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Networking Protocols Vie for Attention

ATM, Fibre Channel, SDDI Give Engineering Community Ample Food For Thought

by Chris Dickinson

At least three new video networking technologies will be on the agenda of the TV engineering community this Summer, as the momentum gathers behind the wholesale move to digital production and parallel developments in compression continue apace.

THREE'S A CROWD

One protocol is already being used between companies and even continents, another has the backing of key manufacturers as a facility routing standard, while yet another - originally designed for moving video and audio data round a newsroom and - is being tested for long distance routing by US telecom giant AT&T.

The problem for potential users is which system should they opt for - and whether these are true breakthroughs or just three more protocols to add to an already crowded market.

The system making most of the running in Europe this year has been the ATM (Asynchronous Transfer Mode) optical networking technology. ATM is being used in a new fibre-optic network connecting a consortium of seven video and film postproduction houses in London, England. Telecom providers BT and Videotron are operating the UK network - dubbed SohoNet - with links to Hollywood promised later this year.

To confuse matters further, there are different forms of ATM with standards still

under development. But SohoNet claims to be using the latest ATM version with networking speeds of 155 Mbps.

ATM is also being used in tests by German broadcasters NDR, ORB and ZDF, along with Deutsche Telekom. Avid is helping with these tests, which allow two NewsCutters to exchange news stories, graphics and other digital material over 400 km at speeds of 50 Mbps.

Further uses of ATM include a new video transmission service being offered by IBM over its private data network, the IBM Global Network, as well as several services in the US including the Pacific Bell Media Park network in Hollywood and Sprint's Drum service.

FIBRE FRENZY

The second new system being trumpeted by its backers is Fibre Channel, originally developed by Tektronix, but at NAB pulling in Hewlett Packard, Avid (again), Panasonic and Silicon Graphics as public supporters.

Fibre Channel does not claim long distance networking status, but is being touted

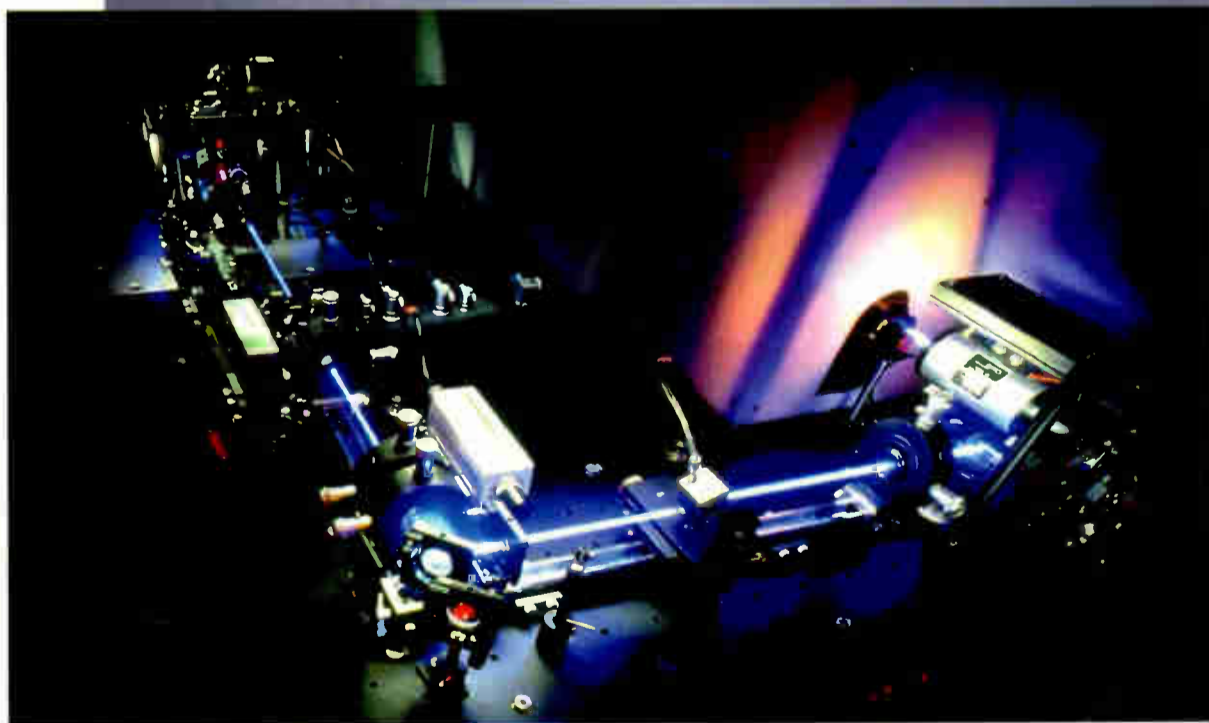
as the standard for routing material within a facility. Tektronix says it offers a peak bandwidth of 1 Gbps, is based round MPEG-2 compression, and could work in harmony with ATM - with Fibre Channel covering the local network, and ATM catering for long-distance traffic.

The third system is SDDI (Serial Digital Data Interface), developed by Sony as the

compression-friendly version of its SDI, which has long been accepted as the de facto industry standard for television routing.

SDDI is an integral part of Sony's 'Total Solution' for the newsroom. AT&T has also run tests with the system, passing video signals between New York and Las Vegas over a single 45 Mbps line. ■ (See News Analysis, Page 6)



The Nimbus Ultra Violet Laser Beam Recorder is at the heart of Europe's first DVD mastering facility. The Netherlands facility will meet the demand for DVD titles anticipated this autumn, according to owners EMI. Newswatch, page 3.



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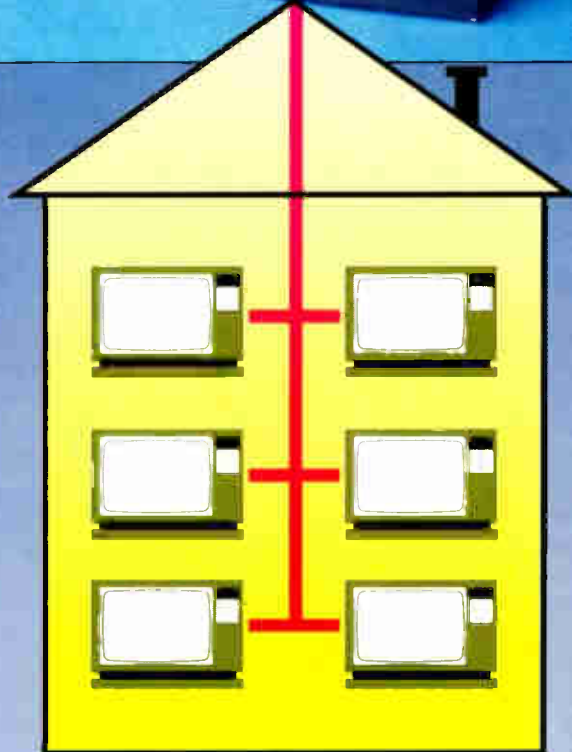
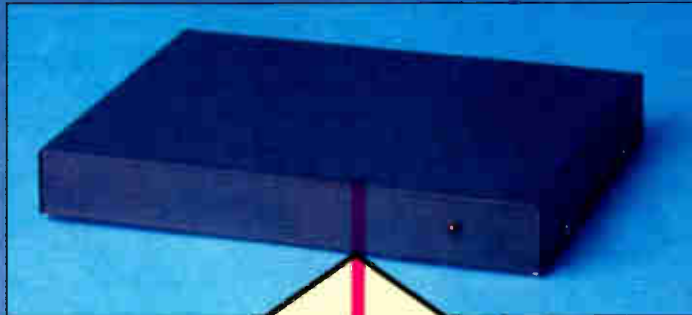
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INTERACTIVE TV

TELETEXT VIA ATM

CAMBRIDGE, UK

Wait-free teletext has been added to the menu at the Cambridge Interactive Television Trial in the UK, giving viewers an early glimpse of the potential for the much-heralded 'intercasting' concept.

Intercasting has been touted as the means by which broadcasters will seize the initiative from burgeoning Internet Service Providers like CompuServe, AOL and Pipex. It involves including Internet-style pages in the same bitstream as pictures, saving viewers the effort and delay of a telephone modem connection. Unlike a dial-up service, basic pages could also be free of connection charges, with income potential on premium information such as stock prices.

Teletext has been providing information alongside pictures - as digital data in the vertical blanking interval - for more than two decades in Europe. Unlike the World Wide Web, it is a text-only system. But viewers also experience delay, as information pages are transmitted in sequence at less than 76 kbps.

This is eliminated on the Cambridge trial, by sending pages from ITV and Channel 4 provided by Teletext Ltd as a 2 Mbps burst within the bitstream used for pictures and sound.

The Cambridge trial was launched in September 1994 and uses an Acorn Online Media set-top box connected between the ATM (Asynchronous Transfer Mode) cable network and a normal TV. On-demand services currently include movies, education, games, news, documentaries and weather. Subscribers can not only access but also manipulate programmes as if they were playing from their own VCR.

Further tests will include a 'hyper-teletext' news service with links to other services such as the Internet, and the development of Electronic Newspapers incorporating high-quality pictures and graphics. Acorn Group's home page is at <http://www.acorn.co.uk>.

DIGITAL DISK

DVD FOR EUROPE

UDEN, THE NETHERLANDS

EMI International has set up Europe's first mastering facility for DVD (Digital Versatile Disc) at its manufacturing plant in the Netherlands, as part of its expansion into the digital media market.

The move follows the installation of an interactive media development suite at EMI's flagship Abbey Road recording studio in December last year.

An authoring suite was subsequently opened at the Town House studio in West London on April 1 specialising in high-

quality pre-mastering of MPEG-1 material for CD-ROM and Video CD discs, and MPEG-2 footage for the 4.7 GB DVD format and digital broadcasters. Up to 30 times real time is taken to process each frame in an off-line process designed to maximise coding integrity.

DVD masters will be cut on a Nimbus Ultra Violet Laser Beam Recorder (see cover picture), which is capable of mastering the whole family of CD formats. EMI says the plant will be operational in time for the anticipated demand for titles this Autumn, and a companion DVD manufacturing line is under development to support the format's launch in Europe.

DIGITAL SATELLITE

CANAL PLUS GOES DIGITAL

PARIS, FRANCE

Europe's first digital satellite service was launched on April 27 by Canal Plus. Subscribers are offered a choice of 24 channels via DVB-compliant set-top receivers developed by Sony Research and Development in Europe and manufactured in Sony's Pencoed Technology Centre, Wales.

Sony is a Steering Board member of the European DVB (Digital Video Broadcast) Group, and developed the conditional access and applications program interface with SECA and Canal Plus.

Meanwhile the EBU says it intends to set up a parallel DVB Implementation Group (DVB-IG) along the lines of the EuroDab digital radio forum to "actively pursue the objective of smooth, cost-effective and efficient introduction of digital terrestrial television in Europe."

For the first time this will involve service and programme providers previously excluded from implementation talks.

VIDEO TAPE

D-VHS STANDARD FINALIZED

YOKOHAMA, JAPAN

JVC's tireless and so far successful campaign to retain supremacy in the home video format stakes has taken another step forward with the announcement that its D-VHS Standard mode format has been finalised.

The new specification, which was hammered out with Hitachi, Matsushita (Panasonic) and Philips, comes almost exactly a year since the format was first proposed in April 1995.

Based on VHS, the world leading analogue video format developed by JVC some 20 years ago, D-VHS uses bitstream recording to allow future broadcasts and other digital data to be stored in their original compressed form. There are no video connections - recordings are played through a set-top receiver like an off-air signal.

In the D-VHS (Std) mode, data is recorded at an overall rate of 19.14 Mbps, which includes a separately-accessible 146 kbps sub data stream. Two cassette lengths will be offered initially, using a new grade of tape based on S-VHS. The 31.7 gigabyte DF-300 cassette will capture five hours of TV, and the extended 44.4 GB DF-420 seven hours.

JVC believes the fact that D-VHS machines will be able to playback the vast worldwide library of conventional VHS software - as well as S-VHS and the W-VHS widescreen format available in Japan - will secure its position as the dominant home recording medium, "as we approach the upcoming multimedia era".

Applications for D-VHS could include an in-home entertainment or data server for both off-air or pre-recorded material, future two-way digital communication and data manipulation, as well as the more traditional timeshifting and editing duties.

For this reason all D-VHS (Std) machines will incorporate the IEEE1394 Digital Interface - a high-speed serial protocol operating at up to 400 Mbps - for communication with external equipment such as computers, video cameras, electronic still cameras, and other digital audio/visual equipment.

JVC UK spokesman Mike Whyman told TVTI that D-VHS Standard Mode machines are due to be launched in the US by the end of the year. "We're only launching in countries where digital broadcasting is established," he says. "There are no plans at present for Europe."

Other D-VHS modes announced a year ago are an HD Mode running at 28.2 Mbps and storing 3.5 hours of high definition TV (or two simultaneous channels at standard resolution), and a 7 to 2 Mbps LP Mode storing 14 to 49 hours. These are still outlined on JVC's Web site (<http://www.jvcvictor.co.jp/dvhs.html>), but no dates have been announced either for standardisation or launch.

JVC backs industry-wide support for mini-DV - a small-cassette version of the consumer format which spawned DVCPRO - as the digital camcorder format of choice for home use.

But in a throwback to the VHS vs Video 8 battle of the Eighties - and VHS vs Betamax before that - Sony is also thought to favour DV as a deck machine to rival D-VHS.

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Welcome!

With this month's issue, TV Technology proudly announces the appointment of Richard Dean as Editor. Many of you will already be familiar with Richard's work in the pages of World Broadcast News. He was that publication's chief European correspondent for the last five years, and he has written extensively in all areas of video technology. All told, Richard brings more than 17 years of experience in trade and bookstall media to TV Technology.

Richard's appointment signifies TV Technology's commitment to increasing its presence in Europe, part of an overall phase of major development for the publication.

Meanwhile, watch this space each month for Richard's words of wisdom. He'll help you sort out what's important in the ever-changing world of video technology.

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NEWS

Satellite Operators Seek Harmony

by Mark Hallinger

WASHINGTON, USA

A step towards increasing the interoperability of digital satellite feed equipment was taken recently when a dozen manufacturers met at Intelsat headquarters to compare products and test different combinations.

The event took place at a meeting of the Inter-Union Satellite Operators Group (ISOG), a group made up of Intelsat signatories, manufacturers and broadcasters which meets every six months to promote worldwide satellite resources for both radio and television broadcasters.

The impetus for this meeting's focus - described by officials as an information

exchange program rather than a standards affair - came from the growth in digital satellite transmission. In particular, the group was concerned about possible problems in the "occasional use" satellite market as the use of digital feeds continues to increase.

OCCASIONAL FEEDS

Occasional use feeds, which are unplanned, first-come first-served hops often used on a part-time or short duration basis, are currently analogue. Digital feeds here would often encounter interoperability problems between different manufacturers' equipment, as there is little time to confirm compatibility in advance.

For now, digital satellite transmission

remains the domain of programming that is planned well in advance, like a full-time channel or an anticipated event. For these applications equipment compatibility can be checked out well before the transmission.

According to Brian Knoblock, Deputy Foreign Editor of Operations for CBS News in New York and a CBS representative at ISOG, broadcasters do not have to think about transmission parameters in an analogue world, other than perhaps format changes between PAL, NTSC and SECAM. "You book an analogue feed and everyone knows what the equipment is going to be on each side," he says. "The feed will work. You don't have any transmission parameter issues.

"But in a digital world, a broadcaster might walk into an earth station that uses a Scientific Atlanta (S-A) box and send the pictures to a receive station that uses a General Instrument (GI) box. The boxes may or may not work together. All of a sudden a broadcaster has to start thinking about the transmission parameters for occasional use television," says Knoblock. "And that's something we haven't had to think about. Frankly, we don't want to have to think about it."

The aim of the Intelsat-ISOG testing program is to bring analogue's universality to the coming digital world, especially in the occasional use market where feeds are secured at the last minute. "We want to make sure that the output of one piece of equipment will work with the input of another," says Knoblock.

Knoblock adds that interoperability could also reduce broadcasters' expenses, citing a hypothetical example. "If I'm in Africa and I

**The aim is to bring
analogue's universality to
the coming digital world.**



want to feed to the U.S., and I discover that the only place with an earth station that can receive it is in France, that extra satellite hop could double my cost."

TENTATIVE RESULTS

Twelve companies participated in the tests, which consisted of side-by-side picture quality comparisons along with the interoperability checks. Those showing their wares included S-A, GI, Compression Labs Incorporated, Comsat/Wegener, Divicom, DMV, KDD/Ikegami, Philips, STS/California Microwave, Thomson, Tiernan and TV Comm.

Although final interoperability results were not published at press time, some general findings were evident. All of the systems displayed quality pictures at the 4:1 compression ratio benchmark used for the test. Tentative results suggested that the S-A, TV Comm and Philips systems were highly compatible.

"We got several of them to interact with one another, some had more-or-less full compatibility, some had some hitches like poor lip sync," says Vincent Walisko, Intelsat's group director of global broadcast and special services.

"The object of the whole thing was to define a few sets of parameters that we can give to manufacturers, and tell them that within the broad MPEG-2 and DVB standards, these are the particular parameters that are appropriate for different levels of occasional use interchange by satellite," says Walisko.

Walisko adds that the interoperability testing was really a "spot check," designed to generate some details on how the products interact. A second, similar meeting will be held in August, after the manufacturers have had some time to "tweak" their boxes using the results from the first gathering. He ultimately expects all manufacturers in this market to be fully interoperable with other vendors' gear.

"This is not like the consumer market where people will buy hundreds of thousands of units," says Knoblock.

(continued on page 5)



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The Countdown is on to Digital TV

by Richard Dean

After years of speculative talk, a sense of purpose at last seems to have entered discussions about digital broadcasting.

Rupert Murdoch has indicated he will launch a digital bouquet of up to 500 channels on his majority-owned BSkyB station next Autumn, and the BBC is hoping to have digital terrestrial broadcasts up and running by 1998.

Both of these self-proclaimed digital pioneers, and others in Europe such as Canal Plus of France, will have to work hard at weaning viewers off analogue pictures.

The BBC plans to offer extra viewing at programme junctions, and BSkyB is expected to announce ambitious plans for Near Video-On-Demand (NVOD).

Although NVOD squanders dozens of channels by repeating the same programme at regular intervals to create the illusion of interaction, when you've got up to 500 channels, who's counting? It's not an option for terrestrial broadcasters, who will be lucky to get 12 channels in total.

TECHNICAL STANDARDS

So much for modal distinctions. Much more pressing is the issue of technical standards. No viewers want to be saddled with a truck load of boxes to watch needlessly incompatible broadcasts.

This nightmare scenario has prompted Michael Starks, the BBC's Digital Broadcasting Project controller, to make an impassioned plea for standards harmonisation in the run-up to digital television.

"We must make sure that we don't build railways with different gauges," said Starks at a one-day conference in late May on the regulation of DTT (Digital Terrestrial Television).

"In the US, rival incompatible systems of digital satellite delivery are already developing. DTT is also planned, but probably with different receivers. In Germany, we

are witnessing sparring between the Kirch D-Box digital receiver and the Media Box from the rival MMBG consortium of Deutsche Telecom, Canal Plus and public broadcasters ARD and ZDF. Meanwhile Canal Plus in France has chosen one satellite route, and the main free-to-air broadcasters another.



Scientific-Atlanta's AllTouch universal cable/VCR/hi-fi remote control is an early attempt to reduce handset clutter in multimedia homes.

"It's no good the BBC getting its signals to every household - whether by rooftop aerial, satellite dish or cable - unless we can be reliably received on the consumer's equipment," said Starks, who believes most householders will buy only one receiver. "We are all familiar with the division between Apple Mac and IBM-compatible PC computers," said Starks. "We don't want a digital television divide like this."

Starks said the 33-member Digital TV Group of broadcasters, transmission providers, telecoms companies, silicon developers, encryption suppliers and receive-

er manufacturers have made important progress, notably in the field of conditional access. "But we also need a consistent regulatory framework across different distribution technologies."

This would include guaranteed access to public service channels with inclusion in electronic programme guides, maximum

how and to what extent broadcasters should take part.

One thing everybody seems to have agreed upon is that it's too slow. No wonder some have dubbed it the Information Superhighway, and mock the World Wide Web as the 'World Wide Wait'.

Downloading anything more fancy than text is a lengthy and tedious process, and the prospect of receiving movies or TV programmes this way sounds like the punch-line to an unfunny joke.

But according to PC software giant Microsoft all this could change, thanks to a new multimedia architecture called ActiveMovie Streaming Format (ASF).

ASF has been designed to store and transmit a variety of multimedia files across the Internet, or the lookalike 'intranet' closed information networks being installed across an increasing number of corporations.

Apple Quicktime, AVI or MPG (MPEG) video, HTML browser pages, WAV audio and other data types can all be combined into a single synchronised bitstream.

Avid's Open Media Framework (OMF) already allows various files from different machines to be loaded into its workstations. But each file has to be converted to and from OMF before they can be used, just as goods have to be packed and unpacked when they are sent through the post.

Where ASF differs is in the word 'Streaming', which makes it behave more like a fax than a parcel.

As soon as a fax transmission begins, you can start to read it. Similarly, ASF files begin playing immediately. In other words, downloading time is eliminated.

inter-operability between delivery systems with open or shared technical standards, and access to conditional access and subscriber management gateways by service providers on fair and non-discriminatory terms.

"We must make sure that we don't build railways with different gauges."

— Michael Starks,
the BBC's Digital Broadcasting Project controller

CONTINUED FROM PAGE 4

In Search of Digital Satellite Interoperability

"Manufacturers have to decide whether they want to be in this business. If they can tweak the boxes they have that's one thing, but if they have to start a new box they will have to make a judgement."

MOSTLY MPEG

Nine of the 12 companies represented were using MPEG-2 technology, many of them fully Digital Video Broadcast (DVB) compliant. Walisko says that although two products labeled MPEG or DVB should in theory be compatible, the standards (both MPEG-2 and DVB) are both so broad that this is not the case. There are many combinations of data rates and audio channels possible within the standards.

Some problems with audio emerged too. "Certain audios didn't match up, and the video was not always in sync," says Knoblock. "Manufacturers have a choice of where they are going to process the audio, either in the encoder or the decoder. If you have two manufacturers who take a different tack on this, it won't work."

Another interesting aspect of interoperability is the time it takes to get the units working together. Some took minutes to set up, making them suitable for occasional use applications, while others required hours of more extensive work.

Both Walisko and Knoblock were happy with the gathering. "This was an information gathering and an information exchange program between the broadcasters and the manufacturers, all on the neutral ground of Intelsat," says Knoblock.

"Everybody I spoke with was amazed that we were able to get these manufacturers to work together," adds Walisko. "We made tremendous headway, and in the next one or two iterations we should pretty much take care of the interoperability situation." ■

The BBC is taking an aggressive stance towards digital broadcasting. On April 9 it became the first broadcaster to successfully transmit and receive a TV signal compliant with the MPEG-2 based 2,000-carrier DVB-T (Digital Video Broadcasting-Terrestrial) standard since it was finalised in February. Further tests are planned for multi-channel television with an integral electronic programme guide (EPG).

But as its recent 'Extending Choices in the Digital Age' policy statement made clear (see <http://www.bbc.co.uk/info>), the Corporation has also promised to serve cable, satellite, and Internet markets in addition to its traditional terrestrial base without raising the licence fee.

Funding for the BBC's £200 millions digital TV project will come from a combination of further efficiency savings, income from pay services offered by its BBC Worldwide commercial venture with Pearson, external investment through the Private Finance Initiative scheme, and a lump sum from the government-imposed sale of its transmitter network.

Any uncertainties about the interoperability of digital media are dwarfed by the mysteries surrounding the role of the Internet.

A consensus has yet to emerge on what influence it will have on broadcasting, or

Internet streaming was first pioneered for radio by two US companies, Progressive Networks with its RealAudio algorithm, and Xing Technology with StreamWorks.

According to Progressive Networks, there are now more stations on the Internet than you can hear in New York City, which translates to well over 80.

There are some obvious snags with live broadcasting over the Internet. Phone-in participation is a non-starter even from a second phone, because compressing and decompressing the signal at each end of the line adds a 7 second delay.

Also, users have to stop the stream to send an e-mail. And depending on who provides the phone and Internet access, there are likely to be connection charges. On the other hand it may be the only way to hear a foreign station.

Some stations such as ABC in the US and the BBC are already beginning to offer an albeit limited audio-on-demand service for the more than four million RealAudio players that have been installed on computers worldwide since the format was launched in April 1995.

Both RealAudio and Xing are among over forty Internet Service Vendors, Webmasters and content companies that have agreed to

(continued on page 8)

In Search of the Perfect Protocol

Integrated Networks Are Here... But When Will They Speak The Same Language?

by Chris Dickinson

LONDON

What are the relative merits of the different networking protocols that are being made available this year, and how does the industry line up behind each?

ATM (Asynchronous Transfer Mode) optical networking technology has many supporters, with several big trials of video networks using the technology in some form.

In the UK, the SohoNet ATM network currently connects facilities, ad agencies and production companies within just a small part of central London. But BT, which provides the fibre-optic infrastructure, has ambitious plans to reach out to the big studio complexes on the outskirts of the capital - and ultimately via satellite to Hollywood and mainland Europe.

BT has already proved that the much-vaunted US connection is technically feasible by demonstrating a 10Mbps ATM network between Las Vegas and the London SohoNet at NAB. It is thought likely that the company's US telecom partner MCI would become involved in a permanent link.

SPEED

The initial networking speed of SohoNet is 155 Mbps. This is over a thousand times faster than conventional ISDN-2 lines, or the equivalent of over 2,000 standard phone calls taking place simultaneously. The next generation of the system will run four times faster still, allowing multiple real time D1 video streams to be carried over a single data connection.

One of leading lights behind the use of ATM in SohoNet is Neil Harris, a director of London and Los Angeles facilities, The Computer Film Company (CFC). "This is the first stage in the creation of an on-line digital media marketplace in London," he says. "CFC has long been involved in the convergence of digital film and video into an all-computer, tapeless future. We see this network as part of this process."

Harris is an enthusiastic backer of ATM. "There are good reasons for choosing ATM," he says. "One of the main things is that it allows multiple packets of data to slide past one another. Most of the other technologies only allow you to send one packet at a time. You have to wait for the end of first packet to be sent before sending the second. It means the underlying hardware has a lot of jitter; a lot of stop and go. It seems better to me to keep things smooth in the first place."

PACKETS

Because ATM supports both the sending of single packets of data and of continuous streams, there should be no delays if two companies want to communicate in real time, adds Harris.

Another group of users of ATM are German broadcasters NDR, ORB and ZDF who, along with Deutsche Telekom and with the help of Avid, are trialing an ATM network between Hamburg and Potsdam.

Using two Avid NewsCutter non-linear news editing systems and a 50 Mbps ATM

service provided by Deutsche Telekom, NDR and ORB have successfully transferred multiple news stories ranging from between fifteen seconds and three minutes in length across the 400 km between their respective sites in Hamburg and Potsdam.

Peter Konig, head of the technical department at NDR says digital technology has a major role to play in all aspects of television production. "Consequently we regard the

NEWS ANALYSIS

results of the ATM wide area network transmission tests as vital for the integration of disk-based production environments into local television stations, and global production structures of broadcasting bodies," he says.

IBM has also started a new network-based video transmission service in partnership with TXMedia called IBM Video Services, using the private IBM Global Network. The service rolls out over the next twelve months across the US, and to 18 other centres around the world by 1998. One of the first users of the network is Keystone

TCP/IP Ethernet. You can't play ATM into our machines, you have to go through another box. Of course, it does not have to be an expensive box, and it is not beyond the wit of man to devise something. But so far, there isn't a lot of demand to do it," he adds.

There are also rival networking standards that could perform the same functions. Sony, for example, has its Serial Data Digital Interface (SDDI), the compression-friendly development of its industry-standard Serial Digital Interface (SDI).

Sony has announced that AT&T has tested SDDI over a wide area network, with a view to launching a commercial service. According to Sony executive Charles Steinberg, the tests are part of a strategy to make it easier for broadcasters to get digital video back from the field to their studios.

"Sony and AT&T have been collaborating to develop digital video services which provide broadcasters with the tools they need to push video production closer to the origin of the event, and rapidly transmit the information with higher quality and efficiency than is currently available," he says.

Another new networking protocol is Fibre Channel, backed by Tektronix, Hewlett Packard, Avid, Panasonic and Silicon Graphics. The five companies say they are committed to supporting "open, interoperable solutions which will allow broadcasters to grow their facilities without being locked-in to a single vendor's solution", taken to be

the means of networking video and audio around and between facilities is set to become another hotly-contested market. ■

NEWS WATCH

EDITING

RAI BEGINS TAPELESS TRIAL

ROME, ITALY

Italian state broadcaster RAI has been shopping at Avid as part of an experiment to optimise operational efficiency across all working practices.

The performance and running costs of eight Media Composer digital non-linear editing systems, two AudioVision digital audio workstations, and three NewsCutter digital news editing systems are to be monitored and compared against those of traditional tape-based equipment.

Some financial benefits are already apparent, according to RAI's systems manager Roberto Cecatto. "I estimate the set-up costs to be as little as a third of the price of an equivalent analogue facility," he says. "In addition, the systems will offer a much improved method of working. For instance the ability to change a programme as often as we like without distorting picture quality will give us a lot more editing freedom."

Another factor is training. In a traditional editing environment, separate training sessions are required across a range of on- and off-line editing, special effects, titling, and other equipment. With tapeless operation, all these functions are executed on a single workstation.

RAI plans to use the new systems both in its programme production department and for news items.

SHOWTIME

IBC SET TO BREAK RECORDS

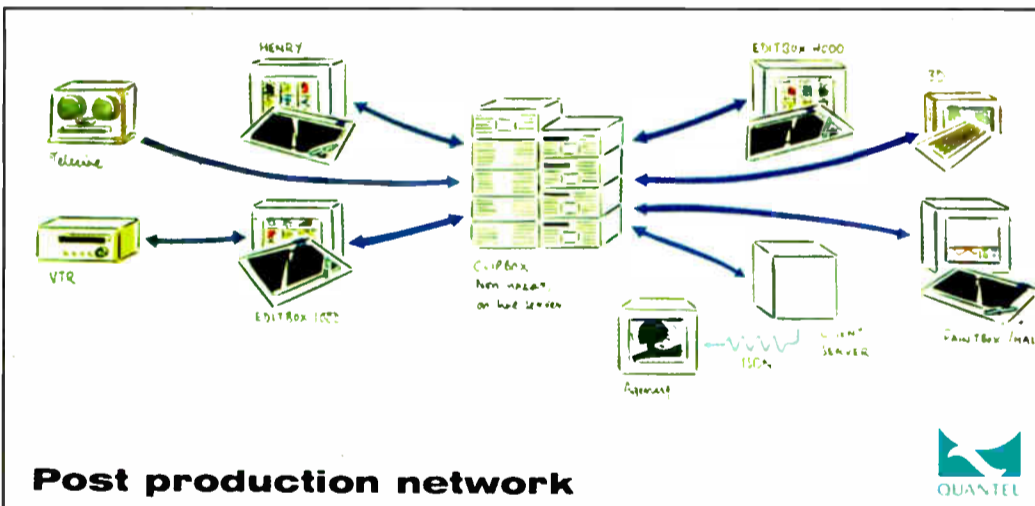
AMSTERDAM, HOLLAND

With eight exhibition halls, more than 450 exhibitors and 40,000 metres of floor space, IBC '96 is set to break all records according to the organisers.

Confirmed events for the show, which runs from September 12-16 at Amsterdam's RAI Centre, include IBC's own Le Nombre d'Or widescreen festival, a party on the night of Saturday 14, and a gala presentation of the IBC Awards on Sunday 15 from 5pm to 6.30pm.

A daily IBC breakfast TV programme will be available in main hotels, but for those unable to attend a repeat will be relayed by Reuters Television at 09.00 GMT (11am Amsterdam local time) on the H5 Upper transponder of the IntelSat-K F1 satellite.

For the latest details see <http://www.ibc.org.uk/ibc/>, or telephone +44 (0)171 240 3839.



Quantel's Clipbox-based Integrated Post Production System already uses proprietary PictureNet and the TCP/IP Internet protocol to connect system components alongside standard SDI. New networking protocols are now being used to link individual facility houses in London, and may soon offer a high-quality line to Hollywood.

Communications, which says it plans to distribute some 50,000 hours of sports coverage over the network.

But not everyone is as enamoured with ATM, especially when it comes to linking a wide area network into an in-house routing network or individual production equipment.

One of the problems is that the infrastructure of most facilities is not configured for ATM operation. Most pieces of broadcast equipment are not supplied with ATM connections, a notable exception being Silicon Graphics computers.

WARY

Quantel, for one, remains wary of ATM. "ATM is a technology with a lot of potential, but even if you speak to computer people, they reckon it's been over-hyped," says Bob Pank, technical communications manager at Quantel.

"We're pragmatists. For sending material, the TV industry has got SDI. Over networks other things come into play, but we have

a side-swipe at Sony.

Fibre Channel offers a basic bandwidth of 1 Gbps, which is four times faster than SDI. While ATM uses fixed 53-byte cells regardless of the payload, Fibre Channel frames can vary from 36 bytes to 3 kilobytes. The system also accommodates single-fibre connections for up to 10 km.

Rex Ferbrache, vice president of strategy at Tektronix's video and networking division, says the Fibre Channel protocols have been put to standards bodies ANSI and SMPTE with a view to creating a common format within broadcast and post production.

"Customers in both broadcast and post production segments have been asking for open solutions," says Ferbrache. "They want to be able to choose different components from different vendors, to create an optimum solution to their needs. This approach also allows customers to augment their traditional routing switchers with a more flexible, high-speed network interconnect."

With all the competition, it looks as though

High-Speed Modem Debuts

by Frank Beacham

LOS ANGELES

A new high-speed modem technology that will allow cable operators with one-way systems to deliver Internet data to subscribers has been announced by Zenith Electronics and U.S. Robotics.

The new system — the first of its kind — will allow cable subscribers to use a standard dial-up phone line for the upstream data path and the cable television coaxial pipeline as a high-speed downstream path. Such a scheme allows operators with older cable plants to quickly offer data services and bypass the sticky technical issues encountered in recent years with two-way data communications over cable.

The companies said the system will be available for delivery by early August and will be a small fraction of the cost of a cable plant upgrade from one-way to two-way capability.

READY TO DELIVER

"It essentially uses off-the-shelf products," said Zenith spokesman John Taylor. That includes Zenith's existing 4 Mb. two-way modem called HomeWorks Universal and

The new data delivery system is important to the cable industry because so few systems have so far been upgraded to two-way capability.



U.S. Robotics' Total Control Enterprise Network Hub. The hub, said Taylor, is new to the cable television industry but is widely used today in Internet computing installations.

A key selling point of the Zenith/U.S. Robotics system is that it allows one-way cable operators to quickly ramp-up for data delivery while offering a migration path to full two-way service when the cable plant is upgraded in the future. Zenith's cable modem, which will cost about \$400 in quantity, can be configured to operate as a one-way RF/telco modem now and then reconfigured remotely to operate as a two-way RF modem when the cable system is upgraded. Thus, the need for a new investment in subscriber equipment is eliminated.

The new data delivery system is important to the cable industry because so few systems have so far been upgraded to two-way capability. Zenith cited research by the Yankee Group that estimated more than 90 percent of the current cable systems are one-way, making it impossible for them to use cable modems with an RF return path.

"We are addressing the immediate needs of one-way operators who want to get into the data business today," said William G. Luehrs, president of the Zenith Network Systems division. "The U.S. Robotics headend system is an essential ingredient to the system, because an overwhelming number of cable systems are still one-way, and they demand a telco return option."

To upgrade a cable television plant to two-way capability the operator must purchase

new headend equipment, new hubs and new in-line amplifiers. The U.S. Robotics network hub can be added without these improvements at a cost of between \$30,000 to \$50,000 for the entire cable system, Zenith said.

HOME DATA

The Zenith/U.S. Robotics system uses one or more 6 MHz analog television channels for data delivery. At the cable headend, the digital data is modulated to fit within the assigned channels. At home, the cable is split with one feed going to the conventional analog cable set-top box and the other to the Zenith modem, which uses an internal

RF tuner to receive the appropriate cable channel.

The Zenith modem hooks to the cable subscriber's PC or Macintosh computer, which also must have a standard modem to make an analog or ISDN telco connection for the upstream connection. In order to control the upstream session, Zenith is supplying a dialer software application to be installed on the user's computer that communicates with the cable modem to set up and terminate the dial-up session.

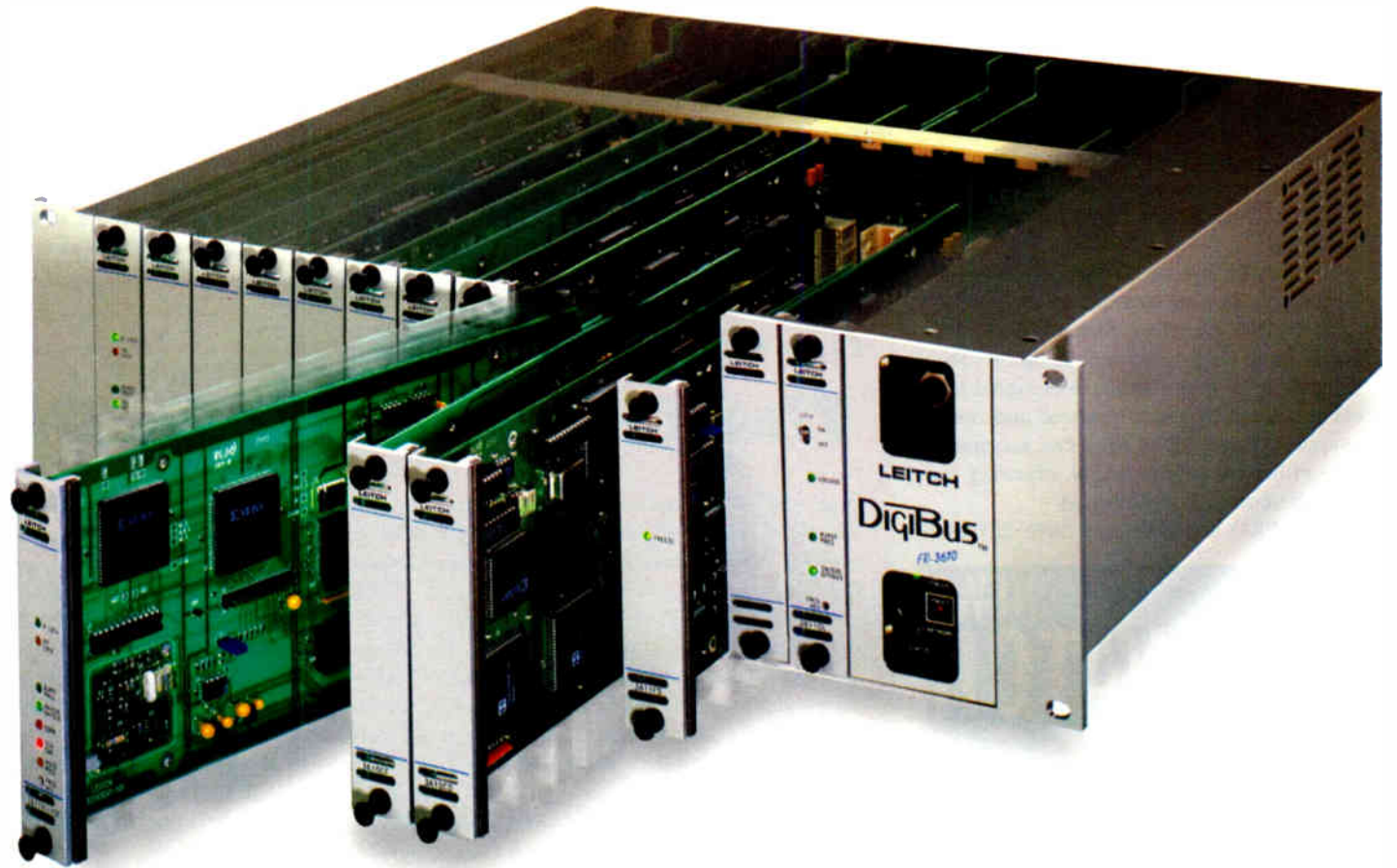
Because this is a hybrid system, the software supports the PPP protocol for dial-up transmission and the TCP/IP protocol for the RF data reception. This allows the computer

to continue to use the same configuration that is used for a two-cable implementation.

"PPP encoding of data packets will be used to transport TCP/IP (requests for information) packets across the switched network to the headend where a U.S. Robotics Total Control Enterprise Network Hub system terminates the connection and reassembles the TCP/IP packet," said a technical "white paper" on the system. "The packets are then sent to a Cisco router which is configured to route packets to and from the information services and the user's PC. Information is sent back to the user through Zenith's high-speed RF cable link."

The new telco return system will be offered as part of Zenith's MetroAccess cable modem product family. The marketing alliance marks U.S. Robotics' first venture in the cable industry. ■

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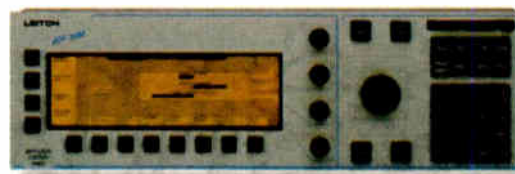


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Panasonic Announces DVCAM Compatibility

by Frank Beacham

SECAUCUS, N.J.

Panasonic has announced that Sony's DVCAM tapes will play back on its DVCPRO format equipment. The playback capability will be implemented in future Panasonic DVCPRO products, said Phil Livingston, director of product management and engineering at Panasonic Broadcast & Television Systems Company.

"We have to re-program the software in the capstan servo," Livingston said. "It is not a big deal."

Panasonic's DVCPRO and Sony's DVCAM are both extensions of the consumer DV format developed earlier this decade by a consortium of 10 electronics manufacturers, including Matsushita (Panasonic's parent) and Sony. For its professional format, Panasonic chose an 18 micron track pitch and metal particle tape as the recording medium. Sony chose to use a 15 micron track pitch and metal evaporated tape for its proposed DVCAM products.

"We view DVCPRO as a 'superset' of DV that is downwardly compatible both with DV and DVCAM products," Livingston said. "All three formats record digital information as defined by the original DV format, so playback is a fairly simple matter."

Because Panasonic chose metal particle tape for its implementation of the component digital recording format, DVCPRO VTRs have built-in RF equalization. This means that despite the different signal levels produced by metal particle and metal evaporated tapes, DVCPRO can accommodate either by automatically adjusting for the difference, Livingston said.

"DVCPRO and DVCAM have different

longitudinal tape speeds, as dictated by the varying track pitches. The wider the track pitch the faster the tape has to move," Livingston said. "But just as DVCPRO VTRs are designed to play back consumer DV footage, it is easy to modify the VTR servo software to also recognize the

determine DVCAM playback capability after getting a tape made on the Sony system at the NAB exhibition in Las Vegas in April. He said, however, his company is "operating on theory" at this time because it does not have ready access to DVCAM tapes for analysis.

ning change (in the manufacturing process) at least."

Another open question is whether or not existing DVCPRO VTRs can be modified to play DVCAM tapes. "Our feeling is that the older machines can be modified but we just don't know yet," Livingston said.

Panasonic made its announcement just as *TV Technology* was going to press. Sony's DVCAM executives were out of town and unavailable for comment. However, a Sony spokesman said the company would have no statement about the DVCAM playback issue at this time.

The Panasonic announcement is significant because it brings some level of compatibility between otherwise incompatible professional DV-based recording formats. DVCPRO, which is now delivering, has been accepted for standardization as the D-7 format by SMPTE. The Sony DVCAM format is due to debut on the market later this year.

Panasonic is positioning DVCPRO as a format for ENG, EFP and general business and industrial applications. It has specifically targeted the digital format as a replacement for Sony's now-dominant Betacam SP analog format.

Sony, on the other hand, has positioned DVCAM as a format for business and industrial applications. The manufacturer's new digital component Betacam SX format is being positioned for broadcast ENG and EFP applications. ■

The Panasonic announcement is significant because it brings some level of compatibility between otherwise incompatible professional DV-based recording formats.



DVCAM tape speed, and play that as well."

Livingston compared the DVCPRO format's capability to play three different tapes speeds — DVCPRO, DVCAM and DV — to that of the consumer VHS format, which likewise accommodates three varying tape speeds. "You just pop in the (VHS) cassette and the servo system figures out whether it was a two hour, four hour or six hour recording and plays it for you," Livingston said. "The operator doesn't have to know anything. It's just that simple."

Livingston said Panasonic was able to

The capability of playing DVCAM tapes on DVCPRO machines means tapes made on Sony's DVCAM camcorders could be edited on Panasonic VTRs to DVCPRO format edited masters. The same is true of consumer DV tapes. Though it has not yet been tested, Livingston speculated that features like slo-mo and other effects could be activated on DVCAM tapes during playback.

The date when the DVCAM playback feature will be added to DVCPRO machines is uncertain, Livingston said. "The details of how this will be implemented are kind of sketchy at this point. It will go in as a run-

CONTINUED FROM PAGE 5

The Countdown to Digital TV

back ASF so far. Authoring software was due to be shipped in June, and Microsoft believes ASF material will start emerging this Summer.

A series of filters will allow software developers to offer much more control over how video and audio is handled during playback, which could include dynamically mixing different instruments in a music video, or adding contrast, transition and lighting effects while editing movies.

The first commercial broadcasting company to use ASF is likely to be EZ Communications, which owns and operates 22 radio stations in eight US markets. It plans to add mainly commercials to its own Web pages, and other clients of its technology services subsidiary Radio Data Group.

ActiveMovie playback will be built into future versions of Microsoft's Windows operating systems - including the upgrade to Windows 95, the business and home PC operating system launched in a worldwide blaze of publicity on 24th August 1995 - and its Internet Explorer browser product. Later versions will support MPEG-2, to allow DVD movies to be played on a desktop PC.

According to a Microsoft statement issued at NAB, ActiveMovie will allow viewers accustomed to small-window video and low-quality audio to see full-screen, television-quality MPEG movies accompanied by high-quality stereo sound decoded entirely in software.

But they won't get this from the 28.8 kilobits per second trickle of the fastest conventional modems. And what Microsoft calls "high-quality stereo sound" is in reality restricted to an upper frequen-

cy of 11kHz compared to the 20Hz-plus of CD, with no mention of surround sound or indeed widescreen.

However as the BBC hinted in its recent digital manifesto, it would be possible to retrieve high-quality video to the desktop if Web-style pages were carried within the superior data rate of future digital terrestrial, cable or satellite broadcasts.

One idea is to allow viewers to interact directly with educational programmes through a cable return path or telephone modem.

If you have the patience to download 1.2 MB, a prototype 'ActiveMovie Stream' player for Windows release (Macintosh version promised later this year) is available on the Internet at <http://www.microsoft.com/lme dia/>.

Meanwhile more about radio on the Internet and player software can be found at <http://www.realaudio.com/> or <http://www.xingtech.com>.

CABLE CONNECTION

With little more than one million UK homes connected to date, the growth of cable is a painfully slow process. But in theory its bandwidth and customer addressability makes it best-placed to deliver digital television's true multimedia potential.

Visitors to this year's Cable & Satellite exhibition at London's Olympia - perversely timed yet again to clash with NAB - were shown what General Instrument claims to be the fastest access to multimedia online services for the desktop PC yet.

GI's new Surfboard broadband modem can handle data at 27 Mbps - some 1,000

times faster than existing telephone modems - and can be used across cable TV, wireless cable (MMDS), and C or ku band DTH satellite.

GI brandished a raft of statistics to make the point. Anybody downloading the 5 minute, 48 seconds 1995 pop video 'Waterfall' from TLC with a conventional 28.8 kbps modem would be staring at an hour glass for some 4.24 hours.

The same 55 MB file would take 2.08 hours over a 64 kbps ISDN line, 14.66 minutes with a 500 kbps parallel port cable modem, 4.32 minutes with a 2,048 kbps E1 connection, and 44 seconds with a 10 Mbps Ethernet cable modem.

Surfboard would keep the computer busy for just 16.2 seconds. And as the associated headend equipment is MPEG-2 compatible, operators could ultimately evolve their networks to supply video and audio services in real time.

The plug-and-play internal card's asymmetrical design currently restricts return path bandwidth to telephone quality, which is enough to point browsers and send trivial files.

But GI says Surfboard's ATM (Asynchronous Transfer Mode) architecture will ensure a cost-effective migration to the symmetrical two-way multimedia networks of the future. This will involve a new 'generator' type of user requiring significant upstream bandwidth.

The company has already developed a PCLinX version with a 1.5 Mbps return path, and is working with ATM specialists Fore Systems on a headend processor to handle high volume, high bandwidth traffic via HFC (Hybrid Fibre-Coax) networks. ■

NEWS WATCH

EQUIPMENT

TEXAS INSTRUMENTS TO LICENSE 3DLABS VIDEO ACCELERATOR

SAN JOSE, CALIF.

Texas Instruments Inc. and 3DLabs Inc. announced a long-term licensing agreement and alliance to develop 3D graphics technology. The two companies will collaborate to develop multimedia chips that incorporate the 3DLabs' Permedia 3D graphics technology with Texas Instruments' mixed-signal semiconductor and submicron manufacturing technology.

Resulting products will target PCs, laptop PCs and other consumer and Internet appliances. The architecture is operable with the Microsoft Direct3D standard as well as other 3D APIs such as the Silicon Graphics Open GL, the Apple QuickDraw 3DRAVE and the Autodesk Heidi.

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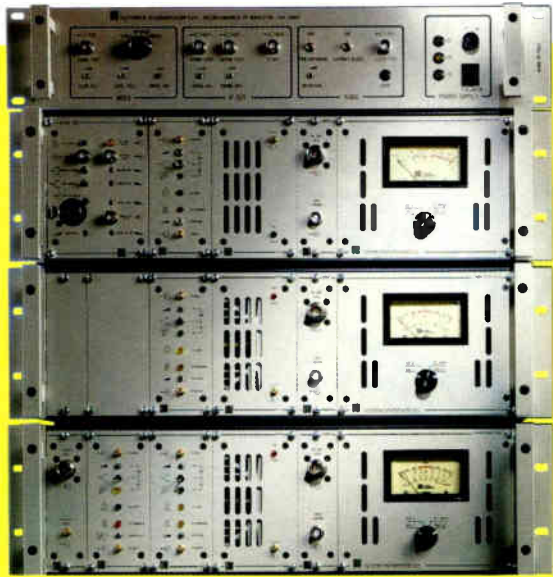
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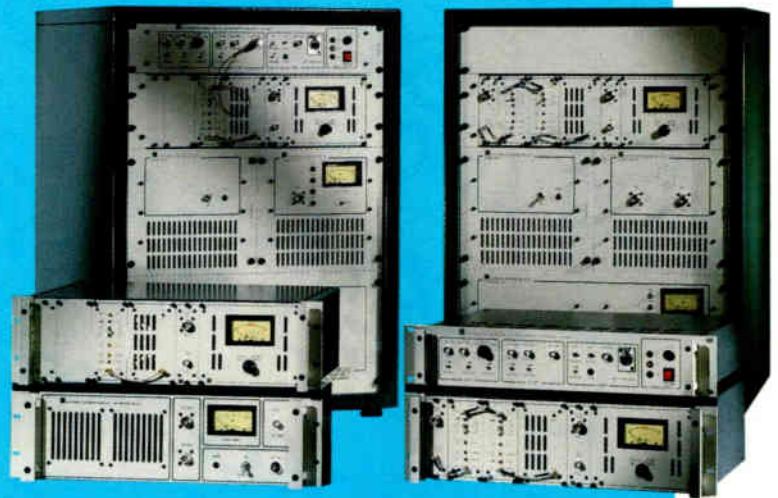
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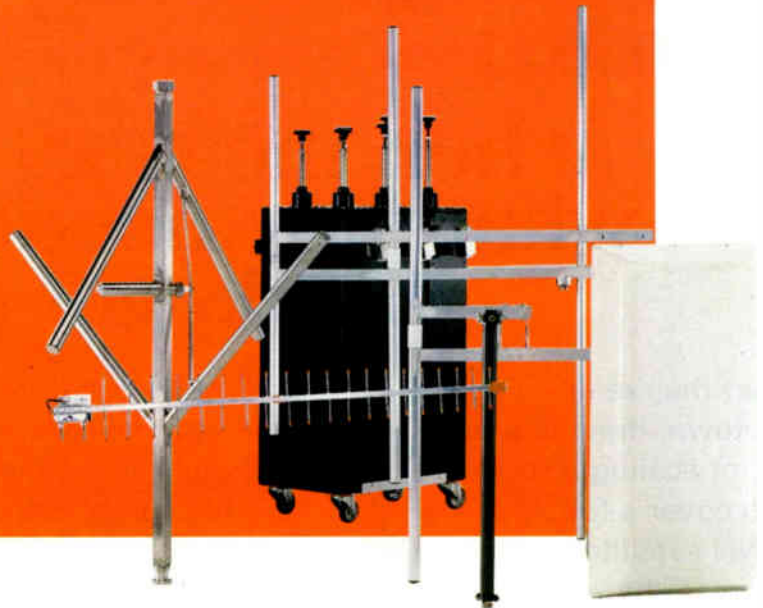


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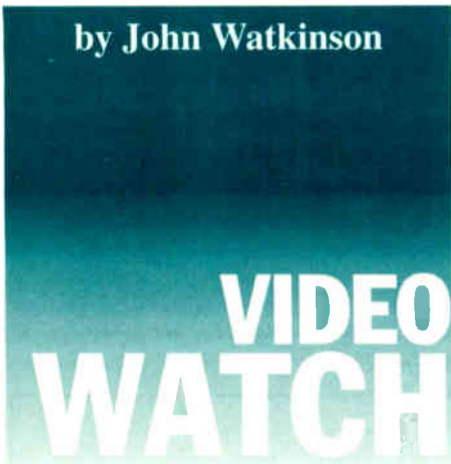
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What Does the Eye Need To See?

by John Watkinson



Television pictures are ultimately for the benefit of human viewers, and although for much of the journey the picture is in the form of a video signal, it passes through a number of critical optical processes. I want to look at some of these here.

EYE OF THE BEHOLDER

Firstly the eye. Without a knowledge of what the eye can see, it is difficult to determine the performance that a television system needs.

Standard definition systems were

controlled by the pupil in the iris.

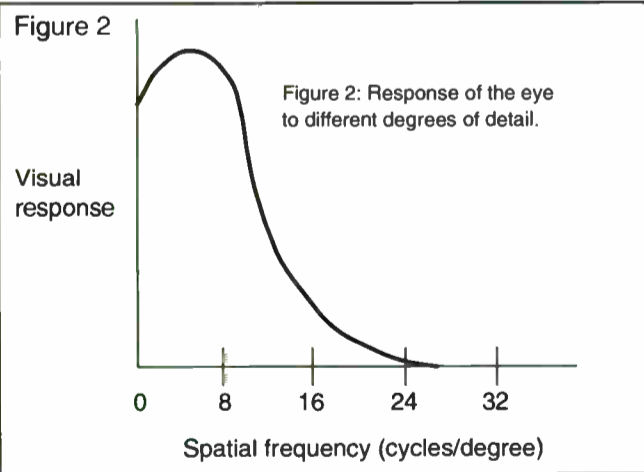
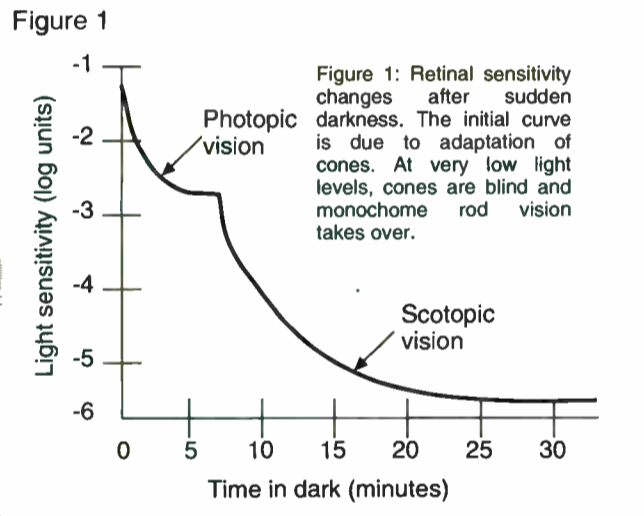
Light entering the eye is involuntarily focused on the retina by the lens; the only part of the eye which is not nourished by the bloodstream. That's why the lens loses some flexibility in old age

The retina is responsible for light sensing and contains a number of layers. The surface of the retina is covered with arteries, veins and nerve fibres, and light has to penetrate these in order to reach the sensitive layer.

This layer contains two types of discrete receptors known as rods and cones, named after their shape. Rods dominate the periphery of the retina, whereas cones dominate a central area known as the fovea outside which their density drops off.

The rods only detect monochrome and have poor resolution, but remain effective at very low light levels. Cones provide high resolution and color vision but require more light.

Fig. 1 shows how the sensitivity of the retina slowly increases when entering darkness. The first part of the curve is the adaptation of cone or photopic vision, followed by the greater adaptation of the rods in scotopic vision.



designed empirically, when our knowledge of the eye was relatively poor. So there's no excuse for some of the same mistakes being made in recent HDTV and ATV proposals.

Secondly, cameras and displays have optical systems whose performance must match or exceed the overall quality we seek.

Considering first the eye; this is nearly spherical and is swiveled by muscles. The space between the cornea and the lens is filled with transparent fluid known as aqueous humor.

The remainder of the eyeball is filled with a transparent jelly known as vitreous humor. The amount of light admitted is

At such low light levels the fovea is essentially blind, and small objects which can be seen in the peripheral rod vision disappear when stared at.

We normally watch television with the photopic region of the eye. As a display can only produce more or less light, the screen cannot become darker than ambient light allows. Consequently the full contrast range can only be seen when the level of ambient light is low.

The cones in the fovea area allow the highest resolution because they are densely packed and directly connected to the nervous system.

Resolution begins to fall off away from the fovea, and the eye must move to scan larger areas of detail. The image perceived is not just a function of the retinal response, but is also affected by processing of the nerve signals.

The overall acuity of the eye can be displayed as a graph of the response, plotted against the degree of detail being viewed. Eye response is measured in cycles per degree of subtended angle, as this is independent of distance.

Fig. 2 shows the response of the eye to static detail. As you can see, the response to very low frequencies is attenuated. An extension of this characteristic makes flashing lights appear to flicker until the Critical Flicker Frequency (CFF) is reached, when the light appears continuous for higher frequencies.

Fig. 3 shows how the CFF changes with brightness. Note that the field rate of European television at 50 fields per second is marginal with bright images.

The response of the eye is a function of both spatial frequencies and temporal frequencies. If the eye were static, a detailed object moving past it would give rise to temporal frequencies determined by the detail in the object, in lines per millimeter, multiplied by the speed.

TRACKING

A highly detailed object can reach high temporal frequencies even at slow speeds, yet a fixed eye cannot respond to them. The solution is that in practice the eye moves, to follow objects of interest causing the image to become stationary on the retina and bringing the temporal frequencies to zero.

This tracking ability of the eye means that dynamic resolution is important in television systems. Unfortunately most TV systems, even modern proposals, fail to take this into account.

We foolishly worship static resolution, but once things start to move, this resolution is lost at a surprisingly low speed. I believe that a fundamental requirement of any advanced television system is that it should deliver adequate dynamic resolution.

The contrast sensitivity of the eye is defined as the smallest brightness difference which is visible. In fact the contrast sensitivity is not constant, but increases proportionally to brightness. So whatever the brightness of an object, if that brightness changes by about one percent it will be equally detectable. That's why noise is more visible in dark areas.

Human vision is subjective and gives an impression of detail perception which we call sharpness. However, the assessment of sharpness is affected by contrast. Increasing the contrast of an image will result in an increased sensation of sharpness even though the measured resolution is unchanged.

When CRTs having black areas between the phosphors were introduced, it was found that the improved contrast resulted in subjectively improved sharpness. Similar results are obtained with CRTs having non-reflective coatings.

DETAIL

One way of describing the ability of an imaging system to carry detail is the Modulation Transfer Function (MTF), the spatial equivalent of frequency response in electronics. But

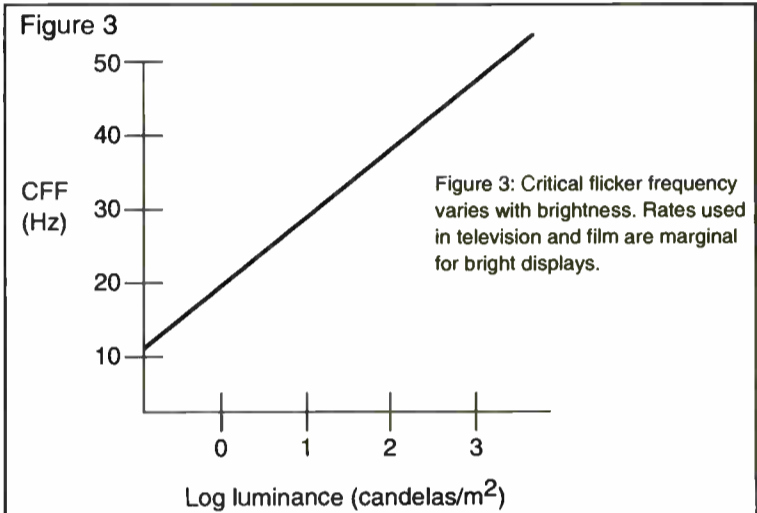
before describing MTF in detail, it is necessary to define some terms.

Spatial frequency is measured in cycles per millimeter, and the response of an optical system is measured by comparing the Contrast Index (CI) of the input and the output at a range of spatial frequencies.

The luminance variation across an image has peaks and troughs, and the CI is given by dividing the difference between them by their sum.

If a non-ideal optical system is shown a test image with the same CI over a range of spatial frequencies, it will output a Contrast Index which falls with rising spatial frequency.

And so back to MTF, which is the ratio of the output CI to the input CI. In the special



case where the input CI is unity, the output CI is identical to the output MTF.

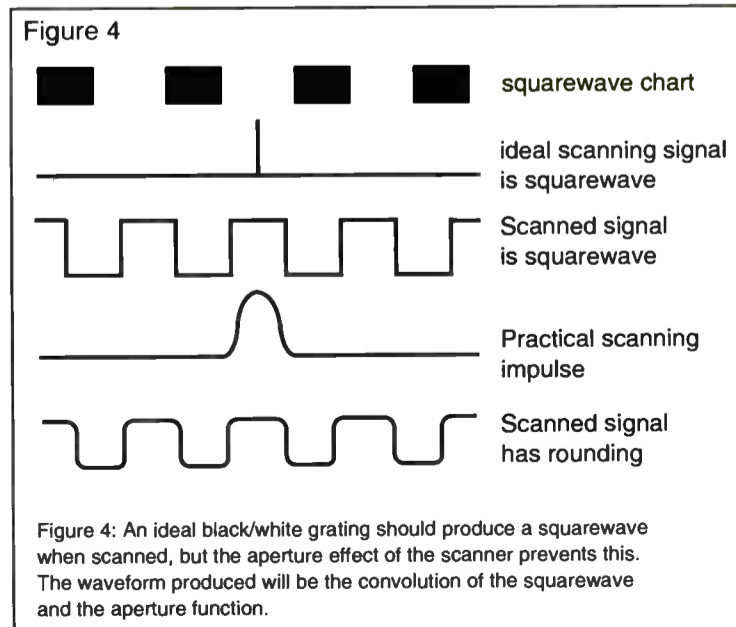
It is common to measure resolution by quoting the frequency at which the MTF has fallen to one half - known as the 50 per cent MTF frequency - while the limiting resolution is defined as the point where the MTF has fallen to 10 per cent.

Fig. 4 shows a test image consisting of alternating black and white bars. When scanned by a point, the result is a square wave which contains odd harmonics in addition to the fundamental.

In practice the scanner will suffer from an aperture effect. This aperture function is not infinitesimal, but Gaussian or rectangular in nature. So in the waveform domain, the impulse response will be convolved with the input waveform. This produces an output waveform which will be rounded off to some extent rather than square.

As convolution is difficult, the frequency domain is often used instead. The

(continued on page 12)



FEATURES

The Ultimate Digital Toolbox?

by Terry Nelson

SOUND IDEAS

In last month's column we touched upon the difficulties that can be presented when moving into the world of digital audio. We also noted there are various pitfalls for the unwary who may be totally versed in analogue techniques but are new to digital.

One of the easiest traps to fall into is the assumption that most of the things that we do easily in analogue are just as easy in digital. If only life were that simple!

A typical example of this is digital gain. Say an in-the-field report comes in on cassette (or reel-to-reel), and we want to bring up the gain to nominal operating level for the final mix. Perhaps the operator was a little over-cautious with levels when recording, and we could do with another 5 dB to make life easier.

In analogue, the scenario is so mundane that we hardly think about it - just patch the tape machine into a small console, and re-record with some added gain.

DIGITAL DIFFERENCE

Not so with digital. True, if the source was a DAT we could follow same path by using the machine's analogue outputs. But what we really want to do is keep it all in the digital domain, and lay the tracks back to the digital tracks of the VTR. However this requires a digital mixer, and you may not have one available for just this small job.

At this point someone may be thinking: "What if I take the digital output of my DAT and record onto a second DAT via the digital I/O? Surely I can increase the gain." Sorry. All you will do is a 1:1 transfer with no gain change, another example of simple things being made complicated.

Enter Audio & Design with its DMM-1 digital mini mixer, arguably the next best thing to the mythical ultimate digital toolbox, which was shown in complete form at May's AES show in Copenhagen.

This is one of those little boxes where the more you get into it, the more applications you find for it, and I wouldn't be surprised to see it appearing on station equipment purchase lists in the very near future.

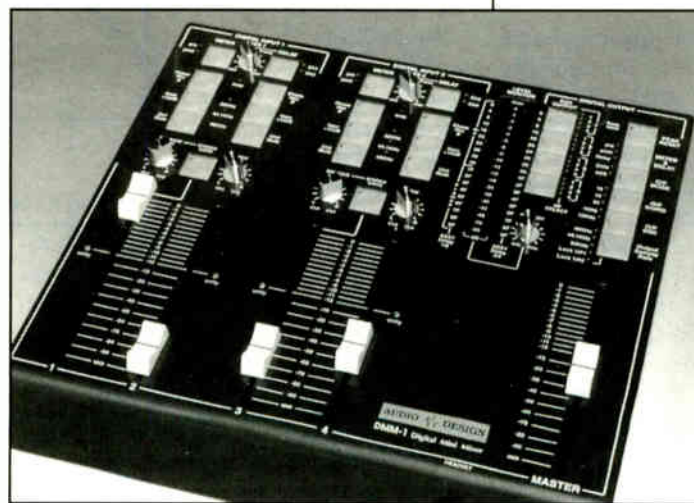
So what does the DMM-1 have to offer? Basically, it's a 4-into-2 digital mixer with two additional digital auxiliary outputs. Each channel features a pre- or post-input fader meter monitor switch, digital delay of up to nine frames, phase reverse, a +12 dB digital gain switch, mute, panpot and a long-throw linear fader.

Each digital stereo input can be in SPDif, optical and AES/EBU formats, and the mixer will accept sampling frequencies from 27 kHz to 60 kHz. Channels 1/2 and 3/4 can either be used as stereo pairs or independent channels, with the panpot becoming a balance control and level confined to one fader when in stereo mode. The delay function can be assigned to either channel or to both.

Moving across the DMM-1 front panel we come to the metering, which Audio Design calls the Level Monitor. This shows extremely accurate metering for levels, as well as delay ranges in milliseconds and frames. Next to the metering are four switches, each with four LEDs, which control the auxiliary outputs.

FLEXIBLE OUTPUTS

At this point it will be useful to clarify the



The DMM-1 can convert between SPDif, optical and AES/EBU inputs and outputs

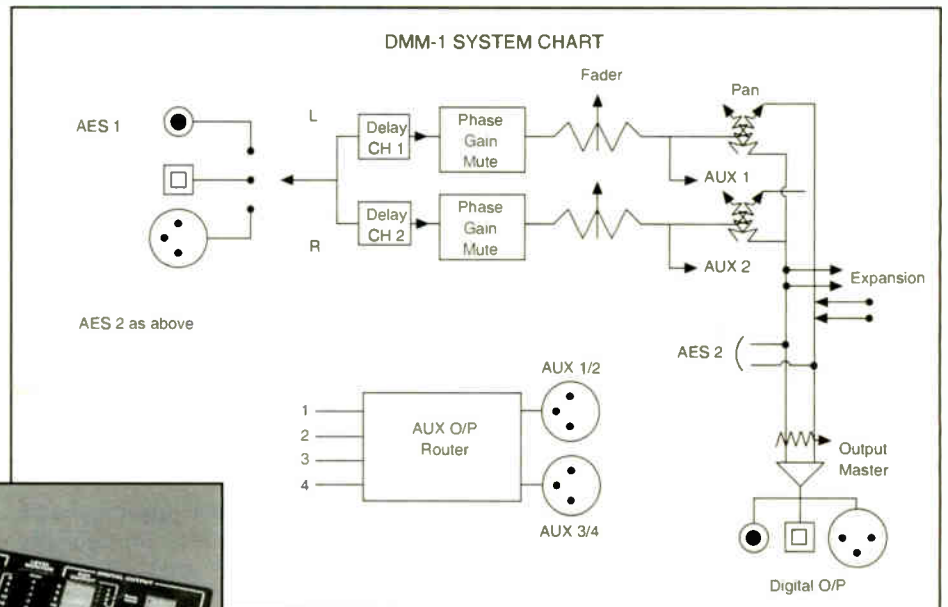
output configuration of the mixer. The DMM-1 features AES/EBU mix outputs together with parallel SPDif and optical outputs. By now you may be rightly thinking, "digital mixer plus sample rate converter" to yourself.

What's more, the two AES/EBU auxiliary outputs carry the post channel fader signals, which can be assigned as required via a 4x4 matrix switcher. These were originally designed to allow D-2/Betacam users to re-assign audio tracks into the right order, which is where the auxiliary output switches come into play.

Moving over again, we find six more switches to control metering functions,

including peak hold, output format configuration, output word length (16-, 18-, and 20-bit), oscillator frequencies (1 kHz and 10 kHz) and output sample rate. These can be switched between 32, 44.1 and 48 kHz or locked to the incoming sample rate of AES input 1 or 2. A long-throw linear master fader below these switches completes the front panel.

While an oscillator is a basic facility on most analogue consoles, a digital oscillator function is not so common, and this is a welcome surprise. In order to provide



instant L/R verification, the left channel dips cyclically for visual confirmation.

The only analogue part of the mixer is a high-quality headphone monitor output, though no doubt some people will immediately hook this up to an amplifier! The signal will track the level meter for pre- and post-fader conditions.

CASCADING

The back panel also features two D connectors marked "Expansion Port Out" and "Expansion Port In". As you will have rightly guessed, several DMM-1 units can be cascaded together to provide more inputs. At present, the total number is three providing a 12/2 mix facility. The auxiliary outputs remain dedicated to each unit.

By now I'm sure many of you will have formulated a list of applications for the DMM-1. But let's take another look at those examples we started with, starting with the DAT copies. We could take a 48 kHz DAT tape, trim up the gain while reversing the phase of the channel which inexplicably got turned around somewhere, and output the result to a 44.1 kHz machine.

What if we want to keep all the sub-code IDs while doing some corrections and retaining the sample rate? The DMM-1 features a "By-Pass" mode which bypasses the input sample rate converters, so the IDs pass untouched through the mixer. Functions such as level, pan and phase reverse remain active.

Similarly the internal audio switcher could be used to correct individual tracks for phase, level, panning and so on while copying or compiling D-2/Betacam/Nagra-D

tapes, and re-routed to required track formats at a 48 kHz sample rate. Meanwhile, any audio slipping out of sync after delays caused to the video signal by graphics or effects processing can be compensated with the digital delay function.

So you can see why I suggested that the Audio Design DMM-1 mini mixer was the nearest thing yet to the ultimate digital toolbox, and well worth further investigation. You may wonder how you ever lived without it! ■

Contact John Fraser at Audio & Design, tel +44 (0)1734 844545, fax +44 (0)1734 842604.

CONTINUED FROM PAGE 11

The ABCs of Eyesight

spectrum of the output is obtained by multiplying the input spectrum by the frequency response.

Essentially the MTF is an optical frequency response, a function of depth of contrast with respect to spatial frequency. The MTF is given by the Fourier transform of the aperture function. Given that the Fourier transform of a Gaussian impulse is also Gaussian, a cathode ray tube with a Gaussian intensity-distribution spot will also have a Gaussian frequency response.

A CCD camera has discrete square sensors and a rectangular aperture function. Its frequency response will be the Fourier transform of a rectangle, which is a sin x/x function. ■

John Watkinson is an independent consultant in digital audio, video and data technology and is the author of numerous books on the subject, including *The Art of Data Recording* and *The Art of Digital Video*; acclaimed as definitive works. He is a Fellow of the Audio Engineering Society and listed in *Who's Who in the World*. Based in England, he regularly presents papers at conventions of learned societies and has presented training courses for studios, broadcasters and facilities around the world. He launched a new video fundamentals book at NAB '96. John can be reached on +44 (0)1734 834285, or read his web pages at <http://www.pro-bel.com/guests/john/>.

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Support & Lighting

Time For Professional Auto-Focus?

by Jeremy Hoare

THROUGH THE VIEWFINDER

Bought a still camera recently? Did you notice it had autofocus, one that really works?

When autofocus first appeared it was crude, slow and fairly hopeless. But recent infra-red eye-tracking developments now enable operators to define the focus command point simply by looking at it.

The same systems can also predict where a moving subject will be next, with a speed that is often quicker than even the most experienced user. This can only get better.

Now think back to that last football match

K5600 BUG-LITE 200W HMI

I'm always on the lookout for things that make life easier or better for lighting cameramen, and one of the most versatile lamps I've encountered recently is the K5600 Bug-Lite 200w HMI.

K5600 may sound like an odd name for a lighting company, formed recently by the same designers that brought the HMI type lighting source to the movie industry 25 years ago. Actually it's the colour temperature of daylight.

The Bug-Lite 200w HMI is like a bare bulb with a frosted UV cover for safety. Capable of being used in a variety of ways and changed depending on the job in hand, it certainly gets my vote for versatility.

Add the frosted balloon-like globe and it is a small spacelight, with a parabolic reflector it becomes a conventional open-face lamp, with a Chimera diffuser a softbox, and with an added inverter and 30 volt battery it turns into a Sungun.

Although primarily designed to work upside down in spacelights, it actually performs all the other functions well, and would be worth considering for those on a small budget.

Makers of documentaries where weight is not crucial would find two lamps and a kit of attachments versatile, as well as being balanced to daylight. For big budget feature shoots, it's a lamp that could easily be hidden in sets or locations, or even seen in shot with a lampshade as a daylight-balanced 'practical'.

A lot of multi-function equipment does nothing well and everything average, but the Bug-Lite seems to escape that trap. This is a lamp Lighting Cameramen will either love for its versatility, or hate for not doing what they expect from individual dedicated units. So like other new products, hire it first.

—Jeremy Hoare

when you did the touchline camera. With a similar autofocus device all you'd have to do is keep your eye firmly on the ball to stay sharp - or if your courage gave out, momentarily switch it off to regain manual control.

And yes, these products are made by some of the very same companies whose lenses we use now!

TIP OF THE MONTH

Two of the greatest aids to achieving creamy smooth camerawork on either a studio pedestal or location tripod are firstly balance and secondly setting the head friction controls.

Some operators prefer the camera to be front-heavy, to create a tension on the panning hand at level. Others opt for a neutral balance. I have seen many fiddle for ages with these controls trying to get both pan and tilt to their liking.

First get the camera balanced how you want it, then set the pan and tilt head frictions. The quick and easy way is to adjust them individually in the first instance.

Next do a series of 45 degree diagonal movements in cross patterns. This will soon establish whether both frictions are in balance. If not, adjust the one you least prefer. Look through the viewfinder on the long end of the zoom to do this - with no picture you're only kidding yourself.

I think you'll agree that this is a fast way of getting the head set up just right. It's also a good way to test intended purchases. I came across one top-of-the-range head at a trade show recently, which I simply could not get right using the method above. Definitely a miss.

OPERATOR IN FOCUS

This month I zoom in on Ian Keown, Supervisory Cameraman at The Television House, a large studio facilities company whose main output is gameshows and sitcoms. It is in the home of the legendary Robin Hood, Nottingham, England.

JH: How did you get into TV?

IK: By mistake. After training to be a photographer and getting my City & Guilds certificate I went after a photo job at BBC Glasgow without success so ended up in the Camera department instead.

JH: What is your favourite piece of kit?

IK: I have two. Firstly the Peewee dolly which is very versatile and secondly the Canon J9 wide angle lens for the lack of distortion and its internal focus.

JH: What kit would you like to see

coalesce. It was split in waterproof housings to prevent sparks which could have exploded the natural gases.

JH: What else would you like to achieve?

IK: Video cameramen being given the same respect as their film counterparts.

JH: What's your biggest mistake?

IK: Getting off a Vinten Kestrel crane at the BBC without waiting for it to be locked off. It promptly shot up in the air and wrecked an antique chandelier and the camera's



Panasonic added auto-focus to its diminutive VJ-Cam semi-pro palmcorder, but UK DVCPRO product manager Adrian Dabell says its professional AJ-D700 DVCPRO camcorder (pictured at all-digital news cable station New York 1) remains manual on grounds of cost, weight and reliability.

improved?

IK: All video equipment built to the same high standards of film equivalents. You don't find plastic viewfinders on film cameras!

JH: What do you most like about being a cameraman?

IK: The 'buzz' when operating on a programme and seeing my name afterwards on the screen.

JH: What's your proudest camera achievement so far?

IK: In October 1987 being the first in the UK to take a video camera (Sony BVP3 three tube) down a working coalmine to the

viewfinder.

JH: What's your tip for success?

IK: Become an accountant! But if you really want to be a cameraman; total determination, make an impression and pester everyone.

AND FINALLY...

What do you think about switchable autofocus? Well how about colour viewfinders then? Let me know and keep sending stories of your life as a cameraman or camerawoman. The best printable ones will end up on these pages. Now that's worth holding your breath for isn't it! ■

A Few Tips to Keep in Mind

by Dennis J. Hamilton

PRODUCTION POINTERS

Keeping in mind the motto, "Use what you can, and disregard the rest," this article cites nine production techniques that many of us have either neglected or simply forgotten about.

1. DON'T FORGET THE AMBIANCE

There is a tremendous misconception when it comes to audio on ENG. When on-location, I recommend that the crew should always record ambient audio, whether you plan to use it or not. Just for

the sake of discussion, let's consider undesirable audio "background noise" and desirable audio "ambient sound." First of all, what can it hurt?

Take the proper microphone and plan on shooting with ambient audio whenever possible. Even a scene in a forest can be enhanced by the ambient sounds of rustling limbs, singing birds, and whistling winds. If the client should change his or her mind, as clients have been known to do, then the audio is already there.

A "music-over" or "voice-over" does not necessarily mean that ambient audio cannot further enhance the production. Remember to keep your ambient audio at ambient level, around -10 on the VUs.

2. KEEP IT STEADY

Most small-time facilities are used to editing on a system with only two audio tracks, either Left and Right, or Channel One and Channel Two. Voice-over and music-over works are laid down on one channel and the ambient on the other. The only problem with this relatively simple technique is that your audio will be cut in half if you cut out half of the channel. With narrative on Channel One and Two

through most of the program, volume levels on the narrative will drop dramatically when you swap out one of the audio channels for your music.

What's the answer? Always use one track for narrative and a second audio channel for the music or sound effects. When there is only narrative, keep it on one channel. This way the audio will remain consistent.

3. USE A BOOM

A reminder from last month's column: Let's hide those microphones whenever possible. Remember, it is acceptable, but not necessarily desirable, to see a mic in a shot. Take a "boom and mic" with your ENG, and tell the camera operator to stay awake and keep it out of the frame.

Place the microphone either above or below the talent or the source of the sound. A boom works great with the correct "shotgun" mic as a means of keeping wires off of the talent or allowing them hands-free working conditions. It also allows one mic to do the work of two during interviews. The "handheld" interview can get irritating, since the talent often "pump"

(continued on page 17)

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The Elusive Perfect Palette

by David Aughenbaugh

CD-ROM PRODUCTION

Working with palettes can be a vital skill. Sometimes your client will want your final product in the form of videotape or unprocessed digital files. Other times the client will be looking for someone who can process the files into their final form, which usually includes compression and palettization. If you are interested in serving this latter type of client, or want to become a developer yourself, knowing how to make good palettes is essential.

MAKING IT UP

Cinepak and Indeo compressors have their own palettes. With these compressors you don't need to worry about palettes unless the videos are going to be shown as part of a larger screen design, in which case you will need to "force" a palette, also known as using an "active" palette. If you are working with stills, flics or any other compressors, you definitely will need to make palettes.

So how do you go about making a good palette? You cheat, that's how. Most palette-making tools are very democratic. When you give them an image, they take a vote; asking "How many pixels want to be this color?" What we want to do is stuff the ballot box in favor of colors that relate to the important areas of the image. These areas should have more colors dedicated to them than less important areas.

As a common example, take the case of a talking head video. The person is clearly more important than the background. But in the average head shot, the background occupies a larger area of the screen than the person. In a color choice system based on popularity, the background would receive more colors than the person.

Looking even closer, the highlights on the person's forehead and nose are very small indeed, but as far as color choice is concerned, these areas are very important. The wrong color in an area as prominent as a highlight will quickly catch the viewer's eye and become a distraction (fig. 1). Once something such as a bad color catches the viewer's attention, it breaks the illusion. The viewer will quickly switch mental modes from receptive to critical, and begin looking more closely at other areas of the frame.

Since desktop video is inherently full of flaws, this is a very bad occurrence. If the viewer is stopping to evaluate the craft, he or she is not absorbing the message or experience that the video intends to convey.

TOOLING AROUND

People want to be pulled into the experience. After all, they just paid 50 bucks for the privilege. If the content is compelling enough, they will accept a certain level of

imperfection. If we cross the line, we lose the cooperation of the viewer. And there are a lot of would-be critics out there. So palettes are important. Got that?

Now that you agree, I am going to show you how to create good palettes for video.

There are a lot of tools that will create palettes. Some definitely do a better job than others, but none of them is capable of what you as an intelligent operator can do. Subjective decision-making is still a bit beyond the range of computer technology.

I am going to assume you will be using DeBabelizer to do the work. I have tried many approaches to making palettes, and



this one offers proven speed and control. If you don't have DeBabelizer, any paint program will work, but you may not be able to do everything I describe.

We will use the example of a talking head video — no cuts or transitions; nothing enters or leaves the frame — just one person talking directly to the camera.

Begin by choosing a frame of the video to work with, and save it off to a 24-bit PICT file (any 24-bit format will do). Call the file "pal_1a.pict" (fig. 2). If your video is more complex, you will have to adjust the procedure to allow for that complexity by creating a mosaic image containing every significant element in the video.

Take the frame into DeBabelizer and choose Palette/Reduce colors. Enter the number of colors that you can allocate to the video (236 for Windows). Turn off the Base Palette and Dither options, and hit OK. A palette will be created and the image will map to that palette.

BUILDING A FOUNDATION

Now we get to the fun part. Look closely at the image and make a mental note of the areas that show noticeable banding or artifacts, especially on the person's face. These areas need more colors dedicated to them. Since we only have a certain number of colors to work with, the colors to be allocated will come at the expense of other areas of the screen. This is a balancing act, but as I said earlier, we want the important areas to look really good.

Undo or Revert the image back to 24-bit. Now, based on what you saw in the indexed image, rope off an area of the image that needs more colors and copy it elsewhere on-screen so that it covers some part of the background. Repeat this process for each area of the image that needs improvement. What you are doing at this point is covering more of the screen with

important stuff and reducing the amount of unimportant stuff.

The algorithms used in creating palettes vary considerably and can get very complicated, but one constant can be assumed in all tools — popularity is important. As the palette is being calculated, large areas of color get more attention than small areas. We are trying to use that fact to our advantage by creating an image with lots of pixels representing the important colors.

Once you have filled up the screen, save this image in 24-bit. Increment the file name to "pal_1b.pict" (fig. 3). Choose Palette/Reduce Colors again and make a palette. Look at the image and see if the areas in question are looking better. These areas should have more colors and appear smoother.

DEFACING THE IMAGE

Perhaps these areas need a little more improvement, in which case you need to go back to "pal_1b.pict" and repeat the

Figure 1 (Before) Default color selection. The image is degraded in important areas. This is distracting to the viewer.

Figure 3 Composite image, stressing important detail.



Figure 2 Frame capture for building the palette.

Figure 4 (After) More colors are given to the main subject, and the background is allowed to degrade. The image looks good where it counts.



process, filling up more of the background with facial bits.

You may need to expand the image area to make room for more image bits. You don't want to cover up the background entirely. If you need to, choose Edit/Document Size and add a few hundred pixels to one edge of the image, giving yourself room to paste into.

Perhaps the face looks good at this point, but the background or some other area of the person is trashed. You allocated so much of the palette to the face that the person's hair or shirt turned into dogmeat. This is the trade-off; you have to find a balance point.

Be sure to think about where the viewer likely will be looking. The path that a per-

son's eye takes around an image is surprisingly predictable. Pay attention to your own natural tendencies as you watch the video. Find out where you can sacrifice quality and where you need to be perfect.

Work with the image until the palette comes out the way you want it. Each time you change the image, save another copy of it. You may want to go back to a previous version and take a different direction.

Once you get something that looks good, save the image as an 8-bit file. Call it "pal_1x.pcx" or "pal_1x.dib," where "x" is the latest file name increment. Save the file to DeBabelizer's palette list as well. I use the convention of PICT for 24-bit images, and PCX or DIB for 8-bit images. Even though these formats are all capable of various bit depths, I use this artificial distinction so I can sort them out at a glance.

Now, to check your work, load up the original image (pal_1a.pict). Choose Palette/Set Palette and Remap Pixels and select the palette you created. This time you can turn on Dithering if you want to. You may or may not want dithering in your final product. If it is a video or a flic, dithering may not look good at speed, since the dither can vary from frame to frame.

Depending on how the palette will be used, you may want to create a separate

palette file. For the Mac, you will save a CLUT (Color Look-Up Table). For Windows, you will have to take the DIB into BitEdit or another paint tool and save out a PAL file (pal_1x.pal). You can also add the Windows colors at this point if you didn't do so in DeBabelizer.

PASTING COLORS

If you will be using the palette to compress a video, you will need to apply the palette to the video somehow. In VidEdit, you do this by pasting the palette colors

from the Windows Clipboard to the video and remapping. You get the palette colors into the Clipboard by copying them from a paint program. Select the image or palette and choose Edit/Copy or Copy Object.

If you are working in Premiere, you can load a palette in the

Compression Settings dialog. If the compressor you have chosen does not support 256 colors, the "Palette" button will be grayed out; otherwise you can use it to select the DIB, BMP or PAL file containing the palette you created. ■

David Aughenbaugh is trained in video, graphics and fine arts, and has worked in digital video for seven years. Recent computer game titles include "Earthsiege 2," "Silent Thunder: A-10 Tank Killer 2" and the upcoming "RAMA." He may be reached at 541-334-3350, Internet:davida@sierra.com

CONTINUED FROM PAGE 14

Production Tips to Remember

the mic between themselves and the interviewee.

4. BREAKING UP IS HARD TO DO

All too often producers fail to realize that there is no commandment that states, "All interviews will be edited together in their entirety and in sequence." Adding video inserts is not the only method of breaking up an interview. Like paragraphs in a short story, the interview can be broken up every time the basic ideas change.

Change the sequencing of events only if it does not alter any of the context of the interview. Cut back and forth between the interview and the B roll, still frames, or graphics to make the interview less predictable and more enjoyable to the viewer.

5. ANSWER MY QUESTION WITH A QUESTION

Why is it that every time we produce a program we always feel we need on-camera talent? Face it, many times the interviewer can get in the way of the person being interviewed. Much of the time, the director and the camera operator are trying to figure out how to frame the shot without the interviewer in it. Let the interviewer ask the questions off camera and keep the person(s) being interviewed in the frame — alone! Letting the question be phrased into the response eliminates the need for an interviewer altogether. This saves time and lessens the potential for viewer boredom.

If a tour is being conducted, use the same technique, with "expert" tour guides. They know where they are going, they know how it works, and they can do a better job — again, oftentimes off-camera, with the camera leading the way and the individual narrating as the tour progresses. The shoot will go more smoothly and make more sense to the viewer if you put them in the shot only on occasion.

6. GIVE A GUY A LITTLE CREDIT

Use a name and attribution for everyone during the segments, especially ENG. It not only looks "professional," but it is fitting. Remember, give credit where credit is due and include the proper attribution; that means asking the right person for his or her correct title.

7. CREATIVE IDENTIFICATION

Use your creative juices to design a logo for all of your work. Whether it is the company logo or something you and your staff have designed, a logo is instrumental in creating an identity for your work.

If applicable, the logo should appear with all attributions and on any character-generated pages with information being presented to the viewer.

8. STEAL YOUR AUDIO EFFECTIVELY

Do not rely on sound effects CDs for

all your audio effects needs. Take a VCR or camcorder out with your best microphone and begin recording and cataloging the sounds you need. Take it back to work, and use it in your program. You will find many of the "great" sounds you need right outside your door. The sounds are free — no royalties.

9. SHOW AND TELL

Remember, television is audio and video.

Try this simple test: Turn on the last program you produced, and turn the brightness all the way down. If you can listen to the program and really not miss anything important, congratulations, you have produced a great radio program! Television should be more than radio with pictures. Show the viewers something beyond what they would expect to see. Good television always teaches viewers something simply by showing

and telling us things we do not know or have never seen.

As I said at the start of my column last month, these points are not new or revolutionary. These are things that many of us are aware of but may have forgotten in our productions. There is a basic formula for professional results, and we are all able to achieve that end. ■

Dennis J. Hamilton has been working in television for nearly 20 years. He has taught television production and production techniques, and has conducted seminars all over the United States. He has produced more than 1,000 programs since 1978. He can be reached c/o TV Technology.

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RF Reflections on NAB '96

NAB '96 was BIG! Attendance exceeded 92,000. Aisles seemed crowded and Sunday's HDTV engineering sessions were standing room only. While there may have been some complaints about the show being split between the Sands Expo and Convention Center and the Las Vegas Convention Center, most attendees seemed happy all these people weren't in the same location at the same time!

I've been attending NAB Conventions since the 1976 show and it seems like each year I end up seeing a smaller portion of the exhibits. This year was no exception. When the show ended at 2 p.m. Thursday there were still people and booths I wanted to see. I realized I even missed one corner of the

main exhibit hall! Reflecting on this year's show, I realized I had spent more time talking about product plans, future development and technology than poking around actual hardware. Perhaps, given the changing state of broadcast technology, that wasn't such a bad thing.

This month I'll try to hit some of the RF highlights from NAB '96. I'm not going to try to list every manufacturer I saw or every new product. There isn't room! I will focus on three areas I hope you'll find interesting. A lot has changed since NAB '95.

With HDTV now on the horizon, UHF tube manufacturers are refining their existing products and developing new devices for digital ATV RF amplifiers. Transmitters are

evolving as well. Competition is fierce — technology is improving and it looks like costs will come down. Reception of NTSC signals wasn't ignored. Two developments discussed at the show were targeted at improving consumer reception of over-the-air TV signals.

HIGH-POWER UHF

I've noticed that interest in high-power UHF transmission increased substantially, likely due to broadcasters realizing that all but a few HDTV stations would operate at UHF. At the same time, the number of UHF stations on the air and making money has increased along with the number of TV networks in the United States. Tube manufac-

by Doug Lung

RF TECHNOLOGY

turers have noticed this too.

The IOT (Inductive Output Tube) received most of the attention. It was the tube of choice for the high-power UHF HDTV tests in North Carolina. Comark and other manufacturers have actively promoted it as the ideal device for HDTV. Many VHF engineers were not so sure, having finally exchanged their transmitting tubes for highly reliable VHF solid-state amplifiers. Talking with vendors, I found they are quite aware their new customers will likely have more experience with VHF tetrodes than UHF klystrons. That was evident in the design of their new Klystron and IOT circuit assemblies.

The contrast between older Varian/Eimac Klystron assemblies and CPI/Eimac's new K-2 Klystron/IOT assembly is amazing. One person can easily change a tube — it simply drops into a socket. Older designs required disassembling the cavities (requiring at least minor retuning), unhooking cooling lines and disconnecting several cables. The K-2 operates at 43 kW visual and 4.3 kW aural in combined service and 60 kW in vision-only service. EEV offered similar advances in its lower-power IOTs. New higher-power tubes will probably follow soon. One thing I noticed on EEV's IOTD140R circuit assembly was that its input looked like a tetrode input — a sliding short for tuning it to resonance and a sliding contact to match impedance. The IOTD140R is capable of up to 42 kW peak power in digital service.

The new generation of tubes offers more than ease of installation and setup. Earlier this year I'd heard the new Philips input cavity design offered much less phase non-linearity than competing designs, allowing better correction of intermodulation products along with better low-frequency linearity. Not to be outdone, EEV showed a new input cavity design with additional improvements. The new K-2 Klystron from CPI/Eimac also offers much better performance than earlier designs.

Several items affect IOT intermodulation/linearity performance. Grid design is one; the type of insulator used to isolate the input cavity from the high cathode voltage is another. IOT users are also concerned with how long the tube will last. Manufacturers took great effort to put past problems behind them. Here are some of the major developments from two established manufacturers and one new to the U.S. market.

A MATURE TECHNOLOGY

EEV made a special effort at the show to demonstrate EEV IOTs are a mature technology, providing long life. I covered that issue in last month's column, and I won't repeat it here. EEV's Dr. Roy Heppinstall discussed one of the IOT's advantages over competing technologies by noting that the IOT can handle short peaks that equal the peak power rating of the tube or even exceed it. The implications of this for amplification

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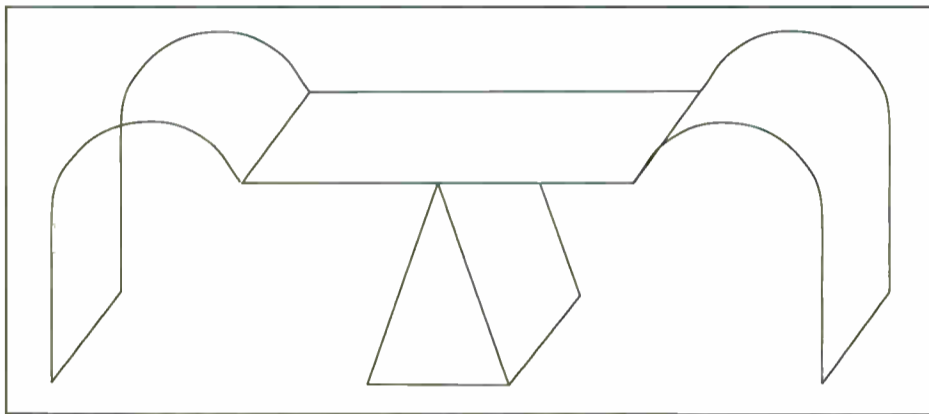
of digital TV signals are that previous maximum output power comparisons, based on peak visual power under analog service, may not be valid. Dr. Heppinstall's paper noted that, with correction, an average digital power level 5 or 6 dB below an IOT's peak output power capability is possible "while maintaining a 40 dB ratio of in-band to out-of-band noise density."

EEV also introduced a new line of IOTs: the 8000 series. One tube, the IOT 8505, is rated for 60 kW visual and 3 kW aural common-amplification service or 50 kW visual and 5 kW aural common-amplification service. The air-cooled IOT 8202R offers the same easy "plug-in" tube installation as the IOT-D140R. An air-cooled IOT 8303R rated at 30 kW visual and 3 kW aural in combined service is scheduled for July delivery. In addition to the changes in the input cavity to reduce phase non-linearities, EEV has also

tion. Eimac found the focus coils were wired in bucking mode. Once again, the tube still worked. These unscheduled tests were certainly impressive, especially considering the Klystron/IOT's reputation as a delicate device.

The performance reported for the K-2 was equally impressive. Peak power capability exceeded 100 kW. Intermodulation performance of -45 dB was achieved without correction at 60 kW visual and 6 kW aural service. Cathode life is estimated at 40,000 hours. Like other IOTs, the K-2 does not have a hard saturation threshold. Note that the K-2 is not currently rated for 60 kW common-amplification service. Operation at 43 kW visual with 4.3 kW aural allows plenty of headroom for tube aging.

Svetlana showed a new variation on the IOT: the Russian-made ISTOK 1stran 11L-9001 Multi-Beam IOT. Nat Ostroff



Sketch of a prototype of the MegaWave indoor TV antenna.

redesigned its circuit assemblies for use with the 8000 series to reduce losses, increase safety margins and make installation and maintenance easier.

I, like others, wondered what would become of the Varian/Eimac tube line when it separated from Varian. If CPI/Eimac can deliver on the claims made at NAB '96, acceptance of Eimac UHF tubes should increase significantly. Like EEV, Eimac felt it important to defend the reliability of its tubes. As a pioneer in Klystron/IOT technology, Eimac bore the brunt of the Klystron's early problems. With the trend toward easier-to-install tubes, it is tempting to ask if this was driven by the need to change tubes frequently. One manufacturer told me the real reason the company is working on easier-to-install tubes is that, with expected lifetimes of several years, it is likely transmitter engineers will never have the opportunity to get familiar with how to change them and set them up.

LEARNING THROUGH ERRORS

What impressed me most about the paper Andy Haase presented at NAB '96 was the way he attacked the usual criticisms of Klystrons head-on. Throughout the paper he made it clear Eimac designed the K-2 to be a rugged, long-lasting device. How? Haase noted that several mistakes were made during the testing of the K-2 and associated circuit assembly. While developing the cavity design, several violent tube arcs were noticed during testing. Finally, one arc destroyed the solid-state control logic circuit, and the test had to be stopped. They found the crowbar was completely inoperative! The tube still worked!

On another occasion, high voltage was applied without grid bias. The tube ran for over five minutes while dissipating 45 kW of DC collector power before it was shut off. Again, the tube was not destroyed. Finally, the paper noted that during one test the tube took several crowbars at low-beam opera-

tion. mentioned it briefly at the end of his paper, and I obtained more details from George Badger of Svetlana. What makes this tube interesting is that it operates at a lower-beam voltage than conventional IOT designs and also has 3 dB or more additional gain. The extra gain reduces the costly power capability needed from the linear RF driver amplifier. I'll discuss this technology more in future columns.

Of course, IOTs aren't the only option. Acrodyne was proudly showing its single tube Diacode-based Au60D transmitter. One year after its introduction at NAB '95, Acrodyne could point to three successful high-power installations and orders for many more. Throughout the development of the Diacode-based transmitter Acrodyne has been very open about the problems it encountered and how it corrected those problems. Considering how new the technology was and the significant power increase above existing products, I feel Acrodyne has accomplished a lot since introducing the transmitter. With strong sales, and with implementation problems hopefully behind them, we should soon have enough data to better estimate the Diacode's long-term reliability.

Those broadcasters that don't want to deal with tubes got some encouragement from a prototype 30 kW peak-power solid-state transmitter featuring the Westinghouse silicon carbide transistor. Stories about the silicon carbide transistor had been floating around since the SMPTE/SBE show in Miami in Fall 1993, but very little information has been released to the public. This year the silicon carbide transistor emerged, not as a concept but as an actual working device in an over-the-air HDTV demonstration. Paul Degonia, Westinghouse's director of HDTV development, described the characteristics of the new device and outlined Westinghouse's design for a 30 kW (peak-power) digital TV transmitter using the technology.

Degonia described the silicon carbide-based transistor as a "Static Induction Transistor" or "SIT." Noting the device has a power response similar to that of a triode, he said there was no compression in the gain transfer curve. Silicon carbide has a high thermal conductivity and can be used up to 500 degrees Celsius. It can also withstand much higher voltages than silicon-based devices. The current "SIT" has twice the power density of silicon transistors. Production versions are expected to increase the margin to four times. The devices demonstrated at the show were rated at 250 W peak power. Westinghouse packaged the transistors in modules rated at 1,000 W peak, 200 W average power. Production versions will be specified at 2,000 W peak.

I was concerned that the sale of Westinghouse's defense electronics division, which produced the silicon carbide units, might hamper its development. There was no evidence of this at the show. During the show Cree Research issued a press release saying it would be supplying the silicon carbide to Westinghouse for use in these amplifiers.

The Westinghouse people were very excited about their technology. I had the impression the technology had moved faster than the marketing. At different times it was implied that Westinghouse would be building a transmitter based on this product. At other times, I heard the main push would be to sell the technology and modules to other transmitter manufacturers. Paul Degonia's presentation certainly made it sound like Westinghouse was committed to building a silicon carbide-based high-power solid-state transmitter. He described Westinghouse's

experience in building high-power, highly reliable military radar devices, and showed how these concepts could be used in building a high-power, highly reliable TV transmitter. He noted that solid-state technology requires fewer parts, is redundant, is fault-tolerant due to the redundancy and can offer on-air reliability exceeding 100,000 hours mean time before failure. Degonia also claimed that the technology would be affordable, saying the cost of ownership would be competitive with tube-based transmitters.

The transmitter described in his paper and shown in prototype form in the hall had redundant amplifiers, redundant power supplies and redundant blowers for air-cooling, all "hot-swappable." I like the concept. It will be interesting to see if Westinghouse can bring it to market.

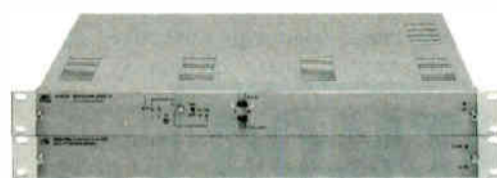
The premier of the first "silicon carbide HDTV broadcast" Monday morning at NAB was certainly exciting. More on that next month. During the press conference portion, Richard Hadala, president of Westinghouse's Communications and Information Systems Company (CISCO), said Westinghouse will focus on the transistor, not the transmitter. He said CISCO will join with other companies to build the transmitters and that discussions are under way. He estimated 12 to 18 months for completion. Michael Jordan, chairman and CEO of Westinghouse Electric Corp., said both Westinghouse and CBS were committed to driving broadcast TV to the digital age. CBS's Senior VP of Technology Joe Flaherty was at the press conference and responded to a question about the cost of

(continued on page 20)



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CONTINUED FROM PAGE 19

NAB's RF Perspective

HDTV by saying it could be integrated into a station's replacement schedule. He noted that digital production gear was already replacing analog gear and that this year's NAB showed prices were eroding.

Comark introduced a new transmitter line, the "ADvantage" based on EEV's new IOTD140R air-cooled tube. Nat Ostroff described the transmitter in his paper Sunday afternoon. The transmitter is designed for digital TV transmission and is a self-contained air-cooled unit. The PS-Squared HV power supplies, exciter and driver amplifiers and control units are all included in the cabinet. Comark's use of multiple digital controllers interconnected with fiber-optic links eliminates the need for complex and expensive wiring harnesses. The computer control system allows for very interactive, hand-holding operation. In the demonstration unit on the floor, Comark showed typical error messages and user information available from the controller. With this data available in digital form, remote control can be as easy as a remote terminal at the studio connected by RF modem or phone lines.

NEW, REFINED EXCITERS

One of the more interesting portions of Ostroff's presentation was the description of a new exciter under development in cooperation with the David Sarnoff Research Center. This exciter uses a new digital automatic/adaptive predistortion technology that Comark claims will provide more than 30 dB reduction in intermodulation products. It should reduce or eliminate the need for a large, high-

power bandpass filter on the output of the transmitter. Comark's goal in developing the "ADvantage" transmitter is to develop a highly reliable, easy-to-operate transmitter that is also inexpensive to operate and less expensive to manufacture. A copy of the paper is printed in the NAB's Annual Broadcast Engineering Conference 1996 Proceedings.

Comark introduced a new transmitter line, the "ADvantage" based on EEV's new IOTD140R air-cooled tube.



Harris Corp. introduced its prototype digital ATV exciter at NAB last year. This year, the company showed a more refined version of the exciter, stating it "represents the first implementation of the full GA VSB exciter by a transmitter manufacturer." As part of his NAB paper, Harris' Robert Davis gave a very comprehensive explanation of the circuitry inside the exciter. If you were unable to attend the session, request a copy of the paper from Harris Corp. or look it up in the Annual Broadcast Engineering Conference 1996 Proceedings.

Harris' digital ATV exciter is completely different than anything analog broadcasters are using today. There are no video and audio inputs. The data from the digital master control goes directly to the exciter, where the data is

recoded for transmission and error correction is added. All processing is done at the digital level until a D/A converter outputs the IF signal for upconversion. When I asked about production of the unit, I was told there are some standards issues that have to be resolved regarding the exact format of the data sent to the exciter from the master control via fiber link or digital microwave. I'll have more

details on this exciter in future columns.

Two technologies described at the convention should improve today's over-the-air television. The first one to impact TV broadcasters will be the widespread use of Philips' Magnavox ImageLock (TM) ghost canceling technology in consumer televisions. As I reported after the Western Cable Show, Zoran's spinoff company Oren Semiconductor developed an inexpensive chip for ghost canceling. It is based on work done by engineers at Philips Consumer Electronics Company in Knoxville, Tenn. Magnavox expects to begin selling set-top ghost cancelers in June. The first sales will be in markets where ghosting signals are a major problem. The technology also is being licensed to other major TV set manufacturers and may start appearing in their sets near the end of 1997. Magnavox sets should have it sooner.

NO GHOSTS

The improvement offered by ImageLock ghost canceler on ghosting signals is amazing. Ghosts are eliminated and, because the heart of the circuitry is a wide-range adaptive equalizer, frequency response variations are also corrected. Long delay ghosts are obvious, and it's easy to see the improvement when they are gone. More subtle is the improvement in sharpness resulting from the elimination of short delay ghosts that cause a picture to look soft or blurry.

After NAB '96 one chief engineer asked me what I thought the most significant item at the show was. I narrowed the field to transmission-related items that would be available soon. Looking for an answer, I said "Well, the Philips Ghost Canceling circuit..." To my surprise, he had come to the same conclusion and went on to remark

about how well it worked. Philips has agreed to provide me with a set-top box to test as soon as they become available. I'll be reporting on the results.

Keep in mind that if your station is not transmitting the GCR signal, its signal will not be improved by the ghost canceling circuits. Many VITS inserters from Tektronix and other companies now offer the GCR signal as part of the standard package. The FCC has mandated that line 19 on both fields one and two must be reserved for GCR signals. If you have an old generator that is still inserting the VIRS on line 19, you will need to reconfigure it to move the VIRS to another line or eliminate it completely.

MEGA ANTENNA

The other significant technology for TV reception is the MegaWave indoor TV antenna. Glenda Benham, one of the MegaWave engineers working on the project, described it during a Wednesday session. The paper focused on the problems measured with existing indoor antennas. Large, separate antennas are needed for different bands and exhibit coupling to the body while being adjusted. Benham showed several measured patterns from a "rabbit ears" antenna that illustrated how the pattern and gain varied from channel to channel. Benham didn't describe the actual design of the MegaWave antenna, but did describe the results. The MegaWave pattern remained a constant "figure 8," with one pair of nulls throughout the VHF and UHF spectrum. Frequency response was flat with a smooth roll-off from the low to high UHF channels. MegaWave used over-the-air TV stations to test the antenna, so the response showed a step at the low to high VHF channel transition due to the difference in allowable transmitted effective radiated powers.

Benham showed a photo of the prototype antenna. It is difficult to describe. One member of the audience said it sort of looked like a wave. See the illustration for my attempt at drawing it. Please note this simple line drawing is based on a photograph shown during the talk and the antenna will certainly be somewhat different. Dimensions weren't given, but from the photo I'd estimate the metal plate, which forms the "wing," to be between 6 and 8 inches deep. The length of the top of the wing appears to be two or three times the depth. I assumed the feed was to the center, but that wasn't stated. It looks interesting. MegaWave tests showed that in 60 percent of the

cases it improved reception. Because of its broadband response and stable pattern, it is ideal for "channel surfing." It looks better, should have low manufacturing cost and offers ideal characteristics for ATV reception. All this with comparable or better performance than existing antennas.

Next month I'll have some observations on the transition to digital TV broadcasting, both terrestrial (HDTV/ATV) and over satellite, along with a few more items from NAB I didn't have room to include here. As always, you can find updated information, press releases and links to broadcast RF manufacturers on my Web site at <http://www.transmitter.com>. Your comments and contributions are always welcome. E-mail me at dlung@transmitter.com or fax me at (305) 884-9661. When I'm in Miami you can reach me at Telemundo at (305) 884-9664. Please do not call before 6:30 p.m. eastern time as normal office hours tend to be hectic. Mail information to Doug Lung, 2265 Westwood Blvd., Suite 553, Los Angeles, CA 90064. If you are sending a time-critical item, call me first to find a local address. ■

Doug Lung is vice president and director of engineering for the Telemundo Group of stations.



BUSINESS

TURNER NETWORK TO USE TEKTRONIX PROFILE PDR

ATLANTA

Turner Entertainment Networks' Cartoon Latin America network will be using video fileservers direct-to-air. The Turner network will use two Tektronix Profile Professional Disk Recorders as mirrored PDRs. The two PDRs will operate as main and alternative cache devices.

The mirrored Profile PDRs will provide automated commercial and interstitial material to cover domestic breaks. The Profile PDR is being tested as a video fileserver as well, offering approximately 351 minutes of storage.

"We are in the early stages of software development for video file-servers," said Brad Gilmer, director of advanced operations. "As compression rates improve and storage increases, we will begin to see the full potential of this technology."

The Cartoon Latin American network will be the first Turner network to use the mirrored Profile PDRs direct-to-air. The equipment agreement is designed to increase the availability of interactive television applications in the consumer market, the company said.

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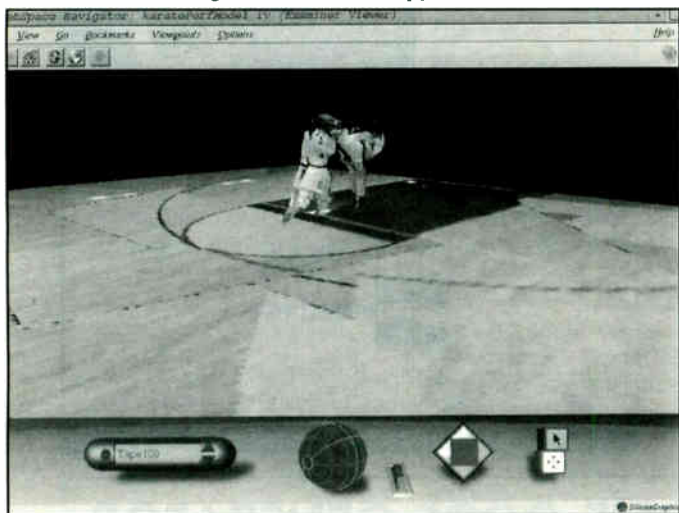
Immersive Video Brings Viewers On-Screen

by Susan Ashworth

SAN DIEGO

Viewers may soon be calling all the shots with a new technology called immersive video. No longer restricted to preset camera angles or clunky virtual reality gear, computer users may someday be able to view a scene as if they were running beside or flying above a favorite action star as he races down the street.

Dubbed the "next generation of VR appli-



Immersive Video can be viewed on the World Wide Web.

Ramesh Jain, the system has the capability to create a fundamentally different experience than that provided by existing VR tools. Although the system does not currently operate with television, it can eventually be configured for interactive motion pictures, viewing sports and entertainment, or business conferencing, said Saeid Moezzi, a senior research scientist in the UCSD Visual Computing Lab.

Immersive video utilizes two principles: live video and interactive virtual reality software. In creating immersive video applications, multiple Hi8 cameras are placed around a relatively small arena, such as a basketball court. Using the live data, a three-dimensional computer model of the scene is created on an SGI PowerPC/2 RealityEngine 2 platform with software designed by Jain's team. The computer model of this arena is used as a reference point, or "backbone," as the ensuing action

in the arena unfolds, allowing a viewer to change his viewing perspective during replay. As two men spar in a karate match, six Hi8 cameras are used to capture the video streams. They are digitized at 10 frames per second and are analyzed against the original computer model to distinguish moving objects, Moezzi said. Using a software package designed by UCSD scientists, a geomet-

ric volume is assigned to the moving objects within the computer model.

The two video streams — the live karate video and computer-fabricated scene — are combined to create a changing mosaic and the 3D movie is recorded in digital video. Sun SPARCstation workstations and an SGI graphics workstation process video data and communicate through a 120 Mbps Ethernet switch. Resolution of the video will improve as the number of cameras is increased, Moezzi said.

As a result, immersive video allows viewers to move within a 3D scene at will, similar to current virtual reality programs.

"Immersive video is a 3D video for certain events that are staged and recorded," Moezzi said. "If the scene is simple, such as a basketball game, you can set up cameras and record the event to create a three-dimensional scene. If you want to create a town, you can paste the texture from real scenery and computer-generated images together."

Using a mouse or other device, a viewer can choose the perspective he or she would like to see. Immersive video is currently targeted toward computers with applications leaning toward television, Jain said. The UC San Diego team hopes to create a library of 3D feature films to be distributed over the Internet using the Virtual Reality Modeling Language (VRML) standard sometime next year. The three-dimensional nature of VRML will allow the user to view a scene from an infinite number of viewpoints.

In the lab's nonactive demonstration available on the Internet, viewers can use a display control panel to pan the room, zoom into a particular person or tilt to get

various viewing angles. The UC San Diego Web site is at <http://vision.ucsd.edu/>.

"Virtual reality isn't able to use actual people," Moezzi said. "However, with immersive video, you can re-create that (person) on a computer screen. It's 3D ... so you see depth. You can move around and change your viewpoint. You can move around the scene because different camera angles are created that weren't available before. Once the image is created, you can determine where you want to sit, like right behind the person who is shooting from the basket."

"We've proven it's possible to create a 3D video image that people can move around in." ■

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Setting a Cable Modem Standard

by Richard Campbell

CABLE READY

With the burgeoning number of new revenue possibilities for the cable industry, and the corresponding demand for bandwidth and capital, data transfer is one place where the supply has not yet met with demand. As the cable industry struggles to find its place in the ever-changing communications arena, I thought it would be a good time to discuss the cable modem.

READY, SET, GO!

CableLabs hoped to have a set of interoperability standards in place by spring of this year. The CableLabs standards will decide which media access control and physical layer protocols will be used for deployment of high-speed cable modems. Although several companies are forging ahead to test the market, large-

scale deployment of cable modems will become feasible only after these standards are in place.

In Princeton, N.J., the public school district has been operating a wide area network over a municipal I-net for the last six years. The WAN connects 500 computers that are utilized by 3,000 students for research, e-mail, and for access to the Internet. Peter C. Thompson (district technical coordinator for the Princeton schools) says that operating with a lack of a standard has left him with three different modem styles, "none of which communicate with each other, and none of which operate on the same levels or operating ranges." Mr. Thompson also reports that a lack of standards for the cable modems often has caused him to be left with "orphaned equipment that can no longer be upgraded."

Although the absence of a standard for cable modems has prevented a large-scale deployment, some companies are nonetheless forging ahead to test the idea of transporting data over the cable system.

THE PLAYERS

Telecommunications Inc. and a Silicon Valley venture capital firm will soon launch its @home (pronounced "at home") service in Sunnyvale, Calif. TCI will use 6 MHz of spectrum to connect its customers to the Internet. Cable modems operating at 10 Mb per second

will receive data from servers located in the headend. The headend servers will communicate with larger servers in regional data centers, which in turn connect to the Internet, through high-speed fiber-optic phone lines that will be leased from the telephone company. TCI hopes that by storing the most frequently called-on information in servers, it can enhance the data transfer speed as well as make the system more reliable.

Continental Cablevision will provide free high-speed Internet access to every primary and secondary public school within its service territories. It will provide one cable modem to 5,000 schools in the 750 communities the company serves across the nation. Continental is also conducting a high-speed Internet access trial in 200 homes in the Boston area. The MSO hopes that its recently announced merger with US West will provide it the additional resources needed to offer these types of services on an accelerated basis.

Time Warner has been testing its Linerunner service in Elmira, N.Y., since the summer of 1995. The MSO offers access to CompuServe and America Online in addition to the Internet and is expecting to take delivery of some 50,000 Motorola CyberSURFER modems soon.

Comcast is testing approximately 50 homes in its Lower Merion Township, Pa., system.

(continued on page 23)

FEATURES

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READER SERVICE NO. 96

Making the Net More Personal

by Frank Beacham

NET SOUP

AT&T didn't think of it. MCI missed it, too. Ditto, Sprint. The idea came from Jay Muller, a 24-year-old musician who wanted to simplify his personal communications.

Why not use the global capabilities of the Internet, Muller thought, to enable users to receive faxes and voice-mail messages at their e-mail addresses? Electronic communications could then be sent directly to people — wherever they may be — rather than to places (such as those with a fax or answering machine).

When Muller could find no company that offered such a service, he started his own. JFAX Communications is now open for business. The fax-to-e-mail service with personal phone numbers began in New York City, Atlanta and London in May.

The voice-mail service should be operating by the time you read this.

JFAX works with any MIME-compatible e-mail service. When a fax comes to the subscriber's assigned phone number, JFAX's proprietary technology instantly converts the incoming fax into a compressed graphic binary file and automatically delivers it via the Internet to the specified e-mail box. A JFAX viewer (available for Macintosh, Windows 95 and Windows 3.1) is used to read, print or save the fax. For voice-mail, JFAX uses a compression algorithm to shrink the audio for delivery over the Net.

Personal JFAX phone numbers cost \$12.50 a month, which includes up to 100 pages of incoming faxes. Additional pages are 20 cents each. There's also an (800) number service that works anywhere, but it's considerably more expensive. By mid-year, JFAX service is scheduled to begin in Los Angeles, San Francisco, Chicago, Washington, D.C., Tokyo, Hong Kong, Paris and Sydney. The JFAX Web site is at <http://www.jfax.net>.

Real-time audio capability came to the Internet only a year ago. Now there are hundreds of Internet broadcasters and a glut of available programming. Progressive Networks, the Seattle company that started it all with its RealAudio technology, has introduced a one-stop site to organize listening from the more than 600 available offerings. Called Timecast (<http://www>

.timecast.com), the new free site goes the next step in personalized Internet radio by enabling users to customize their own daily news broadcast with time-sensitive audio content and have it easily delivered back via the World Wide Web.

"Timecast is a breakthrough in the delivery of multimedia information," said Rob Glaser, chairman and CEO of Progressive Networks. "Timecast makes it easy for Net users to find, select and immediately listen to the multimedia news, information and content that's available today at hundreds of Web sites."

The cornerstone of Timecast is the daily briefing feature, which allows users to build a custom newscast with stories from a dozen well-known news and entertainment organizations such as ABC, cnet, Entertainment Tonight, CBC, Fortune, Web Review, Computer World, Industry.Net and TST-Taylor Subscription Talk. Individual user selections and preferences can be saved for repeat visits.

"Timecast tackles two compelling issues. Not only does it make time on the World Wide Web efficient by aggregating those (sites) that produce audio content, but it levels the playing field so that small entrepreneurs with innovative ideas can be listed alongside major media developers," said Allen Weiner, director and principal analyst, on-line strategies, Dataquest.

Timecast ties RealAudio content to a single Internet site, indexing a huge collection

of audio content with an array of other "one click away" features. For example, a "Live Now" feature — updated every 10 minutes — takes users immediately to live events, such as rock concerts, professional sports games, political speeches and talk-radio programs.

The "Live Radio Stations" feature connects users to one of more than 50 radio stations throughout the world that are currently broadcasting their radio programs using RealAudio technology. In addition to numerous U.S. stations, radio stations from Canada, Italy, France, Australia, Malaysia and Hong Kong are broadcasting their programs via the Internet using RealAudio.

Timecast will also include a fully categorized search facility where users can find programming by keyword, title or capsule description on a comprehensive database of third-party sites offering programming with RealAudio technology.

Since its introduction in April 1995, more than 4 million RealAudio Players have been distributed throughout the world, with over 25,000 currently being downloaded from the RealAudio Web site daily (<http://www.realaudio.com>). ■

Frank Beacham is a New York-based writer and producer. Visit his World Wide Web site at: <http://www.beacham.com>. Mail: 163 Amsterdam Ave. #361, New York, NY 10023. E-mail: beacham@radiomail.net.

CONTINUED FROM PAGE 21

Setting Standards For Cable Modems

It is a fact of life these days that network is one of the largest hurdles facing the cable industry as it matures into a full-service provider. According to Bellcore, a customer is 10 times more likely to experience an outage while watching TV than while using a telephone. Obviously, this is due in large part to the fact that people watch TV much more than they use the telephone. According to Bellcore, the average time a telephone is used is 30 minutes each day; that same household will use the TV between 7 to 7.5 hours.

Many companies are looking closely at the powering issue. TCI is leaning toward 90 V powering as a means to not only meet the increased power demands, but also as a way to improve reliability. Reducing the number of power supplies required in a system also reduces the number of failures.

The reverse path is another major concern, regardless of which portion of the spectrum gets utilized. Any intelligence traveling in the upstream direction will suffer from an accumulation of RFI that is much greater than that of a downstream signal. If there is any measurable leakage in the downstream direction, it will be a point of ingress for interfering carriers. Some estimates indicate that three-fourths of the carriers that interfere with upstream traffic come from the subscribers' homes. Therefore, the quality of equipment that gets installed in

the drop portion of the system is extremely important.

Status monitoring is being considered as a way to improve the reliability of the HFC plant. This will greatly improve the uptime of any communications system by catching failing equipment before it causes an outage.

NETWORK SUCCESS

As the demand for increased modem speed rises, the cable industry is well-positioned to provide this service. As important as a standard for cable modems is, network reliability is also critical to success. The amount of time that the cable services are utilized every day is already high, and it will increase as more and more services are offered.

While the Bellcore standard for service reliability (99.99 percent) is an admirable goal, is it high enough? As service providers, we will ultimately be held to the highest standard of all — the customers. It will be the customers' perception of our reliability that will determine our success or failure in the telephone and data markets. ■

Richard Campbell is a service technician with TCI Cablevision of Nevada, Inc. and has worked in the cable TV industry for more than 14 years. If you have any suggestions or comments, Richard can be contacted on CompuServe at 73732,2340.



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Dual-Cam System Lights Up the Night

Infrared Camera Technology Shines AT KGW-TV

by Susan Ashworth

PORTLAND, Ore.

Bolted on the side of the helicopter at KGW-TV is the station's newest news weapon. It catches regular video in the daytime. And at night it captures what's happening on the ground, even in complete darkness or fog.

This airborne pod is a two-camera system that combines a regular Sony broadcast camera with an infrared camera that picks up thermal heat — it can identify objects as large as a building or locate potential culprits as small as a dog.

OUT OF THE DARK

This past winter, the station used an earlier version of an infrared camera system now known as the ULTRA 4000, from FLIR Systems Inc., to cover regional flooding. "We went out and showed people in the

The SAFIRE system can detect human forms, which emit a bright white glow.



dark who were sandbagging and showed where the floodwaters were," said Mike Rausch, KGW-TV news director. "It gave us a different view of the city at night ... and a different approach to the story."

Housed in a round, white pod, the Ultra 4000 is a dual camera system with a no- or low-light infrared camera whose optics detect thermal energy.

"At nighttime a broadcast camera is useless and that's when infrared can be switched on," said Dwight Dumpert, director of applications for FLIR Systems. "Like a regular camera, you can follow any object on the ground. The system provides inertial stabilization. And you can switch between two monitors to get infrared or visible camera operation."

A collection of solid-state detectors, which hold optics within the camera, sense the infrared heat that is emitted by objects. This energy is projected onto the detector surface and the images are A/D converted into an electronic signal by a thermal imaging system called the SAFIRE. Then these infrared images, which look like black-and-white smudges of light, are sent through traditional cable lines to an eight-inch LCD monitor. The system operates in an 8- to 12-micron range to spot infrared images through fog, smog or haze, Dumpert said.

"This special detector senses thermal infrared energy that is associated with the low heat of our body," he said. "It collects this information and converts it from infrared energy to an electrical signal, a TV signal, which is transmitted to a monitor. On the monitor you'll see a black-and-white image, with black being (a cooler area) and white being hot."

The SAFIRE system can detect human forms, which emit a bright white glow. Bodies of water, animals and vegetation are recognizable, as are inanimate objects, such as trash cans or lampposts, which appear as gray blips of light.

A Sony three-chip CCD camera and a Fujinon S16 x 6.7 lens with a 16:1 ratio and 2X extender comprise the separate daylight broadcast camera. The broadcast camera provides a field of view of 51 degrees wide and 1.7 degrees narrow. Both cameras are operated by either a hand or lap controller.

The 88-pound device can be pointed in any direction, Dumpert said, because it has 360-degree rotation and three-axis gyro-stabilization. The pod can be detached and reattached to any aircraft fitted with the ULTRA 4000 base mount.

"The user can point at a car or person and

the image is stabilized so you don't get jitter," he said. "At the center of the gimbal you have the two camera modules that offer a dual field of view — narrow and wide — with a wide field of view of 28 x 16.8 degrees and a narrow field of 5 x 3 degrees.

INFRARED INTEREST

"(KGW-TV) was interested in doing with infrared what it could do with normal video," Dumpert said. "The infrared system conforms to video standards and because we do that, we can ... transmit to normal video equipment." The station uses

microwave downlink to access video in real time, he said.

As of press time, the ULTRA 4000 had not been officially approved by the FCC for flight on commercial aircraft. If approved, KGW-TV will replace the standard broadcast camera that sits on the nose of the helicopter with the ULTRA 4000, which will be attached over the door of its MD500 helicopter. A flat-panel Sharp monitor will be installed to read the camera's infrared images.

"There are a lot of applications for environmental reporting or law enforcement work," KGW-TV's Rausch said. "Plus, every year there are always a few people who get lost out here." ■

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BBC Serves Up Coverage for Wimbledon

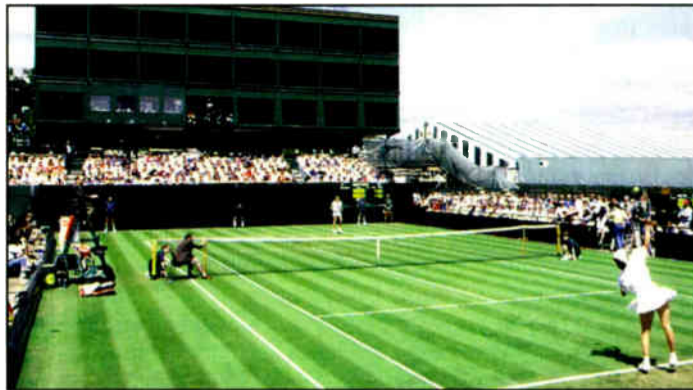
by Susan Ashworth

WIMBLEDON, ENGLAND

Since 1937 — when the matches it broadcast were limited to grainy black-and-white images — the British Broadcasting Company has served as host broadcaster for tennis' most traditional tournament, Wimbledon. Each year the BBC is faced with organizing the coverage of this 119-year-old match, acting as both broadcaster and wise watchdog for the more than 40 countries that attend the fortnight-long tournament that began June 24.

The BBC is serious about its traditions. Each court is limited to a few cameras; no zealous cameraman can block the Queen's

view of center court. But a complex method of match coverage will allow the BBC to cover six matches simultaneously, produce



12 hours of programming each day for its two networks, BBC1 and BBC2, and tape more than 80 interviews with Wimbledon players every day, which are routed to countries worldwide.

TECHNOLOGY CENTRAL

In a mobile truck complex between court 1 and court 17, the BBC controls each of its 32 Sony 370 and 70 cameras that surround six "show courts," those courts

that receive heavy play and coverage. During the first week, six cameras will encircle center court, with the number of cameras increasing to 10 as the week wears on. Three cameras with Fujinon 55:1 lenses will be placed at the north end of the court. Two midcourt cameras — the "personality cameras" that focus on the players — are placed on either side of the umpire's chair. Only one camera is located on the other side of the court, and it operates only when the ball is out of play.

"We don't do cross-court coverage. Only Americans have that strange idea," said Ian Dow, engineering manager for the BBC. "If you do it that way, the balls fly in opposite directions when you cut camera to camera."

That cross-court camera is mounted on rails that operates when the players change sides or towel off. Another remotely controlled camera on a Optex PBIS head sits under the royal box and is run by a camera operator hidden nearby. "That way there's no cameraman in a sweaty shirt and funny hat in the front of the royal box," Dow said.

COMPLEX QUARTERS

In the "cabine" compound — the production area — a customized Grass Valley 200 with 40 channels acts as master control, handling six simultaneous video feeds. Each feed has a separate director as well as individual Sony slow-motion machines and Panasonic D-3s.

"Our master control is taking in those six pictures and taking in video tape machines and taking in the audio and adapting it and

Wimbledon is the most complex annual tournament the BBC covers.



transmitting it to the BBC," Dow said. Video feed is then sent on terrestrial microwave back to BBC headquarters at Television Centre in London. Video feed for smaller international broadcasters is uplinked via satellite.

This year the BBC is debuting a customized EVS disk-based recording system that is used for simultaneous recording and playback of slow-motion video. "The great thing about it is that you've got instant access to your slow-motion replay while you are still recording," said Peter Byram, BBC special facilities manager. The system allows the BBC to record two cameras simultaneously.

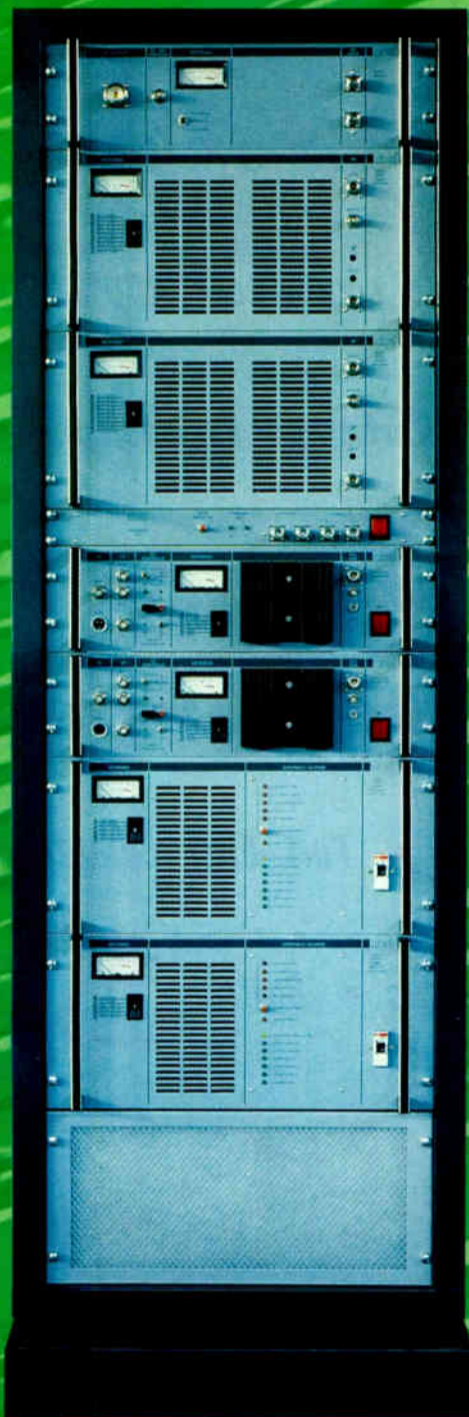
During the tournament, both BBC1 and BBC2 carry different Wimbledon matches, allowing the BBC to provide live feed to whichever network is between sets.

"When (the network) comes to a long change-over, we will take control of that network, break into it, update the viewers on what's happening on another court — perhaps roll a bit of tape of someone being knocked out — then hand the feed back before the play starts again," Dow said.

As a result, Wimbledon is the most complex annual tournament the BBC covers, Dow said. More than 120 technical staffers are on-site for the tournament, not including production or talent.

"You've got six different switchers working separate broadcasts and feeding into a central control," Dow said. "It's tough engineering all that sort of thing so it happens smoothly." ■

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USER REPORT

KASY and Acrodyne Blaze New Mexico Broadcast Trails

by William T. Hayes, D.E.
New Mexico Broadcasting

ALBUQUERQUE, N.M.

In late 1994, Lee Enterprises, Inc. entered into an LMA with Ramar Communications to construct KASY-TV in Albuquerque, N.M. Ramar is the licensee for this facility and Lee Enterprises, through its New Mexico Broadcasting division, provides the engineering, technical operation and programming for the facility. Lee also supplied all the technical equipment used in the operation with the exception of the transmitting antenna, which was purchased by Ramar.

Early in my tenure as director of engineering for New Mexico Broadcasting, I began the process of evaluation and selection of the 60 kW transmitter that would be used in the facility. At the time I was looking at transmitters, I had a choice between a pair of IOT-based transmitters or a pair of tetrode-based transmitters.

Acrodyne Industries showed us a new 60

serviceability standpoint. The only design that met both criteria was the still-untested Acrodyne Au-60D. The plant design for this transmitter had no hardware outside and left sufficient room in the garage for service. I, however, was still reluctant to be serial number one, especially because the Au-60D design had only a single-tube transmitter.

The two criteria most important to me were the space available and the price of the transmitter. After a conversation at the 1995 NAB with Acrodyne, and the vice president and general manager of New Mexico Broadcasting, we decided to take the risk and bought serial number one of the Au-60D.

A FEW BUMPS IN THE ROAD

The transmitter was delivered to KRQE's studios in June 1995 and installed at Sandia Crest in August. Testing and measurements began in September and the transmitter became operational in November.

The journey between installation and our present state has not been without its share of bumps. However, the primary area that had me, and most of the industry, concerned was the radical new diacode tube. As of this writing the diacode has mostly been a reliable and steady performer.

We were able to construct a room inside the garage to house the transmitter and dummy-load heat exchanger. Because of the extreme temperature variations at the site, a system of temperature-controlled, vacuum-operated louvers was installed for the input and output air. We have had two or three transmitter overtem-

perature shutdowns as a result of a failure in the temperature sensor that controls the louvers. As Murphy would have it, the failures always keep the louvers closed, and the ambient temperature in the heat exchanger room rose high enough that the water temperature increased and the transmitter shut down. The local vendor that supplied the louver system has since changed to a different temperature sensor and the louvers have subsequently not been a problem.

Most recently we had a failure in the air conditioner that cools the transmitter room. Temperature on the tube remained constant despite ambient air temperatures in the 90 degrees Fahrenheit range, but the 2,500 W solid-state drivers went into thermal shutdown. We are in the process of installing another air conditioner to provide more cooling and act as a backup for the primary.

COMING CORRECT

The diacode transmitter is driven by a 2,500 W solid-state IPA. The IPA consists of four identical modules that are capable of approximately 750 W each, giving the system a total of 500 W of headroom to compensate for tube aging. Whereas this

may seem like a small amount of headroom, UHF tetrodes have a tendency to fade rapidly. Unlike VHF, where tube life can be extended by increasing filament voltage as emission falls off, the structures inside the diacode are so small that when emissions begin to fall off the actual element structure quickly disintegrates.

Because we lack a backup transmitter in our operation, the IPA can be routed into the antenna through the use of two remote-controlled coaxial switches. Although there is a considerable drop in power, the high-altitude, high-gain antenna and close proximity of the major service area make this an acceptable backup system.

I don't want to lead any reader into thinking that the Au-60D is a flawless transmitter, especially because we are working with the prototype. There are a few weaknesses that we are working with Acrodyne to correct. The Au-60D is a common-mode transmitter and as such has the intermodulation problems associated with common-mode operation. Acrodyne has designed an IF corrector to deal with some of these problems and although the corrector works, its alignment and operation are a bit cumbersome and shielding of the corrector is not as good as it needs to be.

The transmitter uses a Barco modulator that gives acceptable performance but is nothing to write home about. We also recently identified a problem with RF being induced onto the logic control board, which caused the transmitter to shut off and restart intermittently. The problem was reduced by improving the bypassing capacitors on the board but the entire board also needs to be placed in a shielded enclosure. We also are concerned about the aural output power metering because the reading varies as a result of visual modulation. The meter circuit needs to be redesigned to provide a steady indication of aural output power.

Overall, I am extremely pleased with the performance of the Au-60D and the service that we have received from Acrodyne. The company's technical staff has been responsive to our needs and support after the sale has been excellent.

Because Acrodyne is a small company, our relationship is more of a partnership than a customer/vendor one. I can call and express comments and concerns to not only my sales representative or the technical service representatives, but to Bob Mancuso, the CEO. That kind of personal commitment and attention makes doing business with them a pleasure, even when you've bought serial number one. ■

Editor's note: William T. Hayes has been director of engineering for New Mexico Broadcasting for one-and-a-half years. Prior to that, he was manager of engineering for WSAZ-TV in Huntington, W.Va., and director of engineering for KHON-TV in Honolulu, Hawaii. He began his career in radio in 1973.

The opinions expressed above are the author's alone. For further information contact Mitch Montgomery at Acrodyne Industries (Phone: +1-800-523-2596 ext. 115; FAX: +1-215-540-5837) or circle Reader Service 117.



The Acrodyne Industries Au-60D 60 kW transmitter

kW single-tube transmitter based on a single-envelope dual tetrode or diacode. However, because Acrodyne had not yet completed the transmitter, I recall telling the sales representative that there was no way I would put "serial number one" on a transmitter at our facility.

Because the Sandia Crest location of our facility is on U.S. Forest Service land, new construction is difficult due to the long approval process. It was decided that a garage at the current facility shared by New Mexico Broadcasting's KRQE and KOB-TV would be used at the KASY transmitter facility.

This created a real challenge for us in that we were limited in space, and the Forest Service wanted as much of this new installation to be housed in the building as possible. Cramming a 60 kW transmitter plant into a building slightly larger than a two-car garage was risky at best. I spent several months working with the transmitter manufacturers and our own RF engineers, trying to come up with an installation that put as much of the equipment inside as possible while still allowing enough space to actually service the transmitter.

Several workable designs were created, but none were truly satisfactory from the

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USER REPORT

Indosiar Calls on Comark S Series

Newest Indonesian Commercial Station Opts For IOT Transmitter Technology

By Mark Timpany

JAKARTA, Indonesia

Indosiar Visual Mandiri, based in Jakarta, is the newest of the five national commercial television licensees in Indonesia. Construction began in earnest in 1992, and the network has already become a strong competitor for viewers in major cities across the archipelago. Its first anniversary was in January 1996, and work is in progress for expansion of its broadcast coverage to many more markets in the region.

In 1992, when Indosiar Visual Mandiri was selecting transmitters to be used at the first eight sites in its national network, the primary considerations were performance, reliability, and cost. Since all the sites were to be on UHF frequencies at medium power levels, power consumption was the biggest factor in determining operating cost.

The clear choice in transmitter design was one using the relatively new EEV Inductive Output Tube, as all other options would have made electricity costs a heavy burden on this new national network. The inherent linearity of the IOT meant that common mode amplification was possible, and this provided advantages in reliability by reducing parts count in each transmitter.

Indosiar was determined that performance would not be traded for gains in efficiency. The Indonesian television standard is PAL B/G, which in combination with the Indosiar selection of NICAM for stereo sound, provides a good test of the correction capabilities of any common mode amplifier.

A strong feature of the proposal from Comark Communications was its technique of "Full Band" IF correction, complemented by class A solid state drivers. Indosiar needed a transmitter which would

guarantee that any intermodulation products were always stable and well below the level of visibility. The Comark design promised to have an edge over the competition in this regard.

With the more distant sites located about 1400 kilometers away from the offices in Jakarta, reliability was an important consideration. All the transmitters were to be either parallel or alternate-main, so that no failure of a single device could keep Indosiar off the air.

REDUNDANCY

The pricing of the common mode IOT transmitters gave complete redundancy at a cost comparable to the solid state "soft failure" type of protection. Comark was also the safest choice with regards to reliability. There were only two other manufacturers who had IOT transmitters in the field at the time, and Comark had shipped considerably more product, with a track record going back to the early klystron designs.

The Indosiar choice of transmitter for the first phase of construction was the Comark S series. Indosiar has been happy with the selection of Comark, and the same transmitter style and tube type is in service at all the current sites with transmitter power outputs ranging from 20 to 60 kilowatts.

This commonality of design means that the spares inventory can be reduced considerably. Making each transmitter site as much as possible like any other also makes maintenance less of a problem. All the transmitter engineering staff are based in Jakarta, but any one of the engineers can walk into any of the sites and immediately feel at home.

Tube support through EEV has been excellent. A number of design changes have been made to both the tube and cavi-

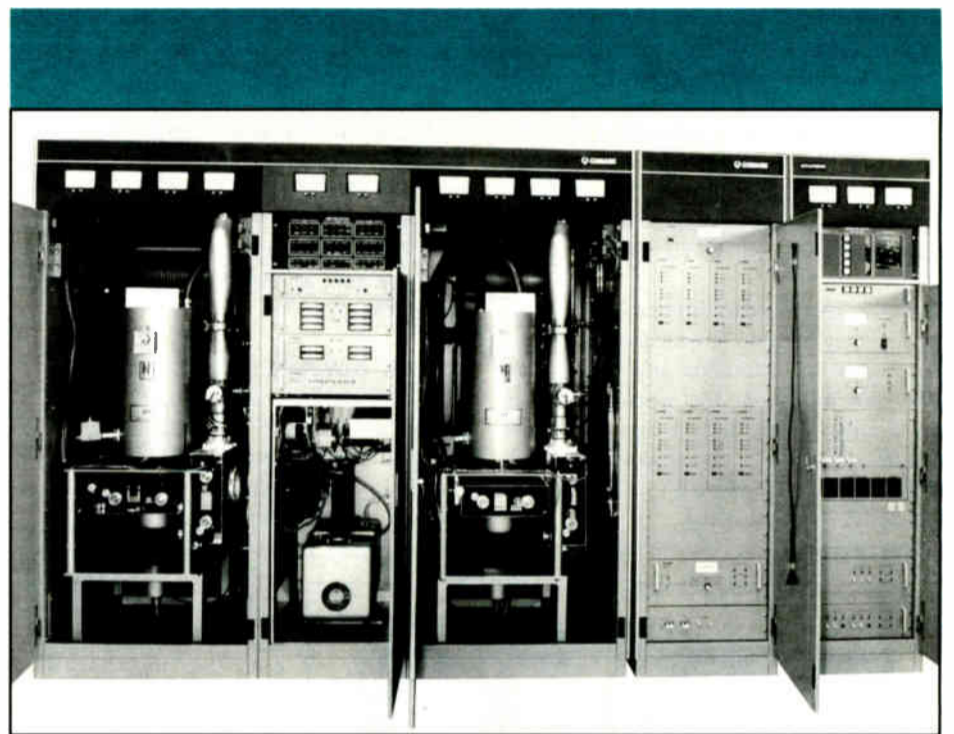
ties in the two years that Indosiar has been operating IOT transmitters, and the result is a more stable and robust product. EEV has maintained cavity and tube spares with its agent in Jakarta throughout this period.

In the case of one of the last changes to the input cavity, Steve Aitkin and Eric Trawny from EEV made a tour of the Indosiar sites and assisted in the exchange

satellite transponder used for program transmission.

WELL-EQUIPPED

Indosiar is also well equipped for whatever happens with digital terrestrial television, and will likely follow the European model when it is time to select a standard for terrestrial HDTV. The use of IOT com-



Comark's S series transmitter

mon mode amplifiers will allow for a quick transition when exciters are available for this standard. Also the redundancy designed into the IVM system, which includes split panel antennas with dual feeders, will allow for an easy and low cost dual-mode transition period.

With over-the-air digital television tests expected to start in Australia later this year, the purchase of a transmitter unable to make the transition could prove to be very short-term planning. As the latest entrant into the Indonesian television market, Indosiar was in a position to avoid equipment purchases that guaranteed early obsolescence.

The choice of a still developing technology for the first eight transmitters was a success. The dangers of such a decision arise from committing to a technology that is poorly supported by the manufacturers or is incompatible with developing broadcast standards. On both those counts, the Indosiar selection of IOT transmitters keeps looking better and better. ■

Mark Timpany has worked as an engineering advisor to PT Indosiar Visual Mandiri since 1992. He is a regular contributor to TV Technology International on regional events. He can be reached by fax at +62-21-567-2221 or E-mail at timpany@ibm.net.

For further details on any of the klystron or IOT product line, contact Eric Trawny at EEV on +44-1245-493-493, fax +44-1245-453-725. For further details on the Thomcast/Comark IOT transmitter line, contact Perry Priestley at +1-215-822-0777, fax at 1-215-822-9129, or browse the Comark web site at <http://www.comarkcom.com>.

BUYERS BRIEFS

The Stati-Cat lightning prevention system from **Cortana Corp.** reduces the high voltage gradient between a cloud and tower that results in lightning discharges. The system works through the principle of charge dissipation, providing a continuous low-resistance discharge path for the static electric charge found on all tall structures.

The CN-1 Crow's Nest is designed to protect the top of the tower from lightning. The Stati-Kitty SC-3 is designed to reduce noise in receive antennas. The Stati-Tomcat SC-4 is used primarily when the fundamental system component, the SC-1, and the CN-1 are not feasible. The CN-1 is mounted to a standard beacon mounting plate, and the SC-1 mounts on the top or sides of the tower.

For more information, circle **Reader Service 34**.

Telefunken Sendertechnik, which is owned by U.S.-based **Continental**

Electronics, recently introduced a family of UHF solid-state TV transmitters with output powers from 5 to 40 kW. The new transmitters are of full modular construction, using 1 kW amplifier modules and power supplies for vision and sound amplification.

The basic component of all the transmitters is a 5 kW amplifier rack. In order to achieve higher output powers (up to 40 kW), multiples of 5 kW cabinets are connected in parallel. All amplifiers, power splitters and combiners cover the entire UHF frequency range without the need for alignment or tuning. The transmitters can be configured as active or passive reserve, as well as N+1 systems.

Each transmitter comes with an additional cabinet equipped with vision-sound exciter(s), predriver stages, a control unit, mains feed and vision-sound diplexer.

For more information, circle **Reader Service 19**.

USER REPORT

LDL TTS30MH Performs for WVII

by Mike Staples, C.E.
WVII-TV

BANGOR, Maine

The only thing worse than having a 30-year-old transmitter that makes you wish it would burn down is the discovery that it just did. At 6:20 p.m. on February 9, 1995, we at WVII-TV in Bangor, Maine, made that discovery. A transmitter off the air plus a building temperature of 138 degrees and rising is a chief engineer's worst nightmare.

The WVII transmitter site was totally destroyed (said the insurance investigator: "it's a smoking crater") by a fire of unknown origin (insurance investigator: "we think it was electrical"), leaving transmitter supervisor Jim Larner and me with two tasks: get back on the air at some power level ASAP, and completely rebuild the transmitter site.

THE NECESSARIES

Within 18 hours a hardwired connection was established to the local cable system, and almost 10 days after the fire WVII was back on the air with a rented Harris solid-state transmitter, operating at an ERP of 23 kW. We then had to expedite the process of procuring a new transmitter.

After calling ABC/Capital Cities for advice from Bob Niles and Tom Hankinson, countless hours on the phone with users of Larcan and other transmitters and numerous conversations with sales representatives, the decision was made to purchase a Larcan TTS30MH transmitter.

That decision was reached in no small part due to the diligence of Larcan sales engineer Bob Palmer; his commitment to determining and fulfilling our needs impressed me greatly, and his willingness to help out in other aspects of the transmitter site reconstruction made that job faster and eas-

ier than it otherwise would have been.

The TTS30MH offers many features that we found highly desirable, including parallel amplifier cubicles that allow reduced power operation if one amplifier fails, optional redundant exciters with automatic changeover switching, clean and simple control circuitry for reliable operation and easy remote control and metering, ample fault indication capability, efficient and clean module design that permits easy field repair with readily available parts, simple and reliable power supply design, numerous protection features and, of course,

The TTS30MH offers many features that we found highly desirable.



the long term stability of solid-state operation.

Naturally, once the transmitter order was placed, WVII manager Bernie Chase was anxious for its speedy delivery and it was then that we learned that commitment to customer service was not limited to the sales department. Sheryl Richmond worked tirelessly from the LDL Communications office in Laurel, Md. to ensure that surge suppressor, voltage regulator and test load components were delivered to us in the short time frame we required. Sally Coleman at the Larcan plant in Mississauga, Ontario, saw to it that the transmitter was ready and shipped to us on schedule, and also connected me to whomever could answer my numerous questions about preparation and installation.

The transmitter was delivered to us on April 6, 1995, just as promised. The next day Larcan engineer Rick Downe arrived to supervise the assembly of the transmitter and to perform final proof of performance measurements. Working through the weekend with Rick, Jim Larner and I became very impressed with the product. It came together quickly, easily and logically, with cables, connectors and terminals clearly labeled and components located for easy inspection and access.

The following Monday, illness removed me from the process, leaving Jim and Rick to continue the job. By Thursday, April 13 the transmitter was ready for proof measurements, which were satisfied easily.

On Friday, April 14 WVII signed on the air, once again at 316 kW ERP. The station subsequently received a gratifying flurry of viewer calls complimenting us on the sharper picture we now delivered. It was clear that the TTS30MH easily outperformed the former GE TT530 transmitter we had used, much to viewers' satisfaction and our absolute delight.

A couple of weeks later we became the Bangor market's first commercial TV station to offer stereo audio, with the changeover being as simple as operating an easily accessed toggle switch on each exciter.

We have now used the Larcan for just over a year and there are more than a few characteristics about the product and the company that we appreciate. There is no "infant mortality" of PA modules, and no FET failures in early operation. In the entire first year there were no PA failures at all, despite disastrous power service glitches and an insufficient amount of cooling airflow in our building design.

The transmitter provides stable, reliable operation with little attention, but we recommend that the air filters be kept clean. Excellent protection is provided against power line problems and VSWR vagaries.

Larcan also provides unsurpassed commitment to service after the sale. At least once a month Bob Palmer calls to make sure that I have no problems, that I am getting the support I need and to offer assistance in any area that his experience can give.

About eight months into the operation of the TTS30MH we began experiencing intermittent sync compression on scenes with high white content, causing a visible flicker in the picture. Bob quickly put us in touch with technical support engineer Ramon Meija, who diagnosed the problem as a bad connection in the output plumbing of one visual amplifier.

After some disassembly the problem was easily seen: we had damaged a bullet in the line during the original construction, and replacing it ended the problem. Time was lost due to power service interruptions, so we are installing a backup generator.

High VSWR caused shutdowns on two occasions of unusual antenna icing, so we operated at reduced power for a period of hours; now we must consider antenna heat as a remedy.

But Jim Larner and I sleep soundly at night and enjoy carefree weekends because we know our Larcan TTS30MH is a reliable machine backed by a group of absolutely super people. ■

Editor's note: Mike Staples, chief engineer of WVII-TV in Bangor, Maine, attended the University of Maine and is an honor graduate of Eastern Maine Technical College. He is a consultant to the Descriptive Studies Institute, and spends much of his time raising kids, dogs and the occasional cloud of dust.

The opinions expressed above are the author's alone. For further information contact Sheryl Richmond at LDL Communications (Phone: +1-303-665-5016; FAX: +1-303-665-8805) or circle Reader Service 119.

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READER SERVICE NO. 80

BUYERS GUIDE

USER REPORT

WVVI Forges Ahead with Harris

by Jim Somich

President
Broadcast Engineering Services

BROADVIEW HEIGHTS, Ohio

Early in 1996, WVVI-TV 66 of Manassas, Va., embarked on a pioneering project to install the highest power Harris common-amplification IOT transmitter built to date. This is the story of that project.

Value Vision International's Washington, D.C.-area station, WVVI, was in deep technical trouble when Broadcast Engineering Services was called last summer to make technical recommendations. A 15-year-old heavily modified, undocumented NEC transmitter was in place and operating at less than one-quarter power. Half of the transmitter was inoperable.

The half of the transmitter that was on-air had been modified to utilize an EEV 70 kW external cavity klystron. Documentation of the modifications was nonexistent. The 70 kW tube was being operated in the multiplex mode, and transmitter output was about 35 kW peak visual, or 25 percent of the licensed value.

WVVI had not been at full power for years and was kicking off the air regularly for a variety of reasons. If there was ever a great case for jacking up a building and installing a new plant, this was it.

A SERIOUS COMMITMENT

To my surprise and delight, the new owners virtually gave me carte blanche to bring WVVI back from the near-dead. This was indeed going to be a case of going from "worst-to-first" on the fast track. It would be an exciting, challenging project to build a state-of-the-art transmitting facility from this pile of rubble. But there was little time to waste.

I decided to go with IOT technology rather than MSDC because I felt that, even though IOT is a relatively unproven technology, it holds the most promise for the digital future of UHF transmission. There are still some problems with IOTs, but the manufacturers are solving them every day. There were many similarities between the various IOT transmitters on the market. The high-voltage power supplies and RF systems can be identical as supplied by outside vendors and, of course, the IOTs and their circuit assemblies are normally supplied by EEV.

I wrote specifications for the new 160 kW WVVI transmitter. At this power level, common amplification is the most economical approach, requiring the fewest number of IOTs to generate the required visual and aural carriers. Harris had not yet built a 160 kW common-amplification IOT transmitter at the time of the bidding negotiations. In fact, no manufacturer had extensive experience with common amplification at this power level.

Harris seemed to favor its MSDC box over its IOT. I honestly believe Harris felt more confident with the tried-and-tested MSDC technology over the untested IOT. Nevertheless, I felt IOT was the way to go and stood my ground with Harris. I like the simplicity of the IOT over the MSDC and expect this technology to be dominant in the era of digital transmission.

TRANSMITTER INSTALLATION

The Harris Sigma IOT transmitter is an interesting hybrid of British and American technology. I was very impressed with the finish and workmanship in the amplifier

cabinets. The high-voltage power supplies (NWL), dry coolers (Liebert), pump modules/line control cabinets (Harris Quincy) and magic-T RF system (Passive Power) are all domestic products.

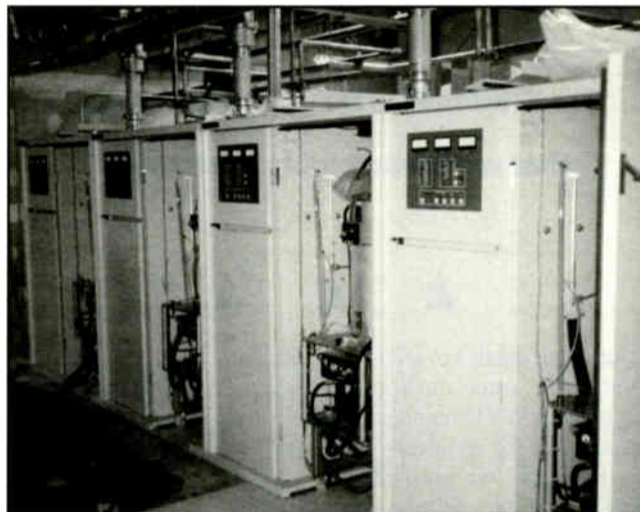
Because of time constraints and the lack of engineers at WVVI, the Sigma transmitter was ordered as part of a turnkey package that also included a new Harris remote control system. An order was placed and delivery was anticipated in less than 60 days. This schedule gave me just enough time to dismantle the nonoperational half of the old NEC transmitter and begin rebuilding the transmitter building.

The transmitter arrived within two weeks of the promised date. The Harris installation engineers were on-site from day one, supervising the placement of the transmitter components. George Owens was EIC for Harris Corp. His knowledge of the relatively new Sigma transmitter was reassuring, but I sensed that even he preferred the tried-and-true over this "foreign" box.

Harris had predicted a five- to six-week installation cycle. The crew completed the initial installation in seven weeks. The installation and initial wiring of the cabinets went almost without a hitch. The hanging of the RF system was relatively straightforward, except that in our layout the system would be hung just forward of the transmitter rather than behind it. Also, the transmitter control cabinet was installed opposite the

transmitter amplifier cabinets because of space restrictions. Harris surveyed the job well and produced a set of prints that were followed almost to the letter during this phase.

During the initial installation period, we also had the assistance of two British Harris engineers. They were not officially part of the installation crew, but aided immeasurably in the process. These engineers went over each cabinet with a "fine-tooth comb" before the installation process was completed. Small problems that could bloom into



The Harris Sigma series UHF IOT transmitter

minor disasters were caught during this period and turned around.

One thing that amazed me about the Sigma was the enormous amount of wire that connects the amplifier cabinets with the control cabinet. No multiplexing is used, resulting in no fewer than five multi-core cables running from each cabinet. The transmitter has no internal wire-manage-

ment system, so a large cable trough was installed across the length of the amplifier cabinets and across the room to the control cabinet. This trough filled up rapidly. I have no doubt that this "simple" approach to system control has its advantages over more complex systems, but be aware that it results in massive cabling.

Every status indication imaginable is brought out of the transmitter and one has to choose carefully to avoid a remote control system that would be unmanageable in size. Whether a status is chosen or not, it occupies wire from the amplifier cabinet to system control (one status per wire.)

No provision is made for neat audio and video input connections either. Wires must be "tie-wrapped" around Harris' bundles to get to the back of the exciters. A centralized panel for inputs would be a good idea (and a lot neater too).

The water plumbing alone for a transmitter of this size is massive. The 160 has two pump modules, two coolers, three water column hybrid loads and a water column station load. Pipes were running everywhere.

The electrical piping is also massive. We had opted for surge suppression and voltage regulation (Staco) that added more complexity and size to the installation.

A small shortcoming of our installation is that the water loads are manually switched between pump modules. If the pump module that is feeding the load system dies, the station goes off the air until the coolant can be manually switched to the other pump module. In every other failure mode the station can stay on the air at half-power except this one. I am told that there is an unofficial Harris kit that remotes this switching process; it is something we are considering.

INTERIM FILTER FAILURE

Once we were able to put full power into our station load, it was determined that the intermod filter was arcing. It would take 75 percent power, but would arc us off the air at the full 160 kW. The filter ran very hot and a

(continued on page 44)

USER REPORT

WXLV Gains Through Dielectric

by Gil Couch, C.E.
WXLV-TV

WINSTON-SALEM, N.C.

WXLV-TV Channel 45 is currently the ABC affiliate for northwestern North Carolina. We signed on the air in 1979 as an independent UHF station, primarily broadcasting religious programming.

After a change of ownership in 1980 the first order of business was to try to increase the station's coverage. With a limited budget the decision was made to move the transmitter site from a high-rise building in the downtown area to an antenna farm located north of Winston-Salem, on Sauratown Mountain.

A tower was first erected to give us 2,000-foot HAAT. Next, a high-gain, directional antenna was installed to give us 5,000 kW ERP using a limited transmitter output of 55 kW. The station was taking a little bit of power and stretching it very thin to cover the ADI.

By 1994 the station was a Fox affiliate and enjoying marked growth in viewership. That year we committed to upgrading our transmission facility so that we might continue this growth through

improved reliability and coverage of our signal. Engineering consultants were brought in to conduct a full signal analysis. After two weeks, thousands of miles, and reams of computer printouts, the results came in.

Because our tower was located in the northern part of our ADI we would still need a directional antenna (with less gain) and a transmitter output power of 140 kW. We turned to Dielectric Communications.

With geological survey maps in hand we flew to the company's Voorhees, N.J., facility. There we met with Obed Bendov and Andre Skalina, who evaluated our situation and gave us fast answers. The perfect solution to our needs was its TFU31EV-R CT3 antenna. This antenna would employ a 1.5-degree beam tilt and 10 percent into the vertical element. The order was placed, and subsequent communications concerning tower hardware took place with ultimate delivery in timely fashion.

A picture is worth a thousand words. We've all heard the horror stories of what can happen when an antenna's actual performance does not necessarily match

expectations. To make a long story short, all of our fears were quickly laid to rest at 7:07 p.m., Sept. 16, 1994. That's when we applied full power to our new antenna for the first time. Immediately, people in fringe coverage areas thought a new TV station had signed on.

Today we have evolved into a new level of television. We've begun a local news operation after affiliating with the ABC network in September 1995. So now with a lot of other things keeping my attention, I don't have to be concerned with coverage issues. No longer is signal coverage a point of contention for our sales department. Need I say more? ■

Editor's note: Gil Couch is chief engineer of WXLV-TV in Winston-Salem, N.C. From 1983 till 1989 he was assistant chief engineer at the station. He holds a degree in electronics engineering.

The opinions expressed above are the author's alone. For further information contact Sally Rich at Dielectric Communications (Phone: +1-207-655-4555; FAX: +1-207-655-7120) or circle Reader Service 60.



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Especially developed for use in ENG, the Hot Pod tripod is the fastest in the world. The central locking system is activated on all three legs at the same time, while the pneumatic center column easily makes it possible to have the lens at a height of over 7 feet. The elevation force of the center column is factory set and doesn't require any setup. When moving to another location it can be carried by its handle located at the center of gravity.



ENG TWO-STAGE TRIPOD SERIES

Sachtler two-stage tripods have an enlarged height range (lower bottom and higher top position) so they are more universal. Legs can be locked in seconds with Sachtler's quick clamping. There are also heavy duty versions for extra stability. The heavy duty aluminum has a 20mm diameter tube vs. 16mm and the heavy duty carbon fiber has a 24mm diameter tube vs. 22mm. All heavy duty two-stage tripods have a folding tripod handle.

NEW! Sachtler CADDY Systems

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2-Stage ENG Carbon Fiber System:

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- Includes independent pan and tilt locks, bubble level, dual pan handle carriers and integrated 75mm ball levelling.

Miller 25-Series II Fluid Head

- 100mm ball level fluid head
- Robust, lightweight, low profile design
- Quick release camera platform
- Weighs 7lbs.—handles up to 25 lbs.
- Multi-step fluid drag system and integrated counterbalance system provide ultra-smooth, repeatable pan-and-tilt fluid control and finger-tip camera balance for ENG camcorders, industrial CCD cameras or small studio cameras



#601-Lightweight Tripod

- Weighs 4.5 lbs., supports up to 30 lbs.
- Minimum height down to 24", maximum height to 57"
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- Engineered from thermoplastic moldings, diecast alloy and hard anodized tubular alloy.
- Fast, one turn, captive leg locks
- Includes 75mm (3") ball levelling bowl

#649-2-Stage Tripod

- Two extension sections on each leg. Operates at low levels as well as normal heights without the use of mini legs.
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- Weighs 6.6lbs., supports 50 lbs.
- Very portable, folds to 27"
- Includes 75mm (3") ball levelling bowl

System 20 #338—Miller 20 Head, 601 Lightweight Tripod, On Ground Spreader
System 20 ENG #339—Miller 20 Head, 649 2-Stage Aluminum, On Ground Spreader
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- Flick on, flick off pan and tilt caliper disc brakes.
- Greater control, precision, flexibility and "touch"
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- Working conditions from as low as -40° up to +60°C.
- SD 12 weighs 6.6 lbs and supports up to 35 lbs.

Vision Two Stage ENG and LT Carbon Fibre ENG Tripods

- The ultimate in lightweight and innovative tripods, they are available with durable tubular alloy (Model #3513) or the stronger and lighter, axially and spirally wound carbon fiber construction (Model #3523). They incorporate torque safe clamps to provide fast, safe and self-adjusting leg clamps.
- "Torque Safe" requires no adjustment. Its unique design adjusts itself when required, eliminating manual adjustment and maintenance and making for a much more reliable clamping system.
- New hip joint eliminates play and adds rigidity.
- They both feature 100mm levelling bowl, fold down to a compact 28", and support 45 lbs.
- #3513 weighs 6.5 lbs - #3523 CF (Carbon Fibre) weighs 5.2 lbs.



Vision 12 Systems

Vision 12 systems include #3364-3 SD 12 dual fluid and lubricated friction drag pan/tilt head, single telescoping pan bar and clamp with 100mm ball base.

SD-12A System

- SD-12 pan and tilt head
- 3518-3 Single stage ENG tripod with 100mm bowl
- 3363-3 Lightweight calibrated floor spreader.

SD-12D System

- SD-12 pan and tilt head
- 3513-3 Two-stage ENG tripod with 100mm bowl
- 3314-3 Heavy-duty calibrated floor spreader

VIN-5ST and VIN-10ST

- Compact and lightweight, they maintain Vision performance and quality.
- Ideal for the latest generation of dockable and one-piece camcorders.
- Provide total stability and durability with payloads up to 33 pounds.
- Compatible with all Vision accessories.
- VIN-5ST includes Vision 5LF head, single stage toggle clamp tripod, spreader and soft case.
- VIN-10ST includes Vision 10LF head, single stage toggle clamp tripod, spreader and soft case.

Panasonic

AG-EZ1 3-CCD Digital Videocassette Camcorder

Heralding a new era in video, the AG-EZ1 is the world's first camcorder to incorporate 6mm DVC (Digital Video Cassette) technology. The biggest leap in video since S-VHS and Hi8 were introduced six years ago, DVC is a revolutionary video format that delivers such high quality—it literally rivals broadcast cameras. Utilizing DVC the AG-EZ1 records an extraordinary 500 lines of horizontal resolution—nearly 25 percent more than S-VHS, Hi8 or laserdisk, and 50 percent better than a live television broadcast. And because it's digital, picture quality is not only sharper but unbelievably clean. Audio is also recorded digitally, resulting in quality equal to that of CDs. In addition to its digital capabilities, the AG-EZ1 also features a 3-CCD pickup system, 180,000 pixel color viewfinder, 10:1 power and 20:1 digital zoom, full automatic and manual controls and a large LCD panel.



AG-DP800H SUPERCAM S-VHS 3-CCD Digital Signal Processing Camcorder



- Three high-density 380,000 pixel CCDs with half-pitch pixel offset achieves over 750 lines of horizontal resolution, a S/N ratio of 60dB and remarkable sensitivity of f8 at 2000 lux. Additionally the Frame Interline Transfer (FIT) CCDs minimize vertical smear, so you maintain impressive picture quality even in very bright illumination.
- Digital Signal Processing circuitry provides four valuable benefits:
 - 1) Consistently reliable up-to-spec performance.
 - 2) Fine adjustment of a wide range of parameters.
 - 3) Memory storage and instant recall of specific settings.
 - 4) More flexible and higher quality image processing, as well as easier maintenance.

- Some of the DSP circuits and their functions:
 - CHROMA DETAIL - This function compensates for poor resolution in the high chroma areas of the picture.
 - DARK DETAIL - Determines optimum degree of contour enhancement in dark areas to deliver crisp, natural-looking images
 - HIGHLIGHT COMPRESSION - Expands the dynamic range of the highlighted areas and prevents halation. The highlight compression circuit allows a wide dynamic range producing detailed images even against bright backlight or daylight.
 - FLARE CORRECTION CIRCUIT - Compensates for unsteady black caused by light or by a subject's movements.
- Six Scene File modes. There are two user modes for custom digital parameter settings including Horizontal Detail, Vertical Detail, Chroma and Dark Detail, and Color Correction. The four preset modes are normal, fluorescent, special and sparkling.
- In addition to regular AGC (Automatic Gain Control), Supercam has a Super High Gain mode. At F1.4 this enables shooting under illumination as low as 2 lux while retaining detail and color balance.
- Synchro Scan function allows flicker-free shooting of computer monitors. Electronic shutter increments can be set variably from 1/61 seconds to 1/253 of a second.
- Built-in internal time code generator lets you record with SMPTE LTC/VITC (Longitudinal/Vertical Interval) time code
- Two hi-fi stereo audio channels with a dynamic range of 80 dB, as well as two linear audio channels with Dolby NR. Normal/Hi-Fi recording is selectable. Uses XLR connectors to further ensure high-quality sound.
- Has a 26-pin connector on the back that outputs a composite or component video signal. This enables convenient backup recordings using an additional VCR equipped with a 26 or 14-pin connector
- Phantom power can be supplied to an optional microphone. Power can be switched off to prevent battery drain when not in use.

JVC

GY-X2B 3-CCD S-VHS CAMCORDER



- Newly designed three 1/2" CCD image sensors deliver 750 lines of horizontal resolution and superb signal-to-noise ratio of 62dB
- New micro-lens technology provides exceptional sensitivity of F8.0 at 2000 lux and LXLUX mode lets you shoot with almost no light! Shoot superb footage with excellent color balance at a mere 1.5 lux
- Variable Scan View allows flicker-free shooting of a computer monitor.
- Quick Record Mode - when turned on the camera is set to the auto iris even if lens is set at manual. Also activated is (ALC) Automatic Level Control and EEI Extended Electronic Iris

which provides both variable gain and variable shutter. Now you can shoot continuously from dark room to bright outdoors without having to adjust gain, iris or ND filter.

- Full Time Auto White circuit lets you move from incandescent to fluorescent to outdoor lighting without changing white balance or the filter wheel.
- Genlock input allow synchronization with other cameras.
- Dual output system allows camera output to be connected directly to an external recorder

GY-X3 3-CCD S-VHS Camcorder

By employing professional camera technology in new economical ways, JVC has succeeded in bringing to market a professional 3-CCD camera that breaks all previous price barriers. The new GY-X3 delivers all the performance of a high end 3-CCD camera—high resolution, high sensitivity, low noise and natural color—at an incredible price.

- Features:
 - Three 1/3" CCDs provide a sensitivity of 2000 lux at F8.0, signal-to-noise ratio of 60dB and 650 lines of horizontal resolution.
 - Low light capability allows you to shoot in as little as 4 lux and still have bright pictures with good resolution and strong, vivid colors.
 - Full Auto Shooting (FAS) mode instantly adjusts to changes in shooting conditions. You can go from bright outdoors to indoor lighting and gain, iris, audio level and color balance will all be automatically adjusted.
 - Variable Scan View allows flicker-free shooting of a computer monitor.
- Has a built-in 14:1 (5.5-77mm) continuously variable speed zoom lens. The amount of pressure applied to the rocker determines the speed of the zoom. Both the iris and zoom can be controlled manually if desired.
- Built-in Control Track (CTL) time code generator as well as a time/date generator. The advanced CTL time code generator has a "scene finder" function that records an identification code each time you start taping. This lets you easily advance to the next or previous scene when using the JVC Edit Desk system.
- Large high resolution 1.5-inch viewfinder displays comprehensive status indicators.

KY-27C 3-CCD Color Video Camera

- New 2/3-inch broadcast-quality 380,000 pixel CCDs with advanced electronics deliver resolution of 800 horizontal lines and reduced smear.
- High sensitivity of F9.0 at 2000 lux allows a truly usable minimum illumination of 1 lux with JVC's exclusive LoLux dual pixel readout sampling technique.
- LoLux mode allows shooting scenes that were previously impossible due to insufficient lighting. CCDs are maximized for low light sensitivity equivalent to an electronic gain of 24dB, then the dual pixel readout system is added which provides an additional 6dB. Together they provide +30dB without the noise and picture degradation normally associated with this much gain.
- Signal-to-Noise ratio of 63dB assures virtually "noise free" images.
- Auto knee circuitry extends a scene's light to dark dynamic range reproduction by up to five times without overexposure.
- Has large 1.5-inch viewfinder with 600 lines of resolution and SMPTE color bars. Status system provides audio levels, accumulated or remaining recording time, VTR operation, battery voltage and camera setup. Zebra pattern indication and safety zones with a center marker are also provided.
- Variable scan function enables a precise shutter speed from 1/60.2 to 1/196.7 of a second in 256 increments to be set, matching a computer's scan rate. Almost any computer display can be clearly recorded.
- Camera head allows direct input of genlock signal and timing adjustment. A wide range optional remote controls, RS-232 interface, multicore and triax CCU's are available.
- Docks directly to the JVC BR-S422U, BR-S411UB and BR-S420CU professional S-VHS recorders. Optional adapters for docking to Hi-8 and Betacam SP are also available.



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NEW! JVC DIGITAL S

BR-D40 Digital Dockable Recorder

BR-D50 Digital Player

BR-D80 Digital Editing Recorder

BR-D85 Digital Editing Recorder with Pre-Read

High Quality Digital Editing Is Here and It's Affordable!

An affordable, broadcast quality digital video recording and editing system, the Digital-S series reproduce images that not only are superior to any analog or digital 4:1:1 format but rival even the highest priced digital systems. It offers the robustness and reliability of a 1/2-inch format and combines 4:2:2 component processing with very mild compression to achieve and sustain excellent quality through multi-generation dubbing.

The quality of Digital-S applies equally to acquisition and editing, plus it has the flexibility to easily integrate into any digital or analog format—tape or disc.

Purchase the entire system or one component at a time, its flexibility lets you use existing equipment.

Digital-S starts with the versatile BR-D40 Dockable Recorder. Designed to produce the highest quality raw footage, the BR-D40 features automatic editing which utilizes a built-in time code reader/generator to ensure perfect, frame-accurate in-camera edits. Time code input and output slave-lock function facilitates editing the tapes from multi-camera or iso-cam shooting. Edit with a choice of two powerful editing recorders—top-of-the-line BR-D85 with pre-read and digital I/O or the economical BR-D80. Completing the line is the BR-D50 Player and the flexible BR-D51 Player with S-VHS playback (Available Oct.96). Both players accept the optional SA-D50U digital I/O interface card.

Broadcast Quality Digital Video

- Utilize 4:2:2 digital component processing to add a richness and warmth unobtainable with any lesser system. In addition, only 4:2:2 stands up to the rigors of sophisticated chroma-keying, multi-generational editing, special effects, blue-screen compositing, matting, ATV up/down conversion, and multiple transconversion between compression systems.
- Reproduces finest colored details and subtlest contrasts while minimizing artifacts using extremely mild compression ratio. Set to 3.3:1 with DCT-based intra-frame coding, Digital S yields a data rate of 50 Mbps, plus it pumps out horizontal resolution of 720 pixels or 540 TV lines. S/N ratio is an incredible 55dB.
- Audio is recorded by 2-channel, 16-bit PCM signals with a sampling frequency of 48kHz. The audio is superior to CD and allows frame accurate editing. PCM audio channels can be edited independently.
- Standard analog inputs/outputs provide outstanding performance for most applications. When virtually perfect dubs are required, they use SMPTE 259M interface for digital video and AES/EBU for digital audio. The one true digital video standard today, SMPTE 259M permits long cable runs and is used for direct professional connection to digital switchers, disk-based recorders and digital tape recorders.

Robust 1/2-inch Format

- Achieves its super-high image quality using a robust, 1/2-inch metal particle cassette tape. The cassette housing has a dust-proof structure to increase tape life as well as your images. Tape speed is 57.8 mm/s for a recording time of 104 minutes.
- Digital S features an extra wide track-width of 20 microns for improved stability and reliability. One frame consists of 10 tracks with the video area on either side of the audio track.
- Equipped with powerful error correction circuitry that not only replaces data in the unlikely event of a tape dropout but continues to play back a picture even with a clogged head.

Digital Editing

- Digital-S VCRs are equipped with variable slow motion which can be accessed by standard editing commands. Smooth and noiseless, the image quality of slow motion is equal to regular playback and is available within a range of $\pm 1/3X$.
- Longitudinal tracks include two auxiliary audio (cue) tracks and a control track for tracking purposes. Cue tracks provide easy location of edit points which can be heard at any tape speed.
- Because of its linear control track, Digital-S has a short lock-up time which eliminates long pre-rolls. This feature achieves a stable picture faster, saving precious editing time.
- Auxiliary video (sub-code) area stores two selectable uncompressed lines of video. Suitable for recording closed caption or other information located in the vertical blanking interval.

PRE-READ EDITING (BR-D85 Only)

Previously an exclusive feature of very high-end digital systems, video pre-read enables the recorder to first play back the digital signal on the tape, before recording a new signal in its place. Operable with either digital or analog signals, pre-read lets you perform layering and A/B roll editing with only two VCRs, instead of three.

Operational Conveniences

- Comprehensive analog inputs/outputs (composite, S-video and component), video and audio monitor output, RS-422 interface and VITC/LTC time code
- Jog/shuttle and system timing controls on the front panel. Footage can be searched in color at $\pm 32X$ normal speed.
- They have a self diagnostic warning system, plus, an RS-232 diagnostic service port measures digital data performance during playback. There is also a standard hour meter.
- They also feature flying erase head, rack mount capability and built-in head cleaner.

SONY DFS-300 DME Switcher



The DFS-300 features basic transitions such as wipes and mixes, as well as complex DMEs, or digital multi effects. It allows you to insert sophisticated patterns like picture-in-picture, mosaic, mirror, slide and matrix wipe designs. With the optional BKDF-301 3D Effects board installed, you can perform three dimensional rotations, page turns, image twists, multi-splits and 3D spherical effects—in real time. No sitting around waiting for loading or rendering. With its digital multi-effects, numerous keying options, 3D transitions and user-friendliness, the DFS-300 is in a league of its own.

POWERFUL MULTIPLE EFFECTS

- Up to 500 Effects**
330 factory preset 2D effects and wipes stored for immediate use. They include wipe, compression, rotation, slide, split, mirror, stream, etc. as standard.
- With the optional BKDF-301 3D board installed, 130 additional preset effects such as twist, page turn, sphere, etc. can be memorized and recalled whenever required.
- Powerful User Program**
Provides powerful, yet easy to operate effects programming to build your own effects. Cut, mix, wipe, slide, rotation and many other 2D effects and optional 3D linear and digital effects can be created with the unit's programming function. Up to 20 created effects can be stored for instant recall and that is doubled when the 3D board is installed.

HIGH PERFORMANCE SWITCHER

- Multi-Format Inputs/Outputs**
Three primary inputs accept composite, S-video and component signals. A fourth input accepts either component, R/G/B/Sync or a computer generated RGB signal. Color correction can be applied to any input. Two program outputs provide composite, S-video and component signals.
- Luminance Keyer**
Foreground sources such as titles, captions or figures can be self-keyed over a background source and rotated, compressed and positioned optionally in 3D space.
- Chroma Keyer**
Superimpose video from a foreground source onto a background source.
Clip and Hue can be controlled for clear and sharp key edges.
Any preset effect can be applied to the chroma keyed picture.
- Snapshot Function**
Stores up to 99 control panel settings in "Snapshot" memory for instant recall. Every parameter such as background color hue, border width, shadow density, etc. can be stored and recalled.

Sony BPPG products are not available for sale outside continental USA

- Effects Modification**
To suit individual tastes, allows effects modification for some of the preset effects like mosaic, posterization, solarization, wave, multi-picture, strobe, frosted glass, cinema mode, etc.
- Fine control over various parameters such as size, density and amplitude further enhances effects editing.
- Transitions**
111 of the most frequently used wipes are available from the preset patterns and 13 of them are directly accessed with a press of the keypad.
- Mixes, wipes, as well as digital effects transitions can be performed manually or automatically. Automatic transitions can be varied from 0 to 999 frames in duration for both foreground and background bus transitions and the DSK transitions.

- Optional Down Stream Keyer**
Optional BKDF-504 DSK (Down Stream Keyer), lets you introduce captions, characters, etc. with clear edge quality, after mix/effects processing.
- DSK key input accepts composite, component or RGB signals
- Position and type of the DSK are selectable and a box mask is provided to mask unwanted areas of the picture.
- Built-in Matte Generator**
Three matte generators for backgrounds; can be a solid color or one of 31 different textured patterns, border and effect matte signals. Also instantly selectable color bars, grid pattern and solid black. With the BKDF-504 DSK, you get two more matte generators for DSK matte and DSK border matte.
- Other Features**
Four different time modes offer the ability to perform key effects such as luminance key, chroma key, external key or downstream key from a variety of input sources.
- Three black-burst outputs provide synchronization to equipment requiring sync signals. A genlock input allows the DFS-300 to be synchronized to an external timing source.

SONY COLOR MONITORS

PVM-1350 13" Presentation Monitor

- Employs a P-22 phosphor fine pitch CRT to deliver stunning horizontal resolution of 450 horizontal lines.
- Beam current feedback circuit eliminates white balance drift for long term stability of color balance.
- Has analog RGB, S-video and two composite video (BNC) inputs as well as 4 audio inputs.
- Automatic Chroma/Phase setup mode facilitates the complex, delicate procedure of monitor adjustment. Using broadcast standard color bars as a reference, this function automatically calibrates chroma and phase.
- Chroma/Phase adjustments can also be easily performed with the monochrome Blue Only display.
- Factory set to broadcast standard 6500K color temperature
- On power up, auto degaussing is performed. There is also a manual degauss to demagnetize the screen.
- On-screen menu facilitates adjustment/operation on the monitor. Menu display is in English, French, German, Spanish or Italian.
- Sub control mode allows fine adjustments to be made on the knob control for contrast, brightness, chroma and phase.



PVM-1351Q 13" Production Monitor

- Has all the features of the PVM-1350 PLUS
- A multisystem monitor, it accepts NTSC, PAL and NTSC video signals. NTSC 4.43 can also be reproduced.
- Equipped with a SMPTE 259M Serial Digital Interface. With optional serial digital interface kit BKM-101C for video and the BKM-102 for audio the PVM-1351Q can accept SMPTE 259M component serial digital signals.
- Equipped with RS-422 serial interface. With optional BKM-103 serial remote control kit, all of the monitor's functions can be remotely controlled.
- Inputs include analog RGB, S-video, component, 2 composite video (BNC) and 4 audio for complete flexibility.
- Aspect ratio is switchable between 4:3 and 16:9 simply by pressing a button.
- Underscan function allows you to view entire image and check the picture edges. Also HV delay to view the blanking area, sync/burst timing by displaying the horizontal and vertical intervals in the center of the screen.
- Color temperature switchable between 6500K/9300K/User preset. 6500K is factory preset. 9300K is for a more pleasing picture. User preset is 3200K to 10,000K.

PVM-1354Q/PVM-1954Q 13" and 19" Production Monitors

All the features of the PVM-1351Q PLUS:

- SMPTE C standard phosphor CRT is incorporated in the PVM-1354Q/1954Q. SMPTE C phosphors permit the most critical evaluation of any color subject. Provides over 600 lines of horizontal resolution.
- The PVM-1354Q mounts into a 19-inch EIA standard rack with the optional MB-502B rack mount bracket and SLR-102 slide rail kit same as PVM-1351Q. The PVM-1954Q mounts into a 19-inch EIA rack with the optional SLR-103 slide rail kit.

Why pay \$10,000 to \$15,000 for a BROADCAST QUALITY CHARACTER GENERATOR when you can get it for only \$2995?
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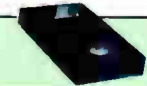
Animated Postscript Character & Graphics Generator

A technological and engineering breakthrough, the PowerScript sets new price/performance standards for broadcast video production, multimedia and industrial applications. It delivers the huge range of titles and graphics supported by PostScript display technology, plus animation, effects, transparency and keying. It features anti-aliased, 17.5 ns (nanosecond) pixel resolution and 4:2:2 broadcast-quality video, plus high-speed RISC processing to provide real-time Level 2 PostScript imaging and fast rendering—even with the most complex images. The PowerScript works stand-alone or with a computer, has a built-in TBC, offers a powerful and intuitive interface, and is suitable for the desktop or can be rackmounted.

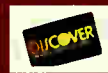


- Powerful Character Generator**
Choose from 35 built-in fonts or download hundreds of PostScript fonts from your computer. It's high-speed RISC processor provides real-time PostScript Level 2 imaging.
- Characters can be rotated at any angle, scaled to any size, stretched horizontally or vertically.
- Styles include variable bold and italic, underline and shadow (drop shadow, variable displacement and opacity). Each character can be adjusted separately.
- Text can be positioned anywhere on the screen or automatically centered, vertically or horizontally.
- Left, right, top, bottom & center justification is provided as well.
- Character's are automatically kerned, using the font's standard kerning information.
- Spacing is highly flexible with variable word and letter spacing and line spacing (leading).
- Intuitive User Interface**
Built-in real-time object-based drawing tool and text editor, no external computer or software required. Design can be done ahead of time and displayed later, or can be done on the fly. Display is real time.
- Supplied keyboard and mouse are used with easy on-screen menus to place and modify graphics and text.
- Customizable function keys let you change fonts, colors, and other characters instantly.
- Separate preview output allows you to create and edit titles while another set of titles is being displayed.
- Roll, Crawl, Animation, Effects**
Variable speed roll, crawl and push (slide) in all directions
- Every text object, graphic, and logo can be separately animated. Complex animations include ability to have elements follow paths, bounce, etc.
- Elements can change outline and/or fill color, transparency, position as they move and results are displayed in real time.
- Move individual characters in different directions; make colors change; flash words; make letters and words bounce; spin a letter across the screen.
- Use effects like fades and wipes to transition between titles and video or between two pages of titles
- Keyer**
Internal linear keyer superimposes characters and graphics on S-video or composite sources.
Also provides anti-aliased down-stream keying via a separate linear KEY output.
- Backgrounds and Graphics**
Titles can be placed on solid color, patterned or graduated backgrounds, or they can be genlocked to incoming video.
- Lines, squares, rectangles, ovals and circles can be created and placed anywhere on the screen.
- Each graphic object can use a different color, transparency, rotation, size, fill and outline.
- Transparency and Colors**
Characters can be made transparent (0-100%) over video, other characters and graphics with 64 levels of transparency.
- Opaque characters can use over 4,000,000 colors, transparent characters can use over 8,000.
- Different colors can be used for fill and outline (variable width) as well as each letter and graphic.
- Imported Logos and Graphics**
Import and display complex graphics created with standard Mac, Windows, Amiga and UNIX-based programs, such as Photoshop, Corel Draw and Adobe Illustrator. Accepts most PostScript or EPS format graphics without modification.
- Imported images can be any size and can be scaled, skewed, and rotated when placed on screen.
- Transparency and anti-aliasing can be defined when graphic is generated.
- Expansion Capabilities**
PowerScript operates on its own but you can still add peripherals and connect to a computer or network. Two PCMCIA slots allow the addition of non-volatile flash-DRAM and Ethernet cards, and an RS-232 serial port allows connection to computers.
- Built-in Test Generator**
The PowerScript can generate standard video test patterns including color bars, crosshatch, ramp, gray wedge, multi-burst and blackburst. Titles can be placed atop any of the patterns.

Still not convinced, then call us for a free PowerScript demo tape and see for yourself.



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SPEED RAZOR MACH III

Digital Video Editor for Windows NT

The ultimate digital video editing software, Speed-Razor MACH III allows you to edit full screen, 60 fields per second, CGIR 601 broadcast-quality video. Designed for the DPS PAR DR-2100/ Perception PVR-2500 and Truevision's TARGA 1000/2000 video capture cards, Speed-Razor MACH III is the fastest and most powerful tool for editing and compositing video clips, animations, stills, music and sound effects. Experience straight cut editing in real time and effects which fly on the fastest machines out there: Alpha, Intel, MIPS-based and PowerPC-based workstations, making this the fastest, most flexible software you've ever seen. Running under Windows NT, it offers three times faster than Windows 3.1 on the same machine and up to ten faster when used on Alpha-based systems.

Speed-Razor features infinite video, audio, transition and effects tracks and comes with Razor Blades—transitions and effects to enhance your production. There are preset tumbles, fades and wipes which you can easily customize and save as new presets. In addition, there are special image effects which are unquestionably the highest quality of any system—analogue or digital. Speed-Razor sports anti-aliased 3D DVEs, an infinite channel chroma keyer and an excellent character generator. Use the included effects or transitions, layer them to create new ones, make your own grayscale bitmaps to use as transitions, or use 3rd party plug-in effects—the flexibility is yours.

There are two user definable resolution modes (thumbnail and final) to facilitate editing. The thumbnail mode allows you to use Speed Razor in the field on a laptop then transfer the project file back at the edit suite and automatically recapture and re-render the entire project at final resolution. RS-422 control and new batch capture module allows you to automate video capture via SMPTE time code, so digitizing video and audio is simple and painless. In fact, with the innovative "Virtual Editing" function you can actually edit your project, complete with effects and transitions—before you've digitized a single frame of video.

EDITING FEATURES:

- Real-time straight cut editing (this doesn't require a new file to be made and requires less space on the hard drive to edit)
- The only video editor with the ability to cut to the field
- Work in Thumbnail or Final Output resolution mode (you set the resolution for each)

COMPOSITING:

- Infinite number of layers of video clips, still and animations can be composited together
- Handles any resolution from Betacam (720 X 480) up to Omnimax film (4000 X 4000)
- Video clips can be combined using an alpha channel, key color transparency, still or traveling mattes

FILE FORMATS:

- Reads and writes ANI files (created by DPS' PAR), PVD files (Perception), DVM files (TARGA 1000 and 2000) and sequences of TARGA files
- Convert files between any of the following formats: ANI, PVD, DVM, AVI, BMP, TGA, FLC, FLI, WAV
- Project-based Library for organizing your work

AUDIO:

- Handles audio up to DAT (48 kHz) quality
- Infinite number of audio tracks for multi-layer audio mixing

EFFECTS:

- Blur (circular, gaussian, fast), tint, brightness adjustment, chroma key, crop, displacement, emboss, freeze frame, glass texture, greyscale, invert, loop, matte, pixelate, repeat fields, scale, transparency, strobe, turn red/green/blue
- 3D DVE (translates and/or rotates an image in three dimensions on the X, Y and Z axis)
- Sets a color channel to an assignable value)
- Titles (full blown CG using any Windows font in any color with automatic drop shadow)
- Sub-pixel rendering for incredibly smooth motion
- Effects can be applied to infinite sources

TRANSITIONS:

- Includes over 100 grayscale image transitions, crossfades, luminance fades, fade to/from black, fade to/from white, push, swirl, twist in/out tumbles, flip, turn, scale (zoom)
- Transitions can be applied between infinite inputs

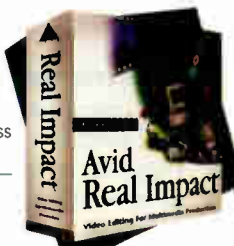
in:sync Speed Razor MACH III for DPS PAR-2100 and PVR-2500 CALL
in:sync Speed Razor MACH III for Truevision TARGA 1000 and TARGA 2000 CALL



Real Impact

Windows NT-based Video Editor for TARGA 2000

Real Impact provides the same professional image quality, intuitive cut/copy/paste editing, and instant random access capabilities that have won Avid 2 Emmy awards—for thousands of dollars less than outsourcing an average video. Designed exclusively for Truevision's TARGA 2000, Real Impact lets you create professional-quality video with audio, graphics, animations, special effects and titles—with the speed, flexibility and creative freedom you need. Create sales, training and product videos right on your PC quickly and easily—without compromising quality. Produce video in 24-bit color, with CD-quality sound and perfect lip sync.



Includes free upgrade to AVID MCXpress (\$2000 Value)

Easy to Use: A true 32-bit application (Windows NT 3.51), Real Impact's intuitive interface and extensive on-line help get you productive right away. It's powerful editing features let you work with video, audio, graphics, animations and titles with the simplicity of cut, copy and paste.

Video Capture: Digitize video and audio—without dropping a frame. Video is full-screen, full-motion, 60 fields-per-second and your audio in sync. It's Dial-a-Quality image feature lets you adjust image quality for differing system, storage and delivery requirements.

Create a Storyboard: Extensive media management with built-in media library and database lets you easily find the video and audio clips that you want. Instant access makes previewing edits simple and immediate. And, with timeline editing, you just click and drag to experiment with different cuts, rearrange clips and assemble your story. There are 32 levels of undo and redo.

Add Graphics, Titles and Special Effects: Create and seamlessly incorporate audio, graphics and animations into your video using popular Windows-based applications. Real Impact supports AVI video files, WAV audio files, FLC animation files as well as BMP, JPEG, PCX, TGA and TIFF graphics files.

FEATURES:

- Real-time JPEG compression/decompression and playback at 60 fps
- Supports RS-422 control protocol and SMPTE time code.
- Edit two tracks of video for layered effects.

AUDIO

- Edit up to four tracks of 44.1 KHz, 16-bit CD-quality audio.
- Real-time pan and volume adjustments, digital audio scrub.
- Waveform for precise audio editing.

- AVI video files, WAV audio files, FLC animation files.
- OMF Interchange files.
- BMP, JPEG, PCX, TGA and TIFF graphics files.

SPECIAL EFFECTS

- Filter effects with previews and adjustable parameters.
- Transition effects include wipes, dissolves, zooms, pushes and squeezes.
- Layered effects include picture-in-picture, luminance and chroma key.

INTEGRATED TITLE GENERATOR

- 32-bit processing (24-bit color and 8-bit alpha channel).
- Support for TrueType fonts and international character sets.
- Drop shadows, transparency and color blends.
- NTSC and PAL-safe color palettes.

MEDIA MANAGEMENT

- Media library for organizing digital clips.
- Database with search capabilities.
- Customized views for easy clip access and retrieval.

Add Audio: Polish your audio with music and narration. Adjust pan and volume in real time. Simultaneous playback of four audio tracks makes audio editing quick and easy. View your four audio tracks in sync with the video immediately, no waiting for tracks to compile.

Digital Media Interchange: Compatible with the Open Media Framework (OMF) Interchange, a file format for the seamless integration of digital data among applications and across platforms. Through OMF, you can import video and audio files from other OMF-compatible applications like Avid's Media Composer.

Output to Tape, CD-ROM or Over a Network: Gives complete control over video distribution. There's no long rendering process, creating professional quality tape is a snap. Embedding video in multimedia presentations for distribution on disk or CD-ROM is as simple as the click of a mouse. Supports third-party MPEG tools to create MPEG files for network distribution.

Avid's Support Advantage: Real Impact is backed by Avid's world-class customer service. Toll-free telephone support and bulletin board service are just some of the benefits.

DIGITAL

PROCESSING SYSTEMS INC.

PVR-2500 Digital Video Recorder

The PVR-2500 offers powerful features for awesome animation, morphing and rotoscoping capabilities. With features like 720 x 480 resolution, 10-bit 2x oversampled video encoding, better than D1 scaling, component and S-Video outputs, multi-processor support and integrated FAST SCSI-2 controller, it empowers your computer to rival the finest professional production studios.

- The PVR-2500 is a full-length PCI card with a SCSI-2 interface that connects up to seven dedicated hard drives. Because the SCSI controller is integrated with the PVR-2500, video data never has to move over the PCI bus during playback. This avoids the bottlenecks found in systems which use the computer's hard drive for video storage.
- Designed to run under Windows NT 3.51 on computers employing Pentium, DEC ALPHA or MIPS processors. Perception's software utilizes NT 3.51's native support for multitasking and multiple processors, allowing use with-in the most powerful computers.
- Perception's multi-format virtual file system ensures complete integration with your existing Windows NT applications. Any acquired video or computer generated Perception video clips appear simultaneously in many different file formats including TARGA, SGI, BMP and TIFF. Also compatible with new NT versions of Lightwave 3D, 3D Studio, TOPAS 5.1, SoftImage and Elastic Reality.
- Video output section utilizes 10-bit 2x oversampled encoding and provides broadcast quality CCIR-601 (720 x 480) resolution. Its dynamic range is in excess of D1 scaling so that images are brighter, have more color and greater spatial resolution. Outputs component, composite & S-Video via the included breakout cables.
- Use with any compatible sound card while synchronization of audio and video is maintained by the PVR hardware. Captured audio is stored on the computer's system hard drive, not on the dedicated drives. This approach provides maximum flexibility for manipulating audio and video during editing.

- Can perform real-time interpolation of 30 fps video to 24 fps film rates or vice versa.
- VCR-like controls on the Perception's GUI simplifies the task of batch digitizing and recording. In this mode, it reads SMPTE line code from the source deck.
- Drivers for Windows 3.1 are supplied as well, so third party editing software like Adobe Premier can be used. In fact, the PVR-2500 bundled with the AD-2500 capture card, a sound card, editing software and one or more SCSI hard drives becomes a non-linear editor of unparalleled performance at an unbeatable price.

AD-2500 CAPTURE CARD

- The optional AD-2500 is a video capture daughtercard, that transforms the Perception into a digital video recorder. It has component, composite and S-Video inputs for real-time recording, and storage capacity is limited only by the size and number of your hard drives. Captured video can also be exported as sequential RGB files for rotoscoping & other compositing applications.
- The AD-2500 incorporates a sophisticated automatic entropy prediction circuit that analyzes the content of incoming video and dynamically calculates the optimum amount of compression on a field-by-field basis—even during real-time recording. You also have complete manual control over compression level/quality settings.



TRUEVISION TARGA 1000/2000

Digital Video Capture Boards for Windows and Windows NT

The TARGA 1000 and 2000 are an easy and affordable way to transform your computer into a powerful digital editing system. Along with their high-speed PCI interface, both the TARGA 1000/2000 incorporate all the functions you need to create spectacular multimedia content. They support NTSC and PAL video standards and let you capture, edit and playback full-motion, full-resolution digital video with fully synchronized CD or DAT quality audio. Designed for high performance IBM compatibles their advanced architecture provides incredible processing speed for video and audio effects, tiling and compositing.



Digital Video Capture Boards for Macintosh PCI

An integrated digital video production engine, the TARGA 1000/2000 PCI for Macintosh is the premier open systems (QuickTime 2.1 Native) video capture/playback and effects acceleration board on the market today. It provides a flexible off the shelf "plug-and-play" solution for video authoring, 3D animation and multimedia applications. With the Mac OS and TARGA's open architecture you can work on an animation or 3D effects project in the morning with software like Strata Studio Pro or Specular Infinity-D and switch to video or CD-ROM authoring in the afternoon with applications like Adobe Premiere or After Effects 3.0, and then spend the next day working on a desktop publishing project with Quark Express or Photoshop. The TARGA 1000/2000 is the complete solution for those tired of being locked into expensive closed architectures, tired of paying for upgrades that never come and frustrated at the lack of creative flexibility.

Advanced DVR (Digital Video Recording) Technology:

The TARGA 1000/2000 employ advanced DVR technology to provide superior video performance. Rather than treating each frame of video as a block of data tied to a specific order of steps such as decompression-resize-compress-write to disk, DVR writes an entire frame of uncompressed video to the huge on-board RAM buffer of the TARGA 2000 (and to a lesser extent on the TARGA 1000).

This is a "memory-centric" approach, in which all board functions share access to the video buffer. For example, a DSP (digital signal processing) chip can scan for additional data, such as matching audio samples to video frames to help maintain lip sync. Transitions, filters, effects and/or resizing can also be applied while the uncompressed frame is in TARGA memory. The final output is then compressed and written to disk. This means that the video data only crosses the bus twice, both times in compressed form.

On other systems, the video data path is longer and more complicated. The video board reads the video data from the AVI/QT memory buffer on the CPU motherboard, decompress it, then send the uncompressed data back to motherboard memory for rendering. Once the render is complete the uncompressed data is once again sent back to the video board to be recompressed. Finally once recompressed, the video data is sent back to down to the CPU motherboard memory to be written to disk. Video is crossing the bus twice uncompressed and twice compressed data.

The DVR architecture can access information in its memory buffer at a speed of 230MB per second. Video runs only at 2 to 7 MB per second, so the TARGA boards have all the time needed to decide what to do with each frame. And, because the uncompressed data is never sent across the bus, bottlenecks that plague other systems are eliminated.

TARGA 1000/2000 Features:

- Allows recording and playback of video directly to/from hard drive at full motion, full frame rates (50 fields/sec - PAL, 60 fields/sec-NTSC). Video is stored and played back at the highest resolution for each format (768 x 576 x 24 bit - PAL, 640 x 480 x 24 bit - NTSC). Compression can be adjusted on the fly to optimize for image quality and/or minimum storage space.
- The audio is digitized at 16-bit resolution (at 44.1KHz or 48KHz sampling rates), yielding professional quality stereo sound. Since all audio & video processing is done by on-board DSPs, you are assured of perfectly synchronized sound and images.
- Equipped with composite and S-video inputs and outputs. Also available with component input/output (TARGA 1000 PRO).
- Genlock using separate sync input for working in professional video suites
- Optimized to work with Windows NT-based software (Adobe Premiere 4.2, in:sync Speed-Razor MACH III)

Macintosh version only:

- Video capture plug-in for Adobe Photoshop.
- Quicktime 2.1 compatible, can be used directly out of the box with many applications.

TARGA 2000 Additional Features:

- Accelerated Windows 3.11 and Windows NT 3.51 display drivers offer integrated, true-color (24-bit), non-interlaced desktop up to 1152 x 870 pixels.
- View your desktop and video-in-a-window on your non-interlaced monitor while the processed video is output at NTSC or PAL to a video monitor and/or a VCR.
- Provides a large work area for displaying video, as well as editing application controls. Any part of the display (or even the whole image) can be recorded to tape (video-out-of-a-window).
- Equipped with composite and S-video inputs/outputs Also available with component input/output (TARGA 2000 PRO)

TARGA 1000 for Windows (with Adobe Premier4.2 for Windows) or Macintosh PCI (specify)	2595.00
TARGA 1000 PRO for Windows or Macintosh PCI (specify)	2995.00
TARGA 2000 for Windows or Macintosh PCI (specify)	3995.00
TARGA 2000 PRO Windows or Macintosh PCI (specify)	4695.00
Special! TARGA 2000 for EISA (PC) or Nubus (Macintosh) (specify)	2495.00

USER REPORT

Itelco T613X Runs Smoothly

by Mike Dant
Engineering Supervisor
KTVD-TV

DENVER

KTVD (Channel 20) is the UPN (United Paramount Network) affiliate in Denver, Colorado. The main transmitter for the station is located on Mount Morrison in the foothills to the west of town, as with most Denver stations. As required by the FCC, our signal level in the direction of the Table Mountain Radio Receiving Zone has to be canceled.

The direction of this canceling notch is zero degrees, toward Boulder, western Longmont and Fort Collins, where there is

substantial population density within the Denver ADI. In addition to the cancellation notch, terrestrial interference compounds signal coverage problems.

Channel 20 decided to reach the viewers in these areas using a translator, the most cost-effective method. Last year a license became available and we applied for a Special Temporary Authority.

In October 1995, we installed an Itelco T613X 1 kW transmitter on the top floor of the Key Bank Building in Fort Collins. The T613X is a recent product from Itelco. It is a solid-state unit using two power modules with four different power stages each.

This was a turnkey installation done by Howard McClure of Itelco, U.S.A. with our

assistance. A local moving crew handled all the heavy work. The antenna was mounted 50 meters above ground and centered on the roof. The transmitter came in a single cabinet that weighed approximately 350 kilograms. It had to be manhandled up two flights of stairs. (The moving crew certainly earned its pay that day!)

The installation took about 14 hours, including the placement and connection of the transmission line. The antenna had been mounted the day before.

When we finally turned it on, we immediately had an RF alarm, which turned out to be a pinched cable from the receive antenna. After replacing the cable, the alarms cleared and the power came up — in fact, to about

1.6 kW. After a signal lever check with the spectrum analyzer on the RF monitor jack on the front panel, we determined that the watt meter was correct and proceeded to reduce power to the rated 1 kW.

Another clue that the power meter was probably correct was when I accidentally rested my hand on the conduit carrying the input AC wiring to the set and found it warm to the touch. After the transmitter output power was adjusted to the proper level the conduit did cool down to room temperature.

PRODUCTION MANAGER

Simple Spots on the Cheap

by Craig Johnston

A short while ago someone asked me to teach a group of fledgling business owners how to come up with low-cost commercial production. I hope it wasn't because they looked at something I did and said, "That looks cheap!"

Books could be written about this, and probably have. Let's narrow the subject a bit and look at the field production side.

They wanted to keep costs down. "Simple doesn't cost much," I told them. "Complicated costs a lot."

WHAT'S ON YOUR MIND?

Simple ideas that are simple to execute are doable and affordable. Start with what you're trying to say.

"What's the No. 1 reason people buy your product or shop at your business? Focus on that," I told them.

Most of the owners gave me a laundry list of reasons customers do business with them. "We're friendly. We're open 24 hours. We have parking."

I made them go back and concentrate on the No. 1 reason. That proved a lot harder to do, but I think it's critical. You've really accomplished a lot if you can get one point across to the viewer in 30 seconds. So it might as well be the primary reason for doing business with you.

Okay. The laundry list has been winnowed down to the fact that the store has the largest selection in town. The next step is planning. As in most projects, good planning keeps the costs down.

"In the commercial production process, dollar-wise, there are basically three types of time," I tell them. There's free. There's inexpensive. And there's expensive.

Free time is generally that time before contracting for production services on the spot has taken place. Before closing the deal is a good time for the client to pick the minds of the folks trying to sell him production services.

INEXPENSIVE TIME

Then there's inexpensive time. Generally, the difference between inex-

pensive time and expensive time is whether equipment and/or talent is involved. Phone calls, consultation, and faxing scripts and story boards back and forth are all inexpensive relative to the location shoot, where time is money in terms of equipment and people.

I tell them to think of the expensive time as a cab ride. If you were watching expenses, you wouldn't get into the cab, let the driver drop the flag, and then try to decide where to go. Instead, you'd decide on your destination before jumping into the cab. Spend inexpensive time or free time planning the best use of expensive time.

Simplify. Plan each shot to be as simple as possible. My definition of a simple shot is one that has the least number of things that must be executed at the same time. You can evaluate any shot as to how complicated it is, and how much time it's likely to take. Just write down all the different things that must happen in the shot, and what the chances are of each of them happening correctly.

ALL TIRED OUT

Here's an example that really happened. A tire dealer is going to drive a four-wheeler up a hill with the camera framing the rear front tire. As the vehicle comes to a stop, the camera is going to zoom back to show the whole front end of the truck, with the dealer leaning out the window and delivering two lines of copy.

Sound simple? No!

What are the chances of getting each element right?

The truck has to stop on its mark and can't slide backwards. That only happens once in three tries.

The camera operator must follow the tire, then correctly zoom back. He gets it once in two tries.

Multiply those two and we're likely to get it right once in six tries. But there's more.

The tire dealer is only likely to get his lines right once in three tries. Now our estimate is that this is going to work once in eighteen tries.

But we're not done yet. The tire we're

following at the beginning of the shot has to stop with the company logo on top. It will happen once in six tries, so now we're up to once in one hundred and eight tries.

We were lucky. This shot was successfully accomplished about forty-five minutes after setup. Luckily, we weren't dodging raindrops. Luckily, we didn't have trucks roaring past. Those and other complications could have put us at a level of once in several hundred tries. And when you reach a certain number of bad takes, my experience is that human efforts start deteriorating, and you end up settling for take sixty-seven, which wasn't perfect but beats the heck out of the last forty or so you've done.

STICK WITH THE PROS

Also, it can cut costs to use professionals in all positions. Usually, it's hardest to sell the idea of using a professional in the talent position. Why can't the business owner do his own on-camera? Why can't Uncle Fred do it? He's got a great voice. How about my kids in the spot? All this is free.

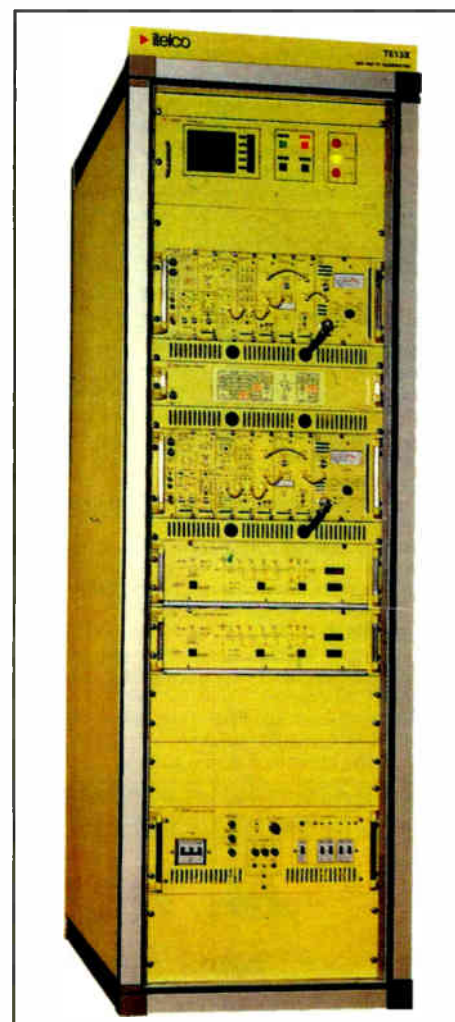
But, remember the taxi cab analogy. If Uncle Fred takes extra hours getting it right, those are extra hours the meter is running on all the other services.

And then there's the question of whether Uncle Fred's getting it right is going to be anything close to acceptable on the air. Is the client or the director going to be able to tell Uncle Fred his read stinks? Good professional talent is generally very accepting of feedback. They know it isn't right until you say it's right, or at least they're willing to let you believe that. It works either way.

I've hardly scratched the surface. In the next issue I'll take the project to post production, and try to show how to save the client even more money.

Please feel free to send me your ideas on how to make spots more cheaply without making cheap spots. ■

Craig Johnston is the Production Manager of KDRV-TV in Medford, Oregon. Write him c/o TV Technology.



The Itelco T613X 1 kW UHF transmitter

The unit's status and faults are indicated in real time and retained in memory in the control and metering module. Phase and amplitude regulation controls are located at the input of each module. Moreover, each module has its own power supply and is self-protected against overtemperature, overvoltage, overcurrent, overdrive and high-reflected power.

Output power, reflected power and individual driver current and voltage are metered in each module. There are several other parameters that are metered as well.

With the exception of a cold solder joint in the control module power supply, the unit has run reliably since last October and, judging by the feedback from the Fort Collins/Loveland area, it was an excellent investment. ■

Editor's note: Mike Dant is engineering supervisor at KTVD in Denver, Colorado, where he has been since the station's beginnings in 1988. He has been in broadcast engineering since 1980, when he became involved in the construction of KTXA-TV in Dallas-Fort Worth, Texas.

The opinions expressed above are the author's alone. For further information contact Howard McClure at Itelco, U.S.A. (Phone: +1-303-431-1699; FAX: +1-303-431-2868) or circle Reader Service 49.

USER REPORT

Marsand Selects the ABS IOT

by Matthew A. Sanderford, Jr., P.E.
Marsand Inc.

FORT WORTH, Texas

Marsand, Inc. is a broadcast engineering consulting firm that serves 13 television stations in Texas and Louisiana. In 1995 we were contracted to build three new television stations (WUPL in Slidell, La., KSHV in Shreveport, La., and KAKW in Killeen, Texas) and to replace one transmitter (at KVEO in Brownsville, Texas).

Many considerations were taken into effect regarding the transmitters for these stations, including start-to-finish real project costs, operating costs, engineering maintenance and the ATV future. We chose IOT technology for the RF plants in order to take advantage of its high efficiency and ATV capability. We then evaluated all the new IOT transmitters on the market today, and determined that they all performed in a very reliable and efficient

manner. However, one manufacturer offered several distinct advantages.

Since February 1995, Marsand has purchased and installed four CST 84 kW IOT transmitters from Advanced Broadcast Systems, Inc. (ABS). All transmitters we had ordered to that point had been 84 kW, common mode, completely redundant IOT systems.

COMING OF AGE

Don Adams, the president of ABS, took the innovative, yet simple, Townsend design and catapulted it into the computer/IOT age. The transmitter footprint consists of a system control cabinet and two identical IOT cabinets. The control cabinet houses the exciter, which consists of two dedicated upconverters and redundant modulators from ITS (that allow for individual correction for each IOT), a manual transmitter control panel, a computer interface panel and space for station equipment such as a monitor, demod and so forth.

Every function in the transmitter can be controlled and monitored via the computer interface panel. However, should the computer go down, the transmitter functions as normal with all functions controlled and metered manually.

The IOT cabinet contains all the control and monitoring circuits, metering, high voltage assembly, Thyatron, an IPA and a cooling fan. The IPA is a dual 400 W unit providing 800 W input power to the IOT. Even with one side down, the IPA can provide drive for the 60 kW IOT to maintain 100 percent power of 42 kW peak visual and 4.2 kW aural in common mode.

The RF system is a switchless combiner made by MCI. Two IOT cabinets are combined in the RF system to provide 84 kW peak visual (now, with the new higher-power IOTs, each cabinet can provide 50 kW visual plus 5 kW aural or 60 kW visual plus 3 kW aural). In the event either cabinet shuts down, the sys-

tem control switches the combiner to route the operational IOT to the antenna, taking the transmitter to half-power versus off-air.

The SCR-controlled unitized beam supply is located on an outside concrete pad, along with the pumps and heat exchangers. The unique balanced cooling system designed by Carl Jacobson at ABS consists of two pumps and two heat exchangers operating in parallel. Barring a major leak, either pump could fail or be shut down for maintenance, and the transmitter would remain operational at 100 percent power using the second pump, with no valves, glitches or downtime.

GOOD SERVICE

Working on many transmitters has allowed me not only to examine the engineering accomplishments of various manufacturers but also to test their service departments. ABS provides expert mechanics, professionally manufactured circuit boards and a layout that is clean and easily accessible for troubleshooting.

For the engineer, the ABS transmitter is a joy: either IOT cabinet can be shut down for maintenance while maintaining half-power, all functions and metering available on the front computer panel of the transmitter are available on a duplicate panel at the studio via modem or microwave and all components are available stateside.

ABS also provides replacement parts at cost plus a modest service charge as opposed to marking up prices two and three times cost. In fact, the company usually suggests parts suppliers with whom we can deal, so there is no "gotcha" mentality where all parts are available only through the transmitter manufacturer. ■

Editor's note: Matthew A. Sanderford, Jr. owns and operates Marsand, Inc., a technical support and consulting company in Fort Worth, Texas. He served in various engineer and director of engineering capacities for 20 years.

The opinions expressed above are the author's alone. For further information contact Wayne McMahon at Advanced Broadcast Systems (Phone: 606-282-7580; FAX: 606-282-7581) or circle Reader Service 77.

USER REPORT

ITS 830 Helps WWIN Reach Local Markets

by Steven R. Schuyler, G.M.
New York Network, LLC

BURLINGTON, Vt.

WWIN Television, a New York Network, LLC station, is a new kind of broadcast television facility. Using LPTV licenses in a cellular fashion and connecting the sites via a two-way fiber-optic distribution system, WWIN can broadcast over an entire region.

The value of deploying this technology lies in the ability to send truly local community news, weather and information to communities.

In addition, commercial airtime becomes available for many small businesses who previously only dreamed of reaching the local consumers in their market of influence. Larger business advertisers still benefit from economies of scale.

"We understood the power of this format right away," said Jeff Loper, co-founder of New York Network, LLC. "The question was, could we find the necessary equipment to meet the requirements for the engineering."

The final engineering answers came with the installation of the ITS-830 UHF 1 kW transmitter at the St. Albans, Vt., site. The other equipment used in the distribution of the video and audio for the WWIN project was already in place and had been performing nicely. The 830 transmitter was activated without a hitch and has been rock-steady.

The ITS-830 will now become an intricate part in this latest convergence of proven technology and cutting edge electronic transportation products. The ITS transmitter was chosen for the development of the world's first interactive broadcast television station.

Important features included the ability to transmit in the digital world of the near future without large upgrade costs and very comfortable access for maintenance and repair of components, should this ever be required.

ITS maintains a 24-hour emergency response presence. During installation, we received very quick and professional service.

The 830s are being placed at selected points along the fiber-optic grid that runs throughout the state of Vermont. The broadcast facility

master control is located in the Miller's Landmark building in Burlington.

The broadcast-quality digital signal leaves the master control and is sent to conversion points located at or adjacent to the LPTV transmitter sites. The signal is converted to analog and then broadcast to the local communities within the contour of the RF signal.

In addition, digital video and audio is provided to the largest cable company, Adelphia Cable, via the same fiber grid.

The programming chosen for this project has not followed the traditional fare of the LPTV service, either. Instead, great attention to programming has produced an affiliate contract with the WB network, syndicated

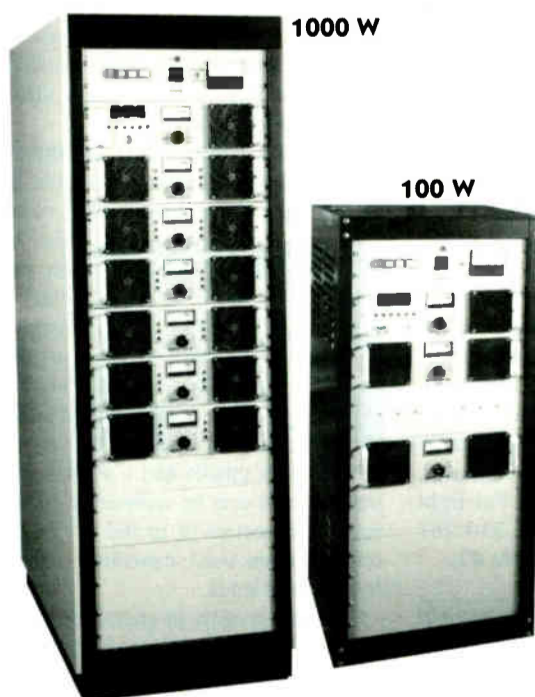
programming and a full slate of 75 regular season Boston Red Sox games.

We now have tested all the elements in this project and will continue the activation schedule throughout the summer. With the ability to send news and local information back to our news editing facility in Burlington, and then send it out over the network to its designated zone or zones, the project will allow interaction between the communities and their new station. The ITS-830 UHF 1kW transmitter could very well become the workhorse for the distribution of the RF signals, either digital or analog, of the new networks now growing over the airwaves in America. ■

Editor's note: Steven R. Schuyler is general manager and co-founder of New York Network, LLC.

The opinions expressed above are the author's alone. For further information contact Richard Schwartz at ITS (Phone: 412-941-1500 ext. 152; FAX: 412-941-9421) or circle Reader Service 79.

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MARKETPLACE

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DIGITAL VIDEO RECORDER

Colby Systems launched the Colby DVR-6000 at NAB, described as a cost-effective direct replacement for D1, D2, D3, D5, MII, Digital Betacam and Betacam SP video recorders.



Designed for general use as well as commercial insertion, editing and animation, the unit offers up to 20 hours of CCIR 601 quality storage on six industry-standard SCSI AV rated hard drives, of which one is removable. This can be expanded to over 50 hours storage with a RAID (Random Array of Independent Drives) Video Server option.

The five basic versions offer full D1 quality JPEG, 1/4 D1 quality MPEG-1, 1/2 D1 quality MPEG-2 or full D1 quality MPEG-2, with play-only variations. Colby says that banishing tape means no more clogged heads, dropouts, tape path cleaning, head replacement or maintenance. Operation is via an exclusive Colby Touch Screen and an industry standard jog/shuttle knob.

For further information in Europe and Africa contact: AVT Srl, +39 6 51 95 73 81 (tel), +39 6 51 95 72 95, Internet: <http://www.avt.it>, or circle Reader Service 12.

WINDOWS NT EDITING

D-Vision claimed to be the first company to be shipping a professional nonlinear editing system on the Windows NT platform at NAB. Its family of four PostSuite systems is CCIR 601-compliant throughout, and cover applications from affordable corporate finishing up to off-line film cutting. Each includes 'snap editing' technology; Dynamic Q; electronic storyboarding; 50/60 field-per second video; and broadcast



quality anti-aliased graphics with real-time fade-in and fade-outs.

The company's stated aim is complete digital media workgroup computing using non-proprietary editing tools, and gave a demonstration of nonlinear editing over a local area network (LAN).

Also shown was D-Vision Sweetener (pictured), a preview of D-Vision's professional audio sweetening and finishing tool intended to provide up to 500 tracks of AES/EBU quality audio, four channels of XLR or serial DAT I/O, 48 KHz 16-bit sample rates, touch sensitive fader override, digital EQ, compression, audio effects, waveform display, and direct subframe waveform editing.

For further information contact D-Vision Systems Europe Ltd at +44 (0)181 540 0515 (tel), +44 (0)181 543 9374 (fax), or circle Reader Service 27.

WORKSTATION CONSOLE

Fairlight and Amek have joined forces to create an integrated 24 track recorder, a digital audio workstation with full graphical editing, and a totally automated digital mixer with surround mixing capability.



Shown for the first time at NAB, the F.A.M.E. system provides up to 36 mix inputs comprised of disk tracks and "live" inputs, and can produce up to 12 mixed outputs. The system can be used for stereo or surround mixing, and includes multi-stem film and television production monitoring options.

Fairlight created a new 40-bit floating-point DSP mixing engine for its MFX3 workstation, while AMEK designed an ergonomic control surface with moving fader automation based on their Supertrue system.

The system is distributed internationally by Fairlight through its normal channels. For further information, contact Fairlight USA, +1 310 287 1400 (tel), +1 310 287 0200 (fax), or circle Reader Service 42.

CAMERA PEDESTAL

Where the appearance of TV equipment on-screen was once taboo, today's more

tech-minded TV directors positively encourage it. This realisation has led Vinten to offer a new generation of studio pedestals which are anything but camera-shy.

Alongside their photogenic looks, the Quartz studio pedestals have been developed with specific attention to the critical shape and weight of the fully skirted base, to provide the cameraman with just the 'right feel' in the studio environment.



The Quartz is available in single and two-stage versions - the Quartz One has a height range from 71 cm to 122cm with a maximum payload of 95Kg, with the Quartz Two giving a maximum height range of 143cm down to a minimum of 66cm and a maximum payload of 80Kg.

For further information, contact Marketing Services Officer Suzanne Walker-Robinson at Vinten on +44 (0)1284 752 121 (tel), +44 (0)1284 750 560 (fax), or circle Reader Service 57.

PHONE-IN SYSTEM

Audix Broadcast claims its DTX system is a complete phone-in system with a feature list that includes control logic, digital hybrid, announcers' and assistants' control panels, and an option which allows call conferencing on-air.

The main control unit includes all the audio and control logic to provide automatic routing of cue programme, clean feeds and talkback to and from the on-air studio. Two studios can share the system with individual announcer's panels and a shared assistant's panel. Calls can be answered either in the ringing sequence or in the user's preferred order, put on hold, cancelled, or passed to the studio's stack.

Optimum quality is guaranteed by the use of the Audix Broadcast DATH (Digital Adaptive Telephone Hybrid), which automatically tracks line characteristics to pro-

vide the highest-quality audio signals from the telephone.

For further information contact Audix Broadcast Ltd on +44 (0)1799 542220, +44 (0)1799 541248, or circle Reader Service 102.

VIRTUAL SET

Accom unveiled a series of improvements to its Elset virtual set system at NAB, all controlled via a new advanced Graphical User Interface.

These include an ability to simulate depth-of-field effects on computer-generated backgrounds in real time, and a "Monitoring Preview" option, following requests from TV television directors for each camera preview to show actors in their virtual environment. Previously this required a separate Onyx computer and multiple copies of the virtual set software. Now each camera needs only a low-cost Indigo Impact platform and low-cost chroma keyer.

Another addition is "Infinite Blue Box", a computer-generated mask providing the illusion of unlimited studio size if the physical camera is pointed outside the edges of the blue screen. Events outside the system can now be triggered by devices such as touch tone phones, allowing distributed interactivity.

Software modules have been re-configured to allow sets to be designed on standard workstations, and Elset can now run on SGI's new InfiniteReality Onyx computer. Accom claims Elset prices have dropped by 30 to 40 per cent since its launch at NAB 95.

For further information, contact Accom at +1 415.328.3818 (tel), +1 415 327 2511 (fax), Internet <http://www.accom.com>, or circle Reader Service 72.

NOTEBOOK AUDIO

You/Com announced at the AES in Copenhagen a retro-fittable extension option for its ReporterSet sound acquisition unit which allows digital connection to a standard Notebook computer.

The connection ensures that no analogue to digital conversion takes place during recording, editing and transmission of files, so optimum audio quality is maintained. No special card is required in the PC. The edited and compressed Musicam/MPEG format audio can then be sent to the studio as a file, or in the form of a play list in combination with real-time audio.

For further information, contact You/Com Telecommunicatie BV on +31 15 262 59 55 (tel), +31 15 257 15 95 (fax), or circle Reader Service 87.



Send new product press releases along with black & white photographs to TVTI Marketplace, 15A Endlesham Road, London SW12 8JX.

USER REPORT

Andrew H-R Line a New Wave for WGTU

by Thomas Scanlan
President/Owner
WGTU-TV

TRAVERSE CITY, Mich.

When we purchased WGTU-TV, Channel 29 and sister station WGTQ-TV, Channel 8 in Sault Ste. Marie, Mich., back in August 1988, we knew we would eventually have to replace Channel 29's antenna. In use since 1971, the old General Electric TY-203A three-bay directional zigzag had simply endured too many harsh northern Michigan winters atop a 1,300-foot Stainless G-7 at the 45th parallel.

With elements bent due to massive ice dams and several burn spots, "Old Ziggy" was replaced in September 1993 with a brand-new Andrew custom 29-section Trasar antenna, complete with radome and expert installation by Central Tower. A thorough inspection of our 6 1/8 Prodelin 75-ohm line was included in our contract with Andrew, along with replacement of defective inners and bullets, and a general cleaning of the inner surfaces of the outer conductor.

Installation was scheduled immediately following the July sweeps, and before the start of ABC's new fall schedule. Just prior to sending the antenna erection crew to our transmitter site, Andrew engineers came in and swept the entire RF system, from transmitter through filterplexer, patch panel, transmission line and antenna. As expected, there were two or three trouble spots in the line, which were earmarked for closer inspection during the installation process.

Once on-site, the crew from Central Tower installed a temporary one-bay antenna at the 300-foot level in order to reach most cable systems. The next order of business was preparing the tower top for the gin pole and the removal of the GE zigzag. All went as scheduled: the temporary antenna was connected to the output of the filterplexer, we signed on at reduced power and the GE unit was dropped and set on wooden trestles at the tower base. Next came the installation of the new Trasar antenna, which was raised, bolted to the tower top and prepared for transmission line connection.

We then inspected the spots in the line that had showed up in the RF sweep. This revealed that there had been a slight burnout at the connections between several of the 19 1/2-foot sections over the years, and Andrew recommended replacing these inners.

CAUSE FOR CONCERN

Further inspection revealed several slight dents in the line, which was cause for concern. Because we had already budgeted several thousand dollars for replacement of inners and the refurbishment of the line, we now were faced with the added cost of replacing at least three outer sections. Realizing that we had been operating with 30 kW into the filterplexer, which would yield about 29 kW into the line after the patch panel, and that we were planning to hit the line with 68 kW from a new transmitter, it didn't take a Ph.D to figure out that our current transmission might fail in several other places if subjected to a massive increase in RF power.

We presented the dilemma to Andrew: we knew we needed more line help than we at first realized, but we didn't want to be down for several weeks while various sections of line were replaced, piecemeal. Further, we didn't want to gamble with our signal and coverage for years to come.

Andrew came back with a suggestion: install its new H-R line. This was a brand-new product, having been just developed. It was immediately available, and we were asked if we would be interested in a full replacement.

Our accountants huddled with various banks, and within two days we had placed an order with Andrew for the H-R replacement. Fortunately, Andrew was able to furlough the crew from Central Tower from another nearby job it was doing, so the rigging equipment could be left on the tower. That alone saved us several thousand dollars in erection crew fees, thanks again to Andrew's willingness to work with us and keep costs to an absolute minimum.

In a matter of 10 days the new H-R line was installed to the new antenna, and we were ready for a full RF sweep, which we conducted at sign-off, so as not to pick up any radiation from the standby antenna. We swept the system at about 4 a.m. one Monday morning. The scope and the printout were as flat as though we were looking at the test signal into a dummy load! The line and the antenna were as clean as any I have ever seen.

Because we were then about to go into local news and "Good Morning America," we decided to wait until 5 p.m., right after Oprah Winfrey, to cut over from the standby antenna to the new system. We made the appropriate announcements, and waited until 5:00. At the magic hour, we signed off temporarily, switched on the new RF system and were

back on with full power 10 minutes later. The phones started ringing, at first complaining that we were off the air, and then commenting (once we signed on) that they had never seen such clear pictures.

We had for many years blamed the antenna for bad pictures, but with the replacement of the line and the antenna, it became obvious

delivery of our Comark IOT transmitter. Comark's engineering consultant recently paid us a visit to again sweep the RF system. The result? Just as clean as when installed! After three years, the Andrew H-R line continues to deliver flawless pictures and maintain the same electrical transparency as it did when measured in the initial installation.

One word of caution: The H-R line features an inner conductor that threads into the next section, and so forth, for the entire length of the installation. Installation and replacement are not done the same way as with traditional hardline. Andrew has a special tool for installing and replacing sections of H-R line that any user would be well advised to get comfortable with, before saying goodbye to the tower crew. Aside from that one word of advice, the H-R line is nothing but top quality in every respect. ■

Editor's note: Thomas Scanlan, 56, is owner and president of Scanlan Communications, Inc., licensee of ABC affiliates WGTU-TV in Traverse City, Mich., and WGTQ-TV in Sault Ste. Marie, Mich.

He is also owner and CEO of Scanlan Television, Inc., permittee of WBKP-TV, Channel 5 in Calumet, Mich.

The opinions expressed above are the author's alone. For further information contact Jim Heard at Andrew Corp. (Phone: +1-708-873-2985; FAX: +1-708-349-5516) or circle Reader Service 55.



Andrew H-R line along the WGTU tower in Traverse City, Mich.

that both components of the RF system are equally important: one can distort a signal many ways, both with the antenna and with poor line. The Andrew H-R line answered all our line problems.

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BUYERS BRIEFS

Pulizzi Engineering Inc. recently introduced the 1.75-inch (1U) Z-line TPC 4000/MTD three-phase power distribution system for 19-inch rack-mounted computer requirements. The product includes multiple time-delay sequencing power up of the equipment connected to it.

Bidirectional EMI/RFI filtering and spike/surge suppression line to line, line to ground and neutral to ground are standard features of the TPC 4000/MTD. This feature allows each duplex to be isolated from the others. For more information, circle **Reader Service 81**.

Veltek Industries Inc. has developed new high-gain signal bender antennas. The MDS, MMDS and ITFS transmit antennas come in several different patterns and can also be customized.

Each antenna is completely enclosed in radome, and can be either pressurized or non-pressurized. The antennas, available in both horizontal and vertical polarities, have a beamwidth of 180 degrees in the azimuth plane. They have low VSWR and N-connector inputs, are 1,200 W power-rated, and can be used with waveguide or coaxial cable.

For more information, circle **Reader Service 62**.



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BUYERS GUIDE

USER REPORT

EMCEE Taking on the World

by Matt Spangler

WHITE HAVEN, Pa.

If the pen is indeed mightier than the sword, then what kind of impact could wireless cable transmission in strife-torn parts of the globe portend? EMCEE Broadcast, the White Haven, Pa.-based manufacturer of transmitters and translators, is determined to find out.

Following its recent success as part of a mission headed by the U.S. Special Operations Command to provide television to the troops in Bosnia, the company hopes to market the special VHF transmitter and broadband amps developed for the project to government organizations interested in supplying "Radio Free Europe"-style programming to certain underdeveloped regions.

THE EVOLUTION OF EMCEE

Because of the expense and specific application of the transmitter, which is adaptable to most CCIR applications, Jim DeStefano, president of EMCEE Broadcast, said he doesn't expect it to appeal to the greater commercial market. However, the company's success is due to its concentration in manufacturing low-power transmitters and translators for broadcast service, which accounts for about 10 percent of the company's business, and microwave products for the ITFS/wireless cable industry, which comprises the remaining portion of its business.

EMCEE has always strived to stay on the cutting edge of transmitter technology, DeStefano said. The company was founded in 1960 in Mt. Vernon, N.Y., by a group of engineers who left one company, Adler, to forge out on their own and make dual-conversion translators. EMCEE began producing 2.5 GHz transmitters in 1964 to accommodate the new FCC rules on ITFS programming. The company went into the low-power service business in 1980. Four years later, after the FCC ruled that ITFS could be used for pay television, EMCEE began offering wireless cable transmitters. Throughout this period the company continued to develop UHF and VHF products for translator service.

Over the years, DeStefano says, EMCEE products evolved from tube-type to solid-state equipment. In fact, all the transmitters the company currently supports are of the solid-state variety. At this year's NAB convention the company introduced a new line of low-power UHF transmitters, new 100 W and 1 kW common-amplification transmitters and a VHF transmitter. Its 20 W transmitter, which DeStefano calls "the heart of the new line," was also shown at NAB '96.

In anticipation of the evolution from analog to digital transmission, last year EMCEE introduced Digacom, a wireless

cable digital transmitter. DeStefano said the company had expected the full transition to digital to occur by now, based on earlier claims by manufacturers of modulators and set-top boxes for digital compression. Unfortunately, the set-top boxes have not become available yet, so the Digacom awaits that inevitability before it is released, he said.

For the last few years EMCEE's business has been about 60 percent domestic and 40 percent international. That trend has reversed in recent months, however, in large part due to international demand for wireless cable systems.

FOREIGN AND DOMESTIC DEVELOPMENT

DeStefano said he expects this trend to continue in the coming years. Wireless cable is relatively inexpensive to implement, and it is particularly appealing to emerging nations, where the infrastructure to build cable systems doesn't exist, he added. For example, EMCEE was recently contracted to supply wireless cable transmitters for the 40-city General Instruments Saudi Arabian project that as far as DeStefano knows, is the largest wireless cable endeavor in the world.

Despite the setback with Digacom, EMCEE will continue to develop wire-

COMPANY PROFILE

EMCEE Broadcast Products

P.O. Box 68
White Haven, PA 18661
Phone: +1-717-443-9575
FAX: +1-717-443-9257
Reader Service 131

less cable transmitters for the digital environment. The company is a part of the Wireless Cable Digital Alliance, a consortium of companies testing digital transmission in field environments.

The alliance has already conducted tests in four locations around the country, and more are expected to follow. DeStefano views EMCEE's involvement with the alliance as beneficial to the company, because it can modify its products according to the requirements set forth by the group.

Though it may be entering the digital domain, the company said it will not ignore its niche products. DeStefano calls UHF/VHF transmission "a nice, steady market," one in which demand is not expected to diminish domestically. He says that, unless EMCEE participates in HDTV developments, he doesn't expect much growth in the UHF/VHF markets. However, he said he isn't making any predictions. ■

BUYERS BRIEF

The MSK 31/M is a new member of the Scala Electronic Corp. test equipment family. The product offers selective measurement and analysis of satellite, TV and FM radio signals in the 47 to 2,050 MHz frequency range. It is designed for professional applications in the installation, operation, monitoring and maintenance of broadcast, CATV and satellite systems.

Features of the MSK 31/M include digital display of levels and frequencies, adjustable RF and IF attenuators, narrowband and broadband panoramic spectrum measurements, automatic channel/frequency search with adjustable level threshold, 100 memory positions for signal measurement values and measurement and demodulation of TV and satellite FM subcarrier frequencies.

The MSK 31/M can be used with the MMK-10 high-resolution video monitor as a complete measurement and monitoring package, or with the MNK-20 broadband noise generator as a frequency vs. amplitude measurement system for the alignment of RF filters, traps, amplifiers and converters.

For more information, circle Reader Service 118.

USER REPORT

T.E.M. Microwave Equipment On Air in Fujian Province

By Huang Xue-hua
Deputy General Engineer of
Fujian Broadcast & TV Bureau

FUJIAN PROVINCE, China

Fujian Province is located in the south east of China and around 80 per cent of the province is covered by mountainous terrain. In 1993, the Fujian TV & Broadcast Bureau planned to build a microwave transmission network to

connect cable systems of 69 counties and cities throughout the province. The Fujian Cable TV station transmits five programmes - Films, Entertainment, Physical Exercise, Service and Education - from Fuzhou, the capital of the province.

In order to meet the target within a short time and reasonable budget, the Bureau planned to build around 20 relay sites and more than 40 unstaffed back-to-back sites. On the basis of the performance and good after sales service experienced with the short distance microwave system at Fuzhou supplied by T.E.M. in 1989, the T.E.M. President Mr. Sozzi was invited to Fuzhou in May 1993 to discuss feasibility proposals and equipment.

T.E.M. was able to design and supply products according to what would be required in practice and the contract was signed in June 1993. Delivery began in the last quarter that year and the project was partially started in January 1994. During the construction period the Bureau increased the capacity to between six and seven programmes to

satisfy an increase in demand, and T.E.M. was able to adapt to these changes.

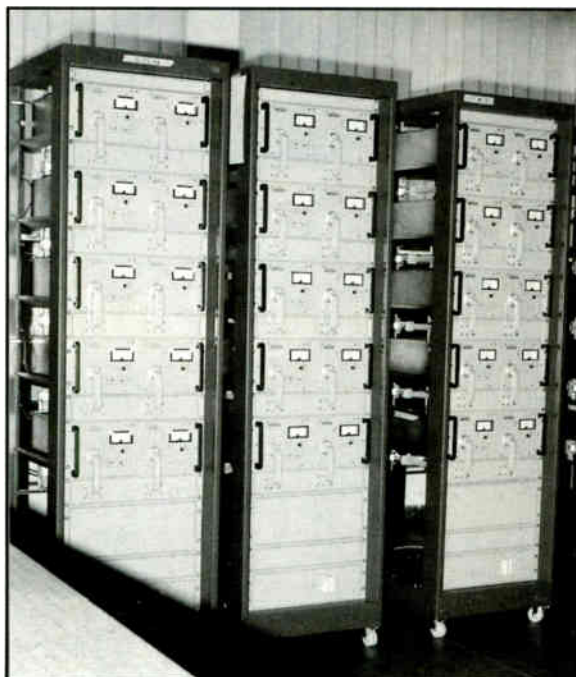
The microwave transmission network now comprises 170 sites and connects cable TV stations throughout the province. After reviewing its performance over the past two years, the Bureau has concluded that the T.E.M. microwave equipment is very robust.

The I.F. specifications appear good, and the broadband amplifiers and other high frequency components provide good linear performance. The whole set installation is convenient, and there are few opening errors.

As far as the future is concerned, the Fujian Broadcast & TV Bureau are currently discussing the issue of digitalisation of the analogue network with T.E.M. Fortunately the T.E.M. design is such that our current network will only require slight modification in order to transmit digital TV signals to the DVB standard. The Bureau will therefore be able to transmit between four and eight compressed digital TV signals on one channel, and so increase its capacity further still. ■

Mr. Huang Xue-hua is Deputy General Engineer of Fujian Broadcast & TV Bureau. He is also the Director of General Engineer's Office and Senior Engineer.

Contact T.E.M. at +39-2-89200131.



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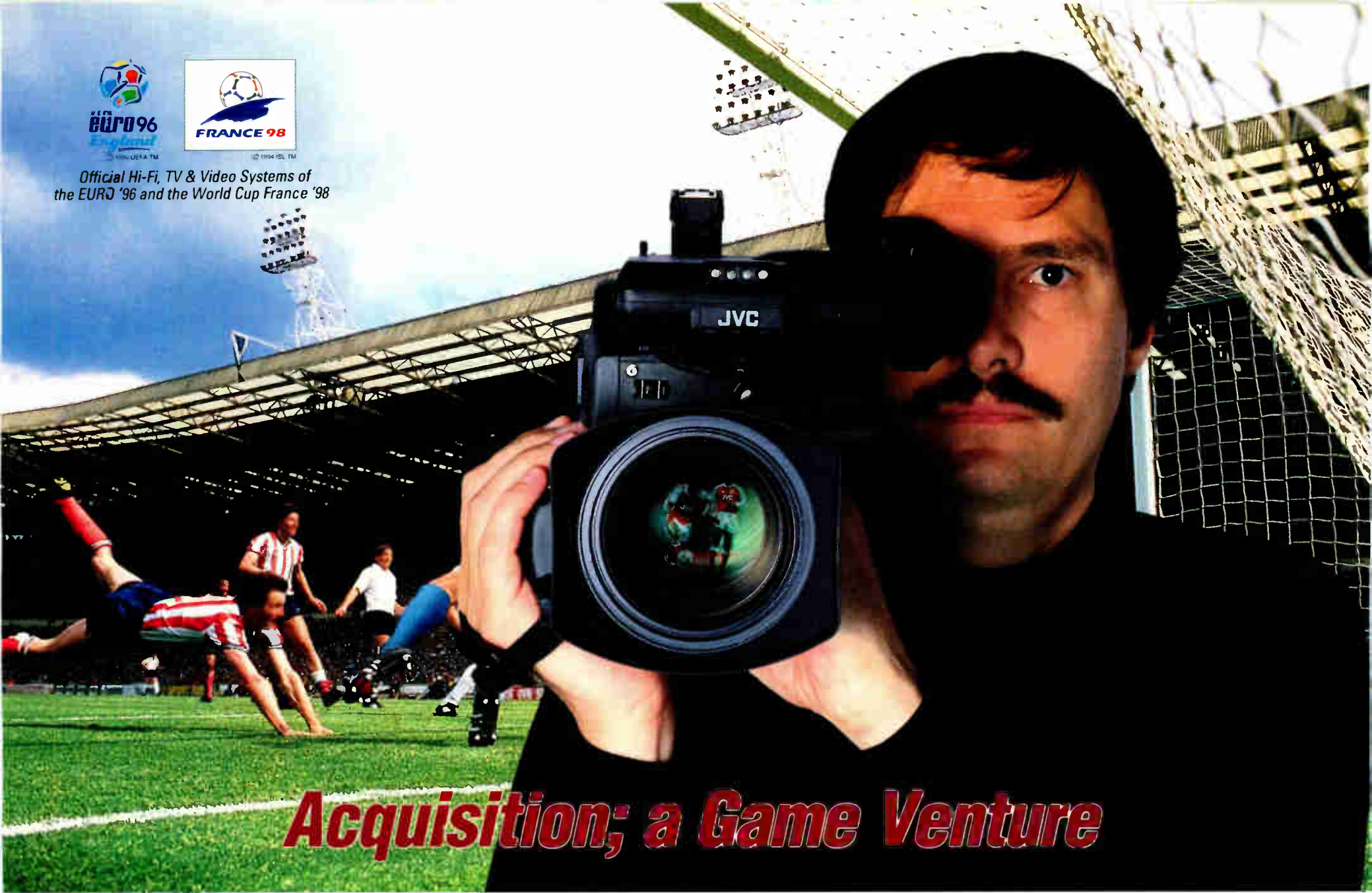
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USER REPORT

Green Rabbit, Chyron Go Wild

by Jenelle Bonifield
President and Designer
Green Rabbit Design Studio

PHOENIX, Arizona

Green Rabbit Design Studio Inc. primarily uses Liberty, SoftImage and Elastic Reality running on SGIs for the majority

of our work. We are three years old and started our business with an Aurora Cornet. When Aurora moved to the SGI platform with Liberty, we followed.

Green Rabbit was recently approached by Raskin-Dalton Television to design a package for a pilot they were producing.

Our assignment was to produce a fast

paced, MTV-style, in-your-face opening whose graphics would grab a teenager's attention. We were provided with video and stills of sports activities, and were told to "go wild." The designers at Green Rabbit — Thomas Bonifield, Vicki Riske and I — especially like this type of direction.

At Green Rabbit we use PowerMacs to design logos and create typography, which is then exported to our SGIs. After we select the typeface for the project, we used that as a design element throughout.

Tom and I have been on Auroras — now called Chyron — for over 10 years. We have watched the software evolve from residing on a turn key platform to the SGI platform. The last version, Version 5.0, removed Aurora from the menu and is now called Chyron Liberty 32.

Projects that we used to only do in an edit bay are now possible to do on our systems. Now that we have added a 4 GB drive on our Indigo 2, we can take in all the video we need through the Abekas and Ethernet to the SGI. We find that we are now taking in hundreds of extra frames for design flexibility.

The tools sub menu is great. My favorite part is that you can save effects settings, which are called diagrams. I used this extensively in "Sports Rap" to alter colours in the adjust and colour correct options. I used these two together to alter colours and then punch up the saturation. I saved the effect and through the macro function, I could treat the captured video.

Another way of doing this is directly in the animation by using the mask actor and all its ranges of options. I generally create the look in paint, then match that in animation by using the mask actors. The diagram files created in paint can be recalled into the mask actor, which has proved to be a rather powerful tool.

After a project is finished, I'll look at it a few months later and wonder, "How did I do that?" Liberty becomes truly intuitive when you get into that design/animation frenzy.

Liberty is a great software package that is always — or almost always — getting better with each update. We aren't as happy with the new menu design, which forces you to toggle between workpages and the palette; and the animation package, which has a few old bugs back in it.

The menu design added handy mask

workpages in addition to the canvas workpages. But the menu requires us to toggle back and forth to see the opacity and to access the palette. This can really disrupt the fluid, intuitive, fast workspace that the rest of Liberty is geared toward.

We also had a problem with the Liberty in-place function. If you have an object fly in and land in-place, it will most likely shift in that last position.

Despite those blips, Liberty is designed to allow the user to create within an almost limitless environment of tools. I find myself in a fluid, rhythmic pace when I'm working — almost relaxing, until I have to do that toggle jig with the palette/workpages. But I can remember when there was only one workpage (there are now six), when it took five minutes to boot up in the morning and when the screen recall was a coffee break, so I guess it's really not so bad.

For "Sports Rap" we built keyframes for approval using brick wall textures, hot, saturated colours, and sports images along with typography. The client loved the stills, so now it was time to animate. The pace was fast, so we primarily used cuts for the transitions.

Almost every frame had some typography on it. The theme of the pilot was "choices," but they didn't want to customize each show. We begged for more words, but "sports" and "rap" were all we had. Green Rabbit did everything we could think of — we stretched, compressed, bounced, dissolved, flew.

The words became tints, luminance objects — they danced with squiggles and transparencies. They popped, they faded. Meanwhile, highly saturated sports images moved behind them: some live action, some stills that we moved in animation.

The final screen was actually our video storyboard keyframes in a grid with the logo animating onto it. Then we built a wipe to the video. We built an e-mail page and created all the name banners matching the open style. A segment animation, Reality Bites, was designed with a built-in wipe to video.

The end product was exactly what our client wanted. By using Liberty software, we truly had "Freedom to Create." ■

Editors note: Jenelle Bass Bonifield is the president and lead designer at Green Rabbit Design Studio Inc. in Phoenix.

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Battle of the Editing Giants

by Terence Dyke and
Paul Smolen

AUSTIN, Texas

Data Translation, with the debut of its Media 100 xs, appears intent on becoming the Pepsi to Avid's Coke. The new system, announced at NAB, delivers real-time effects and broadcast-quality resolution at 2:1 compression for under \$30,000.

The Media 100 xs is positioned head-to-head against Avid's Media Composer series, long the benchmark of comparison for non-linear editing systems, and priced considerably higher than the Media 100. Just in case anyone missed the challenge, Data Translation has been running its "Composer Connection" special, which enables existing Avid Media Composer owners to buy a Media 100 for nearly \$10,000 off list price.

The heart of the Media 100 xs system is the Vincent digital

video engine, which uses JPEG compression at rates as low as 2:1 (300 KB/frame) and supports 4:2:2 digital component YUV signal processing. Other features of the system include real-time transition effects and titling, real-time chroma- and luma-keying, eight channels of CD-quality audio, and support of several standard edit decision list formats.

The Media 100 xs is due to ship in the fourth quarter of 1996. For those who are interested in the Vincent video engine, but have more modest needs and budget, they might consider the Media 100 qx, which has just started shipping. This \$5,000 system uses the same single-board technology, but comes with Adobe Premiere 4.2, the popular QuickTime video editing software.

Data Translation has strived to make the Media 100 xs an open architecture, with all of its media files in QuickTime-compatible format. This is consistent with the

company's effort to position the Media 100 not only as an on-line non-linear video editor, but also as a multimedia authoring platform.

ALLIANCE

In fact, Data Translation recently announced a strategic partnership with Macromedia, publisher of the Director multimedia authoring system. The alliance involves cooperative marketing efforts and support of complementary technologies. Under the plan, Macromedia will promote Data Translation's Broadway video capture and compression system as a compatible alternative for MPEG-1 users.

Broadway is Data Translation's new \$995 system that consists of a half-size PCI board and editing software for Windows 95 or Windows NT. It can capture analogue video, digitize it, compress it to an editable MPEG-1 AVI format, and write it to disk in real time. The company emphasizes Broadway's performance and platform independence to appeal to creators of Web pages, business presentations and CD-ROMs.

ON THE GO

Meanwhile, Avid is not standing idly by. In March it announced MCXpress for the Macintosh and Windows NT platforms. These PCI-based non-linear on-line video editing systems are designed for those who want to produce high-quality video for distribution on tape, CD-ROM or the World Wide Web. Retail prices start at \$15,000 for a turnkey system.

MCXpress for Macintosh features Avid's AVR75 image quality and support for CCIR-601 resolution (720 x 486). Also included are a QuickTime codec, real-time audio EQ, four audio tracks, EDL support, batch digitizing, four video tracks, and Avid's media management features.

Running on a Power Macintosh 9500 or 8500 with the Avid Broadcast Video Board, the Mac MCXpress will be available for \$14,995 for the board and software; a turnkey system will retail for \$29,995.

MCXpress for Windows NT includes support for CCIR-601 media. MPEG output capability, a fully integrated title tool and a plug-in effects architecture. Easy integration with other Windows-based tools is possible through importing and exporting 20-plus standard file formats, as well as an AVI codec for exchanging full-screen, 24-bit colour images.

The software will be available at an introductory price of \$4,995, and users will need an NT system with Targa 2000 PCI or 1000 PCI video boards. Complete systems start at \$15,000, which rounds out

an attractive range of price/performance options.

COLLABORATION

Avid did not stop there. At NAB, Avid Technology and mFactory announced that they would collaborate on creating and

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marketing the Avid Interactive Media Studio, an integrated, start-to-finish multiplatform production environment for developing and distributing interactive multimedia content. Avid brings its expertise in digital non-linear video editing and graphics creation, while mFactory brings its object-oriented authoring software package, mTropolis.

The result is expected to be a suite of tools that will meet the editing, authoring, and distribution requirements of professional interactive content developers.

At the core of mTropolis is mFactory's object-oriented technology called mFusion, which is designed to improve the collaboration between artists and programmers. Artists can create sophisticated interactive titles just by arranging intelligent software objects.

Programmers can extend mFusion's core, written in standard C++, with their own ideas and improvements, enhancing or replacing any aspect of the authoring system that they want. These changes then appear to artists as additional objects, transparently integrated into the base program.

mTropolis v1.0 is available now, and includes an editor for the Macintosh and Power Macintosh platforms as well as players for Macintosh, Power Macintosh, Windows 3.x and Windows 95. There are no royalty fees, and it lists at \$4,995 for single-seat units. Price and availability for the Avid Interactive Media Studio were not announced.

In addition to offering the Avid Interactive Media Studio, Avid and mFactory plan to work together to address common issues concerning media management and media interchange between applications. Using the Open Media Framework Interchange (OMFI) as a means of exchanging media files between editing and authoring applications, Avid and mFactory will provide developers a standardized method of exchanging digital media files and compositions

between their respective products.

OMFI is a standard format for the cross-platform interchange of digital media data and has been selected by the Interactive Multimedia Association (IMA) as its recommended standard for data exchange. OMFI is the result of collaborative efforts by Avid Technology and manufacturers and partners in the post production and computer industries. The format includes rules for identifying the original sources of the digital media data and can encapsulate both compressed and uncompressed digital media data.

The standard is actually embodied in the OMFI Toolkit, a software library for reading and writing digital media data in OMFI format. Developers use this software to add OMFI compatibility to their applications, or even to make OMFI the native file format of their application. The new version of the Toolkit, OMF 2.0, should be available by the time you read this.

Not to be outdone in the standardization and data-interchange arena, Macromedia recently introduced the new Version 5 of Director. This is the first of its products to implement a new policy of standardization across all of the company's products, a common user interface and an open architecture known as the Macromedia Open Architecture.

Developers will now be able to use the same plug-ins, or "Xtras," in more than one application. Xtras work like Adobe Photoshop plug-ins, offering functional extensions as menu options. The extensibility goes beyond Director 4's Xobjects, and does not require the Lingo scripting that XObjects do.

With the demand for good video content being constantly widened by multimedia channels such as CD-ROM and the Web, it's good to see the mainstream desktop-video manufacturers hustling to deliver flexible creation tools for multiple modes of delivery.

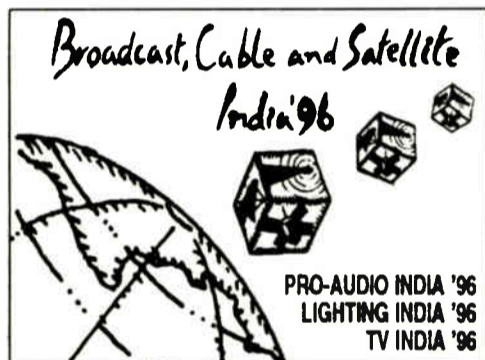
All the head-to-head competition is nothing but good news for the users, since it means that more markets and opportunities will be opening up all the time. ■

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Terence Dyke and Paul Smolen are the principals of Media Methods, a communications design and production firm in Austin, Texas. They may be reached at +1-512-476-0422 or by e-mail at: media-methods@tpoint.com

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SPECIAL REPORT

Shaking a Stick at the Video Machine

by Andrew von Gamm

MUNICH, Germany

All the morphs, warps, 3-D effects and rendering tools you can shake a stick at are coming to the Video Machine from Munich-based multimedia company Fast.

The Video Machine has now sold over 15,000 since it was launched some two years ago. If you thought the original VM Digital Player Recorder (DPR) was impressive, two new developments will really impress you - the new Version 3.0 and the Video Machine Plus.

VM STUDIO 3.0

The third edition of this successful Video Machine software comes as a free update for those 15,000 customers world wide. The main improvements are the increased stability and speed that comes with Windows 95 (or so I am told - I didn't see any marked instability in version 1.0), combined with several new tools that make working with the VM that much faster.

The 'Fit to Fill' tool allows the user to pull a piece of a project out and slot a new piece in without having to worry about overall length and an instant razor blade allows any scene already on the timeline to be cut at will and parts to be moved to other slots in the project.

Another major improvement is the ability to copy whole projects to the timeline and copy-and-paste more than one scene, so you don't have to turn a small sequence into a project before moving and copying. Fast forward now can be made to run at up to 1000 x and further developments are planned for the EDL export functions.

A video overlay is also coming to Version 3.0 for those occasions where the user either does not have a video monitor, or if moving your eyes from one screen to another for eight hours makes you tired. There are also some new audio tools. The final version of VM DPR 3.0 will be available this summer as a free update.

VM STUDIO PLUS

The VM Studio Plus software is an optional extra available for under £1,000 for all those out there who want the effects coming on to the market as plug-ins for Premier and ULead. The heart of the Plus is a render engine that does not compress the image. Effects can be rendered compressed or uncompressed.

The biggest plus of the Plus is the ability to perform all those effects for which you would otherwise need the Alladin. These come in the form of a whole range of plug-ins that are available for a few pounds, while the Plus can also 'read' Adobe Premier and ULead Media Studio plug-ins.

Because they are software only, these effects can be as complicated as your heart desires - all the filters and textures and genuine 3-D effects you ever imagined. The disadvantage is the fact that, because all these fantastic effects are software driven only, they take time, lots of time.

Working with plug-in effects and filters is very simple. A plug-in is, as the name implies, a software plug-in to a main program that appears as a new set of commands or functions. In still photography the most famous is Kai's Power Tools (as reviewed elsewhere in this magazine) that give page curls and fracturals to any PC

paint program.

Where the more complicated effects can take a minute or two to perform for still pictures, video needs that kind of time for every frame. The VM Plus allows the user to perform all the time consuming, number-crunching effects when the computer is not being used. All the effects can be left for rendering overnight - they appear on the effect time-line with a red border which turns to green once they are completed.

There is a still-frame preview that helps give the user an idea of the end result, but

only experience can tell you what the end effect will look like and how it will take. Very complicated 3-D effects that run for several seconds can take a couple of hours, such as the moving picture that folds itself into a dart and flies off in a curve over the horizon for example. The clue here is, as always, a very fast Pentium and lots of RAM.

One small command called 'Optimize' gets around a problem that used to plague many non-linear editing systems - the inability to play several very short clips in preview. The problem occurs when the

length of a clip is shorter than the access time of the hard disk.

Even the very fastest disks fall into a temporary coma for several seconds if they are asked to access a new scene less than one second after they have just accessed a previous shot. The head just cannot move and locate files that fast.

When the operator asks the Video Machine to Optimize, all those scenes that are too short to be played straight off are rendered together with their neighbours, so that they become long enough to play in preview. The

(continued on page 44)

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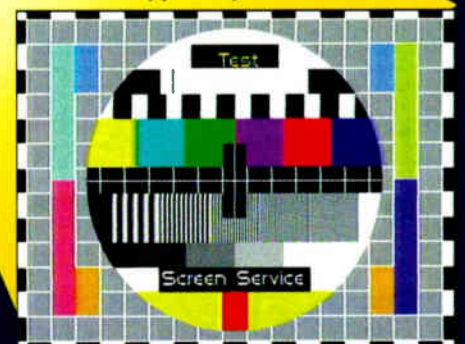


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COMPUTER VIDEO

CONTINUED FROM PAGE 30

WVVI Turns to Harris

small cable to a balance load on the filter burned up twice. Passive Power reacted promptly, sending an engineer to the site to observe the problem and re-tune the filter. Measurements indicated that one-half of the filter had changed tuning from final test. However, even after a full tuneup the arcing still occurred.

Passive designed a new filter that is now on the air at full power with no problems. It will probably still be necessary to air-cool this new filter for best stability.

As of this date, the Sigma is on the air and we are within spitting distance of completion. We have had to replace one IOT that would not idle properly and kept throwing collector overloads, and we are still waiting for the cooling for the new intermod filter.

The transmitter meets all advertised specs. I am especially happy with the ruler-flat frequency response and excellent intermod product numbers (almost 60 dB down!). The test results prove that a class-AB driver can meet the specs of a

class-A driver with a lot less bulk but more complex circuitry. One linearity corrector has already been replaced during final testing but I think things are settling down.

The bottom line is that I am pleased with the Sigma but slightly disappointed at the same time. This is a good system that still needs fine-tuning to produce an excellent design. The individual components are well-engineered, but less thought was given to the system as a whole. We were the pioneers and I am

sure Harris learned things from us that will be passed on in future transmitters.

Given the chance I would do it all over again with Harris, but the project has shown me that no manufacturer has a lock in this business. Next time will be a whole new ball game. ■

Editor's note: Jim Somich is president of Broadcast Engineering Services and MicroCon Systems, a manufacturer of broadcast equipment. He has been a broadcast engineer since 1960 and has been putting TV stations on-the-air and keeping them running for more than 20 years.

The opinions expressed above are the author's alone. For further information contact Gaylen Evans at Harris Broadcast (Phone: +1-217-221-7196; FAX: +1-217-224-1439) or circle Reader Service 71.

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CONTINUED FROM PAGE 43

Sneak Preview of Fast's Studio Plus

Plus also has an automatic file dump function to get rid of all those rendered files made for the optimization function.

Flying Fonts, one of the best video font programs on the market, is also a part of the Plus package and Media Mania is to become an optional extra. Media Mania comes originally from Russia where it was developed by the military (no I don't know why either!). The full version provides a resolution of some 2,000 x 2,000 for use with film, and incorporates a whole range of morph, warp, colour correction and other tools.

CONCLUSIONS

As the 'new and improved' Video Machine, the render engine on the Plus is a big step forward as it allows an enormous amount of effects. If you are used to the Alladin, you will not like the teeth-grinding waiting time.

But if all you need is the occasional page curl and peel-off, asking your PC to do this overnight or during the coffee breaks is totally acceptable. And if enough customers come staggering in through the front door looking for special effects in a hurry, there is always Alladin.

The fact that 15,000 Video Machines have been sold speaks volumes for the open architecture philosophy of the Windows platform. The concept of an editing suite that can be developed from a simple off-line desk to a large non-linear system that interfaces several software and hardware packages is just beginning to feel its muscle.

The fact that not just independent producers but broadcasters are buying the Video Machine and systems like it, suggests that Windows-based editors may become the main type of postproduction platform in a couple of years. ■

Contact Sarah Wright at Fast Electronics, tel +44 (0)181 968 0411.

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TV Technology's Equipment Exchange provides a FREE listing service for all broadcast and pro-video end users. Brokers, dealers, manufacturers and other organizations who sell used equipment on an occasional basis can participate in the Equipment Exchange on a PAID basis. All free listings run at the discretion of the publisher. Call 1-703-998-7600 for details. Submit your free listings on your letterhead and state the make, model number, a brief description, sale price and complete contact information and mail it to: TV Technology, PO Box 1214, Falls Church VA 22041

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Panasonic 200 CLE. Canon lens, case, tripod plate, mic, power supply, \$3000. Tom, 419-621-0602.

JVC GYX2U camcorder, TC board, soft case, no batts or power supply, orig box, manual, exc cond, very low hrs, looks new, \$5100. Monty, 619-674-0833.

Panasonic WV-555BN, Nighthawk 3-tube Newvicon camera, AC power & batt, \$500. Alan, 423-272-4827.

JVC X2 SVHS camcorder, 13x Canon lens, Porta-Brace case, tripod quick release plate, exc cond, low hrs; Sony V5000 Hi 8 camcorder, shoulder style, A/C adapter/charger. Mark, 541-889-8343.

Sony BVP-30 w/CA-30 back, viewfinder, shotgun mic, Canon J13x9B4 IRS IIb Green Stripe lens, very low hrs, \$1800; Panasonic WV-RC30 camera RCU, no cables, \$100 or B/O. Scott, 608-274-7373 or E-mail scottg@cve.com

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Sony M3-A camera, hard case, ITE tripod w/wheels, exc cond, \$1200; Panasonic AG450 SVHS camcorder, charger, batts & hard case, \$500. Russ, 303-458-0241.

Hitachi SKF3, 3 CCD camera, \$7000. Phil, 212-988-6929.

JVC X2, Anton Bauer power, Porta-Brace shoulder case, mic holder, tripod plate, low hrs, orig box, \$6200. Hank, 818-968-1237.

Panasonic 200 CLE, Canon 12x zoom, case, power supply, \$2800. Mark, 206-783-0462.

Sony M7, Canon 15x9.5, flight case, very clean, \$4500; Panasonic WV-250, Fujinon 12x7.5 w/100 ft cable, CCU, case, motorcycle controls, camera adapter, \$4300; Vinten EFP friction head, O'Connor 100 EFP fluid head, 2 stage Vinten EFP tripod, \$2000; Panasonic AU500 MII port w/Porta-Brace case, \$1700. Chip or Howard, 800-371-5777.

Sony VX3 Hi 8, 3 CCD, under 40 hrs, w/3 batts, AC power supply, charger, 12x2 zoom, all cables, orig box, exc cond, \$2500. Ed, 414-692-2882.

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Sony DXC-325 w/Fujinon 16x lens & EVV9000 dockable, Hi 8 rec, \$5500; studio config composed of 4" b&w viewfinder, lens zoom & focus control to be mounted on tripod handles, \$1000; power supply, \$100; Kangaroo camera bag, \$100; Sachtler 14 II fluid head tripod w/dolly, \$1100, excl cond, complete pkg for \$7000. Michel, 619-767-3331 or 619-436-2308.

Sony CCDVX3 3-chip Hi 8 camcorder, perfect cond, orig box, Sony extended warranty to 2/98, \$2600. Michel, 619-767-3331 or 619-436-2308.

Panasonic WV-6000 (2) studio cameras, CCU, cables, zoom lens & controls, studio viewfinders, manuals, \$900/both. Roger, 320-589-6150.

Panasonic WV-250 camera, AG7450 VTR w/docking kit, hard case, 1 batt, batt charger, Anton Bauer brick batt mount, very good cond, \$5000 or B/O. Darrel, 913-625-3546 or E-mail 102726.2363@compuserve.com

Sony DXC3000 U-Matic camera, gd cond, U.S. \$3000. Manu Dadlani, 3, Vasu Smriti, 1st Floor, 13th Road, Khar (West) Bombay, 400 052 INDIA

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Sony RM440 edit controller, good cond, U.S. \$1500. Manu Dadlani, 3, Vasu Smriti, 1st Floor, 13th Road, Khar (West) Bombay 400 052 INDIA.

Sony 3 1/4" edit system, VO5800, 5850, RM440 controller, exc cond, \$4000. Mike, 714-847-6131.

Sony BVE-800 w/3 serial interfaces, \$1100; Sony BVE-500, \$350; Sony RM-440, \$400; Quantel DPB-7000 Classic PaintBox system, \$3000; 5850 interfaces for Convergence, \$150 ea; JVC interfaces for Convergence, \$150 ea; Convergence TC-100 TC, \$100 ea; Ampex ACE-25 w/audio & video switcher, \$4200; 4 Tektronix 1420 vectorscopes, \$850 ea; 2 Tektronix 528 waveform monitors, \$450 ea; Chyron VP-2 w/script font, \$1000. Eric, 203-357-8488.

Sony BVU-950 editing deck, basic unit, used as standby source deck, good cond, \$8000. Alan, 423-272-4827.

Channematic 202, (2) full random insertion automation controllers w/cables, manual, Wyse 60 terminal, \$4300. Jim, 207-947-3300.

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Microphones	Switchers (Video)	

Classified Advertising Rates Effective January 1, 1996

	1x	3x	6x	12x
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SWITCHERS...WTS

ACE T-8C, 8 input component switcher w/chroma keyer, auxiliary router, manuals & boards, exc cond, \$10,000. Rick, 916-929-9181.

GVG 100 switcher, \$4200. Greg, 818-558-1900.

GVG 110, borderline, exc cond, \$6000. Tom, 419-621-0602.

JVC KM-2000 A/B, downstream key, super impose, chroma key, \$2200. John, 800-227-1336.

Panasonic WV5500A video switcher, good cond, \$950. Roger, 320-589-6150.

TRANSMITTERS

Want to Sell

Transmitters—Harris, RCA, Acrodyne, 1 Kilo to 55 Kilo. VHF, UHF, antennas, towers, transmission line, microwave. English, Espanol, Portugues, Frances. Miami, 305-757-9207.

VIDEO PRODUCTION EQUIPMENT

Want to Sell

Luna multiple-copy audio/video dupe unit, \$65; Hi 8 or 8mm video cassette rewriter, in box, \$30; producing special F/X VHS instructional "how-to" program, \$15; radio station style audio cassette rack, 100 tape capacity, sturdy ABS for studio, \$25 ea or \$45 for both; Amiga Deluxe Paint software for animation & graphics, unopened box, \$25. Sid, 312-772-8072 8 AM - Noon CST.

3M D5000 CG, 8 stored fonts w/100 pages of storage, needs power supply work, \$500. Lewis, 818-994-5398.

Sony BVE900 editor/controller w/2 Tek 904, will handle 4 machines, \$4500. John, 207-785-2626.

Videonics TM1 titlemaker, digital video CG, 24 effects, 90 fonts, exc cond, \$325. Jim, 716-264-0335.

Laird CG-7000 color CG, mint cond, \$700. Mike, 714-847-6131.

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Sony VO5850 Hi band rcdr, gd cond, U.S. \$2500. Manu Dadlani, 3, Vasu Smriti, 1st flr, 13th Road, Khar (West) Bombay 400 052, INDIA.

Sony VO8800 w/BKU-706 TC, Porta-Brace, batts/charger, AC adapter, 300 hrs, exc cond, complete package, \$1500. Rus, 303-458-0241.

VTRs/VCRs/RECORDING EQUIPMENT

Want to Sell

Sony EVO9850 Hi 8 editing VTR w/TC card, low use, good cond, \$3750; Sony VO5800 3/4" U-matic VTR, \$1100. Greg, 818-558-1900.

Sony BVU900 3/4" SP player, Dolby & TC, edit feed deck, low hrs, perfect cond, orig box, \$4975; VO4800 3/4" portable, \$350. Eric, 415-456-7630.

Sony BVU920 dynamic tracking w/TC, DNR & TBC, \$7000; Sony BVU110 port 3/4" rec w/TC & carry case, \$400 or B/O; Sony spare buttons & belts for VO4800, BVU110 & BVW25; 6 Sony BVU800 editing machines, no TC cards, B/O; 6 Sony BVT800 TBC's w/cable, must sell, \$1650 ea; Ampex VPR80 w/serial control, TC, rack kit & TBC2B, \$9000 or B/O. Lewis, 818-994-5398.

Panasonic AG5700 SVHS R/P edit deck, less than 10 hrs, exc cond, \$1100; Sony VO6800 3/4" port, low hrs, Porta-Brace case, \$1050. Hank, 818-968-1237.

Panasonic AU-63 MII player w/slo-mo, exc cond, manuals & box, \$5400; Panasonic AU-62H MII player w/enhanced TBC, exc cond, \$5200; Panasonic U-410S dockable MII VTR, exc cond, \$4000. Tom, 605-399-9391.

Sony VO5800 3/4", gd cond, transport cntrl problem, \$599. Greg, 904-994-7131. Sony VP5000 3/4" player w/composite & Y/C outputs, \$850; 2 Sony 6800 3/4" field recorders, 1 w/Porta-Brace case, \$750 ea; 2 Sony TU-1110 TV tuner units w/1 cable, \$100/both; Sony RM-500 VCR RCU, \$125; Panasonic VM-KM2 line adapter, \$25; Sony LDP-1500 laserdisc player, \$500; 2 Sony IF-500 multiple interface boxes (33, 9 & 36 pins), \$900/both. Skip, 916-272-6789.

Sony VO5800 3/4" rec, heads replaced 1992, good cond, \$1200. Tim, 602-279-1551.

Sony VO4800 3/4" port field rec, connects to Sony camera w/cable, low hrs, exc cond, Porta-Brace case, \$400; (2) JVC CP5550 3/4" editing player, low hrs, exc cond, \$300 ea. John, 800-227-1336.

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Sony EVV9000 Hi 8 rec, under 100 hrs, like new, \$1500; Sony VA90 VTR adapter for EVV9000 rec, exc cond, \$400; Sony VO5850 3/4" rec, exc cond, \$1850. Kenneth, 203-322-3000.

Panasonic AU-700 editor VTR, \$485; Panasonic 9240 3/4" R/P, \$475; JVC CR4900 3/4" field deck, \$650; JVC MII KR-M800U VTR, modified w/SVHS inputs & outputs, \$2900. Bennu Productions, 914-964-1828.

Panasonic AU65 MII edit R/P w/TC, looks new, exc cond, \$4900. Monty, 619-674-0833.

Sony VO5600, good cond, \$650. David, 804-721-2467.

Sony MVR5500 still video recorder, RM-E5500, \$950. Phil, 212-988-6929.

Panasonic NV8170 VHS player, play speed audio/video slow fast, x2 frame ad, tape mem, auto replay, ex cond, \$200. Jim, 716-264-0335.

Sony VP5020 3/4" player, \$450; Sony VO9600 3/4" SP R/P, \$2100. Mike, 714-847-6131.

Sony VO8800, VO5800, 5850, VP9000, VP7000, VP5000, BVU870, 850 3/4" U-matic, sell or trade for 1/2" SVHS or TBC's; VPR2B 1"; Videotek RS12, RS10 w/remote; Tektronix 1480R; Abekas 52A, sell or trade. JB Salazar, 210-278-3523.

Sony VO2850 3/4" U-matic studio VCR, top loading machine, used for making dubs, incl hard shipping case similar to Thermadyne, \$200 + shipping. Mark, 541-889-8343.

Panasonic AG-1950 (2) VHS editors w/insert & assemble edit modes, \$600 ea. Scott, 608-274-7373 or E-mail scottg@cve.com

Sony & JVC 3/4" top loading machines, some working, \$50-\$250 ea or B/O; Sony & JVC remote controls, \$35 ea or B/O; Sony VO5800, needs minor work, \$1300 or B/O; Sony VO5850 with TC, needs heads, \$1700 or B/O; Sony RF converters for top loading machines, B/O. Lewis, 818-994-5398.

Sony VO2610 3/4" U-matic VCR, recently serviced, good cond, \$450. John, 619-661-4759.

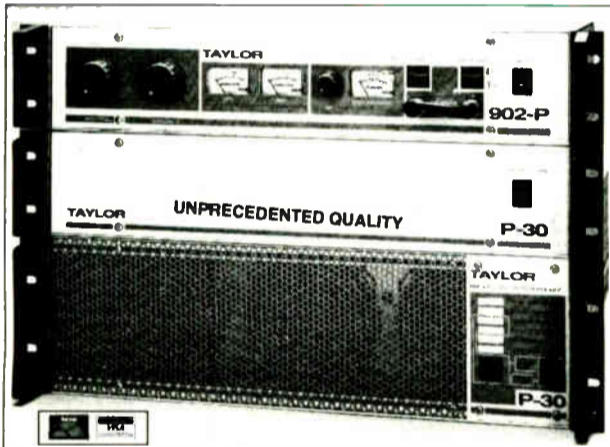
Sony VO5850/5800/RM440 editing suite, SP compatible, 3/4" system, A-1 cond, \$4200; Sony VO5600 3/4" rec, \$900; (5) VP5000 3/4" players, exc cond, \$675. Michel, 514-669-7814.

Sony BVH-3000 with BKH 3010, for \$12,500.00, has 2,760 total hours. SD Video Engineering, 818-509-8791.

Ampex VPR-2Bs/TBC-2Bs in console with overhead monitoring bridge for \$2500.00, no monitors. Equipment has 4,000 to 7,000 hours. SD Video Engineering, 818-509-8791.

Ampex VPR-3 w/7.3 software version and TBC-3 for \$9,500.00, has 11,000 hrs. SD Video Engineering, 818-509-8791.

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4K Watt	\$20,741

TAYLOR
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Taylor Bros. (Oldham) Limited, Lee St, Oldham England. Tel: 0161 652 3221. Fax 0161 626 1736

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C. Prod/post-prod studio N. Government TV facility

D. Cable TV P. Educational TV facility

E. Network/group owner Q. Recording studio

J. Broadcast consultant K. Other (specify): _____

mfg, dist, or dealer

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A. Corporate mgt D. Prod/oper mgt or staff

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July 1996 Issue Use Until November 1996

Use this section to receive free information about products or services advertised in this issue. First fill out the contact information to the left. Then find the Reader Service number printed at the bottom of each advertisement you are interested in, and circle that same number below.

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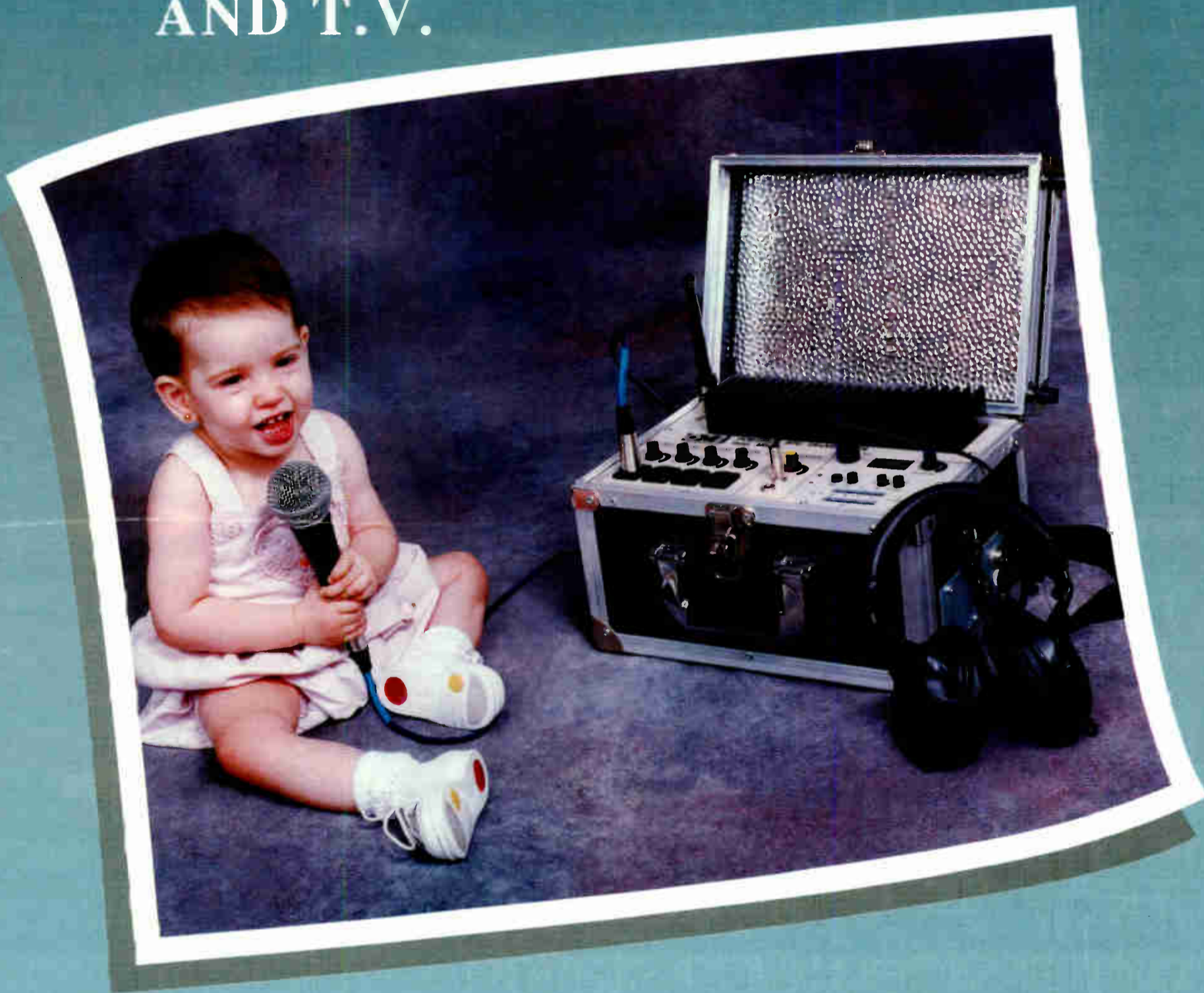
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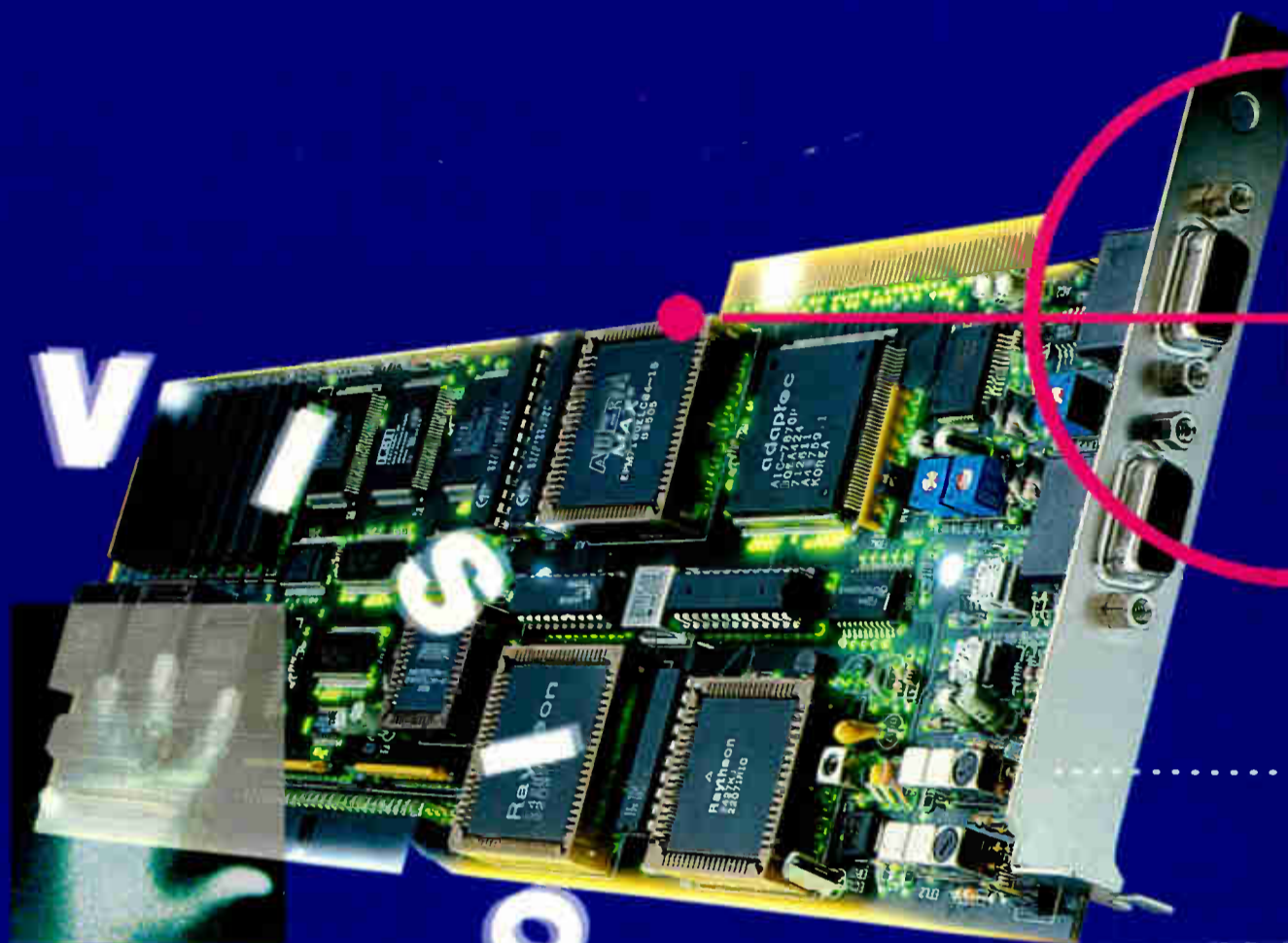
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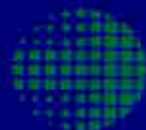
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