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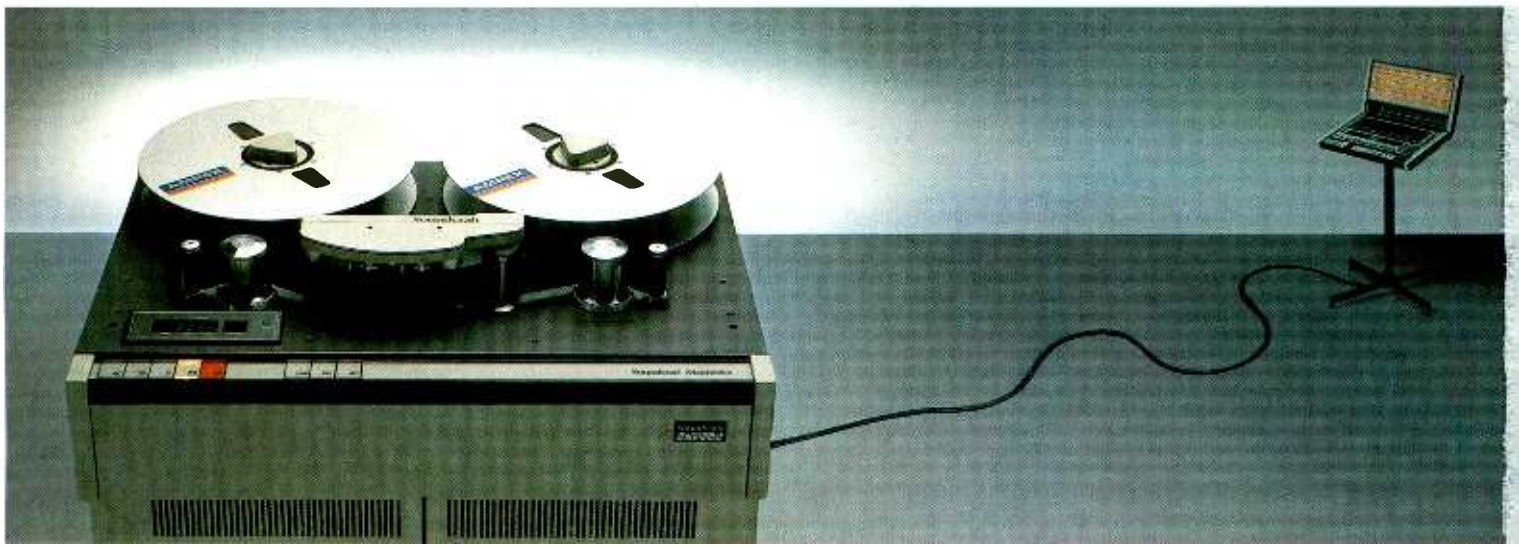

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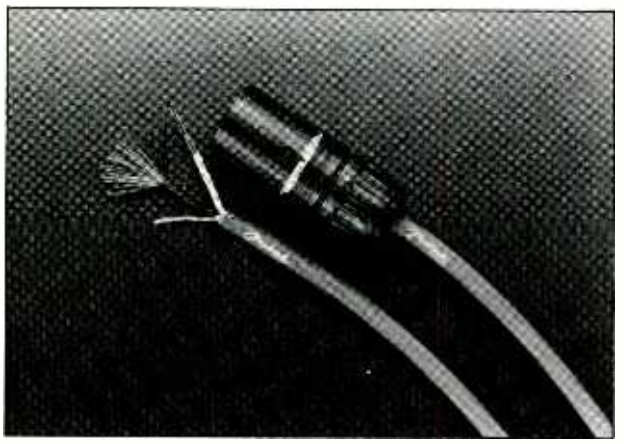

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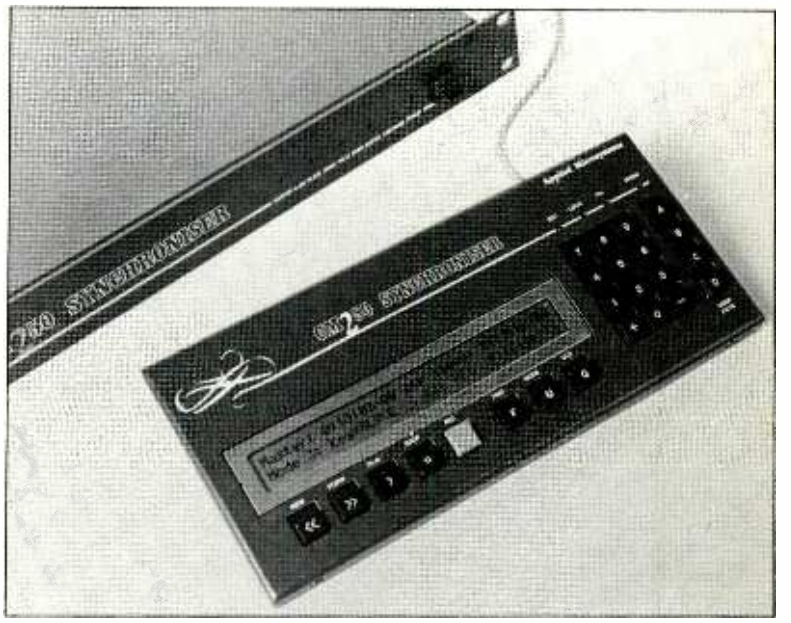

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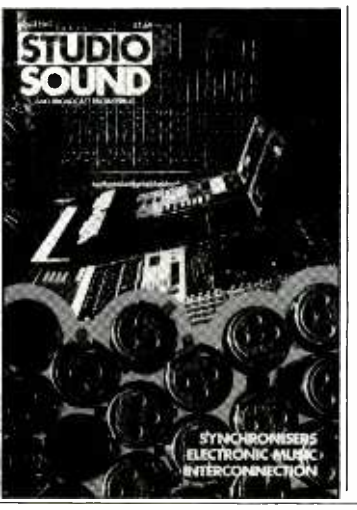

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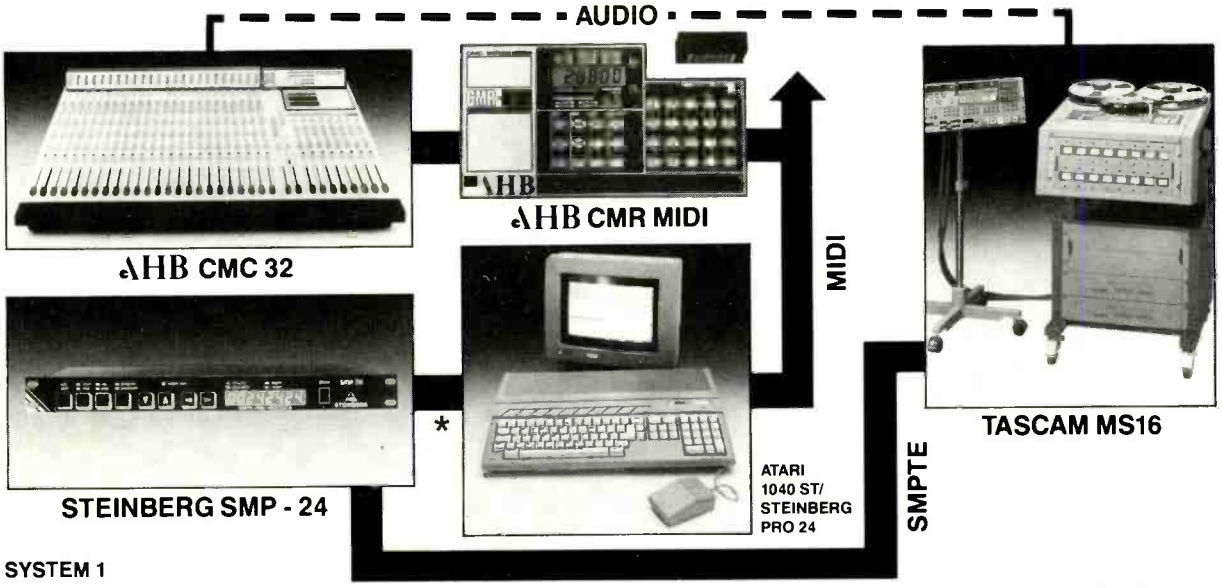
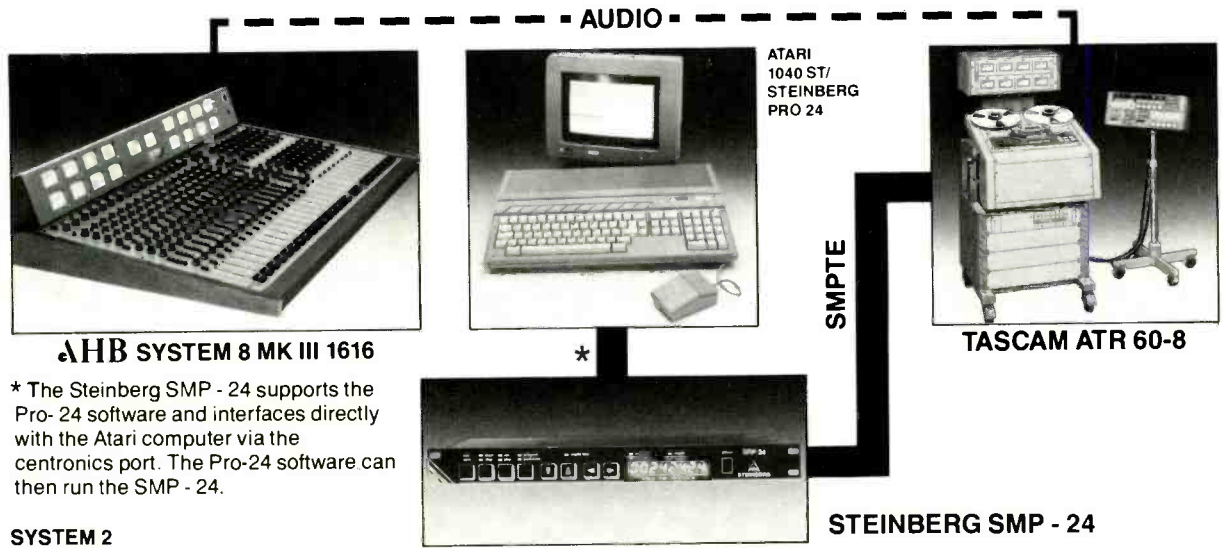


SYSTEM 1

Recording studio systems come in many different formats, but none so versatile as the one depicted here, 16 tracks of audio, 24 track midi sequencing, automated muting and routing, 10 program autolocating, full midi editing facilities, midi location via midi song position pointer. All these features add up to a system that is capable of world class professional mixing and yet can be operated by one person. This is where the future is. Available now.



* The Steinberg SMP - 24 supports the Pro- 24 software and interfaces directly with the Atari computer via the centronics port. The Pro-24 software can then run the SMP - 24.

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EDITORIAL

As I have said many times on this page in the past the pro-audio community, even on a worldwide basis, is very small when viewed as an industry both on a numerical and financial basis. Due to the nature of the business, however, we tend to attract vastly more attention than a less glamorous business and this has its diverse aspects too. We are easy targets for manipulation.

Others do it to us. The industry in various parts of the world comes under fiscal/governmental pressure where money is used to produce some desired control or pressure to raise money. With the recording studio generally not being a big money spinner it is hard to resist these pressures. Some governments place duty of 100% and over on imported pro-audio equipment and so largely stifle any possibilities of gaining from a strong home entertainments base. If there is no home grown product then music buyers in those countries turn to imported material which means not only do those countries lose their foreign currency any way but also see an erosion of their native culture base.

It is not just in this way that controls are tried. Several years ago there was a very unpleasant attempt at redefining tax legislation in California which the State tried to impose retrospectively with the recording industry looking like a prime target. There has to have been a fair amount of ignorance to believe that the industry could ever have afforded the results of this fiscal gamesmanship. In the end a very positive show of force by all the industries made the powers that be see reason. The only positive side was not for California but for those other expanding recording centres of the southern area of the US that received the investment that would normally have been California's.

Right now we have a similar situation happening in the UK although rather less direct. The Government is attempting to change the legislation concerning taxation of income of non-residents working in the UK. With the UK recording industry attracting a great deal of foreign work this is going to be an area of some concern for the industry—an industry that the UK can rightly be proud of and only through what I can at best hope to be ignorance, the Government is attempting to shoot us in the foot. We are that strange hybrid—the service industry that also makes a product and as such are vulnerable at both ends. However externally successful we may seem to be, the UK industry is on a financial knife edge having gone through a period of very heavy investment in equipment (much from UK manufacturers as well) there is not really much room to manoeuvre. The APRS is arranging lobbying and for pressure to be brought on those who have the power to make changes but we will have to wait and see. How different, then, is the attitude of the Republic of Ireland in relation to the arts and industries that support it? It would not take much, may I suggest, to move new studio construction projects across the Irish Sea—they can speak English and the Guinness is far better. If the Government believes that such announced measures will raise any form of revenue in the long term from the UK industry it is grossly mistaken.

Manipulation—we do it to ourselves. Look around and the circumstances are plain to see with price cutting on rates to the point where we are only continuing for love and where in any other business time would have been called. This is really just a form of self manipulation; you are doing it yourself with no need for external assistance.

Worst of all there are many waiting to manipulate us. The fact that the size of the industry is undocumented in facilities or value keeps quite a large number of possibly unpleasant influences out. While attracted initially by what they see as an aura of easy returns, lack of figures frightens most of them off. On balance our industry cannot take too many large multinational corporations as it has a negative effect on products, ie they just stop being made overnight; or on competition, ie just too damn much of it and too little talking leading to too many standards (self manipulation again).

By being small and with no recognisable patterns of traditional industrial behaviour we are almost self regulatory but we will always fall prey to those that believe our external glamour image. Should we attempt to change that image with a few hard facts and figures? Except when our livelihood is threatened I think I prefer the status quo.

Keith Spencer-Allen

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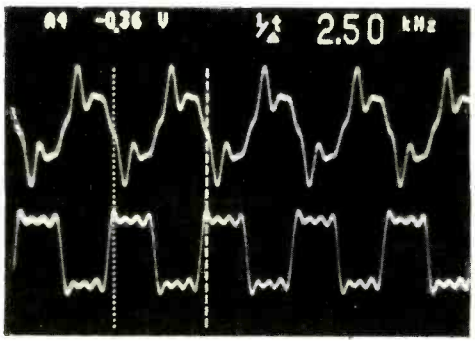

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Mitsubushi X80 stereo machines. New	£11,950
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Studer A80 narrow body 24 track recorder Mk2	£13,500
Studer A80 Mk2 narrow body, no autolocate	£12,900
3M M79 24 track with autolocater	£9,000
Trident TSR 24 track recorder, 3 years old	£9,500
Otari MTR 90 Mk1 autolocate, 4 years old in good condition	£14,900
Lyrec 24 track recorder with autolocate, no meter bridge	£12,500
Otari MX5050 1/4 Master recorder, 12 months old	£1,450
Publison DHM89B2 with 5 seconds	£2,950
Lexicon 224X with 4.4 and remote	£4,995
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MXR DIG rev	£295
BEL flanger	£295
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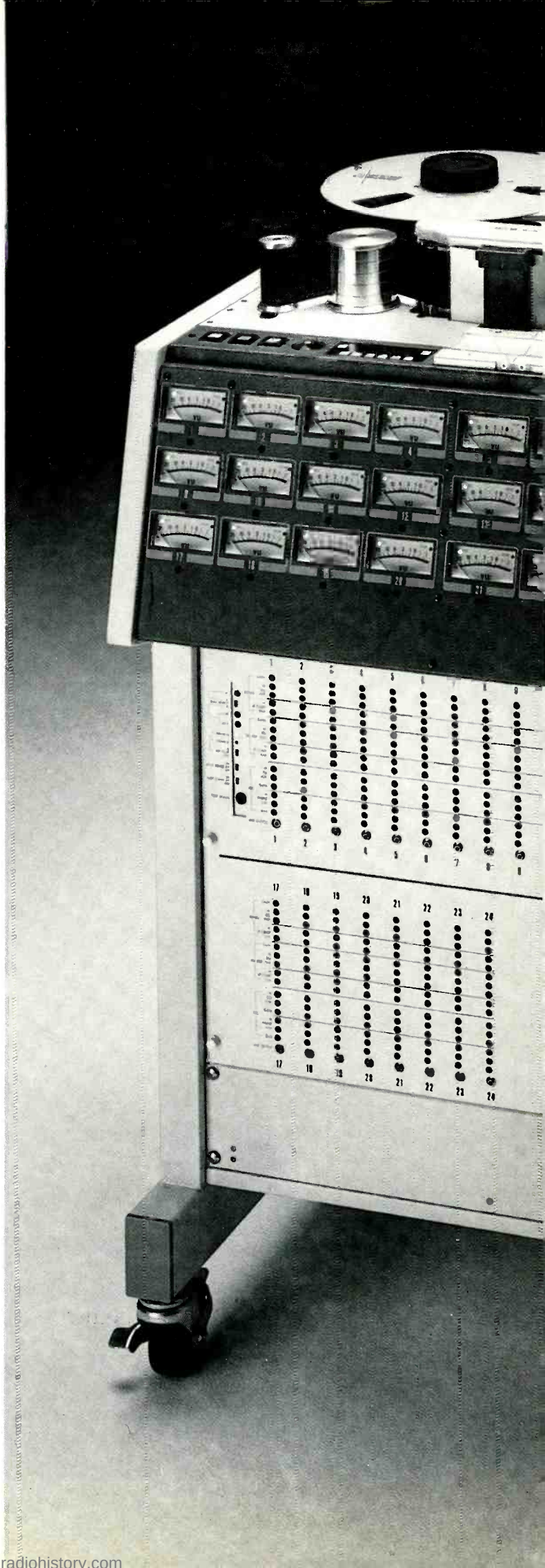

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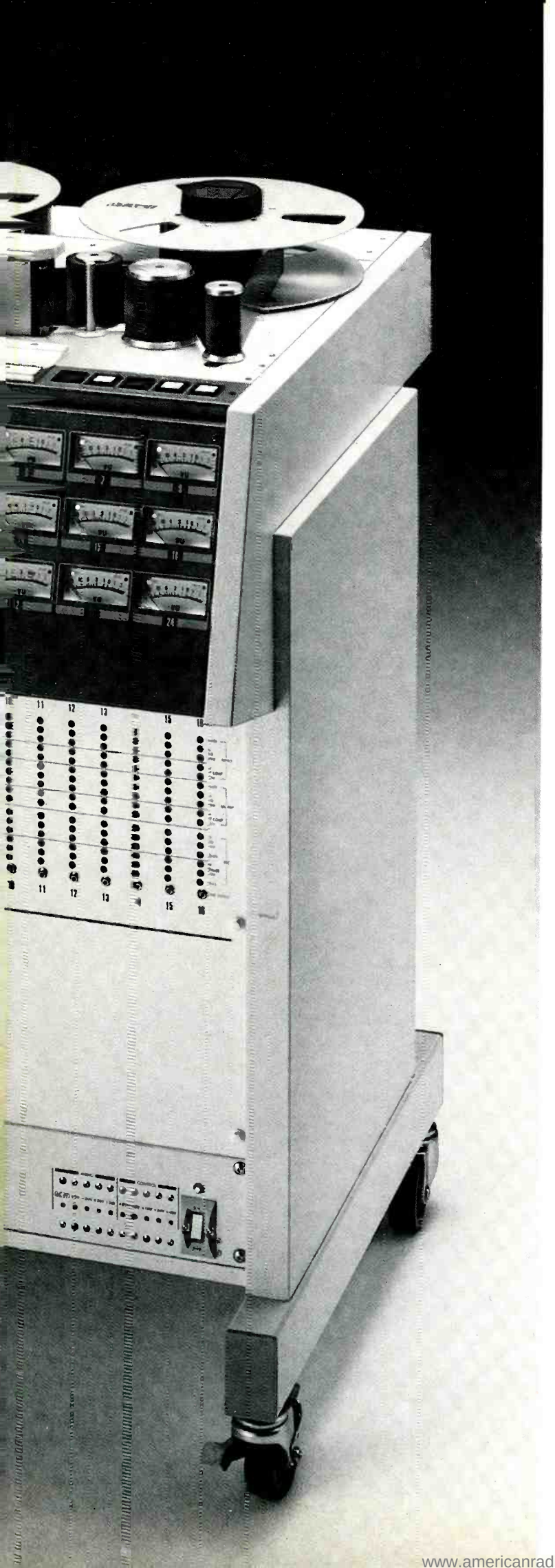

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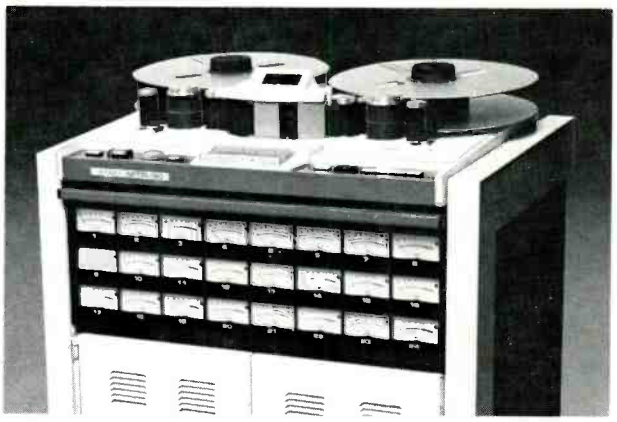

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NEWS

UK studios under serious threat

New tax Regulations, due to come into effect on April 6th, 1987, could mean the end of London as an international recording centre. Speaking of the proposals at a special press conference on February 25th, 1987, organised by the Association of Professional Recording Studios, President George Martin summed up the seriousness of the situation, "I don't think it is any exaggeration to say that this will be the end of London as a recording centre and many studios will go to the wall." He also stressed that the subsequent loss of business to studios would have a considerable knock-on effect for the rest of the professional audio industry.

What in essence the APRS is concerned about is not the basic principle of paying tax on earnings but the interpretation of the new proposals and the fact that the specific act of recording is embodied in the basic structure of the legislation.

At the moment, if the Regulations are accepted as they stand, any overseas entertainer will be liable to a withholding tax on UK earnings. Payments subject to tax will include fees for UK concert performances; sponsorship, endorsement of goods, radio and television appearances in the UK and also making films or recording in the UK. Artist record royalties would also be taxable if the material was performed or recorded in the UK.

Under the Draft Income Tax (Entertainers and Sportsmen) Regulations 1987 the Inland Revenue would be able to withhold up to 29% of an overseas entertainer's gross receipts until a claim from the artist and a proper assessment established the exact liability at which point an appropriate adjustment would be made. For some artists the tax liability could be as high as 60%. In all cases the onus would be on the artist to prove his or her case.

What appears to be a grossly unfair situation—and the point the APRS is making—is the fact that any overseas artists who chooses to come to the UK to record will be specifically penalised. It doesn't take much imagination to see how quickly the London recording scene would lose its international status at a stroke.

London is a major international recording centre, not just for chart music but for a wide variety of recording activities including classical music, jazz and film soundtracks. To deprive London (and indeed the whole of the UK) of its international status would have serious repercussions not only for studios but our pro-audio manufacturing industry as well.

British professional recording equipment enjoys an immense reputation abroad (indeed companies like AMS Industries, Solid State Logic, Amek, and Soundcraft have repeatedly won the Queen's Award for Industry). In most cases this international reputation has been won against strong and determined overseas competition.

Manufacturers need the support of UK studios if they are to continue to develop new and innovative products in this highly competitive field. Major studios on the other hand need the revenue generated by their international status in order to invest in this latest technology. It's a delicate balance and the new Regulations will undoubtedly not only threaten the livelihood of many studios but will inhibit UK R&D and provide a considerable advantage to overseas manufacturers keen to exploit the situation.

According to the APRS the legislation in its present form, "...is virtually certain to cause losses of at least £5.5 million a year on our present scale of business and which can realistically be projected at twice that sum in the future".

Current interpretation of the Draft Regulations by the Inland Revenue is not just concerned with recording in the UK: it extends right across the whole area of recording, performing and promotion and the Regulations are not just looking at direct payments to artists as in the case of a fee for example for appearing on television: They also extend to other payments where the connection is more tenuous.

If an album recorded in or outside the UK was promoted by an overseas artist during a visit to the UK, that artist would incur a tax liability on any additional earnings (as reflected in increased UK sales) that promotional visit had created. In this respect the UK recording industry gets hit from both sides. UK earnings from overseas artists will be taxed if they personally promote themselves in the UK and they will be taxed again if they have actually recorded here in the first place. Clearly the ramifications of this whole legislation are extremely far reaching. It is understood that at least one major international record company has requested that its artists do not use UK studios until the situation is clarified. It will only be a matter of time before the news reaches others and they follow suit.

Understandably considerable concern was shown at the APRS meeting that the industry had not been consulted about the proposals. The original proposals were outlined in last year's budget but it wasn't until December 19th, 1986, that the Draft Regulations were published and comments invited. According to the APRS the Government did not feel it was necessary to consult with the recording industry and therefore the APRS was not invited to register their feelings and/or objections.

Chairman of the APRS Legal and Finance Committee, Simon White, felt that the whole handling of the situation was designed to get the Draft Regulations approved regardless of the feelings of the recording industry. The fact that no one in the recording industry appears to have been aware of the problem until the APRS briefing would tend to bear this out.

In effect what the new legislation is saying is, 'Don't record in the UK. Don't perform in the UK. Don't even open your mouth in the UK.' Not unless, of course, you want to hand over at least 29% of your UK earnings on record sales not just once when the record is released but every time you receive a royalty payment for sales in the UK.

Reaction from studios and manufacturers has been swift and unanimous. There have already been high rate increases for film soundtrack recording in the UK which has already deterred some overseas work. According to Peter Harris, studio manager at CTS, this legislation would be, "...the final nail that will fasten the lid on the coffin for film soundtrack recording in the UK. American producers will either stay at home or go to the rest of Europe."

Abbey Road Studios also attracts many overseas customers and studio manager Ken Townsend, naturally very concerned about the proposals, has already reported the cancellation of a major project by one overseas customer as a direct result of these proposed tax changes.

For some studios there is the whole question of expansion and investment in new or enlarged facilities. The Virgin Group, which already owns a number of important recording studios in the UK (Townhouse, The Manor, etc.), is facing exactly this problem.

Having recently bought Olympic Studios with its large orchestral recording facilities and potential for film soundtrack work should they continue with the project in the light of the new tax proposals? Studio Manager Barbara Jeffries, now feels that the group will have to "...seriously rethink our position on the whole project". As far as Olympic is concerned, like all film soundtrack recording facilities, they have to contend with the recent Musicians' Union rate increases. And Barbara Jeffries points out yet another problem on the horizon, "What are studios going to do about filling the extra 15 to 20% of available studio time the loss of overseas work will create?" She is in no doubt that this could lead to a price cutting war between studios with yet more casualties along the way.

Philip Dudderidge of Soundcraft and Chairman of the APRS Manufacturers' Liaison Committee is particularly unhappy about the repercussions all this would have on the manufacturers and the effect this would have on research and development programmes in the UK. Without the backing of a strong UK recording industry UK companies would suffer in the rest of the world's markets. Stuart Nevison of AMS Industries plc was very clear about the importance of a strong UK presence in the international recording field. Without a strong UK studio presence in the world market place many UK companies would suffer. The international success of AMS (winner of three Queen's Awards) was in no small part due to the fact that the company had easy access to several of the world's best studios, "...right on our doorstep.

"Human engineering plays a vital role in technological development and it is essential that our products are developed in conjunction with the world's top recording studios."

If the UK studios were to lose their lead in the international recording field AMS, would have no option but to, "...travel further afield to understand what the engineer wants. Our industry thrives on feedback. Overseas competition is now very strong and European facilities are getting increasingly competitive. Take away our international status and we will all be the leaner for it."

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BPI announces UK sales figures

The British Phonographic Industry have announced that the value of UK trade deliveries for 1986 finished 13.4% over 1985, with the net value of shipments at £425.3 million, compared to 1985's £375.1 million. Cassettes and compact discs sparked the increase, while LPs dipped and singles continued to drop. Total singles volume was 8.7% down at 67.4 million, and LPs fell 1.3% to 52.3 million. The drop in singles sales was partly attributed to the fact that there were no platinum awards released in the UK last year.

Cassette deliveries soared 25.6% ahead of 1985's mark, ending the year at 69.6 million units, and CD deliveries ended 1986 at 8.4 million, a 16.9% increase over 1985. Almost half of this total came in the last quarter.

In brief

• February 16th saw the opening of a new production/post-production service in London's Soho. Wild Tracks, created by former Molinare head of operations Paul Headland, features a stereo production centre and a 24-track video sound dubbing suite. Audio Studios Ltd, Second Floor, 55 Greek Street, London W1V 5LR. Tel: 01-734 6331.

• White Room Productions of Indianapolis have announced the opening of their newest recording facility, designed specifically for critical voiceover recording and jingle production. It includes Tascam and Otari recorders and a Ramsa *WR-8816* mixing console. White Room Productions, 7168 N Graham Road, Suite 140, Indianapolis IN 46250.

• Syco Systems have announced a working partnership with Orbital Financial Services plc, to expand their product and systems advice with a business planning service for equipment purchase. The service will be available for studios, producers and musicians.

• Sound Technology UK distributor for products including Alesis, Bokse, Aphex and Oberheim recently became Sound Technology plc.

• Electrosonic Ltd have announced their association with OY Helvar of Finland, who have taken a substantial minority shareholding in the London-based company.

• Sam Therapy Studio in London has gone 48-track with the addition of an Otari *MTR90-II*. This complements a new Lexicon *480L*, the Sycologic *M16* MIDI-patch, Prophet *VS* and *Oscar* keyboards, *SRC Friend* chip and a *series III* Fairlight with 380 Mbyte RAM.

Agencies

• Soundtracs plc have announced the appointment of AKG Inc, Stamford, Connecticut, as US distributor of their products.

• Crown International of Indiana have appointed Shuttlesound as a second official UK distributor of their range of mics. amps and test equipment. Shuttlesound will be working in conjunction with HHB Hire & Sales.

• Micropoint Inc of New York have appointed Tam as UK distributor of their premium range of master lacquers and recording styli.

Sound reinforcement at Los Angeles

Begun in the March issue, our report from the Convention in Los Angeles is concluded.

The name Fender is linked mostly with Stratocaster/Telecaster/Precision Bass, however, since joining forces with Sunn, the company has been putting an interesting line of sound reinforcement equipment together including mixers, speaker systems and amplifiers. Though not exactly new, the *2800* series of enclosures (house and stage systems) are worthy of attention in that they combine performance and easy stacking for use in small venues and clubs. The enclosures are Thiele/Small aligned for low frequency response with constant directivity horns for the high frequencies. The two largest systems are trapezoid in shape enabling precise arrays to be mounted in a minimum of time.

Brand new at the show was the *2235* power amplifier with rated outputs of 200 W/channel at 8Ω and 350 W at 4Ω (bridge mode is 700 W into 8Ω), however, Fender are at pains to say that these ratings are 'rather conservative' and that the amplifier will effectively deliver much more. The amplifier features 41 position detented gain controls, logic controlled timing circuit for turn-on to avoid bangs, easily removable front panel air filter with two speed fan, 'artificial intelligence' circuit that interrogates the output terminals to determine whether a short circuit condition exists or not and Heinemann 15 A magnetic circuit breaker with front panel reset. Input is 20 kΩ differential with jacks or optional *XLR*s.

Fostex showed their range of loudspeakers (or drivers) from 18 in subwoofers to supertweeters. All feature heavy duty construction and a noticeable point was the smooth frequency response exhibited by all units (curves in accordance with JIS standard C5531). Do-it-yourselfers may be interested in investigating further.

JBL/UREI introduced the *7922* digital delay for applications requiring the precise alignment of drivers and/or systems. The delay features electronically balanced input with two transformer isolated outputs, linear phase anti-aliasing filter, digital oversampling filters on the outputs and circuitry that allows gain through the system to be set by one control, thus optimising headroom and S/N performance. An LED display indicates the amount of headroom before clip for easy setup. The delay time for either output is shown on an LED digital display and the time difference between A and B outputs can also be shown. The *7922* has two modes of operation, normal resolution and high resolution, with the normal mode setting the delay time in 1 ms increments, ie synchronisation of arrays etc, and the high mode setting the delay time in 10 μs increments, ie driver alignment etc. Maximum delay time in both modes is 327 ms with settings being saved in internal memory, including during power down.

Meyer Sound Laboratories Inc gave a first showing of the Meyer/ATL monitor mix console in a 32/12 configuration. The console features transformerless balanced inputs, 48 V phantom, high pass filter, 4-band EQ with sweepable low and high mid, eight mix buses controlled by rotary knobs, linear fader controlling 'left and right' buses and two auxiliary sends. The desk can be configured in a variety of ways depending on the mode of operation required. The linear faders, for example, can operate as overall channel masters. A simple electronic assignment system allows any of the bus summing stages to be routed in any order to the main outputs to suit set changes, ease of working and so on. For example, mix bus 1 could be routed to output 1, then output 5 then output 9 in the time it takes to press a switch. Other features include unbalanced insert points and direct outs on each channel and output, switchable VU and peak LED segment meters, two auxiliary returns and comprehensive talkback facilities.

Of interest to hard-pressed engineers was the MicroAudio *UA2800* automatic digitally controlled ⅓-octave graphic equaliser/real time analyser. The *2800* features 28 bands on ISO centres (31.5 Hz to 16 kHz) with LED display of amounts of boost or cut per band. The equaliser is adjusted by up/down buttons for each band and up to 16 settings may be stored in memory. The unit can also average EQ and RTA curves (up to eight) with various degrees of weighting. When time is short the automatic mode can be very useful: the *2800* can either equalise 'flat' or to a pre-stored curve in 30 to 40 seconds. Other features include eight RTA memory settings, pink noise generator, balanced and unbalanced inputs and outputs, microphone preamp with 48 V phantom and second order filters with ±12 dB range.

For permanent installations, the *UA2800* can be used with an accessory EQ POD, where curves can be downloaded from the equaliser into a tamper-proof unit.

Midas reminded us all of their existence with the definitive version of the *XL* range of mixing consoles. Available in standard frame sizes of 24, 32 and 40 inputs (also a 16-input extender board), the *XL* provides eight subgroups, main stereo outputs, eight auxiliary sends, eight echo returns, 2-way matrix from groups, eight mute groups and flexible 4-band EQ. Other features include balanced insert points on inputs, outputs and sends and stereo record outputs for when the band want a cassette. Useful is the fader reverse function on the subgroup modules which routes the auxiliary buses to the group faders and the group buses to the auxiliary masters. This means that the console can be used for front-

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NEWS

of-house mixing or as a 10 mix plus stereo monitor console. To fully meet the latter function, Midas have incorporated a full communications section complete with engineer's monitor output.

Mitsubishi now have a slightly smaller version of their super woofer in the *D-80*. This uses a 32 in (80 cm) speaker for a usable frequency response of 10-500 Hz with peak power capacity of 2000 W from 50 Hz. Dimensions are 39⅜×47¼×30¾ in/ 1,000×1,200×782 mm.

Rane showed an updated version of their *GE 30* constant-Q graphic equaliser. This features 30 bands with switchable +12 dB/−15 dB boost and cut or −20 dB cut only, high and low pass sweepable filters, balanced in and out and new circuitry that enables adjacent filters (or bands) to combine in order to centre on any frequency between the two bands for ultra-precise control. The actual centre frequency is found by tuning the response of either of the two sliders to 'nudge' it into position. Q response is only slightly degraded with a minimal increase of boost or cut.

Samson presented their *Concert TD* series of wireless microphones incorporating dbx noise reduction, a combination of systems *I* and *II*. Coupled with true diversity receivers, the Samson represents a step ahead in quality wireless microphone performance with a dynamic range approaching 100 dB, less transmission noise and complete absence of breathing.

Shure showed their first wireless microphone system. The *W25DR* receiver uses what Shure call 'Diversiphase' which maximises antenna gain by constantly monitoring the signals from both antennas, locking them into phase to avoid out-of-phase cancellations and then summing them together. Other features are precision compander circuitry and finely tuned linear-phase filters to ensure a clean signal and freedom from interference from stray sources. Dynamic range is 98 dB typical (A-weighted). For situations where diversity operation is not necessary, Shure offer the *W20R* receiver, which includes the same performance as the *W25DR* but without 'Diversiphase'.

Turbosound introduced the *TFM-2* stage monitor based around a co-axial 15 in driver using Turbo loading devices in a compact cabinet, together with a rear-facing 15 in low frequency driver crossing over at about 100 Hz. The new design is claimed to give improved clarity and projection compared to normal wedge systems, speaking of which, Turbosound also showed the definitive version of their low profile stage monitor with two 15 in drivers and V-horn with proprietary 2 in compression driver.

Also on show was the new *V-2* loading device which combines two high frequency drivers smoothly into one horn. The *V-2* will be fitted into all future *TMS-3* enclosures and will also be available as a retrofit to existing systems. The *V-2* is said to offer greater power handling, a smoother, more extended high end coupled with an overall improvement in sound quality.

Passing to the other end of the spectrum, the *TSW-124* sub-bass system has now been upgraded with the new *LS-2403* 24 in loudspeaker. The new driver features a 6 in voice coil, extremely rigid frame, 600 W RMS power handling and frequency response down to 15 Hz. Existing *TSW-24*s can be retrofitted with the new speaker.

Yamaha introduced a plethora of new equipment of which probably the most interesting to professional users are the *PM1800* mixing console and *DMP7* digital mixing processor.

The *PM1800* contains many of the features of the *PM3000* and is available in configurations of 16, 24, 32, 40 input channels with eight subgroups, stereo bus, four auxiliary sends (which will probably be increased to eight), 8×4 matrix and eight master mute groups. Each channel features 4-band sweep EQ and sweepable high pass filter. The console also features extensive cue/solo functions enabling easy setup and monitoring and input flexibility is enhanced by four stereo returns with full routing.□

Tape for the future

Although there is an increasing number of alternative formats vying to be a recording medium for professional use, magnetic tape is still the most cost effective and practical. It is, however, difficult to see what improvements might be made to tape in its current formulation to keep pace with future requirements of audio recording.

One possible clue to future direction comes from research undertaken at the London-based Institute for Industrial Materials Research. In a recent issue of the *IMR Journal*, Dr John Carson, a research co-ordinator for IMR described some particularly interesting research areas. With permission from the *IMR Journal* we have summarised and quoted quite liberally from Dr Carson's article and future possibilities begin to emerge.

The IMR undertake specialised industrial research which is outside the capabilities of general industry. While undertaking research for a paint manufacturer in the area of alternative colour base materials they made some discoveries that have wide future possibilities. Put simply inanimate materials will always have shortcomings as they cannot adapt to changes in their surroundings for example a solid covering material will crack if what it covers starts moving. Research was aimed at producing an 'intelligent plastiser that would remain flexible and adapt. The possibilities of inducing a cellular structure similar to living organisms within non-living materials, such as the plastiser were investigated but the results were unpredictable.

The next step was to see if the area of genetic engineering offered any assistance. The current excitement is that suitable cell types for future research have now been found and that work is now beginning in specific applications areas. For instance cell type AP-52432/ST has shown promise with an ability to ingest large quantities of non-biological materials and still function as a living organism. Further important is that it is possible for the cells to chain and so form sheet like single cell thick layers. These cells also respond to external stimuli from their surroundings and so can be manipulated by use of the right tools. One important aspect of AP-52432/ST is both an affinity for iron based compounds while accepting polyurethane polymers as a habitat. So here we have the makings of a future intelligent tape.

Just imagine then a future tape that looks the same as current tapes but by certain techniques it will be possible to have flexibility far beyond current use. There is no proven effect of a magnetic field upon AP-52432/ST although this is unimportant as a magnetic field would realign the cell by acting upon the iron oxide that the cell had ingested. Experimental work has shown that the cell network will withstand temporary stress and then realign its original structure perfectly and additionally temperature seems to not be a major performance factor certainly at levels that would be acceptable to humans.

The exciting aspects include such possibilities as being able to alter the recording characteristics of a tape by use of catalytic chemicals and also the possibility to manipulate signals on tape in a similar way to the time slip of track and against track as used on disk based systems. By the use of a shadow mask and a bright infra-red source the 'tape cells' can be made to migrate along the tape base to a predetermined position without breaking up their signal structure and hence move recorded passages in time. Other exciting possibilities are obviously in the area of copying where cloning techniques may offer some spectacular results.

As with all new technology there are some unresolved factors as yet. The first is that all living structures have a limited life span and it may be that recording will only be possible on new tapes—the introduction of a 'use by' date although there is obviously no research data on how long such materials would last. The other two activities of living organisms eating and excreting may also present a problem. Being micro organisms cell AP-52432/ST food intake is very small and could be taken from atmospheric odours particularly those rich in nitrates such as well rotting compost or even cow dung which luckily would not need to be applied to the tape but from a container in close proximity to the tapes. There may even be adapted tape machines which actually 'spray' these products on the tape as you are recording. We understand that the excreting aspects of the cells is also very small and an occasional wipe of tape heads with a piece of toilet tissue should be sufficient. So maybe we will see a new roll for the tape-op—feeding and cleaning the tapes. The tape library may never be the same again.

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ENSONIQ

By Paul D Lehrman

Don't get into hardware. If you're thinking of starting a company in the music industry in America or Europe, that's what everyone will tell you. There's no way, the conventional wisdom goes, that Western firms can compete on a manufacturing level with the huge conglomerates of Japan and Korea. Even if you can stay ahead in the R&D department, within months they can figure out how to make anything you design, better and cheaper.

Against this shines one of the fastest growing new electronic musical instrument companies. It's located 45 minutes from the city of Philadelphia in the rustic town of Malvern, Pennsylvania.

Ensoniq Corporation was founded in 1982 as Peripheral Visions Inc (PVI) by four refugees from Commodore Business Machines: D Bruce Crockett, Al Charpentier, Bob Yannes and Charles Winterble. They had worked on the design of the 6581 SID (Sound Interface Device) chip, which gave the company's *C64* computer its advanced (for the time) musical abilities. PVI's first musical product was a peripheral card called the *DrumKey*, which turned an Apple *II* computer into a drum machine. Although the sounds were on the weak side, and there was no way to interface or sync the system with any other devices, the software for progamming patterns was a breakthrough.

Although the *DrumKey* had a short life span, it was a start in the right direction. In the meantime, the team staged a successful campaign to raise venture capital for their real goal: the development of a VLSI chip that could handle sound sampling and synthesis in a truly professional way. That device, now known as the Q-chip, was revealed to the world in December 1984 as the heart of the Ensoniq *Mirage*, which at the time was by far the least expensive sampling keyboard ever produced.

The *Mirage*, which dared compare itself with the *Emulator* and the Fairlight *CMI*, gained much notoriety from the outset but was slow to become accepted. One problem was its spongy keyboard, which Weber admits today was unacceptable to many players (and which others have referred to as 'a dog'), and it was changed in later production runs. "Unfortunately," says Weber, "the new keyboard doesn't fit in the old case." Fortunately, none of the earlier models were distributed in Europe.

There were also problems with the software, which made recording and loading sounds a cumbersome process, and with the sound quality itself. Certain aspects of the MIDI implementation had to be changed to make the unit more compatible with other synthesisers. Finally, as with any sampler, it took time for the company and the users to put together a decent library of sounds, and for software to be developed (mostly by third parties) that could use external computers to take full advantage of the machine's capabilities.

Today, however, the instrument is proving a tremendous success for Ensoniq. By November 1985, all the problems had been dealt with, and by December 1986, over 20,000 *Mirages* had been sold (including a keyboardless, rackmountable version, known as the *Multi-Sampler*, which came out 1985). Software programs for sample editing are now available for use with most popular micros. The company sells two dozen disks of sampled sounds, and active users groups in several countries have many more. In January 1987, the company came out with a new model of the unit, called the *Mirage DSK*, which features stereo outputs, and is totally software compatible with the older model, at a price $400 lower.

Mirage is not the type of instrument a newcomer would buy. "It's not a user's first keyboard," says Weber, "partly because you can't change sounds quickly in a performance." As with any sampler, loading disks takes time. "It's more like a third keyboard."

On the other hand, another product based on the Q-chip, released in January 1986, is getting a tremendous response. The *ESQ-1* is a wavetable synthesiser, with a sophisticated on-board sequencer and 8-voice polytimbral capability. "It appeals to a much broader base," says Weber. "About 75% of the people who buy our products are pros or semi-pros but we also appeal to people who played music when they were kids. They got a cheap Casio or Yamaha synth, and realised the potential of what they could do, so they've come back to the store looking for something better. Our biggest problem," he adds, "is that we can't supply them fast enough." This year the company has introduced a rack mount version of the synthesiser, but without a sequencer.

Also based on the Q-chip is the *SDP-1* digital sampled piano. With 76 specially weighted keys, "it's mostly for people who want the feel of a piano, with a wider range than a typical synth," explains Weber. "It's for home users, and lounge performers—people who want to replace their *Rhodes*." The *SDP-1* weighs only 44 lb and provides a range of sounds including electric piano, marimba, vibes and left-hand bass. "In its original form we tried to make it sound like a concert piano but now we're brightening the sound a little to appeal more to rock-and-rollers. People who want a more traditional sound can always EQ it down." A rack mount version of the *SDP-1* also became available recently.

From a technical standpoint, the Q-chip is the key to Ensoniq's success. "An unusually high proportion of our income goes to R&D," says Weber. "The centrepiece of the company is VLSI and software design, based around the idea of putting as much as possible on a chip, and making PC board assembly as easy as possible. The cost of assembling the PC board here is the same as it is in Japan."

So far the chip, which contains the equivalent of some 20,000 discrete devices, has undergone only 'minor fixes' since it was first put in production. Since the design is entirely in-house, the company could make its own decisions about how to optimise the chip's performance and longevity, and also realise some valuable economies of manufacturing.

The company maintains a European office in Holland, under the direction of Felix Visser, where all sales and support are handled independently of the US operation. Ensoniq Europe have also recently opened offices in London and Germany. Manufacturing for European markets is all handled in Italy, and the parent company also maintains a Japanese manufacturing facility for sales in that country. All other markets including Canada, Australia, and the rest of the Far East, are handled from Pennsylvania.

The Pennsylvania operation has a staff of 135, while the European arm employs another 25. Not only did they turn over $20 million in 1986, the company announced late last year a deal that made them the envy of the industry. They licensed the Q-chip to Apple for use in the *IIgs* (Graphics and Sound), the computer company's latest product for the home and educational markets.

"Apple started working on the *IIgs* in mid-1985," says Weber. "At the time, Bob Yannes called up Steve Wozniak (Apple founder) to tell him about the chip. After that, we all talked for a long time about how to integrate it." Although the chip Apple is using is identical to the one in Ensoniq's products, the *IIgs* is not 'a *Mirage* with a monitor'. For one thing, the computer dedicates only 64K of RAM for wavetables and other information the sound driver needs, as opposed to the *Mirage's* 128K RAM, and Apple has only provided operating system access to half of the chip's 16 potential voices—anyone wanting to write sofware that will make use of the other half will have to develop some kind of peripheral card that will connect directly to the chip.

Despite these drawbacks, the *IIgs* promises (on paper, at least) to have the most outstanding musical qualities of any personal computer; and although the software that will take full advantage of the computer's sonic capabilities is not yet on the market, a number of third-party developers have some exciting projects underway. For Ensoniq, one of the best aspects of the deal is that they will be able to just sit back—all the developer support, says Weber, is being handled by Apple.

All this growth has forced expansion, and Ensoniq is now about to move into its third location within the same industrial park. The current facilities, which have served since September 1984 (before the *Mirage* was introduced), consist of 16,000 ft² of manufacturing space, with another 15,000 for warehousing. With the company bursting at the seams, they are set to move into 71,000 ft² of space. Of course, if they manage to keep their current rate of growth, they may have to move again in only a couple of years.

Manufacturing floor at Malvern facility

Photo: Paul D Lehrman

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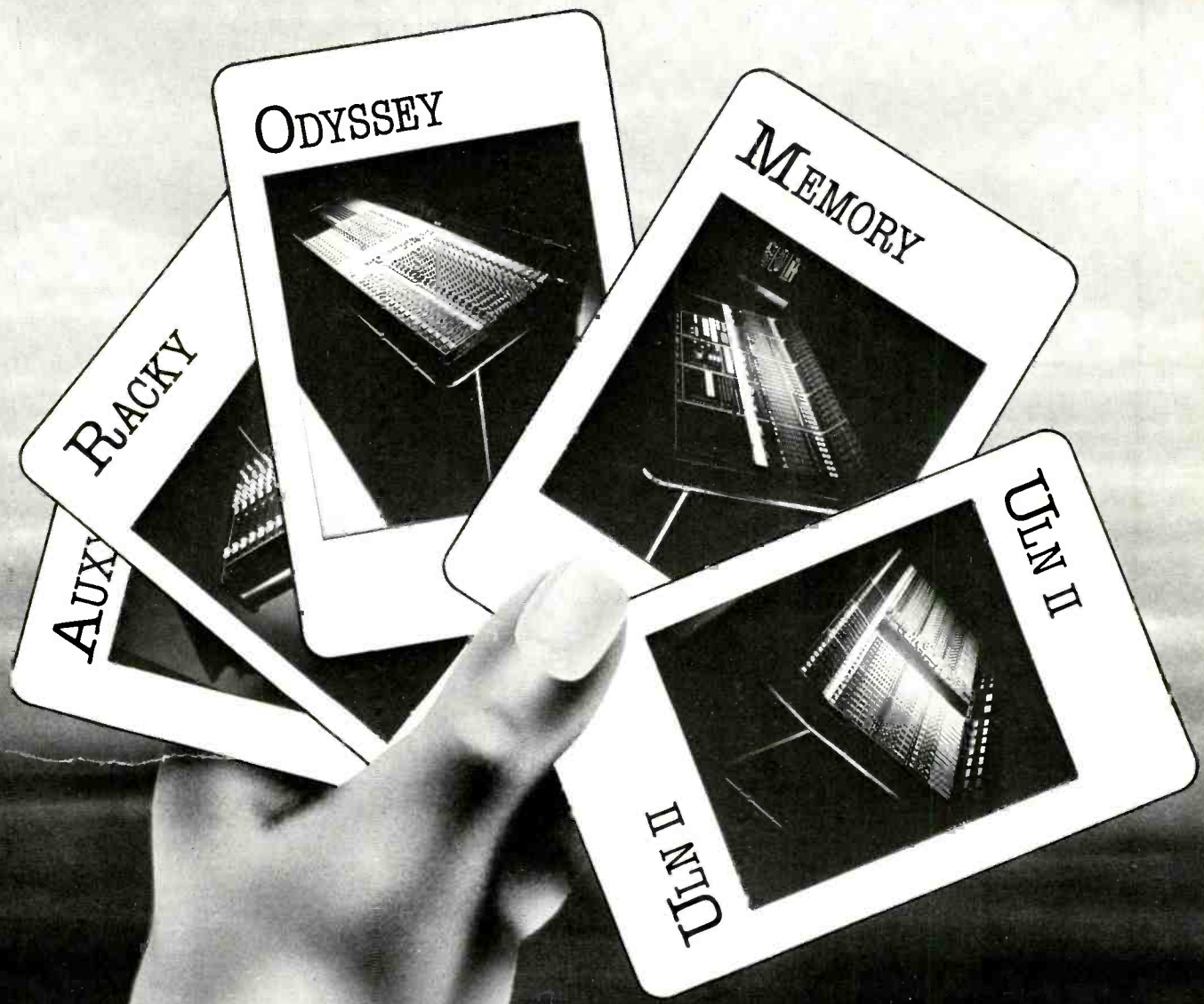

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MUSICAL INSTRUMENTS AT NAMM

By Harold D Osborne

For three days in January, the National Association of Music Merchants held their Winter show at the Anaheim Convention Center, just south of Los Angeles. By most accounts, it was not an earthshaking event. Few new products of truly momentous import were in evidence, and more than one trade magazine writer was heard mumbling, "I'm not going to bother doing an article on *this* show!"

Those worthies not withstanding, there were plenty of interesting things to see in Anaheim but rather then embodying revolutionary new concepts, many of the products that generated the best response were upgrades or improvements of previously existing items—demonstrating that the musical instrument industry is occasionally willing to slow down and let the market catch up to the technology.

A typical example of that attitude was at Yamaha's corner of the hall, where they are still finding new ways to milk their rights to FM synthesis. The show marked the death of the absurdly popular *DX7*, but two fit successors were on display: the *DX7 IID* and *DX7 IIFD*.

The 'D' stands for 'dual'—like the old *DX5*, the *DX7 II* is almost the equivalent of two *DX7*s (but with only 16 voices total), with split and layered modes, and stereo outputs with programmable panning. The 'F' stands for a built in 'floppy' disk drive, which uses standard 3½ in disks for storing voices and configurations. One demonstrator was prattling on that the sound of the original *DX7*, compared with these new units, could be likened to "playing the old *DX7* with three operators turned off". The *DX7 II*s also feature tunable scales, two assignable slide controllers, and improved D/A converters for lower noise. And, of course, the new units are voice-compatible with older *DX7*s. The prices are slightly more than the original *DX7* when it first appeared.

For older *DX7* owners, Grey Matter Response, the American company that makes the *E1* upgrade, was showing *Rev 2.0* of the system, in the 'software ghetto' in the furthest back room of the convention centre. The new *E1* features 16 user definable scales, storage of up to 320 voices, completely mappable controllers, and a MIDI implementation that is mind boggling in its completeness. Although some of the impact of the *E1* has been blunted by the introduction of the new *DX7*s, Grey Matter swore they would keep up, and were talking about designing upgrades for the new models, as well as for the *TX7* and *TX816*.

Back in Yamaha's corner, another new product was the *TX81Z*, a rack mountable synthesiser module that some were calling 'the *FB-01*'s big brother' but which is actually a lot more than that. It uses four-operator FM synthesis and is voice compatible with other Yamaha four-operator synths like the *DX21* but unlike those instruments, the operators can be one of eight different wave forms—not just sines—which can increase the complexity of the resulting sounds enormously. The technique is not dissimilar to, although potentially far more complex than, Casio's Phase Distortion synthesis. Like the *FB-01*, the *TX81Z* is capable of 8-voice polytimbral operation. It can also be tuned in non-standard scales, and has several on-board effects, including panning, reverb, automatic chords and 'transposed delay', which is a variation on the 'chase play' function found in some Roland gear.

But despite the new hardware, the most interesting announcement from Yamaha was that the new units being shown were ready for delivery to dealers in the US. In the past, Yamaha has shown its new products first in Japan, then started shipments to domestic customers, *then* shown them in North America and Europe, and finally—often six months after the initial introduction—started shipping to the West. That time lag has now apparently been cut to about six weeks. A spokesman for the company said they intend to keep to this new policy, which is not only welcome news to non-Japanese customers, it will also undoubtedly cut down on 'grey market' imports of Yamaha products.

Roland are another company that can always be counted on for an interesting NAMM display. At this show they featured the *D-50* synthesiser, which uses a hybrid technique the company calls 'Linear Arithmetic Synthesis'. Each voice consists of two wave forms, which can either be one of 100 on-board PCM samples, or a sawtooth or pulse wave treated with a real time digital filter. The signals can be mixed 'live' with a joystick, and a fair amount of on-board digital processing is provided. The unit can produce up to 16 voices and it has facilities for stacking and splitting sounds, or functioning as two separate synths through MIDI's mono mode.

Roland were also showing several new synth modules. The *MKS-100* is an *S-10* sampler in rack mount form, with 12-bit, 30 kHz sampling, eight voices, and extensive MIDI implementation. The *MKS-70* is the module version of the 12-voice *Super JX* synthesiser, and the *MKS-50* is the equivalent of the company's *Alpha Juno* line.

Casio were busy demonstrating and explaining to packed houses their first full-blown sampling synthesiser, the *FZ-1*, which is scheduled for delivery in April. The unit features true 16-bit linear sampling, with adjustable sampling rate up to 36 kHz. At that rate, maximum sample time is 14.5 s, which can be doubled with the addition of an optional RAM board. Up to 64 sampled wave forms can be stored at a time, with individual envelope and loop settings, and the voices can be mapped across the keyboard and across MIDI channels. A 3½ in disk drive is included but the unit's most unique feature is its built-in 64×96 LCD screen, which uses technology borrowed from the company's miniature televisions, for on-board wave monitoring and editing. US price will be about $2,200, which means that Casio is no longer fanatical about being the cheapest guys on the block.

Ensoniq were showing the new version of their *Mirage*, the *Mirage DSK*, which features stereo outputs and a new low price, as well as the long awaited rack mount version of their *ESQ-1* wavetable synthesiser. Kurzweil similarly announced lower prices (for the first time in the company's history) and a new rack mounted version of the *250* expander dubbed the *250 RMX*. Kurzweil were also showing their model *150*, which they are now calling a 'Fourier synthesiser'. It is an additive-synthesis machine with up to 240 partials, which may not necessarily be harmonically related, per voice. One of the pioneers of computer music, Hal Chamberlin, recently joined the company, and was showing his new *Apple II*-based editing program called *Sound Lab* for the *150*.

Hybrid Arts were showing their *ADAP* sampling system (for the second time), which as of the show was still not quite ready to ship. *ADAP* is a 'black box' that hooks on to an Atari *1020ST* computer. It features stereo inputs and outputs; CD-compatible 16-bit, 44.1 kHz sampling; 8- to 12-voice polyphony; and 20 s of storage at the highest sampling rate, which is expandable to over one minute with additional computer RAM. Up to 64 multi-samples can be stored and accessed through MIDI. The company is providing extensive software support for the system, and some of the features being implemented include: visual editing; freehand wave and envelope drawing; algorithms for pitch bend, vocoding, and reverb; and support of both the new MIDI Sample

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Dump Standard and the Digidesign file format, for easy transfer of files to and from other samplers.

Oberheim have also jumped into the sampling world, with an unusual product that doesn't record anything but will play back samples recorded on an *Emulator*, a *Prophet 2000*, or a *Mirage*. The *DPX-1* has two disk drives for the different sized disks used by the various manufacturers, and it can also get samples via MIDI through the Sample Dump Standard. It maintains all multi-samples, loop points, controller assignments, etc, of the original instruments, and uses 12-bit linear sampling for a claimed dynamic range of 72 dB. (The display even blinks when a *Mirage* sample is being loaded, just like the real thing.) The price is $2,000 but immediately after the show, the company announced that, due to heavy customer demand, a kit will be made available for about $200 that will give the unit—which comes with a single audio output—separate audio outs for each of its eight voices.

Another sign that MIDI is maturing was the plethora of non-keyboard controllers at the NAMM show. Demanding the most attention were the guitar controllers but there were other alternatives as well.

The Ovation/Takamine *GTM6* is an impressive, full-featured guitar system, with individual string-sensitivity adjustments, three foot pedals, programmable pitchbend and transposition, a hold function for drones and sustained chords, three separate program chains, and a built-in 1000-note sequencer. Unfortunately, it is designed to work only with the company's own instruments. An entire system (including the guitar) costs between $2,200 and $2,700.

Not so the Canadian-made IVL *Pitchrider*, which is now being distributed by DOD Electronics. The new *Pitchrider 7000 Mark II* comes with a hexaphonic pickup for installation on any guitar. It also provides programmable pitchbend, transposition, and hold functions, as well as dynamics scaling. A foot pedal for controlling most of the functions is optional.

K-Muse, whose *Photon* guitar-to-MIDI system is normally available as a modification for conventional guitars, was showing a purpose-built controller called *Hyperspeed*. The company has realised that one way to get around the long response time of the lower strings of a guitar controller (since those strings vibrate more slowly, they take longer to analyse), is to use six high E strings. Therefore, the *Hyperspeed* has no audio output, just MIDI. It's a little strange to play, in as much as you can no longer tell the strings apart by the way they feel, but it is fast—the company claims the system will respond in one single vibration of the string.

Another guitar controller that was making its debut was the Stepp *DG1*, which was sharing a booth (and an American distributor) with Simmons. Like the *Hyperspeed*, the *DG1* uses six strings of the same light gauge, and has no direct audio outputs. It is more than just a MIDI controller, though: an attached module contains a 6-voice, 2-oscillator subtractive-style synthesiser, which is addressed directly from the controller, not through MIDI. The synthesiser allows various playing techniques, along with an LFO and two envelope generators, to be used as modulation sources (not unlike some Oberheim synths), so the sonic capabilities of the instrument are surprisingly varied. The synthesiser's response to the controller is extremely fast, due in part to the fact that there is no intervening MIDI conversion, and in part to position-sensing frets mounted in the neck, which require only the presence of a finger (not necessarily a string vibration) to trigger. Stepp haven't forgotten the MIDI interface: the six strings are each mappable to a separate MIDI channel, and the aforementioned modulation sources can be mapped to a wide range of MIDI controllers. In addition, the synthesiser module can be played externally from MIDI.

Zeta Systems of California were showing a number of products, including their various MIDI violins. Available in 4- and 5-string classical or jazz models (the latter have 'cutaway' bodies), the instruments are available as plain-vanilla electric violins, or with an effects preamplifier that includes two sets of frequency dividers, or with a MIDI interface, manufactured for the company by the aforementioned IVL. The system's response is surprisingly quick, and the interface seems quite agile. The company is aiming its sales pitch at traditional violinists as well as jazz and rock players, and will probably do well.

Finally, Fairlight Instruments were exhibiting in a low-key booth, in a room off to the side of the main hall. The focus of their display was the *Voicetracker*, which boasts new software. Newly implemented are mappable harmony, which allows the user to set up different chords to be generated with each note of the scale; a 'soft' footswitch for controlling various functions; re-articulation of MIDI notes controllable by a threshold setting on the input; programmable velocity scaling; and a fully functioning, reasonably decent-sounding on-board synthesiser.

The changes aren't major but they are important, and the unit works and feels a lot better than earlier versions—which means that it fitted right in with the general feeling at the 1987 Winter NAMM show.□

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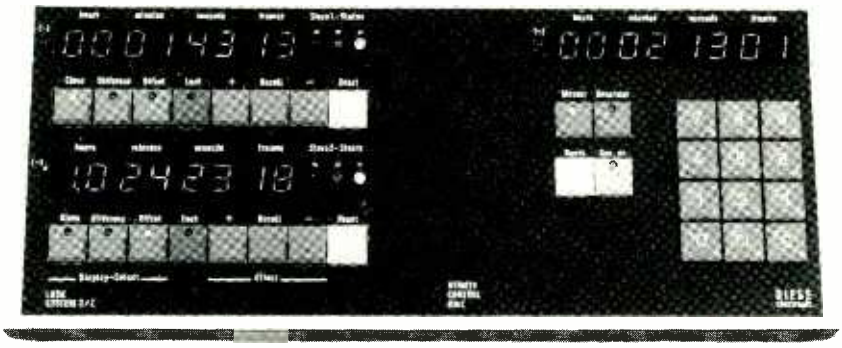

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MUSIC NEWS

Simmons SDX electronic drumkit

Simmons have developed a new range of electronic drumkits which incorporate a number of new and interesting features. The *SDX* series feature 'zone intelligent' drum pads which sense the point of contact and the force used and provide a response similar to that of an acoustic drum. The pads break with the tradition of using piezoelectric transducers to sense how hard the pad has been struck and use instead a resistor pattern printed on to the surface of the drum pad. The technique is similar to that used on computer graphic drawing pads.

An 8 Mbyte random access memory controlled by a semi-custom CMOS chip makes optimum use of the memory capacity to store output signals and voices. The internal memory can be expanded by using a disk drive and SCSI port.

The number of voices varies but up to 16 are apparently available on the top of the range kit. Each voice has five programmable envelope generators for detailed control of sample playback frequency (pitch), filter cut off frequency, noise, amplitude and output mix.

Other features include 16 bit, 44.1 kHz sampling, tracker ball controller and a built-in VDU to assist with programming and editing.

Simmons Electronics Ltd, Alban Park, Hatfield Road, St Albans, Herts AL4 0JH, UK. Tel: 0727 36191.

USA: Simmons Group Center Inc, 23917 Crastsman Road, Calabasas, CA 91302. Tel: (818) 884-2653. **CAS**

TOA

TOA announced three new products at the Frankfurt Music Fair. The *D3* is a four stereo input keyboard mixer for semi-pro use; it is a 1 U 19 in rack mounting device with auxiliary send facilities.

The *310D* is a digital effects unit with a 3-pattern memory. It features three delays and can produce chorus and flanging effects.

The *KD* keyboard combos comprise three models of 50 W, 100 W and 150 W. Each one uses 2-way speakers. The basic model is the *KD-1*, while the *KD-3* has a similar mixer specification to the *D3*.

UK: TOA Electronics, Hutton Industrial Estate, Brentwood CM13 1TG, Essex. Tel: 0277 233882.

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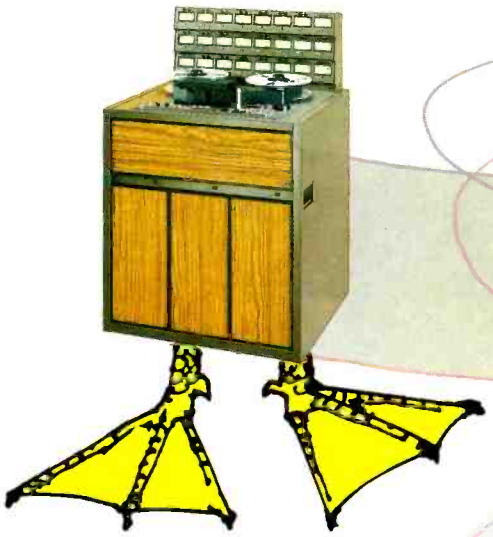

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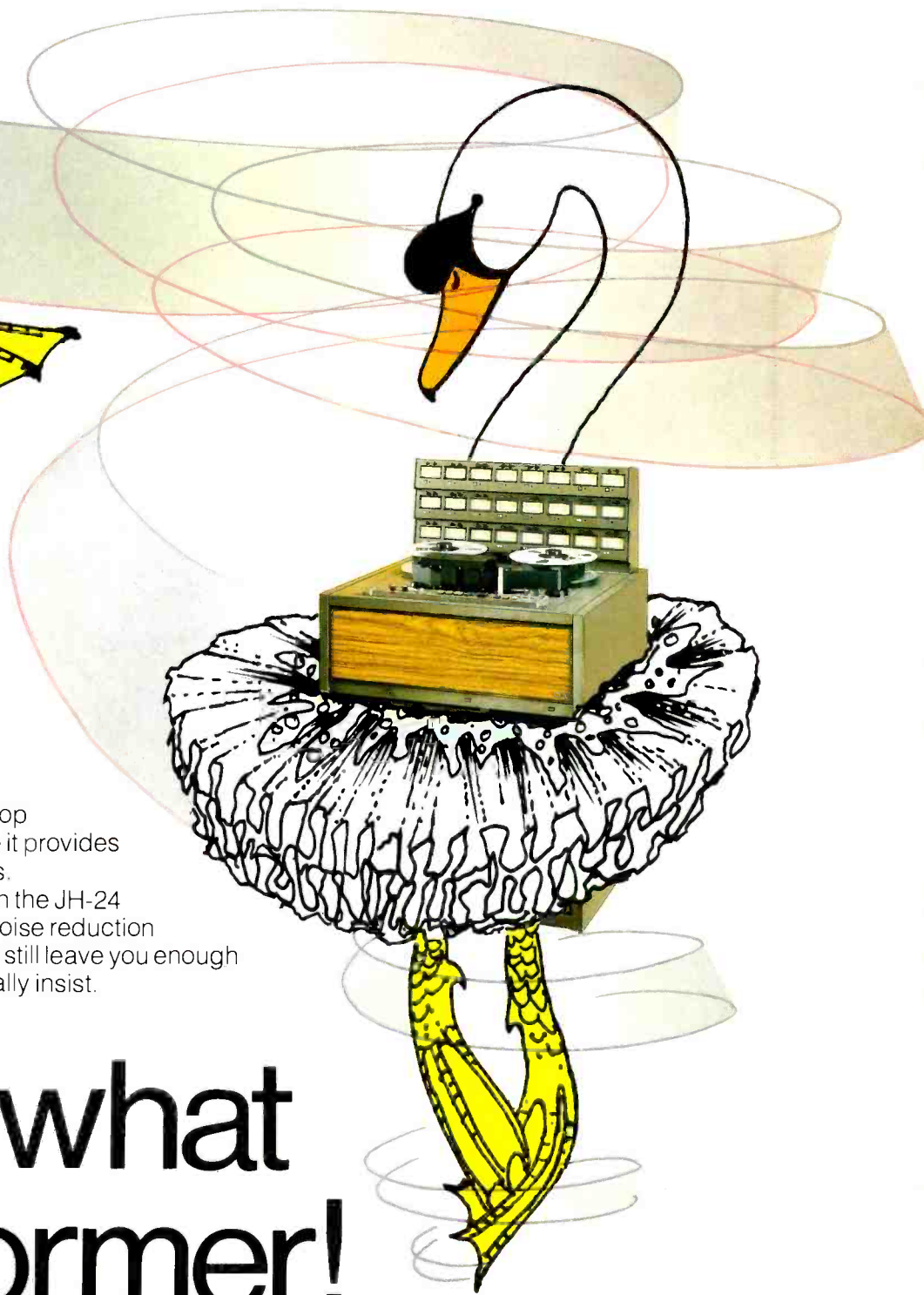

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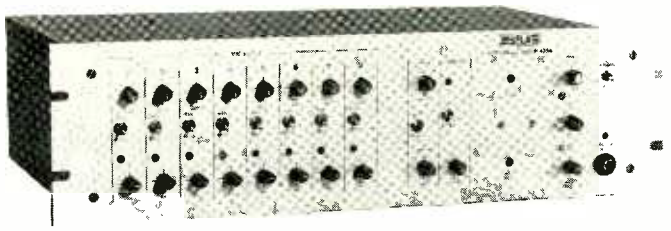

Above: Sela 4258-AT automatic mixer

Below: TDM 24 CX-2 electronic crossover

NEWS

Mitsubishi X-400 digital recorder

The Mitsubishi *X-400* is a 16-track, PD-format digital multitrack recorder aimed primarily at the post-production market. It features the same cut and splice editing technique as the *X-850* and has a full range of interfaces for synchronised VTR operation. In addition to the 16 digital audio tracks there are four additional tracks on the *X-400*: one for timecode, two auxiliary analogue and an auxiliary digital track. With a special interface, computer mixing data can be stored on the Aux digital track.

Basic specifications include ½ in, 30 in/s (1 hr recording with 14 in reels); 48/44.1 kHz sampling frequency; 16 bit linear; 90 dB (unweighted, RMS dynamic range); less than 0.05% distortion (50 Hz to 20 kHz). External clock interfaces include 9.6 kHz (VTR sync); 59.94 Hz sync; 48 kHz; 44.1 kHz and composite video (50 or 60 Hz). The *X-400* can interface on RS422 (SMPTE/EBU) standard ES bus protocol), RS232C control and BCD code output.

The remote autolocator includes digital peak reading meters with complete freedom to preset channel groupings and specific channel setups; up to four 16-channel setups can be stored in the internal memory.

UK: Mitsubishi Pro-Audio Group, Unit 13 Alban Park, Hatfield Road, St Albans, Herts. Tel: 0727 40584.
USA: Mitsubishi Pro-Audio Group, 225 Parkside Drive, San Fernando, CA 91340. Tel: (818) 898 2341.

TDM 24 CX frequency dividing networks

Two electronic crossovers are available from Tim Miller Design. The *24 CX-2* is a stereo 2-way frequency divider and the *24 CX-4* is a stereo 3- or 4-way device. The units have been specifically designed to be lightweight and ultra quiet and feature 4th order Linkwitz-Riley filters and a flat summed electrical response throughout the crossover region.

Both units can be used in either balanced or unbalanced modes. Crossover slopes are 24 dB/octave and each unit contains built-in constant directivity horn EQ (+3 dB at 3.5 kHz rising at 6 dB/octave to 22.5 kHz). The external power supply is said to provide extremely low noise (102 dB) and stable regulation. The two units are UL listed and come complete with a see-through security cover.

TDM Design, Rt 1, Box 573, Hillsboro, OR 97124, USA. Tel: (503) 647-5957.

Sela 4258-AT automatic mixer

Swedish company Sela have introduced their third generation automatic mixer—the *4258-AT*. The basic unit provides eight mic inputs (suitable for all types of mics, line inputs, all control amps and outputs) and can be used in conjunction with a 16-channel sub mixer (*4258-AT/16*) in order to extend the system.

Each channel of the *4258-AT* is electronically balanced (inputs and outputs) with 48 V powering and automatic or manual level control of the programme signal level. Other individual channel features include peak limiting with programme controlled recovery times and de-ess function; a 10 μs peak controlled gate function with exponential attack and recovery time and with 36 dB attenuation and full auto threshold level control.

Included in the basic *4258-AT* are two balanced line inputs, two direct outputs with separate level controls and one line output with master level control. An optional filter unit is available (*4258-AT/BR*) which provides a 2-step sweep band reject filter with variable Q, depth and frequency. The *4258-AT* and one submixer can be powered from the basic unit: additional sub units are powered from their own power supplies.

Sela AB, Gubbangstorget 119-Box 6018, 122 06 Enskede (Stockholm), Sweden. Tel: 08-94 02 70.

Yamaha PD2500 power amplifier

Yamaha have developed a new power amplifier which, due to the high frequency switching power supplies (125 kHz), provides high power levels in a small, lightweight package. According to the manufacturer's specifications the *PD2500*—which is 2U high and weighs 26½ lbs—has a power output of 250 W/channel into 8 Ω, 360 W into 4 Ω and in bridged mono mode 500 W into 16 Ω, 700 W into 8 Ω and 1000 W into 4 Ω.

The amplifier features dB calibrated, 31-detent input attenuators and individual channel LED Clip (indicating 1% or more THD) and LED Signal (showing 2 V or higher at the output) indicators. Two other LED indicators show power on and protection in use. Protection is comprehensive and includes a switch on muting circuit, DC sensing, thermal protection, ultra low frequency sensing and PC limiter.

According to Yamaha the unit is designed to work comfortably with low impedance loads. In addition the 125 kHz switching is claimed to alleviate problems that could be caused by interaction of the switching frequency and the bias frequency when replaying tape signals.

The *PD2500* is provided with balanced inputs and the 2-speed crossflow cooling fan enables close rack mounting of several units.

UK: Yamaha-Kemble Music (UK) Ltd, Mount Avenue, Bletchley, Milton Keynes, Bucks. MK1 1JE. Tel: 0908 71771.
USA: Yamaha International Corp, PO Box 6600, Buena Park, CA 90620. Tel: (714) 522-9105.

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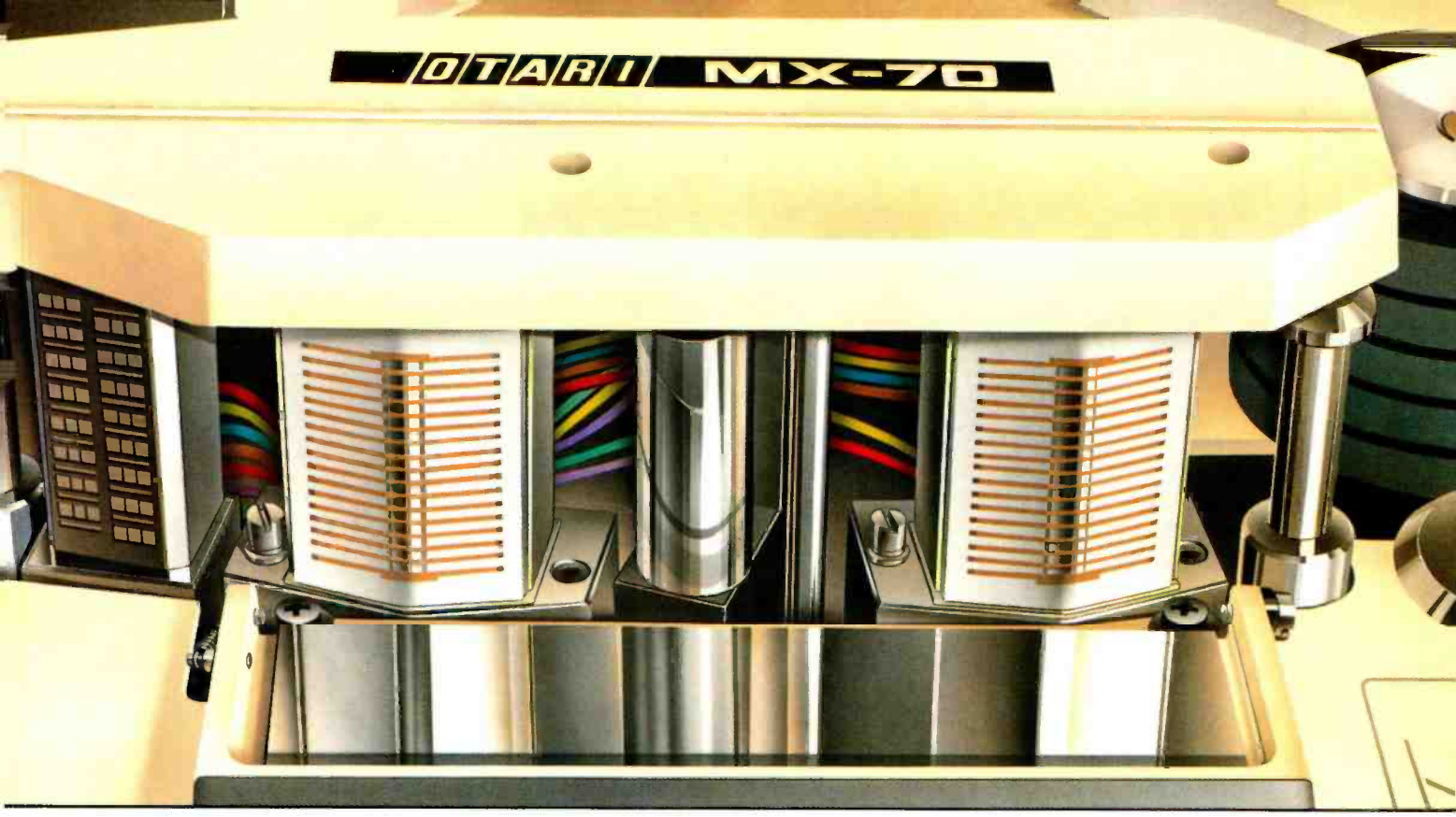

IT MAKES TAPE MORE FLEXIBLE

Otari would like to draw your attention to a remarkable new recorder. The MX70.

The MX70's microprocessor-controlled tape transport, closed-loop tension control and real-time tape counters give you instant, accurate tape control. And that gives you more time to do a better job.

The MX70 is designed for ease of use with machine controllers and synchronisers, meeting a variety of standards, including SMPTE. This makes it as valuable in video post-production and broadcast studios as it is in audio recording.

Features like these, and many others, make the MX70 one of the most flexible tools any growing studio could wish for.

But there's one area where Otari's MX70 really does offer the kind of flexibility that no other machine can match. In formats.

The MX70's option list lets you choose between 1" 8-track and 1" 16-track formats. Convert to ½" 8-track. Or even switch between all three options on the same machine.

But while the MX70 sets new standards for flexibility, the men at Otari have stuck rigidly to tradition.

They haven't budged an inch on quality.

OTARI®

For more information on the MX70 or other Otari products, contact

Stirling Audio Systems Ltd., 1 Canfield Place, London NW6 3BT. Telephone: 01-6254515

Otari Corporation
2 Davis Drive,
Belmont, California 94002
Telephone: (415) 592-8311
Telefax: (415) 591-3377
Telex: 910-376-4890 OTARICORP BLMT

Otari Electric Co. Ltd.
4-29-18 Minami-Ogikubo,
Suginami-ku,
Tokyo 167
Telephone: (03) 333-9631
Telefax: (03) 331-5802
Telex: J26604 OTRDENKI

Otari Singapore Pte Ltd.,
625 Aljunied Road,
07-05 Aljunied Ind.,
Complex Singapore 1438
Telephone: 743-7711
Telefax: (743) 6430
Telex: RS36935 OTARI

Otari Electric Deutschland GmbH
Gielen Strasse 9,
4040 Neuss 1
Telephone: 02101-274011
Telefax: (02101) 222478
Telex: 8517691 OTEL D

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NEWS

Tantek Master Matrix

Tantek have recently launched the *Master Matrix* series, an 'electronic' patchbay system designed to supplement a conventional patchbay. The basic *M4100* controller will route 12 audio signals to 16 desinations, the *M4200* expander doubles the capacity (to 24/32). Both units are 19 in 2U high. Control of the system is monitored via a large LCD screen which graphically displays the entire interconnection routing. All external equipment can be user-defined and the software will store up to 99 different patch plans.

Real time re-routing can be controlled by the controller keypad, footswitch, via MIDI or via dedicated remote control unit (*M4300*).

Although MIDI control isn't essential, the system is claimed to offer powerful features for MIDI users. Program Select is used to specify patches but in addition up to 16 MIDI program selects can be 'embedded' in each patch for transmission to other MIDI equipment. In this way an entire MIDI keyboard/effects system can be set up by calling up a single patch on the *Master Matrix* system.

Tantek, Pro Audio Div, Business & Technology Centre, Bessemer Drive, Stevenage, Herts SG1 2DX, UK. Tel: 0438 310120.

Europe & Scandinavia: Musimex, 46a Marlborough Road, London N22 4NN, UK. Tel: 01-881 6060.

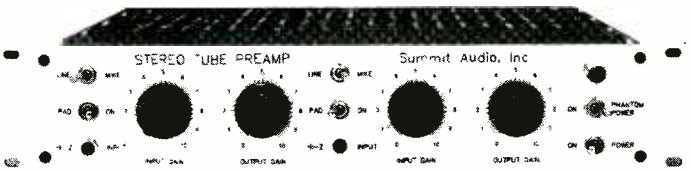
Summit Audio TPA2 preamp

Designed for 19 in rack mounting, the *TPA2* is a stereo valve (tube) preamplifier with mic and line inputs. Both channels feature separate input and output gain controls, switchable 15 dB pad and front panel HI-Z jack inputs for direct connection of guitar or synthesiser.

A switchable 48V phantom power supply is provided and the separate gain controls provide a convenient way to create specific overload effects.

Summit Audio Inc, PO Box 1678, Los Gatos, CA 95031, USA. Tel: (408) 395-2448.

UK: Britannia Row Ltd, 35 Britannia Row, London N1 8QH. Tel: 01-226 3377.



Clyde Beta series mixers

Using a custom designed urethane enclosure, the new *Beta* series of modular mixing consoles conforms to full broadcast specifications and is available as a fully balanced 8/2/1. A range of modules is available including mono mic/line (with or without EQ); stereo phono/line (inc RIAA) and line only input module feeding two discrete outputs for use in VT editing applications. VCA faders are also optional.

The *Beta* can be used in desktop, portable or rack-mounted applications and is fitted with various power supply options including internal mains PSU, external DC supply or internal rechargeable batteries. According to Clyde there is no degradation in performance from the mixer when using the various supply options.

Other features include comprehensive monitoring (VU or PPM); talkback; line up oscillator; auto-speaker mute; fader switches for remote starts etc; two balanced Aux outputs; inserts and direct outputs on all channels.

Clyde Electronics Ltd, Unit 45, 3 North Avenue, Clydebank Business Park, Clydebank G81 2LA, UK. Tel: 041-952 7950.

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Neve V Series – when only the best is good enough.

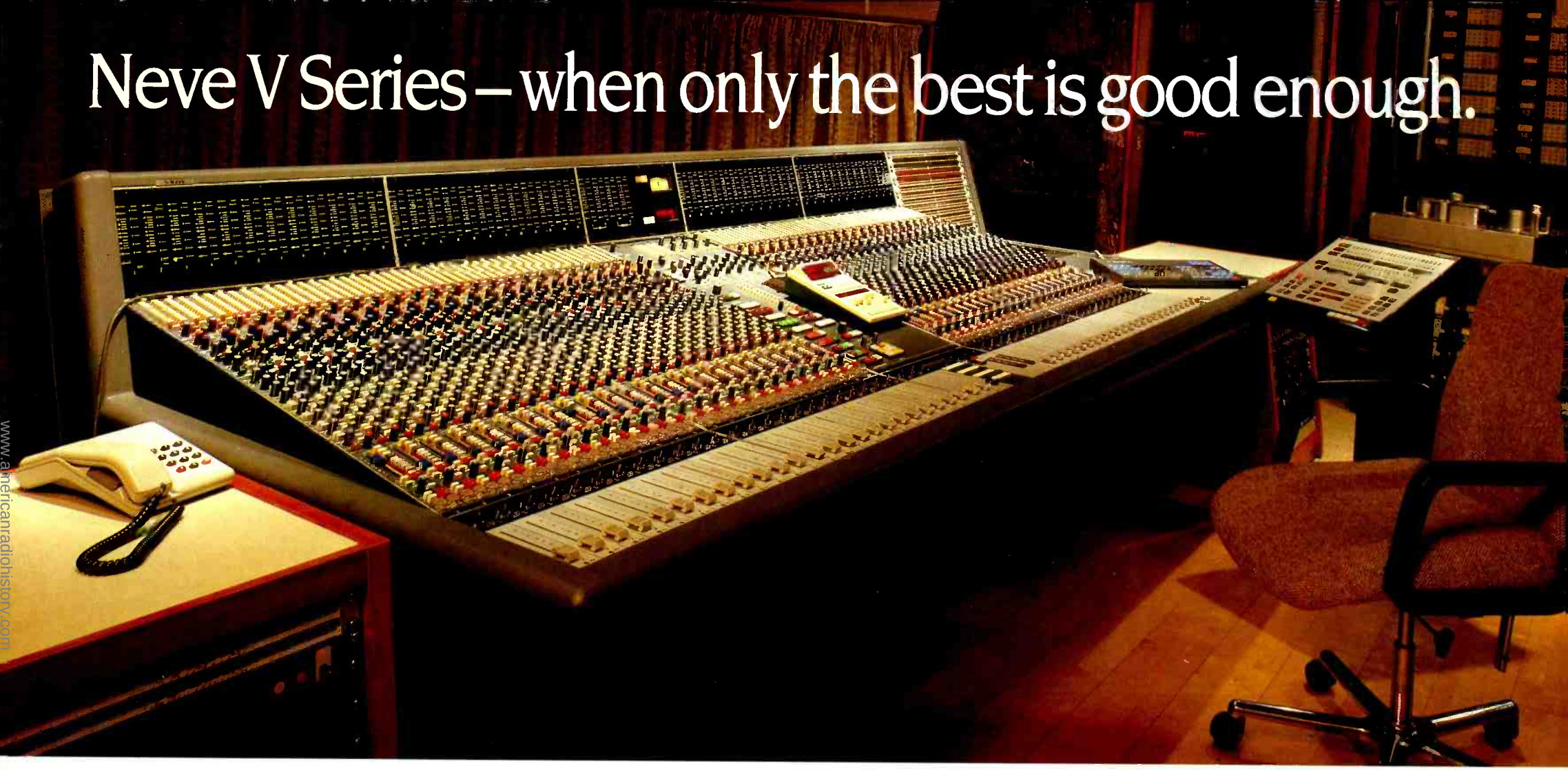

PHOTO: PRT STUDIOS LONDON

"The V Series/Necam combination is extremely good."

GRAHAM DIXON (Freelance Engineer)

"We were delighted by the exceptionally clean response of the console and the ease of operation of the Necam system during mixing."

GEOFF CALVER & CHRIS CAMERON
(Producer/Engineer & Producer/Arranger)

"...without doubt the finest console I have worked on."

BOB MALLET (Resident Engineer PRT Studios)

NEVE ELECTRONICS INTERNATIONAL LIMITED, CAMBRIDGE HOUSE, MELBOURN, ROYSTON, HERTS. SG8 6AU. TEL: 0763 60776. TELEX: 81381. FACSIMILE: 0763 61886.
RUPERT NEVE INC, BERKSHIRE INDUSTRIAL PARK, BETHEL, CONNECTICUT 06801. TEL: (203) 744 6230. TELEX: 96-9638. FACSIMILE: (203) 792 7863.

Neve
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NEWS

In brief

● Hybrid Arts have developed a low cost CD mastering and editing system. The *DAW 1* (Digital Audio Workstation) is claimed to provide editing accuracy to one CD event and is available in an 'all-in-one' 19 in rack mounted unit. Hybrid Arts Inc, 11920 West Olympic Boulevard, Los Angeles, CA 90064, USA. Tel: (213) 826-3777.

● Kitco have introduced a new low cost refillable heat shrink tubing kit. The kit is supplied in an unbreakable ABS case and is divided into five separate compartments to contain the various sizes of tubing. Kitco, Unit 14, Bath Road, Bitterne, Southampton, Hants, UK.

● Soundcraft have designed and are about to launch a new dedicated automation system for the *TS12* console. Further details from Soundcraft Electronics Ltd, Unit 2, Boreham Wood Industrial Park, Rowley Lane, Boreham Wood, Herts WD6 5PZ, UK. Tel: 01-207 0194.

● UREI have announced higher sensitivity to input signals and higher power handling for the new *C* series of studio monitors. Sensitivity of the *811C* is now 99 dB SPL/W/M, the *813C* is 101 dB SPL and the *815C* is now 103 dB SPL. All three models function with an improved frequency response envelope to beyond 17.5 kHz. The new monitors utilise a new *801C* coaxial drive unit which features a titanium diaphragm compression driver to provide a one point sound source.

B&K meter modules

Bruel & Kjaer have introduced two additional modules for the type *2231* sound level meter. The *BZ7103* Frequency Analysis module maintains the function of *2231* as an integrating sound level meter but also enables it to record automatic serial frequency analyses with ⅓- and single-octave filters (type *1625*).

Start and stop frequencies are selectable. To optimise the total measurement time the set up measures the L_{eq} in each frequency band over a length of time dependent on the filter bandwidth. It is also possible to preset the number and average up to 999 frequency analyses made at the same or different points. The max and min RMS levels as well as max peak level and overload duration can also be measured for each frequency band.

The new *BZ7106* Short Term L_{eq} module is specifically designed for measuring and recording short term L_{eq} over consecutive user defined periods of time. By using the interface module the *2231* can provide 64 different digital output formats for data loggers or other storage systems without loss of measurement time.

Bruel & Kjaer A/S, DK-2850 Naerum, Denmark. Tel: 02 80.05.00.

UK: Bruel & Kjaer (UK) Ltd, 92 Uxbridge Road, Harrow, Middlesex HA3 6BZ. Tel: 01-954 2366.

USA: Bruel & Kjaer Instruments Inc, 185 Forest Street, Marlborough, MA 01752. Tel: (617) 481-7000.

Soundcraft TS12 inline console

Mirage S300 active monitor

The Mirage *S300* is a high power, active, 3-way loudspeaker intended for professional applications. The basic cabinet is constructed from 30 mm MDF and provides reflex loading (−3 dB at 40 Hz); however, a vent blanking plate is supplied which, according to the designers, allows the −3 dB point to be lowered to 20 Hz or lower. This is achieved in conjunction with additional equalisation to the electronic crossover which is supplied as a 3 U high rack mounted unit.

The *S300* uses a 318 mm ATC bass driver, a 75 mm ATC softdome mid range unit and a 38 mm KEF high frequency dome unit. For high sound pressure levels Mirage recommend using three identical 250/300 W stereo amplifiers.

The electronic crossover features electronically balanced inputs and outputs, 24 dB Linkwitz-Riley filters, equalisation and time delay stages. Each input amplifier has a VCA signal limiter with feedback control from each drive unit, independent rectification stages are designed to track the thermal characteristics of each voice coil and reduce levels when an overload condition is detected. A front panel switch also allows the overall output to be muted if required.

Overall system specifications include frequency response 50 Hz to 15 kHz (within 2 dB: reflex mode); maximum SPL 112 dB; 500 W maximum recommended power handling; input impedance 50 kΩ and output impedance 33 Ω.

MG Designs, Wemco House, 477B Whippendell Road, Watford, Herts WD1 7PU, UK. Tel: 0923 45300.

Data Acquisition Scopadaptor

Data Acquisition Ltd have announced an oscilloscope add on unit which is claimed to provide true FFTA performance. When connected to a 2-channel oscilloscope the *Scopadaptor* functions as a 2-channel FFTA, a 2-channel digital storage oscilloscope (DSO), can produce simultaneous on-screen time and frequency traces and provides a screen dump facility to any standard dot matrix printer.

In the FFTA mode the *Scopadaptor* provides true anti-aliasing, fast update rate, frequency spans of 0 to 50 Hz up to 0 to 20 kHz, selectable averaging and weighting, log/lin scaling and 200 line resolution. The DSO mode is claimed to provide true 2-channel DSO facilities with timebase speeds down to 5 s/div, single shot and 'freeze' facilities. Conventional scope input attenuators, shift and comprehensive trigger controls, including a 25% pre-trig facility, are included.

Data Acquisition Ltd, Electron House, Higher Hillgate, Stockport, Cheshire SK1 3QD, UK. Tel: 061-477 3888.

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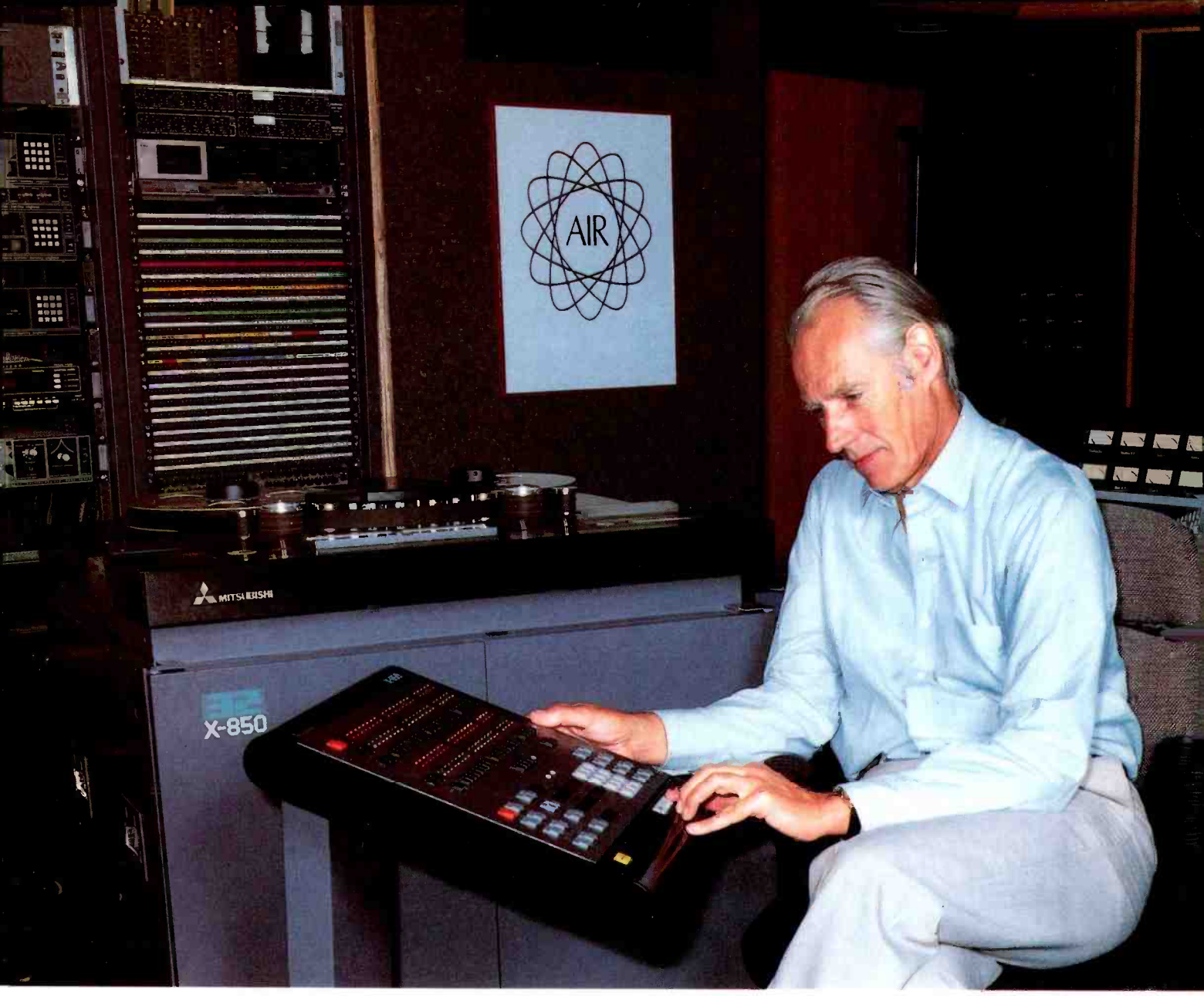

George Martin:

"At first, it's different. But then, as you experience the clarity, the accuracy and the nuances of the Mitsubishi Digital sound, you're convinced. This is the most marvelous musical storage medium."

The legend George Martin. Producer, composer, musician, engineer. Chairman of Air studios.

His choice is two Mitsubishi 32-Channel Digital Audio Recorders for Air Studios Montserrat, plus X-86 2-Channel Digital machines. It will be difficult, if not impossible, to ever find anyone whose endorsement means more than that of George Martin. We deeply appreciate his confidence in Mitsubishi products and people.

MITSUBISHI PRO AUDIO GROUP
DIGITAL ENTERTAINMENT CORPORATION

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Canada: 260 The Esplanade, Toronto, ONT M5A 1J2 • Phone (416) 365-3363 • Telex 06219839
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What does it take to pro-audio centre

It takes more than a warehouse full of the best audio equipment.

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It also takes experience: at HHB you won't find slick salesmen, just a team that knows its business inside out.

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Our directors started out building sound systems for rising stars, and the staff all have very similar backgrounds.

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›e the best equipped
·n the country?

departments are hard at it to preserve our reputation for the best back-up in the business.

Our enlarged digital editing suite now includes AMS Audiofile, as well as Sony CD mastering.

It takes comfort: we realised that the hair shirt was out of fashion and so in our new premises you'll find a high level of comfort that extends throughout the building.

And of course to make your visit more palatable we're always happy to offer you suitable refreshments.

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RICHARD GARRIDO
Directeur du marketing

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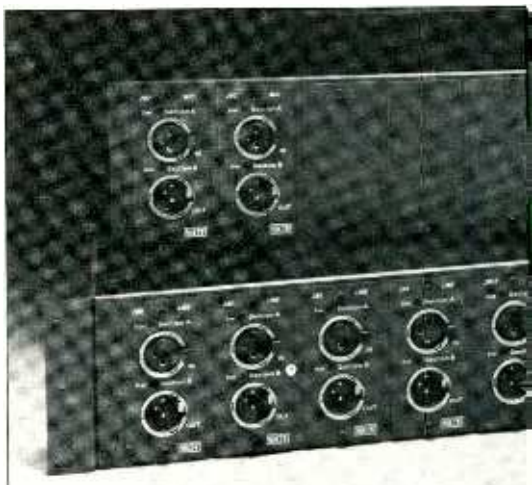

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SCV社の製品創りのポリシーは、現場の生の声を最優先し、
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プロの現場エンジニアが欲する機能性と使い勝手、さらには
「こんな場面に即応できる機器があれば、どんなに便利だろうか！」という
見解を積極的に受け入れ、独自の開発による高性能機器群を生み出しています。
まさにフランスならではのエスプリが感じられる、
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我国では音響特機が、プロのお手許にお届けしています。

「問題処理アンプ」

渇望の1台。現場の究

MODEL DI BOX 2
アクティブ・ダイレクト・インジェクション・ボックス

最先端技術を駆使し開発された本機は、トランスを使用しないアクティブな回路を採用し、準透な伝送特性を実現しています　フロのユーザーにとって、低出力レベルのステップアップ用に内蔵された＋20dBのゲインをもつブースターアンプは、きわめて活用範囲が広く、同時にタイレクト・スピーカー・インフット機能は、歪みを発生することなく、非常に高レベルのボルテージの受け入れが可能です。全アクティブ回路、ゲインに対しての十分なフレキシビリティ、クリアーなサウンド、さらにバッテリーやファンタム電源により駆動できる、ハンディでハイ・ハフォーマンスなDI BOX 2です　■

【SPECIFICATIONS】●周波数特性(20～20KHz) ＋0、－2dB●SN比・0ケインセット 96dB、＋20dBゲインセット・82dB●THD 0ゲインセット(200Hz) 0.08%、＋20dBケインセット(2KHz) 0.12%●IMD.0.1%●RISE TIME:10μsec●電源部・9Vバッテリー(300時間)、15～48Vファンタム●寸法(mm)・120W×56H×94D●重量 430g

MODEL PC80
フェイズ・チエッカー

PC80は、オーディオ信号系の位相を、電気的にも、アコースティックな面からもチェックできる、ハンディーなフェイズ・チェッカーです　ミキサーのパッチポイント、パッチ盤、ワイヤリングの端末など、ライン系の位相の他に、マイクやスピーカーユニット、スピーカーシステムなどのアコースティックな位相も正確にチェックできます　PC80は1Hzのワイドバンド・パルスを発振するく発振部>と、読み取り用マイクを内蔵したく受信部>とで構成されます　新設の音響システムの最終チェック、ホール等での持ち込み機材と既存システムとの位相合わせ、さらに、プロセや天井埋め込みなどの既存設置スピーカーの位相の見直しなど、「音響設備のあるところには1台」絶対に欠かせない位相チェッカーです　■

【SPECIFICATIONS】●パルスレート〈発振部>1Hz●周波数スペクトラム エレクトリカル〈発振部>1Hz～20KHz〈検知部>1Hz～20KHz、アコースティカル〈発振部>200Hz～5KHz〈検知部>100Hz～15KHz●出力レベル〈発振部>0～1V●入力レベル マイク・ポジション〈検知部>10mV～1V、ラインポシション〈検知部>0.5～50V●寸法 113W×60H×31D(mm)●重量.〈発振部>280g〈検知部>250g

MODEL NGS-2
デュアル・チャンネル・ノイズ・ゲート

フロユースとして開発された、ステレオ2chのノイズゲートです　フロ現場のあらゆる使途に対応でき、例えば演奏ステージのミュージシャンが使用しているマイクのON OFFを、自動的に行ったり、ケートをかけたい周波数バントの選択も可能です　バランス入力で、リリース・タイムは0.1～3secの間でアジャスタブルです　■

【SPECIFICATIONS】●F特 20～20KHz ＋0、－1dB●SN比 84dB●THD 0.01%●IM歪 0.01%●アタックタイム:1μsec●リリースタイム 0.1～3sec●寸法:483W×44.5H×190.0D(mm)●重量 3.2kg

MODEL SRL 2
ステレオ・リミッター・コンプレッサー・ディエッサー

ステレオタイプのディエッシング機能をもつ、コンプレッサー・リミッターです　FMトランスミッター、ディスクのマスターリング・プロセス、SRやディスコティックの音楽シーンに対応し、ギターやベースなどのサステイン効果のコントロールなど、多彩なファンクションを装備しています
入力感度を含めた出力ゲイン、アタック・タイム、リリース・タイム、コンプレッション・レシオなどのバリアブルな調整が可能です　バー・ディスプレイの表示は、出力レベルとリダクション・ゲインが、スイッチングにより切り換えられます
ゲイン・コントロールは、超ローノイズ級のICとFETを効果的に使用、本機の開発段階からの意図として、RFIのプロテクションには、最大の配慮が成されています　■

【SPECIFICATIONS】●周波数特性(20～20KHz) ＋0、－0.25dB●SN比 73dB●ライズタイム 2μsec●THD:0.15%●IMD 0.01%●コンプレッション比 2.1～20:1●寸法:483W×190D×44.5H(mm)●重量:4.1kg

MODEL 824
アクティブ・マイクシグナル・スプリッター

マイクロホンからの信号を効率よく分配するために構成された分配器で、各チャンネルあたり3系統の出力が得られ、入力側にはバッドが装備されています
モデル824は、1ユニットで8ch構成であり、各入出力にはハム・ループをカットするグランド・リフト・スイッチが設けられています　モデル824の特徴の一つとして、入力信号の簡易モニター機能があり、ヘッドホンとバーグラフによりモニターが可能です　使用例としては、出力の1系統はメインのSRミキサーへ、1系統はレコーディンクへ、残りは中継へ送り出すといったことができます　その場合、出力はライン・レベルのため、信号の劣化を生ぜず、誘導雑音に対しても、強力にプロテクトされます　■

【SPECIFICATIONS】●F特 20～20KHz ＋0、－0.5dB●THD 0.01% ●IMD:0.01%●重量 7.5kg●電源部(824ps)別売

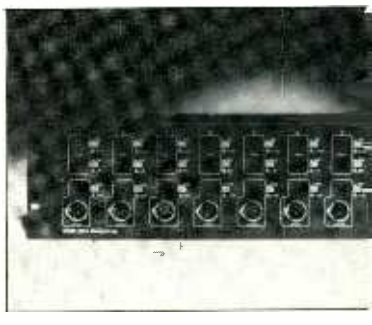
MODEL 209
デュアル・パラメトリック・イコライザー

ステレオ2ch構成のハイパス　ローパス・フィルターを装備した9素子パラメトリック・イコライザーです
各9のポイント周波数において、±15dBのゲイン・コントロールと、1.6～2オクターフまでのQ値のコントロールができます　ハイパス　ローパス・フィルターは、大出力時のスピーカーの保護に有効な遮断特性が設定されています　トータル・ゲインは－∞から＋6dB間で任意にセットでき、動作中バイパスの状態にもできます
ハイ・インピーダンス・バランス形入力と、ロー・インピーダンス・バランス形トランス出力により、あらゆる機器と接続ができます　ループから発生するハムをカットするグランド・リフト・スイッチを装備しており、フロント・パネルには、アクリル保護カバーも付属しています　オプションのカードにより、2WAYのチャンネル・デバイダーとしても機能させることができます　■

【SPECIFICATIONS】●F特 20～20KHz ＋0、－1dB●SN比:84dB●THD・0.01%●寸法 483W×133H×190D(mm)●重量・6kg

MODEL MD8
マルチDI BOX

MD8は、きわめて評価の高いDI BOX 2を8連装した、画期的な19インチラックマウントタイプの8chマルチDI BOXです　従って、ユニットの基本的な機能やスペックはDI BOX 2と共通です
MD8は、その優れた音色に加えて、この8chマルチDI BOXという独自の機能性によって、スタジオ、SR、放送局等々応用範囲は広く、特にマルチキーボード演奏シーン等には最大の効果を発揮します



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Model 288 ユニバーサル バッファ・アンプ

モジュールタイプ

■282：マイク・プリアンプ　入力トランス使用のハランス形入力。低雑音回路採用。フロント・パネルで感度調整可能。

■283：RIAAイコライザー　RIAAイコライジング後の出力は、トランス使用のハランス形。フロントパネルで、出力レベル調整可能。

■284, 285, 285Tラインアンプ／バランス入力。フロントパネルで出力レベル調整可能。キャノン3Pコネクター。

- 284は、電気的バランス入力で、アンハランス出力。
- 285は、電気的ハランス入力で、トランスによるバランス出力。
- 285Tは、トランスによるバランス入出力。

M288は、プロ現場で派生するほとんどの難問を、卓抜な能力で解決するユニバーサル・バッファ・アンプ。

応用例①　入力レベルがマイクレベルだった。あるいは−20dBでどうしても＋4dBは欲しい。

応用例②　出力インピーダンスがハイインピーで、ケーブルを延ばせない、どうしよう!!

応用例③　出力がアンバラ出力だ。ノイズが心配だ!!

応用例④　出力を2パラ、3パラ、それ以上のパラ出力が欲しい。

応用例⑤　なんてこった、フォノプレーヤーを結ばなければならない。プリアンプなんて手元にない!!

応用例⑥　600Ω出し、600Ω受けで統一しなければならない。機材にトランスを入れるわけにはいかない。

こんな時こそ〈問題処理アンプ〉M288の出番。プロ現場のテクニカル・サポーターとして、そんな諸問題を一挙に処理、解決してしまうプロの強い味方です。

極のノウハウ。M&R

MODEL 228
デュアル1/3オクターブ・グラフィック・イコライザー

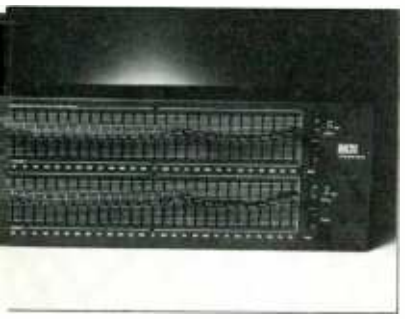
ステレオ2ch 1/3オクターブ・バンド　28素子構成のグラフィック・イコライザーで　位相差のきわめて少ないLC RCネットワークと　超ローノイスICとで構成されています

放送局、ディスク・マスタリング・プロセス　ポストプロ　SRユースと広い適合範囲をもち　28ポイントの中心周波数で・12dBの可変レベル幅をもっています　出力ケインの調整幅は−∞〜＋6dBです

イコライザーのハイ・パス時にはランプで表示され　リレー動作により　クリック音の発生を防止しています

ハイ・インピーダンス電子バランス入力と　ロー・インピーダンス・バランス形トランス出力をもち　あらゆる機器と接続が可能です　ハム・ループをキャンセルするグランド・リフト・スイッチを装備しており、フロントパネルにはアクリル保護カバーが付属しています ●

【SPECIFICATIONS】●周波数特性 20〜20KHz）＋0、−1dB●SN比 92dB●THD 0.01%●寸法 483W×190H×178D(mm)●重量 7.1kg



MODEL 222
2WAYステレオ・クロスオーバー

モデル222は、SRコースや設備用に開発された、2チャンネル2WAYのチャンネルデバイダーです

クロスオーバーポイントの変更は、フラクイン方式のカートの選択により行えます　両チャンネル共、35Hzローカットフィルターを装備し、さらにロー、ハイ各チャンネルにはミュートスイッチと位相切り換えスイッチが用意されて、使いやすさを十分に考慮しています ●

【SPECIFICATIONS】●周波数特性 20Hz〜20KHz ＋0、−0.2dB●SN比 96dB●THD 0.1%以下●IMD 0.01%●寸法 483W×44.5H×175D(mm)●重量 3.0kg

MODEL A4-2
4/3WAYステレオ・クロスオーバー

[illegible]や　ディスク[illegible]クな[illegible]設備に欠かせないステレオ2chのチャンネル・デバイ[illegible]です　4WAYまたは3WAYのクロスオーバー・[illegible]の変更は、フラクイン式のカートの選択で行えます

各帯域には、ケイン・コントロールとLEDインジケーターが装備されています

入力部はハイインピーダンスで、電子バランス入力、出力部はローインピーダンスで、アンバランス出力　クロスオーバー・スロープは、24dB/OCTというきわめてシャープな遮断特性をもち、スピーカーの特性のあばれなどに影響されないスムースなつながりが保証されます ●

【SPECIFICATIONS】●周波数特性 2Hz〜20KHz ＋0、−3dB、20Hz〜20KHz ＋0、−0.2dB●SN比 96dB●THD 0.1%以下●IMD 0.01%●寸法 483W×44.5H×175D(mm)●重量 3.2kg

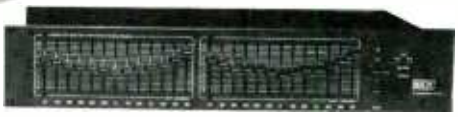
MODEL 213
デュアル2/3オクターブ グラフィックイコライザー

モデル213は、位相差のきわめて少ないLC/RCネットワークと超ローノイスICとで構成された、13バンドのグラフィックイコライザーで、ディスクマスタリング、放送局、ポストプロ、SRコースを考慮して開発されました

オーディオ帯域を13ポイントでカバーし、各ポイントのケインは＋12dB幅で可変できます　トータル・ケインの調整幅は−∞〜＋6dBです

ハイパススイッチも装備し、ハイインピーダンス電子バランス入力とローインピーダンス・トランス・バランス出力によってどのような機器とも接続できます ●

【SPECIFICATIONS】●周波数特性 20〜20KHz 0、−1dB●SN比 94dB●THD 0.01%●IMD 0.01%●寸法 483W×190D×89H(mm)●重量 1kg



MODEL 128
モノラル・グラフィック・イコライザー

レコーディング・スタジオ、放送局、ポストプロ、SRに対応する、LCフィルター・ネットワークとローノイスICとで構成された28素子のグラフィック・イコライザーです

各28のポイント周波数におけるケインのコントロール幅は±12dBで、トータル・ケインは−∞〜＋6dB間で可変できます　また作動中のハイパス・スイッチも設けられています

ハイインピーダンス電子バランス入力に、ローインピーダンス・バランス形トランス出力を備え、どのような機器とも接続が可能です　グランド・リフトスイッチが装備され、ハム・ループをカットすることができます ●

【SPECIFICATIONS】●F特 20〜20KHz ＋0、−1dB●SN比 94dB●THD 0.01%●寸法 483W×89H×190D(mm)●重量 5.4kg

■特　長

1) INPUTには通常入力の他、HILEVELポジションを選択すると、最大300W出力のアンプからの信号をダイレクトに入力することができます
2) 低出力ピックアップ用には、ゲインを20dBアップすることができます
3) バランス出力(キャノン)の他、アンバランス出力を用意しています
4) グランドリフト・スイッチ及びリヤーパネルには、ハレルコ・マルチ出力コネクターが標準装備されています

【SPECIFICATIONS】●F特 20〜20KHz、＋0dB〜−2dB●SN比 96dBV●THD 0.08%●ID 0.1%●電源 ファンタム又は外部バッテリー●寸法 483W×133D×170H(mm)●重量 4.1kg●キャノン接続 1番グランド、2番ホット、3番コールド

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TENTH EDITION PUBLISHED BY

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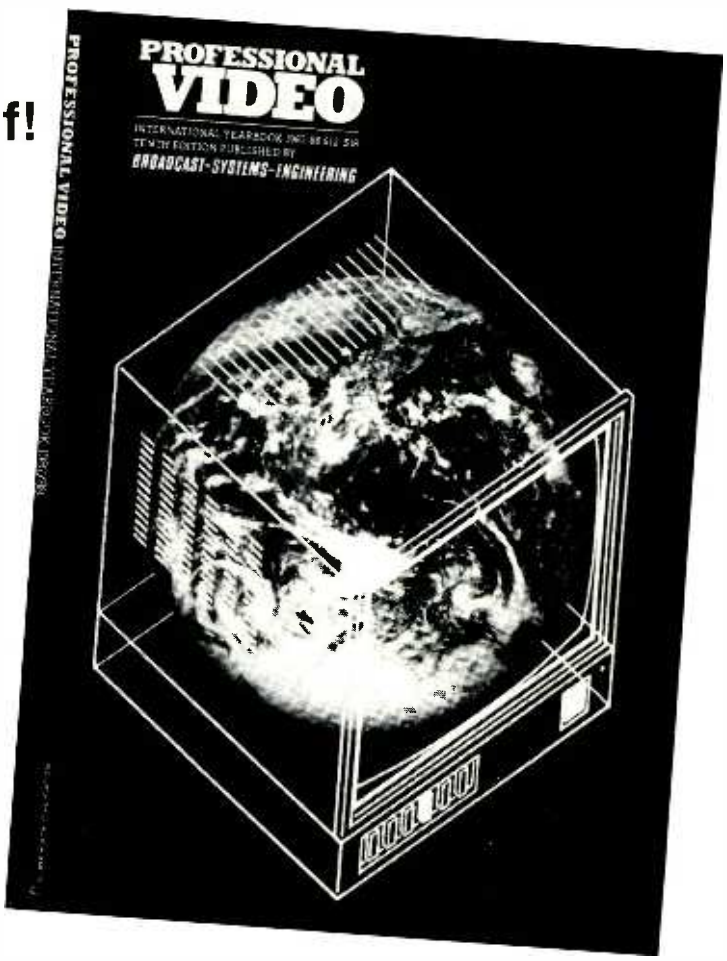

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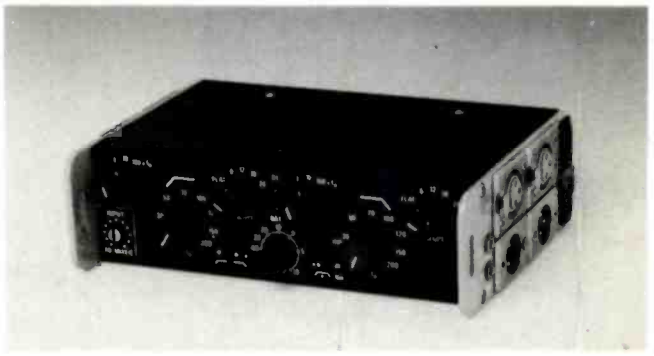
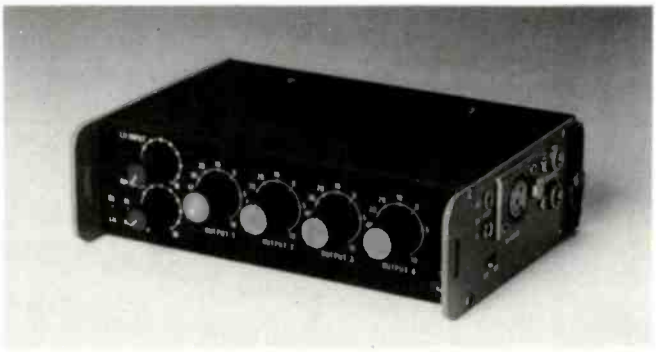
port·a·flex
tools of the trade

AD066-6 Interface A – A two channel unit for the interconnection of equipment with differing input and output formats and of widely differing operating levels. A 1KHz oscillator is fitted to assist line-up.



AD066-5 High Pass and Low Pass Filter – For high pass, low pass and bandpass applications but also forms a basis for band splitting techniques. Both filters are tunable 20Hz – 20KHz and each slope is switchable between 6, 12, 18 and 24dB/Octave.



AD066-8 Two Channel Splitter – For distribution of a stereo or two channel signal between four two channel unbalanced outputs which may be varied independently. Each output has a high drive capability.

AD066-2 Power Supply Unit – The P.S.U. can deliver 0.5A at 12v which is sufficient to drive a full complement of Port-a-Flex units. There are also 4 x 12v outlets enabling radio microphone receivers and the like to be powered.

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ALL SYNC'D UP

By Terry Nelson

Some people didn't think much of MIDI when it arrived in the early '80s. While the proponents and opponents were expending great energies in lively debate, Harry Thumann was busy laying the foundations for what was to become a fully integrated synthesiser-composer-studio system at his Countrylane Studios in Germering-Munich, West Germany, a system which he completed in November 1986.

Thumann's philosophy is deceptively simple: keep an eye on the latest developments and be ready to explore new territory opened up by new technology.

"As a studio owner, you have to be constantly looking ahead to what the situation will be in two or three years time, and in some cases even as far ahead as five years. And this is what makes the music business very interesting for me. Of course, it is easy to follow trends that may turn out to be a flash in the pan, and this is why you have to look very hard at the way methods of working are evolving, together with the evolution of technology.

"As it happens, my hobby is buying new toys. However, I would hasten to add that this is always a search to find new ways to save time and gain working flexibility, rather than for any reasons of one-upmanship against other studios."

Thumann enjoyed 'toys' even as a kid, scrounging broken-down valve radios from the local radio shop, and gradually filling his parents' house. When he was 12, he made an agreement with his mother that he'd curb his habit as long as he was able to learn electronics properly. Through making and servicing amplifiers for musicians and groups, he gravitated towards an involvement in the Munich music scene. And with a burgeoning interest in the creative side of things, he started playing drums. From here, Thumann slid easily into recording, and it wasn't long before he turned part of his parents' house into a home studio. Starting with a basic Midas 12/4 console, he graduated to a highly customised 24/8/16 complete with 20 5-band fully parametric equalisers of his own design and construction, MCI 16-track recorder, Studer master machine and Moog *IIIC* modular studio synthesiser system.

In the mid '70s, Thumann ran the studio, freelanced with Munich radio stations, and even found time to tour with the German rock band Barrabbas. "I soon found out that touring was not really what I was cut out for and concentrated my energies on the studio." A level of success came when, among the first records with La Bionda, the hit *One for me, one for you* was made. This marked the beginning of a relationship with Italy's Baby Records that lasted from 1978 to 1983.

It was also in the late '70s that Harry started thinking about 'the ultimate console': "I had ideas floating around in my head but no one else seemed to be thinking along the same lines."

Things were not static in England, however, and a meeting with the (then) infant Solid State Logic showed there was some common ground: "I saw this console tucked away at some exhibition (when SSL were Acorn Studios) and thought, Aha! We can do something here!" In short, extensive discussions and shuttling between Stonesfield and Munich resulted in the first SSL *4000B* console, which caused a sensation when shown at the 1978 AES Convention in Hamburg.

Whereas most SSLs usually end up in quite glamorous surroundings, this first console was installed in a most unlikely place—the bedroom! It was becoming increasingly evident that proper studio premises were essential (especially when going to the bathroom might mean stumbling into three girls doing backing vocals) and the new Countrylane-to-be was still under construction when the console was delivered.

The new Countrylane Recording Studios and Musicworks opened in January 1979, and due to its modern design and equipment got off to a good start with clients such as Carl Palmer, one of the first to use the studio. However, with the general slump in the music business in the early '80s, Harry Thumann felt himself under pressure to make a decision for the future of the studio. "With the cutback in business, studios in Munich were dropping prices to ridiculous levels just in order to survive! However, that doesn't do much to help the overdraft and you still have to live."

In 1982/3, the introduction of MIDI (Musical Instrument Digital Interface) signalled the way open towards integrated synthesiser systems where different components could (in theory) start talking to each other without the need for expensive interfaces that were often far from satisfactory. Synthesisers had played an important part in Harry's productions virtually from the beginning (he had the first ARP *2600* in Germany and the Moog in 1970) and he was quick to realise the implications—and possibilities—of the new standard. "MIDI got off to a bit of a shaky start, mainly because different manufacturers were reticent about publishing information on what was and was not MIDI-controllable on their equipment and because they were not sticking properly to the standards that had been laid down. Nowadays it has gone the other way, where it would appear a point of prestige as to who has the most data information in their operation manuals. Anyway, I thought that MIDI was an opportunity to 'shake the tree and see what falls out'."

The other stimulus came from a series of successful productions from Italy known as the *Rondo Veneziano.* Harry had been involved with the mixing of these since 1981 and the newly developing Composer System at Countrylane presented itself as a more flexible means of production as well as providing added possibilities.

At this time, the Composer System consisted of a Fairlight *CMI* with various slave synthesisers running off from it through MIDI, together with Commodore *64* MIDI interfaces for expanded sequencing power (eight tracks on the Fairlight +16 +16).

"What I was developing was ideal for the *Rondo* and the 1983 production was done almost exclusively on the Composer System. I also have to give credit here to the composer and producer of the *Rondo Veneziano*, Gian-Pierro Reverberi, who

Harry Thumann, owner of Countrylane Studios.

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also saw the possibilities of the system, thus enabling me to develop it through use of a production rather than by experimentation. As a result, the bugs and difficulties got smoothed out a lot faster than if I had been just doing things in my own time."

Since then the Composer System has been used on the yearly production of the *Rondo* with the latest being the result of just the composer, engineer and the system.

November 1986 saw the realisation of the integrated Composer Studio System (now to be known as Key One).

"My ideal was to be able to come into the control room and start work. Everything would be within arm's reach of my chair with a centralised control system so that I would no longer have to keep getting up to adjust this and start that and so on. Of course, there will always be changes as we go along but it is at least now a fully integrated system and not a mess of keyboards and computers in a tangle of patchcords!"

Although a large amount of our sessions are mostly done in the control room, Countrylane is still a fully-fledged recording studio with studio space for a large string section—the live room, if you like—together with piano room, drum booth and general studio space with trapped areas for bass guitar and the like.

"I think it is most important to have a creative ambience in a studio, which is why we have tried to combine pleasant surroundings that are not 'too studio' together with proper acoustic design (Sandy Brown Associates)."

The atmosphere of Countrylane can certainly be qualified as 'relaxing', though it would probably be truer to say 'calm and conducive to work'. Another tradition that is carried on at Countrylane is one of in-house design work. Concurrent with the installation of the Composer system, the SSL console was fitted with an automated muting matrix for the monitor/group section providing greater control during mixdown. Each channel can be routed simultaneously to any of three mute groups, be independent (muted manually) or mute automatically when tape machines are stopped and un-mute when they are in sync.

"This was very simple to do—it just meant a lot of wiring! However, the space is there on the computer and it really does add a lot to working flexibility."

The Composer system itself features a considerable amount of in-house remote control keypads for centralised operation and increased working speeds. These include buttons for main system remote control of code source and generation, interface routing for the analogue inputs and outputs from the Fairlights, tempo control, start-stop triggers, and so on. The MIDI end of the console even has three piano-style pedals under the master keyboard which can be addressed in any way as MIDI control pedals.

A criticism that can often be levelled today is that with the technology there is a tendency to lose sight of the fact that it is still only there as a tool and not an end in itself. Countrylane is very much 'hi-tech' but maybe it is better to let Harry Thumann have the final word.

"I'm always looking for ways that can save time to the benefit of creativity. It is a fact today that you don't have the time to experiment when the client is there, however, much you may think this is a ridiculous situation. (This is one reason why I have a very large library of sounds that is quickly available.) The time you can gain on working efficiency is time for the product. On the other side of the coin the system saves money by being efficient, which means that your client will keep coming back if a fast turnaround is what he requires.

"However, making music is still what it is all about."

The Composer Studio System (Key One)

As can be seen from the flow chart the nerve centre is a Fairlight *II* which is used to 'record' the basic score and from whence all things proceed! "The Fairlight is used for 80% of the time as a music composing system—I tend to prefer synthesised sounds over samples.

"Using Page C, the basic chord sequence can be written in and a tempo decided. This now forms the basis of the song and enables me to build on it as necessary. The most common way of working is to go through each section of the song and 'orchestrate' it as required. The loop facility, which allows a section to be cycled through endlessly while you are looking for sounds or doing overdubs or whatever is a great boon. The big advantage is that you are not forever waiting for the tape to run back and start again. One area where this is really apparent is in doing vocal overdubs where the singer can get into the groove without being distracted. Should it be necessary, you can also change pitch and tempo in realtime. I think it becomes immediately obvious that once you have the actual score on disk, it allows you to go back at any time and re-orchestrate or re-do sections without any problems as the notes will always be there.

"One comment I should like to make here is that with productions involving a system of this nature, pre-planning is absolutely essential and you need the minimum of a score—even if it is just the chords and the lead lines. Head arrangements are all very well but with this way of working they can be very time wasting!"

System Layout: Key One

The MIDI implementation of the system can be split into four blocks as follows: First block: Music Data input and Sync Source selection. This starts with the *DX7*—though this could be any master keyboard such as a Yamaha or Roland—and the Octapad (or any other pad system; a client can come with his own system and just plug it in).

Next thing is sync code selection. This can be selected from either the *SBX-80* sync box reading SMPTE and Song Pointer information or the Key One code, which comes from the MIDI version recorded on track 23.

Thus the first block is where you are inputting the 'Human Data' and at the same time defining the sync source for the MIDI components where you are in the score, and so on. This is then mixed and processed and works together with the next block which is called Data Processing (composing, arranging, editing, etc.).

This consists of the Fairlight systems, the Atari, Commodore

Low budget recording

The advent of the 'home studio'—or demo studio—equipped with 8- and 16-track recorders from people such as Tascam, Fostex and Otari, has been viewed with much suspicion by many professional studios who see them as a threat to their business—and it would be foolhardy to try to say that this has not been true. But Harry Thumann tends to look at them in a different light. "For a start, they are going to be providing many of the engineers of the future as fully professional studios offer very limited chances of employment or training.

"I also tend to feel that the 'low budget' people are a large source of potential clients for the fully professional studios and should be treated accordingly. Everyone should be able to have access to professional studio facilities for mixdown, overdubbing, and so on, rather than feel left out. We recently bought a Fostex *B16* recorder and this allows us to replay clients' tapes for mixdown or transfer to 24-track for additional dubs.

"This introduces new working methods such as allowing musicians to work at home or in small studios on the basic tracks and then come into the professional studio for mixdown and any final dubs that may be needed. This way a limited budget is put to the best use and everyone is working. Also, the 'magic' of the original session is maintained as experience shows that it is very rare that the atmosphere of a session can be recreated. Another way of working is that the work tape is prepared at the main studio before the musicians go away and work on the production either at home or in limited studio facilities. When they are satisfied that things are alright they can then come back to the main studio for final production and mixdown.

"In our own case, preparing the tape means laying down two codes—SMPTE and our own Musicworks (or Key One) code—and maybe several scratchpad score tracks. I always record the codes with Dolby as I find it diminishes crosstalk when all the tracks are full. The Key One code is recorded at −10 dB ref: 320 nWb/m and SMPTE at −20 dB.

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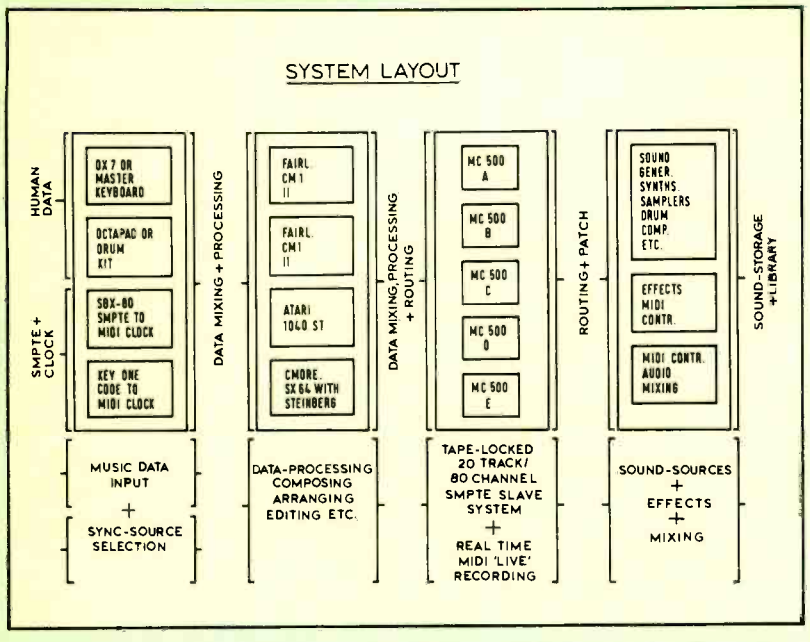
ALL SYNC'D UP



C64 or any unit that the client may bring, such as a Kurzweil Music Editor. This is where the music data is inputted, processed, stored, arranged, re-pitched or whatever may be musically valid. In my own productions, this is always the Fairlight, however, I often have clients who prefer the Atari.

This then goes to what I call the tape-locked 20-track/80-channel SMPTE Slave System, which can also be used as a real time MIDI 'live recording' system using five Roland *MRC-500* microcomposers, which give 10 MIDI outputs for realtime MIDI productions. Whenever this system is needed it is nearly always synchronised to the SMPTE code. Of course, it can be synchronised to any other code as well. The main point is that it catches up very fast and synchronises within a bar over the entire song. A point worth mentioning is that the *MRC-500* makes a very nice MIDI through box in standby mode, thus avoiding any re-patching when it is not required. With this system it would also be possible to do a session with say, three keyboards, drumpad and guitar interfaced to MIDI where the musicians just play live and you record the performance.

The resolution of this third system is 1/384 of a bar, which I feel is accurate enough for it to be called a realtime recording system.

The fourth block is the largest physically and includes all of the sound generating sources, synthesisers etc, computers, the MIDI controlled effects units and Yamaha MIDI-controlled digital mixers (due for delivery soon).

In between the third and fourth blocks is a routing and patching system which we will be coming back to. The fourth block can also be accessed directly from the first so it is not necessary to always go through stages two and three. However, this is the MIDI layout as I use it in my own productions.

The system as shown is the result of a lot of planning to provide a logical layout that can be equally suitable to my own needs and to my clients, while retaining the flexibility to be re-configured very easily as required.

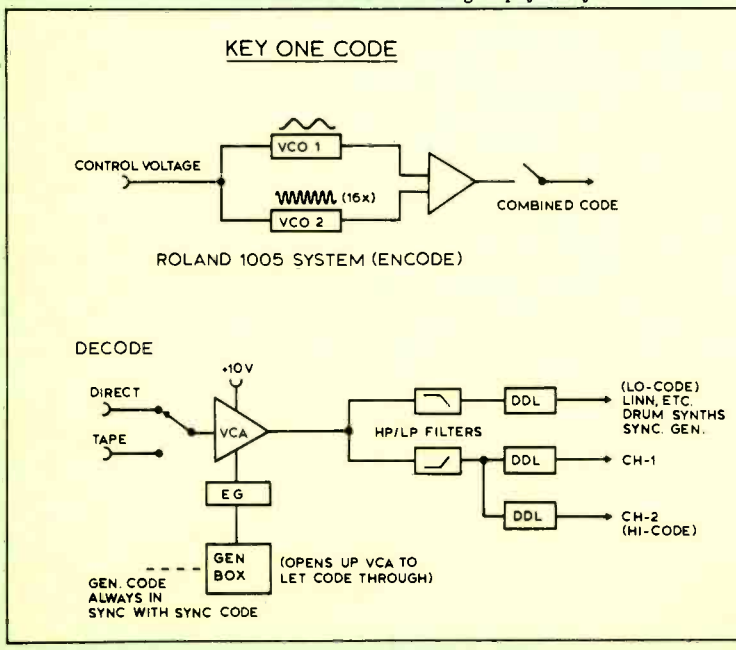
For instance, the audio performance can be recorded on tape and at the same time the real time MIDI data recorded by the Microcomposers and this can then be worked on as required. Another case could be where a client does not want to run 80 synths parallel to tape but just wants to have a phrase performed in the Fairlight and the same line played by 20 synthesisers in order to choose which one he likes best. It's clear that every session will be different and have different requirements. However, the layout as it stands can be easily re-configured by re-programming the programmable patchbays as well as by manual re-patching using those horrible, disgusting 5-pole DIN plugs!

System Flow Chart

An output with a black dot just comes up at the patchbay—an output with two black dots and lines joining them is a break-in point (as in a console patchbay)—an output with a triangle and marked 'A or' is wired to a remote keypad and has a relay to route it to the sound data dump bus of the Atari.

I should also mention that I can dump the sound data of most of the synths to the microcomposer and this can be while I am playing. This means that I can easily return to a song at any time and work on it from where I left off. On the final slave microcomposer I will always try to have the sound data integrated so that when it is loaded it will always have what it had the last time.

The system incorporates 32-way 19 in patchbays with DIN plugs, ie 32 inputs at the front and 32 outputs at the back. The inputs/outputs are connected by small PC cards with a relay enabling different patch configurations or routing to different MIDI streams. (An example of this could be a situation where a configuration of the right sounds for a song has been reached and you want to store the *DX7* sounds on the Atari. You could either re-program the patch or manually re-patch. However, if all the sound dumping programs are running on the Atari, the relays can be activated by a remote keyboard which routes the relevant synthesisers to the sound data dump bus of the Atari. In the system shown this is mainly the 19 inch synths and sound modules. This means that sound data can be dumped into



Key One Code

The Key One code is created with a Roland *100S* modular system which has very stable oscillators. A control voltage is applied to two VCOs, one of which is tuned low with the other being at 16 times the frequency. These are then summed to provide the final code.

Decoding is as shown on the diagram with the source being either from code on tape or being generated directly. The code passes through a VCA which is opened up by code from the SMPTE generator for proper sync. The code then passes through high and low pass filters with the low code being used for Linn drums, etc, and the high code for synthesisers, etc. It will be noticed that the code outputs can be delayed with 'budget price' DDLs (in fact, a Fostex *3050*, Boss *DE 200*, Korg *SDD-1000*) in order, for example, to achieve perfect synchronisation between the Linn and Fairlight. It should be noted here that it is the code which is delayed and not the audio. The reason for the low price DDLs is that they feature fully variable delay ranges instead of being stepped and are thus appropriate to the job in hand.

Countrylane point out that a feature of their code is that it can be read anywhere, with only high and low pass filters being needed for decoding.

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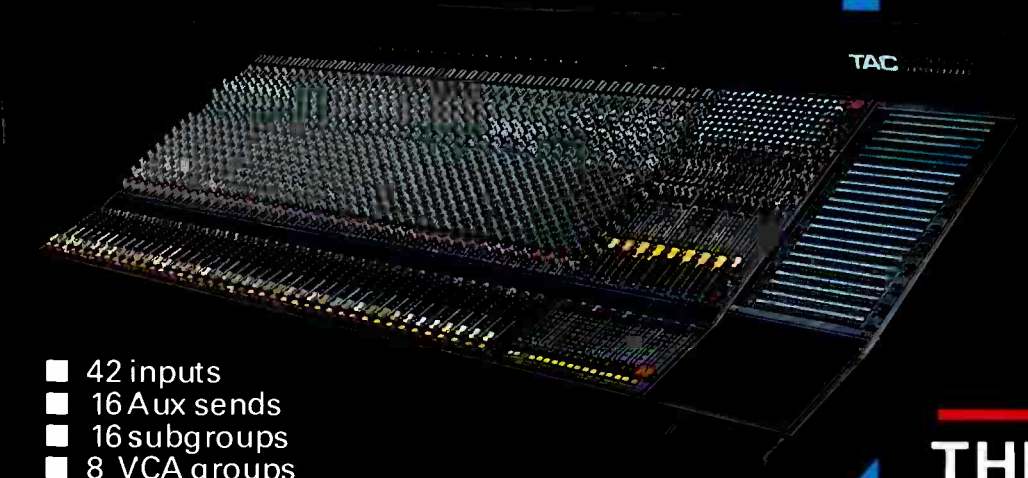

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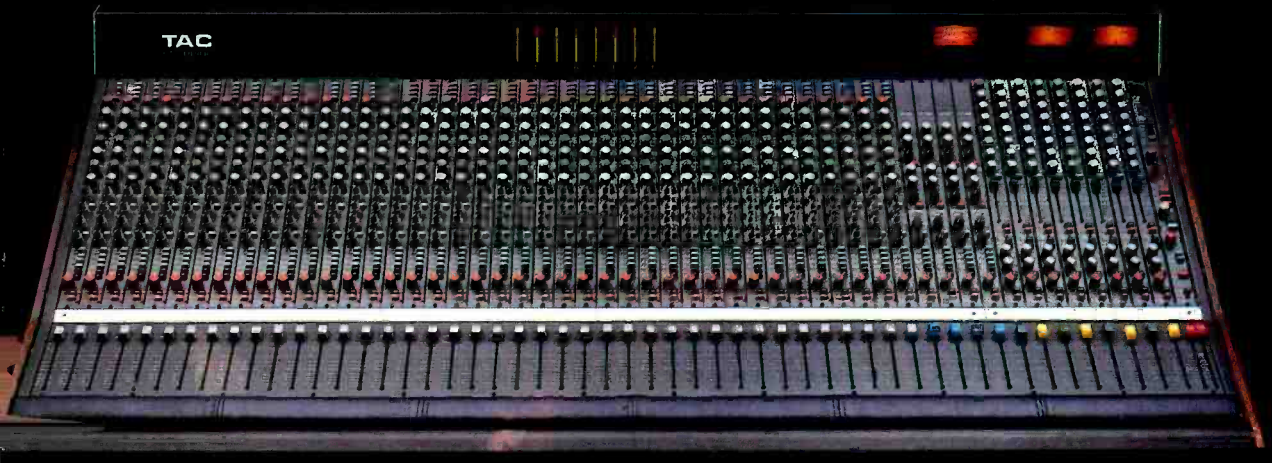

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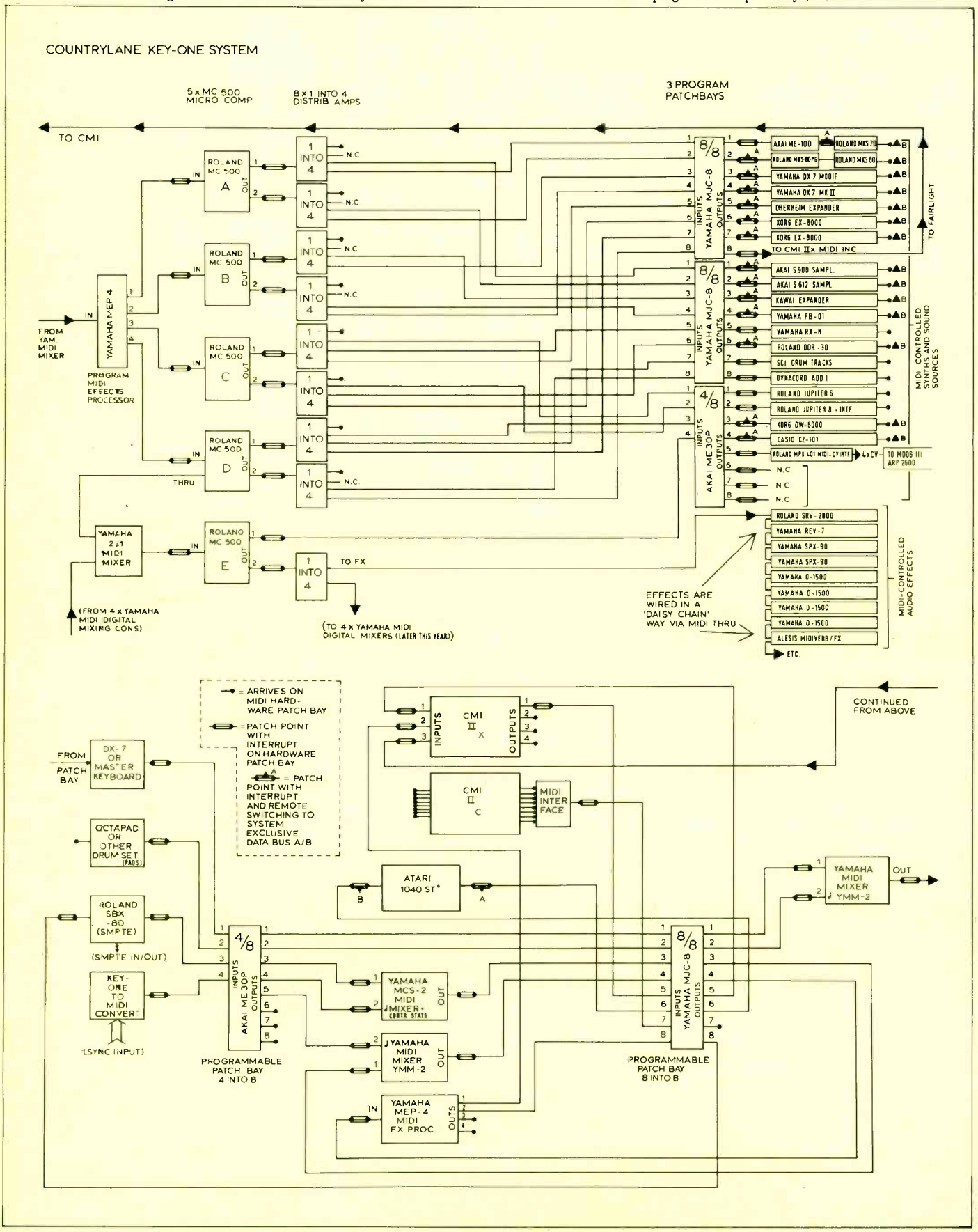
ALL SYNC'D UP

the Atari and then re-integrated into the system without any re-patching.)

Turning our attention to the system, the top left of the diagram shows the *DX7* master keyboard. This has been modified for split operation so that the sound module can run like an expander and run on any MIDI channel (*DX7*s usually only run on MIDI channel 1) while the keyboard can be used as a true master and also run on any MIDI channel. (The modification just consists of a plug-in *PC* board.) Below the *DX7* is the Octapad, the *SBX-80* for SMPTE and the Key One to MIDI convert. (This is the MIDI output of the Key One code which is described separately.) These four outputs go into an Akai *ME30P* programmable patchbay (4/8) which then routes



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TASCAM

A 32-Track version of the ATR-80 will be available soon. © 1986 TEAC Corporation. Tokyo.

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outputs 1 and 2 into a Yamaha *MJC-8* (8/8) programmable patchbay, outputs 3 and 4 into a Yamaha *MCS-2* MIDI mixer and control station and output 5 into a Yamaha *YMM-2* MIDI mixer. The difference between the *MCS-2* and *YMM-2* is that the former is also a control station whereas the latter has no control facilities. Next in line is another *MJC-8* with outputs 1 and 2 going to another MIDI mixer and thence into the main sub-system.

The purpose of the 2/1 MIDI mixers is to avoid data jam when recording on an SMPTE locked MIDI system. Working in this way means combining two things: the tempo timing clock data and the sync information (where you are in the song) together with the performance data of the musician—or musicians—and making sure that the sync information is 'on top'.

The *MJC-8* patchbay decides where performance data should be routed: to the Fairlight, the Atari, a Commodore, and so on. The system as shown is for Key One.

The *MEP-4* (programmable MIDI effects processor) is principally used to provide constant velocity information from all the different keyboards, drumpads, and so on. For instance, the Fairlight has a level of understanding MIDI data which is different from, say, a *DX7*. It can also be used to introduce delays when synchronising with external productions but I mainly use it for re-aligning the dynamic information. This information is then fed to another MIDI mixer as this is a good place to finally bring up the sync code to the SMPTE code-driven sub-system consisting of the five Roland microcomposers.

Unfortunately, the layout of the patching looks rather like spaghetti as I have yet to find a better way to do an 8:24 patchbay. (There are software-driven patches but I don't trust them for the moment!)

The outputs from the *MEP-4* also go to the five microcomposers and in normal operation the *MEP-4* is in bypass mode so that all the *MC-500*s receive the same information (clock and timing pulse), and thus play and perform what they have in memory. However, the *MEP-4* is there to split MIDI information into the different Microcomposers should it be required, such as in live recording situations, modifying dynamics and introducing delays.

The five Microcomposers are synchronised through MIDI as are their punch in/punch out functions to make a proper realtime MIDI data recording system. The outputs from the microcomposers are run into 1/4 distribution amplifiers (which also function as line amps) before arriving at the three programmable patchbays as shown and then on to the sound sources.

The sound source layout is self-explanatory and as you can see there are three patchbay outputs free at the time of writing which will no doubt have found partners soon. The effects units under MIDI control are daisy chained as the delay in MIDI switching commands is so short that they can be easily run in this way.

The diagram also shows the intended position of four Yamaha *DMP7* digital MIDI mixers, which will be run in cascade to provide sub-mixes to the main SSL console. However, their final integration into the system will depend on how well they perform in terms of quality.

A point with the overall system is that it is arranged for easy re-configuration if and when it is required.

Key One components

Akai *ME-10D* Roland *MKS-20*
Roland *MKS-80PG* Roland *MKS-80*
Yamaha *DX7* (modified) master keyboard
Yamaha *DX7* MkII
Oberheim Expander
Korg *EX-8000×2*
Akai *S900* sampler
Akai *S612* sampler
Kawai expander
Yamaha *FB-01*
Yamaha RX-11
Roland *DDR-30*
SCI *Drumtraks*
Dynacord *ADD 1* drums
Roland *Jupiter 6* (MIDI channel 1)
Roland *Jupiter 8*
Korg *DW-6000*
Casio *CZ-101*
Roland *MPU-401* (or *101*)
Roland *SRV-2000*
Yamaha *Rev-7*
Yamaha *SPX-90×2*
Yamaha *D-1500×4*
Alesis *Midiverb*

Equipment

Console
1 32/32 Solid State Logic *4000* custom console driven by a CAI computer system with latest software updates. In-house programmable muting on monitor section

Tape machines
1 Studer *A80* Mk2 24-track with Dolby M24
2 Sony 16 bit PCM stereo digital mastering systems (NTSC and PAL standards on U-matic and Betamax)
1 Studer *A80VU* ¼ in stereo 0,75 with Dolby A
2 Studer *B67* ¼ in stereo, 0,75 with Dolby A
1 Studer *PR 99* 2-track
1 Fostex *B-16* 16-track with Fostex SMPTE synchroniser (4030)
2 Sony *TC 854/4* 4-track
1 Sony *TC 640-A* 1/4-track
1 Uher *Report* 2-track

Monitoring
2 JBL *4350* monitors modified with TAD speakers (retuned) driven by Crown *PSA-2* and Citation *16A* power amps with 2 *DN27/JBL 5234* crossovers
2 Yamaha NS-10M with JVC *JA-544DC* power amp
2 Auratones with Quad *303* power amp
1 Crown *RTA-2* real time analyser

Slave/sub mixers (for keyboards and drum machines):
2 Yamaha *RM 1608* 16-channel mixers
1 Yamaha *RM 804* 8-channel mixer

Reverb
2 Yamaha *Rev-1* digital reverb
1 Yamaha *Rev-7* digital reverb
1 Yamaha *R-1000* digital reverb
1 EMT *240TS* Gold Foil
1 Roland *SRV-3000* digital reverb
1 MXR *Zero One* digital reverb
1 DeltaLab *Acousti computer*

Comments on MIDI

"MIDI now provides communication possibilities between more and more devices—compared to say five years ago—but there is still a lot of progress to be made. For example, some sequencers can now read song pointer information which makes a lot of sense, however, some of them work to a certain point and then hang up the program. The best I have found so far is the *MRC-500* microcomposer with its calculator-style keyboard—it works very well and has a lot of possibilities.

"Another area that needs development—and this is probably only software—concerns program changes. A song could have various patches on a keyboard that changes from verse to verse. Depending on the keyboard status and where you re-start the song while establishing the mix, you could find the wrong patch is being used as the program change information has not been received. It would be far better if the sequencer had what I call a 'reflect function' where it is always checking on what the last program change command was relevant to the bar in question; so it not only knows where it is in the song but what programs should be running at that particular point. And this should include note information as well as patches.

"Another point is that there should be more collaboration between manufacturers and users in order to create a better dialogue and understanding of what is required, and this is something that I would certainly be interested in doing.

"One anomaly is that manufacturers always talk about the note capacity of their piece of equipment but if you tried to send the score of the average synthetic pop record through one MIDI cable the result would be totally out of sync and have notes missing. You really need five to eight MIDI streams just to get the synchronisation right, which is why the system I have now works very well. There is one piece of equipment that does give this facility, the Yamaha *QX-1* but it takes so long to load and enter the programming modes that it is no pleasure to use and this is why I have the microcomposers. They have two outputs and having multiple units does give me a certain built-in backup to the system."

Maybe one area where manufacturers have been doing some mindreading is in the area of interfacing the 'older generation' synthesisers to the benefits of MIDI. Certainly Harry is pleased that he can now incorporate his Moog *IIIC* modular system and *ARP 2600* into the overall scheme of things via a Roland *MPU 401* (or 101), which provides four CV outputs from MIDI data.

"There are still lots of things that you can do with a modular system that you can't achieve with the majority of today's synthesisers. A lot of people make the mistake of discarding what has gone before and just keeping the new rather than getting the benefits of both."

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BARRY FOX'S BUSINESS

Everyone dreams of a computer which will translate spoken words into machine instructions or text on screen. The military already use this technology to let pilots arm and fire weapons. The Japanese Government is funding a 15-year project, which will—in theory, at least—enable two people to speak in different languages at the same time, and hear a translation of what the other is saying. So what price a tape machine and console that do as they are told, in any language?

The British Government has created a less ambitious project, called the Alvey Programme, following the recommendation of a committee chaired by John Alvey of British Telecom's research labs in 1982. The Alvey Programme provides Government support for research and development in information technology, with the intention of making British industry competitive with the USA and Japan. The programme is managed by the 'Alvey Directorate' in the Department of Trade and Industry. It probably has more chance of achieving something useful than the rather muddled schemes for European co-operation, which are often referred to simply as 'Eurocrap'.

The underlying principle of Alvey is that there should be co-operation between several companies, universities and government laboratories. The DTI meets 50% of the industrial costs and 100% of the remainder. John Holmes is Alvey's speech technology consultant, with a dozen projects under his wing. He was at the last Digital Information Exchange seminar and told some interesting tales. For instance, it turns out that all the Alvey speech projects rely heavily on digital audio technology.

Humans use speech for communication without any apparent effort, so why should it be so difficult for machines to do likewise? The explanation is easy, when you think about how we talk and listen.

In normal sentences, words are not separated. But paradoxically there are silent gaps in the middle of some words. Try saying "How are you?", which flows continuously, and then the word "Attack", which has a gap in the middle.

When humans hear speech, they mentally eliminate background noise, as heard on a poor telephone line, in a reverberant room or at a noisy cocktail party. The so-called 'cocktail effect' lets the human brain home in on faint but interesting words, while ignoring boring chat from someone much closer.

Microphones, tape recorders and computers cannot do this. This is why dummy head binaural recordings, made from a seat in the stalls, sound so bad. It's what helped bury 'Holophonics'. The human ear and brain can concentrate on a distant source of music even though it is swamped in room echo and background noise; a recording system cannot discriminate, so it accurately captures everything at its real level.

The human brain also fills in gaps in the sound, through past experience. This is how a cheap transistor radio, without any genuine bass or treble response, can still produce a reasonable replica of music. It is how we understand the meaning of speech under very poor listening conditions. The brain only runs into trouble when it is required to identify a completely new word, for instance the name of someone you have never previously met. But humans then show initiative based on experience.

Like the human brain, a computer can only recognise words which it has been programmed to identify. Without intiative it gives up or makes mistakes when confronted with a new word or asked to identify known words in a stream of conversation. To a computer '16 ages' makes as much sense as 'six teenagers'. To a human it is obvious that the latter is the intended meaning.

The future lies in producing software programs which will let a speech system make a sensible interpretation where there are several possible interpretations for the sounds heard. This is very difficult. Often the emphasis on words can convey meaning. Computers need to know a lot about the real world to emulate the human brain. So far they don't.

Take the sentence 'this new display can recognise speech'. A dumb computer could easily interpret it as "this nudist play can wreck a nice beach".

Speech varies from person to person and depends on time of day and physical health. Ask anyone who has tried to edit a morning take with afternoon overdubs. Different accents, different dialects may confuse the brain but they crash a computer.

This is why military systems rely on only a few commands which are quite unique. Presumably pilots are taught not to shout 'Fire' if they see something smouldering...

Already many firms in the computer industry offer speech recognition equipment, and claim high percentage accuracy. "Quoting percentage accuracy is meaningless," says John Holmes, "unless you also quote the background noise, the speed of speech, the size of the vocabulary and so on. A claim to 100% accuracy can easily end up as 10% under different conditions."

According to Holmes, the speech recognition projects within the Alvey programme have all standardised on the use of Sony *PCM* processors—usually the *701*—to capture speech and store it on video tape as the first stage of teaching a computer how to handle a large vocabulary intelligently. The audio quality of conventional analogue cassettes is adequate but, according to Holmes, replay speed is not sufficiently consistent.

"A very slight difference in speed, and thus pitch, can take the processing decision over a threshold. So experiments aren't repeatable. With digital coding, speed is absolutely constant so experiments are repeatable."

Holmes reckons that low cost digital recording systems, designed for semi-professional use, came along at "just the right time" for the Alvey programme. Pity they had to be Japanese.

Holmes tells a story which will strike horror in the heart of anyone who ever flies.

When passengers check in their luggage, the airline clerk puts on a label which specifies the intended destination. Normally, baggage handlers sit by the conveyor watching the labels and picking up the bags by hand.

But now the staff of United Airlines in the US look at the labels, and shout out the destination so that a speech recognition system can hear. The bag is then mechanically grabbed and routed by another conveyor to the intended plane. According to Holmes, speech recognition is now good enough for the electronics to make only around one mistake in a hundred.

"You just have to hope that the staff notice it," he says. "The airline believes that if it didn't have speech recognition, it couldn't now cope with the volume of baggage. There would be chaos."

But surely the system adds the risk of machine error to the risk of human error, for instance if the baggage handler calls out the wrong destination in the first place?

"When UA first started using speech recognition," Holmes admits "I flew from Los Angeles to New York, through Chicago. When I got to New York, my baggage was still at Chicago."

Holmes doubts very much whether the Japanese will achieve their 15 year target of instant translation over the telephone.

"Even if the system works perfectly there still has to be a delay," he says, "because of the very structure of language. Remember the apocryphal story of the United Nations translator who was trying to interpret a rambling speech by a German. In that language they put the verb at the end of the sentence. So as the German politician rambled, all the interpreter could do was sit silent and wait until he had finished a sentence. What delegates finally heard was a strangled cry from the interpeter through their headphones—*For God's sake give me a verb.*"

Holmes estimates that it will take four or five years before any of the Alvey projects comes up with speech recognition circuits that allow someone to talk to a computer and get a usable first draft on the screen, with only 2% or 3% of the words needing correction. "And even this is no use for translations," he warns. "For that you need much more than just plain dictionary look-up. That's the easy part. You need artificial intelligence to cope with the semantics. That's the hard part."□

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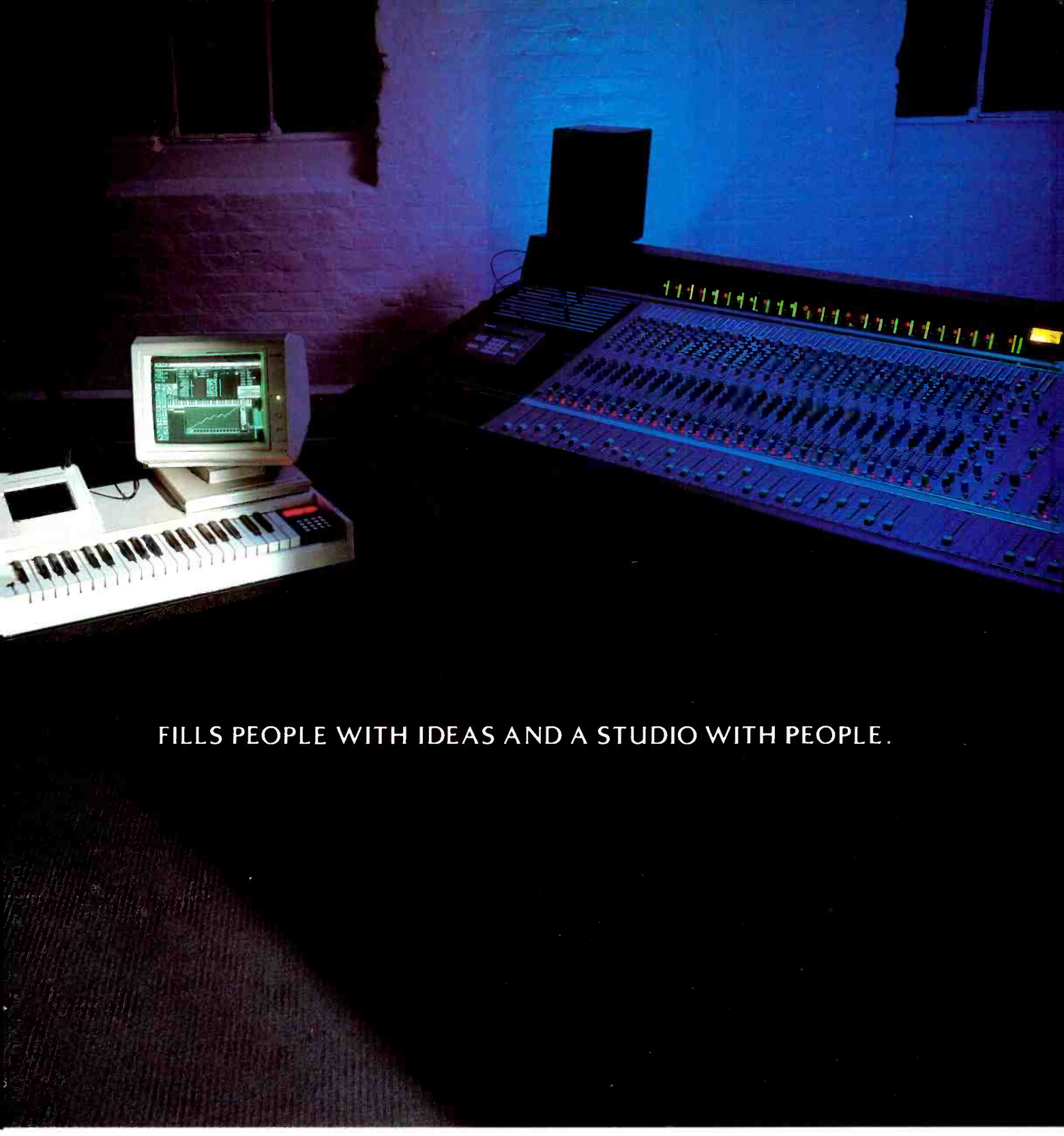

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SYNCHRONISERS

This listing of available synchroniser products covers systems used for synchronisation of audio tape machines with other tape-based machines. The definition of a synchroniser is becoming less precise as more machines contain at least some of the basics and require only a cable between them to start basic sync activities. These units here are easily identifiable as machine synchronisers and include those made by manufacturers solely for their own products by the reasoning that they remove the need for an additional synchroniser. We have excluded systems that tie external electronics to the tape machine or vice versa.

Adams-Smith

2600 Modular System: modular synchroniser system expandable from two to multiple machine control. Optional Compact Controller.

Zeta 3: two machine chase sync system with features including SMPTE generator and MIDI interface.

Adams-Smith Inc, PO Box 130, 34 Tower Street, Hudson, MA 01749, USA. Tel: (617) 562-3801.

UK: Adams-Smith (UK) Ltd, Barnwell House, Barnwell Drive, Cambridge CB5 8UJ.

UK: Marquee Electronics, 90 Wardour Street, London W1V 3LE. Tel: 01-439 8421.

Albrecht

VFS Controller: Video Film Transport Controller that will control sep mag transports and will talk to other tape machines through interfacing synchroniser.

Wilhelm Albrecht GmbH, Maybachufer 48-51, D-1000 Berlin 44, West Germany. Tel: (030) 623 60 39.

UK: FWO Bauch Ltd, 49 Theobald Road, Boreham Wood, Herts WD6 4RZ. Tel: 01-953 0091.

USA: Gexco International Inc, 317 St Paul's Avenue, Jersey City, NJ 07306. Tel: (201) 653-2383.

Alpha Automation

The *Boss*: audio editing system allowing full control of tape machines, storage of editing details and other production tasks. Qwerty keyboard and VDU allows up to 99 simultaneous decisions.

Alpha Recording, Division of Alpha Recording Corp, 2049 West Broad Street, Richmond, VA 23220, USA. Tel: (804) 358-3852.

Applied Microsystems

CM250: two machine synchroniser with integral SMPTE generator and separate control unit with 80 character LCD display.

Slave-2 expansion unit for *CM250* synchroniser allowing three machine control.

Applied Microsystems Ltd, Tower Mill, Bagshot Road, Chobham, Woking, Surrey GU24 8BZ, UK. Tel: 09905 6267.

Audio Kinetics

Wide range of synchroniser options.

Q.Lock: versatile synchroniser control system with wide range of software options and over 80 machine interfaces available.

Eclipse: editor system which may be used as central controller for *Q.Lock 4.10* and is expandable up to 32 machine control on SMPTE bus system.

Pacer: low cost two machine synchroniser in 1 U rack unit with optional Pacer Pad remote keypad and display.

Audio Kinetics Ltd, Kinetic Centre, Theobald Street, Boreham Wood, Herts WD6 4PJ, UK. Tel: 01-953 8118.

USA: Audio Kinetics Inc, 1650 Highway 35, Suite 5, Middleton, NJ 07748. Tel: (201) 671-8668.

CMX

CASS 1: audio editing/console automation system giving computer aided control of six tape machines and 15 additional sources. Keyboard and CRT monitor with floppy disk storage of data.

CMX Corp, 2230 Martin Avenue, Santa Clara, CA 95050, USA. Tel: (408) 988-2000.

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

Cipher Digital

Wide range of synchroniser and controller products: Series *4800*, Shadow II and Softouch.

Cipher Digital Inc, PO Box 170, Frederick, MD 21701, USA. Tel: (301) 695 0200.

Editron

Model *100A*: multipurpose synchroniser system accepting multiple code standards, one master/two slave operation with varispeed facility.

Model *200A*: timecode synchronising/editing system developed to interface with *100A*. Consists of remote keyboard and rack mounting control box.

Model *500V*: six machine active synchroniser system with internal sync/timecode generator with multistandard operation. Audio edit and hard disk options.

Editron Australia Pty Ltd, 36 Lever Street, Oakleigh, 3166 Victoria, Australia. Tel: (03) 568 4022.

UK: Scenic Sounds Equipment, Unit 2, William Road, London NW1 3EN. Tel: 01-387 2812.

USA: Editron, 1900 S Sepulveda Boulevard, Suite 354, Los Angeles, CA 90025-5620. Tel: (213) 275-2790.

Fostex

4030: rack mount synchroniser reading and resolving all standard SMPTE rates with frame, sync, auto and chase modes.

4035: synchroniser controller with transport control, autolocate and data entry functions. Will support system of up to three slaves.

Fostex Corp, 560-3 Miyazawacho, Akishima, Tokyo, Japan.

UK: Bandive Ltd, Brent View Road, London NW9 7EL. Tel: 01-202 4155.

USA: Fostex Corp of America, 15431 Blackburn Avenue, Norwalk, CA 90650. Tel: (213) 921-1112.

Giese

Lock System *3*: synchroniser system for film/TV applications. Optional remote control.

Lock System *3/2*: system for synchronisation of different audio, video or film machines. Standard is one master with two slaves. Optional remote and system expansion possibilities.

Taker *A/B*: system for looping control in post-production.

Taker *1000*: post-production synchroniser.

Giese Electronic, Klaus-Groth Strasse 84/86, D-2000 Hamburg 26, West Germany. Tel: 250 60 64.

GTC

Editon: synchroniser system capable of operating with SMPTE or CTL pulses. Capable of locking to VITC if used with video machine. Also dual slave version.

Multi Slave synchroniser: synchronising system for film sound, audio and video machines. Expandable by adding IDC units to systems.

gtc Film und Fernseh-Studiotechnik GmbH, Wohrendamm 29, D-2070 Grosshansdorf, West Germany. Tel: 04102 620 62.

UK: gtc Ltd, Stonesfield Way, Ruislip, Middx HA4 0YL. Tel: 01-864 1601.

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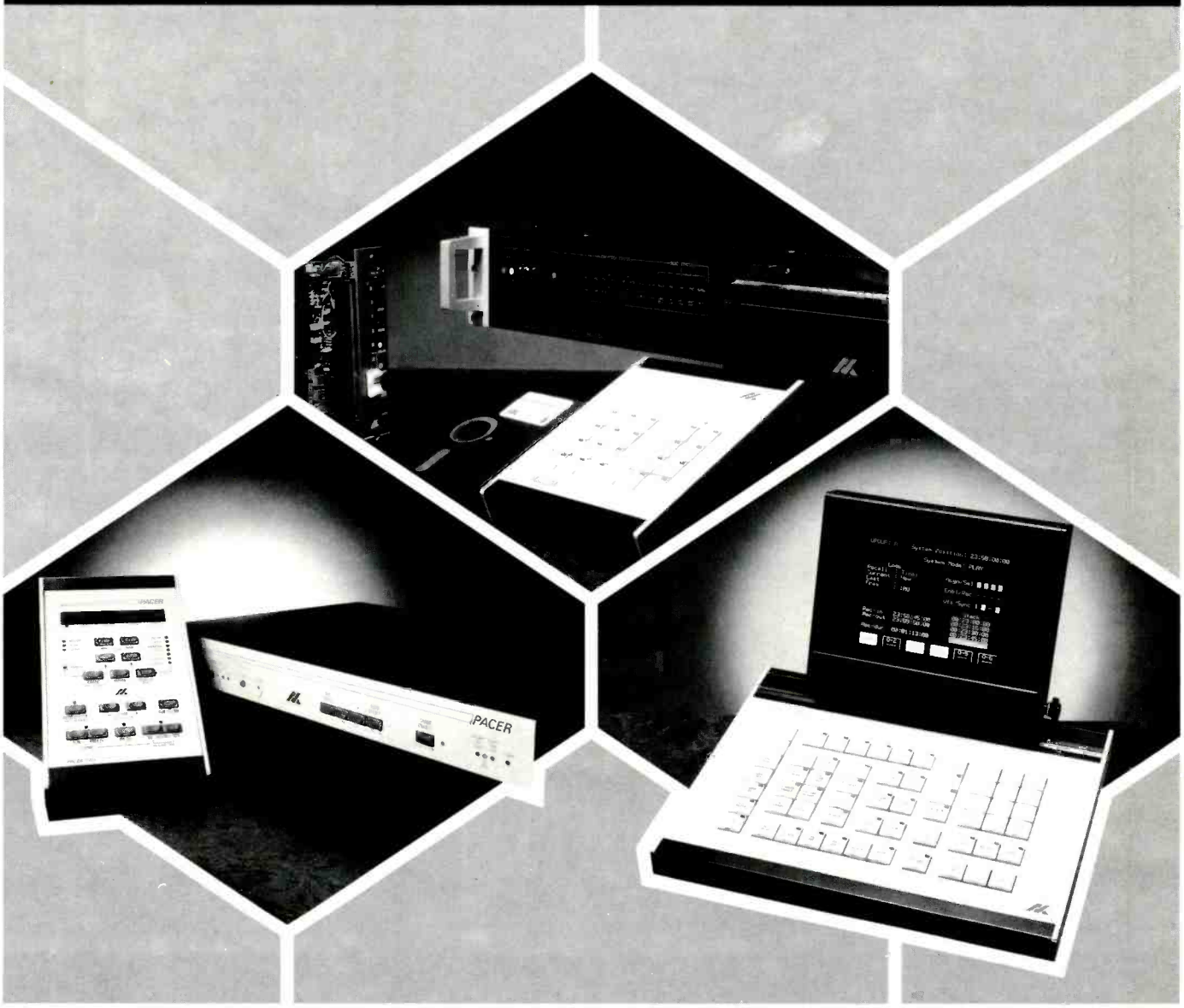
AUTOMATIC AUDIO POST-PRODUCTION



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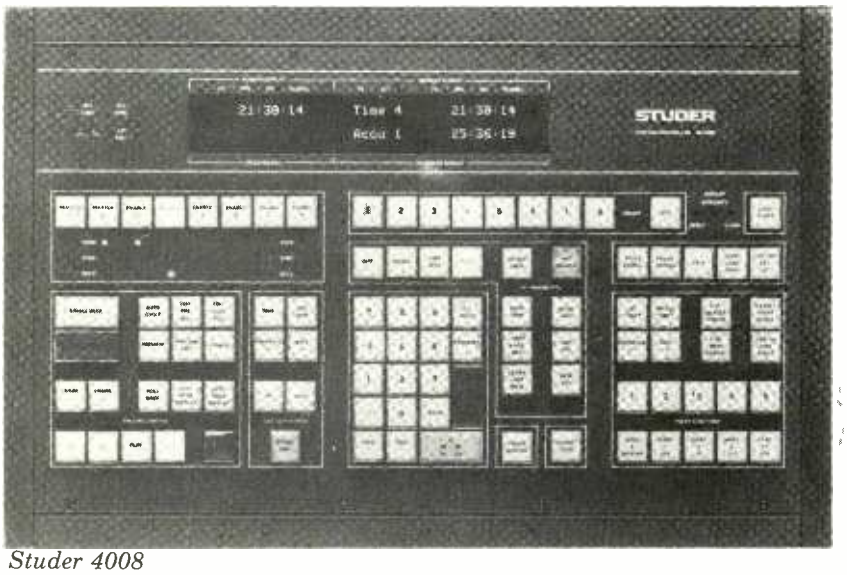
SYNCHRONISERS



Studer 4008

Otari

Chase lock synchronisers for Otari tape machines.

EC-101: module to fit inside *MTR-90*.

EC-102: 1 U rack unit for *MTR-20*, *MTR-10/12* and *MX-70* (not available yet).

A derivation of the *EC-101* for the *DTR-900* is in development.

Otari Electric Co, Otari Building, 4-29-18 Minami-Ogikubo, Suginami-ku, Tokyo 167, Japan. Tel: (03) 333-9631.

UK: Otari Electric (UK) Ltd, 22 Church Street, Slough SL1 1PT. Tel: 0753 822381.

USA: Otari Corp, 2 Davis Drive, Belmont, CA 94002. Tel: (415) 592-8311.

Solid State Logic

Part of the SSL console studio systems is a machine control system which is based around an Adams-Smith synchroniser although an Audio Kinetics interface is possible. The SSL system puts the basic synchronisation facilities under intelligent desk control.

Solid State Logic Ltd, Begbroke, Oxford OX5 1RU. Tel: 08675 4353.

USA: Solid State Logic, 200 West 57th Street, New York, NY 10019. Tel: (212) 315-1111.

USA: Solid State Logic, 6255 Sunset Boulevard, Los Angeles, CA 90028. Tel: (213) 463-4444.

Sondor

Multi-deck Sync-Control Unit *9908*: sep mag synchroniser with a capability for eight sprocketed tape decks allowing sync shift and offset capability.

Sondor Export AG, CH-8702 Zollikon, Zurich, Switzerland. Tel: 01-391 80 90.

UK: Sondor of Switzerland Ltd, 107 Swains Lane, Highgate Village, London N6 6PT. Tel: 01-341 9181

Sony

RM-3310: autolocator and synchroniser system for PCM *3324* multitrack.

BVR-90: intelligent synchroniser system allowing lock between Sony analogue multitrack and other type of transport eg VTR matching speeds of transport operation.

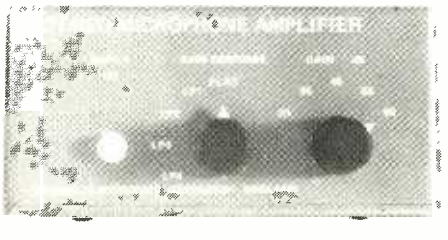
The *APR5003* and the 2-track DASH machines have internal facility for locking to external timecode input.

Sony Corporation, PO Box 10 Tokyo AP, Tokyo 149, Japan. Tel: 03 448-2111.

UK: Sony Broadcast, Belgrave House, Basing View, Basingstoke, Hants RG21 2LA. Tel: 0256 55011.

USA: Sony Corporation of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656.

STEREO MICROPHONE AMPLIFIER



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SURREY ELECTRONICS LTD, The Forge, Lucks Green, Cranleigh, Surrey GU6 7BG
Tel. 0483 275997

Soundmaster International

Integrated Editing System: fully programmable machine synchroniser system based around IBM *PC* using Soundmaster software designed for TV and film production use.

Soundmaster International Inc, 306 Rexdale Boulevard, Unit 5, Rexdale, Ontario, Canada M9W 1R6. Tel: (416) 741 4034.

Studer

Range of synchroniser products principally designed for Studer products although not exclusively.

TLS4000: chase synchroniser system orientated towards Studer *A810*. System includes optional Local Control Unit to allow fuller control.

SC4008: synchroniser controller capable of controlling up to eight *TLS4000*.

SC4016: may control up to 16 *TLS4000* units with other facilities including automation control, machine sequencing, audio editing etc.

Studer International AG, Althardstrasse 150, CH-8105, Regensdorf, Switzerland. Tel: 01-840 29 60.

UK: FWO Bauch, 49 Theobald Street, Boreham Wood, Herts WD6 4RZ. Tel: 01-953 0091.

USA: Studer Revox America Inc, 1425 Elem Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651.

Synchronous Technologies

SMPL system: two machine synchroniser with MIDI, TTL pulse and autolocate facilities.

Synchronous Technologies, PO Box 14467, 1020 West Wiltshire Boulevard, Oklahoma City, OK 73113, USA. Tel: (405) 842-0680.

UK: State of the Art Ltd, Studio House, High Lane Village, Stockport SK6 8AA. Tel: 06632 2442.

Tascam

ES-50: slave chase synchroniser with integral generator and capable of reading all SMPTE frame rates.

ES-501: add on controller to *ES-50* giving keypad and displays, autolocate events control and offsets.

Teac Corp, 3-7-3 Naka-cho, Musachino, Tokyo, Japan. Tel: 0422 53-1111.

UK: Harman (Audio) UK Ltd, Mill Street, Slough SL2 5DD. Tel: 0753 76911.

USA: Teac Corporation of America, 7733 Telegraph Road, Montebello, CA 90640. Tel: (213) 726-0303.

Timeline

Lynx: rack mount system incorporating timecode reader/generator and synchroniser system. One module connected to each controlled transport and up to 32 units can be used as chase sync system with master designation of any unit.

LTC-422: versatile audio production controller using Lynx modules as machine interfaces.

Timeline Inc, 458 Minneford Avenue, City Island, NY 10464, USA. Tel: (212) 929-1311.

UK: Stirling/ITA Ltd, 1 Canfield Place, London NW6 2BT. Tel: 01-625 4515.

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You can get locked-up for less than you'd think these days.

Automation is fast becoming vital to the effective use of MIDI instruments in the studio. The Steinberg Research **SMP-24** has been designed, in conjunction with studio engineers, to fulfil this task efficiently and to meet the demands of complex MIDI productions in the studio.

Furthermore, the **SMP-24** supports our Pro-24 software. Via the Atari's centronics port, the Pro-24 can run the **SMP-24** unit to provide the first fully-integrated SMPTE-locked MIDI recording system.

On SMPTE: Four timecode standards can be selected including EBU. The MIDI/SMPTE standard is incorporated. 256 programs can be recalled and unlike other units, the **SMP-24** stores master program information to disk.

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EXOTIC CABLE TECHNOLOGY

It is nearly 10 years since Jean Hiraga published his article on loudspeaker cables ('Can we hear connecting wires?' *Hi-Fi News & Record Review*, August 1977. Translated from an original article in *La Nouvelle Revue du Son*). At the time the article caused something of a sensation in the hi-fi world in that it set out to demonstrate that cables which measured well didn't necessarily provide the best sound definition. The hi-fi world hasn't looked back since.

Until then users saw cable technology in relatively 'simplistic' terms: ie long lines and high impedances create HF losses, screening and balanced lines reduce hum pickup and RF interference and in the case of loudspeaker leads, larger conductors provide less resistance hence more available output and greater damping factor.

Whilst the professional user has looked at such factors as reliability, number of ways, robustness, conductor identification, screening, size and of course cost, as relevant parameters the hi-fi world has taken a somewhat different route: esoteric designs are being offered with one parameter to the fore—sound quality.

Naturally the hi-fi world provides fertile ground for new cable designs. Rewiring is simple, cable lengths are short, invariably only a stereo pair of unbalanced connections are required and cost (in relation to the perceived improvement) is generally—but not always—realistic. Although some esoteric cabling has been used professionally the practice doesn't appear to be particularly widespread. In the professional field the whole subject remains highly emotive and the average studio is unlikely to start ripping up the control room on the basis of a 'flavour of the month' recommendation. Whether the end justifies the means is not the object of this survey, we are simply taking a general look at some of the available products and the different design approaches in use.

The development of exotic cables has moved along several distinct avenues. These have included the size, purity and crystalline (or lack of it) structure of the conductor; the number of strands, type of screening and the nature of the insulation, ie material, physical layout (joined figure of eight; flat, spaced; loosely sleeved, tightly wrapped, etc), thickness and so on.

The development of low level signal cables and speaker leads have proceeded almost side-by-side and some manufacturers suggest using the same cable for both applications. One of the main problems with this approach is of course the difficulty of providing suitably terminated cables for low level applications when the cable is rigid

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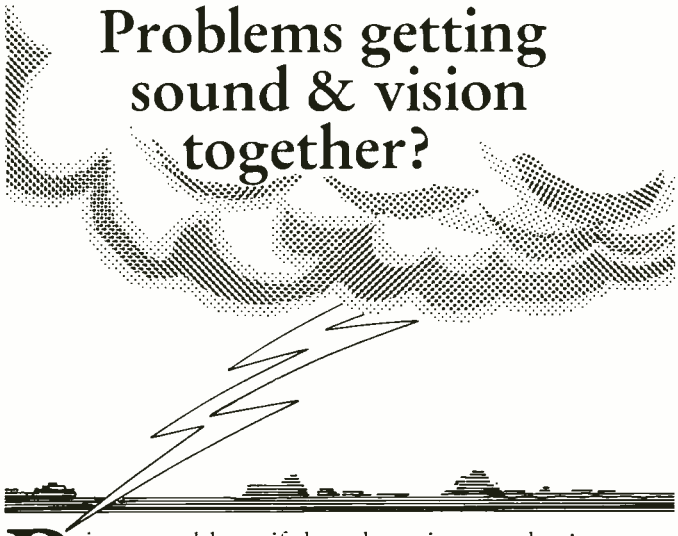

Bigger problems if they do arrive together! Seriously though, effortless control of video and audio tape is vital in the studio.

We have applied our expert knowledge of tape transports to develop a unique range of products: the CM50 autolocator now with optional SMPTE reader, the CM250 synchroniser available in 'chase' and 'control' versions and the CM255 superlocator and theatre control system. *Call us now and we'll send you our comprehensive brochure ... in a flash!*

Applied Microsystems

Bagshot Road, Chobham, Woking, GU24 8BZ. ☎ (09905) 6267.

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and/or bulky in nature.

Historically the first developments included higher purity copper conductors and the use of Litz wire (using as many as a 1000 strands). Interestingly the professional world was already ahead of the game in this respect as one of the sources of high quality cabling for hi-fi systems was the very cable used by some of the major European microphone manufacturers. Seizing the marketing opportunity, LC-OFC (Linear Crystal Oxygen-Free Copper) was developed which created a whole new family of cables. Development still continues along the lines of purer and purer conductors and there are now improved LC-OFC types, silver-coated variants and even pure silver conductors (at around £2,000 for a typical hi-fi system imagine the cost of rewiring an entire studio!).

Some manufacturers have studied time delays in cables (the claim is the lower frequencies travel slower than the higher frequencies) and have produced multi-stranded designs with thin and thick strands designed to reduce errors across the audible frequency band.

Speaker cables have followed on similar lines. Starting with bell wire the move to higher current carrying alternatives was sensible and practical. Fashion moved through various stages of single core, multistranding, high amp ratings (some fanatics, so the story goes, resorting to welding cable in pursuit of improvements!) through to virtually every combination of braiding, stranding and inter-weaving you can think of.

Figure of eight construction was popular for a time then this was replaced with individually insulated conductors. This was followed with a brief period of hand twisting the individually insulated conductors then came the flat spaced cables with the two conductors separated with a flat section of insulation. Today a number of these earlier designs survive (although many more have fallen by the wayside) along with time compensated alternatives and the latest vogue—the solid single core cable.

The following list provides details of cables and sources of supply for some of the more esoteric cables you may encounter. We have tried to include full addresses but in some cases we were unable to find correct agents as they are usually companies out of pro-audio. We will publish any further information received at a later date.

Audio Research

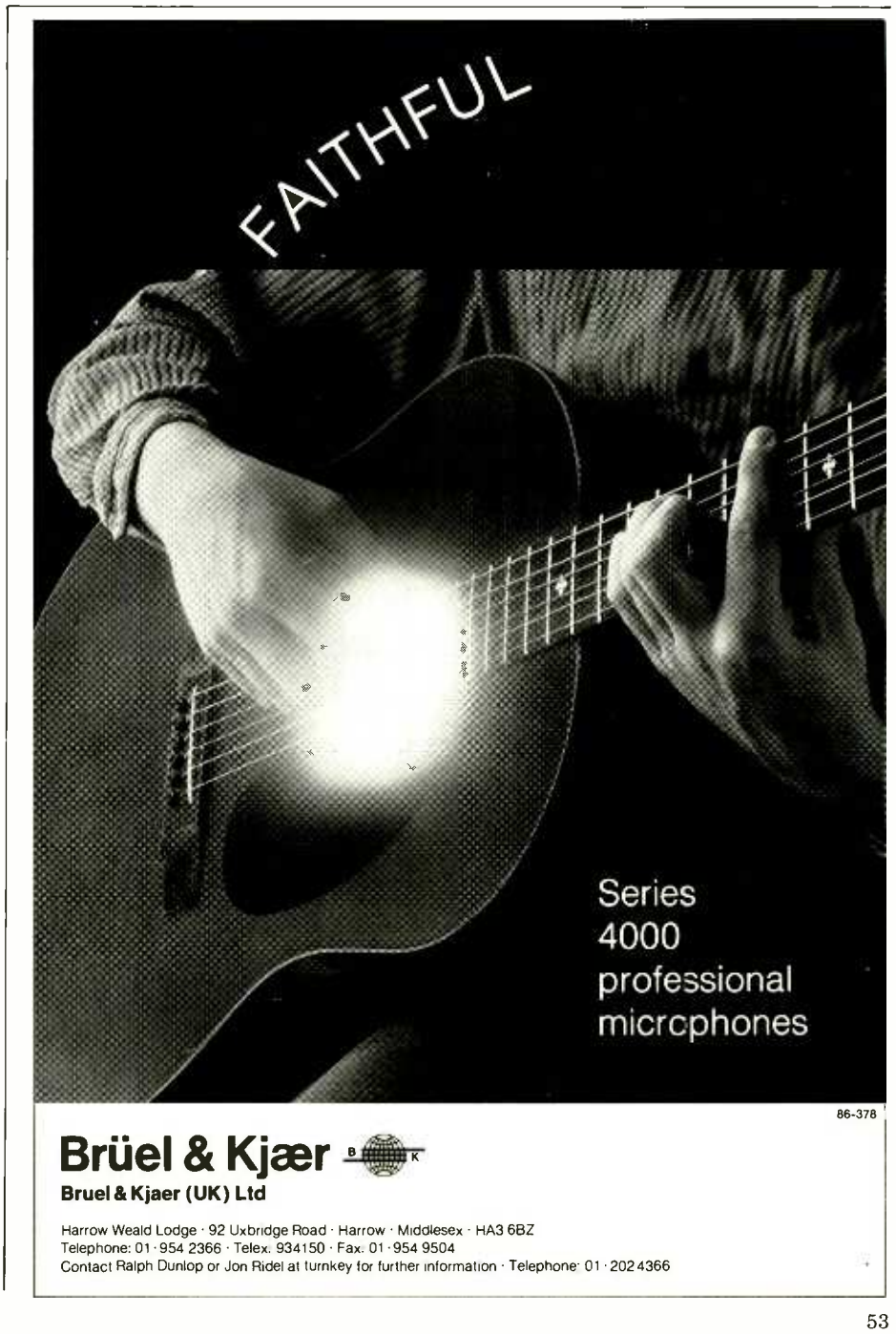
US solid core design, oxygen-free copper conductor and PVC insulation.
Audio Research Corp, 6801 Shingle Creek Parkway, Minneapolis, MN 55430, USA. Tel: (612) 566-7570.
UK: Absolute Sounds, 42 Parkside, London SW19. Tel: 01-947 5047.

Audio Technica

Both LC-OFC interconnects and LC-OFC loudspeaker cables are available. Three interconnects are available in the Vital Link range—*AT628* a 300-strand LC-OFC cable; *AT620*, a Litz wire cable with polypropylene double shield and *610a*, a high conductivity cable with ground wire. *AT635* (LC-OFC) and *AT631* are both flat twin loudspeaker cables, the former having four 75-strand conductors and the latter two 100-strand high purity copper conductors.
UK: Audio Technica (UK) Ltd, Technica House, Lockwood Close, Leeds LS11 5UU. Tel: 0532 771441.
USA: Audio-Technica US Inc, 1221 Commerce Drive, Stow, OH 44224. Tel: (216) 686-2600.

Cable Design

This company produces solid core cables with additional stranded sections included in the design. *Soli-core O* uses a single (1/1.80) copper core with three 0.45 mm copper conductors twisted around the central core. Insulation is PVC. *Soli-core B* is similar but features a twisted pair (1/1.8) as the central core with four thinner copper conductors (1/0.5). Top of the range is *Solicore S*. This uses twin 1.8 mm^2 central conductors with five (0.45 mm^2) additional conductors. High grade PVC insulation with an aluminium inner foil screen is used. The cable is



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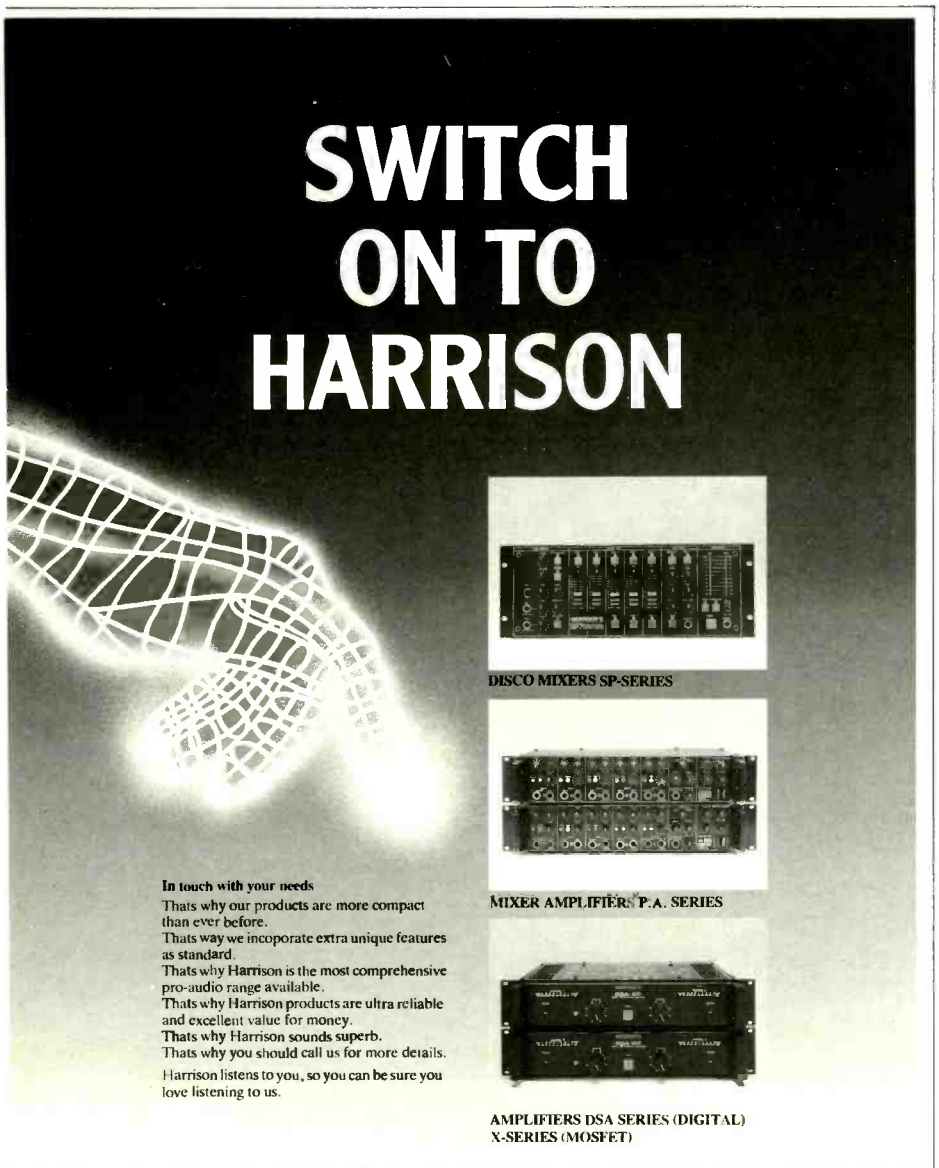
EXOTIC CABLE TECHNOLOGY

marked for directionality. Overall diameter is 1.5 cm.
Cable Design, 87 Chessel Crescent, Bitterne, Southampton SO2 4BT, UK. Tel: 0703 442183.

Deltec

Solid-Link is a silver-plated, high purity copper interlink featuring four individually PTFE insulated conductors. A loudspeaker cable—*8S*—is also available which has silver-plated single 0.6 mm strands insulated with PTFE.
Deltec Precision Audio, 16 Claude Road, Roath, Cardiff, UK. Tel: 0222 482818.



DNM Design

Solid core cable for speakers or interconnect. The latter is an unscreened design using two 0.25 mm^2 tin plated copper conductors spaced 5 mm apart. The speaker cable has two 0.64 mm^2 conductors spaced 19 mm apart with a third (central) conductor designed for use with a special sensing system developed in conjunction with the company's power amplifier.
DNM Design, 15 Highland Avenue, Brentwood, Essex CM15 9DD, UK. Tel: 0277 225865.

Hitachi

Originally launched in 1984, *SAX-102* is an LC-OFC design featuring a twisted pair of 100 (50×2) 0.08 mm strands. Inner insulation is polythene surrounded by a braided shield and covered with PVC. Overall diameter is 6 mm and the cable is marked for directionality. Hitachi also produce a non-directional LC-OFC loudspeaker cable (*SSX-102P*) with two (1.25 mm^2) 54-strand conductors. The cable has a high quality polyethene insulation over a compressed helical wrap tape (to prevent internal vibration) enclosed in rigid PVC. A balanced twisted four-conductor version of the above is also available as *SSX-104* and *Lead LC-OFC* is similar to *SSX-102P* but with lead wrapping replacing the tape wrap.
UK: Absolute Sounds, 42 Parkside, London SW19. Tel: 01-947 5047.

Kimber

The *4TC* cable features a variety of different gauge interwoven conductors. Insulation is Teflon.
Kimber Cable, 2675 Industrial Drive, Ogden, UT 84401, USA. Tel: (801) 621-5530.
UK: RATA, Edgebank House, Skelsmergh, Kendal, Cumbria LA8 9AS. Tel: 053983 247.

MIT

Delay compensated OFC solid core cable with three conductors—an inner solid core, braided middle core and outer conductor of fine strands. Recommended usage is to connect shield at source only. *MI 330* is the interconnect and *MH 750*, a somewhat thicker loudspeaker cable. Also from MIT is the Shotgun loudspeaker cable assembly which incorporates an extra unterminated 8 in length of cable at the loudspeaker connection point. This is said to improve the overall quality of the signal.
UK: Absolute Sounds, 42 Parkside, London SW19. Tel 01-947-5047.

Monster Cable

A variety of cables is available including three different *Prolink* designs specifically for studio applications. These include the series *3* (standard), series *2* (high resolution) and series *1* (super high resolution). All feature multistranded 'Bandwidth Balanced' construction, varying gauges of wire for high/mid and low (phase aligned) or separate high, mid, and low frequencies (multi phase aligned). Also available is the *Interlink* series (*Reference, Special* and *4*). All cables are available

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in bulk or can be purchased terminated: *Prolink* with special *XLR*-type connectors and *Interlink* with special RCA connectors. Monster Cable also produce a variety of loudspeaker cables for various applications using the above technology.

The very latest design from Monster Cable is the *M* series. These cables are for professional applications and include the *M1* speaker cable and the *M1000* interconnect. Both cables use 'Microfiber' dielectric and special winding techniques and feature 'Bandwidth Balanced' construction.

Monster Cable Products Inc, 101 Townsend Street, San Fransisco CA 94107, USA. Tel: (415) 777-1355.

UK: Custom Cable Services, 35 High Street, New Malden, Surrey. Tel: 01-942 9567.

Naim Audio

NACA4 loudspeaker cable uses PVC insulation and has two (56/0.3) conductors of high purity copper. The construction is of the flat twin type.

Naim Audio, Southampton Road, Salisbury, Wilts SP1 2LN, UK. Tel: 0722 332266.

USA: Naim Audio North America Inc, 1759N Sedgwick, Chicago, IL 60614. Tel: (312) 944-0217.

QED

Incon is a multi stranded speaker cable consisting of a twisted pair (32/0.2) of oxygen free copper conductors. Soft inner PVC insulation is used with an outer hard PVC covering. The cable has a 1 mm^2 cross section. *Incon* is also available as an interconnect with graphite screening as standard. Other speaker cables in the range include *C38* and the standard QED *79* and *42*. The latter feature *79* and *42* strands of high purity copper respectively. Insulation is PVC.

QED Audio Products Ltd, Unit 12, Ashford Industrial Estate, Shield Road, Ashford, Middx TW15 1AU, UK. Tel: 0784 46236/7.

USA & Canada: May Audio Marketing Ltd, 646 Guimond Blvd, Lonquevil, QUE, J4G 1P8, Canada. Tel: (514) 651-5707.

Randall

Solid core design with plaited construction and PTFE insulation. Shield connected at source only. *TX* version has four conductors and the *TX-Flex* is a less rigid version using a 2-core design.

Randall Research, 17925 Sky Park Circle, Suite A, Irvine, CA 92714, USA. Tel: (714) 261-9141.

UK: Absolute Sounds, 42 Parkside, London SW19. Tel: 01-947 5047.

Siltech

Dutch LC-OFS (Long Crystal Oxygen-Free Silver) interconnects available in a variety of configurations, ie 2-core, twisted with 0.75 mm (*MC2-20*) or 1 mm (*MC2-28*) silver conductors; 4-core, cross twisted double twin with 0.65 mm (*MC4-24*), 0.75 mm (*MC4-40*) or 1.5 mm (*MC4-56*) silver conductors. Manufactured from molten silver to encourage large crystal growth without voids. Silicone modified PVC insulation. Silver speaker cables are also available in a variety of options including single core, 2-core twisted, 4-core cross twisted and 3-15 individual strands of 0.3 mm conductors for experimental modifications.

UK: Absolute Sounds, 42 Parkside, London SW19. Tel: 01-947 5047.

van den Hul

Both interconnects and speaker cables are available. The latter is produced with seven silver-plated conductors (*D-300 II*) or alternatively there is a 19-strand design available (*CS-12*) with silver-coated copper conductors and mono crystal architecture. Two designs of interconnect are available. *D102 Mk II* is similar to the earlier *D102* cable but has improved screening (foil wrap and dense braiding) and thicker conductors. Overall cable diameter is 7 mm. Also available is *Super IC*, an MC (Massed Crystal) cable based on the *300 II* speaker cable. Used as an interconnect however, the cable is difficult to terminate.

van den Hul, Eperweg 14, 8167 LH Oene (Gemeente Epe), The Netherlands. Tel: 05784-864.

UK: Automation Sciences Co, 20 Little Gaddesden, Little Gaddesden, Berkhamsted, Herts HP4 1PA. Tel: 044284 2786.

Vecteur

Directional LC-OFC cable for interconnects and loudspeaker use. Basic structure consists of four solid cores wired in a star-cross configuration at each end. Separate shields are used for high and low frequencies neither of which is connected to any signal carrying wires. *Vector S* is the latest cable. It is based on a quadrupled standard Vecteur cable and is specifically designed for 'difficult' loudspeaker loads.

UK: Presence Audio, Eastland House, Plummers Plain, Horsham, West Sussex RH13 6NY. Tel: 044485 333.

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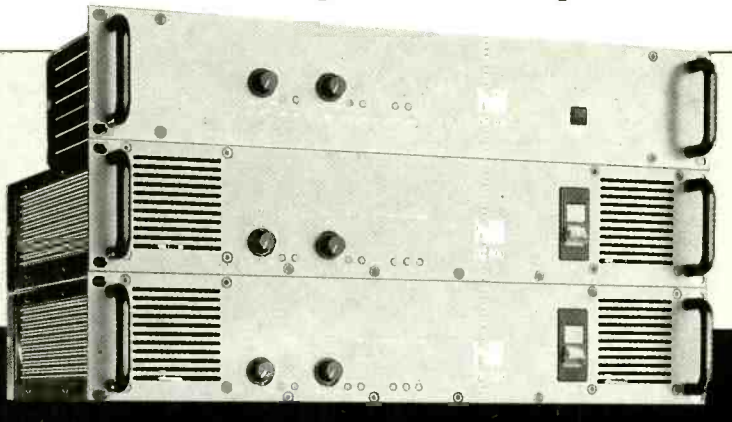

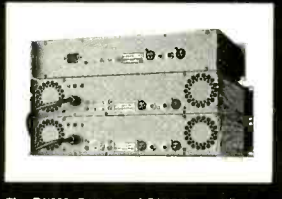

The DX300, DX800 and DX1500 amplifiers all feature balanced XLR inputs, balanced and unbalanced ¼" inputs, banana outputs, ground lift switch and a terminal block with access to all inputs and outputs.

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DX1500 output power: 300 watts into 8Ω, 500 watts into 4Ω, 750 watts into 2Ω (per channel, both channels driven, 20Hz-20kHZ, -0.5dB), 1000 watts into 8Ω, 1500 watts into 4Ω (bridged mono) 1500 watts into 2Ω, 1600 watts into 1Ω (burst power*) distortion (250mW to rated power at 8Ω): IMD SMPTE: <0.01%. THD (1kHz): <0.01%. THD (20Hz-20kHz DIN): <0.02% size: 2 rack spaces, 13" behind front panel weight: 15Kgs, 34 lbs. cooling: 2 servo controlled DC fans.

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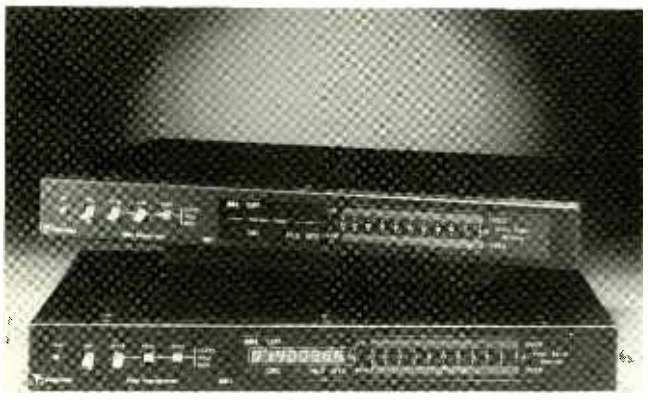

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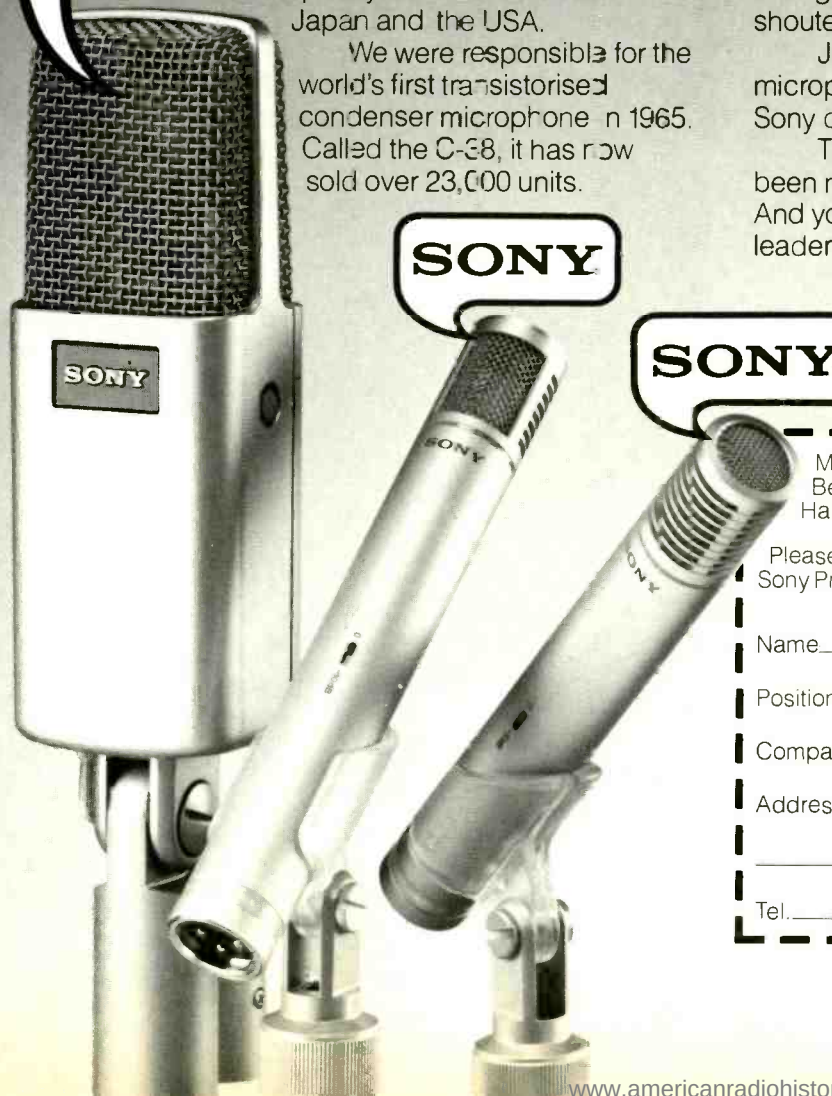

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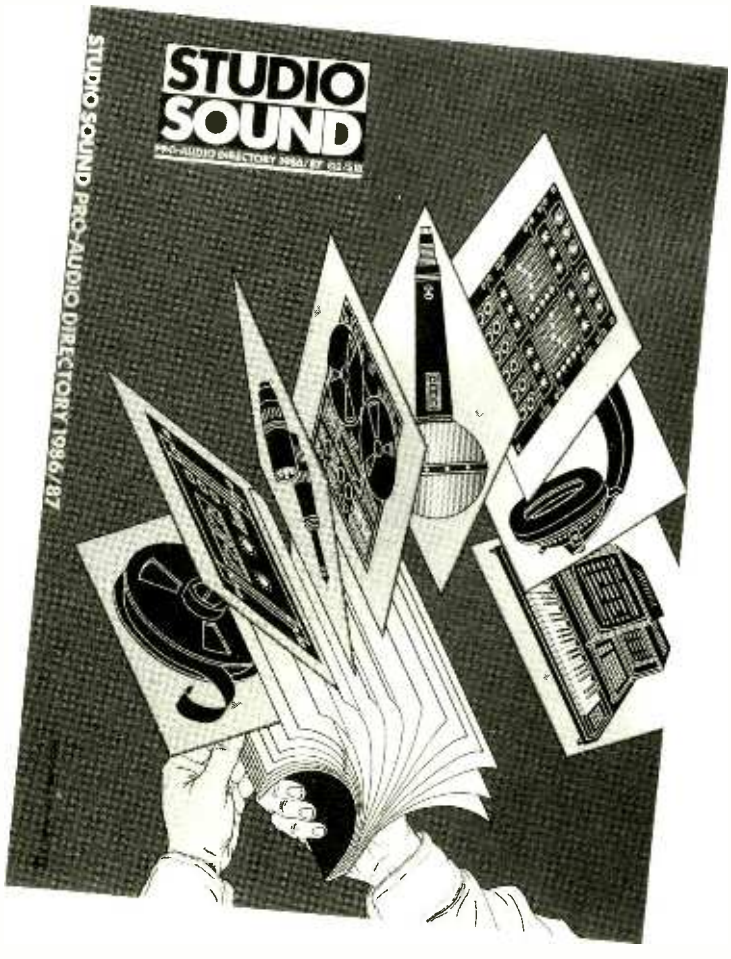

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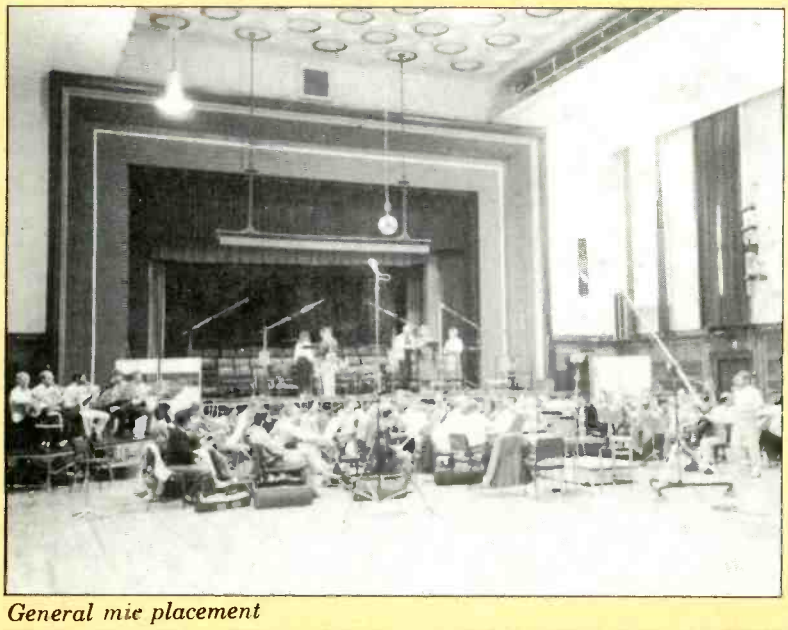
by Jim Betteridge

In 1955, at the age of 16, James Lock joined IBC Studio in Portland Place for the legendary sum of £1 17s 6d (£1.89½p) a week. Since then, he has recorded several hundred classical LPs plus innumerable other classical recordings for television and radio, including orchestral and operatic works. He is currently Head of Classical Recording at Decca.

James Lock: "IBC was an excellent training ground for me. As far as the level and quality of the productions we handled, it was on a par with the major record companies such as EMI, Philips and Decca. The major difference for me as a trainee and later as an engineer was that with record company studios, all the costs were absorbed by the label and so there was no great pressure around studio time. Our clients, on the other hand, were very often paying for everything themselves, and so they wanted it done quickly. Hence, there was quite a lot of pressure to work quickly, and if you were slow, you simply weren't chosen for the next session. All the engineers were great friends, we were very close, but it was also highly competitive.

"It wasn't until about 1956 that we started working in stereo, and so until then all we had was a 3-channel mixer, with the big rotary pots, placed right up against the window looking out into the studio. There was a single Lockwood monitor off to the left plus an auxiliary rack containing the various outboard limiters and equalisers. The studio wasn't purpose-built, as such, and its layout was simply a result of how the original rooms were. So although it didn't have to accommodate much equipment, the control room was huge and had a large open fireplace in it as the sole source of heating. I always found it terribly amusing that there we were trying to judge sound with this deafening crackling and snapping going on in the background. But it was always considered more important to keep everyone reasonably warm, and in fact one of our most pressing duties in cold spells was to keep the fire fed! It was more like a rather palatial living room than a hi-tech studio atmosphere, and that's what I always remember as one of the main criteria for making records—that you must listen to it in terms of the environment in which you expect to listen to it at home. Dead control rooms for me are a total anathema. My ears start to close in, with the monitors being driven harder and harder against absorptive forces they just can't compete with. I know it gives people more concentration on the clarity, but it's much more fatiguing and is not representative of how the record's going to be played in people's homes."



General mic placement

In 1955 magnetic tape was still a relatively new medium for music recording, and a large part of the engineer's skill was to understand and make full use of the medium.

Lock: "Apart from microphone positioning, one of the greatest responsibilities was the setting of the limiter. Limiters played a big part in proceedings in those days because of the lack of head room on the record side of the tape recorders and, of course, the tape itself. We were using EMI *BTR1*s and *BTR2*s, which were superbly built, but nevertheless subject to the technical limitations of the time. Great attention would be given to the *Magic Eye* meter on the limiter, and we would always be conscious that an entire section could be so easily ruined by a poor setting.

"Quite a lot of our classical recording work at that time was with Saga Records which had recently set up to provide a catalogue of high quality, stereo classical recordings. We had the contract to do all the recording, and studio manager Alan Stag engineered most of those. The studio itself was quite small and larger orchestral sessions were recorded on location at Conway Hall in Red Lion Square, Holborn. It was almost all close-miking in those days, and so much of the ambience was added from the echo chamber at IBC. For those location sessions we hired a couple of standard GPO telephone lines, one as a send and one as a return, to link us up with Portland Place. The frequency response must have been terrible, but we were more interested in an overall warm sound in those days, as opposed to today where there's so much emphasis put on technical perfection.

"In time many more independent studios opened up around town, and IBC started on a downward slope. I was continuing to drift more toward classical than pop, and at that time Saga Records offered me a job as their house engineer, which I accepted. They virtually gave me a free hand to buy whatever equipment I needed—mics, mixer, a Lyrec tape recorder, monitors etc—to be able to make first class classical recordings. Sadly, national service was knocking at the door, and although Saga got me deferments, they finally went bust and I was called up. But those were very important years at Saga where, for the first time, I had total responsibility for everything. There were very few precedents concerning how to do things, especially in the early days, and it was a continuous process of adaption and technical creativity. For instance, Joe Meek, who was one of the senior balance engineers at IBC when I was there, actually invented the spring echo. He used to work long hours at the studio and then go home to his workshop and carry on there. He was a very clever, imaginative man, and probably the most influential person in my early career, and one for whom I have the greatest admiration."

After spending two years out of circuit with the Royal Signals, James was forced to relinquish his former status in the recording industry and joined Decca on January 1st, 1963 as a humble tape-op. His main influence there was the well known classical engineer, Kenneth Wilkinson, and it was mainly he who taught Lock what Lock describes as the Decca way of recording.

"Wilkinson taught me what a basic orchestra should sound like, and that a recording is only as good as the hall it's made in. That's something I'll never compromise on, although commercial pressures mean that it's getting harder and harder not to do so. As a department at Decca we very strongly stick together on this, and it generally pays off for everyone with

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regard to the quality of recordings we put out. And that attitude originates from Wilkie.

"The approach as far as the actual recording goes is basically to recreate, in an artistic way, all the nuances of a score, plus the embellishment of a nice ambient sound; and this is where I part company with the purists who go to concerts every night of the week, and then take a stance against certain recordings on the grounds that they don't sound like a performance in a concert hall. I've been to many, many concert halls, and most of them I would completely eliminate in terms of good natural acoustics. London, for instance, is completely without a really good venue, with the exception of the Albert Hall, which is actually too big, but does have what I would call a very natural quality of sound. Apart from that, there are no London halls that I could begin to accept, and hence the criticism that a recording doesn't sound like a concert hall performance really holds little weight with me. Quite frankly, I don't intend my recordings to do so, and I don't think any of my colleagues would either. That's why we don't make records in the likes of the Festival Hall or at the Barbican. If we're talking about Europe in general, there are some very fine halls: Musikberein, the home of the Vienna Philharmonic; the Alte Oper, Frankfurt; the Concertgebouw in Amsterdam, which is one of the best places in the world; we're actually very limited in the number of good venues in Europe. One of the things I've always admired about Decca is that they always give equal status to the technical quality of recordings as they do artistic. I think that is the secret of successful recording—Decca understand that the success of a recording can't be determined on paper by virtue of the artists' and conductor's names alone. The criteria of a good record, in order of importance, are: 1, the musical work; 2, the performance, and; 3, the technical quality. But it's very important to have all three, and Decca would never willingly compromise any one of them."

The vast majority of Lock's classical recordings have centred around the use of an orchestral miking technique referred to as the 'Decca tree'. It was originally pioneered in the '50s by a Decca engineer called Wallace and evolved into its current form, as used by Lock, under Kenneth Wilkinson.

Lock: "The mics are generally between 10 and 11 feet above the ground The central tree is positioned just behind the conductor and consists of three M50 omnidirectionals in a straight line equally spaced with the outer mics pointing toward the corners of the orchestra. Then, on either side, in line with the tree, are two more M50s facing diagonally across the orchestra, to open the sound out more. I see the mics very much like lenses in photography, and what I'm trying to do is to focus them so as to get a clear image but with the right width and depth of field. For the soloists I use individual cardioid mics, and simply position them according to how strong their voices are. Most conductors are very pleased with the results. Some complain they can't hear enough first violins, but that's because they're standing right by them when they're conducting, which gives them a false balance. The tree technique has survived virtually unchanged since the '60s, although Decca's technical department has made several modifications to the mics. The details are in-house secrets, but they do make a significant difference to the final product.

"In a nutshell, the most important points with a recording are the balance between direct and reverberant sound, and a good stereo image. I've been through all the discussion papers, the theories and practicalities of the various stereo miking techniques to improve imaging, but I know of no other system that can consistently work as well as the Decca tree. Of course, the use of five omnidirectional mics on an orchestra will look horrendous when scrutinised by any theorist's calculations, but I'd rather use my ears than wade through ten pages of mathematical calculations that usually don't finally suggest a better solution anyway.

"I'd like to think that the Calrec *Soundfield* mic held all the answers, and it undoubtedly gives a very life-like sound but it's a very complex way of doing things and always requires remixing from the 4-track. The theory is very good, and it does work, but my only concern with the Calrec is that all the recordings come out sounding the same: rather bland and without the real impact and magic that I think people want from a record. I know it should be up to the conductor to bring out the performance but you can't always rely on that. A good recording is a combination of the performance and the mix. It's necessary to use the technology to subtly emphasise certain parts of the score, just as lighting is used to emphasise colours on film. With music something needs to be added to replace the visual side of the performance that people obviously don't get on a record. It's entertainment and it's no good being overly purist about it. There is a distinction that can be drawn here between making records and broadcasting, and for broadcasting there are stronger arguments for simply trying to recreate the sound in the concert hall. If you're sitting in your living room listening to a live broadcast from the Festival Hall or the Fairfield Hall, or wherever, certainly you want to hear the sound of the hall in its raw, live state, and all the atmosphere just as it is; that's wonderful. But it doesn't work to apply that attitude to making records. You're selling entertainment. And that's a very important point."

An approach largely established by Decca was the use of two balance engineers for operatic recordings. The first Decca studio to have a mixer specifically designed to accommodate this idea was in Vienna. This was one of Decca's three major international centres for operatic recording, and the site for much of the recording of Wagner's *The Nibelung's Ring*, a Homeric task started in 1958 and nearing completion by 1965 when the new console was installed. No expense was spared in the production of the console which was built by Siemens to Decca's own high specification.

Lock: "It had 40 channels and cost around £40,000, which was a lot of money for those days. It was a split console; in other words it placed the producer in the middle and two engineers either side of him. Decca has always had two balance engineers on operas. In fact, it's an arrangement that they originated and is still used to this day. It has the advantage of doubling the

Part of the Decca tree mic system

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number of fingers at the controls, which means that a good mix can be achieved live, rather than having to remix from the multitrack afterwards. It does rely on the two balance engineers thinking the same way, otherwise it can become a fight at the controls. One rather misguided design point with that desk was putting the producer in the middle, which meant that the stereo imaging for the engineers either side of him was terrible. That was something I changed when I repeated the operation in Vienna 10 years later."

One of Lock's major clients since he joined Decca, over 23 years ago, has been the internationally renowned tenor, Luciano Pavarotti. When, in 1983, Pavarotti started to play large live concerts requiring sound reinforcement, Lock was a natural choice as balance engineer (*Studio Sound*, January 1987). Lock gives his own personal viewpoint on the project.

"The first concert I did with Pavarotti was a bit of a scramble because I was called in at the last moment to lend a hand. The PA was a standard JBL pop-type system and had already been installed, so I was presented with something of a *fait accompli*. The evening was by no means perfect, but it was a great success. Since then we have done around 50 live concerts worldwide, often in arenas holding tens of thousands of people. He's really swept America and Europe.

"My main concern at the live shows now is the balance of the orchestra, because I know that the combination of Pavarotti's expertise as a performer and the excellence of the system he's going through will virtually take care of itself—although of course I am always monitoring it closely.

"There's obviously no question of using the tree miking technique in a huge venue such as Wembley Arena because the natural acoustic is so dreadful. The sound goes away and doesn't come back again. A much closer miking technique is required. For the first few concerts we used quite a number of Scheops *BLMs* (Boundary Layer Mics, similar in principle to *PZMs*), but there was too much crosstalk and so now we use them for general pickup of strings and woodwind, with cardioid MK4s on each section of the orchestra. It's more necessary to have separation and individual control over the various parts of the orchestra for these live concerts, because in such a dead acoustic the musicians are often just playing the notes—they simply can't hear the rest of the orchestra and have no way of creating their own balance. With recordings, where it's generally a good natural acoustic, I very rarely use any equalisation at all, but in the live situation there is quite often call for a couple of dB here or there, just to bring out the percussive edge of the harp, or give the timps presence, but it's still quite minimal. It's a very different technique to recording, because you've already got quite a powerful acoustic source, and the PA is there simply to bring that forward, to expand it a little, but the focus must still be the stage.

"We've had virtually no serious complaints about the live sound when using the Meyer system, and Pavarotti's success has really opened the doors for other operatic artists. I think even complete operas could be staged, combining live orchestra and chorus with lasers and live performers miming to the chorus and soloists. Still with all these ideas, it's the same old story—there will always be those purists who are against it, but I really think they're missing the point. This technology is making it possible to bring live opera to a much wider audience, and it's up to us to make it as good as it can be. The future is really full of fantastic possibilities."□

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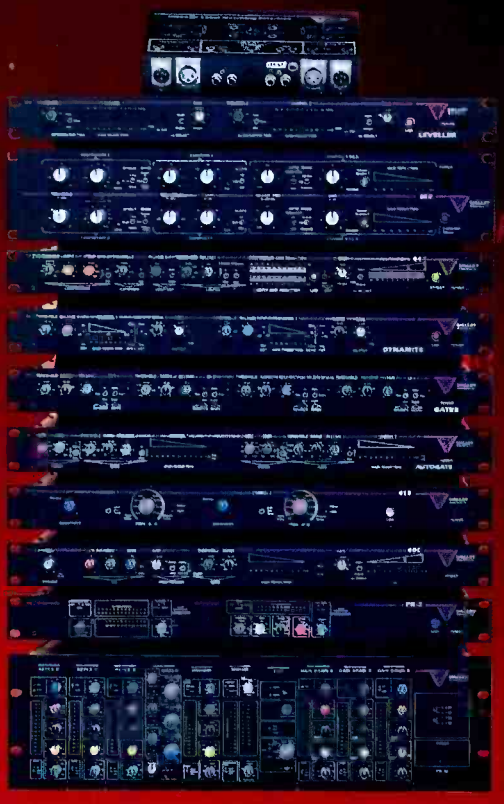

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WHY MIDI SYSTEMS DON'T WORK

A personal opinion. By David Mellor

I am prompted to write this by a recent spell of difficulty caused by the breakdown of the capstan motor in the multitrack recorder in my personal studio. Unfortunately, there seemed to be a capstan motor famine in this country at the time and the replacement had to come from Japan, which takes some time. I am not one to stand idly by counting my miseries and fortunately I was working on a project which involved very simple instrumental pieces, so I decided that I would continue, using my MIDI sequencer as a multitrack. I do not have a big system but a quick count-up of synth voices convinced me that I could work in this way. I prefer to work at home when I can, using the advantages offered by commercial studios for acoustic instruments and vocals.

There is much talk of MIDI systems at the moment, and from what you hear in some quarters you might think that the multitrack tape recorder was on the way out. Indeed, why go on to tape with all that nasty noise and distortion when you can program your synths into a handy little MIDI sequencer and mix them 'live' on to the stereo master?

The answer is that by being able to concentrate all your resources on each track as it goes down, you multiply the power of your studio and musical equipment enormously. With a strictly MIDI-based system, every sound you want to make has to be produced simultaneously with every other sound.

Does it make that much difference? Actually, I am cheating because I did the calculation first so I know the answer. I knew what sort of result to expect but even so I got a bit of a shock.

Let's take as an example a piece of music on 8-track tape. This can have up to eight separate tracks, right? (Always start an argument from a point on which you both agree, that's what I say.)

What you need, therefore, to get rid of that expensive multitrack tape recorder is a MIDI system with at least eight separate polyphonic voice outputs, hopefully including all your favourite instruments—and not forgetting that extra signal processors will be required as you will not be able to treat each track as it goes down on tape. This could get a little complicated, so let's make a list of equipment needed for a tape based recording system and for a MIDI system.

That ought to give the MIDI-based system a reasonable chance and, after all, we have replaced that terribly expensive multitrack with more, and more powerful, polyphonic synthesisers and a better reverb unit, which of course cost peanuts!

Now comes the mathematical bit. What do you know about probability theory? If you have ever bet any money on the horses then you will know enough. (Actually, the dogs have a lot more 'street-cred' these days!)

Quick example: how many ways can you touch two of your fingertips, from different hands, together? Well, you have five fingers on each hand so the answer is five times five, or twenty-five different ways. If you had three hands the answer would be five times five times five, or 125 ways. Try it!(?)

It's the same with the two recording systems. Each gives you a large but finite number of possibilities (assuming we stick to presets for the moment, in both cases) and we can work out the number of different combinations of sounds we can get. Let's start with the MIDI system.

Looking back at the gear list we see numbers of synthesisers, etc, and numbers of programs. To find out the number of possible combinations of sounds we just multiply them up: 16×16×16×16×16×16×16×16×16=68,719,476,000. That is over 68,000 million different possible sound combinations.

At one per minute that would take you over 130,000 years to try them all! It sounds OK but let's look at the tape system. In this case, although there are fewer synthesisers, they can be MIDI'd together along with the FX units *on each track*. Think about that for a second before we work it out: 8×8×8×8×8=32,768 possibilities *per track*.

Once again, the possibilities are multiplied together to give: 32,768×32,768×32,768×32,768×32,768×32,768×32,768×32,768×8=a big number!

In this case the number is a little more than this: 10,000,000,000,000,000,000,000,000,000,000,000,000!

Although the MIDI system may have a lot to offer, it cannot begin to compare with this—and we haven't started editing the presets yet.

I trust no-one thinks I am advocating abolition of MIDI or anything remotely like that. What I am saying is that I feel there is a tendency to unwittingly shut off possible lines of musical enquiry. I would argue that modern music is all about finding new possibilities and exploiting them. Using a multitrack recorder, whether analogue, digital or solid state—as long as it can record and reproduce something that represents sound, rather than control data—is so much more powerful than any sequencer system that anyone considering dispensing with its advantages would be extremely ill-advised. It may be easier to program rather than record but 'taking it easy' is not what music is about.

When I was a kid at school, my music teacher used to say that music was dead because all the tunes had already been written. I think there was a moral to be recognised in that!□

Tape system	*MIDI system* *MIDI sequencer*
8-track tape recorder	
Synthesiser A – 8 different programs	Synthesiser A – 16 programs
Synthesiser B – 8 different programs	Synthesiser B – 16 programs
Synthesiser C – 8 different programs	Synthesiser C – 16 programs
Synthesiser D – 8 different programs	Synthesiser D – 16 programs
Digital reverb unit – 8 programs	Synthesiser E – 16 programs
	Synthesiser F – 16 programs
	Synthesiser G – 16 programs
	Synthesiser H – 16 programs
	Digital reverb unit – 16 programs

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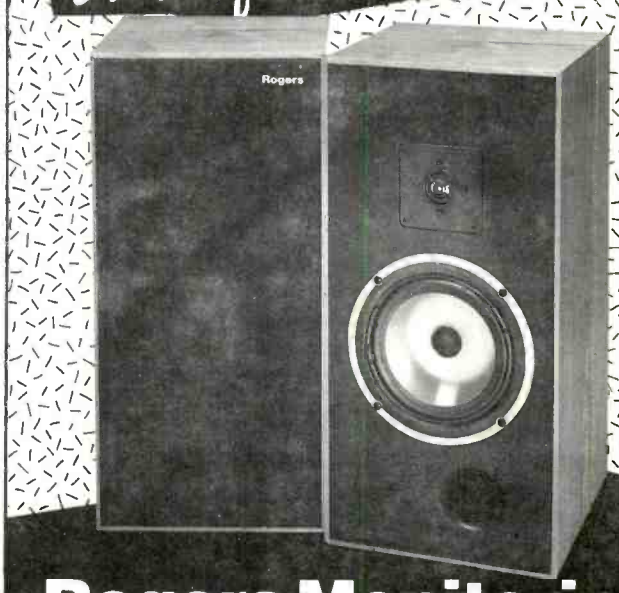

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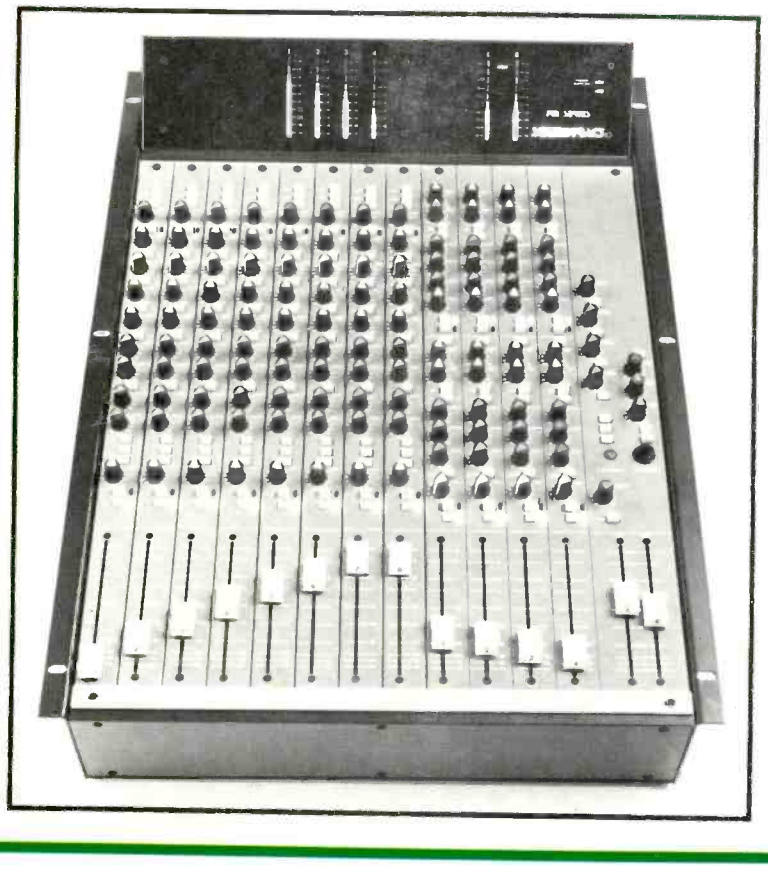

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SYNC TALK

By Tim Leigh Smith

Language may be used for the dissemination of knowledge or the dissimulation of knowledge. When computer terminology comes into the studio world the results are all too often used to impress rather than inform. How many of us for example really know where the ES bus goes, or what is the correct form according to RS-422 protocol? Will we be any wiser after reading this article?

Buzz generation

Bus, interface, port and protocol have taken on the status of buzz words which may be attached at random to any group of letters or numbers to create an impressive sounding, often meaningless, facility.

Bus is quite simply a short form of omnibus. Victorian power stations had thick copper bars called omnibus conductors which served a number of places—like the big red London double deckers or assistant waiters, bus-boys. Interface is the meeting or connection of two systems so that a VDU and keyboard becomes an operator interface.

A port is many things including a gateway and an outlet or inlet for fluid or goods. Much more interesting than a mere socket. Protocol is literally that which must be stuck on first, originally a fly sheet describing the contents of a document, later a draft agreement and a formalised attitude in diplomatic circles. Thus a protocol is an agreed procedure for communication, such as a handshake.

Any port in a storm

Many home computers have an RS-232 or RS-423 port and the RS-422 port is appearing on more and more studio gear. These RS numbers refer to Recommended Standards drawn up by the Electronic Industries Association of America. The full form of the reference includes a letter suffix to indicate the current revision, thus RS-422A is a first version and RS-232C is a third version.

These standards basically relate to the type of electrical signals on each pin of the ports. They also include details of other physical attributes, ie size, shape and number of pins, and logical attributes, such as the meaning of the signals and their interrelationship, but these are not always observed.

The main differences are that RS-232 is around ±12 V to ground; RS-423 (used on BBC *Micro* computers) is around ±5 V to ground; RS-422 is also around 5 V but for balanced lines offering the advantages of working over longer distances with better noise rejection. Various different codes and protocols are used via these ports.

Codes

The common codes are BCD and ASCII. BCD is Binary Coded Decimal which uses 6 bits (bit=BInary digiT) to define 36 characters: the alphabet and numbers from 0 to 10. ASCII (American Standard Code for Information Interchange) uses 7 or 8 bits to define 109 agreed characters and additional user-defined characters up to 127 (7 bit) or 255 (8 bit).

In effect these codes are just like an alphabet but knowing the alphabet just isn't enough: you need to know the correct protocol in order to communicate. The alphabet used in this article is used for many different languages, for example. Equally someone who knows the Greek alphabet may have no knowledge of the protocol for its use, the Greek language.

Take the ES-bus

For some years the European Broadcasting Union (EBU) and the Society of Motion Picture & Television Engineers (SMPTE) have been collaborating on the development of a digital remote control system, initially for television equipment, using distributed intelligence—intelligent interfaces on a common bus. The general specification was published in December 1984 (as EBU Technical Standard 3245 in Europe) and the system has since become known as the EBU/SMPTE-bus or ES-bus.

The system has four basic levels. The electrical/mechanical level defines the physical attributes of the main bus. The supervisory level deals with data transfer and error reporting. The system service level arranges message assembly and transmission. The virtual machine level defines a typical machine of a particular type—a typical VTR, a typical ATR, etc—with all the known functions that type of machine can

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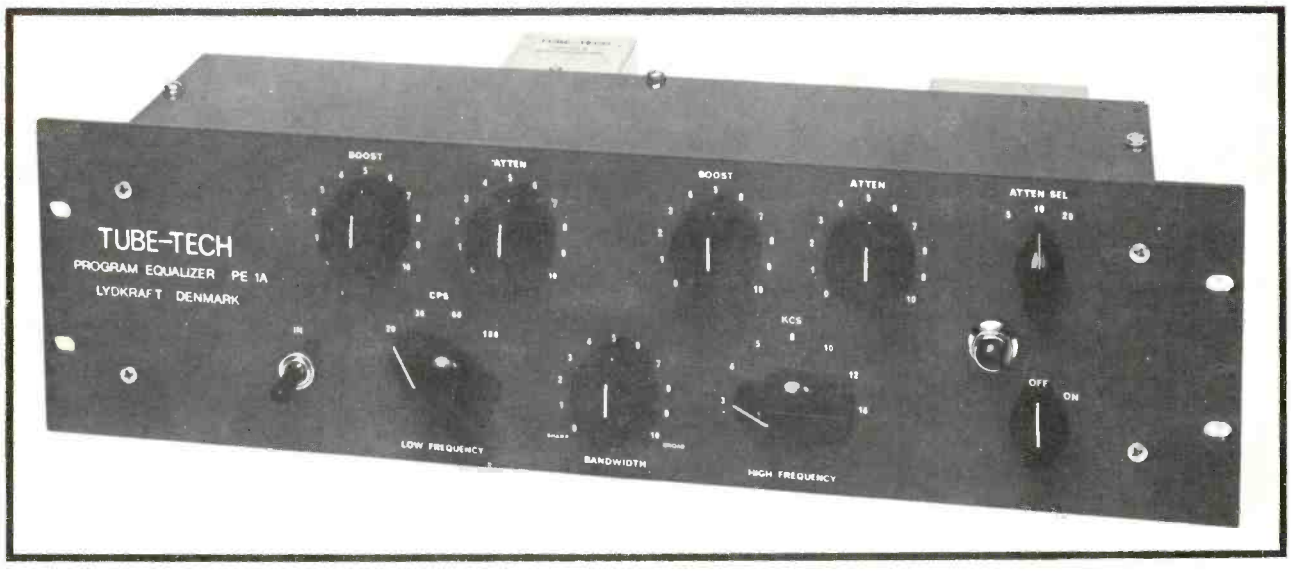

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SYNC TALK

perform. An interface, ideally built into the machine by the manufacturer, translates the general control messages into the specific control signals the actual machine requires.

Get the message

System service messages set up 'virtual circuits' so that the apparent communication is directly from machine to machine. Virtual machine messages are in three levels. Common messages apply to any sort of virtual machine. Type-specific messages only apply to a particular type of machine. User-defined messages allow for the special functions which only particular manufacturers offer.

The combination of common, type-specific and optional user-defined messages relating to a particular type of equipment is called the machine dialect.

So far two draft Supplements to the original standard have been issued. The first describes the common and system service messages. The second describes VTR type-specific messages—the VTR dialect. There are several drafts in preparation including one for audio tape machines which should be ready around June.

One problem with the drafting of the system is the need to allow room for future developments in equipment without leaving great loopholes one could drive a bus through. A possible threat to the adoption of the ES-bus as an international standard would be a manufacturer with a wide product range deciding to devise an in-house digital control system on a 'take it or leave it' basis. Some major manufacturers, however, are actively involved in the development of Supplements dealing with particular types of equipment and the signs are promising.

Doing the interface

For the present the various synchroniser manufacturers have to devise a suitable interface to relate each new piece of equipment to their existing gear. When the first model of a new type of tape machine becomes available in Britain, Audio Kinetics are quite frequently among the first to get a look at it. We asked Sid Price of Audio Kinetics to explain, roughly, what is involved when they produce an interface for a specific machine.

"With *Pacer*—which we consider to be the next generation on from *Q.Lock* in terms of interfacing—what we have done is develop a generic piece of hardware. Our experience enables us to configure it so it will interface with any number of machines for issuing of commands and the receiving of tally information from those machines, and also the control of an external servo input on those machines. We find these days that our design is such that the hardware configuration is usually pretty well the same, it's what the software does with it that changes.

"The technique again is to have a generic 'kernel' piece of software which is a synchroniser, and a set of interface software which is customisable for the machines. The kernel program is always the same. It's a little like having a 'virtual machine' on the ES-bus. The kernel doesn't know what sort of machine is out there, it just issues commands to the machine interface software. This tends to be customised parametrically, that is you change variables which change the way in which it reacts rather than, say, writing a new piece of programme each time you come to interface a machine. Each machine has a different style of servo mechanism so basically what you have to do is establish the parametry control on that servo and optimise it.

"With *Q.Lock* it's a little more complex. We have several generic interfaces: *GPI* which is for audio machines; *VMI* which is for video machines; and *Unifilm* which is an interface for sprocketed film transports where you're using bi-phase signals to control the machine rather than servo mechanisms. So the first choice is to pick which of those interfaces is closest to the machine. You configure it and then you once again optimise a generic kernel, and there's one for each of those particular types of equipment."

There you are, perfectly simple if you understand these things. Fortunately the way of technology is that specialists have to know more and more about less and less while the rest of us just need to know a bit about everything.□

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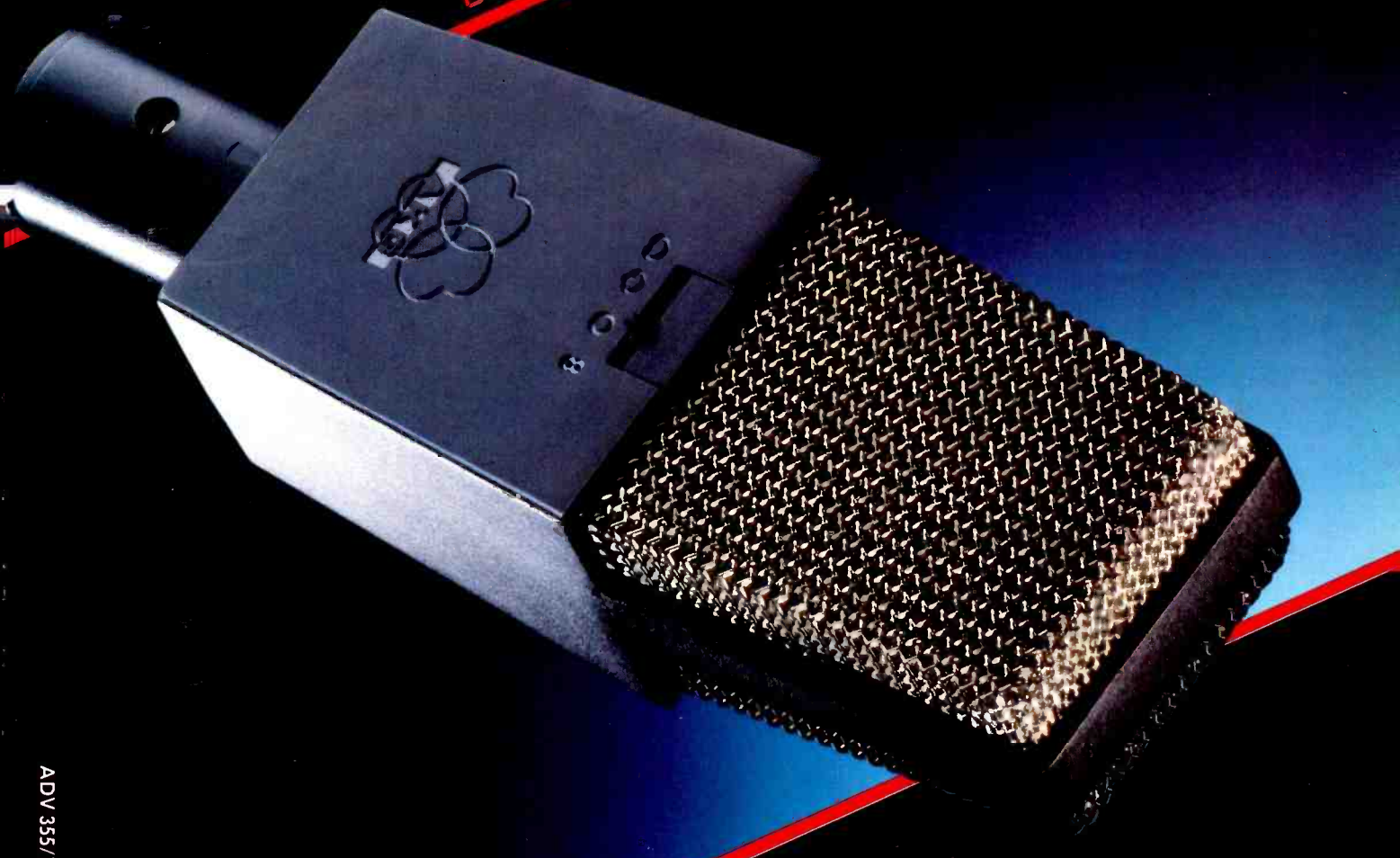

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MILLSTREAM

Dik Cadbury was first bitten by the recording studio bug shortly after joining Decameron in 1973 and working as guitarist on their second album. Three albums later and after he'd purchased a riverside cottage in Cheltenham the group disbanded, but Dik, by now an accomplished songwriter and musician, was keen to get his own rehearsal and recording facility together.

Cheltenham is a Cotswold town famed for its spa waters and fine Regency buildings. Arguably, no shopping street in England can rate against its promenade for beauty. Apparently a favourite haunt of retired army generals and semi-retired pop stars, Cheltenham is centrally located between London and the Welsh mountains, Birmingham and the West Country, and is thus a very convenient place to live, or install a recording studio.

As luck would have it, a former pottery studio right next door to Dik's cottage came onto the market, a structure that formed the backbone to the present day Millstream Studio, just a few yards from the centre of the town. The studio takes its name from a millrace which flows between it and Dik's cottage; a footbridge traverses it to connect the two buildings.

"I think the site dates back to the Domesday Book; well, in as much as there has, until recently, always been a mill here. We started tinkering around with the building and discovered that half of it was going to fall down anyway so it became an all-or-nothing situation because we were in for some fairly radical rebuilding work. So, I thought, OK, we'll go in for this properly and we totally gutted the building until just a brick shell remained.

"Then, John Acock, who used to work at Kingsway, De Lane Lea and CTS, introduced me to acoustic consultant Roger Paton. I think Roger had been involved in the installation at CTS. Anyway, he came over and we went into the whole design very thoroughly, basing it around what we knew would be the general sort of workload to expect from this area, such as local bands, jingles for local radio.

"Limited space necessitated a control room above, studio below, scheme. But pushing the lower walls out two metres towards the river and extending the upper level three metres have enabled a studio area of 9.3×4 m.

"Jonathon March, former sound engineer with Decameron and now a fine cabinet maker, did most of the building, wiring and plastering work. The control room is above only two-thirds of the recording studio and is acoustically isolated from the latter on a double joist system, staggered. We didn't like the idea of video monitors for overcoming the line-of-site problem—they sort of whine at you all the time—so what we did is lean the wall in at the higher end of the studio at a fairly acute angle and then hung it with mirrors. The control room window then views the entire length of the studio through these."

This unique arrangement not only allows the engineer to see the musician, but in a few minutes the higher end of the studio may be totally separated off with just a couple of screens to form a 'live' drum booth. Overhead mics are slung as high as three to four metres above the kit. The 'liveness', achieved by the extra volume and mirrors is enhanced by a wood floor.

"The foundations are Elizabethan I'm told, so some of the brickwork dates back to that sort of time. When it came to cladding the studio we did think about covering it all in plaster but found it more efficient to encase it with stud-work filled with Rockwool and covered in hessian, thus forming lots of shelves and flat surfaces at different angles, not only providing places to stow instrument cases, coffee cups etc., but also

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overcoming the problem of standing waves."

Brick columns that support the whole building, which are also encased in the same manner, jut out into the studio forming interesting alcoves in which guitar speakers and combos may be separated off without cluttering the open floor area with screens and mic stands. All of the studwork corners are finished with a metal trim which protects them from accidental damage when heavier instruments and screens are being moved around. Also, combined with the light green hessian, they give a smart, uncluttered and professional feeling to the interior.

The studio is equipped with AKG, Calrec, Sennheiser, Beyer, *PZM* and Shure mics and an upright Bechstein piano that sits sedately in one corner. Roland *JX 8P*, Yamaha *RX11* (plus Programmer), Yamaha *DX7* and *PF10*, Korg *Poly 6* keyboards and many other instruments are available to hire on request.

It was Roger Paton who also introduced Dik Cadbury to Colin Saunders of Solid State Logic. At the time, Colin was still only dabbling with the idea of marketing his newly built SSL prototype which he had sitting in the small studio he was then running at Stonesfield. The meeting had favourable consequences for Dik who, not long afterwards, became the proud owner of the very first Solid State Logic *A4000* series console off the production line. The 18/16 board is still giving unfaltering service hooked up to a 3M *M79* 16-track with *CM50 Autolocator*, Studer Revox 2-track and Teac 4-track machines with Tannoy, Turner and Auratone monitors.

Dik is a musician first and a studio owner second. At least, that was the impression he gave when given the choice between running the studio and a gig with Steve Hackett—the studio was

MILLSTREAM

closed up for two and a half years!

"When we first opened the studio I was, I admit, pretty naïve about the marketing side of things. We were getting work through my contacts with Decameron and the folk scene first and others from Plant Life Records, Rola Records (a Cheltenham company), and Johnny Coppin, another former member of Decameron who stayed around the Gloucestershire area and has made five albums here now. But, it was a very slow spread of reputation then and that was also one of the main reasons why the studio was closed while I was away. It was too early to hand over the running of the place to someone else, and the admin side needed to be taken care of. We were nearly out to the bank by the end of it all.

"When I came back, though, I was far more interested in the marketing side of things—exploring other areas of work such as advertising productions and conferences and involving myself far more in composition and production of film and jingles music for radio commercials. A company called Orijingles was promoted to this end. Eventually, Mick Dolan, who came here as a freelance engineer after running his own PA hire company (Bell Sound) and originally a guitarist with Hard Meat in the '60s, was taken on full-time because the workload had increased sufficiently to pay his wages."

The extra workload included artists such as the Albion Band, Frame by Frame, Idol Rich, Mike D'Abo, Alan Taylor and Pendragon, to name a few, and their requirements gradually brought into the studio increasingly more effects and signal processing equipment around the original core of the SSL desk and 3M multitrack. These included a Klark-Teknik *DN780* digital reverb, Rebis sampler, a Sonic *Scintillator* racked up with *Scamp*, plus Eventide and Drawmer. An *SPX-90* is a recent addition.

"We've just put two albums to bed; one with Ashley Hutchings, founding father of first Steeleye Span and then Fairport Convention, and who is now the leading light in the Albion Band. He was in Cheltenham at the Everyman Theatre doing the music for 'Larkrise' which the band recorded a couple of years ago. The album is speech and music also, with Dave Mattocks and a whole host of people. Dovetailing with them were Pendragon, from Stroud near Gloucester, who have done tours with Marillion. They were making their first album. Mick has been up to Oldham to record two Phil Cool shows digitally with an *F1*. He brought the tapes back here to edit and post-produce. We hired a machine from HHB and transferred the digital to analogue.

"Just after we reopened, Severn Sound Radio station came on the air and it was a question of there it is, here we are, let's go for some jingles. Dave Bell, who used to do all the lyric writing for Decameron, and I had started writing songs after the band broke up and it was a logical progression from there, really. To actually condense them into 30 second lumps and bung them at the radio stations.

"Dave normally throws a lyric shape at me and then I bash about with it using synths and drum machines. On the audio-visual and film music side, I'm particularly interested in the new Audio Kinetics *Pacer* for syncing the video to multitrack. It's probably the first machine within our price range that we can seriously consider to do the job, whereas before we'd get all of the rough cuts on video and then just rock-and-roll through the takes working by feel more than anything. The *Pacer* will give us that edge into the VAPP market, and with our new show reel we'll be able to make the audio-visual companies realise that original music can be far more exciting than hammering the same 10 pieces of music 'off disc' to death all the time. And, of course, cable TV is another area offering scope for background music."

Apart from the audio-visual and jingles markets, Millstream aims to attract people who are looking for quality on a limited budget—above the demo studio status but not as expensive as other international-class studios in the same area. Since re-opening it has earned a reputation for achieving a good product. But for bands who just want a demo and aren't that worried about the end result, a two-tier booking system is operated. "For nine months we had a youth trainee learning engineering on the YTS Scheme. When he finished I couldn't take him on full-time, so what I did was advertise the 'Nightrider' sessions, which is basically discounting the studio for night-time and weekend days that are free. And as opposed to charging the full day rate, I'd discount it to £12 or £10 per hour for six hours or over so that it gets them into Millstream and gives the young trainee experience of being the real engineer in charge of the session. He gets paid a cut from the hourly rate and is kept in touch and doing things. It is doing very well because what actually happened is the bands came in for the first time on the 'Nightrider' and it did what they wanted it to in terms of getting more work or a record deal; and then having more money they came back to do a proper session, with chief engineer Mick, in the daytime at daytime rates."

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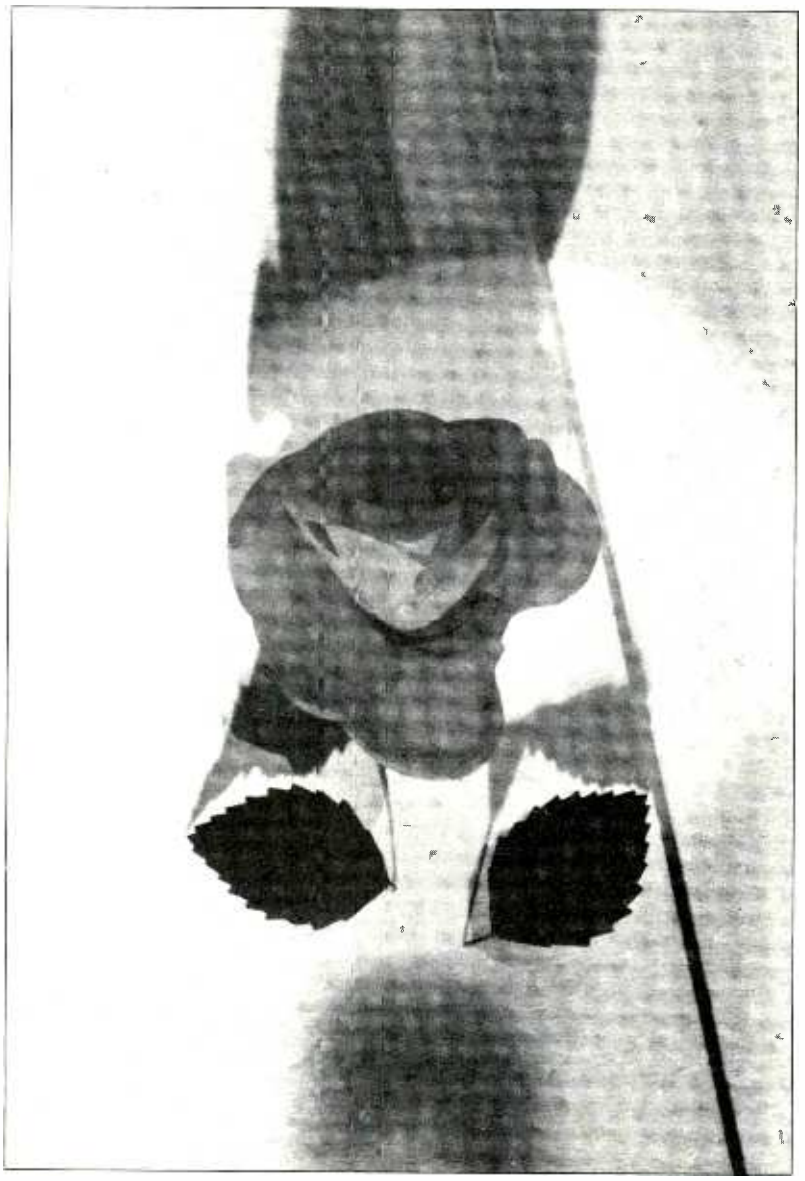

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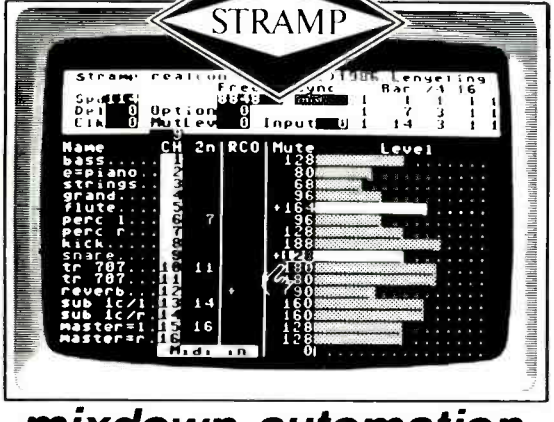

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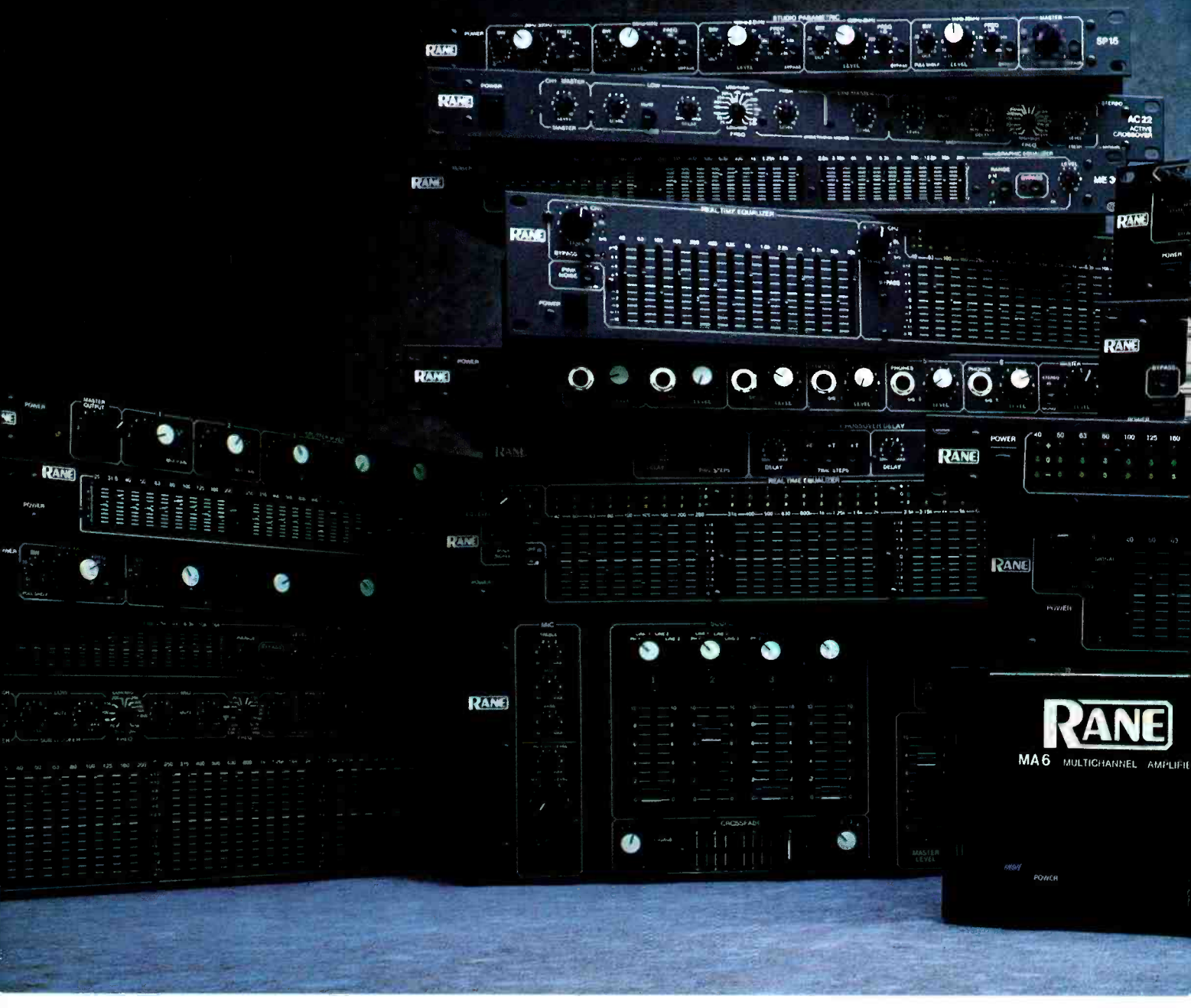

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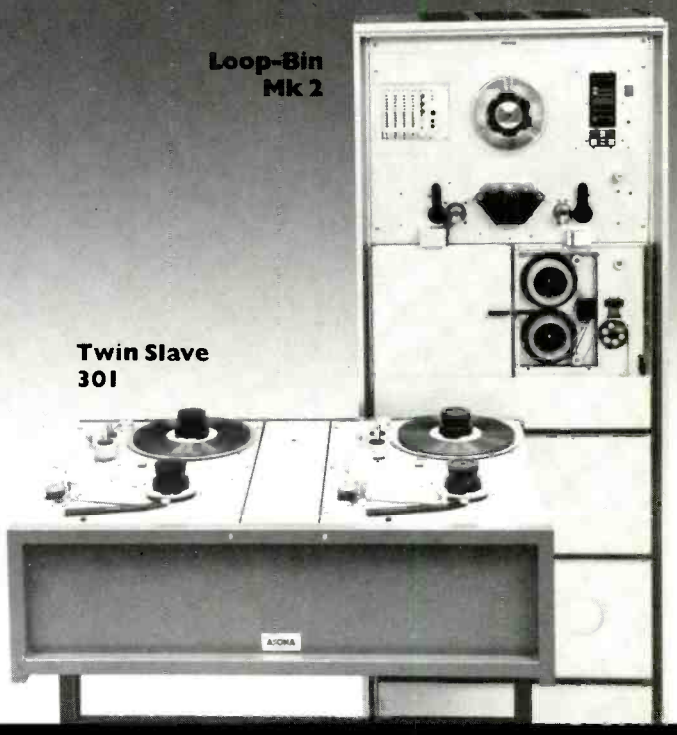

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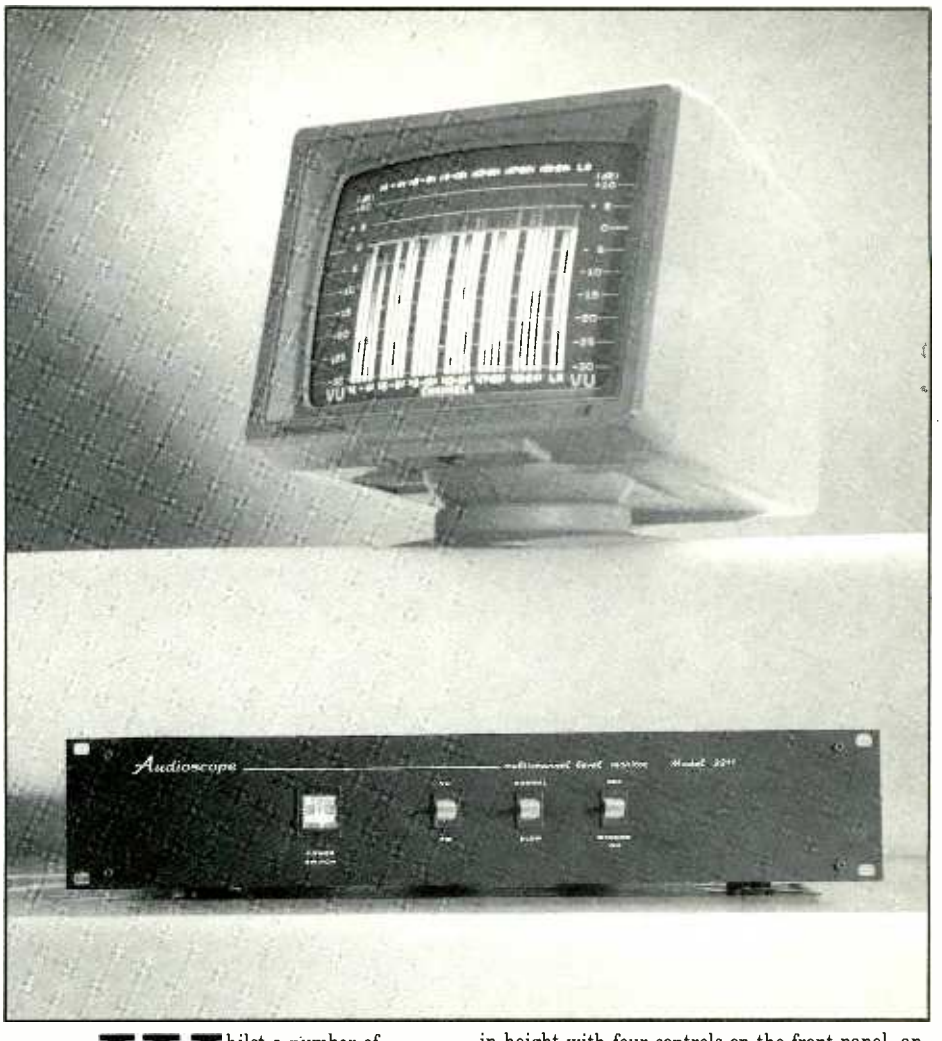
REVIEW

Hugh Ford's technical evaluation of the Audioscope 3211 audio level monitor



Whilst a number of bargraph level monitors using television monitors are available the Audioscope *3211* is an extremely versatile version of this type of audio level monitor. The electronics are housed in a 19 in rack mounting chassis 2U in height with four controls on the front panel, an illuminated power on/off rocker switch and three paddle switches the functions of which may be remotely controlled.

These switches select PPM or VU modes, select fast or slow 'ballistics' and switch a window function on/off—more about this later. To the rear the 26 audio inputs are electronically balanced at two 37-way 'D' connectors with a third similar connector providing a spot input—+5 V TTL levels at this connector illuminate a spot in any of the 26 displayed columns such as for including a record indicator in the display.

The PAL compatible video outputs are available as composite video or as separate RGB and syncs at four rear panel BNC connectors in parallel with a 9-way 'D' connector and a DIN connector. Further facilities are at two 5-pin DIN sockets one of which permits duplication of the three front panel switches and the other operates an optional page facility. This option allows several sets of labels for the columns such that instead of the normal 24-channel columns plus L and R columns the unit may display such things as auxiliary levels, line inputs or whatever.

Power is applied via an IEC connector with an adjacent 20 mm power fuse which is not identified in value, other features being clearly labelled. Removing 10 Posidriv screws releases the top cover to reveal the internal circuits which are manufactured to a very high standard with the overall layout and standard of construction being to the best professional standards.

The power supplies with a toroidal power transformer and a small and very quiet cooling fan are to the left front with the remainder of the base being covered with a mother board. Thirteen input channel boards plug vertically into the

Manufacturer's specification

Signal inputs: 26 electronically balanced inputs on 37-pole **D** connectors, 20 kΩ impedance. Unbalanced sources may also be connected.
Maximum input before overload +24 dBm.
Display modes: the standard unit has two factory programmed display modes and can show: channels 1 to 24 in groups of 4 or channels 1 to 24 in groups of 4, plus master left and right. For special requirements, a further 6 modes can be factory programmed to show levels of submasters, sends/returns, line inputs etc.
Display colours: colours used in the display are user selectable. Columns showing input levels can be a single colour, or different colours below and above 0 dB (eg green below, red above). Colours of the primary and secondary graticules are also individually selectable. The secondary graticule can be switched off if required.
Scales: user selectable between
−30 dB to +10 dB logarithmic
−40 dB to +10 dB logarithmic
−30 dB to +5 dB logarithmic
−40 dB to +5 dB logarithmic
−45 dB to +5 dB logarithmic
−50 dB to +5 dB semilogarithmic
−12 dB to +12 dB logarithmic
1 to 7 corresponding to −12 dB to +12 dB (PPM type IIa)
Tracking between channels—one screen scan line. Polarity reversal error less than 0.5 dB.
0 dB reference voltage: user selectable between
0.775 V RMS (0 dBm)
1.22 V RMS (+4 dBm)
1.66 V RMS (+6 dBm)
1.95 V RMS (+8 dBm)
2.18 V RMS (+9 dBm)
Frequency response (20 Hz to 20 kHz): ±0.5 dB for input levels from −20 dB to +10 dB. +0.5/−2 dB for input levels from −30 dB to −20 dB. High and low pass filters fitted to each channel roll off at 16 Hz (6 dB/octave) and 20 kHz (12 dB/octave).
Dynamic response: the following modes are selectable from the front panel: VU meter, risetime 150 ms, decay time 150 ms. Peak meter, integration time 10 ms, decay time 1.5 s per 20 dB. Peak meter slow, integration time 10 ms, decay time 2.5 s per 20 dB.
'Record' indicators: a coloured square positioned over the top of each column will appear when a TTL +5 V signal is applied at the relevant pin of a 37-way **D** connector on the rear panel. The colour is user selectable.
Outputs: video, 75 Ω, positive modulation, red, green and blue, all 1 Vpp, sync, 4 Vpp, composite video, 1.5 Vpp, monochrome. (PAL colour composite video output and genlock input are available as options.)
Power requirements: 220 VAC 50/60 Hz, 60 W (120 VAC switchable within unit).
Dimensions: (whd) 484×90×316 mm.
Weight: 8 kg (18 lb).
Manufacturer: Audioscope, Elettroacustica Professionale, Via Arrigo Davila n 16, 00179 Rome, Italy.
UK & North Europe: Michael Stevens & Partners, Invicta Works, Elliott Road, Bromley, Kent BR2 9NT. Tel: 01-460 7299. Telex: 896827 TACS G.

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mother board at the rear, each of these input boards dealing with two input channels and having two sets of pluggable links for setting the input sensitivity and two links for setting the PPM attack time to normal or fast.

To the front, four horizontal daughter boards fit on to indirect edge connectors on the mother board with one of the daughter boards supporting a further board.

With the exception of 18 potentiometers on the mother board for setting the linearity of the vertical bar displays and four potentiometers for subtle adjustments on each input channels, all user facilities take the form of numerous pluggable links.

Display

The vertical scale may be selected between a standard 1 to 7 PPM scale, a ±12 dB scale which is dB linear, +10/−40 dB, +10/−30 dB, +5/−30 dB, +5/−40 dB, +5/−45 dB all dB linear or a +5/−50 dB semi-logarithmic scale with the law of all scales being selected by means of links on the mother board.

Annotation of the vertical scales is generally at 5 dB intervals, with the exception of the PPM and ±12 dB scales where the interval is 2 dB. These annotations may be located at any position on the display and may be in any colour. In addition a PPM/VU annotation is shown at the bottom of the scales—this may be switched off or set to normal or inverse video.

The major horizontal calibration lines coincide with the annotations, with optional intermediate horizontal lines having the ability to choose the colours of the major and minor lines separately.

The horizontal annotations identifying the individual audio channels would normally be at the top and bottom of the display, but like the vertical scales the annotations maybe moved anywhere and shown in any colour. As these annotations and the scales are read out of a ROM (read only memory), scales and annotations may be readily altered for individual users.

Grouping of the vertical bars for each channel may be in any combination of 32 possible positions with links allowing any input channel to be routed to any particular position. With no levels indicated the unit generates a background of bars in any desired colour with audio level being indicated by vertical bars in a second colour which may be changed to a third colour at any desired input level.

A further facility is the use of a 'window' which sets up a further coloured section in all bar positions, the upper and lower levels of the window being fully selectable as is the colour. This facility, uses the 'spot' facility electronics, however, and is not active if the spot facility is in use.

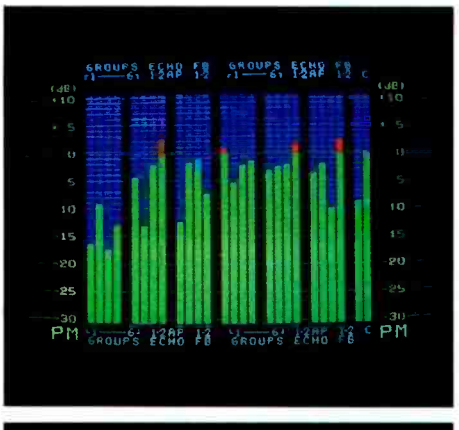
It follows that the position and colour of spots is the same as that of windows. In all cases the width of the vertical bars is selectable. Whilst the unit is designed with colour monitors in mind it may be used with monochrome monitors with the choice of monitor type and size depending upon the application. This review used a 14 in diagonal colour monitor which is probably the smallest practical display with much larger monitors being necessary for large installations.

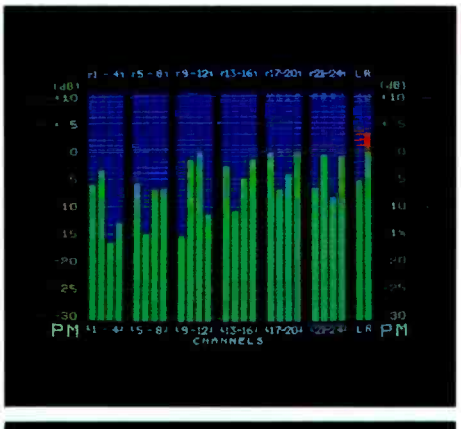
Inputs and outputs

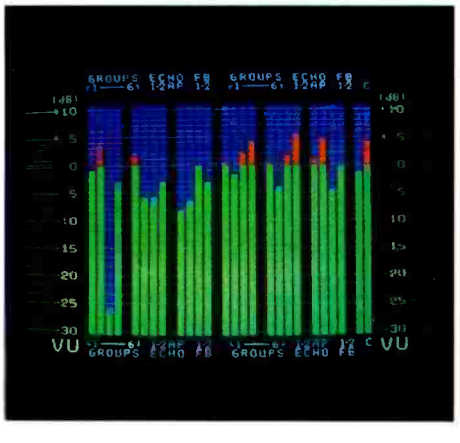
The electronically balanced audio inputs offered an input impedance of 20 kΩ balanced or 10 kΩ unbalanced with the common mode rejection for three channels being shown in **Fig 1.**

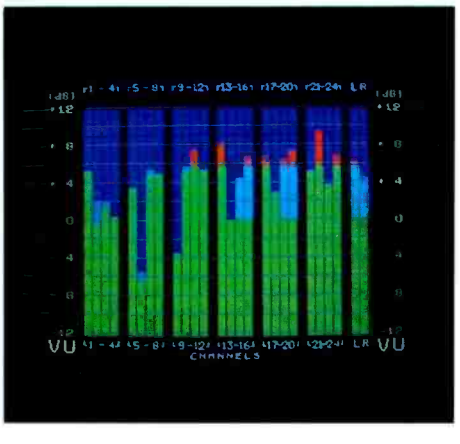
Depending upon the gain setting the inputs could handle up to +28 dB.7V with the overload margins always being satisfactory. The input sensitivity for 0 dB indication is set by links on the input modules and is tabulated in the manual for 0, +4, +6, +8 and +9 dB.7V for metering ranges having +10, +6, +5, +4 or +3 dB maximum indications. In all cases the accuracy of the calibration was to within 0.1 dB.

The RGB video outputs delivered 0/+1.9 V into









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REVIEW

a high impedance or 0/+1.2 V when terminated into 75 Ω with the sync (line and frame) output delivering 0/+3.65 V into a high impedance or 0/+1.3 V into 75 Ω—all sensible levels with the time between line sync pulses were 64.008 μs.

Finally, the spot inputs required +1.2 VDC to activate the spot in the normal mode or needed to be grounded in the inverting mode where the inputs are taken to +5 VDC by 2.2 kΩ resistors.

Static accuracy

The analogue audio signal passes directly from the input stages, containing the rectifiers and time constants, to an A/D converter. Filters are intentionally included in the input stages with the resulting frequency response from the input to the rectifiers being as shown in **Fig 2** where unwanted high and low frequency components are well rejected.

A/D conversion is novel because the converter also does linear/logarithmic conversion (or other scale conversion). In fact it consists of 16 level comparitors the reference input to which is an exponential wave form. The converted level from the rectifiers is then fed to switching and multiplexing circuits and remains in the digital domain right up to the outputs to the display.

The accuracy of the level indication was checked as 1 kHz using PPM and dB scales and was found to be remarkably accurate such that errors were less than 0.1 dB from full scale indication down to −20 dB indication.

Over this range all bars tracked each other to within the readability of one television line with the performance at −30 dB indication being within ±0.3 dB and the accuracy decreasing to +1/−0.5 dB at −40 dB indication and to +2/−5 dB at −50 dB indication.

These comments apply to both the VU and PPM modes of operation with the input sensitivity for PPM 6 being variable from 0 dB.7V to +20.6 dB.7V.

Clearly the overall accuracy is far better than most analogue meters, in particular PPMs where the specification is quite loose in this respect.

FIG.1
COMMON MODE REJECTION OF THREE CHANNELS

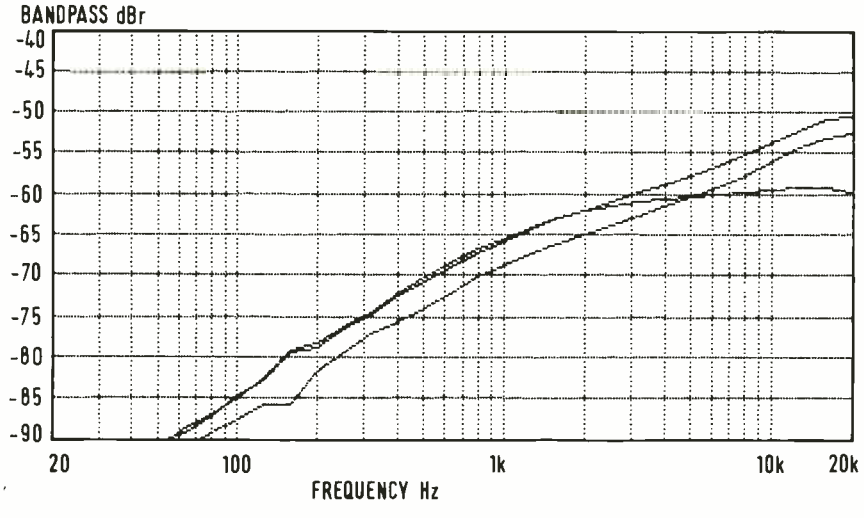
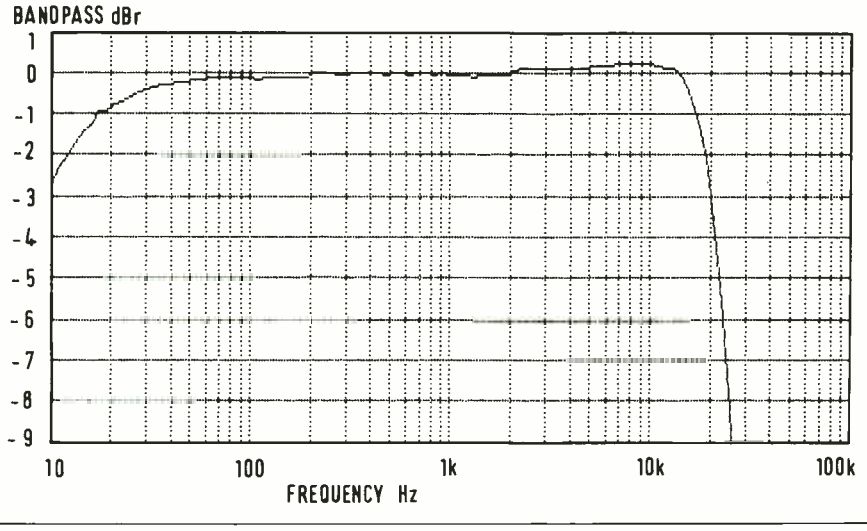


FIG.2
INPUT AMPLIFIER FREQUENCY RESPONSE



Rectifiers and dynamics

The rectifier characteristic in use depends upon the selection of the PPM or VU mode, as does the attack and release time of the metering, these functions being in the analogue mode in the input cards.

When in the VU metering mode the rectifiers act as full wave average responding rectifiers as required of the standard ASA C16.5 VU meter whilst switching the PPM mode turns the rectifiers into full wave true peak responding sections.

The effective ballistics in the VU meter mode are not affected by the fast/slow switch with the attack time to 0 VU being measured at 300 ms or 220 ms to −1 dB corresponding to the ASA standard. However, the release time to −20 dB was 220 ms which is slightly faster than the standard VU meter.

In the PPM mode the release time depends upon the setting of the fast/slow switch, being measured at 1.6 s or 2.6 s to −20 dB in line with both the IEC and DIN standards and close to the manufacturer's specification. Two attack time constants are selectable on the input boards by inserting a pluggable link with the slow setting corresponding to the IEC, DIN and BS5428 standards and the fast time being ten times faster and useful for digital recording.

Using 10, 5, 3 and 0.4 ms tone bursts in the slow attack mode and 1, 0.5, 0.3 and 0.04 ms tone bursts in the fast mode showed the unit to be on the fast side of the standard tolerances but generally within specification.

Slight differences were observed between channels, both in attack and release times, but whilst these are visually noticeable they were within the standard tolerances.

Summary

To start with, the Audioscope *3211* is manufactured to the best of engineering standards and supplied with an excellent 'user guide' giving full circuit details and servicing information in addition to clear set-up instructions.

The form of display is unusually flexible such that the user has a wide choice of formats and annotations with a full choice of colours in the different sections of the display. It follows that readability is excellent.

Turning to the actual performance the accuracy of the displays in all modes was very good and the only possible criticism is that the effective ballistics of the display was on the fast side of the standard limits in the PPM mode.□

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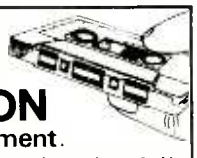

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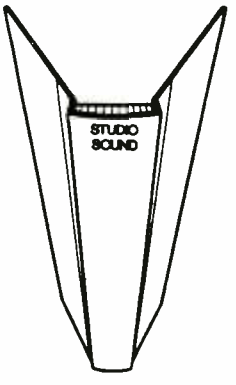

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