

1996 PROGRESS REPORT — AN ENGINEERING PERSPECTIVE

The Society is about to embark on a significant new activity, that of registrar for the program identifiers called for in the ATSC television standards. SMPTE President Stan Baron described these in his message in the August 1996 *Journal*. A committee headed by our Engineering Director for Television, S. Merrill Weiss, has been busy setting up the administrative structure under which this registration authority will operate. This is an extremely ambitious undertaking,

as the ATSC standard that defines the program identifiers provides for more than one trillion unique identifiers, which are expected to last for more than 150 years.

As I write this, I am completing six months in this office. I am deeply grateful to the Board of Governors of the Society for their confidence in me, and to my predecessor, Mark Richer, for assembling an exceptional engineering team. I am also indebted to the Headquarters Engineering staff, led by

Director of Engineering Carl Girod and Staff Engineer Mark Hyman, for their support. We have an ambitious agenda for 1997 as we try to make convergence of collision, and with their efforts, and those of the hundreds of volunteers who give unstintingly of their time, I am confident that we can accomplish what we have set out to do.

William C. Miller
SMPTE Engineering Vice-President

Motion Pictures

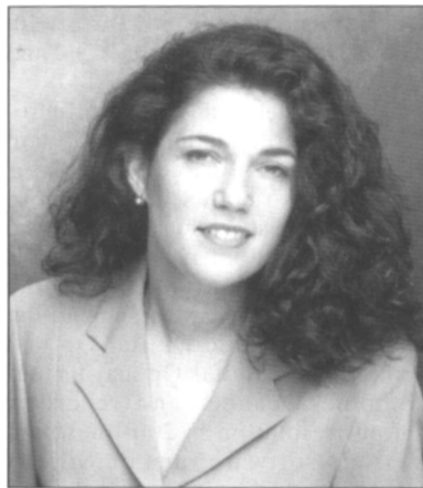
With an estimated 70% of all film color negative going directly to telecine, 1996 was the year that recognized the importance of video dailies and the cinematographer's need to better communicate with his or her video post-production and computer graphics counterparts.

New York's venerable Guffanti Film Labs, opened by Paul Guffanti, Sr., in 1929, closed its doors in September 1996. But other labs were acquired by video post-production facilities. Commonwealth Film Labs in Richmond, Va., was bought by Henninger Video of Arlington in January 1995, and Detroit's Filmcraft Lab was bought by Grace & Wild, Inc., a Michigan video post-production house, in October 1995.

Video Post and Transfer in Dallas, Tex., opened its own film lab in May 1996, offering 16mm and 35mm color negative processing. In June, Miami's Continental Film Laboratories opened a new branch in Orlando, Fla., for 16mm and 35mm color negative processing and video dailies to service the growing local needs of studio and independent production.

With negative cleanliness a prime concern, Lipsner-Smith introduced the Excel 1100 and the compact Excel 900 nonimmersion motion picture film cleaning machines, both featuring dry particle transfer rollers and rotary buffers wetted with isopropanol instead of the now-banned film cleaning solvent trichloroethane.

Several companies proposed systems to enable the telecine colorist to



Linda Young

convey color and density information to the cinematographer. The Gamma and Density Co. introduced the Thorough Control System (TCS), featuring a unique cinematographer's chip chart that, upon transfer, produces a seven-step gray scale to match against defined IRE levels on a waveform monitor. The result is a transfer gamma of 1. Other color and tonal scales on the chart provide additional analysis of film latitude and contrast. TCS requires the use of its own Tele-Cine Chart set-up film loops, available for every negative, intermediate, and positive stock.

Because of TCS's controlled gamma of 1, a ratio of 1:2 is established between standard Bell & Howell printer points and IRE units. By matching the filmed cinematographer's chart at the head of every take

to the Tele-Cine control loop, overall negative density in "printer points" of under- or over-exposure can be estimated and listed like a lab timing report.

Eastman Kodak, Rank Cintel, and Aaton introduced evaluation systems based on Kodak's enhanced 18% Gray Card Plus for the cinematographer. Kodak's system comprises the Kodak Cinematographer's Tool Kit and the Kodak Telecine Tool Kit. The Cinematographer's Tool Kit includes a Gray Card Plus, Telecine Exposure Calibration (TEC) films, Cinematographer's EV Software, and a Cinematographer's EV Scale. The Telecine Tool Kit includes both the TEC films and an improved Telecine Analysis Film (TAF).

Having calibrated the telecine with TEC and a waveform monitor, the colorist reads the red, green, and blue levels of the Gray Card Plus at the head of each scene and matches them against a Kodak look-up table. The results are red, green, and blue "transfer points," defined by Kodak as equivalents of lab printer points. The Cinematographer's EV Software and EV Scale, a slide-rule version of the EV Software, provide an on-location method of spot-metering and measuring available film latitude, given the characteristics of the telecine involved.

Rank Cintel's TKG system is a hardware solution based on Kodak's TEC and TAF set-up films. For the gray area at the head of each take, TKG automatically samples output

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signal levels from the Rank and creates a scene list of exposure in red, green, and blue transfer points and overall stops.

Aaton's GreyFinder system for Rank Cintel and Philips BTS telecines also relies on TEC/TAF setup, but goes a step further. GreyFinder samples a frame with an 18% gray card as a digital signal passing through the keyer of Aaton's Keylink KeyCode reader system. Resulting RGB readings are stored in Aaton's AatonBase transfer database and, if desired, inserted as a window or in VirtualSlates, Aaton's optional full data page keyed over the first frame of each take. AatonBase also accepts TKG data from Rank telecines so equipped. Aaton's Webslate system converts GreyFinder sampled images to JPEG thumbnails, attaches to them relevant timecodes, transfer points, and comments using HTML, then uploads the resulting web pages to a WWW site to be viewed anywhere in the world by the cinematographer.

Video dailies are the sole purpose of Filmlab's new Orion Integrated Negative-to-Video transfer system. A dedicated, low-cost solution, the Orion features a linear CCD array, 12-bit digital video processing, and a KeyCode reader built into its gate. Color correction can be done using a system that simulates lab timing lights, resulting in a list of timing lights useful for cinematographer feedback and lab printing.

Philips BTS erased key distinctions between scanners and telecines with its Spirit DataCine Film Scanner, an offshoot of the BTS/Kodak FLH 1000 HDTV telecine. It creates 2K x 2K frame-by-frame data files in DPX or TIFF formats at near-film-resolution for direct output to CGI workstations, or down-conversion to NTSC, PAL, 16:9 ATV, or 1125- or 1250-line HDTV. To format 2K files to video, the Spirit DataCine uses a proprietary spatial data interpolator that also provides X-Y zoom and image rotation capabilities.

The Spirit DataCine's square-pixel progressive scanning is facilitated by a tri-linear RGB array for color sensing and a four-element CCD array for detail, both developed by Eastman Kodak. 2K file transfers are 6 to 10 frames/sec, and lower resolution scans

for 1K output and video achieve 23 frames/sec, almost real-time. 2K file transfer speeds are currently limited by the 100 Mbit/sec HIPPI output interface.

Kodak introduced the Cineon Genesis Plus Digital Film Scanner, an advanced next-generation scanner that offers faster scanning times and handles 35mm, and for the first time, 16mm and Super-16mm. The Cineon Genesis Plus utilizes Kodak DXR image-capture technology to generate 2K or 4K image files and supports both 10-bit log and 8-bit linear file output with RGB color correction. Data processing and storage are managed by a Silicon Graphics Indigo 2. In partnership with Management Graphics, Inc., Kodak debuted a software driver for the Solitaire film recorder tailored to Cineon's 2K and 4K output resolutions.

Phalo Systems of Vancouver introduced its Verité Digital Film System using a patented tri-color gas laser technology to both scan and record 35mm and VistaVision formats. The Verité Digital Film System is available in three configurations: the Digital Film Scanner, the Digital Film Recorder, and the Digital Optical Printer. The Digital Optical Printer combines scanner and recorder. Output resolution is 200 lines/mm. Verité's software runs on Silicon Graphics Indigo 3, Onyx, and Challenge workstations.

Tiffen, in collaboration with Eastman Kodak, introduced its first software product, Crystal Image color "digital filters" for Kodak's Cineon workstation. Basically a series of Cineon plug-ins, Crystal Image filters simulate the look of several popular Tiffen glass filter series, including warming, cooling, diffusion, and contrast reduction and share the names of their optical counterparts — extending the language of the cinematographer to the world of digital post-production.

Tiffen also introduced several new types of old-fashioned glass filters, including a finely graded Decamired filter series for advanced precision color control; a novel series of Color Grads for sunrise and twilight horizon effects and a matching set of Color Complement filters for related close-up work; a Monochrome Day-for-Night and Cool Day-for-Night series;

and a line of Net Frames for do-it-yourself net and stocking mounting. Further, Tiffen debuted a series of "viewing filter wheels" for predicting Lo Con, Fog, and Pro-Mist filter effects by eye.

Arriflex and Century Precision Optics introduced bellows lens systems, bringing swings, shifts, tilts, rises, and falls associated with view cameras to modern 16mm and 35mm motion picture cameras. ARRI's system features six specially developed lenses ranging from 20mm/T2.8 to 150mm/T2.8 with more on the way, while Century Precision Optics' method, a commercial adaptation of Clairmont Camera's groundbreaking Swing/Shift system, features ten lenses, from 18mm/f2.8 to 150mm/f3.8.

To the growing field of Super-16 zooms, Angenieux added the 8 to 80mm, T2.4, while Optex brought forth the latest Canon conversion for Super-16, the 10.5 to 210 mm, T2.4. Century Precision added a low-distortion Double Asphere Wide Angle Adapter for its internal focusing 6mm, T1.9 Super-16 prime, converting it to a remarkable 4.5 mm.

Kodak introduced the first two color negatives of its new Vision series, 320 T 5277/7277, with an exposure index of 320 Tungsten, and 500 T 5279/7279, with an EI of 320 Tungsten. 320 T replaces recently introduced EXR 200 T film 5287/7287, and 500 T replaces 7298 in 16mm and 5296 in 35mm. Kodak's Vision series films yield simultaneous improvements in speed, grain, and sharpness, with noticeably less grain in shadow areas. Vision films are said to be so uniformly manufactured a cinematographer no longer has to stock up on a particular batch to insure consistency. Kodak also debuted an improved low-contrast print stock for telecine transfer, Kodak Color Teleprint Film 5381/7381.

Fuji introduced a new fast color negative, F-500, with an EI of 500 Tungsten, finer grain, and a new integral matting agent for better optical printing and laser scanning. Advances in Fuji's Sigma Crystal Technology allow grain size reduction with no loss of high-speed sensitivity. F-500 is available in 16mm as Type 8671, 35mm as 8571.

Imax theaters are expanding and

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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.

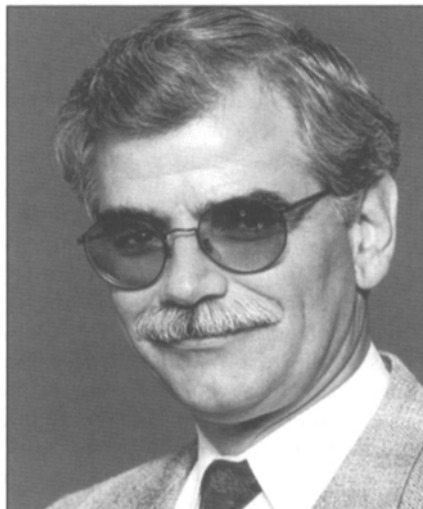
In January filmmakers around the world managed to attend the Sundance Film Festival by checking out <http://www.virtualfilm.com>, the Virtual Film Festival's live webcast site from Park City, Utah. Later that year, on Monday, July 3, 24 hours before aliens attacked Earth on the opening day of *Independence 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.