December 1978 60p

studio sound

AND BROADCAST ENGINEERING

PA AND BROADCAST MIXING CONSOLES

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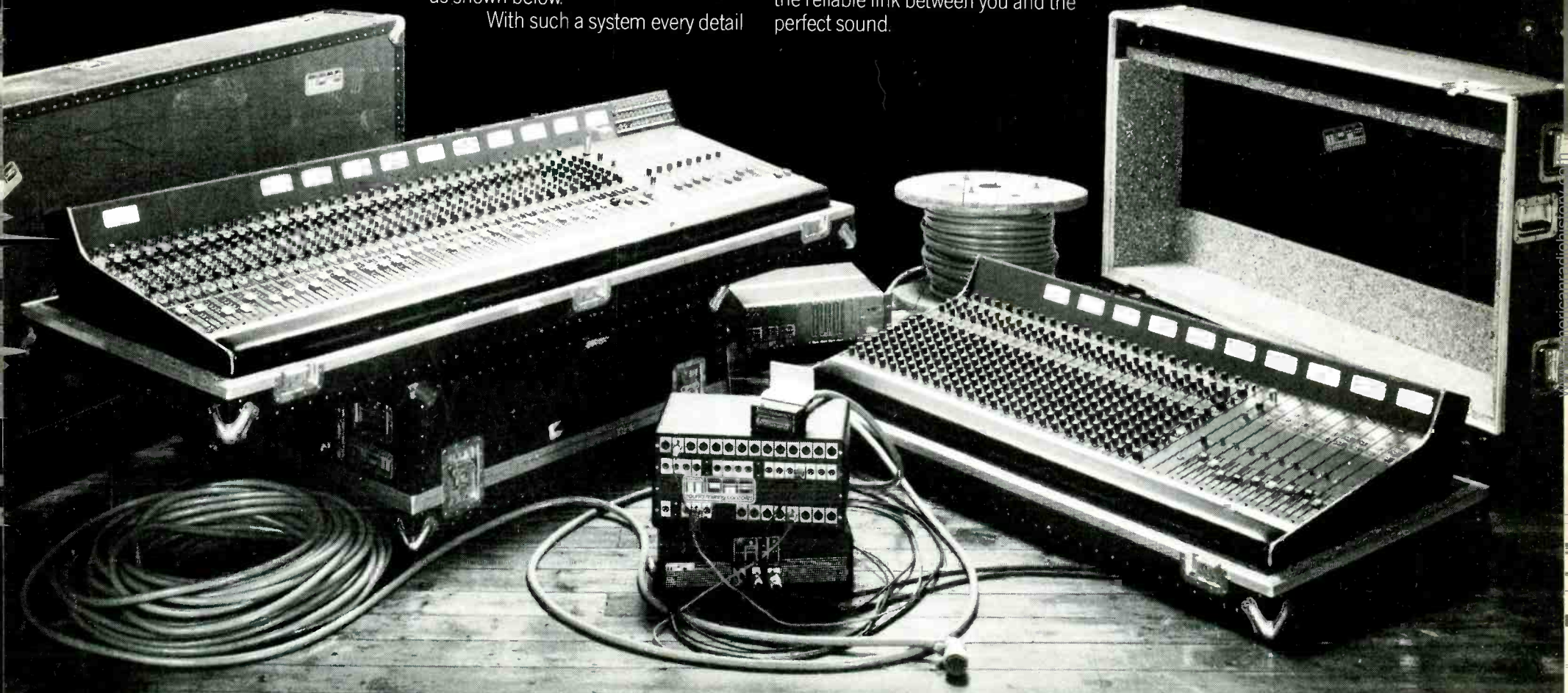

Typical system comprising 32 into 8/2 main and 24 into 8 stage monitor console with stage boxes and multi-way link cables. Supplied to many discerning organisations including Pink Floyd, Clair Brothers, Supertramp, Tasco and Cat Stevens.

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

SUBSCRIPTIONS

STUDIO SOUND is availabie at an annual subscription of £9.50. All enquiries to: Subscription Dept, Link House, 25 West Street, Poole, Dorset BH15 1LL. Poole (02013) 71171. STUDIO SOUND is also available on a rigidly controlled requested basis ONLY to qualified personnel. For terms of control please see back page.

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Total average net circulation of 12111 per issue during 1977. UK: 6175, Overseas: 5936.

THE LINK HOUSE GROUP

studio sound

AND BROADCAST ENGINEERING

A recent visit to the ETEAP exhibition in Paris emphasised the local mixer console manufacturers of France, very few of whom have enjoyed successful marketing farther afield than immediately neighbouring countries. Although there are a few truly international companies whose products are distributed worldwide such as Neve and MCI, there are perhaps a further 50 involved in the market, some with extremely successful international marketing networks, others of which initially support perhaps a single recording studio with which they are affiliated and then commence marketing more widely afield. It has been reported that only those companies offering standardised packages stand much chance of survival in such a competitive market (MCI being the prime example) and yet there were two British companies exhibiting identical desks manufactured to the same supplied specification at the APRS exhibition in London. Economic lunacy, or a profitable venture for each company?

Although we still have the age old argument concerning multitrack consoles for separate or integral input module monitoring, there are so many other permutations of mixer facilities that many mixing engineers believe their own preferences superior to those offered by manufacturers, and so we immediately have the 'custom' console which is often sold to other studios, particularly after said engineer has moved as well. But where will it all end? With the amalgamation of some of the smaller companies?

Automation and digital systems are other prime examples. Computer technology and programming skills are very much divorced from comparatively simple audio technology. Can these smaller mixing console manufacturers afford the necessary resources to develop this new technology? With the introduction of digital multitrack recorders, surely the next step is the digital mixing console enabling the elimination of much of the remaining noise and distortion from analogue circuitry before disc cutting. When digital discs and broadcasting eventually arrive, analogue processing should totally disappear until the final power amplifier. Such a microprocessor based mixer has been developed by the BBC Research Department and provides digital mixing, with software stored coefficients for digital equalisation. Obviously automation of every single function is inherent. The prototype mixer uses four 4-bit slice microprocessors per channel to give 16-bit word capability with a hardware multiplier peripheral enabling processing of a biquadratic equalisation filter in 3μs. Although still rudimentary in its facilities, the BBC mixer surely provides some indication of the future. Now we need a digital microphone!

Information request

On page 39 of this issue is a rather complicated questionnaire concerning the activities of most companies in the audio business. Your assistance in spending a few minutes completing and returning the questionnaire with related information would be most appreciated. If you prefer not to cut the magazine, please return a photocopy of the page to the editorial address shown on this page.

Multitrack Consoles by AMEK

AMEK M2000: 28 inputs; 16 busses; 8 direct assigns; 24 meters

AMEK M2000: the purpose-built multitrack console — mainframe for 28 inputs, with 24 track-reading meters — 16 buss outputs and 8 direct assigns.

In-line format with panning between live busses; mic and two line inputs; 4 band equalizer with switched frequencies; 4 auxiliaries; Penny and Giles faders; in-place solo on channel and monitor.

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Excellent performance specifications.

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A computer will be available by Advanced Music Systems using time-lock to tape via SMPTE code and floppy disc store, with access to several mixes.

Contact — UK: Nick Franks and Graham Langley, AMEK SYSTEMS AND CONTROLS LTD. Islington Mill, James Street, Salford, Lancashire M3 5HN. Tel: 061-834 6747. Telex: 668127

Or—Australia:
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AUDIO CONTROLS,
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North Adelaide,
Tel: 08-267-4529
Telex: 88729

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ADV 244/E

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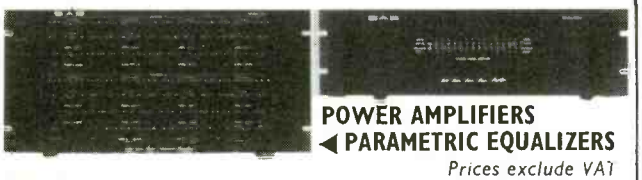

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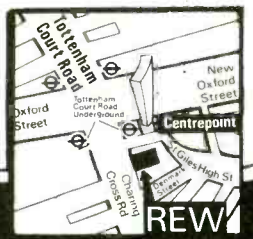

NEAREST TUBE STATION
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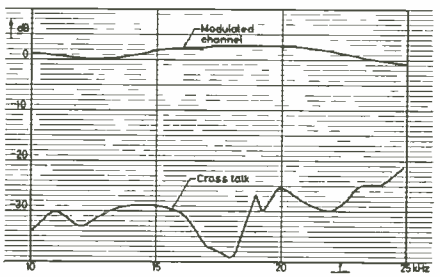
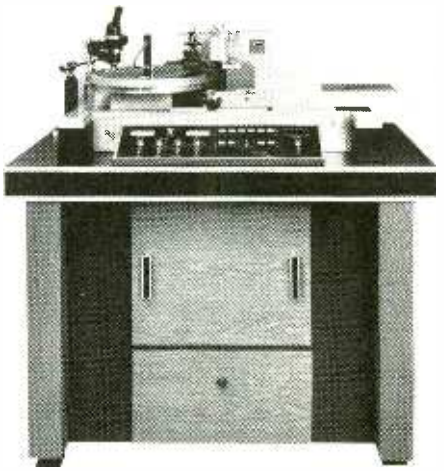
We made the man with the triangle in the Boston Pops extremely happy.

He wasn't cut off this time.



Channel separation measured on cut lacquer disc by interferometric methods. DSS 731/GO 741.



Arthur Fiedler's Boston Pops and Crystal Clear production made this new direct-cut record.

To be sure, they used three different combinations of cutting equipment. And the result, the Scully cutting machine with Ortofon cutterhead, was chosen by Arthur Fiedler and the sound experts. Not only to please the triangle player in the famous orchestra - but the depth in the music responded to the name "Crystal Clear".

The explanation: The special construction of the Ortofon cutterhead

Every cutting engineer knows the difficulty of cutting frequencies in the supersonic area because of problems with the resonances in the cutterhead. These problems can be solved in several ways. The high frequencies can be cut off. Or an equalizer can be used to compensate for the resonances. Excellent when producing "middle-of-the-road". But for more sophisticated music you'll need the Ortofon equipment because we have solved these resonance problems. The Ortofon cutterheads DSS 731 and DSS 732 have the lowest secondary resonance above 30 kHz and 24 kHz respectively. This ensures a flat frequency response and high channel separation in the lacquer.

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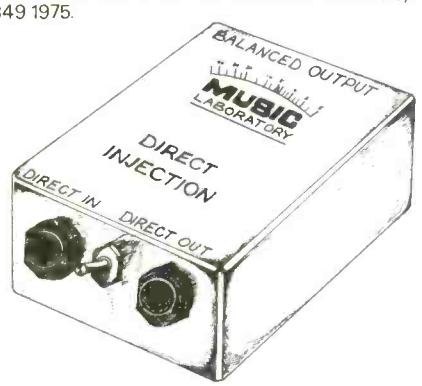

SPECIFICATION DATA FOR D.I.BOXES

Standard
Maximum Input Level +15dB
Frequency Response 20Hz to 40kHz ±·5dB
Input Z 25kΩ
Output Z 600Ω
Voltage Ratio −15dB
Ground Lift

DeLuxe
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Frequency Response 17Hz to 50kHz±1dB
Input Z 25kΩ
Output Z 600Ω
Voltage Ratio −13·5dB
Distortion 0·01 above 40Hz
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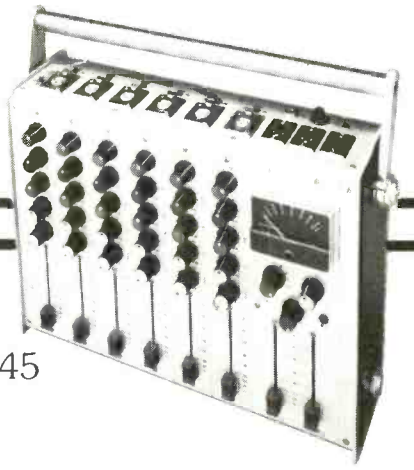

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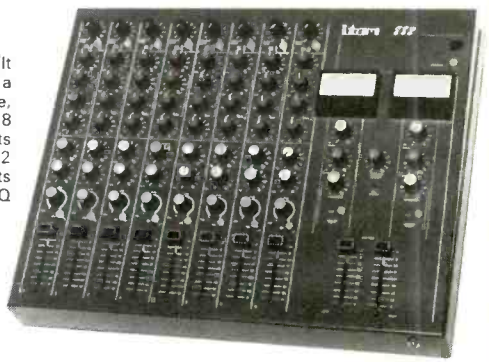

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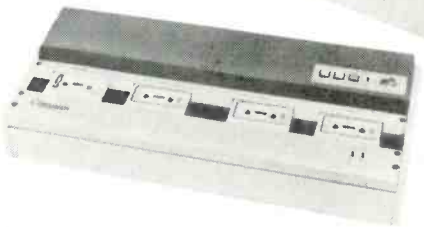

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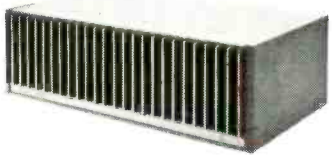

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The London Palladium; The Grosvenor House Hotel, London (S500-Ds in the main ballroom); Colac P.A. Hire Co. (S500-Ds on Dr. Hook European tours); The Duane Family (Winners of the Variety Club of Great Britain Award 1977); E.M.I. Publicity Department; Supertramp (U.S.A. and European tours); The Rubettes; Colosseum II; Black Sabbath; Liverpool Express; Simon Townsend Band; Island Records; Gallagher and Lyle; Tangerine Dream; Five Hand Reel; Horslips; The Barron Knights; . . . . . the Admiralty Surface Weapons Establishment (for hush, hush use!)

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ATR-700

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Please rush me full details of the Ampex ATR-700

Name .....

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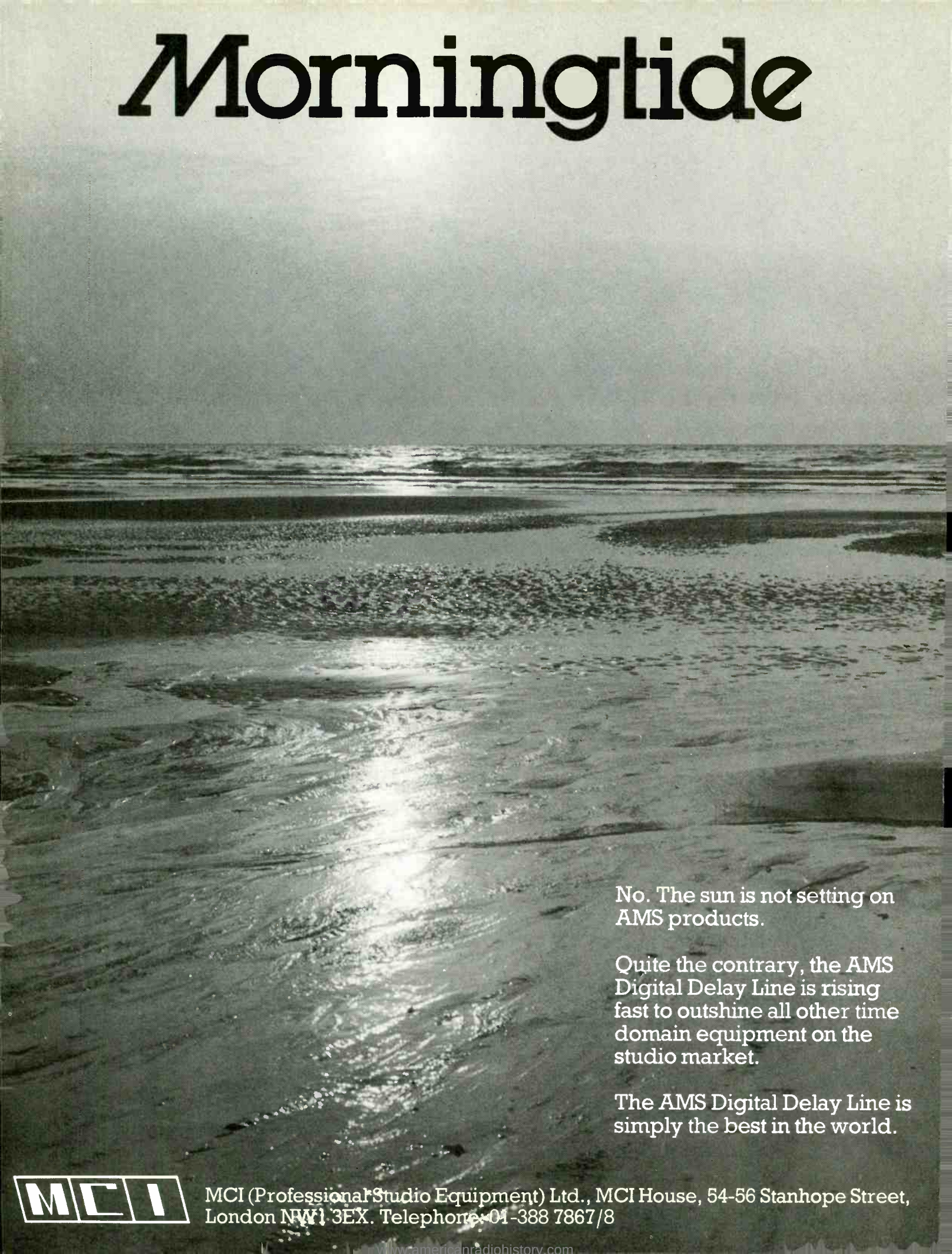
Morningtide



No. The sun is not setting on AMS products.

Quite the contrary, the AMS Digital Delay Line is rising fast to outshine all other time domain equipment on the studio market.

The AMS Digital Delay Line is simply the best in the world.

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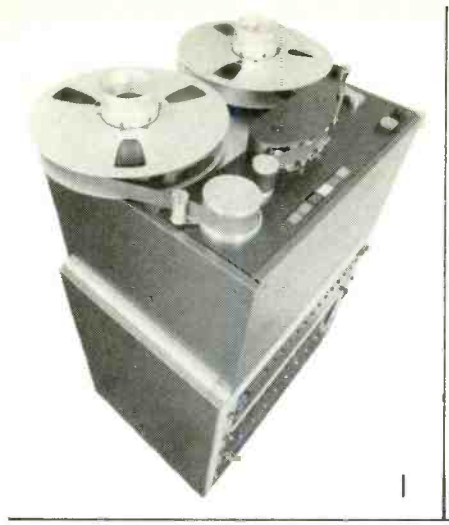
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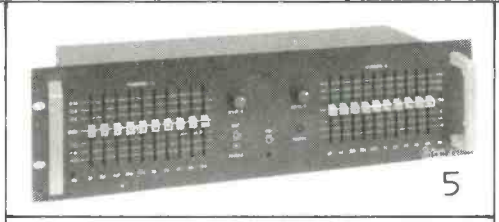
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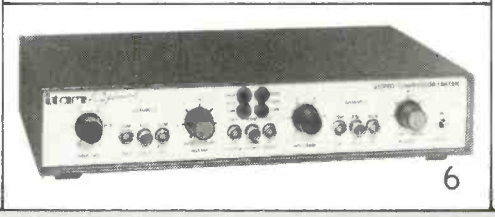
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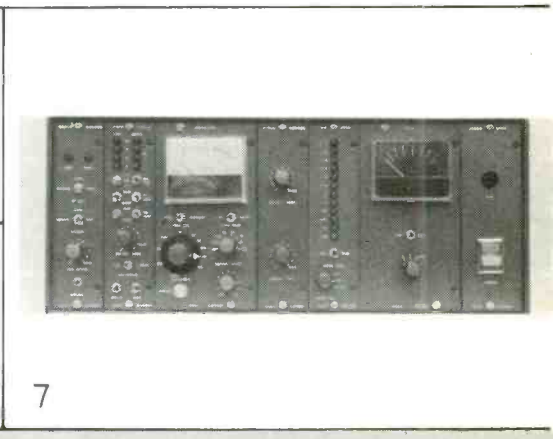
7

This is ITAM '79

1. ITAM 1610. 16 track 1" recorder

2. ITAM 806. 8 track ½" recorder

3. ITAM 10-4.10 input 4 output mixer

4. ITAM 882. 8 input 2 output mixer

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6. ITAM Compliment. Stereo compressor limiter

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Studer Model 189 18 x 8 x 8	£9000
Allen & Heath Modular 2 16 x 8 x 16	£2200
Allen & Heath Modular 2 10 x 8 x 16 with Brennel 8 tracks 1" recorder, two items	£3100
Allen & Heath Modular 2 10 x 8 x 16	£1600
AMEK 2000 20 x 16 x 16	£9000

MULTI TRACK MACHINES

3M M79 24 track, 8 months old	£18000
Studer 16 track Mk I	£9500
MCI JH 10 24 tracks	£9500
Ampex MM 1100 16 tracks	£9250
3M M56 16 track	£9000
Studer A80 Mk I 8 track	£6750
Scully 280 8 track	£3200
Scully 280 8 track	£3000
3M M79 Stereo with auto locate, as new	£4800
3M M79 4 tracks with stereo head block	£4500
Ampex AG 440 4 track	£1800
Ampex AG 440 stereo	£1200

MISCELLANEOUS

DOLBY A301 Stereo	£400
JBL 4311 Speakers, new, each	£255
Eventide Phaser	£150
Neumann U87, used	£275
Neumann U67	P.O.A.
Neumann M49	P.O.A.
Neumann M50	P.O.A.
Neumann KM56	P.O.A.
Neumann KM54	P.O.A.
AKG D202	£45
AKG D224	£80
AKG D190	£22

R.D.G. in France. Agent: Magnetic France, 11 Place De La Nation, Paris.

Wanted: all studio equipment. For a realistic quote RING NOW.

VAT not included

Tried and Tested – Still Unbeatable

The Revox A77 is the most widely used compact recorder for all professional requirements. Over 400 versions to give you a machine tailor-made for your precise requirements.
Full ITA after sales service back up.

REVOX from ITA

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

We Have Actually Moved!

Due to rapid expansion of business over the last three years the Music Laboratory has been forced to move to large central London headquarters and is now in the position to provide a greater and more efficient operation.

Sales Dept.
As the leading suppliers in the country of all professional recording studio equipment, we are pleased to offer a very large range of Tape recorders, sound mixers, power amps, studio monitors, microphones, processors, tape etc. all of which can be demonstrated in our fully equipped luxury demonstration studio.

Service Dept.
Music Laboratory regards servicing to be top priority and has built up its reputation in this field by maintaining machines for most professional organisations in the country and constantly have European customers bringing their machines to us for service.
We are London's main Revox agents and the official Revox Service Centre carrying over £20,000 worth of Revox A77 spares alone, therefore providing the fastest and most efficient possible service.
We are also the main service centre for the professional range of Teac/Tascam products.

Hire Dept.
Being the only company able to offer for hire a vast range of recording equipment we have created the opportunity for people to achieve fully professional recordings previously unobtainable outside fully equipped studios. We are able to hire out anything from a D.I. box to a complete 8 track package and are the main source of supply for theatres, studios, record companies, hire and tour companies, clubs, musicians and the general public.

Manufacturing Dept.
We are now producing our own products including a range of Direct Injection boxes which are being exported to over thirty countries or are available throughout England.

Music Laboratory offers a daily delivery and collection service to professional companies for our sales, service and hire departments plus a 24 hour nationwide despatch service.

We are pleased to answer any enquiries you may have or to give any advice where necessary.

24 hour answerphone service.

music laboratory

72-74 Eversholt Street, London NW1. Telephone 01-388 5392.

REVOX

The Music Laboratory is England's main Revox Centre serving the recording industry.
We hold large stocks of equipment and accessories for rapid delivery.
We are the official Revox Service Centre London, holding vast stocks of spares for fastest service turnaround; 24 hour collection service.
If you are out of the area, we will send you a flight case for safe transportation.

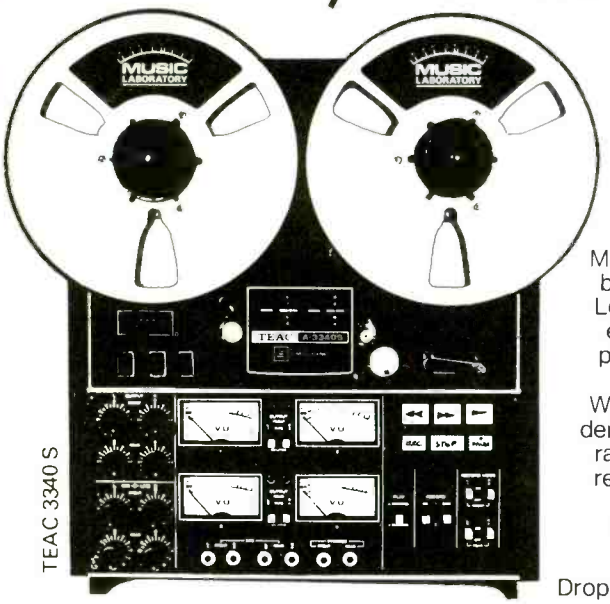
Revox
hire service.

Revox B77

music laboratory

72-74 Eversholt Street, London N.W.1. Telephone 01-388 5392/3/4/5.

Teac/Tascam Centre



TEAC 3340 S

Once again the Music Laboratory have been appointed main London Centre for the entire Teac/Tascam professional range of studio products.
We have on permanent demonstration the whole range of 4 and 8 track recorders and mixers; also we hire out complete systems.

Drop in for a demonstration.

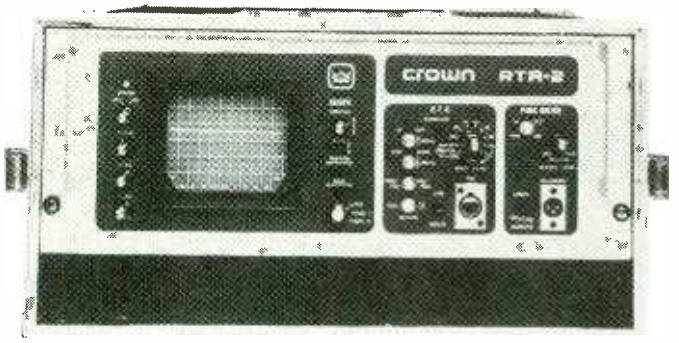
TEAC Tascam 80/8

music laboratory

72-74 Eversholt Street, London NW1. Telephone 01-388 5392.

NEW *from* amcron

REAL TIME ANALYSER RTA 2



* 5" CRT Display
* Internal Pink Noise Source
* $\frac{1}{3}$ or 1 octave Display
* Frequency range 20-20 kHz
* Outputs for X-Y Recorder
* Compatible with any microphone
* Price £1960 ex. VAT

The Amcron RTA2 Real Time Analyser is designed as much for use as a production tool as it is for on-site audio analysis of Theatres, and Recording Studios. A flight case is available.

POWER AMPLIFIER D75

The Amcron D75 power amplifier replaces the previous model D60. Employing completely new type circuitry it offers also many new features, but without any increase in the price.

* New Amcron 10C comparator.
* Balanced XLR input connectors.
* Signal presence indicators.
* Separate Signal/chassis earth.
* 45 watts into 8 ohms per channel.
* Price £230 ex. VAT

Other Amcron Products include:

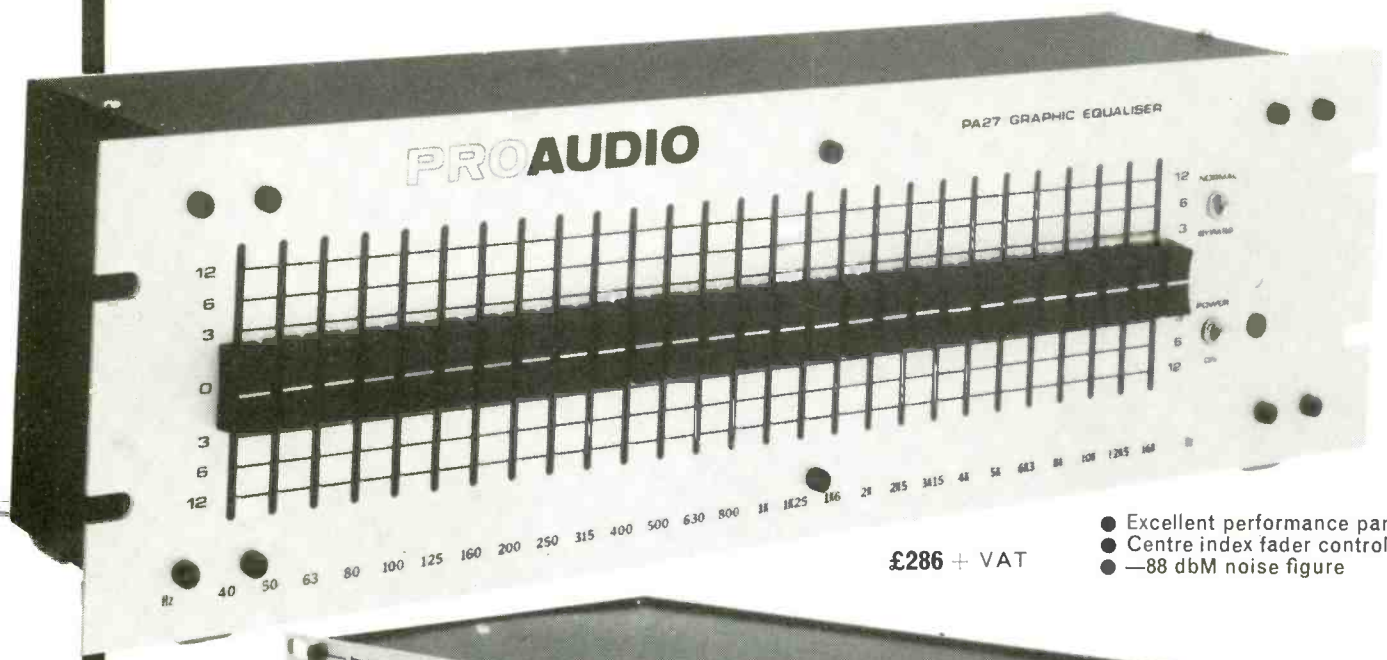
DC300A 500 watts/channel	**£550**
D150A 200 watts/channel	**£350**
VFX2A Crossover unit	**£270**
EQ2 Equaliser unit	**£599**
IC150A Preamplifier	**£260**
IMA Intermodulation Distortion Analyser	**£610**

MACINNES LABORATORIES LIMITED
Carlton Park Industrial Estate,
Saxmundham, Suffolk. Tel. Sax. 2262/2615

Macinnes France
18 Rue Botzaris,
Paris 75019.
Tel. 206 60 80
206 83 61

PROAUDIO

PROFESSIONAL PRODUCTS



- Excellent performance parameters
- Centre index fader controls
- —88 dbM noise figure

£286 + VAT

- All crossover points in phase
- Switchable 2/3 way
- Muting on all outputs
- L.E.D. limit indicator
- —90 dbM noise figure
- All XLR connectors

£280 + VAT
less limiters

£380 + VAT
including 6 limiters

PA20

STEREO OCTAVE/10 BAND GRAPHIC EQUALISER

£260 + VAT

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Telephone 01 961 3295

GERMAN AGENT

ATC Acoustic Engineers
Pier House Laundry, Strand-on-the-Green,
London W4 Telephone: 01-995 3654

For further details

PROAUDIO
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WALTON ON THAMES
SURREY
Tel: Walton on Thames 21078

Name.....

Address.....

Tel. No.....

IVIE
IS A NATURAL

A state-of-the-art real-time analyzer

The IE-30A RTA from IVIE is the most advanced audio analysis system in the world, yet it weighs a mere 3 pounds. It's so small that you can place your complete acoustics laboratory under an airline seat.

To assure the ultimate in measurement accuracy, IVIE uses 6-pole (Class III) 1/3-octave filters, and built in a low noise, precision (Type 1) sound level meter. These features combine to provide unmatched measurement capabilities for sound system equalization and evaluation. Having a calibrated voltage input range of 180 dB (0.5 μV - 500 VAC) allows for accurate measurements from the noise floors of preamplifiers to line level voltages (selectable true rms, average or peak detectors).

New microprocessor accessory With the new IE-17A accessory, the IE-30A has microprocessor calculating power, and an X-Y recorder interface for data output. Now you can automatically analyze RT_{60}, time delay events, reflections, articulation losses, tone burst and absorption characteristics – all under computer control. Don't settle for bulky test gear that does only half the job. Get the IE-30A System.

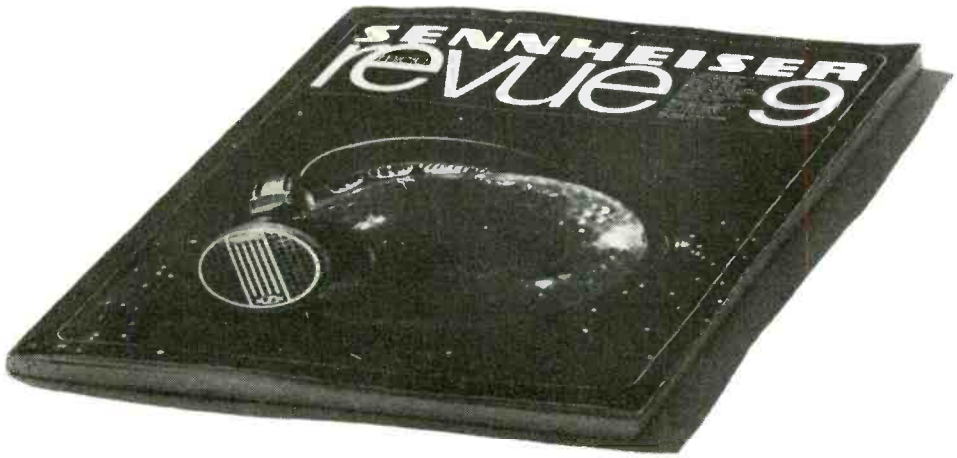
The IE-30A is shipped fully calibrated in a rugged flight case with a precision Type 1 microphone, RTA test probe and rechargeable batteries.

For the professional, it's a natural.
Call or write for a brochure and a demonstration.

IVIE ELECTRONICS INC.
500 West 1200 South
Orem, Utah 84057 U.S.A.
(801) 224-1800
TELEX or TWX: 910-971-5884

SENNHEISER

profipower – the musicians microphone



This newly developed microphone is Sennheiser's answer to many of the problems performers of popular music encounter. Considerable efforts were necessary to find the best solution for the various demands put by professional musicians. The result was "profipower" – beyond doubt a microphone in a class of its own.

To find out more about this exciting new development and the full range of Sennheiser microphones, complete the coupon below. We will then send you a free copy of the recently published Micro Revue 9 – a 124 page catalogue packed full of information on all Sennheiser products.

Please send me a free copy of the Sennheiser Micro Revue 9 catalogue.

Name

Address

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Hayden Laboratories Limited

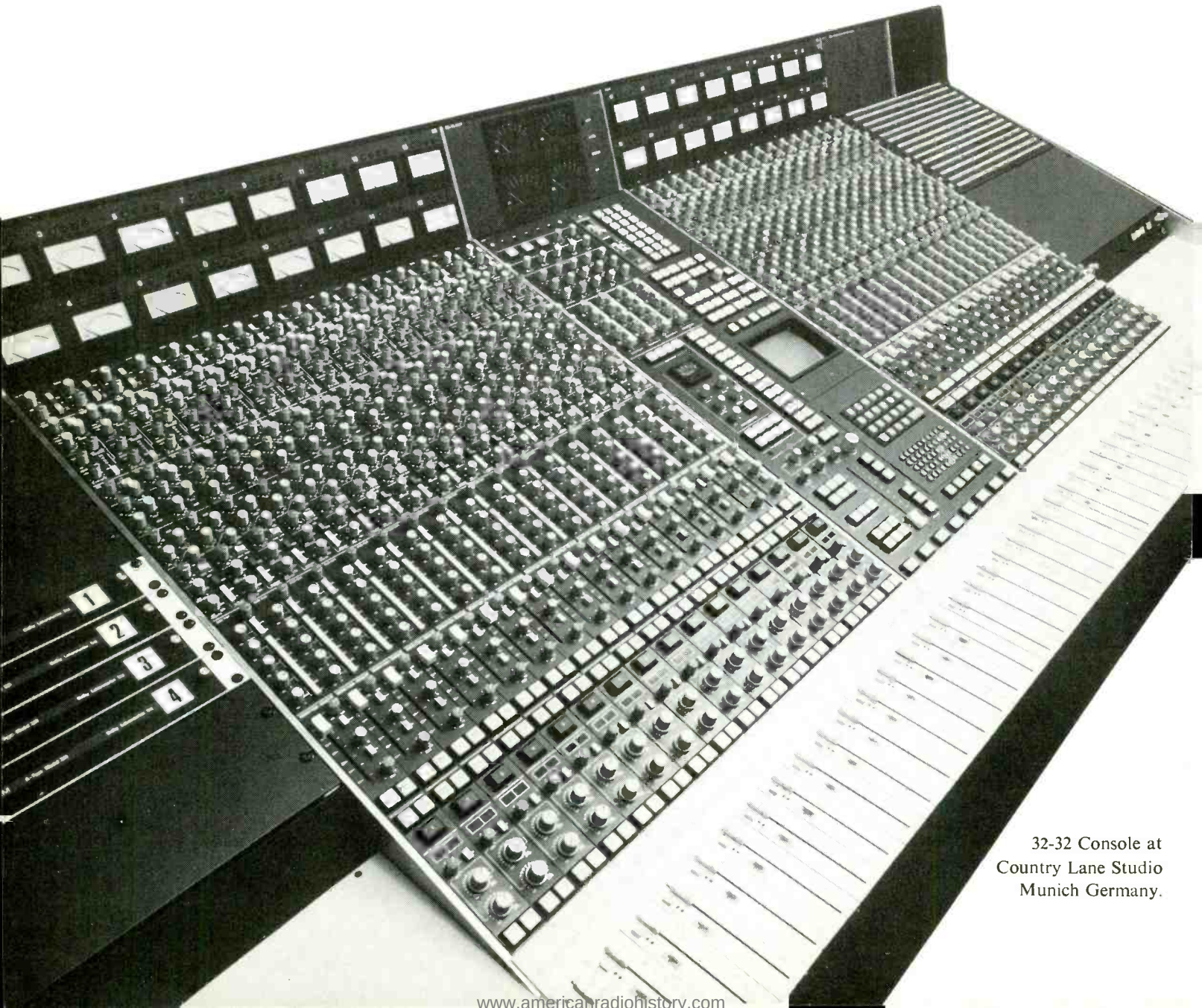
HAYDEN

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

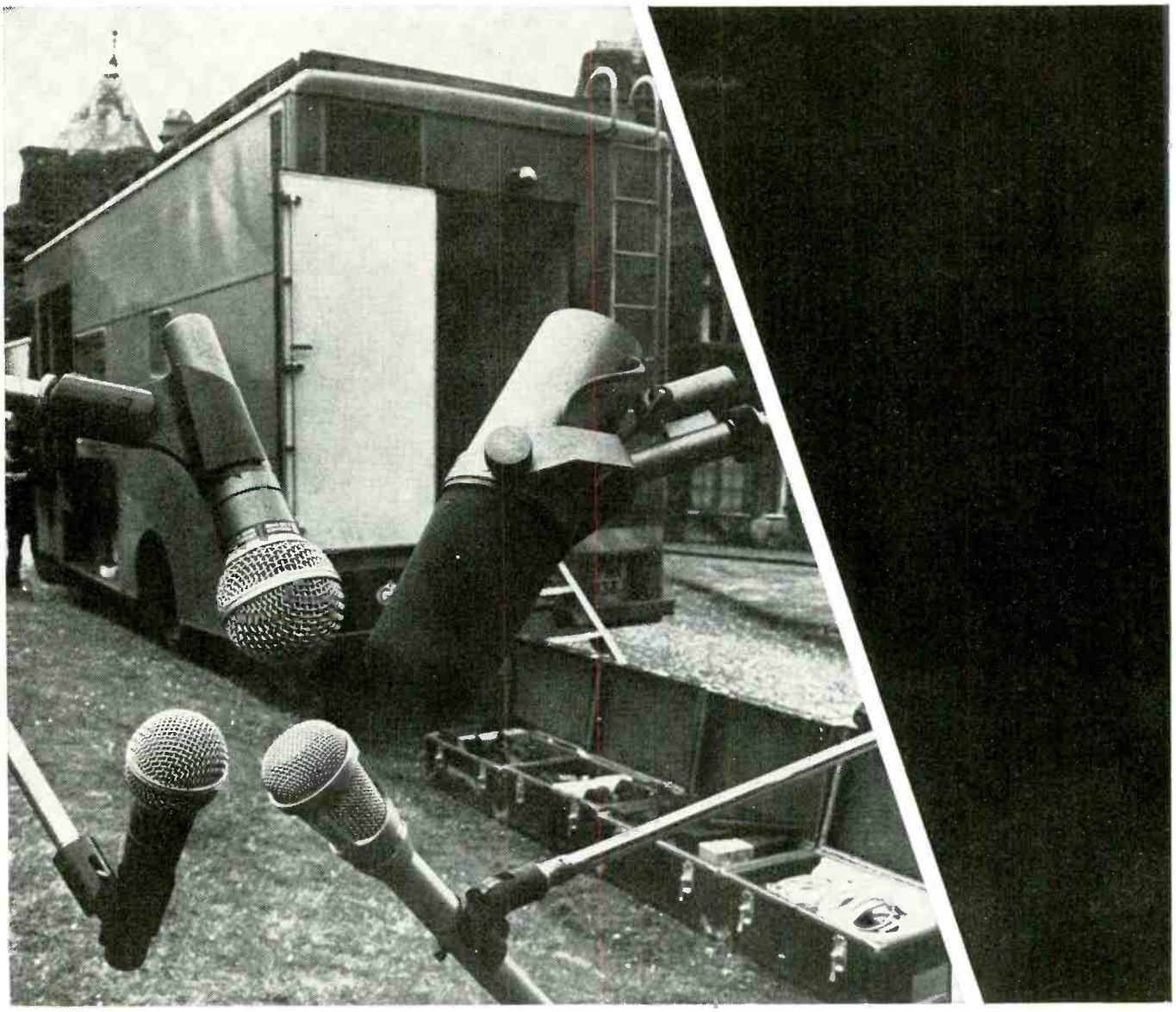
If you aren't thinking about this you shouldn't be buying a console.

Solid State Logic Ltd. Church Rd. Stonesfield Oxford England. Telephone (099 389) 324. Telex 837400

U.S.A. — Australasia: Sierra Audio Corp. 621 S.O. Glenwood Place Burbank California 91506 U.S.A.
Telephone 213 8438115. Telex 691138



32-32 Console at
Country Lane Studio
Munich Germany.



Stones' Rolling Studio

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

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

SHURE®

New audio frequency test set

A new pocket-size digital audio level meter designed for field test and maintenance work on AF transmission equipment has been introduced by Wandel & Goltermann (UK) Ltd. Designated the *PM-10*, the meter is capable of measuring signal levels from −50dBm to +10dBm over the frequency range 80Hz to 20kHz. Results, prefixed by the correct sign, are displayed with a resolution of 0.1dBm on an LCD display. The meter is battery operated using either an internal dry battery giving 100 hours continuous operation, or alternatively rechargeable nicads giving up to 20 hours use. To minimise current drain the meter switches itself off after five minutes. It incorporates an internal generator with a send frequency of 820Hz, providing two switchable fixed levels at −10dBm and −27dBm (standard), other levels and frequencies being available to special order. Input impedance is switchable from 600Ω to variable high impedance values

to allow terminated and through measurements to be made. The meter weighs less than 544g and measures 89x159x38mm.

Wandel & Goltermann (UK) Ltd, 40-48 High Street, Acton, London W3, UK. Phone: 01-992 6791.

Export management course

Sundridge Park Management Centre near London, is organising a residential export management course from October 22 to 27 that might appeal to those manufacturers who intend to increase their exports (hopefully all!). Topics covered include export strategy and market research, distribution in export markets, export pricing, advertising and exhibiting abroad, sales management and personal selling overseas, cultural differences in the Arab world and in tropical Africa (are there any Middle East recording studios? ed), the export quotation, documentation, insurance and terms of payment and financing foreign trade. The fee is £310 including tuition, course notes and 'high standards' of cuisine and accommodation.

Sunbridge Park Management Centre, Bromley BR1 3TP. Phone: 01-464 4121.

Amber distortion measurement system

Newly available in the UK from Scenic Sounds Equipment is Amber's *4405/4407* distortion measurement system. This is a high performance distortion measurement and analysis system featuring fully automatic operation with high speed measurement capability. The system features programmable ultra-low distortion and analysis circuits to measure THD, and optionally IM and difference frequency distortion. Operation is fully automatic with no manual ranging, tuning or other operations being required. The system will auto-range over an 80dB input range; will auto-tune over a frequency range of 20Hz to 100kHz (swept plots: 20Hz to 20kHz or 100Hz to 100kHz); and auto-nulls and auto-scales while normalising the distortion output in a format suitable for presentation on any standard AC voltmeter.

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

Harman to distribute Teac

Harman (Audio) UK Ltd has become sole UK agent for the Teac Tascam range of mixers and tape recorders. Harman took over the range as from September 1, 1978. Harman intend to introduce a new Teac tape deck in the near future. Watch this column for further details.

Harman (Audio) UK Ltd, St John's Road, Tylers Green, High Wycombe, Bucks HP10 8HR, UK. Phone: 049 481 5221.

Professional cables

SNR Professional Cables Ltd has introduced a new range of high quality cables for professional musician, studio and PA use. Belden cable with Rendar jacks or Neutric connectors is used and they come in two ranges: *Bouncer* coiled cables for screened or loudspeaker applications; and *Tripper* straight cables also for screened and loudspeaker applications. In addition straight microphone cables (high impedance and balanced/unbalanced low impedance) compatible with various makes of microphone are also available. Various lengths of cable are being produced, whilst customised cables of special length and/or with different connectors can be made to order in large or small quantities. The cables are eligible for a one year guarantee providing any faulty cable has not been improperly used or subjected to exceptional working conditions. Prices range from approximately £5 to £18 according to length and type of connectors.

SNR Professional Cables Ltd, 6-8 Linkfield Corner, Redhill, Surrey RH1 1BB, UK. Phone: 0737 60859.

Keith Monks and Audio & Design US warehouse

Keith Monks (USA) have moved to larger warehousing premises with a showroom and offices at 652 Glenbrook Road, Stamford, Conn 06906. Phone: (203) 348-4969. The new premises are being shared with Audio & Design (Recording) Ltd of Reading, Berks, UK, who have made an arrangement with Keith Monks (USA) to share warehousing and distribution costs. The agreement enables the two companies to use specialist staff and to assist each other in product promotion. Both companies will, however, trade independently. Monks also inform us that they hope to increase their present consortium to four companies by the end of the year.

Gentle Electric synthesiser interface

An exceptionally accurate pitch and envelope follower that allows the musician to control any standard synthesiser using the pitch, amplitude, and articulation nuances of monophonic sounds or instruments has been introduced by Gentle Electric of California. A built-in low noise pre-amp allows the use of low or high level signals from instrument pick-ups, acoustic instruments, voice and live or recorded sounds. A compressor is included for unique synthesiser processing of the signal, controlled feedback or dynamic reversal. Outputs include a reliable 1V/octave pitch control voltage (30Hz to 10kHz), a fundamental frequency pulse wave, linear and log envelope followers and variable sensitivity gate and trigger. Price of the *Model 101 Pitch and Envelope Follower* is $549 from Gentle Electric, 130 Oxford Way, Santa Cruz, California, 95060.

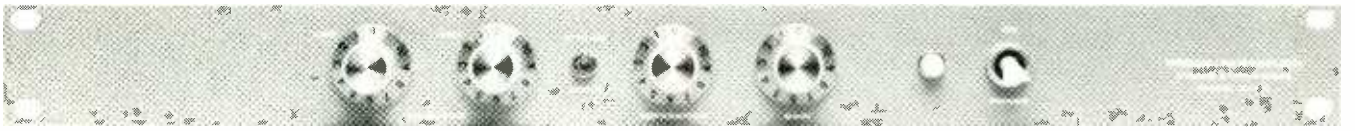
Solid State Logic

Many visitors to the recent APRS exhibition were drawn toward the rather small stand of Solid State Logic Ltd, a new name in the audio business, who were exhibiting an extremely advanced automated mixing console. In retrospect, the company has over 150 years (more than most!) experience in the 'sound' business since it is a subsidiary of J. W. Walker & Sons Ltd which has installed traditional English organs for churches, colleges, cathedrals and concert halls all over the world. More recently the company progressed from wind into electronic based organs, and an involvement with Acorn Studios, also owned by J. W. Walker & Sons has lead to the development of a multichannel, computer controlled automated console, the *SL4000* series. Solid State Logic has secured a contract to supply one console per month to Sierra Audio Corp in California where they will be used to equip some of America's most advanced studios—the contract is worth over $2,000,000 and has enabled 15 more jobs to be created. Available with up to 48 channels, each module contains both input and outputs as per American vertical style, and features mic and line amps (mic input overloads at +3dBm), dynamic control with limiting, compression, de-esser and expander/gate, four band parametric equaliser with constant Q, overload indicator monitoring pre-EQ, post EQ and post VCA, six cue sends for foldback and echo, monitor/group section, tape machine/monitor controls, stereo routing for 32 channels, and separate channel and monitor mutes. Other standard features include two independent subgrouping systems, one-button tape drop in system, pre-timed automatic fade and master quad compressor on output buss. Options include a minicomputer system which handles not only level memory, but also autolocation, editing and record keeping, 100-step plasma display meters with peak hold facility, and a precision phasemeter. UK prices range from £36,000 to £86,000 for basic systems, computer systems from £13,500 and numerous other options.

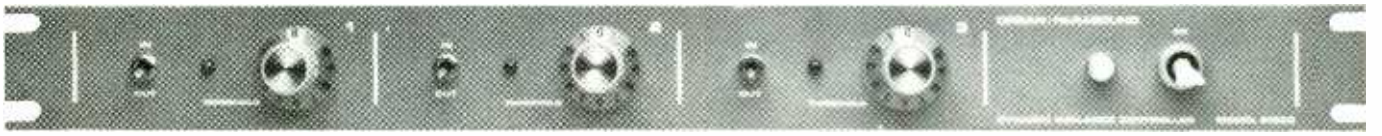
Solid State Logic Ltd, Stonesfield, Oxford, UK. Phone: 099 389 324. USA: Sierra Audio Corp, Burbank, California.

28 ▶

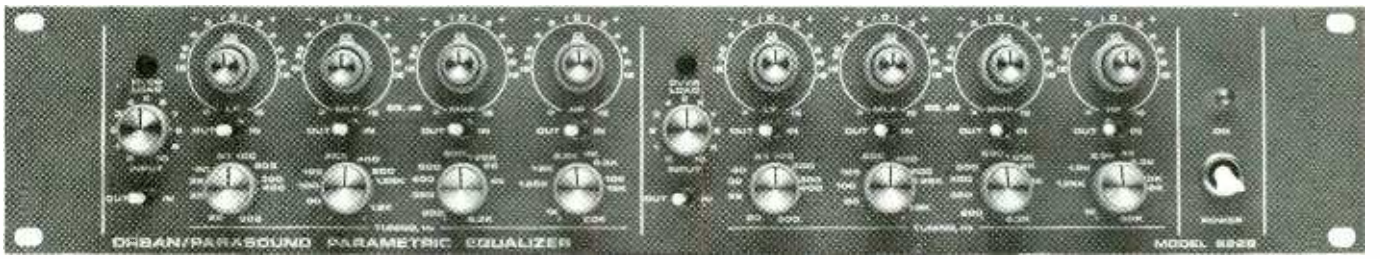
Four of the Best from Orban



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



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



NEW Model 622B Parametric Equaliser
Two channels of overlapping four band parametric equalisation with continuously variable tuning, equalisation level and bandwidth. 'Constant Q' rather than reciprocal equalisation curves for musically useful extremes of EQ.

NEW Model 418A Stereo Compressor/Limiter
Variable time-constant H.F. limiter section. Accurately ganged stereo controls. 'Programme controlled' attack and release times. Simple and sensible front-panel controls.

For full information or a demonstration of any of the Orban products, contact:

Scenic Sounds Equipment

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

Sweden: Tal & Ton Musik & Elektronik AB,
Kungsgatan 5, 411–19 Gothenburg Tel: 130 216

Contracts

● Millbank Electronics has supplied the London Coliseum, home of the English National Opera, with a backstage sound system providing show relay, selective paging and rehearsal facilities.

● Enertec of France has delivered six sound mixing systems to two Pakistan television centres at Islamabad and Peshawar. Each centre has received systems for three studios, comprising *UPS4124* mixing desks, *F400* series tape recorders, *DR412* record decks, and ancillary equipment.

Paging Newnes

Newnes - Butterworths have announced the publication of the fifteenth edition of their Newnes *Radio and Electronics Engineers pocket book*, edited by Hal Moorshead. Price of the book is £2.55 in the UK and $5.25 in the USA.
Newnes - Butterworths, Borough Green, Sevenoaks, Kent TN15 8PH, UK.

Aphex Systems VCA

The marketing firm that introduced the revolutionary *Aural Exciter*, has now introduced its second product, the B&B voltage controlled attenuator. Developed by Harvey Rubens and David Baskind of B&B Audio, the VCA provides a bandwidth of DC to 200kHz ±0.1dB, THD 20Hz to 20kHz 0.004% with 10dBm input and 10dB attenuation, noise −90dBm (worst case), modulation noise 6.5dB, slew rate less than 10V/μs, maximum input level of +20dBV, and maximum attenuation of 100dB. Baskind estimates that any professional studio could use as many as one thousand VCA's.
Aphex Systems Ltd, 7801 Melrose Avenue, Los Angeles, California 90046.
UK: Aphex Audio Systems UK Ltd, 35 Britannia Row, London W1 8QH. Phone: 01-359 0955.

Studio Electronics modules

New South Wales based Studio Electronics Pty Ltd has introduced a range of plug-in audio modules. The *Model 220* voltage controlled attenuator is a low noise (−124dBm), low distortion (0.01% at +4dBm, 0.3% at +20dBm) and highly linear element gain control providing 100dB dynamic range with a bandwidth from DC to 1MHz. Price is $A54 for small quantities. The new *Model 300* audio operational amplifier claims an equivalent input noise voltage of −132dBV in an unweighted 20Hz to 20kHz bandwidth bringing it within 1dB of the theoretical maximum noise for a 600Ω source resistance. Recommended gain range is from 20dB to 60dB while bandwidth is such that there is only a 1° phase-shift at 20kHz, a high slew rate of 24V/μs and less than 0.1% distortion. Price is $A39 in 1-24. Price reductions apply for quantities and other modules include an RIAA equalised amplifier and mic head amp.
Studio Electronics Pty Ltd, Burwood, PO Box 1055, New South Wales 2134, Australia. Phone: (02) 747 5686.

Advanced Music Systems move

Advanced Music Systems has moved to a small village just outside Burnley—Units 2 and 3, Wallstreams Lane, Worsthorpe Village, Near Burnley, Lancs. The telephone number remains 0282 36943.

3M to deliver first digital recorders

Four US recording studios will be taking delivery of 3M Digital Audio Mastering Systems this autumn. The four—LA Record Plant, A&M Records and Warner Bros Records, and Studio 80 in Minneapolis—will receive a 32-track premix recorder and a two/four track mastering machine. Developed jointly by the BBC and 3M, claimed signal-to-noise is 90dB with a flat response to 20kHz. A prototype digital recorder was shown last November at AES and is estimated to cost around $150,000. One system is destined for Europe early in 1979 where it will be short term leased to interested studios.

Tannoy/JBL loudspeaker changes

Pleasant news from JBL—the JBL *4301* and JBL *4311* will have their prices reduced as from October 1, 1978, the reason being that sales are going so well that JBL feel that by dropping prices, they will be able to increase their market for these models, leading to even higher sales (and profits!). The changes are as follows, JBL *4301* formerly £170 will now retail at £149, and the *4311* previously £320, will now retail at £275 (including VAT).

Other news from JBL is of the introduction of the JBL *4301E* which is basically a *4301* with built-in amplifier—power rating is 10W and the loudspeaker will retail at £238. Also new is the *4313* monitor loudspeaker which is a 3-way system incorporating a 250mm bass driver, a 130mm midrange driver and a 25mm high frequency dome loudspeaker. Quoted specifications are maximum power input 40W continuous sine wave power, nominal impedance 8Ω, frequency response 40Hz to 18kHz, polar response no less than −6dB at 130° horizontal and vertical to 15kHz, and a sensitivity of 89dB SPL, 1W, 1m. Retail price of the JBL *4313* is expected to be under £400.

From Tannoy comes the news that they have redesigned the *Buckingham* loudspeaker for professional use. The new *Buckingham* has a modified bass driver and crossover to give more bite at lower frequencies. The design changes have been made in association with Morgan Recording Studios who have taken delivery of the first of the new units. The redesigned *Buckingham* has now gone into production and loudspeakers will be available solely for professional use.
Harman (Audio) UK Ltd, St John's Road, Tylers Green, High Wycombe, Bucks HP10 8HR, UK.
Phone: 049 481 5221.

Deaf Awards Dinner 1978

The Annual presentation Dinner and Dance of the Distinguished Engineers' Audio Federation (DEAF for short) is this year being held at the Europa Hotel, London on Friday December 15. Profits from the evening will be donated to a charity in aid of deaf children. Tickets for the dinner dance are £15 per head, or in tables of 10 for £150. Could all those interested in supporting this worthy cause, please contact Peter Booth at Trident Studios, Tony Shields at Ampex, or Harold Barrow at Pye Studios, 17 Great Cumberland Place, London W1.

US approval for Reslo

Two of Reslosounds radio microphone systems, the *Cabaret* and *Director 1*, have now been approved by the FCC for use in the USA. The *Cabaret* is a handheld, self contained radio microphone designed for artists, and has already been approved by UK, and German authorities, and is to be shortly approved in Australia. The *Director 1* is suitable as a speech link to TV or film cameras for outside broadcasts and also in studio floor supervision.
Reslosound Ltd, Eagle Road, Rye, East Sussex TN31 3NB. Phone: 079 73 3959.

Low-cost film recorder/reproducer

Wide Range Electronics Corp has introduced a new series of magnetic film recorders and reproducers designed to give high performance on limited budgets. Designated the *3600* series, units are available for 16mm and 35mm film formats and meet or exceed all relevant SMPTE standards. Models available include single track and multitrack units, recorders, pickup recorders and dubbers. Options include vertical mount reels for 912.5m film capacity, 48cm rack mounting, and various motor drive systems.
Wide Range Electronics Corp, 2119 Schuetz Road, St Louis, Missouri 63141, USA.

Level meter psophometer

Marconi Instruments has introduced a new/level meter psophometer, type *E247*, manufactured in Australia by Amalgamated Wireless (Australasia) Ltd. The *E247* is true rms and quasi-peak responding and is intended for the measurement of signal levels and noise over the frequency range 10Hz to 110kHz. Various weighting filters are included and it also incorporates a weighting network which enables a visual indication equivalent to the aural effect of disturbing voltages at various frequencies to be obtained (psophometrically weighted noise).
Marconi Instruments Ltd, Longacres, St Albans, AL4 0JN, UK.

People

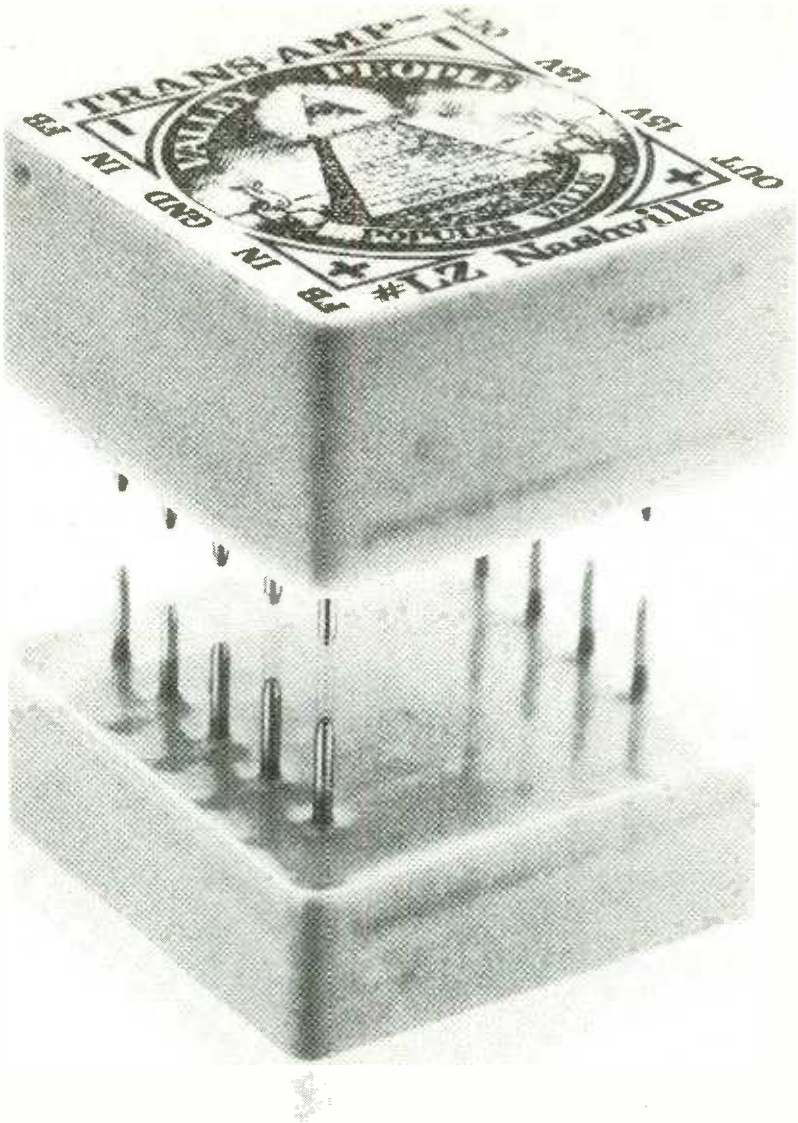
● ADC Products, a division of Magnetic Controls Company, have promoted John Antanies to western regional sales manager. In addition Richard Van Overbeke has been promoted to district manager, western region; Warren Anderson to mid-west OEM field salesman; and Dennis Thompson to south western OEM salesman.

● James Redmond, director of engineering at the BBC since 1968 is to retire in November. He will be succeeded by Bryce McCrirrick who is at present deputy director of engineering. Peter Rainger at present assistant director of engineering becomes the new deputy director.

● Burndept Electronics have appointed Don Fairhurst as marketing assistant.

● Paul Wilkinson has been appointed general sales manager of Magnetic Components Ltd.

● Sony Broadcast BV has announced the following appointments. Marketing Division: Tom Hadley formerly deputy head of engineering information service, IBA as marketing services manager; Graham Shaw formerly manager technical operations, Yorkshire Television as field services manager; Alan Pywell formerly European marketing manager, Tektronix Ltd as sales manager; and Leonid Strashun formerly with Ampex (GB) Ltd as technical training manager.



The Simply Revolutionary Transamp[tm]

A new and genuinely revolutionary audio and instrumentation differential amplifier module from Valley People Inc. of Nashville, Tennessee.

Its extremely low noise input circuitry is equally suited for interface with such low impedance devices as microphones, tape heads and phono pickups or for true, balanced, virtual earth summing amplifier applications.

When used to eliminate console microphone input transformers, Transamp[tm] produces otherwise unrealisable noise performance – and turns in subjectively superior audible results.

The technical specifications – briefly

- Noise – within ½dB of theoretical limits, when direct coupled to a 150 Ω microphone (Noise Voltage – .5η V $\sqrt{HZ}$)
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- Slew Rate – 26V/μ sec. (Differential output)
- Distortion – .005% typical, any gain and any input level (IM or THD)
- CMRR – Well in excess of 100dB
- Size – 32mm x 32mm x 16mm

The cost

1-9 pieces £20 post paid within Europe. Substantial quantity discounts apply.

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Transamp[tm] is a registered trade mark of
Valley People Inc., P.O. Box 40306, Nashville, Tennessee 37204, U.S.A.
Device patents pending

studio diary

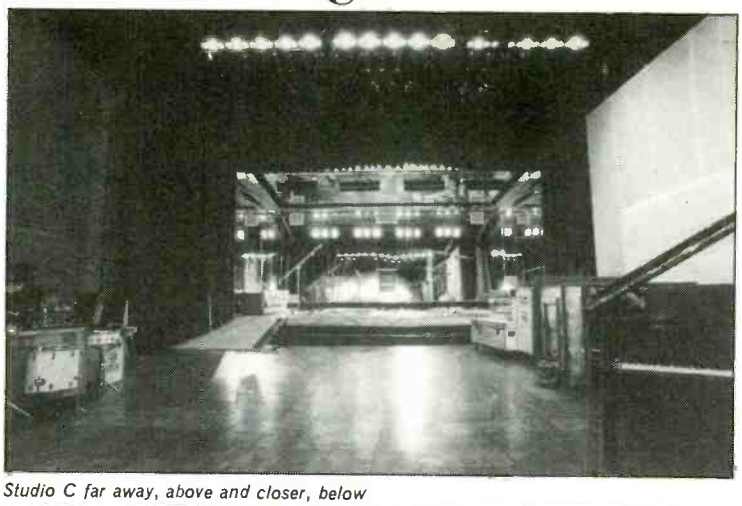
LA Record Plant

This month sees the re-opening of the Los Angeles Record Plant Studio C (the largest of the three). The studio and control room, which were completely gutted by the disastrous fire of January 78 including the collapse of the entire roof, have been totally rebuilt at astonishing speed and, apart from size, bear little resemblance to the previous studio. The new facility in a word is *magnificent*. No expense has been spared and in every case the decor also serves acoustical purpose. Designed by Tom Hidley with minor additions and omissions by Lee De Carlo (chief engineer) to be the 'ultimate studio', Studio C itself measures a generous 20m x 10m x 6.6m and began life as a sound stage in the halcyon days of film — the wheel has now come full circle and the studio is once more a sound stage fully and permanently equipped for simultaneous sound recording with video productions. Looking from the control room into the studio, parquet flooring (set on top of 20cm heavy duty Gunnite—the highest density concrete available) extends the whole length with the exception of the stage area which is raised 60cm up a gentle ramp. To the left, the west wall is plain 'B-flat' red brick from floor to ceiling running the length of the studio to stage area—a hard yet porous surface which will dissipate high end frequencies evenly along the whole wall — the east wall to the right is covered with fibreglass under a velvet material, again extending to the stage area . . . with the exception of a 6.6 square metre circle right in the centre of the wall. This can be moved in any direction allowing a complete change in the standing wave pattern of the room to suit any artist's needs — all within 30 seconds.

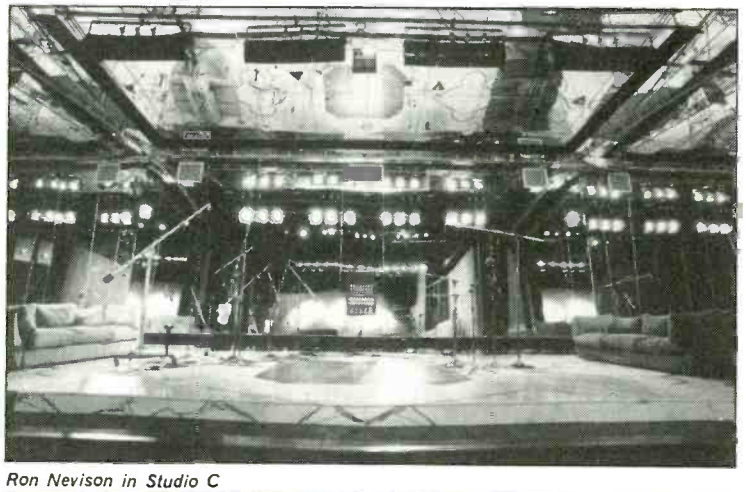
Immediately in front of the control room windows, a cantilever extends the entire width of the studio giving good audio response from the sides and floor, and is finished entirely with redwood. Yet another example of aesthetics/acoustics harmonising and justifying each others existence.

The whole facility is completely wired for video recording or indeed a live show. A complete computerised lighting system is in situ and will cope with any lighting effect while pigtails hang from the ceiling ready to accommodate lights brought in by a TV crew. Microphone boxes between control room and truck park appear at any number of points throughout walls, floor and ceiling of the studio — every microphone box also contains video lines for both camera and monitor.

All power, audio, cue feed, and video lines run through separate steel conduits cemented into the concrete floor beneath the parquetry. Each is totally isolated from the other to the extent that no joint in any conduit occurs adjacent to another joint. Fibre optic lines have been included as an experiment. The control room is based on a proven European design already in use at Pye and Utopia in London. It is interesting to note that Studio C is the first new Tom Hidley room in the USA for three years. It is geometric in design, the clear working area being an easy 4.8m x 6m with all equipment recessed into the walls. In fact the only thing in the room apart from humanoids(?) is the fully automated API 40/32 console. Finish of the room is Redwood and must really be seen to be totally appreciated. The console centre is also room centre and from this position the engineer has 180° of glass from shoulder to shoulder allowing a superbly unimpeded view of the studio and isolation booths to either side. The front left and right quad monitors (Tom Hidley *TH1* with JBL components) — quad in case someone makes up their mind —being hung 1.5m above the floor either side of the main glass. The triple pane windows, use 19mm, 12.5mm, and 9.5mm thick glass from control room to studio.



Studio C far away, above and closer, below



Ron Nevison in Studio C

Lee de Carlo: "The room, a relief room (as opposed to compression), is a single wall system which is an unusual departure and is hardly trapped at all. What trapping there is is geometric within the control room — it's all a totally floating structure at every junction.

The ceiling is separate (by an air gap) from the walls — the walls that house the monitors sit separately from the side walls which sit separate from everything else. The trapping system is unique! The traps above the control room are equidistant from the ceiling to the cap (or top) of the control room which follows the contour of the actual ceiling itself — an interesting idea.

"We're counting on 34dB of separation at 30Hz between control room and studio which is more than sufficient. The room has perfect ⅓-octave resonance as does the studio. With control room and studio resonating at the same frequency, perception of sound in the studio should be exactly that in the control room. The convergence point of the monitors is 1.425m while they are mounted 1.5m from the floor allowing the same relative frequency response whether you're standing or sitting."

To break up the smooth stretches of Redwood wall in the studio, 2.1m × 0.9m panels of rock inlaid with Geodes (a hollow round nodule which when cut in half is full of crystalline deposits), amethysts, quartz, and other semiprecious stones have been let into the side walls. They are both phenomenal and bizarre and probably priceless — they serve to dissipate the reflection from the midrange driver and tweeter as they slam into the wall from about 45cm away.

There is an isolation booth on either side of the control room and as with the main studio, the west walls of both are hard and reflective brick or glass while east walls are soft fibre glass. Each booth is divided into two sections allowing a small tight space or opened up an additional 7.2m. Sliding 19mm glass doors on the east booth allow a grand piano to be rolled in while still allowing total view of the control room and studio.

Attention to detail in the working environment is typical of the design of the complex — not only is the studio acoustically one of the finest but also in terms of the accent put on a serious uninterrupted creative working environment. While the Record Plant has all kinds of

32 ▶

The Series IS, based on the world famous industry standard Series I. Unequalled features, technical sophistication and a modest price.

Input channels (12, 16 or 20)

Transformer balanced mic input with a 20dB pad. Variable gain mic amp. Insert send/return (line input). 120Hz high pass filter. Four band EQ, with the two mid band frequencies sweepable. Two monitor sends (post-EQ) and one echo send (post-fade). Automatic pre-fade Solo. LED peak indicator whose delay time indicates the relative size of the transient.

Five outputs

Left and right main, monitors A and B and master echo, each with two band EQ, solo and insert. Each output may be balanced by a plug-in transformer.

Meters

Two studio quality VU's and peak reading LED's display the main stereo output or any function soloed.

Communication

There's both talkback and intercom. The talkback mic can speak into the main output, monitors A or B, or into a ClearCom (or compatible) intercom system.

Specifications

Excellent, ie incredibly quiet and distortion-free.

Finally

Two echo returns, conductive plastic potentiometers throughout, socket for Shure lamp and, of course, the Soundcraft comprehensive 2-year warranty.

Encore.

Début.

The new EX4S studio quality 2, 3 or 4-way stereo electronic crossover.

Internal switching

The facilities for changing the crossover points, and for converting the unit to a 2, 3 or 4-way are inside, to provide maximum protection for P.A. systems, by avoiding accidental switching.

Front panel controls

Eight band-attenuators, eight LED peak indicators, and LED's to indicate 2, 3 or 4-way mode.

Circuitry

Bessel function filters (superior to Butterworth filters in other crossovers) give an ultimate slope of 24dB/octave, the most linear phase response and the best transient response. The result is, quite simply, a better sound.

And the rest

EX4S is built into an all extruded black anodised 19" case; tough enough to stand up to all the wear and tear of the road. XLR and multipin connectors on the back. Inputs are electronically balanced while outputs may be balanced by plug-in transformers. Of course, it's also covered by Soundcraft's comprehensive 2-year warranty.

Soundcraft Electronics Ltd., 5-8 Great Sutton Street, London EC1V 0BX. Telephone 01-251 3631. Telex 21198.
Soundcraft North America, PO Box 883, JFK Station, Jamaica, New York 11430, USA. Telephone (212) 528 8158. Telex 01-2203.

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entertainment laid on elsewhere in the building (game rooms, sauna, jakuzzi, pinball, private bedrooms and living rooms), the working environment, though plush, remains businesslike the whole time.

Equipment in the control room consists of: 3M *79* 24-track machines (standard throughout the Record Plant), a 40/32 API Custom built console with Allison *65K* programmer (also standard throughout). The 32 outputs are awaiting the 32-track 3M digital recorder which will soon be delivered for Studio C (see News).

All switching, the Studer power amps, white monitor equalisation and EMT echo plates are housed in a loft area above and behind Studio C. Outboard equipment includes Eventide DDL, Flangers, and Harmonizers, Pultec equipment, ADR, UREI, DBX compressors and limiters, Orban equalizers, Kepex, R. Meyers, API and ADR noise gates and dbx and Dolby noise reduction. The latest additions in outboard equipment is an ADR *SCAMP* system employing two kinds of noise gate and an anxiously awaited Time Shape module.

On top of which the Record Plant has another facility in Sausalito, plus 3 × 24-track mobile trucks and E1 Magnifico. What did it all cost? Too much to talk about!

Enbee

Studio C from another angle

Radio Hallam go 24 hour

Commencing from October 1, 1978, Radio Hallam in Sheffield will celebrate its fourth birthday by extending broadcasting hours from the present 21 hours a day to full 24 hour broadcasting. This move follows a successful six week trial period mounted during the spring. Additional staff have been recruited including newsmen for a round-the-clock news service, a producer for live and recorded output in the early hours, and two presenters.

Programme Director Keith Skues intends using the extra time allocation to feature live music by local artists, with recordings of these sessions being used during the day.

New 24-track studio for LA

Can-Am Recorders Inc has opened a 24-track studio in the Los Angeles suburb of Tarzana. Equipped with a custom built Quad-Eight console with computerisation and MCI tape recorders, the studio will accommodate approximately 35 musicians and offers recording and mixdown services. Studio size is 7.6m x 10.7m, whilst the control room is 6.1m x 7.6m. Ancillary equipment includes EMT *240* reverberation unit, digital delay lines, Orban parametric equalisers and comp/limiter and Urei limiters.

Rock City, Shepperton

News of progress at Rock City Sound Studio, a new studio being built at Shepperton. The studio will be the only sound recording studio at the Shepperton Studio Centre complex and is expected to be in operation during October..

The new studio will have a Trident 32/24 *TSM Series* mixing console with parametric eq. The console which is being built on site, is expected to be commissioned in October. Engineering and acoustic design of the studio is being carried out by Chou Ling and equipment already purchased includes a 3M *M79* 24-track with *Sonaplan* autolocate and two Studer stereo mixdown recorders. Ancillary equipment includes Dolby and mics from Neumann and AKG.

The studio is part owned by Colin Patanden and Chris Slade (members of Manfred Mann's Earth Band), together with John Glover and Brian Adams and will probably open to the public at the beginning of January 1979. This will follow the recording of the Earth Band's debut album which it is hoped will commence during November.

A & R Recording, New York

The evolvement of the business district is probably one of the most important contributory factors to New York City's commercial vitality and continued viability as the major financial centre of the world. Businessmen, both visitors and residents, know that whatever their trade may be they are guaranteed to be within walking distance or a short cab ride of their appointments. The Garment District, The Diamond District, The Financial District, The Advertising District (Madison Avenue), The Theatre District and many more all vending their wares in close proximity to one another in their individual districts. The Music Business is no exception. Most of the important purveyors of music do business in an area between 42nd and 62nd streets and Fifth Avenue to the east and Ninth Avenue to the west. Of course districts tend to overlap and the Music District happens to also contain most of the hotels which tourists and conventioneers use. Planted firmly within this Double-knit and Brut District is one of the more important and operationally comprehensive of New York's recording studio operations—A & R Recording Inc. A & R is a studio of some 19 years standing, outliving several competitors and a look at its history is interesting.

The name of A & R has nothing to do with Artist & Repertoire as one might suspect, but is in fact the initials of the founders, Jack Arnold and Phil Ramone. The original studio, established in 1959 in premises at 112 West 48th Street, was set up with the intention of doing nothing more ambitious than demos. It turns out, however, that the room (11.5m x 12m) had an incredibly unique sound. Phil Ramone attributes much of this to the ceiling height of 3.6m and before long clients were requesting to do their final tapes there and in no uncertain terms letting it be known that this was no mere demo studio. In a short period of time Phil (Jack Arnold ended his association with the studio shortly after the formation) discovered the need to upgrade the equipment to firmly secure his studio's position in the professional field. Money, of course, is always needed for such ventures, and at that time Art Ward, manager of a group called The Honeydreamers (also a keen flier and captain in the US Navy Air Reserve) was recording his demos there. Art's insight allowed him to invest by paying off a number of debts which had accumulated and he is, to this day, president of the corporation. Parallel to all this, Don Frey, a senior mixer at NBC TV, was moonlighting at A & R and did a lot of the installation work. His work there became more than he could handle on a part-time basis and he accepted an invitation to work full-time. Don was eventually invited to invest and is vice president in charge of operations.

But studios cannot exist on equipment and acoustics alone. Both Don and Phil tell me that the major engineering influence on A & R's success was a mixer by the name of Bill Schwartau who left Coastal Recorders (now defunct) and took all his accounts with him. In fact, the first really big client was a man who produced only jingles—Mitch Lee. As I said before, though, it was also the extraordinary acoustics of the studio that was attractive to producers. Because of the acoustics, the studio lent itself ideally to Jazz and R & B (quite the opposite of the large rooms of RCA, Capital and Columbia of the period) and Phil Ramone were busy building up a following and reputation with such people as Bacharach and David, Lieber and Stoller, Quincy Jones, The Drifters and The Coasters. Atlantic Records had no studio in those days and Tom Dowd was instrumental in bringing much of their work to A & R. And all this was achieved in this small room with a broadcast console modified for 3-track recording. It should be noted, too, that there was fierce competition from Al Weintraub's Bell Sound Studios which was considered king of the indie studios in New York. Bell literally commandeered the Billboard charts in the late Fifties/early Sixties.

So here we have one of those delightful American success stories, but unfortunately in 1966 doom loomed over the horizon. The Rockefellers decided that they wanted to extend their Plaza and build some more high-rise office buildings. Surely this must be the worst nightmare of any studio proprietor—having firmly established a sound one has to vacate the premises. A & R was given one year's notice to do just that, but in that time they were lucky enough to be offered space on 52nd Street. Now here's the twist—during negotiations the landlords wanted to switch tenants and offered them instead the old CBS Records office building on Seventh Avenue which contained a recording studio on the top floor. A & R accepted on the understanding that they only needed the top floor and the basement and CBS moved their

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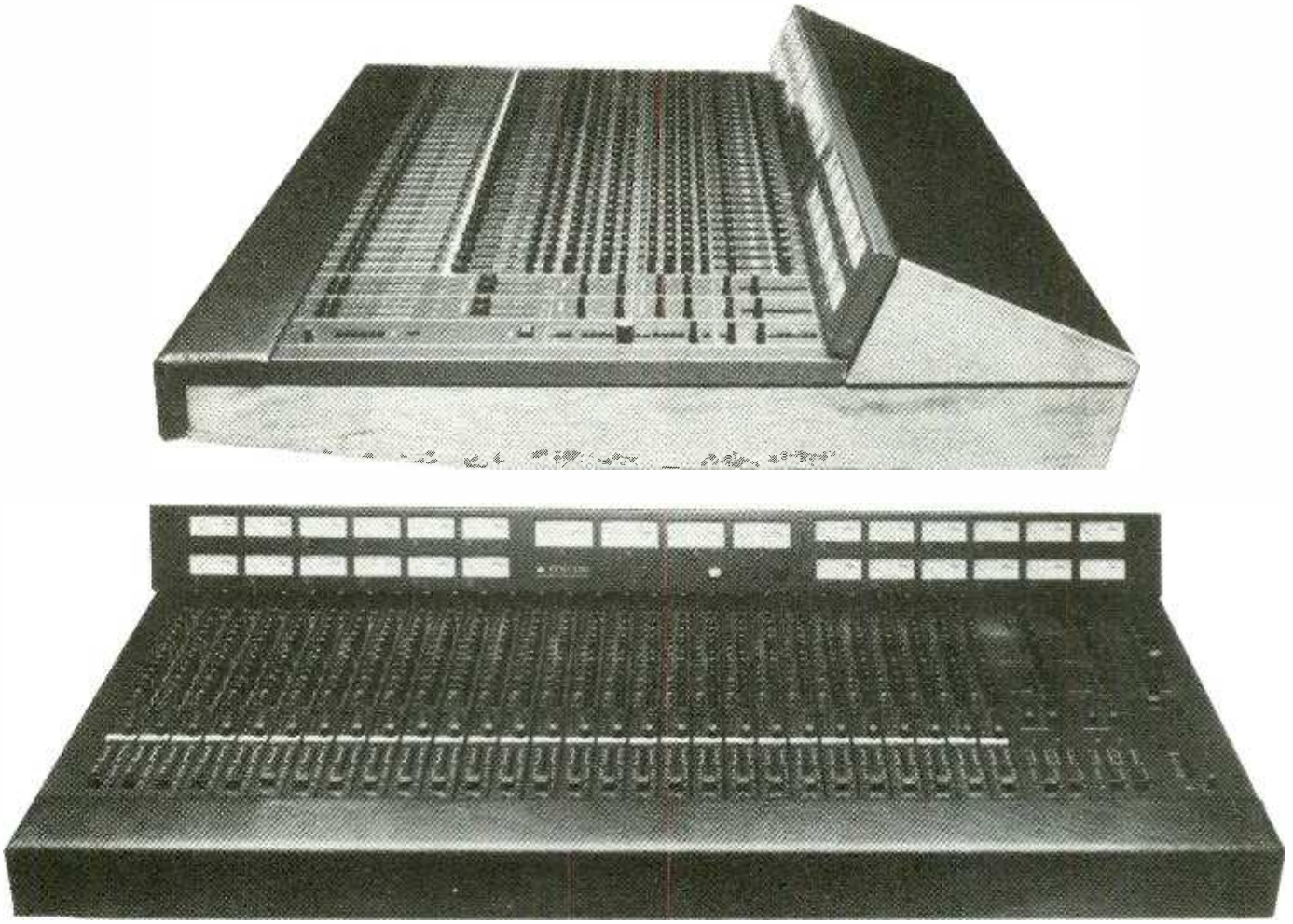
SYNCON



28 x 28 x 4 Modular Console

Automatic mixdown switching = quad mix, monitoring and sub-grouping: Multiple channel status assignment: 16 + 24 track routing: The most versatile mixer of it's kind, SYNCON will be demonstrated at the forthcoming AES convention, Paris Berlin and Barcelona exhibitions or by arrangement at any of three London 24 track studios now equipped with SYNCON.

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studio operation into the premises on 52nd street!

Now they were to move into their new environment—a very different environment with a ready-made studio 15m x 12m x 12m. Ready-made in the sense that the basic construction was there—the window between control room and studio, sound-proofing, wooden floor, air-conditioning — but the acoustics were not to their liking. The room was deadened considerably and they achieved an acoustic environment that is both clean and yet spacious, rather like Abbey Road's studio 2. In fact I can vouch for the fact that cutting rhythm tracks in Studio A-1 (as it is called) is a real pleasure. The sheer size of the room also enabled them to investigate the film-scoring market and as a capacity of 70 musicians was possible, projection equipment was installed above the control room to allow 'scoring to picture' with a big screen. Don Frey informs me that he believes A & R to be the only full service studio in New York (that is one that caters to phonograph records and advertising) that offers this facility.

The size of the new premises at 799 Seventh Avenue allowed A & R much room for expansion. A second studio (A-2 8.1m x 9m) was constructed, a small announcer overdub suite (A-3), tape copying and film transfer room, a maintenance shop (which I am told used to be Mitch Miller's office in the CBS days), and of course executive offices. A hefty portion of the basement was taken up by the tape library as it is customary in the States for studios to store clients' tapes for a period of one year—a privilege which becomes more troublesome and expensive as tapes get wider! Profit on tape sales become totally absorbed by storage costs.

During the construction work at Seventh Avenue, A & R was offered part interest in the purchase of a building known as 322 West 48th street. On the ground floor of this building two more studios were built—R-1, an L-shaped studio 12m x 9m and R-2 9m x 6m. In addition to the studios, there is a maintenance shop, film to videotape transfer room and on the second floor (first floor to British readers) sundry offices and a tape duplication facility. It may seem at first glance that dividing the operation up like that, with several city blocks between the two buildings would prove to be cumbersome. In practice this is not so. Responsibilities are spread across the two facilities—the telephone switchboard, accounting office and Art Ward's office are all at 48th street while studio bookings, the tape library and Don Frey's office are at Seventh Avenue. Movement of tapes, documents and such entails just a short walk.

For the past three years A & R has been undergoing a big updating programme to the tune of nearly a million dollars. When such an immense figure is involved one can understand why Don Frey says that executive buying decisions lean toward the conservative, and resist the rush to buy the latest and greatest just because it exists or to be first in the market place. Let's now look at A & R as it is today.

Studio A-1 is equipped with a Neve *8068* with 32/24 with eight group VCAs, eight auxiliary sends and four echo returns. MCI 24/16-track machines are standard equipment at A & R (with the exception of R-2) with Studer, Scully and Ampex for 4, 2-track and mono recording and remixing. There is an 8-track machine floating around somewhere, but this configuration has been virtually phased out. Monitors are the UREI *813s* driven by McIntosh *2100* amplifiers. Dolby is available for whatever number of tracks is being utilised and there is a very comprehensive collection of limiters and equalisers built into the rack; DBX, UREI, Teletronix, Pultec, Fairchild, etc. The studio itself has two isolated booths.

Apart from size and decor (the control room has a quasi Spanish flavour), studio A-2 with its capacity for about 25 musicians differs in equipment in the choice of console. Here we have the MCI *500*, a console which, in my opinion, the designers have bent over backwards to make so comprehensive that it literally bristles with booby traps for the unsuspecting recording engineer! It is, however, capable of just about anything the most creative mixer could dream up. This studio also contains two isolation booths and a heavily damped platform for drums and electric guitars capable of excellent separation without locking the musicians in separate rooms.

Moving over to 48th street we find that R-1 is an L-shaped studio, a shape derived by the building of the control room in the corner of a space 12m x 9m and can take up to 35 musicians. The intention here was to simulate the sound of the old 48th street A & R and judging from the amount of rock, jazz and R & B that goes on here, they seem to have succeeded. This studio also provides two isolation booths and the concrete floor seems to provide just the right combinations of brightness and separation. The control room houses the MCI *500*, equipped, as indeed are all consoles at A & R, with VCAs and eight groups. All studios are, therefore, ready for automation when demand necessitates the investment.

Of all the studios, the most unique, for many reasons, is R-2. Firstly, it is the smallest, being only about 9m x 6m, with a capacity for about 15 people, but equipment and purpose single it out from the others. R-2 has become Phil Ramone's home, so to speak and it is reserved virtually exclusively for his use. Phil is, as we all know, a very busy producer (recently producing Billy Joel, Paul Simon, Chicago and Phoebe Snow), and time does not allow him to participate in the day to day running of A & R and in fact his function is more of technical adviser. This makes sense as few people get as much experience of what is going on around the studio world as he, moving around the country as he does. It also makes sense that he needs a room as a standard reference point in which to mix and it is in R-2 that he does much of his recording and most of his remixing. Currently the monitor speakers are Altec *604Es* with Mastering Lab crossovers driven by McIntosh *2500* amplifiers but he assures me that UREI *813s* will be installed very shortly. The most interesting aspect of the equipment, however, is Phil's choice of the Neve *8068* Necam automation and Lyrec 24-track machine combination!

As far as microphones are concerned, A & R has an inventory that would satisfy just about anybody—Neumann, AKG, Sony, Sennheiser, Shure, E-V, RCA, etc, etc. Echo chambers are exclusively EMT and historically it's interesting to note that the EMT was unpoular in the late fifties in the States. Results of experiments which were carried out by A & R in terms of plate tension eventually were included in the EMT setup manual. The only service which this studio does not provide anymore, is disc mastering. It became very specialist and unprofitable and, as Don Frey puts it, he'd rather let the 'cutting boutiques' take over!

Enough of technical equipment—without talented people such equipment simply gathers dust and eventually ends up under the auctioneer's hammer. There has not been a shortage of talented people passing through the portals of A & R! Roy Cicala, Shelley Yakus and Jay Messina of the Record Plant; Brooks Arthur; Don Hahn of A & M Records; Fred Christy of Media; Tom Hidley of Westlake; Dave Green, now freelancing in Canada; Tony May of Generation; Roy Hallee and many more. Recently Elliot Scheiner won the NARAS best engineering award for the Steely Dan album.

A & R's clientele seems to be evenly divided between records, motion pictures and advertising. HEA Productions, under the direction of Susan Hamilton, has a standing order for two full days of booking per week with important accounts such as Dr Pepper and Dodge. This year the movie industry brought to the studio the soundtrack of *Hair* and perhaps the most mammoth motion picture scoring of all time *The Wiz* which entailed the use of two 24-track machines linked in tandem. Joe Brooks (with an engineer called Malcolm Addey) produced Debby Boone's all time success for a female singer *You Light Up My Life* in A-1. Frank Sinatra, Paul Anka, Andy Williams, The Four Seasons, Ray Charles and Liza Minelli's Broadway show *The Act*—all recorded at A & R.

Surrounded by models of World War II aircraft in Art Ward's somewhat modest office, I asked him what he thought accounts for the success of an operation such as this, having such humble beginnings expanding to a payroll for some 40 to 50 people when the recording company giants, with their unlimited resources ought to make such a thing impossible. His answer was simple—'service'—service unshackled by union rules and regulations, an environment which makes the artist and producer feel comfortable and wanted. Nothing is too much trouble for the client. **Malcolm Addey**

A & R Recording
Studio R-1, control room

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For the past three years we've been telling you about the benefits of using graphic equalizers; now we've made it even easier to appreciate them. Introducing the MXR Dual Fifteen and Thirty-One Band Equalizers. Two equalizers designed with the imagination and understanding to solve your toughest equalization problems. Designed for use in either studios or sound reinforcement situations, our new eqs offer features not previously available at any price.

The Dual Fifteen Band Eq features two channels of equalization with the bands set two-thirds of an octave apart. By breaking the frequencies down further than conventional octave equalizers, you now have the flexibility to contour your music with much greater selectivity. As most musical information occurs in the midrange, this is where you need even more definition, and the Dual Fifteen Band Eq gives you six bands of contour in this area rather than the usual four. In addition, each channel has its own level control.

The Thirty-One Band Eq divides the frequency spectrum even further. A single channel unit, the Thirty-One Band features frequency bands set one-third of an octave apart, generally regarded to be the optimum amount of resolution.

When used in conjunction with any PA system, our equalizers can make a bad environment sound good, and a good performance sound great. Unlike parametric equalizers, the frequency response change is immediate and easily visible, so that when you shape a response curve you know what it's going to sound like.

Both units feature a range of −12 to +12 decibels on each band, standard 19" rack mount, and the rugged construction you always get with an MXR product. Both units also feature phone plug input/output connections, (the Thrity-One Band also features Cannon type XLRs), high slew rate (7V/microsecond), and incredibly low noise (better than −90 dBM). But not only do we offer great specifications, we produce great ideas... you wouldn't expect any less from us.

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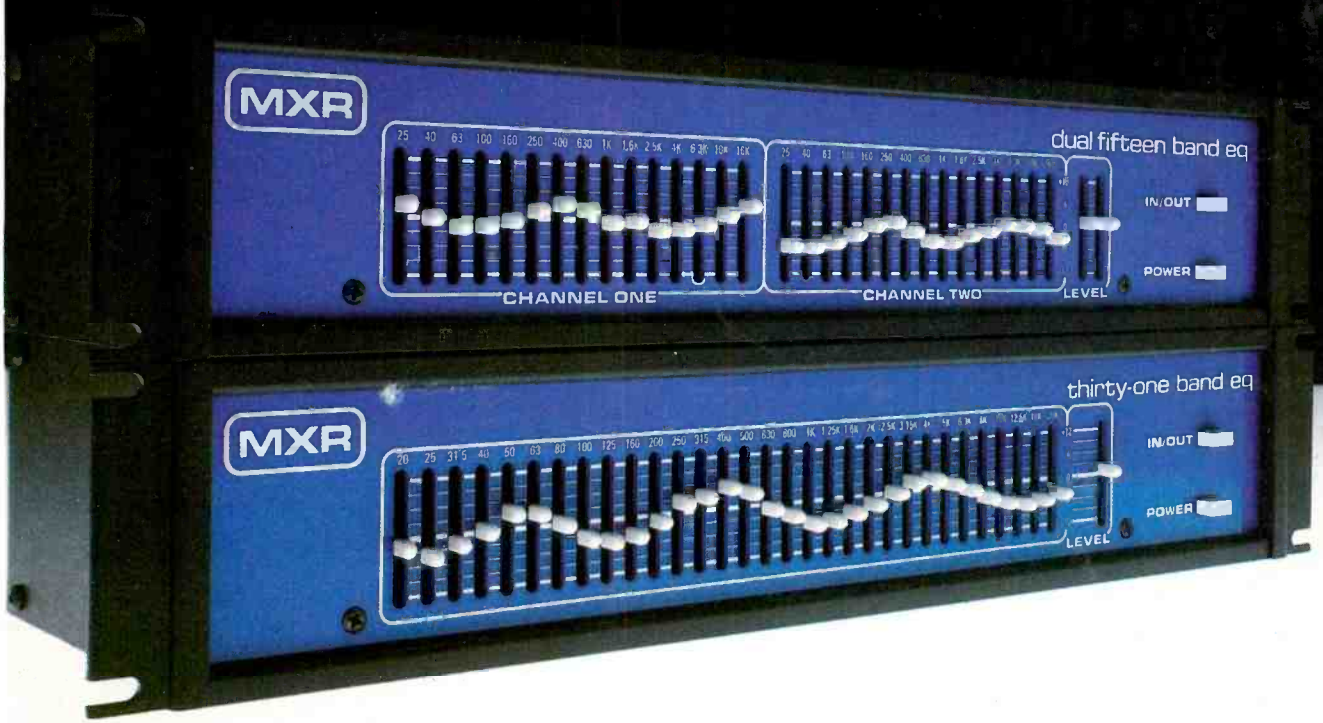

Commercial radio in Britain

PART THREE – Into the future

Tony Attwood

Stop Press
The Home Office has just announced locations for 18 new Commercial and BBC local radio stations. Details next month.

The final article of our short series on British Commercial Radio. Tony Attwood looks at four separate possibilities for future development of new stations.

LOCAL RADIO MUST meet the needs which the BBC national radio services cannot serve because they are not locally orientated." Thus spake the voice of government in the 1978 White Paper *Broadcasting*. Noble and (rather obvious) phrases, such as this, tend to get easily forgotten in the face of the news that the IBA and BBC are being given the go-ahead to develop sufficient local radio stations to reach 90% of the country's population. Soon after the publication of the White Paper a committee was set up under the chairmanship of the Home Office but including representatives from the IBA and BBC, in order to thrash out the question of who would be allowed to do what, and where, on what frequency and at what power.

By the time the committee got together for its first meeting, over 200 companies had been in touch with the IBA stating their interest in putting in bids for ILR franchises in various parts of the country. Few, if any, of these companies took much note of the White Paper statements to the effect that the IBA would be looking for stations which were 'diverse in character'. Likewise there has been only a very limited awareness shown so far of what running a truly *local* station might imply. Most companies seem to be offering the same fare as elsewhere in the country, and clearly the 18 existing stations (excluding LBC for obvious reasons) are being used as models to which submissions to the IBA can be written.

In point of fact the only examples of proposed diversity that are apparent at the time of writing are companies offering to run twinned stations. Non-profit making trusts (specifically mentioned in the White Paper) seem a bit thin on the ground, and references to radio for rural areas also seem to have been largely ignored. This is despite the fact that the IBA has publicly stated both its willingness to subsidise less profitable enterprises through the rental system (in 1978 the Authority announced it had made £1m through the secondary rental scheme which it was going to plough back into ILR) and its willingness to consider stations covering utterly gigantic areas—such as the entire Scottish Highland Region.

Reaction to the White Paper among radicals in the radio industry has tended to fall into two camps—those who feel we should accept what we've been given by the government and look to ways of working within the framework of the White Paper, and those on the other hand who continue to stress that it is necessary to change the system in order to get better local radio in the UK.

This latter point of view is not as theoretical as it might seem at first sight. A change of government in the next election could bring into power a party who might take a more liberal attitude towards commercial radio, although it must be admitted that the Tory top brass has not been especially forthcoming on ILR beyond suggesting that they would let the IBA 'Fill up the blank spaces in the local radio map', which is more or less what Labour is doing.

Nevertheless it is well remembered (especially in the Tory Party) that right back in 1969, the question of ILR was favourably raised at the Tory Party Conference and in the following year the proposals to set up ILR found their way into the party's manifesto. It is this background of favourable response to ILR that makes Conservative politicians look a better bet on this particular issue than anyone else.

This view is strengthened by the fact that in July 1978 Archie Hamilton, Tory MP for Epsom and Ewell, introduced a private members bill which sought to set up an undefined number of commercial *community* radio stations in the UK. In his speech Hamilton noted that Los Angeles, for example, with a population of some 6 million, had 30 radio stations. Why, he asked, was the UK deprived of this sort of resource? Such thinking is of course abhorrent to the Home Office who are still thinking solely in terms of covering a map with each area getting one, or at most two stations, rather than providing a large array of genuine alternatives for people to choose from.

Naturally, therefore, Hamilton's bill didn't get any farther than its first reading in the Commons but it represents a significant sign of radio awareness on the Tory back benches. What is more, the word is going round that the majority of Tory MPs are actually in favour of Citizens Band radio, as well as more ILR. CB is currently hated even more in the Home Office than ILR. According to Lord Harris. who chairs the Home Office committee of enquiry into setting up new local stations, CB is used in the USA by schoolkids, prostitutes and bank-robbers. Probably it has been so used, but then almost certainly so have the personal columns of the Times at one time or another. Of course no one can say if all this interest in radio from the opposition will manifest itself as Acts of Parliament one day, but the signs are promising.

But to be fair, the signs from the government side are not all bad. The White Paper does leave the door open for further development of some fringe areas such as hospital radio, university and college stations, (I've never understood why so few institutions invest the £2,000 odd needed to set up a loop induction radio system on their campus) and cable broadcasting—including educational services. All proposals within these areas are being well received by the Home Office, and there can be no doubt that developments taking place will open discussions on all areas of radio.

However, for many of those who are pushing for large changes in the government's whole approach to radio, these fringe concerns are of little more than passing interest. Prominent among those seeking wider changes is John Grierson, founder of Manx Radio, broadcaster and member of an unsuccessful consortium that put in a bid for London's general entertainment station, which was of course won by Capital.

Grierson argues strongly that there is a need to overhaul all the UK broadcasting legislation and to write the whole thing afresh. He sees the problem as one stemming from the fact that the UK was given commercial TV before commercial radio, which has led senior administrators considering ITV as a model when looking at possible developments in ILR. As a result, he argues, the ILR stations have been much too big and have developed into exactly what detractors from the idea said they would be—a licence to print money to a Top-40 format.

It is, incidentally, interesting to pause at this point to ask just why so much ILR is Top-40 orientated. There is of course nothing wrong with Top-40 radio, but is the Top-40 so important and so wonderful that it is necessary for every station to devote much of its 9am to 4pm programming to it? The most likely reason for its hold on ILR at the moment is that when the ILR companies currently approaching their fifth birthday got their franchises, they looked around for a model of profitable radio on which they could base themselves. The most profitable station up to then had been the pirate Radio London, complete with Kenny Everett, Dave Cash et al. Radio London made money, it was subconsciously argued, and so shall we using their format. The only major change introduced during daytime programming has been the addition of phone-ins.

John Grierson's remedy to the current situation is to make it much simpler and much cheaper to set up a station, cutting down the high IBA transmitter rentals. and the complex array of technical specifications forced upon the companies by the Authority. However it must be remembered that the larger stations that have now lived under IBA technical specs for five years do not mind them at all, and stress the fact that IBA requirements or no they would be developing equipment to the same standard as they are now doing anyway. Indeed they quite rightly stress that they have an active interest in improving their studio equipment still further (IBA willing). After all, they have the money, and it is certainly better spent in the studios than on flashy entrance halls and reception facilities.

John Lumsden of Radio Clyde, for example, has constantly stressed the technical innovations that have helped programming in the last five years, noting that the electro-mechanical side in particular has been considerably improved. He maintains that possibly the weakest link in the chain has been the grams units, for whether they were of American manufacture or some

other, they suffered from abysmal wow and flutter, not to mention the rumble, and although capable of almost instant start, were really quite unsatisfactory for FM stations.

The situation was literally turned upside down with the introduction of the Technics direct drive quartz speed controlled turntable which has now been widely adopted in ILR. Tape recorders have improved since manufacturers have got rid of most of the mechanical moving parts, and 'state of the art' machines like MCI and Leevers-Rich have improved wow and flutter, signal-to-noise ratio, and start time parameters.

But John Lumsden's list of improvements does not stop there. He also notes a considerable improvement in recording tape, which he now finds able to handle much larger amounts of signal level and can therefore offer lower distortion, lower noise or a compromise of both. "We may, for the future, wish to revise our agreed peak flux limits," he states, "thereby allowing the broadcasters to benefit from these improvements."

Microphones for popular music have now been introduced with certain characteristics that allow close-miking with minimal spill pickup. The first of these was the Shure *SM58* and the latest one is the Electro-Voice *DS35*. Efficient radio link equipment has also become available (particularly from Moseley Associates), which is capable of very good voice and music performance.

Looking to the future, John Lumsden feels that we will be likely to see the wider spread adoption of multitrack tape recorders for use on music, thereby allowing better recorded sounds in a smaller capacity studio, the like of which exist in local radio at the present moment. These multitrack machines would be followed by computer assisted mixers, easing the sound balancer's job when mixing music and reducing the number of generations of tape when recording drama.

However the biggest improvement is possibly ITC's introduction at IBC in September of their new record/replay cartridge machine. This machine is capable of full professional tape recorder performance, and obviously opens up new avenues for production. For example the station's play list could be on cartridge. These machines could be used in conjunction with computer control to allow the centralisation of all cartridges in the station.

Above: *Radio Victory (Portsmouth) self-op continuity studio with antique BBC LSU10 monitors*

Right: *Radio Victory production studio (and self-op back-up) with Audix desk*

Obviously listeners to Clyde will continue to benefit from John Lumsden's enthusiasm and ability to make use of the latest developments, providing that the IBA do not suddenly impose strict upper limits on the quality of studio equipment as well as lower limits already in force. But spare a thought for the potential smaller stations. How are they to cope with the IBA regulations that already exist in the field of studio equipment?

It is the question of small stations that is at the heart of most discussions now going on in relation to ILR. Everyone I have spoken to in the course of writing these three articles (with the exception of those people currently employed within ILR stations) wants to see the country covered in a myriad of small stations, each offering their audiences something singularly different from the fare of their rivals. Some will want to give a really local feel to their programmings, and may concentrate themselves in an area as small as a single London Borough. Others will of course want to be 24-hour music stations playing only their chosen brand of music—reggae, rock, modern jazz or whatever. They may well be commercial, but not necessarily.

The government has two arguments against this sort of proposal: frequencies and profitability. The frequency argument is, as I suggested in the first article, one of the government's own invention. If they were to open up the VHF band to 108MHz, then all the stations could be fitted in with no trouble at all. And should the old argument rise up again that people do not have sets with VHF bands on them, the experience of the Isle of Man should be remembered, where it was impossible to get good MW reception in the early years of local broadcasting. In response to this the number of homes with a VHF set in them shot up from 10% to 60% inside three years. Currently in the UK 54% of all sets can receive VHF broadcasts, but if people suddenly found the one station they wanted to hear was on VHF only, the proportion would shoot up at once.

There is just a slight glimmer of hope that something might be done about the VHF band in the next few years. The government has made it clear that it will not do anything until the 1979 meeting of the World Advisory Radio Conference. Since the conference is bound to agree to the use of the band up to 108MHz for broadcasting, and since the government has made a lot of noise about following the decisions of the conference, the band may be made available within the next couple of years.

The government's second argument—profitability—is denied by the Canadian experience. Stations serving 20,000 people and run by half a dozen enthusiasts are making profits in North America. Obviously they don't have to pay transmitter rentals and there are no exacting studio standards to match up to, so the analogy is not exact, but it does seem to indicate that the view of the companies waiting to bid for ILR in the Exeter and Torbay region of Devon for example, all of whom stress that they would not be interested in trying to run a station serving Exeter and district alone (target population 150,000), represents an over cautious attitude towards ILR.

As John Grierson points out, surveys have shown that there are twice as many people who are available to listen to radio (ie sitting in cars, doing housework, working in factories and so on) as are already listening. Give them something they really want to listen to and they will certainly tune in. The fact that they are not already listening shows that there is something radically wrong with the programmes currently being offered. Small stations could be the answer.

So what is to be done in order to get the change in the style of radio in the UK that a number of commentators seem to want? There

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appear to be four separate possibilities. The first has already been mentioned — the Conservative Party. Pressure brought to bear now might have future results. Not a racing certainty, but a possibility.

Secondly there's the Court of Human Rights in Strasbourg. The scenario here will work like this: Albert Wavelength sets up his own low power station on a clean frequency in his living room, broadcasting to anyone who cares to tune in locally. The HO moves in and removes the equipment, whilst Albert is yanked off to court to be found guilty of operating wireless telegraphy equipment illegally. He then takes his case to the Strasbourg Court on the grounds that the British government is refusing to allow him the basic human right of freedom of speech, as guaranteed, incidentally, by the Helsinki agreement. He wins his case and the UK government is forced to change its legislation in order to bring itself in line with the rulings of the court. Then we can all set up our own low power FM stations, wherever we want to.

The advantage of this approach is that if successful it would achieve the biggest break-through imaginable in radio in the UK. The disadvantages include cost, time and lack of certainty of winning the case in the European courts.

The third possibility comes in the form of satellite broadcasting. The White Paper has one paragraph on the subject. In part it states that the government considers it would be 'premature to reach any firm conclusions on the allocation of responsibility for satellite transmission, though it would not wish the IBA to be excluded from any international discussions on the matter.' And that would be that—no action until we see what everyone else is doing—if it were not for the fact that in the not too distant future multinational corporations will be putting up their own communications satellites and hiring out the channels to the biggest of the broadcasting companies around the world. Clearly one early target population is going to be the British, as being particularly susceptible to the offer of new programmes coming through the clouds. In response the government will undoubtedly get out the old Marine Offences Act which took the radio ships away, change a few words here and there and pass the Interplanetary Space Offences Act.

It is unlikely that the Interplanetary Space Offences Act would have much effect though because the operating companies and the advertisers will undoubtedly themselves be multinational and thus not too worried by domestic British legislation which would prevent the satellite linkup. Pressure may be put on the USA to stop allowing the stations to go up into orbit, but it is unlikely that the USA would agree to give up such a profitable side line. The disadvantage of this possibility is that although it will undoubtedly give us more radio and TV, it is highly unlikely to give us *better* radio and TV. What's more, the control of the stations will not be in the hands of those listening, and it will certainly be a case of those on high deciding what those down below really want.

Which brings us to possibility four —and this is something rather different. In September 1977 the IBA put out a press release which stated that it was willing to invite 'proposals from groups with plans for self supporting local radio regardless where they come from'. If one adds to this the fact that the IBA is willing to look into ways of supporting stations that may not make much profit, and are concerned to develop franchises substantially different from those currently in operation, then there is reason for supposing that a new type of radio station could be formed within the current legislation, with the co-operation of the IBA.

The main aim at this stage must surely be simply to prove once and for all that small stations serving small populations are viable in the UK. Given that the adherence to the high technical standards of the IBA, and payment of some transmitter rentals will remain part of IBA demands, it would, as I have already indicated, be foolish to consider a station serving a population as small as 20,000. But an area with a population of around 100,000 ought to be a reasonable proposition. So the plan must be to find such an area, persuade the IBA to offer a franchise for it, set up a company to bid for the franchise and then apply. Even if the company doesn't win the franchise it will have served the purpose of persuading the IBA that the experiment should be conducted, rather than continuing to follow the conventional businessman's wisdom that a target population of 250,000 is the minimum that will do.

The main problem is to find a suitable area. In the White Paper there are two interesting issues raised which give a clue as to which sort of areas the IBA might look favourably upon. One is the insistence that areas lacking in social amenities should be high on the list of priorities for getting local radio, and the other is that the question of serving rural areas must be given urgent attention. Obviously it isn't enough simply to find a deprived rural area and stick a line around it, showing the supposed VHF reception limits, and then claiming that the area is a unified community which can be served by one station. If the station ends up trying to serve disparate groups who do not feel attached to other groups in the area then the whole point of having a small station will be defeated.

In order to put possibility four into operation, anyone interested can go ahead and choose an area to put a small station. After that it would be advisable to seek the co-operation of as many local people as possible before getting in touch with the IBA. As to the money needed to set the station up, there appears to be a vast range of companies anxious to put money into ILR as the directors of every company that has been formed to bid for an ILR franchise will tell you. Once the company is announced offers of finance will come pouring in. So once you've studied the maps, talked with the local people and got your case together, just drop a line to the Chief Assistant (Radio), at the IBA, 70 Brompton Road, London SW3, explaining where your station should be, why it should be there, and of course what it would do if it were there.

Does possibility four work? I can't guarantee that you'll get your station—I can only say I'm in the process of finding out myself, for in conjunction with a number of colleagues and local people I've had a go at suggesting an ILR station in West Cornwall serving the towns of Camborne, Redruth, Truro, Falmouth, St Ives, Helston and Penzance. Total population somewhere in the region of 100,000. The industrial base is weak, although there are signs of the tin mining industry getting going again, whilst Falmouth harbour is gradually developing into a centre for the offshore oil industry now working the western approaches. The local communities in the area certainly feel an accord with each other far more than they do with those living east of Truro.

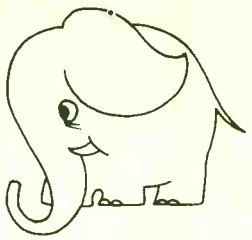
The main programming proposal is for two frequencies to be allocated, one of which carries local West Cornish programming all the year round, whilst the other operates a special holidaymaker service from Easter to September, this primarily being a music channel with news about what's on, where to go, and how to avoid the traffic jams. It's early days yet in the project, but the IBA have shown an interest in the idea, and things are looking good. If you feel you'd like to be involved and have something to offer the project, perhaps you'd get in touch.

There are of course other things that individuals can do about the state of radio in the UK. Certainly everyone ought to be encouraged to go to the public hearings that the IBA hold locally before any ILR franchise is awarded. And once a company has been awarded a franchise, there is no reason not to write to that company offering your services. Judging by the number of stations that the IBA are talking about opening up, this could be the start of the golden age of the studio engineer in radio, not to mention the freelance programme producer, radio reporter, DJ, technician and so on.

But whatever happens to local radio in the UK there is one thing I would personally like to see more than anything else—the much greater utilisation of the enormous talent that there is around at the moment. Too often one sees businessmen running radio stations as if they were supermarkets. There are some very enthusiastic and creative people around and I hope they get a fair deal. ■

Capital Radio held a party for 48 youngsters born on the same day as the station in 1973 to celebrate its fifth anniversary. Each received a birthday cake which they promptly iced for a competition and further celebrations at their homes

studio sound
INFORMATION REQUEST



Studio Sound is planning a new publication project for 1979, and we would appreciate the assistance of all readers involved in the sound business in studying, completing and returning this questionnaire to:

Angus Robertson, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA UK

Full details about this new project will be announced early next year.

Company Name .....
Address .....
Country ..... Telephone ..... Telex .....
Contacts (with positions) .....

BUSINESS ACTIVITY (please mark relevant boxes)

☐ Recording Studio—
Please complete questionnaire

☐ Equipment Manufacturer—
Please send full details of all products with glossy photos for those that we do not already hold. Also include full name, addresses, phone and telex numbers for all worldwide distributors with name of principle. Worldwide prices also appreciated.

☐ Equipment Distributor—
If sole importer for a particular country, please send full details and prices of all products handled and include details for subdistributors, please state lines handled.

☐ Equipment Hire—
This includes PA and light shows, outboard equipment, mobiles etc. Please send details for equipment available for short or long term hire or leasing. Please include rate card or rates.

☐ Service Companies—
These include disc cutting, disc pressing, tape and cassette duplication, books or publications offered, effects libraries, training courses/packages, equipment servicing/maintenance etc. Please send full details, rates etc.

☐ Consultancy/Design—
Please return this form and we will send a further detailed questionnaire.

STUDIO QUESTIONNAIRE

Studio name .....
Owner..... Studio Manager..... Engineers.....
No. of Studios..... No. of control/Remix booths..... No. of Echo Chambers.....
No. of Rehearsal Rooms..... No. of Cutting Rooms..... No. of Copying Rooms.....
Others, please state .....
Tape Machines .....
(make/type/tracks) .....
Mixing Consoles/Boards .....
(make/inputs/outputs/monitors) .....
Monitoring: Amps..... Drive Units .....
(make)..... (make type) .....
Quadraphonic capability☐ used a lot☐ sometimes☐ rarely☐ never☐
Ancillary equipment: Comp/Limiters .....Reverb/Delay.....
(make/models) .....(make/models) .....
Dolby☐ .....
dbx☐ Equalisers .....Effects .....
Others, state (make/models) .....(Type/make/models) .....
Studio Sizes (feet/musicians) .....
Musical Facilities (please specify) .....
Cutting Facilities (please specify) .....
Film Dubbing Facilities (please specify) .....
Mobile Facilities installed in truck☐ portable☐
Other comments/services .....
Activities: Rock☐ MOR☐ Jingles☐ Orchestral☐ Film Dubbing☐ TV Dubbing☐ AV Programmes☐
Basic Rate for 24-track recording .....Other Rates .....

business

Left or right?

READERS of these pages have in the past provided excellent feedback. We know about the effect of dicky birds on microwave links and where to buy single edged razor blades. So perhaps readers can help with a further problem. Is drummer Sandy Nelson a south paw? Recently Sunset Records issued *The Very Best of Sandy Nelson* with a cover picture depicting the lad playing the drums left handed. But is he really left handed or did the record company get the cover picture negative the wrong way round. It does happen, you know.

A few years ago Philips issued Mozart's *Nozze di Figaro* (Philips 6707014) performed by the BBC Symphony Orchestra and Chorus conducted by Colin Davis. The boxed set of four records was accompanied by a lavish booklet containing a full page picture showing the whole orchestra and their conductor in full, left handed action. Now statistically it is pretty unlikely that Colin Davis, the BBC Symphony and Chorus are all left handed. To their credit the record company recognised this and eventually re-printed the booklet. But statistics won't help Sunset. So *Studio Sound* readers to the rescue, is Sandy Nelson a southpaw or did the record company get their cover pic the wrong way round?

Morning call

EVERY touring band has its own morning call stories. One band took to writing "No morning call" in the hotel register for just those mornings that they needed an early call to catch a train or plane. When they need a lie-in, they write "Call at dawn without fail" and sleep soundly through till noon.

An expatriate musician told recently of how he shared a room for a night with a sax player who had his own novel approach to the problem. Before turning in after an especially late gig one night, the sax player hopefully wrote "No call" in the hotel register. Early next morning the hotel maid dutifully hammered on his door and rattled her pass key into the lock.

"No call", bellowed the musician and went back to sleep. Half an hour later the same thing happened, another hammering, another rattling of the key and another shout. The third time it was different. At the first sound of hammering the musician leapt up, went straight to his sax case and pulled out a mains plug ready wired to a couple of leads with bare ends. He pushed these into the metal key hole, put the plug into the mains and went back to bed. Next came the rattling of a key, a short sharp cry of grief from the corridor and no further disturbance.

Parliamentary broadcasting

RADIO RHUBARB is regarded by some as a long awaited re-run of the Goon Show and by others as the most boring programme yet devised to soak up air time—more boring even than a 'phone-in chat show with a polite presenter unwilling to cutoff callers with nothing to say. But Radio Rhubarb may go down in history as the first radio programme to alter the whole British democratic process.

Traditionally, anything said in Parliament is privileged so MPs can say what they like without fear of slander or libel. Likewise what they say can be reprinted in Hansard without legal risk. There has not been a single case of libel or slander arising from parliamentary insult this century. But what is the legal position when an MP says something potentially libellous in Parliament and it is broadcast live over Radio Rhubarb? Up until recently everyone either ignored the question or assumed that broadcast comments were as privileged as Hansard transcripts.

But it seems that this assumption may have been misguided. In late May this year an Ulster Unionist MP, The Rev Robert Bradford, made some serious allegations in Parliament that were broadcast live. Suddenly Bradford found himself at the receiving end of a writ for libel. So far the procedure is at an early stage and Bradford has not yet received a statement of claim. So he does not know whether he is being challenged for something said in Parliament (if so it would be the first time this century) or whether there is a deliberate attempt to make a test case out of the issue because the alleged libel was broadcast.

Very probably the matter will die a natural death, like so many other libel actions, with an out of court settlement. But clearly, someone sooner or later will pursue into court a libel action on the strength of something said in Parliament and broadcast live. If the action proves successful it must mean either the end of live broadcasting from Parliament or an end to the traditional freedom of speech within Westminster walls during the hours of broadcasting.

Kids radio van

LONDONERS have become accustomed to the sight of clown-like characters performing odd rituals on London's street, by the river, South Bank and in open spaces. The only surprise now would be if it weren't all something to do with Inter-Action and Ed Berman. The Fun Art Bus, the Talacre Centre, Professor Dogg's troupe and various other schemes for engendering Community spirit etc with a capital C. Being a tax-paying cynic I always wonder who is actually paying for all these Inter-Action activities. But it's certainly a better investment than Polaris and it presumably keeps the mimers, clowns and mummers on the streets and out of mischief.

There's now an addition to this Inter-Action family, a sort of stable companion to the Fun Art Bus. It seems that Rank-Xerox, Mullard, Capital Radio and various local authorities (via Inter-Action Trust) have coughed up the necessary funds for a £15,000 studio-on-wheels christened the MIY or Make-it-Yourself Kids Radio Van. The avowed aim of MIY is to park on London borough sites around London during the school holidays and let passing kids have a go at making their own radio programme. A team of eight Inter-Action wallahs (two full time and half a dozen part time volunteers) help groups of kids record a programme and print newsletters and posters, while showing unspecified slides, films and video on a back projection screen and monitors built into the van. A bunch of kids with an idea for a programme are handed a Uher stereo *Report 4400* and sent off to interview unsuspecting locals. (Wisely one of the team goes along to make sure the Uher at least comes back.) The tape is then edited using Revox *B77* and *A77* decks and played to anyone interested. At the end of the day one minute cutdowns are passed on to Capital Radio for possible broadcast on the 7pm *London Today* programme. There's also the chance of a six minute slot in the Sunday afternoon *Hullabaloo* show.

It all sounds a lot of fun for everyone, including (perhaps especially) the grown-ups, and the very first one minute clip broadcast proved that the idea can work. The kids put together a programme on pets and one interviewee took the opportunity to beg Capital listeners not to leave plastic bags and bottles around, because "animals get inside them". But to be frank Inter-Action organisation isn't exactly rapier-efficient. The press releases publicising inauguration of the van at Capital reached very few of the magazines that would have been interested and when I heard about it elsewhere, contacted them and dutifully turned up at the Talacre Centre to see the van in action the PR lady who had told me where to come was herself nowhere to be found. The van team seemed delightfully vague about how London kids are to know in advance where the van will be.

"I think a Capital DJ says something in the morning, no maybe it's lunchtime", was the hardest news I could get on advance publicity. Certainly there seemed to be no attempt to advertise the Talacre day in advance. So I wasn't surprised to see only a handful of pretty uninterested kids around the van. According to Inter-Action, however, this had nothing to do with the lack of advance publicity.

"This is an atypical situation", I was told. "We're on our own doorstep here and the kids have seen it all before. We try everything out on the local kids before taking it out to other parts of London. They're used to radio, recording, video, even *U-Matic* video editing."

I now have this fantasy about poor under-privileged kids living near the Talacre Centre getting bored stiff in the school holidays with nothing to do but edit U-Matic video tapes.

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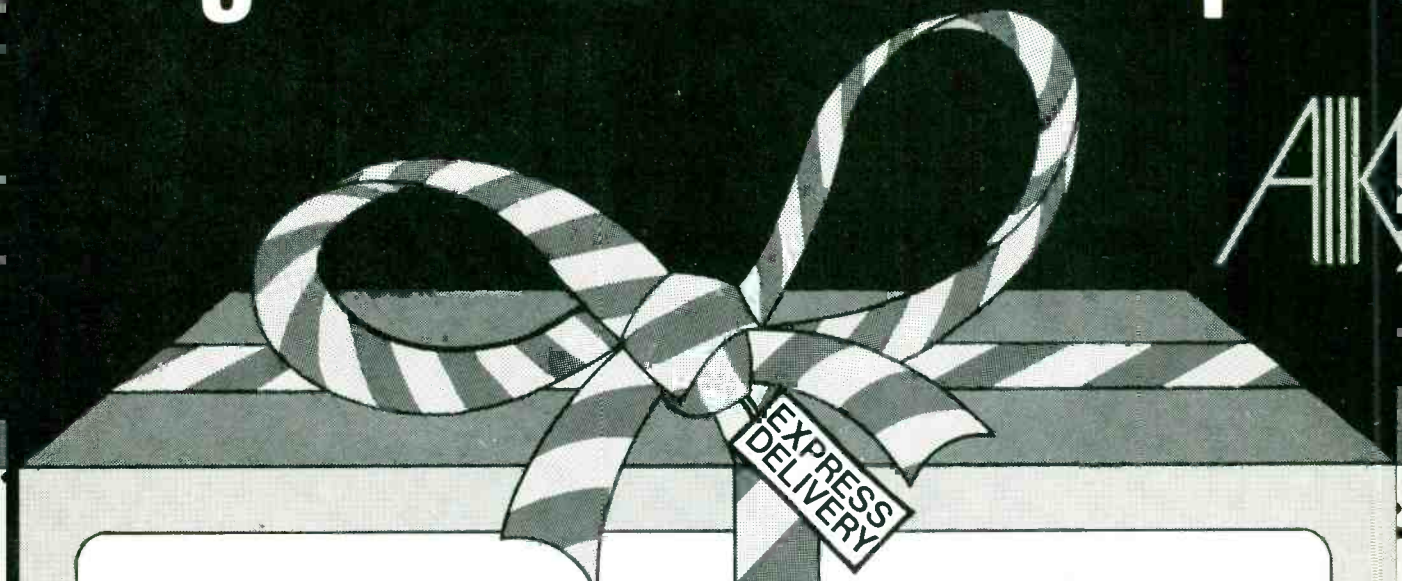

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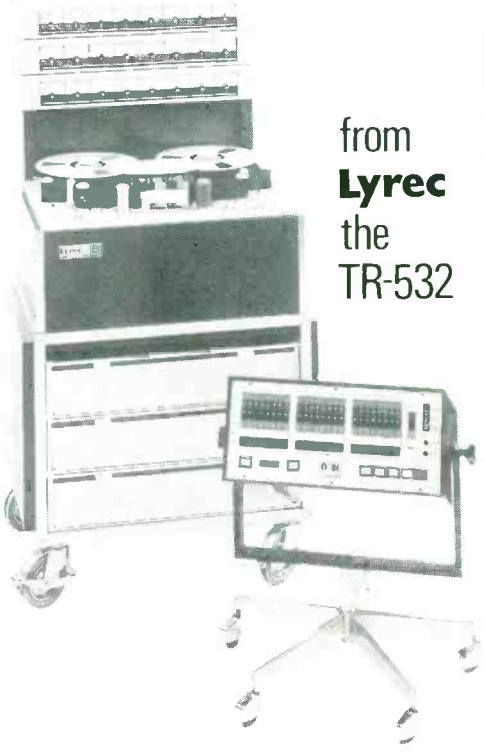

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From AUDIO magazine, July 1978.

"With the development of the new recording system we have left behind and abandoned any form of compromise solution. The new design philosophy is based on the optimization of modules, that is, the whole chain is divided into natural functions, and each function by itself is realized as a module. Hence, a solution is obtained which is optimum on all points at the same time as a system is realized which is more amenable to adjustment to new types of magnetic tape."

Dr. Hermann Lia. Senior Engineer Dept. of Magnetic Research and Development at Tandberg.

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2. The recording circuitry operates at a Lower voltage level and will, therefore, give less intermodulation because of slew-rate limitations.

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Cassette technology is surging ahead. Completely new high-coercivity tapes have already been anounced (metallic tapes) and should be on the market soon. Only the new Tandberg Actilinear TCD 340A cassette deck, of machines already on the market, can be adapted to use these tapes.

Tandberg's equipment has, traditionally, been aimed almost exclusively at the serious home recording enthusiast: to use the word in its proper sense for once, the amateur – the 'lover'. The development of the Actilinear recording system has made the term even less meaningful: professional recording studios are already using Tandberg cassette and reel-to-reel decks at major recording sessions. We just try to make the finest recording equipment we possibly can.

For more detailed information on the new Tandberg Actilinear system and the whole hi-fi range, write to us at:

TANDBERG

Tandberg (UK) Limited, 81 Kirkstall Road, Leeds LS3 1HR. Tel: (0532) 35111. **Patents pending.*

Birth of a mixer

Malcolm Toft (Trident)

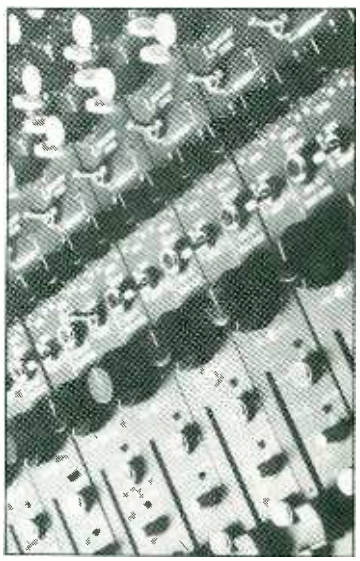
Trident originally developed the A series console for its own studio, and here Malcolm Toft, managing director of Trident Audio Developments, describes the development of the new TSM series multitrack console.

IN ORDER TO UNDERSTAND why the *TSM* range of consoles represents such an important evolutionary step for our company, it is perhaps worthwhile looking back to how we came to manufacture consoles in the first place (a question I have asked myself many times over the past few years). Marketing and manufacturing mixing desks was a secondary rather than a prime objective when we initiated the design of our first *A* series console back in 1971. As manager of Trident Studios at that time, it fell to me to survey the console market for a replacement console for our main control room.

In those days we operated with a remote 16-track recorder (commands being given to the tape operator by Intercom) due to lack of space. The area where the console was located was further inhibited by a lift housing which took up a corner of the room. This all added up to a maximum console length permissible of 1.5m and we wanted facilities to update to 24-track!

After lengthy discussions with the available manufacturers, we ended up with one final choice: build it ourselves. This was not agreed upon hastily nor lightheartedly as it was not an area that we had hitherto considered going into. However, in the final analysis it boiled down to the fact that we really had no other options, and we would at least know every nut, bolt, wire and circuit in the console. Also at that time, Trident employed some of the most creative recording engineers the industry could offer, namely Ken Scott, Roy Baker and Robin Cable. With not a little trepidation, the project was embarked upon from a small top floor room at the studios. Many heated (and cordial) discussions followed between all of us involved in the project, with the result that approximately a year later the first *A range* console was installed in Trident Studios.

The point of all this is to understand that as a consequence, most of the features and systems built into the console emanated from Trident's own particular requirements, and without any thoughts of making the console 'market oriented' to use the jargonese now so popular in our industry. We were therefore not a little surprised to find, working away in our little room, that word of our venture had spread and before the *A range* had been installed, we had a firm order for a scaled down version which we dubbed the *B range*. This forced us to consider the possibility of manufacturing on a separate company basis, and when a second order followed, Trident Audio Developments Ltd was born.



Right: *closeup of Trident TSM desk.*
Below: *Trident TSM desk installed at Good Earth Studio*

It soon became apparent, as more orders came in, that we would have to find our own premises and employ our own staff. We moved to North London and set about trying to cope with the orders. Coming from a studio background we knew the cost of studio downtime and the amount of revenue lost by the late arrival of a vital piece of equipment. Nothing could be more vital to a studio's operation than a mixing console, so keeping to our delivery dates was of paramount importance. As a consequence, any ideas of adapting the *A* and *B series* consoles to a broader market acceptance fell by the wayside as we experienced the growing pains of a new company and all the problems entailed therein and it was not until two years ago that we were able to catch our breath and think about a successor to these consoles.

We had, by this time, naturally enough established contacts with many studio engineers, some of whom were not slow in pointing out to us where they felt improvements could be made from both an electromechanical and systems standpoint. After many different discussions spread over a wide period of time, a clear picture evolved in our minds as to the advantages and disadvantages offered by our existing consoles. One surprising outcome was that nearly all of the engineers we spoke to preferred a separate monitoring section whilst paradoxically (and naturally) they wanted the console to be as compact as possible.

The controversy surrounding in-line monitoring versus separate monitoring will no doubt continue unabated for some time hence, but what persuaded us (and we did require some persuading since input/output modules are easier to manufacture than separate ones) is that nearly every engineer we spoke to said that when they are showing a 'guest' engineer the console for the first time, everything is extremely easy to understand being totally sectionalised. Separate stereo/quad remix busses had been lacking in our previous systems since at Trident our main control room for which the *A* console was originally designed, lacked remix facilities (there being a separate remix suite) and as a consequence special attention had not been given to the remix functions of a console.

This presented us with a further argument against a separate monitoring section and the piece de resistance of the input/output philosophy. When the console is used for mixdown utilising the quite separate mixdown buss, the engineer is left with a lot of multitrack monitoring modules and facilities totally redundant to his present requirements and occupying a lot of space. These problems we solved in what we consider to be a unique way and one which gives the system a versatility that even we did not fully realise until later. We had already decided that if we were to retain a separate monitoring section, it would keep most of the *A range* features but with some rationalisation. It would retain the monitor eq, a feature which every engineer found useful when replaying a multitrack through the monitor section and the producer asked for 'more brightness on the snare' or some such other request that would normally entail a lot of patching or even return to a semi-remix state through the input modules, thereby destroying precious eq settings etc. There would be a monitor pan pot in quad, instead of speaker selection by pushbuttons, linear fader for track monitor, echo and foldback send, solo and mute, etc.

We soon realised that what we had sitting redundant during mixdown were in effect either 24 or 32 (depending on monitor configuration) mini input modules. All that was needed was the inclusion of a pushbutton to route the output of the monitor panpot into the remix busses instead of the speakers. Other possibilities followed quickly from that. By the inclusion of a 'fader-reverse' button, the roles of the track monitor fader and Penny and Giles group master fader could be reversed thereby giving each of these extra 'mini input' modules a long throw conductive plastic input fader. This also means that during live multitrack recording, the normal monitor track faders can be used to control the multitrack group levels (normally at maximum anyway) and the producer can balance the monitor mix on the long throw Penny and Giles faders. Back in the mixdown mode, there is one further advantage, sub-grouping into the stereo/quad mix. By routing the signals the engineer

wishes to sub-group through the appropriate multitrack group and not directly to the remix buss, the multitrack monitor fader on the appropriate monitor module will control the overall level back into the remix buss.

This facility converts our 32/24 configuration console into a 60-line input console (there being four separate echo returns) when remixing and the 40/32 configuration becomes a 76-line input console. That should be enough for even the most ardent digital or multitrack syncing enthusiast! The input side of the console again borrows heavily from the *A series* ergonomically, the graphic 4-band eq is retained but each range is sweepable with widely overlapping frequencies and there is also a 2-position bandwidth control. If we'd made the bandwidth continuously variable we'd have put our rack mounting parametric out of business! Instead of the three selectable high and lowpass filters offered by the *A series* there are now continuously variable sweep filters and the parametric and filter sections now have individual in/out switches with LEDs.

Another important rationalisation of the *TSM* console is that the equaliser is contained in its own module without any ancillary functions. This serves two purposes, firstly from a servicing standpoint should an equaliser module fail and a spare not be available, a simple service card can be plugged in to bypass the equaliser section at least allowing the rest of the input facilities to work. Secondly, it means that less or more complex eq modules can be added to the system during its lifespan or when new technologies become available. All of this is not easily possible with the input/output approach.

A question which inevitably arose during the electronics design of the console was whether to use discrete or opamp (IC) technology. Here again we found that in the final analysis we had very little choice and I would like to state our reasons why and also I hope, lay to rest some of the fears and dare I say paranoia that has arisen around IC's. We had already journeyed into the use of IC's with our *Fleximix* portable mixing consoles and had received extremely favourable feedback from mixing engineers who had used the mixer both in Europe and the USA. One thing we were extremely pleased to note and which definitely strengthened their argument for use in the *TSM series* was that the *Fleximix* console had still retained the 'musicality' of its big brother discrete consoles. In many cases it was thought to be almost too 'clean' a sound. Servicing had proved to be extremely straightforward since an opamp could be simply plugged in for replacement purposes even by the most technically unskilled operator and the devices themselves were very rugged.

The final and equally strong argument was that we wished to incorporate into the *TSM* consoles even greater system flexibility and complexity than that offered by the *A series* consoles. Apart from allowing greater flexibility of operation, we also wanted to electronically buffer more parts of the system, maintain phase integrity and also keep a constant +24dB headroom at all points in the system. This would just not have been possible using discrete circuitry bearing in mind that we also wanted to reduce the size of our consoles. I would in passing like to add my own comments to the controversy surrounding IC's and it is this: I feel the reason for so much distrust in their use is that when linear IC's were first used in audio, they had very poor slewrate, headroom and noise characteristics but were used nevertheless because they had very obvious advantages over discrete circuits in simplicity of design and layout (not to mention in some cases cost). As a consequence most early IC consoles had a marked difference in sound to comparable discrete consoles which was primarily characterised by a poor harmonic response.

As a consequence most IC consoles even today still have that stigma to overcome even though the new generation of opamps now available totally vindicate themselves by offering exceedingly good slewrates (40V/μs is now readily obtainable), low noise and excellent headroom capability, thereby often outperforming discrete devices and with the added bonus of much greater immunity to RF pickup.

One final advantage we gained from totally rethinking our electromechanical packaging concepts was that we were able to capitalise on the experience we had gained over the years in console construction. We have therefore incorporated some of the latest production methods into the *TSM* which means that our pricing is still very competitive and our build time is reduced enormously therefore offering our customers a much better delivery schedule. Most of our hand wiring is now replaced by mother boards, even our patchbay is totally modular using a new printed circuit mounting jack socket, and flat ribbon cable is used between the jackfield and mother boards to speed manufacture and erase human wiring errors.

We're not saying we've produced the perfect console, that is impossible, but we believe we have come up with a very serious alternative to the systems at present available. At the time of writing seven firm orders have been placed and that's not bad considering six of these were without customers seeing or hearing the *TSM* in its finished form. ■

Survey: PA and broadcast mixing consoles

Next month we will be covering multitrack recording mixing consoles, but this month we deal with broadcast and sound reinforcement types. Broadcast mixers generally have rather more specialised monitoring facilities than others while sound reinforcement mixers must be robustly constructed and easily transportable.

ALICE (UK)
Stancoil Limited, Alexandra Road, Windsor, UK.
Phone: 07535 51056. Telex: 849323.

ACM series
Modular mixing system for mono or stereo broadcasting and four or eight group PA applications. Wide range of modules includes mic/line, stereo line, DJ self-op with limiter, stereo compressor-limiter, voice-over 'ducker' comprehensive monitoring with split headphone feeds, VU or PPM metering, multiple talkback facilities, custom-built modules for special applications. Broadcast mixers can have table-top or floor-standing consoles with central script area.
Prices: *ACM10/2B*—stereo broadcast mixer £2,950, *ACM10/2P*—stereo PA mixer £2,250, *ACM12/4P*—4 group PA mixer £2,850, *ACM16/8P* 8-group PA mixer £4,650

828 series
Eight channel and 12-channel stereo output portable mixers, transformer balanced mic inputs, line input via c/o switch, direct channel outputs, full eq echo, FB, PFL, limiters, headphone and LS monitoring outputs, VU meters or PPM's to order, mains or external 24V powered, all steel case.
Price: 8 in *828* £395.

12/4 series
12 and 16-channel 4-group mixers, balanced mic inputs, full eq two line inputs per channel, foldback and two echo sends, PFL, Ch on, limiters, choice of VU meters or PPM's, separate fader panel allows choice of faders.
Price: £1,285.

STM 6
Portable DJ self-op mixer for OB use, two mic channels, two stereo gram channels (RIAA or line) and two stereo line channels. Off-air receiver input for headphone monitoring, mono, stereo and PA outputs, twin PPM's (or VU's to order), PFL, remote start.
Price: £465.

ALLEN & HEATH (UK)
Allen & Heath Brenell Ltd, Pembroke House, Campsbourne Road, London N8, UK.
Phone: 01-340 3291. Telex: 267727.
USA: Audiotechniques Inc, 142 Hamilton Ave, Stamford, Connecticut. Agents in Canada, Belgium, France, Germany, Austria, Greece, Italy, Portugal.

Mini Mixer
The smallest professional mixer in the world, the *Mini mixer* is designed for use in areas such as portable sound systems and 'on stage' submixing. As the unit has enough physical space for balanced input transformers these items are supplied separately, prewired for insertion into the mixer inputs.

Production Mixer
The *S6-2* production mixer features two stereo RIAA equalised units, two stereo line inputs and two microphone inputs all fully equalised with PFL and PFM. An autofade circuit is incorporated giving variable programme 'ducking'. Remote state microswitches are provided giving solid state control of 5A relays inside the external power supply.

SD 12-2 Stereo Console
Designed for portable sound reinforcement applications where fully professional facilities are required on location. The *SD 12-2* features: 12 input channels with mic-line selection, channel insert points, channel direct post fade outputs, 4-band eq, pre eq foldback (with separate foldback eq), echo send and PFL. A comprehensive 4-way monitoring system includes tape return monitoring with the stereo metering system switching with the monitor selection. XLR connectors are standard with the option of phantom powering, multicore and flightcase.

MC162-2 Modular Console
Formally known as the Pop Mixer, this unit is designed for portable sound reinforcement applications where the added 'in field' serviceability of modular consoles is required. Available in any format up to 16/2, the unit features two independent foldback mixers and an integral carrying case with handle.

SR20 and SR28
At the top of the Allen & Heath sound reinforcement range these mixers can provide virtually every feature required for 'live' sound mixing. With up to 28 inputs and a choice of 4, 6 and 8 subgroups feeding a stereo master output stage, the unit can be supplied to customers specification. Being fully modular the *SR Series* is particularly suited to applications where service delays cannot be tolerated.

ALLINGTON (UK)
Allington Audio Developments, 14 Lenton Blvd, Nottingham.
Phone: 0602 44943.

SRM16/2
PA console with 16 inputs and two outputs, balanced mic inputs, peak overload indicators, hi, mid and lo eq, panning, two aux outputs, PFL, VU metering, —125dBm equiv input noise, +18dB max output into 600Ω.
Price: £680.

SRM16/4
Similar to above but with four outputs.
Price: £840.

ALTEC (USA)
Altec Corp, 1515 South Manchester Avenue, Anaheim, Cal 92803, USA.
Phone: (714) 774-2900.
Europe: Altec Lansing International Ltd, 17 Park Place, Stevenage, Herts SG1 1DU, UK.
Phone: 0438 3241. Telex: 825495.
UK: Theatre Projects Sound Ltd, 10 Long Acre, London WC2E 9LN.
Phone: 01-240 5411.

1628A
Automatic microphone mixer with eight inputs, one master output and one priority output. Provides envelope detector dynamic range of +3 to —67dBm and attenuator response time of 6dBm/ms rise and 10dB/s decay.
Price: £610.

1690
Recording console with eight balanced mic and eight unbalanced line inputs, two aux inputs, two programme outputs, eight line outputs, four sub outputs, —126dBm input noise, channel LED peak indicators operating at +14dB, nine segment vertical bar LED meter display.

AMEK (UK)
Amek Systems and Controls Ltd, Islington Mill, James Street, Salford M3 5HW.
Phone: 061-834 6747. Telex: 668127.
Agents in Australia, France, Germany and USA, addresses next month.

X Series
Various input, output and monitor modules available to give a high performance relatively low cost desk for recording, reinforcement or theatre applications. Formats vary from four to 32 inputs, two to four out with 8-track monitoring, subgrouping etc.

M1000
10 buss console in a standard 24 input mainframe (32 frame also available), the standard console being configured 24/8/2+16 allowing for full 16-track usage.
Price: £8,000 to £9,000 for 24/8/2.

AMBRO (USA)
Ambro Broadcasting Inc, 850 Pennsylvania Blvd, Feasterville, Pa 19047, USA.
Phone: (215) 322-5100.

Range of broadcasting consoles with modular plug-in amplifiers and remote starts for external source equipment for all nine inputs. Various versions from 6 channel 24 inputs mono, dual mono or stereo up to 12 channel 48 inputs units.
Prices: between $2,500 and $5,600.

AUDIO DESIGNS (USA)
Audio Designs and Manufacturing Inc, 16005 Sturgeon, Roseville, Michigan 48066.
Phone: (313) 778-8400.

Range of unit and modular systems based on the following audio modules: *301* noise suppressor; *ADM 302* limiter: *660* spectrum analyser; *ADM560* Vue-Scan, TV monitor of up to 28 bars; *770* input module, with input attenuate, cue send pre/post, 3+4+4+3 eq in/out, input overload LED and solo, with channel slider; *ADM1500/1501* eq similar.

BC Series
Stock consoles up to 16/4 formats, chassis with four VU meter display, for sound reinforcement. Standard desk console $2950.

BC-5 Series
Broadcast production consoles. Format up to 16 low level inputs or 28 high; four outputs with individual VU and monitor, es and return, flexible monitoring. Standard $6425.

TV-32
Broadcast production console up to 32 input and four subgroups; 20 low level inputs or up to 104 high, echo return on both masters, metering of all group functions; machine controls; selective groups mic muting.
Price: standard $18,725.

AUDIO DEVELOPMENTS (UK)
Audio Developments, Hall Lane, Walsall Wood, Brownhills, Staffs, UK.
Phone: 05433 5351.

AD007
8/4 portable unit with comprehensive eq, metering osc, two switched PPM's and compressors. Standard with short travel Ruwido faders, P & G *1520* or *1820* to special order. 12-channel extender unit available, connected via designated socket.

AD031
8/2 'Micro Mixer'; two groups submixed to give third

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SURVEY: PA & BROADCAST MIXING CONSOLES

output; single PPM monitors all functions. Headphone monitor outlet. If compressors required, fitting is in place of one mic channel. Faders and extensions available as *AD007*, in corresponding versions.

AD045 Pico
6/2 portable mixer with balanced mic and line inputs each with microphone powering as standard with either normal Phantom XLR connectors or Tonader (DIN 45595) DIN connectors with powering. Pico includes a rechargeable 12V battery with DC-DC converters for mixer rails.

AUDIX (UK)
Audix Ltd, Stansted, Essex CM24 8HS.
Phone: 0279/813132.
Canada: Phillips, 200 Consumers Rd, Suite 105, Willowdale, Ontario.

MXT-1000
Full broadcasting performance, comprehensive facilities and a flexible design make the *MXT-1000* audio mixer particularly suitable for the small radio and recording studio, mobile and theatre applications. Details of a special radio 'on-air' version of the *MXT-1000* are available on request. The *MXT-1000* readily enables the individual customer's specific requirements to be met without recourse to 'custom building'. Both number and choice of input channels, as well as two or four group working—two stereo groups can be selected and supplied as a working system at short notice.

B100 Series
The *B100* range of modules and mixers has been designed specifically for the broadcasting industry. Two basic systems are available, designated *B101* and *B102*. The *B101* consoles are 2-group systems and the *B102* has facilities for four groups plus two main outputs or six groups.

3500 Series
The *3500* range of modules has been designed for the larger studios where 8-group working is essential. Based on a 35mm modular width, the range offers a compact console with maximum flexibility and facilities. Consoles can be built with any number of input channels, mixing to eight main groups for multitrack working, plus a further mixdown from the eight groups to two main outputs for direct transmission.

AVAB (Sweden)
AVAB Elecktronik AB, V. Hamngatan 1, 411 17 Goteborg, Sweden.
Phone: 031-112032/031-112034.
UK: MCI (Professional Studio Equipment) Ltd, MCI House, 54-56 Stanhope Street, London NW1 3EX.
Phone: 01-388 7867.
USA: Audiotechniques, 142 Hamilton Ave, Stamford, Connecticut 06902.
Phone: (203) 359-2312.
Audio Industries Corpn, 1419 Nth La Brea Ave, Hollywood, California 90028.
Phone: (213) 851-4111.

ME802S
Portable mixer for location recording. Inputs: eight mic line. Outputs: master A and B, tap 1 and 2, echo send and monitor A and B. Balanced in/out. PPM meters with LED display, phantom feeding, stereo echo and tape return, 2x10-octave equalisers, XLR in/out connectors, mixer fitted in standard size brief case.

ME802
Portable mixer for recording and PA. Fitted in briefcase. Eight balanced inputs mic/line. Outputs: master A and B, tap 1 and 2, 2x10-band octave equalisers, XLR in/out connectors.

MP532
Portable PA mixer, designed to meet the requirements for touring theatre companies etc. Inputs. five mic-line, two stereo tape and one stereo phono: with power amp 2x80W rms.

BOGEN (USA)
Lear Siegler Inc, Bogen Division, PO Box 500, Paramus, New Jersey 07652, USA.
Phone: (201) 343-5700. Telex: 710-990 5047.
Range of basic mixer/preamplifiers with rotary level controls. Balanced or unbalanced inputs, either XLR or jack connectors, facilities for extending inputs with add on units. Also separate octave equaliser.
Prices: $130 to $400.

Tech-craft range
Mixer/amplifiers for PA applications, some with rotary faders, others with sliders, VU meter. Also modules designed for mic or gram inputs.

BULGIN/SOUNDEX (UK)
Bulgin Electronics Soundex Ltd, Park Lane, Broxbourne, Herts EN10 7NQ.
Phone: 09924 64455.

Series 1300
Four inputs, two outputs (one stereo input, two mono pannable), PPM or VU metering, XLR or jack connectors.
Prices: £220 to £277 depending upon options.

Series 1400
6-input stereo mixer with hi and lo eq on each channel with panning. Various input modes covering lo and medium impedance balanced mics, unbal line, high sensitivity and phantom powering capacitor mic input. VU or PPM metering, 1kHz oscillator.
Price: £522 to £570.

Series 1500
Similar to above but 12 input channels, stereo.
Price: £970 to £1,067.

Series 1600
Similar to above but 12 input channels, four outputs.
Price: £1,188 to £1,280.

CADAC (UK)
Cadac (London) Ltd, 141 Lower Luton Road, Harpenden, Herts AL5 5EL.
Phone: 05827 64351. Telex: 826323.
USA: Cara Pacific Sales Co, 3050-F Via Alicante Dr, La Jolla, California 92037.
Phone: (714) 452-0813.

Portable
Normally fitted 10 or 12 channels but available up to 21. Two or four group outputs. Version with full quad panning on all channels. Two FB, PCF, osc, talkback standard monitoring. Both mic and line bridging inputs to channel separately gain adjustable. Five-band eq: hf shelving curves, three mid bell, and one lf shelving. Each band has frequency select/cut and booster control. Table top or stand versions. *XLR* fitted.

CALREC (UK)
Calrec Audio Ltd, Hebden Bridge, Yorks, UK.
Phone: 0422 842159.
USA: Edcor, 3030 Red Hill Ave, Costa Mesa, California 92626.
Modular mixing desks, based on full range of standard units.

J Series
Stereo broadcast equipment, in three basic units assembled as required: channel unit with eq, gain, filter and route; groups unit for mixing and sub-routing; and monitor/output unit with line amp as appropriate.

K Series
Consoles for large studios, up to 32/4 format with up to four subgroups. Full eq and grouping on all channels, monitor with VU/PPM PFL/AFL/Compressor/Limiters, osc, Talkback, Phantom power provision.

CAMBRIDGE ELECTRONIC WORKSHOP (UK)
Cambridge Electronic Workshop, a division of Analogue Electronic Workshop Ltd, 4 Water Lane, Oakington, Cambridge CB4 5AL.
Phone: 022023 3737.

High quality portable and installed consoles for theatre use. Fully modular desks purpose-built to provide a range of custom assemblies from standard production items. Complete worldwide installation and commissioning service. Standard 2 and 4-group models available. Cue lights, show relay, communication facilities, tape remotes, VU/PPM metering. Any group or input may be metered via PFL, also stereo and off-tape monitoring, switching for eight output/LS line, jack bay, locking DIN connectors. Standard module includes separate mic/line sensitivities, hf, variable mid, lf, hi/lo pass filters, eq in/out, two aux send pre or post, pan, PFL, group routing.

10/2
10 input channels, two main groups, two aux groups, PFL, oscillator, full talkback, four direct inputs.

12/4
12 input channels, six direct inputs all accessing two mono and four main groups. Mono groups routed to main groups via quad pan pots. PFL, oscillator, full talkback, foldback groups with eq available to a maximum of eight.

CETEC (USA)
Cetec Audio USA, 13035 Saticoy St, North Hollywood, California 91605, USA.
Phone: (213) 875-1900. Telex: 910-499 2669.
UK: Cetec Systems Ltd, Sapphire House, 16 Uxbridge Rd, Ealing, London W5 2BP.
Phone: 01-579 9145. Telex 935847.

Series 10
10/2 portable console with 10 stereo input channels and 10 switchable remote stereo inputs; comprehensive TB and cueing systems; stereo headphone output, remote tape controls; clock; available in mono/stereo/quad forms with eq if desired.

Series 20
Live music console. Up to 30 inputs, four program outputs, mono output, stereo output, two FB, one ES. Mic/line and optional switching for up to 48 additional remote inputs. Phase: solo; attenuate to 60dB; group solo, echo return; programmable mute for four independent presets; three way eq on all inputs; LED channel-on; illuminated VU for all outputs, PPM available; plug-in modular construction.

Series 2000
Available in formats of up to 32/24, based on the following modules: *712L* nine frequency graphic eq/mic amp; *711L* eight frequency eq/mic amp; *311L* mic amp; *SM-5* five channel switch push button; *SML* switch module lever, 24-channel.

CHILTON (UK)
Magnetic Tapes Ltd, Chilton Works, Garden Road, Richmond, Surrey.
Phone: 01-876 7957.
USA: Freedom Electronics Inc, 3540 E Lake Street, Minneapolis, Minnesota.
Canada: Radio Service Inc, 2500 Bates Road, Montreal H3S 1A6.
Italy: Audio Consultante, Via Sabbatini 13, 41100 Modena.
Switzerland: Hi Fi Electronics, Idastrasse 3, 8003 Zurich.
Sweden: HZ Studio, AB Box 6099, 171 09 Solna.
South Africa: Tru Fi Electronics SA (Pty) Ltd, PO Box 31801, Braamfontein, Tvl, 2017.
Holland: Totaa Theater Techniek BV, Egelantiersgracht 30, Amsterdam.
Denmark: Conquist Recording Studios, Holtebakken 33, 2990 Niva.
Norway: Siv Ing Benum & Co, Boks 2493, Solli, Oslo 2.
Greece: Christos Lilis, 8 Enianos Str, Athens 104.
Germany: Amptown Sound Equipment, 2000 Hamburg 60, Alte Wohr 20a.

M12/4 Portable
For recording, portable or PA applications. Channels include: balance mic/line with gain, HF and LF eq, subgroup with pre/post facility; PFL; PAN; channel fader. Output panel includes line/monitor meter switch, aux master send/return, switchable OSC, monitor and headphone gain controls each with tape/line/PFL

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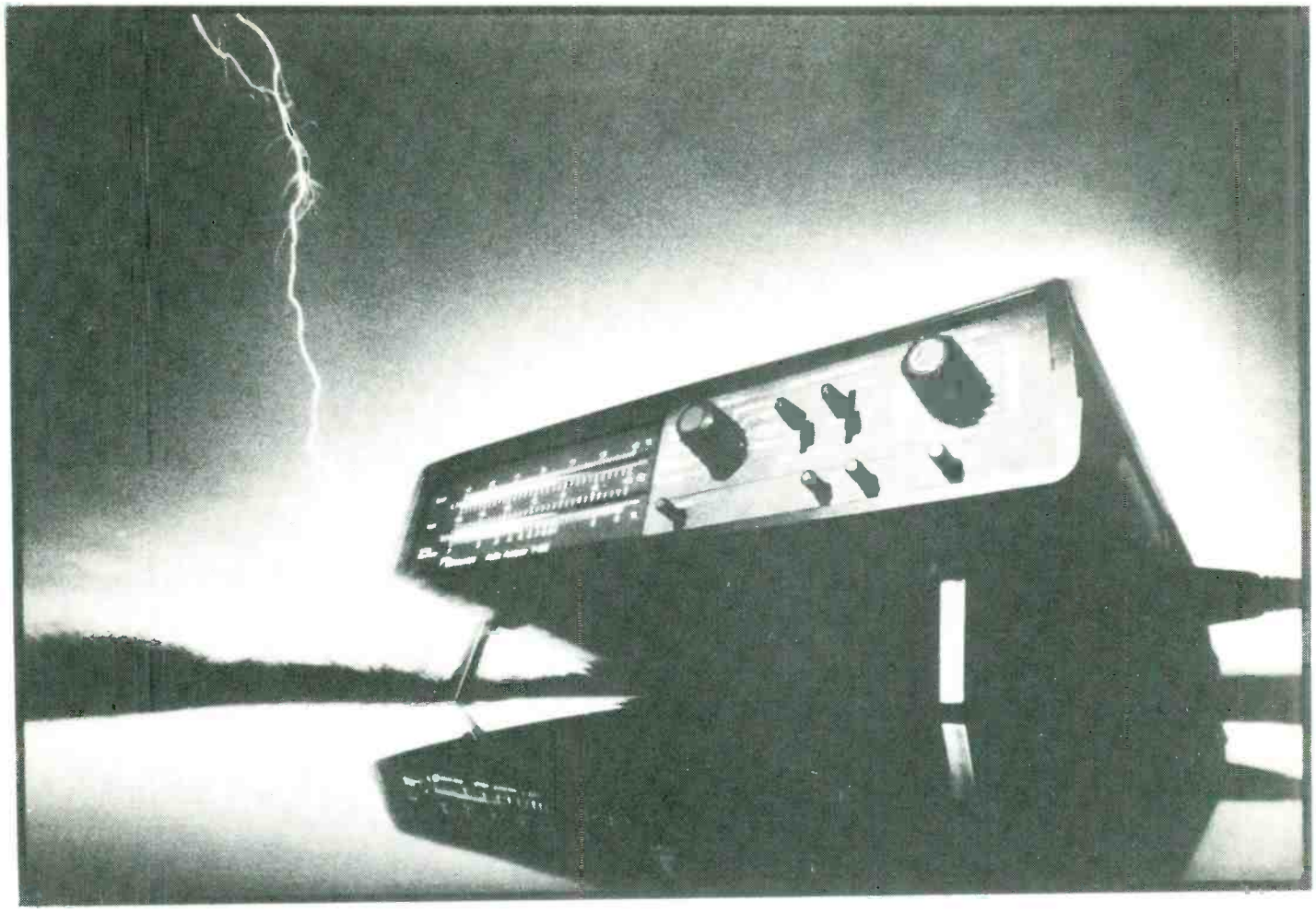
A flash of brilliance from Nakamichi illuminates audio analysis.



Smaller and lighter than a telephone directory. Yet the equal of a pile of test instruments many times its size and weight.

The Nakamichi T-100 is everything you've been wanting in an audio analyser.

And maybe a bit more.

It contains a built-in oscillator with 21 frequencies from 20 to 20,000Hz; a pink-noise generator; a level meter featuring a lightning-fast dual plasma display with choice of "VU" or peak ballistics; a speed, wow and flutter meter with the option of unweighted or DIN peak weighted measurements; a fully automatic 400Hz distortion analyser; an A-weighting filter for noise measurements; a watt-scale graticule for power level indication.

It's rugged, versatile and accurate. An instrument that sustains infallible diagnosis.

Service and laboratory professionals, equipment reviewers, dealers, salespeople... and incurable audiophiles, the T-100 has arrived.

Enlightening audio analysis.

Write for more information to Natural Sound Systems Ltd, 10 Byron Road, Wealdstone, Harrow, Middlesex HA3 7TL.

Nakamichi

Products of unusual creativity and competence...

SURVEY: PA & BROADCAST MIXING CONSOLES

selector. Different input modules optional; extension unit and multicable input socket for music balancing.

M10-2 Mark 3
Similar M12/4 series, with appropriately reduced outing facilities.

CROSSROADS (USA)
Crossroads Audio Inc, PO Box 19871, Dallas, Texas 75219, USA.
Phone: (214) 526-1636.

Minipro
Concert sound re-inforcement mixer. 16 in, three out; balanced input; simple eq; prefade monitor mix buss; post fade echo/effects subgroup, master eq on main and monitor outputs; *XLR* connectors; two large VU meters. PCB construction; all controls rotary. Weight 14kg approx, length less than 77cm.

CRYSLON
Cryslon Electronics Ltd, 31/33 Oxford Street, Leamington Spa, Warwickshire CV32 4RA.
Phone: 0926 37628.

8000 Series
Range of mixers designed primarily for auditorium applications and based on *8000 series* module. Facilities include balanced mic/line inputs, switched gain controls, LF cut, LF, mid and HF eq, eq cut, two auxiliary outputs (pre or post fade), four group selection push buttons/LED indicators, balanced group outputs.
Price: about £120 per channel.

6100 Series
Range of plug-in modules including mic amp, mixer, line amp, 20W amp and equalisers.

CAE (USA)
Custom Audio Electronics, 2828 Stommel Road, Ypsilanti, Michigan 48197, USA.
Phone: (313) 482-6568.

XPC-16 Series
Modular sound reinforcement mixer that uses no mainframe, chassis or motherboards, with modules simply fastening side-by-side with internal Molex connectors. The basic input module features switched gain, eight output assigns, two aux sends, pan, lf and hf eq with selectable bend points, and solo, while the *XPC-16P* input module is similar but additionally with built-in limiter, three aux sends, peak/shelf eq, parametric eq, mid eq, The submaster module includes master outputs in stereo, pan, stereo lo and hi pass eq, assign switches for other submasters or masters. An alternative output module is the 8-Mix Master module for monitor mixing and studio applications, while the 8-Line In module provide eight line inputs for effects returns and submixes; also a Communications module with intercom and lamp.

DUKANE (USA)
DuKane Corp, 2900 DuKane Dr, St Charles, Illinois 60174, USA.
Phone: (312) 584-2300.

13B465
Up to 16 input channels, to three output groups; overload indicator on channel and group; cue channel to monitor any combination in/out. Supplied with two large VU meters. Designed for mass audience facilities.

2A75B
Mixer-amplifier for PA and sound re-inforcement purposes. Fine inputs, each taking mic/line/disc, three pad positions; balanced output *2A76B* is associated mic input expander, with five additional channels.

FAIRCHILD (USA)
Fairchild Sound Equipment Corpn, 75 Austin Bvd, Commack, Long Island, New York 11725, USA.
Phone: (516) 543-5200.
UK: Jacques Levy Professional Recording Services, 6 Carlisle Mansions, Carlisle Place, London SW1.
Phone: 01-834 9248.

ICBM
Series of modular broadcast consoles and IC broadcast modules (ICBM) including mic input module line and hi level input modules, remote input, output, monitor and communications modules. Metering via VU in console shell; wide format flexibility.

GELF (UK)
Gelf Electronics Ltd, Unit 5, Mount Avenue, Bletchley, Milton Keynes MK1 1LS.
Phone: 0908 77503.

Monitor Mixer 16/6
Developed particularly for stage monitoring, this provides 16 inputs and six independent outputs. Input sensitivity is —40dB and each channel provides lf, mid and hf eq and separate level controls for each output group. Each output has a 9-band eq with 10dB at 50, 100, 200, 400, 800, 1600, 3200, 6400 and 12800Hz.
Price: £2,700.
Gelf also manufacture larger mixers using similar modules.

HARRIS (USA)
Harris Corporation, Broadcast Products Division, 123 Hampshire Street, Quincy, Illinois 62301, USA.
Phone: (217) 222-820.
UK: Lee Engineering Ltd, Napier House, Bridge Street Walton-on-Thames, Surrey KT12 1AP.
Phone: 09322 43124. Telex 928475.

Dualux 80
Dual channel monoaural console. Eight mixing channels, 18 inputs, allows control of AM and mono FM from the same control point. Executive dual channel stereo/mono console, 26 inputs into 10 full channels may also be operated monoaurally. Dual channel capability allows control of FM stereo and mono AM simultaneously.

Gatesway 80
Monoaural console. Eight mixing channels, 18 inputs. Stereo 80 console, 180 console, 18 inputs may be switched into eight stereo mixing channels to provide a large degree of flexibility that will satisfy any stereo requirement.

HARRISON (USA)
Harrison Systems Inc, PO Box 22964, Nashville, Tennessee 37202, USA.
Phone: (615) 834-1184. Telex: 555133.
UK: Scenic Sounds Equipment, 97/99 Dean Street, London W1.
Phone: 01-734 2812. Telex: 27939.

Live Performance Console
Available in either 16 or 24 input mainframes with satellite extender frames of either 16 or 24 input configurations constructed from aircraft aluminium with a target weight of about 68kg for a 24-channel console. Features include four pairs of main stereo groups, 3-band parametric eq eight parametric hi pass filter on each input/output module, eight auxiliary send groups, automation ready, Penny and Giles VCA fader section with switching to select any or all of eight subgroup masters which allows for grouping of subgroups.

HELIOS (UK)
Helios Electronics Ltd, Browells Lane, Feltham, Middlesex TW13 7ER.
Phone: 01-890 0087

Nordic System
Modular system ranging from simple 10-input mixers to complex TV sound desks. Includes a choice of mainframe sizes with control and monitor panel, jackfield, internal LS and power supplies, four different input channels ranging from four auxiliary sends and two output busses to six aux and eight outputs with a VCA option, two types of auxiliary master talkback module and echo return modules and metering which is customer specified.
Prices: from £10,000 to £35,000.

HH (UK)
HH Electronic, Viking Way, Bar Hill, Cambridge CB3 8EL.
Phone: 0954 81140. Telex: 817515.
USA: Audiotechniques Inc, 142 Hamilton Avenue, Stamford, Conn 06902.
Phone: (203) 359-2312.

Stereo 16
16-input stereo mixer with four band eq, balanced low impedance input switchable to high imp unbalanced, peak programme indicator, foldback, echo and pan. Graphic equaliser built in as standard, VU meters also fed from channel PFL, stereo phone socket, optional digital effects units which plug into front panel, XLR or jacks with multi-pin connector for stage box.

Stereo 12
Similar to above but only 12 channels and less peak indicators, graphic equaliser and separate monitor VU.

HILL (UK)
Malcolm Hill Associates, Hollingbourne House, Hollingbourne, Kent.
Phone: 062780 556.
UK Sales: 6 Lillie Yard, 19 Lillie Road, London SW6 1UD.
Phone: 01-381 3446.

A Series
Uses basic channel module featuring variable gain (from —90dB), ±18dB hi, mid and lo eq, foldback, aux and echo sends, pan, function and fader. Connectors jacks (option XLR), 4-band eq in output groups, VU metering previous to output faders. 4-track capability.

B Series
Similar to *A series* but standard with XLR connectors and VU meter on each channel.

C Series
Similar to *A series* but with mic/line channel switch, Penny and Giles faders, 8-track routing, various monitoring options.

D Series
Designed specifically for complex PA applications, this series is based on A, B and C series but with additional hi and lo pass filters, three frequency band selection on mid control, two post fade sends, four output channels, 100mm wirewound professional faders, quad possibilities.

ICE (UK)
ICElectrics Ltd, 131/132 Blackdown Rural Industries, Haste Hill, Haslemere, Surrey, GU27 3AY.
Phone: 0428 2015.

Mix 1000
Mono mixer for disco applications with mic, aux and two phono inputs, remotes for phono decks, phones output and master fader.
Price: £102

Mix 3000
Stereo mixer with aux, two mic and three phono inputs, phones outputs, eq, master level.
Price: £152.

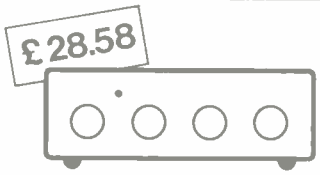
INTERFACE (USA)
Interface Electronics, 3810 Westheimer, Houston, Texas 77027, USA.
Phone: (713) 626-1190.

Model 16T8
Theatre mixer with 16 inputs with eight push button selected submaster busses (input modules can feed any number of busses) with pot submasters and eight outputs selected by matrix pots from the eight submix busses and each equipped with a slider fader. (*Model 24T8* is similar with 24 inputs). Modules include con-

52 ▶

Accessit

Signal processing beyond the facilities of mixers is essential to provide correct interfacing and creative control of audio signals. Five units launch the ACCESSIT range, which will be constantly expanded to provide the most up to date signal processing products. The processors can be used separately or racked together in a 19" compatible format. ACCESSIT is sold direct, to ensure the best possible back up service and value for money.

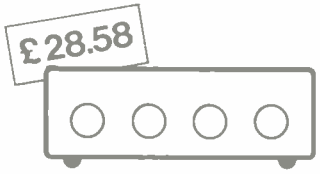


COMPRESSOR

The Compressor is an automatic gain device, essential to help control and maintain signal levels. Variable attack and release times give scope for a wide range of effects. An LED indicator shows when gain reduction occurs.

Automatic microphone amplifier
Achieving a "tight" music sound
AVC for constant level programme
High noise level PA systems
Self levelling line amplifier
Effects limiter for recording

Input from –40dBm at 33kohms
Output from 0dBm at 600ohms
Noise less than –60dBm
Attack from 0.5mS to 5mS
Release from 0.1S to 2S
Ratio approx 6 : 1

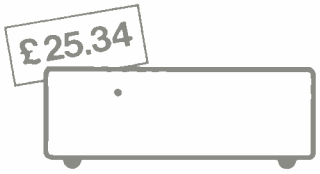


EQUALISER

In addition to the basic tone control in mixers, more extensive tonal effects are often desirable. The Equaliser uses the latest parametric design, over two bands, enabling the boost and cut circuits to be tuned to any spot frequency.

Sweeping pop music effects
Improving reverb unit response
Selective mixer signal equalisation
Tuning the acoustics of rooms
Soundtrack "cleaning" process
Anti-feedback device for PA

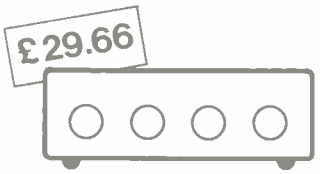
Input 0dBm at 10kohms
Output 0dBm into 600ohms
T.H.D. less than 0.1%
Bass + or – 16dB at 50 300Hz
Treble + or – 16dB at 3 14kHz
Noise less than –80dBm



POWER SUPPLY

All ACCESSIT units offer two-way powering. Internal decoupling means that they can be operated from batteries or an external, low voltage source. The optional mains supply is housed in a standard ACCESSIT case and has independent outputs for up to four processors. The outputs are electronically smoothed, regulated and protected against inadvertent short circuit and overload. An LED indicator features on the front panel.

Input 240 Volts 50, 60Hz
Output 24V DC 200mA
Ground Negative reference
Ripple Less than 200μV
Regulator Power I.C. type
Size 142 × 132 × 43mm

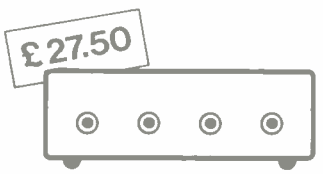


REVERBERATION

Reverberation is an ambience effect which livens up and gives depth to an otherwise "dry" sound. A custom made spring unit and variable tone control circuitry ensure a natural sound. For reverb only or in-line applications.

As a mixer echo system
Pseudo-stereo effects
Spot echo for individual signals
Enhancing "dry signals"
Ambience for AV recordings
In-line effects for instruments

Input from –30dBm at 33kohms
Output from 0dBm into 600ohms
Decay 3.5 Seconds
Noise less than –58dB
Mix Continuously variable
E.Q. Bass, treble balance



BOOSTER

Level and impedance matching problems can be solved with this interfacing unit. Unique switching systems give the option of use as four separate line drivers or as a distribution amplifier, with balanced or unbalanced outputs.

AV Distribution amplifier
Matching peripheral equipment
Driving long cable lines
Multiple output PA booster
Cue Headphone amplifier
Feeding balanced inputs

Input 0dBm or –10dBm switched at 47kohm single, 12kohm mult
Output 0dBm unbalanced, –6dBm balanced to drive down to 600ohms
T.H.D. less than 0.1%
Noise less than –80dB

Trial Offer

To see how the ACCESSIT range fits your requirements, we give you the opportunity to try the units for 30 days. Interface them with your system, and see how you can use the creative effects to your advantage. There are probably more applications than you can think of at present! If, within 30 days you are not happy that ACCESSIT can fulfil your needs, return the units to us for a prompt and courteous refund.

To order your system, simply send your order and cheque, or call us with your credit card number and we will send you your order by return with full instructions and a three year guarantee.

Service should never be required but our prompt service by mail department is ready to deal with all problems.

ACCESSIT products are the result of up to date engineering, making advanced features available at low cost. Order at no obligation today!

Use this reply paid card for further information or your order

Please send more details on :

- ☐ *Limiter
- ☐ Equaliser
- ☐ Booster
- ☐ Reverberation

Please send application notes on :

- ☐ *Recording
- ☐ PA systems
- ☐ Broadcast/Disco
- ☐ Audio Visual

Please supply the following units. (Vat, P&P included in prices)

_____ £ _____
_____ £ _____
_____ £ _____
_____ £ _____
_____ £ _____
Total £ _____

Limited to UK only.

☐ *Payment by cheque (Please post in envelope) or by Credit Card

BARCLAYCARD VISA Access

_____

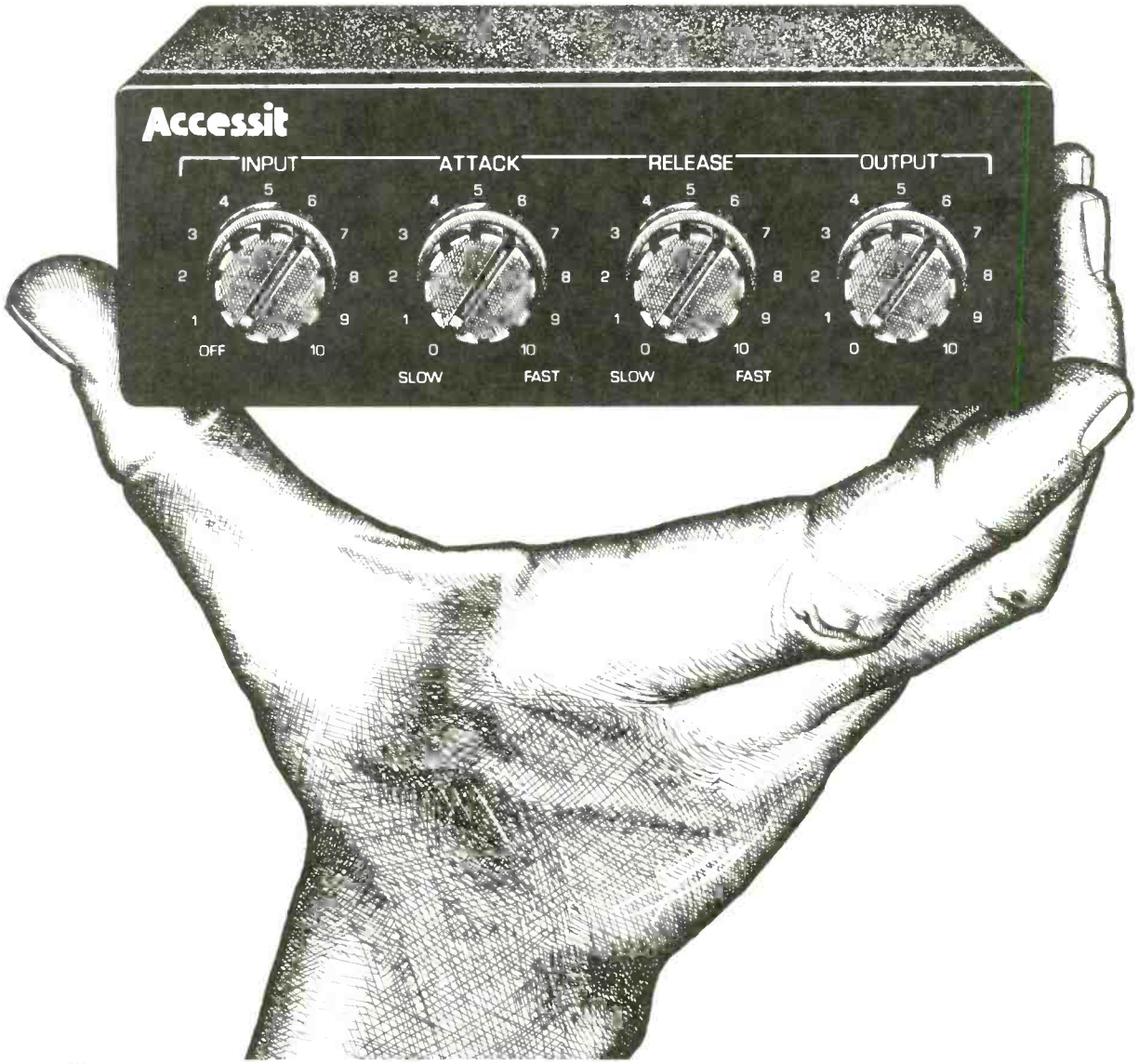
Signature _____

Name _____

Address _____

_____

*tick as applicable



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|2|

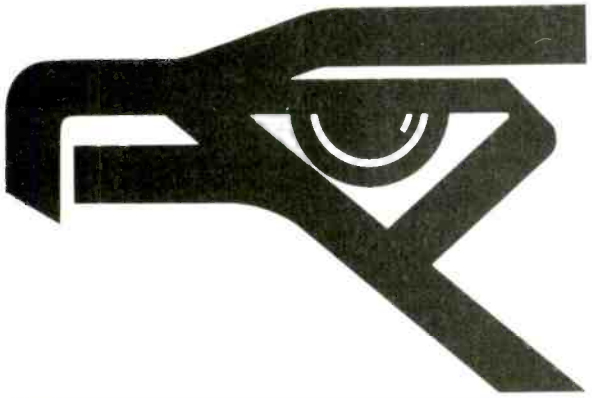
A REALLY PROFESSIONAL MICROPHONE

THE EAGLE PRO M90 MICROPHONE

A tough cardioid mike for stage use.
Voice or music. Indoors or out.
A mike with really good feedback control and an amazing 40 to 16000 Hz frequency response.
Three layer windshield. XLR connector.
Custom-built clip for stand use.
A mike that will never let you down.

That's why the real professionals use it.

EAGLE



Please send me details of all the Eagle mikes, mixers, stands and other studio equipment.

Name _____

Address _____

_____

_____

Phone _____

EAGLE INTERNATIONAL

Eagle International Precision Centre, Heather Park Drive, Wembley HA0 1SU. Middlesex. Tel: (01) 902 8832

SS1

SURVEY: PA & BROADCAST MIXING CONSOLES

ductive plastic sliders, balanced XLR inputs, switched gain, three eq circuit, solo, phantom powering, four cue sends.

ITAM (UK)
Industrial Tape Applications, 1-7 Harwood Avenue, Marylebone Road, London NW1 0AE, UK.
Phone: 01-724 2497. Telex: 21879.

10.4
Portable or studio desk for recording or PA. Modular construction in fixed format for high turnover/low cost. Facilities include: balanced mic/line input with gain; lo, mid, hi eq; ES; FB; pan between groups 1/2 and 3/4; channel assign; fader; four limiters with LED indication (variable); four monitor volume controls fed to stereo monitor output. Headphone socket; four echo returns. Connections via phone jacks. Weight approx 11 kg.
Price: £647.

KAJAANI OY (Finland)
Kajaani Oy Electronics, Nuaskatu 11, SF-87400 Kajaani40, Finland.
Phone: 986-37311. Telex: 45148.

10EA Series
Fully modular construction of aluminium on a strong steel frame. Console can be tilted on its support for easy maintenance. Each channel has three balanced inputs with phantom power on all mic inputs, separate gain controls for mic and line, Penny & Giles faders, comp eq, true power law pan pot with grouping via reed switches to three stereo groups or our mono. Logic controlled PFL with monitoring and main listening for complicated playback situations digital timer, large screen phase crt, telephone interview equipment and auto DJ module. To supplement the console organisation a colour coded patchbay is available. Possible combinations of 6/2 to 24/2+4+4 with standard combinations.

LIBRA (UK)
Libra Electronics Ltd, Unit 4, Browells Lane, Feltham, Middlesex.
Phone: 01-890 0080.

Live Sound Mixers
Designed for theatres and conference/art centres with input and output selection designed specifically for such applications. Each input module can be selected to any input and combination of output. Thus an input can be assigned through one or more faders to any configuration of outputs. This follows normal theatre lighting practice where cues can be pre-prepared while existing cues are in use. Group control can be arranged by plugging outputs back to an input assigned to a separate output.
Price: from £2,500.

MACINNES (UK)
Macinnes Laboratories Ltd, Macinnes House, Carlton Park Industrial Estate, Saxmundham, Suffolk IP17 2NL
Phone: 0728 2262/2615.

18/4 Mixing Console
18 input console for either mic or line, with four outputs, two echo sends, and a new Socapex multiway connector which is a standard fitting. Stage box and multiway cable also available.
Price: £1,600.

MALATCHI (USA)
Malatchi Electronic Systems Inc, 3731 E Colfax Ave, Denver, Colorado 80206, USA.
Phone: (303) 321-3520.

Modular professional rack mount mixers and consoles for live sound reinforcement and recording. Any number of input channels with one, two, three or four and more output mix configurations.

MARCONI (UK)
Marconi Communication Systems Ltd, Chelmsford CM1 1PL.
Phone: 0245 53221. Telex: 99201.

B1006
Modular sound console consisting of eight (or 12) channels with two groups, a monitoring module, a power supply module and a talkback module. PFL and cue lamp circuits on all channels and groups, equalisers on all channels, hi pass filter, transmit/rehearsal facilities.

MARTIN (USA)
Martin, 320 W 46th St, New York, NY 10036, USA.
Phone: (212) 541-5900.

SLM-1020A
Compact 10/2 console. Channels switchable between line and balanced mix 200Ω Output 600Ω balanced main groups, monitor 5kΩ unbalanced. Equalisers per channel at 50/100 or 200Hz, and 3k/6k or 12kHz. Separate channel pan. Weight approx 11kg. Twin VU meters.

SBC82
Stereo broadcast console, similar specifications to *SLM1020A*. Designed for broadcast/disco, 10 inputs on five dual-ganged sliders, into two groups, with mono cue facility. May be used with *234* mic/line cards or *234PE* phone eq cards.

MAVIS (UK)
International Entertainment Services, 11A Sharpleshall Street, London W1.
Phone: 01-722 7161. Telex: 27655.
USA: IES Inc, 3702 Astoria Blvd, Long Island City, NY11103.

Minimix 12/2
Compact portable mixer with channel buss and master controls on left, right phones and subgroup return. Channel facility includes mic/line input with, gain/trim pot; three range eq; ES and FB bussing from each channel; channel fader. Headphone jack outlet for monitoring.

Portable
16/4 mixer for mobile use. Channels with full eq with two additional high level aux input channels. Configuration may be as basic four track full range or two track split into three channels per track, in conjunction with electronic crossover. Further sub groups for external echo and for two fully equalised monitor circuits. Phone jack output for headphone.

PAS 55/30
Comprises two wings similar 15/4 mixer unit above, but with group positions reversed in one instance. Central console incorporates four PPM meters and necessary switching and subgroup control. For use ss up to 30/30 recording/remix system. With extra stereo crossover, each wing may drive quad PA.

McMARTIN (USA)
McMartin Industries Inc, 4500 Sth 76th Street, Omaha, Nebraska 68127, USA.
Phone: (402) 331-2000.
UK: Lee Engineering Ltd, Napier House, Bridge St, Walton-on-Thames, Surrey KT12 1AP.
Phone: 09322 43124. Telex: 928475.

500 Series
Small broadcast console for mic and four line inputs, built-in cue speaker, studio muting, stereo capability. Various options for card amps.
Price: mono $1,324, stereo $1,871.

1000 Series
Broadcast consoles with five or eight stereo channels with either slider or rotary faders, built-in monitor amp, headphone amp, all inputs on screw connectors.
Price: $3,000 to $4,600.

MIDAS (UK)
Midas Audio Systems Ltd, 54-56 Stanhope Street, London NW1 3EX.
Phone: 01-388 7060.
Distributor details next month.

P.R. System
Designed for live media and recording applications. Systems range from 6/2 submixing consoles to 36/8/2 front of house consoles. Consoles may also be linked to provide up to 60 inputs—stage boxes and multiway cables also available.

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

MCC Mark III
Self powered mixer with 10 input channels and two output groups. Channels arranged two groups of five, fader only control. PFL on each group and all channels, with stereo monitoring. Monitoring VU broadcast, VU peak reading or PPM. External battery or mains operation. DIN standard or XLR connectors. Rack mounting.
Price: £375 XLR, £346 DIN.

MM (UK)
MM Electronics, PA:CE Ltd, Kneesworth Street, Royston, Herts.
Phone: 0763 45214.

MP Series
8, 12, 16 or 20 channel stereo or 4-track mixers for small studios or PA. Semimodular construction with unbalanced inputs, two masters, VU meters, hi, mid 1 and 2, lo eq, foldback, echo, pan and slider fader. The *MP385/485* provides eight outputs with modified channel selection. The *MP185 Super 16* is similar to the basic series with PFL, peak indicators on all channels, 7-band graphic equaliser on each stereo output, and also 2-way electronic crossovers. Other options on MP series for mute switches, talkback, XLR instead of normal jack connectors, balancing transformers and multipins.

MUSTANG (UK)
Mustang Communications, 31 Nelson Street, Scarborough, Yorks, UK.
Phone: 0723 63928.

Range of mixers primarily intended for performance and may find studio application. Mixers available in rack or free standing format, with cabinets for racking also available.

NEVE (UK)
Neve Electronics International Ltd, Cambridge House, Melbourn, Royston, Herts SG8 6AU.
Phone: 0763 60776. Telex: 81381.
Distributor details next month.

5302/5312 Melbourn
12/2 multipurpose mixing console for mono or stereo programming. Options for various input modules, XLR connectors or multipins, uses Neve *3000 series* slimline modules, PPM or VU meters, comprehensive monitoring.

5305/5315 Range
Four buss console for broadcasting and music recording with two master outputs. Available in frames wired for 12 or 20 channels but this may be extended. Several types of equaliser are available and all inputs and outputs are wired to multipin connectors. *5315* available in 12 or 24 channel versions.

5422
Compact suitcase portable 8/2 mixing console with full eq on each channel. Two VU meters standard option for PPM, XLR connectors, internal nicad batteries for several hours operation.

PARTRIDGE (UK)
Partridge Electronics Ltd, 23-35 Hart Road, Benfleet, Essex SS7 3PB.
Phone: 03745 3256.

Range of mixers for various scale operations in broad-

cast and recording between 5/1 and 24/8 formats. Wide range of possible design and configuration based on the following modules: preamp combinations from lo imp balanced mic to disc, with gain and hi, lo boost/cut; virtual earth mixer; eq with mid control also; compressor/limiter with input gain, threshold and recovery controls; autofade; monitor; selection of groups and subgroups; foldback, talkback pan; lineup osc. Wide range metering as required. Wide range of standard chassis frames.

Mini
5-channel mini mixer in 5/1 format. Meter switchable, single bass/treble and gain controls.

PEAVEY (USA)
Peavey Electronics Corp, 711A Street, Meridan, Mississippi 39301, USA.
Phone: (601) 483-3565.
UK: Peavey Electronics (UK) Ltd, Unit 8, New Road, Ridgewood, Uckfield, Sussex TN22 5SX.
Phone: 0825 5566. Telex 957098.

Mark 2 Series MC8/12/16
Stereo mixers with eight, 12 and 16 channels respectively, LED overload indicator and 4-band eq on each channel, stereo pan, LED ladder on main and sum (40dB range), stereo headphones, balanced inputs and outputs, on XLR, line and breaks on jacks.

MR-7
Similar to above but rack mountable with transit case and only seven channels.

PHILIPS (Holland)
Electro-Acoustics Division, NV Philips Gloeilampenfabrieken, Eindhoven, Building SAQ 11, Netherlands.
Phone: (040) 733793/732646. Telex: 51121.
UK: Pye TVT Ltd, Coldhams Lane, PO Box 41, Cambridge CB1 3JU, UK.
Phone: 0223 45115. Telex: 81103.

LDC25 & LDC 15
20 and 12-channel versions respectively with two output/aux and two output/monitor channels. Channels feature hf, mid and lf boost and cut, pan, two aux send busses and PFL. Groups feature re-injection. Intercom module contains operational intercom and slating circuits, VU meter supplies as standard.

PHILIPS (Holland)
Electro-Acoustics Division, NV Philips Gloeilampenfabrieken, Eindhoven, Netherlands.
Phone: (040) 732904. Telex: 51121.
UK: Pye Business Communications Ltd, Cromwell Road, Cambridge CB1 3HE, UK.
Phone: 0223 45191.
USA: Philips Audio Video Systems Corp, 91 McKee Drive, Mahwah, New Jersey 07430.
Phone: (201) 529-3800.

SM4
Modular range of units for flexible set up of custom systems, intended primarily for PA and theatre area as well as 'semi-broadcast' use; with associated power amps.

Modules include the following: *LBB1140* mixing preamp, various inputs for pick up, music, mic and line, bass/treble ±14dB, VU meter; *LBB1142* 50W mixing amp, as preamp with amp; *LBB 1102* 50W power amp; *LBB 1143* 100W mixing amp; *LBB1103* 100W power amp; *LBB1104* 200W power amp; amp/attenuator *LBB1151/01*; *LBB 1151/02* tone control amp, hi/mid/lo boost and cut; filters *LBB1151/03*, as tone control amp before but with sliding frequency for anti-resonance treatment; *LBB 1151/05* simple complimiter; *LBB1151/06* gong/chimes/alarm unit; AM and FM tuner modules; control desks for small desk installations; sliders, VU module and mains control; signal push button module; five button, also available with illumination.

PYE (UK)
Pye TVT Ltd, Coldhams Lane, Cambridge CB1 3JU, UK.
Phone: 0223 45115. Telex: 81103.

SM8
Eight input channels selectable from three input channels: mono mic/line, stereo disc or stereo hi level Channels include sensitivity, PFL, foldback, pan. P & G faders standard. Custom version with switching for up to 48 sources. Talkback may be used externally if required. Eq ±8dB at 3/5/8kHz and 60/120/240Hz and ± 10dB at 0.7/2.4/4kHz. Fader backstop switches accessible for cue or machine start. Mono output from normal two groups working. Wide range monitoring and flexible switching, with interlock of talkback.

SM12
Compact 12/4 portable/studio/ob mixer based on narrow 30mm modules. Channels include: mic/line; pan between predetermined groups; eq ±15dB at 30/60/120/240Hz, 0.5/1/1.4/2.4/4/7kHz and 2/3/5/7/10/15kHz; three subgroups pre/post each feeding one of two busses; phase; Comprehensive group and channel monitoring. Master and appropriate return controls for echo and aux. Comprehensive talkback.

QUANTUM (USA)
Quantum Audio Labs Inc, 1905 Riverside Dr, Glendale California 91201, USA.
Phone: (213) 841-0970.

QM-8A
Compact 8/4 console for use in studio PA, sound reinforcement and mobile. Channels include: balanced mic/line switch; mic attenuate; boost/cut at 50/200Hz and 3/10kHz; output assign to any of four busses or pan between 1/3 and 2/4; two aux sends, conductive plastic faders. Full monitor and group outputs; talkback; echo return; quad master attenuator; submaster control, for individual output buss; headphone cue system; large VU meters; headphone cue system.

RAC (UK)
Rugby Automation Consultants, 19 Freemantle Road, Rugby, Warwickshire CV22 7HZ.
Phone: 0788 810877.
Specialists in manufacture of smaller custom mixers, majority less than 16 channel input. Many sold to hospital radio networks requiring simple mixer but with relatively specialised facilities.

As well as standard studio console arrangement build may be sloping-front or rack mounting. Circuits available separately as plug-in modules, with a range of 38, with application in studios, hospital radio, schools, colleges.

RAINDIRK (UK)
Raindirk Ltd, 33A Bridge Street, Downham Market, Norfolk.
Phone: 03663 2165/3617.
Distributors next month.

Modular free standing and rack mounting mixers. Custom manufacture or standard line for OB and in-house programme preparation.

OB 8/2
8/2 mixer with extra input channels as required. Free standing or 48cm rack mounting, balanced throughout, VU's or PPM's. Penny & Giles plastic conductive faders. Channels include mic/line select, phase reverse and mic attenuate, Eq treble, sweep mid eq 400-10kHz and bass, hi pass filter —12dB/oct at 30, 60, 120, 180 and 270Hz. PFL and cue send. Parallel outputs available from group outputs plus 1 into 4 dist amp.

RM61
Six input single output rack mounting mixer, six line inputs, two mic inputs, Penny & Giles *1520* faders, PPM, PFL and channel cut, monitor loudspeaker and associated limiter and equaliser.

TVL
10 input line level TV/radio editing mixer ±8dB line variation, Penny & Giles faders, PFL, channel cut, PPM meter and monitor loudspeaker.

RTW Peak Meters
A comprehensive range of 100, 200 and 300 element bar graph peak meters. Horizontal/vertical scaling with PPM and VU characteristic.

RAMKO (USA)
Ramko Research Inc, 11355 Folsom Blvd, Rancho Cordova, California 95670, USA.
Phone: (916) 635-3600.
Range of single channel (SC) and dual channel (DC) mixers. All units: height 20cm, with horizontal LED meters and touch pad controls, lighted, on all input, solo and mute and selection switches—no moving contacts. All solid state switching; self contained monitor and cue amps; mono mix outlet on all stereo consoles; cue on all channels; mute select via plug-in jumper wires. Inputs selectable: hi/lo level, 250Ω balanced or 100kΩ balanced bridging. Prices (numbers indicate channel content): *SC-5M* $898; *DC-5M* $1,138; *DC-5MS* $1,495; *DC-8M* $1,750; *DC-8MS* $2,298. Two year guarantee on parts and labour.
Also *DC-12* and *DC-38* consoles.

SATT (Sweden)
SATT Elektronik AB, Box 32006, S-12611 Stockholm 32, Sweden.
Phone: 08 810100. Telex: 10884.

SAM82
8/2 portable mixing console with balanced mic inputs on XLRs, switched gain, phantom powering, phase reverse, lo pass, lo and hi eq, output selector, panning, two aux outputs, linear fader, cue. Includes talkback output, insert facilities, option for battery operation, carrying case, built-in test tone generator.
Price: basic Sw Cr 19,000.

SCHLUMBERGER (France)
Schlumberger Instruments et Systemes, Centre de Rueil, 296 Ave Napoleon Bonaparte, 92503 Rueil, Malmaison, France.
Phone: 977 92 23. Telex: 26649
Range of consoles from small portable units to extensive multitrack configurations, produced on a large scale.

UPS4000
Modular construction, based on die-cast alloy chassis plugging into cast modular frame; console may be tilted on its support. Modules interchangeable *in situ*. Electronics use ICs widely; group routing via FET switching, grouped on plug-in mother boards; modules interconnect by mother board, reducing wiring demands.

Any system configuration supplied using combinations of following principal modules: input, with four balanced inputs, mic/line gain, hi pass filter; eq with boost/cut, eq Baxandall characteristic ±12dB at 60 and 10kHz or presence at 0.7/1.2/2/2.8/4/56kHz ±12dB in 2dB steps; band pass 24dB/octave at 100/250/500Hz and 4/6/8kHz; routing module; auxiliary outputs, four aux sends, both pre/post; echo return with gain to main group bussing; output amp balanced; limiter/compressor, 'limiting function —10dBm' with 25dB headroom, threshold variable over 20dB range, variable attack and release; fader with mute and PFL; mic TB amp with limiter; TB return, with two amps for various PFL and monitor functions. Automation facilities available oriented for use in broadcast or recording environments.

VLR401
Intended for reporting applications and small sound installations. Four input channels, two line inputs mono output and dry battery or external power supply. It also offers headphone monitoring, alignment generator and VU meter. It claims to meet ORTF specifications for equipment in the signal path.

UPS1602
This mixer is designed for control room applications in broadcasting, motion picture, theatre, educational and audio visual applications. Comprises six balanced mic/line inputs, two outputs, input pad, hi and lo eq, talkback PFL, internal power supplies and optional remote control facilities on each channel. Headphone and VU monitoring is standard.

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SURVEY: PA & BROADCAST MIXING CONSOLES

UPS2104
Full broadcast mixing console featuring 40 sources switchable to ten input channel amplifiers with four output groups. Uses extensive diecastings and modular construction to create a particularly robust design. Full foldback and echo buss facilities etc are incorporated.

UPS2124
As 2104 but with 48 sources switchable to 12 input channels.

SELA (Sweden)
Svenska Elektronik-Apparater AB, Fact, S-12206 Enskede 6, Sweden.
Phone: 08/94 02 70.
Range of mixers for film industry and Nagra recorders.

2880BT
4-channel mixer designed specifically for use with Nagra portable tape recorders from which it obtains power. Each channel accepts wide range of balanced mics and provides dialog filter, lf and hf in each channel rotary faders, line outputs which may be used for cans.

2880ST
8-input portable mixer with two groups, balanced input with phantom powering, hi-pass filter, lf and hf equaliser, auxiliary send (or echo), two returns into groups, line-up oscillator, two PPMs power supply which also powers Nagra and phantom mics.

2880-IS
Minimixer for professional applications, six mic inputs and which will operate directly from Nagra recorders, balanced inputs, phantom powering, roll over filter.

SENNHEISER (West Germany)
Sennheiser Electronic, 3002 Bissendorf/Hann, West Germany.
Phone: (05130) 8011. Telex: 0924623.
UK: Hayden Laboratories Ltd, Churchfield Road, Chalfont St Peter, Bucks SL9 9EW, UK.
Phone: 02813 88447.

M101
Portable mono mixer with four channels designed for use with Nagra or similar. Battery powered from twin 9V batteries, each channel with bass cut, equaliser on output, tone generator, VU meter.

SHURE (USA)
Shure Bros Inc, 222 Hartrey Ave, Evanston, Illinois 60204, USA.
Phone: (312) 328-9000.
UK: Shure Electronics Ltd, Eccleston Road, Maidstone ME15 6AU, Kent.
Phone: 0622 59881.

M67-2E
4/1 mixer with XLR connectors, rotary level controls, lo pass filter in each channel, VU meter, option battery headphone output, balanced inputs.
Price: £147.06.

M677
Six input accessory for M67-2E.
Price: £134.52.

SR109-2E
Eight channel mono mixer designed for 48cm rack mounting with hi and lo eq on each channel, rotary faders, built-in tone oscillator. XLR connectors.
Price: £507.30.

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

B1000
6-channel monophonic transportable mixer with flat scale fader, PFL, lf and hf eq, echo send, gain, switched mic/line, balanced inputs and outputs at Cannon connectors, comprehensive metering, switched, headphone monitor jack.

B2000
10-channels each with flat scale fader, lf, mid and lf eq, echo send, foldback, group panning, channel cut switched mic/line with gain control. Balanced inputs and outputs at Cannon connectors, two groups with Independent monitor outputs, echo send output, foldback output, echo return input. Two VU or PPM switched to inputs or outputs selectively. Headphone monitoring through meter select switch to phone jack.

B6000 Series
Eight or 16 channel six group mixer with 10 or 20 switched inputs, 3-band eq, echo send and foldback mix, mic/line switch. Balanced XLR connectors, VU meters, headphone amp, jackfield access.

Sonifex also manufacture dubbing consoles.

SOUNDCRAFT (UK)
Soundcraft Electronics Ltd, 5 Great Sutton Street, London EC1V 0BX.
Phone: 01-251 3631. Telex: 21198.
USA: Soundcraft North America, PO Box 2023, Kalmanzoo, Michigan 49003.
Phone: (616) 382-6300. Telex: 224408.

Series 1S
Non modular portable system designed primarily for PA market but also used by broadcasters. Available in 12, 16 and 20 inputs built into rugged aluminium flight case with all connectors brought out on front panel (both XLR and multipin), 4-band eq with two mid sweep two aux sends, full communication and monitoring facilities.
Prices: £1,150 to £1,730/$2,845 to $4,245.

Series 2
Semi-modular range designed originally for 4 and 8-track recording but also used for PA since these groups can be subbed to main stereo outputs. Available in 12, 16, 24, and 32 input sizes with 3-band eq, complex filtering, four aux sends, LED channel overload indicator, complex monitoring.
Prices: £2,150 to £8,000/$6,000 to $18,000.

SPHERE (USA)
Sphere Electronics, 20201-A Prairie Ave, Chatsworth California 91311, USA.
Phone: (213) 349-4747.
Standard and custom mixers for various applications including recording and broadcasting.

Alpha Series
Consoles designed primarily for radio and TV broadcast production. Alpha *B* is stereo broadcast console, Alpha *T* for TV Alpha *1* and *11* are portable, with full facilities in small format for smaller stereo and quad recording situations. Features include long throw faders, solo, mic/line selection, switchable pad, echo send and return cue mix, pan, quad output option, TB, slate option, monitor, osc. Consoles also available custom for sound re-inforcement. Optional extra module is *900* graphic in channel fitting, nine frequencies.

STELLAVOX (Switzerland)
Stellavox, 2068 Hauterive, Neuchatel, Switzerland.
Phone: 33 42 33.
UK: John Page Ltd, Wesley House, 75 Wesley Avenue, London NW10 7DA.
Phone: 01-961 4181. Telex: 24224.

AMI 48
Fine inputs for 12V AB or phantom powered capacitor mic, 48V capacitor mic, dynamic mic. XLR or Preh connectors. Bass roll-off, bass/treble lift/cut, pan, 20dB pad each input. PFL, individual post-fade outputs. Switchable stereo compressor on two channels, limiters with LED indication on each input. Stereo limiters with LED indication on master group outputs. 880Hz line up osc Two illuminated PPM meters. 8x21x27cm, weight 4.3kg. Price £2,182 with limiter £2,846.

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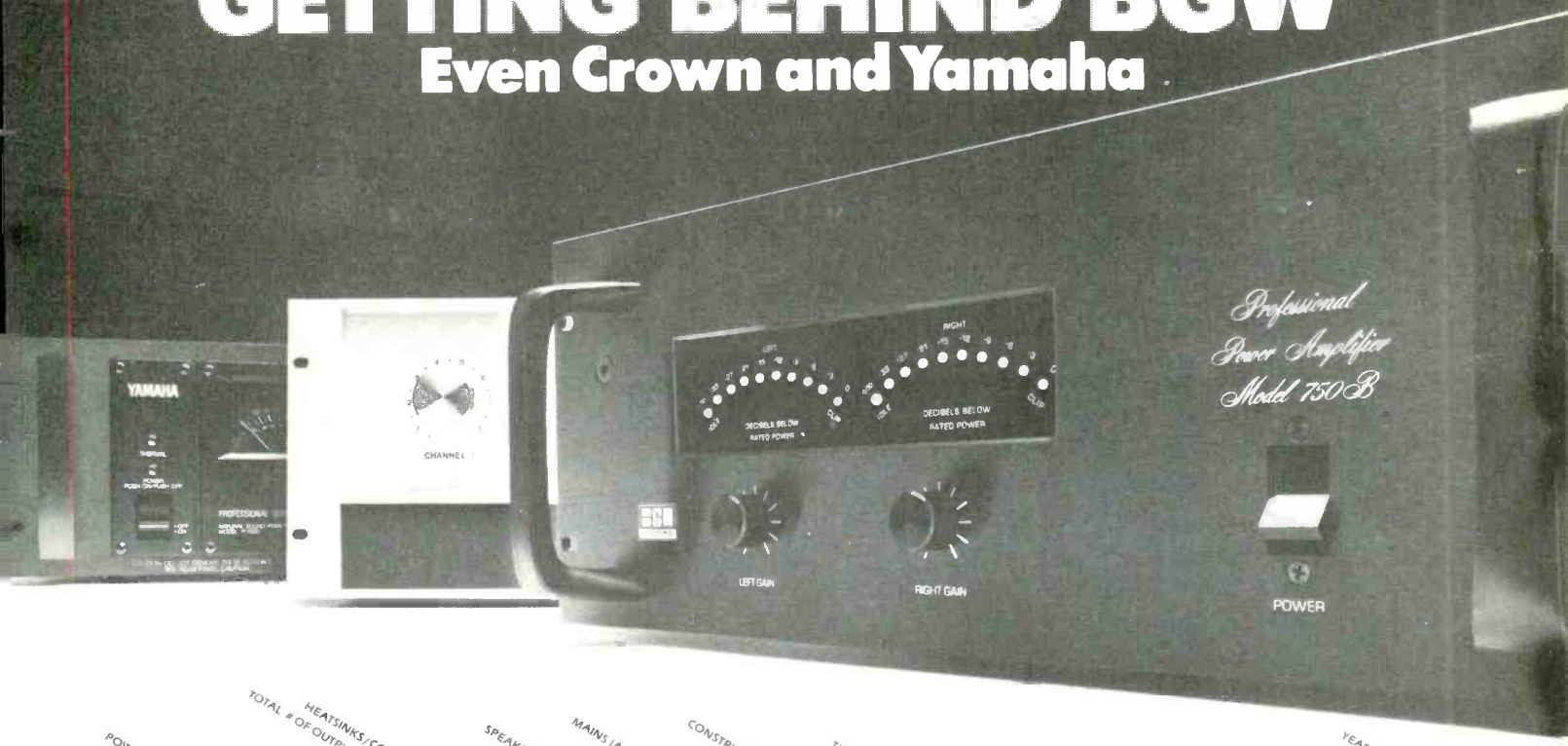
EVERYBODY'S GETTING BEHIND BGW

Even Crown and Yamaha



	POWER* @8 OHMS	@4 OHMS	TOTAL # OF OUTPUT TRANSISTORS	HEATSINKS/COOLING SYSTEM	SPEAKER PROTECTION	MAINS (AC) PROTECTION	CONSTRUCTION DESIGN	TURN-ON DELAY	CIRCUITRY	T.I.M.	PRICE*	YEAR INTRODUCED
BGW 750 B/C	225 Watts/ch.	360 Watts/ch	20	Forced air cooling for 2 massive removable modules	Active arc-interrupting circuitry	Front panel magnetic circuit breaker	Modular all Teflon wiring	Relay operated transient delay circuitry	Full complimentary	0.02%	$ 999 — Model 750C $1099 — Model 750B	1978
CROWN DC300A	155 Watts/ch.	NO FTC RATING	16	Passive airflow only	None provided	Rear panel fuse only	Hard-wired, non-modular	None	Quasi-complimentary	Not specified*	$ 919 ***	1974
YAMAHA P2200	200 Watts/ch.	NO FTC RATING	12	Passive airflow only	None provided	Rear panel fuse only	Hard-wired, non-modular	None	Full complimentary	Not specified*	$1095	1976

Here they are — The big guns of professional amplification: The respected Crown DC300A, The cosmetically impressive Yamaha P2200, And BGW's new, no-nonsense 750B/C.

Top-of-the-line professional power amplifiers from the industry's most respected manufacturers. All boasting impressive reputations. All costing about $1,000.

The table reveals the specifications.* You decide which one is best.

THE RELIABILITY FACTOR

Above all else, professional musicians and audio engineers want to know two things about their power amplifiers: How dependably they function under extreme conditions, and how well they interface with other components.

BGW's new 750 Series amplifiers have taken the lead in both areas. Twenty (20) output transistors as opposed to Crown's 16 and Yamaha's 12 provide a Safe Operating Area unmatched by either the DC300A or the P2200. While both Crown and Yamaha rely on passive "convection" cooling, the extensive heat sinks on BGW's pro amps are cooled by forced air for reliable, continuous performance even on the hottest outdoor concert stages. Unique new arc-interrupting circuitry protects speakers — not just the amplifiers themselves — from catastrophic DC offset.

Like all BGW amplifiers, the 750B and C feature modular construction and front-panel circuit-breakers rather than hard wiring and cumbersome rear-panel fuses. The result: Maintenance is easier both onstage and in the studio — when time and tempers can be very short.

CLARITY AND PRESENCE

Now that audible Harmonic and Intermodulation Distortion have been all but eliminated from professional power amplifiers, Transient Intermodulation Distortion (TIM) has become important. Neither Crown nor Yamaha specifies TIM levels whereas TIM specs for BGW's 750's Series are published with the greatest of pride. The 750B and C consequently produce clearer, warmer, and more open sound.

Pros will also appreciate another BGW exclusive: A delay circuit that eliminates all transient "thumps" when the 750B and C are activated. Neither Crown nor Yamaha has anything like it.

POWER

This is where BGW really leaves the competition behind. While the Crown DC300A and the Yamaha P2200 are rated at 155 and 200 watts, respectively, BGW's 750B/C delivers a full 225 watts per channel into 8 ohms,** leaving the competition behind entirely at 4 ohms, with a whopping 360 watts. Only BGW has FTC rated 4 ohm power specifications.

Both the DC300A and the P2200 are good power amplifiers by conventional standards. But real recording pros don't deal with convention.

They get behind BGW.

Because the competition already is.

*Based on manufacturers' published specifications and prices available 7/1/78.

**BGW 750B/C FTC Specification: 225 watts minimum sine wave continuous average power output per channel with both channels driving 8 ohm loads over a power band from 20Hz to 20kHz. The maximum Total Harmonic Distortion at any power level from 250 milliwatts to 225 watts shall be no more than 0.1%.

*** Includes optional HMB-7 Handles ($20.00, not shown)

BGW SYSTEMS **Get Behind Us!**

BGW Systems, INC.
13130 S. Yukon Avenue
Hawthorne, California 90250
In Canada: Omnimedia Corp., 9653 Cote de Liesse
Dorval, Quebec H9P 1A3

SURVEY: PA & BROADCAST MIXING CONSOLES

STRAND SOUND (UK)

Rank Strand Electric, Rank Audio Visual Ltd, PO Box 70, Great West Road, Brentford, Middlesex TW89HR.
Phone: 01-568 9222. Telex: 27976.
North America: Strand Century Ltd, 6334 Viscount Road, Malton, Ontario, Canada.

Theatre Mixer

16/4 basic (maximum 32 modules), balanced mic inputs, unbalanced line input, hi, mid and lf eq, two aux sends, panning, PFL, slide fader, VU or LED PPM metering, power amp modules, tape start/stop module, cue lights, talkback module, unusual bright red finish.
Price: basic less amps etc £2,350/$7,000.

Concert Mixer

Similar to above but additionally with variable mid frequency eq, 3 aux sends, up to five routing switches, LED peak indicators, Penny & Giles faders, various options, multipin connectors.
Price: £9,300/$36,000.
(Previously manufactured by Theatre Projects Services)

STUDER (Switzerland)

Studer International AG, CH-5430 Wettingen, Switzerland.
Phone: 056 2687 35. Telex: 53682.
UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ.
Phone: 01-953 0091. Telex: 27502.
USA: Willi Studer America Inc, 3916 Broadway, Buffalo, New York 14227.
Phone: (716) 681-5450. Telex: 91-9138.
Canada: Willi Studer Canada Ltd, 14 Banigan Dr, Toronto, Ontario M4H 1E9.
Phone: (416) 423-2831 Telex: 06-23310.
France: 12-14 Rue Desnouettes, F-75015 Paris.
Phone: 533 58 58/9. Telex: 24744.

089 MkII

Intended for mobile and truck working as well as static studio operation. 12 input channels each with: line/mic/osc switching; phase; fine and coarse attenuator; variable Hz hi and lo pass filters; 80Hz ±8dB, 8kHz ±8dB, 0.4/0.7/1.2/2.3/ 3.9/6.8kHz ±9dB; two or four aux subgroups; mute. Also: filter modules, combination hi/lo pass with variable frequency and roll-off; stereo reverb similar channel module; and compressor/limiter ganged for stereo, variable compression and release, compression meter indication. Monitor selection all groups, subgroups and returns; talkback. Two submasters for reinsertion. Two PPMs, VU available if required. Break points on rear mounted jack bay.

169

Portable mixer with same dimensions at *A67* tape recorder, and 12 modules which may be arranged 11/1, 10/2 or 8/4, switched gain, lo cut, lo, mid (variable) and hi eq, panning, solo/mute, two aux outputs, various monitoring facilities, VU or PPM metering.

269

Similar to above but max 18 modules so 17/1, 16/2, 14/4

TRIDENT (UK)

Trident Audio Developments Ltd, Shepperton Studio Centre, Squires Bridge Road, Shepperton, Middx.
Phone: 09328 60241. Telex: 27782.
USA: Studio Maintenance Services, 12438 Magnolia Blvd, North Hollywood, Cal 91607.
Phone: (213) 877-3311. Telex: 85127782.

Fleximix

Modular system whose configuration can be rapidly altered. Systems built up using four basic modules: input, submaster, left/right master and auxiliary. These may be contained in 15 or eight module mainframes which can be rigidly or flexibly coupled, or mounted in flight cases. Optional modules include stereo limiter/compressor, input line balancing, output line balancing, and a quad pan module. Other options include a meter overbridge and P & G conductive plastic faders.

TURNER (UK)

Turner Electronic Industries, 175 Uxbridge Road, London W7 3TH, UK.
Phone: 01-567 8472.

TPS16/2

Portable and compact non-modular mixer series intended for live mixing and location recording. Channel controls include: 30dB pad, sensitivity variable —60 to —20dBm on 600Ω balanced line: eq ±15dB at 10kHz ±16dB at 0.7/1.2/2.4/3.8/5.6/7kHz and ±15dB at 100Hz; pre/post on two sub-group sends, level variable; pan; PFL; P & G type *1820* fader. Subgroups out and remaining channels are mixed, output controlled by faders. Additional output for stereo tape or aux PA is independent of main faders. Eq available for echo send/return. Flexible talkback system; two VU meters switchable across all group and subgroup outputs.

Optional extras include multiway cable, connectors and XLR stage box; cans; Mixer is in metal case for transport.

TWEED (UK)

Tweed Audio Electronics, Rosewood Industrial Estate, Kelso, Roxburghshire, Scotland.
Phone: 05732 2983.

B1302

Broadcast mixer with four mic channels each with gain, lf and hf eq, two aux outputs, PFL and pan; one presenter mic channel with limiter and voice over, two stereo gram channels, six stereo high level inputs with eq and balance, comprehensive monitoring for off-air MF and VHF, station output, PFL, mixed programme/talkback, desk output and radio car etc. Four PPM reading left, centre, right and ancillary are fitted and script space for presenter provided.
Price: £4472, $7,960.16.

Twin Telephone Hook Up

Designed for local radio 'phone-ins', the system accepts a clean feed from the studio mixer and provides two incoming channels from either PO exchange lines or private circuits. Three-way discussions are possible, each channel incorporates a soft gate to cut line noise. No routine adjustments required.
Price: £661, $794.32.

TORE SEEM (Norway)

Tore Seem A/S, Postboks 4, N-1344 Haslum, Norway.
Phone: 02 533975.

TSM12-2/4

12-channel for broadcasting applications, two echo return channels, two output and four aux output channels. For monitoring the mixer is equipped with two stereo PPM bar graph instruments.

2005 AD (USA)

2005 AD, Naudain St, Philadelphia, Pa 19146, USA
Phone: (215) 545-3488.

2022

20/2 mixer for live music and PA situations. Any number of channels up to 20 as required. Channels include: mic input 150Ω balanced, with hi impedance mic and aux options; 20dB mic pad, 30dB preamp range; eq hi/lo shelves and mid bell; pan; cue mix; echo mix; mute; solo with indicator; LED overload indicator; long throw plastic faders. Four digital LED VU meters: left, right solo/echo, cue. Headphone/monitor output gain. Two aux inputs with pan, solo and mute. Cue master, and echo return. Outputs 600Ω balanced; external echo breakpoints. Modular construction on aluminium chassis. 74x38x14cm, weight 18kg. Vinyl scribble strip.

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The sound system that raised the Iron Curtain!

Last year, under the direction of the U.S. State Department, the Nitty Gritty Dirt Band made history by being the first American band to do a tour of the Soviet Union.

From a diplomatic stand point, it would prove to be the most significant series of concerts an American group had ever played.

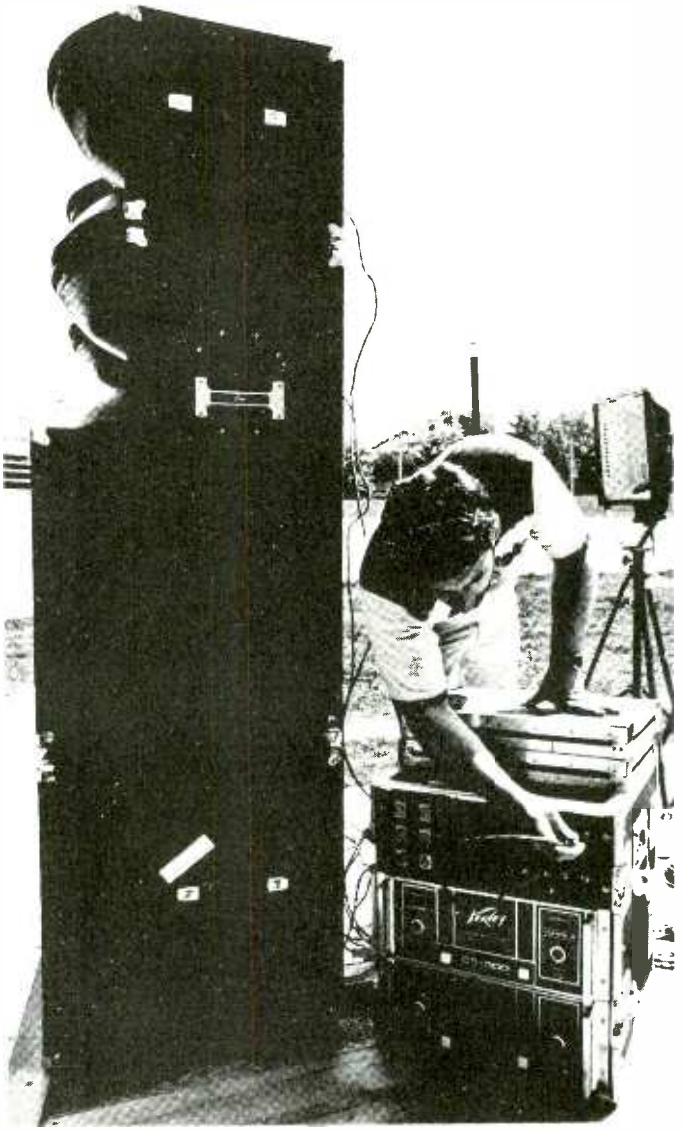
The prerequisites for such a tour were obvious. Only the most reliable, high performance sound equipment should be used. Maximum efficiency, versatility, and compactness would be absolute necessities.

The choice was Peavey. SP-1 enclosures bi-amped with CS-800 power amplifiers would create the backbone of the system. Artist and LTD instrument amps would make up the on stage gear along with Peavey monitor enclosures and a 1200 Stereo Mixing Console.

May 2, 1977 the tour began through five cities and twenty-three performances in every imaginable condition from large auditoriums to outdoor bicycle tracks.

Dirt Band sound man Gary Mullen recalls, "One of the problems we faced was severe drops in voltage. At times we were running on voltages as low as 80 volts. I can't tell you how or why, but the equipment kept on working. Not only was it loud, but through the wonders of bi-amping, it was crystal clear. In the five shows at the bicycle track, the system was left on the stage each night and two nights brought enough rain to float a barge. Each time we uncovered it for a show it worked great,...the tour was a total success!"

The folks at Peavey appreciate the Dirt Band's confidence in our equipment. We're proud to have had a part in bringing a piece of the U.S.A. to the U.S.S.R.



"The system was set up with FH-1 bass cabinets stacked two high with two MF1-X horns on top of each stack and two stacks on each side of the stage. It looked pretty small but the system totally covered the area with no dead spots and enough acoustic power to make it loud enough to wake the dead!"

Gary Mullen
Dirt Band sound man

PEAVEY

Distributed in the UK and Ireland by:
PEAVEY ELECTRONICS (UK) LTD.,
Unit 8, New Read, Ridgewood,
Uckfield, Sussex, TN22 5SX

I'd like to know more about the Peavey line of advanced sound gear. Send me a free catalog.

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Montreux jazz festival

Terry Nelson

Terry Nelson examines the intricacies of providing sound reinforcement, stage monitoring, live recording, and OB for radio and TV at this year's Montreux Jazz Festival.

TO MANY THE name Montreux conjures up visions of lakeside tranquility, but to jazz fans (as with Newport) it means two to three weeks of solid music from world famous names to 'new discoveries'. It also means a lot of behind-the-scenes planning and organisation in which PA, recording and stage crews play no small part. Add to this OB teams for radio and television and it quickly becomes evident that the sound side of the Montreux Jazz Festival is no simple affair. This year I went to the Festival for a week and was able to mix in with the recording studio (Mountain) and the sound team in both the mixing booth and stage monitor position as well as being a 'punter' in different parts of the Casino hall to check out the sound from audience's point of view (or should I say hearing?).

Sound reinforcement system

For the second year running PA had been supplied by Electro-Voice following on from the favourable reception last year. In fact, EV have always had close links with Montreux and supply the majority of microphones used. The fact that the PA has to be supplied underlines one of the major problems facing any reinforcement system in the Casino concert hall. From the Casino's inception it was assumed that artistes would bring their own PA and that for the Jazz Festival one of the major sound reinforcement firms would be glad to supply the PA free of charge for promotional purposes. No doubt the more sceptical among you are already thinking that budget reasons were behind this philosophy and you would be right! As can be seen from the layout diagram (**fig 1**), the disposition of the hall is not easy; and the problems don't end there, just take a look at the house curve (**fig 2**)! As if this weren't enough, the stage is temporary and acts as a first class bass resonator, confirming the rule that says live performances must always be in spite of the environment and not because of it.

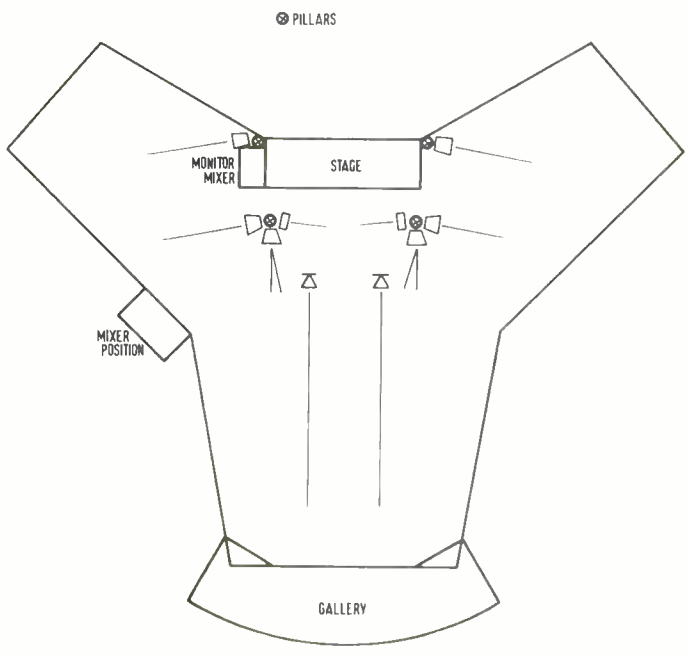
It all goes to show how one can be taken in by first impressions—when I first saw the hall several years ago during a visit to Mountain Studio, I certainly had the impression that perhaps an acoustician had been called in after seeing the anechoic forms on the ceiling to cut down reflections, carpeting, non-parallel sides, etc. A certain 'dryness' to the sound was, however, noticeable. Subsequent attendences at concerts in the Casino hall have proved how even 'pretty' halls can be acoustic disasters. This, in spite of the fact that the old Casino was a mecca for jazz and rock concerts and that the new Casino was intended to be even better, as the millions of Swiss francs spent on it bear witness. One would have thought that enough cash would have been available to pay for a permanent house sound system and so have avoided complaints about the sound since the Casino's opening. It is also worth noting that rock and pop concerts in the new hall have virtually all ceased (the groups are going to Zurich, Basle, Wintherthur or Geneva) whereas at one time Montreux was a must on all European tours.

With all this in mind, Electro-Voice decided to try and improve upon last year's performance. The hall was measured and the house curve established using a White analyser enabling even coverage of all areas in the hall (within 1.5dB variation of SPL) to be planned well in advance of the Festival and allowing the system to be assembled on given data. Due to the disposition of the hall, the PA was 'flown' from the main pillars and ceiling which also free the not so large stage area. The system used was 3-way comprising of 12×*TL606* single 38cm Thiele cabinets and 2×*TL806Q* four 30cm Thiele cabinets for the bass, 6×*9040* and 4×*6040* midrange horns with *DH1012* drivers plus 2×*4020* mid horns with *DH1506* drivers for the mids and 24×*ST350A* tweeter horns for the treble. In addition to the main array, four *S15-3* threeway stage cabinets were used as 'fill-ins' for the dead spots between the pillars. The back rows and rear gallery of the middle section of the hall were served by the two *TL806Q* cabinets with the two *4020* horns when further reinforcement was necessary. Amplification was provided by McIntosh, with a total output power of some 5kW, and the disposition can be seen from **fig 3**. One White *4001* graphic was used for the four *S15-3* systems and a *4001-B* with plug-in crossovers for the main PA. The bass cabinets also used their respective equalisers in order to flatten out and extend down the bass response.

The mixing console was a 32/4 Yamaha sound reinforcement model and the only outboard gear was a UREI comp/limiter borrowed from Mountain Studio. The EMT plate echo from the studio was also used for reverb effects. So much for the gear. The man running the equipment was a friendly American from Walt Disneyworld Studios, Florida, by the name of Tom Durell (who is classed as an audio/video specialist by the Disney people) and it was evident from the start that Tom was no stranger to the sound reinforcement world. I might also mention that the gallery 'box' which served as the mix position left Tom out of the direct line of any of the speaker systems! Not exactly conducive to balancing though the problem was alleviated slightly by placing a *Sentry III* midrange horn pointing directly at the console (a monitor for the mixer?!) Tom commented that if he were called back for another jazz festival, he knew exactly where he wasn't going to mix from!

From the soundmixer's point of view, a gig like the Montreux Jazz Festival is not easy due to the immense variety of groups and orchestras, and styles of music. For instance one night was Chicago blues and Taj Mahal with his own special brand of music, and the following day was four big bands. In one evening we were treated to a big band followed by the Bill Evans Trio, another evening the Stan Getz quintet followed by Irakerre, a large jazz-rock group from Cuba with four brass, bass and lead guitars, drums and widely assorted percussion such as congas. Not an easy job. To underline some of the problems that arose there was an amusing incident during the sound check for the Bill Evans Trio. During the rehearsal the manager or producer complained that the sound of the double bass was far too boomy and muddy and must be corrected. Tom informed the lady that only one microphone, that of the piano, was on and that at very low level. The stage was acting as a resonator coupled by the bass's spike and causing all the problems. There were also other times when artists failed to turn up at all for the sound checks and then wondered why things took longer to set up when it was their turn to go on in the evening. This was typical of the Ray Charles night where the stage crew were not even informed that Mr Charles likes his microphone stand on his left and not on the right, meaning that this had to be changed after he had come on stage and with it most of the piano microphone stands that were already in position.

FIG. 1 APPROXIMATION OF MONTREUX CASINO LAYOUT WITH SPEAKER STACKS AROUND PILLARS, ALSO SHOWING MIXER POSITIONS



The Buddy Rich big band were also offenders and had there been a sound check, things such as the soprano sax ramming the mic right into the instrument for a forte solo might have been avoided. The lack of professionalism by certain professionals can be rather amazing at times! Another point made evident was that no matter how good the equipment, it can only be as good as the man behind it; this was amply demonstrated the one or two times when Tom had the night off or was forced to suffer 'foreigners' at the desk who either couldn't cope with the system or were not very experienced PA engineers. Leaving all these problems aside, what about the sound in general? I think the first thing that can be said is that the sound was very natural with a distinct lack of coloration—always a good test of any amplification system, be it studio monitor or PA. I spent time in three or four different places in the audience area (as well as in the mix area) and the aim to achieve even coverage certainly seemed to have succeeded. The fact that the majority of instruments were non-electric means that reinforcement was the rule and this came over very well. The unobtrusive amplification was a good achievement—Stan Getz's saxophone really sounded like one, as did the grand piano.

The overall effect of the big bands was very full with any electric instruments such as bass, guitar or electric piano being played at low level onstage and being re-amplified to mix in with the rest of the instrumentation. However, this necessity can also have its drawbacks for the electric musicians involved, as was demonstrated during the sound check for one of the American college big bands. Due to bleed through into the other mics, the guitarist was obliged to turn his volume way down and even though re-amplified up to fit in with the rest, the guitar sound just wasn't the same—the guts were lacking. When faced with this kind of situation, the smallest amp possible is the best way out so that flat out it will sound like a beefy setup through the microphone. This way both musician and engineers are kept happy. Another point about the onstage amplification is that Rhodes pianos do not sound at their best through Fender Twins (unless of course you want a muddy sound with distorted bass) and that if amplification is going to be put at the disposal of artists, a proper keyboard setup ought to be included. The setup for the mixer was reasonably simple, everything being in mono. One of the four group outputs was used as a subgroup for things such as solo mics and trumpet sections, the subgroup output being fed into the Universal Audio comp/limiter and back into the main mono mix.

Monitoring

The stage monitor system was under the auspices of Mr Chris 'Snoopy' Penycate with the aid of a Yamaha 16/4 sound reinforcement mixer (of the same type as the main PA mixer), four Amcron *DC300A* power amps and 10 Electro-Voice *FM12-3* 3-way floor monitors. The EV monitors have a very flat response with the

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Above; *Cuban jazz-rock group Irakerre in action.* **Top:** *'Flying' Electro-Voice speaker stack oversees the PA!*

FIG. 2 HOUSE CURVE CASINO OF MONTREUX

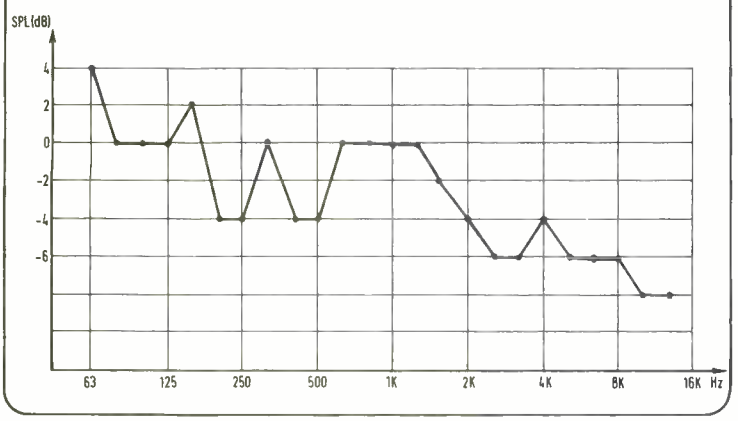
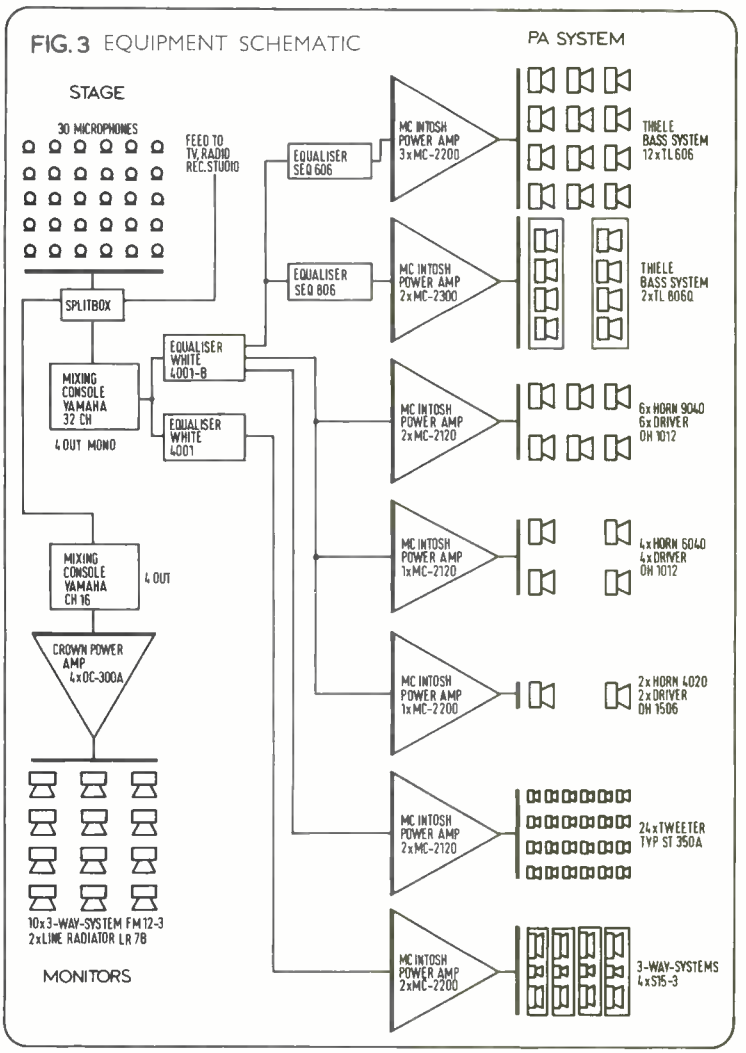


FIG. 3 EQUIPMENT SCHEMATIC



intention of avoiding feedback prone peaks. Chris found it preferable to attenuate the HF horns down, so no doubt the manufacturers will reserve the right to make the necessary modification of an HF attenuator. The other niggle was that these cabinets came direct from the States and ordinary jack sockets were used instead of the XLRs used on European EV cabinets. A small point perhaps, but it is nice to have compatible connectors in a PA rig and thus avoid last minute soldering and bad language. Two *LR7B* line radiator column speakers were also installed on the two main pillars to face back at the stage and give a general monitor coverage while the floor wedges catered for individual situations. In point of fact the two column speakers were rarely used, the wedges covering the monitor needs in most of the cases. As for the monitor mix itself, a reasonable amount of flexibility was available as each of the four output groups had four level controls for the four monitor outputs. In general, the four monitor outputs were used, thus giving four different mixes—if greater flexibility was needed the main group outputs could also be used.

Monitoring requirements obviously varied as much as the music and musicians—from being very loud to no monitors at all. In the case of many of the big bands, no request for monitors was made and here the monitors were cleared away from the stage, the philosophy behind this being Chris's diagnosis of the musician's mentality—'see it, want it!' He's been around! As already noted, requirements differed widely such as the bassist who wanted to hear his instrument through the monitor and not through his amplifier! This in fact became quite common with some of the electric instruments (especially bass) where the amplifier was kept at almost off, stage amplification being provided by the monitors. At times this was handy from the point of view that the bass, piano or what have you, could be pushed at the points needed and not spill over into the mics—on the other hand it was sometimes a disadvantage for the very reason that due to the high monitor level required, spillover into the adjacent microphones became a problem. I was with Chris at the monitor desk quite often to have some firsthand views on the different monitor situations and listen (via the monitor placed behind the mixing chair) to the different mixes and levels needed. At times, such as for some of the big bands, it was necessary to put your ear right into the monitor in order to hear anything—during others you were literally blown out of your seat (and these weren't rock bands!). Psychological monitoring to World War III!

Obviously the main problem arising from high monitor levels, apart from spillover, was that this provoked the volume merry-go-round and with it the danger of feedback. This was true during the Buddy Rich Big Band set where he wanted the monitors so loud that they must have been only 1dB off feedback nearly all the time—in fact there were several squeals. Since Chris had the amp rack next to the desk with the outputs brought out on a patch panel with parallel sockets for each speaker output, he was able to patch in his monitor to hear exactly what was going out at the different places on stage and thus catch any potential howlrounds—or at least track any down very quickly.

Microphone distribution

It can be recalled here that Montreux is special owing to the multiplicity of situations involved with the concerts—simultaneously with the 'live' sound in the hall are the recording studio, TV OB vans and radio transmissions. If everyone used their own microphones, this would obviously make life a little difficult, but here a bit of thought has been used. The onstage mics all go into a fixed distribution box having outputs for main PA, monitor, recording studio, radio and TV. Outputs for the PA come up in a box in the gallery room used for mixing; monitor outputs by the side of the stage and the studio/OB lines go to a special distribution/patch system in the 'rack room' forming part of Mountain studio. From this it can be seen that one microphone is used for all the different assignment functions, greatly simplifying matters and allowing the optimum positioning (and also avoiding potential battles of the my mic's going there and that's it variety).

Mic placement was usually the role of the studio staff aided and abetted by the stage crew under the direction of 'Higgy' (Alex Higgins to the uninitiated). In passing, I think a word of praise for the stage crew is in order; the changeovers were done in a minimum of time and fuss and the only times where there was a bit of delay were due to lack of rehearsal on the artists' part. Meanwhile, back at the mics—the lineup used was pretty much the same with Electro-Voice *RE20*'s being the main workhorse microphones for drums (close mics), instrument amplifiers, percussion, solo brass, etc. A pair of *U87*'s were used as overheads on the drums and for the big bands *U47*'s were used for trombones and *KM84's* for saxes. For the grand piano two to three *KM84*'s were used for recording with perhaps one or two being used for the PA. Tom Durell also tried out one of the new EV *CS15* condenser mics (with cardioid capsule) on the piano for PA use and was very pleased with the results, though it did sometimes mean four mic stands jostling for position at the piano!

With electric instruments a DI feed was taken between the instrument and amplifier (in addition to miking up the amp) and mainly used for foldback purposes though it could obviously be used at discretion for the recording and PA mixes. The number of microphones used at any one time varied greatly, from perhaps nine for a small group, to thirty plus for a big band—you can see now why those soundchecks were necessary for smooth running. Depending on the group and music played, the number of mics on the drums varied quite a bit—from overhead pair with two mics for bass drum and snare for small groups and some big bands, to the full complement of a mic per drum and hi-hat plus overheads for the 'heavier' combinations.

Radio and TV

In addition to the separate mixing operations of PA and recording studio, there were also outside broadcast aspects. In fact, of the two, the TV team is most independent, doing their sound mix the same time as the video in the OB vans outside the casino. It is also the TV team that does the lighting (which in the circumstances is fairly logical I suppose) and passes the Tweety and Sylvester cartoons over the monitor TV screens placed around the hall during the intervals. These same TV sets give the audience a preview of the forthcoming broadcasts should they have a poor view of the stage or artists! In view of the extra lighting facilities, video, etc, there was very little interference from thyristors—often a plague in concert situations where flexible power arrangements and/or unsophisticated lighting consoles are not available, and in fact for the seven days that I was there I only noticed the characteristic high pitched 'bzzzzz' once.

Another point worth mentioning is that this year Claude Nobs (the festival organiser) came out 100% in favour of the paying public (who pay quite a lot in general—certainly in comparison to British concert prices) and insisted that the PA be installed to the advantage of the hall and not to the camera angles of the TV. In fact, in the past the Jazz Festival has been rather like a TV production with a paying audience—the camera angles dictating the placing of the PA, etc. This led to the ludicrous situation one year where the bass bins were flat on the floor blowing out the dust from the front row's trousers; the mid and high ends were deafening the first five rows and all the rest of the audience heard was a strange mixture of screeching noises accompanied by subterranean rumblings! Oh for permanent installations in concert halls! As it is, it is rather a strange sight to assist at a concert where three large TV cameras are prowling around in front of the stage and two 'mobile' cameramen are weaving in and out of the musicians or crawling about on the stage and under the piano.

Each to his job but it is rather disconcerting to play when you have a TV camera hovering two minutes behind you at several inches from your neck! However, once the initial grumbles were over, a spirit of cooperation reigned and things went pretty smoothly—at least, as far as I could tell! Whereas the TV is independent, the radio is dependent on Mountain Studio. During the festival, the studio is used as an operations room for all the various radio companies and looks like a showroom for Studer and Revox 2-track machines, with vision link for the hall provided by several TV monitors. All the tape machines are linked up to the stereo mix emanating from the studio control room and thus able to record the concerts. All nice and simple.

Mountain Recording Studio

Last, but no means least, in the festival sound activities is Mountain Recording Studio SA and thanks straightaway to Dave Richards, the chief engineer, for allowing me inside his hive during some hectic nights. The action was centred round the 32/16 Neve desk and two Studer *A80* 24-track machines, not forgetting the stereo *A80* used for the

Electro-Voice 3-way stage monitors hug the limelight.

stereo monitor mix. To recap on my past visit, Mountain is an Eastlake quad capable studio with all the usual toys such as *M24* and *361* Dolby, harmoniser, Kepex, etc, the main additions since I was last there being an EMT *250* digital echo and custom built auto-panning unit. The desk also rejoices in eight reverb returns and two of these were transformed into mic channels for the two ambience (or audience) microphones, thus leaving the 32 main channels free for the stage mics. Communication with the concert hall is maintained by two CCTV cameras plus monitor set from the SSR, so the studio staff can see it in colour and ClearCom with the main PA and monitor mixers. As with the PA team, rough mix positions were obtained during the sound checks in the afternoons, the fader and eq settings etc of each instrument being noted on an adhesive strip in front of the faders. This way, each band or group had its own strip which could quickly be placed in position as and when they came on stage. Monitoring (the nights I was in the studio) was off the 24-track monitor mix inputs though the actual mixing was mainly via the group outputs (ie for all those not in the know all monmix faders open at the same position).

As we mentioned a little earlier on, radio is dependent on the studio for its feed and this is taken from the stereo output of the 24-track monitor—the same output also feeding the Studer master recorder which for the circumstances is used as a logging machine.

This way the engineer could amuse himself with panning effects and suchlike without altering the basic 24-track recording. The first evening that I spent in the studio saw Dave at the console, and for the three following nights Bill Porter was there as guest engineer. (Bill's earlier work at Nashville will be well known to Chet Atkins, Everly Bros, Roy Orbison, etc etc fans—he is presently director of recording services at the University of Miami). It can easily be appreciated that the Montreux Festival places no small demand on the recording engineer who also becomes a broadcast engineer as well with three to four different formations to record each night on multitrack and at the same time assuring a high quality stereo mixdown for broadcast purposes. Very often the concerts are on the air simultaneously and going out to perhaps seven or eight countries. Though Dave was the first to admit that such a responsibility can be pretty hard going, it was evident that the reward of getting a good job done under difficult conditions, more than compensated for any problems that might arise.

One of the things about this type of recording that immediately hit the eye was the speed with which 50mm reels of tape changed machines! To ensure overlap for editing, the second 24-track was brought into action after about 20 minutes running time on the first one, and so on. This may seem rather short on time and high on tape, but Mountain feel that safety in numbers for this kind of work offers the best security. One or two words as to how the studio works for the festival may be in order here. Though groups and artists do commission the studio to record their concerts (either expressly for a record release or for a possible live LP) all the concerts are in fact recorded and the artists given the option to buy the tapes or not. In the case of the latter, the recordings are then erased though this rarely, if ever, happens. Last year 20 live albums were released and when I popped into Mountain the other day to check on this year's score, Dave told me that all this year's recordings had been sold with an expected release of about 40 LPs. Not bad for two and a half week's work! Assisting Dave Richards at Mountain is another Britisher, Martin Pearson (or as he got dubbed during the festival Mr Mic!) who was responsible for the microphones onstage, leaving Dave (or Bill) the time to changeover the desk for the next formation. Remember there was often only 15-20 minutes between artists.

The other members of the Mountain team who helped keep things moving along are Andre Gauchat, the maintenance engineer (and everything else as well when needed!) and Eugene Chaplin, tape operator, who was assisted by a visiting American, Tom Price. I must admit that I was pretty impressed by the calm the bods at Mountain kept even when things got hot (literally, sometimes, in the control room, even with the air conditioning flat out!), though I suppose that once you've done one festival you've done the . . . What's that? Another DI box on the piano gone on the blink and the pianist's screaming blue murder because he can't hear himself?! Oh well, only another 11 months to the next festival. In fact there was no slacking even after the festival as work started straight away on the new Queen album, and David Bowie is currently recording with his new group.

As to next year, there is some speculation as officially the 1978 festival was the last one to be organised by Claude Nobs, who appears to be about the only person here able to get this sort of festival together. However if the same technical standard is maintained for future festivals, things will be made that bit easier for the organisers. Just one word in closing for future organisers—try to cut the running time or the number of artists. Six to seven hours of virtually nonstop music, however good, can often give rise to musical indigestion! ■

SURVEY: PA & BROADCAST MIXING CONSOLES

TYCOBRAHE (USA)

Tycobrahe Engineering, 665 Valley Dr, Hermosa Beach, California 90254, USA.
Phone: (213) 376-8801.

Modular mixers for combinations of PA, sound reinforcement and live recording.

MXL24(—4)

24 input console for performer use. Sealed rotary level controls throughout; channel controls include: pan of monitor and main group bussing; input attenuate; three range eq, lo 50/100/150Hz, mid 300/600/1.2kHz, hi 2.5/4/7kHz; monitor and main mix controls. Dual-band limiters fully synched for stereo operation, with hi/lo limiter frequency switch on main outputs. Eq circuitry fuses active gyrators; power supply regulated over ranges 85-135 and 170-270V. Limiters attack 2μs, release 0.5s, limit 8.8:1 100x62x25cm, weight approx 40kg.

VORTEXION (UK)

Vortexion Division, Clarke & Smith Manufacturing Co Ltd, Melbourne Works, Wallington, Surrey.
Phone: 01-669 441. Telex: 22574.

System 2000

PA system that includes mixer, mixer/amplifier, and slave amplifiers. Maximum capacity of mixer is ten channels and the chassis is wired to accept the following input modules: 30/60Ω balanced mic, 200Ω balanced mic, 600Ω balanced mic, hi imp ceramic gram, low imp mag gram, radio tuner, tape, priority, line and mic bass cut. System 2000 may be rack mounted or free standing.

Model 2001

May be used to extend 2000 by adding a further 16 channels.

WARD-BECK

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

Model M2484

24/8 broadcast console. Facilities include two reverb return channels, eight submasters, which act as multitrack outputs 1-8, eight direct outputs which act as multitrack outputs 9-16, four programme master busses, two reverb send busses, four foldback busses, one PA buss, one PFL, one solo, 18 channel mix down selection, two control room monitor outputs, two studio monitor outputs.

YAMAHA (Japan)

Nippon Gakki Co Ltd, Hamamatsu, Japan.
UK: Kemble (Organ Sales) Ltd, Mount Avenue, Bletchley, Bucks.
Phone: 0908 71771.
USA: Yamaha International Corp, 6600 Orangethrope Avenue, Buena Park, California 90620.

EM120

Sound reinforcement mixer with six channels, one aux phono stereo input, and three aux mono inputs. Main input channels have hi and lo eq and aux send outputs. Channels may be switched left, right or both.
Price: £335.

EM150

More versatile 6/2 with panpots and reverb/echo sends on each channel. Subgroup inputs, spring line reverb, monitor send and overall 7-band graphic eq with 24dB swing. Twin 75W rms output stages and VU meters.
Price: £425.

PM170/180

6-channel, stereo output mixers with panning, hi and lo eq, hi pass filter and VU metering. *PM170* features jack connectors while *PM180* has XLRS.
Prices: *PM170* £290, *PM180* £400.

PM1000-16

16/4 portable or studio mixer for recording or quality PA applications. Comprehensive eq and subgrouping, sliders all channels and groups. TB, pan, input select, etc. Metering VU on all groups, additional small VU on two echo subgroups.
Price: £3,500.

PM1000-24

Expanded version of above.
Price: £6,500.

ZOOM

Zoom Television Ltd, Pinewood Studios, Iver Heath, Bucks, UK.
Phone: 0753 654044. Telex: 84505.

MZM1

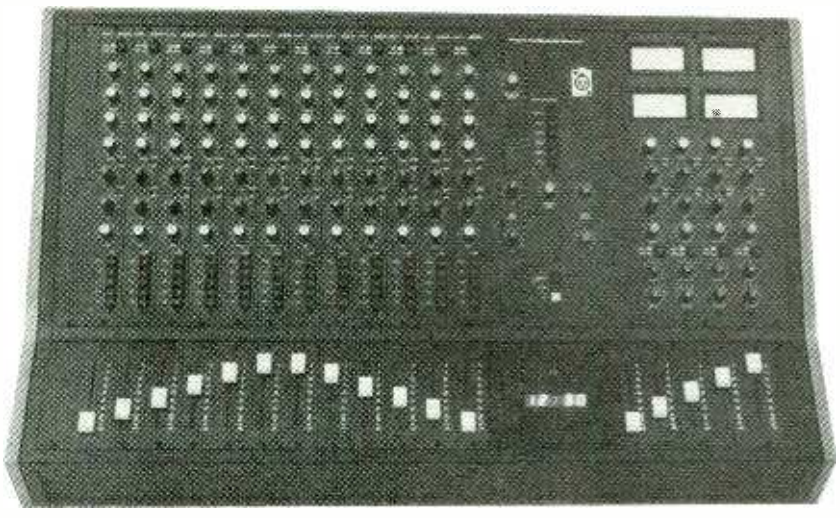
General purpose 6-channel mixer for PA. Unbalanced mic inputs, aux inputs, switchable 20dB attenuation in each channel, PFL, VU meter, headphone monitoring, battery powered, available in carrying case.

ZOOT HORN

Zoot Horn Sound Equipment, 31 Station Road, London SE25 5AH, UK.
Phone: 01-653 6018/8483.

Modular Series

Offered in recording studio and public address options to custom requirements. Sound re-inforcement/public address options include, switchable and continuously variable eq turnover frequencies, hi/lo pass filters, integral limiters, up to four foldback subgroups, quad pan, The recording studio options include bell/shelf curves variable slope filters. multitrack output, VU/PPM metering and patch bays. Adaptable to broadcast and multitrack applications.



Progressive Electronic Products

CM-1 channel module, VEM-1 virtual earth mixer, GM-1 group module, LHD-1 line and headphone driver module

CM-1

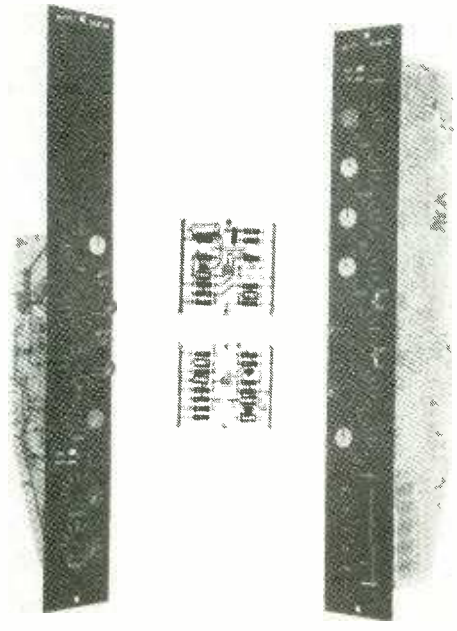
MANUFACTURER'S SPECIFICATION

Mic input: 200Ω balanced input.
Line input: unbalanced.
Outputs: Four cue/echo sends, one PFL output, 8 group outputs at combining level, 1 channel output prefade at operating level.
Gain: mic +80dB variable, line +60dB variable.
Boost and cut: treble ±15dB, mid ±10dB, bass ±15dB.
Frequency response: 30Hz to 20kHz flat ±0.8dB.
THD: 1kHz, mic gain +20dB 3V rms output, supply +24V 0.009%, supply +30V 0.008%.
Noise: better than —130dBm ref mic input transformer primary.
Max output voltage: 24V rail 6.4V rms, 30V rail 7.3V rms. Overload indicator comes on at +15dB.
Power requirements: 24V DC 42mA LED off, 30V rail 47mA LED off.
Dimensions: height of front panel 380mm, width 50mm, depth behind front panel 95mm.
Price: £40.50.
Manufacturer: Progressive Electronic Products, 593 High Road, Leyton, London E10, UK.

THE CM-1 CHANNEL module is one of a series of modules manufactured by Progressive Electronic Products for constructing inexpensive mixing desks. The module is based on a single glass fibre printed circuit board onto which all the components, including the front panel controls, are mounted.

Layout of the components is tidy and uncluttered but no components are identified and no servicing information was provided. However the manufacturer's application notes gave concise instructions on how to use the module to assemble a mixing desk.

Inputs to the module comprise a balanced microphone input and an unbalanced line input, both via solder pins on the printed circuit board, as are the connections for the remote fader and the channel auxiliary output. Connections for the single power supply rail and for the prefade listen buss and the eight mixing busses and the four cue sends are by means of solder pads with associated holes in the circuit board. This excellent arrangement means that when making a mixer the busses simply consist of a single tinned copper wire joining the solder pads in adjacent channel modules.



All outputs, with the sole exception of the channel auxiliary output, are equipped with 22kΩ mixing resistors such that they can be directly fed to a virtual earth mixing amplifier and then to the group faders.

Turning now to the front panel facilities, all these are clearly identified by white printing on the matt black front panel. At the top of the front panel there is a locking pressbutton switch for selecting either the microphone input or the line input, the input gain being controlled by a potentiometer below the switch. There follow three potentiometers for treble, bass and mid-frequency equalisation.

The four cue level outputs are controlled by two tandem potentiometers equipped with concentric knobs, one potentiometer controlling cue outputs 1 and 2, and the other controlling outputs 3 and 4. Toggle switches adjacent to the potentiometers allow the cue outputs to be switched to either prefade or to postfade. The final potentiometer is the pan control which only affects the mixing busses which are selected in pairs, the four locking pushbutton switches which control busses 1 and 2, 3 and 4, 5 and 6, and 7 and 8, there being a further button which selects prefade listen.

A final front panel feature is a red LED indicator adjacent to the above mentioned pushbuttons and identified as '+15dB'. This feature is a very effective overload indicator which not only indicates a peak +15dB ref 0.775V output level but also indicates imminent overload in the module's input amplifier.

Frequency response and noise

With the equalisation controls at their midposition, the overall frequency response for the line input and also for the microphone input is shown in **fig 1** which illustrates an adequate flat response within the audio frequency band and a sensible rolloff at high frequencies.

The available range of the three equalisers is shown in **fig 2**, the bass equaliser having an approximately ±15dB range at 50Hz, the mid equaliser a maximum range of ±10 dB in the useful 4kHz area and the treble equaliser giving ±15dB at 15kHz. In practice, the available range of all equalisers was more than would be required in practice, but the control laws were such that the available range was easily controlled.

Investigations into the noise performance were for a time hampered by hum pickup until it was discovered that the front panel was not earthed. It is suggested that the manufacturer should make some provision for earthing the front panel as the black anodised finish is an excellent insulator and just bolting the module into a frame will not provide grounding.

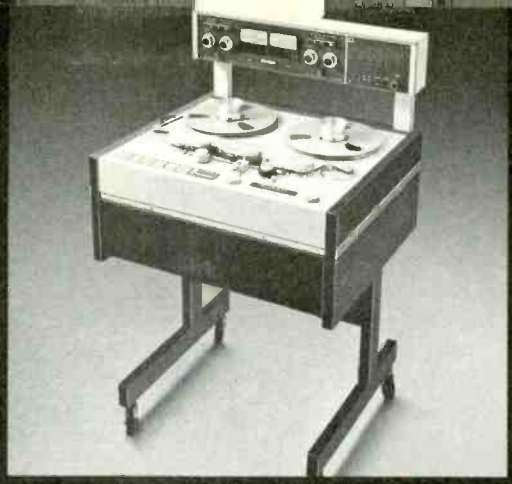
TABLE 1 NOISE PERFORMANCE

Measurement method	Line input (shorted)	Microphone input (terminated 200Ω)
20Hz to 20kHz rms	—96.5dBm	—126dBm
'A' Weighted rms	—98.5dBm	—129dBm
CCIR Weighted rms	—89.5dBm	—120.5dBm
CCIR Weighted quasi-peak	—85.5dBm	—116.5dBm

Having resolved this problem the measured noise referred to the inputs is detailed in **table 1.**

Whilst it would be interesting to know how the manufacturer specifies a microphone input noise

64 ▶



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of −130dBm, the 3dB noise factor at the microphone input is nothing to complain about! Similarly the performance of the line input is satisfactory.

Distortion

When running the module with the maximum permitted rail voltage of 30V, the available output at the onset of clipping was found to be + 17dB ref 0.775V falling to +15dB at the lower recommended rail voltage of 24V.

The second and third harmonic distortion when delivering +15dB ref 0.775V output with a rail voltage of 30V is shown in **fig 3** the third harmonic being at a very low level at all frequencies but the second harmonic rising rapidly above 5kHz.

At a lower output level of 0dB ref 0.775V, both distortion products remained below 0.01% from 20Hz to 5kHz with the second harmonic only rising to 0.1% at 15kHz.

Checking intermodulation distortion to the CCIF method sweeping two tones separated by 70Hz from 200Hz to 30kHz and looking at the difference frequency components showed that these were remarkably low with the distortion being less than 0.01% at all frequencies.

Inputs and outputs

The maximum module gain from the microphone input to the mixing buss output was found to be satisfactory at 78dB with the line input gain being 38dB as opposed to the specified 60dB which I would regard as excessive.

The measured input impedance of the microphone input was found to be constant with gain at 746Ω at 1,592Hz which is perhaps a little on the low side for some microphones, as was the maximum input for input clipping at −8dBm.

At the line input the input impedance was also constant with gain setting at 23.9kΩ which is adequately high with the maximum input level capability in excess of − 22dBm being satisfactory.

With the exception of the channel auxiliary output located before the fader and after equalisation, all outputs had an output impedance of 22kΩ for feeding a virtual earth summing amplifier, the channel auxiliary output having a low output impedance of 59Ω.

As previously mentioned an output level of +17dB ref 0.775V is available when using a 30V power supply rail, or − 15dB with a 24V rail-adequately high levels for most purposes.

Other matters

The front panel LED overload indicator was found to be very fast in action and to be a peak detector which illuminated at +14dB ref 0.775V output level. In addition the LED illuminated before there were any signs of overload in the input amplifier—this is an excellent feature of this module.

With the exception of the input gain control which was too coarse in action about its most clockwise position, the operation of all the controls was found to be satisfactory on programme material with the pan control having a useful law.

Summary

With regard to its intended applications and its cost, this is an excellent module for constructing mixing desks for small studios, PA systems and the like.

Naturally there are a number of minor criticisms but the only real shortcoming is the overload capability of the microphone input. This is inadequate for some capacitor microphones, but a pad can of course be inserted or the line input used with such high output microphones. 66 ▶

FIG.1
PROGRESSIVE CM1 FREQUENCY RESPONSE

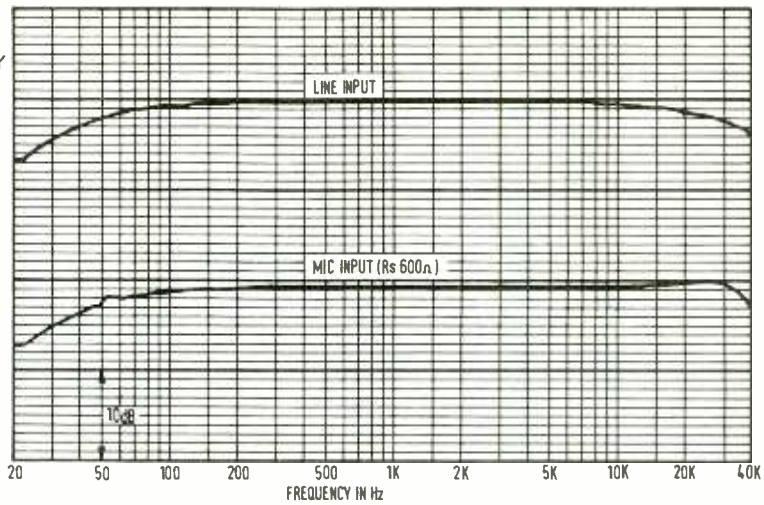


FIG. 2
PROGRESSIVE CM1 BASS, MID AND TREBLE EQUALISERS

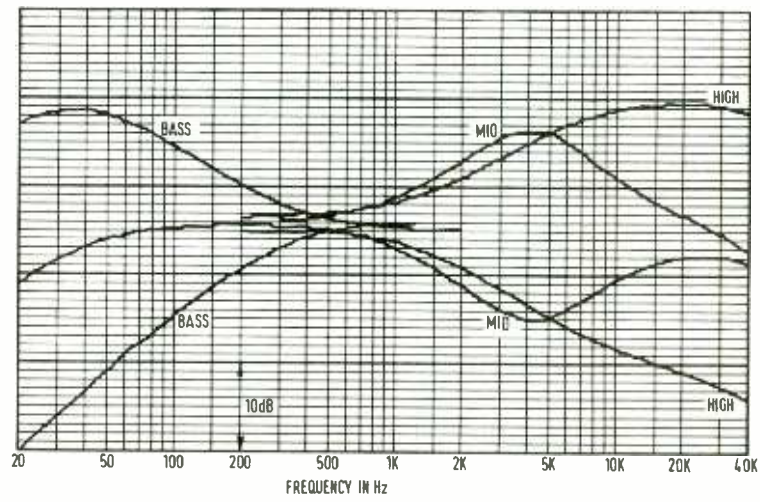
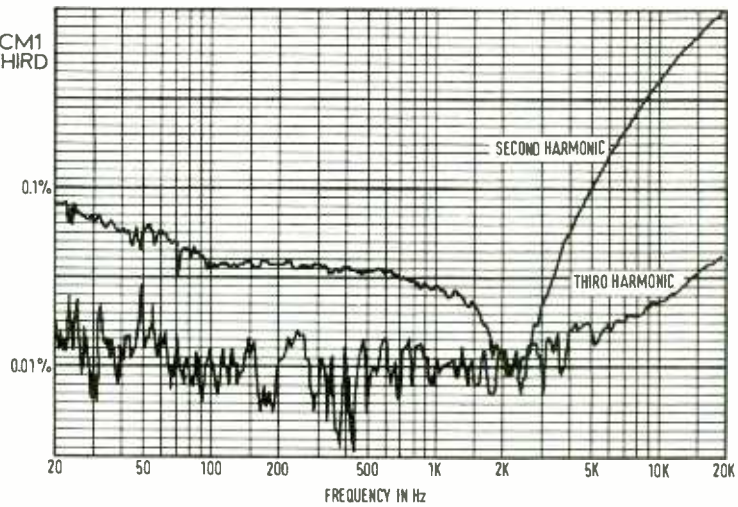


FIG.3
PROGRESSIVE CM1 SECOND AND THIRD HARMONIC DISTORTION



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VEM-1

MANUFACTURER'S SPECIFICATION

Input: in series with 22kΩ combining resistors.
Output: 100Ω 18V pp maximum.
Gain: 0dB±0.1dB.
Frequency response: 20Hz to 110kHz ±0.3dB.
Total harmonic distortion: 0.0085%.
Noise: —105dBm.
Power requirements: +24V DC 6mA.
Price: £4.50.

THIS VIRTUAL EARTH mixing module comprises a small (70×75mm) glass fibre printed circuit board, onto which are mounted the good quality components of the amplifier. Wiring to the board for signals and for the +24V DC power supply is by means of solder pins, all of which are identified clearly. As no printed circuit connector is fitted the board is intended to be mounted by four drilled holes which accept up to M4 bolts.

The amplifier is provided with two signal inputs which feed the virtual earth mixing point via 22kΩ resistors, a further input pin being fitted to provide direct access to the virtual earth mixing point for additional inputs which should be fed via external 22kΩ mixing resistors. The input impedance of the virtual earth mixing point which in an ideal world would be zero was found to be 17Ω above 1kHz rising at low frequencies to 93Ω at 100Hz which is adequately low to provide a good crosstalk rejection between input.

On the output end, the output impedance was satisfactorily low at 14.8Ω with a maximum drive capability of +19.3dB ref 0.775V, the overall gain from the mixing inputs being +0.06dB and −0.04dB respectively at 1kHz.

As shown in **fig 4**, the frequency response from the mixing inputs to the output is very flat in the audio frequency range and extends well outside the audio frequency band beginning to rolloff at 150kHz. Checking the individual harmonic distortion showed that the less offensive second harmonic predominated, but this was at a very low level as is shown in **fig 5.** Measuring the total harmonic distortion and noise under various conditions provided the excellent results **table 2.**

Intermodulation distortion to the CCIF twin tone method, using swept tones separated by 70Hz, showed that within the audio frequency band the level of distortion was below 0.005% rising to 0.01% at 50kHz and to 0.1% at 200kHz—an excellent performance.

Finally, the measurement of noise was undertaken with the mixing inputs shorted to earth, but it unfortunately transpired that the review sample of the module was faulty: however the noise performance in **table 3** was measured on identical circuitry in the group module which is also reviewed.

TABLE 3 NOISE PERFORMANCE

Band limited 22Hz to 22kHz rms noise	—98dBm
'A' weighted rms noise	—109dBm
CCIR weighted rms noise	—91.5dBm
CCIR weighted quasi-peak noise	—87.5dBm

Summary
As a general purpose virtual earth mixing module for constructing inexpensive desks this module is very cheap and offers an excellent performance.

TABLE 2 TOTAL HARMONIC DISTORTION

	100Hz	1kHz	10kHz	20kHz
+10dB ref 0.775V unloaded	0.0027%	0.0027%	0.019%	0.040%
0dB ref 0.775V unloaded	0.007%*	0.0065%*	0.008%	0.014%
0dBm into 600Ω	0.0085%	0.0075%	0.0095%	0.014%

*largely noise not distortion.

FIG. 4 PROGRESSIVE VEM-1 FREQUENCY RESPONSE

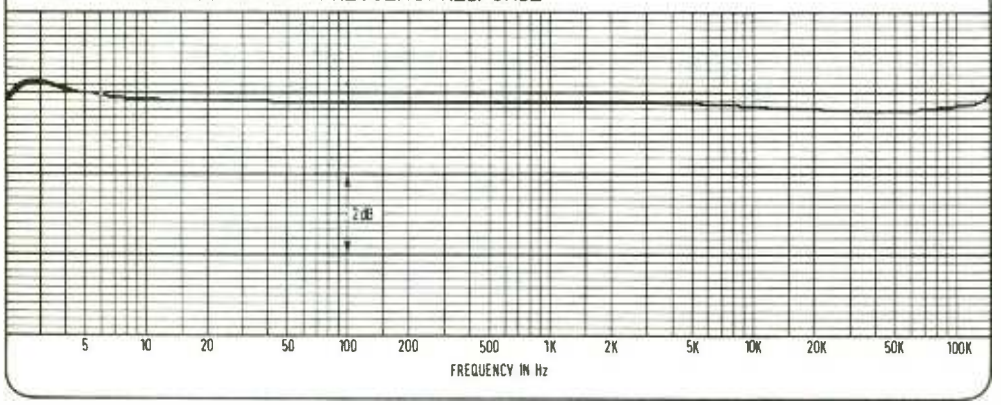
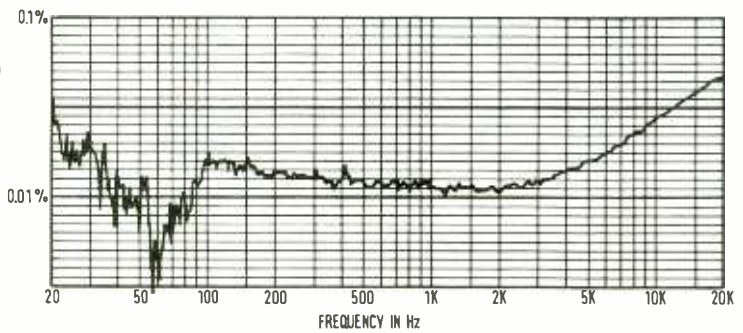


FIG. 5 PROGRESSIVE VEM-1 SECOND HARMONIC DISTORTION



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GM-1

MANUFACTURER'S SPECIFICATION * (provisional)

Gain: from input to group output +10dB ±1.0dB from input to monitor output (all controls at full) +12.5dB ±1dB.

Frequency response: from input to group output +0dB −0.5dB 10Hz to 50kHz, from input to monitor output +0dB −1dB 20Hz to 50kHz.

Maximum output level: group output 7V rms into 600Ω load, monitor output 7V rms worst case.

Distortion (total harmonic): from input to group output loaded with 600Ω or greater less than 0.008% at 5V rms at 1kHz or 0.015% at 10kHz. From input to monitor output less than 0.01% at 5V rms at 1kHz or 0.05% at 10kHz.

Noise: group output with group fader at full less than −75dBm unweighted. Monitor output with all controls at full less than −65dBm unweighted (measurement band limited at 80kHz).

Power consumption: approximately 26mA at 24V DC.

Price: £34.

THIS PROGRESSIVE Electronic Products group module is specifically intended for use with the channel modules reviewed in this edition of *Studio Sound* and has an identical 380 x 50mm black anodised front panel to which is attached the glass fibre printed circuit board.

The single board houses all the electronic components which are of good quality and neatly laid out: however, there are no component identifications to aid servicing although the input and output connections are clearly identified. These consist of solder pins for connections which do not go to other circuit boards (such as connections to tape and the group fader) and solder pads for connections to adjacent boards. The latter are arranged such that the channel modules and group modules can be interconnected by straight lengths of tinned copper wire which run the length of the mixer and are soldered to the solder pads on each module.

As is to be seen from the block diagram of the group module (**fig 6**), the inputs to the group are fed to a virtual earth summing amplifier (*VEM* as separately reviewed in this edition) in addition to which two variable level echo returns are provided. The output from the summing amplifier is fed to a group fader which is external to the module and thence buffered by a +10dB amplifier to provide the group output. Monitoring of this signal or the tape return signal is selected by a pressbutton switch.

The selected signal is fed directly to a VU meter connection without any buffering which is all right in the case of the low impedance group output, but could cause distortion and loading in the case of the tape return if the tape unit in use has a high output impedance.

The remaining parts of the group module provide 10dB of gain following the monitor gain control and thence left and right monitor outputs via a pan pot. Four cue outputs are embodied in the form of concentric potentiometers for cue outputs 1 and 2 and 3 and 4; each pair being able to be switched to either prefade or postfade by means of miniature toggle switches. The layout of the module, which uses coloured knobs for easy identification of the controls, is such that the pan pot is at the top, followed by the two pairs of concentric controls for the cue sends and their adjacent pre/postfade switches. These are followed by the monitor gain control and the group/tape switch underneath which are the two echo return level controls.

As is to be seen from **fig 6**, the module uses not only the *VEM* virtual earth amplifier, but also the *LHD* line and headphone driver module which is also separately reviewed.

Frequency response and noise

The overall frequency response from the high impedance group input to the group output and to the monitor output is shown in **fig 7**, when using a 600Ω load for both outputs and also for the group output into a high impedance. Clearly the overall response is very flat within the audio frequency band, but loading the group output with less than 600Ω should be avoided.

Gain from the input to the group output was found to be 9.4dB with the gain to the monitor output being 18.5dB with the pan control central or 21.5dB at the extremes of the pan control. As is to be expected the measured noise at the outputs reflects the differences in gain, **table 4**.

TABLE 4 NOISE AT OUTPUT

	Monitor	Group
22Hz to 22kHz rms	−75.5dBm	−34.5dBm
'A' weighted rms	−79.0dBm	−37.0dBm
CCIR weighted rms	−70.0dBm	−78.0dBm
CCIR weighted quasi-peak	−65.5dBm	−74.0dBm

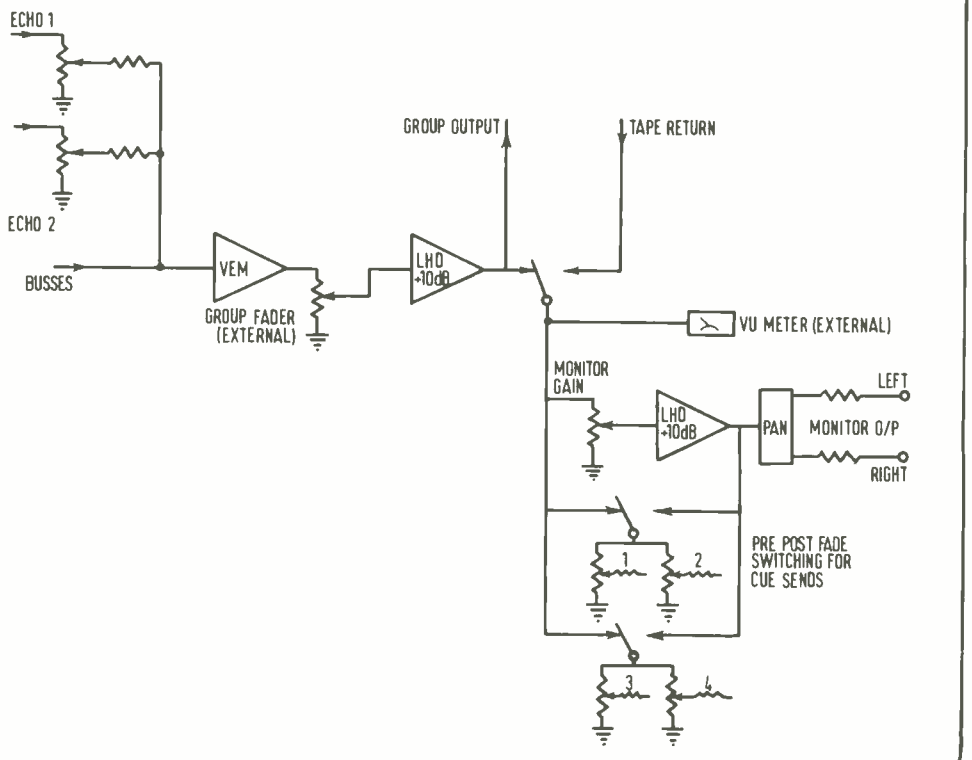
Considerable care was needed to measure the above noise performance due to hum pickup, particularly from the black anodised front panel which was not connected to earth and would not normally connect to the mixer chassis because anodising is a very good insulator. Otherwise the noise performance is quite adequate for a module of this class.

Distortion

Investigations into the individual harmonic distortion and also intermodulation distortion to both the CCIR and the SMPTE twin tone methods showed that at +10dB output ref 0.775V peak equivalent sinewave all distortion components were less than 0.01%—a creditable achievement.

70 ▶

FIG. 6 PROGRESSIVE GM-1 SCHEMATIC



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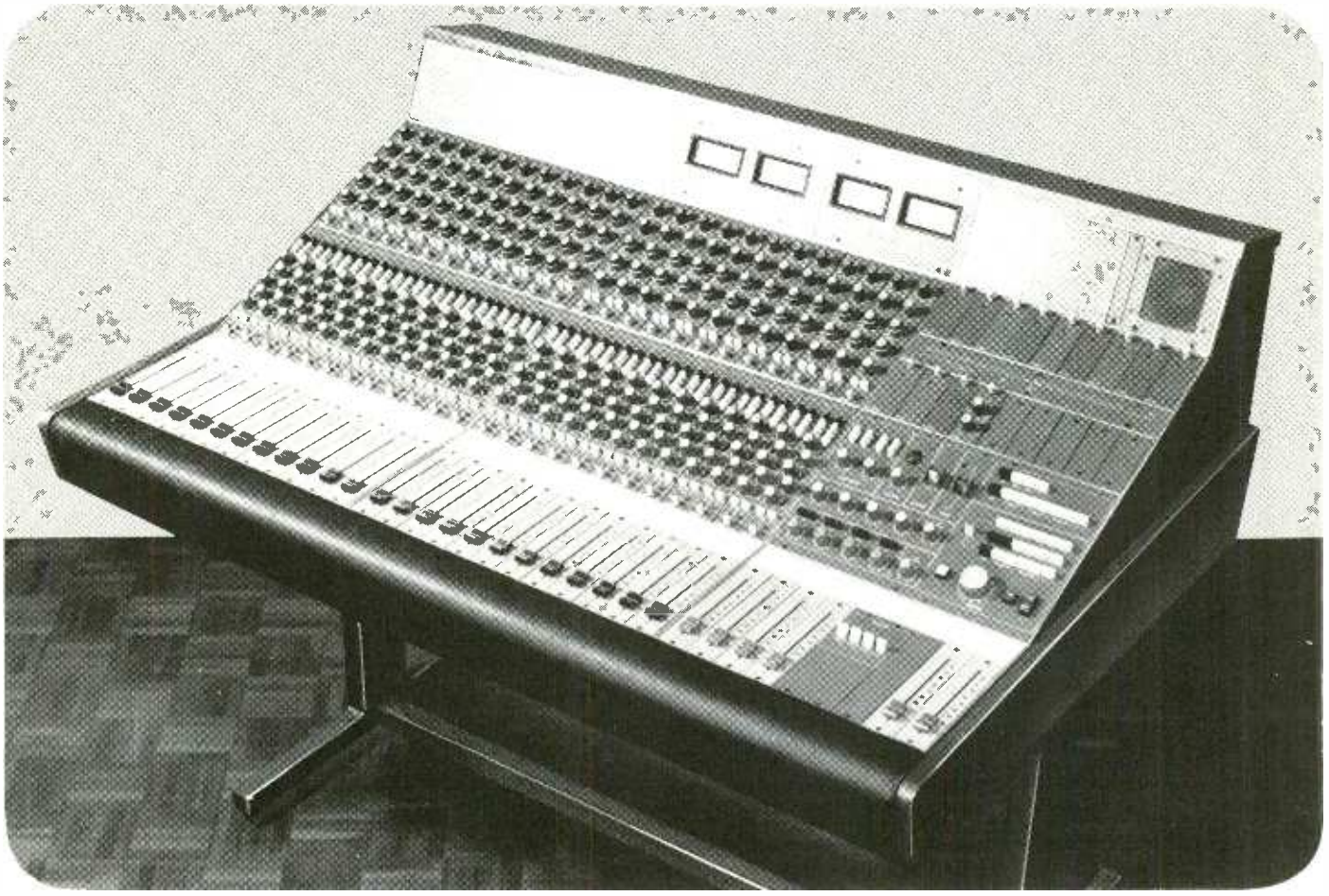

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The versatile 5312 'Melbourn' All-purpose Console for recording or broadcast where 12 input channels, 2 group outputs and comprehensive monitoring are required.

The comprehensive 5402A Broadcast Console providing highly flexible radio broadcast facilities for disc jockeys or continuity applications.

The compact 8301 'Kelso' Transportable Console featuring 10 inputs, 2 main output groups, cue, speaker monitoring outputs and talkback facilities.

The portable 5422 'Suitcase' Mixing Console suitable for full professional use and powered either by re-chargeable batteries or from an optional mains supply/charger.

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Rupert Neve of Canada Ltd., 2721 Rena Road, Malton, Ontario Tel: 416 6776611. Telex: 21 06 983502.

Rupert Neve GmbH, D-6100 Darmstadt, Bismarckstrasse, 114. W. Germany. Tel: 6151 87038. Telex: 419581.

DDL 7142

Total harmonic distortion as measured at the monitor output at various frequencies and output levels was also excellent as is to be seen from **table 5**.

TABLE 5 OUTPUT LEVEL

	Total harmonic distortion and noise			
	100Hz	1kHz	10kHz	20kHz
0dB ref 0.775V	0.024%*	0.024%*	0.024%*	0.026%
+10dB ref 0.775V	0.006%	0.007%	0.014%	0.027%
5V rms rated level	0.0042%	0.0078%	0.022%	0.036%

*largely noise, not distortion products.

Inputs and outputs

The maximum input level at the 22kΩ impedance group inputs was found to be adequate at + 17.5dBm with the input impedance being constant as set by the value of the mixing resistors connected to the virtual earth point. So far as the impedance of the virtual earth mixing point is concerned this was as stated in the review of the *VEM-1* module, always being adequately low.

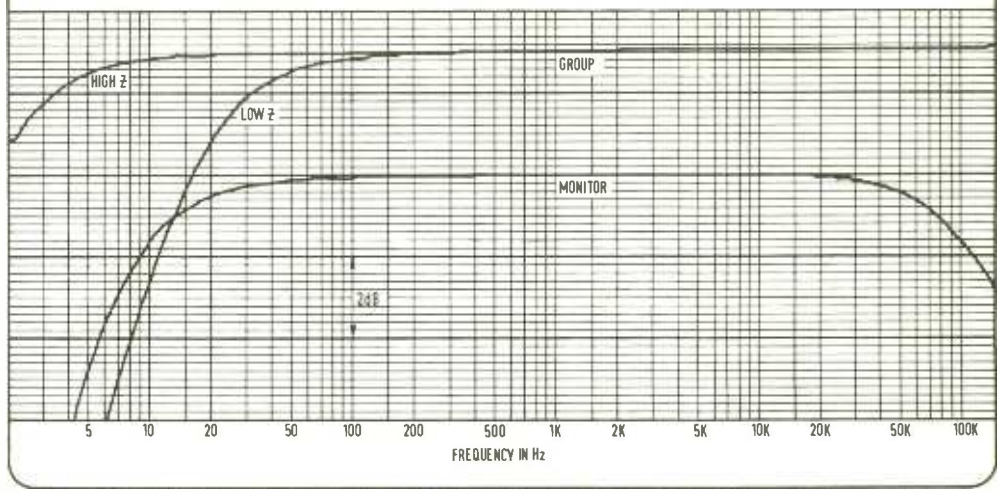
As is to be expected, the input impedance of the echo returns varied with the gain setting of the returns with a maximum of 22kΩ at the lower gain settings falling to a quite acceptable 10.8kΩ at maximum gain.

The tape return input impedance varied mildly with the monitor gain setting, but was always on the low side around 7kΩ to 8kΩ—I would have preferred to have seen a minimum of 10kΩ here, and to have seen the VU meter output buffered.

Cue outputs had a practically constant output impedance of 22kΩ which like the monitor outputs are intended for feeding further virtual earth mixing amplifiers or other current driven amplifiers in order to eliminate the effects of capacitive loading by the connecting cables.

Finally, as is desirable, the output impedance of the group output was very low at all audio frequencies, with a drive capability of up to + 20dBm.

FIG. 7 PROGRESSIVE GM-1 FREQUENCY RESPONSE



Other matters

Power requirements from the recommended + 24V DC line were found to be a maximum of 26.9mA which occurred under no-signal conditions. Operation of all controls was clean and the general standard of construction of this prototype unit submitted for review was to a good standard having regard to the class of unit.

Summary

Like the other modules, this is a most satisfactory performer which is offered at a very low price, enabling those with a modicum of cash to construct mixers which are good performers and remarkably good value for money.

LHD-1

MANUFACTURER'S SPECIFICATION

Input: maximum source resistance 10kΩ.
Output: 10Ω 18V pp maximum into 300Ω minimum.
Gain: 0dB ±0.1oB.
Frequency response: 20Hz to 110kHz ±0.3dB.
Total harmonic distortion: 0.003%.
Noise: —105dBm.
Power requirement: +24V DC 16mA.
Price: £5.50.

THIS MODULE, which is intended for use as a buffer amplifier to drive headphones or 600Ω lines, consists of a 75mm square glassfibre printed circuit board. Connections to the board are by means of solder pins which are clearly identified on the neat board layout, mounting of the board being by means of four drilled holes to accept bolts.

The unbalanced input to the amplifier was found to have an adequately high impedance of 22.8kΩ in parallel with 75pF with the output having a sensible 69Ω impedance and being also unbalanced. Whilst the output is intended for driving into low impedances, it is likely that the unit could be used to drive high impedances and here a small snag arose. Because the output is coupled to a DC level of about +12V by a 150μF capacitor which is taken to earth by a 680kΩ resistor at the output, it takes a long time for the DC at the output to discharge (time constant 102s) and it is suggested that the manufacturer lowers the value of this discharging resistor to say 10kΩ.

At the onset of output clipping, the output level was found to be 7.6V into an open circuit of + 19dBm loaded into 600Ω with the overall gain of the amplifier being −0.003dB unloaded. Attempts to measure the individual harmonic distortion and also intermodulation distortion to the CCIF twin tone method showed that both these forms of distortion were at extremely low levels well below 0.01% within the audio band. Indeed the intermodulation distortion only reached 0.01% at 120kHz. The measurement of total harmonic distortion and noise unloaded and loaded gave the results in **table 6.**

As can be seen, the distortion performance is most gratifying as is the frequency response into an open circuit as shown in **fig 8.** Furthermore, the noise performance was substantially better than that specified by the manufacturer with noise levels being measured with the input short circuited, **table 7.**

TABLE 6 HARMONIC DISTORTION

	Level	100Hz	1kHz	10kHz	20kHz
Unloaded	+10dB ref 0.775V	0.002%	0.002%	0.0035%	0.0058%
	0dB ref 0.775V	0.002%	0.002%	0.0027%	0.0035%
Loaded	+10dBm 600Ω	0.0025%	0.0025%	0.004%	0.0062%
	0dBm 600Ω	0.002%	0.002%	0.0027%	0.004%

FIG. 8 PROGRESSIVE LHD-1 FREQUENCY RESPONSE

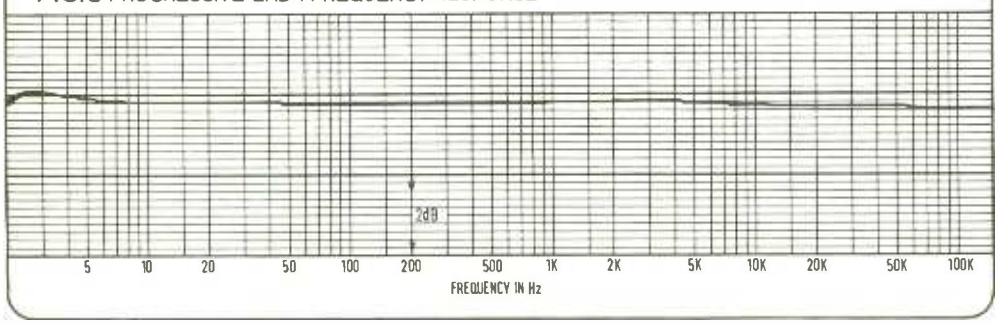


TABLE 7 NOISE PERFORMANCE

Band limited 22Hz to 22kHz rms noise	—112dBm
'A' weighted rms noise	—114dBm
CCIR weighted rms noise	—116.5dBm
CCIR weighted quasi-peak noise	—112.5dBm

Checking to power requirements of the module showed that it consumed a maximum of 13.3mA from the + 24V DC supply with the maximum consumption occurring under quiescent conditions.

Summary

The performance of this line and headphone driver module is really beyond reproach and furthermore it's very cheap—what more can be said.

Hugh Ford

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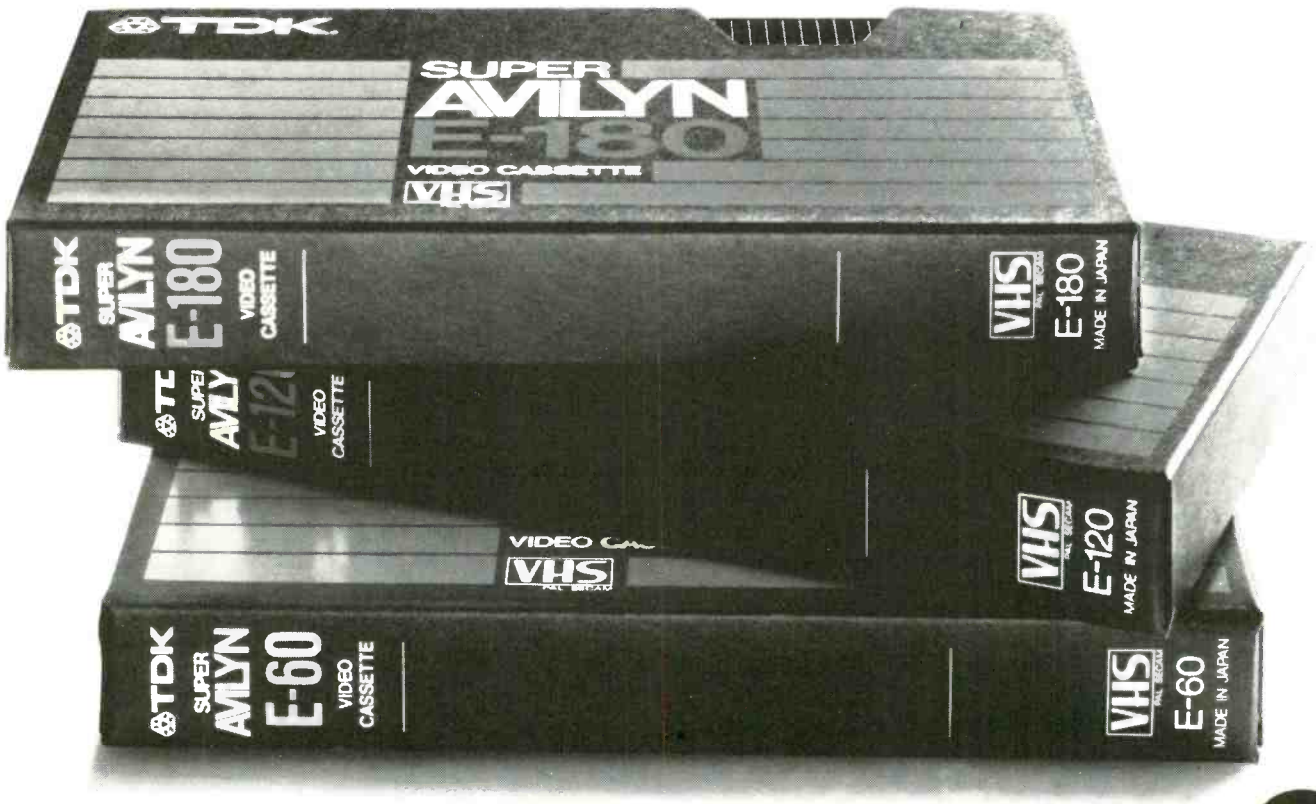

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Ampex ATR-700

MANUFACTURER'S SPECIFICATION

TAPE TRANSPORT

Tape recommended: Ampex *456* (*Grand Master*) and *406*, or equivalent.
Tape width: 6.35mm.
Reel sizes: 127, 178, 267mm per ANSI and NAB standards.
Reel hub size selector: two positions for large or small reel hubs.
Tape Speed: switchable 9.5 & 19cm/s or 19 & 38cm/s. Adjustable pitch range ±5%. Not field convertible models.
Tape speed accuracy: within ±0.3% at both speeds.
Wow and flutter: 0.08% Wrms at 19 and 38cm/s. 0.12% Wrms at 9.5cm/s. Weighting is NAB measured by the reproduce method.
Shuttle time: approximately 90s for 360m reel in either direction.
Tape drive system: three motor, direct drive.
Capstan motor: DC servo motor, direct drive.
Head configuration: three heads for erase, record and reproduce in 1-track 1-channel (has basic 2-channel electronics), 2-track 2-channel, or ¼-track 2-channel. In addition, space is provided for a fourth head.
Tape timer: with rewind stop memory, indicates in minutes and seconds to a maximum of 99min and 59s; indications are for the higher tape speed (19 or 38cm/s). Accuracy is within ±10% maximum error.
Tape lifter: manually defeatable lever type for cueing.
Motion sensing: circuit to detect complete stop of tape before going into play mode when play button is pushed during fast wind. Delay time from stop to next motion is 0.7±0.3s.
Operating position: vertical or horizontal.
Mounting: can be installed in standard 483mm rack (uses vertical rack mount adaptor, included).
Transport controls: fast forward, fast rewind, stop, record, edit, lift defeat, play, pause, varispeed, reel hub size.
Remote controls: fast forward, fast rewind, stop, play record, pause.
Safety standard approval: UL/CSA.

ELECTRONICS

Line output: +4dBm, 600Ω balanced (can be set up for +8dBm).
Maximum line input: +24dBm.
Line input: —10dB (0dB = 0.775V), 600Ω balanced with switchable —20dB attenuator.
Maximum mic input: (attenuator off) —30dB (0dB = 0.775V).
Input connector: Cannon XLR-3-31.
Output Connector: Cannon XLR-3-32.
Equalisation: NAB or IEC, switchable on rear panel.
Record/reproduce frequency response: 38cm/s 40Hz to 100Hz ±3dB and 100Hz to 18kHz ±2dB. 19cm/s 40Hz to 100Hz +3, —2dB and 100Hz to 15kHz ±2dB. 9.5cm/s 40Hz to 7.5kHz ±2dB.
Distortion (THD): maximum (using 456 tape) NAB equalisation, 38cm/s. 0.3% at 400Hz, 185nWb/m. 4.0% at 15dB above 185nWb/m.
Equalisation, bias, level: separately switchable for different tapes. Including Ampex *641*, *456* and *406*; 3M *250*.
Erasure: 70dB at 400Hz, +10dB reference.
Signal-to-noise ratio: (overall, 'A' weighted) NAB equalisation referred to 6dB above 185nWb/m, ¼-track 55dB, 2-track 60dB. IEC eq referred to 320nWb/m, 2-track 58dB.
Frequency response: for synchronous reproduce 100Hz to 12kHz, ±4dB at 38cm/s. 100Hz to 8kHz, ±4dB at 19cm/s.
Synchronous reproduce signal-to-noise: (overall 'A' weighted) NAB equalisation referred to 6dB above 185nWb/m ¼-track 40dB, 2-track 45dB.
Headphone output: 10kΩ minimum load, unbalanced, standard 3-conductor stereo phone jack 0.8V ±2dB.
Record level calibration 0VU: 0dB referenced to 185nWb/m of tape flux. Position 1 0dB, position 2 +3dB position 3 +6dB.
Dimensions (hwd): 548x440x254mm.
Weight: approximately 28kg.
Power requirements: 100/120/220/240V ±10% 50/60Hz switchable 150W.
All performance tests made with Ampex *456* (Grand Master) tape.
Price: £1,064.
Manufacturer: Ampex Corporation, 401 Broadway, Redwood City, California, USA.
UK Agent: ITA, 1-7 Harewood Avenue, Marylebone Road, London NW1.

THE AMPEX *ATR-700* is unlike any previous Ampex tape machine in that it is semi-professional and not even made by Ampex despite the Ampex name. However one can readily see why Ampex employ a Japanese company to manufacture a machine of this class as they were until now missing out on the large market for small studio equipment which is so far supplied by Revox, Teac, Otari and similar companies.

At first sight this a typical Japanese machine, but a look within soon reveals that the standard of engineering is far better than the not unusual bent tin and springs efforts. The spools are driven by separate direct drive motors which were equipped with band brakes and mounted onto a fairly lightweight alloy casting which forms the basis of the tape transport section of the recorder. The heads, tape guides and the direct drive servo controlled capstan motor are mounted onto this casting as is the mains transformer; I don't think the recorder would take kindly to being dropped in view of this.

The basic spool hubs are designed for cine type reels with adaptors for NAB reels up to a maximum diameter of 267mm, there being a large/small reel switch for adjusting the tape tension appropriate to the size of reels in use.

From the pay-off reel, the tape passes over a swinging guide, to a damping roller attached to a flywheel, over a fixed edge guide before the erase and the record heads from whence there is another fixed guide before the replay head and a space for a second replay head before a third fixed guide and the capstan. The idea of this space is that a machine can be equipped for both ½-track and ¼-track replay. Indeed, full-track, ½-track and ¼-track versions of the machine are available operating at 38 and 19cm/s or 19 and 9.5cm/s, but synchronous replay is not of course available in the full-track version.

The capstan itself is of medium diameter and directly driven from a DC servo motor, there being high and low speed versions for the different models. The pinch roller is servo operated as are the tape lifting pins.

From the capstan the tape passes over a large diameter roller which drives a Hall effect tape motion sensor and the mechanical tape timer which reads in minutes and seconds at the higher tape speed. Tape contact with this roller is maintained by a sort of floating guide arrangement which guides the tape before and after the roller from where it passes to the takeup reel.

Control of tape motion is by means of six push-button switches located below the tape transport, all of which can be embodied in a remote control unit which plugs into the rear of the recorder. In addition to the usual start play, record, stop and two fast wind functions there is a pause function which operates in both the record and the replay modes—a useful feature. All the tape motion controls are fully interlocked by integrated circuit logic which inhibits entry into record or replay modes unless tape motion has previously ceased. A red LED indicator adjacent to the pause control flashs during this delay and also when pause mode is selected, there being another red LED indicator adjacent to the record pushbutton to indicate record mode.

Each tape track has a record/safe toggle switch with associated LED illuminated when the appropriate track is in record mode, it being possible to drop either or both tracks into record on the fly, but not to drop both simultaneously out of record without stopping the tape.

A further tape motion control is the edit push-button which stops the takeup reel and dumps tape from the capstan—however it is potentially dangerous that this feature is available in both the replay and the record mode. Access to the heads for editing was mediocre with the machine used lying on its back, but very difficult with the machine vertical in spite of the hinged head cover which gave ready access to the heads for other purposes. The remaining tape transport controls consist of a variable speed control with a fixed speed function when depressed, a manual tape lifter defeat, the large/small reel size switch and finally the speed selector switch. Finally on the head cover are two reproduce/sync slide switches and a position for a 2/4-track replay switch for use when the second replay head is fitted.

Turning now to the audio electronics section this machine is unusual in that each channel has two inputs arranged such that either or both inputs to each track can be switched by means of rear

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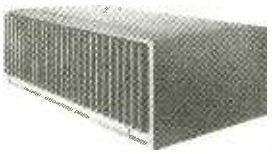

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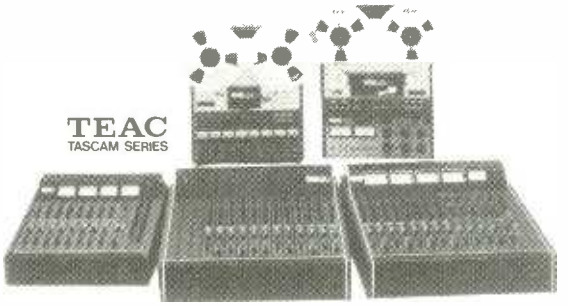

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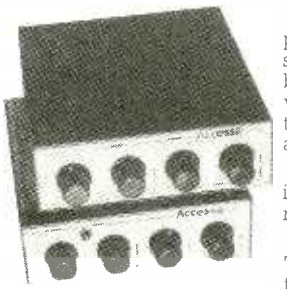

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panel slide switches to accept line or microphone level (also with a 20dB switched attenuator). Level metering is by twin VU meters under which are four input level controls comprising 270° potentiometers equipped with presettable click stops. Similarly equipped is the master record level control to the right of the individual input controls, the master control being a single potentiometer controlling all inputs. Adjacent to this are coaxial output level controls with preset level clickstop and two toggle switches for switching output and level meters to before or after tape.

Another unusual feature are three, 3-position toggle switches for setting up the machine for different tape types. One controls bias, another record equalisation and the third adjusts the

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FIG. 1
AMPEX ATR700 OVERALL FREQUENCY RESPONSE AT 19cm/s AND 38cm/s

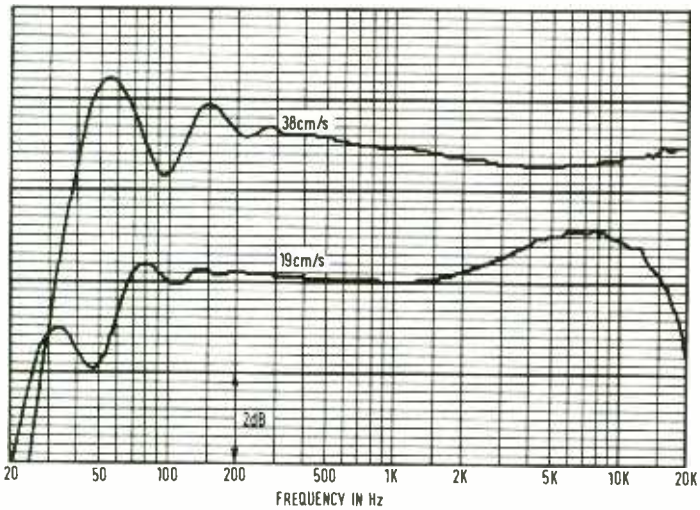


FIG. 2
AMPEX ATR700 FREQUENCY RESPONSE IN SYNC MODE

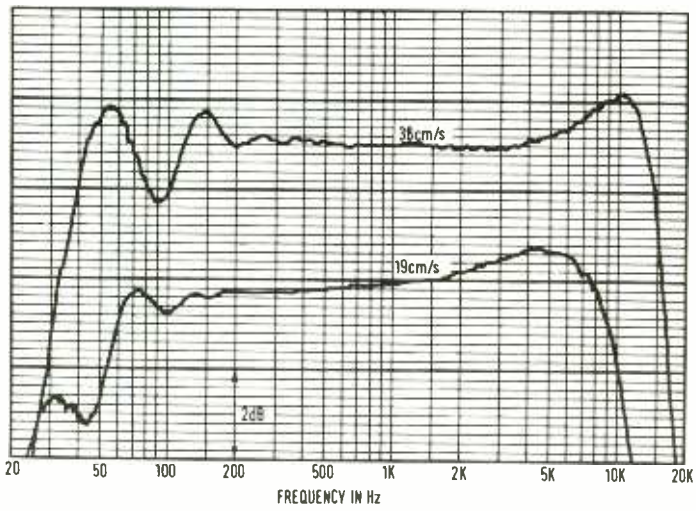
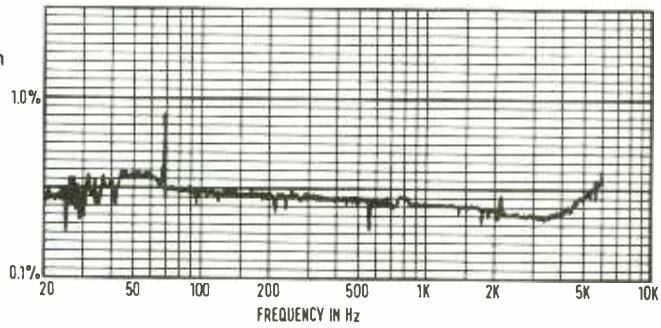


FIG. 3
AMPEX ATR700 THD AT 320nWb/m AND 38cm/s



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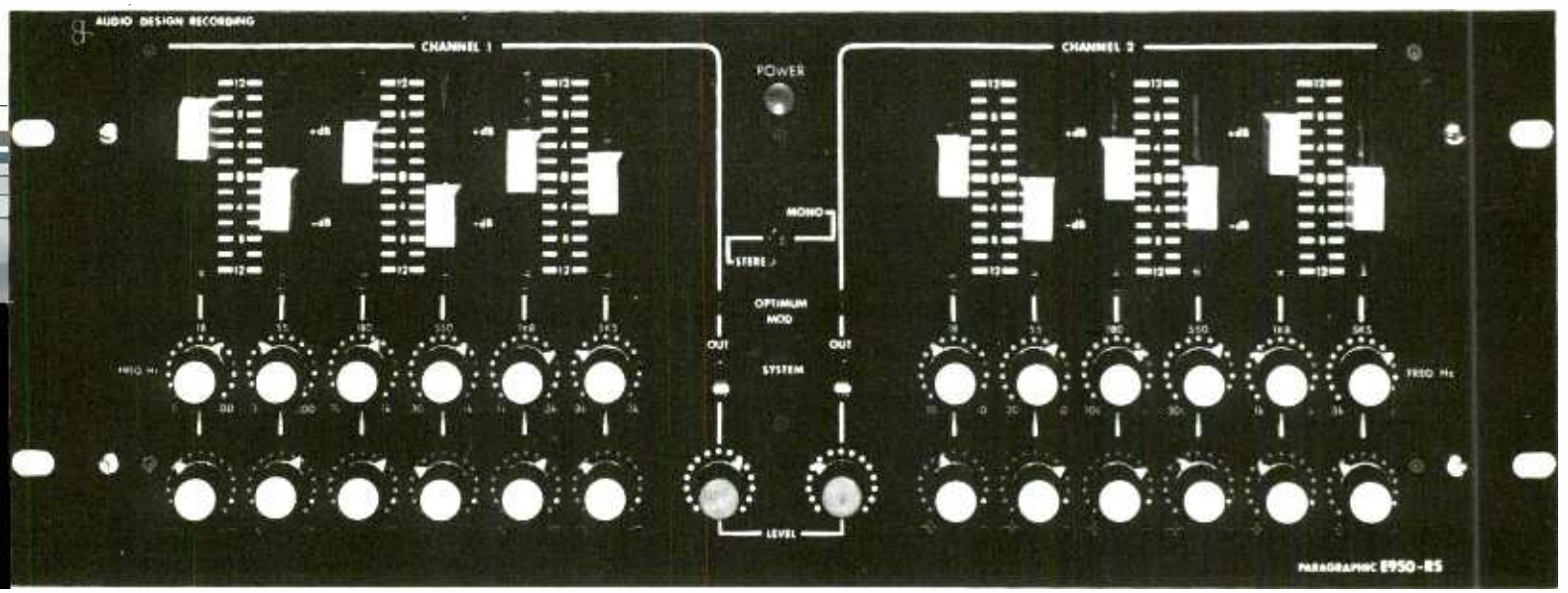

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monitoring level to correct for the maximum replay level available from the particular tape type. As supplied, the machine can be set for 3M *250* tape or Ampex *641*, *456* or *406* but no internal controls are provided by adjusting the record equalisation for other tape types.

At the rear of the machine are four XLR type input connectors providing a balanced microphone or unbalanced line inputs with XLR output connectors providing a balanced output. In addition to slide switches for the 20dB microphone attenuators and for selecting line or microphone input configurations, a further slide switch sets the electronics to either NAB or IEC standard equalisation.

The final rear panel features are a multi-pole socket for remote controls, and the fixed mains power lead and its adjacent fuse which is properly identified in value.

The audio electronics are situated in the base of the machine and comprise plug-in cards together with an extender card, the transport control electronics being separate and mounted on the tape transport.

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FIG. 4
AMPEX ATR700
CCIF
INTERMODULATION
DISTORTION

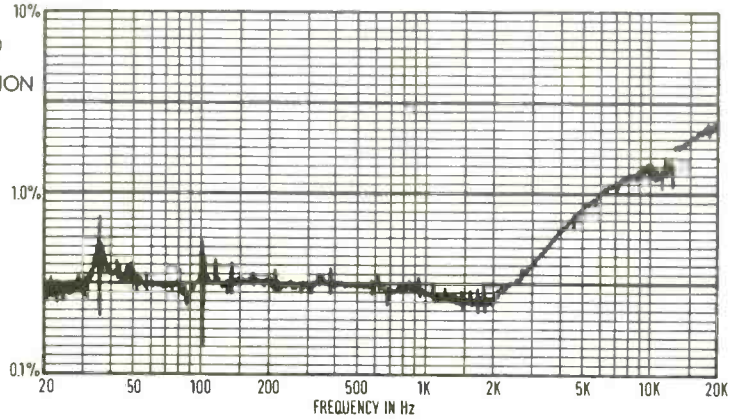


FIG. 5
AMPEX ATR700
CROSSTALK
BETWEEN
RECORD AND
REPLAY

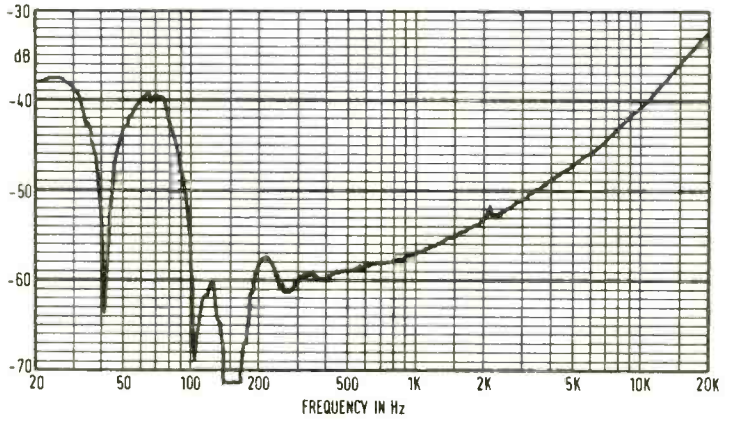
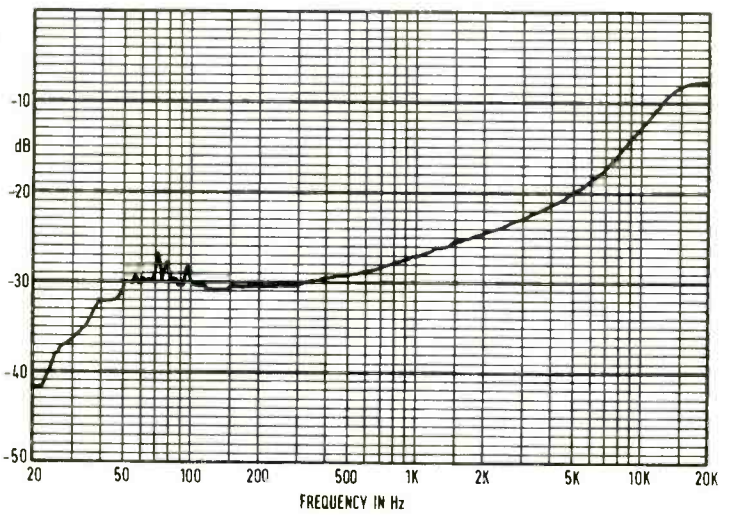


FIG. 6
AMPEX ATR700
CROSSTALK
BETWEEN
RECORD
AND SYNC



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Within the audio electronics, adjustments are provided for treble replay equalisation for both tape speeds and both IEC and NAB equalisation, the range of these controls being more than adequate. Further controls allow adjustment of bias level for the three bias level switch positions, but it seems surprising that there is no record equalisation adjustment although level adjustment is provided.

Overall the standard of the electrical construction of the recorder was to a good Japanese domestic standard, using domestic quality components and boards. Mechanically the standard was above that of the the electrical department, but here the standard is not in my opinion up to the European competition.

Replay performance

Initial attention was directed at the replay frequency response in both normal replay and sync modes. The frequency response was checked at both tape speeds using IEC and NAB replay equalisation using BASF and MRL calibration tapes.

As received, the replay frequency response was up to 3dB down at 10kHz at 19cm/s with a significant difference between channels, but recalibrating the machine rectified this problem and at both tape speeds the replay frequency response was finally within 1 dB within the frequency range of the calibration tapes with both IEC and NAB equalisations.

In the sync mode, the high frequency response fell as is to be expected, but at 38cm/s tape speed was within ±1dB up to 14kHz which is a quite reasonable performance. With the record level switch at its mid position, a recorded fluxivity of 320nWb/m corresponded to an indication of zero VU on the meters with the other two positions of the switch giving ±3dB change in metering and output sensitivity. This arrangement caters for the common tape types currently in use as the meters are genuine VU meters to the American Standard C16.5.

The actual output level from the machine depended upon the setting of the record and replay level controls. With the record level switch at its mid position and the output level control at its click stop position, the output for a recorded fluxivity of 320nWb/m was +9dBm at both tape speeds and both replay equalisations, there being an additional 6dB of output with the level control at its maximum. The maximum fluxivity that the replay amplifiers could handle was found to be in excess of 25dB above 320nWb/m—an excellent capability, coping with any foreseeable tapes.

Noise in the output was measured with respect to a fluxivity of 320nWb/m using Ampex *456 Grand Master* tape which had been recorded on the machine without any audio signal and also measured without tape moving, thus showing the margin between machine noise and that from a good modern tape. Similarly noise due to the machine in the sync mode was measured.

With the exception of unweighted noise where channel 1 exhibited more mains induced hum than channel 2, the noise performance of the two channels was effectively identical, the figures in **table 1** being the worst cases.

From **table 1** it can be seen that the performance of the replay channel is excellent and that of the sync mode quite acceptable but with hum levels on the high side. When comparing these figures with other machines, it should be remembered that this machine had twin channel heads which are at a disadvantage when compared with the wider track width of the European stereo heads.

Record/replay performance

As the overall frequency response was very similar for both equalisations and for both channels, **fig 1** is typical of the machine at the two available tape speeds it being seen that replay head contour effects account for the major frequency response errors. Whilst this figure and other record/replay parameters were measured using Ampex *456 Grand Master* tape, similar results were obtained using the machine with 3M *250* tape with the appropriate control settings. At 38cm/s the frequency response is within ±1dB from 30Hz to 20kHz, and as can be seen from **fig 2**, the performance in sync mode is limited to ±1dB from 40Hz to 15kHz at 38cm/s but this is certainly a more than adequate performance at 38cm/s. However the 19cm/s sync frequency response is rather limited.

Again using Ampex *456 Grand Master* tape, the output level for 3% THD was excellent at about 11dB above 320nWb/m depending upon the tape speed and equalisation in use, the THD at 320nWb/m at 38cm/s with IEC equalisation being shown in **fig 3**. The CCIF twin tone intermodulation distortion under the same conditions being shown in **fig 4**.

Crosstalk between the two channels when recording on one channel and then replaying the tape is shown in **fig 5** which generally demonstrates a good performance for a twin track machine, but does show rather large high frequency crosstalk. This pattern is also apparent in **fig 6** which is the result of recording one channel and replaying the other in the sync mode.

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TABLE 1 NOISE AT OUTPUT

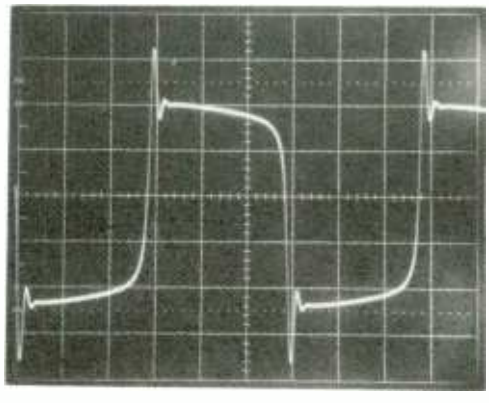
	Reference level (320nWb/m) to noise IEC equalisation 38cm/s	NAB equalisation 38cm/s
With Ampex *456* tape		
Band limited 22Hz to 22kHz rms	54dB	53.5dB
'A' weighted rms	64dB	62dB
CCIR weighted rms ref 1kHz	55.5dB	54.5dB
CCIR weighted quasi-peak ref 1kHz	51.5dB	49dB
Without tape		
Band limited 22Hz to 22 kHz rms	62dB	64.5dB
'A' weighted rms	76dB	75dB
CCIR weighted rms ref 1kHz	70dB	68.5dB
CCIR weighted quasi-peak ref 1kHz	65.5dB	64dB
Sync mode without tape		
Band limited 22Hz to 22kHz rms	50.5dB*	52dB*
'A' weighted rms	65dB	64.5dB
CCIR weighted rms ref 1kHz	60dB	59dB
CCIR weighted quasi-peak ref 1kHz	56dB	55dB

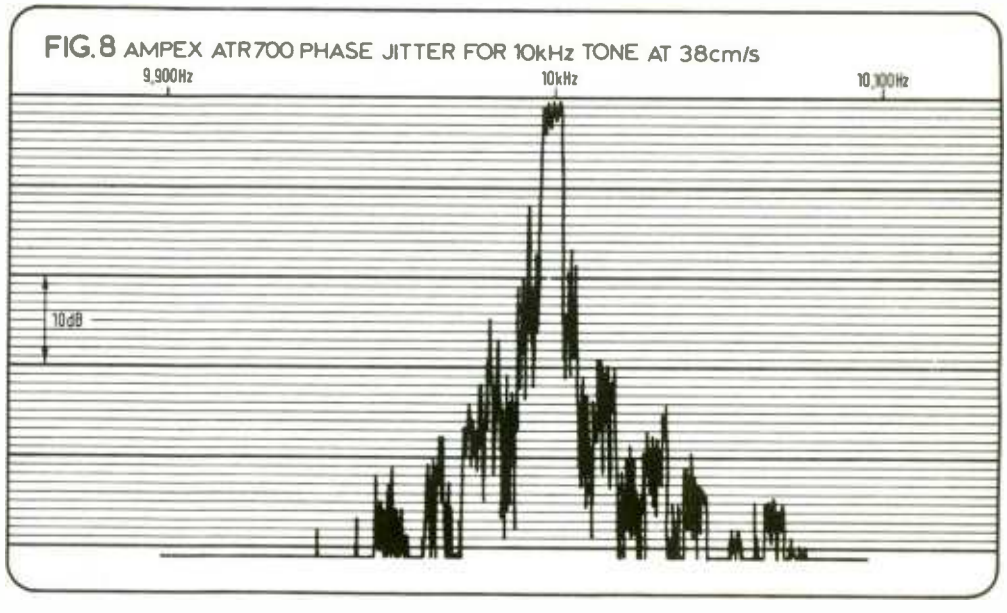
*One channel had 5dB worse hum than the other, this is the worst channel.

TABLE 2 INPUT LEVELS

Input	Level for 320nWb/m	Maximum input
Line	—11.5dBm	greater than +22dBm
Microphone	—72dBm	—23.5dBm
Microphone attenuated	—52dBm	—3.5dBm

FIG. 7 1kHz squarewave at 38cm/s





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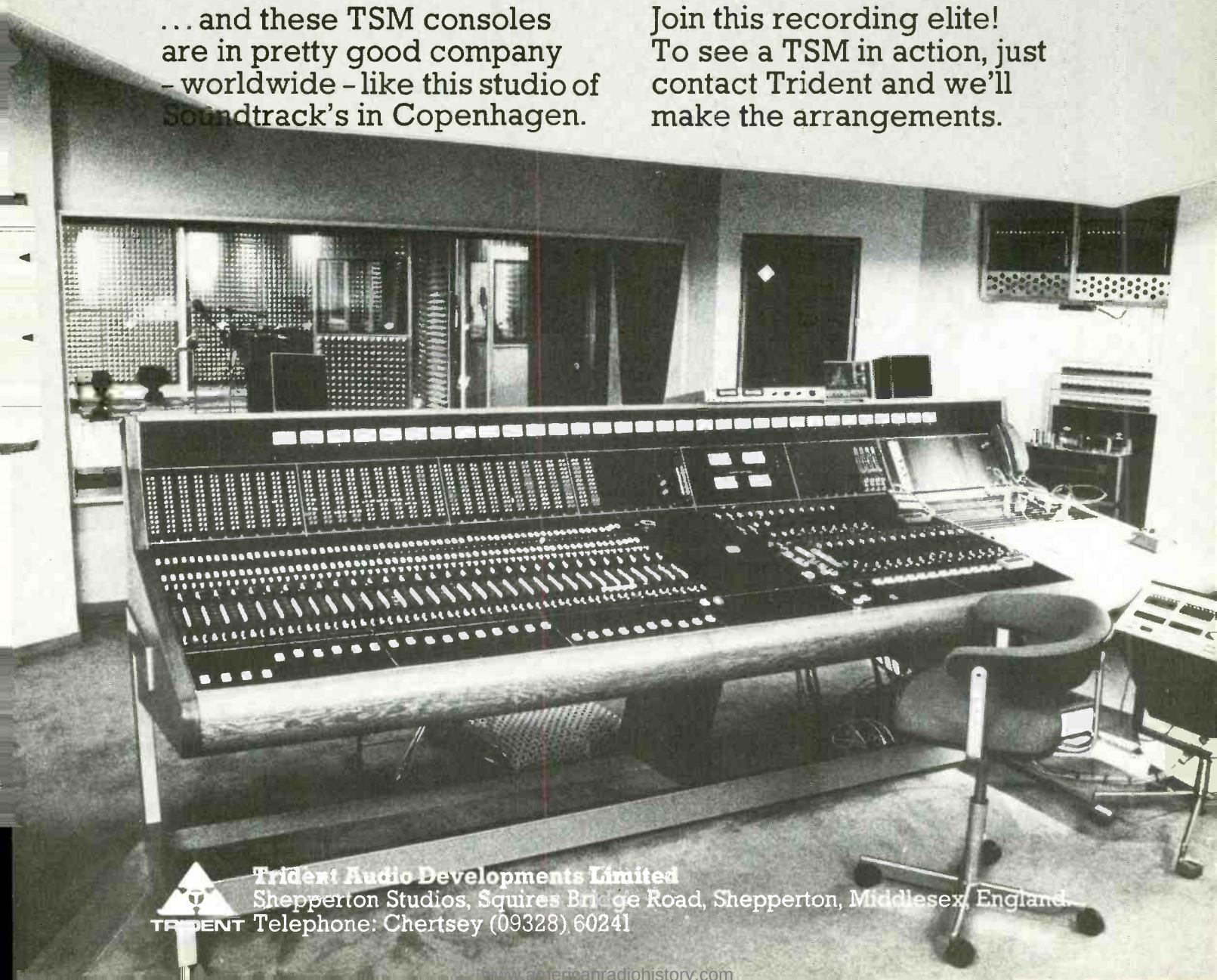

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The results of recording and reproducing a 1kHz squarewave is shown in **fig 7** which shows a degree of overshoot and little ringing typical of better recorders.

Inputs and outputs

The input levels for recording a fluxivity of 320nWb/m on Ampex *456 Grand Master* tape and the maximum input levels for waveform clipping in the amplifiers are noted in **table 2.**

These sensitivities are generally satisfactory with the input impedance of the unbalanced line input being adequately high at 100kΩ. However it is felt that the microphone input impedance at 700Ω (or 650Ω with the attenuator in circuit) is on the low side.

Table 3 shows the equivalent input noise at maximum gain settings for the inputs.

The headphone output was satisfactory giving +4dB ref 0.775V for a recorded fluxivity of 320nWb/m with an associated output impedance of 620Ω as was the main output with an impedance of 370Ω.

Wow, flutter and speed

IEC weighted quasi-peak wow and flutter was found to be constant throughout a NAB reel of tape at 0.03% at a tape speed of 38cm/s or 0.06% at 19cm/s—both satisfactory figures. So far as scrape flutter is concerned, **fig 8** shows a 3Hz bandwidth spectrum analysis of a 10kHz recorded and replayed tone. Whilst there is evidence of sideband flutter, this performance is in a good class, but it was interesting to note that the damping roller, whilst removing 50Hz sidebands from the carrier (a common recorder disease), in fact made sideband 'noise' slightly worse.

TABLE 3 EQUIV INPUT NOISE

	Microphone input (loaded 200Ω)		Line input
	Unattenuated	attenuated	
Band limited 22Hz to 22kHz	—120dBm	—102.5dBm	—75.5dBm
'A' weighting rms	—127.5dBm	—106dBm	—78dBm
CCIR weighted rms ref 1kHz	—118dBm	—97dBm	—70dBm
CCIR weighted quasi-peak ref 1kHz	—114dBm	—92.5dBm	—64.5dBm

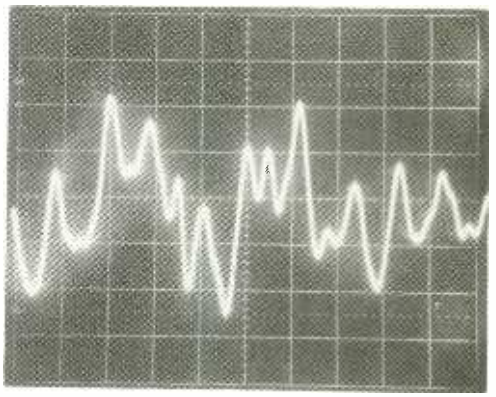
Drift in speed from one end of a NAB reel of tape to the other was found to be 0.05%—no complaint here, but the accuracy of the tape time left something to be desired with 1.5% error.

Other matters

Phase jitter between tracks was good as shown in **fig 9** for a 10kHz tone at 38cm/s with the peak to peak jitter in the order of ±10° as measured with a B & K phasemeter.

Operation of the machine was always quiet and the winding performance was good but not of the very best class—however the manufacturers have had the sense to limit the rewind speed to a sensible velocity.

FIG. 9 10kHz phase jitter at 38cm/s



Summary

This is a very versatile machine suitable for small studio or mobile use, one great advantage of many machines for these purposes being the versatility of the input arrangements.

The performance as measured with Ampex *456 Grand Master* tape is good for a machine of this class, but perhaps it is peculiar that no provision is made for adjusting the record equalisation for alternative tape types for which the machine is not pre-aligned.

Hugh Ford

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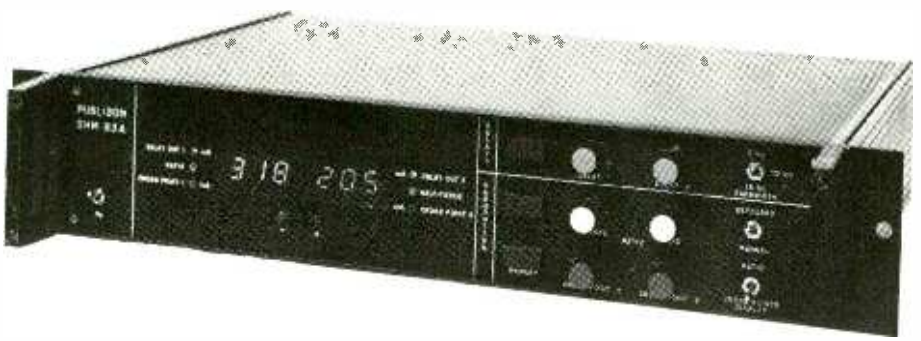

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MEMORY MODE with keyboard remote control, one can play with any memorised sound.
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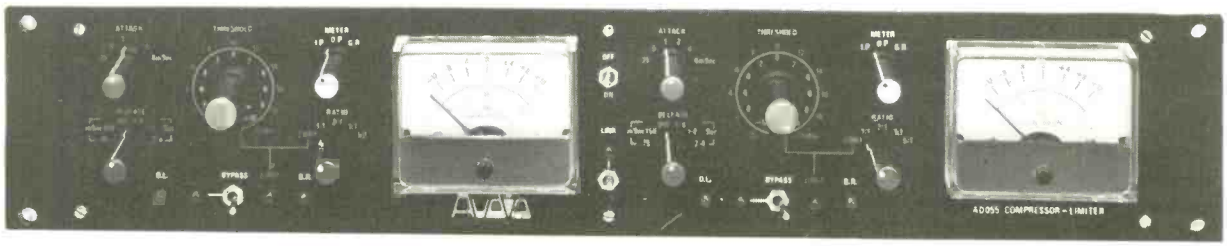
Studio Compressor-Limiter



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

Specification

RATIOS 2 : 1 3 : 1 5 : 1 Limit (20 : 1)
RELEASE TIME Adjustable — 75mS 150mS 300mS 600mS 1·2 sec 2·4 sec
ATTACK TIME Adjustable — 0·25mS 0·5mS 1mS 2mS 4mS 8mS
FREQUENCY RESPONSE 1dB 20 Hz to 30 kHz NO COMPRESSION
DISTORTION 0·1% at 1kHz to 10kHz NO COMPRESSION +8dB input
MAX. COMPRESSION 25dB
MAX. OUTPUT +19dB at 1kHz +12dB at 20Hz
MAX. INPUT Dependent on the MAX OUTPUT and MAX COMPRESSION.
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Audio Developments
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WALSALL, W. Midlands, WS9 9AU
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FORMULA SOUND

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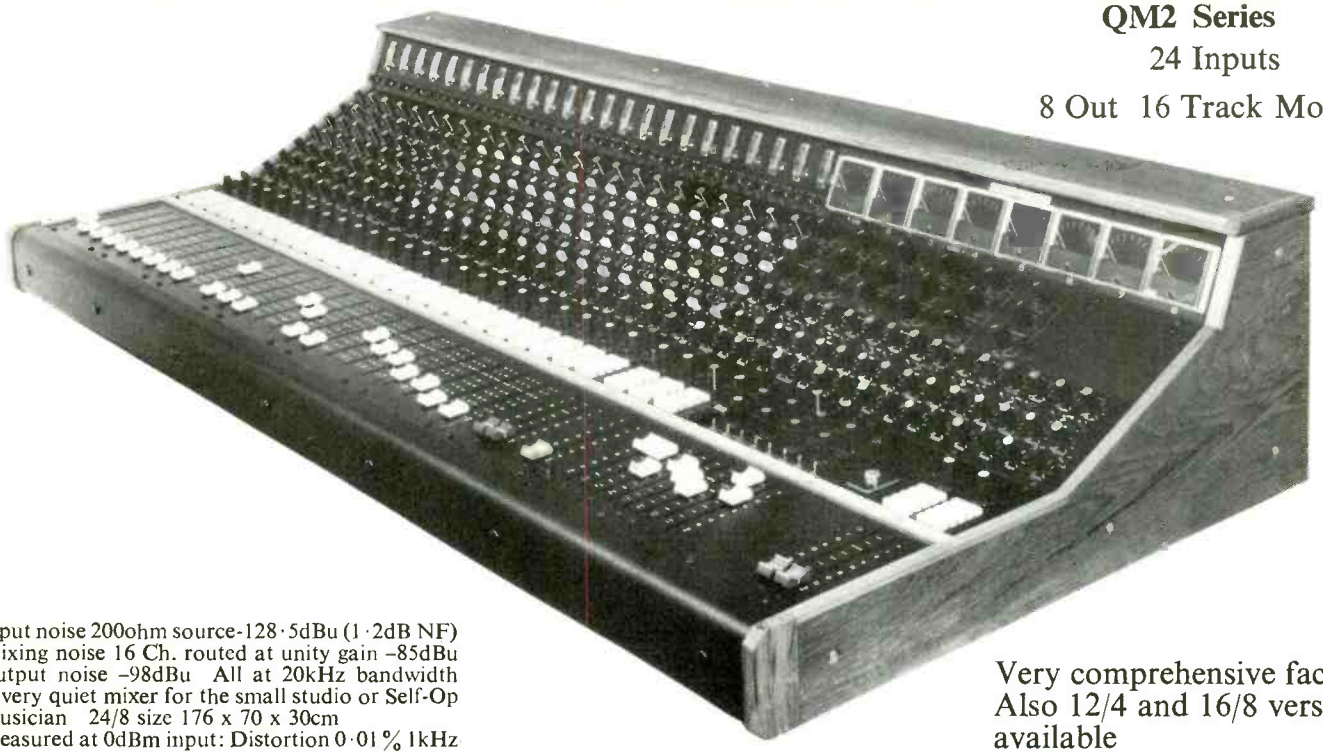

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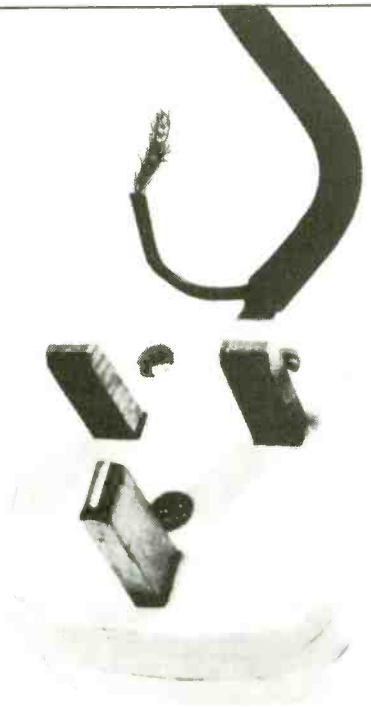

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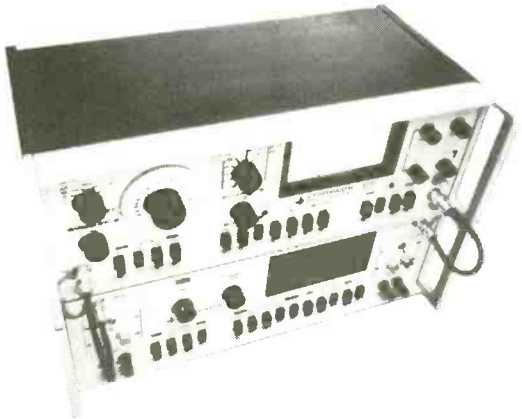

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★**Your tapes to disc.** Vinyl pressings, sleeves, labels. In our own pressing plant. Top quality. S.a.e. for photo leaflet. Deroy Records, Cove, Dunbartonshire G84. X

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★**Fanfare Records.** Tape-disc pressings, demo's, masters, any quantity. Studio/mobile Neumann disc cutter. S.A.E. brochure. 1 Broomfield Close, Rydes Hill, Guildford. Tel. 0483 61684. X

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★**Rack mounting kits** for Quad 405's, includes variable input control, XLR's, link switch, £35. Transformers, bridged mode, optional. For hire, Midas 16 into 4 console. Malcolm Chapman, Sound Reinforcement Services. 348 0212. L

★**Tape copying service.** Open reel and cassette available. The Music Laboratory, 01-349 1975. X

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★**8 Track studio equipment** including Soundcraft series II 16/8 (4 sweep). Raised meters to align with large matching patch-bay. All rosewood finished ends, leather cushions. Remote controls to Tascam 80-8, Revox 3.77. Assembly ready wired-up and brand new. Klark Teknik DN 27. Assorted cans 2 very special studio monitors containing Klipsch horns, horn-loaded PM4's and ribbon H/F units. Best offer over £8,900 lot. May split. Box 797, c/o *Studio Sound*. L

★**Current MCI Console** JH 528 stereo Quad 28 in and 24 out, operated only a few weeks, debugged and latest factory mods. Cherokee Recording Studios, phone (213) 653 3412. U.S.A. L

★**New high speed cassette copiers** available at substantial discounts. Wollensak/Alpha/Recordex, etc. Also available cassette loading machines and similar equipment. Typical saving is £250 plus on Wollensak 2770. Contact Geoffrey Yates, 01-363 6125. F

★**Revox NAB Adaptors.** Hammond type, new, boxed, guaranteed, £2 each. Revcx fibre carry cases only £4 each. Chymes (0734) 690177. L

★**Revox, Teac,** Otari, Brenell, Tascam, Nakamichi, Tannoy sales and service. The Music Laboratory. 01-349 1975 X

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★**Customised Allen & Heath** mixing console, 24 into 8 into 16; extras include large American jackfield, 48v phantom power, channel cut with L.E.D., E.q. cancel switches, pre or post switching on echo and fold back sends, VU or PPM monitoring. Two years old, mint condition, £2,350 o.n.o. Ring 802 7868. L

★**Pair Tannoy Cheviots,** ash/blue. Little used, v.g.c. £215. 2X Beyer M500 ribbon mics £27 each, ZX Beyer M260 ribbon mics £20 each. Tel. Brentwood (0277) 211519 evenings. L

★**Three EMI** BTR 2 tape recorders (half track mono) for sale. Modified and maintained by BBC engineers. Offers invited. Contact Mrs. Tamburrini B.I.R.S., 29 Exhibition Road, London S.W.7 or telephone 01-589 6603. L

★**8-track Ampex** AG-440 tape machine. Well maintained in excellent condition, £3,950 o.n.o. Tel. 01-668 3457. L

★**Latest Otari** 8-track tape machine. Soundcraft Series 2 16 into 8 desk with 4 sweep eq's, special jackfield and custom flight case. Both previously purchased for jingle writer, hardly used and now surplus to requirements. For sale at £5,850 together or might split. 994 3811 day, 992 3042 evenings. L

WANTED

★**Tannoy GRF** corner horns, good price offered for one pair in good condition, damaged ones considered. Tel. Mike 0473 49541. X

★**Pair of JBL 4350's** or Lockwood Majors, 3M's M79 stereo machine and 3M's M79 P.C. boards. Tel. 0203-21000. X

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

★**Teac 3340 (S) urgently wanted.** The Music Laboratory. 01-349 1975. X

★**Tannoy Speakers Wanted.** The Music Laboratory. 01-349 1975. X

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★**Major New York City** recording studio seeking top notch creative maintenance engineer. Excellent opportunity. All enquiries confidential. c/o Studio, P.O. Box 275, Old Chelsea Station, New York (New York 10011), U.S.A. L

★**Part-time vacancy** for an experienced maintenance person in a 24-track studio in North London. If interested, please contact Sarah on 340 7873 or 340 4757. L

SITUATIONS WANTED

★**Capable creative** electronics engineer (30), conversant in analogue and digital, 7 years varied industrial experience, plus 3 years with 16 track studio, seeks well paid position with London studio or similar. Box 795, c/o *Studio Sound.* L

VACANCIES IN SOUND OPERATIONS

We are looking for one or two additional operational staff in our Sound Department. We would like to hear from any experienced sound technicians interested in joining us, either people already working in television or alternatively wishing to move from radio or sound recording. We will also consider less experienced people for appointment as trainees. The essential requirements are a good general education to A-level standard or better, together with a keen interest in high fidelity sound reproduction. Other interests should tend towards the artistic, particularly music, where instrumental ability will be an added advantage. The age limits for Trainee candidates are 20 to 25 years.

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Salary range £4,362 plus L.W.A. £435. Apply in writing by 2nd January latest to

Assistant Bursar, Royal College of Music, Prince Consort Road, London S.W.7

giving relevant experience

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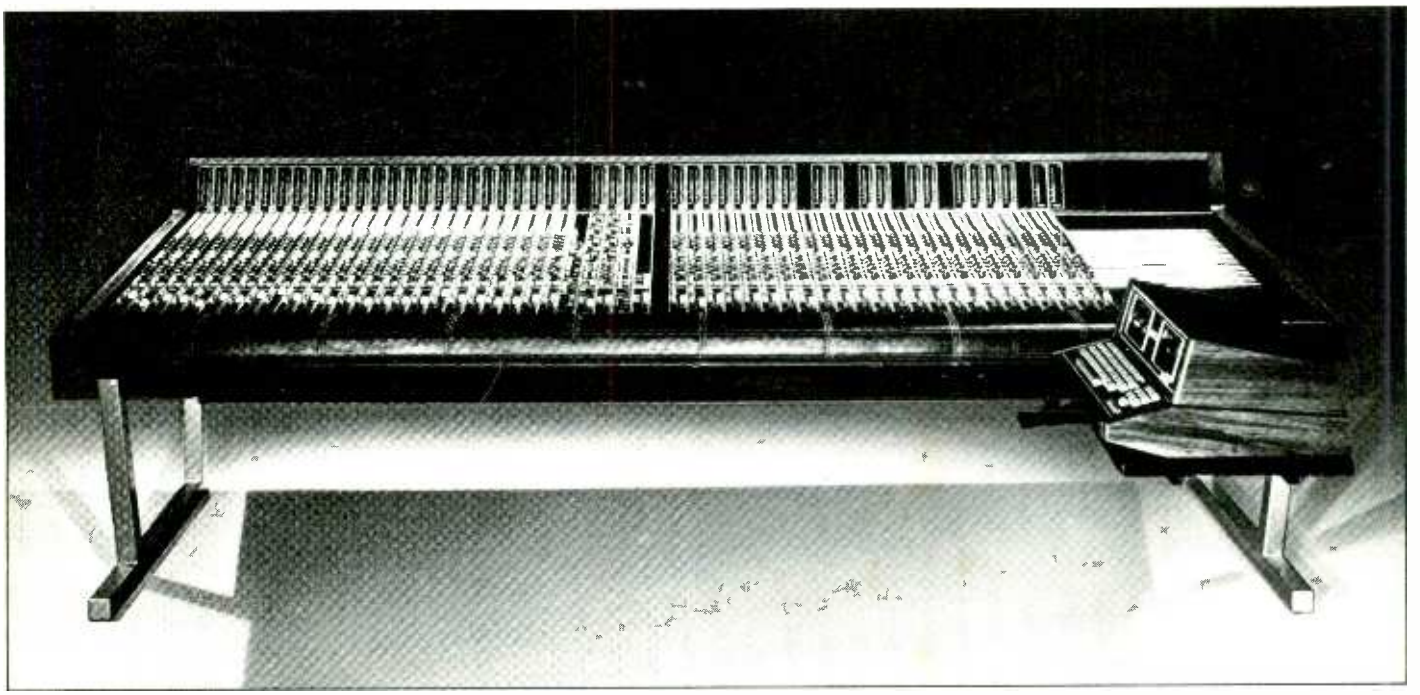

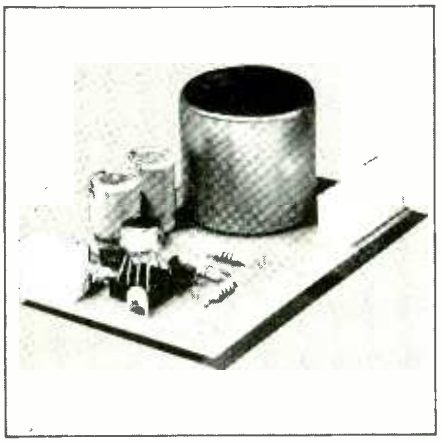

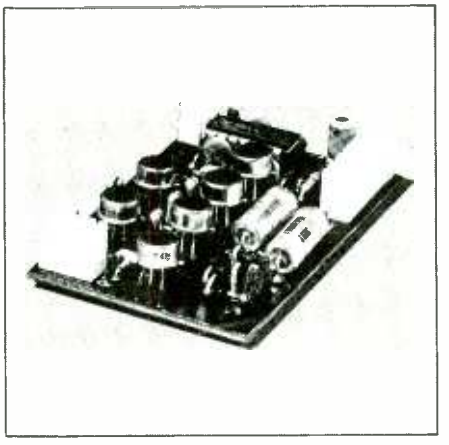

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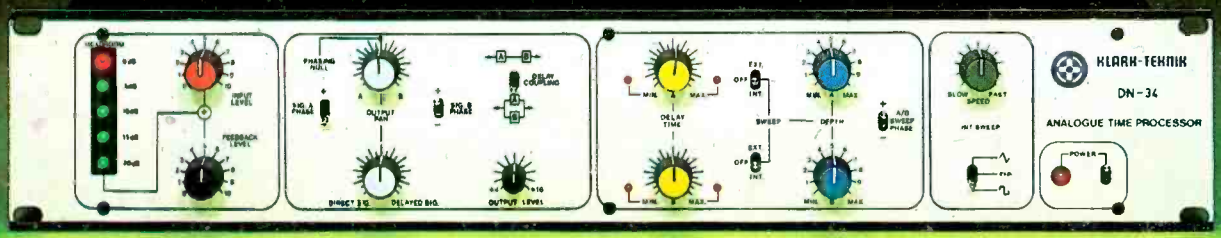
The new DN34 analogue time processor.



Think of the effect you'll have.

The new DN34 analogue time processor is an exceptionally versatile signal processing and special effects unit, designed around two discrete, independently controllable delay sections.

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With a product of this stature you can achieve all these effects cleanly and noiselessly.

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- Negative flanging.
- Double tracking.
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- Triple tracking.
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- True vibrato.
- Chorus.
- 'Cardboard tube' echo.
- Doppler / Leslie effects.

And, if this isn't enough, the DN34 can give you such new effects as:—

- Crossover flanging.
- Time-related frequency synthesis.
- Complex Doppler effects.

The DN34 analogue time processor also offers you:-

- A dynamic range better than 90dB.
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- T.H.D. at less than 0.3%.
- Numerous exclusive features including full 'on board' mixing and phase reversal facilities.
- Amazing performance and value for money.

The DN34 is unequalled in the signal processing field today.

And we're not just saying that for effect.

KLARK-TEKNIK

You know it's the best.

For further information about the DN34, our new DN70 digital time processor, and also our DN27 and DN22 graphic equalisers:
Klark-Teknik Research Limited, Summerfield,
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Telephone: Kidderminster (0562) 64027 Telex: 339821.

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