

February 9, 1959

Memorandum for Mr. R. B. Bevier

Subject: CRT Display of Computer Output

In accordance with your request for an evaluation of the prospective uses for CRT display devices, a meeting was held on February 4, 1959 with the following persons in attendance:

R. E. Blue  
F. H. Branin  
E. W. Coffin  
R. J. Evey  
R. C. Gwinner  
R. Mc Gowan  
R. B. Miller  
L. O. Nippe  
J. L. Scott  
R. R. Seeber

The relative capabilities and costs of the Endicott Microfilm Printer-plotter and the IBM 740/780 CRT Recorder-Display system were discussed.

From various remarks and observations made both during and after this meeting, it is evident that two principal courses of action are desired by those who need and/or can use CRT display equipment. First, there was complete accord in the matter of acquiring the Endicott Printer-plotter as soon as possible. The expected uses for this machine, as described below, indicate clearly both the need for and desirability of obtaining it immediately. Second, although the cost and limited alphanumeric display capabilities of the 740/780 system weigh against it, there is still a desire to use this device, even if only for relative evaluation studies. In particular, the immediate visual display feature of the 740/780 is of direct importance and interest to Dr. R. Miller's Human Factors group, as indicated below.

It is urged, therefore, that a renewed effort be made to obtain the necessary support for maintaining the Endicott Printer-plotter

and that this machine be installed in the PDL Computing Center as soon as this support has been assured. It is also proposed that the 740/780 CRT system, which is presently sitting unused in the 709 machine room of the 703 building, be fired up for use on a temporary basis with the 709 machine as long as these machines remain in their present location. Even a few months of use of this equipment would be very worthwhile in providing direct experience in the use of visual display techniques.

The principal features of the Endicott Printer-plotter and 740/780 system, with respect to both curve plotting and alphanumeric display, may be summarized as follows:

	<u>Endicott Printer-plotter</u>	<u>740/780</u>
Plotting	2000 points/second	7000 points/second
Printing	2 pages/second	2 pages/minute
Film Record	Yes	Yes (740)
Visual Display	No	Yes (780)
Input	Magnetic tape or 704, on line, via tape drive unit	704 or 709, on line

The Endicott Printer-plotter can take tapes prepared for printing on either the 717 or 720 printers and can do so without any change in the mode of tape preparation. The plotting mode requires a different tape format, however.

The presently discernible uses for the Endicott Printer-plotter machine and 740/780 system are as follows:

1. The Endicott Printer-plotter could be used very effectively in speeding up the printing operation in Mr. P. W. Case's automation of design effort. Mr. Case estimates that he will have an average daily production of about 300 pages of wiring lists. His presently planned method of operation is to print these lists on vellum, using tape input to the 717 printer, then reproduce several copies on the Bruning machine and finally microfilm the vellum for permanent storage and later reproduction in volume.

The time for printing 300 pages on the 717 is about 2-1/2 hours and the time for copying 300 pages on the Bruning machine, 1/2 hour; thus a lapse of at least 3 hours, exclusive of handling and scheduling delays, is involved between the time a tape is prepared and hard copy is available. Using the same tape, the Endicott Printer-plotter could produce an exposed microfilm record of 300 frames (pages) in about 3 minutes; developing time would be less than 10 minutes; copying time (on the Copyflow machine) would be about 15 minutes. Thus, a lapse of only 30 minutes, exclusive of handling and scheduling delays, would be involved. Moreover, a microfilm record would be produced in the process, thereby eliminating a step in the present scheme of operation.

(Contd.)

1. Although Mr. Case was not present at the meeting, he has stated that he would use the Endicott Printer-plotter as soon as it could be installed and demonstrated to do his job satisfactorily. As recommended by Mr. E. W. McClendon, a feasibility test should be undertaken. Arrangements are being made to send a tape to Endicott for such a test, but according to Mr. R. E. Blue, the Endicott Printer-plotter is not being operated at present; approval from Mr. J. E. Dayger would have to be obtained in order to fire up the Endicott Printer-plotter and carry out the test.
2. Another possible use for the Endicott Printer-plotter might be in printing logic diagrams for Mr. P. W. Case. However, since 176 contiguous lines per frame are needed whereas the Endicott Printer-plotter can handle only up to 76 lines per frame, some modification would be required.
3. Either the Endicott Printer-plotter or 740/780 system, or both, could be used in Dr. R. B. Miller's study of man-machine inter-relations. A CRT display device is needed by the Human Factors group for preliminary testing of display techniques for human decision-making, such as in business gaming. Dr. Miller's plans call for the machine to plot multiple-variable information in various graphic formats on demand by members of the experimental team of players who are in process of making strategic and tactical business decisions. For maximum use in this purpose, the Endicott Printer-plotter should be equipped with a high speed developer so that a visual display may be made rapidly available. Alternatively, the 740/780 system, with its instantaneous visual display could be used. According to Dr. Miller, this study of visual display techniques is of critical importance to the 1959 effort of the Human Factors group.
4. Either the Endicott Printer-plotter or 740/780 system could be used for displaying computed transient or frequency response curves in connection with the writer's work on machine analysis of networks. This application has been discussed in two memoranda to R. A. Henle dated January 9 and 26, 1959, copies of which have already been sent to you. In the January 26, 1959 memo, incidentally, it was requested that the 740/780 system in the 709 machine room be made available for use on a temporary basis.

5. Other potential users of CRT display devices include: Dr. H. G. Kolsky in plotting computed results of his timing studies in the STRETCH machine; Mr. M. Kloomok in connection with his work on a centralized file of engineering drawings; and Mr. R. C. Gwinner in his work on financial and administrative control. (A copy of Mr. Gwinner's memo is enclosed.) Messrs. L. O. Nippe and R. J. Evey also indicate that the Endicott Printer-plotter might prove to be a very useful output device for many of the existing production printing jobs in the PDL Computing Center.

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Enclosure