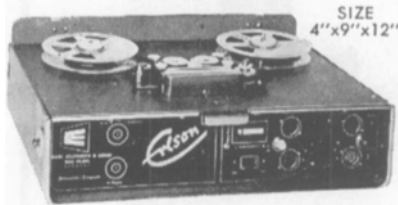


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## Application of Magnetic Stripe to Motion-Picture Film

By E. L. TAYLOR

A REPRINT

### Introduction

The recording and reproduction of magnetic soundtracks has progressed a very long way since first introduced into this country—on steel tapes travelling at high speeds.

The BBC, during the early part of this century (about 1928), first used magnetic recording in an experimental form to record historical events as a possible alternative to the gramophone record for which the, then, very new electrically-operated cutter was used on thick wax masters. The steel tape recording/replay machine, known as the "Blattnerphone" and illustrated in Fig. 1, replayed sound immediately after recording whereas the wax recording necessitated the slow process of electroplating before discs could be

stamped. It was possible, of course, to replay from the original wax master but this invariably damaged the walls of the groove making it impossible to be used for processing. The early magnetic tape recorder/replay machine, though primitive and somewhat dangerous if the operator put his hands on the fast-moving steel tape, was nevertheless a step in the right direction. In due course steel wire was used to replace the steel tape and this was followed by the use of a varnish-like material containing minute particles of magnetic material applied to a base of paper, plastic or film.

In the past ten years very remarkable strides have been made in the improvements of the magnetic medium and the methods of application. Keeping in step

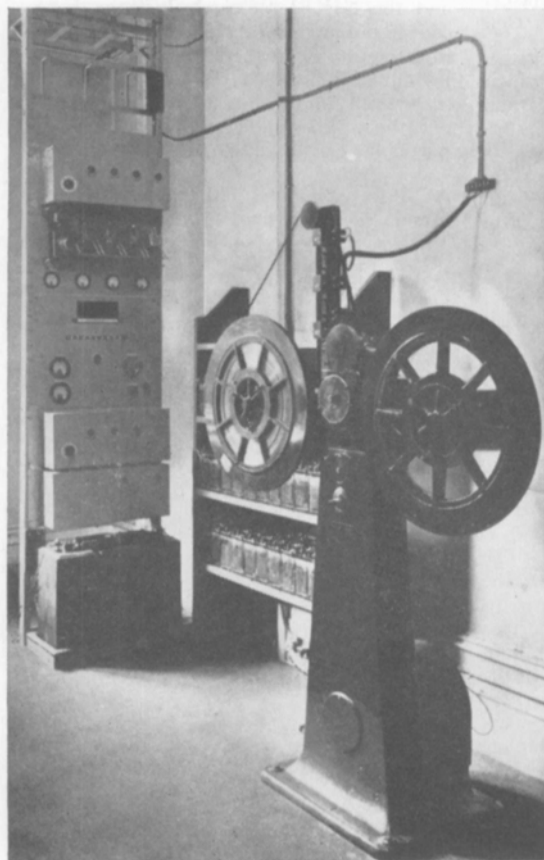
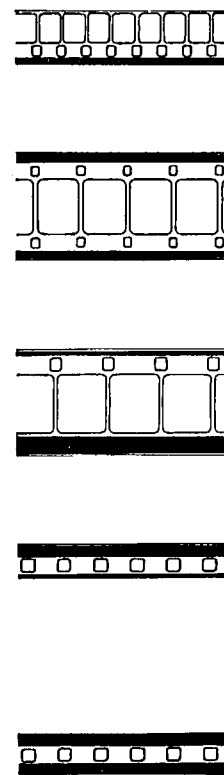


Fig. 1. The "Blattnerphone," an early steel tape recording/replay machine that replayed sound immediately after recording.

Fig. 2 (right). Types and placement of magnetic stripes that can be put on film.



Reprinted from *British Kinematography Sound and Television*, 48: 224-226, by permission of the British Kinematograph Sound and Television Society, and by the author, E. L. Taylor, Assistant Manager, Rank Studio Equipment, The Rank Organisation, Woodger Rd., Shepherds Bush, London W12, England.

with this, improvements have also been made in the development of equipment for the wide range of purposes in which the tape is now used. Sound recording, video tape recording, computer tape re-

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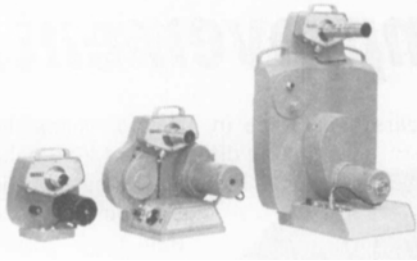
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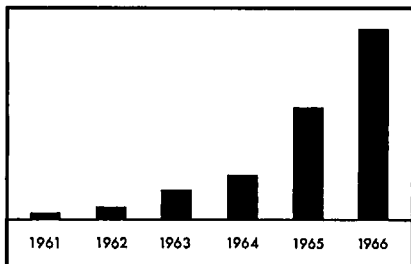
As you might expect, it features other advances as well, including electronic speed regulation over its entire operating range. At the same time, the 400-ft camera has been improved by the addition of a new scr control circuit. Thus neither of the two larger cameras requires any accessory control equipment.

Here are partial specs on all three cameras:

HYCAM MODEL (film capacity, ft)	100	400	2000
FRAME-RATE RANGE*	10-9000	10-11,000	10-5000
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\*Full 16-mm frame rates given. For 1/2-frame, multiply by 2; for 1/4-frame, multiply by 4.

By no coincidence at all, the annual sales chart shows a similar growth as the industry increasingly votes Hycam the camera of choice.



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ording, and automation, are just a few of the applications of magnetic tape.

## Magnetic Stripe

The methods of applying magnetic sound stripes on to motion picture films become more numerous as the years go by, whether the requirement is for professional 35 mm films made for the cinema, television or teaching machines or for the rapidly growing amateur 8mm, Super 8 and 16mm gauges. An example, showing just a few of the types and placement of magnetic stripes which can be put on to film, is shown in Fig. 2. Several separate magnetic tracks on one film or tape are often required for stereo recording, control tracks or simply as a balancing stripe, but whatever application is concerned, the magnetic stripe must comply with several very vital conditions:

(a) The thickness and width of the stripe must be kept constant within close limits on the whole film length.

(b) The location of the stripe must be correct without weave.

(c) If required, a compensating balancing stripe must be applied at the same time as the main stripe to maintain even winding of long lengths of film.

(d) Adherence of the magnetic varnish when dry, to film base or emulsion must remain perfect.

(e) The surface of the stripe must be flat and smooth.

(f) The electromagnetic performance of the sound track must achieve the highest quality of sound reproduction with absolute minimum dropouts and ground noise.

## Sonocolor SCF2 Machine

These aims have been accomplished in the French-made Sonocolor SCF2 Magnetic Film Striping machine, shown in Fig. 3, designed primarily for industrial operation to apply full coating, single or multistripes, in one operation. The depositing of the magnetic emulsion is carried out by a process known as "calibrated meniscus." Referring to Fig. 4, this principle of coating is carried out as follows:

(1) A small tank (T) is supplied with magnetic varnish and the level is maintained by means of an overflow outlet.

(2) A roller (R), partly immersed in the varnish, is kept in rotation, the speed of rotation being consistently proportional to the film speed.

(3) The thickness of the magnetic varnish on the roller is calibrated by means of a blade (B) which has very accurate cut-outs positioned according to the type of magnetic stripe to be applied. This blade is fitted with micrometric adjustment devices.

(4) The film passes close to the rotating roller. The wet varnish covering the surface of the roller has a meniscus (M)

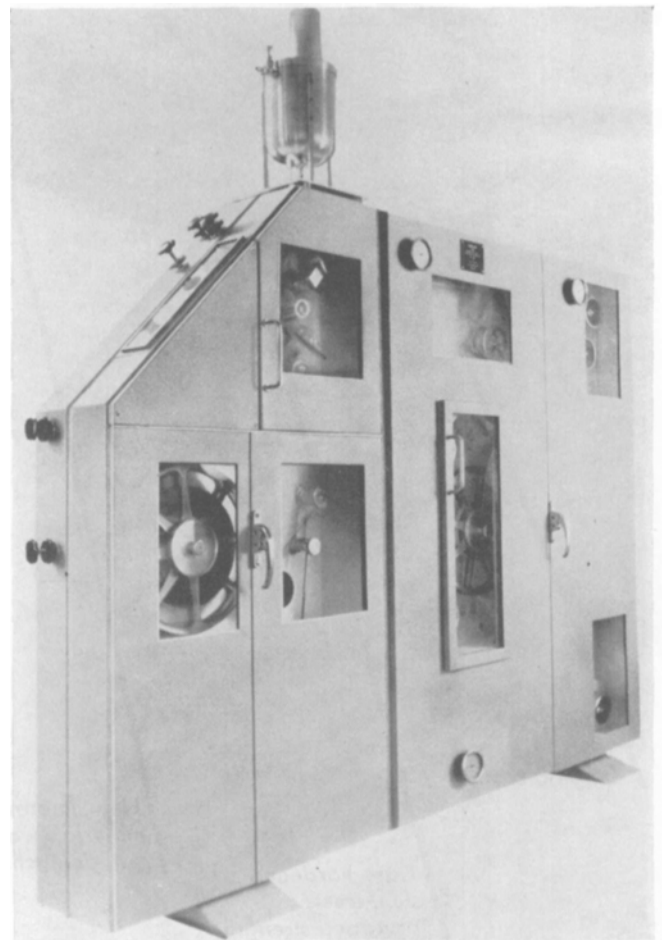
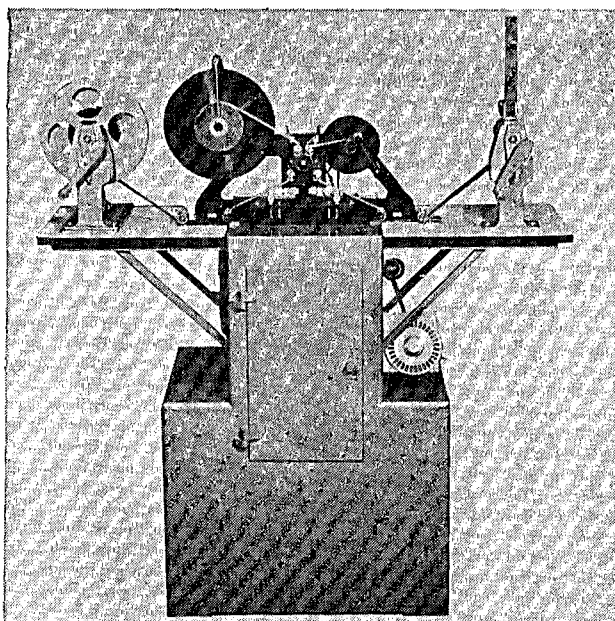
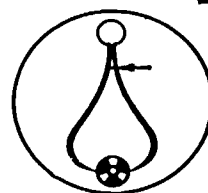


Fig. 3. The French-made Sonocolor SCF2 magnetic film striping machine.

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2. A 16 frame exposure gate permits a range of 6 different exposures with the standard color pack combination and 10 frames with a range intensity and hue differences.
3. The platen, color positive raw stock and guides are moved down to the negative in the exposure gate by a pneumatic cylinder thereby eliminating physical labor.
4. When the positive film and the platen contact the negative in the flat gate, there is no shifting of the negative position and contact is firm.
5. After each exposure the positive film is advanced by a time controlled motor. The time control is adjustable therefore spacing between exposed strips can be changed.
6. Each frame of the exposure gate is provided with guides so that proper filter combinations can be inserted without difficulty.
7. The basic color pack which has to be adjusted for emulsion changes, is easily accessible through an opening at the front of the machine.
8. To meet conditions of developer modifications and emulsion changes, the overall light output is adjusted by a 30 point switch. This switch controls the energy supplied to the lamp by changing the amount of capacitance across the lamp, this direct control of energy input to the lamp, by discrete amounts of capacitance, with the voltage held constant, provides excellent, simple, control procedure.
9. The power supply has been conservatively designed so that when the unit is connected to a regulated A.C. supply, the light output at a given capacitance setting is accurately reproduced.
10. A characteristic of the Xenon flashtube is that the color quality of the light is not changed during the life of the tube.
11. The basic Xenon flashtube with its electrical circuitry is inherently simple and dependable.
12. The power supply has been designed to allow rapid charging of the capacitor bank so that no time is lost between successive exposure of strips.
13. The negative film is guided over the flat exposure gates on rails which are spring loaded to float above the engraved glass in the exposure gate, thus eliminating possible negative scratches. Firm negative/positive contact at time of exposure is accomplished by the spring loaded platen.
14. In this tester there are no meters, no shutters, no optics, no motors and no moving parts between the light source and the negative positive plane.

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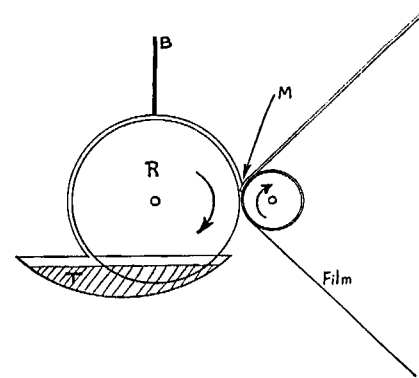
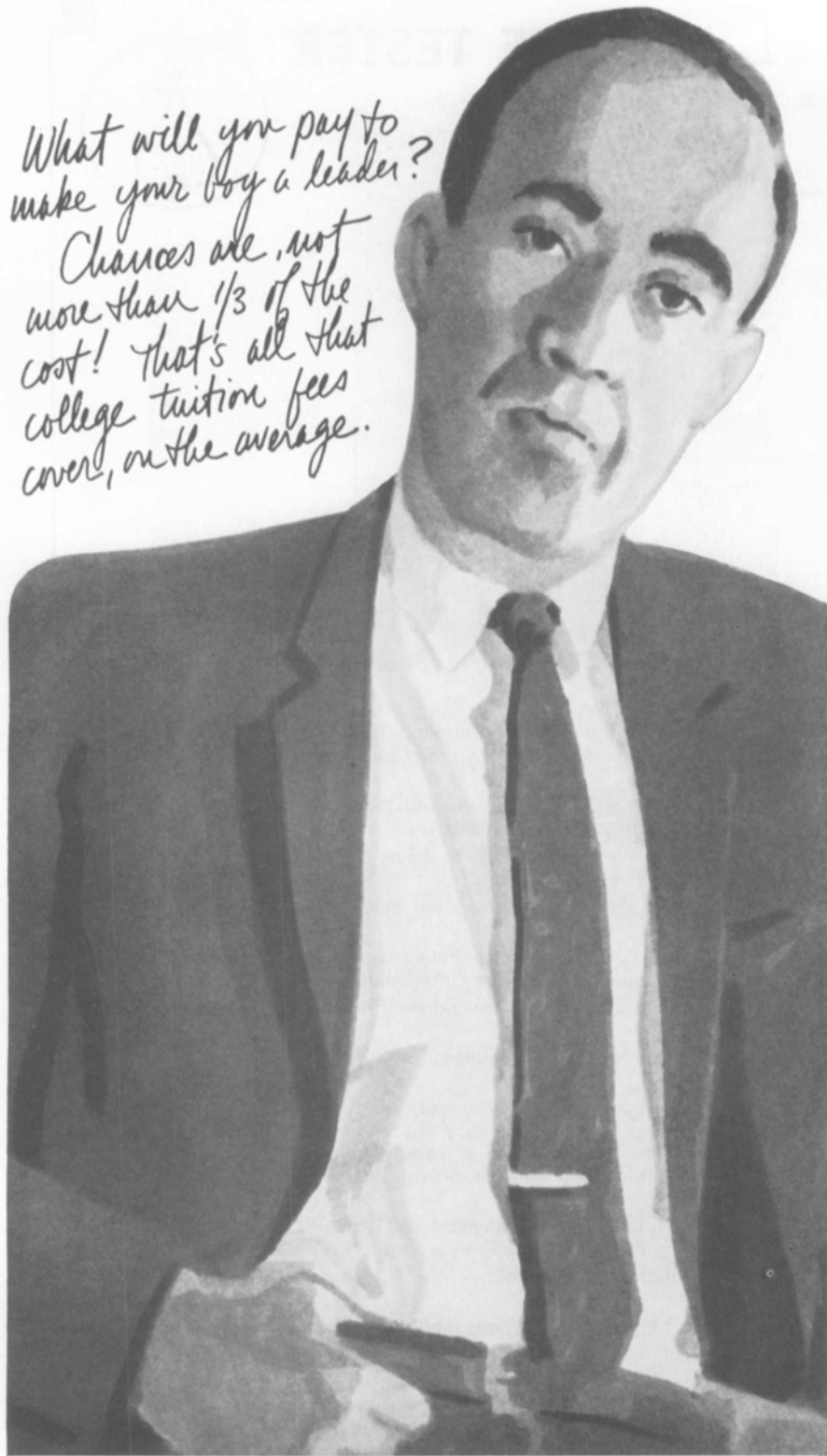


Fig. 4. "Calibrated meniscus," a process of depositing magnetic emulsion.

created by the blade (B) which transfers from the roller to the film an adequate quantity of the magnetic varnish.

A point of interest about this method of applying magnetic varnish is that the speed of rotation of the roller being constantly proportional to the linear speed of the film, means that the quantity of varnish deposited is independent of the coating speed and the machine can be stopped without any risk of varnish overflow onto the film. After having passed through the magnetic orientation tunnel, the film is driven into a drying cabinet and finally on to a take-up spool.

The Sonocolor machine, as mentioned above, will apply single or multiple stripes in one operation. It has been estimated that one man can operate a machine and process up to 3,300 ft of film per hour and interchange from one film gauge or different type of stripe to another in a matter of a very few minutes. Every possible precaution has been taken in the design of the machine to avoid the possibility of damage to the film during the striping operation. All rollers are sprocketless, mechanical tension is kept to a minimum and the drying cabinet is kept to a reasonable temperature to prevent damage to the film base. Provision can be made for various thickness control devices and it is possible for the machine to be operated in a dark-room for the striping of raw film stock. The Sonocolor SCF<sub>2</sub> machine can successfully stripe on triacetate stock, whether it be negative, positive or colour film.

It requires less than 14 ft<sup>2</sup> of floor space and is completely self-contained. The only provision other than the electrical supply is an exhaust unit to remove heavy vapours to an outside duct. Power requirements are 220-v 50-Hz 3-phase supply at approximately 9 A. The heating elements in the drying cabinet provide varying heat levels with a maximum electrical consumption of 3 kW.

The application of the single magnetic stripe (with or without a balancing stripe) on 35mm film is likely to be of growing importance in the television field, especially since the technical com-

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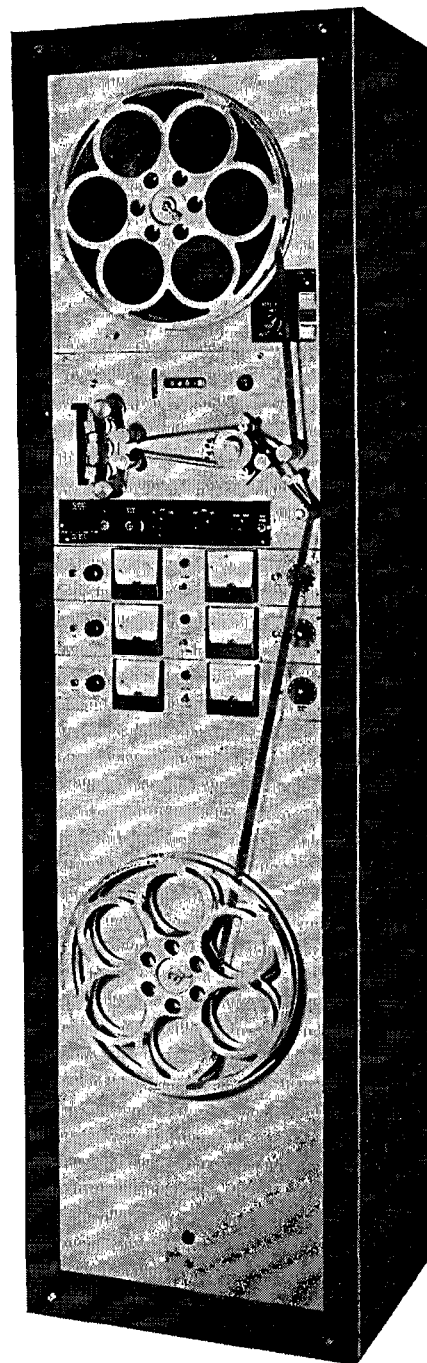
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mittees of both BBC and Independent Television have adopted the continental DIN system. This system calls for a magnetic stripe in the same location on a print as the optical track and continues to make use of the present normal perforations.

As regards 16mm films, both on picture negatives and positive prints, magnetic strips have been used on TV stations' telecine equipment for years. It is likely that compared with "live" TV, the proportion of 16mm and 35mm films will be increased with the development and progress of colour television, both with combined picture and optical sound (comopt) or with combined picture and magnetic sound (commag). This applies especially to colour TV features intended

for the growing world market and its varied systems and line standards.

There are likely to be supplementary purposes for which striped magnetic tracks can be used. For instance, the cutting copies of feature subjects are likely to be edited with sepomag sound. At this stage, when complete, the picture film could be magnetically striped and the sound from the sepomag reel transferred to it, thus converting it to a commag print for immediate transmission.

Such a procedure might be suitable if the routine and expensive process of transferring and preparing comopt tracks is to be avoided.

The author wishes to thank the Rank Organisation and Sonocolor for permission to publish this article.



ATLANTA, Feb. 27—The Atlanta Section met Monday evening, February 27, 1967, at 8:00 p.m., at Provence Productions, Inc., a new motion-picture and television commercial production facility in Atlanta. Members and guests of the Atlanta Section enjoyed a highly instructive evening in this commercial motion-picture production center devoted almost entirely to the production of television commercials. It is one of the largest production facilities of this type in the Southeast and certainly the largest in Georgia.

Gene Mylar, Program Chairman, discussed meetings tentatively scheduled for this year, giving an enumeration of the meetings, dates, and locations.

The evening's program was quite interesting. It began with Bill Brady, a veteran in sound engineering work and formerly with Paramount Productions in Hollywood, discussing the new Fisher microphone boom which he helped design. This boom is much smaller, lighter, and more compact than other booms now on the market and will prove of tremendous value to motion-picture and television producers.

John Barbe, an independent composer, demonstrated several of his music compositions used in the television commercial spots produced by Provence Productions, Inc., including sample spots produced for department stores, banks and independent concerns. He discussed music scoring for television spot commercials, demonstrating with and without music.

Jerry Crowder, President of Provence Productions, Inc., discussed production problems in motion-picture production work. Sample clips of productions were shown and discussed. A question-and-answer period was held.

Fifty-two members and guests attended. Refreshments were served and a tour of the Provence Productions' facilities was given.—Hubert Jenkins, *Chairman*, Public Health Service Audiovisual Facility, National Communicable Disease Center, Atlanta, Ga.

BOSTON, Feb. 15—Dr. Brian Thompson, Director of Optics, Technical Operations Research, Burlington, Mass., presented a paper on "Applications of Lasers to Photography," at the first 1967 meeting of the Boston Section.

The meeting was held at the Arrowhead Inn in Bedford, Mass. and 55 persons attended.

The speaker was highly entertaining as well as informative. Dr. Thompson answered questions from the floor immediately after his paper and during a post-meeting coffee klatch. Audience reaction was quite favorable as evidenced by the number of people waiting to ask questions and examine a hologram sample.—Glenn Lahman, *Secretary-Treasurer*, WBZ-TV, Boston, Mass.

CAPE KENNEDY, Feb. 18—Frank J. Eberhardt, Central Florida Technical Representative, Motion Picture and Education Markets Div., Eastman Kodak Co., presented an interesting program before 35 persons at the Cape Kennedy Section meeting at NCO Academy at Orlando AFB.

Eberhardt described two new films, the Kodak 4X Reversal Film Type 7277 and Ektachrome R Print Film Type 7388. He projected a side-by-side comparison of Tri X and 4X, and between ER Print Film Type 7386 and Ektachrome R. He distributed data sheets on the new films. A