September 1977 50p

studio sound

AND BROADCAST ENGINEERING

MOBILE RECORDING

A NEW STANDARD OF EXCELLENCE

Harrison 4032 and 3232 Master Recording Consoles

NO COMPROMISE

Harrison

Information, sales and service are available through our selected professional audio distributors:

AUSTRIA, SWITZERLAND AND EASTERN EUROPE: Studer International AG (Switzerland) Tel. (056) 26 80 35. Telex 53682

BENELUX: Heijnen B. V. (Netherlands) Tel. (08851) 1955. Telex 48039

CANADA: Studer Revox Canada Ltd. Tel. (416) 423-2831 Telex 06-23510

DENMARK: Quali-Fi A/S Tel. (01) 631711. Telex 16527

FAR EAST: Studer-Revox Hong Kong Ltd. (except Japan) Tel. 5-278571 Telex 84640

FINLAND: Insco OY Tel. (90) 471123. Telex 121836

FRANCE: Studer France Tel. 583 58 52. Telex 26474

GERMANY: Franz Vertriebsgesellschaft mbH. Elektronik, Mess- und Tonstudiotechnik (EMT) Tel. (07825) 312. Telex 754319

GREECE: Electronica G. E. Tel. 3613096. Telex 214688

ITALY: Audio Products International Tel. (02) 27 33 96. Telex. 32402

JAPAN: Shinoshi Manufacturing Corp. Tel. 08-460-6052

MEXICO: Ingenieros en Electronica Asociados S.A. de C.V. Tel. 5-20-91-34 y 5-20-45-91. Telex 1775756

SPAIN: Neotecnica, s.a.e. Tel. 242-0900. Telex 22099

UNITED KINGDOM: Scenic Sounds Equipment Tel. (01) 935-0141. Telex 27989

FACTORY: Harrison Systems Post Office Box 22964 Nashville, Tennessee 37202 Tel. (615) 834-1184. Telex 555133

EXPORT AGENT: Audio Systems International 146 North Orange Drive Los Angeles, California 90036 Tel. (213) 933-2210. Telex 698645 or 555133

EDITOR
RAY CARTER

ASSISTANT EDITOR
MEL LAMBERT

EDITORIAL PRODUCTION
DRUSILLA DALRYMPLE

CONSULTANT
HUGH FORD

SECRETARY
WENDY SMEETH

EXECUTIVE ADVERTISEMENT MANAGER
DOUGLAS G. SHUARD

ADVERTISEMENT MANAGER
TONY NEWMAN

THE LINK HOUSE GROUP

Editorial and Advertising Offices:
LINK HOUSE, DINGWALL AVENUE,
CROYDON CR9 2TA, ENGLAND
Telephone: 01-686 2599
Telex: 947709
Telegrams: Aviculture Croydon

STUDIO SOUND is published on the 17th of the preceding month unless that date falls on a Sunday, when it appears on the Saturday.

SUBSCRIPTIONS
All enquiries to: Subscription Dept, Link House, 25 West Street, Poole, Dorset BH15 1LL. Poole (02013) 71171.

DISTRIBUTION
STUDIO SOUND is available without charge to qualified readers; these are directors, managers, executives and key personnel actively engaged in the sound recording, broadcasting and cinematograph industries in any part of the world. Non-qualifying readers can buy STUDIO SOUND at an annual subscription of £8.20 (UK) or £7.80 (Overseas).

OVERSEAS READERS
For overseas readers, outside Europe, who require STUDIO SOUND within days of publication instead of weeks, we have the facility to send the magazine by Accelerated Surface Post (USA only) or Airmail.*
The Accelerated Surface Post charge is $10 per annum.
The Airmail charge is £12 (sterling) per annum.
If you would like your copies of STUDIO SOUND sent by either of these methods, please write to the Editorial Office at Croydon.
On receipt of your remittance all subsequent issues of STUDIO SOUND will be sent to you by ASP/Airmail.
**All copies to Europe are sent Airmail.*

BINDERS
Loose-leaf binders for annual volumes of STUDIO SOUND are available from Modern Bookbinders, Chadwick Street, Blackburn, Lancashire. Price is £2 (UK and overseas). Please quote the volume number or date when ordering.

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

Total average net circulation of 11299 per issue during 1976. UK: 6433, Overseas: 4866.

studio sound

AND BROADCAST ENGINEERING

Mobile Recording

Depending on your line of business in the widespread world of studios, an immediate thought of a mobile will no doubt be directly related. Further thought will then offer a confusing mass of variables. The idea of mobile recording is going to offer an even greater variety—from a live concert being taped on 24 tracks to an on-the-spot news report on cassette. But one thing seems common—it's not as easy as it might be. Bureaucracy and 'other' people in general do not seem to be very appreciative of recording problems, even though they're the consumer of the final product; and it appears that the primary qualification for working 'outside a studio' is a sense of humour, or at least the ability to laugh about it afterwards.

But 'other' people are an essential part of the live recording set-up; so should we communicate outside the industry more than we do? The fact is that the demand for live recording is expanding rapidly, so maybe the recording industry has reached a stage in its development where liaison is going to have to become pr . . .

Business

Much of the interesting information which we, the 'editorial' team of STUDIO SOUND, glean from the recording industry will not really fit into the present structure of the magazine. It won't stand as news items and it won't go into Work. So we've started a new column entitled 'Business', collated and written by Adrian Hope, which can best be described as being halfway between News and Work; which really leaves you none the wiser until you've read it.

contents

SEPTEMBER 1977 VOLUME 19 NUMBER 9

Big tough cable drums from Keith Monks

CD1

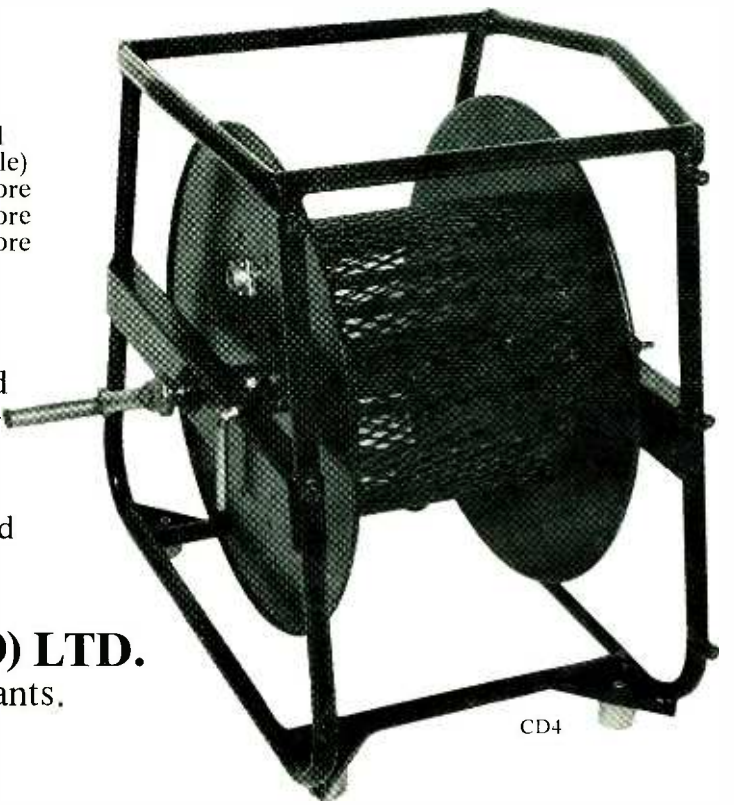
Every Keith Monks cable drum is a multi-purpose carrier—for microphone, speaker or power cables. They're built of tough reinforced steel, with firm-standing rubber feet. And there are four different models to suit every job.

* Each one has a removable centre drum—use one frame, several reels, to save time, cost and space.
* Each one has a nylon-dipped black finish—hard-wearing and rust resistant, for indoor and outdoor use.
* They all stack with other frames of the same size—make rigid, stable space-savers.

Check this table to find the cable drum to suit you!

Model No.	Capacity Standard twin-screened cable	Multi-core cable
CD1	100m	50m (standard microphone cable)
CD2	200m	30m ¾" Multicore
CD3	400m	60m ¾" Multicore
CD4		200m ½" Multicore

Weight range: 10lb to 120lb



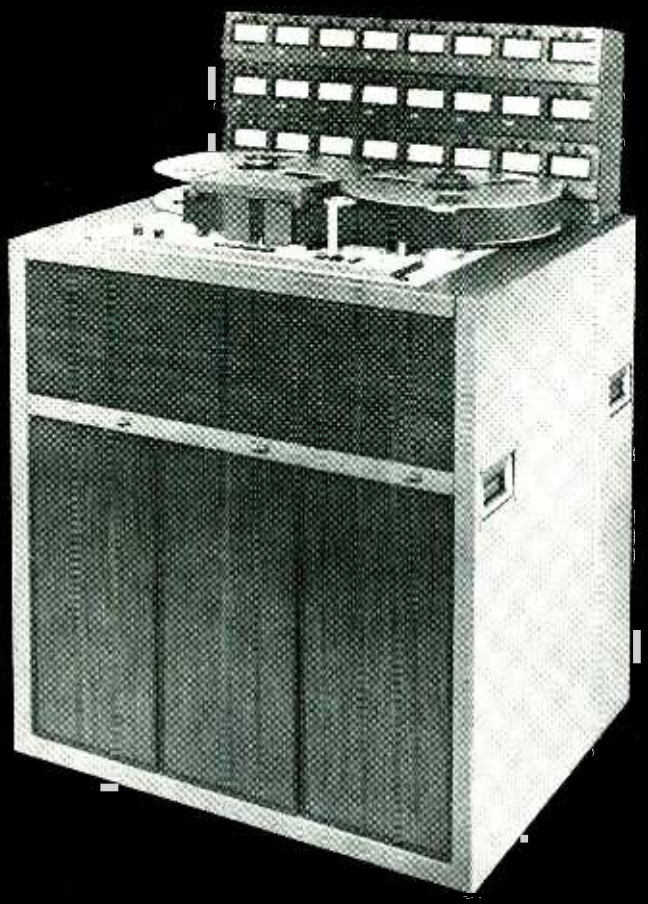
CD4

And if there isn't a cable drum to suit your requirements – modifications and special designs can be made to order!

Find out more about Keith Monks cable drums – just get in touch at the address below – we'll be pleased to send you more information without obligation.

KEITH MONKS (AUDIO) LTD.
26 Reading Road South, Fleet, Hants.
Telephone: Fleet (02514) 20568 or 3566
Telex: 858606.

Distributed throughout the world by recognised distributors.



MCI JH-16

THE BUSINESS MACHINE

This is MCI'S JH-16. doing what it does best — making money.

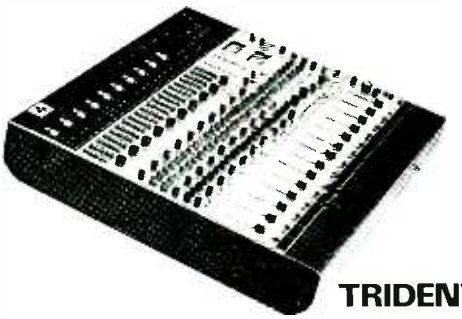
MCI'S JH-16... the world's best multitrack machine... and the busiest.

MCI The Art of the States

MCI (PROFESSIONAL STUDIO EQUIPMENT) LTD.
MCI House, 54-56 Stanhope Street,
London NW1 3EX. Tel. 01-388 7867/8. Tx. 261116.

NEW PRODUCT BULLETIN

ITA



TRIDENT Fleximix

Can be built up from stereo through 4 channel to 8 channel groups with unlimited number of input channels. Well thought-out and superbly constructed to the highest standards.
ITA always have Fleximix in stock for demonstrations and immediate delivery.

AUDIO & DESIGN

The latest range of SCAMP modules are designed to meet all the requirements of sophisticated studios. We have a full range in stock for inspection.

ORBAN PARASOUND from USA

Dual channel multispring reverb unit. Each channel features four springs — far smoother than single spring systems. "Twang" and "boing" are virtually eliminated by incorporating a floating threshold limiter. Bass, mid-range EQ and bandwidth controls. The best compact reverb unit available.

H&H

ITA carries a full stock of H & H products, including the new S500-D professional power amplifier 500W. A great British product to make American equivalents nervous.

ITAM Compliment

New Stereo compressor limiter. Competitively priced. Free standing self-contained unit, accurate stereo tracking, stepped 1:1, 1:5, 3:1 plus limiting ratio at 20:1. Switchable attack time, variable release time, automatic release time. Input attenuation to accommodate large range of inputs. Pre-set adjustable output. Switched link for stereo tracking. Visual representation of compression.
£247 + VAT

QUAD

The new 405 power amplifier s now in stock. 100 watts per channel — simply the best, for £££'s less! Immediate Delivery!

ITA

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

Introducing the NEW 3.77

Based on the famous A77 Series design, the new 3.77 Professional has been introduced specifically for the studio user. Look at these new features:

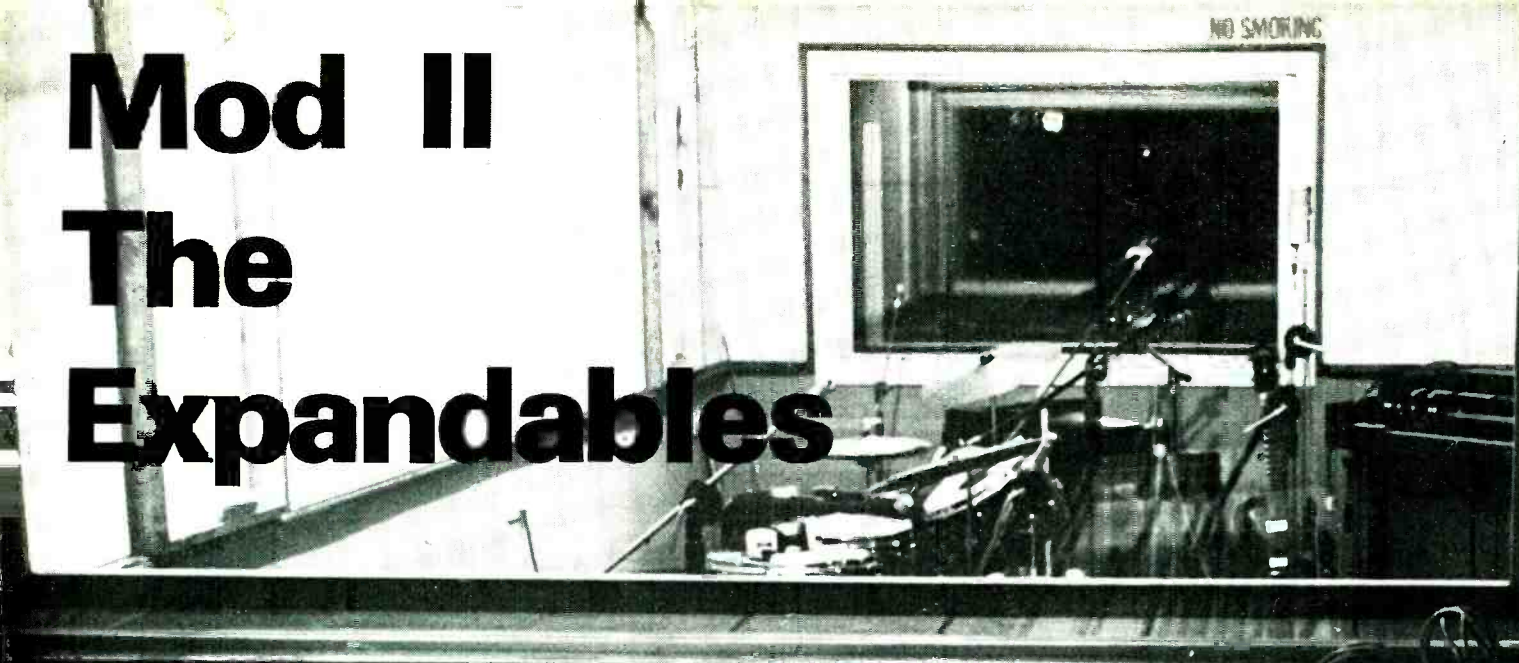
1) 3 tape speeds; (3¾/7½/15 ips or 7½/15/30 ips to choice).
2) Wide-ranging built-in variable speed gives you 100% speed variation on each speed.
3) Full logic control with motion sensing.
4) Excellent editing facilities—the 3.77 has a flat facia for easy access to the heads PLUS internal audio line up oscillator, edit dump control and "capstan servo off" selector, PLUS end of tape lamp defeat button. Easiest editing ever!

For immediate delivery £575+VAT

TA 3.77

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

Mod II The Expandables



In today's recording world it is essential to maintain flexibility within your chosen operationa format.

Our basic package deal can give you a low cost 8 track studio which can grow as far as you can take it!

for full details of Mod II and Brenell multi-track tape machines write today or visit — our demonstration studio at Pembroke House.

Allen and Heath Brenell Limited,
Pembroke House, Campsbourne Road,
Hornsey, London, N8 7PT.
Telephone: 01-340 3291 Telex: BATGBR 267727

Audiotechniques Inc.,
142 Hamilton Avenue,
Stamford, Connecticut 06902, U.S.A.

REMINDER

ITA Conveniently located in Marylebone with easy parking facilities.

ITA Stocks over £60,000 worth of studio equipment.

ITA Supplies over 90% of UK Universities, Recording and Broadcast Studios.

ITA Exports to over 30 Countries.

ITA Engineers represent over 70% of total staff.

ITA Holds £10,000 worth of spares.

ITA Is the UK's largest supplier of Alice, Allen & Heath, Audio & Design, H & H, Klark, Teknik, Orban Parasound, Otari, Quad, Revox, Teac, Trident, 3M Tape.

ITA Currently provides account facilities for over 500 established companies.

ITA Has a subsidiary in Paris servicing Europe. (Son Professionnel)

ITA — No.1 in Europe

seen from the professional angle

the 201 is something quite personal...

The M 201 Hypercardioid moving coil microphone is designed for recording or broadcasting. The M 201 offers excellent separation characteristics in extreme accoustical conditions.

Specifications:
Frequency Response: 40-18000 Hz. Output Level at 1 kHz: 0,14 mV/μ bar ≙ -56 dbm (0 dbm ≙ 1 mW/10 dynes/cm2). EIA Sensitivity Rating: -149 dbm. Hum Pickup Level: 5 μ V/5 μ Tesla (50 Hz). Polar Pattern: Hypercardioid. Output Impedance: 200 Ω. Load Impedance: > 1000 Ω. Connections: M 201 N (C) = Cannon XLR-3-50 T or Switchcraft: 2+3 = 200 Ω, 1 = ground. M 201 N = 3-pin DIN plug T 3262: 1+3 = 200 Ω, 2 = ground. M 201 N (6) = 6 pin Tuchel.
Dimensions: length 6", shaft Ø 0,95". Weight: 8,60 oz.

BEYER DYNAMIC

BEYER DYNAMIC (GB) LIMITED
1 Clair Road, Haywards Heath, Sussex.
Tel: Haywards Heath 51003

TRAD

SALES and SERVICE

Telephone: Watford 47988
Specialists in Service and Repair of T.R.D. recorders. All parts, motors, etc., available. Collection and delivery: London and Home Counties.
Prices ex-Watford.
Delivery extra.

FOR SALE

1 Studer A80 24 track	£19,000
2 MCI JH114 24 track	£18,500
1 MCI JH114 16 track, 9 months old with auto-locate	£10,500
1 3M M56 16 track	£7,500
1 MCI JH10 16 track	£6,750
1 new 8 track dual capstan	£3,300
1 Brenell 8 track Richardson electronics ...	£2,600
1 Teac A-3340S as new	£575
1 Teac A-7300-RX with DBX, shop soiled ...	£1,050
1 Teac A-6100 2 track with ¼tr replay ...	£540
2 Lockwood Academies (white)	£250
1 Otari MX5050 2 track, shop soiled ...	£640
1 Alice 4/2 reduction desk	£275
1 Neve 16-4-8 Console	£8,000
1 MCI JH416 20-16 Console	£6,705
1 Sound Techniques system 12, 18-4-18 ...	£4,750
2 Spendor BCIII's	£320
1 Rapid cue cart machine	£300
1 ITA 10/4 mixer, as new	£575
7 Calrec CM1050C mics ... ...Each...	£55
1 Neumann U67 valve condensor inc. PSU ...	£185
1 Vortexion 3+3 mixer	£85
New boom mic stands ... ...Each...	£15
2 Allen & Heath A.D.T. ... ...Each...	£175
2 TRD Series 700 2 track m/c's	£325
1 Roland space echo	£260
1 pair Stax SR3 phones with PSU	£30
1 pair Koss ESP9 with PSU	£45
1 Allen & Heath Quasi Mixer	£300
1 A & D F-700RS comp/limiter	£300
6 x ¼" test tapes, 15" or 7½"	£10
6 STC 4033 inc. plug	£15
1 Scully 16 track MM100	£6,250

WANTED — ALL STUDIO EQUIPMENT

All prices are exclusive of VAT

149B ST. ALBANS ROAD
WATFORD, HERTS.

Tel: WATFORD 47988 Telex 262741

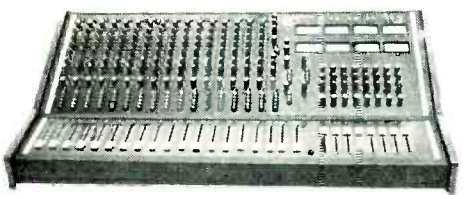
All under one roof

the widest range of studio equipment for professional and home recording studios

DEMONSTRATION STUDIOS · LARGE STOCKS AVAILABLE
PERSONAL CALLERS WELCOME · FRIENDLY SALES & TECHNICAL ADVICE SERVICE

Showrooms open –
Tuesday – Saturday
10.00 am – 5.00 pm
Late night Weds until 8.00 pm

SOUNDCRAFT SERIES II STUDIO MIXER



One of the finest mixers currently available, the Soundcraft series II studio mixing console represents the highest standard of manufacture and electronics design. The mixer is available in 12, 16 or 24 channel with 4 or 8 outputs.
The unparalleled range of facilities include: full EQ on all channels, remix controls, LED overload indicators, pre and post fade cue send, output routing, comprehensive monitoring, plus much more. Full details and specs on request. Price dependent on configuration.

Typically 12 into 4 from **£1695** + VAT.

Soundcraft Series I and II NOW IN STOCK

FAST EXPORT AND UK DELIVERY SERVICE

MM ELECTRONICS – MP175 12/2

Superb value for money in studio quality mixers! The MP 175 represents the first really cost-effective solution for small studios and bands.
It features an uncompromising technical specification, with 3 way EQ, 2 aux. send groups, echo return – many options available. Basic price **£250** + Vat

Entire MM range also available

CALL IN OR PHONE TO DISCUSS YOUR REQUIREMENTS

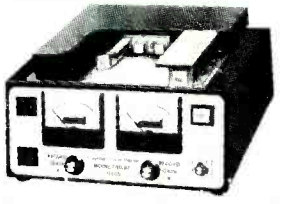
Sole UK distributors of ANGLEPOISE MIC STANDS
available for wall, table or clamp mounting.

Ex-stock
£14.75
+Vat

Instant Start BROADCAST TURNTABLES

Russco Technics

PROFESSIONAL. NAB CART. MACHINES



Wide range of exclusive models

AGENTS FOR AKG · ALICE · ALLEN & HEATH · BEYER · CALREC · CHILTON · FERROGRAPH HH · IVM · NEAL · QUAD · RUSSCO · REVOX · TECHNICS · TANNOY · TEAC · etc

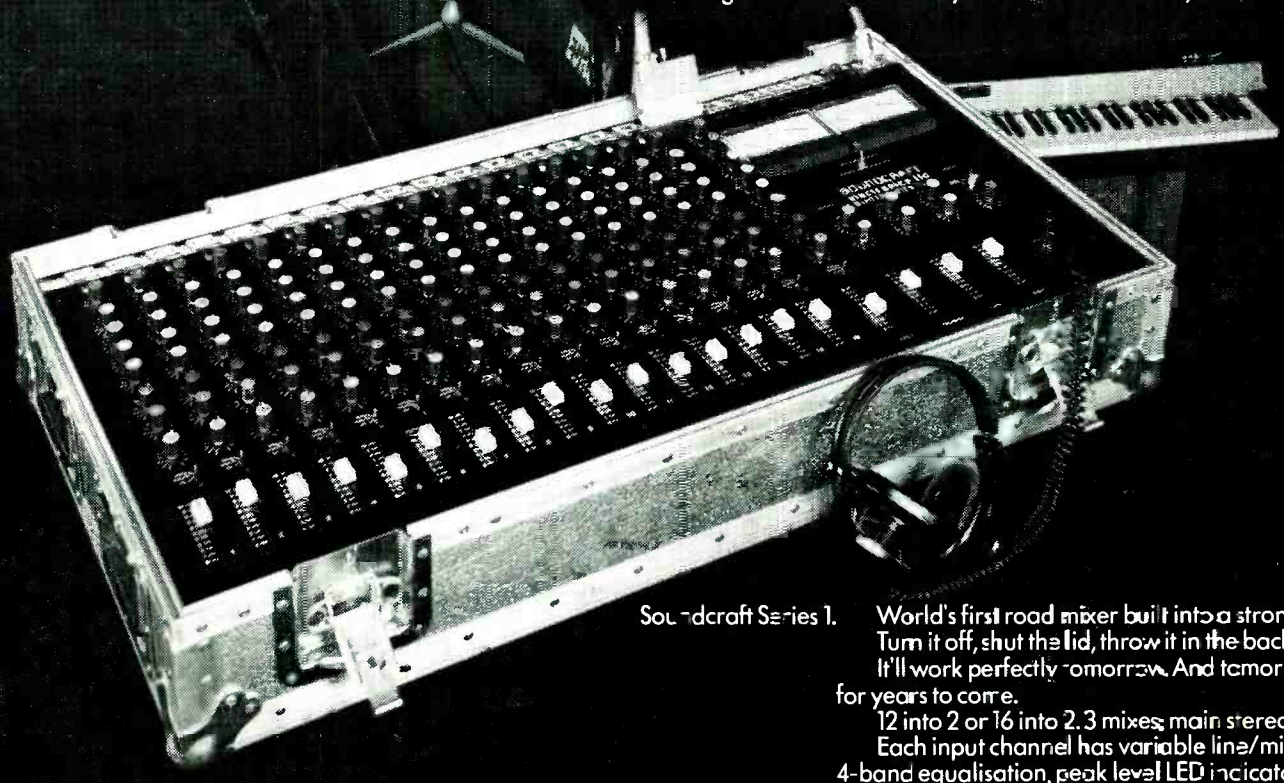
Roger Squire's

STUDIO EQUIPMENT DIVISION

BRANCH MANAGER: TONY KINGSLEY
SALES ENGINEER: DAVE WHITTAKER
55 Charlbert St., London, NW8 6JN
Telephone: 01-722 8111
Local parking – 5 mins from St Johns Wood Tube

Broken strings
Lost plectrums
Ripped skins
Limp stands
Pipless maracas
Crackling leads

At least you don't have to worry about the mixer.



Soundcraft Series 1. World's first road mixer built into a strong metal flight case. Turn it off, shut the lid, throw it in the back of the truck. It'll work perfectly tomorrow. And tomorrow and tomorrow, for years to come.

12 into 2 or 16 into 2.3 mixes; main stereo, monitor and echo.

Each input channel has variable line/mic attentuation, 4-band equalisation, peak level LED indicator, echo and monitor (foldback), pan, mute and pfl.

Each output has 2-band equalisation, (so does the monitor master) and the illuminated VU meters show master, monitor or pfl.

THD < 0.1% Max mic gain 70dB. Relative input noise −125dBm.

Multicore cable and stage box also available.

SOUNDCRAFT ELECTRONICS LIMITED

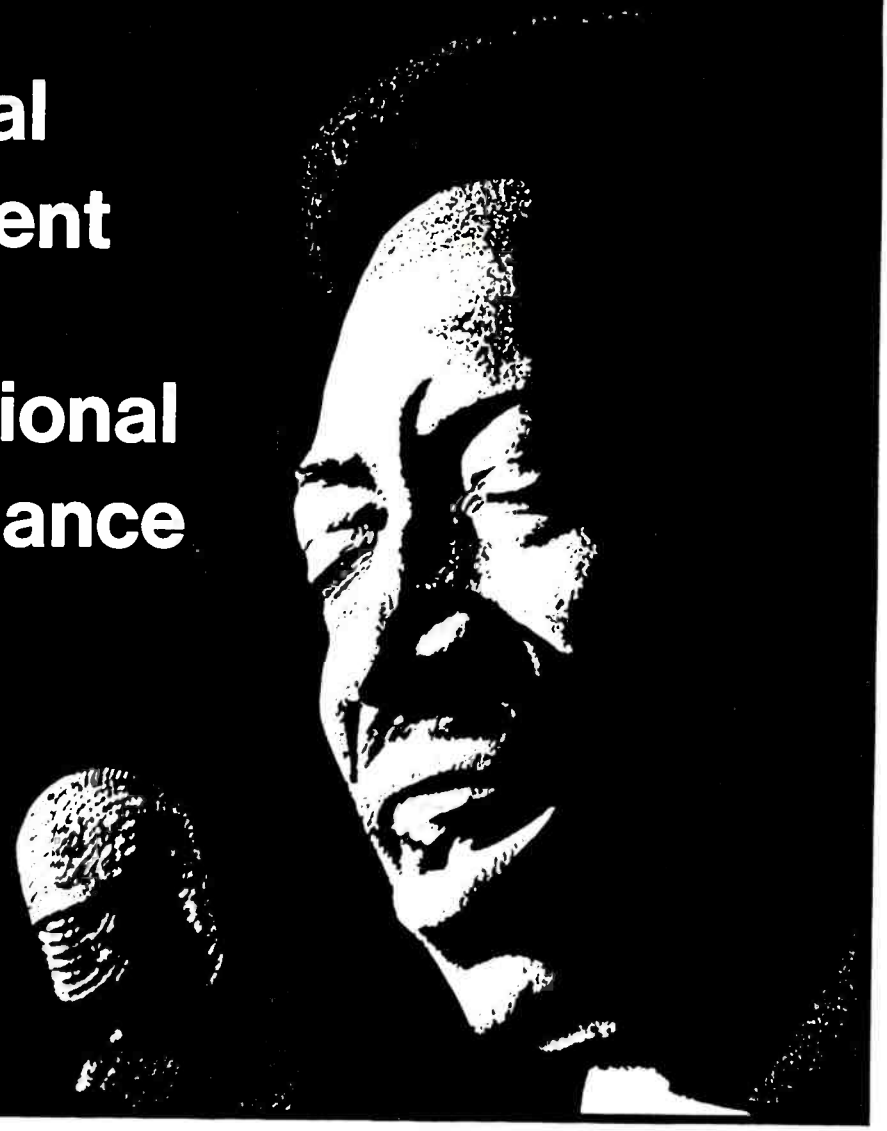
Soundcraft Electronics Limited 5-8 Great Sutton Street London EC1V 0BX England Telephone 01-251 3631 Telex 21198 Telegrams Soundcraft LDN EC1

P.O. Box 883 JFK Station Jamaica New York 11430 USA Telephone (212) 528 8158 Telex 01-220[illegible]

Electro-Voice

Professional equipment

for professional performance



EV

– all the mikes, speakers, speaker systems, horns and drivers you need.

To: Electro-Voice Division,
Gulton Europe Limited,
The Hyde, Brighton, Sussex BN2 4JN.

SS2

Please send me details on the Electro-Voice

(Tick) ☐ *Microphones*
☐ *Speaker Systems*
☐ *P.A. Speakers, Horns, Drivers*

NAME .....
COMPANY .....
ADDRESS .....
.....
..... Tel. .....

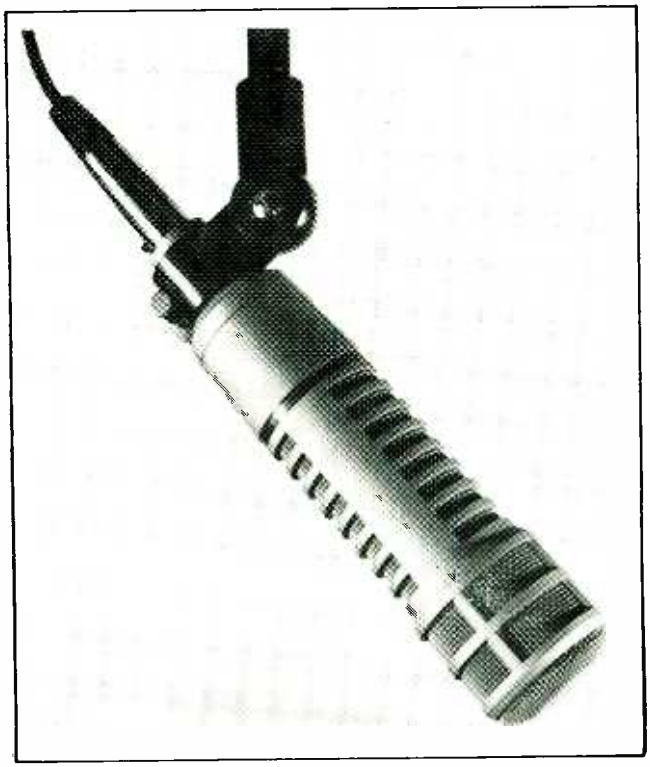
gulton

Gulton Europe Limited

The Hyde, Brighton,
Sussex, BN2 4JU, England
Tel (0273) 66271
Telex 87172

Electro-Voice

MODEL RE20 DYNAMIC CARDIOID



DESCRIPTION AND APPLICATIONS

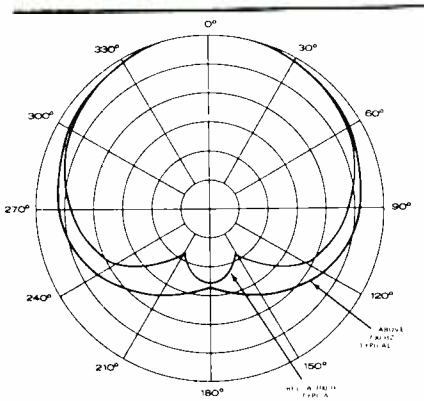
The Electro-Voice Model RE20 is a professional quality dynamic cardioid microphone created especially for recording, broadcast, and sound reinforcement applications requiring essentially flat response over a very wide frequency range. The wide frequency response, coupled with excellent transient response, makes the RE20 easily comparable to the finest condenser cardioid microphones. Unlike standard condenser cardioid microphones, however, the RE20 is virtually free of bass-boosting "proximity effect" when used close, because in design it is a Continuously Variable-D® microphone. An easily operated "bass tilt down" switch corrects spectrum balance for use in long-reach situations, or other applications where bass attenuation is needed.

A true cardioid microphone, the RE20 offers greatest rejection at 180° off axis – directly to the rear of the microphone. Directional control is so effective that the frequency response is nearly independent of angular location of sound source, creating virtually no off-axis coloration yet providing greatest possible rejection of unwanted sounds.

An integral blast and wind filter covers each acoustic opening on the RE20. At recording sessions and on stage, singers can "close talk" the microphone, singing with their lips almost touching the grille screen with no worry of "p-pops" or excessive sibilance. Part of the filter also shock mounts the internal microphone element, reducing the transfer of vibrations from external sources.

Using the mechanical nesting concept of design – the internal transducer parts are nested one within another – the RE20 is able to withstand all rigors of professional use. The diaphragm, made of Electro-Voice Acoustalloy ™ is not affected by extremes of temperature and humidity. Further protection is provided by the extremely rugged exterior steel casing.

The RE20 is supplied wired for 150 ohms impedance. Fifty- and 250-ohm impedances are available through a simple wiring change.



SCALE IS 5 DECIBELS PER DIVISION

Polar Response

SPECIFICATIONS

Element:	Dynamic
Frequency Response:	45–18,000 Hz
Polar Pattern:	Cardioid
Impedance:	50, 150, and 250 ohms changed by solder connection
Output Level:	–57 dB (0 dB = 1 mw/10 dyne/cm²)
EIA Sensitivity Rating:	–150 dB (150 ohm output)
Diaphragm:	Electro-Voice Acoustalloy ™
Case Material:	Steel
Dimensions:	8-17/32" (216.7mm) l., 2-9/64" (54.4mm) widest diameter, 1-15/16" (49.2mm) body diameter
Finish:	Fawn beige micomatte
Net Weight:	1 lb., 10 oz. (737g) without cable
Cable:	15' (4.6m), 2-conductor shielded, rubber-jacketed, brown broadcast-type cable, supplied with Switchcraft A3F connector on microphone end.
Accessories Furnished:	87213 Stand Adapter
Optional Accessories:	Model 309 shock mounted stand adapter for use with floor stand or recording boom.

for those who can tell

the difference. . . .

The TRIDENT FLEXIMIX portable mixing system provides the comprehensive facilities which would normally be found only on an expensive studio console. This gives Fleximix the big desk 'feel' as soon as you operate it. Add this to the unique expandability of the system and you can see why it is in a class of its own. For a little over £2000 you can buy a 10 input—2 output configuration, which could subsequently be expanded to a system with 10 mixed outputs, any number of input channels and 24 track monitoring. Expansion is simply achieved by slotting-in additional channel modules. When available slots are used up, another mainframe is added. Modules may be placed in any sequence. No factory rework or rewiring is necessary. Additional mainframes may be either rigidly or flexibly coupled to the original system and flight-cases are available to accommodate any arrangement.

A number of exciting new modules are now available which will extend even farther the system versatility. These include a Compressor/Limiter module. Quad joystick module and Line-balancing module.

Send for details to:
Trident Audio Developments Ltd.,
Sales Office: **112/114 Wardour Street,**
London W1V 3AW.
Tel: 01-734 9901. Telex 27782 Tridisc.

Factory address:
Shepperton Studios,
Squiresbridge Road,
Shepperton, Middlesex.
Tel: Chertsey (09328) 60241.

TRIAD

United States Agent:
Studio Maintenance Service,
12438 Magnolia Blrd.
N. Hollywood
Ca. 91607
Tel: (213) 877 3311.
Contact: David Michaels.

Canadian Agent:
Audio Analysts Inc.,
2401-A St. Catherine St. East,
Montreal H2K 2J7, Quebec.
Tel: (514) 525 2666. Contact: Pierre Pare

Ferrograph – manufacturer of highest-quality reel-to-reel recorders – has designed two time-saving test sets suitable for checking any type of audio system.

In seconds, the ARA1 Audio Response Analyser gives precise response information, displayed as a gain/frequency plot on a long-persistence CRT. A unique feature of this fast, accurate test set is its frequency-sensing facility. Operation is entirely independent of synchronising or trigger signals. Consequently, there are no problems resulting from a time-lapse between input and output signals.

Other features include:

- Range 20Hz to 200kHz, resolution to 0.1dB.
- X-Y plotter outputs for permanent records.
- Large display on 27cm CRT; choice of graticules.
- Manual and automatic tuning for one-shot and repetitive sweeps.

Full details and comprehensive specification are included in a new leaflet.

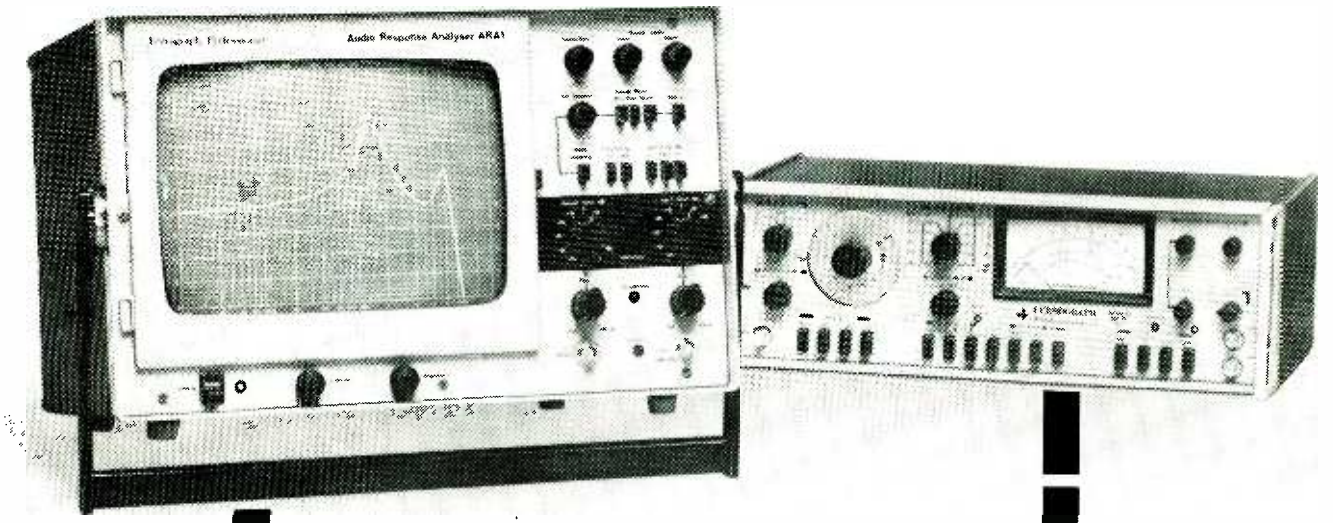
The RTS2, sold in thousands round the world, is a comprehensive low-cost test set that will run up to ten different checks on an audio system's performance – using just one pair of leads. You don't need to put up with an array of incompatible test gear, improvising and compromising with numerous lead connections, wasting time sorting out hum loops. With the RTS2 you get fast, push-button operation. And accurate results.

Ferrograph audio test equipment: used by broadcast and recording studios throughout the world. Send for full details today.

Ferrograph

Wilmot Breeden Electronics Limited
442 Bath Road Slough SL1 6BB
Telephone: Burnham (06286) 62511
Telex: 847297

Ferrograph will give you an unbiased opinion on any audio system.



Name

Company

Address

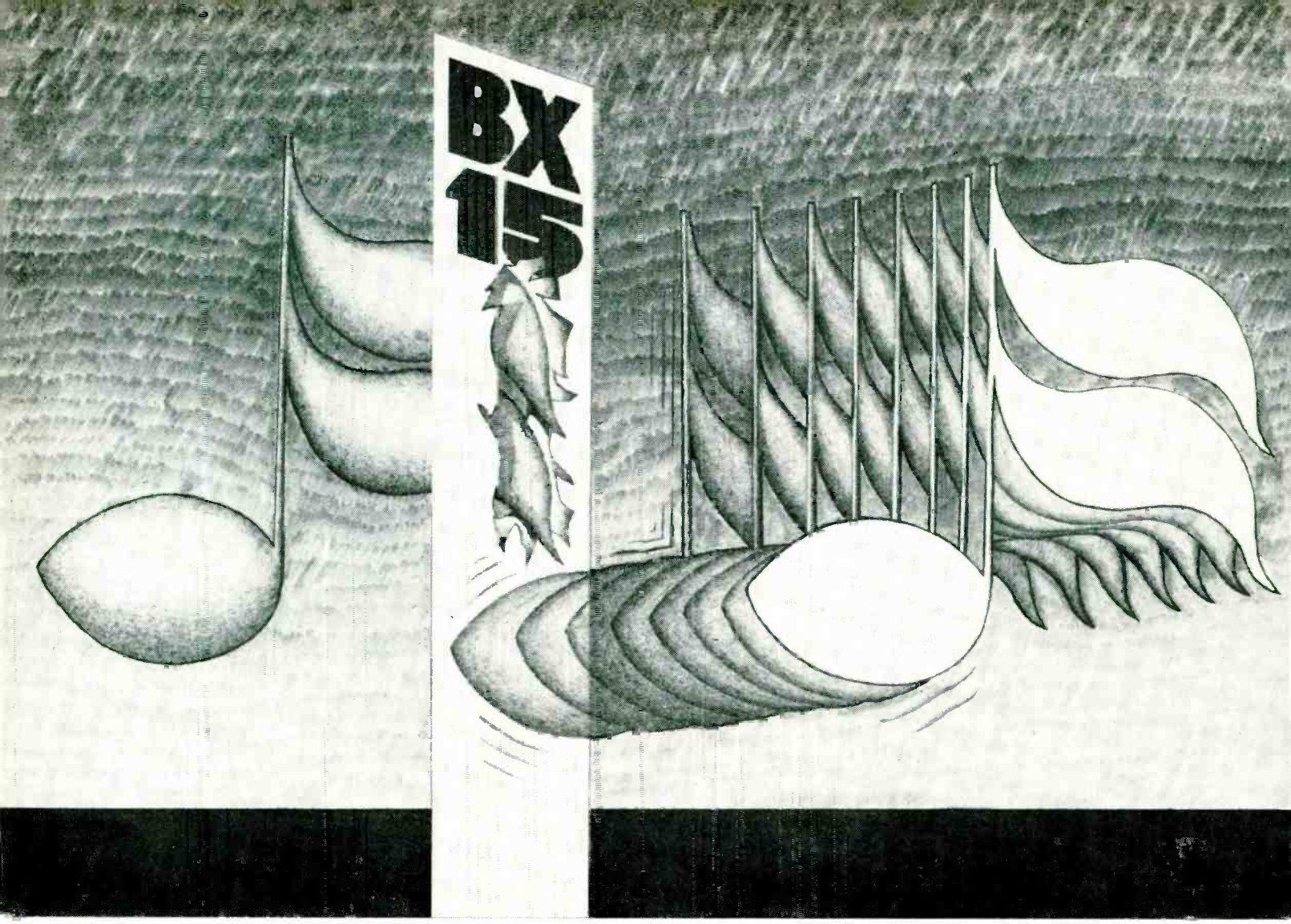
Telephone

☐ Please send full details of the ARA1 Audio Response Analyser and the RTS2 Audio Test Set

☐ I would like these equipments to be demonstrated Please phone me to arrange an appointment

Wilmot Breeden Electronics Limited, 442 Bath Road, Slough, SL1 6BB SS

Ferrograph Test Equipment. For fast and accurate audio analysis.



Jump into genuine reverberation

New AKG reverberation unit BX 15

From the practical experience gained with the highly successful BX 20 a smaller unit has now been evolved — the handy and robust BX 15. Designed to fill the gap between the less sophisticated and the more costly and some times elaborate studio products. The BX 15 is ideal for small studios, O. B. work and professional musicians.

Brief specification:
Two independent channels with variable high and low frequency equalization. Switchable input level with additional overdriving safety factor by means of a built-in limiter. Inputs and outputs are balanced and the decay time is switchable from 1.5 to 2.0, 2,5, 3.0 and 3.5 seconds. Continuous mixing of 'reverb' and 'dry' signals with separate potentiometers. Dimensions: 17 x 19 x 12 inches (43 x 48 x 30 cm). Weight: approx. 45 lbs (20 kg).

182/4 Campden Hill Road Kensington **AKG Equipment Ltd.** London W8 7AS Telephone 01-229-3695

ADV 198/E

PROLINE 2000TC

with Twin Varispeed servo capstan

sophistication without complication

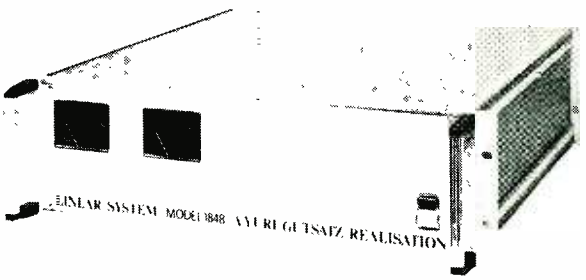
The Proline 2000 uses electronics in place of mechanics – on board solid state analogue switches – modular construction for easy maintenance, and a host of other high technology concepts adding up to the most sophisticated recorder in large scale production in Britain today.

LEEVERS-RICH
PROLINE PROFESSIONAL

Have a word with Tony Costello or John Robinson at 01-874 9054
Leevers-Rich Equipment Ltd
319 Trinity Road London SW18 3SL
Telex 923455

THE QUALITY OF LINEAR SYSTEM MODELS IS NOT ONLY ASCERTAINED BY SOPHISTICATED LABORATORY CONTROL METHODS. ONE HAS TO HEAR THEIR PERFORMANCES, THE HUMAN EAR BEING THE BEST OF JUDGES. A SOUND IS NOT ONLY BUILT UP WITH TECHNICAL SPECIFICATIONS.

YURI D. GUTSATZ Jr.



ONE OF THE LINEAR SYSTEM REALISATION:
MODEL 1848 : 2 x 200W RMS/8r

LINEAR SYSTEM

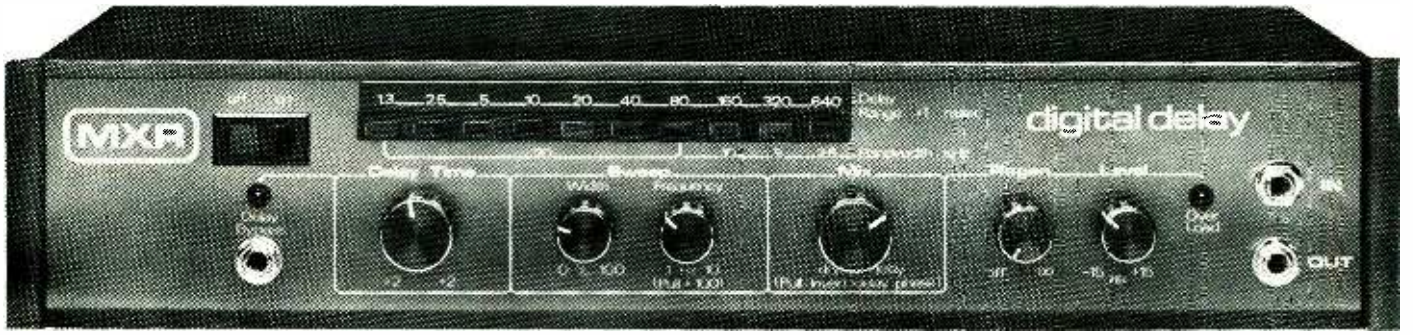
A YURI GUTSATZ REALISATION

Registered Office:

3 COUR JASMIN, 75016, PARIS, FRANCE.
Tel: 5277031

APPLICATION FOR SALES ARE WELCOME

UK Agent:
Benelux: Leo Maebe, I.A.T.A., Kerkstraat 16,3020 Herent, Wijgmaal. Tel. 016/44 3377



The musical computer.

MXR have been working on a new type of audio delay line. The result is the MXR Digital Delay.

It works on memory banks. Just like an analog computer. The system is called "Digital Random Access Memory". And it's a great improvement on the old type of 'shift register' delay.

It's small. Completely self contained and has ordinary jack plug sockets so it can be used on stage. Or rack mounted for the studio.

The basic unit delays a sound by between 0.08 m.sec and 320 m.secs. But you can add plug-in memory boards to increase this to 1.28 secs.

You have precise control over the volume mix between the original and delayed sound. And over the amount of delay.

So you can produce a large range of effects. From the slightest hint of echo to hard reverb and A.D.T.

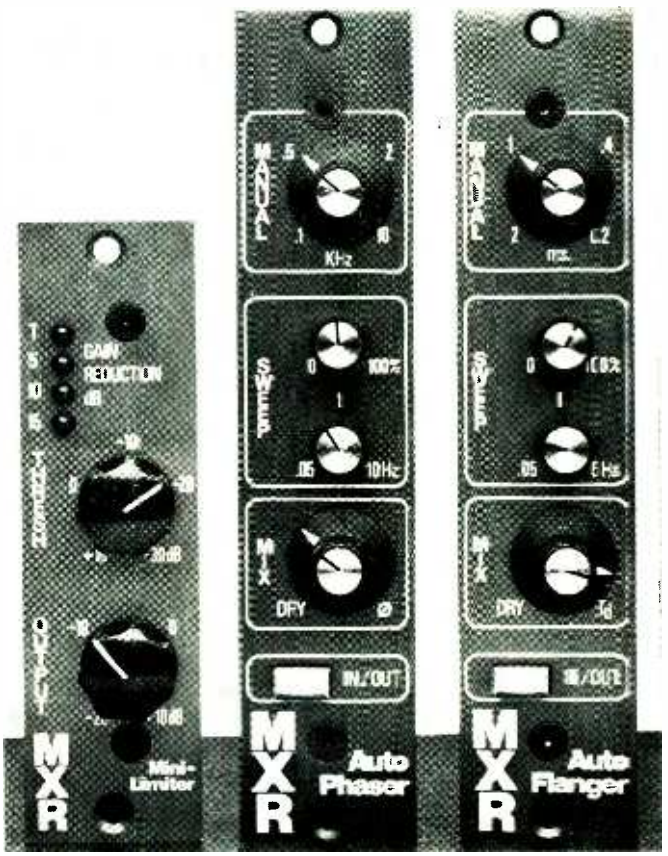
There are special circuits built in to give you flanging, frequency modulation and true vibrato. Pitch alteration, non deteriorating repeat hold and overdubbing effects.

And there's nothing on the market that can produce anything like the same results. Unless you want to pay at least £1,000 on top of the price of the MXR.

The Digital Delay is just part of the MXR Innovations range. Which also includes the Auto Phaser, the Auto Flanger and the Mini Limiter. Everything MXR makes is designed to keep noise and distortion levels down to a minimum. And to sell at a very reasonable price. All the equipment is thoroughly tested before it leaves the workshop. And is backed up by the service professionals need.

MXR is distributed in the UK by Rose-Morris.

Find out more. Fill in the coupon.



☐ I am interested in knowing more about MXR.

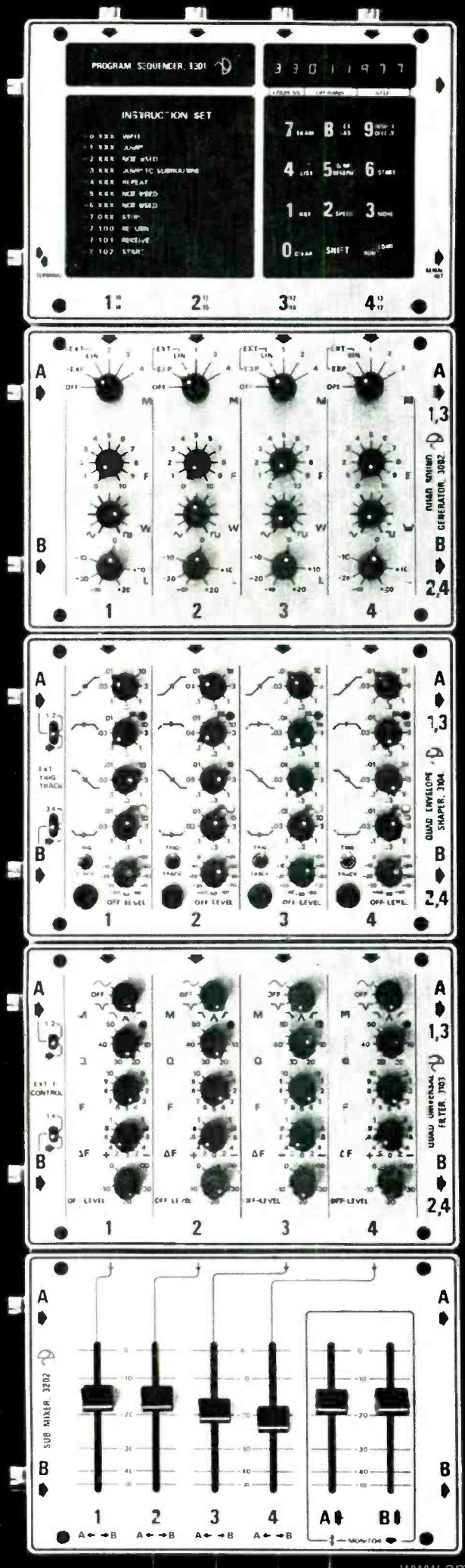
Name _____

Address _____

Rose-Morris & Co Ltd., 32 Gordon House Road, London NW5 1NE. 01-267 5151.

559 77

Rose-Morris
MXR



A NEW ERA IN AUDIO-PROCESSING

MICRO-PROCESSOR CONTROLLED MODULIZED SYSTEM FOR GENERATING, MANIPULATING AND EDITING OF SOUND WITH PROPERTIES YOU COULD HARDLY IMAGINE

THE ERA

The micro-processor revolution is going on. Now it has reached the domain of audio-processing. As the first company, Dataton can present a module-based audio-processing system controlled from a MPU-based intelligent sequencer — Dataton System 3000. A host of applications, not earlier available in this price-range, will be feasible.

The vertical integration process in sound- and music production will now take another step: You can use Dataton System 3000 on stage as a musical instrument by using some of our tactil inputs. You can use it as an advanced (or simple) mixing console in a studio or you can build an electronic music studio around it. At any time you can upgrade or change your system with a minimum of financial effort.

THE SYSTEM

Using the most recent technology, Dataton System 3000 has adapted a unique system approach. The main components in the system are equal-sized modules with different functions. To afford a large application range there are modules for sound generation, manipulating and editing. These functions may be manually or voltage controlled. The control voltage may be generated from external tactile controllers or from the MPU-based PROGRAM SEQUENCER 3301. Or you can use the audio signals themselves as control voltage signals.

A flexible connecting system allows the modules to be hooked together in virtually infinite ways — in seconds, completely eliminating patch wires and back panels. However, if a distributed system configuration is preferred, cables may be used to make the interconnections.

Control programs may be entered through an internal keyboard on PROGRAM SEQUENCER 3301. There are a lot of program editing functions making programming easy. You can also enter a program from an external terminal or dump it in real time from a musical keyboard.

The photo shows one out of thousands of system configurations. At the top you have the MPU-based PROGRAM SEQUENCER 3301 directly hooked to a quad sound generator bank with frequencies controlled by the sequencer. Below the sound generator bank there is an envelope-shaping module. An advance filter module follows, directly connected to a mixer module. The signal routing paths are easy to learn — up-down, left-right.

By using external digital-analog modules, one program sequencer can control seven columns of modules like this, giving one of the largest and most advanced computer-controlled synthesizers, from the smalles modules available. The solid module house does not measure more than 3.5 by 13.5 by 19 cm...

THE MODULES

A broad range of modules can now be offered helping you to make sound the creative way:

QUAD INPUT AMPLIFIER 3001	MASTER MIXER 3201
QUAD SOUND GENERATOR 3002	SUB MIXER 3202
NOISE GENERATOR 3004	DUAL PANORAMA UNIT 3203
STEREO OCTAVE FILTER 3101	PROGRAM SEQUENCER 3301
STEREO REVERB UNIT 3102	D-A CONVERTER BANK 3302
QUAD UNIVERSAL FILTER 3103	MONOPHONIC CONTROLLER 3311
QUAD ENVELOPE SHAPER 3104	POWER SUPPLY 3320
RING MODULATOR 3105	POWER AMPLIFIER 3321

Later on this year we will introduce a musical keyboard and an audio cassette interface for loading control programs on audio cassette recorders. We will also introduce a program printer for hard copy print-out of control programs and a versatile dissolver interface for slide-projectors and spot-lights. There will also be a bus transceiver module for remote-controlled patching for stage use and a mixer module for multi-track recording with echo-send outputs.

Are you ready for the new era? Call for more information!

Dataton AB, Box 257, S-581 02 Linköping, Sweden. Telephone: 013-10 07 11

Foreign distributors will still be adopted in some principal countries.

dataton

news

Brother of A77

The new Revox *B-series* of what is essentially hi-fi gear contains a new tape machine that is almost certain to prove a worthy successor to that well-known, and often much abused old workhorse of many studios, the *A77*. Revox are quick to point out though, that the new *B77* is not a direct replacement, and that the trusty *A77* will continue in production for a few years yet.

The new model is, however, light-years ahead of the *A77* (which is not surprising when one considers that the latter's design is about ten years old). Full motion-sensing control logic has now been incorporated, and editing facilities have been greatly improved by moving the heads back a shade to allow easier access for a wax pencil. A pause control is also provided.

Record on/off controls now take the form of toggle switches, rather than push buttons next to the vu meters as fitted to the *A77*. Other differences include an infra-red end of tape sensing system that reduces the chance of stray light affecting the trip mechanism; output controls that only reduce the level of the headphone sockets; and pushbutton speed change.

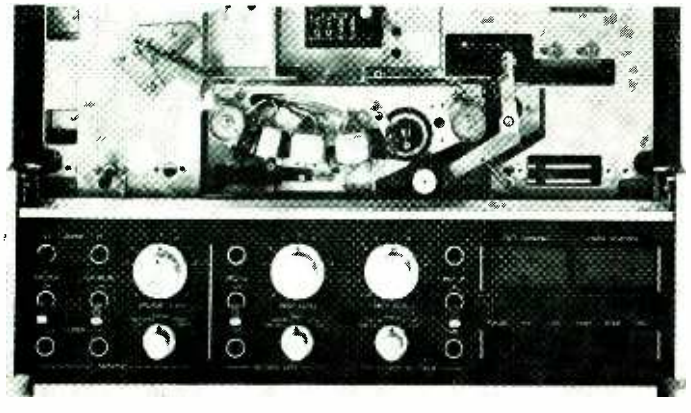
At present the *B77* is only available with 9.5 and 19 cm/s tape speeds; other high-speed and selsync versions will follow early next year. Price is around £550. There are no plans to market a 'suitcase' version with integral amplifiers and speakers.

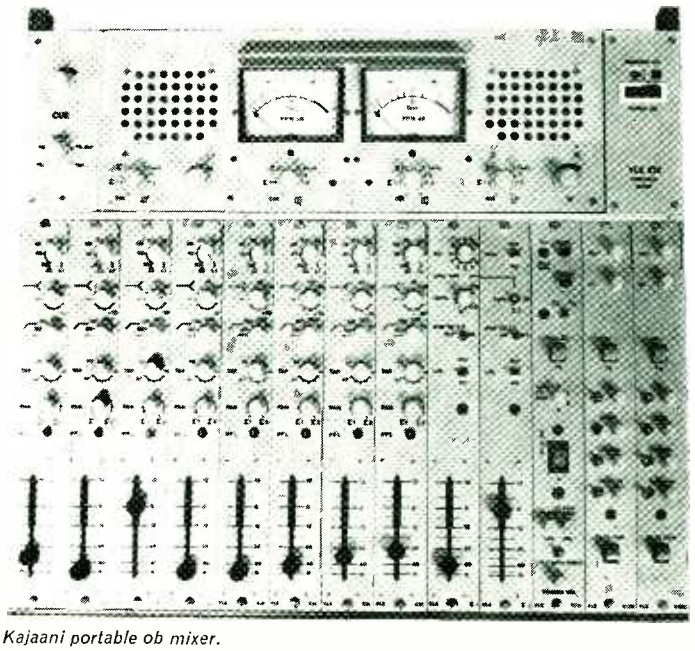
We hope to review the *B77* in the December issue of STUDIO SOUND.

For the record, the *B-series* comprises the *B77*, plus *B760* fm tuner (15 pushbuttons for station selection and digital frequency readout); *B750* 2 x 75W (DIN 45 500) power and preamp (electrically separable by a switch to allow, for example, an equaliser to be inserted between the two stages); *B790* direct-drive turntable with tangential tone-arm; *BX 230*, *350* and *1100* loudspeakers, *B730* preamplifier and *B740* power amp (virtually identical to the already available *A740*).

Willi Studer, CH-8105, Regensdorf, Zurich, Switzerland.
Canada: Studer Revox Canada Ltd, 14 Banigan Drive, Toronto M4M 1E 9, Ontario.
UK: FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Herts. WD6 4RZ.
Phone: (01) 953 0091. Telex: 27502.
US: Revox Corporation, 155 Michael Drive, Syosset, NY 11791.

Front-panel controls of the new Revox B77.





Kajaani portable ob mixer.

Outside-broadcast mixer

A new portable, modular unit from Kajaani features eight transformer-balanced inputs for mic, line or tape replay (plus phantom power for capacitor mics); 3-position bass cut; treble cut/boost at 10k Hz; pre-fade listen; stereo transformer balanced outputs with associated ppms; limiter and overload indicators; plus two internal loudspeakers for monitoring.

A separate add-on unit, which is connected to the mixer by a multicore cable, provides talkback and intercom facilities from two commentators to the mixer, and subsequent connection to a production or switching centre via a telephone line. Individual or common talkback is available on two sets of commentators' headphones, and can be mixed with the pre or post-fade mixer output, telephone feed and two foldback lines.
Kajaani Oy, Nuaskatu 11, SF-87400 Kajaani 40, Finland.
Phone: 986 37311. Telex: 45148.

Audio & Design E950 paragraphic equaliser.

Paragraphic equaliser

The new model *E950* from Audio and Design can be used as either a stereo 6-section or 12-section mono system. Each section has ± 14 dB boost/cut, variable frequency over a 4-octave range, and variable bandwidth 'Q' from 0.6 to 8.

Balanced inputs and outputs on *XLR* connectors are featured. The unit is of standard rack-mount format, and measures 48.3 x 17.8 x 20.3 cm (w x h x d).
Audio and Design Recording, St Michael's, Shinfield Road, Reading RG2 9BE, Berkshire.
Phone: Reading (0734) 84487.

30 ▶

Automation made easy

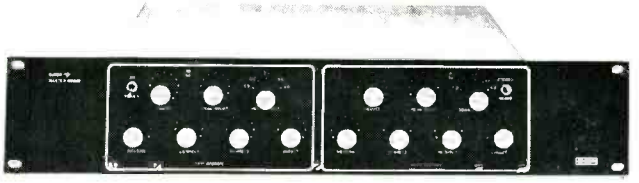
For those of you who have toyed with the idea of automating your desks, or remote-controlling signal processing units, but have been put off by the high costs involved, the *MC675* hybrid circuit now available from Cadac may be the answer. The module is the same as fitted to their automated consoles (see January issue, p 26) and *A505* compressor-limiter (see July issue, p38), and can be used to control gain by remote control; as a low-noise high-linearity analogue divider; or an amplitude modulator. There's versatility.

Depending on how many you intend to buy, a module will set you back between £13 and £40. For £48, Cadac will supply a module plus pcb evaluation kit. Comprehensive data sheets and suggested circuit details are also available.
Cadac (London) Limited, 141 Lower Luton Road, Harpenden, Herts AL5 5EL.
Phone: Harpenden (05827) 64351.
Telex: 826323.

The Newest Master-Room

Super 'C' Series Dual Channel Variable Decay Time Reverberation Unit

- Two independent channels with variable decay time of 1-3 seconds or 2-4 seconds
- Comprehensive reverberation return equalisation
- Provision for internal mixing of direct and reverberant signals
- Remote control capability



Other MICMIX Products Include :-

Studio 'B' Series Reverberation Units
Single channel units with variable decay plus equalisation. In 1-3 or 2-4 second models.

Master-Room Studio Series Reverberation Units
Fixed decay time single input stereophonic return. Available in 2, 5 and 7 second optimised fixed decay time models.

Master Audio Meter
Stereo L.E.D. bar panel mounting meter switchable between peak or V.U. indication.

Sole U.K. agents :

Scenic Sounds Equipment,
97-99 Dean Street, London, W1V 5RA
Tel : 734 2812 3 4 5

France :
3M France SA Mincom Div.
Blvd. de l'Oise, Cergy
Paris 95000
Phone 031 64 20

Holland :
Pieter Bollen
Geluidstechniek
Eindhoven
Phone 040 51 77 77

Denmark :
Lake Audio
Artillerivej 40
DK 2300 Copenhagen S.
Phone 01 570 600

Norway :
SIVL ING. Benum Skovvn 22
Oslo 2
Phone 02 56 57 53

Sweden :
Tal and Ton Musik and Electronic
Kungsgatan 5
S411 19 Gothenberg
031 13 02 16

MIC-MIX Audio Products
Dallas Texas

NEWS

Unshockable microphone

Shure has introduced a new dynamic microphone, *SM59*, that features a 50-15k Hz frequency response and anti-feedback cardioid pattern. A patented mechanical/pneumatic shock mount is said to dramatically reduce mechanical noise and pickup of floor vibrations. A 'pop' filter is also included. The mic measures 19.7 cm in length, weighs 215g and costs £86.
Shure Electronics Ltd, Maidstone, Kent ME15 6AW.
Phone: Maidstone (0622) 59881.

SM59 dynamic mic from Shure.

Impulse noise reduction system

Though aimed primarily at the domestic market, as Gordon Skene pointed out in the LA AES report (STUDIO SOUND July '77, p62) the *SAE 5000* impulse noise reduction system may prove useful for cleaning up discs for re-issue where no master tape exists.

The unit works by detecting the presence and duration of the offending impulse, which usually lasts for less than 0.001s, and replacing the gap with a small segment from the music information immediately preceding the impulse noise. The makers claim that this allows total continuity and integrity of the material to be maintained simultaneously. Price in the UK is about £176.

Extract from manufacturer's specification:
Frequency response: 20-20k Hz ±1 dB.
Distortion: <0.1% thd at any level to rated output 20-20k Hz; <0.1% im at any level of rated output with any two mixed frequencies between 20-20k Hz at 4/1 voltage ratio.
Signal-to-noise: >90 dB below rated output.
Dimensions (w x h x d): 27.3 x 7.6 x 23.5 cm.
Scientific Audio Electronics Inc, 1721 Newport Circle, Santa Ana, Ca 92705, USA.
Phone: (714) 556 0371.
Telex: 678462
UK: REW Professional Audio, Charing Cross Road, London WC2.
Phone: (01) 836 2372.

SAE 5000 impulse noise reduction system.

The industry expands

Audio & Design in USA

The company has recently set up a new subsidiary to handle importation and distribution of their products in America. Dealers have been established throughout the country, and an initial stock valued at $150k is being set up. Further details from:
Audio & Design Recording Inc, 1019 N Winchester, Chicago, Ill 60622. Phone: (312) 252 8144.

Audio Pulse in UK

Pyser has been appointed sole UK distributor for the Audio Pulse *Model One* digital reverb unit.
More information from:
Pyser Limited, Fircroft Way, Edenbridge, Kent.
Phone: Edenbridge (073 271) 4111.

EMI in Canada

EMI has established a new Canadian subsidiary to market and service its products, including broadcasting antennas, studio equipment and cable tv systems, throughout that country. The new company has already received orders worth about £300k for antennas.
EMI Technology Limited, Suite 503, 240 Duncan Mill Road, Don Mills, Toronto, Ontario, Canada.
Phone: (416) 447 5538.

Broadcast compressor-limiter

By changing only one module the Harris *MSP-100* stereo processor can be converted from fm to am operation. The unit features a 3-band agc with adjustable frequency bandwidths, thresholds and shapes, and attack/recovery times on each band. A limiter section can be set to an automatic mode that selects the optimum attack/recovery constants, and is followed by a protection module that splits the audio into two frequency bands to optimise high-frequency limiting.

The change from fm to am operation is effected by simply swapping the relevant protection modules. The am module contains a fast broadband peak limiter featuring low noise and distortion. Pre-emphasis of the fm module is selectable at 25 μs intervals from 0-75 μs.

Extract from manufacturer's specification:
Frequency response: 30-15k Hz ±1 dB of 1 kHz-value at +10 dBm output.
Distortion: ≦0.25% total harmonic distortion, 30-15k Hz at +10 dBm output; ≦0.25% intermodulation distortion, same conditions.
Noise: 70 dB below +10 dBm output over 30-15k Hz and 0 dBm input.
Gain: 23 or 43 dB (± 2 dB), switch selected.

Further details will appear in our survey of compressor-limiters to be published in next month's issue.
Harris Corporation, Broadcast Products Division. PO Box 290, Quincy, Ill 62301, USA.
Phone: (217) 222 8200.

Such genderosity

Wow, the Radio Industries is to admit the likes of me, even: a menial person of the weaker sex—gosh dare I say it — a female into their club. And after 40 years! I *really* am moved — and it would appear that we have 'Newscaster of the Year' Angela Rippon to thank. Oh, and Douglas Muggeridge, BBC Director of Programmes for radio, the club's recently appointed president.

We've never actually been banned from the club, having been given the golden opportunity of joining the men in their annual functions: viz the Annual Awards Lunch and the Summer Ball. But as from June 28 we are one of 'the boys'—well guests—and we're on trial for six months. But if we're awfully good they may like us, and keep us on.

Incidentally, the club has another idea for the future. At present, speakers at monthly lunches are voluntary, but if manufacturers so wish they will be able to sponsor a speaker or entertainer at one of these affairs. A list of the (BBC, Thorn Industries oriented?) members is available from Barrie Hall, Publicity Officer, Radio 3. (Phone: (01) 580 4468 extension 2722).

Well did you ever . . .

B. Righton

FBTRC award

David Smith, a 32-year-old electrician from Cambridge, has been awarded the annual tape competition organised by the Federation of British Tape Recordists and Clubs. His entry entitled 'Cambridge steam weekend', which consisted of actuality recordings made over several weekends and edited together with a commentary, won him the first prize of the Vickers Trophy and tapes and accessories.

Alice modular mixer

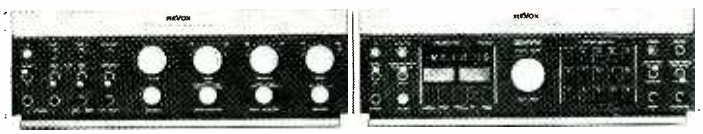
Described as the 'eagerly-awaited replacement, for the 'much-loved' *SM* series, the new *ACM* (Alice compact modular) system is based on a 38-mm wide modular design and is available in stereo and 4 and 8-group formats. Electronic specification meets the latest IBA Code of Practice.

The system accommodates up to 40 channels, and frames can be supplied with blanking panels to allow for later expansion.
Alice (Stancoil) Ltd, 38 Alexandra Road, Windsor, Berks.
Phone: Windsor 51056/7.
Telex: 849323.

32 ▶

the most important news in reel-to-reel tape recorders for a decade

the Revox B77



REVOX

Available from selected dealers only For further information on the Revox A77, A700 and B ranges, contact sole U K. distributors F. W. O. Bauch Limited, 49 Theobald Street, Boreham Wood. Hertfordshire WD6 4RZ

NEWS

A rose by any other name

Couldn't help noticing that the Vitavox T-shirts with the text 'Vitavox live sound engineer' modestly printed on the back are available in 'small, medium and *executive*'. (Our italics.) Nobody wants to admit to having a beer-gut?

The shirts cost a 'nominal' £1.50 from: Vitavox Limited, Westmoreland Road, London. NW9 9RJ. Phone: (01) 204 4234.

Function generator

The new Farnell *FG3* has a frequency range of 0.02-100k Hz (extendible down to 0.002 Hz) with sine, square and triangle waveforms, and on internal log/lin sweep facility of 1000:1.

Output amplitude is variable up to 12V peak-to-peak into 600 ohm, and low-level outputs of ttl, linear sweep ramp and triangle are available.

Farnell Instruments Ltd, Sandbeck Way, Wetherby, Yorkshire LS22 4DH.
Phone: Wetherby (0937) 3541.

Aperiodic loudspeaker

Said to be ideal for studio monitoring, the new Griffin *Type 27* 'aperiodic' loudspeaker incorporates 'a revolutionary crossover design featuring degrees of inherent mid-range and treble damping and coil control previously obtainable only by using tri-amplification'. Also contained within a special reflex system are twin-angled damped pipes that enable the bass unit to radiate very-low frequencies (below 30 Hz).

The units are supplied in matched, mirror-image pairs, each capable of handling up to 100W rms. They cost £198 per pair.

H K Griffin and Co, Siddons Factory Estate, Howard Street, West Bromwich B70 0SU.
Phone: (021) 556 0559.

Capitol NECAM

Neve are to supply Capitol Records, Hollywood, with what is claimed to be the first NECAM console to be installed in North America. At a recent official signing ceremony, John Krans, Capitol recording manager, seemed pretty happy with the deal: 'Neve's NECAM computer consoles are certain to become the world's favourite for music recording, as their manual console have been for years'. The order is worth $160 000.

Blumlein—the unsung stereo pioneer

On a sunny day in June a flotilla of press, audio engineers and EMI people descended on a normally quiet little backwater called The Ridings in Ealing, West London, to see a GLC blue plaque unveiled. For it was at No 37, The Ridings, that Alan Dower Blumlein lived until his untimely death in a Halifax bomber that crashed killing all on board while testing Blumlein's highly secret *H2S* radar system. That was in 1942; and it had taken until 1977 for anyone to commemorate the man whose genius spawned 128 patents for inventions that broke new ground in telephone engineering, radar, television and sound recording.

Without doubt the prime mover behind the plan to commemorate Blumlein was his biographer, F P Thomson, OBE. Thomson was also responsible for having the Press Council rap the *Daily Telegraph* firmly and justifiably over the knuckles for mocking Blumlein earlier this year. The paper had cited him as an engineer whose work was so secret that no one had ever heard of it, and which was in some obscure way humorously equatable with sewage handling. In this context it was endearing to see the unveiling event covered for the *Telegraph* by a reporter blissfully unaware of his paper's recent gaffe.

But, sadly, all this conforms with the general state of ignorance over Blumlein's achievements that persists even today. It is by now fairly well known that it was Blumlein who in 1931 first taught how to record stereo using the then-novel crossed-pair microphone techniques, a double-modulated record groove, and a carefully angled pair of reproduction loudspeakers. (In a recent issue of STUDIO SOUND, Pete Townshend advocated that pop and rock engineers should 'have a go' with modern versions of the crossed-pair technique still used by purists for classical recording work.)

It is less well known, however, that Blumlein did pioneering work on centimetric radar, high-quality music land lines, and the Marconi-EMI 405-line tv system, which was adopted by the BBC in 1936 and used in 1937 to transmit coverage of George VI's Coronation Procession, despite the very poor light conditions.

In some areas there is inexcusably total ignorance of his work. When asked why the British Genius Exhibition in London's Battersea Gardens (which salutes 100 years of British achievements) made no mention of Blumlein, an organising

spokesman replied: 'Who's Blumlein?' In other areas there is gross misunderstanding: Sir Alan Hodgkin, in his official speech at the unveiling, referred to the recent inauguration by the BBC of quadraphonic Matrix H broadcasts, and told the assembled press that Blumlein's famous stereo patent (BP 394325) referred not only to the invention of stereo but 'also included an outline of quadraphonic and ambisonic techniques'.

To set the record straight for Sir Alan's benefit, although BP 394325 laid the *foundation* for matrix quadraphony by spelling out the principles of sum and difference signal handling, it nowhere mentions surround-sound or quadraphony. Furthermore, the Ambisonic surround-sound system is that developed by Messrs. Fellgett, Gerzon and Wright, with NRDC backing. Although a logical, modern extension of Blumlein's pioneering work, it is by no stretch of the imagination 'outlined' in his 1931 patent.

To continue setting the record straight, it is important not to overlook the prime source of modern interest in Blumlein. In the mid-Sixties, engineer B J Benzimra wrote a lengthy article entitled 'A D Blumlein — An Electronics Genius', in the trade journal 'Electronics And Power' (June, 1967). This he regarded as a 'delayed obituary', 25 years after his death. Along with useful references to contemporary publications by, and concerning, Blumlein (including a series of articles published in 'Wireless World' by Blumlein in 1925), the Benzimra document lists and offers a synopsis of every single patent applied for by Blumlein during his work with EMI.

Although it will clearly be many years yet before Blumlein's total contribution to modern electronics and sound technology is fully recognised—his original *H2S* radar is still in use today—the interest created by the new plaque should provide at least some added impetus.

Adrian Hope

Loudspeaker survey omission

It appears that a bad case of the untidy desks has resulted in our leaving out the Rogers *LS3/5A* and *Export Monitor* loudspeakers from our recent survey (STUDIO SOUND May '77, p48). Their entry would have read as follows:

ROGERS
Swisstone Electronics Ltd, 4/14 Barmeston Road, London SE6 3BN. Phone: (01) 697 8511.

LS3/5A
Impedance: 15 ohm nominal.
Frequency response: 70-20k Hz ±3 dB.
Spl: 95 dB max, wrt 2 x 10^{-5}N/m² at 1.5m in 'average listening room'.
Max power input: 25W speech and music.
Drive units: two; 10 cm bass driver and 1.9 cm dome tweeter. (3 kHz crossover.)
Dimensions: 18.5 x 30 x 16 cm.
Weight: 5.5 kg.

EXPORT MONITOR
Higher-power handling version of well-known *LS3/6*.
Impedance: 8 ohm nominal.
Frequency response: typically 40-20k Hz ±3 dB.
Max power handling: 50W rms at 400 Hz; 100W speech and music.
Drive units: three; 20.5 cm bass driver, Celestion *HF 1300* derivative tweeter and *HF 2000* super tweeter.
Dimensions: 30.5 x 30.5 x 63.5 cm.
Weight: 14 kg.

Nagra mini-mixer

A miniature mixer, *SNM-3*, for use with Nagra *SN series* of tape machines is now available in the UK from Hayden Labs. Switchable input between two a-b powered condenser or dynamic mics, before and after tape monitoring, and separate headphone level are featured. Total weight of the mixer and an *SN* tape machine is just 1,7 kg.

Kudelski SA, 1033 Cheseaux sur Lausanne, Switzerland.
Phone: Lausanne 912121.
Telex: 24392.

UK: Hayden Laboratories Ltd, Hayden House, Churchfield Road, Chalfont St Peter, Bucks, SL9 9EW.
Phone: Gerrards Cross 88447.
Telex: 849469.

CISCO 1977

The second CISCO, otherwise known as the international fair for cinema, theatre, conventional hall equipment, production equipment and related materials, will be held in Paris from October 3-7, 1977. Further details from Nicole Hiep, CISCO, 3 rue Garnier, 92200 Neuilly sur Seine, Paris. Phone: 747 8400.

SENNHEISER
microphones

the professionals

For your free copy of the 100 page Sennheiser Catalogue complete the coupon and post to us right away.

Hayden Laboratories Ltd

HAYDEN HOUSE, CHURCHFIELD ROAD,
CHALFONT ST. PETER, BUCKS SL9 9EW.
Telephone: Gerrards Cross (02813) 88447

HAYDEN

Please send me a free copy of the 100 page Sennheiser Microphone Catalogue

Name

Company

Address

Code SS977.

Multitrack on the road

Peter Smith *

*Maison Rouge

Live gigs and farmhouse recordings are definitely on the increase—but the problems and techniques associated with this type of multitrack recording can be a little different, to say the least. 'You want to record—where?'

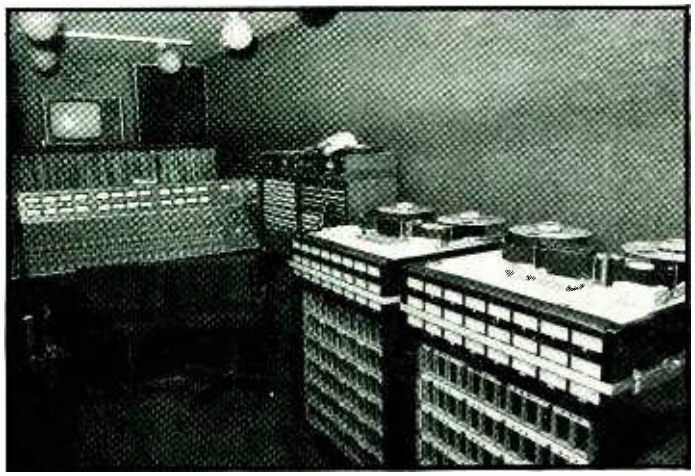
THE OVERALL CONCEPT of the 'multitrack' mobile is just an extension of the original BBC idea of doing live recordings, but being able to do them in the way that a modern band likes to work—with all the facilities of multitrack working. It also offers a way of bringing a controlled environment to a place where such an environment would cost a fortune to build. Thus, an album can be recorded in a farmhouse, or whatever the band's idea is of 'congenial' surroundings. Furthermore, a mobile is a relatively cheap method of recording multitrack because there aren't the overheads, the large numbers of staff or the ground rent you face when running a 'static' studio.

Besides the 'convenience' of a mobile there's no clock-watching involved; only calendar watching. If a band has booked a mobile for five days, they know they've got five days to do whatever they want to do. They know exactly what it is going to cost them—less of course the tape they use—and that's it; there's no other consideration to take into account other than possible hotel bills.

If they're not used for an actual live album, mobiles can provide a very useful tool to enable the band to improve on its own stage show. They may hate every minute of what they hear on playback, but such introspection should give rise to an improvement in creativity.

The atmosphere of a live recording is obviously different and worth recording, but the quality does tend to suffer due to problems like separation—sticking isolation screens up on the stage is just not on because the band is there to do a show, not a mobile recording. In normal circumstances the promoters only agree to a live recording to help the band. Unless, of course, the record company has stated that the show is going to be a live album, in which case far more consideration is pointed at the mobile, than the audience.

Manor (24-track, UK)



Building a mobile, however, is not as simple as it may appear, even though there has to be an uncomplicated approach to everything that's inside. You can't build along the lines of a static studio, where an engineer usually has at least a few days to get used to the desk. In the mobile he's got possibly three or four hours in which to learn the desk, use it and do a full recording, and at the end of it all walk off with a set of tapes that he hopes will be of the very best quality. The basic design has got to be as good as a conventional studio control room because with live gigs you are also faced with the external problems of the environment in which the session is actually being recorded; it can never be as manageable as a studio and unfortunately this environment is going to show up on the record. The mobile can therefore help alleviate the recording problem by being designed in the right way to help the engineer discover the parameters of this environment, and thus help him compensate for them.

Design

In the actual design of the mobile the first pertinent problem is that the vehicle in question is going to take a lot of punishment on the road. Most roads are unpredictable, no matter where you are, not to mention the problems of cornering and emergency stops. The external body of the mobile must therefore be allowed to twist, but the control room itself must be as rigid as possible to prevent the twisting, etc upsetting the equipment. As a result the control room must be 'floated' inside the truck; but even so the equipment to be carried in the mobile, especially the desk, must be built a lot stronger internally than that destined for static studios. The one main specification for the truck itself is that any gear put in it (or likely to be put in it) has got to keep within the axle weights. This can cause problems, but is best overcome by allowing a reasonably healthy load margin. Also the chassis bearers have to be slightly stronger; there will be a fair amount of unequally distributed weight. It's not as if the vehicle will be loaded with packing cases —there will be a desk halfway down the vehicle with all its weight active on that point.

It must also be remembered that you will have to take everything with you. For spares, it is virtually necessary to take a third of the desk, a third of the tape machine—in fact, a third of the recording studio as a back-up system. You can't afford to simply take along another power amp in case one blows; you have to have spares of virtually everything. If not the full card, at least the transistors —and plenty of solder. Oh yes, definitely plenty of solder.

For a large multitrack mobile it is therefore essential to have a back-up vehicle that carries all the microphones, stands, spares, coffee machine, accessories, etc. The mobile itself should just carry the main recording gear: the desk, the tape machines, and the necessary signal processing equipment. This is more for the comfort of the customer than necessity; it's possible to divide the mobile off at one end and store the gear in there, but it's the wrong environment. The engineer or producer likes to be able to sit in relative comfort, and have somewhere to drink a cup of coffee during the recording

session (it's nerve-racking for anybody). If everything is tightly packed into one spot—for instance, like the BBC outside broadcast trucks—where they don't have a client to please, just a job to do—it's not really a comfortable environment at all.

The next aspect that needs to be considered is acoustic design. Firstly, there's the extraneous noise to be minimised. This noise is unfortunately inevitable to some degree, unless you've got a 40-tonne truck, the walls of which you can fill with concrete. If the mobile is parked on a street where trucks are liable to be pounding past, they're always going to be there and you're going to be hearing them. It's not as distracting as it sounds, however, especially when monitoring, because you can often 'ignore' the sounds while concentrating on the speakers. Even when you're not monitoring and a lorry goes past every 25s, it doesn't affect your thinking because you know what it is and can subconsciously ignore it.

An engineer who's never previously recorded in a mobile often takes a little time to adjust, but as long as the environment is as near as possible to that of a studio control room, and as long as it is designed to look wide, spacious and comfortable, when the doors are shut the chances of his ever even remembering that there is anything different out there are quite minimal. As far as his eyes (and ears) are concerned, there are two monitors, a tape machine and a desk in front of him. It's a world on its own, and everything outside can be completely ignored.

Internally, a mobile needs to be 'dead' and this is helped by the very 'soft' walls, ie there aren't several centimetres of concrete to contend with. The walls are usually made of aluminium, and if extraneous noise can get in, the internal sound is bound to go floating out. I consider it important that a mobile be dead, for the simple reason that auditoria, no matter where they are, tend to be very live, especially when there isn't an audience. With no audience they tend to sound more like echo chambers than concert halls. If the mobile is dead you have the advantage of being able to detect how much reverberation exists within that hall. Once the audience is seated (or standing) and the recording's about to start, there is still a good indication of how live the hall is, and whether or not, at a later stage, handfuls of echo are going to be needed. Normally absolutely none at all is required because it's all been done by the environment. A 'dead' mobile also gives a good indication of the separation between particular instruments: there may be a horn on the other side of the stage, but one microphone over the violins, for example, will be picking it up very clearly. Because there is no reverberation within the truck—or at least very little—everything you hear is going to be exactly live; if the truck's live you won't hear it because the sound will be muffled by the mixture.

Monitoring has to be reasonably accurate—it's no good having a mobile that's bass or top heavy. Every time the engineer walks in you need to say: 'Look, I'm terribly sorry, but just remember when you do the balance to keep some of the top off or the bass off' —the engineer will have absolutely no idea at all. As long as the environment of the mobile is good and flat, you don't have to tell him anything; he can walk in, listen to the monitors, do what he wants to do, and take the tapes away. And when he takes them into another studio they're not going to sound really dire in any way.

On the road

Operationally, there are many unexpected 'hazards' that you learn to deal with, purely from experience. And not least of these is just getting the mobile to the recording site. In the UK, a mobile is a very different vehicle from most seen on the roads, and it tends to be hounded by police cars that hover behind for 20 or 30 minutes trying to work out exactly what the vehicle contains. If they aren't satisfied, the chances are that they'll stop you anyway; not so much to check your papers or anything, but just to be inquisitive about what is hidden in such a strange vehicle. All the same, you've got to keep all your papers up to scratch; you can't afford to risk anything.

As far as driving on English roads is concerned, travelling is fairly reasonable apart from some of the places like Devon where we have our quaint 'Devonshire country roads'. These are normally 2m wide, and if you've got to try and get a 2.5m truck down them, it can present a lot of problems. Like spending three or four hours to travel a couple of miles, with some poor blighter lying underneath the back axle guiding you along to keep the boulders out of the way of the body. Obviously a lot of damage occurs to the truck when you do these sort of things, but it's only body damage and it's not

Multitrack on the road—just about!

that hard to replace the aluminium plates.

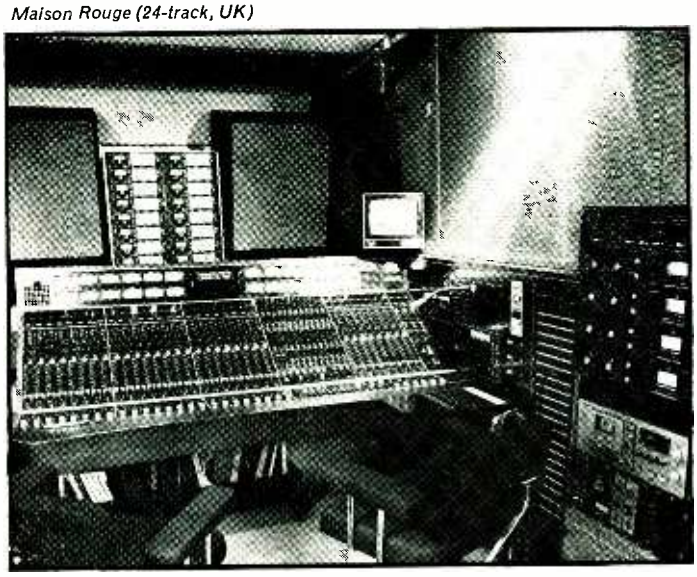
Travelling in Europe creates a different problem: customs. To satisfy the regulations, it is necessary to enter any truck that's going out of the country and coming back in again on a form called an ATA Carnet. This lists absolutely everything, including the last nut and bolt that might exist, and customs officers take great delight in going through this long document so that you miss the boat and get annoyed with them.

Also with a mobile you have a large amount of empty space behind wooden panels, under seats, etc, and these are very interesting areas as far as customs officers are concerned. For example, it would be very easy to take a speaker out of its cabinet and put something behind it. One customs officer stuck his finger through one of our cones to see if there was anything there. They also like to poke the ceiling and ask silly questions like: 'Does the roof come down?' or 'Can you lift the floor up quite easily?'. You have to stand there and say quite honestly, 'No you can't', and hope to God they don't try, because otherwise you're going to be there for a long, long time. There are a lot of hiding places in a mobile, and I don't think I'd ever like to do a gig in any country where it is possible for kind souls to stow plenty of dope or the like away while you're not around. Besides being exceptionally embarrassing, it could be rather dangerous to the extend of landing yourself in jail for five years—just for doing one gig.

Obviously you don't want to spend too much time on the road but, unfortunately, you've got to allow quite a bit of time to get through certain 'things', and gauging this only comes with experience.

36 ▶

Maison Rouge (24-track, UK)



MULTITRACK ON THE ROAD

With a car you can arrive at Dover 20 minutes before the boat is due to leave; with a mobile it's often necessary to get there at least 1½ hours before the boat sails. You may well end up sitting around for an hour, but at the other extreme you may have a 5-minute dash to the boat while the customs officer is going through all the bits and pieces he wants to. There are two methods of entry at a harbour: the freight section, and the car section. With a car it's easy—you just drive through two barriers, the officer smiles at you and says: 'Have you got more than £25 on you?', you say: 'No', and on you go. With a mobile going through the car section it's slightly more complicated but nearly as quick, taking about an hour at the most to get through and on to the boat. If you go through the freight section, or you are hoodwinked into it by one of the officials who refuses to let you go through the car section, there are all sorts of nasty problems in store: like having to drive half-way round Dover harbour getting little rubber stamps on a piece of paper (and the reverse applies coming back from France.)

Setting up

On arrival at the gig you've got a different set of problems: the management, promoters, road crew, fire officer and electrician all have to be contended with; and all their little whims of fancy they decide to throw in your path. The manager, for instance, may refuse to allow you to park on a particular bit of his forecourt, because he likes to park his car there. Or he won't allow you to run the cables in until after six o'clock, because *he* feels that this allows enough time for you to get in your gear; this is about as good as useless if the concert is at 7.30.

Next there's the electrician. If he's French you've got the communications barrier to start with; if he's English he's probably stubborn—you hand him a piece of cable with three bare ends on it and ask him to shove it in something: to which he says, yes, and it won't be the power socket. You've then got to keep following him to make sure he has put it in something suitable to your needs.

It is, of course, possible to use a portable generator but they're expensive, and it also means that you've got to have somebody with a big can to go and get diesel every so often to top it up. More often than not it's best to find places that have got their own supply systems, and also find out beforehand whether or not they're suitable to your needs.

Now we come to the band, road crew and the promoters. They don't know much about mobiles. Although they want a live album, the mobile adds aggravation to the insurmountable problems that they've already got in setting the gig up. It's just another big hassle that's arrived on four wheels.

It causes chaos because the entourage overall have got into a cycle of working; they know exactly what they want to do . . . where they wish to plug their mics in, etc. You then come up to them and say 'here's the boxes that I want to patch across from the pa split feed'. You've suddenly broken their routine. It's understandable that people get annoyed when you break their routine, because they're quite happy with it—it works every day. However, when you've been paid to do a gig, you've got to do it . . . If you don't, you must have a very good reason.

The bigger professional groups tend to be much more helpful than the younger bands in this respect—but at the same time it doesn't always work out that way. Occasionally big names feel that they do your job better—because they have broad experience in such matters—whereas the younger band doesn't really know what's going on: there are a lot more microphones on the stage and they're quite happy to accept anything they're asked or told.

Co-operation can go either way.

A mobile team tends to stay in the same hotel that the band are in, which will normally be booked by them; if not you book all the necessary hotels in advance. You grab meals when possible; if there are problems, at best it is a mad dash for the nearest hamburger stand or else: go without. As for sleep, etc it depends entirely on the gig. Some are an absolute cinch—you don't know it has happened. Others turn you insomniac.

Hopefully the band will have arrived and have started setting up their gear. If they're nice, straightforward people they'll set up their own gear first before concentrating on the pa. If it's the other way around, it creates a few more problems.

With the back-up truck opened, out come the cables. They're run down to their appropriate positions at the stage boxes on stage—the excess is thrown up on the top of the lorry to get it out of the way. The microphone flight cases are unloaded and are taken down to the stage, awaiting the assistant engineer to start the miking.

Dive into the mobile and start lining up machines and untying everything making sure all is ready for action once the mics have been set. The miking takes quite a bit of time—much of this is taken up keeping the cables out of people's way.

At this point, the engineer usually arrives and starts nosing around while asking pertinent questions about the truck. He sits himself down in front of the desk and muses over it for an hour leaving the regular crew to finish the miking. You test out the mics and leave the engineers to take a back seat until that's been done, just to make sure that they are all working.

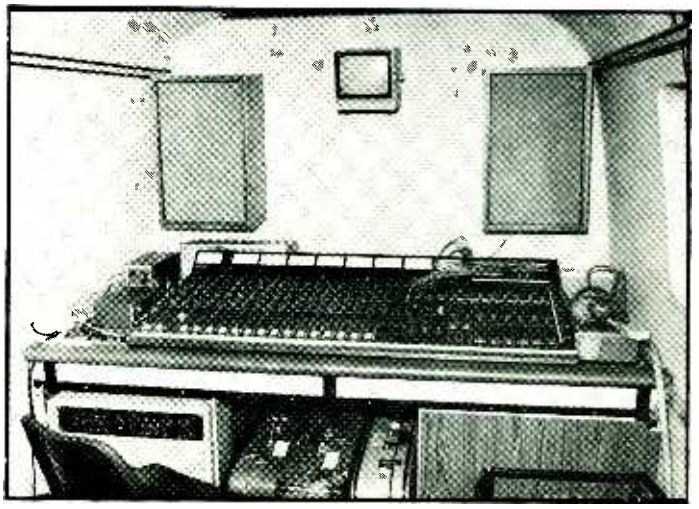
Laying cable is an art in itself, the skill of which varies depending on the situation.

For instance, with somewhere like the Albert Hall there are tremendous problems akin to disappearance down into the bowels of the earth. Cables can't just be run through two sets of doors and down the stairs . . . you have to take it down three flights of stairs, through the old air-conditioning system full of dust and concrete, along hot water pipes in a confined duct, through the entrance to the gents and up underneath the stage. This isn't the easiest route but it has to be; the GLC have elected it to be that way—it's a two or three hour job. In contrast, at somewhere like the Palladium, it's through a window, across a few hooks, and you're on the stage. They've got everything you could want to use, and a cable run like that might take three-quarters of an hour at the most.

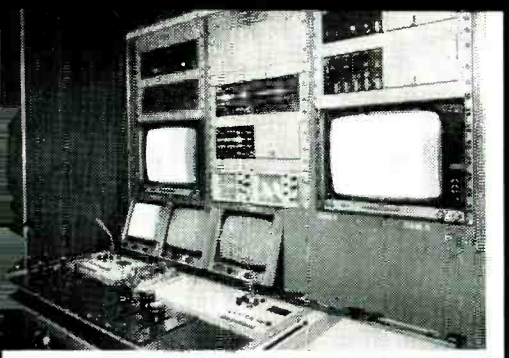
38 ▶

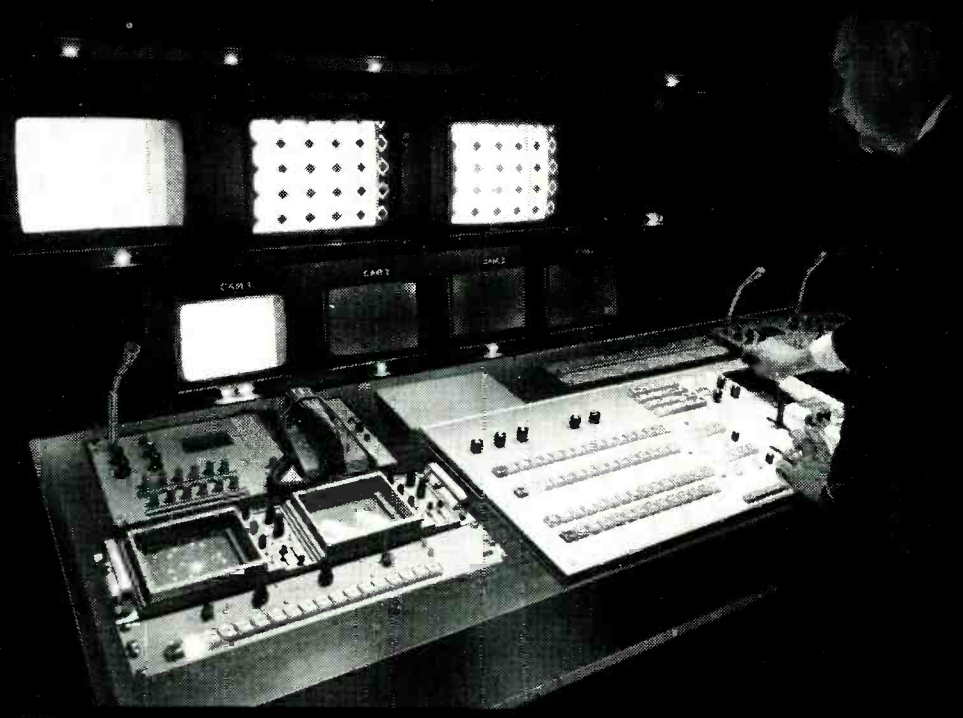
Rak (16-track, UK)

Microsound (16-track, Holland)

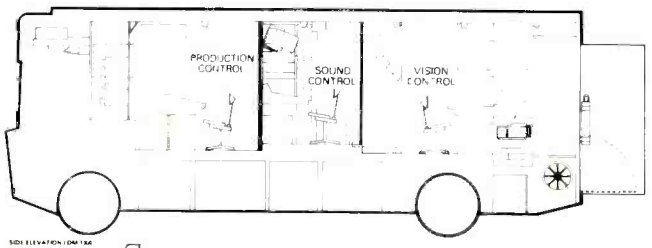


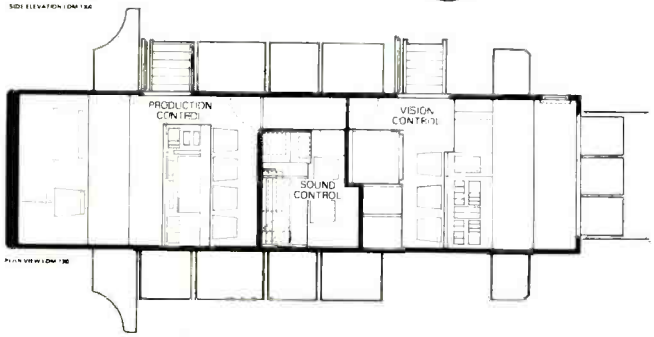
PHILIPS

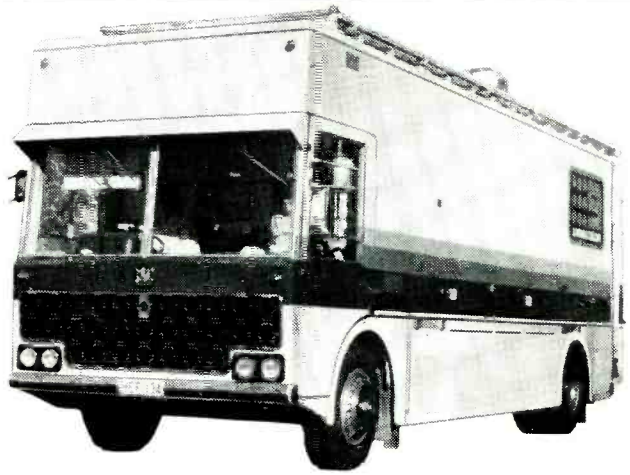




The Globetrotter







The Globetrotter – a versatile and extensively equipped four-camera outside broadcast vehicle. Globetrotter – because this compact vehicle has won acceptance with broadcasters in Europe, Africa, the Middle and Far East. Inside, the air-conditioning, heating, humidity control and sound insulating, coupled with a high standard of craftsmanship in coach building, have produced a balanced working environment that is completely independent of external conditions.
Three fully equipped control rooms provide production, sound and vision engineering facilities. Any of the wide range of Philips cameras, tripod-mounted or hand-held, can be incorporated.
The vision mixers, talkback audio mixers and VTR equipment have been developed with full OB production capability in mind.
With space for many alternative items of equipment, the highly flexible design can be adapted to suit *your* particular operational requirements.

For your next OB vehicle, call Pye TVT Limited,
PO Box 41 Coldhams Lane Cambridge England CB1 3JU
Tel: Cambridge (0223) 45115 Telex: 81103

Pye TVT Limited
The Broadcast Company of Philips

A member of the Pye of Cambridge Group

For others, the truck might be parked right outside the back door, the cables run through another and on to the stage and you're there—it takes 15 minutes, if that. Unfortunately there aren't many gigs like that.

Regarding the exact placement of the mics, it's best to ask the head roadie about stage layout. He will tell you about the band equipment; you might discover that each guitar uses four or five different amplifiers to get the different sound effects. This isolates the first problem—it's not just a case of sticking one mic in front of one guitar amplifier since he's using all five at different times. This normally means five separate microphones and the problem is at least as great with the drum kit. This situation means that the mobile crew must hold back until literally 90% of the stage has been set up and if they're initially concentrating on the pa, you've just got to hope they're going to get round to the stage gear as soon as possible. It boils down to the particular routine of the road crew.

Microphones

The environment of the stage largely governs the choice of microphone for a particular job. For instance, a Shure moving-coil sounds a lot better on guitars than a Neumann *87*. Not because the *87* is any worse; in a fixed studio a capacitor mic tends to be a natural choice. However, on stage, it picks up bass from the other side of the stage because its area of pickup is far more. You can stick a Shure virtually in the centre of the speaker and the only thing it picks up is the guitar, killing any external ambience. Highly directional microphones are essential.

The choice is not always totally straightforward. The band format suggests what will be needed and 90% of the mics you'll put up will be right. There's always the 10%, however, that need to be changed because they're just not suitable for the environment.

Whatever the final line up, it all has to go down on tape. You can't say to the guy that you're terribly sorry but eight tracks aren't working so you're going to have to run 16 tracks only. He's booked 24 tracks and he's going to expect 24 tracks to work. Everything has to be 100% or at least 99%—invariably there will only be one take.

Specifically, Shures and some AKGs are exceptionally good for vocals; although they're used for pa's and they sound fairly good in a mobile as well. They're essential for live performance because, when a guy is singing, he's usually chewing the head of the microphone and you need a tough unit; a Neumann would never do it—not in a month of Sundays. There would be so much crackling and spitting as to make such use impractical. In any case, who wants a guy slinging £250 worth of microphone around on the end of a cable? For example, there was a punk band where the lead guitarist was so involved in his music, he ran back into his guitar stack. It rocked backwards without falling over, but then rocked the other way and fell over, flattening the microphone.

On another occasion an *87* over a tomtom was literally being hit by the drummer resulting in one of the crew at the other side of the stage watching the head roll past him. The drummer's face dropped half an inch as he realised that yet another microphone had collapsed on him—upstairs, the engineer went a funny sort of colour having lost his beautiful tomtom sound.

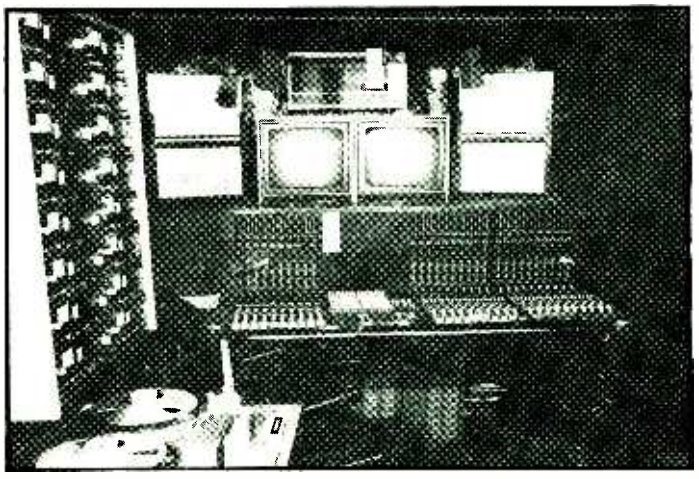
Occasionally things go wrong in the middle of a performance. For instance, if a single mic goes down, the remedial action depends on who the band is. If it's a good old rock and roll band then no one is too bothered about a roadie creeping along the stage to change a mic.

With a family show that's not possible . . . you say 'well it's gone down, and there's nothing we can do about it'. If they take a break or the lights go down for a couple of minutes, one can sneak on with the scenery changes, or whatever, and do something about it.

Such happenings don't necessarily mean that material gets lost because some losses can always be retrieved at a later date. For example, if it was the guitar mic that went down, they'll probably overdub the guitar later. It's far from disastrous—as long as the basic rhythm section is there all the time, everything else can be added on, if necessary, afterwards.

Mixing

It is often helpful to run a mix off the truck monitors to a stereo tape machine. Usually the engineer wants to take along a stereo tape together with the mixdown so that he can get a representative feel of what it was like at the gig. The mere fact that he was in the mobile, and probably watching it on video, means it won't be quite as good as it might have been or quite as accurate as it would have been if he'd been sitting out in front of the stage. But that stereo tape is representative of his feelings and his wishes at that precise time.



Dieks (16, 24 and 32-track, Germany/Switzerland)

Mixing the audience atmospherics is a very important job—this is one area that the band feels a lot about. They want their live album to have the best audience reaction that they can arrange. Occasionally things are done in the mixing; the audience is double tracked or triple tracked to make it sound bigger than it ever was (this isn't cheating anybody because the audience microphones always tend to be pulled down). If not, they destroy the separation you've taken care to obtain by using very directional microphones. On balance, it's better to leave the ambience mics on at low level throughout. It does affect the separation but you get a good feel of the venue; the people cough and cry out 'let's have another one, Andy', with all sorts of clapping and God knows what else going on. Leaving out balancing problems, etc it does feel as if you're there—the audience is present all the way through the track.

Operators of mobiles receive strange requests. People tend to get ideas that it would be nice to record music in the middle of a field with cows all round—mood mooing you might say. Such ideas mean, in practical terms, that you find yourself sticking up microphones with umbrellas and bags over them so that the rain doesn't get in . . . Trying to get the sound through the little plastic bags causes a considerable degree of aggravation to sound engineers.

Mobiles and TV

Film and television companies are providing quite a lot of work for the mobile market and there is a much greater involvement of live recorded music in pop transmission than there has ever been before. Even some of the children's programmes have started adding a lot of pop material.

While many television companies want to keep their options open on 24-track recording, they seem quite happy to leave it to other people to cover this aspect while getting on with their own job of video. They find it convenient to hand over the microphones and 24-track hassles and all the associated problems to someone else.

For under £400 a day, you can get someone to drive up, connect from their truck to the stage, and do the whole shooting match in one fell swoop. They have got simple television sound on the video tape, but in addition, they have a 16-track recording which can be mixed down at their leisure to get the best sound for a perfect show.

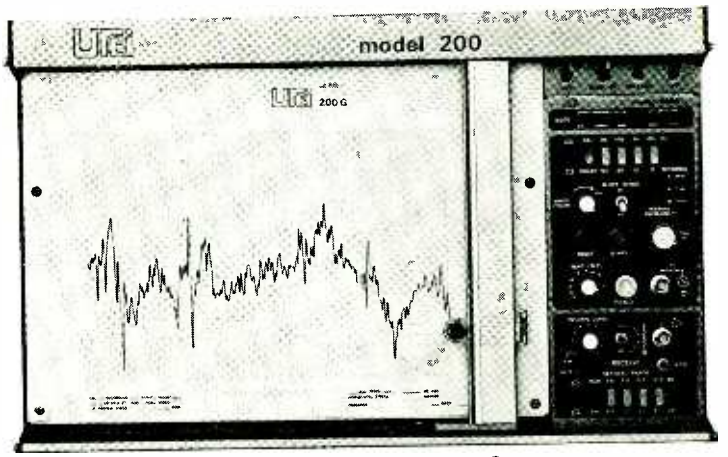
Hopefully, when television companies do start producing in stereo, which is almost inevitable, there will be an even greater necessity for mobile multitrack recording. After all, what could be better than stereo sound accompanying a picture of your favourite band? ■

Automatic Response Plotting System

By coupling audio analysis plug-in modules to Hewlett-Packard's X-Y plotter, Urei offer automatic frequency response recording, with automatic rate sensing and control, ensuring accurate tracing without the necessity of slow sweep rates.

Suitable for hard copy records of tape machine responses, telephone lines, acoustics, speakers, microphones—Urei Model 200 will resolve to 0.05 dB and has a range up to and beyond 60 dB. Choice of calibrated sweep and calibrated frequencies, accuracy is to ±0.3% full scale. Automatic or manual frequency control, range 20Hz to 20KHz.

Full descriptive literature is available on request.



UNITED RECORDING ELECTRONICS INDUSTRIES

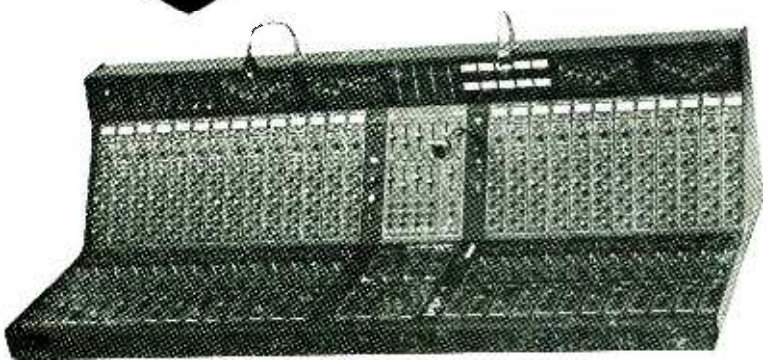
Manufactured by
United Recording Electronics Industries,
11922 Valerio Street, No Hollywood,
California, 91605. USA.

F.W.O. Bauch Limited
49 Theobald Street, Boreham Wood,
Herts. WD6 4RZ Tel: 01-953 0091 Telex: 27502

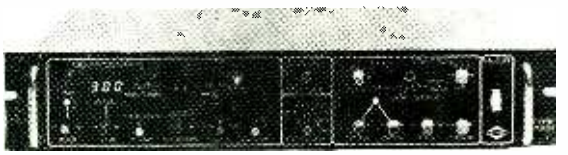
STRAMP

STRAMP

THE NEW GENERATION



Multireflex ECHO-7000.
multipurpose effect unit including echo, rev., phasing, frequ.-vibrato etc. All effects in stereo. Full electronic, digital display. Excellent S/N and headroom.



MPS-24C: professional studio console.
9-band EQ, VU + overload per channel, four effect ways, four stereo submasters, two stereo masters, LED peak reading meters. Extremely low noise level. Max. 24 tracks out.

Please send me further information
Name
Address

STRAMP - PRODUCTION AND DISTRIBUTION: PETER STRÜVEN GMBH · D-2000 HAMBURG 53 · BORNHEIDE 19 · TELEPHON D-040/80 10 28

APRS Exhibition 1977, a report

Mel Lambert and Frank Ogden

This year's APRS Exhibition was held at its usual venue, the Connaught Rooms, London, from Wednesday June 15 through Friday June 17, 1977.

IT LOOKED like it was going to be a good one long before the doors opened on June 15. At the January exhibitors' meeting all available stand space was booked within the first three hours. Another room was found in the general exhibition area; that went as well.

According to the APRS organisers there was at least £2M of hardware spread over three floors of the beautifully redecorated Connaught Rooms. Following the odd shambles of previous years (mostly due to acts of God) the exhibition machinery ran almost perfectly, and in accordance with the international status that the show has attained. Exhibitors with heavyweight desks—and hernias—moaned about the stairs, while working engineers, mostly the object of the exercise, felt that staging the show over the weekend would enable more people to see it. The latter view is especially relevant since the '77 event occupied three days instead of two as in previous years. Thursday, Friday and Saturday certainly seems a better idea.

The extra day was a definite improvement. It spread the load—perhaps a little too thinly on the first day—and took out much of the hot sweatiness that characterises the APRS show. Even the FWO Bauch lagers were colder . . .

Despite the rather predictable exhibits, people went along just the same. At a time when 24-track is *de rigeur* and a new tape machine is of little specific interest, the Cadac *CARE* desk drew one of the largest crowds, though exhibitors reported healthy interest in every quarter. Although recording industry turnover level is fairly static, hardware investment and re-investment continues unabated. Companies marketing and manufacturing predominantly 8-track gear reported that the money was going into private musicians' studios, while the heavyweights stated that the money spent by big name studios was returned in hard bookings. Those who spent the most got the most back. Inevitably the loser (and there has to be one) is the smaller independent studio that has to fight for a contracting share of the market—principally through cut price rates—leaving little for capital investment.

In a specialist exhibition such as the APRS it is fairly easy to spot trends, of which time domain signal processing is one. Although dominated by US firms, such as Marshall and Eventide, Klark Teknik showed an analogue charge-coupled delay line which would represent a worthwhile dollar saving. Similarly, the UK has been quick on the uptake with the 'in line' concept for console organisation.

The idea of an input/output module desk started in the US with a series of mixers designed by Dan Flickinger for, among others, Johnny Cash. MCI rapidly followed with the *JH-series*, with Harrison and Spectra Sonics hard on their heels. It therefore comes as no surprise to find some UK manufacturers following a similar pattern. For instance, the Raindirk *Quantum* series has been around for about a year, while Allen and Heath used this show to exhibit a 28-channel desk along the same, albeit simpler, line. More surprisingly, the basic price tag for a *Syncon* desk would show some change from £7000. Next year will probably feature quite a few more of the same, especially when one considers the undoubted savings in space and price.

According to APRS secretary, Ed Mazek, attendance at this year's exhibition was 2212, an increase of about 15% on last year's figure. 315 overseas visitors from some 40 countries made it to the show. Of the 88 exhibitors, four were from overseas, including Lyrec and Superscope who were showing at APRS for the first time.

This year's report takes the form of a pictorial extravaganza—it makes a change from reading all that close print. The photos have been grouped together—a double-page spread of mixers, plus a page of tape machines and another of ancillary gear—to give some idea of the range of equipment available in each category. Most of it's pretty new.

Next year's exhibition will be at the same venue and will again run for three days. The dates will be Wednesday June 21 through Friday June 23, 1978; put it in your diaries.

Apologies to the following, who were showing some interesting gear but through acute lack of space couldn't be included:

NEVE, whose working NECAM system attracted a lot of interest. We may have seen it a couple of times before, but the sight of those dancing faders always creates a stir.

ITA, who were showing a selection of their own mixers and the products they distribute in the UK. They were also letting visitors play with a Teac Tascam *80-8* with dBx noise reduction linked to a *Series 5* mixer. You don't have to be big to be beautiful.

FERROGRAPH, who had the only full-frontal nude at the show. But, settle down, it was just a *Studio 8* with the internals exposed.

42 ▶

You never know who you're going to bump into at the APRS.

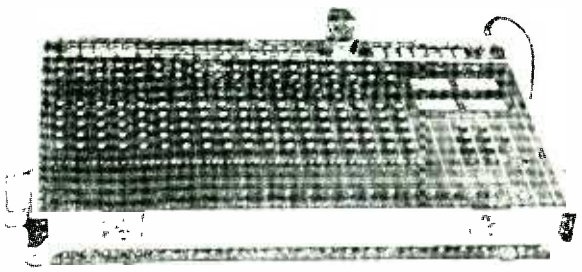
Photographs courtesy of Roger Phillips

amcron

ONE WORD SAYS IT ALL!

The Power amplifiers for the professionals

MACINNES 16/4 PA MIXER



The new 16/4 Macinnes mixer has been designed for use in high quality PA systems where reliability coupled with the need to stand up to rough usage are important. Now built into a sturdy Fibre Glass case, the 16/4 is priced at **£1,600.**

SESCOM

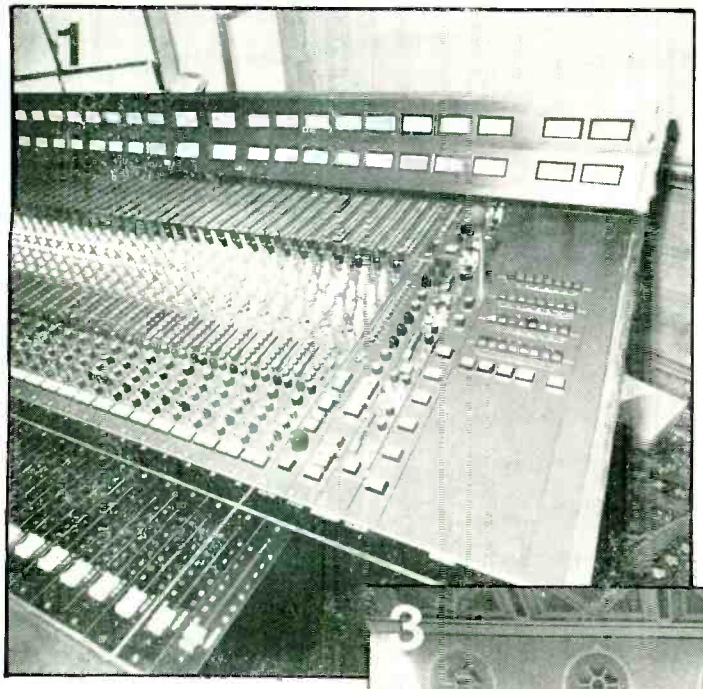
Audio Products for the Professional

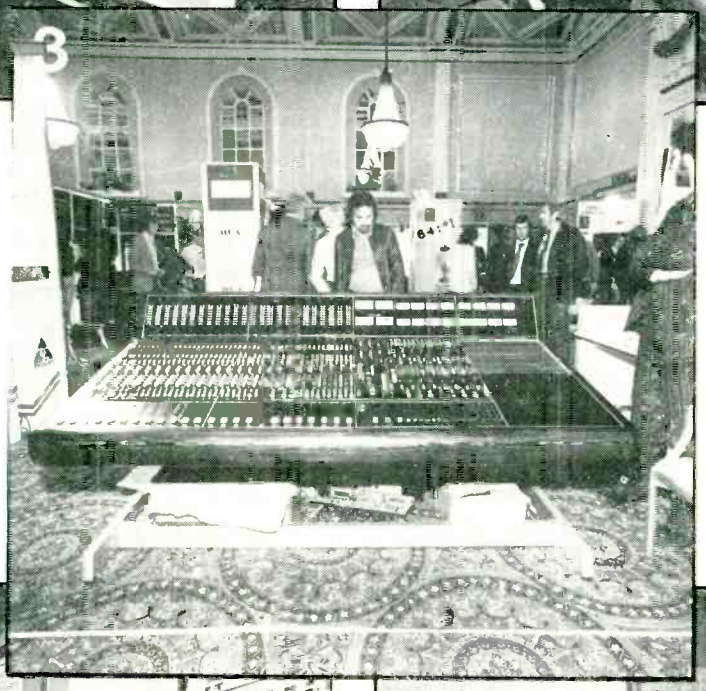
- ★ Mic Transformers
- ★ Direct Injection Boxes
- ★ Mic splitting Boxes
- ★ In-Line Transformers
- ★ Mic Pre-amps
- ★ Active Equalisers
- ★ High and Low Pass Filters
- ★ Multi-Cables

Send now for the latest Sescom Catalogue

MACINNES LABORATORIES LTD.
MACINNES HOUSE, CARLTON PARK INDUSTRIAL ESTATE, SAXMUNDHAM, SUFFOLK IP17 2NL TEL: (0728) 2262 2615

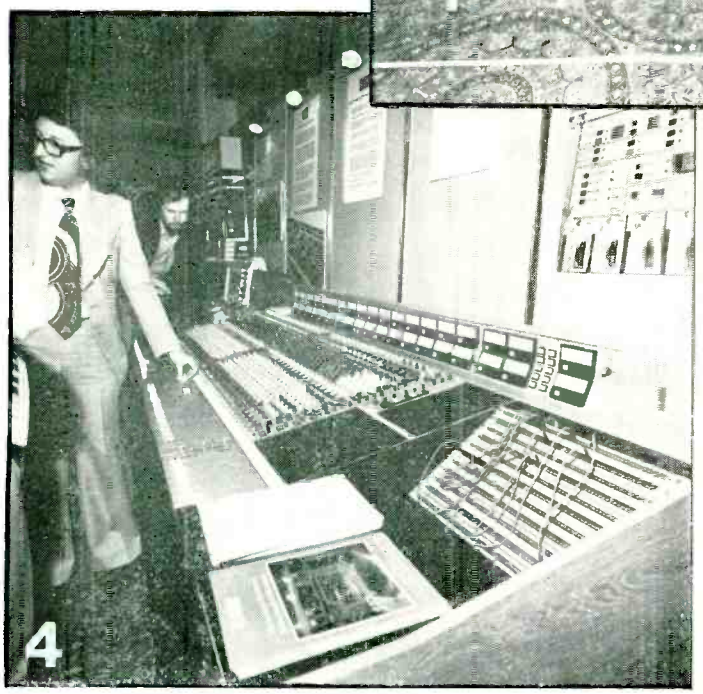
MACINNES FRANCE S.A.R.L.
18 RUE BOTZARIS,
PARIS 19
Tel. 206 60 80 et 206 83 61

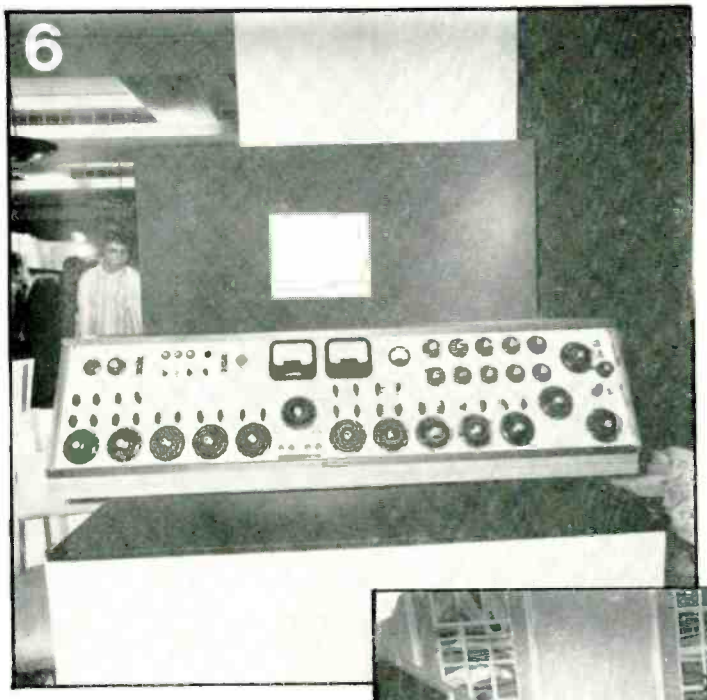


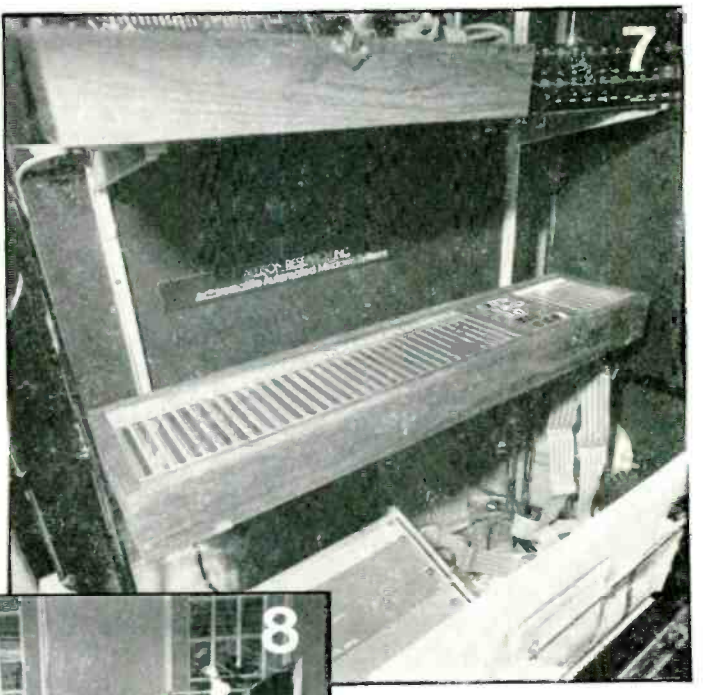


APRS Report

1. *Remotes for a Studer 32-track (when it arrives, 24-track until then) fitted to a 40/32* **Raindirk** *desk destined for Central Sound Studios. The switches have now been changed to Switchcraft units containing two separate bulbs. This will allow a different colour to indicate a change of ready/record status.*
2. *A* **Midas** *22-input/16+8-output desk with mic or tape-in switching. Four blank panels allow the input configuration to be expanded to 24 tracks.*
3. *Although* **Trident** *planned only to show modules, they turned up with a 24/26/26 desk with full parametric 4-range eq on slide faders.*
4. **Cadac** *brought along a 40/32/32 CCA desk equipped with four echo sends. Dc-controlled faders use V-cat attenuators and can be routed to seven sub-groups for dc-ganging. The seventh fader may be used as a gang master to control all desk faders fitted with dc-ganging facilities. Input and output interfaces are also provided for connection to Cadac's CARE automated storage system.*
5. *A 28/26 Syncon desk with quadraphonic monitoring from* **Allen and Heath.** *The design is based on input/output modules, and features four auxiliary sends, two parametric eqs with switchable 'Q', and solo and mute buttons on each module. A separate auxiliary module controls the main outputs, echoes, monitoring and communications.*







6. *As part of their 15th anniversary celebrations* **Neve** *brought along the very first mixer they built. It was sold to Recorded Sound Ltd (now NOVA Sound) and featured 10 inputs and two outputs.*

7. *The redesigned* **Allison Research** *Memory Plus level control system and 65k digital programmer. The controller features an endless-loop, light-sensitive plastic 'fader' with a 32-element led display to let you know where the fader is positioned.*

8. *Dag Feiner at the controls of an* **MCI** *28/32 JH-500 series console linked to a 24-track JH-16 series multitrack—the only fully working automated demo at this year's APRS. The desk is one of seven destined for Radio Televizija Belgrad, Yugoslavia.*

9. *A* **Macinnes** *16/4 mixer housed in its glass-flare flight case. The design includes two foldback chains, two echo sends, a 3-position eq with ±12 dB cut or boost, and ±18 dB of treble and bass attenuation.*

10. *A rather basic example of the new* **Alice** *ACM system. Available in a variety of inputs to 2 or 4-output configurations (up to 12/4 or 14/2) the system fully meets the IBA specification for ILR stations. Can't help wondering if Ken Townsend was really looking for a replacement for Abbey Road's Neve MECAM setup. Nice poise though Ken.*

44 ▶

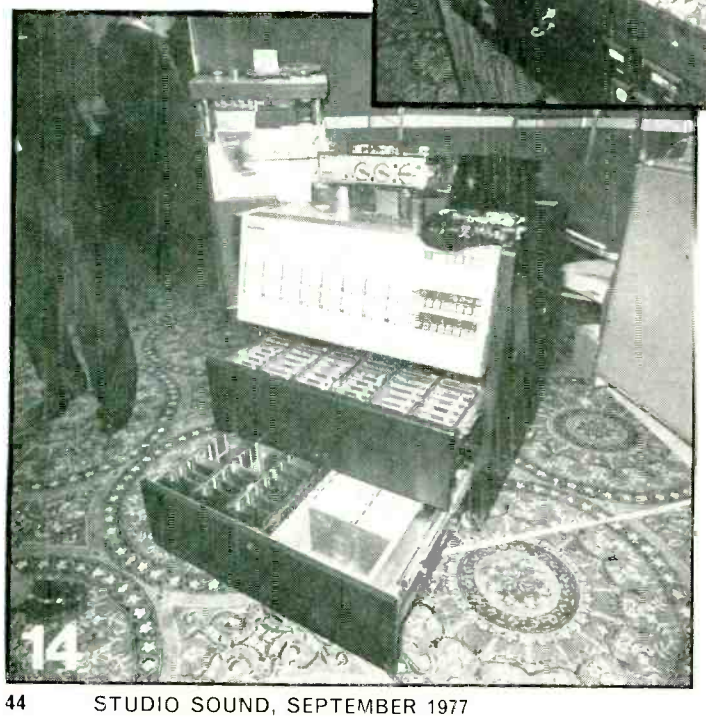
APRS Report

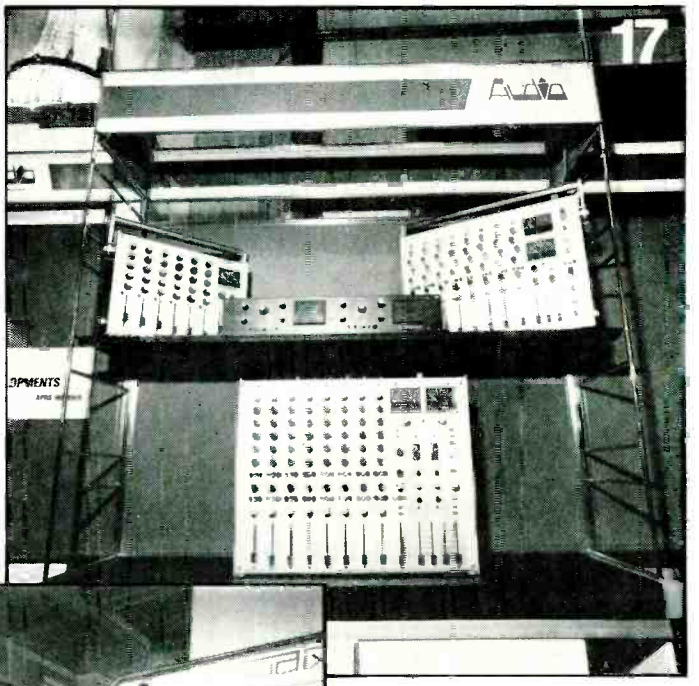
11. **Hammond** was displaying more or less the entire Otari range. From left to right: a model 5052 SH with two speeds, selsync and front-panel bias adjustment; a console version of the 5052 with varispeed and separate bias oscillator and record amps; a 4-channel model 5030-QX HD in a road case; an 8-channel model 5050-8 SH using 12.5 mm tape and a console-version Model 7308 for 8-track recording on 25 mm tape.

12. 'Penthouse' version of the **Leevers-Rich** 2000TC which features a twin varispeed servo capstan and full motion sensing. No pots to be seen anywhere.

13. *A 64:1 Gauss 1200 series tape duplicating system on the* **Cetec** *stand. The system comprises a loopbin containing an 8-track master tape recorded at 9.5 cm/s, a master reproducer running at 610 cm/s, and a cassette pancake slave running at 304 cm/s. It costs about £25k.*

14. *All sizes of equipment were to be found on the* **Hayden Labs** *stand. Perched on top of the Telefunken M15A multitrack are the Nagra E and the Noriyuki minimixer for use with a Nagra SN. The M15A is available with up to 32 tracks, the erase, record and playback amps for which are switched on and off by overlapping ramp-shaped voltages to ensure click-free and gapless drop-ins.*





15. *A* **Lyrec** *TR53 multitrack linked to a redesigned and even more comprehensive remote control unit.*
16. *The* **Tannoy** *Buckingham is capable of handling 200W continuous integrated programme material, and delivers 95 dBA spl at 1m from 1W. The horn-driver of the 25-cm treble and mid-range unit uses Ferrofluidics for increased heat dissipation. Each loudspeaker won't leave much change out of £1000.*
17. *Pride of place amongst the portable mixers on the* **Audio Developments** *stand was the AO55 stereo compressor-limiter. The electronics are derived from the modules fitted to AD207 and 031 mixers, plus extra threshold ratios and an attack control.*

18. *An* **Audix** *custom-built dj suite for an independent local radio station. The desk incorporates 12 mono mic or line and four stereo line inputs into a stereo output. Turntables are Garrard 401s; tape machines by Ferrograph.*
19. *The* **Neal** *model 302 features full motion sensing and logic control of deck functions. Front-panel buttons allow bias and line-up levels to be displayed on the ppms. A 152-mm decoupled flywheel and capstan is said to reduce wow and flutter to below 0.06% DIN-weighted.*
20. **Lockwood** *was showing a selection of their turntable consoles including one that incorporates the Technics SP10 Mk II.*
(see Review p 66)

'And now here with the details...'

Peter Sharp *

*Independent Radio News

A 'simple' cassette recorder is to today's radio news reporter what the notebook and pencil were to yesterday's trench-coated journalist. A story is nothing without actuality!

AS COMMERCIAL news radio begins to take off in Britain, more and more attention is now being devoted by the radio reporters and producers of these news programmes to recording equipment. No longer is it merely enough to 'get' the story—sound quality is of equal importance. If you can't hear what is being said . . . you can't follow the story.

In the three and a half years since Independent Radio News went on the air, there have been major developments in the manufacture of portable cassette recorders. And although the debate over the relative merits and disadvantages of portable reel-to-reel machines continues, it is generally agreed among reporters at IRN—Europe's only commercial radio news network—that *they* are far happier with a light-weight cassette recorder slung over their shoulder. They agree that a reel-to-reel machine, such as a Uher, obviously has its advantages in a formal, pre-arranged 'two-mic' interview where levels can be carefully monitored.

But in news reporting, 90 to perhaps even 95% of assignments consists of quick 'in and out' interviews, normally ending in a dash for a telephone. Any reporter who has spent eight hours outside a union meeting lugging a heavy Uher through the rain is usually most insistent when he gets back to the office about his preference.

There is perhaps another reason for this reluctance to use reel-to-reel equipment: reporters—myself among them—are notorious for their lack of technical ability when it comes to operating tape machines. This has changed radically since IRN went on the air; but ask any engineer at IRN his opinion of the reporter's appreciation of the workings of a tape machine, and you will get a short and rude reply.

A cassette recorder is an unsophisticated machine—it takes a lot of punishment and even the most hamfisted reporter can learn to use one in a couple of minutes. But the decision by IRN to rely primarily on the cassette recorder was initially dictated by its news format. IRN, which services Capital Radio, LBC and the other 17 commercial ILR stations, has adopted an hourly 3-minute news bulletin. From the start it depended heavily on actuality . . . the sound of the newsmaker.

An IRN duty editor gives this example: 'While the BBC will begin a news bulletin by reading the story in a scripted report from the studio, we want the voice of the person making the news to tell the story. For instance, if the miners ballot to go out on strike, we want the voice of the general secretary announcing the result.'

Actuality can also include raw sound. IRN reporter Steve Harvey once recorded the actual sound of an IRA bomb going off in the centre of London. And it's this sort of treatment of news that gives IRN its edge over the more formalised and less imaginative coverage by the BBC. It is this same format that called for a quick, efficient light-weight cassette recorder.

But there were also more practical reasons for opting for cassette machines as LBC's chief engineer, Roger Francis, explained: 'At the beginning it came very much down to a question of cost. We could buy the National Panasonic—our first machine—for £40 to £50; we would have had to spend £350 for a Uher. Also, most of the reporters were unfamiliar with tape recorders and had no broadcasting experience; they were obviously more confident with a cassette machine. And finally the size and weight of the machine were ideal.'

The search for a replacement to the National Panasonic cassette machines that had been in use since IRN/LBC went on the air in 1973 began last year. By that time it was becoming clear that the Panasonics were simply not suitable. To their credit, the recorders were enormously hard-wearing and stood up to some devastating punishment—they were dropped in paddy fields during coverage of the fall of Saigon; soaked by rain outside the Herrema kidnap siege in the Irish Republic; and generally bashed and battered by dozens of insensitive reporters covering stories across Europe. And the National Panasonic took it all and came back for more.

It was not, however, a professional machine, and didn't even have a vu meter. To determine whether or not you were actually recording, a tiny red light on top of the machine would flash on. At midnight in a dark cupboard this little light would shine like a beacon. But as most interviews were being carried out in broad daylight, it was almost impossible to see if the machine was working.

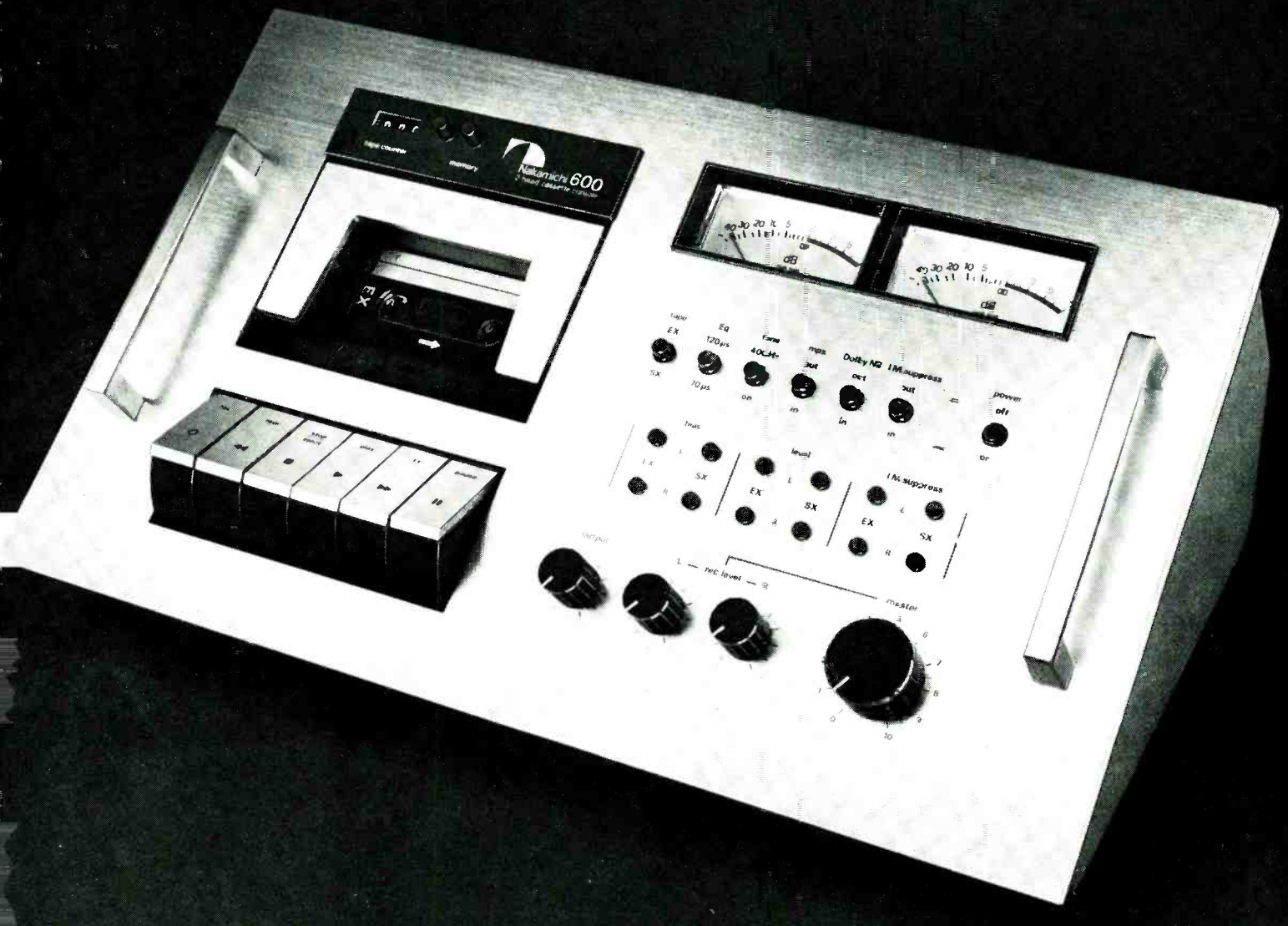
The pushbutton controls were also badly designed: to engage the machine into 'record' you had to push a little red tab set in the top of the play button. The slightest bump on any of the other buttons would instantly disengage the recording mechanism. In a crowd of reporters pushing forward for an interview you needed to protect the machine like a baby.

But the most serious drawback with the National Panasonic was its unsuitability for 'live' voice reports down a telephone line. In many cases, to increase the voice quality of an on-scene report it was necessary to 'croc-clip' the output of the machine to the mouthpiece of a telephone handset. By plugging the microphone into the machine and putting the machine into the record mode, it was possible to use it as a mini public-address system to boost the report down the telephone line. Attempting this operation with a Panasonic was a disaster. To literally turn on the machine it was necessary to put the machine in the record mode. Since there was no effective pause button, you would have to be prepared to record through the cassette to engage the machine. Many times, of course, this would be impossible, since you would be wiping your previously recorded interview.

There were also other niggling features that made the machine unpopular: it had a tiny digital counter that was continually breaking down; a very weak cassette iid; and the technical specifications, we were told, were not very impressive.

First choice as replacement by London Broadcasting's chief engineer was the Sony *TC92*, which had been used with success by radio reporters in the US and Canada. It was slightly heavier and more expensive than the National Panasonic, but equally hardworking. I found that it had a far greater volume level than the Panasonic, but it too had its drawbacks. Once again there was no pause button, and it had an extremely slow start up to speed. 48 ▶

Suddenly, other 2-head cassette decks look like toys.



Take a look at the new Nakamichi DT600 above.

Such an astonishing cassette recorder, that it makes the competition look like no competition at all.

For a start, compare its dynamic range.

With the 600, you can record up to +7dB without distortion. This is unprecedented by any other cassette deck, because no other model has the Intermodulation Distortion Suppressor that makes it possible.

Secondly, take the frequency response.

Other cassette deck makers may be proud of reaching 15,000Hz. Guaranteed minimum specification of the 600 is 40-18,000HZ ± 3dB. As for wow-and-flutter, at 0·08%, you can virtually forget it.

It doesn't stop there. Here is a combination of other features you won't find on any other 2-head deck.

Nakamichi's exclusive focused-gap crystal permalloy head.

Built-in test tone and record level calibration controls.

User adjustable bias.

Peak reading meters from −20 to +7dB.

A memory tape counter.

Master recording level control.

Even a system for unattended recording or playback.

We could go on.

Only Nakamichi could have made the DT600.

For the first time. 3-head performance in a 2-head machine.

NAKAMICHI

Natural Sound Systems Ltd, 10 Byron Road, Wealdstone, Harrow, Middx. HA3 7TL. Tel: 01-863 8622

AND NOW HERE WITH THE DETAILS . . .

The *TC92* took at least two seconds to reach proper speed, which caused a lot of aggravation while feeding, for example, a 20s extract from an interview down the telephone. By the time the machine was playing at its normal speed you would have lost the first few seconds of the actuality.

It was not until last November that the ideal replacement was discovered . . . in America. I had been sent by IRN to cover the presidential elections in Washington, and during that time worked out of the offices of Associated Press Radio. The role of APR is similar to that of IRN in London, serving hundreds of radio stations with their syndicated national and international news. The machine issued to their reporters was the Marantz/Superscope *C-105*. It is heavier than other compatible machines—weighing about 3.2 kg—but APR staff were singing its praises.

As former APR reporter Norman Beebe explains: 'I had used half a dozen different machines but none of them really matched up to the Superscope. Its pause button is so precise you can clip a letter off a word. And for the first time with a machine of this size you are able to mix a voice/actuality report down the telephone.'

It's this public-address/play mix facility that makes the Superscope the ideal machine for radio reporting. In practical terms it means that by attaching the machine to a telephone line the machine becomes a portable mixer. It works like this:

1) the telephone line (via croc-clips) and the microphone are plugged into the machine in the usual fashion;
2) lined up on the cassette is, for example, a 20s cut of actuality;
3) the machine is put into play with the pause button down and the reporter begins his report in the usual way;
4) mid-way through the voice piece he 'cues-in' his actuality by pushing the 'pause' button;
5) since the machine is in the play mode the actuality feeds down the line;
6) when the 20s of actuality is finished, the reporter pushes down the pause button and through the microphone concludes his report and sign-off.

An operation that could have taken audio engineers back at IRN up to five minutes to splice together has been fed and recorded in 45 seconds . . . the actual length of the report. And, if the engineer has really been on his toes, the report will have been carted up as it was received and will now be ready for transmission.

As with most new equipment, however, there were teething troubles. With just one volume control on the machine, the voice report and the actuality were seldom matched in level. While speaking through the microphone it was necessary to have the volume control faded up as far as it would go. This meant that the actuality was fed down the line at much too high a level. With a bit of practice you could quickly fade down the actuality and bring up the voice when you finished.

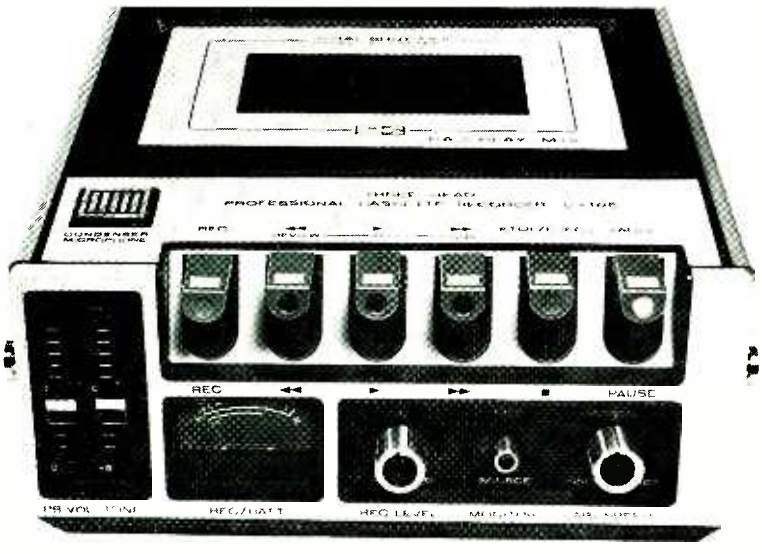
It was AP Radio that came up with the answer—they modified their machines by converting the tone control into a separate fader to preset the actuality level, with none of the resulting level distortions.

The modifications, which are reasonably simple to carry out, also yielded another bonus for reporters. One of the most effective radio voice reports is a commentary from the scene—whether it is a riot, a fire, a gunfight or a simple concert; that is any story that involves its own sound is best reported with the noise in the background. In the past, the difficulty in covering stories this way was that in many cases you were physically too busy to prepare a scripted report; at times the noise itself tended to blot out your own voice. The answer had been to feed the actuality of the riot—or whatever—to the engineers back at base, where they would mix it under the voice report. But again it was a time consuming operation, particularly when the engineers were busy. With the modified Superscope the actuality can be prerecorded and voiced-over live into a news bulletin if necessary.

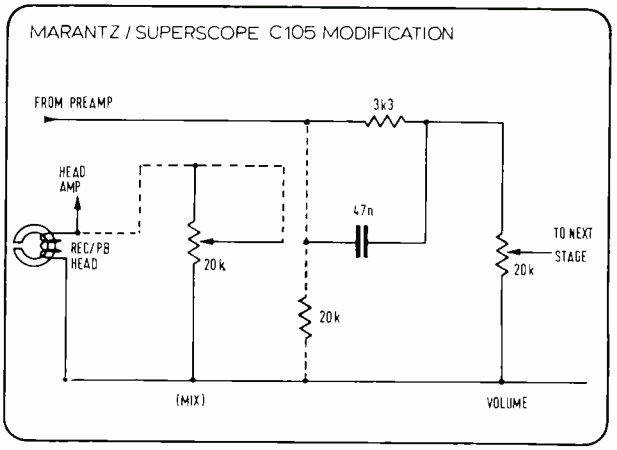
When I returned from the US elections I brought a Superscope back with me; two months later IRN ordered a dozen machines for its staff. London Broadcasting's Chief Engineer: 'There was no question about it—with the pa/mix the machine was ideally suited for our reporters. The technical specifications are higher than other similar machines, and although it's still too early to judge its reliability we're delighted.'

The Superscope was also particularly suited to the programme requirements of LBC. One of the most frequent jobs for reporters is the live voice report from the scene in a question and answer session with the programme's studio presenter. Using the Superscope it now means that a reporter can cue-in his own separate interview that he has already carried out, while talking with the presenter.

A final word on the Superscope from IRN's intake editor, Keith Belcher: 'It now means that reporters in the field can do an almost studio-quality job of mixing actuality and voice without the need to record his piece while the event is going on. In other words he can record "wild sound" of say a riot, and then when he has the facts at his finger tips can add his voice to the report. In studio-quality terms the Superscope is far superior to all other cassette recorders we have used.' ■



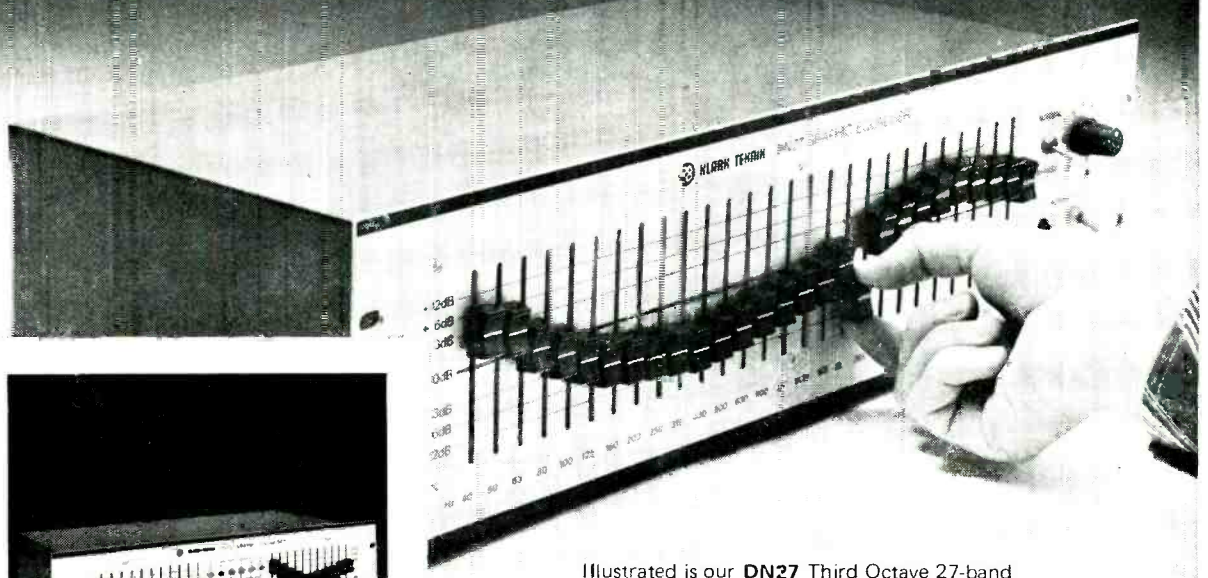
THE BUSINESS END of the Marantz/Superscope C-105 'professional' cassette machine. Three record modes are offered: 'manual' by which levels are set on the front-panel knob and 'rec/batt' vu meter; 'limiter' which is effectively 'manual' mode plus peak limiting; and 'arl' (automatic record level) which has two degrees of compression—a 20ms attack and 2s recovery time for transients lasting less than 2s, and an extended recovery time of 20s for transients of more than 2s duration. Three degrees of switched eq—'normal', bass-cut and treble and bass-cut—are also available. A varispeed facility alters the playback speed by up to ±20%. Thus, if the batteries have become partially run-down during a recording, hopefully the playback speed with a fresh set can be matched accordingly. The modification shown above converts the 'tone' fader into a 'mix' control. This attenuates the output from the record/playback head, and allows actuality to be matched to a reporter's voice-level or 'laid under' a report as background ambience.

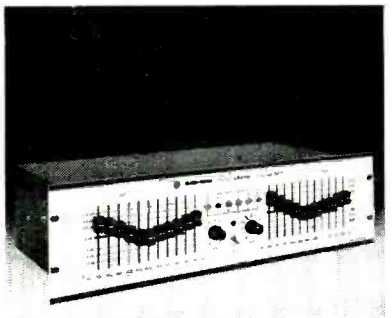


Broken lines show new wiring

At the BBC, Thames Television, Capital Radio, Granada, Air Studio, Rockfield, Decca, EMI & Strawberry... they have...

PERFECTION AT THEIR FINGERTIPS





Illustrated is our **DN27** Third Octave 27-band **Graphic Equaliser.** Also shown is our DN22, dual-channel, 11-band unit. Both have many technical plusses which our literature describes.

WORLD WIDE DISTRIBUTORS
Klarion Enterprises, South Melbourne, **AUSTRALIA**
ARC. Sprl., Brussels, **BELGIUM**
Camtek, Dorval, Quebec. **CANADA**
Team Sound APS, Charlottenlund, **DENMARK**
Studio-Center, R.E.D. Paris, **FRANCE**
Audio-Quipment, Aachen, **WEST GERMANY**
Pieter Bollen, Eindhoven, **HOLLAND**
Laboacustica SRL, Rome, **ITALY**
Continental Far East, Tokyo, **JAPAN**
General Video, Wellington, **NEW ZEALAND**
Siv, Ing. Benum & Co., Oslo, **NORWAY**
Ultralinear International, **SINGAPORE**
Colosseum Accustics, Johannesburg, **SOUTH AFRICA**
SATT Elektronik AB, Stockholm, **SWEDEN**
Dr. W. A. Günther ING. SIA. Zürich, **SWITZERLAND**
Hammond Industries, Syosset N.Y. **U.S.A.**

It's not surprising to find our equipment with these and many other users: after all, we are technically superior - as both operator and engineer can testify, and you may be surprised to learn that we are no more expensive

This perfection can be yours. Give us a ring !

KLARK-TEKNIK
RESEARCH LIMITED
Summerfield Kidderminster
Worcestershire DY11 7RE
Telephone (0562) 64027

as selected for the DESIGN CENTRE LONDON

business

ADRIAN HOPE

Hey man, turn it down

MORE AND MORE studio engineers are taking an interest in the possibility that hearing can be damaged by prolonged exposure to excessively loud sounds—for instance, years of monitoring at high levels. After all, who wants to be a deaf ex-engineer?

From Manchester in England and Pennsylvania State University in the USA come two interesting items of news in this field. According to Dr T A Henry of the Simon Engineering Laboratories at Manchester, it may well be peaks and transients that cause damage, rather than constant high average levels. This would certainly tie in with the well-known fact that the sound of gunfire at close quarters plays both temporary and permanent havoc with hearing. And, if correct, it certainly does not bode well for studio engineers who often listen to markedly transient material (for instance, drum tracks) at high level. A spokesman for Simon Engineering Laboratories has been quoted as suggesting that the amplification equipment used at concerts and discos is relatively safe because it clips the peaks.

In fact, this flies in the face of another, equally persuasive train of thought; namely that sub-standard or over-driven equipment which clips the peaks is even more dangerous to the ears than high-quality gear with plenty of head-room. The train of thought here is that when audio peaks are clipped, the waveform squares, and spikey harmonics —some of ultrasonic frequency—are produced. These spikes then barrage the ears as high-powered, high frequency transients. This theory would explain why musicians working in loud, but well-equipped rock groups, seem to suffer less hearing damage than those squeezing the last dB out of budget equipment. You pays your money and you takes your choice as to which interpretation you back.

From Penn State University in the USA comes the suggestion that the ear is not *directly* damaged by loud noise, be it high average level, faithfully reproduced transients, or the spikey harmonics from clipping. The theory is that damage results from the human body's reaction to stress caused by noise. Apparently, Penn State Workers have gathered evidence that shows how under normal circumstances, when the body is subjected to loud sound, it protects the ears by releasing hormones into the bloodstream. These restrict the supply of blood to the ears and produce the kind of temporary hearing loss that anyone experiences when they listen to loud sound. Every engineer knows how what sounds loud at the beginning of a session sounds far more moderate by the end.

Under normal circumstances, when the loud sound disappears, the body hormone level and hearing return to normal. But if the stress pattern is repeated too often for too long, the blood-starved cells die and temporary hearing loss starts to become permanent. The Penn State suggestion, which will appeal to studio engineers, is that, if the theory is correct, unnatural changes in the blood hormonal balance may be a signpost to risk of permanent hearing loss.

+10dbm candle power?

I'LL WAGER that within five years at the most, light fibres will be replacing coaxial cables as some audio and video links in recording studios. Although none has yet appeared at the APRS, light-fibre transmission systems are now being marketed by several firms previously active only in the audio field, and exhibited at electronics exhibitions. Both Plessey and Belling and Lee, for instance, are already heavily committed to this area, and this, along with the advantages offered by optical connections, is what makes it a cert that studios will soon become interested.

It's not perhaps yet too widely realised that you can transmit an incredibly wide band of audio or video information down an optical fibre, simply by modulating a light beam. Superficially, optical cables look similar to coax cables, being a bundle of flexible glass or plastic fibres sheathed in a black sleeve. Thanks to the phenomenon called total internal reflection, light focussed into one end of the cable can only escape from the other after bouncing along its length like a tiny ball-bearing in a rifle barrel. Surprisingly, there is relatively little attenuation, even over tens or hundreds of metres.

The light which is beamed into the cable can either come from a laser or, more economically, a light emitting diode. The laser or led light is modulated by a combined am/fm system, to carry audio or video information piggy-back. The beam received at the other end is then demodulated, to reconstitute the audio or video. Bandwidths of up to about 10 MHz are possible using an led source, and up to 140 MHz using a laser.

The cost of the link is still relatively high, due mainly to the price of a modulator at one end and demodulator at the other, and the need to form the connectors in optically-true fashion. The cable itself—usually a bundle of several dozen (or even hundreds) small fibres —is, however, fairly cheap. A simple 10m link costs around £140; £120 for an led modulator and demodulator pair, and around £20 for the cable. Obviously longer links become relatively cheaper, unless repeater stages are needed.

One advantage of a light link is its totally flat electronic characteristic, with no eq needed over the entire bandwidth. But most important of all for studio use, because the signal is optical rather than electrical, it is totally immune from electrical and electromagnetic interference fields. Hum loops become a thing of the past; so does radio pickup of the type that was once breaking through from the powerful transmitter of the Chinese embassy onto tapes being made in a London studio unlucky enough to be sited nearby. And of course, when studios start recording sound in digital form, optical fibres may become essential to carry the high bit-rates necessary for acceptable audio quality.

Damn clever those Asians

THE ENTERPRISE and ingenuity of the South-East Asian record pirate knows no bounds. While companies like EMI are researching legal and technological ways of curbing what is now a routine exercise, namely the bulk sale of pirated copies of commercially produced recordings, the pirates have come up with a new idea.

The object of the exercise is to release a 'live' recording of a concert before the legitimate version is even off the presses. For a pirate to smuggle a portable tape machine into a concert is, of course, difficult, dangerous and electronically unsatisfactory.

To overcome such problems, the pirates have taken to the use of remote recording by radio. A room is hired near the hall and equipped with a multitrack machine and several receivers, tuned to the frequency of several high quality radio mics of the type now used to give stage and tv performers unlimited mobility. The radio mics are worn by several pirate accomplices, who buy tickets for the concert and place themselves at strategic multimic positions around the hall. From there, they transmit to the multitrack a sound perspective of the event that compares favourably with that being picked up, at considerable expense, by the company legitimately recording the event with conventional microphones. ■

STUDIO-TECHNOLOGY

OF WORLD WIDE FAME

Direct Drive Studio Turntable EMT 950

Light mass 13" glassfiber turntable fixed directly on rotor of d.c. motor. Commutation controlled by hall elements. Fast start and stop. Motor driven back-cueing. As a result of extensive research, the large mass necessary for low rumble and flutter values has been replaced by an "electronic mass" in the control circuit.
Built-in shock absorber. Motor driven tone arm lift for fast lowering (200 ms) without exceeding the mechanical limits of the stylus cantilever.
All drive control functions implemented with logic circuits and fully remote controllable. Cue monitoring with optional speaker.

Product Line

Reverberation Devices ● Studio Turntables and Pick-up Cartridges ● Tape Recorders with endless loop cassettes, and for 24 hour recordings ● Electronic Delay Systems ● Compressor-Amplifiers ● Microphone Winch Systems ● Electronic Tuning Forks and Polarity Testers ● Flutter Analyzers

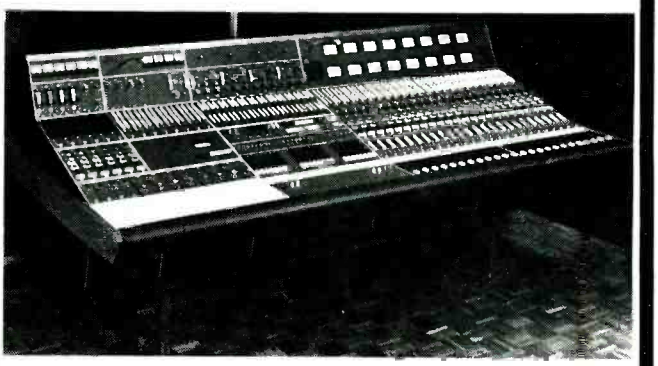
AUDIO TECHNOLOGY

EMT-FRANZ VG mbH.

P. O. B. 1520 · D-7630 LAHR

FOR SALE

Rupert Neve Mixing Console, Type 8014



Fully maintained in a leading London Studio for the past four years.

24 input channels

16 mixed outputs

24 track monitoring

4 Limiter/Compressors

Spare Coutant Power Supply

6 Echo Return Meters

16 Meters with auxiliary group to group switching

Comprehensive Jackfield

Available September 1977

Price - £25,500.00 Sterling
EX-WORKS

JACKSON MUSIC GROUP

Malcolm Jackson
The Studios, Rickmansworth,
Herts. England.
Tel: Rickmansworth (09237) 72351
Telex: 262284 Ambsdr G

Television film sound on location

Peter Edwards *

*BBC

To be realistic (or is it cynical) all film assignments have several things in common: suitcases, hotels, travelling and . . . recording. It's really like figuring out the ingredients and baking a cake in a different oven every time.

BBC TELEVISION has at present 56 London-based staff film crews operating around the world—double the number that existed when I joined the corporation in 1962. Virtually all of our filming is on location, the periods away from base normally varying from a few hours to a few weeks, and occasionally stretching to several months. Apart from the news units, which are an independent division, and current affairs and sports programmes, where the crews remain together for long periods, all other cameramen and recordists are deployed separately from programme to programme. Some degree of specialisation is possible, particularly in the varied music and drama field, and this, together with our documentary foreign filming requirements, gives an almost unique opportunity to at least taste the lifestyle of our fellow man, rich or poor, at home or overseas. As an illustration I have lately spent some time recording Buddhist monks in Thailand, the Kursaal Flyers on tour, The Royal Family, 'The Wilkins of Reading', aborigines in Australia's Northern Territories, 'lifers' in a New Jersey jail, croft-living on the Isle of Skye, the Antichrist movement in Hollywood, Viv Nicholson spending in Castleford, and grand opera in a New Mexican Desert. And, of course, the other 55 crews have been up to much the same.

It goes without saying that with such a variety of assignments peripheral problems set in. Occasionally sound men meet other sound men in chilly, inhospitable hotel lounges on rainy days off (it always rains on a day off), and the peripheral problems are compared. Here are a few of mine.

All my loving

My first BBC film assignment abroad was in America during 1968, working on 'All my loving' with director Tony Palmer. I was the youngest sound mixer to be promoted and this was to be my baptism of fire. Tony met us at Kennedy Airport, sporting his Avis-rented Mustang and refreshed from a well-earned break.

'I've got Albert Finney lined up in an hour's time', he enthused, as we blearily humped case after case into our monster station wagons. A classic film-unit scene developed: six people leaning on the car turning the maps round and round—'was it East or West 72nd Street'? The meter maids interested themselves with us only long enough to mark our violating tyres with their chalky cues.

Then the mad scramble into various cars; the impressive Grand Prix start, spoilt somewhat by the crews multiple-point turns into the kerbs; the unfamiliar auto gears crunching; and the newly experienced Palmer screeching back to us in reverse declaring that since we've wasted so much time so far the rest of the afternoon was a write-off. Our BBC electrician remarked that it wasn't afternoon but night on both London time and his time sheet, brother, and then the sparks really flew.

That then was the start of my first US film trip. Recording concerts with Frank Zappa, The Animals, Pink Floyd, Cream, Jimi Hendrix, etc on an already aged Perfectone, three Perfectone mixers, 15 AKG *D20s*, ten single mic drums (no multiway then), four *D109s* and camera tape was to prove a challenge indeed. We all learnt a lot and the Perfectone stayed the course, its front-end design working fortuitously as a limiter. To this day we all remind each other of the incidents.

One particular occasion that comes to mind was recording The Who in a university campus at Peoria, Illinois. The group arrived late, around 1 am after breaking down, and the restless 2000 students watched The Who's crew of six beat my crew of one in rigging our respective gear. The session got under way with our two film cameras—one static, the other handheld—in amongst it. I was mixing blind, my ten mic leads trailing messily out of windows to a station wagon parked outside—so many times on that trip I found myself unable to see the performance. The choice was all too simple: to mix on headphones in the auditorium where both action and camera angles could be assessed (but even with headphones flat out you couldn't hear your own output level over the pa, let alone playing with the niceties of filtering); or, alternatively, in an anteroom (usually a toilet) or station wagon outside, where monitoring is good on the speakers but visual communication difficult. 'On the disc, doesn't the chorus come in here? Do I bring up the voice mics for them, and risk further coloration from the lead singer's pa?' There wasn't pfl on mobile mixers then; even the attenuation was after the front end so in-line pads were, and often still are, a godsend.

One golden rule I now know about is to learn the music backwards. But having said that, one needs to remember that the most creative groups improvise during a good gig and inevitably that's often the most exciting section on film; so you've got to get it right. Anyway back with The Who's Peoria concert and how I discovered that golden rule.

All went well until the last number when I lost the bass guitar altogether, followed very quickly by the rhythm and half the drum kit. Gradually the whole mix seemed to go to pieces—there was plenty of general sound on all channels but nothing specific. A sort of 'early-quad' sound emanated strongly from the lead singers mic, doing a weird aural circular tour of the stage area. Next there was thunderous applause, and that was the end.

Tony Palmer rushed to the recording car muttering, 'What a finale', 'Incredible', 'Fantastic', etc and confirming my worse fears that this last number was obviously the visual bonanza of the 6-week, star-studded trip. I guessed it would be destined for the trailer/title music or more likely, as I nervously handed him the cans for a playback, the bin. He sat on the tailboard, hands clamping the headphones to his ears, gaining every dB of available lf. I started to wrap up, first removing anything large and/or heavy from Tony's area; after all, even a 60 dB pad hurled from 2m could scar a 23-year-old for life.

'You would think the BBC would have sent an older recordist not their youngest; someone who knew what to do when all the instruments disappeared', I mused, as the thunderous applause was leaking from the cans. Suddenly Tony leapt up and screamed, 'Incredible. Fantastic.' Several times he threw his arms around me and went and ordered two large milks (always a good sign).

Well, Who fans will have guessed by now what had happened. The group had ended their gig with the spectacular smashing up of everything below 120V. The 1968 quadraphonic sound was, of course, Roger Daltrey twirling the Beeb's mic around on 6m of cable. So the golden rule was amended to: 'Don't only learn the music, but the groups likely antics too'.

Nowadays, whenever possible, we would hire a video camera and monitor in order to mix in an acceptable audio area, while retaining visual communication.

Z Cars

I was recording a fairly straightforward 'Z Cars' episode prior to its progression (if that's the word) to videotape. The scene was a Liverpool pub where two detectives were having a quiet chat at the bar, with about 20 extras milling about in the background. It was a single-camera setup with cross shooting throughout the scene. After the rehearsal I asked the director if the extras could look animated, but keep their 'rhubarb' down—I would wild track it later to cover the scene and the intercuts.

'It will ruin the feel of the piece,' I was told. 'All the atmosphere will have gone'. Well, I had a good assistant and we were miking as tightly as possible so, reluctantly, we went for a take.

'It's no good', I said after take one, 'we've got to keep the extras' chat down'. (It had already been established that the principles had to whisper, so I couldn't reasonably expect more level from them.) Take two was just as bad.

'Really good', said the director.

'I hope you enjoyed it', I had to retort, 'because no one at home has heard it yet'. Eventually he was convinced and the scene completed.

A couple of weeks later I was at BBC tv centre and I heard the familiar sound of the scene coming from one of the telecine areas. I wandered unnoticed into the gallery and on the monitors saw the same pub scene, but this time built as a set down on the studio floor. Apparently a script change had called for another scene in the pub later in the play, and for speed it had been knocked up in the studio.

In the hot seat was the same director, and as the rehearsal progressed the same artists and extras did their stuff. Halfway through a scene the director punched the talkback to his floor manager: 'For heavens sake tell those extras to keep their noise down, I can't hear any of the lines up here'. The studio sound-supervisor didn't even have to mention it; with electronic multicamera working there wasn't even uneven track intercuts to worry about.

We are really on our own in those headphones . . .

Blue Peter and the Pope

During a trip with the BBC tv programme 'Blue Peter' to Rome, we were to film one of the Pope's audiences during which he reads out references to those assembled. The presenter, Valerie Singleton, producer Edward Barnes, a 2-man camera crew and I arrived suitably resplendent, and found that we had been assigned a small area in front of the masses, slightly to the left of the main stage.

The sequence was intended to be mostly a commentary voiced over the Italian pa, so I leant an STC *4037* stick mic against a nearby speaker, and used a Sennheiser *805* for the tremendous crowd fx when the Pope was brought out on a glittering chair. For about 30 minutes we filmed sporadically on two cameras as the Pope read out messages, and the groups of people applauded back their thanks.

After a while one of the Pope's aides slid across to us and said that the Pope was going to say a little message, in English, about 'Blue Peter'. For another 30 minutes we keenly filmed everything that sounded vaguely like English. Then the Pope stopped, and to our disappointment headed off the stage accompanied by a swarm of aides. He then turned towards us and the number-one aide beckoned the five of us forward.

I grabbed the stick mic, slapped on an extra length of mic lead, switched the Nagra down to 9.5 cm/s—I only had about five minutes of tape left—and left behind the machine on its seat, having arbitrarily set the level in the quickest time ever. The Pope, with respect, being well up on communication made straight for the man with the microphone. Valerie and Edward thankfully slipped next to me and we were given a charming message to the children of England, which was all cross-shot by the two cameramen.

The film has been shown many times on 'Blue Peter', with the sequence ending as the Pope gave us each a little medallion as a memento.

Although I am not particularly religious I certainly sensed a tremendous feeling of well-being after the occasion, but then maybe that was because the tape didn't run out!

The Santa Fe Opera

Recently I viewed on BBC tv my most recent US challenge: the 20th Santa Fe Opera season that was staged in the desert of New Mexico.

For sound men, music surely must be the most rewarding type of programme; at the very least there are so many more enjoyable 54 ▶

Peter relaxing after a gruelling session. Can you spot the symptoms of 'Nagraitis'?

musical frequencies to listen to, rather than an interminable voice. Okay it may be television, but as soon as location music is involved I suppose we are like the film or ob cameraman with a van load of lights to play with. The gun mic is relegated to idents, radio mics turned into rather swish talkback channels, and the *451*s, extension tubes, and all the finery appear from their boxes.

I was told about filming the Opera four weeks before we went. It was to be a co-production with WNET New York, and when BBC producer David Cheshire and I had a chat in his office it certainly seemed different. A call around my BBC ob and tv centre colleagues confirmed that no one else had been involved in televising anything of this nature before. So no clues there. Like so many film assignments, it was obviously going to succeed only if the correct assessment of the problems could be made at long range, without a reconnaissance.

David had been to New Mexico and witnessed the spectacle the year before. (It's an annual event held in July and August.) He also has the unique quality in a producer of knowing what he wants, and understands enough about the technicalities to know what he'll get. However, the discussion somehow got round to putting radio mics on the artists—after all they do have an annoying habit of singing their way around the stage and often end up way off mic. That would mean that a dozen or so *Swintek* radio mics on different channels would be needed, with receivers around the roof or wherever. I've seen these units in use at Las Vegas on Sinatra-type shows and they really work well.

I should mention that on most BBC film work the sound man has no assistant, whereas film drama and music programmes generally allow the sound mixer one assistant. The prospect of my one assistant pirouetting in the wings changing radio mic batteries every few minutes, not to mention creeping about in disguise on stage to retrieve the transmitter that dropped from the ample soprano in Act I and swapping it with channel 13—or was it 31—for the Baritone in Act II, while I alone was grappling with changeovers and 22 channels . . . wasn't all that appealing.

Not to mention the electronic clapperboard system (it's technical equipment so it's 'sound's' responsibility) that flashes a series of led-style numbers in front of the film cameras during the take, the sound track being blipped and verbally idented with the number running at the bleep.

Perhaps we should multitrack it all and sort it out afterwards; it's all 2-camera filming during the audience performances—a 'live'-type situation—so it's got to be right first time. David produced some photographs of the open-air stage showing the clam-shaped roof built to protect the artists. Mics littered around the roof perhaps—they would be sheltered somewhat from the elements, but what about reverb off the floor and separation from the orchestra pit all along the front? Mic mice (mics in small cushions on the stage) are often used if there is little foot movement to upset them, but then there's the possibility of wind and rain to be contended with.

Santa Fe Opera House in the New Mexico Desert

The complications weren't only those of open-air miking dozens of international opera stars moving around a large stage in combinations of rain, changing humidity (burbling *451*s) or wind (plus an orchestra pit with up to 50 players). It also had to be remembered that the whole spectacle was taking place in the desert thousands of miles from the type of technical back-up all this sophisticated equipment might need should the gremlins strike. I only need to mention that even the theatre's stills man and his Nikon were travelling all the way to Santa Fe from New York for you to imagine where I feared I would have to hire the multitrack.

At this stage in the proceedings one *really* appreciates working for the BBC. It is standard practice at the Beeb for programme departments to use their allotted budgets to buy from the BBC servicing departments the resources necessary to complete their programme. In this case the department was film, which sold to the production one film cameraman and assistant (with two camera channels), a film sound recordist and an assistant.

Calculations were then made of the costs of (a) flying a multitrack from London/New York/Los Angeles to Santa Fe; or (b) getting a mobile driven across the desert from the West Coast. Eight-track was obviously not enough since one track would be needed to carry the syncpulse and another the electronic clapper idents—this would leave only six audio channels. So it would have to be 16 or 24-track. Where would it all physically go so that I could see the action? David remembered that there was separate lighting and sound booths at the back of the amphitheatre, but that they were pretty small. 16-track in there? Plus speakers? And Dolby? If the unknown multitrack went faulty . . .

It became more and more apparent that apart from the cost of freighting all this hired gear, the remix costs plus extra mics, multiway cable, stands, mixers, etc that I had to have would mean that multitracking was not going to be of much help. It therefore became evident that the only course would be to take a stereo Nagra and all the AKG *451*s I could find, with *CK1*, *2*, *8* and *9* capsules and wing gags galore. We also chose a small Neve desk to mix down the vocals on to one track of the Nagra, and another desk for the orchestra and audience on the other track. This line up invariably works well and gives the dubbing mixer some overall vocal-to-orchestra ratio mix with which to match the picture.

I then filmed with The Queen's tour of North America for her Christmas broadcast, and flew down to New Mexico where my assistant Steve Diamond had started to rig the system we had settled on. We watched and analysed a full dress rehearsal that night; it really was spectacular. During the interval we rigged a couple of *451*s in the overhanging clam roof and listened to the output to try and get some general impression.

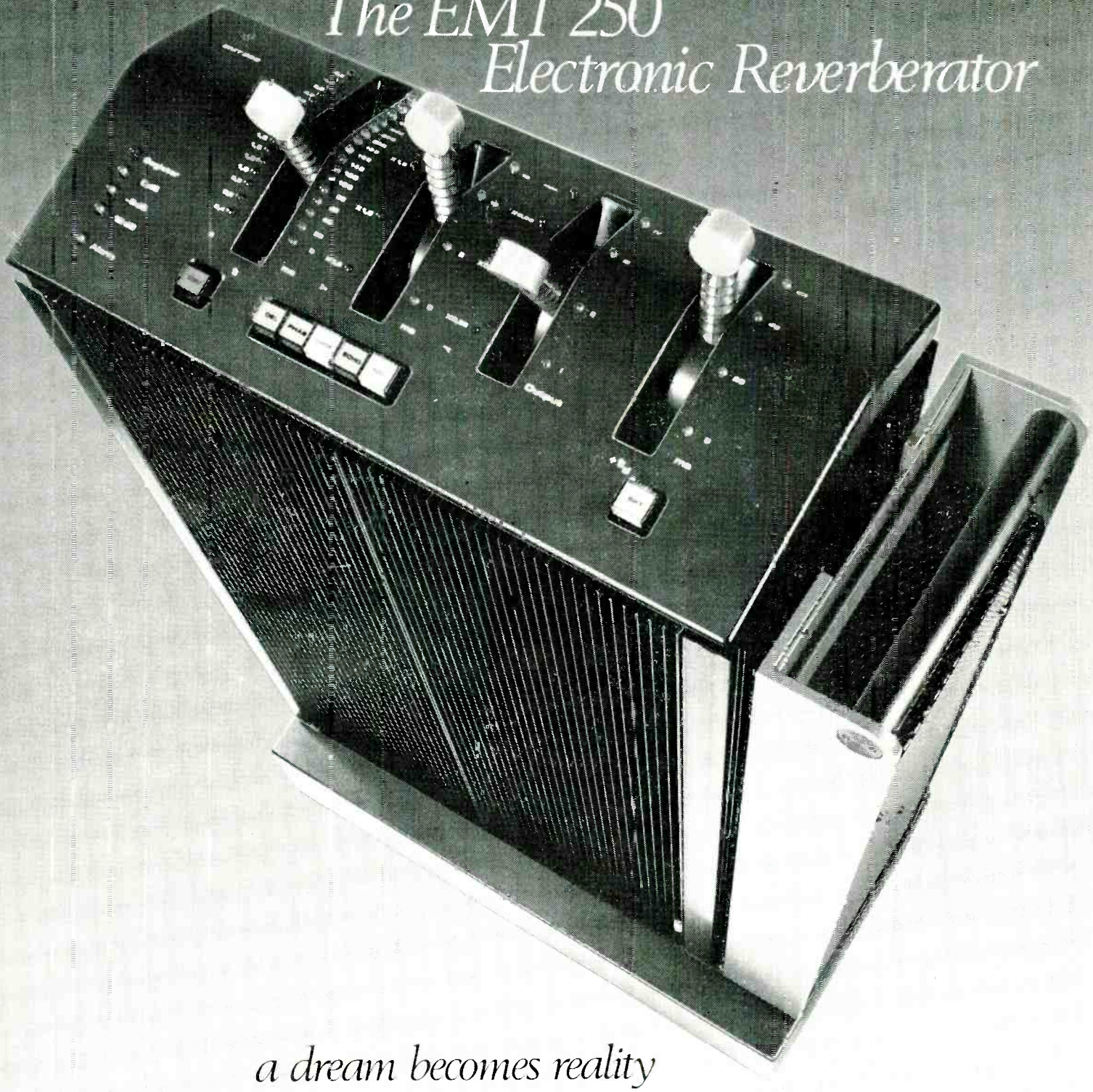
The Santa Fe Opera House certainly is a visual and acoustic wonder—John Crosby, the founder and general manager, had listened to all the advice from audio designers and implemented everything. If there had ever been a design conflict between the two senses the audio came first. The impressive auditorium design was supplemented by a rabbit warren of underground corridors and overhead gantrys within the clam-shaped roof; everything seemed to be built with rigging in mind.

The five operas were recorded much as we had planned in London. On tall mic stands in the orchestra pit, six *451*s with *CK8* capsules (gags neatly sprayed black) just peeped over the stage about 1 to 2m back, according to each opera. Two *451*s with *CK9* capsules were further out front either side of the wings to cover the few occasions when singers might pass the catchment area of the endstage *451*. We had used up all our *CK8*s half-way through the rig, but Alan Gordon Enterprises in LA smartly flew some out in hours—'Anything to help, we'll just bill the BBC when you've finished with them'.

From my superb glass box opposite the stage I was able to view the spectacle and mix the singers onto track one of the Nagra as they moved around the 30m span. One obvious snag, however, was

56 ▶

The EMT 250 Electronic Reverberator



a dream becomes reality

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

Manufactured by: EMT-Franz VGmbH D-763 LAHR West Germany

that the acoustics were so dead that singers were either well on mic or completely off; unlike indoor opera there just wasn't any reverb. The 'holes' between the mics were the greatest danger. Nevertheless, by really careful characteristic positioning it was possible for a soloist to sing his/her way from one wing across the stage to the other with never more than 1½ mics faded up! The Penny and Giles faders on the Neve were, metaphorically, red hot and a dream to use.

The orchestra seating layout was obtained nightly, but with the operas continually changing on schedule—often with overnight stage crews—we had to rig and derig our dozen *451*s with *CK1* and *2* capsules every session. These, together with two *805*s backed off for audience reaction, were mixed down to the second track of the Nagra. During the day, equipped with Nagra and gun mic each, we covered the 2-crew documentary filming.

As so often happens, the best stereo vocal-image sound was the simplest rig. In the roof over the stage two *451*s with *CK9* capsules in cross formation just managed the spread, yet with enough tightness for diction and orchestra cancellation. It took about four nights to find the best spot, but it was worth it. The orchestra mix was rebalanced off the auxiliary mixer out, and all onto another stereo Nagra.

One rather cold night an awful hissing sound appeared on the pair of roof mics. All the usual checks were carried out, but in the end Steve had to be volunteered to climb across the great inner clam roof during a performance. From my box I heard him explain on mic what no one had told us before—when the temperature drops below about 15°C banks of gas fires light up to radiate down on the orchestra and cast . . . we let them freeze for the rest of the film!

Being truly biased I think that the Santa Fe Opera documentary is one of the finest examples of what the BBC and American public broadcasting is all about. There is, however, just one improvement I can recommend—go along to Santa Fe and experience it for yourself.

Balancing to picture

The great advantage of using several film cameras on location is that months later in the creative quiet of the cutting room, having viewed all the rushes and structured the overall film, the director can decide how to best use the material out of all the visual options open to him. If the sound supervisor can arrange for some flexibility in the final balanced mix, it's much appreciated should the track eventually be used over exteriors of a building, aerial shots, etc or even extremely tight shots of a soloist.

Despite all our efforts though, it is often illuminating to listen out for dialogue borrowed from, for example, car interviews and the like, which have then been laid over lyrical panning shots of the countryside. It's happening all the time and to the layman it's just bad sound—the cross we bear.

There has been a lot of discussion about whether or not to balance to picture selection. When dubbing I tend to favour this approach and would certainly like some option; which is why when recording I try to give a choice of sound. The real conflict occurs when a director cuts to a close up of, for instance, some french horns, and not even the composer—let alone the sound mixer—intends them to be dominant. In music the pictures should complement the sound, not distract from it.

However, I couldn't give a choice a couple of years back while filming the origins of pop music in the Mississippi region. Every time I see the film 'The Friendly Invasion', which was directed by Geoff Haydon, I wince at my work. The scene in question is an open-air acoustic guitar and dancing contest; really nice old timers playing and dancing around doing their best work. Two cameras, both with zooms, were used with one hand-held on the stage. I had a mono Nagra, two stand mics (AKG *451*s with *CK5* capsules) for vocals and guitar, and a gun mic lying on the boards to pick up the tap dancing. The mixing was being done fairly level as I couldn't see the zoom lens positions. Anyway, since the track could end up being used over pans across the Mississippi basin, favouring is out.

Why do I wince?—because it ended up as a nice 2-minute sequence of close-up dancing. From the moment the guy stops singing, both cameras happen to tighten in on the feet that beautifully, if barely audibly, tapped their way around in a neat dissolving sequence. If only I had brought the feet fx right up front (there wasn't even a pa to worry about). But there again, as the director kindly remarked, he might have wanted to use the track over those Mississippi vistas. The moral is obvious—twin track it; you can't win otherwise.

In the UK we do now tend to use, for suitable programmes, film cameras equipped with electronic viewfinders that feed off to a couple of black and white tv monitors, which all helps.

'Nagraitis'

Many people often remark that film sound men are a breed apart. If this is so I think it is possibly due to an unnatural combination of working conditions. One is faced with a feeling of bewildering isolation when sound is habitually fed at high level into the aural senses, then transferred to mono several feet away by the microphone and is therefore, perspectively, in conflict with ones visual sense. And 250 ms out of sync with the same. Now strap a heavy recorder to one side of the body for about 15 years and you've got the classic symptoms of 'Nagraitis'.

Having contracted it, the condition is further aggravated by having to work with a multitude of radio mics. If a boom is being used on the set, it is pretty obvious why the mixer occasionally shouts 'cut'—the mic has either dropped into shot or, more likely, following a dodgy camera move the camera operator has panned up to it. Many a rushes' session is livened up by watching out-takes in which the camera is chasing the boom off the top of the set, vainly searching for his favourite fall guy.

Radio mics have changed all that. Mind you, their introduction caught out quite a few cameramen. While filming a 'Dixon of Dock Green' episode, two policemen wearing hidden radio mics were to walk towards the camera and pass left to right. On the take the camera simply panned around with them, until the operator tripped over the tripod leg. 'Booms in', he shouted. 'Have to go again'. What boom? It hadn't even been taken out of the car.

Since the introduction of radio mics, and particularly since the more reliable *Micron* and *Swintek* models were introduced, many of us in film have made up little cages and pouches and use them regularly on all-film drama. They are a useful tool in our repertoire, rather as the fast *Distagon* lenses are to the cameraman. They are not, however, the panacea of all our ills.

Over water and filthy locations conventional mics can be fed into transmitters—obviating cable hassles—or they can be concealed on the artist with a Sony *ECM50* or AKG *CE10*. Even the familiar 'Blue Peter' badge worn by the programme's presenters is a mic! Wind and rustle frequently cause problems, and many of us use variously designed 'cages' that can be clipped under lapels, sewn in shirts, etc. (This usually entails an overture with the wardrobe girl in the bar that can't be put down to expenses. Also when the sound recordist asks an artist if she is wearing a bra, it's invariably a professional enquiry.)

The 'tight' sound obtained from this technique requires many more wildtracks to replace the lost background. A stereo Nagra is again so useful here, with a backed-off fx mic giving the dubbing mixer an in-sync background on the extra track.

I once had the dubious honour of recording an entire all-film play, about 20 hours of shooting, on just three or four radio mics. The play was Les Blair's 'The Apprentice', about the horse racing scene. Les likes his artists to improvise, and often the players and crew have no idea who is going to say what, or where. So it's radio mics all round—switch them on and off they go. To get four working at once we had to pole the receivers, raise or lower transmitter voltages, and pray. If you're suffering from nagraitus this is definitely a nasty way to aggravate it.

Due to the fact that only you can hear the recorded dialogue, radio mics that are playing up, unlike visible booms falling into shot, are much more difficult to explain away. Shouting, 'Cut everyone, sorry,' towards the end of a perfectly lovely take is not the best way to get bought the first pint. But you have to do it when only you are hearing: rustle as mic one has dropped out of it's mount and is very efficiently recording rapid heart beats; mic two has decided on an intermittent aerial fault; mic three is 'carrier swishing' whenever passed by mic two, while it's batteries are ticking warnings on the audio; and mic four is intermodding with mic one exactly after the command 'action'—you kept it faded out, eyes transfixed on the artist hoping she would either not improvise at all on this take, or if she had to she would be leaning over mic one, two or three at the time.

As I say, if we are a breed apart it's 'Nagraitis'. ■

Inside or outside-
it's all the same to the UPS 5000

Schlumberger has launched a new sound mixing console that's as happy working on location as in a studio. And you have no hang-ups with the UPS 5000 Series. It's a compact unit with all modules connected within the system without cabling.

From a customer's point of view it's really economical. Low purchase price, low running costs and simple maintenance. Added to which, it's a truly sophisticated high technology product.

Take your pick with either 12 or 16 input modules—for the UPS 5000 is the easy-to-use modular console that gives you everything you need in an elegant package.

We can't stop broadcasting its benefits, but then, don't take our word for it. Write or telephone for our detailed technical brochure on the UPS 5000. Or better still, ask for a demonstration. When you work with the new console you'll suddenly find you really enjoy working.

COMPTEURS SCHLUMBERGER AUDIO PROFESSIONAL DEPARTMENT
296 AVENUE NAPOLEON-BONAPARTE 92505 RUEIL-MALMAISON
TEL 977 92 23 TELEX 692474 F

COMPTEURS
Schlumberger

work

Sutton Sound

An area of the recording business so far largely, and somewhat surprisingly, untapped is that of classical demo tapes. This is what makes the Student Recording Scheme and the work of the Sutton Sound Mobile of Queensway (recently drawn to our attention by an enterprising pr man for the New Philharmonia Orchestra) somewhat out of the ordinary. We saw the mobile and learned about the scheme from Mark Sutton while he was recording a Wigmore Hall concert by prize-winning musical students.

The mobile, a converted Bedford-Luton 35 cwt truck, was acoustically designed by Ken Shearer to provide a stable sound inside, with no leakage of traffic noise filtering in from the street. This is particularly important because the Sutton mobile is designed primarily, if not exclusively, for classical recording with wide dynamic range. So a low ambient noise level inside the truck is essential. The vehicle was first clad internally with a thick layer of *Rockwool* faced with 19 mm chipboard to curb the transmission of sound either way. This board is layered with frequency selective resonators to flatten the internal acoustic, and overlaid with carpet, albeit mainly for decoration. Air-conditioning enables the mobile to be used with its heavy door closed, and cctv and telephones provide communication with the recording location. Again, because the truck is designed primarily for classical recording, the normal machines used are Philips (*EL 3503*) or Studer stereos, although the desk by Sutton Audio is 20-in 8-out. Sutton claims massive headroom for the desk, with the ability to cope with peaks of some 28 dB over 0 vu before clipping. Generally recordings are made flat, with Dolby-*A* and, as in the case of the Wigmore Hall occasion, simply a stereo pair of *C 451*s. Monitoring is via Tannoy *Golds* in *Lancaster* cabinets.

Normal rates are £25 per hour, with a flat £25 total fee for setup; but for the Wigmore Hall gig it was all done for love. The occasion was the recital by prize winners in the Student Recording Scheme, an interesting enterprise started by Mark Sutton. The object of the scheme was to enable the best final-year students from the four main music colleges in London to make a 20-minute demonstration tape. Each college selects its best students for the year. Then using free tape provided by EMI and funds from the Martin Musical Scholarship Fund administered by the New Philharmonia Orchestra (hence the pr plug that interested us in the first place) the students give of their best in front of microphones hooked to the Sutton mobile parked outside the school. It costs the student nothing and each performer retains the tape as his/her property, as a memento of student achievements, and a means of interesting agents and promoters. At the same time the tapes are judged by a panel which this year was made up of Sir Lennox Berkeley, Eleanor Warren and Edward Greenfield. After listening to the recorded offerings of 30 students, the judges chose Japanese pianist Kumiko Udagawa and the Coull String Quartet as joint winners. 'Emitape' then sponsored a public recital at the Wigmore Hall for the winners, and the prize recital itself was recorded by the Sutton mobile for the benefit of the students.

An important point made by Edward Greenfield is that evaluating student performance on tape rather than live, does give the judges an opportunity of listening to the same offering more than once; for instance to check first impressions after a period of time. It is, after all, extremely difficult for any team of judges hearing live offerings to apply exactly the same and unbiased standards to the first performer, early on a cold and wet winter's morning, as to the last performer before lunch and the first in the afternoon, and so on. But entries on tape can be heard several times and doubtful passages re-checked if necessary.

Quite apart from the question of prize winning, the chance for a classical music student to make a professional demo tape free is not to be sneezed at. The recording industry is geared to the economical production of demo tapes by pop singers, song writers and bands using small, dead rooms and multi-track machines. Few of those studios, however, are geared to the crossed-pair 'live' recording of a solo pianist or chamber quartet in a natural-sounding acoustic. Use of the Sutton mobile, parked outside a music school, enables the student to perform in a known acoustic which is sympathetic to the style of music. It is, after all, inconceivable that any music school would be without a room suitable for natural - style, crossed - pair recording.

If funds permit, the future plan is to extend this scheme to musical colleges outside London, so that a wider range of students will have the opportunity to make a tape and become eligible for a prize, and a chance to play at the recital. In its laudable aims to assist outstanding musical talent with specialist and advanced study, and to help to bridge the gap between study and fully 'professional status', the scheme deserves both to succeed and receive some publicity.

It will then be interesting to see how many small recording studios, with a dead room, 8-track recording and close miking, suddenly see money in them than classicals and try to jump on the 'legitimate' demo bandwagon. It will then be even more interesting to see how engineers, brought up on a diet of eq, artificial echo and mixdown repairs, cope with the requirement to go straight down into stereo, and flat, with no sweetening and no chance of covering up their cock-ups.

Adrian Hope

Sutton Sound

Lansdowne's Top Twenty

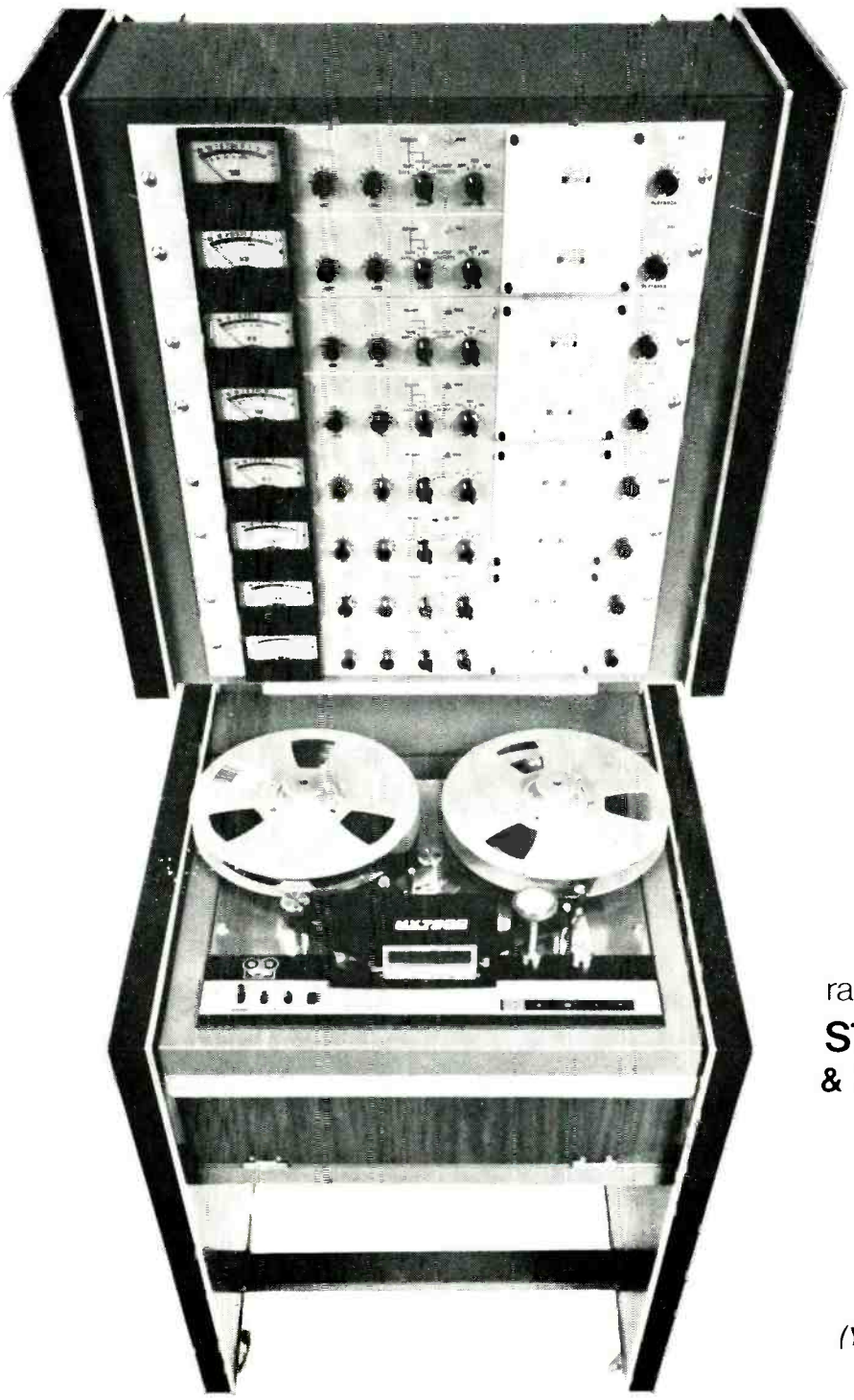
'That,' said Adrian Kerridge, director of Lansdowne Recording Studios in West London, 'is exactly the image we're still trying to shake off after all these years.' Ever Mr Tact, I'd started my conversation with Adrian by recalling that I remembered Lansdowne from all the fine British jazz recordings that were made there in the Fifties and Sixties, under the supervision of Denis Preston. Be assured, it's not that Adrian, Denis or anyone else at Lansdowne is ashamed of those days. Indeed, for relaxed feel and sound those 10-inch jazz lps issued by Polygon and Pye were classics that stand up even today. It's just that in business, like acting, it's all too easy to become typecast. Recently, in fact, Lansdowne almost got re-typecast as a studio that made cover versions of pop hits; but the studio has more to offer than a jazz jam, or six titles in three hours that sound sufficiently like the 'Top Ten' originals to sell like hot cakes in a supermarket.

Although Denis Preston is still with Lansdowne (probably even more active than ever before, now that he has retired) and the studio is still popular with jazz musicians, it's been in the business of recording just about everything for the past 20 years. Cover versions were just one more thing; a spoken version of 'Lady Chatterley' was another. Rock 'n' roll in the Emil Ford days, Diana Dors with her 'pressed-in-pink' record, and the mime tracks for BBC tv's 'Black and White Minstrel Show'; they all went onto tape at Lansdowne. Denis Preston, far from being a jazz-only buff, had been behind the Roger Whittaker recordings for the last ten years, and Acker Bilk's *Stranger on the Shore* went down there in 20 minutes. Lonnie Donegan made most of his original hits in the basement studio at Lansdowne House, as did Wout

60 ▶

THE OTARI MX7308

-a superb eight channel, 1" tape professional recorder



★ Motion sense control logic prevents tape damage.

★ Optional remote synchronous reproduce on all channels.

★ Professional type 600 ohm +4dBm or +8dBm balanced outputs and XL connectors.

★ 15/30 ips. or 7½/15 ips.

★ Front panel edit and adjustable cue.

★ Bias adjustable for new high energy mastering tapes.

★ Reel tension servo standard.

★ Nationwide parts and service backup.

★ Fast delivery!

range also includes

STEREO OR 4-CHANNEL 1/4" & 8-CHANNEL 1/2" MACHINES

write now for full details to UK Distributors

CE HAMMOND & Co Ltd

105-9 Oyster Lane Byfleet Surrey KT14 7LA

Ring Byfleet 41131

(You'll be more than pleased at the prices)

Steenhuis who was in there again under Preston's supervision when I called.

Cumberland Gap, by Donegan, sold 350 000 78s in one week, which should have got into the 'Guiness Book of Records' as the fastest seller, but somehow didn't. In this context it's worthwhile remembering that one of the greatest jazz records of all time, Louis Armstrong's *West End Blues*, had sold only 10 000 copies up to the Second World War.

Pianist Stan Tracey, whom the artistic bandits have finally discovered and lionised (after only 20 years of ignoring his talents), made the original *Under Milk Wood* quartet recording at Lansdowne. Incidentally, Tracey also scored for Acker Bilk with strings, which doubtless helped pay his rent in the hard times before lionisation brought its own rewards. The Sex Pistols, while they were still with Polydor prior to the EMI fracas, spent a weekend at Lansdowne, working on tracks for *Anarchy in the UK*. Denis Preston, the perpetual gentleman, recalls how they seemed very well behaved. 'But I seriously wonder,' says Preston, with an obvious eye to Sinatra's various comebacks, 'whether in 40 years we shall be queueing to pay the equivalent of 25 guineas each to watch a paunchy, 60-year-old Johnny Rotten perform solo at the Albert Hall.'

Lists of who recorded what and when in any particular studio can become pretty overpowering. But in the case of Lansdowne they are more than averagely interesting, and do prove the point that the studio really is something other than a jazz cellar.

The studio also has an interesting history. In the Fifties, Eric Tomlinson and Adrian Kerridge were working at IBC, and Denis Preston was booking that studio for so many jazz sessions that it made sense to think about building his own. Although every other producer today seems to have his own studio or a slice in a studio (or at least plans for a studio or slice of a studio), it was a pretty revolutionary concept then. It was a third engineer working at IBC who found suitable premises for Denis Preston. The premises were in the bowels of Lansdowne House near Holland Park underground station, and the engineer was the late, legendary Joe Meek. 'Meek had fingers of gold,' says Kerridge. 'He was using techniques years ahead of their time, for which he had to improvise equipment.'

Sure enough, Joe Meek's name is to be found listed as balance engineer on many of those original recordings for Denis Preston. And it will come as a surprise to those who think of Meek only for his recordings like *Telstar* (made incidentally after he went off on his own) to realise what he was doing back at IBC and Lansdowne back in the Fifties. He was, for instance, almost certainly the first person—at least in Britain—to close-mic trumpets. Furthermore, it surely can't be coincidence that it was his balanced recording of Humphrey Lyttelton's *Bad Penny Blues* that achieved what had until then been an impossible dream—a hit jazz single. Significantly, Meek, not really a technical man, was probably the first engineer to challenge technical authority. When he once took some tapes for cutting, the engineer looked up from his lathe and moaned about distortion on the tape. Meek would have none of it: 'That's not distortion, it's commercial,' he countered. The pop world and equipment had caught up with Meek by around the time of *Telstar*. But soon after that he blew his brains out, and we shall never know what new ideas he had for the future.

The Lansdowne studio acoustics were by Sandy Brown, and the original decor by 'pre-Habitat' Terence Conran. As with any established studio working along professional rather than happy-go-lucky, it's-good-enough-for-pop lines, Lansdowne — like Abbey Road—has been a training ground for many engineers who have gone on to other things. Interestingly, the studio doesn't have tape ops as such: currently Chris Dibble is 'assistant' to engineer Robert Butterworth; likewise, Paul Ward isn't regarded as 'maintenance' but technical engineer. Incidentally, the maintenance and line-up system is very tightly organised. I was particularly interested in this, having heard only that day about another studio that had gone out of business. This was shortly after a producer that I know socially had wasted a full morning there while the engineers struggled vainly to line up levels.

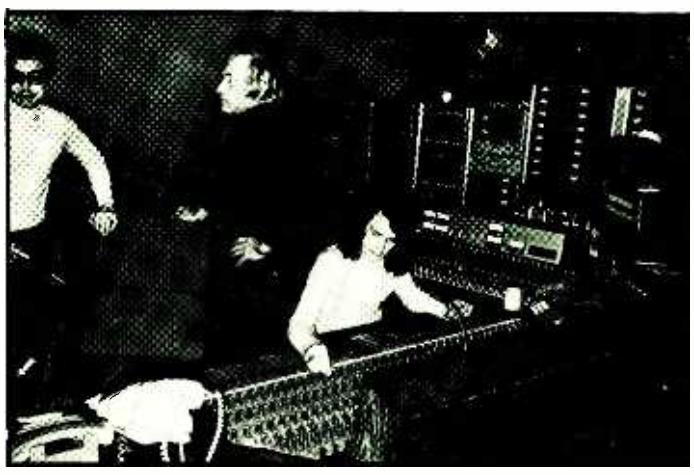
The Studers at Lansdowne are switchable between NAB and CCIR, but are normally lined up on a CCIR recording curve and NAB level standard. The studio holds in stock samples of virtually all familiar types of tape; when a session is booked in with a tape that has originated from outside Lansdowne, they ask in advance for information on the tape identity. Then that day between 8 and 10 o'clock before the session, or during the lunch-hour break, the machines are re-aligned on a stock sample of the tape that is due to come in for the session. In this way only fine tweaking to compensate for batch differences will be necessary. As Adrian says, it spells instant death to any session if you have an engineer walking around with a soldering iron. The risk of this happening is further minimised by a fault book. Anything out of the ordinary that crops up during a session—for instance, a noisy fader channel down and so on—is entered in the book and checked out in the down-time before the next session. The engineer checking the fault then writes in a note to confirm either that it's been fixed or that more information is needed, or it appears non-existent. 'No fault found—suspect brain damage,' reads one note; 'Fix naked lady', says another. This refers to an overhead projector that pastes a full-scale naked lady over the control-room wall, and is much liked by some producers.

The original desk put in by Joe Meek all those years ago is, of course, long since gone. It was made by EMI and had the gold edging on which he insisted. In 1970 came a new Cadac that has been updated cosmetically and electronically several times since, so that it now stands at 28 mic or line in with 24 groups out. And there are some interesting extra features: like, for instance, four independent foldback channels with separate eq that can be used to push up the mid-range presence and cut through a noisy studio situation.

All channels have normal meter vus, but there's also a dual-beam light peak meter that can be switched between reading left and right groups or to any individual channel. Adrian has firm feelings about not-too-well-informed producers who insist on overloading the tape by peaking to zero vu on some instruments. For instance take a bass drum, he says, and record it with peaks on the vu meter reading at −5 dB; on the ppm these will show at around 10 dB higher, ie +4 or 5 dB. Now record up to zero vu and the transient peaks can be up to +15 or 20 dB over the top—because the console has 24 dB headroom it will be the tape that clips, not the desk. The final sound on replay will then be a compressed, hollow thud with slow risetime, rather than the fast rise, transient 'thwack' that was heard live over the monitors—and could have come off tape had the producer kept the levels down at around −5 on the vu. (Exactly the same thing happens with a snare drum, all the transient disappearing at the tape stage.) On the other hand, you can get away with recording at zero vu if it's woodwinds or strings, which generate a more sinusoidal waveform. There are two practical problem areas here: firstly, the engineer has to know about transient overload; secondly, and perhaps more important, he's got to be able to get it across to a producer who only has one ambition in life—to get more level on to the tape and may never have heard how an unlimited bass drum sounds.

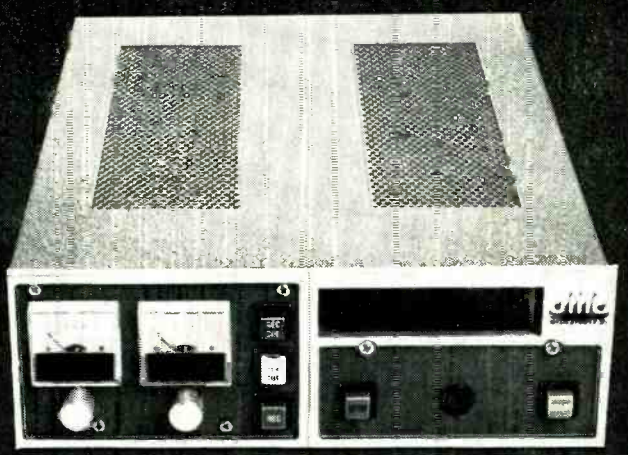
The Cadac desk also has a phase-correlation meter, which can also be usefully switched round to compare not only stereo left and right outputs, but also any track pair across the desk. This way, a stereo pair on a drum kit or piano can be phase checked visually, and unambiguously. The Lansdowne monitors are a couple of Cadac sand-filled monsters weighing half-a-ton each. The Dolby panels are also of Cadac

I really like the finish on this desk



62 ▶

SELTECH...
a good name to know



now offers you
BEAUCART

TYPE 10

For use with A-size cartridges only our compact Beaucart Type 10 measures a trim 3½" high by 5¾" wide by 15¾" deep. Both mono and stereo are available in record or playback versions. Reproducers are furnished with a primary (1 kHz) cue, with secondary (150 Hz) cue, and tertiary (3 kHz) cue and fast forward capabilities available as an option.

TYPE 20

For use with all NAB standard A-, B-, and C-size cartridges, a wider, 3½" high by 10 ⅛" wide by 13 ⅛" deep Type 20 Beaucart machine is offered. These reproducers and recorders are available in mono or stereo. All Beaucart machines incorporate unique features such as our patented pancake motor and adjustable air damped solenoid for quieter overall operation than any other machine on the market.

Beaucart meets the new NAB standard

SELTECH

SELTECH EQUIPMENT LTD
16 York Road, Maidenhead Berkshire, SL6 1SF, England.
Telephone: Maidenhead 36315 – Telex: 848960.

NOW YOU CAN COPY 2 STEREO MUSIC CASSETTES IN LESS THAN 4 MINUTES!

Now available in the UK—the latest in the Wollensak range of heavy duty cassette equipment. The 2772A/V can make superb STEREO cassette copies at the touch of a button.

Wollensak 2772A/V High-Speed Desktop Duplicator features:
★ Frequency Response—40-10,000 Hz ± 3db
★ Wow and Flutter—0.15% RMS maximum
★ S/N Ratio—within 3db of master
★ Tape Speed—13.3 times original speed 25 i.p.s.
★ Speed Accuracy—± 1%
★ Crosstalk—40db minimum at 1KHz
★ Industrial Price—**£1,322.66** plus 8% VAT.

Write for further details OR RING 01-947 7551 for Demonstration.

Please Note—The Wollensak stereo copier can only be supplied to recording studios industrial or educational users or professional companies.

fpa

the cassette people—
FRASER PEACOCK ASSOCIATES LTD.
94 High Street, Wimbledon Village, S.W.19

design, and can be remotely switched between normal replay and sync replay. Along with MXR flangers and phasers, it's interesting to see a pair of 12-year old Fairchild *670* valve limiters and Teletronix *LA2A* compressors, for which all cash offers will be refused. Virtually all the mics are Neumann, including a now irreplaceable stereo treasure.

There's an interesting modification on the studio's Studer *A80*s: the varispeed is controlled by a readily accessible vernier-calibrated pot, and the engineers have drawn up a graph of speed change on the vernier scale against musical pitch in semitones. This way, at one o'clock in the morning when a producer says, 'Let's take it down a semitone', no-one has to mic up the piano to check whether *C* really has dropped to *B*. Equally positive and panic-proof is the cable coding system on the studio floor. Every cable run is identified at each end by a colour and number-coded Hellermann sleeve.

Current day rates at Lansdowne are £39 per hour, and night rates £29 for a minimum of four night-hours and a maximum of eight. Something of an anomaly, which will probably soon go, is that overtime after six and running into the night gets charged at a higher rate. The plan is to abolish overtime rates altogether if a workable scheme can be sorted out.

The wide range of activities has not made for a boring life at Lansdowne over the years. Early on, the studio was into commercials ('You're never alone with a Strand' was one of theirs), and had associations with commercial as well as BBC tv from the early days. Thus, along with the Black and White Minstrels was the old ATV 'Chelsea At Nine' show, for which the prerecorded sound tracks were put down at Lansdowne.

There was also a brief flutter with 'surprise tv'. Under military-style conditions of secrecy, Ivy Benson was booked in to Lansdowne, supposedly to video and audio-record a contribution for a 'Women At Work' programme. But upstairs Eamonn Andrews lurked with a red book. Outside in a mobile, the vtr was laced up with a tape labelled 'This Is Your Life', not 'Women At Work'. At the crucial moment of denouement the vtr puffed expensive smoke. So while Eamonn stayed in hiding, and Ivy Benson killed time in her dressing room, another vtr was raced down from Thames tv's Euston Road headquarters.

'Okay Ivy', someone finally said, 'let's get on with the job'. 'Ivy Benson — this is your life,' said Eamonn, as he swept in through the studio door—and it was all over. Immediately afterwards, the videotape and the subject of it all were whisked off to the tv studios to finish the programme in front of an audience. It's nice for cynics such as myself to know that those moments of revelation really are genuine.

Adrian remembers another time when diplomacy was necessary. When you eat out, travel in a hotel lift, or relax in a bar, the chances are you'll now hear piped background music. (Frankly I'd cheerfully slit every speaker cone within reach—but that's a personal opinion.) Anyway, contrary to public opinion, not all background music is Muzak—a lot of it comes from Rediffusion . . . and a lot of the Rediffusion recordings were made at Lansdowne. Also contrary to public opinion, when you hear piped music from a band that sounds vaguely familiar, the chances are it isn't a rip-off, and the originators themselves have specially re-recorded it with a reduced dynamic range.

In this way, over the years Lansdowne has recorded many name bands, including those of Ted Heath, Ronnie Aldrich and Sid Phillips, all for Rediffusion piping. Adrian recalls how he was overawed at his first chance of recording the then legendary Ted Heath and his Music. Ted Heath, you will recall, was a trombonist, and loved trombones. He was also deaf in one ear: 'I can't hear the trombones, young man', he would say to Kerridge, who didn't like to point out that it was because the trombones were on Ted's deaf side. And this presented a problem—how to bring up the trombones on Ted's deaf side loud enough to keep the great man happy, but at the same time avoid wrecking the balance for more average listeners.

The answer was diplomacy itself. Adrian left the musical balance as it was but cranked up the left-hand monitor channel level, and with it the trombones. This satisfied the bandleader. But how do you mix with a left-heavy stereo image? Answer: you hang over the desk in a state of lopsided physical contortion, so that your right ear is inordinately close to the right-hand speaker. It may not look very elegant, but it gets the job done. Only one question remains—did the engineers at Decca have to work the same way when recording Ted Heath's band?

Lansdowne, then, is a studio with a history that is its strength and weakness. Strength comes from experience and professionalism, business acumen and all-round versatility; weakness comes from the risk that an old established studio will get dubbed old-fashioned. As Adrian puts it, people feel vaguely that 20-year-old notes are still hanging from the walls. Indeed, he makes another interesting point in this context. In ten or 20 years' time, when styles have changed through heaven knows how many more directions, might it be that modern, predominantly rock or pop studios like The Manor will find themselves equally handicapped by memories of their past successes on the Virgin label?

Adrian Hope

Black Country mobile

Most independent radio stations use some form of vehicle to promote the station's identity in their immediate (and sometimes not so immediate) locality. It makes sense to bring the station to the attention of listeners (after all, advertising is sold on listening figures), as well as being a source of low budget programmes; the local fete may be pretty dull fare on site but can be attractively packaged for insertion into a day's programming.

Last October Beacon Radio's chief engineer, Bruce Warburton, and the station's management put their heads together and decided that the station needed to get out and about much more in order to expand its listenership—especially in certain fringe areas where some people hadn't even heard of the station.

Although by borrowing equipment from the studio and hiring pa gear they could do some sort of outside broadcasts, these unfortunately took a lot of planning and manpower to get underway. For this reason Beacon decided to start from scratch, and chose exactly what would be ideal for the job. Their solution was a custom-built caravan kitted out in a similar way to their studio control rooms.

At this stage a number of caravan builders were approached, but it was found that there was only one company willing to undertake the task of building a caravan that could accommodate the weight of equipment Beacon felt it was necessary to carry.

The resultant ob unit, built by Torton Bodies of Telford, is a 7 x 2.1m caravan shell mounted on a heavy chassis. One side of the caravan opens out to form a large stage area with a canopy on top. At one end of the caravan is a small shop where the whole range of Beacon goodies — T - shirts, badges, posters, etc—are sold; at the other end is a small lines room.

After the caravan was ordered in January of this year, Beacon set about choosing the equipment they were going to install when it arrived at the end of March. Due to the relatively high cost of the caravan unit, it was imperative that the cost of such equipment should be kept as low as possible without reducing its quality. For this reason they decided to build as much of the equipment as they could themselves; in fact, they ended up building the mixer, line-amps, and gram preamps, and purchasing the rest. Bought-in equipment includes two Technics *SP10* turntables with Gray arms, three Sonifex cart machines, four 200W Hill pa amps, various bass bins and horn units, and a Technics off-air tuner.

The mixer layout follows as close as possible that of on-air decks, in order to create the least confusion for their presenters.

The desk comprises: two microphone modules with coarse and fine gain, bass cut, pa send button and a 3-position switch for mic on/off and pfl; five stereo line modules with fine gain, pa send, pfl, and remote start; an output amp module; a monitoring module for stereo monitoring on cans and checking the levels of input sources, desk output, pa and off-air signals; and a pa send module. The latter, in conjunction with the pa send buttons on the individual modules, enables the pa output of the desk to be fed from the desk output, off-air, or a separate pa mix. While operating in the 'pa mix' position any channel or number of channels can be routed to the pa mix by simply pressing its particular send button; this also removes that particular channel from the main mixer output. Beacon has found this facility extremely useful when a presenter wants to do a competition for a large crowd of people, but does not necessarily require it to go to air.

Also included in the desk is a talkback module that routes talkback down a separate control line back to the station. Incoming talkback from the on-air studio automatically switches itself into one side of the presenter's headphones. It is also routed to a talkback speaker on the desk, and operates a red flashing 'call' lamp that flashes during the call, and for a further 4s to attract the attention of the presenter (should he have

64 ▶

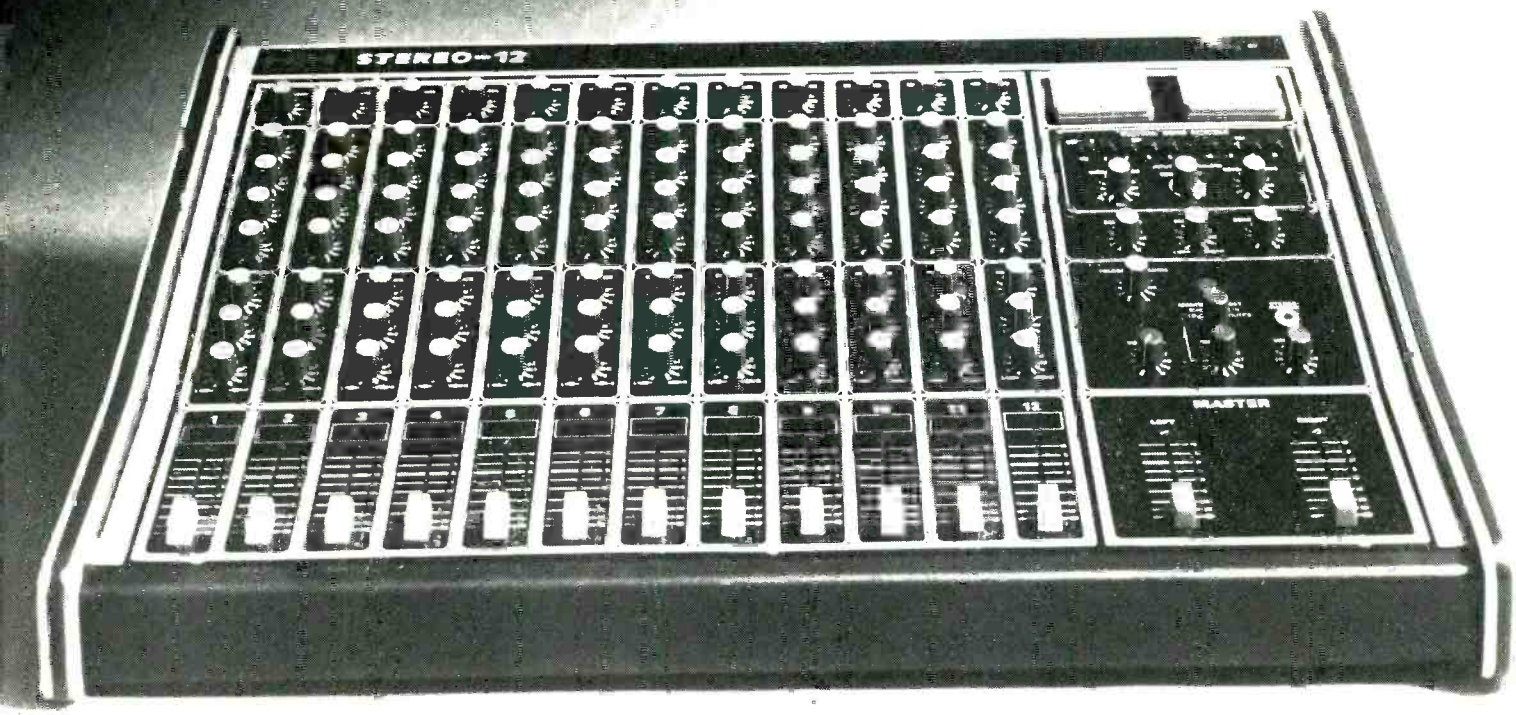
H|H electronic

Are you Mixing with The Right People?

Stereo 12 Sound Mixing Console

Without a doubt the highest quality Mixer for its price available in the market today. At last, a transportable mixing console for home recording, studio or stage use that not only claims to come up to professional standards but whose results can prove it.

Find out today why the Sterec 12 is so different from other mixers on the market — phone or write to H.H. for details of our professional range of products.



H.H. Sounds a lot better

H.H. Electronic, 10 Museum St., London W.C.1 England (Telephone 0044 01-836 3222)

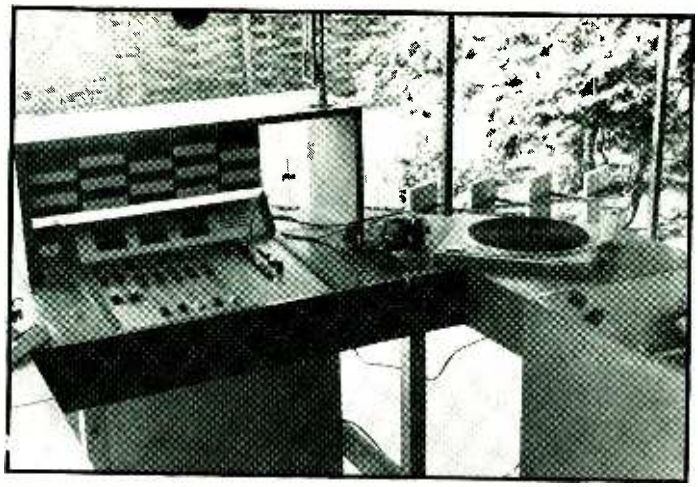
removed his cans). Talkback send is via an electret microphone and a send amp equipped with an age loop to provide a constant talkback level.

The exterior of the caravan has been painted white, and then sign-written with the Beacon logo to match the Land-Rover used to tow it. Soundproofing consists of 5 cm of *Rockwool* covered with hessian on the back wall of the caravan. This was found to have excellent absorption properties, resulting in minimal pa howl-round.

After the first wet day spent working on the caravan, it was realised that the noise of rain drumming on the thin roof was quite intolerable. A false plywood ceiling was constructed, with a layer of carpet-felt sandwiched between the plywood and the glass-fibre roof, which cut down the noise to an acceptable level. The entire floor area of the caravan has been covered in 2.5 mm thick 'cushion' flooring.

A standard 483 mm rack in the lines room houses the two pa amps, line amps, transformers, off-air tuner, jackfield, and howl-round reduction unit.

Since the caravan first went into service on May 11, it has been used for about 20 obs, clocking up a total of almost 100 hours of on-air time. It has broadcast from garden fêtes, carnivals, industrial exhibitions, agricultural shows, football grounds, youth centres, athletics meetings, supermarket car parks and schools. All of these venues have required the caravan flaps to be opened out—fortunately



The Beacon Mobile set-up courting trees

when the weather does get colder they have the option of simply shutting up the caravan and doing a programme from an (effectively) closed studio.

At a later date Beacon hope to expand the use of the caravan by adding a stereo uhf link and talk-back equipment. This will result in a large saving on the PO land-line costs they have incurred this summer. Extensive lighting equipment will enable them to do more night-time programmes, discos, etc without the problem of hiring equipment. It is hoped that a portable generator will soon be mounted in the rear of the towing vehicle to provide on-site power for such excursions.

Most of the proposed ob venues are selected by Beacon's promotions manager; it is then an engineering task to arrange the logistics and to have a site meeting with the show organiser and the local PO survey engineer. At the site meeting, the exact site is chosen; bearing in mind that the ground must be reasonably flat, access is needed from the main road, and that any closely-situated stalls, etc, will not be unduly perturbed by the pa's volume. Secondly, they have to decide where the caravan is going to get its power; the engineers prefer the source to be close by since long lengths of main cable can result in a loss of power from the pa amps. It is then confirmed with the survey engineer that the necessary land-lines can be put into the chosen site.

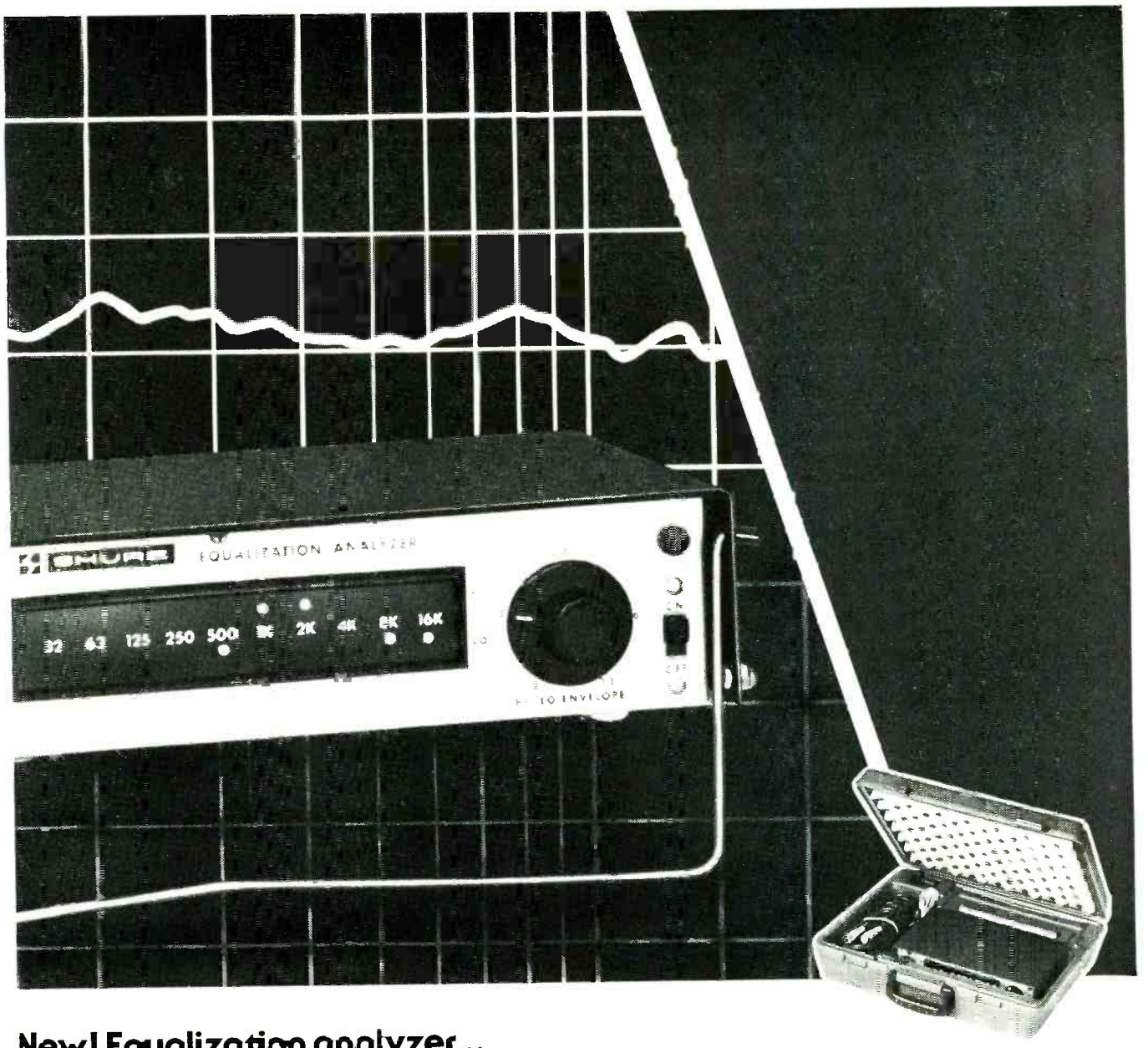
On the day of the outside broadcast, the caravan and its crew aim to get to the site at least two hours before the start of the broadcast. On arrival, the caravan is opened up and the first hour spent in setting up the equipment, adjusting the position of the pa speakers for minimum howlround, and erecting the vhf aerial used for monitoring Beacon's off-air output. One hour before the start of the broadcast, the land-lines are connected to the equipment and contact is made with the base studio.

The lines are then checked for quality, and, after the engineer is satisfied, they are patched through to the control room, the outside broadcast source is pre-faded by the operator, and the studio-to-ob talkback is checked. This stage is usually reached about 45 minutes before the start of the broadcast.

During the whole of this operation—and for most of the broadcast—the pa is fed from the off-air tuner, allowing the staff and audience to hear the commercials and local news bulletins originating from the base studio. The exact timing of commercial breaks and news bulletins is decided between the ob presenter and the studio operator.

The caravan has suffered just a few problems while on obs. Mains power was lost on one occasion for a few minutes as the result of a fault elsewhere at the showground blowing a fuse. The loss of output was covered by a record being played at the studio until the mains returned. On another occasion the wind was strong enough to blow the gram arms across the records, making playing impossible. This has been dealt with by modifying the console to include transparent screens around both turntables. Another inevitable problem is that of crowd control—on some occasions Beacon have had to hire crash barriers to stop over-enthusiastic crowds from mounting the stage area.

It's a man's life in the world of outside broadcasting.



New! Equalization analyzer...

Balance a system...Balance a budget.

Quick and accurate adjustment of sound system frequency response is finally within the reach of most budgets. The Shure M615A5 Equalization Analyzer System is a revolutionary breakthrough that lets you "see" room response trouble spots in sound reinforcement and hi-fi systems—without bulky equipment, and at a fraction of the cost of conventional analyzers.

The portable, 11-pound system (which includes the analyzer, special microphone, accessories, and carrying case) puts an equal-energy-per-octave "pink noise" test signal into your sound system. You place the microphone in the listening area and simply adjust the filters of an octave equalizer (such as the Shure SR107 or M610) until the M615 display indicates that each of 10 octaves are properly balanced. You can achieve accuracy within ± 1 dB, without having to "play it by ear."

Send for complete descriptive brochure.

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

TECHNICORNER

The M615 Analyzer's display contains 20 LEDs that indicate frequency response level in each of 10 octave bands from 32 Hz to 16,000 Hz.

A rotary hi/lo envelope control adjusts the HI LED threshold relative to the LO LED threshold. At minimum setting, the resulting frequency response is correct within ± 1 dB. Includes input and microphone preamplifier overload LEDs.

A front panel switch selects either flat or "house curve" equalization.

The E615 Omnidirectional Analyzer Microphone (also available separately) is designed specifically for equalization analyzer systems.

SHURE®

reviews

Technics SP-10 Mk 11

Kenny Everett and Hugh Ford

MANUFACTURER'S SPECIFICATION

Type: direct-drive turntable.
Motor: brushless dc motor, electronic rectification, quartz-controlled phase-locked servo circuit.
Turntable platter: aluminium diecasting, diameter 32 cm, weight 2.9 kg, moment of inertia 380 kgcm.
Turntable speed: 33⅓, 45, 78.26 rpm.
Starting torque: 6 kgcm.
Build-up time: 0.25s (=25° rotation) to 33⅓ rpm.
Braking time: 0.3s (30° rotation) from 33⅓ rpm to standstill.
Speed fluctuation by load changes: 0% within 5 kgcm.
Speed drift: within ± 0.002%.
Wow and flutter: 0.025% (JIC C5521) wrms; ±0.035% (DIN 45407) weighted, zero-to-peak.
Rumble: —60 dB (IEC 179B); —50 dB (DIN 45539A); —70 dB (DIN 45539B).
Power consumption: 26W.
Dimensions (w x d x h): turntable only, 36.85 x 36.85 x 10.25 cm.
Weight: turntable only, 9.5 kg.
Price: £500 approx.
Manufacturer: Matsushita Electric Trading Co Ltd, PO Box 288, Central Osaka, Japan.
UK agent: National Panasonic, Technics Division, Building 63, Whitby Road Trading Estate, Slough, Bucks.

AN OPERATIONAL ASSESSMENT

FROM an operational point of view it's very difficult to talk about the Technics *SP-10 MkII* because it seems to be almost perfect; there aren't many complaints.

It's a terribly neat unit: there's no knobbly bits sticking out like on the Gates, and there are no fins or decorations on it. The neatness appeals to me because I'm a Capricorn and we're terribly neat people. And it's less expensive than the Gates. Of course, you do have to buy an extra arm.

They're also easy to get hold of—I got my two within a couple of weeks of asking for them from National Panasonic. So that was nice. I like having things as soon as I want them; don't we all.

The first time I heard about the Technics was not through a review or a magazine but when Capital Radio tried one out in their on-air studio. I thought: 'Oh, 'ello what's this, you can't beat Gates. What are they flinging on us now. Japanese stuff.' Well, I put a record on it—a very quiet Stevie Wonder track—and it struck me immediately, the lack of rumble and other gunge going on in the background. You could just about hear the walls of the grooves breathing, and that was about all; you couldn't hear rumble or distortion or anything. I was most impressed with it—very clean.

The start time is terrific, because with the Gates you need half a turn to avoid the slur that you get. With the Technics it's about 5 cm. The torque is quite terrific as well: you could probably slap an elephant on top of this turntable and it wouldn't stop moving. I have actually tried to stop it by sheer brute force—I'm not known for my brute forceness or butchness, I have arms like knotted string—and I actually managed it. It didn't stop with the engine actually grinding and groaning—it just went: 'Right, I've had enough of this, I'm going to burn out if this goes on,' and sensibly just packed up and stopped. Which I guess is a built-in factor in the jiggery pokery inside, and is quite clever because if something gets in there and jams it, it's better to stop than getting hot, burning out and making expensiveness for you.

The silence of operation also struck me. With the Gates you can definitely hear this traction engine-type of noise as all the rubber bits are glangling around against each other inside. But with the Technics there's absolutely no sound: you can hear your blood going round more than the turntable, it's most quiet—it quite staggers me, the quietness of it.

There was another thing that staggered me. I cued up two copies of Cat Stevens's *Greatest Hits* on my pair of Technics' turntables, and then fine tuned them with my finger so that the sounds were both exactly in phase, almost cancelling each other out. I let them run for a while, while I had a cup of tea and a buttie. When I came back the lps were just ending on their last tracks and were about a cycle and a half out, which must be about 1½ mm? That's quite amazing and quite useless, practically, but it's nice to know that it's that exact.

The turntable does, however, have a couple of annoying points, but they're very slight. If you carelessly press the start/stop switch—ie slap it with your finger like some of our hairy, butch-fingered djs do—the bouncy microswitch tends to go on/off very quickly. Which is very embarrassing in front of two million people. This can be avoided by gently pressing the switch in a very careful manner, but some djs can't be bothered and the 'funny' happens about once in every 50 times it's used. We've got round this at Capital by one of our technicians building into the switch a peculiar system that only takes notice of the first instruction in any 5s period. So if you turn it on and then off, on, off, on, off, on, off, it will only take notice of the first 'on'.

The next point is the number of transistors and things inside the turntable. When I read the leaflet I was horrified—there are a million components in the works and I'm afraid that one day one of them is going to go 'phut' and I'm going to be left with only one turntable. I guess it's going to take a team of surgeons to fix it. The old Gates were ok in that respect because they were just string and elastic and Meccano, and if something went wrong you could just take the platter off and sus it out—screw up some things tighter or put in a new elastic band. But these Technics are so space-age that a creature like me, who doesn't even know what a volt is, would just be left in the lurch. I would have to ring a technician and it would take days, so that slightly horrifies me.

You tend to be more aware of record faults with the *SP-10* because it is so perfect. If the record hole isn't quite in the middle—which happens with most records these days—you tend to notice it. You're really aware of record wow on the Technics, which is a bit of a drag, but it's not the turntable's fault that it's so perfect. And I'd like to put a complaint to record companies: please put your holes in the middle. Thank you.

68 ▶

The widest range of Professional Audio under one roof

Professional REW Audio

LONDON LOUDSPEAKER CENTRE

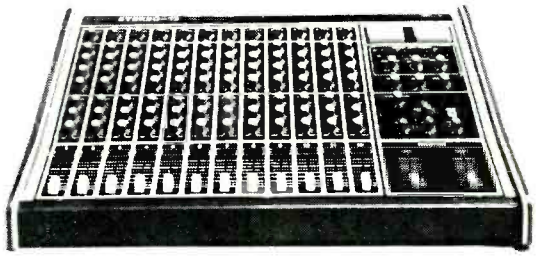
Hundreds of speaker chassis in stock!

Main agents for CELESTION, GOODMANS, TANNOY, JBL, ELECTROVOICE, FANE, GAUSS, ALTEC, KEF, ATC, CERVIN-VEGA

CELESTION G12/50 STD 12" 50-watt	£20·00
CELESTION G12/50 Aluminium Dome 12" 50-watt	£21·00
CELESTION G18C Bass 18" 100-watt	£43·90
CELESTION Powercell 12" 100-watt	£43·90
CELESTION Powercell 15" 125-watt	£53·90
CELESTION MH1000 Horn 25-watt	£14·00
Plus all other Celestion models in stock	
GOODMANS 12P STD 12" 50-watt	£18·00
GOODMANS 12PD Disco 12" 50-watt	£20·00
GOODMANS 12PG Lead 12" 50-watt	£19·00
GOODMANS 15P Bass 15" 75-watt	£24·00
GOODMANS 18P Bass 18" 100-watt	£39·00
GOODMANS Hifax 750 Horn 50-watt	£18·00
JBL K140 Bass 15" 150-watt	£119·00
JBL K130 Lead 15" 125-watt	£109·00
JBL K120 Lead 12" 100-watt	£99·00
Plus all other JBL Speakers, Drivers & Horns	
TANNOY HPD 385A 15" 85-watt	£112·85
TANNOY HPD 315A 12" 60-watt	£94·65
TANNOY HPD 295A 10" 50-watt	£84·15
All model dual-concentric full range inc. crossover	
GAUSS 12" all models 12" 150-watt	£105·00
GAUSS 15" all models 15" 200-watt	£125·00
GAUSS 18" all models 18" 200-watt	£155·00
ELECTROVOICE EVM12L lead 12" 100/200-watt	£115·00
ELECTROVOICE EVM15L lead 15" 100/200-watt	£115·00
ELECTROVOICE EVM12B bass 12" 100/200-watt	£119·00
ELECTROVOICE EVM15B bass 15" 100/200-watt	£119·00
ELECTROVOICE EVM18B bass 18" 100/200-watt	£139·00
All other Electrovoice speakers plus horns in stock	

All prices include VAT. Carriage extra: 12" £1; 15" £2; 18" £3; Horns £1·50

MIXERS



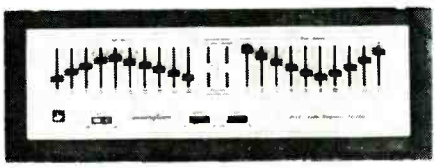
New HH mixer—now in stock

Allen & Heath Mini 6/2
Quasi 10/2, 8/4
Pop Mixer 16/2
Canary 12/2, 10/4
MM 8/2, 12/2, 16/2, 12/4
Teac Tascam Model 2 6/4
Teac Tascam Model 3 8/4
Teac Tascam Model 5 8/4
Sony MX510 5/2
Sony MX650 6/2
Also Hill, Alice, Soundcraft.

MICS

REW carry the largest range of mics in the UK. Over 500 always in stock.
AKG, Beyer, Shure, Calrec, Neumann, Nakamichi, Teac, Reslo, Sony, Sennheiser, SNS Radio, Dan Gibson, Electrovoice.

GRAPHIC EQUALISERS



SOUNDCRAFTSMEN

SAE, JVC, Technics, MM, MXR.

AMPLIFIERS

2 x 500 watts
S500D £396 inc VAT

Also in stock: Amcron, SAE, Phase Linear, Bose BGW, HH TPA Series, Revox, Quad, MM.

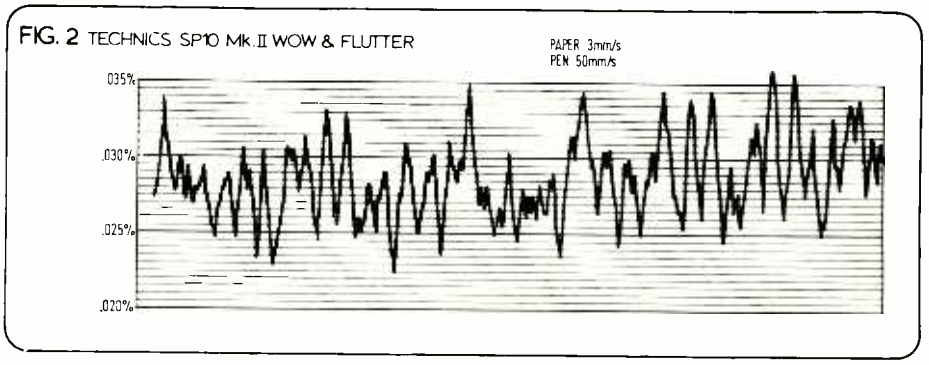
REW Professional Audio, 126 Charing Cross Road and 17 Denmark Street, London WC2. Tel: 01-836 2372/7851

Mail Order to: REW House, 10-12 High Street, Colliers Wood, London SW19. Tel: 01-540 9684/5/6

TECHNICS SP-10 MkII

That's about all I can say about the Technics turntable; it's not much, but you can't really say much about something that's so good. It seems to me to be the best turntable I've ever come across anyway (and I've seen quite a lot of turntables in my time). I can't imagine any improvements that could be made to it. The speed switching from 33, 45 and 78 rpm is the fastest ever, and the quietest as well; the operation is quiet; it's neat; it's heavily respectable in the spec department; and that's about it really. I'm glad I've got two of them.

Kenny Everett



TECHNICAL REVIEW

THE TECHNICS *SP-10 MkII* turntable is clearly aimed at being the ultimate in studio models, and incorporates many novel features that are based on Technics' extensive experience in direct-drive turntables. The first unusual feature is that the turntable unit is separated from the ac power supplies, with the result that the hum pick-up problem, which bugs all turntables to some degree, does not exist with this model. The separate mains power unit, which can be driven from 110, 120, 220 or 240V, is connected to the turntable itself by a 1.5m lead terminated with a 4-pin *XLR* plug that connects to the power supply unit.

A fixed 2.2m lead provides the mains connection to the power supply unit, which measures 10 x 34.5 x 8 cm (w x d x h) excluding the soft feet. On the front panel the only control is a toggle-type on/off switch with its indicator lamp.

Within the power supply there are two printed circuit boards with clear component identifications, one of which has five fuses to protect the incoming supply and the outgoing dc supplies to the turntable. The supply to the turntable is fully stabilised, and deviations from the 240V setting (down to 180V) had no detectable effect on the overall performance.

The electronic control within the turntable unit occupies four high-quality printed boards, which plug in and generally have good component identification. The complexity of the electronic control involves a mass of transistors and integrated circuits to control turntable speed, start and stop functions, and braking in the stop and standby modes.

Fig. 1 is a block diagram of the electronics, from which it can be seen that a crystal oscillator is used as a speed reference. The output of the oscillator is divided down for the three speeds of 33⅓, 45 and 78.26 rpm, such that the divided oscillator output is compared with a tachometer output from the turntable by a phase-comparison circuit. The result of the phase comparison is used to drive the dc direct-drive turntable motor via a power amplifier.

The result of this is that the turntable speed is phase locked to the crystal, and in practice the immense power reserve of the drive circuit meant that phase lock was retained easily when a Watts *Disc Preener* was pressed hard on to a disc—and even substantial hand pressure on the turntable was required to loose phase lock. A refinement of the arrangement is that the turntable has a single set of stroboscope markings illuminated by a neon light, which itself is driven from the divided crystal frequency. Thus the single set of markings are all that is required for any mains-power frequency and any of the three speeds.

A single microswitch pressbutton is used to start or stop the unit, and a miniature jack socket on the turntable provides for remote start/stop in parallel with the local control. In fact, a 'remote box' is provided, but its function can be easily built into a desk since all that is required is a single-pole microswitch.

Turntable speed selection is by three recessed and illuminated microswitch controls on the turntable surface, the selected speed having its switch illuminated. Sensibly, when the unit is switched on it always selects the 33⅓-rpm speed.

One of the most important aspects of the turntable is, of course, the mechanical construction, which is unusually substantial, the main part of the unit being a fairly thick, ribbed alloy casting. The motor is let into a recess in the middle of the casting, and presents a large diameter reference face on to which the heavy turntable platter is secured by three machine screws. The standard of finish of the mechanical parts is excellent and access for servicing is very simple, the band-type brakes being located under a cover beneath the turntable platter. This brake is a conventional band-type with solenoid operation at one end and a fine adjustment at the other end, the band being of steel, lined with a felt-type material.

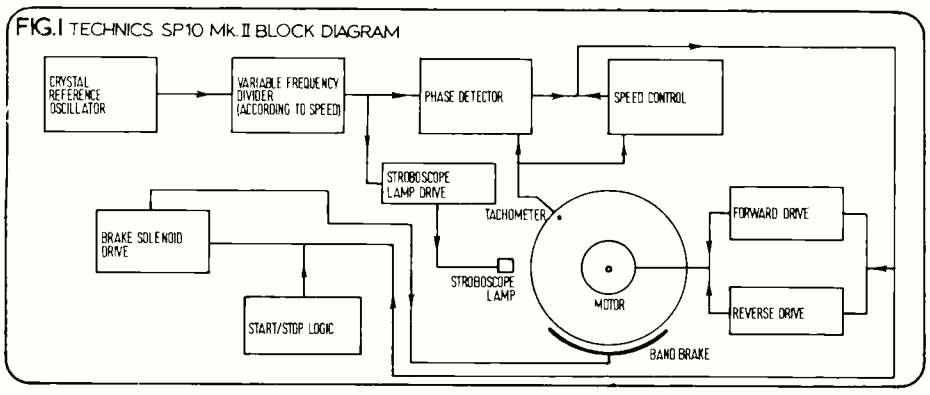
Because of the large amount of available motor torque, the manufacturer recommends that the turntable be mounted in at least 3 cm-thick 'heavy material', and provides two lengths of mounting screws. I always dread the idea of cutting out bases for turntables, but for once this unit requires a very simple cutout—a rectangle with the corners left in on a diagonal. Although a template is provided, the cutout is so simple that it is not really required.

An optional base and dust cover is available complete with suspension; otherwise the form of suspension is left to the user. In either case the outline dimensions of the turntable are such that it is only just possible to use a 23 cm pickup arm, such as the SME *3009*, and a longer arm is to be preferred.*

The electronics are mounted beneath the turntable on metal pillars, and are protected by a heavy metal cover that is secured to the underneath of the main casting by a multitude of screws. The bottom surface of this cover is equipped with small feet.

Turning to the mechanical aspects of the unit, the diameter of the centre pin was found to be 7.125 mm, which is on the small side and gives a minimum clearance of just over 0.1 mm on the smallest permitted hole in a record. The NAB Standard 'Disc Recording and Reproducing' calls for a pin diameter of 7.188 mm (+0, −0.0127 mm), and it is felt that the Technics turntable should meet this standard. A similar situation exists with the large centre hole adaptor, which has a diameter of 37.897 mm compared with the NAB standard of 38.10 mm (+0, −0.051 mm). The dimensions of the standard NAB centres are in agreement with the IEC 98 disc hole tolerances, which lead to minimum hole diameters of 7.24 mm for small holes or 38.151 mm for large holes. In fact, the small centre spindle is designed to be within the Japanese Industry Standard of 7.15 mm (+0, −0.03 mm) when on its nominal

70 ▶



*In addition to the plinth and cover option Technics has also introduced an arm for the *SP-10 MkII*. The price is about £200. **—Ed**

CROWMAY BREAKS THE PRICE BARRIER FOR HIGH SPEED CASSETTE DUPLICATING EQUIPMENT

CROWMAY LTD. is a new Company designing and building machines associated with the manufacture of pre-recorded cassettes and would like to introduce you to their HIGH-SPEED DUPLICATING SYSTEM.

The commercial duplicating of cassettes falls into two categories.

1. IN - CASSETTE DUPLICATING — Where the virgin tape is wound into the cassette before recording takes place.
2. OPEN REEL HIGH SPEED DUPLICATING—where the virgin tape is recorded before loading into the cassette.

Crowmay equipment falls into the second category.

Among the disadvantages of copying in this fashion is the fact that very small quantities become less economic and the equipment requires more capital investment. Among the advantages are higher production rates, since the speed at which one can transport tape is not limited by the cassette mechanism itself, and thus higher duplicating ratios are possible.

The **CROWMAY** duplicator runs at a ratio of 32:1. That is, the $7\frac{1}{2}$ i.p.s. 1" masters are played back at 240 i.p.s. and the cassette tape which will be played back at $1\frac{7}{8}$ i.p.s. is recorded at 60 i.p.s. Thus a copying system of this sort consists of two types of machines, that is, masters and slaves. The master plays back the tape to be copied, and to avoid the necessity of re-winding the tape at the end of each programme, the master is usually of a 'loop bin' construction. That is, the tape is loaded into a storage bin and the beginning and the end of the tape are joined together to form a loop, and thus the tape plays over and over again as long as the master machine is running. The slave machines are simply high speed tape recorders, on which the reels of cassette tape are recorded. A system usually consists of one master connected to a number of slaves.

Since side one and two of the master are copied simultaneously, each slave will record a 32 minute programme in one minute.

A unique feature of **CROWMAY** slaves is the section which houses the record electronics. One of the problems with high speed duplicating is the alignment of these electronics. This process, in common with all tape recorders and duplicators, is necessary from time to time as the tape heads wear and eventually need replacing. It is one of delicately balancing a number of inter-related controls, and since the audio quality of the finished cassette is dependent on the accuracy of this alignment, it can be a time consuming process requiring technical expertise and specialised equipment. On the **CROWMAY** machines all the signal electronics are contained in the centre section, and with the removal of four screws and the connecting cables, this complete section may be removed. These record electronics and the head blocks, removable by three screws, are treated as a single unit and are supplied as a pre-aligned spare part.

This is a great advantage to the small business, since technical staff, whose time will surely be at a premium, need not be involved in the alignment of a slave as when such alignments become necessary, all that is required is to change the package and head block for an aligned spare set, and return the worn set to **CROWMAY** for calibration.

This is also an advantage to the large concern, as spare sets may be kept and aligned while production is slack, so that if an alignment is required during a busy period, there is no wasting of valuable production time.

Another distinctive feature of **CROWMAY** equipment is the accessibility of the various circuits which control the tape transport. Each of the main sub-assemblies is easily removed for servicing, hence down-time is further reduced.

Each **CROWMAY** system is supplied with a projector and audio-visual programmes for training operators and technicians.

Inevitably, such equipment is expensive. However, if you have already been discouraged from either expanding or breaking into open reel, high speed duplicating by the cost. Think again . . .

CROWMAY BELIEVE THEY HAVE BROKEN THE PRICE BARRIER.

CURRENT PRICE LIST

MASTER PLAY-BACK MACHINE — Complete with loop bin and four channels of playback electronics **£5,900** each

SLAVE RECORDER — Complete with record electronics heads and head-block **£4,250** each

SPARE ELECTRONICS PACKAGE — Complete with heads and head block **£1,060** each

All prices exclude VAT and delivery and installation outside of England

CROWMAY LTD., 757 Romford Road, Manor Park, London E12

crowmay

Registered Office
757 ROMFORD ROAD
MANOR PARK E12
Telephone:
01-478 0833

dimension, but it is toleranced to be up to 0.034 mm smaller than the lower limit of the JIS standard. In practice, the spindle size is a compromise that depends upon the use to which a turntable is to be put—if minimum wow and flutter is required the spindle must have the maximum permitted size, but this dimension will be unpopular in broadcast applications because of the difficulty in changing discs rapidly with a close-fitting centre hole.

Peak-to-peak runout of the centre spindle was found to be 0.023 mm, which is generally satisfactory, as was the vertical runout at the turntable edge (0.127 mm) and horizontal runout at the edge (0.041 mm). However, the flatness of the turntable mat left much to be desired, since its thickness varied by 0.33 mm in what appeared to be the form of a tapered sheet.

Clearly such factors affect the measured wow and flutter and rumble, but these parameters were to an extraordinarily high standard. Wow and flutter measured only 0.035% to the IEC (quasi-peak) weighted standard, the relation between wow and flutter and time being shown in **fig. 2.** It should be noted that this performance is far better than any commercially available test disc, the best of which have a residual of around 0.06%. Naturally it is very difficult to determine if the measured 0.035% is due to the test disc or the turntable, but I have measured as low as 0.025% IEC-weighted with this particular disc.

The measurement of rumble poses similar problems, but here the B & K *type QR2010* disc has specified rumble of less than −50 dB to the 'A'-standard or −65 dB to the 'B'-standard, with reference to a recorded velocity of 10 cm/s at 1 kHz.

The best measured turntable rumble was found to be −49 dB to the 'A'-standard with the B & K disc, but this measurement was found to be very difficult; not only was great care needed in damping the pickup arm resonance but also, in spite of a concrete floor, light footsteps and the vibration from aircraft and even distant traffic upset the measurement. The 'B'-weighted measurement eliminates these problems due to the low frequency roll-off, and here the best measured rumble was a remarkable −73 dB using a special test disc, or −68 dB with the B & K test disc.

Equally remarkable was the start and stop performance, the build-up to 33⅓ rpm of 220 ms being shown in **fig. 3.** The following table shows that both the start and the stop are extremely rapid at all three speeds:

speed	start time	stop time	angle of rotation for complete start/stop cycle
78 rpm	350 ms	450 ms	95°
45 rpm	325 ms	400 ms	80°
33⅓ rpm	220 ms	350 ms	60

The actual turntable speed is phase locked to the internal crystal reference at the three turntable speeds of 78.26, 45 and 33⅓ rpm. These speeds were found to be accurate to better than 0.0014% over normal room temperature ranges. Loading the turntable with even considerable hand pressure did not make any difference to the speed, and did not, surprisingly, affect wow and flutter due to phase changes in the phase locked loop that controls speed. However, the performance is quite amazing in comparison with any other known turntable.

No doubt some readers will be puzzled by the nominal 78.26 rpm for 78 rpm recordings; some explanation of the standard turntable speeds will not be out of place. British Standard 1928:1965, 'Specification for processed disk records and reproducing equipment,' lays down the following standard speeds that are subject to a tolerance of ±2%:

50 Hz supplies	60 Hz supplies
77.92 rpm	78.26 rpm
45.11 rpm	45.00 rpm
33⅓ rpm	33⅓ rpm

This rather peculiar situation arises from the number of dots required on a stroboscopic disc for checking turntable speeds. IEC 98 standard has removed this peculiarity by specifying 78 rpm ±0.7%, 45 rpm +0.75%, −0.5% and 33⅓ rpm ±0.5%. To confuse things further the NAB standard says: 'It is recognised that 78.26 rpm discs are still in existence, but this speed is no longer considered standard', and specifies 45 rpm or 33⅓ rpm ±0.3% for reproduction or ±0.1% for recording.

The outcome of all this is that the Technics turntable speed is precisely on the centre of the NAB standard and within tolerances of the other standards mentioned.

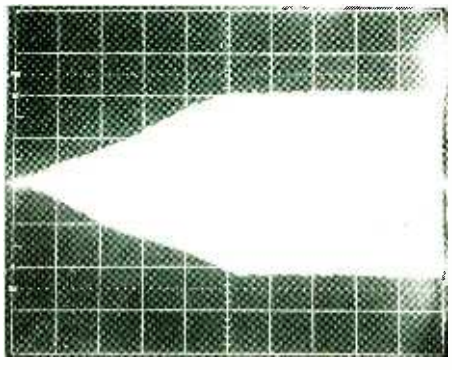
Summary

Double the wow and flutter, knock 10 dB off the rumble performance and double the start and stop times, and then compare with other professional turntables—the Technics *SP-10 MkII* is this order of magnitude better than most professional units, which for some reason always seem to have worse performance than the best domestic units.

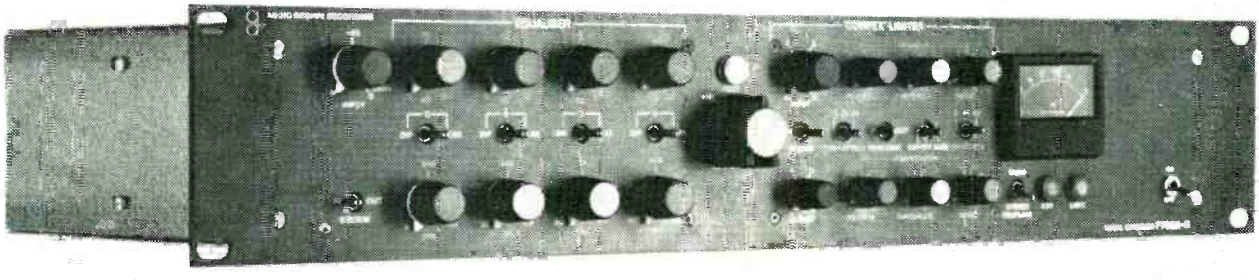
Certainly the performance of the *SP-10 MkII* is superb, but the mechanical dimensions of the centre spindle and the large hole adaptor could benefit from a little enlargement; also with the review sample the flatness of the turntable mat was not very satisfactory. But these deviations are insignificant when compared with the disgraceful quality of most commercial discs.

Hugh Ford

FIG. 3 *Build-up to 33⅓ rpm (see text)*



Sweep equaliser, compressor, expander, limiter, all in one unit:



The ADR Vocal Stresser

It's a unique audio package. And here's where to use it.

In the Broadcast Studio

Make wide adjustments to programme material before broadcast; eg. 'doctor' telephone lines to make them more suitable for broadcast.

The equaliser improves signal quality; the compressor improves mean level; the expander in gating mode attenuates noise during pauses, and the limiter controls peaks.

In the Mastering Suite

Control every medium, from disc cutting to cassette duplication, particularly reducing sibilance and adjusting overall dynamic balance.

In the Recording Studio

The sky's the limit, or at least the creative ability of the artist and the engineer is. With vocals, or indeed any signal source, you can get very exciting sounds.

The Vocal Stresser is basically the F760X Compex-Limiter and the E900 Sweep Equaliser integrated as one, with all functions switch-selectable.

For instance, the equaliser can be switched out of the system and used as a separate unit, accessible through its own input/output from a different channel.

Or switched before or after the Compex-Limiter or even in its side chain.

The benefits of these three modes are considerable.

Used before, you get maximum signal conditioning and still maintain critical overload control.

Used after, you get an enhanced compression effect although the limiter gets equally affected by the varying signal shape.

And in the side chain, the equaliser becomes an extension of both the threshold and compressor controls, making them particularly sensitive to chosen frequency bands.

Send for full technical specifications.

audio & design recording ltd.
St. Michaels, Shinfield Road,
Reading, Berks, UK.
Telephone: Reading (0734) 84487.
Telex: 847605.

Manufacturing members APRS.

REPRESENTED IN: USA–CANADA–AUSTRALIA–NEW ZEALAND–JAPAN–SOUTH AFRICA–BRAZIL–
EASTERN EUROPE–BELGIUM–DENMARK– FINLAND–FRANCE–WEST GERMANY–GREECE–HOLLAND–ITALY–NORWAY–SWEDEN–SWITZERLAND

We make sound sound better.

Kudelski Nagra 'E' Portable Recorder

Hugh Ford

MANUFACTURER'S SPECIFICATION

Dimensions: 315 x 226 x 104 mm.
Weight: 5.5 kg with tape and batteries.
Power supply: 12 '*D*' cells or rechargeable cells or ATN-2 mains power supply.
Tape speed: 19.05 cm/s.
Reel size: 178 mm with cover open; 127 mm with cover closed
Tape width: 6.25 mm.
Equalisation: NAB or CCIR.
Track format: Mono, full track.
Headphone control: Tape—direct.
Microphone input: one: dynamic 200 ohm 0.138 mV for 0 dB; condenser T +12V 2 mV for 0 dB; T +12V 4 mV for 0 dB. Can also be used as asymmetrical line input 2.5 mV for 0 dB.
Line input: voltage line input, source impedance greaterthan1kohm:0.4V(150kohminputimpedance); current line input, input impedance 330 ohms: 3 μA.
Line output: asymmetrical with output load ≧300Ω: 0.94V for 320 nWb/m and 1.55V for 510 nWB/m; floating with 600 ohm load (option): 4.4V for 320 nWb/m.
Overall frequency response: 50-15k Hz within ±2 dB.
Signal-to-noise ratio: 62 dB unweighted.
Third harmonic distortion at 400 Hz: <0.9% at 0 dB; <2% at +3 dB.
Erase depth of a 1200 Hz recorded signal: >79 dB.
Wow and flutter: ±0.1% (DIN 45 507).
Tape used for the above measurements: PER 525.
Reference oscillator (1 kHz signal): '0' vu level =—8 dB.
Reference oscillator used for tape calibration: 1 kHz, —12 dB; 6.3 kHz, —12 dB; 10 kHz, —12 dB
Manufacturer: Kudelski SA, 1033 Cheseaux sur Lausanne, Switzerland.
UK Agent: Hayden Laboratories Ltd, Churchfield Road, Chalfont St Peter, Bucks SL9 9EW.

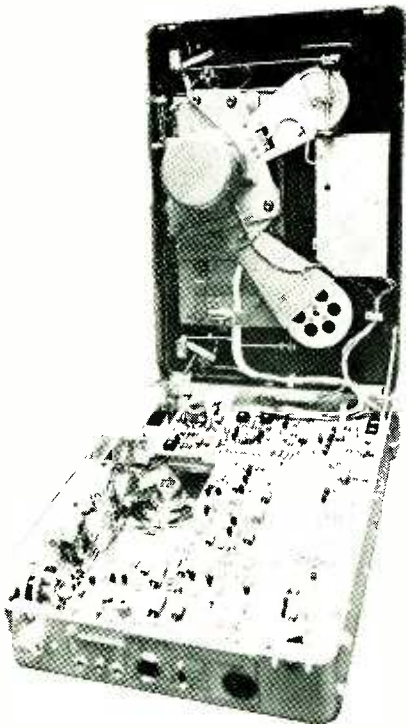
THE NEW Nagra *E* is in many ways a simplified version of the well-known and well-respected Nagra *IV* series of recorders, whilst still retaining many of the latter's features and compatibility with most accessories. Being intended for general radio reporting work and the like, the Nagra *E* is a single-speed machine working at 19 cm/s with full-track record/replay and no pilot tone facilities.

Layout of the tape transport is very similar to the Nagra *IV*, with the spools mounted so that up to 127 mm diameter spools can be used with the cover shut, and up to 178 mm diameter spools with the cover either open or removed.

From the payoff spool the tape passes a tension arm that controls the braking of the feed spool, and then to a fixed guide, followed by the erase head, another fixed guide, a tachometer and flutter roller, and thence to the record head via a further fixed guide. This is followed by the replay head, which has a fixed guide either side, and then the large diameter capstan and pinch roller. The latter is of the usual Nagra-type and folds out of the way for threading the tape on the machine. The takeup tension roller and spool complete the tape path.

With the exception of the spool mounts and the tension sensing rollers which are mounted on the main transport casting, the remainder of the tape path is mounted on a separate plate of substantial thickness. This provides a good reference face for the heads and guides. As with other Nagra machines the head mounting is unusually rigid, as in the head azimuth adjustment (the tapered cam type used in the *IV*).

Control of the tape transport is by a single loading lever on the top of the machine and a well-protected rotary six-position switch on the front of the machine. This switch provides positions for: stop; fast tape movement in either direction; playback; 'test' for record level setting; record; and 'reference signal and calibration'. The switch knob has two screwdriver-operated pins that are intended to lock certain switch positions: one of them locks the switch in the 'stop' position to avoid the machine being accidentally started in transit; while the other restricts the switch movement to the playback modes so that tapes cannot be



accidentally erased—a possibility with other Nagras!

The remaining front-panel features include recessed potentiometers for microphone input and line input level setting, the latter being a level control in the playback mode; three miniature toggle switches for battery test, tape/direct monitoring and loudspeaker on/off; and a very clear peak-reading record level meter. In addition, there is a standard 6.35 mm headphone jack and a voltage line input on banana sockets.

An important feature of the front-panel controls is that, like the earlier Nagra *III*, all the controls are protected from damage by skirts around the knobs of the rotary controls. And, unlike the Nagra *IV series*, the layout is very clear and simple, making the machine suitable for use by unskilled operators.

On the left side of the machine there are two connectors: a 6-pin Tuchel type connector for the current line input and external speed variation; and a *XLR*-type plug for microphone connection. The latter operates in conjunction with a screwdriver operated switch on the base of the machine to allow connection of dynamic microphones, 12V condenser microphones at two input sensitivities, or to act as a symmetrical line input.

On the other side of the machine there is a two connectors: a 6-pin Tuchel type connector conventional Nagra external power connector and its associated internal/external powering switch. This allows the machine to be externally powered from a Nagra power supply, or for internal rechargeable batteries to be charged (where such cells are used). Normal '*D*' size batteries can also be used; an expensive proposition nowadays when one considers the cost of 12 *IIP2*'s. An asymmetrical line output in the form of three banana sockets is also situated on this side of the machine.

Not only are all connections and functions very clearly identified, including pin connections on sockets, but the underneath of the machine also has full voltage and impedance information for all connections. Furthermore, within the machine there is a full circuit diagram and a pack of spare parts, including semiconductors and passive components. One may well wonder how these are likely to be used in the field? Well, apart from the level meter in the machine converting to a voltmeter by means of movable links, and the spare parts including a voltage probe, the machine also has an internal oscillator that operates at 1 kHz, 6.3 kHz or 10 kHz!

Within the machine the standard of construction is superb with most of the electronics being contained on a single glassfibre pcb—probably the best laid-out and best identified board that I have come across. All preset controls and inputs and outputs are clearly labelled, and the various sections of the board are identified with their functions. Solder pins and links are provided to separate the sections where this might aid servicing. Adjustment of bias and equalisation for alternative tape types is, of course, provided for with fully variable controls, and the information supplied within the machine includes very clear instructions for such adjustments.

Replay performance

The replay frequency response was investigated

74 ▶

KUDELSKI NAGRA E

using the normal BASF DIN *19S* calibration tape for high-frequency performance, and a flux loop for the low-frequency performance where fringing and wavelength effects are important.

Using the flux loop it was found that the frequency response below 1 kHz was within 0.5 dB of the CCIR equalisation down to 30 Hz, below which the response fell to −3 dB at 30 Hz. At the high-frequency end the response was again with +0, −0.5 dB up to 16 kHz, falling to −3 dB at 18 kHz—a generally very good standard.

Replay amplifier saturation occurred 12 dB above the reference fluxivity of 320 nWb/m, at which point the output amplifier also clipped if the replay gain was set to 0 dB. It is felt that this allows little margin for some modern tapes, and that the replay head amplifier could do with more input capability.

With regard to noise, the replay amplifier was really excellent. The following figures were measured with the machine alone, and for comparison with the sample of Agfa *PER 525* tape supplied with the machine!

	Reference level (320 nWb/m) to noise machine only	with Agfa PER 525
CCIR-weighted ref 1 kHz) rms	65.5 dB	53 dB
CCIR-weighted (ref 1 kHz) quasi peak	63 dB	48 dB
'A'-weighted rms	75 dB	63 dB
20-20k Hz bandwidth rms	64 dB	59 dB

In the case of the band-limited figures, there is some influence due to hum pickup from local testgear. While in normal operation this is unlikely to be a hazard, it should be noted that no headshield is fitted to this machine.

Examination of the output noise spectrum for servo tones and like did not reveal anything greater than −80 dB below the reference level of 320 nWb/m—a really good performance.

Record/replay performance

As received, the record/replay frequency response was not very flat, having a peak of +4 dB at 10 kHz, so it was decided to re-align the record amplifier using the instructions provided within the machine. This initially provoked complete disaster as the response could not be made flat, but looking at the distortion measurements provided the clue—the instructions said turn the bias potentiometer clockwise to the 3 dB over bias point at 10 kHz, but should have said anticlockwise!

Having sorted this out, it was found that the bias control (albeit somewhat sensitive) had a wide range, as did the high-frequency record equaliser potentiometer. The overall frequency response as aligned for Agfa *PER 525* is shown in **Fig. 1**, from which it can be seen that the response was flat to within +1.2, −2 dB from 30 Hz to 15 kHz (reference: 1 kHz). The performance would probably be improved at 1 dB over bias at 1 kHz, which is the Nagra recommended bias, as opposed to the −3 dB overbias point (the DIN recommendation).

Biased at the 3 dB over point, the distortion at 1 kHz in terms of the third harmonic was found to be 0.45% at the reference level of 320 nWb/m; the 3% point occurred at 6 dB above 320 nWb/m.

As with the replay electronics, the drive capability of the record electronics is potentially limited: the record amplifier clipping point occurred 10 dB above the drive requirement to record 320 nWb/m on Agfa *PER 525*.

Inputs and outputs

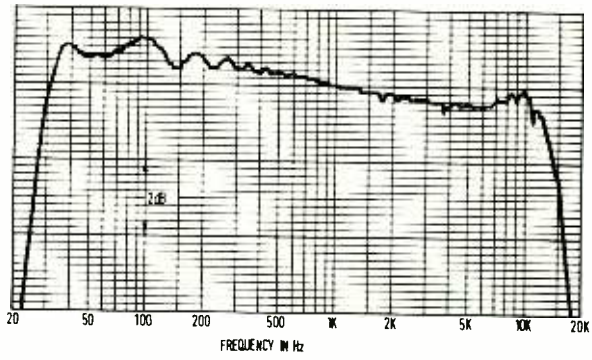
The sensitivity of all the inputs was found to be slightly better than the specification, but generally close to nominal. Checking the noise performance of the inputs showed that the worst noise below a recorded level of 320 nWb/m was as follows:

Input	Noise 20 Hz to 20 kHz rms (ref. 320 nWb/m)
dynamic microphone	−52 dB
capacitor microphone (high-sensitivity)	−61 dB
capacitor microphone (low-sensitivity)	−62 dB
high-sensitivity line input	−62 dB
normal line input	−72 dB

These figures show that with the exception of the dynamic microphone input, the input noise is below tape noise, and in fairness it must be said that the dynamic input is satisfactorily quiet with a noise factor of only 4 dB.

76 ▶

FIG.1
NAGRA E
RECORD/REPLAY
FREQUENCY RESPONSE
AT -10dB, 320 nWb/m



Audio Developments

LIST OF WORLD-WIDE AGENTS

AUSTRALIA:	Rank Industries Australia Pty. Ltd., 12 Barcoo Street, East Roseville, N.S.W. 2069.
AUSTRIA:	M. R. Drott, Johannesgasse 18, A-1015 Wien.
CANADA:	Philips Audio-Video Systems, 200 Consumers Road, Suite 105, Willowdale, Ontario, M2J 4R4.
DENMARK:	Kinovox, Industrivej 9, DK 3540 Lynge.
FRANCE:	Studio Centre, 3 Rue du telegraphe, 75020 Paris.
GERMANY:	Austerlitz Electronic Gmbh, 85 Nurnberg 1, Postfach 606, West Germany.
HOLLAND:	Sound Techniques, Postbus 206, Alkmaar.
ITALY:	Laboacustica, Via Muggia 33, 00195 Rome.
NORWAY:	Siv Ing Benum & Co., Boks 2493, Solli, Oslo 2.
SOUTH AFRICA:	Intelec (Pty.) Ltd., P.O. Box 25048, Ferreirastown,
SWITZERLAND:	Ingenieurburo SIA, W. A. Gunter, 8702 Zollikon, Zurich, Seestrasse 49-51.
U.S.A.: (East Coast):	Audio Services Co. & Sales Centre Inc., 565 Fifth Avenue, New York, N.Y. 10017.
(West Coast):	Coherent Communications, 13733 Glenoaks Boulevard Sylmar, California, 91342.
VENEZUELA:	Luis T. Laffer, Ave. Libertador-Chacao, Apdo 60,949-Caracas 106, Edif. Pacairigua, 141 B.

Audio Developments

The AD 045 PICOmixer

FOR THE BUDGET-CONSCIOUS RECORDIST WHO DOES NOT NEED ALL THE FACILITIES OFFERED BY OUR MORE ELABORATE SYSTEMS

Ideal for owners of the NAGRA IVS and similar professional portable tape recorders.

FEATURES:—
- ★ Six balanced and fully Equalised MIC/LINE INPUTS.
- ★ Mic powering switchable TONADER (12 volt) or PHANTOM (48 volt) to suit Sennheiser or AKG/Neumann condenser microphones.
- ★ Two electronically Balanced OUTPUTS.
- ★ Rechargeable Battery (Five Hours Capacity).
- ★ Headphone Monitoring of PFL and OUTPUT.

OPTIONS:—
- ★ DIN or XLR Connectors.
- ★ VU or PPM.
- ★ Output Transformers (to give floating line).

ACCESSORY:—
- ★ Charger Unit for Battery.

Size—340 x 265 x 110mm.
Weight—6.2. KGm.

For further details write or 'phone:

AUDIO DEVELOPMENTS
HALL LANE, WALSALL WOOD, WALSALL, W. MIDLANDS, WS9 9AU
Telephone: Brownhills 5351/2/3 (STD Code 05433)

KUDELSKI NAGRA E

The input impedance for the dynamic microphone setting was found to be 3300 ohms, which is completely satisfactory, and the impedance in the capacitor setting 325 ohms, which is on the low side for some microphones. Input clipping in the dynamic setting occurred at 90 mV input, and in the capacitor settings, at 1V and 1.8V depending upon the sensitivity adjustment. It was considered that these margins are adequate, but certainly not excessive.

The high-sensitivity line input that uses the microphone connector was found to have an impedance of 9 kohm with a clipping point of 1.8V, while the main line input had a very high impedance and an effectively infinite clipping point.

The asymmetrical output delivered 940 mV for 320 nWb/m recorded flux at 1 kHz with the zero dB output attenuator setting, while the headphone output delivered 400 mV from a source impedance of 29 ohms.

Finally, on the subject of inputs, the capacitor microphone powering was found to be 10.04V, as opposed to the nominal 12V. This difference is, however, of little significance and is a normal Nagra feature.

Other matters

Investigations into the characteristics of the record/replay level meter showed that it was a genuine peak-reading instrument with an attack time of 2 ms to −3 dB or 5 ms to 0 dB, and a release time of about 600 ms. This is, of course, far more satisfactory than the slow vu instrument and other common devices.

Checking the depth of erasure with Agfa *PER 525* tape showed that the performance was excellent, a 1 kHz tone at 320 nWb/m being erased by more than 85 dB.

The wow and flutter was measured using the brand new Bruel & Kjaer wow and flutter meter in parallel with a Woelke instrument as the old workhorse. The results were really excellent, with the wow and flutter at the beginning, middle and end of a 178 mm diameter reel of long-play tape being less than 0.03% IEC weighted, and the drift being less than 0.01% from end to end of the reel.

Summary

The Nagra *E* has much to offer for radio reporting and similar tasks where a rugged basic machine is required. This machine is not too heavy, and is very simple to operate while still retaining versatile input and output facilities.

As for the performance, the dynamic range with current tapes is really excellent but the record and replay amplifiers could do with some more headroom to be on the safe side in the future. The frequency response is within the manufacturer's claims of ±2 dB up to 15 kHz, which is certainly adequate for most purposes while not being the performance of a studio machine.

Mechanically the machine is beyond reproach, with wow and flutter extremely low and first class tape speed stability. The general standard of construction is of course, first class as with all machines from the Kudelski stable.

Postscript UE 400

In our review of the Klein & Hummel *UE 400* equaliser (November '76 issue, p58) Hugh Ford pointed out that the large peak in the distortion curve at around 70 kHz (fig. 6) could cause problems in the audio range.

K & H suggest that this is due to a resonance in the instrument's input transformer, and can be cured by altering the value of R2 from 24 kohm to 5.6 kohm.

Magnetic Tapes

Following the recent review of recording tapes in STUDIO SOUND (August 1977) it has been pointed out by Mr Ted Trendell of EMI Research Laboratories that the method used to measure modulation noise is similar to the method described by him in the Journal of the AES, December 1969, Volume 17, Number 6.

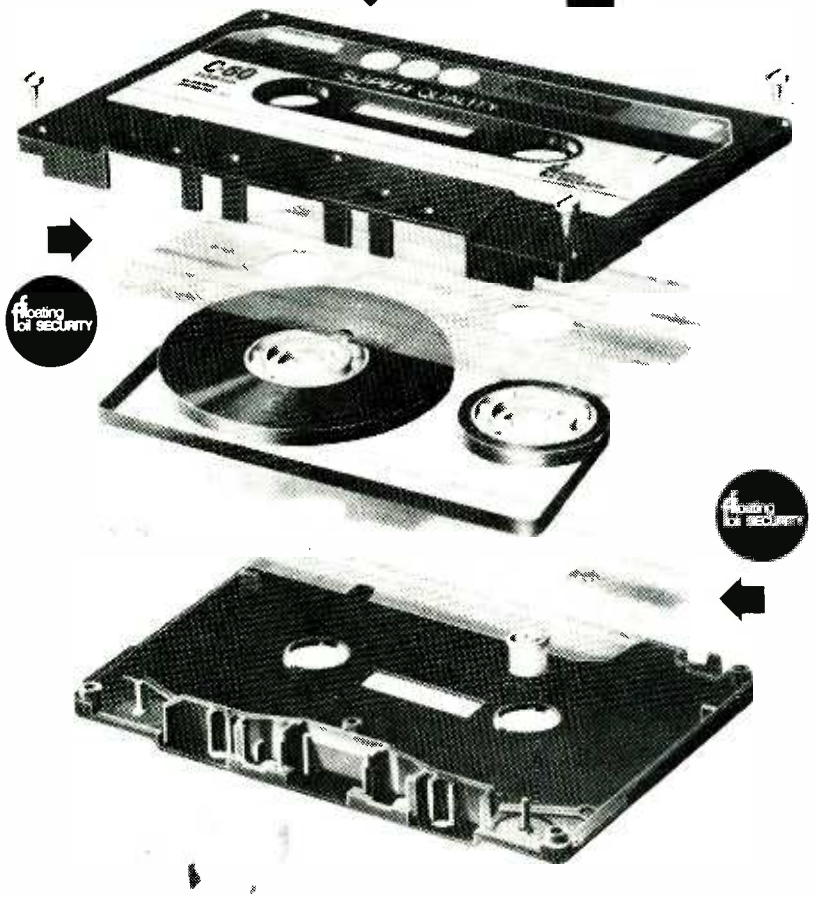
My apologies to Ted for not acknowledging his excellent paper in the tape review, but the method used in the review was devised without specific reference to his paper and certainly no offence was intended.

A similar method for the measurement of modulation noise is currently being considered by the IEC as an international standard.

Hugh Ford

PHILIPS

Before you buy a cassette, explode it.



If you're one of the many people who don't have much time for technical drawings, you may just change your mind next time you have a cassette that jams on you.

Because these two little strips of transparent foil you see in the picture above, are Philip's unique way of making sure it doesn't happen again.

You see, since Philips invented compact cassettes in the sixties, we reckon we know more about them than anyone else. Including their snags, like tape jamming.

That's why we invented the Floating Foil system to keep the movements of the cassette quite steady. The improved regularity of the cassette movement also has the splendid effect of improving the sound quality.

Philips compact cassettes come in three qualities – Standard and Super – C60, C90 and C120 minute playing times and Hi-Fi Chromium Dioxide 60 and 90 minutes.

Philips invented the compact cassette. Now we've improved it.

PHILIPS

Simply years ahead

77

Classified Advertisements

Advertisements for this section must be pre-paid. The rate is **18p** per word, minimum **£3.60.** Box Nos. **45p** extra. Semi-display rates on application. Copy and remittance for advertisements in **OCTOBER 1977** issue must reach these offices by **19th AUGUST 1977** 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.

STUDIO FACILITIES

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

★**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

STUDIO BRZ PRODUCTIONS
Speech Recording to Broadcast Specification
RADIO COMMERCIALS/PROGRAMMES
AUDIO PROMOTIONS FOR TRADE/CONSUMER EVENTS
ALL SPOKEN WORD PRODUCTION CATERED FOR
34 DANBURY STREET, LONDON N1
Telephone: 01-359 9342/7832

★**Sound News Productions.** Britain's oldest full-time tape/disc/cassette transfer service. Direct transfers, pressings for private and for the trade. Fund-raising advisory service for Societies, Choirs, Bands. (Ferrograph, Vortexion, Revox equipment promptly serviced.) 18 Blenheim Road, London W4. Tel. 995 1661. M

WOLLENSAK 2772 STEREO
CASSETTE FAST-COPIER
Now available from SCS, also the mono 2770. We **specialise** in meticulous alignment and maintenance.
SCS Appointed Main Dealers
Telephone enquiries welcome
SOUND CASSETTE SERVICE
PO Box 2, Gerrards Cross, Bucks SL9 8EG
Tel: 02813 84409

★**Your Tapes to Disc,** Mono or Stereo cutting. Vinylite pressings, Sleeves/Labels. Top professional quality. S.A.E. for photo leaflet. Deroy Records. "Eastwood", Cove, Dunbartonshire, Scotland. X

High speed cassette copying and mastering service, mono and stereo.
We specialise in small quantities as well as long runs.
MORARD SOUND PRODUCTIONS
THORNTON HEATH, SURREY
TELEPHONE 01-689 7424

★**Storm Records.** Pressings, Labels, Sleeves. Any quantity, any distance (studio facilities available). 133 Park Road, Blackpool, England. Tel. 0253-23095/27357. L

COUNTY RECORDING SERVICE
From your tapes we cut master discs, demo discs, etc., using our Neumann 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

★**16-track studio available.** £100 per day. Piper Sound Studios, Cheapside, Luton. Tel. Luton 605875, 27195, 26693, 39519. K

FOR SALE—TRADE

★**Disc-cutting styli** for all types of mono and stereo disc-cutting heads. Heater windings fitted, relapping and specials. County Recording Service, London Road, Binfield, Bracknell, Berks. Tel. Bracknell 54935. X

★**Revox, Teac,** Otari. Brenell, Tascam, Nakamichi, Tannoy sales and service. The Music Laboratory. 01-346 4469. X

IMMACULATE M.C.I.
16 track tape recorder, JH16 with auto-locate **£10,000.**
Reason for sale: updating to 24 track.
Phone ROGER MYERS 01-629 6341

★**Cathedral Sound manufacture** a professional standard compressor/limiter module for under £25, mixer modules, and complete mixer channels. Professional discounts available on Revox, N.E.A.L., Sennheiser, also MM mixers. S.A.E. details. Cathedral Sound, Fourways, Morris Lane, Halsall, Lancs L39 8SX. Tel. Halsall (0704) 840328. X

SOWTER TYPE 3678
MULTITAP MICROPHONE TRANSFORMER
Primary windings for 600 ohm, 200 ohm and 60 ohm with Secondary loadings from 2K ohm to 10K ohm. Frequency response plus/minus ½dB 20 Hz to 25 kHz. Contained in well finished Mumetal box. 33mm diameter by 22mm high, with colour coded end leads, low distortion. DELIVERY (small quantities) EX STOCK. HIGHLY COMPETITIVE PRICE. FULL DETAILS ON REQUEST
E. A. SOWTER LTD, Dedham Place, Ipswich, IP4 1JP Telephone 0473 52794

★**Audio + Design** P400/RS (Auto Phase) £235. Two Teletronix LA/3A limiter, £185. Four Keepex, £130. Two Gainbrain, £130. Two TEAC Dolby B (Stereo) AN180, £125. Audix Graphic EQ model 901 (Octave), £115. EMS Synthi A + DK1 Keyboard. All VAT inc. O.N.O's. Tapestry Studio, 01-878 3353. J

Two Spotmaster 370 playback cartridge machines, good condition.
Brentwood (0277) 810531

★**Revox** A77's, A700's available to order. New, boxed, guaranteed at lowest prices. Also spares and service. Chymes of Reading, (0734) 690177. J

★**Audio Developments** superb professional protable mixer type 007. Mint 8 into 8 PPMS. Filters, endless facilities. £1050. Costs £1800. 01 953 6921. J

We've got it taped!
Open reel and mono/stereo cassette duplication at competitive prices small or large runs.
Printing of cassette labels and insert cards presents no problems — ask for a quotation!
Sound Communication (Publishers) Limited, Dewsbury, West Yorkshire. Telephone (0924) 469436

A COMPREHENSIVE RANGE OF PROFESSIONAL TAPEHEADS FROM WOELKE MAGNETBANDTECHNIC, SCHWEITENKIRCHEN, GERMANY.

Quarter inch record and replay heads (illustrated).
Cassette heads—quarter inch heads—half inch to two inch heads, Film heads and Computer heads.
UK distributors,
LENNARD DEVELOPMENTS LIMITED
206 CHASE SIDE, ENFIELD, EN2 0QX
Telephone: (01) 363-8238/9

FOR SALE—TRADE
(Continued)

★**For sale. Audio Developments** Studio 18-4 Mixer with extra features. £3,500 inc. Tel. 04914 3853. K

★**Studio Snips!** 2 x AKG 0202ES mics, immaculate, £45 each. 2 x KMAL studio series boom mic stands, 216 counterweights, 4 legs, rugged, elegant, £25 each. 1 x 6/2 Allen/Heath Minimixer £120. 1 x 5/2 Allen/Heath Monmix £35. Mounted in 19in. console with switchable high/low Z i/ps, £175. Allen/Heath PSU2 for above £15. 120-way ex-BBC 19in. jackfield £55. All plus VAT. Tel. 0273 553867. J

★**Three AKG C451E Mics.** Complete with CK1 capsules. Leads two W3 and one W17 windshields. Plus mains P.S.U. for 4 mics. Complete £220 + VAT. Offers to ATB & A Ltd., 1A Clare Street, Northampton (0604) 31778. J

★**Tannoy Berkeley,** Arden loudspeakers available to order from Chymes of Reading. New, boxed, guaranteed at lowest prices. Berkeleys from £163 including tax. Chassis units also available from £112 including tax. (0734) 690177. J

★**Spools in strong white boxes.** 7in. 18p, 5in. 22p, including P&P and VAT. In boxes of 50. Send order to J. Vincent, 57 Manor Park Crescent, Edgware, Middlesex HA8 7LY. K

★**Separate S/C 2** Spotmaster 370 Playback Cartridge Machines. Good condition. Brentwood (0277) 810531. J

SITUATIONS VACANT

★**Colour Film Services Ltd.** urgently require a Maintenance Engineer for their sound department to undertake the alignment and calibration of audio dubbing and mixing equipment. There may be opportunities to assist with operational work. The appointment will be made within the terms of the ACTT/FSFA agreement, and the starting salary—although depending on experience—will not be less than £3,500 p.a. Apply to: R. J. Venis, Colour Film Services Ltd., 22-25 Portman Close, London W.1. Tel. 01-486 2881. J

HANSA TONSTUDIOS IN BERLIN

the major music recording studios in Germany require:

ONE YOUNG TOP RECORDING ENGINEER

with at least two years music recording experience.

Apply to:

HANSA TONSTUDIOS
Kothenerstr. 38
1000 Berlin 61,
Germany

AUDIO/PULSING ENGINEER
Experienced engineer wanted for sound studio. Studer/Teac/Otari equipment used for multi-track recording and dubbing of music/voice-over/sync. tracks. Starting salary circa £3,400 including some overtime. Apply: **John Heaton, Electrosonic Limited, 815 Woolwich Road, London SE7 8LT.** 01-855 1101.

Thames Television will again be running their **Technical Training Scheme** for young entrants in to the Studio and Engineering Section. This one year course is held at the Teddington Studios and is for **Cameras, Sound** and **Technical Operators** and **Television Engineers.**

Previous successful candidates have been between twenty and twenty-five and have completed a course at a specialist college or have a qualification of HND of Degree Level in Electrical Engineering. Other candidates may be considered who have experience in relevant areas of broadcasting or electrical engineering.

These permanent positions have an initial salary of approximately £2250 p.a., rising at six-monthly intervals to a 2nd year technicians rate after eighteen months.

The course will commence in early October.

Applicants should send full details to: The Training Department, Thames Television, Teddington Lock, Teddington, Middlesex.

THAMES

SITUATIONS VACANT
(Continued)

SOUND RECORDIST

Required by the Overseas Press and Radio Division of the Central Office of Information in London to join a small, busy group of sound engineers servicing both programme and news output. The Division produces programmes and news items for transmission by radio stations overseas and in the United Kingdom. The successful candidate should be versatile and capable of operating all types of studio and location recording equipment. He/she will also be required to edit tapes and to operate circuit transmission equipment to overseas radio stations. The ability to work quickly and accurately under pressure is essential. Some late night and weekend working is involved. This is a short-term appointment which will be for a period of from five to six months. It is graded Assistant Information Officer and salary will be on a scale rising to £3670 p.a. plus Inner London Weighting of £465 p.a. and pay supplements of £313.20 and 5% of gross earnings to a maximum of £208.80. Please send postcard for application form to **Central Office of Information, Room 53, Floor 1, Atlantic House, Holborn Viaduct, London ECIN 2PD,** quoting reference number OPR/CA3/VY. Closing date for completed forms 5th September, 1977.

URGENT

Professional Audio Equipment Manufacturers (London based) requires Top Quality

AUDIO TECHNICIAN

Must be a thoroughly capable Test Engineer looking for further development as there will be considerable involvement in new products.
Please telephone in the first instance Mrs. Michael 01-607 8271.

Allen & Heath, Professional Audio Equipment Manufacturer, is looking for a young

EXPERIENCED WIRING AND ASSEMBLY PERSON

The right applicant will have a keen and enthusiastic approach to electronic assembly and must have the ability to guide and co-ordinate a young team.
Telephone Mrs. Michael 01-607 8271

It helps to mention STUDIO SOUND when replying to ADVERTISEMENTS

Electronic Engineers

Neve are leading designers and manufacturers of professional sound control and distribution systems used throughout the world in television, film broadcasting and recording studios. We have immediate vacancies for Engineers in the following activities for our steady expansion programme.

Audio System Engineers
Several positions are available for engineers with experience in Audio Systems for the recording and broadcasting industry. The work will involve technical liaison and interpretation of customers' requirements, the production of system block diagrams and specifications, preparation of material for quotations etc.

Production Design Engineers
Practical experience of electronic and mechanical design within a manufacturing environment and qualification to HNC or equivalent desirable. Applicants will be mainly responsible for generating production information from system and mechanical layout drawings and providing engineering support to production staff

Design Engineers
Both intermediate and senior positions are available to individuals with linear design experience to work on circuit and system development. A degree or equivalent in electronic engineering will be required together with at least two years industrial experience. An appreciation of a manufacturing environment and the ability to communicate well are essential

Audio Test Engineers
These positions offer interesting and varied work from fault finding at component level to thorough checking of complete systems, with opportunities for involvement in studio installation at home and abroad. Experience in audio testing would be an advantage together with qualifications to ONC/HNC standard. The essential requirement being a willingness to work hard as part of a team.

Section Leader, Technical Publications Section
The applicant will be required to lead the section, but at the same time have capability of both writing Handbooks for our modern electronic equipment involving both analogue and digital techniques, and brochures for sales promotions for our equipment. Cand dates should be qualified to HNC standard or equivalent together with a minimum of 5 years experience of technical or specification writing.

Electrical and Mechanical Draughtsmen/Women
Excellent opportunities exist in our drawing office (Electrical and Mechanical) Candidates should be qualified to HNC standard or equivalent.

Excellent salaries are offered in accordance with the experience and expertise of the applicants. Our Company is situated in a modern plant in rural surroundings. Assistance with relocation can be given where appropriate

Telephone or write to the Personnel Manager

Neve

Neve Electronic Laboratories Ltd.,
Cambridge House, Melbourn,
Royston, Herts SG8 6AU
Telephone Royston (0763) 60776

ASSISTANT DUBBING MIXER

BBC SCOTLAND requires an Assistant Dubbing Mixer in Glasgow to select, prepare and introduce sound effects and music at the time of recording sound track and/or monitor recorded track. Also to assist the Dubbing Mixer in all aspects of dubbing.
Applicants must have the ability to operate grams and tape accurately and quickly; a good knowledge of the principles and practices of film sound techniques; a retentive memory and good visual and aural co-ordination: a positive interest in dubbing and associated film production operations. Experience of grams and tape operation in Radio and/or Television.
Salary: £2,334 p.a. (may be higher if qualifications exceptional) x £111/£126 to £3.246 p.a., plus from £10.86 to £17.38 per month Pay Supplement, plus approx. 8% Shift Allowance.
Write or telephone immediately for application form (enclosing addressed foolscap envelope and quoting reference number 77.G-827SS) to:

Appointments Department, BBC London W1A 1AA
Telephone: 01-580 4468, extension 4825

BBC SCOTLAND

SITUATIONS VACANT
(Continued)

audix

PROJECT ENGINEERS

BROADCAST
and
SOUND INSTALLATIONS

We urgently require additional staff to project engineer contracts involving the manufacture/supply and installation of complex broadcasting and sound reinforcement equipment. Engineers will be expected to take responsibility for most aspects of a contract, to liaise with clients, supervise installations (where necessary) and to ensure delivery times are maintained. A willingness to travel overseas and to work with the minimum of supervision would be an advantage. Some knowledge of radio and television broadcasting techniques and mixing console design is desirable.

Please write or telephone:—

Audix Limited
STATION ROAD, WENDEN,
SAFFRON WALDEN, ESSEX CB11 4LG.
Tel. Saffron Walden (0799) 40888

SITUATIONS—WANTED

★**T.V. Studio Engineer** seeks work on one-off basis as emergency sound/lighting engineer in clubs/theatres in Manchester area. What do you do when your engineer's off sick? Berry, 15 Green Walk, Manchester 16. J

★**Qualified Musician** with experience in music arranging and studio work seeks position as Assistant Recording Engineer. Box 767 c/o STUDIO SOUND (Lancashire). K

★**Enthusiastic young man** (24) seeks position in recording industry, UK or abroad. Willing to start at the bottom, work hard, study and learn recording techniques and procedures. Box 768 c/o STUDIO SOUND. J

FOR SALE—PRIVATE

★**The world's most versatile** Portable Cassette Deck Nakamichi 550 with case, both as new, £245. Tel. 01-723 6921 after 6 p.m. J

★**Ampex MM-1000 8 track.** Heads as new, varispeed and remote control. Full set of service manuals. Very good condition. £4,000 or near offer. Tel. 01-993 2401, ext. 31. K

★**Scully 8-track** 280 series, new heads, £3,500 o.n.o. Tel. 01-806 5258. J

★**Audix MXT200 Mixer** 12/2 or two 6/1! Offers? Also two Audix PA120 amps £150 pair. Tel. 0763 82578 (evenings). J

WANTED

★**Revox's urgently wanted.** The Music Laboratory, 01-346 4469. X

★**12/4 or 10/4 Mixer wanted.** Also AKG Mics. Private buyer (0865) 52424 evenings, or write 28 Millway Close, Wolvercote, Oxford. J

★**Wanted. Revox and Teac** Tape Recorders. Best prices paid. R.E.W. Professional Audio, 01-836 2372. X

★**Tannoy speakers wanted.** The Music Laboratory, 01-346 4469. X

★**Teac 3340 (S) urgently wanted.** The Music Laboratory, 01-346 4469. X

WANTED!

4 each Used EMT 140R Mono or Stereo
11 each Used Neumann U87 Microphones

Must be in excellent condition.

ALSO: Write for Accurate Sound's new Spring '77 Catalog of new and used pro audio equipment.

Accurate Sound Corporation,
114 5th Avenue,
Redwood City, CA 94063 USA.
415-365-2843
Telex: 34-8327

SERVICES

★**R. Beaumont, specialist** audio repairs and Philips VCR service, 21 Southway, Ilkley, West Yorkshire. Tel. 0943 607021. X

★**Tape copying service. Open reel and cassette** available. The Music Laboratory, 01-346 4469. X

IN-CASSETTE DUPLICATORS—STUDIO MANAGERS . . .
CUT CASSETTE COSTS UP TO 25%!
Why pay for tape you don't use? Now you can buy professional quality cassettes precisely wound to any length. Prices start as low as £15.15. And that's not all—most orders are shipped within 24 hours.
Write or phone today for free sample and price list.
P.T.M.A. Ltd. (Dept. S.S.10), 57 Manor Park Crescent, Edgware, Middx. 01-951 0488

REVOX
SERVICE CENTRE
★ Service and overhaul.
★ High speed conversions.
★ Head changes.
★ Self sync.
★ Automatic Double Tracking.
★ Varispeed/varipitch.

the music laboratory
01-349 1975

★**Freelance Audio Engineer.** Anything from headphone splitter boxes to complete studio systems designed and installed. Mixer modifications a speciality. Francis Williams, The Cross, 11 Station Road, Melbourn, Royston, Herts. Royston (0763) 61302. J

★**Revox tape recorder servicing** by RAC Mixers, 19 Freemantle Road, Rugby 0788-810877. L

Professional Entertainment
Sound and Lighting
Hire or Supply Theatre Services
Mobile Recording
Merseyside
Audio Consultants
051-924 8010

SES
The tape machine people.
Rapid repair services with facilities second to none.
REVOX—OTARI—TEAC
NEAL—UHER
Sales and Service.
Ampex tape stocked.
Contact—**Ian Downs.**
01-200 1229 Telex 87515

INDEX TO DISPLAY ADVERTISERS

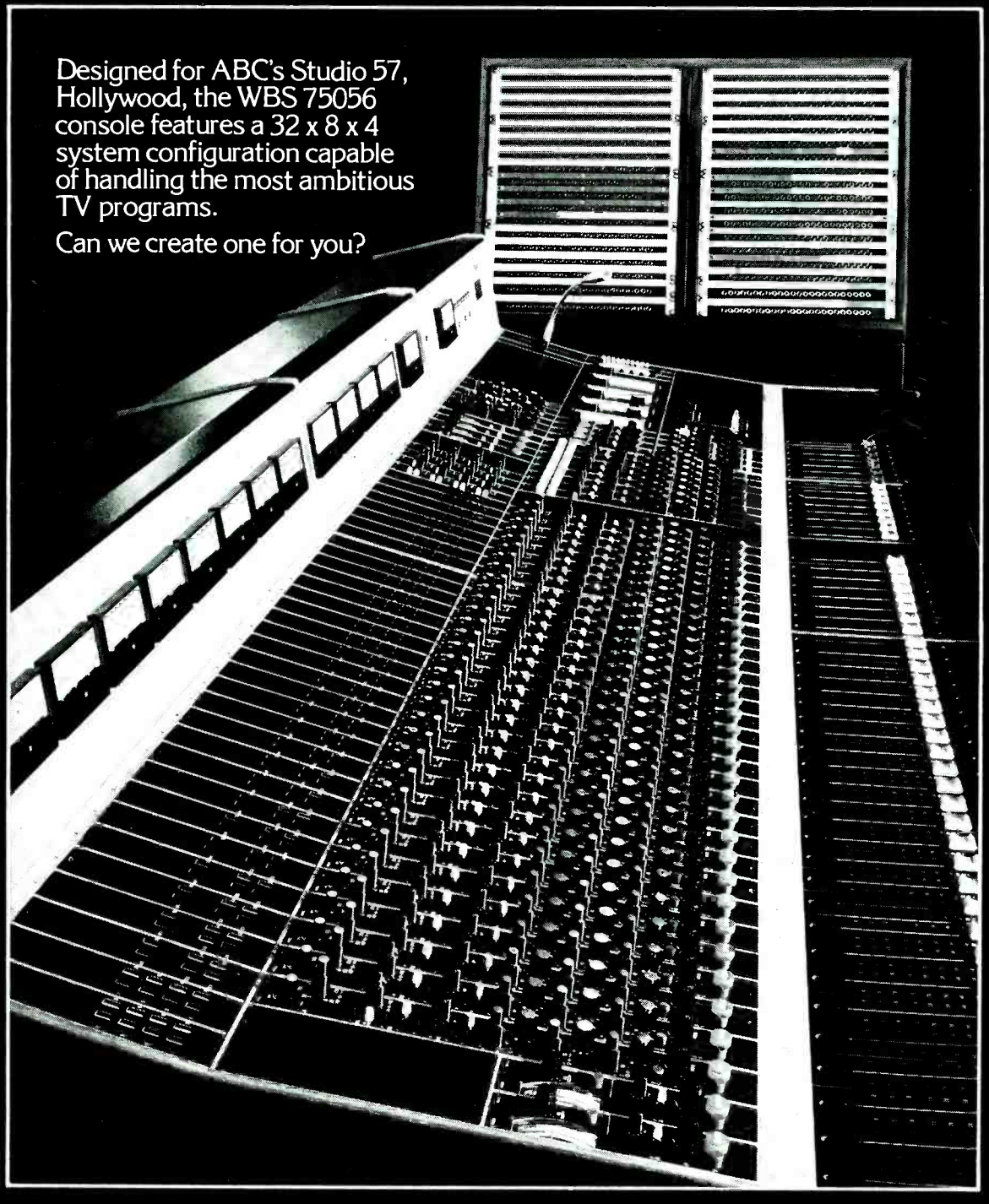
Published by Link House Publications Limited on behalf of the proprietors, Link House Holdings Limited, 10-12 South Crescent, Store Street, London WC1E 7BG and Printed by Arthurs Press Limited, Woodchester, Stroud, Glos. GL5 5PB.


MIDAS PORTABLE CONSOLES, THE RELIABLE LINK BETWEEN YOU AND THE PERFECT MASTER
Available from 2 to 32 tracks with up to 64 inputs, 8 ouxiliary outputs, quadro mix-down and monitoring.
For details of this uniquely versatile system please contact:
MIDAS U.K.
34-38 STANHOPE STREET
EUSTON,
LONDON NW1 3EX.
01-388-7060 01-387 7629
MIDAS EUROPE
LOUIS DE NOTESTR
23, AVENUE D'AVRIL,
1200 BRUSSELLS,
BELGIUM,
322-771-3063
MIDAS U.S.A.
CHARLES AKINS,
SOUND WEST,
5042 RUFFNER STREET,
SAN DIEGO,
CALIFORNIA 92111
714-560-7727
MIDAS CANADA
BOB SNELGROVE,
HERR ELECTRO ACOUSTICS,
363, ADELAIDE ST. EAST,
TORONTO,
ONTARIO M5B 4R9
416-868-0528
20 input 16 track P.R. SYSTEM console.

A new measure of excellence by Ward-Beck.

Designed for ABC's Studio 57, Hollywood, the WBS 75056 console features a 32 x 8 x 4 system configuration capable of handling the most ambitious TV programs.

Can we create one for you?



WBS

Tomorrow's Technology Today.

Ward-Beck Systems Ltd., 841 Progress Avenue, Scarborough, Ontario M1H 2X4, Canada.
Telephone (416) 438-6550. Telex 06-23469.