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Memorandum M-886

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Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: CONFERENCE AT EASTMAN KODAK CO., AUGUST 1, 1949

To: J. W. Forrester, H. R. Boyd, H. Fahnestock, R. R. Everett
D. Hageman, L. Sanford, N. H. Taylor

From: E. S. Rich

Date: August 4, 1949

H. Boyd, L. Sanford, and E. Rich were at the Eastman Kodak Company, Rochester, N.Y., on August 1, 1949, for a conference on matters relating to the Reader-Recorder and to the processing and handling of film. The forenoon was spent at the Hawkeye Plant with Dr. Tyler and T. Cochran discussing the present status of reader-recorder testing. This work appears to be progressing satisfactorily. Malfunctions of the film-motion control circuits and of the film-take-up servos which were noted during my visits in June have received considerable study. Sufficient improvement has been made so that it is felt that the importance of further work on these points can be minimized at the present time. The problems remaining in connection with film-motion control apply to manual control only. Automatic control (from the computer) apparently is reliable as far as their tests have shown. No trouble is experienced with the take-up servos provided reels of less than 500 feet are used. The oscillations which occur when a full reel is used has been determined to be caused by variations in the magnitude of the quadrature-phase voltage applied to the two-phase torque motor coupled to that reel. This difficulty can be overcome by providing a better source of two-phase power.

At the present time tests are being made on the deflection circuits and the phototube monitoring and reading circuits. This will involve considerable study of the factors affecting exposure of the film, i.e., beam intensity, focus, flare, halo, etc. So far, test recordings have been made both at normal speed and line-by-line speeds but no reading has been done. It appears that the testing which they will accomplish prior to delivery of the first units will not go beyond the use of words having either all ones or all zeros, or alternate ones and zeros.

It was emphasized that we consider reliability to be the most important goal toward which to strive. In this connection, the possibility

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of increasing the spot size to improve reliability was discussed. The spots could be lengthened relatively easily since we do not require all of the 25 digits presently available. They will make some experimental masks and test this possibility. To increase the width of the spots would require a new timing drum as well as new masks. Decisions on these points will be postponed until after some tests have been made with the Input-Output equipment at M.I.T.

The afternoon was spent at Kodak Park discussing film processing and handling with Mr. C. E. Ives of their research department. The automatic film processing machine is under test there and was set up for a demonstration. A decision has been reached on the type of film that will be used, so the necessary developing chemicals and the operating conditions for the equipment have been determined. The operating speed we observed was 6 inches per minute.

The film decided on is type 5211 with a grey base, a standard film. This film does not have a low-shrink base.

The chemicals required for developing will be available in concentrated liquid form in quart bottles. Full bottles of the concentrate will keep for more than a year. For use they are to be diluted with 3 parts of water and in diluted form a full, tightly-stoppered bottle should last a few months. Chemicals remaining in the machine or kept in partly filled bottles have much shorter life. They should not be used if left in the machine more than half a day or if left in partly filled stoppered bottles more than 5 days.

Equipment and methods for examining film were discussed. Since we will acquire a Model C Recordak film viewer, Eastman Kodak will make us a set of special reticules for use with this viewer for checking the position, dimensions, skew, etc., of recorded words.

A densitometer will be required for examining processed film to determine if there is the proper contrast between exposed and non-exposed areas. This instrument should allow a single recorded spot to be examined at one time which means the light aperture must be less than 0.010 inch in diameter. Such a densitometer is not manufactured commercially (except relatively expensive microdensitometers). Since we will be interested only in relative readings it was suggested that an inexpensive instrument such as the Kodak Color Densitometer, Model I be purchased and fitted with a special aperture of the proper size. This densitometer would also be useful in other types of photographic work.

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Mr. Ives also made a few suggestions for additional equipment which might be useful in working with reels of film. These included the following.

1. A jig for holding a magazine and opening its light lock in order to minimize fumbling and possible injury to the film while it is being loaded in darkness.
2. A rack for storing extra magazines.
3. Apparatus for rewinding film by hand at the proper tension.
4. A light source and small magnifier for rapid examination of film.

Items 3 and 4 above might be conveniently mounted together on a bench along with the film splicer for making composite reels from several selected pieces of film.

Signed: Edwin S. Rich
Edwin S. Rich

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