TECH NEWS

by Rodger J. Ross

LATEST MOTION PICTURE AND TV DEVELOPMENTS: SMPTE

The 118th SMPTE Technical Conference and Equipment Exhibit in New York Oct. 18-22 attracted visitors from many countries. The latest developments and innovations were described in more than 75 papers, while new equipment and techniques were demonstrated in a large and comprehensive exhibition consisting of 167 exhibit booths. This conference was unusual for the extensive mix of motion picture and television equipment on display, offering visitors opportunities to obtain firsthand information from the many experts and specialists in the exhibit area.

The papers concentrated on production, post-production, distribution and exhibition rather than the traditional topics of past conferences. Concurrent sessions were necessary Monday and Tuesday to accommodate all the papers in these subjects, but as they were presented in adjacent conference rooms, it was easy for those attending the conference to go from one to the other as the program indicated. Selecting a presentation to attend was greatly helped by a booklet of synopses, available to each registrant, summarizing the contents of the papers. Across the hall from the conference rooms was a coffee club sponsored by Philip A. Hunt Chemical Corp., where friends and business associates could meet for discussions and exchanges of views.

Besides the papers and exhibits, several special events took place during the conference. At the Get-Together Luncheon at noon on Monday the annual awards presentations were made. Among these was the John Grierson International Gold Medal award presented to Gerald Graham, formerly director of planning and research at the National Film Board in Montreal. Maurice French of the Canadian Broadcasting Corp. in Toronto received a citation for outstanding service to the Society. Helmut Berger of Baton Broadcasting Inc., Toronto, and Leonard Green, National Film Board, Montreal, were elected Fellows.

On Wednesday evening the annual cocktail party, banquet and dance was held in the Imperial Ballroom of the Americana Hotel, sponsored by the Eastman Kodak Co. and the Hazeltine Corp.

A paper by J. A. Flaherty and R. L. Stow of the CBS Television Network, with the title "Technology Applied to Television Program Production and Broadcasting" put into sharp focus the rapid changes now taking place in the motion picture and television industries. At one time all television editing took place in the control room switcher, a technique dubbed production editing. In contrast, motion picture editing takes place after all the shooting has been completed, in a process known as post-production. The development of simple, portable, and much more versatile television equipment has made possible the more extensive use of post-production editing in making television programs on videotape. This trend will continue, according to Mr. Stow, who read the paper, until dramas now being produced on film, with up to 300 edits per hour, can be produced entirely on tape.

Another paper, "Beyond ENG" by D.K. MacDonald and Gerry McGinty of the Sony Corp., reviewed the changes that have taken place in the past year or two, as electronic news-gathering has gained momentum, and predicted an eventual move to videotape from 35 mm film for prime time television programming. Particularly interesting was the comment in this paper that the creative methodology used in tape production must be in large part the same as film. This calls for single camera video shooting, with the outputs of the cameras going to separate recorders.

The trend towards automation of the mechanical aspects of film editing was demonstrated in several papers dealing with the use of time codes recorded on the film and computer-controlled editing machines. Papers by D. R. Brewer, Burbank Studios, and R. E. Hill, Consolidated Film Industries, Hollywood, and Paul Kaufman and Irwin Young, Du Art Film Laboratories, New York, described a computerized editing system and a frame count cueing method for controlling printing machines. Shown in the equipment exhibit was a 16 mm Arriflex camera fitted with light-emitting diodes to lay down a time code on the edge of the film during original shooting.

John Lowry, Digital Video Systems, Willowdale, Ont., gave a paper Tuesday morning on "Digital Television Fundamentals: A Primer for the Filmmaker", that attracted a good deal of attention. Another paper by John Lowry was "A New Three-Dimensional Digital Special Effects System" by which effects such as pages turning can be produced electronically. In the session on distribution and exhibition R.F. Chinnick, Telesat Canada, Ottawa, talked about "Satellites and Television" and Michael Barlow of CBC, Montreal, described "A Universal Software for Automatic Switchers" in the automation of television station operations.

A series of three papers described the organizational, production and technical aspects of the television coverage of the Olympic Games in Montreal. These papers were presented by Marcel Deschamps, William Murphy and Marius Morais, Olympic

Long-time Supervisor of Technical Film Operations at the programming centre of the CBC, Mr. Ross is the author of two books, Television Film Engineering *and* Color Film for Color Television *and has also won the Agfa-Gevaert Gold Medal, awarded by the Society of Motion Picture and Television Engineers.*

Radio and Television Organization (ORTO), Montreal. Another paper by Canadians Bill O'Neill and Ray Cook of Mirrophonic Sound, Toronto, described "Videotape Audio Track Rerecording Techniques Utilizing High Speed Motion Picture Recording Equipment".

Papers were also received from the USSR, France, Japan, Belgium, West Germany, Mexico, The Netherlands and Sweden, presented in most cases by the authors.

One of the most interesting equipment developments shown at the conference was Steadicam, a stabilized camera "platform", that gives steady pictures even when the cameraman is running up and down stairs and among milling crowds. The equipment consists of a kind of harness worn by the cameraman, supporting a base and a mounting for the camera. In a paper describing this development, Edmund DiGiulio, Cinema Products Corp., Los Angeles, pointed out that pictures produced by handheld cameras often are marred by erratic camera movements very disturbing for viewers, because the human eye and brain in similar situations compensates for body movements so that scenes have a steady appearance. Another feature in the equipment exhibit was a hand-held, battery-operated 200-watt metal halide (HMI) lamp, designed especially for news work.

The trend towards broadcast-quality one-inch helical scan videotape recording was highlighted at this conference in the paper presentations and equipment exhibits. This simpler, less costly and more versatile equipment is making possible a literal revolution in television program production. At the present rate of progress the time may not be too far distant when one-inch recorders will displace the big, costly two-inch quadruplex machines which have been the workhorses of broadcast video recording for the past 20 years. As yet the designers and manufacturers of video recording equipment have not reached the point where standardization of the helical scan system can be generally accepted, but it seems now that the one-inch format may well turn out to be the answer. Still to be agreed on is the question of single head (field scan) or segmented recording which reduces track length. The experts are now talking about "intelligent" videotape machines with heads that can sense and automatically follow erratically recorded tracks.

On Friday morning in a session on "Landmarks and Future Trends", Peter Comandini of Image Transform, Hollywood, put on a large-screen demonstration of the progress that has been made in transferring live television and videotape recordings to color motion picture film. The improvements that have been achieved by video signal processing to remove or compensate for picture distortions and degradations of various kinds were shown in a dramatic manner.

The papers and exhibits at the conference, and the discussions that took place in the hallways and the coffee club showed clearly that rapid changes are taking place in motion picture and television technology. One speaker remarked that it is no longer good enough to make a better mousetrap; technological developments must be geared to the needs of creative production people. Traditional methods of motion picture production are being challenged by television, as advances in electronic technology enable programs to be made with similar methods. That there are many problems still to be solved was shown in a panel discussion during the conference on "Labor in a Changing Technology". Moderator was J. A. Lippke, editor of *Broadcast Management / Engineering Magazine*, and panelists included representatives of management and the labor unions. The outcome was inconclusive so far as questions of training and jurisdiction were concerned.

TIME CODES FOR FILM EDITING

In the past few years we have been hearing more and more about the use of time codes to replace the conventional motion picture camera slating procedure. The latest report appeared in the August 1976 issue of *SMPTE Journal*, where Michael Strong of World Wide Pictures, Burbank, Calif., describes a method of electronic cuing for multi-camera operations. Mr. Strong starts out by saying it is ironic in the age of computers that the slate and clapper board are still being used as the best way to store and retrieve information about the picture and sound synchronization start mark. Even more irrational in an era when the use of time codes has become routine in videotape editing is the practice of manually searching for sound and picture sync marks in the editing of motion picture films.

Recently the European Broadcasting Union published *Technical Document No. 3096-E*, describing a time code for synchronization between film cameras and audio tape recorders, and methods for recording the code on film and tape. The EBU method of film marking has the advantage that it is readily decipherable by eye, as well as with automatic code-reading devices.

Introducing this new technology poses many questions for filmmakers. First of all, what is a time code? Then, one might well ask: How is the time code used in editing, and what advantages does the time code offer in comparison with conventional editing methods?

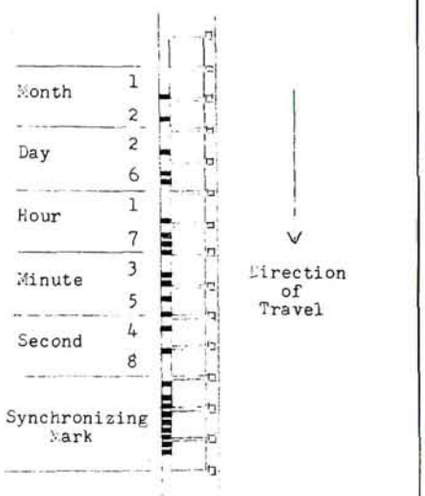
Basically, a time code consists of a continuously repeating series of electrical pulses at one-second intervals, corresponding with real or elapsed time as measured with a clock. The BCD (Binary Coded Decimal) Code, widely used in computer applications, is readily adaptable to marking both film and magnetic tape. The electrical pulses from a time code generator are known as bits. Each digit from 0 to 9 can be identified by a group of four bits, giving a series of unique, easily recognizable patterns.

Principle of the BCD Code

To illustrate the principle of the BCD code, let us say we have a row of four small lamps, labelled 8, 4, 2, 1, controlled by switches. It may seem obvious, but nevertheless very important to remember that the switches can only be in either the on or off positions. By turning on one lamp at a time, one after the other, leaving all the others dark, any number or combination of these four numbers could be readily identified by observing the position in the row of the lighted lamp, and the sequence in which the lamps are turned on. For example, by switching on lamp four first, then two, eight and one, in that order, we could say at once that the number being reproduced is 4281.

The remaining digits in the 0 to 9 series – numbers 3, 5, 6, 7 and 9 – require the use of combinations of lamps to reproduce the numbers, in the form of a code. The number 3 could be displayed by switching on at the same time lamps one and two – that is, 1 + 2 = 3. For the number 5, lamps one and four; the number 6, lamps two and four; the number 7, lamps one, two and four; and the number 9, lamps one and eight. Zero is represented by leaving all the lamps off for a number interval – that is, for the time needed to send 4 bits.

But now we come to the question, how can we handle the next number in the series – the number 10? Obviously we cannot have all the lamps off for zero and lamp one on for the number 1 in the time period allowed



BCD (Binary Coded Decimal) Code for Dec. 26, 17 hrs., 35 mins., 48 secs.

for one group of four bits. The answer is – make use of two consecutive groups of four bits; one group for zero and the next group for 1. In a time code series counting seconds, minutes, hours, days and months, the largest number is made up of only two decimal digits – for example, 59 seconds — so that any number in the series can be represented by two consecutive blocks of four bits each.

The BCD Code for the series of digits 0 to 9 is shown in the following table, with horizontal bars representing switches in the off position, and vertical bars for the lighted lamps:

Number	BCD Code
0	– – – –
1	– – – |
2	– – | –
3	– – | |
4	– | – –
5	– | – |
6	– | | –
7	– | | |
8	| – – –
9	| – – |

The code for two-digit numbers would look like this:

10	– – – | – – – –
59	– | – | | – – |

Recording the Time Code on Film

Marking film with a time code is accomplished by installing in the camera near the gate an array of four light-emitting diodes (LEDs). These would be positioned to expose the film in the sound track area, producing patterns of black bars corresponding with the on-positions of the lamps in the above table. With this arrangement positive electrical pulses from the time code generator would activate the LEDs, while negative pulses would leave the diodes dark. Using a crystal-controlled camera, the time code generator would lay down on the film one digit – that is, one block of four bits – opposite each picture frame. Thus two frames each – or a total of 10 frames – would be needed to record a complete time code series for seconds, minutes, hours, days and the month, and the code patterns would appear on the film at intervals of a little over seven inches.

Three additional frames are needed for what is known as the synchronizing mark, to indicate the beginning of each successive time block. The synchronizing mark is recorded opposite frames 24, 23 and 22, and has the following structure.

Frame No.	Code
24	| – | |
23	| | | |
22	| | – –

The synchronizing mark has two functions, both related to machine reading of the time code. An editing table fitted with an optical sensing device consisting of a lamp and photocell would put out a series of electrical pulses as the film passes through the light beam. The coded information in the synchronizing mark would indicate the beginning of each code group and actuate a counter to display the corresponding numbers, showing the actual time when the scene was recorded in the camera.

Editing with Time Codes

In double-system filming the time code is recorded simultaneously on the picture film and magnetic tape. Camera and sound recorder must be fitted with time code generators. EBU *Technical Document 3096-E* describes methods for recording on magnetic tape and transferring the sound to 16 mm magnetic film.

At the start of each day's filming the time code generators must be pre-set with a master clock. The master clock, which runs continously, is an electronic device putting out reference pulses that set the time code generators to the actual time of day when pre-setting takes place.

To make use of the time code, editing tables would have to be fitted with devices to read and display the coded information. These would translate the codes into readable numerals on a counter. To synchronize sound with picture, the picture film would be advanced to the start of a wanted scene; the recorded code at this point on the film would be displayed on a counter. Then the sound film would be advanced until the numbers on the two counters match.

Editing tables could be fitted with an automatic search facility that would locate the start of any scene in a roll of film, and bring the sound and picture films into synchronism, without any effort on the part of the editor except to dial into the system the time code for the start of the wanted scene. This is the method used almost everywhere in videotape editing.

On display at the SMPTE technical conference in New York in October was a 16 mm Arriflex camera fitted with light-emitting diodes to record the time code on film. Also shown was a time code generator fitting in a space under the camera on the tripod, and a master clock for setting the coder timing.

A paper by Gunter Bevier of Steenbeck Co., in the August 1975 issue of SMPTE *Journal,* describes editing

techniques utilizing time codes. Mention is made in that paper of a prototype editing table that has a time code scanning system, and the suggestion was put forward that equipment could be developed to automatically move the films until a match is obtained between the codes recorded in the picture and sound films. □

EQUIPMENT NEWS

Note to Canadian distributors: We would like to include the names and addresses of Canadian distributors of equipment and services mentioned in this section. Please ask your suppliers to give Canadian sources in their publicity releases. Ed.

Miniature Microphone

Dimensions of the new Micro-Mike from Image Devices Inc. are only 8 x 18 x 5mm (5/16 x 11/16 x 3/16 in.). A broad frequency response and absence of peakiness make this microphone ideal for handling music as well as speech. Active element is an electret condenser, enclosed in a silicone rubber boot, so that it is isolated from the case. The case is made of a smooth slick plastic material to glide over clothing with a minimum of noise. An FET pre-amplifier is built in, driven by a No. 13 battery in an in-line power nodule. Two models are available – Model 14 with a 138 cm cable, recommended for wireless applications, and Model B-30 with a 366 cm cable for balanced input applications. Prices are $110 and $140 US. Available from Image Devices Inc., 1825 NE 149 Street, P.O. Box 610606, Miami, Fla. 33181. Tel. (305) 945-1111.

New 2X Six-Element Lens Extender

A new multi-coated six-element 2X lens extender designed to meet the exacting requirements of the motion picture industry is now available from Alan Gordon Enterprises. The extender is made with the finest optical glass to obtain maximum detail and contrast. The six elements ensure optimum resolution and multi-coating reduces flare, reflections and ghost images while improving contrast and color saturation. The extender is available in mounts for the Arriflex Standard, Eclair CM and Arriflex bayonet which can be used with any Arri bayonet-mounted zoom lens and certain focusable prime lenses. Additional information available from A.G.E. Inc., 1430 N. Cahengua Blvd., Hollywood, Calif. 90028.

Six Element Lens Extender

Lightweight CP Microphone Boom

Cinema Products Corp., 2037 Granville Ave., Los Angeles, Calif. 90025, announces the availability of the CP microphone boom (fishpole type), ideal for location sound filming. The CP microphone boom is extremely compact and lightweight, and extends from two feet to six feet eight inches. It is supplied with microphone stud and internal 10-foot length of wire with two 3-pin female terminations. It is priced at $79.50 US.

Equipment for Filmmakers from Clark Photographics

Honeywell P-16-2S Flatbed Film Editor – The Honeywell P-16-2S film editor incorporates new features that significantly reduce editing time. The patented single-sprocket drive enables editing without contact between picture frames and machine surfaces and also allows one step threading. Each turntable has a torque motor for tight wind in any operating mode. Selective advance / retard features allow alternate sound tracks to be moved independently. Sound tracks can be rewound while the picture film is in motion.

Optasound Synchronous Self-Resolving Cassette Recorder – The Optasound Cassette Recorder can be operated with any film format and with any standard sync system. Models are available with digital, 60 Hz., 50 Hz. (Pilotone) and crystal sync facilities. It can be set to remote control or continuous run. In the playback mode the unit will lock into sync with any device that supplies it with a pulse identical to that recorded as a sync track in the first place. This self-resolving facility permits sync with a projector, for transfer to or from film mag stripe, transfer to and from videotape, sync with VTR, etc. Up to 45 mins. of sync sound can be recorded on 2 oz. of tape.

Estec, New Single Unit Precision Console – The Estec, a new totally integrated post-production console developed by Optasound, is now available. It is specifically designed for the production of professional lip-sync super-8 films and provides a facility with which an individual's idea, from concept to finished film, can be translated by the filmmaker himself. Many options in sync sound transfer and in sound mixing and shaping are possible. Sound editing is done electronically, without splices, through the use of a push-button cue mark. Cues can be erased and replaced at will. Variations of a single cut can be reviewed without the usual time-consuming procedure of recutting and resplicing.

For more information on these products contact Roy Ramsdale at Clark Photographics, 30 Dorchester Ave., Toronto M8Z 4M6. Tel. (416) 255-8594. □

P-16-2S Flatbed Film Editor