BELLCOMM, INC.
1100 Seventeenth Street, N.W. Washington, D.C. 20036

SUBJECT: Trip Report - Dielectric Tape Camera Discussions with RCA
Case 710

DATE: December 12, 1967

FROM: P. L. Chandeysson

MEMORANDUM FOR FILE

On November 16, 1967, M. Cutler and the author met with representatives of the Astro-Electronics Division of RCA to discuss the status of dielectric tape camera (DTC) technology, particularly as applied to planetary photography. Present from RCA were:

Marketing	Engineering
Al Gay	Jim Darcy
Robert House	Ed Walthall
Cliff Paul	Herb Zellen

The DTC concept has been under development by RCA since 1955 and has been funded by NASA and the Air Force. It is a means of storing optical images on a special dielectric tape which looks and handles very much like photographic film. The images are stored in the form of an electrostatic charge distribution rather than as a latent image in silver halide grains. The charge distribution is directly scanned with a vidicon electron gun to produce video signals. In a photographic system, the photographic film must first be developed and then scanned with light to produce video signals.

The DTC offers the possibility of reduced size, weight, and power requirements compared with a conventional photographic subsystem such as used on Lunar Orbiter. In addition, the tape is also less sensitive to radiation damage than film and can be erased and reused indefinitely like magnetic tape. Images can be stored for at least three months without degradation and can be read out several times. Readout at two levels of resolution is available. Color pictures are also possible.

RCA has facilities to produce dielectric tape in 35 MM and 70 MM widths. Formats up to 50 MM square are possible on the larger tape, although the electron guns used with this large format are not well developed. The smaller the format, the lighter the system. One prototype camera has been built; this is a panoramic slit camera intended for meteorology applications on the Nimbus satellite. It uses the 35 MM tape.

Various bread-board cameras have been tested, including a high resolution camera which uses a return-beam vidicon gun to read out the image stored on the tape. A limiting resolution of 80-90 line pairs per millimeter has been achieved - comparable to

the resolution achieved by the Lunar Orbiter photo subsystem. The return-beam vidicon gun incorporates photomultiplier stages which increase the effective light sensitivity of the tape compared to readout with a conventional vidicon gun. The use of dielectric tape with a return beam vidicon readout might be competitive with photographic film especially if satisfactory electron guns are developed to use the larger tape size.

RCA has studied the use of a DTC for a Mars orbiter operating in a 1000 x 20,000 km orbit. In their opinion there is no high capacity tape requirement and they believe that about two feet of reusable tape would be sufficient for each orbit (photograph-read out-erase in preparation for next orbit). They suggest a drum camera with 60 faces on the drum perimeter and a suitable piece of tape mounted to each face; this would eliminate the tape transport problem (take up reels, rollers, etc.). Such a system, complete with its ancillary electronics, would weigh 30-35 lbs, according to RCA. Development time estimated by RCA would be about two years for 35 MM format and three years for a 70 MM format.

Paul L Chandeysson...

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