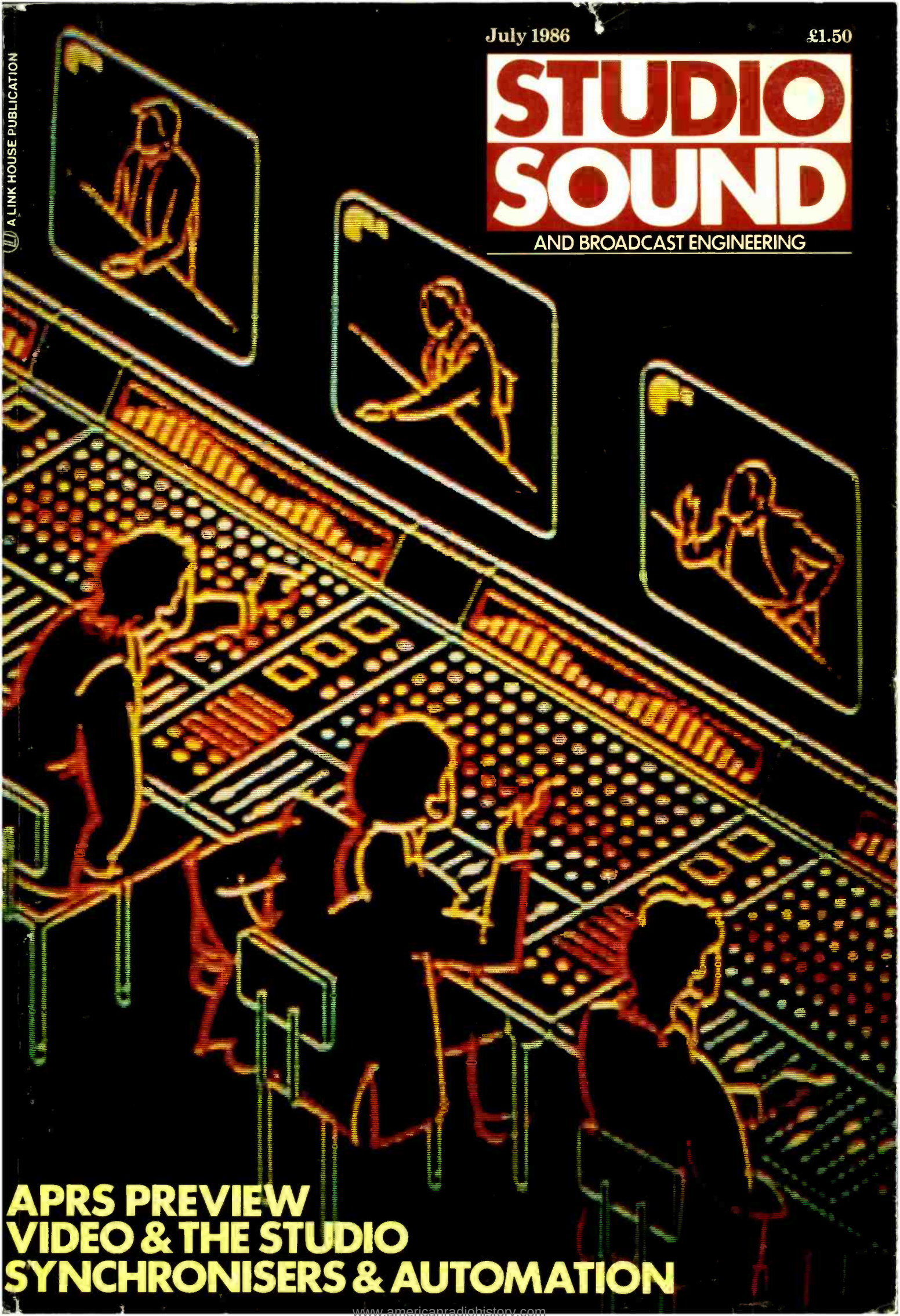
July 1986 £1.50

STUDIO SOUND

AND BROADCAST ENGINEERING

A LINK HOUSE PUBLICATION



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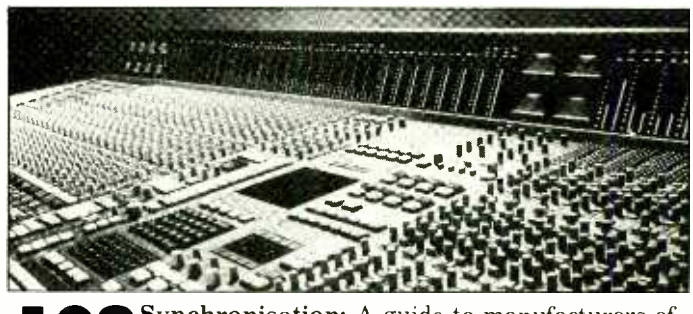

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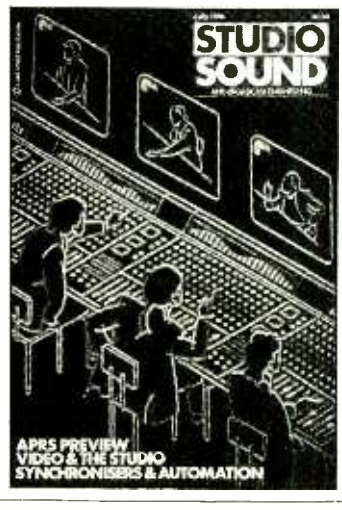

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Publisher and consultant to APRS for Studio Sound's Producer's Guide to APRS Members 1984/85

July 1986 Number 7
Volume 28 ISSN 0133-5944

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HHB are pleased to announce that they've re-equipped their digital rental service with the new Sony PCM 1630 processor and the purpose-built DMR 2000 recorders.

The PCM 1630 is the successor to the PCM 1610 and maintains the CD format compatability which has made Sony the undisputed digital masters.

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These new machines, with the DAE 1100, form the heart of the digital mastering service that has made HHB leaders in the field.

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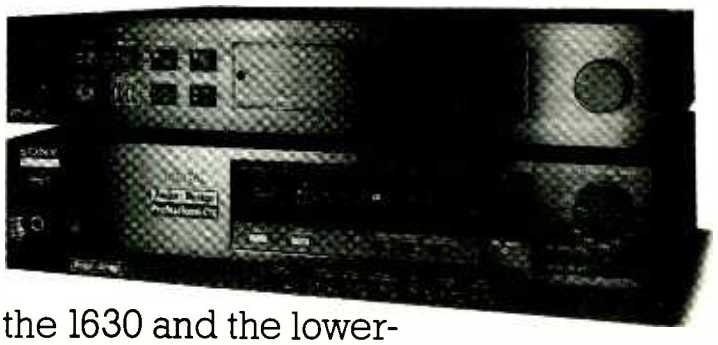

the 1630 and the lower-cost PCM F1 and 701ES, thus significantly reducing post-production costs.

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EDITORIAL

EDITORIAL

This month's comment from Keith Spencer-Allen

Crosstown Traffic

Every industry has its trade shows and the recording/broadcast industries probably have more than most—particularly those of an international nature. For the UK recording industry, the annual exhibition of the Association of Professional Recording Studios (APRS) is *the* major trade event and signifies the start of our trade year with all subsequent events being measured in months after 'the APRS'. Despite some aspects of the arrangement of the event having seemed illogical and mystifying to those who do not understand the nature of the organisation, the show has grown considerably in recent years and is now the leading European show. This is quite an achievement for a small organisation such as the APRS.

This year there is a new venue—Olympia 2—and for the first time provision has been made for exhibitors who want to make audible demonstrations. With the UK industry still being predominantly London area based there is a very strong social atmosphere surrounding the show making it far more than just another show. I hope that this atmosphere can be transferred to the new venue which is far bigger than either of the previous locations.

Next year will see the European Convention of the Audio Engineering Society being held in London during March, just three months before the APRS exhibition. Concern about the consequences of two major exhibitions being held in one territory within such a short space of time (also not forgetting the ITS in Montreux, Switzerland during the same time period) led to a limited amount of consultation between the APRS and the AES. There were some efforts to find a solution to the situation but it was fairly obvious from the start that due to the different types of organisations involved there would be little common ground and the suggestions of joint shows would be total non-starters. The APRS show is a manufacturer-based exhibition with no academic pretentions whatsoever—the exhibitors welcome serious enquiries or maybe even orders! The AES Conventions on the other hand are three, four or five days of presentations of technical papers, discussion groups, workshops and also an exhibition. The make-up of the Convention varies from location to location and although the exhibition may be the most visible aspect of the convention, the emphasis from the AES itself is quite different. There are for instance quite specific rules that exhibitors have to agree to that restrict them from normal open commercial exploitation of the show—such as taking orders or selling from the stand, etc. The basis for these rules I understand lies in the legal status of the AES as an organisation and to allow this freedom would infringe the AES charter. The original intention of the exhibition was that it should be a display of technical exhibits that those attending the technical papers could study while not attending the papers. The AES has realised that this is no longer the case and has made a number of concessions to this situation. The concept may seem somewhat unrealistic but it works OK and there does not appear to be an effective alternative organisation able to propose itself as a suitable exhibition organiser.

So this brings us back to London and the situation next year. Both the AES and the APRS shows will happen—the success of the former perhaps dependent on potential US attendees and exhibitors overcoming their current fear of travelling to 'terrorist torn' Europe. Hopefully both shows will have a high level of support from both exhibitors and attendees although this can be far from guaranteed. For us UK based people it presents a valuable opportunity to have ample exposure to new developments and equipment when ideas are changing so fast. However, as a final thought on this topic I do find myself thinking it strange that the AES has considered it necessary to restrict the major US recording centres of New York and Los Angeles to just one show every two years (alternating between coasts) while London will benefit from *two* major shows within *three months* and they consider this acceptable too. Is London this much more important than New York or Los Angeles?

Have a good one.

STUDIO SOUND
AND BROADCAST ENGINEERING

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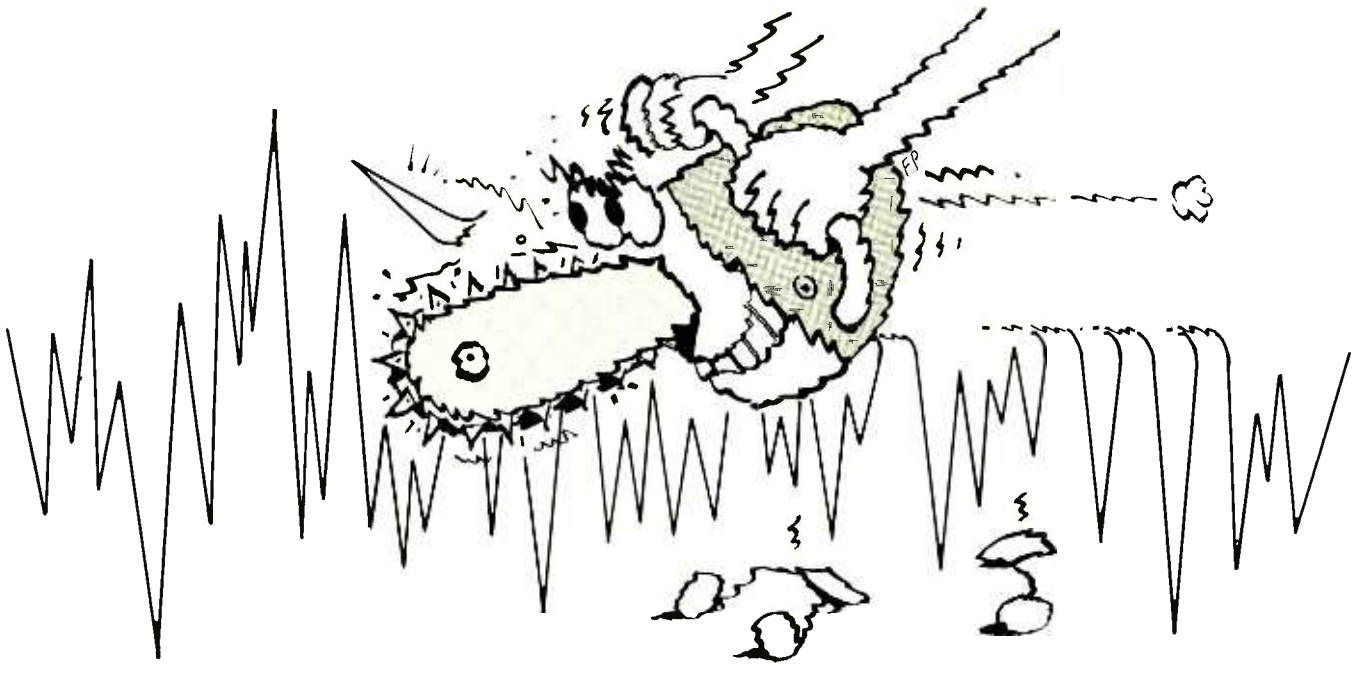

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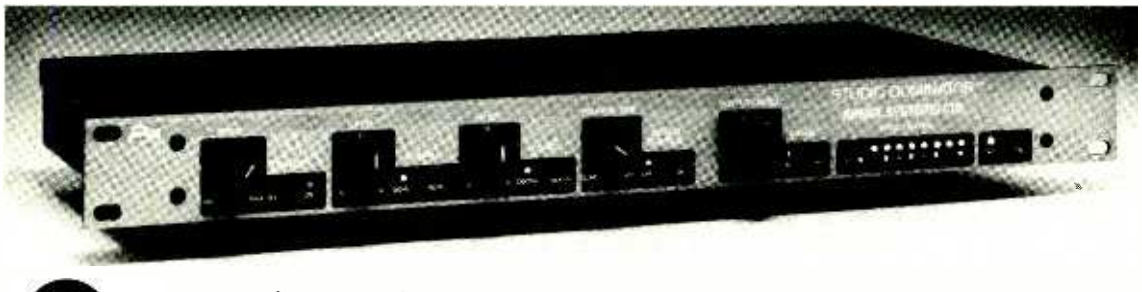

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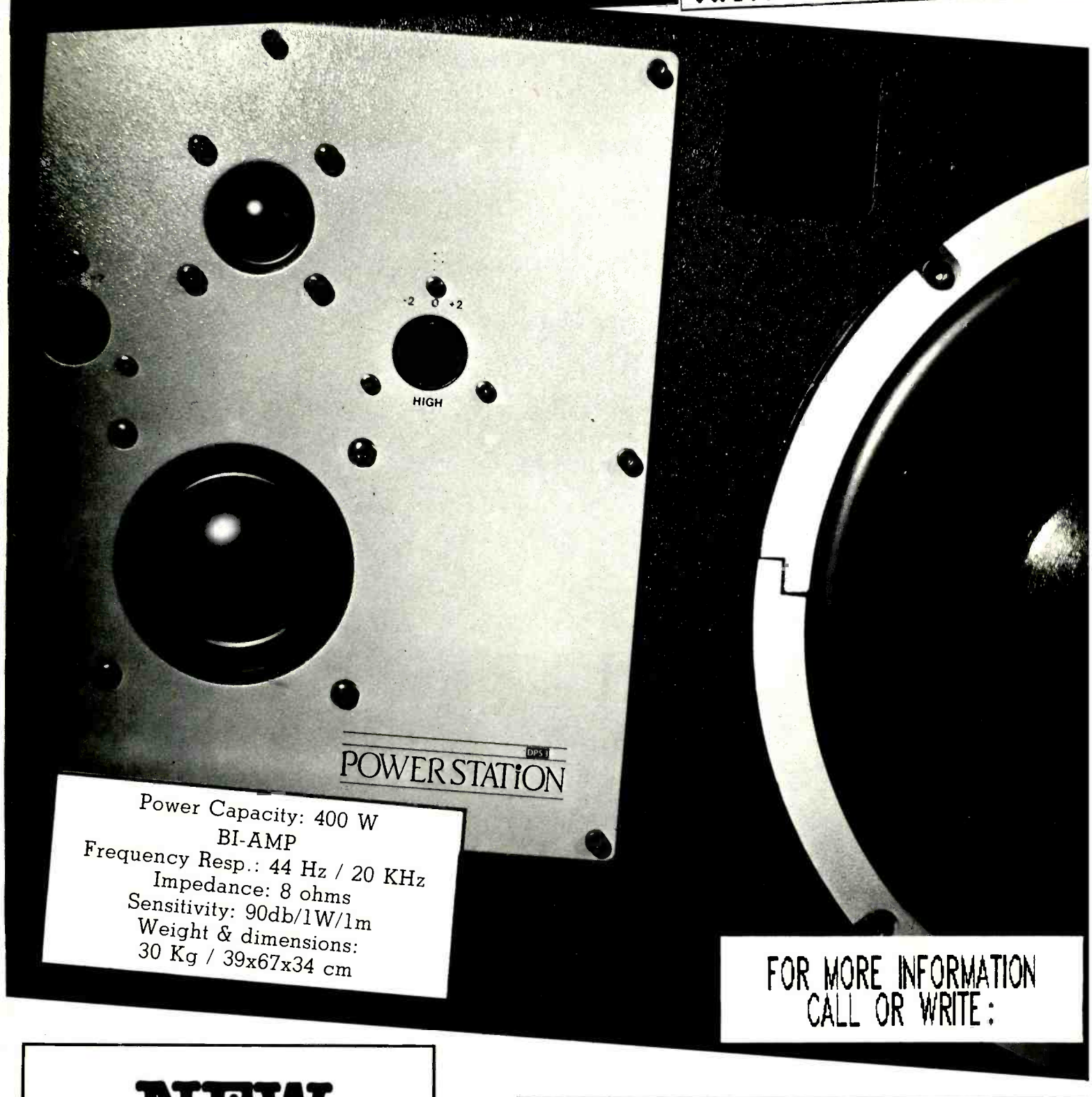

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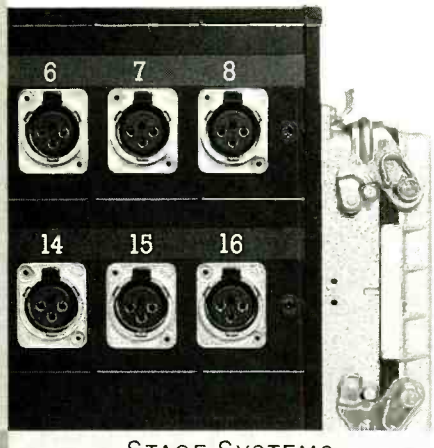
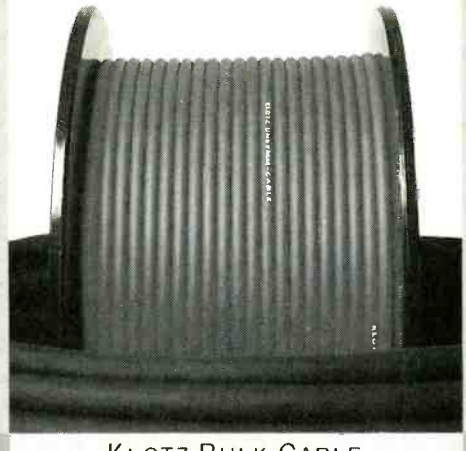


STAGE SYSTEMS



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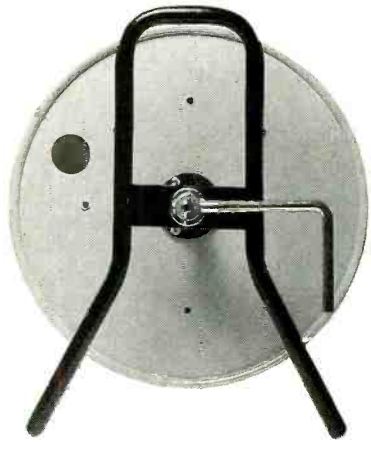

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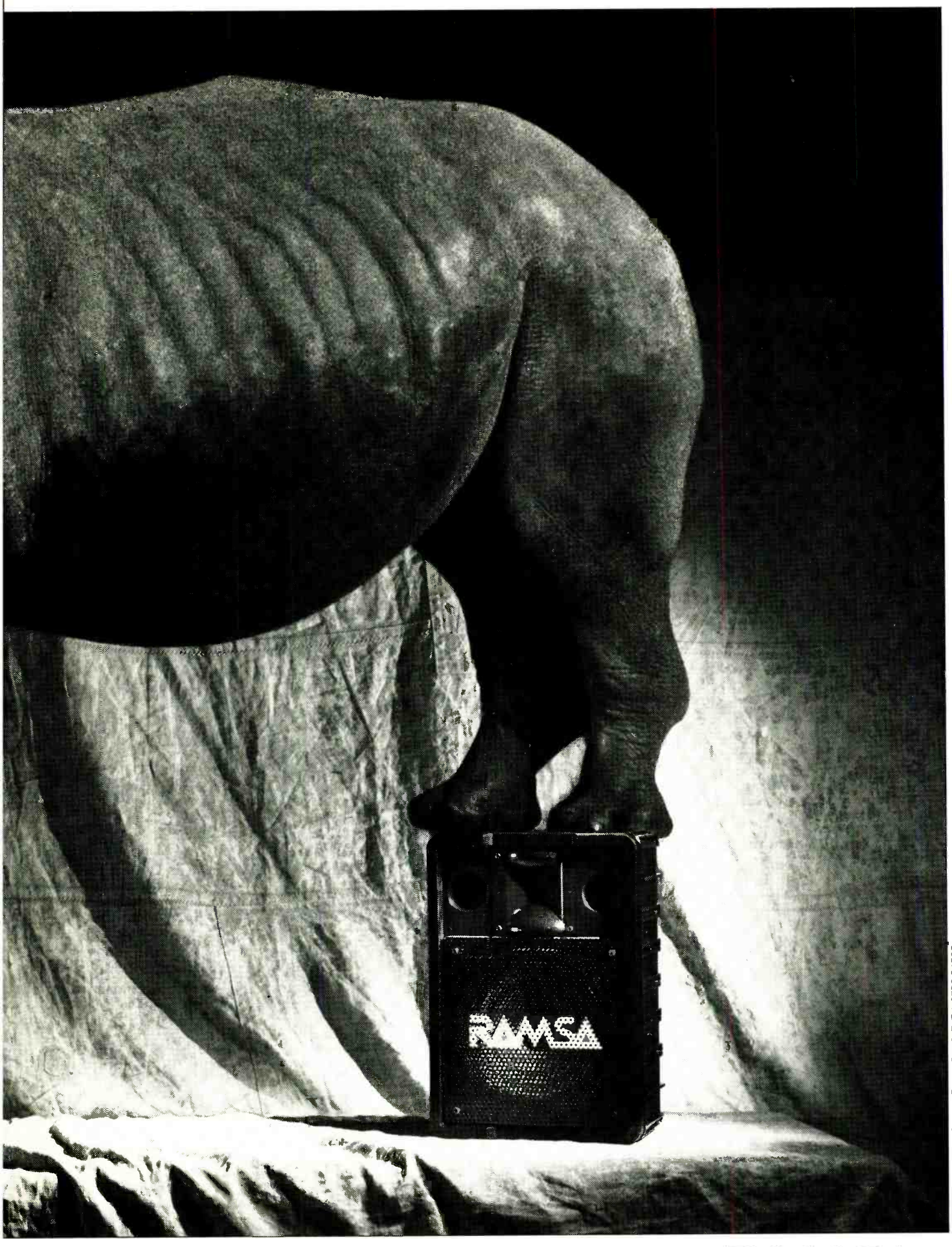

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The design of the console, resulting from detailed ergonomic and artistic studies, was in itself an event among the consoles of 1985. The standard version of the Odyssey is supplied with 30 inputs, 24 outputs, 24 track monitoring, 6 echo sends/returns, 6 VCA subgroups, 3-band parametric EQ, vumeter/peakmeter and phasemeter on stereo outputs, automation system, LED power supply indicators. Three chassis configurations are available with 18, 24 or 30 inputs. Even the maximum configuration can be easily housed, for the Odyssey measures only 2 x 0.8 metres, including the 280 point patch-bay.

Odyssey is available with OPTIMIX or OPTIFILE automation, level automation system by VCA, synchronized by SMPTE or EBU code with mass-memory on disk.

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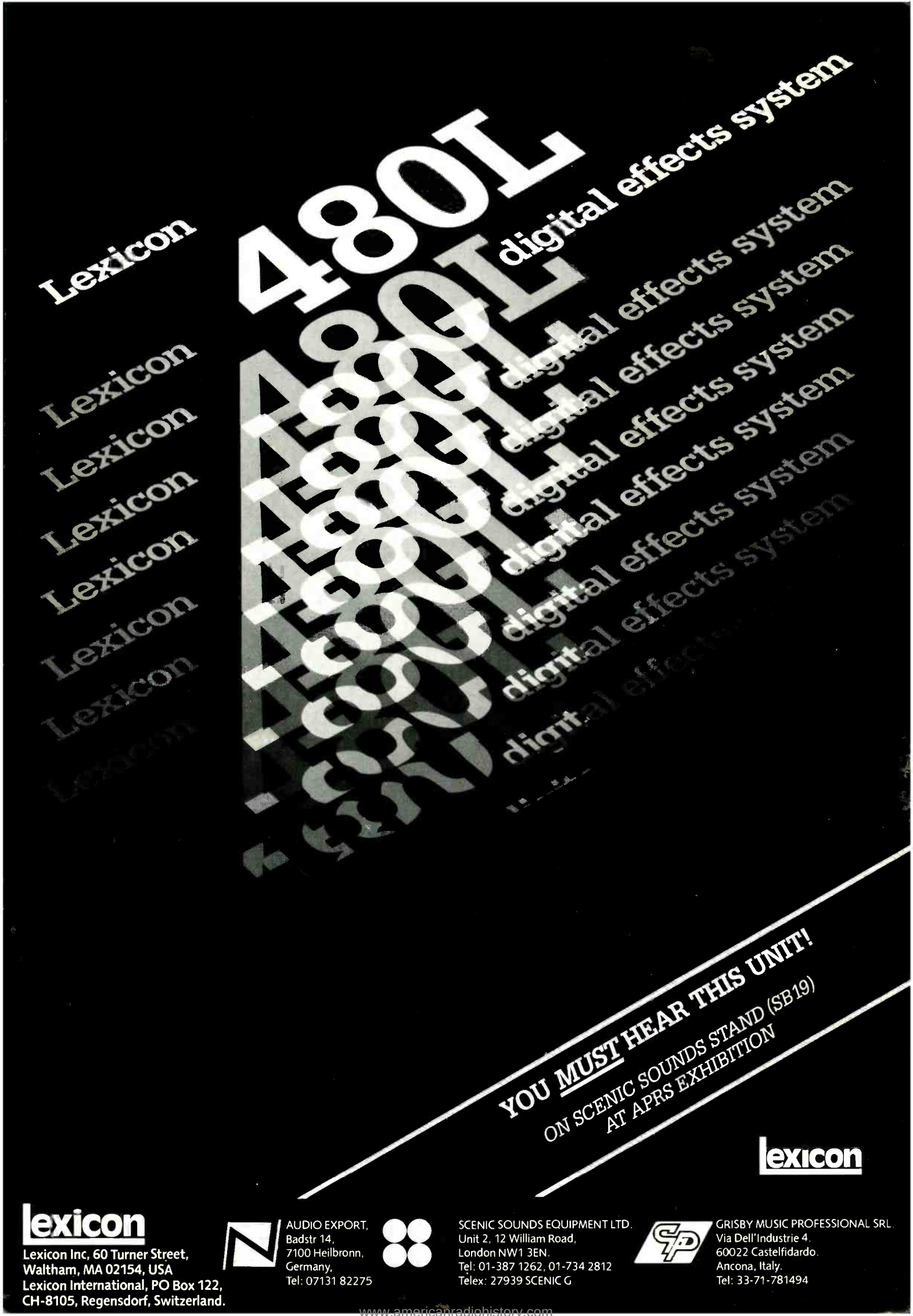

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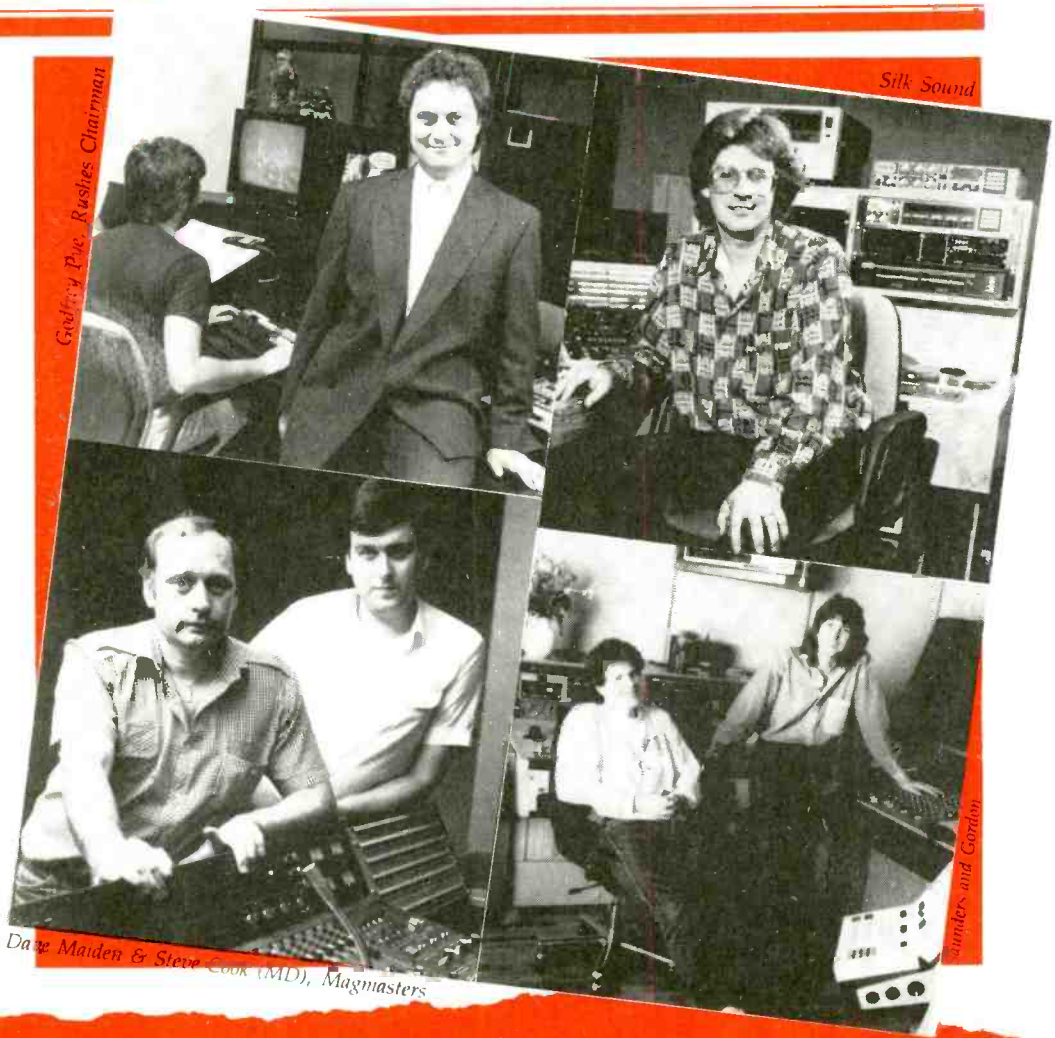
May 1986 No. 8.

ECHO TIMES

In the last Echo Times you may have seen discussed the applications that a handful of early customers of AMS AudioFile were putting their systems to Comments from those owners and subsequent users have helped in defining new and additional features which have now been incorporated on the control surface of AudioFile. As well as upgrading the control surface, production software has now been included in AudioFile which also reflects over 12 months of input with a view to making recording, editing and playback of material in sync with tape both easier and faster.
Since the benefits of using AudioFile in music recording became obvious, efforts were concentrated on the more specialist application of AudioFile for dubbing audio to video/track laying audio to video.
Of all the people invited to examine the production AudioFile – none were disappointed. The following 5 companies saw an immediate application and are a selection of customers who have ordered AudioFile systems for commissioning during May 1986: –

AUDIOFILE



The Best Thing Since Spliced Tape...

MAGMASTERS

Magmasters has been in business for 5 years. Specialise in film and sound tracks which are either on 35mm or 16mm film or videotape and supply mixing facilities for those. Work can be for commercials, feature films or documentaries and television shows. Specialising in large budget commercials.
Having been aware of hard disk recorders for past 12 months and having considered Synclavier and Fairlight. AudioFile seems to offer more of an every day workhorse operation – and of course seems to do that whilst costing considerably less money. The advantages of working with AudioFile over a conventional tape is obviously the ability to shift tracks around which you can't do easily on a 24 track machine. AudioFile will make life significantly easier when we are track-laying sound effects to a video picture. Size was also a very important consideration and taking everything into account, AudioFile looks like the perfect device for our new studio which is specifically for post-syncing both sound effects and music to videotape.

Steve Cook,
Managing Director.

SILK SOUND

Silk Sound is in its 8th. year of business and now has 4 studios, 2 of which are 24 track, 2 audio transfer rooms and a video transfer suite equipped with a 1" C format machine linked to the multitracks for video layoffs and laybacks. The studios specialise in commercials for television and radio and also corporate and broadcast programmes as well as audio visual training shows.
Silk Sound already owns several AMS audio processors and is therefore aware of the quality and reliability of AMS products. Having taken the time to visit AMS whilst considering AudioFile, we were very impressed by the obvious commitment of everyone involved.
Unlike many of AudioFile's competitors, it could be integrated into a mixing console as a total substitute for carts or CD effect players and even a digital multitrack. Using it as a digital multitrack locked to a tape transport saves a considerable amount of time as well as providing the ability for 'tracks' to be repositioned instantly.
Silk Sound sees AudioFile as an important addition to our commercial operation – not just a dream for the future.

Robbie Weston,
Managing Director.

RUSHES

Rushes have been in business now for 9 years and in April announced expansion plans to provide Europe with its first fully integrated digital edit suite. To the already existing Quantel Paint Box is a new 'Encore' machine and the revolutionary new Quantel graphics system 'Harry'. Audio from AudioFile represents the final step in providing both digital vision and sound. It is expected that as well as using AudioFile with this graphics system, AudioFile will also feature at the heart of a digital sound facility proposed for Rushes sometime in the near future. Rushes were aware of other hard disk systems – some of which were just far too expensive and some of which required you to hire a piano player! AudioFile has been the right decision for Rushes.

Godfrey Pye,
Chairman.

SAUNDERS AND GORDON

Saunders and Gordon have been in business for just two years and specialise in sound for video. The majority of their work covers television commercials, industrial films, promotional films as well as pop promotional videos.
The company became aware of the exciting possibilities of using hard disk based audio systems a little over 12 months ago when Lucasfilm introduced the SoundDroid. Although exciting, the cost of SoundDroid was prohibitive and it did seem that other systems that appeared subsequently such as Synclavier were musical instruments rather than dedicated tools for recording, editing and sound manipulation.
As far as Saunders and Gordon are concerned, digital sound is definitely an advantage but the biggest plus for AudioFile is the ability to instantly recall sound with the capacity for having sound effects on-line. Whereas in the past film dubbers have had the advantage of being able to slip sprocket holes in film, we now have that same possibility – in fact AudioFile, being far more versatile, gives far more flexibility.

Robin Saunders,
Director.

ECO SOUND STUDIOS

ECO specialises in audio post production for film and video – mainly in the broadcast field and undertaking work with independent producers for Channel 4, S4C, HTV and the BBC.
John Cross and Ken Rock, both directors of ECO, have spent time considering digital sound recording equipment and recently visited the NAB exhibition in Dallas where they had demonstrations of the currently available systems. Following due consideration of all the options, ECO accepted an offer from AMS in late April to be given a demonstration of the new and updated

John Cross and Ken Rock of ECO.

form of AudioFile that had not been seen outside the AMS factory previously.
The modifications that had been made to AudioFile meant the system would be perfect for ECO Studio 3. AudioFile will be used initially for revoicing French language programmes into Welsh giving the advantages of digital sound, no loss of quality due to regeneration and of course the unquestionable advantage of 'fine sync' on revoiced material.
AudioFile will allow more efficient use of both studio and artistes – It should soon pay for itself.

John Cross,
Director.

PEOPLE IN THE KNOW

''Some recordings can be relatively simple. Alison Moyet's voice was simply recorded straight with a little ghost behind it; AMS on quavers and crotchets.
Vocal lines are improved generally with a discreet repeat behind. I usually use AMS. I think it's the best because I have never wanted to do anything that it hasn't been able to cope with. The sampling is great and now you can use it as an alternative to spinning in choruses from tape because of the increased sampling time.''

Pete Wingfield talking to Janet Angus Home and Studio Recording.

''It's also very difficult for guitarists to play half a riff, wait, and then play the other half of the riff, and get it to sound monotonous in the best sense of the word, as the drum tracks were all sampled. The guitarist just played it through and we selected the parts we wanted and created a four part cycle just dropping the bits in by triggering them off an AMS.
We also did two further stages of work on a shaker. We sampled the opening beat of the shaker and put it into an AMS and recorded it again on another track to give a false dynamic. Then Sade sung a shaker sound into an AMS. We took that and triggered it off in the same way, but on choruses only, just increasing dynamics.''

Robin Millar of Power Plant talking in Sound Engineer and Producer Magazine about the making of the track 'The Sweetest Taboo' on Sade Adu's ''Promise'' album.

R-e/p: Do you use digital sampling to capture elements and move them around in the song?

Louil Silas: Oh, man, all the time! In fact my nickname at one point was Louil ''AMS'' Silas! When I first came here to Larrabee (Studios, Hollywood), and Taavi showed me the things that different pieces of outboard equipment could do, I was amazed. I love the AMS (DMX 15-80S digital delay/sampler) and the (E-mu Systems) Emulator.
Usually, I use sampling for vocal phrases that I may want in a different part of the song. Or, for example, the song we're working on tonight – ''Crush On You'', by the Jets – has a tom fill at the end that I want to put in the first verse. So, we'll be using the AMS to move it.

Louil Silas, Jr. talking to Recording Engineer Producer Magazine.

Our philosophy is different to other producers; we would rather have plain decor and 7 AMS units. We have two REV1s, three REV7s and 9 AMS's. But when we make a record every piece of outboard gear is used and sometimes even more is hired from our own hire company.
There are no real instruments and even when we do use a guitar we use it through a Rockman with lots of effects into the desk. Any drummer will play Simmons pads triggering real drum sounds off an AMS. We don't need a studio because with this equipment we can build the Albert Hall.

Pete Waterman talking about his London recording studios to H & SR magazine.

We use the AMS for certain things and I think you'll find most studios use them on the ambient setting because it's the best thing the AMS does. We got to a situation where Andrew would say 'Lets sample the cymbal into the AMS and just trigger it off?'

Graham Gouldman formerly of 10cc talking about the making of an album with Andrew Gold to Paul White in Home and Studio Recording.

THIRD QUEEN'S AWARD

On the 21st of April 1986 AMS was pleased to be advised that for the third consecutive year that the company had been awarded the Queen's Award for Export Achievement. Pictured are Mark Crabtree and Stuart Nevison along with members of the workforce in the production area of the new factory.

Of particular note on this occasion is that the local press received the following statement from the Queen's Award office – "Exceptional to say the least – we are aware of only one other company winning the award three years on the run". The other company turned out to be Jaguar Cars.

The directors, members of staff and the entire workforce would like to take this opportunity of thanking each and every one of the company's foreign distributors whose efforts have resulted in this highly prestigious award being bestowed, remarkably, for the third successive time on A.M.S.

NEW COMPANY HEADQUARTERS

Pictured above is the new 28,000 square feet purpose-designed facility where all AMS's research and development, design and manufacturing have now been relocated. The new building provides additional space for all departments as well as incorporating much needed areas for technical and sales seminars, demonstration rooms and of course additional space for expansion.

The building, on its own 7 acre site, has been the result of collaboration between senior management and a local designer with a brief to provide "a light, bright, airy atmosphere – an environment that anyone would be happy to work in". The result has been beyond anyone's expectations and with its energy conserving reflective glass and air conditioning, seems more than adequately to have fulfilled the original specification.

One sad note (which we are sure will be understood by all those who have visited us in our Worsthorne factories) has been the move from the village which was finally completed in May. Our new buildings more than make up for many of the shortcomings of the Worsthorne facility, but we are still very sorry to leave behind the many friends we have made who have been so kind and helpful to us over the past 8 years in the village.

PETER GABRIEL INTERVIEW

Peter Gabriel has been using AMS audio processors for some considerable time and his input, along with that of others, has been responsible for shaping products in the AMS range. His dedication to sound quality and sound experimentation has led to his release of some of the most exciting and stimulating albums of the 80s. Indeed, Peter's "Shock The Monkey" tour of North America resulted in more calls for information on the live applications of AMS products than that generated by live performances of any other artist.

As this Echo Times goes to press, Peter Gabriel's latest offering, "Sledgehammer", is moving up the U.K. singles charts and his new album is about to be released. AMS would like to take this opportunity of thanking Peter Gabriel for crediting them on this, and his previous album, and wish him the success he deserves for what is a first class piece of work.

A.M.S.: Did you come from a musical family and can you remember how you first got involved?

Peter Gabriel: Talking history I must admit I'm bad with dates but on both sides of my family there were lots of musical people. There was always a lot of music at family gatherings. There was even an opera singer on my father's side.

A.M.S.: So how did that gravitate towards rock music?

P.G.: As a teenager I grew to love pop music, at 7 or 8 I remember Johny Kidd and the Pirates – Red River Rock I think it was – the first thing I was ever excited about. When I was about 11 I remember Love Me Do – there were certain critical records where I can remember the exact place that I was when I first heard that record. The Beatles' "Love me do" did that to me, the first time I heard Jimi Hendrix did that. It's a bit like everyone remembering where they were when Kennedy was shot. I must admit I am still that way . . .

A.M.S.: Did any type of music appeal more than any other?

P.G.: As I got into my teens, black music had the biggest impact on me. Soul, Otis Reading was my spiritual godfather, Nina Simone who just seemed to be able to get me to respond to rhythm and emotion. I was still very aware of beat groups and by the time I was 17 – psychadelic rock. I was really enamoured with all the hippy stuff, I used to escape from school and hang around clubs before catching the last train home in an evening. For me it gave me a glimpse of a world that seemed much more exciting.

Peter Gabriel interview continued over page.

A.M.S.: *Do you feel the 60's were a critical period for you?*

P.G.: Yes they were. They were very exciting as it was the first time that music was opening up on a large scale. Although Frank Sinatra or Bill Haley had gone before, there really had been no explosion of musical energy like there was in the 60's. Maybe people who were teenagers in the punk era feel exactly the same about that period, and it may have been as critical for them as the 60's were for me.

A.M.S.: *So when did you personally begin writing and how did you manage to get this issued on vinyl?*

P.G.: My first attempt at writing was in one of the partnerships that became Genesis – it was very primitive and literally produced by one finger at a time on a piano. I ended up being the turkey going round with cassettes that we'd done and spending the day looking at some A&R's secretary's feet. Success only came after being introduced to someone who showed me the technique of finding out whoever you wanted to see's Christian name – then burst into the office in a pretty unhappy state and scream "is Bob back yet?" or whoever. As you're on first name terms with her boss and obviously upset she'd better look after you and put you in his office! After using this technique once I realised that attitude is all important – talent is important but more important is the need of the psyche to achieve.

A.M.S.: *In those early days, what do you think it was that Genesis had that helped them succeed?*

P.G.: The approach with Genesis was to try and open up the writing to include different styles and rhythms. In the early 70's there were all sorts of slots and we didn't really fit in any. We tried to confuse the audience – we'd start acoustically like a folk group and end up loud and manic.

A.M.S.: *What about effects, audio processing or maybe your own distinctive vocal style?*

P.G.: During the time of "Lamb Lies Down on Broadway" I first invited Brian Eno to experiment with his EMS synth. All the band were very conscious of other people's sounds that they achieved on record – and of course we were always experimenting. My own voice sounds a little strange to start off with – its not really a regular singer's voice but I enjoy using my voice as an instrument.

A.M.S.: *Besides liking your style and approach very much, the first time A.M.S. contacted you was immediately after hearing the Nonlinear effect on Phil Collins' drum section on your track "Intruder". That sound is now a classic – did you realise how important that sound would become, and how did it come about originally?*

P.G.: As far as the "Intruder" drum sound goes I think I really had the sense when I first heard it to know that it would be a rock and roll standard because it really was so exciting. Hugh Padgham had set up the gated reverb which he had done once before with XTC although I don't think it had been given a lot of space on the track. When Phil Collins came in for the third album, I really wanted that to be a bit revolutionary in a way. One of the things I didn't like was cymbals on a lot of records, particularly with respect to the effect on separation. Phil was a little uncomfortable with having his cymbals taken away but he accepted it eventually, particularly after we put some additional drums in the places where we had taken the cymbals away. He was therefore playing the toms in instinctive cymbal positions. When Hugh brought in the gated reverb effect I immediately knew it was one of the best things I'd ever heard in my life. At that point the track that had almost been a rejected song was then built around the drum sound. Steve Lillywhite was there also.
Now AMS have developed the "Nonlin" and taken it further everybody including myself has it instantly on tap and can use it on a thousand and one different things. I really don't know what disco music would be without that sound now!

A.M.S.: *Had you heard of AMS before that contact?*

P.G.: Yes I had. I first came across an AMS digital delay line at the Townhouse, and Larry Fast (my keyboards player) was the first to really make me aware how important sound processing is in being part of a sound.

A.M.S.: *How do you know if you have enough audio processing?*

P.G.: Now, if anyone asks me how they should set themselves up with equipment I tell them that whatever they have to spend, half of it should be spent on sound processors. For me instruments are impotent unless you have the right things to put them through.
The way you decide how to spend your money is very critical as there are so many options. For me I've spent much more of my income on my studio than on myself and it has worked really well. There is a very different relationship with equipment when you own it – and for me that is essential. What I like very much about AMS is how easy it is to control perspective. I prefer on many occasions to use the effects returns rather than mix them in with the original. The RMX 16 and the DMX 15-80S are vital parts of my equipment and having been introduced to them and worked with them I can't picture not having them. A synthesiser sounds naked to me without processing – even if it is only pitch changing the outputs of the DMX 15-80S slightly up and down on either channel.
I will make time to explore the setting up of chains of various effects returns, continually trying to find different layers of performance. There is an AMS layer – after having started with a bare backbone that final layer adds the richness.
One of the things that I find very interesting is to use the returns from the RMX and the DMX during the recording where space will allow. This is different to putting it on in the mix to flatter the vocals or the instrument. Artists react differently when they overdub to the returns from an effect unit. For me audio processors can be applied afterwards but if a musician is responding to something he is hearing in his cans then you are dumb if you don't get that on tape – because that is part of the chemistry of that performance. A good example is trying to speak when you have your own slightly delayed voice in cans. I have a lot of AMS units and in most mixes it's difficult to find one not being used.
I nearly bought a Harrison live console and had it customised, only because it had 16 effects sends so maybe that shows how important effects units are to me.
AMS outboard units are as important on the road as is the studio and although racks of outboard are a bit extra work and extra budget I believe it's worth every penny.

Peter Gabriel

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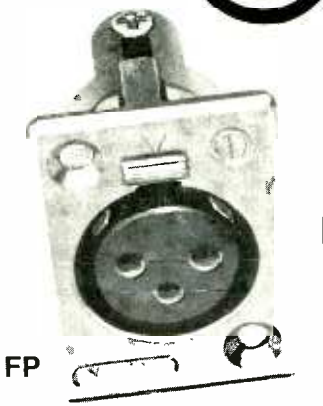

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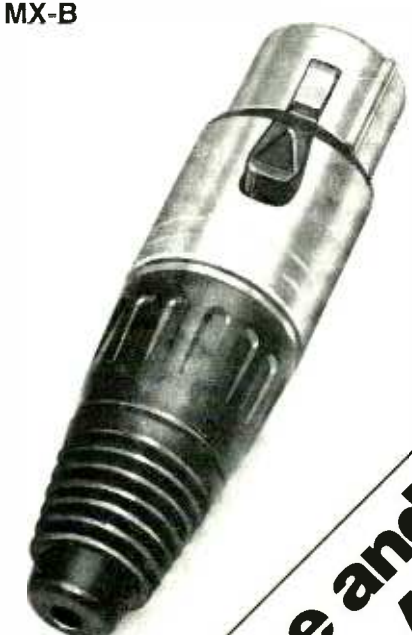

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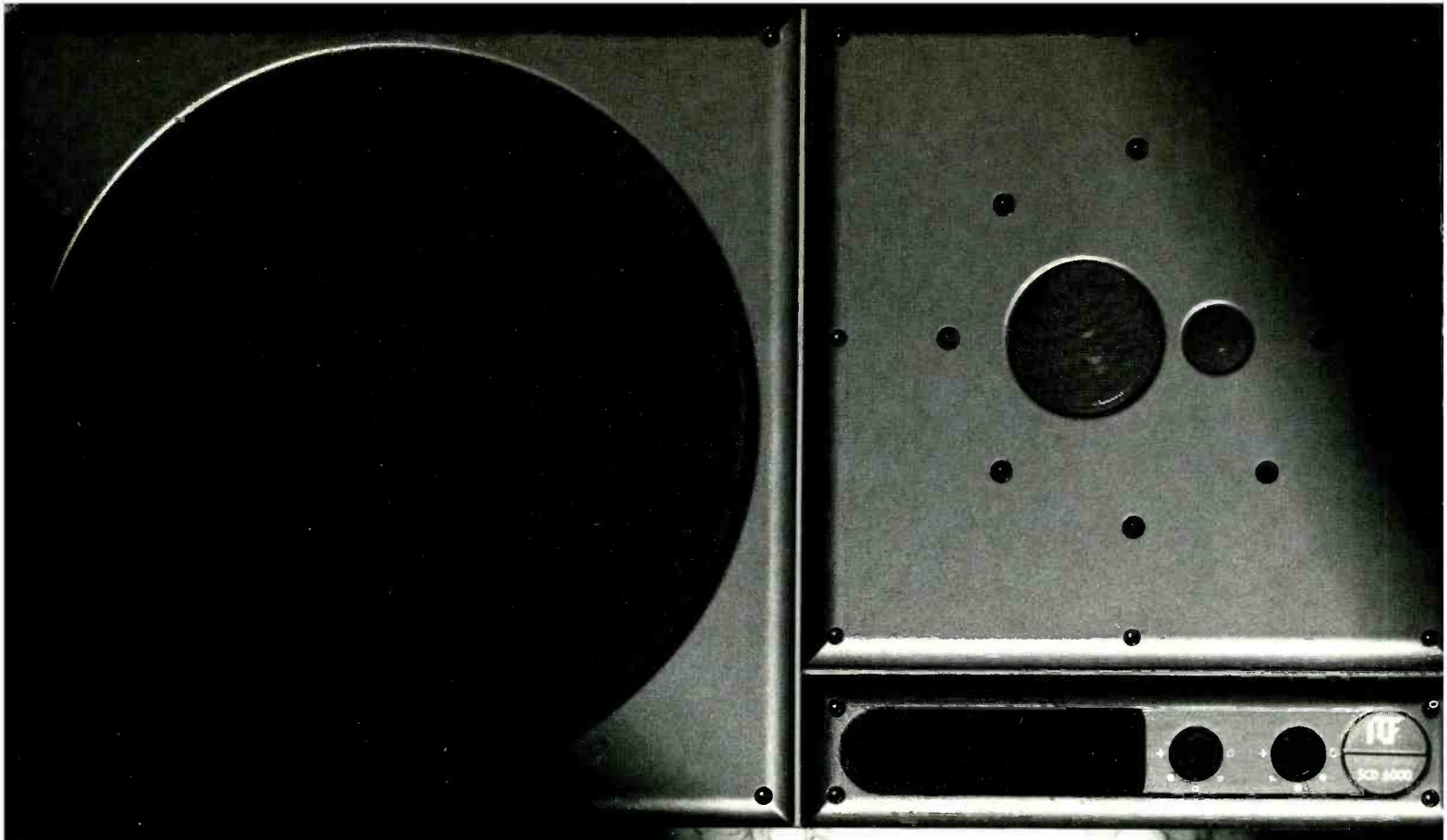

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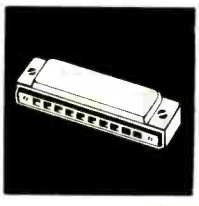

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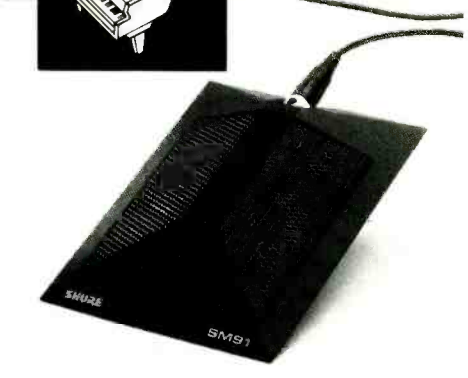

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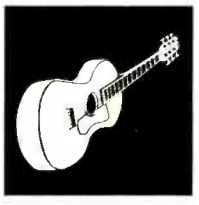

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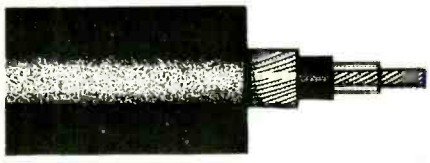

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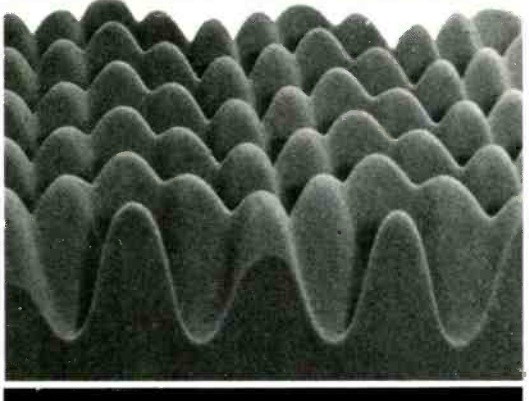

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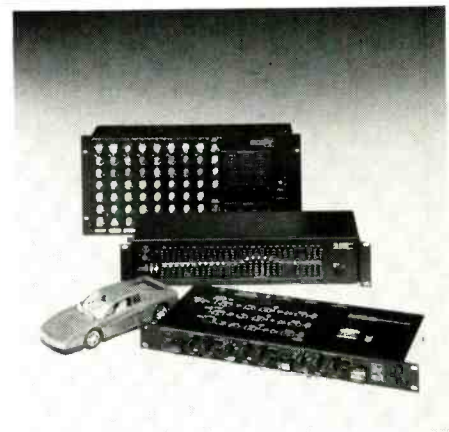

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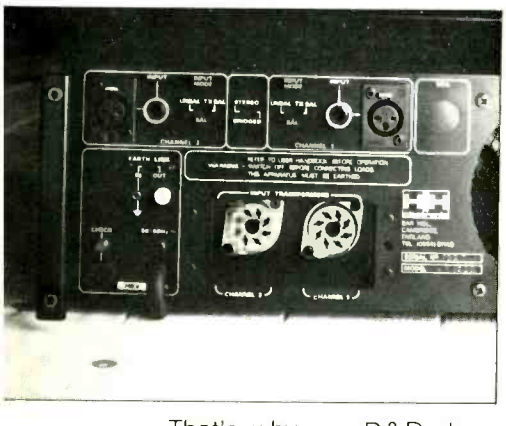

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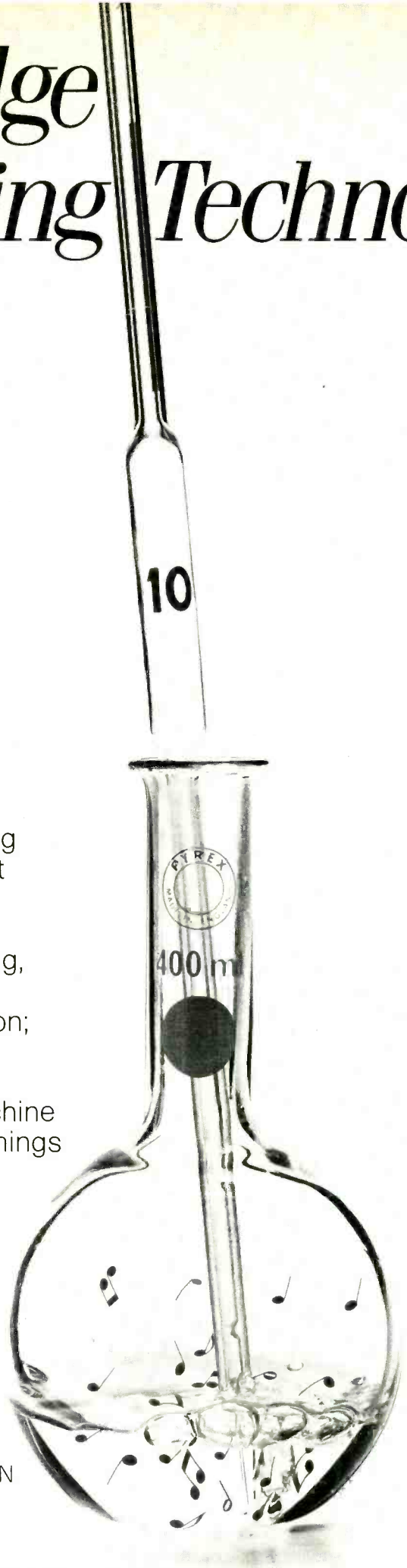
Leading Edge Sampling Technology?



The laboratory standard sampling equipment illustrated on the right will not give you 21 seconds of 20 KHz sampling on each stereo channel, full editing and triggering, plus delay, pitch transposition, sound shrinking and reverberation; all in stereo.

The Publison IM 90 Infernal Machine *(not illustrated)* will do all these things and more.

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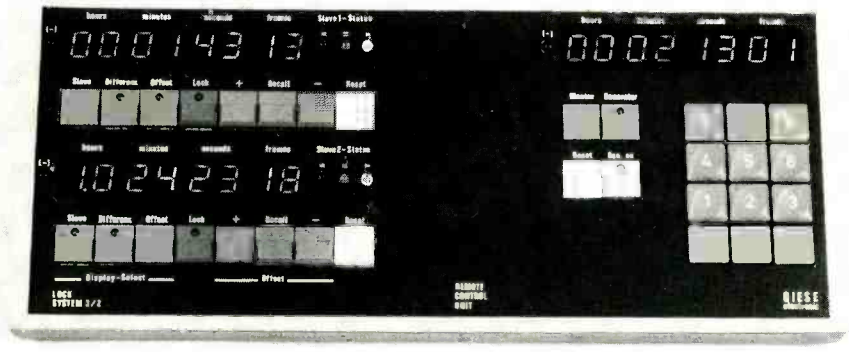

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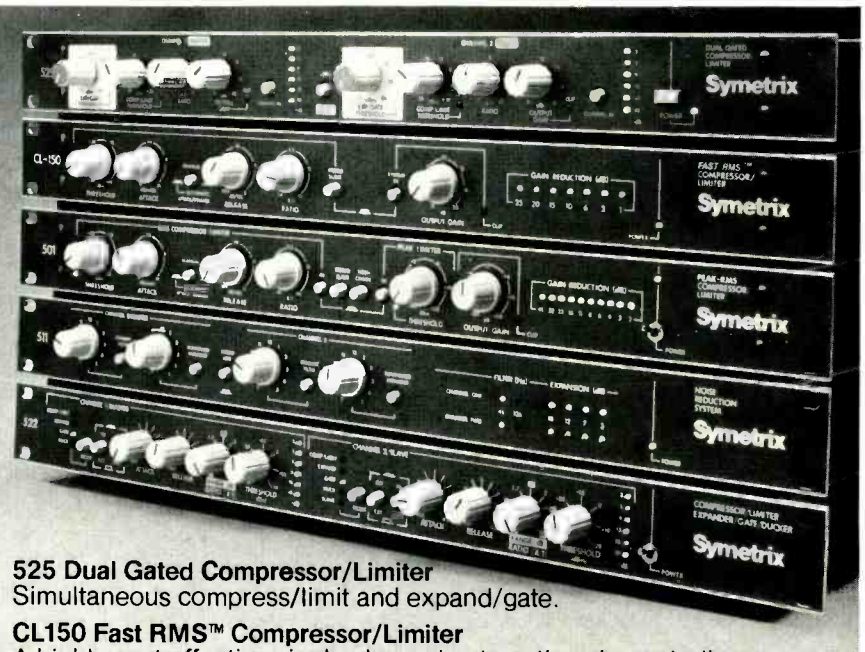

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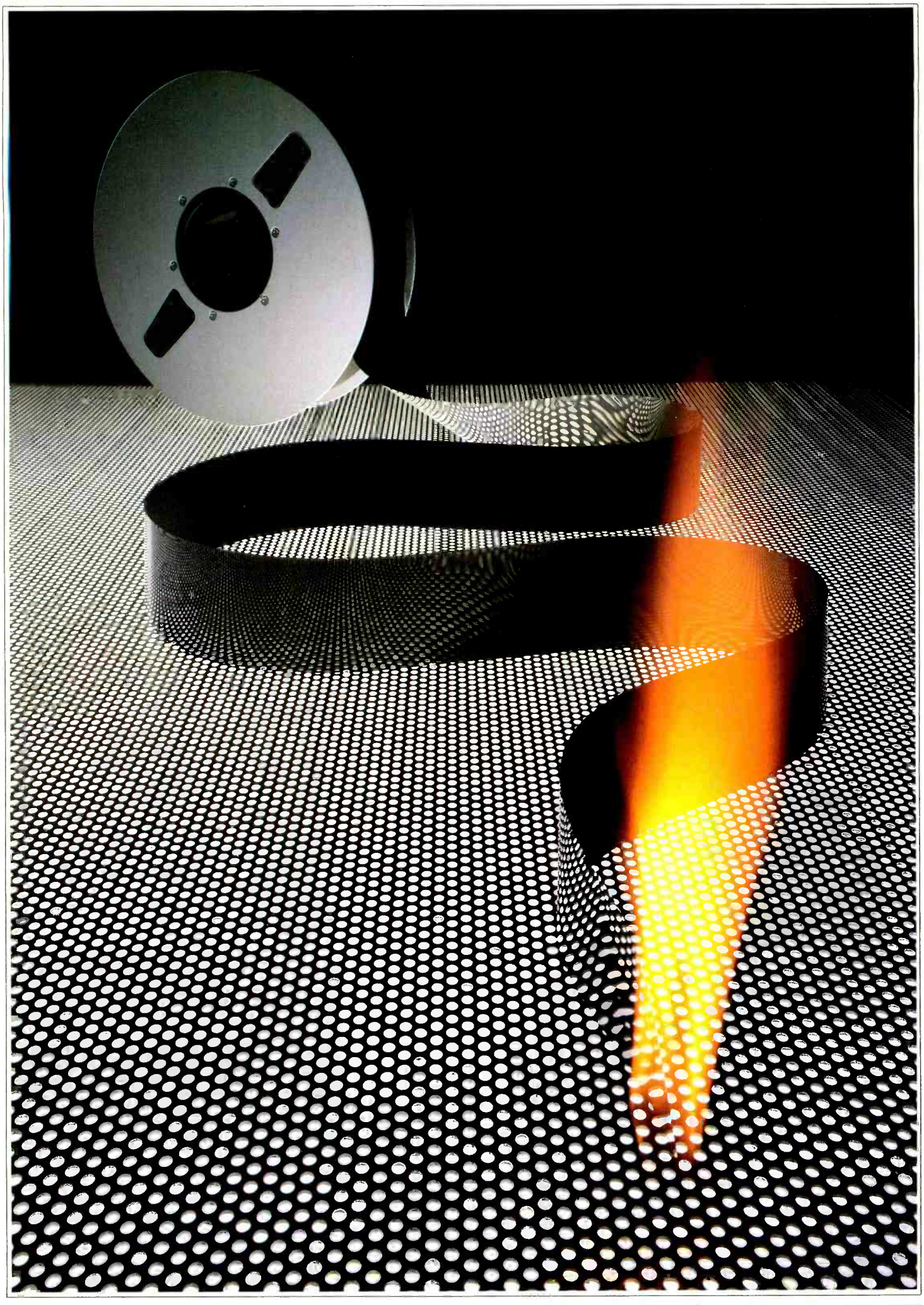

IF TAPE HAS HAD IT'S DAY, WHAT DOES TOMORROW HOLD?

Yes but, . . . I know Synclavier are highly superior synths, but don't ask me to believe that a keyboard is going to make state of the art recording gear redundant.

Synclavier is not a 'synth'. Synthesis is just one element of it's production capability. The system performs all the functions of a digital recording suite. It has evolved, to include all elements of a studio's function - performance, processing and even storage.

Everyone has known this would happen eventually. It's just that no-one expected it to happen so fast and to such an exceptionally advanced level.

Many manufacturers claim the same.

Not quite. We're talking audio quality that's way ahead of the Sony or Mitsubishi digital multitracks. Processing and editing that's unrivalled. And musical performance which inspires musicians like Sting, Stevie Wonder and Oscar Peterson.

In creation and manipulation of sound, Synclavier offers convenience, precision and creative potential than no other configuration of alternative equipment can match.

That's big talk. Give me an example.

There's so much about Synclavier that's awesome; you'd need a full demonstration to answer that properly.

Just to whet your appetite though . . . you can varispeed any track to match any other tracks or visual elements, without changing pitch. You can interlock instantly via SMPTE timecode to music, dialogue or effects. Both phrase and effect editing is possible with 20 microsecond accuracy. Or change the instrumentation, or notation of a track, at the push of a few buttons. You can hear a sax part played by a sampled vocal if that's your wish.

How does it work ?

Computers. The language, the software, and even the hardware architecture were originated by Synclavier's inventors. Because what had existed before was in no way fast enough or even versatile enough to process audio to their uncompromising standard.

Presumably you have to be some kind of a hi-tech-masochist to use it?

No. Not at all, it's easy to use. Synclavier is operated by a combination of musical keyboard, video terminal and a push button master panel.

Master controls are fully labelled according to their practical not digital function. It's easy to get on with, even on first encounter.

THE SYNCLAVIER DIRECT T

Although it must be said that, since there is virtually no limit to the ways Synclavier can manipulate sound, even the most experienced operators are continually discovering many new possiblities.

It all sounds terribly clever, but what about the sound? A lot of people aren't too keen on digital audio.

And with some good cause. But Synclavier is in a different league to anything you may have experienced before. Sampling is at 100kHz, as well as the norm of 44.1kHz. The dynamic resolution is better than 18 bit. Sound synthesis is carried out using a unique method known as 'partial timbres' which gives both the quality and range of natural sound. And because everything is done digitally and direct to disk, there is no degradation and none of the problems associated with multiple analogue to digital transfer.

Presumably this little lot doesn't come cheap?

Compared to a traditional studio, which wouldn't give you the same facilities at any price, it's great value. Particularly when you consider the on-going time and cost savings that inevitably come with Synclavier.

Compared with other digital investments that dont come close to it's recording quality we believe it does a great deal for the money.

But wont something better come along in a few months time?

Yes. From us. Synclavier has a continuous nine year record of delivering the most advanced music production technology.

New developments are introduced rapidly, and are available as system updates for all our existing owners.

There are thousands of man hours invested in Synclavier software. And there are no shortcuts in development for anyone else trying to match the system. It would take years to gain the experience. By which time we will be even further ahead.

Where is it being used now?

There are more than 500 systems worldwide being used in many different applications, such as recording music, video post production and broadcast studios.

Now is the time to find out more.

Synclavier offers tomorrow's alternative to the conventional studio today.

Remember that he who hesitates to move with the times usually ends up lost.

Can you afford not to look at it?

O DISK RECORDING SYSTEM

SYNCLAVIER OWNERS

(INCLUDE)

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- ☐ Baby Records, Milan.
- ☐ Glen Glenn Sound, Los Angeles.
- ☐ PUK Recording Studio, Denmark.
- ☐ Trevor Horn, London

'It's a different philosophy which requires control of sound, Synclavier is the only thing that can do it.

- ☐ Daniel Vanguard, Paris.
- ☐ Oxford University, Oxford.
- ☐ Sud West Funks EV, Freiburg.
- ☐ The Henson Corporation, London.
- ☐ Sting, London.

'It's as radical and as important an invention as the piano was many centuries ago'

- ☐ Charles Aznavour, Geneva.
- ☐ The Tape Gallery, London.
- ☐ Hall & Oates, New York.
- ☐ Martin Rushent, Berkshire.

'I'm making a lot of money out of this system'

- ☐ Wally Badarou, Nassau
- ☐ Royal Acadamy of Music, London
- ☐ Benny Anderson, Stockholm.

TECHNICAL OVERVIEW

The Synclavier Direct to Disk Multitrack System is a modular recording unit which offers high fidelity and precise contiguous recording to a random access media.

When used in conjunction with a state of the art Synclavier System, the Direct to Disk option provides a combined computerised stand-alone 'Tapeless' recording environment.

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☐

Variable sampling rates;
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☐

Greater than 18 bit resolution
utilising proprietary sampling techniques.

☐

Software controlled input routing
up to 32 recording channels (4 channel modules).

☐

Software editing feature include
Punch in, cross fade splicing, SMPTE editing.

☐

Integral audio processing of dynamic, spatial
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☐

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☐

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DS:4-8

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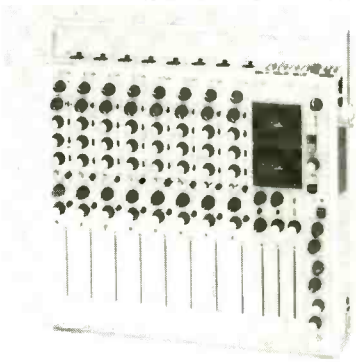

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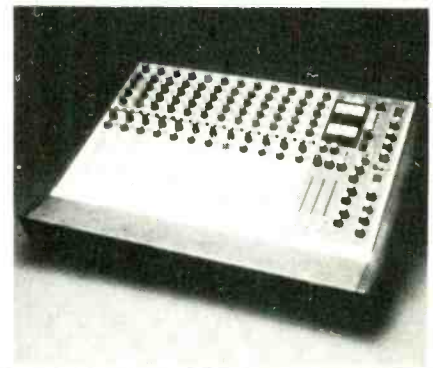

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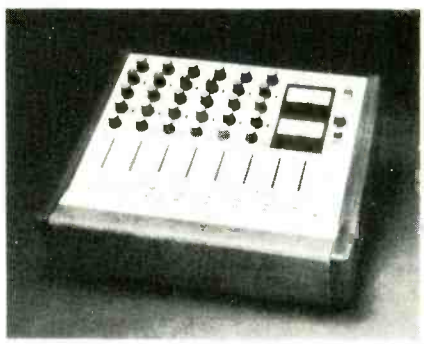

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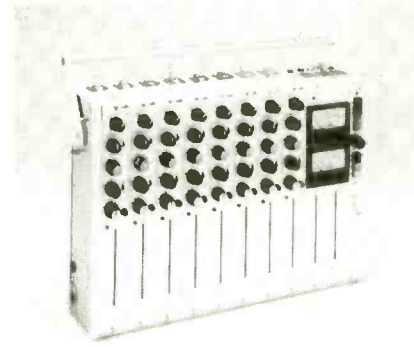

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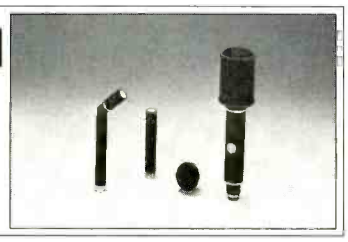

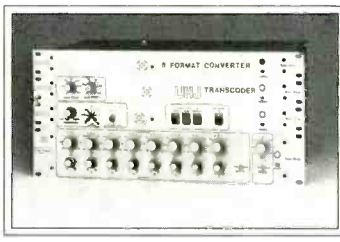

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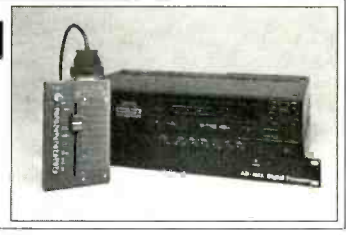

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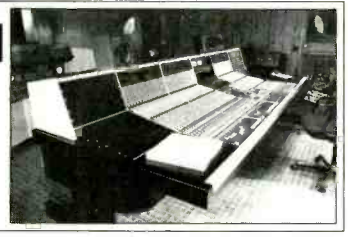

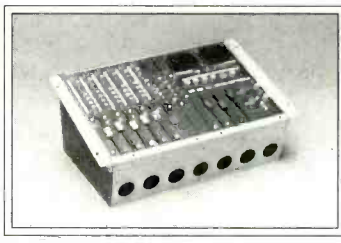

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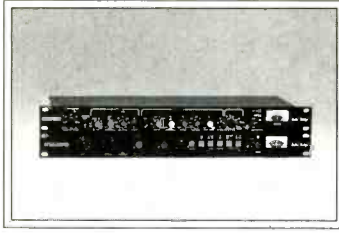

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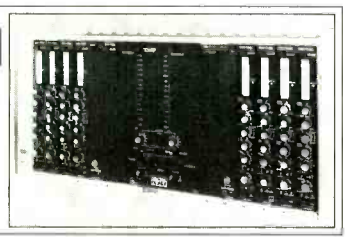

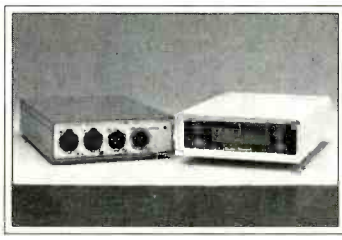

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AKG acquires Ursa Major

In April 1986, AKG Acoustics acquired all the assets and trademarks of Ursa Major Inc. This company will now form the Digital Products Division of AKG Acoustics with R&D activities being undertaken by the parent company, AKG Acoustics in Austria. The Boston-based facilities of Ursa Major will become the second R&D base for digital products. Christopher Moore, president of Ursa Major becomes executive vice-president of the new division.

There will be a degree of rationalisation in the product range with the manufacture of the *Space Station*, *8X32*, *Stargate 323* and *626* ending. The only two Ursa Major products that will appear under the AKG name will be the *MSP-126* Multi-tap stereo processor and the new digital effects processor *ADR-68K* both of which were shown on the AKG booth at the Dallas NAB Convention.

Agencies

● Audio Kinetics has appointed a number of overseas agents. New Zealand: Vicomm Systems, Box 31-029, Milford, Auckland, tel: 444 6085, or PO Box 11-091, Wellington, tel: 851 548. West Germany: BFE, Bauerfernmelde Und, Elektronic KG, Postfach 2300 80, 6500 Mainz, tel: 6131 463116. Canada: J-Mar Electronics Ltd, 6 Banigan Drive, Toronto, Ontario, M4H 1E9, tel: (416) 421-9080, and Sonotechnique PJL Inc, 2585 Bates, Suite 304, Montreal, H3S 1A9, tel: (514) 739-3368 will increase their coverage. Greece: KEM-Electronics OE, 28 Papadiamanti Street, 144 52 Metamorfosis, Attica, tel: (1) 2824041. Taiwan: Acesonic Co Ltd, RM 501, 147 Lung Chiang Road, Taipei, tel: (02) 7168896.

● Michael Stevens & Partners of Bromley, England has been appointed North European distributor for Audioscope products. The range includes three audio spectrum analysers and a multichannel audio level display unit. A colour brochure is available on request and the products may be seen at the company showroom or field demonstrations may be arranged. Michael Stevens & Partners, Invicta Works, Elliott Road, Bromley, Kent, BR2 9NT, UK, tel: 01-460 7299.

● Tartini Musical Imports has become exclusive Canadian distributor for Alesis Studio Electronics Corp products including the *X:TC* and *MidiVerb*. Tartini Musical Imports, 2530 Davies Avenue, PO Box 279, Port Coquitlam, BC V3C 3V7, tel: (604) 464 1341; 1680 Courtney Park Drive, Mississauga, Ontario L5T 1R4, tel: (416) 673 7555.

● Klarion Enterprises has announced the appointment of Entertainment Services of Australia as exclusive dealer in Victoria for Martin sound equipment.

● Stirling Audio Systems has added Trident *65* and *75* series consoles to its professional mixer range enabling a choice of in-line and split consoles. Stirling Audio Systems, 1 Canfield Place, London NW6, tel: 01-625 4515.

● Harrison Information Technology has announced that Syntec International, 60 Gibbes Street, Chatswood, New South Wales is their new sole agent for the Australian market.

● The West German ANT Telecommunications has set up a US subsidiary, headed up by former head of ANT's System Programs Section Jost A Spielvogel. ANT Telecommunications Inc, Avenel Business Park, 211 Perry Parkway, Suite 4, Gaithersburg, MD 20877, tel: (301) 670-9778/9779.

● Hayden Laboratories Ltd has been appointed sole UK agent for the Dynacord *ELA* range of products ranging from live sound equipment to audio communication systems. Hayden has also set up a new facility to design, construct and install all forms of audio systems. This facility will be known as Hayden Systems Engineering and will operate within the Pro-Audio department of Hayden Labs. Hayden Laboratories Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG, UK. Tel: 0753 888447.

GO cutting amplifier gone

Tam has discontinued the manufacture of the *GO* cutting amplifier and the *CPS* control console. Tam took on the licence from Ortofon in 1983 and since then no new amplifiers have been sold as, on the whole, the only new systems being installed are the Neumann *DMM* and there is also a large amount of secondhand disc cutting equipment available. Because of disagreement over marketing strategies between Tam and Ortofon, Tam will no longer manufacture the units under licence. It will, however, continue to produce its own design of stereo treble limiter *STL852* and the tape equalisation modifier for half speed cutting, the *TEM851*. It will also continue to deal in new and used systems and equipment, servicing of all makes of equipment, including Phonotech and Ortofon heads and electronics, together with the supply of spares and consumables.

Several factors have been affecting the sale of new disc cutting systems including the advent of CD and the introduction of the Neumann *DMM* system in 1982, reducing the number of lacquers required to be cut. In Tam's opinion the likely closing of at least one lacquer-manufacturing factory within the next five years, combined with the rapidly increasing rate of cutting rooms installing CD mastering systems, it is unlikely that any new systems will be sold, apart perhaps from some *DMM* for high throughput rooms. Even in the Third World where facilities are being updated and new cutting rooms are being built, Tam feels it can supply more than adequate secondhand systems, some of which are coming on to the market only a year old.

In brief

Audio FX has been appointed UK dealer for the Southworth Music Systems *Total Music* program for the Apple Macintosh computer. Interested parties should contact them for demonstration and/or further information . . . **AKG Acoustics Ltd** has a newly established custom design division to produce special purpose microphones and headsets to client specifications for use in broadcast, recording and communications industries.

Address changes

● Publison Audio Professional has moved and is now located at 18 Avenue de la Republique, 93170 Bagnolet, Paris, France. Tel: (14) 360 8464. Telex: 250303.

● Peavey UK is now located in Corby, Northants. As well as being an ideal location for UK and European distribution, the premises will also be used for assembly and manufacture of certain Peavey products for the needs of European distribution. The full company name and address is Peavey Electronics (UK) Ltd, Hatton House, Hunters Road, Weldon North Industrial Estate, Northants NN17 1JE, UK. Tel: 0536 205520.

More method for your music

The Music Method was set up by Marijke Bergkamp of the Beat Factory to provide a complete production and recording service to the music industry. Representing producers Fran Ashcroft, Richard Ashley, Graeme Holdaway and keyboard programmer and arranger Tom McLaughlin, The Music Method will take on the organisational tasks involved in recording music. The combined skills of the producers and large number of musicians on their books enable them to offer a wide variety of recording projects. After an initial meeting The Music Method will provide a detailed budget and guarantee to complete within 10%.

For further information contact Marijke at The Music Method, 1 Christopher Place, Euston, London NW1 1JF, UK. Tel: 01-388 7826. ▷

Low-cost digital audio comes of age.

The Sony PCM series has now been available for several years. In this time recording and broadcast organisations, government, educational and industrial establishments, as well as individual users have all acknowledged the unique value of these units, and made them a new standard. It is the superlative quality of Sony PCM digital, coupled with extremely low cost that has brought about this professional acceptance of the range. This is borne out by the number of new ancilliary products from other manufacturers, that have further increased the flexibility and versatility of the range. Examples of these products are the 'CLUE' logging and editing system from HHB, as well as various interfaces which allow digital communication with the PCM 1610.

Sony has acknowledged that this acceptance by professional users necessitates a change of policy towards these products. Accordingly they have upgraded them from the domestic catalogue, and, realising the need for professional support and all that that entails, have appointed HHB as specialist dealers to represent them in the pro-audio market.

We are proud to announce this appointment, and happy to assure our customers of continued availability of the PCM range. The re-instatement of the PCM production line has been very largely due to pressure from end-users, who are after all the motivating force in the audio world. So if you are involved with audio recording and are still unfamiliar with Sony digital, then you owe it to yourself to call HHB – the No. 1 name in Digital Audio.

SONY® FROM HHB

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THE SONY PCMF1 AND PCM701ES DIGITAL AUDIO PROCESSORS.

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People, events, services

Literature received

• The Institute of Electrical Engineers has published their *1986 Publications Catalogue*. The 44-page catalogue details books, conference publications and journals currently available from the IEE and includes details of titles due to be published later in 1986. Copies available from Owen Byatt, Books Administrator, The Institute of Electrical Engineers, PO Box 8, Southgate House, Stevenage, Herts SG1 1HQ, UK. Tel: 0438 313311.

• Audio Kinetics has produced a series of Application Notes covering such subjects as running a PAL U-matic video at 24 f/s and maintaining sync references when laying down digital audio (on video tape using a digital processor) from free running material. These notes may be obtained by writing to either the Borehamwood or New Jersey addresses.

• The Sony *PCM-3324* Studio Directory of users in the United States has been published with additional limited information regarding the rest of the world. Other Sony publications include the Open Mic newsletter with information on pro audio developments.

• A new catalogue has been received from Lemo UK Ltd with details of their ranges of connectors.

Developments in LEDE control room design

Acoustic design is often thought of as being a mixture of science, intuition and luck. If your luck is out it can prove very expensive. Fortunately, recent innovations such as time delay spectrometry analysis using the *TEF* (Time, Energy, Frequency) make it possible to define and measure to a greater extent than before. You cannot accurately either predict or modify a room's acoustics until you can define and measure them. In other words, for the first time, machines like the Techron *TEF 10* let you know what is going on.

So what? Well, in parallel with new methods of quantifying acoustics there are new ways of building LEDE control room surfaces to provide the desired characteristic.

Olde LEDE

The ground rules for LEDE were originally devised by Don Davis of Synergetic Audio Concepts in California. He was the first to analyse the control room and produce a definition of how an LEDE room should measure. The early rooms used materials that shut down the front of the room and made the rear half reflective. There were two objectives: first, to free the monitor-to-engineer path of early order reflections from soffits, side walls and consoles, and to make sure that there was no direct transmission path from the monitor cabinet through mounting plinths, the floor and the console—sound travels faster in dense solids than in air. The second objective was to return energy from the rear of the room as a diffuse soundfield. Rooms of this size are too small to have an RT60, because they are too small to have a reverberant soundfield (which is what decays by 60 dB in RT60). Instead, a small room has a decay of diffuse early reflections, which the TEF will demonstrate and measure.

To meet these two objectives, early LEDE rooms had their front half shut down with absorbent materials, and used splayed and angled surfaces in the rear of the room to return discrete reflections.

Since then, there have been two significant advances: Reflection Phase Grating (RPG) and the Reflection-Free Zone (RFZ).

Reflection Phase Grating

Mannfred Schroeder is a German acoustician who lives and works in the United States. He is involved in designing large-scale acoustic environments such as concert halls. During 1977 mathematicians organised a series of talks in Gottingen to celebrate Gauss' 200th birthday. One of them mentioned Gauss' work on number theory, specifically quadratic residues. Schroeder realised that quadratic residues produced a series of numbers that could be used to design a 'random' concert hall diffuser, that would scatter reflections evenly, without hot spots and dead spots at certain places at certain frequencies.

Dr Peter D'Antonio of RPG Diffusor Systems Inc applied Schroeder's theory to small scale diffusion in the rear wall of control rooms. From this, the Reflection Phase Grating evolved. The RPG constitutes a number of wells separated by a thin but rigid boundary, and having wells of differing depths. The well depths are computed by one of two random number theories, the quadratic root number theory and the primitive root number theory. These two result in different well depth sequences and different scatterings.

RPGs have been fitted to several European studios including Baby Records in Milan; Swan Yard Studio One and remix facility, Odyssey studio 2 and Red Bus studios 1 and 2 in London; and Chipping Norton studios in Oxfordshire.

The diffusers are manufactured commercially by RPG Diffusor Systems Inc, based in Maryland. European distribution is handled by RPG Europe.

Neil Grant, director of Discrete Research and RPG Europe says that with RPGs, it is possible for the first time to produce a truly diffuse soundfield, giving considerable advantages. First, the room seems psychoacoustically much larger. Second, the imaging is greatly improved. Doug Jones, an American psychoacoustician, has demonstrated that rear reflections influence imaging more than is generally realised. If you have specular, mirror-like reflections coming back to the console, it will pull the image and produce good and bad imaging up and down the trailing edge of the console as you move in and out of the reflections.

RPGs work down to 300 to 400 Hz, which is likely to be the crossover frequency of the room. Peter D'Antonio has also designed an LF diffuser that works below 40 Hz. Neil Grant says this eliminates the need for bass trapping. "A diffuser, because it smears what would otherwise be a single returned 'spike', reduces the amplitude of the returned signal. Its effect is analogous to an absorber. If you reduce the amplitude by stretching the returns out in time you have performed the same task as an absorber, in a much more constructive way.

"All the energy coming back to the console gets re-integrated with the direct signal. Because it is all within the Hass Zone."

The Hass Zone is a 30 to 40 ms gap after an initial sound arrives, during which the ear will suppress or integrate competing reflections. "Because you are bringing energy back within that gap, you don't hear returns as reflections or flutter—it's as if the monitoring is louder. In a conventional monitoring environment energy is absorbed in the back wall. With this you don't have to strain the monitors."

Reflection-Free Zones

You don't have to have soft, fully absorbent surfaces to have a reflection free zone. If you imagine a fully reflective monitor wall, the signal will bounce on and off it like a light ray on a mirror. If you then move the monitor wall surface, the ray will pass you by: to you the reflection has disappeared and the surface is then effectively absorbent. If you were to splay and angle the monitor wall, side walls and soffits, you could have within a LEDE room a totally glass front wall, provided that all the reflected energy is going past you to the rear of the room where the RPGs will return it in a fully diffuse manner. The only concern then is controlling the decay characteristic, which is conventional, straightforward acoustics.

Now it is possible to use reflective surfaces to create a reflection-free environment, and just use absorbers to control the decay.

Richard Lamont ▷

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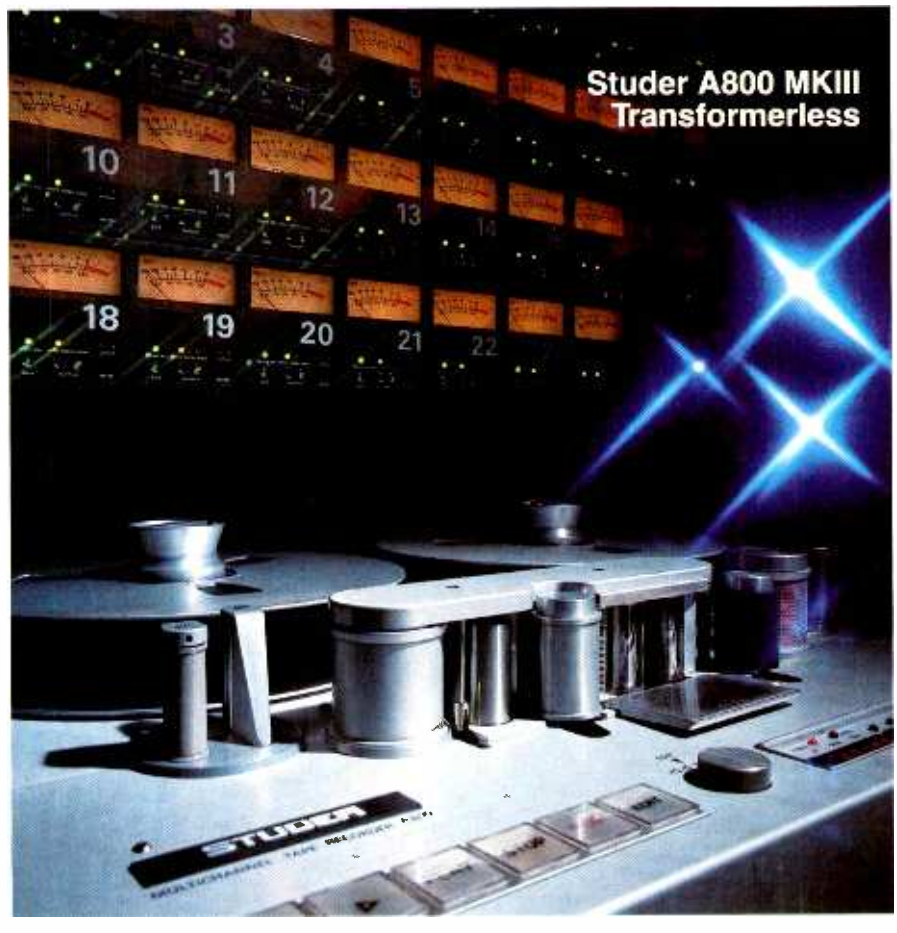

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People, events, services

Test and measurement consultancy

Qubik Consultants is a new company providing information on test equipment currently available in the UK and supplying resource saving solutions to problems encountered in the test and measurement sector of the European electronics industry.

Services will include free consultancy for purchasers of new equipment, assessment of client's current test equipment performance, arranging test equipment calibration and service contracts, implementing turnkey test systems, designing and programming of automatic and semi-automatic test systems, supplying test equipment management program or complete system to inform of test equipment status, test equipment management to ensure continued accuracy and assistance in buying and selling your redundant test equipment via their redundant equipment database.

Test equipment suppliers or manufacturers not already included in the database should inform Qubik Consultants, 7 The Bourne, Albury, Near Ware, Herts SG11 2JR, UK. Tel: (0279 74) 754.

Forthcoming events

June 24 to 28 Broadcast 86, Messe Frankfurt, West Germany.
June 25 to 27 APRS 86, Olympia 2, London, UK.
August 1 to 3 British Music Fair, Olympia 2, London, UK.
November 12 to 16 81st AES Convention, Los Angeles, USA.

Stolen equipment

● An AMS *RMX 16* serial number 3050 went missing in the Vauxhall area of London over the Christmas period. This unit has still not resurfaced. If you should see it, Mr Dunnett will be very pleased to hear from you on 01-767 5404 (evenings) or 01-622 4272 ext 217 during the day.

● On March 17 1986 the following microphones were stolen from a BBC Radio OB vehicle: four AKG *C414* (serial numbers 5727, 5845, 5899, 8123), two AKG *C422* (S/N: 742 and 724), two AKG *D202* (S/N: 55419 and 56170) and a Neumann *U87* (S/N: 31897). If you have any information regarding these mics you should contact the Audio Manager, BBC Bristol on (0272) 732211 or Shepton Mallet police.

Queen's Awards

This year three pro-audio companies were awarded the Queen's Award for Export Achievement. Quite incredibly AMS received its third consecutive award—an almost unique achievement. Amek Systems & Controls won its second successive award. Last but not least, the third winner was Klark-Teknik. We would like to extend our congratulations to all three companies.

AMS is currently expanding into new purpose-built accommodation occupying over 28,000 ft² and the *Audiofile*, introduced in prototype form just over a year ago is now in production at the new factory. Early models have been in service with the BBC, TVS and Trilion Video.

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People, events, services

Studer/Philips joint venture

Willi Studer AG and NV Philips Gloeilampenfabrieken intend to form a joint venture on a 50:50 basis for the R&D of CD-related professional studio systems. As well as R&D, the companies expect to optimise their marketing both in terms of product range and distribution channels.

The joint venture will not affect independent developments by each company in magnetic tape recording and optical disc mastering systems.

Studer Revox America Inc will also market the Philips professional CD player system *LHH 2000* and Philips Subcode Editor *LHH 0425* in the USA.

Bell & Howell and Eiki International

The audio visual marketing and distribution operations of Bell & Howell in the USA have been purchased by Eiki International Inc. This will only affect the USA and Canadian territories.

Bell & Howell Ltd in the UK will continue to supply the complete range of products spares and service through its Visual Communications Centres. In addition they are expanding the range to include the *Hi-Beam* video projector, *VC370* video presenter and new video monitors. They also continue too as distributors of JVC professional and broadcast video products in the UK and most European countries.

People

- Stephen L Fauchier has been appointed district manager for upper midwestern United States by Altec Lansing. His role will be to provide liaison to the factory for sound contractors, theatre equipment dealers and consulting sound system designers.
- Former vice-president of marketing for Ursa Major, Gerard Abeles has announced the formation of A/V Technology International to represent and distribute professional audio and video products worldwide.
- Martin Audio-Video Corp has been joined by Tom Cahill as senior technical service engineer. He comes from a background of studio maintenance, construction, engineering management and involvement in professional digital recording technologies with Sony and Digital Entertainment Corp.
- DeltaLab's ADS, Analog & Digital Systems Inc, has appointed James M Ruse as product specialist in its pro-audio division. He will be responsible for educating dealers and ADS salesmen.
- Stuart St John Miller has joined Entec Sound & Light, with responsibility for the Conference/A-V/Theatre division and comes from a background of theatre and conference sound engineering. Entec has also appointed recording engineer Mark Brown to assist Spencer J Brooks in professional sales.
- Sony US professional audio division has appointed Ken Meyer western regional manager. He has been with the company for seven years, starting in 1979 as a sales rep in the consumer products division, later becoming northwestern regional sales manager for consumer audio and hi-fi products.

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Sawmills corrections

In our studiofile feature on Sawmills Studios, Cornwall, in the June issue the pixies really got to work. For starters the picture was of the control room prior to the changes which are described in the article. Those sharp-eyed readers will, of course, have noticed that the speakers in the picture are Tannoys and not the newly installed Quested system with the same going for several other items. If in doubt believe the text.

The next error was that John Cornfald is really John Cornfield while Dennis Rigley is really Dave King—that's a difficult mistake to explain! Finally Dave King is in fact co-owner with Simon Fraser (who seems to be the only person we didn't get wrong). How the errors occurred we really don't know but we would like to extend all our apologies to Sawmills for the fact that they did. As a way of trying to make amends particularly as they took our mistakes very well, we would like to wish the revitalised Sawmills every success in their studio in this unique location.

NAB report

As a magazine we stopped covering dedicated broadcast topics several years ago but since then an interest in 'proper' audio has grown among the video and picture people. Also now there is only one annual AES Convention in the US, the main US broadcast show, the NAB Convention, has become far more important to audio people. So for the first time in three years we cover briefly the relatively small section of the show which is of interest to this magazine. We hope to carry more details on some of these items at a later date.

Neve: launched a new multitrack console, the *8232*, designed for music recording, mixdown and video post production. It is in-line with 32 input channels and 24 mix buses with microprocessor-controlled instant reset of all track assignments. It is available with manual or VCA faders and can be fitted with *NECAM 96* automation.

Otari: was showing an analogue 32-track tape machine known as the *MX-80* series. Similar in appearance to the *MX-70* series it is also available as a 24-track.

RTS Systems: amongst several new products was the model *927* programmable reference tone generator, a single U, 19 in rack mount unit that can be programmed to output a predetermined set of test tones and other reference information. Operating in stereo there are nine separate registers that can have up to 27 different tone events per sequence allowing selection of frequency, output level, duration and channel routing for each tone event. In other words you can pre-program the unit to deliver a preset pattern of information at the head of a tape including discrete tones, white noise, pink noise, noise reduction tones and stereo channel ID.

Orban: although probably of little use within the studio environment, Orban showed a version of the stereo synthesiser known as the *275A* which has stereo inputs and outputs and can recognise mono and synthesise 'stereo' automatically. Switching between real and synthesised stereo is by smooth crossfade. There are two synthesis modes—Narrow centres dialogue and Wide is more dramatic on music and effects.

Sansui: a new PCM transmission system—*DC-PCM/Tricode* allows compression of digital signals so that in transmission they require approximately only ¼ of the conventional bandwidth. This will allow transmission of digital signals including high quality music signals, down lines previously considered too narrow. Other applications are currently being developed including low speed digital audio recording.

Valley People: a number of new rack mount units included the *400* mic processor which contains a 3-band EQ, compressor/expander/gate, de-esser, insert point and multiple I/O level matching; *415* dynamic sibilance processor; *815* single-channel sibilance processor in rack frame format; and two new powered racks the *PR-10* and the *PR-2* for the *800* series modules.

Audio Engineering Associates: announced MS stereo control units known as the *MS-380* and the *MS-480*, half rack width stereo and four input respectively. These portable units offer both AC mains and battery operation with the provision of mic power, direct outputs and insert points.

Orion Research: featured unit was a digitally-controlled analogue console with the control elements in a compact panel and the analogue audio externally rack mounted. There are no rotary knobs on the console only pushbuttons, and selecting one of these functions switches a display on a large LCD screen and brings a row of soft keys under the screen into operation. For example in this way each channel has a 7-band graphic. The console is available in four frame sizes from eight to 32 stereo inputs with two VCA mute groups, four assignable VCA groups and two editor control groups. There is also provision for storage and recall of 32 full panel settings. There is no provision for multitrack as the desk is designed mainly for production and post-production particularly in video suites. The concept of the small control surface is, however, making progress.

ART: main featured product was the *PD3* which is a 16-bit linear digital delay line with 64 kHz sampling and 20 kHz bandwidth. This has one input and three outs and is primarily intended for time sync in multiple sound distribution systems. Also announced was the provision of Performance MIDI to the *DR1*.

dbx: introduced the *163X* compressor/limiter, *263X* de-esser and the *463X* noise gate expander in the performer line series—the single knob half rack format. Also shown was the *FS900* 2-bay powered mainframe for *900* series modules and the *933* mixer/distribution amplifier.

Droid Works: the SoundDroid concept is progressing and the NAB saw the introduction of a new unit—the *Spotter Station*. This records effects and music libraries on optical disks and gives instant playback for auditioning, effects spotting and for transfer use. The unit's library software also contains library details. A single *Spotter Station* will accommodate up to nine user stations.

RPG Diffusor Systems: was showing *QRDs* in a wide variety of designs and materials and prototypes of a new concept—the *Abffusor*—more details soon.

Lexicon: showed a stereo audio time compressor/expander known as the *2400*. This replaces the original *1200C* and has a much improved audio performance preserving stereo image and uses full 16-bit linear PCM encoding. Also being shown in prototype version only was the *480L*. This is a digital audio processor that is both hardware and software updatable. Initially this will work in conjunction with the *244XL*. It may be controlled by the LARC and can handle two processing operations at the same time. It is also possible to remove user programs from the unit in the form of a cartridge that plugs into the front of the unit. This is a prototype system only and it will be some months before full details will be available.

Sony: the Sony booth was the largest in the show with a whole host of new units. There were several new professional 8 mm video recorders which may be interesting for digital audio recording with an *F1/701* type unit. These were the portable *EVO-210* and the *EVO-510*. High definition TV was also gaining importance as was digital audio in the video side. For example the new Sony *BVH-2800* 1 in VTR has both analogue audio and 16-bit PCM audio so we may see new ways of working and at the least better quality video audio. On the straight audio side the *DFX-2400* digital sampling rate converter was shown. It handles 32, 44.056, 44.1 and 48 kHz sampling rates and offers *1610* and AES/EBU format inputs/outputs. A varispeed controller for the *PCM-3324* was shown which also allows synchronisation with a wide variety of clock input sources. This is known as the *VSU-3310*.

Keith Spencer-Allen ▷

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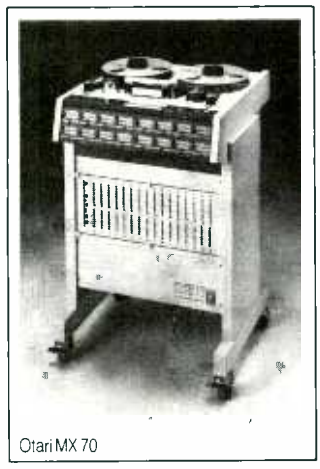
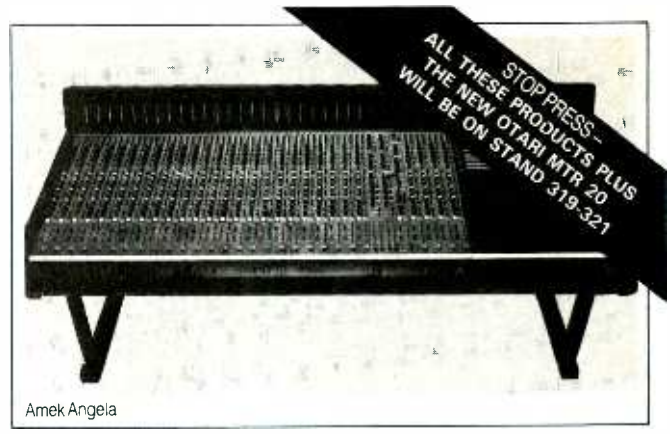
Otari MTR 90



Otari MX 70

The MTR90, as the world's best-selling multitrack recorder, needs little introduction. Suffice to say the MTR90 is now the first choice of many of the world's leading producers and engineers.

The new Otari MX70 is a state-of-the-art 1" 8- or 16-track drawing on the advanced design ideas of the MTR90. The MX70 makes Otari performance and features available at a much lower price.



Amek Angela

The Amek Angela must be now nearly as well known as the MTR90. The attributes of the Angela are many and varied, but those most commonly-quoted are the highly musical eq section and general transparency of sound, the incredible flexibility of operation and the very high standard of mechanical construction.

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Only ITA can offer the experience of having already installed many Otari/Amek systems, for a variety of different applications, from private studios to video post-production facilities.

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DIARY

People, events, services

Contracts

• The new *V* series console from Neve has been supplied to the following studios: Yellow Two in Stockport; Philippe Sarde's studio in Paris; Air and Angel Studios in London; KRS Tokyo, FM Tokyo broadcast station, Taihei studios, King Records, TAMCO, Tokyo Pro Sound, Sound Inn and Sunrise Studios in Japan; Editing Concepts, Limelight Studios, Gravity Records and Minnesota Public Radio in the USA; Cutting Room Sweden; Werner Studios Denmark; and Sound Studio Athens.

• Multitrack Hire has bought a Mitsubishi *X-850* digital multitrack machine to complement its existing range of analogue multitrack recorders. This is the seventh unit delivered in the UK.

• SSL has placed two *SL 4000 E* series Master Studio Systems at Opus Studios in Czechoslovakia. The newly built studios will be used for recordings varying from rock'n'roll to chamber music to Czech folk music. Both rooms will be equipped with Sony *3324* digital multitrack recorders.

• Air Montserrat has incorporated a new *SL 4000 E* as part of its refurbishment project. The console features a unique Q-mixer system which provides for a separate matrix on the Q-mix system with several individual Q-mixers and an integral 400 W amplifier. The console will be used in conjunction with a custom-made submixer. The island's ½ mile air strip meant it was impossible to air freight the console from Antigua—the nearest they could get—so it was finally shipped in preference to having it lowered on to the island by Navy helicopter.

• Encore Studios in Burbank, California, formerly home of Kendun Recorders has effected major changes to its facilities with a variable acoustic recording room provided by acoustic consultants Lakeside Associates, the control room being left virtually intact. Equipment update included a custom SSL *4000* console, Studer *A800* (two) 24-track and 2-track recorders, Lexicon *224XL*, AMS *RMX 16* and *DMX15.80S*, dbx *902*, Drawmer noise gates and two EMT *140* valve plates.

• Sony announced the sale of the 50th *PCM-1630* digital processor at the Montreux AES Convention to the Paris based Studio +30. The current total of *PCM-3324* multitracks in Europe was 43 in mid April. Recent purchasers include the BBC for the Digital Control Vehicle; Radio France, their second, for use by the New Musical Research Group at Studio 102 in Paris; PolyGram Holland, also their second, for the classical recording division; Studio Davout, Paris (three units); Westside Studios, London (two units) and the Doublewtronics complex in Madrid, Spain.

• Elliott Brothers have been awarded a contract to install two Calrec multitrack desks with Studer *A800* tape machines at the Central Office of Information. COI will use the studios to prepare radio and video programmes for worldwide distribution.

• Audio Kinetics *Q.Lock* number 1000 has been installed at Abbey Road, making their fourth, for use with Studer *A80* and *A800* machines and Sony *5850* video recorders.

• Turnkey has delivered a DDA *AMR24* console to Paul Samuelson for his Sam Therapy Studio where he will be using it in conjunction with his Fairlight Series III. Other recent contracts for DDA via Merseyside Audio Consultants have included *D* series desks to English National Opera's Colliseum, the Palladium and the Old Vic.

• Audix has supplied 24 *MXT1200* mixing desks for coverage of the World Cup in Mexico. The order was received via Pye TVT and included 10 desks for OB vehicles and 14 for use in Televisa permanent studios. Greek television channel ERT-2 has ordered three 24-channel *MXT1200* mixing desks, jackfields, monitor loudspeakers and power amplifiers and Audix has also won three separate contracts to supply *MXT1200* mixing desks to Radio Television Hong Kong.

• Power Plant Recordings, Carlton, Australia has installed a 30/24 Trident Series *80B* console and Studer *A80 Mk 4* 24-track. The equipment along with a variety of other professional items was arranged through Syntec International (Melb) Pty Ltd.

• Soundcraft has installed a 32-channel *TS24* console with *Optimix* automation at China Records, Beijing. The sale was negotiated by their distributor Audio Consultants Company Ltd, Hong Kong.

UB40+CBSO=ACTION!

Birmingham reggae band UB40 and the City of Birmingham Symphony Orchestra were recently brought together for a unique 'orchestral reggae' recording session.

As part of a fund raising appeal idea instigated by the *Birmingham Daily News* the resulting recording will be featured on an album entitled *ACTION!* to be produced by Jeff Lynne. Proceeds and royalties from the record—which also features other artists of Birmingham origin such as the Moody Blues, Joan Armatrading, Steven Duffy, Gordon Giltrap Band, Steve Gibbons, Magnum, Alvin Stardust and Ruby Turner, and The Tandy Morgan Band—will be donated to the West Midlands Children's Hospice.

Perhaps symbolically expressing the union of cultures in the face of adversity and the great 'spirit' of Birmingham's cosmopolitan society, the idea for a combination of West Indian reggae sound with the 'true Brit' sound of the CBSO emerged when it was realised that under normal circumstances the cost of such a session would be highly prohibitive.

UB40's Ali Campbell composed a melody line and Lewis Clark of The Electric Light Orchestra arranged the orchestration. The session was engineered by Alan Caves, senior recording engineer at UB40's Abbatoir Studios in Birmingham.

Alan constructed a temporary control room in a small room only slightly larger than a broom cupboard in the recording venue which was the newly built Adrian Boult Hall, part of the Birmingham School of Music. A Mitsubishi *X800* 32-track digital tape machine was kindly loaned by Andy Hilton of Hilton Sound Hire along with a TAC *Matchless* 40-input mixing console and Tannoy *Red* monitors. AKG kindly supplied microphones and 100 head sets.

The melody line was recorded first, by UB40, along with a click track for the orchestra to pitch and sync to and, though apprehensive at first about recording reggae especially after only the day before rehearsing Stravinsky, members of the orchestra soon got into the swing of it.

Rather than multimiking, Alan used only two mic set ups, a close set double cardioid Blumlein pair for a fairly dry sound and another Blumlein pair rigged about 12 or 15 ft above the orchestra for ambience. Each section of the orchestra was then recorded individually negating the need for separation screens which might be dubious anyway in a hall hitherto unused for recording. Bass first, then cellos, violins, and so on overdubbing right through the orchestra until percussion and harp were added last; the sound from both mics finally mixed for best effect.

The 32-track master was mixed at Jacob's Recording Studios in Farnham, Surrey. Earl, bass player of UB40 then raised sponsorship money by cycling the towpaths of the canals between Birmingham and London with the master tapes for cutting at The Townhouse.

There were technical hitches almost right up to the point where the orchestra was due to start playing but even in the face of extreme adversity recording engineers will plod on undeterred though perhaps operating on auto pilot some of the time. Firstly the Mitsubishi started playing up and then several other gremlins got into the works, but Alan persevered and came up with the goods and it seems now that the track may also be used as the theme tune for the next Olympics. □

David Hastilow

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NEW PRODUCTS

NEW PRODUCTS

Equipment, modifications, options, software

Meyer Sound power amplifier

Meyer Sound has developed a new power amplifier which it says incorporates a number of unique design advances. Power output for short term durations (up to 10 min) is rated at 1200 W continuous (600 W/channel). Continuous long term is 800 W. Power bandwidth is 100 kHz, S/N 110 dB, and the quoted THD less than 0.01% (20 Hz to 20 kHz). The damping factor is claimed to be immeasureably high with estimates around 100,000.

The unit features an all steel chassis and an insulated Faraday shielded power transformer. Construction is modular with provision for auxiliary signal processing electronics (eg active crossover, equalisation) via a circuit card slot.

The new amplifier uses bipolar drive circuitry and an FET output stage. Error correction amplifiers linearise the junction between the FET and bipolar circuits thus reducing distortion. Inputs on the amplifier are isolated and float from earth/ground so the amplifier can be driven from single-ended or balanced sources with equal immunity from ground loops. A number of protection devices are incorporated in the design and with the exception of the circuit breakers and DC protection system these automatically reset once the fault condition ceases. The signal path is complementary-symmetry throughout and is DC coupled.

Initially the Meyer power amplifier will only be available as part of the *500* series loudspeaker system. The card slot will carry active electronics and the amplifier fitted with Cannon output connectors specific to this speaker system. A stand alone unit should be available in the Autumn.

Meyer Sound Laboratories Inc, 2832 San Pablo Avenue, Berkley, CA 94702, USA. Tel: (415) 486-1166.
UK: Autograph Sales Ltd, 2 Spring Place, London NW5 3BA. Tel: 01-485 3749.

Totalsystems DBM-1

Totalsystems has issued details of its production *DBM-1* direct digital metering unit. The *DBM-1* features a high resolution 100 segment bargraph display and in addition to level metering will display information such as emphasis, 44.1 kHz sampling frequency and timecode (optional).

With a small modification to the processor the metering can be switched remotely from the record or playback section.

Scaling is linear dB from 0 dB (bit code 7FFF) down to −40 dB (bit code 0148) in 0.5 dB segments and from −40 dB (bit code 0148) to −60 dB (bit code 0012) in 1 dB segments. Attack time is 8.8 μs (sampling period 22 μs). Decay time is variable, there being four fixed settings (9.2, 4.6, 2.25 and 1.12 s) and a constantly variable setting (0.5 to 8 s). Settings are selected at the rear of the unit.

Independent channel overload indicators light when five or more consecutive samples of 0 dB are present. Indication is selectable and can be either momentary or held.

Status indicators include CRC, AVE, HOLD, MUTE, 44.1 and EMPH. Connections are via a 25 way Cannon D-type.

Tendrashaw Ltd, 41 Windermere Avenue, Basingstoke, Hants RG22 5JH, UK.

Sennheiser HD 540 headphones

Sennheiser has recently introduced the *HD 540* reference headphone. Using open headphone technology and RFT technique the *HD 540* headphones employ a novel diaphragm with integral acoustic silk dampening and a new ear cushion. This, Sennheiser claims, affords virtually resonance-free transmission (from 16 Hz to 25 kHz) and exceptional transparency.

A closed type professional version is understood to be under development.

Sennheiser Electronic, D-3002 Wedemark 2, West Germany. Tel: 05130 583-0.
UK: Hayden Laboratories Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 888447.

USA: Sennheiser Electronic Corporation (NY), 48 West 38th Street, New York, NY 10018. Tel: (212) 944-9440.

Brooke Siren Systems FDS360

Brooke Siren Systems has recently introduced the *FDS360* crossover network. This will function as a stereo 2-way or mono 3-/4-way system and is based around a 1 U 19 in rack design. Unlike many conventional designs the *FDS360* provides separate frequency band limiters, polarity switching, LED signal level monitoring, band insertion points for external delay and EQ units, band edge phase adjustment and filter programming by plug-in frequency cards. These provide standard Linkwitz-Riley responses in addition to 12, 18 or 24 dB/octave slopes.

Gain is 0 dB as standard, +10 dB optional and distortion is claimed to be typically 0.005% at +6 dBm output. A separate output balancing unit is available to special order providing full transformer balanced and floating outputs to drive 600 Ω loads. Phase is continuously variable 0 to 180° (plus a further 180° with the polarity switch). Power supply requirements are 110 to 220 V +10%, −20% at 50/60 Hz, the unit being specifically designed with additional low voltage tolerance for road show use.

Brooke Siren Systems Ltd, 213 Sydney Road, London N10 2NL, UK. Tel: 01-444 7892.
USA: Klark-Teknik Electronics Inc, 262 Eastern Parkway, Farmingdale, NY 11735. Tel: (516) 249-3660.

Neutrik connectors

Neutrik has recently introduced a number of new *XLR* connectors. Firstly there is a pair of *XLR* line sockets designed for outdoor and heavy duty use. The *NC3MX-HD* and *NC3FX-HD* are claimed to be robust, corrosion-proof, dust and watertight and perform to IP 65/IEC R144. Additionally there has been added a compact female *XLR* plug with an integrated on/off switch. This plug is no larger than a standard *XLR*.

Neutrik AG, FL-9494 Schaan, Furstentum, Liechtenstein.
UK: Eardley Electronics Ltd, Eardley House, 182/4 Campden Hill Road, London W8 7AS. Tel: 01-221 0606.
USA: Neutrik Prods, 77 Selleck Street, Stamford, CT 06902. Tel: (203) 348 2121.

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When it comes to performance, at any price, the new TracSystems CD201 cassette to cassette duplicator leaves the others standing.

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APRS STAND NO 140

NEW PRODUCTS

Equipment, modifications, options, software

CRL Audio Dynafex range

CRL Audio are set to manufacture and distribute the *Dynafex* range of noise reduction processors having purchased the assets and products of MicMix after the company ceased trading last year.

The first products to be available will be the *Dynafex DX1* and *DX2* noise reduction units. Although functionally equivalent to the earlier versions the new units according to CRL incorporate numerous internal changes and improved sonic performance.

CRL Audio, 2522 West Geneva Drive, Tempe, AZ 85282, USA. Tel: (800) 535-7648.

AHB consoles and programmer

AHB has released details of two new models in the *CMC* range in addition to a new MIDI programmer. The new models (24/16/2 and 32/16/2) both feature programmable routing to the 16 output buses, plus programmable muting on all channel and monitor inputs. The 32-input version has 24-track monitoring as standard. New *CMC* features include eight re-routable subgroups, extensive foldback and talkback systems and additional monitoring.

Although the existing computer expansion interfaces remain available the new *CMR* remote programmer is claimed to offer powerful facilities without the need for an external computer. Features include 100 MIDI memories for MIDI program change of console status, 100 routing memories and a 10-song sequencer with MIDI synchronisation and song pointer implementation. All memory is held in interchangeable RAM cartridges for fast and economical data storage.

Allen & Heath Brenell Ltd, 69 Ship Street, Brighton, Sussex BN1 1AE, UK. Tel: 0273 24928.

USA: Allen & Heath Brenell (USA) Ltd, Five Connair Road, Orange, CT 06477. Tel: (203) 795-3594.

Beyer microphones

Beyer has recently introduced a number of new microphones. The *M700* is a dynamic hypercardioid similar to the *M600* but without bass cut. It is intended for use as a vocalist microphone. The *MCE 80* is a back electret designed for stage use. It has a hypercardioid pickup pattern and a frequency response of 50 Hz to 18 kHz. With 12-48 V phantom powering max SPL is 138 dB; with batteries this falls to 126 dB.

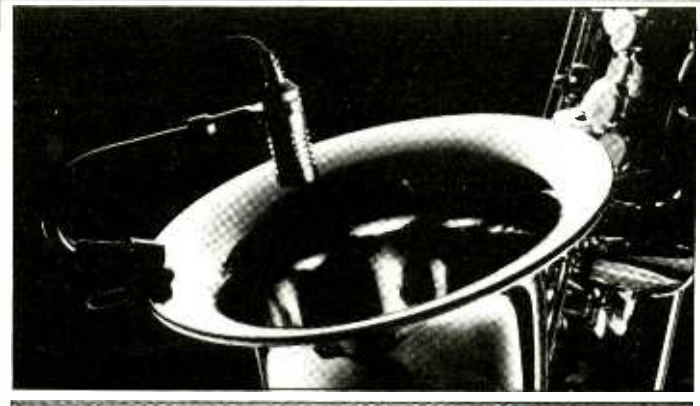
The *MC 740* is a studio condenser microphone featuring five switchable polar patterns. These can either be altered at the microphone or via the *MSG 740* power supply. The max SPL is 134 dB and can be increased to 144 dB by the built in attenuator.

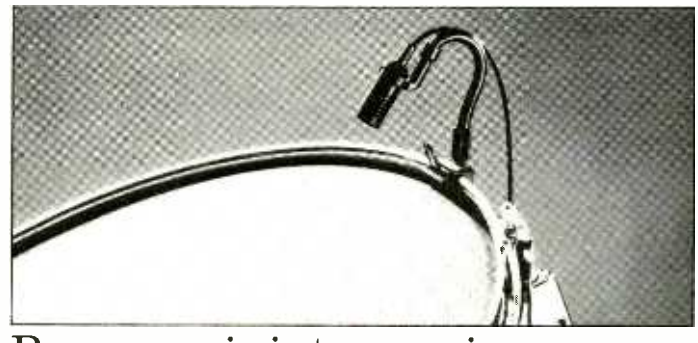
Other new microphones include the *M 380* and the *MPC 40*. The former is a dynamic microphone designed for use with instruments, particularly bass drums. The *MPC 40* is a boundary microphone. It is recommended for piano recording and has a frequency response of 25 Hz to 20 kHz. Power requirements are 12-48 V phantom powering or battery pack (*MES 40*). The *M 380* has a frequency response of 12 Hz to 20 kHz and a max SPL of 140 dB.

Eugen Beyer Elektrotechnische Fabrik GmbH, Theresienstrasse 8, Postfach 1320, D-7100 Heilbron, West Germany. Tel: 071 31 617-0.

UK: Beyer Dynamic (GB) Ltd, Unit 14, Cliffe Industrial Estate, Lewes, East Sussex BN8 6JL. Tel: 0273 479411.

USA: Beyer Dynamic Inc, 5-05 Burns Avenue, Hicksville, NY 11801. Tel: (516) 935-8000.





Ramsa miniature mics

Panasonic (Technics) has released details of a new professional series of miniature back electret condenser mics: four mics are available under the Ramsa name. The *WM-S1* and *WM-S5* are designed for 48V phantom powering, the *WM-S2* and *WM-S10* for 12-48 V phantom powering or for use with standard batteries.

The mics feature a brass case and element with a flexible support made from solid aluminium encased in PVC. The clasp is covered in a special rubber compound to reduce mechanical vibration.

Suggested applications include cymbals, hi-hat, acoustic stringed instruments (guitars, violins) for the *WM-S1* which has according to the manufacturer a frequency response 50 Hz to 18kHz and a max input level of 148 dB.

The *WM-S2* (120 Hz to 15 kHz, max SPL 138 dB) is suggested for brass and also toms and percussion. The *WM-S5* claims to have a very high max input level of 158 dB with a 70 Hz to 16 kHz response. This is designed for snare drum, toms and percussion in addition to trumpet, saxophone and trombone.

Finally the *WM-S10* has a frequency response from 120 Hz to 15 kHz with a maximum SPL of 138 dB. This mic is designed for use in conjunction with a headset.

UK: Panasonic UK Ltd, 300 Bath Road, Slough, Berkshire SL1 6JB. Tel: 0753 34522.

USA: Panasonic Professional Audio Div, Matsushita Electric Corp of America, One Panasonic Way, Secaucus, NJ 07094. Tel: (201) 348-7000.

Focusrite ff modules

Originally designed to replace amplifier modules in Neve consoles Focusrite is now producing *ff* modules either for inclusion in an equipment rack, frame or trolley or alternatively as the basis of a high quality console. The current range includes two input signal amplifiers (*ISA 85109*, *ISA 85110*), two bus/line amplifiers (*BL 86112/T*, *BL 86112/L*) and a switching unit amplifier (*SU 86111B*). ISEP-type frames, PSUs, transformerless inputs are also available including 'packaged' quotations for sets of modules for a complete console.

Focusrite Ltd, PO Box 38, Newmarket, Suffolk CB8 7EG, UK. Tel: 0638 730696.

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.

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For more information on the MX70 or other Otari products, contact
Industrial Tape Applications, 1 Felgate Mews, Studland Street, London W6 9JT. Telephone 01-748 9009
Stirling Audio Systems Ltd., 1 Canfield Place, London NW6 3BT. Telephone: 01-625 4515

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

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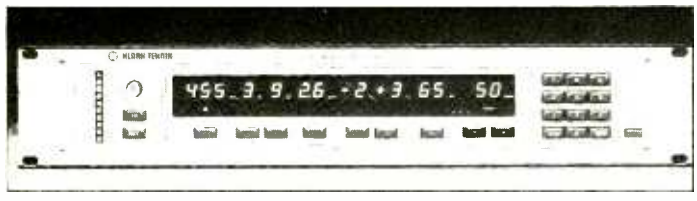
NEW PRODUCTS

NEW PRODUCTS

Equipment, modifications, options, software



In brief

Applied Research & Technology has introduced Performance MIDI for their *DR1* reverb. The program allows the *DR1* to respond to among other things, Note On, Velocity, Mod Wheel, Pitch Wheel and Aftertouch. The update also allows adjustment of any two current *DR1* values via MIDI controls...

Benchmark has released the *DA-102*, a stereo one in five out audio distribution amplifier. Maximum output is claimed to be +29.5 dBV with ±20 V power supplies (+26 dBV with ±15 V). Input impedance is 20 MΩ, output 60 Ω balanced. The *DA-102* is the third in a series of distribution amplifiers and accessory boards that form part of the *System 1000*. Benchmark Media Systems Inc, 3817 Brewerton Road, North Syracuse, NY 13212, USA. Tel: (315) 452-0400...

Safeguard has developed *HS10* a new high-speed flux-cored solder which it is claimed gives greater wetting action for a specific heat input than conventional resin-cored solders. The ultra fast spreading action is said to lessen the possibilities of dry-joints. The solder can be used with copper, brass, silver, German silver, cadmium- and silver-plated and tinned surfaces and is claimed particularly effective on nickel-plated components. A free sample is available from Safeguard Fuse Company Ltd, 63 Woodham Lane, New Haw, Weybridge, Surrey KT15 3ND, UK. Tel: 0932 45300...

Topper Cases has developed a new range of soft bags and padded carrying cases suitable for audio, video and computer products. The new *Sherbourne* range can be silk screened with company logo or trademark in any combination of colours. Topper also offer a design service. From a customer's rough sketch they can provide conceptual designs, working drawings and sample production runs. Topper Cases Ltd, St Peter's Hill, Huntingdon, Cambs PE18 7DX, UK. Tel: 0480 57251. Telex: 32389...**Klark-Teknik** has released details of the *DN716* multiple output digital delay line. The new unit is a 16 bit linear device with 50 kHz sampling. Dynamic range is said to be better than 90 dB and 1.3 s of delay is available at each output. Klark-Teknik has also announced *#2.00* software for the *DN780* digital reverb. Alive, Non Lin, Reverse and Infinite room programs have all been enhanced. The new algorithms have been used to create a full range of reverberation styles, featuring low colouration, wide stereo image and full mono capability. The new software is available free of charge to present UK users...**Philips** has launched the *PM3055* dual timebase oscilloscope. Automatic trace setting and nominal level setting is done automatically by an Autoset button and Philips has adopted high volume 'consumer' type manufacturing techniques in order to produce a cost effective mid-priced oscilloscope. The 50 MHz unit can be fitted with an optional IEEE interface for automatic full function testing. Philips Unicam Ltd, York Street, Cambridge CB1 2PX, UK. Tel: 0223 358866.

NEW PRODUCTS

NEW PRODUCTS

Equipment, modifications, options, software

Turbosound TMW floor monitor

A low profile floor monitor specifically for live sound, theatre, TV and video work, the *TMW* series is initially two complementary units—the *TMW-212* and the *TMW-215*. Both are built from Finnish Birch ply and feature kick-proof grilles and full width foam covers.

Two 12 in drive units and a 1 in compression driver loaded by a triangular resin horn are used in the *TMW-212*. The *TMW-215* uses 15 in drive units and a 2 in compression driver. According to the manufacturer's specifications power handling for the 2 × 12 version is 300 WRMS, peak SPL 127 dB. The *TMW-215* can handle 450 WRMS and provide a peak SPL of 133 dB. The 15 in version also features a switchable active/passive crossover unit.

Turbosound Sales Ltd, 202-208 New North Road, London N1 7BL, UK. Tel: 01-226 0099. Telex: 265612. USA: Turbosound Inc, 611 Broadway #841, New York, NY 10012. Tel: (212) 460-9940. Telex: 230199.

Audio Developments Port-A-Flex system

Audio Developments has announced a range of mains/battery powered units known collectively as *Port-A-Flex*. The system includes 12 separate modules which can be used individually, in cascade or in parallel. Currently four modules are available.

The *ADO66-1* is a compressor/limiter with variable Threshold, Gain, Release and Attack. The meter reads Input, Output and Gain Reduction. The power supply unit (*ADO66-2*) has sufficient power to drive several units or alternatively can be used to power four radio mic receivers plus charge Nicads in situ.

Also available is the *ADO66-3* distribution amplifier and *ADO66-4* monitor box. The former is a 1 in/4 out unit with transformer balanced input and four separately controllable transformer balanced outputs. The *ADO66-4* can be specified with either two PPM or VU meters with switchable sum and difference characteristics and calibration levels. The unit also includes a built-in line up tone and headphone output.

Due to be released at monthly intervals are a headphone splitter, double filter unit, PRO-AM interface, mic amp, double MF equaliser, RIAA equaliser, impedance matching unit and telephone adaptor. Each unit is light and compact (175×115×50 mm) and is housed in an extruded aluminium case allowing easy access for servicing.

Audio Developments Ltd, Hall Lane, Walsall Wood, Walsall, West Midlands WS9 9AU, UK. Tel: 0543 375351. USA: Audio Developments, 1640 Fifth Street, Suite 224, Santa Monica, CA 90401.

NEW PRODUCTS

NEW PRODUCTS

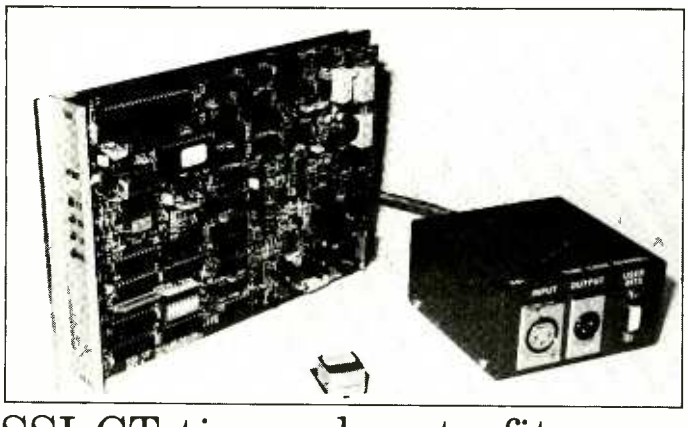
Equipment, modifications, options, software

Soundtracs MC Monitor console

Designed for all monitoring applications the Soundtracs *MC* console includes according to the manufacturer a number of unique features. Available in two frame sizes (32 or 24/10/2), features include 10 monitor outputs plus two auxiliary outputs all with full parametric EQ, variable Q and a variety of Pre/Post fade facilities.

The *MC* uses 100 mm faders on the two Aux returns and 12 65 mm faders for the main sends. Input signal presence is indicated on an adjacent LED along with individual LED meters for monitor sends, aux sends and Solo and Peak indicators on each input channel. The *MC* console is supplied with a 19 in power supply unit and PVC dust cover.

Soundout Laboratories Ltd, 91 Ewell Road, Surbiton, Surrey, KT6 6AH, UK. Tel: 01-399 3392. Telex: 8951073. USA: MCI-Intertek Inc, 745 109th Street, Arlington, TX 76011. Tel: (817) 640-6447.



SSI CT timecode retrofit

The Strategic Sound Inc timecode system is a direct plug-in package for the Ampex *ATR-102* (and *ATR-104* if used with ¼ in tape for 2-channel mastering). The SMPTE/EBU system enables timecode record, reproduce and sync facilities and includes a logic controller, a proprietary centre-track, dual gap head and timecode I/O interface.

According to SSI the centre-track head is easily mounted in the *ATR*'s existing head block—in typically less than 10 min—and can be interchanged with other *ATR-100*s without re-alignment. The electronics are located in the fourth audio card slot and the balanced *XLR* timecode input/output is positioned at the rear of the machine.

The system is user bit selectable and the main electronic board includes an external Reset button along with Timecode, Drop Frame, User Bit and Record indicators.

Funke & Associates, 908 Marilyn Drive, Campbell, CA 95008, USA. Tel: (408) 866-0648, outside CA (800) 621-0854 ext MTS.

First Order Effects programs

First Order Effects has announced its formation as an independent source of new audio effects software for the Eventide *SP2016*. Comprised of engineering staff from the original *SP2016* development team the new programs planned for release include a variety of reverbs; an LPC-based vocoder; psycho-acoustic exciter; stereo compressor/gate/expander; 'sympathetic string' resonator; dynamic envelope-controlled filter and echo programs; binaural panner (front/back/vertical) and super multiband-filtered delays.

Some of the programs are structured as 'splits' allowing the two channels of the *SP2016* to execute completely different audio effects in each channel. MIDI control of the new programs will be possible on suitably equipped *SP2016*s.

All the new programs will be on EPROMs and no other software or hardware modifications are needed. Users with specialised audio processing requirements will be able to order custom chips made to meet their specifications.

First Order Effects, 206 West 106th Street, Suite 27, New York, NY 20025, USA. Tel: (212) 864-5491.
UK: Marquee Electronics, 90 Wardour Street, London W1V 3LE. Tel: 01-439 8421.

Electrospace 'Pressor

The *'Pressor* compressor is 1U high and provides a continuously variable knee from hard through to soft and on to an extremely soft knee where the compressor becomes non linear. A large two colour LED matrix displays either audio levels or gain reduction or both simultaneously using bar graph level meters. A variable hold facility (0.1 to 10 ms, controlled from the front panel) is provided on the side chain and the whole system can be bypassed.

The unit includes variable threshold, ratio, attack, release and gain make up. A separate limit switch activates a peak reading limiter.

Other features include balanced *XLR*-type input/output, side chain monitoring and metering facilities and a VCA control voltage link switch.

Electrospace Developments Ltd, Suite 3, 39/41 Newnham Street, Ely, Cambs CB7 4PG, UK. Tel: 0353 61251/2. Export: Musimex, 46a Marlborough Road, London N22 4NN. Tel: 01-881 6060.

Strudwick VCA-1

Strudwick Research has released details of the *VCA-1* series sub group mixer that can provide up to 16 VCA sub groups, mute grouping and both fader and mute 'scene setting' facilities for any console without modification. It works by placing the *VCA-1* channel in the signal path at the insert point or taking the signal post fader and using the internal *VCA-1* stereo mixing bus.

Each channel contains a balanced input, insert point, optional balanced post-fader output, level control, pan and auto enable button. Displays indicate VCA and mute assignment and a Mute and Assign button are provided. A Mute Master button mutes all channels assigned to that specific master.

In addition to the Central Assignment module a Set/Store panel allows the status of all enabled mutes (and optionally all Master VCA levels including the grand master) to be set or stored at any time. Two banks of 1000 memories (with battery backup) are normally available and can be numerically stepped through by the Up/Down step keys providing real time scene setting.

Two frame sizes, up to a maximum of 48 channels, and various options are available. The standard *VCA-1* consists of 16 master VCA faders, a VCA grand master fader, stereo master fade, central assignment/command area plus a set of controls and displays for each audio path.

Strudwick Research Ltd, 36 Frances Street, Chesham, Bucks HP5 3EQ, UK. Tel: 0494 786384. Telex: 265871. □

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Mark Jenkins on synthesis for the studio

Akai at APRS

Akai plans to show several new synthesiser and recording products at the London APRS show. The *AX80* synth will stay in the catalogue and newly introduced are the 6-voice, splittable *AX73* which acts as a filter/chorus treatments unit for the *S612* sampler, and the *VX90* rack-mounting expander version. The *MX73* is a mother keyboard with velocity sensitivity, programmable key split, programmable wheel, bend, channel, patch, octave, volume, switch, sustain and MIDI mode functions with 100 programs, four programmable sliders and programmable switches.

The *S900* sampler is an 8-voice, 12 bit, 19 in mounting unit with built-in 3½ in disk drive. It has multitimbral capability and sampling times of 12 s (16 kHz), 24 s (8 kHz) and 48 s (4 kHz). Up to 32 multisplit samples can be accommodated simultaneously and editing features include One Shot/Looping/Alternating, ADSR/Loudness, Velocity Crossfade, Positional Crossfade, Attack Pitch Offset, LFO, Filter and Sample Merge.

Multiple outputs are standard and options include drum pad inputs, harmonic synthesiser software, 26 s looping digital recorder with punch in and overdub software, and sample waveform editing software.

New Akai MIDI effectors are the *ME25S* note separator which can turn a non-keysplit synth into a keysplit instrument using another synth or expander, and the *ME30P* 4 to 8, 8-memory MIDI patchbay.

The Akai MIDI Recorder/System Controller package consists of the *CPZ1000* recorder, *RZ1000* keyboard unit and *MZ1000* monitor. Capacity is 50,000 notes over 16 tracks, each track having up to 999 bars with one phrase to each track. Three MIDI In/Outs allow three parts to be recorded simultaneously and real time or step input is possible along with punch in/out, dump to disk, tape and SMPTE sync, external start/stop and RS232 interfacing.

MXP820 is an 8/2 MIDI programmable mixer with fully programmable levels, pans, 3-band EQ, sends, returns, auxiliary inputs and multiple effects loops. Fade times are programmable from 40 ms to 15 s and 99 memories allow a full mix to be automated from a MIDI sequencer. SMPTE is optional and up to eight *MXP820*s may be linked for 64-channel automated mixing.

MG14D is a rack-mounting 12-track recorder based on the *MG1212* design, while *ML14* is a matching autolocator with SMPTE, auto and manual memories, search, repeat, time count, four programmable punch in/outs and four playback mutes.

UK: Akai UK, 12 Silver Jubilee Way, Haslemere Heathrow Estate, The Parkway, Hounslow, Middx TW4 6NF. Tel: 01-897 6388.

USA: Akai America Ltd, PO Box 6010, 800 W Artesia Boulevard, Compton, CA 90224. Tel: (213) 537-3880.

Casio digital drum machine

Casio has introduced the *RZ-1*, a PCM digital drum machine with user sampling via a switchable mic/line input. The 12 drum sounds may be played from the programming buttons as may the four sample memories of 0.2 s each, which may be combined for two samples of 0.4 s or one sample of 0.8 s. 99 patterns can be composed in real time or step time and combined into 20 songs of up to 99 patterns. Songs may be chained together and patterns, songs and samples may all be dumped to cassette tape.

The *RZ-1* features individual instrument outputs and volume controls, stereo and headphone outputs, an LCD display for pattern numbers and other data and filter controls for the sample memories.

Assessment

Although the sampling quality is only fair, the *RZ-1*'s filters can help to reduce unwanted noise and the speed of use is an enormous advantage. Cassette dump will allow the user to build up a library of samples as well as songs, and the relative cheapness of the machine will

MUSIC PAGE

ensure excellent sales and a very high profile in studios of all standards over the coming months.
UK: Casio Electronics, Unit 6, 1000 North Circular Road, Staples Corner, London NW2 7JD. Tel: 01-450 9131.

Sequential Prophet expansion

SCI has announced the *Prophet 2002* rack-mounting sampling module and a memory expansion for the *2002* and *Prophet 2000* sampling keyboard. The expansion, model *877/878*, increases memory capacity from 256k to 512k and sampling time from 16 to 32 s maximum. The *877* kit is for early *Prophet 2000*s without a double-sided disk drive, while the *878* expansion is for later *Prophet 2000*s and for all *Prophet 2002*s.

With the expansion in place it's now possible for each half of the *Prophet*'s memory to hold a 6 s sample with 20 kHz bandwidth. The user may reverse, mix or truncate samples with the help of automated loop point finding, add new amplifier and filter envelopes, create 16-way multisplit samples, layer sounds, create complex arpeggios, transpose and crossfade sounds. The *Prophet 2000* keyboard is velocity sensitive and both models respond to velocity and aftertouch from external sources.
Sequential Inc, 3051 North 1st Street, San Jose, CA 95134, USA. Tel: (408) 946-5240.
UK: Sequential UK, 11 Forth Wynd, Links View Estate, Port Seton, East Lothian, Scotland. Tel: 0875 813815.
Europe: Sequential Europe, Nijveerheidsweg 11c, 3641 Rp Mijdrecht, Netherlands. Tel: 02979 6211.

MIDI software

● **C-Lab:** *SuperTrack* from C-Lab is a 16-channel real and step time polyphonic MIDI composer running on the Commodore *64* micro with a MIDI interface from C-Lab, Steinberg, Yamaha, Jellinghaus, Passport or almost any other manufacturer.

Almost all functions are on one screen and each recording channel has on/off, MIDI channel, velocity level, transpose value, quantise value and independent loop length functions. Tempo can be altered as patterns play and synchronisation can be from internal or external clock, tape, MIDI, or SMPTE via a Roland *SBX-80*.

Tracks from up to 63 patterns may be overdubbed (with punch in/out), transposed, muted, merged, independently delayed, and edited down to the individual MIDI event (including note, patch, control and velocity data) on an Edit listing display. 255 patterns may be chained into a Song with different transpositions, drum machine synchronisation status and track mute status on each recurrence of a pattern.

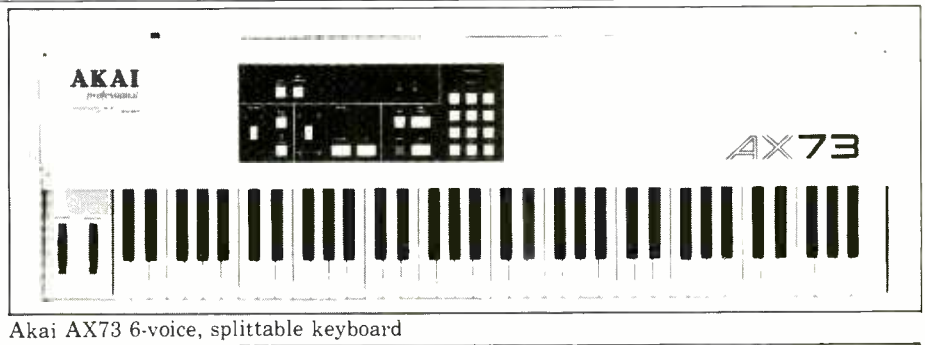
Eight song positions may be entered into an autolocator memory and total song capacity is 8,500 notes.
UK: Sound Technology, 6 Letchworth Business Centre, Avenue One, Letchworth, Herts SG6 2HR. Tel: 0462 675675.

● **Roland MPS:** Roland's *Music Processing System (MPS)* for the IBM *PC* or compatibles such as the Qubie micro offers eight tracks of polyphonic recording on all MIDI channels. Requirements are one 256k *PC*, a Roland *MPU-401* interface, Roland MIF/IPC card and *MPS* software, one or two disk drives, monitor and dot-matrix printer if print outs are desired.

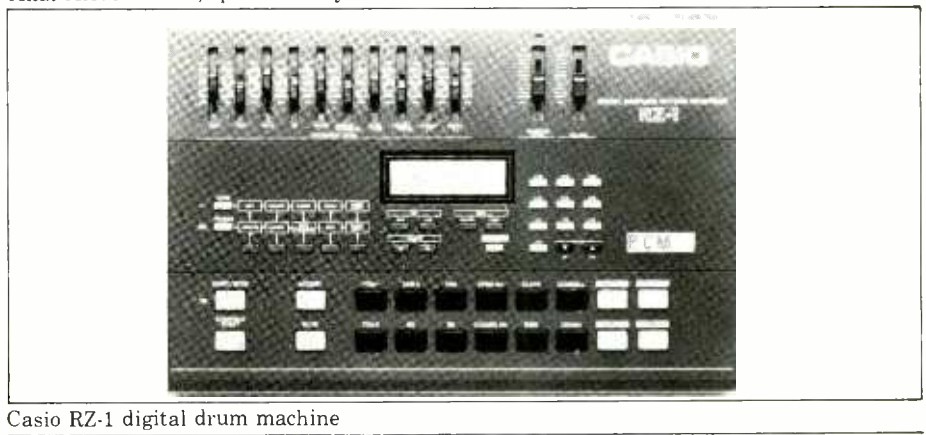
Pieces over 100,000 notes/32,000 bars in length (depending on total memory) are recorded and chained in Song mode, edited in Score mode and transferred to paper in Print mode. 80 bars at a time are displayed graphically and phrases may be stored and recalled, transposed, auto-corrected, merged and edited using a full music score.

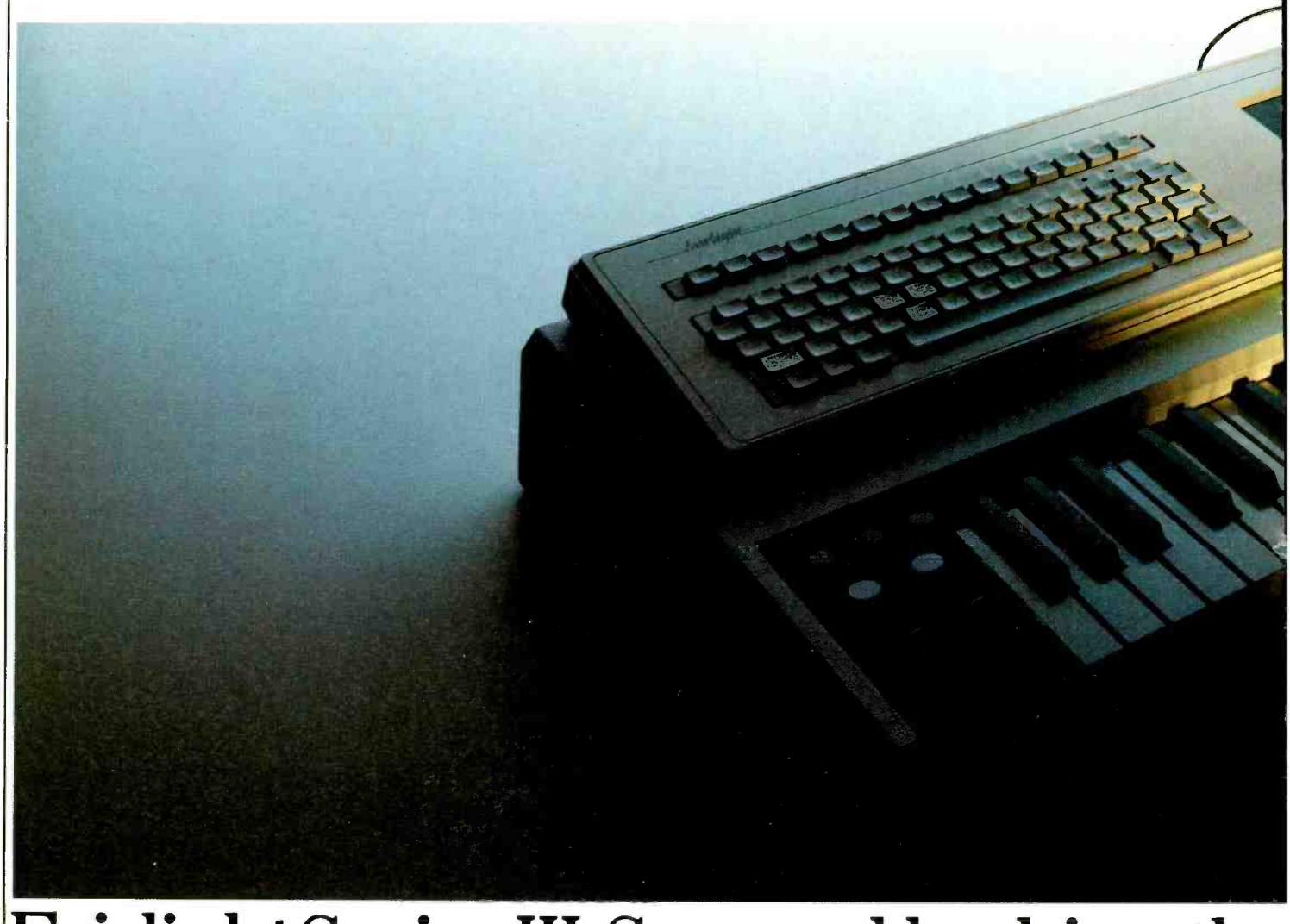
Punch In/Out, SMPTE synchronisation via a Roland *SBX-80* or similar unit and complex editing and preparation of two-part scores are possible. Maximum print out is up to four staves six bars long per sheet.

Roland has also launched *SJE*, an editing/library software package for the *Super Jupiter* synthesiser module which can reside in the *PC* simultaneously with *MPS* using the *DesqView* package from Quarterdeck.
UK: Roland/MusiCalc, 17-19 Alma Road, Wandsworth, London SW18. Tel: 01-870 9912.
USA: Roland Corp, 7200 Downsview Crescent, Los Angeles, CA 90040. Tel: (213) 685-5141.□



Akai AX73 6-voice, splittable keyboard


Casio RZ-1 digital drum machine



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EXHIBITION PREVIEW

APRS PREVIEW

This year's exhibition will be held from June 25th to 27th inclusive at a new venue: Olympia 2, Kensington, London. We have compiled a preview based on information which was available to us at the time of going to press

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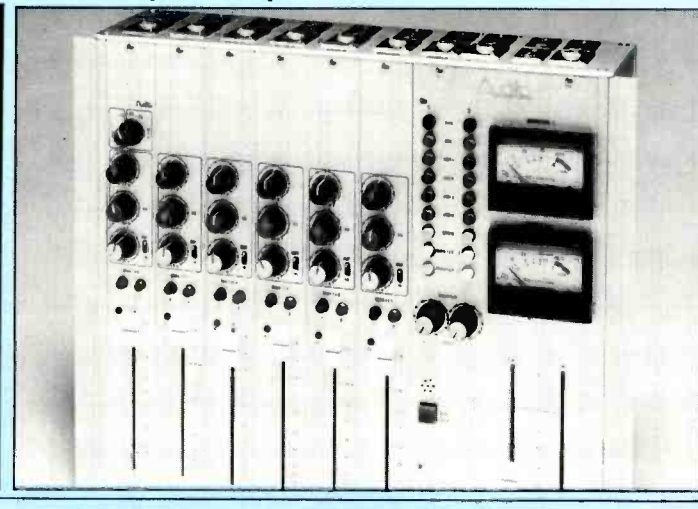
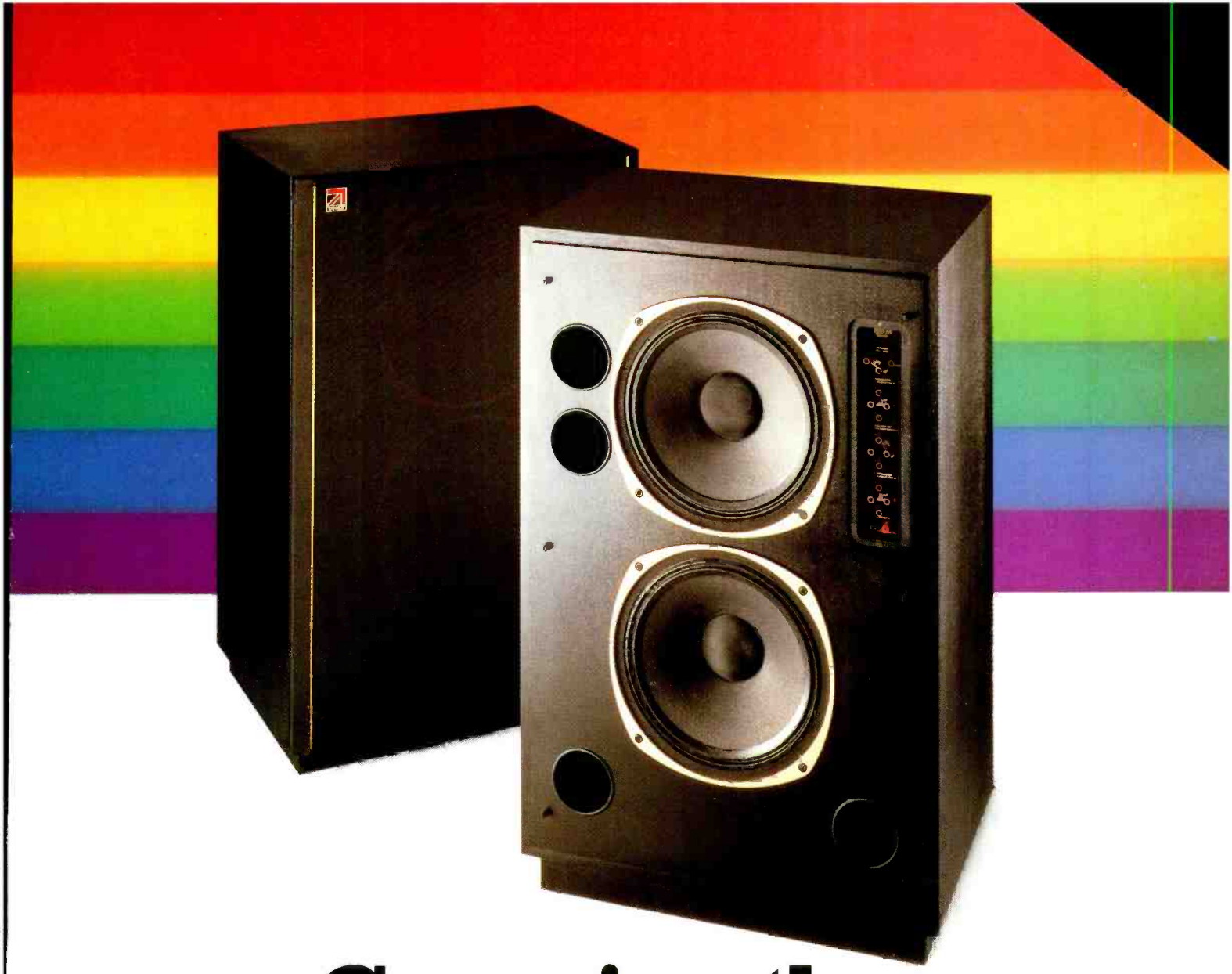
● **Aces**: The following new products: *SML1202* 2-track ½ in mastering machine; *CP512* 12/2 and *CP308* 8/2 mixers both with spring reverb and built in patchbay; recently updated amplifiers with new protection circuits and full DC protection circuit. Their range of multitrack recorders, mixing consoles, power amplifiers and processors will also be shown. ● **Agfa-Gevaert**: Full range of professional magnetic products including studio master tape, magnetic film, audio and video duplication tape and accessories. ● **Akai**: A number of new products will be introduced. *MPX820* programmable 8-channel mixer with MIDI compatibility and SMPTE options; *S900* 8-voice MIDI multiple point sampler; *MG14D* rack-mountable 14-track recorder with dbx and *ML14* autolocator; and the *GX912* 19 in rack-mountable 3-head master mixdown cassette deck with new double tuning bias system, and Dolby *B* and *C*. ● **AKG Acoustics**: Focusing on the company's broadcast and studio microphones, preamps and capsules, AKG will feature an extended range of capsules for the *C460EB* which now includes the *ULS* ultra linear, *CK1X*, *CK2X*, *CK3X* and the new *CK8X* (condenser capsule) remote units. Shown at last year's APRS in prototype form, the *TDU8000* time delay processor featuring one or two inputs and from two to eight outputs will be demonstrated along with AKG studio headphones. Debuting is the *D112* microphone which joins the *D12* and has been designed with the problems of bass miking, high sound level and physical abuse inflicted in studio and stage use in mind. It features presence lift at 4 kHz, making bass instruments clearly distinguishable within a mix. ● **Alice (Stancoil Ltd)**: Series *3000* modular mixer for community, hospital and broadcasting applications where budget is restricted will be shown alongside the *2000* series for local radio and the *828*, plus examples of custom built broadcast equipment. ● **Allen and Heath Brenell/MBI**: AHB will be giving the first UK showing of their *Keymix* range of expandable rack-mounting mixers, options including programmable auxiliary bus routing, programmable routing and MIDI controls. *System 8* also has new models—16/8/16 and 24/8/16, both with 16-track metering. Additions to the *CMC* range are 24/16/2 with 16-track monitoring and 32/16/2 with 24-track monitoring featuring extensive foldback and talkback facilities, eight routable sub-groups and microprocessor controlled programming of output routing and input muting. Shown for the first time, a programming option allows memory expansion, event sequencing and MIDI control of the new *CMC*s. MBI will introduce a new version of the modular series *24A* mixer, *24P*, offering grouped outputs and expanded facilities on the input and monitoring modules making it applicable to production work in addition to on-air. As well as equipment packages suitable for community radio studios MBI series *12* and MBI/AHB *SR12P* mixers will also be shown. Details will be available of MBI Broadcast Systems' radio station design and installation services. ● **Amek**: Models from the wide range of consoles. Featured will be the first UK showing of the *APC1000* Assignable Production Console. Within the stand there will be a booth area enabling a full demonstration of console facilities including the GML moving fader system. Also on display will be the *Angela* and *M2500* recording consoles, *BCII* series of broadcast/post production consoles and the *RM01* modular sound processing rack. ● **Ampex**: Full range of Ampex mastering tapes, cassettes, video cassettes and test tapes for audio and video applications including the new Ampex *467* digital audio cassette. ● **AMS**: *DMX15.80S* with new dual channel sampling and reverse loop will be featured alongside the *Audiofile* with first time showing of *Audiofile* control surface and operating software enabling up to eight audio tracks to be played simultaneously from the system, variable cross fading at edit points, waveform envelope display and control of external audio and video tape transports. The incorporation of a SMPTE synchroniser allows *Audiofile* to lock to audio and video tape recorders. *RMX 16* digital reverb and *Timeflex* stereo time compressor/expander will also be shown. ● **Anders Electronics**: Together with their associated company Componex a very wide range of VU meters will be exhibited. Also on display will be drive cards and a range of solid state displays including newly available alphanumeric modules, counters and the sub-miniature *DCM5* clock module. ● **Applied Microsystems**: Introducing the *CM252* chase synchroniser—a 1 U rack unit with 8-digit LED display and four controls for offset and lock. It may be used separately or as part of the *CM250* synchroniser system. In addition to the established *CM50* autolocator there will ▷

Audio Kinetics Pacer

Audio Developments 6-input Edit mixer





Covering the Monitoring Spectrum.

The Tannoy FSM studio monitor loudspeaker and the DTM-8 reference monitors cover the complete professional spectrum.

The new FSM inherits all the traditions of the widely-acclaimed SRM series. However, the crossover network is all 'hard-wired' and the frequency response adjustment in the crossover employs gold plated links between robust terminals. The result is increased reliability and superior aural properties when compared to wafer switches.

The unique 'LF Window' enables the high pass filter feeding the dual concentric unit to be bypassed. Both units then operate in parallel, with a 3dB subsequent increase in low frequency energy. This facility is of particular value in matching the FSM to different room acoustics with difficult bass characteristics.

Compact desktop units

The new compact DTM-8 meets the need for phase-coherent point source desktop monitoring. It uses a state-of-the-art 8" dual concentric drive unit, which offers all the features of stable stereo images, axially aligned acoustic source, phase coherence, smooth frequency characteristics and low colouration.

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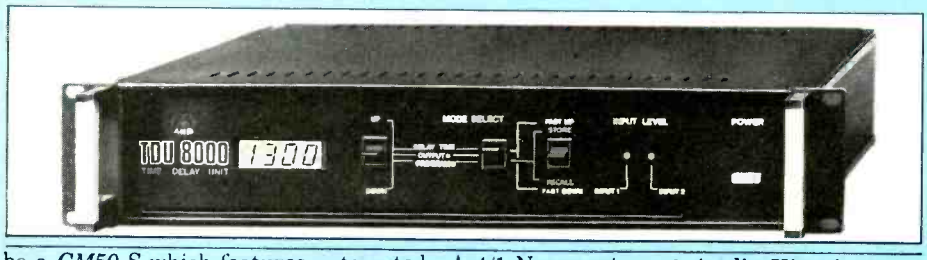
EXHIBITION PREVIEW

Above: Brooke Siren Systems FDS360. Below: AKG TDU8000



be a *CM50-S* which features automated drop-in/drop-out and reading SMPTE in play with battery backed memory. ● **ANT Nachrichtentechnik**: The full range of *telcom c4* companders for noise reduction applications in satellite, cable, microwave and line transmissions, audio and video tape recorders including the first UK showing of new compander card *telcom c4e*. ● **Armon**: As UK agent for ALPS and other electronic manufacturers, Armon will show a selection of switches, faders and rotary pots including ALPS 100 mm and a range of new low cost faders, 9 mm, 12 mm and 16 mm rotary pots, slide pots incorporating LEDs in the shaft, new multi-bank slide pots in module form suitable for graphic equalisers, etc, as well as tactile switches with/without LED, VU meters and digital multimeters. ● **Audio Design Calrec**: Demonstration of a professional 4-channel PCM recording system based on the use of two Audio+Design *PCM701ES* processors. Combining the two digital bit streams from the PCM units, the system encodes them into a single video signal which can be recorded on to most standard low band video recorders including Betamax. On replay all channels are phase coherent and therefore the system is suitable for Ambisonic surround sound and periphonic B-format standards. It also enables recording of SMPTE as part of the composite digital signal without loss of an audio channel. Other products being shown are the full range of Calrec *Minimixers* and condenser microphones, Audio+Design *Filmex* noise reduction processor, special *Scamp* post production package, *Compex 2* and the range of *Little Boxes* including *Propak, Ampak* and a portable timecode reader. Products marketed by Audio Design Calrec will also be shown: *telcom c4e* noise reduction, RTW PPMs and the Eela range. Ambisonics will include Calrec *Soundfield* microphone and the Audio+Design *Ambisonic Mastering Package*. The company hopes to arrange Ambisonics demonstrations—details available on the stand. ● **Audio Developments**: Their established range of mixers including the *AD062 Multimixer*, *AD145* 4-, 6- and 8-input *Pico* mixers, the *AD160* and *AD260* ENG mixers and their range of *A* boxes. Featured new items will be the *AD068* 4- and 6-input *Edit* mixers and the *AD067* 4/1 Nagra mixer. ● **Audio Kinetics**: First APRS showing of *Pacer* 2-machine synchroniser with timecode generator, twin high speed timecode readers, serial interface, full slave interface and resolver facility. Other products being shown are *Eclipse* audio editor, *Q.Lock 4.10, MasterMix* computer assisted mixing and *Timelink* electronic gearbox. ● **Audio Music Marketing**: Introducing Dynamix series *4000* professional multitrack range of mixers with expandable inputs and group outputs up to 32/16/2, 3-band EQ and LED bargraph metering. Other new Dynamix mixers will be production version of *D2000* A/V post production/theatre desk with two stereo RIAA inputs to accept record decks; a 12-input powered mixer has power output of 100 W/channel and on-board graphic EQ. RAM mixers will be shown in new formats: *Pico* range provides 12/2 and 16/2 with similar features to *Micro* multitrack desks: 3-band EQ with swept mid-range, pre/post-fade mixes and insert points, PFL, VU metering. *Mega* modular consoles are now available with 18 or 24 inputs. ● **Audio Services**: Presenting a variety of multitrack machines synchronised for multiple and operation. Featured will be equipment by Synchronous Technologies whose *SMPL* system Audio Services distribute in the UK. This system also allows MIDI information to be synchronised enabling sequencers to autolocate with tape transports. ● **Audio Systems Components**: Range of products including Sony *PCM701ES* together with most formats of VCR/VTR. Other products on show will be SMPTE centre-track timecode retrofit for Revox *PR99* MkII and Otari *MX5050* ¼ in 2-track recorders, ASC *SP10* gram, ASC 7 s stereo digital profanity delay, ASC meters and the *Minx*. ● **Audio Video Marketing** (AVM-Ferrograph): AVM hope to introduce the *CSX* digital audio floppy disk recorder. The range of Ferrograph audio test equipment will be shown alongside AVM-Ferrograph series *77* reel-to-reel recorders, Milab studio microphones and Otari tape recorders. ● **Audix**: Launch of the Audix assignable mixing system with a range of 24 to 72 input channels with four or eight stereo or mono groups. Features include digital remote control and analogue audio processing with modules housed remotely in racks and linked to control console by co-axial cable. There is a single central control panel which may be assigned to act on any channel, group or output. All desk functions including input switching, sensitivity, EQ, main routing, auxiliary routing and panning are under memory control and totally automated. The console will go into production in the summer. ● **Autograph Sales**: As exclusive European dealer for Meyer Sound Labs and UK distributor for Klark-Teknik, Autograph will be showing products from both companies together with equipment from Brooke Siren Systems, Micron and Crest Audio. On show for the first time will be the Meyer series *500* loudspeaker system which includes two *500* full frequency loudspeakers and the *500* power module. There is an optional *501* subwoofer system. Representatives from Meyer will be present and will give information on *SIM* (Source Independent Measurement) including the first European installation. Also on show will be the BSS *DPR402*, the Klark-Teknik *DN780* with latest software releases and the Micron *CNS* radio mic system. ● **Avcom**: Exhibiting the new Telex *CD* range of in-cassette duplicators designed for low volume requirements and based upon the successful 'copier' series. Features include machined and hardened tape guides, AC synchronous motors, individual track LED audio level controls. The system is also easy to expand. Also on show will be the Telex *6120* in-cassette duplication system.

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● **BASF**: Launching the *Studio Master 911* analogue studio mastering tape which they feel offers superior performance to *Studio Master 910* in the following respects: higher dynamic range at all frequencies, reduced modulation noise, excellent winding characteristics, very low print through and superb mechanical properties giving improved cycling. They will also show *920* loop bin mastering tape and LHD and chrome pancakes for pre-recorded cassette production, and *930* digital mastering tape for DASH format machines, calibration tapes and cassettes, and the full range of audio and video cassettes and floppy disks. ● **BBC Transcription**: No information available. ● **FWO Bauch**: Product ranges from Studer, Revox, Neumann, Tannoy and EMT. Featured new products will include the Harrison series *10* fully automated mixing console; the Studer *A807* new low cost family of ¼ in tape machines, Studer *A812* range of tape machines intended as *A80* replacements; Studer *SC4016* synchroniser system controller; Studer *963* mixing console; and the EMT *246* remotable digital reverb unit. ● **Bell+Howell**: Introducing the JVC digital audio mastering system comprising *VP-900* 2-channel PCM processor with 16 bit quantisation, and the *AE-900V* digital audio editor (main unit and control unit) which enables required portions of tape to be dubbed digitally to create digital master tapes with continuous programs and edit

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points can be determined by recalling signals from memory as well as by manual cueing; edit points may also be specified by address. ● **Beyer Dynamic**: The *MPC40* boundary microphone—a smaller, less expensive version of the *MPC50*, a pocket transmitter and a new range of microphone stands will be introduced. The *M380* 'blast resistant' microphone for instruments producing high SPL, the *MC740* studio capacitor microphone switch selectable between omnidirectional, wide cardioid, hypercardioid and figure-of-eight, and the *MCE6 Elektret* capacitor microphone for high SPL have all been shown over the last year in prototype form and will now appear as working models. ● **Branch & Appleby**: In addition to usual product line of magnetic recording and reproducing heads for multitrack tape, film and video audio, they will be showing several new products including the B & A automated dialogue replacement system with large loop memory and touch sensitive display screen; the gtc multi-slave synchroniser; the new B&A replay and sync electronics tray for updating older tape machines; the gtc telephone effects filter for post production effects; a new range of long life magnetic heads for high speed, in-cassette duplication; and long-life *Sendust* heads for film sound. ● **Britannia Row**: Two new product ranges—BGW power amplifiers and the Swiss Sonosax portable ENG mixing consoles: *SX-S* and *SX-T*. They will also show the full range of Westlake monitors and FM Acoustics amplifiers. ● **Brooke Siren Systems**: Introducing the *FDS360* 4-/3-/2-way stereo frequency dividing system incorporating mid band limiters, band edge phase adjustment and separate band insertion points. BSS will demonstrate the *DPR402* signal processor and will show the MCS modular crossover system and the full range of ancillary equipment including *AR116* active DI, *AR125* lead and fuse tester and *AR130* phase check system. ● **Bruel & Kjaer**: In addition to the established studio omnidirectional microphones B&K will introduce specially matched stereo sets types *3529* and *3530*. The former has an A/B stereo microphone set which includes two phase/sensitivity/frequency matched low noise microphones in carrying case including stereo boom for ease of mounting and spatial location; the latter, though similar, includes matched high intensity microphones.

C

● **Cable Technology**: Klotz multicore, microphone, patch and instrument cables, Cable Technology multicore systems, cable drums, pre-made microphone, guitar and MIDI cables and full range of multitrack/mixer looms. In addition there will be CT cable tester. ● **Cadac**: Details of the company's custom sound mixing console building services will be available together with examples of channel designs. ● **Canford Audio**: Additions to the Canford range of cables: *HPS* loudspeaker cable, a twin video/mains cable for monitor feeds and 10 colours of FST installation cables. Other new products will be range of Neutrik Neutricon 8-way connectors, various flightcases, 19 in racks, K+M equipment and microphone stands and the Lynden Micros *Diginouncer*. ● **Cetec International**: Displaying the Cetec Gauss series *2400* high speed duplicating system which may be custom configured to suit customer requirements. ● **Clyde Electronics**: No information available. ● **Connectronics**: Range of *Musiflex, Rockflex, Studiflex* and *Speakerflex* cables will be extended with new *Star Quad* format cable with a Reusen shield and *Sound Wires* range of pre-cut audio cables featuring high grade connectors and choice of colours and connectors. Other new products include a range of heavy duty cable drums constructed of heavy gauge enamelled steel suitable for pro-audio and broadcast applications and will accommodate anything from small microphone cable to the largest multicore and has a detachable reel. ● **Court Acoustics**: A range of studio monitors from RCF for the first time in the UK. These are *6000, 6020* and *6010* nearfield monitors which include features such as specially designed MF and HF units having acoustic centres 2½ in apart and operating in ferro-magnetic fluid. ● **Crow Broadcast Systems**: No information available. ● **Cunnings Recording Associates**: *Studio 8* professional reel-to-reel tape recorders for broadcast and studio application. Ancillary items will include Pilot Tone Synchroniser allowing the synchronisation of *Studio 8* to previously recorded pulse track, controlling the tape recorder and allowing for a tight or soft lock; Timecode Record/Replay Unit provides electronics for recording of centre track timecode in phase with audio channels. Other products shown will include Marantz professional portable cassette recorders with demonstrations of *CP230* 2-head and *CP430* 3-head recorders. Details of the company's other services will be available.

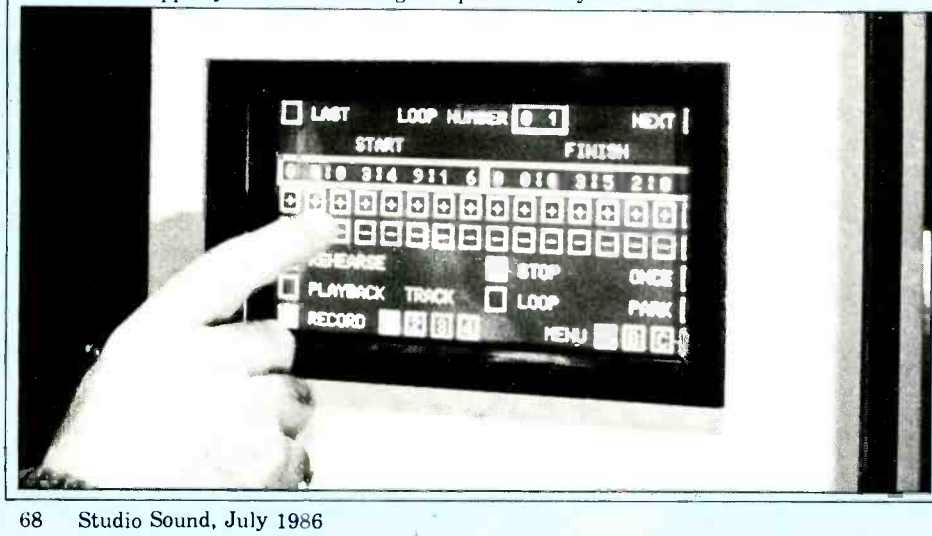
D

● **DDA**: Examples from a wide range of products including the *AMR24* recording console capable of 48-track operation and automation ready, the established smaller ranges of consoles and the *DD500* and *DD1000* electronic crossovers. New products will include a new version of the *S* series PA designed for live work and includes a 4×4 output matrix, eight equalised sends and four equalised aux/foldback returns. Also new theatre input module for the *D* series which has not been shown in the UK before. ● **Dolby**: First UK public demonstrations of Dolby *Spectral Recording (SR)* professional master recording process. Dr Ray Dolby and other staff will be on hand to explain the system. Additional new products will include the model *380i A*-type noise reduction module for the Ampex *VPR-3, VPR-6* and *VPR-80* VTRs which has Noise Reduction Identification system that allows the NR to be switched in/out depending on the coding of the signal. Also on display will be the new Model *390* dedicated *C*-type noise reduction system together with a selection of items from the existing range. ● **Philip Drake Electronics**: Range of studio talkback and audio distribution products for broadcast, theatre and A/V including linked A/V systems using video distribution amplifiers from Avitel, and series *600* and *6000* series talkback/studio intercom systems for communication on either individual/group or global basis. ● **Drawmer**: Will show the complete range of signal processors with headphone demonstrations of the new Midman MIDI management system and possibly other new signal processing products. ● **DW Labs**: Perreaux range of power amplifiers and monitor speakers from Gale.

E

● **Eardley Electronics**: Debut of Neutrik *Audiograph* modules and the Neutrik *Audiograph 3337* analyser which offers many test functions and delivers hard copies of all important audio and acoustical parameters. In addition there will be the *Audiograph* itself and a selection of Neutrik connectors on display. ● **Electromusic**: ▷

Branch and Appleby automated dialogue replacement system



By-pass Spaghetti Junction

The **MG1212 Recorder/Mixer** – the complete recording system from Akai – offers unparalleled flexibility for all your recording needs. So compact, it's as much at home in your front room, when you're putting songs together or trying out an arrangement, as it in the studio, when you're working on masters.

Whatever your application, the Akai MG1212 Recorder/Mixer's got the edge over the competition. If you were limited by 8-track before, now look at this: the MG1212 has 12 audio tracks plus a special sync track – ideal for synchronising your MIDI sequencer to tape for overdubs with a small instrument set-up. If you hated the hassle of wiring between machine and mixer – finding enough leads that worked every time you wanted to put down an idea – the MG1212 has the answer to that too: it's a combined mixer and recorder, and both sections of the MG1212 have the flexibility, versatility and professional quality you expect from a company like Akai. At a price you can afford.

The mixer section features XLR inputs, insert points, LED bargraph metering, and a full 3-band sweep EQ. A centralised routing matrix deals simply and quickly with the task of getting the right sounds to the right tracks.

Akai's unique 1/2" cassette system is at the heart of a recorder section that's crammed with the features you need: an autolocator with pinpoint accuracy; dbx noise reduction; and much more. It's as simple to use as a home video recorder.

And talking of video, the MG1212 has all the facilities you need for synchronising a video recorder with SMPTE time code.

What you won't find is a load of gimmicks that slow you down. The Akai MG1212 is designed to get top-quality results. Quickly. Easily. The way you want.

AKAI *professional*

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London Turnkey Tel: 01-202 4366 **Surrey** Juice Music Tel: 97-48454

EXHIBITION PREVIEW

Range of RCF loudspeakers from Court Acoustics

Full range of TOA professional products including reference monitors, PA equipment, power amplifiers, radio microphones, audio processing equipment and mixing consoles. ● **Electrospace**: The *'Pressor* will make its first appearance. Preliminary details include compressor knee variable from hard to soft and extremely soft knee where the compressor becomes non-linear; hold facility on side chain variable from 1 to 10 ms; variable threshold, ratio attack, release and gain. They will also show the *Strate Gate*, the *Gate* and the *Spanner*. ● **Elliott Brothers**: Loudspeaker products including Rogers and Tannoy ranges, Elliott Brothers custom stands and broadcast mixer, plus details of systems and installation services. ● **EMO Systems**: Full range of stage and studio ancillary equipment including DI boxes, microphone splitters, power distribution systems and disc amplifiers available standard or customised.

F

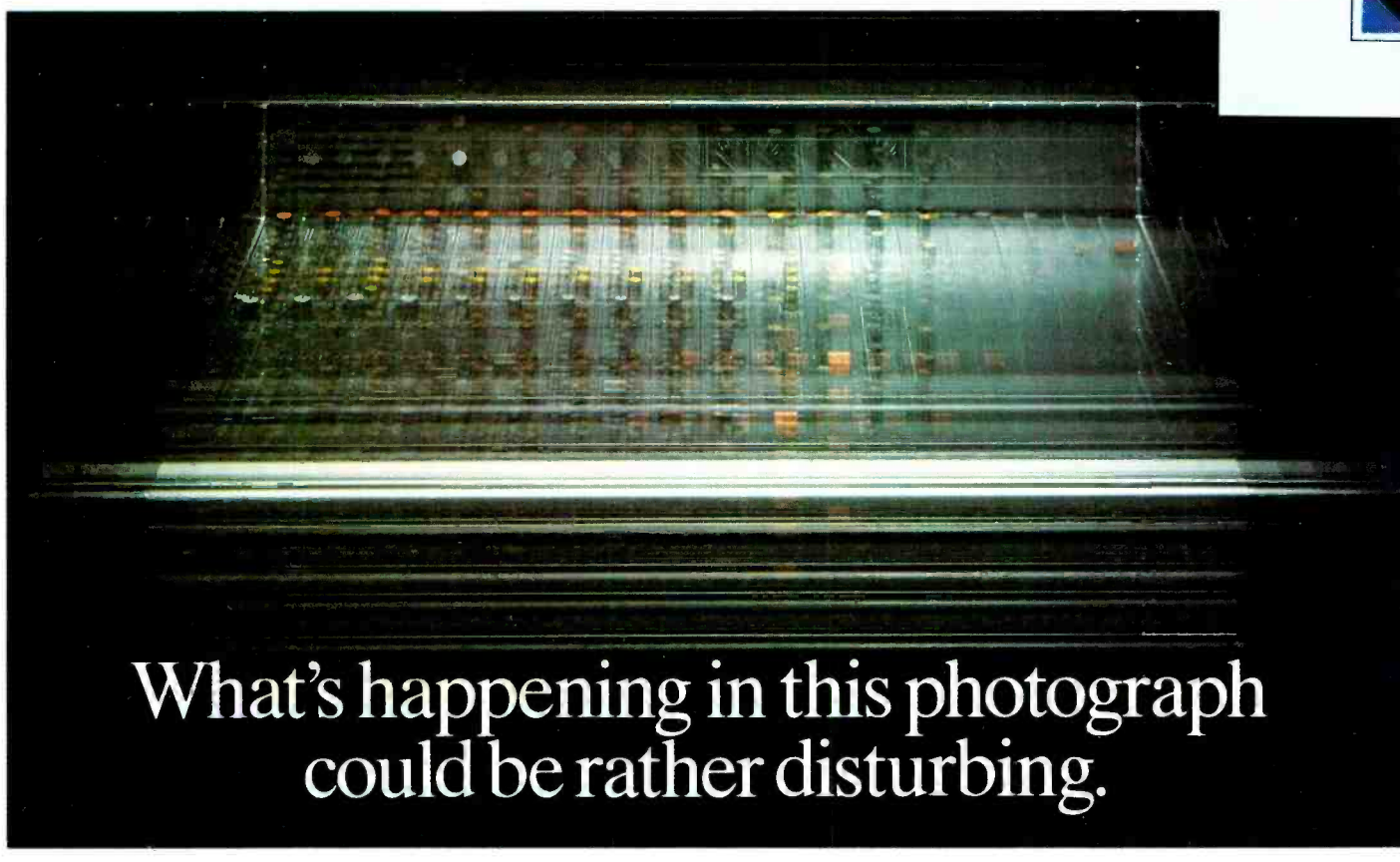
● **Fetiver**: No information available. ● **Film-Tech**: The established *Compact* 3- and 4-channel portable mixers for use in film and video production. On show for the first time is the *VTM 12-3* mixer originally designed for use in BBC VTR areas, it is now available in various sizes and configurations to meet audio mixing requirements in video editing and transfer suites. Another new 'product' is the 50 Hz pulse modification to the Sony professional *Walkman* recorder allowing the machine to be used to record film sync sound. They will also be showing equipment from Yamaha, Bel, Sony and Tannoy. ● **Formula Sound**: Demonstrations of *QUE-4* and *QUE-8* studio foldback systems along with *PM-80* modular production mixer and latest addition to the range of modules. Formula Sound hopes to introduce a new 10-band system equaliser with the established 19-band *SE1* equaliser. ● **Future Film Developments**: Introducing a number of new products including Tannoy monitors, Philip Drake distribution amplifiers, Neumann microphones, Stellavox *TD-9P* 35 mm transfer machine and RTS *848* Matrix Intercom System. Also showing will be Canare cables and winders, Stellavox portable tape machines and mixers, audio cables, connectors and patching systems, video cables, connectors and patching systems, Soundex PPM drive cards and a complete range of audio and video accessories.

G

● **Graff Electronic Machines**: Following on from GEM *Diamond* expandable stereo cassette duplicator, the new *Sapphire* one to one stereo copier debuts at APRS. Operating at 8× normal speed, it will duplicate either both or single sides of a cassette, and features automatic gain controls and rewind. ● **gtc**: Range of synchronising products for A/A and A/V applications including *Editon* single/dual/multi-slave synchroniser, a portable timecode reader, and a footage counter.

H

● **Harman Audio**: New Tascam *ATR60* analogue series with *ATR60-2T* stereo with in-line timecode track ½ in machine for stereo high speed, 4- and 8-track formats and a stereo mastering system. The omega transport used on these machines is controlled by Teac microprocessors and have been designed for SMPTE controlled operation. Tascam *M520* console and *112* and *112R* (auto reverse) studio cassette decks are also new. UREI products being introduced include *813C* monitor with new complement of drivers giving high power capability and low distortion. The *Vidikron* projector for large scale TV projection will be shown with, new to Harman, Rauch precision amplifiers for monitor and PA applications ranging from 250 to 1000 W/channel. ● **Harrison Information Technology**: New *DSA* series digital amplifier range using ultra linear pulse width modulation technology are smaller and lighter than existing amps. New *GP* series graphic equalisers and *AC400* active crossover featuring built-in limiters and adjustable filter cards, and the *SP7* stereo mixer incorporating logic based monitor system will also be shown. ● **Hayden Laboratories**: Showing products from Nagra-Kudelski, Sennheiser, AEG and Dynacord. In addition to established Sennheiser ranges there will be the new *M8* portable mixer, *MKH40 P48* cardioid studio microphone, *MKH20* omni and *EK 2012-90* miniature radio microphone receiver. The Kudelski range will include a new range of accessories for the Nagra *T-Audio* timecode tape recorder. ● **HHB Hire & Sales**: Showing the complete Sony range of low cost digital audio processors: *PCMF1*, *PCM701ES*, the new *SLHF950* Super-Beta VCR and various Video 8 products. The full Sony CD mastering and editing system will be demonstrated throughout the show as will *CLUE* system along with the new Electric Valve Communications *Editing Co-processor* and Audio+Design *Admix*. Amcron power amplifiers will include new Micro-Tech *1200, 1200LX, 600* and *600LX*. Other new Amcron products will be the Techron *TEF12* spectrum analyser/computer which will be on demonstration and brand new *GLM* microphones. Also on show will be Yamaha *REV 7*, and *SPX90*, AMS *DMX15.80S* and *RMX16*, Drawmer noise gates and compressor/limiters, Amcron *PZM* microphones and *PCC160* phase coherent cardioid mics, TAC *Matchless* console and Sony/MCI *JH2424* 24-track analogue recorder, Fostex *B16* and Allen & Heath *CMC2416* and Gauss loudspeakers. ● **HH Electronics**: The new *VX* range of MOSFET power amplifiers which range from *VX150* 1 U rack-mounting amplifiers offering 75 W RMS/channel (4 Ω) through *VX200, VX300, VX450, VX600, VX900* to *VX1200* offering 600 W RMS/channel 2-speed fan cooled 3 U power amplifier. All units feature peak, trip and mono/bridged LEDs. ● **Tom Hidley**: Details of studio design services including projects recently completed and under construction and the new monitoring systems. Tom Hidley will also be present. ● **Hill Audio:** Two new mixing consoles will be introduced: *Soundmix* (24/4/2 and 16/4/2) and *Rakmix* (8/4/2 rack-mounting) feature four auxiliary sends with four returns, 12-way LED and VU metering, ALPS faders, 48 V phantom powering, 4-band EQ and balanced and unbalanced outputs and inputs. The range of power amps will also be shown from *DX500* (280 W 8 Ω/channel) to *DX3000* (3000 W 4 Ω bridged mono), along with *J* series *3S* modular mixing consoles, sound reinforcement speaker cabinets, crossover and ancillary equipment. ● **HW International**: Will show the full range of Shure microphone and electronic products including new professional condenser microphones: *SM94* for musical instrument use, *SM96* for vocals and *SM98* with very flat frequency response and high SPL, a new *FP32* ENG stereo mixer, *SM1* (single earpiece) ▷



What's happening in this photograph could be rather disturbing.

Last Autumn we subjected the MXT1200 audio mixing desk to a severe vibration test.

A test, in fact, to DEF Standard 07-55.

Which meant that for over two and a half hours the desk was rattled and rolled to the equivalent of 'being driven over rough terrain for 8000 miles in a wheeled military vehicle'.*

As you can see in our photograph the MXT1200 was clearly shaken.

But hardly disturbed.

While lesser desks would have cracked under the strain, ours performed to its original high specification.

Of course, a test like this clearly shows why the MXT1200 is a firm favourite for outside broadcast use in places like the Mexican desert and African bush.

But its reliability is equally important in a broadcast studio.

After all, studio moves, rebuilds and modifications can each take their toll.

An MXT1200, however, just goes on performing.

Not that reliability is the only thing in its favour.

The modular construction and extensive range of options gives maximum flexibility, thus dispensing with custom engineering and costly modifications.

Technical performance, too, exceeds the most stringent applications because our engineers utilize the latest circuit technology throughout.

The benefits of this include an extra 6dB of headroom above most other similar desks. Signal to noise ratio is also impressive.

If you clip the coupon we'll send you a brochure containing further evidence that the MXT1200 is the best all-round mixing desk in its class.

With a performance other desk manufacturers undoubtedly find rather disturbing.

A performance we believe you'll find rather interesting.

audix

Sound technology in any language.

To: Alan Bond, Sales Manager, Audix Ltd., Station Road, Wenden, Saffron Walden, Essex CB11 4LG, England. Telephone Saffron Walden (0799) 40888.
Please send me further details on the MXT1200 Audio Mixing Desk.

Name _____

Position/Department _____

Organisation _____

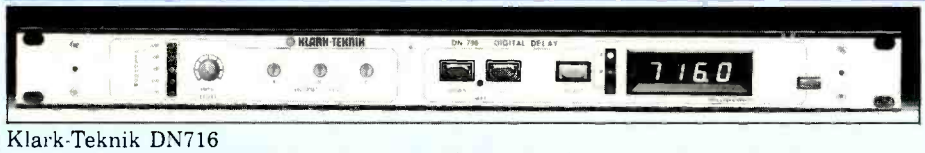
Address _____ Post Code _____

Telephone Number _____

SS/7/86

* NATLAS DEF STANDARD 07-55 (PART 2) SECTION 1/1, TEST A2 SEVERITY 4 (ii).

EXHIBITION PREVIEW



Klark-Teknik DN716


Neve V-series

and *SM2* (double earpiece) microphone/headsets. From the Hafler range of products HW will be featuring the *P500* and new *P225* power amplifiers.

I

● **Industrial Acoustics Company**: Examples of studio projects undertaken for recording, film, radio, television and video post production facilities demonstrating the modular acoustic panel system. ● **International Musician**: Range of musician orientated magazines. ● **ITA**: Products from Otari and Amek/TAC. Otari products on show will include the *MTR-20* mastering recorder, the *MTR-90* multitrack with the *EC101* chase synchroniser card, the *MX-70* 8- or 16-track, the *MTR-12* fitted with *EC402* pilot tone resolver and CTTC channel, the *5050* series of compact recorders and the in-cassette high speed duplicators. From Amek/TAC the *Angela* will be shown and from TAC the 24-track in-line *Matchless* and an example of the *Scorpion* range.

J

● **Jackson Music**: Celebrating 21 years as a specialist in used recording equipment Malcolm Jackson will be showing a range of collector's items including Fairchild *670* stereo valve limiter compressor, Pultec processors and Neumann and AKG valve microphones. Details will also be available of 8- to 48-track packages. ● **Mike Jones Associates**: Demonstrating methods for assessing and aligning analogue and digital recording systems. Microprocessor controlled test instruments are used with proprietary calibration tapes to align recording and duplicating systems; 'monitoring by mail' allows recording systems to be regularly checked to maintain optimum quality; copies made on a system under test on to prepared master tapes supplied by MJA may then be returned to the laboratory for measuring against the original master enabling cost-effective measuring on a regular basis. Details will be available on the stand.

K

● **KEF Electronics**: Various monitors from their range including *KM1* high power monitor system, the *101, 103-2, 104/2* and *105.2* reference speakers and the *K-UBE* KEF Universal bass equaliser. ● **Kelsey Acoustics**: A new range of four Telex Turner wireless microphone transmitters and receivers: *FMR-2* tunable diversity receiver, *FMR-50* standard fixed frequency system, *FMR-50G* guitar system and *FMR-ENG*—believed to be the first ENG wireless system available. Other Telex Turner products will include the range of professional microphones which will be demonstrated along with Audiocom *Phase 2* second generation intercom system. From Kelsey custom cabling and connections division two new home recording patchbays and a selection of professional multicore systems, cabling drums and custom cabling with emphasis on *SL* range of *Socapex* connectors including a new 61-pin signal connector for control applications. ● **Kemps Publishing Group**: Details of the *International Music & Recording Industry Year Book*. ● **King Instrument Corporation**: No information available. ● **Klark-Teknik**: First APRS showing of several new products including *DN716* multiple output digital delay line utilising 16-bit AD/DA converters and 50 kHz sampling rate (giving 20 Hz to 20 kHz bandwidth). Three outputs each give 1.3 s delay; *DN780* digital reverb/processor now has *2.0* software giving all four basic reverb program types totally separate and newly developed algorithms to produce a full range of reverb styles; *DN305* noise masking processor, *PMC402* portable ENG/EFP mixer and 2-way active monitor system for medium level speech or music monitoring applications complete the new products. The full range of established equipment will also be shown. ● **KW Electronics**: No information available.

L

● **Don Larking Audios Sales**: In conjunction with Soundtracs and Studio Equipment Distribution, the exhibit will consist of a fully operational studio set-up featuring the latest Soundtracs automated console. Also on show will be a selection of effects including the new Bel *BDE* delay line/sampler/sequencer together with a wide variety of professional audio products that are normally on demonstration at their Luton showrooms. ● **Lennard Developments**: Range of professional tape heads for OEM and replacement users including the Woelke timecode heads plus Woelke wow & flutter meters and the Auvis Asona cassette labeller. ● **Lindos Electronics**: Demonstration *LA100* Audio Analyser system comprising *LA101* synthesised oscillator and *LA102* measuring set which are available as separate units or combined and featuring automatic sequence testing. ● **Lyrec**: First UK showing of the new *TR533* 16- and 24-track recorders specifically designed for A/V applications. *TR533* features new improved tape deck, audio amplifiers for phase compensated recording and it is supplied with remote control and autolocator. Other products will be the complete duplication line and *FRED* editing tape deck.

M

● **Marquee Electronics**: New Adams-Smith *2600CC* compact controller synchronising system for A/V post production; Eventide *SP2016* with new vocoder and stereo panning software and *Vidikron* video projector which accepts all standards as RGB/combined video/RF inputs and incorporates an off-air tuner will all be demonstrated. Eventide *M969 Pro-pitch Harmonizer* and variety of products from other manufacturers will also be shown. ● **Martin Audio**: New products will be the *VRS-800* horn-loaded bi- or tri-amp system with 'delay line' porting for enhanced low frequency punch. A vertically formatted version of the *RS-800* it uses identical components and is designed to be space efficient. Also, the *BSX* is a compact sub-bass system which uses two 18 in proprietary drivers in a symmetrical centrally ported cabinet, giving 1000 W programme, 28 to 150 Hz frequency response. To celebrate 15 years in the industry, Martin will introduce new derivative systems based on concepts embodied in the *RS1200* and ▷

NEW STANDARDS IN TAPE ENGINEERING

Teac has been the name behind many of the milestones in the development of tape transports. You will find it on the world's leading data recorders, on NASA's shuttle video recorders, on military equipment and of course on the finest musicians' sound recording machines.

Now you will find Teac's TASCAM brand on a new breed of professional-standard multitrack sound recorder/reproducers, built to satisfy the most sensitive ears and engineered to cope with the most punishing workloads, even on video lock-up.

The new ATR-60 range includes 2, 4 and 8 track machines with ¼ inch, ½ inch, 15 ips and 30 ips formats, while the 1 inch 16 track MS-16 is technically without rival. By employing more efficient construction techniques, Tascam are now setting new standards in value: from around £3,400 for a 2-track with centre track time code to around £7,000 for the 16 track MS-16.

TASCAM

TEAC Professional Division

Find out more about the new standards — contact:
Harman UK, Mill Street, Slough, Berks SL2 5DD.
Telephone: (0753) 76911

EXHIBITION PREVIEW

VRS flying systems: • **Midas**: Range of audio consoles for theatre and live applications. • **Minim Electronics**: Selection of products from their range of studio, broadcast and monitoring equipment including presenter's clock for on-air studios, Ambisonic decoding equipment and the *TV7* television sound tuner. • **Mitsubishi**: Digital tape recorders, audio mixing consoles and film sound recording equipment. It will be the first UK showing of *X-86* new 2-channel PD-format mastering machine which has two main audio tracks spread over eight data tracks on tape with additional tracks for timecode. Features include analogue audio for cueing and editing and a spare data track for recording subcode information for CD mastering. Sampling is nominally switchable between 48 kHz and 44.1 kHz, with built-in varispeed to go between ±5%. Tach or SMPTE counter, 14 in reel capacity, built-in autolocator, low power consumption and splice editing are among its features. Also being shown, the *X-850* digital multitrack recorder—successor to the *X-800*—provides 45 tracks on 1 in tape. Other exhibits will include *X-400* 16-track recorder; *Westar* audio mixing console with modular frame sections, patchbay and meter sections, and plug in interchangeable equalisers, preamps, VCAs and faders; and high speed film recorder/reproducer equipment from the Westrex range suitable for film dubbing. • **Keith Monks**: Selection of microphone stands, boom arms, accessories and other peripheral studio products. • **Mosses & Mitchell**: Audio and video patchfields, plus a selection of miniature jack sockets with solder tag wire wrap or PCB terminals. • **MTR**: The complete range of *Vesta Fire* units including new products: *DIG-412* programmable 1024 ms digital delay with 128 programmes and MIDI; *SF-100 Space Commander* stereo digital chorus/flanger; *MR-10* 4-track cassette with dbx, ⅞ in/s, EQ, 10 inputs including disc; *MIDI-1* MIDI/CV gate interface box. • **Munro Associates**: Presenting their expanding range of design and measurement services including a Demonstration of the Techron *TEF 10*. Examples of studio and control room design will be shown and details of current projects for Konk, Bermuda Sound and Everest Cologne. Andy Munro will be available throughout the show to discuss potential projects. • **Music Lab**: Selection of products from Rane, QSC power amps, RED Acoustics and Galaxy Audio self-powered monitors. As main dealer for TAC, *Matchless* and *Scorpion* consoles will be demonstrated. Music Lab Hire will be represented with full information and rate cards available on the stand.

• **Music Week**: Musis and studio magazines. • **Musimex:** The range of products from TC Electronic including the rack-mount parametric equaliser, the Spatial Expander/Dual Stereo Chorus Flanger, a range of compact low noise pedal processors and the UK launch of the *TC 2290* programmable digital delay. Musimex will also be showing Bel Electronics products as their overseas agents. Also on display will be Frazer Wyatt speaker systems—really designed for stage and PA use but a featured item will be the new *Profil* studio monitor.

N

• **Neal**: The complete range of recording and replay cassette machines with modifications, extensions, improvements and options. • **Neve Electronics**: New to APRS, the *V* series console developed from a series of custom multitrack desks based on the original Neve *51* range. Features include individual channel dynamics with internal keying and up to eight mono or four stereo pairs of cue or reverb sends. Being shown for the first time is the new *8232* designed for digital recording and incorporating Neve Formant Spectrum Equalisation characteristics and microprocessor controlled *Instant Reset*. *Necam 96* audio automation system will also be demonstrated.

O

• **Otari**: In addition to the first UK showing of *DTR900* digital multitrack recorder Otari will introduce *MX80* compact 2 in tape transport (24-track or 32-track). No detailed specification was available at time of going to press. The range of analogue tape recorders and cassette duplicators will also be shown.

P

• **Panasonic/Ramsa**: *WS-A80E* 2-way speaker will be launched featuring 8 in woofer and twin bessel horn tweeter, for on-stage monitoring and vocal PA applications. There will also be a first range of four miniaturised professional condenser microphones designated *WM-S1/2/5/10* which may be clipped straight on to instruments such as drums and saxophones allowing better visibility and increased mobility. • **Penny & Giles:** Featured will be a motorised studio fader which will allow console manufacturers to incorporate moving fader automation at a reasonable cost without degradation of the operating feel of the faders. Also on show will be a new range of T-bar controllers and the full range of established studio faders. • **Playback**: Selection of recording tapes which they distribute including those by TDK, Maxell, Ampex, Sony and BASF. Also shown will be floppy disks and a selection of tape sundry items.

• **Professional Audio**: New products on show will include Court *Signature* series monitors, *Unisound* professional and semi-pro microphones, and Renkus Heinz new compact PA system. Other products represented will be a range of Electrospace processors, SCV ancillary equipment, the NKA radio simulator, and the full range of FM Acoustics products. • **Professional Recording Equipment Company**: Range of products from Capitol Magnetics, Enertec Schlumberger, Garner Industries, Leevers-Rich, Pacific Recorders and Perfectone plus new *1530* stereo audio analyser for transmission chain measurements, new IBM software for *1510* to enable full range of tests and the *Sanex 2000* and *3000* series bulk erasers.

• **Publison**: The latest multi-sampling program for *Infernal Machine 90* giving 41 s memory at 20 kHz with MIDI interface. It may be controlled by new remote control box with digital pots. Also showing will be the *Gold Pitcher* on two channels with delay, echo, pitch shifting and multi-sampling with MIDI interface.

Q

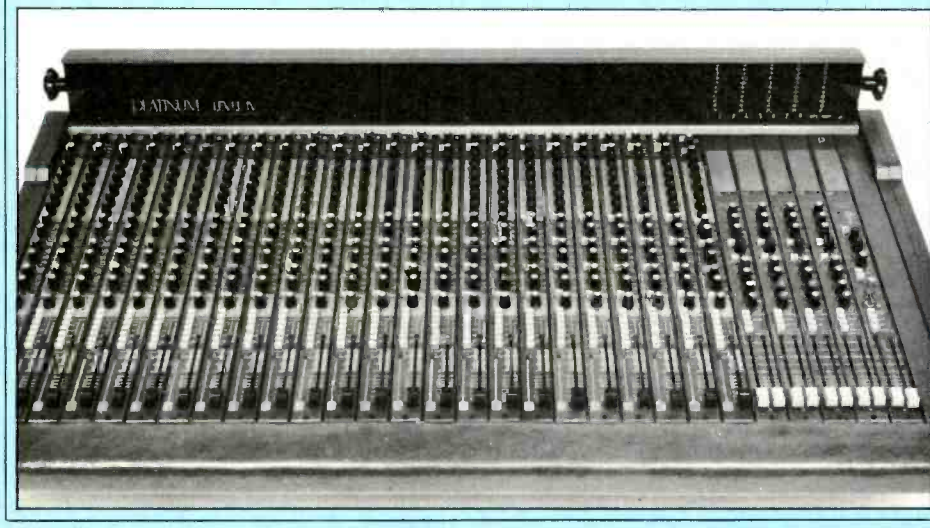
• **Quad**: The Quad *306* power amplifier will be introduced; primarily intended for the domestic market it may also be used for studio foldback and headphone amplifiers. The established *510, 520, 63*, and *405* amplifiers will also be shown.

• **Quark**: Range of MIDI related products. • **Quested Monitoring**: Various monitoring systems will be shown plus recommended amps, crossover, graphic equaliser and analyser.

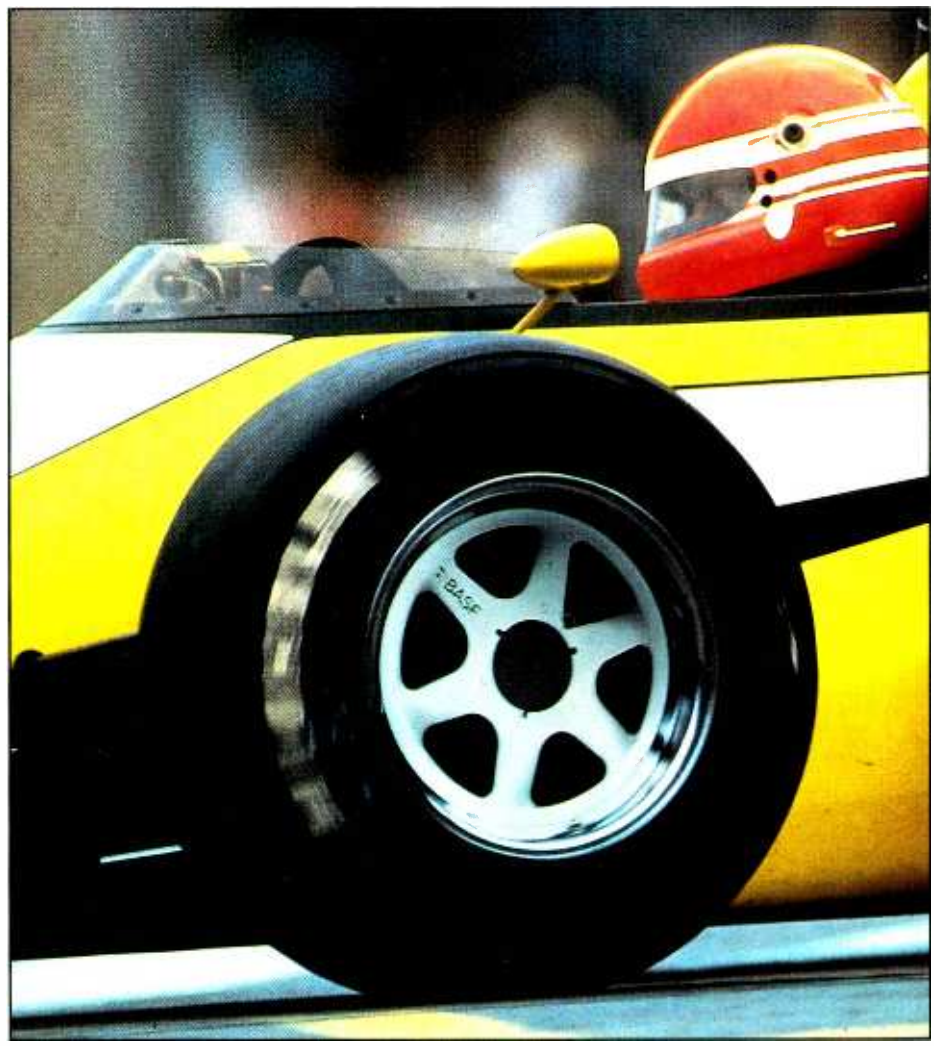
R

• **Rebis Audio**: Analogue and digital signal processors including *RA226* digital sampler giving 5.25 s at 16 kHz ▷

Platinum Level IV mixer from Regentport



911. DRIVE THE HIGH PERFORMER



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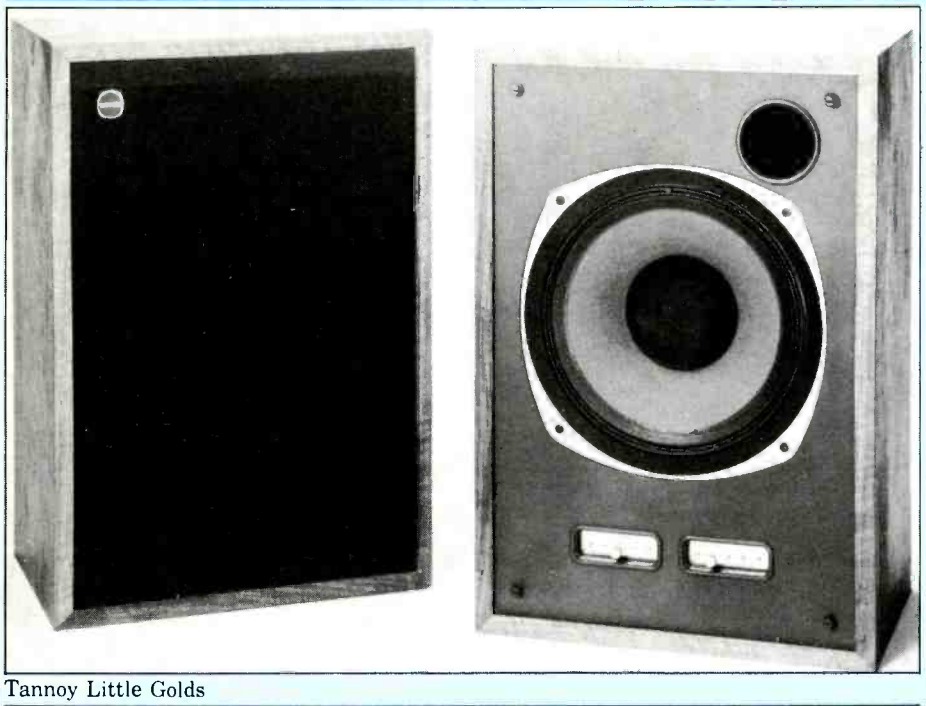

Tannoy Little Golds

bandwidth, variable 2-octave pitch shift, auto trip, memory segmentation for multiple samples, delay mode, repeat echo and inputs for CV keyboard, DC remote and audio trigger. Rack-mount parametric equalisers, compressor/limiters, noise gates, automatic panners, noise reduction, mic/line amplifiers, de-esser, oscillators, LED meters, disk preamps and other equipment will also be shown. ● **Regentport**: New *Platinum* range of modular recording consoles, *Level IV*. Available in 22, 30 and 38 module frame sizes the consoles may be configured to suit requirements. Features include tape monitor on every channel enabling monitoring of tape return, sending it to monitors and stereo masters whilst allowing channel mic input to pass through the same channel and sent to any of the tracks. ● **Rhino Distribution**: Full range of Dod equipment including crossovers, graphic equalisers, signal processors. ● **Roland:** Home recording products will include the Boss *Micro Rack System* with its new pitch/shifter delay *RPS 10* and the *SBX10* and *SBX80* sync units. New MPS music processing system will be demonstrated along with keyboard sampler *S50*, *MKS20* piano module using Structured Adaptive Synthesis and the *MC500* MIDI recorder with built-in floppy disk.

S

● **Scenic Sounds Equipment**: Two new Lexicon products: *2400* stereo time compressor and *480L* processor will be demonstrated along with other Lexicon, dbx and Orban units. In addition there will be Audio Precision *System One* with new wow & flutter and switching modules, Publison *IM90 Infernal Machine* with new SMPTE option and selection from Auratone, Countryman, HH, Schoeps and Editel. ● **Sellmark**: A wide selection of electronic components for recording related equipment. Featured will be a new 100 mm fader designed for multi-channel console use. This is a low cost/low profile design with 100 mm mechanical and electrical travel with a smooth action. Low noise levels are obtained by the use of plasticised carbon tracks and multi contact wiper mechanisms. ● **Shuttlesound**: The full range of professional Electro-Voice mics, electronics, speaker components and systems. New E-V products will include the *PL4*, *PL10* mics and the *8108* matrix mixer. Also on display for the first time in the UK will be the SAJE *Memory* console—an 'advanced user-friendly computer-controlled sound processor'. The SAJE *Racky* system will also be shown in production form. Being introduced at the APRS will be products from Alphaton. These include broadcast splitters and DI boxes and other problem solvers such as an *XLR* phantom power checker and an audible line identifier. ● **Sifam**: Range of PPMs and other audio metering products, electrical metering products and range of control knobs. ● **John Hornby Skewes**: Audio-Technica microphones in the *Artist*, *Performance* and *Pro* ranges; AVF mic stands and P&N stands; own JHS branded range of amplification and rack-mounted DDL effects, etc; JHS accessories including cables, plugs, headphones and pedals; and multi-channel cassette/mixer systems from Teczon and Audio-Technica. ● **Solid State Logic**: Demonstration of new software and hardware options for the *SL 4000 E* series Master Studio and *SL 6000 E* series Stereo Video Systems. Also being introduced will be additional audio and control cassettes for the modular *SL 5000 M* series broadcast console including a new stereo submixer. The complete SSL console range will be shown including the *SL 6000 E* stereo video system, studio computer, *Total Recall*, programmable parametric equaliser, *Instant Reset* computer and *Integral Synchroniser* system. ● **Sonifex**: Range of NAB cart equipment including the new *micro HS-X* NAB cart machine. Other equipment on show will include the *CQ* series, the *CQ-R* recorder for the *CQ* range, the *CQ-HSE* autosplicefinder and a range of racking kits for 19 in rack mounting. ● **Sony Broadcast**: Demonstrating the *PCM-3324* DASH format multitrack recorder in two configurations: one operating two synchronised machines with *RM-331* remote control/autolocators giving 48 channels, the other will be operating with *BVH-2000* VTR synchronised by *BVR-90* 2-machine A/V tape transport synchroniser. The 2-machine system will also feature edit control facilities via *SMC-70* computer. Another *PCM-3324* will be shown with *Inter-Active Expert System* which employs a computer with touch screen control and a video disc player to guide maintenance engineers through routines giving information graphically. Sony CD mastering equipment range will also be demonstrated. Other products on show will be *MXP-2000* broadcast and post production mixing console, *MXP-61* 12-channel mixer, *APR-2003* centre-track timecode 2-channel recorder, *TCD-5PRO* stereo/mono cassette recorder, lavalier microphones, wireless microphone systems and selection of studio microphones. ● **Sound Engineer**: Sound recording magazine. ● **Sound Technology**: Introducing a variety of new products. From Alesis the *Midiverb, XT:c* and *AI* stereo digital reverbs; from Aphex the *Dominator* and *AVM8000* 8-channel surround sound decoder; from Ashly *GQ215* dual 15-band, *GQ131* mono 31-band and *GQ619* dual 31-band graphic equalisers; and Symetrix *544* quad expander/gate. There will also be a number of music production SMPTE/EBU/MIDI and other timecode-related products from Bokse, C-lab and Oberheim. ● **Soundcraft**: First UK showing of the new *Saturn* multitrack recorder and *TS12* in-line *Producer* series follows on from the *TS24*. Other new products will include series *800C* PA console with new input, output and master sections; new stereo and sweep EQ options on the series *200B*; series *200SR* console for live sound; series *600* with integral patchbay, and new stage monitor input on the series *500* live sound mixer. Established products also to be shown include *TS24*, and series *2400* studio consoles, *SAC2000* stereo on-air radio production console, series *4* stage sound console, demonstration unit of the *TV24* in-line console for simultaneous multitrack recording and monitoring for live to air with three discrete mix buses, Soundcraft power amplifiers, and Series *20* stereo mastering machine. ● **Soundout Laboratories**: The complete range of Soundtracs mixing consoles in conjunction with Don Larking Audio Sales and Studio Equipment Distribution. Being shown for the first time in the UK, the *MC* series monitor desk is available in 32/10+2 and 24/10+2 formats. Soundtracs will also introduce a range of 19 in rack-mounting modular mixers for various applications such as 4- and 8-track recording, ▷

TAC

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RAPID RESPONSE 533

EXHIBITION PREVIEW

Range of Yamaha *MZ* series microphones

broadcast, stage monitoring, sound reinforcement, keyboard mixing and video post production. On the stand there will be a working studio set up equipped with a new console, details of which are not being released prior to the show.

● **Space Logic**: Details of their design services and examples of their recent work. Their main area of work for the recording industry is ergonomic and panel design for other manufacturers' products but they can equally look at other areas where design is important.

● **Stirling Audio Systems**: Wide range of products including Trident series *65* and *75* consoles; complete range of Westlake nearfield monitors from *BBSM-4* to *BBSM-12*; complete range of Valley People products and models from the Otari tape machine range. Featured items will be first UK showings of the Timeline *Lynx* synchroniser, the Otari *MX-80* 2 in 24-track, Sanken *CU-41* and *CMS-7* mics, Otari *MTR-20* stereo mastering machine and the USAudio *Gatex*. ● **Strudwick Research**: The *VCA-1* series which provides VCA grouping for any mixing console without modification and includes 16 subgroups, a grand master and the ability to control up to 48 inputs. ● **Studio Spares**: Details of the equipment, supplies and spares that the company can provide.

● **Studiomaster**: Full range of recording-related products including Series II mixing consoles. ● **Surrey Electronics**: New items include *PPM 7* made under licence from BBC with high spec drive circuit; *PPM 6* as *7* but with unbalanced input; *PPM 5* 20-pin dual in-line hybrid in a new version with tropicalised coating; 10-outlet distribution amplifier *4* with lower noise levels; illuminated PPM boxes; Broadcast Monitor Receiver *2* being a new synthesised communications receiver; and an advanced active aerial.

T

● **TAC**: Examples from their wide range of mixing consoles including the *Scorpion* series and the *Matchless* series *II* which has undergone an extensive facelift with the addition of a number of new facilities. On display for the first time will be the prototype of the TAC *SP*, a 40-input, 16-group sound reinforcement console which features additional VCA subgrouping, mute groups and 16 aux sends. ● **TAM**: Will be available to discuss requirements for disc cutting equipment, cassette duplicating equipment and allied accessories—both new and old. As in the past there will be a piece of nostalgic archive equipment on display. There will also be full details available of other TAM services including disc cutting, cassette duplication, custom wound cassette blanks, bin mastering, tape copying and editing to and from all formats.

● **Tandberg**: Range of products including *TD20 AL* 4-channel transmission logger, *TCD910* professional cassette deck and the *TCD911* playback version, plus tape recorders, tuners and amplifiers.

● **Tannoy**: The *SGM* series of studio monitors for the first time in the UK. These include the *SGM 10B*, *Little Gold* monitor, *SGM 12X*, *SGM 1000* (replacing both *SRM 15X* and *M1000*) and the *SGM 3000* (replacing both *SRM 15XB* and *M3000*). Also the *DTM-8* small desk top monitor, and the *FSM* studio monitor using a 15 in dual concentric with an additional 15 in bass unit. Also on display will be the Tannoy *SR840* power amplifier. Tannoy is celebrating its 60th Anniversary this year. ● **Tape Automation**: Demonstration of *X-L Minor*—a new low cost audio loader designed for low budget users and featuring improved splice stability, easy maintenance, microprocessor control and low running costs. ● **Tape One Studios**: As one of the world's leading digital audio post production facilities, they will be distributing details of their newly equipped *DSP* mastering room and hope to meet old and new clients and suppliers. The stand will be staffed by personnel from the production and technical departments who will be able to answer CD, vinyl and cassette mastering enquiries. ● **Technical Projects**: Extending their range of audio/acoustic measurement systems with *MJS401D* featuring computer control, a prototype *Program Builder* software for IBM-PC and BBC micros and production wow and flutter/drift/rumble and IMD options all shown for the first time. As recently appointed Neutrik *Audiograph* agents they will also display new tracking send and tracking receive filters and new *Distortion Analyser* modules, increasing the versatility of Audiograph as a hard copy measuring instrument. Also new intercom/talkback products.

● **TracSystems**: Exhibit will include the *CD01* cassette duplication system which records directly on to blank cassettes from a single master and is designed to cater for short production run and fast turnround. ● **TRAD**: Details and literature on used equipment available for sale and other services and products.

● **Trident**: Launch of *Di-An*—digitally controlled analogue multitrack recording console. Facilities include storage of up to four different EQ settings on each channel, 24 auxiliary sends, full reset and restore of every major function up to 250 times during a mix. The console will be available with from 40 to 56 inputs with 32-track monitoring. Series *75, 65* and *80/80B* will also be shown.

● **Turbosound Sales**: Introducing four new product lines: the *TSE* series Installation System which has been developed to facilitate permanent installations; *TFM* series floor monitors based on a newly designed co-axial 15 in speaker into a cabinet not much bigger than itself and incorporating new loading techniques using TurboMid and TurboBass devices; *V* series is a collection of multiple driver high frequency devices based on specially assembled 1 in or 2 in compression drivers; and *LS-2403* sub-bass loudspeakers which are a new 24 in speaker design incorporating a 6 in voice coil. All new products will be demonstrated in a sound booth on the stand. ● **Ernest Turner Instruments**: Will be showing a comprehensive range of VU and PPM meters. ● **Turnkey**: *Synclavier* will be shown with all the new software updates including hard disk recording, the PPG also with hard disk recording and *Waveterm B*, full range of Fostex equipment including the ½ in stereo machine with timecode and SMPTE based synchroniser system, and the full ranges of DDA mixing consoles and ART digital signal processors.

Y

● **Yamaha Kemble Music**: Demonstrating their newer products including *SPX90* digital multi-effects processor, *PM3000* series mixing consoles and the *MZ* series microphones. All will be powered by Yamaha power amplifiers including the new *P2075* giving 75 W/channel. Debuting at APRS the *S300* speaker system (200 W into 8 Ω) is designed for sound reinforcement applications and features a new design 15 in woofer with 8 in mid range driver and broad dispersion horn tweeter. Other products on show will include *MT1-X* multitrack recorder, *MC* and *EMX* series mixers and a selection of signal processors including *REV-1*, *GC2020* compressor/limiter, *G* and *GQ* graphic equalisers and *YDD2600* professional studio delay.

Z

● **Zonal**: The full range of audio tapes in all lengths and widths plus range of acetate and polyester sound recording film in 35 and 16 mm formats. ● **Studio Sound** will be on stand No 306 from which we will be distributing free copies of the magazine and sister publications *One to One* and *Broadcast Systems Engineering*. Editorial and advertising staff can be contacted through the stand.□

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VIDEO AT AUDIO FACILITIES

In this issue we are looking at how audio and video have found themselves related within a cross-section of London based audio and video facilities. This article from Jim Betteridge looks at audio studios turning towards video in varying degrees

To the eyes of the average multitrack music engineer, recording to picture has always been something of an esoteric pastime. It represents the threshold to the wondrous but rather perplexing world of film and television with its tangle of random formats, techniques and idiosyncrasies—the result of an industry that grew up as an international assortment of independent companies, each with its own answers to the same basic questions that arise when attempting to realise dreams on screen.

As VCRs become as common as TVs and the threat of effective international cable TV becomes a reality, the world market for a wide variety of programmes is exploding. Even the feature film industry, we are told, is showing signs of recovery. Thus writing music for picture is big business and everyone's looking for somewhere to record it in sync.

Television—where the real money is

Each week, as another half a dozen ailing music studios turn to the picture sync game as a means of salvation, the question must be asked: is this a genuine new source of lucrative employment?

Before hearing from some of the studios that have taken the plunge let's look at what's entailed in getting involved with VAPP (Video Audio Post-Production).

Entry requirements

There are a number of levels at which a multitrack music studio can enter the picture game. By simply buying a U-matic video machine you can offer your clients the facility to get a rough idea of how the music is going to work with the picture. Without a synchroniser this is a very hit-and miss affair relying largely on the engineer's ability to punch the play buttons of the multitrack and video machines at the right time. In the past this has often been an acceptable compromise for composition and recording purposes but today musicians and producers expect the greater speed and precision offered by timecode sync.

The next stage is to add a synchroniser which in its simplest form will lock together the transports of two tape machines (video or audio) so that they will act as a single system. Operationally, locking a video and an audio machine together is basically no different to locking two audio machines. Timecode is recorded on a spare track of both and the synchroniser compares the two to ensure that they maintain a fixed relationship, minutely shifting the speed of the 'slave' machine with respect to the 'master' machine should discrepancies occur.

Expedience

Any producer involved in music to picture will tell you that a major factor in the success of a VAPP session is overall speed of operation. An important factor here is how fast the system will rewind the two machines to a given cue point and re-establish play synchronisation. When clients ask to go from the top they often mean immediately, and if you are continually re-running the same 30 s commercial over and over again, a few seconds extra delay every time can become irritating. So when choosing a synchroniser and the machines to be interlocked, it's important to look for the combination that will give the fastest response possible. A speedy response relies partly on the synchroniser always knowing where each of the machines is in all modes. Whilst in the play mode reading timecode and maintaining control is a relatively simple matter but it is also necessary for the synchroniser to have some form of tape position indication for both machines whilst in wind modes so that it can preserve approximate sync. Significant delays can arise if the slave has to wait until the master goes into 'Play' before it can see any timecode and start chasing to its new position. With this in mind some ATR systems have a kind of tape lifter defeat mechanism to keep the tape against the heads in wind mode. They also have a special wide bandwidth audio amp for the timecode track to enable the high speed code information to be read as it races through. There are a number of variations on this where the tape lifters will only drop below a certain speed, or they'll just drop occasionally to provide a burst of code before lifting again. The advantage of this system is that it allows the slave machine to 'park' accurately in relationship to the master, thus facilitating a fast lock-up. The disadvantages are that you need to have a special amp fitted which may have to be specially built if the company concerned can't supply a suitable one and of course there can be problems with head and tape wear.

This method has been largely superseded and augmented by the tacho approach, where the approximate position of the tape in wind mode is derived from the tacho output. This is much simpler but has the drawback of being slightly less accurate, especially over long runs where the tacho can slip, resulting in bad parking and thus a slower lock-up. An intelligent combination of the two is ideal and is possible with some systems.

In the case of a video machine, tape position information in wind modes is derived by monitoring the control track. This is a standard facility requiring no special modification and allows frame-accurate parking. If a studio simply requires a single ATR to be locked to a single VTR it will normally be the ATR that acts as the slave. This is largely tradition although it is generally easier to control an ATR, a VTR won't stand for the minute sub-frame speed alterations without losing picture. In some cases it is also because the VTR will need to unlace and lace-up again either side of a wind which obviously takes time.

Each model of tape machine has its own set of internal control parameters thus a synchroniser manufacturer has to create a specific interface for each device to be controlled. Some machines are more difficult than others and if you're looking toward the VAPP market you should ensure that any tape machine

you intend to buy can be synchronised without difficulty. You'll need to be able to access all the transport controls plus Record for automatic drop-ins; also the tachometer pulse, preferably including direction indication although this can be taken from the fast forward and rewind buttons' indication lamps, and a control input to the capstan motor (DC or FM) for tape speed adjustment in play mode. With a more hardware based system each type of machine will require the construction of a different interface hox, whereas software based systems have, theoretically, all possible options always available.

This two-machine lock-up is the most basic facility that can reasonably be termed VAPP and generally consists of a low-band U-matic and a synchroniser to lock it with your multitrack as already explained. It is now possible to get VHS machines equipped for synchronisation, although the low band U-matic is still undoubtedly the industry standard and by design will more readily stand up to the 'industrial' treatment that it will be subjected to in a busy VAPP studio. For occasional use however the VHS is cheaper and will do the job.

Although 24 tracks will generally be enough for standard jingles, film scores will often run to a couple of multitracks and the need to lock three machines together (two ATRs and a VTR) is not uncommon. Even with simple jingles it may be necessary to run-in 2-track sources reliably in sync. All the more upmarket systems will cope with several machines although at present the SMPL system, based on the *VIC 20* computer, is only capable of locking two machines. Software for control of more machines is apparently in the pipeline.

Whilst low band U-matic is the industry standard for syncing purposes, the final product will almost certainly end up on film or more likely on 1 in C format video tape. It is apparent that at some point your clients will have to have your mixes transferred, and if you can offer this facility in-house it is unlikely that they'll refuse it. A few years ago C format machines were too expensive to make this viable but it may now be possible to get a reasonably priced second hand machine that lacks modern picture facilities required for actual video production but which may be quite adequate.

Not many studios have plumped for this yet but many are seriously considering it. The purchase of a film format mag sound machine would also extend the service you could offer as far as final mixes are concerned.

Lloyd at the Tape Gallery's Synclavier

Tapeless recording

If those with mere analogue multitrack are fearful that their exclusion from the digital domain might be terminal, the threat of revolutionary tapeless recording systems manages to keep Mitsubishi and Sony owners equally nervous. For the average, even upmarket, music studio it seems there is no immediate threat but for music to picture applications there are some very definite advantages.

Recording music to picture is only a part of the sound to picture market. In addition the final mix can include any number of voiceovers and sound effects, each of which has to be found or created and placed against the picture until the client considers that the whole 'works'.

Returning for a moment to film formats, the film industry's method of syncing a whole series of separate 16, 35 and 70 mm magnetic sound machines each carrying a different effect or voice track has always provided a flexibility not available in normal multitrack format. If for instance an effect is a frame late, the tape on the relevant machines can simply be shifted back accordingly. Try doing that with a 24-track. As far as long feature films are concerned, the old methods may still be the best but for short television commercials the digital sound sampling revolution offers a very powerful alternative. It is based on the ability of more sophisticated sampling keyboards to be assignable to any number of different samples on different keys on the keyboard and then use the instrument's internal SMPTE-locked sequencer to replay them to picture. Lloyd from The Tape Gallery explains how they use their Synclavier system:

"We might have a 30 s voiceover which I'll sample into memory and assign to one key, and an end line, which I'll assign to another. Then there'll be a number of effects such as rain which I'll assign to another key, thunder to another key, people walking in the rain to another, maybe a music mix to another and so on. Then I can literally play the commercial live to picture. We have complete control over everything in terms of time because all we're really doing is manipulating note lists. After the first 'performance' the Synclavier's in-built sequencer remembers what and where I played and allows any new sounds to be 'over-dubbed', or previously recorded sounds can be individually shifted up or down in frames. There's also a fantastic degree of control over the sound itself: if we have in our library a great sound effect of three people walking in the rain but we want a small crowd, it's a simple matter of using slight pitch and time shifting to create that. The same goes for any other effect, or if the client wants a cross between two effects, or something completely off the wall, the Synclavier provides total creative freedom and technical accuracy together with speedy operation. Sessions that used to take three or four hours are now only taking an hour and our clients really appreciate that."

The Fairlight *Series III* offers the same kind of facilities and the Droidworks system, though not yet commercially available, promises a similar degree of usefulness. Certainly, this type of facility is becoming increasingly popular with clients and should be considered closely if you're looking to win business from the jingle sector where speed and instant creative flair are of the utmost importance. If you haven't got £50,000 plus to invest, a less expensive option is the AMS *Audiophile*, although it offers none of the creative synthesis facilities. Other sampling synths such as the Emulator *II+* offer SMPTE-locked sequencer packages but lack the editing flexibility and sheer volume of RAM for storing complete 30 s music tracks, etc. Simple rack-mounted samplers can also be used to take a mistimed effect from a track on the multitrack and re-record it in sync but this costs generations and, though useful, is obviously a very basic facility as compared with that outlined above.

Even if you can't stretch to an upmarket sampling synth, the ability of a timecode based system to tie so many ▷

VIDEO AT AUDIO FACILITIES

production components into a co-ordinated but flexible whole can still be extended to musical instruments through MIDI. Once again, if you are going to be competitive it is probably important that your staff understand the way this works. The power and versatility of modern electronic keyboards means that a considerable proportion of music for film and TV is created by a single person and a vast selection of keyboards, drum machines and sequencers. The music to be recorded will almost certainly have been written to picture and probably the composer will have been working at home to an unsynchronised VHS copy, taking timings of precise visual/audio sync points with a stop watch to cue his or her playing. It is also very likely that much of the performance will have been written into a MIDI sequencer enabling an immediate and faultless replay thus saving valuable studio time. Via a SMPTE/MIDI interface it is possible to sync the sequencer into the rest of the system. More complex sequencers will allow detailed editing of the arrangement, changing individual sounds or musical parts or shifting them up and down in time with frame accuracy. This is a very effective expedient and isn't particularly expensive for studio or musician.

Synchroniser technology is undoubtedly getting cheaper and with the Fostex and SMPL systems costing well under £2000, it is now possible for the small studio to get in on the act. Some are saying that this could be the undoing of the bigger facilities that have always enjoyed a degree of exclusivity in this area simply because of the capital involved.

Angel Studios in Islington, London is a very prestigious three studio complex designed to the specifications of studio manager, John Timperley. They've had music to video capabilities since they opened in 1982 using all *Q.Lock* equipment to link their Ampex *ATR124* multitracks with their low band U-matic VCRs and their two 35 mm magnetic audio recorders, each of which is capable of recording either 3-track or 4-track formats. Studios One and Three are both very big and include large areas of acoustic separation offering good visual contact with both the control room and the main studio area thus they are well suited for large orchestral sessions. John's attitude was not dissimilar to those of other studio managers.

John Timperley: "Our clients cover a very diverse range including outside film production houses from France and America; practically all the major TV production companies have been here at one time or another—the BBC, Granada and LWT are regulars. The work is equally diverse: remixing *Boy George's Christmas Show*, *The Kids of Fame Show*, underscoring for the BBC, some of the music for LWT's *Dempsey and Makepeace* was recorded here. This is generally just the music of course, not the whole show with dialogue and effects and so on. The nearest we get to doing the whole thing is when we remix an outside show such as *Boy George's Christmas Show*, where everything was recorded live to multitrack and we remix it and possibly do repair overdubs to picture. We've also recently done a documentary where we actually recorded the dialogue here as well, although that's a rarity for us.

"I don't see that smaller studios with low cost systems are going to be any threat to us. With the size of television and film budgets the recording costs are a relatively small percentage of the total budget, and with a studio full of musicians, the actual hourly studio rate is a small part of that. It's far more important to the client that things are done as well as they can be and reliably, so that orchestras don't run into overtime and deadlines are met."

Other threats

The other purported threat is from the video production facility putting in multitrack audio studios. Compared with the cost of a state of the art broadcast video editing suite, the installation of a multitrack audio studio is not at all expensive. Doug Hopkins, manager of a upmarket three-studio complex, Advision, reiterated John's words and also had this to say:

"As far as actual music recording goes you're still dealing with creative musicians, not advertising executives or management people. They will be used to working in a music studio environment where there are few union problems, all the staff are enthusiastically involved in the creative side of the business and where there's no pressure with time or hours of use. The television business is not like that, it is far more regimented and set up for quick, fast sessions. We're a music studio, we've been responsible for a number of hits and I think our clients will continue to appreciate us for that."

What about the clients? The agencies I spoke to agreed that getting it right the first time was the most important point, coming well above small differences in hourly rates. Graham Perkins of major jingle agency, Jeff Wayne Music (JWM):

"The most important thing for us is reliability; that everything is going to work when we get there. That's certainly more important than a few pounds difference in studio rates, especially if it's a big orchestral session where the musicians might be costing £3,000 an hour. Coupled with equipment that works is staff that are competent to use it and generally willing and helpful."

Did he ever have any problem finding a suitable studio?

"There is a bit of a shortage of good reliable studios with permanent picture sync facilities. Even many of the larger music studios have to hire the equipment in which always adds another degree of uncertainty; it's much nicer to know that it's all part of the furniture and that it all worked yesterday and the day before that. There's a particular shortage of large studios for orchestral sessions, smaller synth studios are generally easier to find with or without picture sync."

Graham's background is as a musician and recording engineer and naturally the jingle writers on JWM's books are musicians, most of whom have played in bands and made records in their time. They very much bear out what Doug Hopkins and others have said about musicians wanting to work in music studios where they feel most at home, as opposed to video houses with audio studios tacked on.

Someone with a film/TV background on the other hand might well feel just the opposite. Thus it seems that there must be room for co-operation between music studios with video and video studios with audio, and different clients will always have their preferences. It is also clear that any reasonably large studio without synchronisation facilities is closing the door to a possible source of work. Only time will tell where the new low cost synchronisers will fit into the story but I know of at least one jingle writer, Peter Soy, who already has his own U-matic and Fostex synchroniser synced to his Fostex B16 and is very happy with it. He now has very little use for recording studios at all—perhaps the whole industry should watch out.□

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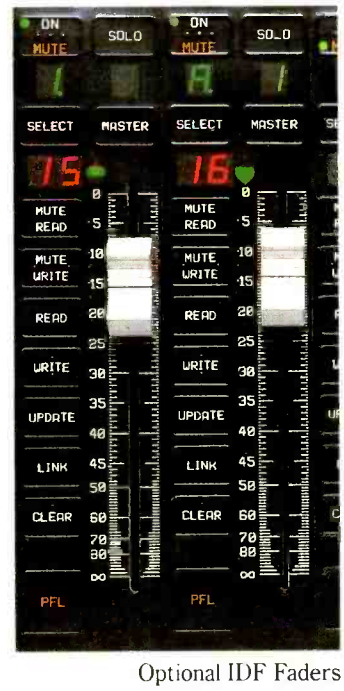

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AUDIO AT VIDEO FACILITIES

Complementing the preceding article, Janet Angus reports on video facilities moving into the audio field

An increasing awareness in the video world of the importance of its audio counterpart has led to a boom in high quality post-production studios at facilities houses. Existing houses have incorporated additional equipment and facilities and the new breed of video houses have included relatively elaborate sound post-production rooms as an integral part of the overall concept. The introduction of hi-fi video has been a major influence, although the increasing awareness of television producers must have made an impact on the way the market is now operating. Stereo television is imminent and already most overseas material is required to be in stereo.

Once the decision to hand over space to a post-production suite has been taken, equipping is simply a matter of gathering your resources and organising the installation. The investment is relatively small for facilities houses who are active in the field. Financial resources are greater on the whole than those found in the average recording studio where figures are juggled daily to try and balance the investment made. Yet the two facilities would appear to have a great deal in common in terms of equipment.

Otari and Studer multitracks mingle with SSL, Calrec, DDA, Trident and Neve consoles. Digital multitracks are often called for and hired in. The post-production suites have many of the outboard units found in recording studios and often a whole lot more. Is it just duplication with everyone vying for the same custom? Some say yes; others say it is not that simple. Apart from anything else the engineers in each type of facility must have different kinds of experience and creative approaches to the job in hand. So maybe it is just a case of finding out exactly what it is you want. Each, obviously, feels that he has something very special to offer and probably does. It is possible that rather than seeing the whole exercise as one of rivalry the two sides of the industry should come together and find some way of complementing each other.

In an effort to see what a cross section of the video houses are doing four London facilities were visited: Fountain Television, Complete Video, Limehouse and Trilion. Each is different in approach and facilities and their viewpoints make for interesting comparisons. Ultimately however they are all out to achieve the same goal—quality audio for video.

Fountain is one of the new breed opening as recently as September 1985. The facility includes television studio, editing suite and sound/post-production studio and is the concept of Mike Matthews who previously ran his own production company utilising other facilities houses. He apparently found himself constantly coming up against an attitude where everything was too much trouble and therefore set up himself.

Fountain is an independent facility forming one of five companies within the Avesco group (the others being AVS standards converter manufacturer, Buck Film Laboratories, Craddock Associates and Fineplane).

The sound suite was set up to play a dual role as a back up studio and post-production. As it has turned out however, there is so much demand for post-production that a second sound facility is in the offing to take 'studio' work off its hands. Sound has often been the poor relation in television post-production and it can also prove far more expensive to produce sound in an edit suite than in a more suitable dedicated facility. Edit room time is more expensive and post-production audio facilities are relatively limited.

The type of work coming their way is varied including pop promos, schools programmes, corporate programmes, commercials, sales promos and children's series. Fountain feel that the reason their work is so varied is because they have the three facilities, any permutation of which the client may use. For example during the making of a recent video, Mike Oldfield took the tapes home to edit himself. It is possible in some facilities houses that a client is forced to keep the job in-house, although this is happening less frequently. It is up to the companies to make the client want to stay by competing realistically on the audio side.

Mick Williams is head of sound and he immediately destroys the myth that video audio engineers must have a video background, revealing that prior to joining Fountain last year he was running the Battery mobile out in Botswana! Although the sound studio was already well into the planning stage he arrived in time to oversee the work and tailor it to his own needs. He is one of an increasing number of 'music engineers' stepping sideways into video; reasons are anything from money to a breath of fresh air. Mick's prolonged absence from the English 'scene' probably contributed to his move but he doesn't seem to mind.

Equipment wise, centrepiece of the control room is a DDA *AMR24* console—a custom design offering what Mick feels is an unusual degree of flexibility. "For example, in addition to control room mix it has pan plus two totally discreet foldback mixes which means that you don't have to tie up your auxiliary sends doing foldback." It is split 28/24 and can also operate 48-track. Multitrack recorder is Otari *MTR90* with *MTR12* (centretrack timecode) stereo machine, Revox *PR99* and a Sony *701* feeding Betamax or low band U-matic.

To a certain extent Mick contributed to the studio design albeit within the restrictions of the existing four walls. These restrictions also necessitated nearfield monitoring although for the type of work, nearfield is better anyway. He chose Westlake *BBSM*s because they have a sound he likes and is familiar with, complemented with Yamaha *NS10*s and Auratones. With a wry look he explains that for a lot of the voiceover work they do, a PA stack would not be entirely appropriate! "I find the Westlake *BBSM* studio monitors to be a fine compromise without the negative implications of the word compromise."

Two outboard racks house two Drawmer *221* compressor/limiters and a *231* dual expander/compressor and two *210* dual gates, AMS *RMX 16* and *DMX 15.80S*, Yamaha *REV 7*, Sonifex cartridge machines, a Rebis rack, Klark-Teknik graphic equaliser, the Electrospace *Spanner*, Audio+Design professional CTC and Dolby *A 261*.

Pride of place though went to the Audio Kinetics Eclipse which, it was explained, is Mick's new toy. "The old Alpha controller pales into insignificance in comparison; Softkey is definitely an advantage. Basically it rationalises the whole *Q.Lock* system having this on the end of it."

In addition to being tie lined to the television studio, there is a 12 × 10 ft voiceover room with wooden and carpeted floor areas which may also be used for music overdubs. It has been the scene of full post-production on drama, music, commercials and music demos. Because of the nature of the facility it goes out at a very similar rate to that of music studios and if there is no post-production work booked in there is no reason why they should refuse bookings from bands. One does wonder though what sort of band would think of trying to book studio time at a television facilities house—but it appears some have.

Mick's relatively small experience of facilities houses renders him unable to make comparisons although he does find the type of client somewhat different at times. "It's not quite like having George Schmuck and the Lamp-posts come in and do a single. But the two sides (video and music studios) have quite a few of the same tools nowadays. I'm a technician and I like using the equipment and what it is on, to some

extent, is irrelevant.

"There are different skills to learn but equipment wise it is not that difficult except that you need a *Q.Lock* or a btx or even something like a Fostex. The actual investment required doesn't necessarily justify bumping up the prices, although at the same time all studio prices should go up because they are too low for the amount of investment they represent.

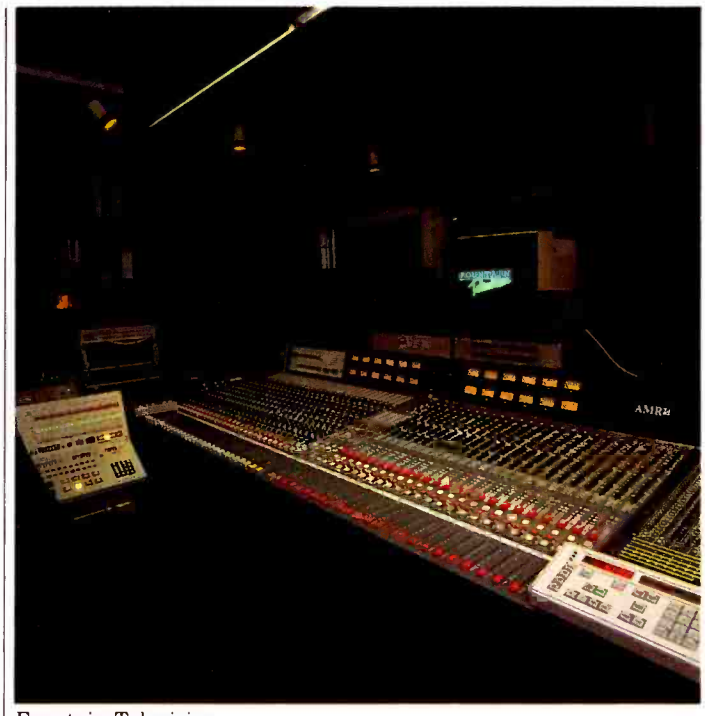
"Although the clients who come in here tend not to be aware of the technical capability of some of this equipment it is good that they are able to come. I will attend the production meeting and follow the whole thing through. It is all about creating a peace of mind for the client by enabling him to work with one team right the way through and it means that you know what has happened at each stage. It rules out as many unknowns as possible."

Looking at the video versus music studio debate Mick concludes that to some extent it really is a different ball game. At Fountain they are able to see a whole project through from beginning to end instead of shooting there, post-production somewhere else and then back for editing and layback. "At a music studio you will have a working picture and then you will have to go somewhere else to put it together with the music. How many studios have got big sound effects libraries? I really don't know—you tell me."

It is generally agreed that the picture edit suite is mainly interested in the picture and they do not have the time to attend to the sound. This fact combined with the relative lack of sound facilities in an edit suite means that until dedicated post-production suites were implemented, sound went pretty much by the board.

"The whole thing about sound in television has not been taken very seriously until recently and the equipment available now is helping to encourage this.

"But the fact that I have been able to move from a music background into this means that I can't very well knock studios for wanting to get into video. Sound is sound is sound; why should anyone feel that any part of it is their domain? I had the same thing with live recording and studio recording. Lateral mobility of labour in the sound field that's what I advocate. One of my main reasons for coming here was that I had done live work,



Fountain Television

Complete Video

studio work and some theatre work—this is another aspect.

"The thing about Fountain is that everything is here and there is an intercourse between the three facilities. I don't like the closeted environment of single dedicated facilities, it is much more healthy if there can be a degree of interchange between them."

Complete Video in London's Covent Garden is a television post-production facility providing services for both broadcast and non-broadcast markets including commercials, a small amount of music videos, corporate, industrial and independent productions and major broadcasting companies both in this country and overseas.

The facility sprawls across two buildings linked via an underground passage and although it first opened its doors in December 1981, sound post-production did not arrive until May 1983. The reason for this however, was not because it was an afterthought but because it was built from profits generated by the rest of the facility. The studio areas were allocated at the original planning stage and were simply filled in when the time was right. Once again the need for high quality audio had been foreseen. General manager Andrew Christie describes the company as being one of the larger of the medium sized facilities, on a par with Visions and Rushes, with an annual turnover of around £2.5 million.

Looking at the SSL *6000E* console and two Otari *MTR90* 24-track machine facility one would imagine that it was perhaps rather a lavish investment for such a production house.

"It has always been our objective to put in the best possible equipment at a given time—we don't skimp. The *6000* was one of the first anywhere purely for television. We recruited Wouter Van Herwerden, formerly sound supervisor at Trilion and gave him a brief to build a dubbing studio which would do anything required in television."

The *MTR90*s are housed in a separate machine room and nestle next to a Studer *A810* with centre track timecode, an Otari *MTR12* and a Revox *B67*. There is the inevitable *Q.Lock 310* and monitoring may be done variously on JBL *4435*s powered by Yamaha *2002* bridged amplifiers, or Visonik *David*s driven with Crown amps. Outboard equipment includes AMS *RMX 16* and *DMX 15.80S*, Court dual 32-band graphic equaliser, Neve compressor/limiters and an EMT *240* echo plate.

Andrew: "We believe it is important to provide an environment which is conducive to quality work. If you look around this building I think you would have difficulty describing us as a typical facilities house. We try to provide an environment which is pleasant and comfortable without being ostentatious whilst being an accurately proportioned and well laid out facility. The space was allocated for sound a year before we laid the first brick of the post-production suite and we spent over £300,000 building and equipping it.

"The equipment is centred around the SSL which is in our opinion is of very high quality. We feel that sound has always taken a back seat in television programmes and we felt that this was likely to change with the advent of stereo cassette machines, stereo television around the corner and music video going out (certainly those going abroad), in stereo. So we felt it necessary to have a facility that was able to do that. For the first year it did little better than break even and I admit we were a little

concerned. But then in the last year and a half it has more than justified its existence.

"It is advantageous for the client to book time in the mixing suite at the end instead of trying to do everything in the edit suite because the facilities are there to do whatever they want. It is a prudent move financially too because it is very expensive to fiddle around with limited equipment in the edit room; it is much better and cheaper to spend the money in the sound studio.

"Most of the clients that come here have chosen to keep things under one roof although if they want to take it somewhere else to mix that is entirely up to them. As for advantages we may have over music recording studios I think you need an ear for television sound as opposed to record—where they might possibly fall down is by not having an overall understanding of television. Here we have people with skills which have been developed to do a specific job.

"We are certainly not competing with them in terms of music video because we do not do that many but to an extent we are for dubbing sound to picture. Not that it worries me because I have a fully booked facility. If there is competition, it is probably healthy competition.

"There is an increasing awareness among television producers of the importance of sound which means that there will probably be enough work for all of us. It is our job to offer facilities for quality television programmes and I know we do so successfully because we are still trading and we have a full order book. I don't think there is that much competition really between video and music studios; if you think about it, of the major facilities houses very few have post-production. If I had a studio I would be buying television facilities, in fact it surprises me that there aren't more television facilities houses already."

AUDIO AT VIDEO FACILITIES

Limehouse

There you have one side of the coin. On the other there is Audio Facilities Ltd—a team of six engineers who amongst other things installed and now run Limehouse sound control room/post-production suites. In fact they see themselves as sort of knights in shining armour bringing light to the subject of audio for video-installing, educating and generally servicing the industry.

'Services to the broadcast industry' is the way Roy Drysdale, head of Limehouse sound puts it: "We aim to supply professional services to the broadcast and recording industry, including the supply of top people in the music recording area for television and video; we also offer consultancy to provide information on how the whole thing can best be achieved economically and artistically. We are a team of six people who have worked in this medium and we have direct access to leading freelancers in the field. The idea is that these people have the experience in doing this sort of thing."

Clearly he does not feel that either side really knows what it is doing. Video/television facilities houses fall down on the quality of their audio and the recording studios on their lack of knowledge of television.

"We are a new idea in broadcast. We designed all the studios at Limehouse—most television places don't have the sort of facilities you see here. We have also gone into digital recording because we are trying to improve the standard of recording in the broadcast industry."

Given that the sound department at Limehouse is Audio Facilities, that area of their work is our prime concern here. Limehouse was set up some two and a half years ago in Canary Wharf on the Isle of Dogs. An impressive modern complex overlooking the river it is a warren of studios, editing rooms and sound production rooms. The two sound rooms are virtually identical with Calrec recording consoles—36-channels—routable to multitrack machines and with tielines it is possible to link facilities and implement the whole lot on a single recording. It is a custom television and recording desk, the design of which they worked closely on with the manufacturer. Monitoring is Tannoy Lockwoods, and analogue multitrack is Otari *MTR90*. A considerable amount of work is done on digital when Sony *3324* machines will be hired in.

Outboard equipment immediately evident includes Audio+Design *E900-RS* equaliser, AMS *RMX 16* and *DMX 15.80S*, Klark-Teknik *DN30/30* graphic equaliser and of course *Q.Lock*. Sonifex cartridge machines and a Sony *Seminar 1* 2-track sit in one corner.

It would appear from talking to Roy that facilities apart, it is the people that matter most. There is no substitute for experience; experience which he feels the music recording studios simply do not have. "It includes the planning of the entire project, working out how it is best going to be set out later, so you need experience for one in the planning stage. It is essential to have the continuity of an experienced sound person working with the director throughout a project, it works so much better. That way you will know what happened at the recording and you can suggest, as you go along, places for editing, both from an artistic and a practical point of view.

"Even with recording of the concert itself there is a massive difference between listening to sound and watching picture with sound. A lot of people do not appreciate that it does make a massive difference. I read an article about the Carl Perkins recording we did which said that there was not a very wide stereo picture; if there had been any appreciation of the concept that comment would not have been made. It was largely a mono source because of all those different things going on and anyway, with television you don't want a wide stereo picture do you? Isn't it confusing? When you are watching and listening it needs to be far more precise than when you are just listening to a record. Experience shows you what options you have available.

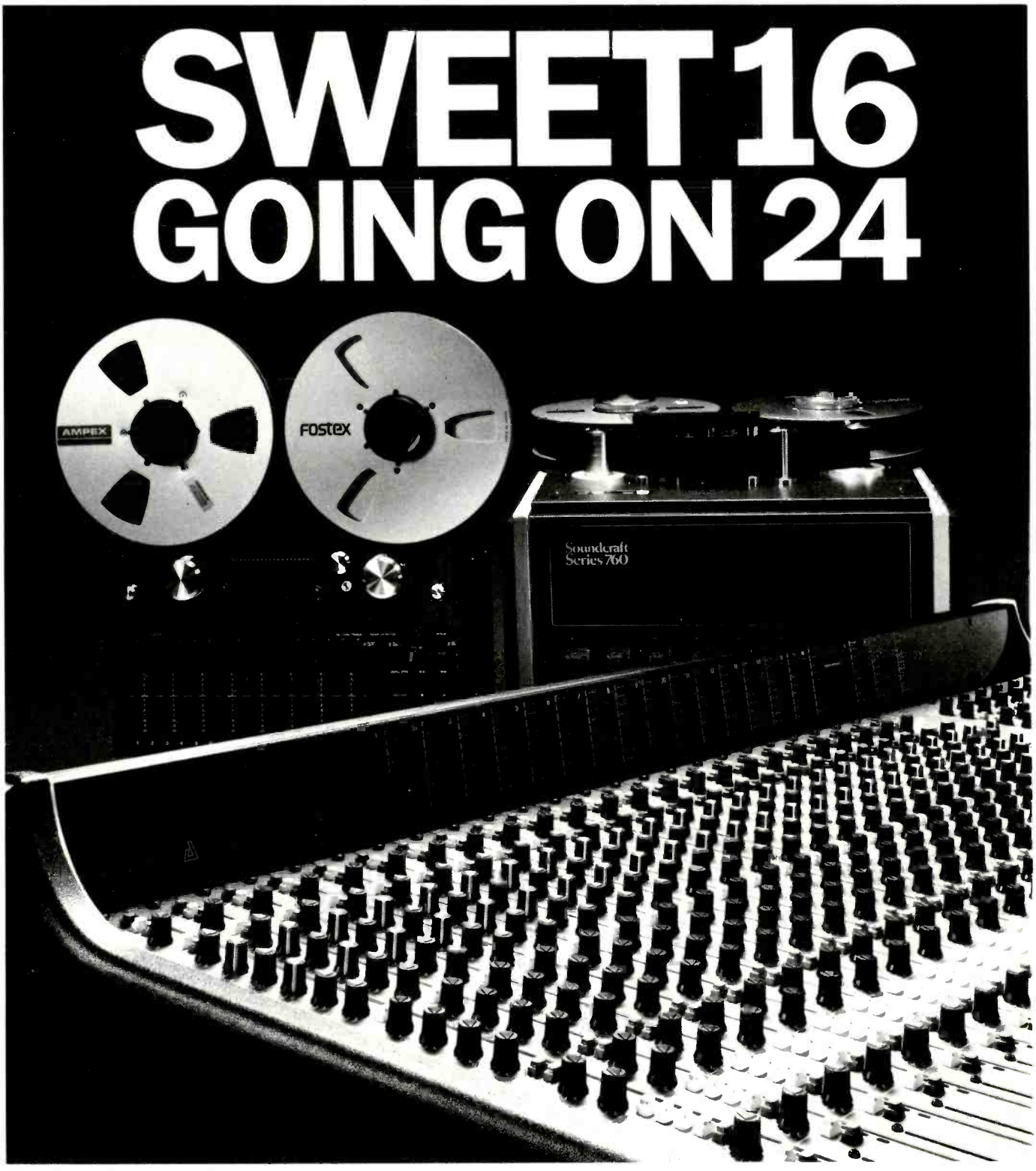
"When you make the recording you are going to end up with a digital or analogue multitrack. First problem, how do you keep in sync? The standard way is by having timecode on one track on the multitrack and one track of the video and using a *Q.Lock*, but it is not that simple.

"There may be inserts, perhaps a Betacam interview; experience means knowing what to do with this and what not to do with it. All the different information is gathered on separate tapes and then collated: vision is put with a guide track and sent to an editing house. Now in many editing houses they don't actually listen that much to the sound—if it works visually then it is probably OK is their approach. So now you have a visually completed edited master with the wrong (guide) sound; the separate sound tapes are not mixed. So now you do an audio mix to picture and it must be to picture—that is the only way to mix; you get a different atmosphere and you can achieve better production by watching as you mix.

"To make them lock easier they have to have been linked with a stable sync source and from there on, all pieces of equipment have to be synced from the same source and so you need a video DA.

"Now you transfer from multitrack to 2-track digital. You have the returned video with the wrong sound: transfer the guide audio on to another multitrack to use as a guide; copy the video on to U-matic; the mixed 2-track is synced with the guide sound and the music is put on in sync. Then lay all the music on to the multitrack and all the insert material. There are going to be places that need other things: effects, whatever. Everything needs to be ▷

SWEET 16 GOING ON 24



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AUDIO AT VIDEO FACILITIES

patched up and finally it is all mixed down to the final master on 2-tracks. The final sound is put back on to the original video—what we term audio layback with the main VTR controlling the digital multitrack and the final stereo mix is transferred on to VTR whilst making a 2-track digital master at the same time. Thus the VT has a first generation audio track because it is digital and we have a digital master which can be used to lock up to that video or for video disc or for CD—it can be anything you want."

Far from seeing the music recording industry as a threat Roy is all for encouraging it to expand and diversify. "If it comes this way then I think it should be more of a liaison than a competition."

Trilion's audio facilities (already looked at in depth in April 1984), have taken the case a step further. Not only have they a large 'music studio-type' post production mixing suite, they have now built a separate *sound* editing room. Trilion has been around for many years longer than any of the other facilities looked at here and both the facility and its chief engineer David Woolley have recording studio backgrounds which may account for a lot. Trilion came out of Trident and David came out of Air. Studio manager Sheila Cane explained how Trilion became what it is today. "Trilion was at the forefront of the pop video boom and from 1975 onwards we did a phenomenal amount of live shows. In the early days the record company would take the tapes away and remix them at a studio and bring them back to put them with the picture. That was no problem until hi-fi came along. Until then anyone could cut a piece of tape to go with a picture but it was only then that all those clicks and bangs became unacceptable.

"We decided three years ago to do something about providing high quality sound tracks to go with pictures. During the last three years we have done all sorts of programmes for all sorts of directors and producers from all sorts of backgrounds and we have found that a lot of them were not comfortable in sound post-production."

So is the initial concept of having a 24-track studio with all the familiar gear in it (Trident console, Studer *A80* and *A810* machines etc, etc) not necessarily the way to put producers at their ease? Not video producers/directors because there are even more knobs whose functions they are unsure of. And not, ventured David, bands because they are intimidated by the fact that they *do* understand the technology, they are worried that you are going to mess up their music and they know you have the tools to do it.

"We are trying to scale down the hi-tech look of our editing rooms because people are intimidated by it. They feel they have lost control when they come down here from picture because it is like walking into a space ship."

Trilion most definitely feel that music studios should leave video to the facilities houses who have the technology and experience to cope with it. Far from seeing that they could conceivably be accused of poaching the music studio's livelihood David says "The boot is on the other foot—the recording studios have just woken up and realised that they don't offer a very good service. They are the ones that are too specialised. So they have decided to dive into video. They are the ones who are poaching work from us.

"They have the advantage in that they have just spent five months making friends with Depeche Mode or whoever and the client is going to feel predisposed to staying with one facility. Studios have the disadvantage in that they have to put the final mastering out to a video house and also because some of them probably don't have the experience to do this sort of work.

"There can be a crossover for the simpler things but when it comes to combining music, dialogue, sound effects, credits, music and doing all those things, you very quickly realise that all they have got is a recording studio with a video machine stuck on the end—not a video post production suite."

Sheila points out that generally they will have to edit at least one third of a live concert recording to fit into a 90 minute television slot, "and the video technology we have allows us to do that."

David: "I don't think there is any question of anyone poaching from anyone, groups go where they feel comfortable. They know when a studio has got a job in hand, when they are on top of the work and if we weren't on top of the jobs we do people wouldn't come here, but they do.

"Very few music videos nowadays consist simply of a concert. They involve interviews and documentaries and all sorts of things. Mixing to video is quite different to mixing for CD. A CD consists of 10 different songs with gaps in between. A video is not a CD with pictures on it, it is an amalgamation of sound and video. If these studios want to get into video because they feel they have the gear in their studios then there is this element of the argument: do they understand the technology in front of them? You can push faders and add EQ and effects but that is only the beginning of the story.

"The whole environment is completely different; it is a completely different medium. Even the language of music video mixing is different to the language of CD mixing."

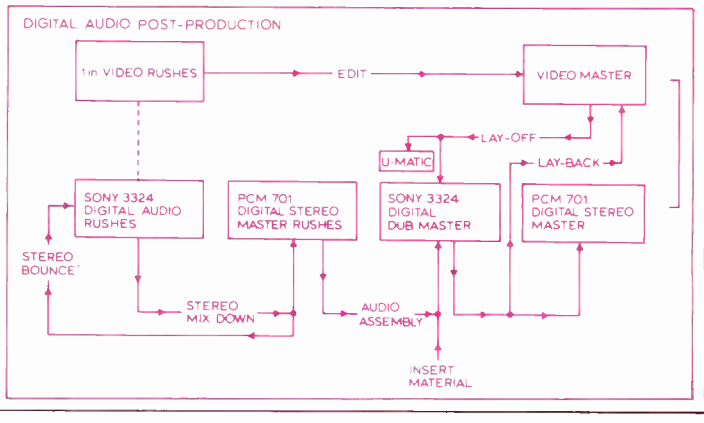
The trend to use lots of footage of the band busy in various locations out and about as well as straight footage of the concert is becoming more and more popular making the exercise that bit more complex. "The engineer has to artistically see the music as only one element along with all the backstage sound effects, plus the dance routine, plus the voiceover, and he has to stop being quite so precious about the sound.

"It is technically very complex playing in several sources; you have got the ENG equipment backstage, the stage multitrack things plus the sound effects in the studio. The engineer has to get used to working in not just four minute songs which you can play backwards and forwards but working cohesively in 3, 4 and 5 s sections of the programme. It really is different in so many different ways and it would be better in the long run if people understood that.

"Another advantage we have over recording studios is that they haven't caught on to the fact that multitrack is not particularly suitable for video post-production. You never have a choice about your source machine—that is whatever was used on the night; if it was 24-track then you have got 24-track. But you are immediately faced with a dilemma: what are you going to do after the stereo balance? When they are not sure they tend to put it on to another multitrack which means you can have more than one source happening concurrently but you are just delaying problems rather than solving them because sooner or later you are going to have to edit, be it to change the order of the songs, insert dialogue, whatever. It is then that you realise that multitrack is not a very good recording medium for video post-production. The only thing you can do is to leave all the mixed source tapes as a jumble of ideas and use them as and when required.

"So after two or three years of video post-production we took a look at the work we were doing and what people were demanding of us and decided that the time was right for us to expand and build a new facility. "We decided to actually come out and call everybody's bluff! Some of the film people had been saying that post-production of multitrack was rubbish, that for drama and the new brand of video it is so time consuming that it drains all your energy. So we decided to stop acting corporately for a second and concede that they had a point. Perhaps post-production on multitrack is limited."

Sheila recounted what was said at the recent Synclavier



demonstration: "that every 15 minutes of every 60 spent in the studio is given over to rewinding the tape. If on film, you want something to be five frames earlier you simply pick it up and move it. You can't do that on tape and so it is time wasting and off putting for the client. We decided to be adventurous and take the mechanical problems out of post-production, allowing a more creative and more fulfilling environment. People in the film world have been looking at computerised equipment for a while—*Star Wars* was done on the Lucasfilm *Soundroid* thing. Lexicon are building something similar to the AMS *Audiofile* and there is some development going on in France."

The new edit facility at Trilion will consist of a Sony 8/2 digital console with two auxiliary sends, full parametric EQ on every channel ("which sounds absolutely lovely") eight A/D encoders and eight D/A decoders, digital interface to all tape recorders except the ¼ in and digital interface to the other major part of the chain: the AMS *Audiofile*.

"It has faders and it looks like a desk, which is important. If I hadn't told you, you wouldn't know. Directors will be able to push the faders up and down. It can be used as an A/A desk with EQ or just part of an all digital chain."

The *Audiofile* has therefore replaced the tape recorder. "We chose it for speed and flexibility. Even if it sounded like 15 in/s non-Dolby I would still use it because it is so accurate and fast. Picture editing has been computerised for ages. Post-production has always been done on borrowed technology which doesn't have the precision required. For example, even the best 24-track machines take half a frame to switch from play to record after you have done it and play it back. All the tracks are time linked to each other. . . it was a piece of technology which was the best available but now it has been overtaken by modern technology.

"As for 48 inputs, the one we have is eight and that is probably six more than we need! It will all come out of two holes in the audio and it will be finished by the time it comes out."

Why *Audiofile*? "Because it is available. The first hard disk unit we looked at was the Lucasfilm *Soundroid*, but that is not available yet. With AMS you can get involved in developing a system to suit you and you know it will end up being the way you want it. I have always been very impressed with their products anyway—they are all very good, very reliable. So we chose a powerful computer rather than a large mixing desk and that gives the room a relaxing and creative feel about it. We haven't got massive machines as the centrepiece of the room instead we have framed pictures and vases."

All the machinery is contained in three 19 in racks out of sight in a separate area at the back of the room where the signal is manipulated remotely from the console coming out to the speakers finished. (The monitors are Rogers *LS5/8*s biamped.)

Equipment in the rack is the *Audiofile*, obviously, Sony *Series 5 PCM 1630* with U-matic, *PCM F1* with U-matic and two additional U-matics—one PAL and one NTSC, an AMS *DMX 15.80S* and AMS *RMX 16* digital reverb. The only equipment which is not digital is the Sony centretrack timecode ¼ in machine.

"We have an Avitel timecode station which has longitudinal and vertical interval timecode generator, reader and character inserter which puts the timecode number in the video. The vertical interval is important because it adds a lot of precision. The longitudinal one stops when the tape is in pause whereas you can still read the vertical one. There is also a ten-source vision switcher giving full interface with the rest of Trilion. And the great thing about it all is that it is all compact and can intelligently speak to the whole of the rest of the system and sit in the rack at the back of the room and mind its own business—no noise, no distractions. The engineer's working surface consists of the 19 in AMS and the Sony desk which, if anything, is even smaller than that.

"What we have talked about is only scratching the surface of what the *Audiofile* can do. I'm a fan, I've been completely sold on it and hope I have shown how far ahead of currently available post-production it is, allowing the creative people freedom to have ideas. I realise what we are doing is a high stakes gamble but the odds are stacked pretty heavily in our favour!"

There you have it: video audio from four points of view. Is this the way the music industry is going? It is certainly food for thought. □

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Abbatoir Studios, Birmingham

Having taken its name from the building's former use, had Abbatoir Studios been built in the 'live end, dead end' tradition?

"No!" exclaimed Alan Caves chief engineer and co-designer (along with acoustic designer Mike Smith) of highly successful reggae band UB40's Birmingham recording studios—"but we may be haunted by pigs!"

Abbatoir is two 24-track studios, one above the other, in a fairly recently constructed shell situated within Birmingham's frantic city centre. An architectural 'melting pot' where the past has been blended with the future like a Cubist remake and then illuminated with 1 million W of neon; buzz roots promenaded by young fashion-conscious culture hungry inhabitants weaving through streets dominated by immense shopping developments, offices, hotels discos and night clubs amongst which nestle bazaars and street markets more reminiscent of the Arabian Nights.

Birmingham is Britain's second largest city, the birth place of some of rock and pop's all-time greats. And now, inheriting the cosmopolitan musical culture which echoes in the din of this place there is a whole host of talent performing across the musical spectrum. Alan Caves has been involved in the Birmingham musical scene for 16 years. All the ideas and experience he has accumulated in that time have been incorporated into Abbatoir's recently opened international class 24-track studio.

It was the upper studio which first evolved from the large rooms initially only intended for rehearsing.

"But the sound of the studio was great—still is—and all of the bands that came here really loved it because it helped them in the interpretation of their own music. And of course, they wanted to make demo recordings. So we installed an 8-track facility which found instant success and before long that was updated to 16-track 2 in 3M *56* with a Soundcraft Series *800* console. We were also doing work for the local radio and television studios and eventually the pressure of the type of work we were getting led us to install our new studio in the basement."

Whereas the upper floor had its limitations—restricted space and access—the basement initially had other drawbacks. "When we first acquired the building it had been empty for four years and the basement was knee deep in water that had leaked in from the canal next door. It had also been the main abbatoir and believe it or not there was still blood up some of the walls. We nicknamed it 'Quatermass Pit' because it was really awful but everything we needed was there. A large loading bay at the rear, stacks of room and with other rooms upstairs the opportunity to provide cafe, pool room and kitchen facilities for clients relaxing between takes. There are also offices on the top floor from where UB40 run their nine companies. So we just got stuck in."

Alan, though no stranger to recording studio construction, having already built two of his own, enlisted the help of acoustics designer Mike Smith. "I'm not a boffin recording engineer. Everything in these studios is here because we know they work. We didn't need a computer read out to tell us. Just a lot of sweat. We 'feel' music. That's what is important. Getting the feeling on to magnetic oxide is where it's at. That individual sound. We don't bug our clients with high technology."

Even so, looking around the recently installed basement 24-track studio with its precisely angled walls and ceilings clad only in wood, rustic brick and parquet floors it's hard to believe it has only the minimum of absorption.

"We wanted to achieve a bright airy sound. This is a basement, quite a big basement but just as likely to get very stuffy when a lot of people are working together which is often the case. We worked out that when the studio is in full swing, when the tape machines and amps are cooking and there's sweat running off the board, about 7 kW of heat is being generated. That's like having seven electric fires on in a domestic living room. But even when the air conditioning is on, a 'stuffy sound' will send people to sleep. So we deflected and scattered the sound and retained as much of the high frequency content as possible without colouration."

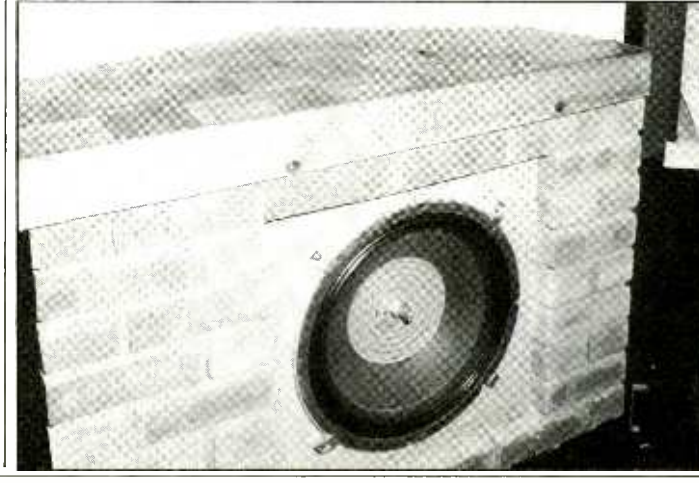
The studio is full of innovative ideas primarily intended for UB40's reggae music which found instant appeal with heavy rock bands. For instance Alan has developed a unique monitoring arrangement designed to cope with the excessive bass requirements of reggae recording.

"The problem with normal monitoring systems is that once the bottom end level is wound right up everything sounds very messy and it's difficult to be sure of what you're achieving. When I was live mixing and managing UB40's PA, I discovered Cerwin Vega speakers. They were great and handled the bottom end fantastically. So I installed their 18 in strokers in solid brick enclosures beneath Tannoy *Buckinghams*, and designed a special 300 Hz crossover to bring them in once the monitoring has reached a certain level. The back end of the control room is split into two bass traps tuned around 160 Hz but for this special arrangement we incorporated Helmholtz resonators into the seating.

"There's a railway viaduct just up the road so we hung tons and tons of *Rockwool* in the external wall cavities, probably more than necessary—it now most likely protects them from us. We put a new floor in between the two studios, fully floated and every entrance has an airlock door system to prevent sound ▷

Chief engineer Alan Caves in Abbatoir's new control room in the basement

Cerwin Vega 18 in as sub woofer system under Tannoy Buckinghams. Note pin through driver



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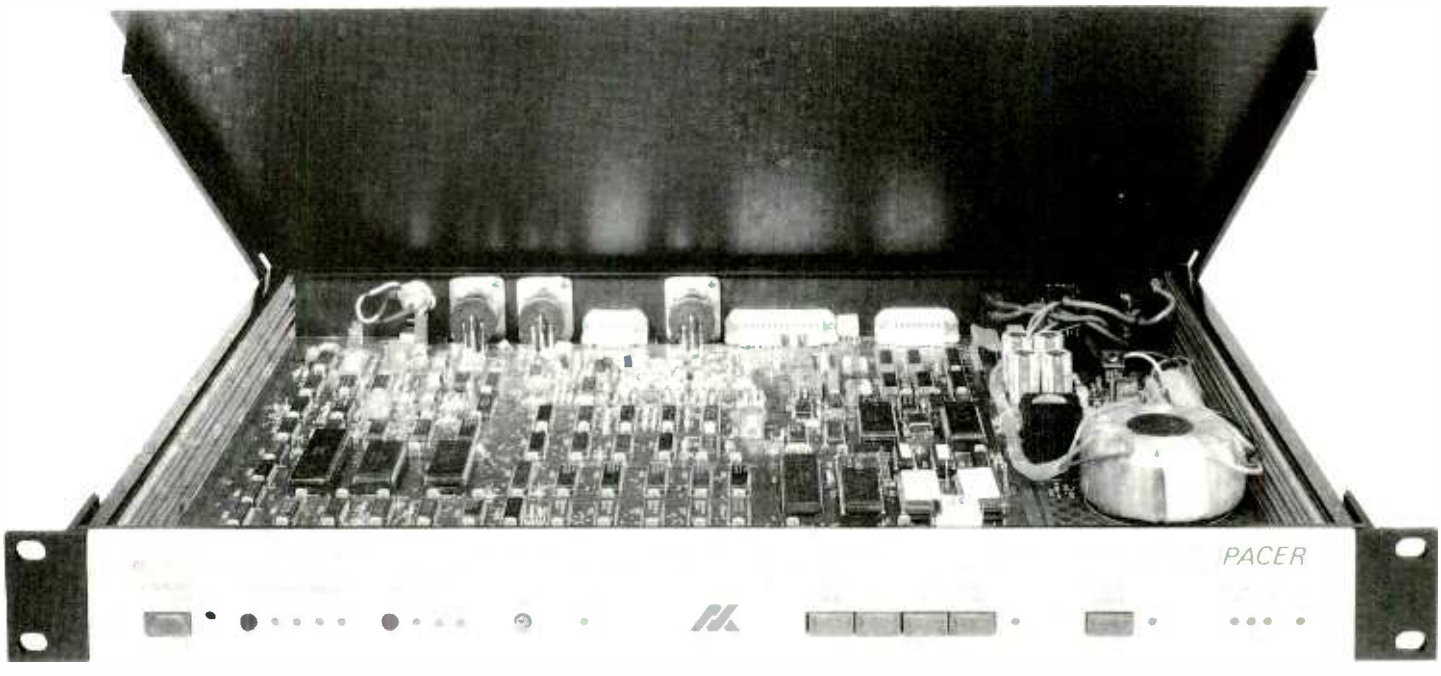

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carrying into the stairwell, corridors and top floor offices."

The basement control room is diamond shaped, each front facet (in front of the desk) containing a window constructed from six glass sheets, necessary for the monitoring set up. The left hand booth (from the engineering position) is for voice, percussion and Yamaha baby grand piano.

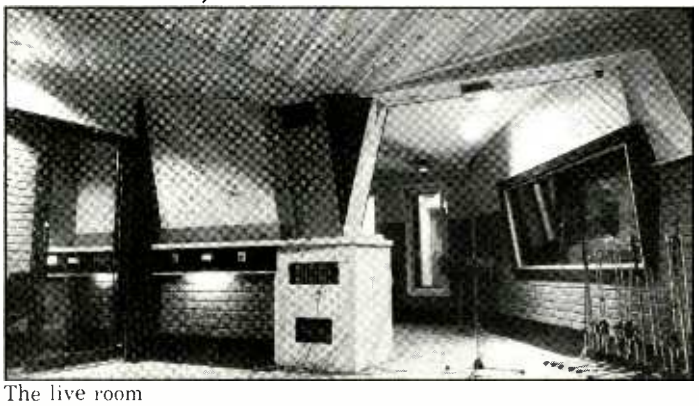
"It took six men a day to get the piano in. Eventually we had to take a wall out and then rebuild it. The piano will never come out now."

The booth, finished in wood and York stone, relies on acutely angled wall and ceilings for sound control. The wall nearest the piano is slatted with rotatable louvre panels, hard glazed on one side enabling precise shaping of the on-mic live sound. "Parametrics and equalisers can't give what that room can—it used to be the meat fridge."

Next door to the piano booth and viewed through the larger central control room window is the 'live' room. Constructed of brick and concrete, it is normally used for drums.

"The live room has length rather than height so by

Abbatoir, continued



The live room

progressively placing ambience mics down the room the drum sound may be varied between dry and gigantic. It's a tunnel effect and gives a very full and punchy sound."

Off the live room are several separation booths each behind sliding glass doors. There is also a smaller booth lined only with mirror tiles for guitar speaker.

The right hand control room window looks into a small post-production area. Because of the angles between the booths and the control room and a novel arrangement of windows within the booths everyone involved in the recording session is able to maintain visual contact during recording.

In the control room every item of equipment is within arm's reach of the engineering position and the mute and fader status of the Amek *Angela* console/Optimix automation is shown on a monitor above the central window. A larger monitor is for video post syncing, another smaller monitor survey's the building's exterior for security purposes. They are considering installing an SSL *4000* series console towards the end of the year.

An Otari *MTR-90* 24-track machine stands behind the engineering seat in an alcove between the bass traps and rear seat and *701* and *501* PCM processors with Sony *C9* Betamax machines above.

A mobile twin rack trolley contains all the outboard effects including Lexicon *224X* with *LARC*, AMS *RMX 16*, *DMX 15-80*s with de-glitch, Bel *BD80*, Aphex, Klark-Teknik *DN780*, Roland *SD 3000* digital echo, *SSS* tape echoes, *Dimension-D*, two Yamaha delay *E1010*, 14 Drawmer stereo gates, 12 stereo compressors. UREI and dbx comps and AKG microphones throughout.

The upper studio is now intended for the more budget-conscious groups and retains the Soundcraft Series *800* 44/8 console and 3M *M79* combination with Tannoy monitoring and a range of professional signal processing and sound shaping equipment. The studio can be run in 'lock' with the lower studio. The upper floor also houses the kitchen, microwave and conventional cookers, pool room, cafeteria and TV/video room. **David Hastilow**

Abbatoir Studios, 92 Fazeley Street, Birmingham B5 5RD, UK. Tel: 021-643 1321.

Werner Studios, Denmark

Copenhagen, Denmark's capital city, has for many decades been the centre of the country's thriving music industry. Until recently, the recording business has been a somewhat insular affair with 'foreign' artists' recording visits being few and far between. In an effort to change this the larger studios have effected either major rebuilds or complete new constructions in their attempts to partake in the world market.

In Jutland the unusually large scale Puk Studio complex with its two LEDE-type rooms is attracting increasing interest from all over the world. In Copenhagen, the most recent facility to open is a completely new studio for Werner. The Danes seem to benefit from a luxury available to very few in the UK—space. The abundance of this has led to the design of interesting, even adventurous rooms which one simply would not be able to afford to do in Britain.

Werner is no newcomer to the recording business. For 10 years a studio has been in operation in various forms, alongside its Replay Records company and a 24-track mobile.

The new facility has been built inside a 500 m² industrial building dating back to the late 18th century. It is the central one of three acquired by the studio, the remainder to be expanded into in the future. Currently one of these is being used as rehearsal rooms and maintenance workshop.

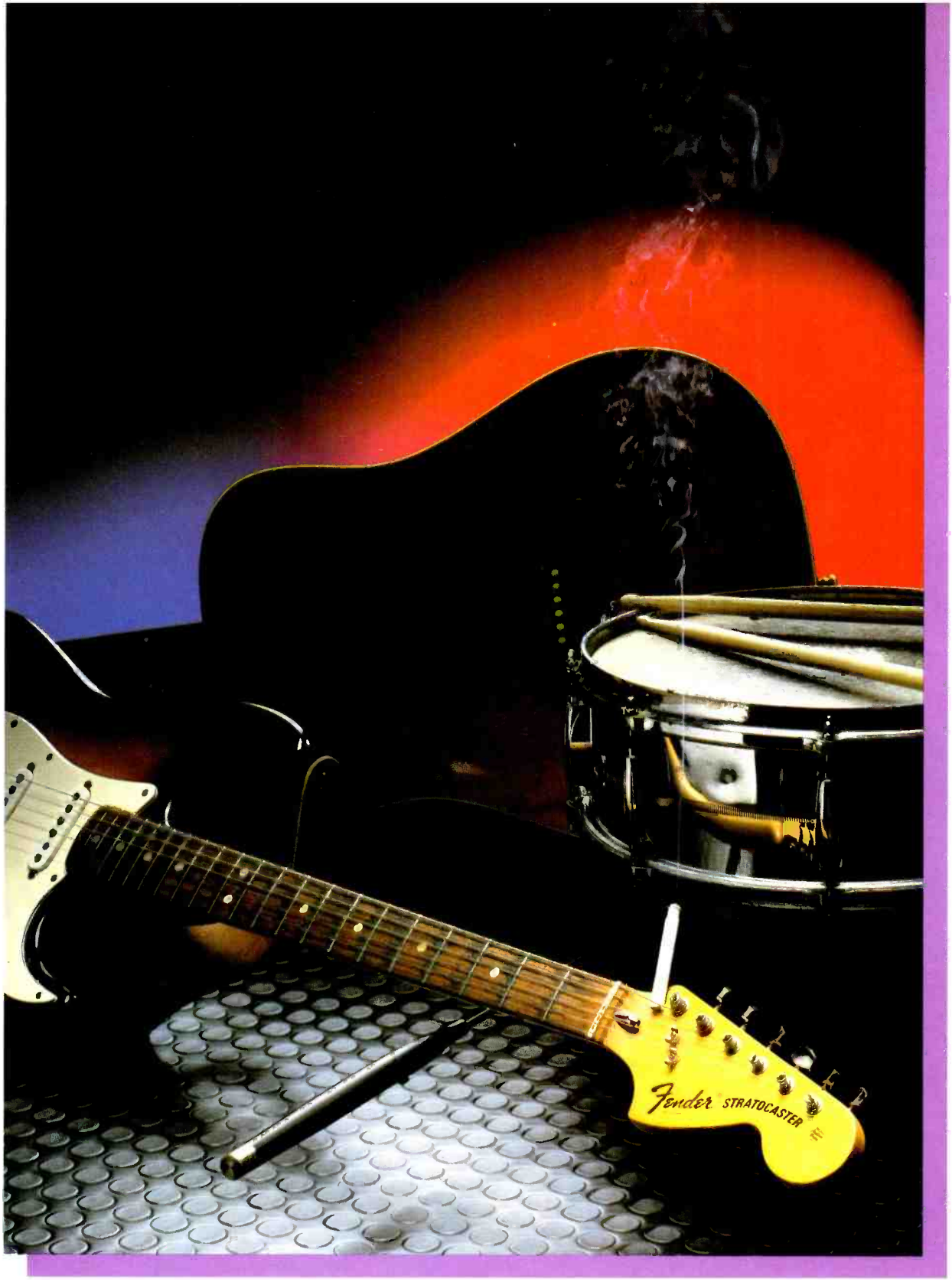
If not prepared, one is slightly taken aback on first entering the studio area. The result of a collaboration between Danish architect Stefan Frantzen, Munro Associates and the four Werner partners, it is a combination of neutral colours, natural daylight, attractive and comfortable furnishing and space which introduces a calmness in a naturally high pressure situation.

With a basic colour scheme of greys and blacks they aimed to create an environment which may easily and instantly be altered by the introduction of a few simple coloured lights. Chief engineer Jörgen Knub explained: "In this way, rather than having strong colours to start with we can now highlight the things that matter, focusing your attention on the equipment and the sound, not distracting you with the room. The colour scheme has a calmness which is very important I think, and it is easy to change it when necessary."

The building itself did not require much attention—a large steel crane had to be removed from the ceiling but the original roof timbers are still there and are stripped or painted white as appropriate. The layout of the rooms follows an idea used in the original facilities, ie all four having wide windows giving total visual communication from the furthest points. The rooms are structurally split in two: the control room with machine room behind being separated from the two recording rooms.

The Werner people had a pretty good idea what they wanted when they contacted Munro Associates to discuss design, over two years ago. Jörgen: We went to hear the Quested monitors at Red Bus and although they sounded good, it was as if you were standing *in* the sound as opposed to listening to it, which is what I prefer. We also wanted to be able to close mic in the studio and mix that with the ambience of the room, so a good sounding studio was very important."

Andy Munro summarised it thus: "It started as an LEDE idea which grew. The main thing was to try and incorporate some natural light in order to make it bright and airy, which was not easy, because it is only available from above, and that is why ▷



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we did this."

'This' is what is termed in the architectural world as a 'lantern'. Positioned in the highest part of the ceiling it is a skylight at an angle of 45° which, rather than being exposed to the outside world, gives a view of the original beamed roof space and admits daylight from the building's side windows.

"The lantern is basically part of the live end of the LEDE room." Directly beneath the lantern is a custom, light grey, effects housing which runs the width of the recording console and sits behind the engineer.

Andy Munro: "Sitting at the back of the room it still feels like a control room because you are getting the direct sound of the monitors; there are no reflections from the front walls. Moving to the back there is only a very slight change in the sound perhaps, just a bit more bass. The aim was to increase the listening area. This also means that you can play anywhere in the room and still hear the monitors properly.

"The front half of the room represents what is now really our standard design practice. The control room window glass is angled to be in the same plane as the monitors in order to make this part of the room anechoic—there is nowhere to reflect.

"Under the window there is bass trapping. What happens is the sound radiates hemispherically until it hits the room boundaries and is then absorbed; consequently all low frequencies radiate

Werner, continued

forwards in phase to be absorbed in the highly damped membrane absorbers in the side walls."

Further back in the room there is a seating area and behind this is the glass door through to the machine room. On either side of the doors there are grey wooden slats in a trapezoid arrangement which are designed to diffuse the sound, bouncing it up, rather than out into the room. On either side of these are floor to ceiling areas of black slate which is complemented by black fabric (over hardboard) on the rear part of the ceiling. Apart from the wooden floor under the console, the room is carpeted in light grey, toning with the grey wood and fabric of the walls.

The monitoring was put together by Munro Associates and comprises a soft dome system with BSS crossovers. There are two bridged Hafler *P500*s for the mid, one *DH500* for the tweeters, two BSS *FD* series frequency dividers and the bass section is powered by Yamaha *PS5005* amplifiers. The whole system was tuned 'in situ' using the Techron *TEF 10* computer analyser for true minimum phase response.

Munro: "As with all our control rooms that are full 'from scratch' designs we strove to eliminate any form of graphic equalisation. This is done by a combination of theoretical calculations at the drawing stage and careful 'tweaking' of the monitor system and the acoustic treatment in the early soundfield."

In order to avoid interference with the sound path, the nearfield monitors, a pair of JBL *4312*s sits on a black cantilevered shelf and when required are hydraulically raised to emerge dramatically from behind the console.

Console choice finally brought Werner to the new Neve *V* series. It is a 48-channel in-line console with 48-track routing and, of course, *Necam 96*.

Jörgen: "We are very very happy with the console; it is very nice sounding. One of the reasons we chose this was because of the *Necam*. We like to see the faders moving and know what is happening with our own eyes."

Werner Scerrer himself has built many things for the studio over the years. One such thing was an events controller for the console. "He built an events system of automation with extra relays so that you can shut off whole sections, for instance all the outboard effects returns."

Other equipment in the control room includes a Fairlight *CMI*, Quantec *Room Simulator*, Lexicon *200* and *224X*, AMS *15.80S* (4.8 s each side), Eventide *2016* processor and the new *Harmonizer*, EMT *250*, Aphex ("the old, good one"), TC Electronics *Spatial Expander*, two Korg *SD3000* delays, Synton *Vocoder*, UREI *1116* compressor, two *LA4*s, *Gain Brains*, Kepex and Drawmer noise gates, Audio Developments compressor, Roland *Dimension D* and *SRV* reverb, two Pultec valve equalisers, a valve cutting compressor refurbished by Werner and an *SRC*.

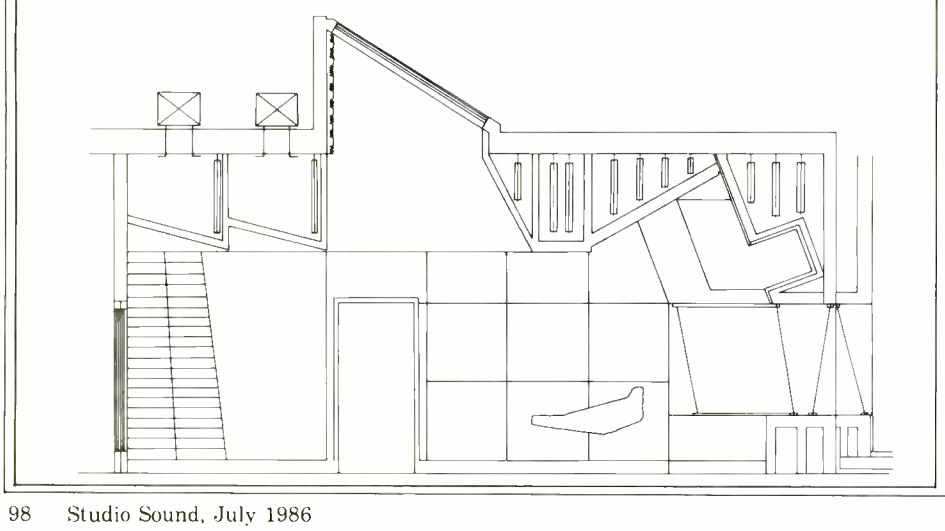
Stepping through to the machine room the advantageous amount of space is immediately apparent. Large machine rooms are very few and far between. This one is approximately 15 m² and may operate either as an extension of the control room or as a completely separate facility where copying, etc, can be done without intruding on sessions.

In matching greys, the room has the increasingly common black Pirelli floor covering with grey brickwork on the walls. The lower half of the rear wall along which the tape recorders are ranged is covered in grey Illsonic tiles to reduce machine noise.

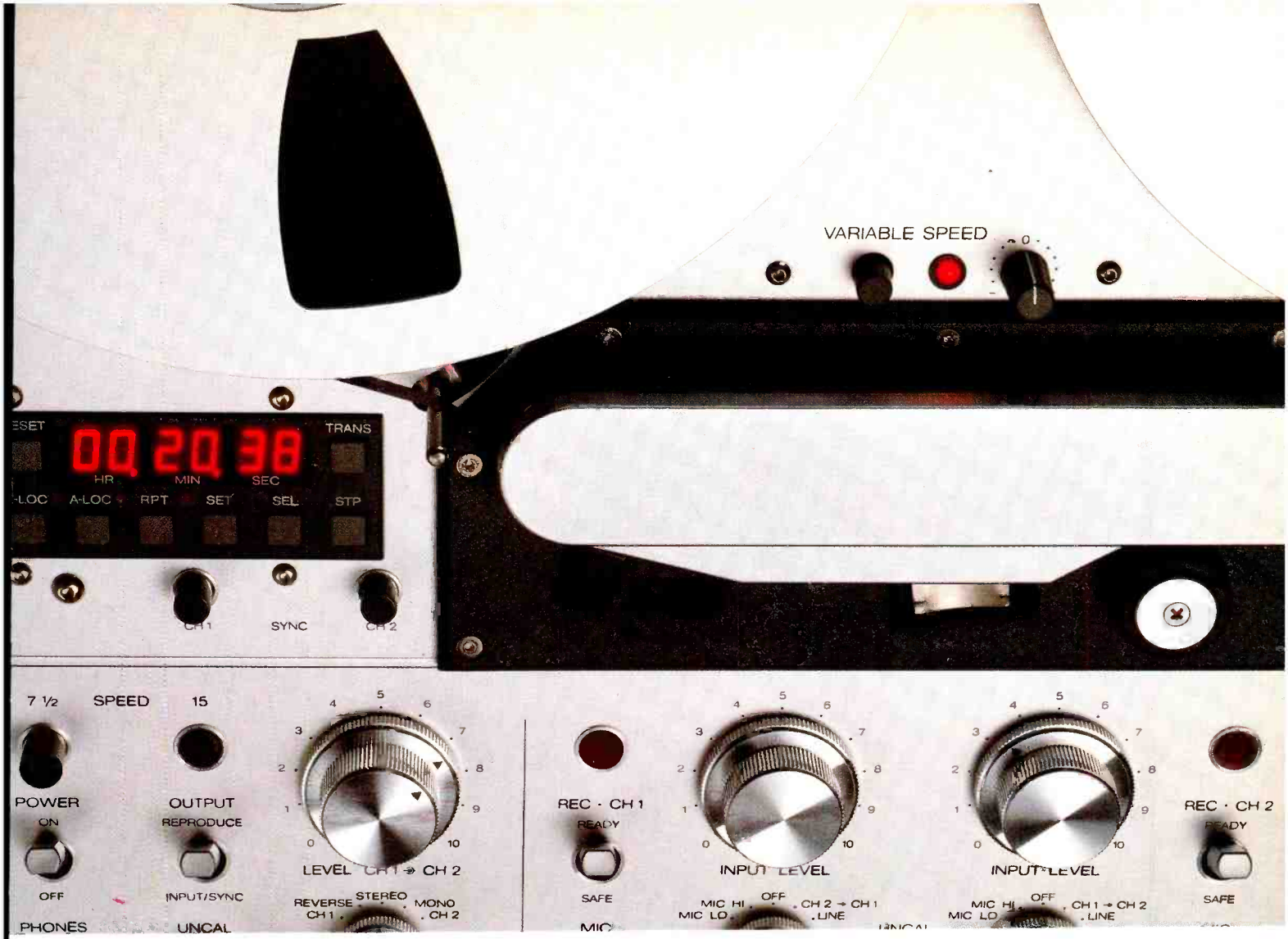
The tape recorder complement comprises two Sony *PCM-3324* digital 24-track recorders, Otari *MTR90* 24-track, Studer *A810* and *A80* for mastering, Audio+Design refurbished *701* with U-matic for use with the Sony multitrack giving a unique editing facility for U-matic, and three Tascam *122* cassette machines.

The decision to buy the Sony multitracks was due to a number of factors. The Werner engineers felt it easier to control than the Mitsubishi. Jörgen: "It works like a normal multitrack, the way people are used to; it is like an analogue multitrack recorder but it sounds much better. We also felt that the 24-track format suited our purposes better enabling us to expand ▷

Side elevation showing 'lantern' in ceiling



Control room



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to 48-track to match the desk. If it had been the Mitsubishi 32-track we would have ended up with 64 tracks which we feel is a bit unwieldy."

Werner's microphone collection is in the process of being expanded. At the time of writing there were: Sanken *CU41*, Neumann *87*, *47*, *KM84*, valve *M49*, *U47*, *269*, *U67*, *KM53* and *54* ("Werner has been building valve line drivers out of Lyrec tape recorder amps"), the Bruel & Kjaer mics, Milab *DC96*, *94*, AKG *460*, *451*, *D12*, *414*, *C34* and *D2000*, Milab stereo mic, Shure *57*, *58*, Crown *PZM*, Beyer *M88*, Sennheiser *421* and *441* and an Electro-Voice *RE20*.

The two recording areas, 70 m² and 30 m² respectively, can be occupied as one or two rooms. They are separated by large double hinged doors which open right up to bring the two together. The colour scheme somehow contrives to give the impression that all the sloping walls are flat. The room was designed to be as bright as possible.

"Visually we wanted to create a unity which avoids that feeling of being cut off from the control room. Looking down the architectural lines of the walls and windows they all follow each other through."

The control room window is a full 7 m across and allows easy scrutiny of the control room occupants! The main room has laterally and diametrically alternating sections of absorber/brick wall finishes, the absorbent sections once again comprising grey wooden slats with absorbers behind.

Werner, continued

The floor in both rooms is maple. In the wedge-shaped isolation room, home of the Steinway grand piano, there is a lowered ceiling with a lot of bass trapping above; the back wall is brick and the remaining walls semi-absorbent covered in grey wooden slats for maximum diffusion.

A favourite recording technique of Jörgen's is to have, for example, a drum kit playing close miked in the isolation room but with ambience mics in the main room. The arrangement of these rooms obviously facilitates this method.

Running down the side of all four rooms is the recreation area. The whole space is painted white, with grey venetian blinds separating the room into three sections: kitchen, lounge and an area with table tennis and pinball tables. It measures some 250 m² with the ceiling going right up to the roof, 6 m high. It is a very bright and light environment.

Although to non-Danish eyes, the Werner complex has come as a bit of a surprise, it has been no overnight thing. Swiss-born Werner Scerrer started his working life in Switzerland as a technical engineer and came to Denmark 17 years ago. In 1974, with a view to building himself a 4-track studio, he set up with a Teac *3340* and a homemade 28/4 console which he constructed out of Bang & Olufsen components. That equipment was later used to start one of the first punk studios in Denmark!

As Werner's ambitions grew, he met musicians Henrik Bötcher and Michael Bruun. They became partners: Henrik dealing with bookings, management and some production, Michael learning about the engineering side under Werner's guidance. Jörgen: "In 1976 they bought a Raindirk Series *II* 28/16/8 to which they later added eight more returns, and a Lyrec 24-track (changed in 1978 for the newer model)."

Henrik also explains that rather than spending their limited money on lots of rather inferior equipment, they invested it in a few high quality items such as the EMT *250*.

At this time Jörgen was a live sound engineer and he came on to the Werner scene in 1979 when he started as assistant and finally, three years later, bought into the company. 1981 was the year of the mobile. In its previous life it was an Ampex/Trident *Trimix* facility which Werner upgraded to 24-track with Otari *MTR90* and a Soundcraft Series *800* fitted 28/24/8 to suit this multitrack mobile application, "and it *just* fitted in the mobile" explained Werner. "Because it is a caravan, we can park it anywhere, and look at the shape of the roof; it is just perfect without any treatment whatsoever." The walls are insulated and the perspex windows are soft enough not to give reflection problems.

The caravan is 7.5 m long and 2.1 m wide and is remarkably spacious inside. In fact, the table and seats which turn into a double bed have been left at the rear because space is not at a premium.

It is put to work on location recording—especially during the summer months—as well as television sound and post production. Monitors are JBL *L100* in modified cabinets alongside Visonik *David 9000* and Auratones. Equipment is loaded in as and when needed although permanent residents include Ursa Major *Space Station*, a "heavily modified Revox *A77* with balanced inputs and everything else taken off: line in and out only; a home-built 6-channel dynamic compressor and gate; Audio+Design *Compex* limiter, Quantec and Roland *2000*. Now we have bought our second Sony digital multitrack we will be able to very easily put it in here for digital recording."

Meanwhile all live recording also goes down on Sony *F1*. There is a 100 m remote cable for the mic splitter and location work is further facilitated by the use of a wireless intercom system and TV monitor. The whole lot is towed around by a genuine Jeep.

Replay Records is one of the largest three independents in existence handling both Swedish and Danish artists as well as Statik Records. Beginning (as so many of them do) as an in-house production company, Werner found that the Danish market was too small to support the typical 3-way production deal that ▷

Recreation area

Control room and studio

The unusually large machine room

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AGENTS IN: South America, Dubai UAE, Sweden, Iceland, Thailand

STUDIOFILE

goes on in larger territories, ie artist/producer, studio, record company. They decided that there was no choice but to form their own company.

Even so, there are only two distribution channels available in Denmark: GDC (founded by CBS, Metronome and Sonnet) and PolyGram—Replay using the latter. EMI goes through Sweden which means that all their releases arrive in Denmark late. Henrik: "At the moment we have seven signings at least—negotiations with others are in progress; of special note is 22-year-old girl singer Nanna who writes all of her own songs and is very successful here. Her last album sold 200,000 (double platinum) which for Denmark is astounding."

In the next block is where it all began. Ten years ago Werner acquired two floors of a building which forms one side of a courtyard, the other three being residential, and all dating back to the turn of the century. The studio, now Studio B, sprawls out across the upper floor, spilling over into the stairwell, the toilet and a store-come-live room downstairs. Werner designed the rooms which are laid out in a very similar way to the new ones. Visual communication from control room, through studio to drum room to isolation room is very good.

The colour scheme is fairly typical of both Scandinavian and studio design of that period—lots of light wood with brown and orange velvet curtains and brown carpet. "The control room is very heavily damped and lately we have changed to only nearfield monitoring," explained Knub. 23 m², the room features a row of cinema seats along the back wall which are especially useful since they tip up to give more room should a stray keyboard player wish to set up at the back instead of in front of the desk (apparently, more frequently the case).

There is daylight in both control room and main recording room. The control room ceiling is angled variously with wooden slats covering trapping behind, as is the section of front wall not occupied by window; the back wall is half covered by velvet curtains and the floor is carpeted right through.

Werner, continued

Centrepiece is the Trident *TSM* 32/24 which was the result of an upgrade in 1981, along with a new Otari *MTR90*. At the time they thought about a Neve *8108* but because it was in-line they decided they preferred to have a monitor section; the main deciding factor was, however, that Trident had become known for its sound in Denmark. "Freddy at Sweet Silence and Rosenborg Studios both had *A* series and so it was a sound that people knew. It may be a bit noisy but it is very clear and open, very bright. It is also very easy to work with the filters." This particular *TSM* has a little custom ergonomic touch: the channels are arranged so that numbers 1 to 24 are most central, the remaining 25 to 32 being ranged to the left.

Monitoring can be done on a number of different units including JBL *4312*s, Tannoy *SRM 12* or *SRM 10*, Visonik *Davids*, Yamaha *NS10*, JBL *4411*s or Auratones. There is a certain amount of to-ing and fro-ing between studios, so the choice of equipment is quite extensive.

A MkII Otari *MTR90* is complemented with Studer *A80* and Revox *B77* ¼ in machines and Sony *F1*. Cassette machines are two Tascam *122*. Outboard effects racks are next to the machines along the window wall and contain Lexicon *200* and *92* DDL, Eventide *FL201 Instant Flanger*, *H949* and *H910*, a Kepex *II* rack, Bel *BD240*, Roland *SRV2000*, Korg *SDD3000* and an Audio Developments compressor/limiter: "It is very easy to handle, it will get a very good grip on the music; it is not very common but we like it."

Inventor Werner (as he is nicknamed) has built a flanger comprising two mono flangers giving two independent or mono in/stereo out. There is also the aforementioned EMT *250*.

As for instruments there are many including *LinnDrum*, Roland *Juno 60*, *Minimoog*, Vox *AC30* and Fender *75* guitar amps, a Gretsch kit with five toms, two bass and two snare drums, and a honky tonk piano in the live room downstairs which is tie-lined to the control room. "Downstairs can be very 'garage' sounding. It's a really popular live room."

In the main room (approximately 30 m²) there is pine floorwork, stained wooden slats on the angled walls with trapping behind, brown velvet curtains on one side wall, and orange on the opposite (which also has two windows). The ceiling slopes down off centre with spotlights hanging from the lowest point.

Following through to the drum room and, on a room within a room design, the isolation room. "It is very easy to tune drums in here and it gives a good dry drum recording. It has always been a very popular room for recording dry and putting a good reverb on to create whatever you liked; it is a very tight sound."

The main part where the kit would sit is approximately 6×12 ft with trapped ceiling and pegboard on the walls. Round the corner the wall is covered in real live egg boxes. The isolation room has a raised floor in order to isolate it more fully from the drum room. Ceiling and lower wall areas are covered in wooden slats with trapping behind, the upper walls being hardboard (or window). "This is a small room for vocals and sax—that sort of thing; it is not totally dead but has a manageable acoustic."

The rest of the floor is given over to relaxation and kitchen facilities. The stairwell has proved to be so popular a venue for recording that the windows have been insulated: "It is really great for recording a snare drum with just a stereo microphone and an Auratone. And this loo," Jörgen demonstrates, "was used by an American engineer for the bass amp."

Of the multitrack facilities in Copenhagen, Werner has for a long time been among the top three. What made them suddenly splash out so lavishly on the new facility? "We had been so busy working in here we were on three shifts; it was very hectic and we felt that this building couldn't stand the pressure anymore. It also gives us the opportunity to do more projects for our record company."

Last year 40% of the work was in-house and this was not merely filling in time; the record company turnover was in the region of 6 million Danish Krone, that of the studio 2 million Krone. Replay has grown to such an extent that in the next six months it will move to premises of its own, when the responsibilities of the various partners will no doubt alter slightly. At the moment, in spite of being almost totally responsible for Replay, Henrik is still acting studio manager; Michael who continues to play professionally is quite heavily into production and Werner and Jörgen, engineering and running of the facilities.

The rest of the team comprises assistant engineers Mads Nilsson and Anders Valbro, Sören Filtenborg who has been with the company for six years and can arrange anything, no matter what, new tape op Jesper Andersen, secretary and book-keeper Inge Lise Andersen and, in A&R, Jan Tronhjem.

Werner are keen to emphasise the fact that they are able to arrange accommodation and whatever else a client may need. Business is brisk not only locally but also from Sweden; with Malmö a mere 45 minutes from Copenhagen, Swedish bands will think nothing of catching the ferry across daily. Werner's central location means that there is good shopping and accommodation nearby, the Capital's centre is just 10 minutes by car or bus.

Looking to the future, it will be interesting to see when and how the other buildings will be put to use. In a climate where English studios are tending to be smaller with less recording space, Werner is definitely a breath of fresh air and the Neve/Sony digital combination a bold step in a country which is trying to pull major acts in from the rest of the world. Everything about the studio is vaguely unusual and deserves careful consideration and a listen.

Janet Angus

Werner Studios, Frederikssundsvej 60 C, DK-2400 NV Copenhagen, Denmark. Tel: 1 34 34 35.

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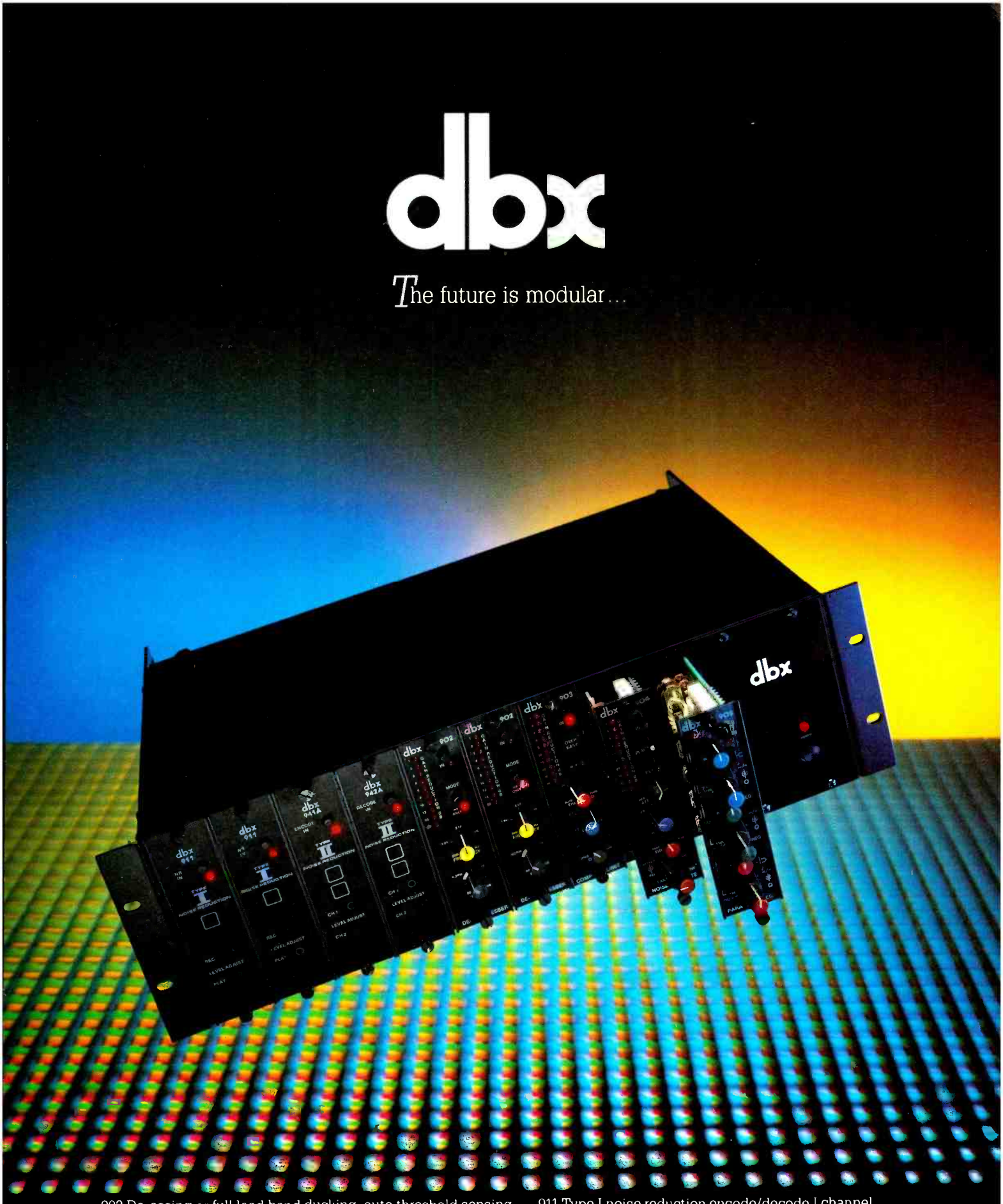

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STUDIOFILE

STUDIOFILE

Clinton Recording Studios, New York

What happens when a record company executive and a freelance recording engineer get together? Inevitably the conversation gets round to music and recording and the old problems get yet another airing; and in the case of Bruce Merley and Ed Rak, Clinton Recording Studios happened.

Bruce and Ed planned their new facility meticulously. They mapped out locations of other major studios in Manhattan (learning incidently that two were closing) and the locations of their potential customers. They knew the demands for facilities from previous experience and did the relevant cost analyses. Things fell into place, so they commenced looking for a suitable location. Having rejected it once because of the ceiling heights, they decided that the old record warehouse situated in the rejuvenating Clinton district of Manhattan could be re-engineered to fit their requirements. The result is an impressive studio complex.

On meeting record company executive Bruce Merley, maybe the building of such a complex is not so surprising. In a world where much of the equipment, however high the specification, is to be found in a cross section of studios, the one discriminating factor in its success or failure surely has to be the people who run it. All too often studio bosses excel at something in their field but not at business, with predictable results but Bruce knows exactly what his market is, what is required of him and his staff, and aims the business fairly and squarely to this end.

The complex, boasting three Neve/Studer 24-track rooms, plus 'floating' Mitsubishi 32-track and 2-track digital machines, was built for the production of jingles, which in US phraseology means top of the market ads. The New York jingles industry can support a facility like this as Clinton have proved since opening their doors for business in December 1983.

The positive attitude of the owners and their staff, coupled with the technical standard offered, meant that they found film music and records also coming their way. But significantly Bruce stated, "we can't be all things to all people", clearly meaning let's not lose sight of why the studio was built. Thus although trying not to turn good record and film business away, they feel it is of paramount importance that their jingles customers can get in when they need to, and are not elbowed out by long stay album projects or the like.

Studio A

In the area of marketing, many studios, large or small, have something to learn. How do you sell a $1 million plus facility and ensure a good return on outlay and effort?

The marketing of Clinton began at the design/construction stage, where potential clients were invited to come and see the facilities before completion. Some of their ideas were even incorporated giving them a sense of being part of it. There was very little direct marketing, ie advertising; instead a one-to-one approach was used to get individual producers and executives interested in the studio

The hardware

Equipment	Studio/ Location
Studer A800, 24-track	A,B,C
Neve 8078, 40/32, with Necam	B,C
Neve 8078	A
Studer A80, 4-track	A,B,C
Studer A80, stereo	A,B,C
Studer A810, full-track mono	A,B,C
Tascam 122 cassette deck	A,B,C
UREI 813B monitors	A,B
Westlake BBSM 10 Monitors	C
McIntosh 2500 amplifiers	A
Bryston 6B amplifiers	B
Bryston 4B amplifiers	C
Lexicon 224XL reverb	A,B,C
AMS reverb	A,B,C
EMT 140S plate reverb (2)	A,B,C
Drawmer noise gates (2)	A,B,C
UREI 1176 compressor (2)	A,B,C
UREI LA-3A compressor (2)	A,B,C
dbx 160 compressor/limiter (2)	A,B,C
Digital metronome	A,B,C
Audio Digital TC2, DDL (2)	A,B,C
Scamp rack	A,B,C

Equipment	Studio/ Location
Sony 25 in colour monitor	A,B,C
JVC 6650 VTR, with remotes	A,B,C
Marshall AR300 Tape Eliminator	A,B,C
Dolby SP24 noise reduction unit	A,B,C
Mitsubishi X-800, 32-track digital	Floating
Mitsubishi X-80, 2-track digital	Floating
Sony 701ES digital processor	Floating
Eventide 910, 949, 969 Harmonizers	Floating
Lexicon Super Prime Time	Floating
Pultec valve equalisers	Floating
btx Softouch synchronisers (2)	Floating
Magnatech 16 and 35 mm mag machine, 1- to 6-track	Film Room
Studer A810 (2)	Film Room
Revox PR99	Film Room

Microphones: Neumann, AKG, Shure, Electro-Voice, Sennheiser, Schoeps, Sony and Crown.

Instruments: model D Steinway 9 ft grand piano; Yamaha C7, 7 ft grand piano, Yamaha Tour series drums, various backline.

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Clinton, continued

personally. Bruce said that he did not want to generate so much work that they were turning it away. They had to allow their regular customers access when they needed it. The production of jingles is a quick turnaround business, and their aim was to "create a service company to satisfy the needs of the industry".

The foundation was there, they were installing world class hardware, and the rooms, particularly the main one, were attractive acoustically. The manner in which the operation was put together from the outset gave the company credibility. Always foremost in mind was the needs of their jingles customers, therefore when records and filmwork was offered, it was looked at rather selectively. When giving Bruce the opportunity to fly the flag in terms of musical milestones—like a number one produced at Clinton—refreshingly he declined. He stated that although he was proud of the studios' achievements, he didn't want to be classified as a particular type of operation by people remembering past results. Film music from Clinton, however, includes *Cotton Club*, *Ghostbusters*, and artists include George Benson, Julian Lennon plus involvement in a Frank Sinatra album.

First impressions say that the hardware used in Clinton is possibly in excess of what is required but Bruce's research among his clients has shown that top class equipment is required to service the growing stereo TV capability in the US, and also the film industry. Again demand for the use of Clinton has borne this out.

The main room, Studio A, is some 2500 ft² in floor area and 22 ft high. It was designed by Ed Rak—as was the whole building—and has wall-mounted paddles which are used for tuning. The acoustic properties of this room are considered by Bruce and Ed to be one of its fundamental assets. Studio B is on a smaller scale, and can accommodate a small group of artists. Studio C is used for mixdowns and some vocal overdubs.

The same Studer/Neve combination is used in each facility, with the exception of Studio A which does not have *Necam* automation. A 'floating' Mitsubishi 32-track digital is available at extra cost if required.

As far as the future is concerned there is growing 'sound awareness' in American TV, both by the TV manufacturers and the stations who transmit many programmes in stereo. Of course for many years an increasing number of film productions have featured high quality sound. Clinton is in an excellent position to record the music they require. They operate synchronising apparatus and this is where Bruce sees the future of his business. At present a good proportion of his work involves acoustically recording instruments, and the demand for this remains consistent and strong. Was there any requirement therefore to investigate the possibility of a MIDI based set up to supplement existing facilities? Although New York boasts a couple of these which Bruce says have carved a niche for themselves, he is looking into this, as well as other possibilities. During conversation two things clearly became apparent; firstly, that the two owners intend keeping their operation in the forefront of servicing their customers; and secondly, they will meet any competition aggressively.

Paul James

Clinton Recording Studios, Inc, 653 10th Avenue, New York, NY 10036, USA. Tel: (212) 246-2444.□

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Studio Equipment Distribution

For export (excluding America) contact musimex Tel. 01-881 6060.

SYNCHRONISATION

A guide to manufacturers of synchronisation equipment

ADAMS SMITH (USA)
Adams Smith, 34 Tower Street, Hudson, MA 01749. Tel: (617) 562 3801.
UK: Marquee Electronics, 90 Wardour Street, London W1V 3LE. Tel: 01-439 8421.
Europe: Adams Smith UK Ltd, Barnwell House, Barnwell Drive, Cambridge CB5 8UJ. Tel: 0223 215366.

System 2600 CC: up to 7-machine synchroniser; SMPTE/EBU; Vertical Interval Time Code (VITC); serial or parallel interface.
System 2600 A/V: basic 2-machine synchroniser/editor expandable to 10; video, audio or double-system operation; SMPTE/EBU; LTC and/or VITC; serial interface.

ALPHA AUTOMATION (USA)
Alpha Automation, Alpha Recording Corporation, 2049 West Broad Street, Richmond, VA 23220. Tel: (804) 358-3852.

The Boss 8400 Series: multi-machine controller; MIDI, 5×RS232/422 ports, 2×RS232; audio and audio for video editing. Includes MPU, monitor, keyboard and two integrated software packages.

APPLIED MICROSYSTEMS (UK)
Applied Microsystems Ltd, Town Mill, Bagshot Road, Chobham, Woking, Surrey GU24 8BZ. Tel: 09905 6267.

CM 250: 2-machine synchroniser with expandable option; SMPTE/EBU; SMPTE generator; audio and video applications; provision for software updates.

AUDIO KINETICS (UK)
Audio Kinetics Ltd, Kinetic Centre, Theobald Street, Borehamwood, Herts WD6 4PJ. Tel: 01-953 8118.
USA: Audio Kinetics Inc, 1650 Highway 35, Suite 5, Middletown, NJ 07748. Tel: (201) 671-8668.

Q.Lock 4.10+Alpha: controls two or three machines from a choice of four; SMPTE/EBU; Genlock software; timecode generator/reader; various software options.
Q.Lock 4.10+Beta: as above but Beta controller console mounted.
Q.Lock 4.10+Eclipse: 4-machine synchroniser expandable to 32; 100 loop memories.
Pacer: 2-machine synchroniser; RS232/422 serial port; lock to video sync; timecode generator; optional remote.

AXE (USA)
Artists X-ponent Engineering, PO Box 2331, Menlo Park, CA 94025. Tel: (415) 365 5243.

KT-1000: programmable digital metronome/synchroniser storing up to 50 different tempos. RS232 interface, MIDI compatible; SMPTE. Can be used to sync video, audio, synthesisers and live recording.

CIPHER DIGITAL (USA)
Cipher Digital Inc, 5734 Industry Lane, Frederick, MD 221701. Tel: (301) 695 0200.
UK: Future Film Developments, 114 Wardour Street, London W1A 3DG. Tel: 01-434 4344.

Shadow 11: multi-machine synchroniser, any combination of up to four multitrack audio, video or film transports. Will support extra machines in chase lock mode. RS232/422.
Shadowpad: optional remote for *Shadow 11*.
Softouch: audio editor for use with *Shadow 11*, RS232 interface.
CD1-750: timecode reader/generator, event controller for use with *Softouch*.

CMX (USA)
CMX Corporation, 2230 Martin Avenue, Santa Clara, CA 95050. Tel: (408) 988-2000/230252.

CASS 1: integrated editing and console automation system. Controls up to six audio machines and 15 additional sources. SMPTE/EBU.

EDITRON (Australia)
Editron Australia Pty Ltd, PO Box 156 Carnegie, 3163 Victoria, Australia. Tel: (03) 568-4022.

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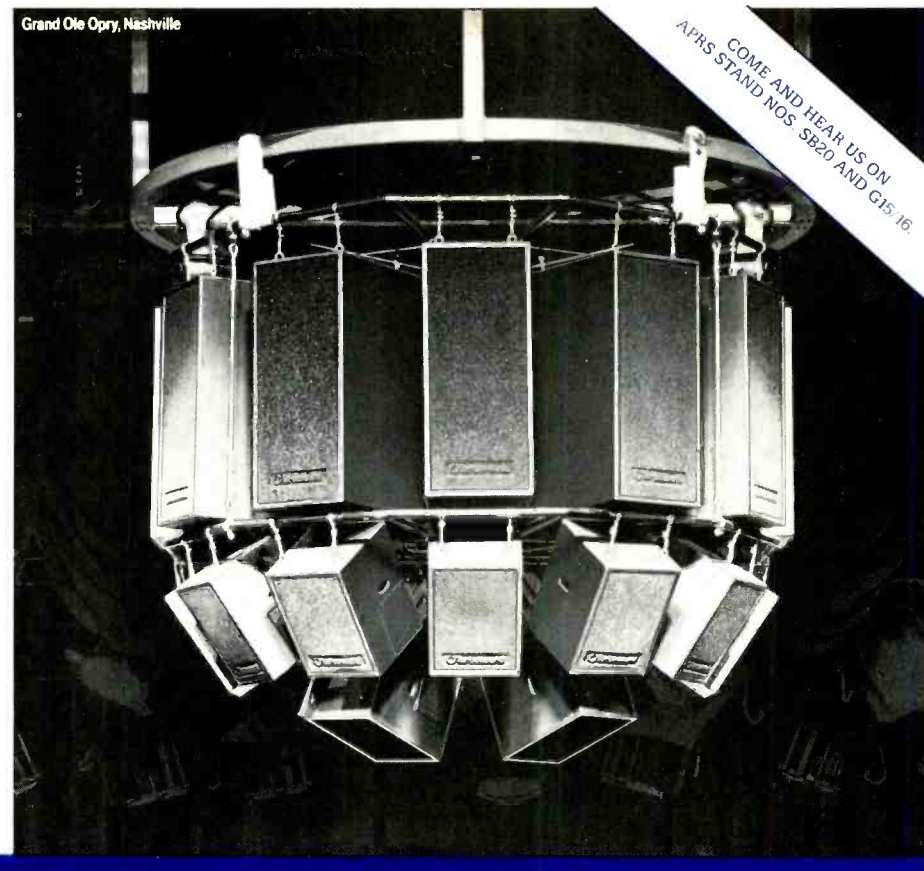
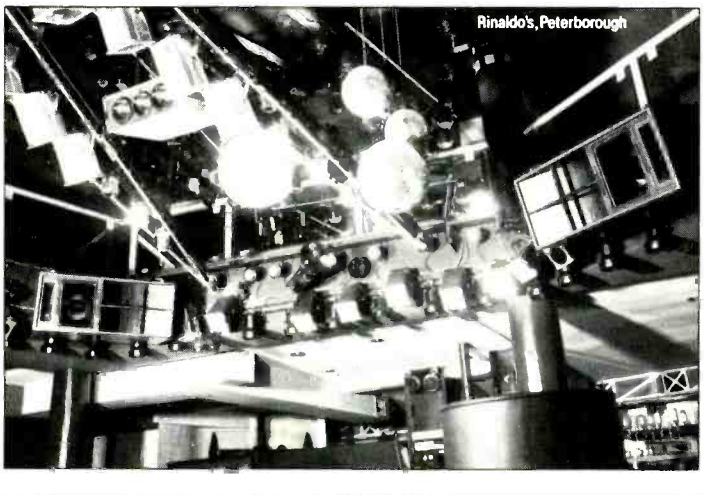
Never, in fact, have speakers been so completely designed from top to bottom. That's why nothing else can equal our power and quality in such small enclosures.

According to tradition it shouldn't really work. But then, tradition has never been our strong point.

We've defied the argument that an enclosure has to be bigger to be louder and to achieve better bass response.



From Nashville to Peterborough, from Ella Fitzgerald to Iron Maiden, Turbosound's the choice.



The 250Hz – 4kHz vocal range is covered, seamlessly, without a crossover point, and each section is dynamically balanced for strong imaging.

And because the enclosures are naturally correct, we don't need to use compensating electronics (we're surprised how many people compare our designs with others that use a mass of electronics to synthesise reality).

With distortion so low it's virtually hi-fi (in enclosures capable of producing upto 141dB maximum SPL), you'll understand why the TMS Series is increasingly regarded as the elite of professional sound systems.

Other benefits are more prosaic.

Compactness radically improves handling and installation capabilities; it obstructs sightlines less and saves money on trucks, crew and maintenance. And it's easy to create an ideal 'point source' array.

We can talk all day about why we sound better than anyone else, but you'll have to hear a Turbosound system to appreciate the real difference.

Like the clients we've mentioned, listen to a Turbosound system in concert, or pick up the phone and call your distributor to arrange an audition.

It's the most natural sound you've heard; whatever your audience, and whatever your music.

*The TurboBass™ and TurboMid™ devices are covered worldwide by Principle Patents (and not simple design patents). The concepts embodied in their design are, therefore, entirely unique. (See brochures for further information).

Turbosound®

A member of the Turbosound Group of Companies London New York

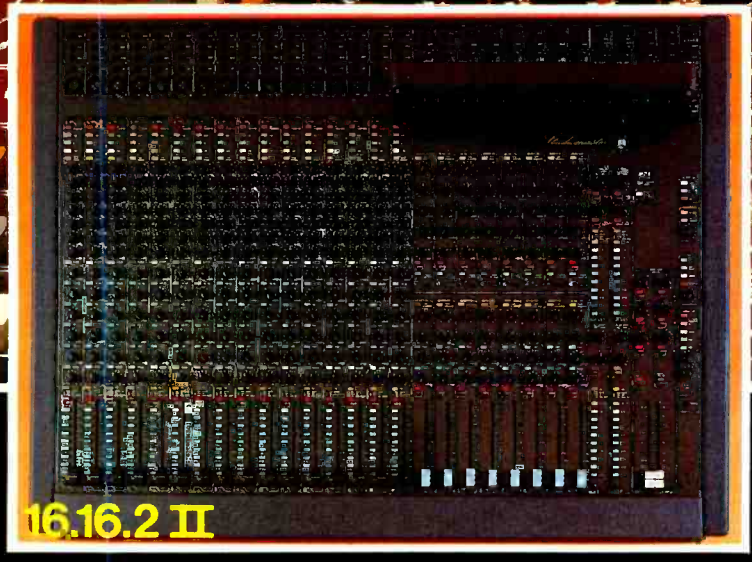
Turbosound Sales Ltd 202-208 New North Road, London N1 7BL Tel: (01) 226-0099 Telex 265612

Turbosound, Inc. 611 Broadway #841, New York, New York 10012 Tel: (212) 460-9940 Telex 230199

Worldwide distributors: *Australia:* Creative Audio Pty Ltd Melbourne (03) 354-3987 *Austria:* Audiosales Moedling (2236) 888145 *Canada:* Belisle Acoustique Inc Quebec (514) 691-2584 *China:* Wo Kee Engineering Ltd Hong Kong (5) 249073/5 *Denmark:* Per Meistrup Productions Karlslunde (02) 151300 *France:* Regiscene Paris (01) 4374-5836 *Greece:* Alpha Sound Athens (01) 651-31300 *Holland:* Ampco Holland b.v. Utrecht (30) 433134 *Hong Kong:* Tom Lee Music Co Ltd Hong Kong (3) 722-1098 *Indonesia:* PT Auvindo Merien Prima Jakarta (01) 323029/320704 *Israel:* Barkai Ltd Ramat-Gan (03) 735178/732044 *Italy:* Audio Link Parma (0521) 598723/4 Milan (02) 285-0334 *Japan:* Matsuda Trading Co Tokyo (03) 295-4731 *Korea:* Bando Pro-Audio Inc Seoul (02) 546-5491 *Malaysia:* Atlas Hi-Fi Sdn Bhd Kuala Lumpur (03) 432104/432077 *Norway:* Nordtek Equipment a/s Oslo (02) 231590 *Singapore:* Atlas Sound (Pte) Ltd Singapore 220-4484 *Spain:* Lexon s.a. Barcelona (03) 203-4804 *Sweden:* Inter Music a.b. Skovde (500) 85260 *Switzerland:* Sinec Schonenwerd (64) 413-747 *Thailand:* Bangkok Cine/Graphic Center Bangkok (2) 314-3570 *UK:* Turbosound Sales Ltd London (01) 226-0099 *USA:* Turbosound Inc New York (212) 460-9940 *West Germany:* Adam Hall GmbH Usingen (6081) 16031

STUDIOMASTER

SERIES II



SPECIFICATIONS

FREQUENCY RESPONSE: 14Hz to 19kHz +1dB **T.H.D.:** 0.02% @1kHz **C.M.R.R.:** -79dB@1kHz **EQUIVALENT INPUT NOISE:** -128dB **CROSSTALK:** -62dB channel to channel @ 10kHz **MAXIMUM VOLTAGE GAIN:** 82dB **DIMENSIONS (L x H x D):** 1016 x 245 x 718 mm (16.8.2 & 16.16.2) 888 x 245 x 718 mm (16.4.2) Input expander 268 x 140 x 718 mm Tape monitor expander 76 x 140 x 718 mm **ACCESSORIES:** ALL SERIES II mixers are supplied with an external power supply as standard. Flight cases are available for any SERIES II at extra cost.

THE STUDIOMASTER SERIES II MIXING CONSOLES

For many years now, Studiomaster have been producing high quality mixing consoles which with each phase of development have brought improved standards of mixing within the reach of more people.

The SERIES II mixers are lighter and more compact than ever before, so you can quickly set up a recording environment wherever it need be. The logical control layout means that despite the extra functions, the mixer is still easy to understand and they are built ruggedly to withstand the knocks of live work.

Six auxiliary busses with push-button return routing and a wide range of insert points cater to the growing demand for effects. 4-band input equalisation offers supreme sound control. Other useful features new to this mixer range include push-button output level selection (+4dBm/-10dBv), tape remix function, separate control room and studio cue mixes.

Perhaps the most outstanding feature of the SERIES II is the MIDI controlled muting of auxiliary returns and input channels. "Patches" are set up on a computer screen, then during mixdown or remix, sets of channels and auxiliaries are sequentially muted or switched on leaving you free to adjust fader levels and effects etc. while the computer actually performs the mixdown.

At Studiomaster we perfected the audio aspect of the mixer to give superb sound control and flexibility. THEN added the computer assistance in a clever way which adds very little cost to the desk, and leaves the desk fully operational when the MIDI is not required. All too often, mixers are built with "gimmick" computer features which are in practical terms useless as they create extra work, or their inclusion means sacrificing audio facilities.

The specification of these mixing consoles is superb, which means you can be sure that the mixer quality matches your multi-track machine for first class recordings that can go on to be mastered perfectly.

As always with Studiomaster, your mixer will grow with your demands: after purchasing your mixer and acquainting yourself with it, you can explore the MIDI capability, you can expand your input channels up to 32 (with 8-channel expanders that require NO soldering) and even expand your multi-track tape monitoring up to 16- or 24-track (on the 16.8.2 and 16.16.2 respectively) with an all new retro-fit add-on.

If you think all this is out of your price range, then you will be pleasantly surprised: state-of-the-art design means that no compromise performance is within your reach.

For further details:

STUDIOMASTER

STUDIOMASTER, Chaul End Lane, Leagrave, Luton, Beds LU4 8EZ
☎ 0582 570370 TELEX: 825612 STUDIO G FAX: 0582 570242

SYNCHRONISATION

USA: Editron, 1900 S Sepulveda Blvd, Suite 354, Los Angeles, CA 90025-5620. Tel: (213) 275-1790.

Model 500V: 6-machine synchroniser; timecode and internal sync generator; audio/video capability; master, slave, chase or sync operation.

EVERTZ (Canada)
Evertz Microsystems Ltd, 3515 Mainway, Burlington, Ontario L7M 1A9. Tel: (416) 335-3700.
Emulator: transport interface enabling audio recorders to be integrated into video editing suite (currently available for Sony *BVU/BVH* range); RS422; SMPTE/EBU; timecode generator.
Chaser: 2-machine chase synchroniser; RS232/422 interface; optional VITC and remote.
EV-Bloc: Eurocard rack system including multi-machine synchroniser, timecode and interfaces for editing.

FOSTEX (Japan)
Fostex Corporation, 560-3, Miyazawacho, Akishima, Tokyo. Tel: 0425-45-6111.
UK: Bandive Ltd, Brent View Road, London NW9 7EL. Tel: 01-202 4155.
USA: Fostex Corporation of America, 15431 Blackburn Avenue, Norwalk, CA 90650. Tel: (213) 921-1112.

4030/4035: Synchroniser system using *4030* synchroniser. *4035* controller and *8710* interface unit. SMPTE/EBU; can control up to three slaves; suitable for audio and video.
4050: SMPTE/MIDI auto locator; optional Serial bus.

FRIEND CHIP (West Germany)
Friend Chip, Bergmannstrasse 4, 1000 Berlin 61. Tel: 030/792 84 02.
UK: Syco Systems Ltd, 20 Conduit Place, London W2. Tel: 01-724 2451.
USA: Europa Technology, 1638 W Washington Blvd, Venice, CA 90291. Tel: (213) 392-4985.

Friend Chip SRC: SMPTE-based synchroniser; audio or video plus MIDI. Modular design, data-to-tape facility. Synchronises all current computer based musical instruments.

GIESE (West Germany)
Giese Electronic, Klaus-Groth Strasse 84/86, D-2000 Hamburg 26. Tel: 040-250 60 64.

Lock system 3: 2-machine audio synchroniser, multi slave option; SMPTE/EBU; optional remote.
Lock system 3/2: 3-machine synchroniser for audio or video; SMPTE/EBU; includes remote.
Taker A/B: film looping synchroniser; SMPTE/EBU reader.

OTARI (Japan)
Otari Electronic Co Ltd, 4-29-18 Minami Ogikubo, Suginami, J-167 Tokyo. Tel: 03 333 9631.
UK: Otari Electric (UK) Ltd, 22 Church Street, Slough, Berks SL1 1PT.
USA: Otari Corp, 2 Davis Drive, Belmont, CA 94002. Tel: (415) 592-8311.

EC 401: audio for video speed controller using proprietary *Widelok* system. Accepts SMPTE/EBU; editor interface and video 'loop-through'.
EC 402: as above, dedicated plug-in version for *MTR-10/12* tape machines Excludes timecode reader/display and universal capstan control output.
EC 101: plug-in chase synchroniser; RS232 interface using SMPTE. Enables *MTR 90 Mk2* to be slaved to video master or second *MTR 90*. Optional VITC and SMPTE/EBU (RS422) interface.

ROLAND (Japan)
UK: Roland (UK) Ltd, Unit 6, Great West Trading Estate, 983 Great West Road, Brentford, Middlesex TW8 9DN. Tel: 01-568 4578.
USA: Roland Corp US, 7200 Downsview Crescent, Los Angeles, CA 90040-3647. Tel: (213) 685 5141.

SBX-80 Sync Box: multi-timebase (SMPTE, MIDI, sync 24, audio tap and click) master controller for multi media systems including audio, video, synths and drum machines.

SONY (Japan)
UK: Sony Broadcast Ltd, Belgrave House, Basing View, Basingstoke, Hampshire RG21 2LA. Tel: 0256 55011.
USA: Sony Corp of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656. Tel: (201) 930-1000.

BVR-90: 2-machine synchroniser, one audio one video. RS422 signal between editor and synchroniser controls both machines.

RM-3310: synchroniser/autolocate/remote. Enables synchronised operation of up to three *PCM-3324* multitrack recorders.

SOUNDMASTER (Canada)
Soundmaster International Inc, 306 Rexdale Blvd, Unit 5, Toronto. Tel: (416) 741-4034.

Synchro: up to 4-machine synchroniser; SMPTE/EBU; suitable for audio and/or video; uses IBM *PC*.

STUDER (Switzerland)
Studer International AG, Althardstrasse 10, CH-8105 Regensdorf. Tel: 01/840 29 60.
UK: FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Herts WD6 4RZ. Tel: 01-953 27502.
USA: Studer Revox America Inc, 1425 Elm Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651.

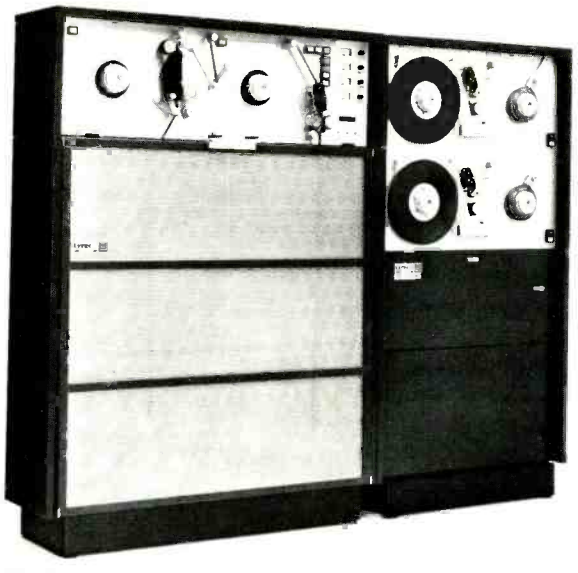
TLS 4000: local control synchroniser for one or two slaves; RS232/422 port suitable for audio or video. Automatically handles timecode, pilot signals and tach pulses.
SC 4008: system controller for use with up to eight *TLS 4000* synchronisers, provision for two 4×RS232/422 ports, auto switching between two masters; SMPTE/EBU bus. ▷

Lyrec P-2500

the system with the smaller footprint that gives bigger capacity

The Lyrec P-2500 System represents 40 years of endeavour in improving the relationship between man and machine.

- ☐ **Less Floor space** giving more freedom for plant layout and ease of material flow.
- ☐ **Vertical operation** gives a user friendly operation at the correct work height.
- ☐ **Fast** and simple un-loading and loading of pancakes.
- ☐ **One person** can easily handle the production of 2,000 copies per hour.
- ☐ **Dolby HX Pro System*** ensures uncompromised audio quality at 64:1 ratio.



To find out how you could benefit from the Lyrec P-2500 tape duplicating system contact:–

Dag Fellner
Lyrec (U.K.) Ltd.,
13 Hampden Hill,
Beaconsfield.
Bucks HP9 1BP
Tel: 04946 4425
Telex 83825 ttlg

Lyrec
OF DENMARK
Technology where it counts

*Dolby and HX Pro are trade marks of Dolby Laboratories Licensing Corporation.

Lyrec Manufacturing A/S Box 199 Hollandsvej 12, DK-2800 Lyngby, Denmark.
Tel: 02-8763 22. Telex 37568 lyrec dk.

SYNCHRONISATION

SC 4016: controls up to 16 machines; SMPTE/EBU; timecode generator, system controller.

SYNCH TECH (USA)
Synchronous Technologies, 1020 West Wiltshire Blvd, PO Box 14467, Oklahoma City, OK 73113. Tel: (405) 842-0680.
UK: State of the Art (Music) Ltd, Studio House, High Lane Village, Nr Stockport SK6 8AA. Tel: 06632 2442.

SMPL console: programmable Punch and Events; timecode derived metronome; instrument sync and autolocate functions.
SMPL lock extension: as above plus control of two transports; SMPTE/EBU and full MIDI locate and lock. Can also be used with edit controller to allow audio to chase and follow two or more VTRs.
TIMELINE (USA)
TimeLine Inc, 270 Lafayette Street, New York, NY 10012. Tel: (212) 431-0330.
UK: Stirling Audio Systems Ltd, 1 Canfield Place, Swiss Cottage, London NW6 3BT. Tel: 01-625 4515.

LYNX LTC-422: controls up to nine machines (more to special order); Genlock available; slaved IBM *PC*.
LYNX/SAL: up to 32 masterless machine system; RS232/422; SMPTE/EBU audio/video synchroniser.
LYNX/VSI: interface for video editors. Supports Ampex *VPR-3* serial interface.

AUTOMATION

A guide to manufacturers of independent automation systems

AUDIO KINETICS (UK)
Audio Kinetics Ltd, Kinetic Centre, Theobald Street, Borehamwood, Herts WD6 4JP. Tel: 01-953 8118. Telex: 299951.
USA: Audio Kinetics Inc, 1650 Highway 35, Suite 5, Middletown, NJ 07748. Tel: (201) 671-8668.

MasterMix: *MX644* central computer/controller, *MX700* digital grouping interface, *MX800* DC grouping interface.
System can be fitted to most automation-ready consoles and with the AK VCA fader the system is available for consoles not prepared for automation.

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

CASS 1: integrated timecode based audio editing and console automation system up to 32 faders.

D&R ELECTRONICA (Netherlands)
D&R Electronica BV, Rijnkade 15B, 1382 GS Weesp, Holland. Tel: 02940-18014.

SCORE (Studio COmputer REmix): software-based system using spare track of multitrack for synchronisation. Back up of internal memory data stored on cassette.

GML (USA)
George Massenburg Labs, 2323 Corinth Avenue, West Los Angeles, CA 90064. Tel: (213) 479-7471.
UK: Amek Systems & Controls Ltd, Islington Mill, James Street, Salford M3 5HW. Tel: 061-834 6747.

Moving fader system: retrofit fader, switch and grouping system. System controlled by tape movement but static pre-setting can be done irrespective of tape position.

NEUMANN (West Germany)
Georg Neumann & Co GmbH, Badstrasse 14, Postfach 1180, D-7100, Heilbronn. Tel: 07131 8 22 75.
UK: FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Hertfordshire WD6 4RZ. Tel: 01-953 0091. Telex: 27502.
USA: Gotham Audio Corporation, 741 Washington Street, New York, NY 10014. Tel: (212) 741-7411.

500 System: *AME 591* microprocessor controlled EQ, *AMR 544* microprocessor controlled fader, *AMM 576* remote controllable mic amplifier.

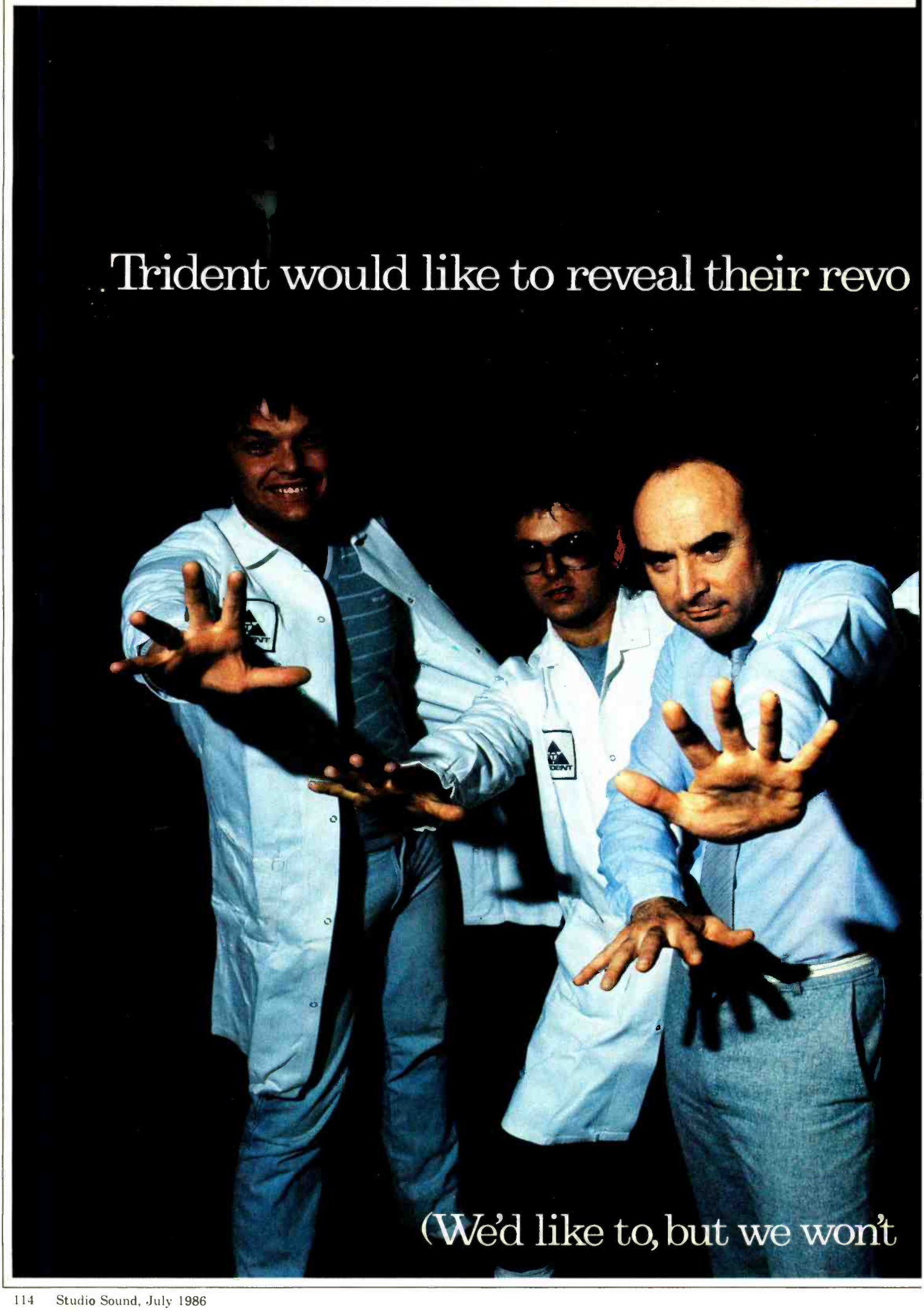
OPTIMIX (France)
Optimix International, 127 rue Amelot, 75011 Paris. Tel: 258 46 67.
UK: Branch & Appleby Ltd, Stonefield Way, Ruislip, Middx HA4 0YL. Tel: 01-423 3597.
USA: Jim Canacho Audio Marketing, 280 Mill Street Ext, Lancaster, MA 01523. Tel: (617) 365-2130.

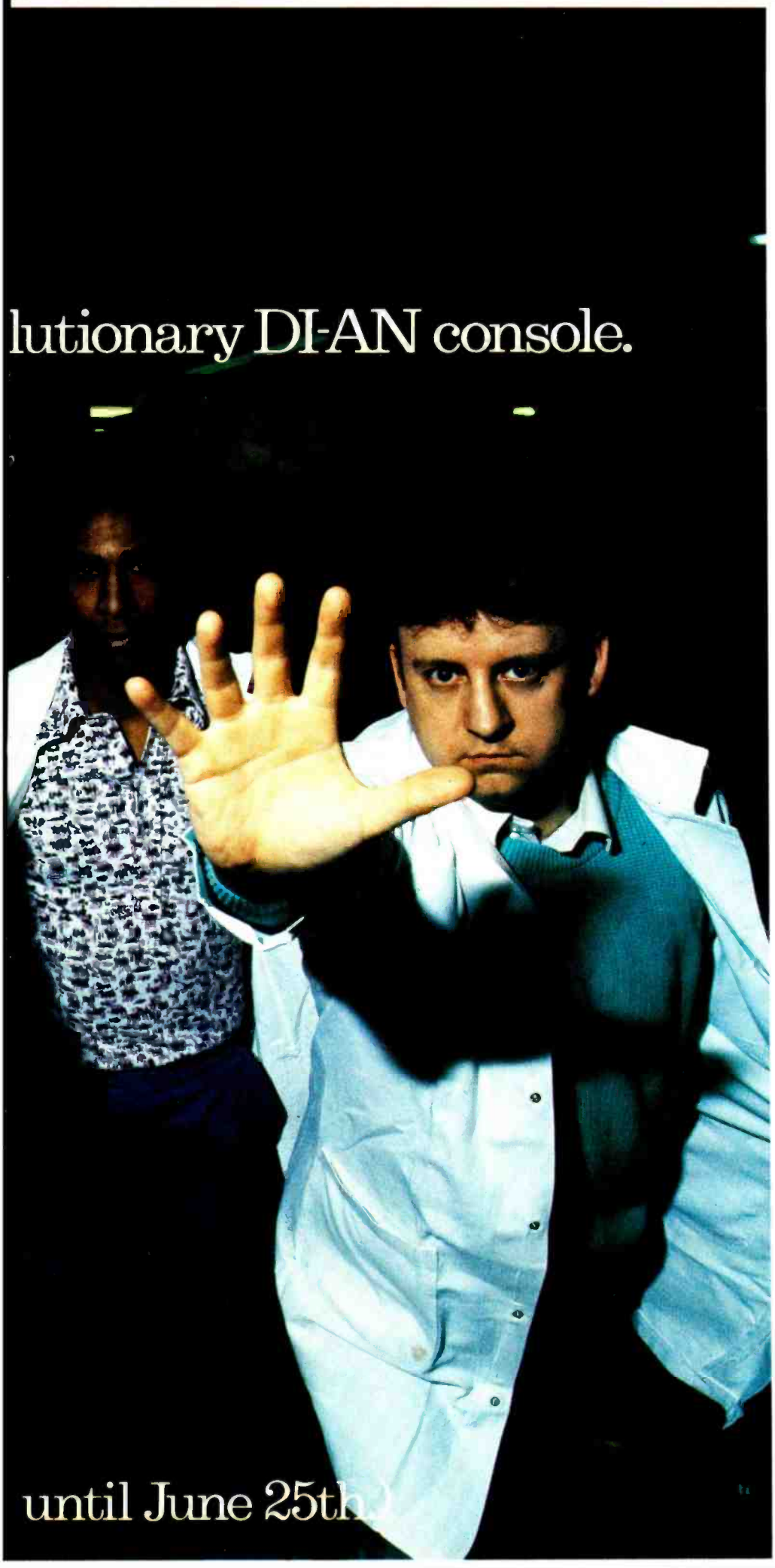
Optimix: retrofit system automates levels and mutes and displays fader position and VCA levels on video monitor.
Optifile: designed to be retrofitted, provides *Optimix* features with SMPTE for non-automation ready consoles.

STRUDWICK (UK)
Strudwick Research Ltd, 36 Frances Street, Chesham, Bucks HP5 3EQ. Tel: 0494 786384. Telex: 265871.

VCA-1: outboard automated console for sub group mixing. Sixteen VCA channels standard, up to 48 available.

NOTE: in addition to the above, most major console manufacturers provide dedicated automation systems for their consoles either as standard or retrofit options.□





FOR SOME YEARS now, the technicians at Trident Audio have been developing a new mixing console that will revolutionise the look and the logistics of recording studios.

It's called the Trident DI-AN. And since people started hearing about it through earlier ads, word-of-mouth and Malcolm Toft's article in 'Studio Sound', interest has been growing fast.

So fast, that one has already been sold to a leading American studio.

Which is remarkable, since no-one outside Trident has seen it yet. And no-one will until it's absolutely ready and absolutely right.

But rest assured. On June 25th, the DI-AN will be on the Trident stand at the APRS show. Perhaps you should be there too.

TRIDENT

TRIDENT AUDIO DEVELOPMENTS LTD
Trident House, Rodd Industrial Estate,
Govett Avenue, Shepperton, Middx TW17 8AQ.
(0932) 224665 Telex 8813982 TRIMIX G
Trident USA Inc., 308 N Stanley Avenue,
Los Angeles, 90036 USA.
(213) 933 7555 Telex (255) 5106000019

CONSOLE DESIGN FOR POST PRODUCTION

Terry Nelson describes the Harrison PP-1 whose modular design allows custom building

Re-recording for film sound places demands on a mixing console completely different from the requirements of broadcasting or music recording. For instance, there is no need for microphone inputs, also operation is geared for up to five operators as opposed to the one engineer usually found in most other circumstances.

The mixing of film sound can be likened to the putting together of an audio jigsaw puzzle: music, dialogue and special/sound effects have to be pieced together and then assembled to form a composite whole. This often involves special routing requirements, quick-change EQ conditions and other specialities so the standard music recording console would just not be suited to the job. Ergonomics play a vital role in the layout of the console as the operator's attention must be primarily on the screen which means that the relevant controls must fall easily to hand.

Production of this type of console has always been a specialist job, with the number of true film sound console manufacturers being counted more or less on one hand. In 1979 the film sound world saw a new entrant in the arena—Harrison.

The *PP-1* post-production console has been designed to meet the stringent requirements of sound production in today's films. Harrison felt there was a need for a new kind of re-recording console and after long discussions with people in the industry—those who have to operate the consoles as well as the executives—the *PP-1* was born.

Configuration

As might be expected requirements change from studio to studio although each console is configured from a basic plan of operation. A typical situation would be a primary section—probably for dialogue—with several secondary sections for music and effects. The outputs from the secondary frames would be summed by the primary and sent to the recorders via the composite mixes feeding up to eight outputs. However, let us start at the beginning and get an overview of the system.

The *PP-1* can be made up to a total of five separate frame sections, with standard frame sizes ranging in multiples of three from nine to 27 inputs thus giving a normal maximum channel capacity of 135. In addition each input channel has provision for a double input giving a total input capacity of 270 lines. More than enough for most people.

One of the innovative aspects is the introduction of automation. As well as level control this covers muting, EQ in/out switching, patch returns and other such time and thought consuming operations to aid the operator's concentration on the finer aspects.

Signal flow

The input modules feature two line inputs, designated A and B, either of which pass through four switches that determine input gain from +10 dB to −20 dB in 10 dB steps. A phase reversal switch is also operative on either or both the line inputs. The selection of A or B inputs, as well as the gain and phase reversal, is automated and programmed by read and write switches. The signal then passes into the filter and equaliser sections. The filters consist of sweepable high and low pass sections for overall frequency response trimming while the equalisers comprise four fully parametric (or state variable) control bands, each of which can be switched in and out of circuit, as can the filter section, manually or by automation.

The dual input philosophy is carried over to the two insert points, AB1 and AB2. AB1 is normally post-EQ but can be switched to the pre-EQ. AB2 is located just after the channel VCA fader. The AB labelling signifies the two send/return circuits from the same insert point with the return—A or B—being switch selectable and also under microprocessor control. In practical terms this means that two effects units can be patched in ready to a channel and switched into circuit at will by the central computer.

The channel fader is DC controlling a VCA. Each frame section has eight VCA group masters and each channel may have local control or be placed under a group master. Grouping is selected by a toggle switch next to the fader with an LED display showing the group number. A VCA mute switch is also installed, the input channel number illuminating when the channel is 'on'. A mute read switch allows for separate programming of mute status independent of the fader for full flexibility. As well as the usual read, write and update conditions for the channel VCA, the automation status can be selected by a 3-position switch between Local A and B. In Local position the channel responds to automation commands fixed by the channel itself. In A or B the channel responds to automation commands governed by the master automation control switches on the communications module. With the fader in Local position *and* the Read and Write switches off, the fader is under manual control—it's reassuring to know you can take over from the machine.

Functions

For those situations where pushing a lot of switches can be a nuisance there is the Lock function. With Lock in circuit all microprocessor controlled switches in the input module are put into the same status as the VCA control switches, ie if the VCA is in Read all the programmable switches will go into Read status as well.

The *PP-1* has a comprehensive Solo and Cue facility. The Solo function is under microprocessor control and gives a Solo-in-place complete with echo, the Solo command muting all input VCAs in the rest of the console section. There is also a 'solo defeat' switch which Harrison call Return. With Return activated the VCA ignores solo commands from other modules. In an 18-channel mix, for example, two channels could be left on in permanence whilst soloing any of the remaining 16. In addition to Solo is the Cue function. This is pre-fader but is more than just a simple PFL, being operative when the channel is muted. The big difference over PFL is that when the Cue button on an input module is pressed, the signal present in the channel is sent directly to the centre speaker monitor channel without appearing on the main signal buses. This means that the signal is superimposed on the monitor mix making an ideal situation for difficult drop-ins and drop-outs.

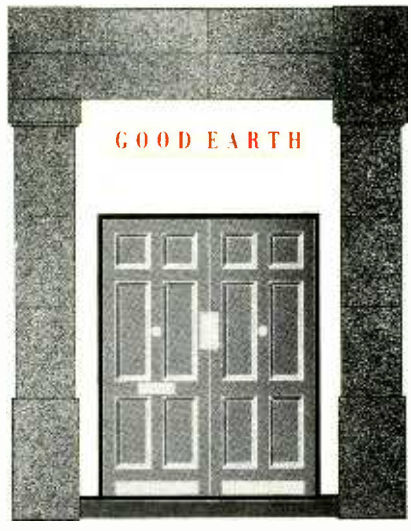
The output of the AB2 insert point feeds the pan and assign circuits. The channel assignment is to eight local main buses. In addition, the channel can also be routed to eight re-assignment channels marked A-H. Independent of the routing is the pan circuit. The actual panning consists of two controls, pan and divergence. The panner itself is a 3-channel control—left, centre, right—and is used in conjunction with the divergence control, the latter regulating the amount of separation between the three channels. Should only 2-channel stereo be required a switch marked 2 next to the panpot converts it from 3-channel to stereo.

The input module has four echo sends, each with its own level control, grouped into two pairs: 1A, 1B and 2A, 2B. A pre-post switch for each pair routes the outputs to be pre- or post- the VCA. The four sends are common to each frame section and are not summed by the primary, meaning that a 3-frame console would have a total of 12 echo sends.

As can be seen, the *PP-1* uses a high level of microprocessor technology combined with flexible operation that makes it suitable for the complicated mix requirements of modern post-production. Before continuing to the output capabilities it may be useful to re-list the automated features on the input module.

- input pad/gain structure
- A-B input select (or B line input select)
- 2 A-B insert points
- in/out for filter section
- in/out for EQ sections
- channel mute
- fader level
- VCA grouping

These facilities are accomplished by a system known as DCI or Distributed Control Intelligence, which in essence means that each input module has its own microcomputer and thus we have an ▷



Dean Street Soho

THE STUDIO

DESK Solid State Logic SL4048E 48 Channel Primary Studio Computer with Total Recall.

MONITORING
Eastlake (with JBL and TAD components) driven by 2 Studer A68 power amplifiers. Yamaha NS/10 MS.
Auratones. 'Ear Opener' simulated radio.

OUTBOARD EQUIPMENT
Publison Infernal Machine 90 (21 secs), Lexicon 224XL, AMS 15-80S Stereo DDL and Harmoniser,
Quantec Room Simulator (digital reverb).
EMT 140 Echo Plate, EMT Gold Foil (240) Echo Plate.
Delta Lab DL1 DDL, Delta Lab DL2 DDL, Eventide 'Instant Flanger', MXR Autoflangers and Auto-Phasers. 2 × Drawmer Dual Noise-Gate. 2 × Urei 1176 Compressor/Limiters, Audio and Design 'Vocal Stresser', Audio and Design Stereo Limiter,
2 × Allison 'Gain Brains' (MK1), 2 × Allison 'Kepexes' (MK1), 'Scamp' rack with Expander/Gates, Frequency Conscious Gates (DNF), Compressors and ADT module.
Orban 3 Channel De-Esser. Trident and Audio Design Equalisers.
Bokse SU/8 Universal Synchroniser.
This list is always growing and updating.

FOLDBACK
Beyer DT100 headphones driven by Quad 303S.

TAPE MACHINES
2 Otari MTR-90 24 track (synchronised by BTX Shadow),
Otari MTR12 ½" (30 or 15 or 7½ IPS)
Studer A80 ½" (30 or 15 IPS)
Studer A80 ¼" (30 or 15 or 7½ IPS)
Sony PCM F1 Digital
2 Studer A710 cassette decks

MICROPHONES
Most popular microphones by Neumann, AKG and Beyer. Also 2 Crown PZM.
Speciality microphones include 2 Sanken CU-41 and 2 valve (tube) Neumann U-47.

STUDIO AREAS

19 ft × 18 ft, slightly live acoustic.

582 sq ft. L shaped, one end has a parquet floor, the other has carpet.

14 ft × 10½ ft with windows into the main studio.

Approx. 22 ft × 20 ft, very live sound, great for any instrument.

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CONSOLE DESIGN FOR POST PRODUCTION

analogue console with digitally controlled functions. A useful aside from this is that the console also has built-in test routines for self-diagnosis in troubleshooting and calibration, the 7-segment LED display for the VCA group routing doubling as a readout.

Modules

Apart from the main monitor panel, each frame section, primary or secondary, will incorporate a communications module, four group master modules (two channels each) and a master module.

The communication module contains the summing buses for the left-centre-right feeds in the case of a secondary frame and has both line outputs and sends to the primary communication module. As well as summing its own left-centre-right feeds, the primary module also sums the feeds from the secondary frames on to three master L-C-R buses for distribution to the main outputs.

For quick checking of the A and B line inputs there is a master momentary toggle switch that selects between all the A or B inputs for the particular frame section.

The communication module has two groups of master automation status selectors, A and B, with switching for each group for Read, Write and Update as well as manual functions. (Programming is accomplished with two switches, Read and Write, with Update status initiated by pressing the two switches together.) This now defines the Local, A, B switch with the VCA faders in the input modules. The group master VCA faders have identical switching, meaning that inputs and groups can be controlled 'locally' or from the master automation groups A and B, where the automation switches will follow the status defined by the master group.

Metering is selectable between VU and PPM by switches in the communication module. A meter peak control also allows the operator to define the threshold of peak level should this be desired. A preset switch restores metering to preset levels. In the case of signal exceeding either level, the whole bargraph lights to double intensity for a moment in order to catch the eye.

The module contains a comprehensive instrument quality oscillator section with sine wave from 20 Hz to 20 kHz and pink noise. The output can be routed to the primary slate/oscillator bus or be available as a line-out on the patchbay. The level is variable or can be sent out at a fixed frequency and level by pushing a switch called Set.

A Slate pushbutton routes the internal module microphone to the primary S/O bus and mutes the monitor outputs. In addition to Slate there are two intercom lines with individual switching and level control, PA1 and PA2. A further control, PA return level, does just what it says by controlling the level of the intercom speakers built into the meter housing.

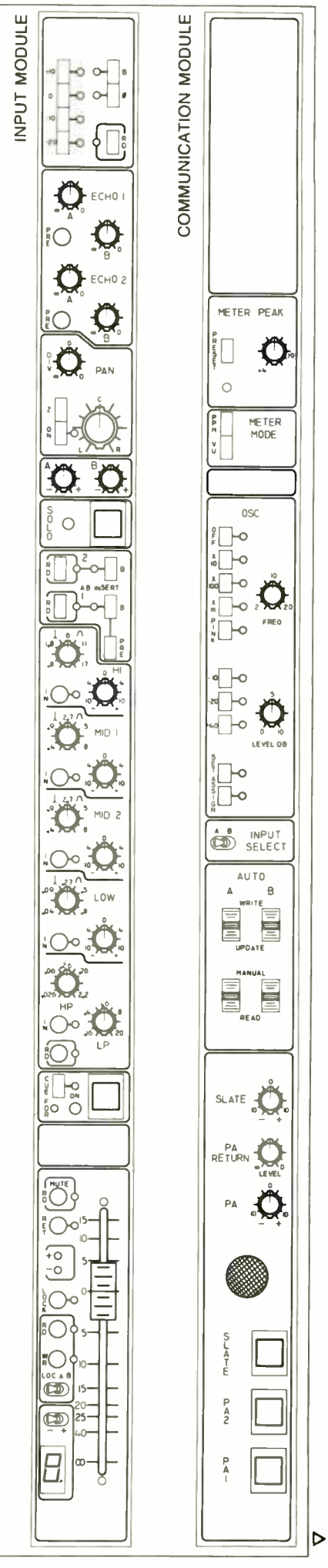
Next are the four modules which make up the eight group masters, each having identical functions. As would be expected, each of the eight group master faders correspond to the VCA grouping buses on the input modules with the Group Mute switch incorporated into the Group Number button as per the input channels. Automation controls are also similar to the inputs with read and write controls plus Local-A-B status switch. Other group controls include two switches designated Send and Receive. To use some film jargon, these are known as interposition switches and serve a very useful function.

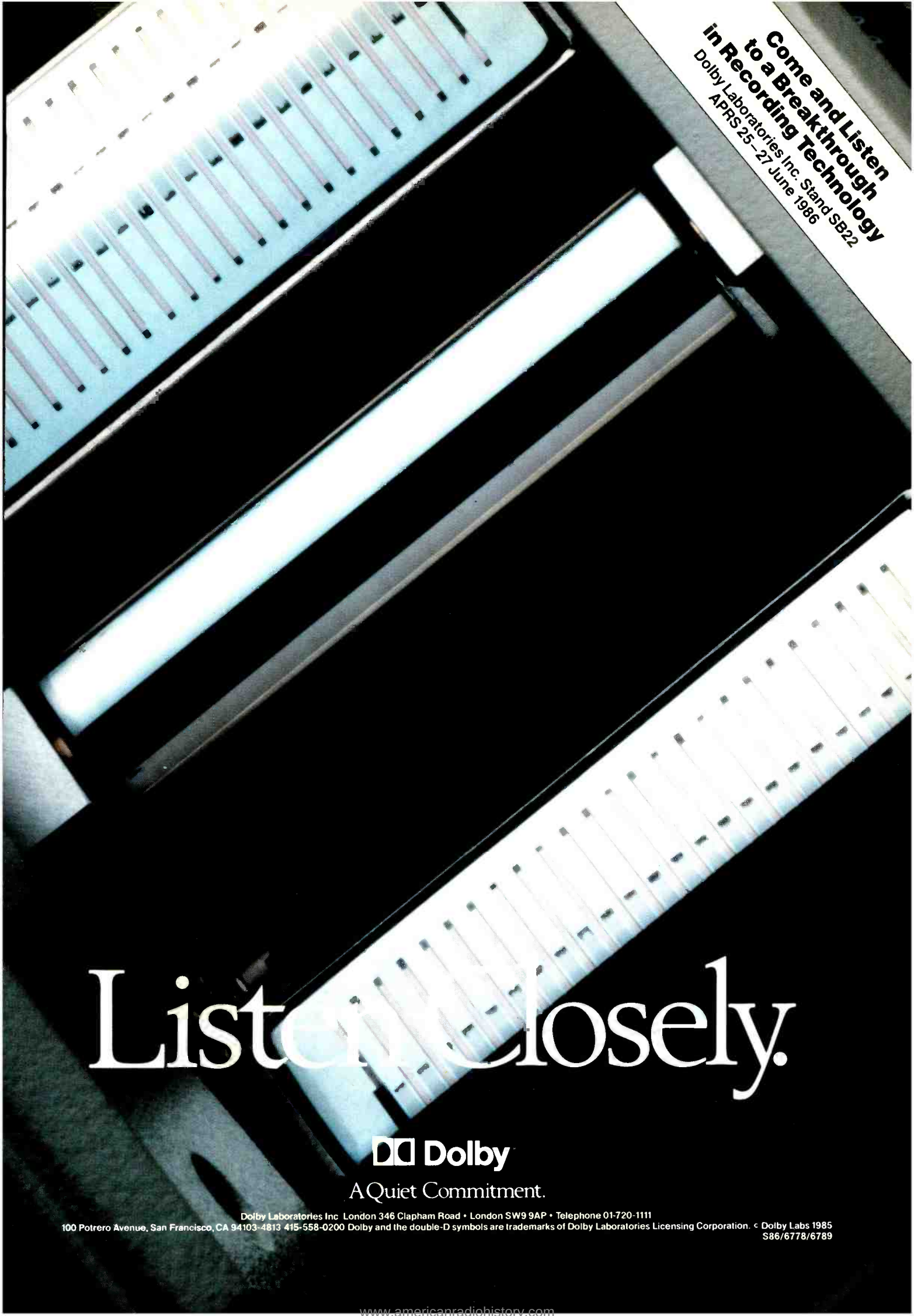
Pressing the Send switch routes the output from the group master (including mute) to an interposition bus that feeds all the frames within the console. Pressing the Receive switch disables the group fader and mute and relinquishes control to the interposition bus for that frame. In this way, the group masters of one frame can also control the inputs of adjacent frames. For instance, one section may run out of inputs for a scene with a lot of different dialogue. The next section may require fewer channels and the spare ones can fill the bill for the dialogue frame. The extra dialogue tracks are then routed into the interposition bus to be picked up by the dialogue frame for total control of all the dialogue tracks.

Each group master has two sets of routing switches—composite and re-assign. Let us look first at re-assign. In addition to the eight main buses (not to be confused with the VCA groups) there are eight re-assign buses per input module. These are summed in the group masters with the A-H sends corresponding to buses 1 to 8, ie re-assign bus C will be in group master 3. The output of each re-assign sum amplifier goes to an automated A-B patch point (as per the input modules) and then on to a master level control. From here the signal is routed back into the eight local main buses (or re-assigned) via eight routing switches. In the case of the secondary frames the sum of the local main buses (local=buses for one frame section) are then sent to the summing amplifiers in the primary frame where buses 1 to 8 are summed together, as are all of the L-C-R buses.

From here it is but a step to the eight composite or main console outputs, ie one main line output per group master. This is where the composite routing switches come in. These are 12 switches that select the main buses 1 to 8, main buses L-C-R and the main S/O bus. In this way the sums of each of the 11 buses plus S/O can be routed to any of the eight main—or composite—line outputs of the console in any configuration. In other words, the final output of the console is achieved via an 11×8 matrix (disregarding the S/O bus).

Each group master also has a pair of illuminated key switches, Bias (red) and





CONSOLE DESIGN FOR POST PRODUCTION

Direct (green), plus an overall On switch to enable them to function. The Bias switches are used to initiate the record mode of the recorders and illuminate when record is in progress. The Direct switch is for monitoring. When not illuminated the monitor section is receiving signal from the composite line outputs of the primary frame; illuminating the switch feeds the output of the recorder to the monitor section.

The remaining module is the rather grandly named Master module and is mainly devoted to metering. Two sets of switches for the eight main light meters on the console and eight auxiliary meters select the display source and four pad switches calibrate the meter levels from +4 dB, +6 dB, +8 dB, +10 dB referenced to 0.775 V.

Each frame section is equipped with 15 bargraph light meters divided up as follows, outputs 1 to 8, left, centre, right buses and echo sends 1a, 1b, 2a, 2b. The source switches on the master module select the display for meters 1 to 8, these being (1) Comp—this displays the output from the composite buses on the primary frame, (2) Main—this displays the output from the sum of all of the main buses 1 to 8 on the primary frame, (3) Local—this displays the output from the main buses for the particular frame section, (4) re-displays the output from the re-assign channels for the particular frame section.

The Master module also has master direct and bias switches to control those on the group masters. In addition to those mentioned, the module has eight user defined switches for automation inputs and five user defined push buttons.

Monitoring

Monitoring on the *PP-1* is very comprehensive, with all the facilities contained in a small square monitor panel. The monitor system can operate in a number of ways which we will look at step by step.

The basic premise is that the monitor panel is an 8-channel control centre. The main output is governed by a master gain control (or main) from −10 dB to +10 dB in 1 dB steps. In addition there is a cue gain trim control of ±5 dB that adjusts the level of any cue signals sent from the input modules in the centre speaker. (Note: the cue signal is superimposed over the overall monitor mix.) Two switches complete the output gain controls, Cue Defeat which switches out the cue system and Dim, which cuts the output levels of the eight monitoring channels by 20 dB.

Eight channels of controls designated Speaker Trim form the eight VCA monitor channel outputs—the main gain acting as VCA master—and these are respectively, left, centre, right, surround, left centre, right centre, X, Y. Each channel has a ±5 dB trim control, mute switch and fix switch. The fix switch bypasses the trim control and restores unity gain within the channel.

We now come to a bank of eight switches designated Source Select, with the first switch marked EFFECTS and the others marked MU (music), DIA (dialogue), FX (effects) and AUX 1 to AUX 5 respectively. These select the returns from the recorders. From here we arrive at the signal routing, or mode select, switches, viz: DIR (direct, MTRX (matrix), 4 to 6.

Direct routes the source selector channels directly through to the monitor outputs, eg composite output 1 to monitor 1 (or left), composite 2 to monitor 2 (or centre) and so on. Matrix routes the eight channels from the source selector to the inputs of an 8×8 switching matrix enabling any configuration of the input signal into the monitor outputs. 4 to 6 is used to synthesise 6-channel sound from four and derives the left-centre and right-centre signals through circuits combining the left, centre, right and surround signals.

There are also three more switches, Dolby encode, Academy, Dolby. These are available for the remote switching of external units such as equalisers for the Academy curve.

An 'accessory' is the *Auto Graph* automated 7-band graphic equaliser. This is available in 1-, 2- and 3-channel formats and can be used singly or in multiples. For example, a dialogue channel could have three channels of EQ patched in for quick change atmosphere shaping.

In situ

The *PP-1* consoles at Warner Hollywood differ from a 'standard' configuration in that each section is set up as a primary. There is additional logic for each frame

section that allows the operator to determine whether his section will receive bus feeds from other sections or whether it will operate independently. This configuration allows total flexibility in mixing for all the release formats in use, as well as in mix-minus situations where the dialogue track(s) would be left open for foreign language dubbing, whilst keeping the original music and effects tracks.

At the time of our visit, the Studio A console was fitted with 57 input modules with space for 60, giving an input capacity of between 114 and 120. The flexibility of the A-B input switching on the *PP-1* means that patching can be cut down considerably and though the large patch panels behind the console permit every variety of signal flow, the main patching—apart from effects devices—is the insertion of Dolby into the recorders. The inputs to the console are connected so that in pre-mix mode monaural tracks go to the B inputs and in the final dubbing mode the 3-, 4-, 6-track 35 mm machines go to the A inputs.

The Harrison automation system is capable of running two rooms so the next stage of development at Warners will be the interconnection of Studios A and D. A long time coming, the system has been through many revisions to keep abreast of the latest developments in computer software and hardware. Harrison is now confident that the system will be valid for some time to come.

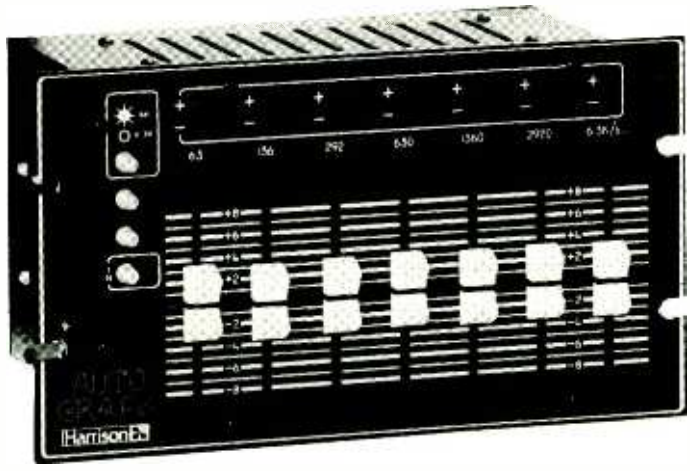
First to try the new automation at the Nashville factory was Disney engineer Richard 'Dick' Portman, who after two days of hands-on working quipped, "The hardest part of operating the system is remembering to turn it on."

By way of recapitulation, functions automated on the *PP-1* console (to single frame accuracy) are: fader level, fader mute, input grouping, input signal select, input gain, channel phase, EQ in/out by section, high and low pass filter in/out and dual A/B insert point control. Consoles fitted with *Auto Graph* graphic equalisers can also provide dynamic real time EQ changes such as would be required for scene changes between different acoustic environments.

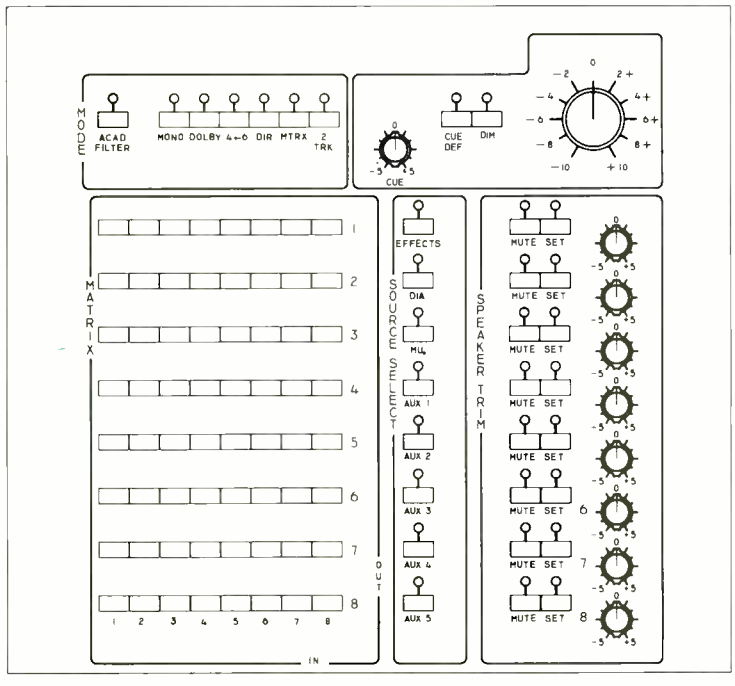
This completes the overview of the Harrison *PP-1* post-production console; a system which shows tremendous flexibility and should easily respond to the multitude of situations required by the film industry. The operational capacity of the console will be increased enormously by the automation system.

Film studios presently using the *PP-1*, apart from Warner and Disney are Saul Zaentz Company Film Center, Berkeley, California and Compact Video, Burbank.□

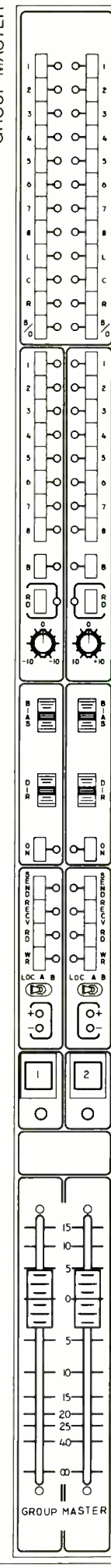
AUTO GRAPH



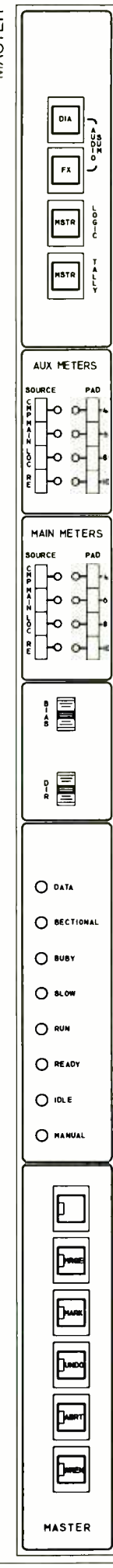
MONITOR BOX



GROUP MASTER



MASTER



STEREO SHUFFLING NEW APPROACH-OLD TECHNIQUE

Michael Gerzon introduces an approach for experimentation

Although many recording engineers and studios don't realise it they already have the equipment to produce a marked improvement in the stereo quality of many of their recordings. Not digital effects using reverberation, delayed echoes or the like but a technique that has been known but almost unused for over 30 years. This is the stereo 'shuffler'.

What is a shuffler, and how come you didn't know you had one? Last question first—a shuffler can be produced by unconventional connections between the inputs and outputs of many mixers (my initial experiments were with an f80 mixer (!) but it should work at any price level) along with a stereo graphic equaliser. But to get the best out of this, and in the absence of a dedicated commercial shuffler, it is important to understand what you are doing.

The basic idea of the shuffler goes back to Alan Blumlein's invention of modern stereo in 1931[1]. (His British Patent 394,325 repays detailed study as perhaps still the best source text on how stereo works.) Blumlein conceived stereo not just as a left (L) and right (R) speaker signal but also in terms of a sum signal M (=L+R) and a difference signal S (=L−R). The letters M and S stand for 'mid' and 'side' signals (as in the M-S microphone technique): M is the signal containing information about the middle of the stereo stage, whereas S only contains information about the sides—since S=0 for a central signal.

Given M and S, the original left and right signals can be recovered by a second sum-and-difference operation, via 2L=M+S and 2R=M−S. By thinking in terms of the sum and difference signals, Blumlein was not merely able to devise the M-S microphone technique (which was rediscovered and named by Laurisden in Denmark in the 1950s) but was able to modify the stereo effect of other recordings. In particular, Blumlein was able to modify the width of the stereo images of coincident-microphone recordings by increasing (or decreasing) the gain of the S signal relative to M before recovering the left and right signals (**Fig 1**). An increase in the relative gain of S increased width, whereas a decrease of S gain decreased width. In view of the fact that width control was known in 1931, it is strange that it is still not available on most modern stereo equipment.

One of Blumlein's many discoveries[1] was that increased width could yield stereo images beyond the left and right speakers. This useful discovery would permit one to pan sounds over a wider stage than normally used in today's studio. There is no reason why panpots should not be designed to cover such an increased stage width—yet I am unaware of a single mixer in which this is actually done.

This is not to say that width control is without problems—which we shall discuss in more detail further on—however, these problems can often be solved by a more sophisticated process called 'shuffling', also based on Blumlein's work. Blumlein noted that one could not merely alter the gain of the difference signal S, but one could alter this gain in a frequency-dependent way by using an equaliser. By this means, he showed how one could improve the directional quality of particular stereo microphone techniques (including one pseudo-dummy-head technique rediscovered at the BBC a few years ago). The process of equalising the difference and sum signals differently before recovering left and right is termed 'shuffling'. In effect, shuffling is a frequency dependent width control.

The first systematic commercial use of shuffling was in EMI's *Stereosonic* system in the mid 1950s[2], in which the bass width of recordings made with coincident crossed figure-of-eight microphone pairs was increased relative to the treble width. The reason why EMI used shuffling was that research had revealed that stereo images at bass frequencies reproduced more narrowly than at treble frequencies for a given intensity ratio in the two speakers, and the increased bass width attempted to compensate for this. This didn't work adequately with the actual recording techniques EMI used at that time, so they dropped it.

From time to time, shuffling (or processes achieving identical results to shuffling) has been revived—for example, various domestic hi-fi products under the Realistic name have shuffler stereo 'enhancement' circuits built in—but in my opinion these are poorly implemented, giving an exaggerated bass-heavy quality. Various American authors have revived or rediscovered shuffling in recent years, notably Richard Kaufman[3] and David Griesinger[4].

Kaufman has proposed using the system illustrated in **Fig 2** for shuffling. This system requires the construction of special sum-and-differencing circuits. Although such circuits are quite simple, they have to be constructed by the user, since they are not available as standard products (except for special purpose M-S microphone processors). Nevertheless, **Fig 2** is a useful way of understanding shuffling, and we shall use this for our basic descriptions of what it does, other methods of achieving the same result are often easier to implement and use but their theory is harder to understand.

Essentially, in order to widen the stereo image at a given frequency, one increases the gain at that frequency in channel 2 of the graphic equaliser, possibly slightly decreasing the gain at that frequency in channel 1 in order to retain a flat frequency balance in the resulting overall sound. Similarly, to decrease the width at a given frequency, one reduces that frequency's gain in channel 2, increasing it slightly in channel 1 to maintain the overall frequency balance.

To change the overall width, one similarly increases or decreases the overall gain in channel 2 of the graphic equaliser of **Fig 2**. Moreover, the processing system of **Fig 2** is a powerful technique of reducing various problems with stereo. For example, reducing the width at low frequencies makes vinyl records easier to cut, since low frequency S signals at a high level are hard to cut. Noise from FM stereo reception can be reduced by cutting the width around 7 kHz, since S channel noise around this frequency contributes most to the perceived noise. Stereo mics picking up thumps from transmitted floor vibrations can often yield more thump-free recordings by selective bass filtering of the S channel.

Besides such problem-reducing roles, shuffling also has uses in enhancing overall stereo quality. One use, with coincident microphone recordings, is to use shuffling to render imperfect frequency-dependent images, due to microphone imperfections, more sharp by compensating for the width variations in the image. This can be particularly useful in the extreme bass, where conventional microphones such as cardioids tend to become more omnidirectional at the very lowest frequencies. An enhancement of extreme-bass width (typically below 100 Hz) can sometimes compensate for this. In a similar way, providing that the capsules are sufficiently coincident, treble irregularities of microphone polar diagrams can be partially compensated for. Also, as described further below, some of the phase anomalies caused by small spacings of a few cm between microphones can also be partially compensated by suitable shuffling.

It has been suggested by Griesinger[4] that the sense of spaciousness of recordings can be improved by increasing the bass width below about 600 Hz. He suggests that, if the S gain is increased relative to that of M at low frequencies by from 4 to 8 dB, this is effective in creating an impressive reconstruction of the sense of space of the recording location when used with coincident microphone techniques. My own experiments using coincident and near-coincident (spacings of about 5 to 7 cm) microphones yield the same frequency and S channel boost ▷

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STEREO SHUFFLING NEW APPROACH-OLD TECHNIQUE

FIG.1
BLUMLEIN'S SUM-AND-DIFFERENCE WIDTH CONTROL

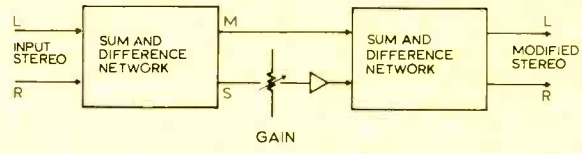
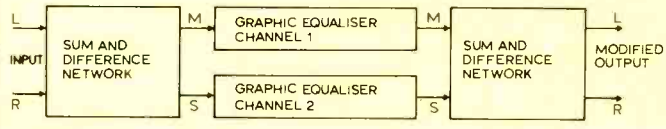


FIG. 2
SUM-AND-DIFFERENCE SHUFFLING SYSTEM



for best results in many cases, however, unlike Griesinger, I believe that this enhancement should be tried on a case-by-case basis, rather than as a blanket processing technique. This is because the technique is not uniformly effective with all locations and microphone techniques, and also there are some unwanted side effects on stereo image quality whose seriousness varies considerably between recordings.

In doing any shuffler processing, it is important to monitor over loudspeaker systems optimised for good stereo imaging—this unfortunately excludes most studio monitoring systems. Something like the classic miniature BBC *LS3/5A* speaker is still hard to beat for accurate monitoring of stereo images—both Griesinger and myself seem to have settled on it as a reference for work in this area, although it is worth trying results with other speaker types. If one doesn't have precision monitoring of stereo imaging (eg if one uses speakers optimised for spaciousness of reproduction rather than precise images), then one doesn't know if the shuffling is producing an authentic improvement in a recording or just compensating for the anomalies of the specific monitoring system used. For location recording work, it is advisable to make recordings without shuffler processing, postponing shuffling to post-tape processing in a familiar accurate monitoring environment.

An understanding of some of the problems that arise in the use of width and shuffler systems will speed up the process of finding optimum shuffler and width settings in a given case.

Normal panpot stereo and also stereo from truly coincident perfectly cardioid microphones, produce stereo images by placing individual sounds in the two speaker channels in identical phase but with differing amplitudes. If sounds are in opposite phase (ie with one channel phase-inverted relative to the other) on the two stereo channels with one louder than the other, then the sound image tends to have a more diffuse quality but can often be located *beyond* that stereo loudspeaker which is louder. While it is wonderful to have stereo images located beyond the loudspeakers, such images can cause problems.

Firstly, if the 'beyond the speaker' images are bassy sounds, then they can cause vinyl records to be hard to cut at high levels due to the large S signal produced. Secondly, because such beyond-the-speakers images have larger S than M signals, such sounds can be drastically reduced in level when reduced to mono, giving an unbalanced mono mix. For cassette, compact disc and video media, however, these problems may not be too important. Thirdly, the beyond-the-speakers images do have an unconvincing localisation quality. This often results in unstable, fuzzy or confusing images, although at other times the images can be quite dramatic in effect.

If beyond-the-speaker images are produced by increasing the width of an already-made recording or submix, then additional problems can arise if this recording does not consist of amplitude-difference stereo images to start with. The four cases when other types of stereo images with phase as well as amplitude differences can occur are:

- recordings made with microphones slightly spaced (by a few centimetres) from one another;
- recordings made with coincident hypercardioid, figure-of-eight or M-S techniques, in which antiphase images can occur;
- when stereo studio effects involving phasing of channels are used, eg autopanning systems, some stereo reverb devices and some stereo synthesiser outputs;
- recordings with time differences in the two stereo channels due to analogue tape azimuth error or digital converter timing differences.

Consider by way of example, a recording made with ORTF technique, in which two cardioid microphones, angled about 110° apart, are spaced apart by ear distance spacing—about 17cm—as illustrated in **Fig 3**. A sound arriving from due left will arrive at the left microphone about 0.5 ms before it arrives at the right microphone (since sound travels in air at about 340 m/s) and will be picked up about 20 dB down on the right channel compared to the left (because of the cardioid directionality patterns of the microphones). At low frequencies, the phase difference of the sound at the two channels is small but at 1 kHz, the sound has to travel half a wavelength between left and right microphones. As a result, at low frequencies (and also at 2 kHz, 4 kHz, 6 kHz, etc) the sound arrives in phase at the two microphones, and a width control increase will indeed widen the stage, reducing crosstalk below 20 dB for moderate width increases. However, at 1 kHz (and also at 3 kHz, 5 kHz, 7 kHz, etc) the sound arrives at the right microphone out of phase compared to the left microphone, so that a width control increase will actually reduce the crosstalk below 20 dB at those frequencies.

As a result, any attempt to use width increase with ORTF technique will indeed widen lower frequencies but it will have the effect of alternately narrowing and widening higher frequencies, resulting in a possibly confused and degraded stereo imaging. Thus, with any spacing of microphones, width control should be confined to those lower frequencies at which the sounds from all directions arrive at both microphones more-or-less in phase. In practice, this would mean confining width control to frequencies below about $\frac{3.4}{d}$ kHz where d is the distance between the microphones in cm, or $\frac{2.1}{d}$ kHz where d is the distance between the microphones in inches. An exception to this rule is when the microphone spacing is so large (eg more than 2 m) that the sound arrivals at the microphones are effectively incoherent, and the microphone signals can be treated as effectively independent signals.

It has to be said that on many recordings where width increase over a wide frequency band 'shouldn't' work, it does seem to give an enhanced wider image. This seems to be unpredictable, so should be tested on a case-by-case basis. The effect of other sources of interchannel phase differences on width control, such as tape azimuth errors, can be similar to the effects described above with spaced microphones.

We have just seen a reason with particular kinds of microphone techniques, and with interchannel tape azimuth errors, why shuffling should be confined to bass frequencies (eg below about 320 Hz for ORTF technique). Experimenting with width control and shuffling yields other good reasons why width control should be confined to the lower frequencies. Given that beyond-the-speaker images have anomalous localisation low frequencies do seem to localise quite reliably beyond the loudspeakers. So, if we increase the width only of lower frequencies (say below 600 Hz or so), those low frequency signal components that do localise well are widened, while those at higher frequencies are retained in their usual easy-to-localise positions. Here the different frequency components of sounds are no longer in precisely the same position.

We shall, for convenience, adopt David Griesinger's[4] term 'spatial equalisation' to describe width increase below about 600 Hz. Actually, the effect of spatial equalisation isn't as simple as just described. First, as observed in the fifties by Clark, Dutton and Vanderlyn[3], and as rediscovered by Griesinger, many stereo reproduction systems give narrower reproduction of bass than treble, so that spatial equalisation might be expected to give sharper images in those cases. This, however, depends on the assumption that wideband sound localisation is simply the sum of the separate narrowband effects, something that is not

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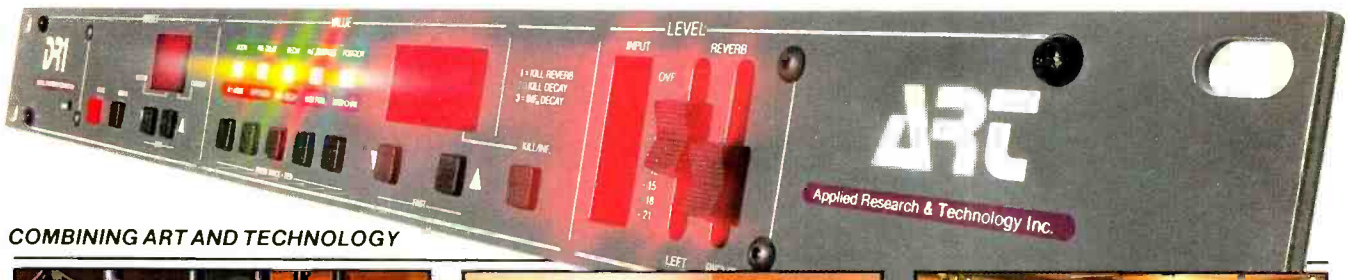

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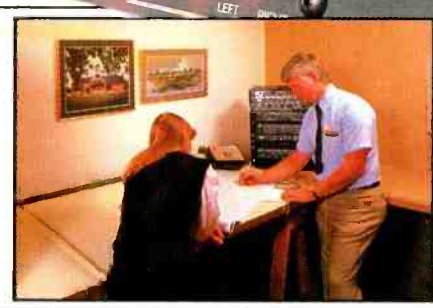

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STEREO SHUFFLING NEW APPROACH-OLD TECHNIQUE

FIG. 3
ORTF SPACED CROSSED-OVER CARDIOID TECHNIQUE

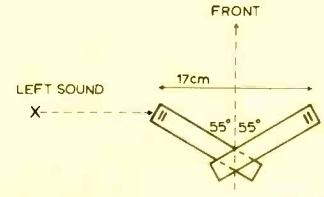


FIG. 4
NON-RECOMMENDED SPACING OF CARDIOID MICROPHONES FOR STEREO RECORDING

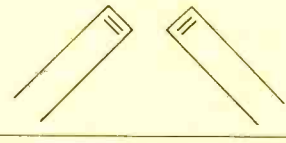
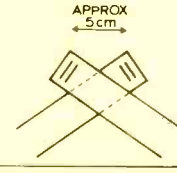


FIG. 5
CROSSED-OVER SPACED CARDIOIDS FOR IMPROVED STEREO IMAGING



confirmed by all research (eg that of Bower[5,6]). This suggests that the ears actually do some sort of cross-referencing of localisation data at different frequencies to produce the perceived imaging effect.

Listening shows that often, with a single sound that has lowish-frequency fundamentals and high frequency overtones, the subjective effect of increased bass width is often (but not always!) that the high frequency overtones are also pulled out to or near to the position of the fundamental frequencies. In such cases, the images can remain sharp. Unfortunately, high frequency sounds without low frequency components (eg cymbals) are not shifted. This can have strange effects on the stereo image—for example, on one recording with a drum kit spread across the right half of the stereo stage, the kick drum is moved over from the left side of the drum kit to the right side by spatial equalisation! Similar anomalies can change the distribution of instruments across the stage in an orchestral recording.

One thing that spatial equalisation (bass width increase below 600 Hz) undoubtedly does is give all the sense of increased spaciousness that normal width increase can give but without the gross anomalies that the latter can give at higher frequencies. It appears[4] that the sense of spaciousness in stereo recordings largely depends on the directional handling of bass frequencies. This is very evident on, say, stereo recordings of audience applause in a live acoustic. The use of spatial equalisation can give a sense of being enveloped in the audience, even though there is no obvious change in the high-frequency imaging. The lower frequency components of the clapping seem to be enough to create a sense of being almost *there* among the audience.

On many recordings, spatial equalisation does not only improve the sense of spaciousness but can also improve the stereo imaging heard by listeners sitting away from the stereo seat.

In general when reprocessing recordings using spatial equalisation, one should avoid aiming at a grossly spectacular effect as this will probably prove to be unnatural and tiring on casual or repeated listening. One should listen carefully to what happens to the positioning of different instruments to make sure that the altered positioning is acceptable—sometimes it won't be. In preparing panpot recordings with the intention of using spatial equalisation, the original mix should either be monitored (under appropriate conditions) through the spatial equalisation, or if not, instruments with lowish or mid-frequency fundamentals should be panned rather more narrowly in the stereo image than is finally intended. One can, of course, experiment with using bass widening only on parts of the mix—eg on stereo reverb and on sounds intended to be placed beyond the speakers only.

Spatial equalisation seems most beneficial on stereo recordings on which the sense of space is inadequate. On recording techniques capturing a good sense of space (eg spaced omnis and—in good acoustic—Blumlein crossed figure-of-eights) the processing is often superfluous, and can sometimes even give exaggerated spaciousness. If one uses crossed cardioids, one cannot normally capture a good sense of space, especially as this technique seems to lend itself best to relatively close placement to the musicians. Spatial equalisation seems often to give excellent results with crossed cardioids, often giving a good sense of the acoustics of the recording venue.

With live recordings made with a crossed cardioid stereo pair, it is actually not true that precise coincidence of the two microphones gives best results (contrary to the case for many other directional characteristics). A degree of spacing can actually improve the stereo image quality. What one should certainly not do is space the microphones as in **Fig 4**—this might liven up the sound but it degrades stereo imaging. **Fig 5** indicates the optimum kind of spacing—this is similar to the 'crossed-over' ORTF technique, except that the optimum spacing for imaging is only about 5 cm (2 in). This spacing, widely used in cheap Japanese stereo electrets, was first commended to me by Tony Faulkner.

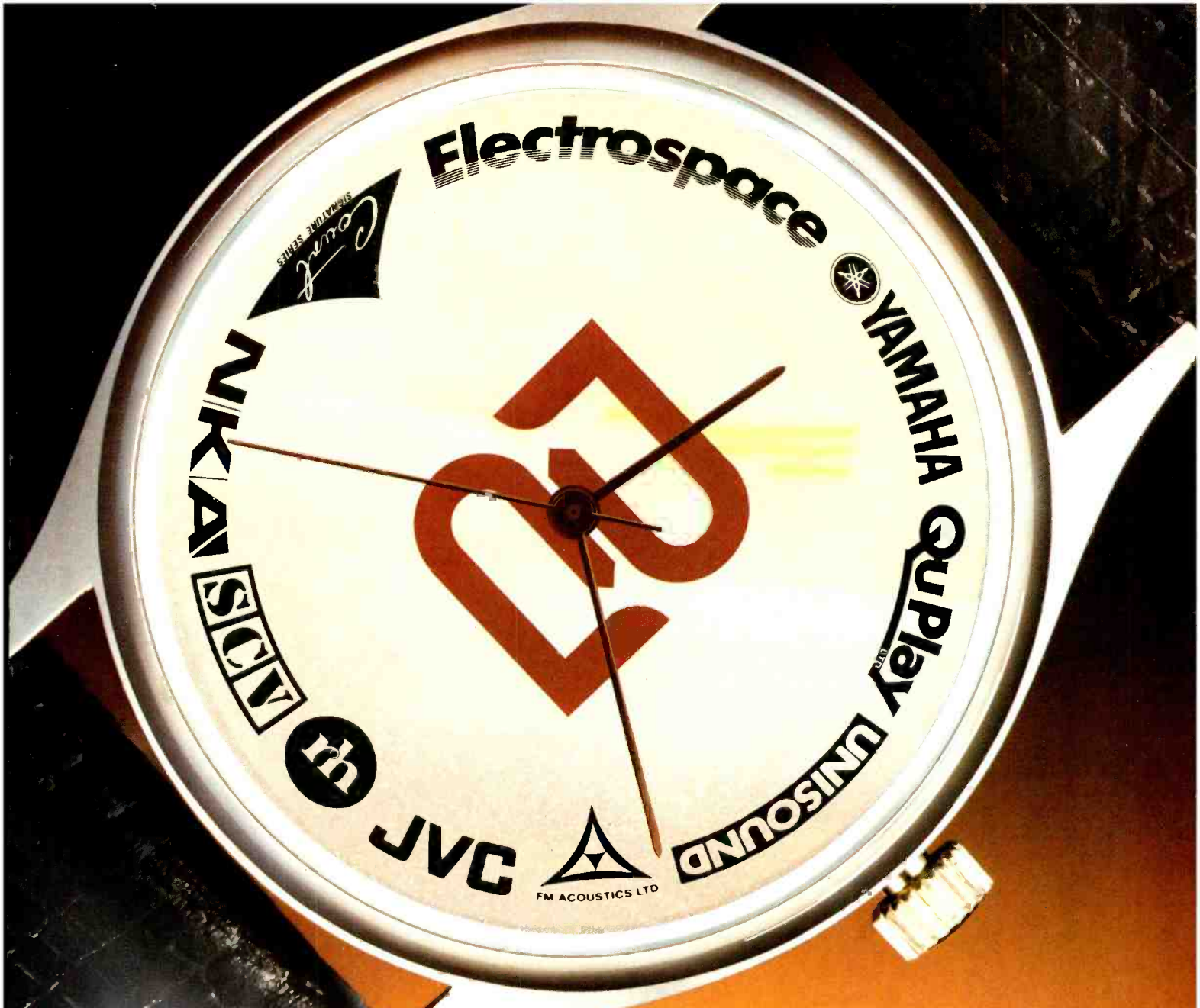
Remarkably, for normal stereo listening configurations, it turns out that the 5 cm spacing produces roughly the same phase/amplitude relationships between the two ears of a listener in the stereo seat as does a live sound from the same apparent direction up to about 2 kHz—and in this respect is better than true coincidence. Such 5 cm-spaced crossed-over cardioids, angled about 115° to 120° apart, seem to be an optimal cardioid technique for stereo imaging accuracy. The use of bass-widening up to 600 Hz with this technique seems to give a much better sense of space than the use of ORTF technique, and without the latter's 'phasiness' anomalies.

There is another reason why spatial equalisation matches this cardioid recording technique particularly well—the existence of phase shifts between sum and difference channels in the shuffler circuits described in this article. Although not mentioned so far for simplicity, such phase shifts occur because equalisers not only alter the amplitude of signals but also their phase. This generally degrades the localisation of amplitude stereo and is usually a defect. It is possible (as realised by Vanderlyn[3] as early as 1957) to 'phase compensate' the equalisers to match the phases in the M and the S channels but this generally involves more complex circuitry, so will not be discussed further here.

Griesinger's results that bass widening sounds best if concentrated below 600 Hz (which my own tests confirm) might partly be a side-effect of the lack of phase compensation—since a bass boost of S relative to M of 8 dB produces a phase lag of about 25° in the S signal centred around 600 Hz—at a frequency at which the ears are particularly sensitive to such 'phasiness'[6]. To make things even worse, the ears are more sensitive to phase lags in the S channel than corresponding phase leads, as can be demonstrated from BBC psychoacoustic data[5,6].

In the absence of proper phase compensation of the M and S signals, one normally has to tolerate some phasiness and blurring at mid frequencies if using shuffling or spatial equalisation. It may well be (I haven't tried it yet) that spatial equalisation might work to frequencies significantly higher than 600 Hz if proper phase compensation is used. However, it is interesting to note that small microphone spacings of the type shown in **Fig 5** produce phase *leads* in the S signal relative to M at frequencies around the crucial 600 Hz region. As a result, spatial equalisation without phase compensation can actually improve the 'phasiness' for crossed-over cardioid stereo, especially for sounds fairly close to the centre of the stereo stage and for microphone spacings of 5 to 10 cm. Simple spatial equalisation has defects that undo the defects of these microphone techniques, giving a happy 'synergy'. The converse is that the defects of the microphone technique of **Fig 4** are made even worse by spatial equalisation without phase compensation!

One can, in other situations, reduce the phase errors in S relative to M by arranging that the transition between low and high frequency gains is as slow as possible, rather than changing rather sharply around 600 Hz. I have found that images *do* sound sharper and less phasey if one sets the graphic equalisers so that the transition takes place over a few adjacent bands, and this is something that can be adjusted by ear for best effect. ▷



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Spatial equalisation is particularly suitable for reprocessing recordings for professional use made on amateur equipment. This is because, as already noted, many cheap stereo electrets have a spacing matched to the properties of spatial equalisation, and also because tape azimuth errors in cassettes or poorly maintained analogue reel-to-reel machines are not worsened by the processing. Additionally, unlike simple width enhancement, spatial equalisation does not worsen audible noise, since it leaves frequencies above about 1 kHz unaltered.

Another situation where spatial equalisation can prove effective is with pseudo stereo derived by the Orban stereo synthesiser device from a mono original. Spatial equalisation can enhance the spaciousness without exaggerating the artificialities of the pseudo-stereo technique. For example, I have found it to work well applied to the Orban pseudo-stereo of Robert Parker's well-known reprocessing of old jazz recordings.

Having indicated many of the possibilities and limitations of shuffling (and there is of course much more that could be said at a technical level), we describe the practical implementation promised earlier using readily available equipment and with easy adjustment. Ideally, for the implementation to be described, one should use a stereo graphic equaliser in which the two channels are ganged. Failing that, two separately adjusted stereo channels can be used, although this means one has to adjust more controls. (I use a 7-band ganged graphic for this application.)

The method to be described has the unusual feature of automatically decreasing the sum channel gain as the difference channel gain is increased, so as to maintain an even overall frequency balance however the controls are set. Its description is so late in the article because it is not as easy to understand how it works as **Fig 2**, and it would have been confusing to introduce that complication earlier, however, once set up, it is very easy to use.

The basic idea is to use a mixer having a phase-inverting stereo signal path, which we shall term the 'processing signal path'. In many mixers, this can be provided by two of the input channels plus a suitable stereo output bus or headphone outputs. One needs gain controls somewhere in that signal path, preferably ganged, eg a headphone output gain control, or a ganged input gain on the two input channels. By way of example, on the cheap Realistic Cat No *32-1200B* mixer, the path between the auxiliary stereo input to the headphone outputs is phase inverting and has in-path gain controls. One then feeds the processing path's outputs back to the processing path's inputs, but connects the leads to interchange channels, so that the left output is fed to the right input and vice-versa (**Fig 6**). Besides the processing path which is fed back as described, the mixer also needs other stereo inputs mixed into the processing path, and a main stereo output subject to its own gain control (**Fig 6**—in the Realistic mixer, any other input can be used, and the main output is used for outputting the shuffled signal).

One then mixes the stereo from other inputs, which is to be processed, into the fed-back signal path (**Fig 6**). The effect of the external feedback loop is to modify the stereo. For signals identical in both input channels (ie central mono or M), due to the inverting property of the processing signal path, the feedback is negative feedback, so that the M gain is reduced. For signals opposite in phase in the two channels (ie the S signal) the feedback is positive since the fed back signal adds to the signal in the other channel rather than cancelling it—this is due to the signal in the other channel being in opposite phase, so being in phase with the inverted fed back signal from the other channel. Thus the S gain is increased. As a result, as one turns up the gain in the processing signal path (by stereo-ganged gain controls at its input or output) the width ▷

FIG.6
STEREO WIDENING CONTROL IMPLEMENTED BY FEEDBACK AROUND A MIXER. THE PHASE INVERSION AND FEEDBACK GAIN CAN BE ANYWHERE IN THE FEEDBACK OR PROCESSING SIGNAL PATH

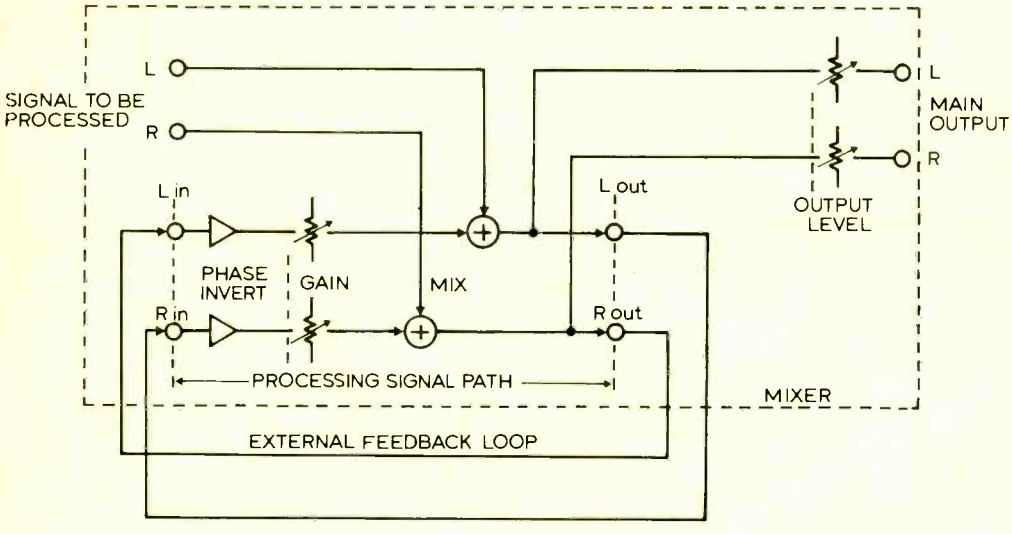
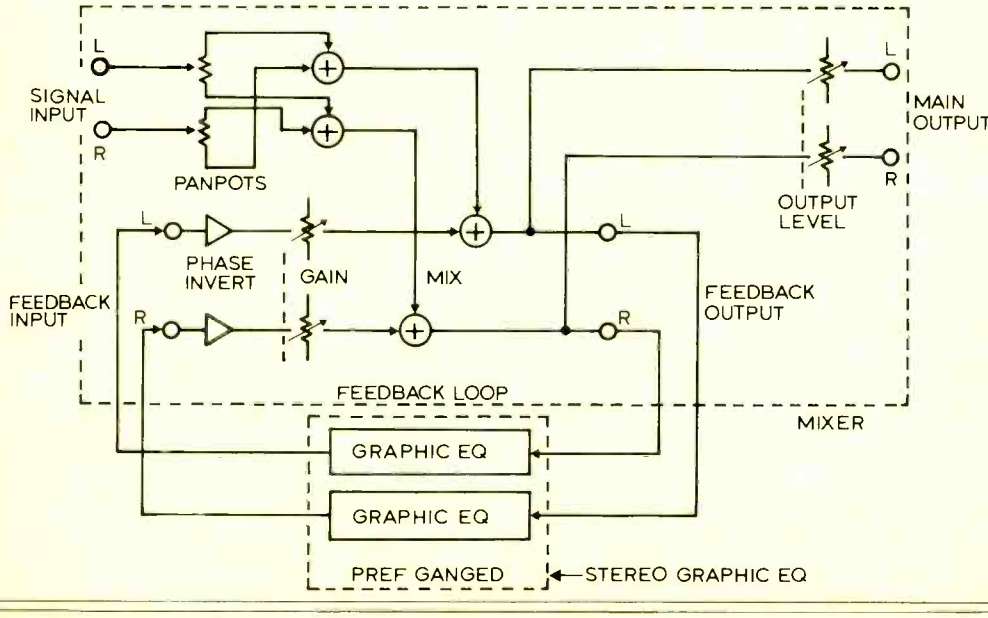


FIG.7
COMPLETE SHUFFLING SYSTEM BASED ON FIGURE 6 PLUS STEREO GRAPHIC EQUALISER (PREFERABLY WITH GANGED CONTROLS). PANPOTS IN THE MAIN SIGNAL INPUTS COMPENSATE FOR THE BASIC WIDENING EFFECT OF THE FEEDBACK LOOP



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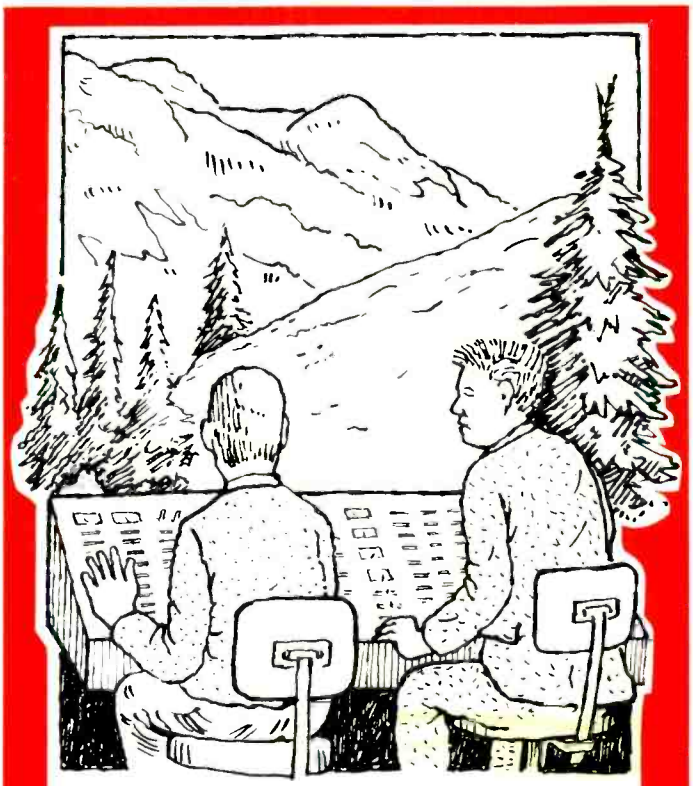

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is increased—up to the point where the positive feedback becomes unstable.

When setting up the feedback (in the Realistic by feeding the headphone output into the auxiliary inputs with channels swapped) take care to keep input and output gains down to start with and turn them up slowly to find out the point at which feedback howl occurs. (Warning—keep speaker or headphone levels well down when doing this!) Below this point, the circuit acts as a stereo widening control for stereo signals mixed in with the processing signal path, allowing adjustment all the way up to infinite width at the point of feedback howl. The simultaneous reduction of M gain as S gain increases give subjectively almost constant gain as width is varied in many mixes, although central images become quieter and edge images louder as the width is turned up. Interestingly, the configuration of **Fig 6** turns the mixer into one whose panpots cover a wider stereo stage than usual (depending on the setting of the width-control gain)—so there is no reason why most studios cannot start using their mixer as a wide-stage mixer.

If one now inserts a stereo graphic equaliser into the feedback path (assuming the equaliser is not phase inverting*) one has the possibility of varying the amount of feedback with frequency (**Fig 7**). Unfortunately, the equaliser will have some gain at all frequencies (even at maximum cut), so will tend to widen the image at all frequencies—this is not usually wanted or desirable.

To counteract this, one first sets up the system without the equaliser (or with the equaliser bypassed) at reasonable feedback settings, and feeds the stereo signals to be processed into the mixer via panpots. The idea is to narrow the inputed stereo image with the panpots to counteract the widening at unit gain in the feedback path. One pans the two channels in towards the centre. If one turns down the right channel input level on the main stereo input, while feeding a signal into the left channel, then turn the left channel panpot to that position at which no output emerges from the right channel main output (so that the panpot counteracts the widening of the feedback path). Similarly, one then turns down the left channel input gain, feeding in a right channel signal, and adjusts the right channel input's panpot to the point at which no output signal emerges from the left channel main output. Turning both input gains back up, the narrow image produced by the panpots at the signal inputs is now adjusted to counteract the widening of the feedback path at its unity gain, so as to retain normal stereo at this setting. (On the Realistic mixer, if the headphone and auxiliary input gains are both set halfway to 5, then panpots set to about 2.2 divisions from centre counteract the feedback effect.)

When one now re-inserts the graphic equaliser into the feedback path (**Fig 7**) its central unity gain settings will again give normal stereo, however, boosting any frequency band on the equaliser (equally in both equaliser channels) widens the stereo image in that band, and cutting it narrows the stereo in that band. Thus one has achieved an effective stereo shuffler by the circuit of **Fig 7**, and adjustment of the stereo-ganged equaliser bands simultaneously modify S and M gains so as to preserve frequency balance. If the equaliser has a bypass switch, one can use it to directly compare the processed and unprocessed stereo. Because of the ganging of the stereo bands, this system requires fewer control adjustments when being altered than the system of **Fig 2**, and so is easy to use. Moreover, one also has overall width control available by adjusting the overall gain within the feedback path.

Rather than using an external graphic equaliser, it is also possible to use equalisers built into the mixer channels used in the processing signal path instead. This has the advantage of requiring no external mixer circuitry other than connector leads, however, the two equaliser channels have to be adjusted separately, not (usually) being gangable. The other disadvantage here is that the equalisers built into the mixer are not (usually) graphics, being designed for creative alteration of tonal quality rather than shuffling. This makes it more difficult to visualise instantly the kind of shuffling produced by settings of the equalisers.

For regular use as an overall width processor and shuffler, it may well be worth obtaining a modest mixer such as the Realistic, with the minimum of unnecessary facilities, just for use as a width and shuffler control, in conjunction with a stereo-ganged graphic equaliser of the type encountered in some domestic hi-fi equipment. The alternatives are building equipment specifically designed for this processing, or using more highly specified professional equipment that is less convenient to adjust.

Inevitably, this article has only scratched the surface of stereo image reprocessing. More sophisticated techniques are possible. These include improvements in shuffling equaliser design (eg using phase-compensated equalisers[2]) through methods of modifying image sharpness, to dynamic signal dependent modifications of the stereo such as have been used in variable matrix decoders. Beyond that, there are the additional enhancements of Ambisonic reproduction technology[7,8], either applied to decoding stereo signals or to 'transcoding' them into an Ambisonic format[8,9].

Although I don't agree with everything in them, I recommend references 3 and 4 for additional ideas on possible uses of shuffling. I hope this article has provided you with a useful introduction to stereo enhancement techniques and useful tools in day-to-day recording and reprocessing work. You are certainly encouraged to experiment using different shuffler settings with different kinds of recordings and processing techniques. There is no telling what kinds of effects and improvements that you might come up with. □

*If the equaliser phase inverts, then a non-inverting processing signal path should be used.

Width settings and crosstalk

It is often useful to know what the gain of S (relative to that of M) is, so that one knows how much width increase has been applied. This can most easily be done by measuring the crosstalk of a left only signal on to the right channel (or vice-versa)—something that can be done on the mixer's meters. The crosstalk is the same whether the S/M gain is reduced or increased by a given number of dB! If S gain is increased, this crosstalk is out of phase but if the S-gain is reduced, the crosstalk is in phase.

S/M gain dB	Crosstalk dB	S/M gain dB	Crosstalk dB
±0.0	−8.0	±7.0	− 8.3
±1.0	−24.8	±8.0	− 7.3
±2.0	−18.8	±10.0	− 5.7
±3.0	−15.3	±12.0	− 4.5
±4.0	−12.9	±15.0	− 3.1
±5.0	−11.1	±20.0	− 1.7
±6.0	− 9.6		

The figures in this table are accurate only for the case when S has no phase shift relative to M, and so are most easily applied to frequency-independent width control.

Acknowledgements

I would like to thank David Griesinger, Tony Faulkner and Ivan Vernon McKinney, Jr, for drawing my attention to various aspects of microphone and shuffling techniques used in this article. □

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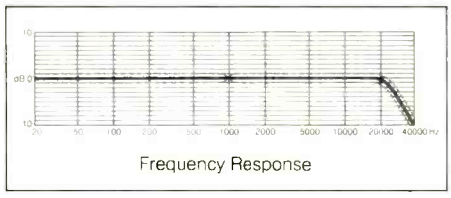

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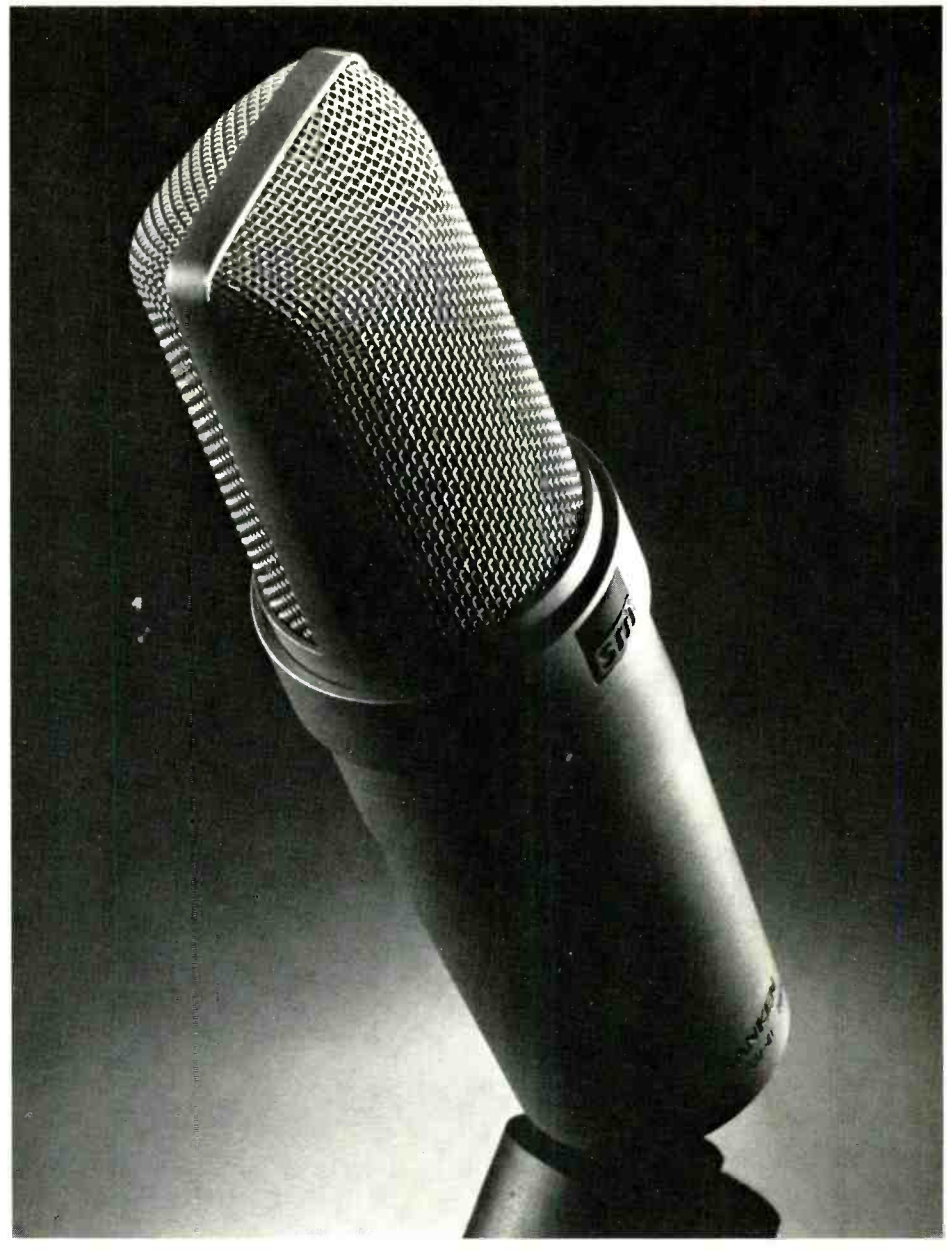

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R (for Rotary) DAT is a spin off from helical scan video recording where the tape moves slowly and the recording heads move rapidly to scan tracks obliquely across the tape width. Because all the micro-engineering groundwork has already been done for video, R-DAT looks like becoming the *de facto* single standard.

The first cassette standard set for S-DAT was larger than an ordinary audio cassette. Now the size has been reduced to make the cassette no larger in plan than a credit card. The R-DAT cassette is of similar size.

The tape for both S-DAT and R-DAT is the same width as conventional audio cassette tape, 3.81 mm. Maximum tape thickness has been set at 13 microns, with a maximum coating thickness of 2 microns. In comparison conventional audio cassette tape is 17 or 18 microns thick. In practice the DAT tape manufacturers will try for a thickness of anything down to 9 microns with 1.5 micron coating, providing more tape per cassette and so a longer playing time.

DAT tape coercivity is between 1,400 and 1,600 oersted for S-DAT and between 1,400 and 1,500 oersted for R-DAT. (Analogue audio cassettes have a coercivity of several hundred oersted, with only metal powder cassettes hitting the 1,000 mark.)

The two types of DAT cassette are not interchangeable.

The R-DAT cassette measures 7.3×5.4×1 cm. An auto-loading and threading system (as in a video recorder) wraps the tape round a rotating head drum similar to the drum in a video recorder. But whereas in a video recorder the tape wraps a full 180° round the drum (even further for 8 mm) in an R-DAT machine the wrap is only 90°. Also the drum is very small, just 30 mm in diameter compared to around twice that for a domestic video recorder. To get a high writing speed (relative speed between the drum heads and tape) the drum rotates at 2,000 RPM compared with 1,500 or 1,800 RPM for video. This gives a relative head to tape speed of 3.13 m/s.

Linear speed for R-DAT is less than 1 cm/s. The track pitch is less than 15 microns—narrower than any video format.

Linear recording density is 61 kbit/in of tape, and the rate of data transfer to and from the tape is 2.46 Mbit/s.

The S-DAT cassette is slightly larger than the R-DAT cassette. It measures 8.6×5.5×1 cm. Tape speed is either 4.76 cm/s or 4.37 cm/s; ie the same speed as for conventional analogue audio cassette tape, or less.

Linear recording density for S-DAT is similar to R-DAT, at 64 kbit/in. So is data transmission rate at around 2.4 Mbit/s.

To achieve this high data rate from low tape speed the recording head is divided into 22 separate parts which lay down 22 separate tracks spread over half the tape width. S-DAT is a flip-over format, like the conventional audio cassette. It records on one half of the tape while running in one direction (90 mins minimum) and then on the other half in the other direction.

Of the 22 tracks, 20 hold digital audio data. The other two are used for cueing and control pulses.

Note well that although the 8 mm video standard can be (and is) used for audio-only recording, this is not the DAT standard. It is a compromise which may be useful for background music or car audio where 18 or 24 hours on a single cassette has benefits. For 8 mm marathon-play audio the playing time is not continuous. The tape passes six times through the recorder, with a different area of the track used on each pass. It must be rewound between passes. So there are gaps between segments. More important the 8 mm audio coding standard is far below that of compact disc. Sampling frequency is tied to the video line frequency (twice line) which gives an audio bandwidth of only around 15 kHz instead of 20 kHz for CD. Also the 8 mm audio coding is only 8 bits, instead of 16 bits for CD.

The 8 mm format gets away with 8 bits by using compansion and non-linear coding. The signal is compressed twice; once in analogue form before sampling, by a 2:1 compander similar to dbx, then again in digital form by a ranging coder which converts 10 bit words to 8 bits.

Genuine DAT matches CD, both in sampling frequency (44.1 kHz) and coding (16-bit linear).

DAT recording pushes tape past even the limits of 8 mm video. Recorded wavelength is 0.7 microns. By comparison, when BASF and AEG Telefunken of Germany introduced the first recording tape and recorder in 1935, the coercivity was between 100 and 250 oersted and recorded wavelength 100 microns, or 0.1 mm. Even this was 10 times better than the 1 mm wavelength captured by Valdemar Poulsen with his turn of the century steel strip recorder.

Live Aid multitrack?

We are coming up to the anniversary of Live Aid. There is still no souvenir recording and the official line is that there will never be one. Give it time. When multitrack tapes of something as big as Live Aid exist, someone, somewhere, sometime will find a way of using them.

With a multitrack tape it would be possible to overdub the lost sax solos from Sade's set, replace the lost passages of Paul McCartney's *Let it be* and expand the sound of the finale sing-song where there was a chaotic muddle while the artists hunted by trial and error for mics that worked. But only gross trickery could fill the gap left by the Wembley power cut in the middle of the The Who.

This is what happened with the Bangladesh concerts in the early '70s. The Bangladesh tapes (32-track from Wally Heider's truck) were 'repaired' by producers Phil Spector and George Harrison. A microphone failed during the Ravi Shankar set, losing some of the tabla percussion track. In the months after the concert, engineers at Record Plant in New York took some tapes of the same instrument recorded earlier and fabricated a rhythm track. With Shankar's approval, this was dropped in to cover the gap. To the best of my knowledge no-one listening to the album has ever noticed.

After the Wembley concert the Live Aid organisers were unambiguous. "No recordings were made. It would have taken years to sort out the copyright problems. It was never intended that there should be a record. Yes, everybody's rumouring that there will be a release but it's just not going to happen."

The official BBC line was the same. For contractual reasons, no tapes were made. And certainly no multitracks.

Anyone close to the event knew this was nonsense. There were multitrack machines being used in the BBC OB vans. The BBC at BH routinely taped the transmitted radio sound, using ¼ in analogue machines. There weren't enough Sony *F1*s spare to do it digitally.

I for one played fair in everything I wrote for the popular press. I dutifully quoted the BBC as saying "no multitrack recordings were made". To have even hinted otherwise could have created all manner of legal problems for the BBC and Live Aid organisers.

But I wondered what would happen if the resourceful Mr Bob Geldof ever cut through the legal red tape, got clearance to issue a record and bewailed the fact that no multitrack recordings were made. How would the BBC explain then

that it did after all do what it officially said it didn't do?

For future reference Stuart Grundy of BBC Radio 1 is now on record in a published letter confirming, "The whole event was recorded in 24-track by the BBC." So we are now allowed to know what we previously knew but couldn't print because the BBC denied it.

No OBE for Bob

No gong yet for Geldof. One of the official lines is that it's because he's an Irishman. Well note this.

Sony's TV factory in Wales now has a new Japanese manager, Suehiro Nakamura. The last one, Tetsuo Tokita, is going back to Japan. He takes with him a British gong. In 1980 the UK Government gave Sony the Queen's Award for export achievement. The same year Tokita got an OBE. He's Japanese. Geldof's Irish. What's the difference?

French jam discovery

I do recommend the Institute of Broadcast Sound's newsletter for a good read. There are always some nice audio titbits. A recent issue, reporting a weekend seminar in Gloucestershire on the impact and import of stereo, contains some anecdotal gems. My favourite is the story of how the French Resistance listened to BBC newscasts during the war. The story came from a tape of reminiscences made for the BBC by a former member of the underground.

Without knowing it, the French were relying on what is now a well-known fact of stereo life but years before stereo went on the market. We all know now that when speech is recorded in phase, with equal balance in both channels, it creates a phantom image at front centre halfway between the speakers. Difference information spreads to left and right. The French found this out in the '40s.

By a happy coincidence, the BBC used to broadcast the same news programmes to France on several transmission frequencies. The Germans jammed them all but used a separate jamming signal for each frequency. The French Resistance used to listen on receivers in pairs, spaced apart like a stereo pair of speakers. They tuned one radio to one transmission frequency, and the other radio to another frequency broadcasting the same programme. The speech sound then appeared to come from halfway between the two sets. The jamming signals came from left and right.

Incidentally, I gather that a similar technique is being pushed as a bonus point for AM stereo in America. Background interference is bad but when the programme is transmitted in stereo wanted signal tends to settle at centre front, with the hash at left and right. □

REVIEW

REVIEW

A technical evaluation by Hugh Ford

AUDIO TAPE

From time to time *Studio Sound* evaluates the currently popular audio tapes in ¼ in form. Not only do manufacturers produce new tape types but manufacturers also change their products over the years without announcing a change in tape type, thus type 'ABC' of a few years ago may not be the same as type 'ABC' sold today. In general, however, such changes are improvements and may correspond to the use of a different type of coating machine, different dispersion techniques for the formulation and even different formulations.

Since the last review of tapes EMI no longer manufacture professional tape and their factory at Hayes no longer exists; in addition Pyral do not currently produce ¼ in materials.

As in the past manufacturers were invited to provide from different batches two NAB reels of each product (the latter request was ignored by Agfa and Ampex). Zonal provided one set of samples which were partially evaluated before being promptly replaced with a second set of samples bearing the same type numbers but said to represent the current product—I suspect that a change of formulation has taken place to overcome shedding problems? (Editor's note: The first set of Zonal samples was provided nearly a year previously when they were the only manufacturer to respond to a request for review samples at that time. The tape review was therefore temporarily shelved.)

In past reviews some Japanese ¼ in tapes have been included but these are not popular either in Japan or other parts of the world. This may be due to their poor mechanical performance on professional and semi-professional machines.

All tapes were visually inspected for damage, type of box and wrapping, and spool (reel) dimensions and the results are shown in **Table 1.** Many tapes are now supplied in sealed plastic bags within an unsealed hinged type box. Whilst the outer boxes are similar in size the differences are significant when designing storage areas. The weight shown is for the products as packed in their boxes.

All the spools (reels) had plastic hubs in lieu of metal hubs but provided that these are conductive to electricity they should not present any problem. The basic dimensions of the spools, the inner hole diameter, the outer diameter and the width at the hubs were checked. In all cases the hole diameter was larger than either the NAB or IEC standards where the upper limit is 76.40 mm, however, this makes mounting spools easier and is not a disadvantage.

Similarly the outer diameters tended to be very slightly larger than specified with some hub widths being smaller than the minimum 11.61 mm specified in the IEC standard.

All tapes had a black back coating ▷

TABLE 1

	Agfa PEM 468	Agfa PEM 469	Ampex 406	Ampex 456	BASF 911	Zonal 610	Zonal 611	Zonal 675	Zonal 676	3M 226
Confectioning										
Outer wrap	None	None	None	None	None	None	None	None	None	None
Inner wrap	Polybag	Polybag	Sealed	Sealed	Polybag	Sealed	Sealed	Sealed	Sealed	Polybag
Box type	Envelope	Envelope	Hinged	Hinged	Hinged	Hinged	Hinged	Hinged	Hinged	Hinged
Box size	276×280 mm	276×280 mm	280×280 mm	280×280 mm	275×277 mm	272×272 mm	272×272 mm	272×272 mm	272×272 mm	278×280 mm
Box width	18 mm	18 mm	21 mm	21 mm	20 mm	22 mm	22 mm	22 mm	22 mm	21 mm
Weight	850 g	950 g	1000 g	950 g	1000 g	750 g	800 g	800 g	850 g	900 g
Spool characteristics										
Flange hole	Small	Small	Small	Small	Large	Large	Large	Large	Large	Medium
Spool hub	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic
Hole diameter	76.8 mm	76.8 mm	76.8 mm	76.6 mm	76.6 mm	76.7 mm	76.6 mm	76.6 mm	76.6 mm	76.9 mm
Outer diameter	267.0 mm	267.4 mm	266.7 mm	266.9 mm	267.7 mm	266.7 mm	266.4 mm	266.6 mm	266.6 mm	266.5 mm
Hub width	11.16 mm	11.23 mm	11.42 mm	11.43 mm	11.26 mm	11.36 mm	11.20 mm	11.40 mm	11.40 mm	11.50 mm
Tape properties										
Back coat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Colour	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Thickness (μm)	1.5	3.8	—	1.3	3.0	5.6	6.0	8.7	3.7	—
Resistivity (Ω)	140 k	150 k	30 k	35 k	70 k	1.3 M	1.7 M	1.4 M	1.2 M	27 k
Oxide coat	PVC	U'thane	U'thane	U'thane	PVC	PVC	PVC	PVC	PVC	U'thane
Thickness (μm)	17	—	—	—	17.2	16	9.8	12.9	12.5	—
Resistivity (Ω)	4 G	4 G	>20 G	>20 G	5 G	2 G	4 G	4 G	4 G	>20 G
OA thick (μm)	50.0	52.8	49.8	50.1	54.2	55.0	37.8	56.5	38.0	49.6
Condition as received										
Reel 1	Very good	Very good	Very good	Very good	Slight blocking	Good	Very good	Good	1 block	Medium
Reel 2	Good	Very good	1 block	1 block	Slight blocking	Slight damage	Slight damage	Slight damage	Slight damage	Leafing damaged
Length										
Nominal (ft)	2400	2500	No spec	2500	2500	2400	No spec	2400	No spec	2500
Actual (ft)	2396/2394	2503/2506	2541/2558	2540/2525	2509/2521	2414/2411	3626/3625	2421/2421	3638/3638	2516/2518
Winding performance										
ATR fast	Very good	Very good	Poor leaf	Very poor leaf	Very good	Very good	Poor leaf	Slight leaf	Slight leaf	Bad leaf
ATR 120	Very good	Very good	Very good	Very good	Very good	Very good	Very good	Very good	Very good	Very good
Teac fast	Very good	Very good	Poor leaf	Very poor	Very good	Very good	Good	Good	Very good	Med leaf
Available types										
Lengths	Not stated	Not stated	600 to 5000 ft	1200 to 5000 ft	Not stated	600 to 3280 ft	900 to 3600 ft	600 to 3280 ft	900 to 3600 ft	Not stated
Widths	Not stated	Not stated	¼ to 2 in	¼ to 2 in	Not stated	¼ to 2 in	¼ and ½ in	¼ to 2 in	¼ to 2 in	¼ to 2 in

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REVIEW

with a low enough conductivity to eliminate the build-up of static electricity and thus improve the winding characteristics, particularly at high tape speeds. In the past some manufacturers had problems with the back coating either shedding or transferring to the oxide coating—these problems no longer seem to exist.

Whilst the resistivity of the back coatings was variable it was always adequately low, however, the resistivity of the oxide coating also varied widely with the very high resistivity of the Ampex products and the 3M product. This was probably associated with their poor winding performances.

In all cases the overall thickness is quoted but only in those cases where the coatings could be dissolved in acetone are the coating thicknesses tabulated, it being assumed that those coatings that did dissolve are based on polyvinyl chloride binders and the remainder on the more modern polyurethane binders.

Under the heading 'Condition as received' leafing refers to individual turns of tape protruding from the pack whilst blocking refers to sections of tape giving an uneven wind, sometimes due to the pack moving in transit. Whilst in general the condition of all the tapes was good as received it appears that Zonal have a problem in handling their products in the factory. Not only were some spools scratched or their perimeter damaged but also the edges of some tapes were marked by careless handling.

In all cases the samples were very close to or longer than the specified length with the available lengths/widths being tabulated.

The winding performance was evaluated on an Ampex *ATR-100* machine at the fast winding speed and at the archiving speed of 120 in/s at a tape tension of 80 g in addition to being fast wound on a Teac *3340*. This is typical of semi-professional machines which operate at low tensions.

All the samples wound better than tapes without a back coating and from experience I do not consider the poor winding of the Ampex *456* to be typical—maybe this was a rogue sample as this product usually winds well.

Electroacoustic performance

The electroacoustic performance (Table 2) was measured on a stereo machine having 2.79 mm track widths typical of stereo ¼ in recorders as opposed to twin-track recorders where the track width is typically 1.91 mm or full-track formats which are commonly used for manufacturers specifications. These differences affect the noise performance as does the 35 μs IEC/CCIR replay equalisation used for evaluation as opposed to the NAB standard of 50 μs+3180 μs with all tapes being evaluated at a speed of 15 in/s (381 mm/s).

Another matter which affects the apparent performance are the gaps in the record and replay heads with these being 12.5 μm for the record head and 2.5 μm for the replay head. These are typical of professional machines but different heads are likely to have unpredictable effects.

Whilst noise, distortion, maximum output level (MOL) and other parameters are related to a recorded fluxivity of 320 nWb/m as determined from a calibration tape and corrected for the fringing effect resulting from using a full-track calibration tape on a stereo machine, bias requirements and sensitivity cannot be related to physical constants. These require the use of a reference tape and for these purposes the unrecorded section of the BASF 38.1 cm/s 35 μs calibration tape S.No 8317 was used.

The optimum bias was determined as the bias required for minimum third harmonic distortion at 1 kHz when recording a fluxivity of 320 nWb/m which normally also corresponds to minimum modulation noise. Whilst this is the best method for determining operating conditions many users do not have facilities for measuring third harmonic distortion and are therefore unable to bias to these conditions. Many recorder manufacturers recommend bias to be set to a number of decibels over bias at a high frequency, typically 3 dB over bias at 10 kHz at 15 in/s or at 20 kHz at 30 in/s. Such settings are generally accurate for a given recorder using a given type of tape.

Having determined the optimum bias for each tape type this is related to the optimum bias of the calibration tape in the tabulations. The sensitivity at 1 kHz, 10 kHz, 15 kHz and 18 kHz was then related to the sensitivity of the calibration tape with both the tape under test and the calibration tape at their optimum bias.

The remaining electroacoustic parameters were also determined at the ▷

TABLE 2

	Agfa PEM 468	Agfa PEM 469	Ampex 406	Ampex 456	BASF 911	Zonal 610	Zonal 611	Zonal 675	Zonal 676	3M 226
Bias (dB)	+0.5	−1.5	−2.5	−2.5	0.0	−1.0	−2.8	+0.4	−0.5	−0.7
Sensitivity (dB)										
1 kHz	+1.1	+2.5	+1.9	+3.0	+1.5	+2.1	+1.2	+1.2	+0.5	+2.3
10 kHz	+2.0	+4.3	+3.5	+5.1	+2.3	+2.1	+2.6	+2.7	+2.7	+4.2
15 kHz	+1.3	+4.5	+3.3	+5.6	+2.3	+1.3	+2.6	+2.5	+2.8	+4.5
18 kHz	+1.4	+5.0	+3.7	+6.0	+2.3	+1.3	+2.8	+2.8	+3.3	+5.0
Saturation (dB)										
10 kHz	+9.4	+10.9	+8.5	+9.5	+8.6	+7.4	+6.8	+9.2	+9.4	+9.6
18 kHz	−0.6	+2.0	+0.4	+1.6	−0.3	−2.4	−0.6	+0.8	+1.7	+1.4
Third harmonic distortion										
3% MOL (dB)	+10.2	+11.2	+7.0	+10.4	+12.2	+10.0	+6.2	+11.0	+7.1	+12.4
K3 at 320 (%)	0.35	0.17	0.50	0.10	0.18	0.30	0.65	0.28	0.45	0.08
Intermodulation distortion to CCIF (dB)										
1% 1 kHz	+2.0	+3.5	−1.5	+3.6	+3.0	0.0	−2.6	−1.8	−1.4	+4.0
1% 10 kHz	−6.4	−4.6	−5.4	−4.4	−5.8	−6.2	−5.9	−5.7	−4.9	−6.4
10% 1 kHz	+10.7	+9.4	+3.8	+8.4	+9.2	+8.0	+4.7	+8.9	+6.3	+9.4
10% 10 kHz	+1.8	+3.1	+1.1	+2.9	+2.4	+1.2	+1.2	+2.6	+2.9	+3.6
Noise referred to 320 nWb/m										
CCIR RMS (dB)	56.1	54.3	56.1	56.4	55.9	55.6	55.6	56.6	56.9	57.1
CCIR Peak (dB)	52.0	50.6	52.1	52.6	51.9	51.6	51.6	52.4	52.7	55.0
A RMS (dB)	65.1	63.1	65.1	65.2	64.6	64.1	64.4	65.4	65.6	66.3
Mod Noise (dB)	54 xxx	56.0	54.5	57.0	57.5	55.0	54.5	56.0	54.5	57.0
Print 24 h (dB)	58.5	56.5	54.5	52.0	57.5	56.0	57.0	58.0	60.0	53.5
SMPTE test (%)	0.4/0.8	0.4/0.6	0.5/1.2	0.35/0.5	0.35/0.45	0.6/0.8	0.5/0.65	0.35/0.45	0.8/1.0	0.3/0.4
Magnetic properties										
Coercivity										
Oe/kA/m	362/28.8	331/26.3	304/24.2	315/25.1	330/26.3	304/24.2	303/24.1	351/27.9	363/28.9	340 27.1
Remn't flux (nWb/m)	1927	2365	1424	1862	3190	1927	1314	2059	1423	2014
Squareness (Ratio)	0.81	0.86	0.81	0.88	0.82	0.80	0.80	0.83	0.82	0.86

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optimum bias for each tape sample. Inspection of the tabulated sensitivities shows that variations in the 1 kHz sensitivity are limited. The high frequency sensitivity generally follows the pattern of the 1 kHz sensitivity such that the high frequency record equalisation required varies little from tape to tape so that any respectable recorder can be equalised for any of the tape types tested.

Turning to the maximum output capabilities, many modern tapes have a 3% distortion point at 1 kHz in excess of +10 dB reference 320 nWb/m with a corresponding lowering of third harmonic distortion at 320 nWb/m and improvement in intermodulation distortion performance at 1 kHz. However, there is not always a corresponding improvement in high frequency saturation and high frequency intermodulation distortion performance.

The method used to measure intermodulation distortion was to apply two tones of equal amplitude separated in frequency by 100 Hz (F1 and F2) and to compare the difference frequency component (F1−F2) with the amplitude of one of the tones to determine the distortion. The amplitude of one of the tones (F1 or F2) was then related to a fluxivity of 320 nWb/m. This means that particularly when using NAB equalisation which puts more signal on to tape at high frequencies than CCIR equalisation it may not be advisable to use the maximum capabilities at mid-frequencies.

Referring to the noise performance there was approximately 3 dB difference between tapes, adding the MOL to the noise giving an indication of the mid-frequency dynamic range which varied more than 6 dB between samples. Print through varied by more than 8 dB with the 3M *226* offering the best dynamic range and almost the worst print through, however, the Zonal *676* offered the least print through and almost the worst dynamic range.

As is common practice the print through was measured by recording just less than one turn of tape with a 1 kHz tone, rewinding the tape and storing it at 20°C for 24 hours. The resulting print through in the form of the largest amplitude pre-echo was referred to the level of the recorded tone on the first pass over the replay heads.

The method for determining modulation noise was, as in earlier tape reviews, recording a 1 kHz tone at 320 nWb/m. Subsequently this tone was replayed through a narrow band notch filter to remove the fundamental tone and then a 500 Hz to 1.5 kHz 24 dB/octave band pass filter in order to measure modulation noise with the harmonics of the fundamental removed by this filter. Again there are significant differences between tape types with the modulation noise from the Agfa *PEM 468* being subjectively most offensive—rather surprising as Agfa tapes usually offer a good modulation noise performance.

Uniformity of reproduction was plotted on a Bruel & Kjaer level recorder for a 60 s length of tape at a pen speed of 80 dB/s to produce the plots for 100 Hz, 1 kHz and 10 kHz for each tape type. With the exception of both the 3M *226* samples which showed different defects the uniformity of the samples was good. A further test of uniformity was the measurement of the apparent SMPTE type intermodulation distortion resulting from recording a 7 kHz tone. The SMPTE distortion analyser effectively rectifies this tone and gives a reading of the apparent amplitude modulation resulting from tape uniformity defects.

The magnetic properties were measured with a 50 Hz B/H loop tracer which displays the magnetising force versus the sample magnetisation. The coercivity is the field required to reduce the magnetisation of a saturated sample to zero and relates to the bias required in addition to the field needed to erase recordings. The higher the coercivity the higher the optimum bias and the more difficult the erasure.

Remnant flux shows the maximum magnetisation of the sample as the magnetising field is reduced from sample saturation to zero. This relates to the maximum output level on the assumption that the complete tape coating has been magnetised. Finally, the squareness relates the saturation magnetisation to the remnant flux giving an indication of the efficiency of the coating.

The individual plots show MOL, high frequency saturation, sensitivity and third harmonic distortion at 320 nWb/m at 1 kHz versus bias current. As is conventional the plots were made at constant record current with the IEC 35 μs replay equalisation being employed.

Conclusions

I never understand why American tape manufacturers persist in producing tapes with a poor print through performance as witnessed by the Ampex and 3M products. Whilst, in the past such products had advantages in terms of a high MOL and good high frequency saturation, European manufacturers have caught-up and offer good alternatives whilst retaining low print.

Agfa has a reputation for producing consistent products with good uniformity and low modulation noise and the new *PEM 469* confirmed these parameters whilst offering a higher output at mid and high frequencies compared with *PEM 468*. The modulation noise of the sample of *PEM 468* was disappointing and I suspect a rogue sample.

Ampex *456 Grand Master* remains a very good product with exceptionally low distortion at 320 nWb/m provided that bias is very carefully adjusted. Whilst the dynamic range at all frequencies was good, print through remains a problem—this was the worst tape measured.

The new BASF *911* gives a very high MOL in conjunction with low print and good modulation noise, however, the bias/erase noise was bettered by other tapes and one sample had a severe coating defect over about 3 in of tape.

Of the Zonal products the *675* has much to offer and is better than many other products in one parameter or another having a high output, low noise and low print. Examination of the current Zonal samples suggests that earlier shedding problems may have been overcome.

Finally the 3M *226* has a high output at all frequencies together with the best noise performance but poor print through—6.5 dB worse than the best tape. On the other hand modulation noise was good whilst the overall uniformity might be improved with one sample having poor high frequency uniformity.□

(See over for diagrams)

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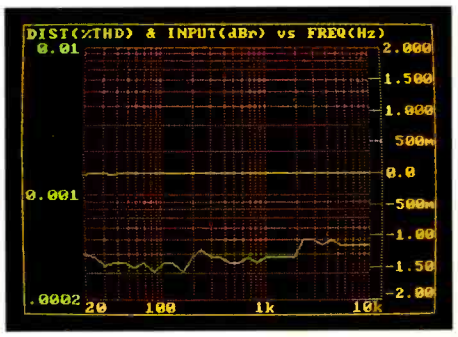

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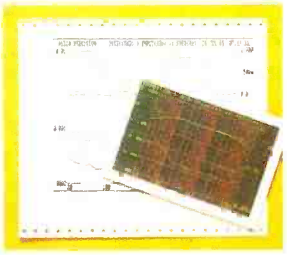

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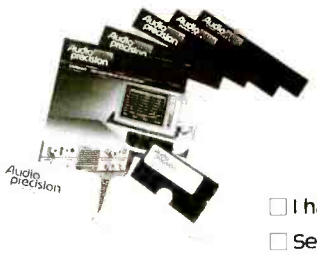

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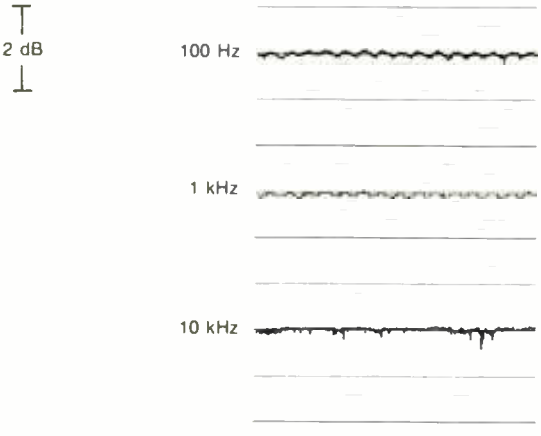
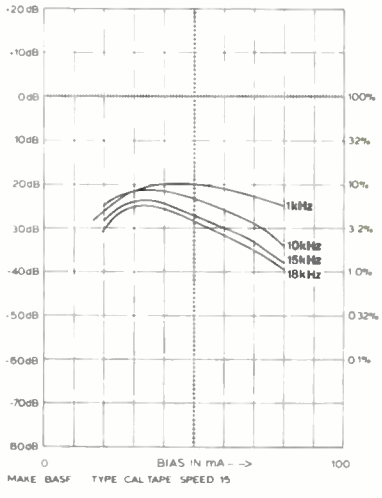
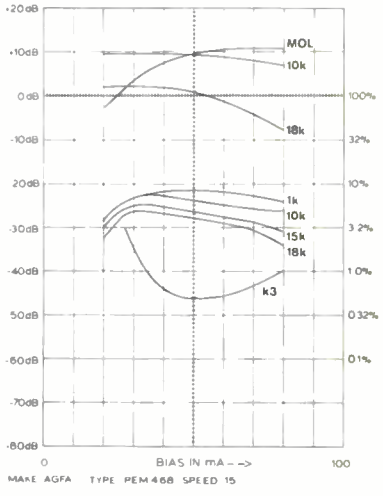
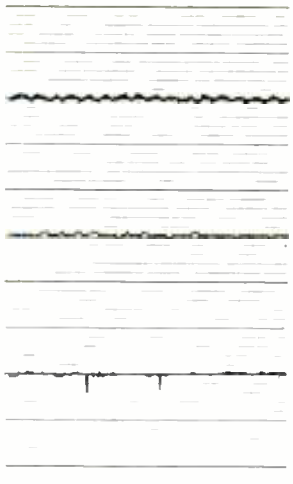


Agfa PEM 468







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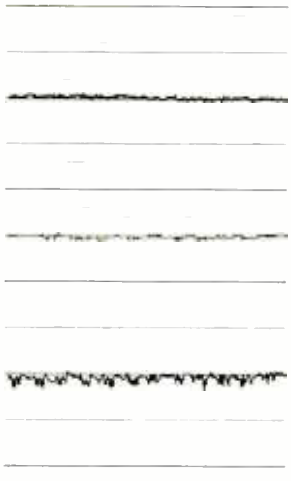
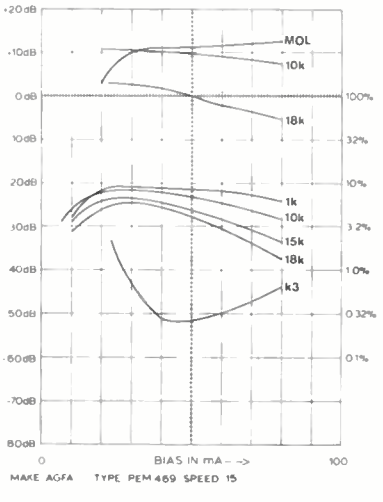
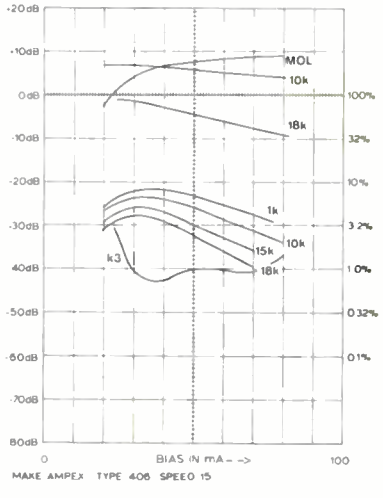
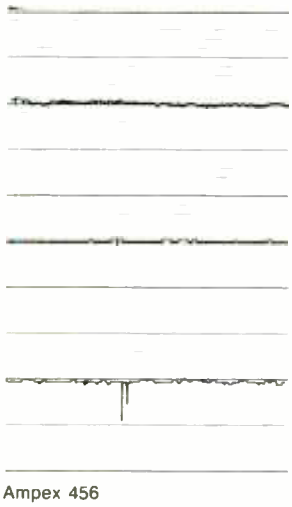


Ampex 406







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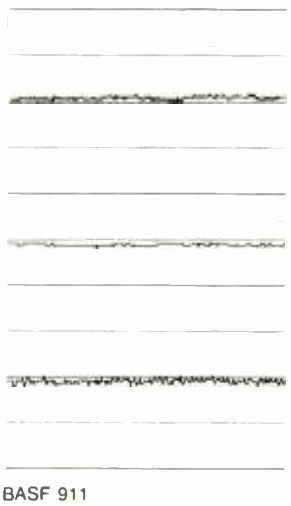

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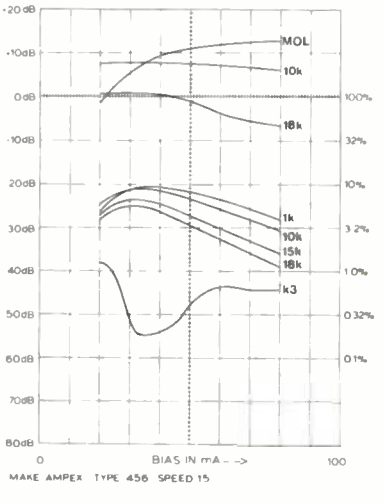

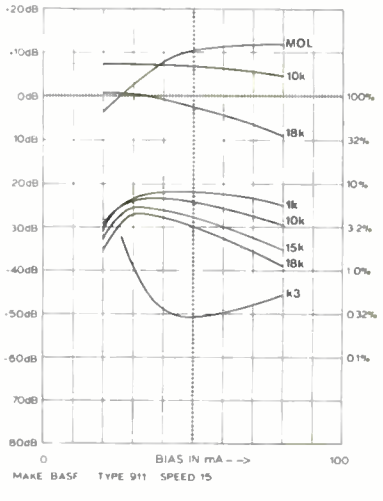

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Alternatively, for an even higher mixer specification, we can offer any of the other Amek/TAC consoles, such as the Angela or 2500 series, both of which are available with automation if required.

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In addition to the analogue Sony 24 track recorder, we can also offer their digital PCM 3324, as well as the top-line Studer range.

Of course a multitrack system does not start and finish with the mixer and recorder; we can also supply everything you need from digital mastering systems through signal processors and monitors to microphones and hardware.

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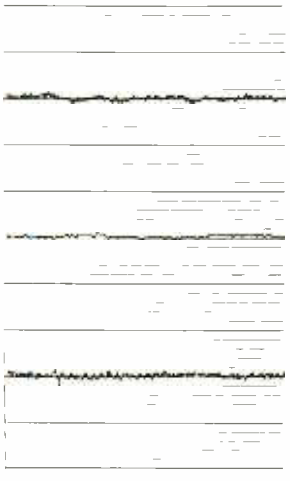
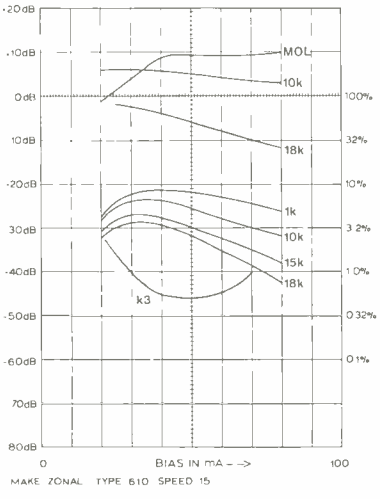
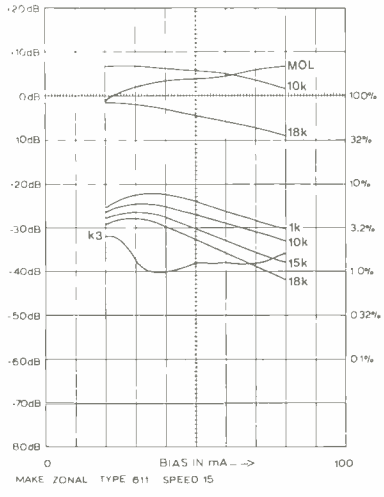
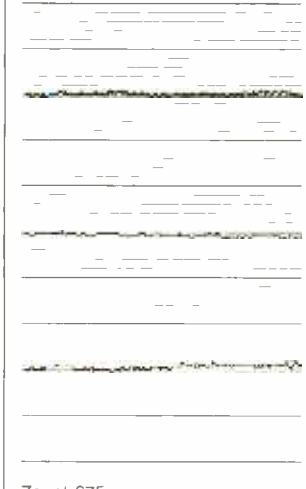


Zonal 610

Zonal 611







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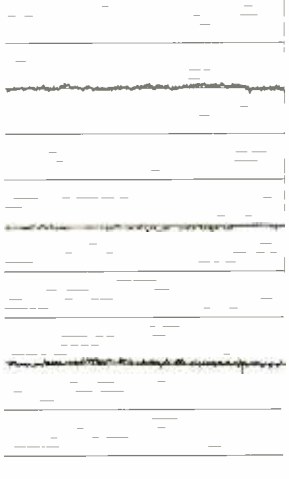

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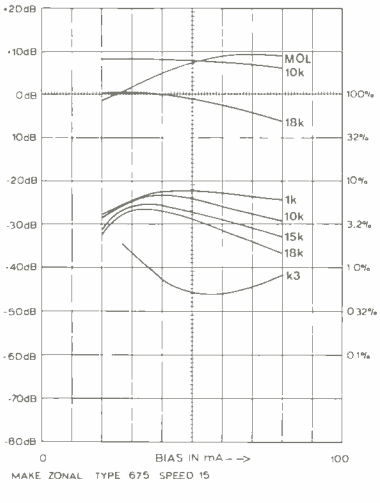

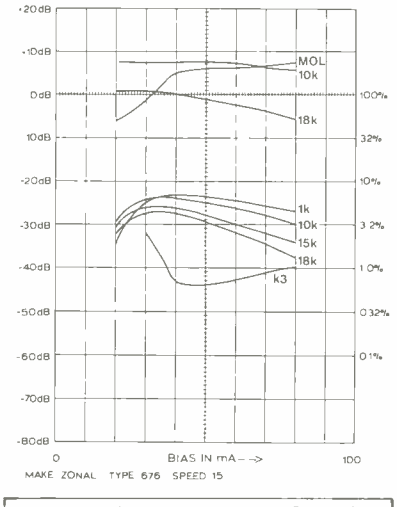

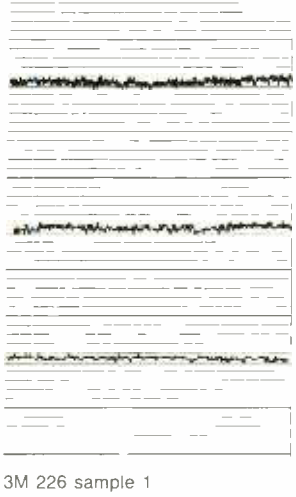

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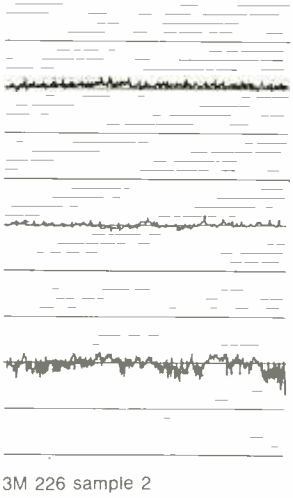

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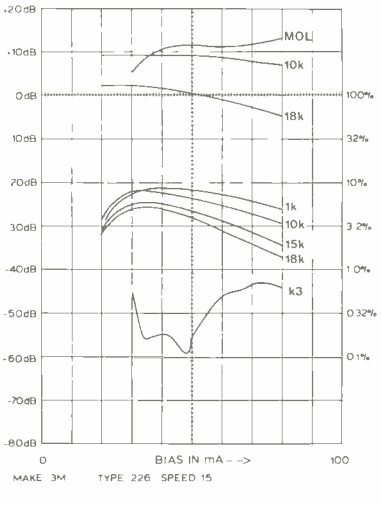

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ADV 349/2/E

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LETTERS

LETTERS

Letters should be marked 'For Publication' and sent to the Editor at the Croydon address on page 3

BGW review

Dear Sir, Thanks for the fine review on our model 750E power amplifier in your February issue. A few minor items in the review deserve comment.

The model reviewed is the 750E not 750D. The E model features the elaborate display while the D is unmetered and includes five LEDs which indicate power on, signal output for each channel and true clip for each channel.

The front panel is actually black and gold utilising selective anodise process on grained aluminium, the cover is also black rather than brown as indicated in the review.

We are reviewing the listing on the fan defeat switch and thermal switches to ensure they meet the required safety standards.

A 70 CFM fan is standard and was provided in the pre-production prototype you reviewed.

Connectors to the display on production units are via an insulated locking connector assembly.

Re damping factor measurements BGW Systems utilises a different measurement technique. A 10 VRMS source from an additional power amplifier channel is placed in series with an 8 Ω resistor and injected into the amplifier under test, this set-up provides a 1.25 ARMS current source. We then calculate the output impedance which was determined to be 0.016 Ω at low frequencies, equivalent to a damping factor of 500. In a Class AB+B design, the driver stage actually drives the loudspeaker load up until sufficient current is delivered at which time the output stage turns on. Unless the test is run at a sufficiently high level, we are measuring the driver stage damping factor rather than the output stage damping factor. In as much as damping factor is a high level phenomenon, we suggest Mr Ford consider changing this one test procedure.

The power supply imbalance, and power line indicators have been recalibrated prior to production.

Yours faithfully, Brian Gary Wachner and Dan Lasley, BGW Systems, 13130 South Yukon Avenue, Hawthorne, CA 90250, USA.

Hugh Ford replies: It was appreciated at the time of the review that the sample provided was not a production unit and I thank Brian Wachner for taking the trouble to inform us of the various matters of interest.

However, I feel that some comment should be made in connection with damping factors. Various modern amplifier designs lead to an output impedance which varies with power level. Such amplifiers do not energise the high power output devices at low output powers but bring them into action only when high output currents are required. The result is that no single figure can properly define the damping factor and that no single output current may be used to properly evaluate all amplifier designs. Brian Wachner is suggesting 1.25 ARMS, The Institute of High Fidelity standard IHF-A-202 suggests 1 W into the rated impedance (0.354 ARMS with respect to 8 Ω) and I, for the sake of convenience, have used 10 mARMS.

Provided that the damping factor is not ridiculously low, just how much does it matter? Taking into account the total series resistance of the amplifier load this consists of the voice coil resistance, plus the loudspeaker lead resistance and the connectors. Typically voice coils are wound with copper wire which has a temperature coefficient of resistance of 0.393%/°C which means that say 50°C temperature rise will increase the resistance of a nominally 8 Ω voice coil by 1.572 Ω—what has this done to the effective damping factor?

In addition the loudspeaker lead resistance is not insignificant. Twin figure-of-eight wire often used in domestic installations has a resistance of 0.1 Ω per metre run at 20°C—a 4 m run immediately offering a maximum damping factor of 20 for 8 Ω loudspeakers! Even using 16 mm² cable as suggested by some amplifier manufacturers only increases the maximum damping factor to 200 if the voice coil resistance remains ignored—a suggestion with which I cannot sympathise.

Certainly the damping factor is an indication of the amplifier design and the amount of feedback in action for a given output current and in this context the measurement of damping factor at a single output current is of doubtful value.

Broadcasting 78s

Dear Sir, Robert Parker's work on the transfer of 78 RPM recordings deserves greater recognition and appreciation than it was accorded in Barry Fox's Business column in your April 1986 issue. Making this material accessible to ears used to modern recording quality is an achievement of which both he and the Australian Broadcasting Commission can be proud.

The un-named engineers, who made those early electric recordings of jazz classics did a far better job than the technology of their time allowed them to know and it has taken the better part of five decades for the home listener, with a decent hi-fi system, to really discover just how good the original 78 sound is. I have never been satisfied with the transfer to long-playing disc of jazz recorded in the '20s and early '30s, perhaps because I started collecting in 1948 and my ears were 'tuned in' to the sound of the 78, either on master pressings or dubbed reissues. Not even the excellent RCA 'X-Vault', 10 in LP releases of, for example, Jelly-Roll Morton, and the matching UK issue on the HMV DLP 1000 series, quite captured the true sound of the originals, and subsequent reissues on LP in America, Europe and this country, have been progressively more disappointing. While I have slight reservations about the pseudo stereo and I occasionally query his interpretation of how the record should sound—that's subjective, as Mr Parker is quoted as saying—his re-processing has, to my ears, got nearer the original sound than anything that has been attempted so far. Comparison with master pressings from my own collection with the Parker transfers of the same items on his LP compilations, has led me to this conclusion.

Until Parker, like many collectors, I have pursued the best possible 78 pressings of favourite artists' work that I can afford but his work is making me think again. The cost of original master pressings in what collectors' jargon describes as 'N—' (hardly played) or 'E+' (carefully played but not very much) condition, is considerable. A pair of titles by Morton, made between 1926 and 1930, on Victor in 'E+' condition, can fetch anywhere between £75 and £200 at auction in the international market. If one averages the prices for 16 titles of varying rarity at around £2,200, then Mr Parker's Australian LP of Morton material, at about £7.50, looks like a bargain, assuming that its quality matches that of "Jazz Classics in Digital Stereo". Rumours of a CD issue on BBC records of the Parker anthologies, if true, are likely to seduce a few collectors like myself into buying a Compact Disc player to get the maximum benefit from Robert Parker's work.

Yours faithfully, Michael Bowen, Director AVC, University of Hull, Hull, Yorks HU6 7RX, UK.

NR suggestions

Dear Sir, When the CX system—developed by two American CBS engineers—was introduced at CBS London in July 1981, it was received with great enthusiasm by the CBS bosses. This was finally the answer to an absolutely hiss- and rumble-free analogue record.

The American company UREI introduced their CX mastering decoder/encoder 1181 for the mastering of CX records. Firms like AEG-Telefunken in Germany were eager to share in this sensational development and introduced their new CX record player with built-in decoder in 1981. In 1982 the German company KORT Elektronik introduced an absolutely perfect CX decoder for the consumer market, which—according to test reports—can be considered as one of the best CX decoders in the world.

After the introduction of the CD, however, certain firms were not so ▷

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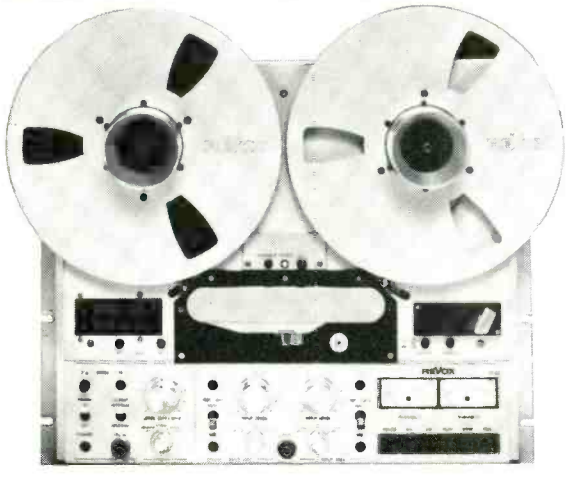

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7½/15 ips IEC	2	14108	£1000 95	£192 00 p/mth	£387 00 + 9 x £ 85 00 p/mth
PR/99					
3¾/7½ ips	2	13502	£1523 47	£292 00 p/mth	£591 00 + 9 x £129 00 p/mth
7½/15 ips NAB	2	13506	£1523 47	£292 00 p/mth	£591 00 + 9 x £129 00 p/mth
7½/15 ips IEC	2	13505	£1523 47	£292 00 p/mth	£591 00 + 9 x £129 00 p/mth
B/215 Cassette deck			£1053 91	£202 00 p/mth	£411 00 + 9 x £ 89 00 p/mth
B/225 Compact Disc player			£ 678 26	£130 00 p/mth	£384 00 + 9 x £ 44 00 p/mth
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LETTERS

LETTERS

enthusiastic anymore about CX, as it quite obviously 'stole their show'. I do not want to go into the advantages and disadvantages of CD, but would rather like to discuss the CX coded analogue record.

For obvious reasons the analogue record will not disappear as quickly from the market as the CD people would like it to. One reason is, of course, that there are millions of analogue record players all over the world, and new models are introduced continuously. They definitely will not be thrown away just because there is CD.

Furthermore, the production of a digital recording necessary for the mastering of a CD demands a minimum of digital equipment, which for the time being is still very expensive. Smaller studios just do not have the financial means to invest something like $50,000 to $80,000, that is needed as a minimum for the equipment necessary to produce a digital master tape for the production of a CD, not included in these costs are the multichannel digital recording machines. This could mean the end of thousands of smaller studios and their creative contribution to the music world.

On the other hand think of all the disco productions (also called maxi-singles), which are more or less throw-away records. Who really wants to keep those on an 'everlasting and indestructible' CD?

Once there was a man who invented the ladder-free stocking. His patent was quickly bought and locked up safely by industry, as this invention would have been a tremendous blow to the sale of stockings. It seems rather odd commercially to introduce an indestructable record and expect record consumption to grow. However, this is a problem that the CD people have to think about.

Back to the CX record. Many studios try very hard to get an extremely low noise level on their recordings by using Dolby A, telcom, or other NR Systems, in order to get an absolutely hiss-free tape recording. A growing number of studios use digital recording techniques and supply digital cassettes for the disc mastering, which are absolutely free of any hiss.

These recordings are then transferred to the analogue record with its usual noise level of about −45 to −55 dB. This is rather ridiculous, as it really defeats the issue. What good is a noise-free tape recording with almost 80 dB dynamic range, if about 30 dB disappear in the normal record noise level? One might even suggest for the usual analogue records, just forget about using any NR systems, as the difference won't be heard on the record anyhow.

This is where the CX record comes in. With its hiss- and rumble-free dynamic range of almost 90 dB, it is a tough competitor to the CD, and it is still analogue. What is most amazing is the fact that consumers can easily be manipulated into the belief that CD only gives the 'marvels of true hi-fi', although there is a much simpler (and cheaper!) way of getting a record without the familiar record noise by just plugging in a CX decoder at much lower costs, to have the same (if not better) noise-free hi-fi record reproduction.

My question to your readers is, have they ever used or even heard of CX records and if so, what was their experience?

Wouldn't it be logical to make all records in the CX mode as a standard? CX stands for Compatible Extension and compatible means that one can also play a CX coded record without a decoder and one would not realise that it is CX coded, as it sounds just like any other uncoded record with its familiar hiss and rumble. But at least those people who want to make use of the CX system and have a CX player are offered the alternative to enjoy absolutely hiss- and rumble-free listening with any new LP that comes on the market.

Mastering a CX record does not take any more work than just pressing a button on the encoder. So there are no extra labour costs involved, which means that mastering a CX record does not make the cutting process more expensive at all.

The step to CX coded records would be even less difficult than the step from mono to stereo recordings years ago when records had to be mono and stereo compatible as not everybody had stereo then.

Why not print on the cover 'CX recording, also non-CX compatible' for those who do not want or have a CX decoder?

Maybe one day the analogue record producers will wake up and realise that CX could be a way to win consumers back from the hiss- and rumble-free cassettes to the hiss- and rumble-free record again.

Yours faithfully, D. Mehtieff, Ing, Elatontechnik, Seligenstädter Str 118, D-6050 Offenbach, West Germany.

Tape speed standards

Dear Sir, With reference to David A Pickett's letter (March 1985) and Barry Fox's item (July 1984) the most important advice on tape speed with German Magnetophons—the only one available as far as I know—is found in the FIAT (Field Information Agency, Technical, reports on captured enemy equipment) Final Report No 923, dated 13 May 1946, by Richard H Ranger. On page 6 he writes:

'It is necessary to point out that all of the Magnetophon development to date has largely been a matter of getting on with what has been done without a thorough-going study of all details. Take the basic matter of the rate of tape feed for example. The rate of 77 centimeters (per second) occurred as a result of using a pulley of 10 mm diameter on the synchronous motor with fifty cycle operation. (The original "synchronous" motors were really induction motors running at 24.5 rps).'

So early Magnetophons did not operate at 78.5 cm/s (30.9 in/s) but at about 76.8 to 77.0 cm/s equal to 30.2 to 30.3 in/s, according to Mr Pickett's reference to the EMI recordings (perhaps made on German HF bias Magnetophons Type K 7). Thus the deviation between 30 in/s and the 'original' speed was only about 1% (and not about 3% related to 78.5 cm/s).

In a similar way the discrepancy in tape width is to be explained. Experimental Magnetophon tapes of about 1933 were 5 mm wide, but only 4 to 4.5 mm were coated. Later, 6.5 mm (full width coated) tapes were used for stability reasons. Tolerating a difference of about 2.3%, the American tapes were designed to ¼ in being equal to 6.35 mm. As in the US cellulose acetate as a base film was used at the beginning, these tapes are said to have shrunk to 6.25 mm after some time, this figure becoming a preliminary standard. Today IEC 94 Part I states the tape width as 6.30 +0/−0.06 mm or 0.248 +0/−0.24 in resp.

Yours faithfully, Friedrich Engel, BASF AG, Audio Tape Application Department, POB 5146, D-6800 Mannheim 1, West Germany.

Tape Speeds
Capstan Diameter 10 mm

v(cm/s)	v(in/s)	n(1/min)	n(1/s)
75.4	29.7	1440 (96.0%)	24.00
75.5	29.7	1442 (96.1%)	24.03
75.6	29.7	1443 (96.2%)	24.05
75.6	29.8	1445 (96.3%)	24.08
75.7	29.8	1446 (96.4%)	24.10
75.8	29.8	1448 (96.5%)	24.13
75.9	29.9	1449 (96.6%)	24.15
75.9	29.9	1451 (96.7%)	24.18
76.0	29.9	1452 (96.8%)	24.20
76.1	30.0	1454 (96.9%)	24.23
76.2	30.0	1455 (97.0%)	24.25
76.3	30.0	1457 (97.1%)	24.28
76.3	30.1	1458 (97.2%)	24.30
76.4	30.1	1460 (97.3%)	24.33
76.5	30.1	1461 (97.4%)	24.35
76.6	30.1	1463 (97.5%)	24.38
76.7	30.2	1464 (97.6%)	24.40
76.7	30.2	1466 (97.7%)	24.43
76.8	30.2	1467 (97.8%)	24.45
76.9	30.3	1469 (97.9%)	24.48
77.0	30.3	1470 (98.0%)	24.50
77.0	30.3	1472 (98.1%)	24.53
77.1	30.4	1473 (98.2%)	24.55
77.2	30.4	1475 (98.3%)	24.58
77.3	30.4	1476 (98.4%)	24.60
77.4	30.5	1478 (98.5%)	24.63
77.4	30.5	1479 (98.6%)	24.65
77.5	30.5	1481 (98.7%)	24.68
77.6	30.6	1482 (98.8%)	24.70
77.7	30.6	1484 (98.9%)	24.73
77.8	30.6	1485 (99.0%)	24.75
77.8	30.6	1487 (99.1%)	24.78
77.9	30.7	1488 (99.2%)	24.80
78.0	30.7	1490 (99.3%)	24.83
78.1	30.7	1491 (99.4%)	24.85
78.1	30.8	1493 (99.5%)	24.88
78.2	30.8	1494 (99.6%)	24.90
78.3	30.8	1496 (99.7%)	24.93
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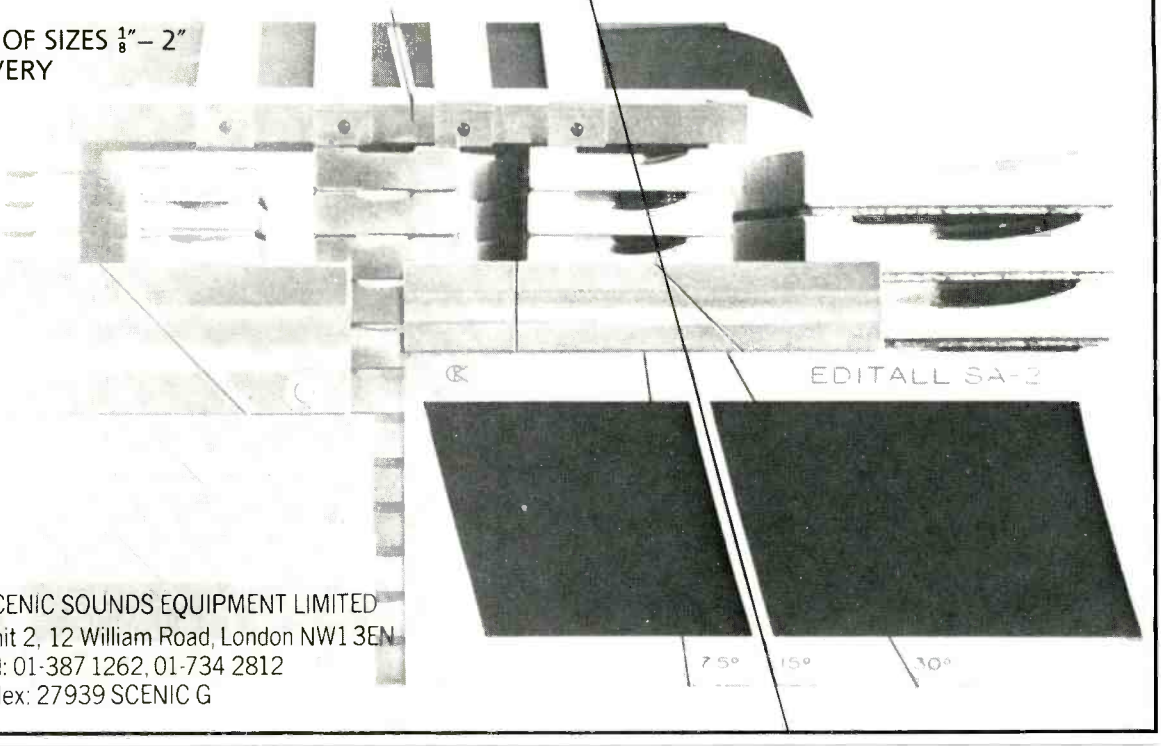

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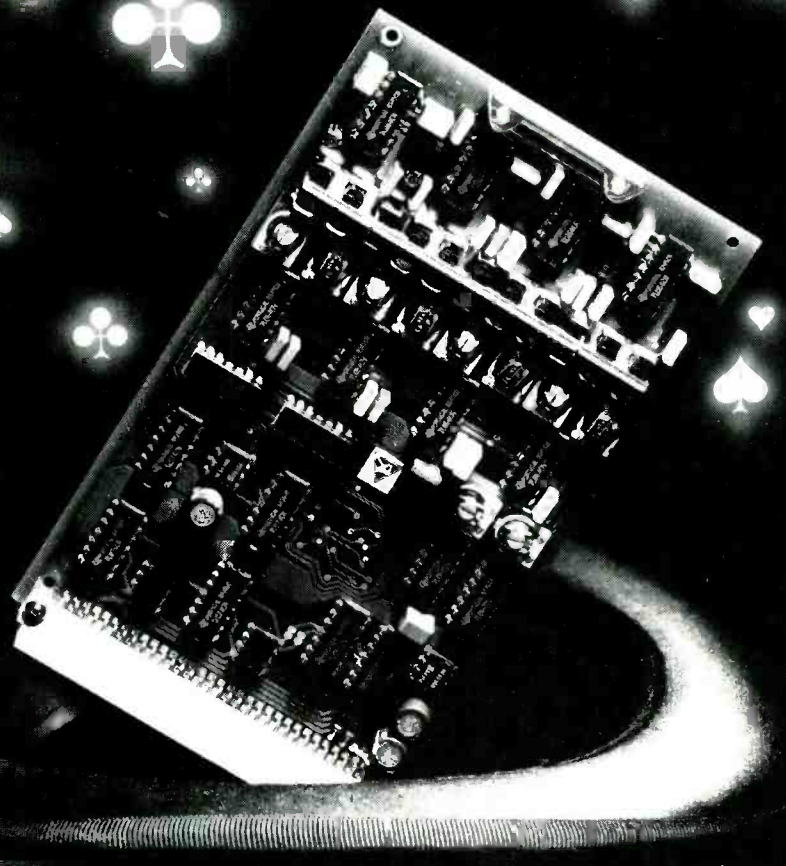

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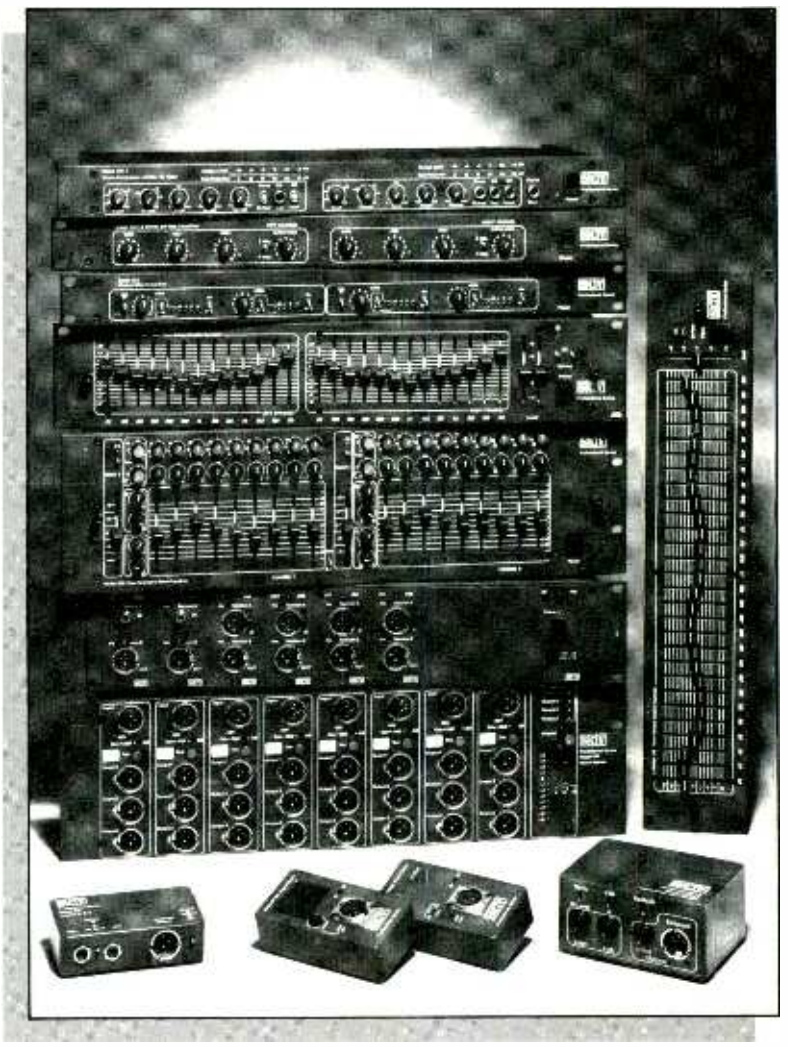

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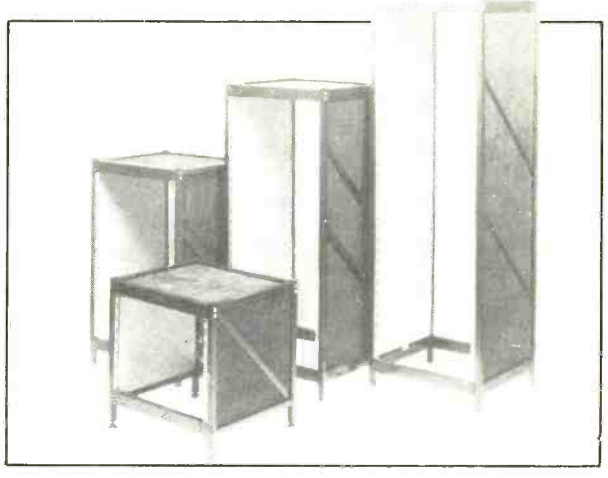

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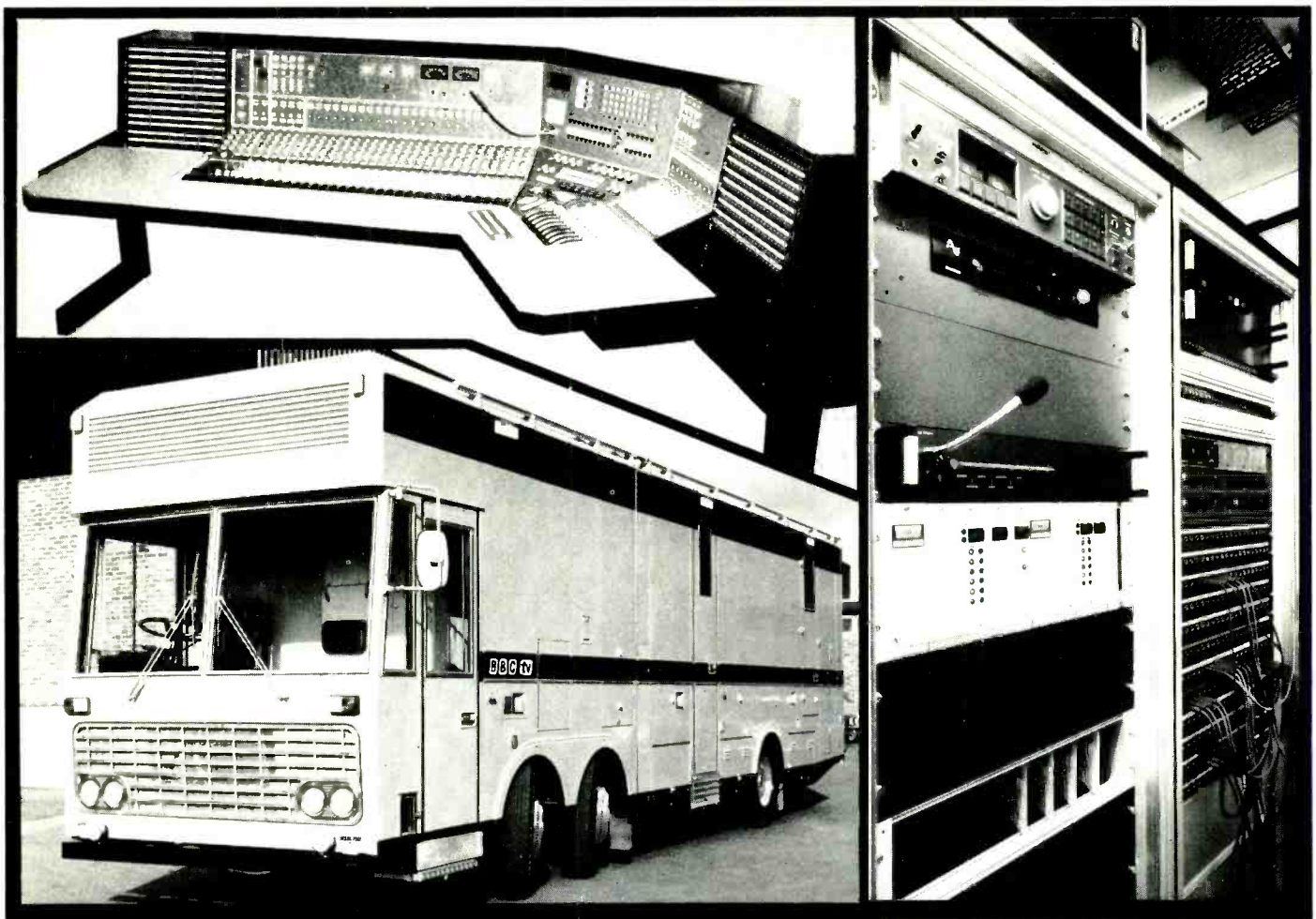

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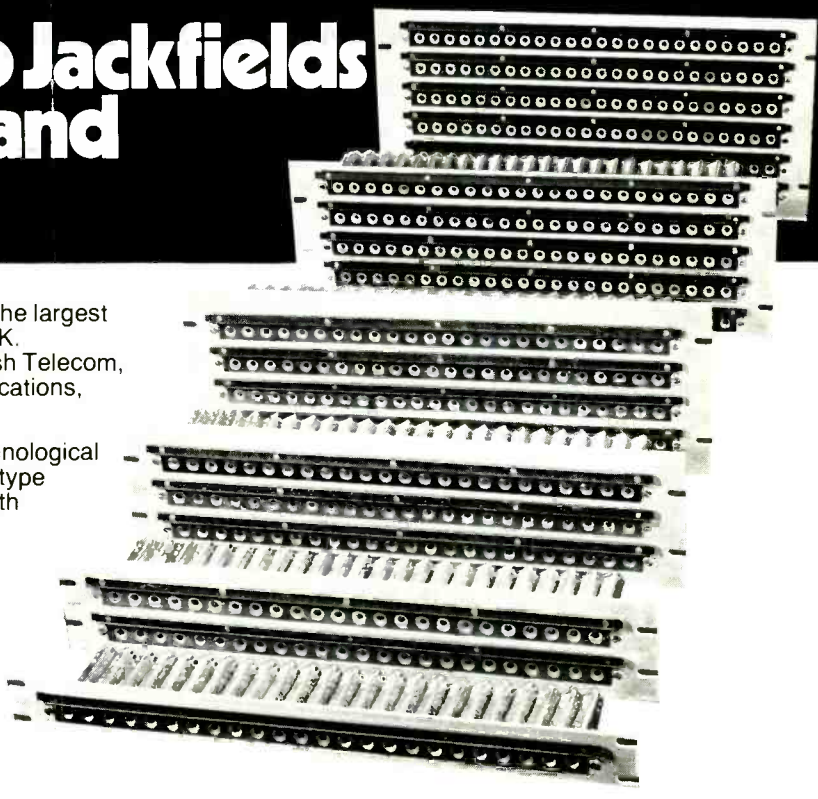

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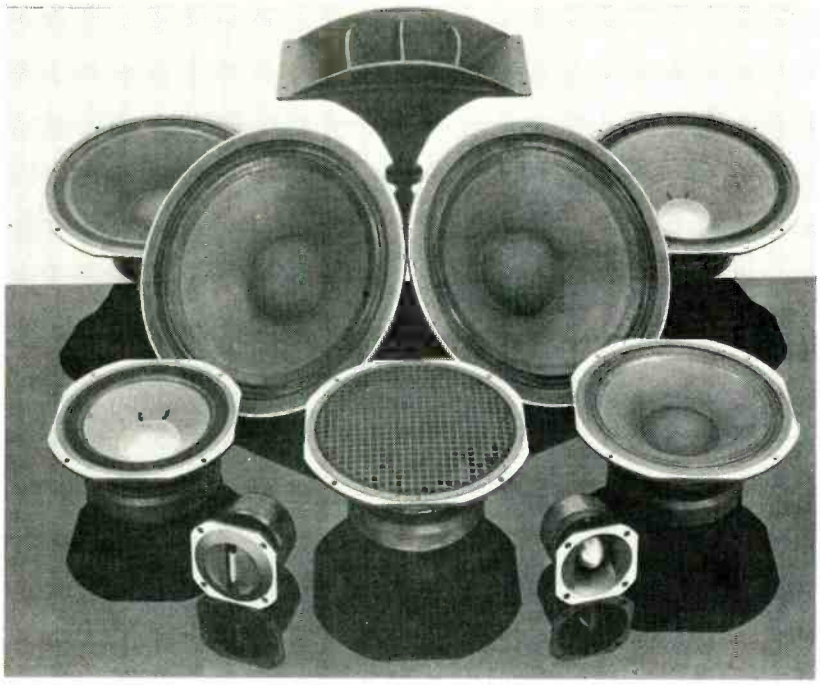

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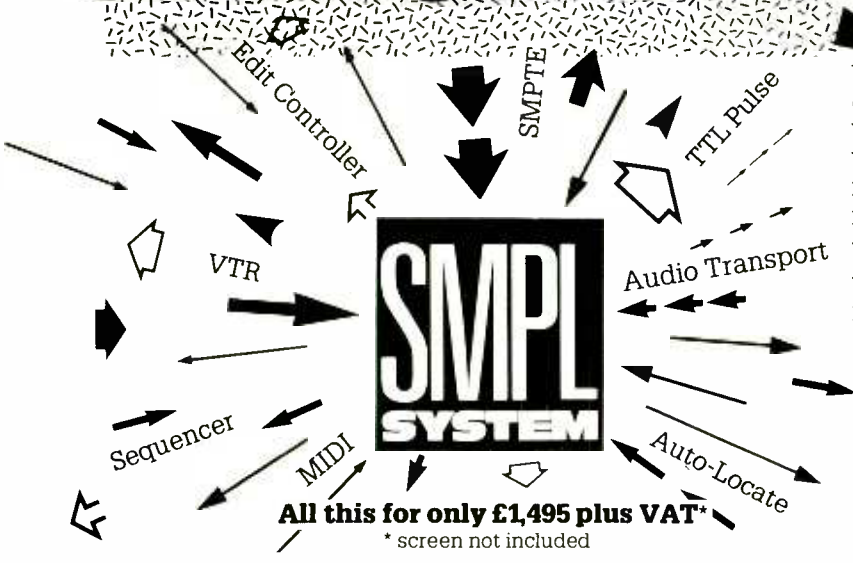

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Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Link House, Dingwall Avenue, Croydon CR9 2TA, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975**: No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder or (2) it is in a business employing less than six persons or (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

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Our continuing expansion has created several new positions to be filled immediately. All of them offer comprehensive benefits, superb working conditions, challenging goals and considerable potential for career advancement.

BROADCAST SALES ENGINEER

This key position involves working with prospective clients to identify their systems requirements and liaison with SSL Project Engineers to translate these into specifications for production. An in-depth knowledge of broadcast audio practices, direct experience in broadcast operations and strong communications skills are essential. A technical background and knowledge of advanced post-production procedures would be a plus.

EUROPEAN SALES ENGINEER

Working with our European Sales Manager, this position involves selling and specifying SSL systems for music studios; film and video production facilities and broadcasters. The position requires detailed understanding of audio mixing systems and procedures plus foreign languages, preferably French and German. A background in both audio operations and manufacturing would be ideal. The position offers extensive travel throughout Europe, and a rewarding challenge for the right applicant.

PROJECT ENGINEER

As a member of the SSL Project Engineering team, you will provide technical support and liaison between our sales engineers, clients, production staff and installation teams. This position involves both console systems and complete project specification and execution. You must possess a keen understanding of audio production requirements, a background in practical audio electronics, and an eye for detail.

FIELD SERVICE ENGINEER

As a member of the SSL Field Service team, you will install and maintain SSL systems in leading audio facilities throughout the UK, with occasional travel abroad. This position requires some knowledge of audio production methods, practical experience with audio electronics and a knack for rapid trouble-shooting. Some understanding of computer technology is important together with a keen interest in the music industry. Additional training will be provided.

CREATIVE WRITER/PRESS ASSISTANT

Our Advertising and Publications Department requires an individual with excellent writing skills and a keen graphics sensibility. Your work with our creative team will involve responsibility for projects including press releases, feature stories, audio-visual presentations and product brochures. A broad interest in the audio world and proven writing ability are essential. A background in corporate communications, journalism and/or print design and production are desirable.

If you feel that your abilities, experience and ambitions make you exceptionally suitable for any of these positions, we would like to hear from you. Of course, all enquiries will be handled in strictest confidence. To apply, please ring Jean Green on (099 389) 8282.

Solid State Logic

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SITUATIONS VACANT

TRAINEE AUDIO SERVICE ENGINEER

We are rapidly expanding dealers selling and servicing professional audio equipment within the recording studio industry.

As part of our policy of providing fast and efficient customer support, we now require an addition to our service team.

The successful candidate will be aged between 21-28 years, with a sound knowledge of electronics. Specific experience in audio is not necessary as full factory training will be given.

Apply in writing to: **MS AUDIO**, Woodworms, Bourne Cottage, Herrings Lane, Chertsey, Surrey, KT16 8PL.

MS AUDIO

FREELANCE SOUND ENGINEER required by Harvey & the Wallbangers for live dates plus general duties. Letter and CV to Mr. Grater, PO Box 33, London SW9 8EL.

SITUATIONS WANTED

GRADUATE SEEKS STUDIO WORK ANYWHERE. Engineering and programming experience. Not afraid to start at the bottom. Enthusiastic, enterprising, car, etc. Go on—why not? Reply to box no. 934.

QUALIFIED ELECTRONICS ENGINEER. Wide experience in equipment/studio design and sound engineering. Looking for contract/permanent position, U.K. or overseas. Reply to box no. 933. (G)

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STUDIO FOR SALE (Midlands, 24 track APRS) or partner/Chief Engineer wanted. £90,000/£30,000 respectively. Reply to box no. 935.

ITA — One of the UK's leading suppliers of professional recording equipment — have the following vacancies

SALES DEPARTMENT

We are looking for a knowledgeable and enthusiastic person to join us in a senior sales capacity. Applicants should have a good working knowledge of currently available studio equipment, and a background in the music, production or video industries. Familiarity with professional multitrack recorders and consoles is essential. A high level of technical knowledge, however, is not so important; of more interest to us will be a demonstrable ability to successfully negotiate sales with our existing customers and to develop new business from sales leads, and his/her own contacts.

SERVICE DEPARTMENT

A vacancy exists in our Service Department for an engineer with knowledge of a wide range of stereo and multitrack tape recorders. Experience with small mixers (up to 8-track), digital delays and reverbs, or high speed cassette duplicators will be a distinct advantage. Responsibility for invoicing, spares stock maintenance, control of warranty replacements and customer technical liaison are also involved, as will a certain amount of field service work. For this reason we are looking for candidates of presentable appearance and who are reasonably literate and numerate.

Remuneration of packages for the above two posts are entirely negotiable according to age and experience, but will be attractive and competitive for the right people.

PLEASE WRITE, ENCLOSING A C.V., OR CALL MARTIN PARMITER OR MICK BOGGIS ON 01-748 9009

ITA, 1 Felgate Mews, Studland St., London W6 9JT
01-748 9009 Telex: 21879.

ITA

SCENIC SOUNDS EQUIPMENT AND MARKETING LTD

One of the UK's leading suppliers of professional audio products and systems is looking for 2 special people to join its small friendly team in Central London.

SERVICE ENGINEER

Due to an internal promotion, we need a self-motivated engineer with at least 3 years' experience of both digital and analogue equipment. An audio background is useful but not essential. The vital ingredients are enthusiasm, ability to liaise with clients and good fault-finding skill right down to component level in complex microcompressor-based equipment. The challenge of learning new technology and the satisfaction of being part of a committed team are guaranteed.

SALES PERSON

Due to our continued expansion, we require another sales person who will share our dedication to create satisfied customers. The task will involve selling sophisticated audio systems and products from our new and existing suppliers. Good basic salary, commission and car are all included in the package. If you think we could work together then please contact Brandon McHale concerning service or Nick Martin if you are interested in either opportunity.

TELEPHONE: 01-387 1262

CLASSIFIEDS

SITUATIONS VACANT

TSW – Television South West Limited, in its extensively refurbished and refitted studio complex in Plymouth, has the following vacancy:

STUDIO SOUND TECHNICIAN

We are looking for a trained television sound technician with experience in general studio operations.

The duties include working as part of a sound crew on the studio floor, including boom operations, plus grams and tape operation including editing. Also, an involvement with general equipment maintenance will be expected.

Applicants should have at least two years' television experience and be willing to work both at the Plymouth-based studios and on location throughout the south west as part of the mobile recording unit. Good hearing is essential and the ability to work both as part of a team and unsupervised is important.

Salary in accordance with union agreements and dependent on previous experience and qualifications.

If you have the necessary qualifications for this post, and would like to work for an exciting and progressive television company offering comprehensive staff benefits and assistance with relocation expenses, please send details for an application form to:

Mrs Clare Griffiths, Recruitment and Training Officer, TSW – Television South West Limited, Derry's Cross, Plymouth PL1 2SP.

TSW is genuine equal opportunity employer.

TSW

PRECO

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CAN YOU SELL PROFESSIONAL AUDIO PRODUCTS TO AUDIO PROFESSIONALS?

We require a personable well-motivated sales person with a good technical background to help sell a first class range of equipment from Capitol Magnetics, Enertec-Schlumberger, Pacific Recorders, Perfectone, Sound Technology and others into the Broadcast, Studio and Film Industries. A good knowledge of at least one of these areas and a clean driving licence are essential. A fair amount of travelling in the UK and later overseas will be required.

This is an excellent opportunity to join a small progressive company where your efforts are appreciated and your results rewarded accordingly.

APPLICATIONS AND C.V. IN CONFIDENCE TO

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MANAGING DIRECTOR
THE PROFESSIONAL RECORDING EQUIPMENT CO LTD
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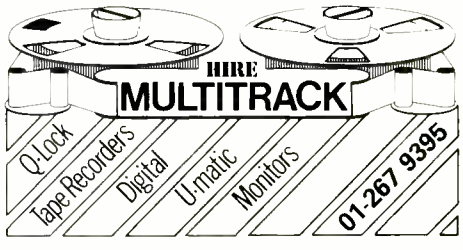

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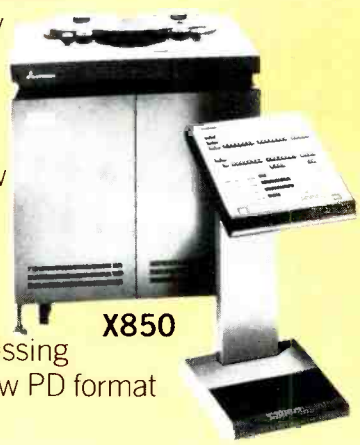
PD PRODIGI

a few quiet words from Hilton Sound..

Some people are fighting a rearguard action to save analog recording systems. They talk about cost and convenience. About the sonic characteristics of analog. Its trouble free use. They even say that it's a good idea to record on analog and mix down on digital. They'll say anything, in fact, to avoid the inevitable conclusion that digital is the way the industry is going. The ostrich and his reaction to danger is far sighted by comparison.



X850

We at Hilton Sound lead the field in the new era of digital recording. We were the first with the Mitsubishi X850 that has been such a revelation to the industry. If you've ever witnessed the X850's ability to decode a mangled tape and reconstruct missing passages, you'll know why the new PD format dashes the hopes of all it's rivals.

X86

Mitsubishi philosophy is to design a system not just to do this year's job, but to be capable of handling the demands of the year 2000 and beyond. Can anybody else say that? Watch this space for Mitsubishi's X86 which will do for 2-track recorders what the X850 did for multitrack.

Hilton Sound, the first for Mitsubishi.

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10 Steedman Street, London SE17
EMAIL REF:
HILTON-SOUND-UK. DGS1311

01-708 0483

The Studer Standard.

The Studer A820 has created a new audio standard by which all other tape machines are to be judged. Studer's new generation of phase compensated audio electronics takes the A820 far ahead of tape recorders made just a few years ago. With its transformerless inputs and outputs, recordings on the ½" stereo A820 have been favourably compared to the best digital recordings heard to date.

The A820 also sets new standards in ease of control – it is designed to meet the demands of tomorrow's computer controlled audio production facilities. Multiple on-board microprocessors control all operating sub systems including capstan drive, spooling motors and audio parameter settings.

Other features include:

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- ☐ Storage of audio line up information for different tape types.
- ☐ Automatic adjustment of audio parameters between ¼" and ½".
- ☐ Shuttle control cue for fine control of tape position.

Just write or phone for full technical details.

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