcasting magazines currently available, but no other magazine regularly covers specifically audio matters as they apply to the broadcast environment. It is unnecessary to ask the audio engineer in broadcasting to wade through pages of data on TV cameras, vision mixers and the like to find the odd snippet on audio. And with sound in broadcasting becoming ever more important, *Broadcast Sound* is able to offer the same, uncompromising coverage for the broadcaster as *Studio Sound* has traditionally given the recording engineer. It will offer the sound man in broadcasting a combination of new product information, in-depth features and technical reviews in a manner suited to his requirements. *Broadcast Sound* will give the broadcast engineer coverage of the field from the audio point of view.

*Broadcast Sound* is being launched at this year's International Broadcasting Convention in Brighton and, with Audio & Design Recording, is co-sponsoring this year's Sound Broadcasting Equipment Show in Birmingham. The first issue therefore includes a full, detailed preview of the audio aspects of IBC, plus a complete show guide, floor plan and exhibitors details for SBES.

*Broadcast Sound* is available free of charge to key people involved in broadcast audio and related fields. An application form to request a regular copy is available from the Subscriptions Department, *Broadcast Sound*, Link House, Dingwall Avenue, Croydon CR9 2TA.

## Telex 6000 Series

Telex Communications Inc of Minneapolis has informed us that it will shortly introduce a completely new tape duplication system, the *6000 Series*. The company is already well known for its cassette copiers and its *300 Series* open reel and reel-to-cassette duplicating systems which have been on the market for some 10 years. According to our preliminary information, the new *6000 Series* will include 10½in reel master and duplicate reel transports operating at speeds up to 120in/s, with cassette versions operating at 30in/s. The series which is of modular system design will permit the mixing of reel and cassette transports. Likely cassette duplication ratio will be 16:1. Official introduction of the *6000 Series* is reportedly scheduled for this autumn, probably in October.

**Telex Communications Inc, 9600 Aldrich Avenue South, Minneapolis, Minnesota 55420, USA. Phone: (612) 884-4051. Telex: 297053.**

## Agencies

● Soundout Laboratories have appointed Klarion, 63 Kingsway, South Melbourne, Victoria 3205 as their exclusive distributor in Australia for the Soundtracs range of sound reinforcement mixers. Soundout have also established a US company known as Soundtracs International based at 262a Eastern Parkway, Farmingdale, New York 11735. Phone: (516) 249 3669. It will handle the marketing and distribution of the complete Soundtracs range with full spares back-up.

● The Electro-Voice division of Gulton Europe have announced that Theatre Projects Services Ltd are now the UK distributor for all their music, disco and speaker cabinets.

● Eardley Electronics Ltd have been appointed UK agents for Ducati, one of Europe's largest manufacturers of capacitors and RFI suppression filters. Associate company, G.E. Electronics (London) Ltd have been appointed UK agents for CSP (SPA) of Milan who are manufacturers of multi-layer plated printed circuit boards.

## Address changes

● Acoustic Technology Ltd have a new address for their Aberdeen office which is now 15 Carden Place, Aberdeen, AB1 1UR, UK. Phone: 0224 54528.

● Audio Rents UK have moved into new showrooms and offices at 110 Gloucester Avenue, London NW1 8JA, UK. Phone: 01-586 7587.

● Lyrec (UK) Ltd are now to be found at 32 Oakfield, Woking, Surrey, UK. Phone: 04867 87170.

## Contracts

● 3M have announced the installation of a second digital mastering system in the UK at Lodge Studios, Suffolk. The installation will consist of a 32-track record/replay machine and a 4-track machine with an electronic editing console. 36 ▶

Stuart Nevison of Advanced Music Systems drew our attention to this nice little item from *Eagle* magazine, August 14, 1982. In a series called *Doomlord II*, we find the new Doomlord on his (its?) way to Earth in a rather unoriginal spacecraft. The craft's control systems are rather odd, however, as the picture shows. Inverted readers may notice a couple of AMS DDLs, a UREI *1176*, an Ursa Major *Space Station* (appropriate?), what looks like a pair of dbx units, and a something else, which might be an Eventide *Instant Warp Drive* unit. Presumably the control surfaces are inverted because of zero gravity.

We suspect that this craft has landed not a million Nox Vectors away from this office. If you think it is parked in your control room, please let us know.

# New realms of expression from MXR.

The Pitch Transposer is MXR's newest addition to our professional line. It is one of our most innovative products, and possibly the most revolutionary signal processor in the music industry today. It is a unique, high-quality unit which provides a cost effective and flexible package for today's creative artists.

The Pitch Transposer extends your musical boundaries by creating live instrumental and vocal harmonies. It has 4 presets which allow the artist to predetermine the intervals to be processed. Transposed intervals can be preset anywhere from an octave below to an octave above the original pitch. The chosen interval is activated by means of touch controls or a rugged footswitch. LED indicators display which of the four presets has been selected.

A mix control is provided, enabling the unit to be used in one input of a mixing console, or with musical instrument amplifiers. A regeneration control provides for the recirculation of processed signals, creating more and more notes, depending upon the selected interval. This results in multitudes of voices or instrumental chords. An entire new range of sound effects and musical textures, unattainable with any other type of signal processor, is suddenly at your fingertips.

With many other pitch transposition devices a splicing noise, or glitch, is present. The MXR Pitch Transposer renders these often offensive noises into a subtle vibrato which blends with the music, and is, in some cases, virtually inaudible. The result is a processed signal which is musical and usable.

We have been able to maintain a high level of sonic integrity in this most versatile signal processor. The frequency response of the processed signal is beyond 10 kHz, with a dynamic range exceeding 80 dB.

A micro computer based display option allows the user to read the created harmonic interval in terms of a pitch ratio, or as a musical interval (in half steps). This unique feature allows the pitch to be expressed in a language meaningful to both musicians and engineers.

We designed our Pitch Transposer as a practical musical tool for those actively involved in creative audio. It reflects our commitment to provide the highest quality signal processors with the features and performance that will satisfy the creative demands of today's musical artist. See your MXR dealer.

**Atlantex Music, Ltd.,** 34 Bancroft Hitchin, Herts. SG51LA, Eng., Phone 0462 31513, Tlx 826967

MXR Professional Products Group

# diary

## Helios Reborn

From 1969 to 1979, Helios Electronics, founded by Richard Swettenham, supplied mixing consoles to the international recording and broadcasting industry, based on one clear philosophy: that of completely flexible custom design to the client's precise requirements.

Despite a massive expansion in the 'mass-produced' console market, such principles still apply today. However, the present economic climate has made it a very difficult ideal to offer.

As a result of the continuing demand for custom console manufacture like that offered by Helios in the past, Richard Swettenham has come to an arrangement with Tweed Audio, of Kelso, Scotland, to offer such a service once again. In addition, it will be possible to refurbish, update and extend existing Helios consoles, a great many of which are still in everyday use. Swettenham also has a large number of ideas on the way in which console development should proceed—and bearing in mind his track record, he is worth listening to. He also points out that very often it is a fallacy to believe that true custom design is more expensive than 'off the shelf'.

The new agreement adds to the services offered by Richard Swettenham Associates, who also offer a wide range of consultancy services to both manufacturers and end-users in the industry. Principal personnel include David Baskind, Robin Lindeman and Peter J Smith.

**Richard Swettenham Associates/ Helios Custom Audio Design, 53 Westbury Avenue, London N22 6BS. Phone: (01) 448 2582.**

## Linn Products put money where mouth is

Linn Products of Glasgow, who have been substantially responsible for revolutionising the hi-fi market and its perception of turntables over the past decade, have also been amongst the most vociferous critics of digital audio, at any rate in its present form and the the limitations of today's technology. In an effort to prove the point that 'open-ended' analogue systems can benefit substantially from even a fraction of the investment that digital systems have been receiving lately, Linn have ploughed more than £250,000 into researching the cutting end of things.

The research has been angled in two basic directions, and the mechanical engineering associated with actual acetate cutting is now coming to fruition. After comparing the different lathes available, Linn started with a Scully, and have spent the past eighteen months or so redesigning and rebuilding 70% of it. This has involved fitting a Sondek bearing, replacing drive systems, mounting motors to the wall, etc; the cutter head itself is the latest Ortofon type, driven by two bridged Naim amplifiers, and with some extra modifications arising from Linn's visit to Denmark.

Results on both acetates and pressings would appear to vindicate their investment, and anyone who thinks analogue and the LP disc are a thing of the past owes themselves a listen. The cutting facility is available for hire at more or less commercial rates for those interested, though Linn stress that they are still learning, and that early users will to some extent be guinea pigs. Two practical limitations: the vari-pitch facility was not operational at the time of writing, the computer program not being finished, though due shortly; there will be no facility for equalisation, substantially because Linn does not believe in EQ.

The area which is still proving troublesome at present is the plating processes, where Linn are trying to get ultra-fine molecule-thickness coatings using vacuum deposition techniques, and have been running into problems with contamination. They are still persevering, however, as they feel that close attention here is worth just as much in terms of the end result as they know they can achieve on the lathe.

## Chassis Europe

British manufacturer, Enclosure Technology Ltd, has introduced a new 19in rack mounting chassis system designed to fulfil the need for a simple and inexpensive chassis for all types of electronic applications. The system, which is termed *Chassis Europe,* is supplied in kit form comprising a front panel with handles, two side panels, plus rear and bottom panel and all necessary fixing hardware. The kits are available with heights ranging from 2U to 12U, each available in a choice of four depths, such that up to 44 configurations may be chosen.

**Enclosure Technology Ltd, Unit G, Southampton Airport, Southampton SO2 2HG, UK. Phone: 0703 614533. Telex: 477045.**

## Memorial to Jacques Levy

Saturday, June 26, saw the unveiling of a plaque by Sir Georg Solti at the University of Surrey in memory of Jacques Levy, former chairman of the Association of Professional Recording Studios. The plaque, which honours the 25 years of dedicated work and direction Jacques Levy contributed to the growth of the APRS, is a fitting tribute to a man who guided the Association from small beginnings to being an internationally recognised body. As a further memorial, the Association has established annual prizes for students in the University of Surrey's Department of Music, and will also be supporting special projects within the department from the Jacques Levy Memorial Fund.

## APRS: Another winner

Despite transportation problems, APRS 82 pulled in an even higher number of visitors than usual. For the second time at the new Kensington Exhibition Centre venue, the show attracted visitors from all over the world, with a total attendance of almost 3,000, including 279 overseas representatives from 217 companies in 36 countries.

The exhibition itself was also the biggest yet, with 124 booths, confirming the belief that APRS is the number one exhibition for British pro audio manufacturers. This year also saw more visitors from broadcasting organisations, reflecting the growing interest in the audio aspects of this field. Many visitors were highly interested in the new digital equipment on show, APRS being used to launch the new Sony *PCM 3324* machine to the UK market amongst other new equipment at the exhibition. Also featured was a new budget range of consoles from Trident's Consumer Products Division, the *VFM* series. Details of these and other innovations premiered at the show will appear in our New Products pages.

The biggest sale reported by exhibitors at the show was SSL's order for a new console to be installed in Hansa Studios, Berlin, worth over £150,000.

## Recording industry management

The Middle Tennessee State University has provided us with details of its Recording Industry Management course, a four year degree programme which covers all aspects of the recording industry. In addition to providing a thorough grounding in recording technology, the course includes sessions on copyright law, artist development, music publishing and merchandising; plus general studies, business administration and mass communications courses. While the course is not especially tailored to the needs of budding or actual recording engineers, the RIM programme facilities include a multitrack studio with a Harrison *2824* console with Allison automation and an MCI 24-track. Full details of the RIM degree course are obtainable from: **Recording Industry Management, Middle Tennessee State University, Box 21, Murfreesboro, Tennessee 37132, USA.**

## Stolen equipment

Any reader having information on the whereabouts of an AMS *DMX 15-80S* digital delay line, serial number 1362, which vanished into thin air on the 8th of June, is asked to contact Andy Hilton at Hilton Sound on 01-708 0483.

## EECO timecode booklet

American synchroniser manufacturer, EECO, has produced a new comprehensive tutorial booklet explaining the early development and technical operation, plus the latest advances, in SMPTE/EBU longitudinal and vertical interval timecode. The new booklet covers the type of information that is encoded using timecode and its importance, usage and advantages in editing and synchronising. Practical guidelines for using SMPTE/EBU timecode and its applications in video and audio are also discussed. Copies are obtainable free of charge from: **EECO Inc, Video Products Marketing, 1601 East Chestnut Avenue, Santa Ana, Cal 92701, USA. Phone: (714) 835-6000.**

## AES Anaheim

The Audio Engineering Society has announced that the 72nd AES Convention, to be held at the Disneyland Hotel, Anaheim, California, is to have the number of days devoted to the convention increased from four to five. New dates for the convention are Saturday, October 23 to Wednesday, October 27. The reason for the additional day is that the first day of the convention is to be devoted to exhibits only, hence allowing attendees wishing to partake of the technical papers a free day to view the technical exhibits. It should also be noted that the convention begins one day later than originally planned.

## New supplier for mic arm

The unique Studio Equipment Services mic arm, used in radio stations throughout the world, is now available from **Tamevie Service Ltd, 15 Cambridge Road, St Albans, Herts AL1 5LH. Phone: 0727 54641.** The arm is available for use with wall, desk or G-clamp brackets.

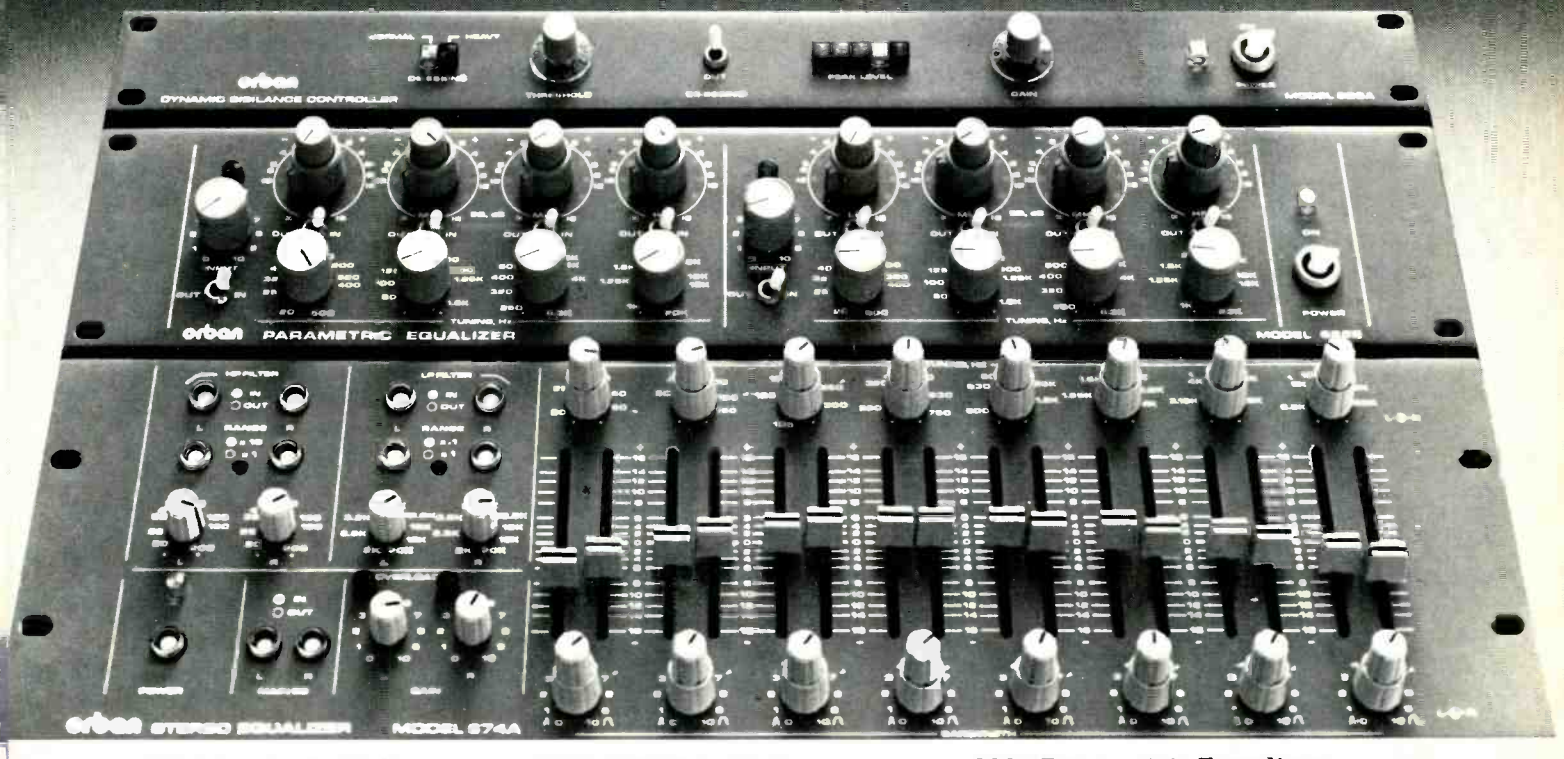
## Theatre Projects net BGW

BGW Systems of California have appointed Theatre Projects Ltd as their exclusive UK distributors, and they will be handling the entire BGW product line of pro and industrial amplifiers. Theatre Projects are Europe's largest suppliers for the lighting, sound, A/V and video equipment fields.

**Theatre Projects Ltd, 10 Long Acre, London WC2E 9LN. Phone: 01-240 5411.** ■

# Tools of the Trade

Signal Processors by orban




**526A Dynamic Sibilance Controller**
Clean, inaudible de-essing of vocals with consistent action regardless of levels

**672A/674 Equalisers**
A parametric EQ with graphic controls, including variable high and low-pass filters usable as an electronic crossover (mono or stereo)

**622B Parametric Equaliser**
An exceptionally versatile EQ which has become the standard in studios, broadcast and road shows.

orban
Orban Associates Inc

European Master Distributor

SSE

**Scenic Sounds Equipment Limited**
97-99 Dean Street London W1V 5RA Telephone: 01-734 2812/3/4/5 Telex 27 939 SCENIC G

**Belgium** Trans European Music (Bruxelles) **Finland** Studiotec (Espoo) **France** 3M France SA, Mincom Div (Paris)
**Germany** Estemac (Hamburg) **Greece** Audiolab Hellas (Athens) **Holland** Cadac Holland (Hilversum) **Italy** Audio Products International (Milano)
**Norway** LydRommet (Oslo) **Spain** M. Llewellyn-Jones (Madrid) **Sweden** Tal & Ton (Gothenburg) **Switzerland** Audio Bauer AG (Zurich)

# new products

## Sony digital delay

New from Sony is the *DDU-1530* audio delay/preview unit. Aimed at the broadcast market, the unit offers 16-bit, 44.1kHz sampling digital audio circuitry with delay times variable in 1ms steps from 1ms to 4.35s. The unit has digital input and delayed output signals, and features a basic memory board with 1.45s maximum delay, further cards being added as necessary. Delay time setting is via an 'up/down' pair of buttons; in addition, two preset delays may be instantly recalled. Input and output levels may be preset or variable, and power-off bypass is fitted. Additional features include 2-channel capability and a sampling frequency range of 40-55kHz. Master signal frequency response is 20Hz to 20kHz +0.05/−1.0dB.

**Sony Communications Systems, Pyrene House, Sunbury-on-Thames, Middx TW16 7AT, UK: Phone: 09327 81211. Telex: 266371.**

## EMT broadcast turntable

New from EMT is the *938* broadcast disc reproducer, designed as a simplified and more economical version of the EMT *950* direct drive turntable. There are many similarities between the two units, both featuring direct drive and shock absorbers. On the new model, however, the electronically-controlled reverse rotation feature has been omitted and the run-up time is a few tenths of a second longer.

**EMT-Franz GmbH, Postfach 1520, D-7630 Lahr, West Germany. Phone: 07825 512. Telex: 754319.**

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

**USA:** Gotham Audio Corp, 741 Washington Street, New York, NY 10014. Phone: (212) 741-7411. Telex: 129269.


## Cable analyser from MSE

The *Dirtcat* is a novel digital real-time cable analyser from MSE. Including a comprehensive front panel display, the unit indicates all the active signal paths within the cable under test, shorts being capable of detection with only one end of the cable connected. The digital circuitry scans both ends of the cable sequentially and the display indicates cable condition in real-time. During testing, no operation is required, so the cable may be manipulated to discover intermittent faults. Headphones and loudspeakers down to 4Ω impedance may also be examined, the unit providing a squarewave test tone and a visual continuity indication. The unit has both 2- and 3-conductor test positions, and turns itself off about 90s after the last switch actuation to preserve battery life. Virtually any type of connector may be added to the unit including TT and BNC types. Two models are available, handheld or rack-mounted. The former is battery-powered while the rack-mount unit requires 115 to 230V AC, 50 to 60Hz power.

**MSE, 14047 Roblar Road, Sherman Oaks, Cal 91423, USA. Phone: (213) 783-3357.**

## New IMF small speaker

The *MCR 2A* is a new extended-frequency-range version of the established *MCR 2* monitor unit from IMF. The unit is designed to produce precise stereo imaging with the widest frequency range for an enclosure of minimum dimensions. In addition, it is phase-compatible with the larger professional models, and features similar ferrofluid damped tweeter and engineered polymer coned mid/bass unit to those used in the *Professional Monitor* range. The crossover configuration is also derived from the larger models. Specifications include a frequency range of 65Hz to 40kHz and a recommended amp power of 20 to 100W RMS.

**IMF Electronics, Westbourne Street, High Wycombe, Bucks, UK. Phone: (0494) 35576.**

## DDA Quadrack

Dearden Davis Associates have announced a practical answer to the multiple power amplifier/crossover requirements for PA or studio in the form of the *Quadrack*. This is a 19 in rack-mounting case, 3U high, containing four 100 W current dumping amplifiers as used in the well-known Quad *405* amplifier. They are configured either individually or in bridge mode with the addition of integral active crossover networks, output level controls and LED power metering. There are five units available: *QR1* mono bridge amp with 2-way crossover; *QR2* stereo bi-amp with 2-way crossover; *QR3* mono tri-amp with 3-way crossover; *QR4* four channel; and *QR5* stereo bridge.

**Dearden Davis Associates Ltd, Unit 7b, Worton Hall, Isleworth, Middlesex TW7 6ER, UK. Phone: 01-847 0363.**

## New Loft Delay Line/Flanger

A new Loft delay line/flanger known as the *Model 450* has been introduced by Phoenix Audio Laboratories. It has a bandwidth of 18 kHz and the standard model has 160 ms of delay. This can be increased to 320 ms by the addition of the *EM-450* extender module. Signal to noise is 90 dB and other features include *XLR* and ¼in jack sockets, musical instrument input with 20 dB of gain, LED headroom indication, single unit height and 19 inch rack mounting. It is also claimed that the new design technology used gives more musical and natural-sounding results.

**Phoenix Audio Laboratory Inc, 91 Elm Street, Manchester, Connecticut 06040. Phone: (203) 640-1199.**

## DeltaLab Effectron delay lines

DeltaLab Research have announced the *Effectron* series of low cost digital delay lines. There are two models: the *ADM 256* is a full bandwidth, wide dynamic range, digital delay processor that features flanging, doubling, chorusing and echo effects with up to 256ms of delay; and the *ADM 1024*, identical to the *ADM 256* but with 1024ms of full bandwidth delay. In terms of the delay, the performance of the *ADM 1024* actually extends beyond that of the *DL-4 Performer Series*.

**DeltaLab Research Inc, 27 Industrial Avenue, Chelmsford, Massachusetts 01824, USA. Phone: (617) 256-9034.**

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

40 ▶

# "Untwisting all the chains that tie the hidden soul of harmony." Milton. 1608-1674.

Knowledge is the key to unequalled audio equalisation — and Klark-Teknik's DN60 Audio Spectrum Analyser is a rack-mounted, laboratory standard instrument that provides instantly usable information for an enormous range of applications. With continuous measurement and display of signal levels at 30 points across a broad audio spectrum from 25Hz to 20KHz, this cost-effective microprocessor-based analyser adds new standards of accuracy to the audio professional's vocabulary.

For easy equalisation, the 30 measurement frequencies of the DN60 exactly match the control frequencies of our latest two-channel DN30/30 equaliser. Add the inexpensive RT60 Reverberation Analyser to untangle structural reflections. Result: exact knowledge permits exact adjustment of response levels for total control of sound consistency. DN60 has got the features you need, because it is:

The most powerful audio-analyser on the market today — and because it is microprocessor-based, not only accurately monitoring the full audio band from 25Hz to 20KHz but also offering three memories plus a peak hold memory.

Options include X/Y plotter, dot matrix printer, the matched RT60 Reverberation Decay Analyser and a calibrated measuring microphone.

It is a tough but compact rack-mounted instrument with easy operation and superb 'lights-out' readability, and it is tested rigorously to Klark-Teknik's usual high standards, with a long burn-in period to ensure maximum reliability on the road and in the studio.

**ALL THESE USES!**

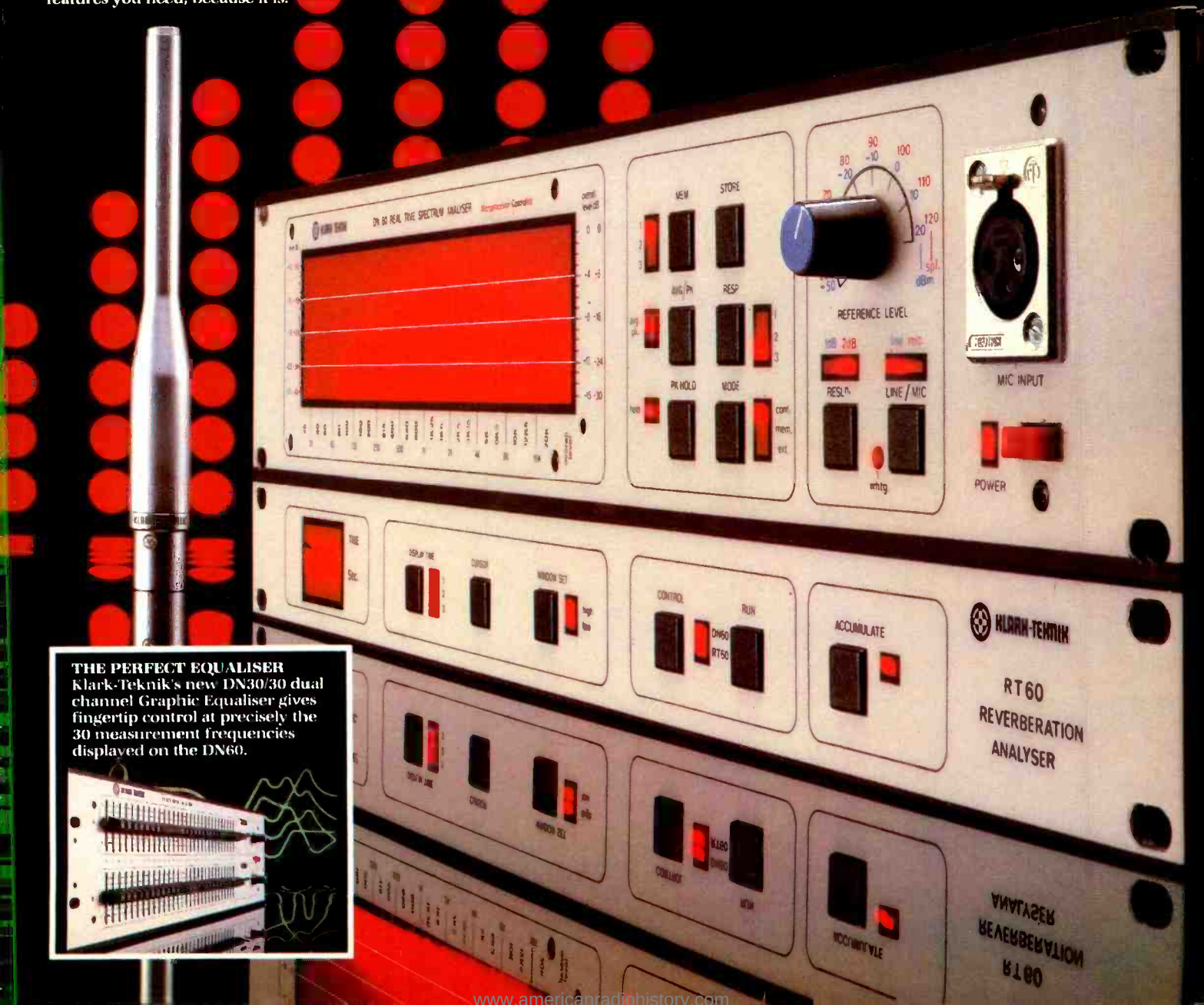
- Tape recorder alignment
- Room acoustical analysis
- Microphone/loudspeaker design and testing
- Reverberation checks
- Continuous system quality control
- Audio components research and development
- Fast semi-automatic production testing
- Selective noise level checks and environmental analysis
- Quality assurance for VTR audio channels
- Broadcast programme quality monitoring
- Music content analysis and level monitoring
- Level optimisation in disc cutting

For technical details ask for:
Our DN60/RT60 Data Sheet.
Our DN30/30 Data Sheet.

KLARK TEKNIK
*sound science*


**Klark-Teknik Research Limited**
Coppice Trading Estate, Kidderminster, DY11 7HL, England.
Telephone: (0562) 741515 Telex: 339821

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


**THE PERFECT EQUALISER**
Klark-Teknik's new DN30/30 dual channel Graphic Equaliser gives fingertip control at precisely the 30 measurement frequencies displayed on the DN60.

# new products

## VFM System from Trident Audio

One of the few totally new products on display at this year's APRS exhibition was the *VFM* modular mixing system from the newly-formed Consumer Products division of **Trident Audio Developments.** The *VFM System* is a range of low cost mixing consoles with applications in recording, PA and theatre sound. What is particularly interesting about the *VFM*'s is the way that a major manufacturer of rather more upmarket equipment has tackled a range of budget consoles and arranged its design priorities in a way that is rather different to most of the other manufacturers in this very competitive price bracket.

Firstly all the models are of fully modular construction and use the same input modules but with a choice of three different output modules and two master output modules. Mainframe sizes are 16/8/2 and 16/4/2 and both are available in recording and PA versions with the difference being the configuration of the output modules and the choice of the master module.

Facilities on the input channel include long-throw carbon faders, overload LED, PFL, sub-grouping switching, pan, one foldback send (prefade), two echo sends (postfade), 4-band EQ, mic/line gain, 20 dB pad, insert point, standard jack socket line in and *XLR*-type mike input.

Output modules all have long-throw faders, PFL, tape/group monitor selection, a monitor section with level, foldback send and pan, and 12-segment LED column meters with the standard module also having an echo return control. The talkback version is the same but with provision for talkback mike input and level control, while the third version has no echo return, having a full 4-band EQ as on the input channels.

Master modules are stereo and have two faders in the same module width, 12-segment LED column metering, PFL, master foldback and echo send controls. The two output modules differ only in the facilities for echo return to foldback and headphone monitoring.

Standard operating level in the *VFM* is +4 dBm with a maximum output level of +21 dBm and a claimed signal to noise of 125 dBm, 20 Hz to 20 kHz at the mike input.

Price is subject to confirmation but will be approximately £1,000 for the 16/4/2 and £1,150 for the 16/8/2.

**Trident Audio Developments Ltd (Consumer Products Division), PO Box 38, Shepperton Film Studios, Studios Road, Shepperton, Middx TW17 0QD, UK. Phone: 09328 60241. Telex: 8813982.**

**USA:** Trident (USA) Inc, 652 Glenbrook Road, Stamford, Connecticut 06906. Phone: (203) 348-4969.

**USA:** Wilson Audio Sales, Rt 3, Barrel Springs Hollow Road, Franklin, Tennessee 37064. Phone: (615) 794-0155.

## Celestion acoustic lenses

Celestion has introduced a pair of new acoustic lenses for use with the company's *HF50* and *RTT50* professional horn tweeters. The lenses—*AL7* and *AL12*—are designed to control the tweeters' high frequency dispersion and give improved sound distribution. With a broad, flat-fronted coverage pattern, they are suited to short-throw use. Both have all metal construction with horizontal polar pattern 6kHz to 16kHz, 60 to 70°/—6dB for the *AL7* and 70 to 80°/—6dB for the *AL12*.

**Celestion International, Ditton Works, Foxhall Road, Ipswich, Suffolk, UK. Phone: (0470) 73131.**

## 2-Wire machine control

New from Auburn Instruments is a 2-wire control system for tape machines and similar devices. New stations may be added simply, and each machine has its own dedicated interface and 2-wire buss. This buss may be distributed via simple single-pole switching or jack patching. The system, known as the *MC/1,* features eight commands and return tallies, master/slave and gang start facilities, and opto-isolated machine interfacing (relays optional). A 'bleeper' gives audio confirmation, and non-active tally lamps illuminate dimly to enable location in darkened control rooms. Each remote panel has an area which may be labelled simply with the machine designation, and custom button coloration and legends are available.

**Auburn Instruments, 34 Lodge Road, Newton, Massachusetts 02165, USA. Phone: (617) 332 7747.**

## Rack-mounted VCA

ProTech Audio have announced a rack mount VCA, the *668VAC*, to fill a demand for a self-contained VCA without the need for an additional power supply. Available in 2, 3 or 4 channel versions, with or without balanced 600Ω transformer isolated outputs, channels may be strapped for single element control of multiple channels. Designed to provide 100dB of attenuation, max input +20 dBV and max output +18 dBV, the unit requires 1U of 19 inch rack space.

**ProTech Audio Corp, Flowerfield Building No 1, St James, NY 11780. Phone: (516) 584-5855.**

## AMS introduce delay compensator

New from Advanced Music Systems is the *A/V-sync,* a microprocessor-controlled unit allowing interference-free adjustment of delay time in the audio path to compensate for video delay caused by a video synchroniser, even if step changes in video delay occur. The *A/V-sync* unit automatically measures the video delay inserted and applies the corresponding delay in the audio path, thus eliminating disturbing effects caused by sound appearing to precede picture in tight sync situations. A further fixed delay may also be inserted to compensate for large additional delays in the video path, such as those experienced with satellite links. With the coming of stereo TV audio, it is possible to add one or two extra channels to the unit without increasing its size. One of these channels may be used to delay SMPTE timecode if desired.

Front-panel layout is straightforward, consisting of 6, 12 and 18dB LED headroom monitors, bypass switch, operating level control, 1 and 10ms delay 'nudge' (up/down) controls, plus displays showing the compensation and extra delay values and a power switch. The unit accepts timing data either as a decoded TTL signal or by directly decoding video feeds. The extra delay can be introduced in increments of 1ms up to 360ms (optionally 1.5s). Maximum total delay is 409ms (1.638s optional) and the bandwidth is quoted as 10Hz to 18kHz +0/—3dB. Dynamic range is 90dB and typical distortion, 0.03%. The device has unity gain.

**Advanced Music Systems, 2-3 Wallstreams Lane, Worsthorne Village, Nr Burnley, Lancs, UK. Phone: (0282) 36943. Telex: 63108.**

## Loudness Monitor

A programme level meter which accurately indicates energy content of an audio signal is now available from Dorrough Electronics of California. Called the Dorrough *Loudness Monitor,* the meter offers a solution to the problem of matching loudness levels between different audio programmes, for example in TV, radio and recording. The meter has a dual function LED display, with a bargraph showing normally weighty persistence material which the operator is directed to hold at centre 0dB, and a dot mode for peak indication. The two separate points of reference are visible to the operator at all times. The unit is available as a single unit, rack mount single or dual, and as a replacement for panel meters.

**Dorrough Electronics, 5221 Collier Place, Woodland Hills, Cal 91364, USA. Phone: (213) 999-1132.** ■

# YOU CAN JUDGE US BY THE COMPANIES WE KEEP.

We've always made a point of associating with the very best names in the world of audio.

In the field of equipment rental, for instance, we provided a sound system that satisfied the exacting requirements of Genesis.

That system was driven by Amcron power amplifiers–arguably the best in the world.

And Amcron appointed us to handle their business in the UK, including the launch of their revolutionary Pressure Zone Microphone system.

After amplifiers, it was logical that we should also supply the best in loudspeakers–Gauss. Their unequalled power handling capability and superb sonic accuracy make them first choice for many PA, musical instrument and studio monitoring applications.

In the recording equipment line, we stock Fostex. They've revolutionised the field of personal multi-track recording, with 4 and 8 track machines which are well within the means of even the enthusiastic amateur.

We could carry on dropping names all day. Sony Professional. Amek/TAC concert and studio mixing consoles. Dbx, Eventide, Lexicon effects. JBL components, monitors and spares. Revox/Studer tape machines. Brooke Siren Systems. Beyer and Shure microphones and accessories.

So you can be sure that if we're prepared to sell or hire it to you, it's got to be the very best of its kind.

Because in the end, we know our reputation depends on it.

For more details of our services for artistes, studios, film and TV companies, music venues and in the fields of industry and education, call Ian Jones on 01-961 3295.

HHB

HHB HIRE AND SALES, UNIT F, NEW CRESCENT WORKS, NICOLL ROAD, LONDON NW10 9AX. TEL: 01-961 3295. TELEX: 923393.

# product guide
## Intercoms and talkback

### ALICE (UK)
**Alice (Stancoil Ltd), 38 Alexandra Road, Windsor, Berks. Phone: 07535 51056. Telex: 849323.**

**Communication matrix:** range of specialised intercom systems including large matrix systems allowing up to 200 stations to intercommunicate.
**Talkback unit:** rackmounting unit designed to interface with standard *ACM* and *ABCM* mixer talkback systems in studio installations, or with other rack mounting of free standing similar units.

### ALTECOM (USA)
**Altec Corp, 1515 South Manchester, Anaheim, Cal 92803. Phone (714) 774-2900. Telex: 655415.**
**UK:** Altec Lansing International Ltd, 17 Park Place, Stevenage, Herts SG1 1DU. Phone: 0438 3241. Telex: 825495.

**Altecom 100 series:** provides single conversation channel for up to 10 or 20 locations using push button dialling, privacy while channel in use, call and busy lamps on stations, remote hands-free reply, optional handset stations coupling to paging system.
**Altecom 200 series:** Decentralised intercom system also offering paging and programme retrieval. Each station has access to two or five programme channels, with selection and volume control, includes alarm, paging (with privacy), three communications channels.
**Altecom 300 series:** multiconversational channel intercom system, provides pushbutton dialling and calling to up to 100 locations on five separate channels.

### AUDIX (UK)
**Audix Ltd, Station Road, Wendon, Saffron Walden, Essex CB11 4LG. Phone: 0799 40888. Telex: 817444.**

**6-wire broadcast intercom system:** can accommodate up to 200 stations covering both technical and offices, using a 3-pair cable for interconnection back to electronics system.

### AVAB (Sweden)
**Avab Elektronik AB, Vastra Hamngatan 1, S-41117 Goteborg. Phone: 031 11.20.32. Telex: 27531.**
**USA:** Avab America, 1714 Stockton Street, San Francisco, Cal 94133. Phone: (415) 421-3562.

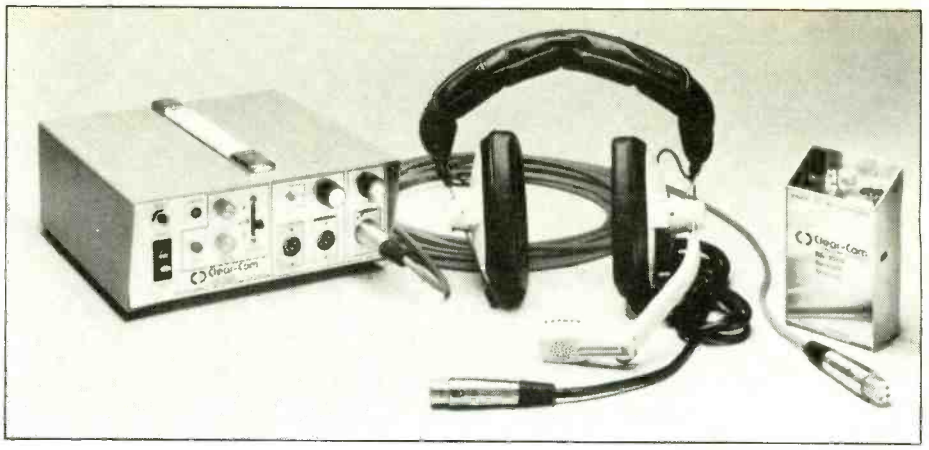
**HS1:** intercom system comprising belt/pocket pack and standard headsets, typically Beyer. The unit is battery powered and may be simply connected in parallel with up to nine other similar units.

### BANG-CAMPBELL ASSOCIATES (USA)
**Television Equipment Associates Inc, Boway Road, Box 20, South Salem, NY10590. Phone: (914) 763-8893. Telex: 710-575 2600.**
**UK:** Future Film Developments, 36-38 Lexington Street, London W1V 3LE. Phone: 01-437 1892. Telex: 21624.

**BCA Interphone:** intercom system comprising belt/pocket pack units into which standard headsets are plugged, mic/speaker panels with gooseneck mike, and director's console with various facilities. The system is two wire with no polarity problems.

### BARKWAY (UK)
**Barkway Electronics Ltd, Barkway, Royston, Herts SG6 8EE. Phone: 076384 666. Telex: 817651.**
**USA:** Fisher Berkeley Corp, Powell & Christie, Emeryville, Cal 94608. Phone: (415) 655-9696.

**800 series:** intercom system that can accommodate up to 56 stations. Station selection uses an 8-digit keypad with numbering scheme 1-8 and 12-87.
**200 series:** Simplex intercom system comprising master and substations. Master stations are available with either five or 10 keys allowing a maximum of 10 stations to be called from each master.
**Polydex 1000 series:** microcomputer controlled intercom system available with from four to 200 stations using modular construction expandable in steps of four, to provide systems with maximum of 32, 40, 100 or 200 stations with two, four, seven and 14 speech channels respectively. Only two pairs are required by each station.



*Equipment from Clear-Com*

### BRABURY (UK)
**Brabury Electronics Ltd, Lower Way, Thatcham, Berks. Phone: 04886 3511. Telex: 848760.**

**310 Series:** studio and OB talkback units built to customers' requirements. Features include electronic switching, multicore cable or encoded single core routing interconnect between remote stations and matrix. Remote stations are active and locally or remotely powered.

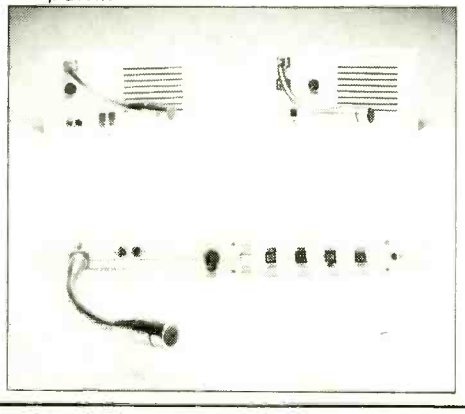
### CALREC (UK)
**Calrec Audio Ltd, Hangingroyd Lane, Hebden Bridge, Yorkshire HX7 7DD. Phone: 0422 842159. Telex: 51311.**

**Microprocessor controlled matrix:** microprocessor controlled audio switching matrix that may be used for talkback systems with multi access, communications systems with multi conference facilities, and assignable switching with memory to recall preset systems configurations.

### CLEAR-COM (USA)
**Clear-Com Intercom Systems, 759 Harrison Street, San Francisco, Cal 94107. Phone: (415) 989-1130.**
**UK:** TBA Lighting, Tim Burnham Associates Ltd, 381 St John Street, London EC1V 4LD. Phone: 01-837 8968.

**CS-200 series:** single and dual channel main intercom stations, available as portable or rack mounting. Will power up to 40 remote stations.
**PS-451:** power supply for feeding dual channel intercom systems, no intercom built in.
**PS-10/10K:** power supply, portable or rack mount, powers 12 remote stations.
**Remote stations:** various remote stations, dual channel for headset, level control, specific call facility. Various types: *RS-100A* is portable belt pack with clip, *MR-102* is mounted on a brushed stainless steel panel for mounting in a conduit box, *KB-111* remote station is self-contained for wall or permanent mounting built-in speaker, *KB-100* is King Biscuit weatherproof remote station with permanently attached hand mike and built-in speaker, *PC-101* remote station kit designed for installation in console, *KB-111K* remote speaker station, for rack mounting with built-in speaker. *RS202S* remote station is 4-channel belt pack with side tone, *MR-202S* is stainless steel panel mounted with four channels, *KB-124* is portable hands free speaker station with threshold indicator, call light cueing, *MS-100* is 4-channel main station, *RM-400* is 4-channel remote station, *CP-100* is television belt pack accepting dynamic or carbon headsets.
**SB-412:** four-channel switchboard and main station with switch matrix for 12 remote stations.

*Philip Drake Mini-Mobile*



**SB-8 switchboard:** switchboard monitor which creates 8-channel intercom capability allowing for group or private communication between switchboard and remotes.
**MX-840 slide matrix:** used in conjunction with the *SB-8* switchboard allowing either 20 or 40 stations to be pre-assigned to the eight channels using a slide matrix.
**AC-10 Adapt-a-Com:** allows interface of any Clear-Com intercom system with any known 2, 3 or 4-wire system.
Clear-Com also produces a range of accessories to operate with its intercom systems. Clear-Com systems are 3-wire.

### CLYDE ELECTRONICS (UK)
**Clyde Electronics Ltd, Ranken House, Anderston Cross Centre, Glasgow G2 7LB. Phone: 041-221 5906/248 30001.**

**CETB1:** communications (talkback) unit designed to provide simplex communications with 10 other stations.

### COMMERCE AIRBORNE (USA)
**Commerce Airborne Corp, Suite 104, 16425 Hart Street, Van Nuys, Cal 91406. Phone: (213) 785-5409.**

**CA-214:** Airborne ENG controller providing complete audio, intercom and transmitter control for typically four stations in an airborne ENG system such as a helicopter or light plane (pilot, cameraman, engineer and reporter).

### COMREX (USA)
**Comrex Corp, PO Box 269, 60 Union Avenue, Sudbury, Mass 01776. Phone.(617) 443-8811. Telex: 710-347 1049.**

**CRA:** pocket sized monitor receiver covering range 50 MHz to 550 MHz (prefixed), 6 kHz bandwidth.
**CTA:** rack mounting cue transmitter with 1 W output in range 26.1 to 26.48 MHz. Has programme and cue inputs.
**LPQRA:** pocket sized cue system receiver covering range 26.1 to 26.48 MHz.

### CROW/SANDAR (Norway)
**Sandar Electronics Ltd, Redhustgaten 12, N-200 Sandefjord. Phone: 033 67.222. Telex: 21547.**
**UK:** Crow of Reading Ltd, PO Box 36, 76 Katesgrove Lane, Reading RG1 2NB. Phone: 0734 595025. Telex: 847056.

Specially designed systems to customers' requirements.

### DAC (UK)
**Derby Automation Consultants Ltd, Dacom Works, Shobnall Street, Burton-on-Trent, Staffordshire DB14 2HD. Phone: 0283 43471. Telex: 34654.**

Wide range of communication equipment; varied applications including hazardous and corrosive atmospheres.
The *Dacom S20* audio communication system uses a manual exchange with provision for 10, 20 or 30 lines with either two or four speech paths.

### PHILIP DRAKE (UK)
**Philip Drake Electronics Ltd, 23 Redan Place, London W2 4SA. Phone: 01-221 1476. Telex: 87515.**

**Talkback unit:** equipment designed for use in television, radio and recording environments. Standard central switching units for 8 × 8 and 16 × 16 crosspoints available. Custom building of larger units for special requirements.
**Commsbox:** designed for mobile use, the

44 ▶

# THE BEST OF BOTH WORLDS

The PPG Waveterm System is the new music synthesiser that combines analog and digital technology. The Waveterm system consists of the PPG Wave 2.2 keyboard and the PPG Waveterm terminal. The PPG 2.2 is a self-contained digital synthesiser which offers a wider range of sounds than ever before possible with one instrument. With its 2,000 waveterms, the PPG offers over 100 sounds which can be stored in non-volatile memory, and each of its 8 voices can be processed by a resonating 24dB/oct. filter and modulated in real time with the five octave dynamic keyboard. The Wave 2.2 contains an eight-track polyphonic sequencer. Each track may be edited after recording and with the use of the highly sophisticated digital front panel, the sequencer may then be mixed and stored for instant recall.

The PPG Waveterm, a high resolution graphics computer terminal extends the capabilities of the Wave 2.2. With its additive waveform synthesis and natural sound sampling it gives you limitless sound possibilities. Natural sounds may be analysed by computer and then combined with other waveforms or sampled sounds. These complex sounds may then be loaded into the Wave 2.2 and processed by the front panel controls for real time performance. The Waveterm also allows you to specify whole scores from the terminal. The sound parameters of individual notes are definable.

Come and see the PPG Waveterm for yourself – you can have the best of both worlds!


# PPG WAVETERM
## DIGITAL MUSIC SYSTEM

Syco Systems Ltd. 20 Conduit Place London W2 Phone 01-723 3844 for an appointment

# product guide
## Intercoms and talkback

*Commsbox* provides communications between up to 10 operators using communications type headsets. Battery or mains powered.
**Mini-Mobile talkback system:** part of the comprehensive Talkback system, providing communication between up to four locations and three cameras, designed for small TV OB units.

### FARRTRONICS (Canada)
**Farrtronics Ltd, 151 Bebtley Street, ZUnit 1, markham, Ontario L3R 1B5. Phone: (416) 495-6720.**
**USA:** Industrial Sciences Inc, PO Box 1495, Gainesville, Florida 32602. Phone: (904) 373-6783.

**Professional intercom system:** intercom system based entirely on line level audio switching (balanced to ground) in each Selective Calling Station. While the unit uses a central semi- or fully-programmable matrix, this does not have switches, relays or cross points, but provides hardwired routing between the switches on each station.

### FORMULA SOUND (UK)
**Formula Sound Ltd, 3 Waterloo Road, Stockport, SK1 3DB. Phone: 061-480 3781.**

**QUE-4:** stereo studio folback system comprising musicians mixers allowing the user to balance his own foldback from four stereo inputs. Each input has fader and pan control. Mains powered.

### GREEN GINGER (UK)
**Green Ginger Ltd, 52 Potters Lane, Kilm Farm, Milton Keynes, MK11 3HQ. Phone: 0908 566170.**

**CQ-B talkback communications system:** single channel intercom system comprising belt pack and standard headset, with indicator and level control, operates on ring system with screened pair cable.
**CQ-B3/B4:** power supplies for intercom circuits, standard *B3* unit handles up to 20 *B1* outstations in one ring, *B4* handles 20 *B1* or *B2* outstations in one ring.
**CQ-B5/B6:** simple master unit using existing power supply, providing two loops under the control of a single designated outstation. *CQB6* also has centralised light calling and buzzer control.

### HIGHAMS (UK)
**Highams Electronic Communication Ltd, Ferndown Industrial Estate, 96 Cobham Road, Wimborne, Dorset BH21 7RE. Phone: 0202 893514/ 893539.**

**Hectaphone Mini:** four-way intercom system can either have four fully interconnected master stations or a master and four slave stations. Alternatively there can be a combination of the above units.
**Hectaphone Maxi:** eight-way intercom system basically similar to *Mini* but maximum eight stations. Eight core loop cabling.
**Hectaphone Magnum:** 21/27-way intercom system. Basically similar to *Mini* but maximum 27 stations, eight core cabling.

### IDI (USA)
**Image Devices Inc, 1825 NE 149 Street, PO Box, 61-0606, Miami, Florida 33181. Phone: (305) 945-1111. Telex: 519358.**
**WE-1:** cordless earphone system operating on induction loop principle. Uses pocket or harness receiving transducer.

### LINK (UK)
**Link Electronics Ltd, North Way, Andover SP10 5AJ. Phone: 0264 61345. Telex: 47132.**

**787 telephone exchange:** telephone exchange system capable of working with up to 10 external lines and up to five operating positions, each position having a keypad with an illuminated push-button for each line.
**708:** standard talkback unit, self contained providing communication between a producer and up to three cameras. Two-way communication, on-air cues, programme sound, two aux inputs, talkback out.
**Talkback systems:** Link produce a range of modules for custom built talkback systems using FET crosspoint switching in a central electronics unit, and outposts that may be cameras or panels with mics and loudspeakers, and can select any other station.

### McCURDY (Canada)
**McCurdy Radio Industries Ltd, 108 Carnforth Road, Toronto, Ontario M4A 2L4. Phone: (416) 751-6262. Telex: 06963533.**
**UK:** Seltech Equipment Ltd, Rose Industrial Estate, Cores End Road, Bourne End, Bucks SL8 5AT. Phone: 06285 29131. Telex: 848960.
**USA:** McCurdy Radio Industries Inc, 1711 Carmen Drive, Elk Grove Village, Illinois 60007. Phone: (312) 640-7077. Telex: 910-222 0436.

**Series 9000 intercom systems:** assembled from two basic modules: *AP276* intercom preamp and matrix crosspoint card, and *AM278/478* output amps. Basic system is an electronic 10 × 10 matrix which can be expanded to 20 × 20, 30 × 30 or larger to order.
**AP276:** accepts dynamic, and carbon mic or a line input and includes automatic gain control, and a 10 × 1 matrix which may either be discrete wired or BCD operated from a suitable key panel.
**AM278/478:** consists of two amps each with a +18 dBm active balanced output, the *478* verson including a transformer providing 3 W into 8Ω.
**Microprocessor intercom:** electronic, microprocessor controlled matrix intercom system. Matrrix sizes from 20 × 20 to 200 × 200, 2-wire control, group and sub assignable, alpha numeric display panel.
**Digitally controlled intercom:** matrix based intercom system using pre-programmed and programmable master stations. Each keypanel has eight keys that are EPROM 'hardwired' by a master control console, and an additional four keys that may be programmed locally from a hexadecimal keypad for either single or multiple assignments.

### MARCONI (UK)
**Marconi Communication Systems Ltd, Marconi House, New Street, Chelmsford CM1 1PL. Phone: 0245 353221. Telex: 99201.**
**USDA:** Marconi Electronics Inc, 100 Stonehurst Court, Northvale, New Jersey 07647. Phonr: (201) 767-7250. Telex: 9919752.

**B3656:** talkback communications system. Consists of a Communications Unit which accepts up to 13 inputs and provides a maximum of 20 outputs although any one station can only select 10 of these outputs.
**B3664:** intercommunication system. Provides duplex working between 13 stations (25 stations optionally) which are hardwired to each other.

### MILLBANK (UK)
**Millbank Electronics Group Ltd, Uckfield, Sussex TN22 1PS. Phone: 0825 4166. Telex: 95505.**

**Crew talkback system:** multi station intercom system using a master control unit. Any sub may call the master station or vice versa. Incoming calls trigger a tone and light the appropriate station switch position. The system is extendable in steps of six channels to a maxium of 18.
**DIRT talkback system:** Direct Instantaneous Reverse Talkback telephone equipment comprising standard *700 series* telephone instrument mounted on a small black box, and fitted with a loudspeaker instead of a dial. In normal use, it allows the user to hear talkback through the speaker, but becomes a 2-way telephone by simply lifting the handset.

### MINICOM (USA)
**Minicom, PO Box 302, Walnut Creek, Cal 94596. Phone: (415) 820-1322.**
**UK:** TBA Lighting, Tim Burnham Associates Ltd, 381 St John Street, London EC1V 4LD. Phone: 01-837 8968.

**Minicom Intercom System:** intercom system comprising belt pack for ring cable, and headset. It includes mike and receive amp, volume control and on/off switch, *PK-2* 2-channel six *XLR* outputs for 24 headsets, *PK-1* power supply operates on 110/230 V, has three *XLR* outputs standard and provides drive for 12 headsets.

### NEVE (UK)
**Neve Electronics International Ltd, Cambridge House, Melbourn, Royston SG8 6AU, Hertfordshire. Phone: 0763 60776. Telex: 81381.**
**USA:** Rupert Neve Inc, Berkshire Industrial Park, Bethel, Connecticut 06801. Phone: (203) 744-6230. Telex: 969638.

Talkback communication supplied or under construction range from simple 15 station equipments associated with OB vehicle installations to very large system for broadcast complexes involving computer control.
**NECOMM:** microprocessor based crosspoint intercom system offering dramatically smaller physical size and lower price per crosspoint than conventional systems. Available in sizes from 8 × 8 to 256 × 256, a complete family of terminals are available, ranging from simple passive panels to processor controlled stations with optional alpha-numeric display and machine control facilities. Remote stations may also be connected via telephone lines, 2-way radio links or microwave systems. All features are controlled by software configured for each customer from a library of standard modules, and these may be optionally updated over a telephone line from Neve's maintenance dept.

### NTP (Denmark)
**NTP Elektronik A/S, 44 Theklavej, DK-2400 Copenhagen NV. Phone: 01 10.12.22. Telex: 16378.**

**Type 330:** communications system comprising a number of interconnecting modules, *330/200* is 2-wire electronic hybrid allowing 2-wire subscribers (such as a telephone) into the system; *330-100* is a 4-wire interface unitr. *330-500* mike amp and limiter, *330-660* loudspeaker unit with 1.8 W amp, *330-700* test tone and white noise generator, *177-600* peak programme meter.

### PB THEATRE SYSTEMS (UK)
**PB Theatre Systems Ltd, 12 Century Street, Sheffield S9 5DX. Phone: 0742 447511.**
**UK:** Hardware House (Sound) Ltd, 1/7 Britannia Row, Islington, London N1 8QM. Phone: 01-226 7940.

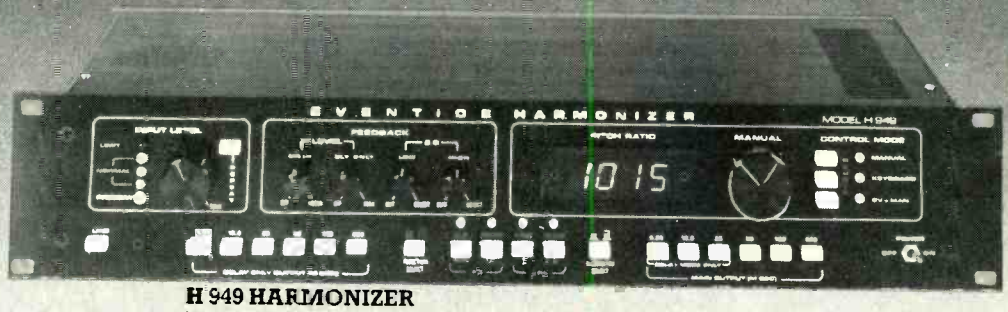
**Series 2:** single or dual channel belt pack type intercom systems, self contained without master stations. Fifteen or more units may be parallel on the same system.

### PHILIPS (Netherlands)
**NV Philips, Electro-Acoustics Division, HBS2, Eindhoven. Phone: 040 79.11.11. Telex: 51121.**
**UK:** Pye Business Communications Ltd, Northfield

46 ▶

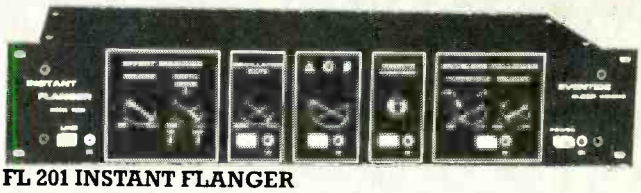
# EVENTIDE CLOCKWORKS

## 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 W1N 5PH Tel: 01-580 4314. Telex: London 28668.

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

# product guide
## Intercoms and talkback

Industrial Estate, Beresford Avenue, Wembley, Middx. Phone: 01-903 0171.
**USA:** Philips USA, 7530 Frontage Road, Skokie, Illinois 60077.

**M28 intercom:** provides a maximum of 28 stations selected using an 8-digit keypad. Communication is full duplex and press to talk is only used in poor audibility conditions. Stations are connected together in parallel using an 8-pair cable.
**M100 intercom:** similar in concept to the *M28* but able to handle over 1,000 stations all using the same basic 8-pair cable.

### PYE (UK)

**Pye TVT Ltd, PO Box 41, Coldhams Lane, Cambridge CB1 3JU. Phone: 0223 45115. Telex: 81103.**
**USA:** Philips Broadcast Equipment Corp, 91 McKee Drive, Mahwah, New Jersey 07430. Phone: (201) 529-3800.

**TS10:** talkback system consists basically of a relay matrix and six diferent types of talkback units. The matrix accommodates up to 14 cross-point cards each with 24 inputs and routes input mike signals and output production talkback, general talkback, mixed camera talkback and programme to the respective remote talkback units.

### R-COLUMBIA (USA)

**R-Columbia Products Co Inc, 2008 St james Avenue, Highland Park, Illinois 60035. Phone: (312) 432-7915. Telex: 6922160.**

**Intercom headphones:** self contained intercom headphones with integral electronics, up to 10 may be used connected for 'party line' operation, self contained battery.

### ROH (USA)

**ROH Corp, 3603 Clearview Place, Atlanta, Georgia 30340. Phone: (404) 452-4240.**

**Series 300 intercoms:** intercommunication system, using rack mounting master stations with maximum 50-channel capacity which may be divided into any combination of intercom, conference party line, talent IFB, 2-way radio or telephone channels. Based on 50-pair cable stations are available with eight, 16, 24 or 32 switches for selectable channels.
**Series 300 interphones:** party line based intercom system with either portable or rack mounting stations, the portable stations having two channels and program, while the rack mounting stations offer four channels and the capability to interface with *Series 300* intercom systems.

### RTS (USA)

**RTS Systems Inc. 1100 West Chestnut Street, Burbank, Cal 91506. Phone: (213) 843-7022. Telex: 662404.**
**UK:** Future Film Developments, 36-38 Lexington Street, London W1V 3LE. Phone: 01-437 1892. Telex: 21624.

**PS30/60 power supplies:** Power supplies for *TW* two-wire intercom systems, the *PS30* powers 10 2-channel stations, the *PS60* 60-channel stations.
**User stations—TW system, min two channel:** *SBP202* 2-channel belt pack for headset; *BP102* similar with signal lamp; *2-CRM* rack mount units with two channels, headset use; *2-CRML* similar but with indicator lights; *SPK-10* speaker unit, headset or handheld mic with push to talk and loudspeaker; *SPK-20* similar but desk stand mic; *SPK-10L* and *SPK-20L* similar but indicator lamp; *SPK-20RM* and *SPK-20RML* similar but rack mount with gooseneck mic; *BP-501C* and *BP-501CL* belt pack user stations capable of monitoring both channels simultaneously, many options; *SCR-110* special camera user station for RCA TV cameras; *WM-102* wall mount station for conduit box; *WMS-102* similar but loudspeaker station for double conduit box; *CM-202* console mount user station.
RTS also produce a range of accessories including splitters, programme coupling unit, footswitch, and the *TW-101 Interface Series* that allow the *TW System* to be interfaced to other manufacturers' intercom systems including 3- and 4-wire, and also to telephone lines (private wires).
**Series 800:** Master station intercommunication system which may be used as a self-contained intercom system using six channels, or with existing systems such as RTS *TW*, Clear-Com, Daven, RCA, etc.
**Series 4000 IFB System:** Communication system providing interruptible feedback (programme interrupt, switched talkback), that allows the programme director to communicate with talent on the studio floor.
**Model 810:** Switchboard intercom master capable of assigning and monitoring six independent intercom channels and three programme channels to 10 separate station lines.
**SAP-1026:** Source assign panel for use with *TW* intercom systems, allowing any one of nine inputs (typically six intercom channels and three program), to be assigned to any one of 26 lines (six camera lines and 20 external lines), each line consisting of two separate feeds from the unit.
**Series 1000:** Matrix intercom system providing communication by up to 10 user stations, each having direct communication with any other (an all master system). It may be used alone, or combined with a *TW* conference type system. Each user station is connected to a central matrix by 50-way micro-ribbon cable.

*Telex Audiocom*

### SEIWA (Japan)

**Seiwa Corp, Nisshin Building, 4-2 Kyobashi 3-chome, Chou-ku, Tokyo 104. Phone: 03 275-2011. Telex: 28358.**
**USA:** Television Equipment Associates Inc, Boway Road, Box 393, South Salem, NY 10590. Phone: (914) 763-8893. Telex: 710 575-2600.
**MR-220:** dual channel VHF monitor receiver. May be used on two VHF frequencies between 70 and 230 MHz, typically to monitor off-air and directors commands for live location work.

### SOUNDOLIER (USA)

**Soundolier Inc, 9380 Watson Industrial Park, St Louis, Missouri 63126. Phone: (314) 926-9870. Telex: 910-760 1650.**
**UK:** Planned Equipment Ltd, Belvue House, Belvue Road, Northolt, Middx UB5 5HP.
**Telephone intercoms:** Range of telephone handset type intercom systems, various modules including wall or desk telephones, phone with built-in speakers, various power units.
**Bantam Intercom:** headset station comprising compact belt box and headset up to 10 stations from single power supply with a maximum cable length of 1 km.

### SPECTRUM (UK)

**Spectrum Audio Ltd, Leeside Industrial Estate, German Road, London N17 0QP. Phone: 01-801 7461.**

**Q-Comm intercom:** Intercom system comprising beltpack Operator Station *HST, PSU10* and *PSU20* power supplies provide for 10 or 20 stations respectively and master desk stations.

### SPT (UK)

**SPT Video Ltd, Unit One Heybridge Industrial Estate, Heybridge, Maldon, Essex. Phone: 0621 54633. Telex: 995133.**
**USA:** SPTMC Inc, 1781 Ridge Road, PO Box 274, Ontario, NY 14519.

**Command Talkback System:** Talkback systems comprising wall or panel mounted control panels available in 3-, 7-, 14- and 21-way systems.

### STRAND SOUND (UK/Canada)

**Rank Strand Sound, PO Box 70, Great West Road, Brentford, Middx TW8 9HR. Phone: 01-568 9222. Telex: 27976.**
**Canada:** Strand Century Ltd, 6520 Northam Drive, Mississauga, Toronto. Phone: (416) 677-7-130. Telex: 06968646.
**USA:** Strand Century Inc, 20 Bushes Lane, Elmwood Park, New Jersey 07407. Phone: (201) 791-7000.

**Intercom systems:** Communication system providing two channels. *SS701* is master station for portable or panel mounting, includes power supply for up to 40 outstations. *SS721* outstation is single channel belt pack. *SS741* is rack mounted power supply for 40 stations.

### TELEX (USA)

**Telex Communications Inc, 9600 Aldrich Avenue South, Minneapolis, Minnesota 55420. Phone: (612) 884-4051. Telex: 297053.**
**UK:** Avcom Systems Ltd, Newton Works, Stanlake Mews, London W12 7HA. Phone: 01-749 2201. Telex: 892513.

**Audiocom:** Communication system comprising *IC-1* portable intercom station belt pack; *IC-1F* is fixed intercom station for flush mounting; *IC-3M* switchboard provides connection for up to six intercom lines to any of three separate non-interfering intercom buss circuits; *PS-1* is portable power supply for up to 30 headset stations or eight speaker stations; *PS-1F* fixed power supply is similar but flush mounting; *IC-S* portable speaker station has speaker and either headset or handheld mike; *IC-SF* is similar but fixed flush mounting; *IF-1* interface connects the *Audiocom* systems with any other 2- or 4-wire communication systems, includes hybrid with balancing controls. Audiocom system is 2-wire.

### TECHNICAL PROJECTS (UK)

**Technical Projects, Electrosound House, 11 Marshalsea Road, London SE1. Phone: 01-407 6781. Telex: 885659.**

**PS1:** Simple power supply operating up to 16 outstations divided into three circuits which may be linked or separated.
**SB1:** Splitter box that distributes one communications circuit to four outlets.
**MS1:** Master station that powers up to 16 outstations on two circuits, the operator being able to talk to either circuit, but the circuits being separated.
**OS1:** Belt pack or free standing outstation, into which a headset is plugged.

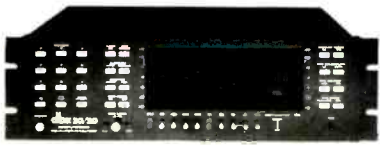
### WARD-BECK (Canada)

**Ward-Beck Systems Ltd, 841 Progress Avenue, Scarborough, Ontario M1H 2X4.**
**USA:** Ward-Beck Systems Inc, 6900 East Camelback Road, Suite 1010, Scottsdale, Arizona 85251.

**microCOM:** Microprocessor controlled communication system which may be expanded in standard modular 24 × 24 crosspoint matrices and remote turrets, the central matrix being expandable up to 192 × 192 using a square or L configuration. The microprocessor central matrix controllers and master remote turrets require only a single 2-conductor cable for complete control including tally. An installed system can be reconfigured to specify any major communication changes by simply changing EPROMs.
**7000B series:** Standard intercom systems based on 12 × 1 switching matrix, and available in standard packages of 12 × 12 or 24 × 24, and comprising two standard modules, the comprising two standard modules, the input/output amp and matrix module. All individual stations are passive, with station switches wired back directly to operate the crosspoints, and with 6, 12, 18 or 24 keys per panel. ■

# Professional Audio in Italy

OTARI

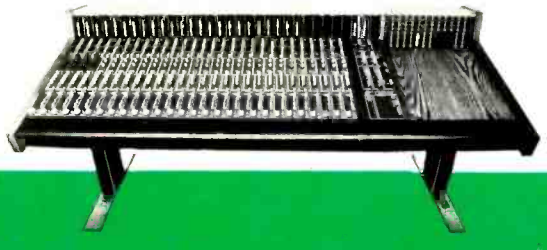


dbx

SAE

gauss

Sound Workshop



MIC MIX

DISKMIX

WESTLAKE

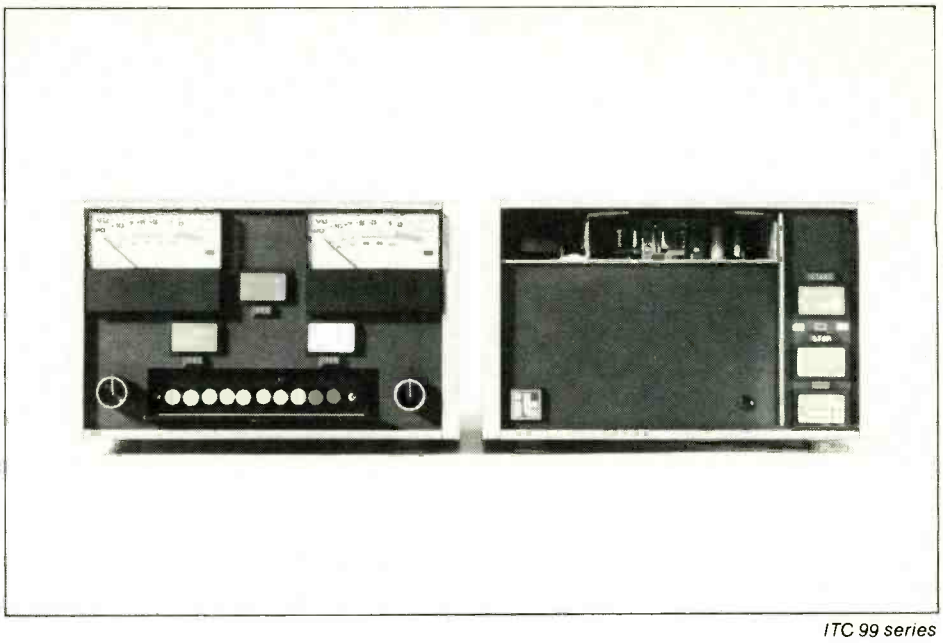
SCIENTEL audio

41100 MODENA - ITALY - VIA SIGONIO 50/2 - TEL. 059/225608 - TX 213687

ITALIAN REPRESENTATIVE FOR

OTARI DBX SAE GAUSS SOUNDWORKSHOP DISKMIX MIC MIX WESTLAKE

# product guide
## Cartridge machines



*ITC 99 series*

### AMPRO (USA)
**Ampro Broadcasting Inc, 2693 Philmot Avenue, Huntingdon Valley, Pennsylvania 19006. Phone: (215) 947-7000.**
**UK:** Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP. Phone: 09322 43124. Telex: 928475.

**Series CT2500/CT3500/CT4500:** single transport; *CT2500* player for A and AA carts; *CT3500* recorder/player for A, AA, B and BB carts; *CT4500* similar to CT3500 but also C and CC; all mono or stereo, single or three tone. Options include fast forward cue-up, erase/tape delay models and electronic splice finder; digital cue detectors and generator, remote control.
**Series CT5500 Tri-dek:** similar to model *CT2500* but with three reproduce-only transports vertically mounted. Mono or stereo, single or 3-tone models. Optional remote control and a 'mini automation system' that allows control of six decks in continuous sequence or single step modes.

### AUDI-CORD (USA)
**Audi-Cord Corp, 1845 W Hovey Avenue, PO Box 611, Normal, Illinois 61761. Phone: (309) 452-9461**
**UK:** Lee Engineering Ltd, Napier House, Bridge House, Walton-on-Thames, Surrey KT12 1AP. Phone: 09322 43124. Telex: 928475.

**A Series:** range of cartridge machines with mono/stereo, single/3-tone models; replay reminder system, full remote control, automation capable, interchangeable transports. Models include single playback, triple playback, single and twin record/play. Accepts A carts only.
**100 Series:** available as *Model 100* single transport player or *Model 115* record/play. Mono or stereo, 3-tone.

### BROADCAST ELECTRONICS/SPOTMASTER (USA)
**Broadcast Electronics Inc, 4100 N 24th Street, Quincy, Illinois 62305. 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.

**Series 2100:** single transport machines for A, B or C carts, mono or stereo, play or record/play with two tones. Three machines fit across 19 in rack; auto mono/stereo switching using dual tones.
**Series 3000:** single transport machines. *3200* replay or record/replay, stereo/mono, A or B carts, *3300* for A, B and C carts, *3400* rack mounting version of *3200*. Available mono or stereo, one or three tones. Also special machines for profanity delay or auto-start.
**Series 5300B:** triple stack mono or stereo, play only machines with similar specification to the *3000 Series*. Single or 3-tone with the option of a record amp.
**Series 5500:** five stack play only, mono or stereo with optional record amplifier.

### CARTRIDGE TECHNOLOGY (UK)
**John A Steven Professional Recording Equipment, 4 Crescent Drive, Shenfield, Essex CM15 8DS. Phone: 0277 215485. Telex: 995701.**

**NAB Cartridge Transport:** single transport, play only and record module, stereo, AA carts only, DC direct drive motor and three tones. 3x fast forward, auto electronic timer, CCIR or NAB EQ, remote control, case or rack mounted.

### CEI/CUEMASTER (Australia)
**Consolidated Electronic Industries Pty Ltd, PO Box 21, Anderson Road, Thornbury, Victoria 3071. Phone: 44 07 91. Telex: 32463.**
**UK:** Granet Communications Ltd, 39 Beechcroft Manor, Oatlands Drive, Weybridge, Surrey KT13 9NZ. Phone: 0932 47785.
**USA:** Benrub Corp, 122 West 30th Street, New York, NY 10011. Phone: (212) 564-1065.

**900 Series:** single transport machines, mono or stereo, A cart only, three tones, play only, record/play decks with record/monitor module. *910/990* models have DC servo motor, *900/980* have synchronous motor. Remote control, CCIR/IEC/NAB EQ, cue tone editing.

### DB ELECTRONICS (USA)
**DB Electronics Inc, 7851 Airpark Drive, Gaithersburg, Maryland 207760. Phone: (301) 977-7048.**

**Model DB-2000:** two transport record/play models, mono or stereo, A or B carts, three tone. Fast forward; remote control.

### FTM (UK)
**Fitch Tape Mechanisms, 7a Balham Grove, London SW12 8AZ. Phone: 01-673 1362.**

**T250 Series:** single transport replay and record/replay, mono or stereo, A carts only; single tone.
**T100:** single transport replay and record/replay, mono, single tone, A carts only.
**Cartette:** simplified play cart machine, single control to start, single tone and mono.

### HARRIS/GATES (USA)
**Harris Corporation, PO Box 4290, Quincy, Illinois 62305. Phone: (217) 222-8200. Telex: 404347.**
**UK:** Dynamic Technology Ltd, Zonal House, Alliance Road, London W3 0BA. Phone: 01-993 2401. Telex: 935650.

**Criterion 90 Series:** *90-1* play, *90-2* record/play, *90-3* triple stack play transport; mono or stereo; two or three tones. *90-1* and *90-3* accept A, AA, B, BB carts; *90-2* also accepts C and CC. Remote control and adjustable cueing time.

### ITC (USA)
**International Tapetronics Corp, 2425 S Main Street, Bloomington, Illinois 61701. Phone: (309) 828-1381.**
**UK:** FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ. Phone: 01-953 0091. Telex: 27502.

**99 Series:** single transport play, record/play or record/play with 'ELSA' (cartridge preparation system). Mono or stereo, five tones and direct drive DC motor. Microprocessor control; separate record electronics.
**SP/WP/RP/RPD Series:** *SP* play for A and B carts, *WP* also for C carts, *RP* record/play, *RPD* record/play delay, mono or stereo, three tones. NAB/IEC EQ and optical record amp for play decks.
**3D:** triple stack, play only, mono or stereo with optional record amp and specification similar to *SP*.
**PD-II:** low cost play or record/play single transport. Mono only; A cart.

### PACIFIC RECORDERS (USA)
**Pacific Recorders & Engineering Corp, 11100 Roselle Street, San Diego, California 92121. Phone: (714) 453-3255. Telex: 181777.**
**UK:** Leevers Rich Ltd, 319 Trinity Road, Wandsworth, London SW18 3SL. Phone: 01-874 9054. Telex: 923455.

**Tomcat:** available as a triple (side by side), play only unit for rack mounting or single record/play unit for rack mounting. Features include microprocessor control, mono or stereo, DC servo capstan. Uses AA carts but with non standard recording format—discrete or matrixed stereo and switchable 7½/15 in/s speeds.

### RAMKO (USA)
**Ramko Research Inc, 11355 Folsom Boulevard, Rancho Cordova, California 95670. Phone: (916) 635-3600.**
**UK:** Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP. Phone: 09322 43124. Telex: 928475.

**Phasemaster:** single transport, record/play, mono or stereo with choice of three running speeds. Features matrix stereo recording with time delay correction of phase differences on replay, three cue tones and 4-digit timer.

### SIS (UK)
**SIS Recording Studios Ltd, 57 St Andrew's Road, Northampton NN1 2PB. Phone: 0604 32965.**

**140 Series:** *S140* mono play, *S142* stereo play, *SR141* mono record/play, *SR143* stereo record/play, single tone, AA cart; fast forward; remote control.

### SONIFEX (UK)
**Sonifex Sound Equipment, 15 College Street, Irthlingborough, Northants NN9 5TU. Phone: 0933 650700.**

**μHS Series:** NAB cart machines supplied as single players, player/recorder combinations or triple stack players with fast forward and sequential operation. Features FSK record and replay facilities at the cue track. Three tones and input-output loops for dubbing applications.
**Q-PAC Series:** inexpensive mono or stereo, players or player/recorders. NAB EQ with optional CCIR; A carts; remote control; single tone.

### TELEX/MAGNECORD (USA)
**Telex Communications Inc, 9600 Aldrich Avenue South, Minneapolis, Minnesota 55420. Phone: (612) 884-4051. Telex: 297053.**
**UK:** Avcom Systems Ltd, Newton Works, Stanlake Mews, London W12 7HS. Phone: 01-740 0051. Telex: 892513.

**MC Series:** single transport, mono or stereo, play only; record module; AA or BB carts; triple tone with DC servo motor. Fast forward, remote control and optional lower speeds.

### UMC/BEAUCART (USA)
**UMC Electronics Co, 460 Sackett Point Road, North Haven, Connecticut 06473. Phone: (203) 288-7731. Telex: 23860.**
**UK:** Seltech International Ltd, Rose Industrial Estate, Cores End Road, Bourne End, Bucks SL8 5AT. Phone: 06285 29131. Telex: 848960.

**Type 100/200:** player or recorder/player, mono or stereo, single or 3-tone; A cart; low profile; fast forward.
**Beaucart II:** low cost mono player or recorder/player, single tone, A cart only.
**Type 300:** similar to *200* but triple deck, player only or recorder/player. ■

# product Broadcast automation guide

## BROADCAST ELECTRONICS (USA)

**Broadcast Electronics Inc, 4100 N 24th Street, Quincy, Illinois 62305. 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.

**Control 16:** programme automation system using microprocessor control and dual processors. Provides 3,000 programme events and 11 functions for optimum programming creativity. Typical system comprises four reel-to-reel transports, two multiple access cart transports and several single cart transports. Five video displays are provided for monitoring system status.
**Econ-Control 16:** similar system to *Control 16* but with only 2,000 events programmable, and no video display facilities.

## CETEC SCHAFFER (USA)

**Cetec Broadcast Group, 1110 Mark Avenue, Carpinteria, California 93013. Phone: (805) 684-7686. Telex: 658461.**

**Series 7000:** programme automation system using *Z80* microprocessor control and standard computer VDT. Basic system comprises single VDT, 16 audio source capability and 100 event memory. Expandable to 10,000 events and four VDT channels.

## DCC (USA)

**Data Communications Corp, 3000 Directors Row, Memphis, Tennessee 38131. Phone: (901) 345-3544.**

**Automation system:** takes control of the entire operation of a radio station from programme log to on-air switching and billing. Entire system can be monitored from single control terminal.

## ENERTEC (France)

**Enertec SA, Dept Audio Professional, 226-296 Avenue Napol, F-92505 Rueil Malmaison Cedex. Phone: (1) 732.92.23. Telex: 203404.**

**Memocast:** programme automation system using Philips Compact cassette decks under microprocessor control. Three transports per 19in rack with up to 24 transports and controller per rack. Cassettes may be located using a keyboard if they are loaded in the system, with a cueing desk available.

## HARRIS (USA)

**Harris Corporation, PO Box 4290, Quincy, Illinois 62305. Phone: (217) 222-8200. Telex: 404347.**
UK: Harris Corp, 145 Farnham Road, Slough SL1 4XD. Phone: 0753 34666. Telex: 848174.

**9000 Series:** programme automation system with several files for different schedules and these files are then integrated to form the broadcast day. Dual floppy disk drives are used for both user and system operating programs and several VDT may be used in different departments.
**9100 facilities Control:** control system to provide 'intelligent' remote control; auto transmitter control, auto logging, plant protection through fire and intruder alarms; auto control of tower lights, building temperature as well as the exercising of stand-by equipment. System comprises a family of microcomputer controlled 'building blocks' which determine the configuration for the intended application.

## IGM (USA)

**IGM Communications, 4041 Home Road, Bellingham, Washington, DC 98225. Phone: (206) 733-4567.**

**Basic A:** programme automation system with 3,000 programmable events and 1,000 labels expandable × 4. VDT for data entry with a capacity for 16 audio sources. Can also operate as a manual assist system as well as complete automation system.
**Model 400:** prepackaged time-insertion audio control unit providing automation facilities controlling six sources.
**MARC VII:** DJ controlled programmable remote control unit for the control of up to seven inputs. Consists of operator's keyboard enabling planning of programme several steps ahead.
**RAM Control Systems:** random access memory controlling up to 19 audio channels with a max of 79 sub-sources. 2K capacity expandable to 4k enabling the programming of up to 3½ days of 24 hr operation with 50 events an hour.
**Instacart Type A and B:** multiple transport cartridge players, mono or stereo, accepts AA carts, available with 12, 24 or 48 capacity units with each vertical stack of carts using the same capstan but with separate heads, tray assembly, solenoid, preamp etc. Type A provides single output but allows overlap of carts and type B provides separate outputs from each cart.
**Go-Cart II:** random access cart transport with 42 or 78 cart capabilities with single playback deck. Microprocessor control of bidirectional drive carrier for quickest access.

## MEI (USA)

**Microprobe Electronics Inc, John Hancock Centre, Suite 1532A, 875 North Michigan Avenue, Chicago, Illinois 60611. Phone: (312) 440-3111.**

**Log 4:** programme automation system comprising *110B* programmer, four Scully or Otari reel-to-reel transports and two cart carousels. Controls eight sources and provides 24 events.

**Model 100MP:** microprocessor-controlled programmer, self contained and allows the station to operate manually, live assisted or automatically. 24 and 48 event models with control of eight sources.
**Control 3:** random select controller/programmer. Can select from three sources and over 900 events can be programmed but with instant live capability.

## MICROWAVE ASSOCIATES (USA)

**Microwave Associates Communications, Northwest Ind Park, Burlington, Mass 01803. Phone: (617) 272-3000. Telex: 949464.**

**MAC-CAT:** computerised remote control system for broadcast and telecommunication use. Utilises a modular design concept with programmable microprocessor with colour graphic displays. Customised software packages.

## RCA (USA)

**RCA Broadcast Systems, Front and Cooper Streets, Camden, New Jersey 08102. Phone: (609) 338-3000. Telex: 834357.**
UK: RCA Ltd, Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex TW16 7HW.Phone: 09327 85511. Telex: 24246.

**Type RT-124:** cartridge tape *Kartwheel* for multicart playback with low cost automation programming. Stores up to 24 carts in a removable wheel.

## ROHDE & SCHWARZ (West Germany)

**Rohde & Schwarz Vertriebs GmbH, Grosse Bergstrasse 213, D-2000 Hamburg 50. Phone: 040 380191. Telex: 213749.**
UK: Rohde & Schwarz (UK) Ltd, Roebuck Road, Chessington, Surrey KT9 1LP. Phone: 01-397 8771. Telex: 928479.
USA: Rohde & Schwarz Sales Co, 14 Gloria Lane, Fairfield, New Jersey 07006. Phone: (201) 575-0750. Telex: 133310.

Automatic measuring and monitoring systems for function and performance monitoring in VHF. All systems to customers requirements.

## SMC (USA)

**Sono Mag Corp, 1091 West Washington Street, Bloomington, Illinois 6170. Phone: (309) 829-6373. Telex: 510-352 2506.**

**ESP:** programme automation system capable of handling up to 20 sources and 256 individually programmable realtime updates, seven external time functions, 20 random or instant access cart machines, 4,000 event memory, programmable digital clock and optional remote control.
**Carousel Series 350:** random access cartridge transport with 24 NAB cart capacity, single playback deck, three tones, cue track logging output and random select programming.
**Caro-Stat:** multiple transport cart player, mono or stereo, A or AA carts; available for 24 carts with two horizontal stacks of 12 each operating from a single capstan. Two tone with logging tone output. ■

# HARNESSING SOUND AT THE SPEED OF LIGHT

With the rapidly expanding video market comes the increasing demand for better sound quality. Simple extension of existing audio facilities through the addition of a video cassette machine, a colour monitor and a Q-LOCK Synchroniser offers a new dimension to your market.

Q-LOCK enables you for the first time to have precise synchronised control over an audio, video or film machine matrix in any combination.

Amongst the numerous features designed for maximum efficiency with minimum operational complexity are:

- Q-SOFT dedicated software packages tailored to your individual requirements and readily upgradable without the need to replace hardware.
- Integral multi-standard SMPTE jam sync code generator with NEW GEN-LOCK option for regenerating code.
- Use of tach pulses in 'Wind' and time code in 'Parking' and 'Play' obviates the need for machine modifications.
- Optional hi speed readers.
- Hierarchy of control assigns machine commands to any combination of machines, or any individual machine without complex replugging.
- Manual or automatic record entry and exit.
- Complete system locator with ten cue point memories.
- Cycle (looping) facility for sound to picture repeat.
- Five time code events.
- Can be integrated with external computers utilising RS232/422 protocols.
- User orientated design by graduates of post production.
- Supplied complete with generator, readers, machine interfaces and all necessary cabling and connectors.

Effectively combining any three machines, be it video, audio or film, the Q-LOCK System controls the whole machine matrix as a single piece of equipment, giving you greater flexibility, easier sound editing and improved accuracy. More machines can be added on a chase basis.

To find out how Q-LOCK can streamline your existing facilities, simply use the coupon or contact Audio Kinetics direct.

## AUDIO KINETICS

Kinetic House, Verulam Road, St. Albans, Herts. AL3 4DH, England
Tel: St. Albans 32191. Telex 299951

Please send me full details on Q-LOCK
Name .....
Company .....
Address ..... Post Code .....
Telephone no .....
Type of business Audio Video Film Broadcasting

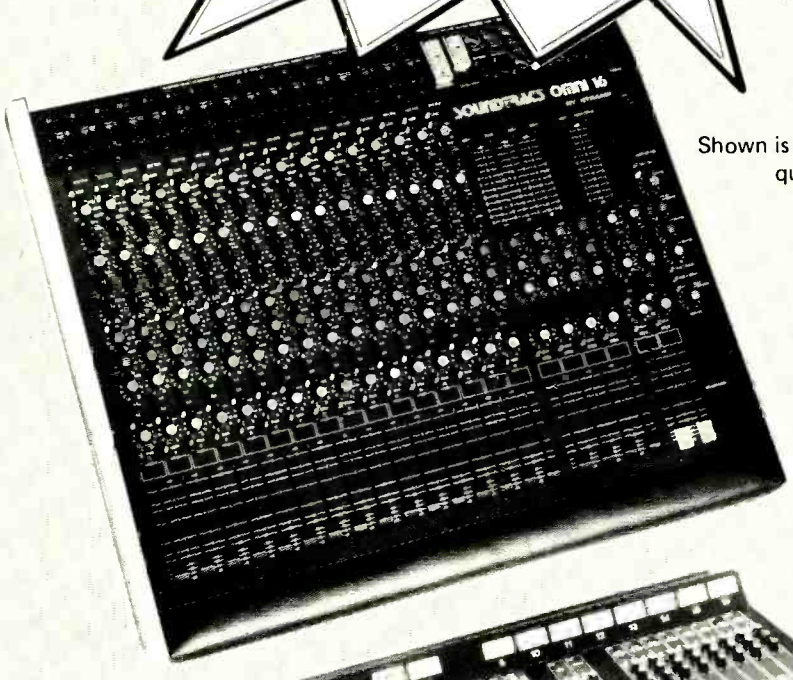
# 29 Guildford Street, Luton, Be

## Don L

## Audic

*This range has been selected as representing the best value available today. All are stock items.*

**exclusive U.K dealers**



## Soundtracs OMNI 16

Shown is OMNI 16 studio version. Soundtracs very high quality range of studio and sound reinforcement mixers 16-2, 16-4, 24-4, and 16-6 monitor mixer available.
Features of illustrated OMNI 16: Separate Mix and line inputs; Break jacks on channels; 3 band EQ: EQ IN/OUT switch; LED display metering; multi-way connectors for stage/ studio inputs and for linking 2 OMNI 16s together to make 32 input mixer.

## B.E.L 24/16/2

First in a new range of high quality low price modular consoles. Features; Separate Mix and line inputs; 4 band EQ (2 sweepable mid range); full 16 track routing; long travel faders; monitor section can be used in remix for sub grouping and extra inputs (max 42 inputs in remix); phantom power available.

**exclusive U.K dealers**

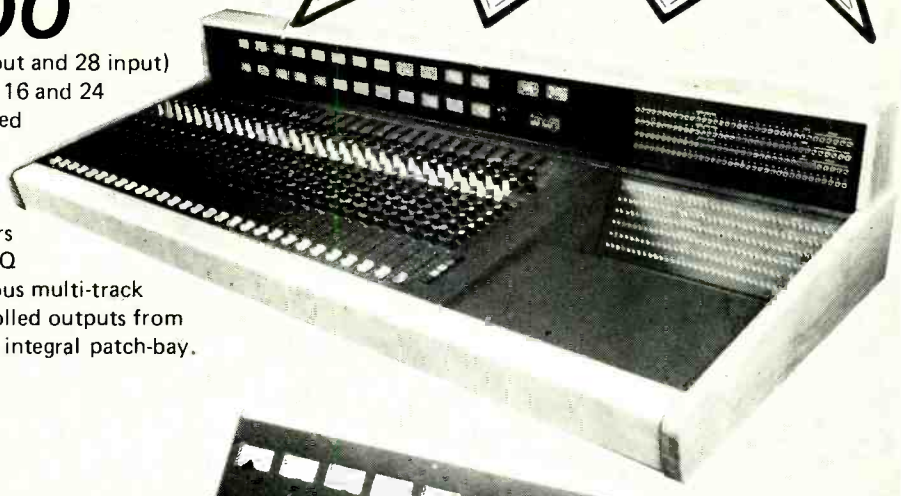
ds.Telephone(0582)450066

arking

Sales

exclusive U.K dealers

## Concord 2000

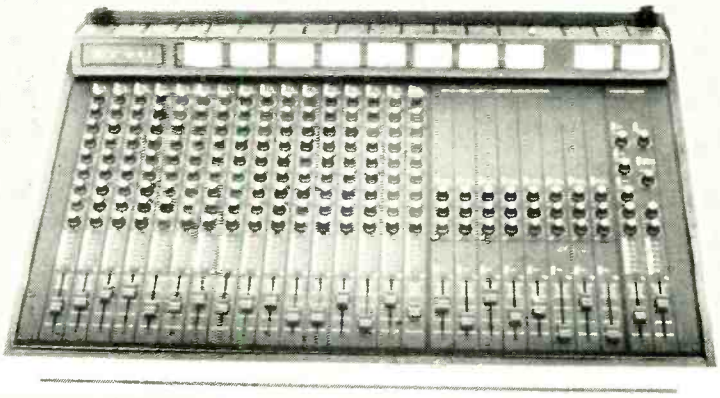


CONCORD 2000 (2 versions available – 20 input and 28 input) Without exception the best value for money in 16 and 24 track consoles. Features: Solid state programmed status switching; In-line console, able to monitor simultaneously all inputs and outputs; Monitors can be used as extra inputs and/or extra sends to 16 bus bars during remix (20 aux buses in remix) 5 Band EQ (3 swept); for broadcast application simultaneous multi-track and 'on air' stereo mix (2 independently controlled outputs from each channel); in-place solo; stereo fold back; integral patch-bay.

## Trident Trimix

The popular range of budget mixers, now includes 20x4x2 and 24x8x2 versions.
Features: Flight case; easy access to components; Break jacks on all inputs; channels routable to 8 sub groups and stereo bus; Monitorrs routable to stereo bus for sub grouping during remix; 3 band EQ with swept mid; 3 auxiliaries; low level version readily available for use with TEAC, FOSTEX, etc. machines.

## Seck 16/8/2



Fully modular expandable console. 18x8x8 shown. Extra monitors available on single module for 16 track use. Monitors can be used as extra inputs during remix. Full patching facilities. External matching patch bay extra.

# letters

## Shure standards

*Dear Sir, At Shure, we are very concerned with standardisation of audio industry practices. We were, therefore surprised to see Shure listed in Table 2 of Ken Dibble's article (What Standard?, February, 1982) as one of the companies that do not follow the IEC standard for wiring XLR type microphone connectors. Not so.*

*Shure follows the EIA (and IEC and BSI) standard for balanced line microphones: positive pressure on the microphone diaphragm produces positive voltage on Pin 2 with respect to Pin 3 of the connector. In fact, in the EIA (The Electric Industries Association of the US) Shure initiated the rewriting of a Standard, RS 221 A (Polarity or Phase of Microphones for Broadcasting, Recording, and Sound Reinforcement), to refer to the XLR type connector and to provide as just described.*

*Our involvement with this Standard lasted from 1976, when we first proposed its revision to the EIA, until 1979, when the Standard was adopted by both EIA and ANSI. (EIA is a member organization of ANSI, the American National Standards Institute, which is the US National Committee of the IEC, the International Electrotechnical Commission. BSI, the British Standards Institution is the British National Committee of the IEC.)*

*A standard adopted by ANSI must not conflict with any IEC standards. And of course RS 221 A does not conflict with IEC 268 12 or BS 5428, Part 5, Section 3. And at Shure, we follow EIA RS 221 A and do not conflict with IEC 268 12 or BS 5428, Part 5, Section 3. We wish to emphasise this point because Shure spent a considerable amount of time to see that RS 221 A was written and accepted by the US audio industry, and it took further efforts and costs to produce our microphones to that Standard.*

*In the work of the EIA committee that revised RS 221 A, the question of unbalanced line microphones also arose. Because these microphones are not often used in multiples, and because manufacturers with different practices would find it difficult to change, it was agreed not to try to standardise unbalanced line mics in RS 221 A.*

*At this time, for unbalanced line microphones, Shure follows what Mr. Dibble calls the "American Standard"; that is, the conductors are Pin 1 and Pin 3. Therefore, when a balanced line must be unbalanced, Pin 2 is connected to Pin 1. The logical outcome for phasing of unbalanced line microphones is: positive pressure on the diaphragm produces positive voltage on Pin 1. At Shure we always try to be logical, so that is the phasing we observe for unbalanced line microphones.*

**Yours faithfully,**
**R. B. Schulein and Elaine Shinbrot, Shure Brothers Inc. 222 Hartrey Avenue, Evanston, Illinois 60204, USA.**

## Digital Dilemma

*Dear Sir, It was sobering to read Peter Fellgett's article, not for some unexpected revelation, just because of the apparent incompleteness, which may have confused rather than enlightened.*

*The dismissal of digitised sound reproduction as mere fashion is as unhelpful now as it is misleading for the long term. For the first time PCM represents a complete system from studio through to consumer's living-room, including mass-manufacture of software. As an engineer I have wasted many hours listening to analogue test-pressings wondering what went wrong and trying to devise methods to make the album sound more like it did in the studio. Seeing the DAD laser-disc as part of the 'digital chain' is crucial in understanding why digitised sound represents such a huge advance, for it should be remembered that once the studio desk output has been PCM converted, there will be no further modification or mutilation of the sound by any subsequent copying, disc-pressing, or laser-disc replay processes.*

*To compare 16-bit digital favourably with studio machines at 15in/s or 30in/s is most encouraging; what would possibly be a more interesting comparison would be 16-bit digital versus a typical vinyl pressing on a typical record player, not forgetting the after effects of extra generations of analogue tape-copying resulting from multitrack remixes and production copies. By monitoring the processed output of an A/D-D/A converter throughout a digital session, one ends up actually balancing an album knowing in advance precisely how it will sound on the DAD test-pressing.*

*Peter Fellgett's proposition that with analogue tape third harmonic distortion falls by 2dB per 1dB reduction below the 3% point is untypical in my experience. Such a ratio will rarely apply near saturation for several reasons:* head-linearity *(eg ferrite heads give results different generally from iron ones);* bias-point-shift *whereby the audio contribution to the total record-head current shifts the operating point in relation to the minimum-distortion-point;* squareness-ratio *of the tape-type. The vast improvement in bass performance by changing from 30in/s analogue to PCM 16-bit has been understated, since the secondary-gap effect of typical analogue replay heads contributes to anomalies which start around middle C, right at the centre of the piano's range!*

*After close on four years of experience doing digital classical sessions with a variety of different manufacturers' equipment, I find it hard to imagine precisely what dilemma Peter Fellgett is talking about. The only one I can suggest is whether or not to stay on the deck of a sinking ship saluting bravely as the waves start lapping around one's knees. According to unconfirmed reports, around 40% of the manpower of the British record industry has been made redundant over the last 18 months, and a blind hanging-on to the status quo seems to offer little hope if any. We have now a long awaited and most necessary new technical development to pull sound reproduction out of the 19th century plough and furrow developed 25 years before the Wright Brothers' first flight. DAD laser-discs and players will be in the shops within 12 months and anyone encouraged by Peter Fellgett's piece to put his feet up and think about digital some other day should reconsider it most seriously.*

**Yours faithfully, Tony Faulkner, Pond Cottage, The Green, Harefield, Middlesex UB9 6NP, UK.**

## The Tape levy and all that . . .

*Dear Sir, It really is time to say all power to Barry Fox – and* Studio Sound *– for the continuing publicity being given to the rather silly campaign for the introduction of a levy on blank tape. (Does this include all types of tape, by the way? If it does, album costs are going to take a knock. Indeed, one wonders whether some enterprising TV producer will not be tempted to make a weekly soap opera out of it!) As a sound engineer, musician and rather heavily committed partner in a small 8-track studio trying to get off the ground (and thus actively involved in the industry), I feel obliged to make some comments about the situation and possibly some points to ponder.*

*To my mind the big question is this: is the record industry really losing money hand over fist due to home taping or has it found a convenient scapegoat? Who tapes at home and for what reasons? In my experience with the situation it results in very little loss of sales – if any – to the record dealer, and thus the companies. So who does tape at home and why? Very often people tape their own records for use in the car or around the home where putting on a cassette is more convenient than changing records all the time. Also, I know of many who use their cassettes in order to keep their records in pristine condition. Musicians often tape their records in order to learn the music, a far better way of doing things than lifting the stylus on and off the record every few seconds. I could go on but I think you get the point. We all know friends often copy each other's records but the big if here is, would they have bought the records in the first place? The reply here is usually no! However, I often find cases where people have taped records only to end up buying them. So where are the lost sales? A common denominator for all situations of this kind is that the people involved never seem to do their basic homework, ie find out the real situation and why it exists. The levy raisers might find that customers don't buy more because of a) bad pressings (I recently bought an LP in England for the first time in years and what do I get, one side with 'frying tonight' all along it. Would the record company be prepared to pay for my time and expense to go back to the shop and change it?), they can get it right here in Europe, why not in GB? b) pretty low quality productions or an excess of rehashes, c) high prices, d) poor availability and e) shall I go on? Waving a big stick and telling the public to buy more records is more likely to have an opposite effect. In my experience people buy records in spite of the problems surrounding them and that those who tape at home either have the records or would not have bought them anyway.*

*At the March AES I did a bit of my own 'market research' and the overall impression I got was that the record market needs to offer a larger percentage of quality productions – not technically but artistically, there is a difference – more readily available at the competitive price. Disco style offerings may be fine for discotheques and dancing, but for listening? There is nothing like a bit of imagination for stirring things up. The digital disc was also thought to hold a lot of promise, as well as being the answer to complaints about quality on conventional pressings. Good radio exposure was also thought to be necessary for boosting sales and bringing new acts to the public eye – and ear – both with records and live broadcasts. After all, if people don't know about it, they won't buy it. To sum up and use a phrase beloved of our American cousins, the record industry needs to 'think positive' and get a bit more adventurous. Though it is no use staying in the past, one must admit that the way and style of doing things in the 60's did often work!*

**Yours faithfully, T R Nelson, Chemin des Roses 2, CH1400 Yverdon, Switzerland.** ■

## AGONY

Quote of the month by expert witness from the Metropolitan Police Tape Laboratory:

"Hertz is a German word for cycles per second."

# Reel Dynamite

There's only one way to produce a tape that will deliver a consistently super-clean sound.

And that's simply by blowing all compromise in a tape's over-all dynamic design.

Easier said than done, of course.

But thanks to 3M tape technology, Scotch 226 Audio Mastering Tape has managed to blast a way through the compromise barrier.

Take the hairy problem of print-through, for instance.

**Unlike most other state-of-the-art mastering tapes, Scotch 226 tapes, from 3M provides 2 to 3dB less print-through than the best of its rivals.**

**Which, in itself, is pretty devastating enough.**

But what about factors such as headroom and biased tape noise?

Or signal-to-noise ratios? Or distortion and frequency response levels? All those factors that directly influence ultimate sound quality?

In two words: no compromise.

Reel after reel, batch after batch, Scotch 226 Tape delivers headroom and distortion properties that are simply second to none.

And the same goes for extended frequency response or modulation noise capability or anything else you might care to name.

All in all, Scotch 226 Tape hands you what no other high-performance mastering tape can: pure, sweet, super-clean sound.

Scotch 226 Audio Mastering Tape. By all means give it whirl.

But prepare your ears for some demolishing reverberations.

For further information please contact:

Martin Luddington,
Recording Materials Division,
3M United Kingdom PLC.,
3M House, PO Box 1,
Bracknell, Berkshire RG12 1JU
Telephone: Bracknell (0344) 58398


3M and Scotch are trade marks

3M

# Cartridge Machine Design

which the cartridge slides into position.

The Sonifex transport system consists of machined alloy parts assembled as a box frame with porous oilite bearing blocks carrying the pinch roller cross spindle, on which is mounted the pinch roller at 90° to the cross spindle. The cross spindle carries a worm wheel which engages with a worm spindle running in dust-sealed ball races at each end. At one end of the worm spindle is a miniature universal coupling attached to a coreless DC servo motor and at the other end of the spindle is a bearing cap and pre-load adjuster. The cross spindle carrying the worm wheel also has a miniature coupling attached to a 360° servo pot which senses the position of the pinch roller. The motor has extremely low inertia and reaches terminal angular velocity in some 40 mS. The motor and servo pot are in a closed loop analogue positional servo system with the electronic control circuits critically damped. When given an instruction to go to a new position, the servo system responds, arrives and stops accurately.

The final position of the system is determined electronically and may be set to give extremely accurate pinch pressures by means of a preset adjustable potentiometer. Further, the 'down' position and the 'ready', partially-lifted position of the roller may be set using preset controls. A partially raised 'ready' position, when the cartridge is inserted, gives extremely rapid and silent starts, the pinch roller rising from the operation of a microswitch.

Take away the power from the system and, because it is a worm and wheel, it remains in position even when loaded and pulling tape. The system is extremely fast, very quiet and precise and only has power applied when instructed to move, in all the ideal system for a compact NAB cartridge machine. The wearing properties of bronze wheel and steel worm spindles are also excellent under the prevailing mechanical load conditions.

The capstan, running in two sealed microfine ball races mounted at each end of the spindle within a machined bearing housing, is assembled through the alloy box section. The capstan with flywheel is belt driven from a velocity controlled DC tacho motor mounted at one side of the box frame. The combination of massive flywheel, ground capstan with belt drive from a DC tacho motor, presents an ideal opportunity to achieve very good wow and flutter figures. The drive motor servo control is achieved by digitally processing the tacho signal and slope-converting to present an analogue signal to the drive motor. The motor may be switched to give high speed running by adjusting the closed loop drive parameters. The choice of flywheel and pulley size from a given motor type are determined from the conditions required to pull a full NAB cartridge at the optimum pinch pressure. The tacho motor used has a 9 segment commutator running at 955 r/min normal speed giving 143.25 power impulses per second at the tape capstan. This frequency falls within the CCIR weighting curve for wow and flutter measurements (CCIR recommendation 409-2) some 20 dB below the peak response of the weighting curve. In addition the belt and flywheel act as a mechanical smoothing circuit, the analogue of which is a power supply choke and smoothing capacitor. The residual motor impulses are damped by the effective mechanical time constant of the system.

Direct drive capstan systems employing Hall-effect motor drives, alternatively, present pole piece impulses which lie well within the CCIR wow and flutter weighting curve closer to the peak response at 4 Hz and inherently present higher wow and flutter figures.

Speed accuracy of a servo controlled belt drive system can be readily held within 0.1%.

A large contribution to wow and flutter is presented by the pinch roller and its associated bearing. Several materials are available for the pinch roller and, whilst natural rubber ensures minimum tape slip, with high pulling forces the imperfections within a moulded and ground rubber roller system produce higher flutter figures than currently available neoprene rollers. In all cases, with a well designed drive system, the pinch roller contributes greatly to flutter and minimally to wow; this is especially true of a pinch roller having accumulated oxides and graphite. The moral is to clean the pinch roller regularly. Pinch roller bearings that align to the capstan-tape system can readily be achieved using sub-miniature single ball races, eliminating any possibilities of tape skew due to pinch roller misalignment. The problem of tape skew with irregular pulling forces across the tape results in HF azimuth misalignments and phasing errors.

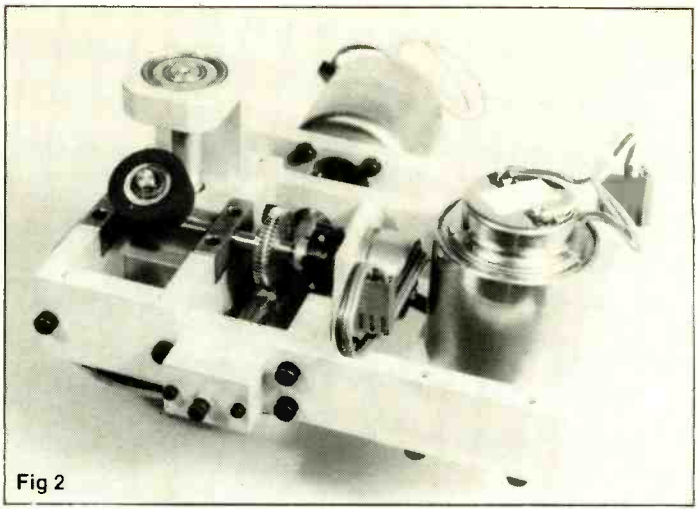


Fig 2

The tape is guided across the heads in the machine by edge tape guides which penetrate the cartridge. The tape guides must be accurately machined, aligned vertically and perpendicular with reference to the cartridge platen. The tape running through the guides must not be obstructed or allowed to weave over the heads. The use of four guides around the heads, each of minimum thickness, ensures an accurate stable tape path, see **Fig 3.**

The replay and record tape heads must penetrate the cartridge to the required depth and be mounted such that the pole edges are at the correct height relative to the cartridge platen. Head mounts which offer full adjustment of height, zenith and azimuth are more readily set up and allow for maintenance adjustments to compensate for head wear and also allow for a quick interchange of heads, although alignment tools are required for resetting. Head penetration is an important feature, to maintain the head-to-tape contact and head wrap around created by the resilient pads within the cartridge shell. Falling HF response may be too easily created by insufficient head-tape contact.

Finally, cartridge guidance is most important. The cartridge slot must be smooth so that the cartridge may be inserted and removed freely and, at the same time, guide the cartridge to the correct operating position. If the cartridge is inserted slightly misaligned, the guidance system should ensure that the cartridge is seated correctly against the right hand reference edge, fully inserted for head penetration and also maintaining full contact with the cartridge platen. A positive downward pressure, all around the cartridge from above onto the moulded cartridge rib section, will ensure that the left hand corner post of the cartridge is held in the correct position. A fixed right hand reference guide and two horizontal slides, lightly sprung down at each end to achieve downward pressure, maintains the cartridge in contact with the platen. A fully sprung left hand slide, rocking about a fulcrum at its centre, ensures that the cartridge is pushed to the right hand reference under all circumstances. All the slide members and guides are highly polished chrome, offering the least mechanical resistance to the cartridge. Both sideways and vertical misalignments of the cartridge produce HF phasing error and falling HF response problems.

The electronic circuits of the NAB cartridge machine can be classified as (i) Head amplifiers and output stages. (ii) Cue detection. (iii) Machine logic and interface. (iv) Power supply. (v) Recording circuits.

The head amplifier input is presented with a signal level some 60 dB below 0 dBu at 1 kHz. This signal is required to be amplified and equalised to give a level response between 40 Hz and 16 kHz. A single time constant CR network is employed of 70 $\mu$s equivalent CCIR and 50 $\mu$s equivalent NAB.

Typical stereo replay heads have individual winding inductances in the range of 65 mH to 400 mH and a DC winding resistance in the region of 120Ω. The head self-resonant frequency will usually fall well outband of signal frequencies in the region of 40 to 100 kHz. Heads for NAB cartridge use are usually provided mounted in a plain mumetal case with the terminations brought out at the rear on tinned copper

60 ▶

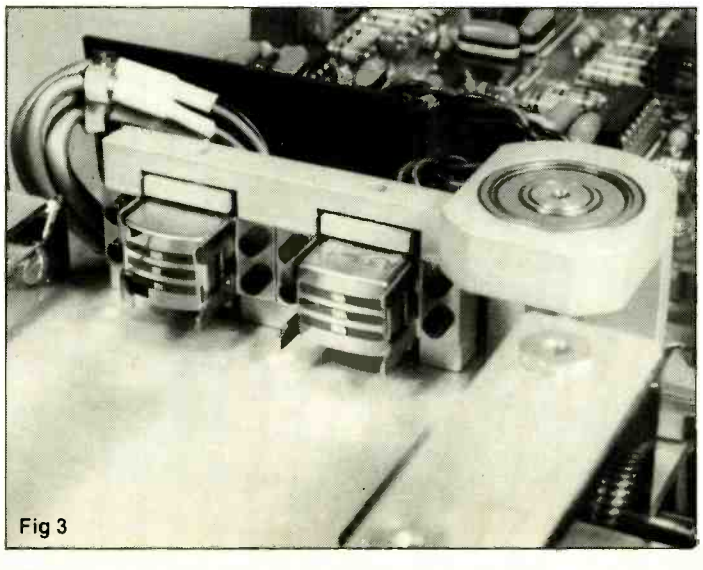


Fig 3

# Super Prime Time lets you put your personal stamp on audio effects.


The Super Prime Time is the first microprocessor-based special effects device and audio processor which enables you to create, store and recall effects for any piece of music live or in the studio.

Eight conventional sound effects are built-in (flanging, tripling etc), and there are 32 additional memories that can be used to modify, create and store your own personal effects.

There is up to 1.92 seconds of full bandwidth delay (from 20Hz to 20kHz), which increases versatility.

Each effect can be recalled at any time through the panel controls or at the touch of a footswitch.

Complete effects programs can be stored on tape, and re-loaded on to any Super Prime Time processor when needed.

Super Prime Time. The effects are out of this world. For full details, contact F.W.O. Bauch Limited.

**Lexicon**

Lexicon Inc. 60 Turner Street, Waltham MA 02154

## F.W.O. Bauch Limited

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

# Cartridge Machine Design

contacts suitable for connection to a female pin-clip assembly. The headmount is designed to grip the head casing with a locking clamp in the correct attitude to the cartridge platen.

Current head amplifiers, employing the *NE5534AN* or similar achieve static signal to noise ratio figures in the region of –48 dB peak weighted (CCIR recommendation 468-1), reference 160 nWb/m fluxivity at 0 dB, 1 kHz.

The use of head tuning at the amplifier front end achieves several positive advantages. If the head inductance is made to tune at a frequency just outside the useful passband, ie 18-20 kHz, and the Q of the resultant circuit is adjusted by means of a parallel resistive load, some useful degree of HF lift or head loss compensation may be achieved if the Q is carefully controlled. Further, outband signals, MF interference bias and demodulated RF at the head, will be trapped by the falling HF response of the head tuning circuit, achieving useful immunity to HF magnetic radiation. It is usual to employ both LF and HF trimming circuits giving some ±8 dB or so lift and cut at 100 Hz and 10 kHz respectively, to finely trim the final response within the limits defined by the test procedure in use. Modified Baxandall circuits perform these functions well and may be employed after equalisation.

A mute stage is generally inserted into each head amplifier chain to provide mute in the fast forward and stop modes. The output stage is normally required to drive a balanced signal at 0 dBu with a maximum operating level of +22 dBu either electronically balanced or, more acceptably, transformer balanced to the output connectors.

The output stage should be capable of driving loads down to 600 Ω without level changes, and suitable low impedance output stages are well known. The Sonifex machine employs an electronically balanced output stage that performs in every respect as an output coil. Machine outputs may be connected in series direct, phase to non-phase, etc, to provide a lossless output summing circuit. This condition is often required when three machines are connected as a stack into one fader input.

The cue circuits are required to amplify, equalise and detect the three main cue signals at 1 kHz, 150 Hz and 8 kHz respectively and, in addition, detect the 1 kHz stop cue when in fast forward. In all, four detectors are required for this function and have precisely defined pass bands and threshold levels. The 1 kHz detected cue is used to logic stop the machine in both fast and normal speed. The 150 Hz detected cue is used when required to logic fast forward the machine at the end of the 150 Hz cue and is also available as a remote output TTL pull down. The 8 k cue provides a remote output TTL pull down. Each of the cue threshold levels are set independently by means of preset controls.

Where FSK information is used on the cue track such information will be contained within a pass band centred around 3.5 kHz extending between 3.3 kHz and 3.7 kHz. The FSK cue detector is a filter having a pass band window defined as above together with an output stage giving 0 dBu at 3.5 kHz. This output may be used with a demodulator to provide FSK serial data.

The machine logic and interface enable the operator to initiate play, stop and fast commands both locally and remotely and also interface the recording sequence and provide record interlock when in play. Further remote connections of the machine logic allow the secondary cue of one machine to initiate play on the next machine allowing a stacked operation firing three cartridges sequentially.

The machine logic provides all the necessary functions for lifting the pinch roller and disabling the amplifier mute circuits, accepting the cue detector signals and providing the correct sequence of operations.

The power supply on a machine of this type has a special duty and must provide a relatively low mean power in standby and run and a high peak power with the pinch roller moving or fast forward selected. The use of a toroidal mains transformer provides a compact low-voltage, high-current capability with a low external magnetic field some 10 dB below that of a conventional laminated transformer. The power supply also carries protection circuitry to ensure that, if one supply rail fails, both are switched off, an essential requirement with high torque servo systems operating from split rail supplies. The power supply protection also ensures that, if the mains supply is switched off with a cartridge in the slot, the pinch servo is instructed to go to rest, so that the cartridge may be removed.

## Recording Circuits

The recording circuitry can be considered in three parts:

- Recording amplifier chain.
- Cue signal generators.
- Bias and record logic.

The record amplifier chain is essentially a gain stage with a maximum gain available of 22 dB over normal levels with a headroom of up to +22 dB above normal level. The output of the amplifier feeds the record head through a constant current network and bias trap. Bias is normally injected in parallel with the signal feed through an LF blocking circuit. The bias trap may be a series or series parallel combination trapping HF bias from the record amplifier output and, at the same time, presenting a selectively high impedance load to the bias current ensuring that a high percentage of the bias current flows in the record head winding. The record amplifier requires an HF peaking circuit giving some ±8 dB at 10 kHz to allow for compensation of the various head losses at high frequency.

*The finished article*

The cue signal generators are required to produce:

a) 1 kHz ±50 Hz primary cue burst at the start of recorded material, 500 ms in length, at a level of 160 nWb/m (0 dB).

b) 150 Hz ±50 Hz secondary cue as required 360 nWb/m (+6 dB), minimum burst length 100 ms, maximum as required.

c) 8 kHz ±400 Hz tertiary cue as required 20 nWb/m (–10 dB), minimum burst length 2 ms, maximum as required.

FSK logging tones may be placed on the cue track in a window betwnn 3.3 kHz and 3.7 kHz at a level corresponding to 35 nWb/m (–10 dB).

The primary cue is placed on the cue track by the start-recording sequence of the machine. The secondary, tertiary and FSK signals are placed on the cue track by the operator. The cue amplifier to record head output circuits are identical to the record amplifier circuits. Distortion in the cue burst generators is limited to 5% maximum.

The record logic is required to interface with the play and stop controls of the machine and to provide the 1 kHz cue enable at the recording start. The end of the 150 Hz secondary cue switches off the bias and terminates the recording sequence. In practice it is usual to arrange that secondary and tertiary cues may be placed on tape during the play mode in order to facilitate post-production editing.

When the machine is placed in the record mode, the record head is connected to the record amplifier and bias circuits either by semiconductor technology or using a mechanical relay. The bias is then brought up to full level in a controlled manner to prevent bumps on the tape. The record-off sequence is the reverse. The bias is brought down in a controlled manner and then the head relay disengages the record head from the amplifiers.

The bias oscillator is required to produce a waveform with a very low harmonic content in order to prevent DC noise from being recorded on the tape. Total harmonic distortion figures for bias oscillators should be in the region of 1% at bias frequencies between 100 kHz and 250 kHz. The choice of bias frequency is largely determined by the record head inductance but will be higher than five times the highest recorded frequency. The output impedance of the bias oscillator must be sufficiently low so that adjustments of bias on any of the three tracks has no effect upon the other tracks. The optimisation of bias current for a particular tape coating is determined by several factors. **(Ref. 3)**. The *micro HS* series recorders employ a bias setting of 0.75 dB overpeak at 1 kHz which produces 1.5% total harmonic distortion at +10 dB above operating level at 1 kHz, whilst maintaining a frequency response to 16 kHz within 1 dB.

The effect of underbiasing is to produce higher distortion products whilst overbiasing produces a falling HF response. The optimum is a choice between the two parameters. ■

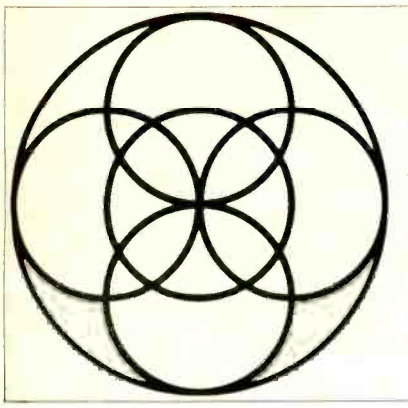
For those striving for a more detailed knowledge of recording techniques or the basic specifications of NAB cartridge machines, I can recommend the following three technical sources:

**Reference 1:** *IBA Code of Practice, 1978,* published by the Independent Broadcasting Authority, 70 Brompton Road, London, SW3 1EY.

**Reference 2:** *NAB Standard Cartridge Tape Recording and Reproduction,* 1976, Engineering Department, National Association of Broadcasting, 1771 N. Street N.W., Washington D.C. 20036, U.S.A.

**Reference 3.** *Magnetic Tape Recording,* H.G.M. Spratt, published by Temple Press Books.

# Sony have just made the world's most advanced 24-track analogue recorder...



# Ambisonics - Questions and answers

Richard Elen

**Although the NRDC ambisonic surround-sound technology has been in existence for over a decade, it has been largely unknown to engineers and producers outside the UK. This article covers some of the primary aspects of the system and how it may be applied, in question-and-answer form.**

**Q** *What, exactly is Ambisonics?*

**A** Ambisonics is a system for capturing or creating a soundfield and reproducing it in the listening environment in such a way as to recreate the original placement of sounds and instruments. In its ultimate form, it can represent this soundfield in all three spatial dimensions. At a lower level, it can create a horizontal soundfield which does not include height information.

**Q** *What is the difference between ambisonics and "quad"?*

**A** A great deal. "Quadraphony" failed because it was based on a false premise: that a soundfield could be represented by four separate sources of sound, behaving, if you like, as four stereo signal pairs around the listener: this is simply not true. In addition, there was a profusion of different systems, none of which were technically satisfactory. Ambisonics is one hierarchical system which is truly compatible all the way from with-height "periphony" to mono. It also has the advantage that it works: ambisonics recognises the fact that speaker feeds must be interrelated to reproduce a coherent soundfield exactly like that which was recorded or created. A lot of effort was expended by the proponents of "quad" to attempt to capture four separate channels of information and transmit them, either matrixed into two and subsequently recovered (which is impossible), or encoded with extra subcarriers which required a great deal of sophisticated equipment to extract. An ambisonic signal does not suffer these limitations.

**Q** *What does an ambisonic signal comprise?*

**A** A three-dimensional soundfield can be captured (for example on tape) on four channels: these correspond to a mono signal (usually termed "W"); front minus back ("X"); left minus right ("Y"); and up minus down ("Z"). Removing the "Z" channel of this "B-Format" signal leaves you with a horizontal surround-sound signal on only three channels. Removing the "X" channel returns you to sum-and-difference stereo information only. A signal of the B-Format type can be generated in a number of ways, and it can be replayed through a suitable speaker system via a decoder which produces speaker feeds to recreate the surround information, in much the same way as a sum-and-difference matrix decoder creates left and right feeds from L+R and L−R in FM stereo radio.

**Q** *How can an ambisonic B-Format signal be transmitted, or cut on disc?*

**A** This depends on the number of transmission channels available. The capturing of the surround information, and the transmission of this information are quite different techniques. The B-Format signal, for instance, does not need to be directly compatible with stereo or mono, but for most applications the transmitted form must be available to listeners who do not have special decoding equipment: it must be compatible with traditional forms. The UHJ hierarchy of encoding and decoding methods enables the maximum amount of surround information to be transmitted on the available channels, yet also allows for compatibility with both mono or stereo. Thus, for example, the three B-Format channels of horizontal ambisonic surround sound may be encoded into two channels for cutting on conventional disc or for stereo radio broadcasting, producing horizontal surround for those who have decoders, stereo for those who have stereo, and mono for the portable radio or record-player listener. It is possible to encode horizontal B-Format in mono-stereo-compatible form using three channels, as the IBA have demonstrated, for FM transmission with phase-quadrature modulation carrying the third channel at full or reduced bandwidth.

The coming of the digital audio disc opens up new possibilities, of course: the four-channel capability of the Philips/Sony *Compact Disc* makes periphonic (three-dimensional surround-sound) disc releases possible: in such cases, listeners equipped with suitable decoders could experience full surround-sound, while those with horizontal-surround decoders could play *the same disc* and hear excellent reproduction, without the height information. Yet listeners in stereo and even mono would still hear all the music, albeit without the extra localisation information that ambisonics provides.

**Q** *How does the listener decode the signal?*

**A** The signal source, be it disc, radio transmission or tape is fed into a decoder unit. This takes the encoded information on the signal and produces low-level outputs corresponding to the number of loudspeakers to be driven. For horizontal surround sound this is typically four or more, while for periphony a minimum of six speakers is required. These outputs can be fed to amplifiers and speakers in the normal way. A typical decoder also has controls to compensate for the distance and position of loudspeakers in the room, and often an ability to use part of the decoder circuitry to "spread" ordinary stereo around the room—so called "super-stereo".

**Q** *How stable is the surround-sound image? Is the sound the same all over the listening area?*

**A** Unlike "quad", and much conventional stereo, ambisonic surround-sound does not rely solely on level to localise a sound. The "quad" systems which relied on level, and conventional "pan-potted" stereo, suffer the disadvantage that the perceived position of a sound is very much dependent on the listener's position in the listening area. Small changes in listening position cause large changes in the sound image. In addition, there is no "depth" to the sound: with pan-potted stereo, sounds can only appear to come from a straight line between the speakers. For a good image, the listening position is very small. Ambisonics, however, utilises phase information as well as level to localise the image. This means that the stability of the surround-sound picture is much less dependent on listening position—just as it is when listening to a coincident-pair stereo recording as opposed to a pan-potted one. In fact, you can go right up to a speaker which is part of a surround-sound replay system and the image will not shift appreciably. The relative *levels* may alter, but the *image* stays more or less constant over a wide area. In fact, even outside the speaker layout, the soundfield image may be appreciated.

**Q** *Exactly how truly compatible is a UHJ-encoded surround-signal?*

**A** The simple answer is virtually completely. When a surround-sound signal is "collapsed" into stereo, there is in theory a slight phase-variation which could affect signals which are localised to the rear of the soundfield. However, this is seldom, if ever, noticed in practice. Indeed, listening to a UHJ signal in stereo on loudspeakers often produces an impression of the stereo sound-stage being wider than normal; on headphones, a UHJ signal replayed in stereo can produce an impression of "surround"—not a true ambisonic soundfield of course—but a distinct impression that some sounds are a little behind you and others a little in front, as if the human ear/brain combination was contributing a degree of "aural decoding" to the signal.

**Q** *How can an ambisonic recording or broadcast be made?*

**A** There are a number of methods available, some of which are currently still under development. There are three basic approaches: the Soundfield Microphone, the Transcoder, and the ambisonic mixer. The Soundfield Microphone is most easily applicable to the concert environment, where a B-Format signal may be produced from a single microphone in the auditorium, this signal either being recorded on four channels of a tape recorder, for subsequent UHJ encoding, or encoded directly into UHJ for two-channel recording or FM stereo broadcast. The B-Format signal may also be encoded in other ways under the UHJ hierarchy, as already described.

The Transcoder does not produce a B-Format signal, but outputs a two-channel UHJ-encoded signal that may be broadcast, recorded or cut to disc directly. The input to the transcoder is generally in the form of four signals, corresponding roughly to the four group outputs of a conventional "quadraphonic" desk. There is also a B-Format input for a Soundfield mic, etc. Thus a multitrack tape recording may be mixed down through a "quad" desk and the result transcoded to produce an ambisonic mixdown. As the transcoder in fact utilises two sound stages—180° wide at the front and slightly less to the rear—there are certain limitations to the

64 ▶

Even the finest 24-track analogue recorder money can buy can't compete with the Sony PCM-3324 Digital Multi-Track recorder. Its unbeatable sound quality takes recording performance that much closer to reality.

With punch-in/punch-out recording, variable speed and splice edit, the PCM-3324 has all the features you'd expect from the ultimate analogue machine. But with the added benefits of Digital technology.

Because with a dynamic range in excess of 90 dB, undetectable wow and flutter, no print-through, no loss of quality on repeated copying, and variable cross-fade, Sony are revolutionising multi-track mastering.

Giving the recording engineer unprecedented control over the creative recording process and making better use of valuable studio time.

And because the PCM-3324 is fully tape compatible with comparable 24-track systems from other leading makers such as Studer and MCI, Sony have ensured you won't be tying up capital in a format which doesn't even cross the boundaries of your own studio.

If you'd like to know more, contact Keith Smith or Mike Jopp at Sony (UK) Ltd, Pyrene House, Sunbury Cross, Sunbury-on-Thames, Middlesex, or telephone Sunbury (09327) 81211.

And find out how Sony are making even the newest analogue recorder out of date.

COMMUNICATION SYSTEMS DIVISION
SONY

# ...obsolete.

## Questions and answers

placement of sounds in the soundfield. The transcoder in addition, by virtue of not producing a B-Format output, does not facilitate certain creative engineering effects such as rotating one soundfield within another. Thus the transcoder is best utilised for simple mixdowns only, and for the conversion of existing "quad" 4-channel masters to UHJ ambisonic form.

The ambisonic console may take two forms: either a complete mixing desk equipped with ambisonic "panpots" and effects controls, in addition to conventional eq, routing and other facilities, or a "mixdown panel" which may be patched into the direct channel outputs of a conventional desk, offering ambisonic localisation controls and effects returns, plus B-format inputs. In both cases, a multitrack tape, produced in the conventional way with perhaps the addition of a Soundfield mic for capturing certain instruments (eg. drums) and ambience may be mixed-down to B-format for subsequent encoding via a suitable UHJ encoder. Such equipment, which is currently under development, may offer horizontal-surround only or full periphonic mixdown capability, with a number of sophisticated effects controls including ambisonic reverberation facilities and soundfield alteration capability. There are no theoretical restrictions on sound-source placement within the two-or-three-dimensional soundfield, and the generation of a B-Format master allows the material to be subsequently reissued in more advanced formats. For example, it may not be possible to release a periphonic mixdown in periphonic form today, but it may be released initially in horizontal-only UHJ. However, with the advent of multi-channel digital audio discs, the material may be made available in "full-surround" form.

**Q** *What is the Soundfield Microphone?*

**A** The Soundfield mic is a special microphone designed to capture the entire ambient soundfield from a single location. An example of this type of microphone is the well-known Calrec design, which may be used both for ambisonic recording or broadcast, or for stereo purposes. In the latter case, the signal may still be recorded in B-Format, the recording subsequently being replayed via the accompanying control unit, allowing the re-orientation of the microphone—in terms of polar diagram, direction, and effective physical position—*after* the recording has taken place. As the entire three-dimensional soundfield is captured, it may be modified after the event. The microphone itself consists of a tetrahedral array of capacitor-type capsules and appropriate preamplifiers. A control unit takes these capsule signals ("A-format") and converts them to standard ambisonic B-format, allowing comprehensive control of effective microphone orientation at the same time. This microphone is thus useful in conventional stereo applications, with or without additional conventional mics, as well as being all that is needed for an ideal ambisonic recording or broadcast of a live event.

**Q** *What do I need to record: a) a live concert, or b) a band in the studio, ambisonically?*

**A** In both cases, you will need a professional decoder and speaker system for monitoring applications. If we consider the example of a horizontal-surround recording, you will need a horizontal-surround decoder and at least four matched loudspeakers. The four should ideally be identical—different loudspeakers produce the same kind of loss of image localisation as two different speakers would in stereo listening—and the monitoring environment and speaker placement should be optimised. In general, a studio control room equipped for "quad" monitoring will be sufficient for this. For example (a)—the live concert—it will normally be quite sufficient to place one Soundfield Microphone in a suitable central position. The B-Format output of the mic control unit should be routed to a 4-channel recorder, or via a UHJ encoder to a 2-channel machine, the setting of the soundfield controls on the control unit being optimised for the best results. For example (b)—the band in the studio—normal multitrack techiques may be utilised, in which case no surround-sound monitoring system will be required until mixdown, unless a Soundfield mic has been used for ambience or other recording during the session. In the latter case, the B-Format signal should be recorded on four channels of the multitrack, as and when it is required. Surround monitoring may be useful in this instance, at least for monitoring the signal going to tape to check for correct mic position. An ambisonic console or mixdown panel is then used for the mix, and the resultant B-Format signal is then recorded on 4-track for subsequent encoding. Alternatively, a transcoder may be used as described earlier.

**Q** *What is required to transmit or cut such a recording?*

**A** Taking the typical current example of FM stereo radio or conventional stereo analogue disc, the B-Format signal must first be encoded into UHJ 2-channel form. This is the current domestic format. The signal is then simply transmitted or cut to disc as normal.

**Q** *Are there any special requirements to cut an ambisonic disc?*

**A** Continuing with the example of cutting a conventional analogue master lacquer from a UHJ-encoded 2-channel source, the usual constraints should be observed—for example, loud out-of-phase signals may cause problems unless there is a strong bass signal located centre-front (we may regard this as "North"). As ambisonics uses phase as well as level to provide localisation, exceptionally heavy bass signals to rear of the soundfield, particularly from the "South" should be avoided in the mix unless there is a good "anchor" sound in that register from the "North".

On the cut itself, there may be deleterious effects to rear localisation if phase-correction equipment is used: just as phase-related stereo effects on conventional recordings may suffer from the same process. As far as possible, the mix should be optimised to avoid such problems, typically by hooking up a UHJ two-channel encoder on the mix to encode the B-Format signal and observing its characteristics on a phase-meter. The phase-meter should also be observed during the encoding process itself, to check that the mix has been optimised in this respect. However, it is worth noting that although these points *may* produce minor problems with unconventional material (especially heavy effects or rear reverberation, for example), such problems are very seldom ecountered in normal ambisonic work.

**Q** *Where can I obtain the necessary equipment?*

**A** The Soundfield microphone is an existing feature of many studios, where it is recognised as a useful stereo microphone. It may be purchased from Calrec Audio Limited, Hangingroyd Lane, Hebden Bridge, Yorkshire HX7 7DD, UK, or hired from Whitetower Records, 2 Roche Gardens, Milton Keynes MK3 6HR. Other equipment and manufacturers were given in the Product Guide in *Studio Sound* August 1982.

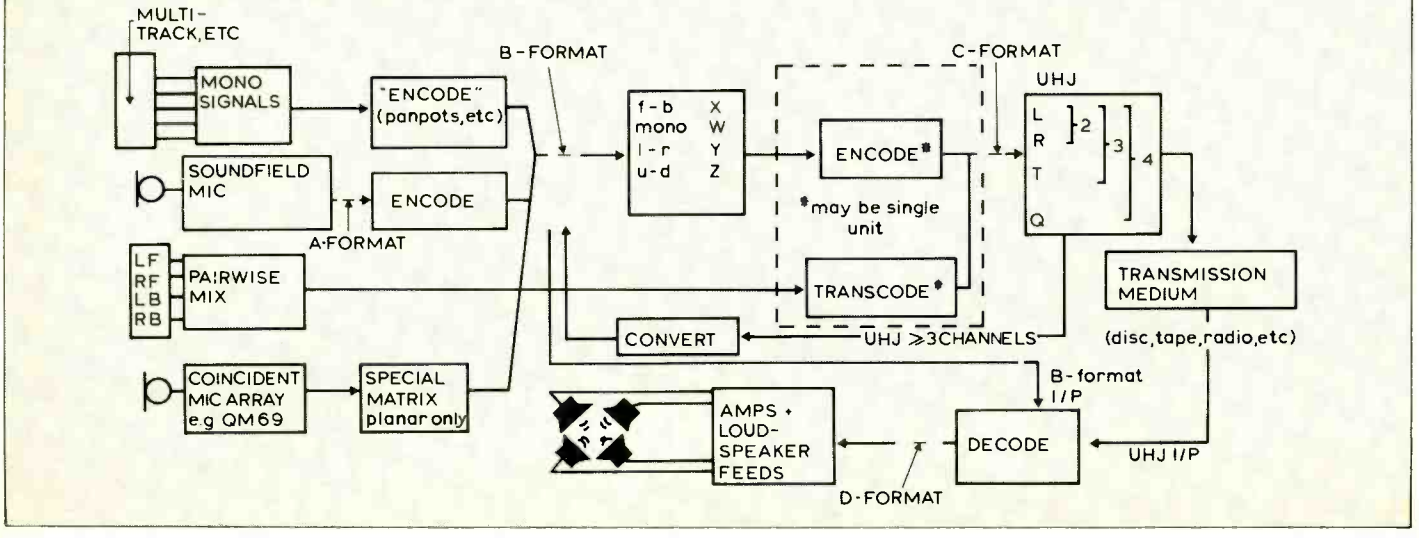
**Q** *How can I hear a demonstration of ambisonics?*

**A** There are already over 100 album titles available of music recorded in UHJ with the Soundfield mic. Information on how some of these may be heard can be obtained from the NRDC Ambisonic Advisory Service.

**Q** *Where do I go for further information?*

**A** The NRDC Ambisonic Advisory Service exists to provide information to manufacturers, producers, record companies, studios and others interested in ambisonic surround-sound technology. For technical information on the system, as well as details of manufacturers and record companies already involved in taking "the next step" in sound recording and reproduction, contact: NRDC Ambisonic Advisory Service, PO Box 98, High Wycombe, Bucks. HP11 1PJ. Phone: 0494 445951. ■

**The Ambisonic signal path and conversion possibilities**



Pond Cottage
The Green, Harefield
Middlesex UB9 6NP
England

Tel: Harefield (0895 82) 2771
Telex: 938527 EPICEN G

The SM81 has been quite a shock to me, not only from when I first tried it out, liked it, and decided to buy a pair, but also a year later when I discovered from the brochure that the mic. was an electret.

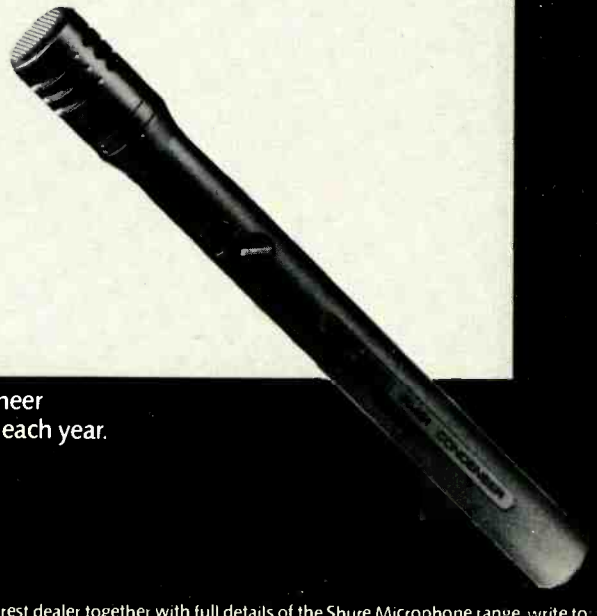
Shure Brothers have always had a good name for robustness and reliability, and electrets are usually thought of as a low cost alternative to regular capacitor mics. with some sacrifice in sound quality.

With the SM81 Shure have produced an unique combination - together with a transparency of sound and freedom from coloration, distortion and noise comparable with other manufacturers' traditional condenser models costing a lot more. The switchable bass roll-offs and attenuator are helpful extras as well, and missing from my other favourite choice of cardioid costing around double the price.

Recording classical music is a tough test for microphones and my SM81s earn their keep successfully as very useful additions to my kit of mics., both for distant and close pickup if required.

**Tony Faulkner**
Audio Engineer

VAT No 225514681



Tony Faulkner is a leading freelance independent recording engineer based in London who records around 50 classical music albums each year.

**SHURE**
You simply can't make it any clearer.

For the address of your nearest dealer together with full details of the Shure Microphone range, write to: Shure Electronics Limited, Eccleston Road, Maidstone ME15 6AU or telephone: 0622 59881

# Expert's Errors

**Don Davis**
**(Syn-Aud-Con)**

**It has been said that a little knowledge is dangerous. As one progresses in audio, it becomes apparent that a lot of knowledge is the begetter of bigger errors. Without identifying the sources (all of which are in print by acknowledged authorities), let's sample a few of the audio fundamentals that stump the better informed.**

## EXAMPLE NO. 1

We are told authoritatively by this expert that 0 VU = +4dBm (this is a frequently made error by the better informed). The *IEEE Dictionary* states:

"Zero volume units (ie 0 VU) is indicated when the instrument is connected across a 600 Ω resistor in which there is dissipated a *power* of 1 mW at 1 kHz (ie 0 VU = 0 dBm)."

Zero VU is defined in the *American National Standard C16.5*. (The *IEEE Dictionary* is one of the most reliable sources of correct definitions available.)

## EXAMPLE NO. 2

The next statement is usually nested in a pretentious chapter on the decibel.

"A four-to-one change *in power* is 6 dB."

You'd be surprised how many otherwise knowledgeable audio people believe this. The actual fact is that

"A two-to-one change in voltage is 6 dB."

If, and only if, a two-to-one voltage change occurs *across a fixed load* does it *also happen to represent a four-to-one power change which is the 6 dB value*. The key point here is that the decibel is always a *power* ratio expressed as a level, either relative or, if a reference is present, absolute.

## EXAMPLE NO. 3

Here's one where the truth is known by the fewness and faithfulness of its followers.

"The efficiency of the loudspeaker is 95 dB per watt per metre."

The problem here is the word 'efficiency'. If you substituted the word 'sensitivity', the sentence would be true. The efficiency of a loudspeaker is dependent upon its sensitivity and its Q, where Q is the loudspeaker's directivity factor. If the loudspeaker above was totally omnidirectional (Q = 1), then we could calculate as follows:

95dB/1W/1m means that it generates 95dB-SPL ($L_p$) at 1 metre if one electrical watt is the input power. An omnidirectional sound source that generates one acoustic watt produces 120dB-SPL at 0.282 metre (an intensity of one watt per square metre). Such an *acoustic* power level is labelled 120dB-PWL ($L_w$).

Therefore, at 1 metre this source would produce

$$120\ \text{dB} + 20 \log \left[\frac{0.282}{1}\right] = 109\ \text{dB-SPL}$$

We can then say that our loudspeaker is (109 − 95) = 14 dB less than 100%. (If our one electrical watt had produced one acoustic watt from our omnidirectional (Q = 1) loudspeaker, we would have had 109 dB instead of the 95 we did get.) Our percent efficiency then is:

$$\%\ \text{effic} = 100 \times \left[10^{\frac{-14}{10}}\right] = 3.98\%$$

The complete equation, for those interested, becomes:

$$\%\ \text{effic} = 10 \left[\left[\frac{\left[(\text{dB/1W/1m}) - (10 \log Q)\right] - (20 \log 0.282) - (120\ \text{dB})}{10}\right]\right] \times 100$$

## EXAMPLE NO. 4

"I measured an $RT_{60}$ of 0.05 secs."

Really! Since sound travels approximately 1130 feet per second at normal room temperatures, this means that the sound measured from the test loudspeaker had travelled

$$1130\ (0.05) = 56.5\ \text{ft}$$

in dropping 60 dB. We hope the absurdity of this statement is apparent to all.

## EXAMPLE NO. 5

'Electronic phase reversal' is defined as reversing the wires at the loudspeaker terminals. The *IEEE Dictionary* states that phase is frequency dependent. Under polarity the same source says "polarity is not frequency dependent."

Since exchanging the connections at the loudspeaker results in *all frequencies* changing polarity by 180°, it is not a frequency dependent operation and its correct name is *polarity*. Moving a loudspeaker placed side by side with another loudspeaker one foot behind the other, relative to the listener, results in a comb filter response at the listener. This is frequency dependent as some frequencies have been boosted and other frequencies rejected. Hence, moving the loudspeakers apart *changes their phasing*.

## EXAMPLE NO. 6

In this 'experts' text it is stated that 40 Hz to 1 kHz is 1.3 decades and 1 kHz to 20 kHz is 1.2 decades and that one decade equals 3⅓ octaves.

Now, one decade is a 10:1 ratio and one octave is a 2:1 ratio. Thus, we can write:

$$\frac{\text{higher freq}}{\text{lower freq}} = 2^N \text{ octaves}$$

and:

$$\frac{\text{higher freq}}{\text{lower freq}} = 10^N \text{ decades}$$

By using natural logarithms, we can further express these relationships as:

ln (higher freq)—ln (lower freq) = ln 2 (N octaves)
ln (higher freq)—ln (lower freq) = ln 10 (N decades)

and:

$$\frac{\ln(\text{higher freq}) - \ln(\text{lower freq})}{\ln 2} = \text{N octaves}$$

$$\frac{\ln(\text{higher freq}) - \ln(\text{lower freq})}{\ln 10} = \text{N decades}$$

This means that:

$$\frac{\ln(1\text{ kHz}) - \ln(40\text{ Hz})}{\ln 10} = 1.4 \text{ decades}$$

or:

$$\frac{\ln(1\text{ kHz}) - \ln(40\text{ Hz})}{\ln 2} = 4.64 \text{ octaves}$$

Again:

$$\frac{\ln(20\text{ kHz}) - \ln(1\text{ kHz})}{\ln 10} = 1.3 \text{ decades}$$

$$\frac{\ln(20\text{ kHz}) - \ln(1\text{ kHz})}{\ln 2} = 4.32 \text{ octaves}$$

Finally, since any 10:1 ratio of frequencies equals one decade, we can write:

$$\frac{\ln(10) - \ln(1)}{\ln 2} = 3.321928...$$

So our 'expert' was *nearly* correct on that part of the problem.

## EXAMPLE NO. 7

This final example (the bible considers seven a symbol for completeness) deals with the expert who says "No device...can exhibit a noise level lower than −125 dBm." This is quoted for a bandwidth of 20 kHz and an impedance of 600 Ω. William B Snow, a giant among giants, gives us the figure of −198 dB below 1 V for 1 Ω with a bandwidth of 1 Hz as the lowest possible equivalent input noise (EIN) and by calculating:

$$-198 \text{ dB/1 V} + 10 \log \left[\frac{1 \text{ W}}{.001 \text{ W}}\right] - 6 \text{ dB} = -174 \text{ dBm}$$

for 1 Hz.

Where: 1 V across 1 Ω = 1 W = 0 dBV and .001 W is zero dBm
−6 dB because the −198 dB/1 V was measured 'open circuit' and is thus 6 dB higher than it would have been into a 'matched' circuit such as is the case in obtaining a dBm value.

Then:

$$-174 \text{ dBm} + 10 \log (20{,}000) = 130.99 \text{ dBm}$$

or roughly −131 dBm.

Since there are no 'noiseless' load resistors, probably the lowest noise level a 'perfect' real device will ever develop would be

$$-130.99 + 3.01 \text{ dB} = 127.98 \text{ dBm}$$

or roughly −128 dBm

I'll not go into further gory details but will simply conclude with the observation that here is another in the legion of users of the decibel who thought it was a voltage ratio.

## Conclusions

Years ago, when protesting to the editor of a magazine in the United States that catered to the recording industry that he had published an incorrect answer to a technical argument that had raged in his Letters to the Editor section, the editor startled me with the following reply:

"Oh, that can't be so. We counted the letters we received and the largest vote went to the answer we printed as correct."

Until you realise how omnipresent politics are, that kind of reply can leave the engineer breathless. Maturity reveals that you must enjoy the truth for the truth's sake. Facts do not fit the majority. ■

# IBC '82 - a preview

**The 9th International Broadcasting Convention will be held at the Metropole Conference and Exhibition Centre, Brighton, UK from Saturday 18th to Tuesday 21st September 1982. The associated exhibition will have over 120 exhibitors displaying and demonstrating an extensive range of broadcasting equipment. In addition there will be 18 mobile broadcasting units and a satellite ground station on show outside the Metropole.**

*Audio Kinetics' Q-Lock 310C synchroniser*

## Technical sessions

The exhibition complements a 4-day programme of technical sessions in which papers dealing with the latest and future developments in sound and TV broadcasting are presented and discussed. This year there are more than 90 papers to be presented and they have been grouped into 14 sessions under the following headings:

- Broadcasting Technology for the Future
- Origination Equipment
- TV Transmitters and Transposers
- Radio Transmitters
- Higher Definition Television
- Recording
- Satellite Broadcasting
- Television Links including Fibre Optics
- Propagation and Planning
- New Services
- Receiver Technology
- Measurement Technology
- Sound Broadcasting
- Digital Coding Standards

## Exhibition

The exhibition at this year's IBC will be substantially increased in size over the previous exhibition in 1980. This preview will only cover those companies exhibiting products that are of particular interest to *Studio Sound* readers, while omitting those exhibits that are not directly relevant. A more comprehensive listing can be found in the first issue of *Broadcast Sound, Studio Sound's* new companion magazine covering all things audio in broadcasting.

### A

● **AEG-Telefunken:** wide range of studio and broadcast equipment including *Telcom* noise reduction; *M15A* tape machines and details of the company's turnkey broadcast services. ● **Agfa-Gevaert:** full range of audio and video tapes as well as test tapes. New extended play version of established *PEM 468* mastering tape known as *PEM 428*. ● **AKG:** wide range of equipment including microphones, headphones, phono cartridges, mixers and reverb units. Featured will be new *C460B* condenser mike preamp; cardioid *CK1X* and omni *CK2X* capsules; the *C414 P48* phantom powered mike; the *BX5E* and *BX 25* reverb units. AKG will also be demonstrating the **Aphex** range of signal processors including the *Aural Exciter* and mixers from **SATT.** ● **Ampex:** will be showing items from their wide range of audio and video products with audio items including the recently introduced *ATR-800* in addition to the established *ATR-124, ATR-100* and *ATR-700* tape machines and the **EECO** *MQS-100* synchroniser. ● **Audio & Design (Recording):** full range of ADR audio signal processing equipment including the *F601 Superdynamic* and *Express* limiters. Associated company Audio & Design Marketing will be showing *Telcom* noise reduction; the **Eela Audio** range of broadcast mixers and ancillary equipment; and a **Raindirk** *Series 400* broadcast console incorporating ADR *F760X-N* compressor/limiter modules. ● **Audio Kinetics:** demonstration of the *Q-Lock 310C* timecode synchronisers with a range of *Q-Soft* dedicated control programs. ● **Auditronics:** *Model 1000* audio distribution amplifier system; *Model 700* modular broadcast console with *Model 1200* automation and a new compact submixer. ● **Audix:** range of broadcast audio mixers including the *MXT500* portable and *MXT1000* mixers; a new compact distribution amplifier as well as two new mixers, the *MXT1200* developed from the *MXT1000* offering improved EQ, two, four or eight groups and other additional features and a mixer using digital control of signal parameters and routing from central assignable panels. Also ancillary equipment.

### B

● **BASF:** wide range of video and audio tapes and cassettes with audio tape, cassette, calibration and test tapes. ● **FWO Bauch:** very wide range of products including audio equipment from **Studer, Harrison, Melkuist, Revox, Neumann, EMT, ITC** and **Lexicon.** Featured will be the new Harrison *TV-3* on-air or post-production console; Melkuist console automation and SMPTE based events selector; Revox *PR99* tape machines; Neumann condenser microphones; ITC NAB cart machines; Lexicon *Model 1200* audio time compressor and EMT *950, 948* and the new *938* broadcast turntable and reverberation systems; a wide range from Studer including the *A800* multitrack tape machine; *A80* and *B67* tape machines; the new *A810* range of 2-track tape machines with centre-track timecode capability; *A710* professional audio cassette deck and the *900 Series* mixing console. ● **Boston Insulated Wire:** wide range of audio cables. ● **Brabury Electronics:** range of audio, video and combined jackfields; patchcords; script, status and tally lights; mains distribution units, equipment racks and the *310 Series* studio talkback and intercoms systems. ● **BBC:** *NICAM* digital sound transmission systems and the *COPAS* (Computer Processing of Audio Signals) system.

### C

● **Crow of Reading:** mainly video equipment but including the **Tentel** *Tentelometer* for the precision adjustment of audio tape machines.

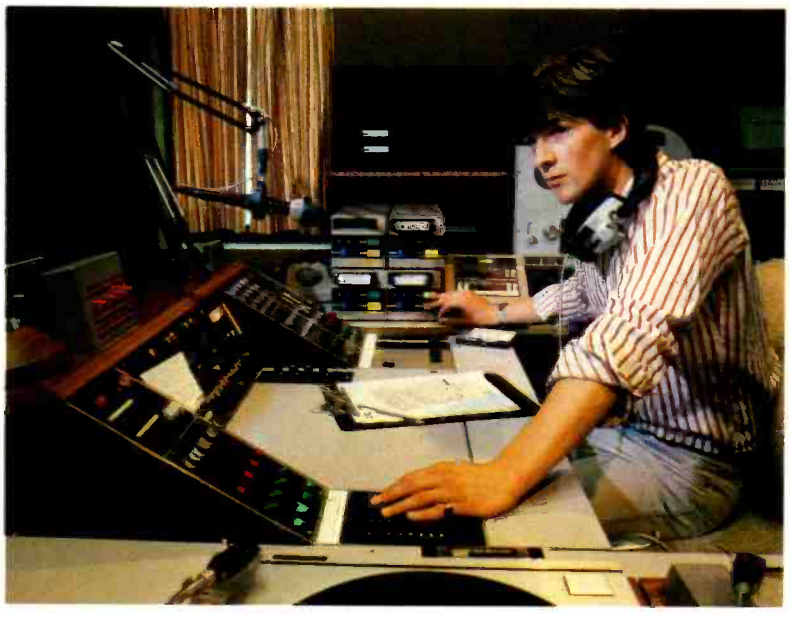
### D

● **Dolby:** demonstration of the company's audio noise reduction system to improve TV sound quality; plug-in A-type noise reduction modules for 1 in B and C format VTR's; a new portable 2-channel unit for external or battery power; and the recently introduced *SP-Series* 24-channel unit in 19 in rack mount unit form for multitrack applications. ● **Philip Drake:** *Commsbox* ring intercom system; *Mini Mobile* talkback system; *7000 Series* broadcast modular amplification equipment; modular OB commentator equipment and a modular talkback system.

70 ▶

# APL series

The APL series, which is now in use at Radio 210 Reading, was designed for the discerning user who is aware of all the pitfalls and performance problems of conventional cartridge machines and wishes to extract the ultimate performance from the NAB cartridge.



*For further information contact:*

**JOHN A. STEVEN**
**Professional Recording Equipment**
4 CRESCENT DRIVE, SHENFIELD, ESSEX CM15 8DS
Telephone: Brentwood (0277) 215485
Telex: 995701 INTCOM G Ref 197

---

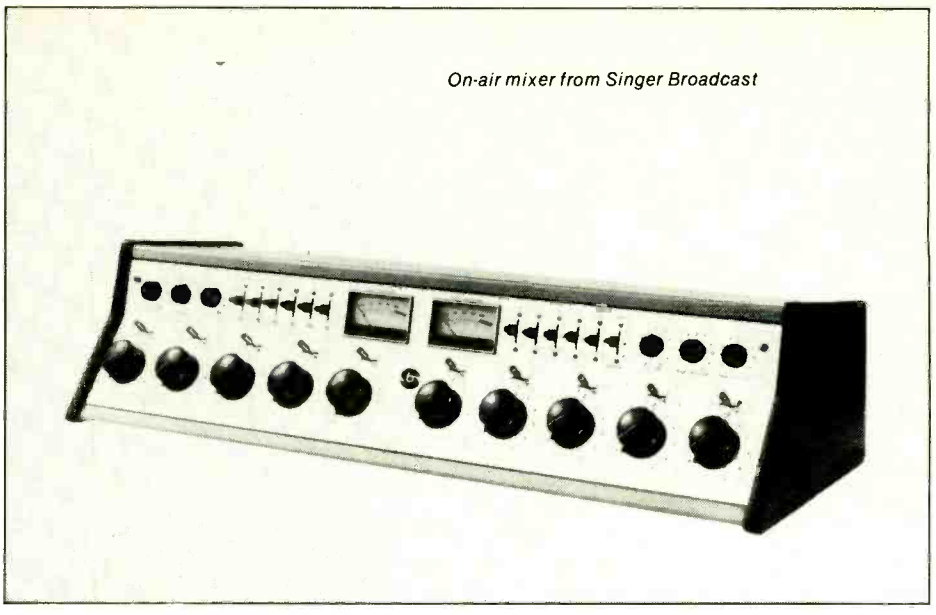
# Alice 2000 SERIES VERY QUIET MIXERS


**Stereo limiters, full talkback and monitoring facilities, sweep oscillator, 48v phantom power.**

**From 4 to 20 channels, two group or stereo output, standard or conductive plastic faders, VUs or PPMs.**

**Alice (STANCOIL LTD.),**
**Alexandra Road, Windsor, England. Telephone Windsor 51056/7 Telex AEGIS G 849323.**

# IBC '82 - a preview



*On-air mixer from Singer Broadcast*

## F

● **Future Film Developments:** comprehensive range of cable, cords, connectors, jackfields, wiring aids and associated components including 19 in racks, Soundex level meters, illuminated studio signs, intercoms and talkback systems from **RTS Systems** and monitor speakers from **Genelec.**

## G

● **Gotham Audio:** wide range of products from **EMT, Neumann, Telefunken, TTM/Fabec, Switchcraft** and **Urei.** Items on display will include digital reverbs, microphones, tape machines, noise reduction equipment, racking.

## H

● **Harris:** a wide range of broadcast equipment including the *μMac* microprocessor controlled modular audio console; the *9003* programme automation system etc. ● **Hayden Labs:** wide range of products from **Nagra, Sennheiser** and **Telefunken.** Featured items will include the Telefunken 2-track and 32-track digital audio tape machines and digital editor; the recently introduced Nagra *TA* tape machine and the Sennheiser *Mikroport* wireless mike system.

## I

● **IBA:** the complete range of IBA engineering publications will be available, while exhibits will feature a number of TV broadcasting projects. ● **Industrial Sciences:** a range of audio consoles and switcher options although largely TV equipment.

## K

● **KVP:** range of cases specifically designed for video use but includes the *Kangaroo Nagra Pack* for Nagra tape machines when used on location. ● **KOVO:** the **Tesla** range of audio mixing consoles including studio and portable OB units.

*Neve 51 series broadcast console*

## L

● **Lee Engineering:** range of products from **Audiopak, IGM, Orban, McKay** and **Continental Electronics.** Products on display will include Audiopak NAB carts; IGM broadcast audio programme automation systems; Orban *Optimod* AM and FM processors; McKay communications receivers. ● **Leevers-Rich:** *Proline 2000TC* and *Proline 1000* audio tape machines; the **Garner** range of bulk tape erasers; *Tomcat* range of cart machines and the *BMX* audio console from **Pacific Recorders.** ● **Lyrec:** *TR55* 2-track audio tape machine.

## M

● **3M:** wide range of video and audio products. Audio products will include tape, featuring the new *226* audio mastering tape, the *M79* multitrack tape recorder and the 3M digital recording system.

## N

● **Neve:** several mixers from the company's range of audio consoles including three mixers from the new *51 Series*, a *5104/5114*, a *5106* and a *5116* console with multitrack facilities. Also on display will be a *5322* 16-channel local radio console and a *542* compact portable mixer. Neve consoles will also be exhibited within a number of the OB vehicles outside the exhibition. ● **NEK:** wide range of audio and video cables for broadcast applications. ● **NTP Elektronik:** comprehensive range of peak programme meters, compressor-expander and limiter amplifiers, phase meters, equalisers and other processing units. Also the *512* audio switching system with electronic matrices. New items include the *277-200* stereo PPM with a 200-segment gas-discharge display tube and the *179-400* limiter amplifier.

## O

● **Optical & Textile:** the *CSS-1* crystal sync audio cassette recorder and the **Swintek** range of radio mikes. ● **Ortofon:** *TC3001* computer for testing pick-up cartridges, tone arms and turntables plus the *P400* measurement computer for headphones, microphones and loudspeakers.

## P

● **Pye TVT:** live demonstrations of the latest additions to the company's range of largely TV products but includes a range of audio mixers.

## R

● **RCA:** comprehensive range of equipment including audio processors and compressor/limiters.

## S

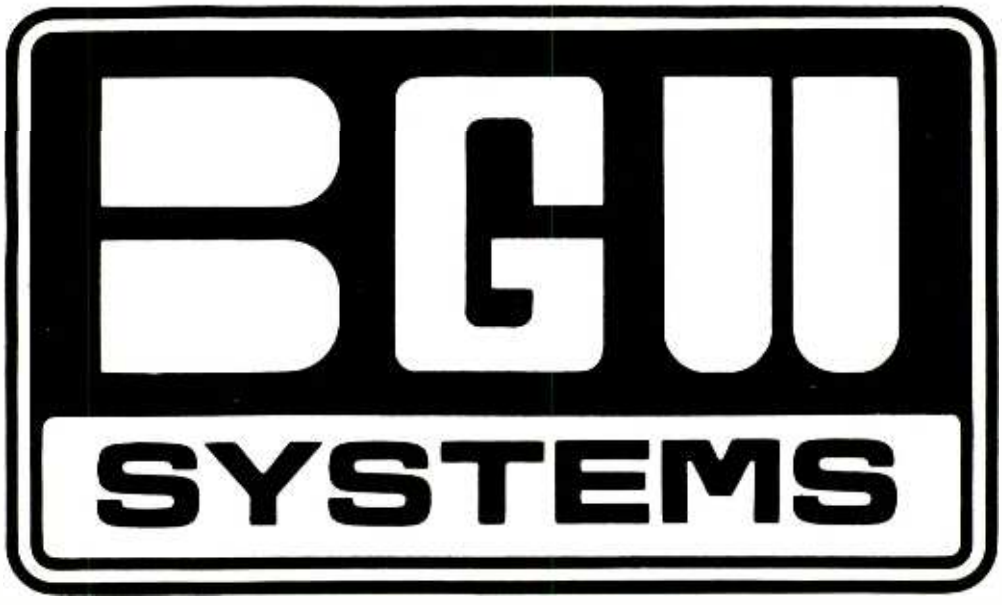
● **Sandar Electronics:** wide range of audio routing and switching systems. ● **Shintron:** range of EBU/SMPTE timecode generators and reader/raster displays, *Model 316* audio distribution amplifiers and *Model 326* stereo unit. ● **Singer:** mono and stereo on-air mixers, plus cart machines. ● **Solid State Logic:** will feature an *SLE-4000E* automated multitrack recording console with the recently introduced *Realtime Events System* allowing sequential preset fader level editing, remote control of sound effects from tape, control of external voltage controlled effects and multi-machine synchronisation. The company will also preview its new *SL6000E* Stereo Video System console. ● **Sony Broadcast:** featured audio equipment will include studio mikes, UHF radio mike systems, portable reel-to-reel and cassette machines; the *MX-P42* portable ENG mixer and the Sony range of digital audio recording and editing system featuring the *PCM3324* digital multitrack machine. Also on display will be a selection of analogue tape machines and consoles from MCI, now a division of Sony. ● **Spin Physics:** range of magnetic recording heads for wide variety of applications including audio duplication.

## T

● **Thomson-CSF:** video and audio equipment with the audio equipment including processing units and distribution amplifiers. ● **Tore Seem:** audio equipment includes *SEEMIX* computer-controlled audio console accepting up to 24 to 28 channels; 3-channel *Pluto* ENG mixer and a variety of other audio equipment. A 32-channel *SEEMIX* console will be on display in an OB vehicle exhibited by **Link Electronics.** ● **Utah Scientific:** includes range of audio routing switchers.

●

● **Studio Sound** and **Broadcast Sound:** copies of *Studio Sound* will be available from the trade publications area of the convention as well as the first issue of *Studio Sound*'s companion magazine, *Broadcast Sound*. In attendance throughout the Convention will be Richard Elen, Editor of *Studio Sound* and *Broadcast Sound*; Keith Spencer-Allen, deputy editor of *Studio Sound*; Noel Bell, deputy editor of *Broadcast Sound*; and executive advertisement manager Phil Guy with Martin Miles. They look forward to meeting both exhibitors and visitors during the course of the Convention. ■




# The complete range of BGW professional power amplifiers and electronic crossovers are now exclusively distributed in the United Kingdom by:


**Theatre Projects Services Limited**
10 Long Acre, London WC2E 9LN
**Telephone:** 01-240 5411 or 01-403 3838
**Contact:** Nikki Antoniou for full details

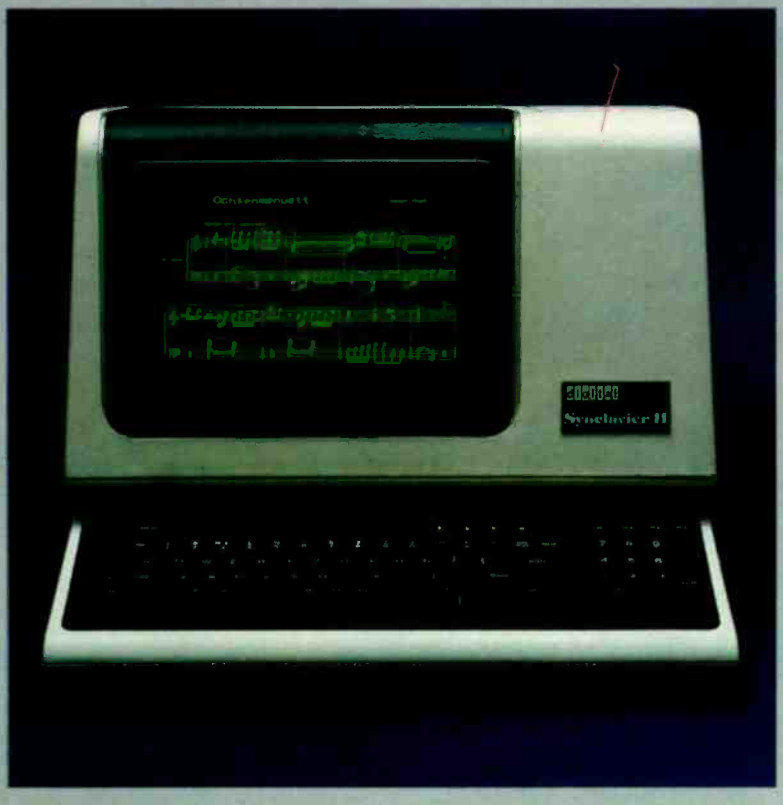
# Synclavier® II

## Digital Synthesis • Music Printing • Sampling

The world's most advanced digital synthesis system has just become the world's most advanced **Music Printing** and **Sampling System.**

Now, with Synclavier® II's Music Printing Option, performances played on Synclavier® II's keyboard can be transferred and printed out automatically in standard musical notation. This amazing new Option provides a quick, high quality computerized printing of *complete orchestral scores* or *individual parts, piano music,* and *lead sheets with lyrics.*

Using the new Sample-to-Disk™ Option, you can now record **real instruments** or **whole sections of instruments** into the Synclavier® II and then play them on its keyboard. New England Digital's technological wizardry has made it possible to record or *sample* any analog signal onto a Winchester Disk using a microphone or line-level source. You can record at a sampling rate of **50KHz.** for a minimum of **50 seconds** up to a maximum of **54 minutes.** After recording, sophisticated software techniques provided by New England Digital allow you to analyze the recorded signal, digitally filter out noise or harmonics, and edit different signals together for unique sounds. Once satisfied with your sampled sound, you can easily transfer it to the Synclavier® II's keyboard for **real time performance.**




The Music Printing and Sample-to-Disk™ Options, advanced as they are, are only part of the incredible Synclavier® II Digital Music System. Since its introduction two years ago, many of the world's most influential musicians, producers and studios have seen and now own a Synclavier® II system themselves.

We invite you to see and hear what they already know, that the future of music is available today from New England Digital.

Synclavier® II digital music systems start at 14,150.00 dollars.

Don't forget to inquire about our line of business software for your studio and personal use.

For more information and a personal demonstration, please call or write,

**New England Digital's only authorized U.K. distributor for sales and service.**

**turnkey**
8 East Barnet Road
NEW BARNET
Herts EN4 8RW
Phone 01-440 9221

New England Digital Corporation
Department 26, Box 546
White River Jct., VT 05001 U.S.A.
802-295-5800

**n.e.d.**
**new england digital**

# Why we are launching a £15,000 synthesiser in Studio Sound

Read the advertisement opposite, and you'll discover a remarkable new recording instrument.

Whether you like it or not, this is the future of music.

A powerful computer that expands musical talents. A polyphonic instrument that won't become obsolete because it's software driven.

We proudly accept our appointment as exclusive distributors for this country.

It may seem a departure from the usual mixers and tape, but when you study the possibilities and listen carefully to the results, you cannot help but see that this is an important and powerful new tool in the art of making music.

In co-operation with David Lawson, our consulting keyboard expert, we'll be pleased to demonstrate the incredible versatility of this instrument to you.

Yes, Synclavier at Turnkey may seem a little unusual, but then, this is no ordinary synthesiser.

Call us now for more information.

turnkey

8 East Barnet Road, NEW BARNET, HERTS. EN4 8RW.
Phone: 01-440 9221 TLX: 25769

# business

BARRY FOX

## Falklands News Fiasco

There was a prompt enquiry into the handling of news reports and pictures from the Falkland Islands. Without doubt there will be a report. However, like the police enquiry into their clumsy mistakes with the Ripper audio tape, it's unlikely that we'll ever get complete lowdown on what went wrong. So let's put on record some interesting facts about what happened.

On April 2, 1982 Argentine forces landed on the Falklands. On April 5, Britain despatched a Task Force to recover the islands. The Ministry of Defence said that no reporters or film crews could go with the Task Force. But this decision was over-ridden by the Prime Minister, Margaret Thatcher. So the BBC, ITV and ITN sent sound and picture reporters and technicians, with 16mm film cameras and Electronic News Gathering video cameras and recorders. The rival teams agreed to pool resources. The MOD had its own film crews on board the various ships, to make an archive record of the operation.

Too late, the BBC and ITN crews found that their ENG equipment would not work properly on board military ships on active duty. The scanning weapon systems radar puts blips of interference across the TV pictures on tape every few seconds, and made woodpecker noises. It also proved impossible to relay either film or video pictures back to Britain by satellite. Normally the Intelsat system, run by a consortium of the world's telephone organisations, can be used to bounce TV pictures and sound from fixed land stations around the world, up to orbiting satellites, and down again to other land stations. But Intelsat beams are wide and low-powered, so the dishes have to be very large—at least 10m in diameter. They must also be secured to a firm land base for accurate alignment with the satellites in the sky. The BBC and IBA each have mobile stations with 3m dishes which can tap into satellite systems from a land base. The IBA has transmitted from an oil rig, but no TV dish of this type can yet work from the deck of a ship which is rolling in the kind of bad weather found in the South Atlantic.

The Navy had satellite dishes on at least two of its Task Force ships, equipped with gyro control. These were used to relay speech and simple graphics, like maps, back to Britain by military satellite routes. These military links had a limited bandwidth of only around 1.5 MHz, however, which meant they could not handle colour TV pictures, so the BBC and ITN had to rely on films shipped 3,000 miles to Ascension Island, and then flown to Britain or relayed from a land-based satellite station on Ascension. To begin with there was no film processing station on Ascension Island, so the news crews were left with unusable video tape and undeveloped film.

Eventually, the RAF shipped a film processing unit, installed in a container, out to Ascension. Finally, on May 26, British TV stations got their first batch of month-old film back by satellite. Until then, the only film available for screening had come from Argentina. There had been news radio reports and black-and-white still pictures which were relayed by the Ministry of Defence, using over £100,000-worth of slow-scan TV equipment. The MOD had hurriedly bought this to fend off criticism that it was deliberately preventing British viewers from seeing British pictures.

The slow-scan equipment came from a British firm, Gresham Lion, and is based on a Post Office/British Telecom design. A distant transmitter, hooked into a narrow bandwidth satellite link, or even a land-based telephone line, scans a still picture and converts its image into digital code. The digital information is then transmitted slowly back to home base where a receiver gradually builds up a replica picture. If the transmission link can handle 64 kilobits of data per second, then a full black and white picture can be transmitted in four seconds. If less bandwidth is available, for instance if the satellite link is also handling priority military information, transmission can be as slow as a few bits per second, with the picture taking an hour to build up. The MOD had bought six systems from Gresham Lion, at around £10,000 each, before the Falkland crisis blew up. Six more were ordered as soon as the pressure for better press and PR became too great.

It wasn't just technical problems that hampered the broadcasters. It was Ministry of Defence obstruction and intransigence as well; the BBC and ITN had to pool resources to cope with this in addition to the technical problems. It's generally agreed that the British Government was scared witless that if the British public was confronted with too much hard fact news, and too many vivid pictures of the reality of war, support for Britain's tough action in the South Atlantic would have melted away. Reporters in the war zone had to have their reports cleared by Ministry of Defence censors before despatch. Jeremy Hands of ITN said their interpretation of British Government guidelines was "inept" and "bloody-minded". Back in London all reports had to pass through the hands of an MOD censor before transmission. This accounted for some of the awkward gaps which were sometimes heard. It also caused delays which reporters and radio and TV stations often felt were unnecessary. It wasn't until a month into the crisis that the MOD seconded censors to the TV station news offices in London for on-the-spot vetting.

Even news of the ceasefire was held up unnecessarily so that relatives of the Task Force heard it a day late. News of the loss of *HMS Sheffield* was also deliberately delayed by the Ministry of Defence. Once the war was over plenty of film, some of it very grisly, suddenly appeared as if by magic. On June 24, the British TV stations were able to run a one-hour extended news programme showing horrifying pictures of the attack on the *Sir Galahad,* two weeks earlier. The pictures had only just arrived by satellite. By then, of course, the war was over and public opinion no longer mattered to the MOD because Britain had won.

While all this censoring and delaying was going on, the Ministry of Defence was surprising the Army and Navy in the Falklands by releasing information that the Task Force saw as of potential value to the enemy. Sailors were being allowed to 'phone 8,000 miles home. The first thing they did was to ask what was happening around them. Even Prince Andrew 'phoned his mother, the Queen, at Buckingham Palace. At the same time the British were intercepting 'phone calls between the Argentinians on the Islands and the mainland.

In short, the whole war, which cost Britain well over a thousand million pounds, may have been a military success, but it was a public relations disaster. The Ministry of Defence is still living in the days of World War II and Korea, when there was no such thing as a satellite link for TV pictures and sound and no-one expected to get any news pictures until weeks, or months, after the event. It's lucky the Falklands didn't develop into a nuclear war. We'd all have been dead before the Ministry of Defence let us know why we were going to die.

---

## Distorted *1812*

The lunatic fringe of hi-fi has become obsessed with the Telarc recording of the *1812 Overture.* This disc—which describes itself as "Audio's Toughest Challenge"—was recorded digitally in Cincinnati's one hundred year old Music Hall, but the cannon shots were taped outdoors using original 19th-century cannons of the Fifth Virginia Regiment, an enthusiasts group. The cannon shots are recorded at very high level and contain audio information right down to 6Hz. The disc was cut at such high level that the groove excursion is clearly visible to the naked eye. At almost every hi-fi and audio demonstration for the last year hi-fi firms have played the *1812* on their own particular turntable/arm/cartridge combination to "prove" that theirs is the only combination which will track it accurately. Quite how anyone is supposed now to know what the Cincinnati cannons really sound like, or what the amplifier or loudspeakers are doing to the signal, or how their own ears are coping with the shock wave, is of course anyone's guess. More to the point Ortofon in Denmark, and Matsushita-Technics in Japan, have been looking at the cannon shot section of the cut with a scanning electron microscope. Independently they have come to virtually the same conclusions and Ortofon has prepared a detailed case against regarding the cut as an audio challenge.

Ortofon argue that the disc has frequencies that are below the IEC audio range (20Hz) and has been cut with such high velocity amplitudes that there has been back-edge cutting, ie the rear flank of the cutting stylus has frayed the groove wall that has just been cut. By going below the 20Hz bottom limit for audio prescribed by the IEC, the signal proudly cut into the groove qualifies for classification as noise or distortion. The cutter head would not normally be heavily damped down in this super low frequency range and is thus likely to go into resonance. All this, combined with the natural elasticity of the master lacquer, has produced a groove modulation which can only be tracked accurately if the disc is turned backwards on the turntable!

Ortofon tried tracking the *1812* with a variety of arm and cartridge combinations. Cartridges with low compliance in lightweight arms were unable to track it because their natural resonance frequencies coincided with the 10-16Hz follow-up booms after the cannon shot. When this happens the cartridge is likely to be shot right out of the groove and up into the air because it has been asked to play back its own resonant frequency after triggering by a very high amplitude.

Ortofon suggest that if anyone wants to track the Telarc disc all they have to do is use a high compliance cartridge which keeps the resonance down at around 5, 6 or 7Hz. This then tracks the groove booms quite happily. But the system will then be at the mercy of warped records which produce trigger frequencies in its resonant range. As a truly flat record is now a valuable rarity most people would probably prefer to sacrifice the opportunity to track the *1812* cannons in favour of the chance to play the rest of their record collection without problems. ■


**FROM THE LIGHT MONO-STEREO (SYNC) RECORDER SP8, THE PERFECT MIXER AMI 48, TO THE PORTABLE MULTI-STANDARD STUDIO TAPE RECORDER-TD 88-, (1/4"-1/2"- perfo-film 16 mm)**

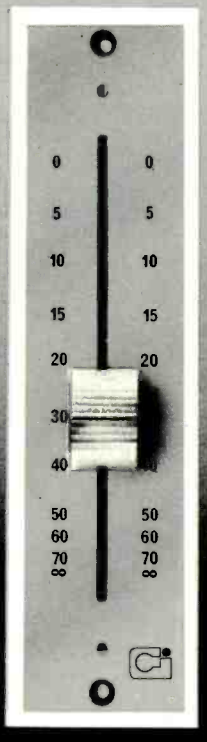
**all are distinguished by:**

**MOBILITY — MUSICALITY**
**BATTERY OPERATION**
**MODULARITY-VERSATILITY**

Visit us at the PHOTOKINA, 6-12 October, 1982, Booth E36, Hall 13

STELLAVOX ® SWITZERLAND
2068 HAUTERIVE-NE
☎ 038 33 42 33 Tx 35380

# the start of a new movement!




**The Citec 100SF Professional Studio Fader**

Just try it! It's the only way you will be able to appreciate the smooth uniform action of this superb piece of advanced engineering. Developed for the professional's sensitive touch and their demanding specifications.

**The Professionals require . . .**

Uniform smooth movement
Exceptional low noise
Essentially infinite resolution
Attenuation greater than 105dB
Audio law calibrated to 70dB
Excellent frequency response
Designed for minimum crosstalk

**The 100SF range more than meets the professional's requirements . . . it's smooth!**

FROM Citec
THE NEW NAME

Citec Limited Cheney Manor
Swindon Wilts SN2 2PZ;
Telephone (0793) 487301

# Studiofile:1

## Studio Maunoir, Geneva

For many composers, having one's own studio is an ideal often removed from the realities of everyday life. However, in the case of composer Thierry Fervant, the ideal has become fact. Formerly in partnership with another small studio and thus subject to the limitations that this can impose, M Fervant decided to sell his share, do some fund raising and build his own facility. Originally intended as a 'modest 24-track studio' for his own realisations, Studio Maunoir has emerged as a fully fledged multitrack studio capable of today's recording industry demands.

The studio itself is in modern premises situated very near the centre of Geneva in a semi-residential area and two minutes walk from the lake. Access is through a forecourt and straight into the lobby, thus there are no stairs to contend with. Depending on the time of day, parking is not too much of a problem and for unloading, vehicles can be driven literally up to the doorstep. In addition the studio has several places of its own in the basement parking underneath.

Once in the lobby one has the choice of playing with the pinball machine, turning right into the office or going through to the studio and control room. Passing through the isolation door one enters into an acoustically treated 'lock' complete with ceiling trapping. Access to the studio is by a door to the right (with a service or technical room to the left opposite) with the control room straight ahead. The purpose of the lock is to diminish bleed from the studio and control room as well as from the outside world. It could also equally serve as a small iso room or place for unwanted guests!

The studio was built in 1979/80 and the control room may have been one of the first in Europe employing the LEDE design. The room is wider at the front than the back, though symmetrical and the control room window is long for maximum visual contact. The front or dead end is faced with thick carpet with a trap over the window, the latter forming part of the monitor bridge, housing two UREI *813* speakers. Thick drapes underneath the bridge complete the absorption characteristics. To the rear, the pine panelling is something of a carpenter's nightmare because of the many angles which reflect and diffuse the sound. Straddling the demarcation line between the two areas is the Soundcraft *Series 3B* 32/24 console, complete with a custom-built 'wing' to the left that houses outboard equipment, tape machine remotes and the 'TV monitor speaker'. The rear left corner of the room provides a home for the 24-track recorder, which has an MCI transport and tape electronics by CB Electronics. As well as an autolocator the machine has useful features such as a noise gate for each channel—triggered by the sync head giving, in effect, a negative attack time—with adjustable threshold, and release and solo buttons for each track. The latter feature is especially handy as all tracks are available for soloing at the spread of a hand either for in place solo (with any effects that may be in use) or for finding that track where the chair fell over just before the flute came in. The gates, while not intended as effects units, can be used creatively as well as for general cleaning up duties. I found them handy for reducing the sustain on the grand piano once or twice, thus leaving the more sophisticated units free for other work. Mastering is on a Studer *A80RC* stereo machine with a *C37* doing sterling service as a copy and general duties recorder.

In the interests of space saving the rear walls also include flush mounting rack space which houses various power amplifiers, Revoxes with varispeed, Teac *C3* cassette recorder, outboard equipment over-spilling from the console wing, and a special drawer for the turntable.

As the studio also does a great deal of work for television and radio, there is an appropriate variety in the monitoring system with the main system comprising UREI *813 Time-Aligneds* with the Studer *A68* amplifier. There are also JBL *4311*s, Electro-Voice *Link 7*s, a pair of Keesonic bookshelf speakers mounted on the console and a TV style speaker complete with amplifier and tone controls. The latter system is used mainly as a mono check for recordings destined for broadcast use, though it also serves as a handy reference for the average home transistor.

The special effects department is quite well stocked and includes a Lexicon *224* and AKG *BX20* for echo and reverb as well as a Roland *Space Echo* and the inevitable Revoxes for pure echo and varispeed effects. Other signal processing includes: *Scamp* rack with *S01* compressors, *F300* expander/gates, *S05/6* dynamic noise filters, autopanner, parametric EQ and ADT module; Orban stereo parametric and de-esser; Roland flanger/phaser (which works very well), EXR *Exciter*, Penytronics stereo octave graphic EQ; and last but not least an Ursa Major *Space Station* for those other time domain effects. Multitrack recording is at 30in/s and with the facility of the noise gates, any further noise reduction is deemed unnecessary. However, for 2-track mastering two channels of Dolby are available.

As Maunoir is also a composer's studio, the presence of synthesisers in the control room is easily explained. In fact, one of the requirements in the initial design was that there be room to put a variety of keyboards behind the console. This is achieved by having them either on the floor or placed on wall mounted shelves, or both. As it is, the Roland *700 Series* modular synthesiser is permanently wall-mounted with an additional block of *Series 100* modules, digital sequencer and Moog vocoder, with a *Prophet 10* and *Polymoog* also in attendance. Other keyboards likely to be used are a Roland *2000* preset synth, *Novatron* with a good selection of tapes and anything else that might happen to be in the studio at the time.

The studio itself is quite large, 10.5m long on the control room side and 12m the far side with a width of 7m. The ceiling height varies from 2m 40cm to 2m 70cm. Coming in through the door from the sound lock one enters the live area of the studio with parquet flooring, sloped wooden ceiling and wood-slat absorbers on the walls. There is ample room for large string sections and very good results have been obtained, especially with *PZM* mics. Both string and wind players have commented on the fact that they can hear their instruments better in a brighter environment and if the musicians are happy then the music can only benefit from it. The far corner also features a large trap for the grand piano, though it is now used more frequently as a drum cage. This way the drummer can be a part of the group in the studio whilst retaining a satisfactory separation for multitrack purposes.

The acoustics of the live area can be modified if necessary by the use of drapes. The rest of the studio is more absorbent with ceiling trapping and thick carpet, and a large trap in front of the control room window. (The latter also forms a useful surface on which to put a multitude of things from keyboards to microphones.) The walls are a mixture of wood-panelling and painted brickwork, with drapes of varying weights to further modify the sound. One end of the piano trap has an opening so it can be used as an amplifier trap for bass or 'cranked up' guitar—or what you will. The studio also has a fully enclosed drum booth, complete with parquet floor and wood panelling, drapes and ceiling trapping, meaning that a bright drum sound can be obtained. However, as with the piano trap, the booth is used more as an isolation room or for vocals.

In addition to the synthesisers in the control room, the studio has a grand piano, Baldwin electric upright, Rhodes *Stage 88* and Hammond *C3* with Leslie, as well as a whole range of Latin American percussion. Microphones available include a goodly selection from Neumann, AKG, Electro-Voice and Shure. Quite a lot of use has also been made of *PZM*s, since the studio's inception in 1980.

The realisation of the studio was very much an 'in-house team effort' with only the basic construction work—walls, door and window frames, floors and air conditioning—left to outside contractors. Systems planning is the work of resident engineer Chris Penycate, who also installed the equipment and wiring with the help of Colin Broad from CB Electronics. Acoustic design was by Terry Nelson who was abetted in the construction by two local woodwork apprentices and two globetrotting Australians.

At present the bulk of the work at Maunoir is local with Thierry Fervant's TV and film projects, as well as his last two solo albums. In an effort to help further local talent the studio also does co-productions with its own label, M Records, with a fair amount of success. As the studio has an animation studio for a neighbour, the audio-visual side of business has not been overlooked and Maunoir hope to develop this area a bit more fully in the near future. There is already talk of synchronisers and automation! The aim is now to get more of an international clientele for the studio and there is no reason why this should not succeed. That the studio sounds right would seem to be indicated by the fact that the last seven albums that Chris has recorded have all been cut flat—no equalisation!

**Terry Nelson**

**Studio Maunoir, Rue Maunoir 13, 1207 Geneva, Switzerland. Phone: (22) 36 43 11/12.**

78 ▶

Sony Digital Audio is anything but a new idea. As far back as 1974 Sony introduced their original working digital audio recorder.

Even at that stage its wider dynamic range, flat frequency response, lower distortion and lack of deterioration in repeated copying put analogue equipment in the shade.

But now, having put much time and effort into research and development, Sony have produced a range of digital audio equipment which produces results even better than their original machine. Giving sound recordings which are virtually indistinguishable from the original performance.

An achievement made possible not only by improving on the original design but also by Sony extending the digital audio range to include a 24 track recorder, reverberator, 2-channel audio processor, preview unit and electronic editor. The widest range of digital audio equipment on the market.

If you'd like brochures covering the Sony Digital Audio Range, phone Keith Smith or Mike Jopp on Sunbury 81211.

And we'll give you some impressive copies.

COMMUNICATION SYSTEMS DIVISION

SONY

# Sony Digital. Sound recording even better than the original.

# Studiofile:2

## Eastern Sound, Toronto

Barely 3km from the heart of Toronto is a neighbourhood of eight or so square blocks known as Yorkville. Originally set up as a craftsmen's colony in the early 19th century, Yorkville served as the centre of Canada's hippie culture in the 1960s, and is today an ultra-fashionable low-rise district of cafés and restaurants, art galleries, professional offices, and labyrinthine assemblages of tiny boutiques stuffed into historic old houses. It also boasts the highest concentration of professional recording studios in Canada—no fewer than five—and the busiest of them all is Eastern Sound, the audio part of the Yorkville Studio Centre.

Although in many ways Canada is economically subservient to the United States (to the constant and vocal dismay of much of the populace) the upper half of North America has a very healthy recording industry of its own. In large part this is due to federal broadcasting regulations that require that a good proportion of the material presented on both government and commercial radio and television be of domestic origin. But to discount the substantial musical and technical talent that Canada has produced as a significant factor in the industry's growth would be a serious injustice.

Canadian artists like Gordon Lightfoot, Anne Murray, Bruce Cockburn and Pat Travers have made use of Eastern's extensive facilities (some will go nowhere else) but the studio has also been host to foreigners like Cat Stevens, Isaac Hayes and Elton John. Peter Mann, the studio's chief audio engineer, who first joined the staff as a 'coffee runner' in 1972, recalls Elton's *Blue Moves* sessions vividly.

"They first rented one of our video soundstages for two weeks of rehearsals," he says. "We had to have two cops outside the place 24 hours a day to keep the 15 or more girls always lined up out front from breaking the doors down. The band had the top two floors of the Hyatt House Hotel across the street. Every day at 11.00am Elton would jog over, sneak in the back door, and pull out Bernie Taupin's lyrics, more or less at random, from a briefcase. By 2.00, he usually had something he liked, and the band would filter in.

"It was a very professional set-up. Each guitar player had five instruments and a roadie to change all the strings every day. A drum roadie changed the heads each day, and we had a piano tuner here all the time. The band would trade musical ideas with Elton for about four hours, and then go out for curry and a couple of hours of football. By 8.00 they'd be ready to record, and a tune would be in the can by 11.00.

"All they did here was basics. The horns were done in LA and the strings in Britain."

Eastern began in 1956 as a film studio with 2-track audio facilities. The studio acquired its present name when it was purchased in 1960 by Manoir Industries, an appliance conglomerate, who put in a 4-track studio, still geared towards film sound, at the back of the historical landmark building. In 1967, Studio One which measures a hefty 50 x 35 x 22ft, with exceptionally live acoustics, was constructed and an 8-track Ampex deck installed. A new control room, housing a 24-track Ampex *MM-1000* and an API console, was built on to the room in 1970, making Eastern the first Canadian studio with 24-track capability and only the third in North America. At the same time, Studio Two, 25 x 21 x 14ft, was constructed to take over the 8-track work.

In 1977, Standard Broadcasting Company, a national radio and TV chain, took over and soon replaced most of the equipment, which Mann says by then was "getting pretty decrepit. But the API consoles were nice to work on, when they worked. They had those great EQs and 16 limiters."

Eastern hired Jack Edwards to redesign all of the rooms, and updated the 8-track room to 24, built a third room for 8-track recording, and installed Neve consoles and Studer tape machines all around.

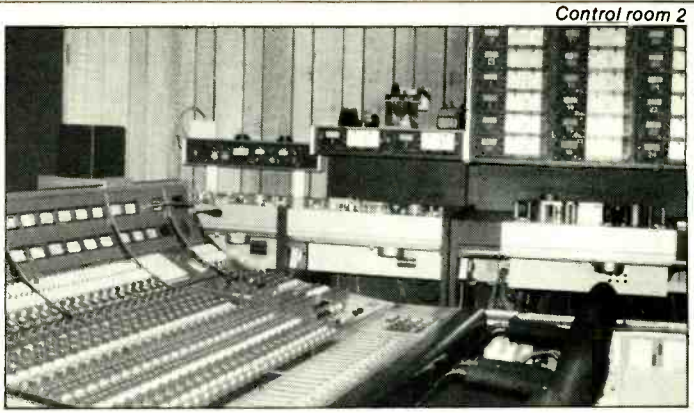
"The 8-track room is now all advertising," says Peter Holcomb, the Montreal-born studio manager, who engineers a bit on the side. "One 24-track room is exclusively for music, while the other does both.

"We handle most of the major ad agencies and jingle houses in Toronto, as well as most of the beer commercials," which is a serious matter to Canadians.

The parent company has a non-profit jazz label, Canadian Talent Company, which does all of its recording here, and the studio handles most of the post-production audio for the broadcasting company's music and variety programmes.

Beside the Studer multitracks,

Control room 2



Eastern uses Studer and Ampex stereo and mono decks. Monitors now include JBL *4350*s and *4311*s, PSB *Avantes*, and *Auratones*, driven by Bryston and UREI amps. The board in Studio One is a 32-input Neve *8068* with *Necam* (the first such installation in the country). Studio Two boasts a 28-input *8058*, while the commercial studio has a 12-input *5305*. One of the more unique pieces of gear in Studio Two is a Mickey Mouse bicycle bell mounted on the talkback mic, which Holcomb explains was installed during a particularly loud rock session, to get the musicians' attention.

Mics are Neumann (enough *U47*s to cover a session of Parliament), AKG, Sony, Sennheiser, and you know the rest, along with a pair of brand-new Crown *PZM*s that have yet to see much use. Outboard gear comes from Eventide, UREI, Pultec, and Allison, and a portable toy rack includes a rare Fairchild *666* valve limiter. EMT *140* chambers and Dolby noise reduction are in every room.

Musical instruments include three Yamaha grand pianos, a *B3*, a Rhodes, and a celeste. "When Cat Stevens recorded *Izitso* here," reports Peter Mann, "he didn't like our big Yamaha, so he brought in his own Steinway. He didn't like that either, so he brought in another, then another, followed by yet another Yamaha. He ended up using ours."

Although audio is an important part of Eastern's operation, only half of its story would be told if we stopped there. Attached to the recording complex by a series of crowded passageways is the largest and most comprehensive privately-owned video facility in Canada. A separate branch of Standard Broadcasting, VTR Productions, as the video company is called, has two full-sized shooting stages, a Bosch film-to-tape transfer system, complete computerised editing facilities, and a room that contains nothing but 200 Beta and VHS ½in video cassette decks for duplicating. There is even a retail store out front to sell the tapes.

"Our biggest client is the Canadian Broadcasting Company," says Peter Bartlett, supervisor of the video side, "and we're currently shooting two situation comedies for them." At the time of our visit, CBCs technicians were on strike, which made VTR Productions, ah open shop, one of the busiest studios in the country. "Sears (the retail catalogue store) is our biggest commercial client," says Bartlett, "and we also do a lot of industrials for companies like Massey-Ferguson," one of the largest manufacturers of construction and farm equipment in the world, whose founding family gave Canada a concert hall, large portions of several universities, and the actor Raymond Massey. "Mostly our work is for outside clients, although we're starting to produce stuff ourselves. We have to be careful, because we really don't want to start competing with the other agencies."

All of the video and audio equipment is linked together with two video and 37 audio tie lines, and synchronisation (another Canadian first) is provided by Studer and Eeco systems.

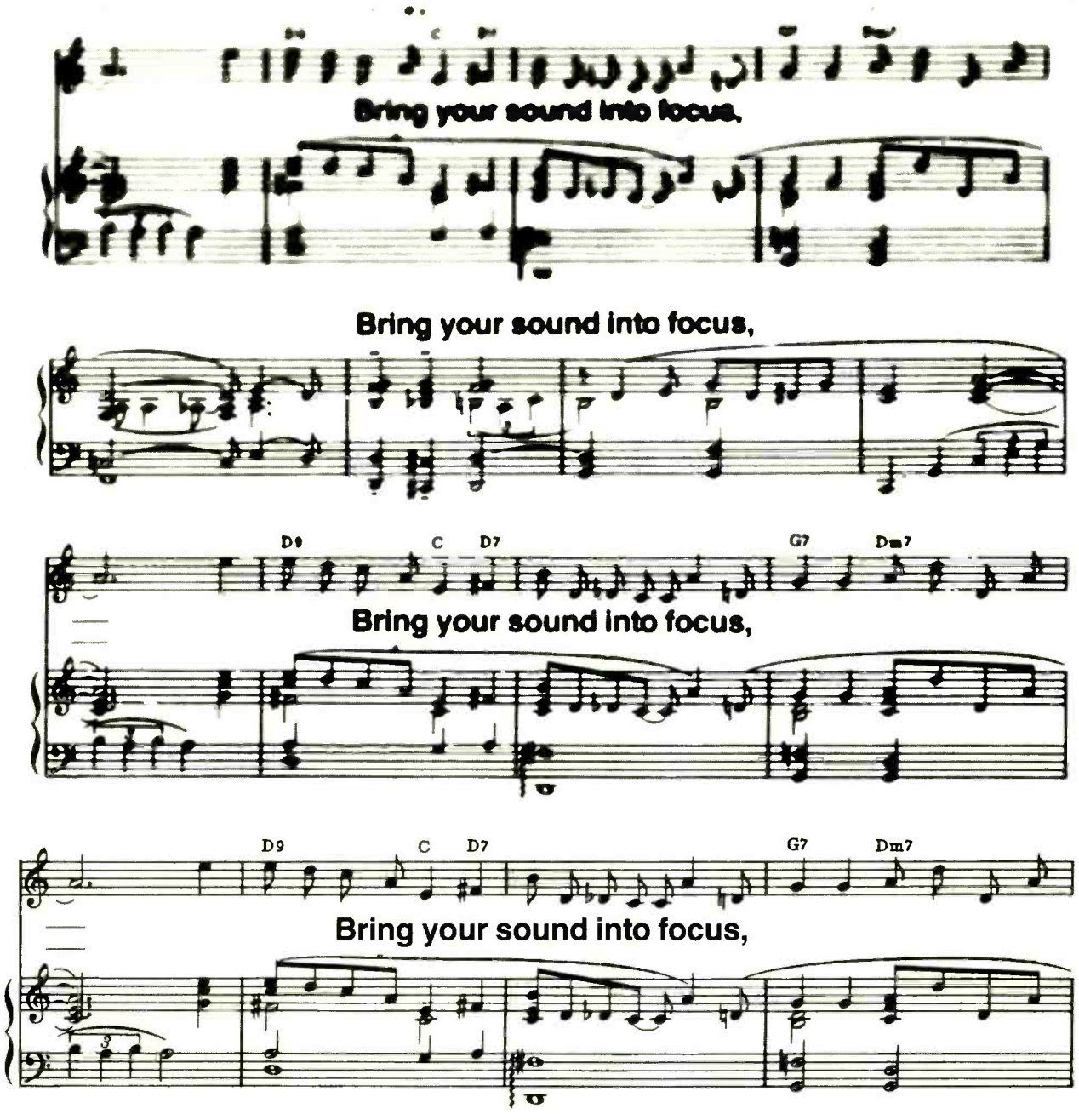
Yorkville Studio Centre modestly occupies a block of some of Toronto's choicest real estate and, like the country to which it contributes so much, uses great quantities of technology and talent to turn out plenty of fine product, without calling much attention to itself. Unless you consider displaying 16 gold records in the lobby bragging.

**Paul D Lehrman**

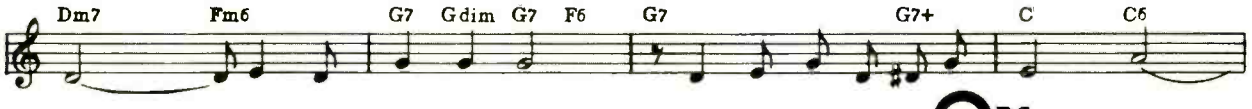
**Eastern Sound, 48 Yorkville Avenue, Toronto, Ontario M4W 1L4, Canada. Phone: (416) 968-1855.**

Control room 1

80 ▶




# Aphex II




Available in the U.K. through:
**AKG Acoustics, Ltd.**

**Aphex Systems, Ltd.**
**7801 Melrose**
**Los Angeles, CA 90046**
**(213) 655-1411**
**TWX: 910-321-5762**

# Studiofile:3

## Jacob's Studios

**The tale of the artist turned studio owner/manager is not at all uncommon, but seldom has it been done with the style and flair of Andy Fernbach and Jacob's.**

The beginning of the story is fairly par for the course, and sees Andy in the mid '70s, having established a reasonable track record with UA, including a couple of albums and an unthinkable number of gigs, setting up a private rehearsal room in the garage block attached to his house in Crondell, a few miles down the road from what was then Jacob's sheep farm. Time saw the room become more and more popular with local bands; in 1979 a 16-track Ampex *1000* and an Allen and Heath desk were installed, and the place was opened up as a commercial concern. Success didn't desert them and by the beginning of 1980 it was apparent that larger premises were required and so it was that a deal was done with Mr Jacob, and Andy bought the farm, including ten acres of land, a portion of which Jacob still uses today. Hence the name and the logo of the sheep's head.

Apart from the addition of a Lyrec 24-track machine, it was simply a case of putting the original equipment into the house and going from there. In January 1981, John Foxx (ex Ultravox) booked the studio to record *The Garden Album*. He had wanted to set up his own studio for some time and had thus acquired a complete equipment list which included an Amek automated console, an MCI 24-track and 2-track, a pair of Eastlake monitors together with a selection of microphones and an assortment of outboard gear. He made an arrangement with Andy to install his equipment in the studio, thereby receiving favourable hire terms. This allowed Andy to hurriedly convert the farm's outbuildings, install the ex-Studio One equipment, and open up a Studio Two, for which he replaced the old A & H desk with a Trident *Series 80*. In July that year, Mr Foxx, having finished his album, moved his equipment into newly found premises in Shoreditch. What might seem to be a bit of a setback spurred Andrew on to confirm his position as executive mastermind, by doing a deal with one Derek Berbidge. Derek was to buy the Studio Two gear and then lease it back to Andy while he finished buiding his studio, allowing Andy to use the cash from the sale to re-equip Studio One with its present complement which includes a Harrison *3624* with Allison automation, Lyrec 24-track, Studer *A80* mastering machine, Studer *A62*, Revox *B77*, a pair of UREI *815*s powered by a BGW *750* and *Auratone* cubes driven by a Quad *405*. Outboard gear includes an Eventide *Harmonizer H949*, AMS digital reverb unit, *Scamp* rack containing compressors, gates, EQ modules and an autopanner, a Pye compressor (stereo linkable), stereo EMT *140* plate, Compex limiters (stereo linkable), Pro-Audio 27-band graphic, Aiwa *3800* cassette deck and a Yamaha *P350* record deck with a Quad *33* preamp. Also included in the price was the use of a Yamaha *C3* grand piano, Fender Rhodes *73*, Fender Twin Reverb, JBL bass cabinet and a Simmons drum kit.

Derek completed his studio in March of this year and made off with his equipment, by which time Andy had established a respectable track record as a studio manager. After a quick chat with the bank manager, he was able to do a lease deal to re-equip Studio Two with an MCI *36/24 400* Series desk with Spectra Vue, a 3M 24-track, MCI *JH120* mastering machine, a pair of UREI *813*s plus a Studer *A68* to drive them, and *Auratones* with a Quad *303*. Outboard gear includes an Eventide *Harmonizer H910*, EMT *Gold Foil* plate, Master Room spring reverb, pair of dbx *160* compressors, *Scamp* rack with a number of gates, compressors and EQ modules, and a pair of Pultec valve equalisers. Microphones, which are distributed between the studios as required, include: Neumann *U87*s, *U47*s, *KM84*s, *KM53* and *KM54*; AKG *C451*s, *D190*s, *C414*, *D202* and *D25*; Schoeps *CMC 5U*s; Shure *SM57*s, *SM58*s; Electro-Voice *RE20* and *1777*.

Studio One has to be the antithesis of the Eastlake concept. Originally a drawing room, the control room still retains the peace and gentility of a country house, including the old fireplace and, although it is now heavily double-glazed, a large bay window overlooking the farm grounds. The acoustic treatment is very much add-on, and was designed by Mike Roberts to eliminate problems which existed without detracting from the airy feel of the place. It is, consequently, very close to what might be considered the ideal domestic listening room, reasonably diffuse with a controlled liveness. Whether or not it constitutes an ideal studio control room is, of course, open to debate. Suffice to say that Rick Wakeman, who is no stranger to the inside of high-tech studios, has had an almost complete lock-out on it since April this year, which looks like continuing for the foreseeable future while he completes the music for a World Cup film and the subsequent album, music for an American cartoon and an American ballet which is due to open on Broadway in the new year. The studio floor area is in what used to be the stables, and is on a number of levels, as was the original building, with old wooden beams and bannisters helping diffusion, and the different levels providing enough acoustic separation to make the available screens all but redundant. The acoustic treatment is again pretty rough and ready, but it really does fit in well with the rustic feel of the place and is obviously capable of producing some good sounds. It consists mainly of 2 in and 4 in slabs of Rockwool applied directly to the wall as well as spaced away from it, covered with either cloth or peg board, which in effect forms a multiple Helmholtz resonator. The control room is about 400 $ft^2$, the recording area about 900 $ft^2$ and the relaxation room next door, which includes a video and pool table, is about 450 $ft^2$ and is sometimes used as an extra overdub booth, being especially good for strings.

The Studio Two control room is about 30 ft by 15 ft, air conditioned, with the acoustic treatment by Andy based on his experience with Studio One. The wall area is treated with 2 in Rockwool slabs covered with cloth providing broad band absorption. The few feet of sloping roof left exposed is covered with plasterboard, until it meets a false ceiling of acoustic tiles backed with Rockwool. The recording area consists of two rooms combining to make an area of about 450 $ft^2$, with interconnecting door and windows.

If you enjoy being in the country, the grounds are a delight and include a 35 ft swimming pool, a tennis court, and at the end of a taxing session you can even go and discuss the pros and cons of automated mixdown with what's left of Jacob's sheep.

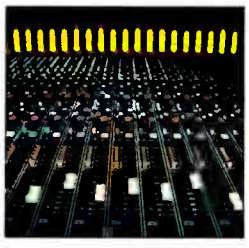
**James Francis**

**Jacob's Studios, Ridgeway House, Runwick, Nr. Farnham, Surrey. Phone: (0252) 723518.** ■

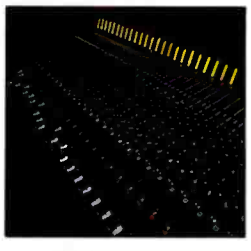
**Facilities:**

The MR-3 is supplied complete with integral patchbay and varying frame sizes to accommodate up to 56 input channels.

Each input module has a full 24-track output-assign matrix and three bands of parametric E/q, with a high pass filter and optional variable 'Q' on each band.

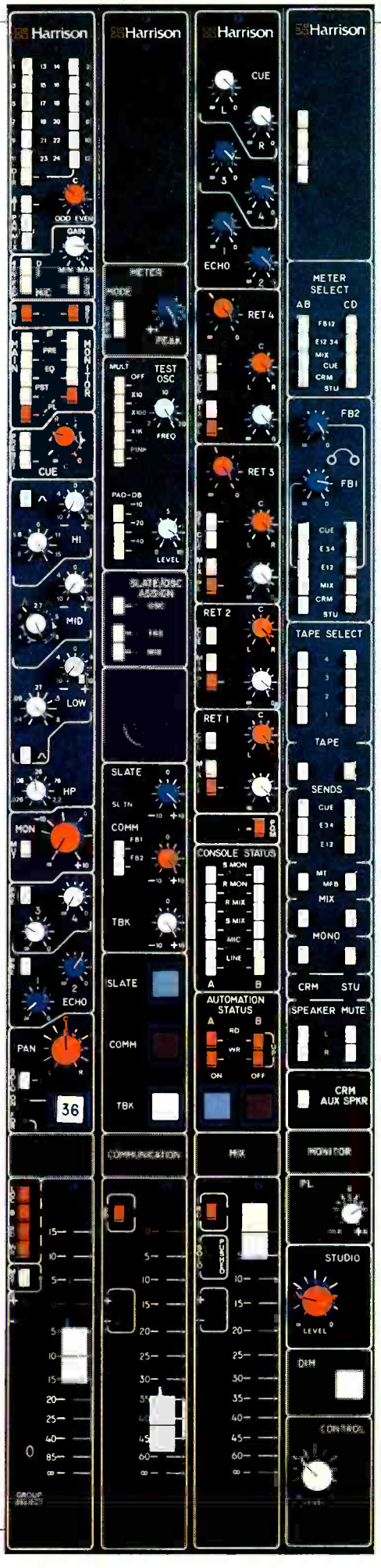


In addition, each module offers six auxiliary sends and a direct assign button for multitrack recording.



Major console status changes are effected with one-button ease. Six modes of operation are available including two new statuses for broadcast and video post production.

The standard VCA faders enable the operator to establish VCA groups when recording and mixing. The console is prepared for rapid installation of three proven automation systems: Melkuist, Allison and Harrison's own Auto-set.




# The Harrison MR-3. High on Features, Low on Price.

You can never afford to buy cheaply. What you must do these days is buy economically.

Recognising this, Harrison has developed the MR-3 music desk. High on impressive features, but not on cost, the MR-3 represents excellent value and a unique opportunity to invest in Harrison performance.

In other words the MR-3 guarantees maximum efficiency in 24-track recording.

The Harrison MR-3. Underpriced it may be, undermade it's not.

To find out more about the Harrison MR-3 contact F.W.O. BAUCH at the address below.

Harrison

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

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

# Pacific Recorders Tomcat Cartridge Machine


**MANUFACTURER'S SPECIFICATION**
**Tape format:** NAB *AA* cartridge.
**Tape speeds:** 7½ and 15 in/s, user-selectable.
**Fast-forward speed:** 15 or 30 in/s, user-selectable.
**Tape track format:** Matrax, two 80-mil audio tracks and one 21-mil cue track.
**Audio channel formats:** discrete left/right or matrixed sum/difference, user-selectable.
**Start time:** < 100 ms.
**Stop time:** < 40 ms.
**Wow and flutter:** > 0.1% RMS unweighted.
**Speed accuracy:** > 0.1%.
**Audio input impedance:** 20 kΩ (bridging), balanced, differential amplifier.
**Input level:** – 13 dBm to + 9 dBm.
**Output source impedance:** < 95 Ω, balanced, floating (transformer-coupled).
**Output load impedance:** 600 Ω minimum.
**Nominal output level:** + 4 to + 8 dBm, adjustable.
**Maximum output level:** + 25 dBm into 600 Ω.
**Frequency response:** 7½ in/s – 40 Hz to 15 kHz, + 0.5, – 1 dB; 15 in/s – 55 Hz to 22 kHz, ± 1 dB.
**Noise:** 7½ or 15 in/s – 59 dB unweighted, – 62 dB A-weighted; no tape, – 64 dB unweighted, – 68 dB A-weighted.
**Distortion at 1 kHz:** record amplifier < 0.1% THD; reproduce amplifier < 0.1% THD; system < 0.9% THD.
**Cue erasure:** > 30 dB.
**Record pre-emphasis:** 7½ in/s – 50 μs, 15 in/s – 25 μs.
**Squarewave response:** 7½ in/s < 25% overshoot, no ringing; 15 in/s no overshoot, no ringing.
**Audio-channel separation:** > 50 dB at 1 kHz.
**Crosstalk:** > 60 dB, cue to audio; > 60 dB at 1 kHz, audio to cue.
**Bias signal:** 200 kHz, crystal-controlled, less than 0.07% THD.
**Cue signals:** 1 kHz primary, 150 Hz secondary, 8 kHz tertiary. Machine automatically responds to primary cue tones in the fast-forward modes.
**Cue outputs:** + 12V DC outputs upon secondary and tertiary tone detection. Cue-track audio signals are simultaneously available at 0 dBm, 600 Ω.
**Connectors:** audio input Switchcraft *D3F*; audio output Switchcraft *D3M*; cue 4-pin *AMP*, lock-ring type; remote control 16-pin *AMP*, lock-ring type.
**Power requirements:** 120V AC, 60 Hz or 220 to 240V AC, 50 Hz. Recorder 25 W idle, 45 W running; player 10 W idle, 25 W running.
**Weight:** recorder with rack style case 45lb; player 17 lb; player single case 5 lb; player tri-mount case 8 lb.
**Dimensions:** recorder (rack style case) 19 × 5¼ × 14¾ in (whd); player (single case) 6 × 6½ × 15¾ in (whd); player (tri-mount rack style case) 19 × 5¼ × 14¾ in (whd). (Allow 3 in at rear for cables and connectors).
**NOTE:** frequency response, noise and distortion measurements made using Audiopak Type *AA-3* cartridges and tape at a recording level of 250 nWb/m.
**Manufacturer: Pacific Recorders and Engineering Corp, 11100 Roselle Street, San Diego, California 92121, USA.**
**UK:** Leevers-Rich Equipment Limited, 319 Trinity Road, Wandsworth, London SW18 3SL.

THE *Tomcat* cartridge machine is designed to handle only NAB *AA* size cartridges and is a machine of novel design in a number of respects which offer distinct improvements whilst in many instances retaining compatibility with existing machines.

A number of versions of the machine are available, the review machine being a fully fledged record/replay machine designed for mounting in a standard 19 in rack and occupying 3 U in height.

The left hand section of the unit consists of the cartridge transport and the replay electronics and occupies about a third of the rack width. The remaining two thirds provide the record electronics for both audio and cue, plus audio signal switching and monitoring and cue record functions.

Cartridges are inserted at the top left of the machine with a white ready lamp being extinguished when the cartridge is properly inserted – this being detected optically. A second purpose of the ready lamp is to indicate a jammed cartridge, in which instance the ready lamp flashes, all other indicators are extinguished, and the capstan stopped.

A further protection against poor cartridges is a red 'Cart Fail' lamp next to the cartridge entrance. This lamp is illuminated if the capstan motor current becomes excessive, which will be the cause if there is excessive friction in a cartridge.

Below the cartridge entrance three white indicators are illuminated for fast forward, secondary cue and tertiary cue, with the fast forward speed being internally selectable between 15 and 30 in/s. In fact the fast forward indicator is also a fast forward pushbutton which is only operable from the play or record mode, in the latter case aborting the record function. Exit from fast forward is either by pressing the stop button or by the machine finding a primary cue tone on tape.

The yellow illuminated stop button serves a number of purposes. Entrance to audio record is by pressing the record button and then the play button – once the record button has been pressed the record function can be aborted by pressing the stop button. After inserting a cartridge the stop button becomes steadily illuminated. However, if the machine has been started and stopped manually the stop button flashes intermittently to indicate that the tape has not been cued. It can, however, be restarted by pressing play.

When the machine has either been cued manually by the fast forward mode, or by meeting a secondary cue tone, the stop button flashes rapidly and the machine cannot be restarted without without first pressing the stop button.

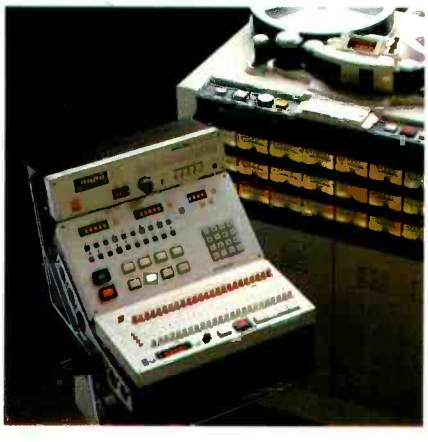
The right hand section of the front panel is purely associated with cue functions. This section consists of five illuminated momentary pushbuttons. Firstly, there is the cue record button which is illuminated red when the record function has been initiated, which may be done in the stop or replay modes and is automatically done when entering the record mode. Once cue record has been entered and the primary cue recorded, the secondary and tertiary cue buttons become illuminated and allow the recording of these cues.

A further pushbutton allows the erasure of cues when in the replay mode, this button being illuminated red when depressed in the replay mode only. the final function in the cue section is a button which inhibits the automatic insertion of the primary cue when entering audio record.

The central section of the front panel is dominated by two VU meters, whose function is controlled by three illuminated pushbuttons which allow the meters to monitor the input signals, the off-tape signals, or in circumstances which will be explained later, the sum/difference signals at the input or from tape.

84 ▶


# The Acclaimed Multitrack Engineering Logic. Otari MTR-90.



Otari science integrated the cold logics with sophisticated electronics into a compact yet responsive whole. The unique pinchroll-erless transport with 60mm diameter direct drive capstan is eloquent case in point. The industry's first CPU-controlled 3 motors, uti-lizing advanced PLL DC servo method, deliver fully symmetrical constant tension tape path. It induces the gentlest handling of your 2" master tape with far more precision than ever. While eliminating tape wear and stretch-ing generic to the conventional pinchroller design.
The MTR-90 comes fitted with the functional efficiency like digitally timed silent punches, electronic cueing, digital timer and ±20% varispeeed with 0.1% readout. SMPTE inter-face access for audio-video, audio-audio synchronization. Spot erasing is perfected thanks to the new narrow head block design. Full-remote as a standard, along with optional 10-position autolocator.
Or high slew-rate components, active mixing of bias and audio for better aural results. Advanced modular concept is exemplified in single card circuitry.
The MTR-90 is available in 24, 16 and 16 prewired for 24 configurations.

OTARI

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

Signals at the outputs are controlled by three further illuminated switches which select input or from tape monitoring. The third button, which has blue illumination, initiates automatic switching of the outputs between input and tape when entering record. The illumination of the input and tape buttons follows this automatic function with neither button being illuminated when the outputs are muted.

Whilst the output levels are fixed the record levels are controlled by two potentiometers which have an anticlockwise detented 'calibrate' position.

The final features at the centre of the front panel are the record button, the 7½ to 15 in/s tape speed button and a mono/stereo button. The function of the latter will be dealt with later.

Overall the layout of the front panel and the identification of the controls was excellent with all the 'dangerous' controls being protected against accidental operation.

At the rear of the unit the audio inputs and outputs take the form of balanced connections at *XLR* connectors with the power input being an IEC connector next to an unidentified imperial size power fuse.

Also at the rear a multipole locking connector allows full remote control with separate connectors for external cue inputs and outputs.

Within the unit the majority of the electronics are contained on 16 plug-in PCBs at the rear. These boards plug into sockets in the base, there being four extra sockets for the installation of options. All the boards were very well made with clear component indentifications – being double sided boards a ground plane is included as a protection against RF interference.

Behind the front panel the power supplies consist of a fully screened mains transformer with three power supply regulator boards.

The tape transport is of interesting design based upon a stainless steel plate which acts as a reference face for the other transport components. Location of the cartridge is accomplished by three mechanisms. Spring loaded plungers above the cartridge press it onto the transport with a further spring loaded 'L' shaped section loading the cartridge against a lateral reference face. Finally, two steel pins in the transport plate limit the insertion of the cartridge.

Tape guidance is by four 'U' shaped guides fixed adjacent to the record and replay heads, which themselves are fixed directly to a small plate without any azimuth or other adjustments. This system provides a stable platform for the heads and guides which bolts onto the main transport plate. This head and guide plate is shimmed during manufacture for exact alignment with the ceramic large-diameter capstan. There are therefore no head or guide user adjustments.

The capstan is driven directly by the motor which is phase locked to a crystal source to provide first-class speed stability. Any excessive motor current due to high cartridge friction gives a cartridge failure alarm.

The pinch roller, which is mounted via a long horizontal shaft, has a self-aligning bearing and is cam operated from a rotary solenoid which has an air-dampening dashpot. Both the rate of pinch roller engagement and the pinch roller pressure are electrically adjusted with the only mechanical adjustment on the tape transport being the position of a pinch roller engagement sensor. This leads to a cartridge transport of excellent stability which should be proof against abuse by operators and maintenance staff.

Mechanically the head and tape guide dimensions are such that not all NAB cartridges will fit into the transport. As such some archived cartridges will not be usable. However, the manufacturer can modify the machine to accept such cartridges when required.

A further non-standard feature is the track dimensions as 0.08 in audio tracks are used instead of the conventional 0.043 in tracks, thus offering a very significant improvement in signal to noise performance. In addition the cue track width has been reduced from 0.043 in to 0.021 in to accommodate the wider audio tracks.

Reverting to the electronics section there are numerous adjustments and operational options most of which are identified on the PCBs.

Before exploring the audio electronics another unusual feature of this machine must be explained. Normally stereo signals are recorded as separate left and right channels, which leads to compatibility problems with monophonic reproduction due to phase errors between tracks, this being a common complaint with cartridge machines. In the *Tomcat*, changing round two DIP headers in the electronics boards allows the sum of the left and right inputs to be recorded on one track and the difference on the other track. This is the reason for the possibility of metering the sum and difference signals and the presence of a mono/stereo switch on the front panel. This latter switch is only operational in the sum/difference mode and when in mono records only on the left track.

In addition to this, the machine simultaneously records a tertiary cue tone with the primary cue tone in the mono mode. Upon replay this tertiary tone is detected and machine automatically applies the replay signal to both outputs.

Those functions and the control of all tape transport functions are effected by a microprocessor which also deals with the remote control interface.

In all there are 42 pre-set controls accessible on the PCBs and further controls which require extender boards for access. Most of these controls take the form of normal pots and I do not propose to describe all their functions. As might be expected the two channels have HF equalisers, level controls, bias controls, etc. In this area the only less usual controls are a phase optimising control in the record channels and switches for switching out the phase compensation and equalisation when setting or measuring phase differences between tracks.

The cue system has its own sets of level and bias controls in addition to frequency trimmers.

Of more interest is a 5-position rotary switch for using the front panel VU meters to monitor other functions such as combinations of output level and bias for both cue and audio.

Various other functions are controlled by two 6-way DIL switches. Some of these options include output muting when the tape is stopped, muting or non-muting during record set, audio out during recording from tape or input, and fast forward muting.

Other switches affect cueing such that replay may or may not be directly entered after self cueing, end of message at the beginning or end of the secondary cue tone, fast wind or just mute at the secondary cue, power up to 7½ or 15 in/s, fast forward to 15 or 30 in/s and finally a test switch which enables the machine to be run without a cartridge in place and also inhibits cue functions whilst still illuminating the cue and function lights appropriately.

All features of the machine were very well thought out with the standard of construction being excellent and first class servicing information being provided in a comprehensive and well produced technical manual.

**Inputs and outputs**

The left and right audio inputs are electronically balanced connections with an input impedance constant at 40.8 kΩ irrespective of gain settings and with a signal handling capability in excess of +22 dBm. The common mode rejection, which has a null control, was found to be as shown in **Fig 1**.

Normally 0 VU corresponds to an input level of +4 dBm with the level controls at their 'calibrate' position. The variable settings allow inputs from −19.5 dBm to +9 dBm to correspond to 0 VU.

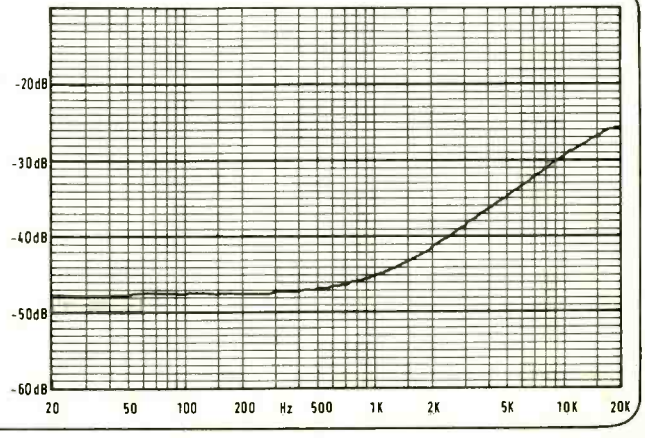
Unlike the audio inputs, the outputs are transformer-coupled and floating with an output impedance measured at 120 Ω and a drive capability of +25.5 dBm into 600 Ω. As supplied a recorded fluxivity of 320 nWb/m correspond to an output level of +7.5 dBm, but this could be adjusted over the range −16 dBm to +10.5 dBm.

The cue track, in addition to recording cue information, may also be used as an audio track with an unbalanced cue input and transformer coupled cue output being provided. The level at the cue output for a recorded fluxivity of 320 nWb/m was +6 dBm as received with an adjustment range from +3 dBm to +11 dBm and an output impedance about 500 Ω. Input to the cue track is unbalanced with an impedance of 91.7 kΩ with the sensitivity to record 320 nWb/m at 1 kHz being +1.5 dBm as received.

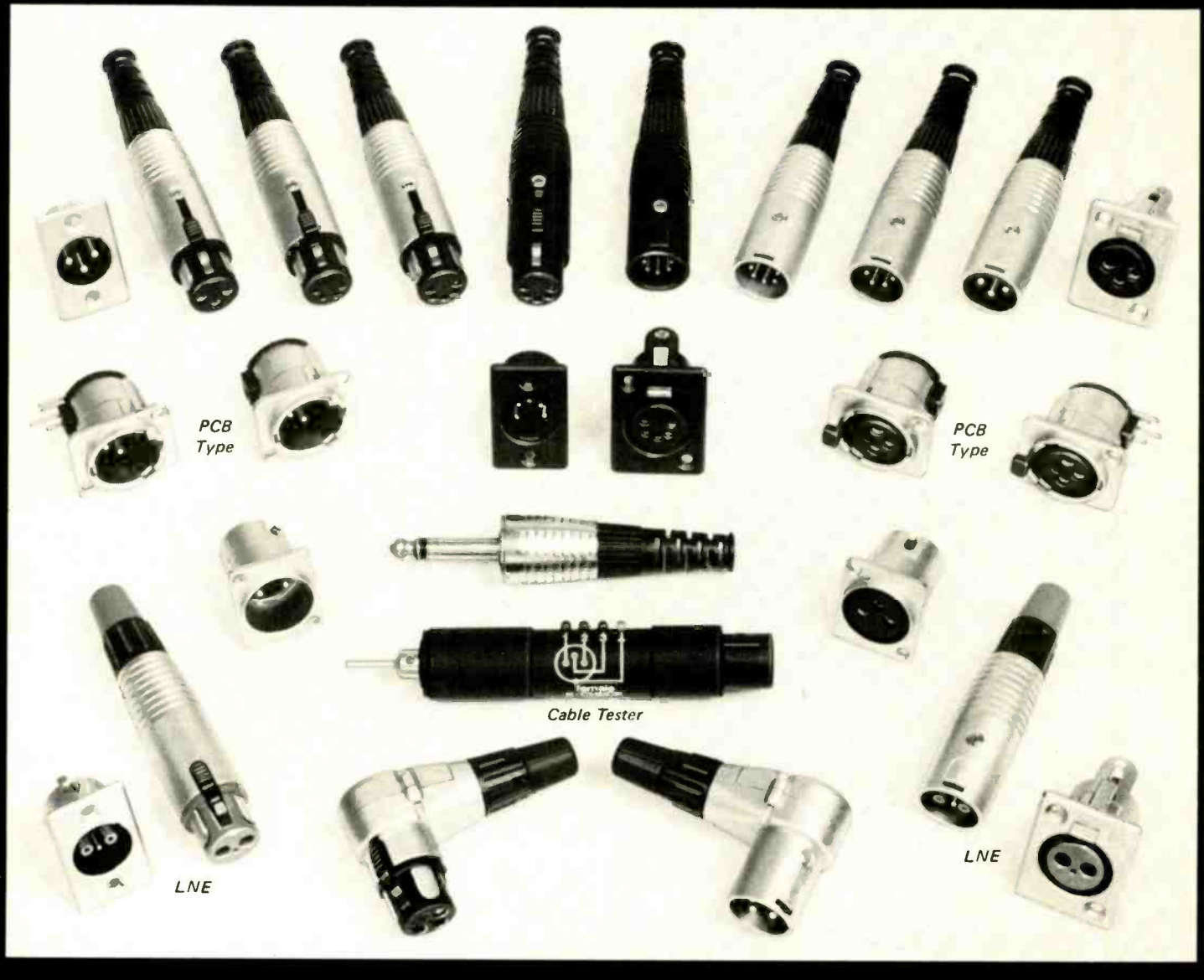
The remaining inputs/outputs are remote control functions which are either pushbutton switched for controls or take the form of directly connected indicator lamps.

86 ▶

FIG 1.
TOMCAT CARTRIDGE
TAPE MACHINE
COMMON MODE REJECTION



# NEUTRIK CONNECTORS




We are proud that in the U.K., Neutrik connectors are chosen by prominent makers of mixing consoles, audio equipment, broadcast and TV studios and by some of the leading connector distributors, which ensures an enthusiastic nationwide distribution.

Sole Agent U.K.

THE HOUSE OF EXCLUSIVE COMPONENTS

**Eardley Electronics Ltd**

Eardley House, 182/184 Campden Hill Road, Kensington, London W8 7AS Telephone: 01-221 0606 Telex: 299574

**Frequency response and noise**

Audiopak type *AA-3* cartridges were used for all measurements involving the use of tape, this including a Camford calibration cartridge to the IEC 70 $\mu$s equalisation at a tape speed of 7½ in/s.

As received the frequency response of both audio channels was found to be within ±0.7 dB from 60 kHz reference 1 kHz at 7½ in/s, the response rising to +2 dB at 40 Hz and −2 dB at 30 Hz. Using the same calibration tape at 15 in/s showed the equalisation at this speed to be accurate to the 35 $\mu$s IEC characteristic with the response being within ±0.7 dB from 120 Hz upwards and rising to +2 dB at 80 Hz and −2 dB at 60 Hz.

The overall record/replay frequency responses for the two channels were effectively identical with the performance at 7½ and 15 in/s as received being shown in **Fig 2** and **Fig 3** at a recording level 20 dB below 320 nWb/m. Both these frequency responses are extremely flat with the exception of the low frequency performance where the replay head design is clearly not optimised.

Whilst the range of the replay equalisers was more than adequate the centre of the range was poorly balanced at both tape speeds as shown in **Fig 4** for 7½ in/s. Whilst this comment did not apply to the record equalisers their range was only just adequate at 15 in/s as shown in **Fig 5**.

Noise was measured at the outputs of both audio channels, both with and without tape with the capstan running, and found to be similar for the left and right channels. The results referred to a fluxivity of 320 nWb/m being as shown in **Table 1.** These figures show a good margin between tape noise and the replay amplifier noise and a complete absence of power line hum or motor noise was noted.

**TABLE 1**

| Measurement method | With audiopak AA-3 | | Without tape | |
|---|---|---|---|---|
| | 15 in/s | 7½ in/s | 15 in/s | 7½ in/s |
| 22 Hz to 22 kHz RMS | 54 dB | 55.5 dB | 58 dB | 57 dB |
| A-weighted RMS | 59.5 dB | 59 dB | 67.5 dB | 65 dB |
| CCIR-weighted RMS | 52 dB | 52 dB | 64.7 dB | 62 dB |
| CCIR-weighted quasi-peak | 48 dB | 47.5 dB | 61 dB | 57 dB |
| CCIR/ARM ref 2 kHz | 58.5 dB | 57.5 dB | 71 dB | 67 dB |

Whilst in the record/replay mode the record gain setting did affect noise in the input monitoring mode; this noise was more than 10 dB below the replay amplifier noise and therefore of little significance.

**Distortion and metering**

Checking the maximum output level for 3% third harmonic distortion 1 kHz with the Audiopak

88 ▶

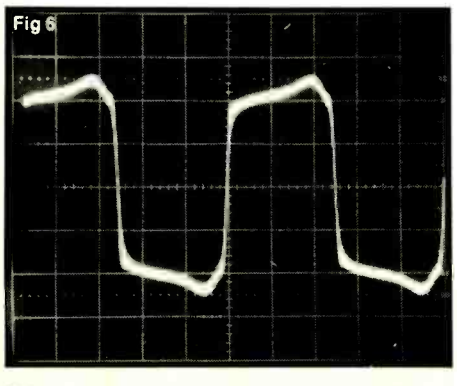



FIG 2
TOMCAT CARTRIDGE
TAPE MACHINE
RECORD/REPLAY FREQUENCY
RESPONSE AT 7½ in/s

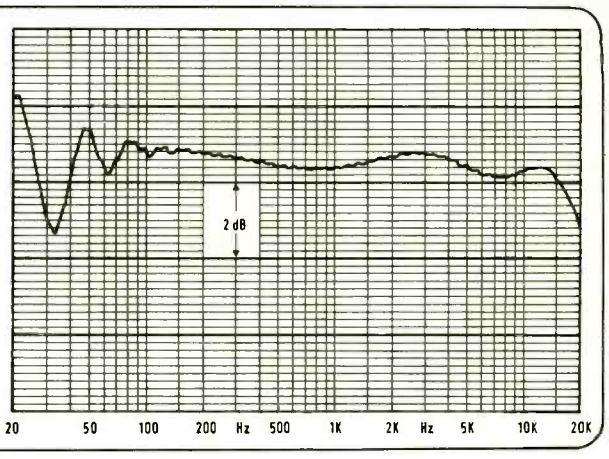



FIG. 3
TOMCAT CARTRIDGE
TAPE MACHINE
RECORD/REPLAY
FREQUENCY RESPONSE
15 in/s

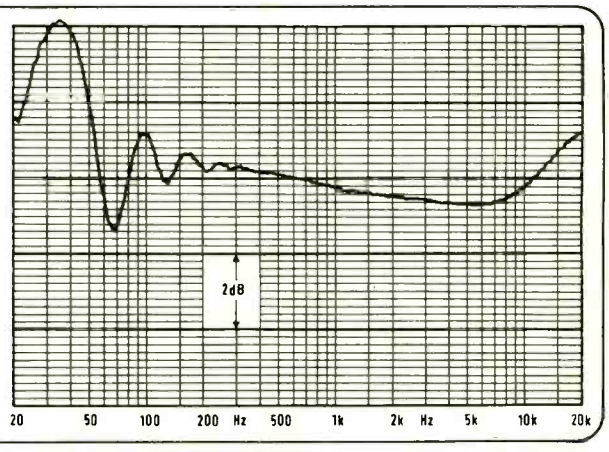



FIG. 4
TOMCAT CARTRIDGE
TAPE MACHINE
REPLAY
EQUALISATION 7½ in/s

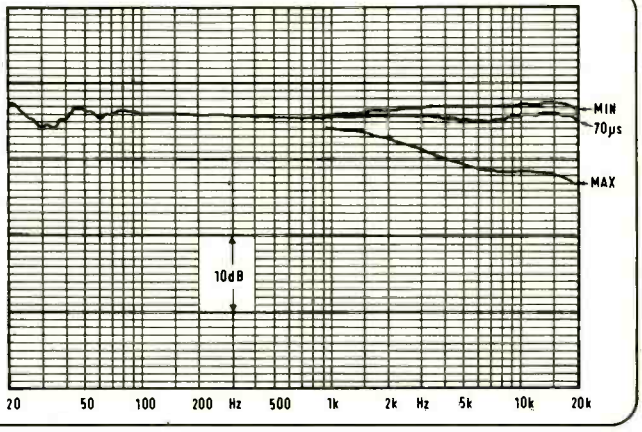
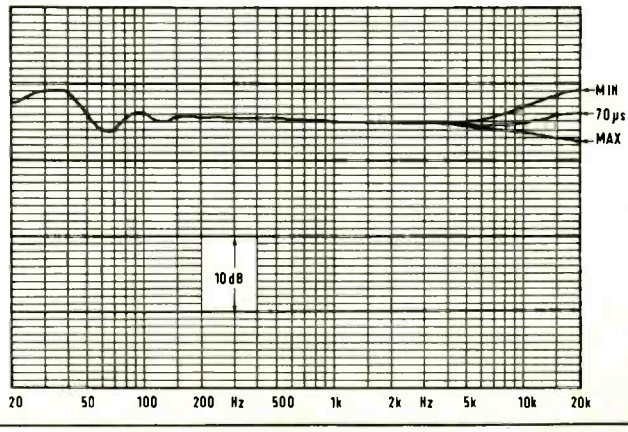



FIG. 5
TOMCAT CARTRIDGE
TAPE MACHINE
RECORD EQUALISATION
15 in/s



# TAKE IT TO THE LIMIT.
## (but not beyond)


These superior sound control units represent many years of detailed development and close consultation with sound engineers to obtain the perfection our industry needs.

The **GEMINI EASYRIDER** Compressor/Limiter offers two channels with continuously variable compression slope and auto compensating threshold for constant output level.

The **EX-PRESS STEREO LIMITER** has expanders to attenuate source noise; a range of compression slopes; clipper and side-chain pre-emphasis. An excellent unit for FM broadcasting or cassette mastering.

**VOCAL STRESSER** and **COMPEX LIMITER** are known the world over. Both have separate compressor- limiter-expander facilities. The Vocal Stresser's switchable sweep Eq reduces modulation effects and de-esses.

The **VOICE-OVER LIMITER** automatically maintains pre-established music-to-voice ratios.

The unique **SELECTIVE LIMITER** will control level in any selected frequency band without modulating the rest of the programme. Ideal for de-essing/HF limiting masters, cassette or as LF limiter for disc-cutting.

Units feature variable attack and release, stereo matching. Most have accessible side chains.

These along with the **TRANSDYNAMIC PROCESSOR**, the **SCAMP MODULAR SYSTEM** and the **PANSCAN** provide the widest choice in professional signal processing.

**Worldwide: Audio & Design (Recording) Ltd,**
North Street, Reading, Berks. RG1 4DA. Tel: (0734) 53411. Telex: 848722ADRUK

**U.S.A.: Audio & Design Recording Inc.**
P.O. Box 786, Bremerton, WA 98310U.S.A. Tel: (206) 275 5009. Telex: 152426ADRUSA

*AA-3* cartridges showed this to be 6.5 dB above a fluxivity of 320 nWb/m at both tape speeds on both channels. The 10 kHz saturation point was 1 dB below this level at 7½ in/s, or 3 dB above this level at 15 in/s.

Very properly the 0 VU indication on the meters was aligned to −10 dB below the 3% harmonic distortion point, with the third harmonic at 0VU at 1 kHz being low at 0.3% at either tape speed.

Optimising the phase equalisers in the record amplifier gave an excellent squarewave performance at both tape speeds, the optimised result at 7½ in/s being shown in **Fig 6**.

The two VU meters were found to have the correct rectifier characteristics and ballistics for genuine VU meters to the ASA Standard C16.5.

**Cue system**

The accuracy of the cue tone frequencies and of the filters in the cue tone detection system was found to be very good with the threshold of cue detection being 18 dB below a fluxivity of 320 nWb/m. Cues were automatically recorded 11 dB below 320 nWb/m with the output level at the cue output being set to +6 dBm for a fluxivity of 320 nWb/m with the available range being 0 dBm to −8 dBm.

The duration of the primary cue was 600 ms which is adequately accurate. The duration of the secondary and tertiary cues was controlled by the time the cue record switches were depressed with a minimum of just over 100 ms.

No problems were experienced with cue detection, the primary cue being satisfactorily detected in the fast wind modes.

Using the external cue track input the record/replay frequency response at 7½ in/s was as shown in **Fig 7**. The quite respectable noise performance is shown in **Table 2**.

**TABLE 2**

| | Reference level (320nWb/m) to noise | |
|---|---|---|
| **Measurement method** | **With tape** | **No tape** |
| A weighted RMS | 54.5 dB | 60 dB |
| CCIR weighted RMS | 47.5 dB | 54.5 dB |
| CCIR weighted quasi peak ref 1 kHz | 44.5 dB | 50 dB |
| CCIR weighted ARM ref 2 kHz | 54.5 dB | 61 dB |

Crosstalk from the cue track to the adjacent audio track was excellent as shown in **Fig 8** for a tape speed fo 7½ in/s with interference from any cue tones being at least 60 dB down.

**Other matters**

Wow and flutter was measured to the IEC weighted quasi-peak standard using 10 min and 20 s Audiopak *AA-3* cartridges at both tape speeds with the result that there was little difference between the speeds, but substantial difference with cartridge length. With the 10min cartridge wow and flutter was 0.1%, falling to 0.05% with the 20 s cartridge – a creditable performance.

Similarly the phase difference between tracks varied significantly wih cartridge length. Measured with a 10 kHz tone at 7½ in/s phase errors of 30° occurred with 10 minute cartridges, increasing to 70° with short cartridges. These figures relate to steady errors as opposed to jitter which is shown in **Fig 9** for a 10min cartridge at 7½ in/s with the vertical scale being 5°/division and the horizontal scale 1s/division.

As with any cartridge machine the uniformity of th audio output was poor by reel to reel standards with cyclic variation of up to ±0.5 dB being recorded at 1 kHz tone was far worse than many reel to reel machines, but took the form of noise rather than discrete sidebands.

The final measurement was that of the separation between the left and right channels which was found to be good as shown in **Fig 10**.

**Summary**

The *Tomcat* is a machine with many unusual and practical features, some of which are incompatible with other machines. However, the only area where this can be a serious limitation is when using old cartridges which do not comply with the 1975 amended version of the NAB standard.

Both mechanically and electrically the quality of construction was excellent, ease of servicing and a first class manual being other good points.

From the point of view of performance the *Tomcat* is significantly better than many of its competitors and on a par with cheaper professional reel to reel machines.

It has always been my opinion that the basic design of cartridges leaves much to be desired and the lengths gone to in the *Tomcat* to give good quality reproduction only serve to reinforce this opinion.

**Hugh Ford**

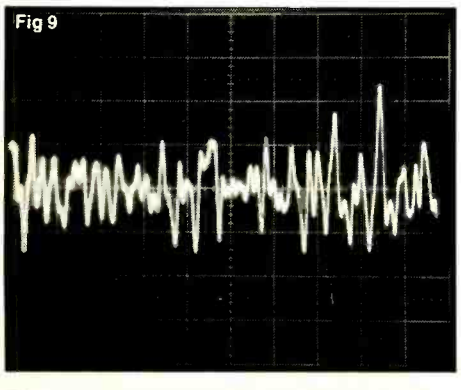



FIG.7
TOMCAT CARTRIDGE
TAPE MACHINE
CUE FREQUENCY
RESPONSE AT 7½ in/s

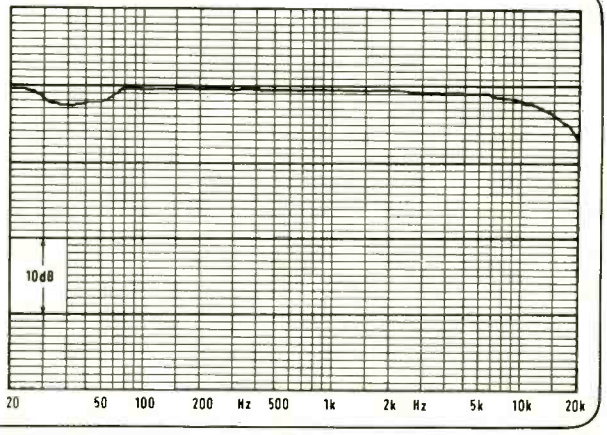



FIG. 8
TOMCAT CARTRIDGE
TAPE MACHINE
CROSSTALK

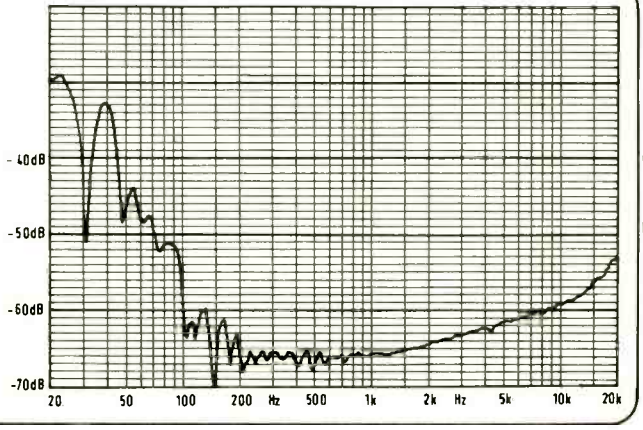
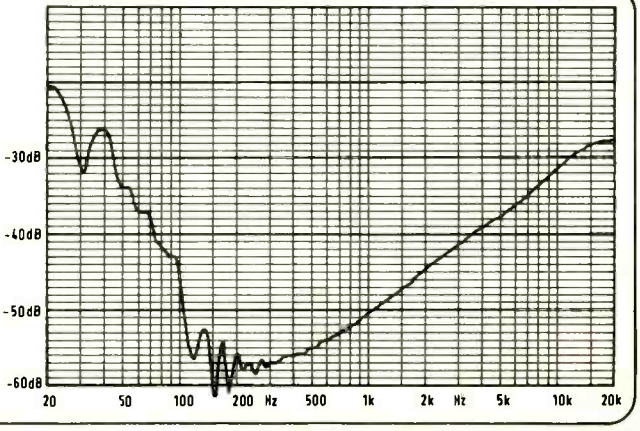



FIG.10
TOMCAT CARTRIDGE
TAPE MACHINE
CHANNEL SEPARATION



# Sonifex micro HS Cartridge Machine


**MANUFACTURER'S SPECIFICATION**
**Cartridge format:** NAB AA.
**Transport speed:** 7.5 in/s ±0.1%.
**Fast wind:** 22.5 in/s ±0.5%.
**Transport start and stop times:** less than 40 ms.
**Wow and flutter:** less than 0.08% weighted.
**Stereo phasing:** less than 15° phase error at 15 kHz.
**Standard output level:** 0 dBu reference 160 nWb/m at 1 kHz.
**Equalisation:** CCIR or NAB.
**Frequency response:** ±1.5 dB 40 Hz to 15 kHz ref 0 dB 1 kHz.
**Distortion (reproducer):** less than 0.3% at 18 dBu.
**Distortion (recorder):** less than 2% at +8 dBu ref. 0 dBu = 160 nWb/m (HOLN tape).
**Signal/Noise ratio:** better than 40 dB reference 0 dBu = 160 nWb/m, recorded, peak weighted.
**Mute level:** – 86 dB reference 0 dBu = 160 nWb/m.
**Stereo crosstalk:** less than – 50 dB at 1 kHz reference 160 nWb/m input to opposite channel.
**Cue-programme crosstalk:** less than – 50 dB at 1 kHz for nominal cue levels.
**Output headroom:** + 22 dBu terminated 600 Ω.
**Output impedance:** less than 50 Ω balanced.
**Cartridge loading:** simple slot load with ready indication giving pinch lift. Controls will not operate until ready mode is engaged.
**Cue outputs available:** secondary pull down. Tertiary pull down. FSK undecoded 0 dBu.
**Player controls:** stop with illumination 'ready' lamp + remote and lamp. Play with illumination 'play' lamp + remote and lamp. Fast with illumination 'fast' lamp + remote and lamp. Fast is interlocked and will not engage during record. Cue defeat switch to over-ride 1 kHz cue and make loops. Cue fast switch to provide auto fast with secondary cue.
**Recorder controls:** record + remote and lamp. Secondary + remote and lamp. Tertiary + remote and lamp.
**Preset controls factory set:** player – output level L and R, HF and trim L and R, LF trim L and R, cue level, pinch pressure, pinch ready position, speed normal, speed fast.
Recorder – HF trim L and R, bias L and R, bias cue, primary frequency, secondary frequency, tertiary frequency, cue level, metering L and R.
**Dimensions:** player 8⅝ inch × 3⅜ inch × 11⅝ inch deep. Recorder 8⅝ inch × 2⅛ inch × 11⅝ inch deep.
**Weight:** player 11 lbs. Recorder 4.25 lbs.
**Power:** 240 V 50 Hz standard (10 VA nominal).
**Connector:** XLR-LNE
**Manufacturer: Sonifex Sound Equipment, 15 College Street, Irthlingborough, Northamptonshire.**

---

ALL manufacturers of cartridge machines have gone to extraordinary lengths to overcome the inherent poor design of the NAB cartridge and the Sonifex machine is no exception and has its own unique features.

Available as a mono or stereo machine for replay only or record/replay, the machine is in two parts, the tape transport and replay section as a separate unit which can be conveniently placed above or below the transport.

The basic construction of both parts is similar with a cast alloy front panel joined to the alloy plate rear panel by a square bar section at either side with 'U' section top and bottom covers securing onto the bars. In the case of the record unit the single printed circuit board covers almost the whole base of the unit and is secured onto the side bars.

In the case of the player a ¼ in machined alloy plate forms the basis of the unit with two printed circuit boards mounted onto the top of the plate and one onto the bottom. The tape transport is itself fabricated from alloy plate sections assembled with Allen screws. The tape is driven by

92 ▶

a steel capstan with precision ball bearings at either end, the lower end having a flywheel which is belt-driven from a DC servo motor.

A rubber pinch roller is used and engagement of the pinch roller is by a novel method that doesn't use solenoids which always create heat and are difficult to damp properly. In the Sonifex the pinch roller is on the usual arm protruding from a long shaft, but the shaft is driven via a helical worm gear with the worm being rotated by a DC motor.

The arrangement is such that the motor acts as a positional servo system being controlled by a precision potentiometer on the long pinch arm shaft.

Armed with this system the machine has three pinch roller positions, disengaged, ready and drive. When a cartridge is inserted its presence is sensed by a microswitch which tells the servo to place the pinch roller in a ready position just clear of the tape. A start command then rapidly engages the pinch roller. Using this system there are no mechanical adjustments as the pinch pressure is electronically controlled as are the other pinch roller positions.

With the exception of the outer capstan bearing all the drive is below the tape transport plate. On the top of the plate the record and replay heads are positively mounted into a machined plate which secures onto the transport plate.

Tape guidance is by two 'U' shaped guides on each head with the leftmost guide being bent inwards to accommodate cartridges to the old dimensions. Locations of the cartridge within the machine is by two spring loaded shoes which bear down on the top of the cartridge at either side. A further shoe pushes the left hand side of the cartridge so that the cartridge is pushed onto the transport plate and the right hand stainless steel reference.

The front panel controls on the player section use illuminated pushbuttons for the stop, play and fast functions, the illumination also following cued functions. In addition two recessed miniature toggle switches allow the stop or fast cued functions to be inhibited so that loops may be played.

At the front of the record unit there is a small VU meter to the left with an adjacent toggle switch allowing it to be switched to left, right or mono. Holes in the panel give access to the two input sensitivity controls which are screwdriver operated.

Three illuminated pushbuttons select the record function, allow recording of secondary and tertiary cues. These cues may be recorded in either the play or audio record mode.

To the rear of the units the audio inputs and outputs are balanced *XLR* connections with a 4-pin *XLR* giving access to the cue track for FSK recording and replay with a nominal bandwidth of 400 Hz about 3.5 kHz.

Similarly the power input is via *XLN* connectors with a properly identified mains fuse of the metric type. Further DIN type locking connectors interconnect the replay and record units, connect a remote control unit and, thirdly, allow triple stack operation with automatic sequencing.

Within the units the standard of construction was excellent with all connections to the printed circuit boards being via harmonica connectors. Only the best quality components are used, including the front panel controls.

All components were clearly identified on the printed circuit boards with the manual containing layout diagrams, full circuits and servicing information.

Within the player the power supplies, incorporating a toroidal transformer, were beneath the transport plate with the remainder of the electronics being on two boards all the preset controls took the form of 20-turn potentiometers making adjustment very easy, the controls being five level controls for audio for the two audio tracks.

The four adjustments on the logic board were also 20-turn potentiometers controlling the normal and fast speeds plus the pinch roller pressure and position.

Within the record section 20-turn potentiometers were again widely used for bias, equalisation and audio level with capacitors for bias trap adjustment and 270° potentiometers for cue frequency and level.

**Inputs and outputs**

The electronically balanced audio inputs had a constant impedance of 19.6 kΩ with a common mode rejection ratio of 48 dB from 20 Hz to 20 kHz. The maximum input sensitivity was −13 dBm to record 320 nWb/m on an Audiopak *AA-3* cartridge with the input being capable of handling in excess of +22 dBm.

Like the audio inputs the outputs were electronically balanced with an impedance in the order of 30 Ω and a drive capability of +20 dBm loaded into 600 Ω.

As supplied the output level was +6 dBm for a recorded fluxivity of 320 nWb/m with an adjustment range of +11, −23 dB.

The FSK input was found to have an impedance of 8.7 kΩ with a signal handling capability of +18 dBm, this connection and the output being unbalanced. The output (which had incorrect pin connections compared with the manual) had a very low output impedance, less than 10 Ω with a drive capability of +18 dBm into 600 Ω or +19 dB ref 7 V into a high impedance.

**Frequency response and noise**

The replay frequency response as received was found to be to the CCIR 70 μs characteristic within +0, −1 dB from 50 Hz to 15 kHz. Checking the range of the high and low frequency replay equalisers gave the excellent range shown in **Fig 1.**

Using an Audiopak *AA-3* cartridge the record/replay frequency response was as shown in **Fig 2** for the two channels at 0 VU and −10 VU with zero VU corresponding to −2 dB reference 320 nWb/m. Checking the high frequency record equaliser produced **Fig 3** showing a wide range of equalisations available.

Noise was measured reference a fluxivity of 320 nWb/m using an empty cartridge and an Audiopak *AA-3* cartridge recorded with bias and no audio signal with the following results, the two channels being effectively identical.

**Table 1** shows a good margin between machine and tape noise in the weighted measurements with

94 ▶

**TABLE 1**

| Measurement method | Reference level to noise with tape | without tape |
|---|---|---|
| 22 Hz to 22 kHz RMS unweighted | −50 dB | −56 dB |
| A-weighted RMS | −57.5 dB | −66.5 dB |
| CCIR-weighted RMS ref 1 kHz | −48.5 dB | −60 dB |
| CCIR-weighted quasi-peak ref 1 kHz | −44.5 dB | −56.5 dB |
| CCIR-weighted average ref 2 kHz | −55 dB | −66 dB |

FIG 1. SONIFEX μHS REPLAY EQUALISER RANGE

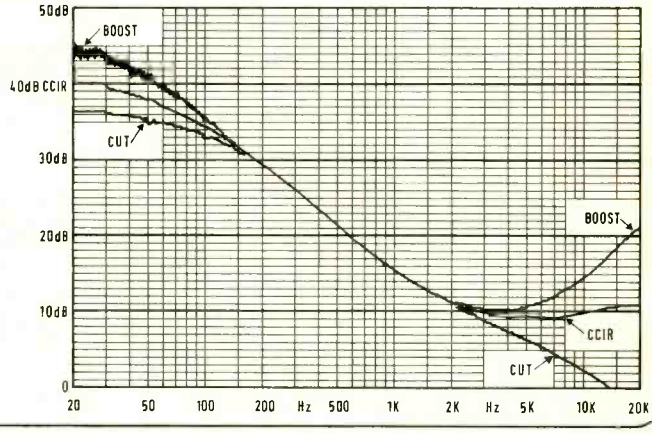
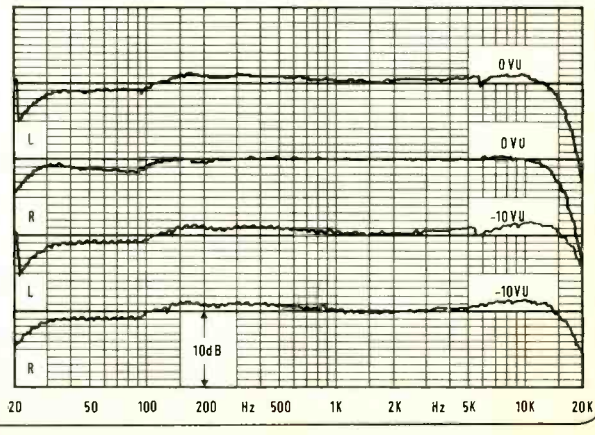



FIG 2. SONIFEX μHS RECORD/REPLAY FREQUENCY RESPONSE



# medium rare!

Some people can be pretty specific about what they want. But we're used to that. That's why, as well as our standard mono, stereo, 3-channel and 4-channel cassette machines, we've got a stack of options, like Dolby HX, balanced line in/out, remote control, voice-operated switching, auto-changeover... the list goes on and on.

And if the feature you want isn't one of our normal options, we'll build it in – specially for you.

Ring us for a chat sometime – you won't get the heavy sell – just the facts!

NEAL

Unit 21, Royal Industrial Estate, Jarrow, Tyne & Wear
NE32 3HR. Telephone: (0632) 899379.

the unweighted measurements being affected by 50 Hz hum at −61 dB. To obtain the available dynamic range the maximum output level for 3% third harmonic distortion of +6.5 dB reference 320 nWb/m must be added to the above figures.

**Distortion and metering**

The third harmonic distortion at an indication of zero VU was found to be 0.3% for both channels with the 3% distortion point corresponding to 8.5 dB above zero VU which is a just acceptable margin.

Checking the VU meter showed it to have the correct 'average' rectifier characteristic with its response to tone bursts being to the ASA standard C16.5 with the correct overshoot. However, the frequency response was far from flat being −1 dB at 30 Hz, +1 dB at 5.5 kHz, +2 dB at 10 kHz and +3 dB at 16 kHz. This appears to be the result of placing the feed to the VU meter after record equalisation.

**The cue system**

Checking the cue frequencies found them to be reasonably accurate at 150.4 Hz, 1000.8 Hz and 8084 Hz with the primary cue duration being 600 ms which is well within the NAB standard. Crosstalk between the cue and audio tracks was at a very low level with the primary and secondary cues being well below noise and the tertiary cue 69 dB below 320 nWb/m.

When using the FSK facility the frequency response was as shown in **Fig 4** peaking at 3570 Hz with −3 dB points at ±200 Hz as specified. Noise in the FSK output was found to be very low at −76 dBA below the maximum output.

**Tape handling**

Wow and flutter to the IEC quasi-peak weighted method remained remarkably constant with cartridge length up to 70s remaining below 0.1%. However, as with all cartridge machines, a spectrum analysis of a 10 kHz recorded tone showed considerable sideband noise.

The range of speed variation available was found to be +7% to −3.3% about the nominal 7½ in/s with the servo system being such that very poor cartridges could exhibit significant speed variations.

Checking the phase jitter between the two audio tracks at 10 kHz produced **Fig 5** showing a peak-to-peak jitter less than 25° – a very good performance.

**Other matters**

Crosstalk between the audio tracks was good as shown in **Fig 6** but the recording and replay of a 1 kHz square wave gave considerable overshoot as shown in **Fig 7.**

**Summary**

The Sonifex cartridge machine is beautifully made in both the mechanical sense and in the layout and standard of construction of all electronics.

As there are very few mechanical adjustments, particularly in relation to the capstan/pinch roller, the machine should be very reliable with servicing being simplified in comparison with other cartridge machines.

Similarly the widespread use of multi-turn potentiometers makes electronic adjustment easy, with all controls having a wide range whilst being easy to adjust with great accuracy.

A final attraction of this machine is its small size and light weight with a good overall performance.

**Hugh Ford**

FIG 3.
SONIFEX μHS
RECORD EQUALISATION
RANGE

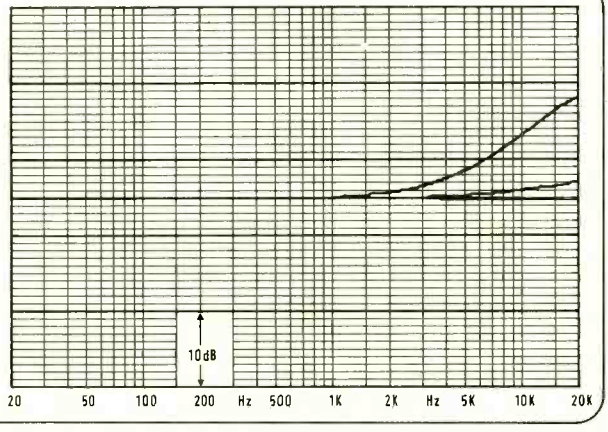



FIG 4.
SONIFEX μHS
FSK FREQUENCY RESPONSE

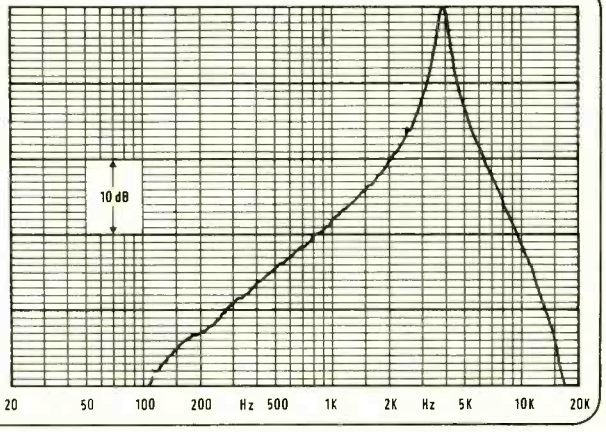



FIG 6.
SONIFEX μHS
CROSSTALK

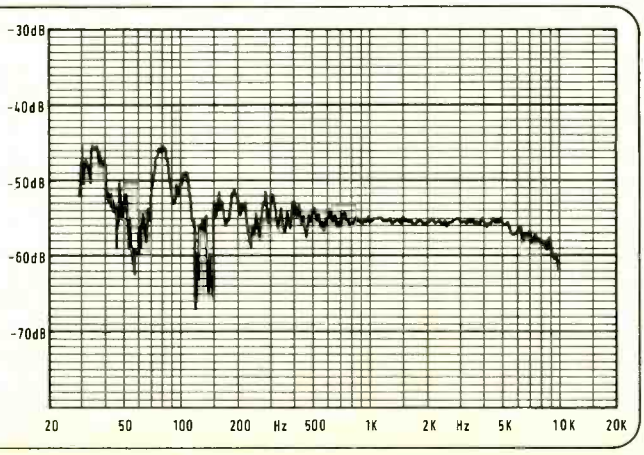



FIG. 5

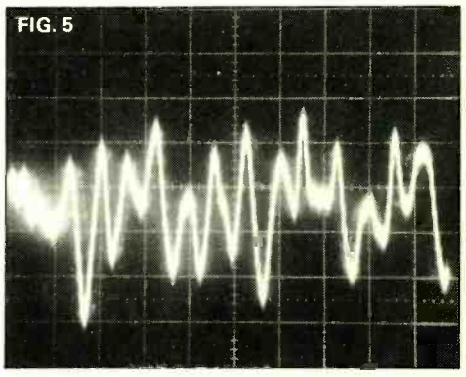
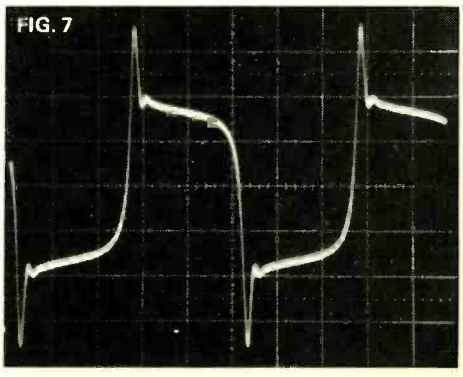
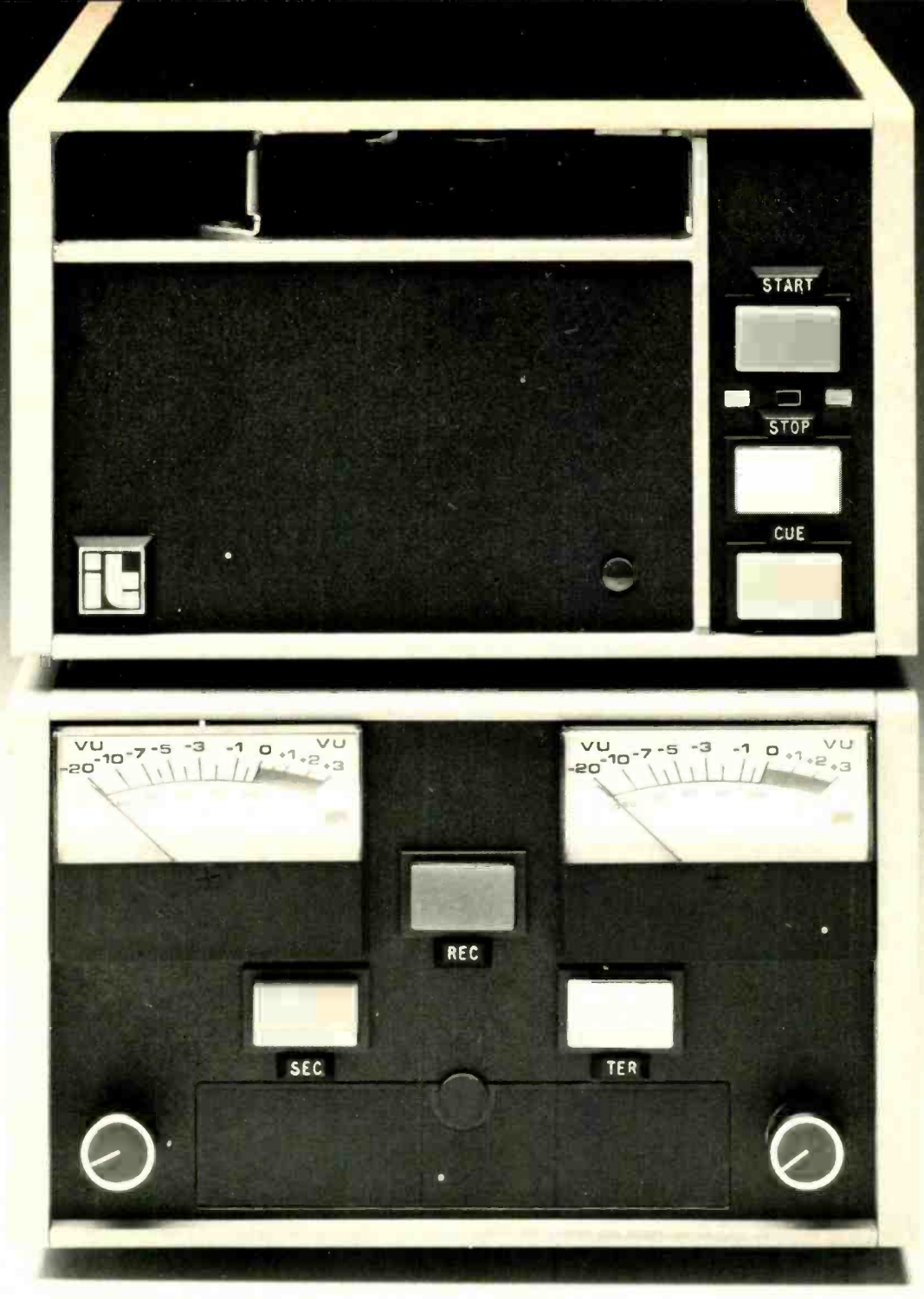


FIG. 7






# THE NEW ITC 99B IS MORE THAN JUST ONE GREAT IDEA ON TOP OF ANOTHER.

When the microprocessor-controlled ITC 99 was introduced three years ago, it represented a new generation of cartridge machines capable of producing reel-to-reel performance. Numerous mechanical and electronic innovations ensured the highest sound quality, improved operator convenience and much simplified maintenance.

Now, the ITC 99B has taken the original breakthrough several stages further.

The result is cleaner, crisper sound... consistently.

Write or telephone for full details:

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

# Bryston 4B Power Amplifier


BRYSTON Manufacturing Ltd of Canada make three similar models of stereo power amplifier with drive capabilities of 100 W, 200 W or 400 W per channel into 8Ω. In essence the specifications of the different models are identical to that of the review sample which is the 400 W per channel version.

The amplifiers are designed to mount into a standard 19 in rack via holes in the black anodised alloy front panel. The only front panel control is the power on/off pushbutton which activates a green LED power indicator at the centre of the panel that also includes two further red LEDs. These red LEDs are clipping indicators for the two channels.

Each side of the amplifier is covered by three finned alloy heatsinks with two further heatsinks at the rear, to the centre of which are the input/output connections and a bridging switch.

The mains power is fed via a massive fixed lead of the self coiling type with, unfortunately, American colour codes.

Audio input is via either ¼ in jack sockets or phono sockets wired unbalanced in parallel and feeding directly 25 kΩ input level potentiometers equipped with collet-type shaft locks.

The two audio outputs take the form of terminals/binding posts on the standard ¾ in spacing with protection being provided by two imperial size power line fuses, one for each channel. These were stupidly identified by 'replace fuse with same type and size'. I strongly suspect that the 7A fuses fitted were already incorrect for 240 V operation?

Another feature that I don't like is the fact that the amplifier's outputs are very close (within an inch) of the phono input sockets – this could lead to instability.

Within the amplifier two large laminated type power transformers are mounted behind the front panel with the rectifiers and smoothing capacitors to the rear providing a separate ±70 V power supply for each channel.

The main amplifier boards solder directly onto four power transistors and a driver transistor either side of the amplifier with four subsidiary boards each attached to a further two power transistors and a driver transistor each – thus each channel has four 2N6609 and four 2N3773 output transistors.

Finally there is a PCB at the centre rear which appeared to be associated with the clipping indicators and also supported two well-buried fuses of unknown function.

Whilst the mechanical construction was generally solid and the exterior finish good the interior wiring was untidy and the standard of soldering mediocre to say the best.

Interconnection between PCBs was by a combination of edge connectors and AMP tabs with the soldering to the edge connectors being to a poor standard and unsleeved.

Components were properly identified on the PCBs, but no servicing information was provided. Indeed, access to the components for servicing would not be easy without removing the boards from the amplifier which appeared to be a relatively simple task.

All measurements were made under controlled conditions with the mains power stabilised to 240 V at the end of the mains lead and using precision non-inductive load resistors unless otherwise indicated.

### Power output and distortion

The power output at 1 kHz at the onset of sinewave clipping was measured into loads of 8 Ω, 4 Ω, and 2 Ω, the latter being an indication of the amplifier's capability of driving nominally 4 Ω loudspeakers where the impedance can approach 2 Ω at some frequencies. **Table 1** shows the results with left and right channels driven singly, there being no difference when both channels were driven in view of the use of completely separate power supplies.

These figures show a large margin above the rated outputs of 200 W into 8 Ω or 400 W into 4Ω with a good performance into 2 Ω loads.

Intermodulation distortion to the CCIF twin-tone method using two tones separated by 70 Hz was measured at various levels up to the rated power output into 8 Ω and found to be consistently below 0.01% at frequencies up to 20 kHz.

Measurement of the individual second and third harmonic distortion at half power and at 1 W into 8 Ω produced **Figs 1** and **2** where below 5 kHz the distortion was below the instrument's residual in the order of 0.005%.

Total harmonic distortion was measured into both 8 Ω and 4 Ω at 1 W and at full rated power with the excellent results in **Table 2** from the worst channel, there being little difference between the two.

At no time was there any sign of crossover distortion and checking the fifth harmonic distortion using an asymmetrical waveform confirmed good symmetry in the amplifier.

Other than being rather dim and difficult to see, the performance of the clipping indicators was excellent with a very fast response better than 10 μs.

Driving a 1 kHz square wave into a load of 8 Ω in parallel with 2 μF gave the degree of overshoot

98 ▶

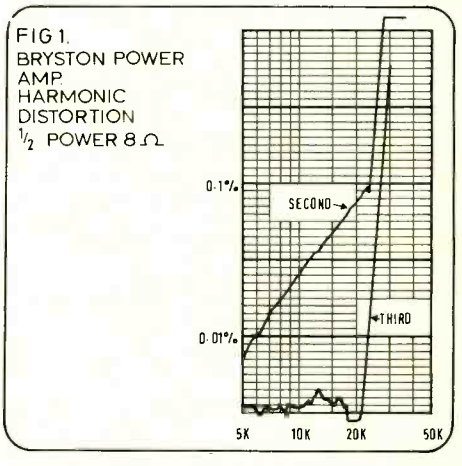
**MANUFACTURER'S SPECIFICATION**
**Power:** 200 W per channel, 8 Ω. 400 W per channel, 4 Ω. 800 W, bridged, 8 Ω. (More than 1 horsepower).
**Harmonic distortion:** less than 0.02% from 20 Hz to 20 kHz at 200 W
**IM Distortion:** less than 0.01% from 10 mV to 200 W.
**Noise:** 100dB below full output.
**Crosstalk:** below noise 20 Hz to 20 khz at 200 W.
**Slewing rate:** greater than 60 V/μ s.
**Power bandwidth:** less than 1 Hz to over 100 kHz.
**Damping factor:** over 500 at 20 Hz, reference 8 Ω.
**Input sensitivity and impedance:** 1.25 V in for full output, 50 kΩ.
**Features:** 1. Bridging switch. 2. Over 1000 square inch of heatsinking, over 1500 square inch with chassis. 3. Regulated power supplies to all voltage gain stages. 4. Each channel separated back to the linecord. 5. Green LED pilot light. 6. Red LED overdrive (clipping) indicators. 7. Will deliver full output to any phase angle at 4 Ω or higher. 8. Warranty: 3 years parts, labour, shipping one way.
**Dimensions:** 19 inch × 5¼ × inch × 13½ inch.
**Weight:** 50 lbs
**Manufacturer: Bryston Manufacturing Limited, 57A Westmore, Drive, Rexdale, Ontario, Canada M9V 3Y6.**
**UK:** Industrial Tape Applications, 1 – 7 Harwood Avenue, Marylebone Road, London N.W.1.

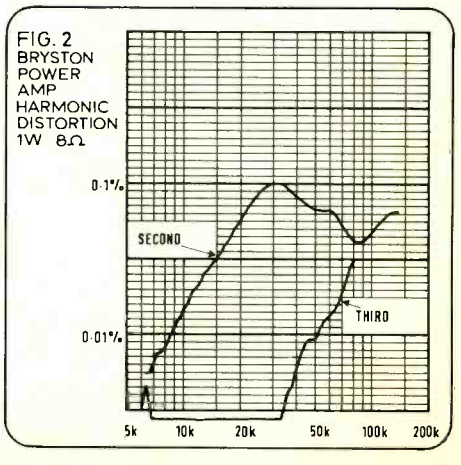
**TABLE 1**

| Load | Power output at clipping left channel | right channel |
|---|---|---|
| 8 Ω | 289 W | 288 W |
| 4 Ω | 447 W | 437 W |
| 2 Ω | 359 W | 325 W |

**TABLE 2**

| load | power | 1 kHz | 10 kHz | 100 kHz |
|---|---|---|---|---|
| 8 Ω | FULL | <0.0014% | 0.005% | 0.0075% |
| 8 Ω | 1 W | <0.01% | 0.012% | 0.019% |
| 4 Ω | FULL | 0.0017% | 0.012% | 0.027% |
| 4 Ω | 1 W | <0.01% | 0.028% | 0.046% |



# Nothing reproduces better than a Sony microphone.

If the microphone you're using gives anything less than completely faithful reproduction from studio to control room it certainly isn't a Sony. The C48 simply can't be bettered in that respect. Its performance is so outstanding, it won't leave so much as a whisper behind in the studio.

And the same level of sound quality applies throughout Sony's range of professional microphones.

The C35P and C36P uni-directional condenser types perform beautifully on stage and are particularly suitable for multiple-microphone recording.

In theatre and outside broadcast situations Sony C74 and C76 shot gun type microphones will accurately pick up frontal sound, with excellent indirect and ambient noise rejection.

Newer additions to the Sony microphone range include the ECM 969 and 989 single point stereo mikes with the option of remote control of directional axes, and the F560 and 660 uni-directional dynamic types, particularly suited to vocal performances.

In fact from the tiny ECM 50 PS tieclip mike to the F115 omni-directional dynamic microphone which will stand up to the harshest climatic conditions without any loss of sound quality, there's a Sony Microphone to suit just about any professional requirement.

Because after 30 years in the business there aren't many situations Sony haven't been called on to cope with.

If you'd like to hear more, contact Keith Smith at Sony (UK) Ltd, Pyrene House, Sunbury Cross, Sunbury on Thames, Middlesex or telephone Sunbury 81211. SONY

PROFESSIONAL AUDIO

shown in **Fig 3** but no sign of instability working into 8 Ω the rise and fall times were both 3.5 μs with a maximum slew rate of 70 V/μs.

The power bandwidth for 0.1% total harmonic distortion at half rated power was excellent extending to 76 kHz when working into 8 Ω for both channels or 49/46 kHz when working into 4 Ω.

**Frequency response and noise**

The frequency response at 1 W output is shown in **Fig 4** which shows a −3 dB point about 70 kHz whilst **Fig 5** shows the situation when driving 200 W into 8 Ω. In practice the amplifier was not DC coupled, but had a low frequency −3 dB point at 0.3 Hz. This requires some caution in use as no protection is including in the event of excessive DC offset.

As can be seen from **Table 3** signal to noise performance referred to 200 W into 8 Ω was very good with no sign of power line frequencies or their harmonics in the output.

TABLE 3

| Measurement method | Noise referred to 200 W into 8 Ω Left | Right |
|---|---|---|
| 22 Hz to 22 kHz RMS | 106.9 dB | 108.1 dB |
| A Weighted RMS | 115.9 dB | 115.5 dB |
| CCIR Weighted RMS ref 1 kHz | 109.8 dB | 107.8 dB |
| CCIR Weighted quasi-peak | 105.8 dB | 103.5 dB |
| CCIR Weighted ARM ref 2 kHz | 116.3 dB | 114.3 dB |

**Inputs and outputs**

The input sensitivity for driving 200 W into 8 Ω at 1 kHz was found to be 1.22 V with the balance between the two channels at maximum gain being within 0.086 dB, the gain controls being of the full range type.

This resulted in some change of input impedance with gain setting, the impedance at minimum gain being 26 kΩ in parallel with 10 pF, or 17 kΩ in parallel with 164/126 pF for the two channels at maximum gain.

The damping factor at the outputs referred to 8 Ω was found to be 460 at 60 Hz decreasing to 420 at 1 kHz with the DC offset at the outputs reaching a maximum of 19 mV.

**Other matters**

The overall phase shift within the amplifier was as shown in **Fig 6**, this being minimal within the audio band. As expected from the use of separate power supplies the crosstalk between the channels was very low as shown in **Fig 7**.

**Summary**

The Bryston amplifier exhibited an excellent performance with very low distortion and noise. In spite of the lack of cooling fans the amplifier could take very hard punishment before the thermal trips operated.

This is a very attractive amplifier, but the manufacturer should improve his standard of wiring and soldering.

**Hugh Ford**

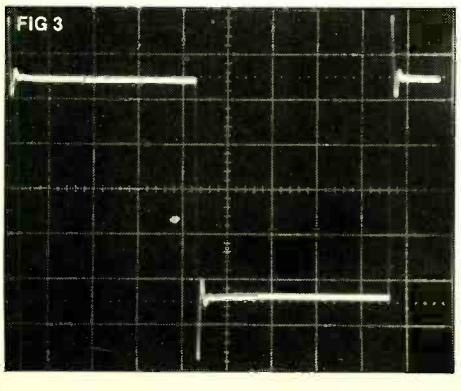



FIG. 4
BRYSTON POWER AMP
FREQUENCY RESPONSE AT 1W

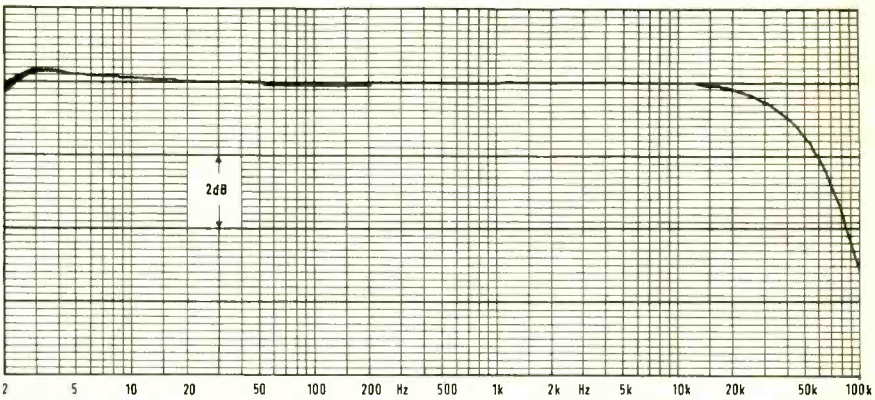



FIG 5.
BRYSTON POWER AMP
FREQUENCY RESPONSE,
200W INTO 8Ω

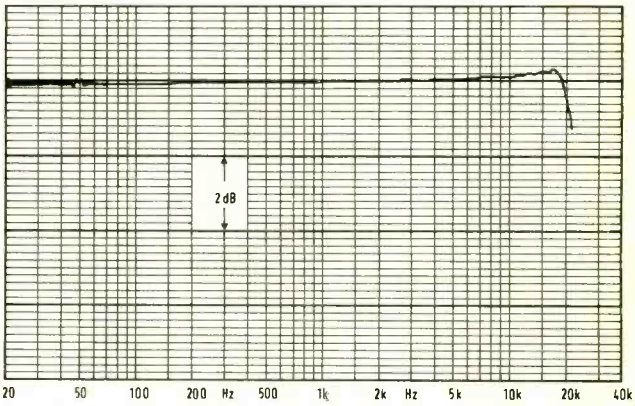



FIG.6
BRYSTON POWER AMP
PHASE SHIFT

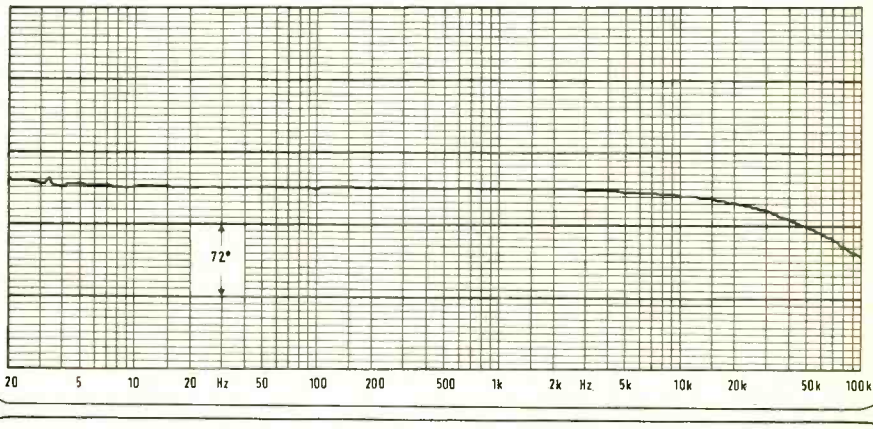
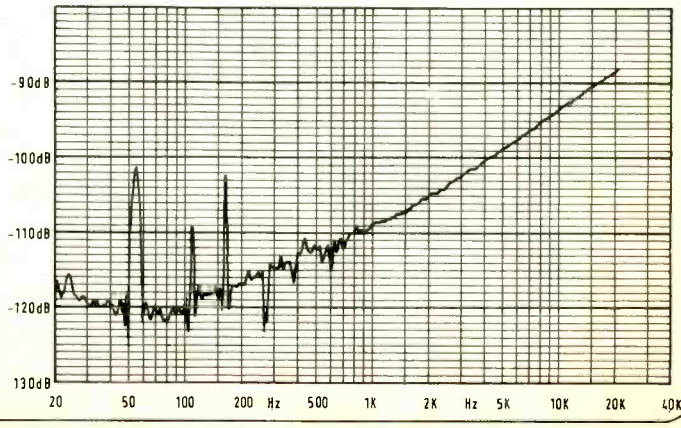



FIG 7.
BRYSTON POWER
AMP CROSSTALK



# A Quiet Boast from Chilton

## The QM3
## ultra low noise mixer ideal for digital recording

The low noise mixing facility of the QM3 may be what we are most proud of, but there are many other features that make it a sound choice before even our more expensive competitors.

These features include:

- Very strong construction.
- Compact but with ample finger space around the controls.
- Options include Full parametric EQ, stereo compressor, 20 LED channel bar graph and filters.
- Long throw plastic conductive faders are standard.
- Broadcast PPM's as standard or VU at no extra cost.
- All control panel modules removable from the top.
- Comprehensive 8 or 16 track monitoring and subgrouping.
- 4 Auxiliary sends switchable pre or post fader.
- Inbuilt talkback microphone and switchable frequency oscillator all routable.
- All outputs and microphone inputs have XLR's as standard.
- Broadcast 12/4 version fully meets IBA requirements.
- Silent cue/mute/assignment switching.
- Standard frames: 12/4/2/1 20/4/2/1 16/8/2/1 24/8/2/1

Find out more about the QM3, a time tested and proven design of the highest technical standard - Contact us today, and ask for our brochure "The QM3 in Depth."

CHILTON

EVERYTHING WE DO IS JUST THAT LITTLE BIT BETTER

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

**REVOX AND STUDER**
A80 RC Stereo from — £4,000
B67 Mk II — £2620
PR99 — £760
B710 Cassette Deck — £600
B77 HS — £560

**REBIS**
RA 402 Parametric — £381
RA 201 Gate — £61
RA 203 Comp/Lin — £110
RA 205 ADT/Delay — £166

**RSD STUDIOMASTER**
16X8 — £1670
16X4 — £985
Studio 4 — £650

**FURMAN**
RV1 Reverb — £195

**TURNER**
A300 — £400

**MXR**
3.2 sec Delay — £890
Pitch Transposer — £685
Dual Limiter — £280
2x15 Graphic — £270

**LEXICON**
Prime Time (256ms) — £1540
PCM 41 — £890

**MICROPHONES**
AKG D190 — £38
D12E — £88
D330EBT — £70
C414 — £274
C51E & CK1 — £105
Calrec 1000 Series — £88
2000 Series — £101
Neumann U87 — £385
Shure SM57 — £60
SM58 — £77

**HEADPHONES**
AKG K141 — £32
Beyer DT100 — £31

**TAPE**
Ampex ¼" 456 — £10

BOOMERANG sounds

All prices exclude V.A.T. E.& O.E.
This is just a small selection. Full list available on request. Phone Carol to go on our mailing list.
Radio Stations — see our ad. in Broadcast Sound.
Please note our new 'phone number
**061 236 0274**
**Beehive Mills, Jersey St, Ancoats, Manchester M4.**

# EDC
## RADIOMICROPHONES
DESIGNED & BUILT BY
PROFESSIONALS

'PIKAMIC's the name,
The Broadcast one.

A SENSATION that lets you use the Mic you love, in an instant. Unplug the lead, plug in the 'Pikamic' transmitter, and INSTANT CORDLESS FREEDOM is yours!

* Crystal controlled.
* Light weight 6ozs complete with battery.
* Integral Aerial.
* Max. dim. 31mm dia. X 101mm long.
* British built. H.O. approved.

For full details contact:
EDC (Elkom Design Limited),
29a West Street, Wareham, Dorset, England BH20 4JS
Tel: Wareham (092 95) 6050

EDC

# PROFESSIONAL VIDEO SHOW '82
Incorporating **VIDEO TRADEX**

## Wembley Conference Centre
23rd — 26th November 1982

**Make a date in your diary now!**

Once again, this important exhibition for professional users of production and distribution hardware will be held at the Wembley Conference Centre.

More visitors than ever are expected to attend, and the top names in the industry will be there showing their latest products.

**sponsored by Video magazine**

**Make sure you are there!**

For further information and your FREE priviliged invitation, fill in the coupon below.

To: Ken Warton
Exhibitions Controller
Link House Exhibitions
Dingwall Avenue
Croydon CR9 2TA
Tel: 01-686 2599
Telex: 947709

Please send free tickets for the Professional Video show to:
Name .....
Job title ..... S S
Company .....
Address .....
.....

# CLASSIFIEDS

Advertisements for this section must be pre-paid. The rate is **40p** per word, minimum **£10.00.** Box Nos. **£2.50** extra. Semi-display rates on application. Copy and remittance for advertisements in **DECEMBER** issue must reach these offices by **7th OCTOBER** addressed to: The Advertisement Manager, **Studio Sound,** Link House, Dingwall Avenue, Croydon CR9 2TA. Cheques made payable to Link House Publications (Croydon) Ltd.

**Note:** Advertisement copy must be clearly printed in block capitals or typewritten.

Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975**: No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder or (2) it is in a business employing less than six persons or (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

**The attention of advertisers is drawn to "The Business Advertisements (Disclosure) Order 1977", which requires that, from 1st January 1978, all advertisements by persons who seek to sell goods in the course of business must make that fact clear. From the above date, consumers therefore should know whether an advertisement relates to a sale by a trader or a private seller.**

## SERVICES

**PRESSINGS, CASSETTES** 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. (M)

**CASSETTE DUPLICATING** from 38p 1-1/hi-speed "SSP were very good quality, the best value for money"—Sound International, July 1981. Simon Stable, 46 Westend, Launton, Oxon. Tel. 08692 2831. (L)

**THE COMPLETE SERVICE.** Disc cutting (masters and demos), pressings, sleeves, cassettes, labels. Fixed and mobile recording studios. Free brochure. TAM STUDIO, 13a Hamilton Way, London N3. Tel. 01-346 0033. M

**SOUND INSULATION AND DESIGN.** Advice on reverberation time, screens, ventilation, acoustic and yibration measurement by qualified Acoustic Physicist. S.I.D., 50 Sudbourne Road, London SW2. 01-737 4336. (K, M)

**EVERYTHING FOR YOUR** next small cassette production. Duplicating (from 1p per minute). Label printing (100 pairs £4.50). Inlay cards printed or blank. Cassettes wound to any length. Audiocord Records, 59 Mayfield Way, Barwell, Leicester LE9 8BL. Tel. 0455-47298. (M)

**REALTIME CASSETTE COPIES,** Dolby B or C, continuously monitored throughout programme, also Reel/Reel copying. Highest quality product available. Call for quote. Pandora Audio, 0487/814227. (K)

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-C96)
LABEL & CARD PRINTING
**SPEECH-PLUS RECORDINGS LTD**
UNIT 32, NO 19, PAGES WALK, LONDON, SE1 4SB. 01-231 0961

**REVOX, TEAC, UHER . . .**
etc., servicing; repairing; line-up; re-biasing; head, guide and brake replacement. Revox varispeed, editing and speed change modifications. A swift and personal service by experienced engineers. Also equipment hire and sales.
**RAPER & WAYMAN**
34 Danbury Street, Islington, London N1 8JU
01-359 9342 (24 hours)

MEMO
To: All Recorders
From: The Tape Duplicating Company Ltd.
ONE TO A MILLION
We now offer Real Time and High Speed cassette duplication to all.
Ask TODAY for details and for a price list of our services—we also specialise in computer cassette and ¼" master tape copying at very competitive prices.
Contact JOHN SCHEFEL, Studio Manager.
4/10 North Road, Islington, London N7 9HN.
Telephone: 01-609 0087 Telex: 264773 METROS G

**Have you heard?**
Cassette and open reel copying. Custom wound blank cassettes supplied. Studio available for voice overs. Dolby facilities. Design, artwork and print services.
**Sound Communication**
Freepost, Field House, Wellington Road, Dewsbury, West Yorkshire WF13 1BR.
Telephone 0924 451717

*Check It Out....*
Quality Pressing **DIRECT** from our modern UK plant.
- Singles, E.P. & L.P.'s. ✓
- Cutting, Processing. ✓
- Test Pressing. ✓
- Labels & Sleeves. ✓
- Cassette Duplication. ✓
- Minimum Records - 500. ✓
- Minimum Cassettes - 250. ✓
- Qualified Staff. ✓
- Sound Advice. ✓

MARKET LEADERS IN STEREO RECORDS AND TAPES.
SRT
01-446 3218

## SERVICES

### MAIN 3M WOLLENSAK DEALERS

Meticulous alignment of all machines before sale. Excellent servicing facilities. SCS Cassettes C2-C100 on orders of 100 and over. Stockists for 3M Audio and Video cassettes. Fast-copying service. Prompt personal attention

**SOUND CASSETTE SERVICES LTD.**
P.O. Box 2, Chard, Somerset TA20 1LR.
Tel: 04606 5393

### 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**

### GATEWAY CASSETTE COPYING

High quality real time cassette copying at the lowest prices.

**Phone 01-223 8901**

### SERVICING PROBLEMS?

Professional maintenance by qualified Electronic Engineer specialising in the following:

REVOX—TEAC—NAGRA—STUDER

Collection and Delivery by arrangement. Please phone for appointment: **01-301 1864 (anytime).**

**P.A.H. ELECTRONIC SERVICES**
**42 Sutcliffe Road, Welling, Kent**

### COUNTY RECORDING SERVICE

For super quality Master Discs, Demo Discs and Pressings. Scully lathe with our latest CR 82/01 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**

### TIM WIGHT

*Technical Design and Drawing Service*

Working drawings for construction or installations, from panel layouts to system schematics.

**The Yard, 1 East Dulwich Road, London SE22 01-279 1311**

100 C-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 ¼in edited master. Any length C-5 to C-90. **NOW ALSO** cassettes in **GOLD** effect finish! Ring for price check.

### STUDIO REPUBLIC

**47 High Street, Pinner** **01-868 5555**

Sale of 1" tape, excellent condition, no edits. BASF SPR 50 and Scotch 206. Only **£5.00** + VAT each. Large range of new and secondhand equipment at competitive prices. Telephone or send s.a.e. for list.

**MICHAEL STEVENS & PARTNERS**
**The Homesdale Centre, 216-218 Homesdale Road, Bromley, Kent BR1 2QZ**
Tel. 01-464 4157 day or 01-467 0382 evenings

### CUSTOM METALWORK

Made efficiently to your specification, including: stage boxes, mic panels, enclosed audio and video jackfield pre-wired to special connectors, delivered and installed.
For further information contact:
**INTEGRATED ELECTRONICS**
**66 Portnall Road, London W9 3BE.** **Tel. 969 4135**

## FOR SALE—TRADE

### MAGNETIC TAPE HEADS

Manufactured to order for ¼", ½", 1" and 2". Please specify machine type. We also offer a relapping service.

**BRANCH & APPLEBY LTD.**
**Stonefield Way, Ruislip, Middx. HA4 0YL**
Tel. 01-864 1577

# ITA

## Used Equipment List

*(The following equipment has recently been taken in part-exchange)*

| | |
|---|---|
| Otari MTR 90 24 track with *Autolocator, 18 months* old. Guarantee | **£12,850** |
| MCI 24 track with Auto-locate 3 | **£12,500** |
| *Otari MTR10-2 stereo* master recorder, our own *demonstrator* | **£2,600** |
| ITAM 1610 16 track record-er, little use. Guarantee | **£3,900** |
| Otari MX 5050B 2 track | **£700** |
| Revox B77 15ips | **£395** |
| Teac A3440 4 track. NEW. | **£650** |
| ITAM 805 8 track | **£950** |

**ITA**
**1-7 Harewood Avenue, Marylebone Road, London NW1**
Tel. 01724 2497. Telex 21879

## SITUATIONS VACANT

# CHIEF ENGINEER

ITA require a very competent engineer to take charge of technical backup on the highly sophisticated OTARI range of recorders and tape duplicators.

The applicant must have considerable experience of working with similar advanced equipment and should have a flair for assisting customers with their technical problems.

**VERY GOOD SALARY**

*Please apply to The Managing Director:*

ITA

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

## FOR SALE—TRADE

**ONE EMI** Tape Recorder 301C/15/7½. Price £50. One EMI Tape Recorder 301D/7½/3¾. Price £50. Telephone 01-422 3443, ext. 31—Ken Surridge. (K)

**EX BBC VALVE MIKES,** AKG C12 and AKG C28. Horizon Recording Studios, Coventry (0203) 21000. (K)

**TASCAM** 22/4 £695. Tascam M144 £473. Credit facilities available. Erricks Bradford 309266 (Julian). (X)

**HILOMAST WTM/2,** winch operated telescopic mast, trailer mounted with equipment box. Max. height 56ft. Can be towed by 1100cc car, with standard tow ball. Offers around £1,000. Paul Robbins, 0734 413131. (K)

**CUT THE COST OF RECORDING.** Sale of 1in. ex-master recording tapes. Ampex 406, Scotch 256, Scotch 206, BASF SPR50, £8 plus VAT. **ACTION SOUND, 01-428 3714, 01-734 0135.** K

## FOR SALE—PRIVATE

**MINT NAGRA IV-S** £2,100 o.n.o. Also pair Schoeps CMC 541 with windshields and mounts, £660, used once. Fishpole £40. 3 × 20 J/Field £60. Microphone flightcase £30. 2 × 6ft. KMAL stands, also other goodies. Phone Nigel 0272 741440 for details. (K)

**TEAC-TASCAM 80-8** ½in. 8-track recorder, remote control, new head, immaculate condition, £1,350. Tel. 01-551 0717 (Ilford). (K)

**TEN SONAPANEL ACOUSTIC SYSTEMS** (80 modules), colour pearl white, £1,250 o.n.o., inc. delivery in U.K. Ring Nigel 0835 62413. (K)

**OTARI MX5050** 8-track ½in. with spool, transport remote, manual and test tape. This robust machine is fully operational but needs some attention, £850. Tel. 01-402 9486. (L)

## FOR HIRE


## FOR HIRE


**FOR HIRE AT BUDGET RATES**

LEXICON 224 Digital reverb and Prime Time.
AMS Digital reverb and Digital delay.
EVENTIDE Harmonizers. LINN DRUM
ROLAND ECHOS DBX comp/limiters.
Plus a whole range of studio gadgets

Phone Andy or Kerstin **01-708 0483**
or write for further details:
**10 Steedman Street, London SE17 3AF**

## WANTED

**McINTOSH, MARANTZ TUBE AMPS.** EMT 927DST, 930ST. Thorens TD-124. Garrard 201, 301, 401. Western Electric tubes, amps, mixers, drivers, horns, speakers. Tel. 213/576-2642 David YO, P.O. Box 832, Monterey Park, CA 91754, USA. (C)

**ATTWELL AUDIO** for classical sound recordings, location or studio (Steinway Grand), demonstration tapes, records or high quality cassettes. **124 Lower Richmond Road, Putney SW15 1LN. Tel. 01-785 9666.** A

## SITUATIONS VACANT

# Opportunities in Professional Audio

World leaders in the marketing and distribution of professional broadcast equipment throughout Europe, the Middle East and Africa, we are currently undergoing a significant planned expansion programme. Applications are now invited for the following challenging opportunities within our Audio Department.

**Sales Engineer**

A young and dynamic sales professional is required to join a small team engaged in the sale of digital audio equipment, analogue tape machines, mixing consoles and RF communication products. Applicants should have a proven track record in audio sales, a high degree of self motivation and an ability to work on their own initiative. Candidates must be prepared to undertake overseas travel when necessary.

**Audio Support Engineer (RF/Analogue Products)**

This new position would suit an engineer experienced in RF communications. The successful applicant will provide in-depth technical sales support on a wide range of audio products. Particular emphasis will be on wireless microphone systems but will also include microphones, analogue tape machines and mixing consoles. This will involve travel throughout our marketing area and full product training will be given. Candidates should be qualified to Degree/HNC level Electronics although direct relevant experience is equally as important.

**Service Engineer (Professional Audio Products)**

To be responsible for the service and repair of an expanding range of high technology products. Applicants should be experienced engineers who ideally have a background in sound recording or broadcast equipment, together with a relevant qualification in Electronics. Some travelling to customers will be involved and full product training will be given where necessary.

We offer attractive salaries, first class conditions of employment and considerable prospects for personal development.

*If you are interested please write, giving brief details of experience and current salary, to Mike Jones, Senior Personnel Officer, Sony Broadcast Limited, City Wall House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 55011.*

SONY® Broadcast

**Sony Broadcast Ltd.**
City Wall House
Basing View, Basingstoke
Hampshire RG21 2LA
United Kingdom
Telephone (0256) 55 0 11

## COURSES

Available from **SHERMAN KEENE PUBLICATIONS:** a recording textbook, a rec. theory correspondence course, and a newly completed vastly expanded curriculum for rec. schools incl. teacher's manual, student workbook and finals. Our book, "Practical Techniques for the Recording Engineer" acclaimed by reviewers, teachers and engineers. 381 pages, 28 chapters (4 on computer mixing). Certificate course features reading and homework in two textbooks and personal dialogue with the author via cassette. Textbook: $29.75 ($31.54 in Calif.), plus $2.75 shipping (USA), ship weight 3lb. Course: $250 per level (3 levels). To order or for more information write to: SKP, 1626 N. Wilcox No. 677-E, Hollywood, Ca. 90028. (X)

## SITUATIONS WANTED

**EXPERIENCED STUDIO MANAGER,** balance and service engineer, seeks position in studio or radio station, U.K. or abroad. Box no. 881, c/o *Studio Sound.* (L)

## SITUATIONS VACANT

**RADIO 210,** The Independent Local Radio Station for The Thames Valley, are looking for a BROADCAST ENGINEER, Grade ILR 2/3. Applicants should have a good working knowledge of Radio Broadcasting and be capable of audio equipment maintenance. They should also possess an aptitude for technical operations since a proportion of the work involves outside broadcasts and recordings. Apply in writing, giving full background and qualifications, etc., to: Paul Robbins, Chief Engineer, Radio 210, P.O. Box 210, Reading, Berks. (K)

## City of London

### Guildhall School of Music and Drama

Assistant Audio-Visual Technician

Applications are sought immediately for the above vacant post. The postholder works to the Audio-Visual Technician and assists in the operation and maintenance of the audio-visual service provided in this music and drama conservatoire. Facilities include multi-track recording equipment and closed circuit TV. Candidates should already have some experience of operating audio equipment. GCE 'O' level maths and physics and an interest in music desirable.

Salary in the range £5,499 to £5,946 inclusive (pay award pending)

For further details and an application form, please contact the Director of Administration (Mr G. Derbyshire) at the School: Silk Street, Barbican, London EC2Y 8DT. Tel. 01-628 2571

## SOUND ENGINEERS

We are a well established company engaged in hire and sales of high quality sound re-inforcement and Public Address Systems. Rapid expansion has created the following vacancies:

### INSTALLATION/MAINTENANCE ENGINEER

Our Sales Division specialises in sound re-inforcement systems for Clubs, Churches, Lecture Theatres, etc. We require experienced engineers to install and maintain new systems, also to maintain Mixers, Amplifiers, Tape Recorders, etc., which are used in our Hire Division and Recording Studios.

### OPERATIONAL SOUND ENGINEERS

Our Hire Division has vacancies for experienced engineers for delivery, installation and operation of short term hire systems including Conferences, Sporting Events, Trade and Television Shows, etc. Previous operational experience of multichannel desks and loudspeaker placement essential. Irregular hours rewarded by generous overtime rates.

Salaries negotiable and dependent on experience.

Driving Licence essential.

*For Application Form please telephone 01-540 9881, or write to:*

**R. G. JONES (MORDEN) LIMITED,**
**The Recording Studios,**
**Beulah Road, London SW19 3SB**

## Sound Maintenance

We are looking for a qualified man or woman to join a small team of electronics engineers responsible for maintaining our broadcast TV equipment. Initially to work on the maintenance and routine testing of multitrack tape machines, sound discs, VTRs, telecine and associated equipment.

A broad knowledge of analogue and digital techniques and of BASIC language will be an advantage.

Salary £10,890 per annum (increase pending), plus attractive incremental and pension schemes.

**Please telephone 01-261 3237 for an application form.**

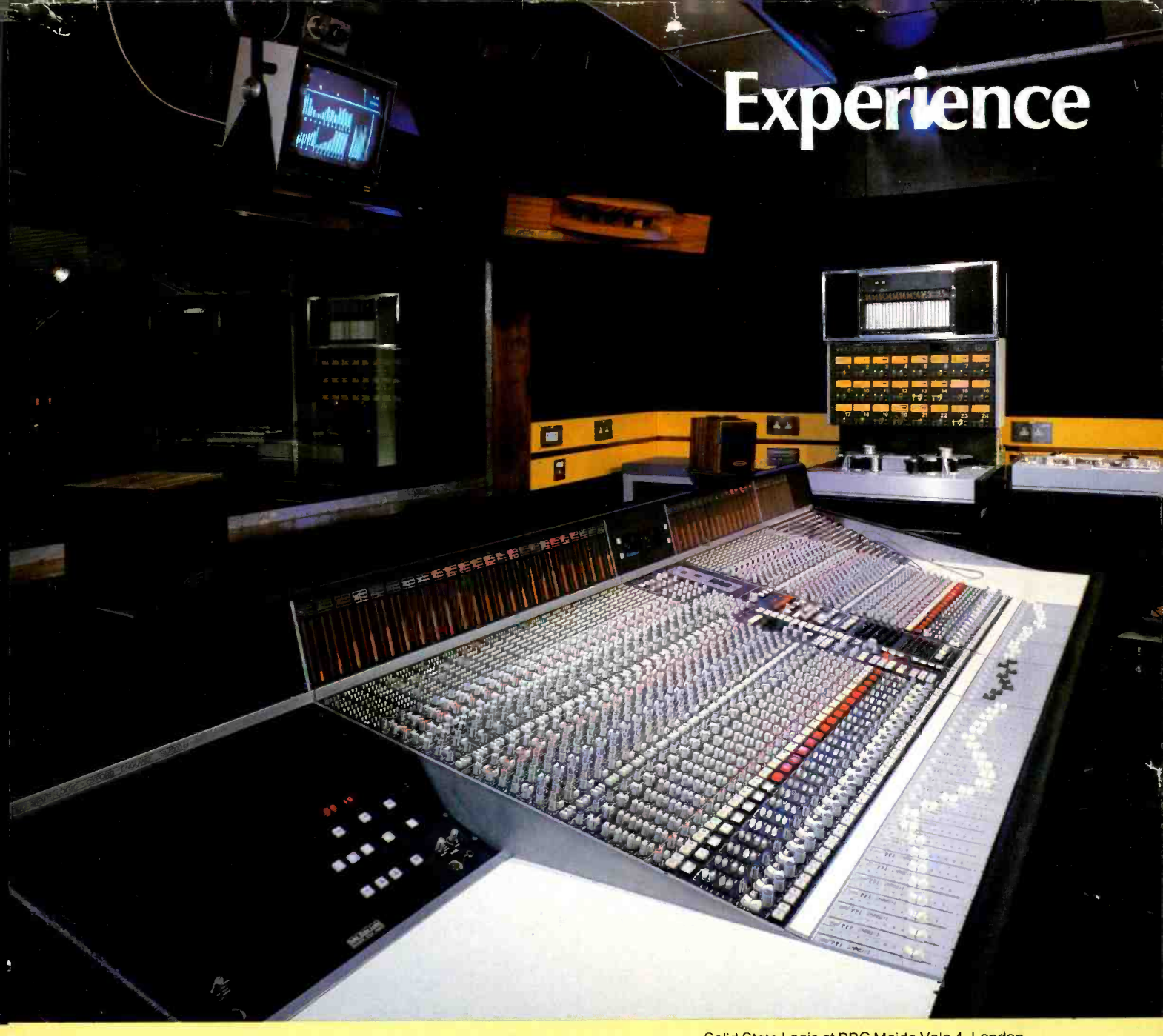
*An equal opportunities employer*

LWT
**London Weekend Television**

# INDEX TO ADVERTISERS




*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 £12.00. All enquiries to : Subscription Department, Link House Publications PLC, Link House, Dingwall Avenue, Croydon CR9 2TA, Great Britain. Phone: 01-686 2599. Published by Link House Magazines (Croydon) Limited on behalf of the proprietors, Link House Publications PLC, Robert Rogers House, New Orchard, Poole, Dorset BH15 1LU and printed by Arthurs Press Ltd, Woodchester, Stroud, Glos. GL5 5PB.




Solid State Logic at BBC Maida Vale 4, London

Technology is no substitute for human experience. The complex demands of broadcast audio require resourceful technique and specialised skills which take years to acquire. Engineers of this achievement need and deserve the most advanced, reliable tools available to support their artistry. Which is one reason that major broadcasters and post-production houses specify Solid State Logic.

The SSL 4000E series master studio system and the new SSL 6000E series stereo video system are products of experience. Innovative human engineering provides easy use of the most comprehensive software and hardware control systems ever offered by the audio industry. Unique capabilities such as total recall capture inspiration and eliminate drudgery, while the SSL real time system and events controller bring practical computer assistance to live broadcast, electronic dubbing and video post-production.

Write or call for complete details on Solid State Logic – The choice of experience.

**Solid State Logic**

**Stonesfield · Oxford · England**

"Visit us at IBC, Brighton, Dates 18–21 September 1982"

Solid State Logic, Stonesfield, Oxford, UK (099 389) 8282

# Series 24a Stereo Broadcast and Production Console

## Versatile, Flexible, Reliable.

The modular construction of the Series 24A mixer with its unique interpatch facility permits any number of a wide variety of modules to be sited in any combination in the extendable main frame. By employing existing modules it is therefore possible to "custom build" to meet the requirements of the user while minimising cost and maximising the standard of construction and long term reliability. And should the requirements of the user subsequently alter, the mixer's format can easily be changed accordingly without any mainframe rewiring...

MBI offer design, installation and commissioning services for studio equipment; acoustic treatment for studio areas; and architectural and interior design services for the studio complex — available individually or as a single, cost-effective package. All are guaranteed to meet broadcasting authority specifications.

**mbi**

**broadcast systems ltd.**

PO Box 112 Brighton BN2 2RS England

Tel: Brighton (0273) 607384

*broadcast imagineering* by the maldwyn bowden interna