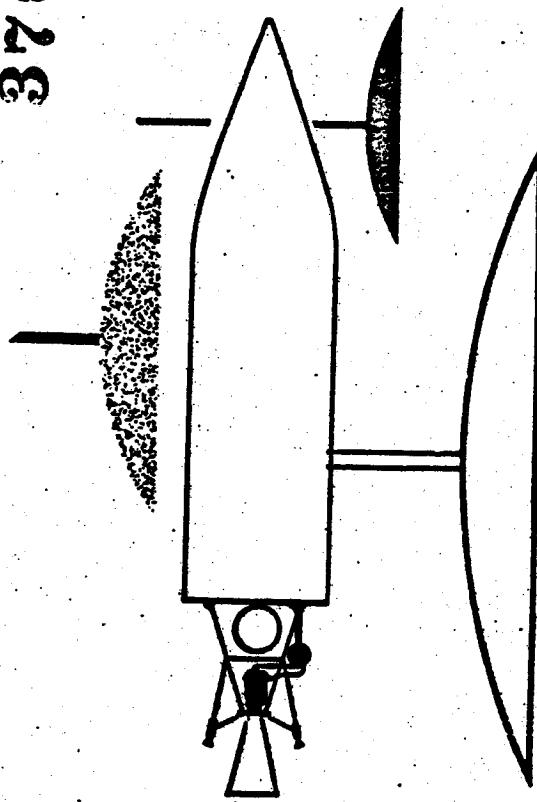


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VOL II

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**DEVELOPMENT
PLAN (S)**

VOL. II SUB-SYSTEM PLAN

G. Infrared Reconnaissance

30 1968

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SECURITY CLASSIFICATION

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RDB PROJECT CARD		TYPE OF REPORT	REPORTS CONTROL SYMBOL DD-RDS/AJRS	
1. PROJECT TITLE INFRARED RECONNAISSANCE SUBSYSTEM FOR ADVANCED RECONNAISSANCE SYSTEM (Uncl.) (PIED PIPER)		2. SECURITY Secret 4. INDEX NUMBER	3. PROJECT NUMBER 1115 5. REPORT DATE 1 March 1956	
6. BASIC FIELD OR SUBJECT		7. SUBFIELD OR SUBJECT SUBGROUP		7A. TECH. OFFL
8. COGNIZANT AGENCY		12. CONTRACTOR AND/OR LABORATORY Lockheed Missile Systems Division		CONTRACT/W.O. NO. AF 33(616)-3105
9. DIRECTING AGENCY	OFFICE SYMBOL	TELEPHONE NO.		
10. REQUESTING AGENCY		13. RELATED PROJECTS		17. EST. COMPL. DATES REL. DEV. TEST OP. EVAL. '58. FY FISCAL ESTS. (M \$)
11. PARTICIPATION, COORDINATION, INTEREST		14. DATE APPROVED		
15. PRIORITY Maximum		16.		
19.				
20. REQUIREMENT AND/OR JUSTIFICATION <ul style="list-style-type: none"> a. This subsystem will provide early warning, observation of military aircraft patterns, and ground detection of targets. No comparable subsystem is currently available or under development. All previous infrared systems have been developed for manned aircraft. For satellite application, the resolution, sensitivity, scanning, and data processing requirements are of different magnitudes because of the altitude and environment (nuclear radiation from the APU for example). Extremely high reliability is required for unmanned operation, and other operational considerations. b. Air Force interest will center about surveillance possibilities, particularly of inaccessible regions as related to early warning systems. c. This subsystem should increase Air Force capability in the direction of greatly increased warning time of attack by manned aircraft, air-breathing missiles, and ICBM launchings. It will also increase the Air Force capability to provide surveillance of military air traffic patterns as an indicator of imminence of hostilities. 				
22. RDS	SAC	CN	K & P	X L C

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R&D PROJECT CARD
CONTINUATION SHEET~~SECRET~~
SECURITY CLASSIFICATION

1. PROJECT TITLE INFRARED RECONNAISSANCE SUBSYSTEM FOR ADVANCED RECONNAISSANCE SYSTEM (UNCLASSIFIED)	2. SECURITY OF PROJECT Secret	3. PROJECT NUMBER 1115
4.	5. REPORT DATE 1 March 1956	

(PIED PIPER)

21 a. Characteristics

This subsystem will acquire infrared radiation data for the tracking of manned bombers and air-breathing missiles. It will include equipment for information storage and relay to ground intercept stations. Variants will provide for detecting and tracking of ICBMs, for instantaneous data transmission through a multi-satellite communication network. Reconnaissance and surveillance data is thus delivered for intelligence groups.

21 b. Approach

Two models of infrared equipment employing detectors of the PbTe type are considered: one for operations against manned bombers and air-breathing missiles and the other against ICBMs. Although the basic concepts will be the same for both, there are two major differences: the type of scan and method of transmitting the data to the ground. For ICBM detection-tracking the information is relayed to the ground via an intersatellite radio network, and a satellite-to-ground link. In the case of the manned bomber detection system, the information is recorded prior to transmission to the ground. The type and quantity of information that is transmitted and recorded is such as to permit the use of very narrow bandwidths (on the order of kilocycles). Sensitivity, resolution, and reliability will be the major problems which will be encountered during the subsystem development program.

21 c. Subsystems Tasks**1. a. IR Scanner for Bomber Tracking**

- b. Contractor: Eastman Kodak Co., and Lockheed, MSD.
- c. The optical system for the manned bomber and the air-breathing missile will be designed in accordance with conventional infrared collector systems. The reflector will be capable of scanning around a vertical axis covering a solid angle of 90 degrees, making it possible to determine orientation of the target with respect to the satellite. The subsystem will be capable of detecting the exhaust plumes of manned aircraft as well as air-breathing missiles in the radiation region of 4.2 microns. The range of detection of a high-altitude intercontinental bomber or missile will be in the order of 420 n. miles. (Ref. 1, p. A-1)

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1. PROJECT TITLE INFRARED RECONNAISSANCE SUBSYSTEM FOR ADVANCED RECONNAISSANCE SYSTEM (Uncl.) (PIED PIPER)		2. SECURITY OF PROJECT Secret	3. PROJECT NUMBER 1115
		4.	5. REPORT DATE 1 March 1956
<p>2. a. <u>IR Scanner for ICBM Tracking</u></p> <p>b. Contractor: Eastman Kodak Co., and Lockheed, MSD.</p> <p>c. The optical system to be utilized for the ICBM detection will be similar in general features to those used for bomber detection. However, due to the nature of the detection problem (high trajectory ballistic missiles) it will be necessary to provide two reflectors mounted back-to-back creating two essentially horizontal fan beams which scan up and down in a nodding motion. The detection range of the system will be a minimum of 3000 n. miles against ICBMs. The altitude of operation of the satellites is in the order of 1000 n. miles. (Ref. 1, p A-13)</p> <p>3. a. <u>Airborne Data Processing</u></p> <p>b. Contractor: CBS and Lockheed, MSD.</p> <p>c. The detected electronic information as received by the scanner which was described in task 1 above is appropriately processed by means of a data processing coder in a form suitable for recording. This data processing equipment will be very similar to that being developed for the Electronic Reconnaissance subsystem.</p> <p>4. a. <u>Data Recording</u></p> <p>b. Contractor: CBS and Lockheed, MSD.</p> <p>c. The data as received from the data processing unit of task 3, is stored on a suitable narrow band magnetic tape recorder. The recording equipment will be quite similar to that being developed for the Electronic Reconnaissance subsystem.</p> <p>5. a. <u>Data Transmission</u></p> <p>b. Contractor: CBS and Lockheed, MSD.</p> <p>c. The data as recorded for subsequent transmission (task 4) provides the input to the data transmission equipment. This equipment consists of a transmitter and associated equipment and will be similar to equipment being developed for the Electronic Reconnaissance subsystem.</p>			

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R&D PROJECT CARD
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SECURITY CLASSIFICATION

1. PROJECT TITLE INFRARED RECONNAISSANCE SUBSYSTEM FOR ADVANCED RECONNAISSANCE SYSTEM (Uncl.) (PIED PIPER)	2. SECURITY OF PROJECT Secret	3. PROJECT NUMBER 1115
	4.	5. REPORT DATE 1 March 1956

6. a. Data Link Network for ICBM Tracking

b. Contractor: CBS and Lockheed, MSD.

c. To provide for immediate transmission of ICBM track data, an inter-satellite network is required. This network is composed of an omnidirectional transmitter and receiver in each satellite. This equipment will not impose a serious weight problem. As targets are detected, the inter-satellite network is activated and all pertinent information is instantaneously put into the network. The number of satellites in this system is chosen such that detection requirements as well as inter-satellite network requirements are met. (Ref. 1, p A-13)

21 d. Other Information

Design techniques as developed by other companies in the I-R field will be monitored in order to assure the completion of a satisfactory subsystem in time for the planned system. There is no available adequate equipment.

21 e. Background History

Study contracts such as Pied Piper under AF 33(616)3105 have determined that reconnaissance data to be obtained with a satellite can be obtained in no other way. Study has determined that important data could be obtained by an Infra red Satellite Reconnaissance System.

21 f. Future Plans

It is planned to continue the studies already initiated and to develop equipment suitable for testing.

21 g. References

1. 2d Quarterly Report, Project Pied Piper.

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TABS

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Subsystem G - INFRARED RECONNAISSANCE

Tab 1 - General Design Specifications

I. GENERAL

A. Statement of the Problem

The basic objective in this subsystem is the solution of the problem of detecting and monitoring infrared images of minute size relative to the large field of view involved. Another aspect of the problem involves the urgency of extracting the data for immediate conversion to military usefulness in counter force activities and to preserve it for use in military intelligence. As in the case of the visual reconnaissance subsystem, the problem is further complicated by the satellite's orbital altitude and velocity.

B. Approach

The approach which will be followed in solving the problem of developing the infrared subsystem is as follows: Two models of infrared equipment, employing detectors of the PbTe type are considered, one for operation against manned bombers and air breathing missiles and the other against ICBM's. Although the basic concepts will be the same for both, there are two major differences, namely, the type of scan and, in the case of the ICBM detection tracking system, the information being relayed to the ground via an intersatellite radio network and satellite-to-ground link. In the case of the manned bomber detection system, the information is recorded prior to transmission to the ground. The type and quantity of information that is transmitted and recorded is such as to permit the use of very narrow bandwidths (on the order of kilocycles per second). The specific equipment to be developed is described in Sec. 2.

C. Solution

Tentative measurements on the infrared radiation emanating from high thrust rocket engines have indicated the feasibility for detecting and tracking aircraft and ICBM's from satellites. However, it will be necessary to carry out a continuing research and testing program aimed at determining radiation values from rocket engines, sensitivity required of infrared detector cells, and means of increasing their capabilities.

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Simultaneous with the research program will be the preparation of the design specifications for the first experimental laboratory model of infrared scanner. This will be followed by design, fabrication and testing of environmental components for flight test, an aircraft test model, a payload test vehicle model and later, an operational test vehicle model of the overall subsystem equipment.

The elements of the infrared air surveillance subsystem for the satellite are all within the state-of-art and can be developed with a normal amount of effort. It is anticipated that the major problems which will be encountered in obtaining an operational infrared subsystem will be those associated with achieving required sensitivity and resolution of the optical system. Another major problem which must be faced will be that of achieving a satisfactory reliability for an automatic unattended system operating in the extreme environment which will exist in a satellite (nuclear radiation fields due to A.P.U., extreme variations in temperatures, etc.).

One of the most difficult problems will be that of providing near 100% reliability during the required military useful life. One specific example is the problem of operating the infrared scanner in the extreme temperature environment and low pressures. This is considered to be primarily a design problem in materials, bearing seals, etc. Shielding design requirements, due to nuclear radiation fields, must be determined in order to prevent deleterious effects on the operation of the PbTe infrared cells, if in fact such effects exist. Ground and flight tests will be required over long periods of time to determine the cumulative effects of these radiation fields.

Information must be derived concerning the spatial and spectral characteristics of rocket engines at various altitudes and using various fuel combinations. It is planned to carry out these tests on test missiles currently in the overall ICBM program. Radiation measurements from the exhaust of turbojets in the region of 4.2 microns will be obtained from current programs.

As a part of the development program it will be necessary to design and fabricate models of experimental laboratory equipment. This equipment will be given extensive laboratory tests to determine feasibility of the concepts and to determine performance parameters primarily of the optical portion of the system.

It is planned to carry out high altitude aircraft tests with the first development model of the infrared subsystem. This development model of the infrared equipment will be modified from the satellite

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configuration by scaling down and calibrating the major components in order to simulate the operation from a satellite. Other laboratory bench models will also be fabricated.

Simultaneous with the aircraft flight test program, critical components of the complete subsystem will be fabricated for testing in the systems test vehicle flight program. These tests will provide certain environmental conditions for components such as infrared detectors, scanner bearings, amplifiers, instrumentation, etc.

The next step is the design and fabrication of several models of the complete IR equipment including all components to be utilized in complete subsystem tests in the Payload Test Vehicle (PTV). These tests will allow the first opportunity to carry out development tests of the equipment in the full scale orbiting vehicle. There will be two variations of the equipment for the first time which will allow tracking of both manned aircraft, and air breathing missiles as well as the ICBM's.

The series of models for complete infrared tracking equipment will be flight tested in the Operations Test Vehicle (OTV). Here there will be six complete subsystems fabricated for each mission; i.e., manned bomber tracking and ICBM tracking. These flight tests will provide the final checks on complete systems performance under operational satellite conditions. It is planned in the case of the ICBM tracking equipment to test out the inter-satellite communications network through the use of two satellites in orbit simultaneously.

In the case of the airborne data processing, recording and transmission equipment, it is intended to take full advantage of the development program which will exist as a part of the Electronic Reconnaissance Subsystem. For this purpose, specifications for these equipments will be prepared based upon the electronic reconnaissance development program and incorporating the minimum number of changes as necessary to fulfil special requirements of the infrared subsystem.

There are no components in the subsystem which are inherently unreliable except for some portions of the electronic circuitry. The electronic unreliability will be treated by the use of redundancy of components and good circuit design.

There are no special installation considerations necessary in connection with the infrared subsystem except for the removable nose cone.

No major GFE is required.

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II. DESCRIPTION OF SUBSYSTEM TASKS

A. IR Scanner for Bomber Tracking

The optical system for the manned bomber and air breathing missile will be designed in accordance with conventional infrared collector systems. The following represents a general guide to how the problem may be solved. The collector would consist of a line array of 40 cooled PbTe detecting cells contained at the focal plane of a 56 in. diameter reflector. Each element would cover a 1° elemental field of view. The reflector would be capable of scanning around a vertical axis and thus cover a solid angle of 90° in 40 concentric 1° circles. The azimuthal orientation of the optical system would be determined and by electronically scanning each individual detecting element in the line array, it would be possible to determine the orientation of the target with respect to the satellite. The detecting elements are capable of detecting the exhaust plumes of manned aircraft as well as air breathing missiles in the radiation region of 4.2 microns. The range of detection on a high altitude intercontinental bomber or missile shall not be less than 420 n. miles. A typical installation of this type of equipment in an orbiting vehicle is shown in Fig. 1. Additional information concerning the operational and hardware studies which support the proposed solution to this task appears in the second quarterly report, MSD-1481, pages 8, 17 and 41.

B. IR Scanner for ICBM Tracking

The optical system to be utilized for the ICBM detection would be similar in general features to that for the detection of manned bombers. However, due to the nature of the detection problem (high trajectory ballistic missiles) it will be necessary to provide two reflectors mounted back-to-back which create two essentially horizontal fan beams which scan up and down in a nodding motion. The optical system would consist of upwards of 70 cooled PbTe detecting elements arranged in a line array at the focal plane of a 56 in. reflector. The incremental field of view will be in order of 0.25° and the overall detection cone will be around 18°. The detection range of the system would be a minimum of 3000 n. miles against ICBM's. The altitude of operation of the satellites is in the order of 1000 n. miles. Additional details covering the operational studies which support the proposed solution of this task appear in report No. MSD-1481, pages 9, 18, and A-13.

C. Airborne Data Processing

The detected electronic information as received by the scanner which was described in para. III is appropriately processed by

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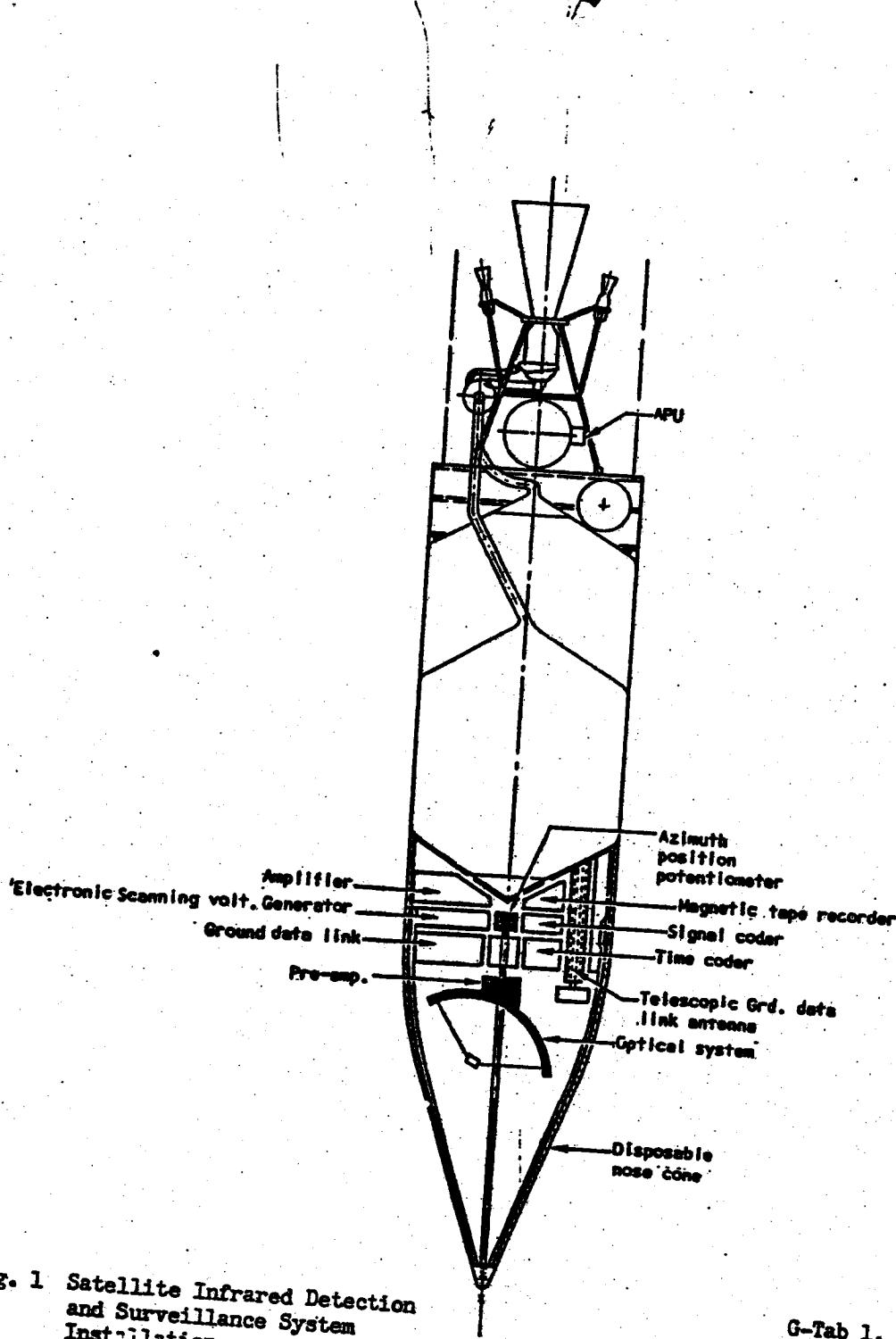
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Fig. 1 Satellite Infrared Detection
and Surveillance System
Installation
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means of a data processing coder in a form suitable for recording. This data processing equipment will be similar to that being developed for the Electronic Reconnaissance Subsystem F.

D. Data Recording

The data as received from the data processing unit of para. IIC in this tab is stored on a suitable narrow band magnetic tape recorder. This data recording equipment will be similar to that being developed for the Electronic Reconnaissance Subsystem.

E. Data Transmission

The data as recorded by the data recording equipment described in para. IC of this tab is fed into the data transmission equipment. This equipment consists of a transmitter and associated equipment and will be similar to the equipment being developed for the Electronic Reconnaissance Subsystem.

F. Data Link Network for ICBM Tracking

To provide for immediate transmission of ICBM tracking data, an intersatellite network is required. This network is composed of an omnidirectional transmitter and receiver in each satellite and would operate on a frequency of about 30 mc. in order to minimize the radiation which reaches the ground. As the targets are detected by the optical system, the data is transmitted instantaneously into the inter-satellite network. The ground station will be capable of "tapping" off the data from the inter-satellite communication network. This ground to satellite data link will operate in the frequency band of 200-300 mc. Operational considerations which dictate the use of the proposed inter-satellite network are contained in report No. MSD-1481, page A-13.

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Subsystem G - INFRARED SUBSYSTEM

Tab 2 Summary - Subsystems M1 locat

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Subsystem 2 - IMPRA REC SUBSYSTEM

Task	Summary - Subsystem Milestones (Continued)	FY			FY			FY			FY		
		CY 60	CY 61	CY 62	CY 60	CY 61	CY 62	CY 60	CY 61	CY 62	CY 60	CY 61	CY 62
1	Design Production Design and Fabrication of CTV Models	X											
4	Flight Tests of Environment Components in STV	X											
7	Fabrication of first model of PTV	X											
8	Model completed	X											
9	Testing of first aircraft model	X											
10	First PTV Laboratory Test Model completed for Manual Control	X											
11	Flight Test of PTV Model for Manual Control	X											
12	Testing of Second Aircraft Model	X											
13	Second PTV Flight Test Model completed for ICBM	X											
14	Completion of Fabrication of First PTV Model for Manual Control	X											
15	Completion of Fabrication of First PTV Model for ICBM	X											
16	Flight Test of PTV Model for ICBM	X											
17	Completion of Fabrication of First PTV Model for ICBM	X											
18	Flight testing of First CTV Model	X											
19	First Manned Booster Model	X											
20	First ICBM Model	X											
21													
22													

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Subsystem C - INTRA REG SYSTEM

Tab 2 Summary - Hardware Delivery

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Subsystem 3 - INFRA RED SUBSYSTEM

Tab 2 Summary - Hardware Definitions

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System G - INTERNAL SYSTEM

Table 2 Summary - Sub-system Test Schedule

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Subsystem G - INFRARED SUBSYSTEM

Tab 2. Summary - Subsystem Test Sched!!!

Tab 2 Summary - Subsystem Test Schedule							
	CT 59	CT 60	CT 61	CT 62			
1	PTV	PTV	PTV	PTV			
2	Aircraft Test Model						
3	Flight Tests of Environmental Components in STV						
4	PTV Flight Tests of Infrared Subsystem (Bomber Tracking) 2 Flights						
5	PTV Flight Tests of Infrared Subsystem (ICBM Tracking) 1 Flight						
6	PTV Flight Tests of Infrared Subsystem (Bomber Tracking) 4 Flights						
7	PTV Flight Tests of Infrared Subsystem (ICBM Tracking) 4 Flights						

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Subsystem G - INFRA RED SUBSYSTEM

Tab 2 Summary - R & U Schedule

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Subsystem G - INFRA RED SUBSYSTEM

Tab 2. Summary - R & D Schedule

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Subsystems of the system

Tab 2 Summary - R & D Schedule
(Continued)

Tab 2 Summary - R & D Schedule (Continued)									
		FY	FY	FY	FY	FY	FY	FY	FY
		CY 56	CY 57	CY 58	CY 59				
		1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER				
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Task - IR Scanner for ICBM Tracking
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Subsystem G - INFRA RED SUBSYSTEM

Hub 2 - Summary - R & D Schedule

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Subsystem G - INFRARED SUBSYSTEM

Tab 2 Summary - R & D Schedule

	FY	CY 59				CY 60				CY 61				CY 62			
		JFM	AM	JAS	OCT												
1. Task - Airborne Data Processing																	
2. Task - Data Recording																	
3. Task - Data Transmission																	
4. (Continued)																	
5. B. Aircraft Model																	
6. 1. Design Completion																	
7. 2. Fabrication																	
8. 3. Flight Testing																	
9. C. PTV Test Model																	
10. 1. Design																	
11. 2. Fabrication																	
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13. 4. Flight Testing																	
14. D. ORV Test Model																	
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17. 3. Laboratory Testing																	
18. 4. Flight Testing																	
19. E. ORV Test Model																	
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24. F. ORV Test Model																	
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28. 4. Flight Testing																	
29. G. ORV Test Model																	
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99. U. ORV Test Model																	
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102. 3. Laboratory Testing																	
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Subsystem G - INFRARED SUBSYSTEM

Tab 2 Summary - R & D Schedule
(Continued)

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Revised Form 103

MSD 1536

Subsystem G - INTRA RED SUBSYSTEM

Tab 2 Summary - R & D Schedule
(Continued)

Task - Data Link Network for ICSN
Tracking (Continued)

B. Aircraft Model

1. Design

2. Fabrication

3. Performance and Environmental Testing

C. FY Test Model

1. Design

2. Fabrication

3. Laboratory Testing

4. Flight Testing

D. FY Test Model

1. Design

2. Fabrication

3. Laboratory Testing

4. Flight Testing

MISSILE SYSTEMS DIVISION

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MSD 1536

G - Tab 2, p 14
(original)

LOCKHEED AIRCRAFT CORPORATION

Revised Form 102

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<input type="checkbox"/> SYSTEM <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> TASK <input type="checkbox"/> OTHER				1. REPORT CONTROL SYMBOL																																																													
				2. PAGE	1 or 4 PAGES																																																												
				3. DATE																																																													
Subsystem 9 - INFRARED RECONNAISSANCE																																																																	
TEST CENTER		PROJECT OFFICER		4. SUPPORTS (Dir or Proj)																																																													
ITEM NUMBER		5. CONTRACTOR		6. INITIAL CHARGE																																																													
7. TEST ITEM		8. TEST DESCRIPTION		10. TEST ITEM AVAILABLE																																																													
9. NUMBER		11. CENTER NR		12. PRIORITY AND PREC																																																													
13. SECURITY																																																																	
1. R & D TEST ANNEX																																																																	
<table border="1"> <thead> <tr> <th colspan="2">14. TEST ITEN</th> <th colspan="2">15. TEST DESCRIPTION</th> <th colspan="2">16. TEST AGENCY AND SITE</th> </tr> </thead> <tbody> <tr> <td colspan="2">1. Experimental Laboratory IR Scanner</td> <td colspan="2">Laboratory Performance Tests</td> <td colspan="2">Eastman Kodak Co. Rochester, N. Y.</td> </tr> <tr> <td colspan="2">2. Aircraft Test Model of IR Scanner</td> <td colspan="2">Flight Tests In Manned Aircraft</td> <td colspan="2">Eastman Kodak Co. Rochester, N. Y.</td> </tr> <tr> <td colspan="2">3. IR Subsystem Environmental Components</td> <td colspan="2">First STV Flight Tests</td> <td colspan="2">AFMTC</td> </tr> <tr> <td colspan="2">4. IR Subsystem Environmental Components</td> <td colspan="2">Second STV Flight Test</td> <td colspan="2">AFMTC</td> </tr> <tr> <td colspan="2">5. PTV Infrared Subsystem (Bomber Tracking)</td> <td colspan="2">First PTV Flight Test</td> <td colspan="2">AFMTC</td> </tr> <tr> <td colspan="2">6. IR Subsystem Environmental Components</td> <td colspan="2">Third STV Flight Test</td> <td colspan="2">AFMTC</td> </tr> <tr> <td colspan="2">20. NAME</td> <td colspan="2">TEST CENTER APPROVAL</td> <td colspan="2"></td> </tr> <tr> <td colspan="2">21. NAME</td> <td colspan="2">ORGANIZATION</td> <td colspan="2">DATE</td> </tr> <tr> <td colspan="2">22. NAME</td> <td colspan="2">RESPONSIBLE CENTER APPROVAL</td> <td colspan="2">DATE</td> </tr> </tbody> </table>						14. TEST ITEN		15. TEST DESCRIPTION		16. TEST AGENCY AND SITE		1. Experimental Laboratory IR Scanner		Laboratory Performance Tests		Eastman Kodak Co. Rochester, N. Y.		2. Aircraft Test Model of IR Scanner		Flight Tests In Manned Aircraft		Eastman Kodak Co. Rochester, N. Y.		3. IR Subsystem Environmental Components		First STV Flight Tests		AFMTC		4. IR Subsystem Environmental Components		Second STV Flight Test		AFMTC		5. PTV Infrared Subsystem (Bomber Tracking)		First PTV Flight Test		AFMTC		6. IR Subsystem Environmental Components		Third STV Flight Test		AFMTC		20. NAME		TEST CENTER APPROVAL				21. NAME		ORGANIZATION		DATE		22. NAME		RESPONSIBLE CENTER APPROVAL		DATE	
14. TEST ITEN		15. TEST DESCRIPTION		16. TEST AGENCY AND SITE																																																													
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20. NAME		TEST CENTER APPROVAL																																																															
21. NAME		ORGANIZATION		DATE																																																													
22. NAME		RESPONSIBLE CENTER APPROVAL		DATE																																																													
MSD 1536																																																																	

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LOCKHEED AIRCRAFT CORPORATION

ARDC FORM 103

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MSD 1536

R & D TEST ANNEX		S. REPORTS CONTROL SYMBOL	
<input type="checkbox"/> SYSTEM	<input checked="" type="checkbox"/> PROJECT	<input type="checkbox"/> TASK	<input type="checkbox"/> OTHER
S. DATE 1 March 1956		S. PAGES Page 2 of 4 pages	
6. TITLE Subsystem G - INFRARED RECONNAISSANCE		7. INITIAL (X) CHARGE	
8. RESPONSIBLE CENTER Project Office		9. SUPPORTS (370 or 390) 10. CONTRACTOR	
10. ITEM NUMBER		11. COMPTN NR	
12. TEST ITEM		13. PRIORITY AND FREQ	
14. TEST DESCRIPTION		15. TEST AGENCY AND SITE	
16. TEST DATE		17. TEST ITEM AVAILABLE	
18. SECURITY		19. NO TEST COMPL DATE	
7 PTV Infrared Subsystem (Bomber Tracking)		2nd PTV Flight Test AFMTC July 1961 Aug. 1961	
8 IR Subsystem Environmental Components		4th STV Flight Test AFMTC Sept. 1961 Oct. 1961	
9 PTV Infrared Subsystem (ICBM Tracking)		3rd PTV Flight Test AFMTC Dec. 1961 Jan. 1962	
10 IR Subsystem Environmental Components		5th STV Flight Test AFMTC Jan. 1962 Feb. 1962	
11 OTV Infra Red Subsystem (Bomber Tracking)		1st OTV Flight Test: GFF * April 1962 **	
* To be determined at a later date. ** For useful life of vehicle and payload.			
20. NAME		TEST CENTER APPROVAL	
21. NAME		ORGANIZATION	
22. NAME		RESPONSIBLE CENTER APPROVAL	
ARDC FORM 1 JUL 55		DATE	

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LOCKHEED AIRCRAFT CORPORATION

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MSD 1536

R & D TEST ANNEX		1. REPORTS CONTROL STATION	
<input type="checkbox"/> SYSTEM	<input checked="" type="checkbox"/> PROJECT	<input type="checkbox"/> TASK	<input type="checkbox"/> OTHER
PAGE 3 3. DATE	4 PAGES		
Subsystem G - INFRARED RECONNAISSANCE		5. INITIAL (EX) 1 March 1962	
7. TEST CENTER	8. PROJECT OFFICER	9. SUPPORTS (Ex or Proj) TO CONTRACTOR	10. CHANNEL
11. TEST ITEM	12. TEST DESCRIPTION	13. CENTER NO	14. PRIORITY AND PREC
13. TEST ITEM	14. TEST DESCRIPTION	15. TEST AGENCY AND SITE	16. TEST ITEM AVAILABLE
15. TEST ITEM	16. TEST AGENCY AND SITE	17. TEST ITEM AVAILABLE	18. SECURITY
17. TEST ITEM	18. TEST AGENCY AND SITE	19. TEST ITEM AVAILABLE	20. R&D TEST COMPL DATE
18. TEST ITEM	19. TEST AGENCY AND SITE	20. R&D TEST COMPL DATE	DATE
19. TEST ITEM	20. R&D TEST COMPL DATE	DATE	DATE
21. NAME	TEST CENTER APPROVAL	ORGANIZATION	DATE
22. NAME	RESPONSIBLE CENTER APPROVAL	ORGANIZATION	DATE
23. FORM 105	PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.		

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R & D TEST AND TEST SUPPORT AIRCRAFT ANNEX

SYSTEM PROJECT TASK OTHER

4. TITLE

Subsystem G - INFRARED RECONNAISSANCE

5. INITIAL
CHANGE

1 March 1956

2. REPORTS CONTROL SYMBOL

PAGE 1 OF 1 PAGES

3. DATE

6. NUMBER

7. ITEM NUMBER	8. AIRCRAFT REQUIRED			9. ABC CODE	10. OO REQ FEE	11. DATE REQ AND LOCATION	12. ESTIMATED RELEASE DATE	13. RECOMMENDED DISPOSITION	14. PHRS P/CST	15. MTY CST
	QTY	TYPE, MODEL AND SERIES	SERIAL NUMBER							
								AIRCRAFT FOR INFRARED RECONNAISSANCE SUBSYSTEM WILL BE SAME AS REQUESTED FOR SUBSYSTEM H - VEHICLE ELECTRONICS		

ARDC FORM 1 JUL 55 106

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R & D MATERIEL ANNEX		1. REPORTS CONTROL SYMBOL		
<input type="checkbox"/> SYSTEM	<input checked="" type="checkbox"/> PROJECT	<input type="checkbox"/> TASK	<input type="checkbox"/> OTHER	
4. TITLE		5. PAGE 1 OF 1 PAGES		
Subsystem G - INFRARED RECONNAISSANCE		6. DATE 1 March 1956		
7. MATERIEL REQUIREMENTS (Indicate from Acquirer Form using Codes, or cite in Examples)		8. INITIAL [X] CHANGE		
		9. NUMBER		
<p>1. Special material required at Eastman Kodak Co., Rochester, N. Y.</p> <p>Test Equipment Aircraft Ground Handling Equipment</p> <p>100,000 1957 GFE 1959</p> <p>2. Special material required at AFMTC</p> <p>Test Equipment</p> <p>50,000 1961</p> <p>3. Special material required at new Test Site to be determined at later date</p> <p>Test Equipment</p> <p>50,000 1962</p>				

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LOCKHEED AIRCRAFT CORPORATION

ARDC 1 FORM JUL 15 107

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SYSTEM A - INTEGRATED RECOMMENDATION

**Rochester New York, Airport
(Eastman Kodak Facilities)**

ITEM: AUTH#

Alternate Launching Site*
USING AGENCY: Lockheed and Eastman

DATE 1 March 1956

LOCATION: Rochester, New York

BUDGET CONTROL FESTIVAL

NEED DATE: This facility currently exists

SCHWABE

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DESCRIPTION AND USES OF AEROM

REMARKS

Specialized equipment will be needed. Facilities for handling and loading one B-50 aircraft at Rochester, N. Y. are required. This aircraft will be bailed equipment operated by Lockheed crews.

* Complete description of these facilities is given in Tab 6 of Subsystem L - Vehicle Ground Support.

Revised Form 108

G - Tab 6, p. 1

LOCKHEED AIRCRAFT CORPORATION

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Tab 7

R & D Contract Funds

Subsystem G - Infrared Reconnaissance

G-Tab 7, p 1

MISSILE SYSTEMS DIVISION

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LOCKHEED AIRCRAFT CORPORATION

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NSD-1536

Subsystem G. ~~STRUCTURED REPORTS ISSUES~~
Tab 7. R & D Contract Funds (in thousands of dollars)

	77-57	77-58	77-59	77-60
1.	1	2	1	1
2.	5	5	5	5
3.	6	6	6	6
4.	7	7	7	7
5.	8	8	8	8
6.	9	9	9	9
7.	10	10	10	10
8.	11	11	11	11
9.	12	12	12	12
10.	13	13	13	13
11.	14	14	14	14
12.	15	15	15	15
13.	16	16	16	16
14.	17	17	17	17
15.	18	18	18	18
16.	19	19	19	19
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255.	258	258	258	258
256.	259	259	259	259
257.	260	260	260	260
258.	261	261	261	261
259.	262	262	262	262
260.	263	263	263	263
261.</				

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Subsystem G. INFRARED RECONNAISSANCE
 Tab 7. R & D Contract Funds (in thousands of dollars) (Cont'd.)

	77 60	77 61	77 62	77 63	
LAC	15	16	17	18	Total
(1) Research and Engineering	24	24	24	24	24
EASTMAN KODAK	303	288	198	168	172
G33	834	219	289	308	212
Sub Total	463	511	497	509	370
Sub Total	463	511	497	509	370
Total	463	511	497	509	370
Total, Fiscal Year	1297	2161	1528	1033	919
Difference in 1971 and 1970					

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MISSILE SYSTEMS DIVISION

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Tab 8

Estimate of Manpower Requirements

Subsystem G - Infrared Reconnaissance

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MISSILE SYSTEMS DIVISION

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LOCKHEED AIRCRAFT CORPORATION

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Subsystem G. INVESTED PERFORMANCE
Tab 6. Estimate of Resource Requirements

WORK ITEM	Type of Resource	QUARTERS											
		1	2	3	4	5	6	7	8	9	10	11	12
GAC Research and Development	1-2-3-4	2	2	2	2	2	2	2	2	1	1	1	1
GAC Scientific and Technical	1	2	3	4	5	6	7	8	8	8	9	9	10
GAC Production Support	2	4	6	8	10	12	14	16	16	16	18	18	18
GAC Manufacturing	4	1	1	1	1	1	1	1	1	1	1	1	1
Sub-Total		7	20	33	46	59	72	85	85	85	98	98	98
GAC Scientific and Tech	1	2	4	4	4	4	4	4	4	4	6	6	6
GAC Engineering Support	2	1	3	3	3	3	3	3	3	3	0	0	0
GAC Shop and Production	4	0	0	5	5	5	5	5	5	5	0	0	0
GAC Technical Field Services	1	0	0	1	1	1	1	1	1	1	2	2	2
Sub-Total		2	9	15	15	15	15	15	15	15	17	17	17
TOTAL		15	21	39	53	66	79	91	91	91	106	106	106
SUMMARY													
106 Type 1. Scientific & Technical													
101 Type 2. Engineering Support													
101 Type 3. Management & Administration													

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Subsystem 6. INSTRUMENT REQUIREMENTS
 Tab 6. Estimate of Resource Requirements (Cont'd.)

WORK ITEM	Type of Resource	QUARTERS												MAN HOURS
		15	16	17	18	19	20	21	22	23	24	25	26	
I. Research and Development	1-2.10	5	2	5	5	3	2	2	2	2	2	2	2	78
II. Manufacturing and Assembly	1	10	10	10	11	11	11	11	11	11	11	11	11	240
III. Engineering Support	2	30	30	30	30	30	30	30	30	30	30	30	30	480
IV. Manufacturing	4	12	17	21	23	23	23	23	23	23	23	23	23	244
V. Total		42	47	53	53	53	53	53	53	53	53	53	53	954
VI. Maintenance and Reliability	1	6	6	6	6	6	6	6	6	6	6	6	6	113
VII. Engineering Support	2	9	9	9	9	9	9	9	9	9	9	9	9	124
VIII. Parts and Production	4	26	29	32	32	32	32	32	32	32	32	32	32	528
IX. Technical Data Services	1	2	2	2	2	2	2	2	2	2	2	2	2	35
X. Sub-Total		51	46	50	50	50	50	50	50	50	50	50	50	1639
XI. Average		55	50	55	55	55	55	55	55	55	55	55	55	1639
XII. Data 200-1. Scientific & Technical														
XIII. Data 2. Purchasing Support														
XIV. Data 3. Management & Administration														

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MISSILE SYSTEMS DIVISION

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