



The opening session of the program.

Highlights

SMPTE 132nd Technical Conference Program

The 132nd SMPTE Technical Conference, "Film and Television — One World?" held in New York City's Jacob K. Javits Convention Center, October 13 to 17, 1990, offered attendees a spectrum of technical knowledge and information relating to the broadcast and motion-picture industries.

"All of the papers presented at the conference were very informative," said Program Chairman Kerns Powers, Consultant. "In fact, during each session there was a presentation outlining new, groundbreaking technology."

Saturday, October 13

"Fujicolor Negative Film F-Series Update" was presented by Kozo Noguchi during the Film Production Presentation Technology session. He said that Fuji has been in close contact with its customers since the film was introduced in 1988, and revealed how the company is planning to make the film more useful as a result of customer input.

Eastman Kodak Co. was a large contributor to this session. The characteristics of a new family of color negative films were discussed by Alan J. Masson in a paper entitled "Eastman EXR Color Negative Films 5248 and 7296: Trade Experience." He described the sensitometric criteria for underexposure latitude and blue-screen work and discussed how the EXR 5248, which is a medium-speed 35mm tungsten-balanced film, and

the EXR 7296, a high-speed 16mm tungsten-balanced color negative film, were trade tested by 44 cinematographers. The group's opinions, as well as examples of scenes shot during the trial, were presented.

The EXR films were also discussed by D. L. Strine in a paper entitled "Eastman EXR Color Negative Films: Selection and Use." He noted that the EXR films offer an exposure index (EI) range of 50 to 500, ranging from the excellent image structure position of the EI-50 daylight balanced 5245 stock to the incredible light-sensitive position of the EI-500 tungsten-balanced 5296 stock. He said that along with the recently announced EXR 5248, these products provide a pallet of imaging possibilities in the theatrical, special effects, television, commercial, and high-definition video markets.

In "Improved Strength Eastman 35mm Motion Picture BH Perforations," Peter E. Pylipow said the problems of BH perforation have been addressed by the company in the form of 0.005-in. corner radii replacing the sharper corners of the standard BH perforation. He added that laboratory and trade testing have met with favorable reports and Eastman Kodak has begun producing its color negative and color intermediate films with the new round-cornered perforation. He recommended that the SMPTE Film Technology Committee establish a working subcommittee to determine

how to most appropriately recognize this modification in the standards literature.

During the Digital Television Processing session, Luigi Gallo, Accom, Inc., presented "The Reference NTSC/PAL Encoder for Today's Digital Environment." He noted that while the first step in transferring film to component video is now well standardized, the second step of the transfer, encoding the digital component video to digital composite video, has proved to be troublesome because of its unpredictable results. He said that a digital encoder can now bridge these two video formats with minimum degradation, technically correct results, and repeatability that is independent of location or facility, thus standardizing the process. He outlined the various digital signal-processing techniques that are required to accomplish this task.

The conversion process was also discussed by Ajay Luthra, Tektronix, in a paper entitled "On the Sampling Rate Conversion of Digital Video Signals." He explored the techniques necessary to convert between digital signals with different sampling rates and presented a qualitative comparison of the analog and digital approaches to the sampling rate conversion. He discussed what types of distortions a rate converter introduces into digital video, how these distortions differ from the conventional distortions in the video, the number of

effective bits in the output, and cost comparisons between the analog and digital approaches.

Sunday, October 14

During the Digital TV Studio session, Michael M. Guess, Grass Valley Group, presented a paper entitled "Design Considerations for Digital Television Studios — The Transition Phase," which examined the shift to fully digital systems and how these changes will affect the industry. He discussed the positive aspects of changing to a completely digital facility, but warned that the advantages can be diminished if the system is not properly implemented. He addressed the basic differences between analog and digital processing; parallel versus serial digital video distribution; considerations for hybrid analog and digital environments; digital system timing requirements; and cable, connectors, and patch bays for serial digital.

On Sunday afternoon, during the TV Production — Recorders and Cameras session, Tadashi Nakayama, Japan Broadcasting Corp., detailed a single-format VTR that is equal to or better than CAV, in a paper entitled "New Format Composite Digital VTR Using 1/2-in. Tape." He said that this product should eliminate the problems that analog formats have in degrading video and audio quality in copying processes via advanced technologies that include channel coding, error correction coding, pair heads for digital audio, and improvement of off-track error rate at editing points.

In "A Novel High Performance, Low Cost Dropout Counter for Videotapes," Franz G. Pavuza, Technical University of Vienna, described the properties of a counter that differs significantly from commercially available instruments in both hardware and software. The range of applicability has been widened by extending the limits for the length and depth of detected dropouts. Dropouts of 10 different lengths and 12 depths can be detected and classified concurrently. In addition, they can be located on a defined area of the tape. He provided test results, emphasizing an interpretation of the counter output data.

F. J. van Roessel, BTS, proposed how to make the best use of the increased dynamic range of present-day CCD sensors in a paper entitled "Adaptive Highlight Compression in



Portion of the equipment exhibit.

Today's CCD Cameras." He discussed aspects of the adaptive variable knee such as the ideal knee characteristic, the present knee, and the adaptive "pivoting" knee of the LDK-90 family; the overall system transfer characteristic; colorimetric aspects of the knee; and requirements for video-processing circuitry due to the implementation of the knee.

Monday, October 15

During the Laboratory Technology session, "Keykode™ Number: A Status Report," presented by John C. Norris, Eastman Kodak Co., gave attendees an update on the status of Keykode numbers in terms of product availability; software availability; and initial trade use, applications, and acceptance. He reported that Eastman Kodak now manufactures all 16, 35, and 65mm motion-picture camera negative and intermediate films with the new edge print; three companies provide custom barcode readers to read and decode the Keykode numbers; and several companies offer software packages and peripheral equipment designed to use the Keykode numbers.

Equipment manufacturers, software developers, and post-production practitioners met in symposia to review the steps in the post-production process and to analyze the most likely applications for Keykode numbers. These meetings resulted in the formation of the SMPTE Working Group on Film Manufacturers' Edge Codes. Another outcome was the evolution of several cooperative industry efforts to implement Keykode numbers in trade practice.

He also discussed testing that was

conducted on potential applications for the Keykode numbers, ranging from feature films and commercials to TV shows and music videos. He said the tests verified that Keykode readers worked reliably and accurately; that attention must be paid to properly exposing the Keykode numbers onto workprints; that the software performed flawlessly; and that at Beta sites, Keykode numbers provided quicker and more accurate interpretation of the key numbers.

The Keykode system was also discussed by Alan W. Lambshead, Evertz Microsystems, in his presentation "Keykode Film Edge Numbers in Vertical Interval Time Code — A New Way to Automate the Electronic Post Production of Film Originated Material." He mentioned the Evertz 4015 Film Footage Encoder, a new device designed specifically to aid in the encoding of film footage and time code during the film-to-tape transfer process. The product encodes the film edge numbers into the user bits and generates continuous time code for editing purposes. The Keykode reader option permits automatic reading of the film edge numbers and placement into time code user bits.

After the material is transferred to videotape, electronic off-line or rough-cut editing is performed without concern about the film frame numbers. Once the edited master is complete, the video edit system is capable of generating the video edit decision list, which can be used if final on-line video editing is to be used for television release. He added that devices such as the Evertz Model 623 Edit Decision Lister can be used to automatically produce a full negative

cutters list of the program, if required.

Michael Chewey, Computer Systems Consultant, provided some insight for the end user in his paper, "Computerization in the Film Lab — What Do We Really Need?" He presented an overview of the uses of computers and computerized equipment within different areas of the laboratory and discussed the ways computers should and should not be implemented. He also mentioned several factors that should be considered before a purchase is made.

During the TV Post-Production sessions, David Hirst, Quantel, presented a paper entitled "One World — Many Languages." He noted that there is a need for a flexible interfacing medium to provide a means of interchanging images between the abundance of visual media that is now available. This interface needs to provide for both images and image-related information to be of most use, and needs to be totally independent of the individual image storage formats of specific devices.

The practical possibility of providing such as interface was discussed, with the suggestion that one such as he proposed can offer solutions to many of the problems currently being faced.

Interfacing problems were also discussed by Bob Pank, Quantel. In his paper, "A Unified Approach for a TV Graphics Animation Suite," Pank said that one major problem lies in the interfacing of video to the frame-by-frame working of the graphics system. This can be solved by the application of a video RAM store of several hundred frames to act as a buffer between video and graphics. This allows the targeting of the optimum combination of processing speed, image quality, facilities, and hardware to match the specific requirements of TV animation. The entire suite can consist of just a VTR, RAM store, and graphics system — a package small enough to be co-sited with the operator to form an independent workstation.

During the Film Sound Technology session, Merv Graham, Graham-Patten Systems, Inc., presented a paper entitled "Integrating Digital Audio Distribution into TV Production." He outlined the problems television facilities are faced with because of the introduction of digital audio sources into formerly all-analog plants. He proposed three possible levels of solutions to most of the problems raised by

using digital audio signals within a TV plant, which included converting the digital audio signal to an unbalanced, 1V/pixel, 75 Ω signal that can be passed through ordinary video DAs, jack fields, and cabling. He suggested the use of a set of matching converters, designed by his company, which are completely contained in the XLR connector body to make conversion to a standard BNC connector simple and affordable.

Also during that session, Dan Dugan, Dan Dugan Sound Design, read his paper entitled "Application of Automatic Mixing Techniques to Audio Consoles." He gave a review of available automatic mixer functions and then described a new product that provides automatic mixing functions in an accessory to be patched into sound mixing boards. This will expand the availability of automatic mixing techniques to high-end applications, such as broadcast news panels, games shows, and Broadway plays. The controller has eight separate audio channels intended to work with eight inputs of a mixing console. The unit offers the Dugan patent speech system, the Dugan music system, and a new number-of-open-microphones compensating function called "gain limiting."

Tuesday, October 16

The editing/post-production environment that has evolved over the decades was outlined by Seth Haberman and Chester Schuler, Montage Group Ltd., in a presentation entitled "Interactive Multimedia Editing — A Quest for Standards," during the Film/Electronic Interface sessions. They emphasized the importance of the standards for edit decision lists and film-cutting lists that have evolved to provide connectivity between the editing/post-production activity and differing distribution and presentation media requirements. They also noted that the emergence of interactive multimedia technology for personal computers is highlighting the need for new tools to deal with the burgeoning production activity.

The entertainment industry, they said, has proved the power of multimedia as a communication tool, but interactivity has only been foreshadowed in a trivial fashion by audience participation gimmicks. The proliferation of media for gathering material for multimedia compositions, as well as for delivery of its message, indicates that the editing process and all

that encompasses it will need to be totally media-independent. This will require a new approach to standards for connectivity.

The session also featured "Editing Film (Transfers) on a Videotape Editing System," a presentation by Jerry M. Lewis, Grass Valley Group, Inc. He outlined how the editing process can be more professional and productive by using Super Edit Film Mode, an editing system that does time code calculations automatically, using film size, speed, and reference output. Product features also include center dissolve; a program for tracing back ten generations of recorded material to the original source material; and 409, a powerful cleaning application that cleans overlaps, combines similar mode edits, maximizes audio/video events, joins inserts, ripples lists, and resorts lists in auto-assembly "C" model for the most efficient use of VTRs.

In a presentation entitled "Film-Video-Back to Film," Jean Pierre Beauviala, Aaton, described the different procedures used in Europe and the U.S. for video transfer of negative film and audio tapes in automatic sync. He discussed the Aaton Universal Correlator for in-camera time recording, on-line video code, off-line video code, audio tape time recording, playback time, and key code. He also provided an outline of the latest version of the Linker, which incorporates a Keycode™ reader and increases the universality of the process for automatic confirmation of the original negative.

Wednesday, October 17

During the Advanced Television Systems sessions, Kiyoshi Tsukada, Manichi Broadcasting System Inc.(MBS), presented a paper entitled "MBS New Broadcast Center: Introducing a New Concept for the Next Generation." He discussed the new MBS TV/Radio Center in Osaka, Japan. The Center was designed to present an open studio and Hi-Vision gallery for the regional community. At the Center, many advanced technologies and ideas are being introduced, each pursuing the prompt event reporting system.

"The Future of the Satellite TV in Europe: The Major Way Towards High-Definition TV," was presented by Philippe-Olivier Rousseau, Eutelsat. He discussed the structure of European television broadcasting, its diversity, and the introduction of new

standards. He noted that for economic and technical reasons it can be expected that the introduction of HDTV in Europe will happen through new satellite direct-to-home subscription-funded channels, which he predicted will appear first in the United Kingdom, France, Germany, and Spain.

In "Development of Practical Devices for Clearvision Broadcasting," Masayuki Ishida, Nippon Television Network Corp., described a procedure that has been adopted in which the picture element data for the preceding field and that of the vertical lines within the same field are used to compensate for the vertical frequency components, and in which they are switched over according to the movements of the image.

According to Ishida, when high-frequency images are compensated, if the SNR of a signal source is inadequate, it is apt to be emphasized. In telecine material, particularly 16mm positive film, the granular noise of the film becomes conspicuous, so a noise-reducing function has been developed to reduce the granular noise of the film. He gave a report on this equipment, which is used for actual broadcasting as a modulation expander, and provided additional information about Clearvision.

James Kutzner, Public Broadcasting Service, presented a paper entitled "Taking the Fear Out of HDTV: A Positive Approach for the Future." He urged the industry to focus on the development of critical devices and systems that will help achieve a practical, orderly, and affordable transition to HDTV. This, he said, will include the development of distribution-to-emission format converters (satellite to terrestrial); inexpensive HDTV videotape machines that provide network delay and syndication playback at location; high-quality NTSC-to-HDTV upconverters; high-quality HDTV-to-NTSC downconverters; and transmission systems including exciters, transmitters, transmission lines, and antennas that take advantage of the new modulation format and facilitate the utilization of existing broadcast towers.

He also proposed a multistep transition plan for networks and their affiliate/member stations so that stations can participate in HDTV programming services at different levels based on their own financial and technical resources. In addition,

he analyzed the transmission power requirements based upon the proposed ATV systems as well as the anticipated legal and licensing environments and offered a conjecture regarding a practical ATV transmission system

S. Merrill Weiss, NBC, discussed "The Technology of Widescreen 525: Behind the Economics," noting that the product makes use of existing 525-line equipment and technology in order to avoid the extremely high costs of current HDTV equipment. He said that in many applications it is sensible to make the very modest investment of modifying and upgrading existing equipment to the widescreen 525 level until the cost of the HDTV equipment drops to an affordable price. He presented two principal considerations in converting 525-line equipment to widescreen 525 operation and discussed the types of equipment that must be converted or upgraded.

During the High Definition Electronic Production session, Jose Luis Tejerina, Spanish National Network, reviewed the current situation of the the European Broadcasting Union (EBU) studies on HDTV production systems in a paper entitled "A Possible Optimum Approach to an HDTV Production Standard." He highlighted the EBU's attempts to prompt standardization, explained the concept of the target standard, and examined the approaches based in a dual-mode production standard. He said that one of the dual-mode approaches is considered to be a possible optimum because it might be acceptable to all of the contending interests.

The design process and the studio practices of an HDTV mobile teleproduction studio was described by Andre Bigras, Telesat Canada, in a paper entitled "HDTV Mobile Teleproduction Studio." The critical viewing angle, size of monitors, editing, conversion to other production standards, and the practical application of the SMPTE 240M were discussed in the context of an operating environment. He also noted how the interior layout of the facility is designed to accommodate both the one-camera shooting style of film producers to the multicamera style of broadcasters and the ergonomics of proper viewing distances.

"Work in Progress on the Development of the Digital Representation of the 1125/60 HDTV Studio Video Signal," presented by Hugo Gaggioli, Sony Advanced Systems, gave

an overview of the studies conducted by the SMPTE Ad Hoc Group on the Digital Representation of the HDTV Production Standard SMPTE 240M. He gave detailed descriptions of the results of studies on digital encoding parameters of the 1125/60 HDTV signal, the filter characteristics of the recommended antialiasing filters, transient regions, numerical accuracy of matrix coefficients for digital transformations of component signals, dynamic range considerations of the analog HDTV signal and its relationship to quantization levels, and mechanical and electrical characteristics of the bit-parallel digital interface.

The relationship between the reproduced color gamut and TV system parameters, such as transmission primaries, signal dynamic range, and signal processing, was discussed by Junji Kamada in a paper entitled "Reproducible Color Gamut of TV System." According to Kumada, it is possible to construct a TV system with a wider color gamut by choosing appropriate primaries and signal dynamic range. The relationship between the signal-to-noise ratio and the reproduced color picture and also the chromaticity coordinates of the primaries were discussed.

"Image Coding with Progressive Scanning as an Alternative to Interlaced Scanning," presented by Ibrahim Hajjahmad, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, explored methods for reducing bandwidth when using progressive scanning. His approach employed a class of image coding techniques that he referred to as transform coding. In this procedure, an image is transformed from the spatial domain to a different domain, the frequency or the transform domain that is more suitable for coding. When received, the coded coefficients are decoded and then inversely transformed to obtain the reconstructed image. He recommended the discrete cosine transform (DCT), which has many attractive properties, including that it can be implemented using fast computational algorithms such as the fast Fourier transform. He described a simulation in which an original image was divided into many blocks, and each block was transformed using DCT. He noted that the results obtained from various pictures using half of the original bandwidth were excellent.