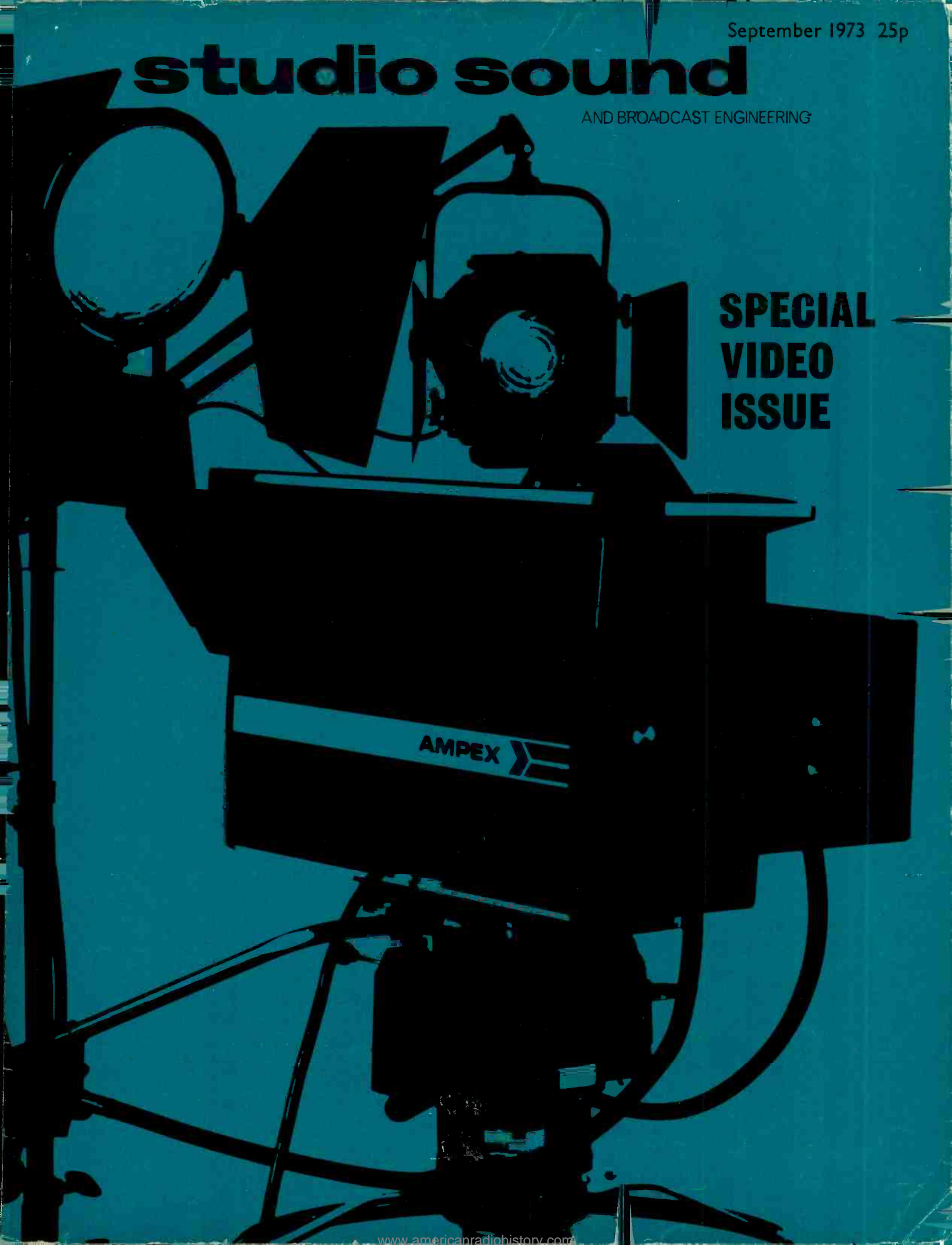


September 1973 25p

studio sound

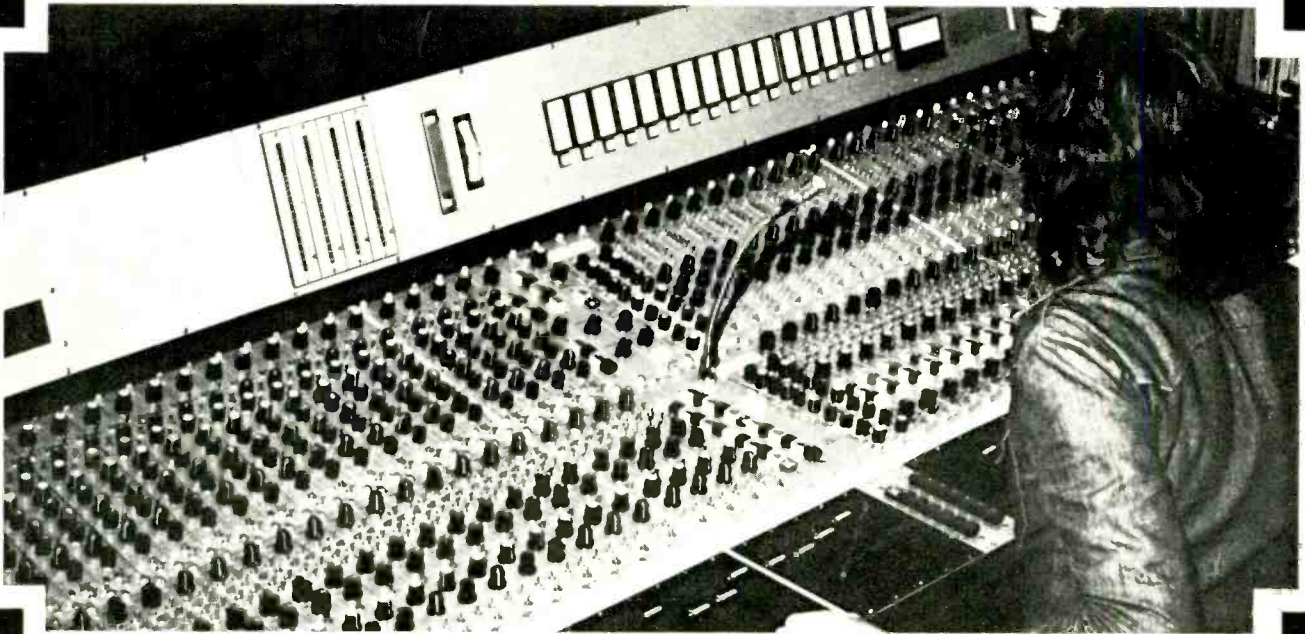
AND BROADCAST ENGINEERING

**SPECIAL
VIDEO
ISSUE**



AMPEX

Creative Consoles = Creative Success



Whatever the recording

Whenever or wherever, a need for sound control console systems, stereo or quadrophonic, to the highest performance specifications in all modes of operation, the first choice of Europeans is Cadac.

Automatic D.C. logic function selection by push-button control of the audio systems, including complete sync facilities eliminating the need for multi-switching in order to change over from normal recording into overdub or re-mix.

Console designed and built for Union Studios, Munich.

Manufacturers of audio control equipment for the sound recording industry.

Cadac (London) Limited
Lea Industrial Estate,
Batford, Harpenden, England

cadac

EDITOR DAVID KIRK
ASSISTANT EDITOR JOHN DWYER
ADVERTISEMENT MANAGER RICHARD WESTBROOK
AMERICAN REPRESENTATIVE STEPHEN H. LAMPEN



Editorial and Advertising Offices: LINK HOUSE, DINGWALL AVENUE, CROYDON CR9 2TA. Telephone: 01-686 2599

American Office: P.O. Box 99569, San Francisco, California, 94109, U.S.A.

©Link House Publications Ltd 1973. All rights reserved.

CONTENTS

FEATURES

VIDEO SECTION By Roderick Snell	
SURVEY: TELEVISION CAMERAS	52
VIDEOTAPE FORMATS AND STANDARDS	56
SURVEY: VIDEO TAPE RECORDERS	62
IKEGAMI 321E AND 321EC TEST REPORTS	68
SONY VO-1600 AND JVC CR600U TEST REPORTS	72
APRS '73 IN RETROSPECT	
By David Kirk	78

COLUMNS

NEWS	34
LETTERS	36
PATENTS	38
DIARY	
By John Dwyer	40
AROUND THE STUDIOS: STUDIO 70 (MÜNICH)	
By Adrian Hope	44
AROUND THE STUDIOS: MANTA SOUND (TORONTO)	
By Steven Vaughan	48

REVIEWS

RICHARDSON 1224 THEATRE SOUND MIXER	
By Hugh Ford	86
ADVENT 201 STEREO CASSETTE RECORDER	
By Angus McKenzie	89

CORRESPONDENCE AND ARTICLES

All STUDIO SOUND correspondence should be sent to the address printed on this page. Technical queries should be concise and must include a stamped addressed envelope. Matters relating to more than one department should occupy separate sheets of paper or delay will occur in replying.

Articles or suggestions for features on all aspects of communications and musical engineering will be received sympathetically. Manuscripts should be typed or clearly handwritten and submitted with rough drawings when appropriate. We are happy to advise potential authors on matters of style.

BINDERS

Loose-leaf binders for annual volumes of STUDIO SOUND are available from Modern Bookbinders, Chadwick Street, Blackburn, Lancashire. Please quote the volume number or date when ordering.

NOT WITHSTANDING our title, video forms the major subject of the September STUDIO SOUND. We offer immediate apologies to those among our readers who are concerned solely with audio but hope they will share our interest in knowing at least in outline what is happening on the opposite side of the fence. Why audio and video have followed rigidly separate paths of development is mystifying but a clear demarcation between the two subjects is maintained even in television broadcasting studios.

There are problems enough in manipulating the 20 kHz of information involved in sound recording. The technical ingenuity necessary to obtain the 6 MHz bandwidth required in recording reasonable quality television remains, even 17 years after the development of quadruplex scanning, fraught with heavy engineering. Quadruplex is gradually giving way to helical scan systems, the latter being cheaper though similarly inelegant. We share Roderick Snell's amazement that helical scan recorders work at all, so great being the difficulties of tracing extremely narrow tracks across an essentially elastic medium. Yet there can be no doubt that helical video recording is a practical proposition, particularly now reasonably stable helical vtrs can be linked to broadcasting systems.

It is unlikely to be long before battery helical vtrs replace cine cameras for mobile news coverage. Educational and industrial film production can similarly be expected to shift to videotape origination, regardless of the medium employed for subsequent distribution. The creative prospects of 'filming' with two or three battery vtrs simultaneously, and later assembling on a real-time electronic-editing basis, are becoming increasingly obvious. Even if videotape systems become no cheaper, they are already so competitive and so versatile when compared with 16 mm film that the future of industrial cinematography may soon draw to a close.

We have great confidence in the future expansion of the helical vtr market though it is hoped not too many years will pass before a less troublesome replacement to the mechanical scanner is developed. Laser technology is evolving rapidly and sooner or later we can expect to see a variation of the now historic electron-beam recording system. This device, long preceding EVR, used a high voltage electron gun to burn directly visible pictures in transparent tape. The difficulty of maintaining a vacuum within the faceless cathode ray tube made the prototype unsuitable for commercial adaptation. A laser-based variation of this idea would solve once and for all the problems of video recording, not to mention those of audio.

SUBSCRIPTIONS

STUDIO SOUND, published monthly, enables engineers and studio management to keep abreast of new technical and commercial developments in electronic communication. The journal is available without charge to all persons actively engaged in the sound recording, broadcasting and cinematographic industries. It is also circulated by paid subscription to manufacturing companies and individuals interested in these industries. Annual subscription rates are £3 (UK) or £3.30 (\$8 or equivalent) overseas.

STUDIO SOUND is published on the 14th of the preceding month unless that date falls on a Sunday, when it appears on the Saturday.

COVER PICTURE

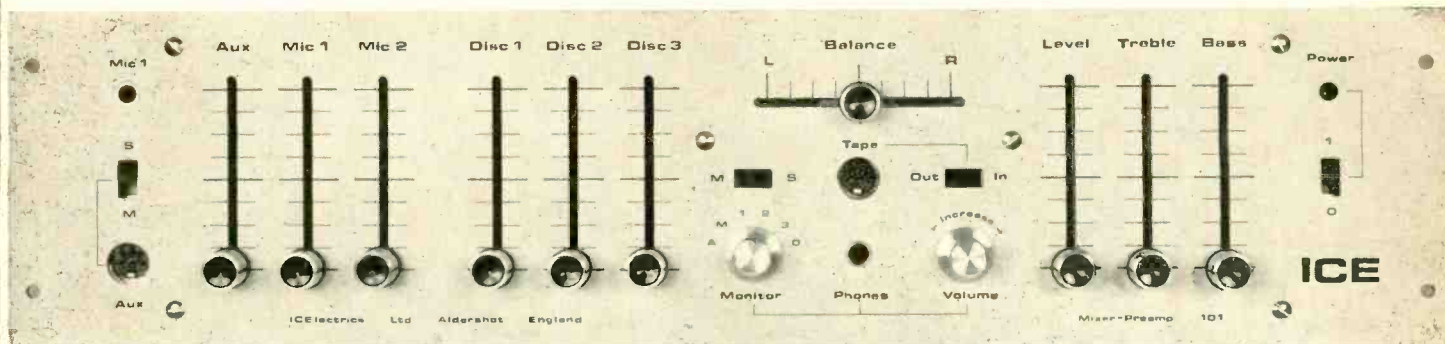
Kodalith based on the Ampex BC-230B broadcast colour television camera. Replacing the BC-230, the camera was first demonstrated in Europe at the recent Montreux Television Exhibition.



Total average net circulation of 7,374 per issue during 1972.

BUILD YOUR OWN TOP QUALITY DISCOTHEQUE!

USING THE ICE MIXERS AND PAU RANGE OF POWER AMPLIFIERS

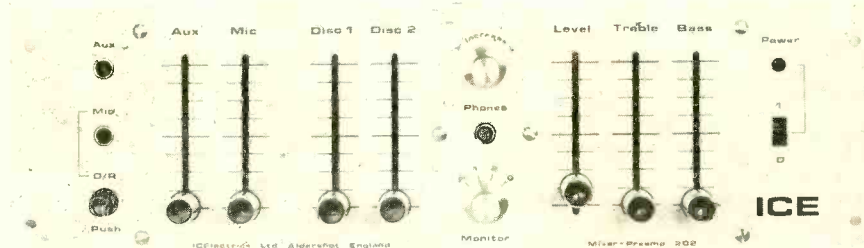


SIX-CHANNEL STEREO DISCOTHEQUE MIXER

Console Kits also available
(2 or 3 decks)

Hear a demonstration at our showroom
or send for details.

ICElectrics Ltd.,
15 Albert Road,
ALDERSHOT (0252-28513)
Hants.



FOUR-CHANNEL MONO DISCOTHEQUE MIXER

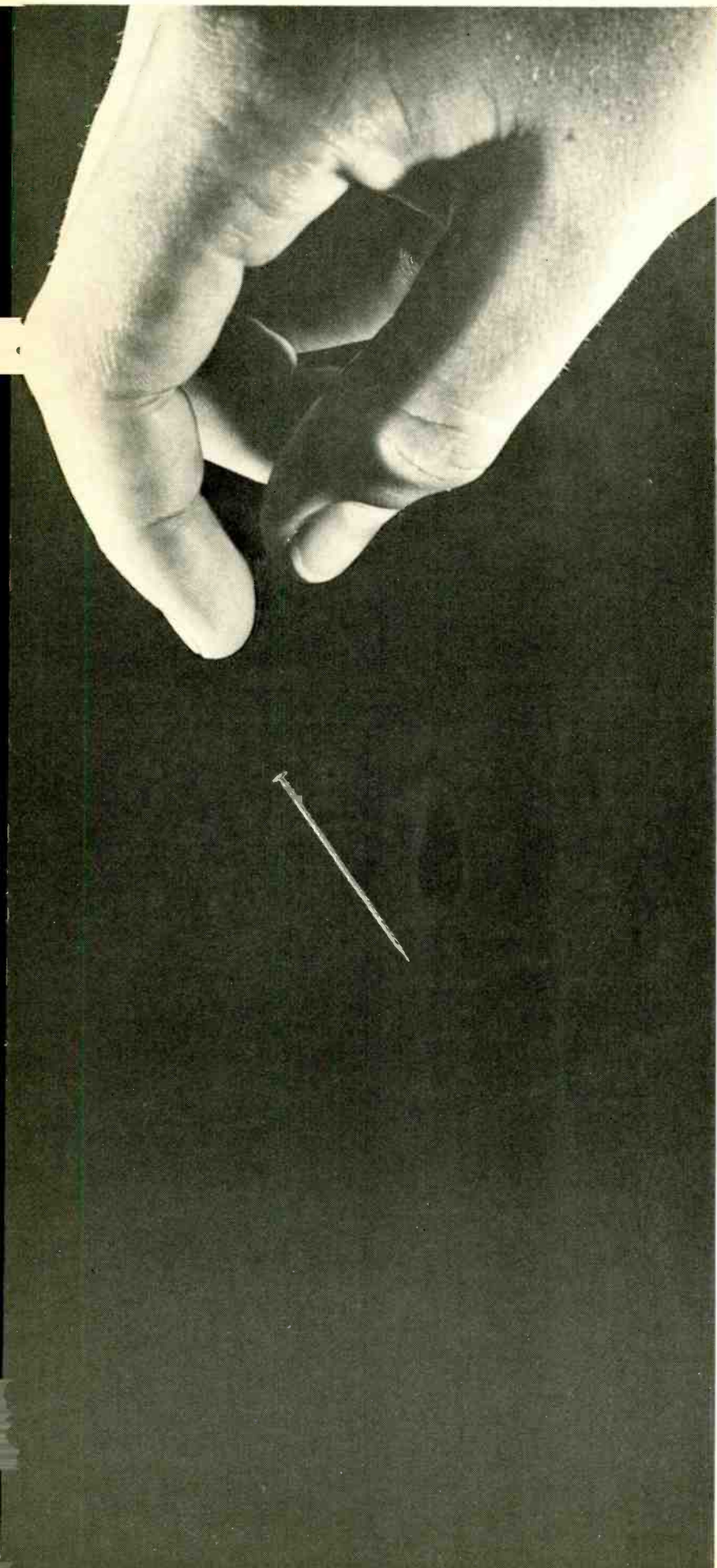
TRADE ENQUIRIES WELCOME

AUDIO CONNECTORS

BROADCAST PATTERN JACKFIELDS, JACKCORDS PLUGS & JACKS, QUICK-DISCONNECT MICROPHONE CONNECTORS. AMPHENOL (TUCHEL) MINIATURE CONNECTORS WITH COUPLING NUT. HIRSCHMANN BANANA PLUGS & TEST PROBES. XLR COMPATIBLE IN-LINE ATTENUATORS. LOW COST SLIDER FADERS BY RUF.

Please note our new address
FUTURE FILM DEVELOPMENTS LTD.
90 Wardour Street W1V 3LE
01-437 1892/3

The dropped pin meets its match.



If someone dropped a pin, a nail or a brick outside a studio insulated with rock wool – inside you wouldn't hear a thing. Just silence. Total silence.

Because rock wool insulates against all unwanted internal and external noise. It's the closest you can possibly get to perfect acoustic correction.

And the reason? Rock wool itself. A combination of rock fibre and air that produces the exceptionally fine acoustic products that form the Rockwool range.

Slabs and rolls you can use to 'float' a false floor above the foundation, line walls for additional insulation, and provide the basic treatment for the ceiling. *Wall panels* too. *Ceiling panels. Tile slabs. Absorber pads.* All from Rockwool. The Sound Proofer.

If you would like to know more about the application of our products, write or phone Dept. SS2, Rockwool Company (UK) Ltd, Arcade Chambers, Eltham High Street, London SE9 1BG Tel: 01-850 7761

Rockwool the sound proofer.

Rockwool Company (UK) Limited.

Budget priced compact cassettes



from 28p

**Low Noise
Guaranteed
Screwed
Not Welded
Library Case**

Prices		1	10	100
POST & PACKAGE	C60	31p	30p	28p
1-10 cassettes 10p	C90	42p	40p	38p
11-100 cassettes 25p	C120	57p	50p	48p

Price per cassette

VAT included

These prices are liable to alteration without notice.



Fraser-Peacock Associates Ltd
94 High St. Wimbledon Village
London SW19 01-947 1743/2233

Registered Office: 94 High St. Wimbledon Village London SW19

PLEASE SEND ME

C60 C90 C120

CHEQUE/PO. FOR

NAME

ADDRESS

VAT No. 216 1151 12
Registration No. 779084 (England)



WHY CHILTON MIXERS?

We are manufacturers in the true sense of the word; producing Teak Cabinets, Sheet Metal Work, Tooling, Front Panel and Printed Circuit Artwork etc., our products are accurate with an attention to detail that is second nature to us.

The popular M10/2 (10in 2out) portable mixer shown is supplied as a basic unit with 10 Line inputs inc PPM, Oscillator, LF/HF Equalisers, Cue Lights, 1 Aux and PFL. You choose the number of Microphone or Gram inputs, the channels to have Presence, Switchable HF/LF Filters or Ducking. In addition a 2nd Aux channel, Talk-Back, and/or Compressors can be fitted.

Ring or write for full information, if however our standard range is unsuitable it may be possible to modify one to suit your requirements.

M10/2 Mk 2 BASIC	£275.00 + VAT
16 input version.....	£415.00 + VAT
12 in 4 out.....	£495.00 + VAT

MAGNETIC TAPES Ltd., Chilton Works,
Garden Rd., Richmond, Surrey, TW9 4NS

Telephone 01-876 7957

LEVEL CONTROL EQUIPMENT

Our equipment is designed to solve problems ...

F760X **LIMITER-COMPRESSOR-EXPANDER**—compression with over-load protection and noise cancellation.

F700X **COMPRESSOR-EXPANDER**—a range of compression slopes to 20:1 with expansion and gate facilities.

E800 **EQUALISER** one of the most versatile on the market: 27 optional switched frequencies in three overlapping ranges giving a broad/sharp bandwidth with 20db boost or cut. HF Shelf boost and High Pass Filter sections.

E900 **SWEEP EQUALISER**—four continuously variable frequency selections with overlapping coverage that gives broad or sharp bandwidth options: 20db Peak or Dip.

E500 **BAND SELECTION UNIT** for use in conjunction with any L-C-E such as our F760X units. It enables any portion of the audio band width to be selected and routed for limiting or expansion etc. In effect its a level sensitive equaliser, or with an expander it can be a programme controlled variable slope filter. You can limit heavily modulated low frequencies at the cutting stage without modulation effects or charges of ambience; sibilants can be eradicated completely; older tapes can be processed to reduce hiss level etc etc. Ideal in any mastering suite.

P400 **AUTOPHASE** programme controlled phasing effect unit.



AUDIO DESIGN RECORDING

St Michaels, Shinfield Rd, Shinfield Green, Reading, Berks.

Tel. Reading (0734) 84487

COMMUNICATION ACCESSORIES & EQUIPMENT LIMITED

77 AKEMAN STREET, TRING, HERTS, U.K.

G.P.O. Type components on short delivery

JACK PLUGS—201, 310, 316, 309, 404

JACK STRIPS—310, 320, 510, 520, 810

JACK SOCKETS—300, 500, 800, B3 and B6 mountings

PATCH PANELS—made to specifications

LAMPS & LAMP STRIPS—SWITCHBOARD No. 2 LAMP CAPS 10 way PO 17 20 way PO 19 BALLAST PO No.11 HOLDER No. 12

CORDS, PATCHING & SWITCHBOARD—made to specifications

TERMINAL BLOCKS DISTRIBUTION—20 way up to 250 way

LOW PASS FILTERS—type 4B and PANELS, TELEGRAPH 71 (15 x 4B)

UNISELECTORS—various types and manufacturers both PO and miniature

LINE TRANSFORMERS/RETARDATION COILS—type 48A, 48H, 149H, 3/16, 3/216, 3/48A, 3/43A, 48J, etc

FUSE & PROTECTOR MOUNTINGS—8064 A/B 4028, H15B, H40 and individual 1/2

COILS—39A, 40A and 40E, etc

PO TYPE KEYS—1000 and PLUNGER TYPES 228, 279, etc

19" RACKS—VARIOUS SIZES

Telephone: Tring 3476/8 STD: 0442-82

Telex: 82362

Answerback: Batelcom UK Tring

**THE TPA 100D IS THE MOST ADVANCED
200W POWER AMPLIFIER MADE IN EUROPE**
Most professional recording and broadcasting
studios in the U.K. use TPA series amplifiers.



CLIENTS USING TPA SERIES AMPLIFIERS INCLUDE:

BBC Radio & T.V. ■ ATV Network Ltd ■ Thames T.V. Ltd ■ I.T.N. Ltd ■ RCA Ltd ■
De Lane Lea Processes Ltd ■ Electricity Research Council ■ Ministry of Technology ■
Cavendish Laboratory ■ British Scientific Instrument Research Centre.

HH ELECTRONIC MILTON CAMBRIDGE TEL 0223 65945

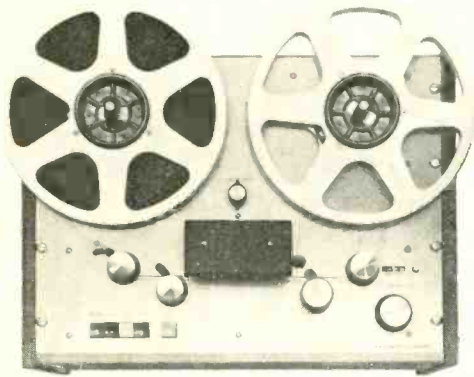
THE WORLDS MOST ADVANCED LATHE SYSTEM.

If the best is barely good enough for you, then look at just part of the outstanding MSR 2000 Disc Cutting System. It is designed to cut stereophonic masters for the most exacting section of the recording industry, we could tell you much more, but why not write for a fully illustrated brochure?



MSR Electronics Ltd.
Meeting House Lane . Balsall Common
Coventry . England
Telephone . Berkswell (0676) 32468

BANK ON BIAS

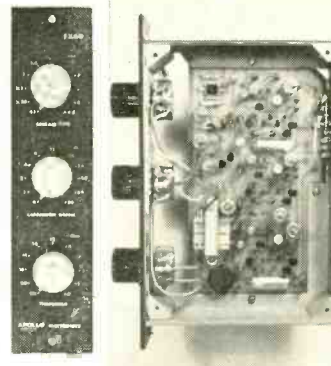


A SOUND INVESTMENT

You will only really know what good value the BE1000 is after you have owned it for a year or two. That will be when other machines that cost almost as much (and in some cases more) have finally collapsed in a heap of wow and flutter and bent tin. But the BE1000 will still be working happily alongside its bigger and more expensive brothers. That's because it's doing the job it's designed to do, it's a no nonsense, no gimmick, hard working professional recorder. Designed and built in London to last and last and last. INVEST in a BE1000 for years of hard work. For mono, stereo and 4 track $\frac{1}{2}$ " machines contact:

BIAS ELECTRONICS LTD. 01-947 3121.
Unit 8 Coombe Trading Estate,
112-120 Coombe Lane,
London, SW20 0BA

PROFESSIONAL AUDIO PLUG-IN UNITS

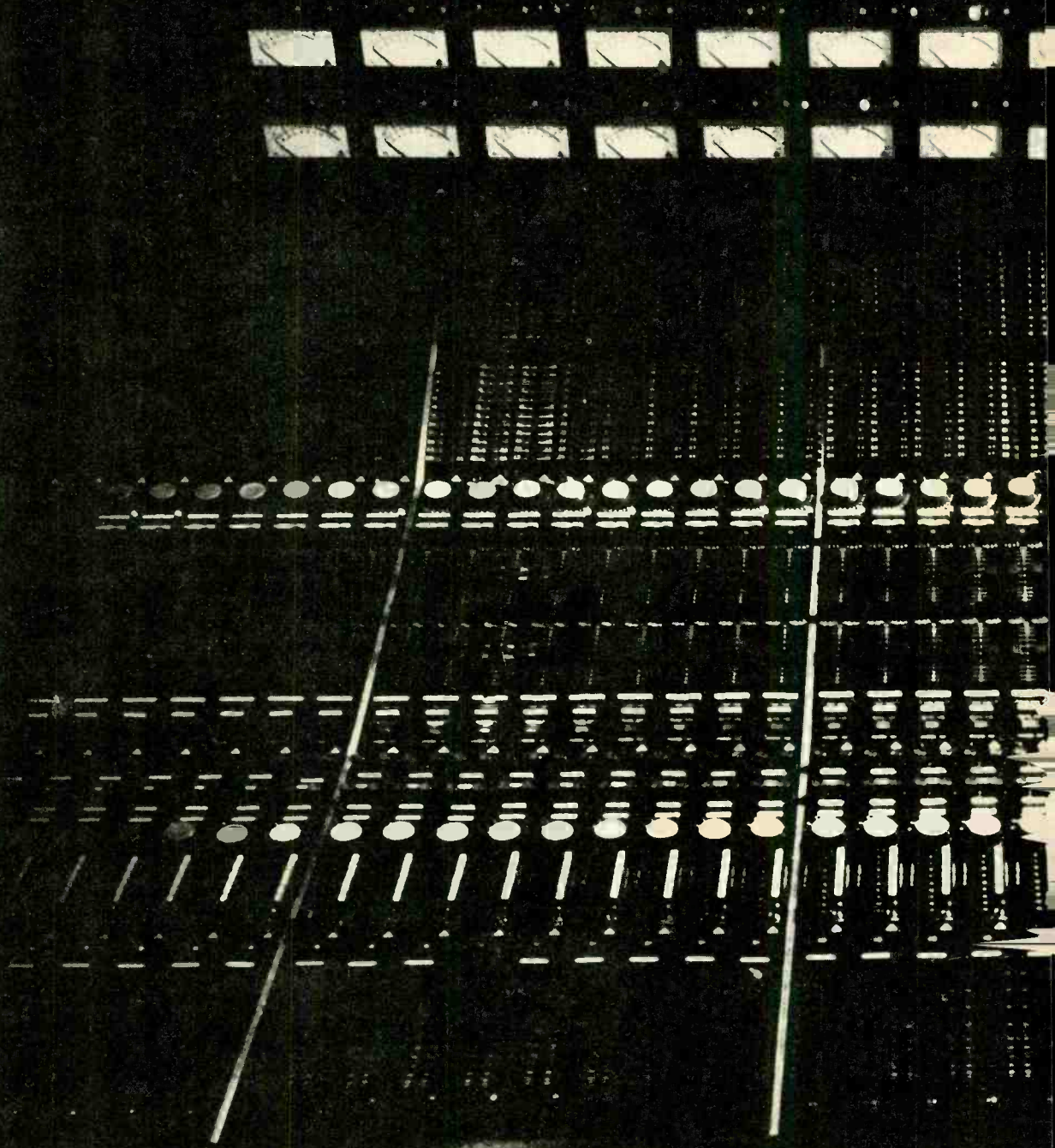


- ★ Superb performance and reliability at moderate cost
- ★ Specially designed, 190 x 45 x 115mm, very rigid and lightweight castings house the electronics most effectively
- ★ McMurdo 16-way red range rear connector for all units except HM80
- ★ Supply voltage required 24VDC negative earth

MA80 input amplifier, Gain 0-80db cont. adj., 4 pos. low cut filter.
PE16 tone equalizer, Treble and Bass ± 16 db 7 Pres. freq. 0 to +16db.
CL36 compressor limiter, Max. compr. 36db, comp. ratio 1:1 to 1:72.
EX60 expander, for 0 to 60db reduction of noise, crosstalk and interf.
LA26 line output amplifier, Gain 0-26db, Zout. 50 ohms balanced.
PA10 monitor amplifier, 10W RMS into 8 ohms load, 32 VAC supply req.
EPF4 mic. amp., Built-in dyn. mic., Gain 90db, press-to-talk switch.
TB90 M112 I2 input to single output summing amplifier, unity overall gain.
MCH7 mixer input channel, for up to 24 channel portable mixers.
MGR5 mixer output group with built-in compr.-limiter, for use with MCH7
MP62 magn. P-U amplifier, 4 equalisations, sensitivity and 2 filter sw.
TH72 NAB-CCIR tape replay amplifier with reference levels.
TRE2 dual speed tape recorder electronics, one complete track.
TRB2 tape bias oscillator, can drive up to 24 TRE2, crystal controlled.
PS24 power stabilizer, input 30VAC, output 24VDC/1A short circ. prot.
SG35 1Hz to 99.9kHz digital audio oscillator, +10 to -80 dbm levels.
SG56 Wien bridge oscill., 5 spot freq., 6 levels -72 to +6dBm.
HM80 the good all round hybrid control module

APOLLO ELECTRONICS
96 MILL LANE, LONDON NW6 1NQ
Telephone: 01-794-8326

More than most



guys can handle.

Despite what anyone might say, sophisticated mixing equipment is really only as good as the man who uses it.

And although the Triad 'A' Series will do all that even the most complex recording programme demands of it, it isn't always enough.

There are top men in every job.
Sound engineers included.

And if you're in that league, this equipment - superbly constructed, ergonomic and flexible - will appeal to your professional sensitivities.

If not, you might as well stick with something else.

After all, why buy an Aston Martin when a bicycle will get you around?



Trident Audio Developments Limited, 4-10 North Road, London N7 9HG. Telephone: 01-609 0087. Telex: 27782.

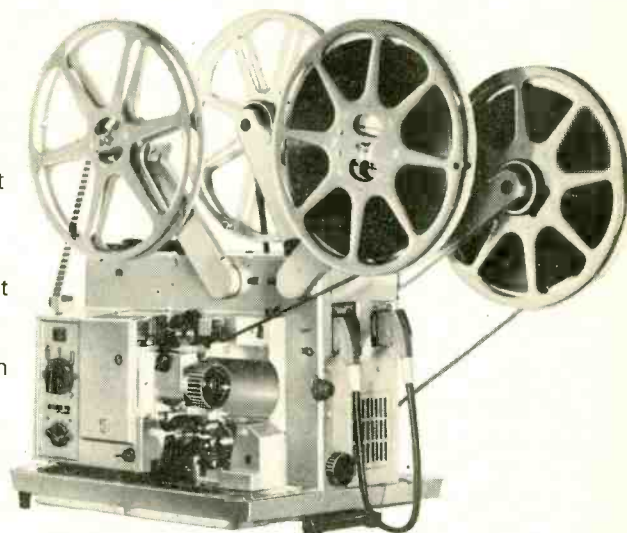
NEW GENERATION BAUER SOUND FILM PROJECTORS

-the final argument for many perfectionists
in favour of 16mm.

Bauer P6 Studio double-system projector

This advanced projector meets the requirements of all producers of advertising and industrial film, TV companies and makers of audio visual programmes. The double band technique ensures perfect synchronism as well as excellent sound quality with a whole range of operating modes for recording, transfer re-recording and dubbing.

The projector and hi-fi magnetic recording deck are mechanically interlocked on one chassis to constitute what is in effect a 25 watt portable sound studio driven by a synchronous motor at 24 and 25 FPS. Facilities offered include optical/magnetic playback and magnetic record on the picture side, magnetic record/playback on edge and centre track on sound side, track mixing and transfer, monitoring, both direct and off film (A/B facility) for 'Sepmag' and 'Commag' recording. Remote operation is also provided for.



Bauer Selecton stationary projector

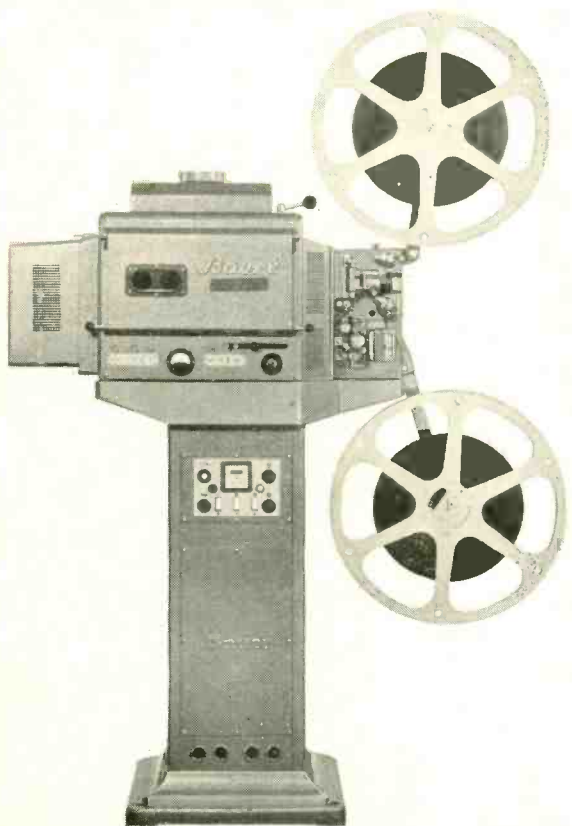
Many years of practical experience and constant improvement of models by Bauer produced the Selecton 110. It's a robust, uncomplicated, heavy-duty projector that will give years of reliable, safe service for film presentations not only in education and industry but increasingly in professional cinemas, preview theatres and exhibition centres. For audiences from 4 to 400 it gives perfect illumination on screens up to 500 sq ft. And really hi-fidelity optical and magnetic sound is produced by the solid-state amplifier.

With conventional reels the Selecton can project a 2½-hour nonstop programme. When the *Bauer endless-loop film carriage* is also used the film need not be rewound and the next performance can begin immediately. What's more, optimised film protection is such that no noticeable deterioration of film can be discerned even after a thousand passages through the system.

Ask us for full information about either projector, and please note our new address.

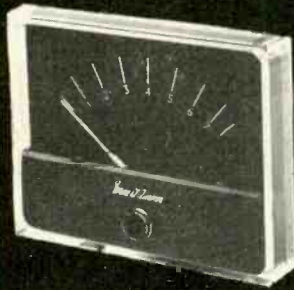
EVERSHED POWER-OPTICS LTD.

Bridge Wharf Bridge Road Chertsey Surrey KT16 8LJ
Tel: Chertsey 61181
Telex: 929945 Lenservo Chrtsy.

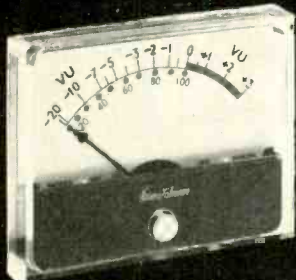


PEAK PROGRAM METERS

to all B.B.C. specifications



AND VU METERS TO THE BELL SPECIFICATION



OVERSEAS AGENCIES

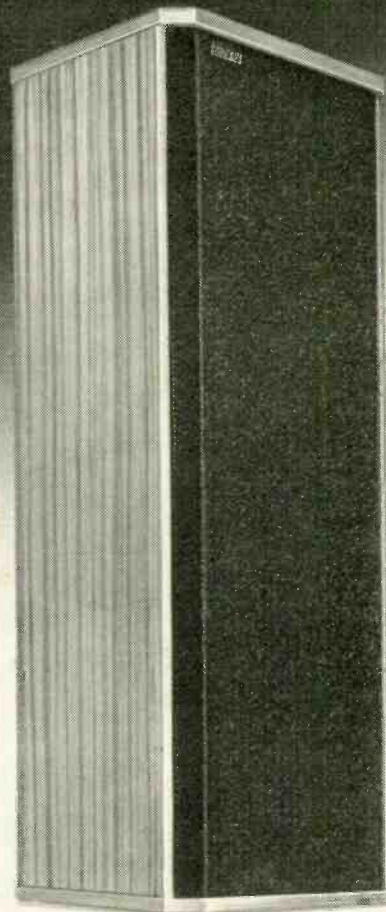
R. Schmidt	Copenhagen	Denmark
OyChester	Helsinki	Finland
Theal N.V.	Amsterdam	Holland
Vianello	Milan	Italy
Rieck	Bergen	Norway
Eltec	Lisbon	Portugal
Nordstrand	Stockholm	Sweden

Ernest Turner
ELECTRICAL INSTRUMENTS LTD

CHILTERN WORKS
HIGH WYCOMBE
BUCKS
ENGLAND

Celestion Loudspeaker Engineering advances the state of the art to a new plateau

Ditton 66 Studio Monitor



- 1.) Celestion's new super tweeter.
- 2.) New design 'pressure' mid-range unit.
- 3.) Ultra Linear 12" Bass drive unit.
- 4.) A.B.R. ensures controlled bass down to 16Hz.
- 5.) Precision crossover for perfect system intergration.

A new Loudspeaker of advanced design suitable for studio use and for home installations of the highest quality.

UNITS: HF 2000 (dome 'pressure' type) MF 500 (Mid-range Dome 'pressure' type) Ultra linear 12" bass driver and 12" ABR. The crossover has resulted from considerable research and crossover points are at 500 Hz and 5000 Hz 80 Watts Maximum, 4-8 ohm. This monitor loudspeaker system has an exceptionally wide and flat frequency response. Very low order harmonic and inter-modulation distortion. Precise response to transients. Beautifully maintained polar response ensures absence of unwanted directional effects and provides a highly satisfactory stereo image throughout the listening area. Matched pairs.

SIZE 40 x 15 x 11 1/2 Natural Teak or Walnut Cabinet

Celestion



Loudspeakers for the Perfectionist

ROLA CELESTION LTD.
DITTON WORKS, FOXHALL ROAD, IPSWICH, SUFFOLK IP3 8JP



Philips make the world's most advanced Hi-Fi stereo tape recorder/amplifier.

The Philips N4450 stands right at the top of that very select class of tape recorders built specifically for the most discriminating non-professional user. No other does so many things so brilliantly.

You don't need to take our word for it. Check the principal features for yourself.

Specification fully according to DIN 45 500 (Hi-Fi) Standard, with signal-to-noise ratio better than 48 dB, distortion less than 1%, wow and flutter $\pm 0.15\%$ at $7\frac{1}{2}$ ips, and frequency response 40-20,000 Hz at $7\frac{1}{2}$ ips (within 6 dB).

Genuine 2 x 20 watt (RMS) Hi-Fi amplifier, which you can use with the recorder's motors switched off. The N4450 can therefore form the heart of a top Hi-Fi system.

10½" reel capacity. Endless tape reel can be used. Selector switch for reel size. Metal hub reel locks.

Six heads for forward and reverse—two recording, two playback, two erase.

Three motors for perfectly smooth, silent drive and minimum wear—one Hall brushless d.c. motor for capstan drive, two d.c. motors to drive the reels.

Tape tension comparators for constant winding torque.

Automatic reverse (continuous reverse is possible after modification). Also manual reverse by pushing a button at any position on the tape.

Automatic stop at end of tape. Four-digit counter with pushbutton zero reset. Four-digit 'Auto-stop' to halt tape at predetermined point, with pushbutton on/off switch.

Solenoid-controlled operation for quietness and reliability.

Illuminated tip-touch controls for transport functions and recording mode.

Optional extra unit gives full remote control of transport functions and recording mode, with the same illuminated tip-touch controls as the recorder.

Cursor-type slide switches for function selection—selected function is illuminated.

Precise sliding see-through controls for recording and playback.

Pushbuttons for rumble, scratch and physiology.

Mini-computer is programmed to 'remember' your instructions—prevents operational errors that might damage the recorder.

Synchronous clock with built-in device for starting and stopping the recorder at any predetermined time within a 24-hour period.

Sockets for record-deck, radio, another recorder, musical instrument, loudspeaker enclosures.

Roller blind at front conceals easily accessible sockets for microphones, tape in/out and headphones.

Four tracks.

Three speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips.

Three-step speed control for fast winding/rewinding.

Levers for cueing during fast wind/rewind.

Splicing device under lower head cover—both head covers easily detachable.

Suitable for horizontal or vertical operation; stereo or mono recording and playback; multiplay; echo during recording; A-B monitoring; mixing; playback and monitoring during recording by means of connected loudspeakers or headphones.

Two calibrated, illuminated VU-type meters for recording and playback level indication.

Recording stand-by (recording level adjustable with tape stationary).

Transparent lid has lower part hinged for easy access to controls.

To build the N4450, we drew on decades of experience in constructing professional recorders for computer installations, airlines and studios all round the world.

The same experience is behind a complete range of Philips Hi-Fi stereo tape recorders and a tape deck/pre-amp.

For a demonstration, see your Philips dealer. And write for a tape recorder booklet to Philips Electrical Limited, Dept SP, Century House, Shaftesbury Avenue, London WC2H 8AS.

Simply years ahead.

PHILIPS

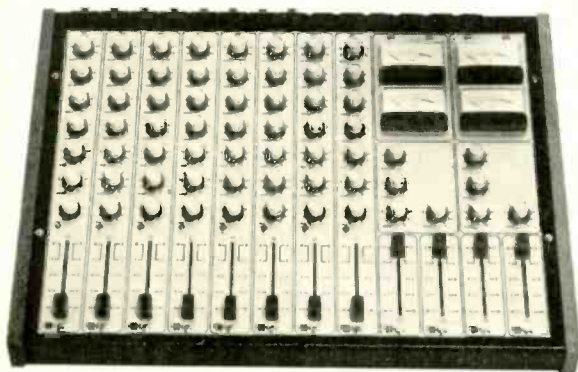
ALLEN & HEATH INTRODUCES

THE FIRST TRULY MODULAR—
MODULAR MIXER



AT AN
ALLEN & HEATH
PRICE!

THE PROFESSIONAL—



THE QUASI 4 OUTPUT MIXER
12 MODULE CAPABILITY IN EITHER 8x4
OR 10x2 FORMAT
XLR OR JACK SOCKET TERMINATION
LOW OR HIGH IMPEDANCE MIC INPUTS
CONTINUOUSLY VARIABLE SENSITIVITY
THREE BAND EQUALIZATION
ECHO AND FOLDBACK OUTPUTS
LINEAR FADER
4 TRACK ROUTING SWITCH AND PAN POT
ON EACH CHANNEL
EQUALIZED ECHO RETURN, MAIN OUTPUT
FADERS AND VU METERS
SIZE 16" x 14½" x 1½" WEIGHT 15 lbs

AT A NON-PROFESSIONAL
PRICE



ALLEN & HEATH LTD.
PEMBROKE HOUSE, CAMPSBOURNE ROAD, HORNSEY, LONDON N8. Tel: 01 340 3291

**If there was one
all-purpose
microphone
that was**

**perfect for
everything,
Gulton would sell it.
But there isn't.**



Gulton's wide range of experience with all aspects of professional recording and broadcasting is reflected in an equally wide range of Electro-Voice microphones. The range - divided into three broad categories - includes a specially designed microphone for every professional requirement.

Model 635A

OMNI DIRECTIONAL SERIES

A really rugged microphone with a steel case. For extra-close work where feedback is no problem. An omnidirectional mike gives minimum pick-up of breath noise at lowest cost. The Model 635A typifies the microphones in this section. Professional quality, hand-held or stand use... for film, recording, broadcasting and public address. Fitted with Switchcraft broadcast type connector.



Response
80-13,000 Hz
Impedance
Low
(250 ohms)
Output -55 db

Model 670

SINGLE-D CARDIOM DYNAMIC SERIES

This series rejects unwanted sounds, thus helping to control feedback - and gives an increase in bass response for extra close work. The Model 670 is lightweight but rugged, and gives an extremely smooth and flat response. Built-in professional type Switchcraft A3M connector. With on/off switch. User replaceable head. Response: 60-14,000 Hz. Output: 58 db. Hi-Z or Lo-Z selectable.



Model RE16

VARIABLE-D CARDIOM DYNAMIC SERIES

This series gives top quality reproduction no matter how close you move to the microphone - and unprecedented control of feedback and unwanted sound. This Model RE 16 is an expensive instrument that's designed for people who require the very best in microphone performance. Response: 80-15,000 Hz. Impedance: Lo-Z. Output: -56 db. 18' 2-conductor shielded broadcast cable with Switchcraft A3F connector.



For full details on the Electro-Voice range and your free copy of 'The Microphone Primer' get in touch with Bruce Buck at Gulton.

Electro-Voice®
DIVISION OF

Gulton Europe Limited
The Hyde, Brighton BN2 4JU
Telephone: 0273 66271 Telex: 87172

NEW equipment for the professional sound-recording studio from *brenell*

DESIGNED AND MADE IN THE U.K.

MULTI-CHANNEL EQUIPMENT

We have set a new price/performance standard with our 4, 8 and 16 channel studio recorders offering full facilities for the production of master recordings. PPM or VU meters on each channel. Equalisation to CCIR, NAB and IEC characteristics. Remote control for tape transport and record functions. The equipment is in full production and studio use in both U.K. and overseas.

STUDIO RECORDERS

for 2-channel reducing, field recording and full-track mastering.

TAPE TRANSPORTS

We offer a widened range of 2 speed and 4 speed models from 15/16 to 60 IPS, $\frac{1}{2}$ " to 1" tape width, with heavy duty solenoid operation and remote control facilities.

brenell

BRENELL ENGINEERING CO LTD

231-5 Liverpool Road, London N1 1LY Tel. 01-607 8271 (5 lines)



PLUGS & LEADS

PLUGS

Pack 107 5 pin Din	22p
Pack 108 3 pin Din	20p
Pack 135 $\frac{1}{2}$ " Jack	27p
Pack 130 $\frac{1}{4}$ " Jack Stereo	50p
Pack 103 Loudspeaker Plug	17p
Pack 100 Phono Plug	7p
Pack 230 3 pin Socket	25p
Pack 236 5 pin Socket	33p
Pack 234 Loudspeaker Socket	33p

READY MADE LEADS

3 pin to 3 pin Din	70p
3 pin to open end	55p
5 pin to 5 pin Din	90p
5 pin to open end	70p
5 pin to 4 phono plugs	100p
Speaker lead Din to spade 12ft.	40p
Extension lead Din plug to socket 12ft.	70p

All leads approx. 6ft. in length

DIAMOND STYLI

(Send S.A.E. for Complete List)
8TA; 9TA; 9TAHC; GP91; ST4; ST9;
EV26, GC8. All at 80p each.
Double Diamond ... £1-25
Diamond suitable for Orbit NM22;
G800; M3D £2.25 each.

CARTRIDGES

Goldring G800	£6-00
Orbit NM22	£4-00
Shure 75/6	£6-00
Sonotone 9TAHC (Dia)	£2-00
Sonotone 8T4A (Dia)	£1-50
Ronnette 105 (Dia)	£1-25

All prices include VAT and postage

J. J. Francis (WOOD GREEN) Ltd
MANWOOD HOUSE, MATCHING GREEN, HARLOW,
ESSEX CM17 0RS Telephone: Matching 476

RECORD CARE

Cecil Watts Dust Bug	£1-20
Parastatic Disc Preener	45p
Antistatic Fluid	20p
Dust Bug Spares (Brush and Roller)	15p

CASSETTE TAPES

Audio-Magnetics C60	
Qty. 3 6 10 20	
Price £1-00 £1-90 £3-20 £6-30	
Cassette Caddy	£1-20
Cassette Head Cleaner	35p

Zonal Ilford Tape

5" Standard 600ft.	25p
5 $\frac{1}{2}$ " Standard 900ft.	50p
7" (Plain boxed) 1200ft.	60p
7" (Westminster Boxed) 1800ft.	£1-25
7" Reel of Leader Tape (Blue or green)	75p

HEADPHONES

Sennheiser HD414	£10-60
AKG K50	£6-50
Beyer DT48S	£35-00

MICROPHONES

AKG D109	£11-50
AKG D202E1	£39-50
AKG D190C	£17-00
AKG D190E	£18-20
AKG D224	£50-00
Sennheiser MD211N	£45-00
Sennheiser MD413N	£27-00
Sennheiser MD421N	£35-00
Audio RMS7F Radio Mike	£210-00

SPEAKERS

E.M.I. 350 Kit 3 ohms	£8-20
E.M.I. 450 Kit ohms	£4-50

STUDIO INSTALLATIONS

T. B. Technical, Audio Systems Consultants, can provide engineers for planning installation, and maintenance of all professional audio equipment.

Also

Audio Test Equipment Hire

T. B. TECHNICAL LTD.
90 Wardour Street, W1V 3LE
01-437 1892/3

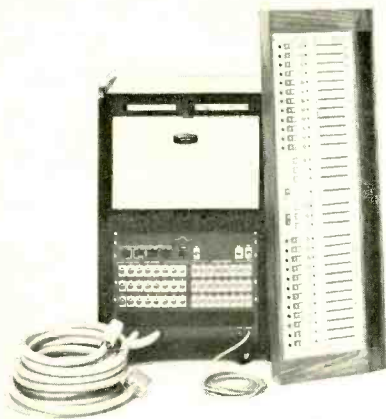
HIGH SPEED COMPACT CASSETTE COPYING SERVICES

- ★ Central London
- ★ Cassette copies in minutes
- ★ 10 to 10,000
- ★ Write today for rate card

MAGNEGRAPH-EUROTTEL

1 Hanway Place, London W1 (Junct Oxford St/
Tott Ct Rd) Telephone 01-580 2156

COMPUMIXING™



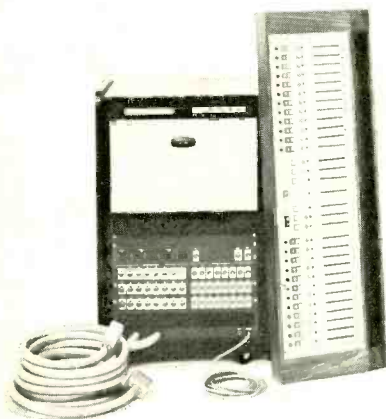
Advision Sound Studios
London



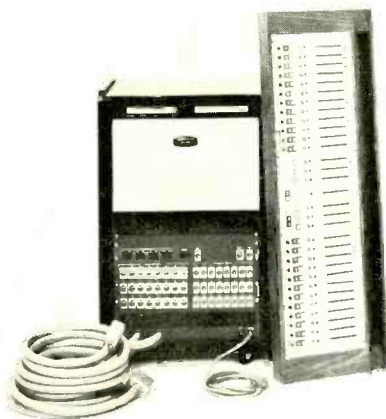
A & M Records
Hollywood



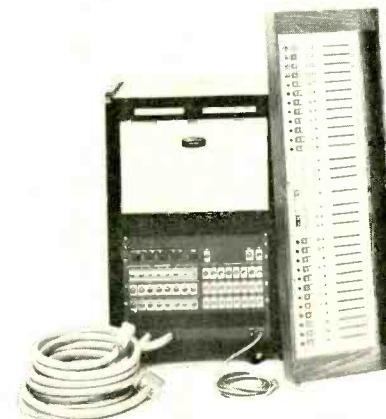
Jack Clement Recording
Nashville



Mowest Recording
Hollywood



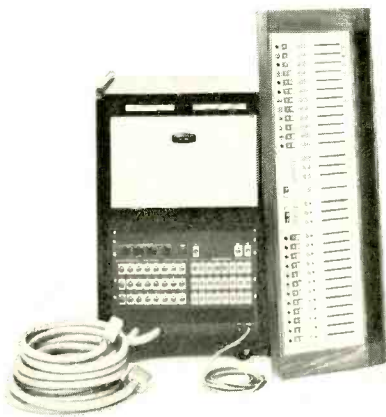
Neil Young Studios
Redwood City



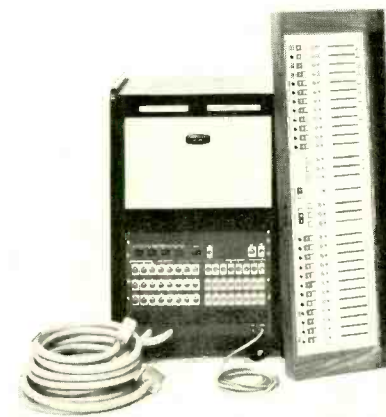
The Ken Nordine Group
Chicago



King Records
Tokyo



Sound Labs
Hollywood



The Burbank Studios
Burbank

quad/eight electronics

Feldon Audio Ltd London
U.K. Distributor 126 Great Portland Street 01-580 4314

Be Ready for Holidays & Europe!

On EMI cassettes & reels direct from manufacturer learn

FRENCH SPANISH GERMAN ITALIAN

... its so simple, just slip cassette into machine, or reel onto recorder. Each pre-recorded language course comes complete with manual. Ideal for beginners or as a brush up course!

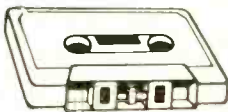
Why pay **£5** per course!
 ONE COMPLETE COURSE OF 24-26 LESSONS **£1.49**
 ALL FOUR LANGUAGES **£5.50** p & p 20p per order

GIGANTIC OFFER Most at less than **HALF PRICE**
MANUFACTURED UNDER CONTRACT BY EMI
LOW NOISE 5 SCREW TYPE CASSETTES

with index cards at less than half list branded prices all in plastic presentation cases.

C60 32p, 10 for £3; C90 45p, 10 for £4.20

HEAD CLEANERS 30p; C120 58p, 10 for £5.50; EMPTY PLASTIC CASES 10p. P/P 20p



CHEAPER GRADES OF CASSETTES BY AUDIO CERTRON & OTHERS

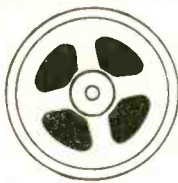
5 SCREW TYPE INDEX CARDS AND CASES.

C60 25p, 10 for £2.35; C90 35p, 10 for £3.25; C120 45p, 10 for £4.25. P/P 20p.

INDEX CARDS 3p PER DOZEN

RECORDING TAPES

SUPERB QUALITY WITH LEADERS & BOXED · POLY-ESTER · PVC · & MYLAR BASED. MANUFACTURED BY LEADING ELECTRONICS FIRMS



Why not try one and cut your recording costs?

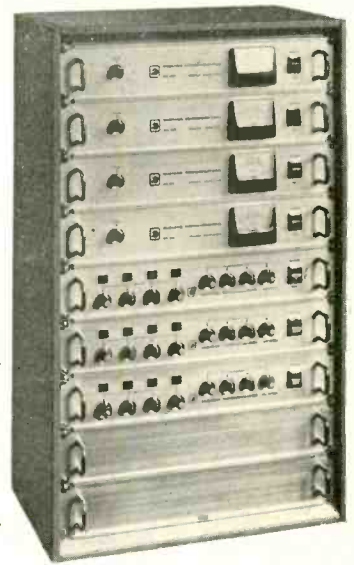
	Standard Play		Long Play		Double Play	
5"	600'	35p	900'	42p	1200'	60p
5½"	900'	40p	1200'	55p	1800'	80p
7"	1200'	48p	1800'	70p	1200'	98p

EMPTY SPOOLS 5" 10p, 5½" 11p, 7" 12p. P/P 20p

WALKERS (S) 16 Woodthorpe Road, Ashford, Mdx. 52136

A BRAND NEW RANGE OF EQUIPMENT FOR THE PROFESSIONALS!

It includes high reliability low distortion power amplifiers for studio or public address work, and some very interesting professional lighting control units, audio transformers, and rack equipment cabinets. They're all described in detail in our smart new catalogue which is yours for the asking.



MUSTANG COMMUNICATIONS
NELSON STREET
SCARBOROUGH
 Yorkshire
 YO12 7SZ
 Telephone (0723) 63298

0.002% THD 100 watt per channel power amplifier

0.002% THD at all levels up to 10 watts and all audio frequencies. Less than 0.02% THD at all frequencies and all levels up to 50 watts, typically 0.004% at 1kHz and 50 watts. Intermodulation distortion is less than 0.03%.

The amplifier is unconditionally stable and does not ring even into a 2µF capacitor.

The two channels are power limited at 120 watts rms and a tracking short-circuit cut-off protects each of the four power supplies. There is also a thermal cut-out.

Both channels will deliver continuously more than 100 watts into a 4 ohm load or 70 watts into an 8 ohm load.

The frequency response is within 1dB from 10Hz to 20kHz and the noise is more than 100dB below 70 watts into an 8 ohm load.

The case size is 430mm x 300mm x 76mm.

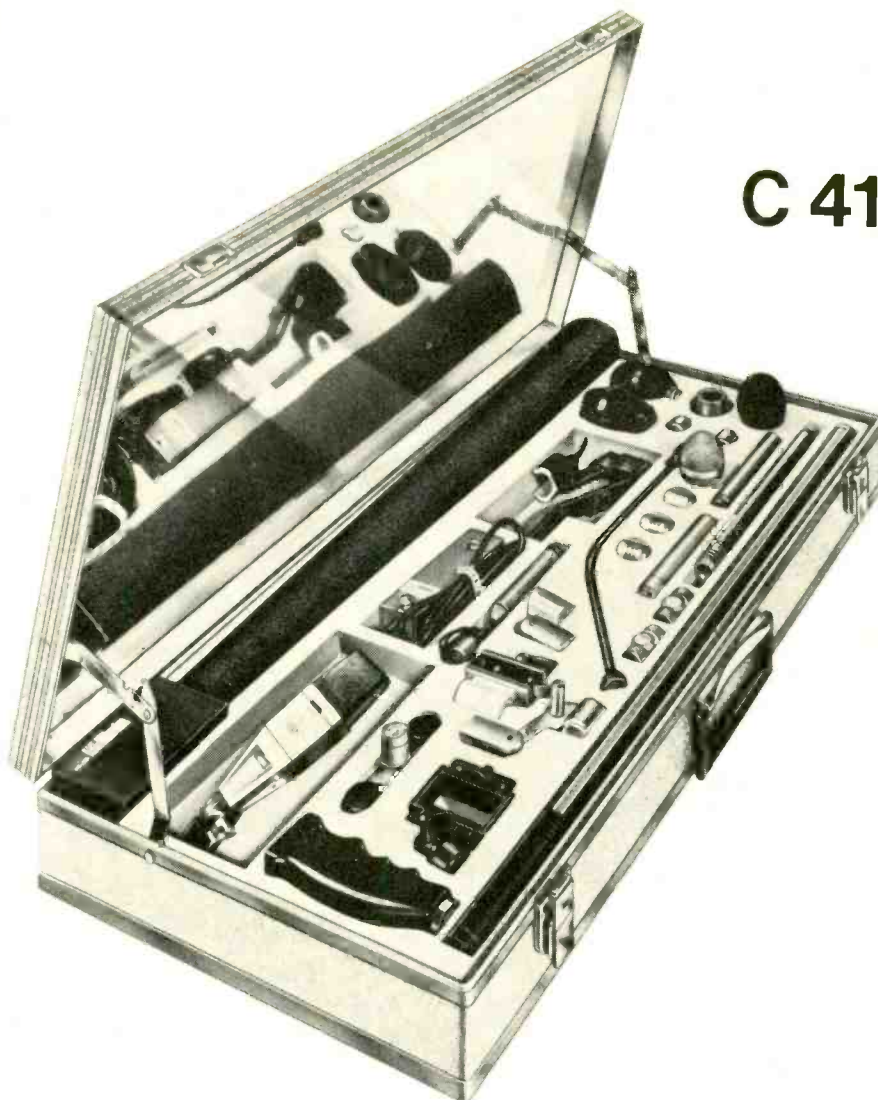


naim audio

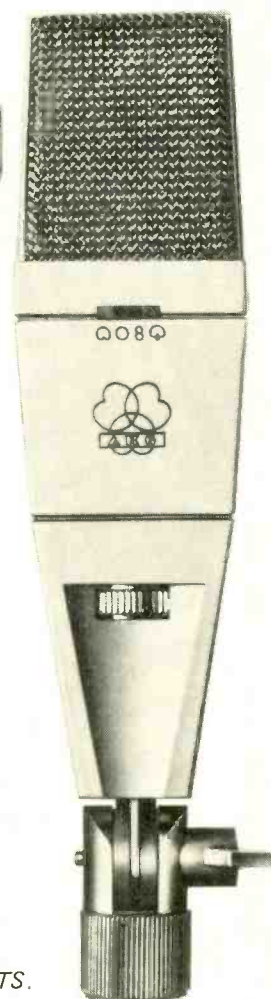
The price of the NAP200 Amplifier is £140 + VAT.

15 CHURCHFIELDS RD · SALISBURY · WILTS · SP2 7NH · Tel: 3746

Whats new in our box of goodies?



C 414



Twenty Years ago AKG introduced the C12. Today, the C414 FET variable pattern condenser microphone is the new addition to the C M S range. Also in the C M S range is the C451 with interchangeable capsules, evolved from the famous C28 series. The latest pre-amplifier available in this Modular System is the C451EB with bass cut facilities. *THESE ARE ORIGINAL AKG DEVELOPMENTS.*

For full details write to:
AKG EQUIPMENT LTD.,
Eardley House,
182/4 Campden Hill Road,
Kensington, London W8 7AS

Name _____
Address _____
SSCMS _____

BEYER DYNAMIC

MEET THE NEW FAMILY...



M.201.



M.111.



M.101.

this doesn't mean we've got rid of the old one.

The latest mikes to join the Beyer Dynamic range are the . . . **101.111.201**, products of high quality to satisfy those who demand 'living' sound from their mikes.

Send coupon for details :

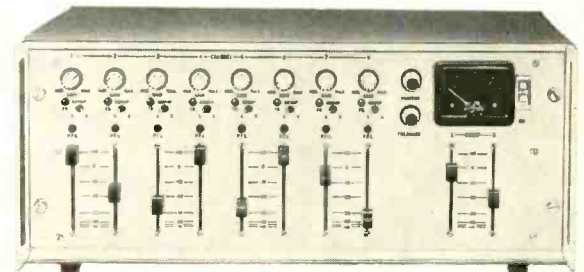
To: Beyer Dynamic (GB) Ltd., 1 Clair Road,
 Haywards Heath, Sussex.
 Telephone Haywards Heath 51003.
 Please send me full particulars and illustrated brochure of the Beyer Dynamic range.
 Name.....
 Address.....

richardson

— we present two standard mixers from our range of professional products.
 — these units make use of our previously advertised plug-in modules together with our universal mother board.

8 x 2 transportable mixer

8 microphone/line inputs each with sensitivity of -90dB to +15dB, pre-set gain control, slide faders, foldback on/off, A or B group selection, pre-fade. 2 floating main outputs, or combined output with separate master faders. Single p.p.m. monitoring. Power supply, external 50 volt d.c.



5 x 2 discotheque mixer

Stereo inputs: 2 gram, 2 tape, 1 mono microphone. All inputs have pre-fade facility, and slide faders. There is overall bass and treble control, and stereo master fade. Other outputs are stereo slave, mono sound to light, and phones. Monitoring is by two Vu meters.

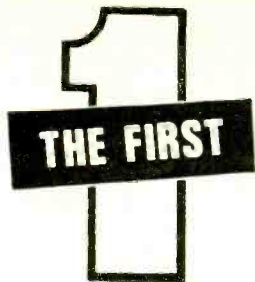
— in addition we can supply equipment built to customers' specifications using our standard range of modules.



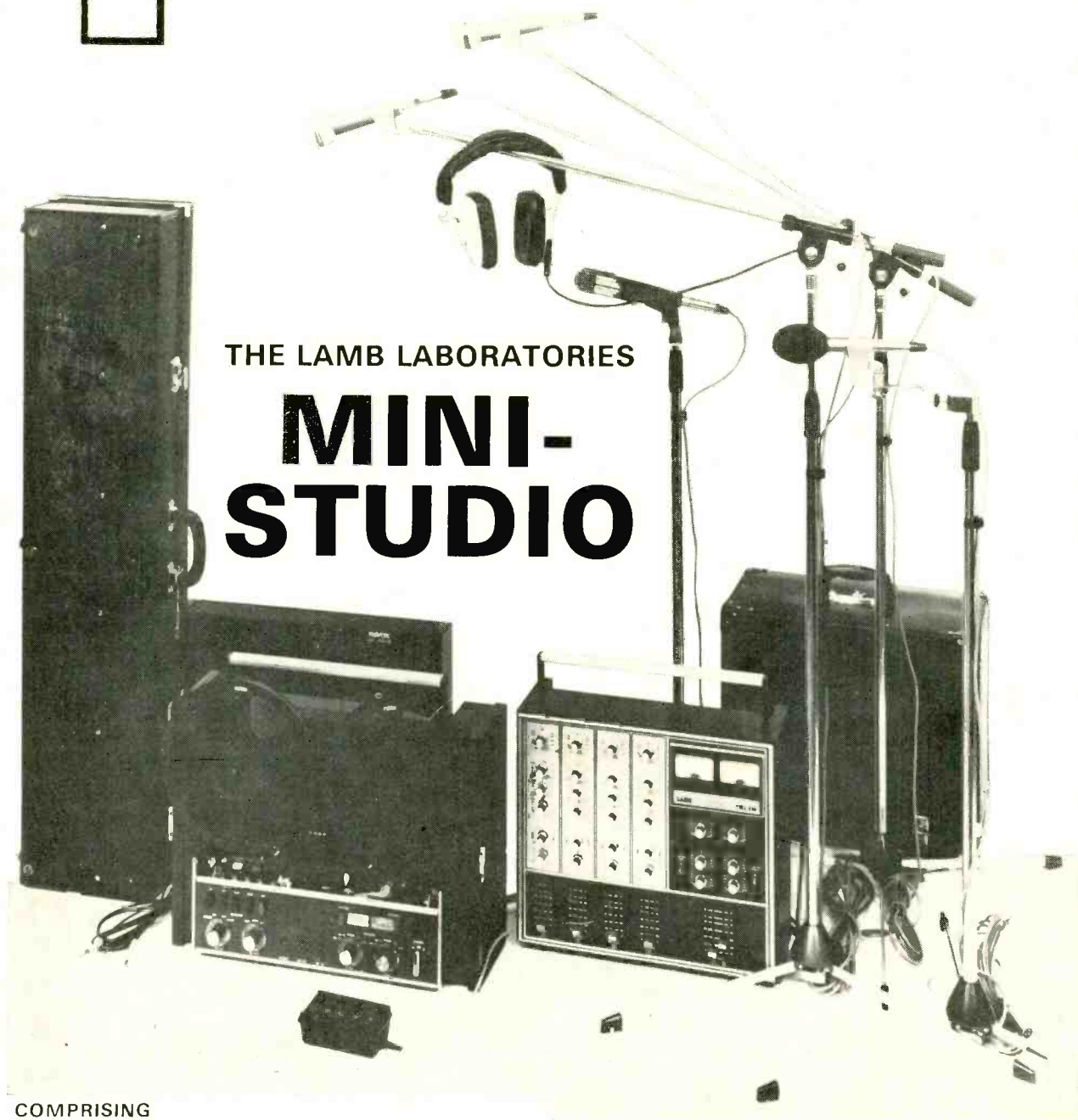
J. RICHARDSON ELECTRONICS LIMITED

57 JAMESTOWN ROAD, LONDON N.W.1

01-267 0723/4874



COMPLETELY PORTABLE STUDIO RECORDING KIT



THE LAMB LABORATORIES

MINI- STUDIO

COMPRISING

A REVOX A77 high speed tape recorder with Sel Sync variable pitch and illuminated remote control unit

PLUS

THE LAMB 4 channel stereo mixer with in-built compressors – full channel equalisation – Pan Pots and Echo Send controls

NOTE: As the power supply provided is capable of running three of our mixers – the MINI STUDIO can be expanded to 12 inputs

The mini-studio kit is completed by 4 BEYER microphones and 4 stands (2 with booms) – BEYER DT100 headphones – power supply – carrying cases – and all interconnecting leads

and all you have to supply is the mains plug!

LAMB LABORATORIES

Lamb House, Church Street, Chiswick, London W4 2PB
Telephone 01-995 4551, Telex 934047, Cables Lambex London

RAINDIRK

for SUPERB MIXERS – MONO TO 24 TRACK

contact **RON PENDER** or **CYRIL JONES** for details
RAINDIRK LTD

33A Bridge Street, Downham Market, Norfolk. (03663) 2165

● If you want to be in the know

about Europe's most advanced **ENTERTAINMENT SOUND SYSTEMS**

then place a tick in appropriate box, complete coupon and send to SNS Electronics Group, 851 Ringwood Road, Northbourne, Bournemouth BH11 8LN. We'll send you some interesting details by return. *I am interested in:*

- | | |
|---|---|
| <input type="checkbox"/> Discotheque Systems | <input type="checkbox"/> Heavy Duty Speakers |
| <input type="checkbox"/> Vocal Mixer Amplifiers | <input type="checkbox"/> Distinctive range of specialist Loudspeakers |
| <input type="checkbox"/> Instrument Amplifiers | <input type="checkbox"/> Radio Microphone Systems |
| <input type="checkbox"/> Other..... | |


Name _____


Address _____

SS1

Please cut it out







NAGRA IV-s

NAGRA III's ALWAYS WANTED FOR CASH

NAGRA SN MODEL AVAILABLE

50 Hz CRYSTAL £59.75 + 10% VAT PULSE GENERATOR

PANAMIC BOOM
A must for sound recordists

Detachable end mount for $\frac{1}{8}$ " and $\frac{3}{8}$ " thread. Anodised alloy tubes for maximum strength and minimum whip. Black finish for non-reflection. Velvetex non-slip grip. Length closed 5ft., extended 13ft. 4in. Weight 2lb. 4oz. **£65.00 + 10% VAT.**

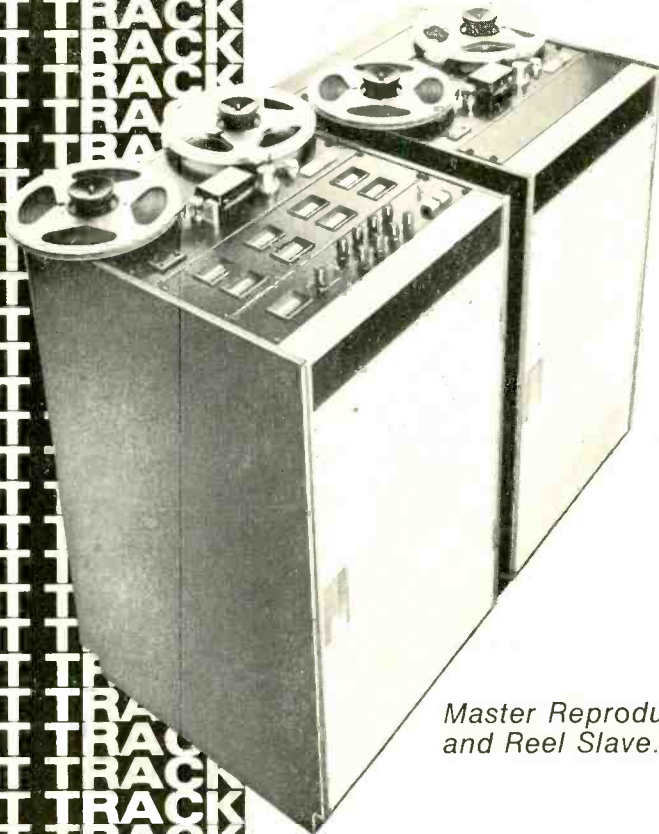
Sole distributors:

J. J. FRANCIS (WOOD GREEN) LTD
MANWOOD HOUSE, MATCHING GREEN,
HARLOW, ESSEX CM17 0RS Telephone: Matching 476

The duplicator that runs ahead of competition...

This one stands alone.

PRO-Series 2800 high speed EIGHT-TRACK
tape duplicating systems by Pentagon.



*Master Reproducer
and Reel Slave.*

The only professional 8-track duplicating systems built in America at a surprisingly modest price. The only one.

Here is a duplicator system unique unto itself. It has a superb combination of features.

- Broadcast quality of duplicates
- Completely solid state
- Virtually maintenance free
- Full control facilities
- Excellent frequency response
- Fully automated operation for reel to reel duplication
- Modular plug-in solid state electronics

And what flexibility. Reel to open reel; Reel to direct cartridge hub (eliminates loading procedure); choice of 1/4 inch or 1 inch reel masters; automatic rewind and restart of your reel master, just to name a few.

Recognized as the leader in the manufacture of professional high speed in-cassette and open reel tape duplicators, Pentagon's entry into the 8-track duplicating equipment field fulfills a long awaited need for a truly versatile and professional system.

Write or call Pentagon direct for full information on the PRO-Series 2800 line of 8-track duplicating systems.

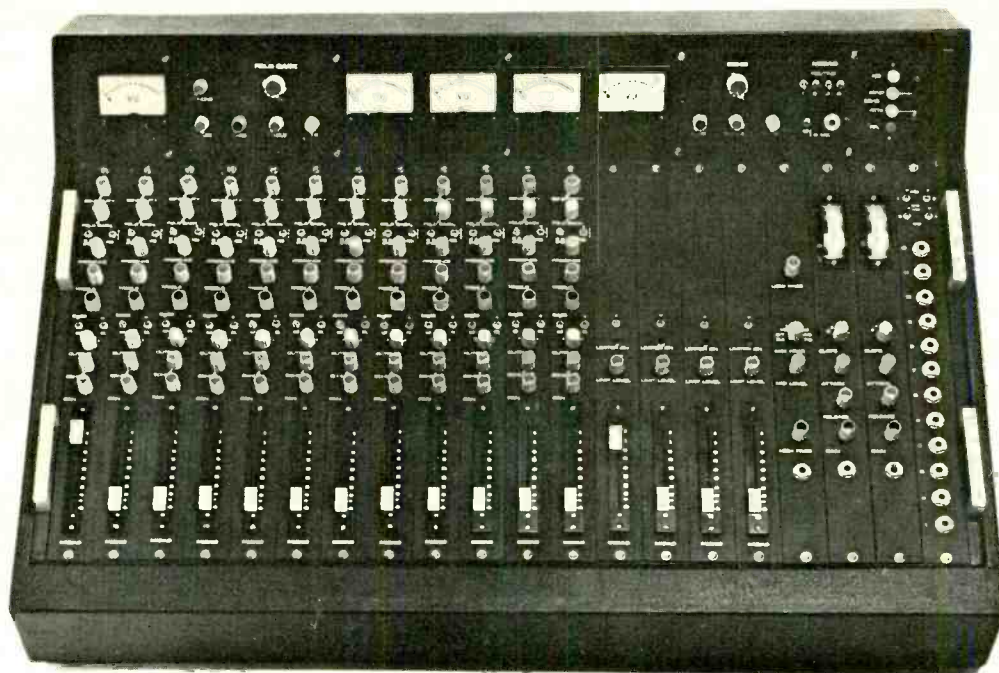
You'll be glad you did.

Pentagon
Industries, Inc.

4751 N. Olcott Ave.
Chicago, Illinois 60656
(312) 867-9200

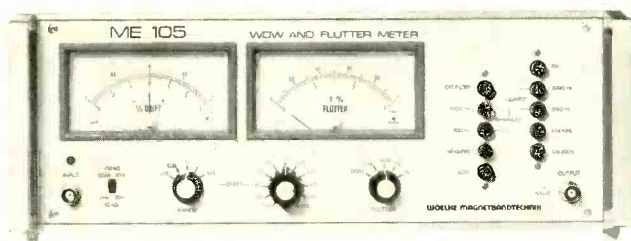
Creators of quality in cassette duplicators

midas modular mixer system



87 NORTH GROVE LONDON N15 5QS tel. 01-800-6341

WOW and FLUTTER METERS



Illustrated is the ME 105, the very latest type of Wow and Flutter Meters manufactured by Woelke Magnetbandtechnik, Munich, Germany, and distributed exclusively by us in the U.K. Anyone concerned with the most accurate measurement of drift (down to plus/minus 0.1%) and wow and flutter (down to plus/minus 0.03%) will be interested in the ME 105. Fuller, final details on application.

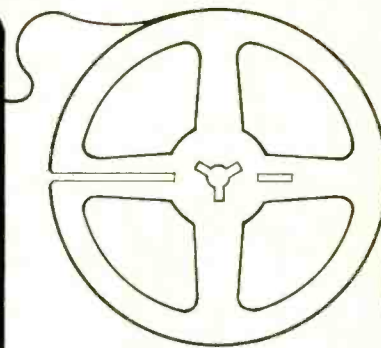
LENNARD DEVELOPMENTS LTD.

206 CHASE SIDE, ENFIELD, EN2 0QX
MIDDX.

Tel. 01-363 8238

HIGH-SPEED TAPE & CASSETTE COPYING

large and
small runs



Fraser-Peacock
Associates Limited
94 High Street Wimbledon Village
London SW19 01-947 2233

WE SPECIALISE IN BRAND NEW

TOP QUALITY BRITISH P.V.C. MYLAR & POLYESTER RECORDING TAPES WITH FITTED LEADERS, Etc., EX 3"

Thanks to bulk purchase we can offer tensilised HI-FI tapes, manufactured by a British firm of world repute. All boxed individually (sealed if required) in polythene. Our tapes are not to be confused with imported sub-standard or used tapes. Full money refund if not delighted.

This month:- "DRY SPLICE" (19p) given FREE with every order.

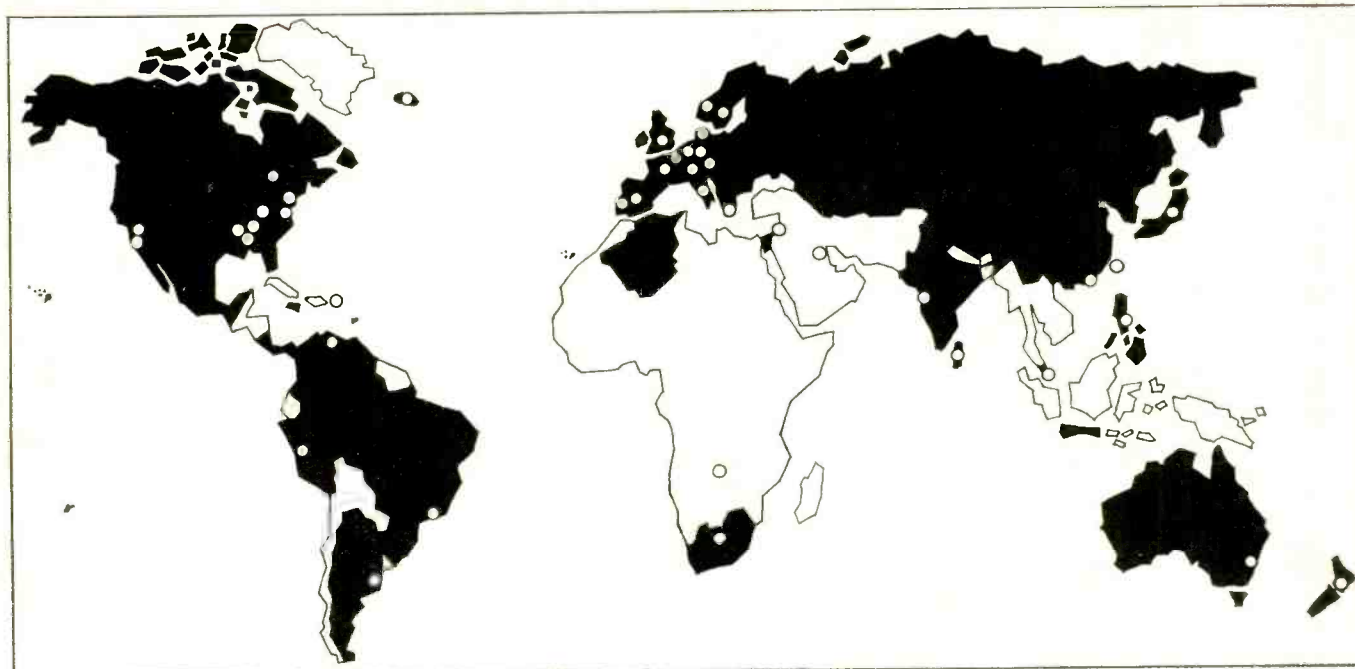
Std.		L.P.		D.P.		Boxed
Length	ea.	Length	ea.	Length	ea.	emptyspls
3"	150' 10p 29p	3"	220' 12½p 35p	3"	400' 22½p 65p	3" 3p
4"	300' 20p 50p	4"	450' 25p 70p	4"	600' 34p 97½p	4" 8p
5"	600' 30p 87½p	5"	900' 40p £1-17½	5"	1200' 62½p £1-85	5" 9p
5½"	900' 35p £1-02½	5½"	1200' 52½p £1-52½	5½"	1800' 85p £2-50	5½" 9p
7"	1200' 45p £1-27½	7"	1800' 65p £1-92½	7"	2400' £1-05 £3-05	7" 10p

All orders despatched by return.

Postage and Packing 9p per order

STARMAN TAPES, 421 Staines Road, Bedfont, Middlesex

Countries shown in black have Dolby equipped recording centres.
Dots show location of authorised distributors of professional Dolby Noise Reduction equipment.



The geography of silence.

One good reason to record in London is that every major studio here is fully Dolby-equipped. In addition to aiding engineers to achieve the highest possible quality on an original recording, the Dolby system reduces any low-level noise introduced when further work is done with a tape at another studio, often in another part of the world.

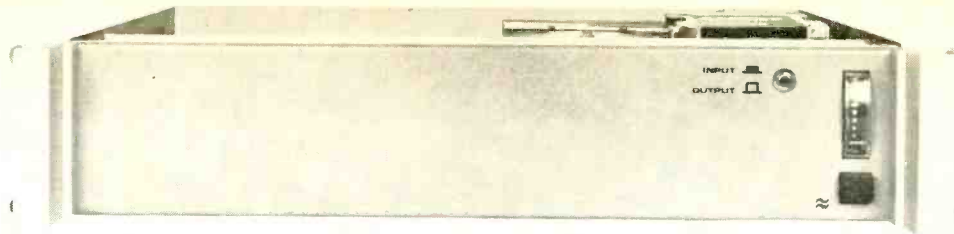
Because so many studios now have Dolby equipment installed, the system is widely used to protect the substantial investments of time, money, and creative effort made in London. Whether an original tape is sent to Nashville or Peking for reduction, or a copy master is sent to a licensee in Tahiti or Heidelberg, professional Dolby installations are there to guard against noise build-up.

Be sure that your studio sends and receives Dolby-encoded tapes.
People everywhere will hear the difference.

DD **Dolby**[®]
Dolby and the double-D symbol are trademarks
Dolby Laboratories Inc

1133 Avenue of the Americas
New York NY 10036
Telephone (212) 489-6652
Telex 125797

346 Clapham Road
London SW9
Telephone 01-720 1111
Telex 919109



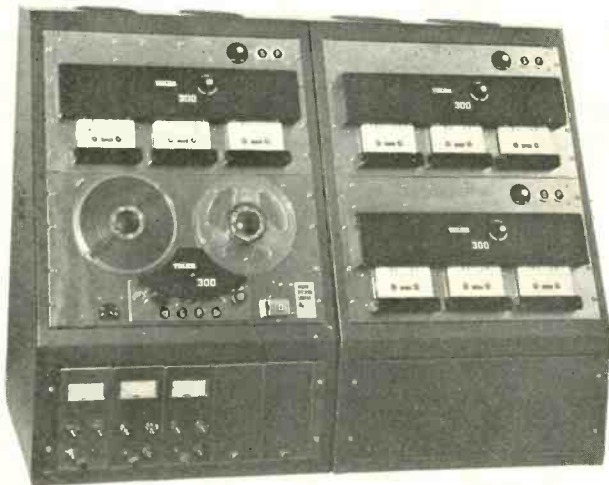
First we looked at the works. Then we worked on the looks.

It's amazing the number of good-looking amplifiers there are about these days. But that's the easy bit. It's what's underneath that counts. So we decided to make sure of the works before we did anything else. And we came up with our 'C' series. A new range of three monitor or entertainment power amplifiers. With the following features. 600 ohm bridging, floating, input. 8 ohm output. Unique fully protective circuitry. Distortion better than 0.2%.

Available in 19" rack or free standing form. Peak reading meter is switchable between output and input. Signal and mains inputs by XLR sockets. MEX 301C: 30 watts, MEX 501C: 50 watts, and MEX 1001C: 100 watts. Quite some amplifiers. And we finished them in stylish Havana with anodised alloy handles. After all that, they deserve to look good. And they do.

Millbank
It's got to be good.

Millbank Electronics Group, Uckfield, Sussex TN22 1PS, England. Tel: UCK (0825) 4166. From Europe: 892-96 4166. Telex: 28604. Manufacturers of specialists audio equipment for industrial and entertainment applications. Sound mixers, tuners, sound systems, loudspeakers, tuner amplifiers, audio modules and amplifiers.



THE 300 SERIES DUPLICATOR IS ALSO AVAILABLE FOR REEL TO REEL, CASSETTE TO CASSETTE OR MIXED SYSTEM DUPLICATION, WITHOUT THE NEED FOR ADDITIONAL ELECTRONICS.

FOR PRICE SCHEDULES, FULL TECHNICAL SPECIFICATIONS AND DEMONSTRATIONS, PLEASE CONTACT SOLE U.K. DISTRIBUTORS:

AVCOM SYSTEMS LTD

NEWTON WORKS, STANLAKE MEWS, LONDON W12 7HA 01 749 2201

INTRODUCING— THE TELEX 300

TELEX IN-CASSETTE HIGH SPEED DUPLICATORS ARE NOW AVAILABLE FOR 8 TO 1 DUPLICATING RATIO IN HALF TRACK 2 CHANNEL AND QUARTER TRACK 2 OR 4 CHANNEL CONFIGURATIONS.

THE TRADITIONAL TELEX QUALITIES OF RELIABILITY RAPID SERVICING, OPERATING CONVENIENCE AND EXPANSION FLEXIBILITY HAVE BEEN MAINTAINED IN THE NEW 300 SERIES, WITH THESE EXTRA FEATURES:

- TRACK SELECTOR SWITCHING
- CALIBRATED RECORD LEVEL CONTROLS
- WIDER FREQUENCY RESPONSE
- AVAILABILITY OF CASSETTE SLAVES IN 2 DIFFERENT SPEED COMBINATIONS, 38/19 CM/SEC. OR 19/9.5 CM/SEC.

Russco Studio Pro Broadcast turntables are at the other end of your 'phone *now!*

Universal $\frac{9}{32}$ " centre exclusive to Lamb Laboratories
instant start – $\frac{1}{16}$ rev to $33\frac{1}{3}$ rpm
extreme robustness
illuminated speed indicators
suitable for remote operation due to all-electric start and indicators
115V fully shrouded autotransformer
£127 retail +Vat



LAMB LABORATORIES

Lamb House, Church Street, Chiswick, London, W4 2PB

Telephone: 01-995 4551 Cables: Lambex, London

Specifications

Weight: 20lbs.

Chassis dimensions: $15\frac{1}{2}$ " x $15\frac{1}{2}$ "

Depth below chassis: $7\frac{1}{2}$ "

Neoprene idler wheel drive system transmitting power direct from the stepped motor shaft capstan to the inside platter rim

2 speeds – 45 and 33rpm

Oilite bearings used throughout

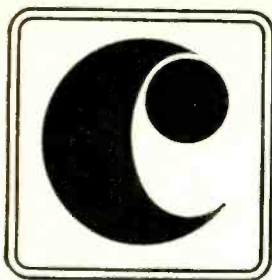
Detachable tone arm mounting plate adaptable to any 12" tone arm

Wow and flutter – less than 2/10 of 1%

Rumble (both vertical and lateral) minus 38dB down from standard NAB level



Grab your
phone dial
01-995 4551
and ask for
John Grose-Hodge
Do it now.



CALREC
IN
EUROPE

SPECIAL ANNOUNCEMENT

'OFF THE SHELF' SUPPLIES OF ALL CALREC CONDENSER MICROPHONES AND ACCESSORIES CAN NOW BE OBTAINED FROM OUR MAIN EUROPEAN EXPORT AGENTS:

ARC S.P.R.L.
RUE TH. DECUYPER
1200 BRUXELLES
TEL. 71-30-63

WITH WHOM YOU MAY ALSO DISCUSS YOUR SOUND MIXING AND STUDIO EQUIPMENT REQUIREMENTS



CALREC AUDIO LIMITED

HANGING ROYD LANE · HEBDEN BRIDGE
YORKSHIRE · HX7 7DD · PHONE 0422 84 2159

A FINE SELECTION
OF SOUND EQUIPMENT
BY

SONIFEX 

For studio mixers and associated equipment, large or small, complex or simple, write or telephone for information and specifications.

Portable Studio Mixers, Jackfield Assemblies, NAB Cartridge Players, are available for early delivery.

For circuit board assemblies covering a variety of functions.

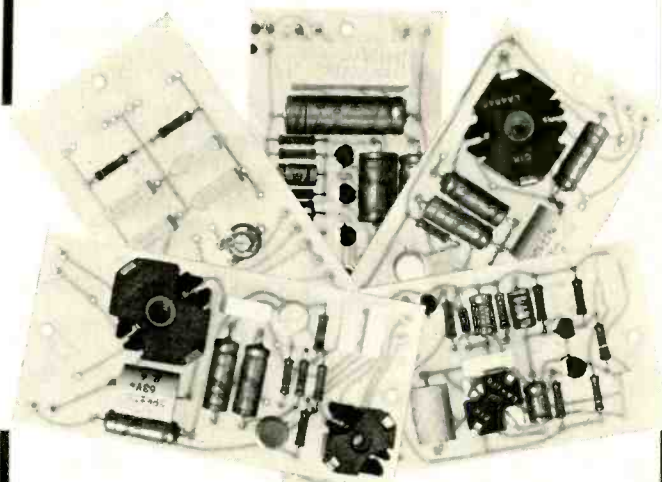
USE SONIFEX SOUND EQUIPMENT

Phone or visit our new premises for demonstrations or quotations and let us provide the answers to your problems.

**15 College Street,
Irthlingborough,
Wellingborough,
Northamptonshire,
NN9 5TU.**

Tel: 0933-650700.

MINIFLUX



The MEG series of magnetic recording modules provide an economic means of modernising and modifying existing tape transports to multi-channel systems.

The modules are adaptable for deployment in up to 24 channels using a single Master Oscillator with separate bias and erase power amplifiers. Modules used for single channel operation do not become redundant when expanded to multi-channel applications.

Write or telephone for comprehensive technical data sheets.

MINIFLUX electronics limited

8 HALE LANE, LONDON NW7 3NX ENGLAND.
Telephone 01 959 5166/2991

MACINNES moves with **AMCRON**

We are pleased to announce that we have moved our Sales, Service and Stores into Macinnes House at Saxmundham. This will result in an even more efficient service for our customers, and we hope that we shall have the opportunity of welcoming you to our showrooms to discuss the products we market.

Amcron Amplifiers lead the world in reproduction cleanliness, rugged construction, and reliability. They are recognised in all fields of sound amplification as being the 'State of the Art' equipment, and the one by which others are judged. While others come and go, only Amcron continue to set the standard. If your needs are for an amplifier that will give the highest quality, that will stand up to being thrown into a truck each night and will be covered by a full 3-year warranty on parts and labour, then the Amcron range is for you.



The **NEW DC300A** will give up to 500 watts from one channel with distortion lower than 0.05%. Hum and noise is below 110 db below 150 watts, and the DC300A is now able to operate into loads as low as 1 ohm.



The **D150** offers up to 140 watts from each channel, or 330 watts as a mono amplifier. Again very low distortion, and rugged construction make the D150 ideal for smaller PAs and fold back systems.



The **D60** will provide up to 60 watts from each channel, and is of the same high quality as the D150. As a mono amplifier it will give over 100 watts. The D60 is only $1\frac{3}{4}$ in. thin.



MACINNES LABORATORIES LTD.

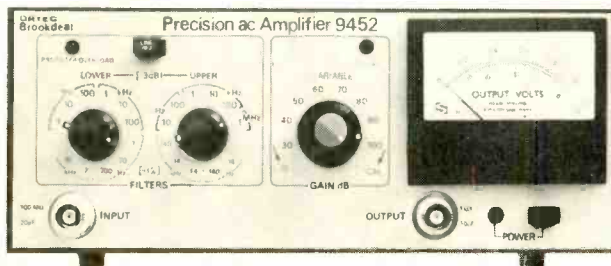
MACINNES HOUSE

Carlton Park Industrial Estate, Saxmundham
Suffolk, IP17 2NL

Tel. Saxmundham 2262, 2615

How versatile can an amplifier be?

Brookdeal
can answer
that...



The radically high performance of our Brookdeal 9452 opens up wide new areas of amplifier capability...
Superb low-noise input even at low frequencies, enables the 9452 to span a wide spectrum of low-level signal applications.

Outstandingly low distortion to a typical non-linearity of 0.001% makes this the ideal preamplifier for many test systems.
Fast overload recovery typically $<10\mu\text{s}$ for recovery from 40dB overload makes 9452 the choice for systems where large overload signals can occur.

Bandwidth covers 1Hz to 1MHz with selectable frequency response. Variable gain control, with 1% accuracy, 19dB to 100dB. But get the full data and you'll see just how versatile an amplifier can be!

Brookdeal Electronics Limited, Market Street, Bracknell, Berks.

An **EG&G** Company Telephone: 0344-23931 Telex: 847164

ORTEC Brookdeal

“SOMEWHERE OVER THE RAINBOW . . .”

(and north of Watford)

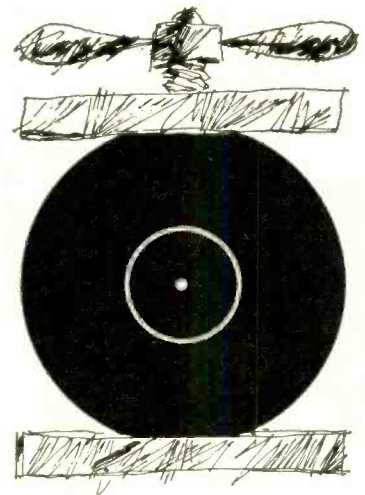
. . . THERE LIES A LARGE VILLAGE
CALLED BIRMINGHAM

In this place a group of enthusiastic little men are putting together lots of exciting things (like Studer 16 Tracks, Triad Mixers, Spendor Speakers, and P.A.G. Film Dubbing Equipment, plus many other goodies) and, very soon when somebody finds a 13 amp. plug the largest recording studio complex outside London will be in operation.

THE NAME IS HOLLICK & TAYLOR

(though watch this space for further information)

THE NUMBER IS : 021-356 4246



**for all Professional,
Custom, & Trade Pressings**

C. H. Rumble Ltd., Benedict Wharf, Benedict Road,
Mitcham, Surrey. Telephone: 01-548 5106

HAMPSTEAD HIGH FIDELITY FOR THE HIGHEST QUALITY STC MICROPHONES

Main distributors of STC professional microphones. The complete range is available from stock. Professional terms available.



HAMPSTEAD HIGH FIDELITY
91 Heath Street, Hampstead, London NW3 6SS
Telephones : 01-435 0999 and 01-434 6377

4104
Broadcast quality commentator's noise cancelling lip microphone
Sensitivity -84 dB ref IV. Impedance 30 or 300 Ω
A highly damped ribbon unit ensures freedom from non linearity and low frequency surges

4105
Cardioid microphone
Small, lightweight and robust, suitable for high quality sound reinforcement
Impedance 30 Ω

4037 A & C
Omnidirectional Moving coil
Frequency response : 30 Hz - 12 kHz. Sensitivity : -84 dB ref IV
Suitable for interviewing

4115
Lightweight Broadcast quality noise cancelling ribbon microphone
Impedance 30 Ω
Sensitivity 85 dB ref IV

4021
Omnidirectional Moving coil 40 Hz - 12 kHz. Impedance : 30 Ω . Output : -80 dB ref IV/dyne/cm²

TOP
4001G
High frequency pressure unit 15 Ω as used by leading loudspeaker manufacturers

BOTTOM
4001 K
High frequency pressure unit 8 Ω as used by leading louspeaker manufacturers

4038
Bidirectional Ribbon 30 Hz - 15 kHz
Impedance : 30 Ω or 300 Ω . Output : -80 dB ref IV at 30 Ω

IBA announce further commercial radio sites

THE LOCATIONS of five new commercial radio stations have been named by the IBA. These are Bradford, Ipswich, Reading, Teesside and Wolverhampton, due to commence operation before 1976. Six stations are scheduled to open in 1974, at Edinburgh, Liverpool, Nottingham, Plymouth and Portsmouth. Commenting on the IBA's plans, Mr Mark Elwes (secretary of the Local Radio Association) said he considered the prospects of commercial radio to be endangered by its slow introduction to Britain.

Chinese technical team visit EMI

A TEAM OF engineers from the People's Republic of China visited the EMI Tape manufacturing plant at Hayes in July. They were headed by Madame Tao Tao, vice-chairman of the Light Sensitive Material Committee of China.

Pye win Kenya broadcasting contract

AN ORDER worth over £300,000 has been placed with Pye TVT by the Voice of Kenya. It covers the supply of a complete television studio to Mombassa, due to begin transmission on September 1. The installation will include four 114 mm image orthicon cameras, tv monitors, telecine, film processing and signal mixing equipment.

County Recording to produce stereo cutterhead

AFTER SIX years of experiment and development, Mr John Martin and Mr Eric Elliott have announced the successful production of a stereo disc cutterhead. The design employs a moving coil transducer with motional feedback and has several design features which are considered unique and may form the subject of a patent. Anticipated price of the head is in the £2,000 to £3,000 region, including all associated electronics, power amplifiers and limiters. Test discs showing the head's capabilities will shortly be available.

Manufacturers: County Recording Service, London Road, Binfield, Bracknell, Berkshire.

Sound level meter

CHANNEL ELECTRONICS have announced a compact low cost sound level meter operating between 26 and 120 dBA in nine ranges. The *SLM16A* measures 117 x 69 x 64 mm and weighs 600g including battery (Ever Ready *PP4* or equivalent). Price is £34.60.

Manufacturers: Channel Electronics (Sussex) Ltd, Cradle Hill Industrial Estate, Seaford, Sussex BN25 3JE.

Audio mixer

FROM AMALGAMATED Wireless (Australia) come details of a 24 channel sound control desk featuring eight output groups, four echo send groups, two foldback groups, four echo return channels, four group equalisers, pfl, line-up

oscillator, talkback, phantom power regulator, integral jack field and nine VU meters. Overall dimensions of the desk are 1830 x 970 x 910 mm with 690 mm thigh clearance. Claimed overall performance is 30 Hz to 15 kHz ± 0.5 dB (ref 400 Hz) with -130 dBm noise (50 ohms source, equalisers bypassed or flat) and 0.3 per cent harmonic distortion (+20 dBm into 600 ohms). Input sensitivity may be switched from -80 to -20 dBm (microphone) and -20 to +10 dBm (line) in 5 dB steps. Equaliser facilities comprise bass roll off (five-position switch), bass cut/boost, presence (up to 10 dB boost at six frequencies), and treble cut/boost. Phase reversal is by pushbutton.

Agents: Amalgamated Wireless (Australasia) Ltd, 81 Aldwych, London WC2B 4HN.

Universal dil and ic pc board

A UNIVERSAL MOUNTING board for dil and ic devices is now obtained through UECL. Manufactured by OEC, the mounting board comprises a series of single-way connectors compatible with 8 and 16 mm dil devices of 2.5 mm contact pitch. Reference code OEC *GBR2032*.

Agents: UECL, Fassetts Road, Loudwater, Buckinghamshire.

BBC order for 3M

NEARLY 70,000 reels of 262 magnetic tape will be supplied by 3M to the BBC during 1973. The contract follows two years of liaison between the BBC and staff from the 3M tape production plants at Gorseinon, Wales, and Caserta, Italy.

Radiomicrophone

SELLING AT £230, the Reslo *Cabaret* consists of a complete radio microphone and receiver in a briefcase housing. An fm transmitter in the stick of ball-head microphone radiates 10 mW at 174.8 MHz which is detected by the receiver's 430 mm telescopic antenna at distances up to approximately 300m. The complete system weighs 3.6 kg and conforms to Post Office requirements.

Manufacturers: Reslo Ltd, Spring Gardens, Romford, Essex.

Monolithic op amp

NOW AVAILABLE from Feldon Audio, the MCI *2001* operational amplifier incorporates a balanced 250k ohm impedance input suitable for either summing or bridging and delivering +24 dBm into 600 ohms. The *2001* operates from ± 24 V, consuming 2 mA in quiescent state, and is supplied in an eight pin *TO-99* configuration (10 mm overall diameter). Distortion is quoted as 0.05 per cent total harmonic at 20 kHz (20 dB closed loop gain) and 0.004 per cent at 1 kHz. Equivalent noise is -112 dB.

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

Low cost cinema amplification

CATERING FOR the growing number of small cinema operations, EMI have developed the *OPI* sound reproduction system, designed to meet the requirements of a 800-capacity auditorium. Costing less than £450 (including VAT), the system comprises a 635 x 580 x 185 mm 30W wall-mounting amplifier, exciter lamp supply and auditorium loudspeaker. A fader control unit for tape or gram signals is also available. The equipment is designed for rapid replacement in the event of failure.

Manufacturers: EMI-Pathe, Beak Street, London W1.

Voltage controlled amplifier

A VOLTAGE-controlled amplifier, one of a new line of audio processing modules, is now available from Total Technology, California. The 50 x 25 x 12.5 mm *1300.3* operates from ± 15 V dc, consuming 6 mA, and has a claimed 20 kHz power bandwidth at 10V p-p output. One-off price is \$75 (£30 nominal).

Manufacturers: Total Technology, 80-14 Glenn Way, Belmont, California 94002.

Cartridge systems

SPOTMASTER CARTRIDGE recorders and players are now being marketed in Britain by Derritron. Manufactured in Maryland, USA, by Broadcast Electronics Inc, the three presently available models are the *400*, *500* and *1070*. Two versions of the *400* are offered, the *400A* being a combined recorder/player while the *405A* is a companion player.

Six versions comprise the *500* series, covering mono record/play, mono play, mono record/play/delay (portable or rack), and stereo record/play (portable or rack). Model *1070* is produced in three forms, respectively featuring mono play, mono record/play/delay and stereo record/play. Rack panel adapters allow units to be paired with each other or with *RM-10* cartridge racks. Standard operating speed is 19 cm/s with 57 cm/s fast forward wind. Wow and flutter are specified as 0.2 per cent (presumed rms) with 50 Hz to 15 kHz ± 2 dB (NAB equalised) overall frequency response. Programme/cue crosstalk is -55 dB and the cueing accuracy 100 ms.

Agents: Derritron Ltd, Sedlescombe Road North, Hastings, Sussex.

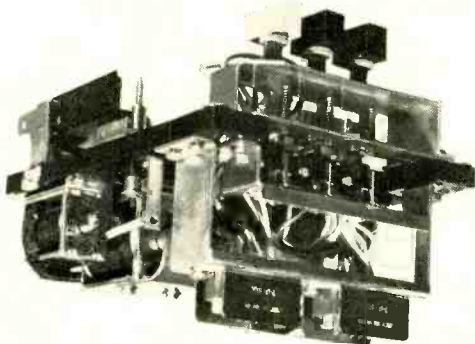
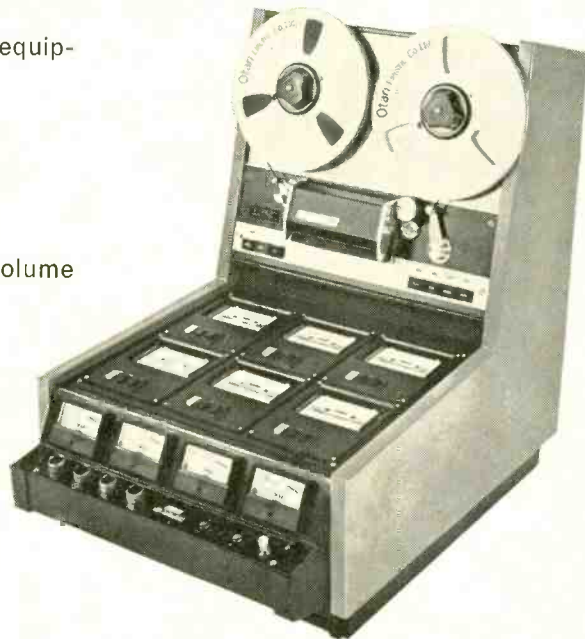
Digital cueing clock

AN ELECTRONIC CLOCK capable of being synchronised with a multitrack tape machine is now available from Electrosonic. The unit is not a simple pulse counter and eliminates the need to maintain a direct reference with any nominal tape starting point. Price of the *ES1857* is £330 and delivery currently four weeks.

Manufacturers: Electrosonic Ltd, 815 Woolwich Road, London SE7 8LT. (Studio demonstrations: Nigel Boswall, 855 1101.)

this is Otari

From Japan's biggest manufacturer of Tape Duplication equipment, the DP4050 reel to cassette copier.
Highest attainable in cassette performance.
Foolproof operation for non-skilled personnel.
Eight times copy speed.
Complete relay-solenoid operation.
Automatic cycle through Record-Rewind-Stop.
Absolute consistency in manufacture through large volume production.
Cassette to cassette version also available.



Modular construction.
Slaves replaceable in 60 seconds.
Servo-controlled direct capstan drive.
Solid construction with Solenoid-operated mechanism based on 5/16" deck plate.

3-SPEED— $3\frac{3}{4}$ / $7\frac{1}{2}$ /15 ips or $7\frac{1}{2}$ /15/30 ips. Electronic speed change. Cast aluminium deck—1" thick. Sel-sync. Cannon inputs, optional balanced or unbalanced. Balanced line outputs. Built-in tone oscillator—700 Hz or 10 kHz. VU meter reads input, output or bias current. Equalisation and bias controls on front panel. Headphone output. F.E.T.S. all inputs. 2 or 4 channel.

Otari MX7000 Master Recorder.
From £879 excl. VAT

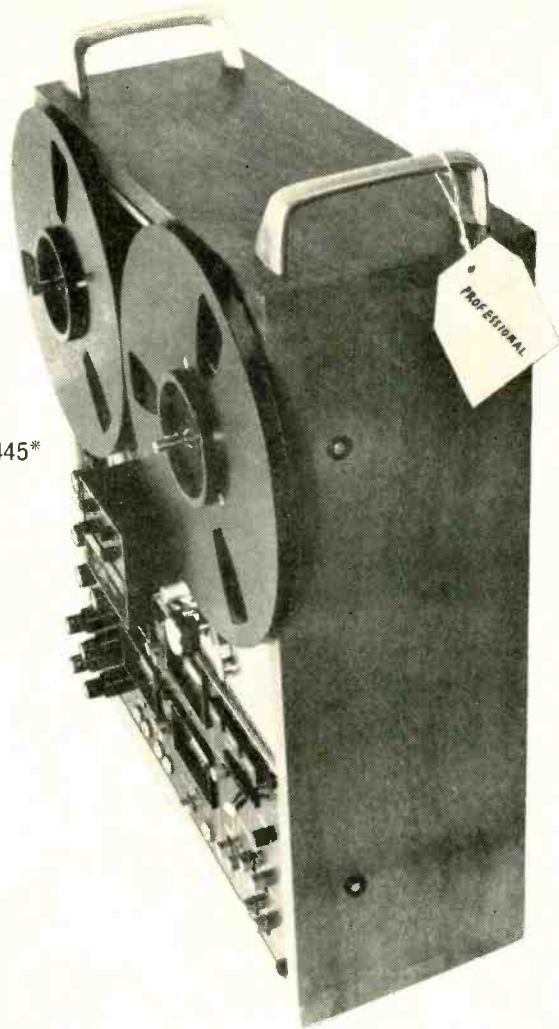


Sole U.K. Distributors:

OTARI®

Industrial Tape Applications
105 High Street, Eton, Windsor, Berks. Tel: (95) 52663 Telex 21879

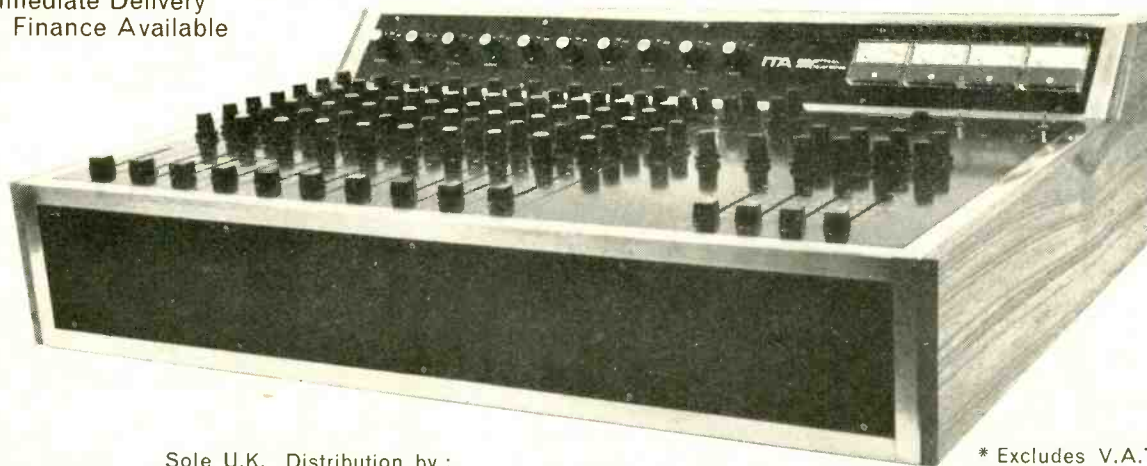
ITA



£492* Semi-pro version: £445*

Made 4
each other

£562* Immediate Delivery
Finance Available



Sole U.K. Distribution by :

* Excludes V.A.T.



Industrial Tape Applications
105 High Street, Eton, Windsor, Berks. Tel: (95) 52663 Telex 21879

THE FOLLOWING list of Complete Specifications Accepted is quoted from the weekly *Official Journal (Patents)*. Copies of specifications may be purchased from The Patent Office Orpington, Kent BR5 3RD.

June 6

- 1323434/5** Minnesota Mining & Mfg Co.
Dropout compensator for PAL colour television.
- 1323437** Bohm, R.
Electronic organ.
- 1323531** Polaroid Corporation.
Magnetic tape cassette assemblies.
- 1323580** Mann, D. V. and Mann, H. C.
Auxiliary drive endless loop tape cartridge.
- 1323653** Motorola Inc.
Tape cartridge player with cartridge locking mechanism.
- 1323655** Motorola Inc.
Tape cartridge player including a cartridge eject and tape head locating actuator mechanism.
- 1323858** Gregorio, P.
Apparatus for reproducing recordings.
- 1323889** Minnesota Mining & Mfg Co.
Combination tape cartridge and tape recording and/or reproducing machine.
- 1323903** Licentia Patent-Ver-Waltungs GmbH.
Multiple beam cathode ray tube arrangements.

June 13

- 1323270** International Business Machines Corporation.
Magnetic disc recording apparatus.
- 1324335/6/7** Akai Electric Co Ltd.
Magnetic head for a tape recorder.
- 1324386** Ampex Corporation
Recording and reproducing information in a self-clocking non-return-to-zero format.
- 1324471** Sony Corporation.
Sound signal delay devices.
- 1324782** Canon KK.
Magnetic recording reproducing device.
- 1324866** Complexul Pentru Prelucrarea Lemnului Reghin.
Musical instrument.
- 1324962** Wurlitzer Co.
Piano soundboard assemblies.
- 1324987** EMI Ltd.
Frequency modulator arrangements including voltage controlled multivibrator circuits.

June 20

- 1325034/5/6/7** FJL Corporation.
Motion picture viewer with removable cartridge.
- 1325161** Defence, Secretary of State for.
Sound reproducing apparatus.
- 1325216** Wandel U. Goltermann.
Delay and attenuation equaliser.
- 1325239** Ampex Corporation.
Magnetic head and method of manufacture thereof.
- 1325345** Eminent NV.
Electronic rhythm apparatus for a musical instrument.

- 1325432** Marklew, E. G.
Television and like optical apparatus.
- 1325485** Philips Electronic & Associated Industries Ltd.
Tape cassette.
- 1325566** Arvin Industries Inc.
Television recording and playback system.

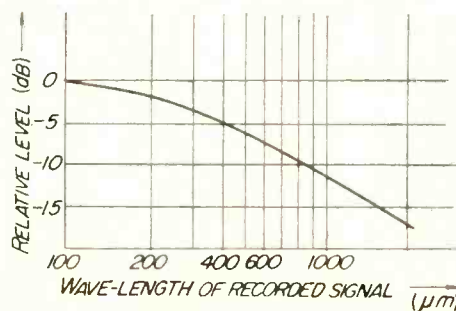
June 27

- 1325621** Raytheon Co.
Frequency band converter.
- 1325771** Standard Telephones & Cables Ltd.
Aerial current monitoring.
- 1325771** Standard Telephones & Cables Ltd.
Aerial field simulation.
- 1325880** Pye Ltd.
Battery economy apparatus.
- 1325910** Fernseh GmbH.
Preventing streaks in video displays.
- 1326078/9** Sony Corporation.
Recording and reproducing system for colour video signal.
- 1326085** Olympus Optical Co Ltd.
Tape recorders.
- 1326337** International Business Machines Corporation.
Tape cassettes.
- 1326386** British Broadcasting Corporation.
Television standard conversion.

Videotape copying

MATSUSHITA ELECTRIC Industrial Co Ltd of Japan are very active in the field of mass tape copying. In BP 1,298,276 a few months ago they described their technique of copying tape by running master and slave tapes from separate supply spools and taking them up together on a common take-up spool. In this way the take-up spool receives a laminate of master-plus-slave tapes which is squeezed by a capstan that bears against the take-up spool. The assumption is that no air can be trapped between the two tapes and, immediately after the pinch point where the capstan acts, a transfer generator imprints the programme material from the master to the slave tape. Matsushita have various patents concerning refinements of

FIG 1.



the process and now in BP 1,311,959 they suggest ways of adopting these basic processes to vtr copying.

The problem of vtr copying by the laminate method just described is that of inefficiency at low frequencies. Fig. 1 shows how, as the wavelength of the recorded signal increases and the frequency decreases, copying efficiency reduces. There will be no copying problems with short wavelength video signals but the story will be different for the longer wavelengths in the audio signal, inter-layer copying reducing the sound signal level.

What Matsushita do is divide the sound signal into a low frequency zone (which is subject to reduction in level by inter-layer copying) and into a high frequency zone (which does not suffer). A boundary frequency is chosen and the signals in the low frequency zone below it are frequency modulated so that they are converted to signals having a frequency higher than the boundary frequency. This modulated signal is recorded on a second linear sound track while the audio signal above the boundary is recorded on the conventional linear sound track. The boundary frequency will depend on tape and recording characteristics and on reproduction the original signals are recovered by conventional detection and mixed with the undoctored signals.

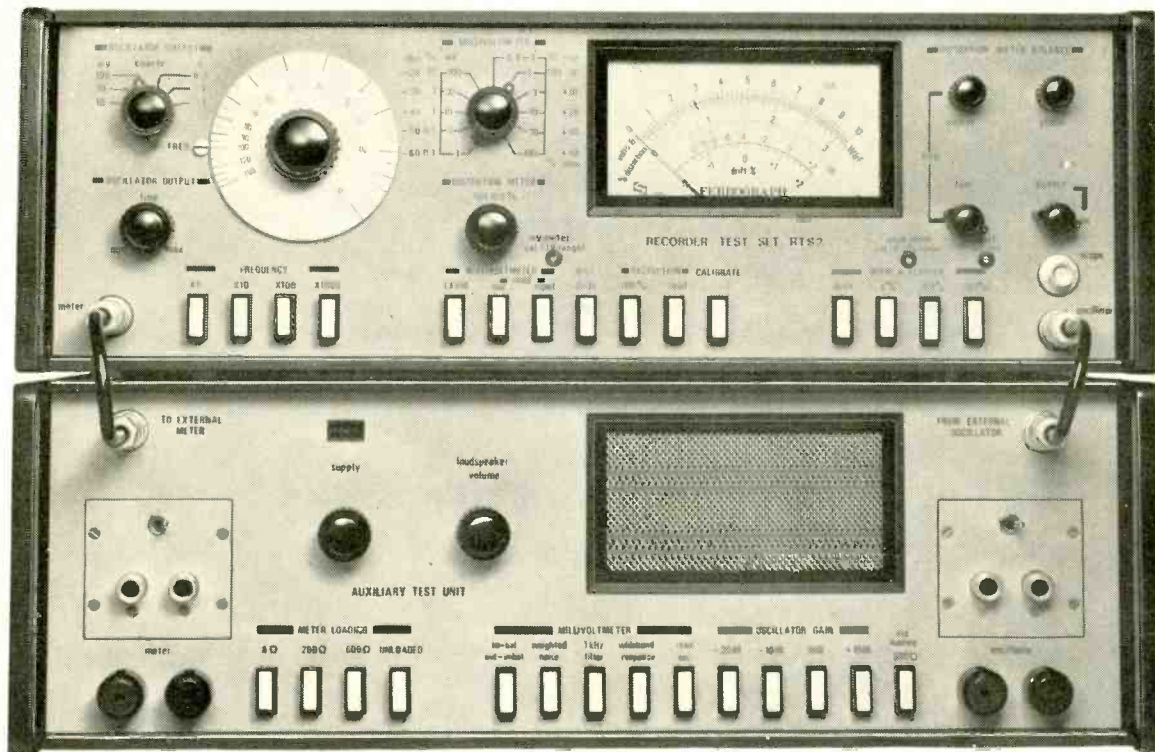
To avoid drum rotation noise, the boundary frequency is lower than the noise frequency (eg 960 Hz for a quadruplex vtr) so that the 960 Hz component is taken out of the frequency range of the modulated signal. A.H.

Disc stampers

TELDEC (TELEFUNKEN and Decca) in Germany have a short patent BP 1,311,782 concerning the production of gramophone record masters and mothers. These are produced from a lacquer original (e.g. nitrocellulose lacquer on an aluminium disc) on which a recording has been cut from tape. They are usually made by electroforming through the desposition copper or nickel in fairly thick layers up to 600 μm. Care must be taken to see that the masters or mothers will separate (original from master, master from mother, or mother from stamper) without damage. So the process is slow and usually the electroforming of masters takes five or six hours and the production of a mother requires a similar further length of time.

What Teldec propose is to mount the lacquer original in a support housing and render it conductive by means of a layer of silver. This coated original is then nickel plated up to a thickness of about 10 μm. The plated original is now reinforced with a thick layer of casting resin, such as an epoxide resin. This can be cured within an hour and the nickel plate layer plus the plastics reinforcement is now easily separated from the lacquer original. Thus all those hours usually spent electrodepositing a bulk of layers can be saved. A.H.

Audio Test Set RTS 2



and Auxiliary Test Unit ATU1 for professional users

RTS2 Checks Amplifiers,
mixers, tape-recorders

For Frequency Response ·
Signal/noise ratio ·
Distortion · Cross-talk ·
Wow & flutter · Drift ·
Erasure · Sensitivity ·
Output power · Gain

ATU1 Extends output level and
measurement sensitivity.
Provides balanced
input/output facilities.
Incorporates weighting
filters, loading circuits.
Has built-in speaker
for monitoring purposes.

Send for leaflets RTS2 & ATU1

FERROGRAPH

A member of the Wilmot Breeden group

Ferroglyph Company Limited Auriema House 442 Bath Road Cippenham Slough Bucks SL16BB Tel: Burnham 62511

Telex 847297

THERE CAN BE little doubt that this year's APRS was a great success. The size of the exhibition alone would have compelled such a conclusion although most of us thought the price of a drink was a bit steep. That, however, was not the fault of the organisers.

As I went round the exhibition I heard few grumbles, particularly among those who were exhibiting for the first time. But I did come across one complaint.

Studio Republic had hoped to bring their mobile along to the APRS exhibition but were told that they would not be allowed to. I asked Studio Republic what had happened and they said they had been told in January that their proposal to bring a mobile to the exhibition would be put to the committee. They told me they heard nothing until four months later, and that they then phoned up to find out what the decision had been so that they could make the necessary arrangements for the exhibition. They were told by the secretary, Mr Masek, that the committee had decided not to allow them to bring the mobile.

A couple of days later on April 25 they got a letter from Mr Masek about booking space for the exhibition. At the end of the letter Mr Masek said: 'I am sorry that an outside display is not possible at our present venue'.

Dick Swettenham of Helios Electronics told me that he had also asked through a committee member if he could show a mobile unit at the exhibition and he was told, reasonably enough, that if he put his request in writing it would be considered by the committee. In the event his mobile unit was not ready in time and so he never made the formal application to the committee.

I have made extensive enquiries and have been offered no evidence of any meeting at which the Studio Republic mobile was discussed. This does not, of course, mean that no such discussions took place—not everything is recorded in the minutes—but I did encounter a reluctance on the part of the APRS to state in clear terms when the matter had been discussed. What Mr Jacques Levy, the APRS chairman, did say was that: 'We have a number

of different committees (he gave examples) and everything relevant to APRS business is discussed in committee'. When I asked him about Studio Republic's case he repeated that statement.

As Mr Levy also told me, there is no obligation on his or anyone's part to divulge the goings-on at any committee of the APRS, but a simple statement by him that the APRS committee had decided not to allow Studio Republic to bring their mobile to the exhibition would have meant that you would now be reading about something else.

I asked Mr Levy why the decision about Studio Republic had been made. He said that it was the policy of the APRS to allow nothing to associate itself with the exhibition which could not be contained within the four walls of the exhibition hall. 'We want all visitors to see every stand and not to be buttonholed for the benefit of individual exhibitors,' he said.

He explained that he and other members of the committee had been to many exhibitions where the visitors had been 'spirited away' to other rooms where they were offered hospitality and, out of politeness, found it difficult to get away, with the result that the stands in the main exhibition were left deserted.

He also added that something like a mobile recording unit could be quite well illustrated by photographs and that visitors could easily gain an impression of its technical quality from printed specifications.

Although I think the last statement is nonsense I concede that, taken by themselves, these points are valid. What they do not take into account, in my opinion, is that if the APRS exhibition is to be a shop window for the world's recording industry then visitors ought to be able to see examples of mobile recording set-ups. It would be quite easy for the APRS to arrange with the police to have vans parked in some area near the exhibition. More important though is that when the APRS makes a ruling on a matter of this kind it should be clearly minuted and a copy sent to whoever is affected by the decision. It is not so much a question of being democratic,

whatever that means, but of courtesy.

AIR, London. Cockney Rebel's album, engineered by Geoff Emerick, should be finished by the end of July. During July and August, Bill Price will record albums by Larry Norman and Jefferson. The Jefferson album will be John Miller's fourth album at AIR in six months. Bill Price will also be doing film work with John Barry for a remake of Tennessee Williams's *The Glass Menagerie*. I am told that Barry will do orchestral sessions later in July.

Caravan have come in to do some mixing with engineer John Punter, who has also worked with producer Martin Ford on John Rowles sessions. Steve Nye is mixing for Chris Thomas on Badfinger sessions and Alan Harris has been recording one of AIR London's own groups, Saffiras.

I understand that nearly all the recent work at AIR has been albums. This has pleased everyone there and even brought a smile to the face of George Martin, who's been recovering from an accident he had while launching his boat 'Solitaire'; he broke both wrists and severed an artery. Never mind, George; plenty of time for the Admiral's Cup next year.

Kinks Recordings, London. The Kinks have built a 16 track studio in Hornsey which they say will take up to 25 musicians. The desk is a Neve, the tape machine is Ampex, the speakers are Cadac, the mics Neumann and AKG, and they have an echo room as well as plates. The brochure also mentions a Dolby unit and there is a baby grand in the studio. Sixteen track recording is £18 an hour, which is low even if the studio is in Hornsey. The studio is just across the road from Hornsey station.

Manor, Oxfordshire. Manor's mobile recording unit must be the first mobile in the country to go 24 track. The machine is an Ampex MM1100 which Ampex say is the first of its kind to be delivered in Europe.

The mobile has been built into one of those containers used by British Rail and has an Ampex AG440 stereo machine, a 30/24 Helios desk, and M range Dolby units. Manor's mobile chief, Phil Newell, said the new vehicle would be on the road at the end of June. 'We anticipate that British and Continental recording groups, production companies, film units and pop festivals will use the excellent facilities it offers'.

Marquee stocking

Marquee, London. Marquee have formed their own production company, Marquee Record Productions, and are busy, they say, 'building up a stock of new products'. The production team comprises Bruce Baxter, Tony Atkins, and Geoff Calver. Tony Atkins has been producing albums for Mike Starr, and the Fandango, Galahad and Sammy bands.

Marquee have had more misfortune in that they were flooded out recently. They say that session time was not affected and that they have recaptured. All their other news is good though. Phil Dunne has told me that they couldn't be more pleased with their MCI desk

Presenting The
VARI-BAND SWEEP EQUALIZER!
 Equalization any way the ear can hear it.
 Continuously variable bandcenter, bandwidth
 (slope) and amplitude at a price comparable to
 non-sweeping equalizers.
MULTI-TRACK
 P. O. Box 3187, Hollywood, CA 90028
 1965 Cheremoya Ave., Hollywood, CA 90068
 (213) 467-7890

'and that's not sales talk'. He also told me that the studio had been getting busier and busier. 'We're now working 24 hours a day'. Marquee hope to open their second studio around the end of September this year. They have an Ampex MM1100 24 track machine on order.

The famous Focus had their Rainbow concert filmed and recorded and Phil Dunne did the 16 track mixing and dubbing for that at the end of May. Ann Odell, new member of Blue Mink, began recording solo work at the beginning of June, and over the Whitsun holiday Phil Dunne and new engineer Will Roper were doing another *Top of the Pops* album for Pickwick. Robert Kirby came in to produce a new Mick Audsley single and album.

In the club, Roy Buchanan has made a live album recorded by Phil Dunne which will be mixed at New York's Record Plant. Artist Paul Brett has been working on his next album for Bradley's Roadshow with engineer Geoff Calver and Will Roper has been working on a new single by Bruno Kretchmar for Billy Gaff's GM Records.

The Music Centre, London. Louis Elman showed unexpected candour when he said in a statement that progress this year had been so far ahead of last year that there was 'no comparison'.

As I said a little while ago, De Lane Lea seem to have turned the corner and, when the Humphries Group publishes its figures soon, they should reflect the improvement.

Studio One closed for a couple of weeks in the middle of June so that they could install a Neve mixer. Since I last reported on the Music

Centre John Cameron has recorded his score for the George Segal, Glenda Jackson film *A Touch of Class* and for a film called *Night Watch* starring Liz Taylor and Laurence Harvey; Paul Beaver and Bernard Drauze have worked on their underscores for *The Final Programme*; Mikis Theodorakis has recorded the score of *Sutjeska* for World Film Services; John Richards has engineered more of *The Little Prince* as well as scores by Dennis King for the *Black Beauty* tv series and Ken Thorne's music for a tv series called *Zoo Gang*; John also engineered Roy Budd's scores for Michael Winner's film *The Stone Killer*; Wilfred Joseph recorded for a film called *Swallows and Amazons*; and Ron Goodwin has recorded for *The Little Mermaid*. LWT have come in to do *The Rolf Harris Show* with MD Harry Rabinovitz.

The most recent sessions have included music for Anglia's *Survival* series, composed by Sam Sklair and mixed by Dick Lewzey; remixes for the film *Don't Look Now*; and music for the film *The Catholics*, composed by Carl Davis.

The list of artists for single or album work is far too long for me to repeat all of it but includes Harry Nilsson, Public Foot, Norman Vaughan, Cymande, Brian C. Marshall, Harry Roche, Eric Winstone, Barbra Moore, Renaissance, Frank Cordell, Michael Albuquerque, Jim Webb, Roger Webb (no relation), sessions for Barclay Records of Paris, Johnny Pearson, Johnny Scott, Johnny Johnstone, Derek Lawrence, and Peter Eden. In just one week at the beginning of July De Lane Lea did work for Air Edel, Pluto Entertainment, Avenue, Sovereign, Enterprise Records, Chess,

Associated Rediffusion and many others.

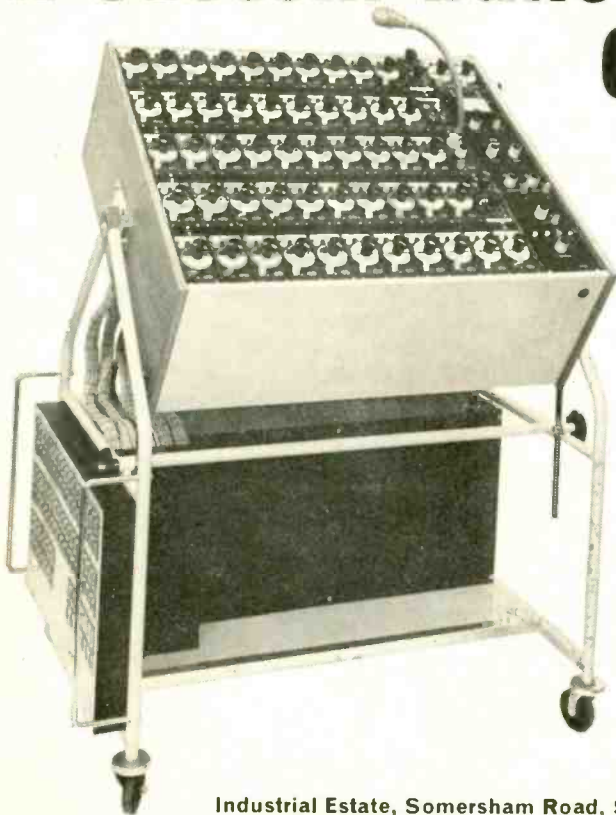
I've had a letter from Renfrewshire Sound Services which explains that they opened last year and that they do mainly mobile work with a Ferrograph Series 7 stereo machine. They have a custom built 8/2 mixer as well as Dolby units and AKG, Reslo and Beyer microphones. They also do dj programmes with Garrard turntables and a cartridge machine.

'The studio is fully equipped for stereo operation'. Raymond Orr, the studio director, told me. 'A creative team devise commercials and so on for the local stations and a complete music library is available to this end. For record retailers, a cassette/cartridge repair service was established to restore tapes to their former glory and is very popular with record shops in central Scotland, although tapes can be posted over the country. Due to increased outside work, an autophone had to be installed (041 638 6197) but this ensures a 24 hour service'.

Scorpio, London. Last month I didn't have enough space to describe their Cadac desk. It is wired for 24 input channels and equipped with 20. There are 19 VU meters mounted above the desk. Norman Bone of Broadcasting and Sound Consultants told me that the equalisation on the mic channels will give both bell and shelving curves with a maximum of 16 dB lift or cut in 2 dB steps in the high, medium and low frequency sections. Each channel has a high pass filter. There are 16 outputs groups, 16 monitor and metering channels, two echo sends, four echo returns,

42 ►

A custom-built mobile 50-way CTH Sound Mixer . . .



The photograph shows the 50-way trolley-mounted console of a complete sound distribution and mixing system recently completed to special order. Ideal for either studio or location work, it operates either from mains or 12 volt battery and incorporates a jack field and two integral 30 watt power amplifiers.

We are always pleased to design and manufacture to special order, but the standard range of CTH Mixers already meets many studio requirements, covering single or multi-output models with up to 100 input channels. CTH also manufacture a range of modular mixing units, consoles, distributor amplifiers, studio disc player units, speaker amplifiers, cable drums and many other items of studio equipment.

CTH ELECTRONICS

Industrial Estate, Somersham Road, St. Ives, Huntingdonshire PE17 4LS. Telephone: St. Ives 64388 (0480 64388)

41

STELLAVOX

The most versatile and all embracing system for magnetic recording.

SP7 RECORDER weighs less than 3.5kg, size 8 x 21.5 x 25cms, speeds 9.5 to 76cm/s (variable with ASV), condenser mic powering, Ni-cad or AA dry cells, optional quartz pilot generator, plug-in head blocks for mono or stereo, with optional neopilot or synchrotone control track.

SM7 RECORDER designed for the highest fidelity stereophonic recording, 25 Hz to 28 kHz ± 2 dB at 38 cm/s, w and f $\leq 0.05\%$ DIN, s-n ≥ 70 dB a. tot $\leq 1.5\%$ at 800 pW/m.

SQ7 RECORDER. Four channels on 6.25 mm tape, with full selsync, weighs 6 kg.

ABR attachment, allows the use of spools up to 30 cm ϕ .

ARU synchroniser, for synchronising to film or VTR including playback filming.

AMI MIXER. Five inputs for dynamic or 12V condenser mics and line, with bass cut, presence, bass and treble controls and pan pots.

AMI 48 MIXER. As AMI plus 48V condenser mics, limiter on each input and prefade listen.



**A. V. Distributors
(London) Ltd.
26 Park Road,
Baker Street,
London, NW1 4SH.
Tel. 01-935 8161**

Please send further Stellavox details.

Name

Address



DIARY

four foldback outputs and two compressor limiters.

All the main output groups and the microphone and echo channels have pfl. Talkback goes to studio, the four foldback groups and the conductor's rostrum, which also has reverse talkback. Norman said a feature of the desk was that the audio systems were selected by pushbuttons. The control was achieved by dc logic which eliminated the need for multiple switches when changing over from normal recording into, say, overdub or remix.

Norman told me that the frequency response from mic transformer input to group amp output is within 0.2 dB from 20 Hz to 20 kHz. Maximum gain was 88 dB for the 300 ohm input and 94 dB on the 1.2k ohm input. With a 600 ohms source resistor on the 1.2k ohm input, the equivalent noise level was -123 dBm. With a 50 ohm source looking into the 300 ohm input, the figure was -128 dBm. The maximum output for the group output amp before clipping was 20 dBm. For the other amps, the figure was 24 dBm. At an output level of 8 dBm into 600 ohms, the total harmonic distortion was less than 0.05 per cent.

Weir, London. At a recent reception to open Weir Sound Studios, Malcolm Jackson came in and started at once to enthuse about the place. 'It's a different story', he said. And if you think I'm saying who or what it's different from ...

Weir are in Broadhurst Gardens, just behind Finchley Road underground station. They have a 16 track Studer tape machine, an eight track Studer A80 and an Ampex stereo machine. At the moment there are two Tannoy speakers above the window but engineer Kevin Eade told me that they were thinking of putting five Altec up instead.

The desk is the Neve that used to be at CTS's former resting place in Bayswater, hence the presence of M. Jackson at the opening festivities. Kevin told me it had many facilities, perhaps too many: 'The talkback is an incredible thing, providing far more than we need'.

The speakers are driven by H/H amplifiers. Weir have two EMT stereo plates and they use AKG and Neumann microphones. They had ordered Dolby units when I was there but these hadn't yet arrived.

The work done on the studio was finished in six weeks. The control room of the old studio had been too small, so they removed a wall at the back of it and opened the control room out. Now there is room for a number of low leather seats at the front of the desk. The studio will take up to 25 musicians. The acoustics were designed by Eddie Veale. Weir offer light snacks with hot or cold drinks and hope to open a bar soon for their clients. Ex-bandleader Frank Weir said they would provide 'a garden refuge, with cold drinks and food under beachlike umbrellas' during session intervals in the summer months. How can it fail?

Sixteen track session rates are £18 an hour during the day with an overtime charge of £2 an hour up to 11 pm. At weekends the rate is £22 an hour. The telephone number is 328 7222/3.

Twickenham Films, London. You have to hand it to Neve's press office. Every time they

sell a desk they let everyone know about it, and the latest purchases include one by Twickenham Films who have bought a 36/6 desk 'capable of full stereo operation'. Neve say it is the largest single-piece desk they've ever built.

Twickenham have the horrors at the moment. They are filming *The Revenge of Dr Death*, starring Vincent Price and Peter Cushing. Danny David is mixing the sound. Also at Twickenham, Donald Pleasence and Michael Caine have just begun *Drabble*, directed and produced by Don Siegal for Richard Zanuck and David Brown. The sound mixer is John Mitchell.

Recently I talked to Jack Nelson about **Trident Audio Productions**, one of the growing number of activities allied to Trident studios.

Mr Nelson and his crew operate from two roomy offices in Wardour Street. When I turned up they were in the middle of organising a launch for one of Trident's rock groups, Queen, and amid hurried conferences about stage lighting and poster photography, and the ringing of innumerable white telephones, Jack told me something about himself and the operation.

On a visit to England some years ago Jack met some of the people at Apple through a girl who had worked for him at home in California. At a Beatles recording session for *Hey Jude* at Trident, he met Trident boss Norman Sheffield. The two of them talked about the record business—Jack was running a record label in

Bob Woolford's mobile recording unit at St. John's Hall, Wimbledon, with the Portsmouth Sinfonia. More next month.



the States called Blue Thumb Records with another guy, distributed here by Island.

'I told Norman to look me up in the States and I started spending holidays here; we did a sort of miniature cultural exchange programme, if you want to call it that, and I said that they had a lot of talent at Trident so why not start their own production business?'

Trident Audio Productions started just a year ago. 'All of our producers have individual companies which I administrate for so that the producers have no worries about business problems'.

At the moment Trident's stable has four producers: John Anthony, Roy Baker, Robin Cable and Ken Scott, all home grown at Trident's studio. They seem to have been conspicuously successful. John has worked with Van der Graff Generator, Roxy Music, Lindisfarne, Home, Gypsy and Rare Bird; Roy has worked with Skin Alley, Nazareth, Lindisfarne, Gasolin and Trident's own group Queen; Robin produced Phil Goodhand-Tait's recent record of the week *You Are*, Bill Quateman, Colin Scott and Jim Webb; and Ken Scott has produced the Mahavishnu Orchestra, Esperanto, Jonathan Kelly and David Bowie, including the Aladdin Sane album. Ken is now working on Bowie's next album in France.

I asked Jack if there was any chance of increasing the number of producers in the organisation and he was non-committal. 'We could manage it but things are hectic enough'.

As the phone rang about the fiftieth time I had to agree with him.

Jack emphasised that all he was trying to run was a service operation—the four were encouraged to go and look for new talent and were free to record wherever they like: 'You've got to be able to give them creative freedom. They have worked on occasions at AIR and Rockfield, for example. Generally, though, the mixdowns tend to be done at Trident. They know the sound there very well'.

We talked about future developments at Trident. Jack said that on the sound side they hadn't scratched the surface yet, but the video side looked exciting too. Trident have a subsidiary, Trillion, which was the old British Lion Television (see Diary for February 1973). 'We want to do the kind of thing that The Faces, the Stones—many of them have done. We're recording a Queen promotion tape next Monday which will be released to promote the group in the States, here and in Europe. The essence of Queen is excitement. They're a very visual group and we can capture what they're doing much better on videotape.'

'There are four totally different sounds that we can get. They all have different musical tastes: some work better with bands, some with solo artists. We also help out with other producers. If there's something we can't handle, we suggest other producers who might be able to. I did that this morning, in fact'.

Jack's final comment was that they all enjoyed their work very much. 'The people here are very happy with the things we do. And everybody's happy with the service we give except my wife'.

What can I add except that as I left the phone rang. Again.

Burbank Studios, California. Robert Hagel, the general manager of Burbank Studios, has sent me a release about the 'Groves Rice Recording Facility', a sound recording studio within the precincts of Burbank film studios. The sound studio has been open for six months and during that time it has been used by Andy Williams, Quincy Jones, Aretha Franklin, Time-Life, Anita Kerr, Hello People, Ranji and Bob Dylan, who did the score for MGM's *Pat Garrett and Billy the Kid*. The soundtrack album will be out in the US already. The latest addition to the list is that of Barbra Streisand, who recorded the title song for her latest pitcher with Robert Redford.

Early in July, Burbank announced that they had begun a 'five step, multi-million dollar expansion of the sound department'. They would begin by opening a second studio so that recording would not be affected when studio One was altered. 'As in music recording One, TBS's music recording Two will have the finest equipment available in the recording industry. The scoring console is by Quad Eight. There will be a film lock on each Ampex tape machine so that they can run with picture or, for just a straight recording session, two 16 track machines can be locked together. That provides 30 tracks, in lock, for original recording, overdubbing or sweetening. Several new electronic time delay systems will be installed.

New 16 track, four track and two track tape machines will be purchased to add to the three 16 track, two four track and three track

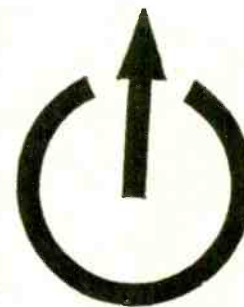


NEW PRODUCT BULLETIN

JH-100 SERVO DRIVEN TAPE TRANSPORT

The MCI JH-100 transport replaces the JH.10 transport in MCI'S JH.16 and JH.24, 8, 16, and 24 track recorders. The JH.100 combines state of the art electronically controlled tape handling and the following unique features:

- D. C. Capstan servo drive
Super accurate crystal controlled fixed tape speeds
15.30.IPS (7.5 IPS available)
- Stable variable speed operation from front panel for special effects and speed corrections
- Wide range external speed programming for inter-machine sync, audio/Video or audio/audio remote speed control, special effects.
- "Piano proof" Flutter
Typically .04% 15 IPS din weighted
.06% 15 IPS din unweighted
- All mode reel tension control system
Constant tape tension
High speed accuracy anywhere in reel
Consistent tape packing
- Full manual velocity programming for cueing, editing special effects
- Totally "relay-less" design with full TTL deck logic
- New "Mark II" auto locator
Full bidirectional operation
Keyboard entry
Readout and operation in real time
No over-shoot-controlled approach speed
- New decor and trim.



CONTACT:
**FELDON
AUDIO**

FELDON AUDIO LIMITED
126 Great Portland Street,
London W1N 5PH

Telephone 01-580 4314 Telex 28668



STUDIO 70, MUNICH

By Adrian Hope

WHEN I MENTIONED to a British music publisher that Studio 70 had invited me to go over to Munich and see their studio he shrugged his shoulders and said 'Well it will make a nice trip but once you've seen a few studios you've seen them all'.

Not true. Certainly once you've listed the equipment in a few studios there is nothing more to be said about who uses what. Who wants to read a list of desk, mic and speaker identification type numbers or hear for the umpteenth time that nobody uses VU meters in Germany? What matters is what makes different studios tick in different ways. And I'll eat not only my hat but a hot dog at an M1 service station if two studios in the world tick in exactly the same way.

Jurgen Koppers was born in Germany but had moved round the world filming films and recording sounds for years before he settled in Munich in 1969. Working mainly as a freelance sound engineer, he was approached by a rich ex-businessman newly turned film tycoon for advice about converting a garage in the basement of a block of apartments into a screening theatre. Koppers wasn't very interested. Then the film man expanded his ideas to include a dubbing theatre (as I pointed out in the Berlin pieces (May), German audiences

won't look at a film with subtitles so the soundtrack must be in their native language) and Koppers was more interested.

'Come in and see what you think of what I've already had done' he suggested to Koppers who duly came and had one piece of concrete advice to offer. 'Go into the centre of Munich, buy a bag of nails and nail up all the doors. The equipment and the installation are worthless and you'll have to start again from scratch. I'll do it for you if you'll let me build a music studio as well'.

'OK', came the reply. 'build your music studio but you have two months to do it in'.

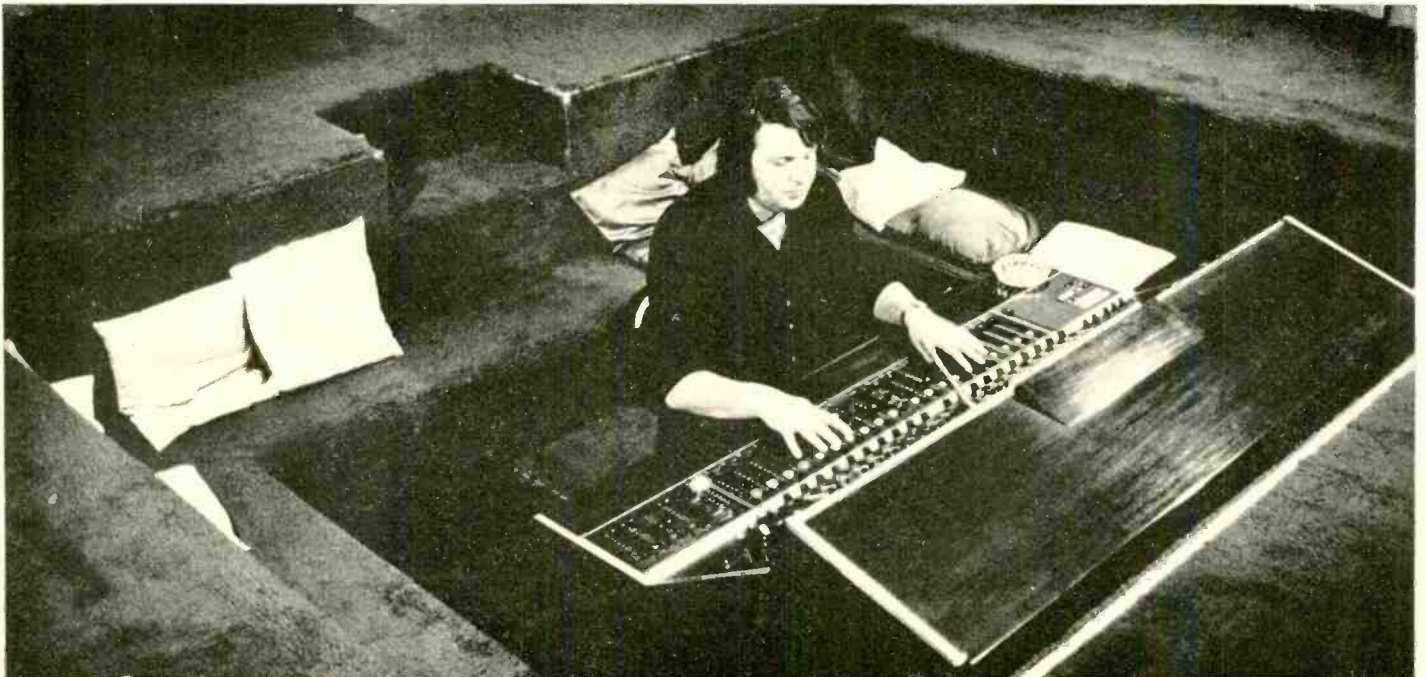
Koppers worked 29 hours a day and finished in seven weeks. That was the birth of Studio 70, in 1970, and it wasn't easy. For instance, the way he obtained the tape equipment was to pester the life out of Studer until finally they sold him a full set of gear earmarked for export to Singapore. After a while Koppers moved over from employee to partner and the film man retired to the mountains above Nice. Since then Studio 70 has blossomed into a film dubbing studio, music recording studio and a reduction room.

Because the original work was done in such a hurry, modifications and additional construction work is still going on. In the two days I was there, busy hands with paintbrushes changed the colour of several ceilings, walls and floors in far less time than it took to reduce a single recorded that morning for a singer who could not sing but had enough money to produce himself on record. Investment so far,

and over the last 18 months, has touched around 1,500,000 Deutschmarks (around £220,000). The only outside help was from an acoustic engineer. And the first cheerful news that Koppers received from him was 'You will never build a studio in this basement'. Every noise from above came down, even the sound of humans walking in stockinged feet and dogs acampering about after them and every sound from below floated up. They finally licked the problem and achieved a 16 dB acoustic noise level (20 dB with the air-conditioning running) by what must be the most drastic soundproofing ever. From the ceiling, an airgap of around 20 cm was formed by sheets of chipboard suspended by flexible connections. More flexible connections held sheets of gypsum on which were clad sheets of pressed straw and cement to which were added layers of Rock-wool. The final facing is of tiles with cavity resonators of various sizes opening out on both surfaces. The flexible connections are wood battens and felt strips with the fixing screws or nails applied so that no direct mechanical connection exists between the two bodies being interconnected. The result of all this soundproofing is the desired end result of no sound leaking up or down (in any case, because

46 ►

Jurgen Koppers remixing on a Helios desk in the reduction room well.



SANSUI

Top quality in everybody's price-range.



First rate quality needs not be expensive. Sansui has seen to that. For instance Sansui's popular AU-101 Solid State Stereo Control Amplifier can be had at a most favourable price. Its tonal quality, versatility, ease of operation and economy make this inexpensive compact amplifier a highly successful best-seller.

The Sansui TU-505 AM/FM Solid State Stereo Tuner is the perfect complement to the AU-101.

Its optimum sensitivity, selectivity, capture ratio, image rejection, distortion, separation and various other features assure the best in stereo sound. The TU-505 also goes well with San-

sui's AU-505 Solid State Integrated Amplifier. Another best buy with some more power than the AU-101.

So if you want better quality for your money, try Sansui. It's sound advice.

And don't forget to get a close look at Sansui's SH-15 "hear-through" stereo dynamic headphones.

With a total weight of less than 10 ounces, the SH-15 contains full-range dome speakers delivering full rich sounds over the complete audio frequency spectrum with accuracy and superior tonal quality.



SH-15

Coupon to be send to: VERNITRON LTD.

Gentlemen,
I do want to know more about your AU-101, AU-505, and TU-505 models. And their prices. Please send me details.

Name: _____

Adress: _____

England: VERNITRON LTD., Thornhill Southampton SO9 QF - Tel.: Southampton 44811
SANSUI AUDIO EUROPE S.A., Diacem Bldg. Vestingstraat 53/55 - 2000 Antwerp Belgium
SANSUI ELECTRONICS CORPORATION 55-11 Queens Boulevard, Woodside, N.Y. 11377, U.S.A.
ELECTRIC CO., LTD. 14-1, 2-chome, Izumi, Suginami-ku, Tokyo 168, Japan

STUDIO 70

Studio 70 own the whole building, they were able to ensure that the apartments were rented out only to people who would not complain anyway). The effective ceiling height throughout all the studios is now low (around 2.6m) and the result is a very dry studio acoustic with a reverberation time of only 250 ms \pm 3 per cent over the range 40 Hz to 14 kHz. This means that good clean separation between instruments even in such relatively small studios can be achieved without the use of boxing in or cubicles. This pleases most musicians who on the whole don't like the 'farm stable' approach necessary in more live studios. Studio 70 have sometimes packed 20 or 30 unstabled musicians into the relatively small space without sound spill problems. Sometimes they also bring in the young residents from the apartments above (around 50 at a time) to help create ambience for live recordings. This saves going out to record live in a club, although Koppers does hump a Studer desk and stereo recorder out once a month to a jazz club and record live for radio. I brought back some copy tapes of studio-audience sessions that were made for a youth club record label and they do have a real party feel about them.

According to Kopper, most German studios tend to have a reverberation time of around 800 ms or even 1s, which makes close miking and stabling essential. But he had heard some British studios with a time of around 450 ms and thought this was for him. But 250 ms was not quite what he has in mind!

The advantages of short reverberation times are of course well known; the clean sound on tape can be jiggered round with delayed reverberation, and echo. But a reverberant original is that way forever.

There is a fairly traditional approach to the recording of strings which assumes that a reasonably live studio is best. So when Studio 70 started recording strings they packed in as many as possible to compensate for their dry sound. Gradually they realised that less and less strings were necessary. Among the excerpt tapes I brought back are some with as few as half a dozen strings (four violins, two violas, and one cello is a fairly usual lineup) and the fullness of sound is really quite staggering. Obviously the players are good, and the scoring is well considered, but the real trick seems to be in getting the basic sound on tape very dry and then simply adding a little reverb.

One of the first problems Koppers encountered in getting Studio 70 off the ground was finding the right staff. He wanted young people in whom traditional German ideas were not yet formed. This meant taking enthusiastic but completely inexperienced people and training them from scratch. He pays them around £2,200 pa from the start on the sensible assumption that this way he won't end up training new staff every three months. I still remember my first boss who paid me £11 a week and then complained bitterly about 'having wasted time on training me' when I went elsewhere for twice the money. Assistants appeared variously from all over the world and the current staff runs at four sound balancers, a couple of freelance helpers, three assistants,

and a technician for repairs. Various freelance film editors and dialogue directors are brought in for the dubbing as and when necessary. One sound balancer is from Israel and another from Canada. The latter arrived when there was enough staff anyway. But after he had turned up every day for two months 'just to sit in and watch' Koppers gave way and employed him.

English seems to be the international language for most sessions at Studio 70 and they tell me that this is increasingly the case throughout German studios as a whole. More and more English musicians are working there, either on a regular or visiting basis.

Current projects include building a dubbing room off the reduction room. Another interesting side effect of that low ceiling and dry sound is that musicians dubbing on extra tracks can listen to the existing tracks via monitor speakers without too much risk of the monitor sound getting on to the dubbed tracks. Of course, if a monitor sound does reach the dubbed tracks, the two will be inextricably combined and the whole point of multitrack recording will have been lost. But many musicians prefer to overdub with a monitor speaker rather than with headphones. Where headphones are needed Studio 70 usually use Sennheiser *HD114* which are transparent enough to allow the musicians to hear their own playing. With closed phones, the musicians have difficulty in playing in tune unless they wear one phone over one ear, which is awkward. But the snag with open phones is that a feedback loop may be created between an open phone and a microphone, especially in a fairly live studio. Hence another point in favour of dryness.

Like many studios, Studio 70 have a favourite local rhythm section and this includes guitar player Ziggy Schwab, bass player Peter Trunk (ex-Kurt Edelhagen) and British drummer Keith Forsey, all of whom now live in Munich. Wherever possible, Koppers tries to persuade record producers to let him book the musicians so that for the most part he is working with men he knows and who know the studio and its sounds.

The Munich 70 equipment includes Studer eight and 16 track recorders. The music studio

has a Studer desk (originally 16/8 but modified) and the reduction room has a Helios which was originally built for Island but for one reason or another never got there. Some compressors and NTP light meters were added. The latter give a ppm reading in white up to 0 dB, red thereafter, and work on the light galvanometer principle. Location recording is with a Studer 12/2 desk, Studer stereo recorder, an AKG reverberation unit and Neumann capacitor microphones. Thus all location recording is put straight down into stereo rather than recorded in multitrack and then remixed. Studio microphones are AKG, Neumann, Sennheiser and Beyer. Koppers expresses a preference for *U47* for voice rather than the newer *U87*. The Helios desk is very popular but the Studer may go, replaced perhaps by another Helios. 'The Studer is beautiful, with no distortion', said Koppers 'but we need the kind of flexibility that a Helios can offer. Although we've converted it from 16/8 to 24/8, we really want 24/16 because we have a 16 track facility on the Studers. Also, German desks tend to be built by electronics engineers rather than sound engineers. For the kind of equalisation we want, we need a foreign desk'.

British prices

I asked about equipment prices in Germany and what I had been told in Berlin was confirmed. Namely that it is far cheaper to buy British equipment in Germany than German equipment. It is even cheaper to buy British in the UK and transport it to Germany. For instance 16 tracks of Dolby cost 35,000 DM in Germany (around £5,000) but can be bought in England for 25,000 DM (around £3,500) with only a 6 per cent import surcharge. At the moment Studio 70 use only two Dolby A units for mastering on the stereo Studer but reckon they will eventually go full Dolby. Some second thoughts were provoked by a demonstration of the new Burwen systems. The first is a record/playback compandor system with massive noise reduction. The other Burwen system is for playback only with a preset variable sensitivity automatically variable bandwidth amplifier, having a mid-frequency of around 600 Hz. This band opens each side of the centre fre-

Studer desk in the music control room.



quency, up or down, to clean up old recordings. Those who have heard the system enthuse and suggest there may be a place in some studio setups for both Burwen and Dolby. Doubtless we shall hear more about both Burwen systems in the not too distant future.

Rates at Studio 70 are around the average for Munich studios. Music recording is 150 DM per hour (£22) for 16 track, including sound engineer, or 120 DM per hour (£17.65) with a sound engineer from outside. Reduction is 135 DM per hour (£20). Musicians in Germany are paid either at a rate of around 50 to 70 DM per title (£9) or at around 30 to 45 DM per hour (£5). Film dubbing works out at 90 DM per hour (just over £13) whereas in Berlin it averages 170 DM per hour (£25). Dubbing in Munich is the cheapest in Germany.

Not surprisingly (bearing in mind their movie origins) Studio 70 do a great deal of film dubbing work. The feature films are broken down into short (around 10s) loops projected on the dubbing studio screen. A dialogue coach assists the dubbing actors into matching their voices to the lip movements on screen. While I was there, a Japanese film was being dubbed into French but of course the principle is the same whatever the language. The film loop runs on until a successful recording has been made and then the dubbed sync voice track is mixed down with the international effects track and music track (both separate) which have been supplied along with the film. The final mixed track with original music and effects but fresh voices in sync with the visuals, is sent to the labs. On average it takes two days to record and one day to mix. The labs finally recut the negative as necessary to make up for the frames which have inevitably been lost in making up and breaking down the loops. So if you ever wondered why dubbed films are slightly shorter than the original versions, that's the answer.

All film dubbing in Germany is done with 17.5 mm magnetic coated film rather than 35 or 16 mm film. The machines used can handle both 35 and 17.5 mm but, as for the most part only half the width of 35 mm coated film is used, the logical thing is split it down the middle and cut costs by half. It also tends to

be easier to join 17.5 than 35 mm.

For dubbing short (30s) commercials into foreign languages, a continuous loop of magnetic coated film is run in sync with a visuals loop on the projector. The music and effects tracks are also looped so that the dialogue coach and the actors can work ad infinitum without stopping or 'rocking and rolling' (as in the USA) until they get the desired result. This technique would of course not be workable with feature films where only the visuals are looped and the dubbed track is built up in segments throughout the length of a continuous spool of magnetic 17.5 mm film.

One of the things which frustrates Jurgen Koppers is that, with no proper union control of music and recording in Germany, there are no session times. Studios are booked by the hour and musicians and engineers tend to plough on until they have got what they want. This may be good for business but it is bad for the end products. After a day of recording nobody is in fit state to start six hours of mixing through the night. What sounds good through the mists of fatigue will probably sound awful and need to be scrapped next morning. But nobody can persuade German musicians and producers to work in three or four hour sessions. The way Studio 70 handles things now is to alternate engineers, one handling the recording of rhythm section, another the over-dubbing of voice or strings, and the original man coming back for the reduction. That way the engineers stay relatively fresh but the engineer doing the remix is still familiar with the music.

It was a trip home to Israel by the acoustic engineer that resulted in the Helios desk in the reduction room being sunk into a 1m deep well hewn out of the concrete floor.

One of the problems with quad mixing is that the very presence of the engineer and desk in a room create unnatural sound paths. The engineer visited a synagogue in Israel to hear a choral recital. The audience had sat in a sunken auditorium while the chorus performed above and around them.

The Israeli finally sold the idea to Koppers and the hole was duly dug and carpeted. Now it looks as if holes may be dug in the other

control rooms at Studio 70. Is this perhaps the answer to reflection-free quad mixing? Only time will tell.

Before I left for England, I went with Jurgen Koppers for lunch in the revolving restaurant some 200m up the tower of the Munich Olympic complex. Over lunch I heard plenty of local studio tales, most of which the laws of libel keep me from repeating. Like the problems of running a studio when groups come in, record all day, and then admit they have no money. Like record producers who don't know what sound they want or how to get it. And which international duo now live in Munich but are banned from virtually every German studio for throwing the microphones against the walls when things go wrong. And how they forget to pay not only for studio time, but for the musicians as well.

I heard how the engineers keep unskilled producers happy by recording flat but putting some equalisation on to the monitored sound during recording. And I heard about plans to build a reverberation room in an old oil tank (remember the studio was once a garage). The chamber will be tuned by filling up with oil or water until it sounds right. Finally I learnt of the latest offer of a job that had just come in: a request from America for 6,000 background titles at the rate of 1,500 per year. Background titles are a big industry in Germany because of the loose union control which in theory restricts such recording in Britain.

'What I don't want' Koppers explained, 'is the studio to turn into a factory. We try and limit the amount of work we take, spreading the load between bread and butter earning work and productions that we want to do and which may or may not make money. It's what keeps the staff, including me, interested'.

On my way to the airport we stopped off at Studio 70 to pick up my suitcase and say goodbye. Koppers greeted one sound engineer. It was his day off but he was chatting down in the canteen. That doesn't happen in a factory.

Music studio equipment (below left) and film dubbing studio (below adjacent).



MANTA SOUND

By
Steven Vaughan



Photos by Moffat,
Moffat and Kinoshita

ONCE UPON a time, way back before 1969, two brothers had a dream. The brothers were Andre and Adam Hermant and the dream was for a recording complex in downtown Toronto that would be the most modern of its kind in Canada. Now it is well known in Toronto that the Hermant family are not short of a dollar or two so before long, dear reader, our two heroes went about the business of making their dream come true.

First of all, they laid down specifications for the complex, and then they took those specifications to Toronto architects Moffat, Moffat & Kinoshita, who with the help of several consultants designed the building that now houses Manta's facilities. The first consider-

ation was that the site was situated in a neighbourhood of much higher brick industrial buildings and the architects' intent was to 'plug-in' this brick building, of much smaller scale, in an unobtrusive way by means of massing and restraint. This they did so successfully that in 1972 they received a 'Design Canada' Award of Excellence from the National Design Council.

Over the period that Manta's building was being erected, the brothers Hermant were not idle. Adam was shipped off to Europe to find the best equipment and also, if possible, to find some good engineers who would be willing to travel to Toronto to live and work.

Finally, in November 1971 Manta Sound

opened for business. Adam Hermant has since departed to other things so it was to managing director Andy that I spoke. I began by asking for a description of Manta's facilities.

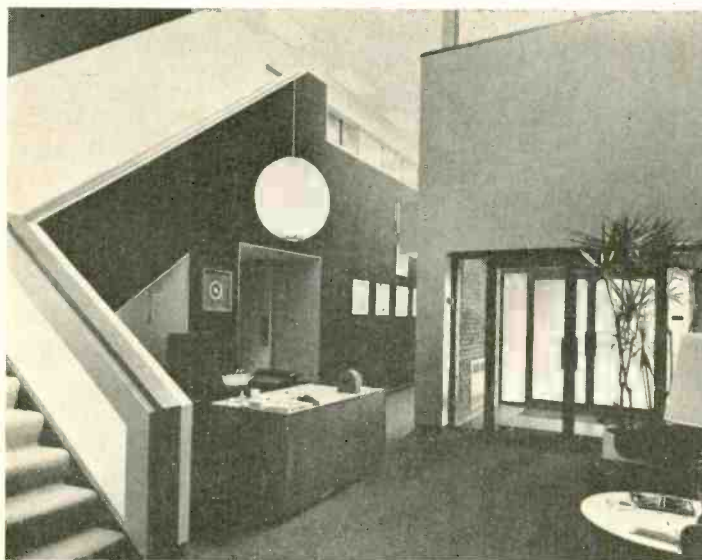
'We have two studios and a production room. Perhaps I can start from the smallest and work up. The production room is where we do all our tape copying and editing. There are no mixing facilities in this room but the monitors are matched to the ones in both studios so there are no worrying moments for people editing albums here. Their tapes will sound exactly as they do in the other two rooms.'

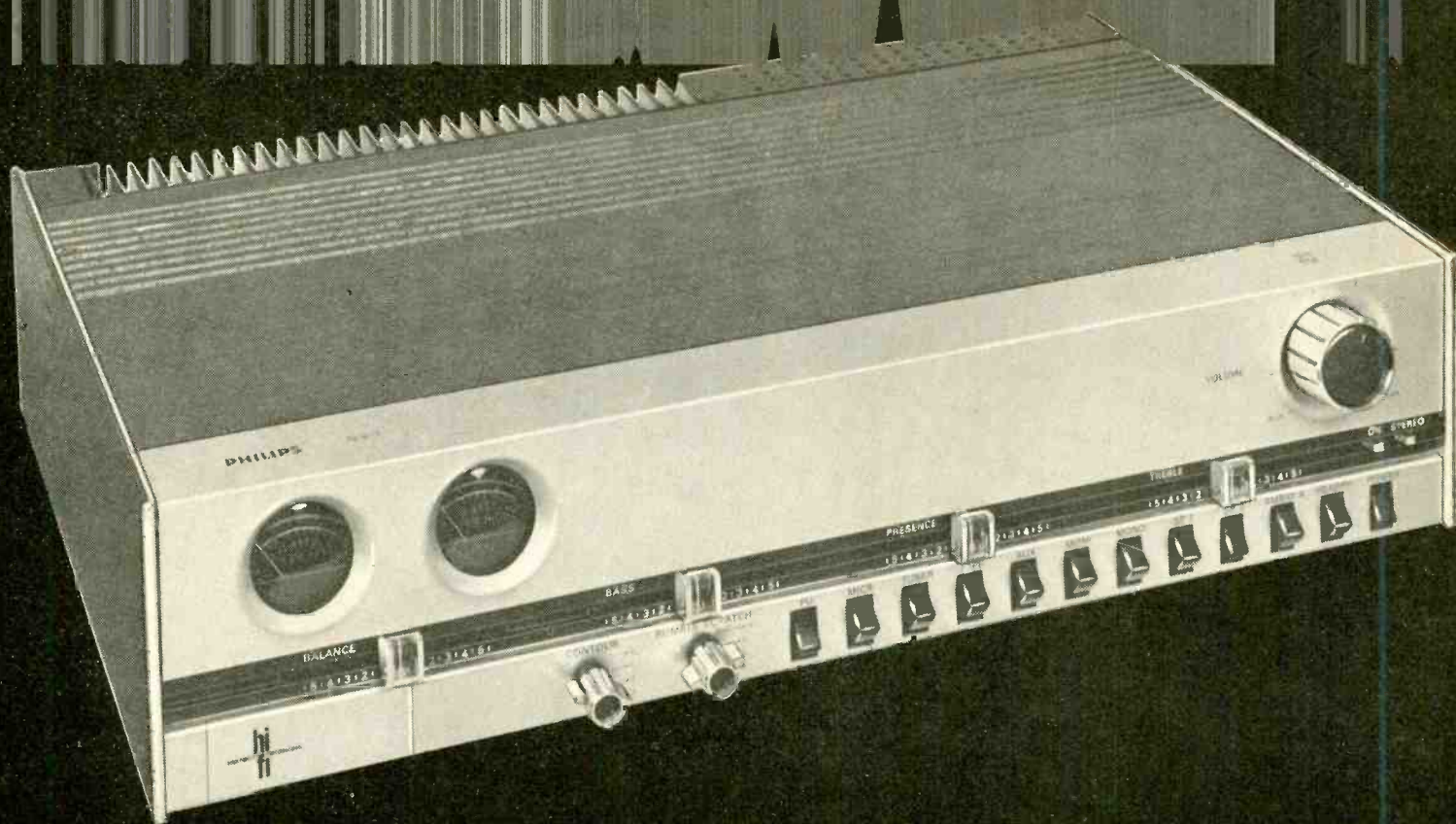
'The production room is the only place where we have anything other than Studer. In fact it is equipped with Ampex throughout except for a Sony stereo cassette machine and a Revox.'

'For some reason that I've forgotten, we numbered our studios in the reverse order and studio One is the smaller of the two. The studio measures 4 x 6m approximately and can handle up to eight musicians although we normally only use it as an overdubbing studio. The control room is 6 x 8.5m. As far as equipment goes it is equipped with a Neve S16/4 desk, sixteen inputs and four out. We use this primarily as a mix-down room for tapes recorded in studio Two. The monitors are Altec Lansings which are powered by Macintosh 2100 amplifiers. This combination is in fact used throughout the complex. At the present time we are trying to get together enough of the Macintosh valve amps to change over to them, as we feel you get a warmer sound from valve amps, but we won't change until we can do the whole complex.'

'The machines in here are all Studer and there is one 16 track, one four, one stereo and one mono. The 16 track is convertible to eight if

50 ▶





This new Philips stereo amplifier gives you everything you want.

And still has something in reserve.

And that something is flexibility. The flexibility that puts you in precise control of every listening situation, from low background music to full-power 'surround sound' using four loudspeaker enclosures.

The Philips RH521 is one of today's most sophisticated amplifiers, built to standards that make the DIN 45 500 (Hi-Fi) look very ordinary.

You get an output of 2 x 30 watts continuous sine wave (2 x 40 watts Music Power), with distortion well under 1%. And a frequency response of 20 Hz to 20,000 Hz, plus or minus only 1 dB.

Two power meters allow you to adjust each channel's output precisely.

A 4-position contour switch and double-tapped volume control give you as many as six degrees of physiological compensation for loss of notes in the highest and lowest register at low volume settings.

Other controls for precision adjustment of sound include sliding potentiometers for balance, treble and bass; scratch and rumble filter switches to suppress high and low frequency noise; and a sliding potentiometer for 'presence', to strengthen or reduce the middle frequencies of a recording—such as the vocal section, or brass instruments.

You can connect a microphone for Public Address use, and headphones for private listening. The sockets for these are conveniently positioned in the front panel, concealed beneath a sprung aluminium flap.

You also get inputs for magnetic pickup, tape, tuner, auxiliary, and monitor (permitting A-B monitoring of tape recordings). And outputs for tape and two pairs of loudspeaker enclosures.

You can select either pair of loud-

speaker enclosures for stereo—so that you could provide stereo in two separate rooms, for instance. Or you can select all four in one room for Philips Stereo-4 'surround sound', achieving a quadrophonic effect at a fraction of the cost of the available discreet systems.

The elegant styling of this model combines extensive use of brushed and polished aluminium with walnut veneers.

Ask your Philips dealer for a demonstration. And write for a free 36-page Audio Guide—to Philips Electrical Limited, Dept SP, Century House, Shaftesbury Avenue, London WC2H 8AS.

PHILIPS



We want you to have the best.

■ MANTA SOUND

necessary. There are also several other stereo machines which are mounted on trolleys so that they can be moved to whatever location they are needed in. Actually this is the case with every machine because on occasions we find we have to do 16 to 16 transfers so every machine has to be easily movable.

'With studio One's desk there are four Neve compressors built in. Also we have a variety of others which, again, are movable to any location in the building. These include Fairchild Universal Audio and some portable Neve compressors.

'Studio Two is 18.25 x 13m with an 8m high ceiling and can handle up to 60 musicians at a

time. We spent around six months with this room getting exactly the acoustics we required. This was done by bringing groups in and recording them. Then we tried different materials on the walls until we finally came up with the right combination. We find the acoustics suit all the types of music that we encounter. There is also a vocal booth next to the control room, but we find that we don't use it so much. In the studio itself we have built a booth which is completely enclosed and mounted on wheels so it can be moved anywhere in the studio that the vocalist wants. We find that in most cases they prefer it to the original vocal separation booth. The control room itself measures 5.75 x 11.75m with a 3m ceiling.'

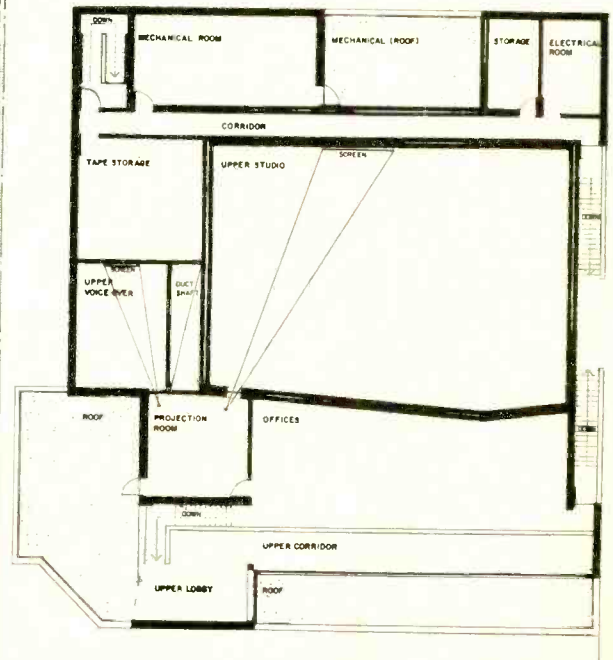
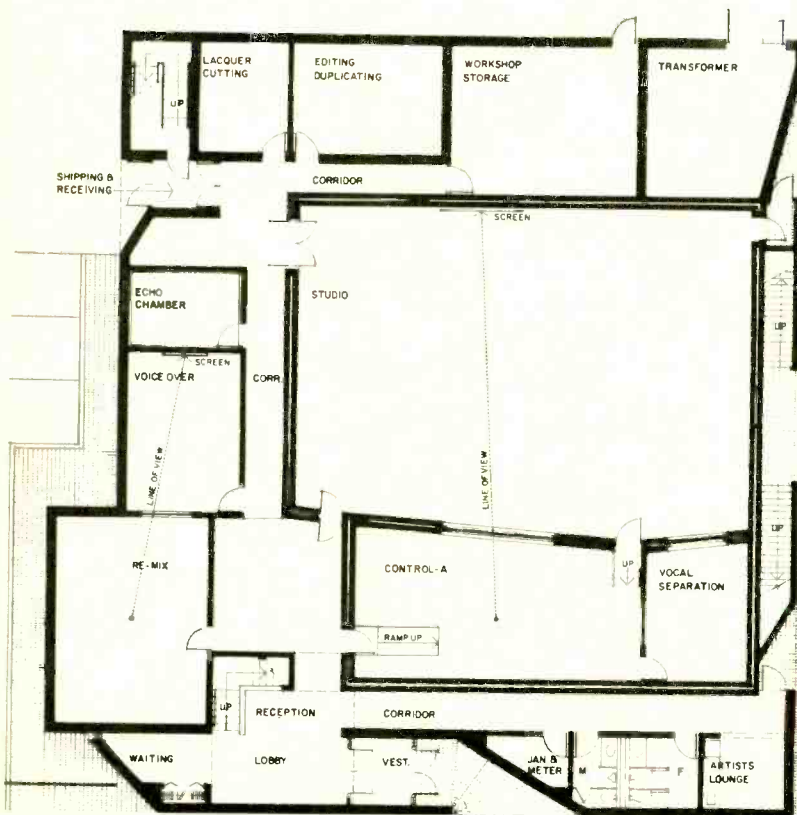
Manta's mixing desk is not exactly standard. I asked for an explanation.

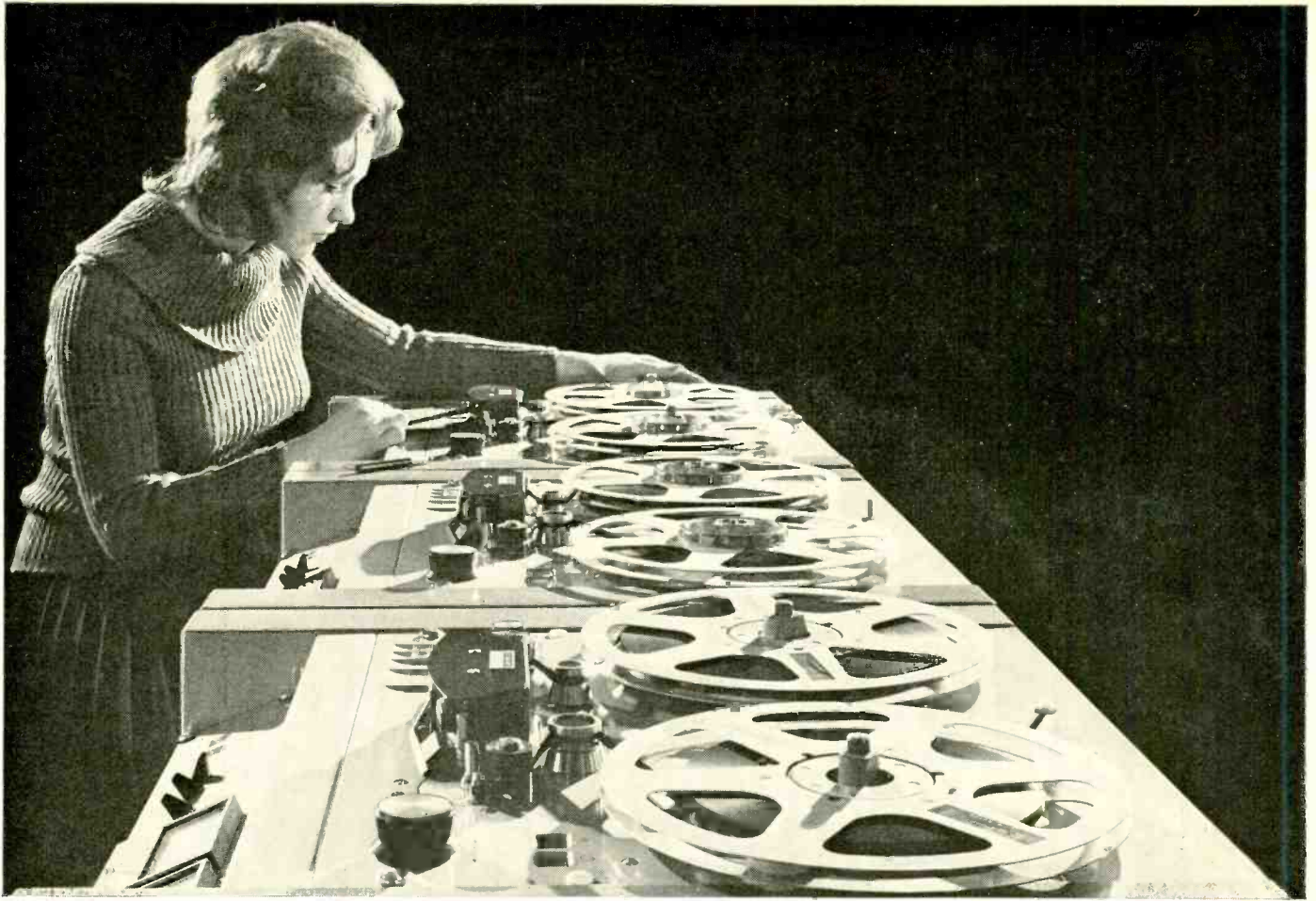
'The specifications were laid down by myself and David Greene who is our head engineer. We agreed that a client paying studio rates plus several session musicians is entitled to a reasonable amount of quickness in the control room. Therefore the recordings should be made flat, without equalisation, and the equalisation added later. So why clutter up the desk with equalisers when the space could be used for more important things such as a comprehensive foldback mix, a separate mono and stereo mix that can be run at the same time as the 16 track master, remote controls for the machines, and easily accessible track routing switches. The desk was built by a Toronto firm, J-Mar Electronics. There are no master faders as such. Any group of faders can be assigned to any one fader and that fader then becomes the master fader for that track. Or a fader can be assigned to a track and it becomes its own master. There are 32 inputs to the desk and 16 out. There are four foldback feeds so that each musician can get more or less exactly what he wants in his headset. When the engineer does want to equalise, there are several kinds of equalisers available. We have six Tempo equalisers which are made in Toronto and are the only ones built into the desk. Behind the balancer's chair in a rack are several Neve and Pultec equalisers. We also have several Pultecs which are portable and used in both studios. For echo, we have four stereo EMT plates and an AKG BX20 spring. Also in the back of the studio is a stairway which we've discovered makes an excellent live chamber'.

Manta Sound are also fully equipped for



Below: Ground and upper floor plans of Manta Sound.





for the professional

contact **Derek Owen** at 01-874 9054 or
Telex 923455

LEEVERS-RICH

EQUIPMENT LIMITED

Agents in Scandinavia, Eastern and Western
Europe, Middle East, Africa, Australasia and
the Far East.

LEEVERS-RICH EQUIPMENT LIMITED
319 TRINITY ROAD · LONDON SW18 3SL
Telephone 01 874 9054 · Telex 923455
Cables LEEMAG LONDON



A MEMBER OF
THE MCP GROUP

VIDEO

AKAI (Japan)

Agents: Rank Audio Products, PO Box 70, Great West Road, Brentford, Middlesex TW8 9HR.

Phone: 01-568 9222

CCS150 colour

Colour system: 625 PAL.

Vidicon tube: (luminance channel) 17 mm electrostatic focusing, electro-magnetic deflection type vidicon; (chrominance channel) Akai colour dissector tube.

Viewfinder: Internal crt.

Lens: 12.5 to 75 mm zoom lens, f2 to closed.

Aperture: Automatic and manual.

Scanning: 625 lines, 2:1 interlace.

Horizontal resolution: 300 lines.

Signal-to-noise ratio: 40 dB.

Ideal subject lighting density: 1,500 lux (minimum subject lighting density: 600 lux using a 500W Halogen type lamp at 2m).

Automatic sensitivity control range: 600 to 20,000 lux (ND-4 standard accessory: 2,400 to 80,000 lux; ND-8 optional accessory: 4,800 to 160,000 lux).

Microphone: 600 ohm unidirectional.

Power requirements: 12V dc supplied from control unit.

Dimensions: 88 x 235 x 335 mm including lens hood and hand grip.

Weight: 2.62 kg including eye-hood assembly.

Control unit video output: PAL.

Rf converter output: PAL.

Control unit power requirements: 240V ac $\pm 10\%$, 50 Hz.

Power consumption: 50W.

Dimensions: 260 x 102 x 230 mm.

Weight: 3.64 kg.

Price: £1,450.

VC110 battery

Designed for Akai battery vtr.

Tube: 16 mm vidicon tube.

Horizontal resolution: 400 lines.

Video signal-to-noise ratio: 40 dB.

Video output: 1.4V p-p, composite signal.

Aperture selector: f1.8 and f5.6.

Lens: 10 to 40 mm, 300m.

Viewfinder: Single eye reflex.

Power source: 9V dc.

Focus adjustment: Micro-split image.

Microphone: Unidirectional built-in mic, 600 ohms.

Dimensions: 75 x 113 x 187 mm.

Weight: 1.9 kg including grip.

Price: £195.

AMPEX (USA)

Agents: Ampex (GB) Ltd, 72 Berkeley Avenue, Reading, Berkshire.

Phone: 0734 84411

BC230B colour

Standard features: Automatic centring, bias-lighted prism, extended red plumbicon, return viewfinder feed, adjustable viewfinder hood.

Colour standards: NTSC, PAL or PAL-M.

Inputs: EIA/CCIR composite sync and subcarrier, and 7.8 kHz square wave or PAL P-pulse.

Outputs: Composite video, 1V p-p, 75 ohms NTSC or PAL.

Registration accuracy: Zone 1 (circle equal to 0.8 picture height) 0.1%.

Temperature range: (camera) -15 to $+45^{\circ}\text{C}$; (CCU) 0 to $+45^{\circ}\text{C}$.

Camera head stability: All controls stable over -20 to $+45^{\circ}\text{C}$ (auto centring on) after ten-minute warm-up period and over any 1,000-hour interval.

CCU: All controls stable over 0 to $+45^{\circ}\text{C}$ after ten-minute warm-up period and over any 1,000-hour interval.

Camera head: 584 x 240 x 432 mm.

Viewfinder: 230 x 203 x 203 mm.

Lens: Angeniux 10:1 f1.7 zoom lens, weight 15.4 kg.

Canon 10:1 f2 zoom lens, weight 5.9 kg.

BC-300 battery

Designed for Ampex VR3000 battery vtr.

Basic features: Weighs 7 kg with electronic viewfinder. Can be carried on VR3000 back-pack frame.

6:1 zoom lens, built-in three-step neutral density filter wheel, and elapsed time indicator. Detachable, tilting electronic viewfinder. Includes tally light indicating proper VR3000 servo operation. Built-in EIA sync generator.

Available only with vtr.

CC452

Scanning: Random interlace; 2:1. Optional sync board for CCIR output.

Grey scale rendition: At least ten shades of grey using EIA grey scale overlay strips with the EIA standard chart.

Output video: Composite, 1V p-p amplitude at 75 ohms, sync 28% of total amplitude; black negative polarity. Provisions for picture polarity reversal and non-composite output.

Geometric distortion: 3% (maximum) within a circle equal in diameter to picture height.

Scan failure protection: Electronic.

Vertical scan frequency: Derived from ac power line. Optional vertical drive input 2 to 4.5V negative going pulse at 75 ohms.

Price: £520.

EIL

Manufacturers: Electrocraft Instruments Ltd, Coombeswell, Farnham Lane, Haslemere, Surrey.

Phone: 042-873 5190

TVT/6/MCVH colour

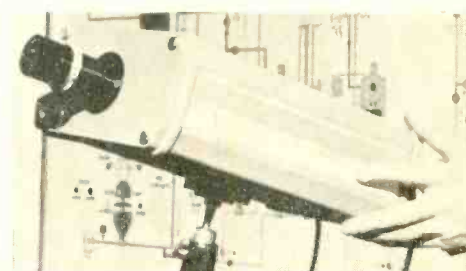
The camera tube has video encoding colour stripes on the surface of the fibre optic faceplate which

54 ►

Survey: Television cameras

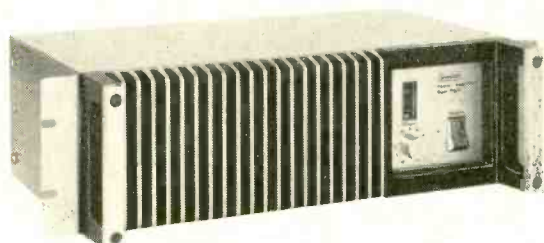


Ampex CC452



EMI Surveyor

RECENT ADDITIONS TO SERIES 7 POWER AMPLIFIERS



Since the company started the manufacture of the Series 7 Amplifiers, these have proved immensely successful with large Contracting and Rental Companies, and have proved so reliable in use that we now offer a 3 year warranty on these units.

Another off-shoot of the success rate of these Amplifiers is that they are now available in many variants as listed below:-

TYPE No.	DESCRIPTION
743	Basic 50 Watt Amplifier.
7431	743 with Peak-Reading Output Meter.
7432	743 with Covered Controls and no Supply Switch.
7433	743 Studio Monitor version with Extended Frequency Range but no 100 volt Output.
744	Basic 100 watt Amplifier.
7441	744 with Peak-Reading Output Meter.
7442	744 with Covered Controls and no Supply Switch.
7443	744 Studio Monitor version with Extended Frequency Range but no 100 volt Output.
7444	744 with 70 volt in place of 100 volt Output.
7445	7441 with 70 volt in place of 100 volt Output.

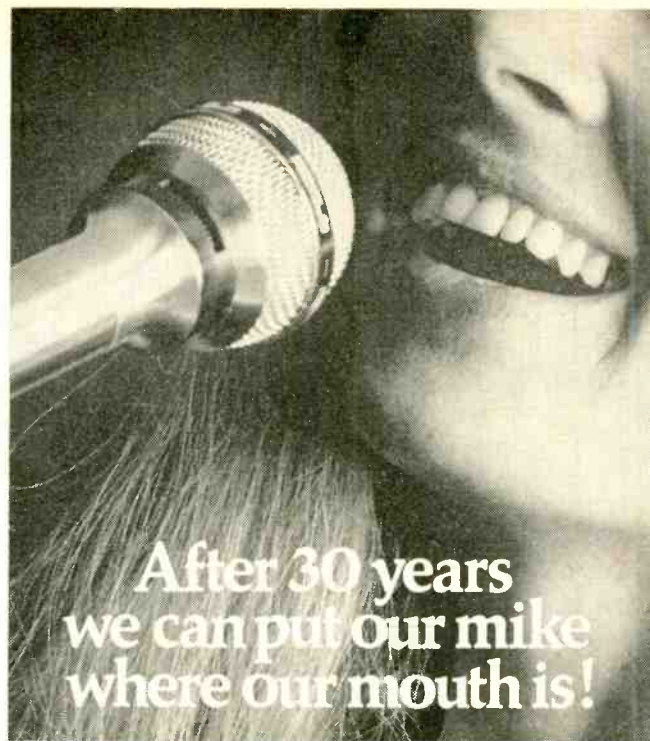
Grampian

SOUND EQUIPMENT

GRAMPIAN REPRODUCERS LTD

HANWORTH TRADING ESTATE,
FELTHAM, MIDDLESEX.

Telephone: 01-894 9141.



After 30 years
we can put our mike
where our mouth is!

For just over 30 years now RESLO have been making microphones of all shapes and sizes.

We believe that entitles us to a little trumpet-blowing about the quality and performance you can expect from microphones backed by that sort of experience.

There are some eleven different types of basic wired microphones covering a whole range of applications.

In addition RESLO make three superb radio microphones designed to add an extra dimension to your act by enabling movement free of trailing leads.

RESLO also make matched receiver units for the radio microphones and a wide range of accessories, stands, leads and clips for the other model types.

But after all's said and done, RESLO microphones speak for themselves, so for a start, why not send off the coupon below and we'll mail a brochure showing you our full range.

RESLO

Spring Gardens,
London Road,
ROMFORD, RM7 9LJ.
Tel: Romford 61926

It all sounds too good
to be true...

I'd like your full brochure on
the RESLO range I want to know about
RESLO radio microphones

Name.....

Address.....

VIDEO

enables separation of the video output signal into a broadband luminance and narrow band red and blue signals by electronic means. The camera is split into two basic units, coupled by a 12 mm camera cable (maximum length 10m).
Price: £1,500.

EMI

Manufacturers: EMI Television Division, 252 Blyth Road, Hayes, Middlesex UB3 1HW.
Phone: 01-573 3888 Ext. 2205

Surveyor

Systems: 625 lines/50 fields or 525 lines/60 fields. System selection by internal links.

Power supply: 100V, 125V or 200V to 250V rms, 50 Hz to 60 Hz.

Outputs: One 1V composite video signal, white positive, 0.7V video and 0.3V sync to be terminated in 75 ohms. Waveform similar to EBU or EIA recommendations including equalising pulses. Output can be adjusted to 1.4V p-p or made non-composite if required.

Geometric distortion: ±2% of picture height or width.

Lenses: C mount (may be adapted to take B).

Pickup tube: EMI 9745 electrostatic vidicon or equivalent.

Dimensions: 110 x 210 x 315 mm.

Weight: 5.9 kg.

Price: £300.

2004/1Z

Basic features: Switched scan reversal. Switched gamma correction. Switched NEG/POS picture. Built-in test signal facilities and cue circuits. Up to 300m camera cable can be used. Four-position neutral density filter. Focus rock (beam alignment). Camera will accommodate a studio flange, 'B' or 'C' mount lens. Employs 30 mm separate mesh lead oxide Vidicon (2004Z) or 25 mm separate mesh standard Vidicon/lead oxide Vidicon (2004/1Z). Plug-in and hinged circuit boards for ease of servicing. Operates on standard broadcast 625 line

50 field (CCIR) system or 525 line 60 field (EIA) system. Three isolated video outputs any of which can be composite or non-composite. 18 cm tilting viewfinder. Variable level dependent aperture correction.

Price: £3,700.

2005 colour

Basic features: Uses three 30 mm lead oxide vidicon tubes. Auto centring. Bias lighting. Remote capping. Built-in six-position filter wheel. White shading corrector. Manual or servo zoom lens option. 190 mm tilting viewfinder. Three isolated outputs of each of the R, G and B signals. R, G, B chroma key outputs. External viewfinder mixing input. Viewfinder indication of lens focal length. Showerproof construction. Standby mode for tube economy.

Dimensions: 381 x 467 x 484 mm.

Weight: 38.6 kg.

Price: £19,800.

IKEGAMI (Japan)

Agents: Dixons Technical Ltd, 3 Soho Square, London W1.

Phone: 01-437 8811

CTC2002

Compact two-part camera. Small size of camera head 61 x 80 x 196 mm and remote control of functions make the CTC2002 suitable for industrial and underwater applications. Supplied complete with control unit and camera control cable.

Price: £185.



CTC4000

16 mm vidicon. 350 line definition. Supplied complete with 16 mm lens.

Price: £99.

CTC5000

600 line horizontal definition.

Price: £160.

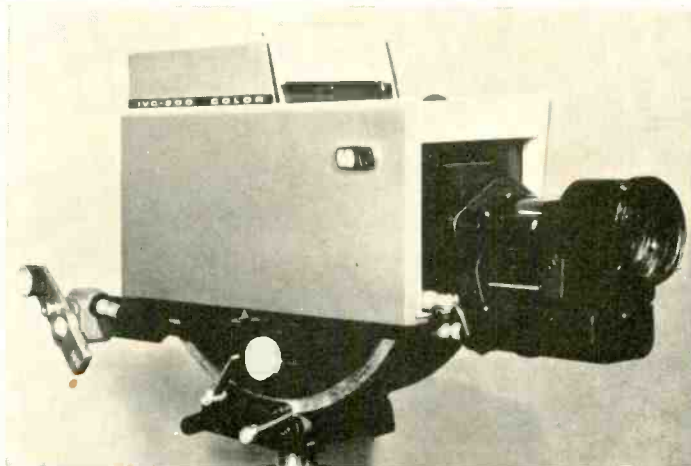
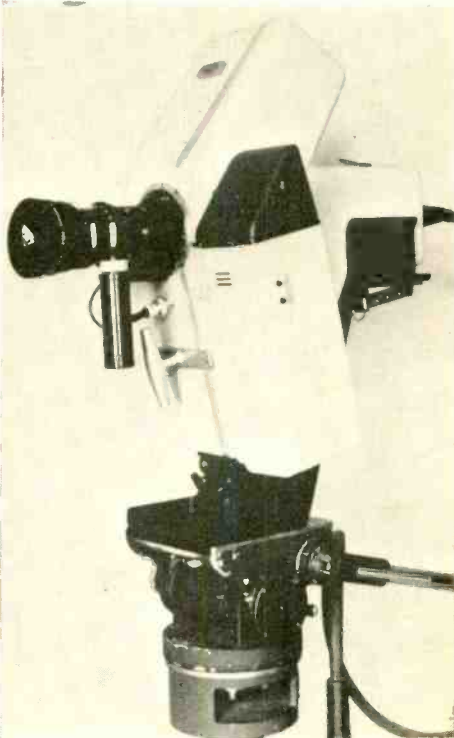
CTC6000

Accepts all clip-on accessories of 5000 range with the facility of optional ccu and associated benefits, 700 line definition.

Price: £380.

CTC8001

Available in variety of forms to suit any application up to 1,000 line definition. Supplied complete with



Above right:
EMI 2005
Above far right:
RCA TK630
Right:
IVC 500 (501)
Far right:
RCA TK4415

10m control cable and ccu. Wide range of accessories available.

Price: £950.

OD52

Outdoor camera in weatherproof case.

Price: £190.

IVC

Agents: International Video Corporation, Liverpool Victoria House, Cheapside, Reading, Berkshire RG1 7AG.

Phone: 0734 585421

41M

Basic features: Self-contained or remote control with three ccu options. Vidicon or plumbicon standard or separate mesh pickup tube plug-in viewfinder. Cctv, catv or broadcast applications. 850 lines resolution. Fet cascode preamplifier. Random/crystal, 2:1 CCIR or EIA internal sync built-in.

Price: £810.

91 colour

Basic features: Fet preamplifiers for low noise level. Electronic skew, linearity, and improved mechanical rotation controls. Improved optical system. Optional video meter eliminates waveform monitor. Available in self-contained or remote control configurations.

Basic price: £3,760.

151 colour

Basic features: Two plumbicons, one silicon diode tube. Completely self-contained for closed circuit operation. Optical configurations for external drive, PAL or SECAM encoding 6:1, f1.9 zoom lens; 10:1, f2 optional. High sensitivity for operation down to 100 lux. Fet preamps for low noise level.

Basic price: £7,365.

501A colour

Basic features: Silicon diode red tube. Fet preamplifiers. Rgb contours from green enhancer with noise coring and comb filter (optional). 100 lux operation.

Registration error: Less than 0.15% within a circle having a diameter equal to 80% of picture height.

Gamma: Switchable 0.3, 0.5, 0.7, 1; maximum tracking error 1%.

Signal-to-noise ratio: 45 dB at 150 nA signal current in green tube.

Basic price: £11,250.

MIRAGE

Agents: Dixons CCTV Ltd, 3 Soho Square, London W1V 5DE.

Phone: 01-437 8811

HD800

Controls: Auto/manual switch, beam, sensitivity (target), focus (beam), black-level (pedestal), power switch, optical focus, vertical drive input, horizontal drive input, external/internal, drive switch, VB/VBS output switch, fuse holder, power input, three test points.

Video output: 1V p-p composite, 7V p-p non-composite.

Bandwidth: 10 MHz (rms noise measured at horizontal speed referred to peak white 35 dB).

Vidicon tube: XQ1241 separate mesh. Silicon or plumbicon tube may be fitted.

Scanning system: Random or external drive 2:1 interlace.

Weight: 4 kg.

Dimensions: 320 x 160 x 130 mm.

Lens mount: C.

Price: £215.

NATIONAL (Japan)

Agents: Dixons Technical Ltd, 3 Soho Square, London W1V 5DE.

Phone: 01-437 8811

WV85 battery

Designed for National battery vtr.

Power requirements: 12V dc.

Power consumption: 8W.

Scanning system: 2:1 interlaced, external sync negative.

Standard lens: 15 to 75 mm, f2.1 C mount.

Vidicon: 16 mm separate mesh.

Video output level: 1V p-p (sync negative).

Horizontal resolution: 450 lines.

Video noise: -40 dB.

Minimum illumination: 50 lux.

Viewfinder: 36 mm crt.

Microphone: Internal electret.

Dimensions: 90 x 395 x 266 mm.

Weight: 2 kg (including zoom lens, camera grip and camera cable).

Price: £810 (including recorder).

RCA (USA)

Agents: RCA Ltd, Communications Systems Division, Sunbury-on-Thames, Middlesex TW16 7HW.

Phone: 76 85511

TK45A colour

Basic features: Automatic colour balance, automatic centring, automatic iris control, compact camera control unit, bias-light and contrast compression included.

Programme video: Two outputs (both composite or both non-composite).

Composite video: 1V across 75 ohms.

Non-composite video: 0.7V across 75 ohms.

Chroma key (R, G, B): 0.7V p-p.

Resolution capability: 600 lines.

Camera head (less lens): 470 x 298 x 508 mm.

Weight: 45 kg.

Camera control unit: 267 x 483 x 405 mm.

Power supply: 133 x 483 x 457 mm.

Weight: 33 kg.

Price: £16,000.

TK630 colour

Programme video: 0.7V p-p.

Monitor video: 1V composite or 0.7V non-composite.

Chroma-key: 0.7V p-p.

Pushbutton switchable waveform and picture monitor outputs. Red, blue, green, encoded video and external.

Minimum incident light for full video output: 500 lux.

Incident light for 45 dB s/n: 1,250 lux at f4.

Horizontal resolution: 500 lines minimum.

Optical filterwheel six-position thumbwheel operated.

Camera tube: 25 mm lead oxide.

Intercom line supplied for working with external 24V supply. Cue intercom optional.

Viewfinder diagonal: 228 mm.

Camera head: 203 x 456 x 558 mm.

Weight: 27.6 kg.

Viewfinder: 165 x 318 x 254 mm.

Weight: 8.9 kg.

Price: £15,000.

SONY (Japan)

Agents: Sony (UK) Ltd, Commercial & Industrial Division, Ascot Road, Feltham, Middlesex.

Phone: 69 50021

AVC3200CE

Scanning system: Random interlace.

Horizontal resolution: 400 lines.

Vertical frequency: 50 Hz.

Signal-to-noise ratio: 42 dB.

Video output: 1V p-p.

Automatic sensitivity control range: 300 to 100,000 lux.

Camera tube: 16 mm.

Lens: f1.8 16 mm 'C' mount.

Dimensions: 120 x 106 x 336 mm.

Weight: 3.1 kg.

Electronic viewfinder (AVF 3200CE): 50° deflection, 100 mm.

Weight: 2.35 kg.

Price: £199.

AVC4200CE

Vidicon: 16 mm separate mesh.

Scanning system: 625 lines, 2:1 interlaced scanning CCIR.

Sync system: Internal generator with lc oscillator 2:1 interlace. Accepts external horizontal and vertical drive.

Video output: 1V p-p sync negative, 75 ohms unbalanced.

Signal-to-noise ratio: 40 dB.

Minimum light level: 200 lux with f1.8 lens.

Automatic sensitivity control: 300 to 100,000 lux.

Lens mount: standard C.

Viewfinder: 70° deflection 101 mm.

Dimensions: 150 x 282 x 378 mm.

Weight: 8 kg.

Price: £385.

AVC4600CE

Vidicon: 25 mm separate mesh.

Scanning system: 2:1 interlaced, 625 lines.

Signal-to-noise ratio: 44 dB.

Minimum light level: 300 lux with f2 lens.

Automatic sensitivity control: 300 to 100,000 lux.

Lens mount: C with adaptor.

Viewfinder: 90° deflection, 101 mm.

Dimensions (camera head): 150 x 280 x 380 mm.

Camera control unit: 443 x 88 x 350 mm.

Camera head: 7.9 kg.

Camera control unit: 11.1 kg.

Price: £615.

DXC5000P colour

Vidicon: 25 mm separate-mesh vidicon (1); Sony colour dissector tube assembly (1).

Viewfinder: 101 mm diagonal.

Lens: f2, 16.5 to 95 mm (6x) with built-in zoom lens; zoom and focus control with single handle knob system; accepts 72 mm, mountfilters and close-up lenses.

Automatic colour temperature compensation with white set switch and memory circuit; automatic gain control.

Scanning lines: 625 lines 2:1 interlace, CCIR standard.

Horizontal resolution: 450 lines (at centre).

Illumination: 1,500 to 2,000 lux.

Minimum illumination: 700 lux.

Output signal: 1V p-p sync negative. PAL encoded, 75 ohms.

Price: £3,495.

VCK2400ACE battery

Designed for Sony battery vtr.

Vidicon tube: 1,693 cm separate mesh button.

Scanning system: 2:1 interlace with vtr sync supplied by DVK 2400CE vtr (to use with CV2100CE or CV2100ACE vtr, adaptor CMA3CE is required).

Horizontal resolution: 400 lines.

Video signal-to-noise ratio: 40 dB.

Video output: 1V p-p composite video signal into 75 ohms.

Automatic sensitivity control range: 300 to 30,000 lux with f2 lens.

Viewfinder: 25 mm diagonal crt.

Microphone: Built-in electret.

Power requirements: 12V dc.

Dimensions: 75 x 127 x 213 mm.

Weight: 4 kg.

Price: £475.

VIDEO

THE MECHANICAL format is the main distinguishing feature of any magnetic video recording system. The choice of format is also the only irreversible decision the designer has to make. There are many examples of electrical changes being made to accommodate improvements in heads or tapes, or even linear tape speed changes to reduce tape consumption or to correct for different scanning rates. But the layout of the tape path and the resulting form of the magnetised track are too different between designs for any kind of compromise to be made which is why the original choice is so important.

A short time ago format choices seemed easier. One simply chose a transverse scan quadruplex system using 50 mm wide tape where broadcast standards of compatibility, resolution and tuning accuracy were necessary, and a one of the enormous range of helical scan, single or two head systems where economy was important and lower than broadcast standards could be accepted.

The four head transverse scan system was developed by Ampex and first demonstrated by them in 1956. The best thing that ever happened in the world of disparate video recording systems was the agreement in 1957 between Ampex and RCA on a basic transverse scan vtr format. Subsequent machines from these two companies showed differences in design philosophy and technique but tapes were at least interchangeable and broadcast companies were able to invest heavily in both makes without fear of being left out on a limb.

The quadruplex format uses four heads on the perimeter of a 50 mm diameter wheel rotating at 250 Hz giving a track length of about 48 mm which, with the linear tape speed of 38 cm/s, gives about 40 tracks per linear centimetre of tape.

The video head writing speed is very high (3,810 cm/s) and with the heads and tapes available in the early 1960s, the carrier range attainable was 5 to 6.8 MHz, giving a bandwidth suitable for 625 line broadcasting if not as good as the best cameras or telecines. Since then, head and tape developments have allowed the carrier to be raised to 7 MHz (for sync tips) and 9.3 MHz (for peak white). The full 625 line bandwidth of 5.25 MHz and 400 line resolution is now achieved with a signal-to-noise ratio of over 45 dB. The pressure for further developments has thus been reduced and refinements in stability, start time, noise patterning and colour accuracy are to be expected.

The main criticisms against quadruplex vtrs are the initial price, complexity, and high running costs. The high initial costs of up to £60,000 for a colour system result from the complex electromechanics needed to maintain scanning accuracy and electrical performance with the four heads. The fact that these heads are switched after every 16 lines of picture means that electronic and mechanical correction of velocity errors has to be very good if 'skew' and other timing deviations are not to obtrusive. Whereas a few microseconds error on head-changeover with a helical scan vtr will only cause a slight disturbance in the vertical blanking period, a similar error in a quad machine makes the pictures unviewable.

The change from metal to ferrite in helical scan recorders lengthened the video head life by up to ten times but no designer has managed

to use ferrites in quad heads. So far, the use of harder metals has only improved the life by a factor of two or three and the present expectation of a BBC quad head assembly is between 100 and 500 hours; typically 200 hours.

Helical scan recorders have almost as long a history as the transverse system and since the Japanese Toshiba first demonstrated their *VTR-1* alpha wrap single head system in 1959, different designs with different helical formats have been appearing in quantity.

With one or two exceptions, the systems can be divided into three basic types:

1. Alpha wrap, single head, where there must be a gap when this head crosses from one edge to another. The gap is usually increased by audio and control tracks.

2. Omega wrap, single head and larger gap, but easier to lace. The lost information can either be around the vertical blanking point, or in the lower part of the picture (Ampex 25 mm) and the missing sync pulses are often regenerated electronically.

In both the above systems, one tv field is recorded per revolution so the scanner revolves at 50 Hz. The single head can easily be replaced by the user, without special alignment. Both Ampex and IVC make recorders with this feature.

3. Half-omega two head systems need twice the drum diameter for the same head to tape speed and the heads have to be spaced 180° apart within a tolerance of seconds of arc. But the fact that, by making the wrap just over 180°, no information is lost so the electronics are simplified. Until recently, one could have said that the two head half-omega systems was the right choice where both cost and performance could be low but recent developments have invalidated such generalisations.

The basic weakness of helical scan systems

The shortest helical scan video track is that of the Akai 6.25 mm *VTI10*. 12.3 cm long. Other track lengths and widths are:

	Length	Width
IVC 25 mm	30 cm	0.19 mm
Ampex 25 mm	41 cm	0.15 mm
EIAJ 12.5 mm	18.5 cm	0.13 mm
Akai 6.25 mm	13.3 cm	0.15 mm

The problem is that this very long and narrow path is described on a material whose backing is comparatively soft plastic which varies with both humidity and temperature. Although the normal environmental variations will only produce changes in polyester film of a few tenths of a per cent, 0.1 per cent change in length of the track will give a 20 µs error which is already too great to give good timebase stability.

Probably the greatest weakness of all is the elongation of the tape due to the friction. The friction between the large tape arc and the drum varies continuously, producing short-term changes in length which manifest themselves as jitter on the screen.

This jitter is traditionally the worst fault of helical scan vtrs and, although bandwidths and noise levels have gradually been improved, the system could never be considered suitable for broadcast use until the short-term stability had been dramatically improved.

Videotape Formats and Standards

One of the first helical scan recorders to show a big improvement in stability was the IVC 25 mm range which had an unusual format that recorded the video track from edge to edge of the tape (fig. 1) to minimise lost information resulting from its single head design. This format was unique in recording the audio and control tracks on the guard band between each video track. This gives the maximum scanned area for storage efficiency and the full CCIR 5 MHz bandwidth is obtained for the very low tape speed of 17 cm/s. One disadvantage is that audio dubbing is not possible, as this would erase a section of video information, but the very narrow (300 μ m) cue track can be erased with only a few lines lost in vertical blanking. This system also uses some clever techniques to increase stability. On the opposite side of the scanner at 180° to the record/play head is mounted a 'pseudo' head which, together with slight pressure inside the drum assembly, allows the tape to float on a thin layer of air. This makes the friction lower and more constant so that, when servo controlled back-tension is used (on their expensive versions), the timing errors are only 1.5 μ s before electronic correction is applied.

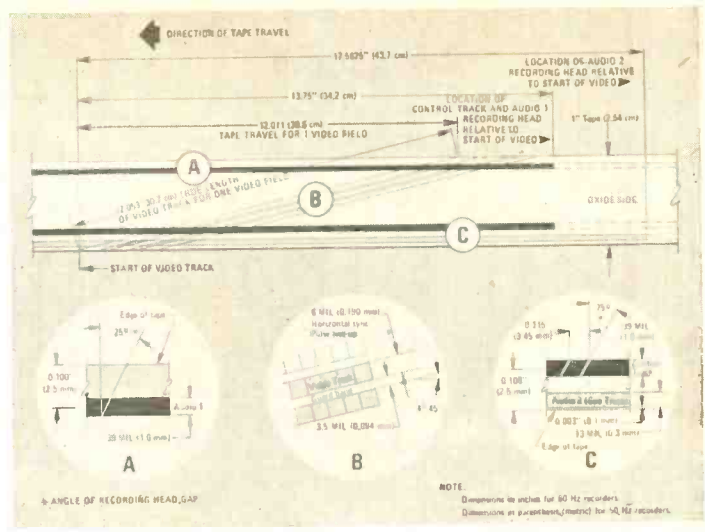
A brilliant solution to the problem of signal loss with single head systems was shown by the Westel Company in both battery portable and console vtrs with a very high claimed performance. Westel used 25 mm tape in an alpha wrap but around a drum which was conical in shape. This gave more than 360° of wrap and the audio and control tracks were held away from the video head by the slight degree of tape overlap. Not only was the dropout time less than three tv lines but the side of the tape which was recorded all the way to the edge was held against the drum by the opposite overlapping edge, eliminating the noise and dropout which are usually found in systems which record the video track up to the edge of the tape. First publicised in 1960, the Westel recorders did not gain the popularity that their technical brochure led one to believe they deserved.

Another interesting solution to the timing problem with helical formats first appeared commercially in the little Philips *LDL1000* 12.5 mm open reel vtr. This machine did not have an outstanding video performance, in fact its resolution was below that of its Japanese 12.5 mm competitors and no better than the Akai system using 6.25 mm tape, so few people noticed how little jitter the machine had. The answers lay in the use of a split drum with the video heads fixed to the rotating upper half instead of the friction being between the tape and the two halves of the drum, the upper half, rotating in the direction of tape travel, actually helped pull the tape through the machine. Since the *LDL1000*, the Philips vtr, Sony *U-matic* system and the new IVC *9000* system all use a similar technique.

Although it is difficult to give exact figures for the stability improvements resulting from this system, the Philips vtr certainly has lower jitter than any comparable open reel 12.5 mm vtr, by a factor of at least three. The prototype European version of the Sony *U-matic* (tested on page 72) had a five-fold improvement in stability over the latest EIAJ/1 high resolution vtrs.

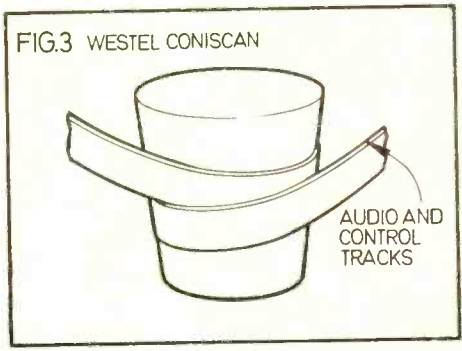
Improvements in tape and head performance, together with better servos and electronic time-base corrections systems, have enabled

FIG. 1



the advanced helical scan recorders by Ampex and IVC to offer broadcast specifications. Philips and Fernseh (the television division of the German Bosch group) have cooperated in producing what looks like a development of the original Philips 25 mm system, with a high quality machine aimed specifically at the broadcast market. High band working, electronic time base correction, a dropout compensator, two audio tracks and a cue or edit track combine to produce a system which, on paper, is as good as the latest quadruplex recorders. The claimed advantages are reduced tape costs through using 25 mm (chrome) tape, reduced capital costs, and reduced servicing costs due to the use of a single ferrite head with a life several times longer than that of quad assemblies. Fig. 2 (to scale) shows the format to be conventional.

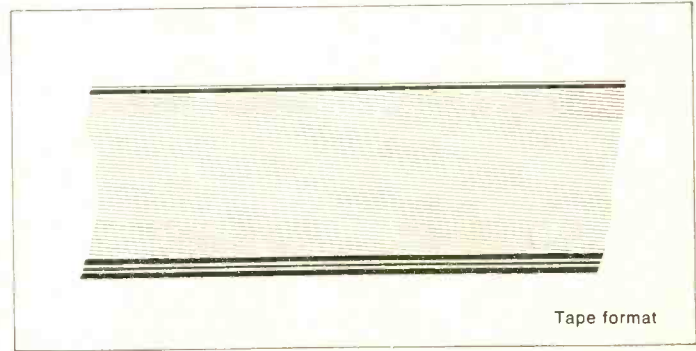
Latest of the top performance broadcast quality vtrs is the IVC *9000*, developed by IVC in cooperation with Rank Cintel in the UK. This is an interesting recorder because it claims to out perform the best quad systems by using the best aspects of quad and helical scan systems. 50 mm tape is used for maximum longitudinal stability and the transport has vacuum chambers for controlling tape tension (fig. 5). By dividing the tv frame into 52 line segments, the short track length eases problems of stability and reliability. A two head scanner with a rotating upper drum gives good stability and a writing speed nearly equal to that of the quad system. It is now possible to use ferrite heads which, apart from their long life,



enable very high band working (9 to 12 MHz) which is the range necessary to reduce the noise patterning on PAL colour recordings to negligible amounts. The accuracy of the IVC *9000* mechanics means that electronic timebase correction is that much easier and a 'window' of only 1 ms is needed for safety.

These and other high performance helical scan systems represent a threat to the well established less economical quadruplex machines. Apart from lowering capital costs after long productions runs, improved capstan servo and tape performance may make low speed narrow track working the next goal. For this, the recording heads are notched to halve their effective width so that the linear tape speed is reduced from 38 to 19 cm/s. K. Sadashige of RCA claimed in a recent paper to the IERE conference on video and data

FIG. 2



ACTION VIDEO'S

SPECIAL SUMMER OFFER



Buy one of these portable VTR and camera outfits from Action Video now and get a Sony CVM 90UB 9" Receiver Monitor worth over £100 absolutely FREE. This brand new 9" Sony receiver/monitor may be used with the portable video recorders, or as a top quality all-channel receiver in school, office or home.

FREE

This offer applies only to the following equipment packages, all of which are based on the EIAJ standard for 1/2" VTR's.

1. JVC Nivico



PV-4500 Monochrome portable video tape recorder and camera giving over 35 minutes recording time. Recorded pictures can be replayed instantly on the camera's viewfinder. Camera features built-in microphone and 1:4 zoom lens. Automatic regulation of video and audio recording levels. Still picture control. Operates from rechargeable batteries, car battery or, via power adapter supplied, from AC mains. Plus Shibaden TU-200K 20" Receiver/Monitor.

Price of Package 1 -
£1026 including VAT.

2. Sony



AV/AVC-3420CE Monochrome portable video tape recorder and camera giving exceptionally high resolution using high density tape. Over 30 minutes recording time. Recorded pictures can be replayed immediately on the camera's viewfinder. Automatic gain control adjusts video and audio recording levels automatically. Still picture device. Camera features zoom lens and built-in microphone. Operates from rechargeable batteries, car battery or, via adapter supplied, from AC mains. Plus Shibaden TU-200K 20" Receiver Monitor.

Price of Package 2 -
£983 including VAT.

3. National



NV-3082E Monochrome portable video tape recorder and WV-82E camera. Over 35 minutes recording time. Recorded pictures can be replayed immediately on the camera's viewfinder. Camera features zoom lens and built-in microphone. Operates from rechargeable batteries, car battery or AC mains. Plus Shibaden TU-200K 20" Receiver Monitor.

Price of Package 3 -
£1020 including VAT.

Conditions of this Offer

To receive your free Sony receiver/monitor your order for one of these three equipment packages, must be received between 1st July and 31st August 1973. All orders must be paid for in full upon delivery unless otherwise arranged. In the event of any dispute, the decision of Action Video Limited will be final.



For further details of these portable outfits and all other video tape equipment contact.

Action Video Limited, 45 Great Marlborough Street,
London W.1. Telephone: 01-734 7465

VIDEO

■ FORMATS AND STANDARDS

50 per cent increase in width gives a corresponding increase in mechanical strength and time base stability over 12.5 mm tape. The reduced linear tape speed and small diameter low inertia spools also contribute to stability and low tape wear. The 85 μm track width is well below average but Sony are confident that the performance of their servo system is good enough to maintain tracking accuracy. In this context, Sony have done some interesting research into permissible tracking errors which will still allow cassette interchange with an adequate signal-to-noise ratio. Tests show that the performance is maintained for errors up to 45 μm and Sony claim they can maintain a tolerance of 25 μm in practice. In addition to the two erasable audio channels, Sony have allowed for a third (optional) channel on top of the video track. The wide tape has meant that longer paths between cassette, fixed heads and drum must be used, for a given guide-post wrap angle, but the designers claim that this increases the production tolerances at the cassette end.

The main weakness of both the Sony U-matic and the Philips systems is the lace up complexity. A system developed by RCA which may be released in the USA before the end of this year has been specifically designed to eliminate this complex lacing mechanism. RCA's *Mag Tape Selectavision* uses four heads on an otherwise conventional drum, so that tape wrap can be reduced to 90°. The drum diameter has to be twice that of a conventional two-head half-omega system for the same writing speed but the tape does not have to leave the cassette to contact the scanner (fig. 10). By this means, cassettes can be inserted and removed from the player as quickly and easily as a Philips audio cassette. The RCA system is definitely aimed at a domestic consumer market and it remains to be seen whether it will be satisfactory in other respects.

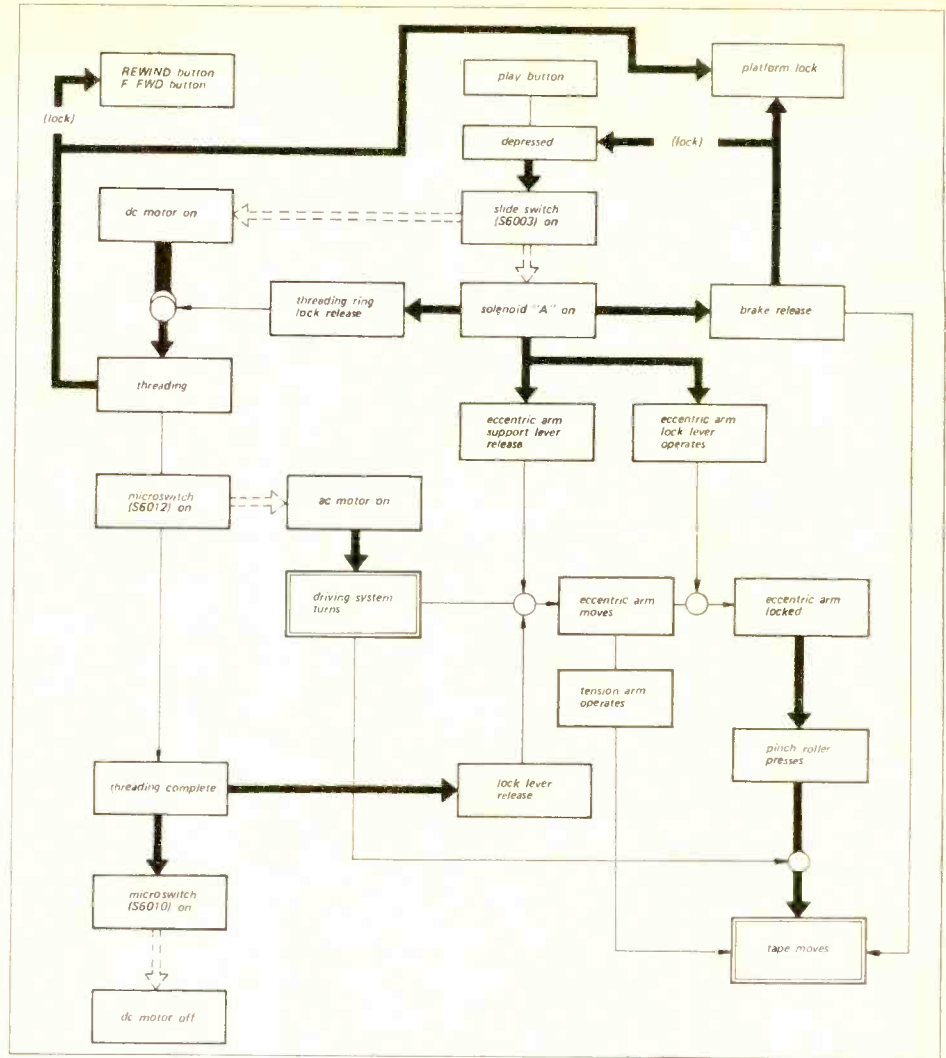
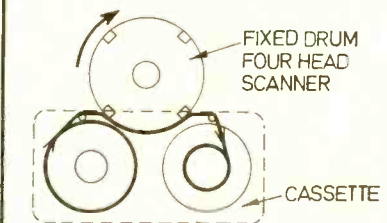


Table 1 Basic Sony U-Matic CCIR specification

Drum diameter:	110 mm.
Tape-to-video speed:	10.27 mm/s.
Tape speed:	9.53 cm/s.
Tape width:	19 ± 0.03 mm.
Tape thickness:	0.027 mm.
Tape-slant angle:	4° 54' 49.1".
Scan angle on tape:	4° 57' 33".
Video-track width:	0.085 ± 0.005 mm.
Cassette dimensions:	140 x 221 x 32 mm.

FIG. 7 RCA MAG-TAPE SYSTEM



■ MANTA SOUND

film sound recording and it is when looking at the projection room that you realise the advantage of having a structure built specially for the purpose. The projection room is cleverly positioned above both control rooms and overlooks both studios. So, by simply moving the projector either studio can be serviced. Andy Hermant tells me that at the time of the interview Manta are also installing a full colour video system. The idea is once again to save

time. When a client wishes to record a piece of music to film, the film will be transferred to video tape and played back over monitors on the studio floor. Anybody who has worked with film will know that the rewind time on video tape is considerably faster than film and that is where Manta hope to save their clients time.

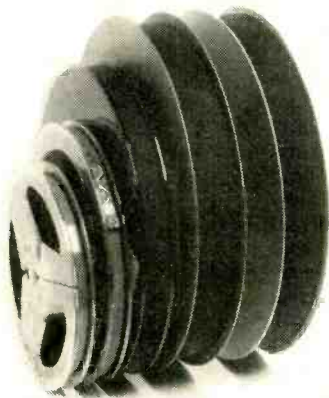
The atmosphere in Manta is generally very relaxed. The interior is tastefully decorated with two lounges for use by visitors and this seems to be appreciated by the musicians and producers alike because business is good and

looks like staying that way. Prices are in line with other studios in town at \$100 an hour for 16 track recording and \$85 for 8 track recording. Mixing is charged at \$75 and \$70 respectively for 16 and eight track recording.

This last item has nothing to do with Manta Sound but I would like to give a pat on the back to Neve. CITY TV, the company for which I am presently employed, recently ordered from Neve a *BMC10/2*. They delivered from England in just four days. So no one can say they don't try.

The complete range of Scotch video and audio tapes.

Why most audio visual specialists use it.



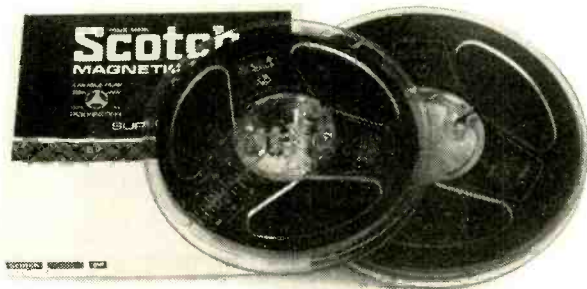
1 Because 3M's range of Scotch tapes is a complete high quality range.



2 Because Scotch Helical Scan Video tape packages exist for all major helical scan recorders. They give longer tape life, have a tighter and more even wind and significantly reduce drop-outs and dirt attraction. Available in $\frac{1}{4}$ ", $\frac{1}{2}$ " and 1" widths.



3 Because New Scotch High Energy Video tape gives up to 4 DB improvement in signal-to-noise, with 3rd generation duplicates better than current best masters.



4 Because Scotch Superlife Audio tapes provide better head to tape contact, reduced headwear, and longer life. Scotch Superlife tapes are packed in strong cardboard boxes, with plenty of space for indexing. They are available in standard, long and double play versions.



5 Because there are Scotch Cassettes, Cartridges and Accessories which fully complement this complete range of Video and Audio tapes. For full details of these and the whole range - post the coupon.

POST NOW! To: D. J. Pacy, 3M United Kingdom Ltd., 3M House, Wigmore Street, London, W1A 1ET.

Please send me full details of the Scotch Video/Audio/Cassette ranges. (Delete as necessary).

Name

Address



3M and Scotch are trademarks.

55/9/73

3M 2071

VIDEO

RAPID CHANGES presently occurring in the video recording scene make equipment surveys difficult but probably more worthwhile. One problem is that of separating the advance publicity from the facts; glossy leaflets and specifications do not necessarily mean the equipment is available or will even become available in the near future. For example, comprehensive specifications and photographs of Ampex's excellent 'Instavideo' portable camera vtr system first appeared in 1971 and many potential buyers had to wait until the beginning of this 1973 to find out that the project had been abandoned. Recently the Japanese Mitsubishi Company, known in Europe and the USA as National Panasonic, have started looking at European outlets for their cctv products. Current leaflets from National show a range 12.5 mm open reel vtrs, *U-Matic* and EIAJ/1 cassette and cartridge recorders and accessories specifically designed for cctv use, but it would be unfair to list these interesting items as so far, only their excellent battery portable camera/vtr system has been imported.

At the other end of the market, improvements on quadruplex vtrs together with some interesting helical machines with broadcast aspirations. The IVC/Rank Cintel 9000 helical recorder uses 50 mm tape, and is specifically designed for broadcast use and claims to outperform current quadruplex equipment, but the Philips/Fernseh, IVC and Ampex 25 mm broadcast colour vtrs each use their well established helical formats with elaborate electronics to correct the timing errors which have hitherto prevented broadcast use. One advantage of this philosophy is the possibility offered to the purchaser of even a simple 25 mm monochrome recorder at around £1,000 of expanding his system to full broadcast specifications, should he become ambitious.

Low linear tape speed is important for cartridge applications and the 17 cm/s of the 25 mm range, the lowest of any with this width tape, provides 60 minutes playing time from a 20 cm spool in a fairly small cartridge. IVC's use of a single-head alpha-wrap scanner also keeps the player size as small as a domestic cassette system.

Two examples of the Sony *U-matic* video-cassette system herald its entry into European 625 line standard. Using 19 mm wide tape running at a very low linear speed, it is the first format designed specifically for cassette use.

Sony have also entered the CCIR modified EIAJ/1 format with three new monochrome vtrs. These recorders have caused some consternation because they use a higher carrier frequency and higher density tape and so are not completely compatible with the existing machines from Sanyo, Shibaden, Nivico and Ikegami. The mechanical format is exactly the same, however, so Sony have won a 25 per cent improvement in resolution at the expense of marginal compatibility with their competitors. The problem is not as bad as it might seem, as the more technical users can often modify equipment to a standard midway between the two. Recorders which can be switched or adjusted for high resolution high energy tapes will probably be marketed before long.

R.S.S.

AKAI (Japan)

Agents: Rank Audio Products, PO Box 70, Great West Road, Brentford, Middlesex TW8 9HR.

Phone: 01-568 9222

VTS-110DX battery

Format: Akai-compatible 6.25 mm.

Tv signal: CCIR standard.

Recording system: twin rotating head, frequency modulation system.

Recording time: 24 minutes.

Tape speed: 23.8 cm/s.

Maximum reel capacity: 13 cm.

Resolution: 200 lines.

Video signal-to-noise ratio: 40 dB.

Video input: 1.4V p-p, 75 ohms.

Audio input (external mic): -65 dB, 600 ohms.

Audio frequency bandwidth: 100 to 10,000 Hz.

Audio signal-to-noise ratio: 38 dB.

Fast forward/rewind time: 6 minutes.

Semiconductors: 41 silicon transistors, 20 diodes, 1 fet, 6 uni-junction.

Integrated circuits: 26.

Power source: 12V dc (two 6V batteries or VA-110 ac adaptor).

Batteries: two rechargeable 6V.

Battery life: 60 minutes continuous.

Battery recharge time: 8 hours.

Power consumption: 14W (without camera and monitor).

Dimensions: 255 x 112 x 263.

Weight: 5 kg.

Picture tube (VM-110 miniature monitor): 75 mm.

Monitor video input: 1.4V p-p, 75 ohms.

Monitor audio input: 1V rms, 10k ohms.

Speaker: 75 x 44 mm.

Maximum audio output: 120 mV.

Price: £595.

VC-115

Basic features: Mains vtr compatible with VTS-110D.

Price: £625.

AMPEX (USA)

Agents: Ampex International, 72 Berkeley Avenue, Reading, Berkshire.

Phone: 0734 84411

AVR-1 colour

Format: Standard 50 mm Quadruplex.

Temperature: 0 to 45°C.



Survey: Video tape recorders

Relative humidity: 10% to 90% (non-condensing).
Composite video input (75 ohms impedance): 0.7 to 1.8V p-p.
Sync: 1 to 8V.
Blanking: 1 to 8V.
Subcarrier: 1.5 to 2.5V.
Tape speeds: 38 and 19 cm/s.
Starting time: 200 ms from standby, 1s from stop.
Stopping time: 200 ms from record or playback mode.
Audio frequency response (400 Hz reference): ± 2 dB 50 Hz to 15 kHz.
Signal to noise: 55 dB from peak operating level.
Wow and flutter: 0.10% rms.
Video signal-to-noise: 43 dB p-p video to rms noise.
Differential gain: 4% maximum blanking to white.
Differential phase: 4° maximum at 4.43 MHz off tape.
Moire: -36 dB.
Basic price: £40,800.

ACR-25

Format: Cassette loading, standard 50 mm Quadruplex.
Basic features: Random access to 24 cassettes. 6-minute playtime per cassette at 38 cm/s. Plays 10s spots back-to-back. No positional restrictions. Special off line rewind facility permits back-to-back sequencing of tapes of any length up to 6 minutes.
 Auto playback adjust assures tape playback interchangeability.
 200 ms start time (350 ms in 625 line systems). Provision for internal dubbing, simultaneous record, manual or automatic playback.
 Available in time-share configuration using existing AVR-1 electronics.
Tape speeds: 38 and 19 cm/s
 Cassettes can be loaded by operator using pre-recorded or blank tape.
 Vacuum tape-handling system.
 No head-to-tape contact during rewind.
 Complete automatic operation; can be computer controlled.
 Compatible with all SMPTE/EBU high/low band, colour/monochrome standards with automatic selection in playback. (Record high-band only.)
 Fully compatible with Ampex RA-4000 programmer
Price: £63,400.

ADR-15 contact duplicator

Format: Standard 50 mm Quadruplex
Basic features: Uses high-coercivity master tapes to make low-loss dynamic transfer of conventional quadruplex video tapes. Duplicates one-hour programme in 6 minutes running at 380 cm/s. Dynamic transfer process eliminates video heads. Handles all tapes recorded to SMPTE standard in colour or monochrome. Modular design allows the addition of up to 2 dual slave units (total of 5 copies). Reusable master tapes. Handles all reel sizes up to the largest two-hour 40 cm reels. Auto duplicate mode produces multiple copies of short segments on each slave reel.

VPR-5800 colour

Format: Ampex 25 mm.
Tape speed: 24 cm/s.
Video writing speed: 2,115 cm/s.
Rotary head life: 1,000 hours minutes or 90 days, whichever occurs first. Uses 2 plug-in field interchangeable ferrite heads, 1 video record/reproduce, 1 video erase.
Remote control facility: Remote control connections available for play, record and stop at back panel. Remote connector also provides interface connections for dubbing.
Dimensions: 670 x 460 x 310 mm.
Weight: 39 kg.
Operating position: Horizontal.

VIDEO PERFORMANCE:
Frequency response: 25 Hz to 5 MHz ± 2 dB, very high carrier mode.
Differential phase and gain: 10° and 10% maximum, respectively.
Input: 75 ohms unbalanced 0.5 -1.5V p-p bnc or remote connector.
Output: 75 ohms unbalanced, 1.0 $\pm 10\%$ p-p bnc type connector.
Sync input: 75 ohm unbalanced 4.0V p-p nominal (use of sync input switches servo systems from video input or internal references).
AUDIO PERFORMANCE:
Frequency response: ± 4 dB, 75 Hz to 12 kHz.
Signal-to-noise: 45 dB at 3% thd.
Wow and flutter: Flutter less than 0.18% rms. Wow less than .04% rms ASA.
Outputs: 600 ohms balanced, +4 dBm level, XLR-3 connector.
Speaker/headphones: 2W into 8 ohms (use of speaker / headphones output silences internal speaker).
Basic price: £2,670.

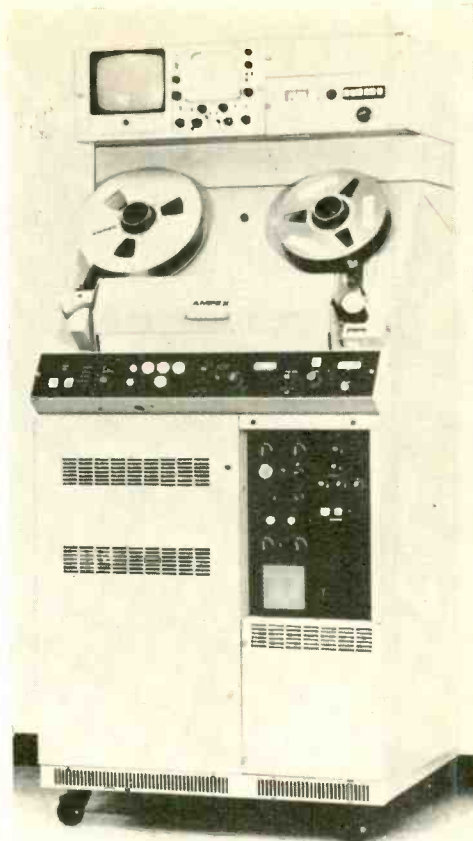
VR-1200 colour

Format: Standard 50 mm Quadruplex.
Video bandwidth (monochrome): Flat to 4.1 MHz; -3 dB at 4.5 MHz.
Rise time: 0.10 μ s.
Video signal-to-noise ratio (colour): 46 dB p-p video to rms noise.
Basic price: £20,300.

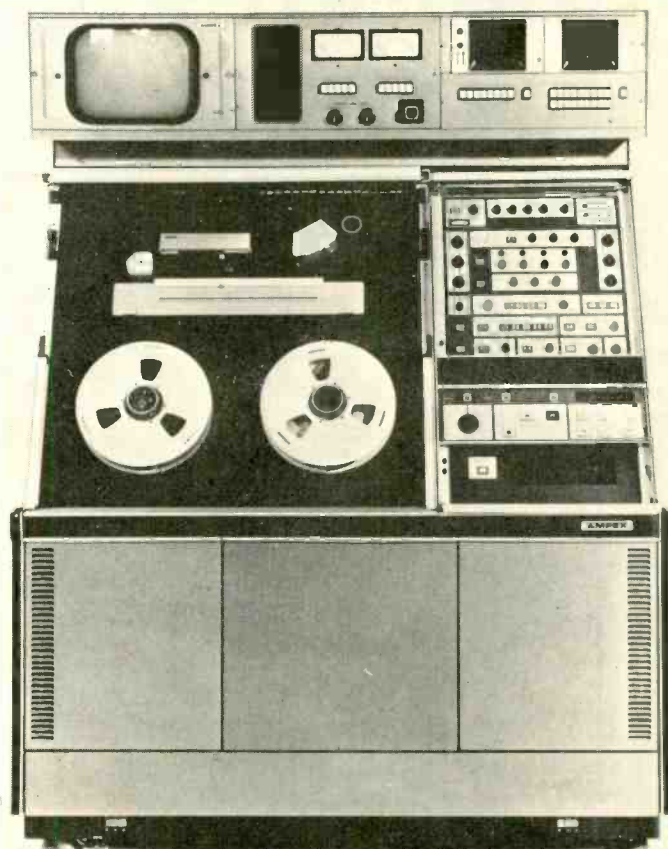
VR-3000 colour battery

Format: Standard 50 mm Quadruplex.
Basic features: Records NTSC, PAL or SECAM to SMPTE and EBU standards. Compact back-pack unit weighing 26 kg. Quick-look playback electronics provide for preview of recorded material (monochrome). Self-contained audio system accepts any standard high impedance microphone or line level

Above: Ampex VR-1200
Right: Ampex AVR-1



64



63

VIDEO

VTR SURVEY

input. Operates on batteries or mains power. Automatic cue-up system conserves tape by recording scenes with a maximum of one frame between cuts. **Price:** £20,000.

VPR-7900

Format: Ampex 25 mm.
Basic features: High carrier frequency (7 to 10 MHz). Fourth-generation copying capability. Integral colour editing using flying erase head and automatic tracking control. Time base stability better than 0.5 μ s. With time base correction system, meets FCC specifications for colour broadcasting. Modular construction permits options to be added on a plug-in basis. Time base correction system offers optional colour dropout compensator, and automatic velocity compensator.
Price: £7,410.

VPP-7950 colour

Format: Ampex 25 mm.
Basic features: Compact, free-standing console incorporating VPR-7900 videotape recorder in a teleproduction recording system. Eye-level monitor section equipped with a colour or monochrome monitor, waveform monitor, and space for an optional vector display unit. Independent monitor controls permitting complete isolation of video and waveform monitoring. Ampex TBC-790 time base correction unit. Modular construction combined with hinged tape transport for ease of maintenance. Plexiglass dust cover over the transport.

FERNSEH-PHILIPS

Manufacturers: Robert Bosch (in conjunction with Philips, Eindhoven), Fernseh-anlagen GmbH, Darmstadt, West Germany.

BCR

Format: 25 mm chrome, helical scan.
Tape speed: 26.7 cm/s.
Recording time: 90 minutes maximum with 27 cm reel.
Head configuration: Omega wrap, single video head. Two audio tracks plus control track and cue/address track.
Video bandwidth: 4.5 MHz (-1 dB), 5.5 MHz (-3 dB) with 44 dB p-p video to rms noise.
Dimensions (studio version, BCR 60): 765 x 530 x 1,470 mm.
Weight: 230 kg.

HITACHI-SHIBADEN (Japan)

Agents: Hitachi-Shibaden (UK) Ltd, Lodge House, Lodge Road, London NW4 4DQ.
Phone: 01-203 4242

SV-530V colour

Format: EIA J/1 standard 12.5 mm cartridge.
Recording system: Two rotary-head scanning.

Tape width: 12.5 mm.
Recording time: 20 minutes.
Resolution: 300 lines (monochrome), 240 lines (colour).
Video signal-to-noise ratio: 40 dB minimum (monochrome).
Video input: 0.5-2V p-p 75 ohms, sync negative.
Video output: 1V p-p, 75 ohms sync negative.
Audio signal-to-noise ratio: 40 dB.
Cartridge dimensions: 128 x 130 x 29 mm.
Cartridge weight: 350g.
Cartridge construction: Built-in erase-error protection, opening for removal of reel chain-lock, and loading-error protection.
Power consumption: 90W.
Dimensions: 493 x 188 x 438 mm.
Weight: 21 kg.
Price: £475 without converter and tuner unit. £575 with converter and tuner unit.

IKEGAMI (Japan)

Agents: Dixons Technical Ltd, 3 Soho Square, London W1.
Phone: 01-437 8811

TVR-321

Format: EIA J/1 standard 12.5 mm.
Recording system: helical scan rotary 2 heads.
Signal standard: CCIR standard (TVR 321E) (PAL colour standard).
Tape width: 12.5 mm.
Tape speed: 16.3 cm/s.
Recording time: 71 minutes (18 cm spool).
Rewinding time: 3 minutes.
Ambient temperature: 10 to +40°C.
Power requirement: AC 220V/240V 50 Hz.
Power consumption: 140W.
Dimensions: 434 x 234 x 390 mm.
Weight: 25.5 kg.
Prices: (321E EIAJ standard): £420. (321C PAL colour): £595. (C321-12L 12 hour time lapse): £720. (C321-24L 24 hour time lapse): £720.

IVC (USA)

Agents: International Video Corporation, Liverpool Victoria House, Cheapside, Reading, Berkshire RG1 7AG.
Phone: 0734 585421

VCR-100 colour

Format: IVC 25 mm cartridge.
Basic features: All VCR-100 series feature a capstan servo, stop motion, two audio tracks, audio amplifier and speaker and are supplied with a 15-minute cartridge, operators manual and accessory connector kit.
Video bandwidth: 30 Hz to 5.0 MHz +1-4 dB (monochrome and SECAM). 30 Hz to 3.2 MHz luminance, 3.6 MHz to 5 MHz chrominance (PAL colour).
Signal-to-noise ratio: 41 dB p-p composite signal to rms noise. 43 dB p-p composite signal to rms noise.
Input level: 0.5 to 2V p-p (1V nominal), composite video, 75 ohm input impedance.
Output level: 1V p-p composite video into 75 ohm line (monochrome and colour outputs).
AUDIO PERFORMANCE
Number of channels: Two.
Bandwidth: Audio 1: 75 Hz to 10 kHz \pm 4 dB. Audio 2: 250 Hz to 7.5 kHz \pm 4 dB.
Signal-to-noise ratio: 40 and 42 dB relative to 3% distortion at 1 kHz (ref +10 dBm).
Wow and flutter: 0.2% rms NAB weighted.
Input: 100 mV rms minimum at 50k ohms.
Output: Unbalanced 1.22V rms into 600 ohms (+4 dBm) Source impedance less than 10 ohms.

Dimensions: 450 x 340 x 220 mm.
Tape: Standard or high-energy 25 mm helical-scan video tape on a 20 cm reel mounted in a cartridge (3M 361 or equivalent).
Tape speed: 17.1 cm/s.
Record time: One hour.
Start time: Stable picture lock in 2s or less (from standby).
Fast forward/rewind time: Three minutes or less for one-hour cartridge.
Tape motion controls: Full electrical pushbutton control of all transport modes permits remote control of all functions, has dial access capability, TTL logic-compatible remote control inputs.
Record control: Record mode can only be initiated by simultaneous operation of 'Record' and 'Play' interlocked pushbuttons.
Stop motion: Push-to-operate stop motion control allows continuous viewing of any recorded video field.
Meters: One for audio and video, switch-selectable.
Manual tracking controls: Permits adjustment of servo phase to insure precise tracking of video tracks during 'reproduce' mode.
Automatic tracking control: Preset position which will track any recording made on other VCR-100 recorders.
Tension control: Affords adjustment of tape tension to match that used during recording.
Prices: £975 to £1,405.

700P colour

Format: IVC 25 mm.
Reels: NAB hub, 20 cm diameter.
Tape speed: 17.1 cm/s \pm 0.15%
Record time: 1 hour maximum with 655m reel.
Recording system: Each scan of video head records one field of video. Three longitudinal tracks; two audio and one control track.
Start time: Stable picture lock in 2s (from standby).
Fast forward/rewind time: 120s for one-hour reel.



IVC Cartridge vtr



Colour lock control: Permits adjustment of oscillator on colour board to ensure proper colour reproduction.

Video bandwidth: 30 Hz to 5.0 MHz ± 1.4 dB (monochrome and SECAM); 30 Hz to 3.2 MHz luminance, 3.6 MHz to 5.0 MHz chrominance (PAL colour).

Signal-to-noise ratio: 41 dB p-p composite signal to rms noise.

Input level: 0.5 to 2V p-p composite 50-field monochrome, PAL or SECAM signal.

Output level: 1V p-p composite video into 75 ohm line (monochrome and colour outputs).

Audio bandwidth: Audio 1: 75 Hz to 10 kHz ± 4 dB; Audio 2: 250 Hz to 7.5 kHz ± 4 dB.

Signal-to-noise ratio (both channels): 40 dB relative to 3% third harmonic distortion at 1 kHz ($+10$ dBm ref).

Flutter: less than 0.25% rms, 0.5 to 250 Hz, NAB weighted.

Input (both channels): microphone 400 μ V at 200 ohms nominal; line -20 to $+16$ dBm ($+4$ dBm nominal) 100k ohms nominal; unbalanced.

Output: Audio 1 balanced or unbalanced into 600 ohms at $+4$ dBm; Audio 2 unbalanced into 600 ohms at $+4$ dBm.

Mounting configurations: portable or rack.

Dimensions (cased): 650 x 360 x 270 mm.

Weight (cased): 35 kg.

Input power: 200 to 250V 50 Hz, 450W maximum.

Price: £1,290 (monochrome) to £2,490 (colour).

800P

Format: IVC 25 mm.

Basic specifications: As 700P series.

Prices:

IVC-801P-SM 625/50 monochrome record/playback vtr including stop and slow motion, two audio channels, internal amplifier and speaker; 230V $\pm 10\%$ 50 Hz power: £1,790.

IVC-801P/C-SM 625/50 PAL colour record/playback vtr including PAL P processor, stop and slow motion, two audio channels, internal amplifier and speaker; 230V $\pm 10\%$ 50 Hz power: £2,055.

IVC-821P 625/50 monochrome record/playback vtr including stop motion, fitted with off/tape video monitoring, two audio channels, internal amplifier and speaker; 230V $\pm 10\%$ 50 Hz power: £2,295.

IVC-821P/C 625/50 PAL colour record/playback vtr including PAL P colour processor, stop motion, fitted with off/tape video monitoring, two audio channels, internal amplifier and speaker; 230V $\pm 10\%$ 50 Hz power: £2,560.

IVC-871P 625/50 monochrome record/playback vtr including stop motion, insert and assemble editing, two audio channels, internal amplifier and speaker; 230V $\pm 10\%$ 50 Hz power: £3,600.

IVC-871P/C 625/50 PAL colour record/playback vtr including PAL P processor, stop motion, insert and assemble editing, two audio channels, internal amplifier and speaker; 230V $\pm 10\%$ 50 Hz power: £3,865.

Video Head Assemblies: £100 to £141.

900P colour

Format: IVC 25 mm.

Video bandwidth: 25 Hz to 4.5 MHz ± 1.5 dB, -5 dB maximum at 5 MHz.

Moire: -35 dB (colour bars of 75% amplitude, 4.43 MHz subcarrier).

Composite video output (75 ohms): 1V p-p.

Noncomposite video: 0.7V p-p.

Colour processor video: 1V p-p.

Sync: 4.0V p-p.

Audio 1 bandwidth: 75 Hz to 10 kHz ± 2 dB.

Audio 2 bandwidth: 75 Hz to 7.5 kHz ± 4 dB.

Audio 1 signal-to-noise ratio: 45 dB relative to 3% thd level.

Audio 2 signal-to-noise ratio: 42 dB relative to 3% thd.

Distortion: 3% thd at 1 kHz with $+10$ dBm input.

Line 1 and 2 outputs: $+4$ dBm balanced.

Dimensions: 840 x 490 x 430 mm.

Mounting configuration: cased, rack mounting or console.

Power input: 200 to 260V, 50 Hz single-phase.

Tape speed: 17.1 cm/s $\pm 0.15\%$.

Scanning speed: 1,544 cm/s.

Video head life: Warranty of 1,000 hours.

Record/play time: 3½ hours on 2,285m reel.

Fast forward/rewind time: 120s or less for 1-hour reel of tape.

Start time: Colour frame lock in 8s or less (with optional 4103P time base corrector).

Time base stability: Less than ± 750 ns error reference to external sync. Less than ± 5 ns, with optional 4103P time base corrector.

Servo reference: External sync, input video, or internal reference.

Wow and flutter: Less than 0.1% rms, 0.6 Hz to 250 Hz NAB weighted.

Basic price: £5,950.

BCR-200 automated broadcast system

Format: IVC 25 mm cartridge.

Record/play time: Up to one hour per transport.

Minimum record/play time: 10s.

Load/unload time: 10s.

Minimum back-to-back sequence time: 10s per event.

Event selection: Sequential or random.

Number of vcr transports: Six (BCR-200J6) or 12 (BCR-200J12).

Pre-roll time: 5s.

Fast forward/rewind: three minutes for one-hour reel.

Video bandwidth: 25 Hz to 4.0 MHz ± 1.5 dB. 30 Hz to 4.0 MHz ± 1.5 dB (525/60) -4 dB maximum at 4.5 MHz.

Signal-to-noise ratio: 42 dB p-p video to rms noise (625/50). 44 dB p-p video to rms noise (525/60)

Horizontal-vertical tilt: 3% maximum.

Moire: -35 dB (625/50 PAL).

Video input/output: 1V p-p composite signal.

Audio bandwidth: 75 Hz to 10 kHz ± 3 dB.

Wow and flutter: 0.1% rms.

Audio input (record deck): -7 dBm to $+18$ dBm, balanced/unbalanced.

Audio output: $+4$ dBm balanced.

Dimensions: Six decks 1,937 x 1,076 x 638 mm. 12 decks 1,937 x 1,619 x 638 mm.

Basic price (six-deck): £20,000.

JVC Nivico

Agents: Bell & Howell, Alperton House, Bridgewater Road, Wembley, Middlesex.

Phone: 902 8812

PV-4500 battery

Format: EIAJ/1 standard 12.5 mm.

Video recording system: Rotary two-head system.

Tape speed: 16.3 cm/s.

Reel size: 13 cm.

Recording time: 35 minutes.

Video input: 0.5 to 1.5V p-p, 75 ohms unbalanced.

Video output: 1V p-p 75 ohms unbalanced.

Horizontal resolution: 240 lines.

Video signal-to-noise ratio: 40 dB.

Audio input level: Mic: -65 dBm. Line: -20 dBm.

Audio output level: ± 2 dBm.

Audio signal-to-noise ratio: Better than 40 dB.

Operating ambient temperature range: 0 to 40°C.

Semiconductors: 101 transistors, 7 ic, 77 diodes, four fets.

Power requirement: 12V dc.

Power consumption: 20W (including GS-4500 portable video camera).

Dimensions: 147 x 333 x 270 mm.

Weight: 7.3 kg (including PBP-1 battery pack tape).

Price (including GS-4500 camera): £811.

CR-6000U

Format: U-matic 19 mm video cassette.

Basic features: Two audio channels for stereo or bi-lingual purposes. Accepts optional RM-50U remote control unit. Includes tracking control, colour lock and skew controls. Automatic replay of entire cassette.

KV350

Format: EIAJ/1 standard 12.5 mm. Mains powered vtr. No data supplied.

Price: £368.18.

NATIONAL (Japan)

Agents: Dixons Technical Ltd, 3 Soho Square, London W1V 5DE.

Phone: 01-437 8811

NV-3082 battery portable

Format: EIAJ/1 standard 12.5 mm.

Power requirement: 12V dc.

Power consumption: 22W (including WV-85 camera).

Video modulation system: Both sideband fm.

Tape speed: 16.32 cm/s.

Reel size: 13 cm.

Recording time: 38 minutes.

Horizontal resolution: 300 lines (on monoscope test pattern).

Signal-to-noise ratio: Video 40 dB.

Video input level: 0.5 to 1.5V p-p.

Video output level: 1V p-p.

Operation position: Horizontal or vertical.

Battery operating time: 45 minutes continuous.

Battery charging time: 10 hours.

Dimensions: 136 x 291 x 318 mm.

Weight: 7.5 kg (including batteries).

Price (including WV85 camera): £810.

PHILIPS (Holland)

Agents: Philips Electrical Ltd, Century House, Shaftesbury Avenue, London WC2H 8AS.

Phone: 01-437 7777

N1500

Format: Philips 12.5 mm cassette.

Video cassette recorder suitable for recording and playing back colour and black and white tv programmes. Fitted with uhf/vhf tuner for recording off-air, and uhf modulator for playback through 625

66 ►

Philips N1500



65

VIDEO

VTR SURVEY

line tv set. Suitable for recording PAL colour transmissions on 625 lines, 50 Hz.

System: Twin head helical scan. Tape is spooled on two coaxial reels.

Cassette dimensions: 127 x 146 x 410 mm.

Weight of cassette: 370g.

Playing time: One hour.

Dimensions: 560 x 330 x 160 cm.

Weight: 16 kg.

Power consumption: 110W.

Video bandwidth: To resolve 2.7 MHz pattern.

Tape speed: 14.29 cm/s

Head drum: Diameter 105 mm. Rotation synchronised to field frequency, in direction of tape run.

Tuner: Vhf uhf varicap tuner with six preset channels. Automatic tuning control.

Front panel controls: Tracking, audio auto/manual record level, position counter reset, cassette eject, re-wind, forward wind, play, stop, record time clock setting (12- or 24-hour period).

Top panel controls: On, off colour killer, video level indicator, six channel selector buttons and pre-setting controls.

Rear panel controls: tv playback output, aerial input, mains socket, video output, audio input/output.

Input: 75 ohms coaxial aerial socket.

Output: 75 ohms coaxial male socket.

Video: 240° DIN (for output to a black and white monitor only).

Audio: 180° DIN (input/output).

Basic price: £363.

RCA (USA)

Agents: RCA Ltd, Communications Systems Division, Sunbury-on-Thames, Middlesex TW16 7HW.

Phone: 76 85511

TCR100

Format: Cartridge loading, standard 50 mm Quadruplex.

Tape interchangeability: Cartridges recorded on any TCR100 are compatible with any other TCR100.

Tape speed: 38 cm/s.

Picture-to-sound separation: 14.8 frames.

Record/replay time (per cartridge): Three minutes maximum; 2s minimum (10s and shorter recordings provide no standard external preroll cues).

Subcarrier: 1-2V burst flag: 3-5V (PAL systems only).

Transport-to-transport switching occurs in the vertical interval and introduces no switching transients on the output processor due to regenerated blanking.

Minimum pre-roll: 2s.

Ambient temperature range: 0 to 45°C.

Ambient relative humidity: 20% to 90%.

Magazine capacity: 22 cartridges.

Recycle time for three-minute cartridge: 25s maximum.

Recycle time for one-minute cartridge: 20s maximum.

Stores sequences: Nine maximum.

Functions within a sequence: Eight maximum (selectable).

Audio bandwidth: ±2 dB (50 Hz to 15 kHz).



RCA TR60

Audio signal-to-noise ratio: 55 dB.

Dimensions: 1,702 x 1,372 x 837 mm.

SPU: 1,702 x 558 x 837 mm.

Weight: 850 kg.

SPU: 272 kg.

Price: £50,000.

TR60

Format: Standard 50 mm Quadruplex.

Tape speeds: 38 and 19 cm/s.

Picture/sound separation: 14.8 frames (235 mm) sound leading.

Recording time: 92 or 184 minutes on a 35.5 cm reel (2.194 km).

Rewind time: Five minutes for 2.194 km.

Stopping time: Less than 200 ms from record or play mode.

Tape interchangeability: Tapes that are recorded on the TR60 are made in accordance with EBU 3084E standards and may be replayed on any Quadruplex machine meeting these standards.

Tape timer: Accumulated time measured in minutes and seconds to an accuracy of 3s per hour at 38 cm/s.

Temperature range: 0 to 45°C.

Relative humidity: 20% to 90%.

Lock-up time for synchronous colour operation: 6s from stop.

Burst flag for PAL systems: 4V p-p.

Dimensions: 1,680 x 840 x 610 mm.

Price: £35,000.

TR70C

Format: Standard 50 mm Quadruplex.

Tape speeds: 38 and 19 cm/s.

Picture sound separation: 14.8 frames sound leading.

Stopping time: 0.2s from record or play mode.

Tape timer: Accuracy to within 3s per hour.

Colour stability: ±3 ns.

Temperature: 0 to 45°C.

Relative humidity: 20% to 90%.

Lock-up time from stop mode: 2.5s.

Audio line output: +18 dBm maximum, balanced or unbalanced.

Monitor output: +37 dBm (5W) maximum level into 8 ohm speaker.

Cue: As audio.

Sync: 3 to 5V p-p standard EIA signal.

Audio frequency response: ±2 dB 50 Hz to 15 kHz (programme).

Wow and flutter: 0.1% rms.

Audio signal-to-noise ratio: 55 dB.

Tape transport: Centrally located at 45° angle and

at a reel height of 1,220 mm.

Cooling: Filtered, forced air.

Dimensions: 1,397 x 1,346 x 673 mm.

Price: £40,000 approx.

SONY (Japan)

Agents: Sony (UK) Ltd, Commercial & Industrial Division, Ascot Road, Feltham, Middlesex.

Phone: 69 50021

AV3420CE battery

Format: EIAJ/1 standard 12.5 mm.

Video recording system: Rotary two-head helical scan, fm recording.

Power requirements: Dc 12V ±1.2V; ac 220V or 240V, 50 Hz.

Power consumption: 12.6W (without camera).

Output: 1V p-p 75 ohms unbalanced.

Horizontal resolution: 300 lines.

Video bandwidth: 3.8 MHz, -20 dB.

Signal-to-noise ratio: 40 dB.

Audio signal-to-noise ratio: 40 dB.

Tape speed: 16.3 cm/s.

Recording time: 30 minutes.

Operating temperature: 0 to 40°C.

Reel size: 13 cm.

Dimensions: 280 x 157 x 295 mm.

Weight: 8.5 kg.

Price: £400 (with camera £750).

AV3600

Format: Sony 12.5 mm.

Video recording system: Rotary two-head helical scan fm recording, 2:1 or random interlace.

Resolution: 300 lines.

Signal-to-noise ratio: Better than 40 dB.

Audio signal-to-noise ratio: 40 dB.

Tape speed: 19 cm/s.

Recording time: 60 minutes.

Rewind time: Seven minutes.

Dimensions: 400 x 233 x 335 mm.

Weight: 15 kg.

Price: £389.

AV3620CE

Format: EIAJ/1 standard 12.5 mm.

Video recording system: Rotary two-head helical scan, fm.

Power consumption: 95W.

Dimensions: 408 x 231 x 335 mm.

Weight: 16.5 kg.

Video input: 0.5 to 2V p-p 75 ohms unbalanced.

Output: 1V p-p 75 ohms unbalanced.

Horizontal resolution: 300 lines (CCIR).

Video bandwidth: 3.8 MHz -20 dB.

Signal-to-noise ratio: 40 dB.

Audio signal-to-noise ratio: 40 dB.

Tape speed: 16.3 cm/s.

Recording time: 60 minutes.

Operating temperature: 0 to 40°C.

Price: £365.

AV3670CE

Format: EIAJ/1 standard 12.5 mm.

Video recording system: Rotary two-head helical scan, fm.

Power consumption: 90W.

Dimensions: 412 x 224 x 398 mm.

Weight: 19 kg.

Horizontal resolution: 300 lines (CCIR).

Video bandwidth: 3.8 MHz, -20 dB.

Signal-to-noise ratio: 40 dB.

Audio signal-to-noise ratio: 40 dB.

Distortion: 3%.

Tape speed: 16.3 cm/s.

Recording time: 60 minutes.
Operating temperature: 0 to 40°C.
Price: £575.

CV2100ACE

Format: Sony 12.5 mm.
Recording time: 40 minutes (with 720m tape).
Tape speed: 29.14 cm/s.
Reel: 18 cm.
Video recording system: fm.
Video input: 1 to 3V p-p, 75 ohms unbalanced.
Video output: 1.4V p-p, 75 ohms unbalanced.
Video signal-to-noise ratio: 40 dB.
Audio input: (microphone): -65 dBm, unbalanced; (auxiliary): -20 dB, high impedance.
Audio signal-to-noise ratio: 40 dB.
Semiconductors: 63 transistors, 32 diodes, two thermistors.
Power consumption: 110W.
Dimensions: 460 x 280 x 400 mm.
Weight: 5 kg.
Price: £365.

CV5600P colour

Format: Sony 12.5 mm.
Power consumption: 120W.
Video input: Composite (sync negative) 1.4V p-p, 75 ohms.
Output: Composite (sync negative) 1.4V p-p, 75 ohms balanced.
Horizontal resolution: Colour mode, 220 lines. Monochrome mode, 270 lines.
Signal-to-noise: 40 dB.
Tape speed: 29.14 cm/s.
Playing time: 40 minutes.
Dimensions: 570 x 280 x 400 mm.
Weight: 30 kg.
Price: £745.

D100CE colour cassette duplication system

Format: U-matic 19 mm video cassette.
Slaves per duplicator rack: four.
Video recording signal: PAL video signal, 50 Hz field frequency, 2:1 or random interlaced.
Cassette size: 221 x 32 x 140 mm.
Recording time: 63 minutes.
Audio input: 0 dBm, balanced.
Tape speed: 9.5 cm/s $\pm 0.15\%$.
Wow and flutter: less than 0.15%.

EV320CE colour

Format: Sony 25 mm.
Power consumption: 180W.
Ambient temperature: -5 to 45°C (storage), 5 to 40° (operating).
Operating position: Vertical or horizontal.
Input: Composite video signal (sync negative), 500 mV to 2V p-p, 75 ohms unbalanced.
Output: Composite video signal (sync negative) 1V p-p, 75 ohms unbalanced.
Horizontal resolution: Monochrome, more than 330 lines. Colour, more than 250 lines.
Signal-to-noise ratio: 40 dB (monochrome); 40 dB (colour).
Signal-to-noise ratio: 40 dB.
Tape speed: 17.9 cm/s.
Head-to-tape relative speed: 1,239 cm/s.
Recording time: 70 minutes with 750m tape.
Fast forward/rewind time: Five minutes with 750m tape.
Wow and flutter: 0.25% rms.
Dimensions: 478 x 283 x 487 mm.
Weight: 40.5 kg.
Price: £1,850.

VO1601D colour

Format: U-matic 19 mm video cassette.
Video recording system: Rotary two-head helical scan.
Storage temperature: -10 to 60°C.
Operating temperature: 5 to 40°C.
Power consumption: 100W.
Dimensions: 616 x 205 x 465 mm.
Weight: 27 kg.
Video input: 0.5 to 2V p-p, 75 ohms, unbalanced.
Output: 1V p-p $\pm 0.2V$, 75 ohms, unbalanced.
Horizontal resolution: (monochrome) 300 lines; (colour) 240 lines.
Signal-to-noise ratio: 40 dB.
Audio signal-to-noise ratio: Better than 42 dB.
Tape speed: 9.5 cm/s.
Wow and flutter: Less than 0.2% rms.
Recording or playback time: 60 minutes.
Fast forward and rewind time: Three minutes.
Rewind time: Three minutes.
Optional accessories: Video tuner (VTV-200) and 1m width screen projector (VPS-500).
Price: £725.

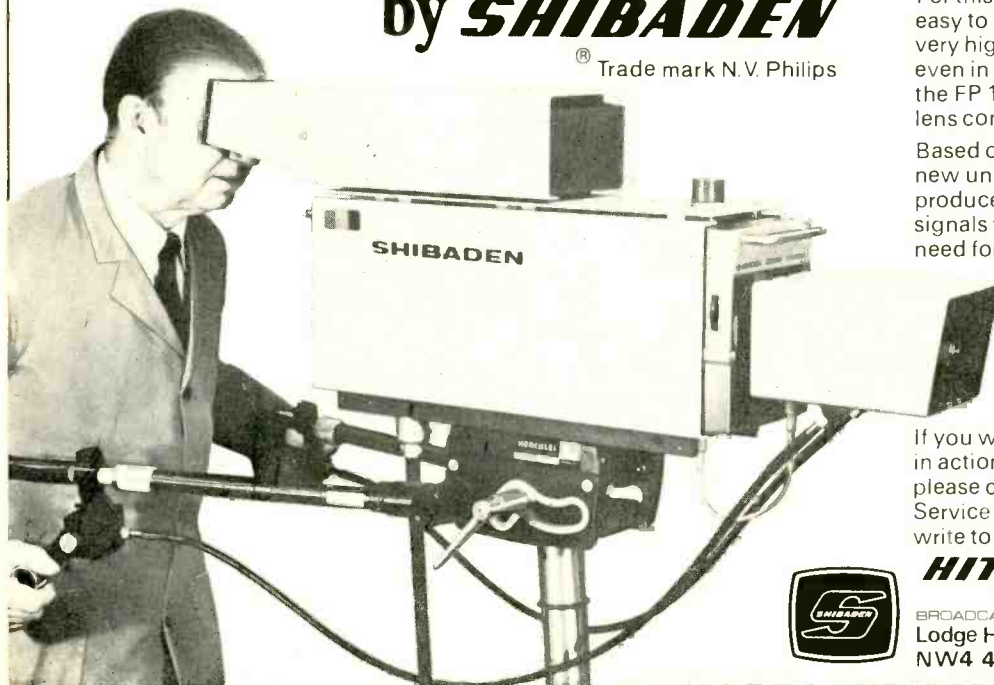
VO1001D colour

Format: U-matic 19 mm video cassette.
Play-only version of VO1601D.
Price: £625.

Sanyo: new agency being formed. Details next month.

The Plumbicon[®] FP 1200 Colour TV Camera by SHIBADEN

[®] Trade mark N.V. Philips



The new FP 1200 Plumbicon colour camera brings to the world of CCTV, a TV camera that embraces many of the features associated with large, commercial broadcast units - yet the price is only £7,000.

For this you get a light, compact and easy to operate camera that guarantees a very high standard of colour reproduction, even in poor light conditions, because the FP 1200 is fitted with automatic lens control.

Based on three Plumbicon tubes, this new unit has a built in encoder which produces standard colour composite signals from NTSC or PAL, without the need for an accessory unit.

And you get built in facilities such as a colour bar generator, a masking amplifier self contained aperture correction circuit, all of which aid the camera's simple-to-use performance.

If you would like to see the FP1200 in action or require full technical details please contact Shibaden's Technical Service Department at 01-203 4242 or write to:



**HITACHI SHIBADEN
(U.K.) LIMITED**

BROADCAST & CCTV EQUIPMENT MANUFACTURERS
Lodge House · Lodge Road · Hendon · London
NW4 4DQ. Telephone: 01-203 4242/6

VIDEO

Ikegami 321E and 321EC test reports

ITC AND IKEGAMI are the usual names for the Ikegami Tsushinki Company of Japan whose equipment was first imported into the UK by Duke and Briggs in Leeds but since 1970 has been handled by Dixons Technical, a member of the Dixons Photographic Group specialising in the sale and hire of industrial film and television equipment.

ITC's range of closed circuit television equipment covers monitors, cameras, vtrs, mixers and pulse generators. Certain of these items, for example, their 12 and 43 cm monitors and their low cost viewfinder camera, have found their way into a large number of studios on account of their good performance and value but their video recorders are less well known. ITC's two 25 mm vtrs, although good value, had their own format and also had to compete with the Ampex and Philips machines which were already well established.

The smaller machines, like the 301E and 3014E were another matter; they were exceptional value. Unlike every other small machine, they were built to the same standards as the best studio types. Separate motors were provided for each spool, for the capstan, and for the head drum. All circuit boards were plug-in for ease of service and the complete head drum and guide assembly could be removed in five minutes.

The mechanical operations were all via solenoids making the tape transport smooth, gentle on tape, and trouble-free. From this one might have expected the 301 to hold a similar place in the market to that of the Revox E36 and A77 in the sound recording domain and it might well have done so had not ITC chosen a non-standard tape width: The 16.93

mm tape used was only available from the importers and, at the time of the changeover from Duke & Briggs to Dixons, supplies dried up altogether. Potential users were reluctant to commit themselves to a system which relied upon a single source for tape. Another criticism of the early models was that their resolution and servo stability were not as good as some of the better 12.5 mm machines but in these respects the later versions were satisfactory and in fact STUDIO SOUND were on the point of reviewing a 3014E when the monochrome version of this new EIAJ/1 compatible range was released.

Mechanical details

The deck top is an austere grey steel panel and the drum and tape guides have an equally heavy duty and functional appearance (fig. 1). Closer inspection confirmed that this recorder is in the Ikegami tradition, the 24 kg weight being attributable to the choice of three large motors, generous power supply, and solenoid control in place of the more usual system of belts, pulleys and linkages, driven by a single motor. This choice produces a similar internal appearance to three-motor sound recorders. The accent on good mechanical design means that there does not appear to be any mechanism (Fig. 2 and 3) show the inside top and under deck respectively.

The top deck plate is the usual steel pressing but with an extruded aluminium reinforcement on its perimeter. Apart from the spool carriers, the drum, capstan and all tape guides are mounted on the thick aluminium casting visible in fig. 2. The most critical tape guides are on the circular flange of the drum mounting which assembly is fitted to the main casting with three bolts so, where a rapid head service is needed, the complete and aligned drum and guide system can be replaced very quickly.

Fig. 3 shows the under-deck: the central of the three ac motors drives both capstan flywheel and head drum (or scanner in American tv terminology). The latter belt is twisted into a figure-of-eight to get the right scanning sense and is just visible between the relevant motor and the drum braking disc at the upper centre of the photo. Earlier Ikegami and Shibaden

vtrs used a synchronous motor directly coupled to the scanner and later Shibadens use a direct coupled dc scanner drive; this combination of belt drive and eddy-current brake has been used by Sony since their first CV2000 and is also found on the Sony and Philips cassette systems.

Apart from the colour processing circuits which are on the printed circuit board at the top right of fig. 3, the electronics are all on boards forming the outer surface of the box chassis, in the usual way, except that here each circuit board is on a hinged socket for ease of adjustment and quick replacement. Anyone who has had to make electronic adjustments to a machine of this type while it is running horizontally will appreciate this system of hinged and accessible circuit boards. The neatly harnessed inter-board wiring also makes the mechanism more accessible.

Controls for tracking and audio and video gain are on the deck top and record/standby and still frame buttons, together with the normal tape motion controls, are by push-operated micro-switches.

The left-hand of the two rear inset panels has the usual audio and video input and outputs, together with the eight pin EIAJ combined socket for use with the several makes and types of receiver/monitor available in the UK. The right hand panel includes power sockets, fuse, colour-lock and colour/monochrome selector switch, and a skew control.

Electrical performance and use

The most awkward part of tape lacing in this type of omega wrap vtr is usually getting round the angled guides and drum. In these recorders, the angled guides are much taller than the tape path needs, making this part of the lace-up easy. As with most solenoid operated audio recorders, tape handling was smooth and positive. The drum took between 2 and 3s to stabilise from still but if the standby button was held down, allowing it to run up to speed, the recorder was stable in record or playback within 1s; generally less. Tape winding was very rapid, being a mere 89s for a 730m reel. Fortunately the braking system was smooth enough to handle the resulting high tape

FIG. 1



velocities.

Reproduced pictures had the stability and low jitter expected from this format, adequately low noise, but slight ringing on edges in both monochrome and colour. Resolution was, by a small margin, better than any of the other CCIR EIAJ/1 ferric oxide vtrs so far tested. Using ferric oxide tapes by Shibaden, Sony and 3M, noise was -41.5 dB and included a slight amount of hum. Dixons improved budget tape was tried and was just outside the specification with a noise level of -39 dB. A 20 per cent increase in rf drive on record brought the performance with Dixons tape and other types originating from Racal-Zonal into specification at -40.5 dB without spoiling the -41.5 dB figure for the others.

Compatibility with the other machines conforming to the EIAJ/1 standard was confirmed and tapes recorded on Nivico, Sanyo, Shibaden and NTSC Sony were played without having to touch the tracking control. The dihedral errors could occasionally be reduced with the skew adjustment but on most monitors was not necessary.

It is generally believed that the above recorders, being optimised for use with more economical ferric oxide tapes, will give a much degraded performance when playing back recordings made on the new Sony AV-3600 series of machines which have higher carrier frequencies and use chromium dioxide tape. This is in part true but the sample Ikegami tested was quite satisfactory in this respect, giving a resolution of 300 lines and -40 dB noise when playing back chromium tapes made on a Sony AV-3620CE. Perhaps an unusually good sample but this is thought to be unlikely as, apart from general recordings and testcards, it was still satisfactory with a full-amplitude 0 to 5 MHz video sweep, which is the hardest test of all. More details of compatibility problems with standard EIAJ recorders and the new Sony high band versions will have to be left to a later article.

The colour compatibility of the EIAJ 'M' type coding system was checked with the Shibaden SV620K which is the only other version available in the UK at the moment and it was found to be satisfactory. ITC's colour electronics are simpler than Shibaden's and this is reflected in the lower increase in cost of colour version when compared with the monochrome versions of each make. Circuit details of the 321 E/C were not available at the time of the review but one reason was that this machine does not include the elaborate afc system which is required by the Shibaden recorders to give stable colour pictures in the variable slow motion mode. The only disadvantage of this economy in the Ikegami was that, if the colour lock control was in the wrong position, still-frame pictures could appear in monochrome.

Sound frequency response, at 14 dB below 0 VU on the record level meter, was -3 dB at 50 Hz and 11 kHz but unweighted noise, including hum, was 38 dB below 0 VU. 'A' weighted noise was -42 dB, which is adequate but leaves a rather small margin. The optional agc was unusual in having an attack time which shortened with increasing level and was subjectively less annoying than many such simple systems. On sinewave tests, with the audio gain at mid-position, agc was active

70 ▶

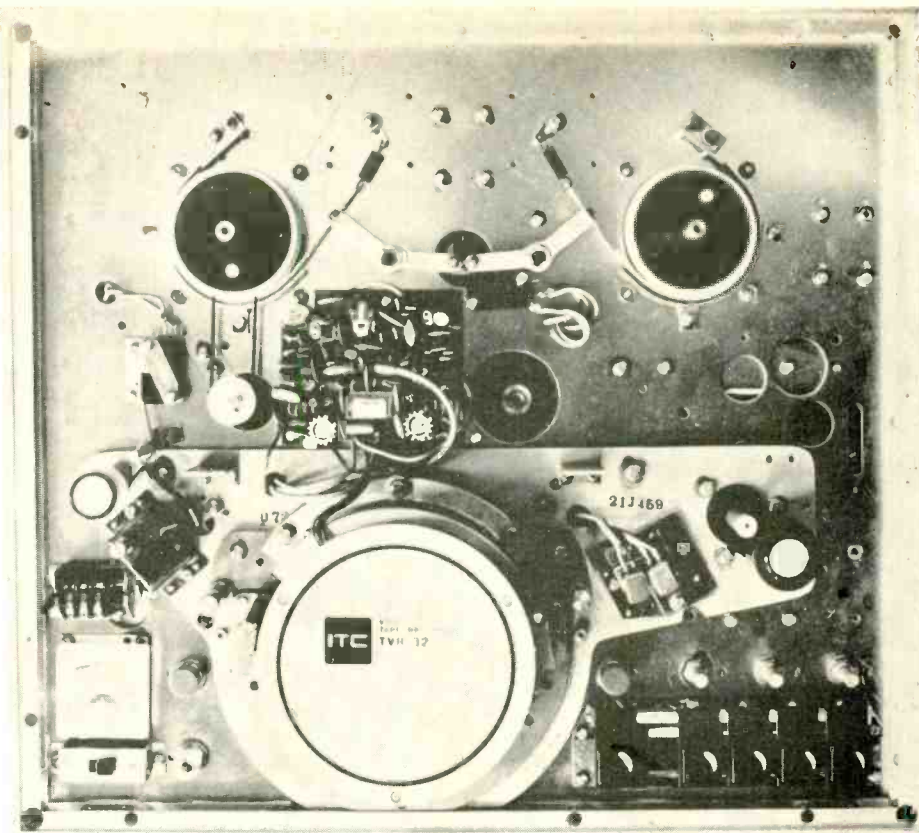
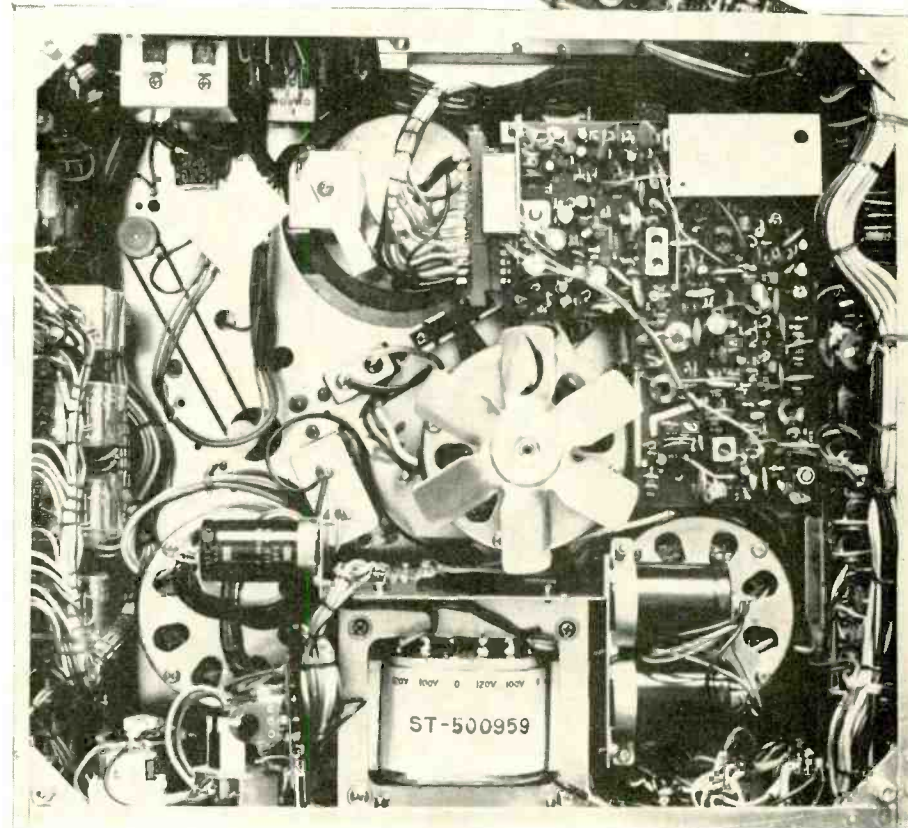


FIG. 2

FIG. 3



VIDEO

■ Ikegami Test Report

between 100 mV and 2V on the line input. Wow and flutter were 0.25 per cent DIN weighted, rising to 0.26 per cent at the end of the reel.

The solenoid operated mechanics lend themselves to remote control and the control box shown in fig. 1 works as expected. A more unusual accessory is the TC-204 recycling unit which enables any chosen section of a tape to be repeated continuously. This unit was simple to install, an eight pin plug being connected to the remote control input rear of the machine,

Summary of performance and specification

	Specified	Measured
Reel diameter	18.2 cm.	190 cm (enabling a 20% playing-time increase with larger reels).
Playing time:	71 minutes.	75 minutes with 730 tape.
Frequency response (video):	3.5 MHz monochrome. 2.5 MHz colour.	3.5 MHz (-20 dB). 2.7 MHz (limiting)
(audio):	100 Hz to 10 kHz (3 dB).	50 Hz to 11 kHz (+0-3 dB).
Horizontal resolution:	250 lines monochrome. 220 lines colour.	290 lines. 210 lines.
Signal-to-noise ratio (video):	40 dB p-p/rms.	41.5 dB p-p/rms with Shibaden tape. 40.5 dB with Dixons budget tape.
(audio):	40 dB p-p/rms (sic).	38 dB rms/rms. 42 dB 'A' weighted.
Wow and flutter:	Not quoted.	0.26% DIN.

and a small detector head consisting of a lamp and photodiode being clipped on the deck by the erase head. Silver marker foils were then stuck to the tape base at the beginning and end of a short section of programme (it could have been any length from a few seconds to the entire tape). The tape was then wound to the start of the section chosen, using the deck controls, from which point the replay sequence could be initiated from the start button on the recycling box. The cycle is then as follows:

1. Tape plays through until the end marker is detected.
2. Machine goes to fast rewind.
3. Machine switches to fast forward when the start marker is detected.
4. Machine stops when the start marker passes in the forward direction (the tape velocity is low here so the tape stops within a few centimetres of the marker).
5. After a few seconds pause, the recorder goes into the 'play' mode.

This cycle repeats itself until the stop button is pressed.

Conclusions

This recorder is built to industrial rather than domestic or educational standards and the heavy construction not only makes a very long working life likely but the ready access of the plug-in circuitboards and the drum assembly should help when repairs are necessary. The solenoid operated controls make the machine's performance independent of the operator and very gentle on tape. That this extends tape life was verified by using the auto-cycling unit on a short section of tape and allowing the recorder to replay this section several hundred times. Not only was the programme itself completely unaffected but the earlier section on which braking and tape reversing were carried out also showed no more than a slight increase in dropout.

The TC-204 cycling device can be recommended wherever continuous playing or library playback from an unattended machine are needed. Here, the ITC system would be an economical alternative to the video cassette recorders which will soon be offering similar facilities.

Used with Dixons own tape, the recording costs are only £4.40 per hour; by far the cheapest method of storing colour recordings available.

The 321 is a well engineered machine which can be recommended where heavy use is expected or where remote control, time switched operation or automatic playback is needed. **R.S.**

■ DIARY

already on hand'.

Their studio One holds 130 musicians. The second studio is intended for solo work or small groups. They also plan extensive changes to the dubbing suite. 'The reproducers and recorders will be capable of vibrating at normal speed (46 cm/s), at two times normal speed or six times normal speed'. The suite will have a new RCA console and a new high speed projector and will be used for mono and stereo dubbing: four track for 35 mm and six track for 70 mm. The suite will be working by the end of the year.

Minot, New York. Last month we published a photograph of Ron Carren at the mixing desk of Minot studios in White Plains. Ron is the head of what he describes as the 'newest professional sound studio in Westchester. It offers all the service and expertise of New York City sound studios, without the hassle of tight or inflexible booking schedules'. He added that session fees are between a half and three quarters of New York prices and discounts are available for extended sessions.

Minot have an MCI console, AKG reverb units, and a Dolby noise reduction system. All I can tell you about the recording machines at the moment is what I deduce from last month's photo, which shows a Scully eight track.

White Plains is only 40 minutes from Manhattan and 20 minutes from Greenwich and there is plenty of parking space. Too bad no-one can get any petrol. In a recent BBC report from New York, Jeffrey Blyth said he passed ten filling stations before he found one open.

Finally, I am not getting enough response from 'Diary' readers to the deliberate mistakes spot. Therefore I'm having a new competition every month. Question: Who were the two wally farmers who appeared at this year's APRS exhibition? Send your answers on a postcard together with the tops from three packets of Farley's Rusks to Mr R. Roffey, Escape studios ...

High-speed Tape Copying Equipment



Fraser-Peacock Associates Limited

94 High Street Wimbledon Village London SW19

01-947 2233

sole UK distributors of Infonics

fpa

- * Dolby A361 and Revox High Speed A77 for hire.
- * Revox A77 MK III Recorders from stock.
- * All leading makes supplied including A.K.G., Beyer, Ferrograph, Teac, Quad, Tannoy, Spondor, Uher 4030/4200/4400, Report IC Recorders.

BAILEYS

131 The Parade, High Street, Watford WDI 1NA
Tel. Watford 34644

R.E.W. The Finest Independent Video and Audio Centre in Europe

DEMONSTRATION STUDIOS

VIDEO RECORDING STUDIOS



TRADE COUNTER

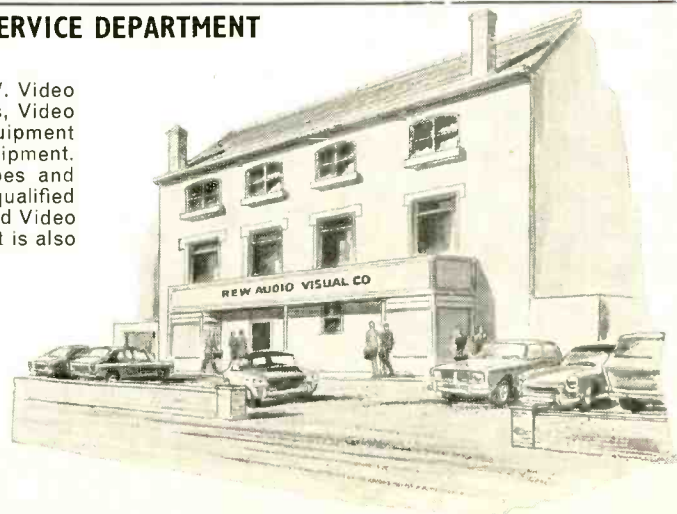
SERVICE DEPARTMENT

Covering 7,000 sq. ft., and with its own spacious car park, the new R.E.W. Video and Audio Centre houses under one roof Video Demonstration Studios, Video Recording Studios, and a Hire Department with vast stocks of leading equipment including Video Cassette Recorders and 525 Line American Standard Equipment. There is a trade counter for immediate sales service on Video Tapes and Accessories and a Service Department, 2,000 sq. ft. in area, staffed by qualified engineers. A special Department is available for Video Tape Dubbing and Video Tape Copying of all formats. A large range of leading Audio Equipment is also on display.



INDUSTRIAL, VIDEO and MAIL ORDER:
R.E.W. House, 10-12 High Street, Colliers
Wood, London S.W.19 2BE. Telephone: 01-540 9684/5/6

PROFESSIONAL SHOWROOMS:
146 Charing Cross Road, London WC2. Telephone: 01-836 3365



VIDEO

Sony VO-1600 and JVC CR600U test reports

FROM SEPTEMBER 1973, a new range of videocassette recorders and players based on the Sony *U-matic* system will appear on the European market. Although no manufacturers are willing to commit themselves on the exact specification of these forthcoming models, the fact that machines from Sony, Nivico, National, Teac and 3M are already on sale in the USA means that the *basic* design destined for European (CCIR) use are already well into production.

Few people realise how many NTSC versions of the *U-matic* are already in regular use in Britain at the moment. For many months they have been used for transatlantic communication within international companies and by British companies who include 525 line colour and monochrome working amongst their services. Recently, one or two of the brighter engineers in the business have themselves been converting NTSC *U-matics* for PAL working.

Sony have just released one or two PAL versions of their *VO-1600* player/recorder, which has sold so well in the USA. These machines are prototypes only, having been individually modified in Japan, and so are definitely not for sale. The models to be released in September will have certain extras and improvements to which Sony are at the moment reluctant to commit themselves. Heavy use of one of these prototypes, together with tests on a Nivico *CR6000*, and discussions with some of the current users of NTSC models has produced enough information to justify a report, if not a technical review.

One innovation which was included in the prototype CCIR Sony *VO-1600* and is expected in the models due for release in September, is

playback compatibility with both NTSC and PAL signals. This standard change which has been a barrier to transatlantic television exchange is, easily carried out by switching the playback speed of the vcr, the different field rate being detected by the 33 cm *Trinitron* colour monitor, which then changes standards automatically. This feature is built into all colour receiver monitors modified by Sony, including the 48 cm version due for release shortly but will clearly not be found where the conversion has been done by another company.

Early discussions between Sony and Philips led many to hope they might agree on a videocassette format that could become a world standard, with the popularity of the ubiquitous Philips audio cassette. Surprisingly, it was Sony who wanted to adopt a similar form of side-by-side reel, arguing that it would have the same advantage of easy spooling *within* the cassette and make possible the use of 10 mm tape for added stability. Philips preferred the system of stacked reels and coaxial hubs.

The *U-matic* cassette is larger than the Philips but in its favour it uses wider and potentially more stable tape which, because of the low tape speed, need not be thinner than 27 μ m for a 63 minute playing time.

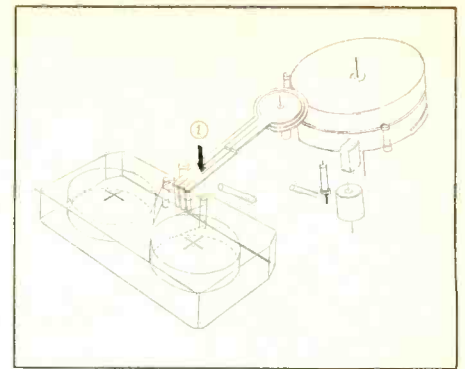
Sony's earlier prototypes were smaller than the models so far seen on the US market and their peculiar method tape lacing looked fraught with difficulties. The current *U-matics* use a rotating guide system, with slight variations between manufacturers. This is similar in principle to the Philips vcr, except that the guides are on a larger diameter rotatable ring driven by an auxiliary dc motor instead of the rotating platform of the Philips.

Fig. 3 shows the current *U-Matic* tape lacing system used on the *VO-1600*, the loading arm being slightly different in the Nivico. Fig. 2 shows the upper deck mechanism and fig. 4 the long tape path between cassette and drum.

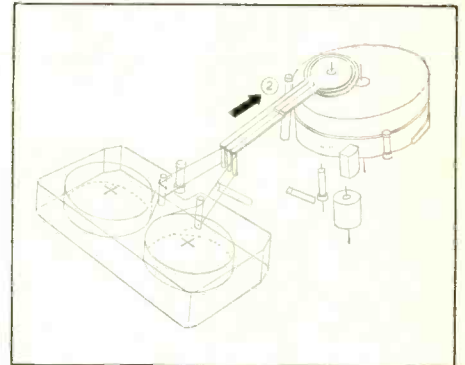
Like the early Philips *LDL100* open reel 12.5 mm vtr and their own *NI500* vcr, Sony use a rotating upper section for the *VO-1600* scanner, the two video heads fixed to this drum. Apart from the difference in short-term stability, it also simplifies video head replacement as the prealigned drum section is a service exchange.

The *VO-1600* tape transport is operated by the usual four keys for fast forward, play, stop and rewind. These are mechanically interlocked and have the heavy feel of a non-solenoid system though solenoids are in fact used. The other top deck controls are for power, audio channel selection, tracking and skew, cassette ejection, record and audio dub or edit. The rf section consisted of both tuner and modulator but neither had been converted for CCIR signals and so were blanked off. The *VO-1601D* and *VP-1001D* due for release in September will have optional rf modulators.

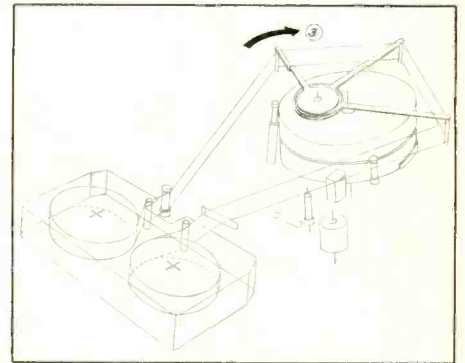
Using the eject lever, the cassette holder is raised from the deck and, after the cassette has been slid in, drops back into the machine, opening the tape guard flap and engaging the two plastic single reels to the driving hubs. The tape extractor arm is now within the cassette (fig. 1a) and, on selecting play or record modes, the b and c lace-up sequence takes place. The loading ring only carries the non-critical tape guides and capstan roller, leaving the fixed heads and critical guides on the same part of the chassis as the drum. In the *VO-1600* tested,



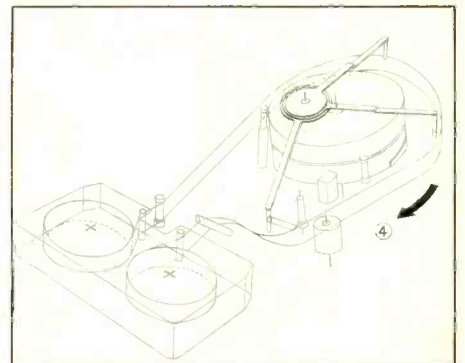
(a)



(b)



(c)



(d)

FIG. 1 An early video-cassette lacing system which Sony (wisely, I suspect) abandoned in favour of the arrangement shown in fig. 3

the complete loading cycle took 5.8s, which is to say a stable colour picture appeared on the monitor screen 5.8s after the play lever was pressed.

The quality of colour recordings was very good indeed, being definitely better than any other recording system using tape less than 25 mm wide in terms of stability, resolution and chroma noise. Fig. 5 shows the performance in monochrome on BBC test card F (the ringing is due to the tuner), and fig. 6 shows the resolution in the colour mode to be 270 lines which is as good as any 25 mm recorder. The main problem with extending the luminance bandwidth is that of patterning caused by interference with colour subcarrier sidebands, so the coding system was checked with colour bars from a Philips generator; again moire patterning was as low as with most 25 mm colour vtrs.

Probably the biggest single advance was in picture stability on playback of signals from all sources. The drum servo was positive and quick to lock to the worst signals we could find from a third generation dub of an original recorded and edited on a 12.5 mm system. There were a large number of cuts between telecine, studio and battery portable and even the shaky edits were handled without increasing the disturbance. On off-air and camera recordings, short-term stability (jitter) reached a new standard for machines in this price category. Although difficult to measure, jitter seemed less than 100 ns through the picture area and was even lower than this on recordings originating from the D100 series professional duplicators. This stability had three practical results. Firstly on a good monitor the pictures were almost as steady as those from a studio or broadcast source. Secondly, problems of line stability when replaying into a domestic television or low cost monitor not designed for vtrs were virtually eliminated. Finally, the performance of second and third generation copies was still acceptable.

Compatibility is, of course the next most important parameter of any system intended for communication and playback of pre-recorded material. Here, the system's ability to replay tapes from both NTCS and PAL sources meant that tapes from London, New York and Tokyo could be checked. Firstly, several prerecorded NTSC colour cassettes were viewed on one of the several VO-1600 Sonys owned by Audio & Video Rentals. These had been copied in Japan from 50 mm masters made in the USA and were played back on a machine which had had several hundred hours use. A test tape was then made on to another well-used VO-1600 from the first model of the new Akai colour camera, which was played back on the machine offered for test. Interchanges were also made between the heavily used JVC CR-6000 and, in every case but one, the tracking control did not need to be moved from its preset position. The exception was a Japanese Victor NTSC recording which was quite satisfactory after a tracking adjustment had been made. Whether the skew setting needed adjustment depended rather on the type of monitor used.

On the cheaper monitors and domestic televisions, the setting proved more critical than with newer or better equipment. The colour lock was potential, more troublesome because it was less easy to see when wrong.

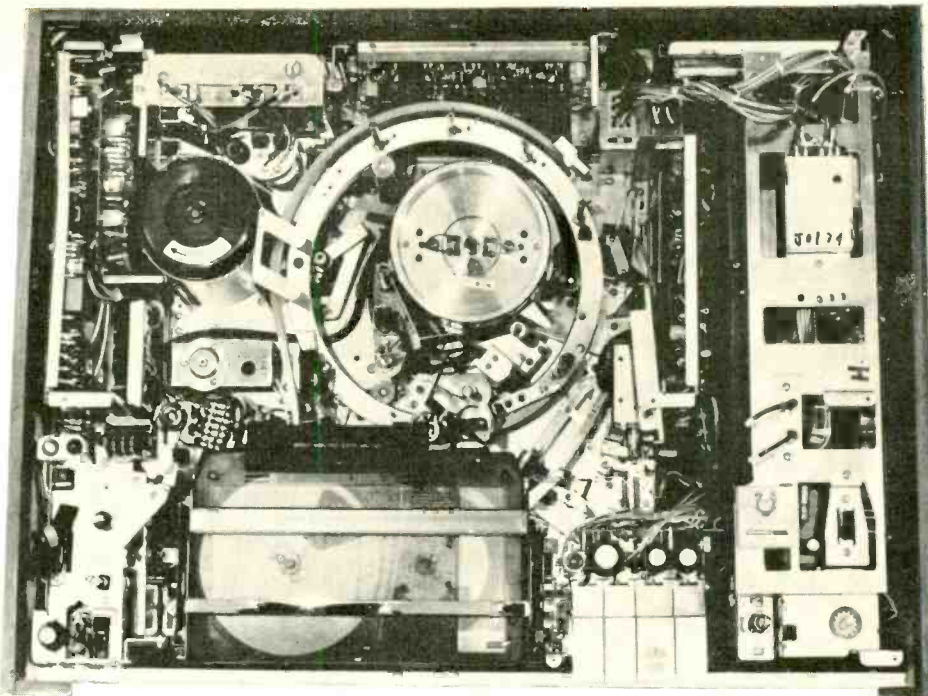


FIG. 2

FIG. 3

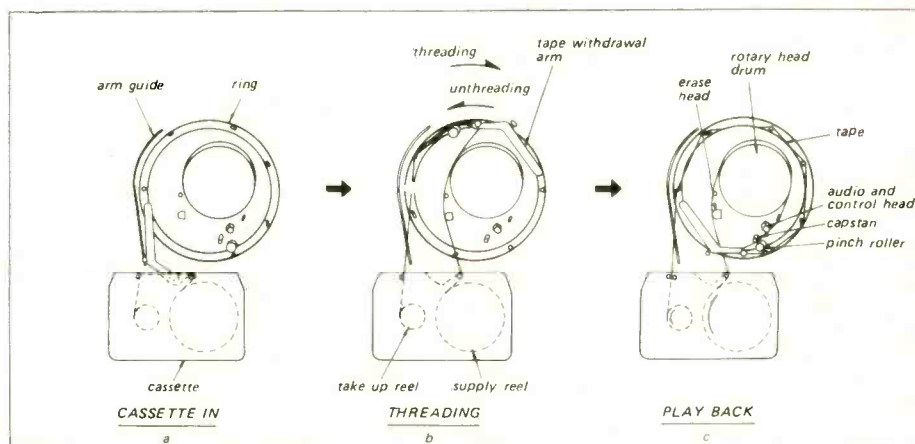
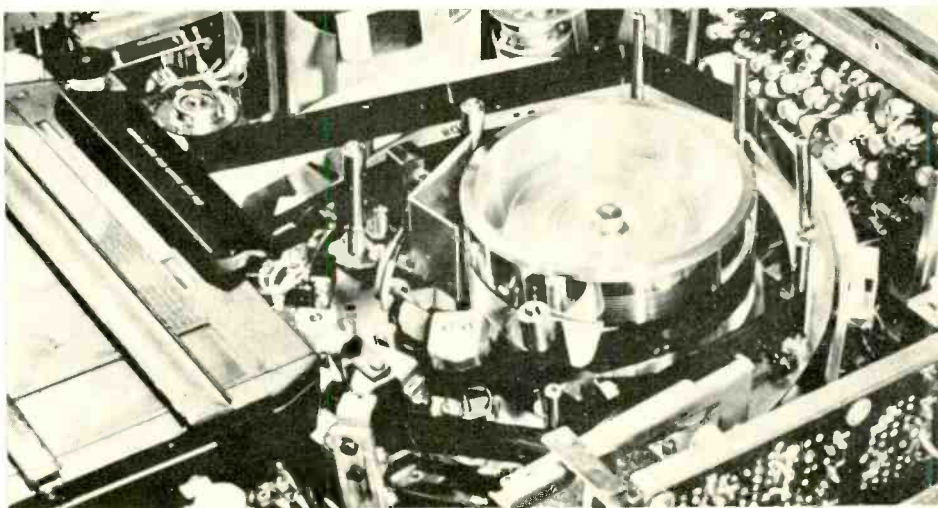


FIG. 4



VIDEO

SONY/JVC TEST REPORTS

The preset or automatic lock position certainly catered for most tapes but sometimes, particularly when switching between standards, either a monochrome picture or a colour picture in the wrong phase appeared. Despite

the low linear tape speed, audio frequency range and signal-to-noise ratio were within specification, which was adequate. Tape jitter on the test machine was 0.33 per cent DIN weighted, which was higher than the other models seen.

Challenged to 'do our worst' with the VO-1600 tests, we used the unit regularly for several weeks and, after all the important checks had been made, it was submitted to a continuous playing exhibition-like situation. The controls were over-ridden and the tape control logic instructed to cycle automatically over a short section of programme which included the leader. Checks of noise, and estimates of dropout rate were made with and without the dropout compensator, after 100 and 1,000 playings of the tape. Unlike a similar test on the Ikegami open reel recorder (reviewed elsewhere), the tape had to be laced and unlaced at the beginning and end of the section so much more tape handling was involved.

Playings	Dropouts per minute with compensator	Dropouts per minute without compensator
1	2	10
100	20	60
1,000	60	250

As the unaided eye was used for counting these dropouts, the figures must only be taken as a very rough guide. Also, the dropouts that penetrated the compensator consisted mostly of 2 to 3 μ s black streaks rather than the speckled lines lasting between 5 and 60 μ s (ie one screen-width) which are common to any system without compensation.

It is worth noting the difference between Sony's recirculating compensation, acting on the rf signal, and the more elaborate Philips system which duplicates the limiter amplifiers and demodulator circuits and switches at video rather than carrier frequencies. The Philips produces less switching transients, as expected, and where the tape damage covers a few tv lines, the Philips, like the Ampex 25 mm system, inserts a section of mid-grey. The Sony system, shown in fig. 6, recirculates the same line so that the dropout is almost invisible if the timing is exact. If, as is usually the case, the line rate is slightly different, the monitor will show an accumulating timing error. Both systems do their job and, as the table shows, a cassette which would be rejected at 100 playings without a compensator with it will be visibly good after 1,000 playings. In practise, most users would probably throw the cassette out after 500 playings.

JVC CR600U

THIS MACHINE was kindly loaned by Action Video Ltd**and is a 115V 60 Hz NTSC recorder supplied with a transformer and a Shibaden TC-182J NTSC colour receiver/monitor. The change to 50 Hz working had been done simply

76 ►

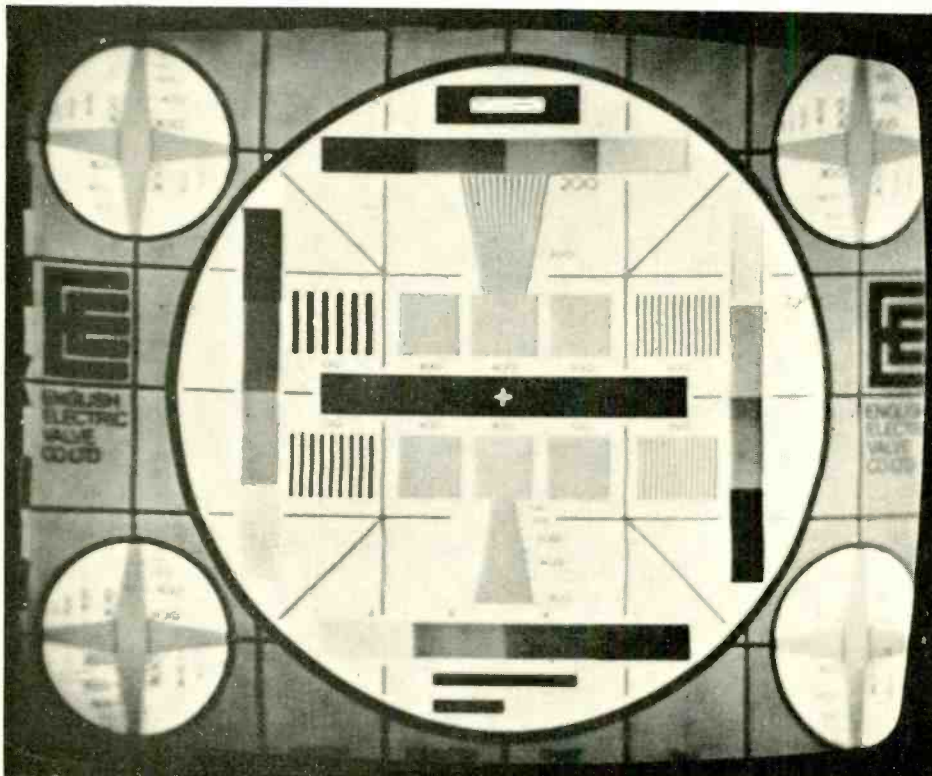


FIG. 5: Top left.

FIG. 6: Bottom left.

** 45 Great Marlborough Street, London W1.

The things those bright sparks at Ianiro dream up!

If you are in the film or T.V. lighting business you'll know that every year lighting manufacturers come up with some bright new ideas. You may also have noticed that Ianiro are usually first to get a new idea on the market. This is because Ianiro usually think of these bright ideas in the first place.

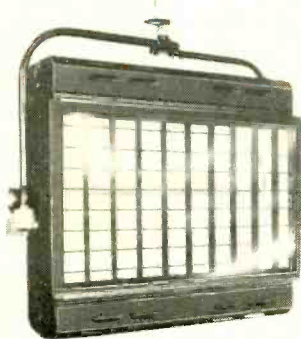
Here are three of the vast range of Ianiro lamps for film, T.V. and photographic studio lighting. These three, the

Pollux, the Antares and the Iris 4 all represent the very latest in studio lighting technology.

If you are considering buying new lamps or fitting out a new studio make sure you have Ianiro on your enquiry list. You'll find we know more about the latest bright ideas. Because nine times out of ten they were our ideas.

THE ANTARES 5000W SOFTLIGHT
Indirect illumination for shadow free colour T.V. lighting.

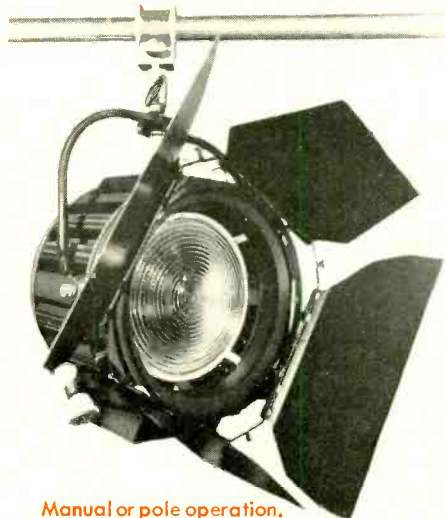
Variable dual power output of 1250/2500W, 2000/4000W or 2500/5000W from 4 linear tungsten halogen lamps.



"Egg Crate" for directional control.
Weight (less cable) 33 1/2 lbs.

THE POLLUX SPOTLIGHT 5KW
Choice of three lampholders: B38, B38 Safety and four pin socket for twin filament bulbs.

A small lamphousing that stays cool with Ianiro's double skin ventilation system.



Manual or pole operation.
Overall weight approx 30lbs (with barn doors).

THE IRIS CYCLORAMA 4
4 Compartments for T.V. studio colour mixing.

Convection ventilation for long filter life.



Multi-curve reflector for even cycloramic lighting from above.
Just 3' 5/16" x 2' 10 3/16" x 9 3/4".

QuartzColor
Beware of imitations

Please send full details of the Ianiro Quartzcolor range of film and T.V. lights.

Name _____

Address _____

SSI



Rank Film Equipment, P.O. Box 70,
Great West Road, Brentford
Middx TW8 9HR.

VIDEO

by changing the motor pulley but this recorder would not handle PAL signals, being once again not for sale but nonetheless giving an idea of the performance and facilities to be expected from the machines which Bell & Howell intend to offer this September.

Although internally and externally similar to the Sony range, there are enough differences inside and out to prove that it is not a Sony in disguise. The tape extractor is not on the loading ring but is the long L-shaped arm visible behind the motor in fig. 9. This pulls the tape out of the cassette to a position between the motor and the drum, when the inclination of the loading ring causes another pin to rise and take over the lacing cycle. The belt driven reel hubs can also be seen under the cassette cage in this figure.

As no service manual was obtainable at the time, the electrical differences cannot be reported on but several extra facilities were worthwhile. These were: pause control (allowing the tape to be stopped without unlacing); a short rewind, also without unlacing, allowing sections of a minute or so to be repeated without unlacing; microswitch pushbutton control system with all solenoid operation; remote control input on the rear of the recorder; insert and assemble editing system: a simple tape counter 'memory' and automatic search facility; and finally a repeat facility for continuous replay of the cassette. When delivered, the recorder had been used for several hundred hours in this last mode at exhibitions and it is likely that the irregularities in behaviour noticed were the result of this heavy use. Thus the mechanical part of the loading cycle was as quick as the Sony but there was an 11s delay before the picture appeared. Playback from the NTSC tapes was very good and the controls were light and pleasant to use. The search facility enabled one to label one point in a programme by zeroing the tape counter, after which the machine would stop from a fast wind at exactly this point. Insert and assemble editing was tried using 525 line signals from the Sony *U-matic* and, although the lack of a capstan servo prevented the perfect timing necessary for completely disturbance-free junctions, the short-term tracking errors that followed each join were less obtrusive than those from any other simple editing system and would satisfy many users.

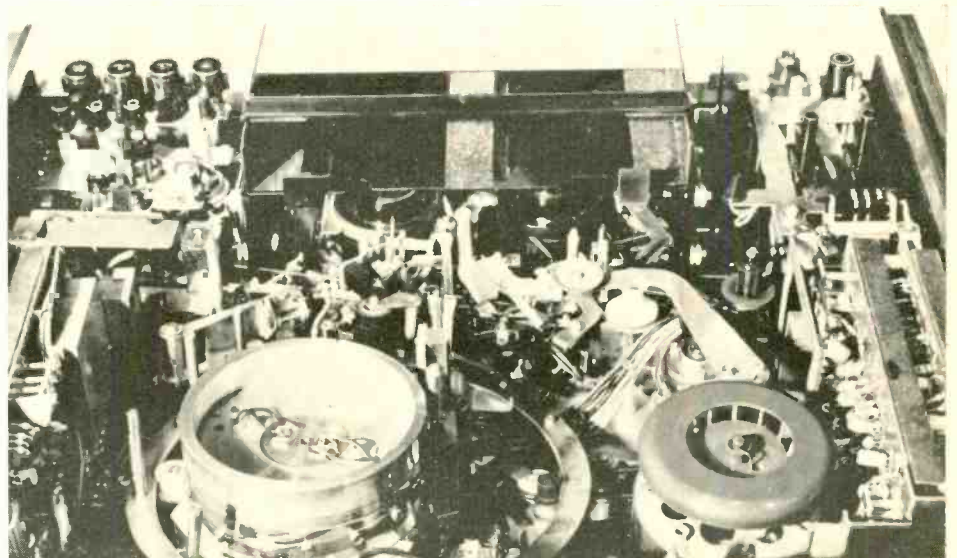
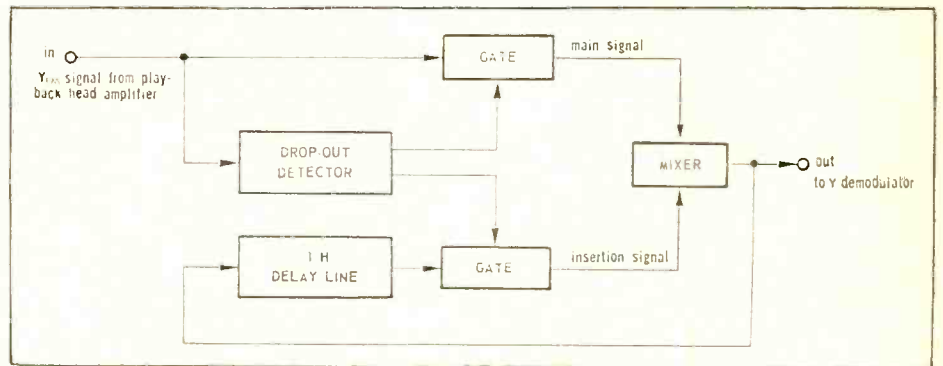
Conclusions

The *U-matic* system seems to be enjoying much success in the USA, where over 25,000 recorders and players from Sony alone had been sold up to May this year. A number of mass-duplicating plants have been installed, each of which can be extended to produce up to 100 copies per pass. Using a heavy duty automated deck for the basic recorder, banks of four copiers can be added to the control

FIG. 7 (right):
JVC CR600U

FIG. 8 (middle):
Sony dropout
compensator.

FIG. 9 (below):
JVC CR600U
interior.



rack, which is normally fed from a high quality 25 or 50 mm vtr, the copying being done in real time. This is the *D-100CE*.

Despite the mechanical and electrical complexity of the player, most users have found less faults and compatibility problems than with many of the more expensive 25 mm machines. The performance, particularly in colour, will satisfy many users who are planning for 25 mm equipment, and tests with second and

third generation dubbings suggest that the system may be good enough for mastering in a budget cctv studio.

The ease of playback of both NTSC and PAL programmes with the automatic standard switching of the Trinitron monitor is something of a breakthrough; playing of cassettes from London, Tokyo and New York without problems is technically impressive.

R.S.

The other half of the story...

By now you probably know that Action Video sell video equipment – anything from a portable outfit to a complete broadcast quality studio set up. But we're not just a shop, nor did we start by selling hi-fi equipment or cameras – we started in video. So here's the other side of our story.

Since we understand a video company to be a company that understands video, we offer a comprehensive range of services which have been built up in tandem with the sales section.

In this way all sections of AV's operations benefit from new developments in any one area – experience is shared so you receive an economical, professional service, based on a thorough technical understanding, from a company which is developing as the video field itself develops.

Under one roof, for continuity and speed, Action Video offer the following facilities

STUDIOS



A large studio fully equipped for six channel operation with complete mixing, editing and effects capabilities. Comprehensive lighting and set building facilities are available. A smaller studio is also available for interviews, casting sessions or for use as a viewing room. Studio facilities are available from £25 per hour.

FILM/TAPE TRANSFER



Designed to enable the full potential of both film and video tape to be combined economically, Action Video maintain comprehensive facilities for professional telecine and tape to film transfer in monochrome and colour using 16 mm or 35 mm film.

Monochrome telecine transfer rates start at £12.50 for the first 15 minutes and reduce thereafter. Colour rates start at £17.50.

OUTSIDE BROADCAST UNIT



For location shooting and playbacks, as well as conference or exhibition work, AV have an outside broadcast unit which is fully compatible with the studio equipment so simplifying video tape production.

The O/B unit is available from £150 per day.

HIRE AND LEASE

A very wide range of CCTV equipment is available from AV on economical hire and lease terms.

SERVICE



An integral part of all Action Video's operations is the service section, fully equipped to ensure reliability in all areas.

Coupling a professional, unbiased approach with an appreciation of the user's viewpoint of video means that AV can help you, whatever your requirement.

Call 01-734 7465 today for the full Action Video story.



ACTION VIDEO LTD

45 Great Marlborough St., London W.1.
Telephone: 01-734 7465/6/7

APRS '73 in retrospect

DAVID KIRK

Below: Ampex 16 and 24 track master recorders

Centre: Allen & Heath larger range modular 16/8 mixer

Right: Ted Fletcher at the Alice AM 16/8 desk

THE ASSOCIATION of Professional Recording Studios sixth annual exhibition of industrial audio equipment closed on Saturday June 23 at 18.00. It coincided with weather as near tropical as London ever experiences but, despite this, the event maintained its atmosphere of quiet informality. Not too quiet, however, for the exhibition was well attended and many exhibitors reported pleasure at receiving firm orders in addition to the usual but less tangible expressions of customer interest. Even STUDIO SOUND had no complaints, being left with nothing but *Hi-Fi News* to sell by Saturday mid-morning.

In retrospect, the majority of APRS '73 exhibits were adequately detailed in the July preview and there is little point repeating the descriptions given then. Emphasis here is on the new or the unexpected.

In addition to a wide range of standard and narrow tape format multitrack recorders, Amity this year offered a 16/4 mixing console, the 1642B. Merged into its 1,524 x 1,016 x 406 mm dimensions are 16 input strips with the following facilities: Penny & Giles 1320 fader, four group and two pan switches, bass cut (30, 50 and 100 Hz), 50 Hz 15 dB cut/lift, 1, 2, 4, 6 or 8 kHz 8 dB cut/lift, and 10 kHz 15 dB cut/lift. Three foldback circuits can be set to pre/post fade and mute and may alternatively be used for cue or echo send. Visual monitoring is by 10 ppms and all connections are via Cannon XLR sockets paralleled to 26-way multi-plugs. Total price £3,900. A 1642B mixer has already been ordered by Cream Music, Frankfurt, to feed an Amity recorder. Another recent order has been made by Columbia Screen Gems, for a 16/8 control desk.

Ampex announced during the exhibition the delivery of a 24 channel MM1100 to the Manor Mobile Recording Unit, Shipton-on-Cherwell, Oxfordshire. The first of its kind in Europe, it follows the comparatively recent trend of compacting multitrack recorders into the smallest possible space. In this instance, 1,143 x 736 x 686 mm. Price of the standard 16 track version is £8,200, including servo-driven capstan.

Bearing a remarkable resemblance to the 10-4 which they have manufactured for ITA, Audio Applications BM104 features ten inputs and four outputs and costs £675. Output level metering is on Ernest Turner VUs, with two



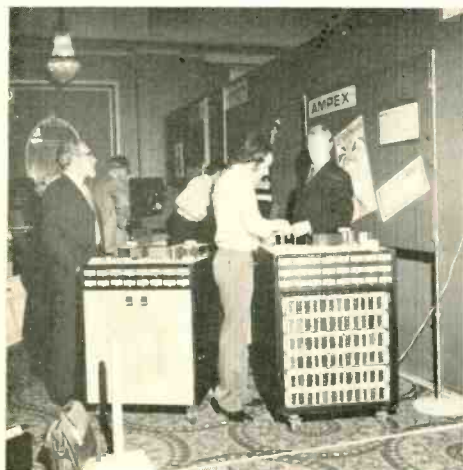
compressors capable of being linked for operation from one pair of controls. Relatively unusual is the arrangement of monitor buttons on a substrip in front of the channel faders. When monitoring normally, the headphones and a paralleled output are fed from the selected output group/s. Pressing a 'solo' button overrides the foregoing and monitors instead the post-panpot of the selected group/s. Echo send, foldback and echo return masters are similarly routed.

Audio & Design displayed items from their range of level control equipment. This presently comprises F600 limiters, the F690 voice-over, F700 compliment-expander, F760 peak limit-companer, F768 compliment-equaliser, E500 band selective processor, E800 and 900 equalisers, and P Series phasers.

An 8/4 mixer within a similar cabinet format to the TRD700 recorder was exhibited by Audio Developments. Designated AD007, the unit incorporates two compressors and two ppms, both patchable to any channel or group. The meters can be set to read sum and difference or normal peak level. A ten-input extension unit is available, increasing the mixer to 18/4 working. Dimensions are 540 x 480 x 225 mm and the weight, including batteries, is 22.7 kg. The AD007 costs £950 and the extension unit £750.

The TRD700 itself, from Audio Developments' sister company Tape Recorder Develop-

80 ▶



AMITY TAPE Recorder

Abridged Specification

TRANSPORT	Tape width	—1" or 2"
	Tape speeds	15 i/s and 30 i/s
	Rewind time	90 secs (for 2,400 feet)
	Max. reel diameter	10½" (N.A.B. hub)
	Wow and flutter	Less than .08% (15 and 30 i/s)
ELECTRONICS	Frequency response.	Record/Reproduce — 30 hz-15 kHz ±2 dB
	*Signal-to-noise ratio (Unweighted)	56 dB
	Input—10K impedance, unbalanced.	Provision for plug-in transformer provided.
	Output—Min. Load impedance	300 ohms, output floating.
	E.Q.—N.A.B. (C.C.I.R. available to order)	
	Bias/Erase frequency—100 kHz	
	*Measured at N.A.B. operating level	

TAPE TRANSPORT

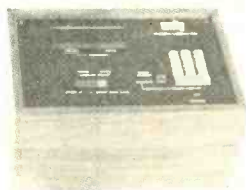
- 1 Precision machined aluminium alloy cast deck plate.
- 2 Constant tension in play mode, effected by relating tape pack diameter to angular velocity of relative spooling motors, utilizing stroboscopic discs scanned by photo-electric devices.
- 3 Papst hysteresis synchronous Capstan motor of the outside rotor type.
- 4 All tape path components interchangeable from 2" to 1" tape including head assembly.
- 5 Tape control logic, motion sensor and direction indicator circuits utilize T.T.L. integrated circuits for maximum reliability and foolproof operation.
- 6 Remote control, elapsed time indicator and index locator accessory available as an optional extra.
- 7 Hand inching of spools when tape is stationary automatically releases brakes for cueing purposes.

ELECTRONICS

- 1 Separate "module per track" construction for ease of alignment.
- 2 Relay switching on monitoring and operating mode of each track allows complete remote operation.
- 3 All active components on plug-in printed circuit boards.
- 4 All alignment controls (including record and playback levels) on 15 turn potentiometers for precise alignment.
- 5 Separate switches for V.U. meter and aural monitoring allow Engineer to listen to incoming line whilst watching "off-tape" signal.
- 6 Silent switching allows tracks to be dropped in and out of record whilst tape is in motion.



**"BRITISH PRECISION
ENGINEERING AT ITS BEST"**



Price List Tape Machines:

- 8 Track (1" transport) £3,990 complete
- 16 Track (2" transport) £6,490 complete
- 24 Track (2" transport) £7,990 complete
- 4 Track Stereo, Mono prices to be announced later.

Transport deck units 2" and 1" transport available separately if required.

Amity Index Locator complete with remote control for transport £450.

Dolby "A" cards and switching built into record/replay module £180 per track.

Amity mixing console type 1642B complete 16 track portable studio console including 16 track monitor mixer and two limiters £3,990 complete.

THE "AMITY INDEX LOCATOR"

This system operates in the following manner. At the start of the recording session, the blank reel of tape is loaded on the machine and the button marked "Zero clock" is pushed. The clock then displays elapsed time as the tape is used, the recording Engineer marking the time of the start of each "take" on the tape log as the session progresses. When the time comes to play back the tape, the Engineer can select any point on the reel by referring to his tape log, and feeding the required number to the index locator by means of the "set-up" keyboard. Pressing the "locate" button then automatically winds the tape to the selected position.

To: NAME

ADDRESS

Please send for free colour leaflet and price lists to:
AMITY TAPE DEVS.,
 3 New Compton Street,
 London W.C.2.
 Tel. 836-7811. Telex (Eng.) 23197
ORANGE GMBH GERMANY
 Frankfurt 12880

SS1

■ APRS '73 IN RETROSPECT

ments, operates at 38, 19, 9.5 and 4.75 cm/s and provides stereo facilities on 6.25 mm tape. Claimed 38 cm/s specification is 0.05 per cent rms wow and flutter, 40 Hz to 18 kHz +1 -2 dB frequency response, and 60 dB signal-to-noise ratio (ref 320 pWb/mm). Optional ppm or VU meters are offered and prices start at £450.

A new monitor loudspeaker, handling up to 100W, has been added to the wide selection of audio systems produced by Audix. Three drivers are incorporated, a 380 mm unit handling bass and mid range up to 4 kHz, crossing over to a pair of 130 mm units

Top left: Beyer headphone display and (top centre) microphone display

Top right: Lamb Laboratories Mini Studio

Below left: Eric Keene demonstrates the lightness of the Alice AD52 miniature mixer

Below centre: Audio Developments new AD007 mixer

Below right: Ken Gundry with Dolby remote control box

mounted in a separate section on the top of the cabinet and angled to give a more uniform hf dispersion. Nominal impedance is 8 ohms and the dimensions are 840 x 485 x 385 mm, 29.5 kg.

Bias Electronics announced the availability of leasing facilities for their 1000 and 2000 tape recorders.

Prototypes of three new capacitor microphones were exhibited by Calrec, all being internally powered by a small 1.5V battery. These are not electret units; polarisation is obtained by ac inversion—an elegant arrangement provided Calrec avoid the temptation to derive polarisation from the programme voltage itself.

Cetec UK, a division of Computer Equipment Ltd, London, chose APRS '73 to introduce a ferrite version of the Gauss patented *Focussed Gap* recording head. The heads displayed were for a four track cassette format though Cetec hope to have eight track 6.25 mm format heads available some time during August.

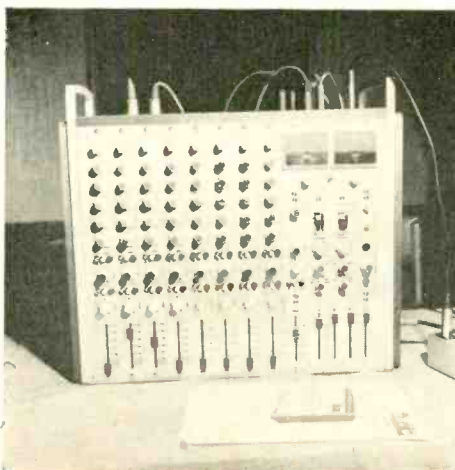
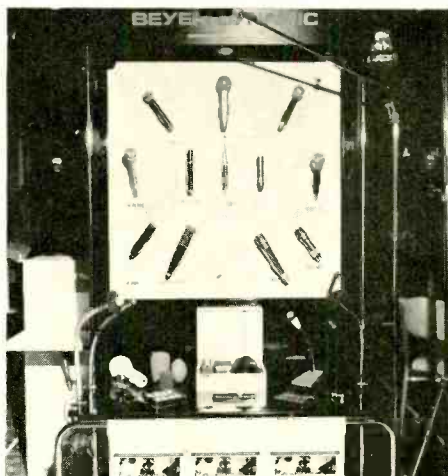
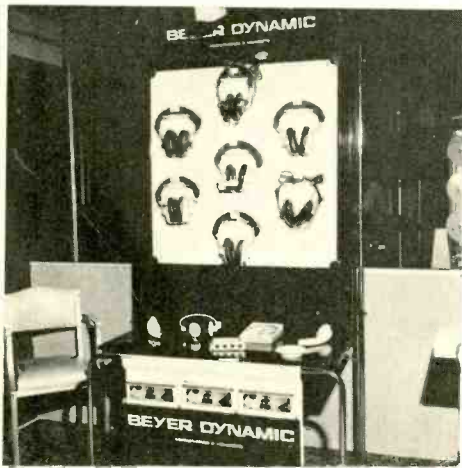
In addition to audio mixers, CTH are now producing digital timers. Basic model is the *DT1*, a five-digit unit reading to 999.99s and primarily designed for racing events. Model *DT2* incorporates a standard time clock and a negative or 'injury time' facility, operating from mains or 12V dc and selling at £360. Remote displays for television outside broadcast applications are also available.

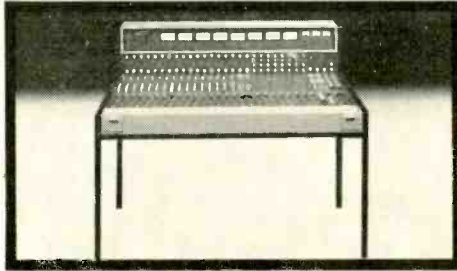
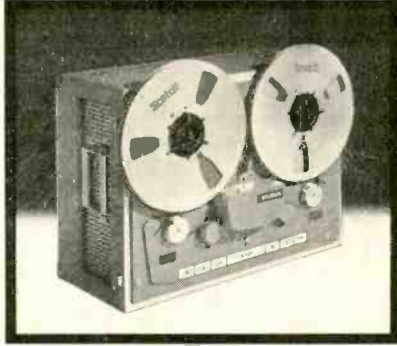
Apologies to Dolby for misquoting a BASF press release in the APRS '73 preview. Our version ran 'A 55 dB print factor, eliminating the need for Dolby noise reduction treatment, is claimed by BASF for their latest studio tape *SP50LH*'. In the original release: '... the excellent print-through factor of 55 dB ... means that the tape can be used without Dolby Noise Reduction treatment'. BASF and Dolby may like to discuss that between themselves; STUDIO SOUND will be happy to publish the result.

Feldon spent part of the exhibition awaiting delivery of MCI's new *JH-100* tape transport, perhaps the first recorder to be specified as 'piano proof'. A crystal controlled dc capstan servo gives a claimed 0.04 per cent DIN peak weighted flutter. Provision is made for synchronisation with external equipment, special effects varispeed, full bidirectional operation and automatic position location. Standard tape speeds are 76 and 38 cm/s though a 19 cm/s version is available. Basic prices have yet to be fixed.

Hayden Laboratories, recently appointed agents of Telefunken studio equipment, displayed a transportable 6.25 mm *M12* recorder, latest version of the *M28* (received in our March 1970 issue). Hayden have also lately acquired the agency for Isophon loudspeakers and exhibited two monitors from this range: the *HSB7501* and *TMB4501*. From

82 ▶





STUDER

*E.W.O. Bauch Limited
49 Theobald Street
Boreham Wood Herts
Tel: 01-953 0091*

— *STUDER A80* —

*STUDER
B62*

*STUDER
189*

■ APRS '73 IN RETROSPECT

Nagra, the miniature *SI* and larger *Series 4* battery recorders were shown while, from Sennheiser, the relatively new *MKE201* and *401* electret and the *416* 'musicians' microphone.

Helios concentrated this year on their *PS* series of studio mixers, conceived for private and budget-conscious commercial studios. The familiar Helios raised control panel is employed for optimum clarity, the basic *PS.1* being available with ten to 16 inputs. Standard facilities include provision for phantom microphone powering, echo send and return, line/tape monitoring of each track, foldback, talk-back, 11-frequency line-up oscillator, and Audio & Design *600*, *700* or *760* compressors. Metering is optional ppm, light band, and/or VU. An additional foldback option allows up to four different mixes for tape tracks plus live microphones or, if preferred, individual headphone mixing boxes. The larger *PS.2* handles the requirements of 16 track operation. Basic prices are from £5,000 upwards.

Japanese tape consoles by Otari were seen on the **Industrial Tape Applications** stand. *MX7000* operates at 38, 19 and 9.5 cm/s and is available in full or half track mono, two, three or four channel on 6.25 mm tape. Spool capacity is 27 cm NAB. The locally manufactured *10-4* mixer was also displayed, being evidently relevant to the Otari and four channel

and purchase of second-hand equipment. There is no mountain of retired *BTR1s* at the Jacksons' Rickmansworth premises; rather, the equipment handled may usually be inspected in its normal location and demonstrated by the original owners. Jackson also offer experienced installation staff and a studio design service. Details from 87 72351.

Following a fire at their Maidstone factory in mid-1971, **KEF** have been concentrating on their range of domestic loudspeakers. A new monitor has been developed, however, and was displayed in the shape of the *5/1AC*. Input to the internal dual channel power amplifier is 775 mV across 10k ohms, balanced or unbalanced, giving an output of 112 dB spl (ref .0002 n/m²) at 2m on axis. Harmonic distortion is specified as less than one per cent from 50 Hz to 15 kHz, signal-to-noise ratio being 90 dB. Dimensions are 890 x 510 x 440 mm, 45 kg.

Klark Teknik displayed three photographs of their *2000* studio recorders. I was tempted to snaffle one but then Klark Teknik would only have displayed two.

Lamb Laboratories exhibited their complete *Mini Studio*, a package deal based around a *Revox H77* with selsync, varispeed and remote control unit. Also supplied is a *PML420* 4/2 mixer, four Beyer microphones, four stands, Beyer *DT100* headphones and all interconnecting leads: £848. Where greater mixing flexibility is required, up to three *PML420* units can be

operated from the same power supply.

Additionally available on the Lamb stand were details of **Russco** gram turntables, now being imported from the USA. The two models being handled are the *Studio-Pro* (33 and 45 rpm) and *Cue-Master* (33, 45, 78), selling at £127 and £115 respectively. Both turntables feature 50 Hz synchronous motors and operate from 230V. Claimed acceleration distance is 1/10 of a turn to 45 rpm, 1/16 to 33 rpm. *Cue-Master* platter weight is 2.5 kg and specified rumble is 36 dB below standard NAB level. Respective figures for the *Studio Pro* are 2.9 kg and -38 dB rumble.

Leevers-Rich introduced a lowline version of their *E200* studio recorder, designed to match the height of mixing desks and to be equally suitable for armchair operation. The electronics are housed in a hinged cabinet, swivelling down to the operator's feet for servicing. Models have already been ordered by two television programme companies. Base dimensions are 660 x 584 mm and the height is 787 mm. The *Lowline* is available in any of the standard *E200* 6.25 mm formats: full track, half track, wide or narrow guardband stereo.

Lighting Technology at least were unaffected by the APRS exhibition committee's No Noise policy. If their *Dream Screen* optic display was a few shades removed from studio requirements, the *Chattalite* had possibilities as an alternative to the plain 'keep out' red light. A microphone concealed in the base of the lamp detects local noise and converts it, through a variable threshold amplifier, into modulated light. Lighting Technology were represented at APRS '73 by Denis Comper who is also handling the services of Cambridge Moulders, Ellis Transport, Pyral (recording blanks), Simpson Taylor, Stanley Laboratories, and Sweetglen Ltd (marketing and studio lighting consultants).

84 ►



Far left: KEF 5/1 AC speaker

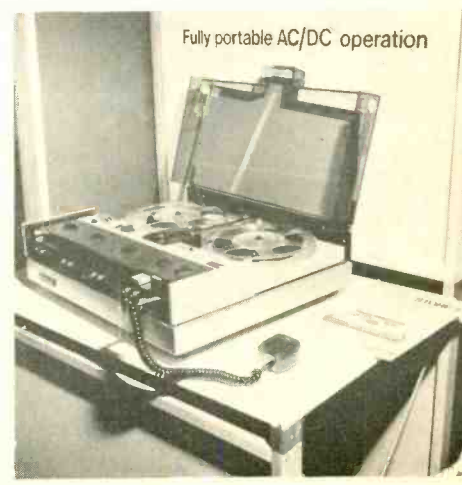
Left: Chilton 12/4 mixer

Below left: Neve's 26/16 desk for Pye's Studio One

Below: Racal-Zonal's Store-4 fm recorder

Teac recorders also handled by ITA. Each of the ten input modules comprises fader, pan, echo-send, bass, middle and treble equalisers, foldback and gain. Microphone input sensitivity is specified as 100 μ V into 200 ohms balanced, line input being 150 mV into 10k ohms. The equalisers provide 16 dB cut or lift and 100 Hz, 2.8 kHz and 10 kHz, with a quoted overall frequency response of 30 Hz to 25 kHz and 0.1 per cent distortion at nominal output. Dimensions are 720 x 520 x 195 mm and the price is £562.

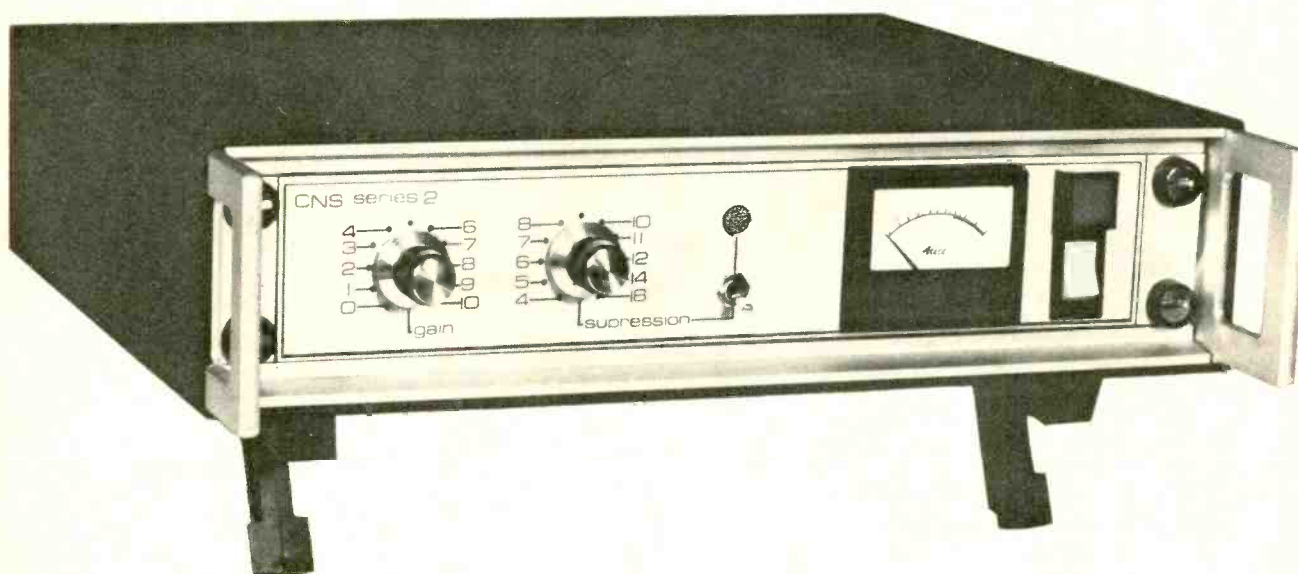
STUDIO SOUND occasionally receives letters from moneyed souls wishing to start a recording studio yet admitting to a vacuous knowledge of the audio industry. 'Send them to me,' suggested Malcolm Jackson, amiable director of Jackson Recording. He claims the largest range of stock of any audio supplier in the world and acts as an intermediary for the sale



Alice built—TO STAND ON ITS OWN

Series II CNS Unit MAINS POWERED

As a follow up to our very successful Crosstalk and Noise Suppression Module The Series II Free Standing Unit offers all the Functions of the Module Plus Continuously Variable Suppression.



- | | |
|-----------------------|--|
| INPUT GAIN | ● Continuously Variable Rotary Control. |
| SUPPRESSION | ● Rotary Control Giving a Range of 4 to 18 dB. |
| SUPPRESSION IN/OUT | ● Miniature Toggle Switch. |
| SUPPRESSION INDICATOR | ● Light Emitting Diode. |
| POWER | ● 220/240V 50/60 Hz, via Cannon Mains Socket. |
| AUDIO TERMINATIONS | ● Cannon Type Sockets. |

PRICE **£98.00** Un-bal. Delivery Ex-Stock.
£105.00 Bal.

Alice (STANCOIL LTD)., ALEXANDRA ROAD, WINDSOR, ENGLAND
 Tel. Windsor 51056.

■ APRS '73 IN RETROSPECT

Magnetic Tapes displayed their standard 10/2 mixer and a new 12/4 design. The latter possesses all the basic features of the former plus switchable pan on the output groups. Price is £495. No sign of the long awaited industrial Chilton but the 100S recorder proved attractive enough for IBA representatives to order six. Custom-built low-speed versions of these will be used as logging recorders by the three London commercial radio stations when they commence regular transmission in October.

3M have expanded the range of Mincom products now being marketed in Britain. Three flutter meters (8100A-W, 8155A and 8300A-W), the 6100 audio test set, 610A sweep generator, 6300 automatic stepping generator and 6200 fm calibrator are among units available for testing audio and instrumentation. 3M's exhibition display centred, however, on a Mincom 79 recorder, latest in the line based on their *Isoloop* transport. Tape speeds are 76, 38 and 19 cm/s, a dc servo capstan system permitting optional five to 45 i/s varispeed. The 79 is available in all standard formats from single channel 6.25 mm to 24 channel 50 mm and prices from £14,950.

Monks (Audio) introduced a new series of microphone stands and boom arms, designated *Studio*. Floor stands are being offered in lengths from 350 or 550 mm, seated on a four-leg base. Boom arms are available from 1,070 to 2,540 mm with a choice of counterweights. Finish is chrome. Also seen on the Monks stand were audio control units and amplifiers manufactured by Beglec (Brussels) and marketed under the Rodec label. The Rodec 1364 mixing panel features two gram, one mic/line and two auxiliary inputs, bass and treble tone controls and two VU level meters.

Centrepiece of the MSR stand was a *Series*

Left: Radford portable *Micro 6* mixer

Centre: Ted Howlett with the Celestion powered 15 drive unit

Right: Sansul QS demonstration unit

2000 four speed disc cutting lathe, intended for use with the Ortofon *DSS661* stereo cutterhead. Standard speeds are 16 $\frac{2}{3}$, 22 $\frac{1}{2}$, 33 $\frac{1}{3}$ and 45 rpm (78 rpm optional). Speed stability is specified as 0.02 per cent DIN peak weighted (short term) and three parts per million long term. The lathe utilises a 406 mm diameter cast aluminium platter weighing 17.7 kg. Specified rumble is -70 dB (relative to 10 cm/s groove velocity) weighted to DIN 45539. Claimed frequency response is 20 Hz to 18 kHz (from disc) with 0.4 per cent second harmonic (0.2 per cent third harmonic) distortion at 1 kHz, 25 cm/s peak. Two ppms (to BBC *ED1478* specification) may be switched across programme input, cutterhead feedback and pickup relay. Separate indicators are provided to read groove pitch, phase, stylus current and depth of cut. A Nikon 150X microscope and Ortofon replay arm and cartridge are fitted. The programme control console includes Ortofon *G0701* cutterhead drives and two 100W monitor amplifiers. Space is provided for Dolby equipment, compressors and limiters. Price of the basic 2000 is £14,500.

Naim Audio, sharing the Magnetic Tapes stand, used an oscilloscope display to demonstrate the remarkably low distortion of their *NAP200* 100W into 4 ohms power amplifier. Distortion at 50W (all frequencies) is specified as 0.02 per cent, CCIF intermodulation distortion being 0.03 per cent. Prices are from £140 while the 80W rated *NAP160* is quoted at £95. Naim's address, not given in the preview list of exhibitors, is 15 Churchfields Road, Salisbury, Wiltshire (phone 0722 3746). Either amplifier may be used to drive the *NAS402* compact monitor loudspeaker, rated at 40W programme. Price of this item is £36. Claimed frequency response is 40 Hz to 20 kHz ± 4 dB though the manufacturers wisely reserve the right to alter the specification.

Curious rumour floating above the **Pye TVT** stand that Philips had developed the last word in recording tape based on (here it comes): *iron*. This was news to Pye and also news to Sony, who have more justifiable claims in this direction.

RAC displayed specimens from their now wide range of audio control modules, including updated versions of circuits reviewed in our June issue. Typical prices (including VAT) are the *MA1.1* microphone amplifier at £2.75, *MA2.2* virtual earth mixer output at £3.35,

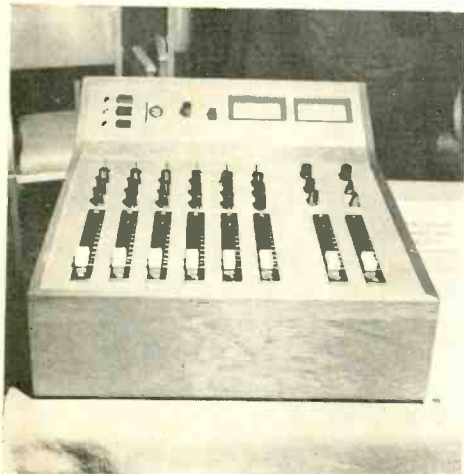
E1.5 19 cm/s tape equaliser at £2.75, and *T2* tone controls from £6 to £6.40. Power supply units start at £4.05, ending at £6.10, while Preh slide potentiometers (70 mm travel) are offered at up to £2.75 (10k ohms log stereo). Other items listed by RAC include Rendar jack and Switchcraft *XLR* connectors, Belling-Lee edge connectors and Gardner transformers.

One of the most elegant recorders at the exhibition was the **Racal-Zonal Store 4**, a four channel 6.25 mm fm recorder with a 152 cm/s specification of dc to 20 kHz -1 dB, 48 dB signal-to-noise ratio and 0.35 per cent p-p wow and flutter. Nobody mentioned audio but the only objection to sound recording on the *Store 4* is the relatively limited recording time. Maximum spool capacity is 22 cm. If one is content with a narrower bandwidth, however, 76 cm/s will pass 10 kHz, 38 cm/s 5 kHz, 19 cm/s 2.5 kHz, 9.5 cm/s 1.25 kHz, 4.75 cm/s 625 Hz, and 2.375 cm/s 313 Hz. The signal-to-noise ratio deteriorates by 3 dB at the lowest speed but one cannot expect everything working fm at half the speed of a Philips cassette, even if the tracks are wider.

The main problem with fm recording is that tape flutter decodes directly into noise. Hence the need for an exceptionally good tape transport. Racal-Zonal have opted for a low-inertia mechanism driven by a tachometer servoed motor referenced to a 100 kHz (152 cm/s) crystal oscillator. Changes in tape speed are effected simply by dividing the oscillator frequency. One of the four tape channels may be used to store the speed control tone, compensating on replay for tape stretch and, to some extent, recorded flutter. I recall trying the same principle on a Revox 77 though the transport inertia was too high to effect any practical improvement. Other features which put the *Store 4* ahead of conventional audio recorders are a tight-wrap capstan, eliminating the need for a pinch wheel, and a dual movement level meter displaying positive and negative peaks simultaneously. The entire unit measures 482 x 140 x 432 mm and weighs 17 kg.

Studio Republic's mobile recording truck failed to materialise, a non-event into which colleague Dwyer has probed (see 'Diary').

Triad's Barry Porter was content, having supplied mixing desks to SARM, Majestic, Worthing and John (Chipping Norton) Congas. The *B* series desk displayed was due for installation at Essex Music's new studios.



A SELECTION FROM OUR WIDE RANGE OF MICROPHONE STANDS

THE STUDIO SERIES

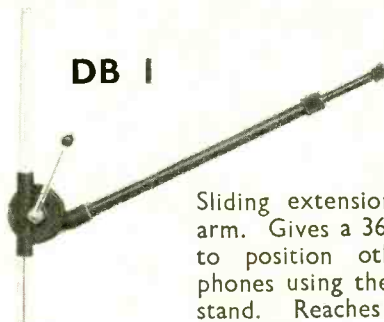


STUDIO 1. Stand with four 14" legs. Height extends to 6' 10". Boom arm 6' 6" long with 2lb. counterbalance.

Studio 2. As above but with 22" legs and boom arm, with 4lb. counterbalance.

STUDIO 3. As above but with boom arm 4' 6" long.

DB I



Sliding extension to boom arm. Gives a 360° coverage to position other microphones using the one boom stand. Reaches from 1' 8" to 2' 10".

EXT I



BOOM EXTENSION
Fits into tube end of boom to give a telescopic extension of an extra 3' 2".



BS1/B

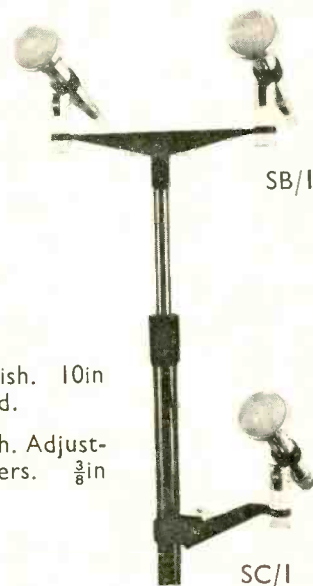
BS2/B

MSPA/B

BS1/B Banqueting Stand. 4½lb base. Matt black finish. 20in max height. Stem may be fixed upright or angled.

BS2/B Banqueting Stand. 7lb base. Matt black finish. 29in max height. Stem may be fixed upright or angled.

MSPA/B Angle Floor Stand. Matt black finish. 80in max height.



SB/I

SC/I

SB/I Stereo Bar. Matt black finish. 10in long. ⅜in locking screws provided.

SC/I Side Clamp. Matt black finish. Adjustable for different tube diameters. ⅜in locking screws provided.

KMAL

— for **QUALITY, DESIGN and ADAPTABILITY**

For further details write or phone to:

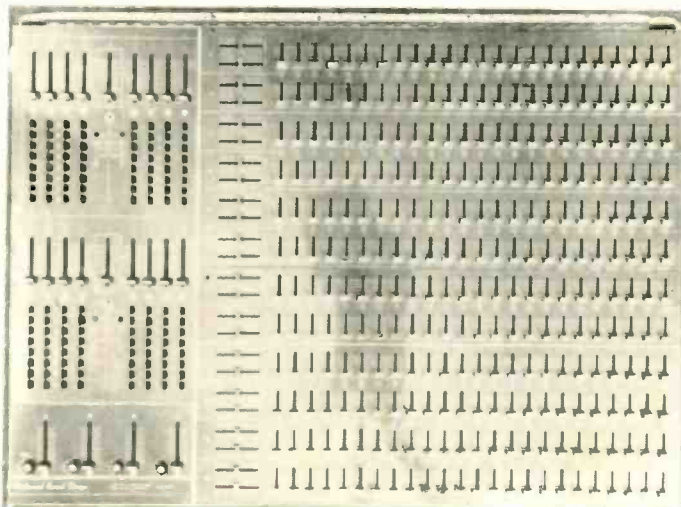
KEITH MONKS (AUDIO) LTD

26-30 READING ROAD SOUTH · FLEET · HANTS

Telephone: Fleet (02514) 7316 and 3566

RICHMOND 1224 THEATRE SOUND MIXER

By Hugh Ford



Input Configuration: Microphone inputs typically coupled to a single output preset for each input channel. On boards with multiple microphone inputs, two or more master presets can be supplied, allowing *Auto-Pan* (TM, Pat. Pend) from one set of levels to another group of manually preset level controls for the same microphones. In addition, voltage control inputs can be provided to allow external level adjustments.

Input impedances: Voltage controlled line inputs: 50k ohms. Units with dual master presets 25k ohms. **Maximum Input level:** Microphone 0dBm. Voltage controlled line inputs +8 dBm.

Tone controls: ± 18 dB at 60 Hz and 10 kHz.

Output level: +21 dBm maximum (+14 dB with reference to input level at line inputs with all controls at maximum level and flat equalisation).

Overall signal-to-noise ratio: Minimum 80 dB; typically 95 dB.

Overall Distortion: Typically below 0.5% total.

Price: £1,250 as reviewed.

Manufacturers: Richmond Sound Design, 1234 West Sixth Avenue, Vancouver 9, British Columbia, Canada.

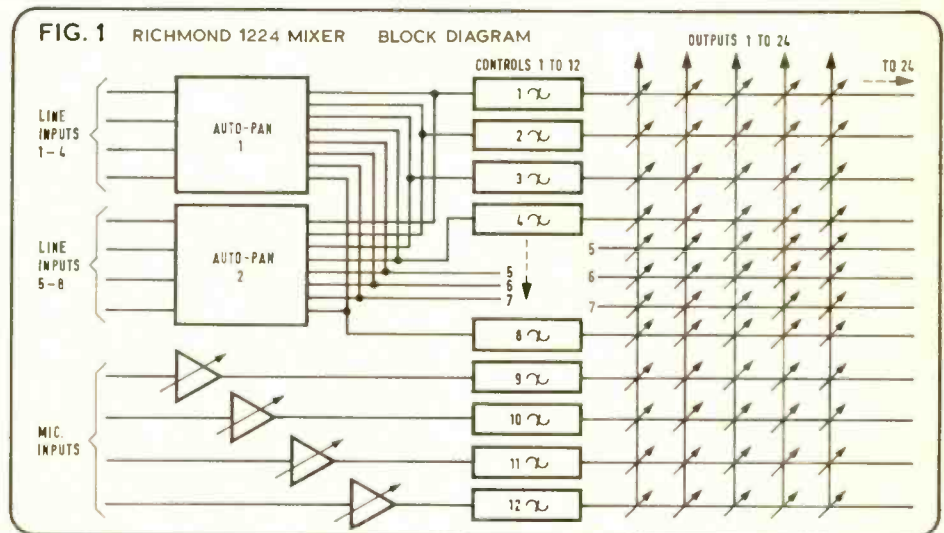
THE REVIEW sample of the Richmond mixer was a prototype of a system specifically designed for use in conjunction with theatrical sound systems. Richmond do not make standard mixers but manufacture mixers to meet specific applications in the theatre. The specification quoted really refers to general systems rather than to the review sample itself.

With the exception of the rather ramshackle power supplies, the complete mixer was built on the back of light alloy front panel 1,015 mm wide and 710 mm high, all components being wired in, including the integrated circuits. The front panel finish was shiny blue with silver etching for the identification of the controls. This colour scheme is claimed to make readability good under poor lighting conditions.

The mixing facilities (fig. 1) included eight line inputs, in two groups of four, and four low level microphone inputs. Each group of line inputs was fed to an 'auto-pan' section (more of which will be said) by which any input could be switched to any of eight output channels which included treble and bass tone controls. A further four output channels corresponded to the four microphone inputs. Each output channel was then fed to some 24 faders (288 faders in all) which provided 24 mixed line outputs intended for driving 24 loudspeaker amplifiers for loudspeakers around the theatre.

The front panel was laid out with the input controls on the left, being from top to bottom the two 'auto-pan' units including faders, underneath which were four microphone channel faders and their associated switched attenuators.

To the right of the input section were the 12 sets of treble and bass controls and to the right of them the 12 sets of 24 output faders. All fader controls were calibrated from 0 to 10, and fitted with square knobs such that the calibration was read from the bottom edge of the knobs. Unfortunately, the construction of



the knobs was such that one could not run a finger along the controls to set the mixer to 'zero' without considerable discomfort from the sharp edges on the knobs.

The auto-pan sections

Each auto-pan section was fed by four line level inputs of 23.5k ohms input impedance which remained constant with control settings. The sets of four inputs fed two groups of slide faders, the wanted group of faders being selected by a miniature toggle switch which operated in conjunction with a variable time constant set by a further slide fader calibrated from zero to 60s. It was therefore possible to carry out automatic fades on four channels simultaneously between two selected levels for each channel.

Furthermore, each of the eight faders were associated with an eight-way interlocked press-button switch which enabled the output of each fader to be fed to one or more of the eight output channels. This somewhat complex arrangement permitted really complicated cross-fades which would be quite impossible for a single operator at a conventional desk and furthermore ensured exact repeatability.

The only snags found in this arrangement were a 3 dB loss of gain when 'fading' between channels which ended up with identical outputs when the fade was complete; the duration of this 3 dB dip depended upon the duration of the fade. Also, slight switch clicks appeared in the output but were not too objectionable provided that the treble tone control was not

88 ►

New Ampex MM-1100

Professional Recorder. 16 Channels for £8,150*, 24 Channels for £12,845*



Now you can enjoy the creative opportunities of 16 or 24-channel recording for less money than you expected. Great, too, for demanding 8-channel work. Gives you unchallenged versatility for extra-sophisticated mastering.

New MM-1100 is worthy of the leaders in to-day's exciting sound revolution. It's a really compact audio recorder/reproducer. It gives you high performance. It's great value for money.

Sounds best with Ampex 406 low noise studio mastering tape.

*Plus VAT

To find out more phone Tony Shields at 0734-84411 or send coupon to Ampex Great Britain Limited, Acre Road, Reading, Berkshire.

Name _____

Company/Address _____

Tel No: _____

8-channel

16-channel

24-channel

406 Tape.

MM-1100

AMPEX

The Memory People

Magnetic Tape · Audio, Instrumentation & Videotape Recording Equipment · Computer Tape Drives · Core Memories · Disk Drives.



NEW PRODUCT BULLETIN

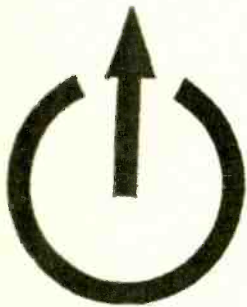
JH-416

In response to input from the 65 owners of the MCI JH.416 recording console the following features have been added to our mixing console.

- Improved conductive plastic faders by Penny and Giles Ltd.
- Illuminated mute switch with channel number
- Full reciprocal midrange equalization—Boost or cut of 14DB
- Mike input pad and new higher gain preamp to accommodate the full range of professional microphones (I.M. distortion at ODBM input less than .15%)
- Full quad panning—both L-R and F-B 360° quad positioning on all input modules and echo returns
- 48 additional tie-lines and jacks on patch bay.
- A choice of conventional moving coil vu meters, or MCI light meters with either vu or ppm characteristics as optional extra.

Of course all the other well known features such as: IC Op Amps for quicker repairs, quad control room monitoring, Phantom Microphone power. Simultaneous Quad, Stereo and Mono output are still standard on the JH-416.

For further details of this or any other MCI product,



CONTACT:
**FELDON
AUDIO**

FELDON AUDIO LIMITED
126 Great Portland Street,
London W1N 5PH
Telephone 01-580 4314 Telex 28668

88 STUDIO SOUND, SEPTEMBER 1973

■ RICHMOND 1224

boosted. It was also noted that what is intended to be a zero time fade (cut) was not instantaneous but occupied something like 500 mS to 40 dB down.

Between the calibration marks six and ten on the channel faders, each mark was equivalent to an output difference of about 5 dB, there being a large difference in level between the lower calibration marks. All the faders on the auto-pan units had identical characteristics at the higher gains but rather dubious breakthroughs when the channels were shut: -68 dB at 1 kHz in one case.

Microphone inputs

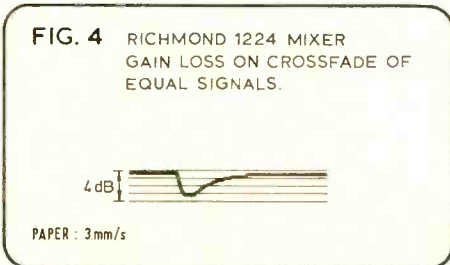
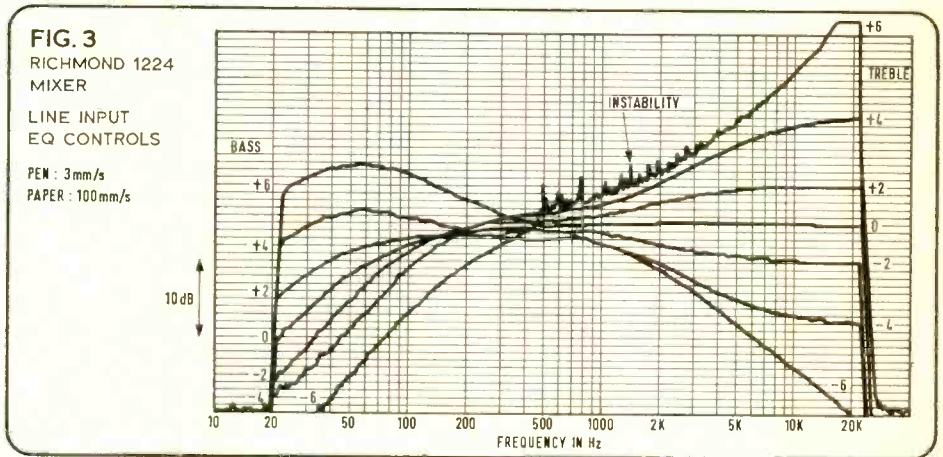
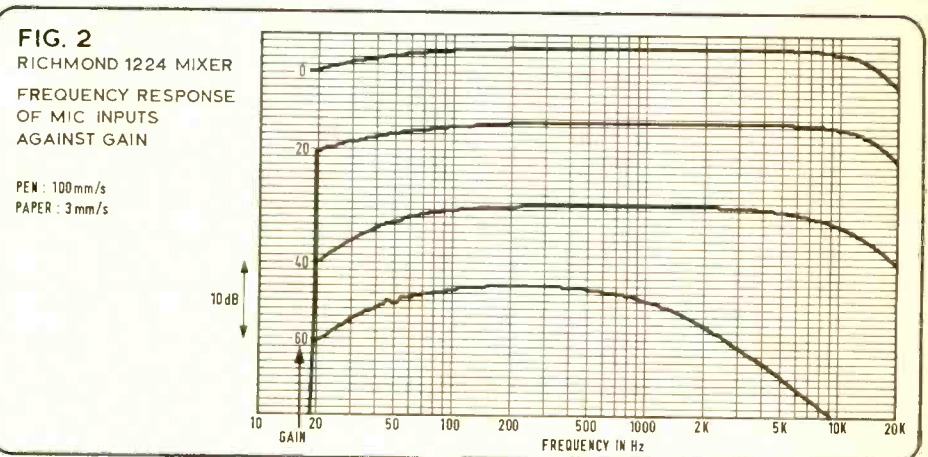
The microphone inputs were found to have an input impedance of 578 ohms, constant

with input attenuator settings, which is rather on the low side for microphones of nominal impedance of 150 ohms or greater. Faders had a sensible attenuation characteristic and the input attenuator, which was calibrated from 0 to -60 dB in 10 dB steps, was accurate to within approximately +0.5 dB.

However, as can be seen from fig. 2, the setting of the input attenuator had the most catastrophic effect upon the frequency response, such that gain settings of 40 dB and above were progressively useless. Also, at maximum gain, violent instability could be produced by setting the tone controls to treble boost.

Overall performance

Fig. 3 demonstrates the overall frequency response of the mixer from the line inputs and also the function of the tone controls which had a rather large effect on mid-frequencies



and which, as can be seen, produced instability at maximum treble boost. The effect of this on a 1 kHz sinewave is shown in fig. 5. The frequency response of the microphone inputs at maximum gain has some similarity to that of a poor quality am radio.

Other than this, control settings were not found to upset the response and there was no significant interaction between controls. The line output attenuators were found to have a fairly constant characteristic of about 15 dB

per calibration division and this coarse characteristic made it extremely difficult to set output levels within anything much better than about ± 3 dB.

The overall gain at the line inputs was 10 dB with a maximum microphone sensitivity at 1 kHz of 38 μ V for 0 dBm output, the microphone input clipping being an excellent 22 mV at maximum gain and reasonably pro-rata at lower gains. Similarly, distortion from the microphone inputs at maximum gain was very low for up to -10 dBm at the mixer output, but the following table shows that distortion from the line inputs is a somewhat different story. Measurements were taken with maximum auto-pan gain and at 1:1 output gain.

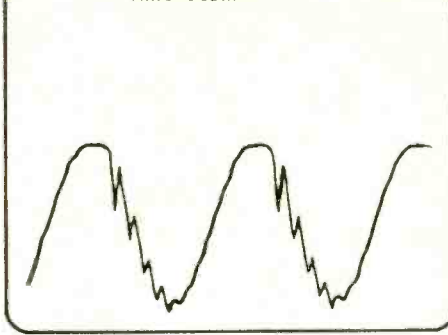
Input level (dBm)	Output distortion (% third harmonic)
0	0.46
+3	0.89
+6	1.75
+9	3.2
+12	5.9
+15	10.5

Clipping occurred at +13 dBm (against the rated +21 dBm) and appeared to be associated with the auto-pan stages of the mixer.

Against this performance one must compare the mixer noise which, with maximum gain settings and the line inputs shorted, was -68 dBm (A) with one input open and the tone controls 'flat', or only -42 dBm (A) with maximum treble boost with one input open and in both cases falling by 3 dB for every doubling of the number of open inputs.

However, the noise from the microphone preamplifiers was good, being 0.38 μ V including hum but this is not surprising when one

FIG. 5 INSTABILITY AT MAXIMUM TREBLE LIFT
1kHz 0dBm INPUT



remembers the poor frequency response at maximum gain.

Summary

In view of the shortcomings in virtually every department of this mixer, there was little point in undertaking any more refined measurements. The auto-pan idea is nice in principle but the device is noisy and distorts. The microphone inputs are good in terms of noise and distortion but the bandwidth at high gains is extremely poor.

We all know that many theatres have very poor sound systems but I cannot recommend this mixer as offering any improvement in sound quality. It may offer an improvement in versatility. **Hugh Ford**

ADVENT 201

By Angus McKenzie

WHEN PHILIPS first brought out their cassette tape machines many years ago nobody realised that such a system could one day produce such an acceptable standard of high fidelity. The transformation of recorded quality has been made possible by the use of the Dolby B noise-reduction system and by the dramatic improvement in the quality of the cassette decks, electronics and tapes. When the Advent 201 is correctly set up for use with a high quality cassette tape, it is possible to achieve quality comparable to that of better quarter track stereo domestic tape machines running at 19 cm/s and not using a noise reduction system.

The Advent 201 is designed specifically to work with a hi-fi system. It has a pair of input phono sockets with a maximum sensitivity of approximately 50 mV for peak recording level and output phono sockets to feed back into the system to give a maximum output of about 750 mV for a fully recorded cassette tape. The input sockets are connected to two separate

recording gain controls which then feed a stereo ganged control, after which the recording signal passes through the Dolby B circuitry, record equaliser and record head driver to the record playback head. On replay this head is connected to the replay pre-amplifiers. The output of these is then switched through to the same Dolby B circuitry, but working now in replay mode. The output of this circuitry then becomes the audio output of the complete machine.

During recording the replay output sockets have an output obtained from the Dolby B circuitry before processing to allow monitoring of the incoming signal. The Dolby B processing is switchable in and out on both record and playback and, furthermore, another switch allows the use of either conventional ferric oxide cassettes or chromium dioxide cassettes. On record, this last switch switches the record Dolby level calibration pots and the bias; on replay it adds an additional top cut circuit after the replay pre-amp.

The deck includes a counter and a pause control as well as the usual cassette ejection mechanism. A fairly fast rewind speed allows a C90 cassette to spool through completely in just over one minute and proved to be very reliable, at no time pulling even a C120 off its

90 ▶

WE HAVE IT—
IT WORKS

COMPUMIX

The first automated mixing system that makes sense. It's designed to augment your present mixing console . . . large or small. Even if you're not ready to address a memory with your mix information, our controller will give you the flexibility of an extra pair of helpful hands; to make those exasperating mixing gymnastics more comfortable.

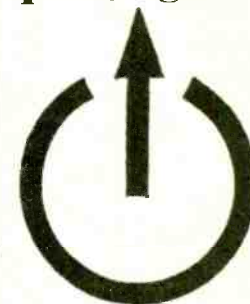
COMPUMIX makes sense because you can utilise your existing equipment to add the benefits of automated mixing. It's ready for all the progressive thinkers to become doers.

COMPUMIX is noiseless voltage—controlled sub-mixing grouping and switching control. Think about that, when you decide . . . simply interface our digital processor for that memory feature.

COMPUMIX won't let you forget the good mixes. Little things make a big difference, however, big things make a bigger difference.

THE COMPUMIX CONTROLLER.
24 inputs (expandable) to 32.6 sub-mix groupings, master fade, 54 programme auxiliary switch functions, complete read, write, update control with our exclusive digital VCA-800.

quad/eight electronics



CONTACT:

**FELDON
AUDIO**

FELDON AUDIO LTD.

126 Great Portland Street,
London W1N 5PH

Telephone 01-580 4314 Telex 28668

ADVENT 201 REVIEW

leader. The wow and flutter was measured along the length of a C90 and the weighted DIN figure did not exceed 0.13 per cent. All tests were carried out after the machine had been used for at least 150 hours so that the effects of wear could be assessed.

The machine's input impedance varies from a minimum of 25 k Ω , with all input level controls at maximum, to a maximum of 100 k Ω when the input mono controls are at minimum. In normal use the input impedance is about 50 k Ω . During recording the appropriate Dolby level calibration controls, switched by the 'chromium dioxide' lever, appear in circuit immediately prior to the record equaliser section. Different record level sensitivities can be chosen for ferric and chrome cassettes such that Dolby level will be recorded to give the right replay flux level. A Dolby tone oscillator is provided and is energised by a push button which allows Dolby level to be checked on the tape. It can also be used at the beginning of any cassette to remind the listener that the cassette has been Dolby'd. Separate bias controls are also provided for the two types of tape, allowing a higher bias current to flow through the record head when using chromium dioxide cassettes. The bias and erase oscillator runs at approximately 105 kHz and the bias signal has the surprisingly low second harmonic distortion figure of 0.06 per cent, the third harmonic distortion measuring significantly higher, as would be expected. The actual distortion characteristic of the bias oscillator is partly responsible for the machine's extremely low tape noise.

The output phono sockets are driven from an output 10 k Ω volume control. With this control at maximum the output impedance on the latest models is approximately 1.5 k Ω , this being the value of the resistor in series with the output. To achieve a lower output impedance for driving into 10 k Ω lines this resistor should be changed to 150 ohms.

A stereo/mono switch is provided which parallels the tops of two input pots, each of which is driven from the input phono sockets via 4.7 k Ω .

The erase signal is adequate to erase previous recordings satisfactorily, even those made at the highest levels, and at no time did the previous recording break through; nor did any crosstalk become apparent between either the stereo channels or those recorded in opposite directions. During replay the record replay head is tuned by a 2,200 pF capacitor and a variable damping resistor allows the head resonance to be controlled to obtain the correct replay response at high frequencies. The BASF test cassette showed the replay response with normal equalisation to be ± 1 dB from 333 Hz to 10 kHz ref 1 kHz on both tracks. To achieve this remarkable replay response, however, it was necessary to adjust the head azimuth very carefully as well as the head damping resistor. The bass end peaked to +3 dB due partly to the Advent's bass replay equalisation. The replay equalisation given by the pre-amplifier is in fact 150 μ s which helps to compensate for replay gap losses, which however are mainly compensated for by the previously mentioned head resonance.

Advent use a head with a rather wider gap

than that used by most other manufacturers so that they can achieve a higher output at middle frequencies; wisely, they do not attempt to extend the response much beyond 14 kHz and thus achieve a significantly lower replay noise level. The figures for the record and replay noise levels with and without Dolby processing for both ferric oxide and chromium dioxide tapes are shown in the accompanying table. No hum is apparent on replay and, when it is considered that each track has a width of only 0.75 mm or so, the results achieved are quite remarkable.

Advent told me that they adopted a nominal 70 μ s replay equalisation after an article I wrote about chromium dioxide in this magazine in 1970 was published. The extra replay

equalisation for chrome throws an rc combination from the top of the replay calibration potentiometer to ground, resulting in an extra 44 μ s top cut. This cut flattens above 14 kHz so that the curve produced is only approximately 70 μ s. The choice of this chrome replay curve allows the same record equalisation to be used for both types of tape. The compromise is reasonably satisfactory, although chromium cassette recordings made on the Advent will not sound correct when played back on most other types of cassette machine, since these either do not have chrome switches to change replay equalisation, or have the correct 70 μ s curve, which is in the course of becoming recommended internationally for high density tapes. 92 ▶

ADVENT 201 REPLAY NOISE REF 0 VU DOLBY LEVEL

	BASF C90LH (no Dolby)		BASF C90LH (with Dolby)		BASF Chrome C90 (no Dolby)		BASF Chrome C90 (with Dolby)	
Replay only unweighted dB	-55	-55	-58.5	-58.5	-57	-57	-57.5	-58
Replay only dBA weighted	-61	-61.5	-70	-70	-66.5	-66.5	-73.5	-73.5
Overall unweighted dB	-51	-51	-55	-55	-53	-54	-55	-56
Overall dBA weighted	-54.5	-55	-63	-63.5	-59	-60	-65.5	-66.5

MANUFACTURERS' SPECIFICATION

Tape speed: 4.75 cm/s.

Wow and flutter: 0.15 per cent DIN weighted.

High speed wind times: 45s for a C60.

End of tape shut off: Fully automatic, disengages pinch roller and heads from the cassette.

Input sensitivity: 35 mV for 0 VU.

Input impedance: Nominally 50k ohms.

Output: With output level control at maximum, 580 mV at 200 ohms from 0 VU tape level.

Frequency response: 35 Hz to 15 kHz ± 2 dB with

Crolyn tape (at -30 VU); 35 Hz to 14 kHz ± 2 dB with regular tape.

Signal-to-noise ratio: Ref 0 VU, Dolby off. Better than 54 dB with chrome tape. Better than 48 dB with regular tape.

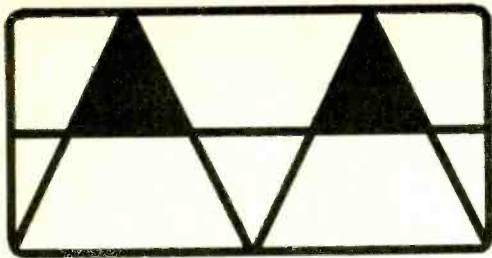
Noise reduction: Dolby on. 10 dB at 4 kHz and above 9 dB at 2.4 kHz, 6 dB at 1.2 kHz, 3 dB at 600 Hz.

Bias frequency: 110 kHz.

Price: £165.

Agents: Cintron, Grove House, 551 London Road, Isleworth, Middlesex.





Response

by Audio Applications Limited

RESPONSE "B" SERIES MIXERS

Especially designed to cater for the needs of recording engineers and users of sophisticated P.A. equipment, our new "B" series of mixers is extremely competitively priced and available in any number of input channels routing into 2 or 4 output groups. Two compressors are fitted as standard and exceptionally comprehensive monitoring facilities are provided.

Adam Hackett would like to tell you more about this exciting and versatile range of mixers. Why not 'phone him?

AUDIO APPLICATIONS LIMITED, Kensington Barracks, Kensington Church Street, London, W.8.
01-937-6615

Ease the hassle cut the time

With this new VHS77
30 ips + 15 ips REVOX with Sel Sync,
ECHO and A.D.T.
Tape delay of only 1/20th second produces the most
natural echo yet.

Hi Speed Duplication

Duplicates Masters in half or quarter normal time
without loss of quality at 30 ips with a frequency
response to over 40 kHz.

Editing

Made a dream, not a nightmare. One note may
occupy around a foot of tape.

Stereo

Tapes recorded to broadcast standard.

Sole U.K. Supplier:



Immediate delivery
to your door



Industrial Tape Applications

105 High Street, Eton, Windsor, Berks. Tel: (95) 52663 Telex 21879

■ ADVENT 201 REVIEW

As readers may be aware, the standard bass roll off, originally chosen by Philips as 1590 μ s, is highly unsatisfactory, since it necessitates 7 dB of bass boost on record at 50 Hz. Such a boost causes serious bass distortion on a lot of recorded material, particularly pop music. Therefore, although this is non-standard for ferric tapes, the Advent machine applies less bass boost on record and consequently less bass cut on replay, the curve being approximately equivalent to 3,180 μ s. It is therefore possible to record pop material at a rather higher level than normal yet at a reasonable distortion level.

A distortion level of one per cent was achieved at Dolby level (200 nWb/m) when a 1 kHz tone was recorded on a high output ferric oxide cassette. I noticed, however, a very much higher distortion figure of three per cent when a chrome tape was measured with the bias adjusted carefully to give a flat overall response. Even when the bias level was increased further the distortion on chrome tape of the same thickness was always above that of the equivalent ferric tape. It is of course at very short wavelengths that chrome tape shows itself to be much better than ferric. At 12 kHz, for example, a level several dB higher can be recorded before clipping, despite the greater fall off on replay with the chrome equalisation.

When I first heard Dolby'd cassettes demonstrated commercially at hi-fi shows I am afraid I was appalled by the very poor tape contact on most of the decks being used for demonstrations, these first ones being imported from the Far East. Quite possibly these poor results—which also included noticeable tape weave from poorer decks, caused by the capstan not being in perfect vertical alignment with the tape and pressure rollers—were responsible for much early criticism of pre-recorded Dolby'd cassettes. In my opinion, far more serious now is the variation of azimuth, not only on different prerecorded cassettes from various manufacturers, but even on cassettes of the same title duplicated by a given manufacturer at different times or on different slaves. Considerable work must be done internationally to provide an azimuth test cassette which should be supplied in a

reliable cassette holder. I would further like to recommend that the price of such a cassette be brought down to encourage its use throughout the industry.

The Advent can be relatively easily azimuthed and when this has been done its azimuth remains very stable. I found the head to tape contact superior on the Advent to that of any other cassette machine that I have so far tried, and this remains true after a year's use. A poor sample of tape, however, can still produce bad dropouts, although the better makes perform very satisfactorily. The consistency of these, however, is still not as good as it might be, as recent samples of low noise high output C90 cassettes made in Europe have shown. While I slightly prefer to use chromium dioxide tape on the Advent, particularly because of its remarkably low noise level, some material not containing substantial power at the high frequency end may well sound better on ferric tape and it therefore seems sensible to use both types on the Advent.

The Advent's tape function controls are mechanical rather than solenoid operated, and have performed very reliably, although the tape pause control seems a little stiff. Up to now most models appearing in Europe have been supplied for use on 110V ac mains, although 50 Hz capstans are fitted. Advent have only recently overcome the difficulty of finding a 240 V ac motor that has a sufficiently low external field combined with low flutter and vibration to be acceptable.

A typical overall response on ferric tape referred to 1 kHz was ± 2.5 dB from 40 Hz to 150 Hz and thence ± 1 dB up to 13 kHz. Above 13 kHz the response fell very steeply, resulting in an improved overall signal to noise ratio. On chrome tape the treble response was not quite as good, a dip of 1.5 dB between 2 kHz and 6 kHz being noticeable on some samples of tape. The response was also measured with Dolby processing switched in and at a level of 25 dB below Dolby level. Any errors of high frequency response were at worst approximately doubled, the worst errors again being in the region of 4 kHz. The maximum observed error under any circumstances with Dolby processing in was a dip of nearly 3 dB at the latter frequency which in practice was only just noticeable. However, the lower, middle and bass responses when Dolby processing was in use were found to be identical to the normal response.

Noise comparison

The most significant figures to notice in the accompanying table of noise measurements are a comparison of the overall record playback noise on a low noise ferric C90 cassette, both with and without Dolby processing, compared to that of chrome, noting the weighted dBA measurements. The weighted improvement will thus be seen to be 8.5 dB on ferric tape with Dolby processing in use, with a further improvement of 3 dB when chrome tape and Dolby B are used. This noise improvement of 11.5 dB is equivalent approximately to the noise difference between a normal stereo cassette machine using ferric tape without Dolby and a good, well aligned domestic reel to reel machine, recording quarter track stereo at 19 cm/s on good quality tape. The main audible differences are not so much frequency response or noise as occasional tape to head contact problems, treble power response and distortion. Wow and flutter produced by good cassette decks should be only just apparent under domestic condition on difficult instruments.

The recording level meter reads either left or right channel, or the higher. The metering circuit takes its output from part of the Dolby circuit before equalisation on record but after equalisation on playback. A degree of treble boost is incorporated in the metering circuit and a crude attempt is made to improve the peak reading capabilities of the meter, thus making it rather better than the normal VU, but still not reaching, by several dBs, the real peak recording level. The meter sensitivity is adjusted such that 580 mV out of the playback sockets is equivalent to a reading of 0 VU on the meter, and is thus equivalent to Dolby level.

The Advent 201 can be recommended as being probably the finest cassette deck and is particularly suitable for quality checking pre-recorded cassettes in duplicating factories. It can also in its own right produce demonstration cassettes of surprisingly high quality which should play back well on other makes of deck but with the reservation referred to for chrome. It is hardly surprising therefore that virtually all the main cassette manufacturers in the UK use the Advent 201 for quality checking. The somewhat higher cost of the Advent is therefore well worth while, as indeed is even the inconvenience, for most users, of having to provide an auto transformer to obtain the necessary 110 V ac.

Dewtron (Regd. Trademark) modules have been going for many years now. There is a module for practically any sound effect you can think of. More especially, there is a whole range of synthesiser circuit modules identical to those used in the professional equipment, like the "Gipsy" synthesiser, distributed



by John Hornby Skewes & Co. Ltd., of Leeds, and also as used in the illustrated model "A.1". Note the revolutionary "Modumatrix" system which replaces outdated patching . . . no plugs or sockets; instant reset facility (pat. app. for). Write now for full Dewtron catalogue of accessories and voltage-controlled LOG-LAW modules, etc. Forget the rest . . . get the BEST. Dewtron craftsman precision with professional results.

Catalogue 15p

D.E.W. Ltd., 254 Ringwood Road, Ferndown, Dorset, BH22 9AR, England.

Classified Advertisements

Advertisements for this section must be pre-paid. The rate is 7p per word, minimum 70p. Box Nos. 20p extra. Semi-display rates on application. Copy and remittance for advertisements in **OCTOBER 1973** issue must reach these offices by **16th AUGUST 1973** 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.

APPOINTMENTS VACANT

CADAC

The company specialise in the design and production of sound control equipment for the recording industries.

With the continued expansion of the company, vacancies arise for the following:

SENIOR TEST ENGINEER TEST ENGINEERS

Applicants should have a theoretical knowledge of electronics and/or experience in studio engineering techniques and practices.

It would be preferable that the Senior Test Engineer has had studio experience.

Salaries by negotiation and to be commensurate with that of the position.

Apply to: **Cadac (London) Ltd.,
Lea Industrial Estate,
Batford,
HARPENDEN,
Herts.
Tel. Harpenden (STD 05827) 64698**

★**Shepperton studios** require a senior maintenance/design engineer for their sound department, with previous experience in all fields of optical and multi-track recording for feature films. This is a responsible position requiring somebody with initiative. Also required. A maintenance engineer with a knowledge of electronics and a basic knowledge of both optical and magnetic film equipment. All enquiries to Nolan Roberts, Sound Department, Shepperton Studios. Chertsey 62611.

OVERSEAS AGENTS

required to sell

PROFESSIONAL MIXING CONSOLES

and Ancillary equipment

Please reply in confidence to Box No. 657 including details and areas covered.

★**Audio Technician** (Man or Woman) to work in new Resources Centre. The person appointed should have an interest in sound recording and operation of tape recorders and should be able to carry out first line service. A general knowledge of language laboratories would be an advantage but instruction will be given. Salary Technical Grade II viz. £1311-£1530 p.a. Application forms together with further particulars obtainable from the Senior Administration Officer, Bulmershe Court, Woodlands Avenue, Earley, Reading, RG6 1HY. To be returned as soon as possible.

APPOINTMENT WANTED

★**Sound engineer.** Studio Manager and Senior Engineer (28) in medium sized studio, wishes for a change of venue. Five years experience working on 8/4/16 Track, with groups and orchestral sessions. Anyone interested? Contact Studio Sound Box No. 658.

STUDIO FACILITIES

★**Mobile recording van.** Live sessions. Stereo. Anywhere. Mobitrack, 01-892 9599.

EMERGENCY STUDIO SERVICE (24 hrs)

All types of Studio equipment serviced from Multitrack to Film Transport.

A professional service for professional people.

Ring: **BOB AITCHISON**
on 01-670 0558

★**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. Telephone 0483 61684.

EDEN STUDIOS LTD

QUALITY recording tape to disc and pressing services, all at very reasonable rates. Please write or 'phone for leaflet.

11 EDEN STREET, KINGSTON, SURREY
01-546 5577

Member Assoc. of Professional Recording Studios

★**You're wasting time** if you're not doing your demonstration tape at our cosy studio, Fender piano, dual manual organ, Ludwig drums, Fender Stratocasters and things and Ten nice channels. Pump your music into our mixer, we're addicts at getting the right sound and six hours costs only £2.50 per hr. We're called Underground Studio and you ring 061-480 9079 between 10 a.m. and 5 p.m. on Saturdays only, or write to Underground Recording Studio, Basement Level, 84 Chatham St, Edgeley, Stockport.

Roger Squire

DJ Studios

The best facilities in town for making Audition Tapes, Jingles, Programmes and Sound Commercials. For further information telephone

01-722 8111

COMPACT CASSETTES PROFESSIONAL HIGH-SPEED DUPLICATION

Dolby B—compression and equalisation available—competitive prices on small runs—full productions undertaken—music and language specialists.

Contact Chris Sands
AUDIO EDUCATION COMPANY
01-723 6635

★**J & B Recordings.** Tape to disc—latest high level disc cutting, all speeds. Mastering pressings, studio, mobile. 14 Willows Avenue, Morden, Surrey. MITCham 9952.

mjb recording and transcription service

Vinyl pressings and acetate demodiscs. Limiting, compression and equalisation facilities; high undistorted cutting levels with feedback cutter heads. Booklet available.

ST. MICHAEL'S, SHINFIELD ROAD,
SHINFIELD GREEN, READING, BERKS.
Reading (0734) 84487 Member A.P.R.S.

★**County recording service** stereo and mono masters and lacquer discs from your tapes. Telephone Bracknell 4935. London Road, Binfield, Bracknell, Berks.

YOUR TAPES TO DISC

Records made to order—7" from £1.50. 12" from £4.00. 4-day postal service. Vinyl pressings, sleeves, labels. Tax-free for schools, etc. We cut records for many Recording Studios, etc. and use the same equipment for you: NEUMANN Disc Cutting Lathes—Mono and Stereo systems. Professional tape machines with Ferrite playback heads, Dolby A and B systems, 200W Amplifiers, Lockwood monitors, Teletronic/Ortofon Limiters. Send SAE for photo leaflet.

DEROY STUDIOS (1948)
Hawk Street, CARNFORTH, Lancs. Tel. 2273

FOR SALE—TRADE

FREQUENCY SHIFTER FOR HOWL REDUCTION Wireless World, July 1973

Fibreglass p.c.b. with 12-way gold edge connector and print for ±15V regulators £1.00.
Complete kit £18.00 } including p.s.u. and
Built & aligned £24.00 } mains transformer.

PEAK PROGRAM METERS TO BS4297 also 200KHz version for high speed copying—same prices

Drive circuit for 1mA L.H. zero meters, 35 x 80mm C.W.O. further 5% less 2 off 4 off 10 off
Complete kit £8.00 £7.60 £7.20 £6.80
Built & aligned £12.00 £11.40 £10.80 £10.20
Ernest Turner PPM meters, scaled —22 to +4 OR 1 to 7. Type 642, 71 x 56mm £9.90; Type 643, 102 x 79mm £11.77.

SURREY ELECTRONICS
24 High Street, Merstham, Surrey

AUDIO VISUAL: COMMUNICATION

synonymous terms: sophisticated techniques from Electrosonic combining the attention demanding features of:

Sound

Super sound; mono, stereo, triphonic or quad with all the power you need

Light

Explosive effects to soft colour washes, mood setting

Visual

Brilliant projected images, sync'd to sound and light via Electrosonic Multiplex control, on as few or as many screens as you need with a myriad of special effects—automatically

This is a conference set; our communicators are equally at home in exhibitions, showrooms, museums, visitor centres—anywhere where the need is to educate, inform and entertain. Hire or Sale.

Conference set and programme software
by Magic Lantern Limited London



ELECTROSONIC

Electrosonic Limited Electronic Control and Audio Systems
815 Woolwich Road London SE7 8LT Phone: 01-855 1101
Telex: 896323 (ESMX London) Cables: Multiplex London SE7

★Tame those dB's . . . Plug in professional quality FET compressor module £15.50. For the 'slick operator' . . . 'Voice over' module £15.50. S.A.E. details. Cathedral Sound SS, "Fourways," Morris Lane, Halsall, Lancs. L39 8SX.

RAC MIXERS

Custom built mixers for groups, P.A., hospital broadcasting, recording, discos etc.

RAC plug in—audio modules for building your own mixers.

Shure, AKG, Calrec, Sony, mikes and stands in stock.

Sony, Tandberg, Nikko and Lux dealers.

RUGBY AUTOMATION CONSULTANTS

19 Freemantle Road, Bilton, Rugby,
Warwickshire. Tel. 07888-10877 (Rugby)

Call, write or phone us.

★Lancashire. Tandberg, Ferrograph, Tape Recorders, etc. Plus over 10,000 high fidelity systems. After-sales service. Holdings, Photo-Audio Centre, 39-41 Mincing Lane, Blackburn BBA 2AF. Tel. 59595/6.

UNIMIXER STUDIO 4 and 6 MIXERS

Each channel can be switched to accept 5 different inputs, choice of DIN, Cannon, jack-sockets, slider faders, tone controls, PPM. Overall noise is better than -127 dBv with a 200 ohm source (using 20 kHz band with filter). Mains or battery powered. Prices from £87 (as with the successful 4S range, supplied directly to users) only from:

SOUNDEX LTD

18 Blenheim Road, London W4 1ES 01-995 1661

★If quality matters consult first our 105-page illustrated Hi-fi catalogue with technical specifications (60p). Members enjoy unbiased advisory service, preferential terms. Membership (40p) p.a. Our associates also manufacture records from your own tapes or record the Master at our studios (Steinway Grand). Bulk terms for choirs, fund-raising, slim discs. Please specify requirements. Audio Supply Association, 18 Blenheim Road, London, W.4. Tel. 01-995 1661.

DOLBY 'B' by KELLAR

Special purchase enables us to offer these famous high performance add-on units to convert your own recorder to Dolby 'B'. Simple connections and adjustments. Full instructions.

KDB 2/4 Full monitoring for 3 head recorders
£44.00 (RRP £69.30)

KDB 3 Simplified—for 2 head or cassette. £27.50
(RRP £42.90)

Prices are inclusive of VAT. Calibration tape or cassette and P & P.

Cash with order or call—closed all day Wednesday

dB AUDIO

299 Upper Elmers End Rd., Beckenham, Kent

★Recently re-equipped studio has a variety of equipment for sale, including E.M.I. mixer and BTR/1 Master Recorder, etc. Any reasonable offer accepted. B.U.C. Radio Department, Stanborough Park, Watford, Herts. or Phone Watford 72606.

★Revox A77 mark III model 1102, new, boxed, guaranteed, £180.00 plus V.A.T. Telephone Wokingham (0734) 781970.

FOR SALE—PRIVATE

★1 E.M.I. B.T.R.2 tape machine, 30 i.p.s., immaculate condition, £200 o.n.o. Telephone Sheffield 581006.

★Ampex FR-100B instrumentation recorder, 1in. tape transport and amplifiers £250. Also marconi mixer 12 channels into stereo with echo facilities, Tel. Sheffield 745379.

WANTED

★Lee Electronics. The Tape Recorder and Hi-Fi Specialists wish to purchase good quality Tape and Hi-Fi equipment for cash. 400 Edgware Road, W.2. Phone PAD 5521.

★Second-hand vehicle (tall) wanted, suitable for use as Mobile Recording Van. Please send details to Department of Music, University of Surrey, Guildford, Surrey. (Guildford 71281).

MISCELLANEOUS

★Tape and Cassette Recorder Repairs by Specialists. The Tape Recorder Centre, 82 High Holborn, London, W.C.1.

WINGS APPEAL SEPT 10th - 15th

GIVE FOR
THOSE WHO
GAVE

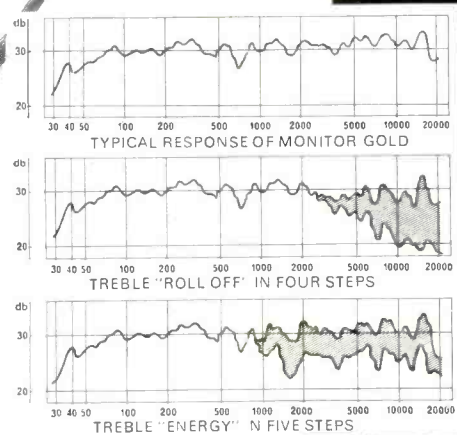
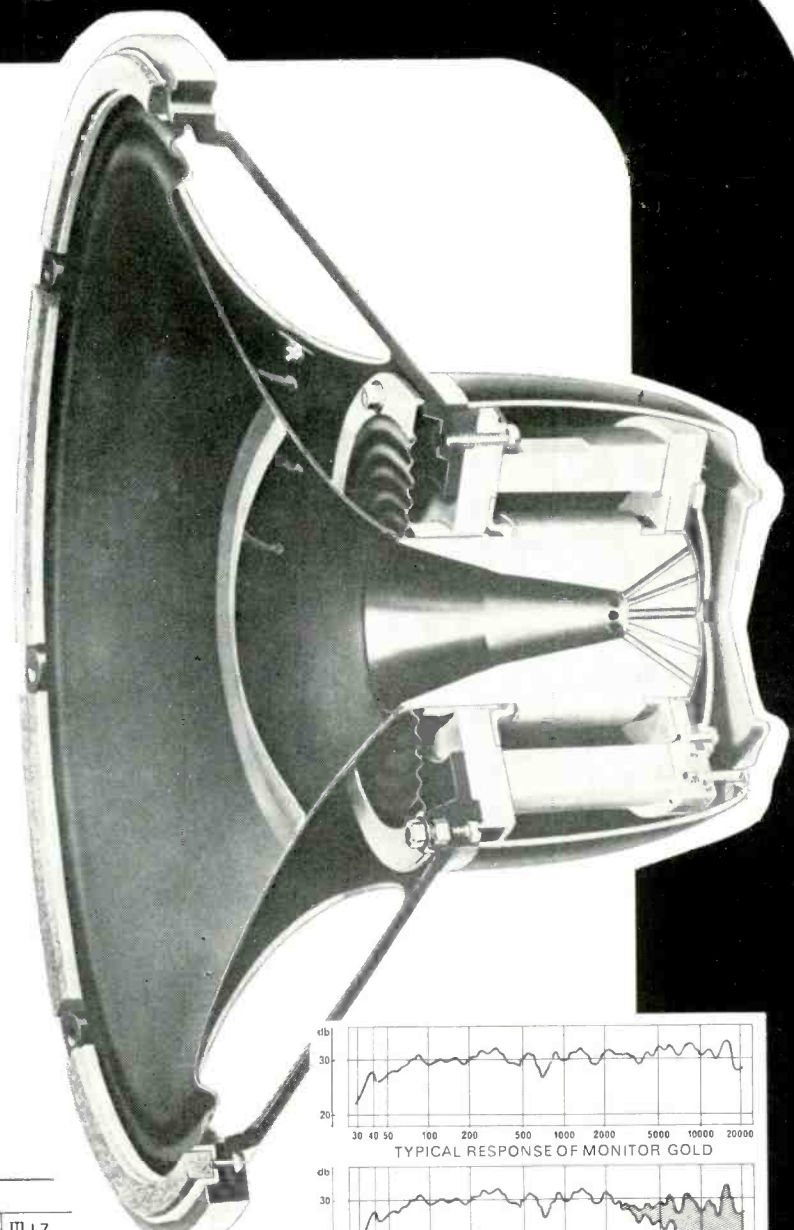


TANNOY

DUAL CONCENTRICS

Versions of the Tannoy Dual Concentric loud-speaker have formed the basis of many of the best studio monitors for more than 25 years. The unit is incorporated in a variety of enclosures made by leading manufacturers both in the U.K. and abroad, as well as being incorporated in "package studios" produced by foremost U.K., European, U.S. and Japanese manufacturers. The unit not only has the advantages of high power handling capacity and long term consistency, but the level frequency response, good polar distribution and exceptionally low intermodulation products make it ideal for the highest quality studio monitor systems. Apart from the current range of Monitor Gold units specified below the Monitor "Red" 15 is still in production and can be supplied upon request in its original 15Ω version.

**SPECIFY TANNOY
DUAL CONCENTRICS
FOR YOUR
STUDIO MONITOR**



TECHNICAL SPECIFICATIONS

	FIFTEEN	TWELVE	III LZ
Frequency Response	23-20,000 Hz	25-20,000 Hz	27-20,000 Hz
Polar Distribution for 60° inc. Angle	-4dB at 10,000 Hz	-3dB at 10,000 Hz	-2dB at 10,000 Hz
Power Handling Capacity	50 watts*	35 watts*	25 watts*
Impedance Via Crossover Network	8 ohms (5 ohms min.)	8 ohms (5 ohms min.)	8 ohms (5 ohms min.)
Intermodulation Products	less than 2%	less than 2%	less than 2%
Bass Resonance	26 Hz	28 Hz	30 Hz
Crossover Frequency	1,000 Hz	1,000 Hz	1,200 Hz

* Depending on type of enclosure.

TANNOY

WEST NORWOOD
LONDON SE 27 9AB
TEL: 01-670 1131

Neve at Covent Garden

Neve is wherever you find the world's finest sound – in recording studios, in radio and TV, in theatres, concert halls and film studios.

It's the performance of the consoles that makes the sound of Neve.

Look at the figures achieved on this console now in the Royal Opera House, Covent Garden.

Distortion At +20dBm

Highest recorded figure 0.058%
Median figure 0.035%
Neve specification claim 0.075%

Noise 20Hz to 20kHz

Output stage - maximum -99.0 dBm
Neve specification claim -80.0 dBm

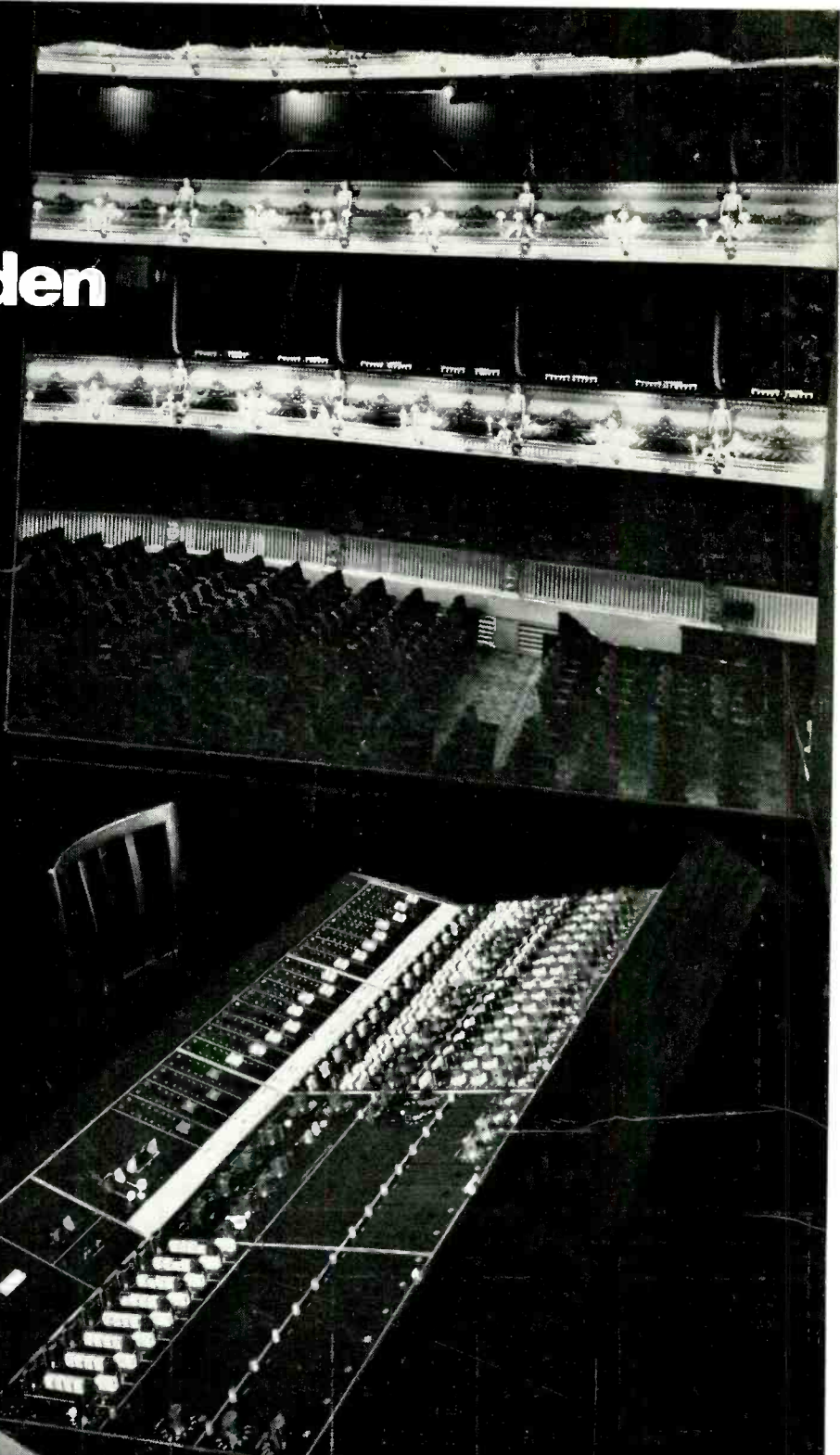
One channel selected -

maximum -81.5 dBm
Neve specification claim -77.0 dBm

Equivalent input noise -

maximum -125.5 dBm
Neve specification claim -125.0 dBm

For the best performance figures in the world choose Neve.
Write now for further information.



Rupert Neve & Company Ltd.,
Cambridge House,
Melbourn, Royston,
Hertfordshire SG8 6AU,
England,
Tel: Royston (0763) 60776
telex 81381
cables Neve Cambridge

Rupert Neve of Canada Ltd.,
7528 Bath Road,
Malton,
Toronto,
Ontario,
Canada.
Tel: 416 677 6611
telex 0621 7652

Rupert Neve Incorporated,
Berkshire Industrial Park,
Bethel,
Connecticut 06801,
U.S.A.
Tel: (203) 744 6230 telex 969638,
Hollywood Office.
Tel: (213) 465 4822