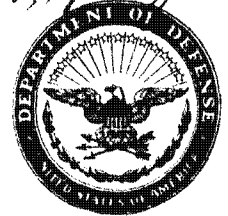


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DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF SPECIAL PROJECTS (OSAF)
AF UNIT POST OFFICE, LOS ANGELES, CALIFORNIA 90045



16 July 1969

REPLY TO
ATTN OF: SP-1

SUBJECT: Quarterly Program Review



to: DNRO (Dr. McLucas)

The attached booklet contains the twenty-first written review of
SAFSP projects, covering the period 1 Apr 1969 through 30 Jun 1969.

for
John L. Martin, Jr. Col USAF
JOHN L. MARTIN, JR
Major General, USAF
Director

1 Atch
Qtry Prog Review (TS- BYE)

Distribution:

Cy 1 - DNRO (Dr. McLucas)

Cy 2 - SAFFM

Cy 3 - SP-2 (Col Norman)

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EXCLUDING INFO RELATING TO PROPAGANDA;
BUT THE SOURCE IS NOT AFRY

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QUARTERLY PROGRAM REVIEW

C O N T E N T S

SECTION

SUBJECT

I Overall General Summary

II Project CORONA

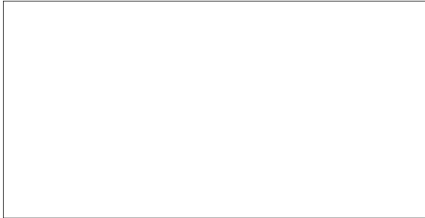
III Project HEXAGON

IV Project GAMBIT

V Project 770

VI Project 989

VII



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VIII

IX

X Common Agena Support

XI Applied Research/Advanced Technology and
Advanced Development

XII



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XIII Cartographic and Geodetic Support

XIV Other Projects:

- 1. Satellite Control Facility
- 2. AF Special Projects Production Facility
- 3. Mission Optimization

XV Procurement

XVI Financial

XVII Administration

EXCLUDED FROM AUTOMATIC REGRADING
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as of 30 Jun 1969

QUARTERLY PROGRAM REVIEW

Overall General Summary

Program Director: Maj Gen J. L. Martin, Jr.
 Assistant to the Director: Brig Gen W. G. King, Jr.
 Vice Director: Col L. S. Norman, Jr.

1. Quarterly Summary of Operations

a. Project CORONA flew a single J-1 mission (1051) on 2 May 1969 and both capsules were successfully air-recovered. Results of the mission showed that overall photographic quality was less than that of an average J-1 flight.

b. Project GAMBIT flew two missions and both were successfully air-recovered.

(1) The first mission (4321) was launched on 15 April and flew a ten-day primary and five-day solo mission. Photographic quality surpassed all previous flights.

(2) The second mission (4322) was launched on 3 June and flew a ten-day primary and one-day solo mission. Photographic quality appears to be equal to previous flights.

c. Project SIGINT successfully launched

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P-11 LAMPAN II/SAMPAN III vehicle 4417 on 2 May from Vandenberg AFB.

(2) The P-11 vehicle was launched on host CORONA mission 1051 and is doing general search for ABM emitters in the 1000-4000 megahertz frequency band. It replaces vehicle 4411 which ceased operation in March 1969.

(3) The following vehicles were still operating as of 30 Jun 1969:

<u>Vehicle</u>	<u>Payload</u>	<u>Purpose</u>	<u>Operational Life as of 30 Jun</u>
2734	THRESHER/REAPER/CONVOY	Tech Intel BOB	268 days
4413	VAMPAN I	Gen Search 100-1000 MHz	259 days
4418	TIVOLI II	Tech Intel 50-4020 MHz	103 days
4420	TRIPOS III/SOUSEA II	Gen Search 4000-12000 MHz	375 days

2. Quarterly Summary of Projects Not Yet Operational

a. Project HEXAGON

The HEXAGON master schedule has been revised to support a first launch in Dec 1970. Detailed review of program schedules is under way to revalidate the dates for exchange of hardware between contractors. In response to prior direction to proceed with procurement of HEXAGON On-Orbit Software, a software procurement plan has been submitted and approved. An RFP was issued to qualified proposers on 8 May, with proposals due at SAFSP on 31 Jul.

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3. Key Personnel Changes

a. Retirements

(i) Lt Col G. R. Gray, Operations Officer, SIGINT, retired on 1 Apr 1969.

BYE-16863-69
as of 30 Jun 1969

QUARTERLY PROGRAM REVIEW

Project 989

Program Director: Maj Gen J. L. Martin, Jr.
Project Director: Col D. D. Bradburn1. Overview

a. Flight Vehicle (FV) 4417, LAMPAN II/SAMPAN III, was launched successfully on 1 May 1969. This spacecraft is doing general search for ABM emitters in the 1000-4000 Megahertz (MHz) frequency band. It replaces FV 4411 which ceased operation in March 1969. All portions of the satellite and its payload operated normally until 25 Jun 1969 when the digital clock in the payload failed. A backup timing reference is now being used.

b. FV 4418, TIVOLI II, continues to operate satisfactorily. It is gathering wideband technical intelligence data on ABM emitters in the 50-4020 MHz band.

c. FV 4413, VAMPAN I, passed successfully its design life goal of nine months on 14 June 1969. It does general search for ABM emitters in the 100-1000 MHz band.

d. FV 4420, TRIPOS III/SOUSEA II, passed one year of successful operation on 20 Jun 1969. It does general search for ABM emitters in the 4000-12000 MHz band.

e. FV 4412, TIVOLI I, ceased operation after more than one year of service. It was permanently disabled on 9 May 1969.

f. FV 4411, LAMPAN I/SAMPAN II, ceased useful operation 7 Mar 1969. Attempts to completely and permanently disable it have been unsuccessful. One of the four telemetry links radiates continuously on 237.6 MHz at normal signal strengths.

The partially disabled state of the satellite prevents the Satellite Control Facility from turning off the errant transmitter. No interference with other operating spacecraft has been reported. This transmission from FV 4411 will probably continue until its predicted re-entry on 6 Feb 1970.

2. Program Direction

As of 1 Apr 1969, the approved program was \$22.660 million. WHIG 8786 approved reprogramming [redacted] The total FY 1969 funding is \$22.160 million.

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3. Program Progress

a. One launch, FV 4417, was scheduled and successfully accomplished this quarter.

b. The schedule for the next five mission is:

<u>Flight Vehicle No.</u>	<u>Payload</u>	<u>Date</u>	<u>Host Program</u>
4419	SAVANT II	3 Sep 1969	CORONA
4407	WESTON	17 Sep 1969	POPPY 2706
4421	MODIFIED TRIPOS/SOUSEA	Mar 1970	CORONA
4422	TIVOLI III	May 1970	CORONA
4423	TOPHAT I	Jul 1970	CORONA

4. Technical Status

a. FV 4417 was successfully launched on 1 May 1969 into an orbit of 252 nautical miles (nm) by 222 nm. The planned orbit had been 265 nm circular. Mission performance was not seriously affected by the lower altitude orbit. FV 4417's attained orbit results in a predicted re-entry of the spacecraft on 6 Feb 1970. The lower energy orbit resulted from a misoriented spin axis of the satellite which was in effect when its orbit adjust motors were fired. The improper orientation of the spin axis has been traced to poor separation of the satellite from its launcher. The different spin axis orientation will have negligible effect on mission data quality except for several days every other

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month. On these days, target emitters near 65 degrees north latitude cannot be located accurately. Failure of the digital clock in the payload on 25 Jun 1969 destroyed the principal time reference carried by the satellite. Timing information is essential in processing payload data to determine emitter location. A less accurate timing device must now be used, and emitter location accuracy will be degraded. The added uncertainty in emitter location is expected to be less than [] Normal accuracies for this payload range from [] for targets passing directly underneath the satellite's path [] for targets located up to 400 nm to the side of the satellite's ground track.

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b. FV 4418 had a failure in one of nine local oscillators in the frequency selection section of its payload. This loss is permanent and the payload cannot be turned to approximately 13% of the frequencies in the 50-4020 MHz band covered by its receiver. All except one of the known ABM emitters of high interest lie within the remaining capability of the payload.

c. FV 4413 had problems with one of its two tape recorders since mid-June. The recorder failed to read out data approximately 50% of the time it was commanded. The first failure occurred after the recorder had operated successfully 25% more than the number of read in/read out cycles for which it was designed. The major data processing problems were resolved this quarter, and full scale production type processing was initiated. Newly acquired data is being processed at the rate it is being collected. The backlog previously collected will be processed by Sep 1969.

d. FV 4420 had a partial power supply failure of one of its two payloads, SOUSEA, which resulted in the loss of frequency measurement data on emitters collected in the 8000-12000 MHz band. Data is now being processed at the collection rate, and all backlogs have been processed and shipped to the National Security Agency.

e. FV 4411 was not made completely and permanently passive in spite of considerable effort to disable it. The procedure used to disable was the same which had been used successfully on many other spacecraft. The disable procedure involved the depletion of the battery by turning on all possible equipment and commanding the lowest suitable charging rate from the solar arrays. Initially, the current drain greatly exceeded the

BYE-16863-69

severely restricted charging current and the battery voltage decreased exactly as predicted. However, as the battery voltage decreased, some of the power consuming items effectively stopped drawing current. A state of equilibrium has been reached such that the charge current from the solar array is just sufficient to keep the battery at a voltage which will operate one transmitter. This voltage is too low for the command receiver/decoder to operate and accept commands to turn off the transmitter. All future spacecraft will have a positive way to completely disconnect the solar array charging current from the battery.

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DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF SPECIAL PROJECTS (OSAF)
AF UNIT POST OFFICE, LOS ANGELES, CALIFORNIA 90045



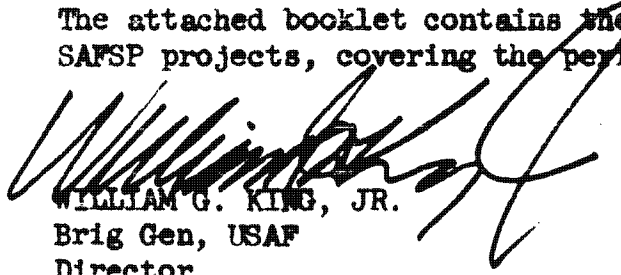
REPLY TO
ATTN OF: SP-1

15 October 1969

SUBJECT: Quarterly Program Review

TO: DNRO (Dr. McLucas)

The attached booklet contains the twenty-second written review of SAFSP projects, covering the period 1 Jul 1969 through 30 Sep 1969.


WILLIAM G. KING, JR.
Brig Gen, USAF
Director

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QUARTERLY PROGRAM REVIEW

C O N T E N T S

<u>SECTION</u>	<u>SUBJECT</u>	
I	Overall General Summary	
II	Project CCRONA	
III	Project HEXAGON	
IV	Project GAMBIT	
V	VIR/Improved GAMBIT	
VI	Project 770	
VII	Project 989	
VIII	[Redacted]	50X1
IX	[Redacted]	
X	[Redacted]	
XI	Applied Research/Advanced Technology and Advanced Development	
XII	[Redacted]	50X1
XIII	Cartographic and Geodetic Support	
XIV	Other Projects: Part I: Satellite Control Facility Part II: AF Special Projects Production Facility Part III: Aerospace Data Facility Part IV: Mission Optimization	
XV	Procurement	
XVI	Financial	
XVII	Administration and Security	

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as of 30 Sep 1969

QUARTERLY PROGRAM REVIEW

Overall General Summary

Program Director:
Vice Director:Brig Gen W. G. King, Jr.
Col R. D. L'Heureux1. Quarterly Summary of Operations

a. Project CORONA flew two missions (1107 launched on 24 Jul and 1052 launched on 22 Sep). Capsule 1107-1 was successfully recovered after impacting in the water, while 1107-2 was air-recovered. Mission 1052 (the last J-1 mission) was successful even though delayed by Agena and Thor equipment problems. Capsule 1052-1 was air-recovered and 1052-2 is planned for recovery on 7 Oct 1969.

b. Project GAMBIT flew one successful mission, 4323, the first of the dual recovery series. It was launched on 23 Aug and flew a fourteen-day primary and one-day solo mission. Both capsules were air-recovered. Photographic quantity of targets covered increased substantially; however, quality was slightly less than obtained on previous missions.

c. Project SUGLET launched two P-11 vehicles and one STRAWMAN successfully during this period.

(1) On 22 Sep, FV4419, SAVANT II, a Soviet missile and spacecraft telemetry collector was placed into a nominal 271 KM orbit.

(2) On 30 Sep, FV4407, WENTON was launched. It collects Soviet It was placed into a satisfactory orbit and all systems are operating properly.

(3) FV2705, STRAWMAN, was launched on 31 Jul and contains the THUNDER, RAMPER, and COWBOY II payloads.

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d. The following vehicles were still operating as of 30 Sep:

<u>Vehicle</u>	<u>Payload</u>	<u>Purpose</u>	<u>Operational Life</u>
4420	TRIPOS/SOUSA	General search for ADM emitters	15 months
4418	TIVOLI	Tech intelligence on ADM emitters & CHICOM telemetry search	6 months
4417	LAMPAN/SAMPAN	General search for ADM emitters	5 months



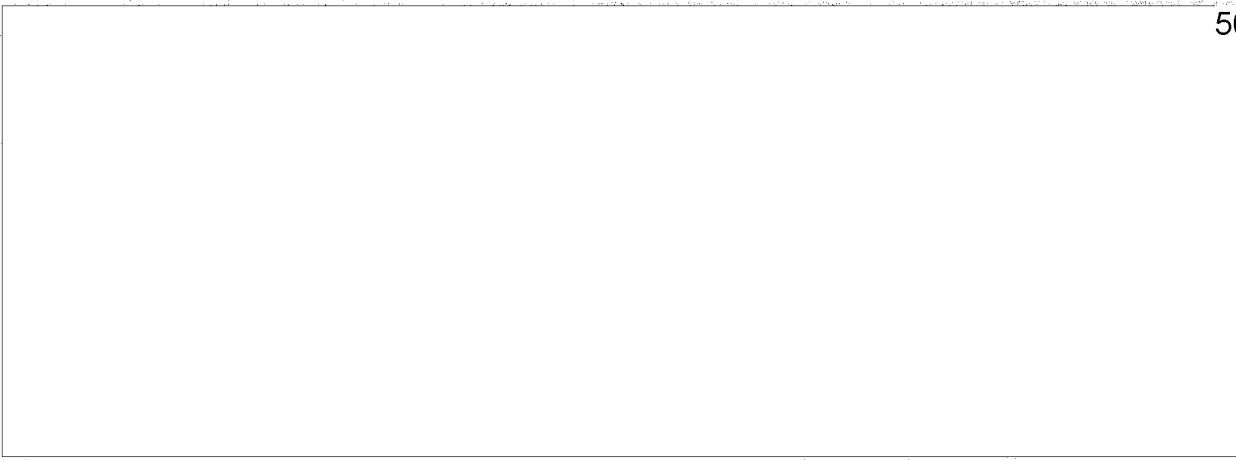
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2734	SIRIUS (THUNDER- HEAFAN, CONVOY I)	Tech intelligence EOB data 125-3300 RF2	12 months
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2. Quarterly Summary of Projects Not Yet Operational

a. Project HEAVEN

During this period, the following tests have been conducted to support a Dec 1970 first launch: vehicle hardware, ASB, test equipment, software, and facilities. A detailed review of the satellite vehicle qualification test program was conducted with the conclusion that the test schedule is tight but workable. Proposals for development of on-orbit software have been received, evaluated, and contract negotiations commenced. An RFP data package is to be released to the contractors by mid-October for follow-on flight vehicles.



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BYE-17000-69
as of 30 Sep 1969~~TOP SECRET~~

QUARTERLY PROGRAM REVIEW

Project 989

Program Director: Brig Gen W. G. King, Jr.
Project Director: Col D. D. Bradburn

1. Overview

a. Two launches were scheduled and successfully accomplished during this quarter.

(1) On 22 Sep 1969, FV 4419, SAVANT II, a Soviet missile and spacecraft telemetry collector, was placed into a nominal 271 nautical mile (NM) orbit. All deployments occurred as programmed and valid intercepts of Soviet telemetry signals have been achieved.

(2) On 30 Sep 1969, FV 4407, Weston, was launched. It collects Soviet [redacted] The spacecraft was placed into a satisfactory orbit and all systems are operating properly. The early payload data available at this time shows intercepts of Soviet [redacted]

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b. Three other spacecraft are in orbit and working satisfactorily. They are:

<u>FV</u>	<u>Payload Name</u>	<u>Purpose</u>	<u>Frequency (MEGAHERTZ)</u>	<u>Months</u>
4420	TRIPOS/SOUSEA	General Search for ABM emitters	4000-8000 and 8000-12000	15
4418	TIVOLI	Technical Intelligence on ABM emitters and CHICOM telemetry search.	50-4020	6
4417	LAMPAN/SAMPAN	General Search ABM emitters	1000-2100 2100-4000	5

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BYE-17000-69

c. FV 4413, VAMPAN, a general search payload for ABM associated emitters in the 100-1000 magahertz band, reentered the atmosphere and burned up on 27 Sep 1969. This spacecraft had operated successfully for over one year and was capable of full operation at reentry.

2. Program Direction

The FY 1970 initial approved financial program was established at \$20.400 million by BYE-12932-69. WHIG 9191 increased the approval by \$1.65 million. The current FY 1970 approved program is now \$21.565 million.

3. Schedule

a. The schedule for the next four launches is:

<u>FV</u>	<u>Name</u>	<u>Purpose</u>	<u>Frequency (MEGAHERTZ)</u>	<u>Launch Date</u>	<u>Host</u>
4421	TRIPOS/SOUSEA	General Search for ABM emitters	4000-8000 8000-12000	Feb 70	CORONA
4422	TIVOLI	Technical In- telligence on ABM emitters and CHICOM telemetry search.	50-4020	May 70	CORONA
4423	TOPHAT	Map and copy tropospheric scatter communi- cations	450-1000		CORONA
4427	ARROYO	Mapping of micro- wave communi- cations sites	1200-2200	Mar 71	CORONA

b. Minor changes in the schedule have occurred in the past quarter to be consistent with the launch schedule of the host program.

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4. Technical Status:

- a. FV 4407 was launched 30 Sep 1969 on the 2706 Poppy booster. The orbit achieved is approximately 266 nm by 236 nm. Perigee is about 30 nm lower than planned but will not affect the mission life or the quality of data obtained. No anomalies have occurred.
- b. FV 4419 was launched into a near nominal orbit of 271 nm circular on 22 Sep 1969. The desired spin axis orientation was achieved. One of the payload transmitters is slow to warm up, which will cause some loss of payload data returned over that link. To date fourteen read out tapes have been received and examined. One had a partial loss of data, while the other thirteen were of consistently high quality throughout. Valid Soviet telemetry signals have been recognized, intercepted and recovered for detailed analysis by NSA. The evaluation phase was completed 26 Sep 1969, and the spacecraft turned over to the Air Force Satellite Test Center for operational tasking.
- c. FV 4417 continues to operate. The payload digital clock, which had failed previously, returned to full time operation when the spacecraft entered full sunlit orbits and its temperature increased. Since departure from full sun orbits, the digital clock has operated partially. During the time the clock is not operating the substitute method of obtaining timing information from backup spacecraft systems has been implemented. Using the substitute time reference, payload data can be successfully processed. Calibration passes have shown no appreciable decrease in emitter location accuracy.
- d. FV 4418 continues to operate with a failure of one of its nine tuning local oscillators. The warm up time of both wide-band transmitters has gradually increased, with the result that only one full tape recorder can be read out during a tracking station pass despite the fact that sufficient time is normally available to permit up to one and one half recorder readouts.
- e. FV 4413 passed one year of on-orbit operation on 18 Sep 1969. One tape recorder failed to operate intermittently but improved in performance since the last report. The recorder responded perfectly the last several weeks of life which ended on 27 Sep. Data is now being processed by the contractor faster than it is being collected. Only a modest backlog of unprocessed data exists from the first one hundred days of flight and the last three weeks of operation.

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f. FV 4420 continues to operate with the only anomaly being the failure of SOUSEA (8000-12000 megahertz) payload to return the frequency measurement on collected emitters. A small backlog of data accumulated during the quarter while the computer software was modified to permit faster data processing. All data processing will again be current by the end of Oct 1969.

g. FV 4411 has not yet become entirely passive. It radiates continuously on one of its four telemetry links at 237.8 megahertz. This signal has not interfered with other spacecraft's transmissions, and attempts to make it cease transmitting have been abandoned. The spacecraft is due to reenter in Jan 1970. Spacecraft launched after Aug 1969 have been modified to permit the solar arrays to be disconnected from the battery to prevent recurrence of this problem. Spacecraft which were launched prior to Aug 1969 will be kept in a silent caretaker status when they are no longer operationally effective.

DEPARTMENT OF THE AIR FORCE
OFFICE OF SPECIAL PROJECTS - OSAP
AF UNIT POST OFFICE LOS ANGELES CALIFORNIA 90045



SP-1

16 January 1970

Quarterly Program Review

DNRO (Dr. McLucas)

The attached booklet contains the twenty-third written review of
SAFSP projects, covering the period 1 Oct 1969 through 31 Dec 1969.

Wm G. King, Jr.
WILLIAM G. KING, JR. *for*
Brig Gen, USAF
Director

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QUARTERLY PROGRAM REVIEW

C O N T E N T S

<u>SECTION</u>	<u>SUBJECT</u>
I	Overall General Summary
II	Project CORONA
III	Project HEXAGON
IV	Project GAMBIT
V	VHR/Improved GAMBIT
VI	Project 770
VII	Project 989
VIII	
IX	
X	
XI	Applied Research/Advanced Technology and Advanced Development
XII	
XIII	Cartographic and Geodetic Support
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XV	Other Projects: Part I : Satellite Control Facility Part II : AF Special Projects Production Facility Part III : Mission Optimization
XVI	Procurement
XVII	Financial
XVIII	Administration and Security

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BYE-16594-70
as of 31 Dec 1969

QUARTERLY PROGRAM REVIEW

Overall General Summary

Program Director: Brig Gen W. G. King, Jr.
Vice Director : Col H. D. L'Heureux

1. Quarterly Summary of Operations

a. Project CORONA flew one mission (1108, launched on 4 Dec 1969) and both capsules were successfully air-recovered on 11 and 24 Dec. Results of this mission showed that the overall photographic quality of the type 3404 film was average for a J-3 mission.

b. Project GAMBIT flew one successful mission (4324, launched on 24 Oct 1969 after a three-day delay caused by AFSCF problems) and both capsules were successfully air-recovered on 31 Oct and 7 Nov.

c. Project SIGINT launched no satellites during the quarter.

d. The following vehicles launched in previous periods were still operating as of 31 Dec 1969:

<u>Vehicle</u>	<u>Payload</u>	<u>Purpose</u>	<u>Operational Life</u>
4420	TRIPOS/SOUSEA	General Search for ABM emitters	18 months
4418	TIVOLI II	Technical intelli- gence on ABM emitters and CHICOM telemetry search	9 months
4417	LAMPAN/SAMPAN	General Search for ABM emitters	8 months

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BYE-16594-70

<u>Vehicle</u>	<u>Payload</u>	<u>Purpose</u>	<u>Operational Life</u>
4419	SAVANT	Soviet Type B and Type M telemetry collection	3 months
4407	WESTON	COMINT Sampling	3 months

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2. Quarterly Summary of Projects Not Yet Operational

a. Project HEXAGON

On 11 Dec, General King met with the associated project offices and the major contractors to assess the validity of the current HEXAGON schedule. It was the consensus of the group that the launch date is valid and can be met by vigorous action on the part of all parties. During this period, several key tests were completed, and TRW was selected as the operational software contractor. Assembly of flight hardware and development of operational software is progressing on schedule.

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3. Key Personnel Changes

a. Retirements and Resignations

(1) Lt Col F. L. Wright, Division Chief, CORONA, retired on 1 Oct 1969.

(2) Capt D. P. Burch, Project Officer, , resigned on 15 Nov 1969.

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BYE-16594-70
as of 31 Dec 1969

QUARTERLY PROGRAM REVIEW

Project 989

Program Director: Brig Gen W. G. King, Jr.
Project Director: Col D. D. Bradburn

1. Overview

a. No launches were scheduled this quarter.

b. On-Orbit vehicles. Five spacecraft are in orbit and working satisfactorily. They are:

<u>FV</u>	<u>PAYLOAD NAME</u>	<u>PURPOSE</u>	<u>FREQUENCY (Megahertz)</u>	<u>MONTHS IN ORBIT</u>
4420	TRIPOS/SOUSEA	General Search for ABM emitters	4000-8000 & 8000- 12000	18
4418	TIVOLI II	Technical intelli- gence on ABM emitters and CHICOM telemetry search	50-4020	9
4417	LAMPAN/SAMPAN	General Search for ABM emitters	1000-2100 2100-4000	8
4419	SAVANT	Soviet Type B and Type M telemetry collection	61,66,71,76 163,165,181, 192,241,248	3
4407	WESTON	COMINT Sampling	60-70 360-420	3

c. Vehicles in process. Work on all four approved spacecraft is on schedule.

d. Programmed launches. The schedule for the next four launches is the same as last reported except that FV 4422 has been inter-
changed with FV 4421 per WRO direction.

BYE-16594-70

<u>FV</u>	<u>NAME</u>	<u>PURPOSE</u>	<u>FREQUENCY</u> (Megahertz)	<u>LAUNCH</u> <u>DATE</u>	<u>HOST</u>
4422	TIVOLI	Technical Intelligence on ABM emitters & CHICOM telemetry search	50-4020	Feb 70	CORONA
4421	TRIPOS/SOUSEA	General Search for ABM emitters	4000-8000	May 70	CORONA
4423	TOPHAT	Map and copy tropospheric scatter communications	450-1000	Nov 70	CORONA
4427	ARROYO	Mapping of microwave communications sites	1200-2200 3400-3900	Mar 71	CORONA

2. Program Direction.

a. WAHOO 1348, dated 21 Oct 1969, directed a switch in launch dates between FVs 4421 and 4422.

b. The approved financial program at the beginning of the quarter was \$21.565 million. During the period, WHIG 9714 increased Aerospace by \$.011 million and WHIG 9748 increased MADS funding by \$.543 million. The current approved program is \$22.119 million.

3. Technical Status.

a. On-orbit vehicles

(1) FV 4407 continues to operate with no anomalies.

(2) FV 4419 continues to operate and return valid intercepts of Soviet

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Several problems have been encountered:

(a) There has been a failure of the payload Time Reference Generator (TRG). The function of the TRG is to provide a timing tone to the satellite tape recorder. When payload data is processed, this tone is used to phase-lock a ground tape recorder, thereby removing the effects of tape speed variation in the satellite recorder. Without the TRG, extracting telemetry data is now more difficult. To prevent a recurrence, the TRGs for all future vehicles have been procured from a different vendor and have been built and tested to higher quality and reliability standards.

(b) A failure in Telemetry Antenna Switch has occurred. The purpose of the switch is to select the best of two data link antennas. Though this cannot now be accomplished, the mission has not been degraded. The switch has remained in the "fail safe" position, and operating procedures have been adjusted to compensate for the known antenna patterns.

(c) One of the two data link transmitters has exhibited severe delays in warm up when turned on, and during this period has been almost completely unusable. All of the highest priority data has been switched to the one good transmitter.

(3) FV 4418 continues to operate. Two problems have been encountered:

(a) A tape recorder failure occurred in December. The redundant recorder was immediately switched into the operating position; however, there has been a ten to twenty percent reduction in capability because the redundant recorder had been used to store data when a normally scheduled read-out station was not available.

(b) Both wide-band transmitters are somewhat slow to warm up, which has caused about twelve percent of the collected data to be lost. Since these slow warm up times have been constant, no further degradation in the amount of data lost is expected.

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BYE-16594-70

(4) FV 4417 continues to operate, even though the payload digital clock and timing tones have failed. A substitute method of obtaining timing information from back-up spacecraft systems has been implemented. Using the substitute time reference, payload data can be successfully processed. Calibration passes show that there is no decrease in emitter location accuracy. This spacecraft is predicted to re-enter in Feb 1970.

(5) FV 4420 continues to operate satisfactorily. The SOUSEA payload (8000 - 12000 megahertz) data has no frequency word present. One of the four narrow band transmitters failed during this report period. No switch of the transmitter's data link assignment was made because the prime information transmitted by this link was the previously failed SOUSEA word. This spacecraft is predicted to re-enter in mid-January 1970. In the meantime, data is being processed as tapes are received from the tracking stations.

(6) FV 4411 still cannot be completely silenced, and all attempts to make it cease transmitting have been abandoned. It radiates continuously on one of its four telemetry links at 237.8 megahertz but has not interfered with other spacecraft transmissions. To prevent recurrence of this problem, spacecraft launched after Aug 1969 have been modified to permit the solar arrays to be disconnected from the battery. The vehicle is predicted to re-enter about 6 Jan 1970.

b. Vehicles in process

(1) FV 4422 is in the system level testing cycle and is the first P-989 spacecraft to have the capability to reorient its spin axis after being placed into orbit. Spin axis control is being demonstrated on this vehicle so that any design changes required can be developed for FV 4427 which requires this spin axis capability to perform its mission. Because of the problems experienced in FV 4418 and FV 4419, modifications have been made to the wide band transmitters to alleviate the slow warm-up problems. All flight supporting software provided by the contractor is on schedule.

(2) FV 4421's payload is scheduled for delivery by the end of Jan 1970. The satellite vehicle is in temporary storage, and all data from this spacecraft will be processed by the

TOP SECRET

BYE-16594-70

contractor and furnished to NSA for evaluation and reporting. Data processing software and hardware will be ready for use prior to launch of the spacecraft.

(3) FV 4423 has been completely designed. All satellite vehicle parts and antennas are being manufactured. The payload components are built and it is being assembled.

(4) FV 4427 is being designed.