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21 October 1966

ADVANCED ANAMORPHIC EYEPIECES

1. PROBLEM.

To extend the anamorphic magnification capability to the [] High Power Stereoviewer to enable the photo interpreter to stereoscopically fuse conjugate images from geometrically distorted photography.

2. FACTS BEARING ON THE PROBLEM.

a. Recently an anamorphic eyepiece attachment was developed for the [] Zoom 70 Microstereoscope. Operational evaluation has shown that this attachment can be extremely valuable for stereoscopic fusion of certain oblique imagery. Production units of this device were purchased and are in use in NPIC.

b. The [] High Power Stereoviewer is replacing the standard Zoom 70 in certain phases of the photo interpretation operation, especially in the detailed analysis phase.

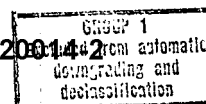
c. Over 150 of the High Power Stereoviewers have either been delivered or are on order.

3. DISCUSSION.

a. Current Procedure. The [] Zoom 70 has become the standard microstereoscope for photo interpretation at NPIC. Because of the inability of a photo interpreter to stereoscopically fuse conjugate images from geometrically distorted photography (e.g., high oblique or convergent panoramic), the anamorphic eyepieces were developed to overcome this deficiency in the Zoom 70. The High Power Stereoviewer is finding increasing application in the photo interpretation operation and the same deficiency exists in that instrument as was formerly present in the Zoom 70.

b. Origin of Concept. The concept of employing anamorphic magnification to permit stereoscopic fusion of certain operational materials was first implemented by the Development Branch, P&DS in FY 1964. In that effort a parallel development was undertaken to determine if the principle of variable-ratio anamorphism would solve an otherwise impossible operational problem. The program for the Zoom 70 was successful and a number of production units were purchased. These instruments were somewhat awkward to use; consequently, another effort to develop an instrument designed for the highest degree of operator comfort commensurate with the required performance characteristics is underway.

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c. Proposed Program. This project will result in the design and fabrication of a set of prototype anamorphic eyepieces for the High-Power Stereoviewer. The program will be divided into two phases: Phase I will be the Design Study and Phase II will be the Fabrication Phase. Initiation of Phase II will be predicated upon the successful completion of the Phase I design study.

d. Technical Characteristics.

1) Anamorphic Range. The system will have a continuously variable anamorphic magnification from 1X to 2.2X; i.e., the anamorphic ratio (ratio of the magnification of two perpendicular meridians of the optical field) will be from 1:1 to 1:2.2.

2) Field. The maximum loss of field will not exceed 5% of the normal instrument's total field without the anamorphics. No significant field curvature will be introduced by the anamorphic system.

3) Anamorphic Axis Orientation. The direction of the anamorphic magnification (anamorphic axis) will be rotatable through 360°.

4) Physical Configuration. The eyepoint will be extended approximately three inches from the position of the present eyepoint and an operator wearing glasses will be able to operate the instrument.

5) Interchangeability. The system is configured to allow disassembly of the anamorphic system from the stereoviewer within three minutes without the use of special tools. Accommodation is made for utilizing the system on any [redacted] High Power Stereoviewer.

6) The anamorphic system will not significantly degrade the optical performance of the High Power Stereoviewer equipped with the Wild Fluotar objectives and compensating eyepieces.

e. Selection of Contractor. [redacted] submitted their proposal in response to the Development Objectives entitled: "Advanced Anamorphic Eyepieces" dated 2 August 1966. Of the seven companies invited to bid only three responded. [redacted] was chosen because: (1) their proposal was the best technical response to the objectives, (2) of their experience in the field of development of anamorphic eyepieces (they were awarded the contract by this office for development of the advanced anamorphic eyepiece attachment for the Zoom 70), (3) they developed the High Power Stereoviewer and therefore are more knowledgeable of the characteristics of this instrument than the other bidders, and (4) they were the lowest bidder.

f. Program Phasing. This project will be a two phase effort. Specifically, the design phase will require four months and the fabrication phase five months and will be predicated on the successful completion of the design study.

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5X1 g. Coordination. There is no known equipment either under development or available commercially which will satisfy this requirement. This has been coordinated with DDS&T/ORD, disseminated to the intelligence community through the 1966 NPIC Equipment Summary and presented to the Committee on Photographic Exploitation. Specifically, representatives of the Naval Air Systems Command, Rome Air Development Center, and the Geodesy, Intelligence Mapping Research and Development Agency maintain that no effort within their responsibility duplicates this project. A previous contract at NPIC has resulted in successful anamorphic eyepieces for the [] Model II Stereomicroscope; however, no anamorphic eyepieces for the Twin Dynazoom Microstereoscope (150 of which are on order) exist or are in development.

h. Alternatives. The only alternative to this program would be to continue to operate the High Power Stereoviewers in the present manner without the ability to fuse certain stereoscopic imagery.

4. CONCLUSIONS.

The Advanced Anamorphic Eyepieces promises to be a significant improvement in the utilization of the [] High Power Stereoviewer. Since it is presently impossible to view certain imagery with adequate stereoscopic fusion, this attachment must be developed.

5. RECOMMENDATIONS.

5X1 It is recommended that approval be granted to contract with [] [] at a funding level of []

6. REFERENCE AND ATTACHMENT.

TAB A - Catalog Form

5X1 ATTACHMENT: [] Proposal No. [] 6-0878, dated September 1966.

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TAB A

R & D CATALOG FORM

DATE

28 October 1966

1. PROJECT TITLE/CODE NAME

Advanced Anamorphic Eyepieces

2. SHORT PROJECT DESCRIPTION

Development of anamorphic eyepieces for the High Power Stereoviewer.

3. CONTRACTOR NAME

4. LOCATION OF CONTRACTOR

5. CLASS OF CONTRACTOR
 Manufacturer

6. TYPE OF CONTRACT
 CPFF

7. FUNDS

FY 19 66 \$ None

FY 19 67

FY 19 68 \$ None

8. REQUISITION NO.

9. BUDGET PROJECT NO.

NP-V-9-02097

10. EFFECTIVE CONTRACT DATE
 (Begin - end)

December 1966-September 1967

11. SECURITY CLASS.

A.A. - Confidential
 T. - Unclassified
 W. - Unclassified

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

DDI/NPIC/P&DS/

13. REQUIREMENT/AUTHORITY

Many interpretation processes throughout the intelligence community require instruments with optical anamorphic stretch capability for optimum interpretation of geometrically distorted photography.

14. TYPE OF WORK TO BE DONE

Engineering Development

15. CATEGORIES OF EFFORT

MAJOR CATEGORY

Viewing Systems

SUB-CATEGORIES

Lens Systems

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

A set of operational prototype anamorphic eyepieces for the High Power Stereoviewer, monthly progress reports, and appropriate instruction manuals.

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION

There is no known equipment either under development or available commercially which will satisfy this requirement. This has been coordinated with DDS&T/ORD, disseminated to the intelligence community through the 1966 NPIC Equipment Summary and presented to the Committee on Photographic Exploitation.

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required)

Develop a set of anamorphic eyepieces for the High Power Stereoviewer with variable anamorphic ratio from 1:1 to 1:2.2, a maximum loss of field of 5%, direction of anamorphic stretch rotatable through 360°, and loss of resolving power no more than 20% from standard High Power Stereoviewer.

19. APPROVED BY AND DATE

OFFICE

DEPUTY DIRECTOR

DDCI

25X1

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