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NPIC/P&DS/D/6-1512
10 August 1966

MEMORANDUM FOR: Chief, Development Branch, P&DS

SUBJECT: Evaluation of Contract [redacted]

REFERENCE: (a) [redacted] Proposal [redacted] "Automatic Stereo Correlation," dated February 1964
(b) [redacted] Letter, Subject: "Proposed Program for Construction of Breadboard System of an Automatic Stereo Correlation and Evaluation of the Performance Capabilities of such a System," dated 31 March 1964

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1. The subject contract is for the design and development of an "operational breadboard" (reference (b)) to determine the feasibility of developing a relatively simple automatic stereo correlation device for incorporation into the [redacted] Fiber-Optic Roll Film Stereoviewer.

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2. Specifically in reference (a), the contractor proposed to determine the feasibility of utilizing a scanning slit approach in the [redacted] Viewer. Two slits were provided so that the image of the right frame is scanned in synchronism with that of the left frame. Two photomultipliers were also provided for detection of the light level of the slits. When the two images are in correspondence, the relationship of the two slits is such that the slit of one image is leading in phase in relation to the other slit. The signals that are developed by the photomultipliers are then relayed to a difference amplifier which ultimately control drive motors which correct for non-correspondence.

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3. As indicated above, reference (b) indicates that "the result of this program would be the operational breadboard and a final report which would detail performance parameters of such a system which might be procured for inclusion in future viewing systems. [redacted] [redacted] proposed to manufacture a breadboard and to conduct sufficient tests to determine the performance capabilities inherent in such a system." Both references (a) and (b) were incorporated into the contract.

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4. The monthly progress reports through December 1964 indicate that the period from the initiation of the contract (25 June 1964) to December 1964 was spent fabricating the breadboard. Beginning in January 1965, testing and evaluating began.

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GROUP 1
Excluded from automatic
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5. The Progress Report dated 18 March 1965 gave the first indication of operation of the system; "Closed loop tests of the X axis have been made. Stereo correlation with a simple target was obtained over a limited field of view. There are a number of problems to be solved before reliable correlation is achieved."

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6. In the Progress Report dated 19 May 1966 under "Projected Work for Next Period," [redacted] indicated that "1) Additional quantitative tests with simple targets [and] 2) Tests with photographic images" were to be made. The same statement was made in the Progress Report dated 15 June 1965.

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7. In July 1965, the contractor submitted the final report dated 23 July 1965, which indicated feasibility had been positively established; however, based on a demonstration of the system during an inspection visit of 10 August 1965, a judgment was made that the report was not complete because feasibility was yet to be determined as evidenced by the breadboard. At that time, the system could correlate over only short distances in one axis using an extremely simple high contrast target. Since feasibility had not been determined, the contractor was told that he must make the facts (the feasibility demonstration) agree with the final report. This could be done by either revising the report to reflect the proficiency level of the breadboard or reworking the breadboard to the standard reported [redacted] chose the latter course of action, that is, to continue the effort until the validity of the concept could be positively determined.

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8. On 10 November 1965, the contractor was contacted and the agreement was reached that [redacted] was expected to demonstrate automatic correlation of a high contrast complex target--compensating for X, Y, θ , and M (magnification) differences. The light intensity (I) could be held constant if they could show that variations in this parameter would not influence any of the other above-mentioned parameters. The objects used for correlation targets were to have an area at least nine times larger than the total area of the optical field and the correlator was to operate over this entire area.

9. After extensive rework of the breadboard, the contractor finally has demonstrated that the basic concept of his Auto-Stereo Correlator is feasible; however, this was not accomplished before 20 July 1966 -- eight months after the instructions for improvement were given. The originally contemplated eight months contract has required in excess of twenty-four months for completion.

10. This contractor's effort has been below average in comparison to other projects recently undertaken by him for this office. Although

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feasibility was affirmatively proven, it was at best marginal with regard to maintainability and reliability. Although correlation was demonstrated in both the X and Y axes during the demonstration periods frequent maintenance was required. The θ axis was shown to have a correlation function; however, it was not automatic and neither the M nor I axes performed during the testing.

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11. From the discussion it can be concluded the basic concept of the Auto-Stereo Correlation device has been proven to be marginally feasible; however, at this time it would not be feasible to incorporate the device into the [REDACTED] Stereoviewer -- one of the goals of the original effort -- for the following reasons:

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A. The function of all five correlation axes -- X, Y, θ , M, and I -- performing simultaneously has yet to be demonstrated. Although it is felt that this deficiency is not a serious technical hurdle, demonstration of system operation in the simultaneous mode would be necessary before incorporation of this correlation technique could possibly be considered for the [REDACTED] Viewer.

B. The contractor has demonstrated correlation utilizing high contrast complex targets, but has failed to show that correlation can be performed on extremely complex low contrast aerial photography. It would be absolutely essential that this determination be made before the technique could be considered.

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C. The reliability of the breadboard would have to be substantially increased before the concept could be introduced into the viewer.

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D. Emphasis must also be given to the unique optical configuration of the [REDACTED] Viewer in relationship to the correlation system. Unknowns such as incorporation of the extremely inefficient (illumination efficiency) fiber-optic cable and complex mirror system into the optical path of the correlation system create doubts as to feasibility of the system in its present configuration. Certainly a demonstration of the feasibility of the system utilizing the [REDACTED] Viewer's optical path components would be required.

12. From the above discussion it can be concluded that this office has been extremely liberal in the interpretation of the original performance specifications of this contract. The following reasons justify this action:

A. This contract is another case of a fixed price contract being applied to a research and development effort. Regardless of where the fault lies in creating this situation, this office concluded when it reached its decision on 10 August 1965 to reduce the performance criteria that this would be the only equitable solution.

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25X1A to the contractor's financial situation -- extremely overexpended -- at that time. This was especially true in light of concurrent contract overruns [redacted] on other contracts. In relation to the state-of-the-art of automatic stereo correlators, it was felt that an extremely high level of expenditure would be required to technically satisfy the contract; however, this could not be justified with the knowledge of the large degree of certainty that the Government would bear a portion of these costs.

25X1A B. The reduction of the specification was the minimum standard that would prove feasibility and in addition was an equitable compromise. It was made in light of the intention to pursue automatic stereo correlation elsewhere [redacted] but the specifications were not reduced to the point to defeat the basic purpose of this contract -- to prove feasibility of the [redacted] concept of correlation. The compromise was made after a decision had been reached not to continue research in this field with this contractor.

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C. The decision to reduce the performance did not in reality reduce the potential value of the contractor's performance. It was the only equitable solution to the situation and, as discussed above, insistence on complete technical compliance to the contract would probably necessitate additional (unreasonable) Government expenditure.

In conclusion, it is recommended that further feasibility studies on the subject correlation device not be undertaken [redacted] for the following reasons:

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25X1A A. Other programs being undertaken by NPIC in the field of stereo correlation -- namely [redacted] Automatic Stereo Scanning Program and, to a lesser degree, [redacted] Auto Stereo Correlator (Exploratory Development Laboratory Branch) -- are technically superior to the subject concept as applied to our operational materials.

25X1A B. The contractor's serious time delays have limited the usefulness of the original concept because extensive further feasibility studies would be necessary as indicated above before consideration could be given to incorporation of the concept into the existing viewers.

25X1A C. The Naval Air Systems Command [redacted] has verbally expressed their intention to support an extensive effort with [redacted] to extend the basic concept demonstrated under the subject contract. For this office to continue the program would be

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a duplication of effort. In this regard, it is further recommended that the existing breadboard, which remains at the contractor's facility, be transferred to the Naval Air Systems Command for their use in the new contract. It is of no use to us and would present a storage problem.

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Development Branch, P&DS

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CENTER ROUTING SLIP
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FROM		10 Aug 66	
ESS/DB			
TO	INITIALS	DATE	REMARKS
DIR			<div style="border: 1px solid black; width: 100px; height: 20px; margin-bottom: 5px;"></div> The attached memorandum is for your information. I concur fully with findings and recommendations and have directed him to implement the recommendation in paragraph 12C by stating in his final report to Office of Logistics that the breadboard should be transferred to the Naval Air Systems Command for their use. <div style="border: 1px solid black; width: 150px; height: 30px; margin-top: 10px;"></div>
DEP/DIR			
EXEC/DIR			
TECH ADV			
SPECIAL ASST			
ASST FOR P&M			
CH/SS			
ASST FOR OPS			
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ASST FOR P&D			
Ch/DB	1	16 Aug 66	
CH/CSD			
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DATE *10/7/06*
Initial Date

Office of the Chief

Development Branch

Exploratory Dev. Lab Br.

Plans Branch

Comment:

You have my after the fact concurrence to your decision - but what do we get out of the transfer, from the Navy. Recan we ask for progress in at least a brief report

MEMORANDUM FOR:

Please tell
we will let ~~some~~ ~~know~~
device, but we would like
a copy of final report.

A COPY OF THE FINAL REPORT
WILL BE FURNISHED TO NDIC

JED 19 AUG 66
(DATE)

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FORM NO. 101 REPLACES FORM 10-101
1 AUG 54 WHICH MAY BE USED.

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