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January 1980 75p

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studio sound

AND BROADCAST ENGINEERING

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In the early days of recording and broadcasting, equipment tended to be so unreliable that having qualified engineers in studios was obligatory if any form of continuous output was to be maintained. Indeed, most studios had to employ engineers to build equipment, never mind just maintain it, since there were few manufacturers around with off-the-shelf designs. Thus, early broadcasting organisations and recording studios had their own research and design departments, many of which survive to this day, unlike the film industry's research departments which ran out of funding many years ago. Again, while broadcasting and recording was in its infancy and controlled by a small number of large companies, many of whom had other equipment interests (such as EMI), there was little market for independent companies. But as the large companies failed to move with the times, and as smaller companies offered freedom, opportunities and salaries that could not be matched, independent manufacturers began to corner the equipment market. Because they have to survive competition, ingenuity and innovation are essentials of independent manufacturers fighting for customers, unlike the older established companies who tend to stagnate when supplying only a small, very restricted market (remember EMI tape recorders?). While broadcasters still employ large numbers of maintenance engineers to keep their equipment operating, for many recording studios the maintenance department is just an overhead, and is often tucked away under the stairs. Many manufacturers have dual pricing policies, since when a broadcaster buys something, he is invariably capable of maintaining it (although selling to the BBC can cause problems since numerous unusual specifications must be met before the sale is completed), while selling the same equipment to say a small recording studio without any proper maintenance back-up is likely to require the supplier to offer extensive after sales service which must be paid for. Again, sales in the more remote parts of the world (where maintenance is often even more lacking) carries an even higher cost because of such after sales service. While the real answer is paying a high price for equipment that is properly designed and manufactured to last, unfortunately many studios now tend to buy the lowest cost equipment which is unlikely to have the longest trouble free life. Unfortunately, good maintenance engineers are hard to find simply because few studios are prepared to pay sufficiently high for the skills and experience required, and indeed there are few training courses orientated toward the maintenance of professional sound equipment. Maintenance is becoming rather more of a board or module changing activity, than true fault finding with even little lights to assist in some equipment. This trend toward non-maintenance department studios is likely to increase as equipment costs come down, and as second hand equipment becomes available, and is unfortunately likely to cause problems for clients.

Studio Sound Yearbooks

During 1980, STUDIO SOUND will be publishing the first of a series of Yearbooks relating to the pro-audio business. If you have not yet received a request for information, but are engaged in manufacturing or distributing pro-audio equipment or providing related services (maintenance?), could you please send full details to the STUDIO SOUND office as soon as possible.

Cover of 3M tape transport by Adrian Mott
and Ray Hyden

JANUARY 1980 VOLUME 22 NUMBER 1



If walls had ears?

"We can't possibly use an output condenser, it must cut the bass mustn't it? And what about the damping?"

"And no output transformer, what with all that hysteresis and iron distortion."

"Pentodes? Tetrodes?"

"No, No, nothing but triodes will do."

"Triodes then, but wait, we can't have all that accumulated Miller effect."

"Transistors then?"

"Oh no, this year's crop are all hard and brittle."

"And that see-saw phase splitter, it's asymmetrical; if we fed a square wave..."

"But what have square waves to do with programme?"

"Shut up, that's irrelevant."

"Class B? But doesn't that always produce crossover distortion?"

"Ah! Feedback will cure all;"

"No, No, we've read that too much feedback causes TID or something."

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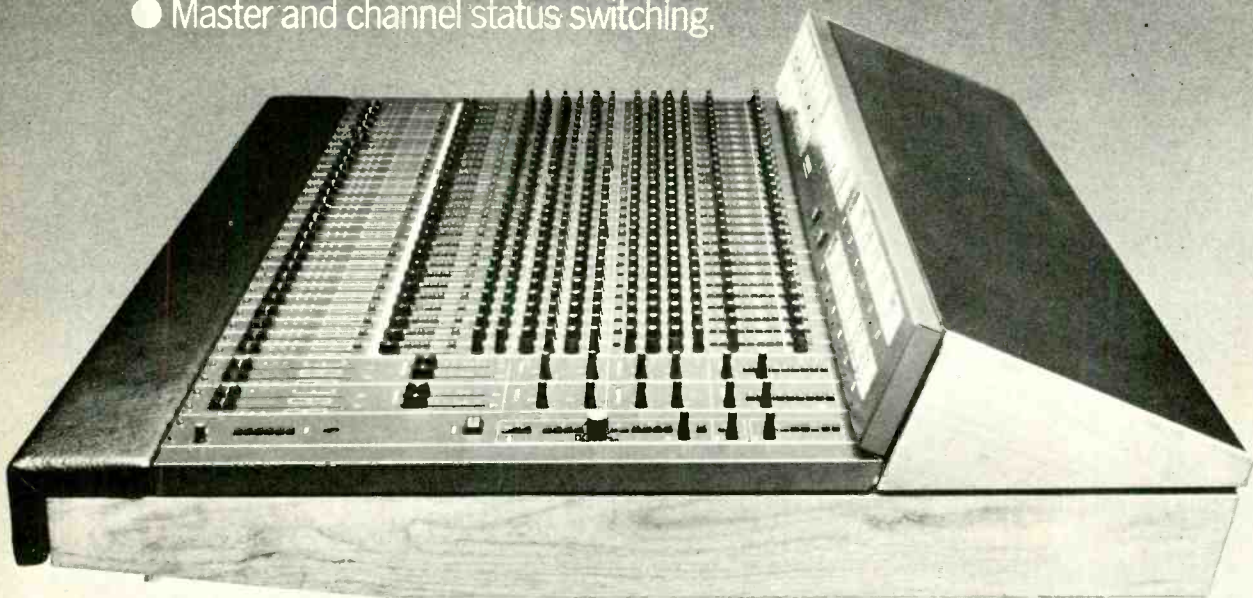
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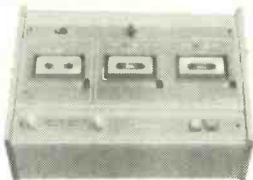
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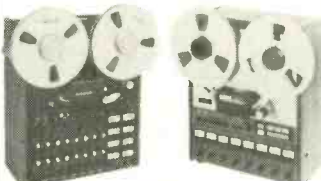
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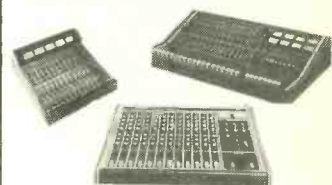
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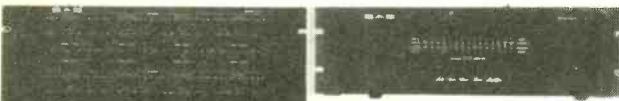
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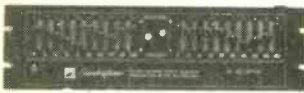
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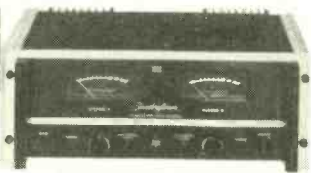
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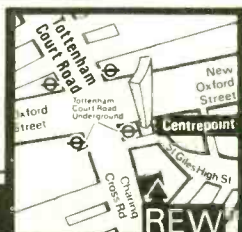
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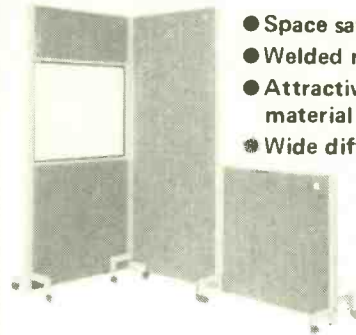
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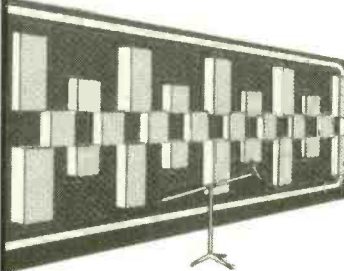
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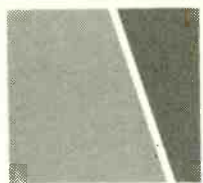
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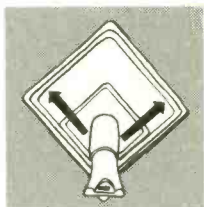
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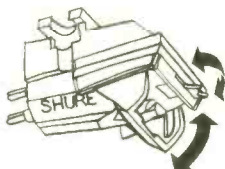
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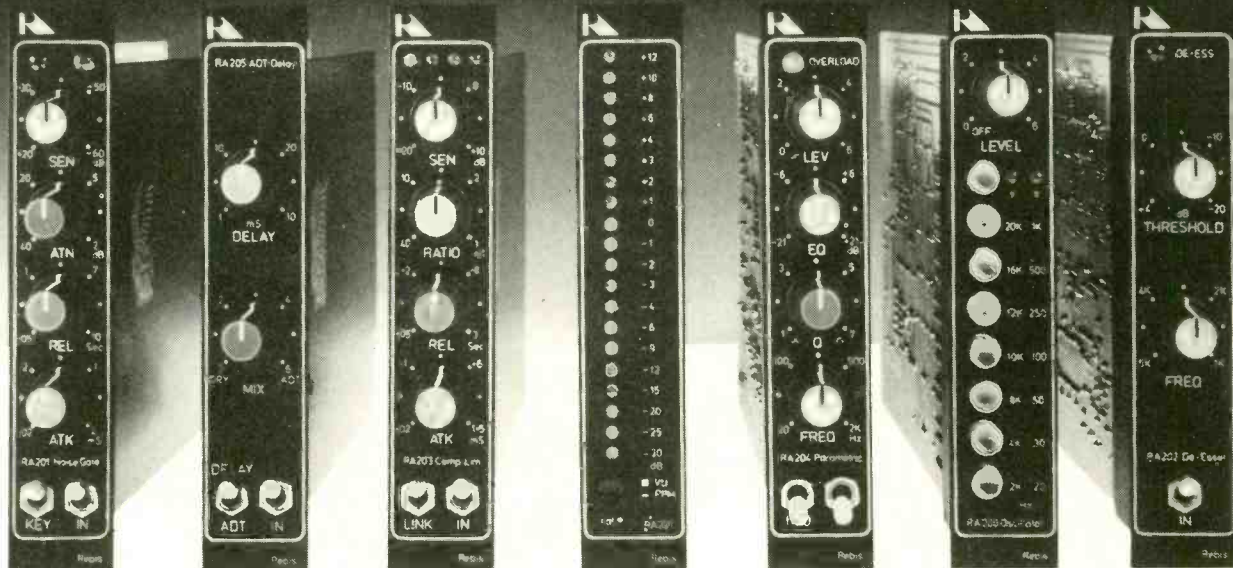
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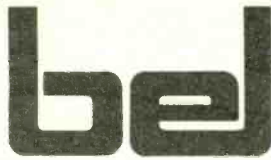
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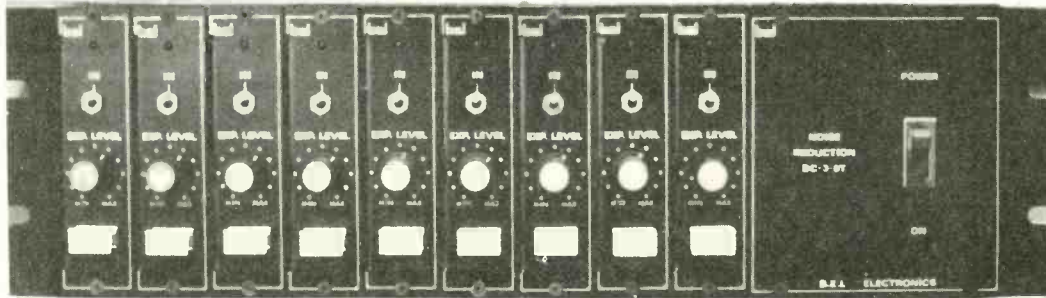
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When used in the Stereo Mode the unit sweeps across its



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- Stereo/Mono
- Keying Facility
- Image Shift
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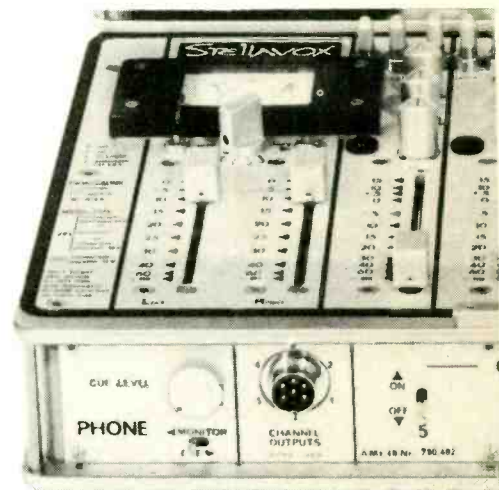
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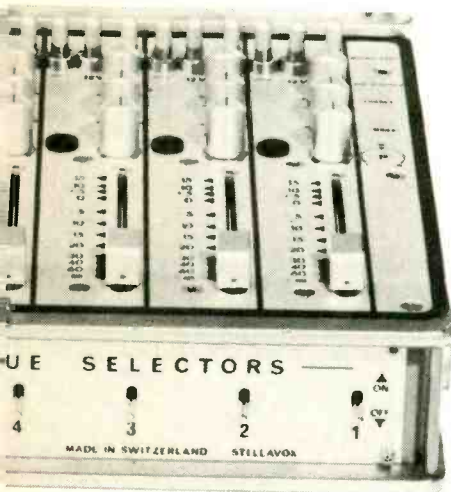
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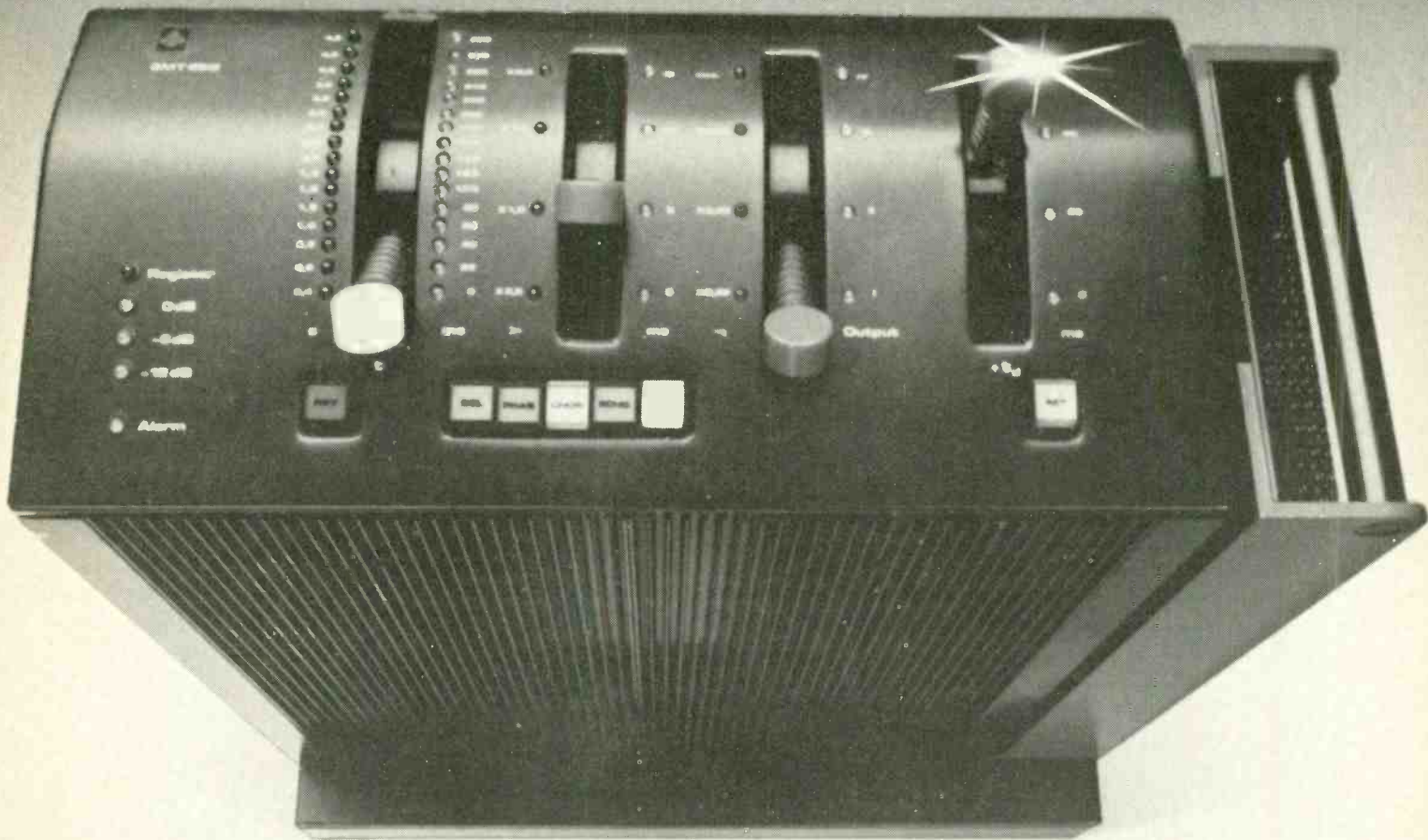
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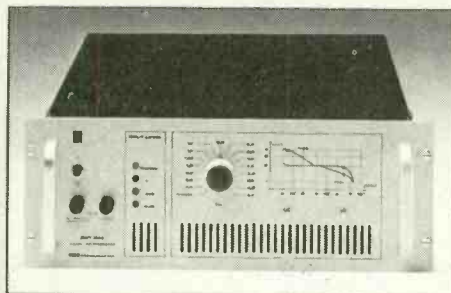


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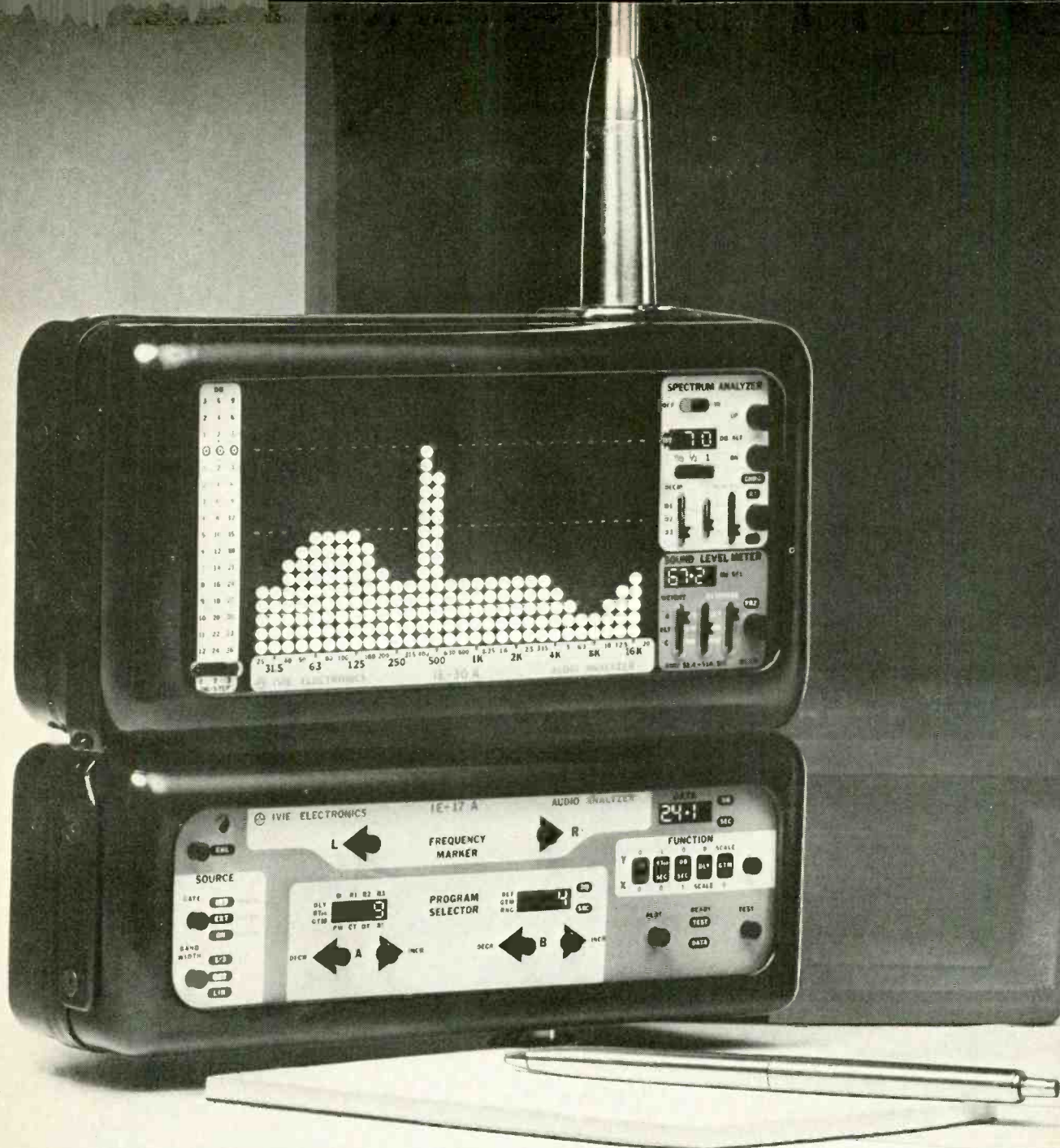
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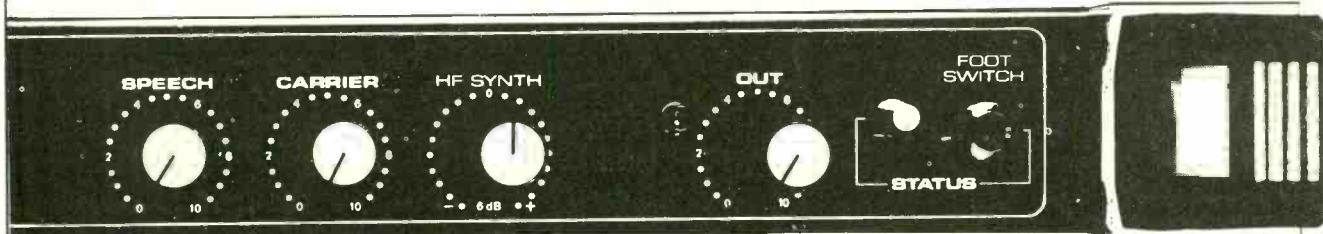
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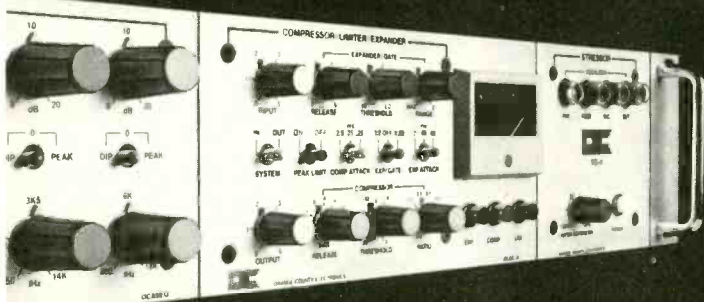


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Angus McKenzie (March 1978)

REVOX

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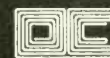
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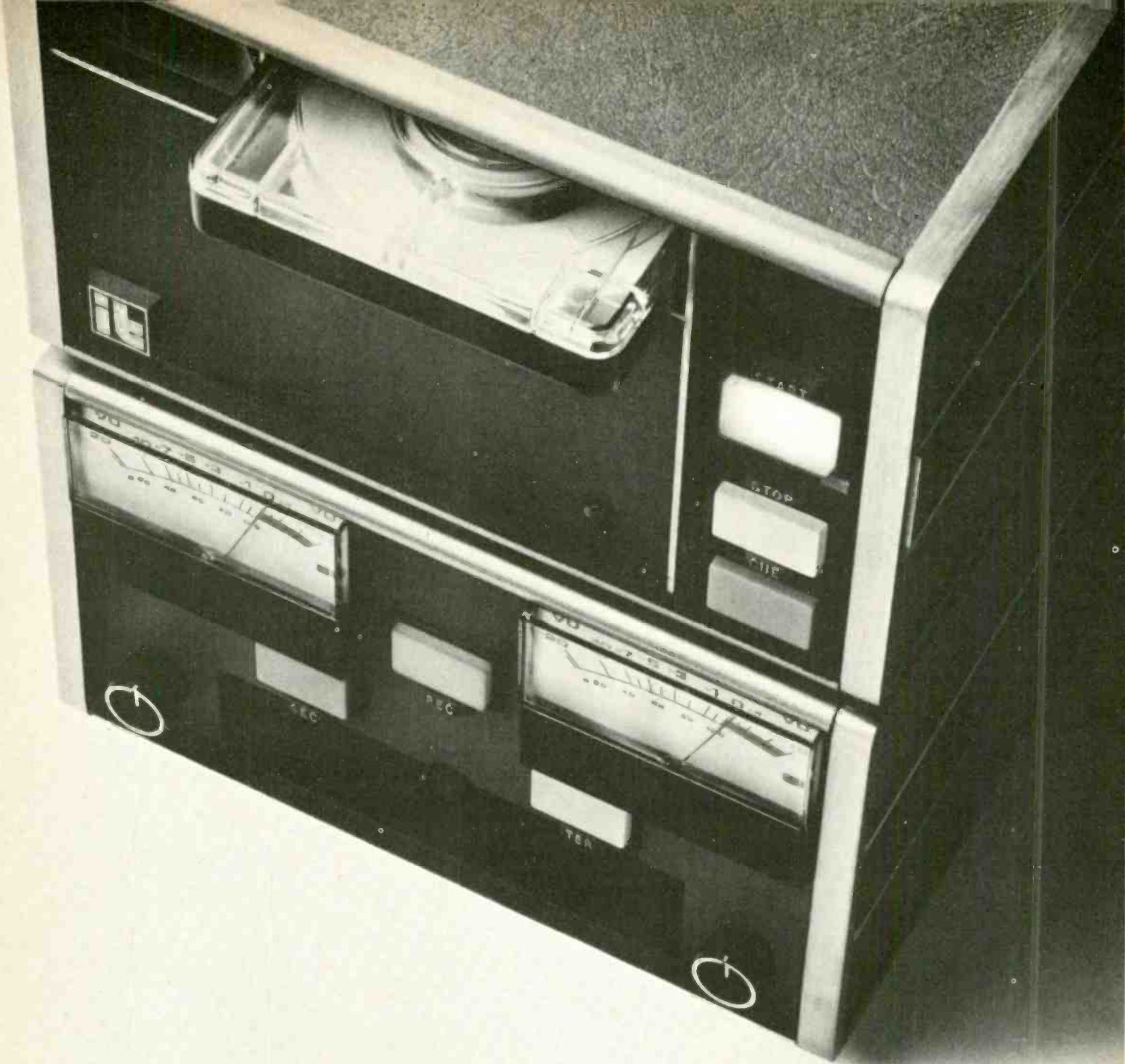
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Master of Disguise...

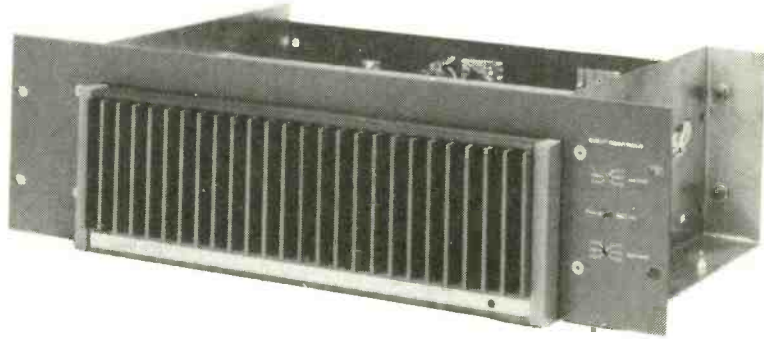
At Audio Reinforcement Services the QUAD 405 appears with all sorts of cover ups.

We manufacture conversion kits especially for this particular brand of power amplifier. There are two basic chassis types, one for studio and broadcast installations, the other for public address and portable reinforcement applications. Both chassis fit standard 19 inch rack equipment, the former showing the amplifier's heat-sink and having all it's connections at the back, while the latter has all the connectors and controls on the front panel and the heat-sink at the back.

Features available include: input sensitivity controls, transformers for balanced lines, input signal link switch, bridge-

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All conversions are available as kits or ready assembled with or without an amplifier, all adding up to "a complete service for all professional users of QUAD 405 power amplifiers."



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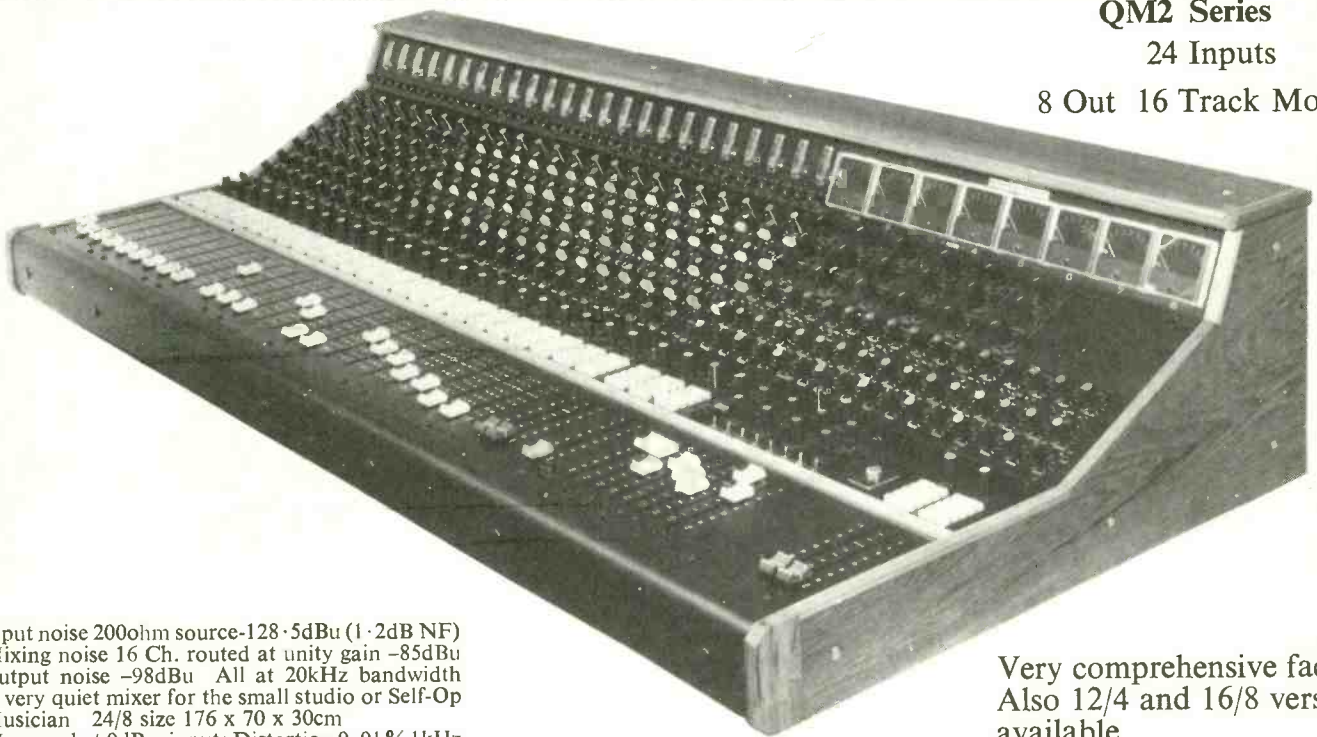
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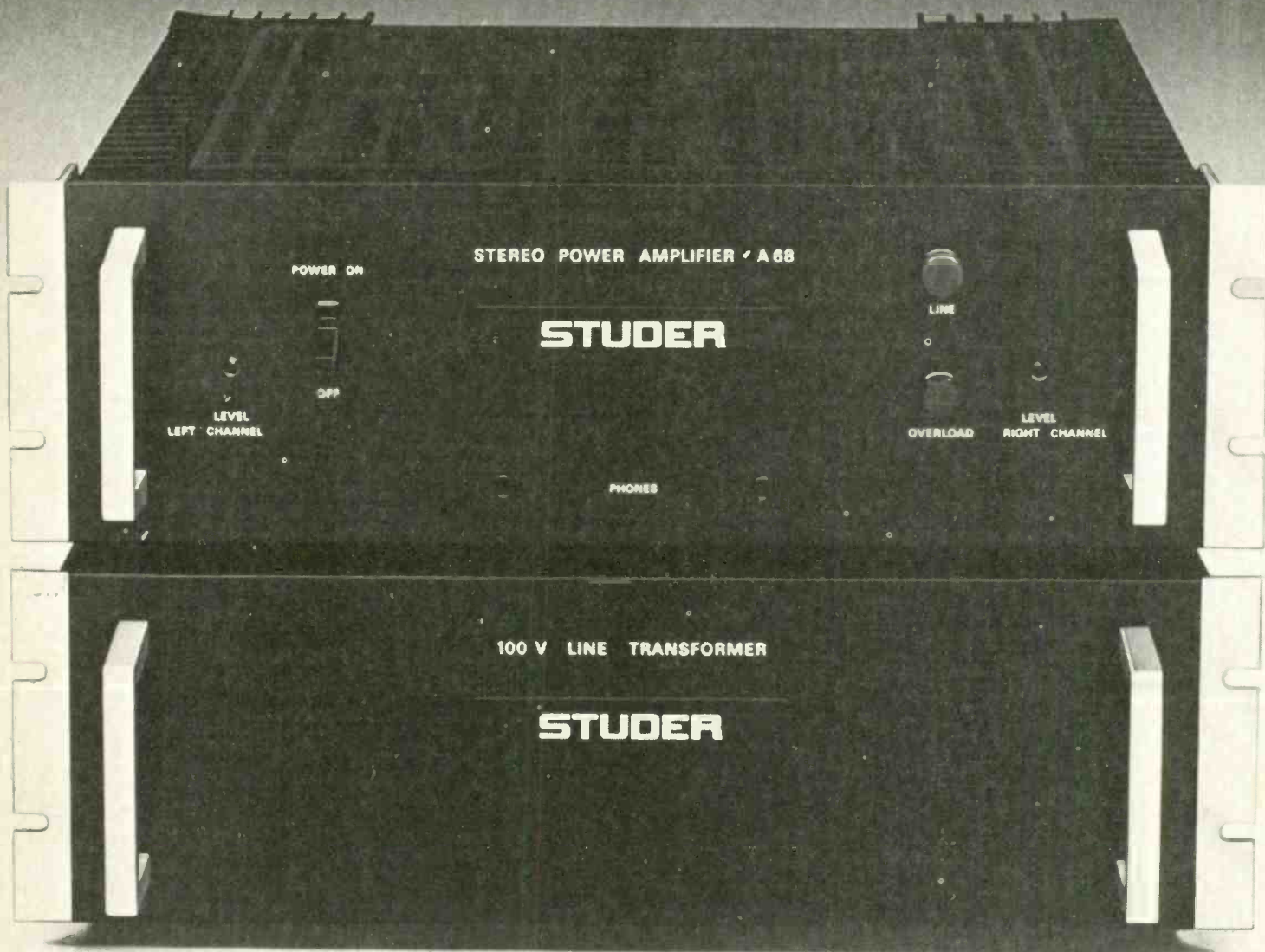


Input noise 200ohm source-128·5dBu (1·2dB NF)
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Prophon Sound Limited

A new company, Prophon Sound Ltd, has just announced its first product the *MX8A* 8-channel stage multiway system for use in conjunction with an off-stage mixer. The system comprises an 8-input send unit and a mains-powered receive unit at the mixer with a single co-axial cable interconnecting the two units. The send unit will accept up to eight high or low impedance (50k Ω - 500 Ω) mics and scans their outputs at a very high rate prior to transmitting a composite output signal to the receive unit. Here the eight mic outputs are reconstituted and fed to the mixer. Specifications are 'typical' frequency response 60Hz-16kHz \pm 2dB with a dynamic range of approximately 100dB. Prices of the units are £57.70 for the send unit; £78.90 for the receive unit; and £8.40 for an 80ft length of co-axial cable on a cable drum. The system will operate at distances up to about 650ft and several lengths of cable can be joined together for long cable runs.

Prophon Sound Ltd, 90 Wilsden Avenue, Luton, Beds LU1 5HR, UK.

Phone: 0582 30726.

SSE distribute JBL

Scenic Sounds Equipment has become an official distributor for the full range of JBL loudspeaker enclosures and components.

Scenic Sounds Equipment, 97-99 Dean Street, London W1V 5RA, UK.

Phone: 01-734 2812.

New SAE power amplifier

SAE has introduced the *P50* power amplifier which is a 1 $\frac{1}{2}$ in high rack mountable unit for professional applications. The amplifier is fully complementary, is rated at 70W per channel into 8 Ω , and is fitted with a specially designed cooling fan to avoid thermal cycling. Features include bridged mono (350W) operation capability; switchable high/low frequency filters; dc protection circuitry; and overload indication at 1dB below clipping which is independent of frequency and load.

Scientific Audio Electronics Inc, 701 E Macy Street, Los Angeles Cal 90012, USA.

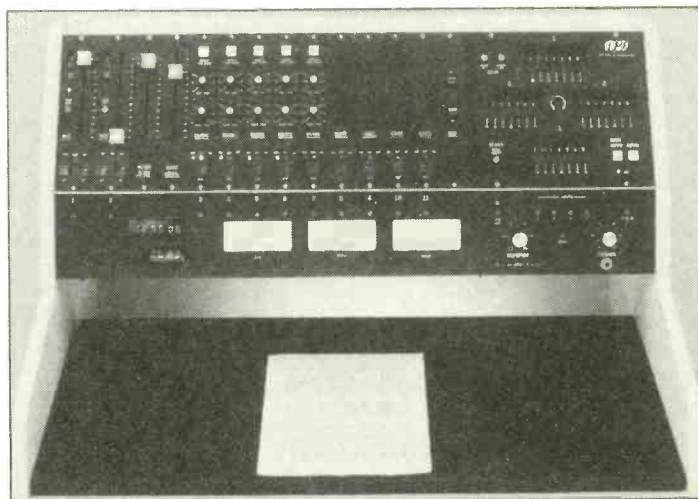
Phone: (213) 489-7600.

Automatic Broadcast Console

Irv Joel & Associates has introduced a modular automatic broadcast console, the *JL-412*. This is based on a new concept in electrical and physical design, is capable of automatically programming a sequence of up to 28 events via thumbwheel selection switching, and can access up to 11 input sources. The console is fitted with a logic system which in addition to offering fully automatic programming also allows manual sequence operation and manual override at all times. Input selection is via the thumbwheels and in the automatic mode the console senses 25Hz tones at the end of reel-to-reel sources, and secondary tones at the end of cartridge sources. The operator can use the console in the semi-automatic mode by use of the NEXT EVENT command. LEDs indicate the status of each input module—READY, NEXT, or ON-AIR. To prevent miscueing, music tapes

must play through 25Hz head tones and are cued automatically through, an IC phase lock loop detector. Cartridges are presumed READY when properly seated in the machine. To ensure that only one source is on-air, except for voice-over, each time a sequence is operated or a manual insert performed, the previous source is cleared. Additional features include front panel trim pots; A-B comparisons between input sources, console output and off-air monitors; simultaneous metering, left, mono sum, and right through three separate meter amplifiers; built-in 5W per channel headphone amplifiers; 10-step mic attenuator; local EBS control by remote switching at the console; digital display of time, plus an event timer which automatically resets when a new source goes on-air; and two separate stereo transformer balanced outputs.

Irv Joel & Associates, 528 River Road, Teaneck, NJ 07666, USA. Phone: (201) 692-0010.



White Model 4320

White Instruments has introduced the *Model 4320* $\frac{1}{3}$ -octave passive equaliser with 27 $\frac{1}{3}$ -octave filters at ISO centre frequencies over the range 40Hz to 16kHz. The filters offer up to 10dB attenuation and the unit has an eq in/out switch on the front panel. On the rear panel two accessory octal sockets are provided: one for a bi-amp or tri-amp crossover network; and the other for the insertion of a response

shaping filter such as a high or lowpass network. The equaliser is designed to be fed by low source impedances, nominally 100 Ω or less, and to be terminated with 10k Ω . Price of the *Model 4320* is \$550.

White Instruments Inc, PO Box 698, Austin, Texas 78767, USA. Phone: (512) 892-0752.

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

Phone: 01-734 2812.

3M to sell digital recorders

3M has announced that it is offering its digital 2-recorder system, or its individual 32-track premix and 4-track master digital recorders, for outright sale. Previously the equipment has only been available on a lease basis. The reasoning behind the change in marketing policy according to Bob Brown, marketing director for 3M's Mincom Division in America, is that the experience of those studios who operated the digital machines under the leasing plan (A&M, Record Plant, Sound 80 and Warner Bros), was that while "introducing a new technology is always subject to Murphy's Law, there were fewer problems than anticipated, and these were easily corrected, due primarily to the exceptional understanding and patience of the studio personnel involved". Accordingly, with the imminent availability of 3M's electronic digital editing system for field testing and the experience to date of the leasing studios, 3M believes the original purpose of the leasing plan to provide day-to-day experience and finished digitally mastered records has been accomplished. In view of this 3M has therefore decided to make its digital recorders available for outright sale.

Coinciding with this announcement 3M UK Ltd has introduced a new scheme under which customers will be offered financial terms for purchasing any capital equipment from the 3M Mincom products group. The scheme will apply to the new range of digital equipment as well as the existing range of professional audio and video equipment manufactured under the 3M trade names of Mincom, Datavision and Comtec, including the established *M79* multitrack recorder range. Full details of the scheme are available from John Prigmore, sales and marketing manager for the 3M Mincom Products Group.

3M UK Limited, 3M House, PO Box 1, Bracknell, Berks RG12 1JU, UK. Phone: 0344 58445.

Address Change

The Ferrofluidics Corp, pioneer of the commercial development and application of ferrofluidic technology, has relocated to new and expanded facilities in Nashua. The company's new address is: Ferrofluidics Corp, 40 Simon Street, Nashua, NH 03061, USA.

Phone: (603) 883-9800. Telex: 710-228-8957.

30 ►



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France **3M France SA, Mincom Div.** Boulevard de l'Oise, 95000 Cergy Tel: Paris 749 0275
 Germany **Audiolive** Kyffhauserstrasse 10A, 5 Köln 1 Tel: Köln 230910
 Holland **Pieter Bollen Geluidstechniek** Hastelweg 6, Eindhoven Tel: Eindhoven 512 777
 Sweden **Tal & Ton Musik & Electronic AB** Kungsgatan 5, 411-19 Gothenburg Tel: Gothenburg 130 216
 Spain **Mike Llewelyn-Jones** AP Postal 8.178 Madrid Tel: Madrid 637 0752

Helios servicing

The liquidator of Helios Electronics Ltd has completed the sale to S & P Audio Ltd of various specialist test equipment, service electronic components and technical servicing information regarding Helios products. All servicing enquiries, accordingly, should now be referred to S & P Audio Ltd, 41 Dorking Road, Tunbridge Wells, Kent TN1 2LN, UK. Phone: 0892 38893.

Sony and Philips exchange patents

On October 8, the Sony Corporation in Tokyo announced that it had reached a comprehensive agreement with Philips permitting both organisations to use each others patent rights freely for a wide range of products. The agreement includes optical audio and video disc technology using lasers. The interchange of research and development work is a significant move towards achieving a world standard for consumer digitally encoded audio and video discs. However, it remains to be seen whether a standard will result from the pooling of their research, since both retain the freedom to operate independently.

New phone number

Studio Equipment Services Ltd, the supply, installation and servicing company, has new phone and telex numbers. Phone: 01-452 1980. Telex: 87515.

Court GE-60 graphic equaliser

A new addition to the Court Acoustics range of graphic equalisers, the *GE-60*, has been announced. The new model is a 19in rack-mount unit comprising stereo equalisation in two rows of 30 1/3-octave bands, on standard ISO centre frequencies from 25Hz to 20kHz. The filter range is ± 10 dB and the faders have centre 'click stops' for accurate alignment. Level controls are provided on each channel offering up to 20dB overall gain, and there are also bypass switches for each channel. Both balanced and unbalanced terminals are provided; input impedance is 10k Ω ; and output impedance is 100 Ω . An optional perspex 'tamper-proof' cover is also available. Court Acoustics Ltd, 35/39 Britannia Row, London N1 8QH, UK. Phone: 01-359 0956.

AKG new products

AKG Acoustics has announced the introduction of several new products. Foremost amongst the new models is the *D300 Series*, comprising three dynamic microphones. These are intended for vocal use, have an elastomeric suspension system and are fitted with a stainless steel grille and multi-layer pop/windscreen reinforced by an internal safety basket. Other features include a field replaceable plug-in transducer module system and variable equalisation switching via a filter network. The *D300 Series* are all low impedance mics fitted with XLR-type connectors and comprise: the *D310* cardioid mic with a frequency range of 80Hz to 18kHz; the *D320B* hypercardioid with a frequency range of 80Hz to 18kHz; and the *D330BT* hypercardioid with a frequency range of 50Hz to 20kHz. Both the *D320B*

and *D330BT* are fitted with hum-bucking coils, while the *D330BT* is also fitted with a secondary transducer wired out-of-phase to reduce noise. Prices of the mics are: *D310* £52; *D320B* £70; and *D330BT* £88.

Another new addition from AKG is the *D125* dynamic cardioid mic with a frequency range of 100Hz to 15kHz and priced at £54. Finally, AKG has introduced two new stereo headphones: the *K241* with a frequency range of 16Hz to 20kHz and nominal 600 Ω impedance; and the *K340* which utilises a 2-way principle combining both dynamic and electrostatic transducers. Frequency range is 16Hz to 25kHz and nominal impedance is 400 Ω . Prices are *K241* £54 and *K340* £80.80.

AKG Acoustics Ltd, 191 The Vale, London W3 7QS, UK. Phone: 01-749 2042.

New Shure SC39 Series phono cartridges

Shure has introduced a new range of pickup cartridges designed for broadcast, recording and other professional applications. Called the *SC39 Series*, the range comprises three cartridges — the *SC39ED* with a recommended tracking force of 0.75 to 1.5gm and an elliptical stylus; the *SC39EJ* with a recommended tracking force of 1.5 to 3gm also with an elliptical stylus; and the *SC39B* with a recommended tracking force of 1.5 to 3gm but with a spherical stylus. The cartridges have several new features designed to protect the stylus including an internal support wire and special elastomeric bearing that ensures stable backcueing without groove jumping. Another feature is a lateral deflection assembly termed the sideguard which responds to side thrusts on the stylus by withdrawing the stylus shank and tip safely into the stylus

housing before it can bend. The cartridges also feature a lever operated locking guard to protect the stylus tip when not in use — which additionally when in the playing position has a visible cueing aid for precise groove positioning. In line with Shure philosophy the cartridges offer high trackability, but additionally the styli are also finished by a special process to produce a *Masar* tip. This new stylus tip, it is claimed, gives minimum asperity and abrasion and virtually eliminates noise build-up. The *SC39ED* offers an essentially flat frequency response, while the *SC39EJ* and *SC39B* offer a flat response up to 15kHz with a smooth roll-off up to 20kHz to minimise hf 'splatter' which may result from hf pre-emphasis in FM broadcasts.

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

Switchcraft connectors

Two additions with unique design features have been added to the Switchcraft range of *QG* connectors. The first, termed the *Fas-disconnect*, has a non-locking feature which allows immediate disconnection with minimal force, making it ideal for fast equipment take-down. The second is the *Y Series* of rear-mounted receptacles which permit a complete sub-assembly to be soldered, cleaned and tested prior to chassis mounting. The *Y Series* are available with pc or solder terminals with lock or *Fas-disconnect* latching, and may be colour coded.

Switchcraft Inc, 5555 N Elston Ave, Chicago, Ill 60630, USA. Phone: (312) 792-2700.

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

Phone: 01-953 0091.

Digital signal processing course

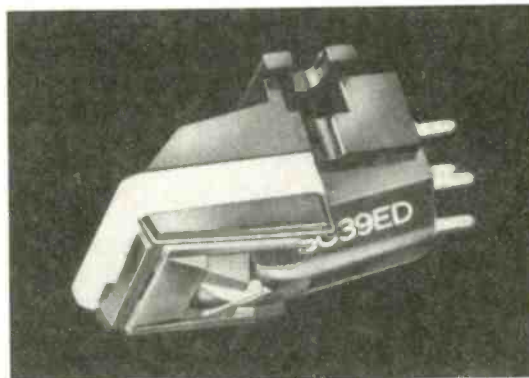
The Integrated Computer Systems Publishing Co is holding a 4-day course on modern methods of digital signal processing in London from February 19-22. The course is designed to present the necessary fundamentals, to explain the processing techniques, to survey the hardware and software available for design and implementation, and to apply this information to a range of design examples. Cost of the course is approximately £500 and full details are available from the Integrated Computer Systems Publishing Co, Pebblecombe, Tadworth, Surrey KT20 7PA. Phone: 03723 79211. The course is also being held in Amsterdam, Brussels, Paris, Munich and Stockholm on dates running from late January to mid-April.

Orange County DEQ module

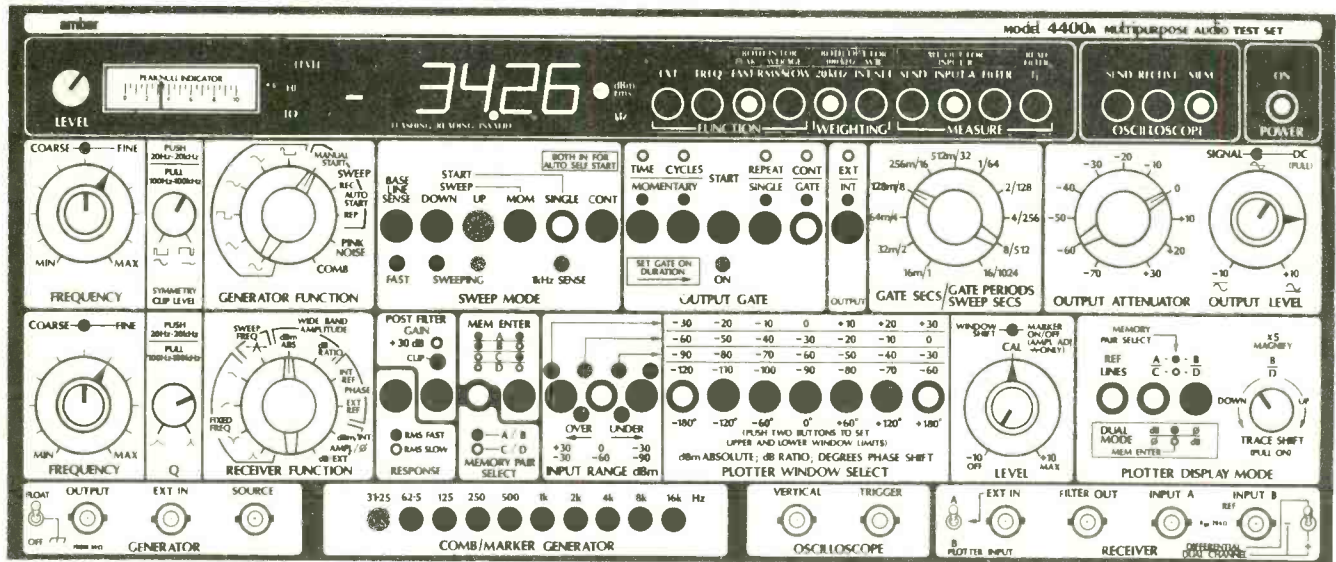
Orange County has introduced a new fully parametric 4-band equaliser module, the *DEQ*, to the same basic format as the *PEQ* module detailed in *Studio Sound* (August 1979, p22). The only difference between the two modules is that with the *DEQ* each section may be tuned over an 80dB control range (60dB cut and 20dB boost), while with the *PEQ* module each section may be tuned over a 40dB control range (± 20 dB cut and boost).

Orange County Electronics, 1125 Empress Street, Winnipeg, Manitoba R3E 3H1, Canada.

Phone: (204) 775-8151.



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Audio Award presentation

This year's Audio Award has been presented to Arthur Haddy of Decca and Anthony Griffith of EMI in recognition of their services to music via the gramophone. The award, which is presented on behalf of various British music organisations by our sister magazine *Hi-Fi News*, takes the form of individually engraved bronze statuettes in the form of entwined treble clefs. While the award is usually presented to classical musicians, on this occasion the award was made in appreciation of the unending technical research and administration which lies behind the issuing of classical records. Both Arthur's and Tony's careers have spanned the 30 years stretching between the end of the '78' and the birth of digital recording, and the expertise of both has played an important part in shaping the sound we now take for granted on classical LP's. As recording engineers they have been responsible for hundreds of recordings and have themselves been instrumental in developing many technical improvements. Arthur's research into disc cutting technology and Tony's remastering of vintage '78' performances being prime examples of their 'backroom' work. The awards were presented by composer Malcolm Williamson, Master of the Queen's Music, who paid tribute to the work of engineers without whom the art of the musician and composer would be restricted.

Aragorn graph transducer system

Aragorn Dynamics has produced a series of modules based on a newly invented device called the *Graph Transducer*—a number of precision potentiometers manufactured as a single small unit which readily converts graphs or contours into electrical information. The first module in the series is the *S201S* dual channel 10-band, single octave, graphic equaliser which is electronically identical to conventional equalisers, but takes the form of a single pcb with conductive plastic tracks, tri-bifurcated take-off points and hemispherical contacts giving inherent low noise and longevity characteristics. The *S201S* utilises standard interface inputs/outputs, incorporates unity gain trimmers to compensate for any attenuation, and has a bypass switch. Up to four *S201S* modules may be mounted in a 19in rack for use in an 8-track mode. The other modules in the series utilise the

Graph Transducer in the voltage versus time mode as a waveform and control sequence generator. The primary module, *S101*, contains a stable wide range logarithmic VCO which sequentially steps through 20 points and is able to create arbitrary waveforms (timbres or tones) accurate to the 20th harmonic. The module may run continually or for a single cycle and additionally it may step manually or be used in a retriggerable mode. The next module, *S102*, is an extender module which may extend the *S101* in series or produce a simultaneous contour controlled by the *S101*. The final module is the *S103*, a multi-purpose digital meter which accurately sets each point using the step facility. The *S103* may also be used to measure control voltages, frequency and period, while a count facility indicates the position the sequence has reached. Each complete instrument contains a tracking integrator with autorange to produce smooth contours, and in this form the units can be used with music synthesisers. In the *AD2000* programmer format (*S101*, 3 x *S102* and *S103*), they will sequence a standard synthesiser setting a tune, duration, plus the level and filter frequency of each note. Additionally the programmer will control a bank of VCA's, servos or lights, using the *VCP01* voltage/power converter. Although designed by Aragorn Dynamics, the graph transducer system is manufactured and marketed under licence by:

Turner Electronics, 58 Upper Tooting Road, London SW17 7PB, UK. Phone: 01-672 8585. Telex: 946108.

New magnetic tape heads

A range of British designed and manufactured magnetic tape heads constructed to NAB standards has been introduced by Monolith Electronics. Called the *QAL* range, the heads are for both record and replay and are physically interchangeable with those on studio cartridge machines and suitable for 1/2in high quality audio usage. The heads feature additional internal shielding to reduce pick-up from other electromagnetic components and have a quoted frequency response of better than ± 1 dB from 40Hz to 20kHz, with claimed improvements in signal-to-noise ratio of up to 10dB over existing tape heads. Monolith Electronics Co Ltd, 5/7 Church Street, Crewkerne, Somerset TA18 7HR, UK. Phone: 0460 74321.

Contracts

●Brabury Electronics has delivered a 40-channel mobile broadcasting unit to RTV Novi Sad, Yugoslavia. The vehicle, built on a Mercedes 913 chassis, contains a Neve 24-channel master console plus two 8-channel sub-masters, together with two 1/2in tape recorders, a 50W transmitter and relay receiver, a radio telephone, and standby powering.

●London's Konk Studio has retrofitted *Necam* automation to its Neve 8038 32/24 console.

●Neve has supplied the Royal Opera House, Covent Garden with a *Model 5316* 24-channel console with eight groups and four outputs plus four aux sends. Features include an 8-track recording facility together with comprehensive monitoring meters, source selectable for flexibility of control.

●Pye TVT has supplied Indonesia with OB vehicles, cameras and 18 Neve *Model 5422* suitcase mixers for coverage of the 10th South East Asia Games in Jakarta.

●Alice is to supply Cardiff Broadcasting with two ABCM on-air consoles and associated equipment for its main on-air studios. In addition Midland Community Radio (Coventry) has ordered its studio and technical equipment from Alice.

Appointments

●Ronald Fuller has joined RTS Systems as marketing manager.

●Studio Equipment Services has appointed Jon Raper as technical manager and Steve Holmes as sales manager.

●Ampex has appointed Tony Shields as audio product manager for its European, African and Middle East marketing area.

●The IBA has appointed Major General Peter Baldwin as deputy director of radio with responsibility for all the IBA's radio functions including the expansion of independent local radio. Major General Baldwin was previously closely involved with the planning and implementation of the British Forces Germany TV project and the BFBS radio service.

●The BBC has appointed Frank Berrisford as assistant head of the engineering information department in succession to Geoffrey Sturge who has retired after 17 years' service.

●Ron Fone has been appointed president of Teledyne Acoustic Research. Ron was formerly general manager of the company's UK operation.

●Cetec Gauss has made a number of new appointments — Larry

Phillips becomes marketing director, loudspeaker products; Walter Dick becomes chief engineer, loudspeaker products; Bart Bingaman becomes chief engineer, duplicator products; Jim Williams becomes director of engineering; and Jerry Fisher becomes quality assurance manager.

Financial

●Following the collapse of the proposed deal between EMI and Paramount, Thorn Electrical Industries has made a bid to takeover EMI. Thorn believes that EMI's record and music business will complement its TV, video and audio interests; and that EMI's defence division will enhance its own interests in this field. However, it remains to be seen whether the bid will succeed or whether EMI will rebuff the approach, as EMI may take the view that either it can put its own house in order, or alternatively that other potential bidders such as Philips, Racal or GEC will make an approach.

●Decca has announced that its records/television/audio division made a substantial loss last year (in the order of £1.6 million) compared with a profit of some £0.5 million the previous year. This has opened up speculation in the financial world that Decca may, like EMI, be open to a takeover bid, with Paramount in the wake of the collapse of the proposed EMI deal being rumoured as a possible potential bidder. ●As we go to press, we hear that Polygram are contemplating a takeover bid for Decca's audio division, and that outline agreement has already been reached on terms between Polygram and the Decca Group.

Vision-Sound Professional Audio

Audio consultant Michael Salafia, previously with Audiotechniques, has announced the formation of Vision-Sound Professional Audio Inc, a new audio consulting company and dealership. The company will specialise in equipping recording studios and in providing home recording systems for professional musicians. Vision-Sound will act as dealers for a wide range of equipment including Harrison consoles, Studer recorders, Calrec *Soundfield* mics and a full complement of peripheral signal processing hardware. Vision-Sound are also the exclusive East Coast representatives for Neotek consoles. Vision-Sound Professional Audio Inc, 110 Grand Avenue, Englewood Cliffs, New Jersey, USA. Phone: (201) 871-4101.

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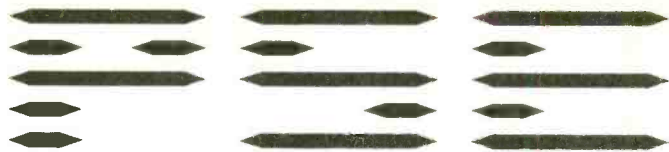
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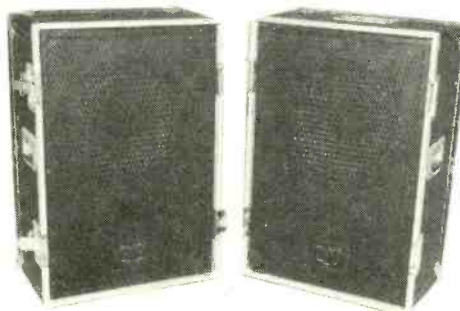
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studio diary



Montreux Jazz Festival 1979

With gleeful rubbings of hands, Electro-Voice were able to announce a record-breaking third year of supplying the sound reinforcement system for the 1979 Montreux Jazz Festival. (No doubt the organisers were equally gleeful but for reasons I'll leave you to work out!). Whereas last year, reported in December *Studio Sound*, I was able to attend the Festival for a week, this year I was limited to three evenings—however, sufficient to gain a good enough impression of the setup.

In general, the same procedure for the previous year was used with the added bonus of the same mixing team: Tom Durell of Disneyworld on the main PA desk and Chris 'Snoopy' Penycate at the monitor mixer. The hall was again analysed out, this time using the Ivie $\frac{1}{2}$ -octave analyser with micro-processor and an average curve worked out. The same philosophy of 1.5dB variation in SPL between best and worst seat was maintained and the slight changes in component choice from last year were made in order to work better with the hall. Electro-Voice recently acquired Tapco as a sister company and it seemed fairly logical that they should provide the power amplifiers for the PA. The 3-way system comprised 14 equalised TL606A Thiele bass cabinets (permanent installation version of the TL606) powered by seven CP500M amplifiers, six HR9040 and four HR6040 mid-range horns with DH1012 drivers and four CP500M amps, 24 ST350A VHF horns and three CP120 amplifiers; in addition

the dead spots were catered for with four SP15-3 3-way stage systems driven by two CP500M. (To save you looking it up, the Tapco amps are all 2x250W except the CP120 which is 2x60W.)

In order to improve the sound in the press gallery further, this year, the enterprising move to use a delay line, was made. This meant that the main PA was kept grouped around the four main pillars and that the system for the gallery—two TL606A with two Sentry IV high ends and CP500M amplifier—was placed to effect solely the press area. The installation was not without a few problems as several DDLs were used and rejected due to malfunction or unsatisfactory performance, and the final unit was a Yamaha analogue delay line! The delay time selected was in the order of around 40ms. In practice the setup worked quite well, though better with certain musical formations than others. Best results occurred when only a little direct stage sound reached the gallery, and the main PA and delayed system were providing the bulk of the information. However, there were times when things were a little 'out of step' and this was especially noticeable on drums. It is psychologically unnerving hearing and seeing a drummer who is playing about 60ft away, and at nearly the same time hearing the close-miked results from speakers 10-12ft away. I found I was constantly having a mental battle deciding where the sound was coming from. Had it been possible, it might have been a good idea to have added a bit of



judicious echo to the delayed signal. Guitars and solo instruments often benefit from the ADT effect and having their sound considerably 'beefed up' so there are positive sides to the situation.

Unfortunately the mixing position was again in one of the side boxes which meant that Tom had to run from the mixing desk to the press gallery to check on the sound, making in-performance corrections virtually impossible.

As with last year, Yamaha supplied the mixing consoles; PM2000 32-input 8-group desk for the hall and a PM1000 24-input, 4-group desk for the monitors. Again White $\frac{1}{2}$ -octave equalisers were used for the two hall systems, whereas Tapco C201 octave graphics were used for the stage. Tom was very pleased with the new PM2000 desk and found it a considerable improvement on the older 1000 series,

both in terms of facilities and flexibility. Also helping out at the PA console—was engineer John Etchells formerly of Super Bear studios and now freelance.

The sound itself was at least as good as last year and many people remarked that there seemed more 'beefiness' in the bass.

To show that the PA could also be loud was demonstrated by the Rick Wakeman extravaganza (I feel the festival could do with a few more shows like that!) or the rock/blues with Rory Gallagher (I gathered the reggae evening was none too tame either.)

As I mentioned, Chris Penycate was once again at the monitor desk with his rack of trusty Amcron DC300As and 10 FM12-3 monitors, the latter modified this year with tweeter horn attenuators. Once again the PM1000 showed itself a



little unsuited for monitor desk use—so perhaps we can look forward to Yamaha complementing their sound reinforcement range with a monitor console?

All in all the stage monitoring proved fairly satisfactory; though Chris commented that if he had been able to make up several pairs of headphones for drummers out of the *FM12-3s*, he would have done, as there were complaints that they couldn't hear properly even though they had the monitors barely inches from their ears at full blast. Levels on-stage sometimes reached quite awesome proportions and on the reggae night a peak of 132.7 SPL was registered from the monitors via the timbales.

The stage crew were once again under the able guidance of Alex Higgins with Martin (Mr Mic) Pearson in charge of mic placement in collaboration with Mountain Studio run by Dave Richards.

Microphones this year were less varied than last year with E-V *RE20s* mostly in use. *U87s* were permanently on-stage as the overheads for drums with the occasional *KM84* for percussion racks. Vocal mics varied between E-V *DS35s*, the new *PL77* or Shure *SM58*. *AKG C24s* were used for the main stereo ambience pair.

As in previous years Mountain Recording Studio was getting most of the Festival down on tape for possible future live albums with chief engineer Dave Richards sharing chores with John Etchells.

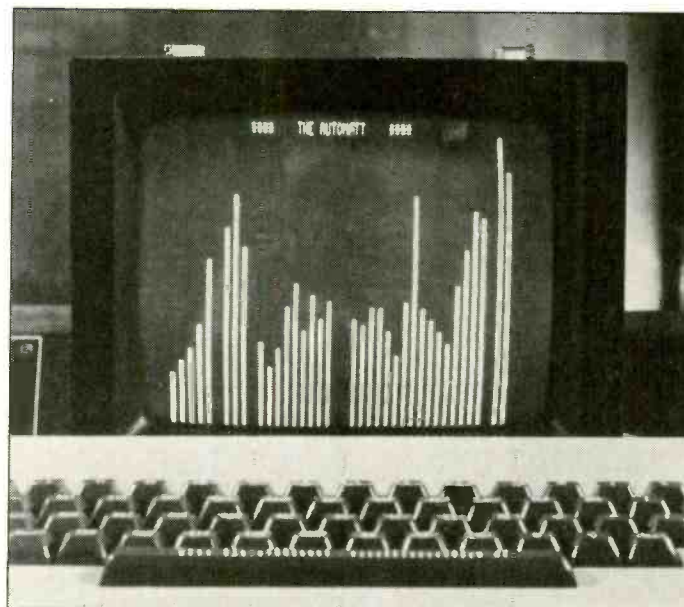
After two and a half weeks of solid music, with sometimes two concerts per day, nearly everybody was glad when it was over—until next year when the whole merry-go-round starts up again.

Terry Nelson

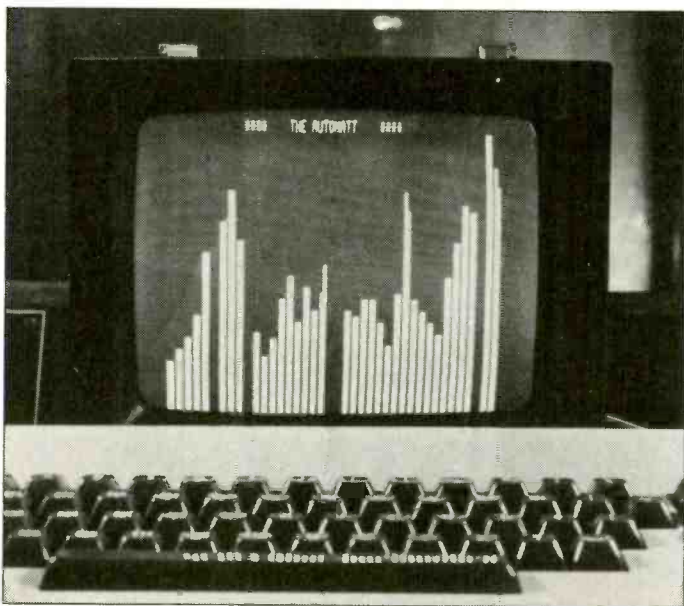
Automatt— San Francisco

'Automated Recording Studios in San Francisco', the subtitle on the Automatt's letterhead, sums up the facility perfectly: three fully automated state of the art rooms plus a Mastering Suite.

The studio was opened in November of 1976 by David Rubinson (producer of many San Francisco legends in music) with the assistance of chief recording engineer, Fred Catero (the recorder and mixer of many of the same legends), and chief design engineer, Mike Larner (the designer of what promises to be a legend in itself—The Auto Screen)—more on this later. The Automatt began life as just the one studio, in a building which also housed the SF operations of CBS consisting of two studios



Above: Fig. 1; Below: Fig. 2 Automatt



plus a mastering suite.

The site for the Automatt was chosen for obvious reasons. David's production and management company had an office and rehearsal rooms on the second floor, the SF Bay Area music archives were stored on the first floor, the studio itself on the ground floor and CBS next door, thus David had complex recording equipment and few booking problems for his artists, all at his fingertips.

The original studio (now Studio C), measuring 750sq ft with a 500sq ft control room was a vacant room (built originally by Coast recorders in the early Sixties who preceded

CBS), and was totally re-equipped to become the Automatt... this included installing MCI 24- and 2-track and Ampex 440 2-track tape recorders. JBL 4311 and *Big Red* monitors (with Mastering Labcross-overs) powered by McIntosh 2300 amplifiers, and the very first Harrison 4032 console ever sold with Allison 65K automation system; these were interfaced by Mike Larner with a commercially available Zilog Z-80 microprocessor computer system. Mike Larner reiterates; "The Harrison/Allison system was in operation for a while and worked fine—but there was a problem... we could never be

absolutely sure the system was working during a mix and there was no way of testing it, as there are no meters on the Allison and nothing to adjust. The only way we could check it was by listening to the end result and if it sounded right then it was probably okay—we felt the need for something more flexible—mainly to inspire client confidence. It was decided that if we could get a bar graph display on a video monitor at the decoded analogue voltage levels (not audio levels), ie a realtime visual representation of the positions of each of the 40-input faders of the console, this would be invaluable. So we set out to do this".

A freeze function has been provided with this system allowing any mixdown setting to be displayed indefinitely—helpful in comparing one mix with a previous mix or returning all faders to their start position during any mixdown (compare figs 1 & 2).

Another feature of this system is the capability to store any text along with the console automation data on the tape, eg musician, composer, track configuration etc (incidentally this interface system has been patented).

In 1977 the SF recording industry was going through a rough period. With its high overheads CBS could no longer justify its SF facility which was closed in early 1978, leaving two more studios and the mastering room for the Automatt to move into which it did, just as the SF recording/music scene began to rebound from its doldrums and the present boom began. Initially the studios were run virtually as they were left, with CBS 38/24 custom boards in each room. Then, earlier this year Studio B was completely redesigned acoustically and re-equipped. The Ampex 1100 tape machines and CBS console came out; the MCI 24 and 2-track, Ampex 440 (4 and 2-track) tape recorders together with the second Harrison console (this time a 3624) again with Allison 65K automation, went in.

The acoustic changes included extensive alterations to walls, floor and ceiling further enhancing the room's reputation for its tight rhythm sound. Urei 813 time-aligned monitors were also added to the existing JBL 4311s. Studio B measures 500sq ft—the control room 320sq ft.

Which leaves Studio A all 1500sq ft of it and the largest in northern California so far, and noted for its

36 ▶

live (but controlled) sound suitable for large orchestral productions or heavy metal rock and roll. The 320sq ft control room is now taking its turn in being re-equipped. Departing from the Automatt's tradition of Harrison, a 40-in 32 monitor and 24-out Trident TSM console has been chosen and was due for installation by Studio Maintenance Services of Los Angeles before the end of July.

Trident was chosen, apart from its sound, for its excellent systems engineering. The board, once again, will be interfaced with the Allison 65K programmer. Tape machines will be MCI as before, and a choice between Urei 813 and JBL 4311 monitors—not to forget the Auratones in every room.

The Automatt's outboard equipment is more or less what is expected in a top studio today: a choice of Urei, Teletronix, Inovonics limiters, an EMT compressor, an ADR compex-limiter and some great old RCA tube limiters (valves). Pultec and Lang equalisers abound, with back up from Orban parametrics; digital processing from Eventide, Urei, and Lexicon; analogue delay is provided by a Marshall Time Modulator and MXR. Also, for echo, six EMT remote controlled chambers answer the need.

On the subject of outboard equipment, Mike Lerner expressed his admiration for the 224 Lexicon digital reverb units—"magnificent ... best things to come along in a long time"—and several more units are to be ordered; at the same time an ADR Scamp system is being closely scrutinised for the new Studio A.

On the inevitable subject of digital recording and the future, Mike had this to say: "The Automatt has already done some digital work with the Sony PCM system. We recorded Herbie Hancock in Japan direct onto the PCM and then mastered here direct-to-disc with excellent results—way above what we are used to!" Better than other existing digital machines? "YES!"

"The problem is they are all making a digital tape machine and we reckon the way to do it is to make a digital system."

In a Digital System, will the console remain the same in appearance and function or become another computer terminal? "Soundstream's original system was just a computer terminal—very unwieldy to operate. If you wanted a fade you had to type in the length, there was no feel for the creative, spontaneous engineer's touch which should dictate the design of the console."

We also discussed the fact that one of the reasons for the delay in digital getting off the ground is that few digital manufacturers go to the recording engineers and ask them what they want to do and how they would like to do it. Maybe in other industries this doesn't apply. Trident is of course one exception. They have a working studio from which to obtain design criteria and a magnificent concept of operation.

The setting up of the first all-digital studio will require tremendous self confidence. It will probably be built by someone for someone who has his own work to

record and is not totally reliant on others and their opinions." Someone like David Rubinson perhaps? "Studio C has the potential for this—it will be the next studio for a board change, and there are a number of things due for a change."

Of the artists the Automatt rooms have recorded, the list is more impressive and diverse every month: Elvin Bishop, Blue Oyster Cult, Captain Beefheart, The Clash, Chick Corea, Grateful Dead, Herbie Hancock, Eddie Money, Steve Miller Band, Greg Kihn, Roy Orbison, Peter Paul & Mary, The Rubinoos, Santana, Boz Scaggs,

Neil Young, and recent projects include Van Morrison's forthcoming album with Mick Glossop engineering; French band, Shakin' Street, the Durocs (with Elliot Mazer producing) and the soundtrack (both album and film) to Francis Ford Coppola's epic *Apocalypse Now*, with David Rubinson producing.

A final word on the Automatt from David, "Two years ago a studio complex such as the Automatt could not have been contemplated—in spite of CBS' efficiency they couldn't get it off the ground with their multiple studio complex."

"We're no great geniuses at the Automatt, the market here improved at such a rate that we were able to come into a town where there were already many good existing studios and open up a large multiple studio complex which requires multiple use—high overheads (paying off state of the art equipment is an extremely high overhead), and we were able to come into a market which was already saturated and not only survive but thrive—other studios in the area are also doing very well. It's burgeoning, and increasing, and one of the great things is it isn't any one kind of music—it's all kinds. SF used to be rock 'n' roll town but now it's black, disco, blues, rock 'n' roll and film music (and this took a long time coming).

While LA opens a new 24-track studio roughly once a month and still remains the recording centre of the world, producers are looking elsewhere to record at the same time. There was a time when the record company would want to be at the recording sessions to make sure everything was going right and have complete control of what was going on in the studio; now it's more and more a case of 'here, take this artist, here's the budget, go away and make a record'; and three months later you bring back an album. There is less need now to have studios where the seats of power exist." And the industry as a whole? "It's easy to get misguided and place too much attention on machines and dials and lights and forget that the essence of a recording studio is the people who make it work and the atmosphere of the place; and very few artists are really involved or concerned with the signal-to-noise ratio of the input module, or whether the pre-amp is transformerless, or how many bits you have in a programmer. They are really concerned about how well they produce and create in a given environment. Enbee

The Automatt, 827 Folsom Street, San Francisco, Cal 94107. Phone: (415) 777-2930. Telex: 340116.38 ▶



Above: Automatt's Studio A, one of the largest in California



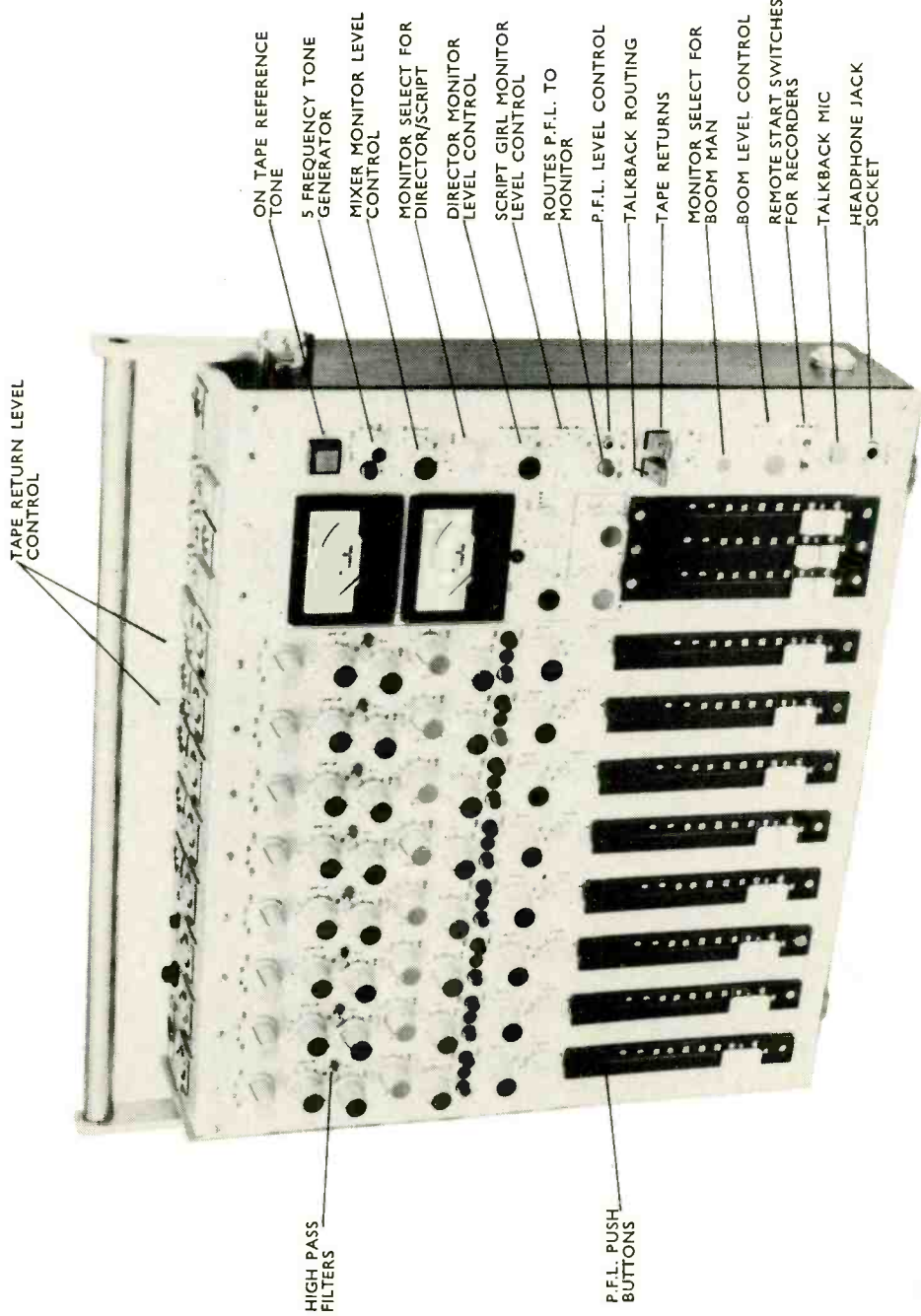
Above: Automatt's Studio B; Below: Studio C



Audio

Developments

AD O31 MIXER FOR THE FILM INDUSTRY. AN EXAMPLE OF THE VERSATILITY OF THE MIXER AND THE COMPANY THAT MAKES IT. THERE ARE HUNDREDS OF COMBINATIONS OF OPTIONS GIVING VARIATION TO THE STANDARD FORMAT. MAKING THE AD O31 THE MOST VERSATILE MIXER MADE.



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AGENT: IVAN KRUGLAK, Coherent Communications, 13733 Glenoaks Boulevard, Sylmar, California 91342. Phone 213 362 2566

Musicfarm, Australia

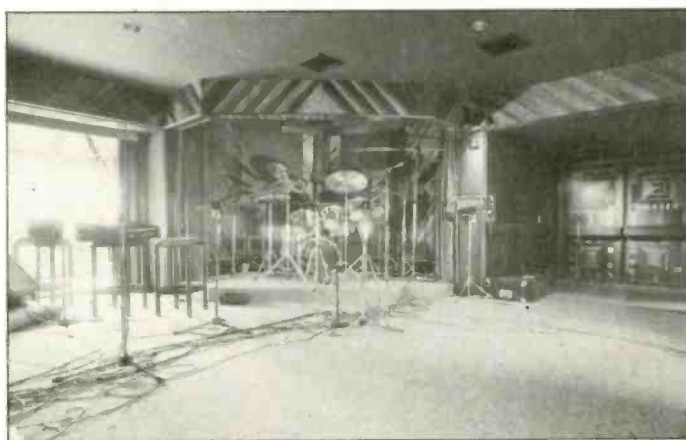
Musicfarm is Australia's first 'environmental' type studio, along the lines of Caribou Ranch, Chipping Norton, The Manor, and others. Opened in 1976 it has been developed from a modest 8-track setup, through a complete demolition and rebuilding programme and is now a superb and beautifully constructed 24-track studio, complete with acres and acres of land, 5-star accommodation, good food, fresh air, and scenery that takes your breath away.

Coorabel, although miles from anywhere, is within easy reach of everywhere. Serviced by a nearby airstrip, it's about four miles from the main highway north, so while the lucky ones can jet up from Sydney in half an hour, the gear can be moved in by road. As regular trips are made to the northern cities by touring bands, Musicfarm becomes the ideal place to have a break from the road, cut some tracks, and relax.

For the hyper-active there are horses, 4-wheel drives, and magnificent bushland and rainforests to leap around in. And for the non-active laidback personalities there's chef Alan Best's food, naughty magazines, very naughty video tapes, and the chance to catch up on some much needed sleep in the luxury accommodation.

In June 1976, *Studio Sound* published an International issue in which I wrote a piece about Australia, and while I was collecting information for this I met John Sayers, Musicfarm's chief engineer and designer. I remember being impressed by both him and his ideas. His studio, Trafalgar in Sydney, was about the only one I visited with any evidence of acoustic design. It had been built with American and European standards in mind, and was in my opinion head and shoulders above its competition. In the three years since then, others have followed suit and Australian recording studios have woken up in a big way to overseas acoustic and aesthetic trends. There are now 2½ East/Westlakes and many more, both well designed and equipped. And now once again John, together with Gary Deutsher—fellow director, studio manager and provider of money—seems to be leading the way; this time in the 'environmental'/acoustic design concept. It's my guess that in a few years several such studios will have sprung up, taking advantage of Australia's natural beauty and favourable weather.

Musicfarm's studio itself was



built from scratch by local craftsmen with construction supervised by John. How many engineers have had this opportunity, and how many could handle it? No architects were used, no design consultants flown in, all the responsibility rested with one person who freely admits that his inspiration was his intuition. It is however obvious that John is very much *au fait* with present design philosophy and his design reflects current thinking. Like a racing driver and his car, John has fitted the studio to himself and his own requirements. But what of other engineers I hear you say? Well I think it would fit them too, and after experiencing Musicfarm for a couple of days would suggest that if the studio didn't suit them, they shouldn't be there anyway.

Equipment is of course to a very high standard: the control room features an MCI JH500 automated console with at present 32 inputs. Tape machines are again MCI with *Autolocate III* and *Autolock*, Otari 2-tracks and a Nakamichi cassette recorder. Monitors are Urei powered by BGW and Audionics amps, dbx/Dolby, Urei and Orban compressor/limiters, EMT 240, and Deltalab acousti-computers look

after the reverberation, and effect devices include Eventide *Harmonizer*, and DDL, and other sundry boxes. In the studio, instruments include Fender Rhodes and Bechstein pianos, Slingerland drums, and Musicman amps. Microphones are the ever-present Neumann, AKG, Shure, and foldback is fed through Yamaha cans.

The impression of Musicfarm is one of relaxed and quietly confident professionalism. People are nice, and not only because they had opened just three weeks prior to my visit. All were willing to talk freely and openly—after a while. I say this because they had just read an article published in the *Australian Playboy* on an area well known as 'alternative society' country. Thinking that a little mention might do them no harm, they spared no expense in making the visiting journalist welcome . . . but all to no avail. "In just under two paragraphs not only were they misreported (Lindsay Smith-Moir, company secretary and accountant, was described as a weekend hippie; he's not), but also the one photograph was of the master bedroom, from the outside . . . hmmm! So when I rolled up they were a little wary, but after a look round and a few drinks things settled down

and I was able to talk at length with everybody (including a brilliant but mad bass player with whom I'd worked before and disagreed violently over the acoustic merits of a well known Sydney studio).

The studio's main product is Rock, but all types of music are encouraged. Rates are dependent on length of stay, facilities used, and at present are negotiable.

Future plans include an open-air auditorium as Musicfarm often organises concerts, the most recent of which featured Split-Enz. There are plans for another 24-track machine and to build on another much larger isolation room with variable delay characteristics but essentially a 'live' feel. Other projects include a foolproof power supply to the whole farm as the local electricity council doesn't seem to notice (or care about) the minor voltage fluctuations, which at present don't in fact affect operations; but better be safe than embarrassed.

In conclusion, Musicfarm is a very nice place indeed. All the facilities are excellent and the accommodation is very comfortable thanks to Lee Deutsher (Gary's sister/fellow director/public relations client hostess/horsewoman). The studio itself is really quite magnificent—in redwood and green velvet. It's beautifully constructed by a local shipwright, and judging by the detail a true craftsman, it's very spacious—with windows! There's a drumcage, although it isn't completely enclosed, an isolation booth and a live area both with their own view, and a bass amp platform. Equipment is, as I said earlier, to a high standard (which is as it should be) and an unusual feature of the control room are the Urei monitors. I didn't get the chance to have a really good listen, but what I did hear sounded bright and crisp, and the imaging seemed to be very accurate. Studio technician Don Rummery lives in or nearby so AM servicing is no problem.

Really Australia should have had a Musicfarm a long time ago. But things are much better and I hope that the numerous artists, musicians and producers (not forgetting the record companies, who have badly neglected the studios) will support the current improvement in available facilities.

As a postscript I have only one reservation of such studios as Musicfarm. How will an essentially urban art fare in a rural setting? Only time will tell.

Howard J. Davidson

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Digital recording - next year?

Hugh Ford

THIS CONTENTIOUS remark comes from a document called 'The Benefits and Dangers of Standardisation' issued by Stephen Temmer on November 1, 1978 explaining his reasons for initiating an anti-trust action to stop the activities of the Audio Engineering Societies' Committee to form a standard for digital audio.

As far as the consumer is concerned there are standards in the field of home sound reproduction, and for that matter video reproduction. We can buy a disc anywhere in the world and it is compatible with our turntable and amplifier. The same applies to the Compact cassette. How these are made in the studio doesn't concern the consumer who is working with worldwide standards. Things are not quite so happy in the world of television where there are three basic standards—625 line PAL, 525 line NTSC and the SECAM system. Normally the consumer is not too concerned about this variety because the broadcaster converts the original signal to be broadcast in the national standard system.

These are all analogue systems and conversion from one standard to another can be accomplished by replaying the original whilst simultaneously making a recording with the system of the desired end product. (This was true of television but modern standards converters use digital conversion.)

From the consumers' point of view at least a national standard is essential and preferably an international standard. We have all seen the disaster of the various quadraphonic systems and this was directly provoked by the lack of standards due to commercial interests rather than technical prob-

"It is interesting to note that the consumer really doesn't get consulted in these deliberations. And frankly, all that will really be in it for him is higher prices. It is a well known fact that the principal complaints about music in the home are noisy pressings and poor cassette duplicates. I'm afraid that neither of these will be significantly improved through the use of digital technology in the studio!"

lems. Just who paid for this—the consumer who now has his 'quad' equipment stored in the basement.

In home video recorders the outlook is pretty bleak for millions of consumers for the same reason. Will 'Betamax' or 'VHS' win and who is going to make pre-recorded tapes for the loser?

All this is happening in the analogue world where it is simple to copy material from one system to another. In the digital world copying from one system to another without degrading the quality by converting from digital to analogue and back again is not so simple. Compatibility is essential in terms of sampling frequency, number of bits, linear or other coding, pre-emphasis and so on.

Clearly if a different domestic and studio system is to co-exist it is vital to choose conveniently related characteristics such that relatively simple digital standards converters can be used to convert from the studio standard to the domestic standard or standards.

It is my belief that separate standards must exist as in the studio environment we are concerned with

error correction with a digital tape system and with the capability of editing. In the home it appears likely that the digital disc will be the medium. This has completely different error correction requirements to magnetic tape and of course there is no requirement for editing. Maybe tape systems will also exist in the home and the current trend suggests the use of PCM converters used in conjunction with video tape recorders (for instance the Sony Betamax with the PCM 1 digital converter). Such systems permit the broadcasting of digitised audio via television transmitters and again compatibility is vital from the consumers' point of view.

Philips seem to have the only digital audio disc on public trial, currently—though JVC and Sony have exhibited systems and the basic characteristics of the three systems are shown in Table 1.

A Digital Audio Disc Standards Committee has been formed in Japan and is considering 11 different Japanese systems, and the Philips system, and intends to select

a standard by the end of 1979. Also in autumn 1979 Philips and Sony agreed to exchange patents concerning video discs, and this should enable a slightly more unified front to be presented to the consumer. Clearly there are substantial differences between the above three systems but at least the sampling frequency of 44.056kHz is compatible with the NTSC television system and is thus in line with a consumer digital video cassette system.

A number of professional recording systems have been announced in the form of multitrack digital recorders, as opposed to converters, for use with the U-Matic or Betamax video cassette recorders. Apart from 3M, none of these systems are yet commercially available but MCI intend to test market their recorder by the end of 1979. This system using MCI developed tape transports in conjunction with electronics developed by EMI in their Hayes research laboratory is already in use by EMI who have a prototype editing system. The only other system in live use is the 3M system, but here again editing is in its infancy and 3M have in conjunction with Inter Technology Exchange Limited read papers on the editing system. As described the editing methods are extremely complex going as far as presenting an effective oscilloscope display of the recorded waveform in order to choose a suitable editing point to avoid clicks. It is my opinion that such a system is far too complicated for practical use in the recording industry which in practice is rather tied to conventional means.

Sony have also announced an editing system which appears to be somewhat more practical than the

TABLE 1

	JVC	PHILIPS	SONY DAD-1X
Sampling frequency (kHz)	44.056	44.33	44.056
Number of bits	16 linear	14 linear	16 linear
Signal-to-noise ratio	85dB	85dB	95dB
Total replay time	2 hours	1 hour	2½ hours



Above, Soundstream 4-channel digital tape recorder using standard instrumentation tape recorder with digital adaptor (only available for hire), as used by Fleetwood Mac for Tusk. **Left,** Sony PCM-1600 digital system using U-Matic video cassette recorders (background), PCM adaptor (top left) and editing controller (foreground), as used by Stevie Wonder for The Secret Life of Plants.



3M system. With the Sony system a $\pm 3s$ aperture about the desired editing point is digitally stored in a solid state store with a reduced number of bits. A potentiometer control is then used to 'rock and roll' to select the desired edit point with the editor then completing the job once the desired point has been selected.

Unfortunately at the time of writing the editing of digital recordings appears to be a major stumbling block and until the editing problem is overcome, I cannot see that digital recorders can be considered as practical devices for studio use. Maybe stereo machines can be used for some types of recording but multitrack machines offer little advantage over analogue recorders, until a practical editing method is available.

A further factor which restricts the use of any of the proposed digital recorders is the international nature of the recording industry. Just what chaos would ensue if the different makes of 24-track machines were not compatible with each other. If the vocal were recorded in London on a Studer and you wanted to record the backing group in LA you would be tied to a Studer equipped studio in LA. MCI or 3M studios wouldn't be any good!

Well, the following table shows

the various digital systems which have been described by various manufacturers and there's little compatibility to be seen in Table 2.

Not only is there a lack of compatibility outlined above but also the different machines use different error correction methods and this area will be extremely important in practical use. As can be seen the bit packing densities are in the order of 25,000 bits per inch and bearing in mind that any spacing loss due to tape contamination is represented

by the formula $\text{dB loss} = \frac{55d}{\lambda}$

where d is the separation introduced between the tape and the replay head and λ the recorded wavelength, contamination of the tape can be a serious problem. Smoke particles can introduce a 25μ .in separation and fingerprints about 100μ .in separation and spell disaster.

It follows that cleanliness will be vital in digital recording and that handling the tape is out of the question with bare hands. Consequently editing by cutting is not a sound proposition.

It is notable that all these proposed systems offer a frequency response flat up to 20kHz with harmonic distortion in the order of 0.05% or less, effectively, zero wow and flutter, zero print-through and effectively zero modulation noise—

a very substantial improvement on analogue machines of any sort. In addition there is no degradation of the signal when copying, so given a suitable systems converter there is no reason why the domestic pre-recorded tape should not have equal quality to the original master tape which itself may be stored indefinitely without degradation of the recorded quality.

These are all things to come in the future but PCM converters for the U-Matic and Betamax video formats are currently available. The first of these on the scene was the Sony PCM 1 which was reviewed in *Studio Sound* July 1978 and was found in conjunction with a U-Matic recorder to offer a very substantial improvement on analogue recorders. The PCM 100 is a second generation stereo converter using a 14-bit twos' complement format giving a dynamic range of 85dB with a 44.056kHz sampling frequency. Its successor the PCM 1600 for use with the U-Matic recorders is a 16-bit linear system offering a 90dB dynamic range again with a sampling frequency of 44.056kHz. These digital audio/video systems are available and in use today but as yet editing remains a problem. However Sony have developed their type DEC-1000 digital editing console for use with the PCM 1600 system

and two U-Matic recorders but as yet I do not believe that the DEC-1000 is for sale.

This editing system allows rehearsal of edits and overcomes the click problem at edit points by means of an automatic cross fade with seven selectable cross fade times between 1ms and 100ms. SMPTE time code is used for locating sections of tape and locking the two video recorders.

At the time of writing these PCM systems are only available for use with video cassette recorders using the NTSC television standard, but it is understood that a PAL version of the PCM 1600 may be available in the future.

The EMI system as taken up by MCI is currently in use by EMI studios and the Decca Record Company have developed their own system for internal use. This, unlike the EMI system, is based on two IVC 1in helical scan recorders which may be locked in synchronism for performing edits with the edit points being located by using the analogue audio tracks in conventional rock and roll methods. Once the edit points have been located the edits can be rehearsed before the edit is performed.

The Decca system like other proposed systems uses a 16-bit linear code with a sampling frequency of 48kHz which conveniently converts down to the 32kHz used by the British Post Office for digital line transmission.

In conclusion it appears that in spite of much talk for several years there is quite a long way to go before practical digital recording systems are available to studios. It is no good just offering studios a digital recorder without a practical editing system and it appears that only Sony are approaching this goal. ■

TABLE 2	AMPEX	3M	MATSUSHITA	MCI	MITSUBISHI	SONY	TECHNICS
Sampling Rate	50kHz	50kHz	50.4kHz	50kHz	44.056kHz	50.35 or 44.056kHz	49.152kHz
Number of bits	16	15	16	12+2	14	16	12 log
Dynamic range	96dB	90dB	90dB	90dB	84dB	90dB	85dB
Type speed	30in/s	45in/s	15in/s	30in/s	15in/s	22½in/s	15in/s
Tracks/channel	2	1	4	2	4	2	30
Channels/inch	24	32	32	32	8	24	8
Bits/inch	25k	27.8k	20.16k	25k	17.6k	30.72k	3.3k
Recording time	60m	45m	?	48m	60m	80m	60m
Block rate	250Hz	70Hz	1.2kHz	227Hz	?	182Hz	?

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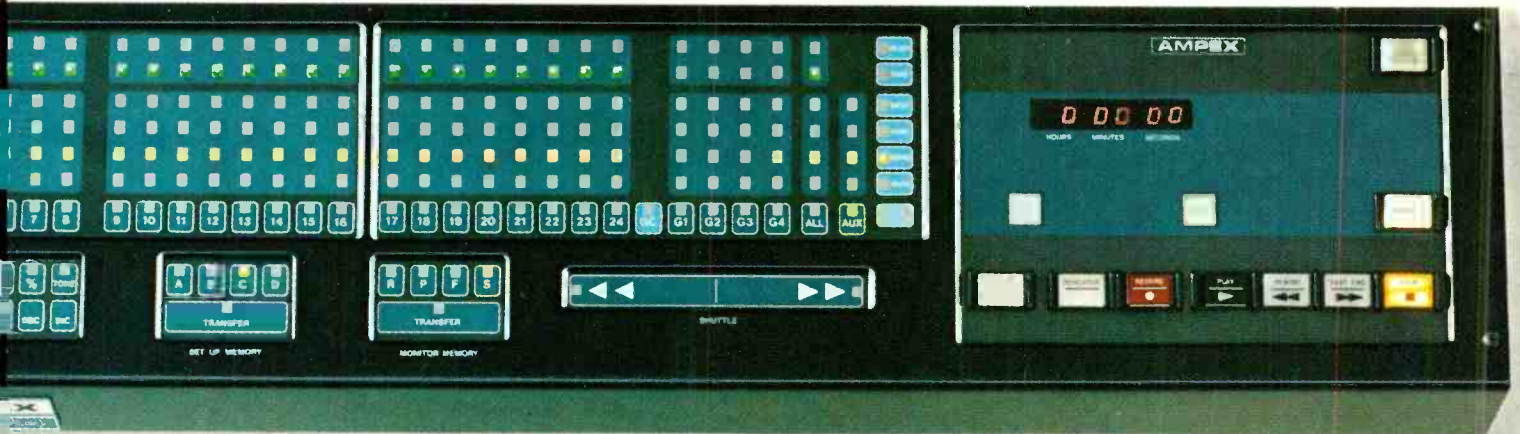
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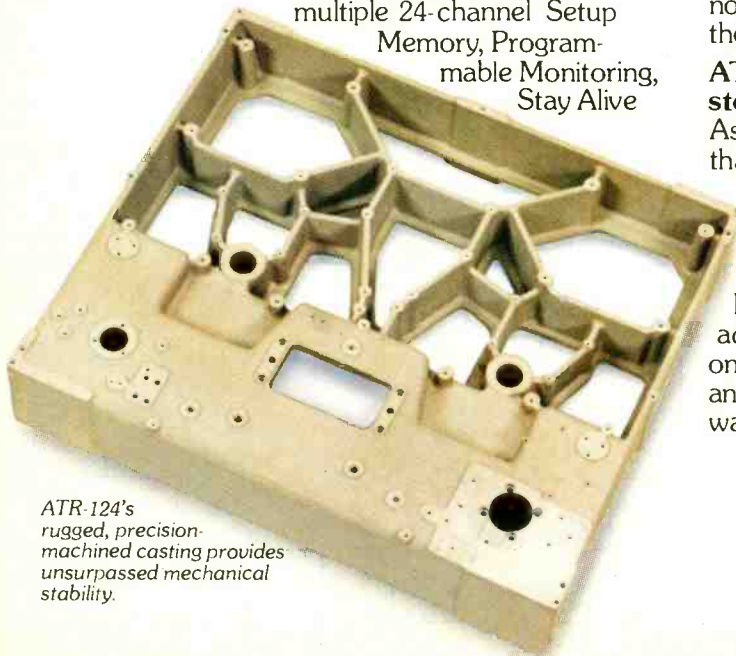


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AES 64th Convention New York: A Report

Angus Robertson and Noel Bell

The 64th Convention of the Audio Engineering Society took place at the Waldorf-Astoria in New York, from November 2 through 5. Angus Robertson took in the technical exhibition, while Noel Bell attended both the AES Convention and that of SPARS held during the same period.

HELD ONCE again in the Waldorf-Astoria Hotel in Manhattan, the AES's annual New York Convention provided an opportunity for locals (and many not so locals) to bring themselves up-to-date on happenings in the pro-audio business, although to be fair regular exhibition attenders such as myself had come across most of the products on display at least once before, and some of the companies at 10 other shows this year alone. But both convention and exhibition were typically successful, and there were several occasions when many parts of the exhibition were packed to capacity. Possibly, the general lack of outstanding new products reflects the consolidation that many recording studios are beginning to accept as inevitable over the coming months, with the continuing depression in the music business. Nevertheless, there were over 170 exhibitors variously scattered around six rooms on the third floor of the hotel, around two tiers in the ballroom, and in various suites and rooms around the fifth and sixth floors of the hotel. Regular visitors immediately located the various emergency staircases and staff elevators in an attempt to negotiate the exhibition, waiting for the normal guest elevators being somewhat wasteful of time.

Tape recorders

But just because both recording studios and manufacturers are finding difficult times ahead, which is limiting the introduction of totally new products, there is still much activity in the continuing development of existing products, enabling the latest ideas and technology to be incorporated without full development costs. Likewise, digital recording is still something of a dream for the vast majority of recording studios, and seems likely to remain so for some years to come. While Sony last

year showed a digital 32-track recorder running at 22½in/s, this year it was a digital 24-track on 1in tape running at only 15in/s (3M runs at 45in/s) which Sony are expecting to market during the summer of 1980. Unfortunately Sony had no technical details available on the recording format or price.

Although many companies have demonstrated 2-channel digital tape recorders using a video tape recorder and PCM adaptor, Sony remains the only company to be marketing such an adaptor, the *PCM-1600* which operates with the Sony *BVU-200* U-Matic video cassette recorder. Decca's digital recorder (not at AES) likewise uses video tape recorders (but in this case an IVC open reel VTR), while Pioneer and Technics also demonstrated consumer style PCM adaptors, but neither companies were able to discuss potential marketing. Likewise MCI has produced a transport for a digital tape recorder which will incorporate electronics developed by EMI in Britain, and which was first announced at APRS in London but which was not on display at New York. As is well known, EMI has been going through certain financial difficulties recently, and although many have made offers for EMI in the end a British company, Thorn, was the successful bidder—but only the coming weeks will indicate which of EMI's various divisions remain with Thorn and which are sold off or closed down as unprofitable, so the future of the MCI/EMI digital recorder will probably be uncertain for some time.

But one new digital offering was from Mitsubishi with an open reel 2-channel recorder using ¼in tape running at 15in/s using a transport manufactured for Mitsubishi by Teac. Digital sampling frequency is 50.35kHz with 16-bit linear coding recorded as an interleaved eight digital tracks on the tape with

two extra analogue tracks for reference audio and address code (timecode). Six of the digital tracks are used for recording the digital signal, with two tracks for error correcting codes—unlike many other digital systems, Mitsubishi claim that physical tape splicing is possible, although Mitsubishi has also produced an electronic editing controller (the *XE-1*) to operate with the digital tape recorder (the *X-80* series), which allows automatic editing using SMPTE timecode, and which provides fade-in and fade-out and digital level control for adjustable recording levels. Bearing in mind its principal application for mastering, Mitsubishi has also produced a disc cutting adaptor (*DDL-1*) which includes a digital delay line to enable a disc preview output to be generated, the delay time being variable from 0.8 to 1.8s to accommodate both 45 and 33rpm disc speeds. Performance of the recorder is claimed as 20Hz to 20kHz ±0.3dB, with 90dB dynamic range and -85dB crosstalk. Price is expected to be around \$18,000 with the editor as \$8,000, and deliveries are expected in summer 1980.

While last year Ampex presented a paper describing techniques developed for digital recording, this research has not yet led Ampex to introducing any digital tape recorders and, possibly against expectations, Ampex instead has launched a totally new 24-track multitrack analogue tape recorder, the *ATR-124* (or *ATR-116* in 16-track versions). Based on the techniques that went into the *ATR-100* series 2- and 4-track recorders, the *ATR-124* makes use of a closed loop DC servoed transport that maintains constant tape tension at all times, including the stop mode, without pinch rollers. The system senses the motion of the capstan, the direction in which it is moving, and then automatically adjusts the tension accordingly. *Flux Gate* record heads are used with both record and sync playback windings on one head, enabling improved sync performance, and input/outputs are transformerless. The recorder accepts 16in spools and has full dual-microprocessor transport control with three speeds and four equalisations switchable to any speeds—the recorder will

not operate if equalisation is not set for a particular tape speed. While the principal transport controls are normal illuminated switches (with dual illumination to indicate both that a condition has been selected and that it has been completed, ie the tape has stopped), the bulk of controls use membrane pressure switches with LED indication that allow operation by running a finger along the panel, rather than individually. The *ATR-124* is the first tape recorder to take a hint from console manufacturers, and provide memory for channel selection and monitoring. For each channel, the following modes may be selected: mute, repro, sync, input, safe and record. Each channel can be selected to any of the previous modes when a particular transport condition is entered, such as all mute except a timecode track, and there are four groups into which the monitoring conditions of any channel can be preselected for instant recall, so that one can simply switch between particular recording and monitoring modes without continual switch selection. A further membrane switch with a surface a few inches long provides variable shuttle control, rewind to wind with zero in the centre, operated by running a finger along the surface. In addition to the three fixed speeds, variable speed from -50% to +200% is available, or from -6 to +6 tones. A rehearse button enables manual rehearsals before the final attempt is made, while the channel VU meters illuminate red in record instead of yellow/white, while they flash if the channel is not recording correctly. A multi point search to cue controller provides 100 cue positions and event times, and permits electronic editing with the PURC record insert controller which eliminates the problems of overlaps and gaps when making inserts. Design is such that all servicing can be performed either from the front or from the top—the spooling motors drop through from the top, not underneath. Deliveries of the *ATR-124* should commence in early 1980, with an expected price of £35,000 to £40,000 depending upon options.

On the mastering side, Ampex has introduced a number of options for the established *ATR-102* and *104* 2- and 4-track tape recorders including four speed/dual eq Padnet, a ½in 2-track headblock that gives performance approaching that of digital when used at 30in/s, a cue amplifier that provides self-contained audio monitoring, and an editing kit. The *ADD-1* audio digital delay device which was introduced at Los Angeles and which allows the *ATR-100* series to be used for disc cutting with a preview output, replaces the preview kit previously available for the *ATR-100* and erroneously shown in the Disc Cutting Survey in November *Studio Sound*.

For MCI it was an exhibition of consolidation, for neither the *JH-32* 32-track 3in or the *JH-220* digital 2-track were on show, the former having been temporarily delayed, the latter still under development by EMI. But the well established *JH-110A* range, which includes mono to 8-track recorders, has been updated with new electronics to form the *JH-110B* series. The new electronics are completely transformerless (neither head nor input/output), resulting in improved immunity to magnetic fields and extended frequency response, improved phase integrity and strict adherence to standardised eq curves. The opamps offer low noise, wider open loop bandwidth and improved drive capabilities



1, Sony digital 24-track, 2, Mitsubishi digital 2-track, 3, Ampex 24-track ATR-124, 4, two 3M digital remote controllers with editor in centre.

with NAB/CCIR switching without the need for re-equalisation. A wide range of versions are available for 10½ or 14in spools in three speeds and normal or mastering with preview head versions, and for ¼ or ½in wide tape, with mono, 2- or 4-track electronics. Two specials in the series are the *JH-110B* 8-track (reviewed elsewhere in this issue) and the *JH-110BC* stereo DIN standard broadcast recorder. While the 32-track is not yet here, MCI introduced the *JH-45* Autolock which is an updated version of earlier models, and which provides in a single unit a SMPTE/EBU timecode generator, reader, synchroniser and autolocator, and which will slave any MCI tape transport to any other machine (video, film or audio), providing timecode with an extremely small displacement of ±50µs typically.

3M provided demonstrations of 'editing' between a pair of digital 32-track tape recorders, but the editor being used was not that described in papers and shown at last year's New York AES, which was a visual display screen type unit with full alphanumeric keyboard (developed by ITX), but instead a very simple device which sandwiches between the remote controls for two machines and provides simple editing facilities using a small number of buttons. Unfortunately 3M had no information available about this new editor, but I understand that edit point location is simply by pressing the stop button out of standard play, and then shifting the edit point using three shift keys—in other words no shuttling is available for locating the edit point, a facility which is of course available on every analogue recorder, on the Sony digital editor, and on the previous ITX editor unit shown (but never demonstrated actually operating). A *Digital Preview Unit* has also been introduced for the digital 4-track, which is dedicated accessory making use of all four output channels on the recorder, providing a preview output using the two spare channels for disc cutting. While the preview output comes directly from the tape, the main output is fed through a digital delay providing delays from 0 to 1.3s with an option for 1.96s.

Teac were demonstrating the range of *Tascam* tape recorders and mixing consoles including the new *Model 85-16* which is a 16-track on 1in console mounted machine with racks for the electronics and optional dbx, and the adjustable angled transport has 16 VU meters mounted in two rows on the front panel. Tape speed is 15in/s with ±10% variable speed, the transport includes a four-digit display for tape speed or elapsed time, accurate zero search, three DC servo motors, 28dB system headroom, and claimed 62dB unweighted S/N (87dB with dbx). Possibly only a curiosity as far as studios are concerned, but doubtless of interest to budding superstars is the new *Tascam Model 144 Portastudio* which is a self-contained mixer-recorder measuring some 18 x 14in and including four input channels switchable for mic/line with pan pot, lf and hf controls, aux send, and slider fader, all mixing down into a *Compact* cassette deck running at double normal speed (3½in/s) with 2-channel record and 4-channel replay for multitrack recording with full Dolby-B to provide a claimed 63dB weighted S/N with 20Hz to 18kHz response. The *Portastudio* provides simple switched multitracking, a mix down facility from 4-track to

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stereo, four VU meters and pitch control of $\pm 15\%$ on transport.

Technics introduced the *RS-1800* tape recorder which is three speed 30/15/7 $\frac{1}{2}$ in/s, with recording at 30 in/s providing 30Hz to 35kHz ± 3 dB with 0.01% wow and flutter, and uses Technics' 'quartz locked isolated loop three motor direct drive'.

Promoted as a 'state of the art recorder/reproducer', *Mobile Fidelity Sound Lab* has taken the Studer *A80* transport operating at 30 in/s with 2-tracks on $\frac{1}{2}$ in tape, and added new electronics operating in 100% Class A 'with no IC's present in the audio path', providing phase compensation, and used with custom fabricated heads of low noise design. Claimed response is 15Hz to 30kHz ± 1 dB with 80dB dynamic range operating to 3% distortion, and 40dB crosstalk from 40Hz to 20kHz. Price of complete package is \$30,200, or retrofit with heads for existing transport at \$18,900.

Eumig, better known for its cameras, introduced a rather unusual *Compact* cassette deck, the *FL-1000*, which includes microprocessor logic that may be externally controlled via an 8-bit I/O port to interface to many small computers. The transport features three heads, three eq settings (for ferric, chrome and metal tape), *Computest* which enables individual adjustments to be made for particular brands of tape by recording various tones for level and response, includes a 42-segment fluorescent peak/hold display and has electronic tape counter with searching. Possible applications are automated replay systems for broadcast automation or discos, or as a very intelligent cassette transport for recording home computer programs.

Consoles

Mixing consoles from all the major manufacturers were on show at AES, although most had been seen before. Manufacturers included Allen & Heath, Auditronics, Automated Processes, Interface, MCI, Midas, Neve, Quad-Eight, Quantum, Raindirk, Soundcraft, Sound Workshop, Spectra Sonics, Tangent and Trident. Consoles on show that have not previously been discussed in these pages included:

Audio Processing Systems have both the *Models 2000 and 3000* mixing consoles, the concert and theatre *Model 2000* being an input with master console with 16 to 32 input modules, max four submix modules, four master modules and one quad module per console, while the new *Model 3000* is a multi-tracking console with combined input/output modules expandable in eight module increments with 24-track assignment and panning.

Audioarts Engineering produces the *4000* mixing system which is modular with configurations from 12 to 32 input channels, four sub-groups and 4- or 2-track outputs with separate reinforcement outputs and include control and monitor modules. The *Monitor 10* mixing system is designed for professional stage monitor mixing and distribution systems and includes 26 inputs with 26 outputs, five sub-group busses and 10 mix busses.

Cadac was back after a conspicuous absence as newly-formed **CA Audio Systems Ltd**,

48 ▶

The Men Behind the Consoles



Colin Sanders,
Solid State Logic



Andrew Hall,
CA Audio (Cadac)



Derek Tilsley, Neve



Cyril Jones, Raindirk

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featuring *In Line series* consoles available as *In Line F* with direct selection of mix busses and ancillary routing, and *In Line E* with controlled routing from master assignment panel. Standard consoles have capacities of 28, 36, 44 or 52 channels with monitoring for 24, 32, 40 or 48-track working. Cadac also introduced *digitcat*, which is a new type of VCA claimed to offer improved performance over other types on the market.

Canary were exhibiting for the first time at AES and showing their range of small portable consoles ranging from 10/2 up to 24/2, with the 16/2+ and 24/2+ having VU meters on each input channel.

Harrison were showing a slightly smaller version of the gigantic *Automated Post Production* mixing console shown at Los Angeles and now installed at Walt Disney Productions, and have now taken the 'distributed control intelligence' (DCI) used in this mixer a stage further to develop a new multi-tracking mixer. While only a single module from the new *MRI* console was on show (together with blueprints), all the features provided can be seen. By including a micro-processor in each channel, the number of automated functions is considerably increased over present consoles, features including main and monitor paths, automated aux L+R send, monitor VCA, six echo sends (two automated), automated pan (and quad pan), auto muting, machine control on modules with local control, software control of most switches and pots enabling simple reprogramming for different functions, and a ground reference amplifier for lower noise. The *MRI* console will be available for up to 56 inputs with 48 outputs.

Noise Ltd in Maryland specialise in constructing custom portable audio cabinets which are constructed around the increasing number of audio mixing modules becoming available on the market enabling them to be professionally housed.

Strand Sound is a new company with bases in Britain and Canada, and is part of the British Rank Organisation that also includes theatre lighting specialists Rank Strand Lighting. Strand Sound will be producing sound equipment for theatres including a new range of intercoms and modular mixing systems, *System 1* offering from four to 32 inputs and two, four or six group output channels, while *System 2* offers additional facilities and greater flexibility, and finally the *TP series* are small portable mixers ranging from eight to 16 inputs with four output channels.

Solid State Logic was demonstrating the *SL-4000E* series console and have produced an excellent 70-page colour book fully describing the console and studio computer—recommended reading.

Discs

Keith Monks introduced the new *CR500* record cleaning machine which is a simplified and smaller version of the established model which has sold over 5,500 all over the world. The new model uses only a single arm to both apply the cleaning fluid, and for suction to remove fluid and hopefully dirt from the disc.

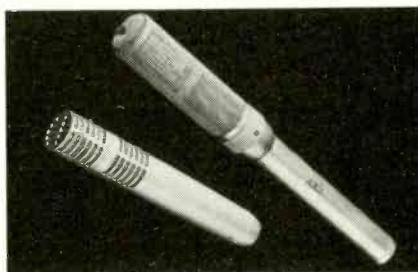
Technics (who seem to have cornered the market for record turntables) have now turned their attention to disc mastering lathes with a



David Solari, Midas



Phil Dudderidge,
Soundcraft



Above left, PML MXSY-8 and XY-82 mics,
below left, TTM 2-channel noise reduction
frame, above, Keith Monks new record cleaning
machine

quartz synthesiser direct-drive unit which may be easily attached to Neumann mastering lathes. Wow and flutter is a barely measurable 0.0034%, and the Technics *SP-02's* DC motor has a torque of 28kg/cm to bring heavy 50kg cutting turntables up to full speed in only three seconds, with electronic braking in four seconds and speed may be varied in 0.1% steps up to $\pm 9.9\%$. The *SL-9560* 'quartz phase locked control direct drive professional console' (record player) was also introduced, which includes turntable and tone arm deck, a control and illumination section. Four insulators between the main section and floor attenuate vibrations, while the double insulated construction is effective in dealing with remain-

ing vibrations. The *SP-16* turntable is direct drive with servo operation, while the *EPA-100PA* advanced tone arm features dynamic damping and anti-skating. Other features include line output and loudspeaker monitoring, remote control, and an overhead illumination box with twin VU meters.

Microphones

AKG introduced the *D-300 series*, 'the ultimate entertainers microphones' which includes the *D-330BT*, *D-320B* and *D310*, the first two being hypercardioid and the latter cardioid, all with hum eliminator, elastomer suspension, handling noise rejector, base elastomer suspen-

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sion, plug-in transducer system, and dual band equalisation.

PML Microphone Laboratories of Sweden (Pearl) announced the availability of two stereo capacitor microphones, the *MXSY-8* and *XY-82*, the former having two variable capsules, remote pattern control and AC power supply, the latter having two cardioid capsules with 24-48V DC powering. The new PML mics offer 35 to 40dB front to back ratio for maximum instrumental isolation when used in mono. Cost is \$2,300 for the *MXSY-8* and \$1,000 for the *XY-82*, from Cara International Ltd in California.

Monitors

Audio Consultants Inc demonstrated the *Audicon Monitor* which provides wide dispersion without hot spots, allows mixing at different levels while maintaining accuracy and balance, and cabinets are sealed from back and sides; no box ever needs to be removed from speaker shelf, all components being standard JBL parts—designed in collaboration with John Storyk of Sugarloaf View.

Barco from Belgium were demonstrating the *MLS-1/80* monitor loudspeaker system which is a 3-way system which includes an electronic device (driven by the audio itself) which provides 30dB of gain reduction if the system tries to introduce harmonic distortion over 1%.

Eastern Acoustic Works Inc showed the *MK series* which uses the latest in vented box synthesis techniques and proven roadable construction techniques and is available in a number of models for different applications. The range also includes the *RS-50* studio reference monitor which provides in a compact package, a system with high acoustic output combined with accurate reproduction, and includes magnetic damping fluid for maximum heat/power dissipation.

The *ADC/John Meyer Reference Monitor* was developed in Switzerland by John Meyer in 1974/75, is manufactured under licence in Switzerland by ADC, and is available in the US from Meyer Sound Laboratories Inc. The system comprises two vented speaker enclosures, each with high frequency horn and driver, and 12in cone-type low frequency driver, and also electronic crossovers, phase and amplitude correction networks, speaker protection circuitry and stereo bi-amplifiers.

Reverberation

Now that the EMT patents on reverberation plates have expired, a number of companies have entered the field with similar products.

Audio Consultants (Audicon) has introduced *The Plate*, which incorporates the latest technological and engineering developments in the unit's driver and ultra low mass pick-up systems. Reverberation time is variable from one to four seconds at 500Hz and the unit measures 49½ x 13½ x 93in—cost is \$4,950. UK distribution is by Cue Communications.

Ecoplate is manufactured by **Programming Technologies Inc** and uses a stainless steel alloy plate, three-pole filter in amp to keep undesirable low frequencies from reaching the plate, rugged plate suspension for minimum tuning, improved shockmount, and reverb time is adjustable from one to seven seconds.

The only European contender is the Swedish **Stocktronics RX4000** reverberation plate which

is distributed in Britain by ITA, and which uses a steel alloy plate with low internal crystalline damping characteristics producing greatly extended high frequency response, improved high frequency decay time, electrically increased low end damping with flattens decay time with respect to frequency, and constant plate tension. Price is around \$3,000.

AKG introduced its smallest reverberation unit to date, the *BX-5* which is rack mounting 5¼in high, and uses the established torsional transmission line principle with stereo inputs and outputs. Decay time is adjustable for approx 1½, 2½ or 3½ seconds while the unit includes VU metering and parametric mid range eq.

Other goodies

Deltalab introduced the *DL-4 Time Line*, which is the latest in the series of digital delay and effects units, the *DL-4* having many of the features of the earlier *DL-2 Acousticcomputer*, but being in the 'performer series' principally for live musicians use, and includes unique VCO with infinitely variable waveshape control, 512ms delay at full bandwidth, 2.5s delay with external memory module, flanging/doubling/chorusing/echo, digital octave flanging, infinite repeat, 15kHz bandwidth at all settings, resonant and doppler effects, footswitch control of effects, and 90dB minimum dynamic range. Price is \$1,200.

BGW Systems exhibited the *Model 600* professional power amplifier which is the first in a series of basic power amps from BGW, being offered at only \$849 by omitting certain convenience and appearance features while maintaining the quality and ruggedness found in the *Model 750*. Continuous power per channel is 175W at THD of 0.1% into 8Ω. The *Model 50A* is the baby in the range with an output of 25W per channel into 8Ω with THD of 0.02%.

Aphex Systems introduced a new *Aural Exciter*, the *602B*, aimed directly at broadcasters, which is claimed to provide increased effective range due to increased intelligibility, particularly on AM radio, while the perceived frequency response is also improved for the small and poor quality loudspeakers used in many television and FM radios.

Manufactured in Sweden by **Fabec**, the *TTM Universal Noise Reduction Frame* will accept all three types of noise reduction modules available on the market (Dolby *Cat 22*, dbx *K-9* or telcom *c4D*), taking a total of 24 modules and providing all necessary power supplies and interfacing for the various modules and include 15-turn pots for encode (record) and decode (playback) on the unit front, with output line level and threshold for level LEDs on the front panel which provide alignment to within 0.25dB. Cards may be bypassed if not required and a two channel unit is also available. US distributor is Gotham, UK Scenic Sounds.

Court Acoustics introduced the *GE60* 30-band stereo ⅓-octave graphic equaliser which ranges from 25Hz to 20kHz on ISO centres, with the upper and lower bands acting as high and low pass filters respectively. The graphic uses high slew rate IC amplifiers with precision wound inductors and costs £630.

White Instruments has extended its wide range of equalisation units with three offering partial ⅓-octave ranges, the *Model 4301* for recording studios with maximum resolution in

bass and mid with active ⅓-octave filters from 40Hz to 900Hz, and ⅓-octave filters from 1kHz to 16kHz; the *Model 4310* for the auditorium with ⅓-octave bands from 180Hz to 4.5kHz, and ⅓-octave bands between 31.5 and 160Hz, and 5kHz and 10kHz with an octave band at 12.5kHz; and the *Model 4240* which is for voice ranges offering ⅓-octaves from 250Hz to 2kHz and eight broader filters for end trimming.

Having so far designed products for measuring the acoustic performance of auditoriums, **Ivie** has now gone a stage further and produced a *Modular Sound System* comprising *5000 series* modules which include a universal mainframe system which takes nine modules, 2- and 3-way crossovers, 27-band ⅓-octave equaliser (one module wide), ⅓-octave notch filter (six in one module, each tunable 50Hz to 3.2kHz) 6x2 microphone mixer, and a number of master and slave power amplifiers which are again one module wide and supply 100W into 8Ω or 140W into 4Ω, and which may be paralleled (master and slave) for double power, or paralleled and bridged for quadruple power. Other accessories to follow include a low frequency equaliser for Thiele tuned enclosures, a high frequency equaliser for compression drivers, and 12dB/octave and 18dB/octave plug-in crossovers for the ⅓-octave equaliser.

Sescom Inc, well known for its wide range of passive blue boxes, has now started producing active blue boxes for a variety of applications. The *QM-1* is a 4-channel mic mixer with VU meter, the *PM-1* is a ⅓-band parametric equaliser, the *SC-1* a stereo combiner phono and line, *ADA-1* active audio distribution amplifier, *TE-1* 3-band tone equaliser, *GQ-1* 10-band graphic eq, *AC-1* adjustable active crossover; *ENG-1* a single field mixer for electronic news gathering with two balanced mic inputs and one high impedance input, mixed into a 600Ω line amp with VU meter; *MB-1* is a field multi-box designed for press conferences to take two mic inputs, amplify and mix them together, and provide 12 isolated outputs at mic level for feeding film cameras, VTRs or tape recorders; *ASG-1* is an audio sine wave generator for field or studio use; and a new range of passive mic splitters providing two splits from one mic, one mic three ways, four mics three ways, and eight microphones three ways.

Finally, the **Audio Machinery Shared Access Memory System** that was first shown at last year's New York AES, should be coming on the market during 1980, and will be distributed by MCI, for whom Audio Machinery also produce the *JH-50* automation system.

Convention

The technical sessions at the AES 64th Convention saw the presentation of a wide cross section of papers covering the development work of audio engineers throughout the world. Not having the stamina to attend all the papers being presented we concentrated our attention on those of most interest to recording studios, and as has become the norm at recent AES Conventions digital matters loomed large.

On the PCM audio disc front three papers were presented. From Mitsubishi, engineers from the company's product development laboratory described a new PCM audio disc

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pickup employing a laser diode. The new pickup is a simplified and miniaturised laser pickup system with improved servo gain and a simplified two-dimensional servo-actuator without any spring for suspension. By using a new semiconductor laser weighing only 0.2g, it was possible to design an optical system weighing only 1.5g and within the dimensions 15 x 7.5 x 7.5mm. This was achieved by utilising ultra light weight collimating and focussing lens with numerical apertures of 0.25 and 0.5 respectively. The optical system works as follows. The radiated laser beam is collimated and focussed on the disc; part of the reflected beam, separated from the incident path by a beam splitter, is passed to a split photodetector which generates both radial tracking error signal and RF signal; while the remainder of the reflected beam is focussed on another split photodetector to generate focussing error signal. Turning to the actuator, the driving shaft is held by a Teflon bearing with low frictional characteristics, and allows translation and rotation. One end of the shaft is connected to the optical system and rotation of the driving shaft gives radial tracking function, as the optical system is offset from the centre of the shaft. Both the translational and rotational movements are generated by respective moving coils to which respective error signal is fed. Using this actuator it is possible to attain a servo gain as high as 60dB. The complete player system comprises a vertically mounted disc player with the PCM head tracking horizontally across the disc and reading information perpendicularly; a PCM processor; and a retrieval system.

Continuing with PCM audio discs, Stephen Temmer presented a paper on behalf of Teldec, on the company's *MD (Mini-Disk)* system. Based on Teldec's video disc research the system uses a conventionally pressed PVC record with a trapezoidally shaped, vertically recorded information groove on both sides, protected against damage by a cassette, and with the record remaining inside the cassette during playback. Playback is from below the record using a piezo-electric pressure transducer with improved groove tracking behaviour and service life. The transducer being capable of playing extremely short wavelengths of down to 0.5mm. The system uses 14-bit linear quantization offering a S/N ratio of 86dB; has a sampling rate of 48kHz; and uses a biphasic transmission code. Playing time of the disc is 2 x 60 minutes; it has four transmission channels; has an automatic search facility; and has a diameter of 135mm (5.3in). Groove spacing is 1.66µm; playback groove velocity is constant at 1.89m/s; disc revolution varies between 278 and 695rpm; the shortest wave length is 0.61µm; transmission rate is 3.072 Mbits; and storage density is approximately 1000kbit/mm². Manufacture of the disc is carried out by recording digital information from tape mechanically in real time onto a metal blank, this original already possessing the centring and profile of the finished record, obviating the need for additional work on the stamper which might adversely affect tolerances. The *Mini-Disk* cassette record is only partially opened for playback within the player. On insertion in the player, the disc, which has a ferro magnetic material pressed into the conical centring area, is pulled into

the player's centring ring by a magnet and then held in place by the magnet. Playback then taking place from below the disc.

The third paper on PCM audio discs was presented by Lorend Vries of Philips and described the error control system of the Philips *Compact* disc. Mr Vries explained that Philips are using an error correcting code in which the basic unit of information is a 3-bit character. This is suitable as the *Compact* disc format has a low average error rate in the order of 2×10^{-4} . The error correction system is of the convolutional type using interleaving, with the degree of interleaving being designed to correct for the longest error burst length in bit intervals that can reasonably be expected at standardised disc quality. This being 201-bit intervals for a 12-bit sync word in the Philips 14-bit quantisation format. The complete error control system combines an error correcting and detecting system with an error concealment unit. The error correcting system offering the possibility of correcting the vast majority of errors, while the error concealing system replaces unreliable samples by estimated values obtained through linear interpolation between correct samples.

Turning to professional PCM recording, Mitsubishi presented a paper on their *X-80 Series* two channel PCM tape recorder employing stationary heads with the facility to use both electronic and tape cut editing. In addition the spliced tape being reusable with this recorder. The new recorder uses ¼in tape at 15in/s and utilises a sampling frequency of 50.35kHz and 16-bit coding. The circuit configuration of the recorder takes an input signal and passes it through low pass filters to eliminate aliasing noise, then passes it through sample-hold units where it is sampled and converted to a pulse-amplitude modulation signal. The output from the sample-hold units is converted into a 16-bit signal by successive approximation technique in the A/D converters. The RSC encoder then adds the check bits to the PCM signal and the resulting combined signal is split into eight tracks and interleaved. The PCM signal distributed between the eight tracks is subjected to modified frequency modulation and recorded on the tape with a recording density of 797 bit/mm. This data density requires the appropriate compensation to be applied to the recording current during recording and to the playback signal during playback. The demodulated MFM signal is completely freed from the effects of wow and flutter in the time base corrector (a buffer memory) and at the same time the eight parallel tracks are recombined into one serial signal. At the output of the TBC, the RSC decoder performs deinterleave and error correction, restoring the PCM signal to its original form. This signal normally passes directly through the tape cut editor circuit to the D/A converter. However, at the point where a tape splice has been made a large number of errors are generated. This enables the RSC decoder to detect tape splices, at which points the tape-cut editing circuit performs the editing function. The signal that enters the D/A converter becomes a PAM signal and on passing through the LPF in the playback chain, the analogue signal is reconstituted. Capstan rotation of the recorder is servo controlled on the basis of the difference in phase between the PCM playback signal

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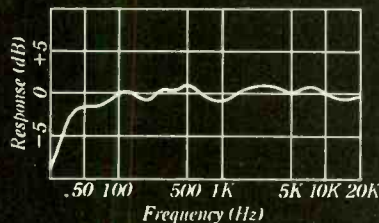
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and the reference quartz-crystal clock signal generated in the recorder. In addition to the eight digital tracks an auxiliary analogue track and an SMPTE code track are provided outside the digital tracks. The analogue track being used for rock and roll editing in the tape splice mode of editing and the SMPTE track being used for electronic editing. Performance specifications of the new recorder are: frequency response 10Hz to 20kHz ± 0.5 dB; dynamic range 90dB; less than 0.02% distortion at peak levels; and less than -85dB crosstalk.

Another paper presented on PCM was from Matsushita (Technics) who described a digital audio system based on a new error correcting code suitable for helical scan PCM recording. The new code termed 'interleaved matrix code' can correct two error words in six words and uses an interleave distance of 16H line periods. The system is based on the NTSC TV format and the PCM signal format is derived from this. Accordingly while the signal allocation and composite signal are to the standard NTSC TV format, the other characteristics of the system are as follows: two channel; DC to 20kHz frequency response; 44.056kHz sampling frequency; 14-bit linear quantization; and drop out compensation via error correction by the new interleaved matrix code.

Staying in the digital field CA Audio Systems presented a paper on their *digicat* microprocessor controlled attenuator. Presented by Tim Shuttleworth and Andrew Hall the paper described a system which, using a microprocessor to control a high resolution attenuator by digital multiplication, claimed to give accurately repeatable attenuations with no set-up adjustments, no drift, no distortion and negligible degradation of signal-to-noise ratio. The manufactured device which will be available in Cadac consoles in early 1980 is based on a R-2R (binary ladder) multiplying D/A converter in a two gradient multiplying configuration, giving 4096 attenuation values. *Digicat* is a 12-bit device giving 72dB of controlled gain and the system is inherently automation ready since fader positions are converted into 12-bit code as a first operation. No set-up adjustments are required since distortion is purely op amp dependent and because the resistors are laser trimmed gain is extremely accurate. 10dB maximum gain is available with *digicat*; dynamic range is 121dB at 10dB gain; THD is 0.005%; and noise is -97dBu at 10dB gain.

Finally, Jack Gordon a design consultant and James Wood of Inovonics presented a paper entitled 'Bridging the gap between the VU meter and the PPM'. This presentation described a circuit configuration which assures constant UK/EBU quasi-peak readings while meter behaviour is independently varied. A meter with the above characteristics, termed the Headroom Meter by the presenters of the paper, was described as behaving in a logarithmic manner in its upper half of its scale, but in which readings are steadily compressed below centre scale in order to bring low-levels onto the meter scale. The Headroom Meter, which is characterised as an HU meter, can be produced by utilising the circuitry described in the paper to carry out VU/HU conversion. This circuitry is rather too complex to outline here, but basically involves variable rise trajectory, variable fallback slope, variable

accent-slope, and variable dwell duration.

SPARS

Coinciding with the AES New York Convention, SPARS (The Society of Professional Audio Recording Studios) held its inaugural convention at an adjoining hotel. First priority for SPARS was the holding of its first membership meeting, where 30 of the country's top recording studios collectively met for the first time. The meeting took the form of the adoption of bylaws, the election of national officers and a board of directors, the establishment of the future direction of the society, and the promulgation of the society's aim to develop a continuing liaison between members with the intention of discussing common problems and collectively coming to practical solutions. The first result of this latter process was the unanimous adoption by SPARS of the PPM meter as the society's standard meter, following a report from Robert Liftin of Regent Sound Studios who is head of the society's technical committee. Explaining the reasoning behind the adoption of recommended society practices, Joe Tarsia of Sigma Sound the newly elected president of SPARS, stated that the aim of SPARS is to formulate guidelines for its members and other recording studios which will be beneficial to everyone, and that "this is the first of many recommended technical practices to be postulated by SPARS for the benefit of the entire industry".

Under Joe Tarsia's leadership, SPARS membership has more than doubled since the society's inception in June 1978. With a present membership of 30 of the country's leading recording studios (only leading studios are permitted to join), and the intention of expanding the membership to around 50 of the top studios, SPARS sees itself as being a major influence within the audio industry. This became clear during the course of the SPARS convention where the members were addressed by nine major manufacturers on the topic of 'Multitrack Tape Machines For The 1980's'. During the course of these seminars both the society and the participating manufacturers found the interchange of information very useful. The collective result of the interchange being a much clearer understanding by both of the factors influencing their relative positions. For the manufacturers it was an opportunity to discover what the society's members felt were their needs, while for the members it was an opportunity to find out what the manufacturers intended should be their equipment in the 1980's and what factors had influenced their design objectives.

The SPARS convention did not confine itself to technical matters alone, for it also devoted its attentions to the views of the clients of recording studios (namely the record companies), and to lectures on the economic, financial and legal aspects of recording studio administration. These latter lectures proved to be some of the most stimulating as it was clear that most recording studios were not aware for example of some of the advantages of equipment leasing arrangements, or legal measures which could be taken to recover outstanding debts, or legal measures which if implemented could prevent or limit the build-up of debt.

The review by accountant Stephen Cohen of the American economic outlook and its likely effect upon studios, in particular was of

great interest as it was clear from this review that the American recording industry faces difficult times over the next two years. With a likely inflation rate of between 12% and 16% during 1980, a period of wage and price controls likely in the near future, bank interest rates at 16% with a likelihood of these stabilising at around 13%, restricted consumer spending, and economic stagnation, the message was clear. Consumer spending will continue to fall, the recording industry is likely to issue less product, and any plans for the expansion of facilities by recording studios should be viewed with great caution. This economic overview was echoed by SPARS members, however, the consensus of studio owners' views was that since record sales were greatly influenced by impulse buying they felt that any credit squeeze and fall in consumer spending would affect the industry to a lesser extent than other consumer markets. Accordingly, while it was agreed that the American economic outlook is gloomy, it was felt the industry would stagnate rather than suffer a major recession. One sidelight which emerged from the economic seminar was that the society's fears that the economic recession would coincide with the need for expensive investment in digital equipment will not now happen. The consensus of opinion being that the large scale introduction of digital equipment will not occur until the mid-Eighties by which time it is anticipated that the economic climate will have improved and that the necessary investment will be made at a time of lower interest rates.

The formation of SPARS and the programme of its first convention shows that the American recording studio industry is concerned to present a collective viewpoint to its clients, to manufacturers, and to formulate standards for the industry. One aspect that was very clear to me as an outside observer was the high level of enthusiasm which the SPARS members exhibited in searching for the answers to problems which affect them all on an individual basis. In fact perhaps the major point to emerge from this first SPARS convention was the realisation by its members that while individually they have limited influence upon the format and structure of the recording industry, collectively they can make their voice felt much more effectively. What was even more noticeable was that while SPARS recognises that as an organisation it has a great potential to influence, its members believe they have a duty to ensure this influence is tempered by formulating standards which are reasonable and practical.

Looking to the future, SPARS already has plans to hold a spring convention in Los Angeles which will coincide with the AES Convention. Additionally, Katarina Pettersson has been appointed administrator for SPARS and will be headquartered in Los Angeles. The achievement of Joe Tarsia and his colleagues in holding such an interesting and successful convention so soon after the inception of the society is notable. It is worth reminding our American readers that the society is continuing to recruit new members and that interested studios should contact either Joe Tarsia at Sigma Sound, Philadelphia; Robert Liftin at Regent Sound Studios, New York; Mack Emerman at Criteria Studios, Miami; Murray Allen at Universal Recording, Chicago; or Christopher Stone at the Record Plant, Los Angeles. ■

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What's in a union?

A musician friend, a good union man at heart, frequently bewails what the Musicians Union does 'for' him. Like for instance the prohibitively high overdubbing rates that encourage producers and musicians to do a private 'illegal' deal below the unaffordable union scale rate; like the anti-library music rules that have sent musicians scurrying off to Belgium to record, or at least off to a London studio labelled 'Belgium' for the day; and like the convoluted situations that can arise because the rules are different if it's a film session and sometimes a film session doubles as a record session. The trouble is that all rules and laws which are intended to be fair are also terribly complicated and produce ridiculous anomalies (witness the tax laws and their loopholes). On one studio session the issue of an extra half fee hinged on the burning question of whether or not the players were reading verse and chorus from a single sheet of paper or separate sheets. The crux is that different work attracts different rates and rules. That's how, on a session slated as both record and film, a musical director has found himself struggling with horrendously complicated anomalies that left him trying to finish everything within one time period to conform with one set of rules, but needing to overrun that period to conform with another set of rules. And matters aren't exactly helped by the fact that the MU has had only a few telephone lines which are often engaged. Come to think of it with such complicated rules, and responsible members anxious to play fair, I'm not surprised they are so often engaged.

What's currently worrying some Musicians Union members, and even a few MU officials, is that autocratic way in which their upper echelons handle any outside enquiry. "They seem to work on the principle that it is a show of union solidarity to brush them aside," one concerned insider told me in frustration. This brush-off technique, which resembles that of the BPL, was never better instanced than when I tried recently to get some official MU views on the increasingly burning issue of videogram agreements. 'Videogram', incidentally, is the new and now generally accepted buzz word for a sound and vision recording intended for release on video disc or video cassette. A Videogram Rights Committee comprising MU, Writers Guild and Equity officials, was created to try and hammer out some kind of formula with the production companies to ensure that musicians, writers and performers get a reasonable reward for their efforts. Essentially the committee argument was that all the artists involved should be rewarded by a royalty fee which is tied to commercial success of the videogram, rather than the original session fee. Initial negotiations hovered around a figure of about 30% of all revenue accruing from sales of a video disc or video tape. The first agreement reached was between the Independent Television Companies Association, representing the 15 ITV companies in Britain. A royalty of 15% applies if the TV company exploits the material in video format and 35% if exploitation is by some other company. In other words, if Thames TV makes a programme for normal transmission and then issues it on

video disc or video tape, the writers and performers will get 15% of the revenue. But if Thames sells the programme to some other company, for instance a record company like EMI, then the artist's royalty steps up to 35%. The three unions (Writers Guild, Equity and Musicians Union) then divide up their reward on the basis of the original budget proportions, ie whether a solo musician or full orchestra was employed and how much dialogue was specially written. The agreement is limited to two years because frankly everyone is still feeling their way. But it gets the show on the road. Although the BBC is still negotiating, it looks likely that a similar deal will be struck. This will then clear the way for video re-issue of all material originally recorded or filmed for TV use. Then comes the next crunch, involving feature films.

So far the feature film producers have argued that an archaic clause in their contracts, which gives the film company the right to exploit the material however they wish, gives them the right to sell feature films for TV transmission or re-issue them on video disc or video tape. The unions argue that this clause was intended only to give film producers the right to put publicity pictures outside a cinema, make advertising trailers, release clips for TV screening and so on. This basic film contract comes up for renegotiation in a few months' time and it's an odd-on certainty that the unions will both press for some reward for the actors, writers and musicians in feature films that are screened on TV (currently most of them get nothing) and negotiate a videogram re-issue royalty rate. It's an equal odds-on certainty that the film producers will object to any such scheme, so stand by for sparks, and probably strikes into the bargain.

Finally, comes the most important issue of all for recording studios and record companies. There's currently much glib talk about pop groups in the future recording video discs rather than audio discs. The trade and public vaguely imagine that future releases by the Rolling Stones will have colour TV pictures as well as sound. In reality there's absolutely no agreement between anyone over the rates that the musicians and performers should get for recording original material in video as well as audio format. But an agreement is essential because in the long run the recording industry relies on new material. You can't go on for ever re-issuing old material. Currently the only video

taped original programmes available for sale or hire in the UK are either pirated or involve non-union performers and foreign artists, such as American pop stars and musicians. (In the USA the attitude is very much one of record and issue now, argue later.) What worries recording studios and session musicians alike in the UK is that unless something, at least temporary, is ironed out, the videogram industry will resort to just the same under-the-counter deals that have plagued the sound recording biz, ie those 'Belgium' library music sessions and private deals on overdubbing. In general most artists and producers would rather work, above board, in the UK. But if frustrated they will end up going abroad or working on unofficial cash in hand deals.

It was with all this in mind that I called the MU for their views. I very soon wished I hadn't. "There is no agreement yet," said union spokesman Stan Hibbert, "and in my view there is no point in debating the matter until there is an agreement." But there are already pre-recorded video tapes of music available, we just can't ignore their existence, I pressed. "I am not obliged to discuss the matter with you," rebutted Hibbert. But what about the tapes of artists like the Supremes and Tina Turner that are already being specially made for video cassette release in this country, I persisted. "Are those American artists?" was the somewhat revealing union reply! "The whole matter is under discussion by our executive committee and has not yet been resolved," Hibbert finally offered me as an official statement. "Does that satisfy you?" he asked. Does my view really interest you, I wondered in reply. "No," said Hibbert and I called it a day.

The MU is to the best of my knowledge still dedicated to furthering the interests of its musician members. A fuller understanding by the press and public of the very real problems which face the modern musician might not come amiss. Equity, whose actor members are at similar risk, has already realised this. For an object lesson in good PR the MU might try calling Equity with a question once in a while. As someone in daily contact with the MU mused, and I suspect it wasn't just wishful thinking—"One day one of the heavy Sundays is going to do an in-depth, investigative piece on the MU and its relationship with the recording industry . . .".

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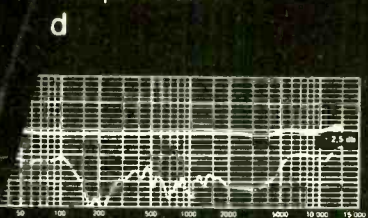
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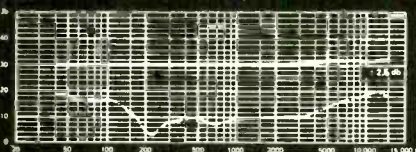
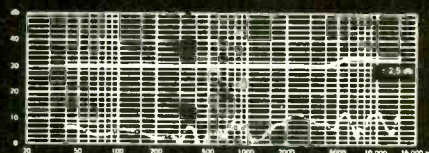
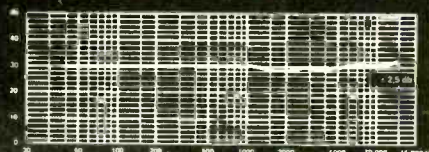


Figure-eight



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Survey: multitrack tape machines

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Frequency response: ±1.5dB, 30Hz to 18kHz at 15in/s.

Noise: 52dB, unweighted, at 15in/s for 24-track.

Wow and flutter: 0.05%, DIN-weighted, at 15in/s.

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Price: on application.

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MODEL 2600 TRANSPORT

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Features: see last month's survey.

Price: on application.



Amity wide tape transport

Last month's survey covered 2- and 4-track machines, and here we complete our tape recorder surveys with multitrack 8-, 16-, 24-, 32- and 40-track machines. While many companies have demonstrated digital multitracks, only one appears to be anywhere near open marketing and is the only unit included in this survey.

AMITY SHROEDER (UK)

Amity Shroeder Ltd, 9 Mason's Yard, London SW1, UK.
Phone: 01-930 7951. Telex: 21359.

WIDE TAPE TRANSPORT

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Wow and flutter: 0.05%, DIN 45507 weighting.

Features: transport only, assembled on aluminium casting; power supplies housed separately; full logic interlock with motion sensing.

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UK: Ampex (GB) Ltd, Acre Road, Reading RG2 0QR.

Phone: 0734 864211. Telex: 847611.

AG440C

Tracks/speeds: 8 on 1in; 3½/7½/15/30in/s in any combination.

Features: see last month's survey.

MM1200

Tracks/speeds: 8 on 1in, or 16 or 24 on 2in; 7½/15, 15/30in/s.

Frequency response: ±2dB, 50Hz to 18kHz, 'overall' in sync and record modes.

Noise: 64dB for 8- and 16-track; 59dB for 24-track (ref peak record level to unweighted noise) using 456 tape at all speeds.

Wow and flutter: 0.04% peak, ANSI-weighted (DIN 45507).

Ampex MM-1200



Features: full logic control with motion sensing; dc (phase-lock) servo direct-drive capstan; comprehensive record ready/safe and input/sync/repro selection and LED indicators for each track (plus master and standby monitor controls); electronic minutes and seconds counter plus 'search-to-cue' facility with accuracy of ±0.5s at 15in/s; local or remote mounting of control module; plug-in head block with automatic tape tension correction for 1in or 2in tape width; removable VU meter panel for ease of maintenance. Optional extras include PURC (pick-up recording capability accessory) for 'clean, precise insert edits'; variable speed oscillator for -50 to +150% varispeed; plus EECO time-code synchroniser and other video-orientated accessories.
Price: on application.

ATR-124/116

Tracks/speeds: 24- and 16-track on 2in (option 8-track on 1in), 7½/15/30in/s.

Frequency response: 30in/s 40Hz to 30kHz ±2dB, 15in/s 25Hz to 20kHz ±2dB.



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Separate Microphone and Line input level potentiometers. Single Mic/line input master control with local 'reverse input' switch, channel input phase reverse, Mic attenuator, 3 treble and base frequencies, swept mid EQ., -12 db/Oct hi-lo filters, 4 independent Echo/FB sends with pre/post switch, 8 group and master stereo (remix) routing. In place channel solo, PFL (or AFL) listen, channel selection to master cut buss. Ch direct outputs, 48v phantom Mic power.

GROUP ROUTING AND RE-INSERT

Full panel mounted routing of any group o/p to tape input - no patching. Re-insert of main groups to the stereo group outputs via pan pots.

MONITORING

L1/LO of the multitrack, stereo (remix) or copy machines. Monitor dim, mono, graphic display of monitor levels 2 cues (FB) and one echo send. Monitor state indicated by red or green LED's.

AUX LINE INPUTS

8 (option 12) equalised line input channels with stereo routing and pan to all main groups and monitor circuits, plus sends to channel and monitor cue lines.

P & G faders throughout, comprehensive patch facilities - parallels and spares, switchcraft in/out connectors, PSU, patch cords, maintenance kit, many customer facilities available - PPM's, film pan pots, fader packages with 6 channel muting busses etc.

AGENTS:

Canada C.O.R.A. Inc.
131-1 Beme Rue, 1046 Quebec P.Q.,
Canada Tel. 418-522-1397

Denmark Audiophil
Howitzei, 49-1, 2000 Copenhagen,
Denmark Tel. 134 1622

Netherlands & Belgium Pieter Bollen, Geluidstechniek bv,
Hastelweg 6, Eindhoven,
Holland. Tel. 40512777/520662

South Africa Prosound,
Elkhâam, Upper Level Pretoria Street,
Hillbrow, Johannesburg 2001,
South Africa. Tel. 642-8721/1209

Spain Telco Sociedad Limitada, Gravina 27
Madrid, Spain. Tel. 1 2317840

France Reditec,
62-66 Rue Louis Ampere,
93330 Neuilly/ Marne, France
Tel. 300 96 30

W. Germany Elmus GmbH,
D1 Berlin 12,
Herderstrabe 16,
W. Germany. Tel. 030 312 20 12

Acoustics Audio Import
Curtiusstrabe 85,
4300 Essen 1. Tel. 0201 70 17 34

U.S.A. (Brochure Service Only)
Keith Monks Audio (USA),
652 Glenbrook Road,
Glenbrook CT 06906
Tel. (203) 348-4969

Raindirk Limited, Downham Market, Norfolk, Tel. 03663 2165 Telex No. 817737

SURVEY: MULTITRACKS

Noise: 30in/s AES unweighted 69dB, A-weighted 73dB, 15in/s IEC CCIR unweighted 67dB, A-weighted 71dB. Also provides NAB eq.

Wow and flutter: 0.03% weighted.

Features: 16in spools, 4 assignable eqs selectable to tape speeds, electronic editing with insert controller, optional remote control, -50 to +200% speed adjustment, step-up memory storing four selections of channel modes, monitor memory setting monitor modes in each transport condition, touch variable shuttle control, rehearse for editing, option for multipoint search to cue, option aux output amps, record illuminated VU meters which flash if recording failure.

Price: £35,000 to £40,000 depending upon options.

BRENELL (UK)

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

US: Audio Marketing Ltd, Glenbrook Industrial Park, Stamford, Conn 06906.

Phone: (203) 359-2312. Telex: 996519.

MINI 8

Tracks/speeds: 8 on 1in; 7½/15in/s.

Frequency response: ±2dB, 30Hz to 20kHz.

Noise: 60dB, unweighted, ref 0dB VU.

Wow and flutter: 0.05%, DIN-weighted.

Features: full logic interlock with touch-sensitive switches and motion sensing; remote control incorporating digital readout counter and individual record/standby channel status; self-centering hubs to reduce mechanical vibration; horizontal or vertical operation.

Price: £4080 including digital tape timer.

CADEY (UK)

Cadey Tape Recorders Ltd, 59 Yantlet Drive, Strood, Kent, UK.

Phone: 0634 76117.

MULTITRACK

Tracks/speeds: 16 on 1in, or 16 or 24 on 2in; 15in/s.

Frequency response: ±2dB, 30Hz to 17kHz.

Noise: -60dB, unweighted, on *Scotch 206*.

Wow and flutter: 0.1%cms ('end of reel included').

Features: full logic interlock but no motion sensing; 2-head configuration—erase plus record/replay/sync head; comprehensive remote control, incorporating deck commands and record safe/ready and replay on single pushbutton for each track; valve bias and erase oscillators; teak console construction (not floor standing).

Price: 16-track £3,800, 24-track £4,800.

CB ELECTRONICS (UK)

CB Electronics Ltd, 10 Fitzroy Crescent, Woodley, Berks RG5 4EU.

Phone: 0734 694512.

400 SERIES

Tracks/speeds: 1 to 32-track, 1in or 2in tape, 30/20/15in/s; 24/25 frames 16/35mm/s on film.

Frequency response: 20Hz to 20kHz±2dB at 15in/s, ±3dB sync output.

Noise: depends upon track configuration.

Features: three separate equalisations (NAB and DIN at 15in/s, AES at 30in/s), separate sync amp, noise reduction rack and switching, phase correction master bias, silent gapless drop-in, noise gate on every channel, full remote control, full logic control with motion sensing, servo capstan, bi-directional servo on spool motors, maintains constant tension in both play and wind modes, four cue position auto locate with a search and repeat.

Price: 16-track from £10,500, 24-track from £13,000, 32-track from £16,500, electronics only £200 per channel.



Brenell Mini 8



IEM 1000 Series



IEM 1610

IEM (USA)

International Electro Magnetics Inc, Eric Drive and Cornell Avenue, Palatine, Illinois 60067, USA.

Phone: (312) 385-4622.

MODEL 1100B

Available in 8-track on 1in tape, see last month's

survey.

1000 SERIES

Tracks/speeds: 8 on 1in or 16 or 24 on 2in; 7½/15/30in/s.

Frequency response: ±2dB, 30Hz to 15kHz, overall at 15in/s.

Noise: 70dB below peak record level.

Wow and flutter: 0.05% rms in the band 0.5-150Hz.

Features: as 1100 Series, plus 14in reel handling.

ITAM (UK)

Industrial Tape Applications Ltd, 107 Harewood Avenue, Marylebone Road, London NW1, UK. Phone: 01-724 2497. Telex: 21879.

France: 2 rue des Tennerolles, F-92210 Saint Cloud, France.

Phone: (1) 602.68.18.

806

Tracks/speeds: 8 on 1in; 15in/s.

Frequency response: ±2dB, 40Hz to 22kHz via tape; ±3dB, 70 to 17kHz for sync mode.

Noise: 65dB, weighted, ref 900nWb/m.

Wow and flutter: 0.06%, 'record/replay'.

Features: relay-solenoid logic (based on Studer/Revox transport); servo-controlled capstan with 100% varispeed; modular plug-in electronics; facility for switching Dolby A and dbx noise reduction; line in/out plus headphone output per channel; full selsync on all channels; available in console for table-top versions.

Price: £2,250, optional 8-channel dbx noise reduction unit £718.

1610

Tracks/speeds: 16-track on 1in, 7½/15/30in/s.

Frequency response: 30in/s 35Hz to 25kHz ±2dB, 15in/s 30Hz to 22kHz ±2dB.

Noise: 30in/s 65dB, 15in/s 64dB A-weighted.

Wow and flutter: 0.1%.

Features: optional VU or column LED metering, XLR connectors, digital read time counter, remote control, sync mode. Optional dbx.

Price: £5,750.

LYREC (Denmark)

Lyrec Manufacturing A/S, Hollandsvej 12, DK-2800 Lyngby, Denmark.

Phone: 02 87.63.22. Telex: 37568.

UK: Lyrec (UK) Ltd, 19 Errcroft Way, Twickenham TW1 1DA.

Phone: 01-891 2022

US: Rupert Neve Inc, Berkshire Industrial Park, Bethel, Conn 06801.

Phone: (203) 744-6230. Telex: 969638.

TR532

Tracks/speeds: 8 on 1in or 16 or 24 on 2in; 15/30 in/s.

Frequency response: ±1dB, 60Hz to 18kHz at 30in/s for record/repro.

Noise: between 58dB for 24-track and 62dB for 16-track; both rms unweighted values at 30in/s.

Wow and flutter: 0.04%, peak weighted.

Features: full logic control with motion sensing; dc-servo direct-drive capstan; comprehensive remote control unit incorporating ready/safe/sole and sync/repro/line controls for each channel, tape motion selection, digital timer with reset, search-to-cue and 7½ to 60in/s varispeed; full selsync plus 'aux sync' on all tracks; servo-controlled winding tape tension with adjustable winding speed limit; swivel-mounted transport; interchangeable head-blocks. Optional audio and tape controller has three independent search/load-to-position. Facilities for store and recall of 32 search points. Positive/negative tape timer. Varispeed with speed read-out. Shuttle mode between two positions. Playtime computing for shuttle distance. The audio and tape controller is a small desk-top unit—weighing only 2.5kg.

Price: on application.



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SURVEY: MULTITRACKS

MCI (USA)

MCI Inc, 4007 NE 6th Avenue, Fort Lauderdale, Florida 33308, USA.

Phone: (305) 566-2853. Telex: 514362.

UK: MCI (Professional Studio Equipment) Ltd, MCI House, 54-56 Stanhope Street, London NW1 3EX.

Phone: 01-388 7867. Telex: 261116.

JH-110B-8

Tracks/speeds: 8-track on 1in, 7½/15/30in/s. Full specification last month.

Price: \$8,745.

JH-16 SERIES

Tracks/speeds: 8 on 1in, or 16 or 24 on 2in; 15/30 in/s.

Frequency response: ±2dB, 30Hz to 16kHz in reproduce; ±3dB, 30Hz to 16kHz in 'cue' mode; both at 15 or 30in/s.

Noise: 64dB in reproduce; 60dB in 'cue' mode; both below +4dBm output, unweighted.

Wow and flutter: 0.05% peak, DIN-weighted, at 15 or 30in/s.

Features: full logic control with motion sensing; phase-locked capstan and dc servo-controlled reel motors; quick-change heads; ±20% varispeed plus interface for external voltage control; comprehensive remote control. Autolocator 11, available as an option, has search-to-cue facilities, master status push buttons to select tape/input/overdub for each track, plus transport controls.

Price: 8-track from \$16,000, 16-track from \$22,500, 24-track from \$33,450.

JH-32 SERIES

Tracks/speeds: 16 or 24-track on 2in, 32-track on 3in; 15/20/30in/s.

Frequency response: 30in/s 50Hz to 30kHz +1 -2dB, 20in/s 30Hz to 28kHz +1 -2dB, 15in/s 30Hz to 26kHz +1 -2dB.

Noise: A-weighted 24- or 32-track 30in/s 66dB, 20in/s 65dB, 15in/s 64dB.

Wow and flutter: 0.04%.

Features: 20in/s tape speed has special eq, full track erase, no transformers, three preset alignment selections, separate cue and repro eq, pitch change in semitones.

Price: on application.

3M (USA)

3M Company, Building 224 BW, 3M Centre, Saint Paul, Minn 55101, USA

Phone: (612) 733-1110. Telex: 297434.

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

Phone: 0344 26726. Telex: 849371.

M79

Tracks/speeds: 8 on 1in, or 16 or 24 on 2in; 7½/15 or 15/30in/s.

Frequency response: +1, -2dB 50Hz to 15kHz at 15 and 30in/s for reproduce and rec/repro.

Noise: 68dB for normal replay, and sync in standby mode.

Wow and flutter: 0.06% max, NAB weighted at 7½ and 15in/s.

Features: dc servo capstan and spool motors, Isoloop drive system, full logic control, with motion sensing, 3.9 to 49in/s varispeed, sync facility, remote control, Sonoplan autolocator, and remote switching Dolby as options.

Price: 8-track £11,500, 16-track £17,000, 24-track £21,000.

DIGITAL AUDIO MASTERING SYSTEM

Channels/speeds: 32- or 16-channels on 1in, 4- or 8-channels on ½in tape, 45in/s; takes max 14in spools to give max 45 mins recording time on 10,800ft of tape.

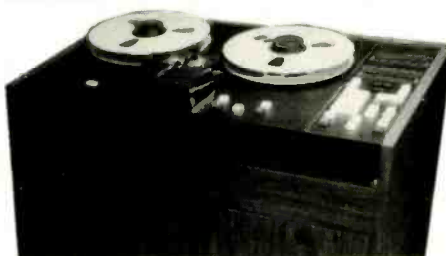
Frequency response: 30Hz to 15kHz ±0.3dB, 20Hz -2dB, 20kHz -3dB.



Lyrec TR 532



MCI JH-32



3M 32-track digital mastering system



Otari MTR-90

Noise: 90dB.

Wow and flutter: not measurable.

Harmonic distortion: 0.03% 100Hz to 20kHz at max input/output level (+28dBm).

Crosstalk: 90dB.

Features: digital recording with 1-track per channel, removable remote control panel with auto locate.

Price: 32-track £75,000/\$115,000, 16-track \$72,500 4-track £25,000/\$35,000. Electronic editing system \$7,500.

OTARI (Japan)

Otari Electric Co Ltd, 4-29-18 Minami Ogikubo, Siginami-ku, Tokyo 167, Japan.

Phone: (03) 333 9631. Telex: 26604.

UK: Industrial Tape Applications, 1-7 Harewood Avenue, London NW1.

Phone: 01-724 2497. Telex: 21879.

US: Otari Corporation, 1559 Industrial Road, San Carlos, Cal 94070.

Phone: (415) 592-8311. Telex: 910-376 4890.

MX-5050-8

Tracks/speeds: 8 on ½in; 7½/15in/s.

Features: similar to MX-5050-QX 4-track machine described in last month's issue.

Price: £2,490.

MX-7800

Tracks/speeds: 8 on 1in; 7½/15, 15/30in/s.

Frequency response: ±2dB, 30Hz to 20kHz at 30in/s, ±2dB, 30Hz to 18kHz at 15in/s.

Noise: 65dB for repro; 53dB for sync mode.

Wow and flutter: 0.04%, at 30in/s.

Features: full logic control with motion sensing; synchronous servo-controlled or direct-drive capstan; full selsync on all channels; head lifter defeat for cueing; plug in heads; available in console or chassis versions.

Price: £4,490.

MTR-90

Tracks/speeds: 16- or 24-track on 2in; 15/30in/s.

Frequency response: 30in/s 50Hz to 20kHz ±2dB, 15in/s 30Hz to 18kHz ±2dB.

Noise: 24-track 62dB, 16-track 64dB unweighted.

Wow and flutter: 30in/s 0.03%, 15in/s 0.04%.

Features: pinch roller free transport, servo's on all motors, varispeed, 5-digit realtime counter, full remote control with complete indication, motor driven head shield, electronic editing.

Price: 16-track £11,616, 24-track £16,775.

SCULLY (USA)

Ampro/Scully, Newton Yardley Road, Newton, Penn 18940, USA.

Phone: (215) 968-9000.

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

Phone: 09322 43124. Telex: 928475.

284B-8

Tracks/speeds: 8 on 1in; 3½/7½ or 7½/15in/s with ac capstan, or 3½/7½, 7½/15, 15/30in/s with dc-servo capstan drive.

Feature: similar to 280B Series machines described in last month's survey.

SOUNDCRAFT (UK)

Soundcraft Magnetics Ltd, 9-10 Great Sutton Street, London EC1V 0BX.

Phone: 01-251 3631/253 9878. Telex: 21198.

SCM381-8/16

Tracks/speed: 8- or 16-track on 1in; 15in/s.

Frequency response: 30Hz to 20kHz +1 -2dB.

Noise: 68dB unweighted.

Wow and flutter: 0.03%.

Features: NAB eq, removable front panel for remote control on 8-track, realtime digital tape counter, varispeed, capstan drives outside of tape, jack or multipin connectors, sync output.

Price: £5,250 8-track, £7,500 16-track.

SCM382-16/24

Similar to above but 16- or 24-track on 2in tape. Available early 1980.



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

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

SURVEY: MULTITRACKS

STEPHENS (USA)

Stephens Electronics Inc, 3513 Pacific Avenue, Burbank, Cal 91505, USA.
Phone: (213) 842-5116.

CAPSTANLESS MULTITRACK

Tracks/speeds: 4, on 1/2 in, 8 on 1 in, or 16, 24, 32 or 40 on 2 in; 15/30 in/s, plus 50 in/s scan.

Noise: 75dB for 4- 8- and 16-track; 72dB for 24-track; 71dB for 32-track; and 70dB for 40-track at 30 in/s. (80, 77, 76 and 75dB respectively for tape stopped.)

Wow and flutter: 0.045% at 15 in/s; 0.025% at 30 in/s.

Features: full logic control with motion sensing; capstanless tape transport system utilising servo-operated supply and take-up motors coupled with motion sensing; integral VSO system provides 10 to 80 in/s varispeed; reels may be of differing sizes (and may be interchanged) because self-adjusting electronics 'guarantees proper tape tension'; optional self-contained 12V battery pack providing over four hours of recording time; sync lock for vertical sync pulse or 60Hz on tape; various remote control units and Q-II autolocator containing 10 memory locations available as extras. Standard deck is mounted in a custom-built wooden cabinet. Portable cases are available on request. *Model 811D* electronics (4-, 8- and 16-track) features separate rotary channel-select switches for record/ready/sync selection; *Model 821B* (24-, 32- and 40-track) is a multiplex system with one rotary switch and separate channel LED indicators.

Price: 4-track: £6,214. 29 (\$13,050); 8-track £7,590.48 (\$15,940); 16-track £11,109.52 (\$23,330); 24-track £14,190.48 (\$29,800); 32-track £19,400 (\$40,740); 40-track £23,100 (\$48,510). Remote control units from £247.62 (\$520), Q-II autolocator from £1,650 (\$3,465).



Scully 284 B-8



Soundcraft SCM 381-8



Stephens multitrack

month's survey. In addition, pre-wired for autolocator, comprehensive remote control and varispeed; full selsync on all channels; variable spooling in 'edit' mode; amplifier functions may be remote-controlled; pivoting transport; available in metal or teak consoles, or transport plus electronics module. *TLS2000* tape lock system can be used to synchronise two machines to an accuracy of $\pm 100\mu\text{s}$, with a lock-up time of about 3s.

Price: 8-track £11,587, 16-track £16,735, 24-track £24,818 standard, £22,828 compact version.

A800

Tracks/speeds: 8-track on 1 in, 16- or 24-track on 2 in; 7 1/2/15, 15/30 in/s.

Frequency response: 30Hz to 20kHz $\pm 2\text{dB}$ at 15 in/s and 30 in/s.

Noise: 24-track 15 in/s 66dB, 30 in/s 70dB.

Wow and flutter: 0.04%.

Features: microprocessor controlled, electronic or manual editing, master NAB/CCIR switching, master bias setting, digital timer in realtime, zero locator, address locator, optional *Tapelock* synchroniser, varispeed, complex metering and monitoring electronically switched.

Price: 8-track £17,429, 16-track 24,627, 24-track £32,559.

TEAC (Japan)

Teac Corp, 3-7-3 Naka-cho, Musahino, Tokyo 180, Japan.

UK: Harman (Audio) UK Ltd, St John's Road, Tylers Green, High Wycombe, Bucks.

Phone: 049481 5331. Telex: 83651.

UK: Teac Corp of America, 7733 Telegraph Road, Montebello, Cal 90640.

Phone: (213) 726-0303. Telex: 677014.

Tascam Series 85-16

Tracks/speeds: 16-track on 1 in; 15 in/s.

Frequency response: 40Hz to 18kHz $\pm 3\text{dB}$.

Noise: 67dB weighted, 62dB unweighted.

Wow and flutter: 0.04% peak, 0.03% rms.

Features: optional *DX-16A* dbx noise reduction unit *AQ-85* Auto-Cue unit.

Price: not available at press time.

Tascam Series 80-8

Tracks/speeds: 8-track on 1/2 in; 15 in/s.

Frequency response: 40Hz to 18kHz $\pm 3\text{dB}$ in sync mode.

Noise: 65dB weighted, 60dB unweighted, extra 30dB available with dbx.

Wow and flutter: 0.04% NAB weighted, 0.06% peak.

Features: full logic control with motion sensing, -10dB in/out to interface with *Tascam* mixers, optional remote control and *DX-8* dbx noise reduction unit which includes auto switching with the tape recorder record/play/sync modes of 80-8; full selsync, digital tape counter with memory (stop at zero), cue facility in fast wind, overload LEDs on each channel, vertical or horizontal operation.

Price: £2,350, *DX-8* dbx unit £793.

TELEFUNKEN (West Germany)

AEG-Telefunken, Postfach 2154, D-7750 Konstanz, West Germany.

Phone: 862460. Telex: 733233.

UK: Hayden Laboratories Ltd, Hayden House, Churchfield Road, Chalfont St Peter, Bucks SL9 9EW.

Phone: 02813 88447. Telex: 849469

US: Gotham Audio Corporation, 741 Washington Street, New York, NY 10014.

Phone: (212) 741-7411. Telex: 236779.

M15A

Tracks/speed: 8 on 1 in, or 16, 24 or 32 on 2 in; 7 1/2/15, 15/30 in/s.

Features: see last month's survey. In addition multitrack machines have an optional separate sync output, and can accommodate up to 24 channels of *Telcom c4* noise reduction.

Price: 8-track £13,065, 16-track £18,757, 24-track £25,441, 32-track £33,535.

Telefunken M15A



A80/VU MkII

Tracks/speeds: 8 on 1 in or 16 or 24 on 2 in; 3 1/2/7 1/2, 7 1/2/15, 15/30 in/s.

Frequency response: $\pm 1\text{dB}$, 60Hz to 18kHz via tape; $\pm 2\text{dB}$, 60Hz to 12kHz in sync mode; both at 30 in/s for 16-track.

Noise: 62dB, NAB-weighted, for up to 16-track record-repro at 15 and 30 in/s; 57dB for 24-track, under same conditions.

Wow and flutter: 0.04%, DIN-weighted.

Features: similar to *A80IRC* described in last

Teac Tascam Series 85-16

