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expected to achieve a worldwide total of 170 by 1997, including several multipurpose ventures. Barcelona's Imax theater is the first to permit screen changeover from 70mm to IMAX to OMNIMAX, and from 2-D to 3-D. Kineopolis multiplexes are experimenting with Imax theaters alongside conventional 35mm.

Other new developments in large format: Eastman Kodak changed KeyKode on 65mm film to 120 perfs so that code will appear every eight Imax frames; Avid, in turn, has created the necessary software to utilize it. Newcomer Gulliver Lab in Paris now processes 65mm and prints 70mm, while Sweden's Film Technik can now blow up 35mm VistaVision to 70mm, and process 70mm positive.

For its high-speed NetFX local-area network, Prisa Networks introduced new Fibre Channel interface boards and software enabling 1 Gbyte/sec to be moved between Silicon Graphics Inc. servers and peripherals. Built around this achievement, Silicon Graphics unveiled an open platform system for unprecedented real-time previewing of digital film effects at 24 frames/sec and full film resolution. In addition to Prisa's NetFX, the new digital film preview station combines

an SGI Onyx workstation with InfiniteReality graphics, several Ciprico Model 7000 Fibre Channel RAID Disk Arrays, and a Viewgraphics Dataview adapter for storing the results on D-1 or D-5 VTRs.

Wide-area networking also continues to make inroads in post-production. Sprint and Global One, the joint venture among Sprint, Deutsche Telekom, and France Telecom, conducted the first international demonstration of Sprint's Drums wide-area network. Using a high-speed T-1 link between the U.S. and SGI's Silicon Studio/London facility, story boards and roughcuts were viewed and discussed in real time from both sides of the Atlantic.

IBM also joined the emerging wide-area networking marketplace. Its new IBM Video Services network offers MPEG-2 video transmission over the pre-existing terrestrial IBM Global Network, already one of the world's largest providers of integrated data, voice, and video services.

The smallest computer innovation was no doubt Production Magic Inc.'s "Shot Logger," a wireless time code shot logging device based on Apple Computer's pen-based MessagePad

120 and Newton operating system. The system includes a beeper-sized transmitter for automatically sending time code start/stops from a camera or audio recorder to a credit-card-sized receiver in the MessagePad's PC Card slot. Scene names, numbers, and notes are added by hand in Shot Logger's database, and the resulting log is uploaded with Production Magic's LoggerLink software to any popular nonlinear system, Macintosh, or Windows 3.1 database.

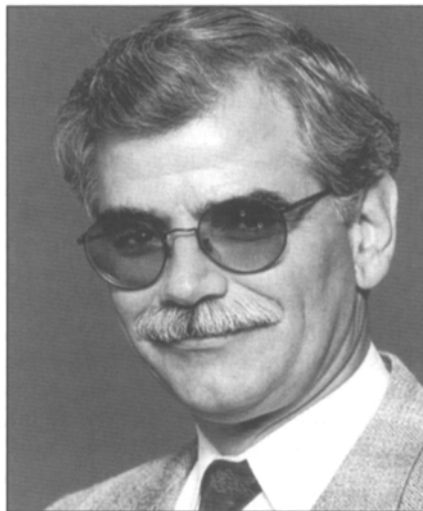
In January filmmakers around the world managed to attend the Sundance Film Festival by checking out <http://www.virtualfilm.com>, the Virtual Film Festival's live webcast site from Park City, Utah. Later that year, on Monday, July 3, 24 hours before aliens attacked Earth on the opening day of *Independence Day*, more than 2 million filmgoers logged onto <http://www.id4.com> to preview plans for global evacuation, just in case. We survived. Hope you enjoyed checking out my nonvirtual site here at ly@progressreport.com.

Linda Young
1996 Editorial Director
Motion Pictures

Television

1996 was a year for television technologies to mature into systems. The year was interesting for television technology and television products, not just for what was accomplished, but for what was not. Time Warner completed its merger with Turner Broadcasting. NBC covered the summer Olympic Games by creating a virtual broadcast studio by tying its Atlanta facilities to its New York broadcast center via fiber-optic lines. MPEG-2 chip sets became available in quantity, allowing for improved picture quality at lower bit rates.

Significant milestones for advanced television were achieved in 1996. However, as of this writing, the FCC has failed to adopt an advanced television (ATV) transmission standard, a delay caused by political as well as technical reasons. Another nonevent



Robert B. Kisor

of 1996 was the agreement of a final digital videodisk (DVD) standard.

This delay was primarily due to concerns over copy protection and rights issues. Hopefully both will happen in 1997.

Even without an approved standard, experimental HDTV broadcast licenses were granted to three stations, NBC, CBS, and PBS affiliates. CBS was the first to actually transmit an HD signal on July 23, when it began sending test signals on Channel 32 in Raleigh, N.C. KLAS-TV (Las Vegas, Nev.) demonstrated HDTV broadcasting at NAB, using a solid-state silicon carbide transmitter utilizing a 500-W transistor developed at Westinghouse. Use of these high-power transistors permits the development of smaller, more energy-efficient transmitters, hopefully reducing the cost of transition to ATV broadcasting.

NHK and Matsushita Electric Co.

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have developed an HD processor to be used in conjunction with a D-5 VTR to record 10-bit 4:2:2 HDTV signals based on SMPTE 240M and SMPTE 247M with 5.4:1 intra-field, fixed-length DCT compression. The HDTV signals are processed through a 1.5 Gbit/sec serial digital interface based on SMPTE 292M. All VTR functions are identical to the D-5, and tape recording time is two hours.

NHK has developed a portable HDTV camera that outputs HDTV and NTSC signals simultaneously. The camera uses 2/3-in. CCDs with 2 million pixels. This camera was displayed at NAB and used for coverage of the Olympic Games in Atlanta. During the games, NHK and German broadcaster ZDF produced programs in 1125 and 1250 HDTV formats, respectively, and exchanged these programs through digital standard converters.

While we have been arguing the ATV issue in the U.S., the European community has finalized technical specifications for digital video broadcasting (DVB). These technical specifications have since been approved by the European Technical Standards Institute (ETSI). DVB is a consortium of over 200 companies and organizations from over 25 countries, representing all sectors of the television production and delivery chain. Equipment is being manufactured and facilities are being constructed to implement this MPEG-2-based transmission.

ZDF (Mainz, Germany) started transmitting MPEG-2-coded and fully DVB-compliant programming, compressed into a 6-Mbit section of a transponder, on January 1, 1996. This service is scheduled to migrate to ASTRA 1G in 1997, and the capacity for program delivery will increase to 35 Mbits/sec.

Digital Betacam continued as the dominant digital studio production format. The thought that D-Beta would ease the format proliferation vanished as three new compressed digital formats emerged. Digital-S from JVC, DVCPRO from Panasonic, and Betacam SX from Sony were rolled out; all three formats are MPEG-2 compliant. Digital-S is a 4:2:2-based signal that is compressed to about 50 Mbits/sec. Betacam SX is

also 4:2:2 but is compressed to a bit rate of about 22 Mbits/sec. DVCPRO first came out as a 4:1:1 format compressed to 22 Mbits, but by the end of summer a 4:2:2 version at about 48 Mbits/sec was announced. All of these formats target news gathering and station production and offer complete editing solutions with a hybrid tape/hard disk recorder. Sony's solution is part of a total station/newsroom system that includes acquisition, editing, production, and broadcast.

Video servers are no longer individual entities, but part of fully integrated editing and distribution systems. Implementation of this technology has proliferated as storage costs drop and complete systems become available from Philips (previously known as BTS), Tektronix, Quantel, Silicon Graphics, ASC, Avid, and Hewlett-Packard.

At NAB it seemed every manufacturer was using a Tektronix Profile to demonstrate its digital equipment or editing solution. Early in the year the Grass Valley division of Tektronix decided to end development of the Sabre edit system. A follow-up to the cancellation of Sabre was the Lightworks VIP system, demonstrated at NAB and announced as product at IBC. VIP is a version of the established editor with Profile storage, switcher effects, and integrated digital effects. The system can control up to eight RS-422 machines, of which four can be VTRs. Also developed by Tektronix was an Exabyte tape library that allows for storage of 50 hours of material at 48 Mbits/sec compression. Data transfers out of the library occur at 24 Mbits/sec.

Avid restructured itself, and among the consequences were the elimination of the Spectrum product and the development of an NT platform for its Media Composer. The company refined its total solution, allowing for a complete tapeless operation from news studio to broadcast. Integration of a complete newsroom automation system and a working ATM network solution has provided the link between desktop, on-line edit bay, and broadcast. Avid has also installed several total solutions at stations.

Silicon Graphics has developed a new generation server to replace its Challenge. The new unit has an archi-

tecture that significantly increases internal bandwidth, allowing for greater I/O capacity. Philips has completed several large Media Pool installations for play-to-air applications. ASC has developed increased server capacity as well as an integrated editing solution. Hewlett-Packard has implemented MPEG-2 compression in its servers to increase picture quality. Quantel has developed a compression option to its Clipbox product that allows for either uncompressed, 5:1, or 10:1 compression options.

MPEG-2 compression became a reality as chip sets from Sony and IBM were finally available in quantity. For the Republican National Convention in San Diego, CBS used Tiernan Communications encoders and Comstream modulators to transmit six MPEG-2 8.4-Mbit channels within one 54-Mbit Ku-band transponder. The system was operated at 53 W for all feeds, and reliable operation was obtained at power levels below 40 W. The Australian Broadcasting Corp. completed a project to provide its own earth station facilities. The project, completed in February, replaced all antennas, uplinks, downlinks, monitoring, and control facilities. The facilities provide three MPEG-2-coded programs into one-half of a Ku-band transponder.

Philips brought a new generation of telecine to the market. Named the Spirit, it is actually referred to as a *datacine*. In addition to being able to output traditional 601 video, it can also output higher resolution files. At IBC a Spirit was connected to a Silicon Graphics server, demonstrating real-time, 2-K resolution playback.

Networking hardware development started to catch up to the promises of earlier years. Networking topology options started to shake out with ATM and Fibre Channel taking over as the protocols of choice. ATM hardware from several vendors matured to the point where this topology is no longer smoke and mirrors, requiring a development team for every installation. Drivers for specific devices are still coming but the core technology appears to be the solution for wide and metropolitan area networks. The remaining roadblock to production,

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post-production, and broadcast facilities is the inability of the telcos and cable companies to tariff this service so it is affordable in today's market. While ATM is proving to be a viable wide-area solution, vendors including Avid, Tektronix, Hewlett-Packard, and Silicon Graphics have agreed to work with the Fiber Channel Association to develop a protocol that will allow data

networking at 1 Gbit/sec and higher.

One method of video transfer that has proven successful and cost-effective is the Internet. While the Internet is limited to sending only a few high-resolution frames at a time, its potential is enormous. Can we expect low-resolution video streams to be pushed around the Net for editorial approvals in the near future?

1996 was a transition year; 1997 should be a year of moving forward with new technologies. Continued digital migration, development of tapeless news and station systems, and hopefully an advanced television standard will be the milestones to look for in 1997.

Robert B. Kisor
1996 Editorial Director
Television

Education

Congratulations to all the SMPTE Sections. Our membership has increased from 8,234 in January to nearly 9,300 by the end of the year. This was not a miracle; it is the result of many members and their friends' dedication, enthusiasm, unreserved efforts, and generosity making it happen.

Section Chairs' Meeting and Training

This year, we held three meetings for Section Chairs: in Seattle in February, in Las Vegas in April, and in Los Angeles in October. All attendees benefited tremendously by the direction provided by the Executive Committee and enjoyed exchanging experiences with them. Section Chair training was held in Los Angeles on October 12, an event that explained in detail the role of the Section officer, including program budgets and meeting arrangements. SMPTE President Stanley Baron, Executive Vice-President David George, Conference Vice-President Ed Hobson, and Financial Vice-President Neil Feldman all addressed the participants.

30th Advanced Motion Imaging Conference

The 30th Motion Imaging Conference marked a strong attendance of more than 450 people at the Sheraton Seattle Hotel & Towers, February 1 to 3, 1996. The theme was "The Convergence Continues: Computer Technology and Television." The Pacific Northwest Section and the Local Arrangements Committee, led by Mike Scott and Cliff Anderson, are to be commended for providing an enjoyable



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and informative conference for all who attended. Program Chair Brian Lay was very pleased to see the large turnout from computer, film, and television industries.

Preconference Course and Workshop

Charles Poynton, Poynton Vector Corp., offered "A Technical Introduction to Digital Video," a full-day seminar that focused on the emerging area of multimedia. Poynton provided the more than 300 computer and television professionals in attendance with information to help them see how their respective fields were related. Each participant was given a copy of Poynton's book, *A Technical Introduction to Digital Video*.

Technical Sessions

Program Chair Brian Lay and his committee arranged more than 25 technical papers into four sessions —

Storage; Generation and Authoring; Delivery and Distribution; and Presentation and Display — that took place Friday and Saturday, February 2 and 3.

Among the papers presented were: "Practical Implementation of Advanced Television: Update 1996," by William Y. Zou, PBS, James A. Kutzner, Twin Cities Public Television, and A. Bruce Jacobs, Prairie Public Television; "New DSP-Based Studio Platform," by John Nietzsche and Larry Baxter, Mercury Computer Systems; "Distributed Facility Control Via Ancillary Data," by William C. Miller and Alfred Molinari, Capital Cities/ABC, Inc.; "Aspects of Testing in the Convergence of Television and Communications," by David K. Fibush, Tektronix, Inc.; "Delivery of Distance Learning Center Content Across High-Speed and Low-Speed LANS in a Campus Environment," by David H. Dirks and Doug Coffland, Lawrence Livermore National Lab (University of California); "Motion Picture Delivery Using the Internet," by Bob Davis, Iterated Systems; "Picture-Quality Assessment in Video Compression," by G. M. Drury, NTL; and "Investigation of DMD-Based Display for Integrated Computer and Television Application," by Vishal Markandey, Greg Hewlett, and Greg Pettitt, Texas Instruments.

The 138th SMPTE Technical Conference and World Media Expo

The conference technical program was entitled "Film and Video Synergies: Creation to Delivery" and