The Association of Cinema and Video Laboratories

A Report on the Fall Meeting

By ROBERT M. SMITH

As in the past years, the ACVL met on the Friday and Saturday before the SMPTE Conference. On Saturday morning Association President Frank McGeary, Motion Picture Labs, Inc., reported on the Directors Meeting to ACVL Laboratory Members. Executive Secretary Preston Bergin summarized the Association's activities in Washington. A standard contract has been drafted with the General Services Administration for all government film-processing business. Acknowledging all of the cooperation he had received throughout 1974, Mr. Bergin then asked for more cooperation and participation from the members during 1975, for their benefit individually and as an industry.

The Equipment and Techniques Forum, held on Saturday, began with a very amusing Welcoming Speech by John Ford, of See Here Now!, an educational filmstrip production company. Following are brief descriptions of the technical papers.

Some Honest Facts About Film and Videotape

Wilton R. Holm, AMPTP Research Center, Los Angeles

In this keynote speech Mr. Holm reminded the audience that the emergence of video technology should prompt film people to look for new ways to improve the capabilities of their medium. Videotape cannot be used well for theaters, he said, because while the image information from the original scene was converted into electronics form by the TV camera — which is a good interface — we have no good interface for getting back to an optical display to put on the screen.

Tape doesn't have anywhere near the resolution capability of film but, for a 25-in picture, it is not needed. Through image enhancement the television image is made to look very sharp because it has better contrast up to the limit of its resolution, then it drops off very rapidly.

Film, too, could be enhanced — by converting it to video and pre-emphasizing it (image-enhancing). The resolution will not be increased because the detail is not there but it would make a duplicate look sharper than its original. Before long, you will be able to get into the electronic medium and use film for what it can do. "The AMPTP Research Center has some patents that have been licensed to Image Transform and they are going to be doing film to film as well as film to tape."

Neither limiting resolution nor acutance fully describe the performance of a system. And neither permit an effective comparison of the film and videotape systems. One measure that does work for all systems — lenses, films, electronics — is the modulation transfer function. Basically, the MTF represents the contrast or visibility of detail in a picture — detail which can be fine or coarse. Percent modulation is the way of defining the amount of contrast between the light and dark bars on a resolution chart.

There is another way to equate film to tape in a way. We have television systems today with 525, 625 and, allegedly, 655 scanning lines/frame. At present it is thought that the theoretical maximum for videotape systems is around 800 lines. Eastman 5254 film is equivalent in its resolution to about 1200 to 1300 lines and 5247 may be as much as 1600 to 1800 lines.

The best pictures on TV today are on tape because tape is more than adequate for this size image. In addition, very little is lost in reproducing tape on highband reproducers. Much more is lost in reproducing film. However, in not many months you will see a film that will produce sharper-looking duplicates than many camera originals — all because of the magic of electronics.

Panel Discussion: Rawstock & Print Security

Panel moderator *Robert Kreiman*, DeLuxe General, Inc. introduced the panelists and invited each to comment on a particular aspect of the problem.

1. *Wilton R. Holm.* As Vice President of the AMPTP and Head of its Research Center, Mr. Holm has been working with Federal and local law enforcement agencies to find ways to solve the print piracy and film security problems. The stolen-print market has increased enormously in recent years with the development of inexpensive, efficient 16mm projection equipment. This loss represents upwards of millions of dollars in lost revenue for film companies. At present, the penalties for copyright infringement are mostly trifling, except for the sound-recording industry. (They have recently acquired additional legislation to protect them.) Either something must be done or give the existing copyright laws some means of enforcement or another basis must be provided for dispensing justice for these kinds of acts.

Some way of proving that the prints are illicit is needed. It is possible to code film so that the code cannot be detected. This can be done at the film manufacturing stage or in the laboratory. However if it is coded in the lab any illegitimate print made in the lab would be a properly coded print. The lab security problem, then, is probably the most critical part of the problem.

2. *Herbert Ernshaw*, an attorney with Rogers & Wells, New York, has represented a number of laboratories and film companies in cases involving film piracy and film theft. He discussed the need for print identification in systems to assist in pressing charges and getting convictions in these kinds of cases. Clear, convincing proof has to be made available on an expeditious basis to gain convictions in these cases. What is needed is a system whereby by mere physical examination you could tell that a print was an illicit copy or that it was "my property." Identification and control systems will, of course, increase the print cost, but this should reduce considerably the expense of the policing activities should a legal action become necessary.

3. *Harold Goldberg*, Print Manager for Universal Pictures, Mr. Goldberg is responsible for the ordering and distribution of several thousand prints in all gages annually. He is also responsible for the selection of the freight carrier and for the proper handling and delivery of prints to their destinations. After prints are delivered, each office has its own method of security; however, a running inventory in each branch must agree with the main office control at all times. A strict accounting is maintained at all times. Only key personnel have access to the print vaults. Company policy does not allow a print to leave the exchange unless a shipping ticket is presented from the booking department to the shipping room. "Despite all our security precautions, periodically I receive lists of motion pictures from unauthorized sources offering for outright sale."

4. *Roderick T. Ryan*, Coordinator of Engineering Services for the Motion Picture and Audiovisual Markets Div. of Eastman Kodak in Hollywood. He discussed how the film manufacturer can help identify film either in rawstock form or in processed form.

Unless the order of film was fairly large, the rawstock information would pertain to too many customers to be of help. The edge-printing information on dupe negatives and on prints can be very valuable. Some of the edge-printing data is available in *Motion-Picture Films for Professional Use*, Kodak Publication H-1. Some of the information is printed on the film primarily for the use of the manufacturer. However, if you have a question about a date symbol, for example, you should contact the local Kodak Technical Representative.

5. *Edward Reichard*, Vice-President and Chief Engineer of Consolidated Film Industries. He reviewed security in a departmentalized lab operation and provided a case history of an actual theft problem, the theft of rawstock.

In a high-volume laboratory where there is a complexity of departmental operations an extremely large inventory of rawstock, both film and tape, is required. The physical setup of the plant may add to the complexity of an efficient control system — which obviously is essential.

The rawstock receipt and control system used in a plant with such a diversified program was explained. Complete documentation is maintained beginning with an inventory of film and tape rawstock at the loading platform. Receipts are required to obtain stock from the vaults. Finished prints are stockpiled in controlled areas on racks within cages and are released for shipment only on IBM control cards and shipping orders.

6. *Murray Fallen*, General Manager, Lab Operations, Bellvue Pathé Ltd., described a similar procedure used in a smaller lab whereby an immediate stock inventory can be made without taking a physical count of the rolls.

7. *John Reeves*, Director of Security, Burbank Studios. He dis-

A contribution submitted on 15 November 1974 by Robert M. Smith, Program Chairman for the ACVL Meeting, DuArt Film Laboratories, 245 West 55 St., New York, N.Y. 10019.

cussed how to establish that you have a loss, the corrective action that should be taken and the markets for stolen material. It is important, he said, that all serious infractions be prosecuted and that the company gain a reputation for being firm in this matter.

The Forced Processing of Eastman ECN-2, Type 7247 and 5247

Irwin Young, Chairman, DuArt Film Labs and Rombex Productions, New York.

Forced processing is most simply defined as overdeveloping the original, to attempt to compensate for camera underexposure. The phrase "attempt to compensate" is used because along with overdevelopment of the original comes such undesirable side effects as increased grain and higher contrast. These factors, added to the loss of detail in shadow areas due to underexposure often combine to produce pictures of less than satisfactory quality.

It has become apparent to us that this film, due to its basic built-in improvement over its predecessor in the areas of graininess and resolution, can tolerate moderate elevations in ASA speed, in some cases without forced development and in others with forced development in modified steps. [It should be noted that the manufacturer does not recommend that this film be force-processed.]

In the film samples shown, we have split-screen comparisons in original 35mm and 16mm. As you would expect, there are certain liberties you can take in extending the exposure range of 35mm, which do not necessarily follow in 16mm. This is so because, although the number of grains per unit area is the same in both 16mm and 35mm, the number of grains making up the 16mm picture is fewer than it is in 35mm, and this has always been at the root of the problem in comparing quality of pictures shot in 16mm versus 35mm.

As a laboratory, we recommend that a common language with the filmmaker be used in discussing forced processing of 7247 and 5247. This language should be based on percentage increase of developing time. It would enable the filmmaker to better understand what his results would be in whichever laboratory he processes, thus enabling the filmmaker to obtain the maximum quality from the product he is using. Film is only one of the many means of media communication. The more we can simplify its usage and maintain optimum quality, the greater will be the benefits to all.

The Economic Outlook

Geoffrey Holt, Supervisor of Economics Dept., Bank of Nova Scotia.

In speaking about the effect of inflation internationally on the Canadian economy, he said that: "The main point to consider is that the insulation that Canada has had so far against the international business slowdown is now disappearing. Some kind of recession lies ahead. Just how long the adjustment lasts will depend on the outcome in other countries, particularly the U.S. The latest signs there suggest that there is quite a clearcut slowing down in business and that a full business cycle adjustment is at work.

"Although we in Canada have some longer-term, stronger growth forces going for us, not only the demographic ones but also the potential for natural resource development, we will have to enter this particular time along with everyone else."

A Report on CRI Based on Questions From the ACVL

George Gordon, Director of Technical Services, Motion Picture and Audiovisual Markets Div., Eastman Kodak Co., Rochester.

The questionnaires received from ACVL Member Laboratories concerning Eastman Color Reversal Intermediate Film 5249/7249 and Process CRI-1 concentrated on uniformity in the 35mm format, sensitometric control of blue contrast and maximum density in both 35mm and 16mm formats and the relationship of Process CRI-1 to Process ME-4 in 16mm format. These questions can be better discussed with an understanding that CRI occupies a special position in motion-picture laboratories. It is the only reversal film which has its contrast multiplied by approximately 3 during printing; it is the only reversal film used in 35mm motion-picture format and projected at 90 ft/min; and there are generic differences between reversal films and negative-working films.

Uniformity

The most effective approach to process uniformity is good agitation in the solutions and attention to the surface condition of the film at crossovers as the film enters the next processing solution. Agitation is really turbulation at the solution-to-emulsion interface and is difficult to measure or specify directly. Pressure, flow rates, jet designs, etc., are indirect parameters. The recommendations in the manual for Process CRI-1 are based on our machine and are such that more agitation, according to the measured parameters, is not perceptibly better but less agitation, similarly measured, is perceptibly poorer.

Good turbulation can be achieved either by drilled headers or by spray nozzles, but regardless of which is used the film must be supported by backup rollers and the liquid jet must be aligned with the film strand to ensure that the film receives the "liquid scrubbing," or true agitation, which has been designed into the machine.

At solution crossovers the emulsion surface must be very uniformly treated so that no streaks of any kind can be seen. Even a thin film of solution can make a difference. This is also true for the squeegee preceding the dry cabinet. This means you must use good squeegees and maintain them well, and if necessary use other techniques such as submerged wiper blades on an incoming strand. The intent is to ensure that each unit area of film is exposed to the processing solution for the same time and in the same condition so that all areas get uniform process reaction.

Usually major attention is paid to agitation in the first developer, but we have found that the color developer is as important with respect to uniformity as is the first developer.

In addition to the obvious need for excellent final squeegees the drying conditions inside the cabinet can affect uniformity. Among other factors, drying is influenced by emulsion swelling, that is, the amount of water the film carries into the dryer. In Process CRI-1, swelling is affected by the *p*H of the final fixer, which is designed to be a compromise between providing a desirable environment for the dyes and its influence on the amount of emulsion swelling. Variations in fixer *p*H may be a cause of some variation in drying conditions from day to day and, hence, may be responsible for changes in observed uniformity.

For agitation and uniformity there is no magic formula — just good design, good maintenance and good operating practices.

Sensitometric Control

The blue-sensitive-layer contrast and maximum density, frequently, are the most variable sensitometric parameters. It is fortunate that the blue image has the most tolerance visually. Our experience shows that three items are the largest factors in controlling blue contrast and maximum density.

First-developer temperature affects the blue layer more than it does the other layers. The temperature should be easy to control to the specified ± 0.5°F, or even a little tighter, if the temperature sensor in the heat exchanger truly controls the temperature in the machine tank and not some place else in the plumbing circuit. Within the machine tank the temperature also should be uniform throughout the solution in respect to both time and location.

Another factor is the potassium iodide concentration in the first developer. The chemical analysis for iodide is admittedly rather tedious, but with care it can be done. Initially, we analyzed for potassium iodide frequently, but after accumulating experience with our replenisher formula and rate we found the iodide level in the tank was quite consistent and we could greatly reduce analytical frequency. Running the process in a consistent manner and avoiding unusual operations — such as processing film in white light to check for scratches or using other film types for this purpose, that is, avoiding procedures which tend to upset the potassium iodide equilibrium — should help to maintain a stable iodide concentration and reduce the need for chemical analysis.

The most critical control for blue contrast and maximum density is the concentration of antifoggant AF-6 in the prehardener. The chemical analysis is very difficult and AF-6 is unstable in the prehardener solution, whether machine tank or replenisher. At Kodak Park we control AF-6 sensitometrically, that is, we exert maximum effort to have all other controls on specification and then adjust the AF-6 concentration to achieve the desired sensitometric result.

Relationship Between Process CRI-1 and Process ME-4

The significant difference between Process CRI-1 and Process ME-4 is the greater need for uniformity in CRI-1 and the basic differences in the films which go with each process. This leads to the different specifications for agitation, the difference in specified potassium iodide concentration in the first-developer solution and replenisher, the different temperature and time of first development, different fixer *p*H and different stabilizers. There may be a strong resemblance between these two processes, but if one processes 7249 in Process ME-4 one must expect sensitometric differences and control problems. These differences may or may not be significant depending upon the other circumstances surrounding the use of 7249 in this manner.

Are Videodiscs in Your Future

Robert B. Pfannkuch, Vice-President, Communications Materials Group, Bell & Howell Co.

It is likely that there will be a videodisc system introduced commercially by 1977. It is more likely that it will be a consumer item and will probably not provide an economic opportunity to most laboratories because of the large capital investment for equipment.

There are at least two or three more videotape formats that either are being considered or are actually under development that will consume considerably less tape per unit time than the existing ¾-in formats do. These are likely to become available within the next year or two. And they may well be the medium with which many laboratories can compete with the videodisc producers.

Video Transfer Trends and Challenges

Moderator *Findlay J. Quinn*, Quinn Laboratories, Toronto

1. *Mel Sawelson*, Consolidated Film Industries, dealt with motion-picture lab practices consistent with videotape mastering and duplication. He first described the film-to-tape transfer procedure in use at CFI. The whole system is a parallel of the film laboratory systems.

After the customer has approved the trial print in the screening room, he then goes across the hall to the telecine with the timer and a video man. The timer makes his timing decisions again, scene by scene, with the video man who is aware of what the restraints can be in converting a color print to a tape master. After all the scenes have been cued and the timing corrections made for each scene, the print is then cleaned and played in continuity and a videotape master made. That master is then played back for the client (who generally sees it within about 20 minutes of his having approved the print on the screen). After he has approved the tape master, a mirror is made. The duplicates are then made on a high-speed duplicator from the mirror master and they are checked for quality on an individual basis just as film release prints would be checked.

2. *Jack Sinclair*, Sher and Sinclair Ltd., Toronto, spoke on factors affecting the quality of the tape to film transfer. Today, Image Transform is recognized as the leader in videotape to film transferring and the reason for this is quality control. Because of the narrow bandwidth limitations there is virtually nothing that should be lost in the transfer process. One of the best videotape playback machines was selected and modified to suit their particular application of playback to film. Special signal-processing systems had to be designed and built. A special decoder was made to decode the NTSC signal into red, green and blue, and then because of picture degradation caused by video noise, the Image Transform noise-reduction system was developed.

With the noise reduced, signal processing takes place to reduce ringing, remove smearing and to re-image-enhance the signal. The "cleaned up" RGB signals then go to the color-control console. Here the operator can readjust the RGB gains, black-level or gamma, and store these corrections in a computer. When the tape is played back for transfer to film, all the corrections are switched-in automatically at the first frame of each scene. The output of the color-control panel feeds the custom Image Transfer film recorder, which is of the electron-beam type and records a separation master. This is then converted to color negative or reversal film stock in a normal film printer. To assure accurate control of the film recording, two special test signals are recorded at the head and tail of each job.

3. *Peter Hollidge*, Advertel Productions, Toronto, spoke on small-format videotape to quadruplex videotape transfer. He warned the audience that while the technology was ready, they should exercise a great deal of caution. The industry, he said, is without control and without a really good credit-check organization.

A New Color Print Film With a Short Processing Sequence

Presented by *Hartwell T. Sweeney* for the authors, *John L. Baptista, George L. Bonheyo, Reid O'Connell, Richard K. Schafer*, and *Eric V. Knutsen*, Eastman Kodak Company, Rochester.

Process ECP-2 having a 10-min wet time provides an efficient means of processing color release prints. Developer temperature is 97°F with all other solutions and washes operating at 80°F. The process uses CD-2 as the developing agent and employs a ferricyanide bleach which can be conveniently regenerated. A new print film will work well in this higher-temperature developer. Called Eastman Color SP Print Film 5393 and 7383, the new film gives screen performance results comparable to Eastman Color Print Film 5381 and 7381. The two products and the associated processes will serve a wide range of laboratory efficiency requirements.

Equipment Papers

The program concluded with three reports on new product developments:

"New 16mm Color Analyzer, Model 116," presented by *Al Arbeeny*, Hazeltine Corp.

"Automatic High-Speed Breakdown Tables," presented by *W. D. Carter*, Carter Equipment Co.

"Cross-Modulation Tester with Digital Density Readout," presented by *R. D. Whitmore, Jr.*, Hollywood Film Co.