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December 1999

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Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE
FOR RECORDING, POSTPRODUCTION AND BROADCAST

MILLENNIUM SPECIAL EDITION



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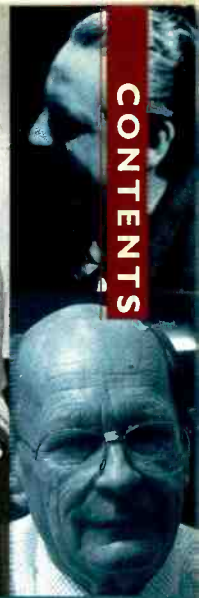
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Once in a lifetime

AT THE RISK of discovering Millennium Fatigue had set in even earlier than anticipated, in January this year *Studio Sound* seized the occasion of its 40th birthday year as an opportunity to begin celebrating its history and to take a look at audio's past. It was inevitable that publications new and old, soft and hard would take on the Millennium challenge as the calendar prepared to trade '19' for '20' but just for a moment the field was clear...

So it was that 1999 gave you the chance to win a unprecedented amount of customised high-end equipment and to read—at leisure—about the past events that constitute our history, inform our present and shape our future. And with the timely arrival of the December issue, we have explored your perceptions of the history of audio, its defining moments and its essential designers and practitioners. It was a fascinating exercise and one we're more than happy to share with you as a footnote to the old millennium.

So it is that this issue, uniquely, comes free from the technical baggage of equipment reviews and is loaded with the opinions and perspectives of those who read and write it. This is your chance to look at yourselves in the *Studio Sound* mirror. And like all mirrors, it tells the real story.

Armed with a short list of divisive questions designed to identify our icons and our inspirations, we polled far and wide and waited for the fallout. It came—naming names, dating dates and exposing misconceptions by the cartload. So it is that you can read of chronically impossible juxtapositions of influence, unlikely accreditations and dubious dates. (For the record, we've corrected the many and various misspellings of 'Sergeant' - it seemed just too much of an indictment to let them become part of a professional audio archive.) Of course, not everybody answered all of the questions posed. Some provided reasons, others did not.

You may wonder why the questions didn't turn up on your email or why, if they did, your answers have not made it into print. If you'd been here, trying to correlate the thoughts of several generations of experience and opinion you would know how difficult it has been. Apologies where they are due.

It's interesting to note not only what shows up in people's preferences but also what does not. Where, for example, is Phil Spector in everyone's estimation of significant record producers? It may be that he was everybody's second choice and we only asked for your first. Then again...

We've called it 'Millennium Sound Bites'. Read it without too much of an eye for detail, but with a healthy appetite for the history of sound recording and you will not be disappointed. It names your heroes and your favourite moments. And it misses your favourite film and your fondest memories.

TO COUNTERPOINT audio's successes, we've also assembled a rogues' gallery of failed equipment—the kind of kit that may have fired somebody's imagination but defied their technical resources. It is a litany of ideas that might have been a work of genius had their instigators checked the mail, eaten breakfast or had better taste in underwear on the morning of inspiration. And it is a testament to the imagination and resourcefulness of our inventors.

Again, it makes fascinating reading and repeatedly challenges you to have exercised better judgement had you been the development team leader. Some of the propositions make ready recycling material, but others may have you questioning the certainty of your own technical vision.

With the benefit of hindsight, it is easy to see how the invention of multi-tracking and automated mixing changed the course of audio history, but there are plenty of seminal innovations that required greater leaps of faith to bring them to the marketplace.

So read and enjoy, certainly. But read between the lines. This is an unofficial history of pro-audio. It is not the story of pro-audio, but it will make a worthy addition to any work that aspires to be. It tells the story that no individual can bring to the page. It is an insight into our achievements and our beliefs. It is an indictment of our preferences and our assumptions.

Zenon Schoepe & Tim Goodyer

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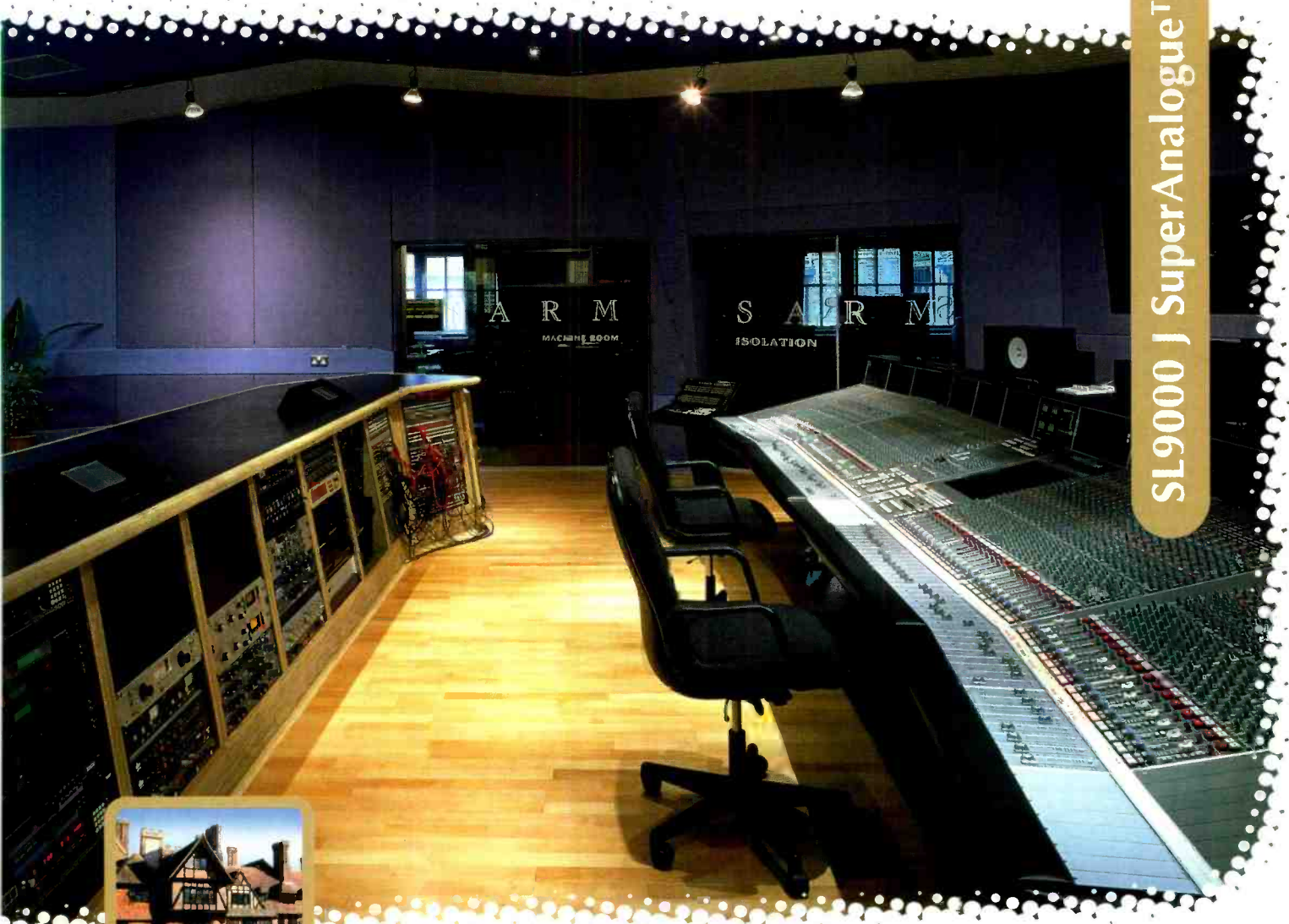
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Great Studios Of The World

SL9000 J SuperAnalogue™ Console



Third SL 9000 for Sarm

A new 96-channel SL 9000 now installed at the beautiful Hook End Manor residential studio takes Sarm's complement of the world's favourite analogue recording console to three. Joining an exclusive club of triple 9000-owning studios that includes Larrabee, The Enterprise, Hit Factory, Nippon Columbia and TK Sequence, Sarm's two 80-channel SL 9000s are located in Studios 1 and 3 of its internationally renowned three-studio London complex, Sarm West. An ever-popular SL 4048 G Series can be found in Studio 2.



Solid State Logic

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Canadian Manta recording, film and post house has purchased a SA&V SADIE Artemis workstation for each of its five studios. The Artemis systems join Manta's existing three SADIE Classics and two Octavia systems and will be central to the facility's future operation.

Metro, Canada. Tel: +1 615 327 1140. SA&V, UK. Tel: +44 1353 648888.

Studer South-East Asia has installed an On-Air 2000 console with v3.0 software, in the Radio Corporation of Singapore's new digital broadcasting studio for News Radio 93.8FM. The move is part of RCS' on-going preparation for DAB. The studio has a number of voice processors and patching systems including a Re'an analogue patch and Ghilmetti digital patch to provide patching to MCR.

Studer South-East Asia. Tel: +65 223 5873.

London's Videosonics cinema and TV sound specialists has installed Dynaudio-Acoustic BM15 passive 2-way close-field monitors in all 8 of its edit-prep rooms. The exposure of faults in location material played a key part in their selection. Elsewhere in London, DAT digital audio specialists has installed a Dynaudio-Acoustics M3 5.1 surround system in its new DVD film preview theatre. Current projects include numerous film back-catalogue-to-DVD format.

Videosonics, UK.

Tel: +44 171 209 0209.

Unity Audio,

UK Tel: +44 1440 785843.

Copenhagen's Focus Recording Studios has taken two of the remaining DPA 4040 limited edition gold microphones on the grounds that they are 'the best microphone that money can buy today'. Focus is an independent SSL 4000 G-series equipped facility handling projects from classical and jazz, through dance, to film music.

Focus Recording, Denmark.

Tel: +45 3871 1209.

DPA Microphones, Denmark.

Tel: +45 48 14 28 28.

Culver City's Sony Pictures' Post Production Division recently opened a new Sound Design Suite. The new 5.1-equipped studio centres on a 32-channel ProControl-Pro Tools system supplemented by an Eventide 4500, tc electronic's Fireworks and M3000, two dbx DDPS Dynamic Digital Processors, Lexicon PCM 91 and PCM 300, Ashley 24-bit EQ, Boulder microphone preamp, two Sony DADR 5000 hard-disk recorders, and a Drawmer Masterflow DC2476. Elsewhere in California, Hollywood-based Greg De Belles has installed a D&R Cinemix automated mixing console in his production studio. De Belles is primarily a composer of music for television and film. Elsewhere in Hollywood, Monterey Post Sound has purchased the Euphonix System 5 for its new North Hollywood facility making the first postproduction installation of the 24-bit, 96k digital studio system in Southern California. The 7,000ft² facility is expected to be on line in February 2000. The Euphonix System 5 will be installed on a THX-certified dubbing stage with an extensive Pro Tools 24 workstation, Apogee Sound MPTS-1 theatrical playback loudspeakers and Crown Reference-1 amplifiers. The new facility will also include an

ADR/Foley stage featuring a Euphonix CS-series console.

Euphonix, US. Tel: +1 650 855 0400.

Amsterdam-based Marco Sound Design has added a second Fairlight FAME digital audio workstation and mixer system installed in a new audio editing suite. Both FAME systems and a small yet powerful Fairlight MFX3plus workstation will be linked via Fairlight's MediaLink networking system. The second FAME system, is intended to keep the facility on the edge of the rapidly expanding postproduction market in the Netherlands.

Fairlight, UK. Tel: +44 171 267 3323.

Helsinki's University of Arts and Design has specified an AMS Neve Libra Live digital broadcast production console for its new purpose-built TV studio facility. Finnish national broadcaster, YLE, acted as a consultant to the University by supervising the project in terms of technical equipment and solutions. The University chose the Libra Live for its surround production capabilities.

AMS Neve, UK.

Tel: +44 1282 457011.

Netherlands-based Ha-EI Engineering has installed a customised 32-channel Allen & Heath GS3000 and an A&H GL2200 console in its mobile recording unit. The 6m long Chevrolet Van has a width of just 2.3m and is fully equipped for recording live concerts, festivals, radio and television programmes. Additional equipment includes Neumann, Sennheiser and AKG mics, Tascam recorders, and Lexicon, BSS, Klark Teknik and Drawmer board.

Ha-EI, Netherlands.

Net: www.plex.nl/haeleng/mrecremain.htm

A&H, UK. Tel: +44 1326 372070.

New York's Smash Studios is celebrating its 10th birthday with the installation of DAS loudspeakers in all their rehearsal rooms. Three of the facility's four smaller rooms are outfitted with DAS DS15-A as main speakers and monitoring. The fourth adds a fourth DS15-A for a second monitor. The fifth and largest rehearsal room has a full complement of DAS concert speakers for stage monitoring: four Sub 18s and one R212 per side. Smash handles preproduction as well as production of leading bands such as Amber, The Real McCoy, The Spin Doctors, and White Zombie in its rehearsal and recording studio complex.

DAS, US. Tel: +1 860 434 9190.

Rental acquisitions include LA's Design FX becoming the first West Coast rental facility to offer a completely refurbished Ampex ATR-102 in the 1-inch 2-track format. Across the Atlantic, Europe Audio-Video Rent bv has expanded its stock with a Focusrite Red Two 4-band stereo EQ, a Tascam DA 45 24-bit DAT-recorder, a Dolby 5.1 decoder and a Sony DVD 725 player.

ATR Service Company, US.

Tel: +1 717 852-7700;

Europe Audio-Video,

The Netherlands. Tel: +30 6775911.

Surround 2000

US: The first Surround 2000 International Conference and Technology Showcase, took place at the Beverly Hills Hilton over the 5th-6th November. Organised by *Surround Professional* magazine and its founding editor, Tomlinson Holman, Surround 2000 attracted about 450 audio professionals all having the same interest in mind—surround sound. As might be expected, there was a small trade show, but the meat of the event was an extremely full programme of workshops, seminars and special events. The conference programme was varied and included room design and monitoring, mastering, music recording, emerging trends and technologies, microphone techniques et al. One of the aims was to encourage information exchange and debate and here the event can be classed as an unqualified success. No stand-up fights were reported, but there were several impassioned debates with differing opinions that showed just how new the field of surround is and the many ways

of approaching it.

The sessions were all conducted by industry heavyweights (and practitioners) such as Tom Holman, Bob Margouleff (who gave the keynote speech 'Why are we using multichannel?'), Dr Floyd Toole, David Griesinger, Jerry Bruck and John Eargle. The audience also consisted of many familiar faces from pro audio, and showed that surround sound in all areas of production is being used and developed—all of which bodes well for the future of the industry. **Terry Nelson**

SBES report

UK: Birmingham hosted the annual Sound Broadcasting Equipment Show again in November, drawing its regular crowd of broadcasters to talk shop and sup beer. Now settled as a 2-day event, SBES maintains its popularity in spite of its relative lack of glamour and the dismal reputation of its host city, and proved its worth once again. Equipment launches were typically thin on the ground but the SADIE EditSlate made up in novelty and desirability what



▲ US: Mick Fleetwood's company, The Point Group, is to release classic BBC live session archives spanning 30 years and featuring a wealth of legendary bands. Having secured the rights to release classic BBC live session recordings in North America, the first job was to audition hundreds of hours of recorded material and with many recordings of varying quality, an accurate reference monitoring system was an important consideration—HHB's Circle 5 monitoring system has won the honour.

'It's a great privilege to have access to these extraordinary and historic recordings and to choose which ones will be heard by the wider public. Listening to them on monitors of such high quality simply makes the task all the more enjoyable,' Fleetwood comments. David Beesley, president of HHB USA, adds 'We're naturally delighted that Mick has specified HHB Circle monitors for such a unique and important project.' As a direct result of their use on this project, Fleetwood's studios in the UK, Los Angeles and Hawaii all now have Circle 5 monitors.

www.prostudio.com/studiosound Studio Sound



▲ **UK:** London's Millennium Dome has chosen Telex' RTSTW system for its intercom. Working in conjunction with a development team from Telex, Canford Audio has overseen the customisation of the RTS system to enable the high frequency signalling tones used in the intercom to be transmitted over the 20kHz audio channels provided in the Dome's fibre-optic infrastructure. The Dome is one of the largest construction projects currently underway in the UK and expects more than 12 million visitors during the year 2000. This demands an innovative internal communications system to ensure a smooth flow of traffic and address Health & Safety as well as security issues.

was lacking in quantity. Combining a high-quality LCD screen and graphics pad, EditSlate obviates the need for keyboard and mouse and lends considerable speed of operation to the SADiE system. Other new arrivals at the broadcasters' hall included the Zetron Cellphone Detector for alerting studio folk to the presence of active mobile phones, Symetrix' 300 Series (310 comp-limiter, 302 dual mic pre, 303 interface amp, 304 headphone amp, 305 dis amp, 306 preamp-ducker, 307 dual isolation transformer), the relaunched DN4000 digital parametric EQ from Klark Teknik and the rerelease of Innova Son's Sentury console as the Sensory Live.

New analogue recorders

US: Analog Magnetics, a new American company formed by ATR's Michael Spitz, Wavelength Communications' Bruce Borgerson, and Crane Song's Dave Hill, is in the early design phase of its new 2-track analogue recorder. Different versions will be targeted at the recording-mastering and archiving markets. The justification for the project is an ongoing demand for high quality analogue machines not met by existing manufacturers. Spitz quotes the strong demand for his rebuilt Ampex ATR recorders, which command premium prices, in mitigation. 'You won't see a factory on the scale of Ampex or Studer,' says Borgerson. 'Analog

Magnetics will be a lean, workshop-centred enterprise. We don't anticipate more than 15 employees even at peak production. The company's first product, the AM2001, is a mix-down mastering recorder for 1/4-inch, 1/2-inch and 1-inch tape from mono to 8-track, accommodating all traditional formats plus the new 1-inch stereo mastering format. The 8-track format is anticipated to experience a

resurgence because of growing interest in using analogue for mastering for 5.1 surround mixes. Analog Magnetics is also engaged in preliminary planning of a 2-inch transport design.

The inventor of stereo

DENIED his rightful place in history books due to reasons that are for the most part inexcusable, Robert Alexander's meticulous

book, *The Inventor of Stereo, The Life and Works of Alan Dower Blumlein* (Focal Press ISBN 0-240-51577-3), chronicles the enormous achievements of this remarkable man, and should start the recognition process that has for too long eluded the undoubtedly genius of Alan Dower Blumlein.

During a working life of just 15 years—cut tragically short due to his death at age 38 in a wartime air crash—Blumlein wrote >



▲ **UK:** London's Air-Edel recording studios has completed revising its Studio 1 control room for improved bass response and 5.1 working. The project was undertaken by Munro Associates and incorporated Dynaudio M2 (LCR) and BM15 (S) speakers powered by Chord SPA 1032 amplifiers. Air-Edel, UK. Tel: +44 171 486 6466.



▲ **UK:** London's Hear No Evil studios has put its new Euphonix R1 to work on several feature films, six episodes of *Randall & Hopkirk Deceased* and BBC flagship drama *Real Women* among various other projects. The films include *Paranoia* (above) for Sky Films and *The Valley* by Sara Sugarman featuring Jonathan Price and music by Oscar-winning composer Stephen Warbeck and the voice of Cerys Matthews. *Randall & Hopkirk Deceased* is a 6-part remake of the original sixties cult TV series that proved a mammoth project for composer Murray Gold and engineer Steve Parr due to volume of music and the production time-scale. The music was recorded directly onto the R1 with the exception of an orchestral session that was recorded at Angel Studios on RADAR and then transferred to the R1.

< and cowrote 128 patents; a rate of one for every 46 days of his career. This in itself would be considered an achievement were it not outshone by the sheer brilliance shown by his originality and the quality of the ways in that Blumlein set about dispatching the problems besetting contemporary engineers of the day.

He built and applied new techniques to the use of microphones; designed a lateral disc-cutting system that enabled the production of modern records in a way that continues today; made possible

much of the 405-line high definition television system that continued to be broadcast in Britain until 1986; improved radar systems to the extent that they were still fully operational 40 years later and developed stereophonic sound to the point where neither the company he worked for, nor many of his colleagues, understood the complexities and possibilities of his system until a decade and a half after his death.

Alexander also brings us Blumlein the man—shy to the point of

introversion as a child and unable, or rather too busy elsewhere, to read until the age of eleven. An aptitude for matters electrical and fiscal was demonstrated as early as seven, by his repair to the family home doorbell accompanied by an invoice to his mother. This awareness of his own worth continued after graduation with First Class Honours from Imperial College, and grateful employers amply rewarded him throughout his career. Notes, however, were never meticulously kept by him,

and it was not unknown for colleagues to be briefed via a circuit diagram traced onto a misted windscreen while driving at speed toward his beloved Gypsy Moth aircraft.

I recommend this book to all aspiring engineers—and those of us in need of inspiration. The general reader may be treated to an insight into the life and works of a man who at last may take his rightful place among this century's greatest minds. Move over $E=MC^2$ (a new formula is about to rest on our lips: $M=1/2(A+B)$, $S=1/2(A-B)$). And not a moment too soon.

Neil Hillman

New focus

UK: Focusrite Audio Engineering has announced that responsibility for marketing and distribution of its products in North America will transfer to Digidesign, a division of Avid Technology, from 1st January 2000. Group One, based in Farmingdale, New York, has distributed Focusrite since 1993. Phil Dudderidge, Focusrite Chairman, commented: 'Digidesign has been a partner of ours since 1996 when they launched the d2 equaliser plug-in for Pro Tools. We are developing other products for the Pro Tools market and both companies recognise the strategic benefit of bringing our businesses together in North America.' Speaking for Group One, Jack Kelly commented: 'Of course we are disappointed to relinquish a line like Focusrite, but since we assumed responsibility for Soundtracs and M&K loudspeakers earlier in the year we have new challenges and growth opportunities. So it's business as usual and we are expecting our last quarter with Focusrite to be as good as any. We wish Phil and his team at Focusrite every success in the future.' ■

*The 7.1 standard
Octagon*

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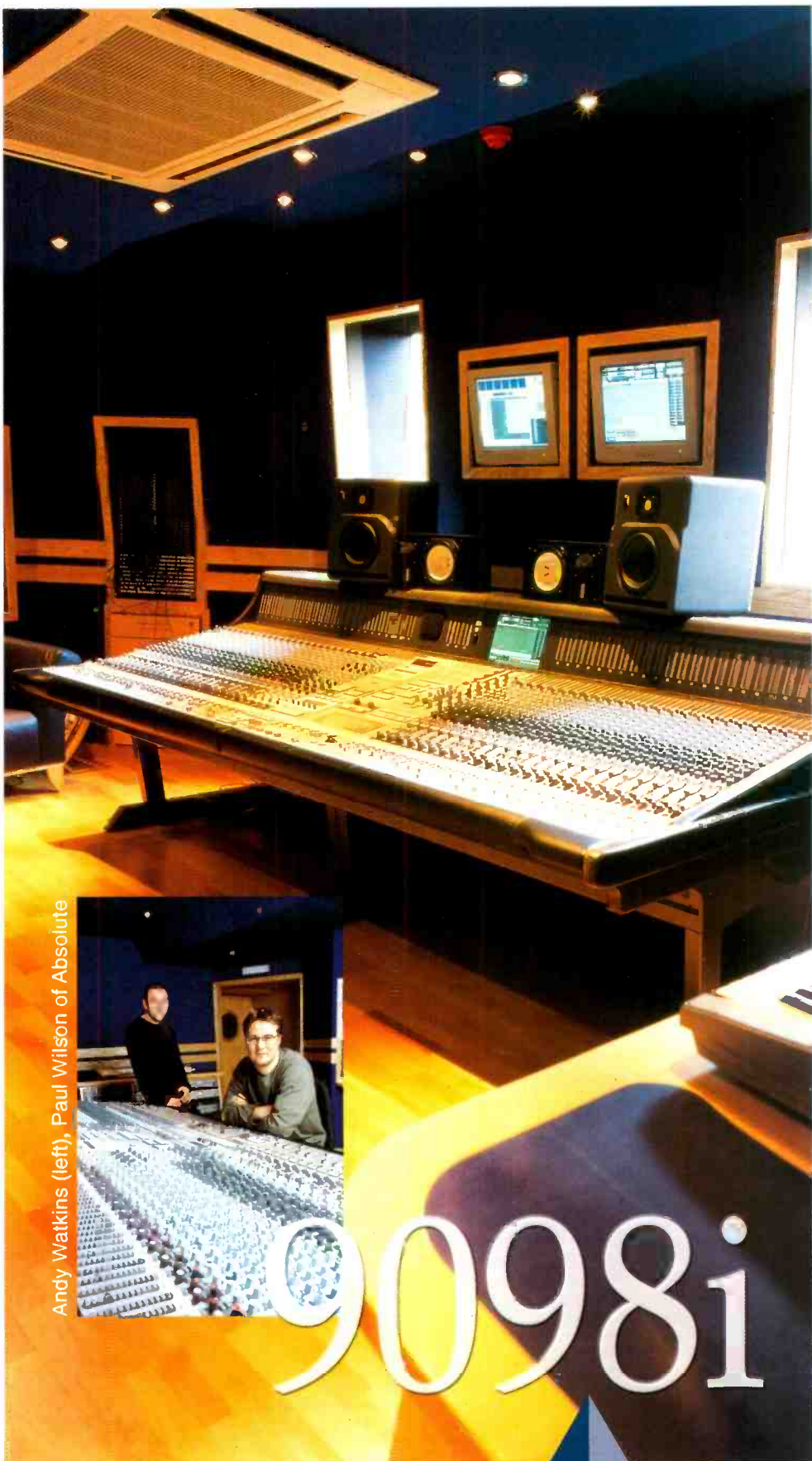
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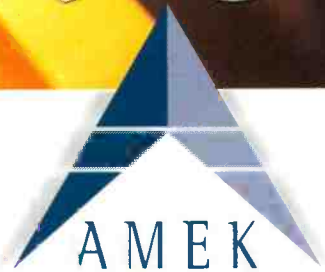
"This is a brand new studio, purpose-built for us, so we could specify our ideal writing and mixing environment down to the last detail. Having been huge fans of the Rupert Neve 9098 EQ modules we knew that the Amek 9098i would give us that unique sonic quality in a large format console. Now, having worked on the newly installed console with Tina Turner, we can fully appreciate the total flexibility that it offers in any recording and mixing situation."

Producers Absolute

When only the best will do. When no compromises are acceptable. When sonic performance rules. These are some of the criteria in selecting a 9098i. Along with its sonic integrity, the feature set is also equally impressive. Recall, dual moving fader automation, built in dynamics and indisputably superior mic preamps and equalizers. The 9098i combines the best characteristics of vintage consoles with features demanded in today's mix environment. We invite you to audition a 9098i and experience the finest mixing console ever created.



Andy Watkins (left), Paul Wilson of Absolute



AMEK

www.amek.com

December

7-10

MIP Asia Incorporating Cable and Satellite Asia 99

International Convention and Exhibition Centre, Suntec City, Singapore.

Contact: Peggy Redford at Reed Midem, Paris, France.
Tel: +33 1 41 90 45 65.
Fax: +33 1 41 90 45 70.

8-10

Convergence India 99

Pragati Maidan, New Delhi, India.
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Fax: +91 11 462 3320.
Email: exhibitionsindia@vsnl.com
Net: www.exhibitionsindia.com

January 2000

23-27

MIDEM 2000

Palais de Festival, Cannes, France.
Contact: Jane Garton, Reed Midem.
Tel: +33 1 41 90 44 39.
Email: jane_garton@midem-paris.ccmil.compuserve.com.
Net: www.midem.com.

24-27

Broadcast, Film and Audio, BFA 2000

Bombay Exhibition Centre, Mumbai, India.
Contact: Jasubhai Media.
Tel: +91 22 6542363.
Net: www.exicomindia.com.

February

19-22

I08th AES

Palais des Congres, Paris, France.
Contact: Hermann A O Wilms.
Tel: +32 2 345 7971.
Email: I08th_exhibits@aes.org
Net: www.aes.org

March

5-7

Entech 2000

The Dome, Sydney Show-ground & Exhibition Centre, Homebush, Sydney, Australia.
Contact: Caroline Fitzmaurice, Connections Publishing.
Tel: +61 2 9876 3530.
Fax: +61 2 9876 5715.
Email: caroline@conpub.com.au
Net: www.conpub.com.au

15-19

ProLight & Sound 2000

Frankfurt, Germany.
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Fax: +61 81 757 00.
Email: info@werbebauges-mbhoctanorm.de
Net: www.werbebauges-mbhoctanorm.de

26-29

SIB International

Rimini Trade Fair Centre, Rimini, Italy.
Contact: Ente Autonomo Fiera di Rimini.
Tel: +39 541 711 711.
Net: www.fierarimini.it

April

12-14

Optical Disc Production 2000

Tokyo Big Sight, Tokyo International Exhibition Centre, Japan.
Contact: Mesago.
Tel: +81 3 3359 0894.
Fax: +81 3 3359 9328.
Email: kunimoto@message-jp.com
Net: www.mesago-jp.com/odp

June

3-6

Nightwave

Rimini Trade Fair Centre, Rimini, Italy.
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6-9

Broadcast Asia 2000, Cablesat 2000 and Professional Audio Technology 2000

Suntec Centre, Singapore.
Contact: Singapore Exhibition Services.

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Fax: +65 835 3040.
Email: jk@sesmontnet.com
Net: www.broadcast-asia.com

7-9

PLASA Light and Sound Shanghai 2000

Intex, Shanghai, China.
Contact: P&O Events.
Tel: +44 171 370 8231.
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Email: shanghai@eco.co.uk

13-15

ICCE 2000: International Conference on Consumer Electronics

Los Angeles Airport Marriott, 5855 West Century Boulevard, Los Angeles, California, USA.
Contact: Diane D Williams, Institute of Electrical and Electronics Engineers.
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2000 SSAIRA NOMINATIONS

THE THIRD SSAIRAs—the *Studio Sound* Audio Industry Recognition Awards is set. This follows the outstanding success of the last two year's awards in which the readers of *Studio Sound* voted for products in assorted categories.

In response to popular demand we expanded the number of category types last year to take in desktop duplicators, location-portable equipment, and plugins.

However, we first need to gather the nominations from which the winners will be selected. And quickly. This is where you come in...

In short, anyone can nominate a product for a suitable award category, but only fully qualified readers of *Studio Sound*, not manufacturers or related personnel, will be permitted to vote.

To nominate a product simply fill in the form and post it or fax it to us or send your nominations via email by listing the category number followed by the product.

To be eligible, a product should have been released since the Munich AES Convention (held in May 1999) and obviously needs to conform to the description of a particular category.

The resulting nominations selection

1. Large scale console:

Analogue or digital, recording, broadcast, post or film.

2. Medium to small scale console:

The affordable end of the console business continues to see plenty of innovation.

3. Outboard dynamics:

A 'by-function' category covering any outboard featuring dynamic processing.

4. Outboard preamp:

A 'by-function' choice from outboard including microphone preamps.

5. Outboard equaliser:

Graphic, shelf or parametric.

6. Outboard Reverb:

The final 'by function' category addresses reverb processing.

7. Combined outboard device:

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8. Monitors:

Never more important or prolific than for surround sound.

9. Microphones:

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10. Convertors:

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11. Audio editor:

Hardware or computer-based?

12. Audio recorder:

Your choice can draw from CD-R, MD, DAT, HD, or HR.

13. Desktop duplication:

Convenient and economical, your preference please!

14. Location-portable equipment:

Gear for guys on the move.

15. Plug-ins:

The list continues to grow but which is your favourite?

16. Special category:

Your opportunity to recognise anything or anyone that has benefited pro-audio. Think carefully and laterally.

NOMINATIONS can be made by photocopying or cutting out the page opposite, filling it in and returning it to: SSAIRAs Nominations, *Studio Sound*, 8 Montague Close, London Bridge, London SE1 9UR UK. Fax: +44 171 407 7102. Alternatively, you can email the category numbers and your nominations to SSAIRAs@unmf.com

will be published in future issues of *Studio Sound* for postal voting and for interactive voting from the *Studio Sound* web-site.

With regard to the categories, it should be noted that, in the case of outboard equipment, this is described by function rather than product description—hence a 'voice channel' may legitimately be entered as a compressor if

you feel it excels in this area. Not all the categories work this way, however, but all are explained in the table. There is also a special category in which you are invited to nominate equipment, people, initiatives or anything else that falls outside the other categories yet warrants acknowledgement.

Nominate only in the categories you feel comfortable with. Do it now!

SSAIRA FAX VOTE

N O M I N A T I O N S

SSAIRA NOMINATIONS

1 Large scale console

7 Combined outboard device

13 Desktop duplication

2 Medium to small scale console

8 Monitors

14 Location portable equipment

3 Outboard dynamics

9 Microphone

16 Plug-ins

4 Outboard preamp

10 Convertors

17 Special category

5 Outboard equaliser

11 Audio editor

6 Outboard reverb

12 Audio recorder



N O M I N A T I O N S
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Like microphones, loudspeakers have resisted the leaps in development afforded by the digital revolution. Genelec's

Ippo Martikainen traces their development.

IN SIMPLE TERMS, a loudspeaker is an electroacoustical transducer with the purpose of converting electrical signals into sound. But as there are no easy practical ways to move air molecules directly with electricity, the conversion is made in two phases. First the electric signal is converted to mechanical movement and then the mechanical movement is converted into an acoustic signal. The most striking feature of this transformation is its poor total efficiency, as only few per cent of the electrical energy is converted into sound and the rest is lost as heat.

The transducer principles having practical meaning are electrodynamic, electrostatic and piezoelectric. The electrodynamic loudspeaker, which is by far the most common, was introduced in its current form in 1925 by CW Rice and EW Kellogg¹. In their experiments they went through many different ideas and found the voice coil and paper-cone combination to be the most promising solution.

The first transformation is done with a linear electric motor (a voice coil in a magnetic field) and the second with a diaphragm glued to the voice coil. The efficiency in the first step is good as we know from electric motors (it does not matter whether the motor is rotating or linear), but the second is poor due to the great mismatch between high impedance diaphragm and low impedance air. Variations of the electrodynamic theme are numerous; for example constructions such as ribbon, where the diaphragm is a flat, thin ribbon immersed in a magnetic field, and planar where several turns of wire covers the surface of a diaphragm, again immersed in magnetic field.

The electrodynamic transducer principle itself is simple and it looks fairly linear. In practice it has several inherent and well known nonlinearity mechanisms which have been subject to gradual improvements over the decades. At its best it can deliver a very good replica of the original electrical signal.

In an electrostatic loudspeaker the first transformation is done using signal-driven electrostatic attraction and repulsion forces affecting a film diaphragm. The second transformation is made with the same diaphragm and in this case, because the film is very thin and light, it is well matched into air yielding high mechano-acoustical efficiency. This principle was refined by Peter Walker, who in 1955 introduced

a new design². This 3-way system had a constantly charged diaphragm between acoustically transparent, rigid electrodes operating in a push-pull arrangement. As the force affecting the charged diaphragm is independent of the diaphragm's position, this speaker is inherently linear, and the acoustic distortion in the mid band can be around 0.05%. On the electrical side, the electrostatic loudspeaker appears as a capacitor, which means that mainly reactive current is flowing into it and heat is generated in the amplifier output stage (instead of voice coil in the case of dynamic loudspeakers). The total efficiency is about the same as for electrodynamic loudspeakers. Most electrostatic systems are dipoles—the radiation pattern is a figure-of-eight—which has the benefit that the system does not directly excite vertical or lateral room modes; the drawback is limited LF response which can be compensated by making the system larger, which again causes drawbacks in terms of directivity; the film has to be divided into smaller sections or to be made curved. The directivity dilemma was elegantly solved—again by PJ Walker—who introduced a new system (the Quad ESL-63) that approaches a curved radiator using concentric ring electrodes fed through a delay line. The diaphragm is thus excited first from centre, and as the outer parts are delayed, a curved wavefront results. Regardless of the obvious merits of the electrostatic principle, the maximum output is regarded to be low for studio use. With a few exceptions, electrostatic speakers seem to be limited to high-end consumer applications, at least for the time being.

The piezoelectric loudspeaker uses ceramic materials where an applied electric field causes mechanical movement. The electromechanic motor can be in a form of a thin wafer on which the radiating diaphragm is glued, but also piezoelectric films have been developed which change either their length or thickness. Most piezoelectric drivers suffer from displacement nonlinearity and hence they have been used for treble only. On the electrical side they appear as capacitors.

The electrodynamic transducer is the workhorse of the audio industry, and the following discussion refers mainly to the development of loudspeaker systems based on them. Also, while the emphasis here is supposed to be in professional applications, most of the

research work done in loudspeakers is done as such, without restrictions to professional or consumer applications.

Due to the age of the electrodynamic driver, the general principles of loudspeaker design are by no means new either. In 1940 Harry F Olson published *Elements of Acoustical Engineering*, a comprehensive book, which—with the updates on its later editions, and the second book *Acoustical Engineering*, published in 1957—contains the bulk of the necessary information for good speaker system design. A third invaluable book, Leo L Beranek's *Acoustics*, was published in 1954.

Understanding and analysing the system performance has been subject to wide research. Low-frequency reproduction has been simplest to analyse and hence the work has started there. A modern closed-box speaker design was introduced in 1954 by Edgar M Villchur (Acoustic research AR-1). In 1958 James K Novak published comprehensive analysis of both closed and vented enclosures. A few years later, in 1961, Arthur N Thiele applied filter transfer functions to bass reflex speaker design, and he was followed in 1972 by Richard H Small who continued his work with both small and large signal analysis of closed, vented and (in 1974) passive radiator boxes, with associated synthesis methods. A third Australian, JE Benson, published several detailed articles in 1971–73 about the same subject. After this work the loudspeaker LF design has been pretty straightforward, and several CAD programs have been created to make the job even easier. Still the LF performance of actual products is far from perfect which only indicates the number of compromises to be done in the actual design.

Crossover design was a topic of many papers in the seventies and eighties, and of those Linkwitz-Riley and D'Appolito are often referred. Also KEF should be mentioned again in this context, as they voiced the now obvious fact that the electrical filter response has to be the difference between the desired acoustical response and the raw response of the driver.

While the calculating power of computers has increased, the interest has moved to modelling of transducers. Diaphragm vibrational modes and response can now be calculated with good accuracy, and the same is true for enclosures and their diffraction. We are approaching a state where the speaker



Speaking aloud

system can be designed and modelled on-screen (and maybe even auditioned) before the actual system has been built

WHILE THE PAPER cone performs well in LF applications, mid-band colouration prompted new developments when HD Harwood at the BBC started to look for other materials in the sixties. Plastic cones, first made from mixture of polystyrene and neoprene and later from polypropylene, offered much improved performance. Various forms of polypropylene diaphragms are now widely used as either LF-MF or MF units. Most current 2-way monitors use some form of polypropylene cone in the LF-MF driver. The number of variations of the '2-way 160mm or 200 mm woofer/25mm tweeter' theme is astonishing. The influence of the BBC work has been significant also beyond UK designed monitors.

While paper, polypropylene and similar materials are inherently soft, there has been another approach—to find extremely rigid materials. In 1962 DA Barlow introduced sandwich cones, made from two skins of aluminium glued on expanded polystyrene. The idea was to use the driver only in its piston range and move to a similar but smaller driver at HF. (KEF made roughly similar but flat face woofers, also Philips had one woofer with an expanded polystyrene cone but no skins on the surface). Subsequently, the Japanese have made significant improvements in this respect; Technics introduced their flat honeycomb drivers in the seventies, Pioneer and Yamaha used beryllium. Yamaha's NS-1000M with beryllium MF and HF domes was favoured in seventies and eighties and it offered very good performance. The continuing Japanese interest in exotic materials has resulted in interesting solutions such as carbon fibre and boron-titanium composites. In Europe woven Kevlar fibres, either as such or as skin material in a sandwich cone are also used. Although a rigid diaphragm offers a lot of benefits, if the internal damping of the material is too small, very pronounced break-up modes occur, and, although they are outside the intended passband they usually are audible. When correctly constructed the performance can be clearly better than with the softer counterparts, specially at high levels. The most common application is a titanium or an aluminium dome in tweeters.

Increasing the power handling has

been a particular American interest. 102mm voice-coils were used by JBL, Altec and Electro-Voice long before European manufacturers. Heat resistant coil formers, glues and wire insulators were developed for this purpose; JBL developed ideas for ventilation of the coil. All these were necessary for sound-reinforcement applications.

AN IMPORTANT CHANGE of the measurement methodology took place when Richard C Heyser published *Time Delay Spectrometry* (TDS) in 1967. Not only did it give full transfer function of the speaker, it also made it possible to make measurements in non-anechoic sites, with frequency resolution limited by the size of the space. In TDS the impulse response is calculated from the actual sine wave frequency response through inverse Fourier transform. This allows also distortion measurements. Another option was used later by Laurie Fincham at KEF, who used impulse excitation and a gated measurement window. The impulse response was achieved directly, and frequency response via FFT. Due to the excitation signal distortion measurements are not possible. The impulse method is very fast but often needs averaging to improve SNR because the energy content of the excitation signal is small. This was overcome by using special periodic noise (Maximum Length Sequence) excitation where the crest factor is very low. MLS signals are used by, for example, Doug Rife's MLSSA and Audio Precision.

The current measurements can reveal audible colouration and distortion; also there is basic understanding of what kind of frequency response gives good fidelity ratings in listening. Still there are many unknown areas between the current measurement methods and human perception, and understanding the hearing mechanism is a necessary element for development of meaningful measurement methods. The measurements are made in mono; however, we listen in stereo and multichannel, and the human perception of spatial information is of utmost importance which is currently ignored. These issues have been discussed over the years with no real progress being made, the most recent voice in the desert is that of John Watkinson's.

Two or even three drivers have been mounted on a single chassis. Jensen had its 2-way and 3-way (coaxial and

triaxial) speakers, James B Lansing made the Altec 604 in 1943 and it was revitalised in late seventies by UREL. The Altec tweeter had a separate magnet structure and a horn that caused some shadowing and irregularities in the MF response. These were avoided by the Tannoy Dual Concentric design from 1947. The benefit of the Tannoy construction was the use of the woofer cone as extension of the tweeter horn which was machined in the pole piece. Another clever solution was the use of two air gaps in the magnetic structure, one for the woofer and the second for tweeter. Later the use of ferrite magnets instead of Alnico made the single magnet structure obsolete. Although the woofer cone displacement causes a level and frequency dependent modulation to the HF signal, the benefits are also obvious: all frequencies are radiated from the same direction, the structure is symmetrical, the radiation pattern is well controlled and hence the directivity is smooth, all important features for good stereo localisation. Tannoy has refined the art of coaxial drivers.

With neodymium magnet materials the tweeter size has been reduced and it has become possible to mount a dome tweeter in the centre of the woofer cone; this was first done by KEF in their Uni-Q drivers.

Even with the improved measurement methods and better understanding of their correlation to the hearing experience, by far the most common performance information is the on-axis magnitude response of sound pressure vs frequency. This is insufficient to characterise the total performance because it is not what we hear. The phrase 'near field monitoring' is misleading because acoustically the listener is in far field even with the speakers on top of the console. What we hear is the direct sound plus reverberation of the room, and the reverberant part is dictated by the off-axis radiation (power response) of the speaker and the room characteristics. This fact is well known and documented, but still not well understood. Excellent work was done in the mid eighties in Canada by Floyd Toole who documented in listening tests that the best correlation of subjective quality vs measured frequency response was achieved when the frequency response was flat not only on axis, but spatially averaged in a listening window of roughly $\pm 30^\circ$ (H) x $\pm 15^\circ$ (V), and when the power response is smooth. Rapid >

changes in directivity, as is common in 2-way designs around the crossover frequency (tweeter is directive, woofer is not) are clearly audible. Floyd Toole is currently at JBL and the fruits of the past work are pleasantly visible and audible in the new LSR monitors.

Avoiding the changes of directivity can take several forms. With horn-loaded tweeters in 2-way systems the problem is the narrow radiation pattern of the horn. This was first improved with lenses, multicellular and later with radial designs. A major improvement came in the early eighties from JBL who introduced Bi-Radial horns offering roughly 100° x 100° radiation. This matched well with the woofer at the crossover.

At low frequencies the drivers are omnidirectional because they are small compared to the wavelength. If this state of affairs can be maintained at all frequencies, there will be no change in directivity; the system is almost omnidirectional. This approach is favoured for example by Bill Woodman from ATC who, in the seventies, designed a soft-dome mid range driver. A 75mm radiator is nondirectional up to about 3kHz, and switching there to tweeter avoids a rapid change in directivity. However, as this kind of system radiates in all directions, the perceived sound is highly dependant on the room characteristics—what the reverberant field frequency spectrum will be due to room surface absorption as many early reflections affect the stereo imaging. Several

companies, like Quested and PMC, have developed systems around the 75mm mid-range dome driver; Stan Kelly designed a still larger, 100mm dome for Boxer, there the crossover frequencies have to be lower.

Another approach was taken by Genelec in 1983 with its Directivity Control Waveguides used in an egg-shaped enclosure. There the aim was also to make the directivity uniform and smooth, but not as wide as possible, instead to limit the radiation angle so that the stray radiation is reduced and the direct to reverberant field ratio improved. Thus the system's performance is less dependant on room characteristics. This results in very accurate imaging which is further supported by the cabinet shape—with no sharp corners there is no diffraction! However, the audience did not like their appearance, and more conventional enclosures had to be used. Fortunately, as the DCW prevents radiation at the plane of the baffle, the diffraction is very small also in rectangular enclosures. In 1988 the DCW was scaled up to large soffit-mounted systems, and in 1991 downscaled to 2-way systems. In the nineties the idea has been adopted by several companies.

UNTIL RECENTLY, the most common way of constructing a speaker system was to use, passive crossover network feeding the drivers and a separate power amplifier. Another solution—later called an active system—is

to use one power amplifier for each driver, and a low-level crossover network to feed the power amplifiers. This was tried in the thirties, but it took a long time to gain acceptance. At the end of the sixties Sennheiser marketed a 'no compromise' hi-fi system using this principle, in the early seventies several German companies like Heco and Klein+Hummel, supplying German broadcasters, did the same. Similar ideas emerged in Bulgaria where NIVOX used motional feedback, and Hungary where BEAG later developed cardioid LF and MF radiators for their monitors. Philips was the best-known advocate of motional feedback in the early eighties, and it seems that the active design has been more European than American or Asian speciality. The first American active monitor was Meyer's HD-1 (launched in the late eighties) which used a complicated analogue delay to correct the tweeter position in relation to the woofer. Also some Finnish people started developing active systems in 1976 that led to the founding of Genelec in 1978. It took until the mid nineties before this principle gained industry-wide acceptance, now favoured by 38 manufacturers of monitoring speakers.

Today's speaker systems are far from perfect and there is lots of room for improvement. It is still easy to recognise whether the sound comes from a speaker or from a natural source; this of course depends also on microphones.



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There is a stupid dilemma concerning microphones and loudspeakers: we are all used to lowering prices of electronics, and the same trend is somehow expected from transducers as well. The problem lies in the fact that transducers are fairly mature technology, and their price-performance does not follow the Moore law of processors. The electronics of active speaker systems can and will be made at lower cost, but the price of high-quality transducers themselves is likely to go up, and this trend will get stronger in the necessary search for still better transducers. At the same time people are ready to pay astronomic sums for a piece of cable, in a hope that it would make the sound somehow better.

The digitisation of the signal path is soon to extend to speakers as well. This is not to say that attempts would not exist—there are examples of digital crossovers from the eighties—but the audible benefits have to be heard, which simply means that this may not have been the most important aspect of improvement. The homework for the acoustical domain should be done first before attempting to correct obvious flaws with clever digital algorithms. Naturally the time will come when the benefits are audible, and this opens doors for other possible designs, but, again, this will inevitably increase the cost.

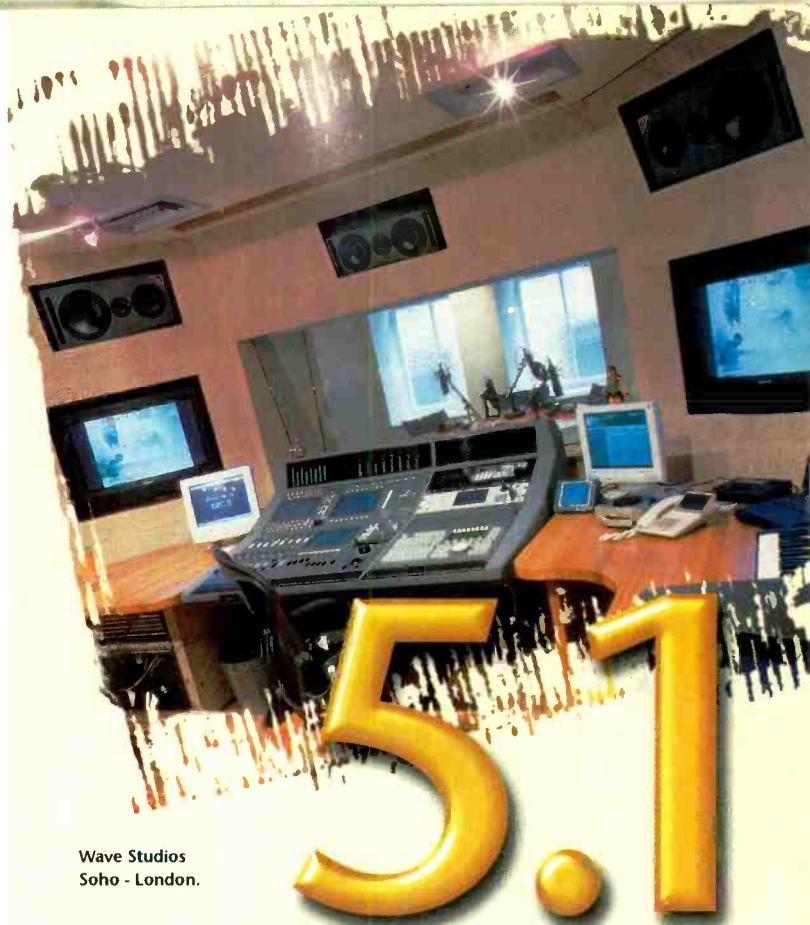
Concerning the multi-channel work, it seems that we are in a similar position as in the very early days of 2-channel stereo—enjoying the possibility of five different directions. This seems to be the practice whether the program is an action film or an opera recording. Adding the LFE channel is a source of numerous misunderstandings, and using a subwoofer often causes cancellation

clips in the combined system response. Having five full-range speakers capable of handling the LFE signal as well seems to be waste of potential; the other option of using a single subwoofer for all LF and LFE signals and five satellites may not be good either, as there may be psychoacoustical needs for more than one low-frequency source in the room. There is obviously some work to be done before we find the good ways of using all the channels.

In the centre of this level of practical questions we raise issues such as higher sampling rates and hearing in the ultrasonic domain. This is kind of bizarre because simultaneously we are ready to throw a major part of the information away in an attempt to compress the data to more convenient space. I am not against technical development, just the contrary, but the fact-orientated engineering mind asks why not make sure that the current technology works in practice as well as it theoretically should, before entering into new areas without proper knowledge? ■

1. Rice, CW; Kellog, EW, 'Notes on the Development of a New Type of Hornless Loudspeaker' *Journal of the American Institute of Electrical Engineers*, Vol 44, pp982-991 (Sept 1925), reprinted in *JAES*, Vol 30, Nos 7/8 (1982)
- 2 Walker, PJ, 'Wide-range electrostatic loudspeakers', *Wireless World*, Vol 61, 208, 265, 381 (1955)
- 3 'Are you listening?', *Studio Sound*, Sept. 1999
- 4 In the sense of the radiation pattern it was not too different from the constant directivity horns; smoother though, and because it was a direct radiator 3-way design, the distortion of compression drivers was avoided.

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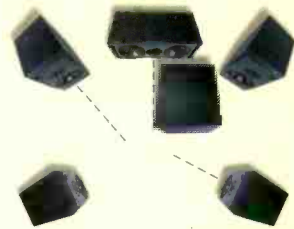
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CLOSING DATE: 7TH FEBRUARY 2000

TO ENTER, you can either email your answers to ruby.competition@unmf.com, fax them (to +44 171 407 7102) or send them on a postcard to Ruby Competition, *Studio Sound*, Miller Freeman Entertainment, 8 Montague Close, London SE1 9UR, UK.

As long as you are a registered *Studio Sound* reader, you may enter any number of installments of the competition as long as you do so separately (multiple entries will be collected by the gnomes and used as tinder for *Studio Sound's* log fire),

...include your Unique Reader Identification Number.

The Unique Reader Identification Number is the 9-digit number located in the middle of the top row of your *Studio Sound* address label.

REWARDS

STUDIO SOUND'S birthday celebration continues with two further star prizes: a Purple Audio MC76 compressor and a collection of EMO boxes—the E520 single DI box; E445 cable tester; E325 3-way mic splitter; and E630 mains distribution panel. Like the other prizes in this series, these are custom editions of current models finished in ruby red livery instead of, say, original rock 'n' roll white-on-black look.

The MC76 is a young relative of the legendary Urei 1176 limiter, borrowing heavily from both its functionality and styling. His review in *Studio Sound* (May 1998) prompted George Shilling to liken it most closely to the 'E' revision of the classic 1176 in presentation, and to judge it slightly brighter and faster in performance than its inspiration. The MC76, then, is a mono compressor based on the same FET technology as the original 1176. It offers the same attack and release controls and the same push-button selection of four compression ratios as did the 1176 and allows the same 'professional tricks' to be employed in their use. With original units still climbing in value, a ruby Purple could make an ideal shade of outboard.

THE PURPLE AUDIO MC76 QUESTIONS

- Q1** Production of the 1176 was discontinued when which company acquired Urei?
- Q2** What colour is the face of the regular MC76?
- Q3** What decimal number is represented by the Roman numerals 'MC'?



STUDIO SOUND

REWARDING RUBY PRIZES

AKG 535 stage condenser, C1000, and C3000 microphones

A&H 32-channel GS3000 console

CEDAR Series-X DHX Dehisser

Drawmer DS201 dual gate

EMO E520 Single DI box; E445 cable tester; E325 3-way mic splitter; E630 mains dis panel

Genelec 1029A monitors

Joemeek VCI compressor

KT DN-360 graphic

Marantz CDR640 CD recorder

TL Audio CI Classic compressor

Purple Audio MC76 compressor

Ongoing thanks are due to all those who have so readily contributed equipment, time and advice in the preparation of this competition.

WINNING FORM

IT ALL CAME TOGETHER back in May. The mammoth Ruby Competition that was to mark *Studio Sound's* 40 years serving the pro-audio business was set up and ready to roll. And you stood to be the beneficiaries of a wealth of classic audio gear donated by selected manufacturers and finished in a unique commemorative ruby-red livery.

First up was Joemeek's VC1 Studio Channel, competing for your attention with an interview with Todd Rundgren, intimate recording details of Jamiroquai's latest album and John Watkinson's confidential on error correction. Your choice was not exclusive but bagging a unique piece of custom kit proved irresistible to many of you. The story continued with give-aways from AKG, Allen & Heath, Marantz and TL Audio. And that's what we'll judge today. Beyond this first trove of Ruby treasure, however, there are further rewards from CEDAR, Drawmer, EMO Systems, Genelec, Klark Teknik, and Purple Audio, all to be awarded in due course.

It gives us great pleasure to announce that the winners of the first stage of the competition are as follows:

As an opener, Joemeek's VC1 proved a popular prize, and will be particularly popular with **Luke Hurand** from Chesnay Studios in Strasbourg when he receives his custom Ruby edition compressor. He pointed out the SC2 as the original Joemeek compressor rather than the SC1 which was a prototype in a biscuit tin. In winning AKG's 535, C1000S and C3000 mics, **Jerry Barker** from the UK was the only entrant to put the models in the correct order of release—it seems that the 'S' in the revised C1000 caught everyone else out. Arguably the most generous of the prizes and certainly the most bulky, A&H's GS3000 console attracted it's share of suitors, of whom only **Karl Johnson** from Staffordshire in the UK has the foot that fits the glass slipper... That Marantz is a Dutch company will not make the prospect of receiving his CDR640 CD recorder any less attractive to **Janis Krauklis** from Riga in Latvia who decisively recognised that it is neither a Japanese nor American one and that its first CD-R machine was the CDR1. Finally, TL Audio's C1 Valve Classic compressor has been the biggest competition draw to date. Here only one question threw significant numbers of you off the scent—it isn't Tony Larking who designs the TL kit but ex-Neve man Dave Kempson. Tony will, however, be duly flattered if not by **John Dircke** from Eindhoven in The Netherlands who got it right. Congratulations all round. Now begins the job of getting the ruby kit into eager hands.

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hot property

POST PRODUCTION

MUSIC RECORDING

FILM SOUNDTRACK

magmasters soho - london

As one of the UK's leading audio post production centres, working on high-end television productions like "Trial & Retribution", "Traffers", "Bob Martin", "Madame Bovary" and blockbuster films "Star Wars", "Titanic" and "Deep Blue Sea", Magmasters Sound Studios started their transformation to go 'digital' just twelve months ago.

With the initial installation of two DPC-II digital consoles last year in Studios 1 & 2, a third DPC-II digital console has recently been installed in Studio 5 for Bob Jackson, specifically for TV documentary and Light Entertainment productions. Scott Jackson, Operations Manager for Magmasters, explains their commitment, "We looked at all the available options but the overriding decision was due to Soundtracs compatibility, ease of use and speed of operation".

DPC-II

digital
production
console

Soundtracs PLC, Blenheim Road, Longmead Business Park, Epsom, Surrey KT19 9XN, UK. Tel: (+44) 0208 338 5000. Fax (+44) 0208 338 5050
Soundtracs USA Inc, 200 Sea Lane, Farmingdale, New York 11735, USA. Tel: (+1) 516 249 1234. Fax: (+1) 516 249 2854
email: sales@soundtracs.com web: <http://www.soundtracs.com>

SOUNDTRACS

NEW

GS³⁰⁰⁰

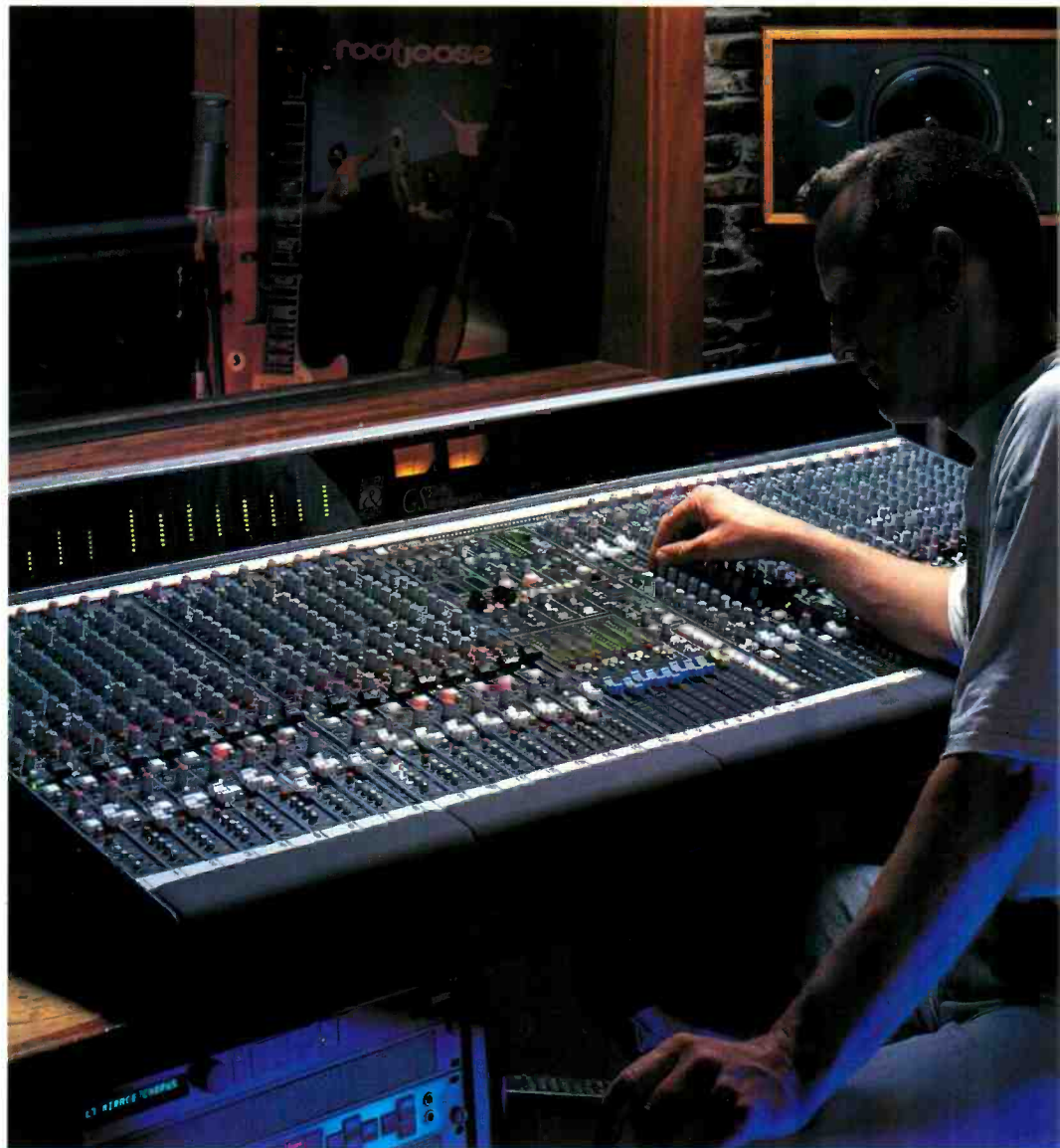
OK... or Outstanding?

- 8 buss routing architecture
- 24 and 32 channel frames
- 52 and 68 inputs to the mix
- 2 SVT (symmetrical valve technology) valve preamps
- Wide ranging mic preamp
- In-line twin fader input format
- 4 band EQ with fully parametric mids
- 2 dual stereo inputs with automation as standard
- 6 aux sends with 2 automated master mutes
- MIDI mute automation
- 4 mute groups
- MIDI machine control
- Tape send and return on every channel
- Group/direct switching
- Oscillator for signal setup
- Talkback facility
- 2 studio feeds
- Solo in place and PFL on both fader paths
- Channel status indicator LED
- Optional 21 segment input bargraph meterbridge
- Interface for three 2-track recorders

SVT VALVE PREAMPS



GS3000's 2 valve preamps can be patched to individual channel inserts, groups or LR. The valve preamps incorporate Symmetrical Valve Technology, allowing them to be used in balanced mode for regular inputs or in single-ended 'guitar' mode, which drives the the valve to give the type of pleasing harmonic distortion much sought after by guitarists. Other valve preamp features include valve drive control, pre-valve swept frequency EQ, hi-cut filter and output level trim.



Most modern recordings sound OK - but few sound really outstanding. The new GS3000 gives you truly great sounding mixes, with all the analogue warmth, sparkle and power that set the best apart from the rest. The new GS3000 - sounds glorious.



H A Harman International Company

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<http://www.allen-heath.com>
email: sales@allen-heath.com





Millennium Sound Bites

 **Ryuichi Sakamoto,**
producer
and recording artist

- 1 Brian Eno.
- 3 Pro Tools 24.
- 4 Brahms *Intermezzo* and *Ballads* by Glen Gould.
- 6 *Pierrot Le Fou* (1965) by JL Godard.
- 8 The development of the PA system by Nazi Germany.
- 9 Sony's Walkman.

 **John Andrews,**
Solid State Logic

- 2 I'm too close to this, but there was a BBC dance-band balancer called Freddie Harris who broadcast Glenn Miller and Ted Heath, and was the first to use artificial echo (reverberation, actually) on music (and got reprimanded by his bosses, as echo was only for use on drama).
- 3 Partisan or not, it's got to be the SL4000 console, for obvious reasons.
- 4 The John Culshaw Decca *Rheingold*, recorded in 1958. The first full-length opera recording, first in stereo, and still a stunning sound.
- 5 Neville Chamberlain, 3rd Sept. 1939: 'We are at war with Germany'.
- 6 Must be Al Jolson in *The Jazz Singer*—first with sound.
- 8 As recording began in the 1890s (I think!), we must choose the introduction of either the LP or the CD. Or maybe electrical recording.
- 9 Alan Dower Blumlein, the inventor of stereo.

 **Hermann Grier,**
SPL

- 1 Georg Neumann: Microphone inventions, vinyl cutting machines, Ray Dolby: getting rich in encoder-decoder businesses, Willi Studer: Best multitrack machines.
- 2 Bruce Swedien; his work for Quincy Jones and Michael Jackson.
- 3 Neumann SX series: the vinyl cutting machines made music affordable to the public.
- 4 Toscanini and Caruso.
- 5 Opening of Olympic Games in Berlin 1936, first intercontinental broadcast in the history. The next broadcast of that intensity was in the late forties.

6 *Citizen Kane*, *Matrix* (I just love them).

- 7 Coke versus Pepsi, the big difference of nothing.
- 8 What you heard when you had sex for the first time.
- 9 Elvis, who else?

 **Duco de Rijk,**
D&R

- 1 Rupert Neve represents for me analogue audio quality.
- 2 Sir George Martin, the guy that showed us the possibilities of multitracking.
- 3 Multitrack recorders. The only way to make music with bad musicians.
- 4 *Sergeant Pepper*, absolute proof of the power of multitracking.
- 5 *War of the Worlds* (Orson Welles). A lot of people really believed in this broadcast about green men from Mars.
- 6 *Star Wars*, again a typical example of one of the first special effects films.
- 8 The synthesiser, the first step in creating sounds from sources other than musical instruments.

 **Nick Franks,**
Amek cofounder

- 1 Frank Zappa—on stage, in the studio, Synclavier, orchestra or rock band—the maestro.
- 2 Brian Wilson of The Beach Boys. There is no doubt that Brian Wilson had a staggering talent. It is tragic that his career was cut short by drugs, emotional problems and the lack of receptivity of his record company. Had his talent been nurtured there is no telling what it might have led to. Mr Unbelievable.
- 3 The multitrack audio recorder. As I understand it this was brought into being by Les Paul and the team at Ampex. Without multitrack recording none of modern pro-audio as we know it would have been possible.
- 4 *Sergeant Pepper's Lonely Heart's Club Band* by The Beatles; *Good Vibrations* by The Beach Boys; *The Last Record Album* by Little Feat (engineered by George Massenburg); *Kind Of Blue* and *Bitches Brew* by Miles Davis. Maybe I should also mention *Gesang der*

As the end of the Age
nears it is time to look into
the mirror, and it tells a
startling tale. This is history
as we have understood it.
Our icons, inspirations and
memories, our footnote
to the old Millennium.

Jungling by Karlheinz Stockhausen.

5 Jimi Hendrix playing 'Hey Joe' on *Top Of The Pops* in 1966. If a UFO had landed on the front lawn it couldn't have been more astounding. Jimi came out of nowhere and appeared to have no precedent and nothing was ever the same afterwards.

6 *2001: A Space Odyssey* by Stanley Kubrick, it anticipated computer-generated special-effects cinema of today, but added the metaphysical dimension of the eternal question as to what the human race is.

7 I think that 'New Labour New Danger' was right on the money, but in pro-audio terms the Sony advert showing a Mitsubishi wagon carrying a Sony digital multitrack with the caption 'they make a great truck' did it for me.

8 The release of 'Jailhouse Rock' by Elvis Presley. With this record music strode to the forefront where it has remained ever since.

9 Elvis Presley.

 **Gordon Reid,**
CEDAR

1 Les Paul—because he invented multitracking and is therefore responsible for the wide-scale popularisation of the recording industry into what it is today.

2 Scott Joplin—perhaps the first to make 'black' music acceptable to 'white' ears, and thus lead to jazz, blues, rock, soul, rap, dance...

3 Dolby A—because it made cheap cassette media possible, extending the industry into every part of the globe.


4 Watergate—the recording is its own significance, not a recording of something significant. Anyway, it brought down the most powerful man in the world. You can't say that of *Dark Side of the Moon* or *Sergeant Pepper*. >


The First 130 Years

Over a century of
pro-audio, broadcast,
music industry and
multimedia
developments.


Compiled by Jim Evans

1876


 Alexander Graham Bell with Thomas Alva Edison invent a microphone.

 Alexander Graham Bell's first practical telephone.

1877

 Emile Berliner invents a microphone


1888

 Emile Berliner invents the flat disc record


1896


 First film with a soundtrack by Lee De Forest

1899


 Magnetic recording of sound is devised

 Aspirin is invented

 Popular tunes: Edward Elgar's *Enigma Variations* and Berlioz' *The Taking of Troy*


 First gramophone factory opens in Hanover, Germany


1900

 Paper labels introduced on records


 Earliest speech via radio waves

1901


 Emile Berliner and Eldridge Johnson form Victor Talking Machine Company

 First 10-inch disc recorded—'When Reuben Comes To Town' featuring SH Dudley

1902

 Enrico Caruso makes recording debut in Milan

1903

 World's first amplifier (called 'intensifier') patented by Sir Charles Parsons

The Millennium Questions: The most significant... 1 Audio Personality.

2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial.

8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.

- 🎧 The 12-inch record is introduced
- 🎧 First UK pressing plant opens
- 🎧 First recording of a complete opera: Verdi's *Ermani* on 40 single-sided 10-inch discs
- 1904**
- 🎧 First performance of Puccini's *Madame Butterfly*
- 1905**
- 🎧 Puccini and Massenet sue Pathe Freres for recording royalties—and lose
- 1906**
- 🎧 Edison launches 'Grand Opera' cylinders with two minutes playing-time—a failure
- 🎧 Sound-on-film machine patented by Eugene Lauste
- 🎧 In Russia Boris Rosing experiments with cathode ray tubes to produce first crude TV pictures
- 1909**
- 🎧 Edison closes his European cylinder operation
- 1910**
- 🎧 A gramophone and records go with Captain Scott on his Antarctic expedition
- 🎧 Col. Tom Parker is born
- 1912**
- 🎧 Introduction of double-sided records
- 🎧 Sinking of *Titanic*
- 🎧 First known recording of 'It's A Long Way To Tipperary'
- 1913**
- 🎧 Decca introduces portable gramophone in UK
- 1914**
- 🎧 ASCAP formed in US to collect performing royalties for artists
- 1915**
- 🎧 Frank Sinatra born
- 🎧 Einstein's general
- 26 December 1999**

- < **5** Neil Armstrong's 'One small step for man...'
- 6** *The Jazz Singer*—the first talkie was also a musical. Given that the visual aspect of movies appeared in the 19th Century, adding sound would seem to be the most significant step since.
- 8** The chimes at midnight, 31st December 2000. (By definition, the defining audio moment of the 20th Century.)
- 9** The dog (Nipper) in the HMV logo. Or maybe the Dolby Double-D.



Steve Turley, Harrison GLW

- 1** Sir George Martin. He shaped a generation of recordings.
- 2** Les Paul—a significant artist and a recording industry pioneer.
- 3** The multitrack tape recorder. It re-defined the way the recording industry works, bringing more precision to the process, and spawning a whole industry of supporting products. The multitrack tape recorder injected technology into the musical process, not just the recording process.
- 4** The first 'talkie', *The Jazz Singer*. It was the first step in proving the value of audio in the entertainment.
- 5** Without a doubt, the first moon landing in July, 1969. That point in time divided modern history from the age of industry into the age of technology.
- 6** *Star Wars*. The first big commercial success in which sound became as much an element as the picture.
- 7** Apple Computer's 1984. The small screen began to compete in earnest with the big screen. It also marked the real first step in today's Super Bowl commercial phenomenon.
- 8** The Grand Ol' Opry went on the air in 1925, and is still aired to this day. It represented the first tie between music and radio that has never been broken. Radio has done as much to spread interest in recorded music as any other technology.
- 9** This was a hard one, but I think I have it. The Shure 55 microphone. The 55 alone on a stand says more about the state of the 20th Century audio industry than any other single icon.



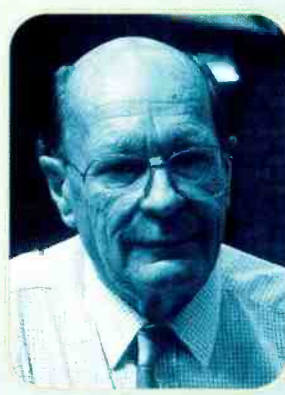
Ken DeLoria, Apogee Sound

- 1** Tony Meola, sound designer of *The Lion King* (among many other international successes). Tony is not only a brilliant designer, but is also a warm, sensitive and interesting human being active in beneficial causes, inside and outside of the audio industry.
- 2** 'Thorny' (Alexander Youill-Thornton). Thorny is Luciano Pavoratti's sound designer and a consummate professional skilled in the field of sound system tuning. He played a key role in the development of Meyer Sound Labs, the development of SMAART, and has helped Apogee

- Sound with many projects. In my opinion, he is the best and brightest live-sound engineer alive today.
- 4** *Close To the Edge*, by Yes. The first time a rock group achieved the tonal complexity of a symphony orchestra.
- 5** 'One small step for man, one large step for mankind'. The first broadcast from the moon.
- 6** *Goldfinger* (James Bond). This movie spawned an entire genre of action-hero films using special effects. Such films still dominate the market 35 years later.
- 8** Overall, the release of the compact disk. This set in motion an irrevocable paradigm shift to digital audio.
- Live Sound: The Beatles at Candlestick Park. It was at this gig that we finally came to grips with the fact that present day sound technology

- mix up musical genres, the last 35 years would have been a desolate period in pop music which for the majority of people defines their audio experience.
- 3** The tape recorder. The ability to record audio onto an editable media has revolutionised the way that audio can be delivered to a mass audience. It has had implications across all the industry and changed the world.
- 4** Winston Churchill's 'We will fight them on the beaches...' speech, or Neil Armstrong's first steps on the moon for my money. Both of these recordings are known by virtually every human being who has access to some form of reproduction technology and have survived for decades.
- 5** Probably the first Live Aid concert. Bringing together so many broadcasters and creating a spectacle for

The Audio Century



Rupert Neve
Champion of Audio Quality

THE SON of missionaries working in Argentina, he first became involved with electronics at the age of 12. He went on to be regarded as the father of the mixing console with his ideas and first

interpretations of user requirements seen in all consoles today. A champion of audio quality, his work has remained a bastion of analogue excellence in the face of increasing digitisation. One of the few individuals who imparts instant integrity with the inclusion of his input into a project. His designs and circuitry have been seen at Neve, Focusrite, Amek and Summit Audio.

was utterly useless for large-scale shows and started on serious research to create effective loud-speaker systems.



Joe Bull, Studio Audio & Video

- 1** Blumlein or Michael Gerzon have probably contributed more to the audio world than any others in the last century. Michael was certainly a personality by anyone's standards.
- 2** Sir George Martin. He contributed so much to the musical revolution in the sixties (though serendipity played a great part in GM being at the right place with the right people at the right time). I fear that without his ability to

so many millions of viewers and listeners must stand as a peak in the last century's achievements.

- 6** Difficult one. In the last 30 years I would probably cite *Star Wars* as heralding a new genre of film—cramped with special effects in both visual and audio domain.
- 7** Contradiction in terms, surely. For me personally, the commercial that has stuck with me for longest is probably the sixties 'I001 cleans a big, big carpet for less than half-a-crown!'. But I'd hardly say it was significant—just memorable. I remember being very impressed by the Benson & Hedges cinema ads during the late seventies (crocodiles in swimming pools) >

The 100th Anniversary Questions: **The most significant... 1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.**

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theory or relativity

1917

🎵 First jazz recordings

🎵 Welcome to this world Dean Martin

1919

🎧 The only recording made by Edison himself for commercial release—'Let Us Not Forget', a tribute to the Allied servicemen of World War I

1920

🎧 HMV builds the first record autochanger

🎵 First million-seller:

'Whispering'

'The Japanese Sand Man'

by the Mayfair

Dance Orchestra

1921

🎧 *Dream Street* is first full-length 'talkie'

🎵 In the maternity

ward: musical tots

Bert Wedon and

Mario Lanza

1922

🎧 Marconi's first regular entertainment broadcasts on radio

🎧 Optical sound

on film introduced

1923

🎧 First royal disc

recording made by

King George V and

Queen Mary

🎧 USSR established

1924

🎵 First live

performance of

Gershwin's

Rhapsody In Blue

🎵 'The Prisoner's Song'

by Vernon Dalhart

is country music's

first million-seller

🎧 Young cartoonist

Walt Disney debuts

with *Alice's Wonderland*

1925

🎧 First electrical recordings from HMV,

Victor and Columbia

🎧 First television

transmission of

recognisable

human features

28 December 1999

<—they seemed to bring a sea-change in the style of advertising

8 I would stick with the moon landing: 'Houston, Eagle has landed'. This was strictly an audio moment as there was a temporary loss of video when the Eagle lunar module touched down, if I remember.

9 CD technology—creating a reproduction mechanism that wasn't prone to easy damage and made such significant advances in bringing quality audio to the masses must be applauded.



**John Carrol,
Soundtracs**

1 Colin Saunders. Obviously because of his achievements, but more importantly the manner in which he handled his success.

2 Sir George Martin for innovation, creativity, dedication and consistency.

3 Multitrack tape machines. Probably MTR90 or B16 but take your pick!

4 'Stairway to Heaven'. It still does it for me even after all these years.

5 The coverage of the student protests in Tian'anmen Square. It first sprung to mind, so it must have made the impact.

6 *Ryan's Daughter*. Probably because I'm Irish, but there you go, a great blend of storyline, cinematography and music. The only film I have consented to watch twice.

7 VW Golf advert with distraught girlfriend-mistress abandoning all gifts other than car keys. Well produced, great backing track.

8 First satellite transmission.



**Lars Olof Janflod,
Genelec**

1 It would be very easy to just mention any of the big international names, but I have met many significant audio personalities in smaller countries that would deserve a mention but that never got international fame for reasons like being active in a small language area. Such a person that I have a lot of respect for is the Swedish 'grand old man in recording and mastering', Rune Persson.

2 John Watkinson for his enlightening and down to earth back to basics columns in *Studio Sound*. There is a lot of marketing 'bs' going on in our industry and (Dr) John helps in setting the record straight.

3 The ADAT certainly has changed a lot of the practices in pro-audio and so have all the various DAWs.

4 Miles Davies *Sketches of Spain*

5 Martin Luther King's 'I have a dream speech'. The JFK assassination.

The JAS plane crash in the middle of Stockholm during the August water festival a few years back.

6 My personal favourite is 1900, but that is certainly not for good audio. It's just a very good story told in a very good and fascinating way.

7 The vast majority of commercials being produced seem to assume that the viewers are a bunch of idiots and thus its very hard to name anyone significant. However the Benetton campaigns have been so different and in a way brave, so that would be my vote even though I may not sympathise with the messages they have put forward.

8 The digital audio revolution and the increased possibilities it has led to in editing audio for film, video, music.

9 The only name that comes to my mind is Rupert Neve.



**Francis Rumsey,
University of Surrey**

1 I'm going for Michael Gerzon as far as research is concerned, although some might say Alan Blumlein was more important. Possibly in the light of some history, Michael will be seen to have been as at least as influential

years from now.

2 SSL's mixer automation. Although SSL was not the first or only company to automate aspects of studio mixers, they established a *de facto* standard for recording studio mix automation that changed the face of studio recording. The facility to reset the controls of a mixer to a prestored configuration, albeit manually, must have saved hours of studio time over the years, and an easy-to-use studio computer made possible operations that engineers would never have otherwise considered.

4 Probably The Beatles' *Sergeant Pepper* album for its innovative use of early multitrack recording, a technique that was to revolutionise the way in which pop recordings were made. On the classical front, the John Culshaw-Decca Wagner Ring Cycle was a masterpiece of technical and creative achievement at the time, mixed

The Audio Century

2



Ray Dolby

Household name

INTRINSICALLY linked to analogue multitrack, Dolby was significant in the continued acceptance of analogue formats in professional applications by developing a string of solutions for raising analogue's performance. It's a legacy

that remains to this day and ensures that analogue remains a viable alternative when pitted against digital alternatives. Attention was shifted to film where the brand name has become perhaps even more significant with noise performance enhancements and the implementation of multichannel playback capability. Broadcast multichannel involvements have followed carrying the concept of where ever Dolby goes a standard will exist. No other pro audio names is as well know in households throughout the world.

as Blumlein. Furthermore, Gerzon's work was primarily audio-related, whereas many of Blumlein's inventions were nothing to do with audio. Gerzon cared very deeply about audio quality in all its forms, and was able to relate the most complex topics at a variety of levels of communication. His vast output of papers, patents and ideas, covering topics from spatial sound field representation to lossless coding and buried data in digital audio, contains much material that will perhaps only be appreciated many

directly to stereo on a smallish mixer, often edited with a razor blade on location, huge musical forces to manage. Few people would even consider trying to do something like that these days without an army of digital multitracks, countless microphones and mixer channels, hard disk editors. We're getting lazy perhaps.

8 I'd say the invention or introduction of stereo reproduction, but it doesn't really have a 'moment' associated with it—it happened in a number of steps and a number of people >

The Millennium Questions: The most significant... 1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.

00:01:20

00:01:25

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email: nfo@sadie.de

-  Earliest known recording of a 'live' performance on disc: 'Laff It Off' with Finzel's Arcadia Orchestra **1926**
-  John Logie Bard demonstrates TV *Melody Maker* hits the newsstands
-  Bing Crosby's first commercial recording is 'I've Got The Girl' **1927**
-  Al Jolson in *The Jazz Singer* **1928**
-  First scheduled TV broadcasts **1929**
-  Decca Record & Gramophone Co formed in UK
-  Wall Street Crash **1930**
-  'Mood Indigo' by Duke Ellington **1931**
-  EMI formed through merger of The Gramophone Company and Columbia
-  BBC Record Library opens in London
-  Alan Blumlein takes out patent covering stereophonic sound recording
-  Adolph Rickenbacker, Bath and Beauchamp invent an electric guitar **1932**
-  Abbey Road Studios opens for business **1934**
-  The electric tone-wheel organ invented by US engineer Laurens Hammond
-  Talking Books for the blind issued on 24rpm discs **1935**
-  Birth, in Tupelo, Mississippi, of Elvis Aaron Presley **1936**
-  BBC starts

30 December 1999

< did the work. The publication of Blumlein's 1931 stereo patent might be considered a reference moment. The addition of a spatial dimension to sound reproduction was a crucial development.

9 The compact disc. Its ubiquity, its revolutionary step in terms of potential sound quality, its association with quality and convenience, and the fact that the audio industry produced a product that subsequently became adopted by the computer industry, all make this one of the strongest audio symbols of the century. 'CD quality' is a term still used widely as a sort of reference point for quality.



Nikos Espialides, Megaron, Athens

- 1** Thomas Edison.
- 2** Ray Dolby. His name is the most renowned audio trade mark of this century, connected to almost all the fields of the audio industry.
- 3** The multitrack recorder. The two magic words behind the booming record sales industry from late sixties onwards.
- 4** Pink Floyd's *Dark Side of the Moon*. The first recording of music ever, where sound is its most important 'musical' element.
- 5** 1969 man's first step on the moon. Mankind waited almost 15 millennia of development to see something like this—if it was not shot in a studio.
- 6** Disney's *Fantasia*. My parents when they were kids. Myself when I was a kid. The same for my daughter, recently.
- 7** Orson Welles' radio production of 'the invasion of the martians' (quite a convincing one. I might add).
- 8** The introduction of stereo recorded sound. I am having much harder times than this one.
- 9** The CD. A predominantly audio carrier that showed the way to the new technologies of the 21st Century.



Chris Walsh, Martinsound

- 1** Elvis Presley for impact on society.
- 2** Les Paul who invented the multitrack and designed a definitive guitar.
- 3** Multitrack recorder changed the way production 'could' be done. The isolation of instruments or elements of an orchestra or sound track led the way to modern recording techniques that include sequencing and digital multitrack where every aspect of the original performance can be manipulated (timing, pitch, format).
- 4** Modern sounds in country & western. Ray Charles—this is probably the most influential album by the most influential vocalist—his singing style is the most imitated.
- 5** Orson Welles' *War of the Worlds*. This broadcast blurred the line between fact and fiction and may be the grandfather of all 'performance art'.

7 Macdonald's introduction of Ronald Macdonald. The destruction of nutrition in America and the world.

8 Hearing man's voice beamed back from the moon.

9 John Hammond Sr. Columbia Records. Count Basie to Woody Guthrie to Bob Dylan to Bruce Springsteen with literally hundreds of significant artists between



Jason Squire, formerly 20th Century Fox; University of Southern California.

- 1** Maybe Murrow, maybe FDR.
- 2** Maybe Robert Sarnoff, since he was way ahead of his time.
- 3** Either the crystal radio or the Walkman: either one opened the field of personal audio considerably, though

watch, but what else could possibly communicate those heart-wrenching circumstances other than film?

8 Maybe some classic news broadcast, such as the New Jersey destruction of the Hindenberg, since that seems to be etched in my mind as an unforgettable example of spontaneous, genuine emotionally charged reporting.

9 You mean besides Stan Freberg? Or Chuck Blore?



John Gluck, Calrec

1 Ray Dolby. Was a driving force behind audio at Ampex. Then developed core technology that moved professional recording forward significantly. Made better quality audio more available to a mass market and

The Audio Century



Sir George Martin
People's producer

A producer of the old school yet he was first to cross over and define the role of the modern producer. A classically trained musician he was open minded enough to interpret and encourage the

experimentation that made his work with The Beatles the stuff of legends. No one man better typifies the description of job-title 'record producer' and if you were stop someone in the street and ask for a name chances are it would be his. His work with the Fab Four has eclipsed much of his lower key projects but he has kept busy in to retirement. Other land marks include his breaking away from major record label studios and establishing his own AIR facilities.

at different periods in history.

4 Edison's first cylinder recording? First commercial recording of Caruso? Bill Haley and the Comets 'Rock Around the Clock' as it ushered in the era of rock 'n' roll?

5 Orson Welles' *War of the Worlds* on Mercury Theatre.

6 Perhaps the early work of Georges Melies, which must have amazed people, or the Lumiere brothers in France, such as the vignette of a train pulling into a station which, when projected to an unsuspecting public, caused people to duck and run from the room, proving the impact of this new projected image. Or maybe the documentary footage of Holocaust survivors upon liberation. Difficult to

is now probably doing the same again for television audio.

3 SSL 4000 computer assisted console. It revolutionised the industry.

4 *Sergeant Pepper* album. Innovative recording and mixing techniques, sounds and music.

5 The first moon landing. It really was the ultimate example of man using technology harnessed for a great good. It provided enormous spiritual and psychological stimulation for anyone who saw it and does so even now.

9 The Walkman

Laurel Cash-Jones, AES and Audio Industry Consultant

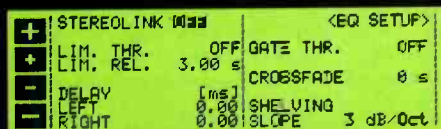
- 1** Ray Dolby.
- 2** Sir George Martin.

The Millennium Questions: The most significant... 1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.

EVERY PICTURE TELLS A STORY

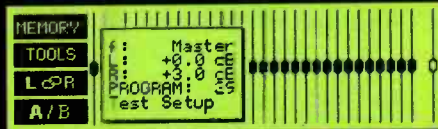
The new ULTRA-CURVE PRO DSP8024

24-bit dual DSP stereo Mainframe with 31-band Graphic EQ, Real Time Analyzer, Auto-EQ function, Parametric EQ / Notch Filter, Feedback Destroyer, Limiter, Noise Gate, precision Level Meter, high-resolution 24-bit converters, complete MIDI implementation, Delay function with up to 2.5 seconds of delay, optional extra 24-bit AES/EBU interface, and much more ...



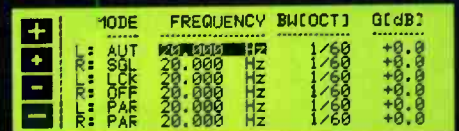
LIMITER, NOISE GATE, DELAY

The digital "brickwall" limiter with adjustable threshold and release time reliably protects your setup against overload. The integrated IRC (Interactive Ratio Control) noise gate eliminates unwanted noise and hum during signal pauses. The DSP8024 can also be used to implement a delay line for your live applications.



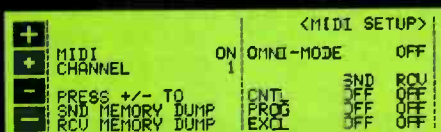
DIGITAL STEREO 31-BAND GRAPHIC-EQUALIZER WITH AUTO-Q FUNCTION

The true response characteristic of each filter gives the exact frequency response, which you adjust using the faders. All settings can be stored, copied, compared, added and subtracted. The Auto-Q function allows for a perfect correction curve to match any room's acoustics.



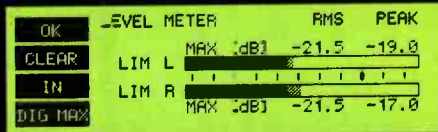
FEEDBACK DESTROYER / PARAMETRIC EQ

In addition to the graphic EQ the DSP8024 features six fully adjustable parametric filters. Any of these six filters can automatically "seek and destroy" unwanted feedback frequencies. The perfect solution for all feedback problems in your live applications.



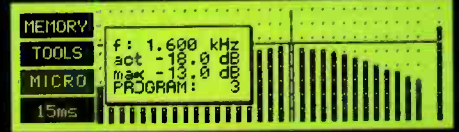
COMPLETE MIDI IMPLEMENTATION

The ULTRA-CURVE PRO also has a complete MIDI implementation, which allows for remote control via a MIDI sequencer software. In addition to that you can use our free EQ-DESIGN editor software to control the ULTRA-CURVE PRO from your PC.



INPUT / OUTPUT LEVEL METER

The DSP8024 offers high-precision input/output metering capability. These can of course show R.M.S. or peak to peak values with selectable reference levels. Additionally, the limiter activity is also indicated.



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These pictures only tell a part of the success story. The open system architecture, Windows® compatible software and free updates ensure that your ULTRA-CURVE PRO will never be outdated. For more information please visit our WEBSITE

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broadcasting

1937

🎧 First commercially marketed tape recorder—the Magnetophon made by AEG-

Telefunken in Germany

🌟 The Hindenberg Disaster recorded for posterity

1938

🖋️ Invention of the ball-point pen by Hungarian, Lázlo Biro

1939

🇩🇪 Germany invades Poland

🎵 Lale Anderson records 'Lily Marlene'

🎵 Glenn Miller gets 'In The Mood'

1940

🔌 Electrification completed in US

📊 First charts of popular record sales published by Billboard

1941

🎬 Walt Disney's *Fantasia*, with 3D sound

< 3 Multitrack recorder.

4 *Sergeant Pepper*.

5 Choose one of three—MTV, *Ed Sullivan Show*, Mercury Theatre *War of the Worlds*.

6 *The Jazz Singer*.

7 Apple 1984.

8 The development of time delay spectrometry.

9 The computer.



William Bauer,
radio and record
promotion expert

1 Thomas Edison.

2 Trevor Horn, Producer (a personal favourite).

3 AEG Telefunken magnetic tape recorder (1940s).

4 Bill Haley and the Comets, 'Rock Around the Clock' 1952. This recording fused black 'blues' and pop and was the first recording of rhythm and blues to crossover to a white mainstream audience, it marked the birth of a new music genre called Rock 'n' Roll and set the tone for popular music and the youth culture for the last half of the 20th Century.

5 2nd November 1920 the broadcast of the Harding-Cox presidential elections. This was the 'world's first commercial' radio broadcast and originated from the rooftop of a factory owned by Westinghouse Electric in Pittsburgh, PA. The station is now KDKA radio.

6 *The Jazz Singer*, 1929. The world's first talkie.

7 Apple Computer 1984.

8 The development of the Audion valve by Lee De forest in 1912.

9 The microphone. (1925) Electronic recording, including the microphone, allowed for a more natural and realistic sound than was previously possible. As a result, relatively high quality commercial, mass produced recordings grew in popularity and recorded music became an integral part of virtually every household.



Roy Pritts,
AES President-Elect.

1 Quincy Jones.

2 Phil Ramone.

3 Ampex Tape Recorder.

4 The Beatles' *Sergeant Pepper*.

5 Welles' *War of the Worlds*.

6 *The Jazz Singer*.

7 Memorex: 'Is it recorded...'

8 Edison's 'Watson... come in here'. The electronic transmission of sound.

9 RCA Victor's His Master's Voice



Martin Polon
Pro audio journalist

1 The Beatles. No other artist(s) or technician(s) so fired the interest of the public in recordings, recorded music or the technology used to make music. Perhaps it is true that the Beatles did not have the raw energy of the Rolling Stones—my runners up for this title—but soon made up for it with the finesse of using every nuance of developing technology to

make their recordings—the best, the most interesting!

2 Sir George Martin. Of course.

3 AEG Telefunken Magnetic Tape Recorder (MTR), although Ampex is given credit (and much of it is deserved) for refining, developing and marketing the MTR, the real work was already completed by AEG Telefunken and Agfa in developing the recorder and the plastic tape.

4 The series of LPs done by the Decca Record Company (English Decca) under the aegis of its director, Arthur Haddy, which laid to disc Wagner's Ring with the company's revolutionary frrr (full frequency range recording).

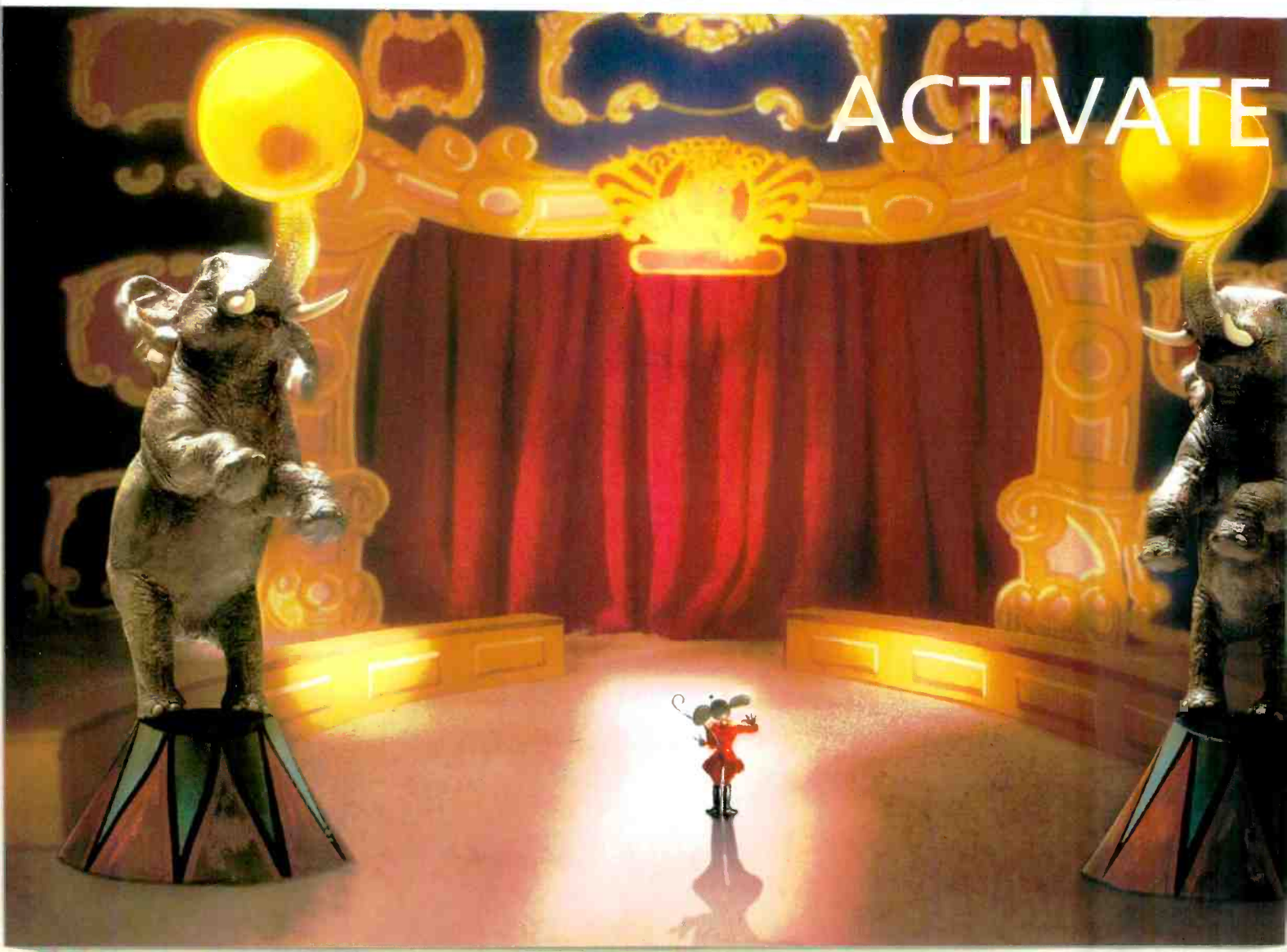
5 Bing Crosby's radio show in the United States on the ABC radio network during the late forties. This weekly programme was transitioned to Ampex audio tape recorders to allow its raconteur star to spend more time on the golf course each week.

6 Walt Disney's *Fantasia*.

7 The Apple Computer Macintosh Debut Commercial. Aired in 1984, during the most expensive commercial moment of network television, sandwiched between NFL professional football plays, this commercial used sound and picture to convey via a hammer throwing individual, that a new force was coming to the world of computing and that the old monoliths would fall.

8 The date when the Compact Disc went mainstream. Fifteen years later

ACTIVATE



the medium has proven to be the most successfully adopted digital medium in the world today—used for lossless audio recording and reproduction, computer data recording, storage and data entry, motion picture sound tracks and myriad other uses.

9 The Walkman. No other audio device in the history of this century or in use today, whether cassette or CD has been so universally adopted for recreation and education by so many millions of people. It has brought high fidelity into the daily lives of commuters, exercisers, athletes, walkers, loungers, workers and so forth.



Thomas Lischker, RTW

1 Willi Studer (or Neve). Both influenced the audio industry for a long time by means of their individual leadership.

2 Live transmission from the landing on the moon—although this was not so complex as far as on location production is concerned (only one camera and the sound was terrible)—this event brought all people in the world together and gave an idea, what information technology would be able to do in the future.

3 There have been many milestones, like the first live broadcast, introduction of vinyl records, the first tape recorder with RF-bias, going from mono to stereo, multitrack recording, launch of the CD and so on. However, in these days, the targets of

technology improvement always have been defined to be an improvement of quality (high fidelity) and/or handling. The development of technologies in other areas, for example film, TV, graphics, printing and so on, went their own way without having many points of contact. With the beginning of the digital area, bits and bytes came into play and, of course, the computer. At the beginning the improved quality and the better handling attracted many people, but this was only the first step. With the fast development of the information technologies we now have what we call convergence of media—mainly based on the hardware platform of the computer. This will lead into the convergence of production tools—with all the advantages and disadvantages we all know. The merger of different media and their respective technologies into one what we could call information technology (it is not only multimedia) is, to my opinion, the defining (not only, but also audio) moment in the 20th century.



Louis Austin, The Home Service

1 Malcolm McLaren, because he has come up with some interesting ideas over the years and I love his ability to reinvent himself.

3 I would say—and this has nothing to do with any clients I may have—the frequency conscious noise gate.

It was a revelation when I first tried one after years of using the crude on-off gates that were available to me.

4 'A Day in the Life', because it broke totally new ground and definitely changed the face of popular music.

5 Martin Luther King 'I have a dream'.

6 *Apocalypse Now*. For its dream-like narrative quality of Martin Sheen and the contrast between horror of war and blatant stupidity-comedy

7 *L'egoiste* (EGO) It was one of the most expensive commercials ever. Totally over the top, shot at a famous hotel in Nice (I cannot remember) and I have heard the light was not right so they rebuilt the set as a mockup in South America to get the light right. I love it because it was so over the top.

8 Terrible one this, I suppose the Apollo Moon Landing, although this was visual as well, it was a ground breaking broadcast.

9 The Shure 55S mic, it's the one on my logo and I chose it over 10 years ago because it was so widely recognised, I think a decade later it's even more familiar and trendy because of its lovely retro looks, I have to own up I have never used one!



Muff Winwood, Sony S2

1 Les Paul—The first time I heard layering and overdubbing of multiple guitar. What a great player, and he manufactured a beautiful guitar too.

2 Joe Meek pioneered the sound >

Melody Maker organises first public jam session recording at Abbey Road
1943

Colossus, the first electronic computer is built in the UK
1944

Glenn Miller takes off for the last time
1946

First digital electronic computer invented by J Presper, and John Mauchly.
1948

Leo Fender creates the solid body electric guitar: the Fender Broadcaster (renamed Telecaster in 1950)

First long-playing microgroove record invented by Peter Goldmark

Transistor invented at Bell Telephone Labs by John Barden and Walter Brattain

& CONTROL



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GENELEC 1034BC

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
The GENELEC 1036A Large Control Room Monitor System brings NEW true weight to the phrase "20 Hz to 20 kHz".

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Two systems defining a NEW true Balance of Power.


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ACTIVE MONITORING
The Whole Truth And Nothing But The Truth

 **John Von Neumann** builds first computer to use binary arithmetic and store instructions internally


 First juke box to offer 100 selections

1949


 The 45rpm 7-inch disc is introduced

 The original stage cast album of *Oklahoma* is first 33rpm LP to sell a million


 George Orwell's *1984* is published

 In the Births Column it's hello to Peter Gabriel, Bruce Springsteen, Mark Knopfler


1950


 Open spool tape recorders on sale in US, reaching Europe a year later


1952

 First UK singles chart—in NME—has Al Martino's 'Here In My Heart' at No.1


1953


 IBM begins manufacturing large computers

 RCA Laboratories records TV programme onto tape

 Birth of the EP


1954

 Chuck Berry's first hit 'Maybeline'

 7-inch tapes running at 7 1/2 ips from Victor (US) and EMI (UK) hit the market

 Birth of the Fender Stratocaster

1955

 Bill Haley's 'Rock Around the Clock' goes to No.1 all over the world

1956

 Charles Ginsburg and Ray Milton Dolby of Ampex Corporation in California

demonstrate the first practical video recorder

34 December 1999

< of British pop from his bedroom, 30 years before anybody else.

3 The Marshall Amp—Rock would never have been the same without it.

4 Too many in my lifetime but the first stereo recording was very significant.

5 BBC Radio Saturday Club—laid the foundations for a worldwide British pop scene, more than any other single institution.

6 *Blackboard Jungle*—the first time I saw sex, violence and rock 'n' roll.

7 'Take A Tip, Take A Bristol': the most hummable specially written TV ad.

8 The amplifying of Charlie Christian's guitar: When he played in Benny Goodman's bands the rest of the world discovered a new instrument—the electric guitar.

9 Sir George Martin.



Charlie Gillett,
GLR London radio and Oval Records

1 Berry Gordy—he pulled together a succession of miracles in Detroit in the mid sixties (as well as recording a group of that name!)

2 Sam Phillips—the engineer at Sun Studios in Memphis, and the founder of Sun records, who first recorded Howling Wolf and Junior Parker, two of the major blues artists, and then recorded Elvis Presley, Carl Perkins, Jerry Lee Lewis, who pioneered rock 'n' roll. It wasn't just that he recorded them, which was remarkable enough, but how he recorded them—giving them an atmosphere where they felt relaxed and creative, and using echo effects which made it sound like they came from another planet...

3 The cutting lathe that enabled 78rpm records to be made. From 1905 to 1955, this was the major means of reproducing music.

4 Not my favourite by any means, but probably 'Rock Around the Clock' by Bill Haley. Credit to producer Milt Gabler.

5 It might have been the first time I heard 'Be-Bop-A-Lula' by Gene Vincent on AFN, broadcast out of Germany in 1956.

6 *The Girl Can't Help It*.

8 Little Richard saying 'a wop bop a loo bop' at the start of 'Tutti Frutti'.

9 The HMV-RCA dog.



Robert Sandall,
Virgin Records; Sunday Times; BBC Radio 3

1 Frank Sinatra—he invented microphone technique.

2 Phil Spector—he was the first man to use the recording studio as an instrument.

3 The electric guitar—it changed the sound of pop music.

4 Elvis Presley's first single on Sun Records, 'That's Alright'/'Blue Moon of Kentucky'. Because he invented rock 'n' roll.

5 Live Aid, in terms of what it accomplished socially and culturally and because of the sheer scale involved in staging and broadcasting it.

8 The advent of radio broadcasting because of the huge possibilities this opened up.

9 The Beatles.



Alan Winstanley,
Westside Studios

1 John Lennon—he was one of the first people who inspired me to get into music, and certainly one of the most talented.

2 Phil Spector: When I was a kid I remember listening to the radio wondering why some sounded so much better; they really seemed to jump out at you, they were all his records.

3 The SSL console without a doubt. It changed the way we mixed records in the early eighties, with its automation and Total Recall.

4 *Sergeant Pepper's Lonely Hearts Club Band*. There are better Beatles albums,



Todd Wells,
Soundtracs

1 Colin Saunders. He changed the way we think about music mixing consoles and had the vision and the determination to see the development of the 4k series through.

2 Rupert Neve—nobody has contributed as much to microphone front ends and lower noise levels in the analogue domain.

3 SSL 4000, as (1) above.

4 *Sergeant Pepper*. Significant experimentation in music production as well as the start of multitrack.

5 1968 man on the moon. Obvious.

6 *Schindler's List*. Its simply such a moving tale of how greed was overturned by true human emotion in such dreadful circumstances

7 Coke: 'I want to Teach the World to

The Audio Century

4



Willi Studer
Tape machine pioneer

STARTED a company whose name became synonymous with professional grade multitracks and instilled a level of mechanical excellence that persists to this day. He was

instrumental in the standardisation, development and proliferation of the analogue multitrack as a machine that could deliver reliable and exemplary results and could be serviced and maintained to ensure it remained that way. Most Studers are still earning their keep. Branched into mixing consoles, digital multitracks, and systems supply where the name imparted an air of professionalism that few other brands can match.

but this was so experimental, using backward effects, varispeed, phasing and synchronising machines together for multitracking.

5 Live Aid. The way it all came together really quickly and made money for a good cause, bringing artists together from both sides of the Atlantic. It had not been done before and it has not since.

8 The invention of the electric guitar, it has defined the sound of contemporary music.

9 Sir George Martin, for his arrangements, production and for gelling the sound of the band that changed the landscape of modern music.

Sing'. It did!

8 September 1945 the end of the Second World War, the innovations and political changes that followed and for the British the loss of its Empire followed by years in the wilderness.

9 The Guitar? Helped the transition from Negro blues to Rock and Roll



John Storyk, Walters-Storyk Design Group

1 It's got to be Les Paul—kind of like the top 100 baseball players—there are 100 great players, but all the lists start with number 2—since the Babe is automatically number 1... No Les—no toys that start the whole thing >

The Millennium Questions: The most significant... 1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.

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Dealer Inquiries Welcome!

🎵 Elvis Presley makes first recordings for RCA
1958

🎧 Decca launches stereo recordings with the slogan FFSS—Full Frequency Stereophonic Sound

🎧 RCA Victor announces tape cartridge containing prerecorded music

🎵 *My Fair Lady* sells a million

🎧 First integrated circuits demonstrated in America
1959

✈️ The day the music died—Buddy Holly dies in a plane crash along with Richie Valens and The Big Bopper

🎵 The Twist, Cliff Richard's 'Living Doll'
1960

🔬 US physicist Theodore Maiman constructs the first laser

🎵 Motown Records' first million-seller is 'Shop Around' by The Miracles

🎵 Roy Orbison's 'Only The Lonely' and Ralf Harris' 'Tie Me Kangaroo Down, Sport'
1961

🎧 *Tape Recorder* magazine observes, following a reader survey, that 'stereo on tape was far more popular than we had thought'

🎵 Dave Brubeck's *Take Five* and *West Side Story* film soundtrack
1962

🎵 Bob Dylan signs to CBS and releases his debut LP

📺 TV signals transmitted across the Atlantic via Telstar satellite
1963

🎧 Philips' Compact

36 December 1999

< going. I'm not saying that someone would not have made those same toys—but we will never know.

2 Sir George Martin, Les Paul...

3 Multitrack tape machine.

4 *Sergeant Pepper, Music of my Mind* (Stevie Wonder).

5 *War of the Worlds*.

6 *Wizard of Oz*.

7 The first big Apple commercial (set of commercials) at the Super Bowl

8 The multitrack tape recorder—the moment someone thought of overdubbing—this is the beginning of 'non-linear' recording which is the still the core of the recording progress



Howie Weinberg, mastering engineer

1 Billy Corgan of the Smashing Pumpkins. This guy can actually produce, engineer, mix, and also write, sing and play every instrument—and yet he's one of the most focused artists I've ever worked with. I've mastered all the Pumpkins albums, and I'm always blown away by how multidimensional his talent is. Plain and simple, he's just a gifted guy.

2 Georg Neumann, who invited record cutting equipment and microphone technology. Basically, without him I'd be out of a job!

3 Pro Tools and the digital audio workstation, hands down. It offers multitrack editing which 10 years ago would have seemed unthinkable. When it first came out, it had bad sound quality, but now that it has 24-bit resolution the sound quality's excellent. You wonder how you could ever live without it.

4 *Paul's Boutique* by the Beastie Boys. This album took sampling to another level, and still sounds fresh. Just an awesome record, and one I'm really proud to have worked on.

9 Buddy Holly. Over 30 years later, his records still have the best vocal sound ever.



Mick Glossop, producer and engineer

1 Geoff Emerick, for his pioneering work with the Beatles.

2 Joe Meek, the first engineer-producer to create original sounds based on his own vision, rather than to merely reproduce the natural acoustic character of musical instruments.

3 Pro Tools, it represents a massive leap forward in audio manipulation and processing.

4 'River Deep, Mountain High' produced by Phil Spector, the first hit record to define the 'larger than life' approach to making records

5 Live Aid, for obvious reasons

6 Monterey Pop—as far as I am aware, the first film of a music festival, featuring some fantastic performances by Otis Redding, Jimi Hendrix, et al.

8 Practical tape recording.



Graham Blythe, Soundcraft

1 Rupert Neve. He has been responsible for so much good stuff for so long and is still coming up with the goods.

2 George Massenburg. He excels both as recording engineer as well as design engineer, and invented the parametric EQ. He is also a really nice bloke.

3 Somewhat reluctantly I would have

until she achieves excellence.

2 Douglas Shearer (MGM recording director and director of technical research, 1928–1968). I met Douglas Shearer at the beginning of my career. He was one of the most innovative 'sound' men, with very significant achievements, especially in developing the early (1938) motion picture noise reduction technology. He won 12 Oscars for Best Sound Recording and received 7 Scientific, Technical, Engi-

The Audio Century



Colin Saunders
Founder of SSL

ESTABLISHED the mixing console as the centre of all activity in a control room with the integration of an automation computer, recall and machine control in his SSL 4000. Changed the way the desk was

viewed and used and changed forever the way that records were made. This made the self-op producer-engineer a reality, made SSL a desirable brand for studio time sales and established an intercontinental standard. Visionary and creative he fed quality user-feedback into the console design process with great success. Left a console legacy that can still be traced back to his own original ingenuity.

to say the first big SSL console. The sound quality wasn't anywhere near the stuff the rest of us were doing at the time, but we cannot deny its huge influence on the recording process.

4 Very torn here between *Abbey Road* (perfection from beginning to end) and *The Wall* (wonderful sound concept and terrific guitar from Gilmour).

5 *War of the Worlds* for demonstrating the awesome power of radio. For technical achievement, Live Aid.

6 *Star Wars* for using surround sound.

8 Maybe this should be Live Aid, being a summation of so much technology.

9 Studer A80, Shure SM58



Michael Kohut, Sony Pictures Entertainment.

1 Barbara Streisand. She has the most incredible voice. Having worked with her on *Yentl*, *Prince of Tides* and various albums over the years, I was fortunate enough to experience her absolute dedication to achieving perfection in her work. She takes audio extremely seriously and will not stop

neering awards from the Academy. I am in awe of him.

3 The Magna-tec Recorder for its durability, sound quality and longevity.

4 The JFK assassination tape. The gunshots were so chilling. That recording stunned the world.

5 Orson Welles' vivid 1938 radio version of HG Wells' *The War of the Worlds*. It panicked the people of America.

6 *Doctor Zhivago*—That film achieves total realism. Audiences immerse themselves in the story. The characters are so real. We feel for them and indeed we can even imagine that we are one of them. It is absolute escapism—a magnificent experience.

7 'Wendy's, where the beef...'—simply the most memorable

8 JFK radio and television speech to the American People on the Soviet Arms Buildup in Cuba (blockade of Cuba) The White House, 22nd October, 1962. After Kennedy delivered this speech, the world was on the brink of nuclear war.

9 David Lean. He is one of the >

The Millennium Questions: The most significant... 1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.

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At just £2382 (ex-VAT), inclusive of meter bridge and PC based automation software, the **TM-D4000** represents a new price / performance standard in the 8 buss digital console market. This advanced third generation TASCAM digital mixer offers moving faders, dynamic automation, extensive machine control, 24-bit audio throughout, on-board stereo digital effects and dynamics processors, fully parametric EQ, and the most versatile I/O capability of any digital desk at this price point.



TASCAM's range of latest digital recording products provides 24-bit high resolution signal quality for multitrack tape, hard disk, DAT and digital mixing.

TASCAM

a whole world of recording

defense establishes a computer network that will become the basis of the Internet

Major TV moment
Man on the Moon
—A great leap mankind, we're told

Blind Faith play free concert in Hyde Park 1970

Dolbyised cassettes arrive

IBM develops the floppy disk for storing computer data

BBC releases *Gone Fishing* album

Fibre-optic cable invented by Robert Maurer, Donald Keck and Peter Schultz at Corning Glass 1971

Appearance of first microprocessor designed by Intel for a pocket calculator

George Harrison's *All Things Must Pass*

Rolling Stones play UK dates prior to moving to France for tax reasons 1972

Pink Floyd premiere *Dark Side of the Moon* at London's Rainbow

Don McLean's *American Pie*

First quadraphonic albums issued 1973

Elton John's first US No. 1: 'Crocodile Rock'; release of *Goodbye Yellow Brick Road*

Pink Floyd complete recording of *Dark Side of the Moon* at Abbey Road

World vinyl shortage 1974

Abba's 'Waterloo' wins Eurovision Song Contest

First hits for Queen 1975

Sony introduces Betamax video system

< raising the consciousness of the greatest number of people Dolby Digital is achieving that end with benefits to everyone else in the industry.

4 The Watergate tapes. No recording since has ever been the subject of so much controversy and analysis. Ultimately they led directly to the fall of one of the two most powerful men in the world.

5 The Mercury Theatre broadcast of HG Welles' *War of the Worlds*. Orson Welles managed to produce a fiction so convincing it caused panic when first heard by the public, and was still capable of fooling me and my girlfriend for a few moments when I inadvertently tuned into the middle of what we thought was a 'news broadcast' on AM radio in the seventies. The noise of the car masked the age of the recording, that's my excuse...

6 *Apocalypse Now* is a *tour de force* of sound and picture. It set the agenda for much of what has followed.

7 Almost any ad (trailer) for a blockbuster film. These are becoming an artform in themselves, pushing the envelope of just how much information can be conveyed in a very short time using editing techniques bordering on subliminal which might even be illegal if used for advertising other products.

8 Neville Chamberlain (British Prime Minister) announcing, 'a state of war exists between our two countries' (Britain and Germany). The world changed for everyone who heard it, not immediately, but profoundly and the ramifications still shape the world.

9 The HMV dog, listening to the horn.



Mark Gander, JBL Professional

1 Les Paul.

2 George Massenburg.

3 Ampex tape recorder.

4 *Sergeant Pepper*. The Beatles.

5 *Hey Jude* live premier worldwide broadcast and video. The Beatles.

6 *2001: A Space Odyssey*.

7 Apple Macintosh 1984 Super Bowl launch TV commercial.

8 Woodstock 1969.

9 Sir George Martin.



Chris Difford, musician

1 Todd Rundgren's albums have always left me feeling like this man has been working, I can smell the tape spinning on the machine, I can feel the hard work of making records. He always tries so hard to create new sounds and new audio art, although sometimes he does fall wide of the mark.

2 Peter Gabriel's studio is what I would like my studio to be like, calm and beautiful, a place to create music and be with people in harmony. There is love around RealWorld, the kind of love only a good person can create.

My dream is to do what he does in Wiltshire here in Sussex.

3 MiniDisc—I love the touch, the sound and the ease of use.

4 *Dark Side of the Moon* blew my mind when I first heard this record its when true stereo came into my life, although I was stoned at the time. It sounds as good sober today.

5 Live Aid—match that, Net Aid came close but no cigar—I cried, I was in awe.

6 Woodstock. I would say *Still Crazy* but that would be silly, I love seeing Hendrix, I like the feeling of this film, the hippy in me comes to the fore.

7 Levi jeans. Too tight for me, but they look good when they sound good.

8 First Hearing *The Sound of Music*. 'The

4 Harry Smith's compilation of American recordings of the twenties and thirties. Many artists like Bob Dylan, Arlo Guthrie and so on, were significantly influenced by them.

5 FDR's fireside chats during the Great Depression. They helped many people back on their feet psychologically.

6 *The Jazz Singer* starring Al Jolson (premiered 27th October, 1927) is often credited with being the first sound film (it wasn't), but was so wildly popular that it convinced producers and movie theatres that sound films were the wave of the future. By the end of 1928, 16 sound stages were in use. And theatres across the country were being wired for sound. *The Jazz Singer* is famous for the line 'you ain't

The Audio Century

7



Georg Neumann
Microphone Designer

Founded in Berlin in 1928, Georg Neumann's microphone company was to provide the bench-mark against which all other microphone manufacturers would be judged. First

out of the stable was the CMV3 'Neumann Bottle', a condenser offering a selection of 'heads' giving different patterns. The U47 followed until discontinuation of its VF14M valve forced its demise in the late fifties and prompted the launch of the U67 in 1960. The mid fifties saw Neumann's first stereo mic, the SM2, the cardioid KM64 appeared in 1964, the 48V phantom-powered KM84 and the KML Lavalier in 1966 and the KTM transistor condenser in 1965. His legacy lives on.

hills are still alive', on the big screen I was sucked into a world of song, a place where I could grow and become me, a chance to be anything other than a plumber, not Christopher.

9 Sir George Martin: Gentleman, grand master, and *Yellow Submarine*.



Lou Gonzales, Quad Recording

1 Edward R. Murrow for his 1940 London broadcasts.

2 Les Paul, who made the first significant multitrack recording

3 SSL 4000ETR It allowed sound engineers to separate themselves from any one facility and put much more creative control in their hands. The automation and the Total Recall changed the way we work forever.

heard nothin' yet!'

7 The [American] Indian with a tear on his face—'Don't pollute my lands' the most effective ad ever against pollution.

8 'Come here Watson, I need you'—Alexander Graham Bell

9 Nipper, the RCA Dog



Clive Green, CADAC

1 Blumlein—introduction of the first stereophonic system, or at least the first patented.

3 The analogue tape recorder first and foremost, followed by the development of the integrated circuit for audio applications—had an enormous impact.

5 The radio broadcast announcing the war with Germany in 1939. >

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MASSIVE PASSIVE STEREO TUBE EQ



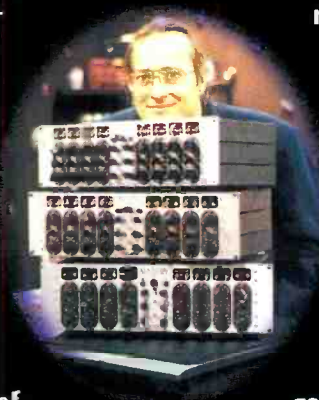
A PICTURE IS WORTH A THOUSAND WORDS...

Perhaps, but would photographs of our Variable Mu or VOXBOX have created their successes alone?

You have to hear this gear. You have to use this gear. Put your hands on the knobs and crank 'em.

Engineers who have already gotten hold of the MASSIVE PASSIVE have told us: "Why does it make everything sound so much better?", "It's organic and orgasmic.", "It's a f%#king powerhouse.", "It's unlike any other EQ.", "This is IT. The sound I've always dreamt of but couldn't ever get until now."

GOT THE PICTURE?



Craig 'HUTCH' Hutchison designed these monsters...

The MASSIVE PASSIVE is a two channel, four band equalizer, with additional high pass and low pass filters. "Passive" refers to the tone shaping part of this clever new EQ design not using any active circuitry. Only metal film resistors, film capacitors and hand-wound inductors sculpt the sound, kinda like a Pultec EQ on hyper-steroids. Super-beefy, hugely-high-headroom Manley all-tube make-up gain amplifiers deliver your tunes into the next realm. You'll need to experience this.

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MANLEY




for domestic use
 🎵 Led Zeppelin release *Physical Graffiti*, the first LP on their Swansong label
 🎵 Wings record *Venus And Mars* in New Orleans
 🎵 Appie Records dissolved
1976
 🎵 'Anarchy in the UK' and famed 4-letter TV appearance by young combo known as The Sex Pistols
 🎵 'Bohemian Rhapsody'
 🎵 The Who and Little Feet play in the rain at Charlton FC
 🎵 *The Song remains The Same*: Led Zeppelin
1977
 🎵 First digital recordings in the US
 🎵 And what were you doing on August 16th, the night the King died?
 🎵 Marc Bolan's Mini hits a tree on Barnes Common
1978
 🎵 Philips Industries announce Compact Disc concept
 🎵 *Star Wars*: Surround sound returns in style
 🎵 Record companies claim 'Home Taping is Killing Music'
1979
 🎵 World recession hits record sales
 🎵 First digital recording manufactured in UK is Decca's 2-disc set of live classical recordings from Vienna
1980
 🎵 John Lennon shot in New York
 🎵 *The Blues Brothers* movie premieres in Chicago
 🎵 Pink Floyd's *Another Brick In The Wall* banned in South Africa
1981
 🎵 It's goodnight to

< **6A** thirties film called *Comradeship* dealing with a mining disaster and how the French and German mining communities assisted each other, despite the traditional enmities.
 9 The Neumann U47 mic, a classic that was introduced in 1949 and remained a standard item until 1965.

 **Bill Tesar, The Toy Specialists**

- 1 Marconi.
- 2 Edison.
- 3 The Microphone.
- 4 *Trout Mask Replica*.
- 5 *War of the Worlds*.
- 8 The first telephone conversation.
- 9 Ham Brosious.

 **Neil Hillman, Pro-audio journalist**

- 1 John Lennon. Any man who is sufficiently moved to return his MBE to Her Majesty the Queen, Elizabeth II due in part to his single 'Instant Karma' slipping down the charts; engages a percussion section based on a hotel wardrobe door or quotes Chairman Mao during an intro, warrants a stab at this title. And there were one or two significant and hummable tunes attributed to him too.
- 2 Sir George Martin.
- 3 Magnetic audio tape and the SelSync record head.
- 4 *Pepper's Lonely Hearts Club Band*, 1967. After 3 months apart from each other, they returned to their familiar Abbey Road studio with anything but more-of-the-same in mind. The result was an album quite unlike anything that had gone before, both technically and artistically.
- 5 Apollo 11 broadcasting from another planet. Neil Armstrong's scripted and well-rehearsed 'one small step for man' speech live from the moon. Or was it the rather more closer Mojave desert?
- 6 *The Jazz Singer*. Overnight, cinema pianists were thrown from the theatre pits into the bleak new world of the talkies, wrapped only in old music sheets to keep them warm.
- 7 Macleans toothpaste. The first commercial on British television.
- 8 Band Aid. Just for a while, it really did seem like rock 'n' roll could save us. My fondest memory of that event is of the label on the audio distribution amplifier at the rear of the Outside Broadcast compound that simply read 'Feed the World'.
- 9 Alan Dower Blumlein. He built and applied new techniques to the use of microphones; designed a lateral disc-cutting system that enabled the production of modern records in a way that continues today; made possible much of the 405-line high definition television system that continued to be broadcast in Britain until 1986; improved radar systems to the extent


that they were still fully operational 40 years later and developed stereophonic sound to the point where neither the company he worked for, or many of his colleagues, understood the complexities and possibilities of his system until a decade and a half after his death. Even now, it is hard to get producer's and director's to embrace the essentially simple concept of Blumlein's M+S stereo system; a wonderful tool for modern location production and the *de facto* preferred method for most location recordists. During a working life of just 15 years, Blumlein either wrote or cowrote 128 patents: a rate of one for every 46 days of his career many of which became elegant standard circuit configurations for a host of applications. In short, there was seemingly not one area that he turned his attention to


9 Ray Dolby (standing for continuous developments of major improvements and standards in recording technology).

 **Simon Blackwood, Focusrite**

- 1 Sir George Martin. Aside from the Beatles, the success of the diverse range of the other work he has recorded reflects genius rather than a single dimension.
- 2 Rupert Neve. Well aside from the natural biased pitch, no one person has had such a continuing influence over our business for such a long period of time. He taught us that it is not the specs, but how they sound that really counts.
- 3 Pro Tools. Releasing incredible power-performance/price, a whole new revolutionary way of working.

The Audio Century





Michael Gerzon
Mathematician

INVENTOR and mathematician Michael Gerzon died at the age of 50 leaving a legacy of insight and innovation, and a generation of friends and admirers. An Oxford University graduate, Gerzon was to spend some 20 years as a consultant after working on early surround sound (SQ) systems at CBS. A regular and recognisable presence at AES shows, Gerzon's expertise in mathematics and his enthusiasm for sound recording and his aptitude for psychoacoustics saw him involved in a variety of ground-breaking projects and registering a large number of patents. His death in 1996 was a great loss to the recording fraternity.

that went untouched by his brilliance.

 **Reiner Oppeland, Bauer Studios, Germany**

- 1 Clive Green of CADAC, the grand seigneur of mixing consoles
- 2 Pop: Alan Parsons. Jazz: Prof. Carlos Albrecht. Historically: Mr Blumlein.
- 3 Sony's PCM line of recording equipment, starting the all-digital era
- 4 Beethoven's piano Concerto No.5, recording of early 1943 at Berlin Radio Hall, as included in the 50th Anniversary of Stereo CD issued by the AES
- 8 Two jumps—the public introduction of stereo LP records in late fifties—the introduction of the CD.

- 4 *Dark Side of the Moon* (a personal thing really—time and space!). As far as I am concerned the first album that was not aimed directly at the Top 40 that made the Number 1 slot for what seemed to be the whole of my adolescent years. Still play it today!
- 5 'Small step for a man a giant leap for mankind' A voice from another planet.
- 6 IMAX. *The Blue Planet*. High definition view of the bubble we live in.
- 7 The first one (before I was born). Creating a whole new way of communicating to customers.
- 8 The CD or MP3. Revolution. CD is a whole new media that allowed recordings to last 'forever'. MP3. >

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Q2

sometimes analogue is

the right solution

1998 saw Calrec introduce two new digital consoles, emphasising Calrec's commitment to a digital future. However Calrec recognise that for many applications an analogue console is the right solution. That's why Calrec still supply a full range of high performance analogue production and on-air consoles to broadcasters world-wide.

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Bill Haley: still touring almost until the moment he died

- ★ Worldwide TV audience of 35 million for Rod Stewart live TV broadcast from LA
- 🎵 Simon & Garfunkel re-unite for Madison Square concert
- 1982**
- 🎵 The Philips CD launched in Japan by CBS-Sony
- 🎵 Michael Jackson's *Thriller* starts breaking a few (sales) records
- 🎵 Jamaica World Music Festival in Montego Bay
- 1983**
- 🎵 European launch of CD in the UK, West Germany, France and the Netherlands
- 🎵 The stars turn out for Ronnie Laine's benefit concerts
- 🎵 Black Sabbath headline at Reading
- 1984**
- 📀 Apple Macintosh released as 'the computer for the rest of us'
- 🎵 Release of Do 'They Know It's Christmas' by Band Aid
- 📀 Philips and Sony introduce CD ROM
- 📀 ISDN suggested to replace Public Switched Telephone Network
- 1985**
- 🎵 Live Aid at Wembley and JFK Stadium Philadelphia raises over £50m for the starving in Ethiopia
- 🎵 Deep Purple headline at Knebworth
- 🎵 Paul McCartney's *19*, Dire Straits' *Brothers In Arms*
- 📀 Integrated Digital Access service from BT
- 1986**
- 🎵 Dolby Spectral Recording (SR)
- 🎵 Second Digital

< A return to innovation and choice —changing the established order.

9 Rupert Neve.



Phil Dudderidge, Focusrite

- 1 Rupert Neve, for having the audacity to put his name on his product.
- 2 Willi Studer (for defining a professional quality standard and for the same reason as (1)).
- 3 The loudspeaker—what would we hear without it?
- 4 *Sergeant Pepper*—changed my life (yours too, probably).
- 5 (UK) *The Goon Show*—the prototype of alternative radio humour (with sound effects). (US) HG Wells—*The War of the Worlds*—drama so real people committed suicide.
- 6 *2001—a Space Odyssey* (so stunned I didn't speak for 20 minutes afterwards, which was weird for a first date!). Outstanding soundtrack.
- 7 THX commercial at the cinema—wonderfully, sonically demonstrates its own proposition.
- 8 Pink Floyd performing *Atom Heart Mother* at the Roundhouse in quadraphonic (circa 1971).
- 9 RCA microphone (you know the one).



Harold Viering, Otari Europe

- 1 Undoubtedly Bing Crosby. He is said to have stimulated and triggered the development of the world's first analogue 16-track recorder. In those days 8-tracks and some funny 12-track experiments were reality, which caused 3M, long before Studer and AEG, to develop and manufacture this machine.
- 8 Introduction of 3M's world wide first digital multitrack DMS-32 (1979), and the first digital multitrack sessions with PolyGram Classics and Herbert von Karajan and also Boney M (Frank Farian).



David Hawkins, Eastlake Audio

- 1 Has to be (from the mildly biased perspective of someone who considers him to be the Professor Alexander Fleming of applied acoustical science) Wallace Sabine, the American physicist. Early in the century, Sabine started rational scientific examination of why some musical venues sounded wonderful but many others were dreadful. In so doing, he identified the building blocks of acoustical performance, defining measurement units still in use today and devising ingenious measuring techniques.
- 3 The original fifties (I guess) Ampex recorder that first permitted over-dubbing. The standard of musicians' play may have stayed higher if it had never come to pass but our musical repertoire would be enormously diminished.
- 4 *Sergeant Pepper*.

- 5 *War of the Worlds*. What a wonderful chaos-generating scam.
- 6 Has to be *The Jazz Singer*, the first to have synchronised sound carried on the same piece of celluloid as the picture, though it did put thousands of pianists out of work.
- 8 When the recording engineer climbed out of the primeval ooze to become a recognised and significant contributor to the creative process.
- 9 Valdemar Poulsen, the Danish engineer who invented magnetic recording (the recordings were made on wire by a machine he called the 'telegraphone') just before the start of this century, but whose work continued over into this century. Without him we might well be recording straight onto wax-covered cylinders or shellac-covered discs!

- 4 Queen's 'Bohemian Rhapsody'. Okay, it was made at The Roundhouse so I have a vested interest, but I thought that for the first time real music (and at some length) entered the charts. I still listen to it with amazement.
- 5 The Gulf War coverage. It changed war. It changed the world.
- 6 *Pretty Woman* with Richard Gere and Julia Roberts. I love this film. I only wish they made more like it. Give me a good story and good acting in preference to special effects every time.
- 7 'Drink a Pint of Milk a Day'. I'm on a low-fat diet these days and I'm amazed that such an effective campaign (the epitome of the short slogan—every song should have one) would not perhaps even be allowed today (I only drink skimmed milk now—ugh).
- 8 The birth of tape recording.

The Audio Century



Valdemar Poulsen
Inventor

POULSEN began his experiments in magnetic recording while working for the Copenhagen Telephone Company. His research led him to exhibit his wire recorder at the

Exposition Universelle in Paris in 1900. The immediate reward for his efforts was the Grand Prix de Paris, but there was more to be done to secure his place in history. In 1902 he founded the American Telegraphone Company through whose mixed fortunes he furthered his work. In 1907 his efforts were recognised with the Gold Medal from the Danish Society for Science and 1909 saw an honorary degree from the University of Leipzig. He died in 1942.



Gerry Bron, Gerry Bron Management

- 1 Nipper—HMV dog
- 2 Sir George Martin. An obvious choice perhaps, but I knew George long before the Beatles and always thought that he had something no one else has. And he's a gentleman.
- 3 Multitrack recording. Les Paul was probably the first. I always remember the first time I used stereo as a 2-track machine and then 4-track. That was really something. I also remember saying that it would be impossible to mix 24 track without two engineers. I was probably right as SSL hadn't started.

I remember seeing the first wire recorder at school. We've come a long way very quickly since then (I'm not that old).

9 Abbey Road Studios. I live round the corner. They still congregate outside every day.



Ken Townsend MBE

- 1 They don't come much more significant than Luciano Pavarotti. One of the Greats who helped break down the class barriers which existed between popular and classical music. On the engineering front, my vote goes to Keith Grant—a man of similar pro- >

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Choosing the right audio Codec.



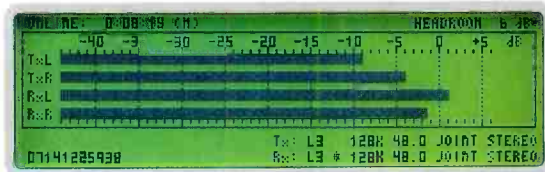
The Dialog4 MusicTAXI range is one of the most comprehensive codec packages on the market today. It contains all the standard ISO/MPEG audio coding algorithms in common use today such as Layer 2 and Layer 3, as well as CCITT G.722 for high grade voice bandwidth connections, and G.711 so it can talk to a plain old analogue telephone line, too. Connectivity features include upto three ISDN terminal adapters and X.21 port, for operation up to 384kbps. Dialing is quick and easy using the 96 entry directory.



The range of network protocols included means that it can be taken to virtually any part of the world. In the studio the audio i/o can be analogue or digital (AES/EBU & S/PDIF interfaces are both provided). The aux data channel enables embedded control data to be sent alongside the audio, and the unit can be controlled remotely from a PC or the external Remote Panel if desired. Most importantly automatic sensing of the codec at the other end of the call means that it sets itself up to communicate with the most commonly used systems in use today, i.e. Telos Zephyr, CDQPRIMA, Glensound and



others without complicated manual programming. Operationally the buttons are large and straightforward to use, while the illuminated LCD display gives a clear indication of what is going on at all times. No noisy internal cooling fan to worry about in quiet studio conditions. The Remote Panel can control a MusicTAXI from over 500m away via the RS422 interface. The online menu indicates online time, send-level, receive-level, adjusted headroom, Rx and Tx audio configuration, SYNC flag of MusicTAXI at the other end.



Tapeless recording and transmission on the spot is the answer to the enhanced requirements of correspondents. The CTAXI is the solution and is set to become the standard for mobile recording and transmission, because it satisfies the users demand: stereo recording, editing, file-transmission to computers, realtime-transmission to all well known codes. The CTAXI is, of course, child's play to operate. You can use it as telephone, walkman, audio recorder, mobile editing station, transmission device. The size is as small as today's cutting



edge technology allows: 58 x 239 x 150 mm, the weight is 1150 g including 2 x Li-ION batteries. The charger is inbuilt and allows uninterrupted operation. PCMCIA flash cards or hard drives can be used for stereo recording. BWF format is supported.

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< portions and outrageous clothes.

2 Colin Saunders for dreaming up the SSL console, getting it into production, selling it around the world, and providing excellent backup service, while remaining a really nice guy. Sadly missed.

3 The tape machine ranks as the most significant product of the 20th Century, transforming direct to wax in the first 50 years to sophisticated multi-channel techniques in the second half of the century. A close call between the BTR2 and the Studer J37 as my particular favourites.

4 To say *Sergeant Pepper* would indicate bias, so I am opting for *White Christmas* from Bing Crosby as a truly remarkable recording in its era.

5 The broadcast on 3rd September 1939 to say we had declared war on Germany ranks as the most significant of all time, with obvious implications for almost the entire population of the world.

6 The first film I saw was *Snow White and the Seven Dwarfs*. My seven granddaughters have all watched it with sheer delight when very young. It gets my vote for the pleasure it has given to children.

7 The majority of commercials however seemingly clever have no relationship to what they are supposed to be selling and so I rarely remember the product. So for me it's John Smiths Hamlet cigars running a close second.

8 Organised chaos is the only way to describe the BBC. Our World first ever satellite broadcast linking five continents on Sunday, 25th June 1967. To me the defining moment was the successful transmission of 'All You Need Is Love' live with The Beatles from Studio One at Abbey Road.

9 Most pop artists lose their fan base as somebody new comes along. Not so Sir Cliff Richard who since 1958 has deservedly achieved Icon status with his many loyal fans as his recording career now spans over forty years. Even I felt quite young when at the last concert I saw Cliff in Birmingham some of his supporters arrived with zimmer frames, but he continues to inspire them as only a true Icon could. Well done Cliff.

Jerry Boys, Livingstone Studios

1 Rupert Neve for maintaining the concept of audio excellence for the last 30-40 years.

2 Geoff Emerick for being the major force behind the idea of using the studio as a creative tool through his work with the Beatles.

3 SSL E-series for bringing mixing into the computer age.

4 *Sergeant Pepper's Lonely Hearts Club Band*—just brilliant.

8 Band-Aid—because it showed we care.

9 Neumann U87/67. It is still after more than 30 years the best all-round microphone at any price.



Frank Hund, Creamware

1 Uli Behringer, the person with the highest impact on driving the market towards affordable quality.

2 Peter Gabriel.

3 The PC-Mac computer, the most powerful tool in audio history.

8 Broadcasting—created communication and was primary momentum for change of the social role of music.

9 The guitar—the symbol of a new culture of the 20th century.



Dave Harries, APRS

1 Sir George Martin. My mentor for 35 years, producer of some of the greatest recordings of the 20th Century, president of the APRS, great sense of humour and still going strong.

2 There are many—Colin Saunders, Bob Harrison, Rupert Neve, Alan Blumlein. But the most significant must be Ray Dolby whose foresight shaped the sound recording and cinema sound industries.

3 Again, there are several products that can be said to have shaped the direction of the audio industry. The Sony 48-track, AMS AudioFile, EMI BTR2, the Nagra portable, Neve Necam, but tops must be the SSL desk with automation and total recall.

4 A difficult choice. A contender must be The Beatles' 'Let It Be' recorded on the roof of the Apple Building because it was their last concert and I was there. If you'd had a most significant concert category, this would be the one. Top recording, though, must be Solti's amazing recording with the Vienna Philharmonic of Wagner's *The Ring*, recorded by Decca in the early sixties.

5 Probably 'All You Need Is Love' by the Beatles, broadcast live on worldwide television via satellite from Abbey Road.

Star Wars with John >

Information

Exchange in London

Paul Simon's *Graceland*; Andrew Lloyd Webber's *Phantom of the Opera*

Digital telecoms networks begin to appear

1987

Digital Audio Tape (DAT) players-recorders developed
Philips introduces CD-Video

Record industry gets upset over supposed threat of DAT

1988

Neve, Mitsubishi, SSL and Sony announce digital standards initiative

Mandela Day at Wembley Stadium is world's biggest concert since Live Aid

APRS hosts a 'tape-less' recording forum in London

1989

First appearance of ground-breaking sound restoration system from CEDAR

Satellite television is broadcast direct to UK homes via satellite dish decoders

High-definition TV broadcasts start in Japan

Duran Duran inaugurate London Arena in Docklands

Mick Fleetwood and Samantha Fox host memorable BPI Awards

1990

BBC introduces a digital stereo sound system (NICAM)

Siemens Austria buys AMS; AKG buys Quested Monitors and Edgetech

1991

Formats battle between MiniDisc and DCC comes

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SPECIFICATIONS: Amplifier power: 250W rms/ch, 400W (100ms peak). Peak acoustic output: 117dB SPL (100 ms pink noise @ 1M). Residual hum/noise: ≤ 10 dB SPL (A-weighted @ 1M). THD @ 90 dB SPL: $< 0.4\%$ (100Hz - 10kHz @ 1M). Response ± 2 dB (1/3 oct. swept noise): 48Hz - 20kHz @ 1M, 45Hz - 20kHz @ 2M. -6dB LF cutoff: 40Hz. Control Amp Dimensions/Wgt: 3.5" h x 19" w x 10.75" d (2U), 42 lbs.



SYSTEM: Type: Modular, active near/mid/far-field monitor. Configuration: 2-way acoustic suspension. Woofer: 6.5" treated paper. Tweeter: 1" metal dome. Magnetic Shielding: Partial. Monitor Dimensions/Wgt: 14" h x 7.5" w x 11.9" d, 17 lbs. Monitor Enclosure Materials: 3/4" mdf w/HP laminate. FEATURES/CONTROLS: Connectors: Input: XLR, TRS. Output: XLR. Controls: Input sensitivity: -10, -3, +4, +11, ∞ dBu. Listening proximity: 5 position (near/mid/far). Boundary proximity: 5 position (0, 1, 2)

A-20 Everything, as in every single thing, about the A-20 points to the concept of unmitigated clarity and razor sharp reference – revealing every nuance in detail, in balance and in sonic image. The amplifier is a horse (check out those specs), and due to its outboard nature, there is more efficient heat dissipation and head room than when crammed inside a more conventional wood-based monitor enclosure. Moreover, this puts acoustic controls and diagnostics within your fingers' easy reach. Incorporate some of the finest drivers made and the result is a monitor that not only helps make each session as predictable and repeatable as humanly possible, it makes for a recording that is cut with considerably more precision than any previously known.

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into the open

Industry statistics report CD sales overtake audio cassettes

'Multimedia' is on the march

Freddie Mercury dies from Aids

1992

Audio Codec developments make possible the transmission of high quality audio over ISDN

Digital Compact Cassette (DCC) introduced

All and sundry celebrate 25th anniversary of release of Sgt Pepper's Lonely Hearts Club Band

MIDI Music Show in London attracts big crowds

Mitsubishi quits pro audio

1993

US government allows Internet to carry commercial traffic

Worldwide standard for digital television agreed at meeting in Sydney

Loudspeaker designer and industry personality Dave Martin goes missing

European Community declared

< Williams and the London Symphony Orchestra's amazing soundtrack recorded by Eric Tomlinson. This was the first film to so successfully use Dolby Surround and marked the beginning of the resurgence of the cinema industry. It was a good film and technically brilliant.

7 Don't know. Maybe Heineken, the beer that refreshes the parts that other beers can't reach, or Hamlet Cigars. Jacques Lousier plays Bach.

8 Probably the formation of the APRS in 1947, the world's first trade organisation for professional recording studios, followed by the opening of the first APRS show in 1967.

9 Alan Blumlein's 'Walking and Talking' stereo discs and films produced in the thirties.



Tim Goodyer,
Studio Sound editor

- 1 Madonna. Queen of reinvention.
- 2 Prince. Does things I would not.
- 3 The Internet. The future of media.
- 4 Owner of a Lonely Heart. Common affliction; uncommon production.
- 5 Hearing 'I love you, my sweetheart' over the telephone.
- 6 Forbidden Planet (1954). First screen robot; first electronic soundtrack.
- 7 Cadbury's Flake. Oral sex before the watershed.
- 8 Being bought 'I Wanna Hold Your Hand' as a first single. Thanks, Dad.
- 9 Nipper. Sitting on His Master's coffin.



John Hutchinson,
MCPS-PRS Alliance

1 Akio Morita, whose simple request to his staff for a device which allowed him to listen to music while moving around led to the invention of the Sony Walkman—and sparked a huge global cultural change in how music is thought about and used by consumers. He was also a quiet but towering figure in the development

of the consumer audio business generally, and so greatly influenced the music industry itself (and he latterly bought a chunk of it in CBS, of course).

2 Emile Berliner, the inventor of the flat disc recording process. Edison's phonograph (cylinder) really had no commercial future, and was something of a dead-end technology—and significantly Edison himself only ever

stereo recording and set a standard for audio carriers that lasted through shellac, vinyl, CD.

3 The radio microphone transformed stage performance (as well as making it a lot safer) and radio-TV news reporting.

4 Sergeant Pepper's Lonely Hearts Club Band—which changed the rules for recording.

The Audio Century

10



Les Paul
Guitars and multitracks

SYNONYMOUS with a certain elegant and aspirational solid electric guitar, his name is mentioned with reverence by players every day. Few will also know that he is widely regarded as the father

of multitracking having pioneered the practice with an ad hoc but ingenious arrangement that is apparent in his early recordings. His input spurred manufacturer multitrack development, much as it did with guitars, and he has remained involved through what has been by any standards a remarkable and long career. Honoured by the AES and he still comes to the shows.

thought it would be an office dictating machine! He never envisaged an entertainment function. It was Berliner's disc concept that led directly to a commercial, mass produceable music product, then to

5 Winston Churchill, June 1940: '...we shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and streets, we shall fight in the hills; we shall never surrender.'

6 The Jazz Singer—the first talkie >

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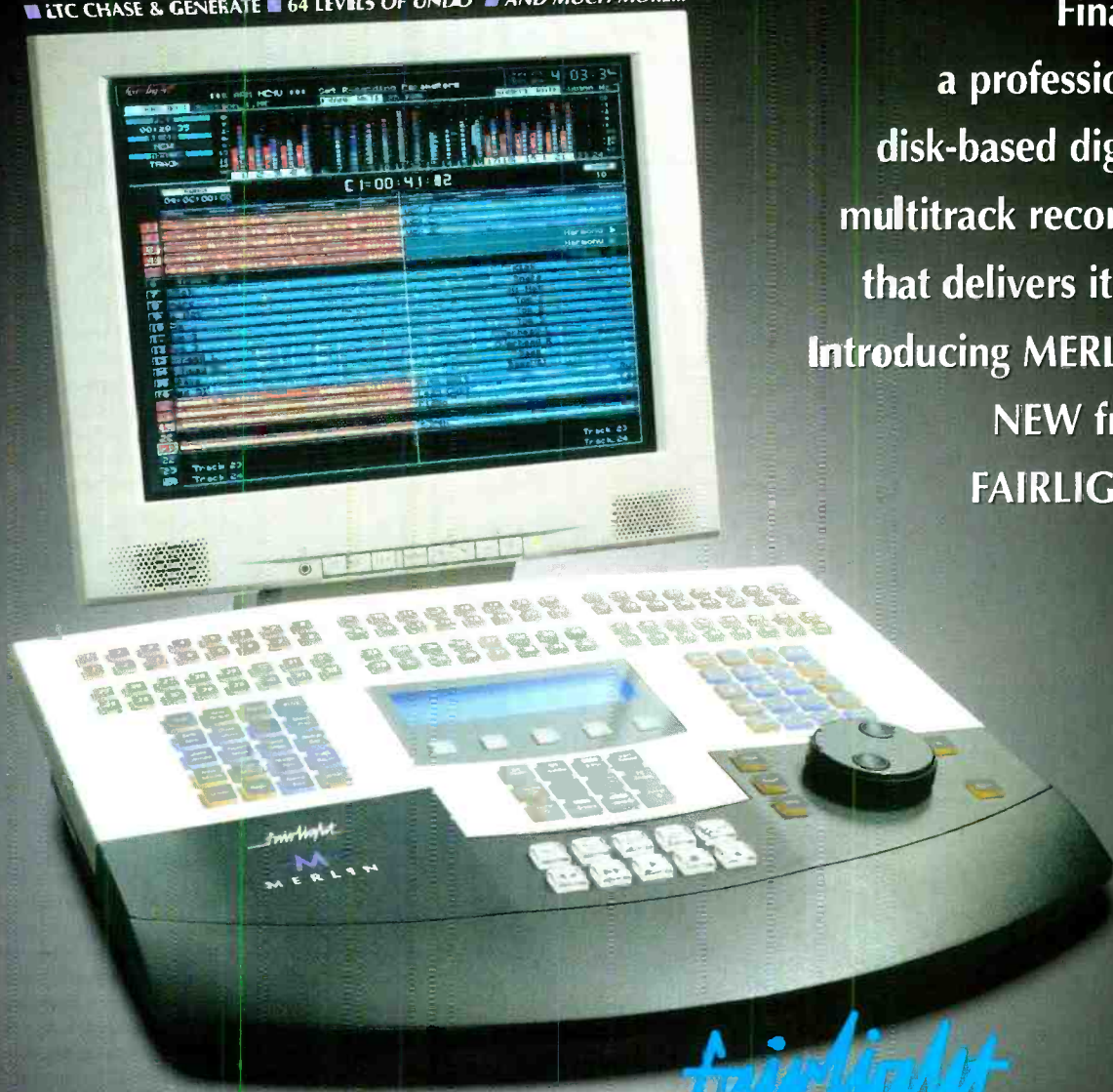
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a single market

1994

★ Digital developments abound
 📍 In-ear monitoring becoming increasingly popular

📍 London's Town House installs the 1,000th SSL console
 📍 Trident Studios celebrates its 25th anniversary

1995

📍 More digital desks at the 98th AES show in Paris
 📍 Following EMI and Virgin merger the much-loved Manor Studios closes for business

🎵 Final recordings of Glenn Miller are unearthed, dusted down, remastered and released as a double CD

📍 Intel Pentium Processor

1996

📍 Abbey Road Studios opens dedicated multimedia division in alliance with Apple Computers
 📍 Europe's first DVD mastering suite opens in Uden, Holland
 📍 Russian pro audio

< and a musical.

7 Coca Cola: 'I'd like to buy the world a coke'. It was one of the first examples of a big pop hit linked with a TV commercial, as well as being a great song.

8 Owner of a Lonely Heart by Yes. It was widely regarded among top record producers as the best production ever—by Trevor Horn.

9 Nipper.



Robert Orban, Orban

1 David Sarnoff, who brought radio into every living room in the United States through the Radio Corporation of America.

2 Sir George Martin, who, along with the Beatles, redefined the structure of pop-music production.

3 The Ampex Model 200 magnetic tape recorder (and its immediate successor, the Model 300), it redefined the level of quality in sound recording.

4 This is a matter of taste. I would have to say conductor Georg Solti's 1957(?) recording of Wagner's Das Rheingold on London-Decca (produced by John Culshaw), which first opened the world's eyes to the possibilities of stereo as an artistic medium (and was also an exemplary performance).

5 The live television coverage of John F. Kennedy's assassination, which brought the United States together as a single community in a way that has never occurred before, or since.

6 Citizen Kane (what else?), which redefined the entire grammar of the sound film.

7 The anti-Barry Goldwater commercial in the 1964 campaign for the US Presidency, showing a little girl holding

a daisy, with a nuclear explosion in the background. This was the defining commercial in the technique of 'negative campaigning', which, regrettably, has driven out thoughtful discussion of issues in American politics.

8 Franklin D. Roosevelt's 1941 radio speech to the nation regarding the bombing of Pearl Harbour that brought the US into World War II: 'A day that will live in infamy'.

9 Leopold Stokowski, the charismatic conductor who first married recording technology and classical music (and who starred in Disney's *Fantasia*).



Richard Hulse, Radio New Zealand

1 Rupert Neve.

2 Sir George Martin.

3 The multitrack recorder and the Digital Audio Workstation.

4 Sergeant Pepper.

5 Live Aid.

6 Star Wars Episode IV.

8 Orson Welles' broadcast of the War of the Worlds.

9 The 77DX mic.



Colin Pringle, Studio Sound, formerly of SSL and AMS Neve

1 I am going to say Colin Saunders because he was significant for both the industry and for me personally. He managed to create a product and a business which could satisfy individual needs yet still achieve many of the quality controls which are sometimes not available for customised products. He, or at least the SL4000, really did set a standard for mixing consoles at the time when multitrack projects became more complex. The SL4000 was the enabler and became the basis for the careers of many of the indus-

try's engineering craftsmen.

2 There is a wide choice available, thankfully, of those whose work I continue to admire. Bob Clearmountain and Hugh Padgham have certainly done more than anyone else to elevate mixing both as a craft and in the public's awareness. I admire the exceptional recording achievements of George Massenburg and Ed Cherney. But there are many others whose output never fail to impress: Frank Filipetti, Kevin Killen, the Lord-Alge brothers, Eliot Scheiner and many others. Among producers, I believe Phil Ramone's prodigious and varied output is marvellous, and Don Was, and Daniel Lanois have an ability to influence the whole creative process in a significant way. Enough.

3 The tape recorder—or perhaps the multitrack recorder. It all starts with what you put on tape.

4 Music is significant. Recordings are good, bad or indifferent. If you are looking for significance, perhaps the speeches of Martin Luther King?

6 Pee Wee's Big Adventure. Saving Private Ryan had some amazing audio.

8 All those moments when the second engineer forgot to record the run-through.

9 Near impossible. I'd have to go for Les Paul.



Bert van der Wolf, Kompas recording, The Netherlands

1 Thomas Edison. Where would we be without him?

2 Raymond Scott, almost unknown, but 20 years ahead of his time.

3 Microphone, everything else would be useless without it.

4 Hmmm, I wouldn't know... So >

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advances with staging of Moscow Music

1996

Copenhagen hosts 100th AES convention

1997

There are now 75m Internet subscribers. By 2002 there are likely to be 400m. Over the same period the number of mobile phones will have increased from 250m to 700m

Elton John's Diana tribute 'Candle in the Wind 1997' is recorded, mastered and despatched within a record 48 hours. It will go on to be the biggest seller—ever

1999

Solid State Logic celebrates 30th anniversary
 Digital television becomes a reality
 MP3 files cause copyright controversy
 David Bowie's latest album *Hours* only downloadable from the internet.
 Britpop Blur satellite music to Mars for 2003
 Millennium Fever

- < many good examples. Capitol series from the fifties are great... Sinatra...
- 5 Orson Welles, *War of the Worlds*. Scary shit for people in those days.
- 6 *Star Wars* was pretty amazing for it's time I guess.
- 7 Coca Cola in all its appearances. The bottle is a masterpiece.
- 8 The moon landing: 'A small step for a man, a giant leap for mankind'.
- 9 Nipper: His Master's Voice.



John Grove, IBS

- 1 Rupert Neve.
- 2 Ray Dolby.
- 3 The compact disc.
- 4 'Magical Mystery Tour'. The Beatles.
- 5 Live Aid.
- 6 *Brazil*.
- 8 The sound of the church bells, when Diana's funeral cortege left Westminster Abbey.
- 9 The audio cassette.



Guy Fletcher, British Academy of Composers and Songwriters

- 1 Joe Meek. The first engineer I ever worked with, and, even by today's standards, the best.
- 2 Too many to choose from, but a toss-up between Joe Meek and Geoff (Sergeant Pepper) Emerick.
- 3 The *Nightfly* album by Donald Fagin, one of the first all-digital recordings—just great!
- 4 The Beach Boys *Pet Sounds*. It showed us what could be done with good vocal arranging and unconventional recording techniques.
- 5 Live Aid—An amazing technical triumph and not a bad sound balance either!
- 6 *Star Wars*—broke all the moulds.
- 7 Ridley Scott's Hovis commercial.

- A perfect match of picture and score in 30 seconds.
- 8 The small step for man message sent from the lunar surface—crap quality, but certainly an important moment.
- 9 Rupert Neve—For giving us the best desks in the world during the rock and pop revolution—reliable, music-friendly and durable.



Morten Stove, DPA

- 1 Ole Brøsted Sørensen. This guy is an audio guru. He can calculate faster than a PC. He is too modest to get a load of publicity, but he can talk audio from any view point. Not only has he invented some great microphones, but he also is a great musician.
- 2 Sir George Martin.
- 3 Well that could be the copper wire, without it none of the audio products would work.
- 5 This must be the broadcast of Armstrong walking on the moon, no competition.
- 6 *Wizard of Oz* in 1938. The film switched from white to colour in the middle of the movie when the invention of the colour film suddenly was a fact—and turned the story around it.
- 1 Sir George Martin, because he is synonymous for improving a piece of audio with every possible means to the maximum, always with regard to serving the final product
- 2 Gary Rydstrom, who is constantly pushing the frontiers of quality sound in the cinema and has been integral part (and of course still is) of some of the most successful films in history.
- 3 The first DAW. It really changed

- the possibilities, speed and degree of perfection achievable—the most significant all-purpose audio-tool.
- 4 The Beatles: *Sergeant Pepper*. A revolution in recording technique, miles ahead of its era, musically radical and inventive.
- 5 Landing on the moon 1969; brought everybody in front of the screen and every broadcaster available to work.
- 6 Nikita Mikhalkov: *The Barber of Siberia* (1999). The best audio work I have ever heard in a movie—wonderful European style (picture and sound); incredible detail, dynamics and above all always serving the product (Mixer: Vincent Arnardi).
- 8 Technically: the transition to digital in all aspects of production. Dramaturgically: the first film with sound 1927 and the first multichannel-film *Fantasia* of Disney.
- 9 Rupert Neve, stands for constant, life-long quest for best possible quality for our tools.



Alan Wick, Turbosound

- 1&2 Sir George Martin. I chose him for both categories because he uniquely combines top professional skills with actively making the public at large aware of the art of record producing and sound recording. I can't think of a better ambassador for our industry.
- 3 The fader. Whether round, linear, analogue, moving, digital or whatever (in other words the volume control), it remains the primary object of human interaction between artist and listener for all pro audio applications.
- 4 I know it's a cliché, but it has to be *Sergeant Pepper*.
- 5 The reading of HG Wells *War of*

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< the Worlds over the radio, because of the effect it had on the listeners at that time.

6 Earthquake. It was, I believe, the first time audio in general, and loudspeakers in particular, were given prominence in the film industry.

7 The first talkie movie.

9 I can't decide between (a) the original His Masters Voice logo, (b) the classic Shure table microphone used by so many USTV interviewers or (c) the Fender Stratocaster.



1 Rupert Neve. It's not because he is the greatest or the cleverest or the most successful or even the most innovative; it's because over a major part of the years of pro-audio development, he has been there and done it. In the early days he had his business problems (don't we all) and it does look as though he has had at least nine lives. Neve as a console manufacturer in the late sixties and seventies, was the undisputed leader and his name became a byword. Later, maybe like some others of us, Rupert could be accused of reinventing himself every 12 months, but the man is a gentleman and I don't blame him!

2 Sir George Martin. The only man in the world to actually get an audio silk purse out of a sow's ear. Controversial! When George took them

on the World's most successful band were hairy lads from Liverpool with lots of 'talent' but no 'greatness'. George transformed them into not only a hit record machine, but also into individual musicians and people of depth and ability.

3 Dolby. We tend to forget the horrors of audio noise and how Ray obliterated it with his psychoacoustics-based electronics. After a patent application at the end of the thirties, his thinking has reverberated throughout the industry.

4 Dunno, there are so many, personally if I had to choose one record that influenced me more than any other, it would be 'Pinball Wizard' by The Who.

5 This has to be Live Aid. It pulled together all the disciplines of recording, stage and broadcast... and they very nearly got it perfect! I still think that Fred's (Mercury) contribution was one of the greatest pieces of television ever shown; rivalling the 1952 coronation!

7 The Plasticine commercials that preceded Wallace & Gromit.

8 I ought to say, when 'Telstar' made number one in USA! But really, it was probably Orson Wells' War of the Worlds broadcast in the thirties.

It comprehensively demonstrated the power of audio.

9 If the icon is a thing, it's the Neumann U47 microphone. If it's a person, it's Willi Studer... The world would be a much poorer place without either of them. The U47 became the pattern for quality and has never been superseded, Studer's products became the standard for the finest in tape recorders that all others could only aspire to.



1 Willi Studer, because he had a dogged determination to set a benchmark for quality. His multitrack tape machines are still running well 25 years after they were manufactured.

2 Ray Dolby because his companies products span all aspects of professional and consumer audio. Most significantly his contribution to vast improvement in sound quality for films.

3 AMS Audiofile. Because it was the first to establish nonlinear, non destructive editing. Many have copied it since, but the product remains a standard in postproduction.

4 Sergeant Pepper, first extensive use of multitracking.

5 Telstar satellite and the start of worldwide live broadcast.

6 Lawrence of Arabia, first established use of surround sound in cinema using 70mm and 6-track magfilm.

7 Levi jeans, because of the Muddy Waters soundtrack.

8 The first BBC radio broadcast. It started a media that has influenced and shaped world events.

9 If you restrict it to the pro-audio establishment, I guess it would have to be Rupert Neve.



1 Les Paul, inventor, pioneering user, and promoter of multitrack recording (not to mention a great guitar player, songwriter, and entertainer)

2 Sir George Martin (creative, experimental, prolific, in the right place at the right time).

3 First commercially produced Ampex tape recorder.

4 Beatles' Sergeant Pepper (woke up an entire generation to the creative possibilities of the recording studio).

5 One small step for man, one giant leap for mankind!—not sure what kind of mic Armstrong was wearing.

6 Star Wars (brought multichannel sound back to film) >

The Millennium Questions. The most significant... **1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.**



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The Millennium bug ate my girlfriend

"I had toyed with the idea of going digital for a decade, more or less, so when the world stopped still for Blair's Millennium, it seemed a good way to fill the endless tedium of life, the universe and everything. AND SO... out went my faithful, outdated and obsolete analogue recording equipment, and in came a truck-load of cardboard boxes; computers, converters, hardware, software, overware, underwear, cables, tables and vegetables (or at least a fruity apple or two). Beam me up Spock, if it didn't look like the Starship Enterprise about to enter warp drive. So I turned on, tuned in and...crashed. After a day or two on the software helpline, I got through to a very helpful voicemail message guiding me to a website of adverts and a starting point of a learning curve that has been moving in a gradual downwards direction ever since. So now I'm three months in. Blair's still there, and I'm still here; desperately fiddling with digits, powering-up, backing-up and cracking-up. I've learned more than I ever wanted to know about computers, and forgotten most of what I ever knew about music (and certainly about soul...) BUT I do have two full minutes recorded (if I cut, paste and loop that should fill my first CD.) AND I have a room full of digital equipment worth fully 10% of what it cost three months ago. SO, - if you want to be a REAL COOL DUDE, follow me into the digital domain. If you want to be an analogue square, then HEY, THAT'S COOL TOO.



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< 7 'Plop, plop, fizz, fizz, oh what a relief it is'. Alker Seltzer.

8 Orson Welles' broadcast of HG Wells' *War of the Worlds* (demonstrated the power of audio to move people).

9 Same as 1, Les Paul.



Terry Marshall, DSP

1 If we are talking about people who have shaped audio engineering in some way then I would have to say Robin Geoffrey Cable. If we shifted towards the other side of the glass, then Les Paul.

2 Les Paul.

3 Must be the first multitrack machine: Ampex, 1-inch, 8-track recorder launched multitrack. I was going to say digital or the launch of the Compact Disc, but digital has made less of an impact than multitrack. Digital strives to become analogue anyway.

4 *Sergeant Pepper*—The Beatles.

5 'One small step for man...'

6 *Star Wars*.

8 When George and the boys used sound-on-sound bouncing techniques on *Sergeant Pepper*.

9 The RCA logo with the dog listening to His Master's Voice.



Ted Hayton, Warp Corporation

1&2 I have to vote for Sir George Martin. Not only has he been one of the most innovative practitioners in the last 40 years, he has also been the audio industry's leading ambassador.

3 This has to be the tape recorder.

4 I missed out on The Beatles (I was just too young and naturally hated anything my elder sister was into). It was Steely Dan's 'Can't Buy a Thrill' and 'Countdown to Ecstasy' that steered me into a career of going deaf for a living. In fact, it was the guitar riff that is right on the fade of 'My Old School' that did the trick. To me, these were seminal recordings, not only was the music exciting, the recording and production

were just out of this world. Gary Katz (producer) and Roger Nichols (engineer) were gods and I just wanted to get involved in making music in the way that they did.

5 This was a close run race for me between The Moon Landing, Live Aid, The assassination of President Kennedy and Orson Welles' radio broadcast of *War of the Worlds*. In the end I have chosen the assassination of President Kennedy because of the global impact it produced. I was just old enough to understand what had happened and I remember distinctly being huddled around one of the first TV sets in our village in Cumberland.

6 *The Jazz Singer* (1927) is without doubt an historic milestone film from the point of audio. Although this was not the first Vitaphone sound system feature, as we all surely know, this film heralded feature-length films where spoken dialogue was used as part of the dramatic action. The very first talkie film however, is an early one-reel Vitaphone short film entitled 'Al Jolson in A Plantation Act'. Jolson agreed to do the one-reel short and the film was shot during a rehearsal break for the 1926-27 tour of his Broadway hit *Big Boy*. The short premiered on 7th October, 1926 at the Colony Theatre, New York.

7 The Surfer: 'Good things come to those that wait' Guinness ad. This had every thing for me, style atmosphere and heavy branding... but then I like Guinness.

9 John Lennon.



Hugh Padgham, record producer and engineer

1 Les Paul—or one thing he invented multitrack recording, and secondly he invented the classic rock guitar. Those two things—and especially multitrack recording—have really helped shape the

sound of popular music.

2 Al Schmitt—I think he is the best overall engineer that there's ever been in terms of his ears and the quality of his recordings.

3 The multitrack tape recorder—until this existed you could only record things there and then. Its effect is evident in everything that I do as a producer and engineer.

4 Either 'Rock Around The Clock' or 'Heartbreak Hotel'. Each, in their own way, represent the beginning of rock music.

5 'All You Need Is Love' [Our World]. The first live global television broadcast.

8 The first 78 rpm record, whatever it was, that was available to the public. Either that or hearing Led Zepplin's debut album for the first time. That record just blew me away... It still does.

9 Rupert Neve—He has made fantastic-sounding equipment that everybody still really wants. Everyone in the recording industry knows and reveres his name.



Nick Owen, Soundscape

1 The guy who did The Beatles.

2 Bob Moog.

3 Synclavier.

4 *Dark Side of the Moon*.

5 Churchill's announcement of the end of WW2.

6 *Blade Runner*

7 Budweiser 'Frogs'.

8 The first 48-track tape machine.

9 Quincy Jones.



Karl Winkler, Neumann US

1 Rupert Neve. When he lends his name and/or design to a product, it has instant credibility.

2 Al Schmitt. With 7 Grammy awards, countless gold and platinum albums, a warm, genuine, personal-

ity, and the ability to work with all types of artists, Al is the ultimate engineer's engineer.

3 The Neumann U 87. 30+ years and still the No. 1 choice. Probably more vocal recordings are done with this mic than all other combined.

5 HG Wells, *War of the Worlds*.

6 *Fantasia*. The first time for stereo sound, and the first (and possibly only) film where music was central and the images were in support of the music. The imagination and influence of this film have never been equalled.

7 The Volkswagen ads of the late sixties and early seventies. These were some of the first ads which played to a lifestyle and created an 'image' of the Volkswagen owner that was different than reality.

8 The Berlin Olympics in 1936, the first wide broadcast of sound using condenser microphones—the Neumann CMV 3.

9 Georg Neumann. Developed the first commercial condenser microphone, developed multi pattern mics, developed remote pattern control on mics, built the first anechoic chamber, invented the pen recorder (forerunner to all modern plotters and frequency response plotters), developed phantom 48-volt powering, invented the NiCad battery, and famous products such as the U47, M49, M50, U67, KM 84, U87, all of which are still highly coveted today for their sound.



Mike Papp, Summit Audio

2 Dr Lee de Forest, inventor of the 'Audion Tube-valve' for the amplification of audio.

3 The tape recorder which allowed hi-fidelity recordings as well as the ability to edit sounds.

4 My personal favourite is *Sergeant Pepper's Lonely Hearts Club Band* >

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< by the Beatles, of course. The recording media itself becomes an artform. One must not overlook the early multitrack recordings by Les Paul in this regard.

5 *War of the Worlds*, HG Wells... demonstrated the power of broadcast media.

6 Probably *The Jazz Singer* with Al Jolson which is the first feature length 'talkie'. In my mind, all multimedia stems from the integration of sound with picture.

8 Again, the combination of sound and picture.



Rick Naqvi,
Presonus

2 Bob Clearmountain.

3 Alesis ADAT.

4 The Beatles: *Sergeant Pepper*.

5 The lunar landing.

6 Pink Floyd: *The Wall*.

7 Nike 'Revolution'.

8 The Beatles on Ed Sullivan.

9 Les Paul.



Malcolm Addey,
recording engineer

1 Brian Wilson. As a producer and as an artist he took pop music beyond three chords. He had amazing ideas long before certain people who shall remain nameless were getting kudos for having similar ideas. His incredible musicality, wonderful vocal arrangements and ability to realise his vision made for

fantastic results.

2 Alan Blumlein. As the chief audio expert at EMI, he was the first to patent the 45/45 cutting system used for LPs and he also did a tremendous amount of work on stereo in the thirties. His crossed ribbon microphone system was the beginning of everything we know today in terms of accurate stereo positioning, and we're still using exactly the same system, although perhaps with more modern microphones.

3 A cross between two things—the Neumann U47, which is perhaps the most popular, most used microphone anytime, anywhere, and the first magnetic tape machines developed by Ampex, specifically the 350 series. They were so widely available and so reasonably priced that they made professional recording accessible to thousands of facilities that otherwise wouldn't have been able to afford the expensive machines of Telefunken and EMI.

4 Stan Kenton's 'Peanut Vendor'. I was still a teenager when it came out in the late forties, and—aside from the classical music which hitherto was my thing—it was the first record that made me sit up and say, 'Wow! That's the most exciting sound I have

ever heard in my life!' It was loud, it had an extremely interesting arrangement and it was also one of the records that put Capitol on the map. The quality of the record was incredible. It was one of the first to use artificial reverberation, and it also made use of the brand-spanking-new Neumann 47 condenser mike that gave it a sound that up until then could never have been attained with the old RCA ribbon. That record got me into jazz and it probably changed a lot of people's ideas as to what a pop record should be at that particular time.

5 Without question Orson Welles' *War of the Worlds*.

6 *Citizen Kane*. Welles broke all of the rules, many of which he didn't know, and he managed to gather unto himself a crew that believed in him. He was doing something new, he wouldn't let the [studio] establishment near it after they had given him carte blanche, clever boy, and he happened to pull off the most incredible feat of movie-making. In terms of the camerawork, the lighting, even the sound, he did things that had never been done before. An incredible movie.

7 The Cleo Award-winning Pepsi-

Cola commercial from 1968, written by Joe Brooks, and which I was fortunate enough to be involved with. It was probably the first commercial where the product was never mentioned in terms of the graphics. There were plenty of quick cuts of people dancing in very hip sixties fashion, while in the background there was this singing; 'You've got a lot to live and Pepsi's got a lot to give...' It was the first commercial that I'd ever seen where the product wasn't being slammed at you every five seconds. It won a lot of prizes and was the envy of everybody in the business at that time.

8 Probably the introduction of digital recording. It absolutely changed everything, making it possible for the public to hear something of lasting quality.



Joerg Wuttke,
Schoeps

1 Alan Blumlein is certainly one of the most significant if not THE most significant audio personality of this century. He invented details which are important until today and for the future. Other famous people like Michael Gerzon and others very

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< often referred to him.

2 I name John Pellowe. Of course, within this century there had been many very significant audio practitioners. However, John Pellowe is today nearly as known as the *Three Tenors* and it was him who made the first outdoor recording of this style in the Caracalla Thermae. The circumstances of recording are by far more complex than in a studio for it is not only outdoors, it is also combined with a loudspeaker playback. Altogether millions of spectators and listeners are addressed. And, as far as I know, there had never been one real accident.

3 My answer is 'tape'. In this case I do not have to specify whether it is analogue or digital. In any case, magnetic tape is the fundamental basis of all audio recordings.

8 I think the invention of the recording on tape was the defining audio moment of this century.

9 Dolby. Many other things or names could be mentioned. However, who does not know Dolby? This name is written on better cassette decks and if it comes to cinema we see again: Dolby, Dolby, Dolby...



Bill Jasper,
Dolby

- 1** Akio Morita of Sony.
- 2** Sir George Martin.
- 3** Ampex 200 tape recorder.
- 4** Beatles *Sergeant Pepper*.
- 5** Landing on the moon.
- 6** *Star Wars*.
- 8** *Fantasia*.
- 9** The Walkman.



Peter Poers,
Jünger

3 Sony PCM-3324/DASH technology. A revolution for all kinds of audio production applications—analogue as well as digital.

4 Pink Floyd's *Dark Side of the Moon*—timeless music, even for the next century.

5 Is there something? John F. Kennedy at the Brandenburg Gate: 'Ich bin ein Berliner!'

6 *Jurassic Park*—the perfect illusion, the realisation of an earlier dream of mine. First movie which gives you more if you can watch it with surround sound.

8 The change from analogue to digital audio. The rebirth of all produced audio of the past.

9 The symbol of HMV, giving us the message that there has been audio for many years.



Tony Gravel,
Tascam UK

- 3** TEAC 144, Yamaha SPX90, Fostex B16.
- 4** *Dark Side of the Moon*.
- 5** Live Aid.
- 6** *Close Encounters*.
- 8** *Axe Victim* by Be Bop Deluxe.
- 9** Sir George Martin.



Josiah Gluck,
recording engineer

- 1** Sir George Martin. Under his guidance audio truly became a creative tool, not just a glorified Dictaphone.
- 2** Les Paul—multitracking and sel/sync. It all begins here.
- 3** Digital multitracking recorders.
- 5** Orson Welles' *War of the Worlds* radio broadcast. It showed the power of sound manipulation. As radical an application of 'montage' as the films of S. Eisenstein.
- 6** *King Kong*. Sound for movies was only five years old, but the creativity and skill involved were amazing; 'This Is Cinerama'—introduced

multichannel hi-fi stereophonic sound to the public. The premiere even made the front page of the *New York Times*.

9 Thomas Alva Edison. He figured out where to start.



John Kurlander,
recording engineer

- 1** Rupert Neve. Neves, Focusrite, Amek. Mr. Rupert Neve... what an achievement.
- 2** Alan Parsons. He performed the one-of-a-kind stunt of transforming the back-room recording engineer into a headlining artist without actually appearing on the recording. The engineer became the star, the artists his crew!
- 3** Neumann microphones—For over 70 years they have remained the finest in microphone technology. From the CMV3, U47, U49 and M50 to the TLM50, a major achievement of consistent market leadership.
- 4** *Sergeant Pepper* and *Pet Sounds*—Simultaneous recording excellence on both sides of the pond.
- 5** 'All You Need Is Love' [*Our World* TV show]. It seemed a really big deal technically, musically and emotionally at the time.
- 6** *The Jazz Singer*. Being what is widely regarded as the first talkie, it took the giant first leap into sound and laid the foundation for all future refinements.
- 8** My baby's first sentence! Actually, there's no such thing. The audio industry redefines itself constantly, usually at least twice a year at each AES show.
- 9** Abbey Road Studios. Since the thirties Abbey Road has retained and repeatedly reinvented its repu-

tation for technique and artistry.



Al Schmitt,
recording producer
and engineer

- 1** Frank Sinatra. He set the standard for quality and taste. He is the most imitated singer of this century.
- 3** The tape machine. It allowed us to edit and overdub easily, and also for archiving in this century.
- 4** Les Paul and Mary Ford's first multitrack recording [*'How High The Moon'*]. It opened the door and let us know the possibilities were unlimited.
- 5** Orson Welles' *War of the Worlds*. It showed us the importance of radio and how easily we, the public, could be fooled.
- 6** Al Jolson's first talking movie [*The Jazz Singer*]. It allowed us to experience audio along with the visual.
- 8** Thomas Edison's first playback on his talking machine. This was the start of the recording industry.
- 9** Thomas Edison. We all owe him our living.



Tony Visconti,
record producer

- 1** I'd have to say Les Paul. He accomplished some audio-earthshaking innovations in the middle of the 20th century that affected everyone in this business. He's still as sharp as a tack, working on new inventions.
- 2** Geoff Emerick, for his amazing work on the latter Beatles albums, most notably *Revolver* and *Sergeant Pepper*. Given the basic equipment he worked with (by today's standards), his sonic achievements were ingenious.
- 3** Analogue: the multitrack tape recorder. Digital: the DAW. >

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4 'How High The Moon' by Les Paul and Mary Ford. This recording, single-handedly, proved that making records was a distinct art as opposed to merely capturing a live performance. The implications of this record have affected every artist from Nine Inch Nails, creating surreal aural soundscapes, to opera singers inserting their high notes on a separate audio track.

8 Frank Sinatra singing duets with singers in other countries, via satellite. Full marks to Phil Ramone for enabling this to happen.

9 Probably Rupert Neve.



Richard Buskin,
Pro-audio journalist

1 The Beatles—Their compositions, the trends that they set and their repeated pushing back of the musical and technological boundaries.

2 Thomas Edison—Without whom...

3 The Neumann U47 tube microphone—the sounds that it captured during the first half of this century still match the best that current technology has to offer.

4 Elvis Presley's 'Heartbreak Hotel'. By helping to popularise a blues-based sound among white teenagers, it served as rock 'n' roll's foremost call to arms and ignited the musical interests of countless future cultural icons.

5 Orson Welles' *War of the Worlds*. A brilliant conjuring of images by way of sound effects and the spoken word, it single-handedly demonstrated the power—and inherent dangers—of radio as a means of mass communication.

6 *Citizen Kane*—The most influential picture of the sound era, courtesy of its unconventional dramatic structure and technical virtuosity.

8 Neil Armstrong's 'One small step...' The first words transmitted live from the Moon.

9 A tie between The Beatles—for all of the reasons mentioned in answer 1—and Frank Sinatra, based upon the longevity of his worldwide popularity, the instant recognisability of his voice, and how much both that and his vocal phrasing have been imitated.



Malcolm Toft,
MTA and Trident Founder

1 Rupert Neve. Because he's made a significant and consistent contribution over many years.

2 Dr Ray Dolby.

3 The Dolby noise-reduction system

4 *Sergeant Pepper*. I'm sure everyone will say this, but it certainly did change the face of music and recording.

5 LiveAid. Because it was both a marvellous event and was in a worthwhile cause.

6 *2001 A Space Odyssey*. Because it was the definitive sci-fi movie and is still relevant to-day.

7 The 'Beattie' ads with Maureen Lipman. Brilliant writing and superb role creation.

8 Once we got to 8 tracks in the late sixties, 4-track had been the maximum possible for almost a decade and then we went from 8 to 24 in a matter of a few years.

9 Les Paul. The originator of multitracking.



Zenon Schoepe,
executive editor,
Studio Sound

1 Ray Dolby. For all the reasons everyone else has given.

2 Frank Zappa. One of the very few to truly qualify for genius status. Scores highly in all relevant departments. A musician who was comfortable enough to span all musical styles and who maintained a healthy interest in the mechanics of the creative recording process. Intelligent and switched on enough to ensure the mastery

The Millennium Questions: The most significant... 1 Audio Personality. 2 Audio Practitioner. 3 Pro-audio Product. 4 Recording. 5 Broadcast. 6 Film. 7 Commercial. 8 Defining Moment of the 20th Century. 9 Audio Icon of the 20th Century.

of his own destiny.

3 The telecoms revolution and the chip. In less than ten years of professional audio application telecoms has altered working practices as dramatically as the multitrack tape recorder with the proviso that it will go on to integrate into our daily domestic and professional lives far more profoundly. The chip has made the impossible possible. Dedicated DSP's have only relatively recently come of age yet their influence can be seen everywhere. Tomorrow's promise can be seen in today's silicon.

4 *Tommy* by The Who. Ambitious and legitimising for rock as opposed to the glorified pop that was being paraded around as serious music at the time. The album became a performance, became a film, became a stage musical. Few other projects have made it with such multimedia

crossover appeal. Proper band too, and your parents would hate them.

5 The vision of families huddled around the radio and hearing that they were in to WWII. Broadcasting may have become more sophisticated, even interactive, but nothing even gets close to the power of radio at its purest, most innocent and most direct and how lives have hung on its every word.

7 Anything Saatchi & Saatchi had a hand in. They revolutionised the whole concept of advertising and took it away from the humdrum and dated formats to something much slicker, more clever and, it has to be said, more sinister. They spawned the ad commercials agency concept so outrageously steeped in eighties culture and rode an audio postproduction commercials industry up on the back of it. They raised awareness to the >

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< medium's previously acknowledged, but strikingly underexploited power.

8 Those tentative and initial grunts of consent from a handful of manufacturers that instigated the first steps in defining the 5-pin in a more useful application than that of an inappropriate hifi connector. MIDI has democratised the music making process.

9 Fender Stratocaster. Beauty and functionality. Inspired and encouraged generations to indulge in creativity and opened up musical involvement to those outside of the existing structured music making process.



**Bryan Adams,
Musician**

1 I've always admired Les Paul for his contributions guitar-wise and his experiments with analogue tape slap. Pretty significant stuff...

2 Sam Philips who recorded Elvis at Sun Records in Memphis.

3 The microphone

5 On radio, Winston Churchill's BBC broadcast

'We will fight them on the beaches'. On television, I'd have to say the Beatles on Ed Sullivan

6 Casablanca.

7 Coca-Cola. 'I'd like to teach the world to sing'.

8 Four months at number one with 'Everything I do (I do it for you)'...!(grin)

9 The microphone.



**Tom Scott,
EDnet**

1 For me, and a host of other recording professionals, Wally Heider was and is our most significant personality. Professional, irreverent, daring, blistering, innovative, terrifying, there are no end to the adjectives that come to mind when I think of this recording pioneer. As one of the first successful independent studio owners, he pushed the envelope in multitrack recording technology and practice both in the studio and on the road.

3 The VU meter, based on the nature of human hearing, gave us a scale that made our product a human dimension. I believe that the current

crop of 'too loud' and unpredictable dynamic range audio on CDs and in the cinema would benefit from a rediscovery of the VU meter.

6 While many might say *Apocalypse Now* is the most significant film soundtrack, I would point to an earlier work by sound designer Walter Murch, *The Conversation*. The later work of Murch, role model and mentor to a generation of cinema sound professionals, is presaged in this moody innovative (mono!) soundtrack.

8 The Rosemary Woods tape, wherein it is revealed that you can learn a lot from an erased tape.

9 Les Paul. Starting out in his garage (the original 'garage band'?) he created the instruments and the techniques that propelled the last half century of popular recording.



**Claude Cellier,
Merging Technologies**

1 Stefan Kudelski. A great example of creative genius and miniaturisation applied to an audio product. The Nagra recorder changed the whole way of working for location recording—both for broadcast and film and opened up a whole new vista of possibilities.

3 Nagra IV recorder, due to its longevity and technical innovation. 30 years after its introduction, it is still an industry standard, though possibly getting near retirement!

4 *One Size Fits All* by Frank Zappa, due to the quality of the musicianship, content and technical prowess. As a product, this record was in advance of what other leading musical acts were putting out.

5 First steps on the moon of Apollo XI. This was a great technical achievement, being a live broadcast from the moon and received by what must have been the largest audience ever. A fine milestone for humanity!

6 Any Chaplin. For me, the films represent the best in human genius by incorporating the whole gamut of human emotions into one dense mixture before anyone else.

7 The recent one for Alaska Airlines. Totally crazy!

8 The invention of radio and the first stumbling steps of wireless.

9 The Grammy Award, because my father has one in the drawing room for Best Ethnic Music! (*Mystery of the Bulgarian Voices*).



**Tomlinson Holman,
TMH Labs**

1 The late Hugh Ford of *Studio Sound*, because audio is a diffuse and multifaceted area with many progenitors. Ford provided 'the missing link' in the early days by providing highly competent reviews based on a thorough knowledge of the engineering, thus 'closing the feedback loop' around many subspecialities. His loss is still felt.

2 Too hard a question, since many identified with this question such as Sir George Martin were really producers who knew how studios ticked, but did not provide technical advancement themselves.

3 The Ampex 300-35 I. Didn't we, of a certain generation, all learn to record and edit on this beast?

4 I'd like to do it in context of 5.1 channel material. In that case, John Eargle's recording of the 1812 Overture with chorus for Delos of the Dallas Symphony and Chorus would have to be seminal as it was one of the first released big works in 5.1, and worked very well.

5 *War of the Worlds* by Orson Welles, *Halloween*, Scared the pants off most of America all at once. Nothing has been more significant since.

6 *Star Wars* as it was both a technical and aesthetic breakthrough.

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MICROPHONES

The Millennium Questions The most significant... **1 Audio Personality.**
2 Audio Practitioner. **3 Pro-audio Product.** **4 Recording.** **5 Broadcast.** **6 Film.**
7 Commercial. **8 Defining Moment of the 20th Century.**
9 Audio Icon of the 20th Century.

7 Is this in the same league as those above? I'd say the 1984 Apple commercial for the Super Bowl for the introduction of the Macintosh.

8 Analogue developments incorporate steady progress on many fronts which has only slowed down once we reached the nineties. The introduction of digital may well be seen in the long-term history as being of most importance, so the introduction of the Compact Disc in 1983 would be the defining audio moment, when viewed from a long ways off.

9 'That's one small step for man...'



Ian Jones,
HHB

1 Sir George Martin.

2 Toshi Doi. Top Sony engineer who perfected PCM Recording and is responsible for the CD.

3 Studer's first multitrack recorder.

4 The Beatles—*Sergeant Pepper*.

5 'All you need is Love'. First ever live satellite broadcast 1967.

6 *2001 Space Odyssey*—Stanley Kubrick

7 Lurpak. 'Dancing Cows', first real use of computers graphics at that time.

8 Hearing digital audio for the first time.

9 The Coles 4038 Microphone, originally designed by BBC and still available today.



Ed Simeone,
tc electronic Inc

1 George Massenburg. A true renaissance man, inventor of the parametric EQ, GML automation, Grammy winning producer-engineer. One of the few people on earth who can build the major components that make up a studio, engineer, produce and mix a recording and live to tell about it.

2 Tom Holman—THX. Who changed the whole makeup of the motion-picture experience. This raised the bar for a motion-picture sound, even for the home.

3 The 24-track analogue multitrack recorder.

4 *Sergeant Pepper*. Because it was done on a 4-track console.

5 'Elvis, Live from Hawaii'. The first worldwide live concert.

6 *Apocalypse Now*. When those helicopters flew over for the first time, I knew I was in the right business!

7 Apple Mac 1984 Orwellian commercial.

8 The invention of the stereo long-playing record.

9 The Digital Audio disc



Terry Nelson,
Pro-audio journalist

1 Alan Blumlein, for his foresight and vision. His work is still a reference today, even as we move headlong into the wonderful world of multichannel.

2 I would have to say Alan Parsons, due to the fact that his engineering credits for Pink Floyd's *Dark Side of the Moon* brought him star status as an engineer and later producer thus bringing the 'man behind the console' to the public attention.

3 Although NOT a pro-audio product the Sony F-1 was undoubtedly responsible for opening the Pandora's box of digital audio and marked the dawn of a new age in recording and audio technology.

4 'Heartbreak Hotel' by Elvis Presley. Combining country, blues and rock'n'roll, this was the

definitive 'crossover' record that opened a whole new era of popular music.

5 'The battle of France is over—the battle of Britain is about to begin.' Churchill's wartime speeches used the power of radio to inspire a nation and the free world.

6 *2001—A Space Odyssey* by Stanley Kubrick. The ultimate trip! This film combined excellent storyline with totally innovative techniques and advances for sound and picture. Its influences are still everywhere today.

7 Could there ever be a 'most significant commercial'? However without commercials we would not have Ridley Scott or *Alien*. So any Ridley Scott commercial.

8 The invention of the thermionic valve (or tube). This was when audio really took off.

9 The gramophone. It was the one common

meeting place for young and old to enjoy music for a variety of reasons.



George Massenburg,
producer and engineer

3 The magnetic tape recorder. Really the Ampex 200, the first professional, practical recorder.

4 T A Edison, 'Mary Had A Little Lamb'

6 *Citizen Kane*. An innovative technical masterpiece and a great story; neither gets in the way of the other, and each fully and distinctly supports the other.

7 Apple Macintosh 1984 'Big Brother' during the Super Bowl. The Macintosh changed computing, where all of the great American corporations (such as IBM and Xerox) were pathologically short-sighted.

8 Richard Nixon, thinking he could get away with his ham-handed tampering of the White House Tapes, gets busted... bad.

9 The microphone... any microphone... and directors have been trying to hide it ever since it was first seen. ■

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EVERY PIECE OF EQUIPMENT INCLUDED here has, at least, been exhibited at a major trade show or through the trade press—no confidences have been broken and we haven't been rummaging through the R&D dustbins.

So we hope that this article is taken in the manner it is intended—a celebration of innovation—and the proof that almost all companies, despite what their marketing people might tell you, don't always get it 100% right.

NEVER OFF THE GROUND



Alesis ai

During the 1985 New York AES, in a small hotel room at the end of a long corridor, a little known company launched an up-market 'all singing and dancing' digital reverb system. There was a simple low-key demo and basic data sheets about the processing power, the new technologies involved, and the control capabilities. Particularly clever was the way that all programs and user-settings were stored in the remote control and so plugging the remote into a different ai processing frame immediately made your personal settings available there. A single line at the end of the data sheet said that the prototype had been constructed with pre-production CMOS devices and launch of the ai was



dependent on their commercial availability. The thinking time that this allowed Alesis obviously caused a complete marketing rethink, with the appearance of low-cost digital reverbs a few months later leading to a range of products to revolutionise the studio industry, and the ai was never heard of again.



SSL 01 Production Centre

It was a widely known fact that SSL were working on digital products in the mid eighties, but most thought that this meant mixing consoles. They however chose to show their digital abilities with



a compact mixer combined with a hard disk recorder-editor that acted as if it was two separate stereo tape recorders. It certainly showcased their digital competence, but seemed so totally out of step with anything that the industry was looking for at that time. The 01 gradually disappeared, a large number of their R&D team left shortly after, and it was several more years before SSL went digital again, this time with the far more practical ScreenSound.

64 December 1999

The Kit that never was

THE ANNALS of the recording industry are littered with oddities, both big and small. Some are products shown at an early stage before the designers really thought everything through, and ultimately, they either gave up or continued development in a different form. Others were ideas that were simply too far ahead—of the industry or the technology, or both, and suffered accordingly. There are remarkably few silly ideas to be found but hindsight often gives a seemingly crazy twist to what was at the time a very logical development path.

Keith Spencer-Allen returns from the vaults

THE PHANTOM MULTITRACKS

If you have only ever worked with multitrack tape machines from the major names you may be unaware of the difficulties to overcome in designing a relatively flawless multitrack. The major names were on the industry learning curve and had decades to get it right. Newer entrants had to learn about the difficulties of head crosstalk, erase-record timing and successfully handling of 2-inch tape across the headblock. Aware of that, they then had to opt for the low cost or added feature route, and it was at this stage that aspiration and reality often diverged.

As soon as it became clear the transition to digital multitrack was going to be slower than thought, a number of manufacturers entered the multitrack field offering a range of different machines but not all came to market in any quantity. Allen & Heath announced the Syncon M24 24-track, a quite remarkable approach to design where almost all machine control was passed to a sophisticated remote panel leaving a multitrack virtually devoid of buttons, knobs and switches. Micro-processor control allowed tape alignment presets to be stored, a capstanless transport, and error warning of an electrical or mechanical inconsistencies—all before such features appeared in other machines. A&H certainly had the ability to make it work having acquired the Brenell company—already a maker of multitracks—but decided against bringing it to market weeks before the announced launch. They subsequently pulled out of tape machines completely, robbing the industry of what was possibly the most photogenic tape recorder ever.

In 1988, a small UK company by the name of Studio Magnetics launched a more up-market

range of products under the Seca brand. The centre piece was the Omega 24-track that was preferred for 32-track should that become a standard. In most areas this was a quite standard machine, but most controls and all the meters had been moved to the remote control, and the electronics penthouse was extended over the transport deck. Lights under the penthouse could illuminate the deck and help protect it from airborne detritus, but unfortunately when changing reels when standing up you had to work blind which rather counted against the concept.

An early casualty of multitrack development was the short lived UK-based ironically named Uni-track company, formed in 1969 to manufacture a range of multitrack tape machines beginning with the Uni 16 16-track. A very bright team of designers pushed the technological envelope—perhaps a little too hard. Twin capstan transport, continuously variable tape tension and numerous other innovations, plus the delivery of Europe's first 24-track machine to a major London studio in mid 1970, created a high degree of interest. Talk of 32-track machines and a digital recorder development programme must have been a distraction as the delivered 24-track reputedly never worked reliably. Unfortunately the company was never able to develop their ideas any further and folded in late 1970. According to an interview with Uni-track in early 1970, it appeared that they had hoped to trademark the term 'multitrack' but were beaten to it and had to settle for Uni-track, which they argued would be appropriate when their 'encoded-multichannel PCM' digital technology was launched—a case of too much, too soon.

The most recent and radical analogue multitrack was the Thompson Audio Developments T24.



Using a transport with capstan or pinchrollers, all machine control was via tracker ball, keypad, function and transport keys, while metering and other functions were displayed on a colour monitor. Session information could be sent to a printer or floppy, and the complete operation was under updatable software control. This marriage of computer and analogue tape deck was very realistically priced but sadly never appeared to make it to production stage.

Perhaps one of the bravest attempts to change the analogue industry came from US company, MCI. In the early eighties they introduced the JH-32 range of multitracks whose up-market features list included the tape speed of 20ips—considered to be a reasonable balance between the LF response of 15ips and the HF abilities of 30ips. While the range included 16/24-tracks on standard 2-inch tape these were literally overshadowed by a

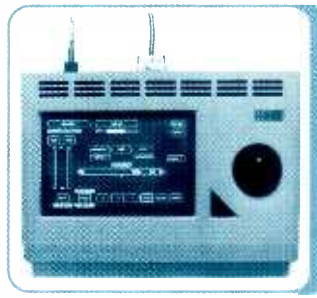
employing the tallest Japanese model available to stand next to the PCM3200 to reduce its apparent height. Other names were there as well—Matsushita as a signatory to the DASH format produced a digital 24-track under the Technics name; although this was only seen once outside of Japan. Despite the impres-



sion of immediate product availability given by some of the digital multitrack manufacturers, others knew it was going to be slow and difficult until standards were agreed. The last sentence in the Studer preliminary data for the A808 was probably a 'Lagadec-ism' and had the ring of truth: 'Miracles are not included in the specifications of high-performance digital audio formats'.

Real World Research Audio Tablet

Following a shake out of the early digital workstations, a second generation appeared that reflected advances in computer technology and had some user-input in their conceptualisation. The Audio Tablet was



initially considered to be a stereo mastering and editing hard-disk system. It used a compact horizontal controller (tablet) with a graphical interface on a touch-sensitive screen. This intuitive approach soon found industry support and working agreements with organisations such as the BBC. However for undisclosed reasons, Real World were unable to bring the system to market and aside from a few up-market systems, all user-interfaces were to revert to QWERTY-based computer platforms for many years

Sansui PC-XI Tricode PCM Processor

In the early eighties, many of the Japanese Corporations were tentatively trying to market PCM adaptors for recording digital audio on VCRs, and there were numerous choices available. Although in almost all cases these products came from the domestic divisions, a twist of marketing, realising that the pro market was probably the only area where these things would be used, re-directed demos and exhibition to

pro trade shows. Sony won that market with their PCM-FI adaptor, but it was only because they had chanced including a 16-bit mode while everyone else standardised on 14-bit—one of the rare cases when audio quality clearly won the day. All the other PCM adaptors, of which this Sansui unit was but an example just



disappeared overnight. The FI ensured Sony a place at the heart of pro digital, but it could have been so different.

Tascam FXZ-100 Digital Recorder

In the years before digital standards were defined there were numerous tape machines introduced, some of which looked serious while others just seemed technical exercises. The FXZ stationary-head recorder seemed a quite practical approach being a 2-channel PCM format with 16-bit and 48kHz sampling. Recording at 7.5ips it was getting a playing time of 130 mins on a 10 1/2-inch reel of 1/4-inch tape. Apparently the design of the machine would allow easy conversion to 4, 8 or 16-track recording on the same tape-width format. The machine was seen once and never again as Teac moved into the DASH format camp. >



mighty 32-track machine using 3-inch tape! This gave a track-width that is an improvement on 24-track on 2-inch, but the obvious problems were the width and weight of the tape reel.

The arrival of digital recording did not reduce the supply of oddities. Before the finalisation of the DASH and ProDigi digital multitrack standards there were numerous unique machines. In the early eighties Studer showed the A808 PCM, a digital 8-track using 1/4-inch tape and Sony showed several digital multitracks before the PCM3324 arrived, as they battled to get the digital electronics down to a manageable size—even



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PLAIN WEIRD

Creating products or solving problems through technology sometimes means that the end-product is not evolutionary and, to most of us, can look 'plain weird'. Here are a selection of products that seem peculiar but were all viable. Any lack of success associated with them in their time is probably more due to our reaction to a concept that seems odd rather than their effectiveness.

JVC Sound Beam MU-6200E Microphone

The concept behind the Super Beam was to create a highly directional microphone without the trade-offs associated with shotgun microphones and 'up to a seven times improvement in horizontal directivity'. A large number of electret capsules were arranged in an arc with the outputs fed to a control unit that



allowed continuous adjustment of directivity pattern. Its physical dimensions—115cms wide and 1.8kg in weight—obviously created some difficulties, but as was pointed out at the time, in security conscious situations the Super Beam looked far less threatening than a standard long shotgun microphone. Although it found itself in some hire company inventories, the Sound Beam appears to have been a casualty of JVC's desertion of the pro-audio business.

B&K APE

In 1988 Wieslaw Woszczyk of Montreal's McGill University presented an AES paper on the subject of diffrac-



tion and microphones, and how it might be possible to create microphone attachments using diffraction to modify sound pickup. The idea became a joint project with Bruel & Kjaer, and the WA0609 Acoustic Pressure Equaliser (APE) was the first

result. It acted as both a directional and spectral equaliser when fitted to a B&K 4003 or 4006 microphone. While it became affectionately known as 'Wieslaw's Balls', this was actually just one of several attachments developed—another made the microphone look more like a hammer! Because they only fitted these B&K mics there was always going to be a small user-group, but it illuminated the effect of diffraction from microphone casing that is still ignored by some many manufacturers.

MB Electronics KLSM2000 Monitoring System

As digital location recording became an established technique for classical and jazz recording through the mid eighties, inconsistency in monitoring environments was recognised as a problem. German company MB Electronics showed this arrangement of shoulder-mounted speakers

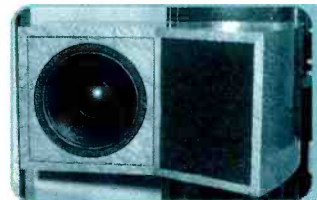


and harness as a solution. The speakers were kept at a uniform position and distance from the user no matter whether they turned their head or bent down to adjust the console.

Frequencies below those reproducible by the speakers were transferred direct to the wearer's body through the shoulder harness. It worked well, didn't weight too much and was a solution to a problem, but it seemed to cause such hilarity at the exhibitions it was seen at, it appeared to have been quietly returned to the R&D dept.

Turnkey Nearfield 'Bent' Monitors

In the early eighties, when the industry was trying to move a step beyond the use of Auratone console-



mounted speakers, UK pro-audio dealer Turnkey produced these unique nearfield monitors. Designed by Andy Munro, they had angled baffles, the idea being that the listener could be on the axis of both the LF and HF drivers. There was a concern in those days that being so close to a multidriver monitor small movement of the head would cause considerable changes as you moved between driver axes. Obviously it didn't worry enough people for this concept to become established.

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Digitally synthesized Noise signal with low crest factor and high repetition rate. Flatness < 1dB typ.

Polarity Test Signal
Proprietary polarity test signal for polarity measurements with the forthcoming Minilyzer.

Wide Level Range
Output level adjustable from -76dBu to +6dBu in 2dB steps. Unit selectable in dBu, dBV or V.

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CBS Copycode Coder

In the mid eighties, when the record companies were terrified at the arrival of high-quality consumer recording media such as DAT being used for widespread copying from CDs, that they argued through their trade organisations—the RIAA and



IFPI—for a CBS Labs developed system system called Copycode to be made a legal requirement. It proposed a notch at 3838Hz be cut in the CD audio and a chip in a DAT machine would detect it and not enter record, preventing copying. Despite what the record companies and their trade bodies argued, the notch was clearly audible and against considerable pressure they had to back down. This box was the CBS encoder device that would have cut the notch.

AHEAD OF THE TIME



AKG CAP 340

First making an appearance in 1989, AKG's CAP340 was a powerful (for



the time) DSP system (the 340 being the max processing power in Mega Flops) with a host computer and audio interfaces. Being just a processor it was dependent upon the written software with a room simulation program being the best known, although a 'digital mixing console' with binaural inputs, level, elevation and delay controls was particularly clever. Ahead of its time in marketing terms, the CAP was initially introduced as a research tool and was even taken into space for an experiment on the Russian space programme. There was a price list and the software did become practically orientated, but cost placed it outside of the studio range and the CAP moved exclusively back to R&D.



Finial Technology Laser Turntable

As CD became established as the music distribution medium, there was

interest in applying laser technology to the vinyl disc—both as superior replacement approach to the mechanical phono cartridge, and as means of extracting information from historical discs. Making the concept work was a lengthy and complex business, over coming track problems such as eccentricity and focus loss through warping. However there was



a drawback—the laser system was able to accurately playback not just the groove info, but also the sound of every bit of dust sitting in the groove! An idea that probably needed some heavy-duty noise removal DSP processing to make it work, which was not available at the time. Finial withdrew the product claiming that it was too expensive to market.



EMT 450 Digiphon

EMT's Digiphon was one of the earliest hard-disk recording systems to make an appearance at trade shows and the brochures of the time show an understanding of the facilities and their practical uses not out of place today. The drive units employed interchangeable disk packs or



Winchester drives, and was available as a 30-hour stereo system or as a multitrack replacement of up to 40-channels. More sophisticated controllers developed, and the hardware grew far beyond this 'small' system pictured. EMT probably suffered from being in the field too early.



Mitsubishi XE-1 Editor

While the early Mitsubishi X-80/X-80A stereo machines could accept manual tape-editing, the XE-1 Editor appeared quite early, and for the adventurous facility would have allowed a video editing approach to tape editing. This being 1982, there was no attempt to store the audio, but up to three stereo machines >



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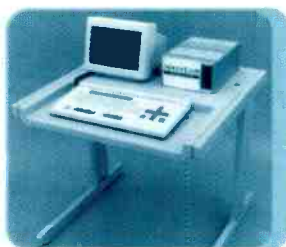
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could be controlled with level and crossfade editing abilities, plus the chance to rehearse edits and monitor edit point waveforms. This was a sophisticated device in its time, there was even an enhanced XE-2, but it suffered from the reluctance of the industry to go the reel-to-reel digital 2-track route and hence was largely redundant.

**Soundcraft
Digitor Stereo
Audio Editor**

An interesting hybrid stereo editor that held the 16-bit 44.1/48k digital audio programme in RAM up to a maximum between 5 and 6 minutes. The keyboard and screen were used to create edits, the details of which were stored and recalled from floppy disk. Once complete the audio would



have to be downloaded to tape. The Digitor was not originally developed by Soundcraft but they took over marketing and development. Exactly why it disappeared is not clear, but the high cost of even the limited RAM and the development of hard-disk recorders that were more practical probably explains it.

**Compusonics
DSP-1000
Recorder-Player**

In the mid eighties US company Compusonics launched a family of digital recorders-players that used a variety of high-density floppy disks as the audio storage medium. All audio was data reduced by at least one fifth giving a record time of about 45 mins on the quasi-domestic version shown here. Later ver-



sions used hard disk as well, but despite UK company Ferrograph licensing the format, it was not able to break through into the mass market.

**AUTOMATED
PROCESSES**

**Total Recall
Automation**

Although console automation was in its earliest of days, in 1973 this ad—Total Recall started to appear for the Allison Research /Automated Processes Programmer Model 256 E/D 'with

provision for up to 256 variable dynamic functions. This assures capacity to provide total automation of the entire con-

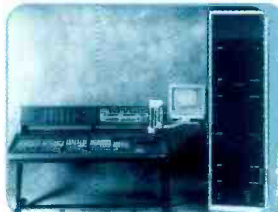


sole' and they meant level, pan, EQ, echo sends, all console switching and masters. Unfortunately the available technology couldn't really support this level of control and while the name found a home elsewhere, it was nearly 15 years before the level of automation aspired to here became a reality.

**DIGITALLY
CONTROLLED
ANALOGUE CONSOLES**

While a few console manufacturers turned to digital audio as a console technology quite early, most others tried to combine digital control with an analogue signal path. While they were freed from having to worry about digital audio, the task they had set themselves was still difficult, particularly when the technology and the components to achieve digital control were not readily available. On a business front, the move into these technologies was incredibly demanding and caused most companies considerable problems—sometimes terminal.

Audix's Assignable and the US-



marketed Neve Orion consoles were aimed at the broadcast market. Alice's Silk console was built specifically to fulfil a specific postproduction facility's needs although the technology did find uses in later analogue consoles. Amek's APC 1000 con-



sole was probably one of the most advanced digitally controlled consoles in the mid eighties, outperforming other leading types but this did not translate into big sales.

UK-company Novation had a R&D team many of whom were ex-Neve. The Alpha was a compact digitally controlled console



that was 'half' launched several times, but never fully materialised. Commercial problems led to the demise of what was seen as a very good console concept.

The most spectacular DCA console was Trident's Di-An that suffered from premature marketing and significant underestimation of development time. A fully assignable console, the Di-An cost Trident dear, but it was eventually finished and a number sold—several are still working today.

DIGITAL CONSOLES

**Neve
DSP Digital
Console**

Neve's first commercial digital consoles were the ultimate in assignable flexibility and were intimidating to many users. The multitrack recording console delivered to CTS Studios, London, took months to make reliably functional although it did sound good. The concept was developed to a more defined console layout and found favour with German broadcasters in the form shown. Considerable rethinking was required for Neve's next step in the form of the Capricorn, and by this time the DSP technology was defunct—the pioneering job had been done.

Digital console development was widespread through the late eighties and there are many examples of consoles that were largely development exercises that may or not become full



products. Typical examples are the German ANT digital console and the French Digitec digital console, the later developing into the Virtuoso—the nearest it came to mass market, before the company was acquired by Studer and used as the basis for their early digital consoles.

? *Analog Digital Synergy's Synergy One*

1987 and one of the earliest practical looking consoles appeared—and with a team that included ex-MCI staff. The Synergy One was a fairly close approximation of an analogue console with a largely in-line knob-per-function layout. The



versions shown did not include any mic input functions; although console sizes from 4 to 64 channels were mentioned. The backlit console looked stylish, the aims of the digital processing had kept close to analogue console emulation plus full automation, and it was reasonably priced. But like so many other consoles on the technological cusp, it was seen for only a short time.

? *Neumann Strategy*

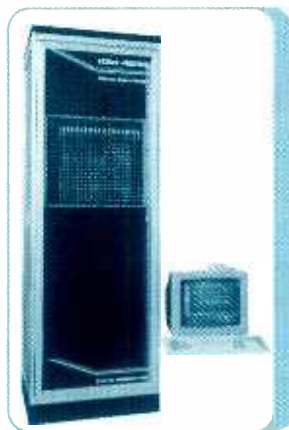
Neumann had always developed quite sophisticated mixing consoles using digital control of analogue. The appearance of the Strategy digital console in 1992 caused quite a stir. But even at this stage it was announced that it was being shown as an 'exerc-



cise'. Despite what positive feedback may have come from its exhibition, when Sennheiser acquired Neumann the following year, the digital console programme was one of the first projects to stop.

? *Digital Automation KSD-48/96*

This was an attempt to build a digital console with a high performance computer and without the console control surface, it being replaced by keyboard,



mouse and screen. Large number of channels were mentioned and the provision for high sampling rates. A host of DSP functions aside from the standard functions were to be handled internally. The unit made a considerable impact in 1987 but gradually slipped from view. Exactly what that industry would have made of a totally virtual console is difficult to envisage.

JUST TOO CLEVER

? *Teldec DDM CD Mastering*

Teldec had developed Direct Metal Mastering technology for vinyl discs, cutting directly onto a copper master and so helping maintain consistent high quality. While almost everyone else turned to lasers to cut CDs, Teldec, with Neumann, devel-



oped DDM technology for cutting CDs using a piezoelectric transducer and a diamond stylus. They claimed investment was about a tenth of that needed for laser CD mastering and it didn't need a clean room. It worked and cut in real time, but the laser revolution was established and this incredible technology seems to have disappeared.

? *Ursa Major MSP126 Stereo Processor*

Ursa Major always had a reputation for innovation, but this unit, launched in 1985, was just a little, but too clever for the prevailing studio attitudes. The unit had 8 basic operating modes, all of which were orientated to

creating a stereo image or pan position using delays, room simulation, repeats, stereo comb filtering and Haas panning. It was a very sophisticated digital processor that was probably something of a disappointment to the manufacturer and to AKG who later acquired the company.

? *AKG Direct*

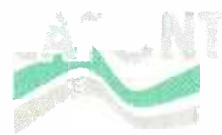
Originally developed by German company Coach Audio, AKG's Direct recording system was an unusual hard disk recording-editing system. It was designed as a multitrack system



with the idea that the number of recording tracks could be increased by adding extra disk packs up to a maximum of 32. The system went through several changes where some of the shortcomings were overcome, but the fall-out rate for hard disk systems in the early nineties was high.

? *Otari ProDisk*

Another multitrack hard disk recording system originally developed by Digital Dynamics and acquired by Otari. Quoted as having up to a 64-track capability, the ProDisk system pushed the multi channel abilities of the hard-disk medium, but the recording industry was less than keen on the upload-download problems of massive multitrack hard disk systems on non removable drives. The arrival of the more modular and industry-familiar style of Otari's Radar system finished the ProDisk as a digital multitrack replacement. ■



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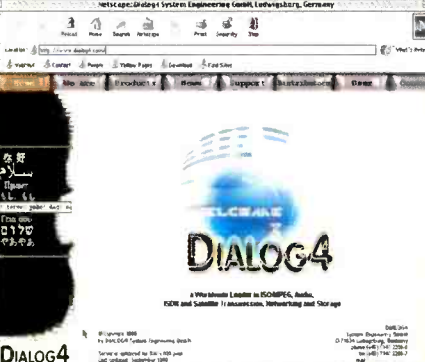
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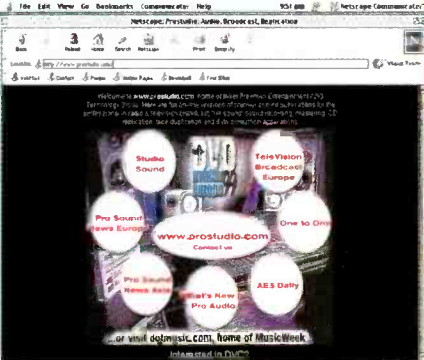
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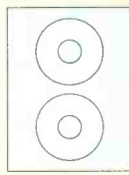
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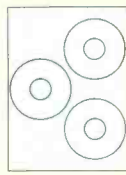
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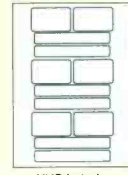
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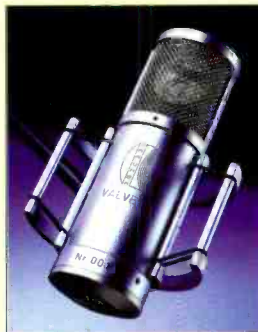
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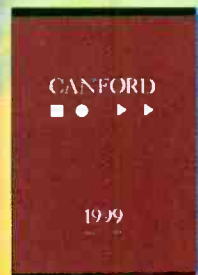
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US: The speed of connection

Given the development of on-line music distribution, it is surprising how little interest studio owners have in their product writes **Dan Daley**

IDEALLY, AMERICA is supposed to be a classless society. A lofty ambition and one yet to be achieved. There are a lot of things you can legislate for, but there's even more you cannot, including the roll of cosmic dice that affect things like economic status and the colour of your skin and how other people with different skin feel about yours. Aside from race and affluence, another delineation is evolving, and while its socially comprehensive, it is having a particularly interesting impact on the music business and professional audio in general.

I was invited recently to moderate some panels in Orlando and Miami for NARAS—the Grammy People, as I call them—on the topic of downloadable audio. NARAS stands for the National Academy of Recording Arts & Sciences, which would put its domain squarely into that also occupied by recording studios and the producers, engineers and musicians who occupy those studios. Yet at the Miami event, the well-turned-out crowd of attendees held few traditional studio rats. (The Orlando event was hosted at the Full Sail school, which by definition was stuffed with aspiring studio peo-

ple, but that's a stacked deck when you think about it.) Then again, the people on the panels were equally diverse and, while a few of them had come from recording backgrounds, they were now deeply enmeshed in this other, more corporate milieu of MP3 and dot-coms galore. The panels were packed with representatives of streaming audio scheme developers, on-line content distribution entities, hybrid on-line record companies-cum-personal managers and a further assortment of new-age executives whose titles were often startling juxtaposed combinations of once distinctly separate functions; my favourite was 'director of content development and label relations'. Of a total of a dozen panelists chosen by the Miami Branch (it's not yet a full chapter) of NARAS, only one was a dedicated recordist—a mastering engineer whom I specifically chose to lend at least some credence to the Recording Arts & Sciences part of the organisation's putative mission.

Six hours' worth of panelling produced a tableaux that is becoming characteristic of how the music business is rapidly evolving here: assorted, assertive experts from

an increasingly widening and often bewildering array of companies and disciplines (some of which seemingly having come into existence only moments earlier) talking intimidatingly at an audience whose own sense of purpose is as ambitiously vague as last week's Internet stock IPO. The panellists all have answers of sorts, within their particular fields of endeavour; the audience, however, barely has anything close to pointed, specific questions. Rather, they come to the table with a loose collection of hopes, dreams, skills and talents—only occasionally among which is the ability or wherewithal to record something audio—and an intensely earnest wish for someone to tell them what to do with these components that will result in something like a successful career in making music.

The aforementioned answers sometimes hit the mark, but just as often do not, because the whole field of how music is made and sold is shifting before our eyes. And many of these answers are engendered by a need not so much to share knowledge as to express and promote a corporate point of view. In the area of downloadable music, as in the rest of the Brave New World of the modern music industry, many of its technical elements are far from standardised, and the shifting landscape is made that much less stable by the fact that standards are being created by market competition rather than collegial teamwork among technical peers.

There were hardly any recording studio owners in any of the audiences, and few

Europe: Blue laser? No Sweat

With a profusion of formats trying to find optimum applications, the Japanese have turned to soft drink writes **Barry Fox**

SONY DID NOT have much success with its optical disc studio recording system. Before that the company lost the Betamax-versus-VHS consumer battle. Now Sony is going out on a limb with a new DVD recording format that differs from all the others already planned. Sony's new system relies on solid-state blue lasers and should be ready for sale within a year.

Although the as-yet unnamed format has been developed as a home recorder that 'tapes' the North American digital high-definition TV, the core technology can also be used for European PAL and 625-line digital TV, high-capacity data storage and sound recording. President Teruaki Aoki says the company is working 'underground' to rally support from other manufacturers. Anyone who uses VHS video, audio tape or computer streamers knows that access is painfully slow compared to disc. Sony has been promoting MiniDisc as the end of cassette audio. Until recently, recordable DVD was seen as the death warrant for VHS.

Sony had initially backed the recordable DVD system called DVD+RW developed by Philips, and adopted by Hewlett-Packard. Now Sony has said 'No' to +RW for video and will promote it only

for use with a PC, to backup data from the hard disk. Sony's adoption of another system for video makes a total of five new recordable disc formats to choose from. But Sony's technology leapfrogs all the existing systems by quadrupling the storage capacity of a blank disc and abandoning all hope of making new recordings play on existing players.

The DVD Forum, which has set the industry standards for DVD movie and computer ROM discs, has already written a standard for a recordable DVD format. DVD-RAM uses a blank disc coated with phase change material that records information as reversible changes in reflectivity. The changes are so small that an ordinary DVD-ROM drive or DVD-Video player will need modification to read them. Hitachi, Toshiba and Panasonic already sell RAM recorders, but they are only for computer use.

Pioneer has demonstrated a rival format called DVD-RW, and NEC has another called Multimedia Video Disc. Again, existing players will need modification to play the new recordings. Philips claim that the use of a modified phase change coating lets +RW discs play back on existing DVD players. Pioneer and Panasonic have disputed

The storage capacity of a conventional DVD disc is limited by the red laser used for recording and playback. The light, of 650nm wavelength, cannot be focused into a small enough spot to pack information more tightly on the disc. A blue-green laser, with wavelength of around 515nm, allows the spot to focus so tightly that a standard 12cm disc can store 12Gb per side. Blue lasers are, of course, already used for disc mastering.

this. Philips has not yet done what would so easily settle the issue once and for all—provide +RW recordings for us to try on existing DVD ROM drives and players.

Sony now says that, although DVD+RW

engineers. One of the truths that emerged was that regardless of how the whole downloadable thing sorts out, the actual process of recording music remains pretty much the same, at least for now. But that's sure to change. And I was surprised that more studio owners and managers were not interested in the larger picture of what happens to the music that walks out their back doors and how it is undergoing a massive and fundamental metamorphosis, one that is certainly eventually going to affect what walks into their front doors.

There has been a lot of talk in the US recently about how Internet-based technology is creating yet another new class distinction in America: the distinction between those who have the knowledge and those who don't. Politicians wave dire-warning flags about the need to get computers and the Internet into schools early on, lest an elite few get the benefit of the intellectual capital of computers and others remain deprived. The same warning flags are worth waving at the studio business, because what I saw tells me that, as vague as this new generation of music entrepreneurs may be about their ultimate purpose and plans, they are not all coming from the perspective that how music is recorded is at least as important as how it is sold. And at the speed at which the world moves these days, it might take less than a generation for all those long, intricate arguments we love to have about the details of sound to become moot points.

is good for use with computers, to back up a user's data from the hard disk, the storage capacity, 4.7Gb per side, is inadequate for home video recording. One reason is the difficulty of converting analogue video signals into the MPEG-2 digital code used for DVD. When prerecording movie discs, the Hollywood studios reduce the total number of digital bits needed by analysing the scene on screen and using fewer bits when there is less movement and detail. This trick does not work efficiently 'on the fly' for live recordings. And North America's digital HDTV needs a lot of bits!

The storage capacity of a conventional DVD disc is limited by the red laser used for recording and playback. The light, of 650nm wavelength, cannot be focused into a small enough spot to pack information more tightly on the disc. A blue-green laser, with wavelength of around 515nm, allows the spot to focus so tightly that a standard 12cm disc can store 12Gb per side.

Blue lasers are, of course, already used for disc mastering. But so far only bulky gas lasers have been available. Until 1993 solid-state lasers could only emit dim pulses, and they failed after a few hours. Small Japanese company Nichia Chemical, best known for its Pocari Sweat soft drink, was first to make a solid-state diode emit a continuous beam of blue light for thousands of hours. Nichia stole a march on all the big boys by baking gallium nitride in nitrogen. Sony has licensed the technology.

In a nutshell

In true millenarian style **Kevin Hilton** surveys those lesser events that underpinned the pro-audio century—well almost

IT'S THE END of the first broadcast century. As just about everybody else is doing it, the time is right to look back and assess the last one hundred years of radio and television. The problem with this kind of survey is that the truly significant events can be represented on a relatively short time-line. What is more interesting is to look at the supposedly lesser happenings that, nonetheless, have had a great impact on the media.

Kicking off the century in fine style, in 1900, Canadian physicist Reginald Fessenden, theorising that a Tesla alternator could generate an electromagnetic wave that could carry both voice and music by modulating the amplitude of the carrier, sent a human voice over one mile. By creating the basis of AM radio broadcasting, Fessenden inadvertently drove a generation of radio listeners bonkers by forcing them to listen to scratchy, coming and going broadcasts in positions only fakirs are comfortable in.

Just to prove that money and technology have always been linked, the first commercial radio station, the Inter-Island Company, went on the air in Hawaii in 1901. It is not recorded whether its advertisements were as annoying, lame-brained or badly spoken as their modern counterparts. In the same year, Guglielmo Marconi—who had achieved radio communication over more than a mile in 1895 and transmitted signals across the English Channel in 1898—sent the letter 'S' in Morse code from Cornwall to Newfoundland. It was the first, but most boring game of radio Scrabble.

Russia 1906. Boris Rosing produces crude television pictures using both the cathode-ray tube (based on work by William Crookes in 1878 and then Karl Braun in 1897) and the Nipkow disc (a mechanical scanner invented by Paul Nipkow in 1884). In 1916, an employee of the Marconi Company, David Sarnoff, suggested 'electronic music boxes' for the home. His idea was turned down, but as he only went on to head up RCA, what did he know? By 1926, John Logie Baird had come up with a working TV system, based on the Nipkow disc. Two years later he demonstrated colour TV, but abandoned the idea when he realised how much more expensive the licence was compared to black and white.

In 1922, the British Broadcasting Company had been formed by a group of wireless set manufacturers, so that their 'electronic music boxes' would have something to play. Marconi had already cornered the market by starting 2LO, Britain's first radio station. And they say media moguls are a new thing. Becoming a public chartered corporation in 1926, the BBC

began an experimental TV service three years later, based on the Baird system. But John Logie's dominance was short-lived; in 1931, US physicist Allan Balcom Du Mont produced the first practical, low-cost CRTs. Using film material from RCA, EMI's Central Research Labs developed a working high-definition TV system.

By 1933, the world of broadcasting as we know it was emerging. For radio, Edwin Armstrong and Michael Pupin developed and patented the frequency modulation transmission method. Armstrong later killed himself because he became mired in patent litigation; no-one would have blamed him if it had been due to the inanities later committed in the name of FM radio. Modern commercial radio had its roots in Radio Luxembourg, the 'home of the stars' that was for many years Europe's only conduit for new popular music. As for television, the world's first HD TV service began broadcasting from the BBC's Alexandra Palace studios in 1936, using the EMI system. Baird's system was abandoned but it is still his name that sustains, not that of the EMI team, particularly Alan Blumlein's.

The future big nations in television technology, the US and Japan, geared up in the BBC's wake. NHK began experimental transmissions in May 1937, a project based on the work of Japanese TV pioneer Kenjiro Takayanagi. In America, radio was still the ruler, as evidenced by Orson Welles panicking the Mid-West with his Mercury Theatre of the Air production of *War of the Worlds* in 1938. It proved the power of radio and suggestion; the only problem is that it has entered the American psyche and just about everybody—from movies to cartoon series *Hey Arnold!*—has done their own re-enactment of the event. But Welles would have probably enjoyed the manufactured mythic status...

Television was demonstrated to America at the 1939 New York Worlds Fair and technician-come-showman David Sarnoff, president of RCA, manoeuvred to produce programming for his TV sets, just as he had done with radio. In 1923 he had called TV 'the ultimate and greatest step in mass communication'; he founded NBC to do the job, but found himself up against another wheeler-dealer, William S Paley of CBS. When NBC was later forced to sell off one of its two networks by the FCC (founded 1927) and ABC was created, the word ratings would no longer only refer to a group of sailors.

So, it's the bottom of the page and we're only up to the Second World War. And who said the history of broadcasting was inconsequential? Sorry but we'll have to pick it up next month. As *Ally McBeal's* Richard Fish would say, by-gones.

Studer A820

In the second masterclass in this series **Raymond Budd** and **Martin Berner** take a look at the history and modification options of the Studer A820 multitrack machine

THE A820 MCH effectively replaced the A800 offering the world its first 2-inch multitrack with automatic audio alignment. One of the most significant features of the A820 MCH is that each of the tape transport command keys (except the one needed to scroll around in a certain menu tree) can be assigned an individual function selected from a menu of over 90 features. The experience of Studer's worldwide client-base was used to derive a series of country-specific operation modes replacing the expensive hardware modifications found on earlier machines. The resultant menu tree allows each user to select functions and modes, suited to their specific requirements.

The main features of the A820 MCH are its in-house designed, brushless, hall commutated, DC capstan motor; fast wind-speed (15m/s); reverse play and reverse record modes; its modularity (due to plug-in cards for fast and easy access in case of maintenance); and the opportunity to install an internal noise-reduction system (optional): Dolby A (CAT 22), Dolby SR (CAT 280), Dolby A/SR (CAT 300) and Telecom C4. If one wishes to retrofit any of the above noise-reduction systems into an A820 MCH, new PCBs are still available from Studer's representatives: (www.studer.ch/company2.htm).

Five internal microprocessors were needed to handle all the tape deck and audio commands. One in the Master section (Master MPU) to receive the key commands and illuminate the corresponding LEDs of the local keyboard or remote control, to memorise the tape tension parameters, the key assignments and internal modes and all the locator and counter positions. One in the Tape deck section (TD MPU) to read all the sensors and tacho information, to operate the solenoids, and position the pinch roller assembly, and to deliver the spooling motor with the required current. One in the Capstan section for the servo control of the capstan motor in nominal or varispeed mode as well as to ramp up the motor with a constant acceleration to reach the nominal speed after the pinch roller has pressed the tape against the shaft in case of a play or record command (Acceleration from 0–30ips in less than 0.1s). One in the audio section (audio MPU) to route the audio signal and to memorise all the audio parameters for two different brands of tape as well as for additional head blocks in 2-inch 16-track and 1-inch 8-track



Autoaligning, a fast transport and room for noise-reduction cards

format for either of two different brands of tape. One in the vu meter panel (vu MPU) to receive the audio commands and light the corresponding LEDs, to operate the bar-graph display and to keep the audio status after power off. Another microprocessor is required in the audio remote control to receive the remote commands and illuminate the corresponding LEDs.

Throughout the production of the Studer A820 MCH (1987–1994) several software versions were launched to implement new features or to improve the reliability of the machine.

The final Software releases are as follows: Master 04/91, Tape Deck 35/95,

Capstan 10/92, Audio 41/90, Audio Mk.II 42/90, VU Panel 42/90, Audio Remote 42/90. For the last few Studer A820 MCH and MkII version with an additional, not fully equalised Synchron Output, especially for noise gate triggering was brought out. Unfortunately an upgrade of a MkI tape recorder to this standard is not possible.

The Studer A820 MCH has its own software controlled error-detection system; this system has proved to be very successful. Due to the precise nature of the error-detection system, however, occasional error messages are caused by fluctuations in conditions. Happily there are some simple modifications that will help

suppress such messages.

MPU cards occasionally give 'Error, Data lost' messages on early versions of the A820 MCH. This is caused by an occasional incorrect microprocessor reset during the power on routine. For prevention please ensure the machine is equipped with the appropriate above software version. A further modification of the battery buffered microprocessor cards were developed in 1991 including the Master MPU (1.820.786.xx); Audio MPU (1.820.782.xx); VU Meter MPU (1.820.783.xx); and Audio remote control (1.820.783.xx). To identify whether this modification has already been made check that the PCB shows the index number 1.820.754.12 (this should be etched onto the PCB) you should find two stranded wires on the solder side, in case the modification is made. On the PCBs with the etched index number 1.820.754.13 this modification is implemented, too. (If you require modification instruction or would like to either update your PCB or update software revisions, please contact your local Studer representative.)

It is worth noting that these MPUs have the same board layout, the only difference between them all are the firmware on ICs 15,16 and 18, and the jumper positions which determine the identity.

Some brands of Crystals on the MPU PCBs cause ugly faults. It is definitely worth checking that the MPU PCBs no longer have the crystal type from NYMPH with the grey sleeves installed, otherwise replace them with the newer type metal face out (crystal, 4.9152MHz, order number: 89.01.0560).

'Move Sensor Hardware Error', 'Spooling Motor Tacho Left' and 'Spooling Motor Tacho Right' are all tacho error messages. The spooling motor tacho left or right message could be caused by damaged Light gate ICs in the Spooling motor bearing housing. Remove the tape tension sensor PCBs 1.820.771.xx and check that the body of the optical sensor is not cracked. Otherwise fit a new tacho PCB, the light gate IC with it is sealed with a certain lacquer to make it resistant to the air-condition inside the sealed bearing housing. It is also worth ensuring that there are no oil drops on top of the tacho disk before reinstalling the PCB; the access to clean or even to check it is not very easy. The best way to do this is to use two head-cleaner sticks (available from Studer, part number: 15.066.001.00) insert one onto the top and the other on the bottom of the tacho disk and press them together while turning the corresponding spooling motor by hand for cleaning. It is best to use the sticks either dry or after applying a little soap solution onto the tip of the stick. Do not use methylated spirit or any other acid liquid to avoid erasing the tacho segment marks imprinted to the tacho disk.

The move sensor hardware error

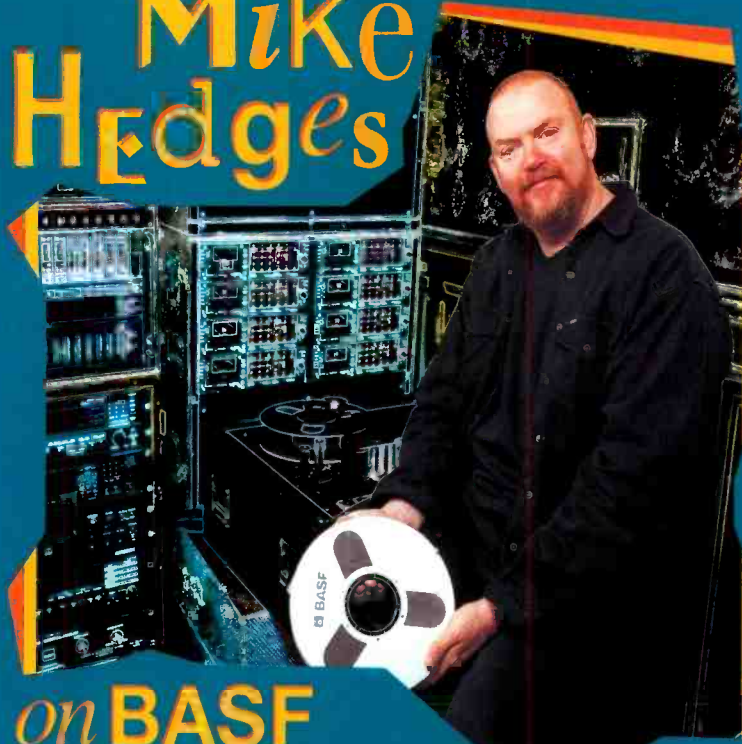
could be caused by a failure of light gate IC or by slippage of the move roller. This can be cured by cleaning the move sensor roller surface, or by replacing the roller with the newer type (dark grey colour) which has more adhesion (part number: 1.080.446.08). The duty cycle of the tacho pulses should be checked and readjusted according to the manual.

The capstan drive amplifier (1.820.774.26) is another cause of error messages and should be modified by replacing diode D7 (6.8V Zener) with a 6.2V Zener. The modified card should now be indexed 1.820.774.27.

The two washers between the two power transistors and the heat sink should be replaced with the thick washers 50.20.0331 to avoid false key command recognition of the Studer A820 MCH. With this modification the PCB will become 1.820.774.28. ■



Mike Hedges



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Distortion

Distortion is simultaneously one of the most frequently used words in the audio industry and the least understood. **John Watkinson** tries to straighten the waveform

THE TERM DISTORTION is often used loosely to suggest that an audio waveform isn't exactly as it should be. While not untrue, there are, of course, other causes of this; noise for one. This makes the definition of distortion harder to derive. Fig. 1a shows that we can consider any non-ideal audio signal path as consisting of an ideal path that passes the waveform unchanged, followed by a stage that adds an unwanted signal to the perfect signal. Clearly one aspect of the art of high audio quality must consist of minimising that unwanted signal to the point where the audio waveform is as accurate as our ears can detect.

Minimising the unwanted signal is easier if it is understood. Fig. 1b takes the concept further by breaking down the unwanted signal into two parts: one that is unrelated to the signal and one that is

a function (however complex) of the signal. It should now be clear that the unrelated signal is what we normally call noise and the related signal is distortion.

Signals unrelated to the audio waveform include tape hiss, thermal noise in electronic components and crosstalk from other channels of audio, video or even radio frequency breakthrough. Having eliminated unwanted addition to the audio waveform must now be some function of the waveform itself. This is the definition of distortion: a process that adds to the waveform a function of the waveform.

By this strict definition, even a tone

control causes distortion because it alters the waveform (and, of course, we can hear it). For convenience it is necessary to subdivide distortion into two categories. The first, known as linear distortion, changes the waveform without generating harmonics, and the second, known as nonlinear distortion, changes the waveform and adds harmonics. This is shown in Fig. 1c.

Linear distortion comes about because different frequencies pass through a system at different speeds and so a complex waveform is changed because the high frequencies shift with respect to the low frequencies. Fig. 2 illustrates the point. Fig. 2a is a waveform containing a range of frequencies. Fig. 2b is the waveform after linear distortion. Note that the waveform has changed, but no new harmonics have been created.

In contrast, Fig. 3 shows that the term nonlinear relates to the transfer function. In Fig. 3a a sine wave passes through a system having a linear transfer function. There is

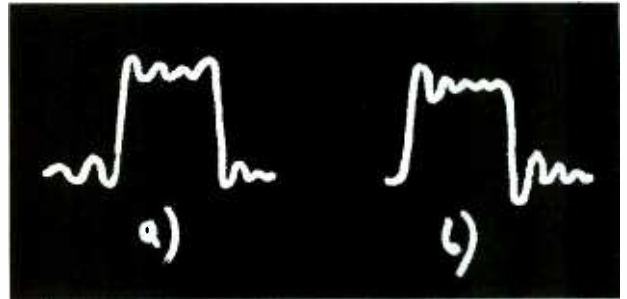


Fig. 2: Linear distortion

no distortion. At Fig. 3b the transfer function is curved, so that the output is not a sine wave. As a sine wave is a pure or single frequency signal, if the waveform is no longer sinusoidal, harmonics must have been added.

A system that creates no nonlinear distortion is said to have a linear transfer function whereas a system which creates no linear distortion is said to be phase-linear. Unfortunately many people refer to linear frequency responses when the correct term is flat: this causes confusion.

The reason there is so much fuss about distortion is that above certain levels it is audible and impairs realism. In general the concept of harmonic distortion is well known to be damaging, whereas linear distortion damages realism in a different way, but the fact that it does so is not as well appreciated as it might be.

An audio system having a nonlinear transfer function will produce harmonics from a single sinusoidal input, and sum and difference frequencies from a pair of sinusoidal inputs. The latter is known as intermodulation. The effect of this kind of distortion is to change the harmonic structure so that the timbre of musical instruments is altered. The harmonic structure of sound is analysed by resonant structures in the ear which take time to operate and so harmonic distortion is most audible on sustained notes. Very brief harmonic distortion, lasting less than 1ms, will not be heard, hence the use of a standardised attack time in a PPM.

In contrast, linear distortion is seldom audible on sustained notes. It is possible to change the linear distortion of a square wave and it doesn't sound any different. It is this fact that has led to the myth that phase doesn't matter, whereas all that is actually proved is that it's not important on statistically stationary (continuous) signals. In fact the time-domain accuracy of transients is exceptionally important. Transients are analysed by a different mechanism in the ear which is

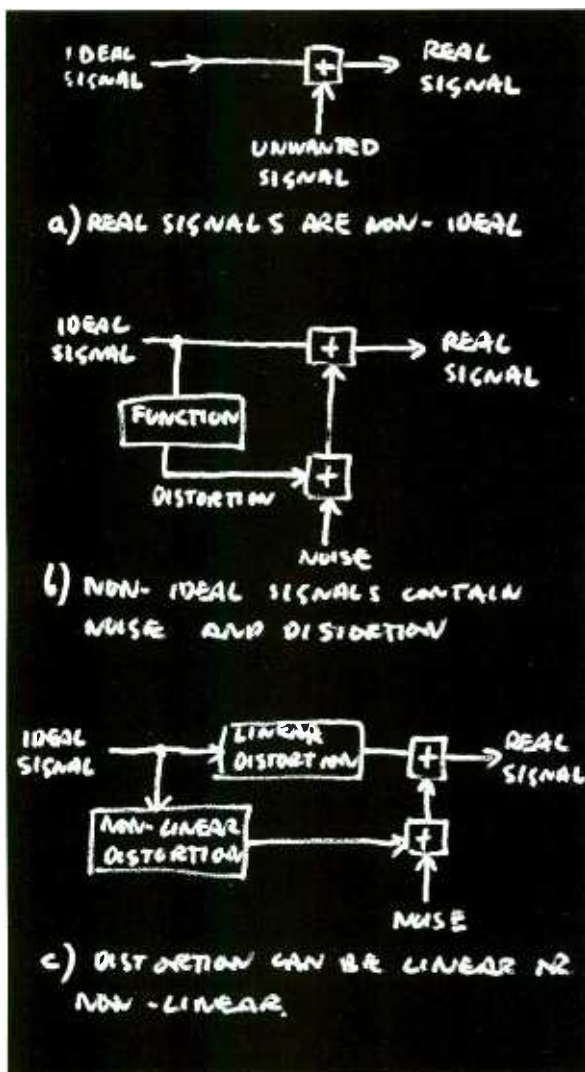


Fig. 1: Defining distortion

sensitive to linear distortion. If the linear distortion experiment is repeated using a percussive instrument the introduction of linear distortion is dramatically audible.

The fact that harmonic distortion, or frequency domain distortion, is most audible on continuous signals whereas linear or time-domain distortion is most audible on transients is a direct consequence of the ear obeying Heisenberg's uncertainty theorem without which a proper theory of hearing is incomplete.

Harmonic distortion is difficult to measure. Conventionally an input signal of a certain frequency is applied to the system, and on the output that frequency is notched out by a high rejection filter. In theory, any energy remaining must be at other frequencies and so must be distortion. In practice energy at other frequencies may also be due to noise and so what is actually measured here is the total harmonic distortion plus noise (THD + N).

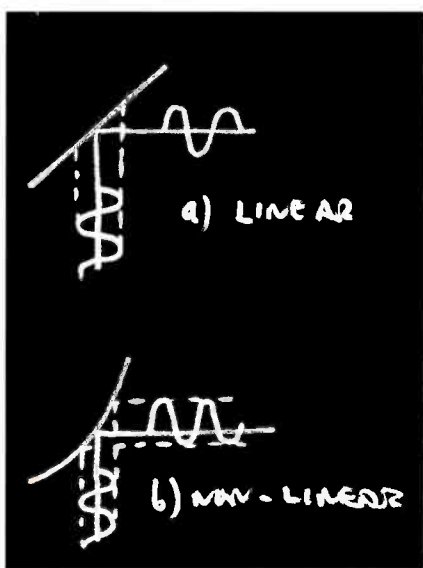


Fig.3: The term nonlinear relates to the transfer function

THD is normally expressed as a percentage of the signal power that is converted to harmonics. This is a vague measurement that gives absolutely no insight into the harmonic structure of the distortion or of its audibility. It is important to bear in mind that all practical musical instruments use non-linearity to create the harmonics that give them a pleasing tone. This does not mean that harmonics are always pleasing, it is just that musical instrument designs having non-pleasing harmonics were abandoned.

Thus it is possible to have two cases in which the same amount of distortion power is present and the same test percentage reading is obtained, but one of these has a pleasing harmonic structure and one does not, leading to an obvious audible difference in quality. The figure of 0.1% THD was considered quite respectable when valve audio amplifiers were common, because valve

amplifiers having this distortion level sounded 'clean'. However, when the first transistorised amplifiers were introduced, it was misguidedly thought that 0.1% THD was the appropriate design goal. It would have been if the harmonic structure of the solid-state amplifier was the same as that of a valve amplifier, but unfortunately it is not.

The distortion spectrum of solid-state amplifiers is more audible and so a lower measured level is required to give the same subjective performance. The result of this misunderstanding was that the first solid-state amplifiers represented an enormous leap backwards in sound quality, thankfully since rectified. Interestingly the distortion characteristics of loudspeakers are different to amplifiers, so that a distorting amplifier can be detected even with speakers that distort.

The mistake made with early transistor amplifiers was to assume that the THD figure is more meaningful than it really is. In fact the THD measurement does not and cannot relate to what a system sounds like. Another mistake that is commonly made is to test for THD at an inappropriate level. Class-A valve amplifiers suffered most distortion at full power and this is where THD was measured. If this approach is used for class-B amplifiers or A-D converters the results will be over-optimistic because both of these suffer from distortion that increases at low levels. In the amplifier there is crossover distortion and in the A-D converter there is quantising distortion.

The correct approach to distortion testing is to measure THD + N at a variety of levels in order to find the level at which it is worst. Anything else is either self-deception or dishonesty, depending upon whether the product is being developed or sold as a result of the tests. For a full insight into distortion, it is necessary to analyse the spectrum of the distortion. Unlike the THD + N measurement, the distortion spectrum does relate to the audible performance and it can to a large extent separate the effect of noise.

In stereo the two signals have a further function which is to deliver spatial information. As a result a stereo signal pair contains more than twice as much information as a mono signal. The spatial information is carried in the difference between the signals. By definition if an accurate difference signal is to be derived, the two signals to be subtracted must be very accurate.

As a result everyone knows that the frequency and phase response of stereo signals must be more accurate to prevent image wander, but oddly it is less well known that stereo signals must also have a lower distortion figure than mono signals. In mono all the sounds come from the same place and masking is at its greatest. In stereo masking is less effective and the signals have to be cleaner. ■

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A way in or the way out?

The latest technology seeks to alter the way we work and the way audio fits into the production universe. **Zenon Schoepe** argues it threatens our ability to earn a living.

IN THE YEAR 2000, a young boy will walk in to a music shop and with great excitement, and more than an element of relief, will hand over his hard-earned savings in exchange for the guitar that has been hanging on the wall for months. Elsewhere a guitarist will yield to a persistent nagging desire and decide to buy a portastudio. A dedicated home recordist will have finished doing his sums and will commit to jacking-in his day job, moving premises and upgrading his inflated arsenal of recording paraphernalia to the point where he believes he will be able to charge for it. Some years later the portastudio guitarist will enter a proper studio for his first session, he'll lend a hand in the control room and won't go home for two days.

In the city an undergraduate will get a job as a runner for a postproduction house during the summer holidays and will help out in the transfers suite. He'll demonstrate an aptitude and when the facility is besieged by a large rush-job he'll run no more, he'll never return to college and in a year he'll be track laying at a rudimentary level on his own.

Somewhere else, another will go against his parents' best advice and gain entry to a broadcaster's protracted and underpaid training scheme while a band's friend and roadie will be forced to take command of the basic mixing console when the regularly unreliable sound man finally doesn't make it to the gig. Finally a talented electronics boffin will quickly and efficiently sort out a circuit board for a friend who has convinced the landlord of a local pub that he can build him a sound system out of bits and pieces.

These are all typical anecdotes of how people got into, or fell into, the audio industry. They will be as applicable and current next year as they ever have been and in all cases these newcomers are grasped by the excitement and passion of being involved with sound. They see themselves as part of, and a continuation of, work that has been ground

laid by famous names and famous projects.

We have an illustrious heritage and despite our meagre size and comparatively paltry resources, at the high end we concern ourselves today with the sort of real-time digital processing that you'll also find only in military applications. Remarkable achievements yet we do ourselves down either through humility or because we take it for granted.

What you have to ask is what sort of prospects of a future and 'way in' will we offer the young of the next century? What all the aforementioned tired old anecdotes have in common is that they represent first steps on a ladder of career progression. There was somewhere to go.

There are those who will tell us that the personal computer will eventually become powerful enough to incorporate advanced audio capability, and video capability lest we forget, in much the same way that it currently offers a web browser, email and a host of word processing and office tools.

We already see DAWs and digital desks that are affordable enough to be made to work outside of studio complexes. Most music is already roughed out on personal setups, much even goes to completion in the same way. Broadcasters are being asked to balance increased throughput to feed more channels with a requirement to save money at all stages. Film is stratified into enormous filmmaking centres and those altogether leaner national operations that serve the small population of a single local language.

Technology is enabling and it will become even more self-sufficient, but with self-sufficiency comes isolation. This purported scenario paints a desolate and solitary operating environment in which users will be able to do most, if not everything, themselves and they will not be required to interact with others for contribution to the equation. They'll interact most with the paying client.

It'll be marvellous technology in the hands

of the skilled, established and gifted, but where in this is the 'way in' for new recruits? Where is the industry in all this? Is it the making of the finished product and the using of branded machinery that constitutes an industry or is it the community that makes an industry?

For me it has to be the latter and the inheritance by all of relevant audio computer tools does not broaden our industry, it dilutes it.

Computer processing has created a seemingly insatiable demand among manufacturers for writers of code, but notice how the business of conversion, the real-audio interface, has remained the preserve of a relatively few small companies. User-interfaces, their sophistication and suitability for specific tasks, have remained a bastion of professional qualification, the sort of professionalism that fuels audio production businesses with back up, service and recruit intake. Yet the last five years have seen an about turn in what is deemed acceptable operational compromise when lured by the Jezebel of affordability. Common sense and prevailing commercial currents suggest that businesses based on these foundations will be run tightly and will not have the capacity to indulge in any sort of long-term investment in recruitment.

Working practices are being changed dramatically by the democratisation of technology. It's to be expected, it is nature's way, it's what it was created to do. Within this context we all have a duty to fly the flag for audio and to draw new blood into the industry and to instill in them a sound sensibility so they can continue the work after we have gone. It is also vitally important that we keep hold of the talented individuals we have.

Before the advent of the affordable, compact, fax machine I would pay a bureau dearly for the convenience. Typesetters were once pivotal to publishing, but with the arrival of desktop publishing they simply disappeared. I can see analogies to our audio world. ■

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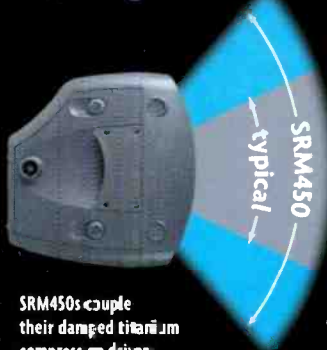
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