Early Microfilm Plotters at Bell Labs

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Summary

The microfilm plotter used at Bell Labs to create computer art and animation during the 1960s was initially a Stromberg Carlson SC-4020. However, around 1968 a Stromberg DatagraphiX SD-4360 plotter replaced it. This short article documents this replacement and corrects the general assumption that all the work done at Bell Labs was with the SC-4020.

The SC-4020

Early digital art and animation was done at Bell Telephone Laboratories, Incorporated (Bell Labs) during the 1960s. This work was done on mainframe IBM and GE computers, which created data to control and to create graphic images on a Stromberg Carlson SC-4020 microfilm plotter.

The microfilm plotter had a Charactron cathode ray tube (CRT) in which the electron beam was deflected through a mask of alphanumeric characters and then deflected to a final position on the faceplate of the screen. A shutter-less 35 mm or 16 mm camera photographed the screen of the CRT. For computer animation, the camera captured a series of images to create the final animated sequence.

Although intended as a high-speed printer, the major impact of the microfilm plotter was in graphics. Hours and days of plotting tables of number by hand were replaced by near instant graphs done on the microfilm plotter. This had significant impact on research and development work at Bell Labs, and elsewhere.

Such researchers at Bell Labs as Edward E. Zajac, Kenneth C. Knowlton, and others (including myself) used the SC-4020.[1] The film from the SC-4020 was processed outside the plotter.

Not All SC-4020: The SD-4360 Took Over

Many historians and I assumed that all the computer animations done at Bell Labs were made using the Stromberg Carlson SC-4020 microfilm plotter. A recent book by Zabet Patterson[2] focuses on the SC-4020 as the instrument that fostered the beginnings of computer art at Bell Labs. But we all missed that the 4020 was replaced by a 4360.

A neighbor of mine worked at Bell Labs during the 1960s as the operator of the microfilm plotter. He was ill in the hospital, and I went to visit him. I showed him a documentary made in 1968 by the BBC about computer choreography. The documentary showed the microfilm plotter at Bell Labs and how the images were made on the faceplate of the CRT. I mentioned the SC-4020, and he firmly stated that the machine shown was not the 4020 but a newer machine, the SD-4360. I was flabbergasted, and immediately investigated the factual basis for his statement and interviewed him in more detail [3]

He showed me slides of the SC-4020 and its separate film processor. It clearly was not the microfilm plotter shown in the BBC documentary. This machine was a DatagraphiX SD-4360. A photograph in an article in the Bell Labs News shows Kenneth Knowlton and Mrs. Ruth L. Sommers, with the microfilm plotter in the background.[4] The machine is a SD-4360.

What is now known and documented by the above examples is that the SC-4020 at Bell Labs in Murray Hill, NJ was replaced in 1968 by the Stromberg DatagraphiX SD-4360 microfilm plotter. This was more than just a name or model number change; the new plotter was different hardware, although the basic Charactron CRT was similar.

Gene Youngblood wrote a book in 1970 about new media[5] in which book he described a computer-animated movie made by John Stehura around 1965-69. A website describing Stehura's work[6] shows a sketch of the plotter that he claims to have used. It is not the SC-4020 but the SD-4360. This implies that the movie might have been made later than 1965.

All of my computer art and animation was done before 1968, and thus with the SC-4020 at Bell Labs. The computer animation done by Kenneth C. Knowlton with animator StanVanDerBeek was also done mostly before 1968 with the SC-4020 – and so too the early animation by Edward E. Zajac, Frank Sinden, Joseph Kruskal, and Robert Tatem. However, the computer art and animation done after 1968 was with the SD-4360.

Discussion: Historians Take notice

In the end, all this simply is a matter of getting the facts accurate and correct. What matters is that the computer art and animation were programmed on a digital computer and created on a photographic microfilm plotter. The model number matters little, other than avoiding making future statements that give the wrong model.

Figures

Fig. 1. Photograph of the Stromberg Carlson SC-4020 at Bell Telephone Laboratories, Inc. in Building 3 at the Murray Hill, NJ facility. [Photo courtesy of Jerry White.]

Fig. 2. Photograph of the Stromberg DatagrahiX SD-4360 at Bell Telephone Laboratories, Inc. at Murray Hill. The photo shows Kenneth Knowlton with Mrs. Ruth L. Sommers and is from an article “Movies help radiation treatment” in the May 21, 1971 issue of the Bell Labs News. [Photo courtesy of Alcatel-Lucent USA Inc. / Bell Labs.]

References

[1] Knowlton, Kenneth C., “A computer technique for producing animated movies,” *Proceedings of the AFIPS Spring Joint Computer Conference*, April 21-23, 1964, pp. 67-87.
[2] Patterson, Zabet, *Peripheral Vision: Bell Labs, the S-C 4020, and the Origins of Computer Art*, MIT Press, 2015.
[3] Interview of Jerry White conducted July 25, 2015 in Stirling, NJ.
[4] “Movies help radiation treatment,” *Bell Labs News*, May 21, 1971, p. 6.
[5] Youngblood, Gene, Expanded Cinema, P. Dutton & Co., Inc. (New York), 1970.
[6] http://cyberanimation.tripod.com/historypage.htm