NPIC/TDS/D-697-67
20 February 1967

MEMORANDUM FOR: (See Distribution List)

SUBJECT : Automatic Focusing System Staff Study

1. Attached is a copy of the Staff Study for Automatic Focusing System project dated 16 February 1967. It briefly describes the interpretation problem and related facts which initiated this project and the proposed program for its solution.

2. If you concur with this developmental project, please indicate below. If you believe that changes are required, please attach a memorandum with your comments. Address any questions concerning this project
25X1 to [redacted] or [redacted] Design Objectives and industry proposals are available at Technical Development Staff offices
25X1 in [redacted]

3. In order that this staff may advance the project as expeditiously as possible, your answer is requested by ~~24 February 1967.~~ 1 March 1967.

/s/
[redacted] 25X1
Colonel, USAF
Assistant for Technical Development, NPIC

Attachment:
Automatic Focusing System - Staff Study

CONCUR: ______________________ DATE: ______________

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25X1 NPIC/TDS/DS/[redacted] (20 Feb 67)

16 February 1967

AUTOMATIC FOCUSING SYSTEM - STAFF STUDY
#02217

1. PROBLEM

To demonstrate the feasibility of automatically maintaining focus during the process of scanning film with rear projection systems.

2. FACTS BEARING ON THE PROBLEM

Present viewing devices (both direct and indirect) at NPIC have no provision for automatic focus control. Varying environmental and operational conditions often caused the viewed images to become defocussed. It appears that the remedy for this situation is within the capability of contemporary technology.

3. DISCUSSION

a. Current Procedures: The viewing of imagery by direct and indirect optical means has been complicated by the random defocusing of the image caused by varying environmental conditions and by the translations of the imagery itself. This places an unnecessary burden upon the photo interpreter--constant, tedious, manual readjustment of the focusing mechanism during the scanning process.

b. Origin of the Concept: The feasibility of developing an automatic focusing technique which could be readily applied to various categories of optical equipment was studied under a previous contract. The conclusions of the study were that (1) Automatic focusing was technically feasible and (2) An automatic focusing technique has been developed which was indeed applicable to many different type of optical devices.

c. Proposed Program: This is a TDS sponsored effort to give us a capability for A/F which we can apply to viewers, etc. as needed. The proposed program is an immediate follow-on effort to the Automatic Focusing Feasibility Study. It will include the actual fabrication of an automatic focusing device as applied to a rear-screen projection unit. The demonstration model for this particular contract effort will be a breadboard configuration; it will not be designed or constructed as a prototype unit.

The major research and development efforts will be concentrated on the focus-detection optics, lens stereo system, and those characteristics of the film-drive system that contribute to the film-phase variation, thus causing the basic variation in focusing.

Three primary values of magnification will be selected for demonstration, 5X, 15X and 70X to determine whether or not the automatic focusing system can be made to provide a useful range of automatic focus control from low to very high magnification values.

It is anticipated that the proposed task can be accomplished in six working months with an estimated cost of [redacted] on a cost-plus-fixed-fee basis. 25X1

d. Selection of Contractors: Since this is a follow-on to a previous 25X1
contract with [redacted] it would appear to be most beneficial to continue the project with the same technical staff that has been concerned with the project since its inception. As a consequence, [redacted] is recommended as the Contractor. 25X1

e. Coordination: There is no known equipment available or under development which will satisfy this requirement. This project has been coordinated with: DDS&T/ORD, disseminated to the Intelligence Community in the 1966 NPIC Equipment Summary, and presented to the Committee on Photographic Exploitation and representatives of the Army, Navy, and Air Force. The appropriate technical personnel of PAG, IAS/DDI, and TID have been briefed on this project.

f. Alternatives: There are no known devices, existent or under development, which will yield the results of the proposed project. Although there are commercial automatic focusing devices on the market, none are precise or versatile enough to meet the stringent requirements of NPIC's equipment.

4. CONCLUSIONS

An automatic focusing system for the rear projection problem is an important basic step in the evaluation of automatic focusing in general. The system can be modified to apply to other optical systems. Its development will provide an addition to a versatile rear projection viewer currently under development.

5. RECOMMENDATIONS

It is strongly recommended that approval be given to contract with 25X1
[redacted] for a feasibility model of an automatic focusing system for rear projection at a funding lend of [redacted] in FY-1967. 25X1

6. REFERENCES AND ATTACHMENTS

TAB A. Catalog Form
TAB B. Technical Specifications
Attachment: [redacted] Proposal 25X1

(When Filled In)

R & D CATALOG FORM

DATE: 15 February 1967

1. PROJECT TITLE/CODE NAME: Automatic Focusing System

2. SHORT PROJECT DESCRIPTION: Fabrication of a Feasibility Model of an Automatic Focusing Device as applied to a rear projection viewer.

3. CONTRACTOR NAME

4. LOCATION OF CONTRACTOR

25X1 [redacted]

5. CLASS OF CONTRACTOR: Manufacturer

6. TYPE OF CONTRACT: CPFF

7. FUNDS

FY 1966 $ None

25X1 FY 1967 [redacted]

FY 1968 $ None

8. REQUISITION NO.: NA

9. BUDGET PROJECT NO.: NP-V-21-02217

10. EFFECTIVE CONTRACT DATE (Begin - end): April 1967 - October 1967

11. SECURITY CLASS.: AA-Conf. T.-Unclass. W.-Unclass.

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

25X1 DDI/NPIC/TDS [redacted]

13. REQUIREMENT/AUTHORITY

If the device to be fabricated proves successful, the basic principles will have application in any optical device that requires critical focus.

14. TYPE OF WORK TO BE DONE

Engineering Development

15. CATEGORIES OF EFFORT

MAJOR CATEGORY	SUB-CATEGORIES
Viewing Systems	Focusing Systems

16. END ITEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.

Feasibility model and final report. Current focusing systems are too costly and complex, lack precision, require periodic calibration, and cannot be applied to a variety of lens systems.

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION There is no known equipment available or under development which will satisfy this requirement. This project has been coordinated with: DDS&T/ORD, disseminated to the Intelligence Community in the 1966 NPIC Equipment Summary, and presented to the Committee on Photographic Exploitation and representatives of the Army, Navy, and Air Force.

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required) Automatic focusing will be an integral part of other programs under development; i.e., automatic stereo scanning and rear projection viewing. This project will investigate feasibility of automatic focusing applied to rear projection. A suitable technique has been selected, based upon results of previous investigation. In this approach, the object is imaged on the face of a wide-area non-linear photocell which vibrates in the direction of the optical axis. By sensing the phase of the fundamental component in the output signal, and also certain harmonic content, it is possible to determine the state of focus/de-focus.

19. APPROVED BY AND DATE

OFFICE	DEPUTY DIRECTOR	DDCI