1. Origin

The Discoverer series of satellite launchings involves the covert development and operational use of short-lived photographic reconnaissance (CORONA) and mapping (ARGON) satellites from which a recoverable capsule will be retrieved at a pre-selected ocean area. Prior to its initiation the development of such a system was started by the Air Force as a part of Weapons System 117L. This phase was cancelled in February 1958; and, Discoverer became the covert continuation, with a few modifications of a program already undertaken.

2. Management

Overall management of the project is shared by CIA (DD/S) with originally ARPA and now Dr. Purkt's office and with the support and full participation of the U.S. Air Force. Detailed supervision of Lockheed, the system manager, is performed by the Air Force Ballistic Missile Division, which is also responsible for the provision of ground facilities. CIA takes the lead in contracting for and in monitoring through LMSD the development of the photo payloads and CIA controls the security of the program.

3. Cover

In the early part of the 117L program (September 1958), the Thor-boosted portion of the project was redesignated as a separate Research and Development effort leading to the development of operational systems such as SENTRY (later SAMOS), MIDAS, TRANSIT ETC. The spin stabilized version of the Sentry reconnaissance system programmed for the Thor shots was also cancelled at that time and the DOD Discoverer series created as a space test program for future military systems. In reality, the CORONA and

ARGON program plus a very limited number of purely cover payloads make up the Discoverer Series which is ostensibly engaged in the following activities:

a. Perfecting of a re-entry system to recover a satellite from orbit.

b. Testing of components of future operational space programs (SAMOS, MIDAS, TRANSIT).

c. Testing and improving telemetry and tracking systems.

d. Experimenting with bio-medical specimens in space as related to development of techniques for man in space programs.

e. Collecting data relative to temperature and radiation in space as well as the effects of the space environment upon missile and satellite components.

f. Studying behavior and characteristics of a satellite in orbit.

Through the use of cover shots and small telemetry packages in the various reconnaissance shots as well as ground observation of the satellites in orbit, the activities mentioned above continue to ostensibly produce limited scientific data which is exploited and rationalized as the true and exclusive purpose of the Discoverer Series. Of the remaining, presently programmed, CORONA and ARGON launches, there are two purely cover shots; one bio-medical and one instrument package which will be inserted into the program at the time re-entry is perfected and a hostile press make it necessary to produce concrete results of test objectives to back up the research story.

4. Experience to date

The Discoverer series consists of twenty nine vehicles of which twenty are photo reconnaissance, four are mapping and the balance are for cover purposes. As of 17 April there had been eleven launches and one short of

yet. Seven of the launches achieved orbit, but none had been recovered. There had been eight camera launches. One of these, the last, operated according to specifications. Of the rest three failed of orbit and in the other four, malfunctions occurred.

5. Description of System

The Vehicle

The vehicle is a two-stage rocket consisting of a THOR first stage and the AGENA second stage. By June of 1960 this system should provide a four day polar orbit.

CORONA and ARGON Cameras

The CORONA camera is a modified KH4C-1 with 70 mm film. Focal length is 24 inches. By June 1960 it is expected that 7000 feet of film (40 lbs.) can be carried for a two-day operation at a planned altitude of 120 miles and a vehicle speed of 17,000 feet per second.

The resultant scale of the photography is about 1:300,000. Expected ground resolution is 25 feet. A swath of approximately 150 X 1200 N miles should be covered in each pass or about 270,000 square N. Miles. This is a programed 1,350,000 square N. Miles per day.

The ARGON camera is a mapping type with 3 inch focal length and 5 inch film. The resultant scale of the topography is approximately 1:4,000,000. Camera format size is 4½" X 4½" and covers a ground area of approximately 850 X 250 N. Miles. Expected ground resolution is approximately 333 feet. Maximum film load is 4000 feet (40 lbs.). This is sufficient film for four days operation to obtain complete mapping coverage of the earth's land mass with primary emphasis on USSR.

Recovery

The recovery system consists of separation of the reentry nose cone over Alaska followed by retro rocket propelled reentry into the atmosphere and with parachute deployment at 30,000 feet with the nominal impact area approximately 850 miles south of Honolulu. Recovery is to be effected by air snatch by C 119 s hooked up by sonfone ships in an area from just East of Johnson Island to about 350 miles East of the nominal impact point.

6. Comparison with LITL Reentry System (Photo Reconnaissance System X of SAMOS)

The following are the main differences as presently planned between the photo reconnaissance systems in Discoverer and in SAMOS:

(a) SAMOS will carry longer focal length cameras and with its growth potential may obtain better ground resolution.

(b) SAMOS will provide in flight processing and automatic readout on all flights except R-5 which is a recoverable unit.

(c) Since SAMOS will be boosted by an Atlas rather than a Thor, the cameras will be on orbit for longer periods e.g. 30 days. The first recoverable SAMOS photo payload is not planned until August of 1961.

Problems Encountered

The main problems requiring solution have been those of obtaining most effective orbit, successful camera operation and successful recovery. The first appears solved. Continuing camera difficulties have centered around the stresses encountered in ascent and the extreme environmental conditions on orbit. These are difficult to simulate in the laboratory and have brought

check film scoring and camera jamming. Initiatives A & B have eliminated many of the possible causes of camera and/or film failure and confidence in successful camera operations is increasing. Recovery problems (rocket-motor failures, battery failures, loss of visibility) have also had intensive analysis and we are in the verge of successful recovery. The experience gained to date has been valuable to other programs.

7. Program Cost

The Department of Defense has provided the vehicles, ground and recovery facilities and the cover payloads. The direct costs of the vehicles came to about [redacted] each.

CIA has procured the photographic payloads and the mono scan modifications. Program costs supporting CIA's effort are as follows:

CORONA

Costs through 31 December 1959	[redacted]
Estimate to complete	
Estimated total price	

ARGON

Costs through 31 December 1959	[redacted]
Estimate to complete	
Estimated total price	

ARGON is funded in its entirety by the Department of Defense. Of the total cost of CORONA CIA has contributed [redacted]

8. Future Program

A. Through FY 1962

An extension of the CORONA program is planned for the spring and summer of 1961. This will consist of several photo reconnaissance vehicles and probably one or more mapping payloads.

[redacted]

b. FY 1962-1970

An intelligence requirement will exist during the balance of the decade for satellite photo-reconnaissance of denied areas with ground resolution of 25 feet or better. This conclusion is based on the following assumptions:

(1) Lacking an international arms agreement there will be a continuing need for photo-intelligence of Soviet Bloc arms development; or

(2) With such an agreement at some point in the decade there will be a need of photo intelligence for inspection purposes.

(3) Although manned lower altitude flights, carrying equipment giving better photography, may be carried out, there will be an additional need for gross coverage from satellite photography to fill in the time and area gaps of the more sophisticated coverage and to point to areas deserving of closer scrutiny by such systems.

The conclusion stated at the outset seems therefore justified. However, the extent to which reconnaissance satellites must be flown covertly is by no means clear. It is reasonable to expect that our reluctance to orbit cameras openly over denied areas would disappear at once with positive free world support for such action, or in the event of a Soviet attempt to do so, or with a requirement for this kind of "inspection" in support of an arms agreement, and that one or another of these events is likely to occur. Since the weight of the evidence appears to support this view, it is assumed for the purpose of this study that CIA will not be engaged in satellite reconnaissance beyond CY 1961.