

TECH NEWS

by Rodger J. Ross

COMPUTERIZED LABORATORY CONTROL SYSTEMS

Demands for higher technical quality and greater uniformity in color motion picture films have made necessary more rigid control and monitoring of laboratory processes. Within the past few years the Hollywood laboratories have been adopting computerized control systems, to simplify and speed up the detection and correction of processing and printing variations. The work that is being done at Deluxe General Inc. has been described in several papers in the SMPTE Journal. Fred Scobey, vice-president engineering of that company has summarized this work in a paper presented at Film '75 in London, England, and published in the Sept. 1975 issue of the BKSTS Journal.

Color Quality Control

When a roll of color film is being processed the images produced in the film will be affected in various ways by the processing conditions as well as by the conditions of exposure to which the film was subjected. In the case of a color print film all of these conditions can be controlled by the laboratory.

It is customary for laboratories to process control strips at regular intervals, and then measure the images obtained. The purpose here is to find out whether or not the processing conditions are varying, and to make the necessary corrections to give as nearly as possible uniform results. Close control of processing enables the timer to predict with confidence the scene-to-scene timing corrections needed to compensate for variations in the original negatives and produce acceptable prints.

This method of processing control requires a continuous supply of con-

trol strips for the processing machine operator. These are usually made by the laboratory in a sensitometer, a device that exposes the film through a neutral density step wedge. A major problem for every laboratory is precise control of the exposure conditions in the sensitometer, for if these conditions are allowed to vary only slightly, the readings on the processed strips will change, and these changes could be interpreted as having been caused by variations in the processing conditions.

Exposing Sensitometric Strips

The equipment used by Deluxe General to accurately expose sensitometric strips is described in a paper, "A New Automatic Sensitometer", by Michelson and Scobey in the Dec. 1971 issue of SMPTE Journal. In designing this machine it was recognized that the strips produced would be standard for the laboratory, and since large numbers were needed, the exposure of the strips should be automated. In the device described in this paper, the roll of film is carried over a rotating drum. Neutral density wedges are fastened to the periphery of the drum and the film is exposed by an internally mounted lamp, through a slit. With this device maximum variations in the plotted red, green and blue curves for color positive stock are less than ± 0.015 in density.

Measuring the Control Strips

The usual procedure in a film laboratory is to measure the processed control strips in a color densitometer, utilizing red, green and blue filters, and then plotting the results in the form of three curves on graph paper. This is a tedious, time-consuming procedure to begin with, and then there is the problem of evaluating the plotted curves to decide what if any adjustments or corrections are needed.

At Deluxe General an automatic recording densitometer is used for reading the control strips. Instead of plotting the curves on graph paper, the densitometer readings are entered into an IBM System 7 digital process control computer. After a control strip has been read, the computer automatically begins a data reduction routine, giving minimum density, speed, contrast and maximum density. These values are typed out automatically at an operator station.

Stored in the computer are readings taken from a master control strip. Based on any differences between readings from the master and sample wedges, the computer will reach a decision about the processing conditions producing these differences, and indicate on the print-out what if any action should be taken.

Two papers in the SMPTE Journal describe in detail how the computer is used to control the process. These papers appear in two parts in the March and August 1973 issues, with the general heading, "Computerized Process and Printer Control".

Correcting Timing Tapes

In addition to controlling processing conditions, the computer is used also for correction of timing tapes for additive printing machines. An overall correction can be made in a timing tape, or scene-to-scene timing changes can be entered. The timing tape to be corrected is placed in the operating station reader and a new timing tape is produced with whatever alterations are put into the keyboard. To make an overall correction, a function code is inserted, and the machine then runs off a new tape automatically with the correction applied to all the values in the original tape. In making scene-to-scene corrections, the computer provides an invaluable assist. Previously, when corrections had to be made manually, a feature film with perhaps 1000 scene changes required 4000 mental additions and 3000 punch entries. Now this work can be performed automat-

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ically from the operating station keyboard.

Printer Exposure Control

Every laboratory has to contend with still another set of variables — exposure conditions in printers. At Deluxe General where large numbers of printers are in use, the problem of printer exposure control assumes major proportions. Printer tests made by exposing raw stock through a negative of known density are analyzed by the computer and compared with reference values stored in the machine. Interlayer effects can be taken into account also by the computer. It will then print out the corrections needed to maintain uniform printing conditions in all of the printers in the laboratory.

As the authors of these papers comment in conclusion, any system of this nature has to be cost effective. In the case of color positive prints it is difficult to calculate savings; one can only guess at the extent of losses when a process runs out of tolerance and is not promptly corrected, or when a processing machine has to be shut down due to over-control. Deluxe General estimates that the work involved in the correction of timing tapes has been reduced by a factor of four, and these savings alone justified the investment in the control system.

What Next?

No doubt many film laboratory people listening to or reading these papers are waiting for the next obvious step to be taken — the adoption by one of the big laboratories of a completely automated system of motion picture production. Following the presentation of one of these papers at an SMPTE technical conference in Los Angeles the question was asked: "Are you considering a closed loop process control system?" Mr. Michelson, who read the paper, replied: "We are looking at it, but we haven't done it yet".

In an introduction to the papers on process control in the Sept. 1975 issue of BKSTS Journal, in which Mr. Scobey's paper appeared, Paul Read, operations director of Kay Laboratories Ltd., London, made the following comments:

"Every laboratory technician must be looking to the latest crop of new ideas and apparatus to provide that illusory 'new generation' of production techniques equipment. Since the motion picture industry began, its

development has generally been by important single advances rather than in small steps forward. Perhaps we should be looking for something radically different — to the computer-linked monitoring system that Deluxe has developed."

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.

A New Reversal Color Film for Television

A new film will soon be available from Eastman Kodak Co., designed especially for television news applications. Designated as Eastman Ektachrome Video News Film 7240 (tungsten) this material has characteristics similar to Kodak Ektachrome EF film 7242. Ektachrome 7240 has a normal exposure index of 125, and it is balanced for exposure with tungsten illumination at 3200K. For daylight exposure a Kodak Wratten No. 85B filter should be used.

An advance in emulsion technology has eliminated the need for a hardening step in processing. Existing processing machines utilizing the ME4 process for Ektachrome 7242 film can be converted easily to handle the new film. Only a bypass over the pre-hardener and neutralizing tanks is needed. Process VNF-1 for Ektachrome 7240 is similar to Process ME4, but offers significant savings in chemical costs as well as process simplification.

Ektachrome 7240 can be forced in processing one, two or three stops, to an exposure index of 1000. Normal density ranges can be obtained with 10 foot candles illumination at f/2.8. There is a considerable improvement in graininess when this film is force processed, over Ektachrome 7242. The portion of the film's characteristic curve where picture highlights are reproduced is lower in contrast than most other camera original films, a distinct advantage with uncontrolled lighting conditions (available light).

Elimination of the pre-hardener and neutralizer stages in processing reduces the wet time to 14 mins. 15 secs., a gain of 18%. A 10 to 35% reduction in chemical costs can be expected, depending on the ratio of film-to-leader in the machine. With Process VNF-1 there is a reduction of 15 to 25% in volume of chemicals used.

While this film has been developed especially for television news, it is quite likely other uses will be found for it as well. In the production of television programs on film there are many situations where exposures must be made with available light or with a minimum of supplementary artificial lighting. The higher speed obtainable with forced processing, with less graininess than Ektachrome 7242, should be advantageous in many difficult and perhaps otherwise impossible situations. Any improvement in graininess characteristics of 16mm television films is always welcome, since electronic image enhancement, applied in telecine to give pictures with a sharper appearance, tends to accentuate the grain structure of the images as well.

In the introductory period, when the change-over is being made from Ektachrome 7242 to the new film, there will be some inconvenience for the laboratory, but the advantages of reduced chemical costs, volume of chemicals used, shorter mixing time and reduced machine maintenance will no doubt more than compensate for temporary dislocations. It is anticipated that additional products, including a daylight balance film equivalent to Ektachrome 7241 will be available in the near future. Suggestions have been made in the trade that these developments will lead to new and more simplified processing machine designs.

Camera Mounting and Control System for Aerial Filming

Astrovision Inc., 16800 Roscoe Blvd., Van Nuys, Calif., has developed a camera mounting and control system for aerial filming from Lear Jet and other types of aircraft. A 50mm/100mm relay lens system is utilized, with the whole system encased in a pressurized heated tube that can be operated from inside the aircraft. The system can film 360 deg. from below or above the aircraft

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