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NPIC/P&DS/D/6-1575
15 September 1966

MEMORANDUM FOR: Chief, Development Branch, P&DS
THROUGH: Chief, Exploitation Systems Section, DB
SUBJECT: Evaluation of Unsolicited Proposal Number 149/66
Entitled "A Laser Rear-Projection Viewing System"

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1. [redacted] prepared the subject proposal after the undersigned had visited their facility to investigate their progress on a laser display system being developed for Rome Air Development Center. Although the laser display is used for an entirely different purpose than the proposed rear-projection system, the components and techniques of both systems are identical. Recognizing this fact, [redacted] reconfigured the display device into the proposed viewer.

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2. Basically, the proposal envisions the utilization of a laser as the illumination medium for film transparencies. The light beam would be projected through the imagery as in a conventional rear-projection scheme; however, a small portion (about 3%) of the light transmitted by the imagery would be split off the optical path and focused on a photomultiplier. The signal produced in the photomultiplier would be amplified and electrically processed to drive a potassium-dihydrogen-phosphate (KDP) electro-optical light modulator. The modulator would control the intensity of the beam on its next raster sweep. The raster sweep would be faster than the minimum perceptibility of the human eye; therefore, no visible "flicker" would be evident on the screen. The method of scanning the laser beam over the projected image format would depend on the spot size desired. If only a few hundred scan lines per frame are desired a galvanometer-driven moving mirror can be effectively used; however, if over two thousand (five thousand have been achieved) scan lines are desired, a [redacted] developed torsional scanner can be utilized.

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3. The most important aspect to this proposal is that the basic hardware has been previously developed and the calculated efficiency of the proposed system is well within the state-of-the-art. The subject proposal is for a six month feasibility study to determine if proposed system can in fact be utilized in a rear-projection viewer. Using a one watt laser (larger lasers are available)

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the open gate brightness on the screen should be over twenty foot-lamberts. This calculation takes into account the light losses in all of the elements between the laser and the screen. This project is to determine the feasibility of developing the laser display and if feasible, the system performance could easily be increased by utilizing a more powerful laser.

4. This proposal basically satisfies the concepts described in the Development Objectives entitled Modulated-Light Film Viewing System dated 23 March 1964. If this program is successful many advantages could be derived from this type of system. In the Laser Display previously mentioned, [redacted] has successfully developed a full color display using the three primary spectral lines of two lasers. This could lead to a full color display system that would have the capability of variation of the color balance. Since the system is monochromatic, (using a single laser) optical processing could be performed in the spatial frequency plane to do such simple, but important, tasks as eliminate the scan lines produced in the collection of infrared imagery. An additional aid to interpretation of infrared imagery would be color coding the information; e.g. hot objects could be indicated as red and cold targets could be blue.

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5. From the above analysis it is recommended that a project be established to more thoroughly analyze the desirability of a undertaking feasibility study for A Laser Rear-Projection Viewer for FY-1967. It is important that such an effort be started at an early date to enable the concepts (assuming success) to be integrated with other efforts in the same area. Specifically projects such as the Advanced Rear-Projection Viewer and the Improved Rear-Projection Screen should be thoroughly coordinated with the subject effort. It is further recommended that the undersigned be assigned the primary technical responsibility for this effort.

[redacted]

Development Branch, P&DS

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