

~~TOP SECRET~~
DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.



9 FEB 1967

REPLY TO
ATTN OF: AFRDC

SUBJECT: Photographic Readout System for Use in Reconnaissance Aircraft

TO: AFSC

1. Enclosed is correspondence I received this date from Dr. Flax in his capacity of (S) DNRO. The correspondence is largely self-explanatory, and it is my understanding that Colonel Lowe of your staff has participated in the discussions leading to this letter.

2. As requested by Dr. Flax, I will keep this effort under the special security of the BYEMAN security control procedures within this headquarters. I have assigned staff responsibility for this matter to my Assistant for Reconnaissance, Colonel Dixon. His staff is prepared to assist you in any manner necessary to expedite the development program required.

FOR THE CHIEF OF STAFF

JOSEPH R. HOLZAPFLE
Lieutenant General, USAF
Deputy Chief of Staff,
Research & Development

1 Atch
BYE 52120-67
w/1 Atch

Handle via BYEMAN
Control System

~~TOP SECRET~~

BYE 54304-67
Cy 1 of 2 cys
Pg 1 of 1 pg

Underwrite Your Country's Might - Buy U.S. Savings Bonds

20 FEB 1976

~~TOP SECRET~~

HANDLE VIA
BYEMAN
CONTROL SYSTEM

~~SI~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.

DORIAN
GAMBIT

OFFICE OF THE DIRECTOR

February 9, 1967

MEMORANDUM FOR LIEUTENANT GENERAL HOLZAPPLE, AFRD

SUBJECT: Photographic Readout System for Use in Reconnaissance
Aircraft

A project has been underway for some time within the National Reconnaissance Program to develop the technology to read out photographic film from a reconnaissance satellite to a ground station. This effort has progressed to the point that an engineering model of a readout system for use with GAMBIT-3 optics has been built and demonstrated in ground test.

The pros and cons of extending this development to flight test have been examined in some detail in the light of present budget limitations and the capability of existing and proposed photographic systems to satisfy the requirements of the intelligence community. As a result of this review, it has been decided that further development and flight test of this specific readout system will not be continued at this time. The major contract for this effort is with Columbia Broadcasting System Laboratories. This contract will terminate on February 28, 1967; final phase-down in project manning is underway.

In view of the significant advances in readout technology which have resulted from this project, it is appropriate to examine application to other DoD uses such as aircraft reconnaissance systems. Plans have been formulated in DDR&E to establish a Tri-Service Program to apply this technology and equipment to reconnaissance aircraft such as the RF-4C, RF-111 or the Navy RA-5C. It is anticipated that this Tri-Service Program will commence about October 1, 1967.

CBS has assembled a highly competent engineering staff for the GAMBIT-3 effort which should be retained for the planned Tri-Service Program. This can be accomplished by early initiation of an interim program at CBS to begin to apply this technology and equipment to aircraft and to cover the period from now until the

HANDLE VIA
BYEMAN
CONTROL SYSTEM

DORIAN
GAMBIT

~~TOP SECRET~~

EXCLUDED FROM AUTOMATIC REGRADING
ODD DIRECTIVE 5200.10 DOES NOT APPLY

20 FEB 1976

CONTROL NO. BYE-52120-67
COPY 1 OF 12 COPIES
PAGE 1 OF 3 PAGES

~~TOP SECRET~~

HANDLE VIA
BYEMAN
CONTROL SYSTEM

DORIAN
GAMBIT

Tri-Service effort commences. I have agreed that the Air Force will conduct this program. Accordingly, the purpose of this memorandum is to define the objective of the interim program, the general security procedures which must be followed, and the management responsibilities.

Program Objective

The basic objective of the interim program is to preserve the technology represented by the CBS photo processor and high resolution laser film scanner and recorder, and to continue the development of these basic subsystems for application to manned and/or drone aircraft and other known Air Force requirements. An abbreviated work statement which is designed to accomplish this objective is attached.

Security

The need to maintain comprehensive security protection during the transition period from an NRO to an Air Force Program and thereafter, cannot be over-emphasized. The fact that a photographic readout program was initiated by the NRO, and that some of the technology developed in this program may be utilized in other NRP projects is extremely sensitive and must remain so; such information will continue to be protected under the BYEMAN Security Control System. Otherwise, the security aspects of the aircraft oriented photographic readout program should be handled as SECRET; however, the strictest need-to-know must be established for program access. It is recommended that special handling procedures similar to those used in certain space programs (AFR 205-23) be applied. After the transition period, normal Air Force/DOD security criteria should be applied.

Staff Management

In general, this program must be handled in the Air Staff in a manner similar to other sensitive aircraft reconnaissance programs. The Air Staff Project Monitor must be appropriately cleared in the BYEMAN Security Control System to provide necessary security protection and to coordinate as required with the NRO Staff.

Field Management

In view of the need to protect the association of the NRO with film readout, to protect future application of this highly advanced technology in other programs (such as the MOL), and

HANDLE VIA
BYEMAN
CONTROL SYSTEM

DORIAN
GAMBIT

~~TOP SECRET~~
EXCLUDED FROM AUTOMATIC REGRADING
DOD DIRECTIVE 5200.10 DOES NOT APPLY

CONTROL NO. BYE 52120-67
COPY 1 OF 12 COPIES
PAGE 2 OF 3 PAGES

~~TOP SECRET~~

HANDLE VIA
BYEMAN
CONTROL SYSTEM

DORIAN
GAMBIT

the necessity for a simplified management arrangement which will permit a rapid transition of responsibility to the Tri-Service SPO, the field management responsibility for this interim program should rest with AFSC Headquarters. Here also, the program should be handled in a manner similar to other sensitive reconnaissance programs and the AFSC Program Manager must be appropriately cleared in the BYEMAN Security Control System.

Funding

This program will be programmed and funded as an advanced development line under Reconnaissance Strike Capability. [REDACTED] dollars has been designated to cover the period ending September 30, 1967.

It is requested that the necessary actions be taken to establish this interim program. The NRO Staff will assist in the security planning, and in coordination of the program plan and arrangements which are formulated.

Alexander H. Flax

Alexander H. Flax

Attachment

DORIAN
GAMBIT

HANDLE VIA
BYEMAN
CONTROL SYSTEM

~~TOP SECRET~~

EXCLUDED FROM AUTOMATIC REGRADING
ODD DIRECTIVE 5200.10 DOES NOT APPLY

CONTROL NO BYE 52120-67
COPY 1 OF 12 COPIES
PAGE 3 OF 3 PAGES

~~SECRET~~

WORK STATEMENT

PHOTOGRAPHIC FILM READOUT SYSTEM FOR AIRCRAFT APPLICATIONS, COLUMBIA BROADCASTING SYSTEM LABORATORIES

I. General

The CBS Laboratories are developing an engineering model of several major components of a high resolution photographic readout system. The purpose of this contract is to continue the development of these major subsystems for use in manned or unmanned aircraft, and continued development of components of the subsystem which have other Air Force applications.

These components are:

- (a) Photo Processor.
- (b) High resolution laser film scanner.
- (c) High resolution laser recorder.

II. Tasks

1. The contractor shall continue the functional and performance testing of the photographic film readout system referred to as the CBS Engineering Model #1 (EM-1). Where feasible, the EM-1 shall be used as a test bed for other requirements of this contract. All test results shall be thoroughly analyzed in order to provide a sound technical base for future system

~~SECRET~~

Copy-- 2 of 2 Copies
Page 1 of 1 Pages.
Control No. 670056

~~SECRET~~

and sub-system designs. The objectives of the EM-1 testing shall be

(a) To produce positive transparencies from a variety of negatives transparency inputs.

(b) To obtain system and subsystem reliability and maintainability data.

(c) To establish overall operational compatibility of each subsystem with airplane and drone applications and environments.

2. The contractor shall evaluate the separate and combined use of the major system elements, listed in paragraph 1, in aircraft and drone applications. Various combinations and models of each of the above elements should be evaluated to establish a range of performance, cost, weight and size for the major components. For example, processor through put time vs. exposure index shall be determined for the applicable range of camera type and exposure conditions. Each system element, or if applicable, subsystem component, shall be designed so as to be usable independently of the rest of the system, for other Air Force applications.

3. A configuration study shall be conducted for specified aircraft and/or drones. The characteristics of the vehicles (volume, weight, form factor, etc.) shall be provided by the Air Force. This study shall provide an initial set of system

~~SECRET~~

Copy-- 2 of 2 Copies
Page 2 of 6 Pages.
Control No. 670056

~~SECRET~~

specifications configuration drawings, Aerospace Ground Equipment Studies, interface data and performance tradeoffs related to operational parameters and mission profile analysis. This study will not consider data link equipment but will state data link requirements in terms of performance required.

4. The contractor shall initiate a program of component improvement studies designed to provide options for optimized resolution, area scan rate and band width. Tradeoffs shall be determined between such factors as output film resolution, transmission time per frame (for 70mm, 5 inch and 9.5 inch film) and band width required for the transmission link. Specific design data relating practical engineering considerations to overall system utilization will also be provided. Where practical, breadboards will be developed or, preferably, modifications to previous breadboard systems will be utilized to prove feasibility.

5. The contractor shall establish the optimum use of the recorder subsystem as an airborne recorder for direct or FM recording of continuous tone, analog or pulse type information. Recorders for the following applications shall be considered:

- a. High Resolution Infrared Sensors
- b. High Resolution Laser Scanner Sensors
- c. High Resolution Coherent Side Looking Radar

~~SECRET~~

~~SECRET~~

d. Electronic Warfare Systems

e. Other appropriate reconnaissance sensors

The contractor shall also establish the design parameters of the recorder for recording the outputs of a data link which receives input information from the above sensors. The data link receiver may be either at a ground station or aboard an aircraft.

For both airborne direct recording or airborne or ground recording through a data link, the recorder engineering analysis shall establish a subsystem compatibility with individual system characteristics (i.e., amplitude linearity and phase continuity requirements, wide V/H range, infrared and laser line scan sensor tangential sweep non linearities, radar squint angle and slant range corrections, etc.)

The recorder designs shall be based upon requirements for near real time viewing (where appropriate) as well as storage and later input-output to data reduction and data processing equipment.

6. The contractor shall establish the manufacturability of the various configurations from a schedule, cost, functional and environmental compatibility point of view. This effort shall establish practical tradeoffs relating the degree of

~~SECRET~~

~~SECRET~~

precision achievable (i.e., spinner factor error, mirror flatness, lens performance, etc.) within a range of performance, cost and schedule parameters. Specific cost effectiveness comparisons shall be established.

7. The effort described in this work statement will be conducted from 1 February to 30 September 1967. A level of effort shall be maintained to accomplish as much of the above as is possible within this time period. The expected output of this effort will be technology in the form of detailed engineering reports and breadboard hardware as specified. The contractor will make every effort to maintain a flexible posture to changing requirements and goals.

III. Documentation

1. Documentation will consist of progress reports and detailed engineering reports. Quarterly progress reports will be submitted describing the efforts for each item of the work statement. The final progress report summarizing the entire effort will be provided at the end of the contract period. Engineering reports in accordance with specific customer requirements will be provided at the end of the contract period for each major portion of the subsystem as described above.

~~SECRET~~

~~SECRET~~

IV Contract Period

This contract will be in effect for the period of 1
February 1967 to 30 October 1967.

~~SECRET~~

Copy-- 2 of 2 Copies
Page 6 of 6 Pages.
Control No. 670056