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AND BROADCAST ENGINEERING

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A LINK HOUSE
PUBLICATION



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Limits to growth?

With the expansion of the British Independent Local Radio network, plus the additions to the BBC's local radio system and the re-equipping being carried out by many of Britain's older stations, radio broadcasting is now one of the fastest-growing areas in this country's audio industry. There are more companies involved in the broadcasting field than ever before, and business is quite brisk, providing a welcome shot in the arm for many companies who previously relied primarily on recording studios for their orders. And, of course, broadcasting doesn't just mean transmitters and consoles—every aspect of professional audio is brought into play in the commissioning of a new station, from architectural design, to amplification and monitoring, to tape recorders and cartridge machines.

In addition, many stations are equipping with respectable multitrack recording facilities for their own productions, be they commercials and jingles, or bands. Such facilities, while they may be 16 rather than 24-track, and in other ways perhaps less-sophisticated than the really big commercial studios, do add a much-needed outlet for talent local to a station's service area. As a result, there is the chance that more acts will get airplay than would previously have been the case.

But there are limitations in British broadcasting which effectively prevent these two industry sectors helping each other as much as they could. There is still controversy over whether airplay actually sells records, or whether it encourages listeners to tape tracks they hear on the air, rather than buying them. The BPI insist that the latter is true, and that 'needletime' agreements which exist today allow radio stations

to have something to do, yet safeguard record sales by not playing too many. It would be interesting to see what the Stateside view of this controversy is, where 'needletime' limitations do not exist. It seems to me that while airplay *may* hurt singles sales due to taping, it also brings them to the attention of the public, and that playing album tracks can do nothing else but sell the records from which they come.

But the majority of British stations playing 'popular' music rely on singles rather than album tracks. One reason for this is that there are so few radio stations that each outlet must be all things to all listeners, and that means lowest-common-denominator programming, which will tend to be 'Top 40' and little else. A large increase in the number of stations would encourage diversity and specialisation—a development which is addressed in detail in this issue. I cannot see that more, and specialised, radio stations could do anything other than encourage all aspects of the professional audio industry. Many of us can still remember the significant blossoming of the record industry which occurred during the '60s as a result of the offshore 'pirates'—while they were primarily 'Top 40' stations, they were also national, or at least regional, and had to be different. Today, that diversification does not exist, because although many more stations are on the air, they are largely local, or cover small regions. We would be most interested in hearing readers' comments on the ideas expressed in our article. Would a greater exploitation of radio be a good thing for the audio industry, and the British entertainment industry in general, or would it, as the BPI and certain others would seem to suggest, lead to the end of musicians' livelihoods? American experience would seem to indicate the former, but we'd like to hear your opinion.

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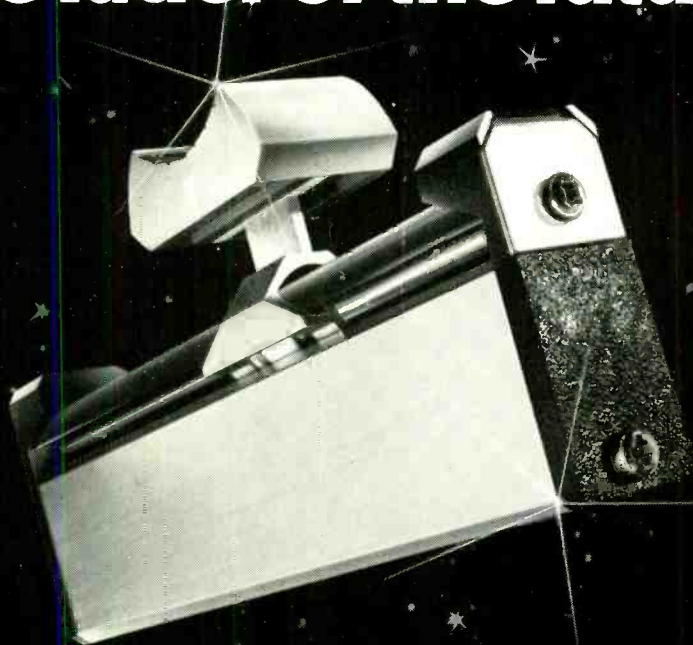
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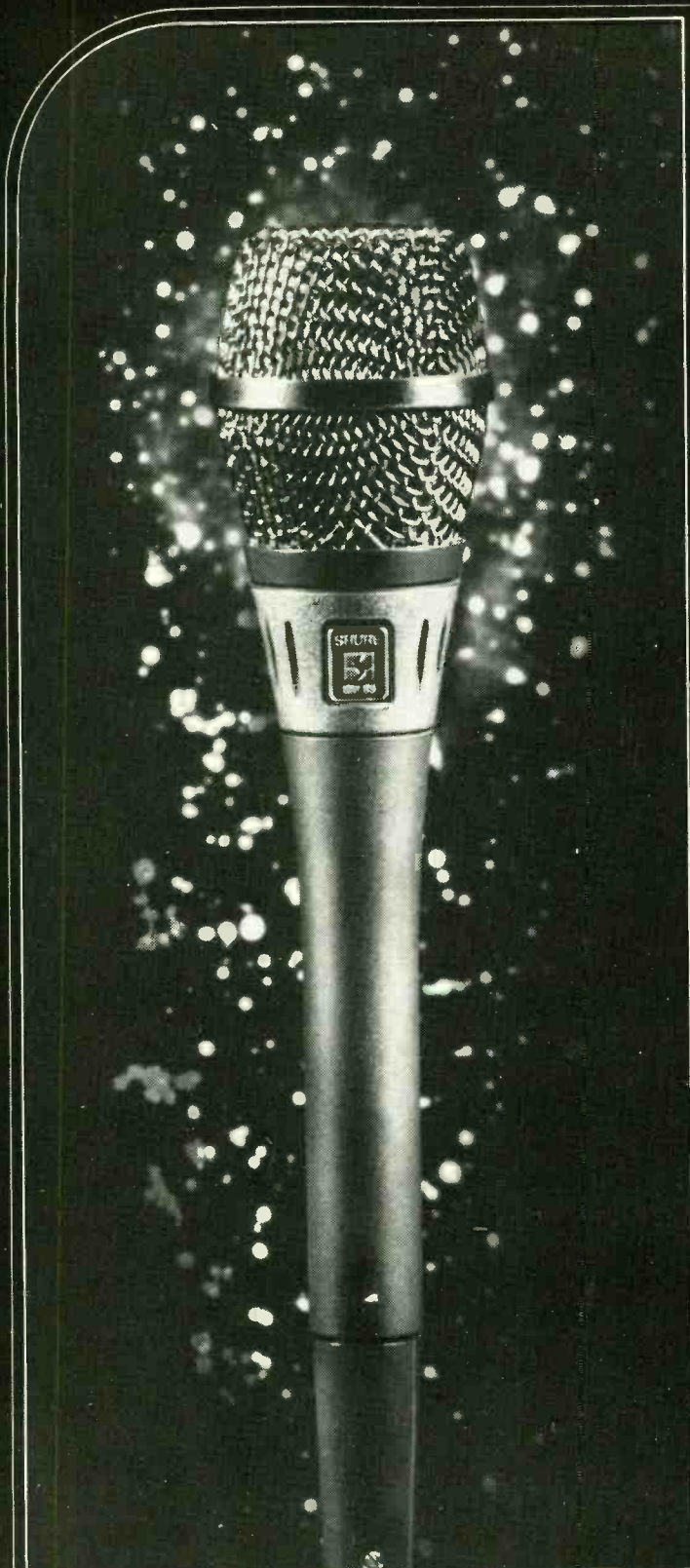
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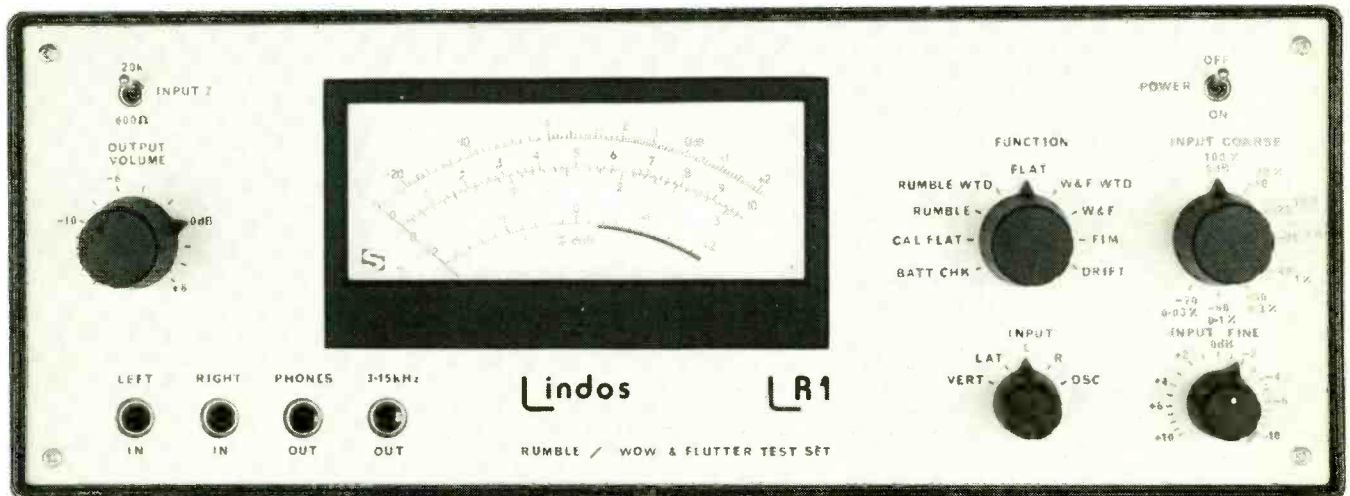
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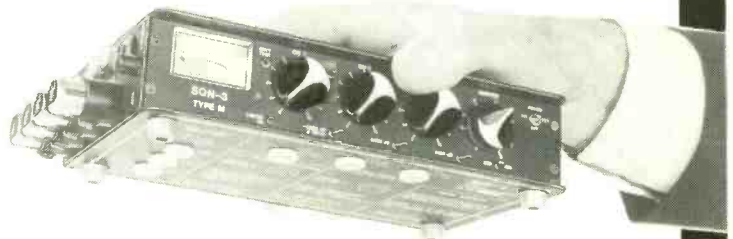
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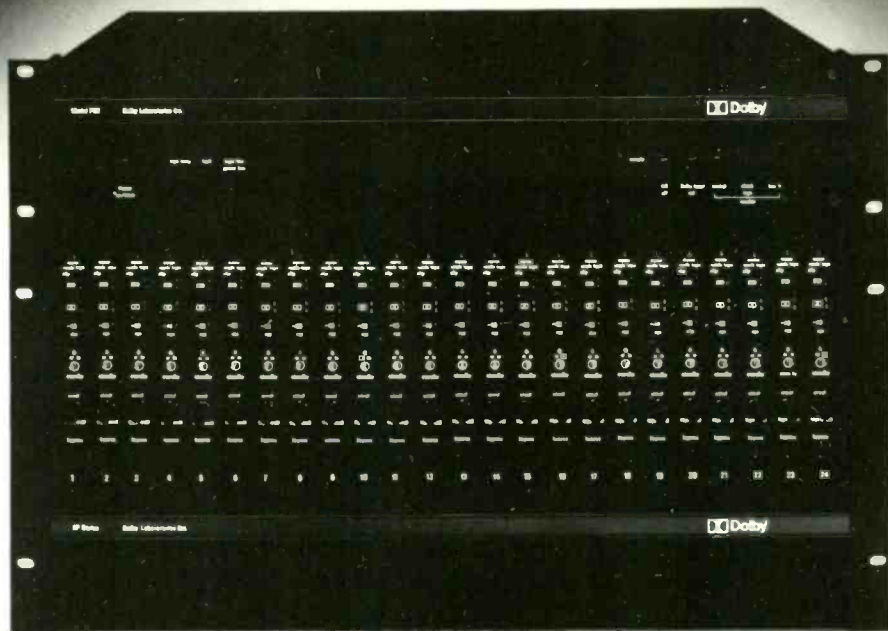


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Dolby noise reduction is an integral part of professional multi-track recording practice in music, radio and TV broadcasting, and film studios throughout the world. A new noise reduction unit, the Dolby SP Series, has been developed for these and other applications, and provides up to 24 tracks of Dolby A-type noise reduction in only 12¼" of rack space. The SP Series' combination of compact size, ease of operation, and new features makes it ideal for equipping new recording facilities and upgrading existing ones.

For further information on the SP Series and other professional noise reduction equipment, contact Dolby Laboratories.

Highlights of the Dolby SP Series:

- Up to 24 tracks in only 12¼" of rack space, including power supply.
- Dolby A-type noise reduction characteristics utilizing standard Dolby Cat. No. 22 modules.
- Separate regulated power supply unit with electronically-controlled output protection.
- Low-noise fan cooling.
- LED display for each track permits accurate Dolby level calibration (within ±0.1 dB if desired) by matching intensity of LED pairs; further LEDs

indicate the presence of signals and clipping, and assist alignment with high-level reference tapes.

- Front-panel "UNCAL" control for each track permits rapid resetting of Dolby level for playback and punch-in on nonstandard-level tapes, then instant restoration of preferred preset studio Dolby level without recalibration.
- User-selectable option of "hard" or electronically-buffered bypass of individual tracks and of all tracks simultaneously.
- Snap-fit connectors on rear panel for rapid disconnection and reconnection.
- Balanced and floating input stages.
- Output stages drive either single-ended or balanced 600-ohm loads at levels up to +28 dB (19.5 V) before clipping.
- Ultra-low-distortion input and output amplifiers.
- Remote ground-sensing output configuration minimizes hum pickup when driving single-ended loads.
- Discrete FET switching for reliable, noise-free routing of audio signals.

Dolby Laboratories, 731 Sansome Street, San Francisco, California 94111, Telephone 415-392-0300, Telex 34409. 346 Clapham Road, London SW9, Telephone 01-720-1111, Telex 919109. "Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation. S81/3621



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Telephone 01-953 0091 Telex 27502



MXT-1000

A flexible mixing system offering a wide selection of different modules for two or four group operation. The MXT-1000 is designed mainly for broadcasters and is used widely in Radio, and Television studios and outside broadcast vehicles, where full broadcast standards are required.



Audix Limited, Wenden, Saffron Walden, Essex CB11 4LG, England
 Telephone: Saffron Walden (0799) 40888 Telex: 817444 Cables: 'Audix Walden'

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with the SM 24/16/2

To complete an already successful range of Multitrack consoles we invite you to compare quality, specification and price of our new 24 input 16 track recording console with the competition.



**£3000
Plus VAT**

- * Transformer balanced inputs
- * 5 band EQ (switchable mid freqs)
- * 3 aux sends
- * Up to 16 aux returns (2 as STD) AS
- * Push button routing
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- * Extremely low noise circuitry
- * Fully modular construction
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16 plus Fact File

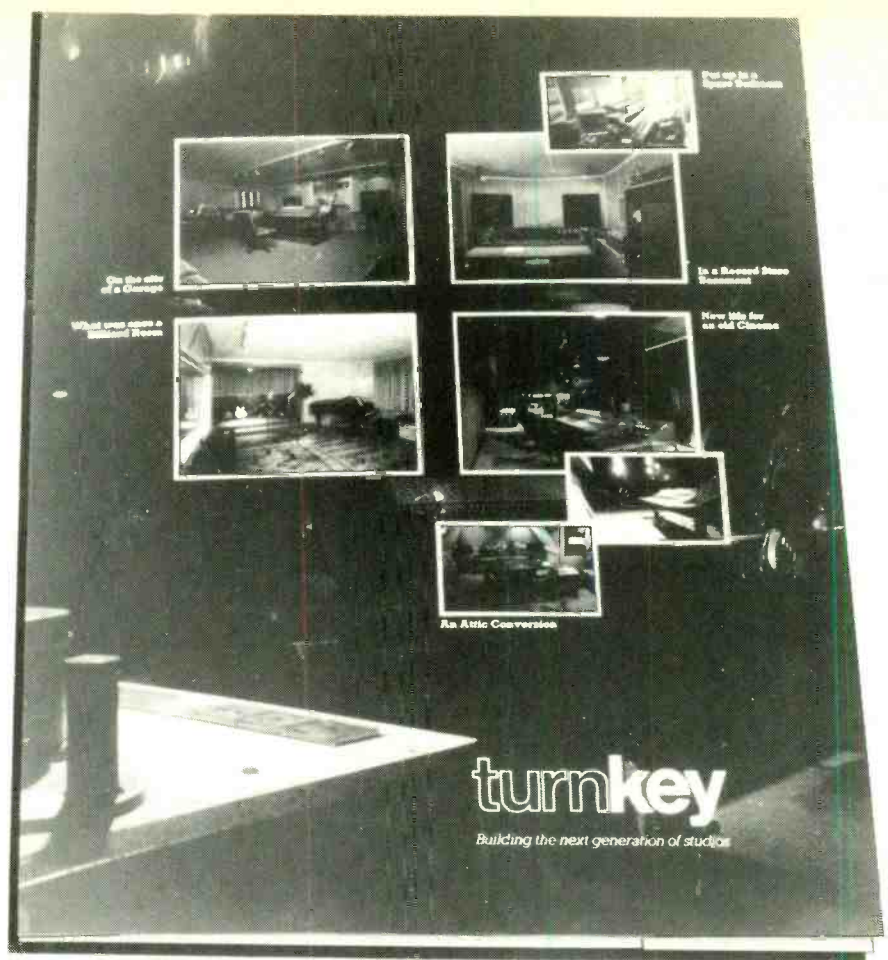
Building 16 and 24 track studios is our business. In castles, cinemas, attics, and basements to name but a few. Some are in our hands from the time the first brick is laid, others we equip and commission.

Based on our involvement with these projects and their problems, we have prepared a unique file of information. It contains vital facts and figures, covering all aspects of establishing a successful studio.

The sixteen plus fact file is essential reading for anyone involved in establishing a professional multitrack studio. Write or call **Andrew Stirling** now for your copy.

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Telex 25769



In brief, this 40 page file covers;

What to look for in a building and what to ask the local authorities.

Building from the ground up, what it costs and how long it takes.

Studio Cashflow Planner and completed examples.

Finance and how to get it, what to tell your bank manager.

Package quotes for complete 16 & 24 track installations including wiring and installation.

How to avoid the signal processing trap.

The cost of running a studio and how much you can charge.

Advertise your studio for maximum response, where and how.

Specialising your services for maximum return.

Automation, the format fight and the future.

Building the next generation of studios.



18-21 September 1982

IBC 82 will be held at the Metropole Conference and Exhibition Centre
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The **TECHNICAL PROGRAMME** of papers by specialist authors and discussions will cover new techniques, systems and developments in sound and television and allied fields.

The **IBC EXHIBITION** complementing the technical sessions will have the latest professional broadcasting equipment on display and demonstration by leading world manufacturers.

The **SOCIAL PROGRAMME** during the Convention will include a Reception and a special Ladies Programme of talks and demonstrations and visits to places of interest.

FURTHER INFORMATION can be obtained by returning the reply coupon below.



The IBC Secretariat, The Institution of Electrical Engineers,
Savoy Place, London, United Kingdom WC2R 0BL.
Telex: 261176 Telephone: 01- 240 1871



Please send further details of IBC 82 to:

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Judge for yourself. Some swear it's a trick, others swear by it. Aural excitement is a patent psychoacoustic process that corrects for generation loss. If you programme or produce music, you should discover how the EXR improves separation, enhances music and adds loudness.

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Listen on a legend. A compact British amplifier is now available to drive Teak and Road versions for personal monitoring.

Goldline Analyser

A price breakthrough in hand held analysers. Built in microphone displays signal on a 10 by 10 LED matrix. Kit includes a white/pink noise for rapid alignment of equipment and sound systems. Now you can trim controls and see the results.

Annis Magnetometer

Play safe. Point the base of this precision instrument at tape path components and any residual magnetism registers on the scale. It's the only way to be sure you are not damaging precious masters.

Wright Microphone

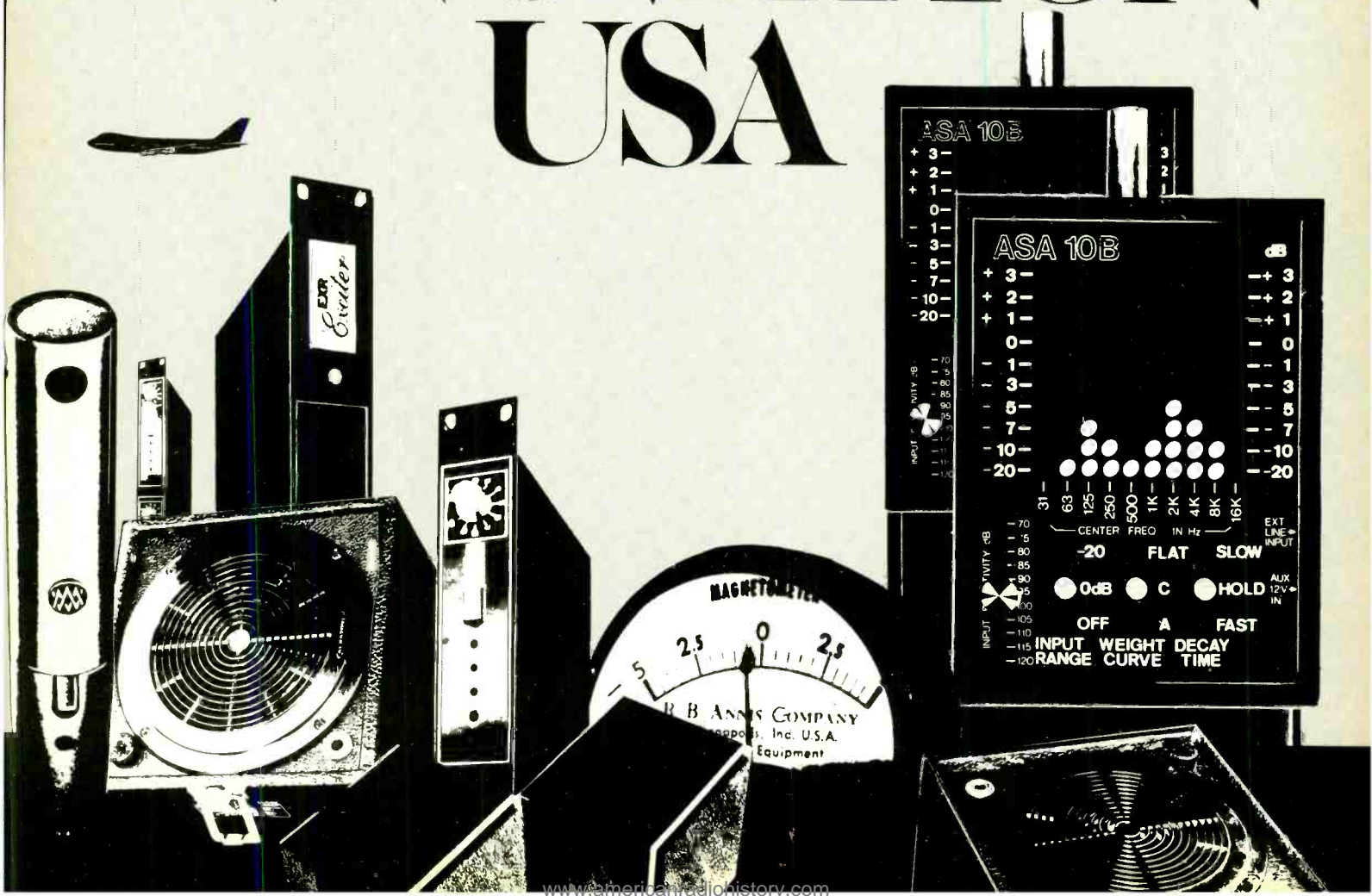
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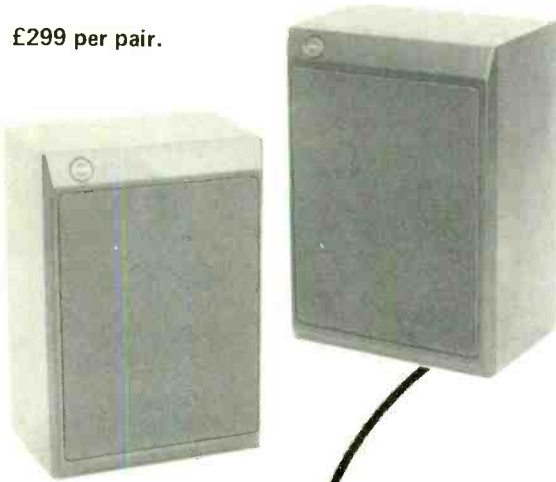
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Fitted in a Flight Case — ideal for Stage and Studio use. 16 mic. inputs/26 line inputs, 3 band E.Q., 3 auxiliary sends, 2 echo returns, routing to 8 sub-groups and remix buss.

A very versatile Mixer at only £999



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BEL BF20 True Stereo Flanger — with keying facility and VC inputs and outputs.

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A range of tape recorders designed for demanding users (typical wow and flutter .03% CCIR at 15 i.p.s.), who can upgrade their equipment as their needs evolve through a wide range of accessories and options such as: remote control panel, varispeed unit with ± 13 semi-tone range, tape marker, scissors, NAB hub adaptors, monitoring loud-speaker...

When ordering your recorder, you may select: 2 of the 4 capstan speeds, the tape deck height, your usual equalization standard (CCIR/NAB), the head assembly corresponding to your type of

operation (mono / stereo / two-track, with full or separate overlapping track erasure), etc.

...And you can change your mind later by upgrading your configuration at your convenience for a minimum cost.

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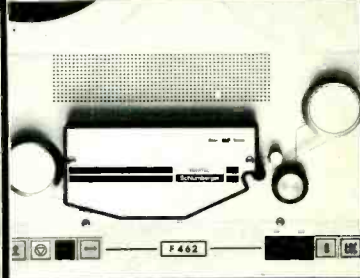
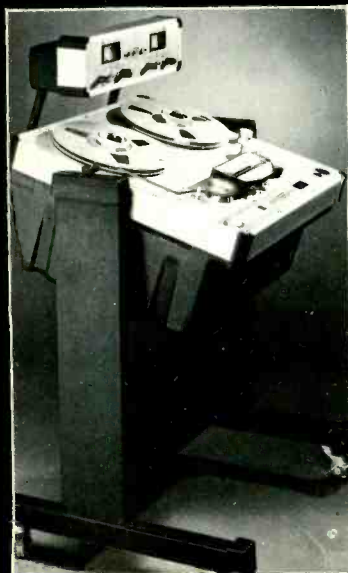
Give us a call. We'll let you know how and where you can try this product (Why not in your own studio?).

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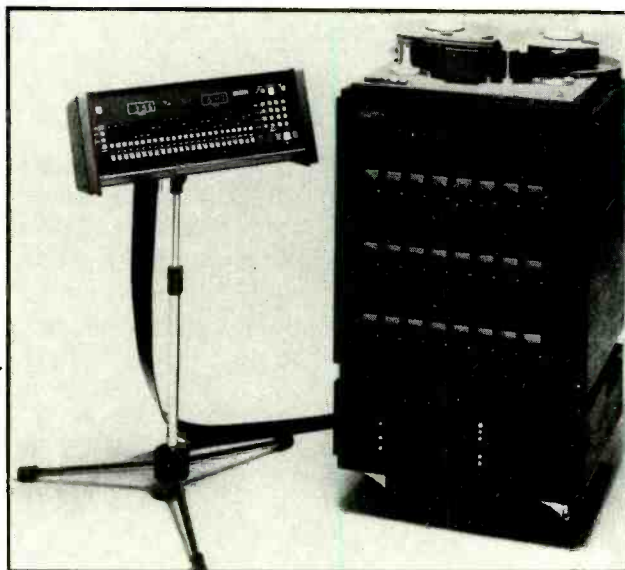


20-way Frame shown

◀ **RAINDIRK CONCORD 28 x 28**

In-Line Console

The RAINDIRK CONCORD Mixer Console is a high quality Mixer which is an ideal partner for the SOUNDCRAFT range of professional Multitrack Machines.



Soundcraft 762 - 24X with 9 memory Auto-Locator

▶ The SOUNDCRAFT 762-24, 24-track 2" Machine, with standard Remote, locate zero and Auto-Cycle function. This high quality, compact, fully professional 24-track Machine, comes with the well proven SOUNDCRAFT back-up and reliability factor, well known throughout the World, and is a must for the discerning Studio Proprietor, with an eye to current Studio economics.

The CONCORD is housed in an attractive wooden Console, and is supplied with a full patchbay. Being an In-Line Mixer, it has the capability of using the Monitors in Remix, giving 56 inputs during mix-down.

The CONCORD has silent Prom Switching with master Status Control, which can be over-ridden on the Channels. Each input has separate Mic and Line inputs, with a 20dB Pad on the Mic Amp. The EQ section has high and low shelving, with two swept mid sections, plus a low frequency filter.

There are four Auxiliary busses, including a stereo fold-back send. The Monitoring is on the input channels, making the CONCORD a very compact Console, while having the facilities of a much larger Desk.

**The SOUNDCRAFT/CONCORD Package is available only from:
DON LARKING AUDIO SALES**

**The Individual prices are: SOUNDCRAFT 762-24 £8,750
RAINDIRK CONCORD 28/28 £7,000**

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Teac 80/8
Teac 85/16B
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Quad 405
Amcron D150
Amcron DC310A
H.H. V200
H.H. V800

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Teac M35 8x4
Teac 2A 6x4
Teac M15 24x8
Studiomaster 8x4
Studiomaster 16x8
Allen & Heath 16-4-2
Allen & Heath Mod 3 16x8
T.A.C. 16-8-2
Soundcraft 1s 16-2
Syncon A
Syncon B

TIME DELAYS

Delta Lab DL1
Delta Lab DL2
Delta Lab DL4
Lexicon PCM 41
Lexicon Prime Time
Bel BA40
MXR Digital

- EQUALISERS
- MICROPHONES
- CABLE
- EFFECTS

MUSIC LAB'S PACKAGE DEALS FOR THE MONTH:

Teac 80/8 ½" 8 track/varispeed
8 track Teac DX8 noise reduction = £2,600.00

8 track 1" Brenell Mini 8 1" varispeed/remote control
Allen & Heath 16x8 = £5,495.00

16 track 1" Tascam 85/16 inc. dbx
Tascam Mod 15 24x8 16 track monitoring,
auto locator. = £9,950.00

HIRE & SERVICE DEPARTMENT WORLD-WIDE EXPORT
COMPLETE INSTALLATION WORK



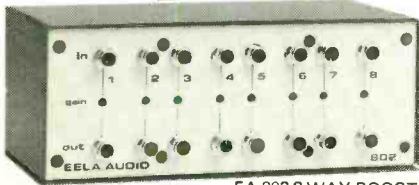
72 Eversholt Street, Euston, London NW1. 01-388 5392

EELA AUDIO STUDIO EQUIPMENT

EA 800 SERIES



EA 850 STAGE BOX



EA 802 8 WAY BOOSTER



EA 803 TELEPHONE HYBRID



EA 804 STEREO DISC PREAMP



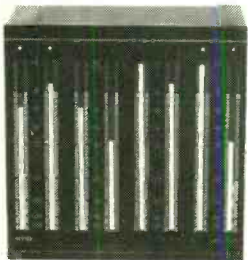
EA 806 PHANTOM SUPPLY



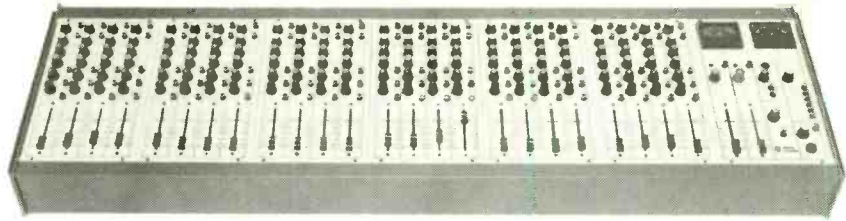
EA 809 PHASE METER



EA 823 TEST METER



RTW
STEREO
AND
MULTI-TRACK
BAR GRAPH
METERS.



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



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



S191 Particularly suited to audiovisual facilities.



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



Musicoder Music can be used either as the control or programme.



Dynaset U311 Dual threshold stereo compressor limiter expander.

R. BARTH KG . Grillparzerstr.6a . D.2000 Hamburg 76 . W. Germany

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hoddlesdon, herts
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STD 099 24 68674

TRIMIX

Trident Audio are proud to announce their new range of expandable consoles: Trimix.

Trimix offers all the previous features of the well established Fleximix system, plus more facilities at a similar price

Trimix features

- Compact size: Each mainframe housing up to 24 modules measures only 40" wide.
- Any module can be placed anywhere in the mainframe allowing 'ergonomic tailoring' to customer's requirements.
- 4 band equalisation on each input plus 60 Hz filter and EQ bypass.
- 4 auxiliary sends, each switchable pre or post fader.
- Separate mic and line gain controls.
- Precision five L.E.D. level indicator on each input module.

- Eight group outputs plus separate stereo master outputs.
- Long throw conductive plastic faders on both inputs and outputs.
- Comprehensive monitoring facilities including monitor pan, monitor level and mute for each group output/machine return.
- Full sub-grouping facilities.
- V.U. metering as standard, L.E.D. column P.P.M.'s available as an option.
- Can be 'Fadex' automated at any time.
- Frames can be joined together both electrically and mechanically to make larger systems.
- Eight way monitor module available to provide sixteen track monitoring.
- Integral patchbay available.

Trident Worldwide Representation:

U.S.A. Studio Maintenance Services,
Los Angeles.
Tel: 213-877-3311
Wilson Audio Sales, Nashville.
Tel: 615-794-0155
Trident (U.S.A.) Inc.,
652 Glenbrook Road, Stamford,
Connecticut 06906 U.S.A.
Tel: 203-348-4969

Australia John Barry Group, Sydney.
Tel: 2-439-6955

Belgium A.S.C. Professional Audio Consultants, Brussels.
Tel: 2-520-0827

Canada Heint Electronics Inc., Markham, Ontario.
Tel: 416-495-0688

France Lazare Electronics, Paris.
Tel: 1-878-62-10

Holland Dick Swaneveld, Hilversum.
Tel: 35-17722

India Kapco Sound Studio, New Delhi.
Tel: 43718

New Zealand Mandrill Recording Studios, Auckland.
Tel: 9-793222

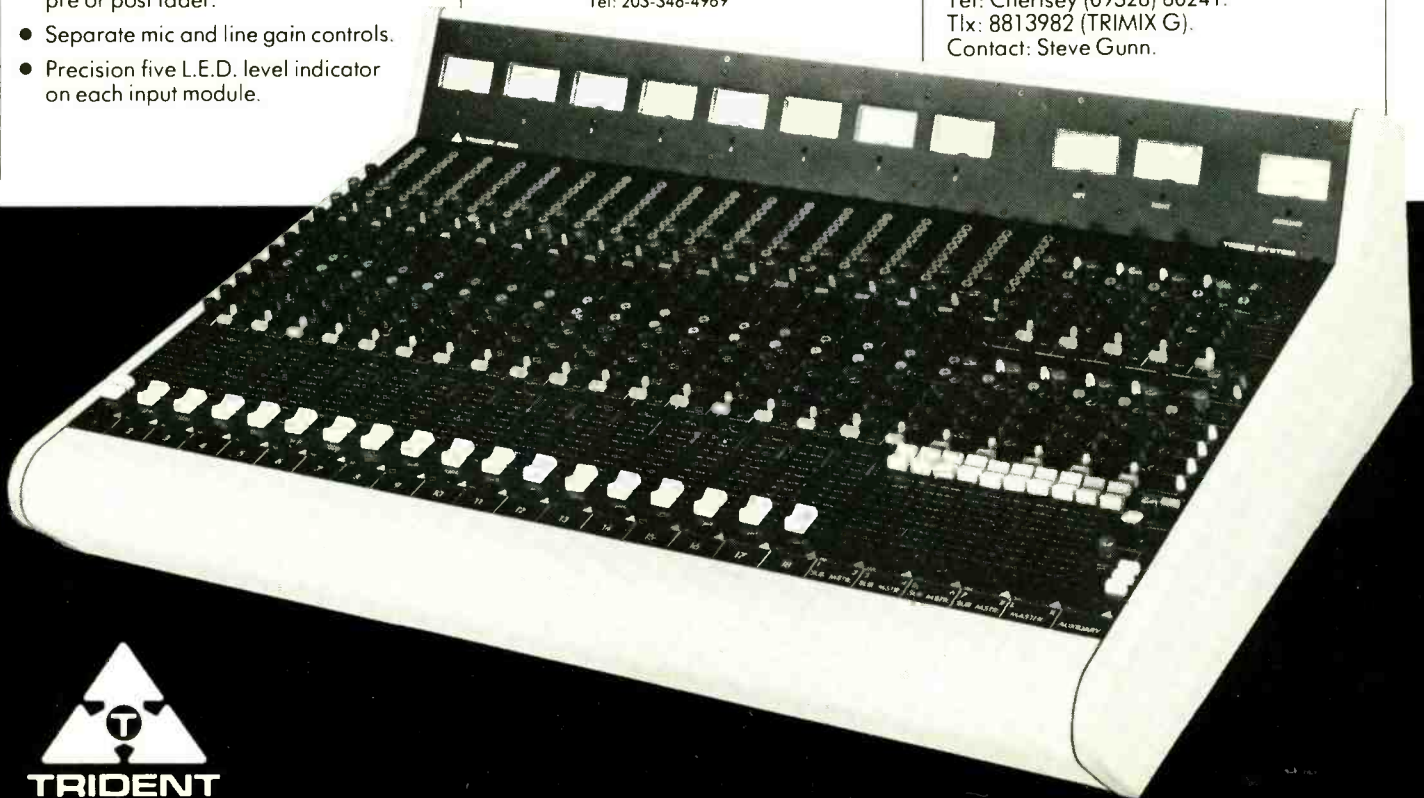
Norway Pratechnic A.S., Oslo.
Tel: 2-46-05-54

S Africa Leephy (Pty) Ltd., Blairgowrie 2194, Johannesburg.
Tel: 11-789 2424

Sweden Stage & Studio, Gothenburg.
Tel: 31-22-40-90

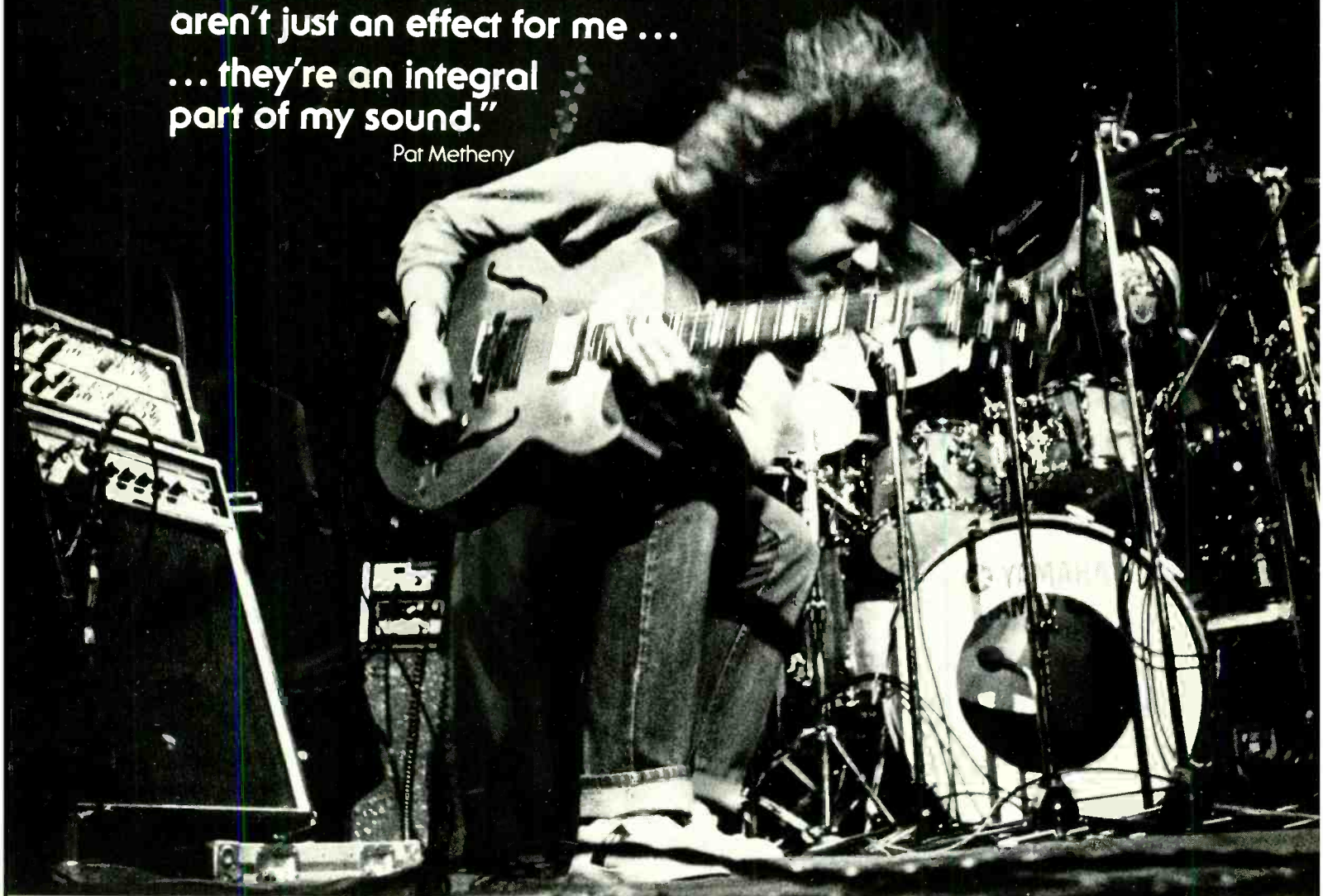
Taiwan Linfair Engineering & Trading Ltd., Taipei.
Tel: 3214454-7

Trident Audio Developments Ltd.
Shepperton Studio Centre,
Post No. 38, Studios Road,
Shepperton, Middx. TW17 0QD, U.K.
Tel: Chertsey (09328) 60241.
Tlx: 8813982 (TRIMIX G).
Contact: Steve Gunn.



**"Lexicon Prime Times
aren't just an effect for me ...
... they're an integral
part of my sound."**

Pat Metheny



Pat Metheny records for ECM Records.

"I felt I needed a bigger guitar sound, and the sound engineer at Talent Studios in Oslo where I was recording told me to wait while he plugged in a box. What came over the monitor was the greatest guitar sound I'd ever heard, something I'd been seeking for many years. The box was a Lexicon digital delay."

"I'm amazed at the guitar sound I get from Prime Time. No other delay has its warmth. Prime Time creates a space around the sound which in a lot of ways is as important as the sound itself. Knowledgeable listeners say our concerts sound like our records. Much of that can be attributed to the Lexicon Prime Time."

"Today, I use five Lexicon systems on a typical concert, of which I do about 300 a year. On stage at my right hand is a Prime Time; another Prime Time is at the board that mixes the drums and piano. A third Prime Time is used on the PA line. We also use a Model 92 and the new 224 digital reverb."

If you'd like to experience the sound enhancement that's made Lexicon's Prime Time the favorite of Pat Metheny and dozens of top touring and recording groups, circle reader service number or write to us. We'll arrange to get you into Prime Time.

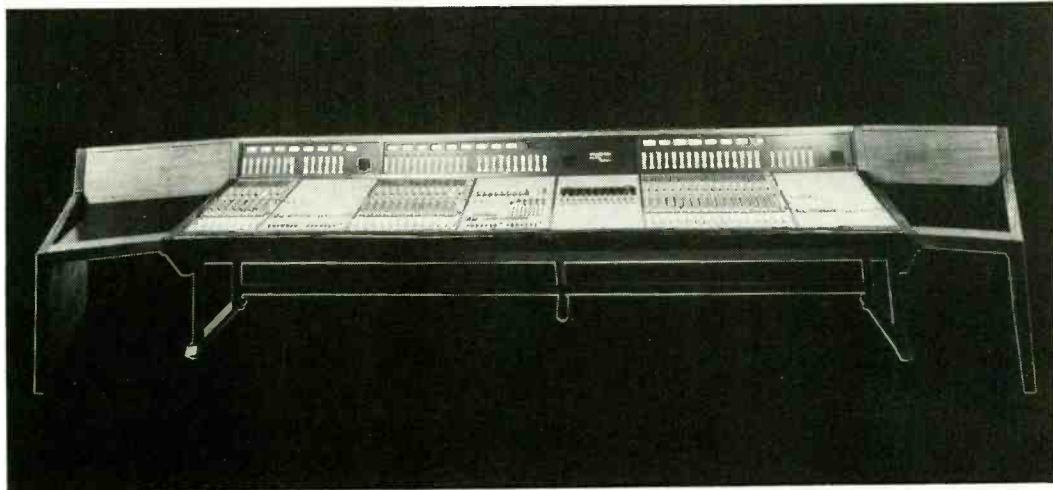


lexicon

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

Amek film console

Console manufacturer Amek Systems and Controls has joined the select group of manufacturers able to supply large custom formatted film dubbing consoles. The accompanying photograph shows the first Amek M4000 36-input film console to be commissioned. This desk was built for Motion Picture Recording Inc in Hollywood, and is designed for 3-man operation (dialogue, effects and music). It is capable of handling mono optical, 3- and 4-channel stereo, Dolby stereo optical, 6-channel stereo or Dolby 70mm stereo recording. The console also features a full 8-stripe monitoring section.



AES Conference

At the New York AES Convention last year it was decided to develop a series of AES conferences as an additional means of disseminating technical information to AES members. The AES has now announced details of its first such conference. Theme of the conference is *The New World of Digital Audio* and it is to be held from June 4 to 6, 1982 at the Rye Town Hilton, Rye, New York. The conference will include scientific papers covering such topics as the digital disc, high density magnetic recording, high density optical recording, digital data protection and preservation, error correction, encoding and transcoding, and digital music. In addition it is intended that a limited exhibition of digital audio products will also take place. Further details are available from: **Audio Engineering Society, 60 East 42nd Street, New York, NY 10165, USA. Phone: (212) 661-2355.**

Forthcoming Exhibitions

March 14 to 18
International Music Show, London (01-727 2666).

April 4 to 7
NAB Convention, Dallas ((202) 293-3500).

June 23 to 25
APRS Exhibition, London (09237 72907).

September 18 to 21
International Broadcasting Convention, Brighton (01-240 1871).

September 28
Sound Broadcasting Equipment Show, Birmingham (0734 53411).

October 22 to 25
AES 72nd Convention, Anaheim, USA ((212) 661-2355).

Klark-Teknik DN60

Further to our review of the Klark-Teknik DN60 realtime spectrum analyser which appeared in the February issue, Klark-Teknik has informed us that the price of the unit and accessories has increased. The new prices are as follows: basic DN60 £1,095; internal communications interface £170; XY plotter interface £100; Paper Tiger interface £100; RT60 reverberation analyser £225; mic preamp £80; and mic capsule £45. Prices of the printer and XY plotter are available on application.

Klark-Teknik Research Ltd, Walter Nash Road West, Coppice Trading Estate, Kidderminster, Worcs DY11 7HS, UK. Phone: 0562 741515. Telex 339821.

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

AHB USA

Allen & Heath Brenell (USA) Ltd is the name of a new company set up to handle the AHB range of professional recording equipment, including consoles and tape machines, in the USA. The company is based at 652 Glenbrook Road, Stamford, Connecticut 06906, phone: (203) 359-2312 and is headed by Robert Berliner. National sales manager is Chuck Augustowski.

Errata

On page 30 of the February news item on Gauss studio monitors, we inadvertently quoted an incorrect address for the UK distributors. This should have read: **HHB Hire and Sales, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. Phone: 01-961 3295.**

We apologise for any resulting embarrassment to all concerned.

Address change

● C-Tape Developments Ltd, producer of the *C-ducer* contact mic system, has moved to a new factory. C-Tape Developments Ltd, Unit 19, Holder Road, Aldershot, Hants GU12 4RH, UK. Phone: 0252 319171. Telex: 858623 or 858393.

Forced to change pitch?

AMS have asked us to publish the following statement:

"Advanced Music Systems and Quintek Distribution Inc acknowledge that *Harmonizer* is a valid trademark owned by Eventide Clockworks Inc and only identifies certain products of Eventide."

New cable facility

Baard Snilsberg, managing director of NEK (Norsk Elektrisk Kabelfabrik AS), the Norwegian cable manufacturer, has announced that the company is to set up a manufacturing plant in the UK. The new plant which is expected to be in operation by the middle of the year is to be located on the Crowther Estate, Washington, Tyne & Wear.

BSS appoint UK dealers

Brooke Siren Systems, the North London-based manufacturer of crossover systems and studio/PA accessories, has supplied us with a list of its newly-appointed UK dealerships. They are: Turnkey (London), Phone: 01-440 9221; Scenic Sounds Equipment (London), Phone: 01-734 2812; Music Laboratories (London), Phone: 01-388 5392; HHB Hire and Sales (London), Phone: 01-961 3295; and Wigwam Acoustics (Manchester), Phone: 0706 68766. **Brooke Siren Systems, 92 Colney Hatch Lane, Muswell Hill, London N10 1LR, UK. Phone: 01-444 7892.**

Custom panel meters

Bach-Simpson (UK) Ltd has published a leaflet detailing its panel meter customising service. The leaflet gives details of design options for such features as covers, scales, pointers, mountings, sensitivity, movement ballistics and sealing. Copies are available from: **Bach-Simpson (UK) Ltd, Trenant Estate, Wadebridge, Cornwall PL27 6HD, UK. Phone: 020-881 2031. Telex: 45451.**

People

● John Woodgate, consumer products manager at ITT has become the new chairman of the Audio Engineering Society (British Section).

● Derek Roughton previously with NEAL and AKG Acoustics has joined Audio Video Marketing, the distributor for Ferrograph, Milab, NEAL and Trident Audio, as sales manager—professional products.

● Edcor has appointed Ron Dumesnil, as manager of its customer service and sales departments.

● Hardy Panasar has joined Fraser Peacock Associates as head of the company's service department.

● Quad-Eight Electronics has appointed John Robbins as manager, production and product support.

● The Sony Corporation of America has announced two appointments to its professional audio/digital audio division. Curtis Chan has been appointed national engineering manager, while Robert Hecht has been appointed Eastern regional sales manager.

● Simon Jones joins Allen & Heath Brenell as sales executive based at the company's headquarters in London.

Scenic Sound's small ads

btx



BTX Shadow Synchroniser

SCHOEPS



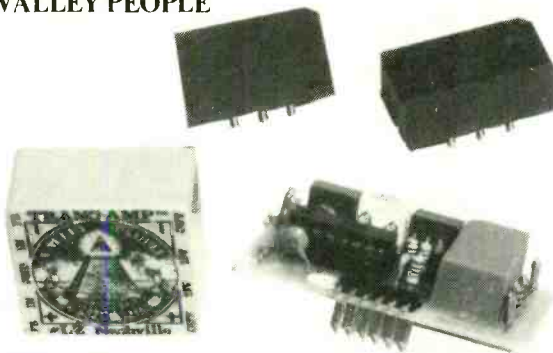
AURATONE



XEDIT



VALLEY PEOPLE



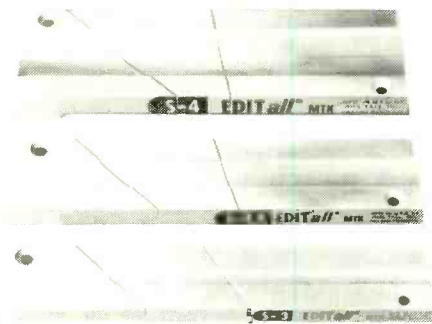
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www.americanradiohistory.com

Digital audio/video first for Molinare

Molinare Ltd, which possesses one of the most comprehensive audio, video and A/V facilities in London, was recently commissioned to undertake a contract which required almost all aspects of its expertise at very short notice. The occasion was the recording of an Edinburgh concert for an Arab sheik's daughter's wedding to a Scottish oil rig engineer in the Middle East.

The concert, a performance of the 16th Century Scottish poet John Henry McTaggart's Gaelic works set to music in the late 1570s by Hamish Gregory, was to be performed in Edinburgh Town Hall shortly after Burns Night by the Scottish Early Music Ensemble, led by John Gregory, a descendant of the composer. The poems were to be sung by the noted counter-tenor Andrew McCauley.

The requirement was for full Ambisonic sound, using the Calrec *Soundfield* Microphone, which was hired from Whitetower Records, and recorded digitally on a pair of Sony *U-Matic* video recorders, sync-locked together and with the Ampex *VPR-2* video recorder by using one of the audio tracks on each machine for SMPTE timecode and an Audio Kinetics *Q-Lock 310* synchroniser. The *Moli 6000* TV production

mobile was driven up to Edinburgh the previous day with the equipment. Digital audio was generated by the Sony *1610* system which was brought in for the occasion. This enabled a full periphonic (with height) recording to be made on four digital audio channels in B-Format.

Due to the very short time available, it was decided to perform the vision mixing by remote control, using three Ikegami *HL 79A* cameras with a fourth available if necessary. To perform this task, use was made for the first time of Molinare's prototype Capricorn *PolyPlex 1* video multiplexer, designed by Molinare and California based Capricorn Electronic Industries. The unit allows a multiplexed video signal to be generated from the outputs of up to four cameras. This signal, in monochrome because of bandwidth limitations, was sent via the OTS Satellite, which is now in use for DBS broadcasting to Europe by Satellite TV Ltd of programmes originated at Molinare's London studios. As the link was available, in the form of a single channel comprising video and stereo audio, it was brought into play for the project. The monochrome reference signal was received by Molinare's own 3.5m dish in London and demultiplexed to enable the vision

mixers to monitor the output of all three cameras simultaneously. The remote vision mixing unit was then driven by control signals from London sent via PO phone lines in 2400-baud serial RS232D digital format, with a 300-baud error-correction reverse channel. Further phone lines were used for communications purposes. As the recording was made, commentary in English was added on one of the *U-Matic* audio channels.

The recording having been successfully completed, the biggest problem of the project presented itself. A train strike was in force at the time, so it was impossible to send the tapes back to London in time for the final editing and post-production, so the OTS satellite link-up was used once again, for three passes to enable the audio and video signals to be relayed back to London. On the first pass, the Ambisonic M and X signals were relayed on the video channel, SMPTE timecode and commentary occupying the audio channels. Then the second pass carried the Y and Z signals plus timecode, while the final pass covered pre-mixed video and timecode. The signals were recorded again from the satellite relay, and editing was performed on lin video and a Sony digital editor. At this point, Arabic commentary was added, and subtitles were superimposed on the

video with the *Chyron* caption generator in English and Arabic. For the latter, a special character set was sent by datalink from the US.

After editing, the complete programme was put together on three *U-Matic* cassettes, two for the audio and commentaries, and one with video, and a complete hardware package including TV projection, three *U-Matic* professional machines, *1610* processors, Ambisonic decoder and eight speakers plus a *Q-Lock* were put together with the cassettes and driven out to Gairwick, where the Sheik's private plane was waiting to deliver the system. Accompanying the equipment was Molinare's maintenance supervisor, Martin Griffiths, to ensure that all went well. Molinare's PR manager, Peter Treger, co-ordinated what was an extremely complex project. He commented "All in all, everything went extremely well. The location shooting and recording went faultlessly, and even the complexities of the satellite linkup went off well, a useful 'dry run' for the start of our DBS activities. In fact, our end of the project was a complete success. The only unfortunate occurrence was that the Sheik's plane was forced to land in Geneva with engine trouble and missed the wedding. You can't win them all!"

Agencies

- The Milab range of condenser mics is now distributed in the UK by Audio Video Marketing, Unit 21, Royal Industrial Estate, Jarrow, Tyne & Wear NE32 9XX. Phone: 0632 893092.
- Scenic Sounds Equipment Ltd has added the *Xedit* range of wow and flutter meters to its range of product lines. Scenic Sounds Equipment Ltd, 97-99 Dean Street, London W1V 5RA. Phone: 01-734 2812. Telex: 27939.
- Audio Kinetics has appointed the following companies as sole representatives for its *Q-Lock* synchronising system. Italy: Audio International, Viale, Compania 39, I-20133 Milan. Phone: (2) 71.42.61. Telex: 335230. Norway: Siv. Ing. Benum AS, Boks 2493, Oslo 2. Phone: (02) 44.22.55. Telex: 17681. Finland: Studiotec, Porttiniitynie 13B, 02180 Espoo 18. Phone: 90-520 604. Telex: 121394.
- HHB has become an agent for the Fostex range of personal multitrack systems. HHB Hire and Sales, Unit F, New Crescent Works, Nicoll Road, London NW10 9AX. Phone: 01-961 3295. Telex: 923393.

- Feldon Audio which already acts as professional dealers for the Sony range of professional audio products, has now additionally been appointed as an OEM dealer for Sony's full range of professional video equipment. Feldon Audio Ltd, 126 Great Portland Street, London W1N 5PH. Phone: 01-580 4314. Telex: 28668.
- Atlantex Music has been appointed as a distributor of AKG mics, headphones and stands to UK musical instrument retailers. Atlantex Music Ltd, I Wallace Way, Hitchin, Herts SG4 0SE. Phone: 0462 31511. Telex: 826967.
- Valley People are to handle the *McLevyier* computer based synthesiser. Valley People Inc, Retail Division, 2820 Erica Place, PO Box 40306, Nashville, Tennessee 37204, USA. Phone: (615) 383-4737. Telex: 558610.
- FWO Bauch has been appointed sole UK agent for the *Param* programmable equaliser system. FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Heris WD6 4RZ. Phone: 01-953 0091. Telex: 27502.

Contracts

- Solid State Logic is to supply The Manor with a 40-input *SSL 4000E Series* console as part of a control room redesign project. Tom Hidley who was responsible for the original acoustic design will be supervising the update.
- Broadcast Electronics is supplying 130 custom-designed 5-deck cart machines to WED Enterprises (a subsidiary of Walt Disney Productions) for use in the Epcot Center (Experimental Prototype Community of Tomorrow) which will open in October at the Walt Disney World complex near Orlando, Florida.
- Studio design and construction company, Alangrove Builders, has recently completed an extensive acoustic remodelling of Mixing Suite C at Electric Lady Studios, New York.
- Neve has received orders for a further three *8108* consoles with automation from NOS the Dutch broadcasting organisation, bringing the total number of *8108* consoles ordered to nine. The latest consoles are 48- and 32-channel models with *Necam II* for TV post production

and radio work, and a 48-channel model with VCA facilities for TV Studio 3 at Hilversum.

- HHB has completed installation of a new sound system at the Albany Theatre, London, comprising Gauss loudspeakers, Amcron *PSA-2* and *DC300A* power amps, a 24/8/2 Total Audio Concepts console, and various peripheral equipment including BSS electronic crossovers. HHB has also supplied Gauss *4583F* studio bass loudspeakers to a number of studios including Rock City, Marcus Music and CBS; while Crown *PZM* mics have been supplied to Mike Oldfield, Adam and the Ants, and Polydor Records.
- AMS is to supply Ransteel Audio with 13 27kHz bandwidth *DM-DDS* disc mastering preview delay lines; the BBC has ordered six *RMX 16* digital reverb systems, while Thames Television has ordered eight units; Yorkshire Television has ordered three *DMX 15 SYNC* video synchroniser audio compensators; and Walt Disney Productions has ordered a *DMX 16E* digital editing system for use with its 3M digital tape machines.

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Telephone: 3613101

MILAN –
Contact: Idea Recordings
C.G.D.,
Via MF. Quintiliano 40,
20138 Milan.
Telephone: 5084

HAMBURG –
Studio Hamburg,
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2000 Hamburg 70.
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From concerts to films and long term album work – Mobile One is the No.1.

A completely self-contained 46 track recording studio featuring 52 audio input channels, overdub booth with space for full drum kit, air conditioning, radio telephone and a full video facility.

Our client list is as impressive as our technical specification and includes:

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Galway – Genesis – GTO
Records – Marvin Hamlisch
– Island Records – London
Philharmonic Orch. –
Barry Manilow – Robert
Palmer – Phonogram
Records – Polydor Records
– RCA Records – Rush –
Bruce Springsteen – Stiff
Records – Supertramp –
Ultravox – United Artists
Records – Virgin Records –
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Williams – Stevie Wonder –
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MOBILE ONE

Equipment includes • Two MCI 24 track tape recorders (each with full remote control) • MCI 36 in 36 out mixing console • Triad 16 by 4 auxillary console • EMT Digital Echo • Eventide Harmoniser • Eastlake monitoring with JBL Loudspeaker and Amcron amplifiers • UREI limiter compressors • UREI Parametric Equalizers • SMPTE code generator/reader.

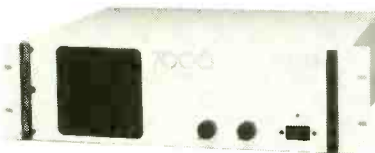
Products

BGW Model 7000

BGW has introduced a new 200W per channel power amp, the *Pro Line Model 7000*, the first of a new series of power amps to be produced by the company. A 19in rack mount unit, the new power amp is a 2-channel unit capable of delivering 200W continuous power output into 8Ω (350W continuous into 4Ω) from 20Hz to 20kHz at a rated THD of 0.1%. The power amp which features ¼in standard phone jacks for input connection, uses 5-way banana jack binding posts for the outputs. An unusual feature of the *Model 7000* is the arrangement of the output devices which are mounted on an internal air cooled flow-through module, whose intake fan exhausts the heated air through a front panel vent, thereby keeping it clear of the usually confined and potentially disruptive areas at the rear of equipment racks.

BGW Systems Inc, 13130 Yukon Avenue, Hawthorne, Cal 90250, USA. Phone: (213) 973-8090.

UK: Court Acoustics Ltd, 35-39 Britannia Row, London N1 8QH. Phone: 01-359 0956. Telex: 268279.



Bach-Simpson multimeter

Bach-Simpson has introduced a new digital/analog multimeter, *Model 467*, available as a hand held portable meter. Features of the new model include 3½ digit LCD display; analogue bargraph display for peaking and nulling; 26 measuring ranges for DC and true RMS AC voltage and current, plus resistance; differential positive and negative peak hold; 50s pulse detection; visual/audible indication of continuity and logic levels; full overload protection; and high voltage transient protection. In addition, a full range of accessories for the meter are available.

Bach-Simpson (UK) Ltd, Trenant Estate, Wadebridge, Cornwall PL27 6HD, UK. Phone: 020-881 2031. Telex: 45451.

Sifam slider knobs

Sifam has added a rectangular design of slider knob, in a similar finish to its established rotary, collet-fixing and push-on knobs, to its range of control knobs. The new knob which is designed to simply push on to the tangs of faders or other such components, measures 21mm long by 13mm wide and has a stepped top profile of 12mm maximum height. In its standard form the knob is black with a single white line at the 'waist', which can be plain or have a 1-way or a 2-way pointer. The new rectangular knob can be supplied to suit most established plastic or metal tang shapes and sizes, and depending upon quantity various other colours are available.

Sifam Ltd, Woodland Road, Torquay, Devon TQ2 7AY, UK. Phone: 0803 63822. Telex: 42864.
USA: Selco Product Co, 7580 Stage Road, Buenapark, Cal 90621. Phone: (213) 921-0681. Telex: 655457.



1 *ECM-939T* and *MRU-90*; 2 *MX-10L* mixer; 3 *ECM-929LT* and *MRU-60*; 4 *ECM-Z300* zoom mic

Sony Sound Crew

Sound Crew is the name chosen by Sony for a new range of mics designed for on-location recording purposes. Top of the range is the *ECM-939T* M/S stereo mic which combines a bi-directional back electret capsule with a cardioid capsule in a compact format. Measuring ½in by 5in and weighing only 2.6oz, the *ECM-939T* comes complete with left and right Unimatch threaded mini-plugs with ¼in phone plug sleeves, a stand, wind screen and carrying case. Specifications are frequency response 50Hz to 15kHz and -57.6dBm output level. To match the *ECM-939T* Sony has produced the *MRU-90* remote control unit featuring a directionality control that varies the recording image from cardioid mono to a stereo image. Controls include high and low EQ adjustment, plus variable mic pickup from 0 to 150°. Specifications include frequency response 20Hz to 20kHz and a dynamic range of >96dB.

Second model in the *Sound Crew* range is the *ECM-929LT* M/S stereo mic following similar design principles to the aforementioned mic and remote. This mic measures 2¼in by 4½in and

weighs 5oz, and comes complete with a stereo mini-plug, Unimatch plug adaptor, mic stand, wind screen and carrying case.

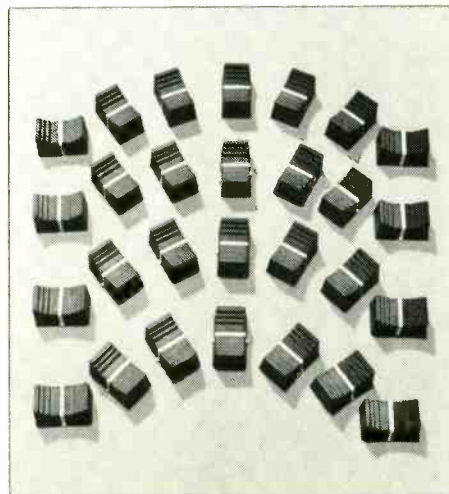
A remote control unit to accompany the *ECM-929LT* is the *MRU-60*, a simplified version of the *MRU-90* giving variable mic coverage from 0 to 150°, but without EQ adjustment. Specifications of this remote include a frequency response of 60Hz to 20kHz and a dynamic range of >96dB.

A further mic in the *Sound Crew* range is the *ECM-Z300* back electret zoom mic designed to interface with the Sony *HVC-2200* video camera. Featuring active zooming electronics, the mic manually zooms from cardioid to super-cardioid to complement the visual images of the camera lens.

To complement the above mics Sony has introduced the *MX-10L* 4-input stereo mixer with one stereo and two mono channels.

UK: Sony (UK) Ltd, Pyrene House, Sunbury-on-Thames, Middx TW16 7AT. Phone: 09327-81211. Telex: 266371.

USA: Sony Corporation of America, 9W 57th Street, New York, NY 10019. Phone: (212) 371-5800. Telex: 424595.



Pocket sized noise computer

General Acoustics Ltd are marketing a unique, pocket sized, battery powered, noise computer which combines the functions of a sound level meter, an Leq meter, a noise dose meter, and a stop-clock in a single package. The unit, which is part of the Metrosonics range of microprocessor controlled integrated sound level meters, is termed the *dB306A Metrologger*. The meter measures sound level in dBA, or Leq, or Lmax, or test duration with indication of the measurement mode on the 4-digit LCD display. Measurement functions and ranges of the meter are governed by user-interchangeable PROM memories, and a choice of two microphone configurations is available.

General Acoustics Ltd, PO Box 20, Scarborough, North Yorks YO11 1DE, UK. Phone: 0723 66347. Telex: 527244.

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H 949 HARMONIZER

Pitch change: one octave up, two down. Delay: two outputs each 393.75 ms. Micro pitch change. Time reversal. Repeat. Randomized delay. Flanging. High and low feedback E/Q. Two selectable algorithms. Frequency response: 15 khz. Dynamic range 96 dB.



H 910 HARMONIZER

Pitch change: one octave up, one down. Delay: output one, 112.5 ms output two, 82.5 ms. Frequency response 12 kHz. Dynamic range: 90 dB. Feedback control.



FL 201 INSTANT FLANGER

Simulates true tape flanging, initiated by an internal oscillator, manual control, remote control or envelope triggering. Now available with the interchangeable B.P.C. 101 card which turns the unit into an instant phaser.



BD 955 BROADCAST DELAY LINE

Designed specifically for the broadcast industry and is primarily intended for the policing of live transmissions. There are three maximum delay times available 1.6, 3.2 or 6.4 seconds plus a unique program dump and catch up facility.



2830 OMNIPRESSOR

The Omnipressor combines the characteristics of a compressor, expander, noise gate and limiter in one package.



JJ 193 DELAY LINE

Four outputs, each with up to 510 ms of delay, independently switchable in 2 ms steps. Extra delay is optional to a maximum of 1.022 or 2.046 secs. Frequency response: 12 kHz. Dynamic range: 90 dB.



R.D. 770 MONSTERMAT

Mono/Stereo Matrix unit. The Monsternmat solves the problem of tape phasing and noise on cartridge machines.



1745M DELAY LINE

Up to five outputs, each with a maximum of 320 ms of delay (640 ms in the double mode) selectable in 20 μ steps. Optional modules available include a pitch changer, and a remote control module which controls the delay line with a micro-computer. Frequency response: 16 kHz (8 kHz in 'double' mode). Dynamic range: 90 dB.



U.K. Distributors

Feldon Audio Ltd.,

126 Great Portland Street, London W1N 5PH Tel: 01-580 4314. Telex: London 28668.

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

new products

RTS Model 410

RTS Systems has introduced a new compact 10W monitor power amp, the *Model 410*, designed for low power amplification applications. The new unit, which includes its own power supply, is a half-rack width unit (8 3/8" x 1 3/4" x 11in whd), and delivers 10W into 8Ω. Specifications include a slew rate of 6V/μs; S/N ratio 90dB; and THD 0.03% at 10W into 8Ω. Designed with a balanced bridging input, the *Model 410* features integral overload protection with thermal cut-out which automatically resets itself, and a front panel volume control. Input connections are via a 3-pin XLR-type connector or a tip-ring-sleeve 1/4in phone jack. Price of the *Model 410* is \$288.

RTS Systems Inc, 100 West Chestnut Street, Burbank, Cal 91506, USA. Phone: (213) 843-7022. Telex: 662404.

UK: Future Film Developments Ltd, 36-38 Lexington Street, London W1V 3LE. Phone: 01-437 1892. Telex: 21624.



Linn LM-1 revised

The American manufactured Linn *LM-1* drum machine has been updated with a number of revised features. Changes from the original unit include the provision of LED displays to indicate the extent to which the machine is rounding off off-beat key strokes and the degree of shuffle being introduced.

In addition revised operating software has been produced, the internal memory capacity has been increased, and an optional crash cymbal

facility has been made available. These modifications apart the unit still offers 12 digitally stored real drum sounds each available on its own buffered output or as part of a stereo mix, plus the facility to build up percussion overlays with any degree of complexity.

Linn Electronics Inc, 3249 Tareco Drive, Hollywood, Cal 90068. Phone: (213) 850-0741.

UK: Scenic Sounds Equipment Ltd, 97-99 Dean Street, London W1V 5RA. Phone: 01-734 2812. Telex: 27939.

Sony DDU-1510

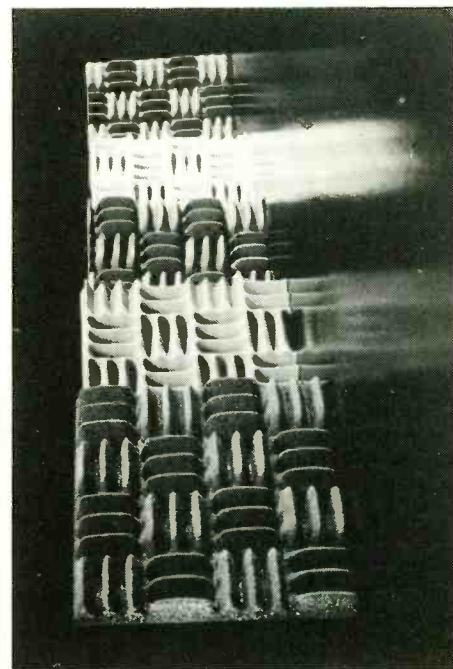
Making its debut at AES New York was a new series of digital units from Sony. The new *DDU-Series* of digital delay units is scheduled to comprise three units, the *DDU-1510*, *DDU-1520* and *DDU-1530*, of which only the first is currently available. The *DDU-1510* digital preview unit is intended for use in combination with the Sony digital mastering system (*PCM-1610*, *PCM-1600* or *PCM-100* processors and the *BVU-200B* recorder) to provide a preview signal as well as a program signal allowing disc cutting lathes to control pitch and depth accurately. The *DDU-1510* has digital input and delayed output signals. Features include analogue preview output to 12-bit precision; switchable selection of either serial or parallel data; and the facility of operation with any sampling frequency between 40kHz and 55kHz. A further feature is a built-in, manually activated, de-emphasis circuit which auto-

matically detects and de-emphasises signals with pre-emphasis, an emphasis 'Mismatch' indicator confirming proper operation. Master signal frequency response of the *DDU-1500 Series* is 20Hz to 20kHz +0.05dB, -1.0dB; dynamic range 90dB; while harmonic distortion is < 0.05% at -20dB peak levels. The second preview unit, *DDU-1520*, and third unit, *DDU-1530* designed for interface to analogue systems, are scheduled for introduction during the coming year.

Sony Corp, PO Box 10, Tokyo Airport, 149, Japan. Phone: 03 448-2111. Telex: 22262/24666.

USA: Sony Corporation of America, 9 W 57th Street, New York, NY 10019. Phone: (212) 371-5800. Telex: 424595.

UK: Sony UK Ltd, Pyrene House, Sunbury-on-Thames, Middx TW16 7AT. Phone: 09327-89581. Telex: 266371.



Sonex acoustic foam

The *Sonex* range of sculpted acoustic foam wedges are now available in a variety of colours; blue, green, brown and orange; in addition to the standard silver. The new colours are painted with a special fire-retardant paint which creates a striking sparkle to the foam, while also increasing its safety. *Sonex* is available in 4ft square sheets in 2, 3 and 4in thicknesses.

Illbruck/USA, 3800 Washington Avenue North, Minneapolis, Minnesota 55412, USA. Phone: (612) 521-3555.

USA: Alpha Audio, 2049 West Broad Street, Richmond, Virginia 23220. Phone: (804) 358-3852.

UK: Canford Audio, Stargate Works, Ryton, Tyne and Wear NE40 3EX. Phone: 089422 4515. Telex: 537792.



ADR F601 limiter

Audio & Design (Recording) Ltd has announced the introduction of the *F601 Superdynamic* limiter. Designed as a mastering limiter for recording applications, and feeding PCM units, satellite links and broadcast transmitters, it offers a 100dB dynamic range (threshold/noise) and 100% transient control. Available as a unity gain single channel (*F601-R*) or stereo/dual mono (*F601-RS*) unit to fit standard 19in racks, the limiter incorporates digital logic switching with electronically balanced inputs and outputs (transformer option). Facilities include precision stepped attenuators and controls; 20dB make-up

gain; side chain pre-emphasis to 0, 25, 50 or 75μs; a novel music/voice ratio control system; transient clipper; symmetrical/asymmetrical (AM) output; output filtering (AM/FM) option; logic function tamper-proof 'inhibit'; and dual function metering. Prices are £795 for the 2-channel unit and £560 for the mono unit.

Audio & Design (Recording) Ltd, 16 North Street, Reading RG1 4DA, UK. Phone: 0734 53411. Telex: 848722.

USA: Audio & Design Recording Inc, PO Box 786, Bremerton, Washington 98310. Phone: (206) 275-5009. Telex: 152426.

More time on your hands from MXR.

Providing extended delay times at an affordable price, the new MXR Model 151 Delay System II gives you over three full seconds of delay (three times that of similarly-priced digital devices). Specifically, the Delay System II can offer you up to 800 milliseconds of clean, quiet delay at a full 16 kHz bandwidth (over 200 milliseconds more than the closest competitor). As a digital recorder, the Delay System II's exceptional memory capability lets you capture entire musical phrases or obtain a wide variety of dynamic and musical studio quality effects from flanging and chorusing to echo and doubling in one rugged package.

And it's easy to use in real time. The large front panel and simple control format make it a snap to quickly select from a vast range of time delay effects. The Delay System II's high-resolution four digit readout displays the precise amount of delay and the bandwidth is indicated by LEDs, so there's no "squinting & thinking" to find out exactly where you are. Level-indicating LEDs let you set up the optimum level in seconds.

The Delay System II fits right into your rack, looks great and provides clean, noise-free performance. A level switch is provided to optimize signal-to-noise for professional home recording and onstage applications. The Delay System II also features easy access with both XLR and phone jack connectors (inputs and outputs) on the rear panel for instant interfacing with your patch bay.

MXR Delay System II — More time on your hands and more ways to use it as a creative tool on stage and in the studio. Hand-assembled in the U.S.A. with the finest components available in a compact, easy-to-use rack-mountable package.

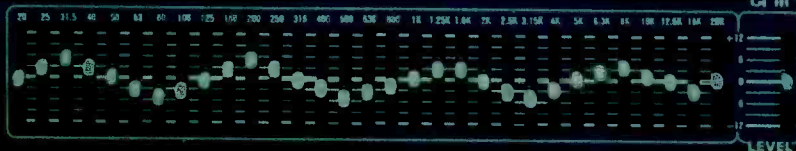
MXR

Professional Products Group

MXR Innovations (Europe),
1 Wallace Way,
Hitchin, Herts. SG40SE. Eng
Phone 0462 31513 Tlx 826967



MXR



thirty-one band eq

IN/OUT

POWER

thirty-one band eq

IN/OUT

new products

Sound Workshop Logex and Diskmix

New from Sound Workshop and premiered at AES New York were two new systems, the *Logex* 8 compact console and the *Diskmix* automation storage system.

The *Logex 8* is a small console system available in a mainframe size which can accommodate 12 inputs, 8 groups plus stereo mix buss. Based on the successful *Series 20*, this modular system offers: inline I/O format; low noise IC design; transformerless inputs and outputs; 3-band EQ with sweep midrange; comprehensive comms facilities; LED metering; pre and post fader patching; nominal +4dBu interface level (adjustable); and an external power unit.

The *Diskmix* system is designed to upgrade automation systems from tape data storage to floppy-disk utilisation. Not an automation system itself, *Diskmix* patches into your existing system to provide sophisticated mix storage on rapidly-accessed disk media. Interfaces are available for MCI, Sound Workshop *arms*, and Valley People *65K* systems.

One tape track is used to store SMPTE timecode which locks all disk-stored automation data to the master tape. The system consists of two rack-mountable chassis, one housing the multiprocessor (two 6502s plus a 6800 for disk control) computer and twin 8in floppy drives, the other containing the PSUs. In addition, a small computer with alpha keyboard is supplied (in fact a Commodore *VIC-20*, also 6502-based) which interfaces with the host computer and with a user-supplied colour TV receiver/monitor. The software is menu-driven, offering a number of pages where different operations may be carried out. In addition to a simple 'mix and store' mode not unlike the basic operational mode of the Melkuist system, facilities are available to carry forward parts of previous mixes into a new mix, by specifying channel numbers and timecode values from the keyboard. In addition to storing mix data (about half an hour of 'heavy' mixing per disk), the system can record session and mix documentation, also entered via the keyboard. Future enhancements will allow for the control and storage of settings on computer-based audio peripherals.

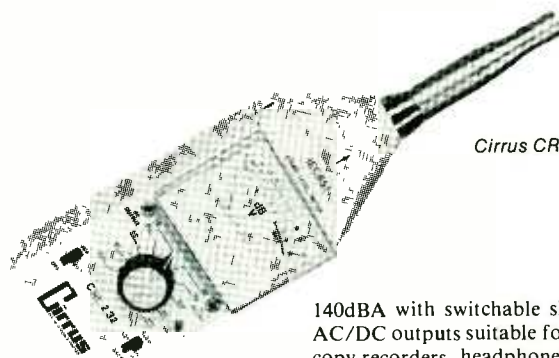
Sound Workshop Professional Audio Products Inc, 1324 Motor Parkway, Hauppauge, NY 11788, USA. Phone: (516) 582-6210.

UK: TRAD Electronic Sales Ltd, 1496 St Albans Road, Watford, Herts WD2 5BB. Phone: 0923 47988. Telex: 262741.

Tangent VU/Peak meter

Console manufacturer Tangent Systems has developed a new 40-segment LED meter which indicates both VU and peak levels simultaneously. The new meter, which is subject to a Patent application, was designed by Rick Cannon and Jason Fisher of Tangent, and is available as an option on the company's *Model 3216* automated consoles.

Tangent Systems Inc, 2810 South 24th Street, Phoenix, Arizona 85034, USA. Phone: (602) 267-0653.



Cirrus CRL 2.32

Cirrus Research sound level meters

Cirrus Research Ltd produce two types of convertible grade sound level meters, the *CRL 2.32* and *CRL 2.35*. Both meters are hand held battery powered units capable of accepting interchangeable microphones which include integral preamplifiers, these simply plugging into the meters. As standard the meters are supplied with *MK181* lin microphones (measuring down to 30dBA) but a variety of other combinations are available. The *CRL 2.32* has a range of 20 to

140dBA with switchable slow or fast response; AC/DC outputs suitable for tape recorders, hard copy recorders, headphones, etc; and incorporates both A- and C-weighting. The *CRL 2.35* has a range of 20 to 130dB; A- and Linear weighting; switchable slow, fast or impulse response; switchable normal, hold or automatic memory display facility; linear scaling; and the facility to accept a variety of plug-in filters such as an octave band filter covering the range 31.5Hz to 16kHz with 0 and 20dB insertion gain, or a vibration unit capable of reading displacement, velocity, acceleration and jerk.

Cirrus Research Ltd, 1/2 York Place, Scarborough, North Yorks YO11 2NP, UK. Phone: 0723 71441.



AMS RMX 16

AMS new products

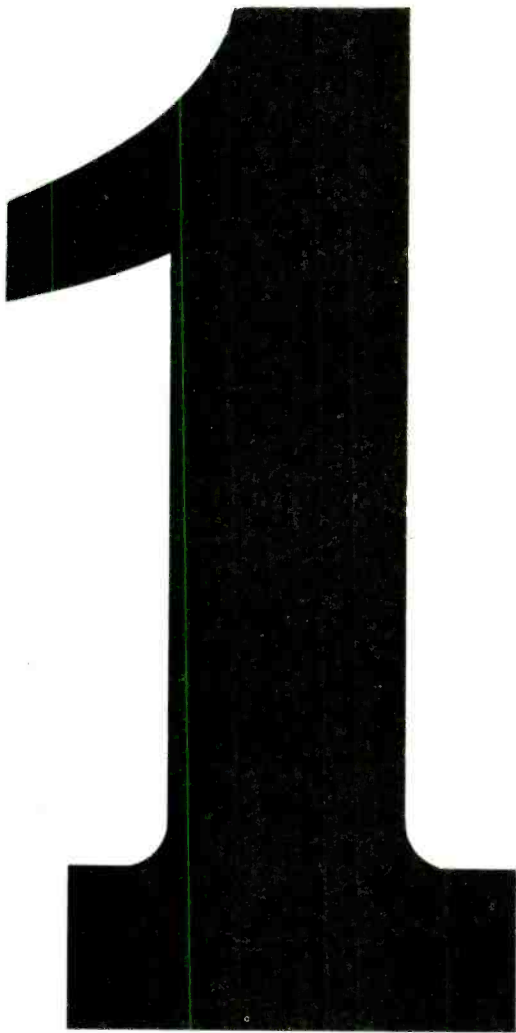
Advanced Music Systems has announced the introduction of three new products. First new item is the *RMX 16*, a stand alone version of the recently introduced *DMX 15R*. Both systems offer the same number of programs and the same facilities for user modification of programs. The *RMX 16* digital reverb system features LED display of program number, program name and user modifiable parameters such as pre-reverb delay, decay time and high and low frequency decay profiles. User-modifiable programs are stored in any one of nine non-volatile memories in the mainframe. The unit has similar specifications to the *DMX 15R* (see *Studio Sound*, September 1981), the principal specifications including an 18kHz bandwidth, 0.03% distortion, 90dB dynamic range, reverb programs including room, halls, plates, delay and special effects, and one-in stereo-out configuration. The *RMX 16* is available with an intelligent remote terminal which can call up any or all of 99 user programmed memories. The remote will shortly be available with a bar code wand which will give a fast and easy method for introducing new reverb programs to the mainframe. New software will be made available in the form of sheets of bar codes which once wiped with the wand will provide new programs for the mainframe.

Second new unit is the *DMX 15SYNC* video synchroniser audio compensator designed to accept a timing input from a field or frame store synchroniser and automatically introducing a compensating audio delay. The rationale behind this unit is the avoidance of problems caused by the common practice of using more than one synchroniser in a chain with resultant loss in lip sync. The new AMS unit neatly overcomes this problem and also allows user entry of pre-delays to compensate for fixed non-synchronisation of video/audio signals transmitted via satellite/land lines respectively. Interfaces for this unit have already been produced by Questech and Quantel.

The final new product is the *DMX 16E* digital editing system, this unit consisting of a 2-channel digital preview editor capable of capturing two sections of musical information up to 15s duration about an edit point. Accordingly, the unit allows rehearsing of edits or manipulation of the stored digital information. The system then provides a programmable digital fade in/out with an accuracy of 100µs.

AMS (Advanced Music Systems), Worsthorne Village, Burnley, UK. Phone: 0282 36943. Telex: 63108.

USA: Quintek Distribution Inc, 4721 Laurel Canyon Boulevard, Suite 209, North Hollywood, Cal 91607. Phone: (213) 980-5717.



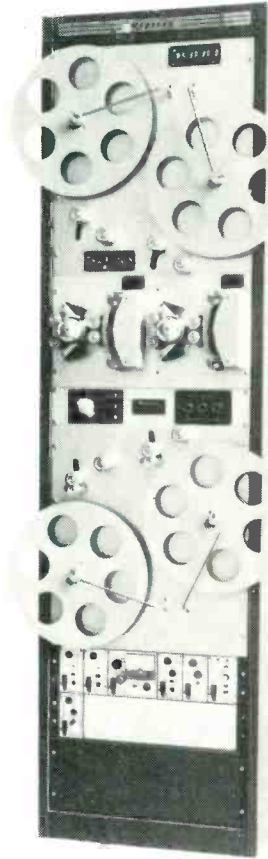
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Westrex Company Limited, Fairway Drive, Bilton Fairway Estate, Greenford, Middlesex UB6 8PW.

Telephone: 01-578 0957. Telex: 923003.

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Westrex 2629 W. Olive Avenue, Burbank CA 91505
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Radiofile:1

Centre Radio, Leicester

Centre Radio is one of the most recent IBA Independent Local Radio stations to open up, the first transmissions from the beautifully converted Victorian building overlooking Leicester's Victoria Park having started on September 7, 1981.

In fact, the station is housed in two buildings, the original building containing the newsroom and administrative offices, while the studios and ancillary equipment are accommodated in a totally new, custom built wing adjacent to Granville House. The conversion of Granville House, and the design of the new wing, proved an interesting challenge for the local firm of architects, Pick Everard Keay and Gimson, as it is within a conservation area.

The main entrance and reception area at Centre Radio are within the new block, and a visitor to the station can look through a double glazed studio window behind the reception desk into the main on-air studio, Studio One. The new wing, roughly square in shape, houses three 'on-air' studios, Studios One and Two being identically equipped, and Studio Three being a discussion/performance studio whose control room, designated Studio Four, is also the commercials production studio. A fifth studio is in the course of construction. Access to all the studios is easy, from a central lobby adjacent to the reception area. The wing is completed by racking, plant and workshop areas.

Centre Radio is the first ILR station to be totally equipped by MBI Broadcast Systems, the



Centre Radio's reception area, on-air Studio One and service area

Brighton-based broadcast wing of Maldwyn Bowden International, and the entire system was installed and commissioned by MBI as a 'turnkey' installation. The three control rooms (Studios One, Two and Four) are largely similar in their technical complement, differing primarily in the amount of peripheral equipment installed. Each control room has an MBI 24A console, Spondor monitoring and a pair of EMT 948 turntables with EMT preamps. Two Studer B67 reel-to-reel recorders are fitted in both Studios Two and Four, Studio One only having a single B67. NAB cartridge units are by Cartridge Technology, Studios One and Two including banks of three replay-only units, while Studio Four has a single record/replay system. Spondor speakers are also fitted in the discussion Studio Three.

The racking room, which contains PO telephone gear as well as the broadcast racking equipment, is a model of neatness. Three full-height 19in rack cases contain full monitoring, test and patching gear, transmitter remote switching and other units, including a modified Technics RS1500 1/4in stereo machine with a remarkable extended loop modification for profanity delay purposes. Beneath this is a Sonifex cart machine which contains, during broadcasting hours, the standard jingle which 'takes over' when somebody says the wrong thing, lasting the duration of the profanity delay. Outside broadcasting hours, the cartridge contains an announcement which is broadcast periodically.

Studio Three for discussions on-air, Granville House and racks room

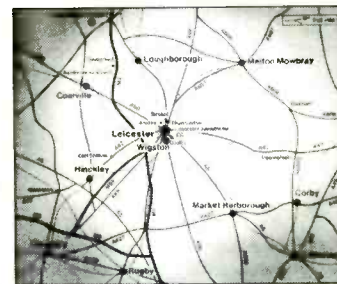


A small monitoring panel facilitates level-checking with two PPMs, plus a small monitor speaker and switch panel which can read the output of all the studios. In the centre rack is a full patchfield, AM and FM compressor/limiters by Audio and Design Recording, and MBI's TXS microprocessor-controlled transmitter switcher and monitoring unit. Also installed here are three Studer Telephone Balancing Units for on-air calls, and the third rack contains Revox (FM), Dymek (AM) and Marantz (tunable) receivers which are used to check the off-air signal. An intercom allows communication between all the operational areas in the building.

In the main lobby are a pair of Ferrography logging recorders behind a glass panel. These are used to record the station's entire output, the tapes then being available to check that commercials have gone out in the correct timeslots if this is queried by an advertiser, the system also providing a permanent record of broadcasts for other purposes.

Being the first MBI installation in a UK ILR station, the equipment came under considerable scrutiny, not least from the IBA engineers engaged in pre-opening Code Of Practice testing and measurement. Suffice to say that the system passed with flying colours. DJs at Centre have also found the MBI consoles very easy to use, and there have been no major problems, confirming both the ergonomic and technical design of the consoles, although there were some initial minor 'teething troubles' with the cartridge machines which were rapidly rectified.

A useful testament to the technical proficiency behind all aspects of the station is the very 'clean' sound the station has off-air. Listening on FM on the way up to the station in the car, the sound was very impressive, without any signs of distortion, over-compression or other faults in either



engineering or presentation. The station's output is clearly very professional and good on the ears.

Also very professional is the conversion which has been done to the original building, Granville House. A busy newsroom occupies much of the ground floor, and has its own booth for recording and editing news reports, incorporating a 'miniature' MBI console with just a few channels, sufficient for news applications. Adjacent to the newsroom is a large grams library, surprisingly well-stocked for such a recent newcomer to the airwaves. Centre's music policy is a pleasant mixture of pop and MOR. Above these rooms are the offices, also well-appointed and efficient.

Many thanks are due to Ken Warburton, Centre's MD, and to Bob Smith, chief engineer, for their help during my visit. Neither are strangers to the Leicester airwaves, both having been involved in BBC Radio Leicester, the first BBC local station which opened in 1967. Ken was one of the original four producers on the BBC local station, working on Radios 2 and 4 before moving to BBC Radio Solent and then on to a major broadcasting operation in Hong Kong. Both men are now doing an excellent job at Centre, adding another much-needed voice to Britain's impoverished airwaves.

Thanks are also due to Michael Fabricant of MBI for helping to arrange my visit.

Richard Elen
Centre Radio (1260kHz/238m AM, 97.1MHz FM), Granville House, Granville Road, Leicester LE1 7RW, UK. Phone: 0533 551616. 40 ▶



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Radiofile:2

Live Mobile: Starfleet Blair does it on the road

"People who have been in radio for years tell us we're insane," says Harriet Bellush, vice-president of Starfleet Blair, "but they love what we do." What might be considered insane about the small Boston-based company is that they specialise in live radio concerts from all over the US—a couple of dozen a year, reaching audiences of up to 25 million over 60 or more FM outlets worldwide, and featuring artists ranging from Bruce Springsteen to The Chieftains to Frank Zappa to the Boston Symphony Orchestra. Unlike other national radio series like the King Biscuit Flower Hour, NBC Radio's The Source, or the BBC Rock Hour (which is only loosely connected with 'Auntie') 90% of Starfleet's work is real live broadcast.

"We do probably ten times as much live remote work as all of the other state-of-the-art mobile units in the country put together," says Starfleet's president, Sam Kopper. "The average recording truck is out there in the field to lay down 24-track tapes to bring back to the studio and mix down later, whereas we have come up with a finished product right then. Of course, many of the artists we work with ask if we can run a 24-track for their vaults or because they're working on a live album, and we like to be able to tell them yes, so we keep an MM-1200 24-track on the bus.

"On the few occasions when somebody calls us just to do an album, or when a live multitrack of the broadcast is super important, we'll rent another machine so that we can avoid that obnoxious reel-change break. We'll sometimes get another MM-1200 or an MCI, and put it in a van next to us and run jumper cables. Lately though we've been working with a Stephens which is small enough to fit right in the bus."

Besides the sole multitrack machine, the first thing the visitor might notice about Starfleet's reconverted army hospital bus ("It's got good karma," says Kopper. "It used to carry wounded in Vietnam.") is the quantity of outboard equipment one usually associates with a stationary studio. Surrounding the 32-input Tangent 3216 board are blocks of UREI LA-4As, dbx 161s, Orban limiters, Kepexes, Gain Brains, Roger Mayer gates, an AKG BX-10 reverb, a Lexicon Prime Time, and an Eventide Instant Phaser and Harmonizer.

"That kind of equipment is becoming more and more part of a band's live sound," explains Bellush, "and they want to use all of it in a live broadcast. We're not in a



Starfleet mobile unit B and (inset) Sam Kopper interviews a member of The Outlaws

position where we can record dry tracks and juice them up in the mix later."

The other unusual thing about the bus is that separate areas are set aside for radio production and for an announcer and an interviewee. "When other trucks do a broadcast, they have to make electronic and physical space for the announcer," Kopper says. "They have to take up a track on the board, and put him or her in front of the speakers, or on the lift gate, or out in a van or somewhere. They have to remember to mute the speakers when the mic is up. We have a little booth with two mic inputs, two headphone jacks, automatically muting monitors, an on-the-air light, and a little video monitor so the announcer can see what's happening on stage. The headphone lines are split so that one side can be intercom."

There is also a new Howe 8-channel stereo broadcast console, which is manned separately from the main mixing board. "The stereo outputs from the Tangent come up on one pot of the radio board," says Kopper. "The operator is being directed by his own director, who is worrying about the timing and what's coming up next—going to a spot or the announcer or whatever, while someone else entirely is handling the music mix. To the operator, it's just as if he or she were doing a DJ show."

There are cart machines aboard, but they are rarely used. "We usually roll spots on reel-to-reel," Kopper says, "because we're going for a more consistent sound. Even if

the agency sends us a spot in mono at 7½ in/s, we'll put it on the master reel for the show at 15 in/s.

"Everything is normalised for broadcast work. In some cases, that fact has made the broadcasts possible and it certainly makes all of them a lot easier."

From whence it came

Not surprisingly, Kopper and Starfleet started in radio. In 1970, Kopper, then programme director of Boston's first progressive-rock FM station, bought an old school bus and outfitted it with a radio board and an Ampex 2-track tape deck. He named it Crab Louie, after one of his favourite seafood dishes ("not a disease of philandering French royalty," Bellush points out quickly). Within a couple of years he was on his own and had graduated to a Teac Model 10 mixer and a 4-track machine, and was handling a lot of jazz and rock gigs for both broadcast and recording, all over the Northeast.

In the spring of 1976 Crab Louie got its first shot at live network broadcasting when Columbia Records asked Kopper to handle a Laura Nyro concert at Carnegie Hall, to be sent to five cities over the new intercity high-fidelity stereo phone lines that AT&T had set up for the Metropolitan Opera. It was so successful that Kopper found himself hooked on the idea of FM networking.

Meanwhile, Bellush, a graduate of the Greenwich Village folk scene with more recent experience managing rock bands in New

England, met Kopper while she was working for a local professional audio supplier. She encountered, she says, much resistance within the company to the fact she was a successful systems designer, and female, and after she was laid off she joined forces with Kopper, taking over the company's relations with artists and record labels.

Starfleet's programmes were soon going out to some 50 stations, and the live broadcasts, sold to sponsors, began to pay for themselves without support from the artists' record companies. Kopper bought a larger vehicle and installed an Ampex MM-1100 16-track. It wasn't long before the large radio networks became interested in the operation, and Kopper was becoming eager to find an outside company to handle advertising and station relations. In August, 1980, John Blair & Co, a New York media conglomerate owning several radio stations (including the Boston station that was now in competition with the station Kopper started at) and doing marketing work for many more, took over Starfleet and the operation became known as Starfleet Blair.

Blair and Starfleet originally hoped to set up a full-time network with all sorts of shows, from live country concerts to multi-city interviews to call-ins, but the established networks moved faster. "Last summer," says Bellush, "we finally realised we couldn't compete with them. But it's better this way. There will be 15 networks on the air by 1983, and they'll all be dying for

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Radiofile:3

Starfleet Blair cont'd

programming. We'll be able to work on all of our ideas for shows and let them handle sales and marketing, which is their gig, while we do what we're best at, which is talent acquisition and programme production."

How they do it

The starting point for a Starfleet broadcast is the mic set-up provided by the sound company at the concert hall. The bus carries an impressive mic collection, but, says Kopper, "the state of the art of most sound companies is so high that all we usually have to do is provide audience mics, which are often Crown PZMs. They're usually not concerned with stereo, so if they are y-ing the piano or overhead drum mics, we'll sometimes separate them or use our own mics. I know it's unnatural to have a piano stretched out in the mix, but I love the way it sounds. The interface with the sound company is handled far ahead of time by our staff, so we don't run into death-defying problems of incompatible connectors and the like on the day of the concert.

"We have our own splitter box, with ground lifts at each end, that we made with the Whirlwind company. We're about to replace the whole thing with a single-cable set-up made by Blake Wire. It's amazingly flexible, even though it carries 50 pairs, along with video and intercom."

Starfleet makes unique demands on its engineering staff in that their job requires them to mix for radio, not for the studio. Kopper does much of the mixing himself and has several part-time engineers on call. "Mixing live is something that's been largely forgotten in the world of 24-track," he opines. "We've had scads of artists insist on using their own engineers, and some of these guys come in with platinum albums under their arms and they blow it completely. They're just not used to it.

"It's very important to reference constantly as many speakers as possible, and also to listen in mono. We have a pair of JBL 4311s, because a lot of ears are used to them, and we have a pair of speakers from Los Angeles called *Right Hemispheres*, which are pretty popular with our people, but the most important speakers, and the ones I would keep if we were only allowed one set, are the *Auratones*. And I could get by with only one—if you know the board, it's pretty easy to imagine stereo spectrums just by looking at the panpots, but it's all

too easy to have it sound good in stereo on the JBLs and less than perfect in mono.

"As we mix, every time a lead part comes up, or there is some kind of subtle hairline change where volume is important, the operator will punch 'Auratones—mono', and once that precise level is verified or adjusted to be right, then it's back to stereo."

"Because we're going out to radio stations," says Bellush, "we have to give them a signal that isn't so hot that their limiters kick in and knock it down 3 or 4ft. We know there will be a little of that anyway, so we feed them something just over the edge of what they would normally broadcast, and when they put it through whatever they've got, it still comes out with a nice fat sound."

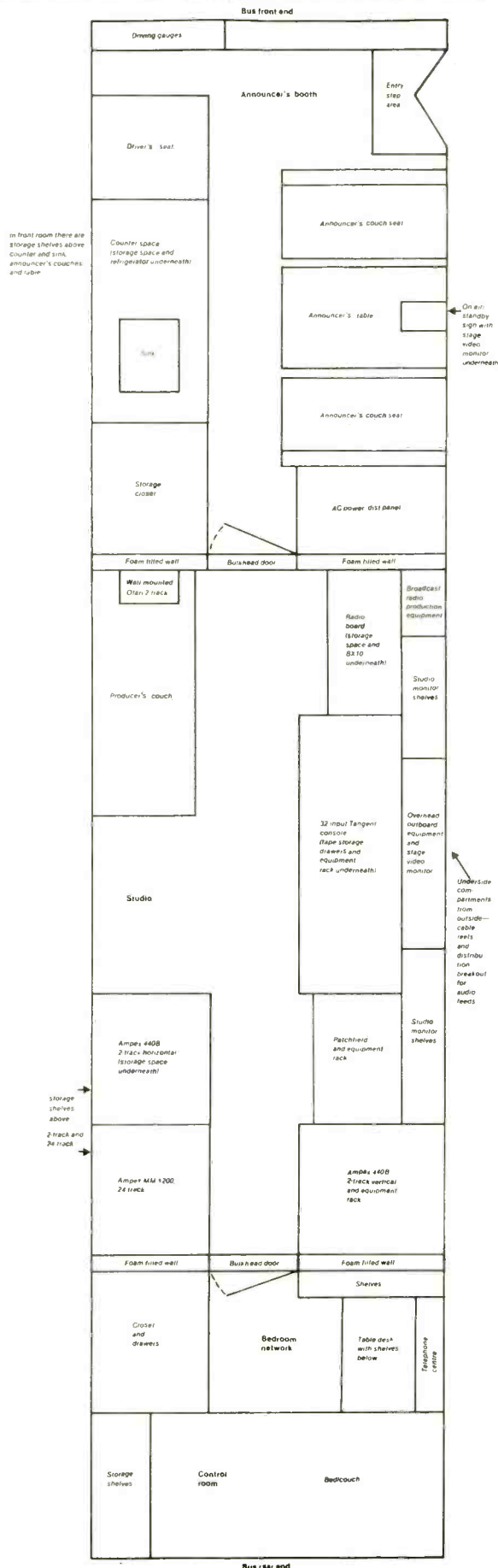
"We use our limiters and compressors to make things sound better in the mix, like vocals or kick-drum," says Kopper, "and after it goes out of the radio board we put on a little extra limiting before it hits the phone lines. It keeps the lines from being overmodulated and it also prevents the stations' drum limiters from going nuts. If we send out a heavy disco kick sound, the stations' equipment would pick that up and the whole sound would pump.

"We have a choice of monitoring points; 95% of the time we're listening to the output of the radio board. Obviously, we have to hit solo buttons and do the same thing anyone does in a multitrack mix but we can also listen after the line limiters, or off the air. We tend not to monitor the radio because then we end up mixing for that particular station, which may well be processing the signal differently from all the others. Our theory is, if you give them a pristine signal, then whatever they do to it, it will still be right."

"Occasionally there are radio engineers who don't watch their channel balances," adds Bellush, "and if you're always monitoring air, you're at their mercy. Same thing if they miss the timing coming out of a local spot. While you're waiting for them, you're leaving 60 other stations hanging."

Getting it out

After it's mixed, a Starfleet broadcast is typically sent over class-A (15kHz) telephone lines to the local phone company, from there to the local AT&T office, then to another AT&T office in a city with satellite uplink, to another local office, to the dish, to the AT&T satellite, and then back down through the whole process again before finally arriving at the local radio stations. Up until a year ago the system was even more complicated, as all of the signals were carried over land-based AT&T-



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Starfleet Blair cont'd

owned Siemens- and Bell Labs-designed microwave and cable links. "Either one of these systems involves lots of interconnection," Kopper notes. "There are maybe 20 different places where amplifiers and equalisers might flip the phase or introduce other problems."

Most recently, the satellite links have been the responsibility of the Robert Wold Communications Company, which multiplexes the signals on to their Associated Press distribution system, which is handled by the Westar III satellite. "But the ideal," says Kopper, "is to get the signal out of the bus and into an uplink which is parked right there, have it go up and then come down to dishes in the stations' back yards." Starfleet is beginning to develop programmes for NBC and other networks, and those programmes will be handled by the networks' own satellite systems. "For a while," says Bellush, "we'll still be using phone lines to get the signal to New York, which is where NBC has its uplink, but at least they have permanent lines from there, so we'll gain that much more control."

"Very soon," says Kopper, "I hope we ourselves, or at least the networks, will get their own portable dishes. It means carrying a lot of shielded cable so that when we park the mobile unit we can put the dish up on a hill or rooftop 1,000ft away if we have to." At one concert in upstate New York, the company did just that.

Finding the satellite from a remote location is not difficult. "You carry a master map of the country," explains Kopper, "that tells you the angle above the horizon and the heading. You make your settings and then just fine-tune it in." Bellush smiles, "When you think navigators used to cross the oceans just by the stars, you realise that what we're doing is pretty simple."

The human side

Although Starfleet takes as much control as possible over the technical side of their work, dealing with artists who are confronted with the prospect of performing for 25 million people can be another thing entirely. But just as in handling equipment, experience and patience can pay off here too. "Some bands can't get used to the idea of live broadcast. We'll explain everything, and after the show they'll still come up to us and ask when we plan to air the tape," Bellush laughs. "Even after we convince them that we'll handle everything right," says Kopper, "they'll still come back with 'what if I play a bad show?'"

"We have to be very careful in our

planning. We work out with them how we'll insert spots in their encore breaks, and we get them used to the idea that they have to go on stage with something of the precision of the CBS Evening News, even if they normally like to come out ten minutes or a half an hour after the scheduled time. We also assure them that we won't get in the way of the music. After they see that everything's worked out, when the adrenalin starts to flow on the night of the concert, instead of using all that energy to play a bad show, they use it to play better. We've never failed to get an artist up for a broadcast.

"We've had a number of artists over the years who swore they would never do a live radio show, like Ray Davies, Frank Zappa, and James Taylor. They've all given in."

"The Taylor show," recalls Bellush, "was one of three nights he did in Atlanta. He was so nervous that he didn't want us to tell him which night we were going to air. He didn't know when we had hooked up and it was all over before he found out.

"But let's face it," she smiles, "all rock artists are on a power trip. They're used to standing in front of thousands of people—imagine the power in performing for millions. Garland Jeffreys got out on stage and said, 'Hi Ma, back in Brooklyn—there are millions of people listening to me now!' When the artist can relax enough to get into it, it's great. The people at home are touched—the radio stations show us their letters and phone logs, and they're just amazing."

Almost as amazing, and certainly as essential to the success of Starfleet Blair's operation, are record company reports on how the live

concerts affect their sales. Bellush says that after a Kinks' New Year's Eve concert, Arista Records called up and said that the weekly sales figures for the group's double live album, which had already been out for eight months, had tripled. Sales of REO Speedwagon's records quadrupled after a Starfleet broadcast that reached 25 million people over 88 stations.

Bellush points to the 'special-event' aura of the broadcasts as a contributing factor. "Shows like King Biscuit air on a weekly basis in the same time slot, but different stations air them at different times. Our concerts are much less frequent, and everyone hears them simultaneously, which makes them feel they are participating in something unique and special. We also promote better, and the local stations sometimes go beyond our promotion requirements because they're so enthusiastic," she says.

Going on from here

Starfleet Blair's future is dedicated to expanding its sphere of operations. Although the company's major concern has been rock music, the programmes it is now selling to other networks include adult-contemporary and country shows, and the Boston Pops orchestra has been a client for over a year. Efforts are being made as well to make the company more efficient. Although the bus has worked in St Louis, Seattle, Las Vegas and Los Angeles, two-thirds of the shows originate east of the Mississippi River. "We prefer working on the east coast," says Kopper, "both for travel considerations and because a 10.00pm concert in New York works fine in California, where it's 7.00pm, but a late-night concert in Los

Angeles simply won't have an audience in the East.

"We've recently decided to stop taking the bus to within 200 miles or so of Los Angeles, and instead for those gigs we hire the Record Plant or Best Audio trucks and airfreight our radio equipment out there. It's not economics really, but we don't like to tie up our crew for a week and a half driving around and when the air conditioning breaks down in the middle of the desert, we're in trouble.

"When I was still in radio full-time, I did some work out of Montreal and I'd love to do more in Canada. We're also looking forward to our first broadcasts from Japan and from Europe, although some of our shows have been aired there. The legwork and link-ups are already done and we're arranging to use mobile units over there."

Starfleet is also looking towards video, and has done two shows with Warner Cable's MTV (one a live Frank Zappa Halloween concert) with an eye towards broadening that relationship. "The only technological advance we haven't yet been able to work with is a molecular transporter," says Bellush with a straight face. "I'll be very happy when it's done, and I won't have to fly the red-eye back from California any more."

"We're all Trekkies—*Star Trek* fans," Kopper laughs. "That's one of the reasons I came up with 'Starfleet'. People like to name companies so as to give the public positive thoughts. Names having to do with food or sex can do it, hence 'Crab Louie'. But that was a hippie name, and after seven years of people asking me why I called it that, I got tired of it. On New Year's Eve, 1978, I was lying in bed and thought about 'Starfleet'. That name says advanced technology, a fleet (and maybe someday we'll have more than one unit), fleet of foot—meaning we do things fast, and stars are who we deal with and also where we send our signals.

"We run the business by the stars," he smiles. "Mercury is about to go retrograde, and our experience tells us not to sign any contracts or close any deals until after it's over. Of course, we don't let astrology dictate our behaviour—it's more like a reference for us, like a weather report. Hey, in this business, you've got to have everything going for you that you can." Well, it seems to have worked pretty well for Starfleet Blair so far. Now if only they don't encounter any sub-space interference...

Paul D Lehrman
Starfleet Studios Inc. 520 Harrison Avenue, Boston, Mass 02118, USA.
Phone: (617) 482-4881.

Main mixing post



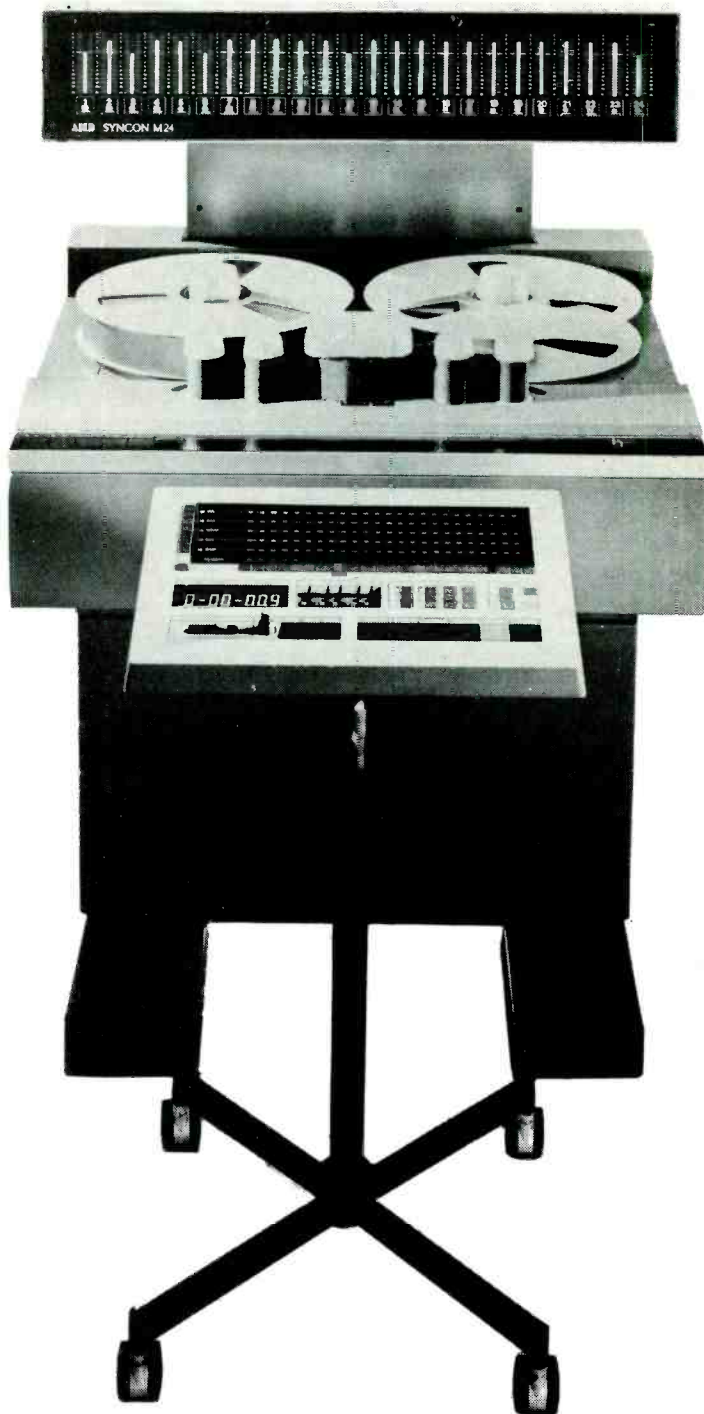
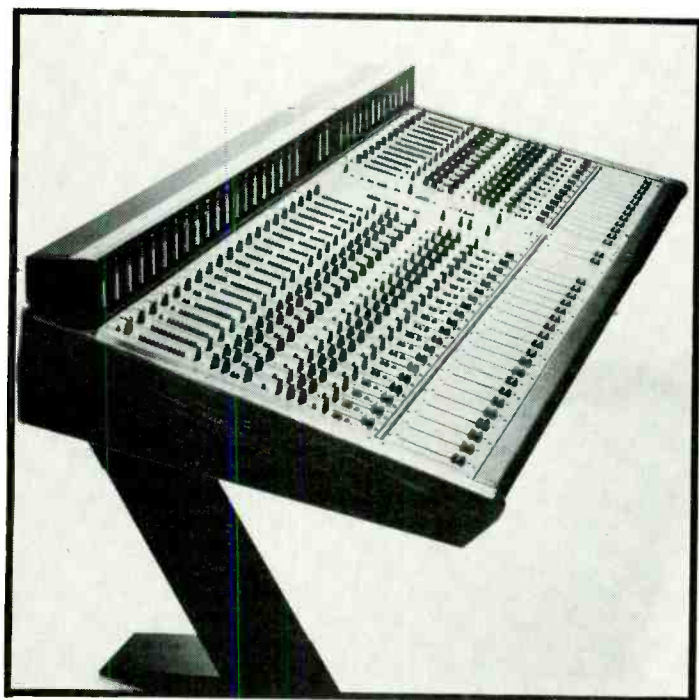
Master Class

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A Thorn in the side

Here we are in the middle of a recession which, despite official pontification to the contrary, is steadily getting worse. And a company like Thorn-EMI can still find time to piddle around with a corporate PR campaign to get its name spelled in capital letters. Different branches of the company can't even agree on the right policy to adopt. If it wasn't all so pathetic it would be hilarious.

Thorn used to be owned by Sir Jules Thorn. EMI used to stand for Electrical and Musical Industries. But just as people found it easier to order BASF tape rather than Badische Anilin und Soda Fabrik tape, so people found it easier to ask for EMI tape. (Of course EMI doesn't actually *make* tape any more, but that's another story.) So Electrical and Musical Industries became EMI, ran into financial difficulties and was taken over by Thorn. Thus was Thorn-EMI created.

Together, Thorn and EMI already owned a whole string of trademarks like Ultra, HMV, Ferguson, Marconiphone and Kenwood (which isn't the same as Trio-Kenwood hi-fi, but that's also another story). Then there's Radio Rentals and probably some other companies and names you've never even heard of. For instance the Thorn-EMI people who sell Ferguson video and television equipment, were called Thorn Consumer Electronics.

Not surprisingly the trade, press and public has been thoroughly confused about the whole business. So, probably, are some people inside Thorn-EMI. With commendable good sense the Ferguson people have dropped all their other names and for publicity purposes are just calling themselves Ferguson. Unfortunately the Thorn-EMI people, who market audio and video software, exist on another plane. Any suggestion that the word Thorn is actually an acronym like EMI or BASF, perhaps for Thorn House Overlooks Reality Now, most definitely isn't thought to be funny.

The real puzzle is how anyone in corporate PR knows so little about magazine and newspaper journalism as to imagine that any editor in this business will break up the aesthetic appearance of a line of print with unnecessary capitals. And if Thorn goes into capitals, what about Neve, Dolby, Sony, Revox, Mitsubishi, Matsushita, Uncle Tom COBBLEY and all?

One editor wondered hopefully if it would now be easier to write rude things about Thorn-EMI. Just spell the name Thorn in small letters and the company won't recognise their name in print.

Wake up

The British record industry could well be left out in the cold over digital disc. Then they'll really have something to complain about. A string of foreign manufacturers, led by Philips, Sony and Matsushita, plan to launch *Compact Disc* players at the end of this year. *Compact Discs* will be pressed in Japan by Sony, Nippon-Columbia, Pioneer and Matsushita. Polygram will make them in Germany and, *CX* notwithstanding, CBS will press in the USA. But in Britain only the small specialist company Nimbus in Wales has shown any interest in *Compact Disc* manufacture. Thorn-EMI is still

futz around with a commitment to AHD, and seems more interested in trying to get people to spell the name Thorn in capital letters, than in talking about the digital revolution. The other majors are behaving as if they have never heard of *Compact Disc*. At boardroom level they probably haven't.

So perhaps someone in the recording industry can leak it to their bosses that the Japanese are moving in for the kill. Already Sanyo has been going round Europe, touting the offer of *Compact Disc* custom pressing facilities in Japan. You see, it's dawned on the Japanese that *Compact Discs* are the ideal weapon for taking over the British record industry as well as what's left of the audio hardware market. *Compact Discs* are difficult to press, which immediately writes off the involvement of most British pressing plants. Philips have stated categorically that the Blackburn videodisc plant will be pressing only videodiscs. But *Compact Discs* are also light and small. So they will be cheap to ship in bulk from Japan. If the British record companies think they've got problems over imports now they ain't seen nothing yet.

Video futures

Prediction: In just a few years time the currently booming video industry will be whining about its problems. Sales won't be as buoyant as the sales directors would like them to be, duplication firms will be going out of business and the correspondence columns of video magazines will be full of letters complaining about the low quality and high price of programmes on video tape or disc. Studios expensively equipped to produce original video programmes will be finding it hard to make ends meet. Retailers will be copying videodisc programmes on to tape. Retailers will have stock on their hands. In other words the video boom is the audio boom all over again.

There's a very good reason for this. The failures and cast-offs from the audio industry are finding jobs in video. It's the one area that's expanding. By switching to video, redundant sharp talkers can bluff their way back into executive jobs. And they are taking their stamp of ignorant, arrogant mediocrity with them. The fast buck reigns. Quality control on pre-recorded tapes is at best minimal, and for the most part virtually non-existent. Consumers are still so wide-eyed and innocent over colour pictures from tape that they will put up with drop-out blemishes on the pictures and distortion of the sound. But, as with audio and hi-fi, the worm will eventually turn. Customers will start to recognise faults and complain about them. It's here that the video industry faces a special problem.

You can look at an LP record and spot surface faults. But even faults which make a videodisc unplayable can be invisible to the naked eye. And you can't tell anything about the quality of a video-cassette recording just by looking at it so factory QC will never be easy. Record retailers have been able to fob off customers who complain about audio LPs by arguing that the complaining customer is a finicky hi-fi nut who is imagining it all. But there is much less room for argument when a customer brings back a

video tape or disc that produces pictures which are obviously duff. The eyes leave less room for argument than the ears.

The future of the sound recording industry is now inextricably linked with the future of video. Play ostrich at your peril.

Hidden figures

Recently we promised further news of the new Government Paper on music copyright if we could get hold of a copy. As reported, at the BPI's conference in late October lawyer Michael Kuhn had poured scorn on what he described as a "hastily prepared Department of Trade Paper" and announced that in it the Government "seeks to do some back-tracking". Immediately after the conference I phoned the Department of Trade press office asking what the paper was. They knew nothing about it. So I wrote to the BPI who said if I wanted a copy I would have to get it from the Department of Trade. Finally the DT tracked it down. It was a memorandum of answers to a ten point comment by the BPI on the Copyright Green Paper. It's easy to see why the BPI weren't anxious to release a copy. It's less easy to see why Michael Kuhn referred to it in the first place.

The record industry's case for a levy is based on loss figures which grow like the beanstalk and are now being pushed towards £300 million a year. These figures originate from four market surveys which the BPI won't release. All they will say is that BMRB was the market research company responsible, and that BMRB is a "highly reputable research company". But the BPI had to show this research to the Government and clearly the Government wasn't impressed. "The survey reports relied upon by the advocates of the levy are themselves cautious as to the validity of their estimates," says the Department of Trade. "Thus, for example, the 1980 BMRB survey report, which is quoted in the BPI/MRS/MCPS/MU booklet on the levy proposal, states, in the context of an estimate of potential loss of sales based on a questionnaire which asked those who tape records whether they would otherwise have bought them, that 'intention to buy measures almost always overstate actual purchasing behaviour' and this repeats the thought expressed in BMRB's 1977 report and quoted in the survey referred to in the Green Paper, that 'this could result in considerable over-claiming'."

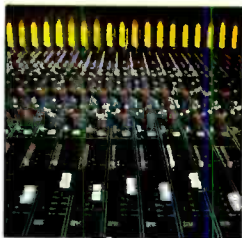
The record industry is now mounting an extensive and expensive advertising campaign built entirely on the foundation of BMRB's reports. But clearly BMRB was cautious in its reports. And we still don't know how many people were quizzed and what questions they were asked. Maybe BMRB's research provides a strong enough foundation for the industry's campaign. Maybe not. Clearly the Government thinks not. If the industry is confident, why won't it release the evidence it's paid for?

In a recent broadcast Michael Kuhn said he thought that "in the last survey 5,000 people were interviewed". Really? My leaked understanding was that it was more like 100 people in group discussions. If Michael Kuhn's broadcast figure was inaccurate it can hardly please BMRB or impress the Government, who both know the true figures.

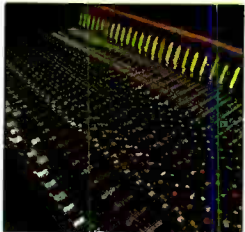
Facilities:

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

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



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



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GETTING

INTO

VAPP

Ian M Southern (Audio Kinetics)

The following epistle is an attempt to clarify the whys and wherefores of adding video facilities to an existing recording studio in order to provide VAPP – Video Audio Post Production.

EVER since the birth of 'talkies' our colleagues in the film industry have been diligently pursuing a perfectionist policy of FAPP – Film Audio Post Production. They have developed the expertise to take a mute picture and totally create the audio from scratch. Dialogue, music and effects are added with illusionist ability and with the potential of zero compromise. The ability to produce such audio miracles is only possible because of the totally separate treatment of audio from initial recording to final mix. The pictures and audio are only combined for the show print. The post-production audio 'painting' process is limited only by budget and production imagination. VAPP is the evolving process of emulating these separate audio techniques and adapting them for 1980's hardware, economics and imagination.

The concept of VAPP is relatively young, being reluctantly pioneered by large TV companies at the demand of audio conscious producers and the quality dictates of overseas sales. The reluctance was understandable as VAPP increases cost by about 5%. Such mere details have been overridden by an increasingly audio educated public, 'the BBC is best' brigade, and the IBA. So VAPP is here to stay, with 90%+ application just around the corner. I should point out that VAPP standards usually do not approach FAPP standards on a purely time/cost basis but this should change as increasingly powerful computing assistance allows substantial time reductions.

Why should I be interested?

Money. If we attempt to quantify the video revolution it focuses on significantly increased demand for all types of video material. Programme demand will come from:-

- consumer viewing of rented tapes
- cable television
- satellite television
- industrial promotion
- industrial training
- educational
- video discs

- video 'jukeboxes'
- channel 4, utilising contracted programmes
- existing networks
- commercials

Programmes can be made more cheaply on video than on film.

To exploit this potential, a number of companies have been setting up to shoot the video on location or in studios. The budget seldom includes the multitrack audio facilities fundamental to VAPP. More importantly they lack the expertise of audio engineering, having been seduced by apparent video 'creativity'. In fact good sound quality can lift an average video production far more cheaply than extra video editing, yet VAPP hourly rates are generally in the region of between £50 for 8-track to £100 for 24-track with extra being charged for sound effects.

Considerable scope is available for existing multitrack studios to share in this market expansion by supplying VAPP facilities on any one, or any combination of, three levels: music, dialogue and effects.

VAPP music is the most obvious entry point for interested studios. The additional equipment required is minimal and the fundamentals of operation can be understood in a day and mastered in a week. VAPP dialogue and effects requirements and techniques will be detailed in a later article.

Specifically you need:	Typical cost (£)
1 Colour monitor	500
1 U-Matic video recorder	2,250
1 EBU/SMPTE timecode control synchroniser/generator	6,100
1 Monitor/U-Matic stand	100
	£8,950

Monitor

Receiver/monitors, allowing an off-air signal source, are useful for testing the VCR machine and for client distraction. A conventional monitor is adequate and prices range from about £500 for a 20in grade 3 to about £3,000 for 20in grade 1 (broadcast). Grade 3 is fine for studio



Electro timecode unit

'workcopy' viewing. If you subscribe to the 'Bigger is Better' philosophy then 26 to 27in monitors will be welcomed by clients, but make sure you have enough room. The trend seems to be towards smaller monitors nearer to the producer and engineer. Projection TVs are a luxury (£2,000 to £3,000) and are still considered to be in their infancy.

Most important is your decision on video line standards. If you anticipate doing American work a dual-standard monitor is essential, being able to display 625-line PAL signals for Europe and 525-line NTSC signals for the USA. Triple standard monitors are available which include SECAM for French and Russian areas. Regrettably a multistandard U-Matic machine suitable for VAPP work is not yet available. An NTSC or SECAM version would need to be rented for specific sessions.

U-Matic video recorder

The U-Matic standard has been adopted as the professional VCR format. A VCR suitable for VAPP work must be able to deliver control

track pulses in wind modes. Only edit machines or the new generation of 'picture search' (tape on head in wind) machines are suitable for serious VAPP work. A choice of 'lo band' (approx 3MHz bandwidth) or 'hi band' (approx 3.5MHz bandwidth) formats are available but they are incompatible so your decision is important. Eighty to 90% of the market uses 'lo band' for VAPP. 'Hi band' costs around twice typical 'lo band' prices and is only available from Sony who also market suitable 'lo band' machines.

The makes of VCR differ significantly in their mechanics. Some machines have to unlatch to wind at greater than twice play speed, thus a cycle sequence is PLAY, STOP, REWIND, STOP, RELACE, RECUE, PLAY. This compares with machines that rewind on the heads at five to ten times play speed giving a sequence, PLAY, REWIND, RECUE, PLAY. The cumulative time saving of the latter machine type is significant, together with the added bonus of avoiding the lacing mechanical clanking which can be unnerving to a client.

Some machines offer a remote

VCR machines suitable for professional use

Sony 2850	Lo band	Unlace	Edit
Sony 2860	Lo band	Unlace	Edit
Sony BVU200	Hi band	Unlace	Edit
Sony 5850	Lo band	On heads	Edit
Sony BVU800	Hi band	On heads	Edit
JVC 8500	Lo band	On heads	Edit
JVC 5500	Lo band	On heads	Play only
JVC 6600	Lo band	On heads	Record/play
JVC 8200	Lo band	On heads	Edit
Panasonic NV9240	Lo band	On heads	Record/play
Panasonic NV9600	Lo band	On heads	Edit



BVU-200 U-Matic recorder and editing unit from Sony Broadcast

control incorporating a variable shuttle control. This is useful for finding an exact video frame and hence timecode point, where a particular effect is required. Well worth having if you anticipate doing effects work.

Synchroniser

This is the heart of your VAPP operation. It can make or break the system, drive you to distraction, or make the process so easy that you wonder what all the fuss was about. The distillation of our experience can best be tabulated as follows:

Essential features

- It should utilise the worldwide standard timecodes which are: EBU 25 fps – Europe; SMPTE 29.97 fps – NTSC colour compensation 'Drop Frame'; SMPTE 30 fps – NTSC; 24 fps – film standard (not essential).
- It should be a control synchroniser as opposed to a chase synchroniser. A control synchroniser will co-ordinate all the machines it is synchronising to selected timecode address points in optimised time. A chase synchroniser can only respond to the last data presented – in other words it cannot park the slave machine until it knows where the master machine is parked. The efficiency of a control to chase synchroniser is of the order of 3:1 and clients will not thank you for a chase-only system.
- It should be able to control three machines from one control unit. Initial 2-machine systems should be capable of upgrading to 3-machine

systems by plug-in additions.

- It should employ dedicated interfaces. General purpose interfaces give general purpose performance rather than exploiting a given machine's facilities fully. We live in hope that the 25+ manufacturers of video and audio machines will one day present a united and standard control port. Until then it's customise or suffer.
- RECORD – both a manual command and a facility for automatic record and 'un-record' on timecode address points are vital.
- It should utilise tach pulses in wind modes and timecode for parking and play synchronising the machines. The older alternative method of requiring timecode recovery in all modes necessitates a 120kHz replay frequency response on a dedicated timecode track, suitably modified. Such systems also require the audio tape to be on the heads in wind, which can degrade master-tape HF response and shorten head life.
- It is vital that the synchroniser can 'iron out' poor wow and flutter performance of the U-Matic machine (can be 0.25%) without degrading the slave's normal performance. The best synchronisers add typically 0.01% – beware of manufacturers who decline to specify this figure.
- A 'cycle' or 'loop' facility is essential for VAPP dialogue and very useful for repeat passes during music overdubbing and mixing.
- It should have an inbuilt timecode generator that can be locked to internal or external sources. The alternative is a separate unit at higher cost and less user convenience.

Desirable facilities

- Machine hierarchy – a simple switching sequence should be available to reassign master and slave designation without the need for complex replugging, so permitting the use in any combination of the three machines connected to the system.
 - Autolocation – intelligent multi-memory autolocation with or without the use of timecode.
 - Automatic offset calculation – when playing in effects tapes from a ¼in machine (usually slave two) the timecode will differ from the master, requiring an offset to be entered. This should be automatic, avoiding 8-digit timecode arithmetic! A slew facility is important to adjust an offset whilst playing.
 - Local zero-timecode values mean the start of a programme could have an awkward 8-digit ident. Locating to any point within the programme, if it has not previously been stored in a memory, requires a calculation and entry of that position. The facility which does the calculation automatically allows the operator to work, as with any autolocator, with a zero at the head of the tape or anywhere within it.
 - The synchroniser should be compatible with audio console computer automation systems such as Melkuist, Necam and SSL.
 - Event relays should be provided, energised at specified timecode address points. These are commonly used to cue cartridge or other remote start machines for spot effects or light cue, or 'on air' lamps, etc.
- At Audio Kinetics these requirements were carefully examined and included in the design of the *Q-Lock 3.10*. With such a wide range of facilities the essential criterion is the operational simplicity: one does not want a programming and machine control system of mind-boggling complexity to impede creativity.

Techniques

One man's techniques may be another's route to a mental breakdown. There really are many ways of tackling the task. The following is therefore for guidance only.

Your client should present you with a U-matic cassette containing:

- A copy of the edited video master;
- Guide track audio;
- Timecode.

Ideally the video will have had timecode inserted into the picture during the copy process from the video master. This makes easier the identification of particular frames, in order to set up defined cycle routines. It is by no means essential.

Prior to the start of the session the multitrack should be striped with timecode from the generator. The generally accepted track for code is the bottom edge. This came about by more than just chance. SMPTE timecode is, by its nature of being a square

waveform right in the middle of the most sensitive area of the audio spectrum (it is made up from 1kHz and 2kHz components) custom-built for crosstalk. It is therefore desirable to keep it as far away from other material and at as low a level as possible. As a session generally starts at track 1 and works down, the bottom edge is the obvious choice for code. Many pieces of timecode equipment require to read code at high speed and therefore a good quality, sharp squarewave, at relatively high level (zero level or higher) is necessary and demands a clear guard band on the adjacent track. The *Q-Lock* generator can be set to deliver a 'slew limited' or sinusoidal code which is still within the EBU specifications for SMPTE code. The readers will recover code to –30dBm, though a recommended level of –10dBm helps to avoid problems of crosstalk in the other direction (from program to code) thus corrupting the waveform to the readers. It is, however, not recommended that programme material of sharp transients, such as drums, be used on the adjacent track.

The synchroniser now takes over, operating the VCR as master and multitrack as slave one. Normal autolocate and cycle facilities allow you to operate both machines as one. Music can be overdubbed to picture, either from scratch or to enhance existing music. The techniques at this point are identical to normal recording studio operations. The same goes for the 46-track to video process. The synchroniser treats all three machines as one with no complication.

The mixing is equally conventional although creative attention to 'matching the video' is important. For an ultimate stereo master the mix should be made on to a machine with a minimum of four tracks, tracks one and two taking the mix. Track three can be left empty or can take a composite mono mix, track four taking the timecode. As before, the timecode is recorded prior to the mix. The 4-track tape can then be taken to the video production facility where the mix is laid back, using their synchroniser, to the video master. Needless to say, if the production is only in mono, a 2-track machine can be used for the mix master.

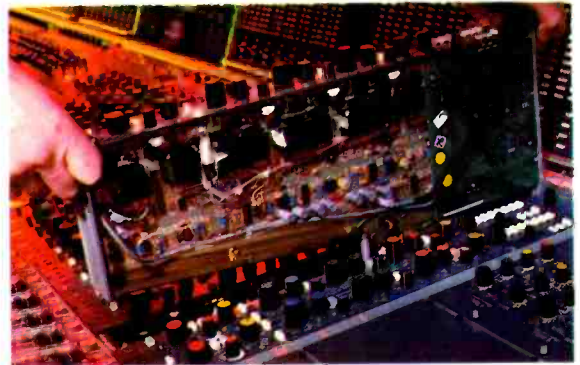
This year will see the release of twin-track machines with a centre track timecode head allowing stereo plus timecode on ¼in tape.

Conclusion

For an investment of about £9,000 you can increase the potential of your facilities significantly to a growth market. The video producers are looking for help and guidance. Logically, the amalgamation of existing facilities, expertise and the expanding VAPP market, will be a recipe for success. ■

Pinewood chose Theatre Projects

For their new fully custom
60 channel/32 group film
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5.5 metre long console designed for operation by a three man dubbing team. Facilities and functional layout were tailored to the customer's needs. Special features include 'Multipan', Theatre Projects' multi-output programmable memory panning system.



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product Mag film transports guide

ALBRECHT (West Germany)

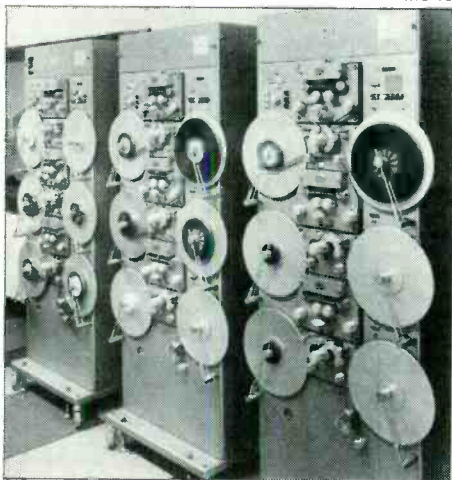
Wilhelm Albrecht GmbH, Maybachufer 45-51, D-1000 Berlin 44. Phone: 030 623 6039. Telex: 0184500.

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

MB42: magnetic film recorder; options for 16mm, 17.5mm, 35mm or Super 8, single or dual tracks; 25 frames/s, variable to 150 frames/s max 16mm, 100 35mm; pilot tone in range 45 to 55Hz, 2-phase TTL sync, optional timecode.

MB43: combines three mechanically linked transports with one common drive; top drive can be equipped for 1- or 2-channel reproduction or recording and reproduction.

MB43



MB51: magnetic film recorder; options for 16mm, 17.5/35mm, 16 and 17.5mm combined, and 16 and 17.5/35mm combined; three channels, various formats, including optical; 24/25 frames/s, 48/50/96/100 frames/s in fast transfer, 750 frames/s max synchronous speed for 16mm, 300 frames/s max for 17.5/35mm; mains, pilot tone, sync, rolling and lacing, with external control by three phase Syntronic signal.

ENERTEC (France)

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

UK: Clive Green & Co Ltd, Britannia House, Leagrave Road, Luton LU3 1RJ. Phone: 0582 411513. Telex: 826138.

DS16/DS17.5: magnetic film recorder; DS16 16mm magnetic film, DS17.5 17.5mm magnetic film; one or two tracks; 25 frames/s, variable between 0 and 250 frames/s; electronically controlled drive motor; 60Hz to 10kHz response ± 1 dB; mains, external frequency, crystal or TTL level pilot signal synchronisation; full electronic remote control.

PPS-C: post synchronisation programmer. By counting film frames, the PPS-C provides full searching remote control for up to four slave magnetic film recorders, slave synchronisation with follow the leader, and manual frame offset.

F240 series: transportable 16mm magnetic film recorder; centre or edge, 5mm or 2.5mm, stereo twice 4mm tracks; 25 frames/s, 19.05cm/s; 50Hz to 10kHz ± 1 dB frequency response, -4dB at 15kHz; pilot tone from mains, crystal, generator, etc, sensing tape punching.

MAGNASYNC (USA)

Magnasync/Moviola Corp, 5539 Riverton Avenue, North Hollywood, Cal 91603. Phone: (213) 763-8441. Telex: 673199.

UK: Photographic Electrical Co Ltd, 71 Dean Street, London W1V 6DE. Phone: 01-437 4633. Telex: 25554.

Series 3000: magnetic film recorder; accepts 16mm, 17.5mm and 35mm film; 16mm up to four tracks, 35mm up to six; 24 frames/s or 25 frames/s option; 16mm to 12kHz, 35mm to 15kHz response; interlock Selsync motors or Magnasync synchronous drive.

PAG (UK)

PAG Films Ltd, 565 Kingston Road, London SW20 8SA. Phone: 01-543 3131. Telex: 928381.

USA: Comprehensive Video Supply Corp, 148 Veterans Drive, Northvale, New Jersey 07647. Phone: (201) 767-7990. Telex: 135139.

Broadcast 16: 16mm magnetic film recorder; twin 4mm tracks; 24/25 frames/s, 0 to 125 frames/s; 30Hz to 15kHz ± 2 dB response; sync locked to mains, internal crystal or external frequency, interlock by a five wire cable.

Minirack: mobile rack with up to four magnetic film transports and one 16mm projector, specification similar to *Broadcast 16*.

PERFECTONE (Switzerland)

Produits Perfectone SA, Ringstrasse 3, Portmoos, CH-2560 Nidau Bienne. Phone: 032 51.12.12. Telex: 34383.

UK: Bell & Howell AV Ltd, Alperton House, Bridgewater Road, Wembley, Middlesex HA0 1EG. Phone: 01-902 8812. Telex: 261378.

USA: Image Devices Inc, 1825 NE 149 Street, PO Box 61-0606, Miami, Florida 33181. Phone: (305) 945-1111.

Rapimag: 16mm or 35mm magnetic film recorder; centre or edge tracks; 24 or 25 frames/s; 40Hz to 12kHz ± 1 dB response; can be used with timecode, pilot tone or external oscillator; synchronous operation at up to 30 times normal speed.

Trans Ultra: magnetic film recorder/reproducer for 16/35mm with all format tracks, available in single, double or triple, and portable transports; one or two tracks; 24 or 25 frames/s, max interlock speed 100 frames/s; 40Hz to 12kHz ± 1 dB response; Rhythm-O-Start uses pilot tone and amplifier, or mains synchronously.

OR16: similar to *Trans Ultra* but includes high speed rewind through lacing path, headblock is retracted at high speeds.

OR-multi: Basically similar to *OR16*, but triple standard taking 16mm, 17.5mm and 35mm film; 2- or 3-track replay is available on 35mm.

Ocodim: magnetic film time code printing unit, prints EBU timecode on to edge of 16mm magnetic film.

PICOT (France)

Fougerolle SA, Picot Dept, 6 Rue Victor Hugo, F-92800 Puteaux. Phone: (1) 728.05.36.

Picot 2000: twin 35/16mm magnetic film recorder, 16mm two tracks, 35mm three tracks (option six); 24/25 frames/s, 30x spooling in 16mm, 12x in 35mm; 60Hz to 10kHz ± 1 dB response; facilities will be available for SMPTE/EBU timecode on a special track, transport is normally crystal locked with correction from a pilot and perfor sensor through a digital memory and D/A converter, pilot runs faster than max spooling speed (30x), the difference is digitally stored until transport catches up.

RCA (USA)

RCA Photophone Systems, 2700 W Olive Avenue, Burbank, Cal 91505. Phone: (213) 846-2092. Telex: 686215.

UK: RCA Ltd, Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex TW16 7HW. Phone: 09327 85511. Telex: 24246.

PM-85SL: servo driven 16 or 35mm magnetic film recorder; 35mm single or 3-track 5mm, 16mm edge or centre track 5mm, stripe track 2.16mm, 16mm dual track 3.91mm; 24 or 25 frames/s; response 35mm 40Hz to 12kHz ± 2 dB, 16mm to 10kHz; may be locked to power line, TV vertical sync or external drive source; runs at up to 10x normal when locked to projector.

PM-86SL: similar to *PM85SL*, but operates at up to 10x normal speed in 16mm mode, and up to six x normal in 35mm.

SIEMENS (West Germany)

Siemens AG, D-7500 Karlsruhe 21. Phone: 0721 595 2428. Telex: 7826851.

UK: Video Cine Sound, 238 Sandycroft Road, Kew, Richmond, Surrey TW3 2EQ. Phone: 01-948 3615. Telex: 8954665.



PAG Broadcast 16

Novocord: magnetic film recorder; single 16mm or 17.5/35mm, dual 16/17.5/35mm, quad 35mm Super 8; 16mm up to two and cue, 35mm up to eight and two cue tracks; 25 frames/s or 24/25, three preset forward or reverse speeds at 0 to 750 frames/s in 16mm, to 300 frames/s in 35mm, run up time 3ms; DIN standard response; Unisync electronic interlock, mains frequency, station pulse (clock), pilot tone (45 to 55Hz), slave to master, optical tachometer generator, SMPTE/EBU timecode.

SONDOR (Switzerland)

Sondor Export AG, Dachlerstrasse 11, CH-8702 Zollikon-Zurich. Phone: 01-65.80.90. Telex: 55670.

UK: Hayden Laboratories Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Phone: 02813 88447. Telex: 849469.

OMA3: magnetic film recorder; 16mm magnetic film, M1 17.5/35mm, M12 dual; centre, edge and other tracks; 24 or 25 frames/s, up to x 10 in sync, x 20 spooling; 40Hz to 12.5kHz ± 1.5 dB response; interlocked to mains sync or pulse generator.

Libra Range 80: transportable 16mm magnetic film recorder, centre and edge tracks, total three; transport mechanism uses sprocket wheel drive associated with a capstan pinch wheel arrangement which considerably simplifies threading.

STELLAVOX (Switzerland)

Stellavox, CH-2068 Hauterive/NE. Phone: 038 33.42.33. Telex: 35380.

UK: Future Film Developments, 36-38 Lexington Street, London W1V 3LE. Phone: 01-437 1892. Telex: 21624.

USA: LTM Corp of America, 1160 N Las Palmas Avenue, Hollywood, Cal 90038. Phone: (213) 460-6166. Telex: 677693.

TD88 Transport: one track (with or without *Neopilot*) or two (with or without *Synchro-tone*) on 1/4 in, two or four on 1/2 in, and *Perfo-tape* for 16mm magnetic tape; 1 1/8, 3/4, 7/8, 1 1/2, 1 3/4, 1 7/8, 2, 2 1/4, 2 1/2, 3, 3 1/2, 4, 4 1/2, 5, 5 1/2, 6, 6 1/2, 7, 7 1/2, 8, 8 1/2, 9, 9 1/2, 10, 10 1/2, 11, 11 1/2, 12, 12 1/2, 13, 13 1/2, 14, 14 1/2, 15, and 30in/s, plus 24 and 25 frames/s

WESTREX (Italy)

Westrex Co Italy, 65 Via C. Maes, I-00162 Rome. Phone: 83 92 990. Telex: 611579.

UK: Westrex Co Ltd, Bilton Fairway Estate, Long Drive, Greenford, Middlesex. Phone: 01-578 0957. Telex: 923003.

USA: Westrex, 2629 West Olive Avenue, Burbank, Cal 91505. Phone: (213) 846-3394. Telex: 698254.

LRA 1551/2 series: magnetic film reproducer (1551 series), recorder/reproducer (1552 series); available for 35, 17.5 and 16mm; single or multitrack; 24 or 25 frames/s; 30Hz to 15kHz ± 2 dB (35mm), 40Hz to 10kHz ± 1 dB (16mm) response; synchronous three phase motors composite, sync interlock, and interlock with forward/reverse operation.

ST510: similar to above, but three transports driven from a single motor, mechanically coupled, max capacity only 360m.

ST6000 series: 35, 17.5, 16mm magnetic film transport; single or multitrack; 24 or 25 frames/s, up to 250 frames/s 16mm, 150 frames/s 35mm, run up 100ms; 30Hz to 15kHz ± 2 dB (35mm), 40Hz to 10kHz ± 1 dB (16mm) response; crystal reference, buss driver sync system, SMPTE/EBU timecode.

Product Broadcast consoles guide

ADM (USA)

ADM Technology Inc, 16005 Sturgeon, Roseville, Michigan 48066. Phone: (313) 778-8400. Telex: 231114.

BC-5 Series: broadcast production consoles. Format up to 16 low level inputs or 28 high.

TV-32: broadcast production console up to 32 input and four subgroups; 20 low level inputs or up to 104 high.

2400/3200: 24/4/2 broadcast production console (3200 has 32 inputs).

1600 Series: compact production console with 16 input channels, four submasters and two masters. Similar to 2400 Series.

ST Series: modular AM/FM stereo broadcast consoles.

ALICE (UK)

Alice (Stancoll) Ltd, 38 Alexandra Road, Windsor, Berkshire. Phone: 07535 51056. Telex: 849323.

12-48/16-48: full function semi modular multitrack consoles for small recording and production studios, 12 or 16 inputs.

12-4/16-4: semi modular mixers for production and CCTV studios, PA etc. Up to 16 inputs.

ACM Series: modular mixing system for mono, stereo, 4- or 8-group configurations with matrix output routing for up to 24-track working.

ABCM Series: modular mixing systems for mono and stereo broadcasting. Custom built consoles include central script area, integral jackfields etc.

828 Series: 8- and 12-channel stereo output portable mixers.

new

2000 Series: 8- and 12-channel stereo output portable mixers.

STM 8: compact full facility on-air mixer for outside broadcasts, DJ self-op or small production studio use.

ALLEN & HEATH (UK)

Allen & Heath Brenell Ltd, Pembroke House, Campsbourne Road, London N8. Phone: 01-340 3291. Telex: 267727.

USA: Allen & Heath Brenell (USA) Ltd, 652 Glenbrook Road, Stamford, Connecticut 06906. Phone: (203) 359-2312. Telex: 996519.

Production Mixer: the S6-2 production mixer features two stereo RIAA equalised units, two

AMEK (UK)

Amek Systems and Controls Ltd, Islington Mill, James Street, Salford M3 5HW. Phone: 061-834 6747. Telex: 668127.

UK: Scenic Sounds Equipment Ltd, 97-99 Dean

new

BC 01: portable, modular 8/4 mixer for broadcast applications, also suitable for rack mounting. The mixer input module features mic/line inputs, phase

stereo line inputs and two mic inputs all fully equalised with PFL and PFM.

AMPRO (USA)

Ampro/Scully, Newton Yardley Road, Newton, Pennsylvania 18940. Phone: (215) 968-9000.

Range of broadcasting consoles: with modular plug-in amps and remote starts for external source equipment for all nine inputs. Various versions from 6-channel 24-input mono, dual mono or stereo up to 12-channel 48-input units.

ARRAKIS (USA)

Arrakis Systems, PO Box 296, Bolivar, Minnesota 56513.

500R Series: compact 8- or 12-channel broadcast radio consoles with mono or stereo outputs. 1000R 8-channel console similar but with simplified operational functions.

AUDIOARTS (USA)

Audioarts Engineering, 286 Downs Road, Bethany, Connecticut 06525. Phone: (203) 393-0887.

8000 Series: 32/8/2, 24/8/2 or 16/8/2 configurations. 44 Series is similar but with reduced group facilities and without VU meters.

AUDIO DEVELOPMENTS (UK)

Audio Developments, Hall Lane, Walsall Wood, West Midlands WS9 9AU. Phone: 0543 375351. Telex: 338212.

USA: Coherent Communications, 13733 Glenoaks Blvd, Sylmar, Cal 91342. Phone: (213) 362-2566.

AD007 Mini Mixer: 8 to 14 inputs into four outputs and aux, plus direct outputs from all inputs for multitracking.

AD031 Micro Mixer: 6, 8, 10, 12, 14 or more inputs into two outputs with mono mixdown, one aux output.

AD045 Pico Mixer: 4/2 or 6/2 balanced in/out portable mixer.

AD045 Pico Plus Mixer: similar to above but with 1kHz tone, EQ bypass and phase change.

AD049 Mixette: portable 4-input, mono mixer with either a VU or PPM meter.

AD060: compact 4-input, mono mixer designed for ENG usage.

new

AD062: 6, 8, 10, 12, 14 inputs into two outputs with mono mixdown, comprehensive EQ, mic powering and monitoring facilities. Mains/battery powered.

AUDITRONICS (USA)

Auditronics Inc, 3750 Old Getwell Road, Memphis, Tenn 38118. Phone: (901) 362-1350. Telex: 533356.

700 Series: 710 has capacity for 24 input channels and 16 multitrack outputs; 720 has 36 input

Street, London W1V 5RA. Phone: 01-734 2812. Telex: 27939.

USA: Everything Audio, 16055 Ventura Boulevard, Suite 1001, Encino, Cal 91436. Phone: (213) 995-4175. Telex: 651485.

reversal, 20dB pad, highpass filter, 3-band EQ, two aux sends with pre/post switching, routing to four busses, pan, channel mute and PFL. The output/monitor module features four master outputs, two aux master sends/returns, monitor selection, VU input selection.

positions; 730 is similar but with separated patchbay and reduced metering area.

Grandson 110A Series: recording/remixing/production/on-air mixer available with up to 18 or 26 input positions.

200 Series: console for on-air applications available in 6-, 12- and 18-input versions.

AUDIX (UK)

Audix Ltd, Station Road, Wendon, Saffron Walden, Essex CB11 4LG. Phone: 0799 40888. Telex: 817444.

MXT-1000: audio mixer particularly suitable for small radio and recording studios, mobile and theatre applications; special radio 'on-air' version available.

MXT-500: small modular mixer to various formats for flight case, conventional, or 19in rack mounting.

B100 Series: The B107 consoles are 2-group systems and the B102 has facilities for four groups plus two main outputs or six groups.

3500 Series: designed for larger studios where 8-group working is essential.

AUTOGRAM (USA)

Autogram Corp, PO Box 456, Plano, Texas 75074.

Manufacture on-air consoles in 8 or 10 input versions with rotary faders and mono or stereo outputs.

AVAB (Sweden/USA)

Avab Elektronik AB, Vastra Hamngatan 1, S-41117 Goteborg. Phone: 031 11.20.32. Telex: 27531.

UK: MCI (Professional Studio Equipment) Ltd, MCI House, 54-56 Stanhope Street, London NW1 3EX. Phone: 01-388 7867. Telex: 261116.

USA: Avab America, 1714 Stockton Street, San Francisco, Cal 94133. Phone: (415) 421-3562.

FM800: production mixer built into lightweight aluminium case, eight input channels.

BOGEN (USA)

Lear Siegler Inc, Bogen Division, PO Box 500, Paramus, New Jersey 07652. Phone: (201) 343-5700.

Basic mixer/preamplifiers: range with rotary level controls; balanced or unbalanced inputs; either XLR or jack connectors; facilities for extending inputs with add on units. Separate 1/8-octave equaliser.

BROADCAST AUDIO (USA)

Broadcast Audio Associates, 11355 Pyrites Way, Rancho Cordona, Cal 95670. Phone: (916) 635-1048.

System 12/16: 12- and 16-channel modular broadcast mixers.

BROADCAST ELECTRONICS (USA)

Broadcast Electronics Inc, 4100 N 24th Street, Quincy, Illinois 62301. Phone: (217) 224-9600. Telex: 250142.

Series 150 and 250: rotary control type broadcast mixers; available in five or eight channels.

CALREC (UK)

Calrec Audio Ltd, Hangingroyd Lane, Hebden Bridge, Yorks HX7 7DD. Phone: 0422 842159. Telex: 51311.

USA: Edcor, 16782 Hale Avenue, Irvine, Cal 92714. Phone: (714) 556-2740. Telex: 685557.

L Series: high density mixers with 35mm wide modules, designed for broadcasting studios (particularly television).

M Series: based on the L series but has micro-computer automation.

CETEC (USA)

Cetec Broadcast Group, 1110 Mark Avenue, Carpinteria, Cal 93013.

8000 Series: broadcast console with eight channels (24 inputs) as standard and expandable to 16 channels.

2000 Series: compact broadcast consoles available with either five or eight channels.

CLYDE ELECTRONICS (UK)

Clyde Electronics Ltd, Ranken House, Anderston Cross Centre, Glasgow G2 7LB. Phone: 041-221 5906/041-248 3001.

USA: Audio Techniques Inc, 652 Glenbrook Road, Stamford, Connecticut 06902. Phone: (203) 359-2312. Telex: 996519.



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Rupert Neve Inc.

7533 Sunset Boulevard, Hollywood, California 90046 U.S.A Tel (213) 874-8124 Telex 194942

Rupert Neve Inc.

P.O. Box 120907 Nashville, Tennessee 37212 U.S.A Tel (615) 385-2090

Rupert Neve of Canada Ltd.

2721 Rena Road, Malton, Ontario L4T-3K1 Canada Tel 416-677 6611 Telex 06-983502

Rupert Neve GmbH

6100 Darmstadt Bismarckstrasse 114 West Germany Telex (003) 419581

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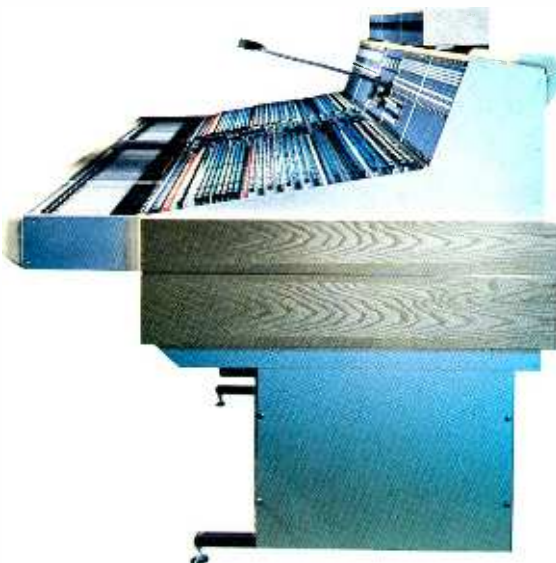
Production Consoles for Radio, Television and Film

The NEVE 51-Series comprises a range of versatile multiple-application audio consoles for Radio, Television and Film programme production including multi-track recording. Excellent performance designed to national and international specifications satisfies worldwide requirements.



All models are suitable for both studio and vehicle installation and have been designed to offer maximum flexibility in application with standardisation in manufacture to give a cost effective product. The range consists of four types of console, each being available in different configurations and numbers of input channels and groups. All consoles are designed for use in either mono or stereo operation and incorporate the much acclaimed Neve Formant Spectrum Equalisation (F.S.E.)

Standard consoles, available on prompt delivery, range from 12 channel/4 group to 48 channel/8 group with 24 track recording facilities. These consoles are of unsurpassed versatility in use. The 51-Series represents the culmination of 20 years of professional audio equipment design and production by Neve.



Neve

Music Recording

The 8128 range of Master Recording and Mixdown consoles is designed to fulfil the requirements of discerning studios requiring up-to-date facilities and the optimum in Musical Sound quality. Modern technology combined with Neve's meticulous design techniques provide a dynamic range matching that required for high quality digital recording. The finest sounding console ever, the 8128 incorporates Neve Formant Spectrum Equalisation (or F.S.E.) providing the critical engineer and producer with incomparable musical resources:—

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Digital Signal Processing offers immaculate performance and exciting features such as assignable controls, complete control reset (CCR) and total automation. Our unrivalled experience combined with the power of DSP offers an exciting new approach to audio control consoles for all applications.



and technology

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Designed for modern "On-Air" studios, the Neve 5322 console provides maximum facilities and flexibility in a highly reliable and easy-to-use unit. Up to sixteen input channels and a choice of plug-in units gives versatility in configuration and allows for expansion to provide for the needs of the future. Modular construction and standardised frame wiring enables flow-line production techniques to be employed resulting in a cost effective product retaining all the Neve hallmarks of quality and performance.



NECAM Automation Systems

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The most sophisticated aid yet devised for the task of music mixdown, NECAM is not simply an automated console, it is an integrated system, responsive to the balance engineer's style and preferences and designed to simplify operations and allow more time for the creative work in mixdown. NECAM is a highly cost effective investment for today's busy studio.

Audio Post-Production in Television and Film Studios

In Television or Film dubbing theatres Necam provides a computer-aided tool for rapid artistic track building enabling the engineer to concentrate on the most critical parts of his task at any given time, no matter whether he is laying down an effects track, rock and rolling a critical post-synchronised dialogue balance or carrying out a final mix.



Portable and General Purpose Audio Consoles

The Neve 542 series is a range of small, compact audio mixing consoles designed for professional recording or broadcast applications. Available in 8, 12 or 16 channel configuration the consoles provide two main and two auxiliary outputs and all inputs have a 3-band equaliser and high-pass filter.



The 8 channel console is also available in a light-weight fully portable suitcase version with integral rechargeable batteries for professional mobile applications.

A 6 channel, 19" rack-mounting unit is also available for O.B. Vehicles.



Intercom and Talkback Systems

NECOMM provides a professional high-quality flexible intercommunications and talkback system for use in television and broadcasting or wherever a high-technology system is required. Using the power of distributed micro-processors together with the flexibility of user-proven software control and solid-state audio switching techniques NECOMM provides unequalled advantages over conventional systems. Standard systems are available having from 8 to 256 locations and the family of intercom stations ranges from simple panels with pre-programmed keys and LED tallies to sophisticated assignable panels having alpha-numeric displays for caller identification and machine control capabilities.



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Suggested Application	Description	£	Suggested Application	Description	£
2 Track Radio Production	Revox B77, Alice 828S, Technics t/table, Nakamichi N480Z cassette	1570	Signal Processing Package A	D & R Rack, with compressor, parametric EQ, noise gate	235
2 Track Stereo Mobile	Otari MX5050B, Itam 8x2 Mixer, Gemini Compressor	1705	Package B	GBS reverb, Teac Graphic EQ, Fostex DDL	498
4 Track Budget Studio	Teac A3440, Seck 10-4 Mixer, DBX RX9 noise reduction	1138	Package C	Rebis rack with 2x noise gate, 2x comp/limiter, MXR Graphic, GBS reverb	950
4 Track Audio-Visual Presentation	Otario MX5050BQII, Teac 133, Alice 828S Mixer	2465	Package D	Rebis rack, delay package, 2x noise gate, 3x comp/limiter, de-esser, para EQ, Klark-Teknik reverb	1545
8 Track Budget Studio	Fostex A-8, Fostex 350 Mixer, Teac V9	1680	Cassette Duplication	Otari DP4050C2, Teac C3X deck, Bulk eraser	1825
8 Track Recording Studio	Otari MkIII-8, Studiomaster 8x4 Mixer	3100		Otari DP4050 OCF reel to cassette, Otari loader, Teac C2X, Bulk eraser	7224
8 Track Recording Studio	Otari MkIII-8, Studiomaster 16x8 Mixer, Otari MX5050B stereo	4940	Microphone Package A	2x AKG D190E, D222EB, D310	195
8 Track Video Production	Otari MkIII-8, Omni-Q Synchronizer, Alice 12-4 Mixer	5658	Package B	AKG D12, D222EB, D190, D224, 2x C451/CK1, 2 Calrec CM1000	696
16 Track 1 inch	Itam 1610, Itam Sigma 16-8-16 Mixer	8250	Package C	AKG D12, D330, 2xD224E, 2xC451/CK1 Neumann U871	983
16 Track 2 inch	Otari MTR90, Syncon B Mixer 20x20	19864	Monitoring	Spendor BC-1, Quad 405, AKG K160 headphones	499
24 Track	Otari MTR90, Soundcraft 2400 Mixer, Otari MTR-10 Stereo	32825		Tannoy Little Red, HH V-200, Auratone 5C, Quad 303, 4xAKG K160	983
16 Track Video Production	Otari MTR90, Audio Kinetic Q-Lock, Otari MTR-10 Stereo	22900			

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

product Broadcast consoles guide

Alpha series: console system with wide variety of modules which may be located anywhere in frame. Fixed or portable applications, especially on-air and production. Custom frame and module variations to order.

Delta series: 'News' mixer, being basically an audio switching system with built-in intelligence, designed to interface with cartridge machines and other high level sources, also two mic inputs.

new

CEDUB: 19in rack mounting, 20 input stereo dubbing mixer for news compilation/commercial production applications.

COHERENT COMMUNICATIONS (USA)

Coherent Communications, 13733 Glenoaks Blvd, Sylmar, Cal 91342. Phone: (213) 362-2566.

MX-80: motion picture location sound mixer, four input, mono output.

DYMA (USA)

Dyma Engineering Inc, 213 Pueblo del Sur, Taos, New Mexico 87571. Phone: (505) 758-2686/8686.

International: small rack mount mixer suitable for use by small production facilities, editing suites, news booths, or remote vans. Mixer has eight input modules

EELA AUDIO (Netherlands)

Pieter Bollen BV, Hondsruglaan 83a, NL-5628 DB Eindhoven. Phone: 040 42.44.55. Telex: 59281.

UK: Eela Audio Industries Ltd, 13 Molesworth, Hoddesdon, Herts EN11 9PT. Phone: 09924 68674.
USA: Audicon Inc, 1200 Beechwood Avenue, Nashville, Tenn 37212. Phone: (615) 256-6900. Telex: 554494.

new

S41: compact, portable, 4-input, mono mixer for ENG use.

System 100: modular block mixer, allowing different configurations to be assembled. *S101* is input block with four mic/line inputs. *S102* is stereo output block with two echo returns. *S103* is input block with four stereo line level inputs. *S104* is 8-track interface unit providing eight separate channels each with a 12-position selector switch to take 10 channel inputs and left and right outputs for routing to an 8-track recorder. Available in standard formats of 4/2, 8/2, 12/2, 16/2.

System 200: modular block mixer, allowing different configurations to be assembled from a 4/2 film dubbing mixer to a 16/8 recording console, or even larger. New on-air modules are to be introduced in the near future.

Concord S2000: In-line mixing console, available with 12, 20 or 28 I/O modules. 32-channel frame size model to the IBA Code of Practice for radio applications is to be introduced in the near future.

ENERTEC (France)

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

UK: Clive Green & Co Ltd, Britannia House, Leagrave Road, Luton LU3 1RJ. Phone: 0582 411513. Telex: 826138.

UPS4000: any system configuration may be supplied using combinations of modules. Auto motion facilities available oriented for use in broadcast or recording environments.

UPS1602: designed for control room applications in broadcasting, motion picture, theatre, educational and audio visual applications.

UPS5000: range of consoles with 10, 12, 16 and 24 input channels.

FAIRCHILD (USA)

Fairchild Sound Equipment Corp, 75 Austin Blvd, Commack, Long Island, NY 11725. Phone: (516) 543-5200.

FPC: portable, flat console available in formats between 8/2 and 16/8.

FILM-TECH (UK)

Film-Tech Electronics Ltd, 31 Lomond Crescent, Lakeside, Cardiff, South Glamorgan. Phone: 0222 493230.

Compact 4-1 EFP: portable mixer for ENG/EFP use.

CLIVE GREEN (UK)

Clive Green & Co Ltd, Britannia House, Leagrave Road, Luton LU3 1RJ. Phone: 0582 411513. Telex: 826138.

Broadcast Console: multitrack mixing console for broadcast studios, 32 inputs, 24 track monitoring.

HARRIS (USA)

Harris Corporation, PO Box 4290, Quincy, Illinois 62301. Phone: (217) 222-8200. Telex: 404347.

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

Gateway 80: mono console. Eight mixing channels, 18 inputs, *Stereo 80* console, *180* console, 18 inputs may be switched into eight stereo mixing channels.

Mono/Stereo 5: broadcast audio control console, five channels, with 13 switched inputs, available in mono or stereo.

Executive: 10-channel, with 22 inputs, switched to specific channels.

M90: broadcast desk, with up to 26 mixing positions and 52 inputs, with two, four or eight output configurations, combined mono output standard.

new

µ Mac: modular digitally controlled broadcast console available in a number of configurations with up to 16 input channels, three stereo and mono or sum outputs.

HARRISON (USA)

Harrison Systems Inc, PO Box 22964, Nashville, Tenn 37202. Phone: (615) 834-1184. Telex: 555133.

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

Live Performance Console: available in either 24 or 32 input mainframes with satellite extender frames of either 24 or 32 input configurations.

HOWE (USA)

Howe Audio Productions Inc, PO Box 383, Boulder, Colorado 80306. Phone: (303) 494-4693.

7000 Series: rotary fader broadcast mixer available in three configurations: *7008* 8-channel mixer capable of handling 18 separate stereo inputs; *7010* 10-channel mixer with the same facilities; and *7012* 12-channel mixer capable of accepting 22 stereo inputs.

IRV JOEL (USA)

Irv Joel Associates, 528 River Road, Teaneck, New Jersey 07666. Phone: (201) 692-0010.

JL-412: console designed to provide automated programming of sequences up to 28 events and 11 input sources, modular system.

KAJAANI (Finland)

Kajaani Oy Electronics, Nuaskatu 11, SF-87400. Kajaani 40. Phone: (86) 37.311. Telex: 45148.

10 EA Series: series includes standard consoles ranging from six to 24 inputs, two to four outputs, two to four aux groups, four subgroups. Due to modular construction changes according to customer needs are possible.

KAJAC Series: in-line type multitrack console designed for broadcast studios. Consoles allow multitrack recording up to 36 tracks with simultaneous stereo broadcast.

MBI (UK)

Malwyn Bowden International Ltd, 168 Edward Street, Brighton BN2 2JB. Phone: 0273 607384.

Series 24A: radio broadcasting mixer, fully expandable, modular system, adaptable from simple presenter desk to network master control desk.

MAP (USA)

Modular Audio Products, 1385 Lakeland Avenue, Bohemia, NY 11716. Phone: (516) 567-9620.

IMPAC Series: range of modular consoles, three standard mainframes, versions with up to 12, or 16 input modules.

McCURDY (Canada)

McCurdy Radio Industries Ltd, 108 Carnforth Road, Toronto, Ontario M4A 2L4. Phone: (416) 715-6262. Telex: 06963533.

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

USA: McCurdy Radio Industries Inc, 1711 Carmen Drive, Elk Grove Village, Illinois 60007. Phone: (312) 640-7077. Telex: 910-222 0436.

SS7800: modular console with 30 mono mixer channels.

SS7900: modular mixer available in standard configurations of 24 or 32 channels with four, eight or 16 submasters or masters.

SS8400: modular, 12 channel mixer, with two inputs per channel and a choice of input modules to accommodate any input.

SS8500: similar to above, but 10 channels.

SS8650: compact free standing mixer, 16 channels, otherwise similar to *SS8400*.

SS8800: modular, compact desk mounting 8-channel console with two inputs per channel.

MCI (USA)

MCI Inc, 1400 W Commercial Blvd, Fort Lauderdale, Florida 33309. Phone: (305) 491-0825. Telex: 514362.

UK: MCI (Professional Studio Equipment) Ltd, MCI House, 54-56 Stanhope Street, London NW1 3EX. Phone: 01-388 7867. Telex: 261116.

JH-500C Series: available in six frame sizes (28 to 56 inputs). All consoles include VCA grouping for eight groups. Broadcast version and numerous options are available.

JH-600 Series: available in two frame sizes (18 to 36 inputs), the *JH-600* series features standard *JH-50* automation, factory installed, for level and mute automation grouping and solo-in-place functions. Broadcast configuration and numerous options are available.

JH-636M: mobile recording console available as a 36-input console or with a dual mic preamp module as a 72-input console.

JH-652: split console providing 52 in-line channels split 26 either side of the centrally located master control section, each side being independent.

new

JH-800: compact, portable, general purpose 12-channel mixer. Features include mic/line inputs, 3-band EQ with high cut and low cut filters, dual stereo mix capability with in-built comp/limiters, four aux sends, VCA faders with four selectable groups, three additional (two mono, one stereo) line returns, line output on each input module, oscillator, 2-way communications facilities, phantom powering, and a complete monitor section including headphone amp.

McMARTIN (USA)

McMartin Industries, 4500 South 76th Street, Omaha, Nebraska 68127. Phone: (402) 331-2000. Telex: 484485.

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

500 Series: small broadcast console four mic and four line inputs.

1000 Series: broadcast consoles with five or eight stereo channels with either slider or rotary faders.

MICRO-TRAK (USA)

Micro-Trak Corp, 620 Race Street, Holyoke, Mass 01040. Phone: (413) 536 3551. Telex: 955497.

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

6618: broadcast 6-channel, stereo/mono console with rotary conductive plastic faders, three inputs per channel.

D-format: range of broadcast consoles, 4- and 5-channel units available in mono or stereo.

MONDIAL (France)

Mondial Electronique, 13 Boulevard Gallieni, F-94130 Nogent-sur-Marne. Phone: 873-37-77.

A 90dB dynamic range is not what it seems when operating headroom and low level digital distortion are considered.

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The system is a unity gain single channel (F601-R) or stereo/dual mono (F601-RS) 1u package incorporating digital logic switching. Inputs and outputs are both electronically balanced (with provision for transformer option).



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Worldwide: Audio & Design (Recording) Ltd,
North Street, Reading, Berks. RG1 4DA. Tel: (0734) 53411.
Telex: 848722 ADRUK

U.S.A.: Audio & Design Recording Inc.
P.O. Box 786, Bremerton, WA 98310 U.S.A. Tel: (206) 275 5009.
Telex: 152426 ADRUSA

product Broadcast consoles guide

The company offers complete systems for local radio, based around three elements: a mixer; line processing unit; and a power supply.

MTE ELECTRONICS (Australia)

MTE Electronics PO Box 48, Ashgrove, Queensland 4060. Phone: 07 302173.

Series 85: presentation to air console, available in 12- or 18-input mainframe sizes. Choice of three input channels.

Series 250: production console designed for broadcasters with 16-, 24- or 32-input 4- or 8-group (sub-group oriented), stereo monitor/master/remix console.

NEUMANN (West Germany)

Georg Neumann GmbH, Charlottenstrasse 3, D-1000 Berlin 61. Phone: 030 251-4091. Telex: 18495. UK: FWO Bauch Ltd, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ. Phone: 01-953 0091. Telex: 27502.

Range of modules that can be assembled into mixing consoles to provide exact requirements.

NEVE (UK)

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

5315: range of consoles for TV and radio production and 4-track sound recording. Fully modular design with 12 or 24 inputs.

5316: broadcast/recording consoles with 24 or 36 input channels routable to eight buss outputs for 8-track recording or to a stereo main output.

8108/8128: multitrack recording and mixdown consoles, also suitable for post-production purposes. Maximum of 56 input channels and 48-track capability.

DSP System: fully assignable console system with separate control and audio paths using digital signal processing.

51 Series: modular consoles suitable for radio, television and film applications. Custom consoles utilising 51 Series modules are available.

5322: compact modular stereo broadcast on-air production console.

542 Series: range of compact mixers suitable for broadcast applications. Available in 8-, 12- or 16-channel configurations.

PACIFIC RECORDERS (USA)

Pacific Recorders & Engineering Corp, 11100 Roselle Street, San Diego, Cal 92121. Phone: (714) 453-3255. Telex: 695008. UK: Leavers Rich Ltd, 319 Trinity Road, London SW18 3SL. Phone: 01-874 9054. Telex: 923455.

BMX: compact broadcast console with choice of mainframe size. Fully modular with mic and line input modules.

PANASONIC (Japan)

USA: Panasonic Co, 1 Panasonic Way, Secaucus, New Jersey 07094. Phone: (201) 348-7000. Telex: 710-992 8996. UK: National Panasonic Ltd, 308-318 Bath Road, Slough SL1 6JB. Phone: 0753 34522. Telex: 847652.

Model WR-130: portable 8/2 mixer designed for variety of broadcast applications.

PARTRIDGE (UK)

Partridge Electronics, 56 Fleet Road, Bentfleat, Essex SS7 5JN. Phone: 03745 3256.

Range of mixers for various scale operations in broadcast and recording between 5/1 and 24/8 formats. Wide range of possible designs and configurations based on modular system incorporating all types of inputs.

Mini Mixer: 5-channel mini mixer in 5/1 or 10/2 format. Meter switchable, single bass/treble and gain controls.

PERFECTONE (Switzerland)

Produits Perfectone SA, Ringstrasse 3, Portmoos, CH-2560 Nidau Bienne. Phone: 032 51. 12.12. Telex: 34383.

UK: Bell & Howell AV Ltd, Alperton House, Bridgewater Road, Wembley, Middlesex HA0 1EG. Phone: 01-902 8812. Telex: 261378.

NT 4101/NT 6101: portable mixers with 4 or 6-channels respectively.

PRIMROSE (UK)

Primrose Electronics Ltd, Reddings, Kirkby on Bain, Woodhall Spa, Lincs. Phone: 0526 52950.

Primrose do not currently manufacture any off-the-shelf mixers but are geared to custom building in a variety of formats.

PROTECH (USA)

ProTech Audio Corp, Flowerfield Building, Suite 1, St James, Long Island, NY 11780. Phone: (516) 584-5855.

Integra 3: large range of PC card modules for assembly into a wide variety of mixing consoles.

ICBM Series: range of modules for assembly into modular broadcast mixers. Completed ICBM mixers can also be supplied in assembled or kit form.

FPC Series: range of portable consoles for sound mixing and recording from 8/4 to 16/8 with custom variations available.

3000 Series: broadcast consoles ranging from 5-channel mono with dual outputs to 12-channel stereo with dual stereo outputs. Uses the *Integra 3* series of modules.

Television Audio Consoles: range of consoles that can be varied to requirements from 16 input channels to 32 plus, with large choice of options.

PYE (UK)

Pye TVT Ltd, PO Box 41, Coldhams Lane, Cambridge CB1 3JU. Phone: 0223 45115. Telex: 81103.

USA: Philips Broadcast Equipment Corp, 91 McKee Drive, Mahwah, New Jersey 07430. Phone: (201) 529-3800.

SM8: eight input channels selectable from three input channels: mono mic/line, stereo disc or stereo high level.

SM12: compact 12/4 portable/studio/OB mixer based on narrow 30mm modules.

QRK (USA)

QRK Electronic Products Inc, 1568 North Sierra Vista, Fresno, Cal 93703. Phone: 800-344 2181.

Omega Audio Console: broadcast console featuring digital switching, IC control of stereo signal channels to ensure minimal tracking error.

BroadKaster: small 4/1 remote broadcasting mixer with two inputs per channel and three mono or stereo outputs.

RAC (UK)

Rugby Automation Consultants, 220 Alwyn Road, Rugby, Warwick CV22 7RA. Phone: 0788 810387.

Specialists in manufacture of smaller custom mixers, majority less than 16-channel input.

RAINDIRK (UK)

Raindirk Ltd, 331 Bridge Street, Downham Market, Norfolk, PE38 9DW. Phone: 03663 2165/3617. Telex: 817737.

USA: Audicon Inc, 1200 Beechwood Avenue, Nashville, Tenn 37212. Phone: (617) 256-6900. Telex: 554494.

USA: ACl/Filmways, 7138 Santa Monica Blvd, Hollywood, Cal 90046. Phone: (213) 851-7172.

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.

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product Broadcast consoles guide

TVL: 10 input line level TV/radio editing mixer.
Mini 4 Group: low cost mixer of basic 10/4 format or custom design portable, desk or floor mounting, maximum 24/4 with 8-track recording.

RAMKO (USA)

RAMKO Research Inc, 11355 Folsom Blvd, Rancho Cordova, Cal 95670. Phone: (916) 635-3600.

Range of single channel (SC) and dual channel (DC) mixers.

RSD (Canada)

Richmond Sound Design Ltd, 1234 W 6th Avenue, Vancouver, British Columbia V6H. Phone: (604) 736-7207. Telex: 0454667.

USA: Listec Television Equipment Corp, 39 Cain Drive, Plainview, NY 11803. Phone: (516) 694-8963. Telex: 640470.

M82 Series: large range of mixers available in many permutations for broadcasting (*M82-III/A/C, etc*) and *M82-I* musician's mixer. There are a variety of mainframe sizes for the various models from 4-channel to 24-channel.

RTS (USA)

RTS Systems Inc, 1100 West Chestnut Street, Burbank, Cal 91506. Phone: (213) 843-7022. Telex: 662404.

UK: Future Film Developments, 36-38 Lexington Street, London W1V 3LE. Phone: 01-437 1892. Telex: 21624.

HPM-41: designed for a variety of professional applications such as film or sound location recording or to augment larger console facilities.

SAIT (Belgium)

Sait Electronics Ltd, 66 Chaussee de Ruisbroek, B-1190 Bruxelles. Phone: 02 376.20.30. Telex: 61130.

UK: Sait Electronics UK, Wireless House, 31 River Road, Barking, Essex IG11 OBX. Phone: 01-594 5642. Telex: 897576.

USA: Sait Inc, 33 Rector Street, New York, NY 10006. Phone: (212) 422-6690. Telex: 222411.

Sait manufacture a range of mixers for most applications—*ESM 601, 802, 1202* and *S19* for theatre and remote recording. The *3S* and *S90* are comprehensive modular multitrack recording desks for broadcast, TV, film and sound studios. Many formats are available.

SAJE (France)

SAJE SA, 5 Rue de Solferino, F-92100 Boulogne. Phone: (1) 609.15.54.

CSM 6: a console suitable for broadcast, multitrack recording and live sound and available in sizes from four to 40 inputs with two to eight outputs.

SAMUELSON (UK)

Samuelson Sight and Sound Ltd, 303/315 Cricklewood Broadway, London NW2 6PQ. Phone: 01-452 8090.

4ABN/P Mini Mixer: portable mixer designed to be used with Nagra tape machines. Features four mic inputs.

SATT (Sweden)

SATT Elektronik AB, Tellusborgsvagen 90-94, PO Box 3200, S-12611 Stockholm. Phone: 08.81.01.00. Telex: 10884.

SAM42: 4/2 portable mixing console with similar facilities to the *SAM82*.

SAM82: 8/2 portable mixing console with balanced mic inputs.

SELA (Sweden)

Svenska Elektronik Apparater AB, Gubbangstorget 119, S-12206 Enskede 6. 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.

2880ST: 8-input portable mixer with two groups.
2880-IS: minimixer for professional applications, six mic inputs.

45-00: small portable mixer available in 4-, 8- or 12-channel sizes with 2 output groups.

SENNHEISER (West Germany)

Sennheiser Electronic, D-3002 Wedemark 2. Phone: 05130 8011. Telex: 0924623.

UK: Hayden Laboratories Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Phone: 02813 88447. Telex: 849469.

M101: portable mono mixer with four channels designed for use with Nagra or similar.

SHURE (USA)

Shure Brothers Inc, 222 Hartrey Avenue, Evanston, Illinois 60204. Phone: (312) 866-2200. Telex: 724381.

UK: Shure Electronics Ltd, Eccleston Road, Maidstone ME15 6AU. Phone: 0622 59881. Telex 96121.

M67-2E: 4/1 mixer with *XLR* connectors, rotary level controls. *M677* six input accessory.

M68FC: four mics plus one auxiliary.

SR109-2E: 8-channel mono mixer.

SIEMENS (West Germany)

Siemens AG D-7500 Karlsruhe 21. Phone: 0721 595 2429. Telex: 7826851.

UK: Siemens Ltd, Siemens House, Windmill Road, Sunbury-on-Thames, Middlesex TW16 7HS. Phone: 09327 85691. Telex: 8951091.

CA: compact modular mixing system for variety of applications expandable up 40 channels with two, four, six or eight master outputs and 2 or 4 auxiliary master outputs.

C8: intended for a wide variety of applications, the standard *C8* model is a 24/4 or 24/8 and intended for permanent installation or OB use.

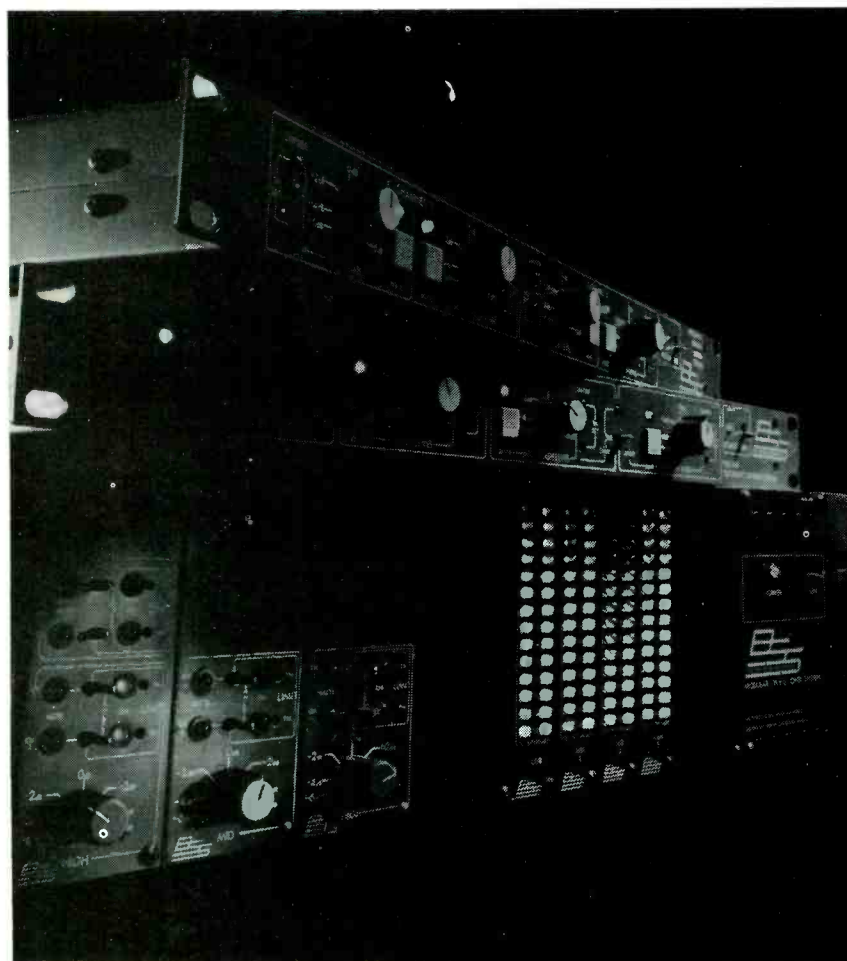
Sitral C: console system offering up to 48 input channels, 1-24 groups, 2-8 auxiliary channels and two or four master channels.

SIMMON (UK)

Paul Simmon Ltd, 28a Manor Row, Bradford, Yorks. Phone: (0274) 307763/307788.

GEN-2: location mixer for use with Nagra recorders. *XLR* inputs.

60 ▶



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Music Laboratories, 01 388 5392. **Turnkey,** 01 340 9221. **Wipwan**

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product Broadcast consoles guide

SOLID STATE LOGIC (UK)

Solid State Logic Ltd, Church Road, Stonesfield, Oxford OX7 2PS. Phone: 099389 324/444. Telex: 837400.

USA: Washington Music Works, 3421 M Street, Washington, DC 20007. Phone: (202) 342-9010. Telex: 440519.

new

Real Time System: hardware/software package which interfaces with SSL4000 Series automation to offer comprehensive presettable control of large-scale productions. Based around a 'preset' (stored sets of static fader data), allows sequences of presets to be assembled, edited and crossfaded between in either direction. System operates either with or without timecode. Events may also be triggered from timecode via an events list, and effects may be controlled via 40 analogue lines which may be used to access control voltages. System also supports multi-machine sync. (Preliminary data: full report in future issue)

SOLIDYNE (Argentina)

Solidyne Srl, Tres de Febrero 3254, 1429 Buenos Aires. Phone: 701-8622.

Series 1000: compact broadcast and TV sound consoles. Available in eight, 10 or 12 input channels with the largest offering 32 programme inputs.

Series 601: broadcast consoles including lights and speaker muting for two or three studios. Modular construction throughout.

401-CI: portable 4-channel console with integrated IC circuitry. Battery operated, mic and built-in amp.

SOUNDCRAFT (UK)

Soundcraft Electronics Ltd, 5-8 Great Sutton Street, London EC1V 0BX. Phone: 01-251 3631. Telex: 21198.

USA: Soundcraft USA, 20610 Manhattan Place, Torrance, Cal 90505. Phone: (213) 328-2595.

Series IS: 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.

SPECTRA SONICS

Spectra Sonics Inc, 3750 Airport Road, Ogden, Utah 84403. Phone: (801) 392-7531.

UK (modules and components): Sun Recording Services Ltd, 34-36 Crown Street, Reading, Berks. Phone: 0734 595647.

Custom and standard consoles for recording and broadcast purposes. Various configurations available.

1024-24, 1026-26, 1032-32: available with 12 to 32 group outputs.

Model 1100: line/mic mixer for use in disco, sound reinforcement, broadcast, etc. 19in rack mounting format. Six inputs and mono output.

SPHERE (USA)

Sphere Electronics, 20201 A Prairie Avenue, Chatsworth, Cal 91311. 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 I and II are portable, with full facilities.

Eclipse C: automated consoles using Allison 65K programmer. Five interchangeable equalisers.

1604 Satellite Mixer: 16/4 rack mount mixer designed to allow existing consoles to accept temporary overloads for large productions.

SQN (UK)

SQN Sales Ltd, 2 High Street, Port St Mary, Isle of Man. Phone: 0624 834294.

SQN-3: portable mini mixer available in two

versions, one of which is designed to interface with the Nagra SN tape machine.

STELLAVOX (Switzerland)

Stellavox, CH-2068 Hauterive/NE. Phone: 038 33.42.33. Telex: 35380.

UK: Future Film Developments, 36-38 Lexington Street, London W1V 3LE. Phone: 01-437 1892. Telex: 21624.

USA: ADB Alanco, 6630 Tailor Road, Box 108, Blacklick (Columbus), Ohio.

AMI 48: five inputs for 12V AB or phantom powered capacitor mic, 48V capacitor mic, dynamic mic.

STR (Switzerland)

Standard Telefon und Radio AG, Friesenbergstrasse 75, CH-8055 Zurich. Phone: (01) 465 21 11. Telex: 52134.

Automatic on-air broadcast control desk with microprocessor control. Console can perform automated sequence programming.

STUDER (Switzerland)

Studer International AG, Althardstrasse 150, CH-8105 Regensdorf. Phone: 01 840.29.60. Telex: 58489.

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

USA: Studer Revox America Inc, 1819 Broadway, Nashville, Tenn 37203. Phone: (615) 329-9576. Telex: 554453.

089 MkII: intended for mobile and truck working as well as static studio operation. 12 input channels.

169: portable mixer with same dimensions as A67 tape recorder, and 12 modules which may be arranged 11/1, 10/2 or 8/4.

269: similar to above but max 18 modules to 17/1, 16/2, 14/4 configurations.

369: similar to the 169/269 consoles. Mainframes of up to 32 inputs.

900 Series: modular consoles suitable for broadcast and TV applications. Custom versions available.

189: designed for permanent and portable applications with 18 input channels.

389: modular console providing 32 input channels.

069: portable broadcast console housed in a suitcase.

TAB (West Germany)

Tonographie Apparatebau V Willmsen GmbH Co, PO Box 130534, Kleine Klotzbahn 27, D-5600 Wuppertal 1. Phone: 0202 447452. Telex: 8591742.

T30: the T30 series are modular mixers that can be constructed around a number of differing mainframe sizes from a wide selection of modules. Special film dubbing versions available as are special modules to order.

TANGENT (USA)

Tangent Systems Inc, 2810 South 24th Street, Phoenix, Arizona 85034. Phone: (602) 267-0653.

BC-1: portable modular broadcast console available with eight to 32 input channels.

TECNICOBEL (France)

Tecnicobel, 8 rue de la Croix Maitre, BP26, F-91122 Palaiseau Cedex. Phone: (1) 920.80.39. Telex: 692543.

CARL 50: broadcast console with one man operation as the design criterion.

RB60: recording and broadcast console for medium and large installations. Fully modular.

TORE SEEM (Norway)

Tore Seem A/S, PO Box 10, N-1344 Haslum. Phone: 02 53.39.75. Telex: 19121.

SEESAM: broadcast/recording console for medium and large size installations. From 24- to more than 40-channel.

SEEMIX: simplified version of the SEESAM system. Series of all-round broadcasting consoles: ranging from 12 to 18 channels, two echo return channels.

TSM 12-2/4: 12-channel for OB vans and small broadcast studios.

UKM-1: one-man studio mixer, two VCA-controlled mic channels, three line inputs, one telephone hybrid channel.

PLUTO 3/1: lightweight, battery operated 3-channel mixer for OB use.

TRIDENT (UK)

Trident Audio Developments Ltd, PO Box 38, Studios Road, Shepperton, Middlesex TW17 0QD. Phone: 09328 60241. Telex: 8813982.

USA: Trident (USA) Inc, 652 Glenbrook Road, Stamford, Connecticut 06906. Phone: (203) 357-8337.

FlexImix: modular system whose configuration can be rapidly altered. Systems built up using four basic modules.



Trimix: compact modular console based on the Series 80. Mainframe houses up to 24 modules. May be configured from 2-track to 24-track.

TWEED (UK)

Tweed Audio Electronics, Pinnacle Hill Ind Est, Kelso, Roxburghshire. Phone: 0573 23777. Telex: 727633.

USA: Tweed Audio (USA) Inc, 12 Ilex Drive, Newbury Park, Cal 91320. Phone: (805) 499-4764.

Offer a custom building service as well as a standard range of consoles.

BC82: small portable console in flight case for mains or battery operation. Offers eight input channels.

12/2-4 Portable: 12-channels with choice of 2- or 4-track configuration designed for mobile use.

M124: standard design available with 12 inputs (16 optional).

M16: 16 input channels with choice of two equalisers, 16-track output, 16 auxiliary outputs.

M24: 24 input channels with choice of equalisers, 24-track output, eight auxiliary outputs.

B243/B244 Broadcast: 22-channels are wired up for stereo and mono operation. Any channel can be plugged into any position. B243 has a script space useful for on-air operation, with central facilities panel. B244 offers conventional mixer design with end table.

B163/B164 Broadcast: same specifications as B243/B244 but number of input channels limited to 14.

B245/B165 Broadcast: comprehensive facilities for production studio, up to 24 inputs.

RP 1601: radio presentation console with eight high level stereo inputs, four mic channels (with optional limiters), two mono inputs for telephone balancing, two remote selectors for outside sources, and full talkback and intercom facilities.

UREI (USA)

United Recording Electronics Industries, 8460 San Fernando Road, Sun Valley, Cal 91352. Phone: (213) 767-1000. Telex: 651389.

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

MOD One: series of broadcast consoles of modular construction.

WARD-BECK (Canada)

Ward-Beck Systems Ltd, 841 Progress Avenue, Scarborough, Ontario M1H 2X4. Phone: (416) 438-6550. Telex: 06525399.

USA: Ward-Beck Systems Inc, 6900 E Camelback Road, Suite 1010, Scottsdale, Arizona 85251.

T1202: portable modular mixer with 12 input channels.

790637: modular TV audio control console.

Model M2484: 24/8 broadcast console.

L3242: standard TV production and on-air console with 32 inputs, and two submasters. Also available with 20 inputs.

ZOOT HORN (UK)

Zoot Horn, 31 Station Road, London SE25 5AH. Phone: 01-653 6018. Telex: 945007.

R1 (2): designed for small OB applications.

VM Series: portable 8/3 console designed as a submixer for OB purposes. Similar to the R1.

R4/1: designed for use with a VTR and camera. Incorporates two mic and a single line input, plus three VTR inputs.

OTARI

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



OTARI MTR-10-2

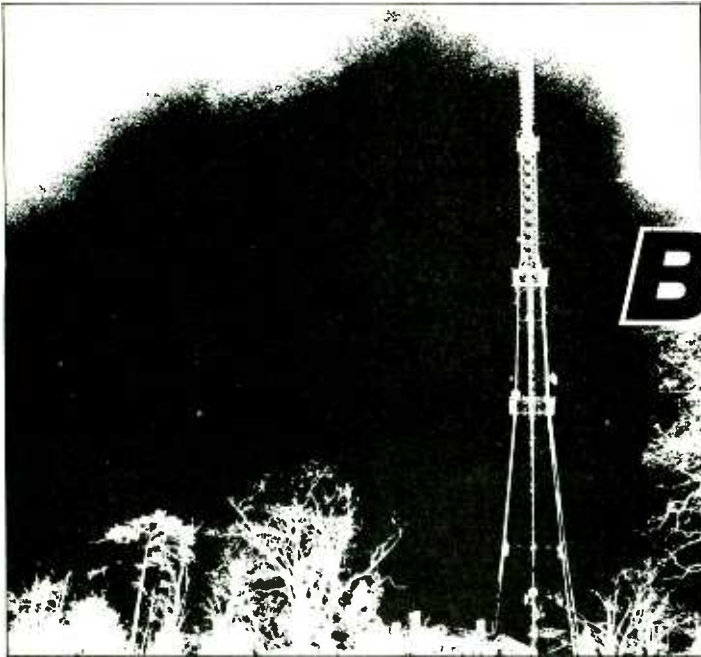
The most advanced studio / broadcast master recorder

Bridging the gap between the new technology and old reliability, it's the logical extension of the innovative technology built into our multichannel MTR-90. The new MTR-10-2 gives the professional unprecedented control:

- Measurable and audibly discernible performance improvements. More than chips and buzz words, a balanced engineering approach: adjustable phase compensation with internal square/sine wave generator; electronically balanced I/O with direct coupled outputs.
- Full servo, D.C.PLL transport governed by an on-board microprocessor — an industry first.
- Unmatched production features —

exclusive multiple edit modes, reverse play, standard alignment level presets, and dual-mode varispeed. Other features include controlled wind, preset master bias switching, three speeds and IEC, AES and NAB selectable. Also it includes return-to-zero and offers an optional tape locator with ten position memory and tape shuttle.

- DIN-head version is available.
- Comprehensive servicing and support. Fully modular power supply, audio and transport electronics card frame. A highly dedicated distributor service network with factory trained and supported technicians. For full details of the heavy-duty machine, please contact us.



British Broadcasting in the '90s

Richard Elen

The British recording industry is in a bad way. It may have 'done all right' in the past, but today, the pressures of economic recession and other factors have taken their toll. The BPI is unhappy about home taping, but this article offers a completely different solution to the industry's malaise, based on better use of that medium which is sadly under-exploited in Great Britain — radio broadcasting.

IT IS a fact that British broadcasting is sadly under-exploited, and in no area is this more true than in that of radio. Transatlantic visitors to London, for example, are quite dismayed to learn that — apart from our excellent national networks, which are the envy of the world — there are only three radio stations serving the seven million inhabitants of Greater London. Being used to cities of this size supporting several dozen stations on AM and FM, each supplying exactly the desired type of information or entertainment at the touch of a tuning knob, they are astounded to discover that there is no such thing as a 'rock station' or a 'jazz station' to which they can turn for their choice at any time of the day or night. London Broadcasting, of all the ILR stations, throughout the country, offers what we might call 'specialist programming', and it also has to supply all the ILR stations with news. All the other local stations, whether BBC or ILR, have to be 'all things to all listeners'. People listen to them because there is no other option, yet with an estimated 90% of the population tuning in at some time or other during the day to a radio station, the chances of the average listener actually hearing something he or she likes at the moment of tuning in is very small.

Thus the public suffers from lack of choice. But it suffers, too, in a much more insidious way, and this is

especially true when we consider music programming on the radio stations of Britain today. The philosophy of a 'general entertainment station', on which many of Britain's radio outlets are based, means one thing where there is an absence of choice. It means 'lowest common denominator' broadcasting. If means that the one or two local stations in a given area *must* concentrate on a limited range of popular styles, all guaranteed to be popular with the mass audience: perhaps half the records in the Top 40 at any one time, plus half the Top 100 from last year or the year before, and a hefty smattering of genuine 'oldies' (records more than two years old).

There are semi-specialised national outlets for MOR, classical and Top 40-ish material via the BBC networks, and plenty of specialist music 'ghettoes' in local stations' evening schedules — but much new music never stands a chance of getting mainstream daytime airplay. Tim Blackmore, head of programmes at Capital Radio, made the point succinctly in a speech to last year's Edinburgh Radio Festival:

"When you realise that a Top 10 record could have sold as few as 100,000 copies and then find out that 20% of national sales are in an area that approximates to the Capital area, it doesn't take an Einstein to see that only 20,000 of our potential audience bought it—that means that some

12 million of our potential audience didn't, and I don't like that ratio as a basis for programme judgements."

Excluding those records which date from yesteryear (perhaps a third or more of the daytime discs on an ILR station), only new records fitting an easily defined category — one of two or three musical styles of the moment, known to be highly popular — really stands a chance of getting airplay: and airplay is the key to record sales (although the BPI may think otherwise). Even though the offshore stations of the sixties were largely 'Top 40' in style and programming format, they created a burgeoning of British musical styles which made British contemporary music a world leader and trend-setter. Today that musical variety still exists, but it is almost entirely underground. The American charts, once sometimes dominated by British records, now contain a mere handful out of a hundred. High-quality American music hardly gets a look in in Britain, let alone much local and national home-grown talent. Is it surprising, then, that the record industry is in such a bad way, sales are declining, and that the BPI has fallen back on home taping as the scapegoat? Although there is indeed a worldwide recession, that is not the whole story. Yes, there is always a market for music to dance to, and music of the disco-descendant 'boomp-crack' type will always sell. Yes, there is a peculiarly British market for the novelty record, at least every Christmas. But the 'mainstream' is likely to represent a certain musical style, out of a couple of styles at most. The fact that the underexploitation of radio may be to blame for the industry's troubles has been realised by many, but little has

been done because it seems such a hard nut to crack. Where do you start?

What is to be done?

The under-exploitation of radio dates back to the '20s, when the BBC was created, and even before, when the administration of the airwaves was placed in the hands of Government. One reason for the setting up of the BBC was to ensure that the awesome power of radio did not fall into the wrong hands, and Government, of course, knew which hands were right and which were wrong. It handed the day-to-day running of this power to the BBC, and, latterly, the IBA. The patriarchal doctrines of the broadcasting administrators assumed that radio had a duty to the masses to be impartial, that the administrators knew best what was good for the 'listeners-in' to hear. There was also a stated desire to 'avoid the chaos that had happened in America' — the fact that said chaos was ultimately sorted out was lost to us on this side of the Atlantic. Indeed, it might well have been better had such chaos reigned in Britain for a while, so that by the time radio was institution-alised it would have attained a wider degree of variety *de facto*. It would have been difficult to take such variety away, as the fact that we still have (although somewhat flawed) a Free Press demonstrates.

It may be argued, however, that the BBC was right for the time. More fundamental and difficult to change (it being a fact that the BBC has not only survived, but thrived, alongside independent outlets) is the basic attitude to control of the airwaves which exists in Britain. Electromagnetic radiation does not exist as a public resource, like the air we breathe: it is effectively (and



actually) owned by the Government in the form of the Home Office and its Radio Regulatory Division. The RRD is not an organisation like the FCC in the United States, which exists to administer, regulate and organise the use of the airwaves as a resource. Instead, a broadcaster is 'lent' the use of a slice of the electromagnetic spectrum by kind permission of its effective owner, the Home Secretary.

This would be almost impossible to change. Those who have brushed with the RRD will know that it is virtually unaccountable to the public, or even to the public's elected representatives. If you want to find out what the RRD is up to, you have to ask a Question in the House. This may soon change, however, providing hopefully at least a foot in the door. If the suggested passing of broadcasting control from the Home Office to the Department of Industry provides such an entry, we should be aware of what form the foot in question could take. What form *could* radio take, and how could it be administered?

How it could be done

It is unquestionable that some kind of organisation should exist to manage the airwaves, but it should manage them on behalf of the public and not own them. We might consider the setting up of an 'Independent Radio Licensing Commission' (TV perhaps could follow later) which would be responsible for allocating frequencies, determining other technical matters such as transmitting sites and antenna systems, output power limitations, and the issue of what we may still call 'licences'. It would also have to establish technical standards, but these might not necessarily be as tightly restrictive as they

are today, leading as they do to an excessive need for overspecified, expensive equipment and thus restricting the ability of broadcasters to do their real job, that of communicating. And assuming that transmitters are technically sensible, and do not cause interference due to poor design, etc, it is unlikely that anyone would notice. Indeed, even with home-built transmitters, and cheap audio gear, you might not know. Antony Dean, the European Broadcasting Union's Director of Radio, gave a talk at Monte Carlo in 1981, which is reprinted in *Independent Broadcasting*, November 1981, under the heading *Today's Radio Scene in Europe*. In it, he discusses the remarkable situation in Italy, where the public broadcasting monopoly granted to RAI (Radiotelevisione Italiana) was partially overthrown by a judgement of the Italian Constitutional Court in July 1976. As a result, there are today literally hundreds of radio stations throughout the country. Commenting on the stations which occupy the entire FM band in, say, Milan, he notes that a tune across the band:

"... brings home the uncomfortable realisation that a disc-jockey in a bedroom using a small stereo transmitter with its aerial hanging out of the window sounds to the listener very little, if at all, different from a disc-jockey on a highly-developed commercial station or on a major national network. The sound in the listener's ear is of high technical quality, and the presentation is virtually identical..."

Of course, we would not wish to advocate either back-bedroom radio

stations or home-built transmitters, but if we discount the latter, you can hear the same kind of broadcasting, with the same degree of professionalism, any weekend on the FM band in London, although the rigours of possible apprehension for illegal broadcasting do take their toll on the amount of equipment and money a typical London 'land-based pirate' is prepared to put into operation, and this does affect technical quality, if not presentation.

Having obtained a licence, it would be up to the station's operators to finance it of course. It is very likely that many such stations would be financed by advertising, but there is no reason why other forms of fund-raising should not be successful. Subscription radio has made its mark in the United States, and whether finance is derived from individual listeners, or by grants from foundations for specific programmes (as is the case with National Public Radio in the US) matters not. If the station provides a service, commercial or otherwise, that sufficient listeners enjoy, it will continue to exist. If not, there will be plenty of other broadcasters waiting in the wings. Monopoly ownership of many stations by a single company can be regulated via existing channels, if need be.

Radio stations need not be obliged to cover a vast area, either. The majority of ILR stations are more regional than local, but there is no reason why true community stations should not exist. There is doubt that some areas can support a conventional ILR station today, but much of this is due to the simple fact that today's ILR stations are very expensive to run. I have yet to hear a good reason why an area of a given size in the UK could not support the same number of radio stations as the same-sized population area in the

US or Canada, if the same flexibility was possible in Britain as in North America.

Frequency allocation

A standard argument which is trotted out by one official organisation or another whenever more radio stations are proposed from outside the broadcasting establishment is 'Where are the frequencies going to come from?' Despite the fact that we have seen this argument disproved enough times in the past for it to be more than somewhat discredited (the near-miraculous uncovering of airspace for first BBC and then IBA local radio being two cases in point), it is still worth discussing, if only to dismiss it. Apart from the fact that there is no earthly reason why a station should occupy both an AM and an FM slot with the same programme (although the same company could well own and operate an AM and an FM station from the same building), there really is no shortage of room. It is not sufficient to suggest that because we are so close to Europe, we should keep off their channels, because it is unlikely that Radio 7 in France will be very worried if you can't hear it in Luton because a Luton station is on that channel. Indeed, the fact that you can hear LBC on VHF in Worthing should not stop you from putting one of Worthing's stations on that frequency, as long as there is a station which covers the area in between on a different channel. To some extent, local radio already utilises this principle of what we might call 'controlled interference' and there are plenty of other holes, even in the AM band. Within reason, it doesn't even matter if Hilversum 3 is on one of those 'holes' as long as it doesn't affect

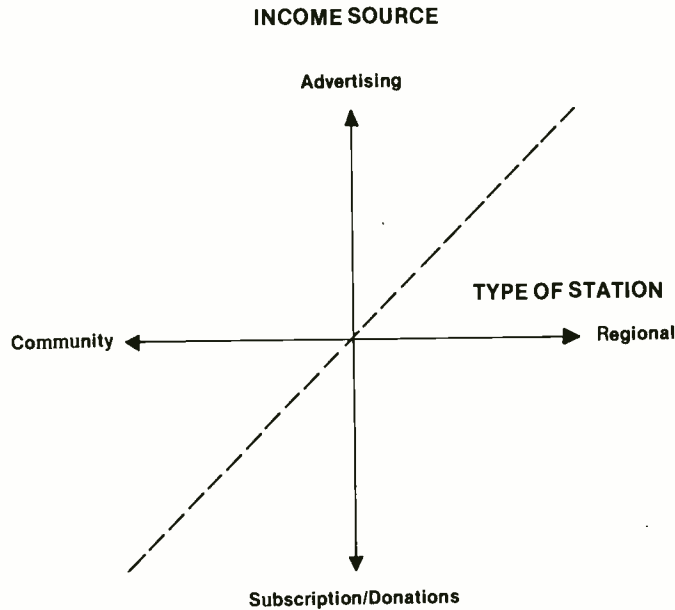
British Broadcasting

your local audience or their national one. If the philosophy that each frequency could only be used once before it wore out held in the US, there would be very few stations. However, they don't appear to suffer from the problem. If you say that Britain is next to Europe, so there are very few holes, I will reply that the United States is next to other bits of the United States and there are lots!

A question of quality

One important consideration about the system suggested here is the effect that all these stations would have on the overall 'quality' of broadcast output. Would 'quality' suffer?

First of all we should consider exactly what the word 'quality' means when applied to radio broadcasting, especially as the very purpose of the BBC and IBA is, to a large extent, to ensure that this somewhat metaphysical factor does not drop below a certain level. The BBC has a long tradition, fostered largely by Lord Reith and his successors, of providing a service envied by the world. And as many of those in important administrative positions in ILR and in the IBA have BBC origins, it is hardly surprising that the Reithian traditions continue today in both camps. There is nothing wrong, many may say, in upholding such standards and, of course, the system proposed here would not make the BBC (or the ILR stations) redundant: it could happily co-exist as, for example, NPR exists in the United States alongside other outlets. But the traditional interpretation of 'quality', as implemented today by the BBC and IBA, has some shortcomings. Above all, it assumes that the British public needs to have its listening filtered by organisations which determine what is acceptable and what is not. I am not referring here, of course, to such matters as obscenity — which merely require responsibility from broadcasters and not paternalism, and are covered by the law of the land, anyway — but simply to the overall standard of broadcast output. In the early days of broadcasting it *may* have been true to say that the medium was so impressive and influential — especially with its reliance on news and current affairs programming — that the population would not have been able to separate truth from opinion, or decide for itself whether a given type of presentation was acceptable or not. Today we must certainly give the public the benefit of the doubt, and assume that, to a large extent, it *can* decide whether or



The diagram shows, in very basic form, the continuum in which independent radio stations could exist. While many of them may exist on the dotted line, stations could in fact operate anywhere on the diagram, although such examples as a large regional station existing on donations, or a very small community station existing on commercial advertising may be less likely, as the commercial catchment area for a small station may be too local even to cover the reduced overheads — those involved in running a large, regional operation may preclude relying on donations from listeners. Under certain circumstances, however, both may be quite practical.

not it likes to listen to a certain type of programming. At the moment it has no choice: not only is the public prohibited from deciding for itself (because the current 'presentation standards' apply to all stations); it also, very likely, *cannot* tune away and listen to something else, as there isn't anything else to listen to — and even if there is, it simply represents 'more of the same'. It must be recognised that today, if not in the past, the public *can* recognise the difference between rubbish and non-rubbish, and that it *does* care about what it listens to. Even more important, it should have the right to choose: today it does not.

It may well be that the only definition of 'quality' that we can apply to broadcasting is, simply, whether the public like what is offered or not. Under the present system, limited choice must dictate a pressure on broadcasters to reduce standards and offer mere 'populist pap' to ensure that *you* get the ratings rather than 'the other channel' (a situation which we see all too often on British television). Under the system proposed, it would be simple: there would be plenty of specialist stations which could concentrate on specific audiences. Those that broadcast rubbish — of whatever kind — will attract few listeners and become unable to survive. Today's Great British Public deserves the right to make its own choice, and not have Hobson's inflicted upon it. The Elect may well have a *duty* to the masses, but the

masses are also quite able to decide for themselves.

Such a system as proposed here could not develop overnight. It might take ten years — but it would be worth it. But why would it be worth it? Who would benefit from forty radio stations in London by the end of the decade?

Who would benefit?

It would be easier to ask who *wouldn't* benefit from a vast expansion in radio broadcasting. No doubt neither the BBC or the IBA would be very happy. Nor, perhaps, would some of the ILR stations who are justifiably jealous of their hard-won franchises. And there might be political objections. This proposal is not a political one, but at first sight it could be seen to advocate an American-style commercial system which would offend those (largely on the political Left) who advocate non-commercial, community radio. But as there is room for commercial stations so there is room for non-commercial ones (see diagram). There might even be a case for a sub-band at VHF allocated to a 'Community Radio Network' if it was felt that the basic plan was overly commercial. Opening up radio would offer benefits to everyone, whatever their political colour. It would improve the quality of life. It would entertain, inform, educate . . . all those things at which radio is almost unquestionably the best. It would create jobs, not simply in broadcasting, but in audio manufac-

turing industries, recording studios, record companies, and for musicians. It would offer the public the choice of a wide variety of specialist programmes. It would benefit the record industry: instead of one market there would be many. New acts would be encouraged, and Britain's creative genius would be able to flourish once again in the airwaves over the United Kingdom. There would be more records produced, by many different acts. There would be more work for the recording studios, producing records but also making commercials, trailers and the other accoutrements of radio today. Equipment manufacturers and other industries would flourish in a strong home market which might even be enough on its own to bring the country out of recession. Advertisers would be able to aim accurately at specific markets with absolute certainty that their ads would reach the right people. Local communities could come together over the air to discuss local problems and find solutions . . . the list is almost endless. No doubt care would be needed in planning and development to prevent chaos or other negative effects, but if handled correctly there would be room for all. The shot in the arm to the record industry alone would make consumer digital audio or the home video boom look like grains of sand on the seashore of possibilities. Home taping worries would be blown away by the winds of change — airplay sells records as well as tapes.

A campaign

Call it community radio, call it 'free radio', call it what you will, campaigns have been and gone many times over the past decade or two. But a campaign is needed now, to develop radio broadcasting in Britain into a system unparalleled in accessibility, flexibility, quality and choice anywhere in the world. Campaigns for radio in the past have largely failed (I would not call our present local radio system a *great* success, although campaigning may have helped it come to pass) because they have been public campaigns, promoted largely without the backing of the many industries that will benefit from the opening out of British radio. This time, public demand for the better exploitation of the medium of radio must be orchestrated by those professionally involved in the industries that can help it come to fruition — and that means virtually every industry in the country which is important to the future of Britain as a trading entity. High technology businesses will benefit most, but it does not end there. The benefits to industry, and the country at large, are immense, and now is the time that those benefits must be realised.



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 DX-2B. OPTIONAL DBX UNIT - S/N Ratio - 92dB A weighted (NAB).

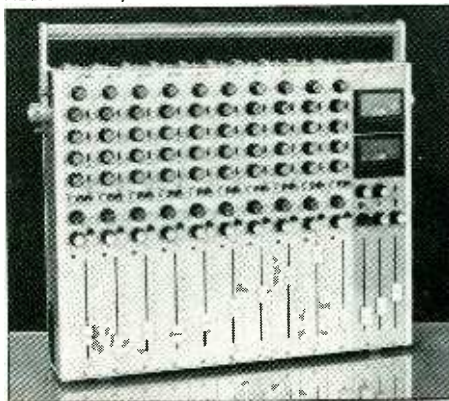
NAB 60th Convention, Dallas - a preview

The 60th Convention of the National Association of Broadcasters will be held from Sunday, April 4 to Wednesday, April 7 at the Dallas Convention Center, Dallas, Texas. While over 460 exhibitors will be showing broadcast equipment, in this preview we detail only those exhibitors showing audio products.

A

- **Accurate Sound:** AS-100 high speed duplicator, Starbird mic boom, plus Inovonics audio processing equipment for AM and FM broadcasting including the MAP-II multiband processor.
- **ADC:** wide range of audio connectors including QCB terminal blocks and broadcast jackfields.
- **ADM Technology:** range of broadcast production consoles in various configurations, plus Model 302 limiter and Model 310 noise gate modules.
- **AEG Telefunken:** Telcom noise reduction modules, plus products and product details of the company's wide range of radio transmitter equipment.
- **Agfa-Gevaert:** wide range of audio mastering tapes, cassette tapes and cassette pancakes.
- **AKG:** range of condenser and dynamic mics and accessories, together with the company's range of reverb units.
- **Albrecht:** range of magnetic film recorders for dubbing purposes.
- **Allied Broadcast Equipment:** mains powered stereo phono preamp.
- **Alpha Audio:** Sonex acoustic foam, plus a variety of studio equipment and accessories.
- **AMS (Advanced Music Systems):** DMX 15-80SB stereo broadcast delay line, new DMX15SYNC video synchroniser audio compensator, plus the company's established range of DDLs and the DM2-20 phaser/flanger.
- **Amber:** Model 3500 miniature distortion analyser, plus the Model 4400A multi-

- purpose audio test set.
- **Amco Engineering:** range of modular cabinets and consoles for broadcast equipment, plus matching control desks.
- **Ampex:** new ATR-800 broadcast orientated tape machine, plus the company's established range of multitrack and mastering machines. Also EECO synchronisers and Ampex tape and cassettes.
- **Ampro/Scully:** Scully 280B Series tape machines and 8300 triple cart machine, plus Ampro broadcast consoles and cart machines.
- **Anvil Cases:** range of equipment cases including the Amp Rack series.
- **Aphex Systems:** broadcast version of the company's Aphex 11 Aural Exciter.
- **Arrakis Systems:** range of audio consoles for broadcast purposes.
- **Audico:** range of cassette loader/rewinder/exerciser/timer units, plus audio and video tape splicers.
- **Audi-Cord:** A Series and 100 Series cartridge machines.
- **Audio Developments:** range of portable and small mixers for broadcast purposes, plus ancillary processing units. Debut of the AD062 mixer, plus a new version of the AD060 ENG mixer.
- **Audio & Design (Recording):** wide range of Audio Developments AD062 mixer



- rack mount signal processing equipment including broadcast limiters, noise gates, etc.
- First US showing of the F601 Superdynamic limiter.
- **Audio Kinetics:** Q-Lock 310 synchronisation system with various Q-Soft software options for machine interface purposes.
- **Audio Technica:** range of mics and phono cartridges.
- **Auditronics:** Model 1000 audio distribution amp system, plus the Model 700 console with Model 1200 automation and a new compact sub-mixer.
- **Autogram:** range of audio mixers, plus a cartridge random selector.

B

- **Basys:** News Fury newsroom computer system with microprocessors for handling text and copy.
- **Belden:** comprehensive range of cables for sound and broadcast applications.
- **Best Audio:** details of the company's audio mobile.
- **Beyer:** wide range of condenser and dynamic mics, plus a variety of headphones.
- **BGW:** range of amplifiers including the recently introduced 320, 620 and 1250 power amps.
- **Bird:** variety of broadcast test equipment including RF power meters.
- **BIW (Boston Insulated Wire):** range of specialist and general purpose audio and video cables.
- **Broadcast Audio:** System 12/16 modular broadcast mixers, plus the APE-242 phono amp.
- **Broadcast Cartridge Service:** various cart brands, plus cart accessories including alignment tools and storage systems. Also cart reloading service.
- **Broadcast Electronics:** Series 150 and 250 broadcast mixers, range of FM transmitters and ancillary equipment, Control 16 programme control system, single and multi-deck cart machines, and QRK turntables.
- **btx:** Shadow System computer interfaceable audio/video synchronising system, 5000 Series SMPTE timecode generator/display units, and Model 4600 SMPTE audio/video tape controller.

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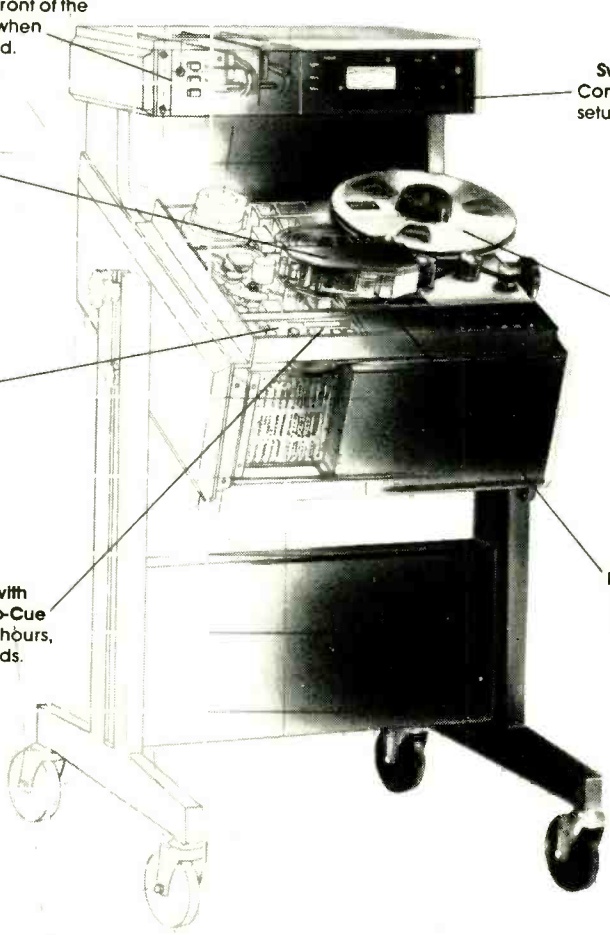
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C

● **Calzone**: range of flight cases for amplifier rack units, mixers, etc. ● **Cambridge Products**: range of interconnection products. ● **Capitol**: *Audiopak* broadcast cartridges. ● **Central Dynamics**: range of audio and video distribution amplifiers, plus production switchers and master control switchers with automation control. ● **Cetec**: radio automation and audio systems including mixers, turntables and antennas. Also computerised billing, traffic and accounting systems. ● **Cetec Vega**: *Model 80* and *81* hand-held radio mics, plus the company's established range of communication equipment. ● **Chase Media**: traffic, accounting and music format computer system. ● **Circuit Research Labs**: range of ancillary processing equipment. ● **Clear-Com**: *RS202* intercom system, plus the *System II* remote stations and *KB-124* duplex remote station. ● **Clyde Electronics**: *Alpha Series* modular broadcast mixer, *Delta Series* news mixer, new *CEDUB* 20-input stereo dubbing mixer for news compilation/commercial production, plus a variety of radio broadcast ancillary equipment including the *CEBTUI* turntable. ● **CMX/Orox**: wide range of time-code generator/readers. ● **Columbine Systems**: radio broadcast information system. ● **Computer Concepts**: traffic and accounting computer systems. ● **Comrex**: wide range of intercom systems, a telephone/studio interconnection system, plus radio mic systems. ● **Continental Electronics**: range of AM and FM transmitters, antenna systems, audio consoles and ancillary equipment. ● **Crown**: wide range of power amplifiers including the recently introduced *PS200* and *PS400* amps, plus the *PZM* range of pressure zone mics and the *Badap 1* programmable audio measurement system. ● **Custom Business Systems**: computer system for radio traffic and accounting purposes.

D

● **Datatek**: audio and timecode routing switchers, plus distribution amplifiers for video, audio, pulse and timecode applications. ● **Datatronix**: range of broadcast mixers, console modules and amplifiers, plus ancillary processing equipment. ● **DB Electronics**: *DB-2000* cart machine plus a broadcast turntable. ● **dbx**: *900 Series* modular signal processing equipment, plus the company's range of comp/limiters, *500 Series* signal enhancers, and various VCAs. ● **Delta Electronics**: remote controlled antenna systems, plus analogue and digital antenna monitors. ● **Di-Tech**: audio/video routing switchers and distribution amplifiers. ● **Dolby**: wide range of Dolby-A professional noise reduction units including new modules for videotape recorders. ● **Dynamic Technology**: **Harris** range of antennas, masts and ancillary equipment including mixers, cart machines and a programme automation system.

E

● **Elcom-Bauer**: range of transmitters and ancillary processing equipment. ● **Electro & Optical Systems**: *Elector* range of timecode generators and readers. ● **Electro-Voice**: wide range of mics and loudspeakers, plus headphones. ● **Emcee Broadcast Products**: range of amplifiers. ● **Eventide**: *SP2016* digital reverb/effects processor, new *Timesqueeze Jr* time



Eventide Timesqueeze Jr

compression/expansion system, and *Specsystem* software package for spectrum analysis. Also the company's established range including the original *Timesqueeze* system and *H949 Harmonizer*.

F

● **Farrtronics**: multi-station intercom system, plus amplifiers and mixers. ● **Fidelipac**: variety of broadcast cartridges and accessories including test carts and cart racks. ● **Fitzco Sound**: wide range of products including mixers, tape machines, ancillary processing equipment and test equipment. ● **Fostex**: *Model 350* 8/4/2 mixer, *Model 250 Multitracker* 4-track high speed cassette/mixer unit, and the *A-2*, *A-4* and *A-8* tape machines using 1/4in tape.

G

● **Garner**: range of bulk erasers for audio and video tape, plus a high speed 1/4in tape duplicator. ● **Alan Gordon Enterprises**: range of mics and headphones. ● **Gorman Redlich**: digital antenna monitors, EBS encoders and decoders, and weather receivers. ● **Gotham Audio**: wide range of products from *EMT*, *Neumann*, *Telefunken* and *TTM* including digital reverbs, mics, tape machines, and noise reduction equipment racking. ● **Grass Valley**: audio/video routing switchers. ● **David Green**: wide range of broadcast equipment including mixers, tape machines, turntables and loudspeakers. ● **Gregg Labs**: AM and FM audio processing amplifiers and the *Telemix II* hands free on-air telephone system.

H

● **Hallikainen & Friends**: computer control system for broadcast transmitters, programme logging system, time announce controller, and television audio system. ● **Harris**: new range of solid state AM transmitters, new earth station controller system for antennas, receivers and uplink electronics, new desk top computer based on the *Autotron Star* system for script preparation, newsroom and word processing purposes. Also a wide range of broadcast equipment including AM and FM transmitters and ancillary equipment, the *µMac* microprocessor controlled modular console, the *9003* programme automation system and various ancillary broadcast audio processing equipment. ● **Harrison**: *MR Series* consoles, plus the *PPI* post production console, an *Alive* sound reinforcement console, and the *Autoset II* automation programmer. ● **Howe Audio**: *Model 7000* and *8000* broadcast audio consoles.

I

● **IGM**: variety of multiple cartridge players, *Basic A* programme automation system, and various remote control units from cart sources.

● **Image Video**: custom designed audio/video systems, plus systems for sales, trafficking and switching, machine assignment, and automation purposes. ● **Interface Electronics**: variety of mixers for broadcast applications. ● **ITC**: single and multiple cart machines, plus professional tape machines.

J

● **JBL**: new *4345* and *4355* 4-way studio monitors, recently introduced *4430* and *4435* studio monitors, plus the company's established range. Also the *7510* automatic mic mixer. ● **Jefferson Data Systems**: newsroom computer systems, plus systems for sales, trafficking and accountancy purposes. ● **Jensen Tools**: variety of tool kits, tool cases, and electronic test equipment. ● **JVC**: *Series 90* digital recording system.

K

● **Kaman Sciences**: broadcast computer systems. ● **Keith Monks**: new studio turntable unit, producer's playback turntable, wide range of mic stands, *LS-19* monitor with in-built power amp, plus record cleaning machines. ● **Kings Electronics**: range of RF coaxial and triaxial connectors. ● **Klark-Teknik**: wide range of ancillary units including graphic equalisers and effects units. First US showing of the *DN722* stereo digital profanity delay unit.

L

● **Leader**: wide range of audio test instruments including a chart recorder. ● **Lemo**: range of audio patching connectors. ● **Lexicon**: *Model 1200* audio time compressor, plus the company's established range of digital reverb units including the recently introduced *Super Prime Time* and *224X* programmable reverb. ● **Logitek**: custom built audio mixers, balanced input phono preamps, power amps, and LED VU display units. ● **LPB**: AM and FM transmitters, various mixers for production and on-air applications, and a variety of ancillary processing equipment. ● **LTM**: range of audio mixers, mics and headphones.

M

● **3M**: 32-track digital mastering system and associated digital products, *M79* 24-track analogue recorder, **Wollensak** cassette duplicators, and *Scotch* audio tapes. ● **Marconi**: new *Pulsam* low-noise modulator claimed to combine the advantages of pulse width modulation and Class B modulation in one system for broadcast transmission usage. Also the company's established range of transmitters and ancillary units. ● **Marti Electronics**: range of radio ENG systems, plus STL units, remote pick-up units,

70 ▶

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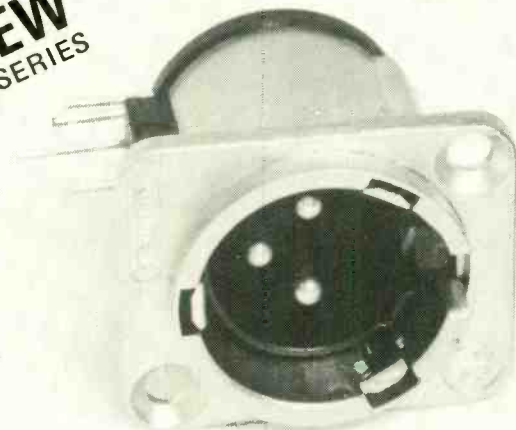
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remote control units, an SCA generator, comp/limiter and associated equipment. ● **Mathews Studio Equipment**: range of mic stands. ● **Maxell**: wide range of audio tape and cassettes. ● **McCurdy**: wide range of broadcast audio equipment including numerous audio mixers, intercom systems, audio distribution amps, turntables, and audio switchers. ● **McMartin**: range of transmitters, small mixers, power amps, audio receivers, ancillary processing equipment and test equipment. ● **MCI**: *JH-636* console for mobile applications, new *JH-800* compact portable, general purpose 12-channel audio console, plus the company's established range of consoles, tape machines and autolocators. ● **Micmix**: variety of audio reverb units including the recently introduced *XL-121* system and *Dynafex* noise reduction/noise gating unit. ● **Micro-Trak**: broadcast turntables, pick-up arms, and phono preamps. Also an antenna heater control system, audio distribution amps, small audio mixers, and a range of broadcast orientated studio furniture including cart racks. ● **Moseley Associates**: wide range of broadcast equipment including STL units, remote control units, audio processing units, and microwave accessories. ● **Motnrola**: mobile, stationary and hand portable VHF and UHF communications transmitters and receivers. ● **Musicworks**: syndicated radio formats especially for modern country music.

N

● **Nady Systems**: *Nady Cordless* and *Nasty Cordless* radio transmission systems and various transmitter/receiver units. ● **Nagra**: range of portable tape machines in a variety of configurations including the *T-Audio* twin capstan multi-format recorder. ● **Neve**: recently introduced *51 Series* broadcast consoles, *Necam II* automation system, *Necomm* intercom system, and various portable consoles. ● **Nortronics**: comprehensive range of replacement tape heads for broadcast, studio and duplication machines. Also the *QM-250* bulk tape eraser. ● **NTI**: range of test equipment.

O

● **Orban**: range of ancillary processing units including the *245E* stereo synthesiser, various quasi-parametric equalisers, and the *418A* stereo comp/limiter. ● **Otari**: *MTR-10* and *MTR-90* professional tape machines, plus the company's established range of tape machines and tape duplication equipment.

P

● **Pacific Recorders**: *BMX* compact broadcast console, *Tomcat* cart machines, and a range of broadcast audio processors and digital timers. ● **Panasonic**: wide variety of equipment including amplifiers, mixers, loudspeakers, turntables, mics, headphones, and digital equipment. ● **Philips**: wide range of broadcast equipment including consoles, transmitters, ancillary processing equipment and test equipment. ● **Potomac Instruments**: range of test equipment. ● **Puhlsen**: range of audio processing equipment.

Q

● **QEI**: range of transmission and test equipment. ● **Quad-Eight**: recently introduced

Ventura disk-automated post production console. ● **Quantum Audio**: *QM-8*, *QM-12*, *QM-128*, *QA-1010* and *Gamma-A* consoles.

R

● **Radio Computing Services**: range of computer systems for radio stations including *Selector* music selection system, *Sampler* call-out system, and a news system. ● **Ramko**: audio mixers, routing system, distribution amps, turntable preamps, line amps, monitor amps, mic/line amps, cart and cassette machines, turntables, and tape machines. ● **RCA**: comprehensive range of radio transmitters, antennas and ancillary equipment including audio processors and comp/limiters. ● **R-Columbia**: headphones and intercom headsets. ● **Recortec**: automated high speed tape duplication system. ● **Rohde & Schwarz**: FM transmitters, FM stereo test generators and decoders, and RF test instruments. ● **Russco**: broadcast turntables, phono preamps, and small audio mixers.

S

● **Saki Magnetics**: range of hot pressed glass bonded ferrite tape heads. ● **SATT**: *SAM82* 8/2 portable mixer and the *SAM42* 4/2 compact mixer. ● **Sennheiser**: full range of condenser and dynamic mics, wireless infra red sound transmission equipment, and the *Mikroport* wireless mic system. ● **Sescom**: comprehensive range of audio interface equipment including transformers, equalisers, mic and line splitters/combiners, DI boxes, and audio modules. Also audio test equipment. ● **Shure**: *M267* 4-way mic mixer, plus the company's ranges of dynamic and condenser mics, and phono cartridges. ● **Sigma**: range of amplifiers. ● **Sintronic**: details of the company's AM and FM transmitters. ● **Sono-Mag**: broadcast automation equipment. ● **Sony**: variety of digital audio equipment, plus a wide range of mics and radio mic systems. ● **Solid State Logic**: *SL-4000E Series* automated multitrack console with *Total Recall* system. Introduction of new software and hardware for post production applications including a realtime system for sequential preset fader level editing; an events controller for remote control of sound effects sources from tape; an effects controller allowing integrated computer control of external voltage controlled devices; and a synchroniser based on the **Audio Kinetics** *Q-Lock* system allowing multi-machine synchronisation from the SSL command keyboard. ● **Soudercraft**: *Series 2400* automated multitrack console, plus the *Series 800*, *Series 400* and *Series 1S* consoles. Also the *SCM Series* multitrack tape machines. ● **Sound Genesis**: variety of equipment from several manufacturers including **Auditronics** *Series 200* on-air consoles. Also details of the company's supply, installation and maintenance services. ● **Sound Technology**: wide range of test equipment including distortion analysers, FM alignment generators, and the *Model 1500A* microprocessor based automatic tape recorder test instrument. ● **Sphere**: *C-Series* consoles and *1604* satellite mixer, plus the company's new continuous band digital fader and attenuator. ● **Stanton**: wide range of phono cartridges for broadcast applications, plus the *Model 310* phono preamp. ● **Station Business Systems**: *Newscom* newsroom computer system and the *BAT* system for log preparation, billing, playlist preparation, and traffic control.

● **Stephens**: *821B* range of tape machines and the *Q-II* autolocate. ● **Studer**: variety of equipment including *169/369 Series* and *900 Series* broadcast consoles, *A800*, *A80*, *B67* and *PR99* tape machines in various formats, and the *TLS 2000* SMPTE synchronising and editing system. Also the company's telephone hybrid and interfacing systems. New products include the *A810* micro-processor controlled broadcast tape machine and a reproduce only version of the *PR99*. ● **Swintek**: wide range of radio mic systems including the *Q-dB-S* system. Also duplex communication systems. ● **Symetrix**: range of ancillary processing equipment including a headphone amp, phase filter, comp/limiter, and signal gate.

T

● **TDK**: wide range of audio tape and cassettes. ● **Teac**: comprehensive range of audio mixers and tape machines from the *Tascam* range. ● **Tektronix**: *TM500* range of audio test instruments including oscilloscopes, test signal generators and audio distortion analysers. ● **Telex**: range of headsets, intercoms, and tape duplication systems. Also *FMR-1* radio mic system and *Audiocom* headset intercom system. ● **Tentel**: *Tentelometer* tape tension gauges for various tape formats, plus spindle height gauges. ● **TFT**: AM and FM frequency modulation monitors, plus STL links. ● **Thomson-CSF**: wide range of radio and television broadcast equipment including AM and FM *Volumax* automatic peak controllers, audio distribution amps, *Audimax* automatic level controller, and dynamic presence equaliser. ● **Trumpeter Electronics**: comprehensive range of audio patchfields, patch cords and audio jack systems. ● **Tweed Audio**: details of the company's custom designed systems for radio and television broadcasting studios. Also two small standard consoles.

U

● **UMC**: range of play only or record/play cart machines. ● **UREI**: wide range of products including consoles, console modules, limiters, equalisers, filters, power amps, and time aligned loudspeaker systems. Also recently introduced professional *CX* encoder/decoder. ● **Ursa Major**: *SST-282 Space Station* and *8X32* digital reverb systems. Also the recently introduced remote control unit for the *8X32*.

V

● **Varian**: vacuum transmitting tubes and cavity amplifiers for AM and FM broadcasting.

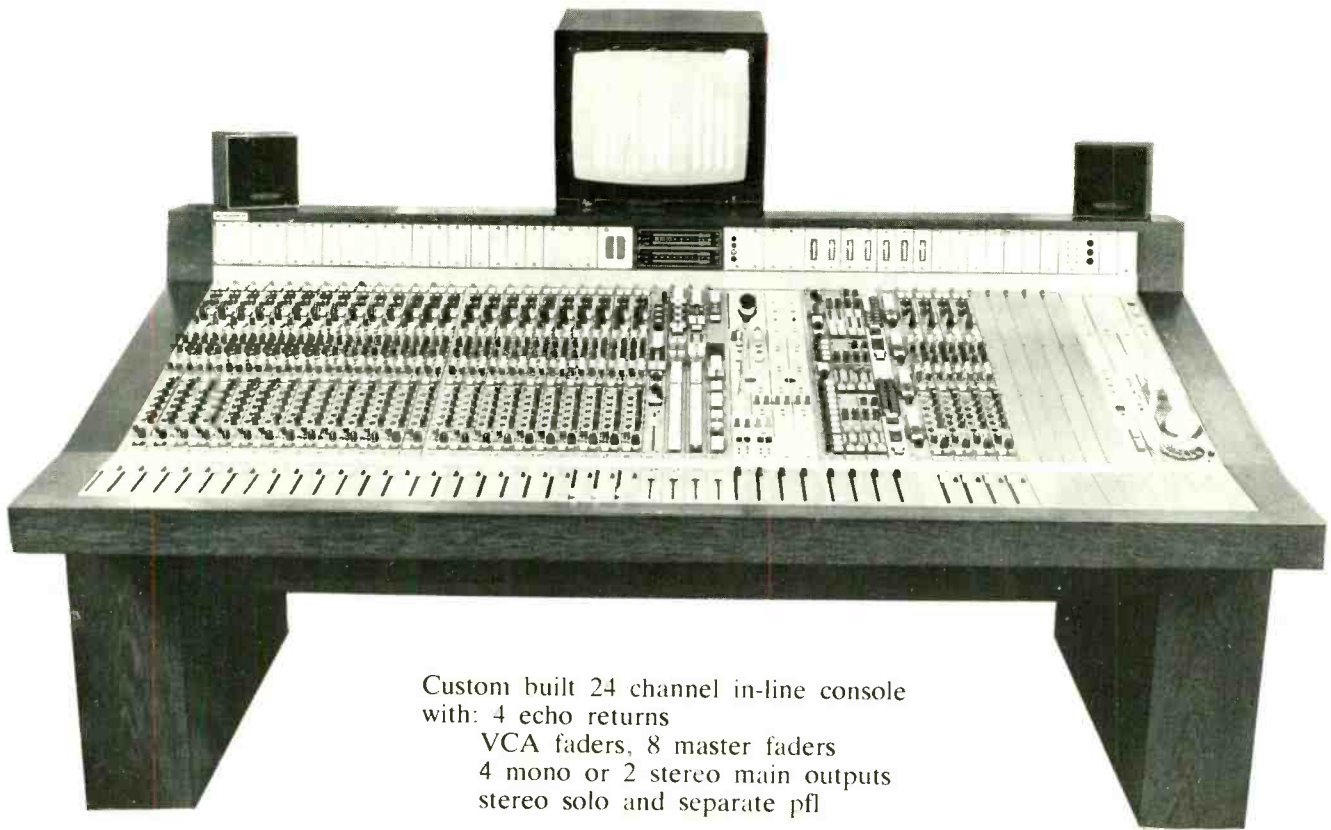
W

● **Ward Beck**: wide range of broadcast equipment including modular consoles, turntables, and intercom systems. ● **Wilkinson Electronics**: range of AM and FM transmitters, audio consoles, silicon rectifiers, dummy loads, and line surge protectors. ● **Winsted**: range of equipment cabinets, dubbing racks and post production consoles.

● **Studio Sound** editor Richard Elen and assistant editor Noel Bell will be attending the Convention together with executive advertisement manager Phil Guy. Copies of *Studio Sound* will be available from our table in the trade publications area. ■

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letters

IBA Surround Sound Broadcasting

Dear Sir, In your December issue, your anonymous diarist delivers a rip-roaring, no-holds-barred attack on the IBA's MSC-1 system of surround sound. Stereo incompatibility and 'phasiness' of other systems are dismissed as 'alleged' and several years of careful investigation of all aspects of surround sound are ascribed only to a "political desire to be different from the BBC".

Your diarist, of course, is entitled to his own opinions on the technical merits of MSC-1 compared with UHJ. But before lambasting the professional integrity of the IBA engineers concerned, he might have considered the facts rather than his prejudices:

1. The MSC system was developed only after fully investigating earlier systems and after providing a unique series of comparative demonstrations to EBU, FCC, etc.
2. The IBA investigated and showed the merits of Ambisonic studio techniques at a time when BBC engineers (whose work we respect) were still sticking firmly to Matrix H, a position that became untenable only after the early IBA demonstrations, leading to the UHJ system that your diarist so much admires.
3. UHJ whatever your diarist may believe is not "an international standard": the EBU committee in fact declined to recommend UHJ to the CCIR for adoption as a standard.
4. It has always been the IBA view that it would be foolish to divert scarce resources to the introduction, for an audience that must inevitably form 'a minority of a minority of a minority', of any system which does not take full advantage of the subtleties of surround sound and which does not preserve the fullest possible compatibility with existing systems. That is to say the majority of the radio audience still listens on AM and the majority of FM listeners still listen in mono, while for some years only a minority of stereo enthusiasts are likely to adopt the inevitably more expensive surround sound mode.

Good surround sound is basically a matter of applying established engineering techniques in the pursuit of a fully acceptable and compatible system.

The engineering facts about hierarchical systems have been known for some time; the IBA's work on MSC now makes it possible similarly to consider the facts for non-hierarchical systems. It can be claimed that two feasible routes to surround sound broadcasting have been defined.

It is understandable that there is frustration at the long delay in adopting an international standard; but that is no reason for refusing to consider the merits of both systems; it will not serve the public interest to ignore alternative systems, as was shown in the early promotion of Matrix H.

What perhaps does need to be done is to make it clear to readers what is meant by 'hierarchical' and 'non-hierarchical' systems. It is possible to do this without becoming entangled in the subtler arguments of the various proponents of different surround sound systems. Those seeking a more comprehensive account may find IBA Technical

Review No 14 of value.

Any surround sound system, in attempting to reproduce a compatible stereo signal from positional information originally encompassing a 360° stage, has to make a special compression of the sounds to occupy the reduced stereo stage. Strictly speaking, to be fully compatible, this compressed signal should occupy 60°.

Thus the balance engineer must make an artistic compromise between surround sound and stereo. This applies to all systems, hierarchical and non-hierarchical. The question whether phase distortion need accompany and possibly worsen this transition from surround sound to stereo is purely a technical matter.

Therefore the question of 'phasiness' is of vital importance to those interested in the setting of national or international standards and to all who wish to see the introduction of a system of sound reproduction that will remain entirely satisfactory for many years to come.

It is not too much to claim that the IBA-led initiative brought about the existence of UHJ. It is a matter of record that the IBA acclaimed UHJ and gave it support in a number of pioneering transmissions on ILR. These were backed with demonstrations to invited audiences (both public and press) that underlined all the transmission options available with UHJ. In doing so the IBA acknowledged fully the work of both the Ambisonics and BBC teams.

The IBA fully supported the adoption of UHJ as an international standard for the EBU and FCC believing then, as it still does, that this is by far the best technical solution if a hierarchical system is, on balance, judged to be more favourable than a non-hierarchical system.

That the UHJ system has not been accepted by the EBU for recommendation to the CCIR is, we believe, rooted in its rather poor stereo performance, which can be demonstrated with some critical material, and the generally deficient performance of variomatrix-type decoders. The IBA demonstrations that this is so apparently satisfied a considerable number of unbiased observers and international committee members.

It is particularly unfortunate that the long road to surround sound has seen so many attempts to confuse the public.

Consider the derivation of UHJ, standing for 'Universal', 'H-matrix' (BBC) and 'J-matrix' (Ambisonics). Until 1977 the two British-developed systems H and J vied for standardisation. They were brought together after the IBA initiative of providing comparative demonstrations. Had it not been for these demonstrations it is highly likely that there might still be 48° and 45° of centre-front stereo phase difference and two vying hierarchical matrix systems!

To provide decodable 2-channel surround sound, some positional information must be transmitted in the stereo channel. In practice, it is necessary to introduce phase encoding for directional information; inevitably this gives rise directly to 'phasiness' in stereo reproduction; at best it provides surround sound of a quality which must be regarded critically as poor even with variomatrix decoding.

Such systems become truly 'hierarchical' if

advantage is taken of adding further information—for instance a 'half' or 'full' bandwidth third channel (2½- or 3-channel transmission). If this is done the surround sound quality can approach that of the original source material; but this additional information in no way improves the stereo reproduction. This is because the phase information must be encoded into the two transmission channels to permit some listeners to use 2-channel decoding for surround sound. UHJ is such a hierarchical system.

It was because 2-channel surround sound is relatively poor and the stereo signal inherently 'phasey' that the IBA sought the engineering alternatives that led to the development of MSC. Unlike UHJ, MSC does not require the introduction of phase encoding in the stereo channels and so does not exhibit 'phasiness'.

UHJ and MSC, when originated from Ambisonic studio signals, are indistinguishable at the three and four transmission channel levels. Each can be decoded back exactly to its B-format original. This applies equally in periphony and surround sound. No such transparency of the transmission path exists in 2- or 2½-channel UHJ and it is surely rightly questionable whether this route should be adopted to take us into the 21st Century.

Even at the time when the IBA endorsed the UHJ approach it was our view that a 2½-channel transmission system was needed to avoid encouraging the public to invest in surround sound equipment only to be disappointed by its limitations.

Finally, your diarist, in suggesting that the Alice-IBA console is "rusting away", does scant credit to the qualities of aluminium. In fact it is shortly to be installed in a new audio studio at Crawley Court. There it will provide a unique challenge to such dyed-in-the-wool UHJ enthusiasts as your diarist to maintain his beliefs in the face of direct comparison of UHJ and MSC in mono and stereo and surround sound using the same source material. If it goes unused, who then is being "political"?

Yours faithfully, Pat Hawker, IBA Engineering Division, 70 Brompton Road, London SW3 1E7, UK.

Dear Sir, As I was one of those involved in developing the IBA's MSC-1 matrix, I thought I should comment on your piece in the December issue (page 26). I can't cast much light on the IBA's motives for undertaking this or any other development, since they were obscure to me even at the time: but this is not in itself adequate as a criticism, since that organisation is perfectly capable of doing the right thing for the wrong reason. The question with UHJ is, as you mention, whether the phase shift between the stereo channels (most marked for rear sounds) can be put up with. It is true that listeners vary in their sensitivity to this 'phasiness', but one might just as well point out that many people are unperturbed by gross colorations, distortions, or other defects—so why bother to produce good sound quality at all? It was by no means a useless development to explore just how good the stereo compatibility could be in a 3-channel-only

74 ▶



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letters

system: as the choice of stereo encoding would not be restricted by the need to reproduce surround sound from two channels, there would be no need for 'phasiness' to occur in stereo. The need for 3-channel receivers for surround sound reception would then be justified if the best compatibility for stereo (and mono) listeners could be ensured thereby—especially considering that such receivers are needed anyway (in conjunction with broadcasts in at least two and a half channels) in order to get the best out of UHJ. A less complicated matrix decoder would be needed than for UHJ, and the bulk of the extra cost of reception (given a loudspeaker decoder working from B-format) would shift to the 3-channel receiver, for which decent reliable circuitry is now in existence.

This question of the best stereo-compatible encoding will not go away when we have digital recording media capable of providing three or more channels for domestic surround sound reproduction. Whether it happens before recording or after playback, at some point a non-trivial decision will have to be made how the surround sound channels are to be encoded (ie mixed) to form the compatible stereo signals—unless someone has the wit to make the matrix presettable, using control information added to the recording. (Indeed, one then ought also to re-examine the relationship between the compatible stereo and mono signals—the sum of L and R does not necessarily represent the best possible mono.) Thus these considerations will continue to be relevant as far as the compatible

stereo is concerned, even though the choice of third channel in MSC-1 is optimised for FM radio and would probably not be appropriate for such media.

So much in justification of the attempt. Whether this best possible stereo encoding is actually given by the MSC-1 matrix is another matter; in fact, one lesson learnt from this exercise is that no such universal optimum may exist. If the programme is of the concert-hall type with the focus of interest at the front, one is not usually perturbed by the phasiness of rear sounds in UHJ, while there is little doubt that in its handling of ambience UHJ does better than MSC-1. This is because MSC-1 was designed under the constraint that it must also yield some sort of compatible stereo for the type of programme where principal sounds are placed all round. Whereas I would have no wish to listen from the middle of the orchestra (or whatever), it seems that some producers expect to be able to use this effect. Unfortunately, conventional stereo encodings (by which I mean those obtainable from B-format without using broadband phase shifters) which perform well with ambient concert-hall material, such as the Blumlein technique, would behave very oddly in this case, causing some sounds to be completely out-of-phase in stereo and perhaps to disappear in mono—problems worse than the phasiness of UHJ! The choice of stereo encoding in MSC-1 (given that it was not to use interchannel phase shifts) was therefore severely restricted by this requirement, while even in such 'allround

surround' material the performance still falls short of ideal, with rather severe 'image bunching' at the sides. (Not that it is at all clear what the ideal behaviour would be in this case.) The behaviour of UHJ, in which front and rear are audibly distinguishable, may well be preferred. Thus we are forced to the conclusion that the best universal compromise stereo encoding will not be found amongst those of phase-free type that, by using phase shifts, UHJ actually manages to strike a better compromise.

Of course, if only concert-hall type material were to be reproduced, UHJ could doubtless be further improved, since the rear-sound phasiness was one of the constraints on its design. I should add that this constraint was given greater weight in the choice of the BBC's preferred encoding, which (whatever they say) is not strictly 2-channel UHJ but differs significantly from it in its treatment of rear sounds, despite the existence of an agreed 'HJ' specification purposely drawn broadly enough to cover both.

Yours faithfully, J Halliday, Nimbus Records Ltd, Wyastone Leys, Monmouth, Gwent NP5 3SR.

Editor's note: we will be publishing an article by Chris Daubney of the IBA detailing the IBA's investigations into Ambisonics and Surround Sound later this year.

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This is a set-up

Pippa Lewis

THIS is the last in our series of interviews with Andy Gemmell-Smith, one-time pirate with Radio Atlantis, following on to Beacon Radio and Radio 210 in Berkshire as chief engineer, then involved in the setting up of a new independent local radio station, Essex Radio. John Wellington, programme controller of Essex Radio, also present at this interview, describes how he and Andy first got together in this venture.

‘I got a ‘phone call from 210 to say someone was ill and could I go there for a couple of weeks, so as I knew some people there anyway I thought I would help them out. At the time I had been given the job of programme controller at Essex, but I was also involved with everything else as well — ie looking for key people to work there, head of news, chief engineer, etc. I got talking to Andy at 210 and discovered that he was involved with Essex anyway with one of the other consortia bidding for the Essex franchise. So I had not only discovered a good engineer, but also someone who wanted to go to air here particularly. I am a frustrated engineer and Andy is a frustrated programme man, so we had a lot to talk about and went to lunch every day for a fortnight discussing new equipment, etc. When I went back to London at the end of the fortnight I knew I’d found our chief engineer. Andy came down a fortnight later to meet our chief executive, Eddie Blackwell, and the interesting thing for me was that when we met we continued our conversation from where we’d left off two weeks previously! This was a long time before either of us actually joined the station in November 1980, but from that time onwards we met and planned what we referred to as our ‘ideal radio station’ and the way we did this was to take all the shortcomings of all the other ILR stations that we had known (six between us and we had visited practically all the others), and worked on the equipment. Suddenly what had been theory turned into practice and all the things that we had talked about were coming true. In a way it might seem odd for a programme controller and chief engineer to sit down and talk about various bits and pieces, but we would have to work closely together and

could work quickly because we appreciated each other’s positions. We were of like mind on most of the things we discussed, I had some ideas about using a 2-man studio; for many years I had been worried that radio had gone from one extreme to the other, starting off ‘a la BBC’ with so many people involved in putting programmes out — researchers, presenters, producers, secretaries, etc, suddenly it went to the opposite extreme with self-operation. The problem with the first was that of too many people which was not feasible for local radio, and perhaps did not offer enough job satisfaction; on the other hand self-operators are so busy that something must suffer — levels are wrong, you miss a commercial break, maybe don’t have time to think about what you’re saying; so I thought compromise, find something

in-between — an ‘operator-assist’ situation with the workload divided between two people. The presenter would still feel involved because he would be playing all his own records; operator would do commercials, guests and tapes. I think the result is so much better and well thought out. I was also worried about having the operator on the other side of the glass in another room; my idea was to have a single studio with both working together which meant designing a 2-man desk — a double horseshoe. This type of desk is unique in ILR although it is common practice in America and Australia.

The first thing I had to do was clear — that I could increase the staff structure to include operators. The way I did this was to take on four people with a second loyalty — as well as operating they worked for other

departments and therefore the cost was spread. This is a very good introduction for young members of staff, and it is also a good training scheme. 9

The next big problem for Andy and John was the mixing desk itself. Andy takes up the story.

‘We needed to design a desk that could accommodate an operator on one side and a presenter on the other. We spent night after night and drink after drink in the pub designing such a desk. We felt it was important that the two should have eye to eye contact so that they could cue each other and talk to each other with ease and the only way we thought that was really practical was the double horseshoe shape. At this point various people became interested in the project, eg other engineers and our own acoustic designer, David Lamberty of Sandy Brown Associates. They came up with a variety of designs but after due consideration they were all rejected and we carried on with the original design. We decided that it was important not to take too much control away from the presenter, obviously he wanted to have absolute control on when he brought in his records and jingles, sound effects and other sources from cart. So we ended up with an operator’s desk which contained two gram channels, two cart channels (for five cart machines), four carts on channel 1 and the final cart on channel 2. The desk also has two reel-to-reel channels as well as a comprehensive 10-way outside broadcast switcher, four mic channels and two telephone channels to enable conference calls, and an IRN channel. The operator’s position also has full monitoring switching, talkback, checks on transmitter status, transmission routing and generally all the facilities one would expect in a fully comprehensive broadcast desk. Immediately opposite the operator there is a sub-panel to be operated by the presenter in which there are facilities for two cart channels for three machines, two gram channels and a presenter’s mic. The presenter has a duplicate set of monitoring and talkback facilities. In all, the double horseshoe has a total of eight cart machines, four turntables, two tape machines and a total of five microphones, three of which are for the guests who sit at an acoustic table built

Andy Gemmell-Smith



into the side of the double horseshoe. This represents the basic structure of the desk.

I also had a list of 40 or 50 fine points which included:

- prefade listen to cancel when fader was open;
- digital timer which reset to zero and counted up when the gram channels were opened to start the grams, or when any start button on the desk was pushed, except of course during prefade listen when the timer continued to indicate what was on air;
- a way of getting in and out of delay during phone-ins which was easy for the presenter and provided a clean sounding edit on air — coming out of delay cleanly on most mixing desks is made more difficult due to the number of buttons one needs to push in order to do this successfully;
- the choice of either manually firing carts by pushing individual machine start buttons or by pushing a start button separate to the machine which put them into sequence at the same time;
- as well as this, the system should remember all the carts which were in the slots at the time the button was pushed so that further carts could be added, eg a news cut after a commercial break — the system would ignore this and not sequence it;
- the facility to jump cart slots with no cart in and fire next cart anyway, providing it was there at the instant the start button was pushed, and in the event of the cart screwing up on air the failure of this cart would automatically fire the next one.

This facility was something in the end that we decided to add ourselves to the desk and was not something provided by the desk manufacturers. We also needed a system to split commercial cartridges from our two pairs of transmitters so that an advertiser in the southern part of our region could buy time without necessarily having to buy the transmissions in the northern part of our region and vice versa. Obviously it can be a bit of a nightmare for an operator if he has to load up two sets of cart machines and push all kinds of manual buttons at the correct time, therefore we asked Leavers Rich to supply our *TomCat* cart machines with a modification I designed to enable the machine to recognise the difference between a split cart and one intended for both sets of transmitters. This, coupled with a very special transmission matrix situated in our racks room, would automatically route the cartridges to their intended destinations with no other thought or effort being required of the operator. At the end of the split commercial break, which could be anywhere within the sequence, the matrix would wait for the last of the cartridges to finish (this should only be a fraction of a second) before derouting the split and firing the next commercial to both sets of transmitters. Certain safeguards were

to be built in to prevent the starting of a commercial break if the commercial for only one set of transmitters was put into the cart machines; in addition to this 'cartfail' lights would flash in front of the eyes of the operator to indicate that a split commercial hadn't got a mate and that he had got a recipe for a potential disaster. Obviously if he were able to go into a break like this he could end up with 30 to 60s of dead air to one set of transmitters and a guaranteed place in the dole queue!

Then there were a number of design features, not the least being the cart machines. These are often free standing at the side of the mixer and just out of reach of the presenter who has to go slightly off-mic to reach them. My plan was to have the machines logically placed directly in front of the presenter/operator at a convenient angle for both technical operation and sight of the 'out' cues of both commercials and the news cuts he would need to play. This would mean commissioning very special metalwork and at this point I was in doubt as to whether many of the mixer manufacturers would be able to accommodate this. At the same time as incorporating the cart machines within the main mixer I decided that the same rule should apply to the telespot unit. When it came to designing the woodwork to surround the mixer the idea of incorporation was extended to accommodation for records, record cleaners, and cart

racks. Everything was either built into the mixing panel or the surrounding woodwork. I was determined to have no 'add-ons' with attendant dangling wires and rows of visible Cannon plugs.

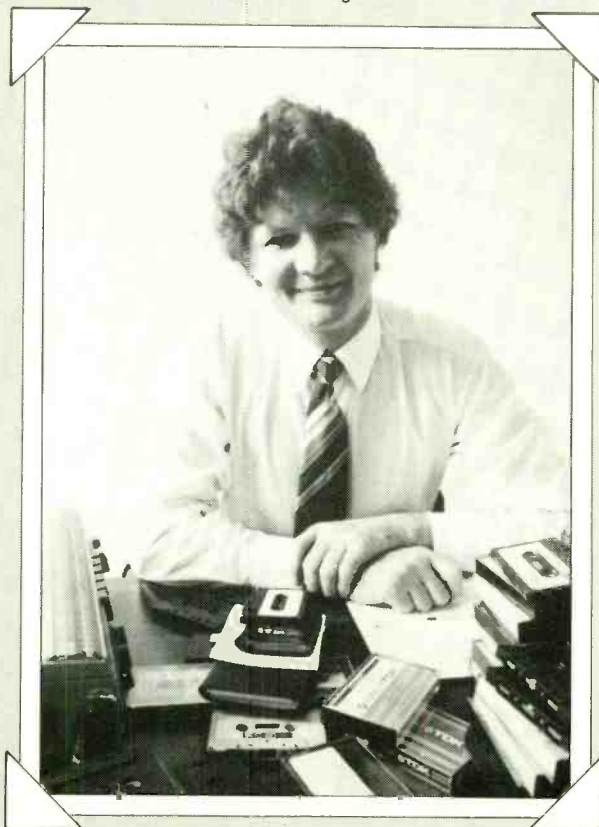
After documenting all my requirements I invited no fewer than nine equipment manufacturers to tender for the job. Several of them went into immediate cardiac arrest; many of them made it clear that they were not prepared to deviate from their standard design; they all considered they had already designed 'the perfect broadcast mixer' and saw no reason why the customer should possibly have a view on this matter. However, one or two of them decided to accept the challenge; Neve even considered the possibility of incorporating many of these features in their new generation of broadcast desks and seemed particularly keen to build the desks for us; we had much help and enthusiasm from John Hughes, but unfortunately in the end they were unable to meet our rather tight schedule. One equipment manufacturer also spent much time contemplating the concept and I would particularly like to thank their representative, I didn't catch his name but he had a bent fag in his mouth, a pocket full of resistors and seemed to think I was suffering from a star-trek complex! (Guess who?) They did, however, quote but would only meet us halfway on some of the design points.

Audix were keen to sell us their small broadcast desks as per Severn Sound but I was after something rather more customised and eventually they requested with their larger and rather earlier design mixer. I was very impressed with the MBI particularly with the quality of workmanship, not to mention the extremely helpful suggestions made by Mel Bowden and Michael Fabricant. Had I not had my heart set on my own particular design I could very well have purchased this equipment. Tweed, on the other hand had few preconceived ideas of their own and were more than happy to tackle this project from scratch. After a quote which even our chief executive liked the look of we decided to go Tweed.

Numerous discussions and meetings with Tweed resulted in sketches of the desk, panel layouts and block diagrams of the desk being drawn up and the desk was underway. Meanwhile, back at our Southend headquarters (we also have premises in Chelmsford), work was progressing on the structure of the building. Once in a while our acoustic consultant would appear and ask us how things were progressing; we had planned the studio complex to accommodate two on air studios, a separate talk studio and a commercial production control room and studio. We had to modify this slightly in conjunction with our acoustic architects to accommodate the double horseshoe. The building work began in Autumn 1980 and was due for completion at the end of April; I took up my full-time position with Essex towards the end of April and expected to begin the installation soon after. Alas this wasn't to be the case as the building was several weeks behind schedule. Gradually though work progressed and the building started to take shape. In no time things were nearing completion including final touches to the studio finishes.

It was only at this point that we first suspected isolation troubles and my immediate thought, knowing that the studios were floating, was to suspect that the windows may have been coupled by the builders and not spotted by the acoustic consultants. After a deal of persuasion we removed one of the windows to find that they were in fact coupled with pegboard, securely glued to both inner and outer walls. This resulted in the inconvenience of every studio window, having to be removed, corrected and refitted right in the middle of the IBA's acoustic COP tests. Perhaps this oversight would have been excusable were it not for the fact that another more serious problem cropped up; we found that all corridor areas surrounding the studios were particularly unacceptable with regard to impact noise. Several experiments were carried out and the sound of people walking at a good pace was

John Wellington



This is a set-up

clearly heard within most of the studio areas. It was particularly discouraging that things were so near completion and we were advised that the entire wooden floor had to be taken up to allow Sandy Brown & Associates to experiment in order to rectify the problem. Our rehearsal period for presenters was severely disrupted by this late excavation work and our programme controller aged considerably through having to continually rewrite and update his training timetables.

Eventually the remedial work was completed to the satisfaction of the acoustic architects; there was still some doubt as to whether or not this corrective work had resulted in isolation that passed the IBA's COP. It seems to be a grey area as to how one should be expected to walk in the corridors outside a broadcast studio. It seems to be the opinion of most chief engineers I have spoken to, that a newsman doing a brisk walk into a studio to read the news at 30 seconds to the hour is a perfectly fair criterion to apply. It seemed to present a difficulty to make measurements in a more scientific manner than this. Obviously there is no better way to create an interfering sound than to use the interfering sound itself. One interesting thing to note is that the IBA measures isolation from a corridor into a studio using a reference level of 70dBA and the noise of somebody doing a brisk walk in the corridor on our rather resonant wooden floor produced 85 to 90dBA. It could be argued that levels in this region should be used for measurement where appropriate. The IBA have asked that further improvement should be made to bring the isolation more happily within COP requirements.

Setting up a radio station inevitably has its problems and the electrical side of our installation caused a few headaches too. Surprisingly enough, many of these occurred in areas which one would least expect — the Studer B67s and the Revox PR99s all gave a certain amount of trouble. The B67s were of the BBC type compact version where a good deal of the electronics have been moved from the front of the machine and slung underneath. This seemed to be the cause of a hum problem and brought our unweighted noise just out of IBA COP requirements. Bauch, after two visits and some work in their own workshops on these machines brought the hum level down to a point where the unweighted noise fell just inside IBA COP requirements. The problems with the Revox PR99s were a little different, the most serious of which was high frequency crosstalk. Bauch still don't seem to have cracked this one, but are working on it. Their own measurements, however, agree with ours and no doubt on past record

they will crack it quickly. Fortunately the PR99 machines were bought for our news operation and we had only intended to use them in mono anyway and the IBA were happy that this measurement need not be applied to a machine that would be used in mono only. However, we paid the price of a professional stereo machine and we expect the machines to be capable of meeting the full stereo spec.

The Tweed desks were also a matter of concern and a number of small bugs had to be ironed out. These were particularly time-consuming and involved myself and another engineer working until four or five in the morning several times on the trot. As an example, gain pots on stereo line modules appeared to track poorly which is not surprising since the pot itself only has a spec of 2dBs matching

when operating a mic fader, instead of muting the control room monitors to prevent causing howl round it operated the same relay as operated by the control room monitor dim button, and merely reduced the speakers by 18dB. We were extremely surprised to have these problems on desks bought from a company of such high repute; however, these were only one or two sillies in an otherwise excellent desk.

This article shouldn't be all negative but I feel the chief engineers would like to see some of the problems one faces in a new installation. Apart from the specific headaches already outlined perhaps one of the biggest bugbears was the constant late delivery of virtually everything we ordered from cart labels upwards; my advice would be to get in good and

whether to use 720 nWb or 810 nWb as our standard peak flux level; most stations record at a peak flux level of 510 nWb. At 720 nWb even our Revoxes were exhibiting distortion figures in some cases as low as 0.3% at 80 Hz! We decided to go Electro-Voice and Tannoy for our monitors and all the staff are happy with this choice. Other equipment which we are delighted with and would recommend includes: HH V200 amps; Studer telephone hybrid; new digital broadcast profanity delay line now being made by Klark Teknik which is an excellent device and provides at 15kHz over 7s of stereo delay without using companders to keep the noise down. It also features automatic catch-up which seems to be even more unobtrusive than the competition. This is another device which we feel we can claim to have pioneered into ILR and to prove it ours is serial no. 001!

It is interesting to note that the equipment which I believed in strongly, some of which is new to ILR and I therefore took a slight chance on, proved to be absolutely and without exception no problem. I feel one of the biggest successes was the Technics SP15 turntables which I am delighted with and which with a couple of small mods (write to me for details), are in my opinion much better operationally than the SP10s, particularly as you don't have to put your fingers on an album to back-cue owing to the 13in turntable. ♪

And, a final word from John.

♪The plus side does not only include equipment, but also individuals and companies who gave us service and attention, a relatively rare commodity these days. Without wishing this article to turn into a plug for various people I will mention only one which to date has no competitor — British Telecom, who were exceptional in their assistance throughout the installation. They even agreed to having all the telepot equipment disassembled from their standard key and lamp units and rebuilt into new metal-work provided by Tweed and incorporated in the main mixer. Although not a technical point you may be interested to note that British Telecom were able to complete the service by giving us the phone-in number of 8811, available anywhere in Essex for the price of a local call.

Setting up a radio station is a combination of headaches and fun, sleepless nights and satisfaction. It is difficult in an article to outline everything but for those embarking on the setting up process of a new ILR I hope this has been of some assistance. My advice is to take time to visit as many stations as possible — buy the chief engineer a Chinese and pick his brains. ♪

Last word from Andy.

♪We have two very good Chinese restaurants close to Essex Radio! ♪

Essex Radio, Studio One



from left to right. Tweed were most helpful over this and made us up at very short notice some 2dB switched attenuators to get us out of trouble. We also had problems associated with their mic limiters which cracked, and a very silly logic problem associated with the electronic pre-fade listen latch in which, perhaps because they had run out of current capability on one latch fade, finding themselves with another latch on the same chip, they had toggled the two together running the pre-fade listen CMOS gate from one latch and PFL change-over relay and the indicator bulb in the pushbutton from the other completely separate latch. It was possible, if the power was interrupted from the desk even briefly, for the latches to split at random and for some of the channels to appear to be in pre-fade listen when they were not, and vice versa. Obviously something had to be done about this, or our once a week specialist music presenter would be terribly confused after a brief hiccup in the mains supply had caused all his studio monitoring to go off! There was another associated problem:

early — even tell people that you are on air earlier than you really are! On the positive side, there was a good deal to outweigh the negatives already mentioned; particularly the wiring, the neatness of which has been commented on — the only credit I can take for this is having the foresight to employ an experienced wiring company (sorry Bruce, I can't mention the name it would look like a plug!); equipment includes the Tom Cat cart machines, the Sony TC5 PRO cassette machines and the new Technics SP15 turntable all of which flew through IBA COP. We were impressed with numerous other equipment which we more or less pioneered into ILR, particularly the Electro-Voice RE20 microphones which seem to be incredible in that they sound beautiful and warm, yet crisp and highly pop-resistant. We also pioneered into ILR Maxell UDXL tape which, after testing every major brand, turned out to be the best in every respect and cheaper than many leading brands. Furthermore, the tape takes an incredible amount of level, we couldn't make our minds up

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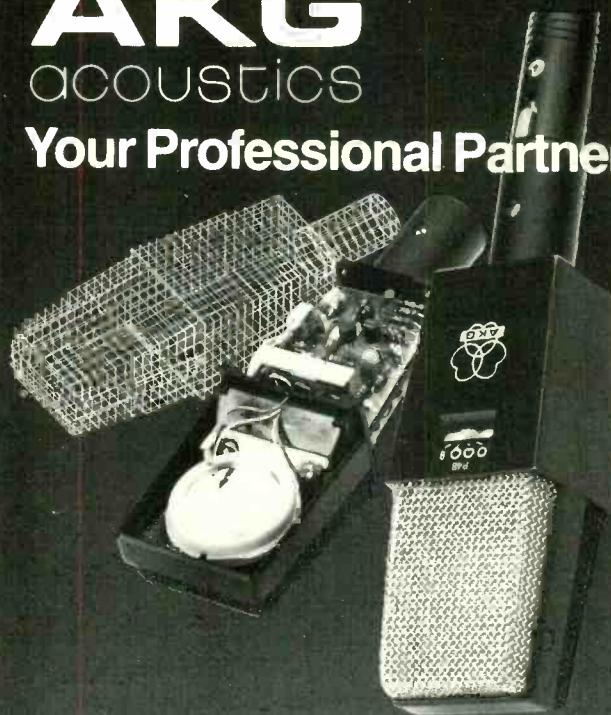
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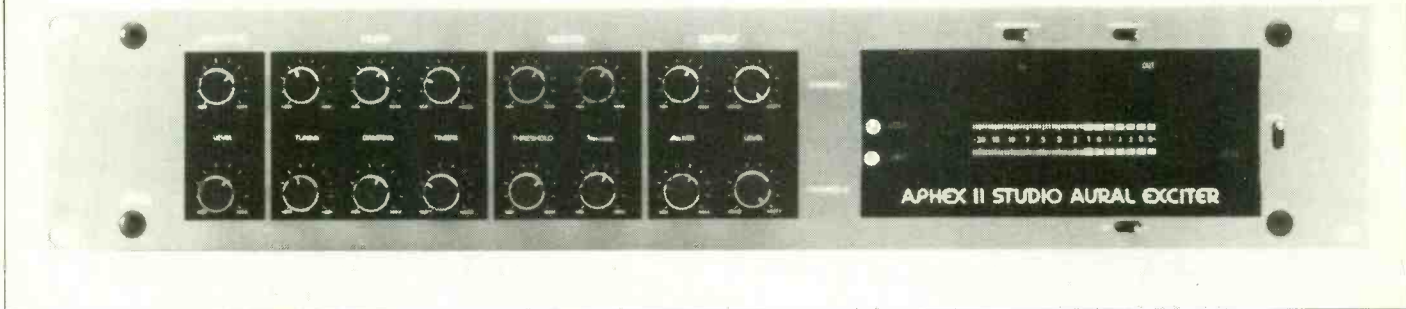
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Aphex II Aural Exciter



THE *Aphex II Aural Exciter* is a sound 'treatment' device intended for use not only in the studio, but also in sound reinforcement and other applications. In operation the Aphex adds harmonics in the mid frequency range to simulate reflections in a natural environment thus altering the overtone structure of sounds unlike the cut or boost of the overall sound which can be achieved with an equaliser.

Reference to Fig 1 shows the *modus operandi* of the Aphex. The input is electronically balanced (with a transformer option) after which the buffered signal is split into the upper direct connection and the lower side chain. The direct signal passes the mix/solo switch which is ganged to the return level mix pot, the direct and side chain signals being summed and passed to the transformer balanced output. In normal operation with a desk the return signal will be treated in the same way as an echo return.

Reverting to the side chain, the signal is first fed to a variable frequency (700Hz to 7kHz) highpass

MANUFACTURER'S SPECIFICATION

Audio path (side chain disabled)
Frequency response: 15Hz to 50kHz +0, -2dB.
Total harmonic distortion: 0.05% at maximum rated input/output.
Intermodulated distortion: 0.05% at maximum rated input/output.
Output noise: better than 110dB below maximum rated input/output.
Crosstalk: better than 80dB.

General

Maximum input/output level: internal jumper selectable +21dBm, +24dBm, +27dBm; special (user definable resistor values for special interfaces).
Meter reference: internal jumper selectable 0VU = 0dBm, +4dBm, +8dBm; special (user definable).
Input impedance: selectable 600Ω or bridging, 40kΩ balanced, 60kΩ unbalanced.
Output impedance: 50Ω balanced floating or unbalanced.

Input circuit: standard — transformerless balanced true instrumentation circuit; optional — Jensen 11-P-9 input transformer.

Output circuit: standard — Jensen 123 AL Nickel transformer; optional — balanced transformerless output circuit.

Side chain access: nominal +21dBV maximum level. Single ended input/output.

Indicators: dual VTF meter with selectable peak VU characteristic; two red/green AxDRIVE indicator LEDs; two limiter LEDs; two peak indicator LEDs (indicates 2dB below clipping); three meter input select indicator LEDs — input, AxRETURN, output; meter mode select indicator LEDs — peak, VU.

Power requirements: 100 to 240VAC, 50 to 60Hz, 12W.

Dimensions: (whd) 19 x 3½ x 6in.

Weight: 19lb.

Manufacturer: Aphex Systems Ltd, 7801 Melrose, Los Angeles, Cal 90046, USA.

UK: AKG Acoustics Ltd, 191 The Vale, London W3 7QS.

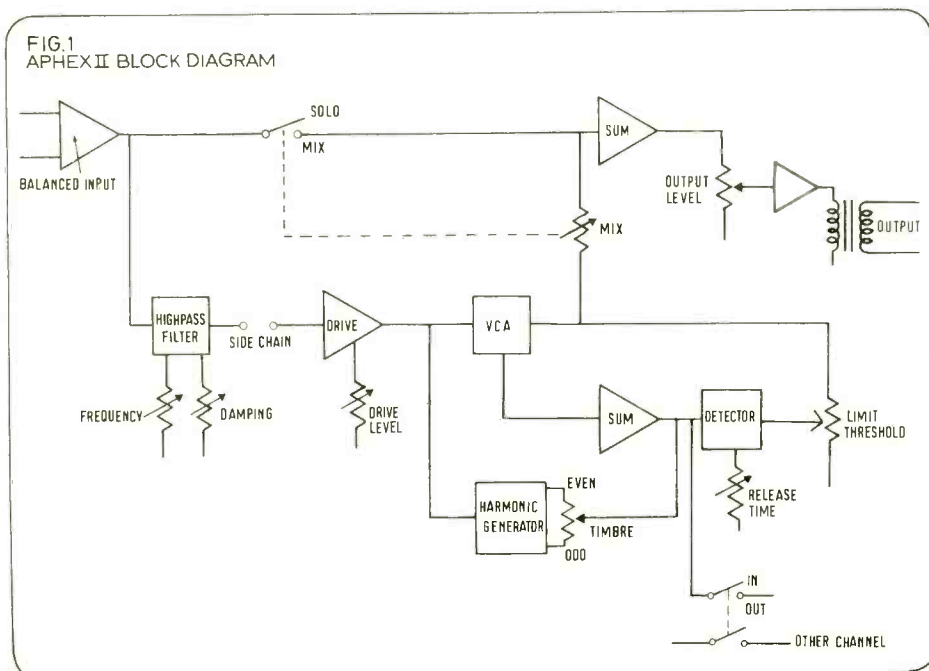
filter with a damping control altering the filter's shape. After the filter, access is provided to the side chain signal followed by the side chain drive amp with a level control which is set for green indication

of the red/green drive indicator. From here there are two functions, harmonic generation and limiting, the latter being necessary to avoid 'spitting' which can result from the addition of harmonics. The outputs from the harmonic generator offer predominant even or odd harmonics with the 'timbre' control effecting the addition of a mix of the outputs.

The limiter has a threshold control for setting the limiting threshold and a release time control, the attack time being fixed. A ganged toggle switch simultaneously switches both channels' side chains in or out of circuit.

The embodiment of the Aphex is a 19in rack mounting unit, two rack units high, comprising a steel 'U' shaped chassis with a brushed alloy front panel. Two horizontal rows of potentiometers, one row for each channel, are clearly identified occupying the left part of the front panel in four black blocks. The left hand block identified as 'AxDRIVE' contains the two side chain drive level pots, the next block being the filter section with the tuning, damping and timbre controls. There follows the limiter block with the threshold and release time controls and the output block with the return mix level/direct switch and the overall output level pots.

To the right there is a black transparent panel concealing the two horizontal bar type meters calibrated from -20dB to +8dB. Toggle switches allow the meters to have a VU or peak characteristic and switch the meters between the input, the



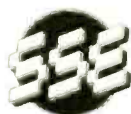
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output and the side chain return level to the summing amplifier. Also, behind the panel, are LEDs with 'DRIVE', 'LIMIT' and 'PEAK' legends. The drive indicator glows green when adequate drive level is present, going red if the drive level is excessive. The occurrence of limiting illuminates the yellow limit legend with the red peak legend illuminating 2dB before the onset of clipping at the output of the summing amp.

Finally there is the in/out toggle switch and the power on/off switch with the power being applied to an IEC connector/fuseholder/voltage selector at the rear of the unit. Four XLR connectors provide the audio inputs and outputs with each input having a phase reverse toggle switch. Four 1/4in jack sockets give access to the side chain inputs and outputs.

Within the unit the audio electronics of each channel have separate very good quality PCBs with clear component identifications. These boards connect to other boards via plug-in ribbon cables, one board containing the power supplies, another the metering and annunciators and the remaining board the input/output connectors.

Overall the standard of construction is excellent with all integrated circuits being socketed and ample test points being identified on the circuit boards; however, the only servicing information provided with the review unit consisted of an incomplete circuit which not only omitted the power supplies and metering but other components.

Inputs and outputs

The electronically balanced inputs were found to

have a common mode rejection ratio of 63dB at 1kHz falling to a worst case of 61dB between 20Hz and 20kHz. The input impedance remained constant with control settings at 40k Ω with the maximum input level for the onset of clipping corresponding to the internally selected operating level. This is adjusted by altering the position of a link on an 8-pin IC connector which caters for maximum input levels of +27dBm, +24dBm or +21dBm plus a further user-selectable position.

At the output, the amplifier has a similar gain selection link with normal operating giving unity gain in the direct mode. In the +24dBm position the onset of output clipping occurred at +24.5dB (ref 7V) or +23.5dBm loaded into 600 Ω with the output impedance being 70 Ω , the outputs being transformer coupled (with electronically balanced outputs being an option) and floating.

At the side chain access points the level was 3dB below the input level with the +24dBm input level selected, the side chain input and output impedances being 34.5k Ω and 725 Ω respectively. The input sensitivity of the side chain has a selecting link for 0dB, +4dB and +8dB the normal position being the most sensitive 0dB position.

Direct mode

In the direct mode, that is with the side chain switched out, the very flat frequency response from the input to the output is shown in Fig 2. Similarly, the harmonic distortion remained very low at all levels below the rated output, a typical performance being shown in Fig 3 which was

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FIG 2
APHEX II DIRECT FREQUENCY RESPONSE AT OVU

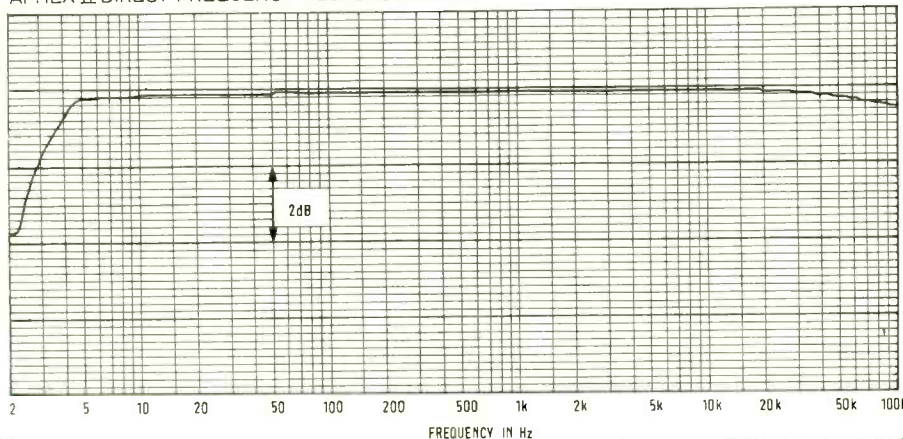
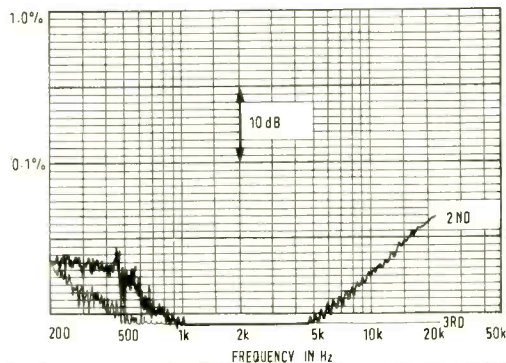


FIG 3
APHEX II HARMONIC DISTORTION AT OVU



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reviews

TABLE 1

Measurement method	Direct	Typical	Worst case
22Hz to 22kHz band limited RMS	112.0dB	100.0dB	86.0dB
A-weighted RMS	112.5dB	101.0dB	87.0dB
CCIR-weighted RMS ref 1kHz	104.0dB	92.0dB	78.0dB
CCIR-weighted quasi-peak ref 1kHz	99.5dB	87.0dB	74.0dB
CCIR/ARM ref 2kHz	111.5dB	100.0dB	84.0dB

plotted at 0VU — that is +4dBm input and output. In addition the twin tone intermodulation distortion remained at less than -70dB (0.03%).

Noise in the output was found to vary widely with control settings with the side chain in action, the main contributor to the noise variation being the drive level control. Table 1 shows the direct-only noise, worst-case noise and what may be typical operational noise referred to the rated output setting of +24dBm.

Side chain

Whilst the highpass filter has nominal -3dB points variable between 700Hz and 7kHz, the actual turnover frequencies were found to depend upon the tuning control and the damping control settings.

Reference to Fig 4 shows the extreme settings of the tuning control together with the effect of the extreme and central positions of the damping control, both controls providing a large variation in the subjective effects.

The extensive effect of the timbre control is shown in the spectrum analyses of a 1kHz tone applied to the input after treatment by the side chain. Fig 5a shows the output spectrum with the timbre control full anticlockwise, the predominant harmonics being the second and fourth. Rotating the timbre control fully clockwise produced Fig 5b where the third, fifth and higher odd harmonics predominate just as the manufacturer intended.

The final part of the side chain, the limiter, was found to have a constant and very fast attack time of less than 100µs which is highly desirable in this application. The release time varied from 5ms to 30ms with a mid position of 15ms, all of which are fine remembering that the input signal has been through the highpass filter.

In operation the green drive indication was initiated at input levels between -2.5dBm and -28dBm depending upon the drive level setting, with the red drive indicator being illuminated at levels 13dB higher. All indicators, including the peak warning 2dB below clipping, were very fast in action and easy to read on programme material.

Metering

Zero VU was found to correspond to +4dBm input or output at the standard link selectable sensitivity. Rather peculiarly, the zero indication in the peak meter mode was the same as that in the VU mode.

As is correct, the meter rectifier characteristics were genuine peak in the peak mode and 'average' in the VU mode. As is normal for a VU meter the rise time to an indication of 0VU was 300ms but the fall time was considerably longer than a standard VU meter at 1.1s to an indication of -20VU. Again, in the peak mode the rise time was quite fast at 14ms but the fall time was the same as that in the VU mode.

As is desirable, the peak LED indicator was very

fast in action giving a readable indication on a burst duration of less than 100µs.

Other matters

Crosstalk between the two channels was excellent, being less than -90dB below 2kHz rising to -73dB at 20kHz irrespective of control settings.

The unit was very tolerant to power line vari-

ations and the broadcast version includes a RFI filter in the audio inputs.

In operation, the Aphex could produce a wide variety of interesting effects, but care was required not to produce undesirable transients which at times appeared not to be captured by the limiter.

Summary

The *Aphex II Aural Exciter* is an interesting effects unit which should find many applications in speech and music recording or reproduction.

An excellent standard of construction combined with good control laws and identities, go towards recommending this unit but as with any effects unit, the sound is a matter of personal choice.

Hugh Ford

FIG 4
APHEX II HIGHPASS FILTER

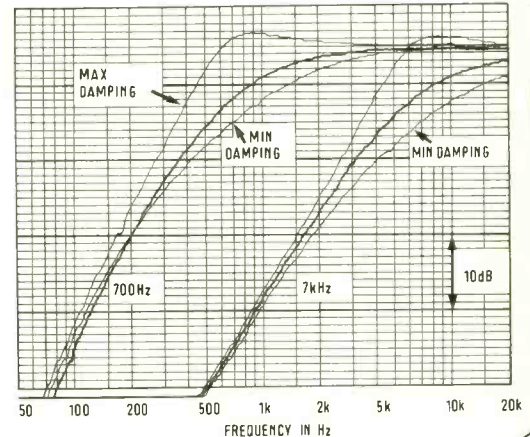
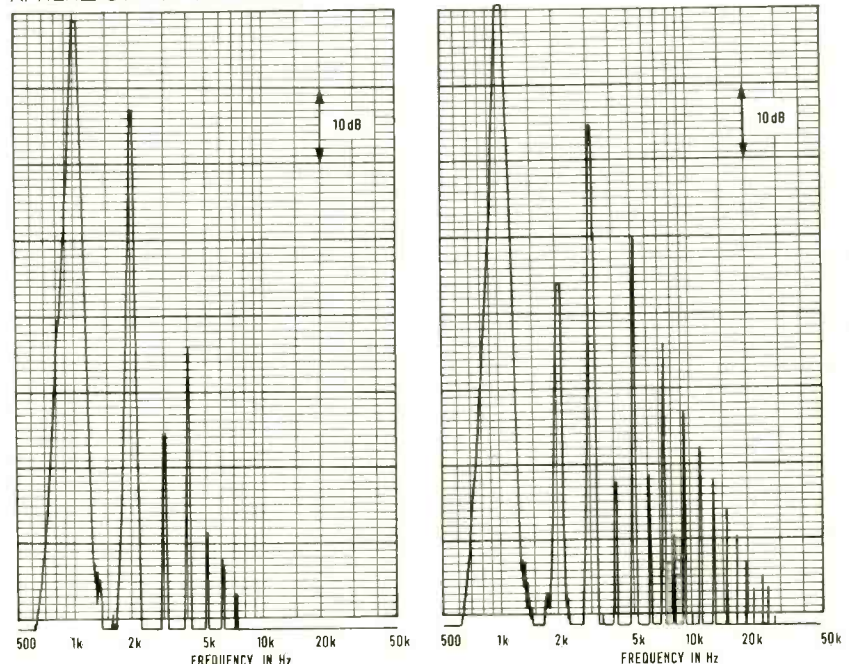


FIG 5
APHEX II OUTPUT SPECTRUM



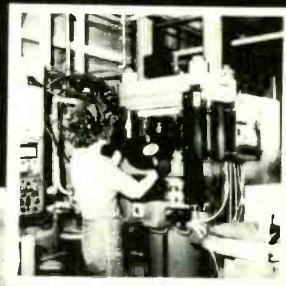
(a) TIMBRE CONTROL ANTICLOCKWISE

(b) TIMBRE CONTROL CLOCKWISE

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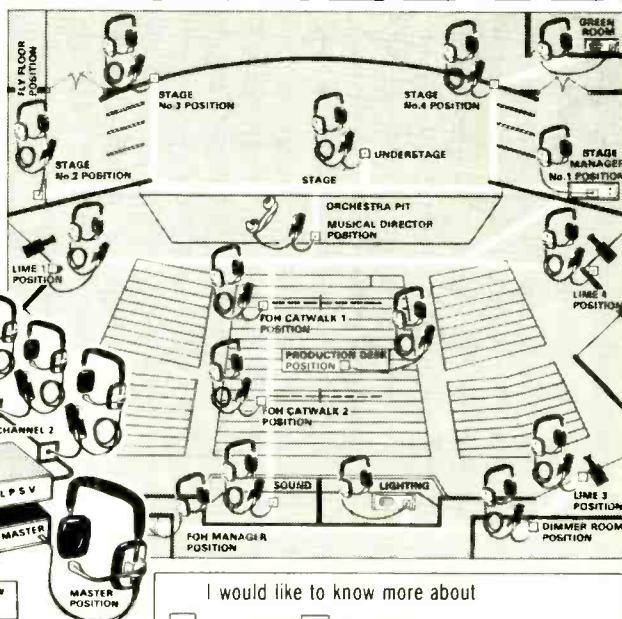
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Revox PR99 2-track



THIS machine is a generally upgraded Revox B77 with features that will probably appeal to the smaller studio in need of a 'workhorse' stereo mastering recorder, or to the aspiring semi-professional user who requires something better than humble A77s or B77s yet cannot justify the expense of a Studer B62 or B67.

In the review situation, it was used for an extended period as a mastering machine in conjunction with a small 8/2 mixer. A fair amount of physical editing was carried out in order to test this most basic of standard operations on the PR99, in addition to dub-editing using the drop-in facilities.

Presentation

The PR99 arrived well-packed in a sturdy box, with the usual polystyrene inserts and all-enveloping tough plastic bag. In addition to a well-presented book of operating instructions, written in English, German and French with clear photographs and diagrams, came a separate book of circuit diagrams. This latter proved most useful — in fact immediately useful in establishing the wiring convention of the XLR connectors as the machine was patched into my system.

The cleaning kit provided with the machine somewhat detracts from the professional presentation; the cleaning fluid is mostly deionised water and detergent with very little isopropyl alcohol, the cleaning tools are a bit of a joke and the type of cotton bud included readily unwinds from its plastic stem. I assume the lint-free cloth is intended for dusting purposes (a dab of *Brasso* and your tape heads will come up a real treat?).

The standard PR99 comes metal cased, ready to fit a 19in rack, and will operate at any angle from horizontal to vertical. For such a solidly built

MANUFACTURER'S SPECIFICATION

Tape transport: two AC spooling motors and a single AC capstan motor, electronically regulated.

Tape speeds: 3 3/4/7 1/2 in/s or 7 1/2/15 in/s.

Varispeed option: 2 1/2 to 11 in/s or 5 to 22 in/s.

Wow and flutter: <0.1% (3 3/4 in/s), <0.08% (7 1/2 in/s), <0.06% (15 in/s).

Tape slip: max 0.2%.

Winding time: approx 120s for 2,500ft of tape.

EQ: NAB all speeds, CCIR/IEC available on high speed version.

Frequency response: (via tape, -20VU) 30Hz to 16kHz +2/-3dB (3 3/4 in/s), 30Hz to 20kHz +2/-3dB (7 1/2 in/s), 30Hz to 22kHz +2/-3dB (15 in/s).

Operating level: 250nWb/m 0VU; level metering ASA standard VU meter plus LED peak level indicators (6dB above operating level, adjustable).

Distortion at 0VU: <1% (3 3/4 in/s), <0.06% (7 1/2 in/s), <0.6% (15 in/s).

S/N ratio: >63dB standard speed version, >66dB high speed version.

Crosstalk: stereo >45dB, mono >60dB.

Erase depth at 7 1/2 in/s: >75dB (1kHz).

Line inputs: ≥5kΩ balanced, CAL +4dBu (adjustable ±10dBu), UNCAL sensitivity variable up to 10dB above CAL input.

Max line input level: +22dBu (>40Hz).

Mic inputs: 100kΩ unbalanced, LO -70dBu (max -24dBu), HI -42dBu (max +4dBu).

Optional balanced mic inputs: >1.2kΩ (40Hz to 15kHz), LO -82dBu (max -36dBu), HI -54dBu (max -7dBu).

Line outputs: balanced, source impedance 50Ω, CAL +4dBu into 600Ω (adjustable -20/+9dBu) UNCAL output level variable up to 10dB above CAL output.

Max line output level: +22dBu into 600Ω, +20dBu into 200Ω.

Headphones output: max 5.6V, internal resistance 220Ω, short circuit proof.

Power requirements: 100V, 120V, 140V, 200V, 220V, 240V 50 to 60Hz max 90W.

Primary power fuse: 100 to 140V—1A slow-blow; 200 to 240V—0.5A slow-blow.

Ambient temperature range: +40°F to +104°F (+7°C to +40°C).

Weight: 40lb 12oz (18.5kg).

Manufacturer: Revox ELA AG, Althardstrasse 146, CH-8105 Regensdorf-Zurich, Switzerland.

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

USA: Studer Revox America Inc, 1819 Broadway, Nashville, Tennessee 37203.

machine, the PR99 weighs in at a surprising 40 lb or so.

Internal construction

Access to the interior is a simple matter; removing four screws releases the bottom cabinet and all is revealed. Mechanical and electronic assembly is to the usual high standard of the manufacturer, although I was somewhat surprised to see that the individual 'daughter' PCBs containing the audio and oscillator circuits are SRBP, and look like standard B77 issue. The various presets on these boards, user-accessible through the front panel, are only of average quality and are not enclosed to protect them from dust, but at least they do line up

with the access holes. The logic and electro-mechanical circuits are on epoxy-glass boards for the most part, and have a more professional appearance, in keeping with the overall appearance of the machine.

There is a fair amount of empty space which could be customised by adventurous souls, perhaps by putting in a 48V power supply to provide a phantom facility on the optional balanced mic input amps. This would be a simple task since the PR99 mains transformer has taps providing 43 and 55V AC associated with the tape drive.

The balanced mic option is already catered for

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by cutouts on the rear panel to fit the additional *XLRs* and a waiting wire loom with sleeved connectors to receive the additional PCBs into the existing circuits.

Supplied with a detachable 2-core mains lead and moulded-on European 2-pin plug, the *PR99* is double-insulated and complies generally with the IEC 65 standard of electrical safety.

Connections and calibrations

The majority of external connections are made on the rear panel, three jack sockets on the control panel (unbalanced mics, stereo headphones) are unlikely to be used in professional applications.

Each line input is via a 3-pin *XLR* chassis socket, line outputs via a 3-pin *XLR* chassis plug. The *XLRs* are non-latching types. Cutouts are provided for two further *XLRs* to accommodate the balanced mic input option. The rear panel also contains a variety of DIN-type sockets with weird pin configurations (fear not — plugs are supplied with the machine) which allow remote control of capstan speed, remote control of transport functions, and fader start. One of these DIN sockets is marked 'Monitor' and provides a fixed signal, unbalanced, taken from a point in the circuit prior to the output line amps. This socket is a convenient measuring point when setting up the machine's working levels in the studio.

The *PR99* may be operated in either CALibrated or UNCALibrated mode. The former provides for level control to be entirely a function of the master faders on the desk driving the *PR99* as in usual professional practice. In the UNCALibrated mode, the rotary level controls on the *PR99* are enabled allowing operation as a stand-alone tape recorder. The sensitivity can be continuously adjusted from zero up to 10dB above the preset operating level under these conditions. As well as CALibrated inputs, the *PR99* has an independent CALibrated output which may be used to feed the monitor panel on a studio desk at fixed level. Alternatively, UNCALibrated output enables the output level control.

The provision of the CALibrated facility makes the machine immediately compatible with professional installations and practice, whilst at the press of the buttons, placing the machine into UNCALibrated mode, the *PR99* is ready for operation in semi-professional and domestic situations.

Control layout and functions

The front of the deckplate carries the controls, in appearance and layout virtually identical to the *B77*. One big difference is the single-level deckplate which allows direct access to the tape channel. The *B77* has a more 'domestic' appearance, with a hinged flap in front of the headblock and the controls raised above the deckplate.

Other differences from the *B77* include buttons for 'sel-synch' which facility comes as standard in the *PR99*, a Tape Dump button which switches off the take-up reel motor and allows tape to be run off into a strategically placed bin when editing, and reflective spot UNCALibrated mode buttons which enable the input and/or output level controls.

The remainder of the controls are the same as the *B77* and are in the same positions (the output UNCALibrated mode button on the *PR99* replaces

TABLE 1 MEASURED PERFORMANCE OF PR99

Frequency response (1, 5)	40Hz to 20kHz within 1dB
Crosstalk (2, 5)	- 51.5dB left on right - 49.5dB right on left
Distortion (3, 5)	0.4% at 0dB 1.0% at +6dB
S/N ratio (4, 5)	67.5dB
References:	(1) Response via tape, record level - 20dB (2) 1kHz at 0dB (3) THD at 400Hz (4) ASA A-weighted, at +6dB (5) 0dB = 250nWb/m

one of the headphone sockets on the *B77*). Two pushbuttons select tape speed, and are interlocked such that pressing one releases the other; there is no 'capstan drive off' position like the old *G36/736* series. Each audio channel is provided with a 5-position input selector: MIC LO for the optional balanced mic inputs, MIC HI selecting the unbalanced mic jacks on the control panel, LINE for the *XLR* inputs, a channel-to-channel re-record position which may be used for tape echo and finally an OFF position where the channel input is shorted. There are two rotary input level controls, enabled in the UNCALibrated mode, ready/safe switches and associated indicator lamps, and large VU meters. The meters have an LED at the centre which acts as a peak indicator and glows steadily when the record level exceeds a preset level (normally +6dB relative to 0dB VU) adjusted as required through access holes on the front panel. Audio output is selected by a 5-position rotary switch: stereo, reversed stereo, one or other channel and mono. In the three latter positions, the output signal is common to both line out *XLRs*. Engaging the output UNCALibrated mode button enables the output level control, a rotary concentric type, which also adjusts the signal level of the headphone socket. In the CALibrated mode the output level control adjusts the headphone level only.

Performance

Like any high-quality tape recorder, the *PR99* requires setting up for the 'normal' input and output signal levels in its working environment, and the bias adjusted to suit the 'normal' tape.

The review machine arrived set up for a +4dB operating level and required adjustment to the 0dB

(ref 0.775V) signal levels used in the test situation. Bias was adjusted for BASF *LPR35*, and the majority of recordings made on the *PR99* used this tape; some mastering was undertaken on Scotch *206*, BASF *SPR50LH* and Agfa *PEM468*, the bias being adjusted accordingly. The procedure for adjusting the signal levels (CALibrated mode) is clearly set out in the operating instructions, and is a simple matter of altering two internal presets and reading the level at the monitor output using an audio millivoltmeter. It would be nice if these two presets were accessible through the front panel, but since the *PR99* uncases so easily, the whole procedure only takes a few minutes.

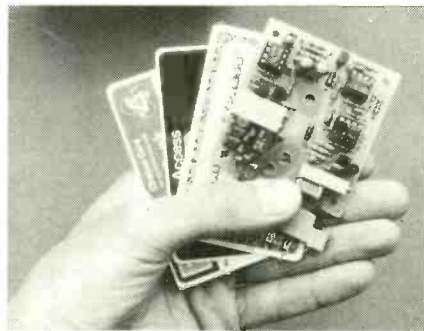
With the *PR99* set up and fed with volts and recording tape, I undertook some measurements within the capabilities of my Nakamichi *T100* analyser before getting down to real work on the machine. These indicated that the machine exceeded its published specification. Typical results are given in Table 1.

In use, the *PR99* performed flawlessly, and clearly is a machine with an impressive performance. It is difficult to see how its performance could be improved in a worthwhile sense without a large increase in manufacturing costs (when it would probably turn into a *B67!*). However, there are a number of operational matters that could well be improved, at almost no cost in manufacture, which would be of real benefit to the user. The pause button has to be held on, and does not latch. As the (optional) remote operating panel has a latching pause, I consider that a mechanical latch, if not a change in the logic, could and should have been incorporated. Such a facility would require indication that the 'pause' state has been engaged, and a small LED or perhaps a self-indicating button with a reflective spot would serve this purpose.

Dropping in and out of tracks using the ready/safe switches is click-free, but has to be used with caution. The 'record' state is only cancelled by the stop button, so if the switches are used to drop out of a track during recording, the logic returns to the 'record' state once the switches are moved to 'ready'. It is all-too-easy to be had by this little 'gotcha', particularly if attention is momentarily distracted. The easiest way of overcoming the problem (apart from 100% concentration on the part of the user) would be to arrange that the record

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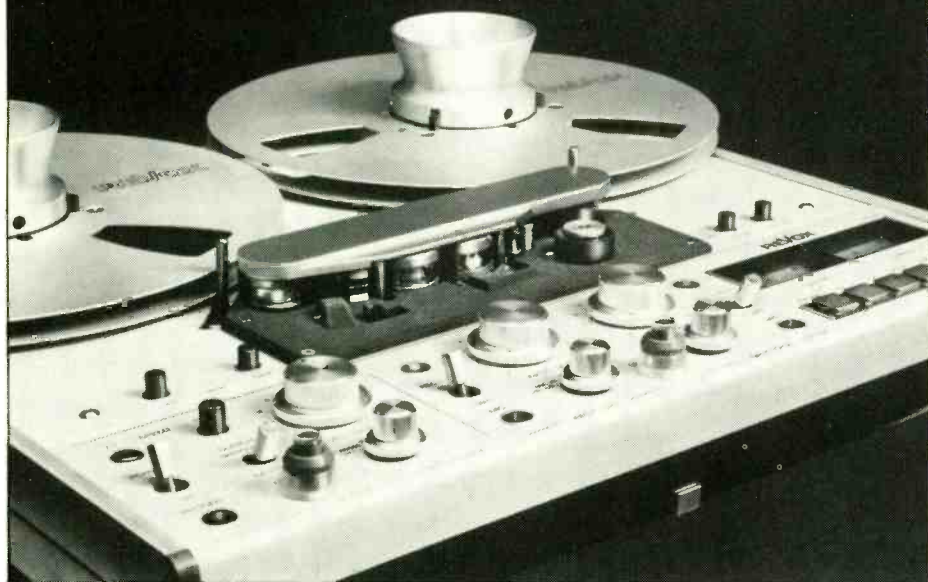
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reviews



Detail of the PR99's heads

indicators flash, rather than remain innocent and unlit with the 'record' state poised to operate the instant the switches are moved to 'ready'.

The 4-digit tape counter was as accurate as mechanical counters are, but I hardly ever used the thing, and would have found it more use had a 'stop at zero' facility been incorporated. This would then serve the purpose of a pauper's autolocate to find the start of that **** track for take 86. Even my first-generation domestic video recorder has this facility, if little else!

Editing is a joy because of the excellent access to the heads, and with the editing lever engaged, the replay head shield slips down out of the way. An editing block such as the trusty *Editall* could be bolted to the headblock cover, but the design and layout of the deckplate does not allow mounting directly in front of the heads, which is probably the ideal position. All my editing operations were carried out with the editing block mounted on the headblock cover using double-sided sticky pads, tape having to be lifted out and up from the tape channel and dropped back in after splicing. Not a difficult operation (particularly if you were brought up editing on a Revox G36) but looping the tape forward from the heads would have made life almost perfect in this respect.

The electronic end-of-tape sensor is of the infra-red type and is mounted across the tape path just upstream of the erase head, the same arrangement as the B77 and a great improvement on the bulb-consuming photoelectric system of the A77 series. I found that this device could be misled when spooling tape containing leader inserts; its behaviour in this respect was a little erratic, sometimes it would allow a leader to pass without triggering the autostop, on other occasions it would trip the autostop on the same section of leader. It would seem that small changes in the level of infra-red which may pass through opaque leaders, cause triggering through a sort of hysteresis effect. The translucent leaders beloved of Agfa always tripped the autostop, and even those thick BASF leaders, the ones supplied in bright cheerful colours in 300m lengths, usually had the same effect. I expect that it would be possible to effect a modification by putting a

sensitivity control in the circuit, but probably most users will end up sticking a few layers of splicing tape over the sensor to reduce false triggering.

One other little irritation is the mains power switch. This is a lever switch, styled to match the other lever switches on the control panel. All very nice from the cosmetic point of view, but it lurks next to the Input Reproduce lever switch. This fact has impressed itself on me because I was using dbx most times I fell for it, and instinct rather than presence of mind caused me to flick the mains power back on straight away. Not a wise thing to do when monitoring via dbx... and as painful as the instinct that causes the all-too-successful grab at the hot soldering iron as it is accidentally knocked off the bench. I humbly submit that a latching pushbutton would be a better idea for the mains switch. As it happens, one of the speed select buttons sits next to the mains switch, so a custom modification looks possible, making the remaining speed switch select one or other speed, and fitting a mains-rated switch on the redundant pushbutton. It would seem worthwhile unless you can afford to re-cone your speakers or have a large store of spare drive-units to draw on every time you knock off the mains in error.

Reflections

In using the PR99 and preparing this article, I've been forced to ponder the place of this machine in the harsh world of reality. That it is a well-built piece of precision engineering with an excellent performance is not in dispute; nor is the fact that it has many useful and generally well thought out facilities. Where I have doubts is in the comparison of the PR99 with the B77 series, to which in most inward respects it is identical. The larger professional studio having a requirement for a stereo machine would almost certainly be more interested in the other well-known workhorses from this manufacturing stable; the budget-conscious small studio would probably 'get by' with a B77, no doubt customised a little to provide a flat-top deckplate to improve editing operations.

The PR99 deserves to be a success; had the B77 not arrived first, I have no doubts that the PR99 would be a stunning success. **Peter Carbines**

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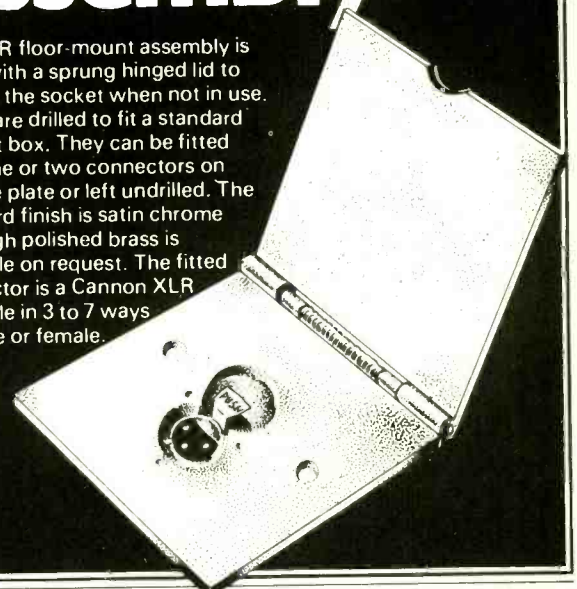
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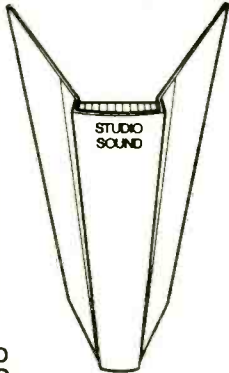
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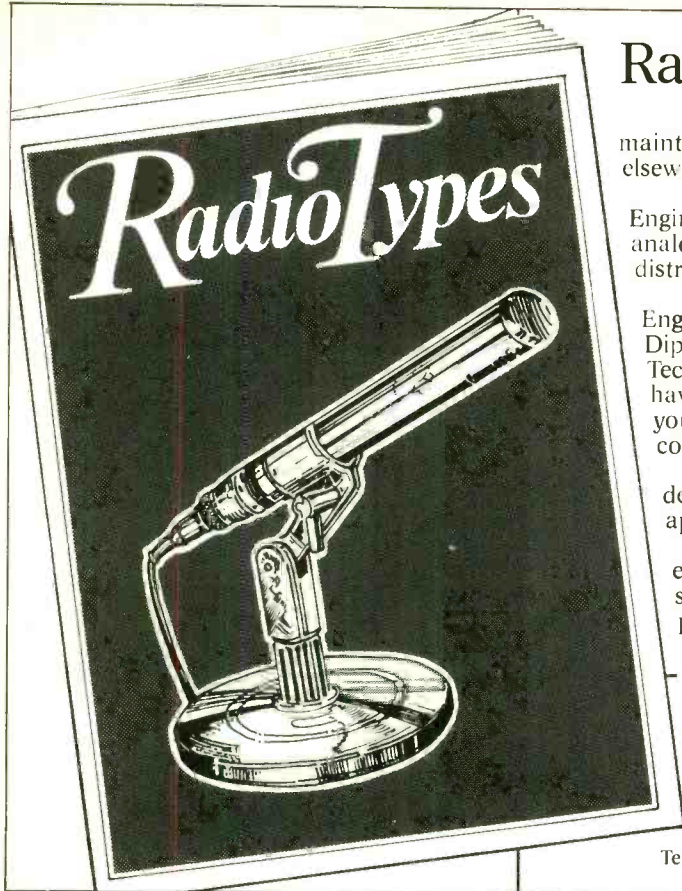
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