27 September 1962

(TS) SUMMARY OF SATELLITE RECONNAISSANCE PROGRAM

1. CORONA-M - 162

The CORONA-M project is an extended version of the CORONA effort, consisting of two CORONA 24" focal length f3.5 panoramic cameras mounted at a 30° convergent angle for stereo. Capacity of each camera is 7800 feet of 70 mm thin-base film, covering 4.5 million square miles per flight. In addition, a 1.5" focal length framing camera and 85 mm Stellar camera is included, to enhance the use of the panoramic photography. The system utilizes the THOR/Agena vehicle and the recovery method is the same as previously used in the single-camera CORONA flights.

The first CORONA-M flight launched in February 1962 resulted in a satisfactory mission and subsequent operation has confirmed the high qualities and dependability of this configuration. To date, there have been 12 launches - ten of which have resulted in the successful recovery of the payload.

Since 15 June 1962, seven launches have been accomplished and all have been successful.

Mission 9037 was launched on 22 June and was recovered after 50 orbits with no malfunction. 9038, the first using an Agena D,

was launched on 28 June and recovered after 63 orbits, but the framing camera did not operate. 9039, launched on 20 July, was recovered after 2 days because of a programmer failure. The frame camera again failed and there was fogged film. 9040, launched on 27 July was recovered after 4 days. The frame camera failed. 9041 launched on 1 August, and recovered on schedule, showed fogging of the frame camera film. 9042 was launched on 29 August and again the frame camera failed. The frame camera failures have resulted from shutter malfunctions due primarily to the shutter design. The new Frame/Stellar camera has been redesigned and will be in all future missions. 9043 was launched on 18 September and due to velocity meter malfunction had an orbit that was higher than normal (362 nm). Apogee was in the [redacted]

In addition to the 7 CORONA-M vehicles presently scheduled for flight (see schedule on last page) 8 CORONA-J vehicles are scheduled for next year. The CORONA-J is a CORONA system modified to have two complete recovery systems. These will provide double the present

capacity and will result in a 7-day active life. A total of 30 days can elapse (130 nm perigee decaying to a minimum of 80 nm) between launch and recovery of the second capsule. The first operation will be for 4 days. Subsequent to the first recovery the orbiting vehicle will be spun up and infrequent TLM readings will be taken to determine status. Ephemeris will be maintained by SPADATS. The second operation will be for 3 days with the same recovery procedures for recovery of the second operation. The problems are to provide heat to the IRP and restabilization. The first CORONA-J/TAT system is planned May 1963, with a total of 8 scheduled for CY 63. CORONA-M will be interchangeable with CORONA-J.

2. LANYARD

This project was initiated in May 1962, in order to obtain photography at an early date with resolution between [redacted] and CORONA-M. The system consists of a greatly simplified version of the discontinued 101B (E-5) project, using the same 66" focal length optical system and some of the camera hardware already produced. The recovery system is the same as that used for CORONA-M. The launch vehicle is a THOR/Agena, with the THOR augmented by three XM-33 solid rocket

boosters which will be dropped at about 60 seconds after launch. The vehicle will have a 4-day life and should produce photography with a ground resolution of from 4.5 to 5.5 feet at altitudes of 110-130 nm.

The 5 LANYARD payloads will be interchangeable with the additional CORONA-M and ARGON payloads which are available, affording considerable flexibility.

3. ARGON

ARGON is a photographic project for geodetic and mapping purposes. It consists of a 3" focal length frame-type terrain camera of high geometric fidelity, supplemented by a 3" focal length stellar camera, both recording images on a single roll of 5" film. The terrain camera capacity is 6000 photographs (225 x 225 nm format) covering 166 million square miles in a 4-day mission. Stereo is provided by overlap in the photographs. Expected positional accuracy obtainable from this photography (alone) is 750 feet, and expected contour accuracy is 1500 feet. The same basic THOR/Agena vehicle and recovery system is used for ARGON as for CORONA.

After 4 previous unsuccessful attempts, the May 1962 ARGON flight was successful. Results were useful but not as good as expected

due to incorrect stellar exposure, and due to a terrain camera shutter malfunction during the latter part of the flight.

Mission 9042 was launched on 1 August 1962, and performed successfully. However the capsule was lost when the parachute seperated from the capsule during the aircraft snatch operation.

Two ARGON missions are scheduled for October, but some doubt exists as to whether the second one, presently scheduled for 28 October, will be launched before spring as sun angle and snow coverage in the target areas reduce the value of such film taken that late in the year.

4. 722 (898BJ-201/E-6)

Project 722 is a photographic area coverage system designed for 8-10 feet resolution. The sensor consists of two 36" focal length f/4 panoramic cameras with a 23.4 degree stereo angle. Development was initiated in October 1960. The system will obtain 14,000,000 square nautical miles of coverage during a 5-day mission of which 9,000,000 square nautical miles will be non-redundant.

Four flights have been made with this system. While these flights did not result in obtaining record, they were extremely valuable in obtaining data relating to the design, development and operation of the system.

The first flight, on 26 April 1962, was described in the June report, but is included in the attached summary chart.

The second test vehicle was launched on 17 June 1962. The vehicle experienced a high control gas consumption rate caused by a constant pitching and yawing force apparently resulting from a leak in the Agena fuel system. As a result of the high gas rate, a decision to attempt to recover the vehicle on the 10th orbit (a night, south-to-north pass near Hawaii). The de-boost velocity was low due to Agena fuel depletion caused by the leak and the vehicle impacted 600 miles long. The re-entry vehicle did not separate from the mid-section because of a short in the separation squib circuit. Both cameras apparently operated properly, although there was an indication that B camera failed after transporting 2600 feet of film. Analysis indicates that this was probably a telemetry monitor point failure rather than a camera failure.

The third flight test vehicle was launched on 18 July. The secondary propulsion system did not fire prior to Agena burn during injection. Orbital operations were nominal except that A camera failed after transporting 2600 feet of film. When de-boost was attempted, the Agena ullage rocket again failed to fire and since the remaining Agena

fuel was not properly positioned in the tanks after having been in a zero-G environment, the Agena engine did not fire.

The fourth flight test vehicle was launched on 5 August. The vehicle operated properly throughout the launch, injection and orbital phases of the mission. The A camera film transport was inoperative during the entire mission. This was most probably due to a spurious command during pre-launch activities. B camera failed after transporting 1620 feet of film. The de-boost and separation sequences were performed as programmed. The parachute did not open, and the recovery vehicle was destroyed on impact. This failure was most probably caused by wake heating entering the access holes in the aft end of the vehicle. The recovery vehicle is being subjected to considerable testing and modification to prevent a recurrence of this failure prior to the next flight. The access holes are being closed or baffled, wires are being re-routed and the thermal protection compound on the aft end has been changed.

As may be noted, from the above, each problem with the exception of film transport has been corrected and has not occurred a second time. Extensive minor redesign and modification of the film transport system and changes in the test procedures promise better performance in this area on subsequent flights.

Significant changes since the June report are:

a. The program launch rate has been decreased as shown on the schedule chart.

b. A decision has been reached with regard to recovery methods. Air snatch of the recovery vehicle has been determined to be feasible and will become the primary recovery mode at an early date.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

9. **POPPY**

Project POPPY is an electronic signal collection effort which is providing ELINT information through the use of an orbiting long-life

signal repeater, reading out [redacted]

in analog form at the ground stations and returned [redacted] for reduction.

[redacted]

The first launch was accomplished in 22 June 1960, and operated until 28 September 1960. This mission covered the S-band and provided the confirmation of known sites [redacted]

[redacted]

There have been three other attempts to launch POPPY devices, one in 1960 and two in 1962. All of these failed to orbit due to booster failure. Although original planning provided for two more launches using SCOUT vehicles during 1962, steps have been taken to provide a launch of [redacted] POPPY payload in November, using a THOR/Agena booster, in place of the two SCOUT launches. [redacted]

[redacted]

[redacted]

11. 417 (P-35/698RH)

Project 417 was initiated in August 1961, with the objective of

providing daily cloud cover information of the area of interest in direct support of the forecasting activities which support the satellite reconnaissance program. The 417 space vehicle weighs 100 pounds, and is spin stabilized in a 400-mile orbit. Expected useful life on orbit is 90 - 120 days. Through magnetic tape recording of a video image, vertical cloud cover pictures of about one-mile resolution will be provided to read-out stations at Vandenberg AFB and New Boston, N. H.

The first launch was attempted on 23 May 1962. On that launch the second stage of the BLUE SCOUT vehicle exploded and orbit was not achieved.

The second launch was accomplished 23 August 1962. All booster systems operated normally, and the 417 payload achieved an excellent orbit with apogee of 463 nm and perigee of 340 nm. The progression rate is just over 1° per day. This is well within the nominal required for successful accomplishment of the mission. All satellite sub-systems have been operating satisfactorily since the launch. Attitude re-orientation was completed by the 50th pass and full mission coverage began on pass 51. As of 23 September 1962 (one month after launch), 1411 pictures were received of a total of 1627 which could have been received. This represents a retrieval rate of approximately 90%.

Of the pictures retrieved, fewer than 5% have been unusable -- all others have been incorporated into daily operational forecasts prepared by the Global Weather Central, in direct support of the satellite reconnaissance activities. Present indications are that the satellite can continue to provide useful information through about mid-January 1963. The Global Weather Central has evaluated the picture quality and usefulness of 417 material as being excellent to superior.

The third 417 vehicle will be ready for launch by late October, but it is not planned to make this launch until the payload presently on orbit fails.

The program costs to date, which include buying the first four vehicles and payloads, have been just over [redacted]

[redacted]

[redacted]

[redacted]

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HANDLE VIA [redacted] SYSTEM ONLY

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PROGRAM [redacted] MISSION PERFORMANCE

Mission No.	Atlas		Agena B		Payload Vehicle	Payload Record Transported--Actual vs. Commanded	Recovery Vehicle		C and C	
I	OK	NG	Plume of solid ullage rocket impinged on main nozzle causing deboost failure.		OK	70 %	NA		OK	
II	OK		OK	NG	Damage to circuits or hatch cut disabled separation programmer.	75 %	NA		OK	
III	OK	NG	Electrical failure in SPS led to main engine no-fire on deboost (no ullage)		OK	75 %	NA		OK	
IV	OK		OK		OK	23 %	NG	Recovery failed to activate - probable cause improper circuit protection against main heating.	OK	

NOTES: C&C Covers ground station as well as command system operation.

NG - Prime mission failure.

NA - System not activated.

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LAUNCH SCHEDULE

as of 28 Sep 62

PHOTOGRAPHIC

		1962 O	N	D	1963 J	F	M	A	M	J	J	A	S	O	N	D	1964 J	F	M	A	M	J	J	A	S	O
CORONA M	10-15' resolution general search		/	/	/	/	/	/																		
J	10-15' resolution general search								/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
L	5' resolution specific coverage					/	/	/	/	/	/	/	/													
ARGON	Geodetic coverage 350' resolution	/																								
722 (201)	10' resolution [redacted]	/	/		/	/	/			/	/	/	/		/											

[redacted]

ELECTRONIC

O N D J F M A M J J A S O N D J F M A M J J A S O

[redacted]

WEATHER

		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
417 (P-35)	Weather coverage of area of interest		/			/			/			/			/			/								