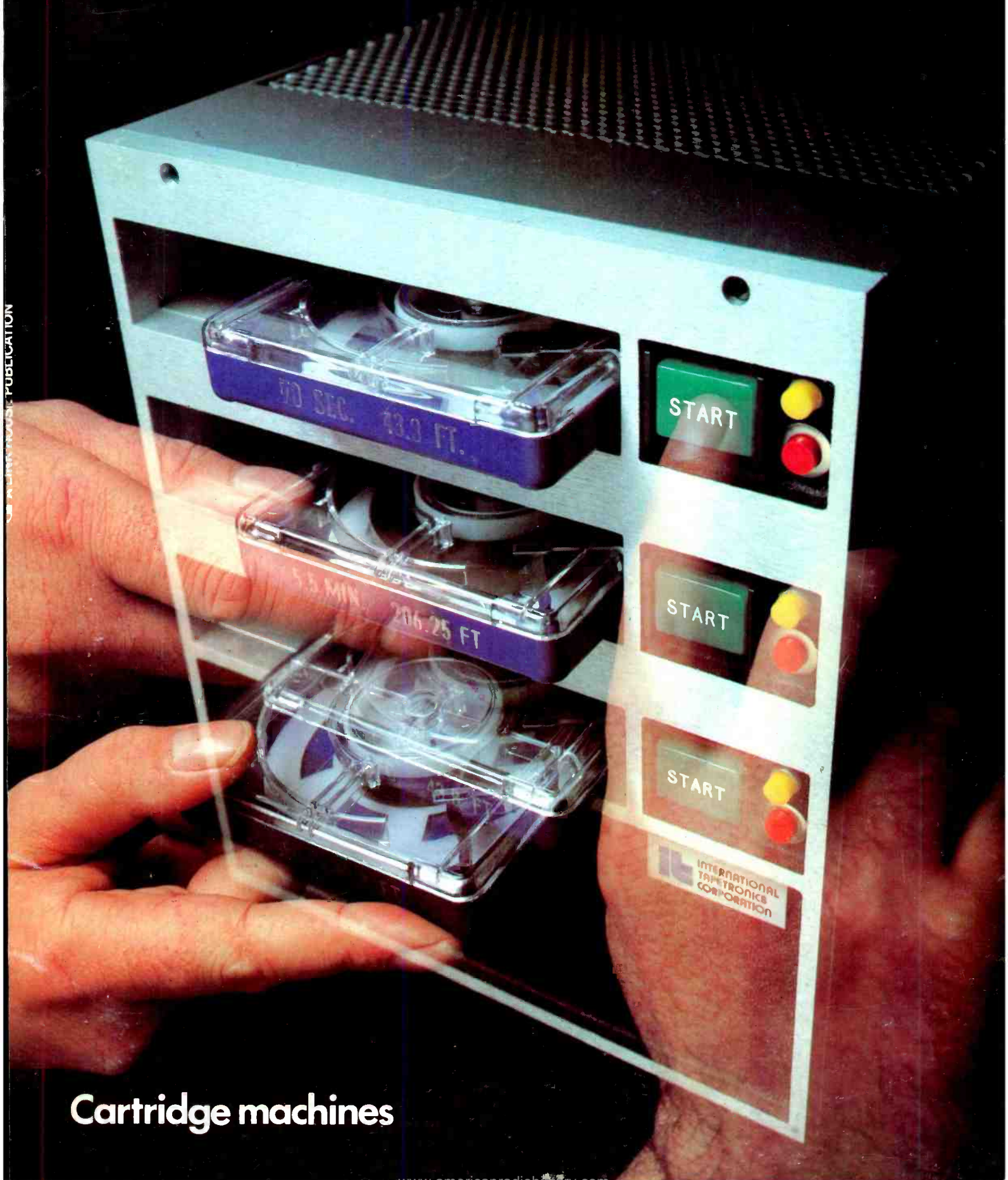


AS A PUBLICATION OF



Cartridge machines

MIDAS the professionals' choice

Russell Pope, concert sound engineer for Supertramp, with their 36 into 8/2 MIDAS Live Sound Console on the 1979 'Breakfast Over America' World Tour. Critically acclaimed for their excellent sound in live concerts all over the world, Supertramp have used MIDAS since the beginning. Why MIDAS? Because MIDAS experience and design philosophy provide highest quality signal processing in a compact and rugged modular frame built to withstand years of use. Russell Pope and Supertramp are professionals. MIDAS is the professionals' choice.



MIDAS AUDIO SYSTEMS LTD. DAVID SOLARI, 54-56 STATHOPPE STREET, FUSTON, LONDON N11J 3EX. Tel: 01-388-7060. 01-387-7679
MIDAS CANADA: BOB SHELGRÖVE, GERR-ELECTRO-ACOUSTICS, 365 ADELAIDE STREET, TORONTO, ONTARIO M5R 1N5. CANADA. Tel: 416-868-0528

EDITOR
ANGUS ROBERTSON

ASSISTANT EDITOR
NOEL BELL

PRODUCTION EDITOR
DRUSILLA DALRYMPLE

CONSULTANT
HUGH FORD

**EDITOR'S
PERSONAL ASSISTANT**
WENDY SMEETH

ADVERTISEMENT MANAGER
PHIL GUY

PUBLISHER
DOUGLAS G. SHUARD

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

© Link House Publications Ltd 1980
All rights reserved

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

SUBSCRIPTIONS

STUDIO SOUND is available on a rigidly controlled requested basis only to qualified personnel (see back page for terms of control), or for an annual cost of £11.60 to non-qualifying readers or where more than two copies are required in a studio or small organisation.

UK Subscription cost £11.60.
UNITED STATES Surface mail subscription \$25, airmail subscription \$45,
OVERSEAS Surface mail subscription £12.50, airmail subscription £22.50.

Change of address

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

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

BACK COPIES

A limited number of back copies are available, 75p each

BINDERS

Loose-leaf binders for annual volumes of STUDIO SOUND are available from Modern Bookbinders, Chadwick Street, Blackburn, Lancashire. Price is £3 (UK and overseas). Please quote the volume number or date when ordering.



Total average net circulation of 13,366 per issue during 1978. UK: 6,257. Overseas: 7,109.



A LINK HOUSE PUBLICATION

studio sound

AND BROADCAST ENGINEERING

NEWS	26
STUDIO DIARY including Windmill (Dublin), EMI and Bastun (Stockholm), Commercial Recording (Hawaii)	32
GENESIS OF A RADIO STATION Tony Attwood	40
BUSINESS	44
COMMERCIAL RADIO, AMERICAN STYLE Part One Brendan Hurley	48
LETTERS	54
SURVEY: CARTRIDGE MACHINES	56
SURVEY: AUTOMATION SYSTEMS	60
SURVEY: BROADCAST ANCILLARIES	64
POLISH RADIO AND TV Noel Bell	70
REVIEWS: Hugh Ford ITC 99 SERIES CARTRIDGE MACHINE	74

One aspect of the audio business that rarely gets covered in *Studio Sound* is that of finance. Perhaps it is something that we will investigate in the future, although how deeply would require some thought. But one question that has recently been raised is that of how much financial protection there should be between a recording equipment manufacturer and its customers, the studios. Probably the most expensive item that most studios buy is the console, and since these are offered by companies both small and large, this is perhaps the best product to look at. From the manufacturer's viewpoint, he wants to ensure that after an order has been placed for a particular console (particularly if it contains custom options that others might not require) that sufficient money is placed on acceptance of the order to provide 'insurance' against cancellation. While the percentage up-front varies, it might be 33%, sometimes less, sometimes even 50%. In practice, this is particularly valuable for small firms since the advance is effectively a loan with which all the components for the console may be purchased without any risk—and at some stage, most companies couldn't have survived without such an advance. But from the studio's viewpoint they want to be assured of delivery by an agreed date, particularly if an advance is being paid. Often the studio will have made arrangements to dispose of the existing console, while new studios will find their proposed cash flow seriously disrupted by late delivery. Since there is invariably considerable competition for console orders, some companies might be tempted to offer terms or delivery that might stretch their abilities. Since few companies have available all the crafts required for console manufacture and all are in the hands of component's suppliers, there are also outside forces at work. But some studios will wish to incorporate some form of penalty clause into the contract, so that if the console is not delivered by the stated date, then financial compensation is forthcoming—perhaps 5% for each week of late delivery. Obviously this can cause considerable harm to the manufacturer, and in the worse instance force him out of business—sometimes with justification, or just through a run of bad luck. While established companies with plenty of business would rarely consider it necessary to accept a penalty clause, some smaller companies might have no choice—and then find themselves putting their cheque book where their mouth was—but that is business. Again, how much care should be taken to ensure availability of back-up components in case one is let down; for instance if P & G can't supply faders, should Duncan be immediately available even if the fixing centres are different, requiring punching of new holes? Some manufacturers are particularly vulnerable if their supply of integrated circuit op-amps dries up. Unfortunately, in the end customers are going to pay if delivery is expected by a specific date because additional expenses will be incurred and the manufacturer has to build the cost of 'insurance' into the price. Whether studios are prepared to pay this price is their decision.

In case you missed last month's announcement on this page, and have not yet supplied any information for the first of *Studio Sound's* Yearbooks covering pro-audio equipment and services, please contact the editorial office immediately.

Cover of ITC triple stack
by Adrian Mott and Ray Hyden

FEBRUARY 1980 VOLUME 22 NUMBER 2

Anglia Television
Beacon Broadcasting
British Broadcasting Corporation
British Forces Broadcasting Service
Broadcasting Corporation of New Zealand
Broadcast Marketing Services
Broadcast Training Services
Capital Radio
Cardiff Broadcasting
C.B.S. Records
Davidson, Pearce, Berry & Spottiswoode
Downtown Radio
E.M.I. Records
Foreign and Commonwealth Office
Gibraltar Broadcasting Corporation
Grampian Television
Granada Television
Harlech Television
Independent Broadcasting Authority
I.R.N. Parliamentary Broadcasting
L.B.C.
London Radio Productions
Metro Radio
Midland Community Radio
Molinare
Ogilvy, Benson & Mather
Piccadilly Radio
Plymouth Sound
Post Office Film Unit
Pye T.V.T.
Radio Clyde
Radio Forth
Radio Tees
Rediffusion Industrial
Royal National Institute for the Blind
Sarner Audio-Visual
Scottish Television
Swansea Sound
Tape One Studios
Thames Valley Radio
J. Walter Thompson
Tyne Tees Television
Ulster Television
Visnews
Yorkshire Television
Zoom Television


Alice Wales OK



Alice (STANCOIL LTD)


ALEXANDRA ROAD . WINDSOR . ENGLAND . Telephone WINDSOR 51056/7

Telex: AEGIS G 849323




“We’ve £150,000 worth of recording gear working 24 hours a day — all fed from the OTARI MX5050B. On a cost effectiveness basis alone the MX5050B is unbeatable, but when taking into account sheer professionalism and performance, it is unequalled by recorders three times the price.”

Mike McLoughlin, Chief Engineer, Independent Tape Duplicators, Aylesbury.



The Otari MX5050B costs little more than modified domestic recorders. That little extra buys so much more.

- 
1. Proper editing facilities with calibrated splicing block.
 2. Four heads provide 2 or 4 track replay.
 3. Bias and EQ adjustable from front panel.
 4. Switchable NAB and IEC EQ.
 5. XLR Connectors.
 6. +28 dBm 600 ohm balanced output.
 7. Direct drive capstan servo with varispeed.
 8. Variable or preset output level.
 9. 70 dB (weighted) signal/noise ratio.
 10. Sel sync on each channel.

OTARI from ITA

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

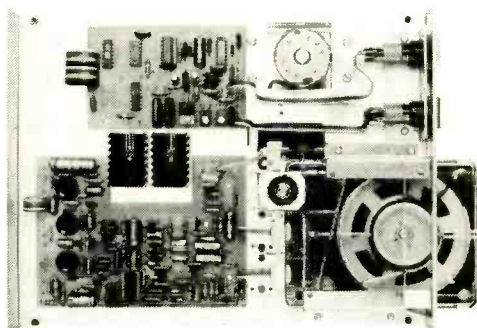
THE VFM CARTRIDGE REPRODUCER

BECAUSE YOU ARE A BROADCASTER YOU USE CARTRIDGE MACHINES. YOU WANT THE VERY BEST RELIABILITY. BECAUSE YOUR TECHNICAL REQUIREMENTS ARE DEMANDING, YOU WANT THE VERY LATEST TECHNOLOGY WITH SIMPLE, RAPID ALIGNMENT AND SERVICING AND A FAST INTERCHANGEABLE SPARES FACILITY.

SONIFEX INTRODUCES THE OTHER BROADCAST CARTRIDGE MACHINE

WITH ALL YOUR EXPERIENCE IN BROADCAST CARTRIDGE OPERATION, YOU COULD HAVE DESIGNED A MACHINE WITH ALL THESE FEATURES.

THE PHS SERIES



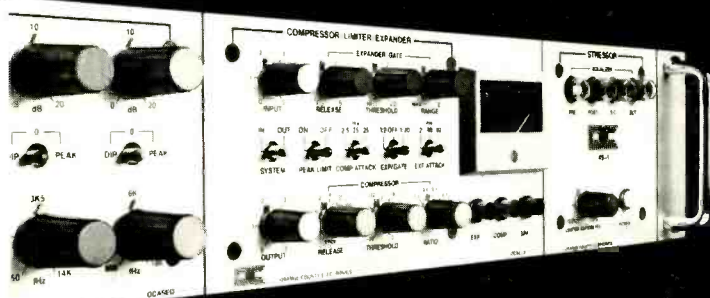
SONIFEX SOUND EQUIPMENT

15 College Street Irthlingborough Northants NN9 5TU

- ✓ Extremely compact overall size with options to mechanically stack and interlock 2, 3 or 4 machines. Overall size 8 $\frac{1}{2}$ x 3 $\frac{1}{2}$ x 11 $\frac{1}{2}$ ".
- ✓ Rugged deck plate assembly, machined from solid aluminium alloy with spring-loaded cartridge guides. Major components are pre-aligned assemblies.
- ✓ Absolutely silent, rapid start and stop with a new motor drive pinch system, electronically pre-cocked by the cartridge and zero energy when running.
- ✓ D.C. servo motor, double belt drive to a massive flywheel and an 8mm spindle, running in sealed races, for a long maintenance-free life.
- ✓ Full 3 cue tone responses with auto triple speed running and cueing, all cues brought out to interlock other machines.
- ✓ High quality British heads with excellent L.F. and H.F. response. The 4 tape guides provide a true stable tape path.
- ✓ An overall specification to readily satisfy N.A.B. and I.B.A. requirements.
- ✓ Simple routine alignment and performance setting with the minimum of effort. Easy access to all parts, both mechanical and electronic.
- ✓ LAST OF ALL, A BROADCASTER'S MACHINE OFFERING VALUE FOR MONEY, MADE IN BRITAIN, AT A PRICE THAT WON'T MAKE THE BOARD OF DIRECTORS FLINCH.

FOR MORE DETAILS TELEPHONE 0933-650700

Stressing Quality



The Orange County VS-1 Stressor combines several necessary signal processing functions to give you the power to handle problems such as level control, noise, and equalization all in one 3 $\frac{1}{2}$ " package:

- Compressor with adjustable ratio, threshold, attack and release times, for loudness enhancement
- Fast peak limiter with 250:1 slope for overload protection
- Highly effective expander/noise-gate for noise reduction
- Full parametric equalizer with extraordinary tuning capabilities
- Overall performance specs and construction to the highest industry standard

The VS-1 Stressor belongs in your studio as a versatile and powerful production tool. It offers the creative producer/engineer the most control in any single package on the market.

Also investigate the VS-2 Stressor, which offers internally pre-set functions for the budget-conscious user looking for great sound.



ORANGE COUNTY ELECTRONICS
INTERNATIONAL INC.

Exclusive Sales & Marketing:

Parasound

680 Beach Street, San Francisco, Ca. 94109 (415) 673-4544

England: **DON LARKING**
Tel. Luton 27195

Dealer Inquiries Invited

Following the world's most successful
four channel recorder isn't easy.
Unless it's the new A3440 by TEAC.



TEAC from ITA

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

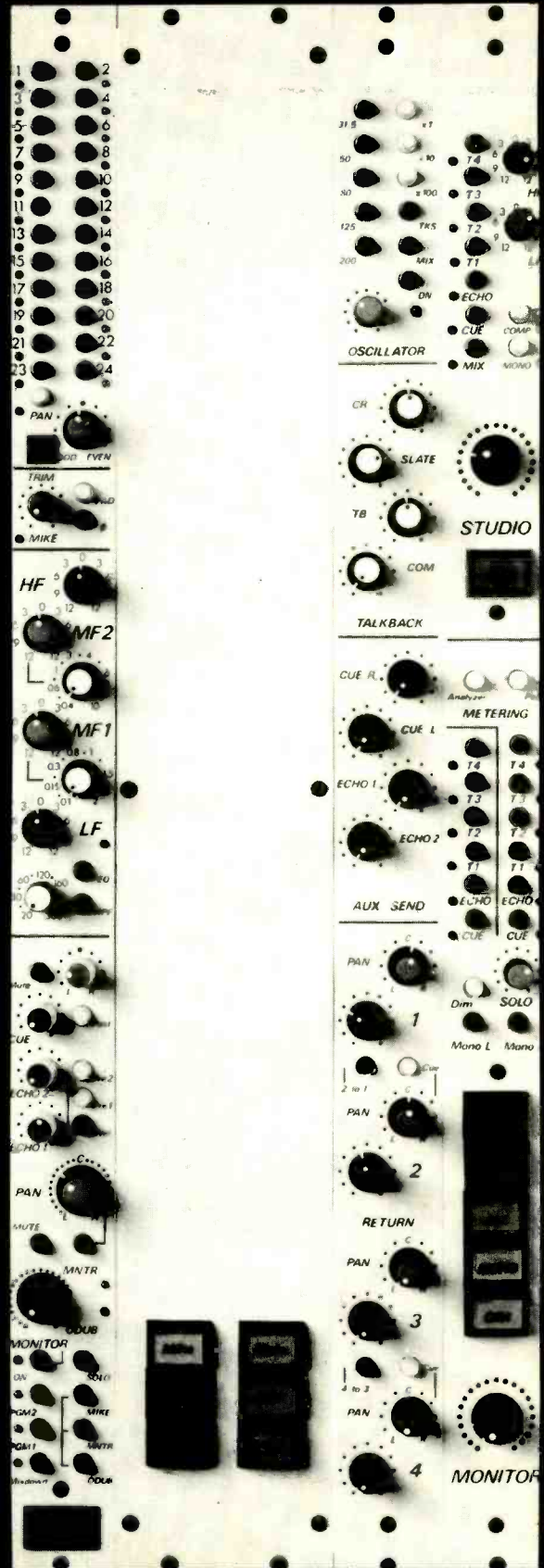
SAVE MONEY SAVE TIME

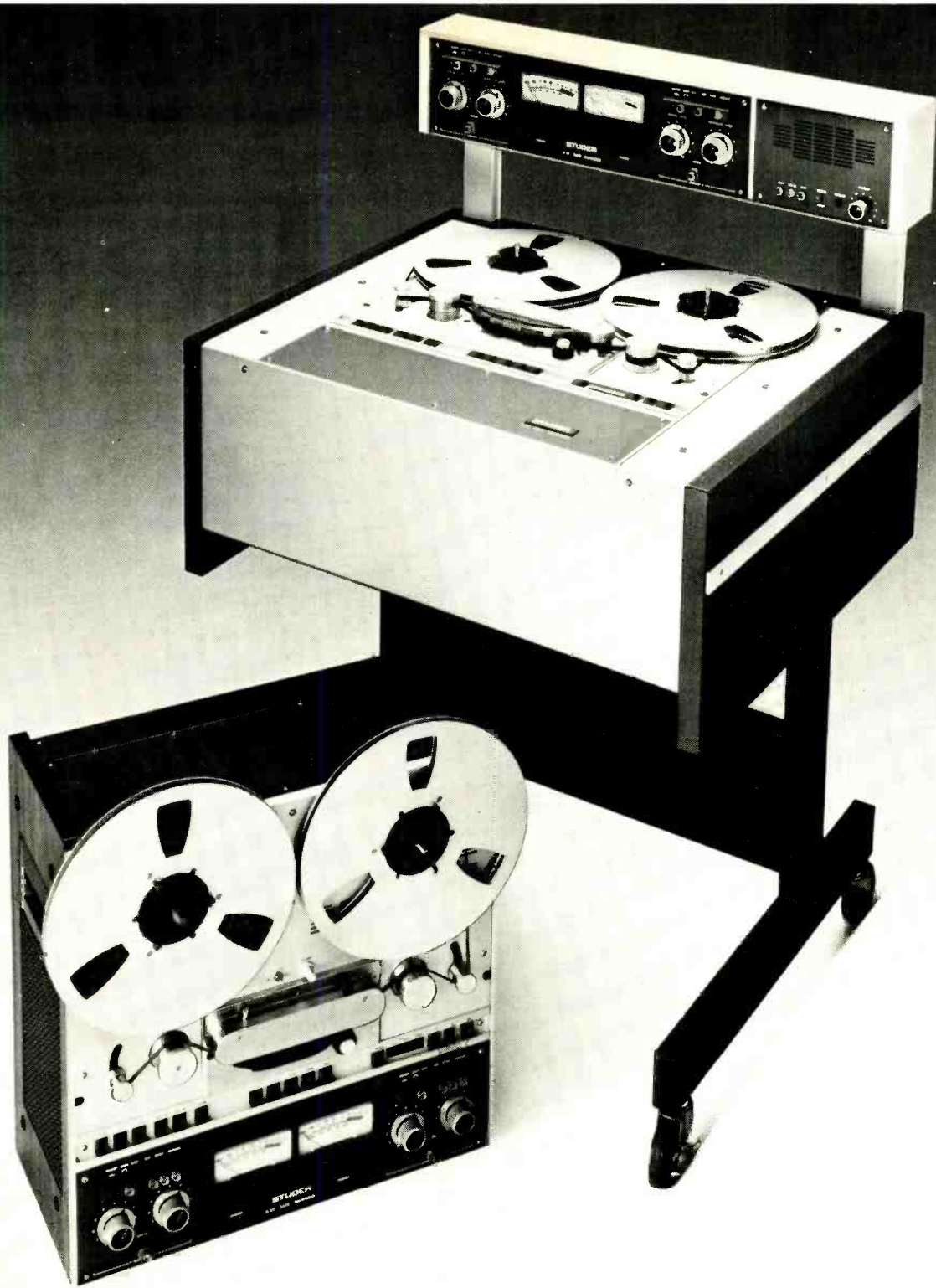
WHAT IS OPTIONAL FOR THE OTHERS IS FOR US A MATTER OF COURSE

- * From 16 to 52 in/out channels
- * 24 channel busses including panning
- * 4 band parametric equalizer
- * Continuously variable Hipass filter
- * Up to 28 sends as standard
- * 3 different channel mute grouping
- * Momentary short travel mute switches
- * All solo facilities including «Solo in place» either in monitor or in remix mode
- * 3 master status logically reversible on each channel
- * 28 light meters either vu or PPM and phasemeter as standard
- * 28 Iso frequency third octave analyzer
- * PLUS 30, RS64 automation with separate mute and level encoding using one 6502 microprocessor per channel
- * High quality and high performance components
- * Tough, reliable and attractively designed

PLUS 30

37, rue de ANNELETS
PARIS. 75019.
Tel: 202 5869 202 2102





The Robust Movers.

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

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

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

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

F.W.O. Bauch Limited

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

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

STUDER FRANCE S A R L Paris
Telephone 533 5858

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

www.americanradiohistory.com

Lexicon Has a Delay System for Every Application and Budget

The Lexicon Model 91 Delay System

We've taken our sophisticated big-system Model 102 PCM technology and packaged it for small budgets — churches, schools and colleges, community auditoriums and similar installations.

And, we've done it without compromising on Lexicon quality or resorting to delta modulation techniques.

Our modestly priced Model 91 has features that have made the 102 the choice for many of the world's greatest concert halls and studios. You get ultra low (less than .08%) noise and distortion...dynamic range greater than 90dB...0 to 120ms delay, adjustable in 7.5ms increments...5-level LED headroom indicator...automatic audio by-pass for zero delay or emergencies...plus other advanced Delta-T performance extras.

And, like all Lexicon systems, the Model 91 digital delay is conservatively designed and modular for fast, easy, on-the-spot maintenance. There's nothing like it in its price range!

Model 92 System

Another modestly priced Lexicon system with "concert hall quality" features! Gives you all the superb performance of the Model 91—plus two delay outputs instead of one. The Model 92 is also an excellent choice for sound studios where a quality delay is required for doubling or echo pre-delay.

Prime Time Model 93 Delay/Processor/Mixer

Specifically designed for studios and entertainers, the Model 93 combines flexibility and versatility heretofore unavailable in any system anywhere. Included are two time delay outputs independently adjustable from 0 to 256ms...complete mixing for delay and reverb processing...integral VCO for vibrato, doppler pitch shift, flanging and similar special effects...long delay (up to 2 seconds) special effects...and numerous other advanced capabilities. Features 90dB dynamic range, with less than 0.08% distortion at all delay settings.

Model 102 Series

The ultimate in sound quality. Stereo and Mono models for studios and sound reinforcement with 15 kHz bandwidth and 1 to 5 outputs. Options include VCO, remote controls and Extension Chassis for very large systems. Full modularity and computer quality construction insure system flexibility and high reliability, proven in more than a thousand installations world-wide.



Big project or small, the job's done right when it's done with a Lexicon digital delay system. Write for full information.

Lexicon

Lexicon, Inc., Waltham, Massachusetts, 02154 USA
F.W.O. Bauch, Ltd., 49 Theobald St., Boreham Wood Herts, WD6 4R2 • Telephone 01-953-0091



"The original A77 had set a standard by which I have judged other domestic and semi-professional recorders for many years. It is now clear that the new B77 sets a new standard not easily surpassed at its price"
Angus McKenzie (March 1978)

REVOX

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

A STATE OF THE ART CARTRIDGE MACHINE

The Cartridge Technology Recorder/Reproducer is a British engineered machine constructed on the same techniques that are found in the most sophisticated reel-to-reel recorders.



Crystal controlled DC motor with ceramic shaft.

Unique patented pinch roller system mechanically solves tape skewing problems and its alignment is unaffected by pinch roller pressure or wear.

Large front panel timer.

Fast forward and audio muting are standard.

Phase linear record equalisation gives better square wave and transient response.

NAB/CCIR equalisation.

Built-in test oscillator.

Illuminated PPM's (VU's optional).

150 Hz and 8 kHz cue tones are standard.

Any combination of cue tones may be recorded and detected simultaneously.

The machine is based on an ISEP module so that it may be case or rack mounted or built directly into a mixer sub frame.



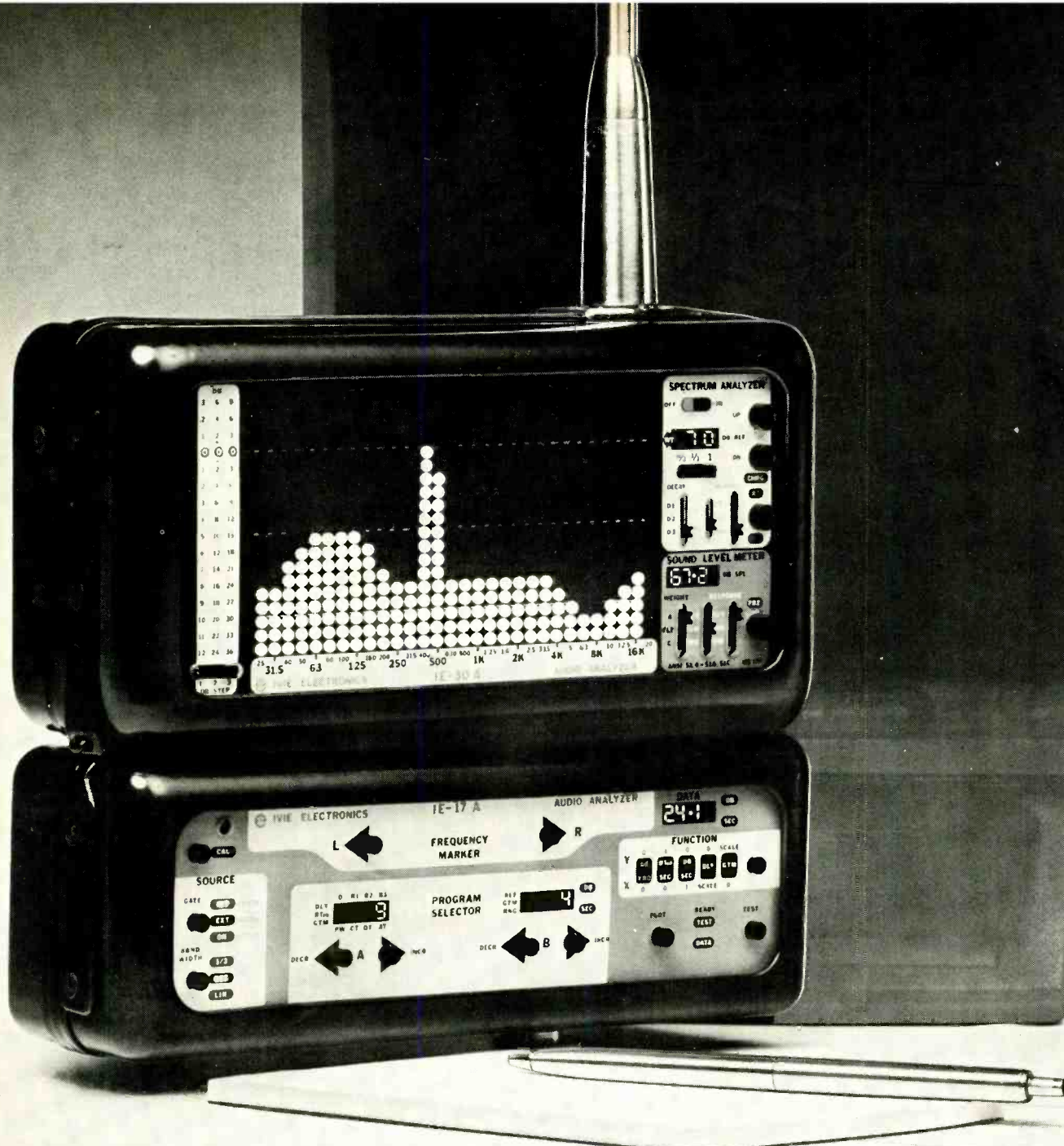
A2 and Stereo-phased AA3's available ex-stock.

Audiopak—for further information contact

JOHN A. STEVEN

PROFESSIONAL RECORDING EQUIPMENT

4 CRESCENT DRIVE SHENFIELD ESSEX CM15 8DS Tel: BRENTWOOD (0277) 215485 Telex: 995701 INTCOM G REF 197



QUITE SIMPLY, THIS IS THE MOST ADVANCED, POWERFUL, VERSATILE AND PORTABLE AUDIO ANALYSIS SYSTEM IN THE WORLD.

IE-30A Grade 1 Precision Sound Level Meter. 1/3 octave analysis - instantly. Two display memories maintained, even when switched off. 9 to 149 dB SPL range. 0.1 dB resolution. Digital readout of SPL with A and C weighting. Three response speeds, thirty frequency bands. display hold, 15, 30 and 45 dB selectable resolution, outputs for peripheral equipment, eq scope, plotter, line amplifier, etc.

Comes as standard with a precision

laboratory microphone calibrated in dB SPL and remoteable up to several hundred feet, a test probe with two precision attenuator settings for calibrated dB/ μ V measurements (true rms, average or peak), nickel cadmium batteries with charger and a hard shell, foam-lined travel case.

IE-17A. An extremely intelligent microprocessor-based system, capable of calculating acoustic and electrical

delays from 1 m/sec to 100 secs. Measurement of reverberation, distortion, discreet acoustic reflections, narrow band analysis, time-gated amplitude response of direct wave and reflected wave phenomena, articulation losses and other time-related phenomena.

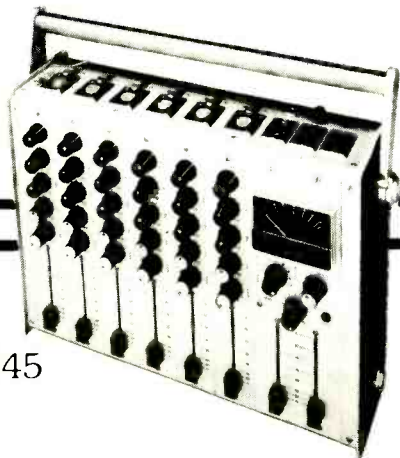
Ivie Electronics Inc. Orem, Utah



F.W.O. Bauch Limited

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

PICO mixer PLUS



AD 045

Specially developed at the request of Thames Television and other T.V. and film production companies with Extra facilities not available on standard model.

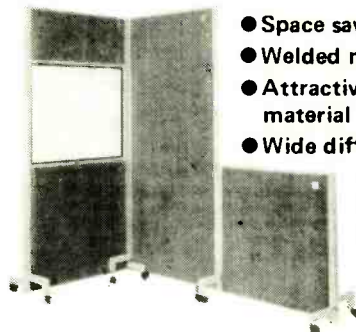
- E Q Bypass switch.
- Phase-change switch.
- Tone Generator.
- Nickel Cadmium batteries to treble times between charges.
- Novel idea of priority p.p.m. (Two peak programme meters in space of one — reads higher of two outputs all the time with indication of left or right.)

Audio

Developments

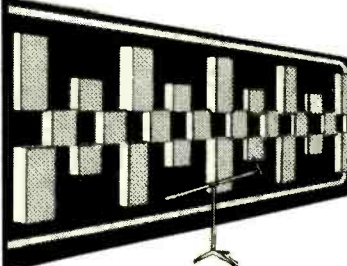
Hall Lane, Walsall Wood
WALSALL, W. Midlands, WS9 9AU
Telephone: Brownhills 5351/2/3 (STD Code 05433)
Telex: 338212 Audio

THE ACOUSTIC SCREENS from AK



- Space saving corner interlock system
- Welded metal frames
- Attractive 'cigarette proof' covering material
- Wide differential non crushing castors
- Custom size option
- Roof sections to match

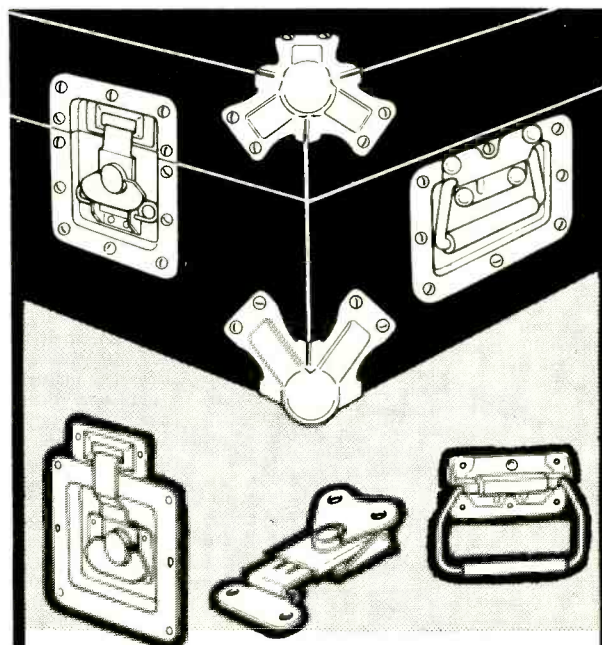
SONAPANEL ACOUSTIC SYSTEM



- Economic and flexible
- Individual layout scope
- Fast delivery
- Detachable fixture allows relocation or resale

AK

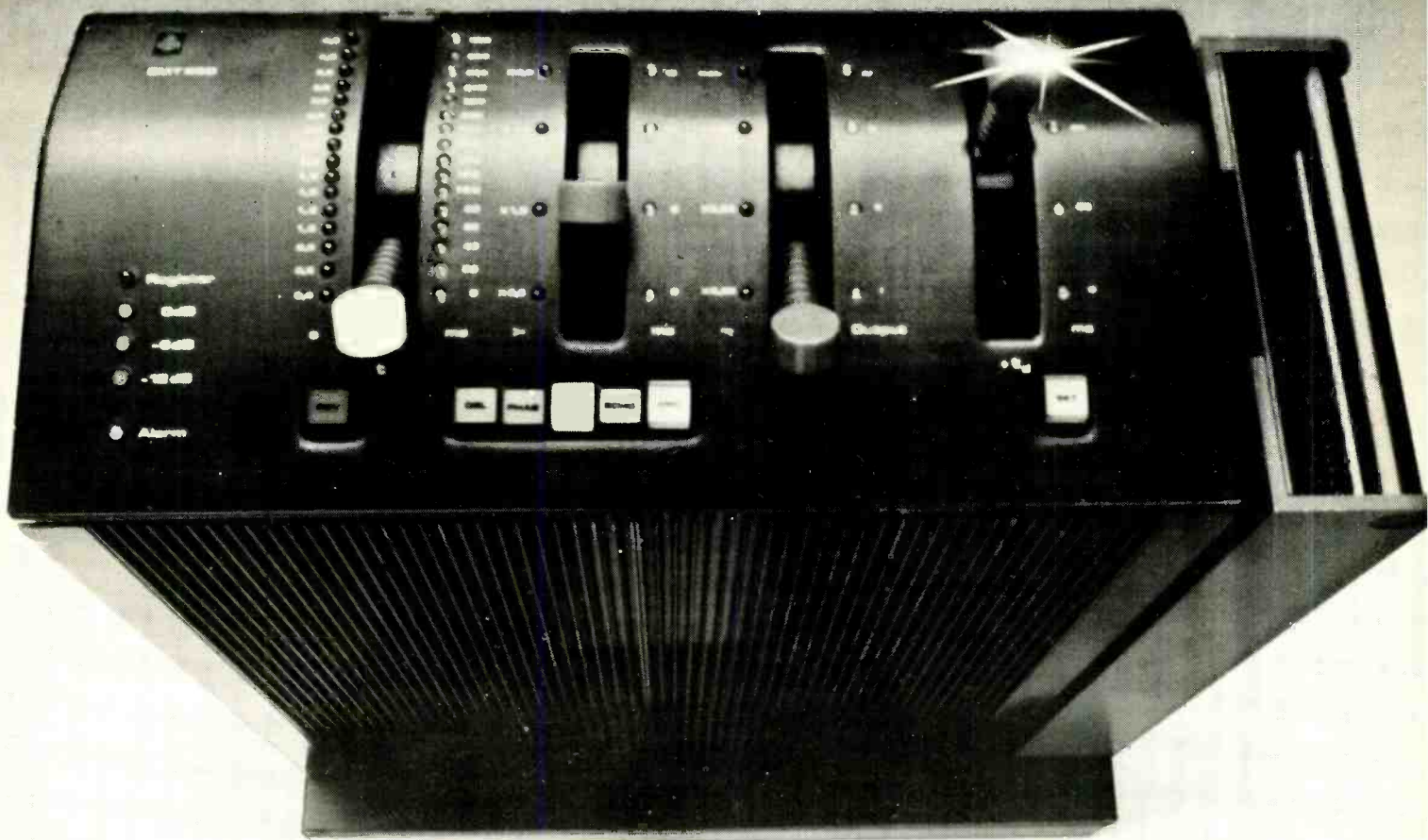
AUDIO KINETICS (UK) LIMITED
Verulam Road, St Albans, Herts, AL3 4DH. Tel: 32191. Telex: 299951



Protex quick-release latches, handles, corner pieces and fasteners are used by some of the world's leading manufacturers because they are just right for the job.

protex FASTENERS LTD.

Arrow Road, Redditch, Worcs. Tel: Redditch 63231

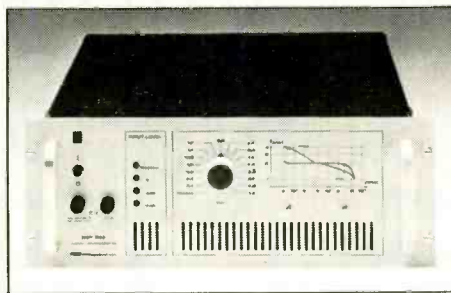


IMAGINE A STUDIO WITHOUT AN EMT PLATE.

We can! EMT digital reverberators are judged by experts to be subjectively superior in sound quality, even to the renowned plate and famed foil.

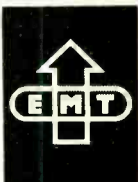
The EMT 250 offers numerous facilities, including the first reflection delay selectable decay characteristics.

The EMT 244 is a compact



microprocessor reverb-only system.

They can even be made to sound like a plate!



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

Analyse-Equalise- Eliminate

Formula Sound help you eliminate your sound problems with the S19GA by combining the functions of an analyser and equaliser. This easy to operate unit is approximately half the cost of a conventional analyser and fits into a rack space of only 5¼".

The S19GA is a half octave stereo 19 band graphic equaliser/analyser with dual L.E.D. display. By using half octave filters twice the control of standard octave devices is achieved.

For the Studio the S19GA enables the engineer to adjust his monitoring equalisation with confidence, knowing that the balance he hears is what's on tape.

For the Concert Hall - the S19GA is an invaluable aid to compensate for poor hall acoustics.

Sound reinforcement - switching the S19GA analyser display to visually monitor programme lets you pinpoint and tune out acoustic feedback.

For the serious audiophile - the S19GA offers professional analyser facilities at a realistic price for domestic use.

Full professional specification - Maximum level +20dBV. Equivalent input noise -90dBV. Total distortion less than .01%.



London Stockist: **S.E.S. LTD.**
The Studio Shop, Oxgate Farm,
Coles Green Road, London
NW2 7EY

More information from



**FORMULA
SOUND LIMITED**

3 Waterloo Road,
Stockport SK1 3BD.
Telephone: 061-480 3781.
Telex: 669249.

Now-highest quality copying at low cost OTARI DP4050 C2 cassette duplicator

The first low cost copier to give you reliability and performance to professional standards. No other copier can match its precision engineering, and it is the only budget copier suitable for music programmes.

- * One master, 2 slaves.
 - * Add on units available up to 11 slaves.
 - * Automatic rewind.
 - * Ferrite heads.
 - * 16:1 duplicating ratio.
 - * Modular slave decks with DC servo motors.
- Also available: Reel to cassette version with 6 slaves.

OTARI from ITA

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



AKG

ACOUSTICS



Versatility: The AKG CMS System

Many different microphone functions in one microphone.

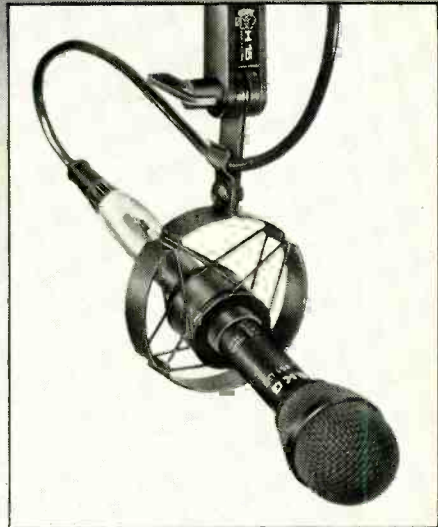
This is the modular system idea of AKG. With the Condenser Microphone Modular System (CMS) a large variety of applications can be covered.

The basic unit is the C 451 pre-amplifier with or without bass roll-off switch. To this pre-amplifier several microphone heads can be attached: omni, vocal, cardioid flat, cardioid presence, bi-directional, anti-shock + anti-pop, short shotgun, long shotgun etc. A variety of windscreens, stand adapters, elastic suspensions etc. is available.

The CMS system also includes short and long extension tubes and gadgets for assembling several pre-amplifiers, for binaural recording, stereo, quadrophonic and sound field applications.

For high intensity sound pick-up two attenuation pads may be inserted between microphone head and pre-amplifier.

The CMS system should be phantom powered from the associated equipment (any DC-voltage from 7.5 to 52 V will do), but power-supplies are also available (battery, mains for 2 mics, mains for 6 mics).



Picture shows one application for TV boom mount, with rumble filter on and cardioid pick-up pattern (H 15 + CK 1 + C 451 EB + W 17).

Send coupon for further information.

Send this coupon for information about AKG products

- HEADPHONES
- MICROPHONES
- PICK UPS
- REVERB UNITS
- TIME DELAY UNITS

ADV279/1/E

Name _____
 Street _____
 Town _____
 Postcode _____ FEB



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

You may think you've heard this one before.

The U89 studio microphone with switchable directional patterns resembles the famous U87, but it's smaller and has newly-designed capsule and amplifier systems which provide several superior qualities.

The U89 has linear frequency response for all patterns, capsule immunity to atmospheric conditions and contamination, five directional patterns and a high overhead margin.

If you think you've heard this one before - you're wrong.

Audio Export Georg Neumann & Co. GmbH
D · 7100 Heilbronn Fleinerstrasse 29 West Germany



F.W.O. Bauch Limited

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

POWER AMPLIFICATION BY MUSTANG



Our SS.100 and SS.50 are economical amplifiers with outputs of up to 175 and 100 Watts RMS into 4-16 ohms, typical THD figures being 0.1%, slewing rate > 10v/μs, noise > 90dB down, zero level input, and full electronic protection.

Considering these points with their proven reliability and robust construction, plug in output transistors and driver board, optional balanced input and 100V line output, and virtually ex stock despatches we reckon we take some beating! Contact us now for the full technical specifications.

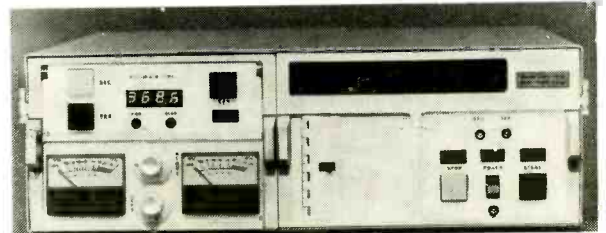
Manufacturers of mixers, integrated mixer amplifiers and slave amplifiers, studio power amplifiers, transformers, lighting control equipment and cabinets for the home and export markets. Contact us for full illustrated technical brochures.

MUSTANG COMMUNICATIONS

Nelson Street, Scarborough,
North Yorkshire YO12 7SZ
England
Telephone 0723-63298



MODEL I 26 CARTRIDGE MACHINE



Stereo Record/Reproducer with Recorded Time Indication
(other models available)

FEATURES

- ★ MEETS NAB, IEC CARTRIDGE SPECIFICATIONS
- ★ COMPATIBLE WITH COMMERCIAL RADIO USE
- ★ FLUTTER .15% WEIGHTED
- ★ NOISE AND HUM LESS THAN -47dB (STEREO)
-50dB (MONO) RE 160 nWb/m
- ★ HIGH AND LOW EQUALISATION
- ★ HINGED FRONT PANEL AFFORDS ACCESS TO
ALL MAINTENANCE CONTROLS
- ★ COMPATIBLE WITH NEW HIGH OUTPUT TAPE

LEE ENGINEERING LTD.

NAPIER HOUSE, BRIDGE STREET,
WALTON-ON-THAMES,
SURREY, ENGLAND KT12 1AP

TEL: WALTON-ON-THAMES 43124/5/6

TELEX: 928475



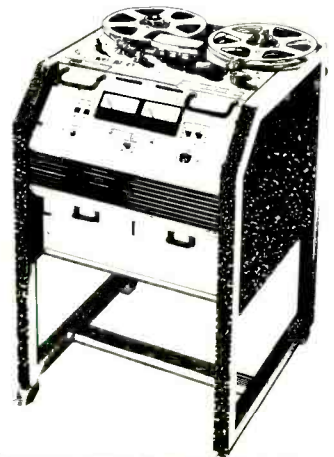
In action with the professionals—



recorders

Proline Professional recorders are in action all over the world in professional radio, TV and recording studios, as they have been for well over 25 years.

LBC Radio is just one of a long line of studios who have successfully proved to themselves that Proline recorders are made for heavy duty, are easy to maintain and are extremely reliable in action. Both the Proline 2000 TC and the economical Proline 1000 use modular construction and have the comprehensive specification required for today's fast-moving recording industry.



Speak to Tony Costello or
John Robinson about them at:

Leavers-Rich Equipment Limited
319 Trinity Road Wandsworth London SW18 3SL
Telephone 01-874-9054



THE PROVINCIAL MULTI-TRACK AND STUDIO SUPPLIES CENTRE

REVOX

B77 always in stock. High-Speed Sel-Sync. Most options best prices.

TEAC

Complete four-track packages on demonstration also a full range of Cassette and Stereo reel machines and accessories.

BRENELL

Mini 8 on Demo.

TASCAM

For the Midlands and Wales always two in stock. Superb Package Deal.

STUDIO MASTER

16-4, 20-4, 24-4; 16-8, 20-8 all in stock and on demonstration.

ALLEN & HEATH

16-8 Packages with 80-8 or Mini 8.

PART EXCHANGE WELCOME — We take Multitrack equipment and musical instruments, Hi-Fi and Amplification.

EXPORT Fast Efficient Service in Europe and Scandinavia.

OUR CATALOGUE is Free and is the Best Guide around as to what is Available. Write or Phone for your Copy.

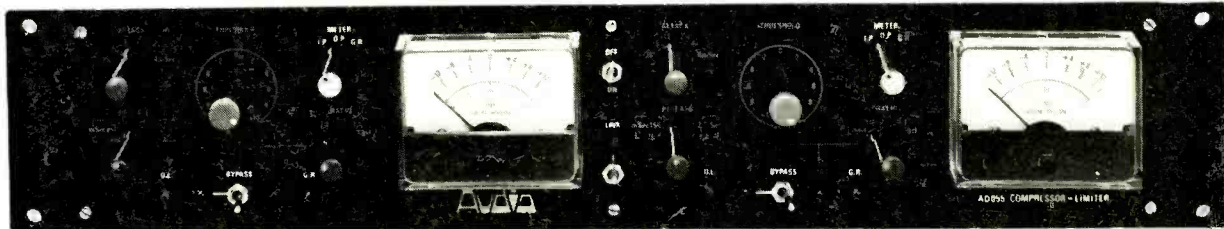
Our **tea** is also Free and is as bad as our Service is good. Try both and draw your own conclusions.

BUZZ MUSIC 65 WIDEMARSH STREET, HEREFORD

(0432) 55961/52016

Studio Compressor-Limiter

AS REVIEWED IN NOVEMBER STUDIO SOUND



A new product designed and developed with care by Audio Developments — The quality and performance you expect.

The ADO55 is for rack mounting. The controls on the attractive front panel are clearly laid out and colour-coded for greater simplicity. All the input and output connectors have XLR, DIN and PO Jacks fitted as standard.

The ADO55 Compressor is a dual channel compressor/limiter with a comprehensive range of useful facilities. The two identical systems may be linked for stereo operation.

Specification

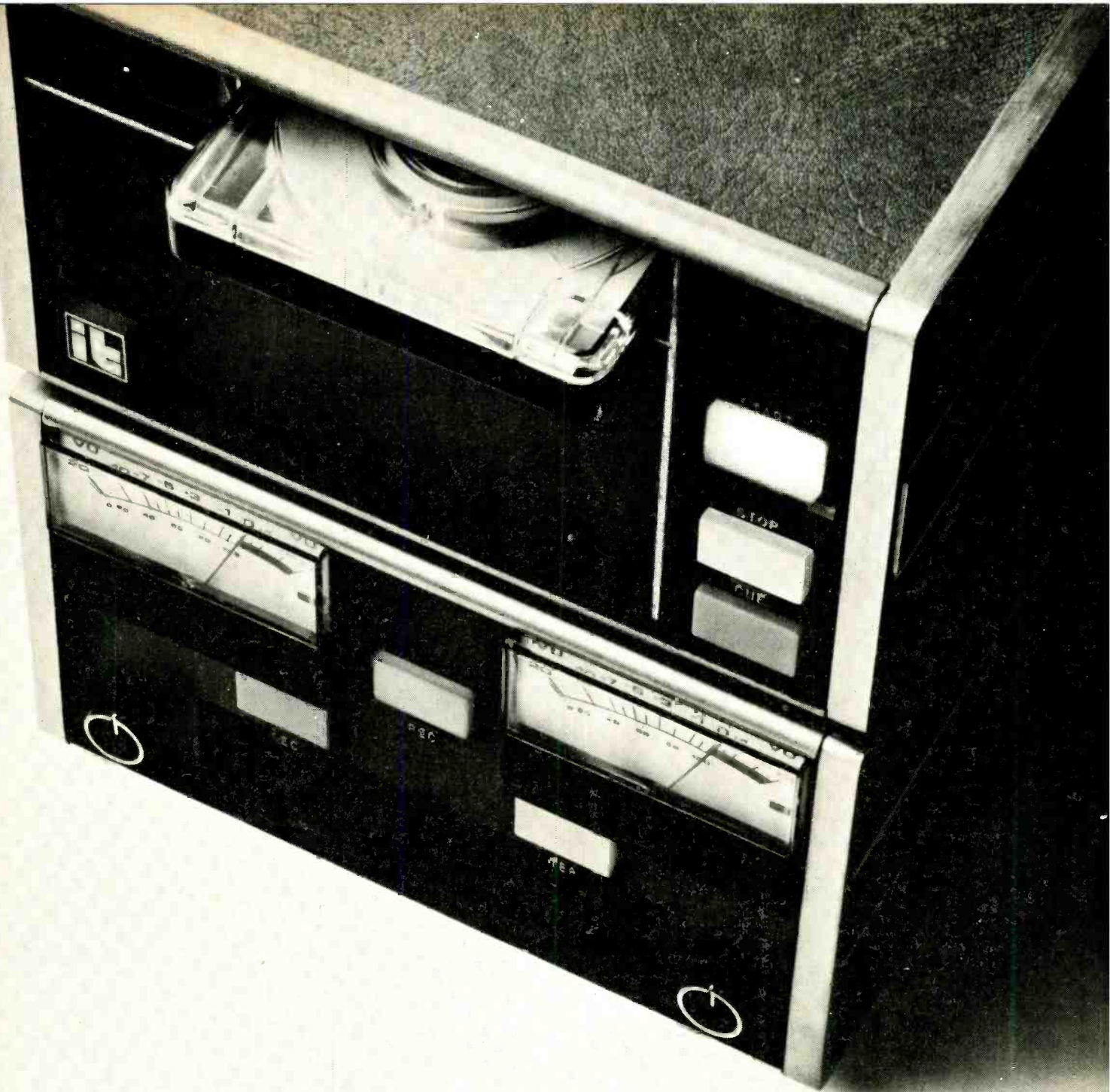
RATIOS 2 1.3 1.5 1 Limit (20:1)
 RELEASE TIME Adjustable — 75mS 150mS 300mS 600mS 1.2sec 2.4sec
 ATTACK TIME Adjustable — 0.25mS 0.5mS 1mS 2mS 4mS 8mS
 FREQUENCY RESPONSE 1dB 20 Hz to 30 kHz NO COMPRESSION
 DISTORTION 0.1% at 1kHz to 10kHz NO COMPRESSION +8dB input.
 MAX. COMPRESSION 25dB
 MAX. OUTPUT +19dB at 1kHz +12dB at 20Hz
 MAX. INPUT Dependent on the MAX. OUTPUT and MAX. COMPRESSION.
 NOISE Wideband — 68dB Band Limited — 71dB

Audio



Developments

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



THIS NEW GENERATION CARTRIDGE MACHINE FROM ITC ALMOST SPEAKS FOR ITSELF.

There's been much talk about reel-to-reel quality from cartridge machines. Unfortunately, most of it turned out to be hot air.

But now it's a cold fact with Series 99 from ITC, the world's leader in cartridge machine technology.

With 19 patents pending for both electronic and mechanical innovations, it's no wonder that ITC's Series 99 sets new standards.

For sheer quality of sound. For greater operator convenience. And for simplified maintenance.

If you want to hear the

cartridge machine that virtually speaks for itself, write now for a few words on the subject to F.W.O. Bauch Limited.

International Tapetronics Corporation
2425 South Main Street,
Bloomington, Illinois 61701, USA



F.W.O. Bauch Limited

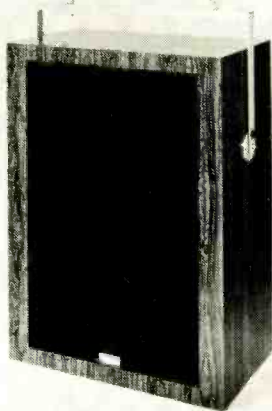
49 Theobald Street, Boreham Wood, Hertfordshire WD6 4RZ

Telephone 01-953 0091, Telex 27502

www.americanradiohistory.com

LOCKWOOD

START THE 80's WITH
POWER
THE NEW UNIVERSAL
MAJOR



150-200 WATTS
PER CHANNEL
INTO 8 ohms
TANNOY DRIVE
UNIT

LOWLANDS ROAD, HARROW, MIDDX.
HA1 3AW ENGLAND

Telephone: 01-422 3704 and 01-422 0768

Rod Argent's Keyboards

WE WOULD LIKE TO ANNOUNCE

The commencement of a new service which we are now offering musicians and recording studios. This service includes not only the hire of specialised keyboard equipment but the unique opportunity to have our own experienced programmer to help you realise the full potential of that equipment. A selection of equipment available includes:
SEQUENTIAL CIRCUITS PROPHET V SYNTHESISER
MODEL 800 SEQUENCER
MODEL 700 PROGRAMMER

OBERHEIM OBX 8 VOICE
4 VOICE

4 VOICE
DS2A SEQUENCER

ROLAND SYSTEM 700 WITH SEQUENCER
MC8 MICROCOMPOSER
CSQ 100 SEQUENCER

Phone through now and ask for Mel who will be pleased to discuss your requirements and help with any problems you may have.

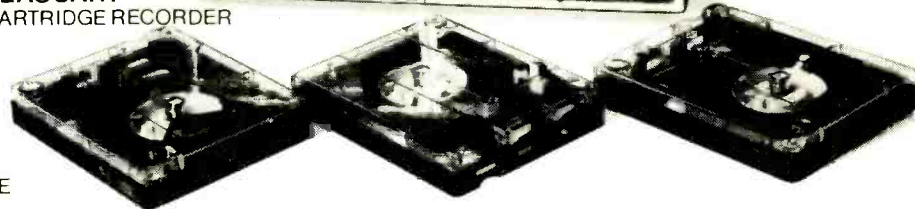
20 DENMARK STREET, LONDON WC2H 8NA
Telephone 01-240 0084/5

Mention the name
SELTECH...
and they'll know
you're a
Professional

BEAUCART
CARTRIDGE RECORDER



ARISTOCART
CARTRIDGE



Professional because you choose your equipment from a range that offers the best in high quality and long-term reliability.

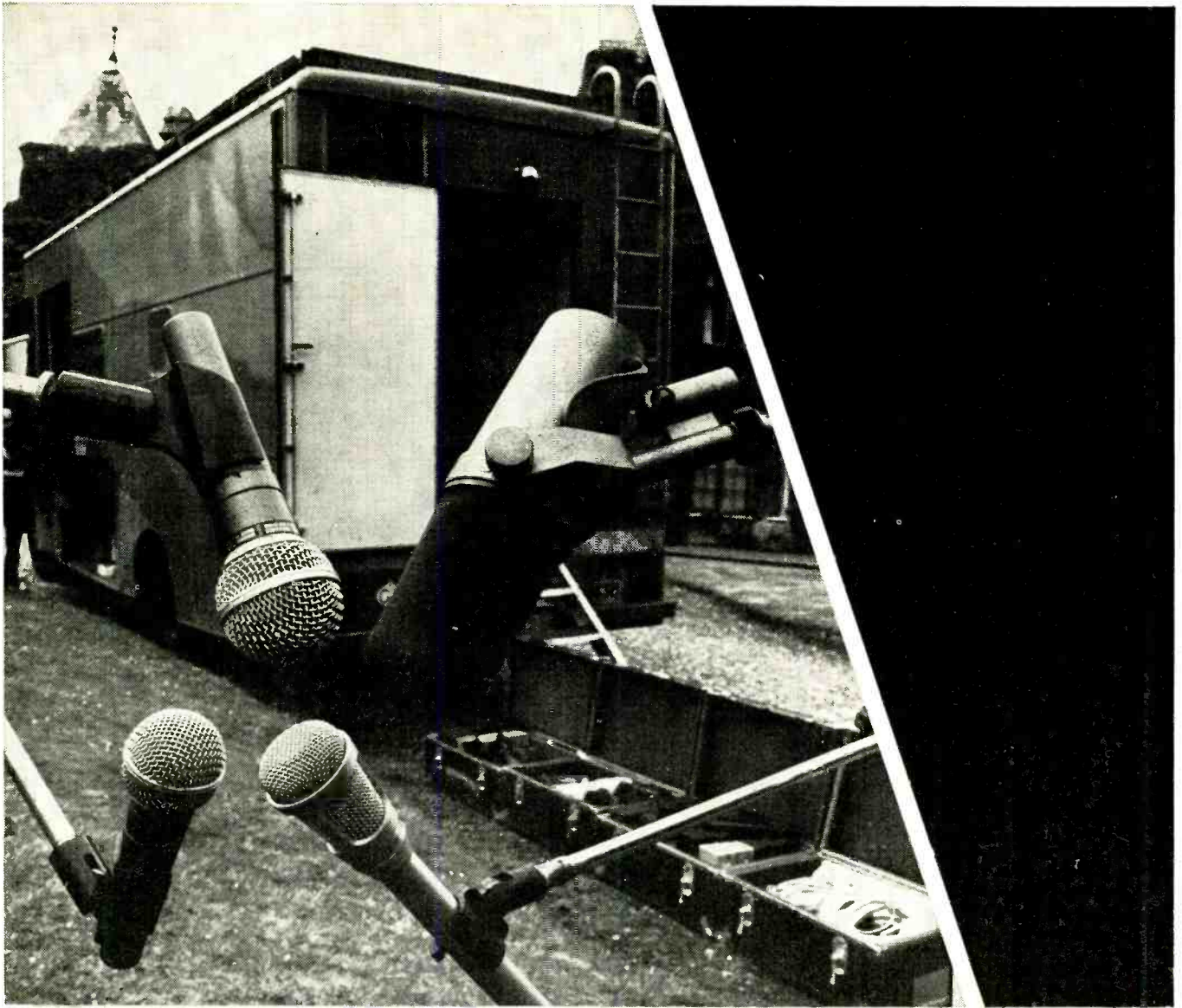
Seltech's range of professional audio equipment includes the top-of-the-range Beaucart cartridge recorders and Aristocart cartridges.

BEAUCART equipment is available in a variety of configurations for all standard size cartridges. All models use the unique pancake hysteresis synchronous motor which combines constant speed drive with extreme reliability.

ARISTOCART attention to design and assembly procedures have established a reputation for quality that makes them a reference standard for cartridges in broadcast applications all over the world.



SELTECH EQUIPMENT LIMITED Rose Industrial Estate, Cores End Road,
Bourne End, Bucks, SL8 5AT, Tel: Bourne End (06285) 29131 Telex: 848960



Stones' Rolling Studio



A complete recording studio in a van? For Mick Jagger, it is almost a necessity. Mick and the Stones can be inspired to produce their next hit anytime, but when they're on tour or on vacation, the best recording studios aren't always around the corner. The Stones rely on their Shure-equipped mobile studio for the unmatched recording perfection they insist upon, for these moments of midnight inspiration. Whether in a recording session or on stage, the Stones' SM7, SM58, SM82, SM53 and SM56 microphones are their assurance of consistent quality and natural sound.

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



Studio Acoustics Course Beyer mini mic

Acoustic Technology, the Southampton-based studio acoustic consultants, are to run a short course in May 1980 for recording studio engineers and owners, designed to instruct those working in studios of the limitations and strengths of their acoustical working environments. The course will cover various aspects of design, sound absorption and acoustic balance, and will draw on some of the company's recent design projects to illustrate problem-solving techniques. Course application forms can be obtained from Andrew Corkhill or Bob Harris at: Acoustic Technology Ltd, 58 The Avenue, Southampton SO1 2TA. Phone: 0703 37811.

To meet the demand for a small, almost invisible mic for television presenters and performers, Beyer have produced the *MCE 5* mic which is the world's smallest mic with a diameter of only 7mm and a total length of only 23mm. The *MCE 5* is an omnidirectional, electret-condenser mic with a frequency response of 20Hz to 20kHz

and a signal-to-noise ratio of 62dB, and an EIA sensitivity rating of -142dBm. The mic is also suitable for OB use and may be fitted with a small detachable metal windshield offering up to 20dB of wind noise attenuation. Price of the *MCE 5* is approximately £60. Beyer Dynamic (GB) Limited, 1 Clair Road, Haywards Heath, Sussex RH10 3DP, UK. Phone: 0444 51003.



Beyer MCE 5

Soundex PPM 402

Bulgin Electronics Soundex Ltd has introduced the *PPM 402*, an economy PPM which closely resembles the characteristics of the company's *PPM 100 Series*, a BBC-style PPM to BS 5428. The new PPM is a true bipolar peak-reading meter calibrated in decibels with dynamic range, frequency response and ballistics similar to BS 5428. The meter's accompanying amplifier is a true bipolar quasi-peak pseudo-logarithmic amplifier. Price of the meter and amplifier is £34.95. Bulgin Electronics Soundex Ltd, Park Lane, Broxbourne, Herts EN10 7NQ, UK. Phone: 09924 64455.

Mobiles — Additions

RAK MOBILE

Bookings: RAK Recording Studios, 42-48 Charlbert Street, London NW8, UK. Phone: 01-586 2012. Telex: 299501.

SANBORN MOBILE

Bookings: Sanborn Productions, Suite 10, 1280 28th Street, Boulder, Colorado 80303, USA. Phone: (303) 443-2372.

Bookings to: Scott Gelin.

Vehicle or trailer type: International truck.

Exterior dimensions: 34ft long, 8ft wide.

Interior dimensions: 22ft long, 8ft wide.

Design: Carl Frost, Gene Reynolds and Larri Martin.

Construction and installation: Sanborn Productions.

Tape recorders: Ampex *MM1200* 24-track and *ATR102* 2-track.

Console: Sound Workshop *Series 1600* 29/16, with *Videograph* bargraph metering via a video monitor.

Monitoring: bi-amped JBL *4333*, also JBL *4313* and Auratone, driven by Yamaha *B2* and BGW *750*.

Ancillary equipment: various including dbx, Dolby, Kepex, Orban and Urei.

Microphones: wide selection of over 60.

Stage boxes, snakes, etc: custom-built snakes, mic splitter and Jensen transformers, etc.

Communications gear: Clear-com system.

Video gear: Sanyo CCTV system.

Hire charges: on request.

Availability: North America.

Vehicle or trailer type: Ford truck. **Exterior dimensions:** 23ft long, 8ft wide.

Interior dimensions: 16.5ft long, 7.5ft wide.

Designer: Doug Hopkins.

Construction and installation: Norwich Coachworks and TEAM Recordings.

Tape recorders: two 3M *M79* 24-tracks plus two Studer 1/2 in machines.

Console: API with 54 mic inputs and 24-track monitoring.

Monitoring: JBL *4310* driven by Crown.

Ancillary equipment: various including Eventide, Urei, *Scamp*, MXR and EMT units, plus Dolby noise reduction.

Microphones: Neumann, Shure, Beyer, AKG and Schoeps.

Stage boxes, snakes, etc: 200ft multicore cable.

Communications gear: intercom system and walkie-talkie facilities.

Video gear: Shibaden CCTV system.

Hire charges: on request (rates include personnel).

Availability: Worldwide.

Broadcast Aphex Aural Exciter

Aphex is to introduce a broadcast version of its *Aural Exciter*. The new unit, *Model 602*, has been modified specifically for in-line broadcast use from the original unit and is currently under test at K-WST, Los Angeles, W-LUP, Chicago, and WZAM, Norfolk, Virginia. This follows initial tests at Stations 2JJ, AM2KA and 2CH in Australia, and at Radio Luxembourg and Radio Transkei (Africa). Engineers at these radio stations claim that the unit enhances the signal, giving it greater intelligibility, presence and detail while maintaining the naturalness of music.

Aphex Systems Limited, 7801 Melrose Avenue, Los Angeles, Cal 90046, USA.

Phone: (213) 655-1411.

UK: Aphex Audio Systems (UK) Ltd, 35 Britannia Row, London N1 8QH.

Phone: 01-359 5275.

Cetec Gauss loudspeaker improvements

Cetec Gauss has improved the power handling capacities of its 12in, 15in and 18in loudspeaker drive units. All the units have been upgraded to handle twice the power (rms watts) of the existing units and the new power ratings are 300W rms for lead guitar types and 400W rms for bass and low frequency units. All of the units' other parameters, ie sensitivity, free air resonance, impedance and size of the voice coil and magnet gap, have been maintained. The improvements have been achieved by winding the voice coil directly onto the voice coil support, using anodised aluminium for the voice coil support, providing additional breathing holes in the support, utilising a 20lb magnet assembly with a high energy ceramic magnet, and using a specially designed magnet assembly with a cast bottom plate and die cast finned aluminium structure. The overall height and weight of the new units is unchanged from the existing models.

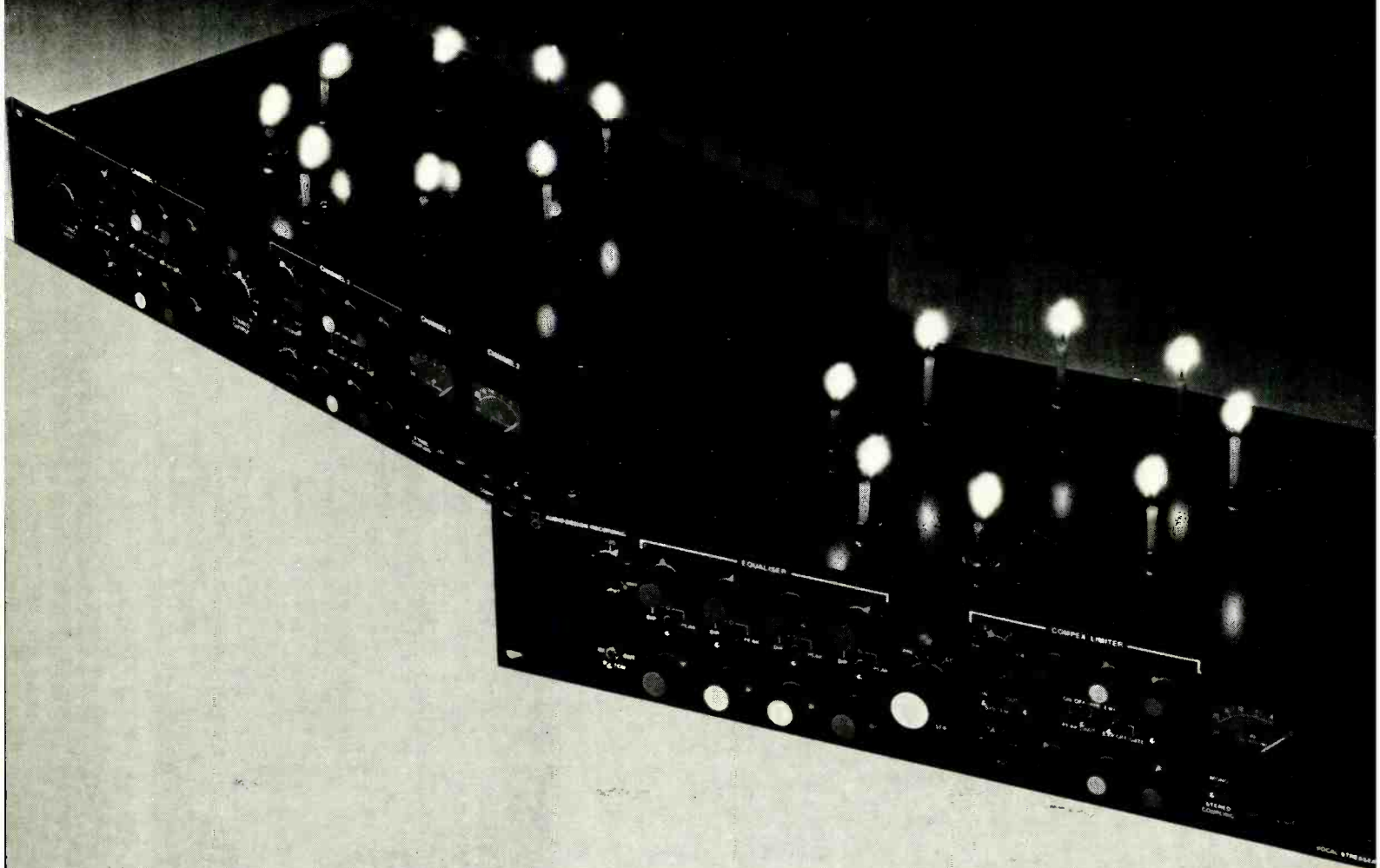
Cetec Gauss, 13035 Saticoy, North Hollywood, Cal 91605, USA. Phone: (213) 875-1900.

UK: Cetec International Ltd, 16 Uxbridge Road, Ealing, London W5 2BP.

Phone: 01-579 9145.

28 ▶

A Pair of well developed 8 year olds



Since their conception in 1972 the F760X Compex-Limiter and the F769X Vocal Stresser from ADR have evolved into a very well developed pair.

In case you didn't already know the Compex-Limiter is a peak limiter, multi-ratio compressor and noise reducing expander/gate all rolled into one.

The Vocal Stresser combines all these features with the remarkable E900 Sweep Equaliser. Remarkable because it not only enables exact

selection of bandwidth for frequency control but it can also be switched either before or after the Compex-Limiter or directly into the side-chain of the compressor making it frequency conscious.

Clever!!!? With well over a thousand units in service worldwide a lot of studios obviously think so!

If you want to put your hands on a well developed pair, call us now, we're as near as your telephone!



Audio & Design (Recording) Limited
84 Oxford Road Reading Berks RG1 7LJ
Telephone: Reading (0734) 53411
Telex: 847605 a/b TILLEX G

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

New PCM 'Minidisc'

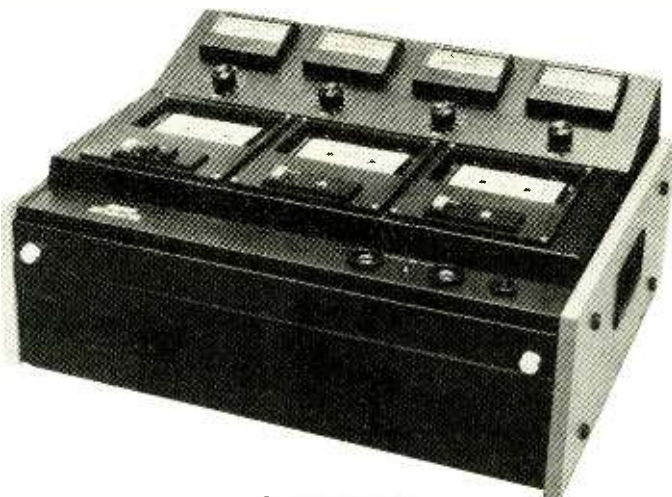
Further to our feature article Digital Audio Discs in July 1979 *Studio Sound*, yet another contender has joined the field—AEG-Telefunken and Teldec in West Germany. Teldec is a company jointly owned by Telefunken and Decca, and a few years ago it launched the first commercial video disc in Europe, but for various reasons the TeD video disc was a financial failure, although it has found some commercial applications in Japan. TeD was a flexible 7in diameter disc played with a special stylus, and which ran for only 10 minutes. But now, this technology has been updated, to produce a PCM audio disc that is claimed to compare favourably with the Philips Compact disc. The new Teldec 'Minidisc' is mechanically pressed from PVC, is 5.3in in diameter, comes housed in a protective cassette to reduce damage to the surface, and is recorded on both sides to give a total playing time equivalent to four LP records. Disc rotation speed is 300 rev/min, there are 600 grooves per millimetre (50 to 60 times greater than the LP groove) and disc wear is claimed not to be a problem (although it was a severe problem on the TeD video disc). Digitally, the 'Minidisc' uses 14-bit linear coding with a sampling frequency of 48kHz to give an 85dB dynamic range. While no information is available on marketing, it is suggested that the player might retail at about \$550.

SAE appoint sales representatives

The professional products group of Scientific Audio Electronics Inc, has appointed a nationwide American network of independent sales representatives. The companies involved are Westrep Associates, LP Marketing, The Little House, Audio Associates, EMR, Northeast Marketing, Phil Walter Assoc, Hawaiian Marketing, Resource Marketing Associates, Tenick & Assoc, Lee Butler, VF Sales Inc, RMS Sales Inc, William Menezes & Associates, Raulson & Co, and The Pringle Group.

Otari cassette duplicator system

Otari has introduced the *DP-4050-C2*, a new compact version of its *DP-4050* in-cassette duplicator system. Featuring a cassette master and two slaves, it has the capability of adding up to nine additional



Otari DP 4050-C2

slaves in groups of three, for a total of 11 slaves all driven from one master. Based on the *DP-4050-OCF* and *DP-4050-CCF* models, the new unit features an 8:1 duplicating ratio, long life ferrite heads, flip-down panel for easy access to alignment controls, servo-controlled modular transport units, large VU meters, and duplication of all four tracks simultaneously in one pass. The modular transports are a useful feature as failure of one unit does not disable the entire machine. The master transport features automatic rewind and stop, plus a $\pm 4\%$ speed control to compensate for non-optimum cassette masters. The add-on *DP-4050-Z3* slave unit contains three slave cassette decks and is easily attached to the master by a multipin connector cable. Price of the *DP-4050-C2* with cassette master and two slaves is \$2,950, while the *DP-4050-Z3* slave unit is \$2,750.

Otari Corporation, 1559 Industrial Road, San Carlos, Cal 94970, USA. Phone: (415) 592-8311.

Forthcoming Exhibitions

January 18 to 24
Midem, Cannes.
January 25 to 27
NAMM, Los Angeles.
February 25 to 28
AES 65th Convention, London.
April 13 to 16
NAB, Las Vegas.
May 6 to 9
AES 66th Convention, Los Angeles.
June 18 to 20
APRS, London.
September 12 to 18
Photokina, Cologne.
September 20 to 23
International Broadcasting Convention, Brighton.

Address changes

● John Garbett (Audio Visual) Ltd has moved to 8 Broad Street, Wokingham, Berks RG11 1AB, UK. Phone: 0734 790415.

● DeltaLab Research Inc, has moved to 27 Industrial Avenue, Chelmsford, Mass 01824, USA. Phone: (617) 256-9034.

● The Otari Corporation has moved to expanded facilities at 1559 Industrial Road, San Carlos, Cal 94070, USA. Phone: (415) 592-8311.

Contracts

● Group W, Westinghouse Broadcasting, has taken delivery of a new Broadcast Electronics *Control 16* programme automation system for use at WPNT-FM, Pittsburgh.

● EMI has chosen the B&W Loudspeakers *Model 801* monitor system for use in their classical music operations at Abbey Road Studios and on location at external recording sessions throughout the world.

● Granada TV has installed a Neve *5316* 24 channel/8 buss radio and television console in Britain's most up-to-date satellite news base in Liverpool. Other modified Neve *5316*'s are being installed in Granada's Manchester studios and when completed this will allow Granada to present its evening news magazine from either Manchester or Liverpool.

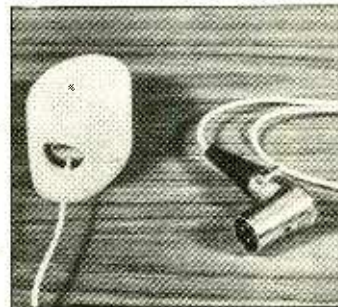
● Cadac Audio has received an order for a specialised 12 channel 4 group re-recording console from Sonopress of Gutersloh, West Germany.

● Philip Drake Electronics is to supply Visnews with a compact communications system for use with the Eurovision news exchange network.

Shure SM18 low-profile mic

A new, low-profile mic for use on tables, altars, etc has been introduced by Shure. Designated the *SM18*, the new mic is a cardioid, dynamic mic completely encased in a colour co-ordinated foam "envelope" available in either a white or brown finish so as to be unobtrusive. The mic is roughly palm-sized and is designed to sit directly on the surface of a table, etc thereby eliminating the visual distraction common to stand-mounted mics. The *SM18* is angled at 10° inside its foam envelope to place the mic element just above the surface on which it sits, and this low profile results in surface reflected sound reaching the mic at nearly the same time as direct sound allowing improved voice reproduction. Frequency response of the mic is 150Hz to 10kHz at 1m and because of its foam envelope the *SM18* is virtually immune to wind noise and mechanical vibrations. Price of the *SM18* is approximately £40. Shure Electronics Limited, Eccleston Road, Maidstone, Kent ME15 6AU, UK. Phone: 0622 59881.

SM18



Harrison Leasing Corporation

Harrison Systems Inc has announced the formation of a leasing subsidiary, Harrison Leasing Corporation, for the leasing of high quality audio equipment including Harrison consoles and related products. Although the new company is a wholly owned subsidiary of Harrison Systems Inc, its leasing programme will not be limited solely to Harrison equipment. Instead, the company is encouraging package leases of studio equipment including items manufactured by other companies.

Harrison Systems Inc, PO Box 22964, Nashville, Tenn 37202, USA.

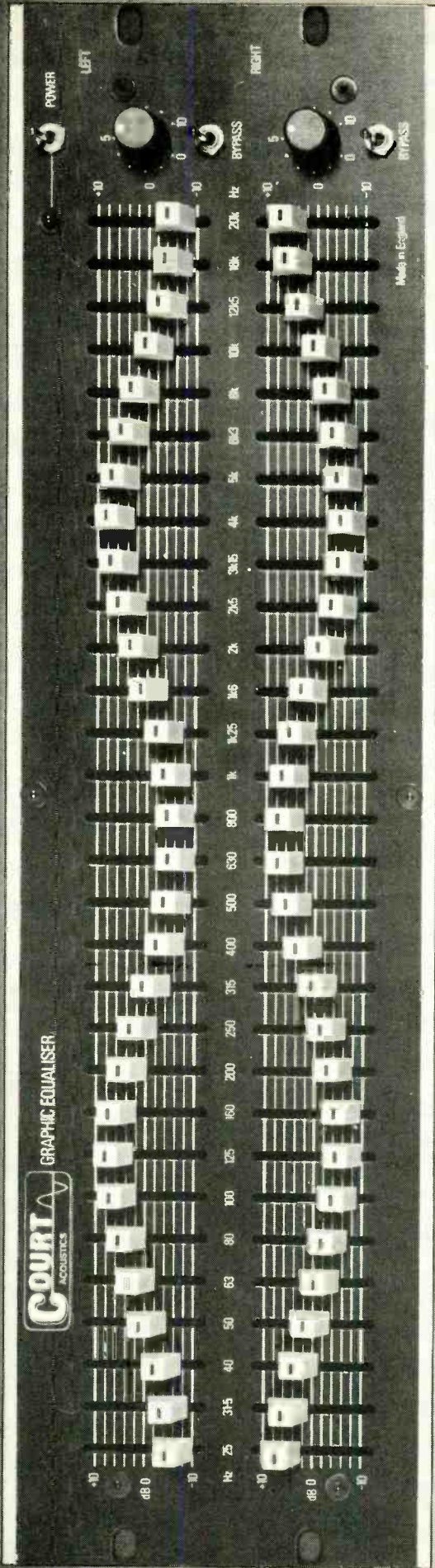
Phone: (615) 834-1184.

30 ▶


AT LAST THE ULTIMATE IN TONE CONTROL IS HERE!

When we decided to design a graphic equaliser to end all graphic equalisers – we had no idea exactly how long it would take. Not just to give more facilities than all the others – that wasn't too difficult for us – but to outperform all the competition and at a reasonable price – took a little longer than we expected.

To our overseas agents and all our customers who have been so patient – we think it has been worth the wait.



- 2 stereo bands of 30 faders with centre click stops giving 20dB of control
- ISO centre frequencies giving a total range of 21hz-21khz in 1/3 octaves
- Level control giving up to 20dB of gain
- Hi & Lo pass filters at each end for rumble, subsonic and supersonic rejection
- Terminations in balanced XLR and unbalanced Jack connectors
- 60 precision inductors for maximum curve performance and minimum noise
- 'Unilooop' feedback design for minimum distortion
- 5 1/4" high rack mounting or free standing for 110-240 volt operation
- All this and more for around £630 – £315 per channel and that's worth waiting for too


COURT ACoustics LTD

Agencies

●SAE Professional Products has appointed Pro Lines Northwest as its representative for the Pacific Northwest states of the USA.

●Atlantex Music Limited is now distributing Furman Sound products in addition to its distributorship of the Ashley, MXR and Sescom ranges in the UK.

Harrison agency

Scenic Sounds Equipment announces that it has regretfully relinquished the UK agency for mixing console manufacturer Harrison Systems, Nashville, and that FWO Bauch Ltd will now be handling these lines in Britain. Scenic Sounds has become a casualty of moves by Harrison to integrate their worldwide marketing organisation with that of Studer, who already distribute Harrison products in many other countries. Scenic Sounds would like to reassure their customers for Harrison products, who recently include Roundhouse, Red Bus and Factory Sound, that they have undimmed faith in the technical excellence of the console, and will continue to provide technical support.

Sonex acoustical foam

We have received details of a relatively inexpensive method of controlling studio acoustics using foam panels. These *Sonex* foam panels use a lightweight, open-cell foam with inherent sound absorbent characteristics, which is manufactured in an architecturally shaped form based on the anechoic wedge principle. The *Sonex* panels may be hung using staples or attached with mastic directly to walls and ceilings, or alternatively mounted on movable partitions for fine acoustic room tuning. The panels are claimed to create a flat, non-reflective acoustic which is effective in reducing and eliminating slap echoes and standing waves. *Sonex* is available in a variety of colours and in 2, 3 or 4in thicknesses in standard 4 x 4ft panels. Price is approximately \$1.25 per sq ft for the 2in foam panel. Illbruck USA, 3800 Washington Avenue North, Minneapolis, MN 55412, USA. Phone: (612) 521-3555.

Aphex reduce VCA prices

Aphex Systems inform us that its *B&B 1537A* VCA is now available at substantially reduced prices as a result of new production techniques at the manufacturing plant. For

example the VCA has dropped from £7.80 to £4.75 per unit for quantities of 1,000 to 5,000, and similar price reductions have occurred for other quantities. The *B&B 1537A* VCA is a class A device with a maximum attenuation of greater than 100dB over the frequency range 20Hz to 20kHz, maximum THD is 0.004%, and slew rate is better than 10V/μs.

Aphex Audio Systems (UK) Ltd, 35 Britannia Row, London N1 8QH, UK. Phone: 01-359 5275.

Ban Electromusic

Ban Electromusic have been appointed UK distributors for the Yamaha range of professional equipment. Ban was set up some three years ago as a hire company but has since expanded considerably to offer a comprehensive touring PA service, full backline equipment hire, rehearsal and recording facilities, an electronic workshop, and a professional sales showroom with demonstration facilities. In addition to the company's Yamaha distribution, Ban is also an agent for equipment from Allen & Heath, Electro-Voice, Shure, Gauss and JBL to name but a few. The company additionally provides a custom design and construction service.

Based on the *P2200* power amp, Yamaha has introduced a simplified version without peak-reading meters, the *P2201*. Otherwise identical, the *P2201* features calibrated log-linear input attenuators on each channel, a power on/off switch, and LED indication of power and thermal overload. Power output is 200W per channel into 8Ω with less than 0.05% THD (typically less than 0.01%) from 20Hz to 20kHz both channels

driven. Frequency response is 20Hz to 50kHz +0dB, -0.5dB and the unit has a damping factor of better than 300 at frequencies below 1kHz, hence reducing the tendency to overshoot. The *P2201* is a standard 19in rack mount unit and has massive side-mounted heat sinks making the use of cooling fans unnecessary in all but the most severe thermal operating conditions. Inputs are male and female unbalanced XLR connectors, plus two parallel standard phone jacks, while outputs are standard 5-way binding posts. A feature of the input channels is provision of a polarity switch allowing either pin 2 or pin 3 of the XLR to be selected as the "hot" lead. Price of the *P2201* is £399.

Ban Electromusic, 89/97 St John Street, London EC1M 4AB, UK. Phone: 01-253 9410.

Amek M2000A console

Amek has introduced a new, medium price automated console, the *M2000A*. Standard configuration of the new console is 36/24 and it has comprehensive facilities together with exceptional flexibility in the signal path arrangement. The console has transformer or transformerless balanced mic inputs, and the input channels feature 4-band fully-parametric equaliser, swept high and low pass filters, six auxiliary sends, VCA faders, 10 subgroup busses with free-grouping and four dedicated submasters. Other features include six effects returns, complete studio and control room monitoring facilities, pink noise generator, and a talk-back system. A 384-position patchbay is fitted as standard and the console comes with a floor stand and power supplies. The

M2000A is available ex-stock and can be supplied with or without the Allison 65K programmer. Amek Limited, Islington Mill, James Street, Salford, Lancs M3 5HW, UK. Phone: 061-834 6747.

BEL BF20 mono flanger

BEL has introduced a mono version of its *BF20* stereo flanger which retains the same model number, but not unexpectedly is a mono flanger. The mono version of the *BF20* has all the features of its stereo counterpart apart from the keying facility, but with the addition of voltage controlled outputs (normal and reverse) and a voltage controlled input. The unit offers negative and positive flanging, feedback enhancement, an envelope mode and manual switching, while additionally two units may be linked together to give the same see-sawing panning effect as the stereo version. The *BF20* mono flanger is a 19in rack mount unit available in unbalanced or balanced versions.

BEL has also introduced a noise reduction unit offering 30dB of noise reduction and capable of decoding dbx encoded tapes. This is an 8-channel modular unit featuring simultaneous encode/decode processing with immediate A/B comparisons, and gain control to adjust signal level. As with the *BF20* this is a 19in rack mount unit, and it gives 2:1 compression and expansion circuitry with pre and de-emphasis. The noise reduction unit is available for approximately £575, while the *BF20* mono flanger is priced at £275.

Don Larking Audio Sales, 50 Cheapside, Luton, Beds, UK. Phone: 0582 26693.

Illustrating *Sonex* foam panels

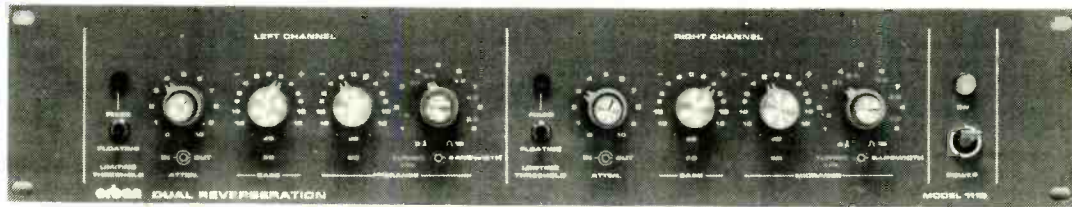


People

- Quentin Howard has been appointed chief engineer of Severn Sound, Gloucestershire's ILR station.
- Bernhard Kohler of Studer International has assumed responsibility for technical support for Harrison Systems products in those countries where Studer International represents Harrison.
- Harrison Systems has appointed Joe Pakutka as quality assurance supervisor.
- Tim Freeman has joined John Garbett (Audio Visual) Ltd to head up the company's design and manufacturing operation.

six of the best!

from Orban



111B Reverberation Unit
Two channel high quality spring reverberation unit



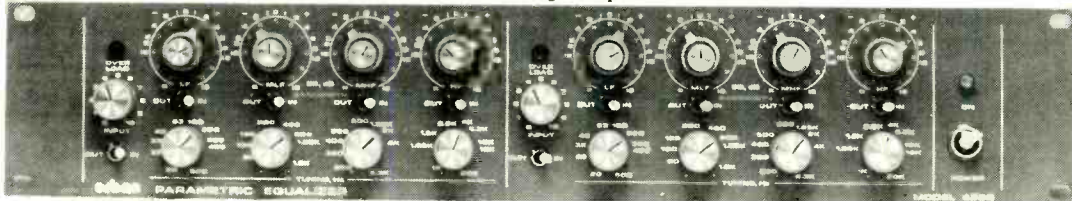
245E Stereo Synthesiser
Uses a unique and patented process to create a realistic and mono compatible synthesised stereo from a mono source



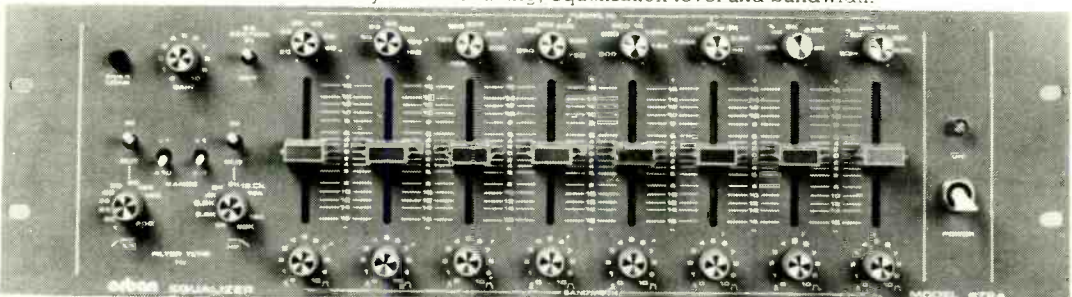
516EC Dynamic Sibilance Controller
Three independent channels of easily adjusted and effective de-essing
Tracking over a wide range of input signals



526 Dynamic Sibilance Controller
Balanced in- balanced out single channel de-esser
with two levels of de-essing and peak level indicator



622B Parametric Equaliser
Two channels of overlapping four band parametric equalisation
with continuously variable tuning, equalisation level and bandwidth:



672 8-Band Parametric Type Equaliser
Continuously variable band width and Q selectable high pass - low pass filtering
dual outputs for use as electronic crossover

European Master Distributor



Scenic Sounds Equipment

97-99 Dean Street, London W1V 5RA Telephone : 01-734 2812/3/4/5

England Industrial Tape Applications Belgium Sait (Bruxelles) Finland MS-Audiotron France Schaeffer, Riesser & Cie Germany Estemac Greece Audiolab Hellas
Holland Cadac Holland (Hilversum) Italy Audio Products International (Milano) Spain M. Llewellyn-Jones Sweden Tal & Ton

www.americanradiohistory.com

studio diary

Windmill Lane, Dublin

Situated in the heart of Dublin, Windmill Lane Studios is Ireland's first 24-track recording studio and is the most prominent example of the current resurgence and progression of the Irish sound recording industry. Opened in February 1979, this 24-track studio has its origins in the film editing company, James Morris Editing, which was formed six years ago. Success in this field led owner James Morris to contemplate creating a top quality recording studio of the highest standard in Dublin, and about two years ago James approached Brian Masterson (now co-director of Windmill Lane with James Morris) to discuss the possibility of setting up such a studio. Having decided that the project was feasible, first priority was the quest for suitable premises. Several premises were considered but, eventually, it was decided that an old granary situated close to the waterfront of the former Dublin dockland was suitable even though extensive internal reconstruction would be required. Once the site of the studio was finalised, planning and construction took a further 18 months, and the completed premises now house not only the recording studio, but also film and video editing facilities.

The reconstruction of the former granary entailed the construction of a 24-track studio from scratch on the ground floor, with the first floor becoming the location for a large preview theatre, a kitchen, plus video and telecine facilities, while the second floor is the location for six film editing rooms (two

16mm editing rooms and four 35mm editing rooms). The most extensive reconstruction work involved the recording studio and rather than attempt the design themselves, Brian Masterson decided to call in John Storyk, of design consultancy Sugarloaf View, to design and oversee construction of the studio.

The studio is a fairly typical Storyk design and is to a non-symmetrical layout. At one end is the control room which juts out into the studio at an angle and has a wrap-around window offering excellent vision. To the left of the control room is an isolation booth with its own window to the control room, this booth is 16ft long by 8.5ft wide and 8ft high. The positioning of the control room allows an engineer at the console 240° of vision — an excellent arrangement with virtually no blind spots. The studio itself is 36ft long by 32.5ft wide and has a 2-level ceiling, that nearest to the control room being 8ft high with the rear ceiling 18ft high. In addition to this arrangement the studio floor is diagonally split with the left-hand half having carpeted flooring and the right-hand section a wooden floor. These arrangements together with varying wall surfaces (the rear wall for example is alternately wood and brick surfaced) and movable acoustic screens, offer a wide variety of recording conditions. Incidentally the standard of construction is extremely high and it is obvious from the overall finish of the studio that Brian Masterson and his colleagues have lived up to their desires to create a top quality

studio.

The control room is fairly spacious and is equipped with an MCI 500C Series automated console in a 36/32 frame configuration, although presently only in use as a 24-track recording console. The console includes an Audio & Design (Recording) Scamp rack, mounted on the left-hand side of the console in the vacant I/O module spaces. This Scamp rack comprises four SO1 comp/limiters, four F300 expander/noise gates, an S23 autopan unit and an S24 ADT flanger. The console operates in conjunction with an MCI JH-16 24-track recorder and two MCI JH-110A 2-tracks, all utilising Ampex Grand Master tape. Other tape machines include a Revox B77 and for cassette copying a Nakamichi 600 cassette deck. Monitoring is over Storyk-designed cabinets utilising JBL drivers, these being mounted over the wrap-around window. Ancillary equipment includes Dolby A noise reduction, four dbx compressors, two Fairchild valve compressors, an AMS phaser/flanger and a digital delay unit, plus an EMT stereo plate, Micmix Master Room reverb unit, and a Quad-Eight CPR-16A digital reverb unit. Microphones in use include a wide selection of models from Neumann, Electro-Voice, Calrec, AKG and Beyer. Incidentally the studio also possesses a Yamaha grand piano.

So there we have it, Ireland's first 24-track studio. It is a fine achievement and can compete on equal terms with the best UK 24-track studios. Although as Isolde Heavey, the studio manager,

explained, in the short period of time they have been in operation most of their clients have been Irish — these include Horslips, Planxty, The Chieftans and U-2 (a new Irish punk band), plus Tony Hatch who has done several commercials at Windmill Lane — the studio is looking forward to attracting much of its business from abroad. The studio's facilities and its approachable and knowledgeable engineering team of Brian Masterson and Tim Morris certainly make it well worth further investigation. However, it remains to be seen whether Dublin and Windmill Lane will become more than a localised Irish recording venue. One thing that is clear though is that the facilities certainly warrant the attention of non-Irish bands and producers.

Windmill Lane Studios, 4 Windmill Lane, Dublin 2, Ireland.

Phone: 01 713444.

Noel Bell

EMI Studios —Stockholm

The Stockholm EMI Studio is situated in Johanneshov, just a few minutes from Stockholm City. It's in a 3-storey building with Studio 2 on the ground floor and the main studio on the second. The ground floor also holds the cutting room, where all the tapes from the two studios are cut by the recording engineer himself.

"It's extremely important to us to be able to cut our own recordings," says chief engineer Björn Norén. "Once you're finished with a master tape you can go downstairs

Windmill Lane, Dublin



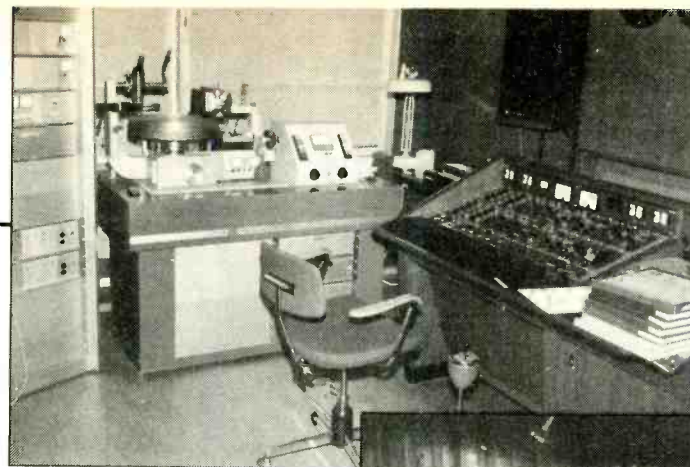
and within minutes tell if it is going to work on records at all. You tend to do the work ahead when you're mixing, instead of just leaving the headaches to the cutting engineer. This way you end up with master tapes that need very little equalising or any other treatment. All of the three engineers working here are familiar with this Neumann lathe and know exactly what the SX74 cutter-head can do."

EMI's also got their own pressing plant in Amal, where they make the stampers, so you just have to put talent in one end (and sometimes it's not even talent) and a record comes out the other end. However, those who've recorded here make an impressive roster of talents viz: *Hooked on a feeling* by Blue Swede, the only Swedish record to make number one on the US charts (that's right, ABBA hasn't made number one, so far) and *Moviestar* by Harpo, which was very successful on the European charts, both engineered by Björn Norén and produced by Ben Palmer. Ulf Lundell also records here, produced and engineered by Björn Boström, and of course, Swedish superstar Sven-Bertil Taube records all his albums here.

Studio One is a very big room, measuring 39 by 78ft, with an impressive height of 24ft. The back wall is covered with absorbers mounted on hinges, making it possible to flip between a hard or soft surface and there are also a whole lot of movable screens so you can actually turn this enormous room into almost any shape or size. There is no permanent drum booth, but the plans are ready for a re-construction of the studio area, which will provide booths for drums and vocals making it all a bit easier to work with.

The control room is equipped with an EMI/Neve 24/24 console, with a separate monitor-mixer. The tape machines are all Studer A80s except for the multitrack machine, which is a Lyrec TR532, that for some reason has become very popular here in Sweden.

"An excellent machine," says Björn Norén "we've had no trouble at all with it. It's been very reliable, although it is Danish. We use EMI tape on it, and that gives a very good, clean sound. We normally use NAB equalisation on the multitrack and CCIR for the stereo's. I feel that CCIR gives you a better signal-to-noise ratio where it is needed the most—on the 2-track master. Sometimes I even use



EMI Studios,
Stockholm

Dolby to improve further."

Of course the EMI studio has all the outboard gadgets like MXR's phasers and flangers, the Eventide *Harmonizer* and the indispensable EMT's; the Steelplate 140 and the Goldfoil 240, but also some odd features like the Roland Space Echo, a tape echo device with a built-in spring reverb with a very typical, hollow 'wipe out' sound in it. Monitors, for all three different rooms, are all Mastering Lab's *Big Red's*.

"It's a relief after all these years of putting up with 3-, 4-, and 5-way systems to hear all the music coming from one spot, rather than having it spread out over the entire front of the speaker baffles. They're so accurate you can pin point any sound from any direction without any ear-fatigue whatsoever, even after long hours. We feed them from a Pioneer Spec, 2-power amp that we find just right for the job, says Björn Boström, engineer and member of the prestigious 'Genever-Klubben' (a Swedish academy of recording people with just 24 members).

Studio Two is considerably smaller than the main studio. "Originally it was only meant to serve as a mixdown room and a relaxed place to do vocal overdubs, but after a few weeks in operation it turned out to be the most wanted room in the house," says Gunnar Lööf, senior engineer who usually records all the jazz-albums produced by the very lively Jazz Division at EMI Sweden. "People started bringing in drums and doing regular sessions in here and everybody just loves the easy-going atmosphere."

Studio Two has an identical set-up to the main studio except for the studio two console which is a Neve Compact 8068.

Studio rate is 500 Swedish crowns, to include engineer and coffee, that's not really coffee—it's a powder that you mix with hot water until you get something that looks like coffee, smells like coffee and tastes like head cleaning fluid. The sound may be okay, but the 'coffee' stinks! Michael Tretow EMI Studios, Palandergatan 33, S-121 47 Johanneshov, Stockholm, Sweden. Phone: 08 491139.



Sugarloaf View

Studio design consultancy Sugarloaf View have supplied us with details of their recent work and commissions. In New York they have designed a fourth studio (Studio D) for Aura Recording, featuring easy set-up platforms for string and rhythm sections, a wrap-around control room window, and a separate projection booth. Also in New York the consultancy have designed two additional studios for Howard Schwartz. These new studios are part of a \$1 million investment programme, occupy some 5,000ft² on the 19th floor of 420 Lexington Avenue, and join the two existing studios designed by Sugarloaf View in 1974. All the studios are MCI equipped and the larger of the two can accommodate some 40 musicians, and boasts a \$200,000 custom designed 56-input automated MCI console. Other equipment for the new studios includes Dolby/dbx noise reduction, Lexicon digital delay/reverb, EMT digital reverb, Audicon plate reverb, EECO/SMPT E interlock, and two Audio & Design (Recording) *Scamp* systems.

Staying in North America the consultancy has designed an unusual Canadian studio complex, called Plus 5 Productions Studio. This is an MCI equipped 24-track complex, located in the wooded foothills of the Laurentians outside Montreal. Among its features are solar powering, an exotic greenhouse, residential space and structural design based upon Mayan architecture.

Sugarloaf View also designed the

newly constructed Windmill Lane Studio complex in Dublin; while elsewhere in Europe they are currently involved in discussions which may lead to the design of two new complexes in Spain and Sweden.

In more remote parts of the world the consultancy has been commissioned to design a complex in Lagos, Nigeria called Natral and this will comprise studios, a cutting room, and a pressing plant. In addition to this Sugarloaf View has been commissioned by Fonovision International in Bogota to design a 2-studio complex which is to be MCI equipped.

Jack Clement Recording Studios, Nashville

In the heart of the Nashville country music recording scene, Jack Clement Recording Studios based at 3102 Belmont Boulevard, Nashville is one of the best known and most successful of the many Nashville studios. Built in 1969 by its namesake it has an impressive record of country hit records and is frequently used by such top-line artists as Don Williams, Kenny Rogers and Dottie West, and Don McLean. Situated on a tree-lined residential street in an old house the studios grew out of Jack Clement's activities as a producer/writer/artist working on and developing his own material and other artist's projects. Although Jack no longer owns the studios they retain his name which is fitting since the

Jack Clement, control room of Studio A



overall feel of the studios is still much as he left them.

A large measure of the studio's success comes from the enthusiasm of general manager, Jim Williamson who has managed the studios since 1974. Jim came to the studios after a distinguished career in professional audio having been, amongst his many past activities, a console designer and worked with various studios including CBS and Decca. In fact the present format and facilities owe much to Jim's energy in building up and developing the studios.

At present there are two studios: Studio A and Studio B. The oldest of the two and the original is Studio A. This is a traditionally built studio with an interior constructed primarily of wood and is approximately 45ft by 32ft with a lofty 22ft high ceiling. This studio is multi-purpose and can be adapted for use either by a small rhythm group or about 40 musicians with ease. This is accomplished by a series of mobile baffles which can rapidly be moved to alter the acoustics. In addition to the baffles the studio has a preset string alcove which is especially useful when recording rhythm and 'colour' instruments at the same time. The control room for Studio A has a good view of the studio, is again mainly of wood construction, and houses a Harrison 32/32 console which is automation ready. The tape machines are a Studer 24-track and Studer 2-track mixdown machine, both recorders are operable at either 15 or 30in/s. Peripheral equipment includes Eventide phasers and flangers, MXR effects units and Dolby noise reduction. Monitoring in Studio A is provided by JBL 4333s which are bi-amped using BGW 500s for the low end and BGW 250s for the high end.

Studio B is much smaller and more intimate, and will accommodate eight to 10 musicians. Origin-

ally it was merely a listening room, but over the years its function has changed, progressively, from being a remix room, to an overdub room and finally a studio. For a long period of time the studio was in need of renovation and updating, as it was equipped with a rather miscellaneous selection of equipment, but Jim Williamson has recently rebuilt the studio and control room to the same high standards as Studio A. Studio B now has carpeted and oak floor sections giving alternative acoustics, plus a drum booth; while the control room has duplicate facilities to those in Studio A and has a wrap around window for increased visibility. Monitoring is provided by John W Gardner loudspeakers, these again are bi-amped using BGW 750 and 250 amplifiers.

Jack Clement Recording Studios, 3102 Belmont Boulevard, Nashville, Tenn 37212, USA. Phone: (615) 383-1982.

Hospital Radio — live broadcast

Hospital Broadcasting usually has a poor reputation in this country— incompetent amateurs and dogooders playing at disc jockeys with tin-pot equipment—but sometimes events happen to disprove this image, as recently proven when the Devizes Hospital's Broadcasting Service put on a 3-day live Outside Broadcast on a scale which would put some professional broadcasters to shame.

The event was the Game Fair, held at the Bowood country estate in Wiltshire, an annual opportunity to show the country way of life to 'townies', and to exhibit wares to the hunting, shooting and fishing fraternity. With three weeks to go, and a national network of landlines arranged for the first time to link up 50 similar hospital stations all over Britain with a potential audience of over 120,000, the bad news struck. The company which had offered a professional portable studio facility free of charge were unable to supply, due to certain 'business difficulties', but after a few frantic calls to scrape together some equipment, Reading's commercial station Radio 210 offered their OB vehicle complete with its own studio and PA system. So the OB was back on, but the national linkup had to be dropped due to lack of time and money. Had the network succeeded, it would have been the biggest link up of 'radio' stations by landline, as well as the first time hospital stations had ever linked up live.

The three days of broadcasting were a complete success, 15 hours of live coverage and over 60 taped

interview pieces. Racial Zonal supplied the tape for the broadcast, and the whole OB has now been condensed into a 60-minute 'Game Fair Special', and is available to any hospital station that would like a copy. A lifetime's experience for the broadcasters involved, and a unique insight into country life for the listeners, and the whole OB cost the Devizes Hospital's Broadcasting Service nothing! When you see what can be done by the 'amateurs', it makes you wonder about the professional radio stations. The local BBC station said they hadn't got the facilities to do such an OB, and instead they treated their listeners to a week of wine tasting!

Devizes Hospitals Broadcasting Service, Publicity Office, The Studios, Roundway Hospital, Devizes, Wilts. Phone: 0380 6666.

Quentin Howard

Bastun — Stockholm

Bastun studio in Stockholm was opened two years back, and was from the beginning only intended to be a mixdown room with a vocal-booth. Today, however, it has become one of the most unusual operations in town with a totally new approach to old recording techniques. The vocal booth now serves as a drum booth, and vocals are done in the hallway between the control room and the former vocal booth!

We always direct inject the bass, says Peter Olsson, studio manager, so the bass does not present any problems, but the piano was the hardest thing to solve. We simply couldn't get a regular grand through the door, so we had to do it another way. The Yamaha CP80 proved to be the perfect solution. It's an ordinary mechanical piano, yet has very short strings, and no resonating body. But the pick-up system is so elaborate that it is almost impossible to tell the Yamaha CP80 from the real thing! And the sound comes in perfect stereo spread, just as a good miking would give.

Then there was the problem with the guitarist. We had no place to put him, except for the little tape storage room and that was too small for both a guitar-player and his amplifier. So when the acoustical treatment of the storage room was ready, there was only room for a Fender twin and a microphone—so the guitar-player has to stand in the control room and play! Peter Lundblad's album

Devizes Hospital 3-day event at Bowood, Wiltshire



The first British broadcast mixer designed by British broadcasters.

- Wide selection of input modules
- Self-operation or engineer-driven capability
- Equalisation options available on all stereo and mono modules
- Expandable frame size
- Comprehensive metering with overload warning (PPM and VU options available for the UK and overseas)
- Sophisticated multi-source monitoring
- Auto-ducking on all input modules
- Remote and local equipment start
- Versatile talkback and intercommunications
- Independent clean feeds on outside source modules
- Optional script spaces
- XLR connections as standard
- Optional balanced insert points
- Transmitter status warnings
- Telephone-in and o.b. line modules with talkback
- Associated furniture available for wrap-round console
- Meets or exceeds broadcast authority specifications

mbi broadcast systems ltd

Edward Street, Brighton, Sussex
BN2 2JB, England. Tel (0273) 607384



Economically priced,
ergonomically built



services from mbi

- radio station equipment selection, installation, and studio commissioning
 - acoustic design and construction of studios
 - architectural and design services (at standard RIBA rates) for radio station construction
- all meeting broadcast authority requirements
- similar services available for multitrack studios

imagined by the maldwyn bowden international group

Club Öken, for instance, was recorded this way.

Working this way gives you a totally unique feeling of intimacy. To have the piano-, bass- and guitar-players out in the control-room also allows the musicians to get the same monitoring as the engineer, which helps them to relate to the whole of the mix, and not only to their individual parts, Peter Olsson claims.

Also, the control-room at Bastun is an inspiring environment to work in, with its pinewood panelled walls and the two large windows with real daylight. Daylight is not normally found in recording studios, you know. In two sessions your studio-tan can be ruined, so beware!

Actually, the studio got its name partly from being situated at Bastugatan on the south side of Stockholm, and partly from this pinewood interior. 'Bastun' actually means 'sauna', and both feels and looks very much Scandinavian.

The monitor speakers are Mastering Lab's *Big Red's* and of course the ever-present *Auratones*.

The console is basically a Harrison 32/32, modified to some extent in the equaliser sections, and can be used with the Allison 65K for automated sessions. The Lyrec TR532 is used for multitrack, and MCI and Studer machines are used for the 2-track masters.

All of the machines use NAB equalisation, but they can easily be switched to CCIR when requested. We record on Scotch 250 tape on all machines, including the cassette-decks, Peter Olsson points out.

Among the outboard gadgets you find Eventide's Omnipressor, Instant Flanger and Digital Delay Line. There are also a variety of compressors and limiters like dbx 160, Urei's L44 and 1176, Audio & Design's *Complex Limiter*, *Vocal*

Stresser and *Selective Processor*. And of course MXR's Phaser and Flanger units (is there any studio that hasn't got them apart from Swedish Radio?). You will also find the Marshall *Time Modulator*, EMT's *Goldfoil Reverb 240* and an Orban Parasound *Dual Reverb* and the Roland *Space Echo*. Of course there are Dolbys for those who still want them.

"I don't use the Dolby very much," says Peter. "I think we can get a better sound at 30in/s without any noise-reduction at all. But naturally we have a lot of customers who insist on Dolby, and since this basically is a mix-down room, we get tapes from all kinds of studios."

Among other artists that record here are Ted Gardestad and Janne Schaffer, Factory, Timjan, and Svenne and Charlotte.

The studio rate is 385 Swedish crowns per hour including engineer, and 285 Swedish crowns per hour if you just want to rent the room alone.

Michael Tretow

Commercial Recording, Hawaii

Honolulu, Hawaii provokes visions of dusky grass-skirted maidens, floral garlands and tanned surf-boarders with few cares in the world for commercial pressures. However, the Islands do not survive on such images alone and amongst the many commercial enterprises there are several recording studios. Recently these have progressively been improving their facilities and services in an effort to attract artists and producers from the US mainland and studio owners now have equipment available comparable to

the mainland at relatively lower recording cost.

One of the most recently updated studios is Commercial Recording in Honolulu, owned by Donn Tyler, which has just completed a 6-month expansion and renovation programme designed to make it one of the most aesthetically and acoustically pleasing studios in Hawaii. Established 13 years ago as a small 8-track facility primarily producing radio and television commercials, together with a small number of local records, the studio has grown considerably so that now it has two studio complexes with additional areas for editing, dubbing and tape duplication.

The smaller of the two studios is being used for radio and TV audio production and may additionally be used as a group demo studio. This studio is equipped with three Ampex ATR $\frac{1}{2}$ in and $\frac{1}{4}$ in recorders plus a Teac 40-4 with dbx noise reduction, and ancillary units include Inovonics comp/limiters, Eventide *Harmonizer*, Orban de-esser and parametric equalisers, and QRK and Technics turntables. Monitoring is over JBL 4315s and *Auratones* in the control room with JBL 4315s in the studio, all driven by Crown 75 and 150 amplifiers. The JBL loudspeakers in all studios and control rooms are suspended directly from the building's roof free from contact with the ceilings or walls. In addition to this small studio Commercial Recording has a small control room with $\frac{1}{2}$ in 4-track and $\frac{1}{4}$ in stereo machines for stereo and mono editing and dubbing. This room can also be used for reel-to-reel and cassette duplication plus the auditioning of material for commercials.

Commercial Recording's main studio, Studio B, is a 24-track facility which can also be used for 16-track. A dominant feature of this studio is that one wall is formed entirely from solid lava rock which aside from its acoustic properties of relative porosity and irregular surface, gives a natural appearance which is aesthetically pleasing, and which is highlighted by the use of dimmer controlled mood lighting. Another wall of the studio features floor to ceiling movable mahogany louvres, with a 3in layer of cellulose insulation behind, allowing the acoustic properties of the wall to be varied from very absorbent to very reflective, or to any desired property between the two. Two isolation booths, one designed primarily for drums and the other for vocals, are positioned at one end of the studio. All the exterior walls of

the studios are of triple wall construction and are over 16in thick. The studios are fully air conditioned with three separate systems which are vibration mounted on the roof of the building and acoustically isolated from the studios. The main studio has direct access via loading doors to the studio's car park allowing easy instrument removal and installation.

Studio B's control room boasts a Tangent 32-input console with transformerless inputs, parametric equalisation and vertical LED metering. Tape recorders include an Ampex MM-1200 24-track machine, switchable to 16-track, and with full remote control and microprocessor memory actuated multipoint search-to-cue transport control. Peripheral equipment includes Dolby noise reduction, DeltaLab DL2 digital delay, Marshall *Time Modulator*, Loft analogue delay, Inovonics comp/limiter, Orban parametric equalisers, de-essers and stereo synthesizers, AKG reverb, Eventide *Omnipressor*, and Teletronix LA-2A comp/limiter. Three amplifier/loudspeaker combinations, switch-selectable from the console, are available in the control room. These comprise a choice of JBL 4333As, JBL 4310s and *Auratones* driven by Crown 150 and 300 amplifiers. There are also JBL 4333As in the studio. With regard to mics the studio's standard is the Neumann U67, with other types available from the studio pool. Incidentally the base of the control room's elevated floor is filled with some 3,000lb of black sand for acoustic damping purposes.

Donn Tyler has created an impressive studio complex and is looking to the future with the provision of video tie lines between all the studios for cameras and monitors, for possible future video production work. Interchange facilities are a feature of the studios, an example being the provision of tie lines to the small studio allowing it to be used as a large isolation booth for strings, horns, etc. Perhaps more unusual is the provision of tie lines from the control rooms to the engineering area allowing certain performance checks to be made without the need to move test or audio equipment back and forth.

While studio owners in Hawaii have their own unique problems such as higher location costs, air freight costs on all equipment and the need for tape overstocking because of long delivery times, Hawaiian studios have a great deal

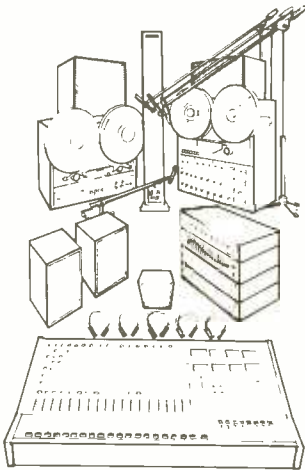
38 ▶

Bastun Studio—Stockholm



Our business is helping you with yours

Considering or upgrading a multitrack system?
We offer a select range of studio equipment, backed with advice, demonstration and service. Turnkey sell, install, lease or hire.



SYSTEMS

As our name implies, at **TURNKEY** we specialise in systems.

From the simplest four channel setup to large eight or sixteen track installations, we can tailor a package to fit your exact needs.

This can include acoustics advice, wiring, consoles, training and so on.

Ask for our 'Quotation Sheet' or call Andrew Stirling now, on 01-440 9221 and discuss your requirements first hand.



MONITORING

QUAD is a remarkable company that has stayed in the forefront of monitor amplifiers for over a decade. Their current series, the 303 and 405 are available for medium and high power use.

JBL and **TANNOY** share the market for studio monitors worldwide. We demonstrate and supply matched systems for budget and big-time monitoring. The renowned **AURATONE** mini-mighty speaker cubes, are also in stock.



SIGNAL PROCESSORS

The choice is immense. We cannot sell them all so we pick and choose the best.

Take **MXR** for example. This American based company has grown from making effects for guitars to studio equipment for professionals. Their digital

MICROPHONES

As with speaker systems, the choice of microphones is very much one of personal preference and we stock a range to satisfy most requirements. Our current favourites are the new **CSE** range by **AKG**. This is a system (in similar lines to the revolutionary **C451** range some years ago) of interchangeable bodies and capsules. As electret technology is used, the prices are correspondingly low.



delay and graphics are second to none.

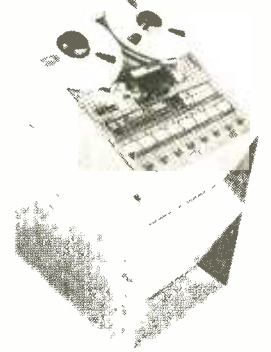
Roland of synthesiser fame, have introduced their 'Studio Series' of rack-mount units, including a phaser/flanger with extensive control facilities. We also have the budget **ACCESSIT** range.

ACCESSORIES

As well as supplying standard plugs, tapes etc., We have developed an exclusive range of 'hard to find' studio accessories.



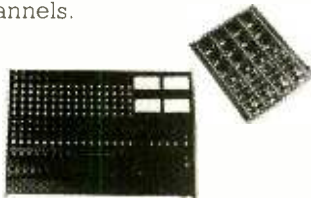
Take for example our 'Great British Spring' - a high quality stereo reverb developed for the budget conscious studio.



We also have . . . mike boxes . . . track sheets . . . preamplifiers . . . direct boxes . . . rolling consoles . . . and much more. Full details in our 'TURNKEY by mail' catalogue.

MIXERS

Our exclusive 1478 is a freebie with all four track recorders. Treble, bass, pan and level on four channels.



The **RSD**, 16 by 4, offers great value for money in budget multitrack mixers. Packed with features and our own mods for 8 track.

SOUNDCRAFT is well known for its 'state of the art' performance. We have extensive experience of the Series Two, 16 by 8.



SYNCON by **A&H** is a major breakthrough in the design of big consoles for 16 and 24 track. We offer fast delivery and installation.

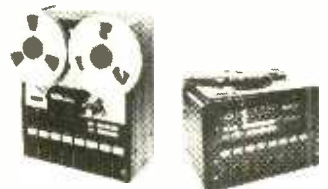
TAPE RECORDERS

REVOX lead in the field of 2 track mastering. The new **B77** includes all the features that were hot-rodged to the **A77**.



TEAC's new 3440 is the updated version of the 3440S. Now with varispeed, logic switching, monitoring and motion sensing.

The **TASCAM 80-8** is the most reliable half inch, 8 track recorder available. We also supply **dBx** and a studio console optionally.



The 8 track, one inch from **SOUNDCRAFT MAGNETICS** is a sophisticated workhorse with unique remote control facilities.



Write or call for a free copy of the 'Turnkey Book', the 'Turnkey by mail' catalogue and **TEAC's** 'Are you ready for Multitrack' book.

You are welcome to come and visit our extensive demonstration showroom at any time during normal office hours.

**8 East Barnet Road,
New Barnet,
Herts EN4 8RW**
**Supply & Installation
of Recording Equipment**
Telephone 01-440 9221
Telex: 25769

turnkey

to offer. According to Donn Tyler, Commercial Recording can offer a similar technical capability and expertise to comparable 24-track US mainland studios for approximately half the cost per hour as a Los Angeles studio. When the Islands' idyllic climate and the laid back feeling of a small city in the tropics is also taken into account, the advantages add up to an attractive lure for musicians with an eye for recording in the sun and surf. Steve McGarratt Commercial Recording, 333 Cooke Street, Honolulu, Hawaii 96813, USA. Phone: (808) 536-5439.

Chicago Super Station— Plus AM Stereo

WFMT in Chicago has become America's first FM stereo radio station with a potential audience of 50 states. For 28 years now WFMT has been broadcasting 24 hours a day on 98.7MHz, and now transmits in stereo from the top of the city's John Hancock skyscraper at an ERP of 133kW. This pumps 1mV/m into 5000sq miles and in practice enables WFMT to reach six states with reasonable signal strength. That's more than any other commercial station in the State of Illinois, and more than a little surprising when you bear in mind that WFMT is a classical and fine arts station, dedicated to broadcasting only unashamedly highbrow programme material. But what about the other 44 states that the station can reach? Well, WFMT has just become America's first radio 'super-station', the first radio station to be made available by satellite link for cable relay. There are currently three television 'super stations' and the WFMT stereo sound signals will be carried piggy back on top of one of these TV programmes. So, as from now, anyone in 50 USA states who subscribes to a cable TV system that hooks up to the satellite TV link, will also be able to listen to WFMT radio.

It isn't yet widely known that under FCC rules any cable or satellite system can pick up and distribute the programmes of any radio or TV station without its permission, without payment and without even its knowledge. The only proviso is that the station programming must remain intact, and even commercials can't be deleted. WFMT is not unnaturally more than a little pleased at being chosen as the first radio station to be picked up in this way, ahead of all those countless rock, jazz and

MOR stations across the country and ahead also of all those worthy, but often boring, public service stations. Perhaps most significant of all is the fact that WFMT is one of the least American, and most European of all US radio stations. Despite the fact that it's a commercial station, WFMT has a great deal in common with the BBC and regularly broadcasts BBC programme tapes. All this ties in neatly with the growing backlash in the USA against traditional formula commercial radio. The great listening public is finally rebelling against air time fodder riddled with commercial breaks. The worst must be a station I heard recently in California which featured news sponsored by a funeral parlour and topped and tailed by a catchy funereal jingle.

Chicago WFMT stands out amongst the dross on three counts: technical quality, programming and attitude towards commercials. The station has its own recording studio at Chicago's Orchestra Hall, with a Neve 5305 desk. At its main studios WFMT uses custom-built consoles designed by chief engineer Alfred Antlitz. The mics used are nearly all condenser types and the tape decks are Studer 480s with Dolby-A and wide track European standard (rather than NAB) to improve signal-to-noise. Studio monitoring is by Crown, Phase Linear and Quad amps with AR, Dahlquist and Infinity QLS speakers. The only signal processor used is an Antlitz own design which controls modulation with the aid of an analogue and digital computer. Although details of the Antlitz device aren't available, the aim is to meet the real-world requirement for a strong transmitted signal while avoiding sledge

hammer processing. The Antlitz eschews HF clipping and band splitting, with each frequency band separately processed and then recombined. There is also no reliance on feedback. Instead the computer continually monitors the signal leaving the studio and analyses its energy/time character. The derived result is then to make whatever trade off, for instance contouring of pre-emphasis, is required between spectrum-related and time-energy processing.

All programmes are self-oped by the announcer with discs played on a Technics SP10, SME arm and Shure V15/IV combination. Off-air monitoring, 24 miles from the transmitter, is by an upgraded Sequerra tuner and four Magna-planar loudspeakers tri-amped over 1kW with an Infinity subwoofer. WFMT may not be run exclusively for audiophiles (the listenership is far too high), but it is a station run exclusively by audiophiles.

Predictably for a Chicago hi-fi, high-brow station, WFMT programming leans heavily on the Chicago Symphony Orchestra. But the Boston, Cleveland and New York Symphs and Phils are also heavily featured, often in live concert recordings made by the station. Apart from classical music chat shows the station's brow lowers as far as an occasional programme on folk music. On the whole the programme content is enterprising. By chance, I hit on WFMT while twiddling the dial of my hotel radio, and heard the very first ever recording of the Chicago Symphony Orchestra, made on an acoustic recorder in 1916, followed smartly by a recent live concert dub.

Meanwhile five AM stereo systems are currently hotly com-

peting for the FCC's much coveted blessing. Most publicity so far has gone to the Kahn system which has been extensively tested, for instance out of the Mexico station XETRA. With this in mind WGN of Chicago (owned by the Tribune, hence World's Greatest Newspaper) recently gave the Motorola system and the Harris system two weeks each for six hours of stereo broadcasting a night. Each system was allowed one full night for on-air set-up tests and the FCC are now ploughing through around 600 pages of results gleaned by the engineers for each system. The aim was of course mainly to check mono compatibility and the test results should be especially interesting because WGN is one of the few (26 in all) 'clear stations' in the USA. Whereas most US radio stations are local with low power and directional aerials, a clear station can transmit non-directionally at high power and reach right across the country with its sky waves. Current bets are that the FCC will come to a decision on stereo before the end of 1979 and once this is announced there is bound to be a mad scramble by stations and set makers alike. WGN has its sights set on being the first AM stereo station on the air. Actually it's hard to see who, other than the set makers, will benefit from AM stereo. Already AM stations have one twentieth the transmission bandwidth of FM stations and the FCC are talking about reducing their 10kHz to 9kHz. Audio bandwidth is thus pathetically tight. No one looks for more than 26dB channel separation at the best and thanks to the increasingly widespread use of thyristor light controls there is even more interference on the AM bands than ever before. But, for a while at least, the public will doubtless fall over itself to buy new AM stereo sets simply because they are new.

Characteristically the BBC in England is maintaining a cold front of disinterest. In fact recent events suggest it is highly unlikely we shall ever see AM stereo in the UK. The BBC recently disclosed plans for transmitting station identification tones along with its programmes, probably by phase modulating the carrier with a digitally coded ID signal. As all the five AM stereo systems involve some form of phase modulation, it is on the cards that in the UK it will be an either/or choice between AM stereo and station identification.

Adrian Hope

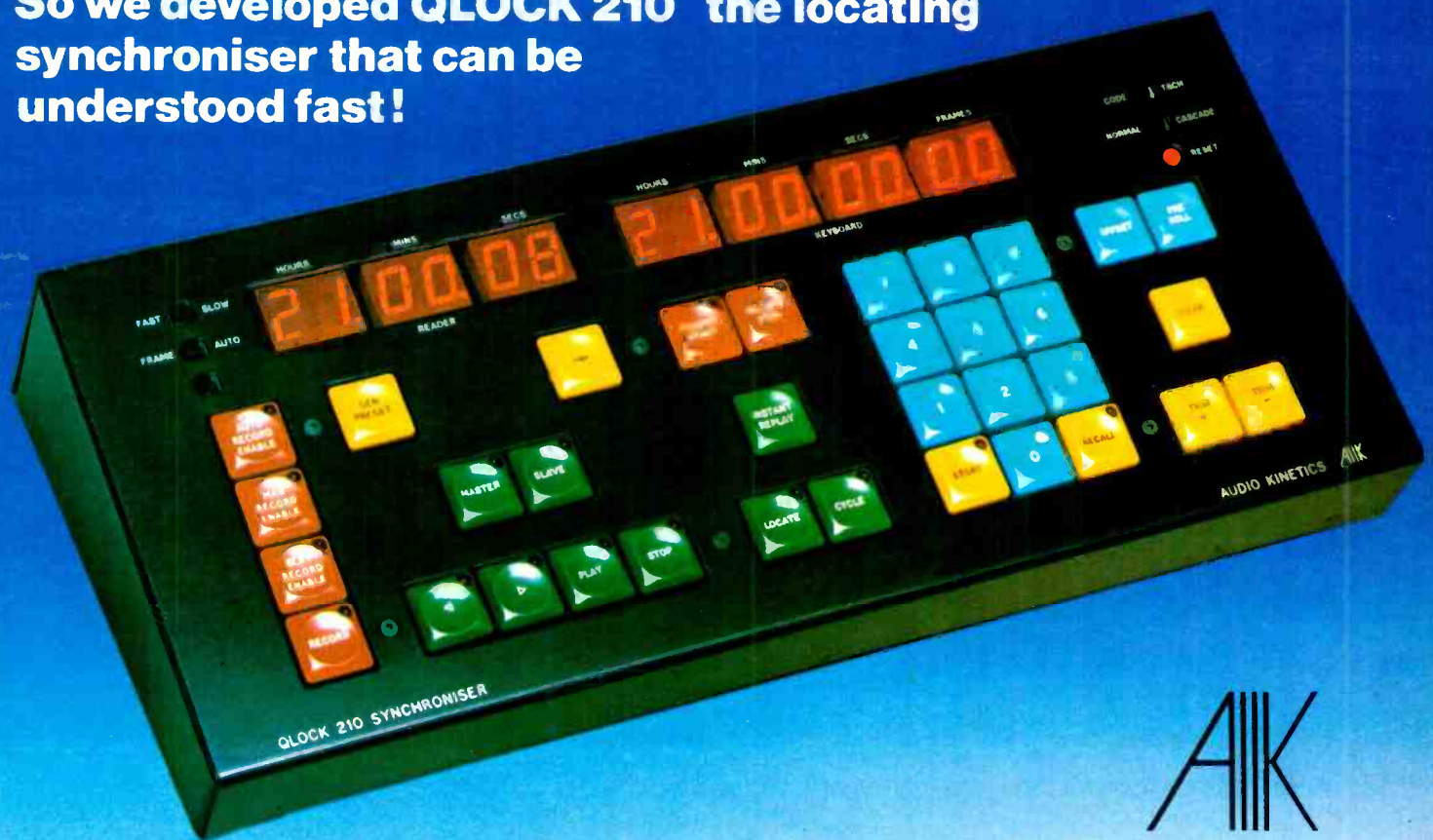
WFMT's senior announcer, Mel Zellman, seated in the master control room at a console designed by Al Antlitz



Sync0 Sync0

Its all in sync we go...

The joys of synchronisation are often dwarfed by complexities
So we developed QLOCK 210 the locating
synchroniser that can be
understood fast!



IF YOU'RE CONSIDERING SYNCHRONISING TWO MACHINES, THE BASIC ESSENTIALS ARE:

1. A DUAL OUTPUT SMPTE TIME CODE GENERATOR
2. TWO READERS
3. A SYNCHRONISER
4. TWO MACHINE INTERFACES

WOULDN'T IT BE NICE IF THESE ESSENTIALS WERE IN ONE UNIT WITH A LIGHTWEIGHT REMOTE CONTROL.

OF COURSE THE OPERATION WOULD BE IMPROVED IF WE ADDED:

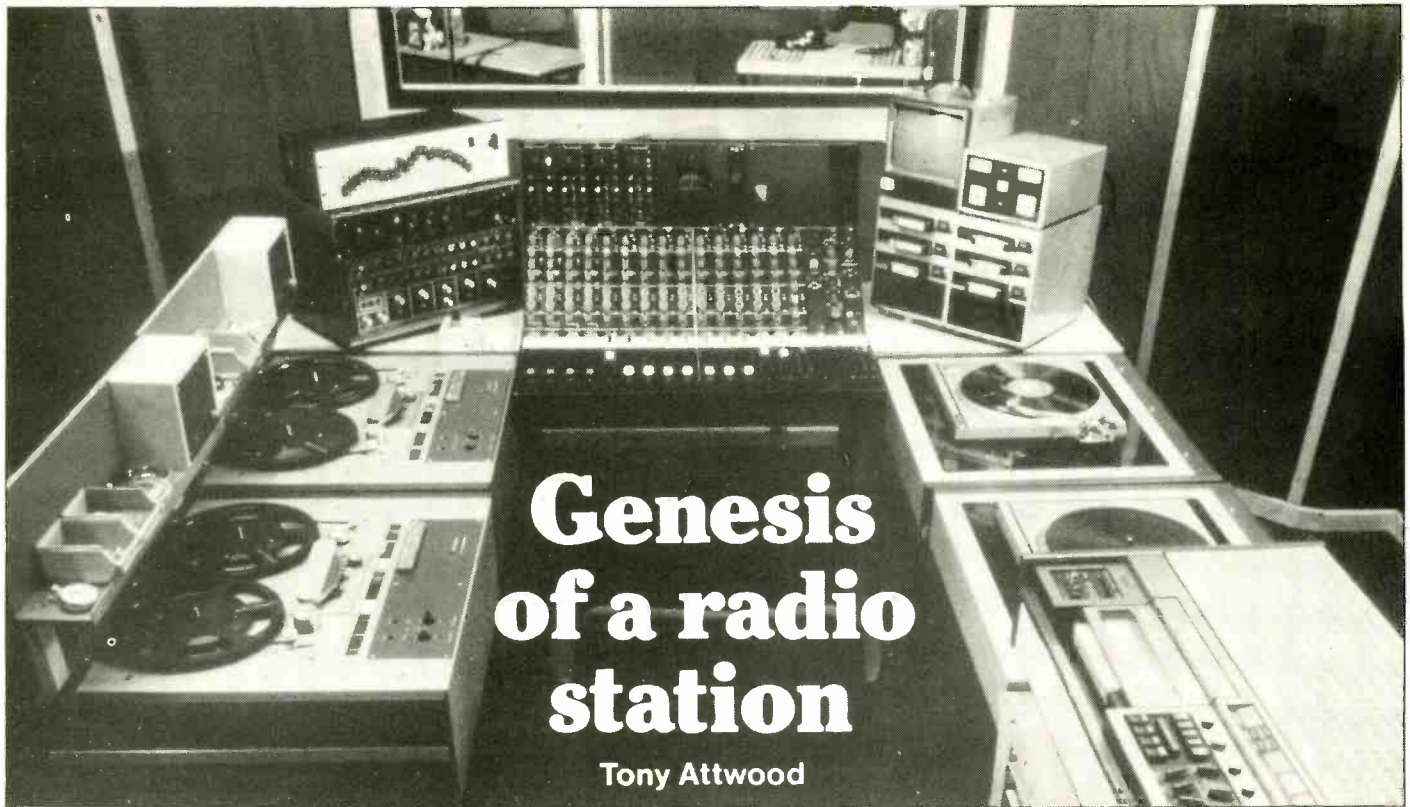
5. THE AUDIO KINETICS AUTOLOCATION PROGRAMS
6. A TAPE TRANSPORT REMOTE ASSIGNABLE TO MASTER OR SLAVE
7. AUTO RECORD DROP IN AND OUT MEMORIES
8. USER DEFINABLE PRE-ROLL
9. USER DEFINABLE INSTANT REPLAY

WOULDN'T IT BE INCREDIBLE IF WE INCLUDED:

10. TACH ONLY READ IN HIGH SPEED WIND ELIMINATING TAPE TO HEAD CONTACT AND THE NEED FOR EXPENSIVE WIDE BAND AMPLIFIERS
11. LEARNING LOCATION PROGRAMS WITH CYCLE ROUTINES ASSIGNABLE BETWEEN ANY 2 OF THE 10 LOCATE MEMORIES
12. RECORD DROP IN VISUAL AND AUDIBLE REHEARSAL

YOU'VE GUESSED, QLOCK 210 HAS IT ALL. TOGETHER!

SOLE UK DISTRIBUTORS, 3M UK LTD., P.O. BOX 1, BRACKNELL BERKS; TEL: 0344-58445
AUDIO KINETICS UK LTD., KINETIC HOUSE, VERULAM RD., ST ALBANS, HERTS. TEL: 0727 32191 TELEX 299951



Genesis of a radio station

Tony Attwood

One of six radio production studios at Molinare in London

IN setting up a new radio station there are generally two stages to the planning. The first involves the proposals put by the would-be operators to governmental or quasi-governmental bodies in order to apply for a licence to broadcast. (In countries where this operation is not required it is often replaced by a stage in which would-be operators put forward their plans to organisations that might be persuaded to lend them some money.) The second stage involves the preparation for the actual building of the station after the licence and finance seeking operations are completed.

There is a world of difference between these two stages. One that is often immediately obvious, is that at the time of stage one, it is rare for a building to have been leased or purchased in which the station can be housed. This means that plans for stage one tend to have a slightly idealised character about them. The directors of the new station will probably have simply said to the consultant engineer, 'Design us the studios'. The engineer is expected to know the legal requirements and that's about it.

The great advantage of the separation of stages one and two, is that by the time stage two comes along everyone who put forward idealised plans in stage one has had a chance to see what everyone else had in mind. Slowly the truth begins to dawn: it isn't just one station but half a dozen that the company has promised to build

There are currently several countries in the world where new radio stations are being regularly opened, and this article looks at the overall problems facing the chief engineer before the station goes on air.

and operate.

For the engineer then there are two enormous changes that will take place at stage two. Not only is it unlikely that the building will actually be suitable to house his original designs, it is also unlikely that his plans will be ready to accommodate all the demands made by other interested parties.

The most obvious of all the other interested parties is clearly the programme controller. He may want a style of programming that does make very specific demands upon the studios which may determine what items of equipment are immediately required. Less obvious, but just as interested will be the advertising team who may have spotted the need for production space over and above that normally required by local stations, perhaps because of the unexpectedly high proportion of local advertisers showing an interest in the station.

Even less expected may be a visit from the chairman of the board of directors (who also happens to be on the board of a local soccer club) and who unexpectedly lets it be known that he does feel that the balance of the soccer programming isn't quite right, and that a somewhat greater amount of outside broadcasting wouldn't go amiss.

And so it can go on. The problem for the engineers is that when people do start dropping in week after week with their special requirements (or worse still when, a week after broadcasting has commenced, someone wants to know why he can't take phone calls directly in Studio Three during his show) it is difficult to know where the demands will stop. As soon as one problem is sorted out another one seems to crop up.

It is this difficulty which is the key to the role of the engineer in creating a new radio station, and it is this problem that reveals exactly why his job is much more than a case of choosing turntables. For it is the engineer's job to make sense of a set of unrelated demands from a variety of sources in such a way that the station actually works, and pleases most of the people most of the time.

Speaking to some of the engineers who have recently gone through these two stages of setting up a station reveals just how difficult it can be, and how, although they did manage to cope with the situation, they were not as fully prepared for the battleground as they might have been.

Fig 1 is an attempt at showing just how various the sources of influence upon the engineer are.

A large proportion of the problem stems from the fact that although all the agencies and individuals may be expected to communicate with the engineer they don't also talk to each other. This leaves the engineer desperately trying to hedge his bets as those around him fail to understand why this is necessary.

To give a specific example of how problems can arise consider the following situation: the owners of a station have an argument with the programme controller over which programmes should be broadcast (with the argument flowing back and forth about profitability and what the people really want). It may not seem at first sight to be much to worry the chief engineer, but if the owners win the battle and the programme controller is sacked, new demands may be made for a type of programming which the engineer had never foreseen and for which the equipment available is hardly suited.

Fig 2 offers one possible solution through listing the possible areas of conflict in terms of the events that might take place in relation to a station and the locations devised by the engineer in which the events can happen.

It is clear from this simple list that it's possible to make the inputs from fig 1 blend together. The government under pressure from trade unions may require a certain amount of live music to be broadcast, which will affect the production studio, which may also be

in demand as a place to put together adverts and as a drama/discussion studio. The programmers may not plan many phone-ins at first but public demand may well force a change of heart, and so on. And all the time the engineer must keep his thoughts on his budget, on the government, and on new developments in the state of the art.

These last two factors—budget and state of the art, often sit uneasily together. Few stations can afford either to buy the latest developments or to make mistakes by purchasing an early model which subsequently proves to be somewhat unreliable. Everyone is watching the integrated circuit scene at the moment—mostly in the hope that prices will come down and that the storage problems can be solved. But in terms of the basic equipment such as the grams unit and reel-to-reel recorder there seems to be not only a recognition of the general continuing improvement in the quality of the machinery available, but also a feeling that there is little in the way of radical developments which will make the new stations look totally different from everywhere else.

To see just what is changing and what is staying the same the implications of the events of fig 2 are explored below. At the time of writing only two of the recently enfranchised British ILR stations have started ordering equipment, these being Cardiff and Coventry. Of the other stations most are naturally waiting until their chief engineer is safely installed—something which can take an increasingly long time given the fact that there is a real shortage of qualified and experienced men to take on the job. My comments below thus relate to these two newcomers in comparison to those stations set up in the previous round of station building in the mid-Seventies.

Event 1: The phone-in

Phone-in equipment in the UK is manufactured solely by the PO and then modified by the stations. The only alternative is for the stations to design and develop their own. This is of course a very different system from that in the States where the radio company can state what it wants and the telephone company answers the demand. However the PO has recently responded to some British demands by producing certain modifications to its Telespot system (mostly in the form of new cards which can be inserted without total redesigning of the system) which will at last move it away from being the BBC's ideal requirement and making it more ideal for ILR.

Alice telephone balance units

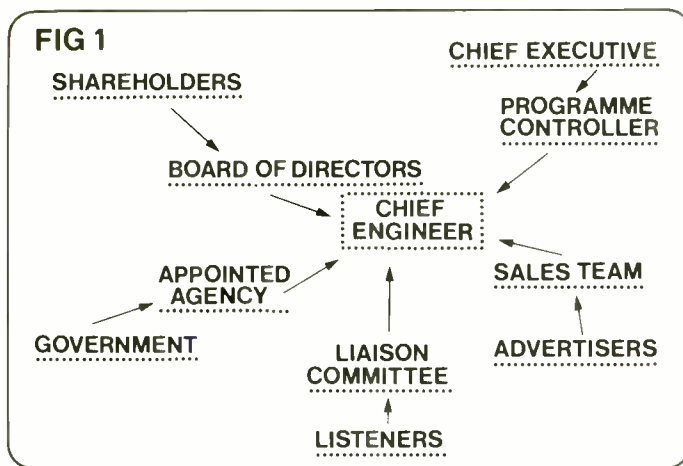


FIG 2

Events	Locations
Phone in	Presentation studio
DJ style presentation	Presentation studio
Adverts	Presentation studio/production area
News	Newsroom/newsbooth
Outside broadcasts	OB wagon/reporters car
Large scale programme production	Production studio
Small scale production and preparation	Preparation studio
Monitoring	Central monitoring area

dominate in the racks room and Cardiff has the *TBU2* unit and Coventry opted for the automatic *TBU3*.

For the studio designer the main question must be whether the presenters are going to want to take calls direct or whether everything should go via a producer who holds the calls, and has the possibility of checking up on the subject matter that the caller wishes to raise, before he or she goes on-air. In the former system the presenter needs the facility to put calls on-air, operate the censor's delay mechanism (which implies having a direct cut-out which automatically drops in a jingle), as well as play records and adverts.

If the phone-ins are to be a major part of the station output it makes sense of course to design one studio as a telephone orientated room, with the other on-air studio being designed for normal DJ/presenter work. Obviously some cross-purpose use will still need to be planned in case of breakdown

or radical change in programming schedule, and this can increase the costs of building the studios, although there are still bound to be some savings in not having to duplicate everything.

One last point of concern for phone-in freaks. In rural areas some callers may be far enough away from their local station to mean that their phone-in is going to be a long distance call. For a station seeking to serve its whole population this is highly undesirable, and will need to be overcome by the setting up of a phone call receiving station in the outlying district from which calls can be run by landline to the main station. DevonAir, the Exeter/Torbay twinned station is one station that has been forced into making this kind of arrangement.

Event 2: Self-op presentation

Both Cardiff and Coventry have again gone to Alice for the consoles each ordering two custom-built Broadcast Custom Modular con-

soles, each also housing some ancillary equipment. Coventry have also ordered custom designed floor-standing wooden consoles housing jackfields.

For the instant start turntables Technics *SP10 Mk2* direct-drive machines remain as popular as ever, and it seems likely that virtually every local station in Britain will be standardised here, despite the difficulties highlighted by John Lumsden of Radio Clyde related to the operation of these machines by faders (see *Studio Sound*, May 1979).

Also standardised are cartridge machines: everyone currently goes for ITC—although see under Event 3 below for further comment.

However one thing is not standardised—human behaviour. Although most of the new stations in Britain will be able to draw on experienced personnel to operate their studios and go on-air, there are bound to be some (such as Cardiff) who will, as a matter of policy, choose local people for the presentation work, even if they have no experience. This is the sort of dilemma which faced Plymouth Sound, one of the country's smallest stations some five years ago: the people it wanted on-air simply didn't have the background in operating the equipment.

Plymouth's senior engineer then, as now, was Tim Mason, who solved the problem by getting rid of the jackfield cue-light system, equalisers for all stereo channels, echo send and foldback, simply to cut down on the number of errors that presenters could make. And with just faders and preset gain controls left, there seems to be little that could possibly go wrong.

Event 3: Adverts

As already stated, ITC triple stacks rule the day with ideally two stacks per studio. Other machines are now available with programmable facility allowing the user to dial on a keyboard a combination of commercials which then fire automatically but some engineers are suggesting privately that the reliability of the machines is still in doubt.

The facility also exists on ITC stacks for two stacks to be fired from one button (which is handy for twinned or satellite stations) allowing them to split transmission for advertising and then return on cue for the main programme).

Event 4: News

When the newsgatherer is in the radio station, he wants everything in front of him: tape machine, carts, phone, typewriter and ash-tray. The variations in the equipment that the newsgatherer sees from one station to another will depend mainly on the demands of the head of news broadcasting: if

Plymouth Sound newsroom with everything set out so the news gatherer doesn't have to move



Genesis of a radio station

for example he doesn't want to record phone interviews and hold both sides of the conversation there will be no need for 2-way facility on the phones (which is the sort of savings chief executives like to see).

In the news booth normal requirements are two mics, a radio link and a cartridge machine—generally in mono unless the company is fanatical about stereo and wants to separate both sides of an interview. For microphones here as everywhere else there is a wide choice: the Sennheiser *MD441* is liked for close-up work, the Beyer *M201* has a reputation in studios for robustness in general purpose use, whilst the AKG *D202* is well liked but is prone to damage in moves, according to some sources. Beyond these general comments the choice of mics for the newsroom and main studios seems as much a matter of personal choice as anything.

Event 5: Outside broadcast

Virtually everyone about to open a new station in the UK puts an OB wagon as the first priority "after we've started earning some cash". Before it comes along OB work is covered by telephone calls, a landline or two to the AA and the police, and dedicated men and women in cars with damaged front wings and a Uher slung over the shoulder. For the local radio reporter there is still no viable alternative to the Uher—the only choice is the model—and most very sensibly go for the 4-speed mono 4000 *Report IC*.

However when the chance of a wagon does come along the main questions must be, how many outside sources is the station going to need, and what sort of programmes are going to be covered by the wagon. As a money saver the abolition of outside broadcasts of music is a common move. This reduces the need for high quality but does imply the need for talk-back facility and cueing to accommodate short inserts.

The next method of money saving in this field is to make the outside work dependent only on the presenter and an engineer. After the latter has set everything up he can leave the presenter to it, get in a taxi and report back to the station. (Tim Mason tells the story incidentally of how he drove the OB wagon to a sports venue, set up the gear, returned to the studio to set up things that end, went back to the wagon once more, and then did an interview himself.)

There is a growing feeling among some community groups that stations with OB facility should use

them as mobile studios, going to a village say, for two or three days, and working with local people making programmes and programme inserts. For this sort of work Uhers, a Revox or two and a simple mixer such as the Alice *STM6* are all that is needed.

Until recently the actual radio link in Britain has for most stations been around 467MHz, but that band is now full. What is more the channels in the 467MHz band are not wide enough to take stereo links. This has resulted in new allocations being made in the 1.5GHz band, despite the fact that there is a dearth of equipment on the market capable of working at this frequency—and manufacturers have been naturally reluctant to commit themselves ahead of the current Geneva WARC conference which could institute further changes.

Landlines are laid by the PO in stereo providing up to 15kHz bandwidth. Recent rumours of delay here have now been shown to be false and some of the new stations will be on-air much sooner than they had anticipated. DevonAir for one has had its on-air date advanced from spring 1981 to November 1980.

Event 6: Production

Most stations now opt for some sort of commercial production studio for the recording of local rock bands, the making of very rapid adverts from local sources, the making of discussion programmes and the development of some access programmes. In this area 4-track Teacs, and the 8-track Otari *MK7800* have both found favour. Cardiff have made no decision on equipment for this area as yet but Coventry's chief engineer Ian Pattman is reported to be discussing his requirement for mixers both for the production studio and the OB wagon, with Alice's John Andrews and Mike Bennett. The equipment under discussion includes customised versions of the Alice 16-48 multitrack music recording mixer and the new Alice *STM8*.

Clearly Coventry are now look-

ing beyond the small scale approach of some stations in which quick jingles for local advertisers can be made by a combo of technicians, presenters and reporters all of whom have done a bit of semi-pro music making in the past. This more adventurous use of a production studio does allow the station to not only make its own programmes and jingles, but also consider making them for other smaller outfits. What is more, the studio can also be hired out to local groups and even small scale record companies, when broadcasting is not likely to be interrupted. Also growing is the demand for audio studios to do voice over work for videos, and small scale jingle work for local disco operators.

Event 7: Preparation

At the heart of preparation are tape machines. Midland Community Radio Ltd (the Coventry station) have already made their intentions clear here, buying five Studer *B67* stereo tape decks. Elsewhere, is the suggestion that Revox is losing some of its old hold on the market to the more robust Telefunken *M12* which is considered to be easier to maintain, and to have a simpler tape path. (However I must admit to having witnessed Revox's getting the harshest of all possible treatment from schoolkids, and still standing up to it.) Another main contender is the Leavers Rich *Proline* which is already installed in Clyde in Glasgow, LBC in London, Trent in Nottingham and Swansea Sound in South Wales.

Event 8: Monitoring

By and large there is agreement here on what equipment to use. The Spondor Monitor speakers have only ever had one real rival—KEFs—and few seem to think it worth putting the more bulky and more expensive KEF speakers into a monitoring area these days. Both Cardiff and Coventry have gone to Alice once again for the final output switcher (the control and interlock circuitry which allows for pre-designated handovers between on-air studios), and Coventry have also chosen Alice distribution amps.

Also in the monitoring room is the delay system. The tape loop mechanical delay is still being

used despite the arrival of both analogue and digital delay systems. Reliability is again a talking point and although generally digital systems are seen to be by far the best for straight delay, the mechanical tape system is still the most commonly found in British stations.

Conclusion: Flexibility and expansion

I have yet to find a radio station that, after four or five years, still has enough room for the work it is trying to do. Offices become shared, the car park gets full up, (because five parking bays are taken up by the OB wagon), the photocopy machine is put in a hallway, and the cable system doesn't have enough capacity.

It's hard to find an exact way around these problems. The building can only be so large, and not everyone is lucky enough to have a spare top floor in the studios for later development as DevonAir have achieved. But there are one or two simple rules. Put everything possible on a trolley, is the first point. (This, unfortunately, may help the would-be thief, so extra security might be in order in this system). Second, lay twice as much cable as you'll need, with a tag block at each end which can be allocated as the need arises. Third, try and arrange a use for equipment as it is upgraded. The Plymouth Sound OB mixing desk was originally in the production studio, for example. And lastly, think about the public. At some time or other they will turn up—maybe to do an interview, maybe to place an ad, maybe to look for a job, and maybe to write an article for *Studio Sound*. These people will probably come in cars, and will need to wait somewhere. They may need to be shown a studio or two—and they may even bring half a dozen kids from the local school round as part of their community education programme. The central question here is this: is the station going to be flexible enough to cope with this sort of movement during the day to day operation of the station? Anyone who has entered LBC's studios in Gough Square during the mid-morning rush will know what happens when a station simply does not have enough space. On the other hand at Plymouth Sound a visitor is liable to have the choice of 10 or more comfortable seats in reception whilst waiting to be attended to. Such experiences make you realise that even with all the best equipment on the market the development of a station can still go very wrong if no one looks at the total problem.

*Special thanks to Tim Mason of Plymouth Sound and John Andrews of Stancoil for their help in putting this article together. ■

Bill Black in Studio A at Radio Clyde





Substantially more than just a recording console, the Solid State Logic Master Studio System is the world's only thoroughly integrated control room command center. The scope of the system's features affords a degree of creative precision that is without rival; yet the "total controller" approach actually simplifies studio operations. Producers have commented that the SSL brings previously impossible accomplishments within reach, while handling procedures which were once both tedious and difficult almost effortlessly.

A unique tandem-function logic network provides simultaneous command and status indication of both console and multi-track electronics. The most sophisticated studio software yet developed brings valuable computer assistance to recording and overdubbing as well as mixing. Comprehensive in-line signal processors, coupled with innovative signal routing, provide virtually un-

limited control of your audio without patching!

Control panel layouts are both logical and legible, allowing the most complex session requirements to be handled with nearly instinctive ease. Readily accessible modular electronics simplify maintenance, as does the extensive "Tests" program of the SSL Studio Computer. To ensure impeccable performance and reliability, production-line construction standards have been raised to the level of meticulous craftsmanship.

We were not satisfied to build just another recording console. Our challenge was to create, for the true artists in our industry, a powerful, elegant instrument which would not limit their creative expression in any way. The strength of this commitment has shaped one of the most exceptional products of recording technology ever offered: The Solid State Logic E Series Master Studio System.

Solid State Logic

Master Studio Systems

UK and EUROPE
Solid State Logic
Stonesfield
Oxford, England
Colin Sanders
099 389 324
TLX 837400

THE AMERICAS
Washington Musicworks Inc.
3421 M Street N.W.
Washington, DC 20007
Doug Dickey
East Coast (202) 333-1500
West Coast (213) 464-8034
TLX 440519

PA or acoustic watts?

At the Harrogate Hi-Fi Festival in 1978, the organisers took the enterprising step of hiring a brass band to remind hi-fi buffs what real live music sounds like. Most of them, you will appreciate, have long since forgotten, even if they ever knew. The band concerts were a roaring success and the experiment was repeated at the exhibition a year later.

For Harrogate 1979, the organisers booked not a brass band, but a swing big band. The Syd Lawrence Orchestra and Singers were hired to play two free concerts and for an organisers party at night. Almost everyone who heard them voiced the same reservations. Although Lawrence fronts cracking brass and reed sections, the band was amplified through a Formula Sound PA system of bins and JBL horns. Eight mics were spread out front, and on the piano, while the bass player used his own amp. Why on earth use PA watts, when you've got all those lovely natural acoustic watts available, was the talking point of the trade press and public? A few people tackled Syd Lawrence himself and put the same question. Lawrence's answer was that the mics were intended only to give the soloist 'a little bit of lift'. A nice idea but not so. The whole band sound was consistently piped through the PA, due to spill-over into the 'solo' mics. With commendable honesty and under a little more pressure Lawrence subsequently admitted that he is 'puzzled' by the whole business of PA, was 'brought up' without it and would really rather not use it. The sad truth is that the public now expects a band, even a big swing band capable of producing 120dB peaks, live, to produce an electronic sound similar to that heard on records. Or at least that's the way bands like Syd Lawrence see the situation. How long before a band starts to sell itself on 'no-PA' publicity?

Ironically, the Berlin Funkausstellung, or more accurately Berlin's Tegel Airport at the time of that show, neatly proved just how redundant PA can be. As weary visitors to the giant electronics exhibition trekked out of the city through Tegel on the Sunday closing day, they were pleasantly shocked to find a

free jazz concert in progress smack, dab in the middle of the main arrivals lounge, fortuitously close to the bar. A 6-piece jazz trad band was happily heightening the spirits of exhausted travellers. There wasn't a mic in sight and even in the largest concourse the band sounded all the better for it. Can you, by the way, imagine what would happen if a jazz band were to start playing in the arrivals lounge at London's Heathrow or Gatwick on a Sunday lunchtime?

45 RPM LPs

Digital software may be coming, but it's certainly not here yet. However, due to considerable publicity for what it will offer in terms of quality, some sectors of the trade and public are getting impatient. Several enterprising record companies now have their own individual ways of bridging the quality gap between past analogue and future digital. Some (Soundstream and EMI) record digitally, using modified instrumentation recorders, then issue in conventional analogue disc format. Others (Nippon-Columbia, Decca and some of the smaller independents) use converted VTRs or production model U-Matics with PCM adaptors. Some masters are cut from tape at half speed, others in realtime and recordings are also direct-cut onto disc. A few companies press in Japan using the improved vinyl compounds originally developed for carrier multiplex quadraphonic discs. Others cut and press in Germany because quality control there is without parallel. The latest approach to upgrading analogue is to cut and press in 45rpm format, but with the full playing time of a 33 $\frac{1}{3}$ rpm LP. This technique is being pioneered deep in the heart of Wales by the small British record company Nimbus who are offering SAM, or Super Analogue Masters.

Nimbus, with a total staff of 20, is based in a beautiful country house on a Monmouth hillside overlooking the Wye river, not far from where Blumlein died in a wartime air crash. The company has been in business for two years now making somewhat esoteric solo and small group classical recordings. These are taped, in Ambisonic B-format,

using Ampex ATR100 4-track machines and a Calrec Soundfield microphone, at 30in/s with Dolby. Editing is minimal and the records are issued in UHJ 2-channel format. The recording studio is a large ballroom-cum-dining room which is sparsely furnished and has a very, very live acoustic. Predictably, Nimbus recordings are not to everyone's taste and as Nimbus do not take kindly to reviewers' criticism, an uneasy status-quo has arisen in the UK. In fact the catalogue is received and sells better on the Continent. Moreover, thanks to the somewhat retiring, one might say insular, attitude of the Nimbus team (technical directors Michael and Gerald Reynolds and musical director Numa Libin) Nimbus has not received public interest commensurate with the company's aims and achievements, especially in quality pressing. This is however changing with the help of some outside high pressure PR aid. I feel obliged to say however that, for my money at least, this aid would be of more long-term value to Nimbus if it were better informed (or silent) on technical matters and refrained from knocking others (such as Enigma) working in the same field of quality record production. Nimbus is in fact already well respected within informed quarters of the UK record industry and by some technical journalists with whom the company has built up an enviable reputation for custom cutting, plating and pressing. It would be a pity to sour this. Nimbus can produce around half a million discs a year and although contract costs are high (over 50p a disc for a short run) the quality and quality control are excellent. Customers include Rediffusion, Magnus and the BBC Transcription Unit. It was while custom pressing disco singles for a pop label looking for quality that Nimbus hit on the idea of SAM. They noted that the 45rpm 12in singles sounded very clean indeed. Why not, perhaps, cut their own 30in/s Dolby masters at 45rpm. Of course 45rpm transfer isn't new or unique. EMI is currently re-releasing a string of musical lollipops on 45rpm 12in discs. For £1.99 you get up to 15 minutes a side. But Nimbus wanted full LP length at 45rpm. This they have now achieved. Their ageing Neumann Variagroove has been modified to given an 8rpm update and after much trial and experiment Nimbus can now cram over half an hour a side on 12in discs at 45rpm. Although the musical material is fairly bass-light (piano, harpsichord etc) the level of cut is surprisingly high and there's no hint of pre-echo. Moreover limiting, equalisation and compression are all dirty taboo words in the Nimbus cutting room. It's all done by utilising the disc land as efficiently as possible and spending far longer on preparing for the cut than most major companies can possibly afford. Cutting engineers still cynical about 30 minutes per side at 45rpm should hold their tongues until they've heard recently issued Nimbus 2123 which offers a full 45rpm hour of Gilbert Rowland playing harpsichord sonatas by Padre Antonio Soler. As with other Nimbus records, the sound

Nimbus Cutting Room



THE ULTIMATE DIGITAL SYSTEM AVAILABLE NOW FROM PRO AUDIO SEATTLE

may not be your particular cup of tea but on the strength of an A/B comparison I can confirm that what comes off their 45rpm pressing compares accurately with what is on their 30in/s master tape.

Metafine tape

3M in the USA recently despatched an emissary to the UK. His mission was to pour some oil on troubled waters. It was in June 1978 that 3M announced the new and wonderful but still wholly unobtainable recording material, Metafine pure metal tape. Although the original announcement was made in New York there were follow ups all round the world and according to 3M there have been 40 million pages of editorial comment on metal tape published since then. There are now approaching a hundred different cassette recorders with circuitry and heads capable of handling the high coercivity tape and already half the tape recorders exported from Japan are metal capable. So you can read about metal tape, talk about it, and buy recorders designed for it, but up until now you haven't been able to *buy* any of it. Just recently 70 UK retail dealers have been getting around 50 Metafine cassettes a month and by the end of 1980 they should be in reasonable supply. Then, and only then, will any thoughts be spared for open reels of $\frac{1}{2}$ in metal tape. So studio engineers must be patient for at least a year yet. The 3M spokesman quoted all in manner of facts, figures, estimates and guesstimates. He also claimed that although production yield was 'not yet up to expectations, the USA plant had not run into any special production difficulties'. This raised an eyebrow or two because Philips has already been remarkably honest over production difficulties and in mid-1979 withdrew at least temporarily from the metal tape market, putting the whole project back to R and D status. Other firms such as BASF and Memorex have simply hung fire all along. 3M maintain that the Metafine shortage is due entirely to 'under-estimated demand'. But this claim also raised a few eyebrows because when 3M launched Metafine in June 1978 the company had already made samples available to 100 audio and video equipment manufacturers and publicly pronounced their reaction to the tape 'uniformly positive'. What's more the 3M spokesman flatly refused to offer the one really *vital* statistic, namely how much Metafine has 3M actually yet produced.

Studio engineers will, however, be most interested in the 'unequivocal guarantee' given to the UK press by 3M's International Marketing Manager Bob Burnett at around noon on October 16, 1979. Burnett's guarantee, given without any reservations, is that 3M metal tape will be stable in the long term. In other words, according to Burnett, it will be safe to make and store master recordings on pure metal tape, without fear of the pure metal tape coating turning to non-magnetic rust.

NB—That's 3M's guarantee, not ours. ■



Why wait for the ultimate? Pro Audio Seattle is the West Coast Headquarters for the Lexicon 224 Digital Reverberator and the Lexicon Primetime digital delay. The combination offers time domain effects and natural reverberation not possible before. Consider this:

The Lexicon Model 224 is the industry's first reverb with built-in control memory to provide instant push button recall of previous settings including bass and mid decay times from .6 to 70 seconds and pre-delay up to 256 milliseconds. Programs available today include acoustic chamber, concert halls and plates that out perform the best mechanical plates made.

Now for the best part. Pro Audio Seattle can deliver your Lexicon digital system today. Cost for 224 Reverberator with 4 programs, plus Primetime digital delay and Anvil flight case is \$9,400 in U.S. funds. Washington State residents add 5.3% tax. Call or write Craig Ingle for direct sales both national and international.

11057 8th Avenue NE
Seattle, Washington 98125
(206) 367-6800

**PRO
AUDIO
SEATTLE**
Professional Audio
Equipment & Services

Expression through time delay.

Time delay has become increasingly important to musicians and engineers as a way to color musical sounds and create spatial illusions. MXR's Flanger/Doubler and Digital Delay have proven to be effective tools for the musically creative professional who requires a wide range of performance possibilities from a precise and cost effective time delay unit.

Both the MXR Flanger/Doubler and Digital Delay offer a flexible system of controls which provide ultimate freedom for creative expression. They feature frequency sweep and width controls, a mix control (between the dry and the delayed signals), a regeneration control for additional intensity and multiple repeats on doubling and echoes, and a delay bypass jack which enables the user to employ a footswitch to bypass the unit entirely for instantaneous cut-offs of time delay effects. Both units represent an expandable system, and can be easily ganged together or interfaced with other instruments and recording gear.

The MXR Flanger/Doubler provides a manual control over delay time, and rear panel connections offering full remote delay time adjustments and a VCA output suitable for stereo ganging of two units. The MXR Flanger/Doubler can switch easily between flanging and doubling modes, and two LED indicators are provided for easy visual monitoring of sweep speed and range.

The Flanger/Doubler is capable of producing infinite varieties of flanging, hard reverberation, vibrato, and numerous doubling effects including subtle chorus sounds. It offers a time delay range of .25 to 5 milliseconds in the flanging mode and 17.5 to 70 milliseconds in the doubling mode.

The MXR Digital Delay offers a continuous range of delay times from .08 to 320 milliseconds. This range of delay times is expandable with three optional memory cards, in 320 millisecond increments to 1280 milliseconds, with full bandwidth (20Hz to 20kHz) capability to 160 milliseconds. The Digital Delay features push button controls for varying delay ranges. A level control regulates the input signal to prevent overloading of the unit's circuitry, and LEDs monitor the input level and indicate whether the effect is in or out.

At fixed delay times the Digital Delay is perfectly suited for "traditional" delay applications such as "slap echo," discrete echoes, and synchronization of speakers in PA applications. By adjusting sweep frequency, mix, regeneration, and level controls, the Digital Delay offers additional effects which include doubling flanging, pitch alteration (vibrato, pitch bending), frequency modulating, and infinite (non-deteriorating) repeat hold.

The MXR Flanger/Doubler and Digital Delay are designed for use in the studio and on stage, with line or instrument levels. They're reliable, delivering a clean signal consistently, with a dynamic range exceeding 80 dB. And as with all MXR Pro Group products, optional road cases are available. For the serious artist, the MXR Flanger/Doubler and Digital Delay are the versatile tools which provide the key that will unlock his creative musical imagination.

MXR Professional Products Group



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**



Commercial radio, American style

Part One

Brendan Hurley

While British commercial radio is only six years old, across the Atlantic radio is coming up to its sixtieth anniversary. In the first of two articles, Brendan Hurley looks at the numerous rules and regulations governing commercial radio, and at new regulations such as AM stereo. Part Two next month looks more closely at the industry and stations.

Background history

TO 'BROADCAST', in its original sense, referred to a method of sowing seeds over a wide area. If you were to make an analogy between this and broadcasting today, you could truly say that in the USA the seeds have taken root and germinated into a variety of plants and hardly a patch has been missed—a sowing job well done.

This year there are 4,551 commercial AM stations, 3,151 commercial FM stations and 1,037 non-commercial FM stations, a total of 8,739 in operation. Between them in 1978 a turnover of \$2.5 billion was achieved representing profits of \$246 million. Thirty-second commercial spots can cost as much as \$500 in the major markets and as little as \$2 in small town radio. All of this to serve America's 500 million radios.

Officially, commercial broadcasting began on September 15, 1921, when the Department of Commerce (which then supervised radio) issued the first regular broadcasting licence to WBZ in Springfield, Mass. Of course, stations had been on the air before then, many of them originating from earlier experimental operations. Regulations at the time of original licensing allotted just two frequencies to stations, 750kHz and 833kHz and, also, stipulated minimum power to be 500W and maximum power to be 1kW.

Radio stations started appearing

at an alarming rate and to accommodate them the Dept of Commerce had to assign new frequencies. The demand for an increase in transmission power was also being loudly voiced. In 1926, the Dept authorised use of frequencies between 550kHz and 833kHz, and raised the power ceiling to 5kW.

Even at this early stage the network idea was beginning to gel. In late 1922, two New York stations broadcast the 'World

Series Baseball' using telephone lines. By 1923 six stations in Pittsburgh, Boston, Chicago and New York all simultaneously carried President Coolidge's message to Congress. Three years later NBC started the first regular network with 24 stations from coast to coast and CBS quickly followed suit with its network.

Meanwhile, chaos prevailed on the airwaves—the result of a court case which ruled that the Secretary of Commerce had no right to limit a station's power or air time. Broadcasters changed their frequencies and powers to suit themselves and cared little for the effects on others. Clearly regulation had to begin and thus Congress passed a bill in 1924 granting the necessary powers to a 5-member Federal Radio Commission. They were to

allocate frequencies and specify power outputs. The Secretary was granted the power to license stations and operators, to inspect facilities and examine operators and to assign radio call signs. There were now 680 stations on the air. After more courtroom capers the present regulatory body, The Federal Communication Commission (FCC), was formed in 1934 and it was to have all the controls needed to protect the airwaves and regulate those using them for broadcasting.

The first big task the FCC had to deal with was the implementation of FM. In the late Thirties Edwin H Armstrong had done most of the development work so the FCC authorised increased experimentation. Then on October 31, 1940, they granted 'construction



permits' to 15 prospective licences. There were to be a total of 40 channels—with five limited to non-commercial educational stations—on the band of 42 to 50MHz. (Note the FCC later shifted this band upwards to 88 to 108MHz because of skywave interference and to increase the number of available channels to 100.) By the time World War II arrived there were 40 FM stations serving only 400,000 receivers capable of picking up FM.

Transmission regulations — AM

The AM broadcast band used in the USA stretches from 535kHz to 1605kHz. There are 107 carrier frequencies which the FCC assigns to different stations depending on their classification. These begin at 540kHz and are in 10kHz steps up to 1600kHz. The maximum power allowed by the FCC for AM transmission is 50kW. However, station classification may limit (i) the air time allowed to a station, (ii) the maximum and minimum power, (iii) night time power and signal direction. Basically stations fall into four major classes . . .

Class I

A Class I station can operate up to the maximum power rating (50kW) and cannot operate below 10kW. The function of these stations is to serve large centres of population as well as remote rural areas. Their transmissions are carefully protected by the FCC to minimise any interference. At night time, when skywave or secondary reception can be received, it isn't unusual to be able to pick up one of these stations from as far away as 500 miles. The frequencies they broadcast on are known as 'clear channels'. By international agreement the USA has priority to broadcast Class I services on 45 such channels with a maximum of two stations on each. Geographical locations of Class I stations are sometimes determined by the FCC, eg: proximity to Mexican and Canadian borders can be a limiting factor.

Class II

These stations are limited to using 29 specified clear channels. They can also use a transmission power of up to 50kW, but, they are compelled to protect services from Class I stations. For this reason some Class II stations have to use a directional antenna or cut back power at night time or even confine themselves to day time operation. The minimum output power is set at 250W. The function of these stations is to serve a population centre and an adjacent rural area.

Class III

Such stations operate on 'regional' channels. Several stations may

operate on a regional channel, but their power ceiling is set at 5kW. The ground-wave signal from such a station may be confined to a certain field intensity contour as a result of interference. (As is the case for Class II stations, they may be obliged to switch antenna equipment into a directional mode at night time.) For transmission power regulations, Class III stations are split into two categories: Class III-A is allowed a maximum of 5kW with a mandatory minimum of 1kW. Class III-B is limited to a maximum of 1kW at night time, 5kW of power during the day and a mandatory minimum of 0.5kW at all times. This type of station is generally used to provide a service to a large city suburb and the rural area surrounding it or to a smaller city.

Class IV

Class IV stations operate on 'local' channels, which they share with other similar stations. They are not permitted to use any more than 250W power at night time or to exceed 1kW power during the day. The minimum day time power is 250W. This type of station is often found on college campuses and in small towns.

Transmission regulations — FM

As already stated the FM broadcast band lies between 88MHz and 108MHz. This provides for 100 channels of 200kHz each. There are 20 channels between 88 and 92MHz reserved for non-commercial educational uses.

Due to the fact that FM broadcasts are considerably less vulnerable to overlapping and do not have ionosphere reflectivity characteristics, the regulation of them is much easier than their AM counterparts. However, limits are placed on antenna heights—ie heights of over average terrain—for certain power ratings. Minimum and maximum powers are also specified and certain channels are assigned to the different class stations. The USA has been divided into three

FIG 1 FM transmitter separation restrictions

	Class A Stations			
	co-channel	200kHz	400kHz	600kHz
Class A	65 miles	40 miles	15 miles	15 miles
Class B	—	—	—	—
Class C	—	—	—	—
	Class B Stations			
	co-channel	200kHz	400kHz	600kHz
Class A	—	65 miles	40 miles	40 miles
Class B	150 miles	150 miles	40 miles	40 miles
Class C	—	—	—	—
	Class C Stations			
	co-channel	200kHz	400kHz	600kHz
Class A	—	105 miles	65 miles	65 miles
Class B	170 miles	135 miles	65 miles	65 miles
Class C	180 miles	150 miles	65 miles	65 miles

zones for FM outlets . . . Zone I encompasses the 18 North Eastern states, including District of Columbia. Zone I-A refers to Southern California. Zone II takes in the remainder of the country. The reason for this zoning, as you'll see later, was to keep the most powerful Class C station out of the more densely populated area.

Class A

These are the least powerful stations of the three classes and can operate in all zones. The maximum effective radiated power they are allowed is 3kW or 4.8dBk, the minimum is 100W or -10dBk. The maximum antenna height that can be used before regulations demand a cut back in power is 300ft above average terrain. No minimum height is specified. A Class A station has to be at least 65 miles away from another Class A station broadcasting on the same channel (see fig 1). Using maximum power and maximum antenna height, one of these stations can effectively service the areas within 12 miles or so of the transmitter.

Class B

The facilities permitted are a maximum power output of 50kW or 17dBk and they are only allowed to operate in Zones I and I-A. Minimum operational power is 5kW or 7dBk. Maximum antenna height above average terrain is 500ft. With an effective signal in a 30-mile area around the antenna (using maximum power) this type of service is common in large urbanised communities where several cities can be served. The nearest co-channel service has to be at least 150 miles away.

Class C

These stations are the most powerful FM's and can use a maximum power of 100kW or 20dBk with an antenna height of 2,000ft over average terrain. They are not permitted to operate with an effective power of less than 25kW or 14dBk. Zone II is the only area in which they will be licensed because their

primary purpose is to serve a large area encompassing several cities, urban and rural areas. Good reception can be achieved up to 60 miles from the transmitter if maximum power is used.

The FCC also has restrictions resulting from international agreements with Canada, Mexico, Bahamas, etc which stations have to adhere to; in some cases antenna heights may also come under Federal Aviation Authority Scrutiny.

Transmitter operator licences

In addition to licencing broadcast stations (transmitters), the FCC also license operators. Different types of licences are issued—first, second and third class. To obtain one of these licences, you have to study a prescribed course and take an examination. The first class licence is the most difficult to obtain. Chief engineers, which each station has to employ, must possess a first class licence. It is compulsory for a station to have a licensed operator at the transmitter facility at all broadcast times. The duties of this operator include monitoring essential transmitter data and making the necessary adjustments to keep transmission within the limits stipulated in the station's licence. In the case of a station which has to switch into a directional mode at night time or change its power, a licensed operator will have to perform the switching. The holder of a second or third class licence, however, is only allowed to make adjustments of external controls and would not be allowed to manually tune the transmitter's final amplifier or the antenna phaser equipment. In some cases a station's specified operational parameters may be so critical that only the holder of a first class licence will be allowed to operate the transmitter.

If a station (using a directional antenna system) is required by the FCC to keep the ratio of the currents in the elements of the transmission system, within a tolerance of less than 5%, or if the relative phases of the currents have to be kept at better than a 3% tolerance, that station will have to have a first class licence holder in control of the transmitter at all times.

In smaller stations the DJ employed will usually be a third class licence holder. Thus he can operate the transmitter and take the instrument readings for the station log.

Transmitter reading

Certain requirements are made of stations by the FCC with regard

Commercial radio, American style

to record keeping of transmitter data. A log showing anode voltage and current, as well as antenna current, has to be entered once every three hours. These readings can be taken by a third class licence holder. If a station is using a directional antenna configuration, readings of the common point current (before the phasing network) as well as the individual antenna currents and phasings (in degrees with ref to any one of the antennae) will also have to be taken. These records have to be inspected and verified by the station's chief engineer every day. It is also mandatory for him to calibrate all the metering equipment and measure actual antenna currents on a weekly basis.

When the FCC issues a licence to a station it specifies sites where field strengths have to be measured. The chief engineer has to take these measurements once a week. All of the stations' logs have to be available for FCC scrutiny and have to cover at least a 3-year period.

Getting a radio station off the ground (on-air) is a task that requires the licence seeker to do all his homework before approaching the FCC. First of all you have to be a US citizen and 'financially, legally and technically qualified'. If a licence for an AM facility is being sought, finding a frequency (hunting a Hertz) without problems of interference is up to the applicant. On the other hand, if an FM licence is being sought you have to request a frequency that has been assigned to the community where the broadcaster plans to locate. When the frequency issues have been carefully worked out, to meet FCC standards, you have to submit all the technical data to the Commission, along with a study of the needs of the community, showing that the proposed service will fulfil a previously unfulfilled demand. It is also necessary to prove that you are financially capable of running the service for at least a year.

The Broadcast Bureau, which is delegated the authority from the FCC, will then process the application. If it meets with their approval a construction permit will be issued. The prospective licensee will now have to have the facility ready within a 12-month period and if all the equipment performs as specified in the application, a licence will now be granted. (Note the FCC fee schedule was dropped in 1977. At that time the annual licence fee was 8.5 times the station's single most expensive 60s commercial. There were, also, varying fees for construction permits, satellite communications, etc.)

Up to now I have dealt with the more mundane aspects of transmission and legalities, all of which contribute, of course, to the everyday operation of a radio station. Now I can open the door into the programme origination sector and step into the area where signal-to-noise ratios are banded around with great gusto.

Studio equipment in everyday use varies immensely from the bigger top market stations to the small town stations. You can find mixing desks (boards), which probably have a high antique value, in everyday use in many stations. Old Gates equipment for the most part, with a knob count of one per channel. Who ever heard of equalisation? Great big bakelite knobs that have been cranked up and down for years are still in use—these old stud and wire wounds, never say die, they just fade away. Old Ampex 600 tape machines put beside new Revox's and Scully's and cart machines abound. Turntables can weigh-in at a hundred

ment. Most items here would be off the shelf. One of the bigger suppliers would be Spotmaster with cart machines and mixers. Turntables come from many different sources including Collins and Broadcast Electronics.

Equalisation and audio processing equipment is now very widespread. AM stations, in light of the obvious advantages FM stations have over them in terms of audio quality, have all been jumping over one another at any opportunity to beef up their quality. FCC regulations only require AM to have a signal-to-noise ratio of -45dB to the transmitter. The market place or the average person's ear, though, insists on better, and most stations achieve better than -55dB. The 'sound like FM' contest is still on though and equipment from many different sources is used to squash as much as possible into the band between 50Hz and 7.5kHz. The theory seems to be—people love a 'mellow' sound. Even the mandatory minimum distortion figures are well liked by most AM persons. The entire audio frequency distortion from input to studio output,

cart in a production studio and then when it goes to the air studio it again gets treated with another 'black box of goodies'. Finally, when it gets fed to the transmitter it gets its final dosage of clipping and limiting.

The scramble for audio processing equipment has created a big demand and many companies are trying to fulfil it. Among them are: Optimod, Orban/Parasound, Inovonics, Elcom and CBS Labs.

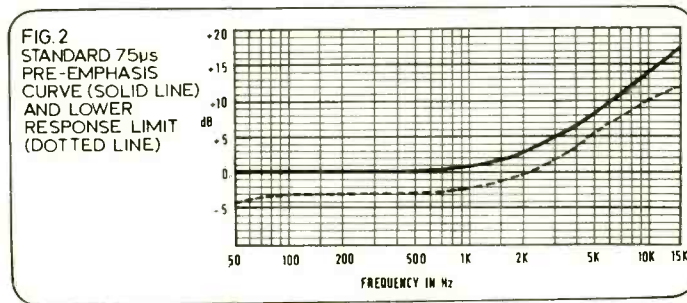
FM stations use audio processing to a slightly lesser extent. Some, of course, do suffer from similar ailments to the AM's but, generally, they are anxious to keep their useful bandwidth from 50Hz to 15kHz.

A number of stations use systems combining equalisation (generally parametric) and multi-ratio compression (some with individual peak limiters and expanders), as well as asymmetrical limiting. Usually allowing 125% positive peak modulation for AM users. The FM versions would generally have built-in pre-emphasis compensation.

The constant onslaught of digital electronics in the last few years has, also, heralded other 'tools' which processing buffs are enthusiastically lapping up. The relatively low cost of RAM's has made a new breed of digital delay line available which doesn't use a shift register (Swap-Dump) type delay. This type of baby is immensely versatile because, in the words of one engineer I interviewed: "It can hang on in there with the info for an age without making a... out of it". A virtually unlimited combination of echoes can be achieved.

Another one of the 'trick boxes' being talked about enthusiastically in the bars where engineers hang out and constantly better and batter each other, is a unit which makes sound appear louder with absolutely no increase in level. The AM guys get very excited about this one. The technique employed is complex. Delays of different magnitudes for different frequencies are introduced and this cons the ear into thinking the sound is louder—and believe me it works!

Many other effects units are available and you could very easily devote several thousand words to their uses, abuses and designs, but suffice to say that currently the American air-waves are full of all sorts of sounds that have been flanged positively, negatively, resonantly, etc and have been subjected to pitching this way and that and synthesised to the nth degree. Strangely, noise introduced into the audio chain, is not considered in a serious light. One of the engineers I spoke to told me a story I could well believe (not because he bought me a drink



pounds or more and may have 16in platters, and date back 30 years when RCA or Collins made them to last. However, I'll put antiques to one side, and look at more recent developments. The big market stations generally have their main mixing boards custom-built to suit their specific needs. There are many dozens of companies who will do this work. Among them you will find Ramco and Harris (formerly Gates) and CBS Labs and Ward Beck and many more. Their turntables will all be crystal controlled—most likely a Technics SP10 and their all too often used cart machines will be a Broadcast Electronics/Spotmaster product. Everything else is pretty international—microphones from AKG, Sennheiser, Beyer, Electro-Voice, Shure and so on. Tape machines from Studer, Ampex, Scully, Teac etc. Meanwhile back in the smaller stations, acoustic treatment even begins to disappear and expense frequently prohibits any attempt to install exotic equip-

ment. Most items here would be off the shelf. One of the bigger suppliers would be Spotmaster with cart machines and mixers. Turntables come from many different sources including Collins and Broadcast Electronics. Equalisation and audio processing equipment is now very widespread. AM stations, in light of the obvious advantages FM stations have over them in terms of audio quality, have all been jumping over one another at any opportunity to beef up their quality. FCC regulations only require AM to have a signal-to-noise ratio of -45dB to the transmitter. The market place or the average person's ear, though, insists on better, and most stations achieve better than -55dB. The 'sound like FM' contest is still on though and equipment from many different sources is used to squash as much as possible into the band between 50Hz and 7.5kHz. The theory seems to be—people love a 'mellow' sound. Even the mandatory minimum distortion figures are well liked by most AM persons. The entire audio frequency distortion from input to studio output,

antenna output, has to be less than 5% harmonics when modulated from 0 to 84% and less than 7.5% harmonics when modulating from 85% to 95%. The FCC specifies modulating frequencies of 50, 100, 400, 1,000, 5,000 and 7,500Hz up to tenth harmonic for this test. Frequency response figures too are not too difficult to adhere to. The laws require a maximum drift of no more than 2dB between 100Hz and 5kHz (ref 1k). All of these measurements are taken with the audio processing equipment being by-passed and common opinion is that some equipment in use deteriorates matters considerably. The state of the art in various forms of equalisers, limiters, compressors etc has surpassed the ability of the user to make the best use of the equipment. This is especially the case in the smaller stations. Some AM stations actually clip anything above 4.5k. Others will use a compressor/limiter when transferring a disc to

I am extremely interested in your
new Series 400 console.

Please send me the colour brochure
which gives full details.

Name

Address



SOUNDCRAFT
ELECTRONICS LIMITED

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

or
Soundcraft Inc., PO Box 2023
Kalamazoo, Michigan 49003, USA
Telephone: (616) 382 6300. Telex: 22-4408 Soundcraft KMZ



Commercial radio, American style

either). Apparently at a party another engineer from a competing FM station asked him how his FM station had such a clean sound and what brand of processing gear he was using. At that point, my engineering acquaintance went into all sorts of complex formulae and explanations. The real truth of the matter, however, was that the station was on such a tight budget that the management couldn't afford to buy any processing equipment.

FM audio standards

The FCC has a separate set of requirements for FM broadcasters. None of them present any great technical difficulties and you are allowed to bypass processing equipment in the audio chain.

The transmitter must be capable of transmitting a band of frequencies from 50Hz to 15kHz and must be able to operate up to the full designated power with a frequency swing of 75kHz, which is 100% modulation. The standard pre-emphasis time constant—in accordance with an inductance and resistance in series—is set at 75 μ s. The amount of leeway from the standard pre-emphasis curve that a system is allowed, is best explained graphically (see fig 2). The two lines on the graph represent the upper and the lower limits. As you can see the upper line has a uniform response throughout the band. The 'worst case' response, represented by the lower line, is a uniform 3dB below the upper limit from 100Hz up to 75kHz. From 100Hz down to 50Hz, however, it is allowed to fall off at a constant rate, to 4dB less than the upper limit. The deviation between 7.5kHz and 15kHz, of the lower limit is, also, at a uniform rate of 2dB per octave. Thus, at 15kHz it is a total of 5dB below the upper limit.

The total audio frequency harmonics in the output at any modulating frequency (50Hz to 15kHz) using 25, 50 and 100% modulation have to be confined to (i) 3.5% (rms) when using a modulating frequency between 50Hz and 100Hz; (ii) 2.5% when using a modulating frequency between 100Hz and 7.5kHz; and (iii) to 3% when using a modulating frequency between 7.5kHz and 15kHz.

These readings have to be taken using the pre-emphasis circuitry in the transmitter and de-emphasis circuitry in the metering equipment. Signal-to-noise ratio measurements have to be taken in the same way. The FM noise level using full modulation has to be at least -60dB using 400Hz as the reference

modulation. The AM output noise level in the transmission system has to be better than 50dB below full modulation.

The FCC also compel stations to have 'automatic means' to stay within 2kHz of their assigned centre frequency. Frequencies threatening to spill over the allowed bandwidth \pm 200kHz—have to be attenuated by at least 25dB, if removed from the carrier by up to 240kHz. If removed from the carrier by up to 600kHz, then 35dB attenuation has to be used and finally, if removed from the carrier by more than 600kHz, attenuation of 80dB is required.

FM stereo broadcasters have to adhere to the rules that govern their monaural buddies, but, they also have a few rules of their own. (Channel separation has to be a minimum of 30dB.)

The stereo system in use in the USA was proposed by the General Electric Co and the Zenith Corp in 1959. Much experimenting took place in early 1960, and the FCC eventually authorised the first stereo broadcast station on June 1, 1961.

AM stereo

The FCC has shown an interest in the possible implementation of AM stereo for a number of years. In July of 1977, they issued official enquiries and since then five systems have been proposed. In part two of this article the significance of AM stereo will be discussed. Here, however, I'll just take a technical look at the systems.

Harris. The Harris Corporation is the largest manufacturer of transmission equipment in the States. They exceed the combined sales of their two nearest competitors, RCA and Collins (A Rockwell International Co) and they are the only major broadcast equipment company to date to have proposed a stereo system.

Harris unveiled their system in October of 1977. Its official title is CPM or Compatible Phase Multiplex. Their system seems to be the most likely candidate for acceptance by the FCC according to most of the major broadcasting consultant companies so we will devote most of our words to it.

Of the five proposed systems—Motorola, Kahn, Belar, Magnavox and Harris—CPM is the only linear additive system. Basically, Harris' method involves the amplitude modulation of the two carrier signals with a phase separation of 30°. The left channel data modulates a carrier which is -15° with respect to the transmitted resultant and

the right channel data modulates a carrier which is $+15^\circ$. The linear combination of these two AM signals gives us a CPM signal.

Because it is a linear additive system, no extra bandwidth or spectral density is required to carry the signal and no pre-distortion of the signal is needed because present envelope detector circuitry would find it compatible. Thus, monaural service would be unaffected and 100%. Negative modulation with 125% positive modulation can be maintained. Also no interference with adjacent station channels will occur, because bandwidths won't need to be increased. All the other proposed systems, because they are non-linear, generate an infinite number of side band pairs and this would lead to splatter into adjacent channels and violation of FCC codes.

Stereo performance tests conducted by several independent bodies and consumer electronic companies seem to give CPM a clear lead over the other systems, especially with regard to skywave reception and distortion. Its modulation effectiveness, frequency response and channel separation figures are also better than other systems under most circumstances. Worst case separation would be 15dB with mid band audio at 35dB.

Implementation from a broadcaster's point of view should prove quite inexpensive. Harris surveys reveal that 90% of the AM transmitters now being used could be converted for CPM use. A stereo exciter, costing between \$3,000 and \$5,000, would have to be purchased and some minor modifications to the carrier generating circuitry would have to be made.

Stereo receivers would be built with synchronous detectors for decoding differing side bands without distortion, left and right matrix and bandpass filters. Thus the receiver would not involve any other complex circuitry and should be relatively inexpensive.

Here is a basic description of the other systems:

Belar. This system employs left plus right amplitude modulation of L-F frequency modulation with 1.25kHz deviation and pre-emphasis of 100 μ s.

Kahn. Pre-distortion is used to force the envelope to carry L&R in this independent side band system.

Magnavox. This is a multiplicative system using L&R amplitude modulation of L-R phase modulation with one radian deviation.

Motorola. Similar to the Harris system—in that it is a quadrature modulation system. However, pre-

distortion of the entire signal is used to force the envelope to carry left/right signals.

An FCC decision on AM stereo is imminent—but then it has been for two years now.

Other regulations

In this 'free enterprise' society the word 'monopoly' might as well have four letters. The FCC will not license any organisation to have any more than seven AM's and seven FM's. Neither is one organisation allowed to have any more than one AM and FM station in any particular market. Ownership of an AM and an FM station in the same market is actively discouraged. The FCC wants to encourage competition wherever it can. A rule introduced in 1977 prohibits an organisation who owns both an AM and an FM in the same market from duplicating any more than 50% of the programming. There are many more rules with regard to Network affiliations. For example, any actions that would imply that the Network station was in any way controlling their affiliate stations would be a violation of FCC codes. Therefore, affiliates have the right to reject any programming sent down the line by a network.

Generally, a 5kHz equalised telephone line is used for feeding stations with programming and also 'net-alert' systems. A black box responds to a signal sent down the line with a digital code to alert stations about up-coming features, eg: a 14-code represents a very special report and 15 would be a national emergency.

FM stations, either because of programme format (see part two) or limited audio quality (5kHz telephone line), tend to use network programming less than the AM's. New developments in satellite technology and also FCC regulations with regard to earth stations may allow quality programming to become available to FM's who can afford it.

The Emergency Broadcast System which was set up by the Federal Government to inform the public of pending disasters, etc has to be monitored by every station. One station in every area is appointed by the government to carry on-air emergency broadcasts. Other stations monitor it or get their alert through their Network. A broadcast station won't be licensed by the FCC unless it's capable of at least receiving emergency broadcasts.

Part two of the article will deal with the overall picture of American Broadcasting from a management and business point of view. ■



The whole truth.

Bipolar transistor power amplifiers are obsolete.

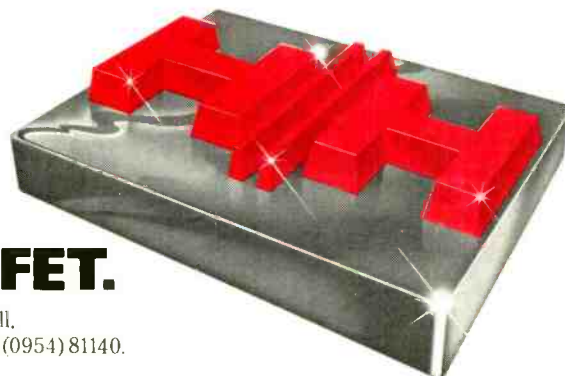
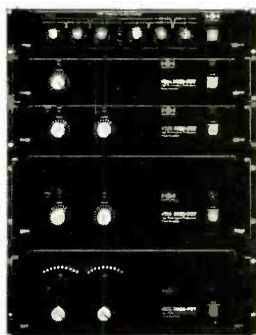
Now there's HH MOS-FET technology; with no thermal runaway, no secondary breakdown, simpler circuits, fewer components and superior high-end performance for better sound quality when reproducing fast transients.

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 X 300 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.

HH Electronic, Dept. A4, Viking Way, Bar Hill,
Cambridge CB3 8EL. Telephone: Crafts Hill (0954) 81140.
Telex: 817515 HH Elec G.

letters

Small is beautiful

Dear Sir, There has in recent months been much discussion about concert PA systems to which I would like to add my comments.

Instead of enormous powers needed to cover large outdoor concerts such as Knebworth and Blackbusch with their repeaters, and even Earls Court, would it not be possible to transmit low power VHF FM stereo in the very local area, then the audience could bring their own PA systems in the form of portable radios. If only 5% of the audience had a radio of about 3W quite adequate coverage could be maintained. All the problems of delay times and reverberation would be overcome as each set would only cover a very small area. It would also be possible to enjoy superb quality sound as loud as you like using headphones.

Yours faithfully, Martin Maynard, Audiogenic Ltd, 34-36 Crown Street, Reading, Berkshire RG1 2SN.

Tape recorder speed measurement

Dear Sir, Having tried in the past to measure tape speed to great accuracy I was interested in Arthur Garratt's article 'Tape Recorder Speed Measurement' in the August issue of Studio Sound.

In the article he quotes speed measurement of 0.105% fast for his Nagra and 0.84% fast for his Ferrograph so I should just like to show how difficult it is to measure the speed to the second decimal space, let alone the third.

Firstly let us look at the co-efficients of temperature expansion and humidity expansion for standard play tapes made from acetate and from untensilised polyester which is the commonest tape base material nowadays.

	Coefficient of humidity expansion	Temperature expansion
Polyester	1.1×10^{-5} per 1% RH	-1.5×10^{-5} per F
Acetate	12×10^{-5} per 1% RH	5×10^{-5} per F

From the above it can be seen that the acetate base film is exceedingly sensitive to humidity. If the relative humidity changes 50% the acetate base film expands 0.6% and the polyester base film 0.055%. If we look at temperature changes of say 30°F (16.7°C) the polyester base film is better this time again shrinking by 0.045% whilst the acetate base film expands 0.15%. Thus changes in temperature of 30 F or in relative humidity of 50% RH don't aid the second place of decimals, let alone the third, when trying to measure tape speed.

So far as the elastic properties are concerned there is little to choose between the two types of base film, both stretching about 0.07% at a tension of 70g.

All right, we can measure the tape length under tension and we can use an air conditioned room with constant temperature and humidity—but this is not the end of the problem.

Unfortunately in practical tape recorders the tape is moved by a rotating capstan which is frequently servo controlled with the intention of

maintaining precise tape speed. Normally the coated surface of the tape is in contact with the capstan, and ignoring tape slip, it is commonly assumed that the peripheral velocity of the capstan is equal to the tape speed—obvious isn't it? Of course this speed is the same as the tape speed over the recorder's heads? Obvious isn't it?

Well, let's take an exaggerated example of a tape passing over a capstan with a 90° wrap angle so that the tape in contact with the capstan has two different lengths L1 and L2 for the inner and outer radii. As a result the inner part of the tape is compressed and the outer part expanded such that the radial velocity of the capstan does not equal the straight line tape velocity as it passes the recorder's heads with a slight wrap angle.

Clearly the lengths L1 and L2 depend upon the radius of the inner and outer surfaces of the tape which in turn depend upon the overall thickness of the tape. Consequently (ignoring other factors) different thicknesses of tape will be transported at different speeds. In designing a recorder it is fair to assume that the actual tape speed may be determined by adding half the tape thickness to the capstan radius. With a large diameter capstan of 2.38in, the difference in actual tape speed between standard play and double play will then be 0.04% but with a small diameter capstan of say 0.25in diameter this difference becomes 0.4%.

That which at first appears simple is not always that simple.

Yours faithfully, Hugh Ford.

Tonmeisters

Dear Sir, Having read with enthusiasm the article by Tony Spath about the Tonmeister Degree Course at Surrey University, and translating it for the German magazine Studio, as a member of the Verband Deutscher Tonmeister I should like to strongly oppose the opinion that the aim of German Tonmeister education is that all recording is a one-man job. The education is such that there is an apt capability of doing the job on the faders as well as following the score and marking the edits. But at the session there are always two Tonmeister present. Responsibility for the recording is much too high for one pair of ears alone! But even so the areas of responsibility overlap in true teamwork.

In pop production the situation is such that the performers are able to control their deeds immediately after performance—a song lasting only from three to six minutes—and there's only a bunch o' them!

Yours faithfully, Christian Dreyer, Birkenredder 103, 2000 Hamburg 63, West Germany.

British plating

Dear Sir, I was concerned by your article on British Plating Problems by Adrian Hope in September Studio Sound. In fact Enigma have pressed records at three plants in this country and not two as you indicate.

At the time when they came to us they were in an early stage of development and attempting

to produce sometimes four or even five new releases every month. Needless to say, everything was hurried and not infrequently the labels would arrive on a Friday afternoon to go on records which were supposed to be in stock the following Monday.

Finally, I should like to set the record straight on one point—we washed our hands of Enigma and not the other way round.

Yours faithfully, N. M. Rose, Director, Sound Manufacturing (Hayes) Ltd, Temple Yard, 11A Temple End, High Wycombe, Bucks HP13 5DM.

Mike Oldfield at NEC

Dear Sir, I read with interest the article in August Studio Sound about the acoustic problems at the National Exhibition Centre in Birmingham. I was however, quite surprised to read the conclusions, which I must say were far more favourable than I had either anticipated or experienced. (Phil was the balance engineer at the concert, Ed.) On the recent Mike Oldfield European Tour, of the 23 concerts played the last, at the NEC, really must rate as the most acoustically difficult, both on and off stage. I was very dissatisfied with the sound which I achieved with the PA as the reverberation in that hall was really a mess. During rehearsals, the band were playing no louder than their usual level but due to the liveliness of the hall, it was almost impossible to hold a conversation between two people stood by the mixing desks in the hall—even with the PA turned off! This was principally because the drum beat could still be heard reverberating around the hall, a full 5s after the initial impact which produced a great blurr of sound which seemed to swamp everything.

Any attempt to control reverb with artificial devices hence became just as futile as attempting to gain any degree of definition and separation between instruments. The end result was an overall sound which was inferior even to some of the quite difficult European arenas in which we played. Not for one minute am I suggesting that the work already done on improvement of the acoustics was either ill conceived or could have been done significantly better by others. But bearing in mind the considerations under which the work was done, particularly its temporary nature, the hall was really a non-starter in terms of acoustic acceptability, and any attempt at justifying its present worth, really would seem to be trying to make a silk purse out of a sow's ear!

One final word however, on the whole tour, the NEC was probably the most financially rewarding and the loading access was excellent, so given the ever increasing cost of modern tours, without a few venues like this, there wouldn't be any large tours at all, so the NEC will doubtless continue in use on the circuits.

While we took one of the Manor Mobiles to record the concert for part of the Exposed album, after the problems with rehearsals, I called off the recording and sent the truck home—although most of the photographs on the album cover were taken at NEC.

Yours faithfully, Philip Newell, The Manor, Shipton-on-Cherwell, Oxford. ■

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

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

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



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

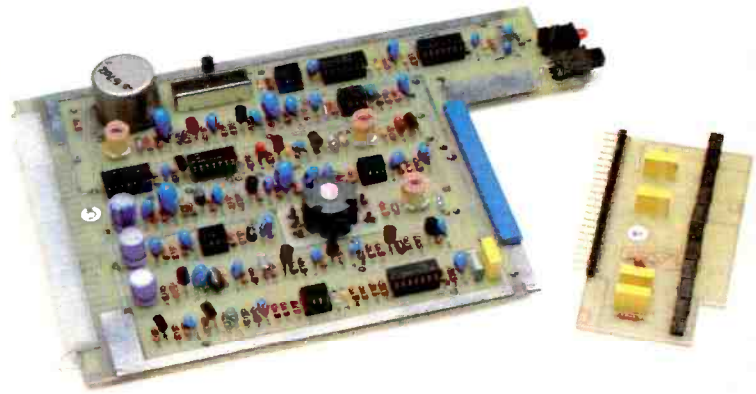
Full function remote with varispeed and digital tape counter.



itam

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

DBX and remote control are optional extras. Finance facility.



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



ITAM, 1-7 Harewood Avenue, Marylebone Road, London NW1. Tel: 01-724 2497. Telex: 21879.
FRANCE: Son Professionnel, 2 Rue des Tennerolles, 92210 Saint Cloud (Paris). Tel: 602 6815.

Survey: cartridge machines

This survey includes only NAB format cartridge machines, both single transport, multiple transports and random access transports the latter being primarily for automation systems.

Note that A, B and C carts are to the 1964 standard, while AA, BB and CC are to the higher 1975 standard. While all machines accepting AA, etc., will also accept A, machines to the earlier A standard will not necessarily accept higher tolerance AA carts.

AMITY SHROEDER (UK)
Amity Shroeder Ltd, 9 Masons Yard, London SW1.
Phone: 01-930 7951/0582 21903.

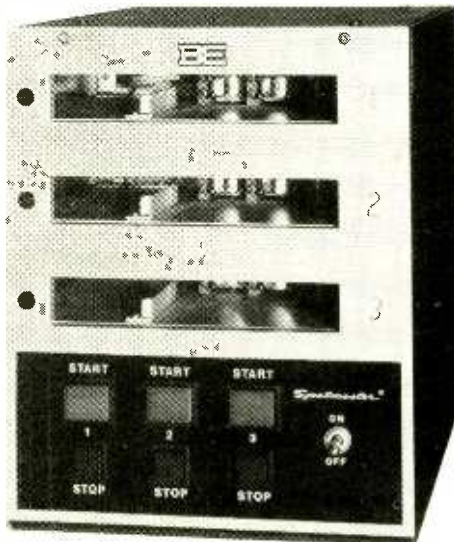
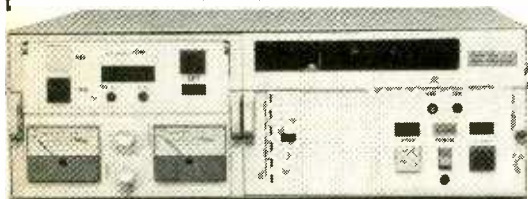
Cartmaster series
Type: single transport player and recorder/players for A carts, mono or stereo, two tone.
Frequency response: 40Hz to 1kHz +3dB -2dB, 1kHz to 15kHz ± 2 dB.
S/N: 50dB unweighted, 20Hz-20kHz.
Wow and flutter: 0.1% weighted.
Distortion: 2% at NAB level.
Features: 2x fast forward, remote control.
Price: £875 to £1,490.

AMPRO (USA)
Ampro Broadcasting Inc, 850 Pennsylvania Blvd, Feasterville, Pennsylvania, 19047, USA.
Phone: (215) 322-5100.
UK: Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP.
Phone: 09322 43124. Telex: 928475.

Series CT2500/CT3500/CT4500
Type: 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.
Frequency response: 50Hz to 15kHz ± 2 dB.
S/N: 58dB 20Hz-20kHz bandwidth.
Wow and flutter: 0.15%.
Distortion: 3% max.
Features: fast forward cue up, erase/tape delay models, electronic splice finder, 1½in start button, digital cue detectors and generator, remote control.
Price: on application.

Series CT5500 Tri-dek
Similar to CT2500 but three transports mounted vertically, mono or stereo, single or three tone.
Price: on application.

Audi-Cord Moducart 100



Broadcast Electronics
Model 5300B

1kHz.
Wow and flutter: 0.15% peak weighted.
Features: three fit across a 19in rack, auto mono/stereo switching using dual tones.
Price: on application.

Series 3000
Type: single transport machines, 3200 play 3200 record/play 3300 for max A, B and C carts respectively, 3400 similar to 3400 but rack mounting. Available in mono or stereo, one or three tones, delay machines for profanity or auto start.
Frequency response: 50Hz to 15kHz ± 2 dB.
S/N: 54dB mono, 52dB stereo below 160nWb/m at 1kHz.
Wow and flutter: 0.15%.
Features: manual fast forward, mic input, remote control.
Price: 3100 £697 to £780, 3200 £697 to £1,364, 3300 £780 to £1,295. European models receive various modifications.

Series 5300B
Type: triple stack play only stereo or mono, optional record amplifier, specification similar to 3000 Series, single or three tone.
Price: £1,498 to £1,796, record amp £496 or £585.

Series 5500
Type: five stack play only, stereo or mono, optional record amplifier.
Price: on application.

CARTRIDGE TECHNOLOGY (UK)
John A Steven Professional Recording Equipment, 4 Crescent Drive, Shenfield, Essex CM15 8OS.
Phone: 0277 215485. Telex: 995701 ref 197.

NAB Cartridge Transport
Type: professional single transport, play only and record module, stereo, AA cart, dc direct drive motor, three tones.
Frequency response: 40Hz to 250Hz ± 2 dB, 250Hz to 10kHz ± 1 dB, 10kHz to 16kHz ± 2 dB.
S/N: 54dB unweighted 20Hz-20kHz bandwidth.
Distortion: 1.5% ref 160nWb/m.
Wow and flutter: 0.12% DIN weighted.
Features: 3x fast forward, auto electronic tape timer, CCIR or NAB eq, remote control, may be rack or case mounted.
Price: on application.

CEI/CUEMASTER (Australia)
Consolidated Electronic Industries Pty Ltd, 15A Anderson Road, Thornbury, Victoria 3071, Australia.
Phone: 03 440791. Telex: 32463.
UK: Granet Communications Ltd, 39 Beechcroft Manor, Oatlands Drive, Weybridge, Surrey KT13

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

A series
Type: series of 'intermediate priced' NAB cartridge machines, available in single or three tone, mono or stereo, replay reminder system, full remote control, automation capable, latching connectors, interchangeable transports. Models include single playback, three playback, single transports (side-by-side) record/play, twin record/play. A carts only. No specifications provided.
Prices: single playback \$649 to \$719, record/play \$1,069 to \$1,289, three playback \$1,919 to \$2,129, twin record/play \$1,699 to \$2,029. 115V/50Hz \$25 extra.

100 series
Type: single transport, available as Model 100 player, or Model 115 record/play, mono or stereo, three tone.
Frequency response: USA model 50Hz to 15kHz ± 2 dB, UK model (modified by Lee Engineering), 40Hz to 125Hz -1 +2.5dB, 125Hz to 15kHz ± 1.2 dB.
S/N: wideband, typical tape. 48dB mono, 46dB stereo.
Wow and flutter: USA model 0.15%, UK model 0.1% weighted peak.
Features: dual eq, remote control, digital tape timer on recorder.
Price: on application.

BROADCAST ELECTRONICS/ SPOTMASTER (USA)
Broadcast Electronics Inc, 4100 North 24th Street, PO Box 3606, Quincy, Illinois 62301, USA.
Phone: (217) 224-9600. Telex: 250142.
UK: Broadcast Audio Equipment Ltd, PO Box 31, Douglas, Isle of Man.
Phone: 0624 4701. Telex: 627900.

Series 2100
Type: single transport machines, accept A, B or C carts (but only A when close together) mono or stereo, playback or record/playback, two tones.
Frequency response: 50Hz to 15kHz ± 2 dB.
S/N: 54dB mono, 52dB stereo below 160nWb/m at

9NZ.
Phone: 0932 47785.

900 series

Type: 910/990 dc servo motor, 900/980 hysteresis synchronous motor, mono or stereo, A cart only, three tones, play only, record/play/deck, record/monitor module.

Frequency response: 910 40Hz to 15kHz ± 1.5 dB, 900 40Hz to 12kHz ± 2 dB.

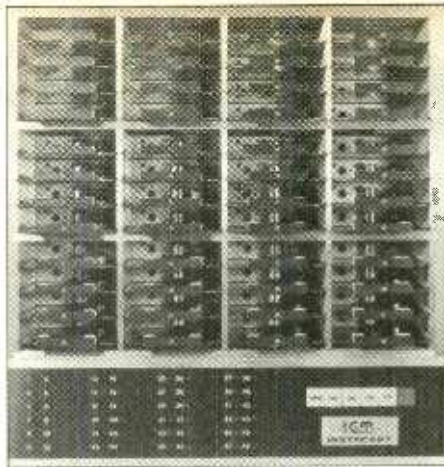
S/N: 910 57dB mono, 55dB stereo, 900 56dB mono, 54dB stereo, below 320nWb/m.

Distortion: 2.5%.

Wow and flutter: 0.12% rms unweighted.

Features: remote control, CCIR/IEC/NAB eq, cue tone editing.

Price: mono from £1,300, stereo from £1,700.



IGM Instacart 48 deck cartridge machine

UK: Dynamic Technology Ltd, Zonal House, Alliance Road, London W3 0BA.
Phone: 01-993 2401. Telex: 935650.

Criterion 90 series

Type: 90-1 play, 90-2 record/play, 90-3 triple stack play transport, mono or stereo, two or three tones, hysteresis synchronous motor, 90-1 and 90-3 accept A, AA, B, BB carts, 90-3 also C and CC.

Frequency response: 315Hz to 10kHz ± 1 dB, 50 to 149Hz +1 -4dB, 150 to 314Hz +1 -2dB, 10 to 15kHz +1 -2dB.

S/N: mono 53dB, stereo 50dB at 160nWb/m.

Distortion: 1.5%.

Wow and flutter: 0.15dB.

Features: remote control, adjustable cueing time.

Price: on application.

IGM (USA)

IGM, 4041 Home Road, Bellingham, Washington 98225, USA.

Phone: (207) 733-4567.

UK: Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP.

Phone: 09322 43124. Telex: 928475.

Instacart Type A and B

Type: multiple transport cartridge players, mono or stereo, accepts AA carts, available with 12, 24 or 48 capacity units, each vertical stack of 12 carts uses the same capstan, but with separate heads, tray assembly, solenoid, pre-amp and stop tone detector. Type A provides single output but allows overlapping of carts, while Type B provides separate outputs from each cartridge.

Frequency response: 'meets NAB standard', not stated.

S/N: mono 50dB, stereo 47dB unweighted.

Distortion: 2%.

Wow and flutter: 0.2%.

Features: visual indication of cartridge status, single, two or three tones, remote control, also telephone answering options.

Price: on application.

Go-Cart II

Type: random access cart transport, available with 42 or 78 cartridge capacities, with a single playback deck. Worst case access time for 42 carts is 6s, and 8s for 78 carts, drive carrier is bi-directional under microprocessor control for best access time, while cartridge is completely removed from a carrier while being played. Use high speed cue with 3,000Hz tone detection for high capacities, FSK codes, digital tone sensing.

Price: on application.

ITC (USA)

International Tapetronics Corp, 2425 South Main Street, Bloomington, Illinois, USA.

Phone: (309) 828-1381.

UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ.

Phone: 01-953 0091. Telex: 27502.

99 series

Type: single transport play, record/play or record/play with 'ELSA' (cartridge preparation system), five tones (including FSK), mono or stereo, direct drive dc motor.

Frequency response: 31.5Hz to 16kHz ± 1 dB.

S/N: 54dB mono, stereo 52dB at OVU.

Distortion: 1.5% at OVU.

Wow and flutter: 0.12% DIN weighted.

Features: mechanically latched solenoid, cartridge preparation system that erases tape, azimuthed (motorised heads), erased again to remove alignment tones and splice located; microprocessor controller, separate record electronics.

Price: mono from £1,039, stereo from £1,147. Stereo record/replay with 'ELSA' £2,418.

SP/WP/RP/RPD series

Type: SP play for A and B carts, WP also for C carts, RP record/replay, RPD record/replay delay, mono or stereo, all three tones.

Frequency response: 50Hz to 15kHz ± 2 dB.

S/N: 55dB below 3% distortion.

Wow and flutter: 0.2% unweighted.

Features: NAB or IEC eq, optional record amp for play decks.

Prices: SP/WP £756 to £920, RP £1,273 to £1,505. RPD £1,481.

3D

Type: triple stack play only, mono or stereo, optional WRA record amp, specification similar to SP.

Price: £1,717 to £1,994, WRA £565 to £702.

PD-11

Type: low cost play only or record/play transport, mono only. A cart.

Frequency response: 50Hz to 12kHz ± 2 dB.

S/N: 52dB below 3% distortion.

Wow and flutter: 0.2%.

Price: £496 to £637.

3M (USA)

3M, Building 223-5N, St Paul, Minnesota 55101, USA.

Phone: (800) 328-1300.

UK: 3M UK Ltd, PO Box 1, Bracknell, Berks RG12 1JU.
Phone: 0344 26726. Telex: 849371.

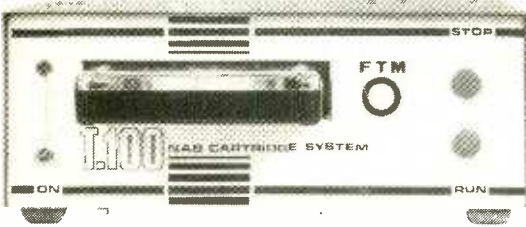
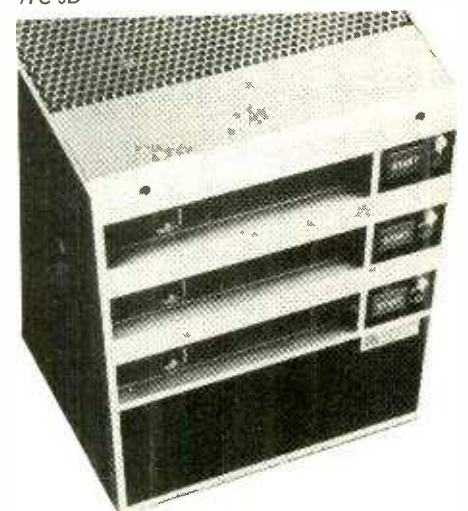
Centracart

This is an entirely new cartridge concept using a loop cartridge without moving parts, and in which the tape remains in the same plane as the pack until it has been played, and with the tape fed from the inside of the cartridge, across the empty centre where the heads are located. No pressure pads, two different cartridges with lengths ranging from 70s to 15 minutes.

Price: not yet commercially available.

58 ▶

ITC 3D



Fitch T100

FTM (UK)

Fitch Tape Mechanisms, 7a Balham Grove, London SW12.

Phone: 01-673 1362.

T250 series

Type: single transport player and recorder/player, mono or stereo, A cart, single tone.

Frequency response: 50Hz to 250Hz ± 3 dB, 250Hz to 15kHz ± 1 dB.

S/N: 52dB.

Wow and flutter: 0.2%.

Distortion: 2% at peak output.

Price: £374 to £760.

T100

Type: single transport player and recorder/player, mono, single tone, A cart.

Frequency response: 50Hz to 12kHz ± 3 dB.

S/N: 52dB.

Wow and flutter: 0.18%.

Distortion: 2%.

Price: £182 to £315.

Cartette

Type: simplified play cart machine, only single control to start, single tone, mono.

Price: £133.

HARRIS/GATES (USA)

Harris Corp, PO Box 4290, Quincy, Illinois 62301, USA.

Phone: (217) 222-8200.

Harris Criterion 90-3



THE 8 HOUR 6 IN 2 OUT

PROKIT 62 is a stereo mixer designed for professional PA and recording applications. Gain, treble, bass, folback, echo and pan are featured on each channel. Slide level faders are used for inputs and main outputs. Echo returns and VU meters feature on the outputs.

PROKIT can be built in about 8 hours with the minimum of tools, following the comprehensive 32 page assembly and fault finding manual.

Phone or write for the 12 page illustrated leaflet.

Exclusively from ;

TURNKEY,
8, East Barnet Road
NEW BARNET
Herts EN4 8RW
01-440 9221

STUDIO EQUIPMENT
SERVICES LTD.
The Studio Shop
Oxgate Farm
Coles Green Road
LONDON NW2 7EY
01-452 1979

REW,
146 Charing Cross Rd
LONDON WC2
01-836 2372

Kit £108.33
Ass'd £161.45
INCL. V.A.T. P & P



SURVEY: CARTRIDGE MACHINES

SIS (UK)

SIS Recording Studios Ltd, 57 St Andrews Road,
Northampton NN1 2PB, UK.
Phone: 0604 32965/30559.

140 series

Type: S140 mono play, S142 stereo play, SR141 mono record/play, SR143 stereo record/play, single tone, AA cart.

Frequency response: 50Hz to 15kHz \pm 3dB.

S/N: 48dB A-weighted.

Wow and flutter: 0.3%.

Features: fast forward, remote control.

Price: from £178 to £388.

SIS SR143



SMC (USA)

Sono-Mag Corp, 1019 W Washington Street,
Bloomington, Illinois 61701, USA.
Phone: (309) 829-6373. Telex: 510-352 2506.

The Carousel Series 350

Type: random access cartridge transport which accepts 24 NAB cartridges, and has a single playback deck, shortest access time 4s, drum rotation 22s, three tones, cue track logging output, random select programming.

Frequency response: 50Hz to 12kHz \pm 2dB.

S/N: 48dB mono, 45dB stereo.

Distortion: 1%.

Price: on application.

Caro-Stat

Type: multiple transport cartridge player, mono or stereo, accepts A or AA carts, available for 24 carts with two horizontal stacks (carts on their sides) of 12 each operating from single capstan, separate electronics for each stack of 12, outputs may be combined with instant access to any cart. Two tone with logging tone output.

Frequency response: 50Hz to 12kHz \pm 2dB.

S/N: 49dB mono, 45dB stereo.

Price: on application.

SONIFEX (UK)

Sonifex Sound Equipment, 15 College Street,
Irthlingborough, Northants NN9 5TU, UK.
Phone: 0933 650700.

Micro HS series

Type: μ HS100 mono player, μ HS200 stereo player. μ HS100R mono record unit, μ HS200R stereo record unit, AA cart, three tones.

Frequency response: 40Hz to 15kHz \pm 2dB.

S/N: 64dB ref 160nWb/m.

Wow and flutter: 0.1% unweighted.

Features: mechanically latched solenoid, full remote, NAB or CCI req, PPM monitoring.

Price: μ HS200 £725.

Q-PAC series

Type: low cost machines available in mono and stereo play, mono record/play, AA cart, single tone.

Frequency response: 50Hz to 12kHz \pm 2dB.

S/N: 56dB ref 160nWb/m.

Wow and flutter: 0.15% unweighted.

Price: players £170 to £310, record/replay £365.



Sonifex Q-PAC

QFX series

Type: mono and stereo players, mono and stereo record units, AA cart, single tone.

Frequency response: 40Hz to 15kHz \pm 2dB.

S/N: 60dB ref 160nWb/m.

Wow and flutter: 0.15% unweighted.

Features: fast forward, equalised cue output for three tone detect, S5000 provides +50% - 30% varispeed.

Price: £425 to £575.

TELEX/MAGNECORD (USA)

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

UK: Avcom Systems Ltd, Newton Works, Stanlake
Mews, Stanlake Villas, London W12 7HS.
Phone: 01-749 2201. Telex: 897749.

MC series

Type: single transport, mono or stereo, play only, record module, AA or BB carts, triple tone, dc servo motor.

Frequency response: 50Hz to 15kHz \pm 1dB.

S/N: 48dB stereo, 50dB mono, ref 160nWb/m.

Distortion: 2%.

Wow and flutter: 0.12%.

Features: fast forward, remote control, optional slower speeds.

Price: £619 to £1,089.

UMC/BEAUCART (USA)

UMC Electronics Co, 460 Sackett Point Road,
North Haven, Conn 06473, USA.
Phone: (203) 288-7731.

UK: Seltech Equipment Ltd, Rose Industrial Estate,
Cores End Road, Bourne End, Bucks SL8 5AT.
Phone: 06285 29131. Telex: 848960.

Type 20

Type: player or recorder/player, mono or stereo, single or three tone, A, B or C carts.

Frequency response: 50Hz to 15kHz \pm 2dB.

S/N: 47dB mono, 44dB stereo.

Wow and flutter: 0.15% DIN.

Features: low profile, fast forward

Price: £763 to £1,479.

Type 50

Similar to Type 20, but only accepts A cart.

Price: £710 to £1,438.

Beaucart II

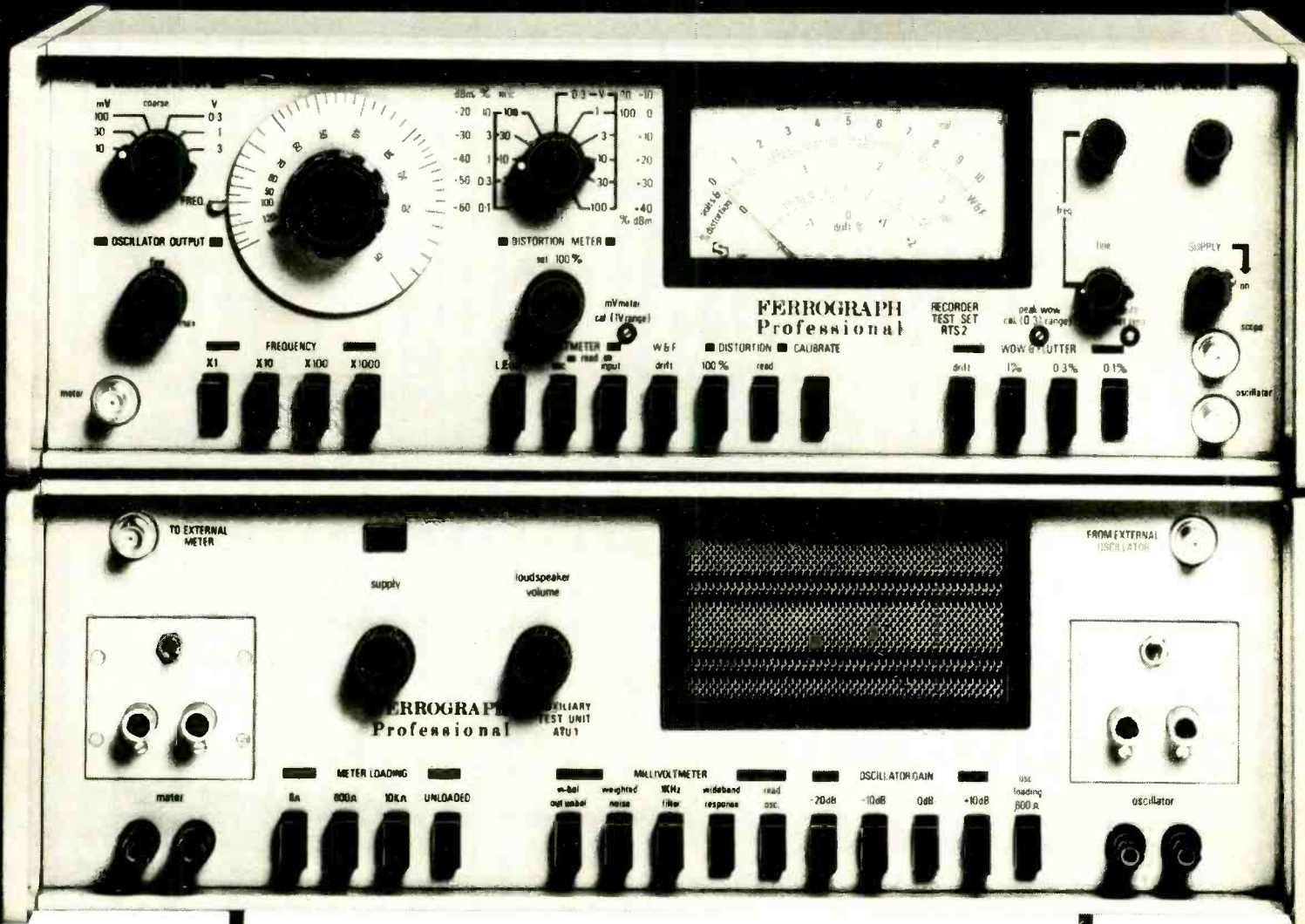
Type: low cost mono player or recorder/player, single tone, A cart only. Specification similar to above.

Price: £595 to £779.

Telex MC-Series



Check'em in Check'em out



All-in-one test units mean faster, cheaper servicing.

Stands to reason.

Take the Ferrograph Recorder Test Set, RTS2.

It saves you from the need for time wasting connections to separate instrumentation...and from the creation of hum-loop. Instead, just a single input and output lead, connections that remain unchanged throughout the test series.

Then - push-button answers.

The RTS2 is considerably cheaper than the usual collection of separate instruments too!

Link it with a Ferrograph Auxiliary Test Unit, ATU1, and you extend its use to include measurement on professional equipment.

Versatile, sure, easy to operate, portable. And long lasting, thanks to the in-built quality and attention to detail that you find in all Neal-Ferrograph equipment. Your answer for efficient servicing tumround.

Please send me your illustrated leaflets with specifications of the equipment I have ticked.

Recorder Test Set
Auxiliary Test Unit

Name _____

Address _____

NEAL FERROGRAPH

Simonside Works, South Shields, Tyne and Wear, NE34 9NX. Tel: 0632 566321.



Survey: automation systems

This survey primarily includes the controllers for programme automation systems, and since most such systems are built to customers' specifications, necessarily the information cannot be that detailed.

BROADCAST ELECTRONICS (USA)
Broadcast Electronics Inc, 4100 North 24th Street,
PO Box 3606, Quincy, Illinois 62301, USA.
Phone: (217) 224-9600. Telex: 250142.
UK: Broadcast Audio Equipment Ltd, PO Box 31,
Douglas, Isle of Man.
Phone: 0624 4701. Telex: 627900.

Control 16

Type: programme automation system using microprocessor control, and dual processors. Provides 3,000 programme events and 11 functions for optimum programming creativity, advance compare time capability with 500 event capacity. A system typically comprises four reel-to-reel transports, two multiple access cartridge transports and several single cartridge transports. Programming may be sequential (when using cartridge music), main/sub (when using syndicated reel-to-reel music formats) and time insertion (for loose programming formats). The system provides instant display of aborted events, special event insertion, voice track and time announce decks, self-correcting digital clock, automatic restart after power failure. Five video displays are provided—programme display, assignment display, log display, events display, compare time display. Programming is via a portable keyboard, while up to three keyboards may be used in the system.

Price: typical system \$70,000.

Econ-Control 16

Type: programme automation system similar to *Control 16*, but simplified without the use of a video display monitor. System may however be updated to full *Control 16* facilities. 2,000 programme events, 10 repetitive compare times. System typically comprises two reel-to-reel transports, one multiple access cartridge transport, and one triple stack cartridge transport.

CETEC SCHAFFER (USA)

Cetec Broadcast Group, 75 Castilian Drive,
Goleta, Cal 93017, USA.
Phone: (805) 968-1561.

Series 7000

Type: programme automation system using Z80 microprocessor control and standard computer VDT for control. The basic system is supplied with a single VDT, 16 audio source capacity (the first nine



Cetec Schaffer Series 700

selectable to 999 trays), and 1,000 event memory. The system may be expanded to four VDT channels, up to 10,000 events, and 64 audio sources. Features include English programming, programming error detection, programming lookahead (19 program and nine time events, with optional clock), dual programme busses (music and voice), six source multi cue system and multi level subroutine capability.

Price: on application.

ENERTEC (France)

Enertec, 296 Avenue Napoleon-Bonaparte,
BP226, F-92505 Rueil-Malmaison Cedex,
France.
Phone: (1) 732.92.23. Telex: 20340.

Memocast

Type: programme automation system using Philips

Compact cassette decks under microprocessor control. Uses three transports per 19in rack module, with up to 24 transports and controller per rack. Each cassette is FSK coded with an ident at the beginning, and with stop tones, the first 10s before the end, and the transports will auto start and stop and rewind, and trigger other transports. By using a keyboard, particular cassettes may be located if they are loaded in the system, and a cueing desk is available.

Price: on application.

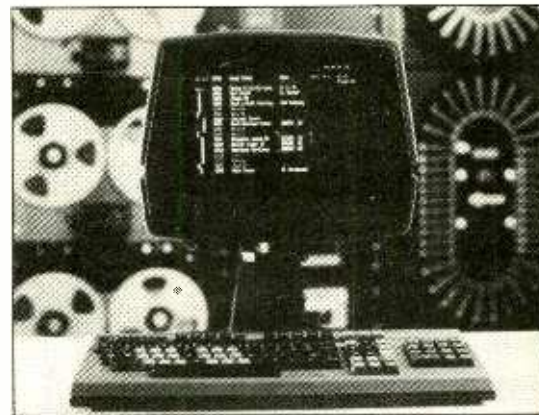
HARRIS (USA)

Harris Corp, PO Box 4290, Quincy, Illinois
62301, USA.
Phone: (217) 222-8200.

UK: Dynamic Technology Ltd, Zonal House,

62 ▶

Harris 9003



STEREO DISC AMPLIFIER 3

For disc replay of the highest quality



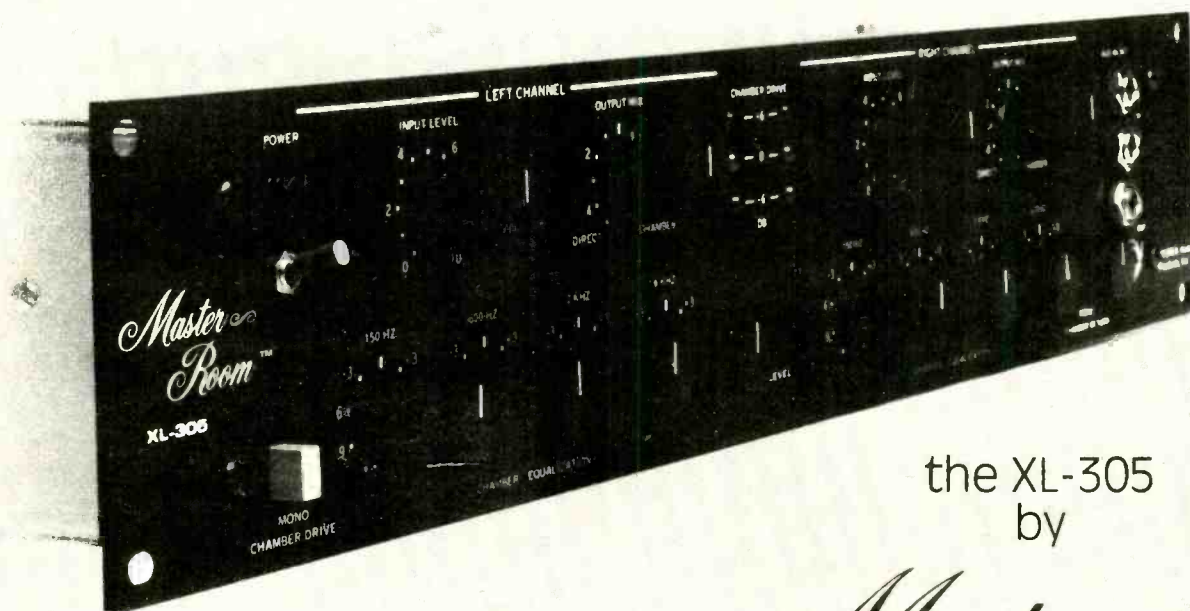
Please ring or write for six page specification leaflet

Reviewed in November issues of Gramophone, Hi-Fi for Pleasure and Popular Hi-Fi

Dominus P.O. Box 1, Cranleigh, Surrey GU6 7JF Tel: 04866 6477

Incredible...

the "Acoustic Chamber Synthesizer"™



the XL-305
by

*Master
Room*™

- Totally new design approach
- The sound of a live acoustic chamber
- Natural sound, even on percussion
- Self-contained rack mount unit
- Full two-channel stereo

The Master Room XL-305 is a totally new design approach in reverberation technology. For the first time, the qualities and properties of a live acoustic chamber are available in a rack mount unit at an affordable price. There is a natural sound on percussion, as well as voices and all other musical instruments. This quality has not been obtainable from other compact reverberation devices. The XL-305 exhibits no unwanted side effects; it's as natural as a live chamber itself.

To hear this new advancement in reverberation, see your professional audio dealer and ask for a demonstration of this exciting new unit. Hear the XL-305 "Acoustic Chamber Synthesizer" for yourself, and you too will agree... It's INCREDIBLE.



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

France **3M France SA, Mincom Div.** Boulevard de l'Oise, 95000 Cergy Tel: Paris 749 0275
Germany **Audiolive** Kyffhauserstrasse 10A 5 Köln 1 Tel: Köln 230910
Holland **Pieter Bollen Geluidstechnik** Hastelweg 6, Eindhoven Tel: Eindhoven 512 777
Sweden **Tal & Ton Musik & Electronic AB** Kungsgatan 5, 411-19 Gothenburg Tel: Gothenburg 130 216
Norway **Siv Ing Benum AS** Skovvn 22, Oslo 2 Tel: Oslo 565 753

NOW HERE

Cuemaster

CARTRIDGE MACHINES

DC Servomotor, Improved
Heads, User-Adjustable
Azimuth, Improved Mains
Transformers Etc.

ALSO

Cuemaster

FSK-Encoded Logging Hard
Copy Printout. Usable
With Any Cartridge.
Designed Especially For
Station Logs.

Ask For Details:



Granet

Communications Ltd.

39 BEEHCROFT MANOR, OATLANDS
DRIVE, WEYBRIDGE, SURREY KT13 9NZ

Weybridge (0932) 47785

SURVEY: AUTOMATION SYSTEMS

Harris cont'd

Alliance Road, London W3 0BA.
Phone: 01-993 2401. Telex: 935650.

9000 Series

Type: programme automation system. System has several files for different schedules such as commercials and playlists, and integrates the files to create the broadcast day. Dual drive flexible discs are used for both user and system operating programs, while several VDT terminals may be provided for different departments. The system also stores the title music, record and commercials, in addition to the logging number. Additional VDT lines may be used for comments or live insertions. The system has a dual Intensity VDT to easily distinguish events (music and commercials).
Price: on application.

IGM (USA)

IGM, 4041 Home Road, Bellingham, Washington 98225, USA.

Phone: (207) 733-4567.

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

Basic A

Type: programme automation system. Programming in English, makes entries in modular form using labels to recall groups of entries, up to 20 programmable log descriptions in English, can be operated as a manual assist device instead of automation, uses microprocessor control (optional floppy disc), 3,000 switching events and 1,000 labels, expandable to 12,000 events and 4,000 labels. The system can handle up to 16 sources, it uses a VDT for data entry, and provides system logging using FSK tone bursts from cartridges.
Price: on application.

Model 400

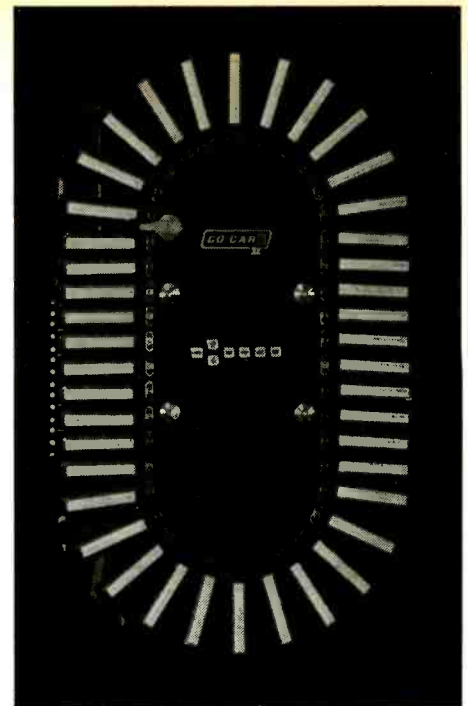
Type: prepackaged time-insertion audio control unit providing automation facilities controlling six sources, with non-music events scheduled on tight time basis, with musical selections arranged to fill the remaining time.
Price: on application.

MEI (USA)

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

Log 4

Type: programme automation system comprising



IGM Go-Cart II cartridge transport

100B programmer, four Scully or Otari reel-to-reel transports, and two cartridge carousels. The programmer controls up to eight sources, provides 24 events, has 25Hz sensors and filters for cue tones, adjustable deadroll, overlap audio, hold and continue capability. Optional features are lazy time control which inserts breaks every 15, 20, 30 or 60 minutes, at suitable breaks in the programming, silence sense which puts 'something' on air during breakdowns, remote advance.

Price: about \$16,500. Similar system Log 2 but with only two reel-to-reels and one carousel about \$11,000.

SMC (USA)

Sono-Mag Corp, 1019 W Washington Street, Bloomington, Illinois 61701, USA.

Phone: (309) 829-6373. Telex: 510-352 2506.

ESP

Type: programme automation system. (Extremely Simple Programmer). Programmes up to several days in a typical station, handles up to 20 sources, runs up to 256 individually programmable realtime updates, handles up to seven external time functions, runs up to 20 random or instant access cart machines, 4,000 event memory, programmable digital clock, optional remote control enables system to be used with live operation. Systems typically include four Carousel cart transports, and four reel-to-reel transports.

Price: on application.

STABILIZER

FREQUENCY SHIFTERS FOR HOWL REDUCTION

The stabilizer is a high quality frequency shifter for howl reduction on speech and music. It offers variable shifts either up or down between 1 and 10 Hertz so allowing choice of the optimum shift for the particular acoustics and sound sources involved in each installation.

+5 Hz FIXED SHIFT CIRCUIT BOARDS as WW July 1973 article but improved noise level, lower distortion, adjustment-free oscillator and IC sockets: Mark 3. Small enough to be built inside the cabinets of many amplifiers. Complete kit and board £34. Board built and aligned £44. Including psu and mains transformer.
DESIGNER APPROVED. C.W.O. less 5% + VAT 15%.

SURREY ELECTRONICS

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



TSM
SERIES
SERIES 80
FLEXIMIX

THREE OF THE BEST

The complete range of mixing consoles that has one to suit you.

Choosing a mixer has never been simpler than now. Whatever your particular requirement or budget, Trident's comprehensive range of consoles — TSM, Series 80, Fleximix — will fulfil your every need — superbly.

TSM The prestigious, large format console designed for the studio that requires the best. Features include fully parametric equalisation, advanced I.C. circuitry, relayless switching, 32-24-24 and 40-24-32 formats and fully modular jackfield. Conversion to automation is readily available.

SERIES 80 Developed especially to fill the needs of 16 and 24-track studios. Most of the superb TSM's features — including optional automation — have been maintained, yet tailored to this surprisingly compact format, without any loss in quality. Yet its highly competitive price makes it a console of outstanding value.

FLEXIMIX A reliable mixer unit designed for the compact studio, giving highly professional quality when space, budget or requirements are at a premium. Being fully modular, it provides total system flexibility — allowing expansion from mono to 24-track.

Choose the best —
Trident.



Trident Audio Developments Limited
Shepperton Studio Centre, Squires Bridge Road,
Shepperton Middlesex, England.
Telephone: Chertsey (09328) 60241 Telex: 8813982

America Area 1 Studio Maintenance Services, California. Tel: 213-877-3311 **America Area 2** Sound 80 Inc., Minneapolis. Tel: 612-721-6341 **America Area 3** Winteradio Companies, Parma, Ohio. Tel: 216-886-5536 **America Area 4** Empirical Audio, New York. Tel: 914-762-3089 **Australia** John Barry Group, Sydney. Tel: 61-2-439-6955 **Belgium** Naybies, Brussels. Tel: 32-2-734-31-38 **Canada** La Salle Audio Products Ltd, Montreal. Tel: 513-342-2511 **France** Lazare Electronics, Paris. Tel: 33-1-878-62-10 **Germany** Peter Struven, Hamburg. Tel: 49-40-801028 **Holland** Cadac Holland BV, Hilversum. Tel: 31-35-17722 **Italy** Audio Products International, Milan. Tel: 392-273-896 **Japan** Continental Far East, Tokyo. Tel: 81-3-583-8451 **South Africa** Leephy (Pty) Ltd., Johannesburg 2092. Tel: 010-48-3821 **Spain** Neotecnica S.A.E., Madrid. Tel: 34-1-242-09-00

Survey: broadcast ancillaries

This survey covers a wide range of equipment used in broadcasting studios, but not otherwise covered in regular *Studio Sound* surveys. This includes logging machines, disc pre-amplifiers, telephone balance and coupling units, profanity delays, and cartridge ancillaries. The IBA specification for logging in Britain requires stereo FM and MF off-air to be recorded, together with a time reference, thus a 4-channel recorder is required, operating at $\frac{1}{16}$ in/s.

ACCURATE SOUND (USA)

Accurate Sound Corp, 114 Fifth Avenue, Redwood City, Cal 94063, USA.
Phone: (415) 365-2843. Telex: 348327.

AS4000

Type: Compact cassette logger, provides 4-track recording in one direction with $\frac{1}{2}$ -track erase, any two speed between 0.5in/s and 20in/s may be selected, controlled end of tape speed, auto end of tape sensing, detection of take-up failure, instant start/stop, skip forward and back, remote control.
Price: on application.

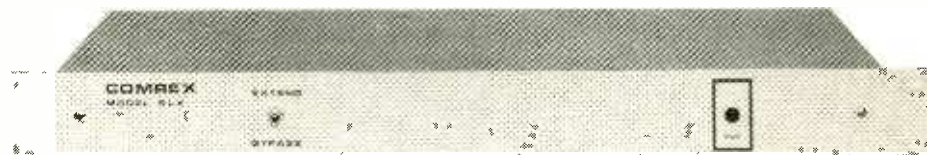
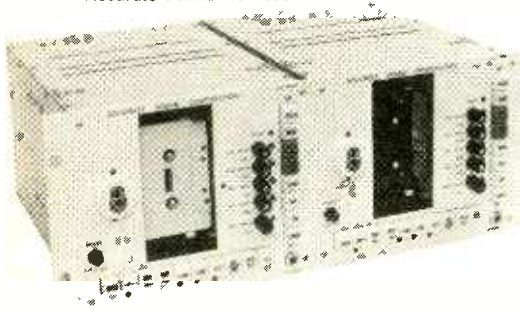
ALICE (UK)

Alice (Stancoil Ltd), 38 Alexander Road, Windsor, Berks.
Phone: 07535 51056. Telex: 849323.

TBU3

Type: automatic telephone balancing unit designed for on-air programmes. All adjustments are factory set, the only control being on/off for the ducker or voice-over device which enables the presenter to override the telephone contributor. The unit balances

Accurate Sound AS-4000



Comrex rack mounting extender receiver

with 30ms of the first input from the mixer, and gives a side-tone rejection of better than 50dB.

Price: £1,140.

Alice also manufactures a precision RIAA disc amplifier.

ALLIED BROADCAST EQUIPMENT (USA)

Allied Broadcast Equipment, PO Box 786, 635 South E Street, Richmond, Indiana 47374, USA.
Phone: (317) 962-8596.

Audio-Metrics Preamp

Type: stereo disc pre-amplifier, mains powered.
Frequency response: to new RIAA curve ± 0.25 dB.
Distortion: SMPTE IM 0.05% at +18dBm, THD 0.03%.
S/N: 80dB relative to 5mV unweighted.
Gain: 5mV input provides +10dBm output.
Price: on application.

BROADCAST ELECTRONICS (USA)

Broadcast Electronics Inc, 4100 North 24th Street, PO Box 3606, Quincy, Illinois 62301, USA.
Phone: (217) 224-9600. Telex: 250142.

UK: Broadcast Audio Equipment Ltd, PO Box 31, Douglas, Isle of Man.
Phone: 0624 4701. Telex: 627900.

BETMS100/200

Type: dual disc amplifiers, mains powered. Channels may be used separately for two mono sources, or one stereo. 100 has 150 Ω unbal output, 200 has 600/150 Ω bal output, phase reversal.
Frequency response: within ± 1 dB of RIAA curve 50Hz to 15kHz.
Distortion: 0.25% THD.
S/N: 65dB for 5mV input.
Gain: 5mV input, +8dBm output.
Price: on application.

Telco 80/91 series

Type: provide automatic answering and message recording when used with Broadcast Electronics/Spotmaster cartridge machines. Provide auto play, manual play, auto record, manual record, auto play/record. Provide interface between telephone company coupler and cart machines.

TW200A

Type: tape cartridge winder which handles all

reel sizes, and runs at 22 $\frac{1}{2}$ in/s, with mechanical tape timer.

Price: £275.

SF101B

Type: tape cartridge splice detector, uses optoelectronics to detect splice, and makes audible tone, adjustable sensitivity, A cart.

Price: £290.

Broadcast Electronics also produce a range of cartridge storage racks including *LS200 Lazy Susan* which holds 200 carts on rotating stand, mounted on castors, price £195; table top version for 72 carts £115; wall mounting racks for 100 carts £115.

CANFORD AUDIO (UK)

Canford Audio, Stargate Works, Ryton, Tyne and Wear, NE40 3EX.
Phone: 089422 4515.

Cartridge labels

Type: sticky labels designed specifically for identifying NAB carts, grid printing without legend for varying uses.

Price: roll 2,000 £6.70.

Telephone Balance Unit

Type: telephone balance unit on Eurocard, manual balancing, clean feed inputs and outputs, optimum balance indicator.

Price: £112.

Cartridge Splice Finder

Type: locates splice accurately in cartridge, also re-cues or times cartridges.

Price: on application.

CEI (Australia)

Consolidated Electronic Industries Pty Ltd, 15A Anderson Road, PO Box 21, Thornbury, Victoria 3071, Australia.
Phone: 03 44791. Telex: 32463.

UK: Granet Communications Ltd, 39 Beechcroft Manor, Oatlands Drive, Weybridge, Surrey KT13 9NZ.
Phone: 0932 47785.

Cepak Variable Message Repeater VMR MkII

Type: message repeater using ferro magnetic impregnated neoprene band on a drum as the recording medium for very heavy use. One track,

WE HOLD THINGS UP ALL AROUND THE WORLD!

Today, everyone gets used to things being held up. In a studio, the only 'hold up' that is welcomed is a microphone on a good stand! When you use KEITH MONKS stands, you can set them and forget them! The versatile design, together with a very wide range, means that KEITH MONKS stands deal with those difficult jobs as easily as the simple ones.

KEITH MONKS (AUDIO) LIMITED produce what is probably the most complete range of microphone stands that is generally available, the world over. Designed and made to a very high technical standard, they are readily accepted in so many fields; international radio and television, major sound studios, public address systems, local radio and many more.

Find out for yourself why so many people have relied on KEITH MONKS STANDS for so long.

KEITH MONKS (AUDIO) LTD

26-28 READING ROAD SOUTH, FLEET,
ALDERSHOT, HAMPSHIRE, ENGLAND

Tel. (02514) 205678/9

Telex: 858606

U.S.A. DISTRIBUTOR
KEITH MONKS (U.S.A.) INC.
652 GLENBROOK ROAD, STAMFORD CONN.
ZIP CODE 06906

CANADIAN DISTRIBUTOR:
B.S.R. (CANADA) LTD.
P.O. BOX 7003, STATION B, CLAIRVILLE
DRIVE, REXDALE, ONTARIO,
CANADA M9V 4B3.
TEL. (416) 675 2425

U.K. Distributors

AMDIO,
26-28 Reading Road South,
Fleet,
Aldershot, Hants.
tel. (02514) 20567/8/9

FUTURE FILM DEVELOPMENTS

36-38 Lexington Street,
London, W.1.
tel. 01 437 1892

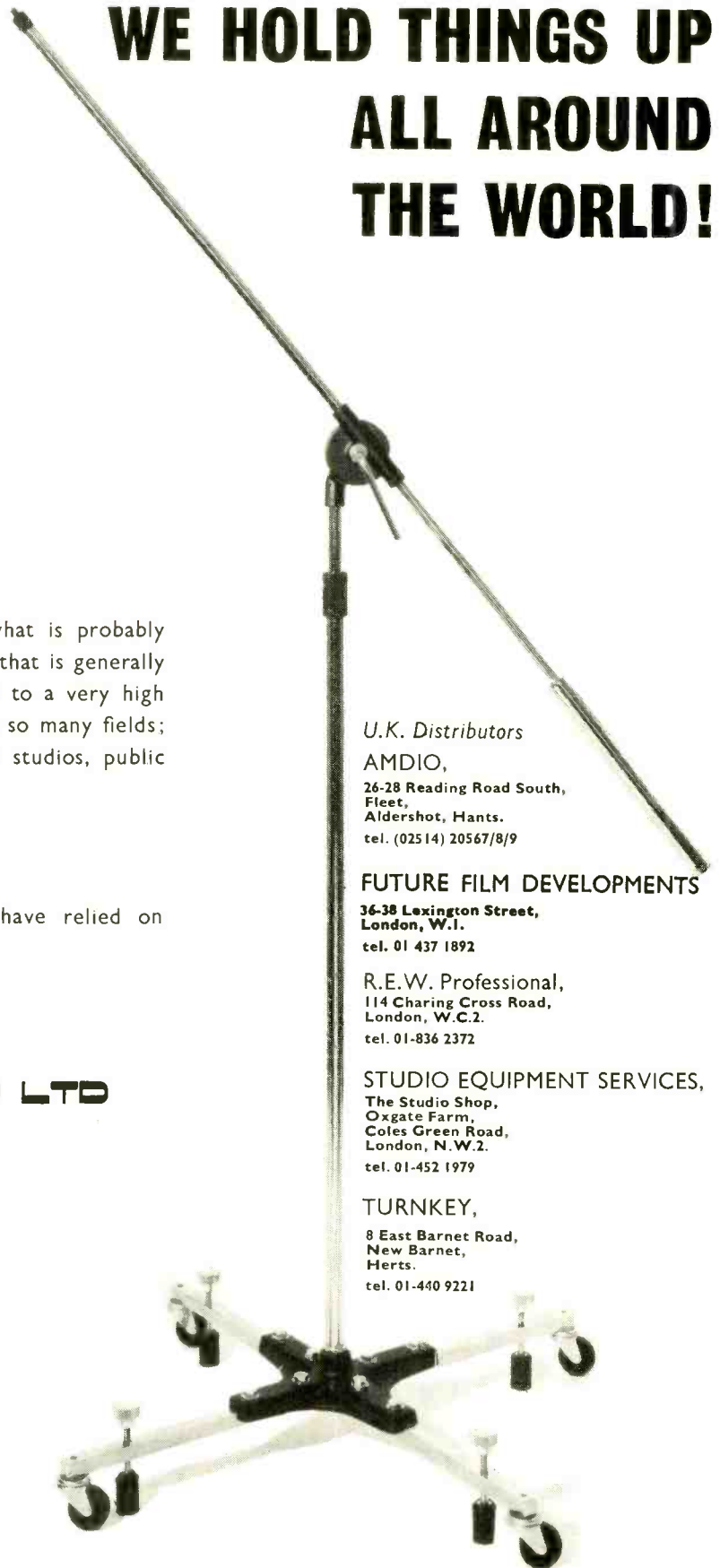
R.E.W. Professional,
114 Charing Cross Road,
London, W.C.2.
tel. 01-836 2372

STUDIO EQUIPMENT SERVICES,

The Studio Shop,
Oxgate Farm,
Coles Green Road,
London, N.W.2.
tel. 01-452 1979

TURNKEY,

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



SURVEY: BROADCAST ANCILLARIES

CEI cont'd

3 minutes duration max, 0.5s to 6s recycling time, various alarms, local or remote recording, bandwidth 200Hz to 3.5kHz \pm 4dB, wow and flutter 1%. Designed for telephone answering... 'all phone-in lines are busy, please try later'.
Price: on application.

COMREX (USA)

Comrex, 60 Union Avenue, PO Box 269, Sudbury, Mass 01776, USA.
Phone: (617) 443-8811.

Low Frequency Extenders

Comrex low frequency extenders operate by frequency shifting signals upward by 250Hz when sent down normal telephone lines which cut-off at around 300Hz, thus allowing an overall frequency response down to 50Hz for programme use. Translation accuracy is \pm 0.08Hz, while the receiver will accept inputs down to -40VU. The Model TLX transmitter and Model RLX receiver are rack mounting while the Model PLX transmitter is portable and battery operated. May be used either for remote reporting, providing higher quality remote links for news reporting, or as a back-up link between studio and transmitter. If tapes are played at half speed, through the Extender and telephone line, a 6kHz bandwidth can be achieved.
Prices: PLX \$1,200, TLX \$1,050, RLX \$1,050, LX-P power supply \$250.

DICTAPHONE (USA)

Dictaphone Corp, 3900 Westsarna Road, Melbourne, Florida 32935, USA.
Phone: (305) 259-4524.

UK: Dictaphone Co Ltd, Alperton House, Bridge-water Road, Wembley, Middx.
Phone: 01-903 1477. Telex: 923357.

4000 series

Type: reel-to-reel logging recorder, 4-channels (3 + timecode), running at $\frac{1}{2}$ in/s (option for $\frac{1}{4}$ in/s) which provides 25 hours recording time using 3,600ft of tape. Single or dual systems available, options for timecode generator and reader which has a 1-hour standby battery. Frequency response at $\frac{1}{2}$ in/s is 300Hz to 3kHz \pm 3dB, at $\frac{1}{4}$ in/s 300Hz to 6kHz \pm 3dB. S/N is 40dB, and wow and flutter better than 1%. Other options include auto level control, voice operated relay board, auto transfer for coupling two loggers, and erase heads.

Price: basic 4-channel transport about £3,000, timecode equipment from £2,000.

DOMINUS (UK)

Dominus, PO Box 1, Cranleigh, Surrey.
Phone: 04866 6477.

Stereo Disc Amplifier 3

Type: stereo disc pre-amplifier, mains powered, switchable input loading.

Frequency response: within 0.5dB of IEC micro-groove characteristic from 22Hz to 20kHz, -10dB at 100kHz.

Distortion: THD 0.008%

S/N: 68dB 20Hz-20kHz.

Gain: input: 2.6 to 18mV, high output +23dBm, low output +8dBm.

Price: £146.96. Balanced in/out version from Surrey Electronics £180.

EMT (West Germany)

EMT-Franz GmbH, Postfach 1520, D-7630 Lahr, West Germany.

Phone: 078 25512. 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.

EMT803

Type: logging recorder, 4-channels running at $\frac{1}{2}$ in/s and $\frac{1}{4}$ in/s, 7in spools, rackmounting max. 24hr recording on triple play tape.

Price: on application.

EVENTIDE (USA)

Eventide Clockworks Inc, 265 West 54th Street, New York NY 10019, USA.

Phone: (212) 581-9290

UK: Feldon Audio Ltd, 126 Great Portland Street, London W1N 5PH.

Phone: 01-580 4314. Telex: 28668.

BD955

Type: digital broadcast delay line for profanity purposes providing a max 6.4s delay with a response of 15kHz, other versions available with 1.6s, 3.2s, delay, and/or 7.5kHz bandwidth. A unique feature is a 'catch-up' mode that gradually extends the delay time to the maximum unnoticeably, after the 'dump' button has been pressed to lose the period in the memory.

Price: £1,232 to £3,321 depending upon frequency response and delay time.

HES (Belgium)

Hes Electronics, Vliegwezenlaan 6, B-1730 Zellik, Belgium.

Phone: 02 465.29.17.

TSV

Type: telephone balancing amplifier, totally automatic, no user controls. Comprises a line impedance self-balancing network using synchronous detector principles, two phase influencing circuits providing

basic rejection over the whole frequency range, a digital sidetone which analyses the output for residual sidetone and attenuates the level when these occur, but with a rapid attack and decay so that the effect is not noticed, and presence networks which for transmit provide a signal similar to that provided by a telephone, and a network to eliminate hum and noise from the exterior voice. Rejection is between 30 and 40dB. Hes also produces racks complete with all the necessary facilities for phone-ins.

Price: on application.

LEEVEERS-RICH (UK)

Leeveers-Rich Ltd, 319 Trinity Road, London SW18 3SL.

Phone: 01-874 9054. Telex: 923455.

Logging Machine

Type: based on Proline 1000 for vertical mounting, 4-channel, $\frac{1}{2}$ in/s, auto changeover, NAB spools for 12 hours recording, preset recording times; wow and flutter 0.5%, frequency response to 5kHz, built in compander for approx 50dB s/n.

Price: about £5,000 for dual transport system.

MICRO-TRAK (USA)

Micro-Trak Corp, 620 Race Street, Holyoke, Mass 01040, USA.

Phone: (413) 536-3551. Telex: 955497.

UK: Lee Engineering Ltd, Napier House, Bridge Street, Walton-on-Thames, Surrey KT12 1AP.

Phone: 09322 43124. Telex: 928475.

Model 6405

Type: stereo disc pre-amplifier, mains powered.

Frequency response: 'RIAA equalisation \pm 0.5%'


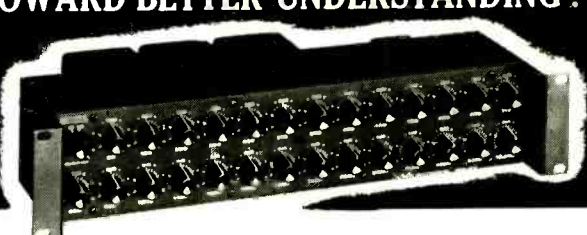
Distortion: 0.05% THD.

S/N: 73dB with 5mV input, input shorted.

Gain: input 5mV for 0dBm output.

68 ▶

TOWARD BETTER UNDERSTANDING . . .

The Model 4240 Active Equalizer is a hybrid of ONE-SIXTH octave filters, which are concentrated in the *speech intelligibility* region between 250 and 2000 Hz, and broader bandwidth filters on either end. The intended application of the Model 4240 is the equalization of sound reinforcement systems employing *voice* as the main program material as in corporate boardrooms, meeting halls, legislative chambers and courtrooms.


Extremely high Q room modes which cause feedback, ringing and loss of intelligibility are excited by these mid-range frequencies. Equalization to suppress these modes using one-third octave or broader bandwidth filters can attenuate other frequencies necessary to *voice intelligibility*. Loss of intelligibility can not be compensated by increased gain.

By comparison the ONE-SIXTH octave filters used in the Model 4240 have TWICE the resolution as one-third octave filters. It is possible to equalize a sound system and affect only HALF as much program material.

The Model 4240 Equalizer is highly cost-effective for these applications since it is built on the same chassis as our one-third octave models. It has 27 filters like the one-third octave units, but 19 are ONE-SIXTH octave and concentrated in the midrange. The broader bandwidth filters on either end are more than adequate to shape the extreme low and high ends of the spectrum.

Our new System 200 Signal Analyzer features field interchangeable, plug-in filters and may be equipped to match the Model 4240 Equalizer making ONE-SIXTH octave adjustment as convenient as one-third octave.

Remember it, Where Voice Clarity is Important



instruments,
incorporated

P. O. Box 698 AUSTIN TEXAS 78767
PHONE AREA 512/892-0752

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

AUDIO SERVICES

AUDIO SERVICES Manufacturers agents for recording studio equipment
Tel: Disley (06632) 2 4 4 2

AHB
ALEXANDER & HUBBARD

8 track 1 inch recorder
Mod. III mixer
Production 6/2 (DISCO) mixer

ON
PERMANENT STUDIO
DEMONSTRATION

g

audio & design
recording

Northern Representation
Full range of equipment
Studio or Mobile Demonstration

SCAMP®

ASC electronic

SOLE Northern Distribution

2 track
Studio Quality
Tape Recorder

KLARK-TEKNIK

statik ACOUSTICS



AGENTS

LOCKWOOD

MAIN DISTRIBUTORS for
North of England
To the recording and public
address industries

LOUDSPEAKERS

-TURNER-

AMPLIFICATION

YAMAHA

Back-line amplification
Sound reinforcement and
Associated Equipment



AGENCY

ACOUSTICS division STUDIO DESIGN CONSULTANTS

surveys using latest IIVIE spectrum analyzer, sound level meter, and
microprocessor audio analyser.

Fully Equipt SERVICE DEPT.

Used Equipment Sales, Part-ex, etc.

AUDIO SERVICE COMPANY 25 SOUTH MEADWAY, HIGH LANE, STOCKPORT SK6 8EJ



Eulipion Audio and FWO Bauch
present our 2nd Great Revox Clinic
on January 31st, 1st February and
2nd February 1980.

- Free while-you-wait service checkout.
- Up to 112 measurements taken on any Revox equipment regardless of age or origin.
- Free computer print out; "Your machines performance". 3 pages of technical data, as measured including 6 frequency response graphs, noise x talk, Wow/Flutter etc.).
- Complete Revox range of equipment and accessories on DEM, including some new additions to the Revox range.
- Mikes, Mixers, Monitors, Cue Boxes etc. on show.
- Revox museum, a selection of Studer Revox machines from the early 1960 E36 to the latest Studer A80.

All this plus informal talks on all aspects of sound recording and reproduction – but please, if you're bringing your machine ring for an appointment slot!

eulipion audio

Hi-Fi Equipment Specialists,
81 Wilmslow Road, Rusholme, Manchester M14 5SU
Telephone: 061 225 4448

EA 7.80

QUALITY REEL TO
REEL & CASSETTE TAPE HEADS + MECHANISMS

QAL THE WORLD'S BEST

MAGNETIC TAPE HEADS
TO N.A.B. MONO &
STEREO STANDARDS.

A MAJOR STEP FORWARD
IN PERFORMANCE FOR
CARTRIDGE MACHINES.

- Reduced "hum" pickup.
- Flat response from 40Hz to 20KHz.
- Improved signal to noise ratio.
- Suitable for I.T.C. Spotmaster, Cuemaster etc.
- EX-STOCK

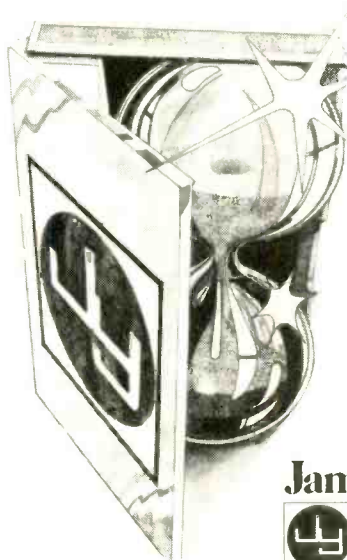


PHONE NOW FOR OUR FULL CATALOGUE OF HEADS AND MECHANISMS.

MONOLITH

THE MONOLITH ELECTRONICS CO. LTD.
5/7 CHURCH ST., CREWKERNE, SOMERSET, ENGLAND. (0460) 74321

Trust James to get it together time after time



We provide a total product package for the industry. Orders of up to 30,000 perfect copies per week from your 1/4" or 1" master present no problem. For smaller runs we can turn your order around in 48 hours.

Design and print of your cassette stationery is part of our service together with choice of shell types and colours.

Full Dolby facilities are available in house. Your inquiries are invited for the manufacture of 8 track cartridges.

James Yorke Limited



Oak House, Northleach,
Gloucestershire.

Telephone: Northleach (04516)

We have a lot to live up to ... and we do.

509

Dolby is a registered trademark of Dolby Laboratories Inc.

SURVEY: BROADCAST ANCILLARIES

Micro-Trak cont'd

Price: \$219.50.

Model 6400/6401

Type: mono and stereo disc pre-amplifiers, mains powered.

Frequency response: three selectable curves.

Distortion: 0.5% THD.

S/N: 60dB.

Gain: input 5mV for 0dBm output.

Price: 6400 mono and \$129, 6401 stereo \$174.50.

MINCOM 3M (USA)

3M, Mincom Division, 3M Centre, St Paul, Minnesota 55001, USA.

Phone: (612) 733-0712.

UK: 3M UK Ltd, PO Box 1, Bracknell, Berks RG12 1JU.

Phone: 0344 26726. Telex: 849371.

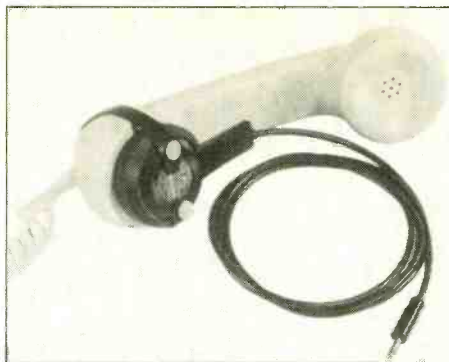
VLR-300

Type: voice logging system using Compact cassette decks running at $\frac{1}{2}$ in/s to provide extended running time (90 minutes). Audio is recorded on one track, timecode on the other. Voice actuated or continuous record, auto record level, heavy duty mechanism. System typically comprises two record decks, and

Ferrograph SP7 delay tape recorder



Ferrograph SP7 4-track logging tape recorder



Shure telephone coupler

one recall deck.

Price: on application.

NEAL/FERROGRAPH (UK)

North East Audio Ltd, Simonside Works, South Shields, Tyne & Wear NE34 9NX.

Phone: 0632 566321. Telex: 537227.

USA: Neal-Ferrograph (USA) Inc, 652 Glenbrook Road, Stamford, Conn 06906, USA.

Phone: (203) 348-1045.

SP7 Logging Recorder

Type: logging recorder based on Ferrograph SP7 with 4-channels running at $\frac{1}{2}$ in/s, and taking NAB spools for 12 hours recording using 3,600ft of tape. Provides auto changeover if the tape breaks or stops, or within 15 mins of the end of the tape. Inputs are balanced, with a single output switchable to any channel for AB comparison.

Price: £1,350.

SP7 Delay Recorder

Type: profanity delay recorder based on Ferrograph SP7 with a redesigned head block providing a loop of tape between record and replay heads. Provides 2s delay at 15in/s, 4s at 7 $\frac{1}{2}$ in/s and 8s at 3 $\frac{1}{2}$ in/s.

Price: £900.

Edit 7

Type: editing tape recorder, replay only with single head, no obstructions in front of the open tape path, space for editing block, single speed, internally adjustable. Edit switch removes power from motors and applies light braking to the reels, dump when operated in run disables the take-up reel drive and auto stop arm, allowing tape to be run off.

Price: £300

Telephone Adaptor Units

Type: a range of four telephone adaptor units approved by the BPO, that interface telephone lines with Ferrograph tape recorders. They do not provide sidetone rejection. Each unit contains a compressor covering the input range 30mV to 2.5V with a 150mV output which compensates for various lines. In addition the RO1 allows the tape recorder speaker output to be fed to the telephone line, RO2 matches the 600 Ω output to the telephone line, RO3 takes a second PO line input (without compression) for recording a second track (such as TIM). RO4 has auto switching which operates tape recorder when the telephone is lifted, and stops it when phone replaced, the only connection being across the telephone line and earth. All units are powered from the tape recorder aux socket.

Prices: RO1, 2, 3 £92.50, RO4 £220.

SOU/2

Type: signal operated switch with variable sensitivity and switchable filters. Interfaces to the Ferrograph aux socket.

Price: £75.

ELC/7

Type: endless loop cassette for reel-to-reel tape recorders, which can be loaded with up to 150ft of standard play tape for 4 minutes recording at 7 $\frac{1}{2}$ in/s, or 300ft of lubricated tape.

Price: £20.

RUSSCO (USA)

Russco Electronics Manufacturing Inc, 5690 E Shields Avenue, Fresno, Cal 93727, USA.

Phone: (209) 291-5591.

Fidelity-Pro/Fidelity-Master

Type: mono and stereo disc pre-amplifiers, -Pro series have additional hi and lo cut and boost filters, mains powered.

Frequency response: within ± 1 dB of RIAA from 20Hz to 15kHz.

Distortion: 0.1% THD.

S/N: equiv to -103dBm input.

Gain: 1 to 100mV input, max output +18dBm.

Price: \$108 to \$215.

SHAREPOINT SYSTEMS (USA)

Sharepoint Systems Inc, 402 Tenth Avenue, Haddon Heights, New Jersey 08035, USA.

Phone: (800) 221-6676.

Upstart

Type: turntable and cartridge machine controller/timer. Unit starts and pre-rolls turntable or reel-to-reel recorder regardless of start-up time, starts and pre-rolls cartridge machine, noiselessly switches on the audio, digitally times the cartridge, while separately timing intro to vocal and time to outro, and removes the audio at the end of the program.

Price: on application.

SHURE (USA)

Shure Brothers Inc, 222 Hartrey Avenue, Evanston, Illinois 60204, USA.

Phone: (312) 866-2200. Telex: 724381.

UK: Shure Electronics Ltd, Eccleston Road, Maidstone, Kent, ME15 6AU.

Phone: 0622 59881. Telex: 96121.

50AC

Type: telephone acoustic coupler using dynamic transducer, which allows the output from a tape recorder to be fed to the telephone without hard-wiring.

Price: \$31.20.

M64/M64-2E

Type: stereo disc pre-amplifiers, also accepts other inputs, mains powered.

Frequency response: within 2dB of RIAA from 40Hz to 15kHz.

Distortion: 1%.

Price: \$81.75.

STUDER (Switzerland)

Studer International AG, Althardstrasse 150, CH-8105 Regensdorf, Switzerland.

Phone: 01 840.29.60. Telex 58489.

USA: Studer Revex America Inc, 1819 Broadway, Nashville, Tenn 37203.

Phone: (615) 329-9576. Telex: 554453.

UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ.

Phone: 01-953 0091. Telex: 27502.

Telephone Hybrid

Type: telephone balancing unit. Unit comprises relay unit which provides switching from telephone line, hold and initial compensation set-up which provide coarse adjustment for major deviations in line impedance (but which only need setting for one particular line), and the electronic unit which includes an electronically balanced hybrid with 20dB sidetone rejection on exchange line, bandpass filters for incoming and outgoing paths, limiter, noise generator.

Price: on application.

Designed for the 1980's, the MTR-90 is a synthesis of the most up-to-date technology and innovation currently available. The new generation tape transport incorporates a pinch-roller-free direct drive capstan with the PLL DC-servo circuitry. Other

features include gapless, noise-free punches, digitally controlled logic, $\pm 20\%$ varispeed, and SMPTE interface access. Comes with a full function remote and available in 16 and 24 track configurations. For further details, please contact us.

OTARI

Industrial Tape Applications
1-7 Harewood Avenue, Marylebone Road,
London NW1 Phone: 01-724 2497, Telex: 21879

Otari Electric Co., Ltd.
4-29-18 Minami Ogikubo, Suginami-ku,
Tokyo 167 Phone: (03) 333-9631,
Telex: OTRDENKI J26604

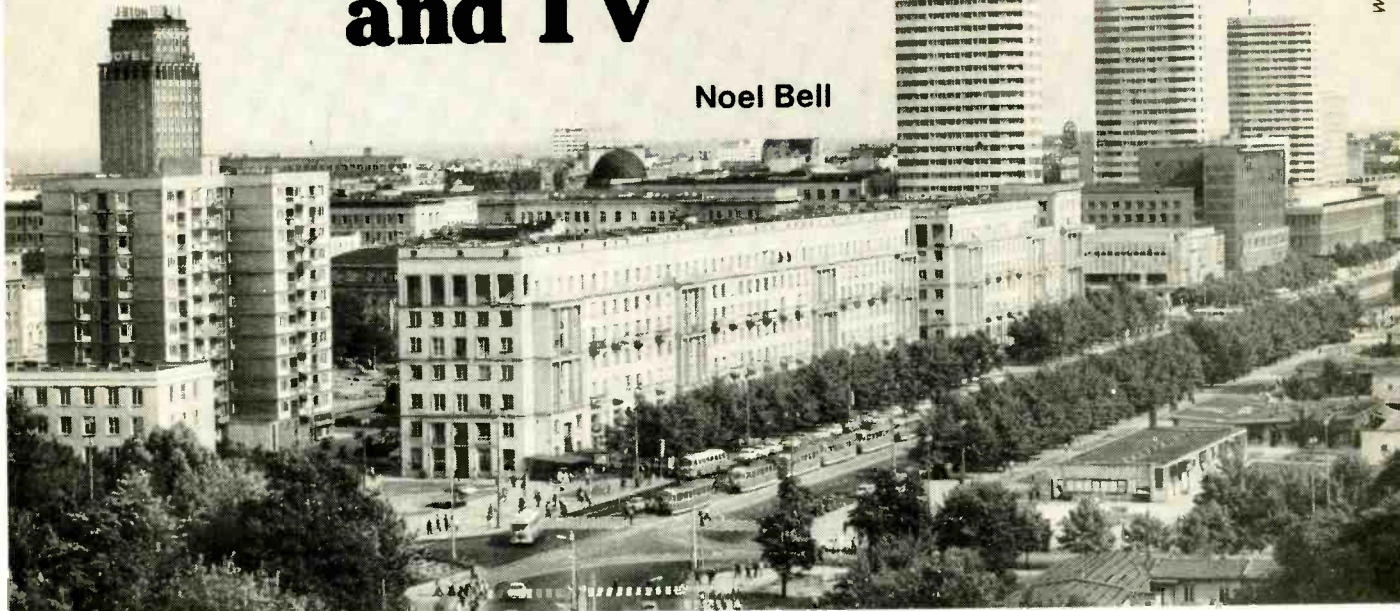
The most advanced 24-track available. OTARI MTR-90.



Polish Radio and TV

Noel Bell

Warsaw City Centre



IN the Spring of last year as Britain was in the midst of unexpected snowdrifts, I purchased extra warm clothing and flew out to the -16°C temperatures and three foot covering of snow, then current in Warsaw, to visit Polskie Radio i Telewizja. My visit was in conjunction with a symposium given by MCI Ltd for broadcasting and sound engineers, held at the invitation of the Polish authorities. Naturally enough though, as well as reporting on the symposium I also took the opportunity to investigate the facilities Polskie Radio i Telewizja currently operate.

But first the symposium. This took place at the Polish television centre in Warsaw and took the form of a demonstration and explanation of the latest multitrack and broadcast techniques and technology, naturally utilising MCI equipment. The symposium was a just reward for MCI who have invested much time and resources in interesting Eastern European countries in their products and who have exhibited at the MWE (International Entertainment Fair) in Poznan over the past three years.

While I had a pleasant plane journey to Warsaw, the MCI team of Dag Fellner, managing director of MCI Ltd in London, and fellow director Siggv Jackson had not only to transport themselves to Warsaw, but also a complete 24-track studio. (Complete that is apart from the usual variegated selection of ancillary equipment.) This was no mean task considering the prevalent weather conditions of deep snow,

It is an infrequent event for the editorial staff to be given the opportunity to personally visit an Eastern European broadcasting organisation. However, last year we were able to see Polskie Radio i Telewizja.

ice and blizzards. The transport itinerary entailed loading an MCI Volkswagen van with the equipment and travelling by road and ferry to Warsaw via Sweden. This journey took four days to complete which was a day longer than expected, and involved travelling from London to Felixstowe, then by ferry to Göteborg in Sweden, followed by a drive through Sweden to Ystad where they joined the ferry to Swinoujscie and reached the Polish Baltic coast. Having arrived in Poland, however, they still had some 700km to travel by road before reaching Warsaw. The last part of the journey was not easy due to the adverse weather conditions and not surprisingly they became stuck in snow near Szczecin, but eventually managed to reach Warsaw but feeling very tired and with Dag suffering from influenza.

The rigours of the journey over, Dag immediately retired to his hotel bed, whilst Siggv supervised the unloading and setting up of the equipment with the aid of a number of willing helpers supplied by the Polish authorities. The following day as I journeyed to Poland in comparative luxury, a very groggy Dag surfaced from his bed and together he and Siggv set about connecting and equalising the equipment, but not without a few difficulties. At this point the wide selection of cables, plugs and

accessories which they had brought came in very handy especially when Dag discovered they had left the patch cords in London. Fortunately, however, they were able to make up enough cords to allow them to carry out a full demonstration. Had it not been for such forethought, though, they would have been scuppered, since suitable connectors just weren't available in Poland.

This wasn't the end of their troubles, though, as the extreme weather conditions were having their effect on the equipment's electronics. The extreme cold in particular was affecting the MCI Autolock SMPTE/EBU synchroniser and the various MCI tape machines, which accordingly were working intermittently. However, as the exhibition room warmed up and recovered from the lack of overnight heating, so the equipment progressively returned to normal reliability. A snap decision was promptly made—from this moment until the end of the symposium, the room had to be kept warm. In actual fact this eventually only entailed about a 6-hour daily heating gap (during the night), since it was arranged that the Polish security officer, allocated to overseeing the wellbeing of the equipment, would switch the heat for the exhibition room on at 4am each morning. From here on the

equipment worked perfectly and the symposium was able to take place without further problems.

The symposium itself was preceded by a reception for the Committee for Polish Radio and Television where the vice-president, Wadim Nikolayew and his colleagues were treated to an in-depth explanation by Dag, through an excellent translator Janusz Sidorenko, and with the aid of chief consultant technical engineer Krzysztof Wojtowicz, of the operational techniques and technology of MCI equipment. Both the reception and the symposium comprised a thorough demonstration of the following MCI equipment; a JH-528LM 28/28 automated console with plasma display, a JH-16 24-track machine, a JH-110-8 8-track machine, a broadcast JH-110A-BC 2-track machine, the Autolocator III, and the Autolock SMPTE/EBU generator/reader/synchroniser. The demonstration was monitored over a pair of JBL 4311 loudspeakers driven by an Amcron D150A power amplifier and in addition an AMS DMX15-80 digital delay unit was utilised. A wide variety of material was available for demonstration including 24-track duplicate master tapes by kind permission of Red Bus Recording Studios in London.

The demonstration illustrated the individual and combined features of the in-line console/synchroniser/tape machines. This included demonstrations of the console's level, mute, and grouping automation for all input/output modules and echo returns; and

illustration of the console's flexibility including operation of the VCA's for level control and MCI's discrete equalisation switching. Turning to the synchroniser this demonstration involved recording the left and right channels of a stereo mix on separate tape machines, then replaying out of sync and waiting for the *Autolock* to re-sync. This particular demonstration created excitement in the Polish engineers who had not experienced such exotic facilities before.

In total over 800 broadcast and sound engineers from both Warsaw and the regional centres attended the symposium and great interest in MCI's equipment was shown by all those who attended. One thing that was apparent, however, was that many of the engineers clearly had not experienced the wealth of functions and possibilities which the MCI package made available.

The conclusion of the symposium was not the end of the demonstration programme, though, as on the day prior to dismantling the 24-track studio, the equipment and a demonstration of its capabilities was filmed for a 20-minute technical news television programme called 'What Happens Today'.

While Dag and Siggy were involved in the intricacies of setting up the equipment for the symposium I took the opportunity on my first evening in Warsaw to investigate the contents of the Polish airwaves. I discovered there were four radio channels and was rather surprised, when arbitrarily tuning into Channel 3 in anticipation of something incomprehensible to my ears, to find that they were playing *Live and Dangerous* by Thin Lizzy. If this was unexpected, however, another surprise was in store. The end of the track arrived, there was silence and then instead of an announcer the album continued. At the end of the Thin Lizzy double album which was played through without a pause the announcer gave details of the track titles, and even read out a translated quote from *Melody Maker*. This was certainly different from the normal British style of radio presentation, and having been somewhat surprised I decided to investigate the other radio channels and spent the next two hours channel hopping, the results of which are shown in Table 1.

Although not able to speak Polish made it difficult to be sure of what some of the programmes were, (and I have since been able to compare my notes with the relevant copy of the Polish equivalent of the *Radio Times*—called *RTV*), Table 1 gives an idea of how cosmopolitan the contents of the radio channels are. A number of general points

emerge. Polish listeners appear to have very similar tastes to British listeners, liking middle-of-the-road music with orchestral backgrounds mainly sung in Polish; disco music with a 'funky' rhythm mainly sung in English, but with some French and Polish records; British and American rock music; jazz; light music; classical music (both records and Polskie Radio's own productions and recordings); poetry and plays; magazine style programmes; sports reports; etc. An examination of my copy of *RTV* showed that Channel 1 is a 24-hour service; Channel 2 opens at 4.30am and closes down at midnight; Channel 3 opens at 6.00am and closes at 1.00am; while Channel 4 opens at 6.00am and closes at 11.00pm. All the channels carry a wide variety of material covering all styles, there being no clear separation of programme content as with the BBC. The quality of production is excellent, although I was rather surprised when listening to the Procol Harum album *Broken Barricades* to hear a number of record blemishes.

I asked Zygmunt Gutowski, manager of Polish Radio and Television's technological information department, whether there was any particular reason for the programming content of Polskie

Radio. He explained that Polskie Radio does not have a completely integrated national network yet and that Channel 1 was only available on LW; Channels 2, 3 and 4, however are available on FM. Accordingly they have to provide a wide spread of programmes so that listeners have as much choice as possible. This format is very popular and it is anticipated that it will remain unchanged when Polskie Radio's national stereo FM network comes into operation, although this is not certain. At present and in anticipation of the stereo network all programmes including outside broadcasts are produced in stereo (all 17 Polish Radio Centres having stereo production facilities), even if they are broadcast in mono on LW or MW. In fact all Polskie Radio's productions have been recorded in stereo since 1975 so there is a considerable archive of stereo material available. Records are all transferred to tape before broadcasting and these tapes are again in stereo. Polskie Radio does not have any practical experience of ambisonics or the Calrec *Soundfield* microphone, which involved me in explaining some of the current research work taking place in the West, but they are extremely keen

on quadrasonics and its major derivatives. They are currently experimenting in this field and were somewhat surprised when I informed them that quadrasonics is commercially dead in the West. In addition to their quadrasonic experiments Polskie Radio are also experimentally broadcasting stereo simulcasts on radio and TV, but currently these are only available in the Warsaw area because of the radio network situation.

Coinciding with the implementation of the national FM network, Polskie Radio i Telewizja will be opening a new radio studio complex in Warsaw which will be an extension to the present television centre. This is expected to be completed early in 1980 and will contain 12 studios including a large orchestral concert hall of some 800m² and 19m high fitted with video tie-lines and studio lighting for simulcasts. The other studios in the complex will range in size from 50m² to 400m².

At present there are two radio centres in Warsaw with more than 20 studios between them, plus special control rooms for outside broadcasts from the Warsaw Philharmony and the Great Theatre of Opera and Ballet. I had the opportunity of visiting the larger of the two radio centres which is housed in a building built in the thirties, but which was adapted for radio use in 1949. This centre incidentally will continue in operation after the new complex is completed. My visit was a most interesting experience for while much of the equipment is rather basic in comparison with current Western practice, this is not exactly unexpected considering Polskie Radio's ambitious investment and development plans for the stereo network and new studio complex, which entails major equipment purchase, thereby rather precluding updating of the present centres until some time in the future.

I began my visit to the radio centre with a look at the main orchestral studio, M1, which had a recording session of Tchaikovsky's *Nutcracker Suite* with the Warsaw, Polish Radio and TV Orchestra underway when I visited it. This studio is some 250m² in size, with a balcony above which spreads round on either side of the conductor's podium. At the opposite end of the studio is stepped staging for brass, woodwind and percussion, with the strings positioned in the front half of the studio, fig 1. The live sound was very clean and had a pleasing ambience. Adjacent to the studio is the control room which is some 30m² and has no direct sight link to the studio, the only link is via video monitoring from a camera above the conductor's podium and talkback facilities. This arrange-

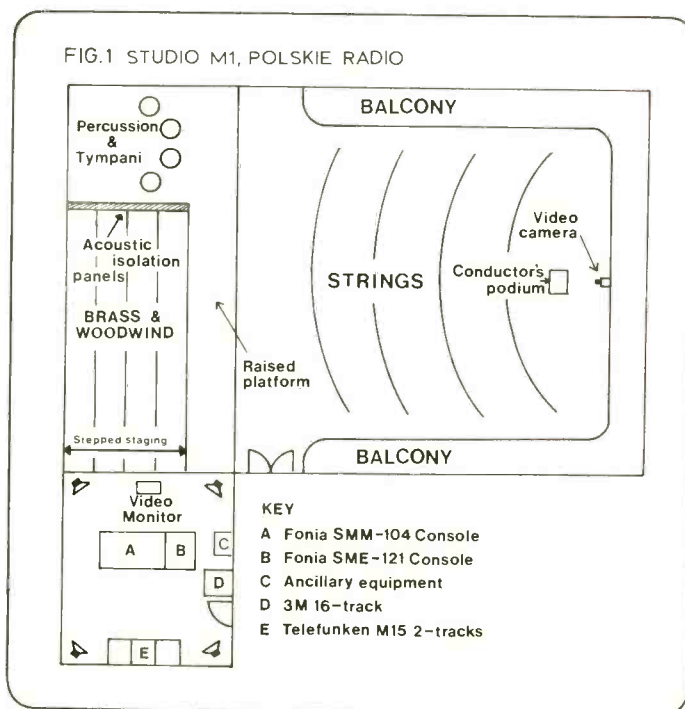
TABLE 1: POLSKIE RADIO PROGRAMMING

Channel 1: Programmes included current affairs, news and information, MOR music sung in Polish, light music and sports reports.

Channel 2: Radio play, news and information, MOR music, and an orchestral concert from Western pressed records.

Channel 3: Thin Lizzy double album *Live and Dangerous*, jazz programme, news and information, Procol Harum album *Broken Barricades*, and a programme of Western pressed records entitled *Music from the Opera*.

Channel 4: Popular music, record review programme of rock and disco music, news and information, and an educational talk.



Polish Radio and TV

ment did not cause any difficulties and seemed to work extremely well in practice.

The layout of the control room can be seen in fig 1, and equipment although rather basic by Western standards comprised the following. Two Polish designed and manufactured Fonia modular consoles mounted alongside each other—a Fonia *SMM-104* console with 16 inputs and quad/stereo outputs, and a Fonia *SME-121* 16/16 console. Fonia incidentally is the Polish State production plant producing radio, TV and recording equipment designed by the Polish Radio and Television Research and

Development Centre. Tape recorders are a 3M 16-track machine with *Selectake* and three Telefunken *M15* 2-track machines using BASF and Agfa tape. The loudspeakers which were laid out in a quad configuration utilise Goodmans drive units of an unknown vintage and sound extremely good although having a slightly dated sound. Ancillary equipment included Dolby A on 16 tracks, AKG 2200 graphic equaliser, EMT 156 PDM compressor and, Shure and Neumann *U87* and *SM68* mics. Studio engineer, Fryderyk Babinski informed me that although the results they are achiev-

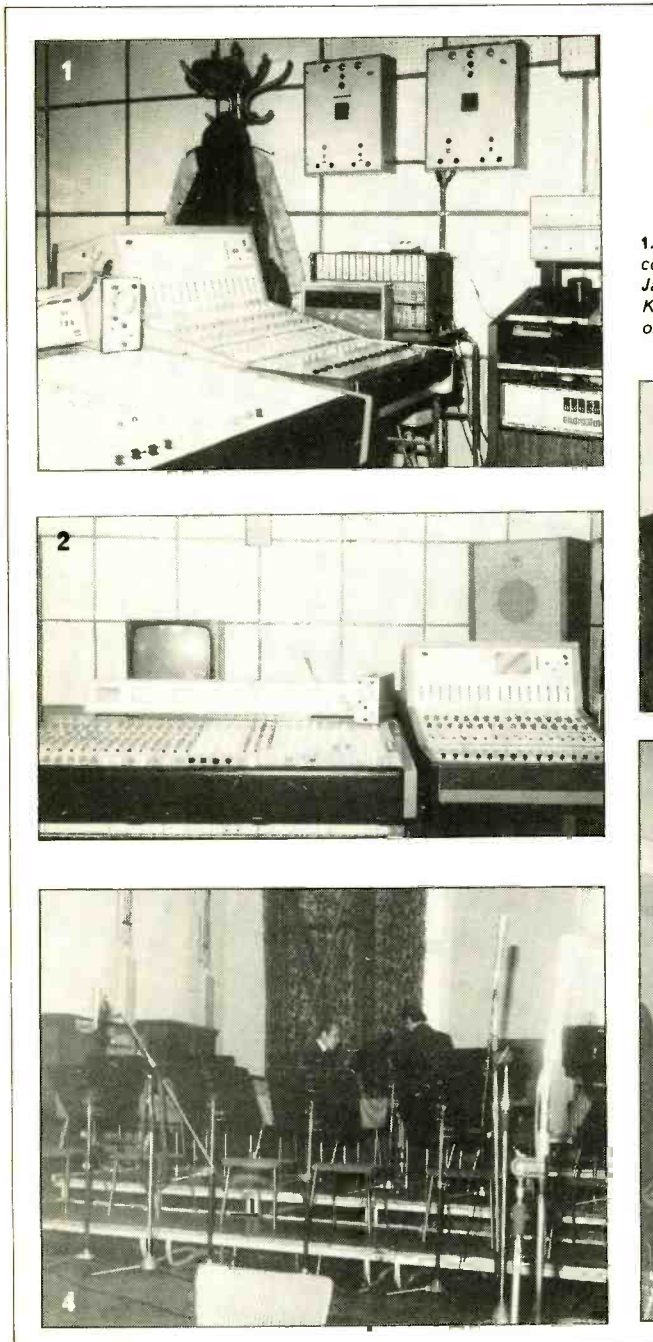
ing are good (I can vouch for that!), they are looking forward to improving on their present high standards when the new studio complex and their new equipment becomes available.

In addition to the orchestral studio I also had an opportunity to see a light music studio and a drama production studio. The light music studio, S1, was of a similar size to Studio M1, but was more of a rectangular shape and boasted a similar array of mics. The control room was much smaller, but did have direct vision to the studio. Equipment included a smaller version of the Fonia *SMM-104* console linked to Telefunken 2-track machines. The drama studio was medium sized and equipped with a wide variety of sound effects props. Its control room was rather cramped and it was equipped with a small Fonia console and Telefunken 2-track machines.

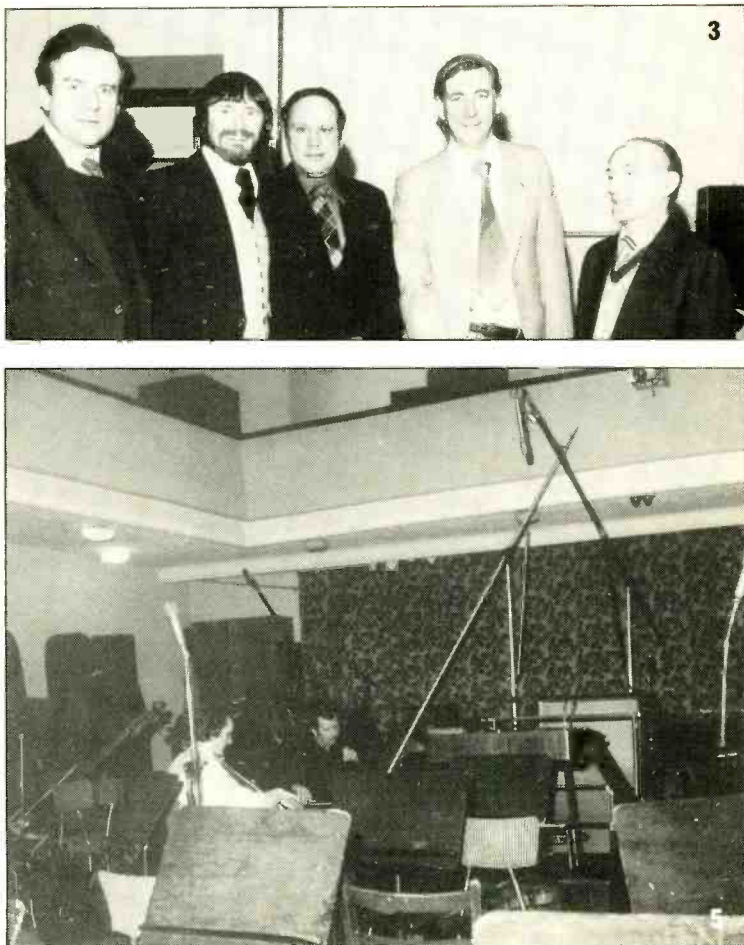
Recording techniques were very similar to current Western practice with perhaps slightly less emphasis on close miking and pan-potting.

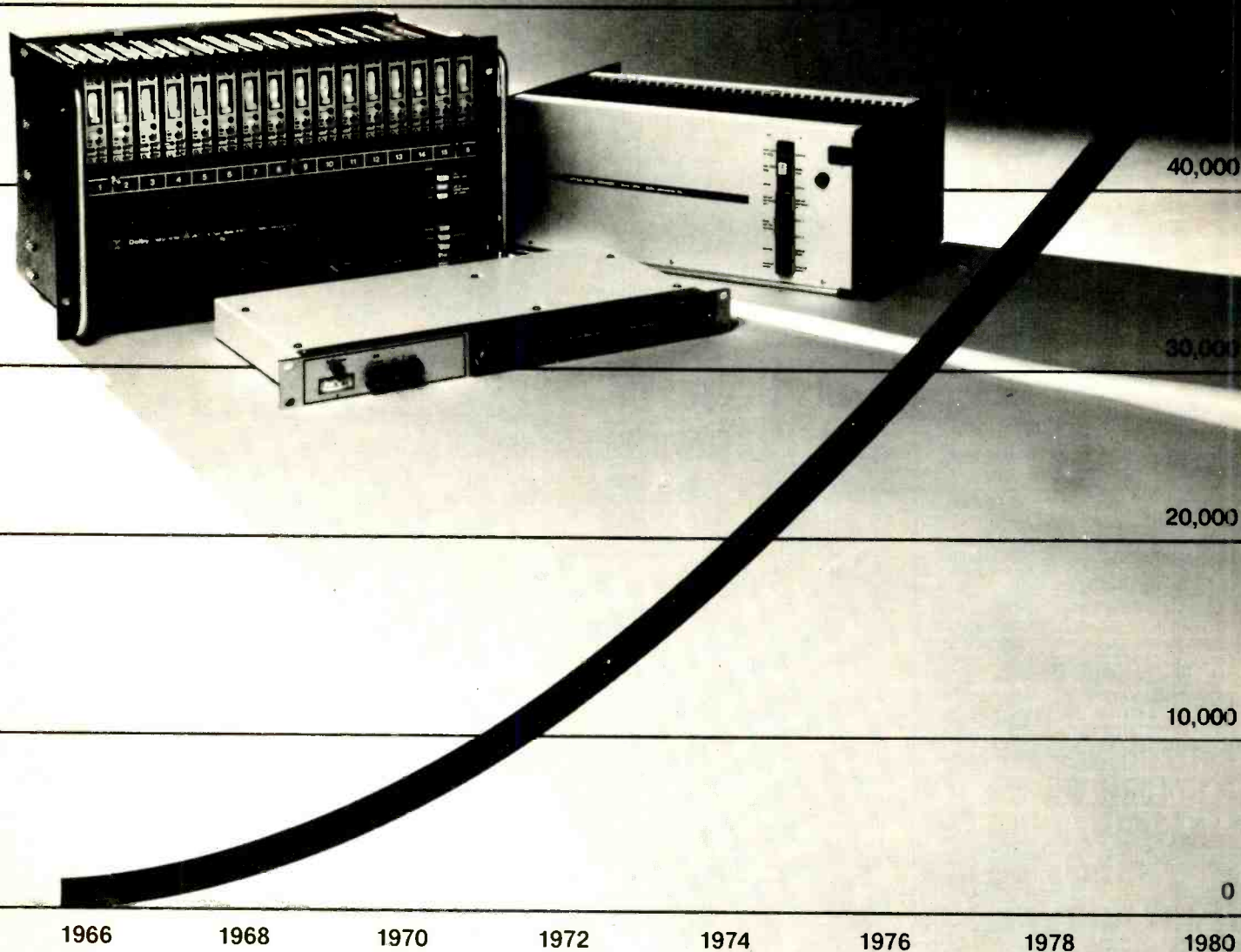
The overall approach appears to be a requirement for a broad, yet well defined sound allowing a feeling of natural ambience to come through. As mentioned above the sound over the studio monitors was perhaps slightly dated, exhibiting a roundness of tone which was pleasing, but which is not quite on par with current Western practice. It was interesting to discover that Polskie Radio is considering JBL monitors for its new studio complex so it would appear they are aware of this potential shortcoming.

In conclusion I would like to thank both MCI and Polskie Radio i Telewizja for the facilities they provided during my visit and in particular I would like to thank Zygmunt Gutowski for his work on my behalf as a translator. As a postscript to the symposium MCI have supplied RTV Poznan with an automated *JH536-32-LM* console, while RTV Szczecin has received an automated *JH524-16-LM* console. It is also likely that further MCI equipment will be supplied in the future. ■



1. Control room of orchestral studio M1 with Fonia consoles and 3M 16-track. 2. Fonia consoles, video monitor and Goodman's loudspeakers in the control room. 3. (L-R) Janusz Sidorenko, Siggy Jackson (MCI), Wadim Nikolayew, Dag Fellner (MCI) and Krzysztof Wojtowicz. 4. Stepped staging for brass and woodwind at the rear of the orchestral studio. 5. View toward the conductor's podium—note the balcony and video camera (top right).





50,000 Tracks Of Dolby Noise Reduction

In November 1979, the number of audio tracks throughout the world equipped with Dolby A-type noise reduction passed the 50,000 mark. No other single form of signal processing has ever been so widely accepted by professional sound engineers.

The reason is simple. Every practical method for storing and transmitting sound adds noise to the original signal. The Dolby system diminishes the noise by 10 dB without audible side effects on any kind of program material. This performance is maintained with any type and amount of noise encountered in normal professional applications. Add proven dependability and world-wide compatibility, and that is why each year more and more professionals continue to choose Dolby noise reduction.

The original Dolby noise reduction unit was the two-channel A301, nearly all of which are still in use. Today there is a range of models for every application, from the MH series for multi-track recording to the CP series for cinema sound reproduction. Together they account for the more than 50,000 equipped tracks now fulfilling the Dolby system's original promise: effective noise reduction combined with complete signal integrity.

DOLBY LABORATORIES, 731 Sansome Street, San Francisco CA 94111, Telephone (415) 392-0300, Telex 34409 • 346 Clapham Road, London SW9, Telephone 01-720 1111, Telex 919109. Dolby and the double-D symbol are trademarks of Dolby Laboratories S 79/2086

 **Dolby**[®]

reviews

ITC 99 series cartridge machine



MANUFACTURER'S SPECIFICATION

(preliminary)

Power: 117/234V ac, 50/60Hz, 40W. Selectable taps for varying line voltage conditions.

Capstan motor: direct drive, crystal referenced, brushless dc servo with ceramic shaft and permanently lubricated ball bearings.

Tape speed: 19cm/s (7½in/s). High speed cue standard on all models at 57.2cm/s (22½in/s).

Wow and flutter: 0.12% or less DIN weighted (better than 1975 NAB standard).

Timing accuracy: 0.1% or better.

Audio output impedance: rated for 600Ω or 150Ω balanced as per 1975 NAB standard. Actual 75Ω for 600Ω connection and 18.5Ω for 150Ω connection.

Audio output level: +25dBm before clipping, selectable ranges to accommodate -16dBm output to +19dBm output.

Amplifier distortion: 0.5% THD measured in accordance with 1975 NAB standard.

System distortion: 1.5% THD or less—record to playback at zero VU recording level.*

Noise: 54dB or better in mono. 52dB or better in stereo.*

Amplifier headroom: replay amplifier +28dB, recording amplifier +24dB.*

Crosstalk between channels: 50dB or better at 1kHz between both programme and cue channels.

Frequency response: ±1dB from 31.5Hz to 16kHz record to playback at -10VU recording level.*

Equalisation: 1975 NAB standard, adjustable to CCIR. 1964 NAB standard may be accommodated. High frequency equalisation control included in recording amplifier with both high and low frequency controls in reproducer.

Head configuration: NAB. Two tracks for mono, three for stereo, separate record and replay heads permit playback monitoring while recording.

Cue signals: NAB. Primary cue (1kHz), secondary (150Hz) and tertiary (8kHz) all standard, open collector sinking signal available externally upon sensing secondary or tertiary cue tones, 200mA at 25V dc capability, optional relay contact closure available.

Logging signals: serial data input and output. 3.35kHz and 3.65kHz internally generated and demodulated for frequency shift keying at a maximum band rate of 300. These tones may be used as auxiliary cue tones.

Audio input impedance: 18kΩ balanced bridging

standard, 600Ω and 150Ω balanced terminating loads may be selected by jumper.

Audio input sensitivity: -23dBm to +10dBm, strappable for the following mid-range (level control knob position) levels -20dBm, -10dBm, 0dBm and +10dBm.

Metering: taut band movement with 'A' scale switch selection for monitoring recording input (automatic switching to playback when not recording), playback, audio bias, cue bias or cue playback. Built-in LED peak indicators follow tape saturation.

Bias amplifier: crystal referenced 256kHz for audio tracks, 83kHz for cue track.

Tape capacity: NAB size AA and BB cartridges. 2s to 16 mins with 1 mil lubricated tape at 19cm/s (7½in/s).

Start time: 100ms.

Stop time: 40ms (transport and electronics) tape travel after stop signal varies according to type of cartridge used and length of tape.

Ambient operating temperature range: 10°C to 55°C.

Remote control: all front panel controls and indicators plus cue erase 1kHz record and defeat and logging tones record.

External connections: XLR audio and latching remote control.

Mounting: table top mounting. Rack mounting shelf optional.

Dimensions (wdh): 216 x 394 x 133mm (8½ x 15½ x 5½in) plus 10mm (¾in) for feet. Playback and recording amplifiers are the same size. Requires 178mm (7in) vertical rack space in ITC rack mount.

Weight: playback 15.9kg (35lb). Recording amplifier 7.7kg (17lb).

*All measurements made using 3M type 157 tape or equivalent and referenced to 1kHz recorded at 160nWb/m in accordance with 1975 NAB standard. Price: mono from £1,039, stereo from £1,147. Stereo record/replay with 'ELSA' £2,418.

Manufacturer: International Tapetronics Corporation, 2425 South Main Street, Bloomington, Illinois 61701, USA.

UK Agent: FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Hertfordshire.

THE International Tapetronics 99 NAB cartridge recorder introduces several completely novel features aimed at improving overall performance of a NAB cartridge tape system, which normally leaves much to be desired. The system, of identical dimensions, comprises two units—the replay incorporating the tape transport, and the replay electronics with separate record unit which is interconnected by a ribbon cable and a separate locking record head cable.

The units are constructed of cast alloy sides, front and back with the top and bottom covers sliding into the sides and locking at the rear. In the base of both units is a mother board into which the individual circuit boards are plugged by printed circuit connectors, the boards are very well supported as they slide into slots in the casting of the machine's sides.

The glass fibre pcbs are of very good quality and include multiturn potentiometers for all user adjustments; however, no component identifications were found for servicing. But this is an early machine with a provisional manual and may well be improved in

production.

The tape transport within the replay section is based on a machined alloy plate, half an inch thick; and secured to this are the dc servo capstan motor, the headblock, the pinch roller and its solenoid. The capstan motor has a large diameter ceramic shaft with the advantage of negligible wear, minimum heat transmission from the motor and no coupling of magnetic fields from the motor in addition to good frictional properties in conjunction with a pinch roller manufactured from a special rubber.

The pinch roller assembly is operated by a chin drive from the specially designed solenoid. The solenoid's plunger has a groove into which ball bearings are attracted in the operated position thus locking the solenoid in position in the presence of a small magnetic field from the coil, and improving overheating problems which can in normal systems alter the coil resistance and thus the pinch roller pressure. Air damping is provided to give smooth and relatively quiet operation.

The headblock is a complex piece of engineering secured to the deck plate by six screws. One edge guide is fitted to the record head and two edge guides to the replay heads. The heads are metal with an aluminium oxide cavity filler. Each is mounted onto a sub-assembly with a long arm for azimuth adjustment and is pivoted for separate front and rear height adjustment. The replay head azimuth is adjusted by a screw at the end of the arm and the sub-assembly is spring-loaded against the azimuth adjusting screw. The record head azimuth is similarly spring-loaded but a motor-driven screw adjusts the azimuth automatically—more about this later.

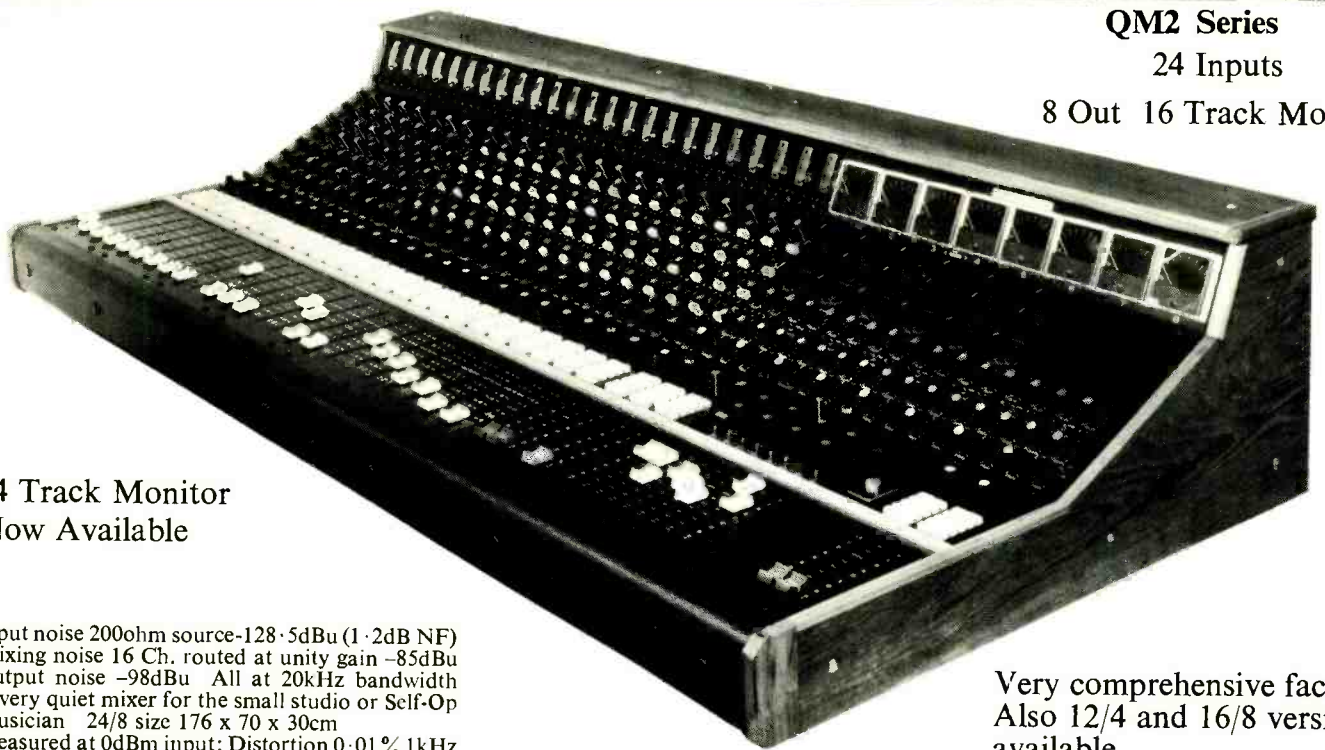
Location of the size AA NAB cartridge within the machine is achieved by leaf springs which press the cartridge down onto the main transport plate and a further leaf spring which presses the cartridge against the right-hand cartridge guide; a quite positive location system.

At the rear of the replay unit the audio outputs are in the form of balanced XLR connections with the mains power input being an IEC connector (with an adjacent properly identified fuse) which feeds the power supply for the complete record/replay system at the rear of the replay unit.

Further features at the rear of the replay unit, all of which are well protected mechanically, are the two connectors for the record unit and a remote control connector. The latter, among other things, allows remote control of all front panel controls which are operational as opposed to test functions. As the system is fully logic controlled incorporating a micro-processor for many functions, only logic levels are required for remote control. Additional connections at the remote connector provide cue outputs, test tone outputs, external cue tone record, FSK logging and other features.

76 ▶

QM2 Series
24 Inputs
8 Out 16 Track Monitor



24 Track Monitor
Now Available

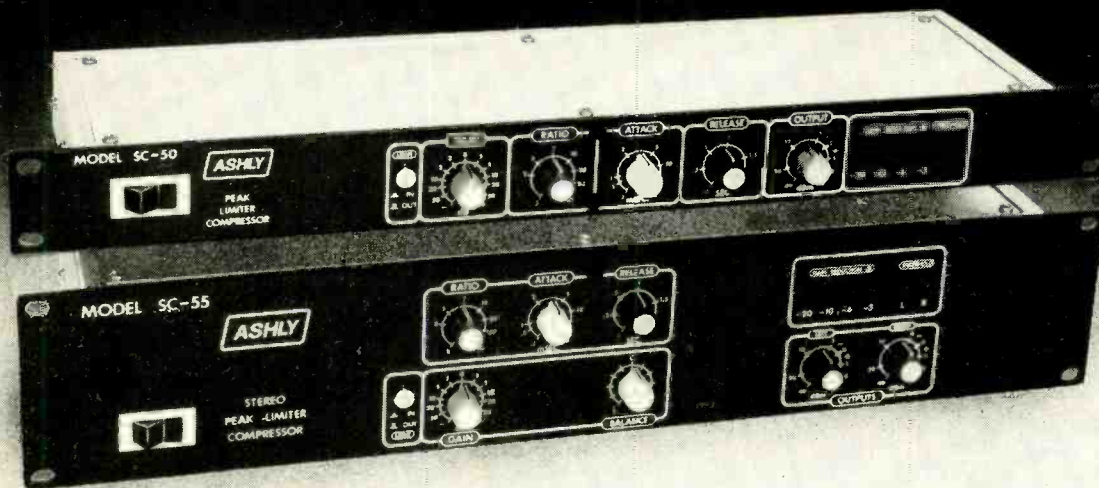
Input noise 200ohm source-128·5dBu (1·2dB NF)
*Mixing noise 16 Ch. routed at unity gain -85dBu
Output noise -98dBu All at 20kHz bandwidth
A very quiet mixer for the small studio or Self-Op
Musician 24/8 size 176 x 70 x 30cm
*Measured at 0dBm input: Distortion 0·01% 1kHz

Very comprehensive facilities
Also 12/4 and 16/8 versions
available

CHILTON MAGNETIC TAPES LTD.

Chilton Works, Garden Road,
Richmond, Surrey, U.K.
Tel: 01-876-7957

Atlantex brings you the best from the USA



SC-66A Stereo 4-band Parametric Eq.
SC-63 Mono 3-band also available.

The Ashly Peak Limiter/Compressors are part of a range of audio control products designed for the working professional. The logical, easy-to-use layout allows full control of all limiting characteristics, and automatic gain control prevents clipping of peaks. Manufactured in the USA, the Ashly range has gained a formidable reputation for reliability and ruggedness that has made them the envy of other manufacturers. Phone today for full specifications and a colour catalogue.

Atlantex

Atlantex Music Limited,
34 Bancroft,
Hitchin, Herts SG5 1LA
Telephone 0462 31511
Telex 826967

SC-50 £209.10

SC-55 £318.52

SC-66A £395.00

SC-63 £246.13

Prices exclude VAT

To the front of the replay unit there are three illuminated pushbuttons which provide start, stop and cue functions plus a small red pushbutton, which in conjunction with the cue button, provides an automatic 'Erase, Locate Splice and Set Azimuth' function (ELSA). This novel feature is microprocessor controlled, initiation of the ELSA function first bulk erasing the cartridge, then recording a tone and automatically setting record azimuth by means of the motor operating a screw in the headblock (previously mentioned), again bulk erasing the cartridge and then proceeding at cue speed to locate the splice.

This is considered a remarkably useful feature, which by setting azimuth automatically, compensates for differences between cartridges and by locating the splice, eliminates dropout problems associated with splices within a recording. Location of splices is achieved by sensing the position of the pinch roller which is moved slightly out of position by the passage of the splicing tape.

Within the replay unit the electronics are mounted on four plug-in pcbs comprising the replay amplifier, the capstan servo, play control logic and the ELSA function board. The single replay amplifier board accommodates both stereo channels, each of which has a preset level potentiometer and both high and low frequency equalisation controls. Additionally there are links for the coarse adjustment of the output level in four steps covering the range -16dBm to +19dBm. Whilst the capstan servo board has a single potentiometer for tachometer symmetry adjustment it too has links for tape speed selection from 15, 7½ or 3¾in/s or remote speed control from an external frequency source which replaces the internal crystal in the servo system.

The play control board includes the 8048 microprocessor and a number of link options (full details of which were not available at the time of writing). Finally the ELSA board has a single control for splice level detection and links for eliminating any desired part of the ELSA cycle.

The record unit on the rear panel has connectors for the cables from the replay unit and XLR audio connectors for the balanced inputs. At the front are two VU meters incorporating red LED peak indicators and illuminated pushbuttons for audio record and secondary and tertiary cue record, plus two potentiometer level controls for the audio signals. Opening a flap at the bottom of the front panel reveals a row of 10 pushbuttons.

Five of these are interlocked and select the signal fed to the VU meters. In the 'normal record' setting the meters monitor the input signal when in the record mode with the tape stopped and switch to the replay signal once the tape is started. Alternatively the pressing of the programme play button fixes the VU meters to the replay signal. The remaining three buttons out of the five allow the VU meters to monitor bias in either the audio channels or the cue channel, or to monitor the cue replay level.

The next two red buttons, with an adjacent red LED indicator, deal with the primary 1kHz cue tone. Pressing the cue defeat button when standing by in the record mode, illuminates the red LED and defeats the primary cue when the machine is started—this is useful for

FIG. 1 ITC 99 REPLAY EQUALISATION RANGE

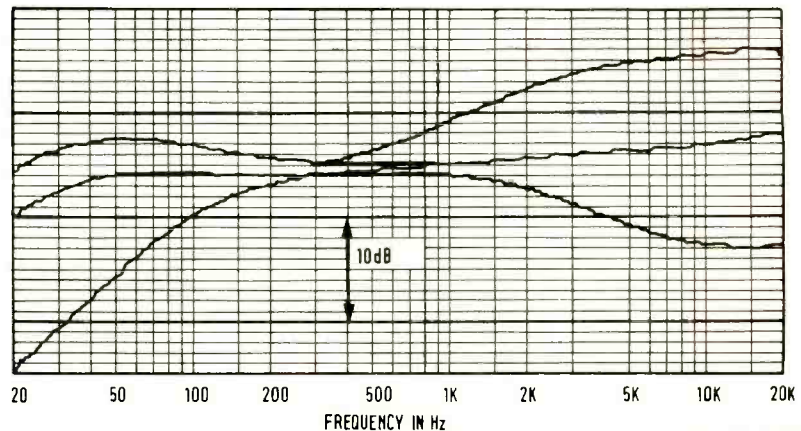


FIG. 2 ITC 99 SPECTRUM ANALYSIS OF MACHINE NOISE

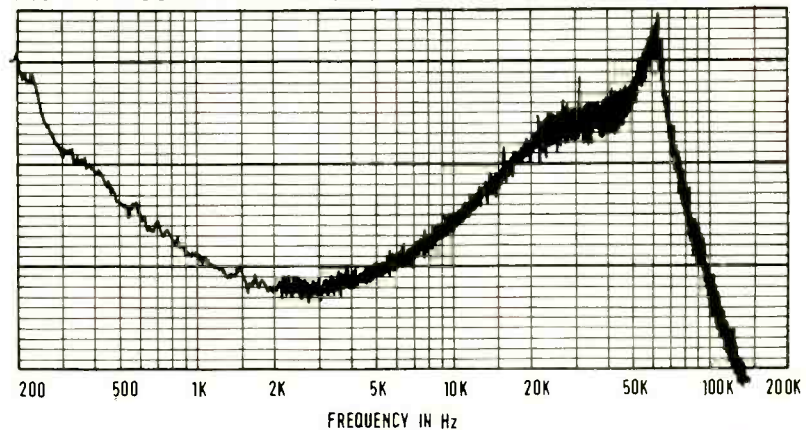
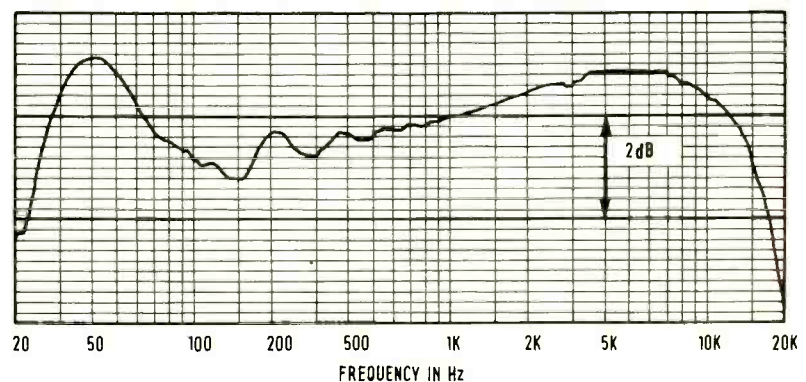


FIG. 3 ITC 99 OVERALL FREQUENCY RESPONSE



	320nWb/m to noise ratio	
	Machine only	With tape
20Hz to 22kHz band limited rms	59dB	53dB
A-weighted rms	69.5dB	55dB
CCIR-weighted rms	62dB	55.5dB
CCIR-weighted quasi-peak	58.5dB	41.5dB

testing purposes when continuous recording is desired. The adjacent button provides a primary cue recording, also for testing pur-

poses. The next door cue erase button has similar uses.

This leaves two green buttons and a small 7-segment numeric display which are associated with the microprocessor controlled internal test oscillator. The two green pushbuttons increase or decrease the number in the display, this number indicates which of seven test functions are being performed. The first four functions provide a 1kHz tone at 0VU, a 1kHz tone at -10VU, a 10kHz tone at -10VU

Penny Dropped?

Switchcraft QG Connectors are money savers

Because we have introduced an attractive new quantity discount structure. Switchcraft are still the same high quality, with unique features such as captive design screws and shell ground terminals.

Two new additions to the range are —

FAS-DISCONNECT

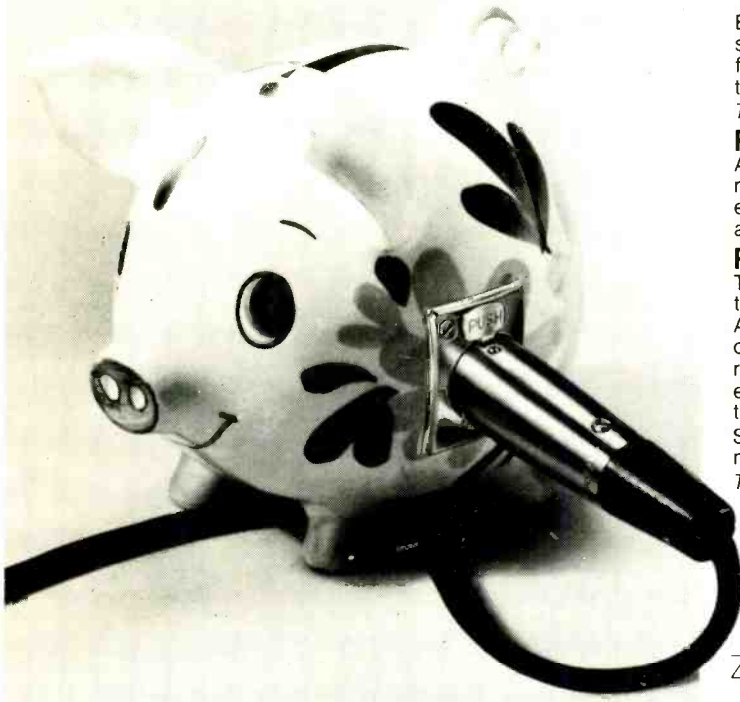
A new non-locking feature allowing immediate disconnection that requires only a 4 lb (1.8 kg) force. Great for that fast equipment take-down in hard to reach, darkened areas. Stage hands never had it so good!

REAR MOUNTED RECEPTACLES

The new Y series QG receptacles permit a complete sub assembly to be soldered, cleaned and tested prior to chassis mounting. Available with PC or solder terminals with lock or Fas-disconnect latching, the Y series offers real savings in production costs. Extra colour trim escutcheons provide functional panel trimming and colour coding.

Switchcraft QG Connectors are just right for audio mixers consoles, PA systems and in computer applications.

The professionals choose Switchcraft QG and save the pennies!



F.W.O. Bauch Limited

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



**MXR 2x15 Band
Graphic Equaliser**



MXR Digital Delay



Revox B77

We are one of the leading equipment sales and installation companies, offering you a friendly and helpful service.

Every item we supply is tested and aligned in our own workshops, and after-sales service is always readily available.

We supply anything from an XLR to a complete 24-track studio installation, at competitive prices to clients that include recording and AV studios, government departments, schools, radio stations, theatres and PA companies in all parts of the world.

Our stocks include AKG, Alice, Allen & Heath, Ashly, Auratones, Beyer, Brenell, Formula Sound, JBL, Keith Monks, MXR, Qad, Revox, Sescam, Shure, Sonifex, Tannoy, Tascam, Teac, Technics, Trident Fleximix, and Uher.

STUDIO EQUIPMENT SERVICES

Studio Equipment Services Ltd.

The Studio Shop, Oxgate Farm,
Coles Green Road, London NW2 7EY
Telephone: 01-452 1979

Quad 404



The GREAT British Spring.



Alice Mixing console

or a 16kHz tone for azimuth setting. Function five provides a frequency step using digitally generated tones for machine alignment. Entering the record mode starts the stepping sequence at 50Hz. It proceeds in 4s intervals through 63, 125, 250, 500Hz, 1k, 2k, 4k, 8k, 10k, 12.5k, 16kHz for frequency response alignment etc. Finally the frequency stays at 3,150Hz for wow and flutter testing.

The sweep may be stopped at any time by using the green buttons to go to 'programme 6' which holds the frequency. Alternatively 'programme 7' provides a slow frequency sweep with the individual tone duration of 8s.

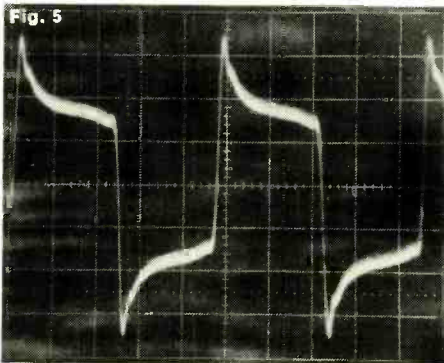
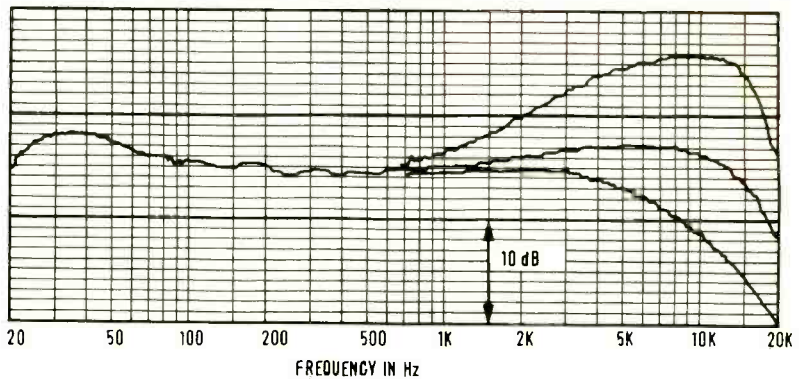
The electronics of the record unit are housed on three pcbs, the record amplifier, record control and the bias amplifier. Like the replay unit all preset controls are multi-turn devices. The record control, which provides the test frequencies, has two controls for setting the 0VU level and the -10VU level with the bias amplifier board having bias level controls for the two audio tracks and the cue track.

Other than the two high frequency equalisation controls, the record amplifier has 10 controls for setting the metering. Both meters have controls for setting normal record and play levels plus a control for setting the audio bias zero indication and for setting the level at which the peak indicator operates. Further controls attached to the left meter allow setting of cue replay and cue bias indications.

The replay performance

Checking the replay frequency response of both channels with a test cartridge showed that

FIG. 4 ITC 99 RECORD EQUALISERS



both channels were within ± 1 dB from 50Hz to 15kHz with respect to the CCIR 70 μ s replay time constant characteristic to which the machine was supplied. Fig 1 shows the replay frequency response using a flux loop with the 'as supplied' frequency response and with the extreme replay equaliser positions which provide a more than adequate range.

As supplied a recorded fluxivity of 320nWb/m gave an output level of +6dBm on both audio channels with the preset control having a range of +4/-13dB about this setting without altering the internal level setting links. Replay amplifier saturation did not occur until a level 21dB above 320nWb/m which is a more than adequate margin. 80 ►

cadac

maintain the standard you know

A full range of flexible consoles with optional DC subgrouping, CARE automation and centralised routing to standard and custom designs for the most demanding applications in music recording, remix, theatre and broadcasting.

proven technical excellence meticulously handcrafted

C. A. AUDIO SYSTEMS LTD., 141 Lower Luton Road, Harpenden, Herts. AL5 5EQ

Telephone: Harpenden 64351 Telex: 826323 Cadac G

CANFORD AUDIO

STARGATE WORKS, RYTON
TYNE and WEAR, NE40 3FX
Tel: RYTON (089422) 4515



AUTOMATIC CABLE TESTER

- * Advanced three way cable tester
- * Operated by single push button—and switches off automatically at end of test
- * Tests for all possible faults—if none present gives OK indication
- * Accepts XLR, PO Jack or Bantam Jack
- *** Unnecessary to bring both ends of cable to tester—making it ideal for fault finding in situ
- * MAKES CABLE TESTING FUN

STUDIO ACOUSTIC TABLES



- * Purpose built for radio, production and TV
 - * Other shapes available, choice of colours
- RING FOR LEAFLETS AND PRICES

SQL SALES LTD present the new
SPR-1 UNIVERSAL SYNCHRONISER
FOR ALL YOUR FILM SOUND TRANSFERS



- * Handles 50Hz AND 60Hz Neopilot sync. pulses
- * Resolves 10Hz, 25Hz and 30Hz Subaudio (SN) pulses
- * Drives and slaves ALL modern portable reel-to-reel recorders
- * Use with Nagra III/IV and our spool adaptors for ALL 6.25mm. AND 3.81mm (SN) sync. tapes.
- * Locks to line frequency, built-in crystal or ext. ref.
- * Unrivalled for versatility and economy

Send for fully descriptive colour brochure to:—

SQL SALES LTD.,

2 HIGH ST., PORT ST. MARY, ISLE OF MAN

Telephone: 0624 - 83 4294

Telex: SQL Sales, c/o 629313 COMCAB G

New York Agent: John Messenger, Apt 2H, 300 W. 23rd St.,
N.Y. 10011 Telephone: (212) 6919567

AVAILABLE SOON — SQL - 3 Control Unit for
Nagra SN recorders (3 mic inputs)

THE GREAT BRITISH SPRING

Spring Reverbs are notorious for the odd sounds that they tend to produce. Many manufacturers have tried to remedy this with limiters, equalisers and the like. In the design of 'The Great British Spring' we took a different approach. We started out with a custom spring unit that sounds good without any fancy electronics. The unit simply has a variable line input and a stereo output.

The six spring paths produce a natural sounding reverberation that is full at the low end and sparkling on the highs. But don't take our word for it. Fifty pence brings you our demo cassette, or drop in and hear it live.



Exclusively from

TURNKEY, 8 East Barnet Rd.
New Barnet, Herts. 01 440 9221.

REW. 114 Charing Cross Rd.
London WC2. 01 836 2372.

Studio Equipment Services,
The Studio Shop, Oxgate Farm,
Coles Green Rd. London NW2. 01 452 1980.

Noise was measured in the output with respect to the reference fluxivity of 320nWb/m both with the machine running without tape, and with an Audiopack cartridge; Table I gives results of the tape recorded with bias only.

The table shows that the machine has a good noise performance, but, 50Hz and 100Hz hum were noticeable at 66dB below 320nWb/m. Another significant factor was that the machine noise has a large high frequency content as shown in fig 2. This noise is such that the tolerances on different A-weighting networks will give significantly different noise readings; the above figures are from a Sennheiser UPM-550 meter which gave 'better' results than the Bruel & Kjaer equipment to the extent of two or three decibels.

The record/replay performance

The best obtainable overall frequency response, shown in fig 3 at -10VU, shows that the machine is virtually within ±1dB from 25Hz to 15kHz—a good achievement for a cartridge machine. As shown in fig 4 the record equalisers have a well chosen range with accurate setting, possibly in view of the use of multi-turn controls. The bias range was more than adequate.

Similarly the saturation point of the record amplifier was excellent with a capability of driving 17dB above the flux required to record 320nWb/m on the Audiopack cartridge.

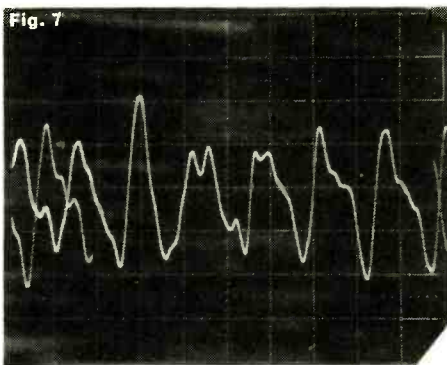
Three per cent third harmonic distortion at 1kHz occurred at a level 2dB above 320nWb/m corresponding to about +4VU which makes a nonsense of the VU meters for use on programme material; these require at least a 10dB margin between 0VU and the three per cent point. However the peak indicators were found to be sensibly aligned and to be fast in operation with a response time in the order of 500µs. In relation to the VU meters it was further noted that their ballistics did not correspond to the ASA standard C16.5 with the movement being far too fast.

The result of recording and replaying a 1kHz squarewave (see fig 5) shows clean reproduction with no apparent ringing.

Crosstalk between the audio tracks and the cue track was inaudible as was crosstalk between the two audio tracks.

Wow and flutter

Measurement of wow and flutter to the IEC peak weighted standard gave consistent results of 0.15% record/replay with different cartridges of different lengths, with the test signal first recorded and subsequently replayed. Using record/replay and single pass, the result was 0.1% and it is suspected that the manufacturer



has published this non-standard type of specification.

My usual practice of doing a spectrum analysis of a 10kHz tone produced fig 6 which illustrates an incredible amount of sideband noise which would spell disaster for a reel-to-reel machine, but I must admit that it's the first time I've done this test on a cartridge machine and I'm not surprised at the result.

In contrast to this the phase jitter between tracks as shown in fig 7 is remarkably good for a 10kHz tone at 7½in/s in a cartridge.

Inputs and outputs

The output level from the machine is set by preset controls and links and is variable over a wide range with the output impedance measured at 84Ω; this is satisfactorily low.

Similarly the input impedance is adequately high at 14.7kΩ, also with a wide range of adjustment of sensitivity.

Summary

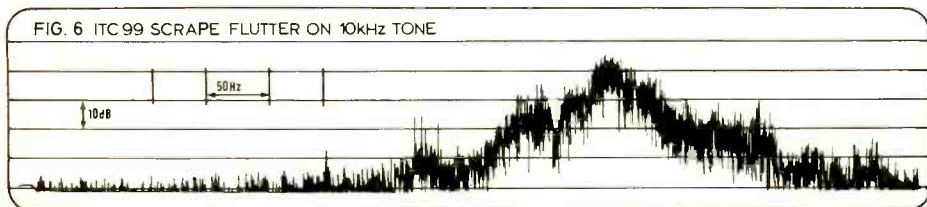
Unfortunately this review had to be completed with considerable haste so I have not touched upon many of the machine's features such as the interface connector and its functions. However the machine was a pleasure to use and I particularly liked the automatic azimuth adjustment feature.

Clearly ITC have taken a new look at the problems of cartridge machines and have succeeded in producing a well built and solid machine with many novel features.

For readers who wish to know more details about this machine and its design I recommend reading the *Audio Engineering Society* pre-print 1556 'A Microprocessor-based NAB Tape Cartridge Machine with Open Reel Quality' presented by John C. Fesler at the November 1979 Convention.*

Hugh Ford

*Price \$2.50, for non-members, from the AES, 60 East 42nd Street, New York, NY 10017, USA.



**JBL PROFESSIONAL DEALERS
IN THE U. K.**

AMES ELECTRONICS
128B Camden Road
London NW1
Telephone: 01 267 6752

UNILET PRODUCTS, Ltd.
Compton House
35 High Street
New Malden, Surrey
Telephone: 01 942 9567

TURNKEY
8, East Barnet Road
New Barnet
Herts EN4 8RW
Telephone: 01 440 9221

ERRICKS' OF BRADFORD
Fotosonic House
Rawson Square
Bradford BD1 3JR
Telephone: 0274 22972

SCENIC SOUNDS EQUIPMENT
97-99 Dean Street
London W1V 5RA
Telephone: 01 734 2812

COURT ACOUSTICS
35 Britannia Row
London N1 8QH
Telephone: 01 359 0956

FORMULA SOUND LIMITED
3 Waterloo Road
Stockport, Cheshire
Telephone: 061 480 3781

H.H.B.
P.A. Hire and Sales
Unit F New Crescent Works
Nicoll Road
London NW10 9AX
Telephone: 01 961 3295

KIRKHAM ELECTRONICS
Mill Hall, Mill Lane
Pulham Market, Norfolk IP21 4XL
Telephone: 037 976 639

REW AUDIO VISUAL
114 Charing Cross Road
LONDON WC2
Telephone: 01 836 2372/7851

For further information contact
HARMAN (AUDIO) UK, LTD.
St. John's Road
Tyers Green
High Wycombe
Bucks HP10 8HR
Tel: 049 481 5331



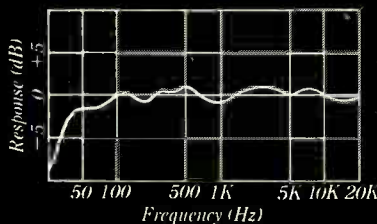
DON'T JUST LISTEN TO MUSIC. MONITOR IT.

Take a tip from the pros. If you want the ultimate in acoustic engineering, equip your system with JBL professional studio monitors.

JBL monitors reproduce the music as played—because today's top performers expect that kind of accuracy. And they get it from JBL. To prove the point: 35 of the top 50 record albums of 1978 were mixed or mastered on JBLs.*

JBL's most sophisticated 4-way monitor is the big 4343—a leader in recording studios worldwide.

Then there's the original JBL compact—the 4311. It's used in studio control rooms everywhere



*On-axis frequency response,
4313 monitor.*

because of its power handling capacity and its superb transient response.

And for the latest advance in compact monitors, there's the 4313. Unmatched stereo imaging, low distortion and flat energy response make it the most versatile professional speaker system available.

Although it's sold only

through professional outlets in the U.S., the 4313 is now available to military personnel through selected audio clubs.

Whatever your needs, JBL has a professional monitor to match it—with flawless accuracy.

James B. Lansing Sound, Inc., 8500 Balboa Boulevard, Northridge, CA 91329.

JBL

**FIRST
WITH THE
PROS.**

*Recording Institute of America Survey.





REW Professional Audio

Now Bigger And Better Than Ever!

Entire 2000 Sq. AT 114-116



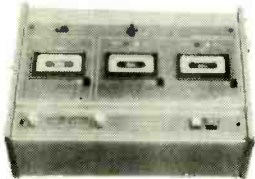
EQUALIZERS

SOUNDCRAFTSMEN

Graphic EQ's.
SAE Parametric EQ's.
JVC SEA 10 (2 x 5 Band),
SEA20 (2 x 7 Band)
TECHNICS SH9010 (2 x 5 Band),
SH9090 (1 x 10 Band)
MXR (1 x 5 Band), (1 x 10 Band),
 (2 x 10 Band)
MM-Pace (2 x Band), **SR271**
 (1 x 27 Band)

WOLLENSAK

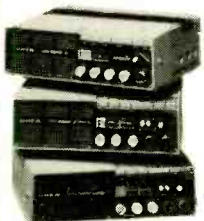
WOLLENSAK/West End Distributors



High Speed Duplicators.
 £1498.90 + VAT. New 2772A/V gives 2 stereo musicassettes in under 4 minutes. Call in for a demonstration.

UHER PORTABLE RECORDERS

As used by most Broadcasting Companies. All models in stock plus every accessory available.



Very low prices, e.g. 4000IC £225 + VAT.
 +SONY + NAKAMICHI + JVC + TECHNICS + TEAC.
 Portables all Off the Shelf.

REVOX

Incredible stocks at ridiculous prices!



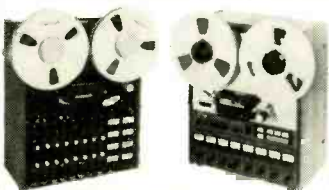
A77, B77, A700 Off the Shelf. High speed, low speed, vari-pitch + all accessories! Ring us now for the lowest price.

TAPE AT TRADE PRICES

Any quantity—same price $\frac{1}{2}$ " tape, 10 $\frac{1}{2}$ " reels.



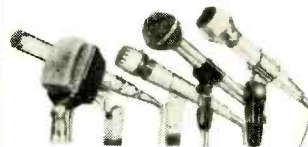
AGFA PEM368 Metal £10.06
 AGFA PEM368 Plastic £7.79
 SCOTCH 207 Metal £9.81
 SCOTCH 207 Plastic £8.03
 MAXELL UD180 Metal £8.89
 TDK AUDUA LB3600 Met £11.40
 TDK AUDUA L3600M Met £9.50
 SONY SLH-11-1100BL Met £10.00
 SONY SLH-740B Metal £6.89
 REVOX 601 Metal £11.80
 REVOX 601 Plastic £10.00
 All above prices exclusive of VAT.
 Also large stocks of 7" & 5" reels.



8 TRACKS $\frac{1}{2}$ " or 1"

Both Tascam and Brenell Recorders in stock for immediate delivery. Plus complete range of 8 Track ancillaries.

MICS-OVER 500 ALWAYS IN STOCK!



AKG We carry every model inc. capacitors
BEYER Most dynamic + ribbons.
CALREC 600 Range.
SENNHEISER Large stocks.
SONY All models.
NAKAMICHI All models.
E.V. Selected range.
SHURE Very large range.
NEUMANN All popular models.
 + Cables, Transformers, Stands, Connectors & Clips, Windshields, etc.

CANNON XLR'S

ANY QUANTITY—SAME PRICE

XLR-3-110 £1.39 + VAT
 XLR-3-120 £1.06 + VAT
 XLR-3-310 £1.85 + VAT
 XLR-3-320 £1.06 + VAT

AMPLIFIERS

HH S500D, TPA, All stage amplifiers.
SAE From 2 x 50 watts to 2 x 400 watts RMS.
QUAD 405, 303, 50E usually in stock.
JPS A fantastic range of budget studio amps.
AMCRON DC 300A, D150A, D60. Trade prices.

SPECIAL OFFER

AMCRON D150A
 £311 + VAT FEW ONLY

TEAC A3340S

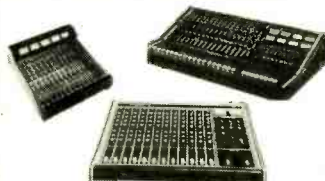


4-channel recorder. Symul-sinc. 10 $\frac{1}{2}$ " reels, 7 $\frac{1}{2}$ " + 15 ips.
NOW BACK IN STOCK
 Price on application.

MIXERS

The widest range under one roof!

From £35-£2500.
 Mixers in stock:
SOUNDCRAFT 16/2, 12/2, 12/4 Series II.
HH 16/2, 12/2.
MM All models.
TEAC-TASCAM Models 1, 2, 3, 5 + Accessories.
CANARY 10/2, 10/4.
HILL 16/2, 10/2.
SONY MX8, MX510, MX650.
Plus ALLEN & HEATH, JVC, UHER, EAGLE, etc.



Plus Echoe's, Phasers, Flangers, Limiters, Noise Reducers, Expanders, Mix-Downs, Mic Stands, Cable Drums, Disco Gear, Chassis Speakers, Studio Monitors, Headphones, Demags, Splicers, etc.



PRO-AUDIO & DISCO: 114-116 Charing Cross Road, WC2 01-836 2372 7851
 Also separate floor of Hi-Fi and Video Phone 01-240 3386/7
TAX-FREE EXPORT & EXPRESS MAIL ORDER: REW House, 10-12 High Street, Colliers Wood, SW19. 01-540 9684 ● Also at 230 Tottenham Court Road, W.1.

The Professional Everything Store

1st Basement Area
 TOTTENHAM COURT ROAD

Lowest Prices Largest Stocks. All Studio & Stage Equipment

EXCLUSIVE FROM REW

SAE A superb range of studio electronics from the U.S.A.



POWER AMPLIFIERS PARAMETRIC EQUALIZERS

Prices exclude VAT

2800 Parametric equalizer 2 x 4 Bands	£408.00
1800 Parametric equalizer 2 x 2 Bands	£239.00
4000 Electronic crossover, stereo, variable frequency ...	£155.00
4100 Digital time delay, stereo	£354.00
2200 Power amplifier 2 x 100 watts	£346.00
2400L Power amplifier 2 x 200 watts	£578.00
2500 Power amplifier 2 x 300 watts	£755.00
2600 Power amplifier 2 x 400 watts	£887.00
5000 Impulse noise reduction unit	£176.00

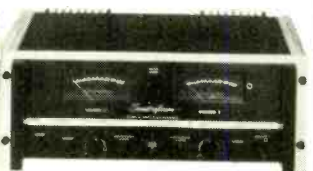
SOUNDCRAFTSMEN

America's Largest Manufacturer of Graphic Equalizers



GRAPHIC EQUALIZERS

2204 2 x 10 Bands	£199.00
2205 2 x 10 Bands, rack mount	£226.00
2209 2 x 10 Bands, rack mount, 600 ohm balanced in/out XLR	£319.00



NEW CLASS H POWER AMPLIFIER

MA5002 2 x 250
 watts, meters

£399.00

Prices exclude VAT

HH DIGITAL MULTI ECHO

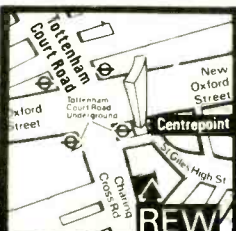
Studio quality at an economic price. Facilities include A.D.T., echo and reverb. Fully electronic (no tapes or discs) giving exceptionally low noise.



Open 9.30 am — 6 pm — 6 days a week
 just walk in — 95% of advertised
 gear available off the shelf

Payment by: Cash,
 Barclaycard, Access,
 American Express, Diners,
 HP (Instant credit possible)

THE LOW PRICE HOT
 LINE 01-836 2372



NEAREST TUBE STATION
 TOTTENHAM COURT ROAD UNDERGROUND

Our business is getting you into business—

MICKS ELECTRONIC WORKSHOP

PROTOTYPE WIRING SERVICE
 PRODUCTION WIRING
 INSTALLATIONS

Phone **MICK ENEVER** on
 Heckfield 450 or Telex 87515 WISCO. G.

AN ACCURATELY MATCHED 8-TRACK STUDIO PACKAGE AT A PRICE YOU CAN'T AFFORD TO MISS . . .

ALLEN & HEATH BRENELL MINI 8 STUDIO PACK- AGE COMPRISING:

MOD III CONSOLE 16 x 8
 HEAVY DUTY POWER SUPPLY
 BRENELL MINI 8 1 INCH COMPATIBLE STUDIO RECORDER
 DIGITAL TAPE COUNTER
 ELECTRONIC VARISPEED UNIT
 PRO-LIMITER

Write or telephone for details today



CATHEDRAL SOUND LTD.,
FOURWAYS, MORRIS LANE,
HALSALL, ORMSKIRK,
LANCS. L39 8SX
 Tel. Halsall (0704) 840328

plan AUDIO

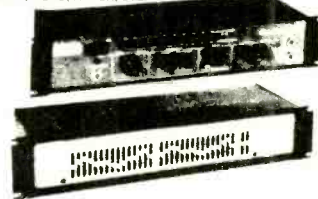
9 South Street, Epsom Surrey
 Telephone Epsom 41822

CAN FIT THE PIECES! TOGETHER FOR YOU!

BUILDING ALTERATIONS, EXTENSIONS, ACOUSTIC TREATMENT, ALL
 DESIGNED AND CONSTRUCTED UNDER FULL SUPERVISION. WE SPECIALISE
 IN HOUSE BASEMENT/ROOM CONVERSIONS AND EXTENSIONS FOR
 MUSICIANS AND SMALL INDEPENDENT STUDIOS WHO REQUIRE A HIGH
 STANDARD OF USABILITY AND FINISH.

● WE ARE PROFESSIONAL DEALERS AND STOCKISTS FOR MANY MANU-
 FACTURERS, INCLUDING: AHB, TEAC, TASCAM, BEYER, AKG, TANNY,
 REVOX, STATIK, KLARK, TECNIC, QUAD, AMPEX, ETC.

AND NOW.... MXR ASHLY SESCOM



● WE CARRY A LARGE STOCK OF TOOLS, CABLE, CONNECTORS AND
 ACCESSORIES, INCLUDING PRODUCTS BY: BOWTHORPE, HELLERMANN,
 BELDEN, RENDAR, NEUTRIK, CLIFF, ETC.

OUR SERVICES INCLUDE

- INSTALLATION, MODIFICATION AND SERVICING OF EQUIPMENT SUPPLIED.
- COMPLETE PACKAGE SYSTEMS COMBINING ALL OR ANY OF THE FOLLOWING: BUILDING DESIGN/CONSTRUCTION, ACOUSTIC DESIGN/CONSTRUCTION, WIRING DESIGN/INSTALLATION, DECORATION DESIGN/CONSTRUCTION, EQUIPMENT SELECTION/INSTALLATION

Classified Advertisements

Advertisements for this section must be pre-paid. The rate is 22p per word, minimum £4.40. Box Nos. 60p extra. Semi-display rates on application. Copy and remittance for advertisements in **APRIL 1980** issue must reach these offices by **14th FEBRUARY 1980** addressed to: The Advertisement Manager, **Studio Sound**, Link House, Dingwall Avenue, Croydon CR9 2TA.

Note: Advertisement copy must be clearly printed in block capitals or typewritten.

Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975:** No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder or (2) it is in a business employing less than six persons or (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

The attention of advertisers is drawn to "The Business Advertisements (Disclosure) Order 1977", which requires that, from 1st January 1978, all advertisements by persons who seek to sell goods in the course of business must make that fact clear. From the above date, consumers therefore should know whether an advertisement relates to a sale by a trader or a private seller.

SERVICES

SHORT-RUN CASSETTE DUPLICATING
Hi-Speed Mono One to One stereo 10-250 36hr service
From 32p each inclusive

Write or phone for rate card to:

SIMON STABLE PROMOTIONS
Inglenook, West End, Launton, Oxon
Tel. 08692-2831 (Bicester)

STUDIO ACOUSTIC DESIGN



Acoustic Technology Limited

58 The Avenue
Southampton
SO1 2TA
Tel 0703 37811

320 Dresser Tower
601 Jefferson
Houston, Texas 77002
Tel 713/759-9768

IF YOU NEED . . .

Cassette Duplication	Empty Tape Spools
Blank Cassettes	White Tape Boxes
1/4" Tape	8T Cartridge Bodies
Leader Tape	Lubricated Tape
Splicing Tape	Head Cleaner Tape

Why not ring us on 01-399 2476/7 and let us quote you for your next requirements.

MEDIATAPE LIMITED, 29a Tolworth Park Road, Surbiton, Surrey.
01-399 2476/7

Our Business is Sound

Cassette and open reel copying in large and small runs.
Blank cassettes supplied between C-3 and C120.
Dolby A and B facilities available.
Studio facilities available for voice-overs.
Design, artwork and print service.
Established suppliers to most of the major publishing houses and Examining Bodies.

SOUND COMMUNICATION



Field House, Wellington Road, Dewsbury, West Yorkshire
WF13 1HF. Telephone 0924 451717

CASSETTE COPYING IN THE MIDLANDS

Specialists in short run productions. Prices from 1p per minute, inc. cassette and library case. Label and inlay card printing, plus services and supplies for film, disc and AV productions.

Write or phone for rate card to:

AUDICORD RECORDS
10 The Chapel, Shilton Road, Barwell, Leics
LE9 8HB. Tel. 0455-47298 (24 hr. answering service)

COUNTY RECORDING SERVICE

From your tapes we cut master discs, demo discs, using our Scully lathe fitted with the latest ME/76 UK stereo disc-cutting system.

Dolby 'A', Dolby 'B' and DBX Noise Reduction.

Telephone Bracknell (0344) 54935.

London Road, Binfield, Bracknell, Berks, England

★A quality pressing and duplication service provided to studios, etc. Complete with cutting, processing, labels, sleeves, art work, inlays, etc. Minimum order for LPS—250, singles—500, cassettes—250. Example price for complete 46 minutes cassette to include mastering, printed label and library case, on Agfa tape—74p each plus VAT. For further details: SRT Record and Tapes Ltd., 01-446 3218. X

CASSETTE FAST-COPYING

Stereo or Mono. High Quality. Prompt Personal Service. Also bulk supplies of excellent virgin cassettes.

SOUND CASSETTE SERVICES Ltd.

P.O. BOX 2, GERRARDS CROSS, BUCKS.
Tel. 02813 84409

TAPE COPYING SERVICES

We specialise in short run cassette duplication.
NO JOB TOO SMALL
Fast turnaround, reliable service
LOW COST
STEREO—MONO—PULSED
01-723 6301 (Baker Street)

HIGH SPEED CASSETTE COPYING IN MONO OR STEREO AT COMPETITIVE PRICES

Long or short runs.
Blank cassettes supplied in bulk.
A growing reputation for reliability.

MORARD SOUND PRODUCTIONS
THORNTON HEATH, SURREY
Telephone 01-689 7424

★Pressings of classical quality (colour also) promptly manufactured from your Master tapes. Sleeve printing, mailing service. Studio or mobile units for Master recording. Specify requirements to Mike Bull, Sound News Studios, 18 Blenheim Road, London W4 1ES. Tel. 01-995 1661. C

SPR

SPEECH RECORDING
CASSETTE DUPLICATING
OPEN-REEL DUPLICATING
LANGUAGES/AUDIO-VISUAL

SPEECH-PLUS RECORDINGS LTD

32, PAGES WALK, SOUTHWARK, LONDON SE1 4SB.

01-231 0961/2

FOR SALE—TRADE

WITH 38 YEARS' EXPERIENCE IN THE DESIGN AND MANUFACTURE OF SEVERAL HUNDRED THOUSAND TRANSFORMERS WE CAN SUPPLY:

AUDIO FREQUENCY TRANSFORMERS OF EVERY TYPE

YOU NAME IT! WE MAKE IT!

OUR RANGE INCLUDES

Microphone transformers (all types), Microphone Splitter/Combiner transformers, Input and Output transformers, Direct Injection transformers for Guitars, Multi-Secondary output transformers, Bridging transformers, Line transformers, Line transformers to G.P.O. Isolating Test Specification, Tapped impedance matching transformers, Gramophone Pickup transformers, Audio Mixing Desk transformers (all types), Miniature transformers, Microminiature transformers for PCB mounting, Experimental transformers, Ultra low frequency transformers, Ultra linear and other transformers for Valve Amplifiers up to 500 watts, Inductive Loop Transformers, Smoothing Chokes, Filter inductors, Amplifier to 100 volt line transformers (from a few watts up to 1000 watts), 100 volt line transformers to speakers, Speaker matching transformers (all powers), Column Loudspeaker transformers up to 300 watts or more.

We can design for RECORDING QUALITY, STUDIO QUALITY, HI-FI QUALITY OR P.A. QUALITY. OUR PRICES ARE HIGHLY COMPETITIVE AND WE SUPPLY LARGE OR SMALL QUANTITIES AND EVEN SINGLE TRANSFORMERS. Many standard types are in stock and normal dispatch times are short and sensible.

OUR CLIENTS COVER A LARGE NUMBER OF BROADCASTING AUTHORITIES, MIXING DESK MANUFACTURERS, RECORDING STUDIOS, HI-FI ENTHUSIASTS, BAND GROUPS AND PUBLIC ADDRESS FIRMS. Export is a speciality and we have overseas clients in the COMMONWEALTH, E.E.C., U.S.A., MIDDLE EAST, etc.

Send for our questionnaire which, when completed enables us to post quotation by return.

SOWTER TRANSFORMERS

Manufacturers and Designers

E. A. SOWTER LTD. (Established 1941), Reg. No. England 303990

The Boat Yard, Cullingham Road, Ipswich IP1 2EG,
Suffolk. P.O. Box 36, Ipswich IP1 2EL, England.

Phone: 0473 52794 & 0473 219390

FOR SALE—PRIVATE

★LR56 Tape Ex-Recording Studio. 5 3/4 in reed 900ft £1.20, 8 1/4 in reels 1,700ft £2.20. Boxes 3in Message tapes 550ft 20p. R. Southern, 551 Chorley Old Road, Bolton, Lancs. B

★Flight cases in stock for Revox, Teac, Tascam and most instruments and amplifiers. Sound Enclosures (0432) 51831. B

★Going 8-track? Up to £650 trade-in on your Teac 3340 against a Tascam 80-8 or Brenell Mini 8. Buzz Music (0432) 55961. B

★Teac, Revox, Tascam, Brenell. Excellent prices. Your unwanted musical equipment welcomed in part exchange. Buzz Music (0432) 55961. B

★Ruvido Faders 10K log type 1021 1000 off 70p each. Tel. 01-543 0179 (24 hours). B

★Neve 20/4 mixing console £12,000. Lindsay 24-channel automated AP1 mixdown console £20,000. Solid State Logic SL4000 computer system with floppy disc storage, keyboard, T.V. display. Needs tape interface system. £10,000. All plus V.A.T. Tel. 01-995 6472. Highlife Production, Heathfield Terrace, London, W.4. B

★Miniature bridging transformer, type 4567. Outstanding performance with small size. 10K to 10K for levels up to +20dBm. Mumetal screening can, 33mm diameter, 22mm high. Leaflet with full details on request. Sowter Transformers, P.O. Box 36, Ipswich. Telephone (0473) 52794 and 219390. B

★Add accurate level control to your mixer with the Cathedral LA3 comp/limiter module. Excellent performance at moderate cost. Build your own mixer with Cathedral low noise channel modules dispatched post free to any part of the world. Cathedral Sound Ltd., Fourways, Morris Lane, Halsall, Lancs L39. Tel. Halsall (0704) 840328. X

★Yorkshire Erricks of Bradford. Tascam, JBL, Bose, AKG, Beyer, Calrec, Revox, Ferrograph, Spendor. Sales, servicing, exchanges, leasing. Bradford (0274) 22972 (Paul). X

★16-track recording equipment for sale: 16-track 2in Scully Model 100 £4,500; 24 x 8 Midas Recording Console £6,000. For further information contact Brad Grisdale on 836 7608. B

FOR SALE:

One optical recorder 35mm 'Klang Film' type KLF 552d complete set of 4 cartridges and one Electronique type Klazo 64d, working perfectly. LIT 11,000,000 + IVA (14%)
One Optical Recorder 16mm 'Bauch Auricon' type RM30E complete with Electronique type NR4154A, almost new LIT 5,500,000 + IVA (14%) Write to:
MALANINNO-Y.TACCONA 71 MONZA (MI) 20052 - ITALIA.

★Wollensak cassette fast copier, imported by C.A.V.A. Ltd., cost less and have full service/spare back up. Mono or stereo copiers, new at £999 plus V.A.T. Contact Yates, C.A.V.S. Ltd., 01-363 6125. E

Power supply for Neumann U67 microphone. Telephone 0295-75-424. B

WANTED

★Wanted, Revox and Teac tape recorders. Best prices paid. R.E.W. Professional Audio. 01-836 2372. X

★Power supply for Neumann U67 microphone. or U67 microphone wanted. Telephone 0295-75-424. B

STUDIO FACILITIES

★Fanfare Records. Tape-disc pressings, demo's masters, any quantity. Studio/mobile Neumann disc cutter. S.A.E. brochure. 1 Broomfield Close, Rydes Hill, Guildford, Tel. 0483 61684. X

★Vinyl pressings from your tapes. Labels. S.A.E. for list. Deroey Records, P.O. Box 2, Morecambe, Lancs. X

★Disc Cutting master and demos, pressings, cassettes, mobile recording studio. Free brochure. TAM Studio, 13a Hamilton Way, London N.3. Tel. 01-346 0033. X

SITUATIONS VACANT

★Expanding 16-track studio in rural position near London seeks reliable freelance engineer possibly full-time. Flatlet could be included. Write Box 823 c/o Studio Sound. B

SOUND TECHNICIANS

Yorkshire Television require two Sound Technicians with a background in Television, Film, Recording Studios or similar. The successful applicants will work on a wide variety of programmes, including Drama, Light Entertainment and Outside Broadcasts. An interest in music is essential. Salary according to experience.

Applications in writing to:-

The Personnel Executive
Yorkshire Television Limited
The Television Centre
Leeds LS3 1JS



YORKSHIRE TELEVISION

Member of the Trident Television Group

SPECIAL INTERNATIONAL EDITION FROM STUDIO SOUND

LIMITED EDITION



Studio Sound presents a special edition focused on the recording industry — worldwide.

In-depth reports of the latest developments and the current state of the art of recording from 14 different geographical areas from around the world are featured. Included is information on the music and live entertainment markets plus announcements from manufacturers and distributors giving details of their up to date product lines or services making this an issue not to be missed.

If you wish to purchase a copy of this Special International Issue, please fill in the coupon and return it with the correct remittance.

Surface rate worldwide (including £1.00 cover price) £1.40. Airmail (including cover price) £3.00. Cheque or International Money Order.

Return coupon to: Studio Sound Subscription Department (Ref: Int.), Robert Rogers House, New Orchard, Poole, Dorset, England BH15 1LU.

Please send me copy/copies of the International Issue. I enclose a cheque/postal order for

Name

Company

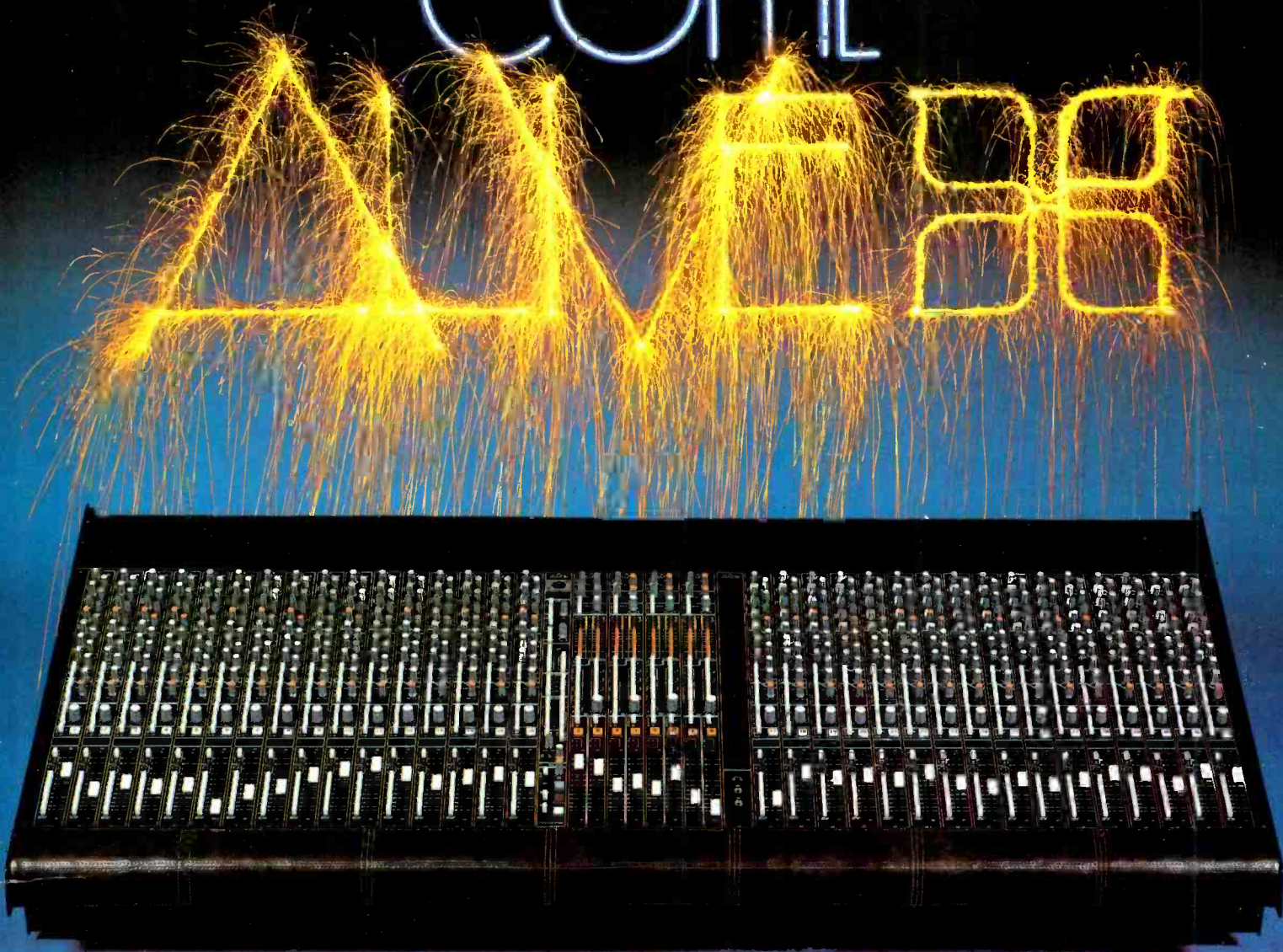
Address

INDEX TO DISPLAY ADVERTISERS

A	A.K.G. Acoustics 17	G	Granet Communications 62	O	Orange County Electronics 6
	Alice (Stancoil) Ltd. 4				Otari 69
	Aphex 22, 23	H	Harrison IBC	P	Plan Audio 83
	Argents Keyboards, Rod 24		HH Electronics 53		Plus 30 8
	Atlantex Music 75	I			Pro Audio 45
	Audio & Design Recording 27		I.T.A. 5, 7, 16, 55		Protex Fasteners Ltd. 14
	Audio Developments 14, 20	J		R	
	Audio Kinetics 14		JBL 80, 81		REW 82, 83
	Audio Service Co. 67	K		S	
B			Klark Teknik OBC		Scenic Sounds 31, 61
	Bauch, F. W. O., Ltd. 9, 11, 13, 15, 18, 21, 77	L			Seltech Equipment 24
	Buzz Music 20		Lee Engineering 18		Shure Electronics 25
C			Lcevers-Rich Ltd. 19		Solid State Logic Ltd. 43
	C. & A. Audio Systems 78		Lexicon Inc. 10		Sonifex Sound Equipment 6
	Canford Audio 79		Lockwood & Co. 24		Soundcraft Electronics 51
	Cathedral Sounds Ltd. 83	M			SQN 79
	Court Acoustics 29		Magnetic Tapes Ltd. 75		Steven, John A. 12
D			MBI Ltd. 35		Studio Equipment Services 77
	Dolby Laboratories Inc. 73		Mick's Electronic Workshop 83		Surrey Electronics 62
	Dominus 60		Midas IFC		Switchcraft 51
E			Monks, Keith 65	T	
	Eulipion Audio 67		Monolith Electronics Co. 67		Trident Audio Developments Ltd. 63
F			Mustang Communications 18		Turnkey 37, 58, 79
	Feldon Audio 39		MXR Innovations 46, 47	W	
	Formula Sound 16	N			White Instruments Ltd. 66
			Neal Ferrograph 59	Y	
					Yorke, James 67

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 £11.60. All enquiries to: Subscription Department, Link House Publications Ltd., Robert Rogers House, New Orchard, Poole, Dorset BH15 1LU. Tel. Poole (02013) 71171. Published by Link House Magazines (Croydon) Limited on behalf of the proprietors Link House Publications Limited, Robert Rogers House, New Orchard, Poole, Dorset BH15 1LU and printed by Arthurs Press Ltd., Woodchester, Stroud, Glos. GL5 5PB.

COME



Now, a high performance studio quality Harrison console designed for LIVE PERFORMANCE. The Harrison NO COMPROMISE philosophy has been carried through every aspect in the design of the ALIVE console. Standard features:

- Harrison transformerless microphone preamplifiers.
- Automated VCA Faders with Groupers.
- 8 VCA matrix sub groups.
- 3 band parametric EQ with high-pass.
- Direct communications interface.
- 4 main stereo output pairs.
- 8 auxiliary send busses.
- 8 built-in 16 segment electronic LED VU meters.
- 32 or 24 channel mainframes and extender frames.
- 3 point overload LED indicator on each I/O module.
- Road proof lightweight aircraft aluminum frame.

Harrison

HARRISON SYSTEMS, INC. • P.O. Box 22964, Nashville, Tennessee 37202 • (615) 834-1184, TELEX 555133

You should know it's the best.

By now you should know that Klark-Teknik has the reputation for manufacturing the ultimate in signal processing products.

Each one represents the very best in its specific technology.

Our substantial research and development commitment ensures not only this but also maximum operational flexibility.

All our products undergo an exhaustive test procedure which involves visual checks, bench

alignment, burn-in period and, finally, performance verification using a music source.

Whoever you are, wherever you are, insist on the best.

Klark-Teknik.

As if you didn't know.



KLARK-TEKNIK

For more information and 'Independent Technical Reviews' of our complete range, contact: Klark-Teknik Research Limited, Kidderminster DY11 7RE, Worcs., England. Tel: (0562) 741515 (5 Lines) Telex: 339821



1. DN70 digital time processor

The latest technology in digital conversion puts this delay line in a class of its own.

2. DN71 A low cost, add-on sound effects generator to compliment the DN70.

3. DN34 analogue time processor

The most versatile delay-based sound effects unit on the market today.

4. DN27 and DN22 The most respected graphic equalizers throughout the world. Often copied, never equalled.

Worldwide Distributors: AUSTRALIA: Klarion Melb, Syd., Bris., Adel.
BELGIUM: S.E.D. Sprl, Bruxelles. CANADA: Omnimedia Corp. Quebec.
DENMARK: SC Sound, Copenhagen. FRANCE: R.E.D., Studio Centre, Paris.
GERMANY: Hausmann Concert Electronic, Berlin. HOLLAND: Pieter Bollen, Eindhoven.
ITALY: Laboacustica Srl., Roma. JAPAN: Hibino Electro Sound, Tokyo.
NEW ZEALAND: General Video, Wellington. SINGAPORE: Ultralinear International.
SOUTH AFRICA: Colosseum Acoustics, Johannesburg. SPAIN: Mabel Sdad, Barcelona.
SWITZERLAND: Dr. W.A. Gunter, Zurich. U.S.A.: Hammond Industries, Syosset, N.Y.